

FOREWORD

This manual contains repair procedures for the DUTRO.

Applicable models: WU300, 340, 410 series
XZU404, 412, 414, 422, 424, 434 series

The manual is divided into 41 sections with a thumb index for each section at the edge of the pages.

Please note that the publications below have also been prepared as relevant service manuals for the components and systems in this vehicles.

Manual Name	Pub. No.
• DUTRO Electrical Wiring Diagram	S1-YXZE05A-SL
• S05C-B, S05C-TA, S05C-TB Engine Workshop Manual	S5-YS05E06A
• W04D-J Engine Workshop Manual	S5-YW04E06A
• H260 Manual Transmission Workshop Manual	S1-YXZE07A
• H350 Manual Transmission Workshop Manual	S1-YXZE06A
• M150, M153 Manual Transmission Workshop Manual	S1-YXZE08A

CAUTION

This manual does not include all the necessary items about repair and service. This manual is made for the purpose of the use for the persons who have special techniques and certifications. In the cases that non-specialized or uncertified technicians perform repair or service only using this manual or without proper equipment or tool, that may cause severe injury to you or other people around and also cause damage to your customer's vehicle.

In order to prevent dangerous operation and damages to your customer's vehicle, be sure to follow the instruction shown below.

- Must read this manual thoroughly. It is especially important to have a good understanding of all the contents written in the PRECAUTION of "IN" section.
- The service method written in this manual is very effective to perform repair and service. When performing the operations following the procedures using this manual, be sure to use tools specified and recommended. If using non-specified or recommended tools and service method, be sure to confirm safety of the technicians and any possibility of causing personal injury or damage to the customer's vehicle before starting the operation.
- If part replacement is necessary, must replace the part with the same part number or equivalent part. Do not replace it with inferior quality.
- It is important to note that this manual contains various "Cautions" and "Notices" that must be carefully observed in order to reduce the risk of personal injury during service or repair, or the possibility that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that these "Cautions" and "Notices" are not exhaustive, because it is important to warn of all the possible hazardous consequences that might result from failure to follow these instructions.

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HOW TO USE THIS MANUAL

0108R-05

GENERAL INFORMATION

1. GENERAL DESCRIPTION

- (a) This manual is made in accordance with SAE J2008.
- (b) Generally, repair operations can be separated in the following 3 main processes:
 1. Diagnosis
 2. Removing/Installing, Replacing, Disassembling/Reassembling, Checking and Adjusting
 3. Final Inspection
- (c) This manual explains the 1st process of "Diagnosis" (found in the "Diagnostics" section), the 2nd process of "Removing and Installing, Replacing, Disassembling, Installing and Checking, Adjusting", but the 3rd process of "Final Inspection" is omitted.
- (d) The following essential operations are not written in this manual. However, these operations must be performed in actual situations.
 - (1) Operations with a jack or lift
 - (2) Cleaning of a removed part when necessary
 - (3) Visual check

2. INDEX

- (a) An alphabetical INDEX section is provided at the end of the book (4/4) to guide you to the item to be repaired.

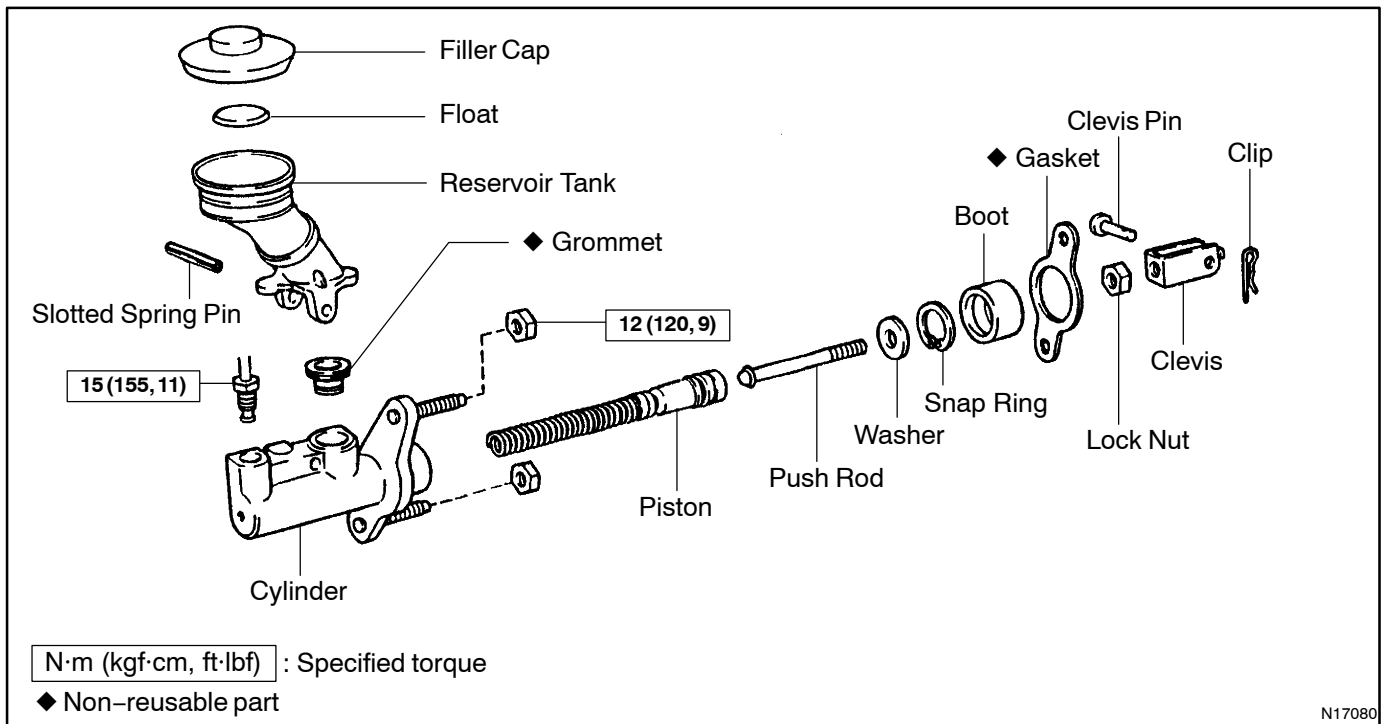
3. PREPARATION

- (a) Use of special service tools (SST) and special service materials (SSM) may be required, depending on the repair situation. Be sure to use SST and SSM when they are required and follow the working procedure properly. A list of SST and SSM is in the Preparation section of this manual.

4. REPAIR PROCEDURES

- (a) Component drawing is placed under the title where necessary.
- (b) Non-reusable parts, grease application area, precoated parts and tightening torque are specified in the components drawing.

Example:



N17080

- (c) Tightening torque, grease application area, and non-reusable parts are described as important points in the procedures.

NOTICE:

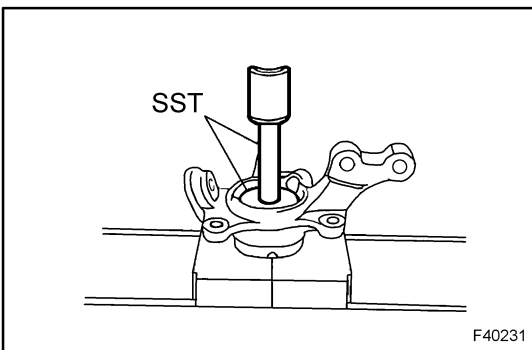
There are cases where such information can only be indicated by an illustration. In those cases, all the information such as torque, oil, etc. are described in the illustration.

- (d) Installing procedures are performed in the reverse order of the removal, and only the important points are described.
- (e) Only items with points are described in the procedure, and the operational portion and content are placed using an illustration. In the explanations, details of the operational method, standard value and notice are placed.
- (f) There may be a case where the illustrations of similar models are used. In that case, specific details may be different from the actual vehicle.
- (g) The procedures are presented in a step-by-step format:
 - (1) The illustration shows what to do and where to do it.
 - (2) The task heading tells what to do.
 - (3) The explanation text tells how to perform the task and gives other information such as specifications and warnings.

Example:

Illustration:

what to do and where



Task heading: what to do

14. INSTALL FRONT AXLE HUB LH BEARING

- (a) Using SST and a press, install a new bearing to the steering knuckle.

SST **09950-60020 (09951-00720), 09950-7001 (09951-07100)**

Set part No

Component part No.

D26745

HINT:

This format provides an experienced technician with a FAST TRACK to the necessary information. The task heading can be read at a glance when necessary, and the text below provides detailed information. Important specifications and warnings always stand out in bold type.

5. SERVICE SPECIFICATIONS

- (a) Specifications are presented in bold type throughout the manual. You never have to leave the procedure to look up your specifications. The specifications are also found in the Service Specifications section for a quick reference.

6. TERMS DEFINITION


CAUTION	Indicates the possibility of injury to you or other people.
NOTICE	Indicates the possibility of damage to the components being repaired.
HINT	Provides additional information to help you to perform the repair efficiently.

7. SI UNIT

- (a) The units given in this manual are primarily expressed according to the SI UNIT (International System of Units), and alternately expressed in the metric system and in the English System.

Example:

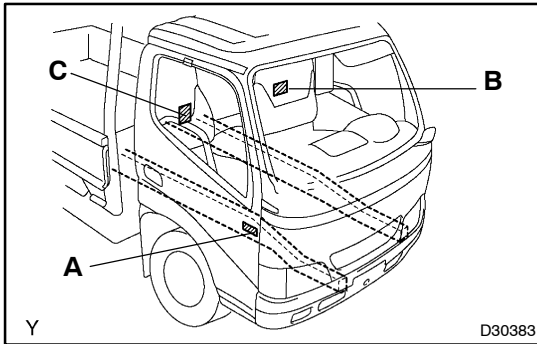
Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)



IDENTIFICATION INFORMATION

VEHICLE IDENTIFICATION AND SERIAL NUMBERS

010CB-03



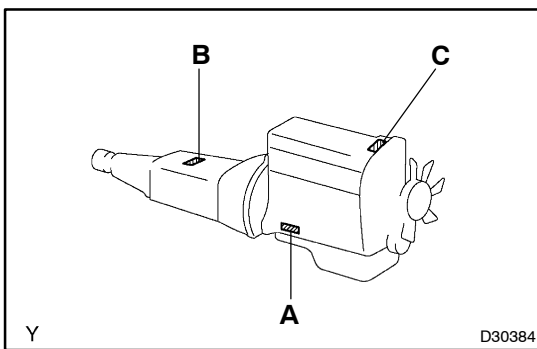
1. VEHICLE IDENTIFICATION NUMBER

- (a) The vehicle identification number is stamped on the right frame, as shown in the illustration. This number has also been stamped on the manufacturer's plate.

A: Vehicle Identification Number

B: Manufacturer's Plate

C: Manufacturer's Plate (Regular cab LHD)



2. ENGINE SERIAL NUMBER AND TRANSMISSION SERIAL NUMBER

- (a) The engine serial number is stamped on the cylinder block of the engine, and the transmission serial number is stamped on the housing, as shown in the illustration.

A: S05C-B, S05C-TA, S05C-TB

B: H260, H350, H351, M150, M153

C: 14B, 15B-FTE, W04D-J

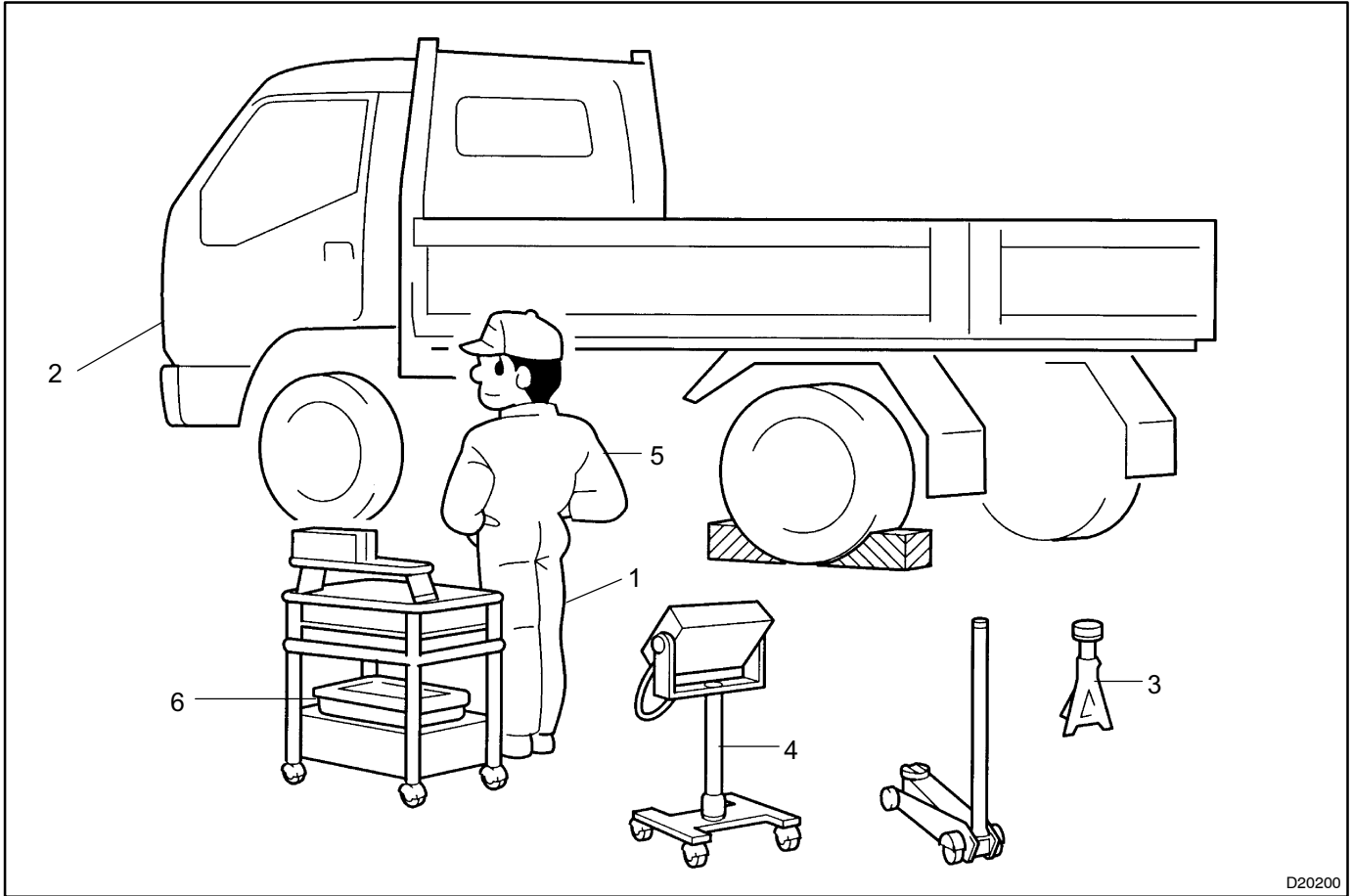
REPAIR INSTRUCTION

010KH-01

PRECAUTION

1. BASIC REPAIR HINT

(a) HINTS ON OPERATIONS

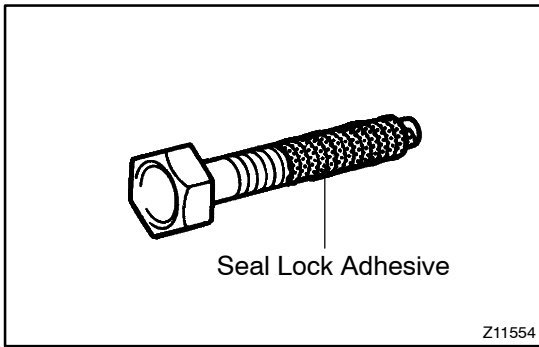


D20200

1	Looks	<ul style="list-style-type: none"> • Always wear a clean uniform. • Hat and safety shoes must be worn.
2	Vehicle protection	<ul style="list-style-type: none"> • Set a grill cover, fender cover, seat cover and floor mat before starting operation.
3	Safe operation	<ul style="list-style-type: none"> • When working with 2 or more persons, be sure to check the safety of one another. • When working with the engine running, pay attention to the ventilation in the workshop. • When working on high-temperature, rotating, moving and vibrating parts, be careful not to burn or injure yourself. • When jacking up the vehicle, be sure to support the specified location with a safety stand. • When lifting up the vehicle, use safety equipment.
4	Preparation of tools and measuring gauge	<ul style="list-style-type: none"> • Before starting repairs, prepare the tool stand, SST, gauge, oil, shop rag and parts for replacement.
5	Removal and installation, disassembly and assembly operations	<ul style="list-style-type: none"> • Diagnose with a thorough understanding of the trouble condition and perform effective operation. • Before removing the parts, check the general condition of the assembly, and for deformation and damage. • When the structure is complicated, take a note or make matchmarks as not to make mistakes that affect the function of the parts. • Clean and wash the removed parts if necessary, and assemble them after a thorough check.
6	Removed parts	<ul style="list-style-type: none"> • Place the removed parts in the correct order to avoid mixing them up or making them dirty. • As for non-reusable parts such as gaskets, O-rings, and self-locking nuts, replace them with new ones following the instructions in this manual. • Organize the parts that were replaced in a box and show them to the customer.

(b) JACKING UP AND SUPPORTING VEHICLE

- (1) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page 01-14).



(c) PRECOATED PARTS

- (1) Precoated parts such as bolts, nuts, etc., are coated with a seal lock adhesive at the factory.
- (2) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.
- (3) When reusing precoated parts, clean off the old adhesive and dry the part with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.

NOTICE:

Check the torque with the lower limit value of the torque tolerance.

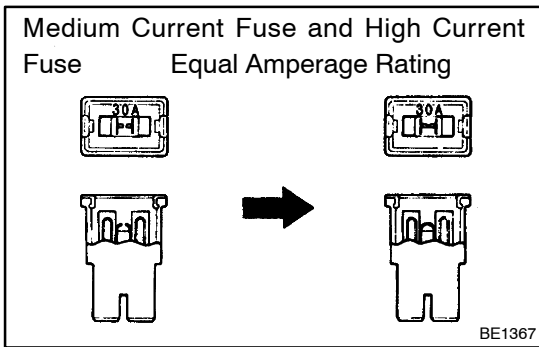
- (4) Depending on the seal lock agent to be applied, there may be cases where it is necessary to leave it for a specified time until it hardens.

(d) GASKETS

- (1) When necessary, use a sealer on gaskets to prevent leaks.

(e) BOLTS, NUTS AND SCREWS

- (1) Carefully observe all the specifications for tightening torques. Always use a torque wrench.



(f) FUSES

- (1) When replacing fuses, be sure that a new fuse has the correct amperage rating. DO NOT exceed the rating, or use one with a lower rating.

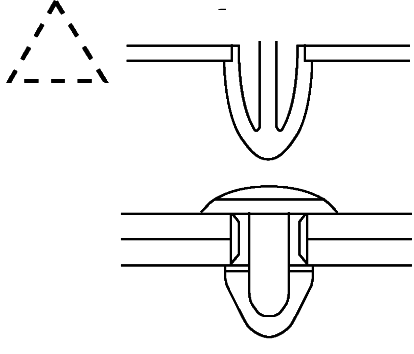
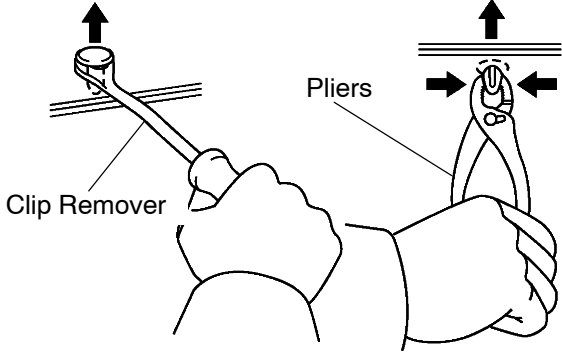
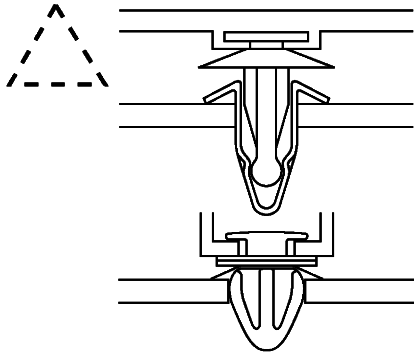
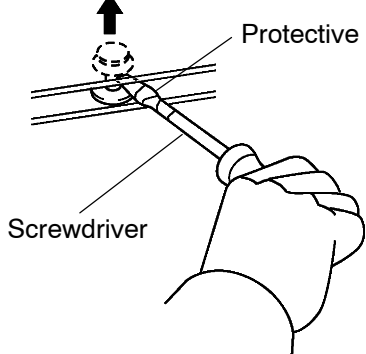
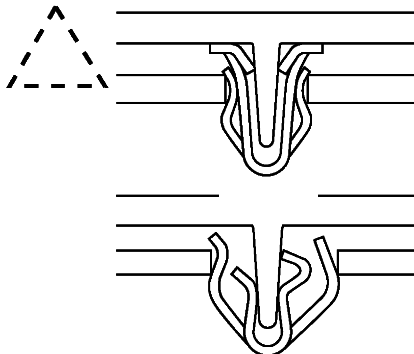
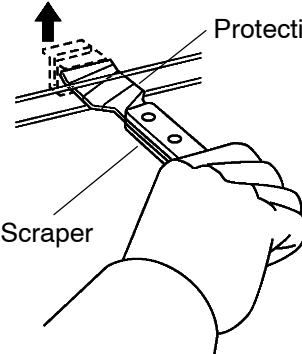
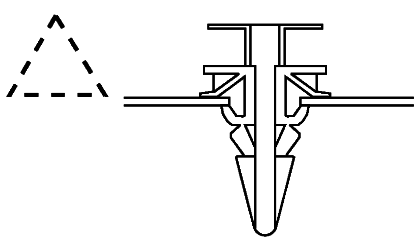
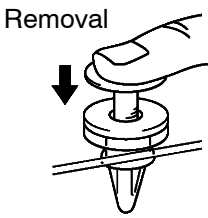
Illustration	Symbol	Part Name	Abbreviation
<p style="text-align: right;">BE5594</p>	<p style="text-align: right;">IN0365</p>	FUSE	FUSE
<p style="text-align: right;">BE5595</p>	<p style="text-align: right;">IN0366</p>	MEDIUM CURRENT FUSE	M-FUSE
<p style="text-align: right;">D27353</p>	<p style="text-align: right;">IN0367</p>	HIGH CURRENT FUSE	H-FUSE

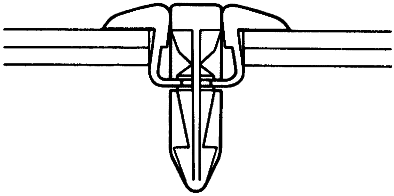
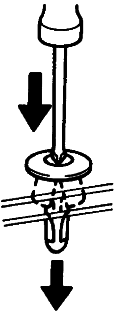
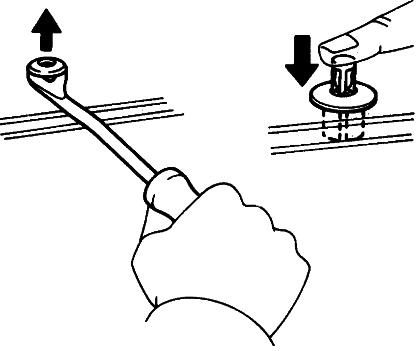
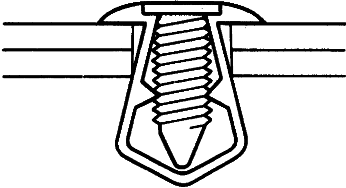
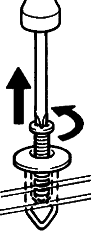
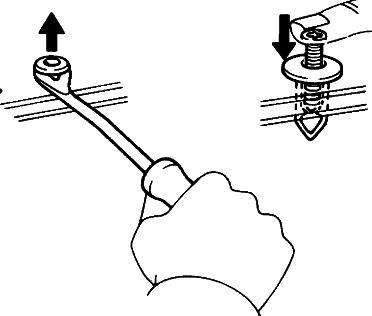
(g) CLIPS

(1) The removal and installation methods of typical clips used in body parts are shown in the table below.

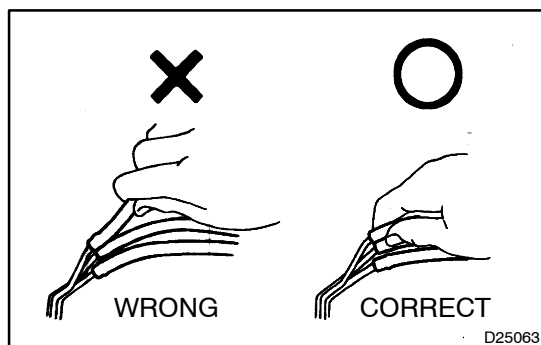
HINT:

If the clip is damaged during a procedure, always replace it with a new clip.

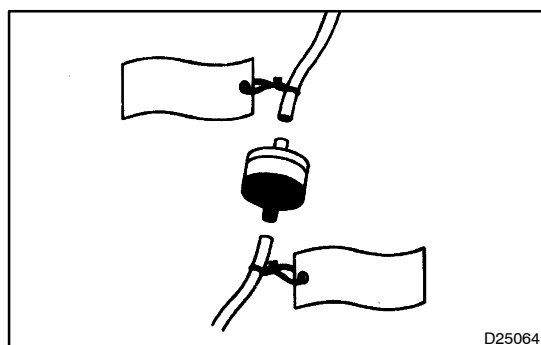
Shape (Example)	Removal/Installation
	 <p>Clip Remover</p> <p>Pliers</p>
	 <p>Protective Tape</p> <p>Screwdriver</p>
	 <p>Protective Tape</p> <p>Scraper</p>
	 <p>Removal</p>

Shape (Example)	Removal/Installation	
	<p>Removal</p> 	<p>Installation</p> 
	<p>Removal</p> 	<p>Installation</p> 

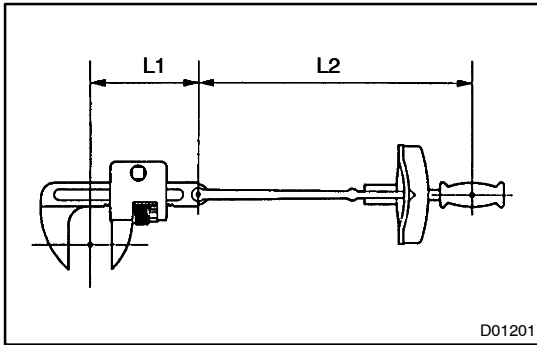
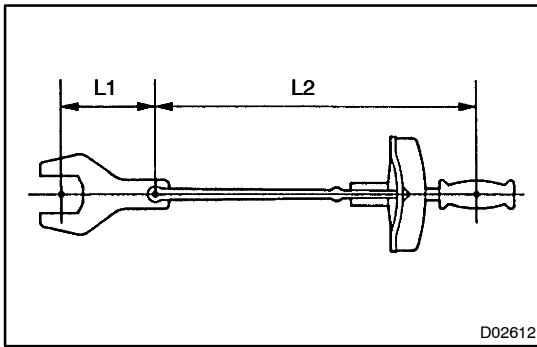
V00012



- (h) REMOVAL AND INSTALLATION OF VACUUM HOSES
- (1) To disconnect vacuum hoses, pull them by holding the end, not the middle of the hose.



- (2) When disconnecting vacuum hoses, use tags to identify where they should be reconnected.
- (3) After completing the job, double check that the vacuum hoses are properly connected. The label under the hood shows the proper layout.
- (4) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter for adjustment. Once the hose has been stretched, it may leak air.



(i) TORQUE WHEN USING TORQUE WRENCH WITH EXTENSION TOOL

- (1) When the torque wrench is combined with SST or an extension tool to extend the length, and you tighten until the torque wrench reads the specified torque value, the actual torque becomes excessive.
- (2) In this manual, only the specified torque is described. In case of using SST or extension tool, calculate the reading of the torque wrench by the following formula.
- (3) Formula $T' = T \times L2 / (L1 + L2)$

T'	Reading of torque wrench {N·m (kgf·cm, ft·lbf)}
T	Torque {N·m (kgf·cm, ft·lbf)}
L1	Length of SST or extension tool (cm)
L2	Length of torque wrench (cm)

2. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

HINT:

The HINO DUTRO equipped with an SRS (Supplemental Restraint System), which includes the driver airbag and seat belt pretensioner.

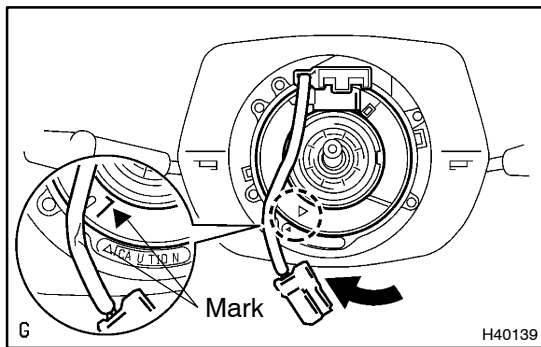
Failure to carry out the service operations in the correct sequence could cause the supplemental restraint system to unexpectedly deploy while servicing. This can cause a serious accident.

Furthermore, if a mistake is made when servicing the supplemental restraint system, it is possible that the SRS will fail to operate when required. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully. Then follow the correct procedures described in this manual.

(a) GENERAL NOTICE

- (1) Malfunction symptoms of the supplemental restraint system are difficult to confirm, so the diagnostic trouble codes become the most important source of information when troubleshooting. When troubleshooting the supplemental restraint system, always check the diagnostic trouble codes before disconnecting the battery (See page 05-216).
- (2) Work must be started after 90 seconds from the time that the ignition switch is turned to the LOCK position and the negative (-) terminal cable is disconnected from the battery.
(The supplemental restraint system is equipped with a back-up power source. So, if work is started within 90 seconds after disconnecting the negative (-) terminal cable from the battery, the SRS may deploy).
When the negative (-) terminal cable is disconnected from the battery, memory of the clock and audio systems is cancelled. So, before starting work, make a record of the contents recorded in each memory system. Then, when work is finished, reset the clock and audio systems as before.
- (3) Even in the case of a minor collision where the SRS does not deploy, the horn button assembly (See page 60-7) and seat belt pretensioner (See page 61-12) should be inspected.
- (4) Never use the SRS related parts from another vehicle. When replacing the parts, replace them with new parts.
- (5) Before repairs, remove the airbag sensor if it may be shocked during repairs.

- (6) Never disassemble and repair the airbag ECU assembly, airbag sensor assembly, horn button assembly or seat belt pretensioner.
- (7) If the airbag ECU assembly, the airbag sensor assembly, the horn button assembly have been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.
- (8) Do not directly expose the airbag ECU assembly, the airbag sensor assembly, the horn button assembly or the seat belt pretensioner to hot air or flames.
- (9) Use a volt/ohmmeter with high impedance (10 k Ω /V minimum) for troubleshooting an electrical circuit.
- (10) Information labels are attached to the SRS components. Follow the instructions on the notices.
- (11) After work on the supplemental restraint system is completed, check the SRS warning light (See page 05-216).



(b) SPIRAL CABLE (in Combination Switch)

- (1) The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may occur. Refer to page 60-15 of this manual concerning the correct installation of the steering wheel.

(c) HORN BUTTON ASSEMBLY (with Airbag)

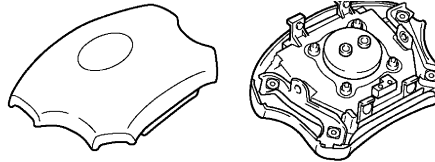
- (1) When removing the horn button assembly or handling a new horn button, it should be placed with the top of the pad surface facing upward. Placing it with the pad surface facing downward may lead to a serious accident if the airbag deploys for some reasons. Also, do not place anything on top of the horn button.
- (2) Never measure the resistance of the airbag squib (This may cause the airbag to inflate, which is very dangerous).
- (3) Grease should not be applied to the horn button assembly, and the pad should not be cleaned with detergents of any kinds.
- (4) Store the horn button assembly where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.
- (5) When using electric welding, disconnect the airbag connector (2 yellow pins) under the steering column near the combination switch connector before starting work.

- (6) When disposing of the vehicle or the horn button assembly unit, the airbag should be deployed using SST before disposal (See page 60-7).
Activate in a safe place away from electrical noise.

Example:

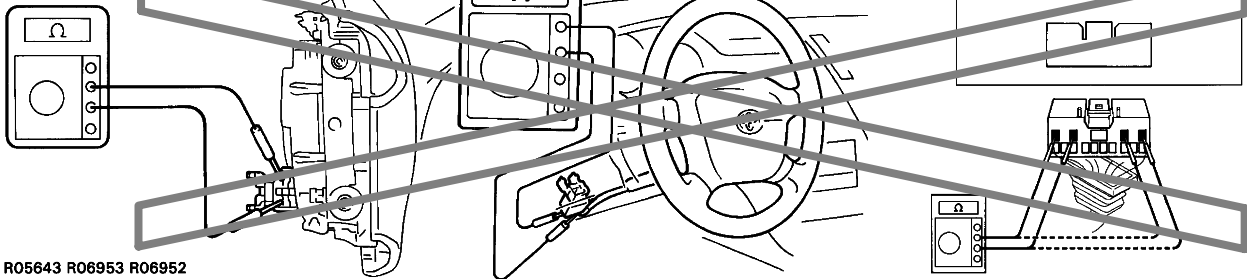
CORRECT

WRONG



N

F43280

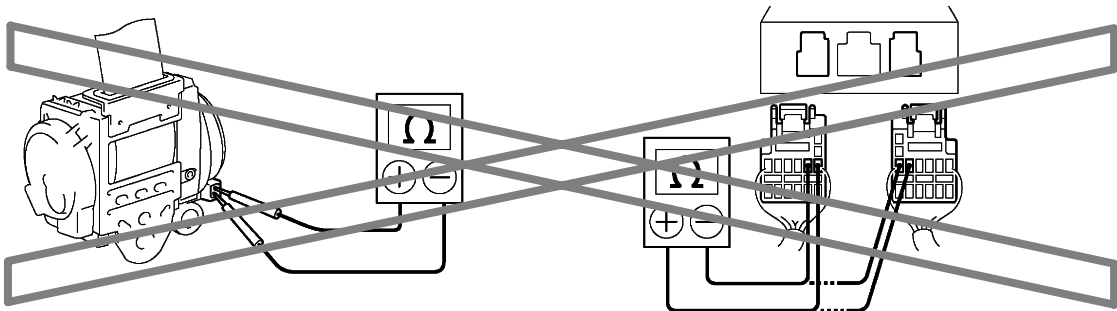
Example:

R05643 R06953 R06952

Z13950

(d) SEAT BELT PRETENSIONER

- (1) Never measure the resistance of the seat belt pretensioner (This may cause the seat belt pretensioner to activate, which is very dangerous).
- (2) Never disassemble the seat belt pretensioner.
- (3) Never install the seat belt pretensioner on another vehicle.
- (4) Store the seat belt pretensioner where the ambient temperature remains below 80°C (176°F) without high humidity and away from electrical noise.
- (5) When using electric welding, disconnect the connector (2 yellow pins) before starting work.
- (6) When disposing of a vehicle or the seat belt pretensioner unit, the seat belt pretensioner should be activated before disposal (See page 61-12). Perform operation in a safe place away from electrical noise.
- (7) The seat belt pretensioner is hot after activated, so let it cool down sufficiently before disposal. Never apply water to cool down the seat belt pretensioner.
- (8) Oil or water should not be put on the front seat outer belt, and the front seat outer belt should not be cleaned with detergents of any kind.

Example:

Y

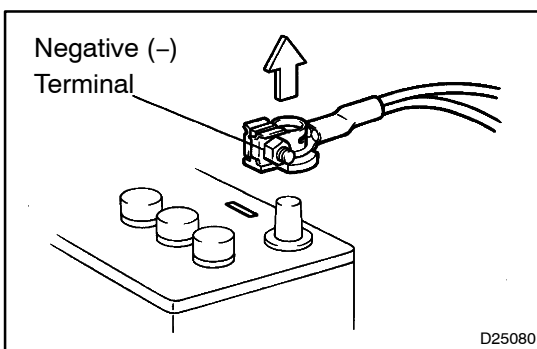
D30370

(e) AIRBAG SENSOR ASSEMBLY

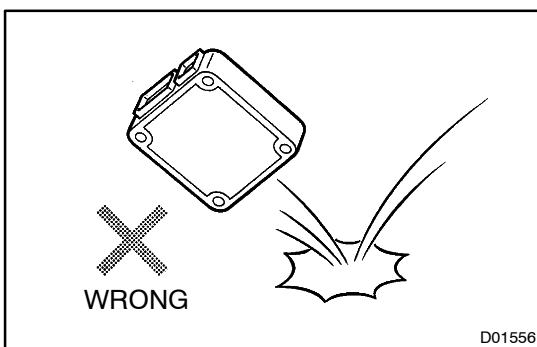
- (1) Never reuse an airbag sensor assembly involved in a collision where the SRS has deployed.
- (2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor mounted on the floor. If the connectors are connected or disconnected while the airbag sensor assembly is not mounted to the floor, it could cause the supplemental restraint system to deploy potentially resulting in injury.
- (3) Work must be started after 90 seconds from the time that the ignition switch is turned to the LOCK position and the negative (-) terminal cable is disconnected from the battery, even if only loosening the set bolts of the airbag sensor assembly.

(f) WIRE HARNESS AND CONNECTOR

- (1) The SRS wire harness is integrated with the instrument panel wire harness assembly. All the connectors in the system are a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken due to an accident, etc., repair or replace it.

**3. ELECTRONIC CONTROL****(a) REMOVAL AND INSTALLATION OF BATTERY TERMINAL**

- (1) Before performing electronic work, disconnect the battery negative (-) terminal cable beforehand in order to prevent it from shorting and burning out.
- (2) When disconnecting and installing the terminal cable, turn the ignition switch and lighting switch OFF, and loosen the terminal nut completely. Perform these operations without twisting or prying the terminal.
- (3) When the battery terminal cable is removed, the memories of the clock, radio, DTCs, etc. are erased. So before removing it, check them and make a note of their settings.

**(b) HANDLING OF ELECTRONIC PARTS**

- (1) Do not open the cover or case of the ECU unless absolutely necessary (If the IC terminals are touched, the IC may be rendered inoperative by static electricity).
- (2) To disconnect electronic connectors, pull the connector itself, not the wires.
- (3) Be careful not to drop electronic components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not be reused.
- (4) When cleaning the engine with steam, protect the electronic components, air filter and emission-related components from water.
- (5) Never use an impact wrench to remove or install temperature switches or temperature sensors.
- (6) When checking the continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.

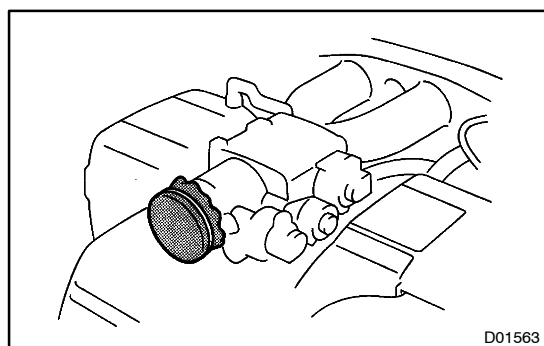
4. REMOVAL AND INSTALLATION OF FUEL CONTROL PARTS

(a) PLACE FOR REMOVING AND INSTALLING OF FUEL SYSTEM PARTS

- (1) Work in a place with good air ventilation and without anything that could cause combustion such as a welder, grinder, drill, electric motor or stove in the surroundings.
- (2) Never work in a place such as a pit or nearby a pit, as there is a possibility that vaporized fuel will collect in those places.

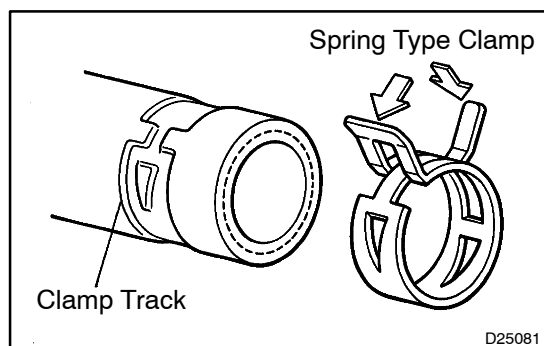
(b) REMOVING AND INSTALLING OF FUEL SYSTEM PARTS

- (1) Prepare a fire extinguisher before starting operations.
- (2) To prevent static electricity, install a ground on the fuel changer, vehicle and fuel tank, and do not spray much water so as to prevent slipping.
- (3) Never use any electric equipment like an electric motor or a working light, as they may create sparks or a high temperature.
- (4) Never use an iron hammer, as it may cause sparks.
- (5) Dispose separately of shop rags containing fuel deposits.



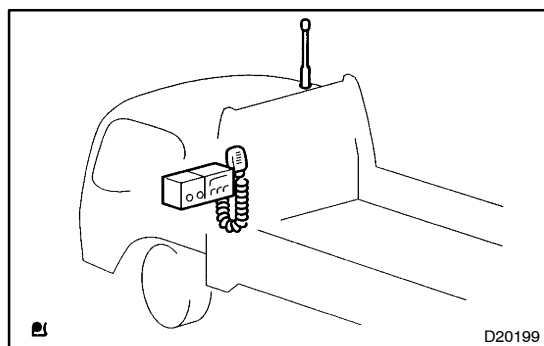
5. REMOVAL AND INSTALLATION OF ENGINE INTAKE PARTS

- (a) If any metal particle enters the inlet pass, it may have a bad effect on the engine and turbocharger.
- (b) When removing and installing the inlet system parts, close the opening of the removed inlet system parts and the engine with a clean shop rag or gummed tape.
- (c) When installing the inlet system parts, check that no metal particles have entered.



6. HANDLING OF HOSE CLAMPS

- (a) Before removing the hose, check the clamp position to ensure that it can be restored securely.
- (b) Replace a deformed or dented clamp with a new one.
- (c) When reusing the hose, install the clamp on the hose where it has a clamp track.
- (d) For a spring type clamp, make an adjustment after installation by pushing in the direction of the arrow mark.



7. FOR VEHICLES EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

- (a) Install the antenna as far away from the ECU and sensors of the vehicle electronic systems as possible.
- (b) Install an antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle electronic systems. For details of the ECU and sensors locations, refer to the section on the applicable component.
- (c) Prevent the antenna feeder from getting entangled with the other wiring, and keep the antenna feeder separate from other wiring as much as possible.
- (d) Check that the antenna and feeder are correctly adjusted.
- (e) Do not install any high-powered mobile communication system.

VEHICLE LIFT AND SUPPORT LOCATIONS

1. NOTICE ABOUT VEHICLE CONDITION WHEN JACKING UP

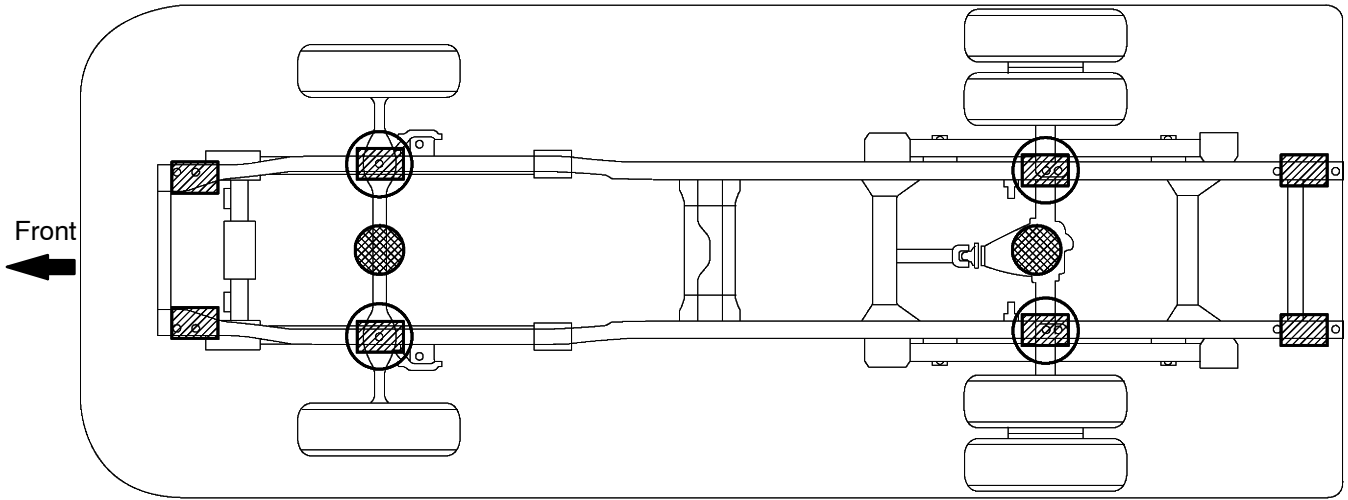
- (a) As a rule, vehicle must be in an unloaded and never jack up or lift up the vehicle with things of heavy weight.
- (b) If removing any things of heavy weight like the engine and transmission, the center of gravity of the vehicle moves. Therefore, place a balance weight so as to keep it from rolling, or hold the jacking support location using the mission jack.

2. NOTICE FOR USING 4 POST LIFT

- (a) Follow the instruction manual for a safety operation.
- (b) Do not damage tires or wheels with a free wheel beam.
- (c) Using a wheel stopper, fix the vehicle.

3. NOTICE FOR USING JACK AND SAFETY STAND

- (a) Work in a flat place using a wheel stopper all the time.
- (b) Support the specified location with a jack and safety stand accurately.
- (c) Do not work or leave the vehicle supported only by a jack. Be sure to support the vehicle together with a safety stand.
- (d) Be careful and accurate in jacking up and down the vehicle.
- (e) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations.
 - Cancel the parking brake on a level place and shift the transmission in Neutral.
 - When jacking up the front wheels of the vehicle at first place stoppers behind the rear wheels.
 - When jacking up the rear wheels of the vehicle at first place stoppers behind the front wheels.
 - When either the front or rear wheels only should be jacked up, set safety stands and place stoppers in front and behind the other wheels on the ground.
 - After the vehicle is jacked up, be sure to support it on the safety stands. It is extremely dangerous to perform any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.



GARAGE JACK POSITION _____

- Front - - - - - Center of front axle beam
- Rear - - - - - Center of rear axle housing



OIL JACK POSITION _____



SUPPORT POSITION

- Safety stand - - - - -
- If necessary, remove the transport hooks on the front end of the frame.



Y

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HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

0108V-03

GENERAL INFORMATION

There are many ECU controlled systems used in HINO DUTRO. In general, ECU controlled system are considered to be very intricate and require a high level of technical knowledge and expert skill to troubleshoot. The fact is, however, that if you proceed by inspecting the circuits one by one, troubleshooting of these systems is not complex. If you have adequate understanding of the system and basic knowledge of electricity, the problem can be accurately diagnosed and fixed. This manual is designed based on the above principle to help service technicians perform accurate and effective troubleshooting, and is compiled for the following major ECU controlled systems:

The troubleshooting procedures are described on the following pages.

System	Page
1. ECD System (S05C-TB)	05-1
2. ABS & BA System	05-95
3. Easy & Smooth Start System and Brake Lock System	05-171
4. Supplemental Restraint System	05-213
5. Audio System	05-277

FOR USING HAND-HELD TESTER

NOTICE:

Be sure to the 24V VIM, because the hand-held tester will be destroyed if you do not use the 24 VIM.

- Before using the tester, tester's operator manual should be read thoroughly.
- If the tester cannot communicate with the ECU controlled systems when you have connected the cable of the tester to the DLC3 with the ignition switch and tester turned ON, there is a problem on the vehicle side or tester side.
 - (1) If the communication is normal when the tester is connected to another vehicle, inspect the diagnosis data link line (Bus \oplus line) or ECU power circuit of the vehicle.
 - (2) If the communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself, so perform the Self Test procedures outlined in the Tester Operator's Manual.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Carry out troubleshooting in accordance with the procedures on the following page. Here, only the basic procedures are shown. Details are provided in the Diagnostics section, showing the most effective methods for each circuit. Confirm the troubleshooting procedures first for the relevant circuit before beginning the troubleshooting of that circuit.

1 Vehicle brought to workshop



2 Customer problem analysis

- (a) Ask the customer about the conditions and environment when the problem occurred.



3 Symptom confirmation and DTC (and freeze frame data) check

- (a) Check the battery positive voltage.
Voltage: 10 – 14 V (Engine stopped)
- (b) Visually check the wire harness, connectors and fuses for open and short, etc.
- (c) Warm up the engine to the normal operating temperature.
- (d) Confirm the problem symptoms and conditions, and check for DTCs according to the applicable chart.

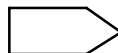
OK

Go to step 5

NG

4 DTC chart

- (a) Check the results obtained in step 3, then confirm the inspection procedures for the system or the part which should be checked using the DTC chart.



Go to step 6

5 Problem symptoms chart

- (a) Check the results obtained in step 3, then confirm the inspection procedures for the system or the part which should be checked using the problem symptoms table.



6 Circuit inspection or parts inspection

- (a) Confirm the circuit for the system or the part which should be checked using the problem symptoms table or the results obtained in step 4.



7 Repair

- (a) Repair the affected system or part in accordance with the instructions in step 6.



8	Confirmation test
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- (a) After completing repairs, confirm that the problem has been solved (If the problem does not recur, perform a confirmation test under the same conditions and in the same environment as when it occurred for the first time).



END

CUSTOMER PROBLEM ANALYSIS

HINT:

- In troubleshooting, the problem symptoms must be confirmed accurately, meaning that all preconceptions must be set aside in order to make an accurate judgement. To ascertain what the problem symptoms are, it is extremely important to ask the customer about the problem and conditions when it occurred.
- The following 5 items are important points in the problem analysis. Past problems which are thought to be unrelated and the repair history, etc. may also help in some cases. So, as much information as possible should be gathered and their relationship with the problem symptoms should be correctly ascertained for reference in troubleshooting. A customer problem analysis table is provided for your use in the Diagnostics section for each system.

Important Points with Customer Problem Analysis

- What ----- Vehicle model, system name
- When ----- Date, time, occurrence frequency
- Where ----- Road conditions
- Under what conditions? ----- Running conditions, driving conditions, weather conditions
- How did it happen? ----- Problem symptoms

(Sample) Supplemental restraint system check sheet.

CUSTOMER PROBLEM ANALYSIS CHECK			
Supplemental Restraint System Check Sheet		Inspector's Name	
Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km miles
Date Problem First Occurred	/ /		
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Other		
Temperature	Approx.		
Vehicle Operation	<input type="checkbox"/> Starting <input type="checkbox"/> Idling <input type="checkbox"/> Driving [<input type="checkbox"/> Constant speed <input type="checkbox"/> Acceleration <input type="checkbox"/> Deceleration] <input type="checkbox"/> Other		

SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE

HINT:

- The diagnostic system in HINO DUTRO has various functions. The first function is the Diagnostic Trouble Code (DTC) Check, in which a malfunction in the signal circuits to the ECU is stored in code form in the ECU memory. Another function is the Input Signal Check, which checks if the signals from various switches are sent to the ECU correctly. By using these check functions, it is possible to quickly narrow down potential problem areas and troubleshooting can be performed effectively. The diagnostic functions are incorporated in the following systems in HINO DUTRO

System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Diagnostic Test Mode (Active Test)
ECD System	(with Check Mode)		
ABS & BA System			
Easy & Smooth Start System and Brake Lock System			
Supplemental Restraint System			

- In the DTC check, it is very important to determine whether the problem indicated by the DTC is still occurring or has occurred in the past but returned to normal at present. In addition during the problem symptom check it must be checked whether the malfunction indicated by the DTC is directly related to the problem symptom or not. For this reason, the DTC should be checked before and after symptom confirmation to determine the current conditions. If this is not done, it may, depending on the case, result in unnecessary troubleshooting for normally operating systems, making it more difficult to detect the problem area, or in trying to repair irrelevant areas. Therefore, always follow the procedures in the correct order and perform the DTC check.
- A flow chart showing how to proceed with troubleshooting using the diagnostic trouble code (DTC) check is shown on this page. This flow chart shows how to utilize the DTC check effectively. Then, by carefully checking the results, this chart indicates how to proceed either to the DTC troubleshooting or to the troubleshooting of the problem symptoms table.

1 DTC check



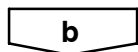
2 Make a note of DTCs displayed and then clear the memory



3 Symptom confirmation

a	Symptoms exist
b	No symptoms exist

a → **Go to step 5**



4 Simulation test using the symptom simulation methods



5 DTC check

a	DTC displayed
b	Normal code displayed

a → **Troubleshooting of problem indicated by DTC**

b

6 Symptom confirmation

a	No symptoms exist
b	Symptoms exist

If a DTC is displayed in the initial DTC check, it indicates that a trouble may have occurred in a wire harness or connector in that circuit in the past. Therefore, check the wire harness and connectors (See page 01-27).

a → **System normal**

b

Troubleshooting of each problem symptom

The problem is still occurring in a place other than the diagnostic circuit (The DTC displayed first is either for a past problem or a secondary problem).

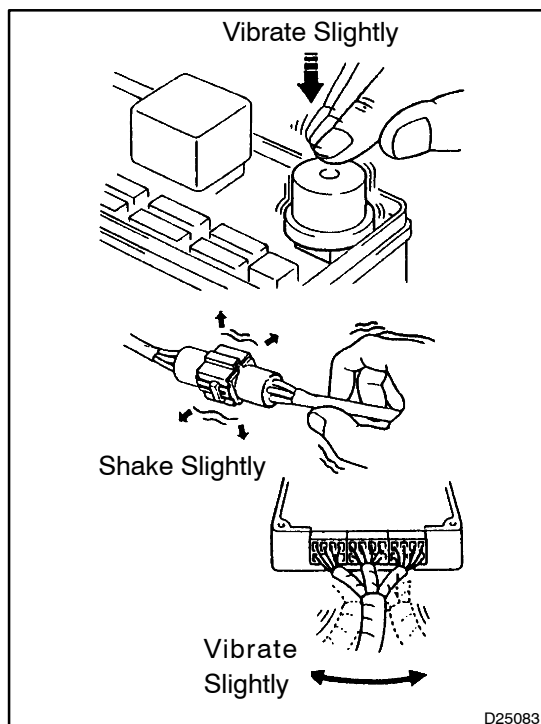
SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occurs. In such cases, a thorough customer problem analysis must be carried out. Then simulate the same or similar conditions and environment in which the problem occurred in the customer's vehicle. No matter how much experience a technician has, or how skilled he may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will tend to overlook something important in the repair operation and make a wrong guess somewhere, which will only lead to a standstill. For example, for a problem which only occurs when the engine is cold, or for a problem which occurs due to vibration caused by the road during driving, etc., the problem can never be determined when the engine is hot or when the vehicles is at a standstill. Since vibration, heat or water penetration (moisture) is a likely cause for the problem which is difficult to reproduce, the symptom simulation tests introduced here are effective measures in a point that the external causes are applied to the vehicle in a stationary condition.

Important points in the symptom simulation test:

In the symptom simulation test, the problem symptoms should be confirmed, and the problem area or parts must also be found out. To do so, reduce the possible problem circuits according to the symptoms before starting this test and have the hand-held tester connected beforehand. After that, carry out the symptom simulation test, judging whether the circuit being tested is defective or normal and also confirming the problem symptoms at the same time. Refer to the problem symptoms table of each system to narrow down the possible causes of the symptom.



1. VIBRATION METHOD: When vibration seems to be the major cause.

(a) PART AND SENSOR

- (1) Apply slight vibration with your finger to the part of the sensor considered to be the problem cause and check that the malfunction occurs.

HINT:

Applying strong vibration to relays may result in open relays.

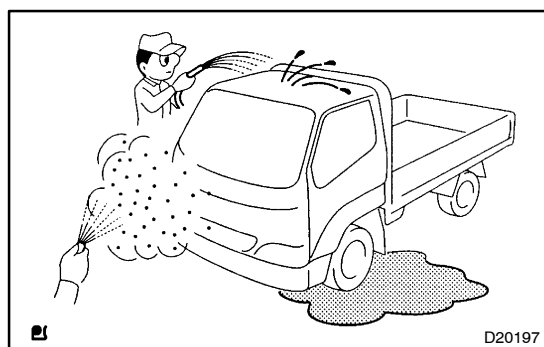
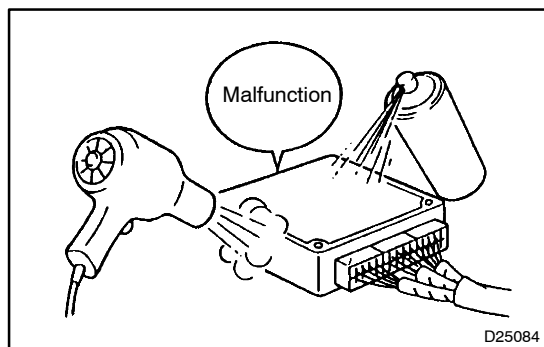
(b) CONNECTORS

- (1) Slightly shake the connector vertically and horizontally.

(c) WIRE HARNESS

- (1) Slightly shake the wire harness vertically and horizontally.

The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.



2. HEAT METHOD: If the problem seems to occur when the area in question is heated.

- (a) Heat the component that is the possible cause of the malfunction with a hair dryer or similar object. Check if the malfunction occurs.

NOTICE:

- Do not heat the components to more than 60°C (140°F) (Temperature is limited to keep the components from being damaged).
- Do not apply heat directly to the parts in the ECU.

3. WATER SPRINKLING METHOD: When the malfunction seems to occur on a rainy day or in high-humidity.

- (a) Sprinkle water onto the vehicle and check if the malfunction occurs.

NOTICE:

- Never sprinkle water directly onto the engine compartment, but indirectly change the temperature and humidity by spraying a mist of water onto the radiator front surface.
- Never apply water directly onto the electronic components.

HINT:

If a vehicle is subject to water leakage, the leaking water may contaminate the ECU. When testing a vehicle with a water leakage problem, special caution must be taken.

4. OTHERS: If the malfunction seems to occur when electrical load is excessive.

- (a) Turn on all the electrical equipment including the heater blower, headlights, rear window defogger, etc., and check if the malfunction occurs.

DIAGNOSTIC TROUBLE CODE CHART

The inspection procedures are shown in the table below. This table allows efficient and accurate troubleshooting using the diagnostic trouble codes displayed in the diagnostic trouble code chart. Proceed with troubleshooting in accordance with the inspection procedures listed in the diagnostic chart corresponding to the diagnostic trouble codes displayed. The diagnostic trouble code chart for the Supplemental Restraint System is shown below as an example.

- DTC No.
Indicates the diagnostic trouble code.
- Page or Instructions
Indicates the page where the inspection procedures for each circuit is to be found, or gives instructions for checking and repairs.

- Trouble Area
Indicates the suspect areas of the problem.

- Detection Item
Indicates the system or details of the problem.

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, check the circuit for that code listed in the table below (Proceed to the page given for that circuit).

DTC No. (See page)	Detection Item	Trouble Area	SRS Warming Light
B0100/13 (05-119)	● Short in D squib circuit	<ul style="list-style-type: none"> ● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness 	ON
B0101/14 (05-124)	● Open in D squib circuit	<ul style="list-style-type: none"> ● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness 	ON
B0102/11 (05-128)	● Short in D squib circuit (to ground)	<ul style="list-style-type: none"> ● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness 	ON
B0103/12 (05-132)	● Short in D squib circuit (to B+)	<ul style="list-style-type: none"> ● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness 	ON
B0105/53 (05-136)	● Short in P squib circuit	<ul style="list-style-type: none"> ● Front passenger airbag assembly (squib) ● Airbag sensor assembly ● Wire harness 	ON
B0106/54	● Open in P squib circuit	<ul style="list-style-type: none"> ● Front passenger airbag assembly (squib) ● Airbag sensor assembly ● Wire harness 	
	● Short in P squib circuit (to Ground)	<ul style="list-style-type: none"> ● Front passenger airbag assembly (squib) ● Airbag sensor assembly ● Wire harness 	

PROBLEM SYMPTOMS TABLE

The suspected circuits or parts for each problem symptom are shown in the table below. Use this table to troubleshoot the problem when a Normal code is displayed in the diagnostic trouble code chart but the problem is still occurring. Numbers in the table indicate the order in which the circuits or parts should be checked.

HINT:

When the problem is not detected by the diagnostic system even though the problem symptom is present, it may be that the problem is occurring outside the detection range of the diagnostic system.

● **Page**
Indicates the page where the flow chart for each circuit is located.

● **Circuit Inspection, Inspection Order**
Indicates the circuit which needs to be checked for each problem symptom. Check in the order indicated by the numbers.

● **Problem Symptom**

● **Circuit or Part Name**
Indicates the circuit or part which needs to be checked.

PROBLEM SYMPTOMS TABLE Proceed with troubleshooting of each circuit in the table below.		
Symptom	Suspected Area	See page
1. With the ignition switch in ACC or ON position, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed. 2. SRS warning light is always lit up even when ignition switch is in the LOCK position	1. SRS warning light circuit (Always lights up when ignition switch is in LOCK position.)	05-180
1. With the ignition switch in the ACC or ON position, the SRS warning light does not light up.	1. SRS warning light circuit (Does not light up when ignition switch is turned to ACC or ON.)	05-183
1. DTC is not displayed. 2. SRS warning light is always lit up at the time of DTC check procedure. 3. DTC is displayed without Tc and CG terminal connection.	1. Tc terminal circuit	05-187

CIRCUIT INSPECTION

How to read and use each page is shown below.

● **Circuit Description**

The major role, operation, etc. of the circuit and its component parts are explained.

● **Diagnostic Trouble Code No. and Detection Item**

● Indicates the diagnostic trouble codes, diagnostic trouble code settings and suspect areas of the problem.

● **Inspection Procedures**

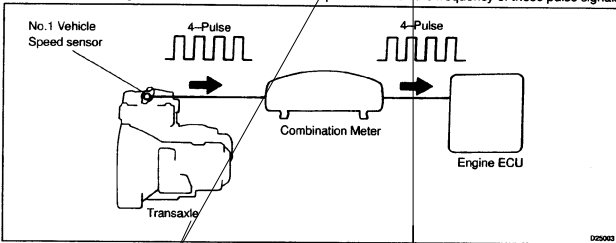
Use the inspection procedures to determine if the circuit is normal or abnormal. If it is abnormal, use it to determine whether the problem is located in the sensors, actuators, wire harness or ECU.

05-178 DIAGNOSTICS - SEI SYSTEM (1ZZ-FE)

DTC P0500/42 VEHICLE SPEED SENSOR MALFUNCTION

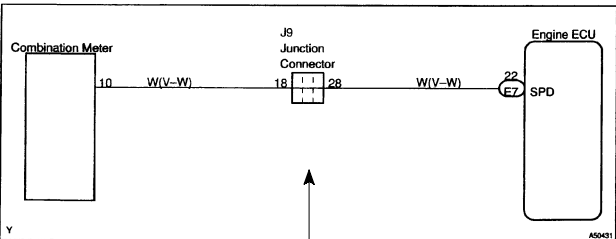
CIRCUIT DESCRIPTION

The vehicle speed sensor outputs a 4-pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the Engine ECU. The Engine ECU determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detecting Condition	Trouble Area
P0500/42	During vehicle is being driven, no vehicle speed sensor signal to engine ECU (2 trip detection logic)	<ul style="list-style-type: none"> Combination meter Open or short in No. 1 vehicle speed sensor circuit No. 1 vehicle speed sensor Engine ECU

WIRING DIAGRAM



● **Wiring Diagram**

This shows a wiring diagram of the circuit. Use this diagram together with ELECTRICAL WIRING DIAGRAM to thoroughly understand the circuit. Wire colors are indicated by an alphabetical code. B = Black, L = Blue, R = Red, BR = Brown, LG = Light Green, V = Violet, G = Green, O = Orange, W = White, GR = Gray, P = Pink, Y = Yellow, SB = Sky Blue. The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

DIAGNOSTICS - SEI SYSTEM (1ZZ-FE) 05-179

INSPECTION PROCEDURE

1 READ VALUE OF VEHICLE SPEED VALUE(SPEEDOMETER OPERATION)

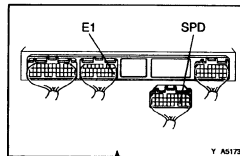
- (a) Select data monitor on the hand-held tester.
- (b) Perform a test drive of the vehicle.
- (c) Read the vehicle speed on the hand-held tester.

RESULT: The same as the speed displayed on the speed meter.

NG → REPLACE COMBINATOR METER ASSY

OK

2 INSPECT ECU

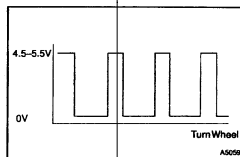


- (a) Check the output waveform.
- HINT:** Using the oscilloscope function of hand-held tester, it is possible to check the function between the engine ECU and the knock control sensor. The waveform shown in the illustration is an example without noise and chattering.

- (1) Connect the hand-held tester between the terminals SPD of the engine ECU E7 connector and E1 of the engine ECU E8 connector.
- (2) Select the oscilloscope function on the hand-held tester. (Refer to the hand-held tester's instruction book for operating instructions.)

RESULT: Voltage is intermittently generated

ITEM	CONTENTS
TERMINAL	SPD→E1
EQUIPMENT SET	5V/DIV, 20ms/DIV
CONDITION	Running at 20 km/h

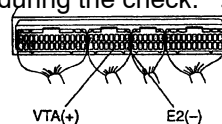


HINT: The multitude gets shorter as the engine speed becomes faster.

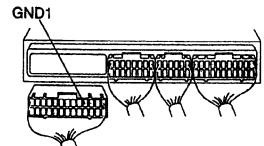
OK → CHECK AND REPLACE ECU

NG

● Indicates the condition of the connector of the ECU during the check.



Connector being checked is connected. Connections of tester are indicated by (+), (-) after terminals name.



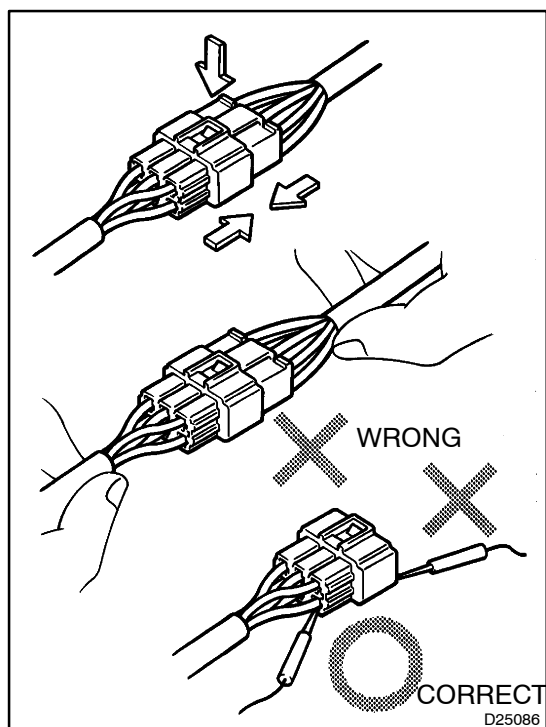
Connector being checked is disconnected. For inspection of connector with body ground, there is nothing about the body ground written down.

ELECTRONIC CIRCUIT INSPECTION PROCEDURE

1. BASIC INSPECTION

(a) RESISTANCE MEASURING CONDITION OF ELECTRONIC PARTS

- (1) Unless stated, all resistance is measured at an ambient temperature of 20°C (68°F). As the resistance may be outside the specifications if measured at high temperatures immediately after the vehicle has been running, measurements should be made when the engine has cooled down.



(b) HANDLING OF CONNECTOR

- (1) When removing the connector with lock, press the connector in the direction of the engagement and remove the lock by lightly pressing the lock claw.
- (2) When removing the connector, do not hold the harness, but hold the connector.
- (3) Before connecting the connector, check that there is no deformation, damage or missing terminals.
- (4) The connector with a lock should be securely connected until it makes a "click" sound.
- (5) When checking the connector with a electrical tester, check it from the backside (harness side) of the connector using a mini test lead.

NOTICE:

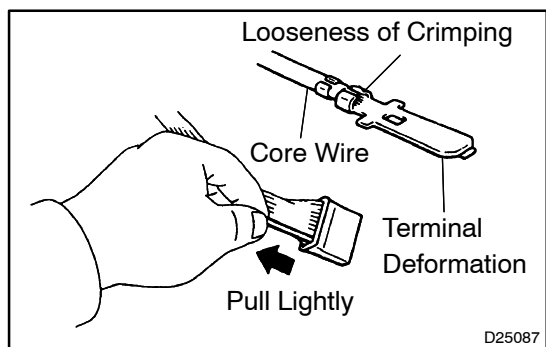
- **As a water proof connector cannot be checked from the backside, check by connecting the sub-harness.**
- **Do not damage the terminals by moving the inserted tester needle.**

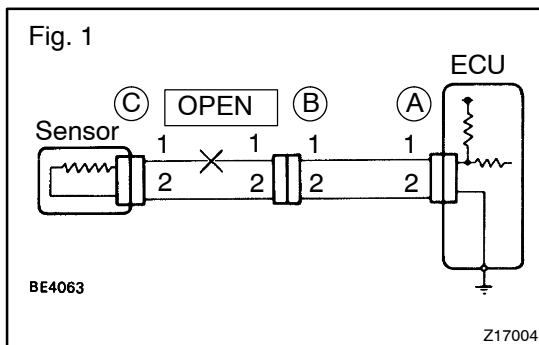
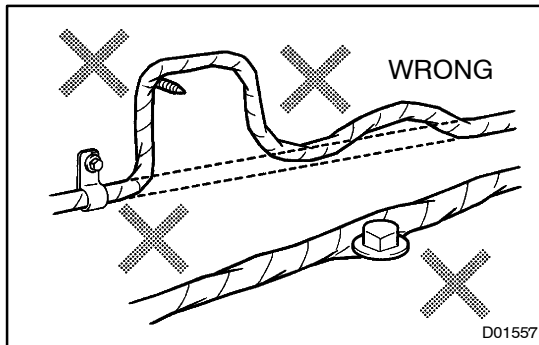
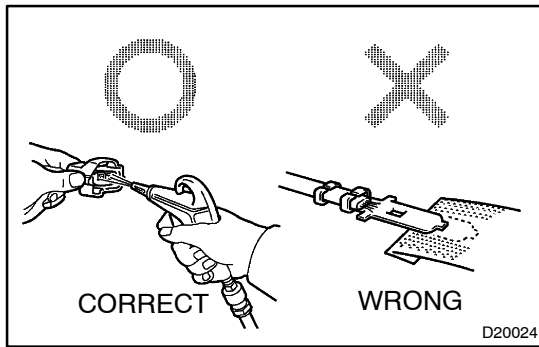
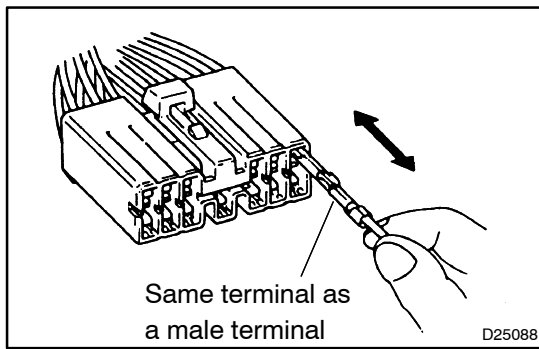
(c) CONNECTOR CHECKING POINTS

- (1) Checking when the connector is connected:
By holding the connector, check the inserted condition and locking efficiency (engaged condition).
- (2) Checking when the connector is removed:
Check by lightly pulling the wire harness (missing terminal, terminal crimping condition, core wire break).
Check visually for any rust, metal particles, water and bent terminals (rust, mixing of foreign object, terminal deformation).

NOTICE:

When testing a gold-plated female terminal, always use a gold-plated male terminal.





- (3) Checking of the contact pressure of the terminal:
Prepare a spare male terminal.
Insert it into a female terminal, check the engaged condition and sliding resistance.

(d) REPAIR METHOD OF CONNECTOR TERMINAL

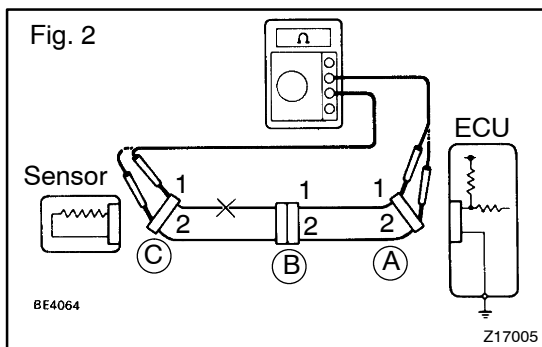
- (1) If there is on the contact point, clean the contact point using an air gun or shop rag. However, never polish the contact point using a sand paper as the platings may come off.
- (2) In case of abnormal contact pressure, replace the female terminal. However, if a male terminal is gold-plated (gold color), use gold-plated female terminals and if it is silver-plated (silver color), use silver-plated female terminals.

(e) HANDLING OF WIRE HARNESS

- (1) When removing the wire harness, check the positioning of the wiring and clamping before starting work in order to be able to restore it correctly.
- (2) Never twist, pull or loosen the wire harness more than necessary.
- (3) Never allow the wire harness to come into contact with a high-temperature, rotating, moving, vibrating or sharp (edge of the panel, tip of the screw, etc.) part.
- (4) When installing parts, never let the wire harness be interfered with.
- (5) Never cut or break the cover of the wire harness. If it is cut or broken, replace it or securely repair it with electrical tape.

2. CHECK OPEN CIRCUIT

- (a) For the open circuit in the wire harness in Fig. 1, perform a continuity check in step (b) or a voltage check in step (c) to locate the section.



- (b) Check the continuity.
- (1) Disconnect connectors A and C and measure the resistance between them.

Resistance: 1 Ω or less

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.

In the case of Fig. 2:

Between terminal 1 of connector A and terminal 1 of connector C → No continuity (open)

Between terminal 2 of connector A and terminal 2 of connector C → Continuity

Therefore, the cause is an open circuit between terminal 1 of connector A and terminal 1 of connector C.

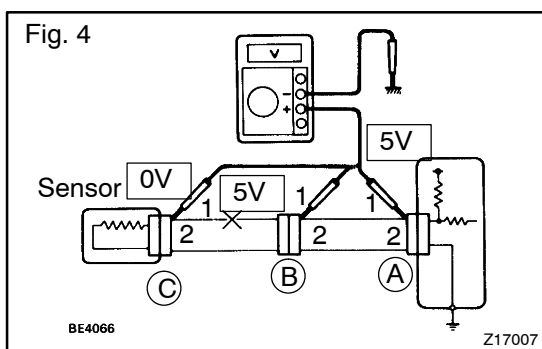
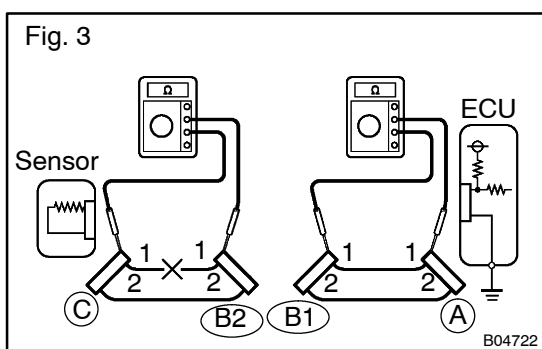
- (2) Disconnect connector B and measure the resistance between the connectors.

In the case of Fig. 3:

Between terminal 1 of connector A and terminal 1 of connector B1 → Continuity

Between terminal 1 of connector B2 and terminal 1 of connector C → No continuity (open)

Therefore, the cause is an open circuit between terminal 1 of connector B2 and terminal 1 of connector C.

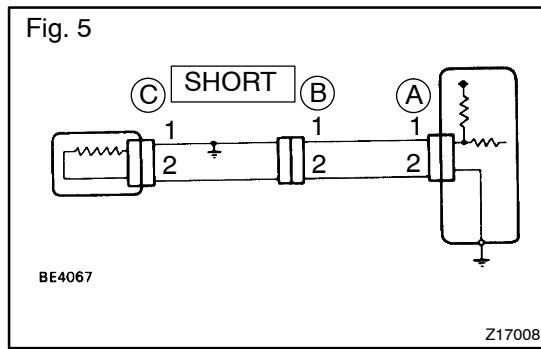


- (c) Check the voltage.

- (1) In a circuit in which voltage is applied (to the ECU connector terminal), an open circuit can be checked by conducting a voltage check.

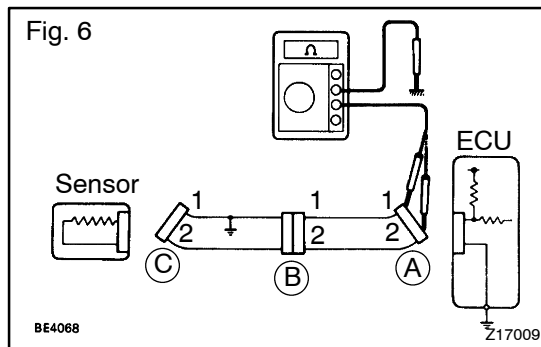
As shown in Fig. 4, with each connector still connected, measure the voltage between the body ground and terminal 1 of connector A at the ECU 5 V output terminal, terminal 1 of connector B, and terminal 1 of connector C, in that order.

- (2) If the results are:
 - 5 V: Between terminal 1 of connector A and body ground
 - 5 V: Between terminal 1 of connector B and body ground
 - 0 V: Between terminal 1 of connector C and body ground
 Therefore, the cause is an open circuit in the wire harness between terminal 1 of connector B and terminal 1 of connector C.



3. CHECK SHORT CIRCUIT

(a) If the wire harness is ground shorted as shown in Fig. 5, locate the section by conducting a continuity check with the body ground in step (b).



(b) Check the continuity with the body ground.

- (1) Disconnect connectors A and C and measure the resistance between terminals 1 and 2 of connector A and the body ground.

Resistance: 1 MΩ or higher

HINT:

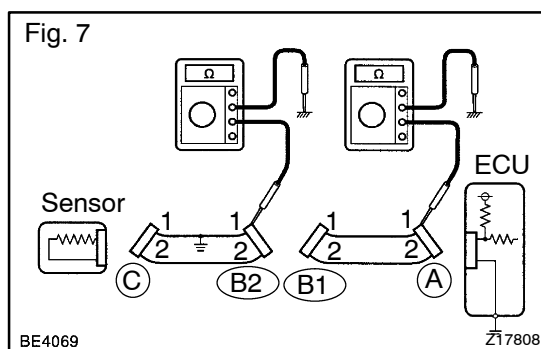
Measure the resistance while lightly shaking the wire harness vertically and horizontally.

In the case of Fig. 6:

Between terminal 1 of connector A and body ground → Continuity (short)

Between terminal 2 of connector A and body ground → No continuity

Therefore, the cause is a short circuit between terminal 1 of connector A and terminal 1 of connector C.



- (2) Disconnect connector B and measure the resistance between terminal 1 of connector A and the body ground, and terminal 1 of connector B2 and the body ground.

In the case of Fig. 7:

Between terminal 1 of connector A and body ground → No continuity

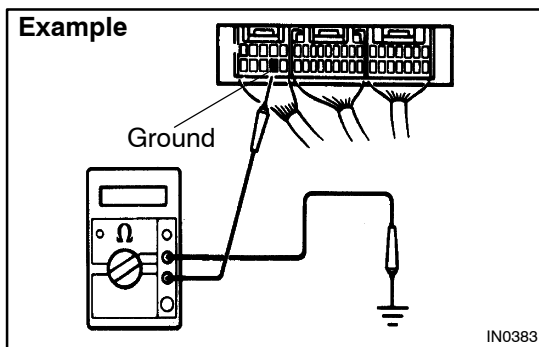
Between terminal 1 of connector B2 and body ground → Continuity (short)

Therefore, the cause is a short circuit between terminal 1 of connector B2 and terminal 1 of connector C.

4. CHECK AND REPLACE ECU

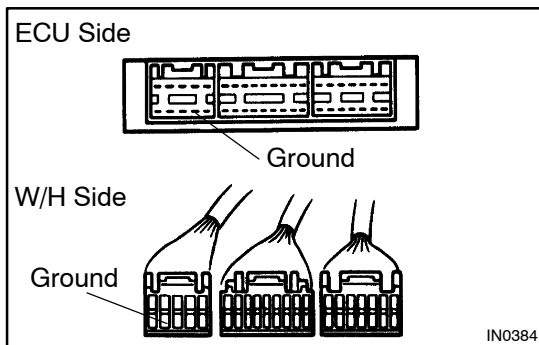
NOTICE:

- Start an inspection of the connector from the back-side of the connector on the wire harness side with the connector connected to the ECU.
 - When no measurement condition is specified, perform the inspection with the engine stopped and also the ignition switch ON.
- (a) First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty. In this case, replace the ECU with a normally functioning one and check if the symptoms appear.



- (1) Measure the resistance between the ECU ground terminal and body ground.

Resistance: 1 Ω or less



- (2) Disconnect the ECU connector, check the ground terminals on the ECU side and wire harness side for bends and check the contact pressure.

TERMS

ABBREVIATIONS USED IN THIS MANUAL

0108Y-02

Abbreviations	Meaning
ABS	Anti-Lock Brake System
A/C	Air Conditioner
AC	Alternating Current
ACC	Accessory
ACIS	Acoustic Control Induction System
ACSD	Automatic Cold Start Device
A.D.D.	Automatic Disconnecting Differential
A/F	Air-Fuel Ratio
AHC	Active Height Control Suspension
ALR	Automatic Locking Retractor
ALT	Alternator
AMP	Amplifier
ANT	Antenna
APPROX.	Approximately
ASSY	Assembly
A/T, ATM	Automatic Transmission (Transaxle)
ATF	Automatic Transmission Fluid
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AVS	Adaptive Variable Suspension
B+	Battery Voltage
BA	Brake Assist
BACS	Boost Altitude Compensation System
BAT	Battery
BDC	Bottom Dead Center
B/L	Bi-Level
B/S	Bore-Stroke Ratio
BTDC	Before Top Dead Center
BVSV	Bimetallic Vacuum Switching Valve
CB	Circuit Breaker
CCo	Catalytic Converter For Oxidation
CD	Compact Disc
CF	Cornering Force
CG	Center Of Gravity
CH	Channel
CKD	Complete Knock Down
COMB.	Combination
CPE	Coupe
CPS	Combustion Pressure Sensor
CPU	Central Processing Unit
CRS	Child Restraint System
CTR	Center
C/V	Check Valve
CV	Control Valve
CW	Curb Weight
DC	Direct Current
DEF	Defogger

INTRODUCTION - TERMS

Abbreviations	Meaning
DFL	Deflector
DIFF.	Differential
DIFF. LOCK	Differential Lock
D/INJ	Direct Injection
DLC	Data Link Connector
DLI	Distributorless Ignition
DOHC	Double Overhead Camshaft
DP	Dash Pot
DS	Dead Soak
DSP	Digital Signal Processor
DTC	Diagnostic Trouble Code
DVD	Digital Versatile Disc
EBD	Electric Brake Force Distribution
ECAM	Engine Control And Measurement System
ECD	Electronically Controlled Diesel
ECDY	Eddy Current Dynamometer
ECT	Electronic Control Transmission
ECU	Electronic Control Unit
ED	Electro-Deposited Coating
EDU	Electronic Driving Unit
EDIC	Electric Diesel Injection Control
EFI	Electronic Fuel Injection
E/G	Engine
EGR	Exhaust Gas Recirculation
EGR-VM	EGR-Vacuum Modulator
ELR	Emergency Locking Retractor
EMPS	Electric Motor Power Steering
ENG	Engine
ES	Easy & Smooth
ESA	Electronic Spark Advance
ETCS-i	Electronic Throttle Control System-intelligent
EVAP	Evaporative Emission Control
EVP	Evaporator
E-VRV	Electric Vacuum Regulating Valve
EX	Exhaust
FE	Fuel Economy
FF	Front-Engine Front-Wheel-Drive
F/G	Fuel Gauge
FIPG	Formed In Place Gasket
FL	Fusible Link
F/P	Fuel Pump
FPU	Fuel Pressure Up
Fr	Front
F/W	Flywheel
FW/D	Flywheel Damper
FWD	Front-Wheel-Drive
GAS	Gasoline
GND	Ground
GPS	Global Positioning System
HAC	High Altitude Compensator
H/B	Hatchback

Abbreviations	Meaning
H-FUSE	High Current Fuse
HI	High
HID	High Intensity Discharge (Head Lamp)
HSG	Housing
HT	Hard Top
HWS	Heated Windshield System
IC	Integrated Circuit
IDI	Indirect Diesel Injection
IFS	Independent Front Suspension
IG	Ignition
IIA	Integrated Ignition Assembly
IN	Intake (Manifold, Valve)
INT	Intermittent
I/P	Instrument Panel
IRS	Independent Rear Suspension
ISC	Idle Speed Control
J/B	Junction Block
J/C	Junction Connector
KD	Kick-Down
LAN	Local Area Network
LB	Liftback
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left-Hand
LHD	Left-Hand Drive
L/H/W	Length, Height, Width
LLC	Long-Life Coolant
LNG	Liquified Natural Gas
LO	Low
LPG	Liquified Petroleum Gas
LSD	Limited Slip Differential
LSP & PV	Load Sensing Proportioning And Bypass Valve
LSPV	Load Sensing Proportioning Valve
MAP	Manifold Absolute Pressure
MAX.	Maximum
MIC	Microphone
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MG1	Motor Generator No.1
MG2	Motor Generator No.2
MP	Multipurpose
MPI	Multipoint Electronic Injection
MPX	Multiplex Communication System
M/T, MTM	Manual Transmission (Transaxle)
MT	Mount
MTG	Mounting
N	Neutral
NA	Natural Aspiration
No.	Number
O2S	Oxygen Sensor
OC	Oxidation Catalyst

INTRODUCTION - TERMS

Abbreviations	Meaning
O/D	Overdrive
OEM	Original Equipment Manufacturing
OHC	Overhead Camshaft
OHV	Overhead Valve
OPT	Option
ORVR	On-board Refilling Vapor Recovery
O/S	Oversize
P & BV	Proportioning And Bypass Valve
PCS	Power Control System
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PPS	Progressive Power Steering
PROM	Programmable Read Only Memory
PS	Power Steering
PTO	Power Take-Off
P/W	Power Window
R & P	Rack And Pinion
RAM	Random Access Memory
R/B	Relay Block
RBS	Recirculating Ball Type Steering
R/F	Reinforcement
RFS	Rigid Front Suspension
RH	Right-Hand
RHD	Right-Hand Drive
RLY	Relay
ROM	Read Only Memory
Rr	Rear
RRS	Rigid Rear Suspension
RWD	Rear-Wheel Drive
SC	Supercharger
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SOC	State Of Charge
SOHC	Single Overhead Camshaft
SPEC	Specification
SPI	Single Point Injection
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
STJ	Cold-Start Fuel Injection
SW	Switch
SYS	System
T/A	Transaxle
TACH	Tachometer
TBI	Throttle Body Electronic Fuel Injection
TC	Turbocharger
TCV	Timing Control Valve
TDC	Top Dead Center
TEMP.	Temperature

Abbreviations	Meaning
TIS	Total Information System For Vehicle Development
T/M	Transmission
TRC	Traction Control System
TURBO	Turbocharge
TWC	Three-Way Catalyst
U/D	Underdrive
U/S	Undersize
VCV	Vacuum Control Valve
VENT	Ventilator
VGRS	Variable Gear Ratio Steering
VIN	Vehicle Identification Number
VPS	Variable Power Steering
VSC	Vehicle Stability Control
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
VVT-i	Variable Valve Timing-intelligent
w/	With
WGN	Wagon
W/H	Wire Harness
w/o	Without
WU-TWC	Warm Up Three-way Catalytic Converter
WU-OC	Warm Up Oxidation Catalytic Converter
1st	First
2nd	Second
2WD	Two Wheel Drive Vehicle (4 x 2)
3rd	Third
4th	Fourth
4WD	Four Wheel Drive Vehicle (4 x 4)
4WS	Four Wheel Steering System
5th	Fifth

GLOSSARY OF SAE AND HINO TERMS

This glossary lists all SAE-J1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their HINO equivalents.

SAE ABBREVIATIONS	SAE TERMS	HINO TERMS ()--ABBREVIATIONS
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner (A/CL)
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	-
B+	Battery Positive Voltage	Battery Voltage (+B)
BARO	Barometric Pressure	High Altitude Compensator (HAC)
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	-
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	-
CTOX	Continuous Trap Oxidizer	-
CTP	Closed Throttle Position	LL ON, Idle ON
DFI	Direct Fuel Injection (Diesel)	Direct Injection (D/INJ)
DI	Distributor Ignition	-
DLC1 DLC2 DLC3	Data Link Connector 1 Data Link Connector 2 Data Link Connector 3	1: Check Connector 2: Total Diagnosis Communication Link (TDCL) 3: OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Trouble Code
DTM	Diagnostic Test Mode	-
ECL	Engine Control Level	-
ECM	Engine Control Module	Engine ECU (Electronic Control Unit)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM), Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	Distributorless Ignition (DLI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	-
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	-
FEPROM	Flash Erasable Programmable Read Only Memory	-
FF	Flexible Fuel	-
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)

HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO ₂ S)
IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	-
IFI	Indirect Fuel Injection	Indirect Injection (IDL)
IFS	Inertia Fuel-Shutoff	-
ISC	Idle Speed Control	-
KS	Knock Sensor	Knock Sensor
MAF	Mass Air Flow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	-
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Lamp	Check Engine Lamp
MST	Manifold Surface Temperature	-
MVZ	Manifold Vacuum Zone	-
NVRAM	Non-Volatile Random Access Memory	-
O2S	Oxygen Sensor	Oxygen Sensor, O ₂ Sensor (O ₂ S)
OBD	On-Board Diagnostic	On-Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalyst Convert (OC) Catalytic Converter for Oxidation (CCo)
OP	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	-
PNP	Park/Neutral Position	-
PROM	Programmable Read Only Memory	-
PSP	Power Steering Pressure	-
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	-
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	Electronic Air Bypass Valve (E-ABV)
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	-
SRI	Service Reminder Indicator	-
SRT	System Readiness Test	-
ST	Scan Tool	-
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger

INTRODUCTION - TERMS

TCC	Torque Converter Clutch	Torque Converter
TCM	Transmission Control Module	Transmission ECU, ECT ECU
TP	Throttle Position	Throttle Position
TR	Transmission Range	-
TVV	Thermal Vacuum Valve	Bimetallic Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)
TWC	Three-Way Catalytic Converter	Three-Way Catalytic (TWC) Manifold Converter CC _{RO}
TWC+OC	Three-Way + Oxidation Catalytic Converter	CC _R + CCo
VAF	Volume Air Flow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor
WOT	Wide Open Throttle	Full Throttle
WU-OC	Warm Up Oxidation Catalytic Converter	-
WU-TWC	Warm Up Three-Way Catalytic Converter	-
3GR	Third Gear	-
4GR	Fourth Gear	-

PREPARATION


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DIAGNOSTICS


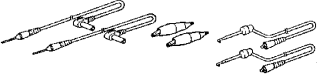
PREPARATION

022ET-01

SST

	09843-18040 Diagnosis Check Wire No.2	SUPPLEMENTAL RESTRAINT SYSTEM ABS & BA SYSTEM
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Recommended Tools

	09082-00040 Electrical Tester	SUPPLEMENTAL RESTRAINT SYSTEM AUDIO SYSTEM
	(09083-00150) Test Lead Set	SUPPLEMENTAL RESTRAINT SYSTEM AUDIO SYSTEM

ENGINE CONTROL SYSTEM

PREPARATION

022DW-01

Equipment

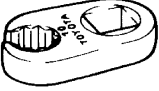
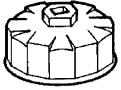
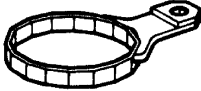
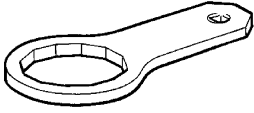



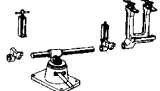

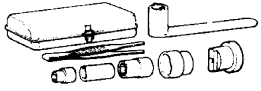

Torque wrench	
Ohmmeter	





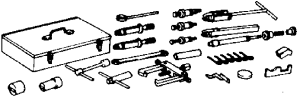
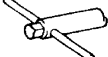
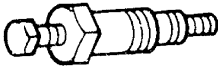
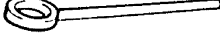





FUEL

PREPARATION


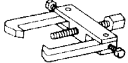
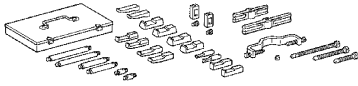
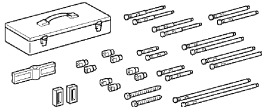
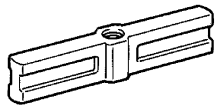
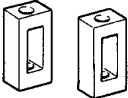
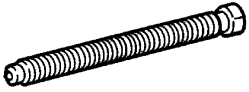



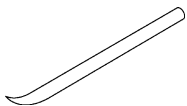

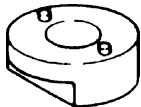
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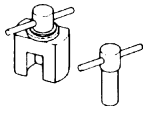
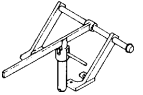
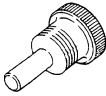
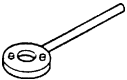
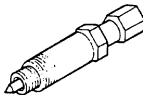
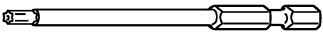
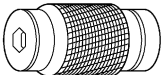
022E0-01

	09023-12700	Union Nut Wrench 17mm	NOZZLE HOLDER AND NOZZLE SET(14B) INJECTION PUMP ASSY(14B) NOZZLE HOLDER AND NOZZLE SET(15B-FTE) INJECTION PUMP ASSY(15B-FTE)
	09228-10002	Oil Filter Wrench	DIESEL FUEL FILTER ASSY(14B) DIESEL FUEL FILTER ASSY(15B-FTE)
	09228-34010	Fuel Filter Wrench	DIESEL FUEL FILTER ASSY(S05C-B) DIESEL FUEL FILTER ASSY(S05C-TA) DIESEL FUEL FILTER ASSY(W04D-J)
	09228-64040	Fuel Filter Wrench	DIESEL FUEL FILTER ASSY(14B) DIESEL FUEL FILTER ASSY(15B-FTE)
	09228-78010	Oil Filter Wrench	DIESEL FUEL FILTER ASSY(S05C-TB)
	09236-00101	Water Pump Overhaul Tool Set	INJECTION PUMP ASSY(14B)
	(09237-00070)	Shaft "C"	INJECTION PUMP ASSY(14B)
	09241-76022	Injection Pump Stand Set	INJECTION PUMP ASSY(14B)
	09245-54010	Injection Pump Stand Arm	INJECTION PUMP ASSY(14B)
	09260-54012	Injection Pump Tool Set	INJECTION PUMP ASSY(14B)
	(09262-54010)	Distributor Head Plug Wrench	INJECTION PUMP ASSY(14B)

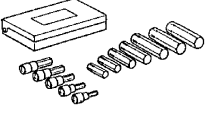

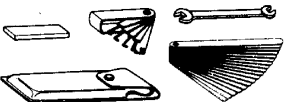
	(09262-54020) Regulator Valve Wrench	INJECTION PUMP ASSY(14B)
	(09269-54020) Socket 14 mm	INJECTION PUMP ASSY(14B)
	(09269-54030) Tweezers	INJECTION PUMP ASSY(14B) INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA)
	(09269-54040) Governor Lever Support Bolt Wrench	INJECTION PUMP ASSY(14B)
	09260-58010 Injection Pump Tool Set	INJECTION PUMP ASSY(14B)
	(09266-76011) Automatic Timer Set Nut Wrench	INJECTION PUMP ASSY(14B)
	(09267-76011) Automatic Timer Extractor	INJECTION PUMP ASSY(14B)
	(09278-46020) Spring Shaft Holding Tool	INJECTION PUMP ASSY(14B)
	(09269-54050) Pump Shaft Round Nut Wrench	INJECTION PUMP ASSY(W04D-J)
	(09272-76011) Tappet Roller Clamp	INJECTION PUMP ASSY(W04D-J)
	(09273-76011) Tappet Clamp	INJECTION PUMP ASSY(W04D-J)
	(09274-46011) Plunger Clamp	INJECTION PUMP ASSY(W04D-J)
	(09275-46010) Plunger Clamp	INJECTION PUMP ASSY(W04D-J)

PREPARATION - FUEL

	(09280-46010) Plunger Spring Holder	INJECTION PUMP ASSY(W04D-J)
	(09287-58010) Injection Pump Camshaft Bearing Puller	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA) INJECTION PUMP ASSY(W04D-J)
	09950-40011 Puller B Set	INJECTION PUMP ASSY(W04D-J)
	09950-50013 Puller C Set	INJECTION PUMP ASSY(15B-FTE)
	(09951-05010) Hanger 150	INJECTION PUMP ASSY(15B-FTE)
	(09952-05010) Slide Arm	INJECTION PUMP ASSY(15B-FTE)
	(09953-05020) Center Bolt 150	INJECTION PUMP ASSY(15B-FTE)
	(09954-05021) Claw No.2	INJECTION PUMP ASSY(15B-FTE)
	09510-1170 Injector Guide Rail	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA)
	09512-1150 Camshaft Clearance Gauge	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA) INJECTION PUMP ASSY(W04D-J)
	09512-1410 Tapet Gap Instrument	INJECTION PUMP ASSY(W04D-J)
	09512-1430 Outer Race Puller	INJECTION PUMP ASSY(W04D-J)
	09512-1910 Injector Setting Support	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA)

	09512-1920	Delivery Valve Holder Remover	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA)
	09512-1930	Injector Spring Compressor	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA)
	09512-2100	Timing Setting	INJECTION PUMP ASSY(W04D-J)
	09512-2210	Timer Wrench	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA)
	09512-2260	Governor Camshaft Bushing Extractor	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA)
	09512-2510	Bit	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA) INJECTION PUMP ASSY(W04D-J)
	09512-2520	Driver-chuck	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA) INJECTION PUMP ASSY(W04D-J)

Recommended Tools

	09040-00011	Hexagon Wrench Set	INJECTION PUMP ASSY(14B)
	09082-00040	Electrical Tester	INJECTION PUMP ASSY(14B) NOZZLE HOLDER AND NOZZLE SET(S05C-B) INJECTOR ASSY(S05C-TA) INJECTOR ASSY(S05C-TB)
	09200-00010	Engine Adjust Kit	INJECTION PUMP ASSY(14B)

Equipment

Angle gauge	
Dial indicator	
Injection pump tester	
Steel square	
Torque wrench	
Vacuum pump	
Vernier calipers	

PREPARATION - FUEL

SSM

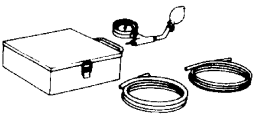
08833-00070 "Adhesive 1324," THREE BOND 1324 or equivalent	INJECTION PUMP ASSY(S05C-B) INJECTION PUMP ASSY(S05C-TA) INJECTION PUMP ASSY(W04D-J)
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INTAKE

PREPARATION

SST

022EF-01

	<p>09992-00242 Turbocharger Pressure Gauge</p>	<p>TURBOCHARGER SUB-ASSY(15B-FTE) TURBOCHARGER SUB-ASSY(S05C-TA) TURBOCHARGER SUB-ASSY(S05C-TB)</p>
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SSM

	<p>08826-00080 Seal Packing Black or equivalent (FIPG)</p>	<p>TURBOCHARGER SUB-ASSY(15B-FTE) TURBOCHARGER SUB-ASSY(S05C-TA) TURBOCHARGER SUB-ASSY(S05C-TB)</p>
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Equipment

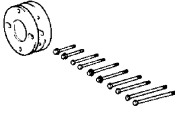
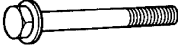
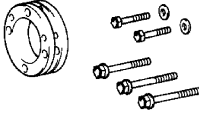

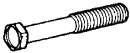
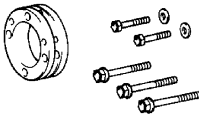

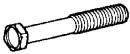

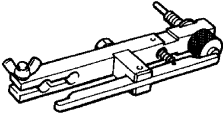
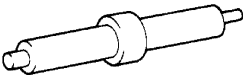

Dial indicator	
Soft mallet	
Torque wrench	

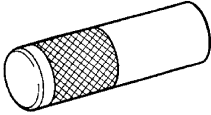
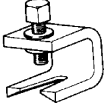



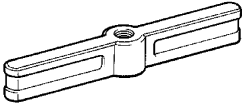
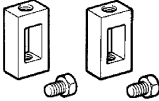
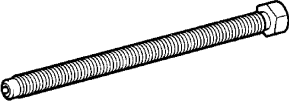
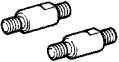
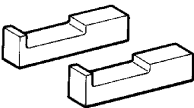
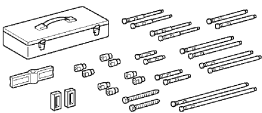
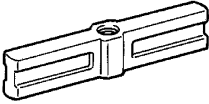
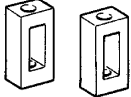
ENGINE MECHANICAL

PREPARATION



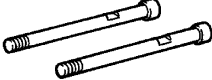
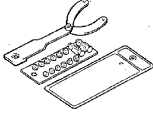
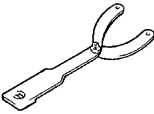

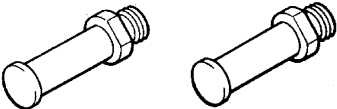
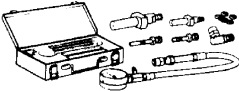

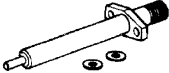
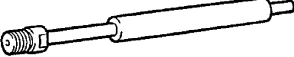
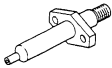

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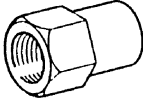
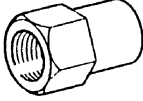
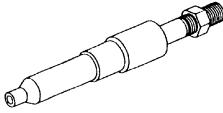
SST

	09213-54015	Crankshaft Pulley Holding Tool	PARTIAL ENGINE ASSY(14B) PARTIAL ENGINE ASSY(15B-FTE)
	(91651-60855)	Bolt	PARTIAL ENGINE ASSY(14B) PARTIAL ENGINE ASSY(15B-FTE)
	09213-58012	Crankshaft Pulley Holding Tool	CAMSHAFT(14B)
	(90201-08131)	Washer	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(91111-50845)	Bolt	ENGINE ASSY(14B) CAMSHAFT(14B) ENGINE ASSY(15B-FTE) CAMSHAFT(15B-FTE)
	09213-58013	Crankshaft Pulley Holding Tool	ENGINE ASSY(14B) CAMSHAFT(14B) ENGINE ASSY(15B-FTE) CAMSHAFT(15B-FTE)
	(90201-08131)	Washer	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(91111-50845)	Bolt	ENGINE ASSY(14B) CAMSHAFT(14B) ENGINE ASSY(15B-FTE) CAMSHAFT(15B-FTE)
	09268-17020	Master Spring Seat	ENGINE(15B-FTE)
	09275-54011	Plunger Stroke Measuring Tool	ENGINE(14B) ENGINE(15B-FTE)
	09301-00110	Clutch Guide Tool	PARTIAL ENGINE ASSY(14B) PARTIAL ENGINE ASSY(15B-FTE)
	09330-00021	Companion Flange Holding Tool	ENGINE ASSY(14B) PARTIAL ENGINE ASSY(14B) CAMSHAFT(14B) ENGINE ASSY(15B-FTE) PARTIAL ENGINE ASSY(15B-FTE) CAMSHAFT(15B-FTE)


	09608-06041	Front Hub Inner Bearing Cone Replacer	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	09611-36020	Tie Rod End Puller	PARTIAL ENGINE ASSY(14B) PARTIAL ENGINE ASSY(15B-FTE)
	09816-30010	Oil Pressure Switch Socket	PARTIAL ENGINE ASSY(14B) PARTIAL ENGINE ASSY(15B-FTE)
	09843-18030	Tacho-pulse Pickup Wire No.2	ENGINE(S05C-TB)
	09950-40011	Puller B Set	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(09951-04020)	Hanger 200	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(09952-04010)	Slide Arm	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(09953-04030)	Center Bolt 200	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(09954-04010)	Arm 25	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(09955-04051)	Claw No.5	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	09950-50013	Puller C Set	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(09951-05010)	Hanger 150	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(09952-05010)	Slide Arm	CAMSHAFT(14B) CAMSHAFT(15B-FTE)

PREPARATION - ENGINE MECHANICAL

	(09953-05010) Center Bolt 100	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(09953-05020) Center Bolt 150	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	(09954-05030) Claw No.3	CAMSHAFT(14B) CAMSHAFT(15B-FTE)
	09960-10010 Variable Pin Wrench Set	PARTIAL ENGINE ASSY(14B) CAMSHAFT(14B) PARTIAL ENGINE ASSY(15B-FTE) CAMSHAFT(15B-FTE)
	(09962-01000) Variable Pin Wrench Arm Assy	PARTIAL ENGINE ASSY(14B) CAMSHAFT(14B) PARTIAL ENGINE ASSY(15B-FTE) CAMSHAFT(15B-FTE)
	(09963-00500) Pin 5	CAMSHAFT(15B-FTE)
	(09963-01000) Pin 10	PARTIAL ENGINE ASSY(14B) CAMSHAFT(14B) PARTIAL ENGINE ASSY(15B-FTE) CAMSHAFT(15B-FTE)
	09992-00025 Cylinder Compression Check Gauge Set	ENGINE(14B) ENGINE(15B-FTE) ENGINE(S05C-B) ENGINE(S05C-TA) ENGINE(S05C-TB) ENGINE(W04D-J)
	(09992-00211) Gauge Assy	ENGINE(14B) ENGINE(15B-FTE) ENGINE(S05C-B) ENGINE(S05C-TA) ENGINE(S05C-TB) ENGINE(W04D-J)
	(09992-00250) No. 7 Attachment	ENGINE(14B)
	09992-00400 Attachment No.7	ENGINE(15B-FTE)
	09408-1041 Press Gauge Adaptor	ENGINE(W04D-J)
	09511-2500 Wrench	ENGINE COMPONENTS PARTS(S05C-B)

	09552-1060	Compression Gauge Adaptor	ENGINE(S05C-B) ENGINE(S05C-TA) ENGINE(S05C-TB)
	09552-1070	Compression Gauge Adaptor	ENGINE(W04D-J)
	09552-1090	Compression Gauge Adaptor	ENGINE(S05C-B) ENGINE(S05C-TA) ENGINE(S05C-TB)

Recommended Tools

	09090-04020	Engine Sling Device	ENGINE ASSY(S05C-B) ENGINE ASSY(S05C-TA) ENGINE ASSY(S05C-TB) ENGINE ASSY(W04D-J)
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Equipment

Dial indicator with magneticbase	
Gasket scraper	
Injection nozzle tester	
Micrometer	
Tachometer	
Torque wrench	
Vernier calipers	

SSM

	08826-00080	Seal Packing Black or equivalent (FIPG)	CYLINDER HEAD GASKET(14B) CYLINDER HEAD GASKET(15B-FTE) VALVE CLEARANCE(S05C-B) VALVE CLEARANCE(S05C-TA) VALVE CLEARANCE(S05C-TB) VALVE CLEARANCE(W04D-J)
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EXHAUST PREPARATION

Equipment

022EJ-01

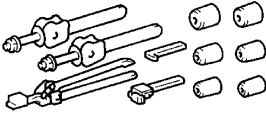
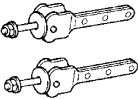

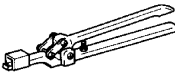
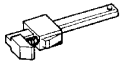


Torque wrench	
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COOLING

PREPARATION

SST

022DY-01

	09230-01010 Radiator Service Tool Set	RADIATOR ASSY(14B) RADIATOR ASSY(15B-FTE) RADIATOR ASSY(S05C-B) RADIATOR ASSY(S05C-TA) RADIATOR ASSY(S05C-TB) RADIATOR ASSY(W04D-J)
	(09231-00030) Plug Handle	RADIATOR ASSY(14B) RADIATOR ASSY(15B-FTE) RADIATOR ASSY(S05C-B) RADIATOR ASSY(S05C-TA) RADIATOR ASSY(S05C-TB) RADIATOR ASSY(W04D-J)
	(09231-00050) No.2 Plug	RADIATOR ASSY(14B) RADIATOR ASSY(15B-FTE) RADIATOR ASSY(S05C-B) RADIATOR ASSY(S05C-TA) RADIATOR ASSY(S05C-TB) RADIATOR ASSY(W04D-J)
	(09231-01010) Overhaul Handle	RADIATOR ASSY(14B) RADIATOR ASSY(15B-FTE) RADIATOR ASSY(S05C-B) RADIATOR ASSY(S05C-TA) RADIATOR ASSY(S05C-TB) RADIATOR ASSY(W04D-J)
	(09231-01020) Punch Assembly	RADIATOR ASSY(14B) RADIATOR ASSY(15B-FTE) RADIATOR ASSY(S05C-B) RADIATOR ASSY(S05C-TA) RADIATOR ASSY(S05C-TB) RADIATOR ASSY(W04D-J)
	(09231-01030) Claw	RADIATOR ASSY(14B) RADIATOR ASSY(15B-FTE) RADIATOR ASSY(S05C-B) RADIATOR ASSY(S05C-TA) RADIATOR ASSY(S05C-TB) RADIATOR ASSY(W04D-J)
	09231-14010 Punch	RADIATOR ASSY(14B) RADIATOR ASSY(15B-FTE) RADIATOR ASSY(S05C-B) RADIATOR ASSY(S05C-TA) RADIATOR ASSY(S05C-TB) RADIATOR ASSY(W04D-J)

Equipment

Radiator cap tester	
Torque wrench	

SSM

08833-00080 Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	WATER PUMP ASSY(S05C-TA) WATER PUMP ASSY(S05C-TB)
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PREPARATION - COOLING

Coolant


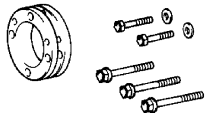

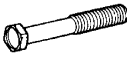
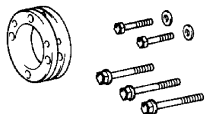

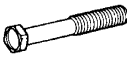
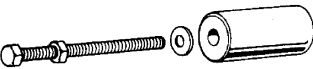
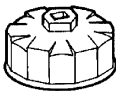
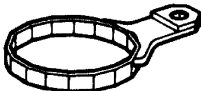

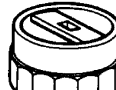
Item	Capacity	Classification
Engine coolant (14B)	11.4 liters (12 US qts, 10 Imp qts)	"Hino Super Long Life Coolant" or equivalent
Engine coolant (15B-FTE)	11.4 liters (12 US qts, 10 Imp qts)	"Hino Super Long Life Coolant" or equivalent
Engine coolant (S05C-B)	w/ heater 18.1 liters (19.2 US qts, 15.8 Imp qts) w/o heater 17.5 liters (18.6 US qts, 15.3 Imp qts)	"Hino Super Long Life Coolant" or equivalent
Engine coolant (S05C-TA)	w/ heater 18.2 liters (19.3 US qts, 15.9 Imp qts) w/o heater 17.6 liters (18.7 US qts, 15.4 Imp qts)	"Hino Super Long Life Coolant" or equivalent
Engine coolant (S05C-TB)	w/ heater 18.2 liters (19.3 US qts, 15.9 Imp qts) w/o heater 17.6 liters (18.7 US qts, 15.4 Imp qts)	"Hino Super Long Life Coolant" or equivalent
Engine coolant (W04D-J)	Standard 12.92 liters (13.7 US qts, 11.3 Imp qts) Wide 12.1 liters (12.8 US qts, 10.6 Imp qts)	"Hino Super Long Life Coolant" or equivalent

LUBRICATION



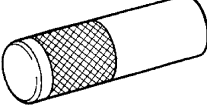
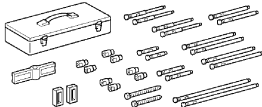
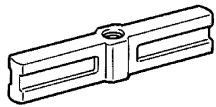
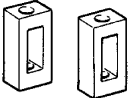

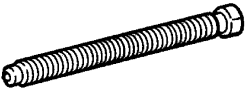
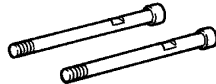
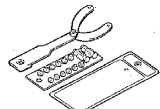
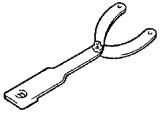

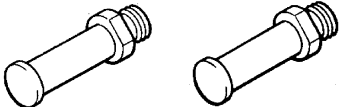
PREPARATION

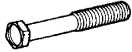
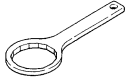
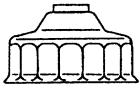

SST

022DZ-01

	09032-00100	Oil Pan Seal Cutter	OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)
	09213-58012	Crankshaft Pulley Holding Tool	OIL PUMP ASSY(14B)
	(90201-08131)	Washer	OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)
	(91111-50845)	Bolt	OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)
	09213-58013	Crankshaft Pulley Holding Tool	OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)
	(90201-08131)	Washer	OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)
	(91111-50845)	Bolt	OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)
	09219-56010	Piston Cooler Remover	SUB-ASSY OIL NOZZLE NO.1(14B)
	09228-10002	Oil Filter Wrench	OIL FILTER SUB-ASSY(15B-FTE)
	09228-34010	Fuel Filter Wrench	OIL FILTER SUB-ASSY(S05C-B) OIL FILTER SUB-ASSY(W04D-J)
	09228-44011	Oil Filter Wrench	OIL FILTER SUB-ASSY(14B)
	09228-78010	Oil Filter Wrench	OIL FILTER SUB-ASSY(S05C-TA) OIL FILTER SUB-ASSY(S05C-TB)

PREPARATION - LUBRICATION

	<p>09330-00021 Companion Flange Holding Tool</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>
	<p>(09963-00500) Pin 5</p>	<p>OIL PUMP ASSY(15B-FTE)</p>
	<p>09608-06041 Front Hub Inner Bearing Cone Replacer</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>
	<p>09950-50013 Puller C Set</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>
	<p>(09951-05010) Hanger 150</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>
	<p>(09952-05010) Slide Arm</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>
	<p>(09953-05010) Center Bolt 100</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>
	<p>(09953-05020) Center Bolt 150</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>
	<p>(09954-05030) Claw No.3</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>
	<p>09960-10010 Variable Pin Wrench Set</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>
	<p>(09962-01000) Variable Pin Wrench Arm Assy</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>
	<p>(09963-00500) Pin 5</p>	<p>OIL PUMP ASSY(15B-FTE)</p>
	<p>(09963-01000) Pin 10</p>	<p>OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)</p>

	(91111-50845) Bolt	OIL PUMP ASSY(14B) OIL PUMP ASSY(15B-FTE)
	S0955-31010 Oil Filter Wrench	OIL FILTER SUB-ASSY(14B)
	09503-1090 Wrench sub assy, filter	OIL FILTER SUB-ASSY(S05C-TA) OIL FILTER SUB-ASSY(S05C-TB)
	09503-1120 Wrench sub assy, filter	OIL FILTER SUB-ASSY(S05C-B) OIL FILTER SUB-ASSY(W04D-J)

Equipment

Torque wrench	
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SSM



08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	OIL COOLER ASSY(14B) OIL PUMP ASSY(14B) OIL COOLER ASSY(15B-FTE) OIL PUMP ASSY(15B-FTE) OIL W/BRACKET COOLER ASSY(S05C-B) OIL W/BRACKET COOLER ASSY(S05C-TA) OIL W/BRACKET COOLER ASSY(S05C-TB) OIL COOLER ASSY(W04D-J)
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STARTING & CHARGING

PREPARATION

022EK-01

Recommended Tools

	09082-00040 Electrical Tester	STARTING SYSTEM
	(09083-00350) AC/DC 400 A Probe	STARTING SYSTEM

Equipment




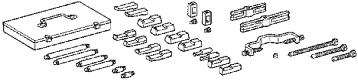
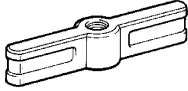
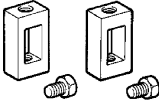
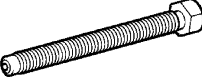
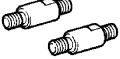
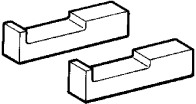

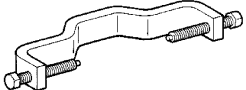
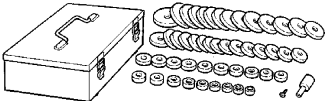
Battery (24 V)	
Battery gravity gauge	
Torque wrench	

FRONT SUSPENSION


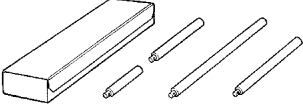

PREPARATION

022DV-01

SST

	09309-60010	Extension Pipe	FRONT SPRING ASSY LH(METAL BUSH TYPE)
	09726-27012	Front Suspension Arm Bushing Remover & Replacer	FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	(09726-02041)	Replacer	FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	09950-40011	Puller B Set	FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	(09951-04010)	Hanger 150	FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	(09952-04010)	Slide Arm	FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	(09953-04020)	Center Bolt 150	FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	(09954-04010)	Arm 25	FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	(09955-04051)	Claw No.5	FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	(09957-04010)	Attachment	FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	(09958-04011)	Holder	FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	09950-60010	Replacer Set	FRONT SPRING ASSY LH(METAL BUSH TYPE) FRONT SPRING ASSY LH(RUBBER BUSH TYPE)

PREPARATION - FRONT SUSPENSION

	(09951-00300) Replacer 30	FRONT SPRING ASSY LH(METAL BUSH TYPE) FRONT SPRING ASSY LH(RUBBER BUSH TYPE)
	09950-70010 Handle Set	FRONT SPRING ASSY LH(METAL BUSH TYPE)
	(09951-07100) Handle 100	FRONT SPRING ASSY LH(METAL BUSH TYPE)

Equipment


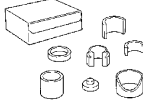

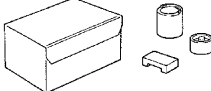

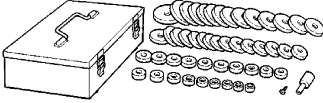


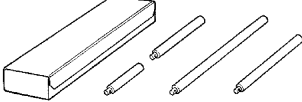

Camber-caster-king pin gauge	
Dial indicator with magnetic base	
Drill	
Micrometer	
MP grease	
Press	
Torque wrench	
Turning radius gauge	
Vernier calipers	
Vise	

REAR SUSPENSION

PREPARATION

022DU-01

SST

	09309-60010	Extension Pipe	REAR LH SPRING ASSY(METAL BUSH TYPE)
	09710-28012	Front Suspension Bushing Tool Set	REAR LH SPRING ASSY(RUBBER BUSH TYPE)
	(09710-07062)	Bushing Replacer	REAR LH SPRING ASSY(RUBBER BUSH TYPE)
	09710-30041	Rear Suspension Bushing Tool Set	REAR LH SPRING ASSY(RUBBER BUSH TYPE)
	(09710-03211)	Remover	REAR LH SPRING ASSY(RUBBER BUSH TYPE)
	09950-60010	Replacer Set	REAR LH SPRING ASSY(METAL BUSH TYPE) REAR LH SPRING ASSY(RUBBER BUSH TYPE)
	(09951-00300)	Replacer 30	REAR LH SPRING ASSY(METAL BUSH TYPE)
	(09951-00350)	Replacer 35	REAR LH SPRING ASSY(RUBBER BUSH TYPE)
	09950-70010	Handle Set	REAR LH SPRING ASSY(METAL BUSH TYPE) REAR LH SPRING ASSY(RUBBER BUSH TYPE)
	(09951-07100)	Handle 100	REAR LH SPRING ASSY(METAL BUSH TYPE) REAR LH SPRING ASSY(RUBBER BUSH TYPE)

Equipment

Drill	
MP grease	
Press	
Torque wrench	
Vise	

TIRE & WHEEL

PREPARATION

022DT-01

Equipment


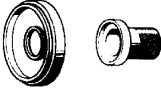
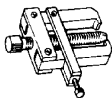
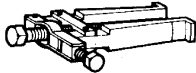
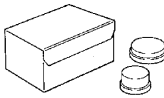

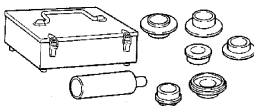

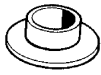


Dial indicator with magnetic base	
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DIFFERENTIAL

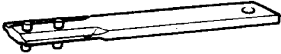

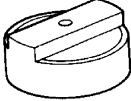

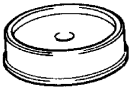
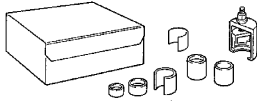

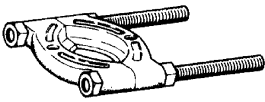
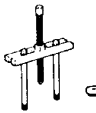
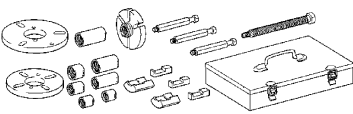
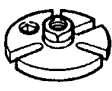

PREPARATION





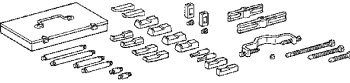
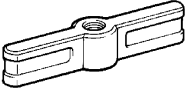
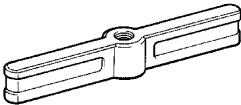
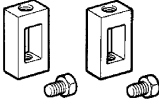
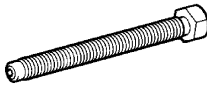
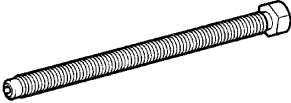
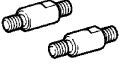
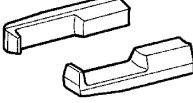

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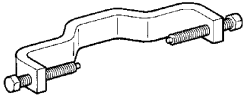
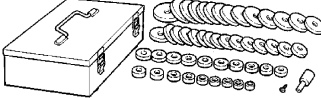



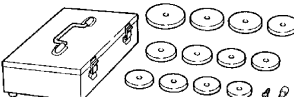



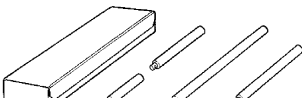

	09223-15020	Oil Seal & Bearing Replacer	DIFFERENTIAL REAR(SH13)	CARRIER	ASSY
	09223-78010	Crankshaft Oil Seal Replacer	DIFFERENTIAL REAR(SH13)	CARRIER	ASSY
	09286-46011	Injection Pump Spline Shaft Puller	DIFFERENTIAL REAR(B305)	CARRIER	ASSY
	09308-10010	Oil Seal Puller	REAR DIFFERENTIAL OIL SEAL DIFFERENTIAL REAR(B305)	CARRIER	ASSY
	09315-00022	Clutch Release Bearing Remover & Replacer	DIFFERENTIAL REAR(SH13)	CARRIER	ASSY
	09316-20011	Transfer Bearing Replacer	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
	09316-60011	Transmission & Transfer Bearing Replacer	REAR DIFFERENTIAL OIL SEAL DIFFERENTIAL REAR(B305) DIFFERENTIAL REAR(SH13)	CARRIER	ASSY
	(09316-00011)	Replacer Pipe	REAR DIFFERENTIAL OIL SEAL DIFFERENTIAL REAR(B305) DIFFERENTIAL REAR(SH13)	CARRIER	ASSY
	(09316-00041)	Replacer "C"	REAR DIFFERENTIAL OIL SEAL	CARRIER	ASSY
	(09316-00071)	Replacer "F"	DIFFERENTIAL REAR(SH13)	CARRIER	ASSY
	09330-00021	Companion Flange Holding Tool	REAR DIFFERENTIAL OIL SEAL DIFFERENTIAL REAR(B265) DIFFERENTIAL REAR(B305)	CARRIER	ASSY

PREPARATION - DIFFERENTIAL

	09504-00011	Differential Side Bearing Adjusting Nut Wrench	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
	09506-35010	Differential Drive Pinion Rear Bearing Replacer	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
	09518-36020	Rear Axle Hub Oil Seal Replacer	DIFFERENTIAL REAR(SH13)	CARRIER	ASSY
	09527-17011	Rear Axle Shaft Bearing Remover	DIFFERENTIAL REAR(B305)	CARRIER	ASSY
	09608-32010	Steering Knuckle Oil Seal Replacer	DIFFERENTIAL REAR(B305)	CARRIER	ASSY
	09710-22021	Front Suspension Bushing Tool Set	DIFFERENTIAL REAR(B305)	CARRIER	ASSY
	(09710-01051)	Lower Arm Bushing Remover	DIFFERENTIAL REAR(B305)	CARRIER	ASSY
	09950-00020	Bearing Remover	DIFFERENTIAL REAR(B305)	CARRIER	ASSY
	09950-00030	Bearing Remover Attachment	DIFFERENTIAL REAR(SH13)	CARRIER	ASSY
	09950-30012	Puller A Set	REAR DIFFERENTIAL OIL SEAL	CARRIER	ASSY
	(09951-03010)	Upper Plate	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
	(09953-03010)	Center Bolt	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
			DIFFERENTIAL REAR(B305)	CARRIER	ASSY

	(09954-03010) Arm	REAR DIFFERENTIAL CARRIER OIL SEAL DIFFERENTIAL CARRIER ASSY REAR(B265) DIFFERENTIAL CARRIER ASSY REAR(B305)
	(09955-03030) Lower Plate 130	REAR DIFFERENTIAL CARRIER OIL SEAL DIFFERENTIAL CARRIER ASSY REAR(B265) DIFFERENTIAL CARRIER ASSY REAR(B305)
	(09956-03040) Adapter 22	DIFFERENTIAL CARRIER ASSY REAR(B265)
	(09956-03050) Adapter 24	REAR DIFFERENTIAL CARRIER OIL SEAL DIFFERENTIAL CARRIER ASSY REAR(B305)
	09950-40011 Puller B Set	DIFFERENTIAL CARRIER ASSY REAR(B265) DIFFERENTIAL CARRIER ASSY REAR(B305)
	(09951-04010) Hanger 150	DIFFERENTIAL CARRIER ASSY REAR(B265)
	(09951-04020) Hanger 200	DIFFERENTIAL CARRIER ASSY REAR(B305)
	(09952-04010) Slide Arm	DIFFERENTIAL CARRIER ASSY REAR(B265) DIFFERENTIAL CARRIER ASSY REAR(B305)
	(09953-04020) Center Bolt 150	DIFFERENTIAL CARRIER ASSY REAR(B305)
	(09953-04030) Center Bolt 200	DIFFERENTIAL CARRIER ASSY REAR(B265)
	(09954-04010) Arm 25	DIFFERENTIAL CARRIER ASSY REAR(B265) DIFFERENTIAL CARRIER ASSY REAR(B305)
	(09955-04061) Claw No.6	DIFFERENTIAL CARRIER ASSY REAR(B265) DIFFERENTIAL CARRIER ASSY REAR(B305)
	(09957-04010) Attachment	DIFFERENTIAL CARRIER ASSY REAR(B265) DIFFERENTIAL CARRIER ASSY REAR(B305)

PREPARATION - DIFFERENTIAL

	(09958-04011) Holder	DIFFERENTIAL REAR(B265) DIFFERENTIAL REAR(B305)	CARRIER	ASSY
	09950-60010 Replacer Set	DIFFERENTIAL REAR(B265) DIFFERENTIAL REAR(B305)	CARRIER	ASSY
	(09951-00480) Replacer 48	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
	(09951-00500) Replacer 50	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
	(09951-00560) Replacer 56	DIFFERENTIAL REAR(B305)	CARRIER	ASSY
	09950-60020 Replacer Set No.2	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
	(09951-00680) Replacer 68	DIFFERENTIAL REAR(SH13)	CARRIER	ASSY
	(09951-00780) Replacer 78	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
	(09951-01030) Replacer 103	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
	09950-70010 Handle Set	DIFFERENTIAL REAR(B265)	CARRIER	ASSY
	(09951-07150) Handle 150	DIFFERENTIAL REAR(B265)	CARRIER	ASSY

Equipment

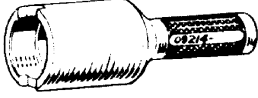


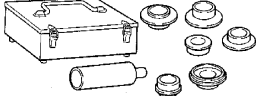
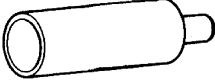


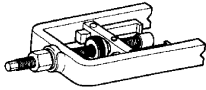
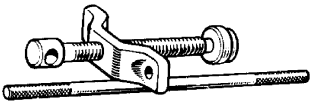
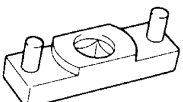
Dial indicator with magnetic base	
Press	
Snap ring expander	
Torque wrench	
Vise	

DRIVE SHAFT / PROPELLER SHAFT

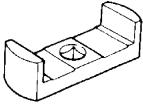
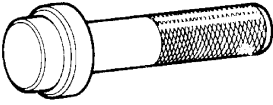
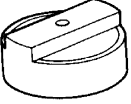
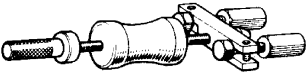
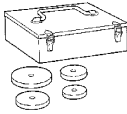
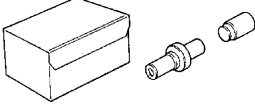
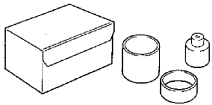
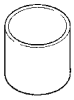
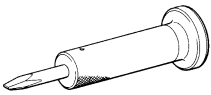
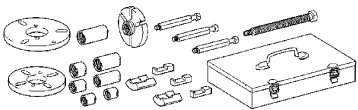



PREPARATION

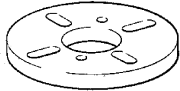
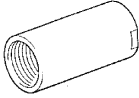

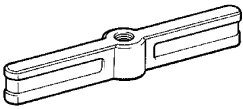
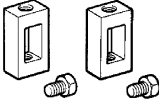
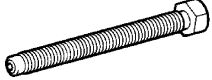
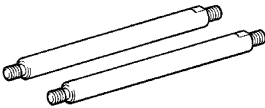
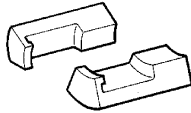

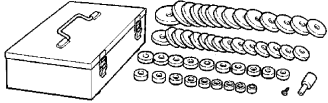

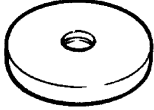
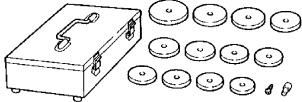
022EW-01

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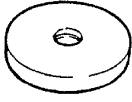
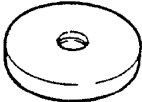
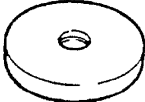
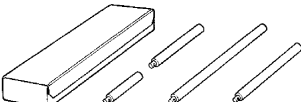



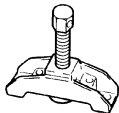


	09214-76011	Crankshaft Pulley Replacer	REAR AXLE HUB LH(5 HUB BOLTS) REAR AXLE HUB LH(6 HUB BOLTS)
	09308-00010	Oil Seal Puller	REAR AXLE HUB LH(5 HUB BOLTS) REAR AXLE SHAFT(5 HUB BOLTS) FRONT AXLE HUB SUB-ASSY LH(5-BOLTS DRUM BRAKE) REAR AXLE SHAFT(6 HUB BOLTS) FRONT AXLE HUB SUB-ASSY LH(6-BOLTS DRUM BRAKE) PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE) FRONT AXLE HUB SUB-ASSY LH(DISC BRAKE)
	09309-37010	Transmission Bearing Replacer	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	09316-60011	Transmission & Transfer Bearing Replacer	FRONT AXLE HUB SUB-ASSY LH(5-BOLTS DRUM BRAKE) PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	(09316-00011)	Replacer Pipe	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	09325-20010	Transmission Oil Plug	PROPELLER INTERMEDIATE SHAFT ASSY(LE-TYPE)
	09330-00021	Companion Flange Holding Tool	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	09332-25010	Propeller Shaft Center Bearing Replacer	PROPELLER SHAFT ASSY(B-TYPE) PROPELLER SHAFT ASSY(LE-TYPE) PROPELLER INTERMEDIATE SHAFT ASSY(LE-TYPE)
	09510-36010	Rear Hub & Drum Puller	REAR AXLE HUB LH(5 HUB BOLTS) FRONT AXLE HUB SUB-ASSY LH(6-BOLTS DRUM BRAKE) FRONT AXLE HUB SUB-ASSY LH(DISC BRAKE)
	09513-36020	Rear Axle Bearing Lock Nut Wrench	REAR AXLE HUB LH(5 HUB BOLTS)


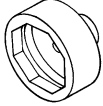
PREPARATION - DRIVE SHAFT / PROPELLER SHAFT

	09513-36030	Rear axle Bearing Lock Nut Wrench	REAR AXLE HUB LH(6 HUB BOLTS)
	09517-36010	Rear Axle Shaft Oil Seal Replacer-	REAR AXLE SHAFT(5 HUB BOLTS) REAR AXLE SHAFT(6 HUB BOLTS)
	09518-36020	Rear Axle Hub Oil Seal Replacer	REAR AXLE HUB LH(5 HUB BOLTS)
	09520-00031	Rear Axle Shaft Puller	REAR AXLE HUB LH(6 HUB BOLTS)
	09550-55011	Differential Replacer Set	REAR AXLE HUB LH(6 HUB BOLTS)
	09601-37011	King Pin Bushing Remover & Replacer	STEERING KNUCKLE LH(5 HUB BOLTS) STEERING KNUCKLE LH(6 HUB BOLTS)
	09710-28021	Front Suspension Bushing Tool Set	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	(09710-08031)	Base	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	09930-00010	Drive Shaft Nut Chisel	PROPELLER INTERMEDIATE SHAFT ASSY(LE-TYPE)
	09950-30012	Puller A Set	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	(09951-03010)	Upper Plate	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	(09953-03010)	Center Bolt	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	(09954-03010)	Arm	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)

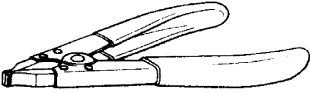
	(09955-03030) Lower Plate 130	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	(09956-03030) Adaptor 20	PROPELLER INTERMEDIATE SHAFT ASSY(B-TYPE)
	09950-40011 Puller B Set	REAR AXLE HUB LH(6 HUB BOLTS)
	(09951-04020) Hanger 200	REAR AXLE HUB LH(6 HUB BOLTS)
	(09952-04010) Slide Arm	REAR AXLE HUB LH(6 HUB BOLTS)
	(09953-04020) Center Bolt 150	REAR AXLE HUB LH(6 HUB BOLTS)
	(09954-04030) Arm 150	REAR AXLE HUB LH(6 HUB BOLTS)
	(09955-04021) Claw No.2	REAR AXLE HUB LH(6 HUB BOLTS)
	(09957-04010) Attachment	REAR AXLE HUB LH(6 HUB BOLTS)
	09950-60010 Replacer Set	STEERING KNUCKLE LH(6 HUB BOLTS) REAR AXLE HUB LH(6 HUB BOLTS)
	(09951-00410) Replacer 41	STEERING KNUCKLE LH(6 HUB BOLTS)
	(09951-00580) Replacer 58	REAR AXLE HUB LH(6 HUB BOLTS)
	09950-60020 Replacer Set No.2	FRONT AXLE HUB SUB-ASSY LH(5-BOLTS DRUM BRAKE)

PREPARATION - DRIVE SHAFT / PROPELLER SHAFT

	(09951-00720) Replacer 72	FRONT AXLE HUB SUB-ASSY LH(5-BOLTS DRUM BRAKE)
	(09951-00890) Replacer 89	FRONT AXLE HUB SUB-ASSY LH(5-BOLTS DRUM BRAKE)
	(09951-01030) Replacer 103	FRONT AXLE HUB SUB-ASSY LH(5-BOLTS DRUM BRAKE)
	09950-70010 Handle Set	STEERING KNUCKLE LH(5 HUB BOLTS) REAR AXLE HUB LH(5 HUB BOLTS) FRONT AXLE HUB SUB-ASSY LH(5-BOLTS DRUM BRAKE) STEERING KNUCKLE LH(6 HUB BOLTS) REAR AXLE HUB LH(6 HUB BOLTS) FRONT AXLE HUB SUB-ASSY LH(6-BOLTS DRUM BRAKE) FRONT AXLE HUB SUB-ASSY LH(DISC BRAKE)
	(09951-07150) Handle 150	STEERING KNUCKLE LH(5 HUB BOLTS) REAR AXLE HUB LH(5 HUB BOLTS) FRONT AXLE HUB SUB-ASSY LH(5-BOLTS DRUM BRAKE) STEERING KNUCKLE LH(6 HUB BOLTS) REAR AXLE HUB LH(6 HUB BOLTS) FRONT AXLE HUB SUB-ASSY LH(6-BOLTS DRUM BRAKE) FRONT AXLE HUB SUB-ASSY LH(DISC BRAKE)
	(09951-07200) Handle 200	STEERING KNUCKLE LH(6 HUB BOLTS)
	09951-01100 Replacer 110	REAR AXLE HUB LH(5 HUB BOLTS)
	09650-2051 Wheel Hub Puller	FRONT AXLE HUB (6 hub bolts) REAR AXLE HUB (6 hub bolts)
	09519-25010 Hub Bearing Replacer	FRONT AXLE HUB SKID SENSOR
	09657-1131 Guide	STEERING KNUCKLE (6 hub bolts)

	09785-36010 ABS Speed Sensor Rotor Replacer	REAR AXLE HUB SKID SENSOR
	09839-9401 Socket Wrench	REAR AXLE HUB (6 hub bolts)

Recommended Tools

	09905-00012 Snap Ring No.1 Expander	
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Equipment

Chisel	
Dial indicator with magnetic base	
Feeler gauge	
Micrometer	
MP grease	
Plastic hammer	
Press	
Spring tension gauge	
Snap ring pliers	
Torque wrench	
Vise	

SSM

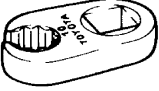



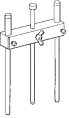
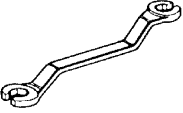
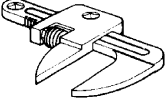
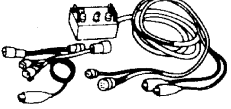

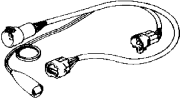
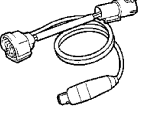

08833-00100 THREE BOND 1360K or equivalent	
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BRAKE

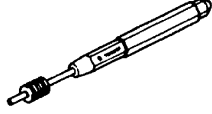
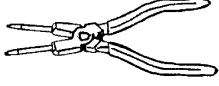
PREPARATION

SST

022EE-01

	09023-00100	Union Nut Wrench 10 mm	BRAKE FLUID BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY REAR BRAKE ABS & TRACTION ACTUATOR ASSY
	09608-04031	Front Hub Inner Bearing Cone Replacer	VACUUM PUMP ASSY(14B, 15B-FTE) VACUUM PUMP ASSY(S05C-B, S05C-TA, S05C-TB)
	09703-30010	Brake Shoe Return Spring Tool	FRONT BRAKE REAR BRAKE
	09718-00010	Shoe Hold Down Spring Driver	FRONT BRAKE REAR BRAKE
	09737-00012	Brake Booster Push Rod Gauge	BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY
	09751-36011	Brake Line Union Nut 10 x 12 mm Wrench	LOAD SENSING PROPORTIONING VALVE (LSPV)
	09922-10010	Variable Open Wrench	BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY
	09990-00150	ABS Actuator Checker and Sub-harness	ABS & TRACTION ACTUATOR ASSY
	09990-00250	ABS Actuator Checker Sub-harness "G"	ABS & TRACTION ACTUATOR ASSY
	09990-00300	ABS Actuator Checker Sub-harness "I"	ABS & TRACTION ACTUATOR ASSY
	09990-00360	ABS Actuator Checker Sub-harness "L"	ABS & TRACTION ACTUATOR ASSY
	09709-29018	Fluid Pressure Gauge	LOAD SENSING PROPORTIONING VALVE (LSPV)

Recommended Tools

	09031-00040 Pin Punch .	VACUUM PUMP ASSY(14B, 15B-FTE) VACUUM PUMP ASSY(S05C-B, S05C-TA, S05C-TB)
	09905-00013 Snap Ring Pliers	VACUUM PUMP ASSY(14B, 15B-FTE) VACUUM PUMP ASSY(S05C-B, S05C-TA, S05C-TB) VACUUM PUMP ASSY(W04D-J)

Equipment

Brake drum gauge	
Dial indicator or dial indicator with magnetic base	
Micrometer	
Press	
Ruler	
Torque wrench	
Vernier calipers	

Lubricant


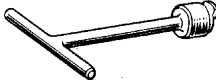
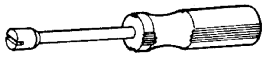

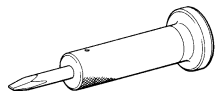
Item	Capacity	Classification
Brake fluid	-	SAE J 1703 or FMVSS No. 116 DOT 3

PARKING BRAKE

PREPARATION

022ED-01

SST

	<p>09703-30010 Brake Shoe Return Spring Tool</p>	<p>PARKING BRAKE CABLE ASSY NO.3 PARKING BRAKE ASSY</p>
	<p>09717-20010 Brake Shoe Return Spring Remover</p>	<p>PARKING BRAKE CABLE ASSY NO.3 PARKING BRAKE ASSY</p>
	<p>09718-00010 Shoe Hold Down Spring Driver</p>	<p>PARKING BRAKE CABLE ASSY NO.3 PARKING BRAKE ASSY</p>
	<p>09718-20010 Brake Shoe Return Spring Replacer</p>	<p>PARKING BRAKE ASSY</p>
	<p>09930-00010 Drive Shaft Nut Chisel</p>	<p>PARKING BRAKE CABLE ASSY NO.3 PARKING BRAKE ASSY</p>

Equipment

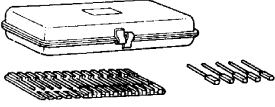
<p>Brake drum gauge</p>	
<p>Chisel</p>	
<p>Torque wrench</p>	
<p>Vernier calipers</p>	

EXHAUST BRAKE

PREPARATION

022EC-01

SST

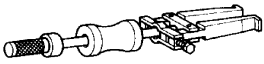
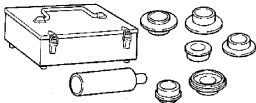
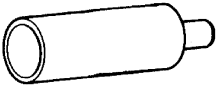
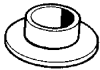
	09240-00020 Wire Gauge Set	EXHAUST RETARDER ASSY
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MANUAL TRANSMISSION/TRANSAXLE

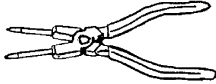
PREPARATION

022EX-01

SST

	09308-00010 Oil Seal Puller	REAR BEARING RETAINER OIL SEAL
	09316-60011 Transmission & Transfer Bearing Replacer	REAR BEARING RETAINER OIL SEAL
	(09316-00011) Replacer Pipe	REAR BEARING RETAINER OIL SEAL
	(09316-00041) Replacer "C"	REAR BEARING RETAINER OIL SEAL

Recommended Tools

	09905-00013 Snap Ring Pliers	FLOOR SHIFT ASSY
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Equipment

Torque wrench	
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Lubricant

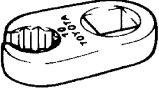
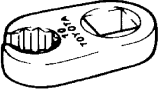
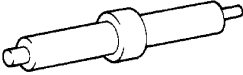
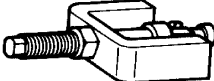
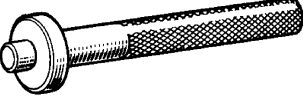

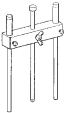
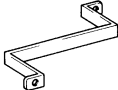
Item	Capacity	Classification
Manual transmission oil (M150/153)	3.2 liters (3.4 US qts, 2.8 Imp. qts)	API GL-4 or GL-5 SAE 75W-90
Manual transmission oil (H350/H351/H260)	4.2 liters (4.4 US qts, 3.7 Imp. qts)	API GL-4 or GL-5 SAE 75W-90

CLUTCH

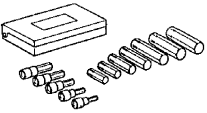
PREPARATION

SST

022EY-01

	09023-00100	Union Nut Wrench 10 mm	CLUTCH RELEASE CYLINDER ASSY
	09023-38200	Union Nut Wrench 12mm	CLUTCH MASTER CYLINDER ASSY
	09301-00110	Clutch Guide Tool	CLUTCH UNIT
	09303-35011	Input Shaft Front Bearing Puller	CLUTCH UNIT
	09304-12012	Input Shaft Front Bearing Replacer	CLUTCH UNIT
	09333-00013	Universal Joint Bearing Remover & Replacer	CLUTCH UNIT
	09737-00012	Brake Booster Push Rod Gauge	CLUTCH W/AIR CLEANER BOOSTER ASSY(W/ BOOSTER)
	09737-00020	Brake Booster Push Rod Wrench	CLUTCH W/AIR CLEANER BOOSTER ASSY(W/ BOOSTER)

Recommended Tools

	09040-00011	Hexagon Wrench Set	CLUTCH PEDAL SUB-ASSY(W/ BOOSTER) CLUTCH PEDAL SUB-ASSY(W/O BOOSTER)
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Equipment

Dial indicator with magnetic base	
Lithium soap base glycol grease	
MP grease	
Snap ring pliers	
Torque wrench	
Vernier calipers	

Lubricant

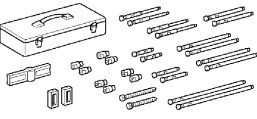
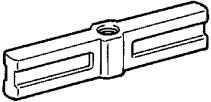
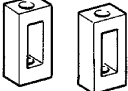

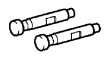
Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116 DOT3

STEERING COLUMN

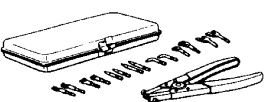
PREPARATION

022EG-01

SST

	<p>09950-50013 Puller C Set</p>	<p>STEERING COLUMN ASSY</p>
	<p>(09951-05010) Hanger 150</p>	<p>STEERING COLUMN ASSY</p>
	<p>(09952-05010) Slide Arm</p>	<p>STEERING COLUMN ASSY</p>
	<p>(09953-05010) Center Bolt 100</p>	<p>STEERING COLUMN ASSY</p>
	<p>(09954-05021) Claw No.2</p>	<p>STEERING COLUMN ASSY</p>

Recommended Tools

	<p>09904-00010 Expander Set</p>	<p>STEERING COLUMN ASSY</p>
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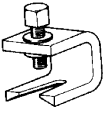

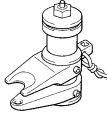
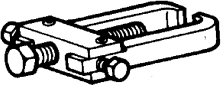
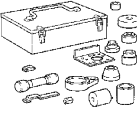

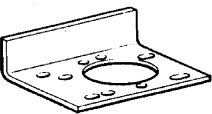
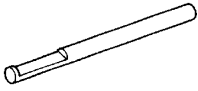
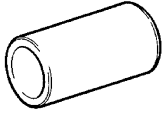
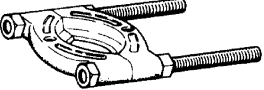
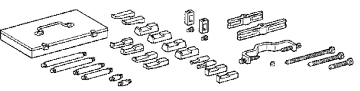
Equipment

<p>Centering punch</p>	
<p>Screw extractor</p>	

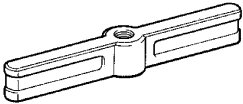
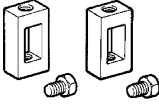
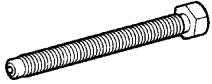
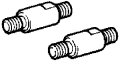
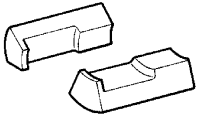
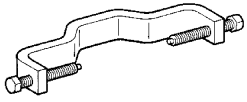
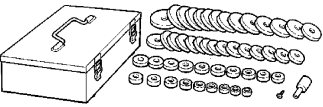



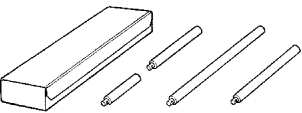


POWER STEERING**PREPARATION**

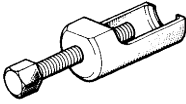
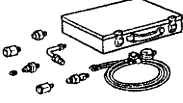


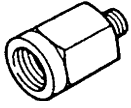
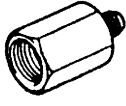

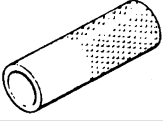

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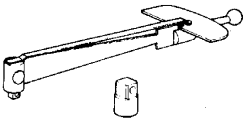
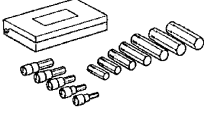
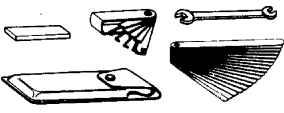
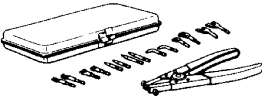
	09023-12700	Union Nut Wrench 17mm	POWER STEERING GEAR ASSY
	09611-36020	Tie Rod End Puller	STEERING LINKAGE
	09616-00011	Steering Worm Bearing Adjusting Socket	POWER STEERING GEAR ASSY
	09628-00011	Ball Joint Puller	STEERING LINKAGE
	09628-62011	Ball Joint Puller	POWER STEERING GEAR ASSY STEERING LINKAGE
	09630-00014	Power Steering Gear Housing Overhaul Tool Set	POWER STEERING GEAR ASSY
	(09631-00051)	No.3 Wrench	POWER STEERING GEAR ASSY
	(09631-00142)	Overhaul Stand	POWER STEERING GEAR ASSY
	09631-10030	Oil Seal Remover	VANE PUMP ASSY(14B)
	09632-36010	Steering Vane Pump Bearing Replacer	VANE PUMP ASSY(14B) VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB) VANE PUMP ASSY(W04D-J)
	09950-00020	Bearing Remover	VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB) VANE PUMP ASSY(W04D-J)
	09950-40011	Puller B Set	POWER STEERING GEAR ASSY

PREPARATION - POWER STEERING

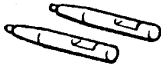
	(09951-04020) Hanger 200	POWER STEERING GEAR ASSY
	(09952-04010) Slide Arm	POWER STEERING GEAR ASSY
	(09953-04020) Center Bolt 150	POWER STEERING GEAR ASSY
	(09954-04010) Arm 25	POWER STEERING GEAR ASSY
	(09955-04031) Claw No.3	POWER STEERING GEAR ASSY
	(09958-04011) Holder	POWER STEERING GEAR ASSY
	09950-60010 Replacer Set	VANE PUMP ASSY(14B) VANE PUMP ASSY(15B-FTE) VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB) VANE PUMP ASSY(W04D-J)
	(09951-00300) Replacer 30	VANE PUMP ASSY(15B-FTE) VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB)
	(09951-00310) Replacer 31	VANE PUMP ASSY(14B)
	(09951-00320) Replacer 32	VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB) VANE PUMP ASSY(W04D-J)
	09950-70010 Handle Set	VANE PUMP ASSY(14B) VANE PUMP ASSY(15B-FTE) VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB) VANE PUMP ASSY(W04D-J)
	(09951-00320) Replacer 32	VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB) VANE PUMP ASSY(W04D-J)
	(09951-07100) Handle 100	VANE PUMP ASSY(14B) VANE PUMP ASSY(15B-FTE) VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB) VANE PUMP ASSY(W04D-J)

	09610-20012	Pitman Arm Puller	STEERING LINKAGE
	09640-10010	Power Steering Pressure Gauge Set	POWER STEERING SYSTEM
	(09641-01010)	Gauge Assy	POWER STEERING SYSTEM
	(09641-01030)	Attachment B	POWER STEERING SYSTEM
	(09641-01040)	Attachment C	POWER STEERING SYSTEM
	(09641-01060)	Attachment E	POWER STEERING SYSTEM
	09434-1110	Oil Seal Press	VANE PUMP ASSY
	09434-1130	Bearing Press	VANE PUMP ASSY
	09434-1140	Bearing Press	VANE PUMP ASSY

Recommended Tools

	09025-00010	Torque Wrench (30 kgf-cm)	POWER STEERING GEAR ASSY VANE PUMP ASSY(15B-FTE) VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB)
	09040-00011	Hexagon Wrench Set	POWER STEERING GEAR ASSY VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB)
	09200-00010	Engine Adjust Kit	VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB)
	09904-00010	Expander Set	VANE PUMP ASSY(15B-FTE) VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB)

PREPARATION - POWER STEERING

 <p>(09904-00040) No. 3 Claw</p>	<p>VANE PUMP ASSY(15B-FTE) VANE PUMP ASSY(S05C-B, S05C-TA, S05C-TB)</p>
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Equipment

Caliper gauge	
Chisel	
Dial indicator	
Feeler gauge	
Micrometer	
Press	
Torque wrench	
Vernier calipers	
Wooden block	

Lubricant

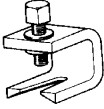
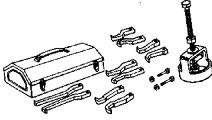
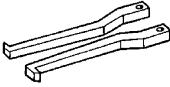
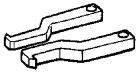
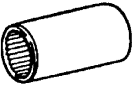


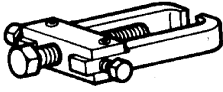
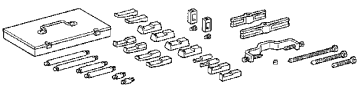
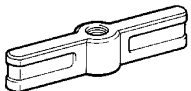
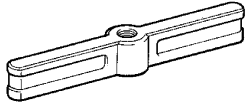
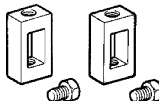
Item	Capacity	Classification
Power steering fluid (Total)	-	ATF DEXRON® II or III

MANUAL STEERING

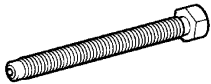
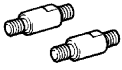
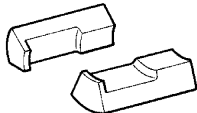
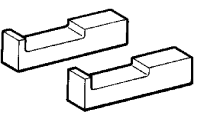
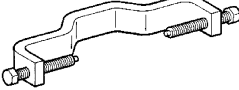
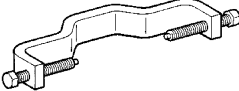
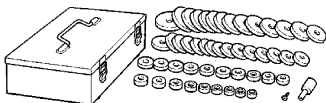




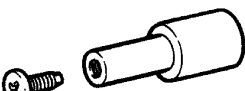
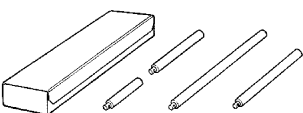
PREPARATION


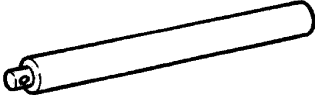
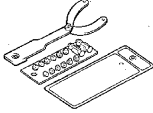
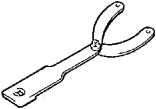

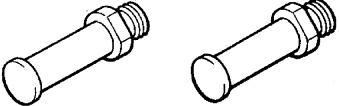
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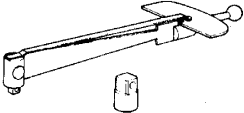
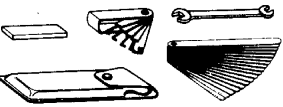
	09611-36020	Tie Rod End Puller	STEERING LINKAGE(STANDARD CAB MODELS) STEERING LINKAGE(WIDE CAB MODELS)
	09612-65014	Steering Worm Bearing Puller	STEERING GEAR HOUSING ASSY
	(09612-01030)	Claw "C"	STEERING GEAR HOUSING ASSY
	(09612-01040)	Claw "D"	STEERING GEAR HOUSING ASSY
	09616-00011	Steering Worm Bearing Adjusting Socket	STEERING GEAR HOUSING ASSY
	09617-60010	Worm Bearing Adjusting Screw Lock Nut Wrench	STEERING GEAR HOUSING ASSY
	09628-00011	Ball Joint Puller	STEERING LINKAGE(STANDARD CAB MODELS) STEERING LINKAGE(WIDE CAB MODELS)
	09628-62011	Ball Joint Puller	STEERING LINKAGE(STANDARD CAB MODELS) STEERING LINKAGE(WIDE CAB MODELS)
	09950-40011	Puller B Set	STEERING GEAR HOUSING ASSY
	(09951-04010)	Hanger 150	STEERING GEAR HOUSING ASSY
	(09951-04020)	Hanger 200	STEERING GEAR HOUSING ASSY
	(09952-04010)	Slide Arm	STEERING GEAR HOUSING ASSY

PREPARATION - MANUAL STEERING

	(09953-04020) Center Bolt 150	STEERING GEAR HOUSING ASSY
	(09954-04010) Arm 25	STEERING GEAR HOUSING ASSY
	(09955-04031) Claw No.3	STEERING GEAR HOUSING ASSY
	(09955-04051) Claw No.5	STEERING GEAR HOUSING ASSY
	(09958-04010) Holder (J)	STEERING GEAR HOUSING ASSY
	(09958-04011) Holder	STEERING GEAR HOUSING ASSY
	09950-60010 Replacer Set	STEERING GEAR HOUSING ASSY
	(09951-00180) Replacer 18	STEERING GEAR HOUSING ASSY
	(09951-00310) Replacer 31	STEERING GEAR HOUSING ASSY
	(09951-00520) Replacer 52	STEERING GEAR HOUSING ASSY
	(09951-00550) Replacer 55	STEERING GEAR HOUSING ASSY
	(09952-06010) Adapter	STEERING GEAR HOUSING ASSY
	09950-70010 Handle Set	STEERING GEAR HOUSING ASSY

	(09951-07100) Handle 100	STEERING GEAR HOUSING ASSY
	(09951-07200) Handle 200	STEERING GEAR HOUSING ASSY
	09960-10010 Variable Pin Wrench Set	STEERING GEAR HOUSING ASSY
	(09962-01000) Variable Pin Wrench Arm Assy	STEERING GEAR HOUSING ASSY
	(09963-00600) Pin 6	STEERING GEAR HOUSING ASSY
	(09963-01000) Pin 10	STEERING GEAR HOUSING ASSY

Recommended Tools

	09025-00010 Torque Wrench (30 kgf-cm)	STEERING GEAR HOUSING ASSY
	09200-00010 Engine Adjust Kit	STEERING GEAR HOUSING ASSY

SSM

	08833-00080 Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	STEERING GEAR HOUSING ASSY
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Equipment


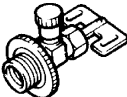
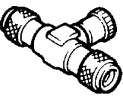


Caliper gauge	
Chisel	
Dial indicator	
Micrometer	
Press	
Torque wrench	


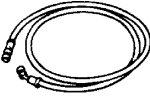
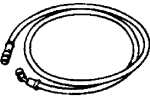
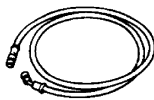
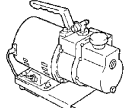
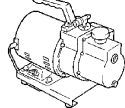
HEATER & AIR CONDITIONER

PREPARATION

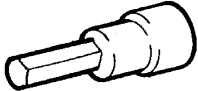

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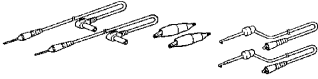


	<p>07110-58060 Air Conditioner Service Tool Set</p>	<p>REFRIGERANT CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT HEATER RADIATOR ASSY COOLER COMPRESSOR ASSY(15B-FTE) COOLER COMPRESSOR ASSY(S05C-B, S05C-TA, S05C-TB) COOLER COMPRESSOR ASSY(W04D-J)</p>
	<p>(07117-58060) Refrigerant Drain Service Valve</p>	<p>REFRIGERANT CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT HEATER RADIATOR ASSY COOLER COMPRESSOR ASSY(15B-FTE) COOLER COMPRESSOR ASSY(S05C-B, S05C-TA, S05C-TB) COOLER COMPRESSOR ASSY(W04D-J)</p>
	<p>(07117-58070) T-Joint</p>	<p>REFRIGERANT CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT HEATER RADIATOR ASSY COOLER COMPRESSOR ASSY(15B-FTE) COOLER COMPRESSOR ASSY(S05C-B, S05C-TA, S05C-TB) COOLER COMPRESSOR ASSY(W04D-J)</p>
	<p>(07117-58080) Quick Disconnect Adapter</p>	<p>REFRIGERANT CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT HEATER RADIATOR ASSY COOLER COMPRESSOR ASSY(15B-FTE) COOLER COMPRESSOR ASSY(S05C-B, S05C-TA, S05C-TB) COOLER COMPRESSOR ASSY(W04D-J)</p>
	<p>(07117-58090) Quick Disconnect Adapter</p>	<p>REFRIGERANT CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT HEATER RADIATOR ASSY COOLER COMPRESSOR ASSY(15B-FTE) COOLER COMPRESSOR ASSY(S05C-B, S05C-TA, S05C-TB) COOLER COMPRESSOR ASSY(W04D-J)</p>

	(07117-78050) Refrigerant Charging Gauge	REFRIGERANT CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT HEATER RADIATOR ASSY COOLER COMPRESSOR ASSY(15B-FTE) COOLER COMPRESSOR ASSY(S05C-B, S05C-TA, S05C-TB) COOLER COMPRESSOR ASSY(W04D-J)
	(07117-88060) Refrigerant Charging Hose	REFRIGERANT CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT HEATER RADIATOR ASSY COOLER COMPRESSOR ASSY(15B-FTE) COOLER COMPRESSOR ASSY(S05C-B, S05C-TA, S05C-TB) COOLER COMPRESSOR ASSY(W04D-J)
	(07117-88070) Refrigerant Charging Hose	REFRIGERANT CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT HEATER RADIATOR ASSY COOLER COMPRESSOR ASSY(15B-FTE) COOLER COMPRESSOR ASSY(S05C-B, S05C-TA, S05C-TB) COOLER COMPRESSOR ASSY(W04D-J)
	(07117-88080) Refrigerant Charging Hose	REFRIGERANT CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT HEATER RADIATOR ASSY COOLER COMPRESSOR ASSY(15B-FTE) COOLER COMPRESSOR ASSY(S05C-B, S05C-TA, S05C-TB) COOLER COMPRESSOR ASSY(W04D-J)
	07117-48130 Vacuum Pump (220 V)	CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT
	07117-48140 Vacuum Pump (240 V)	CONTROL UNIT ASSY HEATER BLOWER ASSY FRONT

Recommended Tools

	(09043-20050) Socket Hexagon Wrench 5	CONTROL UNIT ASSY
	09082-00040 Electrical Tester	AIR CONDITIONING SYSTEM

PREPARATION - HEATER & AIR CONDITIONER

	(09083-00150) Test Lead Set	AIR CONDITIONING SYSTEM
	(09083-00150) Test Lead Set	AIR CONDITIONING SYSTEM
	95416-00140 Gas Leak Detector (Halogen Leak Detector) (DENSO Part No.)	REFRIGERANT HEATER RADIATOR ASSY COOLER COMPRESSOR ASSY(15B-FTE) COOLER COMPRESSOR ASSY(S05C-B, S05C-TA, S05C-TB) COOLER COMPRESSOR ASSY(W04D-J)

Equipment

Belt tension gauge	
Dial indicator	
Ohmmeter	
Torque wrench	

Lubricant

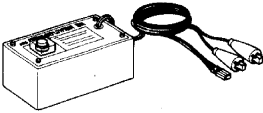
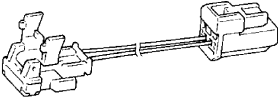
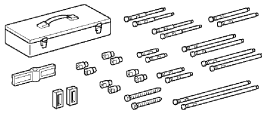
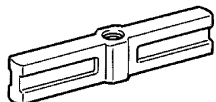
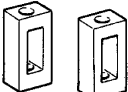
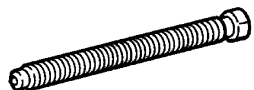
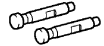
Item	Capacity	Classification
Compressor oil	-	ND-OIL 8 or equivalent

SUPPLEMENTAL RESTRAINT SYSTEM



PREPARATION

022F0-01

SST

	09082-00700	SRS Airbag Deployment Tool	HORN BUTTON ASSY
	09082-00760	Airbag Deployment Wire Sub-harness No.4	HORN BUTTON ASSY
	09950-50013	Puller C Set	SPIRAL CABLE AIRBAG SENSOR ASSY
	(09951-05010)	Hanger 150	SPIRAL CABLE AIRBAG SENSOR ASSY
	(09952-05010)	Slide Arm	SPIRAL CABLE AIRBAG SENSOR ASSY
	(09953-05020)	Center Bolt 150	SPIRAL CABLE AIRBAG SENSOR ASSY
	(09954-05021)	Claw No.2	SPIRAL CABLE AIRBAG SENSOR ASSY

Recommended Tools

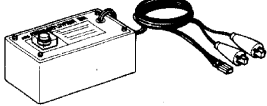
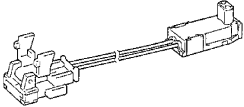
	09042-00010	Torx Socket T30	SPIRAL CABLE SUB-ASSY HORN BUTTON ASSY AIR BAG SENSOR ASSY NO.2
	09042-00020	Torx Socket T40	AIR BAG SENSOR ASSY NO.2

Equipment

Torque wrench	
Bolt Length: 35.0 mm (1.387 in.) Pitch: 1.0 mm (0.039 in.) Diam.: 6.0 mm (0.236 in.)	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposal
Vinyl bag	Airbag disposal

SEAT BELT PREPARATION SST

022EL-01

	<p>09082-00700 SRS Airbag Deployment Tool</p>	<p>FRONT SEAT BELT</p>
	<p>09082-00740 Airbag Deployment Wire Sub-harness No.2</p>	<p>FRONT SEAT BELT</p>

Equipment

<p>Torque wrench</p>	
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WINDSHIELD/WINDOWGLASS/MIRROR

022EN-01

PREPARATION

Equipment

Torque wrench	
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SSM

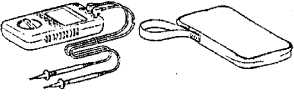
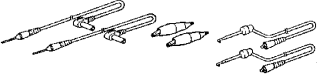
08850-00801	Windshield Glass Adhesive Set or equivalent	WINDSHIELD GLASS BACK WINDOW GLASS
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INSTRUMENT PANEL/METER

022EQ-01

PREPARATION

Recommended Tools

	09082-00040 Electrical Tester	COMBINATION METER
	(09083-00150) Test Lead Set	COMBINATION METER

Equipment

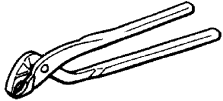
Torque wrench	
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SEAT

PREPARATION

SST

022EM-01

	09130-00160 Hog Ring Pliers	FRONT SEAT ASSEMBLY (DRIVER SEAT) FRONT SEAT ASSEMBLY (PASSENGER SEAT)(STANDARD CAB MODELS) FRONT SEAT ASSEMBLY (PASSENGER SEAT)(WIDE CAB MODELS)
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Equipment

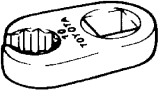
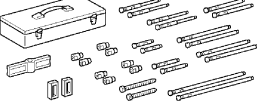

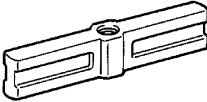
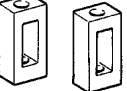

Torque wrench	
Hog ring	
Tape	To avoid surface damage

ENGINE HOOD/DOOR

PREPARATION

022EP-01

SST

	09023-00100 Union Nut Wrench 10 mm	TILT CAB TUBE SUB-ASSY NO.1
	09950-50013 Puller C Set	TILT CAB TUBE SUB-ASSY NO.1
	(09954-05021) Claw No.2	TILT CAB TUBE SUB-ASSY NO.1
	(09951-05010) Hanger 150	TILT CAB TUBE SUB-ASSY NO.1
	(09952-05010) Slide Arm	TILT CAB TUBE SUB-ASSY NO.1
	(09953-05010) Center Bolt 100	TILT CAB TUBE SUB-ASSY NO.1

Recommended Tools

	09041-00020 Torx Driver T25	FRONT DOOR
	09042-00010 Torx Socket T30	FRONT DOOR
	09042-00020 Torx Socket T40	FRONT DOOR
	09904-00010 Expander Set	TILT CAB TUBE SUB-ASSY NO.1
	(09904-00020) No. 1 Claw	TILT CAB TUBE SUB-ASSY NO.1

Equipment


Torque wrench	
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EXTERIOR/INTERIOR TRIM

PREPARATION

022EO-01

Recommended Tools

	09070-20010 Moulding Remover	ROOF HEADLINING ASSY
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Equipment

Torque wrench	
Clip remover	
Cleaner	
Heat light	
Tape	To avoid surface damage.

POWER TAKE-OFF

PREPARATION

022ES-01

Equipment

Torque wrench	
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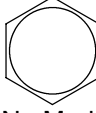
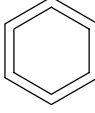
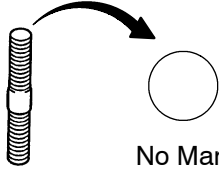
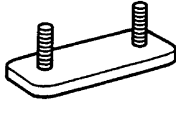

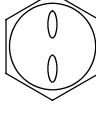
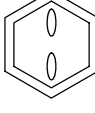

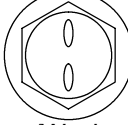














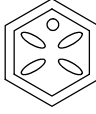


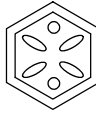
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STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

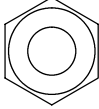
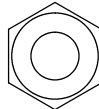
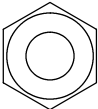

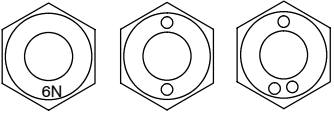
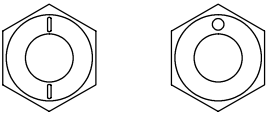
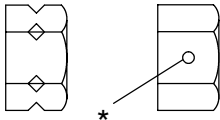
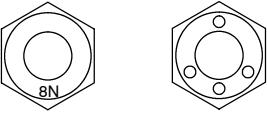
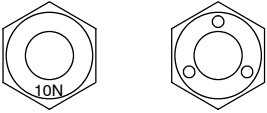
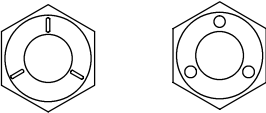

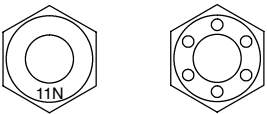
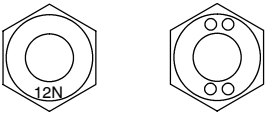
030Y3-03

Bolt Type				Class
Hexagon Head Bolt		Stud Bolt	Weld Bolt	
Normal Recess Bolt	Deep Recess Bolt			
  No Mark	 No Mark	 No Mark		4T
 				5T
  w/Washer	 w/Washer			6T
 	 			7T
		 		8T
				9T
	 			10T
	 			11T

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N·m	kgf·cm	ft·lbf	N·m	kgf·cm	ft·lbf
4T	6	1	5	55	48 in.·lbf	6	60	52 in.·lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	-	-	-
5T	6	1	6.5	65	56 in.·lbf	7.5	75	65 in.·lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	-	-	-
6T	6	1	8	80	69 in.·lbf	9	90	78 in.·lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	-	-	-
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	-	-	-
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

HOW TO DETERMINE NUT STRENGTH

Present Standard Hexagon Nut	Nut Type		Class
	Old Standard Hexagon Nut		
	Cold Forging Nut	Cutting Processed Nut	
 No Mark			4N
 No Mark (w/Washer)	 No Mark (w/Washer)	 No Mark	5N (4T)
			6N
			7N (5T)
			8N
		 No Mark	10N (7T)
			11N
			12N

*: Nut with 1 or more marks on one side surface of the nut.

HINT:

Use the nut with the same number of the nut strength classification or the greater than the bolt strength classification number when tightening parts with a bolt and nut.

Example: Bolt = 4T

Nut = 4N or more

ENGINE CONTROL SYSTEM

031C6-01

SERVICE DATA**15B-FTE:**

Throttle control motor resistance	at 20°C (68°F)	72 – 88 Ω
Timing control valve resistance	at 20°C (68°F)	10 – 14 Ω
Spill control valve resistance	at 20°C (68°F)	1 – 3 Ω
Engine speed sensor resistance	at 20°C (68°F)	1 – 3 Ω
Crankshaft position sensor resistance	Cold	19 – 32 Ω
	Hot	24 – 37 Ω

S05C-B:

Accelerator pedal	Pedal play	1.5 – 4.0 mm (0.06 – 0.16 in.)
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S05C-TA:

Accelerator pedal	Pedal play	1.5 – 4.0 mm (0.06 – 0.16 in.)
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W04D-J:

Accelerator pedal	Pedal play	1.5 – 4.0 mm (0.06 – 0.16 in.)
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TORQUE SPECIFICATION**15B-FTE**

Part Tightened	N·m	kgf·cm	ft·lbf
Crankshaft position sensor x Engine	6.0	60	53 in.·lbf
Throttle body x Intake manifold	21	214	15
Throttle body x Intake heater	6.0	60	53 in.·lbf

S05C-B

Part Tightened	N·m	kgf·cm	ft·lbf
Accelerator pedal assy x Body	5.0	51	44 in.·lbf

S05C-TA

Part Tightened	N·m	kgf·cm	ft·lbf
Accelerator pedal assy x Body	5.0	51	44 in.·lbf

S05C-TB

Part Tightened	N·m	kgf·cm	ft·lbf
Accelerator pedal assy x Body	5.0	51	44 in.·lbf
ECM x Body	5.0	51	44 in.·lbf

W04D-J

Part Tightened	N·m	kgf·cm	ft·lbf
Accelerator pedal assy x Body	5.0	51	44 in.·lbf

FUEL

SERVICE DATA

030Y1-03

14B

Injection pump (Overhaul)	Part No.	w/o HAC, w/o Engine speed sensor w/o HAC, w/o Engine speed sensor w/o HAC, w/ Engine speed sensor w/ HAC, w/o Engine speed sensor w/ HAC, w/ Engine speed sensor w/ HAC, w/ Engine speed sensor w/ HAC, w/ Engine speed sensor	22100-5C680 22100-5C690 for supply part 22100-56450 22100-56460 22100-56470 22100-56480 for supply part 22100-56490 for supply part			
	Direction of rotation injection order		Clockwise as seen from drive side 1 - 3 - 4 - 2 (A - B - C - D)			
	Plunger spring deviation	Maximum	2.0 mm (0.079 in.)			
	Spring free length					
	Delivery valve spring		19.4 mm (0.764 in.)			
	Plunger spring		32.4 mm (1.276 in.)			
	Coupling spring		15.4 mm (0.606 in.)			
	Pneumatic bellows spring (w/ HAC)		30.0 mm (1.181 in.)			
	Roller height variation	Maximum	0.02 mm (0.0008 in.)			
	Fuel cut solenoid resistance	at 20°C (68°F)	9.5 - 11.9 Ω			
	Engine speed sensor resistance	at 20°C (68°F)	650 - 970 Ω			
	Timer adjusting screw protrusion pre-setting		7.5 - 8.0 mm (0.295 - 0.315 in.)			
Plunger spring shim thickness			0.5 mm (0.020 in.) 0.8 mm (0.031 in.) 1.0 mm (0.039 in.) 1.2 mm (0.047 in.) 1.5 mm (0.059 in.) 1.8 mm (0.071 in.) 2.0 mm (0.079 in.)			
	Plunger adjusting shim thickness			1.9 mm (0.075 in.) 2.0 mm (0.079 in.) 2.1 mm (0.083 in.) 2.2 mm (0.087 in.) 2.3 mm (0.091 in.) 2.4 mm (0.094 in.) 2.5 mm (0.098 in.) 2.6 mm (0.102 in.) 2.7 mm (0.106 in.) 2.8 mm (0.110 in.) 2.9 mm (0.114 in.)		
		Flyweight holder thrust clearance Governor gear adjusting washer thickness			0.15 - 0.35 mm (0.0059 - 0.0138 in.) 1.05 mm (0.0413 in.) 1.25 mm (0.0492 in.) 1.45 mm (0.0571 in.) 1.65 mm (0.0650 in.) 1.85 mm (0.0728 in.)	
			Governor shaft protrusion		0.5 - 2.0 mm (0.020 - 0.079 in.)	
			Injection pump (Adjustment)	Preparations of pump tester		
				Test nozzle type		DN12SD12 (DENSO)
				Test nozzle opening pressure		14,220 - 15,200 kPa (145 - 155 kgf/cm ² , 2,062 - 2,205 psi)
		Injection pipe				
		Outside diameter			6.0 mm (0.236 in.)	
		Inside diameter			2.0 mm (0.079 in.)	
Length				840 mm (33.07 in.)		
Minimum bending radius		25 mm (0.98 in.) or more				
Fuel temperature		40 - 45°C (104 - 113°F)				
Fuel feeding pressure		20 kPa (0.2 kgf/cm ² , 2.8 psi)				
Fuel cut solenoid voltage		6 V				

SERVICE SPECIFICATIONS - FUEL

Injection pump (Adjustment) (Cont'd)	Pump inner pressure (Adjusting lever maximum position)				
	Pump rpm 400 1,700		216 - 275 kPa (2.2 - 2.8 kgf/cm ² , 31 - 40 psi) 667 - 726 kPa (6.8 - 7.4 kgf/cm ² , 97 - 105 psi)		
Overflow volume (Adjusting lever maximum position)					
Pump rpm 400		650 - 1,083 cc/min. (39.7 - 66.1 cu in./min.)			
Timer piston stroke (w/ HAC)	Pump rpm 1,200	0.20 - 1.20 mm (0.0079 - 0.0472 in.)			
	1,400	3.20 - 4.20 mm (0.1260 - 0.1654 in.)			
	1,700	4.76 - 5.24 mm (0.1874 - 0.2064 in.)			
Timer piston stroke (w/o HAC)	Pump rpm 1,200	0.9 - 1.9 mm (0.0354 - 0.0748 in.)			
	1,500	3.1 - 4.1 mm (0.1220 - 0.1614 in.)			
	1,700	4.76 - 5.24 mm (0.1874 - 0.2064 in.)			
Timer spring free length		56.5 mm (2.224 in.) 57.1 mm (2.248 in.) 57.8 mm (2.276 in.)			
Full load injection volume (w/ HAC)					
Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder		
Plus 21 - 31°	1,100	200	13.0 - 13.6 cc (0.79 - 0.83 cu in.)		
Full load injection volume (w/o HAC)					
Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder		
Plus 21 - 31°	1,100	200	12.4 - 13.0 cc (0.76 - 0.79 cu in.)		
Maximum speed (w/ HAC)					
Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder		
Plus 21 - 31°	2,075	200	3.4 - 5.8 cc (0.21 - 0.35 cu in.)		
	2,250	200	1.2 cc (0.07 cu in.) or less		
Maximum speed (w/o HAC)					
Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder		
Plus 21 - 31°	2,075	200	1.8 - 4.2 cc (0.11 - 0.26 cu in.)		
	2,250	200	1.2 cc (0.07 cu in.) or less		
Injection volume (w/ HAC)					
Adjusting lever angle	Pump rpm	HAC vacuum kPa (mmHg, in.Hg)	No. of measuring strokes	Injection volume of each cylinder	Variation limit
Plus 21 - 31°	100	97.3 kPa (730 mm Hg, 28.73 in.Hg)	200	12.6 - 17.4 cc (0.77 - 1.06 cu in.)	1.4 cc (0.09 cu in.)
	500	97.3 kPa (730 mm Hg, 28.73 in.Hg)	200	9.3 - 10.9 cc (0.57 - 0.67 cu in.)	0.7 cc (0.04 cu in.)
	700	97.3 kPa (730 mm Hg, 28.73 in.Hg)	200	10.6 - 12.2 cc (0.65 - 0.74 cu in.)	0.7 cc (0.04 cu in.)
	900	97.3 kPa (730 mm Hg, 28.73 in.Hg)	200	12.1 - 13.7 cc (0.74 - 0.84 cu in.)	0.7 cc (0.04 cu in.)
	1,100	97.3 kPa (730 mm Hg, 28.73 in.Hg)	200	13.0 - 13.6 cc (0.79 - 0.83 cu in.)	0.7 cc (0.04 cu in.)
		70.7 kPa (530 mm Hg, 20.88 in.Hg)	200	7.8 - 9.8 cc (0.48 - 0.60 cu in.)	-
	1,700	97.3 kPa (730 mm Hg, 28.73 in.Hg)	200	10.0 - 11.6 cc (0.61 - 0.71 cu in.)	0.7 cc (0.04 cu in.)

Injection pump (Adjustment) (Cont'd)	Injection volume (w/o HAC)				
	Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder	
	Plus 21 - 31°	100	200	12.6 - 17.4 cc (0.77 - 1.06 cu in.)	1.4 cc (0.09 cu in.)
		500	200	9.1 - 10.3 cc (0.56 - 0.63 cu in.)	0.7 cc (0.04 cu in.)
		700	200	10.3 - 11.5 cc (0.63 - 0.70 cu in.)	
		900	200	11.7 - 12.9 cc (0.71 - 0.79 cu in.)	
		1,100	200	12.4 - 13.0 cc (0.76 - 0.79 cu in.)	
		1,700	200	10.5 - 11.7 cc (0.64 - 0.71 cu in.)	
	Governor sleeve plug head thickness			3.0 mm (0.118 in.) 3.1 mm (0.122 in.) 3.2 mm (0.126 in.) 3.3 mm (0.130 in.) 3.4 mm (0.134 in.) 3.5 mm (0.138 in.) 3.6 mm (0.142 in.) 3.7 mm (0.146 in.) 3.8 mm (0.150 in.) 3.9 mm (0.154 in.) 4.0 mm (0.157 in.) 4.1 mm (0.161 in.) 4.2 mm (0.165 in.) 4.3 mm (0.169 in.) 4.5 mm (0.177 in.) 4.7 mm (0.185 in.)	
	Idle speed pre-setting (w/ HAC)				
	Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder	
	Minus 12 - 22°	325	200	q = 3.8 - 4.2 cc (0.23 - 0.26 cu in.)	
	Idle speed pre-setting (w/o HAC)				
	Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder	
	Minus 12 - 22°	350	200	q = 4.0 - 4.4 cc (0.24 - 0.27 cu in.)	
	Dash pot injection volume (w/ HAC)				
	Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder	
	Minus 12 - 22°	325	200	q plus 0.14 - 0.46 cc (0.01 - 0.03 cu in.)	
	Dash pot injection volume (w/o HAC)				
	Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder	
	Minus 12 - 22°	350	200	q plus 0.14 - 0.46 cc (0.01 - 0.03 cu in.)	
	Idle speed (w/ HAC)				
	Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder	Variation limit
Minus 12 - 22°	325	200	1.1 - 2.7 cc (0.07 - 0.16 cu in.)	0.5 cc (0.03 cu in.)	
Idle speed (w/o HAC)					
Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder	Variation limit	
Minus 12 - 22°	350	200	1.3 - 2.9 cc (0.08 - 0.18 cu in.)	0.5 cc (0.03 cu in.)	
Adjusting lever moving angle			38 - 48°		

SERVICE SPECIFICATIONS - FUEL

S05C-B

Injection pump (Overhaul)	Camshaft protruding length	STD	16 – 17 mm (0.63 – 0.66 in.)	
	Camshaft end play	STD	0.03 – 0.05 mm (0.0012 – 0.0019 in.)	
	Protrusion of adjusting nut A		-0.4 – 0.2 mm (-0.0015 – 0.007 in.)	
	Damper thrust clearance	STD	0.02 – 0.10 mm (0.0008 – 0.0039 in.)	
	Bearing bolt	STD free play		1.5 – 2.0 mm (0.060 – 0.078 in.)
		Fitting dimension		49.7 – 50.1 mm (1.957 – 1.972 in.)
Thrust clearance B			0.08 – 0.12 mm (0.0032 – 0.0047 in.)	
Timer hub screw	Oil volume		140 – 160 cm ³ (8.54 – 9.76 cu in.)	
Injection pump (Adjustment)	Governor adjustment		L1 = L2 = 25.5 mm (1.00 in.)	
	Injection timing	Injection interval Injection order	89° 45' – 90° 15' 1 – 3 – 4 – 2	

S05C-TA

Injection pump (Overhaul)	Camshaft protruding length	STD	16 – 17 mm (0.63 – 0.66 in.)	
	Camshaft end play	STD	0.03 – 0.05 mm (0.0012 – 0.0019 in.)	
	Protrusion of adjusting nut A		-0.4 – 0.2 mm (-0.0015 – 0.007 in.)	
	Damper thrust clearance	STD	0.02 – 0.10 mm (0.0008 – 0.0039 in.)	
	Bearing bolt	STD free play		1.5 – 2.0 mm (0.060 – 0.078 in.)
		Fitting dimension		49.7 – 50.1 mm (1.957 – 1.972 in.)
Thrust clearance B			0.08 – 0.12 mm (0.0032 – 0.0047 in.)	
Timer hub screw	Oil volume		140 – 160 cm ³ (8.54 – 9.76 cu in.)	
Injection pump (Adjustment)	Governor adjustment		L1 = L2 = 25.5 mm (1.00 in.)	
	Injection timing	Injection interval Injection order	89° 45' – 90° 15' 1 – 3 – 4 – 2	

W04D-J

Injection pump (Overhaul)	Camshaft end play	STD Service limit	0.03 – 0.05 mm (0.0012 – 0.0019 in.) 0.10 mm (0.0039 in.)	
	Protrusion of adjusting nut A		-0.4 – 0.2 mm (-0.0015 – 0.007 in.)	
	Damper thrust clearance	STD	0.02 – 0.10 mm (0.0008 – 0.0039 in.)	
	Bearing bolt	STD free play		1.5 – 2.0 mm (0.060 – 0.078 in.)
		Fitting dimension		49.7 – 50.1 mm (1.957 – 1.972 in.)
		Thrust clearance B		0.08 – 0.12 mm (0.0032 – 0.0047 in.)
Timer cover clearance	Cover side		0.12 – 0.22 mm (0.00472 – 0.00866 in.)	
	Gear side		0.02 – 0.12 mm (0.00079 – 0.00472 in.)	
Injection pump (Adjustment)	Governor adjustment		L1 = L2 = 23.5 mm (0.925 in.)	
	Preparations of pump tester			
	Test nozzle type		12SD12	
	Test nozzle opening pressure		17.160 MPa (175 kgf/cm ² , 2,489 psi)	
	Injection pipe			
	Outside diameter		6.0 mm (0.24 in.)	
Inside diameter		2.0 mm (0.08 in.)		
Length		600 mm (23.6 in.)		
Injection timing	Injection interval		89° 45' – 90° 15'	
	Injection order		1 – 3 – 4 – 2	
Tappet top clearance			More than 0.2 mm (0.0079 in.)	

INJECTION PUMP CALIBRATION

S05C-B
INJECTION PUMP NUMBER: 22010-9070A

INJECTION PUMP SPECIFICATION	Engine model		S05C-B		
	Injection pump part number		22010-9070A		
	Injection pump type		ND-PE4NB110C721L		
	Governor type		R901		
	Timer type		ND/SB1/900-1500/4L		
	Feed pump type		KE		
TEST CONDITION	Test nozzle type		ND-DN12SD12A		
	Test nozzle opening pressure		17.16-17.65MPa{175-180kgf/cm ² ,2,489-2,560lbf/in. ² }		
	Injection pipe	Outer diameter	6.0mm{0.24in.}		
		Inner diameter	2.0mm{0.08in.}		
		Length	600mm{23.6in.}		
	Calibration	Type of fuel	SAE J967C JISD3603		
		Fuel temperature	40-45°C{104-113°F}		
	Fuel feed pressure		196kpa{2.0kgf/cm ² ,28.4lbf/in. ² }		
Overflow valve opening pressure		240.3-269.7kpa{2.45-2.75kgf/cm ² ,34.8-39.1lbf/in. ² }			
INJECTION TIMING	Rotation		Counterclockwise viewed from driver side		
	Injection order		1-3-4-2		
	Injection interval		89° 45' - 90° 15'		
	Pre-stroke		3.05-3.15mm{0.120-0.124in.}		
INJECTION VOLUME ADJUSTMENT	Rack Position mm(in.)	Pump revolution{r/min}	Measuring Strokes	Injection volume cc{cu.in}	Variation limit cc{cu.in}
	14.4{0.567}	1,500	500	64.25-67.25 {3.921-4.104}	4.0{0.244} or less
	12.3{0.484}	800	500	49.0-51.0 {2.990-3.112}	3.5{0.214} or less
	9.4{0.370} =Rw1	500	500	3.5-4.5 {0.214-0.275}	1.5{0.092} or less
TIMER ADVANCE	Adjusting lever position		Pump speed r/minx		Advance angle
	Full-load		900		0.3° or less
			1,500		3.7° - 4.3°

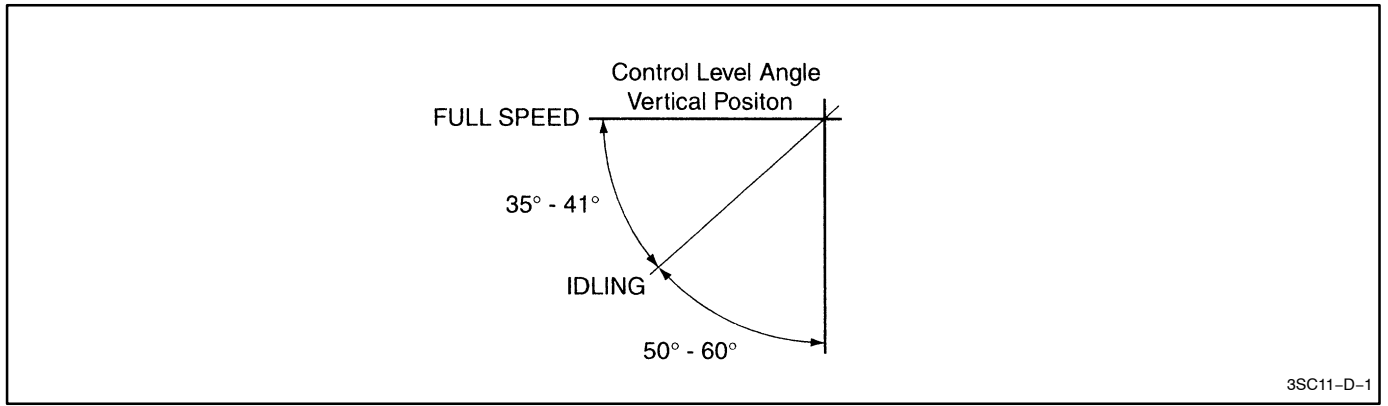
GOVERNOR ADJUSTMENT

Adjusting item	Adjusting lever position	Pump speed r/min	Control rack position mm {in.}
Idling speed control	Idling 50°-60°	100	12.0-12.2{0.472-0.480}
		240	10.8-11.2{0.425-0.441}
		325	9.3-9.5{0.366-0.374}
		520	7.15-7.55{0.282-0.297}
		900	4.3-4.9{0.169-0.193}
Medium speed control	Full load 35°-41° Between idling and full-load	400	11.85-12.25{0.467-0.482}
		600	11.4-11.8{0.449-0.465}
		800	12.1-12.5{0.476-0.492}
		1,000	12.65-13.05{0.498-0.514}
		1,200	13.2-13.6{0.520-0.535}
		1,500	14.2-14.6{0.559-0.575}
Maximum speed control	Full load 35°-41° Between idling and full-load	1,650	12.4-12.8{0.488-0.504}
		1,710	9.8-11.2{0.386-0.441}
		1,950	7.2{0.283} or less

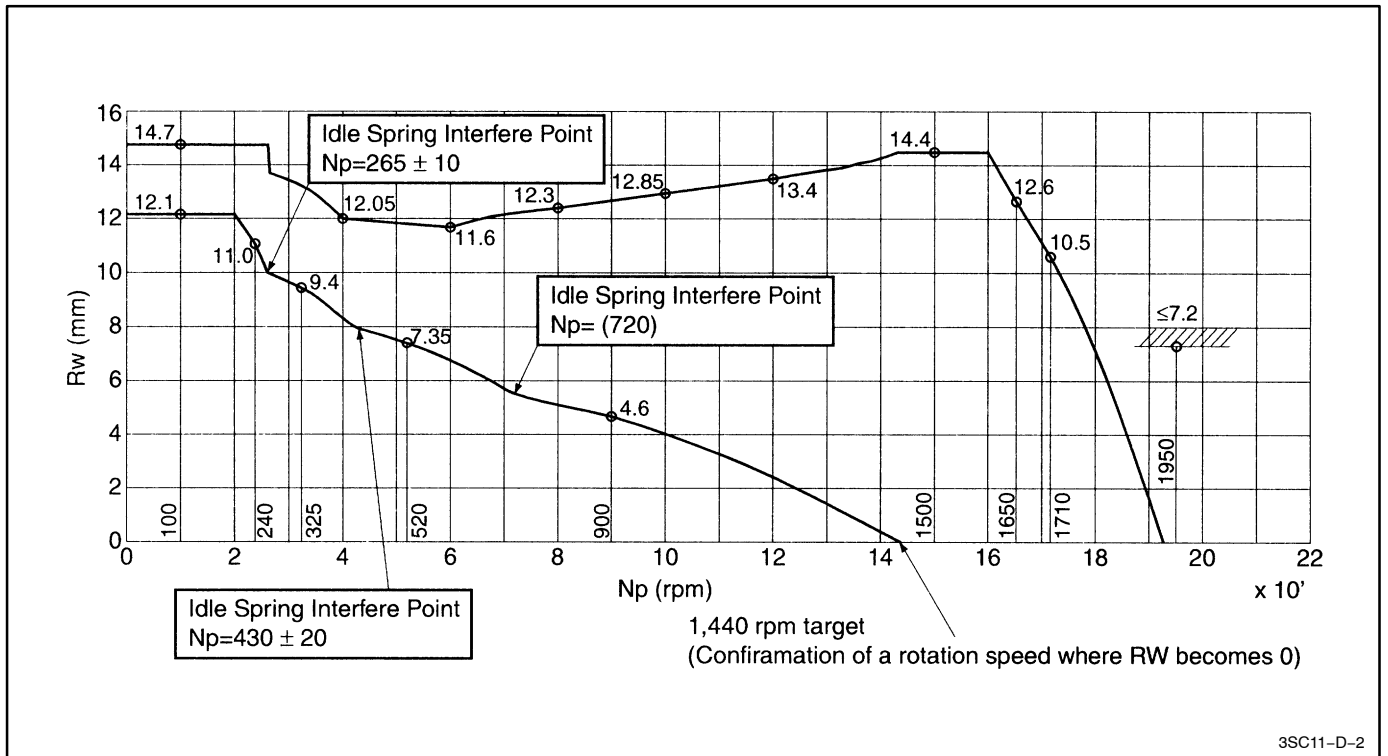
MEASURE THE INJECTION VOLUME

Adjusting lever position	Pump speed r/min	Measuring stroke	Injection volume cm ³ {cu.in.}
Full load	400	500	measure
	800		49.0-51.0{1.930-2.008}
	1,500		64.25-67.25{2.530-2.648}
Adjusting lever position	Pump speed r/min	-	Control rack Position mm{in.}
Idle	325	-	Rw1 ± 0.1...Lever set
Engine starting	100	-	Rw=14.4-15.0

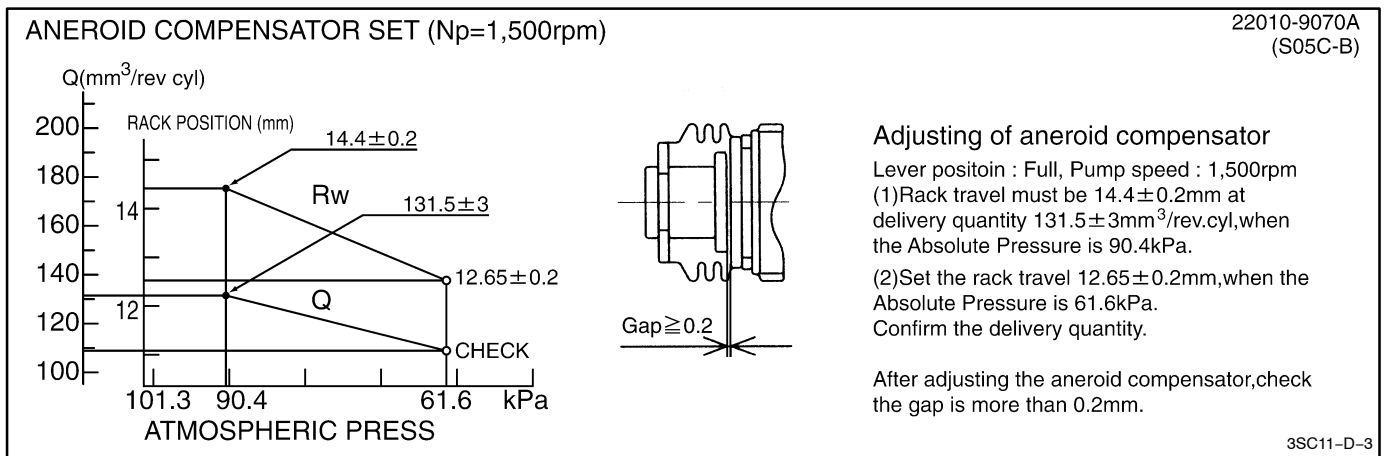
LEVER ANGLE



GOVERNOR CHARACTERISTIC DIAGRAM



ANEROID COMPENSATOR CHARACTERISTIC DIAGRAM



SERVICE DATA

Injection nozzle	Nozzle opening pressure	New nozzle	1st : 16.67-17.45 Mpa {170-178 kgf/cm ² , 2,418-2,532 lbf/in. ² } 2nd : 27.16-28.14 Mpa {277-287 kgf/cm ² , 3,941-4,083 lbf/in. ² }		
		Reused nozzle	1st : 16.18 MPa {165 kgf/cm ² , 2,347 lbf/in. ² } 2nd : 21.57 MPa {220 kgf/cm ² , 3,130 lbf/in. ² }		
	Adjusting shim thickness		0.700 mm{0.0276 in.}	1.310 mm{0.0516 in.}	1.520 mm{0.0598 in.}
			0.750 mm{0.0295 in.}	1.320 mm{0.0520 in.}	1.530 mm{0.0602 in.}
			0.800 mm{0.0315 in.}	1.330 mm{0.0524 in.}	1.540 mm{0.0606 in.}
			0.850 mm{0.0335 in.}	1.340 mm{0.0528 in.}	1.550 mm{0.0610 in.}
			0.900 mm{0.0354 in.}	1.350 mm{0.0531 in.}	1.560 mm{0.0614 in.}
			0.950 mm{0.0374 in.}	1.360 mm{0.0535 in.}	1.570 mm{0.0618 in.}
			0.975 mm{0.0384 in.}	1.370 mm{0.0539 in.}	1.580 mm{0.0622 in.}
			1.000 mm{0.0394 in.}	1.380 mm{0.0543 in.}	1.590 mm{0.0626 in.}
			1.025 mm{0.0404 in.}	1.390 mm{0.0547 in.}	1.600 mm{0.0630 in.}
			1.050 mm{0.0413 in.}	1.400 mm{0.0551 in.}	1.610 mm{0.0634 in.}
			1.100 mm{0.0433 in.}	1.420 mm{0.0559 in.}	1.630 mm{0.0641 in.}
			1.125 mm{0.0443 in.}	1.430 mm{0.0563 in.}	1.640 mm{0.0646 in.}
			1.150 mm{0.0453 in.}	1.440 mm{0.0567 in.}	1.650 mm{0.0650 in.}
			1.175 mm{0.0463 in.}	1.450 mm{0.0571 in.}	1.660 mm{0.0654 in.}
			1.200 mm{0.0472 in.}	1.460 mm{0.0575 in.}	1.670 mm{0.0657 in.}
			1.225 mm{0.0482 in.}	1.470 mm{0.0579 in.}	1.680 mm{0.0661 in.}
			1.250 mm{0.0492 in.}	1.480 mm{0.0583 in.}	1.690 mm{0.0665 in.}
			1.280 mm{0.0504 in.}	1.490 mm{0.0587 in.}	1.700 mm{0.0669 in.}
	1.290 mm{0.0508 in.}	1.500 mm{0.0591 in.}	1.750 mm{0.0689 in.}		
	1.300 mm{0.0512 in.}	1.510 mm{0.0594 in.}	1.800 mm{0.0709 in.}		
Injection pump	Direction of rotation injection order	Counterclockwise as seen from drive side 1-3-4-2 (A-B-C-D)			

INJECTION PUMP CALIBRATION**S05C-TA****INJECTION PUMP NUMBER : 22010-9080A, 22010-9090A, 22010-9100A**

INJECTION PUMP SPECIFICATION	Engine model		S05C-TA		
	Injection pump part number		22010-9080A, 22010-9090A, 22010-9100A		
	Injection pump type		ND-PE4NB110C721L		
	Governor type		R901		
	Timer type		ND/SB1/880-1250/5L		
	Feed pump type		KD		
TEST CONDITION	Test nozzle type		ND-DN12SD12A		
	Test nozzle opening pressure		17.16-17.65 MPa {175-180 kgf/cm ² , 2,489-2,560 lbf/in. ² }		
	Injection pipe	Outer diameter	6.0 mm{0.24 in.}		
		Inner diameter	2.0 mm{0.08in.}		
		Lenght	600 mm{23.6 in.}		
	Calibration	Type of fuel	SAE J967C JISD3603		
		Fuel temperature	40-45°C{104-113°F}		
	Fuel feed pressure		196 kpa {2.0 kgf/cm ² , 28.4 lbf/in. ² }		
Overflow valve opening pressure		240.3-269.7 kpa {2.45-2.75 kgf/cm ² , 34.8-39.1 lbf/in. ² }			
INJECTION TIMING	Rotation		Counterclockwise viewed from driver side		
	Injection order		1-3-4-2		
	Injection interval		89° 45' - 90° 15'		
	pre-stroke		3.05-3.15 mm{0.120-0.124 in.}		
INJECTION VOLUME ADJUSTMENT	Rack position mm (in)	Pump revolution {r/min}	Measuring strokes	injection volume cc {cu.in}	Variation limit cc {cu.in}
	15.2 {0.598}	1,250	500	77.75-80.75 {4.745-4.928}	4.0 {0.244} or less
	14.45 {0.569}	900	500	81.25-83.25 {4.958-5.080}	3.5 {0.214} or less
	9.4 {0.370}=Rw1	500	500	3.75-4.75 {0.229-0.290}	1.5 {0.092} or less
TIMER ADVANCE	Adjusting lever position		Pump speed r/minx		Advance angle
	Full-load		800		0.3° or less
			1,250		4.4°-5.0°

GOVERNOR ADJUSTMENT

Adjusting item	Adjusting lever position	Pump speed r/min	Control rack position mm {in.}
Idling speed control	Idling 50.5°–60.5°	100	12.3–12.5{0.484–0.492}
		225	11.35–11.75{0.447–0.463}
		350	9.3–9.5{0.366–0.374}
		600	6.4–6.8{0.252–0.268}
		1,000	3.4–3.9{0.134–0.154}
Medium speed control	Full load 33°–39° Between idling and full-load	600	13.9–14.3{0.547–0.563}
		900	14.25–14.65{0.561–0.577}
		1,100	14.7–15.1{0.579–0.594}
		1,250	15.0–15.4{0.591–0.606}
		1,575	13.7–14.1{0.539–0.555}
Maximum speed control	Full load 33°–39° Between idling and full-load	1,725	11.05–11.45{0.435–0.451}
		1,950	7.2{0.283} or less

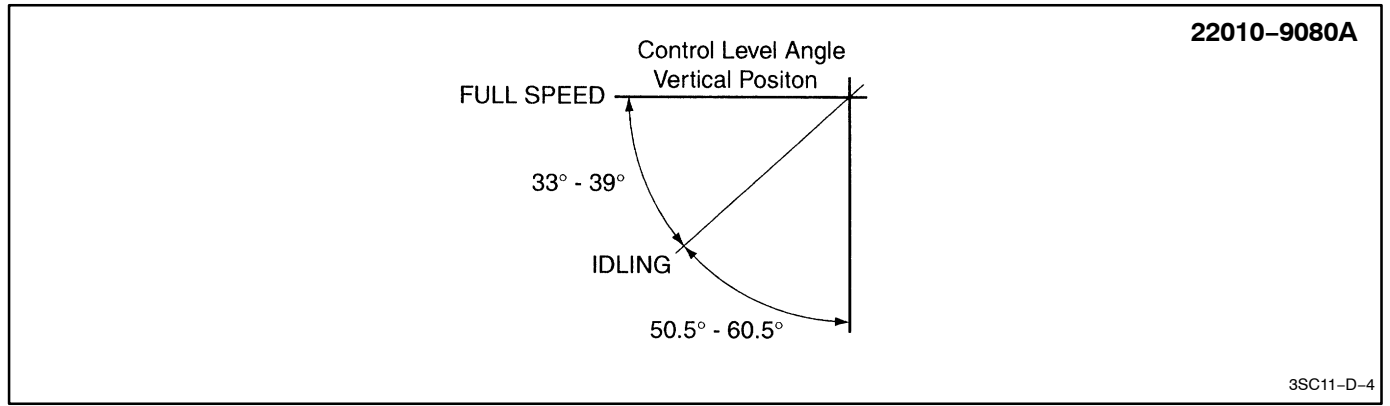
BOOST COMPENSATOR ADJUSTMENT

Adjusting lever position	Pump speed r/min	Boost pressure kPa {mmHg}			Control rack position mm{in.}		
		22010–9080A	22010–9090A	22010–9100A	22010–9080A	22010–9090A	22010–9100A
Full load 33°–39° Between idling and full-load	100	0 {0}			15.1–15.7 {0.594–0.618}	15.3–15.9 {0.602–0.626}	14.6–15.2 {0.575–0.598}
	400	0 {0}			(11.35{0.447})	(1.55{0.455})	(10.9{0.429})
	600	0 {0}			measure = Rw2		
	600	38 {285}	39.3 {295}	26.7{200}	(Rw2+0.2) ± 0.1		
	900	66.7 {500}			14.25–14.65{0.561–0.577}		

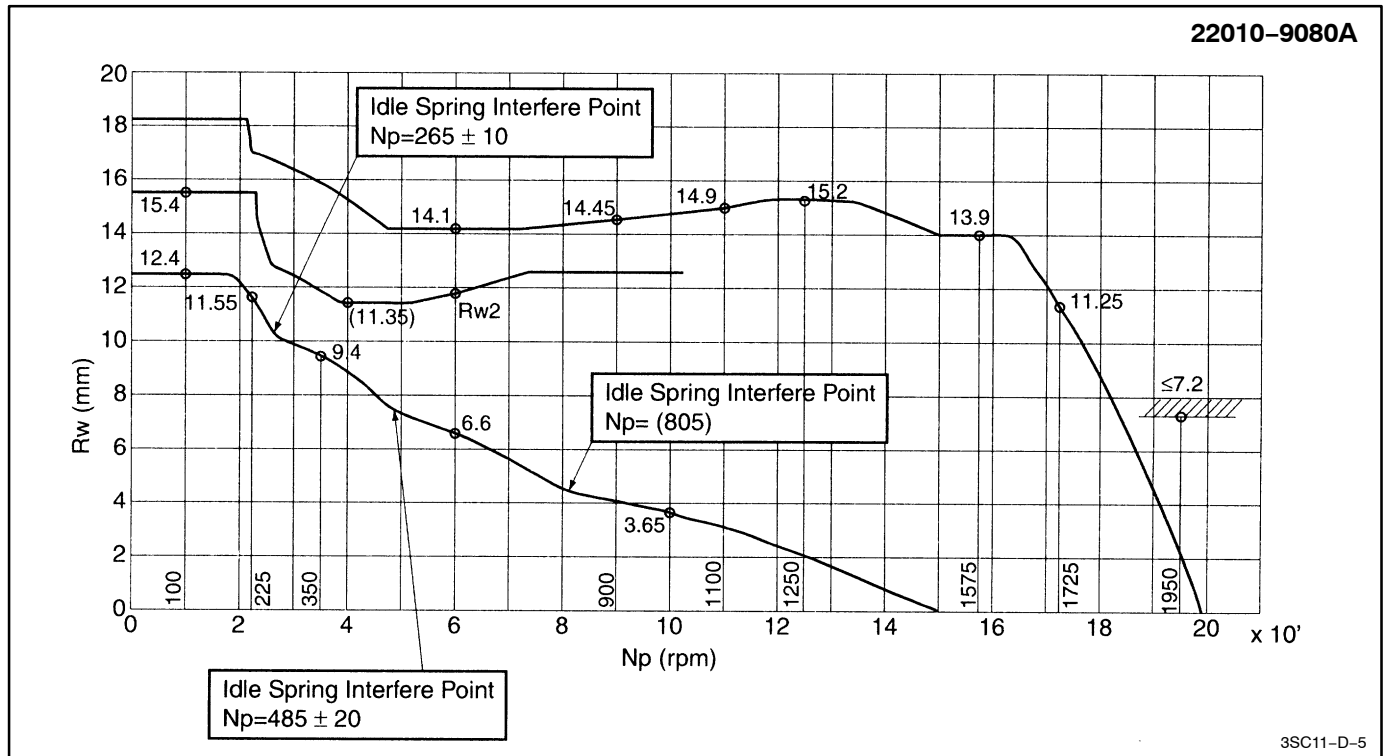
MEASURE THE INJECTION VOLUME

Adjusting lever position	Pump speed r/min	Boost pressure kPa {mmHg}	Measuring stroke	Injection volume cm ³ {cu. in.}		
				22010–9080A	22010–9090A	22010–9100A
Full Load	900	93.3{700}	500	81.25–83.25{3.199–3.278}		
	1,250			77.75–80.75{3.061–3.179}		
Full Load (Boost compensator control)	100	0 {0}	500	92.5{3.642}	95{3.740}	87.5{3.445}
	400			35–37 {1.378–1.457}	39.5–41.5 {1.555–1.634}	24.75–26.75 {0.974–1.053}
Idle	350	0 {0}	–	Control rack position mm {in.}		
				Rw1 ± 0.1.....Lever set		

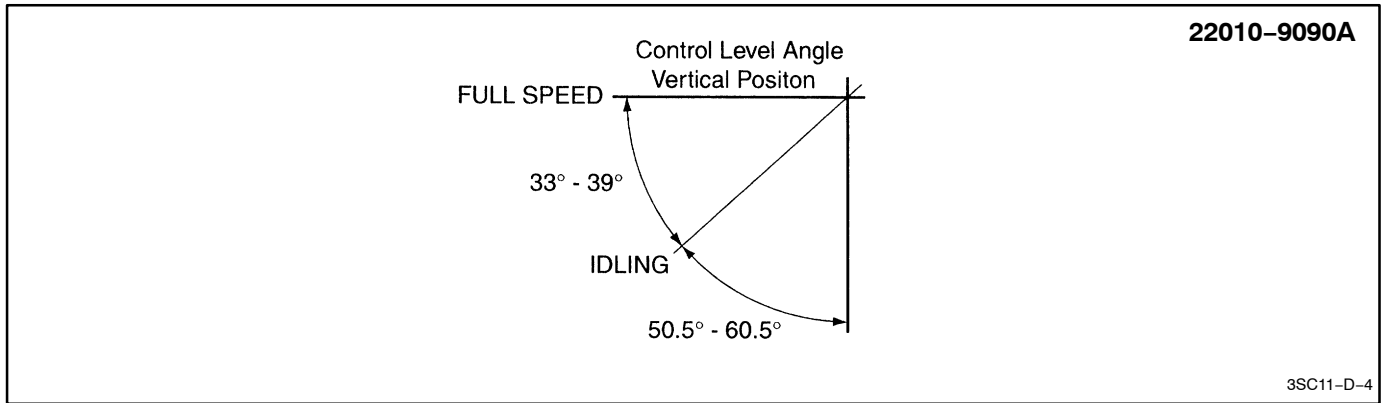
LEVER ANGLE



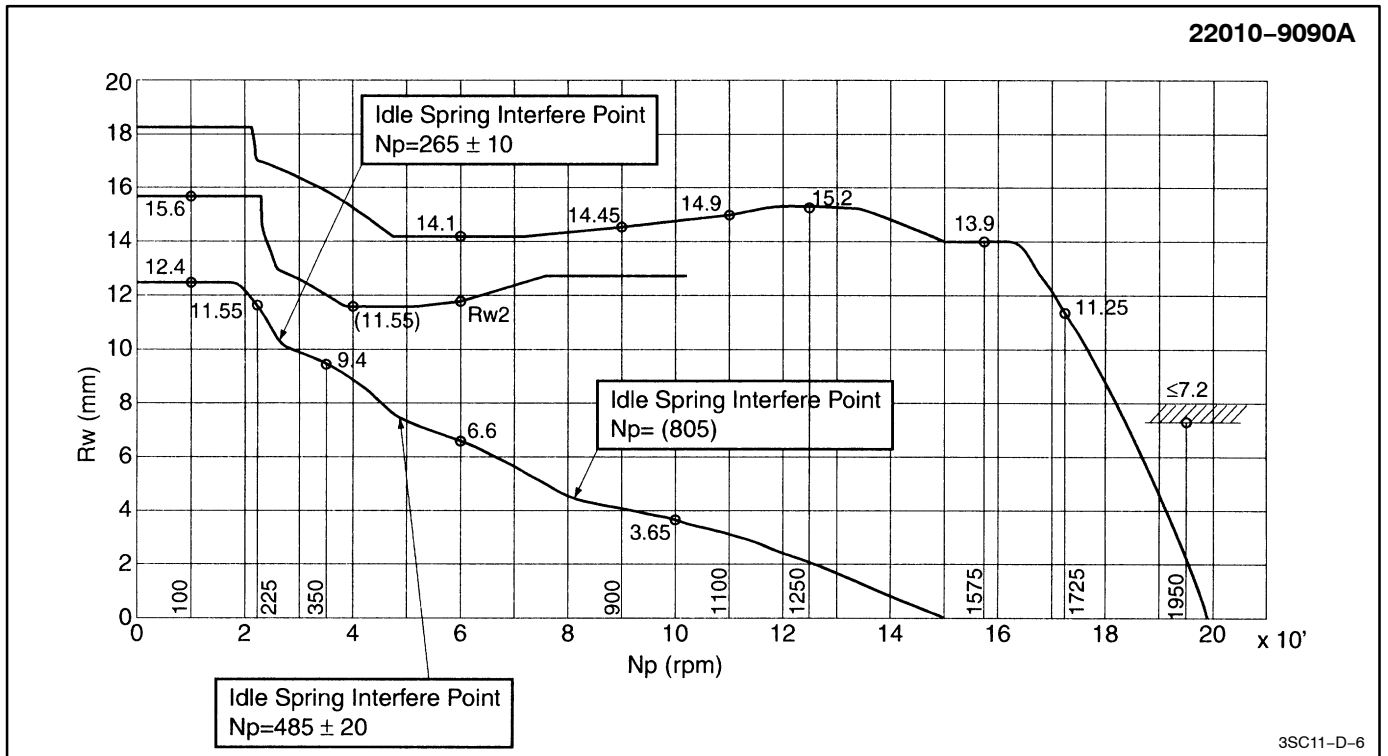
GOVERNOR CHARACTERISTIC DIAGRAM



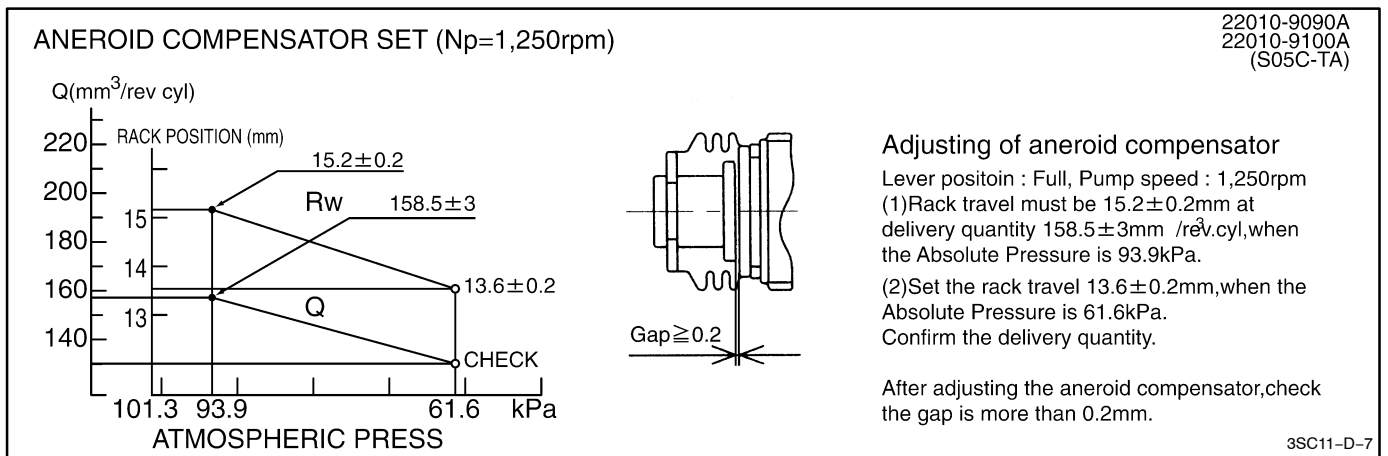
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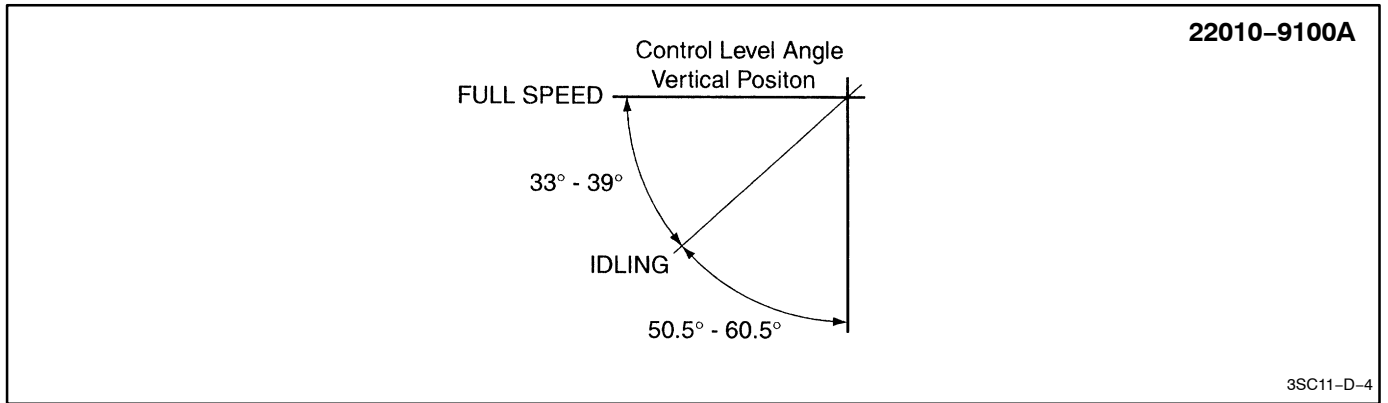
GOVERNOR CHARACTERISTIC DIAGRAM



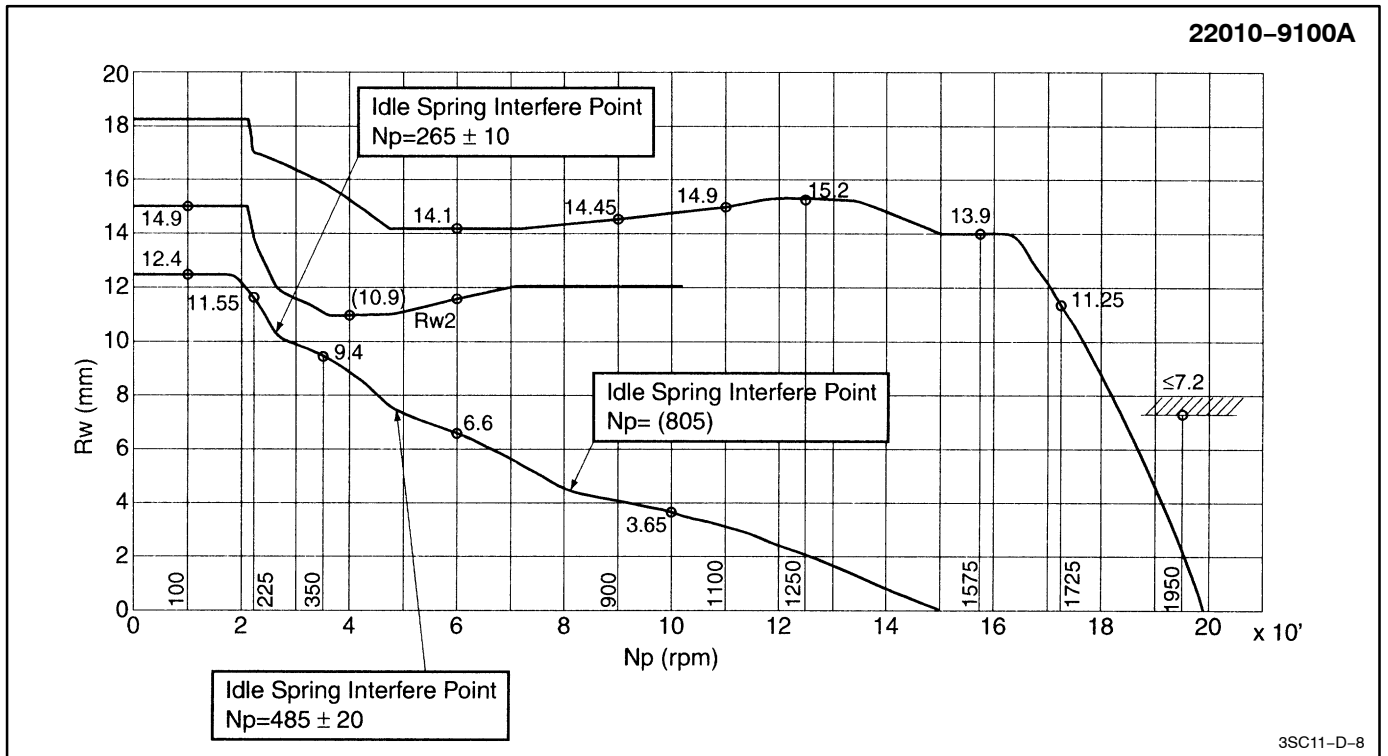
ANEROID COMPENSATOR CHARACTERISTIC DIAGRAM



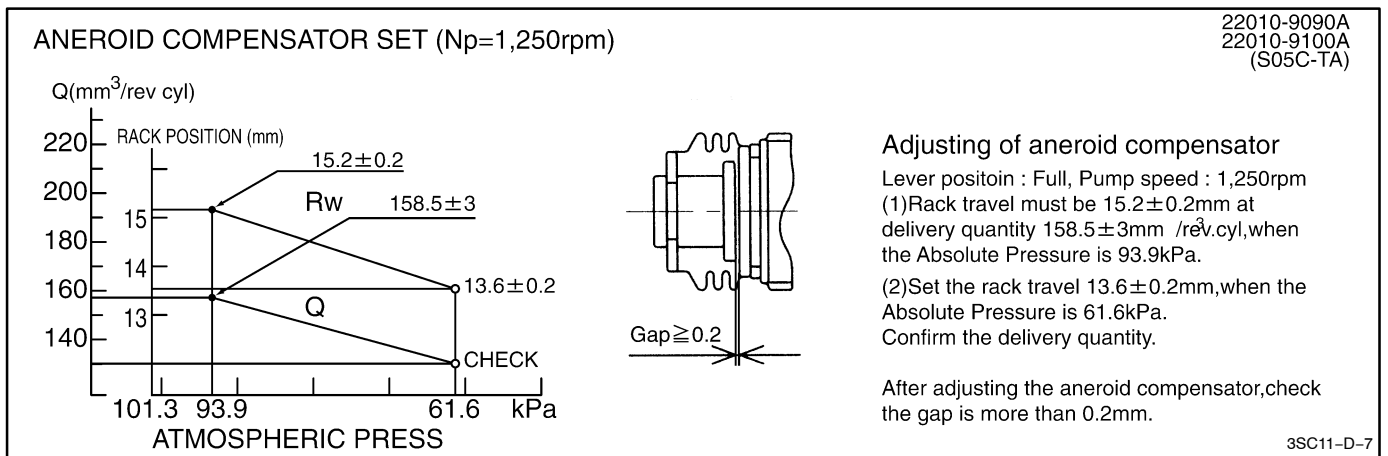
LEVER ANGLE



GOVERNOR CHARACTERISTIC DIAGRAM



ANEROID COMPENSATOR CHARACTERISTIC DIAGRAM



SERVICE DATA

Injection nozzle	Nozzle opening pressure	New nozzle	1st : 18.14-18.92 Mpa {185-193kgf/cm ² , 2,632-2,746 lbf/in. ² } 2nd : 31.28-32.26 Mpa {319-329kgf/cm ² , 4,538-4,680lbf/in. ² }			
		Reused nozzle	1st : 17.65 MPa {180 kgf/cm ² , 2,651 lbf/in. ² } 2nd : 24.52MPa {250 kgf/cm ² , 3,556 lbf/in. ² }			
	Adjusting shim thickness	0.700 mm{0.0276 in.}		1.310 mm{0.0516 in.}	1.520 mm{0.0598 in.}	
		0.750 mm{0.0295 in.}		1.320 mm{0.0520 in.}	1.530 mm{0.0602 in.}	
		0.800 mm{0.0315 in.}		1.330 mm{0.0524 in.}	1.540 mm{0.0606 in.}	
		0.850 mm{0.0335 in.}		1.340 mm{0.0528 in.}	1.550 mm{0.0610 in.}	
		0.900 mm{0.0354 in.}		1.350 mm{0.0531 in.}	1.560 mm{0.0614 in.}	
		0.950 mm{0.0374in.}		1.360 mm{0.0535 in.}	1.570 mm{0.0618 in.}	
		0.975 mm{0.0384 in.}		1.370 mm{0.0539 in.}	1.580 mm{0.0622 in.}	
		1.000 mm{0.0394 in.}		1.380 mm{0.0543 in.}	1.590 mm{0.0626 in.}	
		1.025 mm{0.0404 in.}		1.390 mm{0.0547 in.}	1.600 mm{0.0630 in.}	
		1.050 mm{0.0413 in.}		1.400 mm{0.0551 in.}	1.610 mm{0.0634 in.}	
		1.100 mm{0.0433 in.}		1.420 mm{0.0559 in.}	1.630 mm{0.0641 in.}	
		1.125 mm{0.0443 in.}		1.430 mm{0.0563 in.}	1.640 mm{0.0646 in.}	
		1.150 mm{0.0453 in.}		1.440 mm{0.0567 in.}	1.650 mm{0.0650 in.}	
		1.175 mm{0.0463 in.}		1.450 mm{0.0571 in.}	1.660 mm{0.0654 in.}	
		1.200 mm{0.0472 in.}		1.460 mm{0.0575 in.}	1.670 mm{0.0657 in.}	
		1.225 mm{0.0482 in.}		1.470 mm{0.0579 in.}	1.680 mm{0.0661 in.}	
		1.250 mm{0.0492 in.}		1.480 mm{0.0583 in.}	1.690 mm{0.0665 in.}	
		1.280 mm{0.0504 in.}		1.490 mm{0.0587 in.}	1.700 mm{0.0669 in.}	
1.290 mm{0.0508 in.}		1.500 mm{0.0591 in.}	1.750 mm{0.0689 in.}			
1.300 mm{0.0512 in.}		1.510 mm{0.0594 in.}	1.800 mm{0.0709 in.}			
Injection pump	Direction of rotation injection order		Counterclockwise as seen from drive side 1-3-4-2 (A-B-C-D)			

INJECTION PUMP CALIBRATION**W04D-J****INJECTION PUMP NUMBER : 22010-9060B**

INJECTION PUMP SPECIFICATION	Engine model		W04D-J		
	injection pump part number		22010-9060B		
	injection pump type		ND-PES4A95D321R		
	Governor type		R801		
	Timer type		ND/SB0/1000-1600/3.5R		
	Feed pump type		ND-FP/KS22AC		
TEST CONDITION	Test nozzle type		ND-DN12SD12A		
	Test nozzle opening pressure		17.16-17.65 MPa {175-180 kgf/cm ² , 2,489-2,560 lbf/in. ² }		
	Injection pipe	Outer diameter	6.0 mm{0.24 in.}		
		Inner diameter	2.0 mm{0.08in.}		
		Lenght	600 mm{23.6 in.}		
	Calibration	Type of fuel	SAE J967C JISD3603		
		Fuel temperature	40-45°C{104-113°F}		
	Fuel feed pressure		196 kpa {2.0 kgf/cm ² , 28.4 lbf/in. ² }		
Overflow valve opening pressure		157 kpa {1.6 kgf/cm ² , 22.8 lbf/in. ² }			
INJECTION TIMING	Rotation		Clockwise viewed from driver side		
	Injection order		1-3-4-2		
	Injection interval		89° 45' - 90° 15'		
	pre-stroke		2.97-3.03 mm{0.1169-0.1193 in.}		
INJECTION VOLUME ADJUSTMEN	Rack position mm (in)	Pump revolution {r/min}	Measuring strokes	injection volume cc {cu.in}	Variation limit cc {cu.in}
	9.45 {0.372}	1,000	500	29.5-31.5 {1,800-1,922}	1.5 {0.092} or less
	9.2 {0.362}	1,600	500	27.75-30.75 {1.693-1.876}	2.5 {0.153} or less
	8.3 {0.327}	350	500	5.5-6.5{0.335-0.396}	1.5 {0.092} or less
TIMER ADVANCE	Adjusting lever position		Pump speed r/minx		Advance angle
	3/4 load		1,000		0.3° or less
	4/4 load		1,550		3.5°± 0.3°
	4/4 load		1,600		3.5°± 0.3°

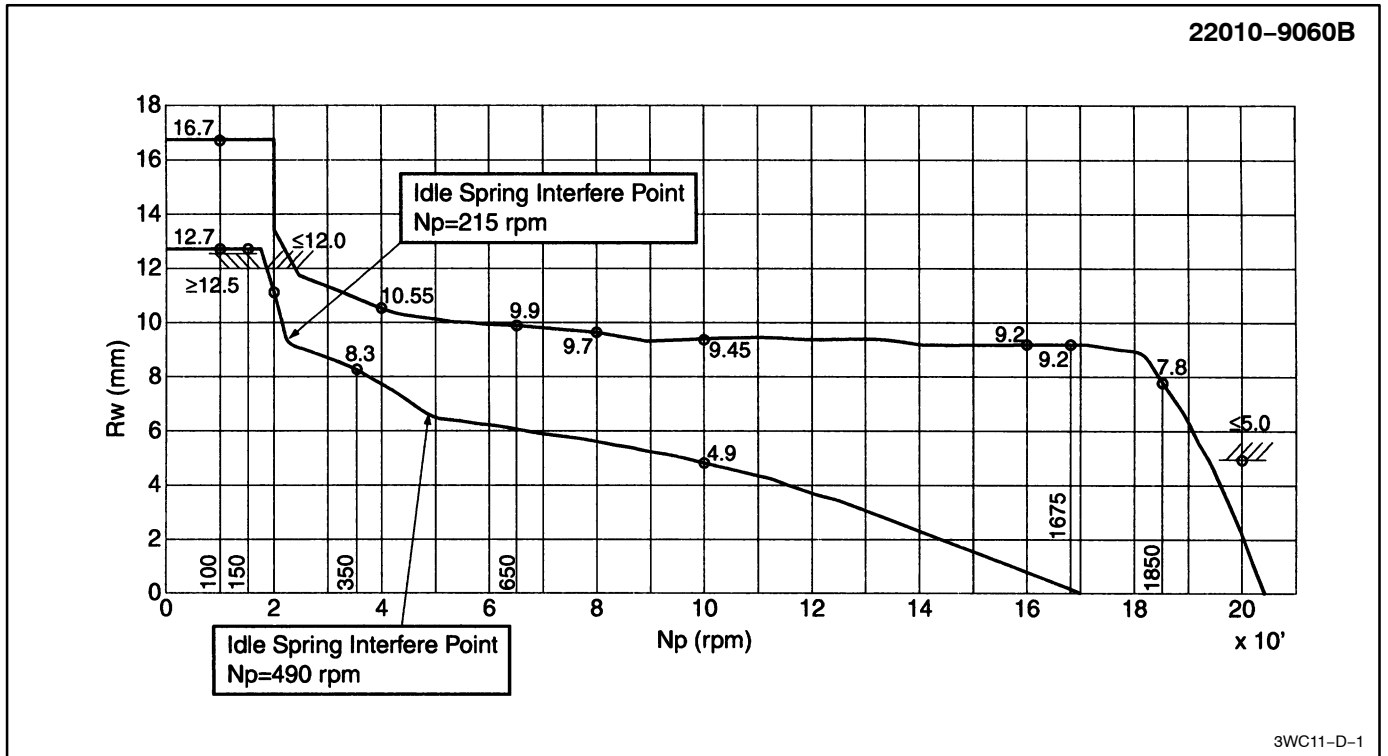
GOVERNOR ADJUSTMENT

Adjusting item	Adjusting lever position	Pump speed r/min	Control rack position mm {in.}
Idling speed control	Idling -22.5° - -12.5°	100	12.7 ± 0.1 {0.327 ± 0.003}
		150	12.5 {0.492} or more
		200	12.0 {0.472} or less
		350	8.3 ± 0.1 {0.327 ± 0.003}
		1,000	4.9 ± 0.2 {0.193 ± 0.007}
Medium speed control	Full load 35°-41° Between idling and full-load	400	10.5 ± 0.2 {0.413 ± 0.007}
		650	9.9 ± 0.2 {0.390 ± 0.007}
		800	9.7 ± 0.2 {0.382 ± 0.007}
		1,000	9.45 ± 0.2 {0.372 ± 0.007}
		1,600	9.2 ± 0.2 {0.362 ± 0.007}
		1,675	9.2 ± 0.2 {0.362 ± 0.007}
Maximum speed control	Full load 35°-41° Between idling and full-load	1,850	Rw1+0.5 {0.020} or more
		1,850	7.8 ± 0.2 {0.307 ± 0.007}=Rw1
		2,000	5.0 {0.197} or less

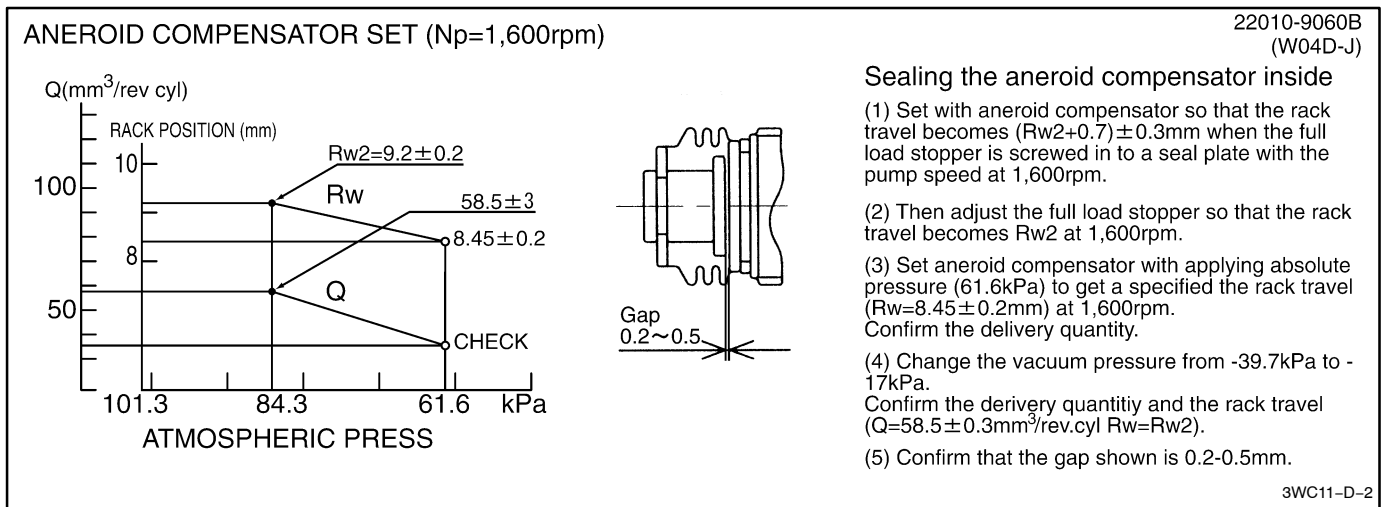
MEASURE THE INJECTION VOLUME

Adjusting lever position	Pump speed r/min	Measuring stroke	Injection volume cm ³ {cu. in.}	Adjusting position
Full Load	650	500	24.0-26.5{1,464-1,617}	Full-load stopper screw
	1,000		29.5-31.5{1,800-1,922}	
	1,600		27.75-30.75{1,693-1,876}	
Adjusting lever position	Pump speed r/min	Measuring stroke	Control rack position	Adjusting position
Engine starting	100	-	Rw=16.7 ± 0.3	

GOVERNOR CHARACTERISTIC DIAGRAM



ANEROID COMPENSATOR CHARACTERISTIC DIAGRAM



Sealing the aneroid compensator inside

- (1) Set with aneroid compensator so that the rack travel becomes $(Rw2+0.7) \pm 0.3$ mm when the full load stopper is screwed in to a seal plate with the pump speed at 1,600rpm.
- (2) Then adjust the full load stopper so that the rack travel becomes $Rw2$ at 1,600rpm.
- (3) Set aneroid compensator with applying absolute pressure (61.6kPa) to get a specified the rack travel ($Rw=8.45 \pm 0.2$ mm) at 1,600rpm. Confirm the delivery quantity.
- (4) Change the vacuum pressure from -39.7kPa to -17kPa. Confirm the derivery quantity and the rack travel ($Q=58.5 \pm 0.3$ mm³/rev.cyl $Rw=Rw2$).
- (5) Confirm that the gap shown is 0.2-0.5mm.

TORQUE SPECIFICATION

14B

Part tightened	N·m	kgf·cm	ft·lbf
Fuel filter assembly x Body	18	183	13
Nozzle holder and nozzle set x Cylinder head	18	185	13
Nozzle leakage pipe Assy x Nozzle holder and nozzle set	25	255	18
Injection pipe clamp x Injection pipe set	7.5	76	66 in.·lbf
Injection pump Assy x Timing gear case sub Assy	18.5	189	14
Pump stay x Injection pump Assy	18.5	189	14
Pump stay x Cylinder block sub Assy	37.5	382	28
Fuel filter to injection pump fuel pipe x Injection pump Assy	26.55	260	19
Nozzle leakage pipe Assy No. 2 x Injection pump Assy	26.55	260	19
Injection pump Assy x Timing gear case	18.5	189	14
Injection pump stay x Injection pump Assy	18.5	189	14
Injection pump stay x Cylinder block	37.5	382	28
Injection pipe x Nozzle holder and nozzle set	25	255	18
Injection pipe x Injection pump Assy	25	255	18
Fuel inlet hollow screw x Injection pump body	36.8	375	27
Regulator valve sub-Assy x Injection pump body	8.85	90	78 in.·lbf
Fuel feed pump cover x Injection pump body	2.95	30	26 in.·lbf
Timer cover x Injection pump body	8.35	85	74 in.·lbf
Timer adjusting screw x LH timer cover	14.2	145	10
Governor link x Injection pump body	13.75	140	10
Distributive head x Injection pump body	11.75	120	9
Delivery valve holder x Distributive head	58.85	600	43
Distributive head plug x Distributive head	88.3	900	65
Governor cover sub-Assy x Injection pump body	8.35	85	74 in.·lbf
Bolt for control lever support pin x Governor cover sub-Assy w/ HAC	6.35	70	61 in.·lbf
Bolt for lever connecting pin x Governor cover sub-Assy w/ HAC	12.75	125	9
Pneumatic bellows cover x Governor cover sub-Assy w/ HAC	7.35	75	65 in.·lbf
Adjusting lever x Governor cover sub-Assy	8.35	85	74 in.·lbf
Engine speed sensor x Injection pump body	22.1	225	16
Fuel cut solenoid x Distributive head	20.6	210	15
Lead wire x Fuel cut solenoid	1.7	17.5	15 in.·lbf
Dash pot x Governor cover sub-Assy	11	115	8
Fuel pipe clamp x Injection pump body	21.55	220	16
Spline shaft x Injection pump drive shaft	84.3	860	62
Fuel sender gauge connector x Fuel tank sub-Assy	1.5	15	13 in.·lbf

15B-FTE

Part tightened	N·m	kgf·cm	ft·lbf
Fuel filter assembly x Body	18	183	13
Nozzle holder and nozzle set x Cylinder head	21	210	15
Nozzle leakage pipe Assy x Nozzle holder and nozzle set	12	125	9
Injection pipe clamp x Injection pipe set	7.5	76	66 in.·lbf
Injection pump Assy x Timing gear case sub Assy	18.5	189	14

Pump stay x Injection pump assy	18.5	189	14
Pump stay x Cylinder block sub assy	37.5	382	28
Injection pump assy x Timing gear case	18.5	189	14
Injection pump stay x Injection pump assy	18.5	189	14
Injection pump stay x Cylinder block	37.5	382	28
Injection pipe x Nozzle holder and nozzle set	25	255	18
Injection pipe x Injection pump assy	25	255	18
Cap nut x Injection pump assy	137	1,400	101
Fuel temperature sensor x Injection pump assy	21.6	220	16
Swivel nipple (Inlet) x Injection pump assy	24.5	250	18
Swivel nipple (Outlet) x Injection pump assy	22.1	225	16
Idle-up bracket x Injection pump assy	13.3	136	10
Fuel sender gauge connector x Fuel tank sub-assy	1.5	15	13 in.·lbf

S05C-B

Part tightened	N·m	kgf·cm	ft·lbf
Diesel fuel filter assy x Intake manifold	55	561	40
Fuel pipe x Diesel fuel filter assy	24.5	250	18
Nozzle holdr and nozzle set x Cylinder head	25	250	18
Nozzle leakage pipe No. 1 x Injector	12.3	125	9
Injection pipe set x Injector	34	350	25
Injection pump x Injection pump bracket	22.1	225	16
Coupling bolt	61.3	625	45
Cotter bolt	90.7	925	67
Fuel tank bent tube x Fuel tank sub-assy	5.0	50	44 in.·lbf
Fuel sender gauge x Fuel tank sub-assy	1.5	15	13 in.·lbf
Fuel tank band No. 1 x Fuel tank bracket	13	130	10

S05C-TA

Part tightened	N·m	kgf·cm	ft·lbf
Diesel fuel filter assy x Intake manifold	55	561	40
Fuel pipe x Diesel fuel filter assy	24.5	250	18
Nozzle holdr and nozzle set x Cylinder head	25	250	18
Nozzle leakage pipe No. 1 x Injector	12.3	125	9
Injection pipe set x Injector	34	350	25
Injection pump x Injection pump bracket	22.1	225	16
Coupling bolt	61.3	625	45
Cotter bolt	90.7	925	67
Fuel tank bent tube x Fuel tank sub-assy	5.0	50	44 in.·lbf
Fuel sender gauge x Fuel tank sub-assy	1.5	15	13 in.·lbf
Fuel tank band No. 1 x Fuel tank bracket	13	130	10

S05C-TB

Part tightened	N·m	kgf·cm	ft·lbf
Diesel fuel filter assy x Intake manifold	55	561	40
Fuel pipe x Diesel fuel filter assy	24.5	250	18
Nozzle holdr and nozzle set x Cylinder head	25	250	18
Nozzle leakage pipe No. 1 x Injector	12.3	125	9
Injection pipe set x Injector	44	450	32
Injection pump x Injection pump bracket	25	250	18
Coupling bolt	61.3	625	45
Cotter bolt	90.7	925	67

SERVICE SPECIFICATIONS - FUEL

Pressure sensor x Common rail	98	1,000	72
Pressure limiter x Common rail	172	1,750	127
Flow damper x Common rail	172	1,750	127
Common rail x Cylinder block	28.5	290	21
Fuel tank bent tube x Fuel tank sub-assy	5.0	50	44 in.·lbf
Fuel sender gauge x Fuel tank sub-assy	1.5	15	13 in.·lbf
Fuel tank band No. 1 x Fuel tank bracket	13	130	10
Fuel cut off valve x Fuel tank sub-assy	3.5	35	30 in.·lbf

W04D-J

Part tightened	N·m	kgf·cm	ft·lbf
Fuel filter assembly x Intake manifold	47	480	35
Fuel pipe x Fuel filter assembly	24.5	250	18
Fuel filter drain bolt	6.9	70	61 in.·lbf
Injection pump air bleeder	5.9	60	52 in.·lbf
Nozzle holdr and nozzle set x Cylinder head	15	150	11
Injection pipe set x Injector	19.6	200	14.5
Injection pump x Timing gear case	29.42 - 34.32	300 - 350	22 - 25
Fuel tank bent tube x Fuel tank assembly	5.0	50	44 in.·lbf
Fuel sender gauge x Fuel tank assembly	1.5	15	13 in.·lbf

INTAKE

030NN-03

SERVICE DATA

Turbocharger sub-assy (15B-FTE)	Axial play	Maximum	0.08 mm (0.0031 in.)
	Radial play	Maximum	0.11 mm (0.0043 in.)
Turbocharger sub-assy (S05C-TA, TB)	Axial play	STD	0.05 - 0.13 mm (0.0020 - 0.0051 in.)
		Maximum	0.13 mm (0.0051 in.)
	Radial play	STD	0.01 - 0.10 mm (0.0004 - 0.0039 in.)
		Maximum	0.10 mm (0.0039 in.)

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Intake manifold x Cylinder head	14B	18.5	189	14
	15B-FTE	18.5	189	14
	S05C-B	28.5	290	21
	S05C-TA, TB	28.5	290	21
	W04D-J	24.5	250	18
Intake pipe x Intake manifold	14B	18.5	189	14
	15B-FTE	18.5	189	14
	S05C-B	28.5	290	21
	S05C-TA, TB	28.5	290	21
	W04D-J	24.5	250	18
Turbocharger sub-assy x Exhaust manifold	15B-FTE	52	530	38
	S05C-TA, TB	56	570	41
Turbine outlet elbow x Turbocharger sub-assy	15B-FTE	21	214	15
	S05C-TA, TB	29.5	300	21
Intake air connector x Cylinder head	14B	18.5	189	14
	15B-FTE	18.5	189	14
	S05C-B	28.5	290	21
	S05C-TA, TB	28.5	290	21
	W04D-J	24.5	250	18

ENGINE MECHANICAL**SERVICE DATA**

031C8-01

14B

V belt	Deflection Generator belt	New belt	8.0 – 11 mm (0.31 – 0.43 in.)
		Used belt	11 – 16 mm (0.43 – 0.63 in.)
Injection timing	Plunger stroke		1.31 – 1.37 mm (0.0516 – 0.0539 in.)
Injection nozzles	Nozzle type Nozzle opening pressure	New nozzle	DLLA150P59 19,610 – 20,590 kPa (200 – 210 kgf/cm ² , 2,840 – 2,990 psi)
		Reused nozzle	17,650 – 20,590 kPa (180 – 210 kgf/cm ² , 2,560 – 2,990 psi)
Idle speed	–		650 – 750 rpm
Maximum speed	–		4,050 – 4,250 rpm
Compression pressure	at 250 rpm Difference of pressure between each cylinder	STD	2,942 kPa (30.3 kgf/cm ² , 427 psi) or more
		Minimum	196 kPa (2.0 kgf/cm ² , 28 psi)
Valve Clearance	at hot	Intake	0.20 mm (0.008 in.)
		Exhaust	0.36 mm (0.014 in.)
Cylinder head	Cylinder head bolt thread inside diameter	STD	11.800 – 12.000 mm (0.4646 – 0.4724 in.)
		Minimum	11.60 mm (0.4567 in.)
	Cylinder head gasket thickness	Mark 1.5	1.47 – 1.53 mm (0.0579 – 0.0602 in.)
		Mark 1.6	1.57 – 1.63 mm (0.0618 – 0.0642 in.)
	Mark 1.7	1.67 – 1.73 mm (0.0657 – 0.0681 in.)	

15B-FTE

V belt	Deflection Generator belt	New belt	12 – 16 mm (0.47 – 0.62 in.)
		Used belt	14 – 19 mm (0.55 – 0.74 in.)
Injection nozzles	Nozzle opening pressure	New nozzle	17,65 – 18,63 kPa (180 – 190 kgf/cm ² , 2,560 – 2,700 psi)
		Reused nozzle	25,5 – 26,48 kPa (260 – 270 kgf/cm ² , 3,698 – 3,840 psi)
Compression pressure	at 250 rpm Difference of pressure between each cylinder	STD	3,000 kPa (31.0 kgf/cm ² , 441 psi) or more
		Minimum	1,960 kPa (20.0 kgf/cm ² , 284 psi)
Valve Clearance	at hot	Intake	0.20 mm (0.008 in.)
		Exhaust	0.36 mm (0.014 in.)
Cylinder head	Cylinder head bolt thread inside diameter	STD	11.800 – 12.000 mm (0.4646 – 0.4724 in.)
		Minimum	11.60 mm (0.4567 in.)
	Cylinder head gasket thickness	Mark 1.5	1.17 – 1.23 mm (0.0579 – 0.0602 in.)
		Mark 1.6	1.27 – 1.33 mm (0.0618 – 0.0642 in.)
	Mark 1.7	1.37 – 1.43 mm (0.0657 – 0.0681 in.)	

S05C-B

V belt	Deflection Generator belt	New belt	5.5 – 6.5 mm (0.217 – 0.256 in.)
		Used belt	6.5 – 7.5 mm (0.256 – 0.295 in.)
Injection nozzles	Pre-lift		0.095 – 0.115 mm (0.0038 – 0.0045 in.)
	Shim side		1.30 – 1.42 mm (0.052 – 0.055 in.) (Jump at 0.02)
			1.44 – 1.70 mm (0.057 – 0.066 in.) (Jump at 0.02)

SERVICE SPECIFICATIONS - ENGINE MECHANICAL

Injection nozzles	Nozzle opening pressure	New nozzle	16,67 – 17.45 MPa (170 – 178 kgf/cm ² , 2,418 – 2,532 psi)
		Reused nozzle	16,18 – 16,97 kPa (165 – 173 kgf/cm ² , 2,347 – 2,461 psi)
Compression pressure	1st opening pressure Minimum Difference of pressure between each cylinder		3,400 – 3,700 kPa (35 – 38 kgf/cm ² , 498 – 540 psi) or more
			2,700 kPa (28 kgf/cm ² , 398 psi) 290 kPa (3.0 kgf/cm ² , 43 psi) or less
Valve Clearance	at hot	Intake	0.30 mm (0.012 in.)
		Exhaust	0.45 mm (0.018 in.)

S05C-TA

V belt	Deflection Generator belt	New belt	5.5 – 6.5 mm (0.217 – 0.256 in.)
		Used belt	6.5 – 7.5 mm (0.256 – 0.295 in.)
Injection nozzles	Pre-lift Shim side		0.077 – 0.113 mm (0.0030 – 0.0044 in.) 1.30 – 1.42 mm (0.052 – 0.055 in.) (Jump at 0.02) 1.44 – 1.70 mm (0.057 – 0.066 in.) (Jump at 0.02)
Injection nozzles	Nozzle opening pressure	New nozzle	18,14 – 18.92 MPa (185 – 193 kgf/cm ² , 2,632 – 2,746 psi)
		Reused nozzle	17,65 – 18,44 MPa (180 – 188 kgf/cm ² , 2,561 – 2,674 psi)
Compression pressure	1st opening pressure Minimum Difference of pressure between each cylinder		3,400 – 3,700 kPa (35 – 38 kgf/cm ² , 498 – 540 psi) or more
			2,700 kPa (28 kgf/cm ² , 398 psi) 290 kPa (3.0 kgf/cm ² , 43 psi) or less
Valve Clearance	at hot	Intake	0.30 mm (0.012 in.)
		Exhaust	0.45 mm (0.018 in.)

S05C-TB

V belt	Deflection Generator belt	New belt	5.5 – 6.5 mm (0.217 – 0.256 in.)
		Used belt	6.5 – 7.5 mm (0.256 – 0.295 in.)
Idle speed			640 – 660 rpm
Maximum speed			3,240 – 3,300 rpm
Injection nozzles	Pre-lift Shim side		0.077 – 0.113 mm (0.0030 – 0.0044 in.) 1.30 – 1.42 mm (0.052 – 0.055 in.) (Jump at 0.02) 1.44 – 1.70 mm (0.057 – 0.066 in.) (Jump at 0.02)
Compression pressure	1st opening pressure Minimum Difference of pressure between each cylinder		3,400 – 3,700 kPa (35 – 38 kgf/cm ² , 498 – 540 psi) or more
			2,700 kPa (28 kgf/cm ² , 398 psi) 290 kPa (3.0 kgf/cm ² , 43 psi) or less
Valve Clearance	at hot	Intake	0.30 mm (0.012 in.)
		Exhaust	0.45 mm (0.018 in.)

W04D-J

V belt	Deflection Generator belt	New belt	7.0 – 8.5 mm (0.276 – 0.335 in.)
		Used belt	8.5 – 10.0 mm (0.335 – 0.394 in.)
Injection nozzles	Nozzle opening pressure	New nozzle	21,6 – 22.6 MPa (220 – 203 kgf/cm ² , 3,130 – 3,272 psi)
		Reused nozzle	21,6 – 22,4 MPa (220 – 228 kgf/cm ² , 3,130 – 3,243 psi)
Compression pressure	1st opening pressure Minimum Difference of pressure between each cylinder		3,540 – 3,820 kPa (36 – 39 kgf/cm ² , 512 – 554 psi) or more
			2,70 kPa (28 kgf/cm ² , 399 psi) 290 kPa (3.0 kgf/cm ² , 43 psi) or less
Valve Clearance	at hot	Intake	0.35 mm (0.012 in.)
		Exhaust	0.55 mm (0.022 in.)

TORQUE SPECIFICATION**14B**

Part tightened		N·m	kgf·cm	ft·lbf
Injection pump Assy x Timing gear case		18.5	189	14
Injection pipes x Injection pump		25	255	18
Generator x Generator bracket	14 mm head	35	360	26
	17 mm head	37.5	382	28
Idler gear thrust plate x Cylinder block sub-assy		47.5	484	35
Oil nozzle for timing gears x Cylinder block sub-assy		13	132	9.5
Flywheel x Cylinder block sub-assy		160	1,635	121
Engine mounting nut		98	100	72
Shift and select transmission control cable Assy x Floor shift Assy		12	120	9
Vacuum pump Assy x Timing gear case Assy		39	400	29
Oil pressure switch Assy x Oil cooler case Assy		15	150	11
Intake manifold x Cylinder head		18.5	189	14
Water outlet housing x Cylinder head sub-assy		18.5	189	14
Nozzle holder and nozzle set x Cylinder head sub-assy		18.5	189	14
Oil cooler Assy x Cylinder block		21	214	15
Oil filter bracket sub-assy x Cylinder clock sub-assy		44	449	32
Exhaust manifold x Cylinder head sub-assy		47.5	484	35
Exhaust manifold heat insulator No. 1 x Exhaust manifold		18.5	189	14
Generator bracket sub-assy x Cylinder block		98	1,000	72
Fan belt adjusting bar x Cylinder head		44	449	32
Cylinder head sub-assy x Cylinder block sub-assy		49	500	36
Valve rocker shaft Assy x Cylinder head sub-assy		25	255	18
Cylinder head cover x Cylinder head sub-assy		10.5	107	8
Timing gear x Camshaft		37.5	382	28
Timing gear cover x Timing gear case	12 mm head	21	214	15
	14 mm head	44	449	32
Crankshaft pulley x Crankshaft		294	3,000	217
Valve lifter set bolt x Cylinder block sub-assy	Bolt A	9.4	96	83 in.·lbf
	Bolt B	37.5	382	28
Engine service hole cover sub-assy x Body		11.5	115	8.5
Floor shift Assy x Body		18	183	13
Parking brake lever Assy x Body		18	185	13

15B-FTE

Part tightened		N·m	kgf·cm	ft·lbf
Injection pump Assy x Timing gear case		18.5	189	14
Injection pipes x Injection pump		25	255	18
Exhaust pipe Assy front x Exhaust manifold		62	630	46
Vacuum pump Assy x Timing gear case Assy		39	400	29
Oil pressure switch Assy x Oil cooler case Assy		15	150	11
Water outlet housing x Cylinder head sub-assy		18.5	189	14
Oil cooler Assy x Cylinder block		21	214	15
Oil filter bracket sub-assy x Cylinder clock sub-assy		44	449	32
Engine mounting bracket front No. 1 LH x Cylinder block sub-assy		44	449	32

SERVICE SPECIFICATIONS - ENGINE MECHANICAL

Engine mounting bracket front No. 1 RH x Cylinder block sub-assy		44	449	32
Cylinder head sub-assy x Cylinder block sub-assy		49	500	36
Valve rocker shaft assy x Cylinder head sub-assy		25	255	18
Cylinder head cover x Cylinder head sub-assy		10.5	107	8
Timing gear x Camshaft		57	581	42
Idler gear No. 1 x Cylinder block sub-assy		47.5	484	35
Injection pump drive gear x Injection pump		137	1,400	101
Timing gear cover x Timing gear case	Bolt A	44	449	32
	Bolt B, C	21	214	15
Crankshaft pulley x Crankshaft		403	4,110	297
Valve lifter set bolt x Cylinder block sub-assy	Bolt A	9.4	96	83 in.·lbf
	Bolt B	37.5	382	28
Flywheel x Cylinder block sub-assy		160	1,635	121
Shift and select transmission control calbe assy x Floor shift assy		12	120	9
Intake manifold x Cylinder head		18.5	189	14
Nozzle holder and nozzle set x Cylinder head sub-assy		18.5	189	14
Exhaust manifold x Cylinder head sub-assy		47.5	484	35
Engine service hole cover sub-assy x Body		11.5	115	8.5
Floor shift assy x Body		18	183	13
Parking brake lever assy x Body		18	185	13

S05C-B

Part tightened		N·m	kgf·cm	ft·lbf
Injection nozzle assy x Cylinder head		25	255	18
Valve clearance adjusting screw		25	250	18
Cylinder head cover x Cylinder head sub-assy		28.5	290	21
Engine mounting nut		100	1,020	74
Radiator	Nut	7.5	76	63 in.·lbf
	Bolt	18	184	13
Manual transmission	Clutch housing bolt	43.1	440	32
	Mounting rubber mounting nut	65	650	48
Propeller shaft flange nut		63.9 - 85.5	650 - 870	47 - 63
Propeller shaft center bearing support nut		37.4 - 49.2	380 - 500	27 - 36
Front exhaust pipe x Exhaust manifold		70	700	52
Front exhaust pipe x Muffler		29.5	301	22
PS vane pump x Engine		47	480	35
Water pump x Cylinder block		28.5	290	21
Thermostat case x Water pump		55	560	41
Fan spacer x Water pump		28.5	290	21
Fan x Fluid coupling		11	110	8
Generator x Bracket	Through bolt	83	850	61
Vacuum pump x Engine		55	560	41
Intake manifold x Cylinder head		28.5	290	21
Intake pipe x Intake manifold		28.5	290	21
Exhaust manifold x Cylinder head		59	600	44
Starter x Engine		154	1,570	114
Starter cable x Starter		13.5	137	10

Engine mounting bracket x Engine	M12	125	1,280	93
Engine mounting insulator x Engine mounting bracket		98	1,000	72

S05C-TA

Part tightened		N·m	kgf·cm	ft·lbf
Injection nozzle assy x Cylinder head		25	255	18
Valve clearance adjusting screw		25	250	18
Cylinder head cover x Cylinder head sub-assy		28.5	290	21
Engine mounting nut		108	1,100	80
Radiator	Nut	7.5	76	63 in.·lbf
	Bolt	18	184	13
Manual transmission	Clutch housing bolt	43.1	440	32
	Mounting rubber mounting nut	65	650	48
Propeller shaft flange nut		63.9 - 85.5	650 - 870	47 - 63
Propeller shaft center bearing support nut		37.4 - 49.2	380 - 500	27 - 36
Front exhaust pipe x Exhaust manifold		70	700	52
Front exhaust pipe x Muffler		29.5	301	22
PS vane pump x Engine		47	480	35
Water pump x Cylinder block		28.5	290	21
Thermostat case x Water pump		55	560	41
Fan spacer x Water pump		28.5	290	21
Fan x Fluid coupling		11	110	8
Generator x Bracket	Through bolt	83	850	61
Vacuum pump x Engine		55	560	41
Intake manifold x Cylinder head		28.5	290	21
Intake pipe x Intake manifold		28.5	290	21
Exhaust manifold x Cylinder head		59	600	44
Starter x Engine		154	1,570	114
Starter cable x Starter		13.5	137	10
Engine mounting bracket x Engine	M12	125	1,280	93
Engine mounting insulator x Engine mounting bracket		98	1,000	72

S05C-TB

Part tightened		N·m	kgf·cm	ft·lbf
Injector assy x Cylinder head		25	255	18
Valve clearance adjusting screw		25	250	18
Cylinder head cover x Cylinder head sub-assy		28.5	290	21
Engine mounting nut x Engine assy		100	1,020	74
Radiator	Nut	7.5	76	63 in.·lbf
	Bolt	18	184	13
Manual transmission	Clutch housing bolt	43.1	440	32
	Mounting rubber mounting nut	65	650	48
Propeller shaft flange nut		63.9 - 85.5	650 - 870	47 - 63
Propeller shaft center bearing support nut		37.4 - 49.2	380 - 500	27 - 36
Front exhaust pipe x Exhaust manifold		70	700	52
Front exhaust pipe x Muffler		29.5	301	22
Water pump x Cylinder block		28.5	290	21
Thermostat case x Water pump		55	560	41

SERVICE SPECIFICATIONS - ENGINE MECHANICAL

Fan spacer x Water pump		28.5	290	21
Fan x Fluid coupling		11	110	8
Generator x Bracket	Through bolt	83	850	61
Vacuum pump x Engine		55	560	41
Intake manifold x Cylinder head		28.5	290	21
Intake pipe x Intake manifold		28.5	290	21
Exhaust manifold x Cylinder head		59	600	44
Starter x Engine		154	1,570	114
Starter cable x Starter		13.5	137	10
Engine mounting bracket x Engine	M12	125	1,280	93
Engine mounting insulator x Engine mounting bracket		98	1,000	72

W04D-J

Part tightened		N·m	kgf·cm	ft·lbf
Injection nozzle assy x Cylinder head		25	255	18
Valve clearance adjusting screw		44.1	450	32
Engine mounting nut		100	1,020	74
Radiator	Nut	7.5	76	63 in.·lbf
	Bolt	18	184	13
Manual transmission	Clutch housing bolt	43.1	440	32
	Mounting rubber mounting nut	65	650	48
Propeller shaft flange nut		63.9 - 85.5	650 - 870	47 - 63
Propeller shaft center bearing support nut		37.4 - 49.2	380 - 500	27 - 36
Front exhaust pipe x Exhaust manifold		69	700	51
Front exhaust pipe x Muffler		29.5	301	22
Rear cab mounting bracket		55	565	41
A/C compressor x Cylinder block		29.5	300	22
Water pump x Cylinder block		28.5	290	21
Thermostat case x Water pump		55	560	41
Fan spacer x Water pump		28.5	290	21
Fan x Fluid coupling		11	110	8
Generator x Bracket	Through bolt	46.6	475	34
Vacuum pump x Engine		55	560	41
Intake manifold x Cylinder head		28.5	290	21
Intake pipe x Intake manifold		24.5	250	18
Exhaust manifold x Cylinder head		47.1	480	34.7
Starter x Engine		154	1,570	114
Starter cable x Starter		13.5	137	10
Engine mounting bracket x Engine		55	560	40.5
Engine mounting insulator x Engine mounting bracket		98	1,000	72

EXHAUST**TORQUE SPECIFICATION**

030NM-02

Part tightened		N·m	kgf·cm	ft·lbf
Exhaust manifold x Cylinder head	14B	47.5	484	35
	15B-FTE	44.1	450	33
	S05C-B	59	600	44
	S05C-TA, TB	59	600	44
	W04D-J	47.1	480	34.7
Front exhaust pipe x Exhaust manifold	14B	72	706	53
	15B-FTE	72	706	53
	S05C-B	70	700	52
	S05C-TA, TB	70	700	52
	W04D-J	72	706	53
Front exhaust pipe x Muffler		29.5	301	22
Exhaust pipe clamp bolt		24.5	250	18

COOLING**SERVICE DATA**

031CA-01

14B

Radiator cap sub-assy	Opening pressure	STD Min	74 – 103 kPa (0.75 – 1.05 kgf/cm ² , 10.7 – 14.9 psi) 59 kPa (0.6 kgf/cm ² , 8.5 psi)
Radiator	Upper and lower tank Water leaks	Standard dimation Test pressure	8.45 – 8.85 mm (0.33 – 0.34 in.) 177 kPa (1.8 kgf/cm ² , 25 psi)

15B-FTE

Radiator cap sub-assy	Opening pressure	STD Min	93 – 123 kPa (0.95 – 1.25 kgf/cm ² , 13.5 – 17.1 psi) 78 kPa (0.8 kgf/cm ² , 11.4 psi)
Radiator	Upper and lower tank Water leaks	Standard dimation Test pressure	8.45 – 8.85 mm (0.33 – 0.34 in.) 177 kPa (1.8 kgf/cm ² , 25 psi)

S05C-B

Radiator cap sub-assy	Opening pressure	STD Min	93 – 123 kPa (0.95 – 1.25 kgf/cm ² , 13.5 – 17.1 psi) 78 kPa (0.8 kgf/cm ² , 11.4 psi)
Radiator	Upper and lower tank Water leaks	Standard dimation Test pressure	7.4 – 7.8 mm (0.29 – 0.30 in.) 137 kPa (1.4 kgf/cm ² , 20 psi)

S05C-TA

Radiator cap sub-assy	Opening pressure	STD Min	93 – 123 kPa (0.95 – 1.25 kgf/cm ² , 13.5 – 17.1 psi) 78 kPa (0.8 kgf/cm ² , 11.4 psi)
Radiator	Upper and lower tank Water leaks	Standard dimation Test pressure	7.4 – 7.8 mm (0.29 – 0.30 in.) 137 kPa (1.4 kgf/cm ² , 20 psi)

S05C-TB

Radiator cap sub-assy	Opening pressure	STD Min	93 – 123 kPa (0.95 – 1.25 kgf/cm ² , 13.5 – 17.1 psi) 78 kPa (0.8 kgf/cm ² , 11.4 psi)
Radiator	Upper and lower tank Water leaks	Standard dimation Test pressure	7.4 – 7.8 mm (0.29 – 0.30 in.) 137 kPa (1.4 kgf/cm ² , 20 psi)

W04D-J

Radiator cap sub-assy	Opening pressure	STD Min	74 – 102 kPa (0.4 – 0.6 kgf/cm ² , 6 – 8 psi) 78 kPa (0.8 kgf/cm ² , 11.4 psi)
Radiator	Upper and lower tank Water leaks	Standard dimation Test pressure (STD) Test pressure (Wide)	7.4 – 7.8 mm (0.29 – 0.30 in.) 177 kPa (1.8 kgf/cm ² , 25 psi) 137 kPa (1.4 kgf/cm ² , 20 psi)

TORQUE SPECIFICATION**14B**

Part Tightened		N-m	kgf-cm	ft-lbf
Drain plug x Engine		4.5	46	40 in.-lbf
Thermostat case cover x Water outlet housing		18.5	189	14
Water pump assy x Cylinder block		25	255	18
Radiator pipe x Timing gear case cover		18.5	189	14
Generator x Generator bracket	14 mm head	35	360	26
	17 mm head	37.5	382	28
Fan x Water pump assy		18.5	189	14
Fan shroud x Radiator assy		11.5	115	8.5
Engine service hole cover sub-assy x Body		11.5	115	8.5
Floor shift assy x Body		18	183	13
Shift and select transmission control cable assy x floor shift assy		12	120	9
Parking brake lever assy x Body		18	185	13
Radiator assy x Radiator mounting bracket	Bolt	18	184	13
	Nut	7.5	76	66 in.-lbf
Stay x Radiator		11.5	115	8.5

15B-FTE

Part Tightened		N-m	kgf-cm	ft-lbf
Drain plug x Engine		13	132	9.5
Thermostat case cover x Water outlet housing		18.5	189	14
Water pump assy x Cylinder block		25	255	18
Radiator pipe x Timing gear case cover		18.5	189	14
Generator x Generator bracket	14 mm head	35	360	26
	17 mm head	37.5	382	28
Fan x Water pump assy		18.5	189	14
Fan shroud x Radiator assy		11.5	115	8.5
Engine service hole cover sub-assy x Body		11.5	115	8.5
Floor shift assy x Body		18	183	13
Shift and select transmission control cable assy x floor shift assy		12	120	9
Parking brake lever assy x Body		18	185	13
Radiator assy x Radiator mounting bracket	Bolt	18	184	13
	Nut	7.5	76	66 in.-lbf

S05C-B

Part Tightened		N-m	kgf-cm	ft-lbf
Thermostat case cover x Water outlet housing		28.5	290	21
Water pump assy x Cylinder block		28.5	290	21
Water outlet housing x Cylinder block		55	560	40.5
Fan x Fan spacer		19	194	14
Fan spacer x Water pump assy		28.5	290	21
Radiator assy x Radiator mounting bracket	M8	18	184	13
	M6	7.5	76	66 in.-lbf

S05C-TA

Part Tightened		N-m	kgf-cm	ft-lbf
Thermostat case cover x Water outlet housing		28.5	290	21
Water pump assy x Cylinder block		28.5	290	21
Water outlet housing x Cylinder block		55	560	40.5
Fan x Fan spacer		11	110	8
Fan spacer x Water pump assy		28.5	290	21
Radiator assy x Radiator mounting bracket	M8	18	184	13
	M6	7.5	76	66 in.-lbf

SERVICE SPECIFICATIONS - COOLING

S05C-TB

Part Tightened		N-m	kgf-cm	ft-lbf
Thermostat case cover x Water outlet housing		28.5	290	21
Water pump assy x Cylinder block		28.5	290	21
Water outlet housing x Cylinder block		55	560	40.5
Fan x Fan spacer		11	110	8
Fan spacer x Water pump assy		28.5	290	21
Radiator assy x Radiator mounting bracket	M8	18	184	13
	M6	7.5	76	66 in.-lbf

W04D-J

Part Tightened		N-m	kgf-cm	ft-lbf
Thermostat case cover x Water outlet housing		24.5	250	18
Water outlet housing x Cylinder head		24.5	250	18
Water outlet housing x Timing gear case		51	520	37.5
Water pump assy x Cylinder block		28.5	290	21
Fan spacer x Water pump		11	110	8
Fan x Fan spacer		11	110	8
Radiator assy x Radiator mounting bracket	M8	18	184	13
	M6	7.5	76	66 in.-lbf

LUBRICATION**SERVICE DATA**

031CC-01

14B

Oil pressure	at idle speed	29 kPa (0.3 kgf/cm ² , 4.3 psi) or more
	at 3,000 rpm	245 - 588 kPa (2.5 - 6.0 kgf/cm ² , 36 - 85 psi) or more

15B-FTE

Oil pressure	at idle speed	130 kPa (1.3 kgf/cm ² , 18 psi) or more
	at 2,200 rpm	320 kPa (3.2 - 6.0 kgf/cm ² , 45 psi) or more

S05C-B

Oil pressure	at idle speed	49 kPa (0.5 kgf/cm ² , .11 psi) or more
	at 3,000 rpm	590 kPa (6.0 kgf/cm ² , 85 psi) or more

S05C-TA

Oil pressure	at idle speed	49 kPa (0.5 kgf/cm ² , .11 psi) or more
	at 3,000 rpm	590 kPa (6.0 kgf/cm ² , 85 psi) or more

S05C-TB

Oil pressure	at idle speed	49 kPa (0.5 kgf/cm ² , .11 psi) or more
	at 3,000 rpm	590 kPa (6.0 kgf/cm ² , 85 psi) or more

W04D-J

Oil pressure	at idle speed	225.5 kPa (2.3 kgf/cm ² , 32.4 psi) or more
	at 3,000 rpm	402 kPa (4.1 kgf/cm ² , 57 psi) or more

Oil pump Assy (Timing gear case sub-assy) x Cylinder block sub-assy			
Bolt A	18.5	189	32
Bolt B	44	449	32
Bolt C	44	449	32
Injection pump flange x Oil pump Assy (Timing gear case sub-assy)	18.5	189	14
Oil strainer sub-assy x Cylinder block sub-assy	18.5	189	14
Oil pipe x Cylinder block sub-assy	Union bolt	50	510
Oil pipe x Oil pump Assy (Timing gear case sub-assy)	Nut	18.5	189
Oil pump (Timing gear case) x Injection pump	18.5	189	14
Oil strainer sub-assy x Oil pump (Timing gear case sub-assy)	18.5	189	14
Oil pan sub-assy x Cylinder block sub-assy	18.5	189	14
Idle gear thrust plate x Cylinder block sub-assy	47.5	484	35
Injection pump drive gear x Injection pump Assy	137	4,000	101
Oil nozzle for timing gears x Cylinder block	13	132	9.5
Vacuum pump Assy x Timing gear case sub-assy	39	400	29
Timing gear cover x Oil pump Assy (Timing gear case sub-assy)			
12 mm head	21	214	15
14 mm head	44	449	32
Radiator pipe x Timing gear case	18.5	189	14
Crankshaft pulley x Crankshaft	403	4,110	298
Valve lifter set bolt x Cylinder block sub-assy	Bolt A	9.4	96
	Bolt B	37.5	382
Valve rocker shaft Assy x Cylinder head sub-assy	25	255	18
Cylinder head cover x Cylinder head sub-assy	10.5	107	8
Sub-assy oil nozzle No. 1 x Cylinder block sub-assy	30	306	22

S05C-B

Part tightened		N·m	kgf·cm	ft·lbf
Drain plug x oil pan sub-assy		34.3	350	25.3
Plug x Oil cooler Assy	1st	29.5	300	21.5
	2nd	19.6	200	14.5
Oil filter element x Oil cooler element cover		24.5	250	18
Plug x Oil cooler element cover		29.5	300	21
Oil pressure switch x Oil cooler element cover		24.5	250	18
Oil cooler case x Cylinder block sub-assy		24.5	250	18
Coolant drain cock x Oil cooler element cover	1st	58.8	600	43
	2nd	44	450	32

S05C-TA

Part tightened		N·m	kgf·cm	ft·lbf
Drain plug x oil pan sub-assy		34.5	350	25.3
Plug x Oil cooler Assy	1st	29.5	300	21.5
	2nd	19.6	200	14.5
Oil filter element x Oil cooler element cover		24.5	250	18
Plug x Oil cooler element cover		29.5	300	21
Oil pressure switch x Oil cooler element cover		24.5	250	18
Oil cooler case x Cylinder block sub-assy		24.5	250	18

S05C-TB

Part tightened	N·m	kgf·cm	ft·lbf
Drain plug x oil pan sub-assy	34.5	350	25.3
Plug x Oil cooler assy	1st	29.5	300
	2nd	19.6	200
Oil filter element x Oil cooler element cover	24.5	250	18
Plug x Oil cooler element cover	29.5	300	21
Oil pressure switch x Oil cooler element cover	24.5	250	18
Oil cooler case x Cylinder block sub-assy	24.5	250	18

W04D-J

Part tightened	N·m	kgf·cm	ft·lbf
Drain plug x oil pan sub-assy	41	420	30
Plug x Oil cooler assy	29.5	300	21.5
Oil filter element x Oil cooler element cover	24.5	250	18
Plug x Oil cooler element cover	29.5	300	21
Oil pressure switch x Oil cooler element cover	12.3	125	9
Oil cooler case x Cylinder block sub-assy	32.5	330	29

STARTING & CHARGING

SERVICE DATA

030MQ-03

Starter:

Starter assy	Rated voltage and power output	24 V 4.5 kW
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Generator assy:

Battery	Specific gravity	1.25 - 1.29 at 20°C (68°F)
Generator assy	Rated voltage and power output	24 V 30 A
	Regulated voltage	at 2,000 rpm 27.5 - 28.5 V
	Generated amperage	w/o load 10 A or less w/ load 30 A or more

TORQUE SPECIFICATION

S05C-B

Part Tightened	N·m	kgf·cm	ft·lbf
30 Terminal wire x Starter assy	13.5	140	10
Starter assy x Transmission assy	154	1,570	114

S05C-TA

Part Tightened	N·m	kgf·cm	ft·lbf
30 Terminal wire x Starter assy	13.5	140	10
Starter assy x Transmission assy	154	1,570	114

S05C-TB

Part Tightened	N·m	kgf·cm	ft·lbf
30 Terminal wire x Starter assy	13.5	140	10
Starter assy x Transmission assy	154	1,570	114

W04D-J

Part Tightened	N·m	kgf·cm	ft·lbf
30 Terminal wire x Starter assy	13.5	140	10
Starter assy x Transmission assy	154	1,570	114

FRONT SUSPENSION

SERVICE DATA

031BQ-02

Front wheel alignment	Camber	Regular cab	0° 30' ± 1°
		Wide cab Oceania & Hong Kong 2.0 t	0° 30' ± 1°
		Wide cab 2.0 t (Metal bush type)	0° 30' ± 1°
		Wide cab 2.0 t (Rubber bush type)	0° 30' ± 1°
		Wide cab over 2.0 t	1° 00' ± 1°
	Caster	Regular cab	2° 30' ± 1°
	Wide cab Oceania & Hong Kong 2.0 t	2° 30' ± 1°	
	Wide cab 2.0 t (Metal bush type)	1° 00' ± 1°	
	Wide cab 2.0 t (Rubber bush type)	1° 30' ± 1°	
	Wide cab over 2.0 t	2° 00' ± 1°	
Steering axis inclination	Regular cab	7° 30' ± 1°	
	Wide cab Oceania & Hong Kong 2.0 t	7° 30' ± 1°	
	Wide cab 2.0 t (Metal bush type)	7° 30' ± 1°	
	Wide cab 2.0 t (Rubber bush type)	7° 30' ± 1°	
	Wide cab over 2.0 t	7° 00' ± 1°	
Toe-in (Total)	A + B	0° - 0° 09' (0° - 0.15°)	
	C - D	0 - 2 mm (0 - 0.08 in.)	
Front wheel angle (inside)			
	Regular cab 7.00-16-10, 12, 7.00R-16-10, 12		33 - 36°
	Regular cab Oceania 185/85R16		36 - 39°
		195/75R16	42 - 45°
	Wide cab 2.0 t Oceania 195/85R16		46 - 49°
	Wide cab 2.0 t Hong Kong 205/85R16		48 - 51°
	Wide cab 2.0 t 7.00-16-10		48 - 51°
	Wide cab over 2.0 t 7.50-16-10, 12, 14,		47 - 50°
		7.50R-16-10, 12, 14, 205/85R16,	
		205/75R17.5, 215/85R16,	
		225/80R17.5	
Front wheel angle (outside) (Reference)			
	Regular cab 7.00-16-10, 12, 7.00R-16-10, 12		28°
	Regular cab Oceania 185/85R16		29°
		195/75R16	31° 30'
	Wide cab 2.0 t Oceania 195/85R16		35°
	Wide cab 2.0 t Hong Kong 205/85R16		36°
	Wide cab 2.0 t 7.00-16-10		36°
	Wide cab over 2.0 t 7.50-16-10, 12, 14,		36° 30'
		7.50R-16-10, 12, 14, 205/85R16,	
		205/75R17.5, 215/85R16,	
		225/80R17.5	
Front spring assy (Metal bush type)	Spring pin diameter	Standard	25.0 mm (0.984 in.)
		Minimum	24.7 mm (0.972 in.)
	Clearance between spring bush and spring pin	Standard	0.02 - 0.125 mm (0.001 - 0.005 in.)
		Minimum	0.50 mm (0.020 in.)
Inter leaf thickness	Standard		1.0 mm (0.04 in.)
	Minimum		0.5 mm (0.02 in.)
Front spring assy (Rubber bush type)	Inter leaf thickness	Standard	1.0 mm (0.04 in.)
		Minimum	0.5 mm (0.02 in.)

TORQUE SPECIFICATION

Front wheel alignment

Part Tightened	N-m	kgf-cm	ft-lbf
Tie rod end lock nut	137	1,400	101
Type A: Regular, wide cab 2.0 t except Australia			
Type B: Wide cab over 2.0 t, Oceania wide cab 2.0 t and Standard cab	74	760	55
Steering knuckle stopper bolt	43	440	32
Type A: Regular, wide cab 2.0 t except Australia			
Type B: Wide cab over 2.0 t, Oceania wide cab 2.0 t and Standard cab	74	760	55

Front shock absorber

Part Tightened	N-m	kgf-cm	ft-lbf
Front Shock absorber (Lower side)	68	690	50
Regular cab			
Wide cab	76	780	56

Front stabilizer bar

Part Tightened	N-m	kgf-cm	ft-lbf
Stabilizer end bracket x Front spring	79	810	59
Metal bush type			
Stabilizer end bracket x Stabilizer	76	775	56
Metal bush type			
Rubber bush type	37	377	27
Stabilizer link x Stabilizer link bracket	17.5	180	13
Lower side			
Upper side	16.5	170	12
Stabilizer bracket x Body	76	775	56

Front spring assy (Rubber bush type)

Part Tightened	N-m	kgf-cm	ft-lbf
Front spring shackle pin	220	2,250	162
Pin lock plate x body	11.5	117	8
Leaf spring center bolt	44	450	32
U-bolt x I-beam	195	2,000	144

Front spring assy (Metal bush type)

Part Tightened	N-m	kgf-cm	ft-lbf
Front spring shackle pin	78	800	58
Grease nipple	4.0	41	35 in. lbf
Leaf spring center bolt	55	561	41
U-bolt x I-beam	195	2,000	144

REAR SUSPENSION

SERVICE DATA

031BS-02

Rear spring assy	Spring pin diameter	Standard	25.0 mm (0.984 in.)
		Minimum	24.7 mm (0.972 in.)
	Clearance between spring bush and spring pin	Standard	0.02 - 0.125 mm (0.001 - 0.005 in.)
		Minimum	0.50 mm (0.019 in.)
	Inter leaf thickness	Standard	1.0 mm (0.04 in.)
		Minimum	0.5 mm (0.02 in.)

TORQUE SPECIFICATION

Part Tightened		N-m	kgf-cm	ft-lbf
Shock absorber	Upper side	68	700	50
	Lower side	68	700	50
Shock absorber x Body		43	440	32
Rear spring shackle pin	Metal bush type	52	530	38
	Rubber bush type	220	2,250	162
Leaf spring center bolt	Metal bush type	97	990	75
	Rubber bush type	73.5	750	54
U-bolt x I-beam	Standard cab	195	1988	144
	Wide cab	290	2,950	213

TIRE & WHEEL

SERVICE DATA

Cold inflation pressure

031BU-02

Cab Type	Countries	Models	Tire Size		Inflation Pressure, kPa (kgf/cm ² , psi)			
			Front	Rear	Front	Rear		
Regular cab	Oceania	BU300R-TQMMWQ3	195/75R-15	195/75R-15	600 (6.0, 87)	600 (6.0, 87)		
		BU300R-TKMMWQ3	185/85R-16	185/85R-16	600 (6.0, 87)	600 (6.0, 87)		
		BU340R-TKMMWQ3			600 (6.0, 87)	600 (6.0, 87)		
Wide cab	Oceania	XZU404R-TKMMWQ3	195/85R16	195/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU404R-HKMMWQ3	195/85R16	195/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-TKMMWQ3	195/85R16	195/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-HKMMWQ3	195/85R16	195/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-TKFQWQ3	205/85R16	205/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-HKFQWQ3	205/85R16	205/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-TKFRWQ3	215/85R16	215/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-HKFRWQ3	215/85R16	215/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU424R-TKFRWQ3	215/85R16	215/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU424R-HKFRWQ3	215/85R16	215/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU424R-TKFTWQ3	225/80R17.5	225/80R17.5	700 (7.0, 102)	700 (7.0, 102)		
		XZU424R-HKFTWQ3	225/80R17.5	225/80R17.5	700 (7.0, 102)	700 (7.0, 102)		
		XZU434R-TKFTWQ3	225/80R17.5	225/80R17.5	700 (7.0, 102)	700 (7.0, 102)		
		XZU434R-HKFTWQ3	225/80R17.5	225/80R17.5	700 (7.0, 102)	700 (7.0, 102)		
Wide cab	Hong Kong	XZU414R-TKMRW3	215/85R16	215/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-HKMRW3						
		XZU424R-TKMRW3						
		XZU424R-HKMRW3						
		XZU404R-TKMMW3	205/85R16	205/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU404R-HKMMW3						
		XZU414R-TKMMW3						
		XZU414R-HKMMW3						
		XZU424R-TKMMW3						
		XZU424R-HKMMW3						
Regular cab	G.C.C.	WU300L-TBMLSV	7.00-16-10 7.00R16-10	7.00-16-12 7.00R16-12	500 (5.0, 73) 525 (5.25, 76)	575 (5.75, 83) 600 (6.0, 87)		
		WU300L-TBMMSV	7.00-16-10 7.00R16-10	7.00-16-10 7.00R16-10	500 (5.0, 73) 525 (5.25, 76)	500 (5.0, 73) 525 (5.25, 76)		
		WU340L-TKMMSV	7.00-16-12 7.00R16-12	7.00-16-12 7.00R16-12	575 (5.75, 83) 600 (6.0, 87)	575 (5.75, 83) 600 (6.0, 87)		
			7.00-16-12 7.00R16-12	7.00-16-12 7.00R16-12	575 (5.75, 83) 600 (6.0, 87)	575 (5.75, 83) 600 (6.0, 87)		
		Regular cab	General Countries	BU303R-TBMLS3	7.00-16-10 7.00R16-10	7.00-16-12 7.00R16-12	500 (5.0, 73) 525 (5.25, 76)	575 (5.75, 83) 600 (6.0, 87)
				BU303L-TBMLS3	7.00-16-10 7.00R16-10	7.00-16-10 7.00R16-10	500 (5.0, 73) 525 (5.25, 76)	500 (5.0, 73) 525 (5.25, 76)
BU303R-TBMMS3								
BU303L-TBMMS3	7.00-16-10 7.00R16-10			7.00-16-10 7.00R16-10	500 (5.0, 73) 525 (5.25, 76)	500 (5.0, 73) 525 (5.25, 76)		
BU343R-TKMMS3	7.00-16-12 7.00R16-12			7.00-16-12 7.00R16-12	575 (5.75, 83) 600 (6.0, 87)	575 (5.75, 83) 600 (6.0, 87)		
BU343L-TKMMS3	7.00-16-12 7.00R16-12			7.00-16-12 7.00R16-12	575 (5.75, 83) 600 (6.0, 87)	575 (5.75, 83) 600 (6.0, 87)		
BU343R-TKMMS3								
BU343L-TKMMS3	7.00-16-12 7.00R16-12			7.00-16-12 7.00R16-12	575 (5.75, 83) 600 (6.0, 87)	575 (5.75, 83) 600 (6.0, 87)		
WU300L-HBMLS3	7.00-16-10 7.00R16-10			7.00-16-12 7.00R16-12	500 (5.0, 73) 525 (5.25, 76)	575 (5.75, 83) 600 (6.0, 87)		
WU300L-HBMMS3	7.00-16-10 7.00R16-10			7.00-16-10 7.00R16-10	500 (5.0, 73) 525 (5.25, 76)	500 (5.0, 73) 525 (5.25, 76)		
WU340L-HKMMS3	7.00-16-10 7.00R16-10	7.00-16-10 7.00R16-10	525 (5.25, 76) 525 (5.25, 76)	525 (5.25, 76) 525 (5.25, 76)				

SERVICE SPECIFICATIONS - TIRE & WHEEL

Wide cab	G.C.C.	WU410L-TKMQSV3	7.50-16-10 7.50R16-10	7.50-16-10 7.50R16-10	525 (5.25, 76) 575 (5.75, 83)	525 (5.25, 76) 575 (5.75, 83)
		XZU412L-TKMRSV3	7.50-16-12	7.50-16-12	600 (6.0, 87)	600 (6.0, 87)
		XZU412L-HKMRSV3	7.50R16-12	7.50R16-12	650 (6.5, 94)	650 (6.5, 94)
		XZU412L-TKMTSV3	7.50-16-14	7.50-16-14	650 (6.5, 94)	650 (6.5, 94)
		XZU412L-HKMTSV3	7.50R16-14	7.50R16-14	700 (7.0, 102)	700 (7.0, 102)
		XZU422L-TKMRSV3	7.50-16-12	7.50-16-12	600 (6.0, 87)	600 (6.0, 87)
		XZU422L-HKMRSV3	7.50R16-12	7.50R16-12	650 (6.5, 94)	650 (6.5, 94)
		XZU422L-TKMTSV3	7.50-16-14	7.50-16-14	650 (6.5, 94)	650 (6.5, 94)
		XZU422L-HKMTSV3	7.50R16-14	7.50R16-14	700 (7.0, 102)	700 (7.0, 102)
Wide cab	General Countries	WU410R-HKMMS3	7.00-16-10	7.00-16-10	500 (5.0, 73)	500 (5.0, 73)
		WU410L-HKMMS3	7.00R16-10	7.00R16-10	525 (5.25, 76)	525 (5.25, 76)
		WU410R-TKMQS3				
		WU410R-HKMQS3	7.50-16-10	7.50-16-10	525 (5.25, 76)	525 (5.25, 76)
		WU410L-TKMQS3	7.50R16-10	7.50R16-10	575 (5.75, 83)	575 (5.75, 83)
		WU410L-HKMQS3				
		WU410R-TKMRS3	7.50-16-12 7.50R16-12	7.50-16-12 7.50R16-12	600 (6.0, 87) 650 (6.5, 94)	600 (6.0, 87) 650 (6.5, 94)
		XZU412R-TKMRS3				
		XZU412R-HKMRS3				
		XZU412L-TKMRS3				
		XZU412L-HKMRS3	7.50-16-12	7.50-16-12	600 (6.0, 87)	600 (6.0, 87)
		XZU422R-TKMRS3	7.50R16-12	7.50R16-12	650 (6.5, 94)	650 (6.5, 94)
		XZU422R-HKMRS3				
		XZU422L-TKMRS3				
		XZU422L-HKMRS3				
		XZU422L-HKMTS3	7.50-16-14 7.50R16-14	7.50-16-14 7.50R16-14	650 (6.5, 94) 700 (7.0, 102)	650 (6.5, 94) 700 (7.0, 102)
		XZU412R-TKMMW3	7.00-16-10	7.00-16-10	500 (5.0, 73)	500 (5.0, 73)
		XZU412R-HKMMW3	7.00R16-10	7.00R16-10	525 (5.25, 76)	525 (5.25, 76)
		XZU412R-TKMQW3	7.50-16-10	7.50-16-10	525 (5.25, 76)	525 (5.25, 76)
		XZU412R-HKMQW3	7.50R16-10	7.50R16-10	575 (5.75, 83)	575 (5.75, 83)
		XZU412L-TKMMW3	7.00-16-10	7.00-16-10	500 (5.0, 73)	500 (5.0, 73)
		XZU412L-HKMMW3	7.00R16-10	7.00R16-10	525 (5.25, 76)	525 (5.25, 76)
		XZU412L-TKMQW3	7.50-16-10	7.50-16-10	525 (5.25, 76)	525 (5.25, 76)
		XZU412L-HKMQW3	7.50R16-10	7.50R16-10	575 (5.75, 83)	575 (5.75, 83)
		XZU412L-TKMRW3	7.50-16-12	7.50-16-12	600 (6.0, 87)	600 (6.0, 87)
		XZU412L-HKMRW3	7.50R16-12	7.50R16-12	650 (6.5, 94)	650 (6.5, 94)
		XZU412L-TKMTW3	7.50-16-14	7.50-16-14	650 (6.5, 94)	650 (6.5, 94)
		XZU412L-HKMTW3	7.50R16-14	7.50R16-14	700 (7.0, 102)	700 (7.0, 102)
		XZU422L-TKMRW3	7.50-16-12	7.50-16-12	600 (6.0, 87)	600 (6.0, 87)
		XZU422L-HKMRW3	7.50R16-12	7.50R16-12	650 (6.5, 94)	650 (6.5, 94)
		XZU422L-TKMTW3	7.50-16-14	7.50-16-14	650 (6.5, 94)	650 (6.5, 94)
		XZU422L-HKMTW3	7.50R16-14	7.50R16-14	700 (7.0, 102)	700 (7.0, 102)
		XZU414L-TKMMW3	7.00-16-10 7.00R16-10	7.00-16-10 7.00R16-10	500 (5.0, 73) 525 (5.25, 76)	500 (5.0, 73) 525 (5.25, 76)
XZU424L-TKMRW3	7.50-16-12 7.50R16-12	7.50-16-12 7.50R16-12	600 (6.0, 87) 650 (6.5, 94)	600 (6.0, 87) 650 (6.5, 94)		
XZU424L-TKMTW3	7.50-16-14	7.50-16-14	650 (6.5, 94)	650 (6.5, 94)		
XZU424L-HKMTW3	7.50R16-14	7.50R16-14	700 (7.0, 102)	700 (7.0, 102)		

DIFFERENTIAL**SERVICE DATA**

030NA-03

B265 (10.5") type differential

Differential oil	Oil type Recommended oil viscosity Capacity Capacity	Hypoid oil API GL-5 SAE 90 3.4 liters (3.6 US qts, 3.0 Imp.qts)
Differential carrier assy rear	Companion flange longitudinal runout Maximum Companion flange lateral runout Maximum Ring gear runout Maximum Ring gear backlash Side gear backlash Drive pinion preload Used bearing New bearing Total preload	0.10 mm (0.0039 in.) 0.15 mm (0.0059 in.) 0.10 mm (0.0039 in.) 0.15 – 0.20 mm (0.0059 – 0.0079 in.) 0.02 – 0.20 mm (0.0008 – 0.0079 in.) 1.00 – 2.76 N·m (10.2 – 28 kgf·cm, 8.8 – 24.3 in.-lbf) 2.00 – 5.39 N·m (20.4 – 55 kgf·cm, 18.0 – 47.7 in.-lbf) Drive pinion preload+ 0.20 – 0.39 N·m (2 – 4 kgf·cm, 1.7 – 3.5 in.-lbf)
Differential side gear backlash adjustment	Thrust washer thickness	21.5 mm (0.846 in.) 1.55 mm (0.0610 in.) 1.60 mm (0.0630 in.) 1.65 mm (0.0650 in.) 1.70 mm (0.0670 in.) 1.75 mm (0.0689 in.) 1.80 mm (0.0709 in.) 1.85 mm (0.0728 in.) 1.90 mm (0.0748 in.) 1.95 mm (0.0768 in.) 2.00 mm (0.0787 in.) 2.05 mm (0.0807 in.) 2.10 mm (0.0827 in.)
Drive pinion preload adjustment	Shim A	1.90 mm (0.0748 in.) 2.00 mm (0.0787 in.) 2.10 mm (0.0827 in.) 2.20 mm (0.0866 in.) 2.30 mm (0.0906 in.) 2.40 mm (0.0945 in.) 2.50 mm (0.0984 in.) 2.60 mm (0.1024 in.) 2.70 mm (0.1063 in.) 2.80 mm (0.1102 in.) 2.90 mm (0.1142 in.) 3.00 mm (0.1181 in.)
	Shim B	1.80 mm (0.0709 in.) 1.81 mm (0.0713 in.) 1.82 mm (0.0717 in.) 1.83 mm (0.0720 in.) 1.84 mm (0.0724 in.) 1.85 mm (0.0728 in.) 1.86 mm (0.0732 in.) 1.87 mm (0.0736 in.) 1.88 mm (0.0740 in.) 1.89 mm (0.0744 in.)

Tooth contact adjustment	Shim	1.050 mm (0.0413 in.)
		1.075 mm (0.0423 in.)
		1.100 mm (0.0433 in.)
		1.125 mm (0.0443 in.)
		1.150 mm (0.0453 in.)
		1.175 mm (0.0463 in.)
		1.200 mm (0.0472 in.)
		1.225 mm (0.0482 in.)
		1.250 mm (0.0492 in.)
		1.275 mm (0.0502 in.)
		1.300 mm (0.0512 in.)
		1.325 mm (0.0522 in.)
		1.350 mm (0.0531 in.)
		1.375 mm (0.0541 in.)
		1.400 mm (0.0551 in.)
		1.425 mm (0.0561 in.)
		1.450 mm (0.0571 in.)
1.475 mm (0.0581 in.)		
1.500 mm (0.0591 in.)		
1.525 mm (0.0600 in.)		
1.550 mm (0.0610 in.)		

B305 (12") type differential

Differential oil	Oil type Recommended oil viscosity Capacity Capacity	Hypoid oil API GL-5 SAE 90 5.2 liters (5.5 US qts, 4.8 Imp.qts)
Differential carrier assy rear	Companion flange longitudinal runout	Maximum 0.10 mm (0.0039 in.) B type ; 0.11mm (0.0043 in.) LE type
	Companion flange lateral runout	Maximum 0.10 mm (0.0039 in.)
	Ring gear runout	Maximum 0.10 mm (0.0039 in.)
	Ring gear backlash	0.15 – 0.20 mm (0.0059 – 0.0079 in.)
	Side gear backlash	0.02 – 0.20 mm (0.0008 – 0.0079 in.)
	Drive pinion preload	Used bearing 0.78 – 1.27 N·m (8 – 13 kgf·cm, 6.9 – 11.3 in.-lbf) New bearing 1.47 – 5.00 N·m (15 – 51 kgf·cm, 13 – 44 in.-lbf)
	Total preload (10.5" 12" type)	Drive pinion preload+ 0.20 – 0.39 N·m (2 – 4 kgf·cm, 1.7 – 3.5 in.-lbf)
	Conical distance	21.5 mm (0.846 in.)
Differential side gear backlash adjustment	Thrust washer thickness	1.40 mm (0.0551 in.) 1.50 mm (0.0591 in.) 1.60 mm (0.0630 in.) 1.70 mm (0.0699 in.)
Drive pinion preload adjustment	Shim A	1.90 mm (0.0748 in.) 2.00 mm (0.0787 in.) 2.10 mm (0.0827 in.) 2.20 mm (0.0866 in.) 2.30 mm (0.0906 in.) 2.40 mm (0.0945 in.) 2.50 mm (0.0984 in.) 2.60 mm (0.1024 in.) 2.70 mm (0.1063 in.) 2.80 mm (0.1102 in.) 2.90 mm (0.1142 in.) 3.00 mm (0.1181 in.) 3.10 mm (0.1220 in.) 3.20 mm (0.1260 in.) 3.30 mm (0.1299 in.)

SERVICE SPECIFICATIONS - DIFFERENTIAL

Drive pinion preload adjustment	Shim B	1.80 mm (0.0709 in.) 1.81 mm (0.0713 in.) 1.82 mm (0.0717 in.) 1.83 mm (0.0720 in.) 1.84 mm (0.0724 in.) 1.85 mm (0.0728 in.) 1.86 mm (0.0732 in.) 1.87 mm (0.0736 in.) 1.88 mm (0.0740 in.) 1.89 mm (0.0744 in.)
Tooth contact adjustment	Shim	0.10 mm (0.0039 in.) 0.15 mm (0.0059 in.) 0.25 mm (0.0098 in.) 0.45 mm (0.0177 in.)

SH13 (13.5") type differential

Differential oil	Oil type Recommended oil viscosity Capacity Capacity	Hypoid oil API GL-5 SAE 90 3.7 liters (3.9 US qts, 3.4 Imp.qts)
Differential carrier assy rear	Ring gear backlash Side gear backlash Drive pinion preload Total preload Conical distance	Used bearing New bearing 0.20 – 0.28 mm (0.0079 – 0.0110 in.) 0.2 – 0.6 mm (0.0079 – 0.0236 in.) 1.47 – 2.45 N·m (15 – 25 kgf·cm, 13 – 22 in.·lbf) 1.97 – 2.94 N·m (20 – 30 kgf·cm, 17 – 26 in.·lbf) Drive pinion preload+ 0.3 – 0.5 N·m (3 – 5.1 kgf·cm, 2.6 – 4.4 in.·lbf) 21.5 mm (0.846 in.)
Drive pinion preload adjustment	Spacer	13.900 mm (0.547 in.) 13.925 mm (0.548 in.) 13.950 mm (0.549 in.) 13.975 mm (0.550 in.) 14.000 mm (0.551 in.) 14.025 mm (0.552 in.) 14.050 mm (0.553 in.) 14.075 mm (0.554 in.) 14.100 mm (0.555 in.) 14.125 mm (0.556 in.) 14.150 mm (0.557 in.) 14.175 mm (0.558 in.) 14.200 mm (0.559 in.) 14.225 mm (0.560 in.) 14.250 mm (0.561 in.) 14.275 mm (0.562 in.) 14.300 mm (0.563 in.) 14.325 mm (0.564 in.) 14.350 mm (0.565 in.) 14.375 mm (0.566 in.)
Tooth contact adjustment	Shim	0.30 mm (0.0118 in.) 0.40 mm (0.0157 in.) 0.45 mm (0.0177 in.) 0.50 mm (0.0197 in.)

TORQUE SPECIFICATION

Part Tightened		N-m	kgf-cm	ft-lbf
Drain plug	10.5", 12" type	50	510	37
	13.5" type	98	1,000	72
Filler plug	10.5", 12" type	50	510	37
	13.5" type	98	1,000	72
Rear drive pinion companion flange sub-assy rear x Differential carrier	10.5" type	304	3,100	224
	12" type	270	2,750	199
	13.5" type	435	4,450	322
Differential case LH x Differential case RH	10.5" type	78	800	58
	12" type	98	1,000	72
	13.5" type	270	2,750	199
Differential case x Ring gear	12" type	304	3,100	224
	13.5" type	270	2,750	199
Retainer (drive pinion bearing) x Differential carrier	12" type	5.4	55	48 in. lbf
	13.5" type	22	225	16
Drive pinion bearing cage x Differential carrier	12" type	103	1,050	76
	13.5" type	75	755	55
Bearing cap x Differential carrier	10.5, 12" type	196	2,000	145
	13.5" type	210	2,150	155
Adjusting nut lock x Bearing cap	10.5" type	13	130	9
	12" type	14	140	10
	13.5" type	22	225	16
Differential carrier x Rear axle housing	10.5", 12" type	52	530	38
	13.5" type 12 mm head bolt and nut	96	985	71
	13.5" type 14 mm head bolt and nut	130	1,330	96

DRIVE SHAFT / PROPELLER SHAFT / AXLE

031CS-01

SERVICE DATA

Front wheel	Preload	5 Hub bolts 6 Hub bolts	4.9 – 14.2 N (0.5 – 1.4 kgf, 1.1 – 3.1 lbf) 17.7 – 44.1 N (1.8 – 4.5 kgf, 4.0 – 10 lbf)
	Axial play		0.05 mm (0.0020 in.)
Rear wheel	Preload	5 Hub bolts 6 Hub bolts	9.8 – 29.4 N (1.0 – 3.0 kgf, 2.2 – 6.6 lbf) 35.3 – 53.0 N (3.6 – 5.4 kgf, 7.9 – 11.9 lbf)
	Axial play		0.10 mm (0.0039 in.)
Propeller shaft (B-Type)	Runout	Maximum	0.8 mm (0.031 in.)
Propeller shaft (LE-Type)	Runout	Standard	0 – 0.6 mm (0 – 0.024 in.)
		Maximum	1.0 mm (0.039 in.)
Universal joint spider (B-Type)	Standard rotating torque (at starting)		0.5 – 2.8 N·m (5.1 – 28.6 kgf·cm, 4.4 – 24.8 in.-lbf)
	Clearance between spider journal and bearing	Standard Maximum	0.024 – 0.064 mm (0.0009 – 0.0025 in.) 0.1 mm (0.0039 in.)
Universal joint spider (LE-Type)	Standard rotating torque (at starting)		1.47 – 2.94 N·m (15 – 30 kgf·cm, 13.0 – 26.0 in.-lbf)
	Clearance between spider journal and bearing	Standard Maximum	0.024 – 0.064 mm (0.0009 – 0.0025 in.) 0.1 mm (0.0039 in.)
Sliding yoke	Free play	Standard	0.062 – 0.174 mm (0.0024 – 0.0069 in.)
		Maximum	0.25 mm (0.0098 in.)
Adjustment parts of universal joint spider (B-Type)	Retainer ring thickness	Mark 1	1.98 – 2.00 mm (0.0780 – 0.0787 in.)
		2	2.00 – 2.02 mm (0.0787 – 0.0795 in.)
		3	2.02 – 2.04 mm (0.0795 – 0.0803 in.)
		4	2.04 – 2.06 mm (0.0803 – 0.0811 in.)
		5	2.06 – 2.08 mm (0.0811 – 0.0819 in.)
		6	2.08 – 2.10 mm (0.0819 – 0.0827 in.)
		7	2.10 – 2.12 mm (0.0827 – 0.0835 in.)
		8	2.12 – 2.14 mm (0.0835 – 0.0843 in.)
		9	2.14 – 2.16 mm (0.0843 – 0.0850 in.)
		10	2.16 – 2.18 mm (0.0850 – 0.0858 in.)
Adjustment parts of universal joint spider (LE-Type)	Retainer ring thickness	White	1.50 mm (0.0591 in.)
		Red	1.55 mm (0.0610 in.)
		Green	1.60 mm (0.0630 in.)
		Blue	1.65 mm (0.0650 in.)
		Yellow	1.70 mm (0.0669 in.)
Propeller shaft intermediate shaft (B-Type)	Runout	Maximum	0.8 mm (0.031 in.)
Propeller shaft intermediate shaft (LE-Type)	Runout	Standard	0 – 0.6 mm (0 – 0.024 in.)
		Maximum	1.0 mm (0.039 in.)
Steering knuckle LH (5 Hub bolts)	Bush inner diameter		28.01 – 28.03 mm (1.1028 – 1.1035 in.)
	Clearance between knuckle and I-beam		0.10 mm (0.039 in.) or less
Steering knuckle LH (6 Hub bolts)	Bush inner diameter		35.01 – 35.03 mm (1.3784 – 1.3791 in.)
	Clearance between knuckle and I-beam		0.10 mm (0.039 in.) or less
Adjustment parts of clearance between knuckle and I-beam (5 Hub bolts)	Shim		1.7 mm (0.067 in.)
			1.8 mm (0.071 in.)
			1.9 mm (0.075 in.)
			2.0 mm (0.079 in.)
			2.1 mm (0.083 in.)
			2.2 mm (0.087 in.)
			2.3 mm (0.091 in.)
	2.4 mm (0.094 in.)		

Adjustment parts of clearance between knuckle and I-beam (6 Hub bolts)	Shim	1.9 mm (0.075 in.) 2.0 mm (0.079 in.) 2.1 mm (0.083 in.) 2.2 mm (0.087 in.) 2.3 mm (0.091 in.) 2.4 mm (0.094 in.) 2.5 mm (0.098 in.) 2.6 mm (0.102 in.)
Rear axle shaft LH	Runout	Maximum 0.8 mm (0.031 in.)

TORQUE SPECIFICATION

Propeller shaft

Part Tightened		N-m	kgf-cm	ft-lbf
Propeller shaft x Transmission	B-Type	88.2	900	65
	LE-Type	74.5	760	55
Propeller shaft x Differential	B-Type	88.2	900	65
	LE-Type	74.5	760	55
Propeller shaft x Intermediate shaft	B-Type	88.2	900	65
	LE-Type	74.5	760	55
Universal joint flange x Intermediate shaft	B-Type	166.7	1,700	123
	LE-Type	686	7,000	506
Bearing plate (LE Type 3, 4 joint Intermediate Shaft)		26.5	270	19
Center Support x Frame	B-Type	37	370	28
	LE-Type	51.5	525	38
Center Support (Upper x Lower)		24.6	250	18
Grease Fitting		6.4	65	57 in.-lbf

Front axle hub sub-assy LH (Disk Brake)

Part Tightened		N-m	kgf-cm	ft-lbf
Front disc x Front axle hub		165	1,700	122
Front axle hub bearing lock nut x Steering knuckle (Temporary)		108	1,100	80

Front axle hub sub-assy LH (5 Bolts Drum Brake)

Part Tightened		N-m	kgf-cm	ft-lbf
Front axle hub x Brake drum		200	2,040	148
Front axle hub bearing lock nut x Steering knuckle (Temporary)		108	1,100	80

Front axle hub sub-assy LH (6 Bolts Drum Brake)

Part Tightened		N-m	kgf-cm	ft-lbf
Front axle hub x Brake drum		200	2,040	148
Steering knuckle stopper bolt		74	760	55
Front axle hub bearing lock nut x Steering knuckle (Temporary)		108	1,100	80

Steering knuckle LH (5 Hub Bolts)

Part Tightened		N-m	kgf-cm	ft-lbf
Stopper (king pin) x Nut		37	375	27
Steering knuckle plug x Steering knuckle		69	700	51
Steering knuckle arm x Steering knuckle		390	4,000	288
Tie rod x Steering knuckle arm		150	1,550	111
Drag link x Steering knuckle arm		150	1,550	111

Steering knuckle LH (6 Hub Bolts)

Part Tightened		N-m	kgf-cm	ft-lbf
Stopper (king pin) x Nut		43	439	32
Steering knuckle x King pin cover bolt		22	224	16
Steering knuckle arm x Steering knuckle		685	6,990	505
Tie rod x Steering knuckle arm		195	1,990	144
Drag link x Steering knuckle arm		195	1,990	144

Rear axle hub LH (5 Hub Bolts)

Part Tightened		N-m	kgf-cm	ft-lbf
Rear drum x Rear axle hub		160	1,630	118
Rear axle hub bearing lock nut (Temporary)		56	575	42
Lock nut plate screw		5.5	55	48 in.-lbf

Rear axle hub LH (6 Hub Bolts)

Part Tightened	N·m	kgf·cm	ft·lbf
Rear drum x Rear axle hub	200	2,050	148
Rear axle hub bearing lock nut (Temporary)	539	5,500	397
Rear axle bearing lock nut x Rear axle lock nut plate bolt	9.6	98	84 in·lbf

Rear axle shaft LH (5 Hub Bolts)

Part Tightened	N·m	kgf·cm	ft·lbf
Rear axle shaft x Rear axle hub	60	610	44

Rear axle shaft LH (6 Hub Bolts)

Part Tightened	N·m	kgf·cm	ft·lbf
Rear axle shaft x Rear axle hub	97	985	71

BRAKE**SERVICE DATA**

031CM-01

Brake pedal sub-assy

Brake pedal height Oceania model w/o ABS w/ ABS	Pedal height from polyvinyl chloride mat	218.4 – 228 mm (8.582 – 8.976 in.) 218 – 228 mm (8.582 – 8.976 in.) 197.7 – 207.7 mm (7.783 – 8.177 in.)
Brake pedal free play	Pedal free play	1 – 3 mm (0.04 – 0.12 in.)
Stop light switch	clearance	0.5 – 2.4 mm (0.020 – 0.094 in.)
Brake pedal reserve distance	at 490 N (50 kgf, 110.2 lbf)	More than 30 mm (1.2 in.)

Brake master less reservoir tank cylinder

Master cylinder spec.	Dimension "A" : Front / Rear drum brake W/O ABS Dimension "A" : Front disc brake or W/ ABS Dimension "B" Dimension "C"	21.1 – 21.5 mm (0.830 – 0.846 in.) 22.7 – 23.1 mm (0.894 – 0.909 in.) 57.5 – 58.1 mm (2.264 – 2.287 in.) 1.23 – 1.97 mm (0.0484 – 0.0776 in.)
Brake booster push rod to piston clearance (w/ SST)	Clearance:	0 mm (0 in.)

Vacuum pump (14B, 15B-FTE)

Vacuum pump blade	Minimum height: Minimum width: Minimum length:	16.50 mm (0.6496 in.) 5.95 mm (0.2343 in.) 44.96 mm (1.7700 in.)
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Vacuum pump (W04D-J)

Vacuum pump blade	Minimum height: Minimum width: Minimum length:	14.80 mm (0.583 in.) 4.80 mm (0.189 in.) 38.90 mm (1.531 in.)
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Vacuum pump (S05C-B, TA, TB)

Vacuum pump blade	Minimum height: Minimum width: Minimum length:	16.50 mm (0.6496 in.) 5.95 mm (0.2343 in.) 44.96 mm (1.7701 in.)
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Front brake (Disc brake 2.0 t)

Front brake pad thickness	Minimum:	3.0 mm (0.118 in.)
Front brake disc thickness	Standard:	35.0 mm (1.378 in.)
	Minimum:	33.0 mm (1.299 in.)
Front brake disc runout	Maximum:	0.12 mm (0.0047 in.)

Front brake (Drum brake)

Front brake drum inside diameter	Standard:	320.0 mm (12.598 in.)
	Maximum:	322.0 mm (12.677 in.)
Front brake shoe lining thickness	Minimum:	4.0 mm (0.157 in.)
Front brake shoe clearance. Standard number of notches to be backed off		10 – 14 notches

Rear brake

Rear brake drum inside diameter	Standard:	320.0 mm (12.598 in.)
	Maximum:	322.0 mm (12.677 in.)
Rear brake shoe lining thickness	Maximum:	4.0 mm (0.157 in.)
Rear brake shoe clearance. Standard number of notches to be backed off		10 – 14 notches

Rear axle load (including vehicle weight) for BU series

Model	Front brake	Rear axle load kg (lb)
BU300R-TKMMWQ3	Disc	1350 (3030)
BU300R-TQMMWQ3	Disc	1350 (3030)
BU303L-TBMLS	Drum	1300 (2920)
BU303L-TBMLS3	Drum	1300 (2920)
BU303L-TBMMS	Drum	1600 (3590)
BU303L-TBMMS3	Drum	1600 (3590)

BU303L-TBMMS3	Disc	1200 (2700)
BU303R-TBMLS	Drum	1300 (2920)
BU303R-TBMLS3	Drum	1300 (2920)
BU303R-TBMMS	Drum	1600 (3590)
BU303R-TBMMS	Disc	1200 (2700)
BU303R-TBMMS3	Drum	1600 (3590)
BU303R-TBMMS3	Disc	1200 (2700)
BU340R-TKMMWQ3	Disc	1400 (3140)
BU343L-TKMMS	Drum	1600 (3590)
BU343L-TKMMS	Disc	1150 (2580)
BU343L-TKMMS3	Drum	1600 (3590)
BU343L-TKMMS3	Disc	1150 (2580)
BU343L-TKMQS	Drum	1600 (3590)
BU343L-TKMQS	Disc	1200 (2700)
BU343L-TKMQS3	Drum	1600 (3590)
BU343L-TKMQS3	Disc	1200 (2700)
BU343R-TKMMS	Drum	1600 (3590)
BU343R-TKMMS	Disc	1150 (2580)
BU343R-TKMMS3	Drum	1600 (3590)
BU343R-TKMMS3	Disc	1150 (2580)
BU343R-TKMQS	Drum	1600 (3590)
BU343R-TKMQS	Disc	1200 (2700)
BU343R-TKMQS3	Drum	1600 (3590)
BU343R-TKMQS3	Disc	1200 (2700)
BU410L-TKFQWR3	Drum	1730 (3890)
BU410L-TKFRWR3	Drum	1650 (3710)
BU420L-TKFQWR3	Drum	1730 (3890)
BU420L-TKFRWR3	Drum	1650 (3710)
BV303L-TBMMS	Disc	1200 (2700)

Rear axle load (including vehicle weight) for WU series

Model	Front brake	Rear axle load kg (lb)
WU300L-HBMLS	Drum	1300 (2920)
WU300L-HBMLS3	Drum	1300 (2920)
WU300L-HBMMS	Drum	1600 (3590)
WU300L-HBMMS	Disc	1250 (2810)
WU300L-HBMMS3	Drum	1600 (3590)
WU300L-HBMMS3	Disc	1250 (2810)
WU300L-TBMLSV	Drum	1300 (2920)
WU300L-TBMLSV3	Drum	1300 (2920)
WU300L-TBMMSV	Drum	1600 (3590)
WU300L-TBMMSV	Disc	1250 (2810)
WU300L-TBMMSV3	Drum	1600 (3590)
WU300L-TBMMSV3	Disc	1250 (2810)
WU340L-HKMMS	Drum	1600 (3590)
WU340L-HKMMS	Disc	1150 (2580)
WU340L-HKMMS3	Drum	1600 (3590)
WU340L-HKMMS3	Disc	1150 (2580)
WU340L-TKMMSV	Drum	1600 (3590)
WU340L-TKMMSV	Disc	1150 (2580)
WU340L-TKMMSV3	Drum	1600 (3590)
WU340L-TKMMSV3	Disc	1150 (2580)
WU410L-HKMMS3	Drum	1550 (3480)

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WU410L-HKM QS	Drum	1730 (3890)
WU410L-HKM QS3	Drum	1730 (3890)
WU410L-TKM QS	Drum	1730 (3890)
WU410L-TKM QS3	Drum	1730 (3890)
WU410L-TKM QSV	Drum	1730 (3890)
WU410L-TKM QSV3	Drum	1730 (3890)
WU410R-HKM MS3	Drum	1550 (3480)
WU410R-HKM QS	Drum	1730 (3890)
WU410R-HKM QS3	Drum	1730 (3890)
WU410R-TKM QS	Drum	1730 (3890)
WU410R-TKM QS3	Drum	1730 (3890)
WU410R-TKM RS	Drum	1650 (3710)
WU410R-TKM RS3	Drum	1650 (3710)

Rear axle load (including vehicle weight) for XZU series

Model	Front brake	Rear axle load kg (lb)
XZU300L-TKMMWR3	Drum	1650 (3710)
XZU300L-TKMQR3	Drum	1780 (4000)
XZU320L-TMMQR3	Drum	1730 (3890)
XZU330L-TKMQR3	Drum	1550 (3480)
XZU330L-TKMSWR3	Drum	1600 (3590)
XZU340L-TKMSWR3	Drum	1650 (3710)
XZU404R-HKMMWQ3	Disc	1400 (3140)
XZU404R-TKMMWQ3	Disc	1400 (3140)
XZU412L-HKMMW3	Drum	1550 (3480)
XZU412L-HKMQR3	Drum	1730 (3890)
XZU412L-HKMRS	Drum	1650 (3710)
XZU412L-HKMRS3	Drum	1650 (3710)
XZU412L-HKMRSV	Drum	1650 (3710)
XZU412L-HKMRSV3	Drum	1650 (3710)
XZU412L-HKMRW3	Drum	1650 (3710)
XZU412L-HKMTSV	Drum	1730 (3890)
XZU412L-HKMTSV3	Drum	1730 (3890)
XZU412L-HKMTW3	Drum	1730 (3890)
XZU412L-TKMMW3	Drum	1550 (3480)
XZU412L-TKMQR3	Drum	1730 (3890)
XZU412L-TKMRS	Drum	1650 (3710)
XZU412L-TKMRS3	Drum	1650 (3710)
XZU412L-TKMRSV	Drum	1650 (3710)
XZU412L-TKMRSV3	Drum	1650 (3710)
XZU412L-TKMRW3	Drum	1650 (3710)
XZU412L-TKMTSV	Drum	1730 (3890)
XZU412L-TKMTSV3	Drum	1730 (3890)
XZU412L-TKMTW3	Drum	1730 (3890)
XZU412R-HKMMW	Drum	1550 (3480)
XZU412R-HKMMW3	Drum	1550 (3480)
XZU412R-HKMQR	Drum	1730 (3890)
XZU412R-HKMQR3	Drum	1730 (3890)
XZU412R-HKMRS	Drum	1650 (3710)
XZU412R-HKMRS3	Drum	1650 (3710)
XZU412R-TKMMW	Drum	1550 (3480)
XZU412R-TKMMW3	Drum	1550 (3480)
XZU412R-TKMQR	Drum	1730 (3890)

XZU412R-TKMQRW3	Drum	1730 (3890)
XZU412R-TKMRS	Drum	1650 (3710)
XZU412R-TKMRS3	Drum	1650 (3710)
XZU414L-TKMMW3	Drum	1550 (3480)
XZU414R-HKMMWQ3	Disc	1300 (2920)
XZU414R-TKMMWQ3	Disc	1300 (2920)
XZU422L-HKMRS	Drum	1650 (3710)
XZU422L-HKMRS3	Drum	1650 (3710)
XZU422L-HKMRSV	Drum	1650 (3710)
XZU422L-HKMRSV3	Drum	1650 (3710)
XZU422L-HKMRW3	Drum	1650 (3710)
XZU422L-HKMTS3	Drum	1650 (3710)
XZU422L-HKMTSV	Drum	1650 (3710)
XZU422L-HKMTSV3	Drum	1650 (3710)
XZU422L-HKMTW3	Drum	1650 (3710)
XZU422L-TKMRS	Drum	1650 (3710)
XZU422L-TKMRS3	Drum	1650 (3710)
XZU422L-TKMRSV	Drum	1650 (3710)
XZU422L-TKMRSV3	Drum	1650 (3710)
XZU422L-TKMRW3	Drum	1650 (3710)
XZU422L-TKMTSV	Drum	1650 (3710)
XZU422L-TKMTSV3	Drum	1650 (3710)
XZU422L-TKMTW3	Drum	1650 (3710)
XZU422R-HKMRS3	Drum	1650 (3710)
XZU422R-TKMRS	Drum	1650 (3710)
XZU422R-TKMRS3	Drum	1650 (3710)
XZU424L-HKMTW3	Drum	1650 (3710)
XZU424L-TKMRW3	Drum	1650 (3710)
XZU424L-TKMTWN3	Drum	1650 (3710)
XZU422L-HKMTS	Drum	1650 (3710)
XZU422R-HKMRS	Drum	1650 (3710)

Rear brake fluid pressure for BU series

Model	Front brake	Rear brake pressure MPa (kgf/cm ² , psi)
BU300R-TKMMWQ3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU300R-TQMMWQ3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303L-TBMLS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303L-TBMLS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303L-TBMMS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303L-TBMMS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303L-TBMMS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303R-TBMLS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303R-TBMLS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303R-TBMMS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303R-TBMMS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303R-TBMMS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU340R-TKMMWQ3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMMS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMMS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMMS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMMS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMQS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMQS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)

SERVICE SPECIFICATIONS - BRAKE

BU343L-TKM QS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKM QS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMMS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMMS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMMS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMMS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKM QS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKM QS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKM QS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKM QS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU410L-TKFQWR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
BU410L-TKFRWR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
BU420L-TKFQWR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
BU420L-TKFRWR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
BU303L-TBMMS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)

Rear brake fluid pressure for WU series

Model	Front brake	Rear brake pressure MPa (kgf/cm ² , psi)
WU300L-HBMLS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-HBMLS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-HBMMS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-HBMMS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-HBMMS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-HBMMS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-TBMLS V	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-TBMLS V3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-TBMMS V	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-TBMMS V	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-TBMMS V3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU300L-TBMMS V3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU340L-HKMMS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU340L-HKMMS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU340L-HKMMS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU340L-HKMMS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU340L-TKMMS V	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU340L-TKMMS V	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU340L-TKMMS V3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU340L-TKMMS V3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
WU410L-HKMMS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410L-HKM QS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410L-HKM QS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410L-TKM QS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410L-TKM QS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410L-TKM QS V	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410L-TKM QS V3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410R-HKMMS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410R-HKM QS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410R-HKM QS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410R-TKM QS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410R-TKM QS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410R-TKM RS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
WU410R-TKM RS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)

Rear brake fluid pressure for XZU series

Model	Front brake	Rear brake pressure MPa (kgf/cm ² , psi)
XZU300L-TKMMWR3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
XZU300L-TKMQR3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
XZU320L-TMMQR3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
XZU330L-TKMQR3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
XZU330L-TKMSWR3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
XZU340L-TKMSWR3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
XZU404R-HKMMWQ3	Disc	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU404R-TKMMWQ3	Disc	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMMW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMQR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMRSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMRSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMRW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMTSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMTSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMTW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMMW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMQR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMRSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMRSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMRW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMTSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMTSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMTW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMMW	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMMW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMQR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMQR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMMW	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMMW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMQR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMQR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU414L-TKMMW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU414R-HKMMWQ3	Disc	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU414R-TKMMWQ3	Disc	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMRSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMRSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMRW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMTS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMTSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)

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XZU422L-HKMTSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMTW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMRSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMRSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMRW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMTSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMTSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMTW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422R-HKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422R-TKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422R-TKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU424L-HKMTW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU424L-TKMR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU424L-TKMTWN3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMTS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422R-HKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)

A B C point data for BU series

Model	Front Brake	A		B		C	
		kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)
BU300R-TKMMWQ3	Disc	864 (1,905)	500 (5.1, 73)	1,999 (4,407)	10,700 (108.6, 1,552)	3,524 (7,769)	19,600 (199.7, 2,843)
BU300R-TQMMWQ3	Disc	864 (1,905)	500 (5.1, 73)	1,985 (4,376)	10,500 (107.3, 1,523)	3,527 (7,776)	19,600 (199.7, 2,843)
BU303L-TBMLS	Drum	1,009 (2,224)	500 (5.1, 73)	1,078 (2,377)	1,600 (15.8, 232)	2,556 (5,635)	10,200 (103.5, 1,479)
BU303L-TBMLS3	Drum	1,009 (2,224)	500 (5.1, 73)	1,078 (2,377)	1,600 (15.8, 232)	2,556 (5,635)	10,200 (103.5, 1,479)
BU303L-TBMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	14,100 (143.5, 2,045)
BU303L-TBMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	13,100 (134.1, 1,900)
BU303L-TBMMS	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	16,600 (169.8, 2,408)
BU303L-TBMMS Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	15,700 (160.5, 2,277)
BU303L-TBMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	14,100 (143.5, 2,045)
BU303L-TBMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	13,100 (134.1, 1,900)
BU303L-TBMMS3	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	16,600 (169.8, 2,408)
BU303L-TBMMS3 Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	15,700 (160.5, 2,277)
BU303R-TBMLS	Drum	1,009 (2,224)	500 (5.1, 73)	1,078 (2,377)	1,600 (15.8, 232)	2,556 (5,635)	10,200 (103.5, 1,479)
BU303R-TBMLS3	Drum	1,009 (2,224)	500 (5.1, 73)	1,078 (2,377)	1,600 (15.8, 232)	2,556 (5,635)	10,200 (103.5, 1,479)
BU303R-TBMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	14,100 (143.5, 2,045)
BU303R-TBMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	13,100 (134.1, 1,900)

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BU303R-TBMMS	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	16,600 (169.8, 2,408)
BU303R-TBMMS Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	15,700 (160.5, 2,277)
BU303R-TBMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	14,100 (143.5, 2,045)
BU303R-TBMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	13,100 (134.1, 1,900)
BU303R-TBMMS3	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	16,600 (169.8, 2,408)
BU303R-TBMMS3 Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	15,700 (160.5, 2,277)
BU340R-TKMMWQ3	Disc	914 (2,015)	500 (5.1, 73)	1,999 (4,407)	10,200 (104, 1,479)	3,311 (7,300)	18,100 (184.6, 2,625)
BU343L-TKMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	13,200 (134.3, 1,915)
BU343L-TKMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	12,300 (126, 1,784)
BU343L-TKMMS	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	16,100 (163.9, 2,335)
BU343L-TKMMS Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	15,300 (155.6, 2,219)
BU343L-TKMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	13,200 (134.3, 1,915)
BU343L-TKMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	12,300 (126, 1,784)
BU343L-TKMMS3	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	16,100 (163.9, 2,335)
BU343L-TKMMS3 Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	15,300 (155.6, 2,219)
BU343L-TKMQS	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	13,300 (135.5, 1,929)
BU343L-TKMQS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	12,500 (127.4, 1,813)
BU343L-TKMQS	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,900 (161.8, 2,306)
BU343L-TKMQS Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,100 (153.7, 2,190)
BU343L-TKMQS3	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	13,300 (135.5, 1,929)
BU343L-TKMQS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	12,500 (127.4, 1,813)
BU343L-TKMQS3	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,900 (161.8, 2,306)
BU343L-TKMQS3 Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,100 (153.7, 2,190)
BU343R-TKMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	13,200 (134.3, 1,915)
BU343R-TKMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	12,300 (126, 1,784)
BU343R-TKMMS	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	16,100 (163.9, 2,335)
BU343R-TKMMS Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	15,300 (155.6, 2,219)
BU343R-TKMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	13,200 (134.3, 1,915)

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BU343R-TKMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	12,300 (126, 1,784)
BU343R-TKMMS3	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	16,100 (163.9, 2,335)
BU343R-TKMMS3 Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	15,300 (155.6, 2,219)
BU343R-TKMQS	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	13,300 (135.5, 1,929)
BU343R-TKMQS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	12,500 (127.4, 1,813)
BU343R-TKMQS	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,900 (161.8, 2,306)
BU343R-TKMQS Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,100 (153.7, 2,190)
BU343R-TKMQS3	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	13,300 (135.5, 1,929)
BU343R-TKMQS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	12,500 (127.4, 1,813)
BU343R-TKMQS3	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,900 (161.8, 2,306)
BU343R-TKMQS3 Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,100 (153.7, 2,190)
BU410L-TKFQWR3	Drum	1,247 (2,750)	500 (5.1, 73)	1,912 (4,215)	6,100 (61.7, 885)	4,134 (9,114)	12,200 (124.3, 1,769)
BU410L-TKFQWR3 Reinforced rear spring	Drum	1,135 (2,502)	500 (5.1, 73)	2,246 (4,951)	8,000 (82, 1,160)	4,134 (9,114)	13,800 (141.3, 2,002)
BU410L-TKFRWR3	Drum	1,060 (2,336)	500 (5.1, 73)	2,244 (4,947)	8,600 (87.8, 1,247)	4,891 (10,783)	16,000 (162.8, 2,321)
BU410L-TKFRWR3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,163 (4,769)	8,000 (82, 1,160)	4,891 (10,783)	14,200 (145.3, 2,060)
BU420L-TKFQWR3	Drum	1,247 (2,750)	500 (5.1, 73)	1,925 (4,243)	6,200 (62.8, 899)	4,060 (8,951)	11,900 (121.7, 1,726)
BU420L-TKFQWR3 Reinforced rear spring	Drum	1,140 (2,512)	500 (5.1, 73)	2,259 (4,980)	8,200 (83.2, 1,189)	4,060 (8,951)	13,700 (139.4, 1,987)
BU420L-TKFRWR3	Drum	1,060 (2,336)	500 (5.1, 73)	2,244 (4,947)	8,600 (87.8, 1,247)	4,829 (10,646)	15,700 (159.9, 2,277)
BU420L-TKFRWR3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,163 (4,769)	8,000 (82, 1,160)	4,829 (10,646)	14,000 (142.9, 2,031)

A B C point data for WU series

Model	Front Brake	A		B		C	
		kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)
WU300L-HBMLS	Drum	1,009 (2,224)	500 (5.1, 73)	1,015 (2,237)	600 (6.1, 87)	2,497 (5,505)	9,200 (93.8, 1,334)
WU300L-HBMLS3	Drum	1,009 (2,224)	500 (5.1, 73)	1,015 (2,237)	600 (6.1, 87)	2,497 (5,505)	9,200 (93.8, 1,334)
WU300L-HBMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,900 (141.8, 2,016)
WU300L-HBMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,000 (132.6, 1,885)
WU300L-HBMMS	Disc (OPT)	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	16,200 (164.8, 2,350)
WU300L-HBMMS Reinforced rear spring	Disc	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	15,300 (155.6, 2,219)
WU300L-HBMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,900 (141.8, 2,016)

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WU300L-HBMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,000 (132.6, 1,885)
WU300L-HBMMS3	Disc (OPT)	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	16,200 (164.8, 2,350)
WU300L-HBMMS3 Reinforced rear spring	Disc	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	15,300 (155.6, 2,219)
WU300L-TBMLSV	Drum	1,009 (2,224)	500 (5.1, 73)	1,015 (2,237)	600 (6.1, 87)	2,497 (5,505)	9,200 (93.8, 1,334)
WU300L-TBMLSV3	Drum	1,009 (2,224)	500 (5.1, 73)	1,015 (2,237)	600 (6.1, 87)	2,497 (5,505)	9,200 (93.8, 1,334)
WU300L-TBMMSV	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,900 (141.8, 2,016)
WU300L-TBMMSV Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,000 (132.6, 1,885)
WU300L-TBMMSV	Disc (OPT)	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	16,200 (164.8, 2,350)
WU300L-TBMMSV Reinforced rear spring	Disc	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	15,300 (155.6, 2,219)
WU300L-TBMMSV3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,900 (141.8, 2,016)
WU300L-TBMMSV3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,000 (132.6, 1,885)
WU300L-TBMMSV3	Disc (OPT)	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	16,200 (164.8, 2,350)
WU300L-TBMMSV3 Reinforced rear spring	Disc	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	15,300 (155.6, 2,219)
WU340L-HKMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	13,000 (132.6, 1,885)
WU340L-HKMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	12,200 (124.6, 1,769)
WU340L-HKMMS	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,900 (162.2, 2,306)
WU340L-HKMMS Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,100 (154.2, 2,190)
WU340L-HKMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	13,000 (132.6, 1,885)
WU340L-HKMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	12,200 (124.6, 1,769)
WU340L-HKMMS3	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,900 (162.2, 2,306)
WU340L-HKMMS3 Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,100 (154.2, 2,190)
WU340L-TKMMSV	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	13,000 (132.6, 1,885)
WU340L-TKMMSV Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	12,200 (124.6, 1,769)
WU340L-TKMMSV	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,900 (162.2, 2,306)
WU340L-TKMMSV Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,100 (154.2, 2,190)
WU340L-TKMMSV3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	13,000 (132.6, 1,885)
WU340L-TKMMSV3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	12,200 (124.6, 1,769)
WU340L-TKMMSV3	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,900 (162.2, 2,306)

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WU340L-TKMMSV3 Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,100 (154.2, 2,190)
WU410L-HKMMS3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,344 (7,372)	11,800 (120.6, 1,711)
WU410L-HKMMS3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,581)	9,000 (91.3, 1,305)	3,344 (7,372)	13,400 (136.2, 1,944)
WU410L-HKMQS	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-HKMQS Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410L-HKMQS3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-HKMQS3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410L-TKMQS	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-TKMQS Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410L-TKMQS3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-TKMQS3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410L-TKMQSV	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-TKMQSV Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410L-TKMQSV3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-TKMQSV3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410R-HKMMS3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,344 (7,372)	11,800 (120.6, 1,711)
WU410R-HKMMS3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,581)	9,000 (91.3, 1,305)	3,344 (7,372)	13,400 (136.2, 1,944)
WU410R-HKMQS	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410R-HKMQS Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410R-HKMQS3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410R-HKMQS3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410R-TKMQS	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410R-TKMQS Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410R-TKMQS3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410R-TKMQS3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410R-TKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.4, 1,305)	5,009 (11,043)	16,500 (167.8, 2,393)
WU410R-TKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.7, 1,218)	5,009 (11,043)	14,700 (150.1, 2,132)
WU410R-TKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.4, 1,305)	5,009 (11,043)	16,500 (167.8, 2,393)

WU410R-TKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.7, 1,218)	5,009 (11,043)	14,700 (150.1, 2,132)
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A B C point data for XZU series

Model	Front Brake	A		B		C	
		kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)
XZU300L-TKMMWR3	Drum	991 (2,185)	500 (5.1, 73)	2,179 (4,803)	8,300 (84.9, 1,204)	2,555 (5,633)	12,900 (132, 1,871)
XZU300L-TKMQR3	Drum	1,121 (2,471)	500 (5.1, 73)	2,152 (4,745)	7,300 (74.4, 1,059)	2,943 (6,488)	13,000 (132.4, 1,885)
XZU320L-TMMQR3	Drum	1,127 (2,485)	500 (5.1, 73)	2,406 (5,304)	8,700 (89, 1,262)	4,246 (9,361)	16,400 (167.1, 2,379)
XZU330L-TKMQR3	Drum	875 (1,929)	500 (5.1, 73)	1,908 (4,206)	7,100 (72.9, 1,030)	4,247 (9,363)	16,300 (166, 2,364)
XZU330L-TKMSWR3	Drum	1,095 (2,414)	500 (5.1, 73)	2,012 (4,436)	8,400 (85.6, 1,218)	4,994 (11,010)	17,000 (173.3, 2,466)
XZU340L-TKMSWR3	Drum	1,145 (2,524)	500 (5.1, 73)	2,012 (4,436)	8,000 (81.2, 1,160)	4,815 (10,615)	16,000 (163, 2,321)
XZU404R-HKMMWQ3	Disc	879 (1,938)	500 (5.1, 73)	1,622 (3,576)	6,300 (63.8, 914)	3,307 (7,291)	11,800 (119.9, 1,711)
XZU404R-TKMMWQ3	Disc	879 (1,938)	500 (5.1, 73)	1,622 (3,576)	6,300 (63.8, 914)	3,307 (7,291)	11,800 (119.9, 1,711)
XZU412L-HKMMW3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412L-HKMMW3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412L-HKMQR3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412L-HKMQR3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412L-HKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-HKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-HKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-HKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-HKMRSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-HKMRSV Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-HKMRSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-HKMRSV3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-HKMRW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,929 (10,867)	16,300 (166, 2,364)
XZU412L-HKMRW3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,929 (10,867)	14,600 (149, 2,118)
XZU412L-HKMRSV	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,812 (12,813)	15,600 (159.5, 2,263)
XZU412L-HKMRSV3	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,812 (12,813)	15,600 (159.5, 2,263)
XZU412L-HKMRSV3 Reinforced rear spring	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,772 (12,725)	15,600 (159.5, 2,263)

SERVICE SPECIFICATIONS - BRAKE

XZU412L-TKMMW3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412L-TKMMW3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412L-TKMQW3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412L-TKMQW3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412L-TKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-TKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-TKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-TKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-TKMRSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-TKMRSV Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-TKMRSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-TKMRSV3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-TKMRW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,929 (10,867)	16,300 (165.8, 2,364)
XZU412L-TKMRW3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,929 (10,867)	14,600 (149, 2,118)
XZU412L-TKMTSV	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,812 (12,813)	15,600 (159.5, 2,263)
XZU412L-TKMTSV3	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,812 (12,813)	15,600 (159.5, 2,263)
XZU412L-TKMTW3	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,772 (12,725)	15,600 (159.5, 2,263)
XZU412R-HKMMW	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412R-HKMMW Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412R-HKMMW3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412R-HKMMW3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412R-HKMQW	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412R-HKMQW Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412R-HKMQW3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412R-HKMQW3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412R-HKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412R-HKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412R-HKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)

SERVICE SPECIFICATIONS - BRAKE

XZU412R-HKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412R-TKMMW	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412R-TKMMW Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412R-TKMMW3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412R-TKMMW3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412R-TKMQW	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412R-TKMQW Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412R-TKMQW3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412R-TKMQW3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412R-TKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412R-TKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412R-TKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412R-TKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU414L-TKMMW3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU414L-TKMMW3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU414R-HKMMWQ3	Disc	779 (1,717)	500 (5.1, 73)	1,622 (3,576)	7,000 (71.7, 1,015)	3,233 (7,128)	12,200 (124.1, 1,769)
XZU414R-TKMMWQ3	Disc	779 (1,717)	500 (5.1, 73)	1,622 (3,576)	7,000 (71.7, 1,015)	3,233 (7,128)	12,200 (124.1, 1,769)
XZU422L-HKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-HKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-HKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-HKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-HKMRSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-HKMRSV Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-HKMRSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-HKMRSV3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-HKMRW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-HKMRW3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-HKMTRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)

SERVICE SPECIFICATIONS - BRAKE

XZU422L-HKMTS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)
XZU422L-HKMTSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,742 (12,659)	15,900 (161.9, 2,306)
XZU422L-HKMTSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,742 (12,659)	15,900 (161.9, 2,306)
XZU422L-HKMTW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)
XZU422L-TKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-TKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-TKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-TKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-TKMRSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-TKMRSV Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-TKMRSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-TKMRSV3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-TKMRW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-TKMRW3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-TKMTSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,742 (12,659)	15,900 (161.9, 2,306)
XZU422L-TKMTSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,742 (12,659)	15,900 (161.9, 2,306)
XZU422L-TKMTW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)
XZU422R-HKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422R-HKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422R-HKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422R-HKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422R-TKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422R-TKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422R-TKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422R-TKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU424L-HKMTW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)
XZU424L-TKMRW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU424L-TKMRW3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)

SERVICE SPECIFICATIONS - BRAKE

XZU424L-TKMTW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)
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TORQUE SPECIFICATION

Part Tightened	N-m	kgf-cm	ft-lbf
BRAKE FLUID			
Bleeder plug			
Front side: 2.0 t (disc & drum), regular cab 3.0 t:	11.0	110	8.0
Wide cab over 2.0 t:	9.5	95	83 (in.-lbf)
Rear side: Regular cab, wide cab 2.0 t:	11.0	110	8.0
Wide cab over 2.0 t:	9.5	95	83 (in.-lbf)
Brake line union nut	15 (12.9)	155 (131)	11 (9.4)
BRAKE PEDAL SUB-ASSY			
Push rod lock nut	25.5	260	19
Brake pedal x Pedal bracket	31	310	22
BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY			
Master cylinder body x Piston stopper bolt	11.8 (7.8)	120 (80)	8.7 (69 in.-lbf)
Master cylinder fluid outlet plug x Master cylinder body	64	630	46
Oil pressure sensor x Master cylinder body	64	630	46
Master less reservoir tank cylinder sub-assy x Brake booster assy	12.5	130	9
Master cylinder support x Brake pedal bracket	19.0	185	14
BRAKE BOOSTER ASSY			
Brake booster nut	12.5	130	9
Brake booster assy x Brake pedal bracket and Clutch pedal bracket assy	29	300	21
Brake pedal bracket and Clutch pedal bracket assy x Body (See page 32-18)			
Bolt A	29	300	21
Bolt B	19	185	14
VACUUM PUMP (14B, 15B-FTE)			
End cover x Housing	7.8	80	69 in.-lbf
Gear lock nut	110	1,125	81
Vacuum pump x Timing gear case	39	400	29
Vacuum pump x Union tube	14	140	10
Check valve	74	750	54
VACUUM PUMP (W04D-J)			
Vacuum pump housing x Alternator	7.5	76	66 in.-lbf
Check valve	32	326	24
VACUUM PUMP (S05C-B, TA, TB)			
End cover x Housing	7.8	80	69 in.-lbf
Gear lock nut	110	1,125	81
Vacuum pump x Clutch housing	55	560	41
Vacuum pump x Union tube	14.0	140	10
FRONT BRAKE (Disc brake 2.0 t)			
Disc rotor installation bolt	165	1,680	122
Disc brake cylinder mounting x Knuckle	265	2,700	195
Front disc brake cylinder mounting x Disc brake cylinder mounting			
for inside	78.4	800	58
for outside	15.7	160	12
Flexible hose x Brake cylinder	29	300	22
FRONT BRAKE (Drum brake, wide cab over 2.0 t)			
Wheel cylinder x Backing plate			
M8 x 1.25 bolt	21.0	214	15
M14 x 1.5 bolt	105	1,071	77
Brake line union nut	15 (12.9)	155 (131)	11 (9.4)
Brake drum x Axle hub	200	2,050	148
FRONT BRAKE (Drum brake, regular cab 2.0 t & 3.0 t, wide cab 2.0 t)			
Wheel cylinder x Backing plate	61	622	45
Brake line union nut	15 (12.9)	155 (131)	11 (9.4)

Part Tightened	N-m	kgf-cm	ft-lbf
Brake drum x Axle hub	200	2,050	148
REAR DRUM BRAKE (regular cab 2.0 t Oceania 195/75R15 tire)			
Wheel cylinder x Backing plate	26	265	192
Brake drum x Axle hub	160	1,630	118
REAR DRUM BRAKE (regular cab except 195/75R15 type, wide cab 2.0 t)			
Wheel cylinder x Backing plate	61	622	45
Brake drum x Axle hub	160	1,631	118
REAR DRUM BRAKE (Wide cab over 2.0 t)			
Wheel cylinder x Backing plate	120	1,200	88
Brake drum x Axle hub	200	2,050	148
ABS & TRACTION ACTUATOR ASSY			
Brake actuator x Bracket	5.4	55	48
SPEED SENSOR FRONT			
Front speed sensor installation bolt	8.0	82	71 in.-lbf
Front speed sensor harness clamp x Knuckle	19	194	14
Front speed sensor harness clamp x Upper arm	19	194	14
Front speed sensor harness clamp x Frame	19	194	14
SPEED SENSOR REAR			
Rear speed sensor installation bolt	8.0	82	71 in.-lbf
Rear speed sensor harness clamp x Frame and housing	19	194	14
ES (EASY & SMOOTH) START			
ES start valve assembly	12.7	130	9.4
Brake actuator union nut	15	155	11.2
LOAD SENSING PROPORTIONING VALVE (LSPV)			
No. 1 shackle x Load sensing valve	12.5	130	9
Load sensing spring x Valve bracket	12.5	130	9
Valve bracket x Frame	25	260	19
No. 2 shackle x Shackle bracket	12.5	130	9
Brake pipe x Load sensing valve body	15	155	11
Breeder plug x Load sensing valve body	11	110	8
Load sensing valve body x Bracket	12.5	130	9

HINT:

(): For use with SST

PARKING BRAKE

SERVICE DATA

031CJ-01

Parking brake lever travel at 245 N {25 kgf, 55 lbf}		6 – 10 clicks
Parking brake drum inside diameter		
regular cab 2.0 t	Standard inside diameter:	160.0 mm (6.299 in.)
	Maximum inside diameter:	161.0 mm (6.339 in.)
regular cab 3.0 t, wide cab 2.0 t	Standard inside diameter:	177.8 mm (7.000 in.)
	Maximum inside diameter:	178.8 mm (7.039 in.)
Wide cab over 2.0 t	Standard inside diameter:	200.0 mm (7.874 in.)
	Maximum inside diameter:	201.0 mm (7.913 in.)
Parking brake shoe lining thickness		
regular cab 2.0 t	Standard thickness:	4.0 mm (0.157 in.)
	Minimum thickness:	1.5 mm (0.059 in.)
regular cab 3.0 t, wide cab 2.0 t	Standard thickness:	3.6 mm (0.142 in.)
	Minimum thickness:	1.5 mm (0.059 in.)
Wide cab over 2.0 t	Standard thickness:	3.8 mm (0.150 in.)
	Minimum thickness:	1.0 mm (0.039 in.)

TORQUE SPECIFICATION

Part Tightened	N-m	kgf-cm	ft-lbf
Parking brake cable lock nut	7.8	80	69 in.-lbf
Parking brake lever x Body	18	185	13
Parking brake cable No. 2 x Body	18	185	13
Parking brake cable clamp x Body	17.5	175	13
Backing brake cable No. 3 x Backing plate	Standard cab 2.0 t & 3.0 t	12.5	9
	Wide cab 2.0 t	12.5	9
	Wide cab over 2.0 t	7.8	69 in.-lbf
Parking brake drum set nut	127	1,300	94

EXHAUST BRAKE

SERVICE DATA

031CH-01

EXHAUST RETARDER ASSY	
Exhaust retarder valve body clearance	
14B, W04D-J:	0.4 - 0.55 mm (0.016 - 0.021 in.)
S05C-B, TA, TB:	0.3 - 0.5 mm (0.012 - 0.019 in.)
S05C-B, TA: (With ameroid compensator)	0.2 - 0.4 mm (0.008 - 0.016 in.)
Between chamber and gasket (for exhaust retarder) clearance	2 - 5 mm (0.08 - 0.20 in.)
Exhaust retarder opening angle	90°

TORQUE SPECIFICATION

Part Tightened	N-m	kgf-cm	ft-lbf
EXHAUST RETARDER ASSY			
Exhaust retarder x Exhaust pipe	29.5	300	22
Exhaust retarder valve body x Bracket	17.6	180	13
Exhaust brake lever x Valve body	13.7	140	10
Exhaust retarder clevis lock nut	13.7	140	10
Exhaust retarder power chamber x Bracket	17.6	180	13
Exhaust retarder adjusting bolt lock nut	7.4	75	65 in.·lbf
Exhaust retarder bracket cover x Bracket	7.4	75	65 in.·lbf

MANUAL TRANSMISSION / TRANSAXLE

TORQUE SPECIFICATION

03028-08

Part Tightened	N·m	kgf·cm	ft·lbf	
Filler and drain plugs	37	377	27	
Engine x Transmission	14B Engine Except 14B Engine	71.5 43	729 439	53 32
Engine rear mounting x Frame	74	755	55	
Engine rear mounting x Transmission	64	650	47	
Clutch release cylinder set bolt	12	122	9	
Selecting bellcrank support x Transmission	36	367	27	
Shift and select outer lever x Gear shifting rod	17.5	179	13	
Shift and select outer lever x Shift and select transmission cable	12	122	9	
Transmission control shift cable x Floor shift assy	11.5	117	8.5	
Transmission control shift cable adjust lock nut	13	133	9.6	
Floor shift selecting bellcrank x Floor shift lever retainer	12	120	9	
Floor shift lever x Floor select lever	14.5	145	11	
Floor shift control lever stopper set bolt	5	50	44 in.·lbf	
Floor shift assy x Body	18	183	13	
Floor shift grommet x Floor	7	71	62 in.·lbf	

CLUTCH**SERVICE DATA**

031CU-01

Pedal height from asphalt sheet	w/ Booster Type LHD	183.0 – 193.0 mm (7.205 – 7.598 in.)
	w/ Booster Type RHD	179.0 – 189.0 mm (7.047 – 7.441 in.)
	w/o Booster Type	155.0 – 165.0 mm (6.102 – 6.496 in.)
Clutch pedal free play		5.0 – 10.0 mm (0.197 – 0.394 in.)
Clutch pedal push rod play at pedal top	w/ Booster Type LHD	0.5 – 1.0 mm (0.020 – 0.039 in.)
	w/ Booster Type RHD	0.25 – 0.5 mm (0.010 – 0.020 in.)
	w/o Booster Type	0.25 – 0.5 mm (0.010 – 0.020 in.)
Clutch release point from pedal full stroke end position	w/ Booster Type LHD	37mm (1.457 in.) or more
	w/ Booster Type RHD	25mm (0.985 in.) or more
	w/o Booster Type	25mm (0.985 in.) or more
Clutch booster push rod clearance		0 mm (0 in.)
Disc rivet head depth	Min.	0.3 mm (0.012 in.)
Disc runout	Max.	1.0 mm (0.039 in.)
Flywheel runout	Max.	0.1 mm (0.004 in.)
Diaphragm spring finger wear	depth Max.	0.6 mm (0.024 in.)
	width Max.	5.0 mm (0.197 in.)
Diaphragm spring tip non-alignment	Max.	0.5 mm (0.020 in.)

TORQUE SPECIFICATION

Part Tightened	N-m	kgf-cm	ft-lbf
Release cylinder bleeder plug x Release cylinder	11	112	8
Clutch pedal sub-assy x Clutch pedal bracket	31	315	23
Clutch master cylinder support x Brake pedal bracket	19	185	13
Clutch master cylinder x Clutch booster	12.7	130	9
Clutch master cylinder to flexible hose tube x Clutch master cylinder (w/ Booster Type)	25	255	18
	for use with SST 21.4	218	15.8
Clutch master cylinder to flexible hose tube x Clutch master cylinder (w/o Booster Type)	15.8	161	11
	for use with SST 19.5	199	14
Clutch booster x Clutch master cylinder support	12.7	130	9
Clutch release cylinder x Manual transmission	12	120	9
Clutch release cylinder to flexible hose tube x Clutch release cylinder	24	245	18
	for use with SST 21	214	15
Clutch cover set bolt	14B Engine	19.1	14
	Except 14B Engine	43.1	32

STEERING COLUMN

SERVICE DATA

030A5-03

POWER STEERING SYSTEM		
Steering wheel free play	Maximum	25 mm (0.98 in.)

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
STEERING COLUMN ASSY			
Steering column upper W/switch bracket assy set nut	7.0	71	62 in.·lbf
Steering column assy set bolt and nut	11.5	117	9
Main shaft assy x Power steering gear	35	357	26
Steering column tube lower set nut	8	82	71 in.·lbf
Steering wheel set nut	50	510	37
Steering wheel pad set screw	2.0	20	18 in.·lbf

POWER STEERING**SERVICE DATA**

0302F-07

POWER STEERING SYSTEM		
Fluid temperature		75 – 80°C (167 – 176°F)
Fluid level rise	Maximum	5 mm (0.20 in.)
Fluid pressure at idle speed with valve closed	Minimum	
	4 ton model	9,300 kPa (95 kgf/cm ² , 1,351 psi)
	2 ton model	7,400 kPa (75 kgf/cm ² , 1,067 psi)
Fluid pressure at 1,000 and 3,000 rpm with valve open	Difference fluid pressure	490 kPa (5 kgf/cm ² , 71 psi) or less
Steering effort at idle speed	Reference	6 N·m (60 kgf·cm, 53 in.·lbf) or less
POWER STEERING VANE PUMP (S05C)		
Vane pump rotating torque		0.27 N·m (2.75 kgf·cm, 2.39 in.·lbf) or less
Vane pump shaft and vane pump housing oil clearance	STD	0.020 – 0.087 mm (0.00079 – 0.00343 in.)
	Maximum	0.087 mm (0.00343 in.)
Vane plate height	Minimum	8.6 mm (0.339 in.)
Vane plate thickness	Minimum	1.397 mm (0.0550 in.)
Vane plate length	Minimum	14.991 mm (0.5902 in.)
Clearance between the rotor groove and plate	Maximum	0.03 mm (0.0012 in.)
Spring free length	Minimum	33.4 mm (1.315 in.)
Vane pump shaft bearing	Press-fit depth	21.4 – 21.7 mm (0.84 – 0.854 in.)
Vane pump shaft oil seal	Press-fit depth	3.6 – 3.9 mm (0.142 – 0.154 in.)
POWER STEERING GEAR ASSY		
Sector shaft thrust clearance	Maximum	0.15 mm (0.0059 in.)
Power piston	Rotating torque	0.35 – 1.0 N·m (3.6 – 10.2 kgf·cm, 3.1 – 8.9 in.·lbf)
Total preload	Turning	0.2 – 0.4 N·m (2 – 4 kgf·cm, 1.7 – 3.5 in.·lbf)
STEERING LINKAGE		
Tie rod end sub-assy Length (Regular cab)	2 ton model	1,159 mm (45.64 in.)
Tie rod end sub-assy Length (Wide cab)	4 ton model	1,435 mm (56.50 in.)
	2 ton model	1,425 mm (56.10 in.)

TORQUE SPECIFICATION

Part Tightened	N-m	kgf-cm	ft-lbf	
POWER STEERING SYSTEM				
Steering wheel set nut	50	510	37	
VANE PUMP ASSY (S05C)				
Flow control valve orifice x Front housing	69	700	51	
Vane pump assy x Engine	47	480	35	
Pressure feed hose x Vane pump assy	56	575	42	
Suction port union set bolt	28	290	21	
Vane pump ASSY (W04D)				
Flow control valve plug	63.7	650	47	
Front body x Rear body	39.2	400	29	
Pressure feed tube x vane pump assy	56	571	41	
Suction port union set bolt	17.5	178	13	
POWER STEERING GEAR ASSY				
Power piston assy set bolt	88.2	900	65	
Sector shaft side cover	88.2	900	65	
Gear housing x Pitman arm	340	3,468	251	
Power steering gear assy x Bracket steering gear housing	180	1,836	133	
Steering drag link x Pitman arm				
	4 ton model	195	2,000	145
	2 ton model	152	1,550	112
Steering gear outlet return tube	42 (36)	430 (367)	31 (27)	
Pressure feed tube	42 (36)	430 (367)	31 (27)	
STEERING LINKAGE				
Steering knucle arm set nut				
	4 ton model	685	7,000	506
	2 ton model	392	4,000	288
Tie rod end sub-assy adjust lock nut	(clamp bolt)4 ton model	74	755	55
	(lock nut)2 ton model	137	1,398	101
Tie rod end assy set nut				
	4 ton model	195	2,000	144
	2 ton model	152	1,550	112

HINT:

(): For use with SST

MANUAL STEERING

SERVICE DATA

030Y0-02

Sector shaft thrust clearance	Maximum	0.10 mm (0.0039 in.)
Thrust washer thickness		1.95 mm (0.0768 in.) 2.00 mm (0.0787 in.) 2.05 mm (0.0807 in.)
Sector shaft outer diameter	STD Minimum	37.966 – 37.991 mm (1.4947 – 1.4957 in.) 37.94 mm (1.4937 in.)
Gear housing bushing inner diameter	STD	38.000 – 38.025 mm (1.4961 – 1.4970 in.)
Sector shaft and bushing oil clearance	Maximum	0.20 mm (0.0079 in.)
Bearing preload	Starting	0.29 – 0.59 N·m (3 – 6 kgf·cm, 2.6 – 5.2 in·lbf)
Total preload	Starting	0.8 – 1.1 N·m (8 – 11 kgf·cm, 6.9 – 9.5 in·lbf)

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Pitman arm x drag link	152	1,550	112
Oil plug	20	200	14
Gear housing set nut	180	1,836	133
Pitman arm set nut	245	2,500	180

HEATER AND AIR CONDITIONING

031CO-01

SERVICE DATA

REFRIGERANT		
Normally function refrigeration system		
Gauge reading	Low pressure side	0.15 – 0.25 Mpa (1.5 – 2.5 kgf/cm ²)
	High pressure side	1.37 – 1.57 Mpa (14 – 16 kgf/cm ²)
Refrigerant charge volume		550 ± 50 g (19.40 ± 1.76 oz.)
V COOLER BELT		
V cooler belt (S05C-#)		
Tension	New belt	7.0 – 8.5 mm (0.28 – 0.34 in.)
	Used belt	8.5 – 10.0 mm (0.34 – 0.39 in.)
V cooler belt (15B-FTE)		
Tension	New belt	9.0 – 12.0 mm (0.35 – 0.47 in.)
	Used belt	12.0 – 16.0 mm (0.47 – 0.63 in.)
V cooler belt (W04D-J)		
Tension	New belt	7.0 – 8.5 mm (0.28 – 0.34 in.)
	Used belt	8.5 – 10.0 mm (0.34 – 0.39 in.)
COOLER COMPRESSOR ASSY		
Magnetic clutch clearance	Standard	0.50 ± 0.15 mm (0.020 ± 0.006 in.)
Magnetic clutch shim thickness		0.1 mm (0.004 in.) 0.3 mm (0.012 in.) 0.5 mm (0.020 in.)

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
V COOLER BELT	-	-	-
Idler pulley bolt (A/C drive belt)	41	420	30
REFRIGERANT LINE (15B-FTE RHD)	-	-	-
Hose suction A x Air conditioning tube assy	33	337	24
Cooler refrigerant suction hose No.1 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant suction hose No.2 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrige requid hose No.1 x Liquid tank	6	61	53 in.·lbf
Liquid A hose x Cooler unit assy	7	71	62 in.·lbf
REFRIGERANT LINE (15B-FTE LHD)	-	-	-
Cooler refrigerant suction hose No.1 x Cooler refrigerant suction hose	33	337	24
Cooler refrigerant discharge Hose No.2 x Cooler refrigerant discharge tube	23	235	17
Cooler refrigerant requid tube No.1 x Requid tank	6	61	53 in.·lbf
Cooler refrigerant suction hose No.1 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge hose No.2 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge Hose No.2 x Condenser assy	6	61	53 in.·lbf
Liquid A hose x Cooler unit assy	9.8	100	87 in.·lbf
REFRIGERANT LINE (S05C-B RHD)	-	-	-
Cooler refrigerant discharge hose No.2 x Cooler refrigerant suction	33	337	24
Cooler refrigerant suction hose x Liquid A hose	14	140	10
Cooler refrigerant discharge hose No.2 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant suction hose x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant suction hose x Condenser assy	6	61	53 in.·lbf
Cooler refrigerant riquid tube No.1 x Condenser assy	6	61	53 in.·lbf
Cooler refrigerant suction x Cooler unit assy	9.8	100	87 in.·lbf
Liquid A hose x Requid tank	6	61	53 in.·lbf
REFRIGERANT LINE (S05C-B LHD)	-	-	-
Cooler refrigerant discharge tube x Cooler refrigerant discharge tube No.2	23	235	17
Cooler refrigerant suction hose No.1 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge hose No.2 x A/C compressor	9.8	100	87 in.·lbf
Liquid A hose x Requid tank	6	61	53 in.·lbf
Cooler refrigerant riquid tube No.1 x Condenser assy	6	61	53 in.·lbf
Cooler refrigerant discharge tube x Condenser assy	6	61	53 in.·lbf
Liquid A hose x Cooler unit assy	9.8	100	87 in.·lbf
REFRIGERANT LINE (S05C-TA/TB RHD)	-	-	-
Cooler refrigerant suction hose No.1 x Cooler refrigerant suction hose No.2	33	337	24
Cooler refrigerant suction hose No.1 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge hose No.2 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge hose No.2 x Discharge G tube	23	235	17
Discharge G tube x Liquid A hose	14	140	10
Liquid A hose x Requid tank	6	61	53 in.·lbf
Cooler refrigerant riquid tube No.1 x Condenser assy	6	61	53 in.·lbf
Liquid A hose x Requid tank	6	61	53 in.·lbf

Discharge x Condenser assy	6	61	53 in.·lbf
Cooler refrigerant liquid tube No.1 x Condenser assy	6	61	53 in.·lbf
Cooler refrigerant suction hose No.2 x Cooler unit assy	9.8	100	87 in.·lbf
REFRIGERANT LINE (S05C-TA/TB LHD)	-	-	-
Cooler refrigerant suction hose No.1 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge hose No.2 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant suction hose No.1 x Cooler refrigerant suction hose No.1	33	337	24
Liquid A hose x Requid tank	6	61	53 in.·lbf
Cooler refrigerant riquid hose No.1 x Condenser assy	6	61	53 in.·lbf
Cooler refrigerant discharge hose No.2 x Condenser assy	6	61	53 in.·lbf
Cooler refrigerant suction hose No.1 x Cooler unit assy	9.8	100	87 in.·lbf
REFRIGERANT LINE (W04D-J RHD)	-	-	-
Cooler refrigerant discharge hose x Cooler refrigerant suction hose	23	235	17
Cooler refrigerant discharge hose x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge hose No.1 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant suction hose x Liquid A hose	14	140	10
Liquid A hose x Requid tank	6	61	53 in.·lbf
Cooler refrigerant riquid hose No.2 x Condenser assy	6	61	53 in.·lbf
Liquid A hose x Cooler unit assy	9.8	100	87 in.·lbf
REFRIGERANT LINE (W04D-J LHD)	-	-	-
Cooler refrigerant discharge hose No.1 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge hose No.2 x A/C compressor	9.8	100	87 in.·lbf
Liquid A hose x Requid tank	6	61	53 in.·lbf
Cooler refrigerant discharge hose No.2 x Condenser assy	6	61	53 in.·lbf
Liquid A hose x Condenser assy	6	61	53 in.·lbf
Liquid A hose x Cooler unit assy	6	61	53 in.·lbf
COOLER COMPRESSOR ASSY (15B-FTE)	-	-	-
Cooler refrigerant suction tube No.1 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge hose No.1 x A/C compressor	9.8	100	87 in.·lbf
Bracket x Engine	47	480	35
Idle pulley bracket x Engine	25	250	18
A/C compressor x Bracket	25	250	18
Pressure plate x A/C compressor	19.6	200	15
COOLER COMPRESSOR ASSY (S05C-#)	-	-	-
Cooler refrigerant suction tube No.1 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge hose No.1 x A/C compressor	9.8	100	87 in.·lbf
Bracket x Engine	68.5	700	50
A/C compressor x Bracket	29	295	21
Pressure plate x A/C compressor	13.2	135	9
COOLER COMPRESSOR ASSY (W04D-J)	-	-	-
Cooler refrigerant suction tube No.1 x A/C compressor	9.8	100	87 in.·lbf
Cooler refrigerant discharge hose No.1 x A/C compressor	9.8	100	87 in.·lbf
Bracket x Engine	68.5	700	50
A/C compressor x Bracket	29	295	21
Pressure plate x A/C compressor	19.6	200	15

SERVICE SPECIFICATIONS - HEATER AND AIR CONDITIONING

COOLER CONDENSOR ASSY	-	-	-
Cooler refrigerant discharge pipe A	9.8	100	87 in.·lbf
Cooler refrigerant liquid pipe A	9.8	100	87 in.·lbf

SUPPLEMENTAL RESTRAINT SYSTEM

031CR-01

TORQUE SPECIFICATION

Part Tightened	N·m	kgf·cm	ft·lbf
HORN BUTTON ASSY			
Horn button assy x Steering wheel assy	8.8	90	78 in.·lbf
Steering wheel assy x Body	50	510	37
AIRBAG ECU ASSY			
Airbag ECU assy x Body	20	200	14
AIRBAG SENSOR			
Airbag sensor assy No. 2 x Body	20	200	14
Seat airbag No. 1 cover RH x Body	20	200	14

SEAT BELT**TORQUE SPECIFICATION**

03020-02

Part Tightened	N·m	kgf·cm	ft·lbf
FRONT SEAT BELT (3P ELRx2, NRx1)	-	-	-
Front seat outer belt assy (Driver side) x Body			
Retractor side bolt	42	420	30
Shoulder side bolt	42	420	30
Floor anchor side bolt	42	420	30
Front seat outer belt assy (Passenger side) x Body			
Retractor side bolt	42	420	30
Shoulder side bolt	42	420	30
Floor anchor side bolt	42	420	30
Front seat inner belt assy (Driver side) x Front seat	42	420	30
Front seat lap type belt assy center x Body	42	420	30
Front seat inner belt assy x Body	42	420	30
FRONT SEAT BELT (3P ELRx2)	-	-	-
Front seat outer belt assy (Driver side) x Body			
Retractor side bolt	42	420	30
Shoulder side bolt	42	420	30
Floor anchor side bolt	42	420	30
Front seat outer belt assy (Passenger side) x Body			
Retractor side bolt	42	420	30
Shoulder side bolt	42	420	30
Floor anchor side bolt	42	420	30
Front seat inner belt assy (Driver side) x Front seat	42	420	30
Front seat inner belt assy x Body	42	420	30
FRONT SEAT BELT (3P NRx2)	-	-	-
Front seat outer belt assy (Driver side) x Body			
Shoulder side bolt	42	420	30
Floor anchor side bolt	42	420	30
Front seat outer belt assy (Passenger side) x Body			
Shoulder side bolt	42	420	30
Floor anchor side bolt	42	420	30
Front seat inner belt assy (Driver side) x Front seat	42	420	30
Front seat inner belt assy x Body	42	420	30

WIPER & WASHER

TORQUE SPECIFICATION

030NH-02

Part Tightened	N-m	kgf·cm	ft·lbf
Wiper motor x Body	5.5	56	48 in.·lbf
Front washer nozzle holder x Front panel cover	3.9	40	35 in.·lbf
Wiper arm x Wiper link	20	204	15

WINDSHIELD / WINDOWGLASS / MIRROR

03022-02

TORQUE SPECIFICATION

Part Tightened	N·m	kgf·cm	ft·lbf
OUTER REAR VIEW MIRROR (AUSTRALIA, PORTUGAL)	-	-	-
Outer rear view mirror retainer x Body	20	204	15
Outer rear view mirror assy x Body	Bolt	20	15
	Screw	11	8
OUTER REAR VIEW MIRROR (EXCEPT AUSTRALIA, PORTUGAL)	-	-	-
Outer rear view mirror assy x Body	23	235	17

INSTRUMENT PANEL / METER**TORQUE SPECIFICATION**

03026-02

Part Tightened	N·m	kgf·cm	ft·lbf
INSTRUMENT PANEL (WIDE CAB MODEL, REGULAR CAB MODEL)	-	-	-
Steering wheel set nut	50	510	37

SEAT**TORQUE SPECIFICATION**

03021-02

Part Tightened	N-m	kgf-cm	ft-lbf
FRONT SEAT (Driver Seat)	-	-	-
Front seatback plate lower x Front seat back assy	40	410	30
Front seat cushion spring assy x Front seat track assy outer	39	398	29
Front seat track assy outer x Body	39	398	29
Front inner seat track rail UPR x Front seat cushion spring assy	39	398	29
Front seat inner belt assy x Front inner seat truck rail LWR	39	398	29
FRONT SEAT (Passenger Seat) (Wide cab models)	-	-	-
Front seatback assy x Body	19	194	14
Front seat cushion assy x Body	19	194	14
Rclining seatback adjuster assy x Center seatback assy	40	410	30
Rclining seatback adjuster assy x Front seatback assy	40	410	30
Front seatback hinge x Body	19	194	14
FRONT SEAT (Passenger Seat) (Standard cab models)	-	-	-
Front seatback assy x Body	19	200	14
Front seat cushion assy x Body	12.5	127	9.2

ENGINE HOOD / DOOR**SERVICE DATA**

030Z4-02

ADJUST TILT CAB LOCK CONNECTING PIPE SUB-ASSY	15.0 mm (0.590 in.)
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TORQUE SPECIFICATION

Part Tightened		N·m	kgf·cm	ft·lbf
FRONT DOOR		-	-	-
Door hinge x Body		23	235	17
Door hinge x Door panel		23	235	17
Door lock assy x Door panel		5	50	44 in.·lbf
Outside handle assy x Door panel		5	50	44 in.·lbf
TILT CAB TUBE SUB-ASSY NO.1		-	-	-
Tilt cab tube sub-assy No.1		185	1,880	136.4
Tilt cab tube sub-assy No.1 x Body		58	590	43
Cab spring support arm No.1		58	590	43
Rear brake tube No.1		15	155	11
Front brake tube No.1		15	155	11
Clutch master cylinder to flexible hose tube		20	204	15
Radiator grille bracket x Tilt cab tube sub-assy		8.5	85	75 in.·lbf
CAB MOUNTING CUSHION SUB-ASSY NO.2		-	-	-
Cab mounting cushion sub-assy No.2		105	1070	77
Cab mounting hook bracket sub-assy No.1		83	845	61
TILT CAB MOUNTING LOCK ASSY		-	-	-
Tilt cab mounting lock assy LH x Body		20	205	15
Tilt cab stopper latch assy x Body	A bolt	58	592	43
	B bolt	20	205	15
Tilt cab mounting lock assy RH x Body	A bolt	37	380	27
	B bolt	20	205	15
Tilt cab lock connecting pipe sub-assy x Tilt cab mounting lock assy		18	185	13
TILT CAB STAY ASSY		-	-	-
Tilt cab stay assy x Body		58	590	43
Front floor side apron No.1 LH x Body		11.5	115	8.5

EXTERIOR/INTERIOR TRIM**TORQUE SPECIFICATION**

03023-02

Part Tightened	N·m	kgf·cm	ft·lbf
FRONT BUMPER BAR	-	-	-
Front bumper bar x Body	18	185	13
FRONT SIDE PANEL SUB ASSY LH	-	-	-
Front side panel x Body bolt	8.5	85	74 in·lbf

POWER TAKE-OFF

TORQUE SPECIFICATION

031CQ-01

Part Tightened	N·m	kgf·cm	ft·lbf
POWER TAKE OFF ASSY	-	-	-
Power take-off assembly x Manual transmission	39	400	29

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ECD SYSTEM (S05C-TB)

HOW TO PROCEED WITH TROUBLESHOOTING

057F8-02

HINT:

Troubleshoot in accordance with the procedures on the following pages.

When using hand-held tester:

1	VEHICLE BROUGHT TO WORKSHOP
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2	CUSTOMER PROBLEM ANALYSIS (See page 05-6)
----------	--



3	CONNECT HAND-HELD TESTER TO DLC3
----------	---

HINT:

If the display indicates a communication fault in the tool, inspect the DLC3.



4	CHECK DTC AND FREEZE FRAME DATA (See page 05-7)
----------	--

HINT:

Record or print DTC and Freeze Frame Data, if needed.



5	CLEAR DTC AND FREEZE FRAME DATA (See page 05-7)
----------	--



6	VISUAL INSPECTION
----------	--------------------------



7	SETTING CHECK (TEST) MODE DIAGNOSIS (See page 05-7)
----------	--



8 PROBLEM SYMPTOM CONFIRMATION

HINT:

If the engine does not start, perform steps 10 and 12 first.

A	Malfunction does not occur
B	Malfunction occurs

B Go to step 10

A

9 SYMPTOM SIMULATION**10 DTC CHECK (See page 05-7)**

A	Malfunction code
B	No code

B Go to step 12

A

11 DTC CHART (See page 05-14)

Go to step 14

12 BASIC INSPECTION (See page 05-7)

A	Wrong parts not confirmed
B	Wrong parts confirmed

B Go to step 17

A

13 PROBLEM SYMPTOMS TABLE (See page 05-21)

A	Wrong circuit confirmed
B	wrong parts confirmed

B Go to step 17

A

14 | **CHECK ECM POWER SOURCE CIRCUIT (See page 05-87)**



15 | **CIRCUIT INSPECTION**

A	Malfunction not confirmed
B	Malfunction confirmed

B → **Go to step 18**



16 | **CHECK FOR INTERMITTENT PROBLEMS (See page 05-7)**



Go to step 18

17 | **PARTS INSPECTION**



18 | **IDENTIFICATION OF PROBLEM**



19 | **ADJUST, REPAIR**



20 | **CONFIRMATION TEST**



END

When not using hand-held tester:

1	VEHICLE BROUGHT TO WORKSHOP
----------	------------------------------------



2	CUSTOMER PROBLEM ANALYSIS (See page 05-6)
----------	--



3	CHECK AND CLEAR DTC (See page 05-7)
----------	--



4	PROBLEM SYMPTOM CONFIRMATION
----------	-------------------------------------

A	Malfunction occurs
B	Malfunction does not occur

B	SYMPTOM SIMULATION (See page 05-7)
----------	---



5	DTC CHECK (See page 05-7)
----------	----------------------------------

A	Malfunction code
B	No code

B	Go to step 7
----------	---------------------

A

6	DTC CHART (See page 05-7)
----------	----------------------------------



Go to step 9

7	BASIC INSPECTION (See page 05-7)
----------	---

A	Wrong parts not confirmed
B	Wrong parts confirmed

B	Go to step 12
----------	----------------------

A

8 | PROBLEM SYMPTOMS TABLE (See page 05-21)

A	Wrong circuit confirmed
B	Wrong parts confirmed

B → Go to step 12

A

9 | CHECK ECM (ECU) POWER SOURCE CIRCUIT (See page 05-87)

10 | CIRCUIT INSPECTION

A	Malfunction not confirmed
B	Malfunction confirmed

B → Go to step 13

A

11 | CHECK FOR INTERMITTENT PROBLEMS (See page 05-7)

Go to step 13

12 | PARTS INSPECTION

13 | IDENTIFICATION OF PROBLEM

14 | ADJUSTMENT, REPAIR

15 | CONFIRMATION TEST

END

CUSTOMER PROBLEM ANALYSIS CHECK

ELECTRONIC CONTROLLED DIESEL SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		Model and Model Year	
Driver's Name		Frame No.	
Data Vehicle Brought in		Engine Model	
License No.		Odometer Reading	km miles

Problem Symptoms	<input type="checkbox"/> Engine does not Start	<input type="checkbox"/> Engine does not crank	<input type="checkbox"/> No initial combustion	<input type="checkbox"/> No complete combustion
	<input type="checkbox"/> Difficult to Start	<input type="checkbox"/> Engine cranks slowly <input type="checkbox"/> Other _____		
	<input type="checkbox"/> Poor Idling	<input type="checkbox"/> Incorrect first idle <input type="checkbox"/> Idling rpm is abnormal <input type="checkbox"/> High (rpm) <input type="checkbox"/> Low (rpm) <input type="checkbox"/> Rough idling <input type="checkbox"/> Other _____		
	<input type="checkbox"/> Poor Drivability	<input type="checkbox"/> Hesitation <input type="checkbox"/> Back fire <input type="checkbox"/> Muffler explosion (after-fire) <input type="checkbox"/> Surging <input type="checkbox"/> Knocking <input type="checkbox"/> Other _____		
	<input type="checkbox"/> Engine Stall	<input type="checkbox"/> Soon after starting <input type="checkbox"/> After accelerator pedal depressed <input type="checkbox"/> After accelerator pedal released <input type="checkbox"/> During A/C operation <input type="checkbox"/> Shifting from N to D <input type="checkbox"/> Other _____		
	<input type="checkbox"/> Others	_____		

Data Problem Occurred	_____			
Problem Frequency	<input type="checkbox"/> Constant <input type="checkbox"/> Sometimes (times per day/month) <input type="checkbox"/> Once only <input type="checkbox"/> Other _____			
Condition When Problem Occurs	Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Various/Other _____		
	Outdoor Temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold (approx. ____ °F/____ °C)		
	Place	<input type="checkbox"/> Highway <input type="checkbox"/> Suburbs <input type="checkbox"/> Inner City <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Rough road <input type="checkbox"/> Other _____		
	Engine Temp.	<input type="checkbox"/> Cold <input type="checkbox"/> Warming up <input type="checkbox"/> After Warming up <input type="checkbox"/> Any temp. <input type="checkbox"/> Other _____		
	Engine Operation	<input type="checkbox"/> Starting <input type="checkbox"/> Just after starting (min.) <input type="checkbox"/> Idling <input type="checkbox"/> Racing <input type="checkbox"/> Driving <input type="checkbox"/> Constant speed <input type="checkbox"/> Acceleration <input type="checkbox"/> Deceleration <input type="checkbox"/> A/C switch ON/OFF <input type="checkbox"/> Other _____		

Condition of Check Engine Warning Light (CHK ENG)	<input type="checkbox"/> Remains on <input type="checkbox"/> Sometimes lights up <input type="checkbox"/> Does not light up		
DTC Inspection	Normal Mode (Pre-check)	<input type="checkbox"/> Normal <input type="checkbox"/> Malfunction code(s) (code) <input type="checkbox"/> Freeze frame data ()	
	Check Mode	<input type="checkbox"/> Normal <input type="checkbox"/> Malfunction code(s) (code) <input type="checkbox"/> Freeze frame data ()	

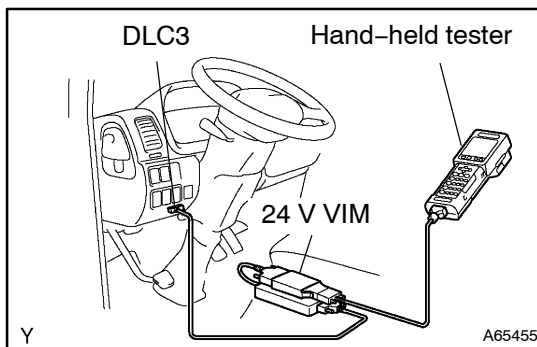
PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Description

- When troubleshooting the Multiplex OBD (M-OBD) vehicles, the only difference from the usual troubleshooting procedures is that you connect the vehicle to the hand-held tester and read off various data output from the vehicle's ECM.
- The vehicle's on-board computer lights up the check engine warning light on the instrument panel when the computer detects a malfunction in the computer itself or in the drive system components. In addition to the check engine warning light lighting up when a malfunction is detected, the applicable diagnostic trouble codes are recorded in the ECM memory (See page 05-14).

If the malfunction has been repaired, the check engine warning light will go off automatically but the diagnostic trouble codes will remain recorded in the ECM memory.



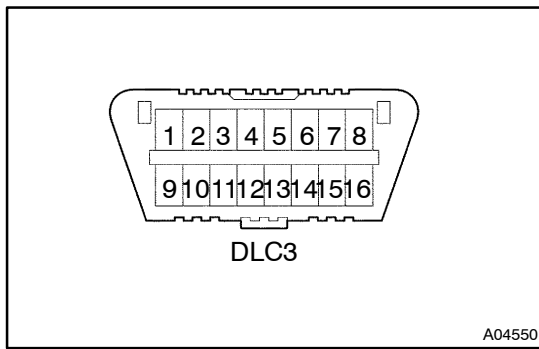
NOTICE:

Be sure to use the 24 V VIM, because the hand-held tester will be destroyed if you do not use the 24 V VIM.

- To check the diagnostic trouble codes, connect the hand-held tester to the Data Link Connector 3 (DLC3) on the vehicle or read the number of blinks of the check engine warning light when the TC and CG terminals on the DLC3 are connected. The hand-held tester also enables you to erase the diagnostic trouble codes, activate the several actuators and check freeze frame data and various forms of engine data (For operating instructions, see the hand-held tester instruction book).
- The diagnosis system operates in the normal mode during normal vehicle use. It also has the check (test) mode for technicians to simulate malfunction symptoms and troubleshoot. Some diagnostic trouble codes use 2 trip detection logic* to prevent erroneous detection and ensure thorough malfunction detection. By switching the ECM to the check (test) mode using the hand-held tester when troubleshooting, the technician can cause the check engine warning light to light up for a malfunction that is only detected once or momentarily (hand-held tester only) (See page 05-14).
- *2 trip detection logic:
When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory.

If the same malfunction is detected again during the second drive test, this second detection causes the check engine warning light to light up. The 2 trip repeats the same mode twice (However, the ignition switch must be turned OFF between the 1st trip and 2nd trip).

- Freeze frame data:
Freeze frame data records the engine condition (fuel system, calculator load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

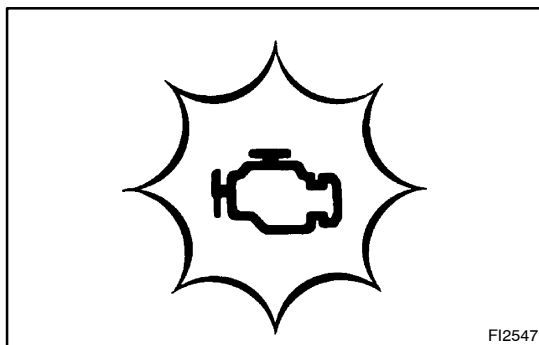


- (b) Check the DLC3.
- (1) The vehicle's ECM uses ISO 14230 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 14230 format.

Terminal No.	Connection/Voltage or Resistance	Condition
7	Bus + line/Pulse generation	During transmission
4	Chassis ground ↔ Body ground/1 Ω or less	Always
16	Battery positive ↔ Body ground/9 - 14 V	Always

HINT:

- If the display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the hand-held tester to the DLC3, turned the ignition switch ON and operated the hand-held tester, there is a problem on the vehicle side or tool side.
- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

**2. INSPECT DIAGNOSIS (Normal Mode)**

- (a) Check the check engine warning light.
- (1) Check that the check engine warning light comes on when the ignition switch is turned ON and the engine is not running.

HINT:

If the check engine warning light does not light up, troubleshoot the combination meter.

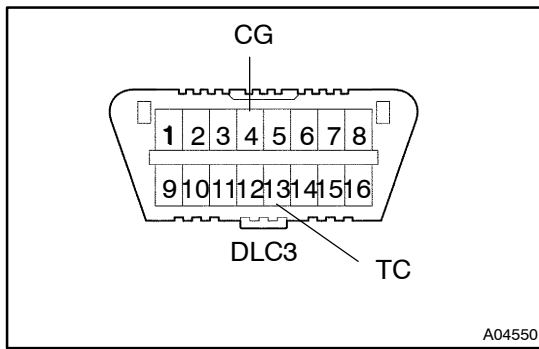
- (2) When the engine is started, check that the check engine warning light goes off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

- (b) Check the DTC using the hand-held tester.

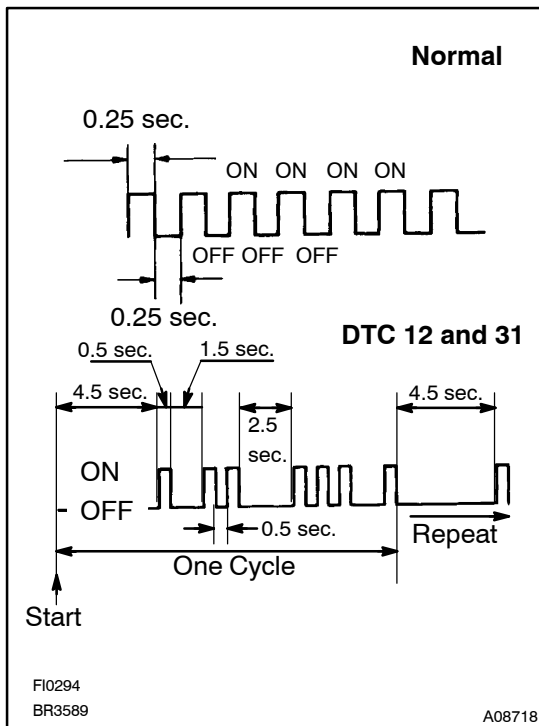
NOTICE:

When the diagnosis system is switched from the normal mode to the check (test) mode, all DTCs and freeze frame data recorded in the normal mode are erased. So before switching modes, always check the DTCs and freeze frame data, and make a note of them.

- (1) Prepare the hand-held tester.
- (2) Connect the hand-held tester to the DLC3.
- (3) Turn the ignition switch ON and switch the hand-held tester main switch ON.
- (4) Using the hand-held tester, check the DTCs and freeze frame data make a note of them. (for operating instructions, see the hand-held tester's instruction book).
- (5) Confirm the details of the DTCs.



- (c) Check the DTC not using the hand-held tester.
- (1) Turn the ignition switch ON.
 - (2) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
- SST 09843-18040



- (3) Read the DTC from the check engine warning light. As an example, the blinking patterns for codes; normal, DTC 12 and 31 are shown in the illustration.

HINT:

If no DTC is output, check the diagnostic connector (DLC3) circuit (See page 05-91).

- (4) Check the details of the malfunction using the DTC chart on page 05-14.
- (5) After completing the check, disconnect terminals 13 (TC) and 4 (CG) and turn off the display.

HINT:

When 2 or more malfunction codes are output, the indication will begin from the smaller numbered code to the larger in order.

NOTICE:

When simulating symptoms without a hand-held tester to check the DTCs, use the normal mode. For code on the DTCs chart subject to "2 trip detection logic", turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again. When the problem has been simulated twice, the check engine warning light lights up and the DTCs are recorded in the ECM.

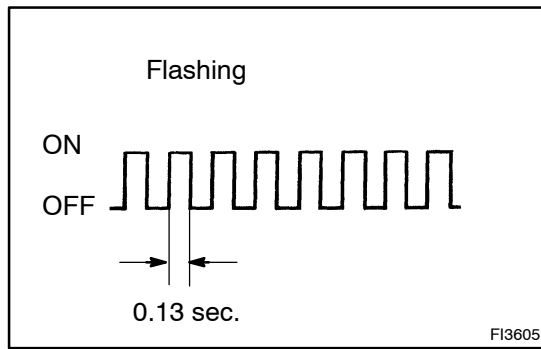
3. INSPECT DIAGNOSIS (Check (Test) Mode)

Hand-held tester only:

Compared to the normal mode, the check mode has an increased sensitivity to detect malfunctions.

Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check (test) mode.

- (a) Check the DTC.
 - (1) Initial conditions.
 - Battery positive voltage 11 V or more
 - Throttle valve fully closed
 - Transmission in neutral position
 - A/C switched OFF.
 - (2) Turn the ignition switch OFF.
 - (3) Prepare the hand-held tester.
 - (4) Connect the hand-held tester to the DLC3.
 - (5) Turn the ignition switch ON and push the hand-held tester main switch ON.



- (6) Switch the hand-held tester from the normal mode to the check (test) mode (Check that the check engine warning light flashes).
- (7) Start the engine (The check engine warning light goes off after the engine starts).
- (8) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch ON until you have checked the DTCs, etc.

- (9) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTCs and freeze frame data, etc.

HINT:

Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from the check (test) mode to the normal mode, so all diagnostic codes, etc. are erased.

- (10) After checking the DTCs, inspect the applicable circuit.
- (b) Clear the DTC.
- (1) The following actions will erase the DTCs and freeze frame data.
 - Operating the hand-held tester to erase the codes (See the hand-held tester's instruction book for operating instructions).
 - Disconnecting the battery terminals or ECD fuse.

NOTICE:

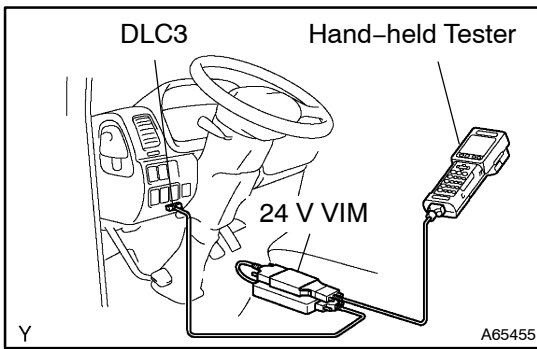
If the hand-held tester switches the ECM from the normal mode to the check (test) mode or vice-versa, or if the ignition switch is turned from ON to ACC or OFF during the check (test) mode, the DTCs and freeze frame data will be erased.

4. CHECK FOR INTERMITTENT PROBLEMS**HINT:**

Hand-held tester only:

By putting the vehicle's ECM in the check (test) mode, 1 trip detection logic is possible instead of 2 trip detection logic and sensitivity to detect open circuits is increased. This makes it easier to detect intermittent problems.

- (a) Clear the DTC (See step 3).
- (b) Set the check (test) mode (See step 3).
- (c) Perform a simulation test (See page 05-14).
- (d) Check the connector and terminal (See page 01-27).
- (e) Handle the connector (See page 01-27).



5. REFERENCE VALUE OF ECM DATA

NOTICE:

- Be sure to use the 24 V VIM, because the hand-held tester will be destroyed if you do not use the 24 V VIM.
- The values given below for "Normal Condition" are representative values, so the vehicle may still be normal even if its values differ from those listed here. So do not decide whether a part is faulty or not solely depending on the "Normal Condition" here.

HINT:

ECM data can be monitored by hand-held tester.

- Connect the hand-held tester to the DLC3.
- Monitor ECM data by following the prompts on the tester screen. Please refer to the hand-held tester operator's manual for further detail.

Reference value:

Item	Inspection Condition	Reference Value
INJECTION VOLUME	Engine at idling*	7 - 13 mm ³ /st
	Engine racing at 2,000 rpm*	11 - 17 mm ³ /st
	Engine racing at 3,000 rpm*	13 - 19 mm ³ /st
INJECTION TIMING	Engine at idling*	0 CA
	Engine racing at 2,000 rpm*	0 - 3° CA
	Engine racing at 3,000 rpm*	1.5 - 4.5° CA
ENGINE SPD	RPM kept stable (Comparison with tachometer)	No great changes
PIM	Engine at idling*	90 - 100 kPa
	Engine racing at 2,000 rpm*	100 - 120 kPa
	Engine racing at 3,000 rpm*	120 - 140 kPa
ACCELE POSITION	Accelerator pedal fully closed	18
	Accelerator pedal fully opened	84 - 90
IDL SIG	Accelerator pedal full closed	ON
STARTER SIG	During cranking	ON
COMMON RAIL PRESS	Engine at idling*	19 - 31 MPa

HINT:

*: In a flat and level place, complete warming-up with all the accessories switched OFF.

BASIC INSPECTION

When the malfunction code is not confirmed in the DTC check, troubleshoot all the possible circuits to be considered as the cause of the problems.

In many cases, by carrying out the basic engine check shown in the following flow chart, the location causing the problem can be found quickly and efficiently. Therefore, use of this check is essential in the engine troubleshooting.

1 CHECK BATTERY POSITIVE VOLTAGE

NOTICE:

Carry out this check under the engine stoppage condition.

	OK	NG
Voltage	11 V or more	Less than 11 V

NG → CHARGE OR REPLACE BATTERY

OK

2 CHECK IF ENGINE IS CRANKED

NG → PROCEED TO PROBLEM TABLE ON PAGE 05-21

OK

3 CHECK AIR FILER (See page 14-77)

NG → REPAIR OR REPLACE

OK

4 CHECK FUEL QUALITY

- (a) Check that only diesel fuel is used.
- (b) Check that the fuel does not contain any impurity.

NG → REPLACE FUEL

OK

5 CHECK ENGINE OIL (See page 17-34)

NG → ADD OR REPLACE

OK

6 CHECK COOLANT (See page 16-36)

NG → **REPLACE COOLANT**

OK

7 CHECK DLC3 CIRCUIT (See page 05-91)

NG → **REPAIR OR REPLACE**

OK

8 CHECK PCV SYSTEM

(a) Visually check the hose and connection for cracks, leaks or damage.

NG → **REPAIR OR REPLACE**

OK

PROCEED TO PROBLEM SYMPTOMS TABLE (See page 05-21)

DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may not be exactly the same as your readings due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in the check mode, check the circuit for the codes listed in the chart below. For details of each code, refer to the "See page" under the respective "DTC No." in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area	Check Engine Warning Light *1	*2 Memory
12 (05-24)	Engine Speed Sensor Circuit Malfunction1 (TDC or G1 circuit)	<ul style="list-style-type: none"> • Open or short in camshaft position sensor circuit • Camshaft position sensor • Camshaft timing pulley • ECM 	○	○
13 (05-27)	Engine Speed Sensor Circuit Malfunction2 (NE circuit)	<ul style="list-style-type: none"> • Open or short in crankshaft position sensor circuit • Crankshaft position sensor • Crank angle sensor plate • ECM 	○	○
17 (05-30)	Interior IC Malfunction	<ul style="list-style-type: none"> • ECM 	○	○
19 (1) (05-31)	Accel. Position Sensor Circuit (Open/Short)	<ul style="list-style-type: none"> • Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • ECM 	○	○
19 (2) (05-35)	Accel. Position Sensor Circuit (IDL SW/Range)	<ul style="list-style-type: none"> • Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • ECM 	○	○
19 (3) (05-38)	Accel. Closed Position SW Circuit (Short)	<ul style="list-style-type: none"> • Short in accelerator closed position switch circuit • Accelerator closed position switch • ECM 	○	○
19 (4) (05-38)	Accel. Closed Position SW Circuit (Open)	<ul style="list-style-type: none"> • Open in accelerator closed position switch circuit • Accelerator closed position switch • ECM 	○	○
22 (05-39)	Water Temperature Sensor Circuit Malfunction	<ul style="list-style-type: none"> • Open or short in engine coolant temp. sensor circuit • Engine coolant temp. sensor • ECM 	○	○
28 (05-42)	Solenoid for Exhaust Brake Circuit Malfunction	<ul style="list-style-type: none"> • Exhaust brake solenoid circuit • Exhaust brake solenoid • Exhaust brake system • ECM 	-	○
32 (05-44)	Injection pump System Malfunction	<ul style="list-style-type: none"> • Supply pump correction resistor • Wire harness • ECM 	○	○
35 (05-46)	Turbo Pressure Sensor Circuit Malfunction	<ul style="list-style-type: none"> • Open or short in turbo pressure sensor circuit • Turbo pressure sensor • Turbocharger • ECM 	○	○
39 (05-51)	Fuel Temperature Too High	<ul style="list-style-type: none"> • Open or short in fuel temperature sensor circuit • Fuel temperature sensor • ECM 	○	○
42 (05-54)	Vehicle Speed Sensor Signal Circuit Malfunction	<ul style="list-style-type: none"> • Open or short in vehicle speed sensor circuit • Vehicle speed sensor • Combination meter • ECM 	○	○
49 (05-57)	Common Rail Pressure Sensor Circuit Malfunction	<ul style="list-style-type: none"> • Open or short in fuel pressure sensor circuit for common rail • Fuel pressure sensor (built in common rail) • ECM 	○	○

DIAGNOSTICS - ECD SYSTEM (S05C-TB)

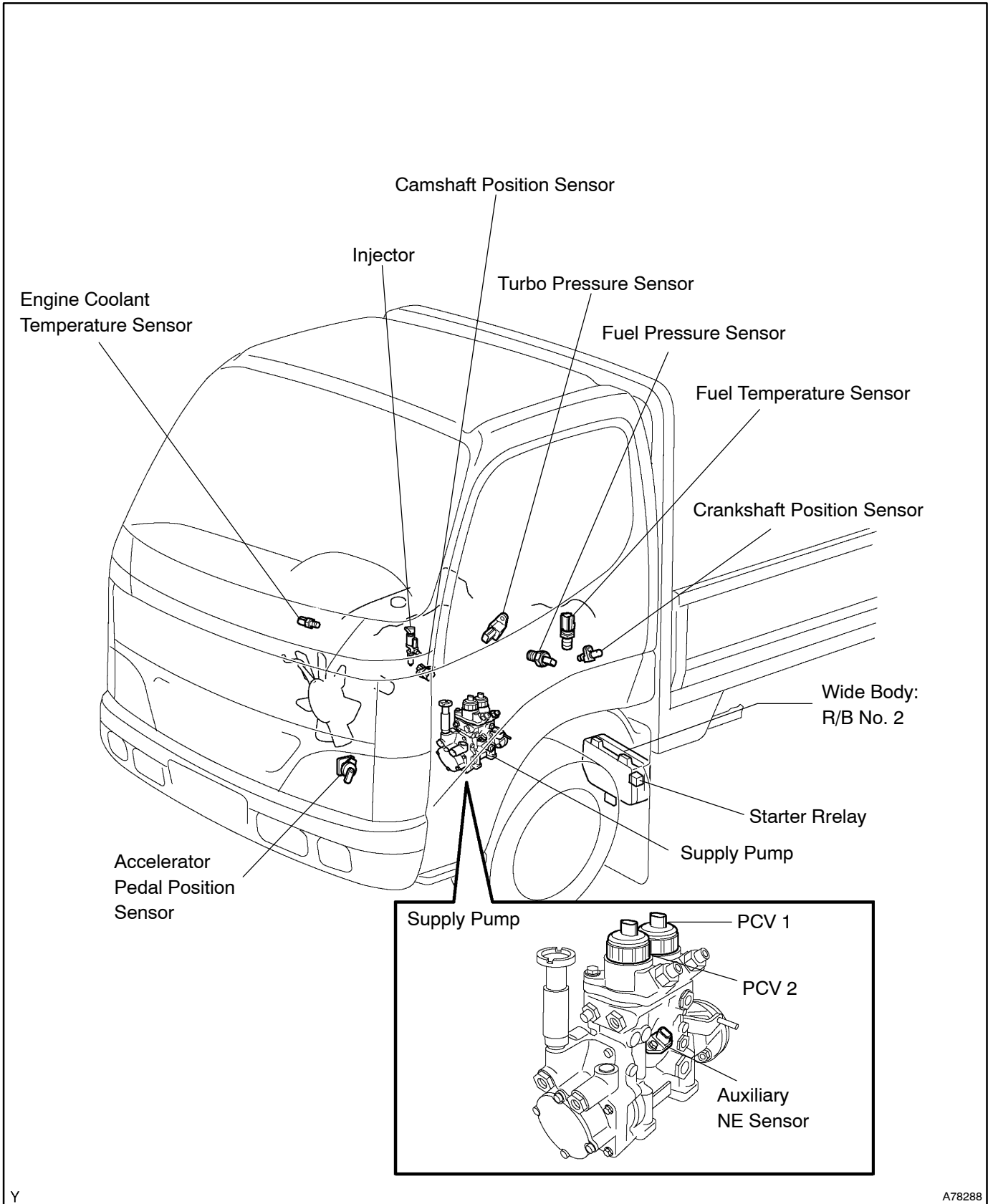
78 (1) (05-59)	Fuel Line Malfunction	<ul style="list-style-type: none"> • Leak in high pressure fuel line • Stuck in fuel supply line • Supply pump 	○	○
78 (2) (05-60)	Fuel Pump System Malfunction (Short)	<ul style="list-style-type: none"> • Short in PCV2 circuit • PCV2 (built in supply pump) • ECM 	○	○
78 (3) (05-66)	Fuel Pump System Malfunction (Over Pressure)	<ul style="list-style-type: none"> • Open or short in fuel pressure sensor circuit • Fuel pressure sensor • Engine speed sensor • Supply pump • Injection timing • ECM 	○	○
78 (4) (05-66)	Fuel Pump System Malfunction (Short)	<ul style="list-style-type: none"> • Short in PCV1 circuit • PCV1 (built in supply pump) • ECM 	○	○
79 (1) (05-68)	Fuel Control Cylinder Balance System Malfunction (Cylinder 1)	<ul style="list-style-type: none"> • Fuel pipe (for common rail injector) • Injector • Flow damper (on common rail) • ECM 	-	○
79 (2) (05-68)	Fuel Control Cylinder Balance System Malfunction (Cylinder 2)			
79 (3) (05-68)	Fuel Control Cylinder Balance System Malfunction (Cylinder 3)			
79 (4) (05-66)	Fuel Control Cylinder Balance System Malfunction (Cylinder 4)			
81 (05-70)	Fuel Pump System Malfunction (No Pressure/Activate Pressure Limiter)	<ul style="list-style-type: none"> • Fuel relief valve (on common rail) • Supply pump 	○	○
82 (05-71)	Engine Overrun	<ul style="list-style-type: none"> • Open or short in SCV circuit • SCV (built in supply pump) • Fuel relief valve (built in common rail) • Supply pump • ECM 	○	○
83 (05-57)	Common Rail System Malfunction	<ul style="list-style-type: none"> • Open or short in fuel pressure sensor circuit for common rail • Fuel pressure sensor (built in common rail) • ECM 	○	○
84 (05-72)	Common Rail System Malfunction (Pressure does not change)	<ul style="list-style-type: none"> • Fuel pressure sensor circuit • Fuel pressure sensor • ECM 	○	○
85 (05-74)	PCV Relay Circuit Malfunction	<ul style="list-style-type: none"> • Open or short in PCV relay circuit • PCV relay • ECM 	○	○
86 (1) (05-75)	Injector Circuit Malfunction (Cylinder 1)	<ul style="list-style-type: none"> • Open or short in injector circuit • Injector (Cylinder 1) • Wire harness • ECM 	○	○
86 (2) (05-75)	Injector Circuit Malfunction (Cylinder 2)	<ul style="list-style-type: none"> • Open or short in injector circuit • Injector (Cylinder 2) • Wire harness • ECM 	○	○
86 (3) (05-75)	Injector Circuit Malfunction (Cylinder 3)	<ul style="list-style-type: none"> • Open or short in injector circuit • Injector (Cylinder 3) • Wire harness • ECM 	○	○
86 (4) (05-75)	Injector Circuit Malfunction (Cylinder 4)	<ul style="list-style-type: none"> • Open or short in injector circuit • Injector (Cylinder 4) • Wire harness • ECM 	○	○
86 (5) (05-79)	Injector Circuit Malfunction (Short)	<ul style="list-style-type: none"> • Open or short in injector circuit • (No. 1) • ECM 	○	○

86 (6) (05-79)	Injector Circuit Malfunction (Short)	<ul style="list-style-type: none"> • Open or short in injector circuit • (No. 2) • ECM 	○	○
92 (05-83)	Engine Stop Switch Circuit Malfunction	<ul style="list-style-type: none"> • Short in engine stop switch circuit • Engine Stop Switch • Wire Harness • ECM 	○	○

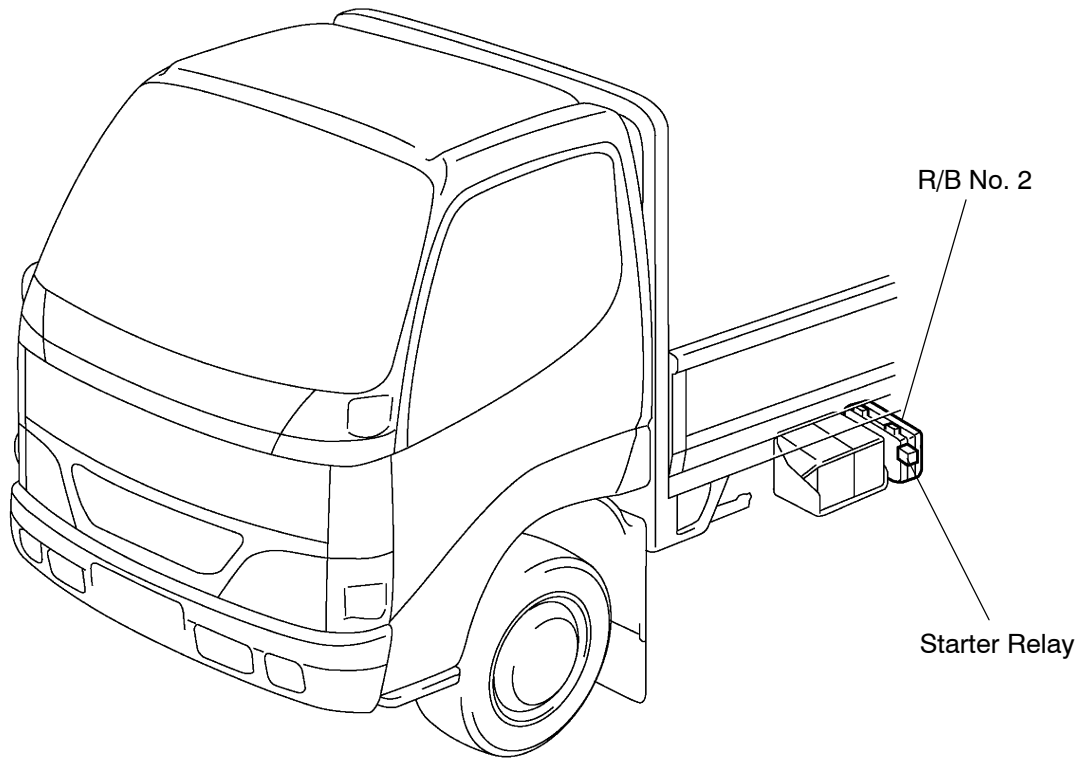
*1: "○" displayed in the check engine warning light column indicates that the check engine warning light is lights up when a malfunction is detected.

*2: "○" in the memory column indicates that a DTC code is recorded in the ECM memory when a malfunction occurs. Accordingly, diagnostic results in the normal or test mode is output with the ignition switch ON.

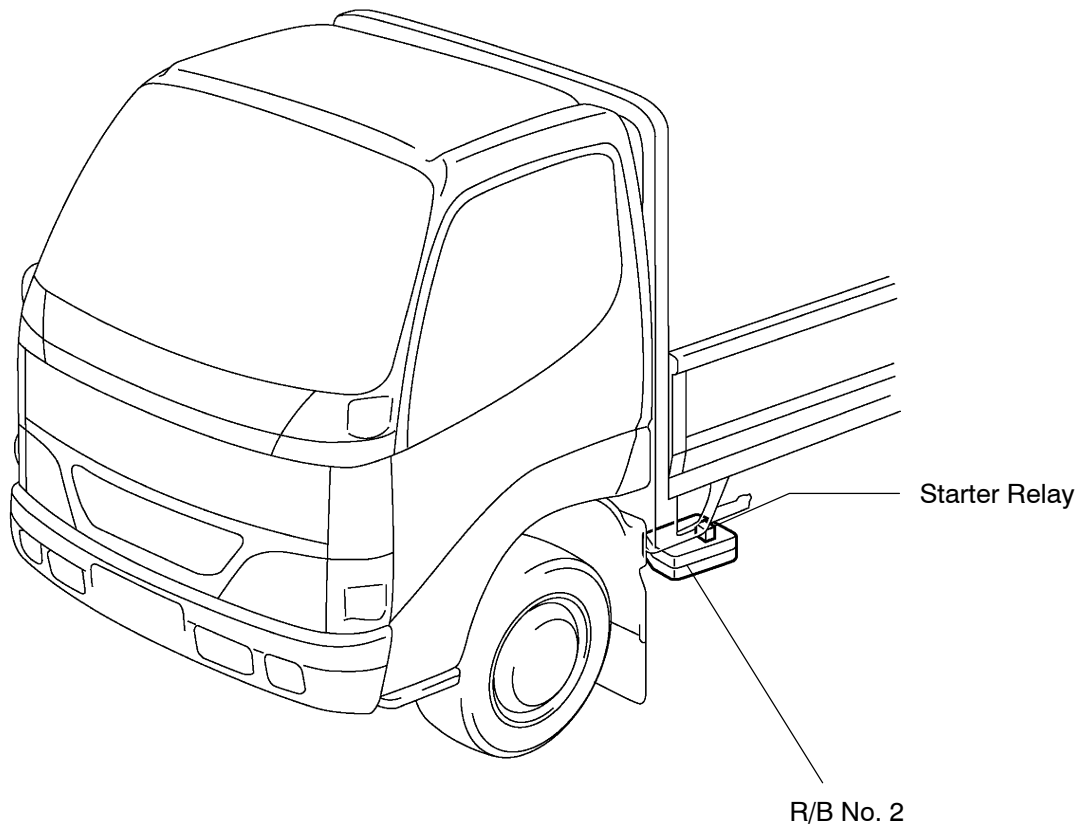
LOCATION



Standard Body except Standard Roof models

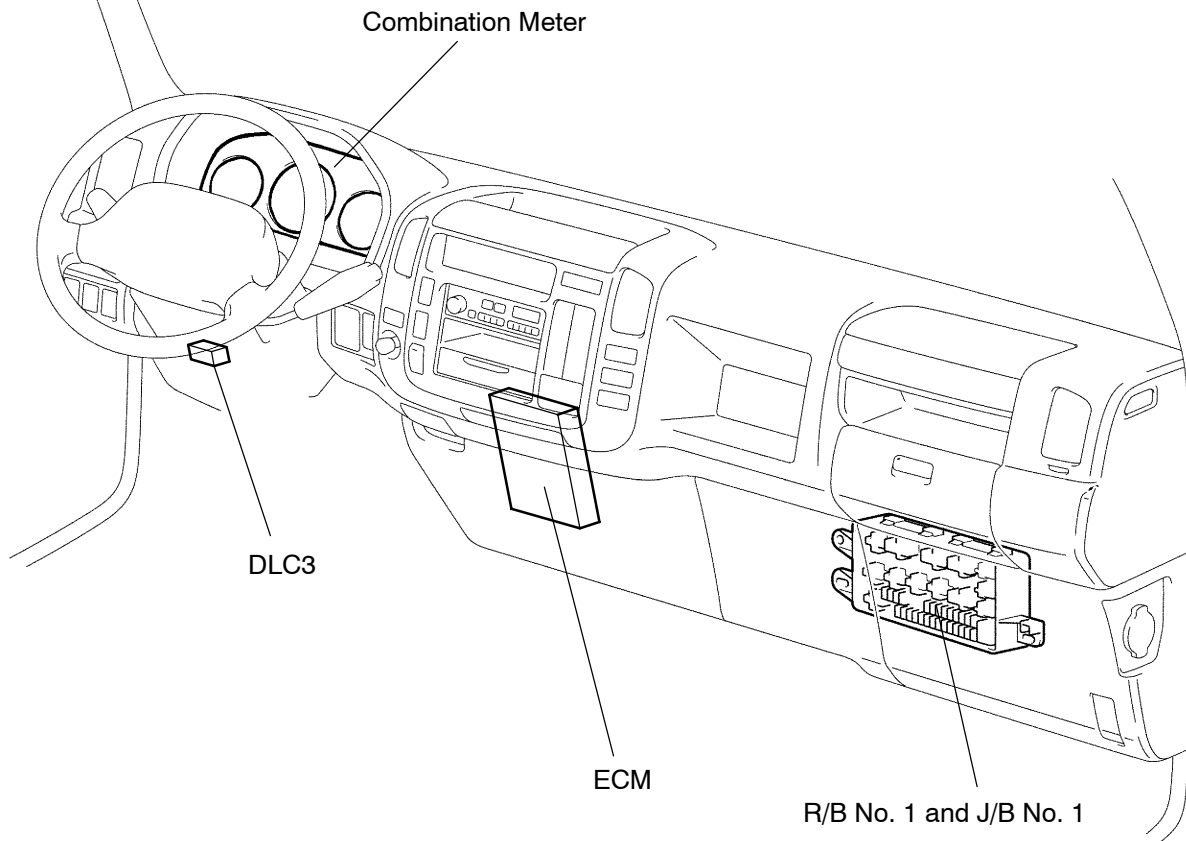


Standard Body w/ Standard Roof models

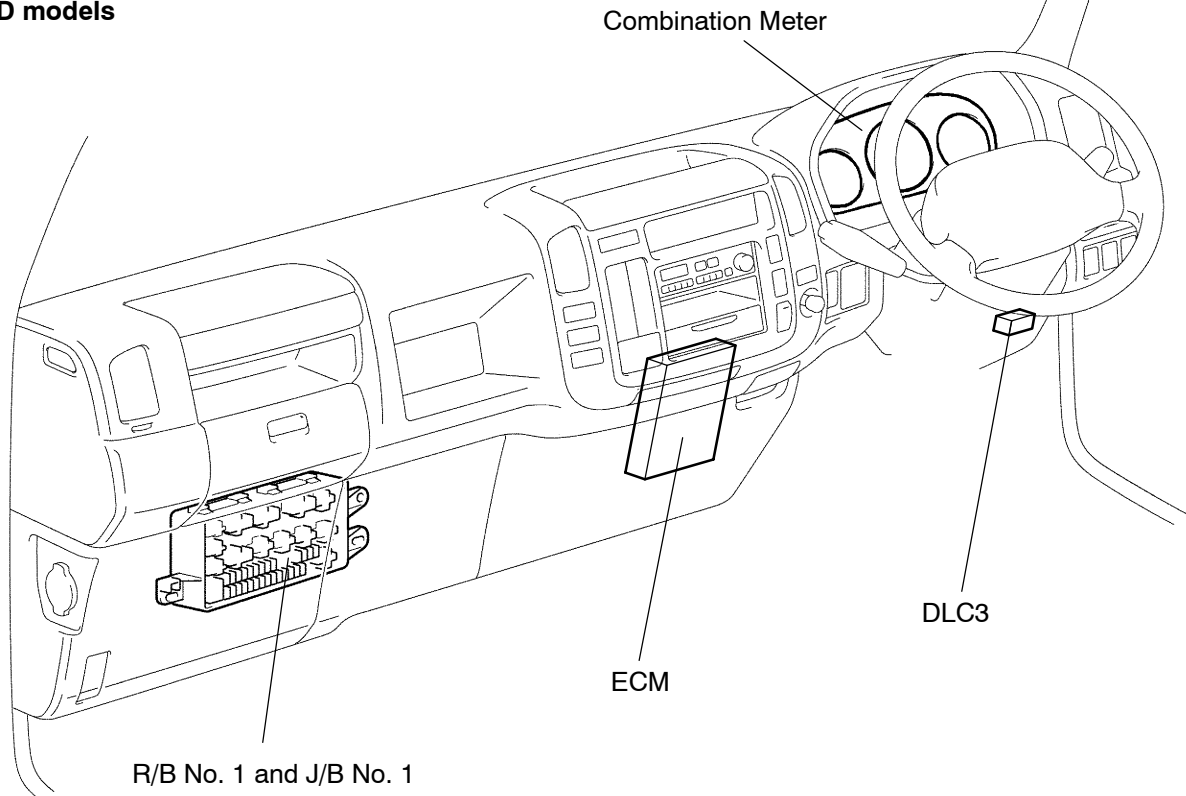


Y

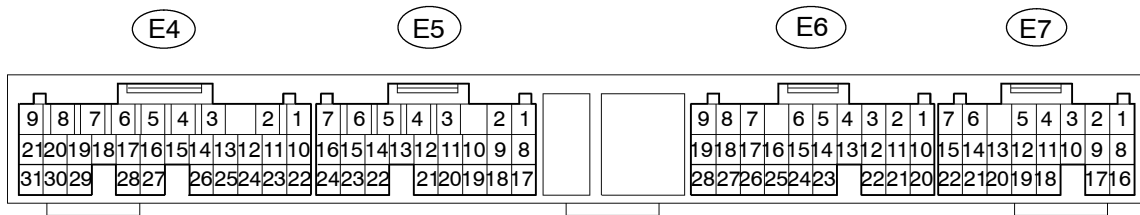
LHD models



RHD models



TERMINALS OF ECM



Y

A56890

Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage (V)
+BP (E5-4, E5-5) ↔ P-GND (E5-8)	B-R ↔ W-B	Always	26 - 29.6
+BP (E5-4, E5-5) ↔ P-GND (E5-8)	B-R ↔ W-B	IG switch ON	26 - 29.6
A-VCC1, A-VCC2 (E7-6, E7-7) ↔ A-GND1 (E7-14)	R-W ↔ G	IG switch ON	4.5 - 5.5
A-VCC1 (E7-6) ↔ A-GND1 (E7-14)	R-W ↔ G	IG switch ON	4.5 - 5.5
A-VCC2 (E7-7) ↔ A-GND1 (E7-14)	R-W ↔ G	IG switch ON	4.5 - 5.5
ACCP1 (E7-21) ↔ A-GND1 (E7-14)	B-O ↔ G	Accelerator pedal fully closed	0.7 - 1.0
		Accelerator pedal fully opened	3.7 - 4.0
ACCP2 (E7-20) ↔ A-GND1 (E7-14)	Y-B ↔ G	Accelerator pedal fully closed	0.7 - 1.0
		Accelerator pedal fully opened	3.7 - 4.0
PIM1 (E5-12) ↔ A-GND4 (E5-2)	B-L ↔ B-R	Apply vacuum 40 kPa (300 mmHg, 11.8 in.Hg)	0.2 - 0.8
		Apply pressure 69 kPa (0.7 kgf/cm ² , 9.96 psi)	3.2 - 3.8
THW (E5-20) ↔ A-GND2 (E7-22)	R-Y ↔ G	Idling, engine coolant temp. 60°C (140°F) to 120°C (248°F)	0.2 - 1.0
THL (E5-19) ↔ A-GND2 (E7-22)	G-R ↔ G	IG switch ON (at engine cold)	0.5 - 3.8
KEY/SW (E4-10, E4-11) ↔ GND (E5-1, E5-3)	LG-B ↔ W-B	IG switch ON	26 - 29.6
ST/SW (E4-13) ↔ P-GND (E5-8)	B-W ↔ W-B	Cranking	6.0 or more
NE+ (E4-23) ↔ NE- (E4-22)	B ↔ W	Idling	Pulse generation (See page 05-24)
G1+ (E4-26) ↔ G1- (E4-25)	R ↔ G	Idling	Pulse generation (See page 05-24)
SPD (E7-11) ↔ GND (E5-1)	V-R ↔ W-B	IG switch ON, Rotate driving wheel slowly	Pulse generation (See page 05-54)
M-REL (E4-17, E4-18) ↔ P-GND (E5-8, E5-17)	GR ↔ W-B	IG switch ON	26 - 29.6
DG/SW (E6-18) ↔ GND (E5-1)	R ↔ W-B	IG switch ON	26 - 29.6
ISO-K (E6-25) ↔ GND (E5-1)	W ↔ W-B	Connect hand-held tester to DLC3	Pulse generation
PCV1 (E7-1) ↔ P-GND (E5-17)	Y ↔ W-B	Idling	Pulse generation
PCV2 (E7-8) ↔ P-GND (E5-17)	B ↔ W-B	Idling	Pulse generation

PROBLEM SYMPTOMS TABLE

When the malfunction code is not confirmed during the diagnostic trouble code check and no problem can be confirmed in the basic inspection, proceed to this problem symptoms tables and troubleshoot according to the numbered order given below.

Symptom	Suspected Area	See Page
Engine not crank (Difficult to start)	<ol style="list-style-type: none"> 1. Starter 2. Starter relay 3. Engine coolant temp. sensor 	<p>19-1</p> <p>19-1</p> <p>16-22</p>
Cold engine (Difficult to start)	<ol style="list-style-type: none"> 1. STA signal circuit 2. Injector 3. Fuel filter 4. Compression 5. ECM 6. Supply pump 7. Fuel pressure sensor 8. Diesel throttle 9. Glow plug system 	<p>05-85</p> <p>11-155</p> <p>-</p> <p>-</p> <p>05-20</p> <p>11-155</p> <p>11-155</p> <p>10-14</p> <p>-</p>
Hot engine (Difficult to start)	<ol style="list-style-type: none"> 1. STA signal circuit 2. Injector 3. Fuel filter 4. Compression 5. ECM 6. Supply pump 7. Fuel pressure sensor 8. Diesel throttle 	<p>05-85</p> <p>11-155</p> <p>-</p> <p>-</p> <p>05-20</p> <p>11-155</p> <p>11-155</p> <p>10-14</p>
Soon after starting (Engine stall)	<ol style="list-style-type: none"> 1. Fuel filter 2. Injector 3. ECM power source circuit 4. ECM 5. Supply pump 6. Fuel pressure sensor 7. Diesel throttle 	<p>-</p> <p>11-155</p> <p>05-87</p> <p>05-20</p> <p>11-155</p> <p>11-155</p> <p>10-14</p>
Others (Engine stall)	<ol style="list-style-type: none"> 1. ECM power source circuit 2. Injector 3. ECM 4. Supply pump 5. Fuel pressure sensor 6. Diesel throttle 	<p>05-87</p> <p>11-155</p> <p>05-20</p> <p>11-155</p> <p>11-155</p> <p>10-14</p>
Incorrect first idle (Poor idling)	<ol style="list-style-type: none"> 1. Fuel filter 2. Injector 3. ECM 4. Supply pump 5. Fuel pressure sensor 	<p>-</p> <p>11-155</p> <p>05-20</p> <p>11-155</p> <p>11-155</p>
High engine idle speed (Poor idling)	<ol style="list-style-type: none"> 1. Injector 2. STA signal circuit 3. ECM 4. Supply pump 5. Fuel pressure sensor 	<p>11-155</p> <p>05-85</p> <p>05-20</p> <p>11-155</p> <p>11-155</p>

Lower engine idle speed (Poor idling)	<ol style="list-style-type: none"> 1. Injector 2. Compression 3. Valve clearance 4. Fuel line (Air bleed) 5. ECM 6. Supply pump 7. Fuel pressure sensor 8. Diesel throttle 	<p>11-155 - 14-82 - 05-20 11-155 11-155 10-14</p>
Rough idling (Poor idling)	<ol style="list-style-type: none"> 1. Injector 2. Fuel line (Air bleed) 3. Compression 4. Valve clearance 5. ECM 6. Supply pump 7. Fuel pressure sensor 8. Diesel throttle 	<p>11-155 - 14-82 - 05-20 11-155 11-155 10-14</p>
Hunting at hot engine (Poor idling)	<ol style="list-style-type: none"> 1. Injector 2. ECM power source circuit 3. Compression 4. Fuel line (Air bleed) 5. Valve clearance 6. ECM 7. Supply pump 8. Fuel pressure sensor 9. Diesel throttle 	<p>11-155 05-87 - - 14-82 05-20 11-155 11-155 10-14</p>
Hunting at cold engine (Poor idling)	<ol style="list-style-type: none"> 1. Injector 2. ECM power source circuit 3. Compression 4. Fuel line (Air bleed) 5. Valve clearance 6. ECM 7. Supply pump 8. Fuel pressure sensor 9. Diesel throttle 	<p>11-155 05-87 - - 14-82 05-20 11-155 11-155 10-14</p>
Hesitation/Poor acceleration (Poor driveability)	<ol style="list-style-type: none"> 1. Injector 2. Fuel filter 3. Compression 4. ECM 5. Supply pump 6. Fuel pressure sensor 7. Diesel throttle 	<p>11-155 - - 05-20 11-155 11-155 10-14</p>
Knocking (Poor driveability)	<ol style="list-style-type: none"> 1. Injector 2. ECM 3. Supply pump 4. Fuel pressure sensor 	<p>11-155 05-20 11-155 11-155</p>
Black smoke (Poor driveability)	<ol style="list-style-type: none"> 1. Injector 2. ECM 3. Supply pump 4. Fuel pressure sensor 5. Diesel throttle 	<p>11-155 05-20 11-155 11-155 10-14</p>

DIAGNOSTICS - ECD SYSTEM (S05C-TB)

White smoke (Poor driveability)	<ol style="list-style-type: none"> 1. Injector 2. Fuel filter 3. ECM 4. Supply pump 5. Fuel pressure sensor 6. Diesel throttle 	<p>11-155 - 05-20 11-155 11-155 10-14</p>
Surging/Hunting (Poor driveability)	<ol style="list-style-type: none"> 1. Injector 2. ECM 3. Supply pump 4. Fuel pressure sensor 	<p>11-155 05-20 11-155 11-155</p>

DTC	12	ENGINE SPEED SENSOR CIRCUIT MALFUNCTION1 (TDC OR G1 CIRCUIT)
------------	-----------	---

CIRCUIT DESCRIPTION

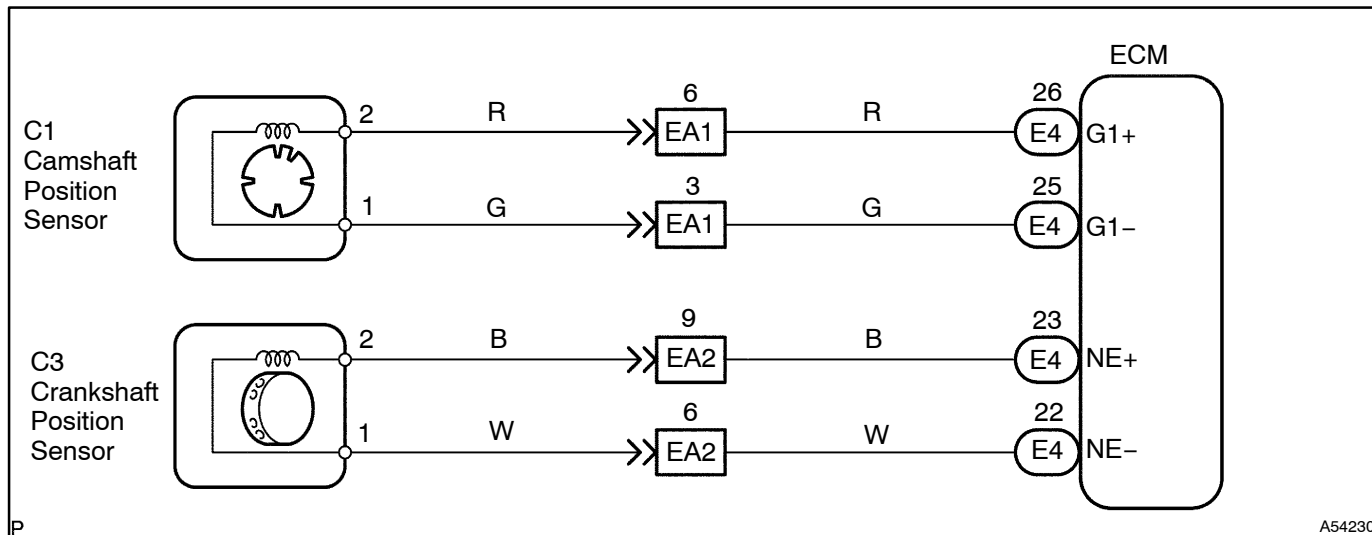
The composition of this sensor, mounted on the supply pump, is the same as that of the main engine revolution sensor, however, the coil volume is different. As the engine rotates, the protrusions and air gaps on the center of the supply pump camshaft create magnetic field by the magnet in the sensor. Then, the magnetic field generates alternative voltage in the coil.

The protrusions and air gaps exist for every 90 degrees of the camshaft (180 degrees of crankshaft angle), and therefore 5 pulses are output for 1 revolution of the camshaft (2 revolutions of the engine).

And also, there is another protrusion and air gap to output a pulse. Based on this pulse, NE standard pulse of the engine No. 1 cylinder can be recognized.

DTC No.	DTC Detection Condition	Trouble Area
12	G1 signal has not been input when NE signal detects 3,600 revolutions	<ul style="list-style-type: none"> • Open or short in crankshaft position sensor circuit • Camshaft position sensor • Camshaft timing pulley • ECM

WIRING DIAGRAM

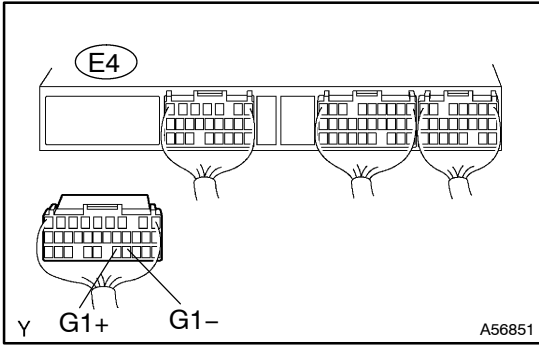


INSPECTION PROCEDURE

HINT:

- Perform troubleshooting of DTC 12 first. If no trouble is found, troubleshoot the following mechanical system.
- Read freeze frame data using the hand-held tester, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1 CHECK ECM

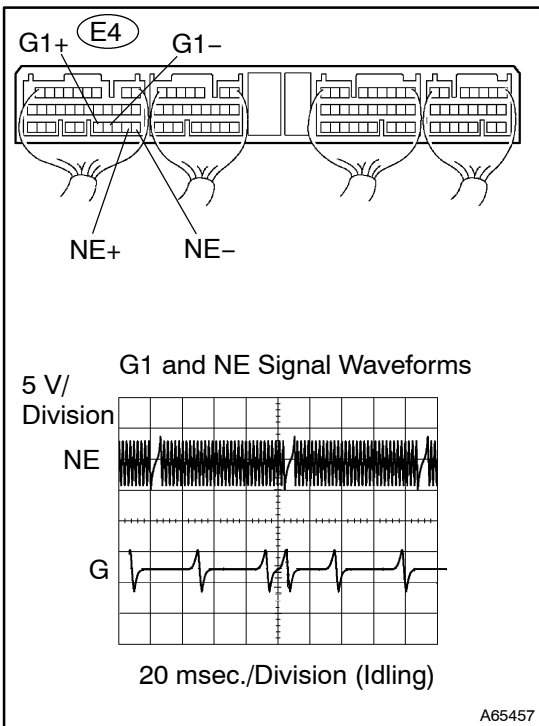


- (a) Turn the ignition switch to LOCK.
- (b) Disconnect the E4 ECM connector.
- (c) Measure the resistance between terminals G1+ and G1- of the E4 ECM connector.
Resistance: 1.85 - 2.45 kΩ at 20°C (68°F)

NG → Go to step 3

OK

2 CHECK ECM



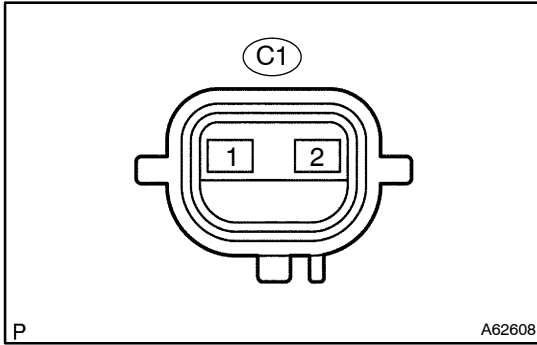
- (a) Reference:
Inspect using on oscilloscope.
- (1) While cranking or idling, check the waveform between terminals G1+ and G1-, and NE+ and NE- of the E4 ECM connector.

HINT:
The correct waveforms are as shown in the illustration.

OK → Go to step 5

NG

3 CHECK CAMSHAFT POSITION SENSOR



- (a) Disconnect the C1 camshaft position sensor connector.
- (b) Check the resistance between terminals 1 and 2 of the C1 crankshaft position sensor.

Resistance: 1.85 – 2.45 kΩ at 20°C (68°F)

HINT:

"Cold" and "Hot" above express the temperature of the part itself. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

NG

REPLACE CAMSHAFT POSITION SENSOR

OK

4 CHECK WIRE HARNESS

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

5 CHECK SENSOR ATTACHMENT PART

NG

REPLACE INJECTION OR SUPPLY PUMP ASSY

OK

CHECK AND REPLACE ECM

DTC	13	ENGINE SPEED SENSOR CIRCUIT MALFUNCTION2 (NE CIRCUIT)
------------	-----------	--

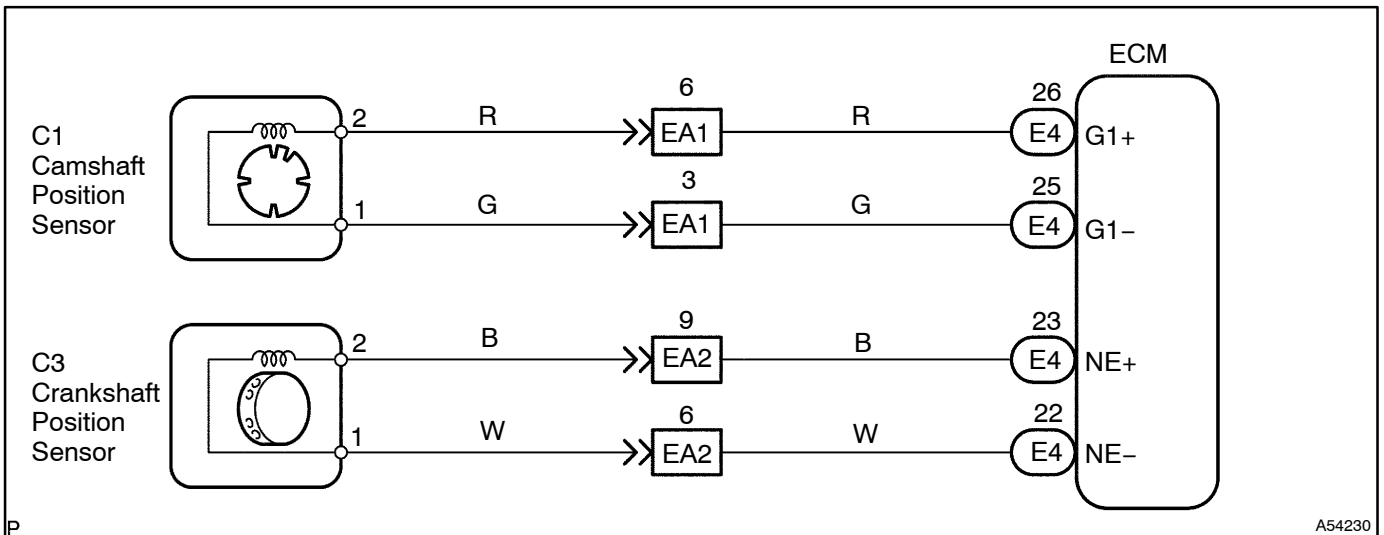
CIRCUIT DESCRIPTION

This sensor consists of a magnet, pickup coil and iron core, and is installed in the flywheel housing. As the engine rotates, the teeth on the outer circumference of the flywheel create magnetic field. And the magnetic field generates alternative voltage in the coil.

The flywheel has teeth in an interval of 7.5 degrees on the outer circumference all the way except the 2 parts. This means the flywheel has 45 teeth on its circumference, and therefore 90 pulses are output for every 2 revolutions of the engine (1 revolution of supply pump camshaft). Based on these pulses, this sensor detects the number of engine revolution and crankshaft angle for every 7.5 degrees.

DTC No.	DTC Detection Condition	Trouble Area
13	NE signal has not been input when G1 signal detects 525 revolutions	<ul style="list-style-type: none"> • Open or short in crankshaft position sensor circuit • Crankshaft position sensor • Crankshaft angle sensor plate • ECM

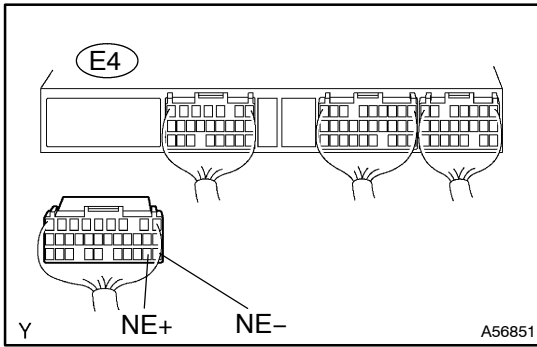
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1 CHECK ECM (WIRE HARNESS SIDE)

- (a) Turn the ignition switch to LOCK.
- (b) Disconnect the E4 ECM connector.
- (c) Measure the resistance between terminals NE+ and NE- of the E4 ECM connector.

Resistance: 105 – 145 Ω at 20°C (68°F)

NG →

Go to step 3

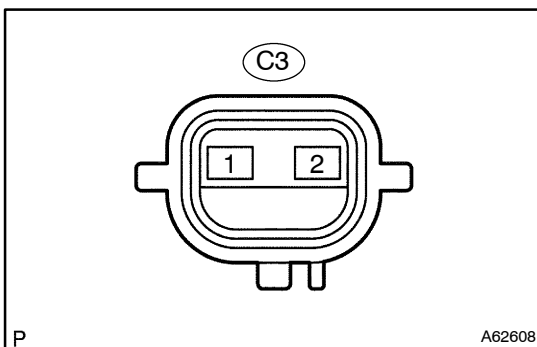
OK

2 CHECK ECM (See page 05-24)

OK →

Go to step 5

NG

3 CHECK CRANKSHAFT POSITION SENSOR

- (a) Disconnect the C3 crankshaft position sensor connector.
- (b) Check the resistance between terminals 1 and 2 of the C3 crankshaft position sensor.

Resistance: 105 – 145 Ω at 20°C (68°F)

HINT:

"Cold" and "Hot" above express the temperature of the part itself. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

NG →

REPLACE CRANKSHAFT POSITION SENSOR

OK

4 CHECK WIRE HARNESS

NG →

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

5	CHECK SENSOR ATTACHMENT PART
---	------------------------------

NG	REPLACE SUPPLY PUMP
----	---------------------

OK

CHECK AND REPLACE ECM

DTC	17	INTERIOR IC MALFUNCTION
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CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
17	ECM malfunction	•ECM

INSPECTION PROCEDURE

HINT:

This code is output when a malfunction is detected inside the ECM. However, if the same code will not be output after it is deleted, this can be considered as a temporary misoperation due to interference of electrical wave. Therefore the ECM has no problem if it recovers normally.

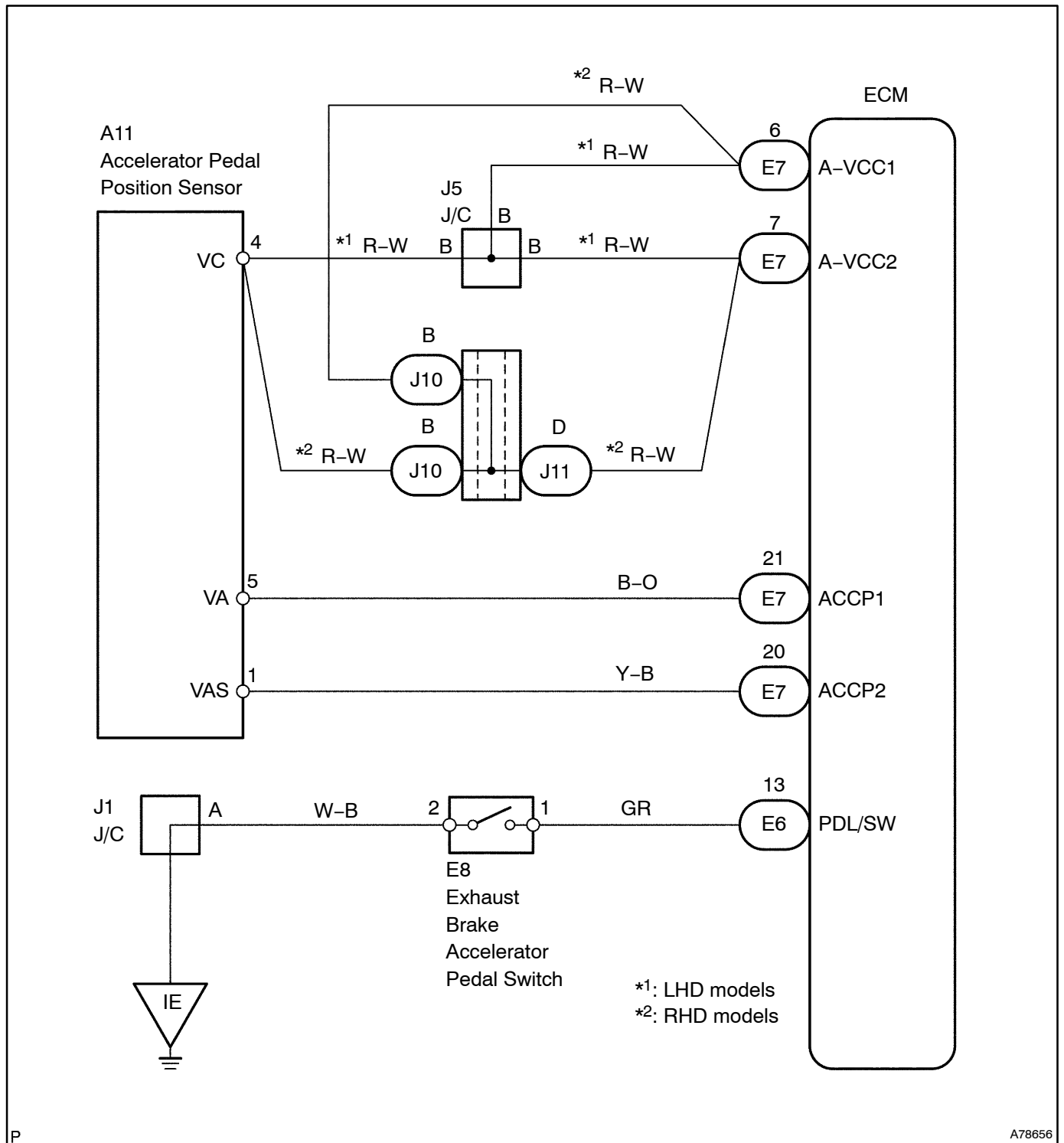
DTC	19 (1)	ACCEL. POSITION SENSOR CIRCUIT (OPEN/SHORT)
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CIRCUIT DESCRIPTION

The accelerator pedal position sensor is mounted in the accelerator pedal and detects the accelerator pedal opening angle. When the accelerator pedal is fully closed, a voltage of approximately 0.8 V is applied to terminals ACCP1 and ACCP2 of the ECM. The voltage applied to terminals ACCP1, ACCP2 of the ECM increases in proportion to the opening angle of the accelerator pedal and becomes approximately 3.8 V when the accelerator pedal is fully opened. The ECM judges the vehicle driving conditions from these signals input from terminals ACCP1 and ACCP2 and uses them as one of the conditions to control the injection volume and diesel throttle valve position. This system has 2-way accelerator pedal position sensor and accelerator pedal closed position switch for fail-safe.

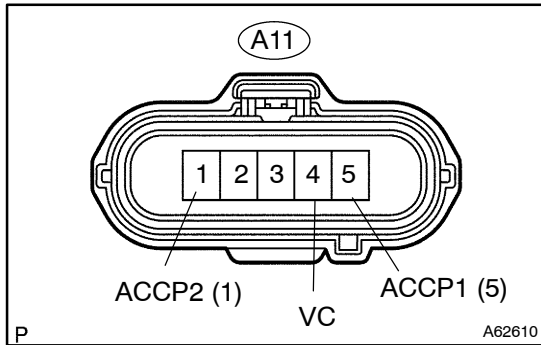
DTC No.	DTC Detection Condition	Trouble Area
19 (1)	Condition (a) or (b) continues 1 sec. or more (a) ACCP1 \leq 0.6V (b) ACCP1 \geq 4.6V	<ul style="list-style-type: none"> • Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • ECM
	Condition (a) or (b) continues 1 sec. or more (a) ACCP2 \leq 0.6V (b) ACCP2 \geq 4.6V	

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK ACCELERATOR LINK ASSY (VOLTAGE)



- (a) Disconnect the A11 accelerator pedal position sensor connector.
- (b) Turn the ignition switch ON.
- (c) Check the voltage between the terminals of the A11 accelerator pedal position sensor connector.

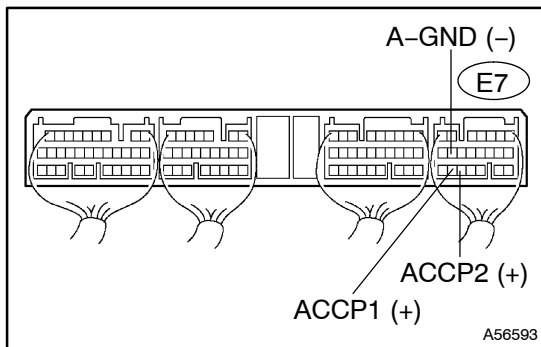
Voltage:

Terminal (Positive terminal ↔ Negative terminal)	Voltage
VC (4) ↔ A-GND	4.5 - 5.5 V

NG → Go to step 4

OK

2 CHECK ECM (VOLTAGE)



- (a) Connect the A11 accelerator pedal sensor connector.
- (b) Turn the ignition switch ON.
- (c) Check the voltage between the terminals of the E7 ECM connector.

Voltage:

Accelerator Pedal	Symbols (Terminal No.)	Voltage
Fully closed	ACCP1 (E7-21) ↔ A-GND (E7-14)	0.7 - 1.0 V
	ACCP2 (E7-20) ↔ A-GND (E7-14)	0.7 - 1.0 V
Fully open	ACCP1 (E7-21) ↔ A-GND (E7-14)	3.7 - 4.0 V
	ACCP2 (E7-20) ↔ A-GND (E4-17)	3.7 - 4.0 V

OK → CHECK AND REPLACE ECM (See page 01-27)

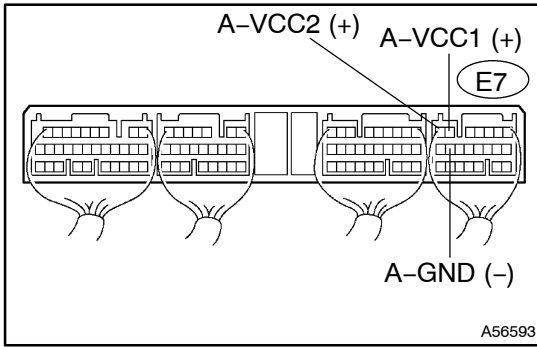
NG

3 CHECK WIRE HARNESS (ECM ↔ ACCELERATOR PEDAL POSITION SENSOR) (See page 01-27)

OK → REPLACE ACCELERATOR LINK ASSY

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

4 CHECK ECM (VOLTAGE)



- (a) Turn the ignition switch ON.
- (b) Check the voltage between the terminals of the E7 ECM connector.

Voltage:

Symbols (Terminal No.)	Voltage
A-VCC1 (E7-6), A-VCC2 (E7-7) ↔ A-GND (E7-14)	4.5 - 5.5 V

NG

CHECK ECM (See page 01-27)

OK

5 CHECK WIRE HARNESS (ECU ↔ ACCELERATOR PEDAL POSITION SENSOR) (See page 01-27)

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPAIR OR REPLACE ECM

DTC	19 (2)	ACCEL. POSITION SENSOR CIRCUIT (IDL SW/RANGE)
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CIRCUIT DESCRIPTION

Refer to DTC No. 19 (1) on page 05-31.

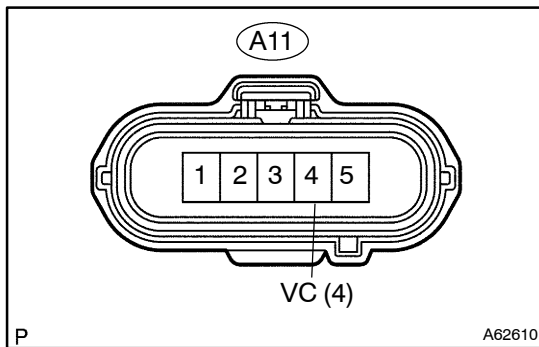
DTC No.	DTC Detection Condition	Trouble Area
19 (2)	When any of following conditions is fulfilled: (a) Engine idling (ACC OFF) (b) No abnormal voltage in No. 1 and No. 2 sensors (c) $0.65\text{ V} \leq \text{ACCP2} \leq 1.05\text{ V}$ (d) $\text{ACCP1} \geq 1.5\text{ V}$	<ul style="list-style-type: none"> • Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • ECM
	When any of following conditions is fulfilled: (a) Engine idling (ACC OFF) (b) No abnormal voltage in No. 1 and No. 2 sensors (c) $0.65\text{ V} \leq \text{ACCP2} \leq 1.05\text{ V}$ (d) $\text{ACCP2} \geq 1.5\text{ V}$	

WIRING DIAGRAM

Refer to DTC No. 19 (1) on page 05-31.

INSPECTION PROCEDURE

1	CHECK ACCELERATOR LINK ASSY (VOLTAGE)
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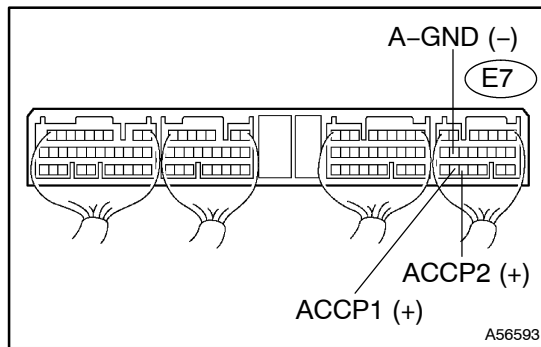
- (a) Disconnect the A11 accelerator pedal position sensor connector.
- (b) Turn the ignition switch ON.
- (c) Check the voltage between the terminal of the A11 accelerator pedal position sensor connector and the body ground.

Voltage:

Symbols (Terminal No.)	Voltage
VC (A11-4) ↔ Body ground	4.5 - 5.5 V

NG	Go to step 4
-----------	---------------------

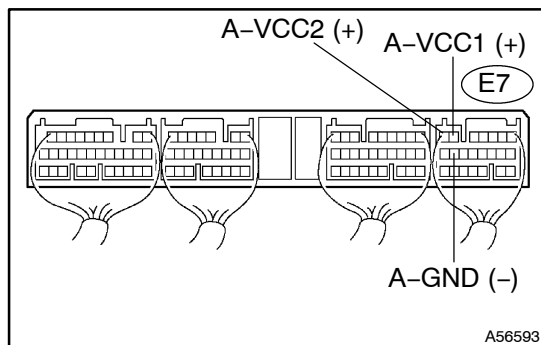
OK

2 CHECK ECM (VOLTAGE)

- (a) Turn the ignition switch ON.
 (b) Check the voltage between the terminals of the E7 ECM connector.

Voltage:

Accelerator Pedal	Symbols (Terminal No.)	Voltage
Fully closed	ACCP1 (E7-21) ↔ A-GND (E7-14)	0.7 - 1.0 V
	ACCP2 (E7-20) ↔ A-GND (E7-14)	0.7 - 1.0 V
Fully open	ACCP1 (E7-21) ↔ A-GND (E7-14)	3.7 - 4.0 V
	ACCP2 (E7-20) ↔ A-GND (E4-17)	3.7 - 4.0 V

OK**CHECK AND REPLACE ECM
(See page 01-27)****NG****3 CHECK WIRE HARNESS (ECM ↔ ACCELERATOR PEDAL POSITION SENSOR)
(See page 01-27)****OK****REPLACE ACCELERATOR LINK ASSY****NG****REPAIR OR REPLACE HARNESS AND
CONNECTOR****4 CHECK ECM (VOLTAGE)**

- (a) Turn the ignition switch ON.
 (b) Check the voltage between the terminals of the E7 ECM connector.

Voltage:

Symbols (Terminal No.)	Voltage
A-VCC1 (E7-6), A-VCC2 (E7-7) ↔ A-GND (E7-14)	4.5 - 5.5 V

NG**CHECK AND REPLACE ECM (See page
01-27)****OK**

5

CHECK WIRE HARNESS (ECM ↔ ACCELERATOR PEDAL POSITION SENSOR)
(See page 01-27)

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

CHECK AND REPLACE ECM (See page 01-27)

DTC	19 (3)	ACCEL. CLOSED POSITION SW CIRCUIT (SHORT)
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DTC	19 (4)	ACCEL. CLOSED POSITION SW CIRCUIT (OPEN)
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CIRCUIT DESCRIPTION

The accelerator pedal closed position switch detects the fully open position of the accelerator pedal.

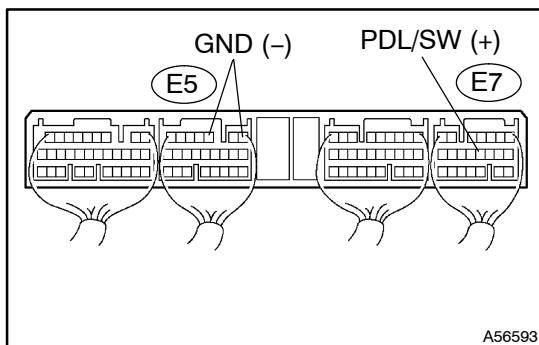
DTC No.	DTC Detection Condition	Trouble Area
19 (3)	(a) Accelerator closed position Switch circuit malfunction (short)	<ul style="list-style-type: none"> • Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • ECM
19 (4)	(b) Accelerator closed position Switch circuit malfunction (open)	

WIRING DIAGRAM

Refer to DTC No. 19 (1) on page 05-31.

INSPECTION PROCEDURE

1	CHECK ECM (VOLTAGE)
----------	----------------------------



- Turn the ignition switch ON.
- Measure the voltage between terminals PDL/SW and GND of the E5 and E7 ECM connectors.

Standard:

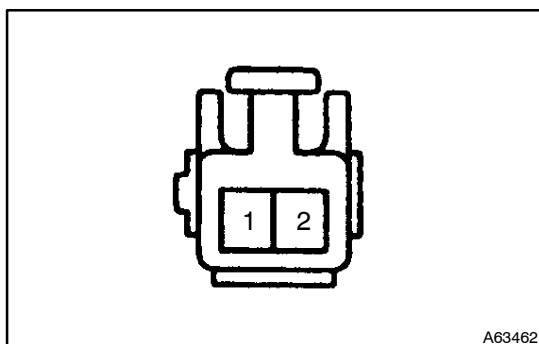
Symbols (Terminal No.)	Accelerator Pedal	Voltage
PDL/SW (E6-13) ↔	Released	19 V or more
GND (E5-1, E5-3)	Fully depressed	0 V

OK

REPLACE ECM

NG

2	CHECK ACCELERATOR SWITCH
----------	---------------------------------



- Disconnect the E8 accelerator switch connector.
- Measure the resistance between the terminals of the accelerator switch.

Standard:

Accelerator Pedal	Resistance
Released	2 Ω below
Fully depressed	Infinity

OK

CHECK AND REPLACE WIRE HARNESS FROM SWITCH TO ECM

NG

REPLACE ACCELERATOR SWITCH

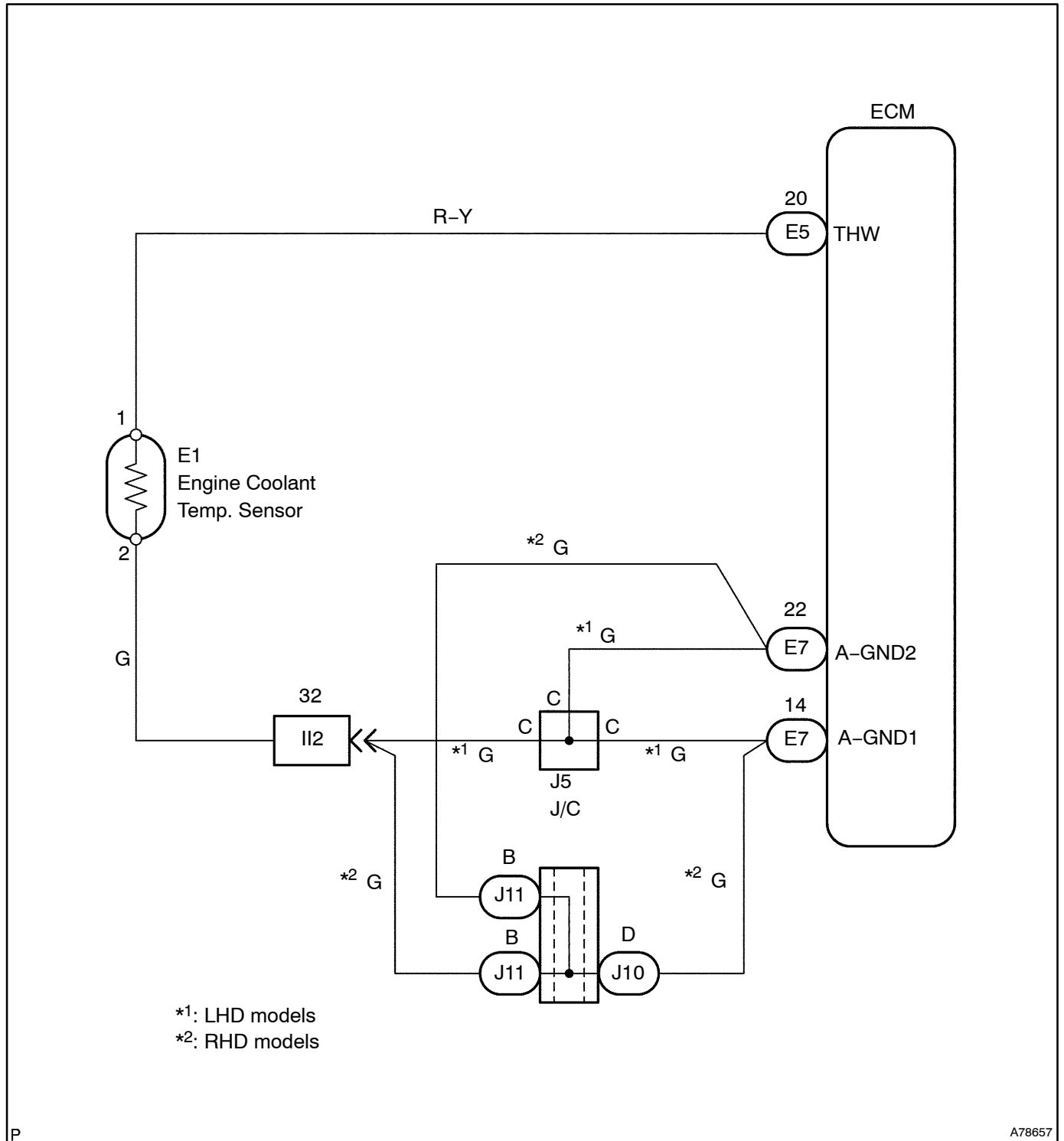
DTC	22	WATER TEMPERATURE SENSOR CIRCUIT MALFUNCTION
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CIRCUIT DESCRIPTION

The engine coolant temperature sensor senses the coolant temperature. A thermistor built into the sensor changes the resistance value according to the coolant temperature. The lower the coolant temperature is, the greater the thermistor resistance value becomes, and the higher the coolant temperature is, the lower the thermistor resistance value becomes. The water temperature sensor is connected to the ECM (See the WIRING DIAGRAM). The 5 V power source voltage in the ECM is applied to the engine coolant temperature sensor from terminal THW via a resistor R. That is, resistor R and the water temperature sensor are connected in series. When the resistance value of the engine coolant temperature sensor changes in accordance with the changes in the coolant temperature, the potential at terminal THW also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during cold engine operation.

DTC No.	DTC Detection Condition	Trouble Area
22	Open or short in engine coolant temp. sensor circuit for 3.0 sec. or more	<ul style="list-style-type: none"> • Open or short in water temp. sensor circuit • Engine coolant temp. sensor • ECM

WIRING DIAGRAM

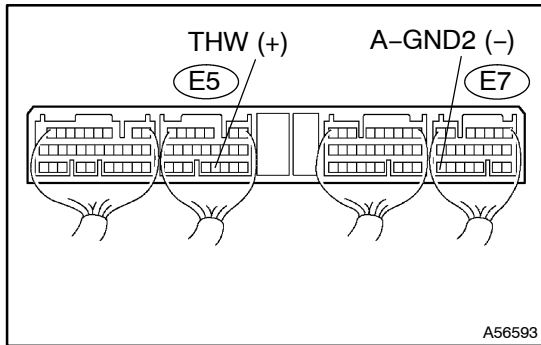


INSPECTION PROCEDURE

HINT:

If DTCs 22 and 39 are output simultaneously, terminal A-GND2 (sensor ground) may be open.

1 CHECK ECM (RESISTANCE)



- (a) Turn the ignition switch to LOCK.
- (b) Check the resistance between the terminals of the ECM connector.

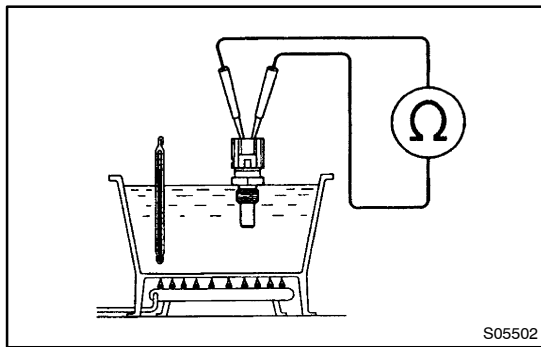
Resistance:

Engine Coolant Temp. °C (°F)	Symbols (Terminal No.)	Resistance
20 (68) (Engine is cool)	THW (E5-20) ↔ A-GND2 (E7-22)	Approx. 2.4 kΩ
80 (176) (Engine is hot)	THW (E5-20) ↔ A-GND2 (E7-22)	Approx. 530 Ω

OK CHECK FOR INTERMITTENT PROBLEMS (See page 05-7)

NG

2 INSPECT ENGINE COOLANT TEMPERATURE SENSOR (CHECK RESISTANCE)



- (a) Disconnect the E1 engine coolant temperature sensor connector.
- (b) Remove the engine coolant temperature sensor.
- (c) Measure the resistance between the terminals.

Resistance:

Engine Coolant Temp. °C (°F)	Resistance
20 (68)	Approx. 2.4 kΩ
80 (176)	Approx. 530 Ω

NG REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK

3 CHECK WIRE HARNESS (ECM ↔ ENGINE COOLANT TEMPERATURE SENSOR) (See page 01-27)

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

CHECK AND REPLACE ECM (See page 01-27)

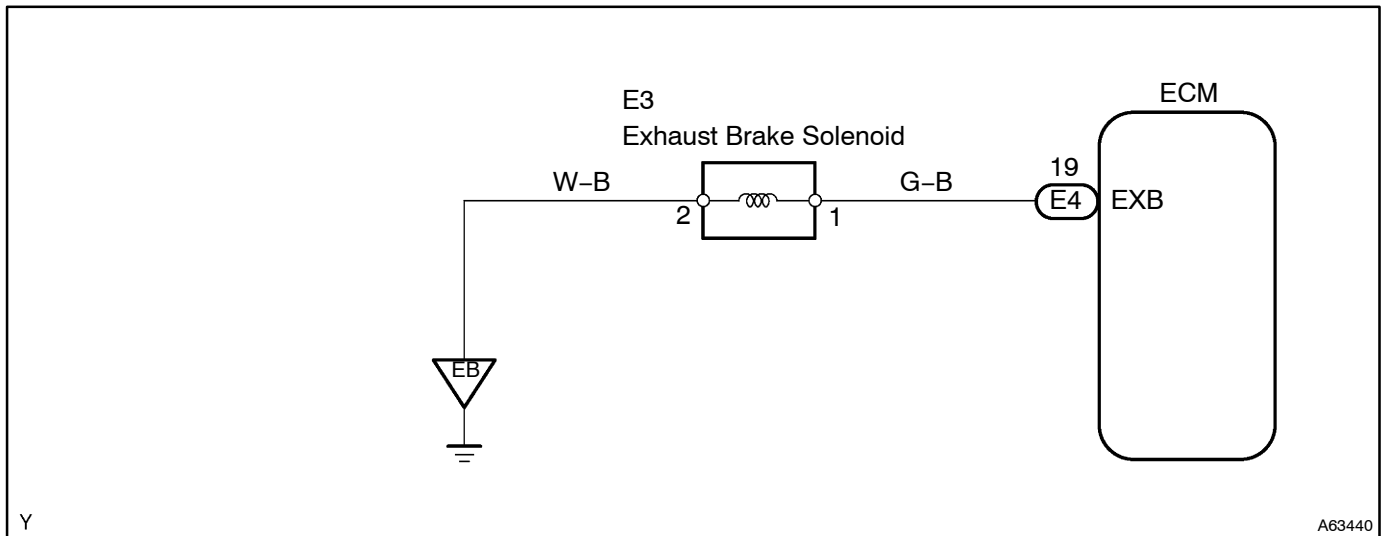
DTC	28	SOLENOID FOR EXHAUST BRAKE CIRCUIT MALUNCTION
------------	-----------	--

CIRCUIT DESCRIPTION

The exhaust brake solenoid operates the exhaust brake valve. When this solenoid is ON, the exhaust brake valve is closed, and when this solenoid is OFF, the exhaust brake valve is open.

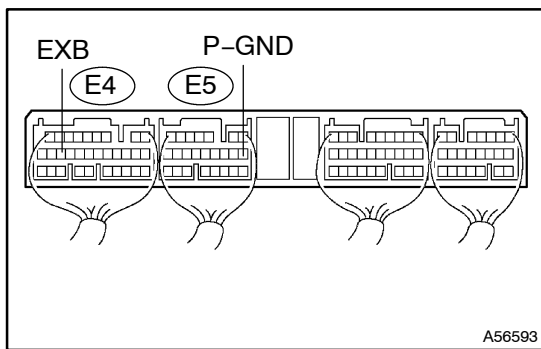
DTC No.	DTC Detection Condition	Trouble Area
28	Solenoid for exhaust brake circuit malfunction	<ul style="list-style-type: none"> • Exhaust brake solenoid circuit • Exhaust brake solenoid • Exhaust brake system • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK ECM (VOLTAGE)
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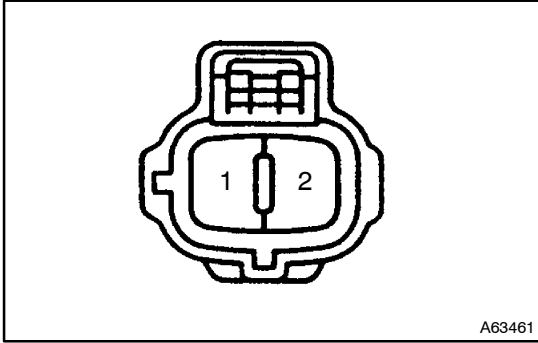
- (a) Turn the ignition switch ON.
- (b) Turn the exhaust brake switch ON.
- (c) Shift the shift lever into any position other than the neutral position.
- (d) Release the clutch pedal and accelerator pedal.

Standard:

Symbols (Terminal No.)	Voltage
EXB (E4-19) ↔ P-GND (E5-8)	19 V or more

OK → **REPLACE ECM**

NG

2 CHECK EXHAUST BRAKE SOLENOID

- (a) Disconnect the E3 exhaust brake solenoid connector.
- (b) Measure the resistance between the terminals of the exhaust brake solenoid.

Standard: $53 \pm 5 \Omega$

OK

CHECK AND REPLACE WIRE HARNESS FROM EXHAUST BRAKE SOLENOID TO ECM

NG

REPLACE EXHAUST BRAKE SOLENOID

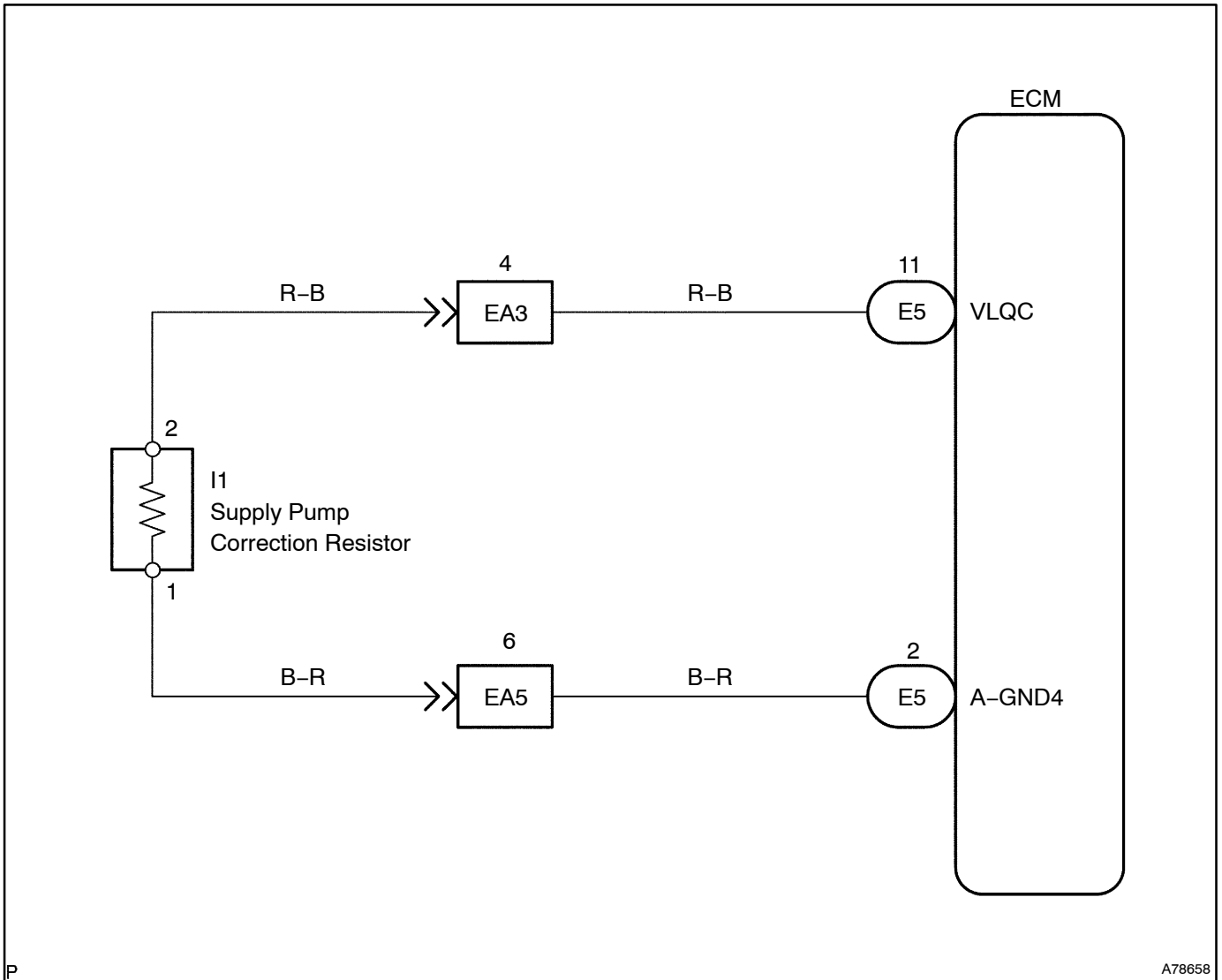
DTC	32	INJECTION PUMP SYSTEM MALFUNCTION
------------	-----------	--

CIRCUIT DESCRIPTION

In the correction system, difference of injection volume between the injectors are corrected.

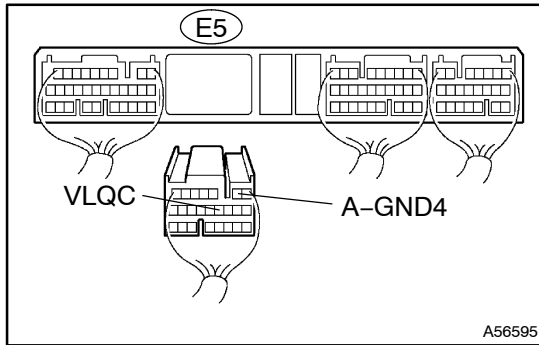
DTC No	DTC Detection Condition	Trouble Area
32	Injector correction resistance malfunction	<ul style="list-style-type: none"> • Correction resistor • Wire harness • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK ECM (RESISTANCE)



- (a) Turn the ignition switch to LOCK.
- (b) Disconnect the E5 ECM connector.
- (c) Measure the resistance between terminals VLQC and A-GND4 of the E5 ECM side connector.

Resistance:

Resistance No.	Resistance (Ω)
1	180 ($\pm 5\%$)
2	300 ($\pm 5\%$)
3	430 ($\pm 5\%$)
4	620 ($\pm 5\%$)
5	820 ($\pm 5\%$)
6	1,100 ($\pm 5\%$)
7	1,500 ($\pm 5\%$)
8	2,000 ($\pm 5\%$)

OK

CHECK AND REPLACE ECM (See page 01-27)

NG

2 CHECK SUPPLY PUMP (CORRECTION RESISTER RESISTANCE)

- (a) Disconnect the connector.
- (b) Measure the resistance between the terminals.

Resistance:

Resistance No.	Resistance (Ω)
1	180 ($\pm 5\%$)
2	300 ($\pm 5\%$)
3	430 ($\pm 5\%$)
4	620 ($\pm 5\%$)
5	820 ($\pm 5\%$)
6	1,100 ($\pm 5\%$)
7	1,500 ($\pm 5\%$)
8	2,000 ($\pm 5\%$)

NG

CHECK AND REPLACE SUPPLY PUMP (CORRECTION RESISTER)

OK

REPAIR HARNESS AND CONNECTOR

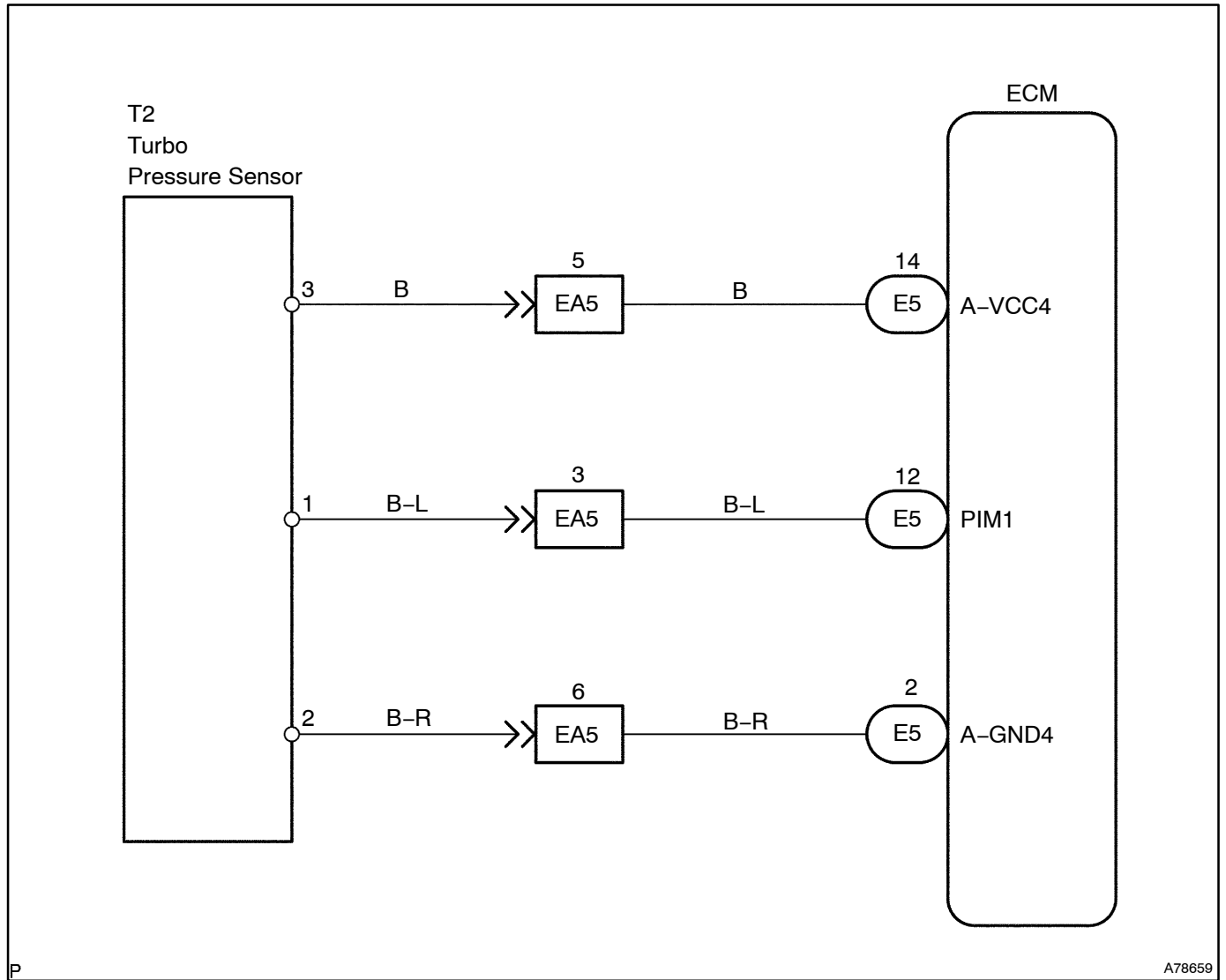
DTC	35	TURBO PRESSURE SENSOR CIRCUIT MALFUNCTION
------------	-----------	--

CIRCUIT DESCRIPTION

The turbo pressure sensor is connected to the intake manifold. The ECM detects the intake manifold pressure as a voltage by this sensor. The ECM uses the intake manifold pressure signal for correction of injection volume control and injection timing control. The VSV for the turbo pressure sensor switches the atmospheric pressure in the turbo pressure sensor to the intake manifold pressure. The turbo pressure sensor monitors both the atmospheric pressure and intake manifold pressure and transmits the output voltage to the ECM. Then, the ECM uses this atmospheric pressure value for correcting the injection volume.

DTC No.	DTC Detection Condition	Trouble Area
35	Open or short in turbo pressure sensor circuit for 1 sec. or more	<ul style="list-style-type: none"> • Open or short in turbo pressure sensor circuit • Turbo pressure sensor • Open or short in VSV for turbo pressure sensor circuit • VSV for turbo pressure sensor • Turbocharger • ECM

WIRING DIAGRAM

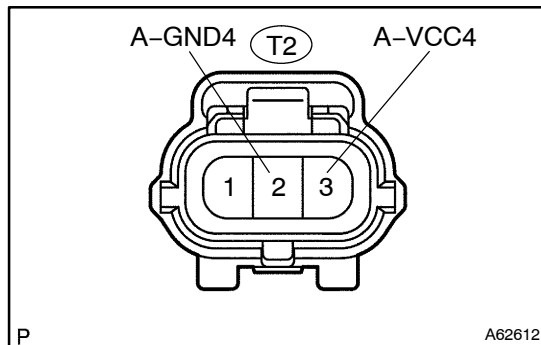


INSPECTION PROCEDURE

HINT:

If DTCs 22, 35 and 39 are output simultaneously, terminal A-GND4 (sensor ground) may be open.

1 CHECK TURBO PRESSURE SENSOR



(a) Inspect the power source voltage of the turbo pressure sensor.

- (1) Disconnect the T2 sensor connector.
- (2) Turn the ignition switch ON.
- (3) Using a voltmeter, measure the voltage between terminals A-VCC4 and A-GND4 of the T2 connector.

Voltage: 4.5 - 5.5 V

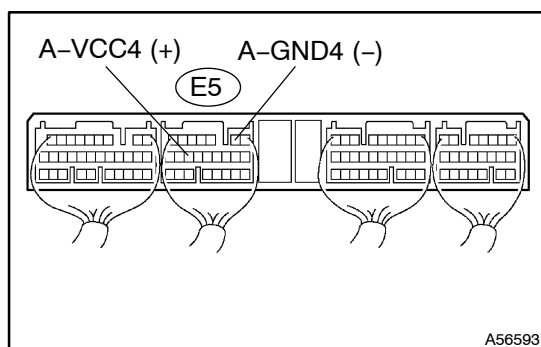
- (4) Turn the ignition switch OFF.
- (5) Reconnect the T2 sensor connector.

(b) Inspect the power output of the turbo pressure sensor (See page 10-14).

OK → REPLACE TURBO PRESSURE SENSOR

NG

2 CHECK ECM (VOLTAGE)



- (a) Turn the ignition switch ON.
- (b) Check the voltage between the terminals.

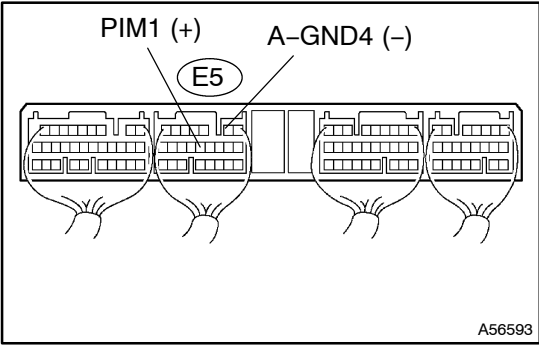
Voltage:

Symbols (Terminal No.)	Voltage
A-VCC4 (E5-14) ↔ A-GND4 (E5-2)	4.5 - 5.5 V

NG → CHECK AND REPLACE ECM (See page 01-27)

OK

3 CHECK ECM (VOLTAGE)



- (a) Turn the ignition switch ON.
- (b) Check the voltage between the terminals of the ECM connector.

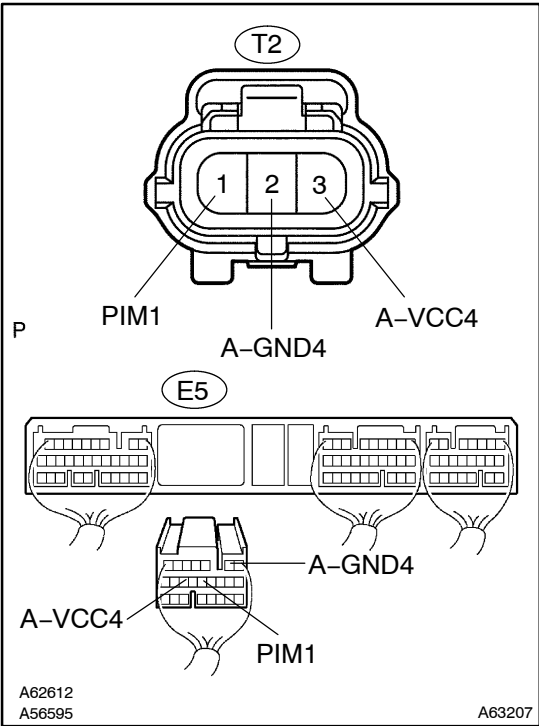
Voltage:

Symbols (Terminal No.)	Voltage
PIM1 (E5-12) ↔ A-GND4 (E5-2)	0.2 - 4.8 V

OK → **CHECK AND REPLACE ECM (See page 01-27)**

NG

4 CHECK WIRE HARNESS (ECM ↔ TURBO PRESSURE SENSOR)



- (a) Disconnect the T2 turbo pressure sensor connector.
- (b) Disconnect the E5 ECM connector.
- (c) Check the continuity between the terminals of the turbo pressure sensor and ECM connectors.

Continuity (Check for open):

Symbols (Terminal No.)	Standard
PIM1 (1) ↔ PIM1 (E5-12)	Continuity
A-VCC4 (3) ↔ A-VCC4 (E5-14)	
A-GND4 (2) ↔ A-GND4 (E5-2)	

Continuity (Check for short):

Symbols (Terminal No.)	Standard
PIM1 (E5-12) ↔ A-GND4 (E5-2)	No continuity
A-VCC4 (E5-14) ↔ A-GND4 (E5-2)	

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5 CHECK VACUUM HOSE (TURBO PRESSURE SENSOR ↔ VSV FOR TURBO PRESSURE SENSOR) (VSV FOR TURBO PRESSURE SENSOR ↔ INTAKE MANIFOLD)

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 CHECK VACUUM SWITCHING VALVE**NG** → **REPLACE VACUUM SWITCHING VALVE****OK****7 CHECK VACUUM SWITCHING VALVE (FUNCTION)****OK** → **REPLACE TURBO PRESSURE SENSOR****NG****8 CHECK TURBOCHARGER SUB-ASSY (See page 13-18)****NG** → **REPLACE TURBOCHARGER SUB-ASSY****OK****9 CHECK WIRE HARNESS
(ECM ⇔ VSV FOR TURBO PRESSURE SENSOR) (a)
(VSV FOR TURBO PRESSURE SENSOR ⇔ BATTERY) (b) (See page 01-27)****NG** → **REPAIR OR REPLACE HARNESS AND CONNECTOR****OK****CHECK AND REPLACE ECM (See page 01-27)**

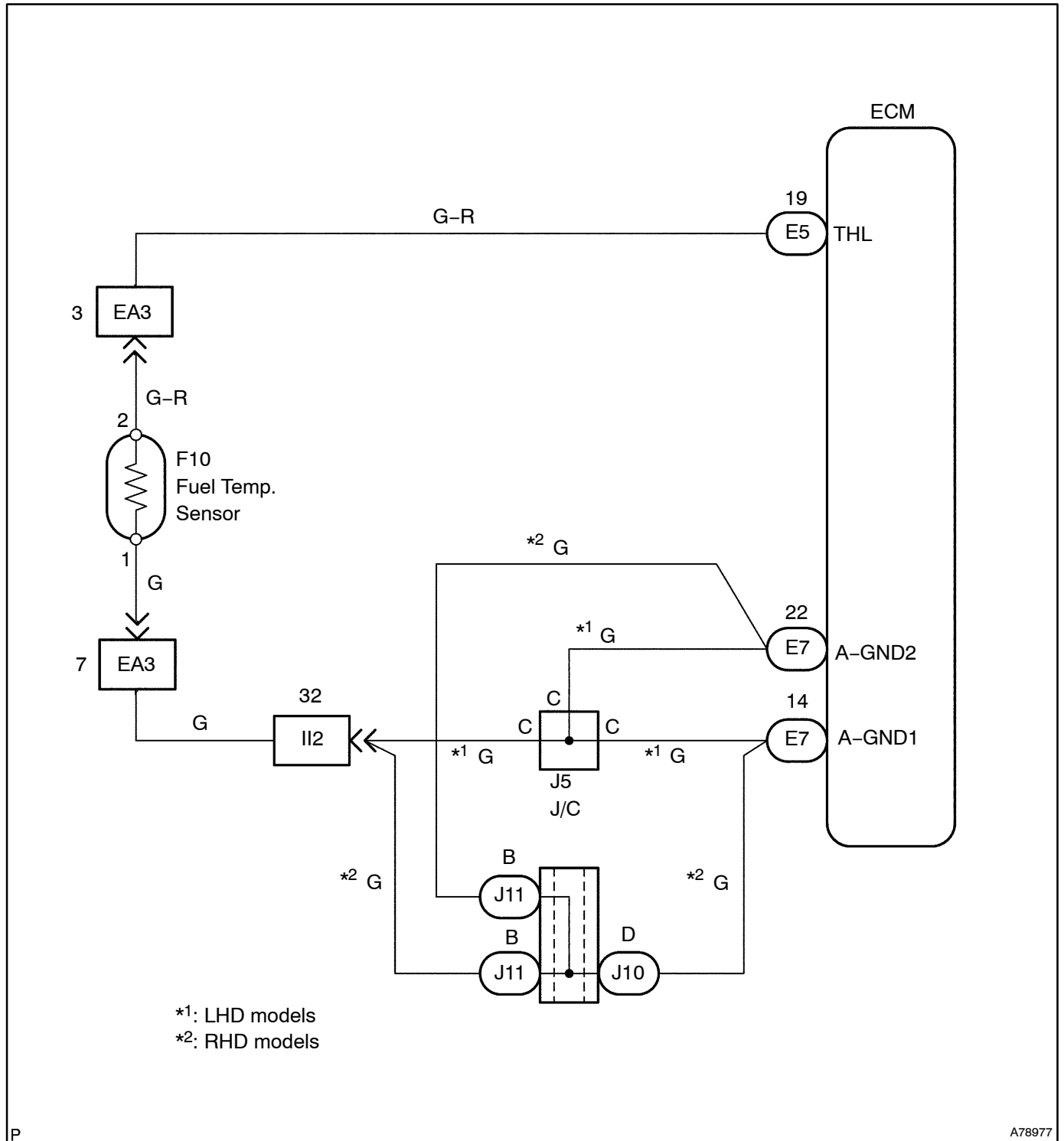
DTC	39	FUEL TEMPERATURE TOO HIGH
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CIRCUIT DESCRIPTION

The fuel temperature sensor senses the fuel temperature. A thermistor built into the sensor changes the resistance value according to the fuel temperature. The lower the fuel temperature is, the greater the thermistor resistance value becomes, and the higher the fuel temperature is, the lower the thermistor resistance value becomes. The fuel temperature sensor is connected to the ECM (See the WIRING DIAGRAM). The 5 V power source voltage in the ECM is applied to the fuel temperature sensor from terminal THL via a resistor R. That is, resistor R and the fuel temperature sensor are connected in series. When the resistance value of the fuel temperature sensor changes in accordance with the changes in the fuel temperature, the potential at terminal THL also changes. Based on this signal, the ECM performs the pressure control compensation of the supply pump and error detection compensation of the highly pressurized fuel system.

DTC No.	DTC Detection Condition	Trouble Area
39	Open or short in fuel temp. sensor circuit for 3 sec. or more	<ul style="list-style-type: none"> • Open or short in fuel temp. sensor circuit • Fuel temp. sensor • ECM

WIRING DIAGRAM

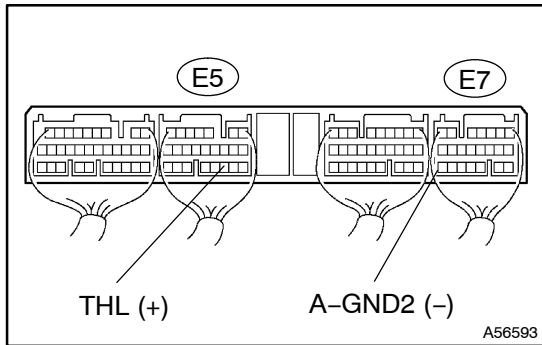


INSPECTION PROCEDURE

HINT:

If DTCs 22, 35 and 39 are output simultaneously, terminal A-GND2 (sensor ground) may be open.

1 CHECK ECM (RESISTANCE)



- (a) Turn the ignition switch to LOCK.
- (b) Check the resistance between the terminals of the ECM connector.

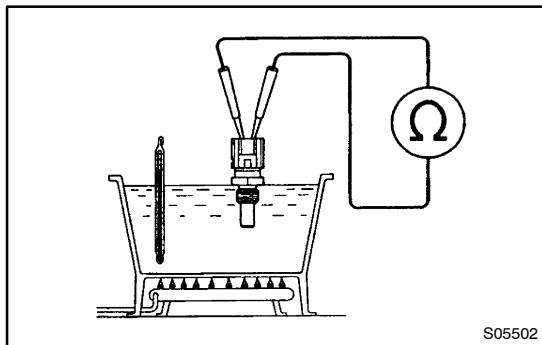
Resistance:

Fuel Temp. °C (°F)	Symbols (Terminal No.)	Resistance
20 (68) (Engine is cool)	THL (E5-19) ↔ A-GND2 (E7-22)	Approx. 2.4 kΩ
80 (176) (Engine is hot)	THL (E5-19) ↔ A-GND2 (E7-22)	Approx. 530 Ω

OK → CHECK FOR INTERMITTENT PROBLEMS (See page 05-7)

NG

2 INSPECT FUEL TEMPERATURE SENSOR (RESISTANCE)



- (a) Disconnect the F10 fuel temperature sensor connector.
- (b) Remove the fuel temperature sensor.
- (c) Measure the resistance between the terminals.

Resistance:

Water temp. °C (°F)	Resistance
20 (68)	Approx. 2.4 kΩ
80 (176)	Approx. 530 Ω

NG → REPLACE FUEL TEMPERATURE SENSOR

OK

3 CHECK WIRE HARNESS (ECM ↔ FUEL TEMPERATURE SENSOR) (See page 01-27)

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

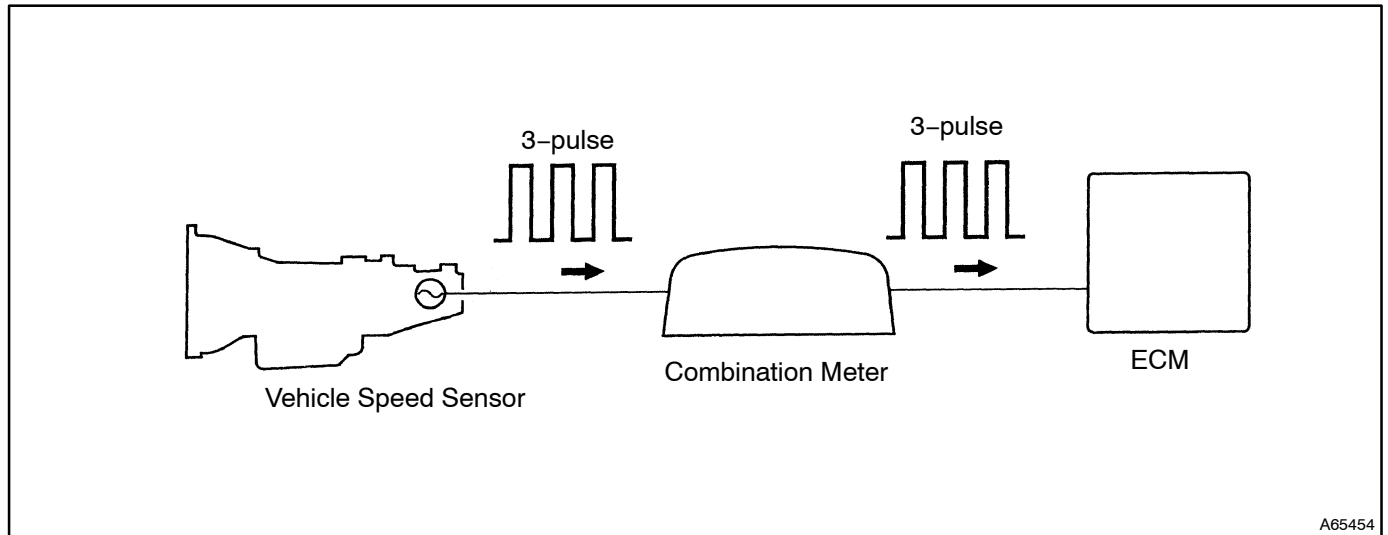
OK

CHECK AND REPLACE ECM (See page 01-27)

DTC	42	VEHICLE SPEED SENSOR SIGNAL CIRCUIT MALFUNCTION
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CIRCUIT DESCRIPTION

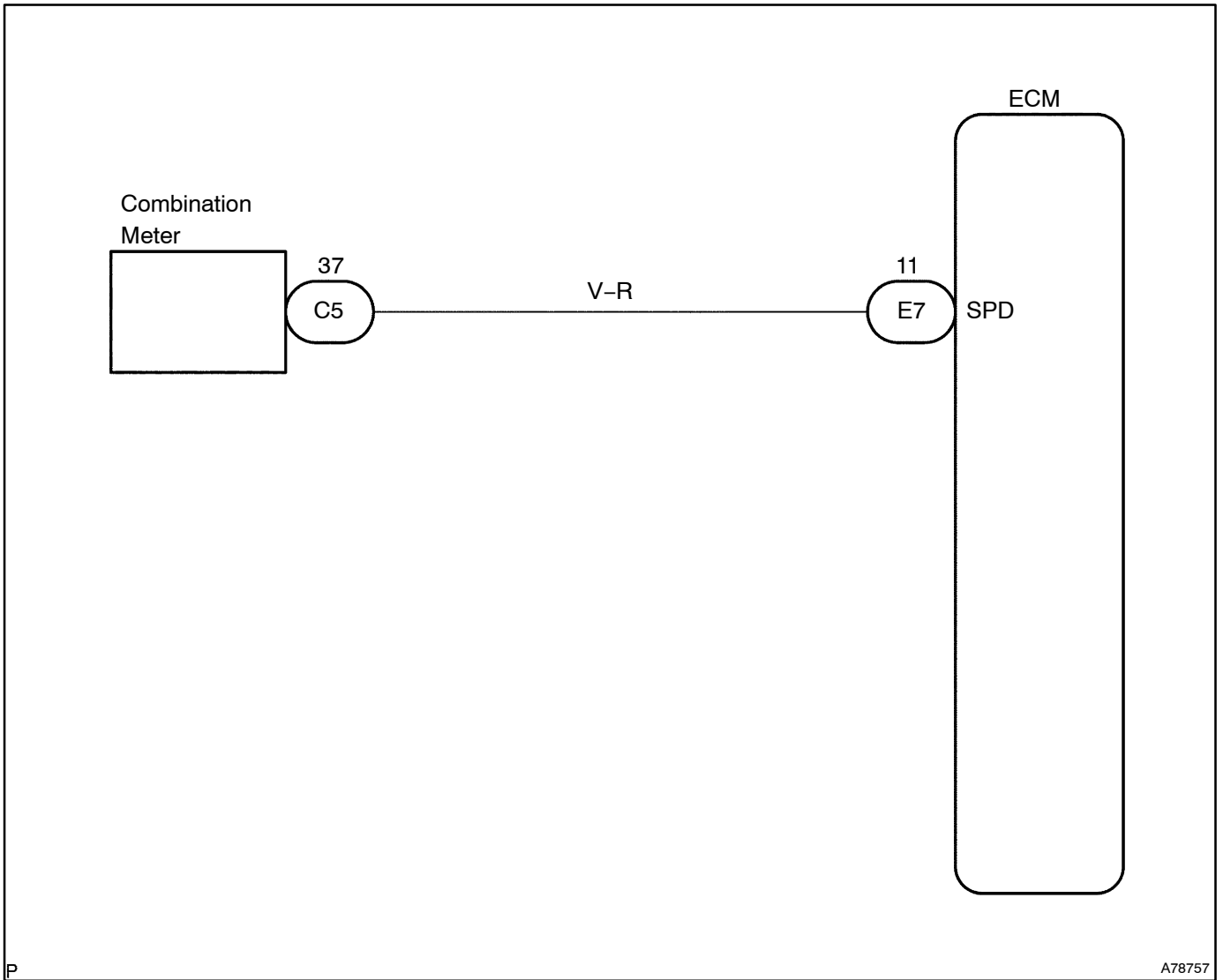
The vehicle speed sensor outputs a 4-pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pulse signals.



A65454

DTC No.	DTC Detection Condition	Trouble Area
42	All conditions below are detected continuously with vehicle speed of 30 km/h or more: (a) Vehicle speed signal: 0 km/h (0 mph) (b) Engine speed: 2,400 - 4,000 rpm (c) Engine coolant temp.: 60 °C (176 °F) or more (d) Accelerator pedal opening angle : 29 % or more	<ul style="list-style-type: none"> • Open or short in vehicle speed sensor circuit • Vehicle speed sensor • Combination meter • ECM

WIRING DIAGRAM



P

A78757

INSPECTION PROCEDURE

1 CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check if operation of the speedometer in the combination meter is normal.

HINT:

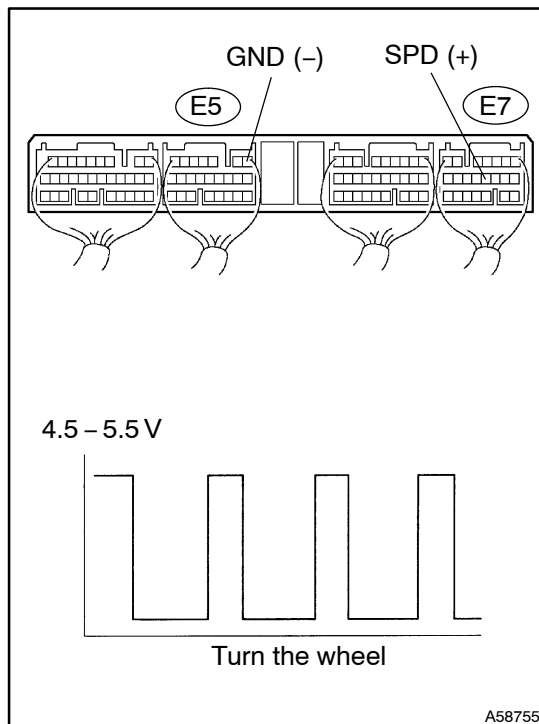
The vehicle speed sensor is operating normally when the speedometer display is normal.

NG

GO TO COMBINATION METER SYSTEM (See page 71-2)

OK

2 CHECK ECM (VOLTAGE)



- Shift the shift lever into the neutral position.
- Jack up the rear wheels.
- Turn the ignition switch ON.
- Measure the voltage between terminals SPD of the E7 ECM connector and GND of the E5 ECM connector when the wheels are turned slowly.

Result: Voltage is generated intermittently.

NG

CHECK AND REPLACE HARNESS AND CONNECTOR

OK

CHECK AND REPLACE ECM

DTC	49	COMMON RAIL PRESSURE SENSOR CIRCUIT MALFUNCTION
------------	-----------	--

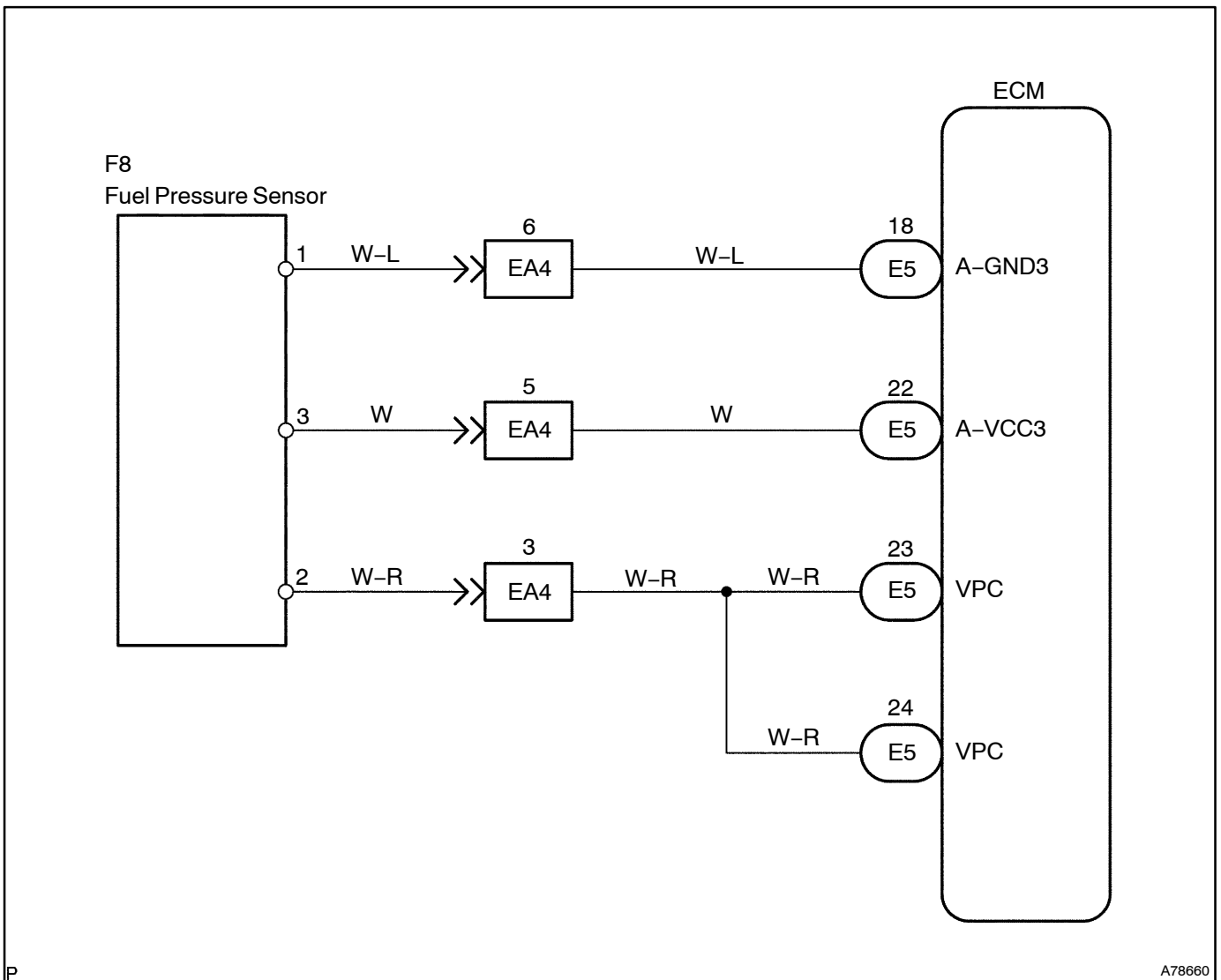
DTC	83	COMMON RAIL SYSTEM MALFUNCTION
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CIRCUIT DESCRIPTION

The fuel pressure sensor installed on the common rail detects the fuel pressure and controls the feedback of the pump discharge in order to maintain the target pressure set by the ECM.

DTC No.	DTC Detection Condition	Trouble Area
49 83	Open or short in fuel pressure sensor circuit for common rail	<ul style="list-style-type: none"> • Open or short in fuel pressure sensor circuit for common rail • Fuel pressure sensor (built in common rail) • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

If DTCs 22 and 39 are output simultaneously, terminal A-GND3 (sensor ground) may be open.

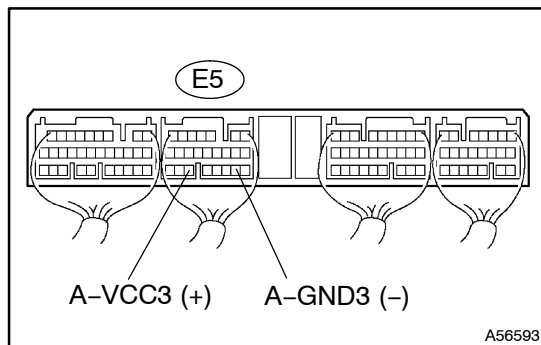
1 CHECK FUEL PRESSURE

NG

REPLACE COMMON RAIL ASSY (See page 11-169)

OK

2 CHECK ECM (VOLTAGE)



- Turn the ignition switch ON.
- Check the voltage between the terminals of the ECM connector.

Voltage:

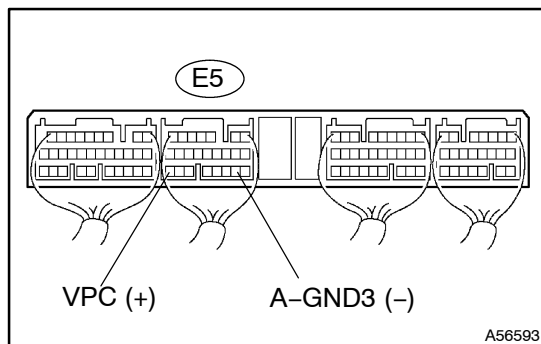
Symbols (Terminal No.)	Voltage
A-VCC3 (E5-22) ↔ A-GND3 (E5-18)	4.75 - 5.25 V

NG

CHECK AND REPLACE ECM (See page 01-27)

OK

3 CHECK ECM (VOLTAGE)



- Start the engine.
- Check the voltage between the terminals of the ECM connector.

Voltage (at 20°C (68°F)):

Symbols (Terminal No.)	Voltage
VPC (E5-24) ↔ A-GND3 (E5-18)	0.7 - 4.7 V

OK

CHECK AND REPLACE ECM (See page 01-27)

NG

4 CHECK WIRE HARNESS (ECM ↔ FUEL PRESSURE SENSOR FOR COMMON RAIL) (See page 01-27)

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE COMMON RAIL ASSY (See page 11-169)

DTC	78 (1)	FUEL LINE MALFUNCTION
------------	---------------	------------------------------

CIRCUIT DESCRIPTION

DTC 78 (1) is output when there are fuel leaks in the high pressure fuel line and also something is stuck in the fuel supply line. When this DTC is output, the injection volume and pressure are regulated, and consequently the engine output becomes low.

DTC No.	DTC Detection Condition	Trouble area
78 (1)	<p>Following conditions (a), (b), (c) are detected when none of DTC 78(2),(3), 49 and 83 are output, engine speed is 650 rpm or more and engine coolant temp. is 60 °C or more.</p> <p>(a) When DTC 81 is detected, it continues in a certain time that NPC*1 is 5 MPa less than PFIN.</p> <p>(b) When the difference between NPC and PFIN is within 5 MPa at idle, the supply quantity of injection pump is larger than the usual quantity while the engine is idling, and this condition continues in a certain time.</p> <p>(c) When the injector volume is 0 and the difference between NPC and PFIN is within 5 MPa, supply quantity of the injection pump is larger, and this condition continues in a certain time.</p>	<ul style="list-style-type: none"> • Leak in high pressure fuel line • Stuck on fuel supply line • Injection pump

*1: NPC means the actual pressure of the common rail.

*2: PFIN means the target pressure of the common rail.

INSPECTION PROCEDURE

1	CHECK LEAK ON HIGH PRESSURE FUEL LINE
----------	--

NG	REPAIR OR REPLACE FUEL LINE
-----------	------------------------------------

OK

2	CHECK STUCK ON FUEL SUPPLY LINE
----------	--

NG	REPAIR OR REPLACE FUEL FILTER AND FUEL LINE
-----------	--

OK

REPAIR OR REPLACE SUPPLY PUMP

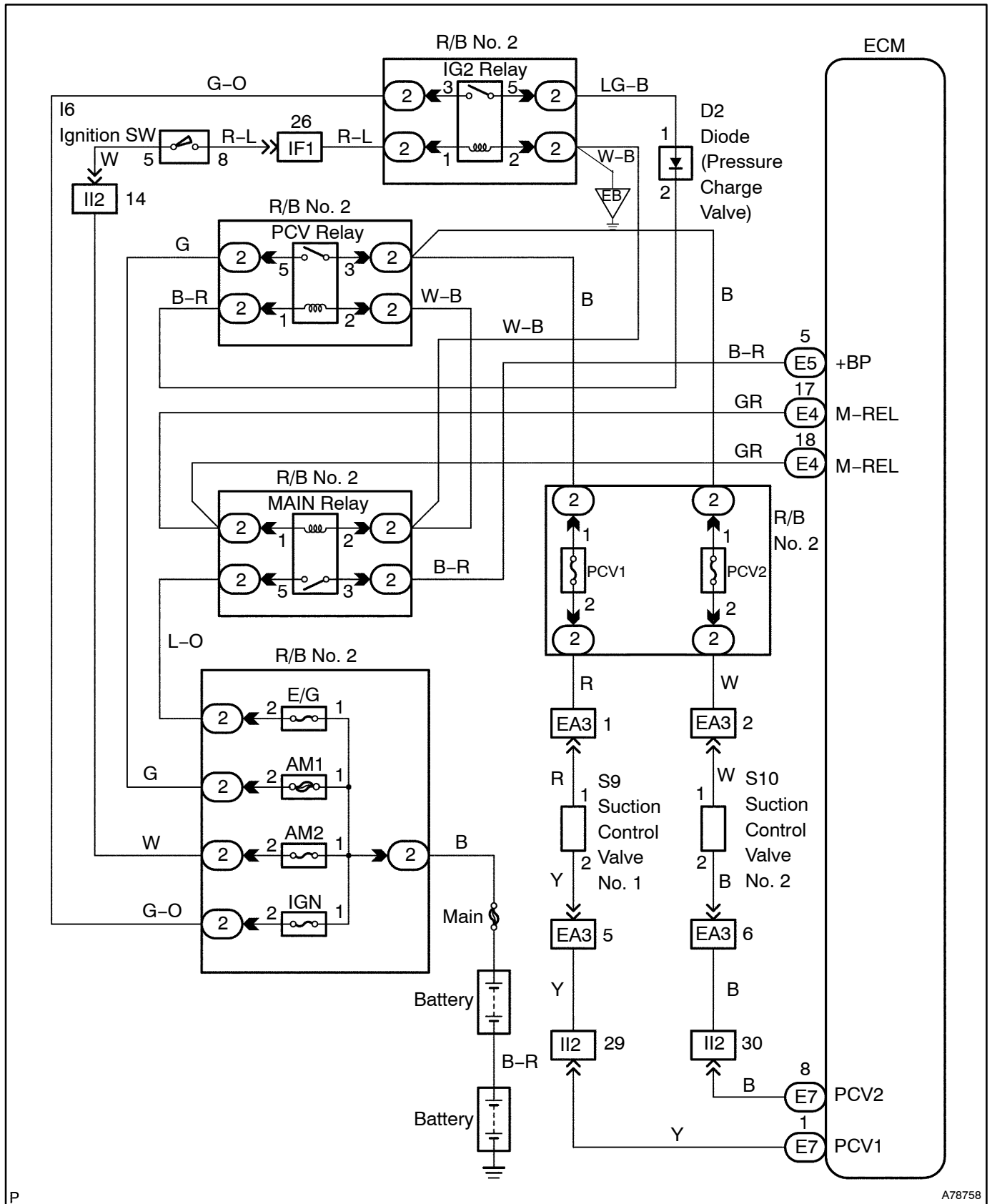
DTC	78 (2)	FUEL PUMP SYSTEM MALFUNCTION (SHORT)
------------	---------------	---

CIRCUIT DESCRIPTION

DTC 78 (2) is output when the PCV2 has a malfunction. The PCV2 on the left side of the supply pump controls the supply pump so that it feeds fuel to the common rail.

DTC No.	DTC Detection Condition	Trouble Area
78 (2)	Short in PCV2 circuit	<ul style="list-style-type: none">• Short in PCV2 circuit• Suction control valve (built in supply pump)• ECM

WIRING DIAGRAM

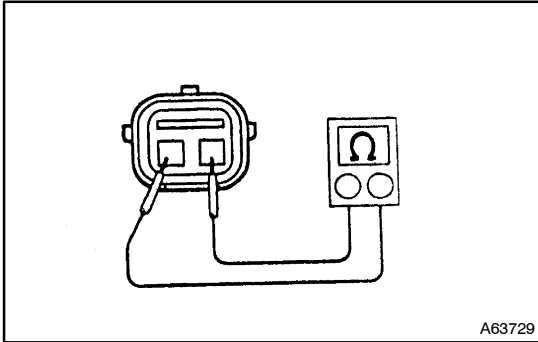


P

A78758

INSPECTION PROCEDURE

1 CHECK SUCTION CONTROL VALVE NO. 2



- (a) Disconnect the S10 valve connector from the left side of the supply pump.
- (b) Measure the resistance between the terminals of the suction control valve No. 2.

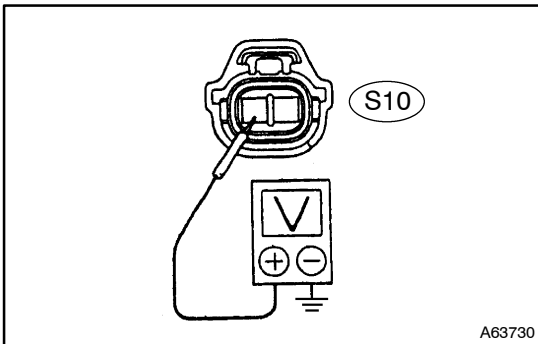
Standard: 2.5 – 3.5 Ω

NG

REPLACE SUPPLY PUMP ASSY (See page 11-163)

OK

2 CHECK PCV2 POWER SOURCE



- (a) Disconnect the S10 valve connector.
- (b) Measure the voltage between terminal 1 of the S10 valve connector and the body ground.

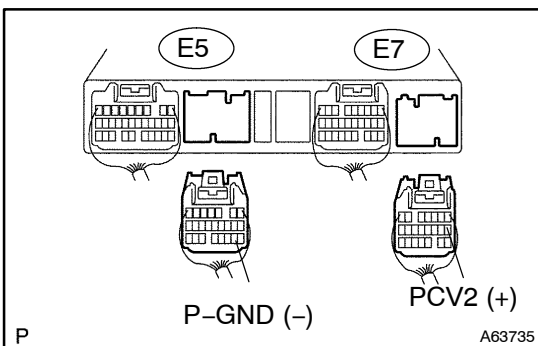
Standard: 19 V or more

NG

Go to step 5

OK

3 CHECK SHORT FOR PCV2 CIRCUIT



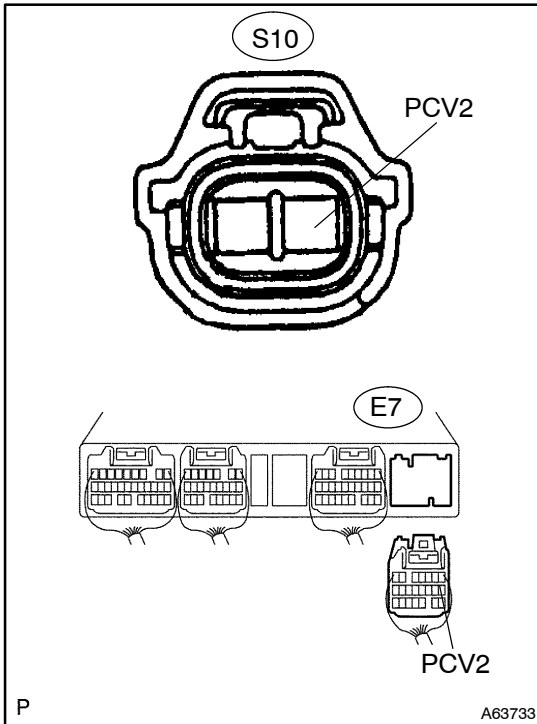
- (a) Disconnect the S10 valve connector.
- (b) Disconnect the E5 and E7 ECM connectors.
- (c) Turn the ignition switch ON.
- (d) Measure the voltage between terminals PCV2 and P-GND of the E5 and E7 ECM connectors.

Standard: Approx. 1 V

OK

CHECK AND REPLACE ECM

NG

4 CHECK WIRE HARNESS (ECM ↔ SUCTION CONTROL VALVE NO. 2)

- (a) Disconnect the S10 valve connector.
- (b) Disconnect the E7 ECM connector.
- (c) Measure the resistance between terminals PCV2 of the E7 ECM connector and terminal 1 of the S10 valve connector.

Standard: 2 Ω or less

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

5 CHECK PCV RELAY

NG

REPLACE PCV RELAY

OK

CHECK AND REPLACE WIRE HARNESS FROM PCV RELAY TO BATTERY

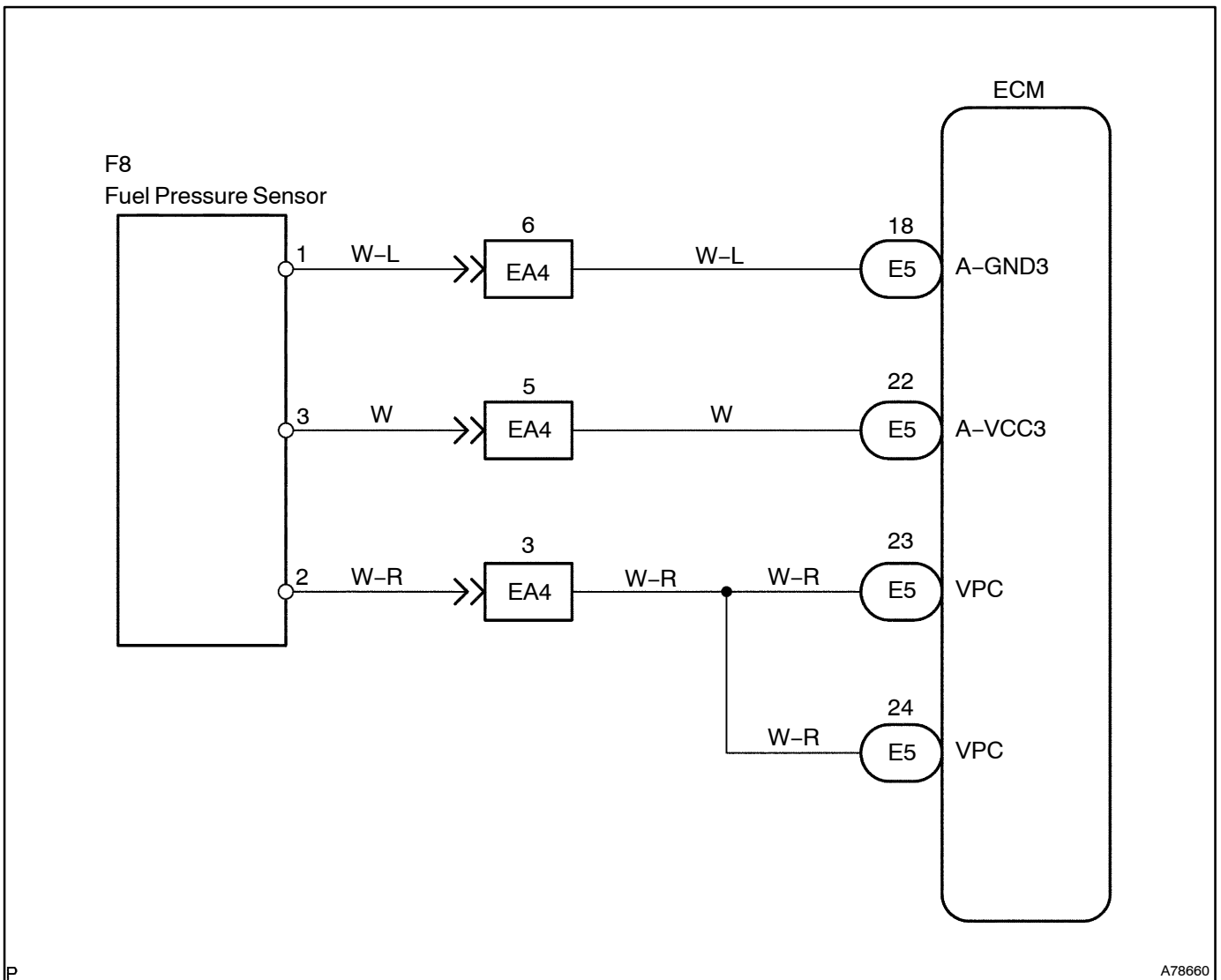
DTC	78 (3)	FUEL PUMP SYSTEM MALFUNCTION (OVER PRESSURE)
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CIRCUIT DESCRIPTION

DTC 78 (3) is detected when the fuel pressure of the common rail is too high.

DTC No.	DTC Detection Condition	Trouble Area
78 (3)	Pressure of common rail abnormally changes against supply quantity of supply pump	<ul style="list-style-type: none"> • Open or short in fuel pressure sensor circuit • Fuel pressure sensor • Engine speed sensor • Supply pump • Injection timing • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK OTHER DTC OUTPUT

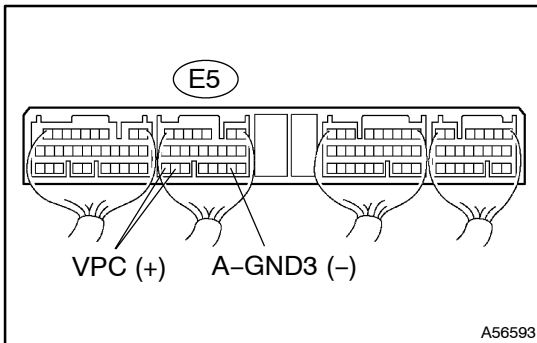
(a) Are there any other DTC output?

YES

PROCEED TO NEXT STEP AFTER REPAIRING OTHER DTC

NO

2 CHECK ECM (VOLTAGE)



- (a) Warm up the engine.
- (b) Keep the engine speed at 650 rpm.
- (c) Measure the voltage between terminals VPC and A-GND3 of the E5 ECM connector.

Standard: 1.56 V or less

NG

REPLACE FUEL PRESSURE SENSOR

OK

3 ADJUST INJECTION TIMING

4 RECHECK DTC

- (a) Delete the DTC in the memory.
- (b) Perform a drive test.
- (c) Recheck for DTC.

A: DTC 78 (3) is output

B: No DTC is output

B

OK

A

CHECK AND REPLACE SUPPLY PUMP OR ECM

DTC	78 (4)	FUEL PUMP SYSTEM MALFUNCTION (SHORT)
------------	---------------	---

CIRCUIT DESCRIPTION

DTC 78 (4) is output when the PCV1 has a malfunction. The PCV1 on the right side of the supply pump controls the supply pump so that it feeds fuel to the common rail.

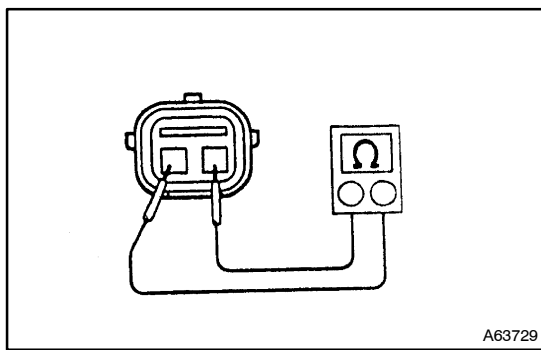
DTC No.	DTC Detection Condition	Trouble Area
78 (4)	Short in PCV1 circuit	<ul style="list-style-type: none"> • Short in PCV1 circuit • PCV1 (built in supply pump) • ECM

WIRING DIAGRAM

Refer to 78 (2) on page 05-60.

INSPECTION PROCEDURE

1	CHECK SUCTION CONTROL VALVE NO. 1
----------	--



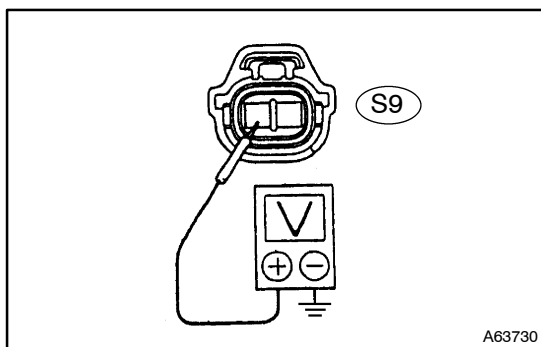
- (a) Disconnect the S9 valve connector from the right side of the supply pump.
- (b) Measure the resistance between the terminals of the suction control valve No. 1.
Standard: 2.5 – 3.5 Ω

NG

REPLACE SUPPLY PUMP (See page 11-163)

OK

2	CHECK PCV1 POWER SOURCE
----------	--------------------------------

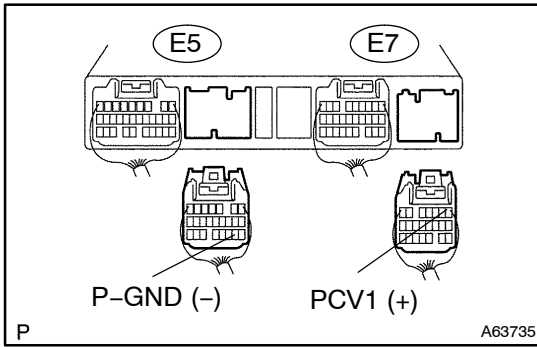


- (a) Disconnect the S9 valve connector.
- (b) Measure the voltage between terminal 1 of the S9 valve connector and the body ground.
Standard: 19 V or more

NG

Go to step 5

OK

3 CHECK SHORT FOR PCV1 CIRCUIT

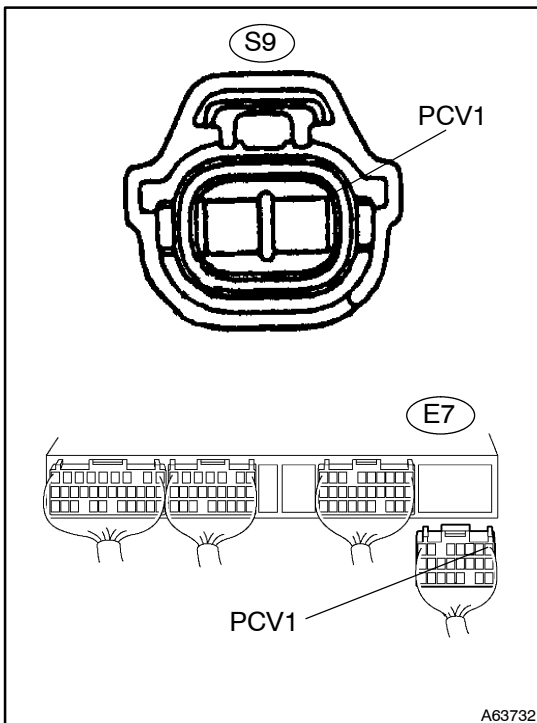
- Disconnect the S9 valve connector.
- Disconnect the E5 and E7 ECM connectors.
- Turn the ignition switch ON.
- Measure the voltage between terminals PCV1 and P-GND of the E5 and E7 ECM connector.

Standard: Approx. 1 V

OK

REPLACE ECM

NG

4 CHECK WIRE HARNESS (ECM ↔ SUCTION CONTROL VALVE NO. 1)

- Disconnect the S9 valve connector.
- Disconnect the E7 ECM connector.
- Measure the resistance between terminal PCV1 of the E7 ECM side connector and terminal 1 of the S9 valve connector.

Standard: 2 Ω or less

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

5 CHECK PCV RELAY

NG

REPLACE PCV RELAY

OK

CHECK AND REPLACE WIRE HARNESS FROM PCV RELAY TO BATTERY

DTC	79 (1)	FUEL CONTROL CYLINDER BALANCE SYSTEM MALFUNCTION (CYLINDER1)
DTC	79 (2)	FUEL CONTROL CYLINDER BALANCE SYSTEM MALFUNCTION (CYLINDER2)
DTC	79 (3)	FUEL CONTROL CYLINDER BALANCE SYSTEM MALFUNCTION (CYLINDER3)
DTC	79 (4)	FUEL CONTROL CYLINDER BALANCE SYSTEM MALFUNCTION (CYLINDER 4)

CIRCUIT DESCRIPTION

DTC 79 is output when the injection volumes (fuel compensation volume) of the cylinders are different.

DTC No.	DTC Detection Condition	Trouble Area
79 (1)	Difference in fuel compensation volume (No.1 cylinder)	<ul style="list-style-type: none"> • Fuel pipe (from common rail to injector) • Injector • Flow damper (on common rail) • ECM
79 (2)	Difference in fuel compensation volume (No.2 cylinder)	
79 (3)	Difference in fuel compensation volume (No.3 cylinder)	
79 (4)	Difference in fuel compensation volume (No.4 cylinder)	

INSPECTION PROCEDURE

1	CHECK OTHER DTC
----------	------------------------

(a) Are there any other DTC being output ?

YES →

PROCEED TO NEXT STEP AFTER REPAIR OTHER DTC

NO

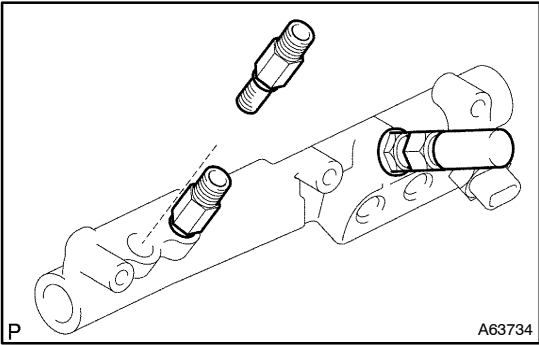
2	CHECK FUEL LEAK (FLOW DAMPER ⇔ INJECTOR)
----------	---

NG →

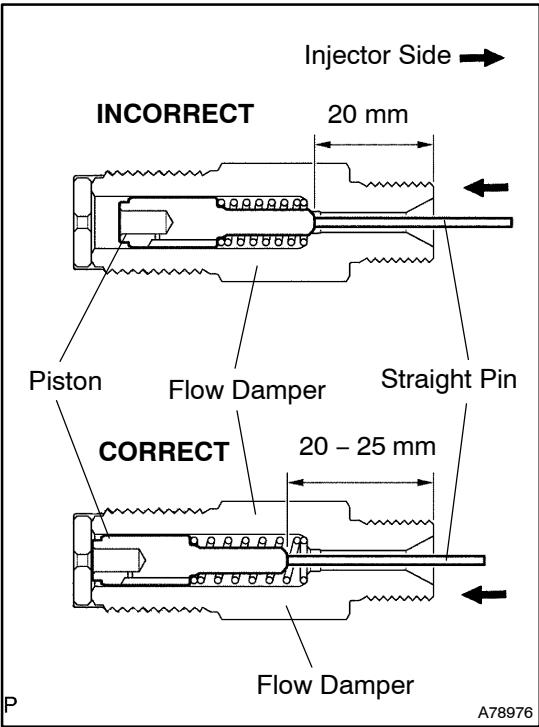
CHECK FUEL LEAK

OK

3 | CHECK FLOW DAMPER



(a) Remove the flow damper of the trouble cylinder from the common rail.



(b) Insert a straight pin into a hole on the injector side of the flow damper and check how long it is inserted.
Standard: 20 mm or more (20 - 25 mm)

NOTICE:
Be careful that water and dirt do not get into the inside of the flow damper.

NG → **REPLACE FLOW DAMPER**

OK

4 | CHECK INJECTOR ASSY

NG → **REPLACE INJECTOR ASSY**

OK

CHECK AND REPLACE ECM

DTC	81	FUEL PUMP SYSTEM MALFUNCTION (NO PRESSURE/ACTIVATE PRESSURE LIMITER)
------------	-----------	---

CIRCUIT DESCRIPTION

DTC 81 is output when the fuel pressure in common rail is too high. When this DTC is output, the injection volume and pressure are regulated, and consequently the engine output becomes low.

DTC No.	DTC Detection Condition	Trouble Area
81	Maximum common rail pressure continues, when none of DTC 78(2),(4) and 83 are output.	<ul style="list-style-type: none"> • Fuel relief valve (on common rail) • Supply pump

INSPECTION PROCEDURE

1	REPLACE PRESSURE REGULATOR
----------	-----------------------------------



2	RECHECK DTC
----------	--------------------

A: DTC 81 is output

B: No DTC is output

B	FUEL PRESSURE REGULATOR BROKEN
----------	---------------------------------------



REPLACE SUPPLY PUMP ASSY

DTC	82	ENGINE OVERRUN
------------	-----------	-----------------------

CIRCUIT DESCRIPTION

DTC 82 is output when the engine speed is 3,900 rpm or more. When DTC 82 is output, the fuel injection stops. However, when the engine speed becomes less than 3,800 rpm, the fuel injection resumes.

DTC No.	DTC Detection Condition	Trouble Area
82	Engine speed is 3,900 rpm or more (over-rev.)	<ul style="list-style-type: none"> • Camshaft position sensor • Crankshaft position sensor • ECM

INSPECTION PROCEDURE

If DTC 82 is not caused to output by the engine overrun, check the engine speed sensor circuit (See page 05-24).

DTC	84	COMMON RAIL SYSTEM MALFUNCTION (PRESSURE DOES NOT CHANGE)
------------	-----------	--

CIRCUIT DESCRIPTION

DTC 84 is output when the fuel pressure of the common rail does not change for a certain time while the engine is running.

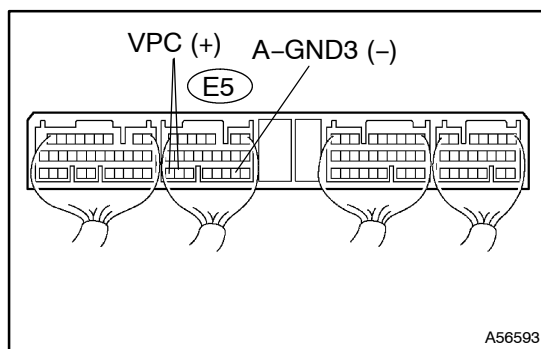
DTC No.	DTC Detection Condition	Trouble Area
84	Common rail pressure does not change for a certain time while the engine is running	<ul style="list-style-type: none"> • Fuel pressure sensor circuit • Fuel pressure sensor • ECM

WIRING DIAGRAM

Refer to DTC 49 on page 05-57.

INSPECTION PROCEDURE

1 CHECK ECM (VOLTAGE)



- (a) Turn the ignition switch ON.
- (b) Measure the voltage between terminals VPC and A-GND3 of the E5 ECM connector.

Standard: 0.9 - 1.1 V

OK → **Go to step 3**

NG

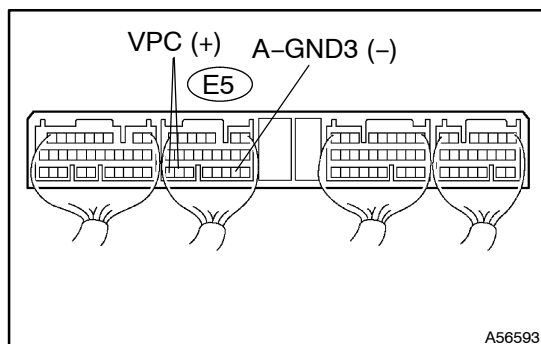
2 CHECK WIRE HARNESS

- (a) Check the wire harness between the fuel pressure sensor and the ECM.

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

3 CHECK ECM (VOLTAGE)



- (a) Start the engine.
- (b) Measure the voltage between terminals VPC and A-GND3 of the E5 ECM connector when racing the engine.

Standard:

The voltage changes between 1.0 and 3.2 V

OK → **CHECK AND REPLACE ECM**

NG

4	CHECK FUEL PRESSURE SENSOR
---	----------------------------

OK	CHECK AND REPLACE COMMON RAIL ASSY
----	------------------------------------

NG

REPLACE ECM

DTC	85	PCV RELAY CIRCUIT MALFUNCTION
------------	-----------	--------------------------------------

CIRCUIT DESCRIPTION

The ECM outputs DTC 85 when a malfunction exists in the PCV relay system.

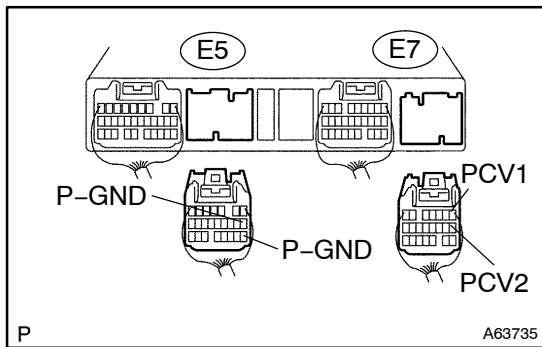
DTC No.	DTC Detection Condition	Trouble Area
85	PCV relay circuit malfunction	<ul style="list-style-type: none"> • Short in PCV relay circuit • PCV relay • ECM

WIRING DIAGRAM

Refer to DTC 78 (2) on page 05-60.

INSPECTION PROCEDURE

1	CHECK ECM (VOLTAGE)
----------	----------------------------



- (a) Turn the ignition switch to LOCK.
- (b) Disconnect the E7 and E5 ECM connectors.
- (c) Check the voltage of the vehicle side connector.

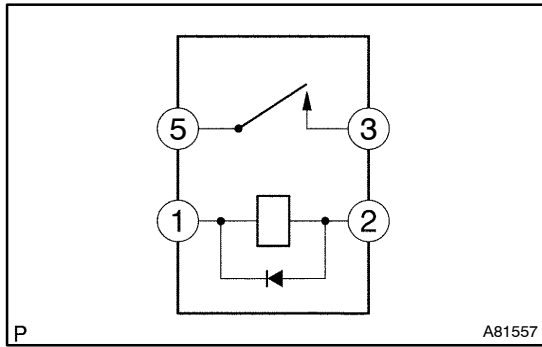
Standard:

Symbols (Terminal No.)	Specified Condition
PCV1 (E7-1) ↔ P-GND (E5-8, 17)	0 ± 0.5 V
PCV2 (E7-8) ↔ P-GND (E5-8, 17)	

NG ➤	REPLACE ECM
-------------	--------------------

OK

2	CHECK PCV RELAY
----------	------------------------



- (a) Remove the PCV relay from the relay block No. 2.
- (b) Inspect the PCV relay continuity.
 - (1) Using an ohmmeter, check that there is no continuity between terminals 3 and 5.
 - (2) Check that there is continuity between terminals 1 and 2.

NG ➤	REPLACE PCV RELAY
-------------	--------------------------

OK

CHECK FOR SHORT IN WIRE HARNESS AND CONNECTOR BETWEEN ECM AND PCV RELAY (See page 01-27)
--

DTC	86 (1)	INJECTOR CIRCUIT MALFUNCTION (CYLINDER 1)
------------	---------------	--

DTC	86 (2)	INJECTOR CIRCUIT MALFUNCTION (CYLINDER 2)
------------	---------------	--

DTC	86 (3)	INJECTOR CIRCUIT MALFUNCTION (CYLINDER 3)
------------	---------------	--

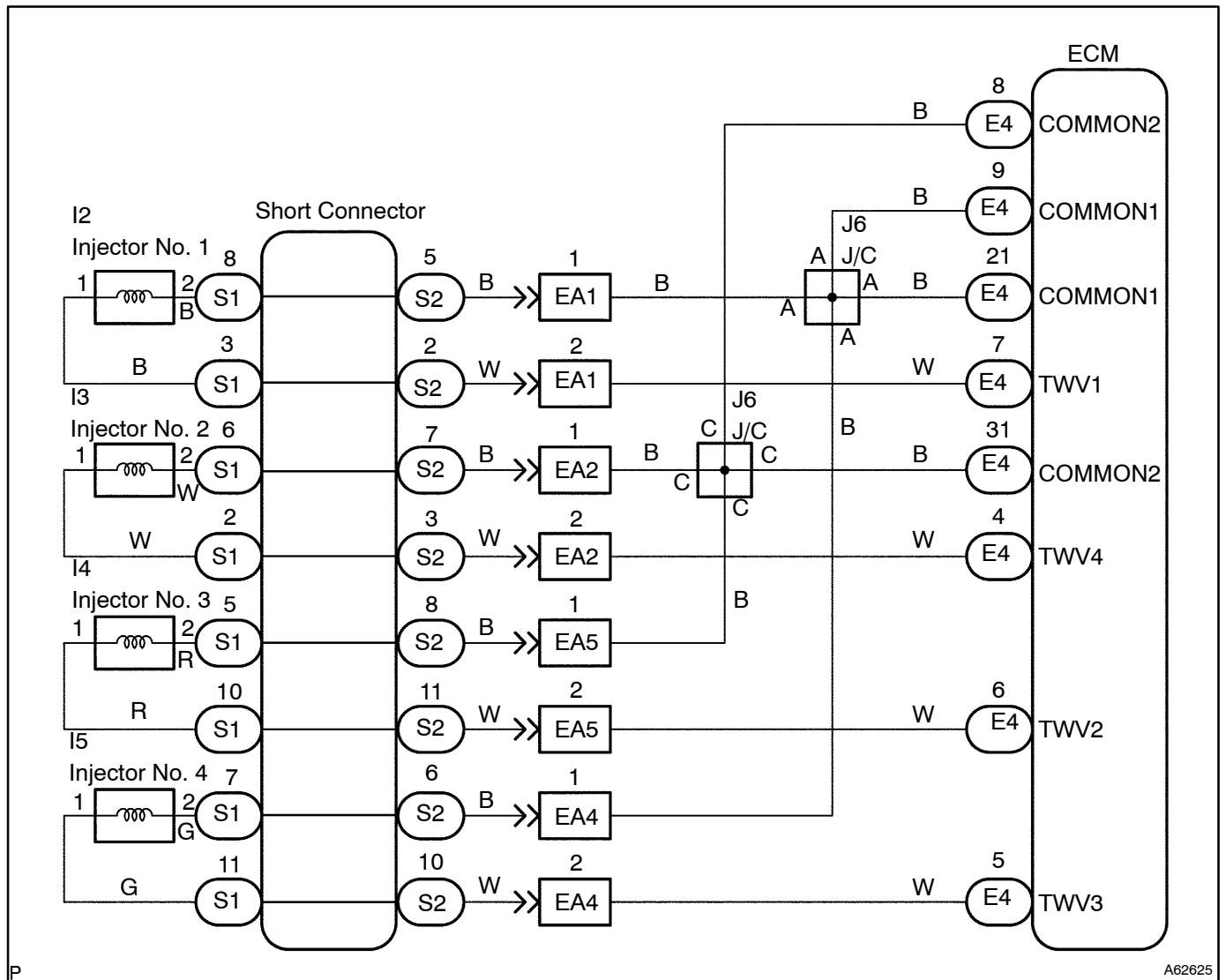
DTC	86 (4)	INJECTOR CIRCUIT MALFUNCTION (CYLINDER 4)
------------	---------------	--

CIRCUIT DESCRIPTION

When the ECM transmits a signal to the injectors, fuel is injected.

DTC No.	DTC Detection Condition	Trouble Area
86 (1)	Open in No. 1 injector wire harness	<ul style="list-style-type: none"> • Open or short in injector circuit • Injector • Wire harness • ECM
86 (2)	Open in No. 2 injector wire harness	
86 (3)	Open in No. 3 injector wire harness	
86 (4)	Open in No. 4 injector wire harness	

WIRING DIAGRAM

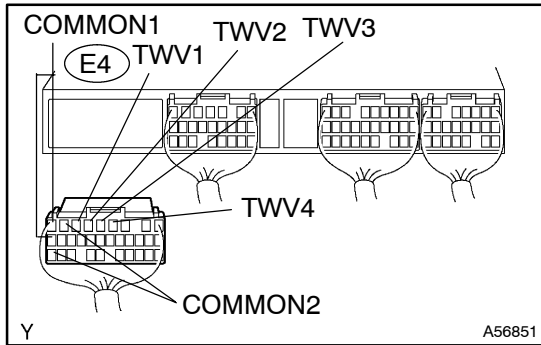


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INSPECTION PROCEDURE

1 CHECK WIRE HARNESS



- (a) Turn the ignition switch to LOCK.
- (b) Disconnect the E4 ECM connector.
- (c) Check the resistance of the terminals of the ECM connector.

Standard:

Symbols (Terminal No.)	Specified Condition
TWV1 (E4-7) ↔ COMMON1 (E4-9, E4-21)	2.7 ± 0.1 Ω
TWV2 (E4-6) ↔ COMMON2 (E4-8, E4-31)	
TWV3 (E4-5) ↔ COMMON1 (E4-9, E4-21)	
TWV4 (E4-4) ↔ COMMON2 (E4-8, E4-31)	

NG → REPAIR OR REPLACE WIRE HARNESS AND CONNECTORS

OK

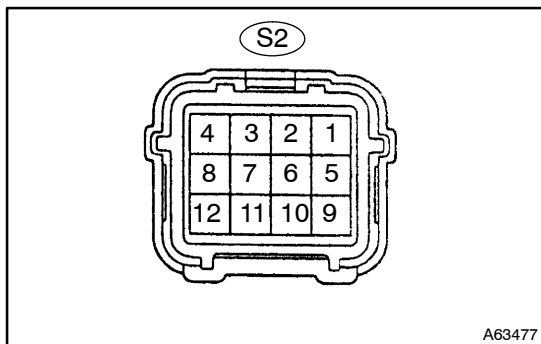
2 CHECK DTC (CHECK SAME DTC IS OUTPUT AGAIN?)

- (a) Reconnect the ECM connector E3.
- (b) Start the engine.
- (c) Check for the DTC.

YES → REPLACE ECM

NO

3 CHECK CONTINUITY WIRE HARNESS



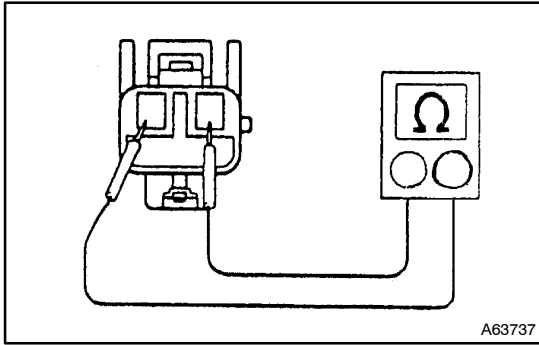
- (a) Disconnect the short connector.
- (b) Check the resistance of the terminals.
- (c) At the male side of the short connector, measure the resistance between the terminals.

Resistance:

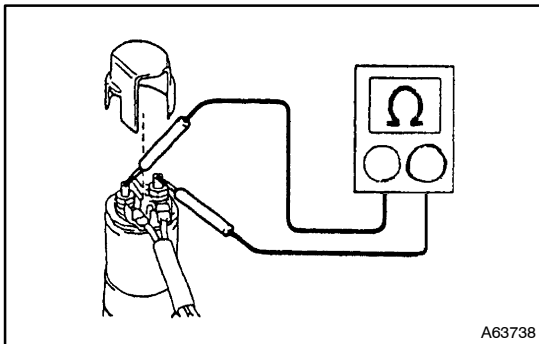
Terminal No.	Specified Condition
S2-2 ↔ S2-5	2.7 ± 0.1 Ω
S2-3 ↔ S2-7	
S2-8 ↔ S2-11	
S2-6 ↔ S2-10	

NG → REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

OK

4 CHECK WIRE HARNESS

- (a) Remove the injector connector of the cylinder shown by the DTC.
- (b) Check the resistance of the injector wire harness.
Standard: $2.7 \pm 0.1 \Omega$ at 20°C (68°F)

NG**REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR****OK****5 CHECK INJECTOR ASSY**

- (a) Measure the resistance between the injector terminals of the cylinder shown by the DTC.
Standard: $2.7 \pm 0.1 \Omega$ at 20°C (68°F)

NG**REPLACE INJECTOR ASSY****OK****CHECK AND REPLACE ECM**

DTC	86 (5)	INJECTOR CIRCUIT MALFUNCTION (SHORT 5)
------------	---------------	---

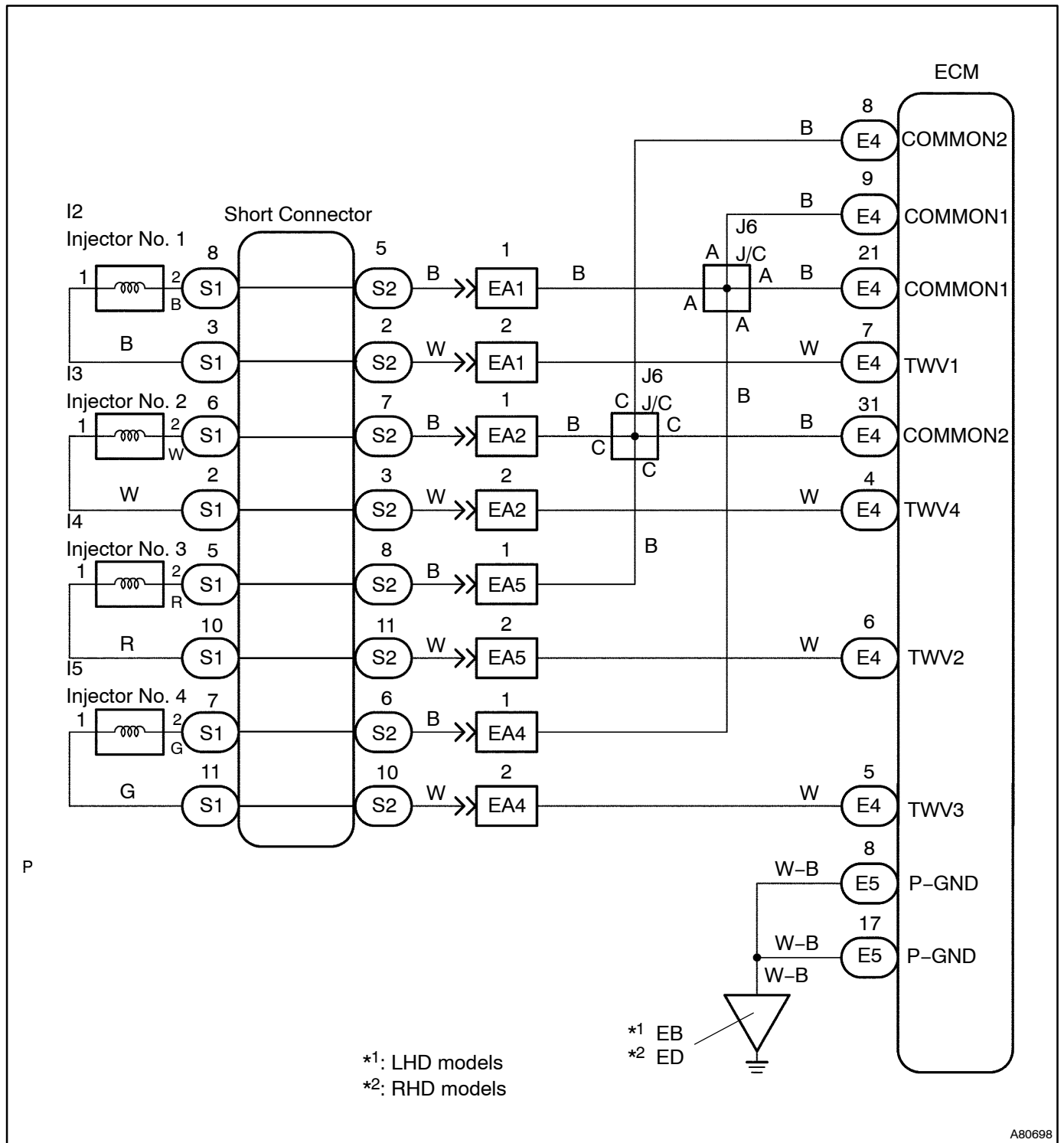
DTC	86 (6)	INJECTOR CIRCUIT MALFUNCTION (SHORT 6)
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CIRCUIT DESCRIPTION

Refer to DTC 86 (1) on page 05-75.

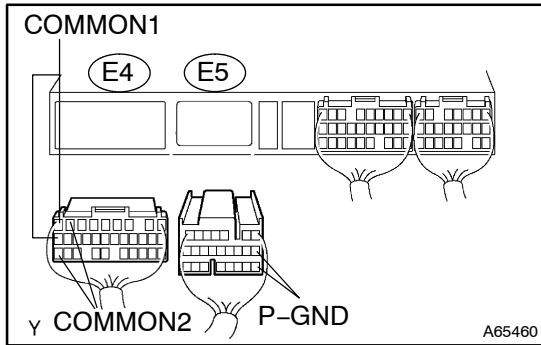
DTC No.	DTC Detection Condition	Trouble Area
86 (5)	Injector +B or GND harness short	<ul style="list-style-type: none"> • Open or short in injector circuit • Injector No. 1
86 (6)	Injector +B or GND harness short	<ul style="list-style-type: none"> • Injector No. 2 • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK VOLTAGE AND CONTINUITY IN WIRE HARNESS



- (a) Disconnect the E4 and E5 ECM connectors.
- (b) Turn the ignition switch ON.
- (c) Measure the voltage and continuity between the terminals of the ECM connector.

Standard (Check continuity):

Symbols (Terminal No.)	Specified Condition
COMMON1 (E4-9) ↔ P-GND (E5-8, E5-17)	No continuity
COMMON1 (E4-21) ↔ P-GND (E5-8, E5-17)	
COMMON2 (E4-8) ↔ P-GND (E5-8, E5-17)	
COMMON2 (E4-31) ↔ P-GND (E5-8, E5-17)	

Standard (Check voltage):

Symbols (Terminal No.)	Specified Condition
COMMON1 (E4-9) ↔ P-GND (E5-8, E5-17)	2 V or less
COMMON1 (E4-21) ↔ P-GND (E5-8, E5-17)	
COMMON2 (E4-8) ↔ P-GND (E5-8, E5-17)	
COMMON2 (E4-31) ↔ P-GND (E5-8, E5-17)	

NG → Go to step 3

OK

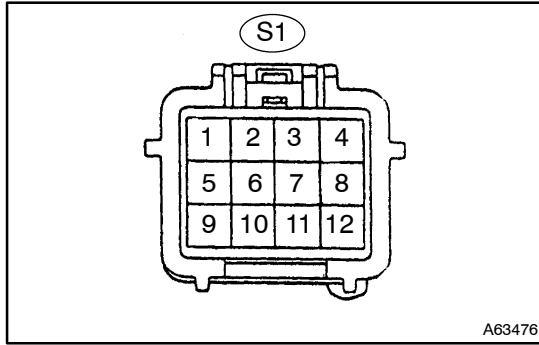
2 CHECK DTC (CHECK SAME DTC IS OUTPUT AGAIN?)

- (a) Turn the ignition switch to LOCK and reconnect the ECM connector.
- (b) Start the engine and clear the DTC.
- (c) Is the same DTC output again?

YES → REPLACE ECM

NO

3 CHECK CONTINUITY IN WIRE HARNESS



- Turn the ignition switch to LOCK.
- Disconnect the short connector.
- Check the voltage or continuity of the terminals of the ECM connector.

Standard (Check continuity):

Symbols (Terminal No.)	Specified Condition
- (S1-2) ↔ P-GND (E5-8, E5-17)	No continuity
- (S1-3) ↔ P-GND (E5-8, E5-17)	
- (S1-5) ↔ P-GND (E5-8, E5-17)	
- (S1-6) ↔ P-GND (E5-8, E5-17)	
- (S1-7) ↔ P-GND (E5-8, E5-17)	
- (S1-8) ↔ P-GND (E5-8, E5-17)	
- (S1-10) ↔ P-GND (E5-8, E5-17)	
- (S1-11) ↔ P-GND (E5-8, E5-17)	

Standard (Check voltage):

Terminal No.	Specified Condition
S1-5 ↔ S1-2, 10	2 V or less
S1-6 ↔ S1-2, 10	
S1-7 ↔ S1-3, 11	
S1-8 ↔ S1-3, 11	

NG

REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

OK

INSPECT HARNESS INSIDE HEAD COVER

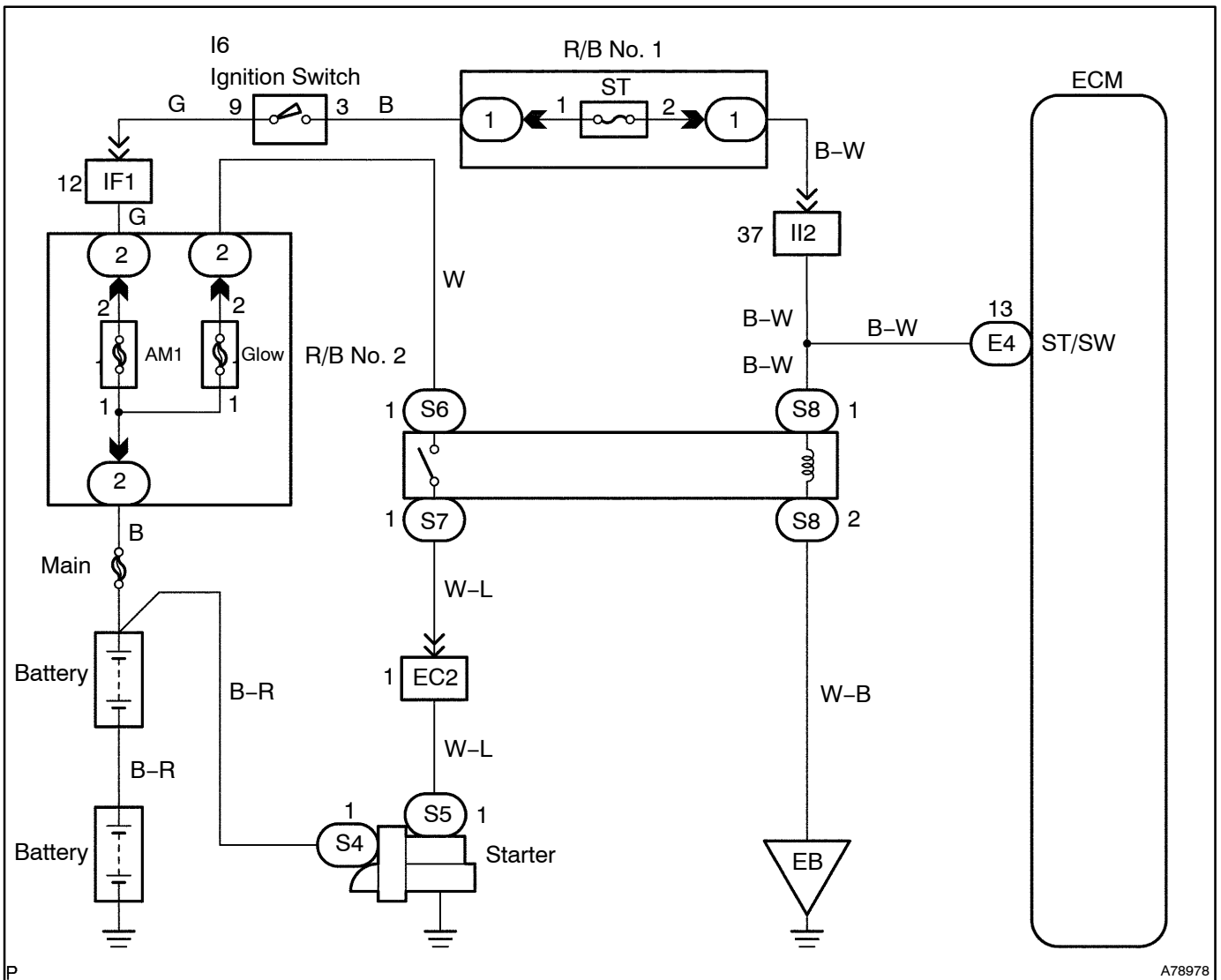
DTC	92	ENGINE STOP SWITCH CIRCUIT MALFUNCTION
------------	-----------	---

CIRCUIT DESCRIPTION

The engine stop switch stops supplying power and forces the engine to stop.

DTC No.	DTC Detection Condition	Trouble Area
92	Engine Stop Switch	<ul style="list-style-type: none"> • Short in engine stop switch circuit • Engine Stop Switch • Wire Harness • ECM

WIRING DIAGRAM



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INSPECTION PROCEDURE

1 CHECK ENGINE STOP SWITCH

- (a) Remove the switch.
 (b) Measure the resistance between terminals of the switch.

Standard:

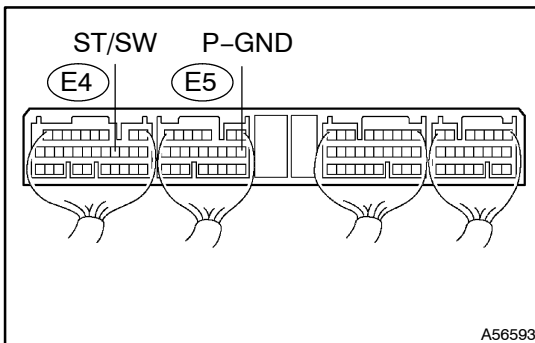
Switch Position	Specified Condition
OFF	No continuity (Ω)
ON	1 Ω or less

NG

REPLACE ENGINE STOP SWITCH

OK

2 CHECK ECM (VOLTAGE)



- (a) Measure the voltage between terminals ST/SW and P-GND of the E4 and E5 ECM connectors when cranking the engine.

NOTICE:

Be careful about the gear position and the safety around the vehicle when cranking the engine.

Standard: 1 V or less

NG

REPLACE ECM

OK

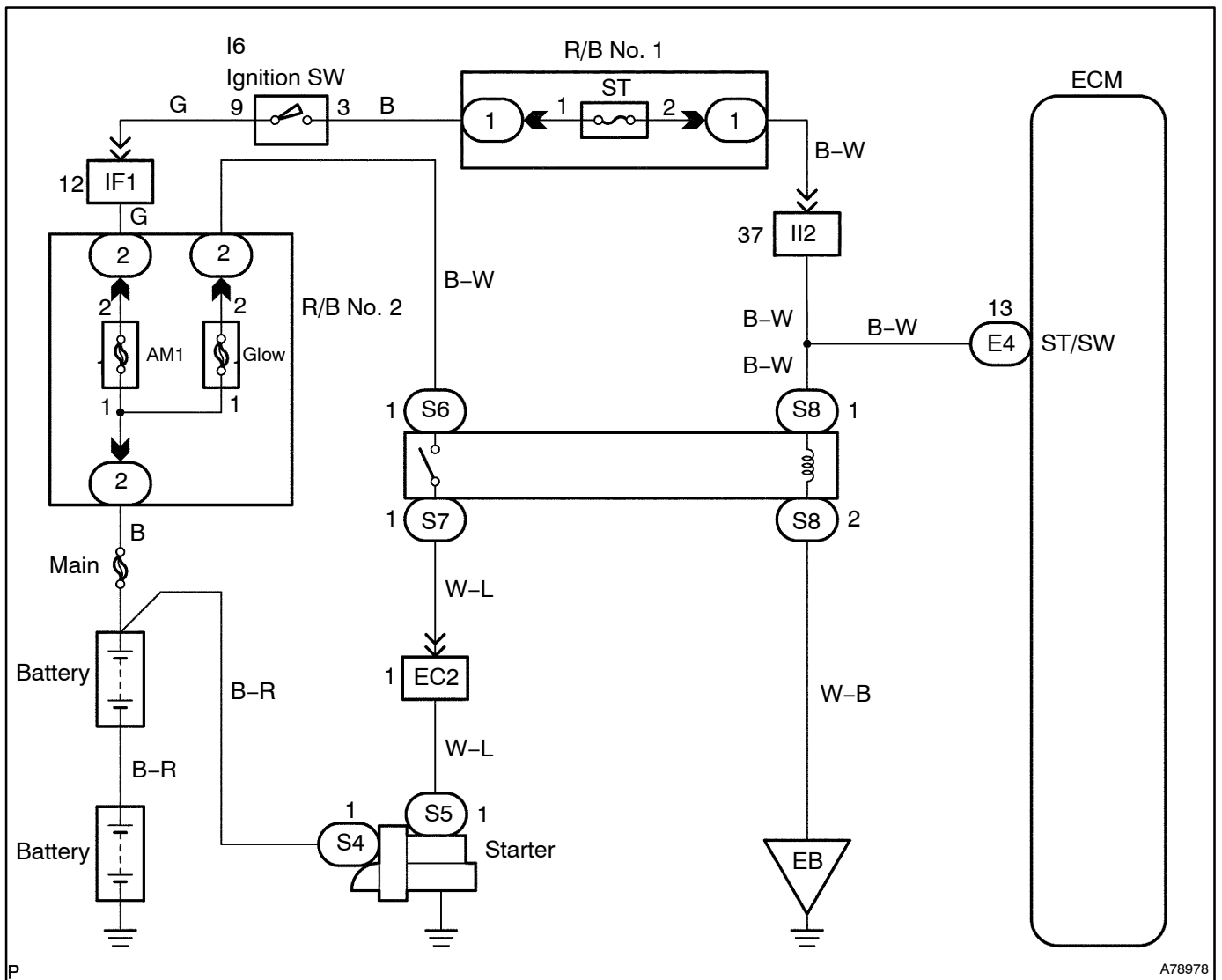
REPAIR OR REPLACE HARNESS OR CONNECTOR BETWEEN TERMINAL ST/SW OF ECM AND BODY GROUND

STARTER SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

While the engine is being cranked, the intake air flow is slow, so fuel vaporization is poor. A rich mixture is therefore necessary in order to achieve good start ability. While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM. The starter signal is mainly used to increase the fuel injection volume for starting injection control.

WIRING DIAGRAM



P

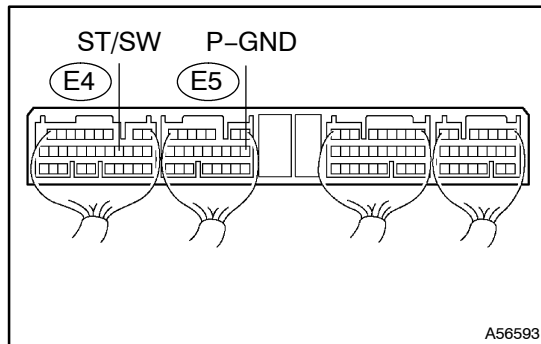
A78978

INSPECTION PROCEDURE

HINT:

This diagnostic trouble code chart is based on the premise that the engine is being cranked under the normal conditions. If the engine does not crank, proceed to the problem symptoms table on page 05-21.

1 CHECK STARTER SIGNAL (VOLTAGE)



- Turn the ignition switch to START.
- Check the voltage between the terminals of the ECM connectors.

Voltage:

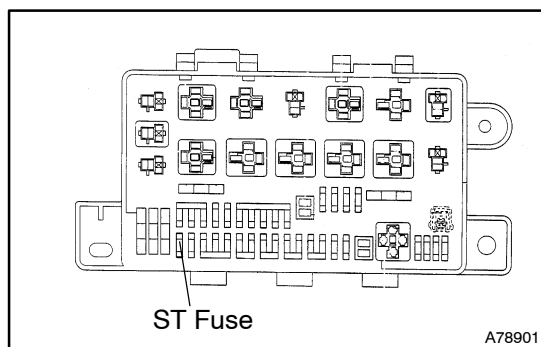
Symbols (Terminal No.)	Voltage
ST/SW (E4-13) ↔ P-GND (E5-8)	6.0 V or more

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-21)

NG

2 CHECK FUSE



- Remove the ST fuse from the R/B No. 1.
- Check the continuity of the ST fuse.

Result: Continuity

NG

REPLACE FUSE

OK

3 CHECK WIRE HARNESS (ECM ↔ STARTER RELAY) (See page 01-27)

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

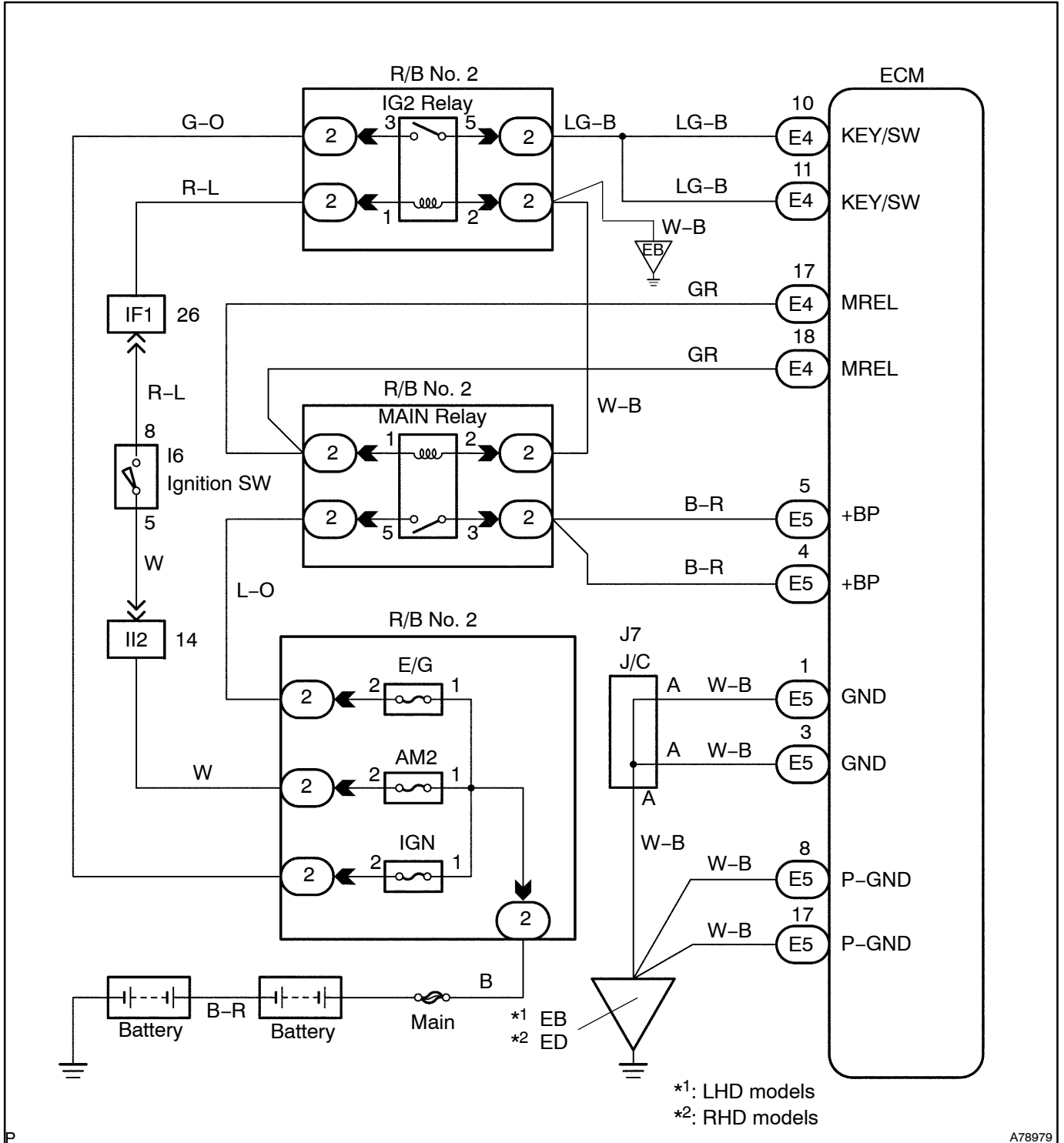
CHECK AND REPLACE ECM (See page 01-27)

ECM POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

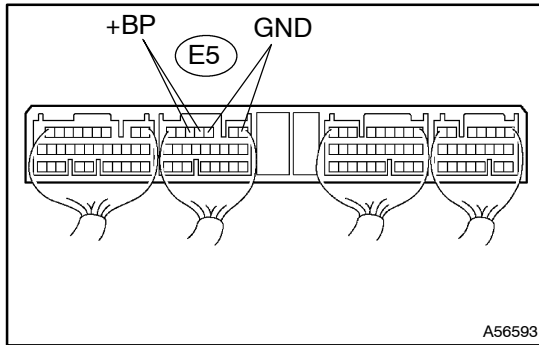
When the ignition switch is turned ON, battery positive voltage is applied to the coil, closing the contacts of the MAIN relay and supplying power to the terminal +BP of the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK ECM (VOLTAGE)



- (a) Turn the ignition switch ON.
- (b) Check the voltage between the terminals of the ECM connector.

Voltage:

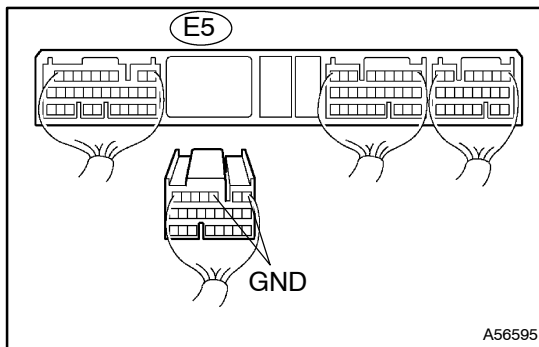
Symbols (Terminal No.)	Voltage
+BP (E5-4, E5-5) ↔ GND (E5-1, E5-3)	26 - 29.6 V

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-21)

NG

2 CHECK WIRE HARNESS (ECM ↔ BODY GROUND)



- (a) Disconnect the E5 ECM connector.
- (b) Check the continuity between the terminals of the ECM connector.

Continuity (Check for open):

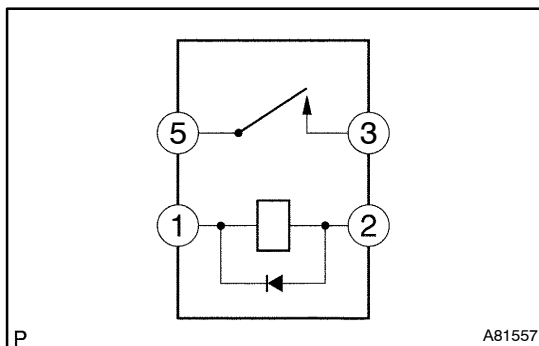
Symbols (Terminal No.)	Standard
GND (E5-1, E5-3) ↔ Body ground	Continuity (1 Ω or less)

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 CHECK MAIN RELAY



- (a) Remove the MAIN relay from the R/B No. 2.
- (b) Inspect the MAIN relay continuity.
 - (1) Using an ohmmeter, check that there is no continuity between terminals 3 and 5.
 - (2) Check that there is continuity between terminals 1 and 2.

NG

REPLACE MAIN RELAY

OK

4 CHECK FUSE

- (a) Remove the E/G fuse from the R/B No. 2.
- (b) Check the continuity of the E/G fuse.

Result: Continuity

- (c) Check for short in all harness and components connected to the E/G fuse.

NG → REPLACE FUSE

OK

5 CHECK WIRE HARNESS (ECM ↔ MAIN RELAY) (a) (MAIN RELAY ↔ BATTERY) (b) (See page 01-27)

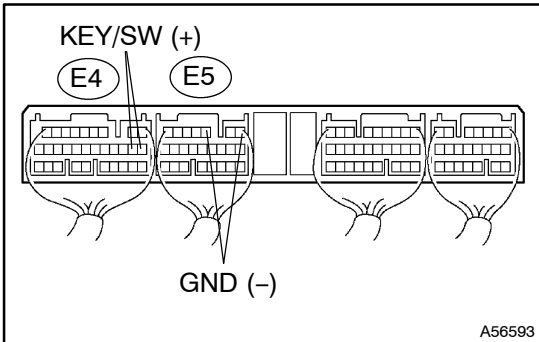
Standard (Check for open):

Terminal No.	Standard
5 ↔ Battery positive terminal	Continuity

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

6 CHECK ECM (VOLTAGE)



- (a) Turn the ignition switch ON.
- (b) Check the voltage between the terminals of the ECM connectors.

Voltage:

Symbols (Terminal No.)	Voltage
KEY/SW (E4-10, E4-11) ↔ GND (E5-1, E5-3)	26 - 29.6 V

OK → Go to step 9

NG

7 CHECK IGNITION OR STARTER SWITCH ASSY (See page 80-2)

NG → REPLACE IGNITION OR STARTER SWITCH ASSY

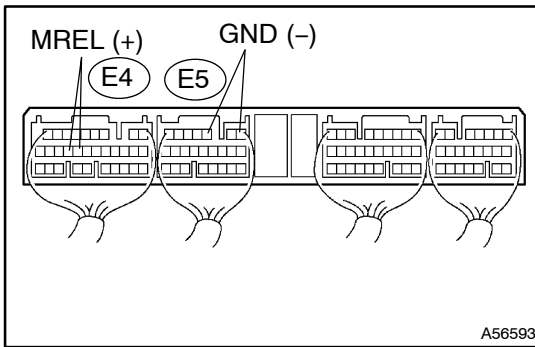
OK

8 CHECK HARNESS AND CONNECTOR (ECM ↔ IGNITION SWITCH) (See page 01-27)

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

9 CHECK ECM (VOLTAGE)


- (a) Turn the ignition switch ON.
 (b) Check the voltage between the terminals of the ECM connectors.

Voltage:

Symbols (Terminal No.)	Voltage
MREL (E4-17, E4-18) ↔ GND (E5-1, E5-3)	26 – 29.6 V

OK

CHECK AND REPLACE ECM (See page 01-27)

NG

10 CHECK HARNESS AND CONNECTOR (ECM ↔ MAIN RELAY) (a) (MAIN RELAY ↔ BODY GROUND) (b) (See page 01-27)

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

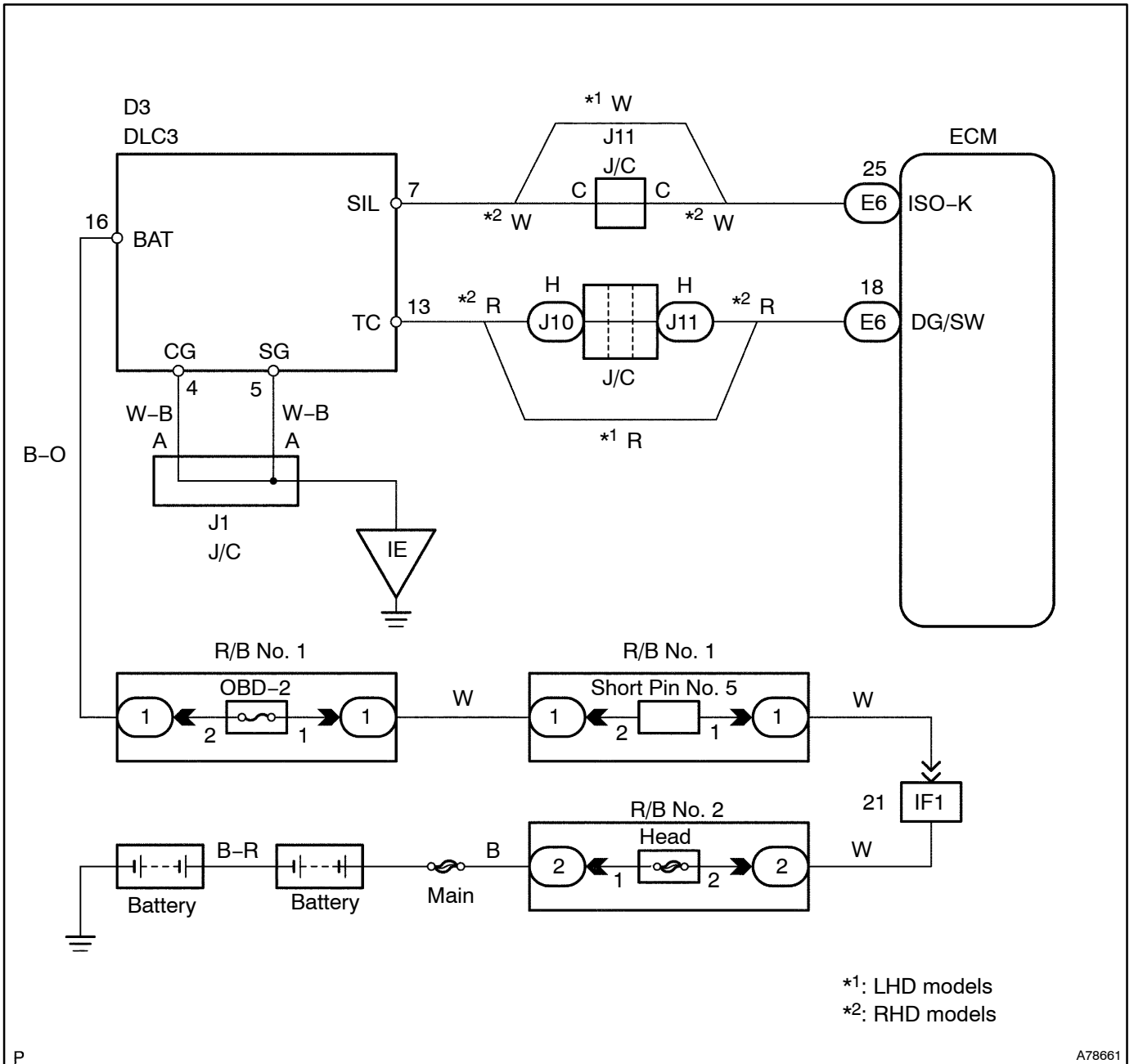
REPAIR OR REPLACE ENGINE ROOM RELAY BLOCK

DLC3 CIRCUIT

CIRCUIT DESCRIPTION

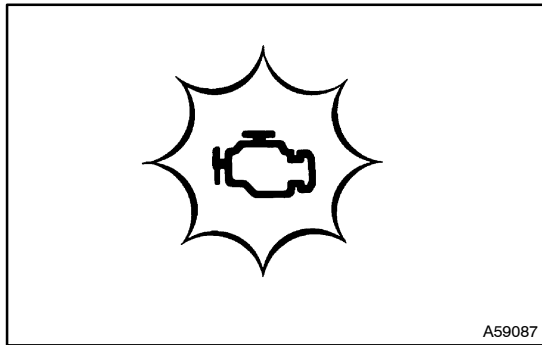
Terminals TC and CG are located in the DLC3. The DLC3 is located under the finish lower panel. When terminals TC and CG are connected, DTC in the normal mode or test mode can be read from the check engine warning light in the combination meter. Also, terminal SIL is located in the DLC3. This terminal can be used for the M-OBD communication using the hand-held tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK ENGINE WARNING LIGHT CONDITION



- (a) Turn the ignition switch ON.
- (b) Using SST, connect terminals TC and CG of the DLC3.
- (c) Check the engine warning light condition.

Check engine warning light: Blinking

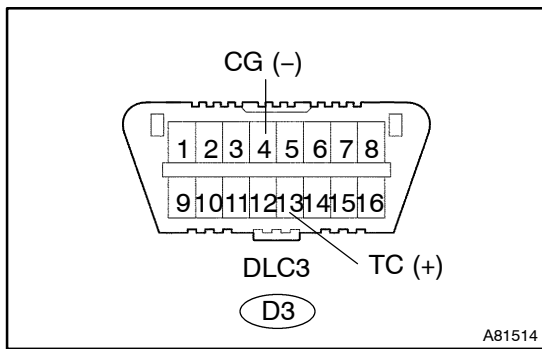
HINT:

If this light is found to be normal and there is no hand-held tester, you do not need to do the following steps, because this circuit is considered to be normal. Proceed to next circuit inspection shown on the problem symptoms table (See page 05-21).

OK Go to step 8

NG

2 CHECK DLC3 (VOLTAGE)



- (a) Turn the ignition switch ON.
- (b) Check the voltage between the terminals of the DLC3.

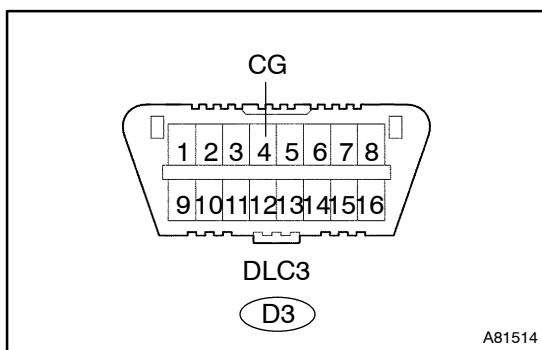
Voltage:

Symbols (Terminal No.)	Voltage
TC (D3-13) ↔ CG (D3-4)	9 - 14 V

OK Go to step 5

NG

3 CHECK DLC3 (CONTINUITY)



- (a) Check the continuity between the terminal of the DLC3 and the body ground.

Continuity (Check for open):

Symbols (Terminal No.)	Standard
CG (D3-4) ↔ Body ground	Continuity

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

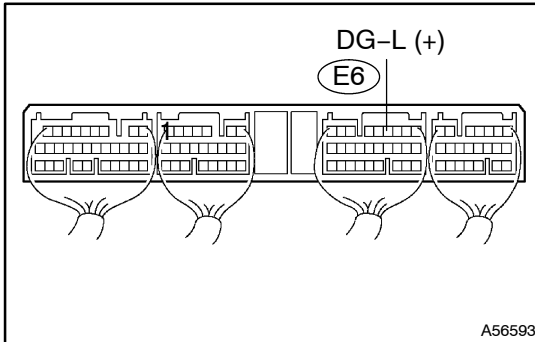
OK

4 CHECK WIRE HARNESS (ECM ↔ DLC3) (See page 01-27)

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

5 CHECK ECM (VOLTAGE)

- (a) Turn the ignition switch ON.
 (b) Check the voltage between the terminal of the ECM and the body ground.

Voltage:

Symbols (Terminal No.)	Voltage
DG-L (E6-4) ↔ Body ground	26 - 29.6 V

OK

CHECK AND REPLACE ECM

NG

6 CHECK BULB (ENGINE WARNING LIGHT)

NG

REPLACE BULB

OK

7 CHECK WIRE HARNESS (ECM ↔ COMBINATION METER) (See page 01-27)

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

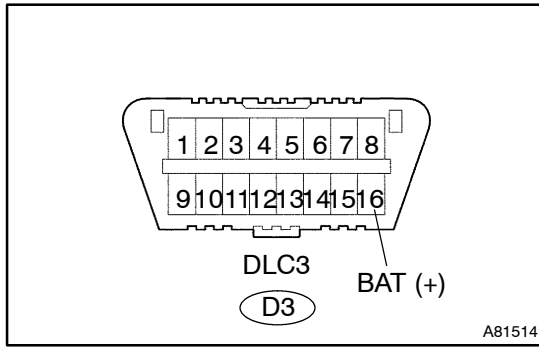
OK

8 READ OUTPUT DTC OF HAND-HELD TESTER (INCLUDING NORMAL DTC)

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-21)

OK

9 CHECK DLC3 (VOLTAGE)

- (a) Turn the ignition switch ON.
- (b) Check the voltage between the terminal of the DLC3 and the body ground.

Voltage:

Symbols (Terminal No.)	Voltage
BAT (D3-16) ↔ Body ground	26 - 29.6 V

NG**REPAIR OR REPLACE HARNESS AND CONNECTOR****OK****10 CHECK WIRE HARNESS (ECM ↔ DLC3) (See page 01-27)****NG****REPAIR OR REPLACE HARNESS AND CONNECTOR****OK****CHECK AND REPLACE ECM (See page 01-27)**

ABS & BA SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

057EK-02

HINT:

Troubleshoot in accordance with the procedures on the following pages.

1 | **VEHICLE BROUGHT TO WORKSHOP**



2 | **CUSTOMER PROBLEM ANALYSIS (See page 05-97)**



3 | **CHECK AND CLEAR DTCs (See page 05-98)**



4 | **PROBLEM SYMPTOM CONFIRMATION**

 **SYMPTOM DOES NOT OCCUR: Go to step 5**

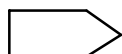
 **SYMPTOM OCCURS: Go to step 6**

5 | **SYMPTOM SIMULATION (See page 01-17)**



6 | **DTC CHECK (See page 05-98)**

 **DTC IS NOT OUTPUT: Go to step 7**

 **DTC IS OUTPUT: Go to step 8**

7 | **PROBLEM SYMPTOMS TABLE (See page 05-116)**

 **CHECK FOR FLUID LEAKAGE AND
Go to step 10**

8 | **DTC CHART (See page 05-108)**



9	CIRCUIT INSPECTION (See page 05-117)
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10	IDENTIFICATION OF PROBLEM
-----------	----------------------------------



11	REPAIR
-----------	---------------



12	CONFIRMATION TEST
-----------	--------------------------



END

HINT:

Step 3, 6, 8, 9, 12:

Diagnostic steps require the use of the hand-held tester.

Fail-safe function:

When a failure occurs in the ABS system, the ABS warning light is lit and the ABS operation is prohibited.

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & BA SYSTEM Check Sheet

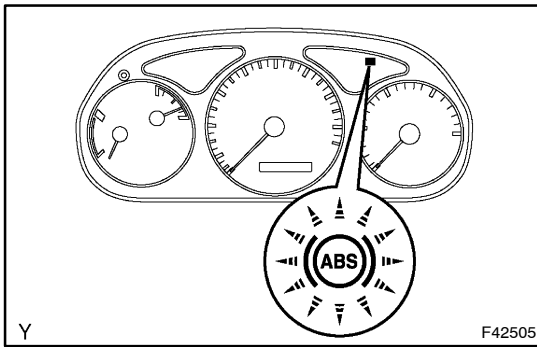
Inspector's Name : _____

Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km miles

Date Problem First Occurred	/ /
Frequency the Problem Occurs	<input type="checkbox"/> Continuously <input type="checkbox"/> Intermittently (times a day)

Symptoms	<input type="checkbox"/> ABS does not operate.	
	<input type="checkbox"/> ABS does not operate efficiently.	
	ABS Warning Light Abnormal	<input type="checkbox"/> Remains ON <input type="checkbox"/> Does not Light Up

DTC Check	1st Time	<input type="checkbox"/> Normal Code <input type="checkbox"/> Malfunction Code (Code)
	2nd Time	<input type="checkbox"/> Normal Code <input type="checkbox"/> Malfunction Code (Code)



PRE-CHECK

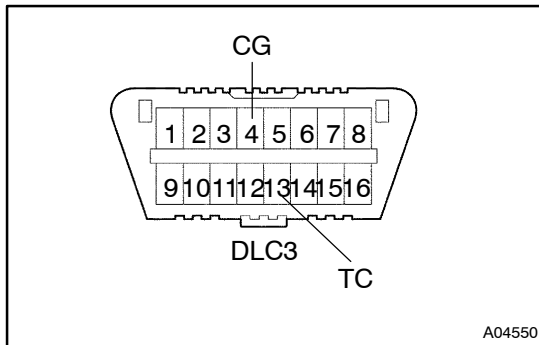
1. DIAGNOSIS SYSTEM

(a) Check the ABS warning light.

When the ignition switch is turned ON, check that the ABS warning light lights up for 3 seconds.

HINT:

If the indicator check result is abnormal, proceed to the troubleshooting for the ABS warning light circuit (See page 05-157).



(b) When not using hand-held tester:

Check the DTC.

(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light on the combination meter.

HINT:

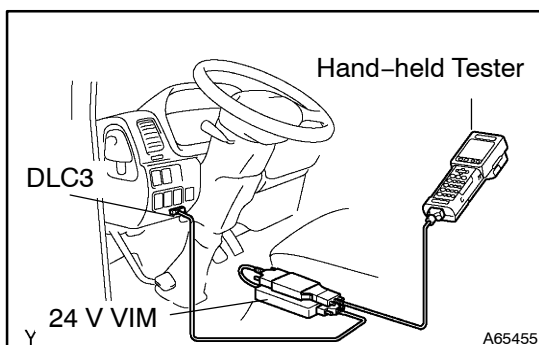
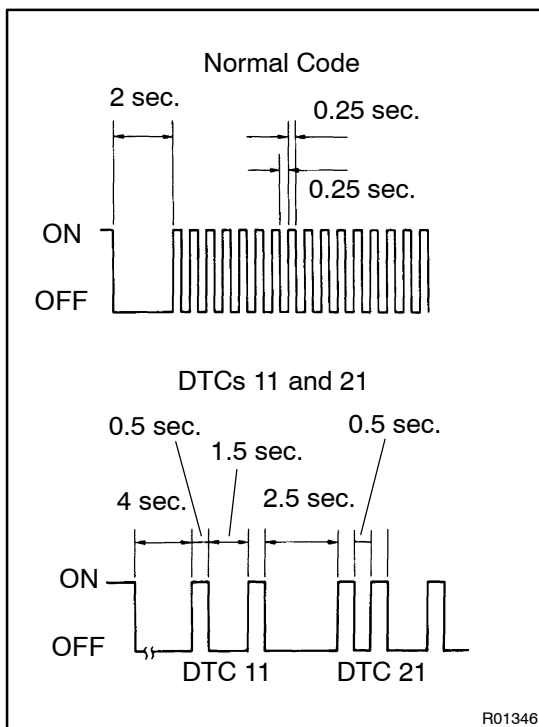
- If no code appears, inspect the diagnostic circuit or the ABS warning light circuit (See page 05-166 or 05-157).
- As an example, the blinking patterns for normal code, DTCs 11 and 21 are shown in the illustration.

(4) Check the details of the code using the code table on page 05-108.

If 2 or more malfunctions are indicated at the same time, the lowest numbered DTC will be displayed first.

(5) After completing the check, remove the SST from the DLC3.

SST 09843-18040



(c) When using hand-held tester:

Check the DTC.

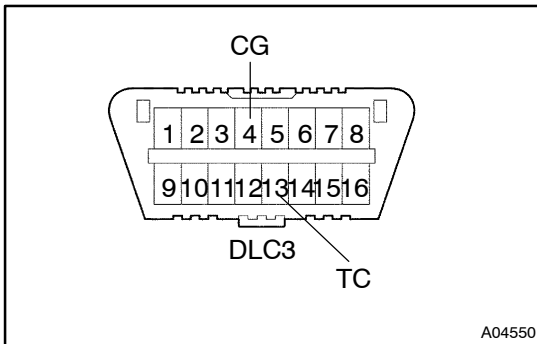
NOTICE:

Be sure to use the 24 V VIM, because the hand-held tester will be destroyed without using the 24 V VIM.

- (1) Connect the hand-held tester to the DLC3.
- (2) Turn the ignition switch ON.
- (3) Read the DTC by following the prompts on the tester screen.

HINT:

Refer to the hand-held tester operator's manual for further details.



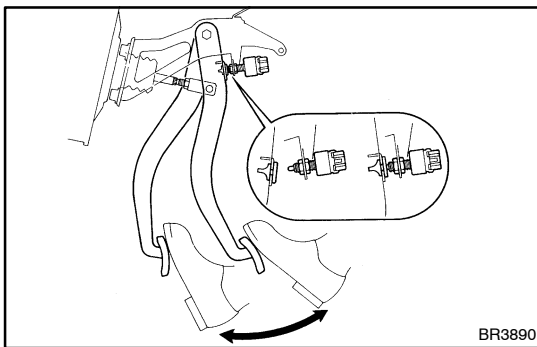
- (d) When not using the hand-held tester:

Clear the DTC.

- (1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

- (2) Turn the ignition switch ON.



- (3) Clear the DTC stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.

- (4) Check that the ABS warning light indicates the normal code.

- (5) Remove the SST from the DLC3.

HINT:

Disconnection of the battery cable during repairs will not erase the DTC in the ECU.

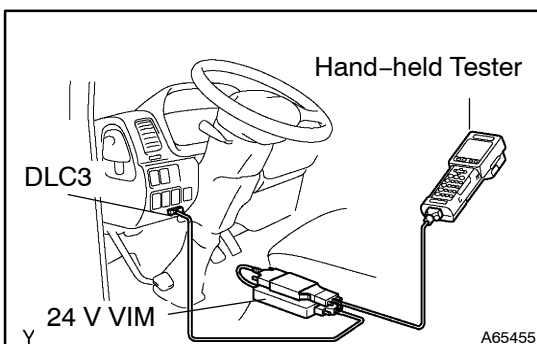
- (e) When using the hand-held tester:

Clear the DTC.

- (1) Connect the hand-held tester to the DLC3.
- (2) Turn the ignition switch ON.
- (3) Operate the hand-held tester to erase the codes.

HINT:

Refer to the hand-held tester operator's manual for further details.



2. CHECK SENSOR SIGNAL (TEST MODE):

When using the hand-held tester

NOTICE:

Be sure to use the 24 V VIM, because the hand-held tester will be destroyed without using the 24 V VIM.

HINT:

If the ignition switch is turned from ON to ACC or LOCK during the test mode, the DTC will be erased.

- (a) Check the sensor signal.

- (1) Connect the hand-held tester to the DLC3.
- (2) Turn the ignition switch ON.
- (3) Perform the master cylinder pressure sensor check.
- (4) Perform the vacuum sensor check.
- (5) Perform the speed sensor check.

- (6) Read the DTC by following the prompts on the tester screen.

HINT:

Refer to the hand-held tester operator's manual for further details.

3. DATA LIST

HINT:

According to the DATA LIST displayed on the hand-held tester, you can read the value of the switch, sensor, and actuator without parts removal. Reading the DATA LIST as the first step of troubleshooting is one way to shorten the labor time.

- (a) Connect the hand-held tester to the DLC3.
 (b) Turn the ignition switch ON.
 (c) Read the "DATA LIST", according to the display on the tester.

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF	-	-
SOL RELAY	Solenoid relay / ON or OFF	-	-
STOP LIGHT SW	Stop lamp switch / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	-
PKB SW	Parking brake switch / ON or OFF	ON : Parking brake applied OFF : Parking brake released	-
ABS OPERT FR	ABS operation (FR) / BEFORE or OPERATE	BEFORE : No ABS operation (FR) OPERATE : During ABS operation (FR)	-
ABS OPERT FL	ABS operation (FL) / BEFORE or OPERATE	BEFORE : No ABS operation (FL) OPERATE : During ABS operation (FL)	-
ABS OPERT RR	ABS operation (RR) / BEFORE or OPERATE	BEFORE : No ABS operation (RR) OPERATE : During ABS operation (RR)	-
ABS OPERT RL	ABS operation (RL) / BEFORE or OPERATE	BEFORE : No ABS operation (RL) OPERATE : During ABS operation (RL)	-
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 mph) max.: 255 km/h (158 mph)	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 mph) max.: 255 km/h (158 mph)	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 mph) max.: 255 km/h (158 mph)	Actual wheel speed	Speed indicated on speedometer

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 mph) max.: 255 km/h (158 mph)	Actual wheel speed	Speed indicated on speedometer
IG VOLTAGE	ECU power supply voltage / NORMAL or TOO LOW	NORMAL : 19 V or over TOO LOW : Below 19 V	-
SFRR	ABS solenoid (SFRR) ON / OFF	-	-
SFRH	ABS solenoid (SFRH) ON / OFF	-	-
SFLR	ABS solenoid (SFLR) ON / OFF	-	-
SFLH	ABS solenoid (SFLH) ON / OFF	-	-
SRRR (SRR)	ABS solenoid (SRRR (SRR)) ON / OFF	-	-
SRRH (SRH)	ABS solenoid (SRRH (SRH)) ON / OFF	-	-
SRLR	ABS solenoid (SRLR) ON / OFF	-	-
SRLH	ABS solenoid (SRLH) ON / OFF	-	-
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 – 0.7 V	Reading increases when brake pedal is depressed
TEST MODE	Test mode / NORMAL or TEST	NORMAL : Normal mode TEST : During test mode	-
#CODES	Number of DTC recorded / min.: 0, max.: 255	Min.: 0, max.: 21	-

4. ACTIVE TEST

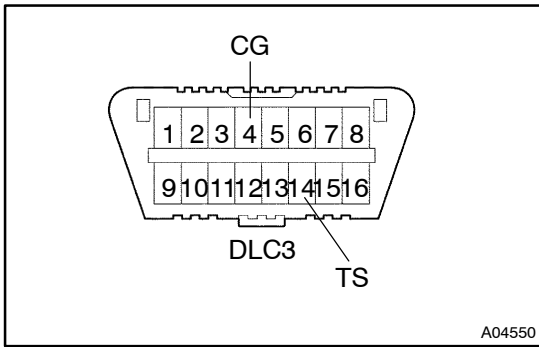
HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay and actuator to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten the labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the ignition switch ON.
- (c) Perform the ACTIVE TEST, according to the display on the tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
SFRR	ABS solenoid (SFRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH	ABS solenoid (SFRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR	ABS solenoid (SFLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLH	ABS solenoid (SFLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRR	ABS solenoid (SRRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH	ABS solenoid (SRRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR	ABS solenoid (SRLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLH	ABS solenoid (SRLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRR & SFRH	ABS solenoid SFRR & SFRH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR & SFLH	ABS solenoid SFLR & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SRH & SRR	ABS solenoid SRH & SRR ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR & SRLH	ABS solenoid SRLR & SRLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH & SFLH	ABS solenoid SFRH & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation of motor can be heard



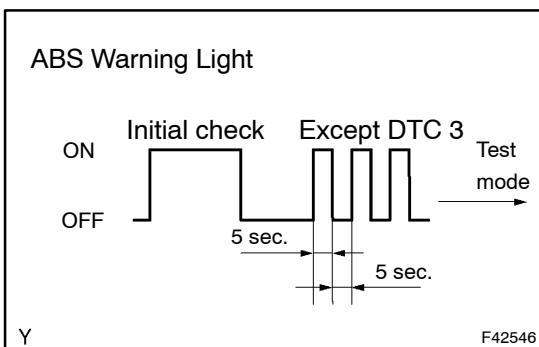
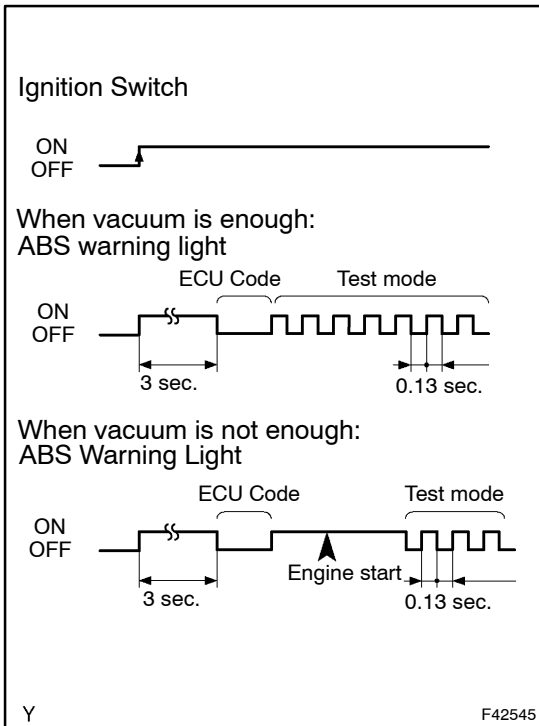
**5. When not using the hand-held tester:
CHECK SENSOR SIGNAL (TEST MODE)**

- (a) Check the sensor signal.
- (b) Procedures for the test mode:
 - (1) Turn the ignition switch OFF.
 - (2) Using SST, connect terminals TS and CG of the DLC3.

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- (3) Turn the ignition switch ON.
- (4) Check that it enters into the test mode after the ABS warning light is on for 3 seconds (initial value check) and the ECU code is output. Do not depress the brake pedal until the entry of the test mode is confirmed.
- (5) If the ABS warning light remains on even after the ECU code output, start the engine. Then, check that it enters into the test mode in several seconds. Do not depress the brake pedal until the entry of the test mode is confirmed. The way of the light indication after the ECU code is output depends on vacuum of the vacuum booster.

When vacuum is enough, it enters into the test mode. When vacuum is not enough, the indication light remains on.



HINT:

- To prevent a installation of a wrong skid control ECU, output an ECU code when starting the test mode. The code varies with the vehicle type to which the ECU is installed, and therefore it is necessary to confirm whether it fits the vehicle type whenever starting the test mode.

ECU code table:

Vehicle type	Code
Front disc brake, short	1
Front disc brake, long	2
Front drum brake, short	3
Front drum brake, long	4

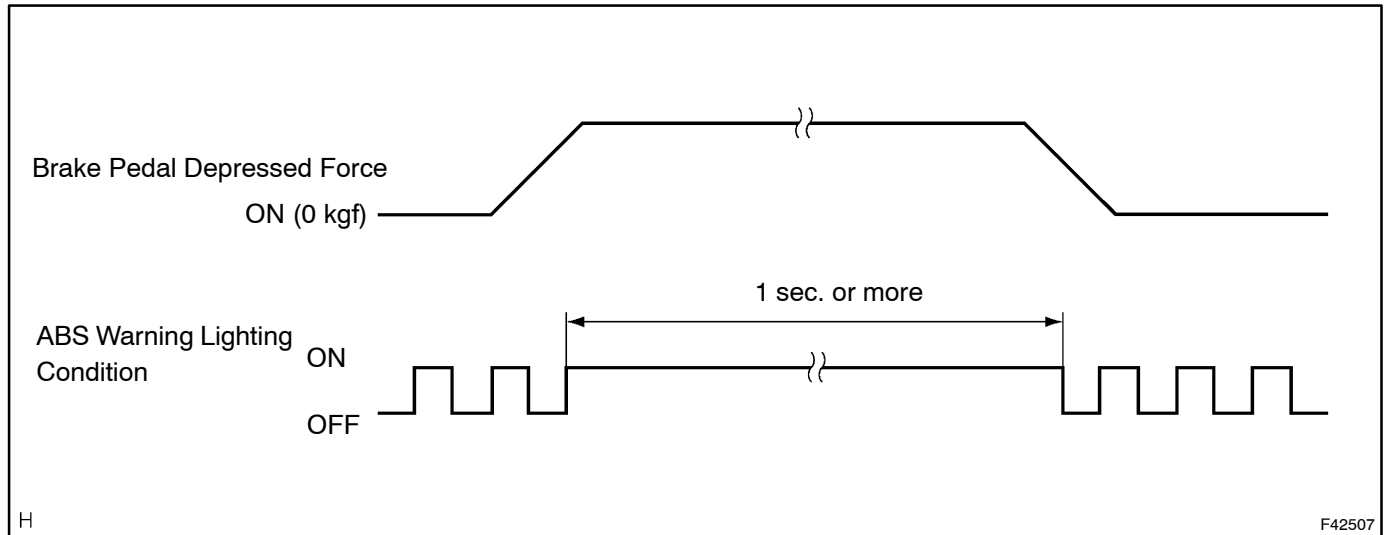
- If the ABS warning light does not blink, inspect the ABS warning light circuit (See page 05-157).

- (c) Check master cylinder pressure sensor.
 - (1) When starting the engine, stop the engine once and then turn the ignition switch ON.

HINT:

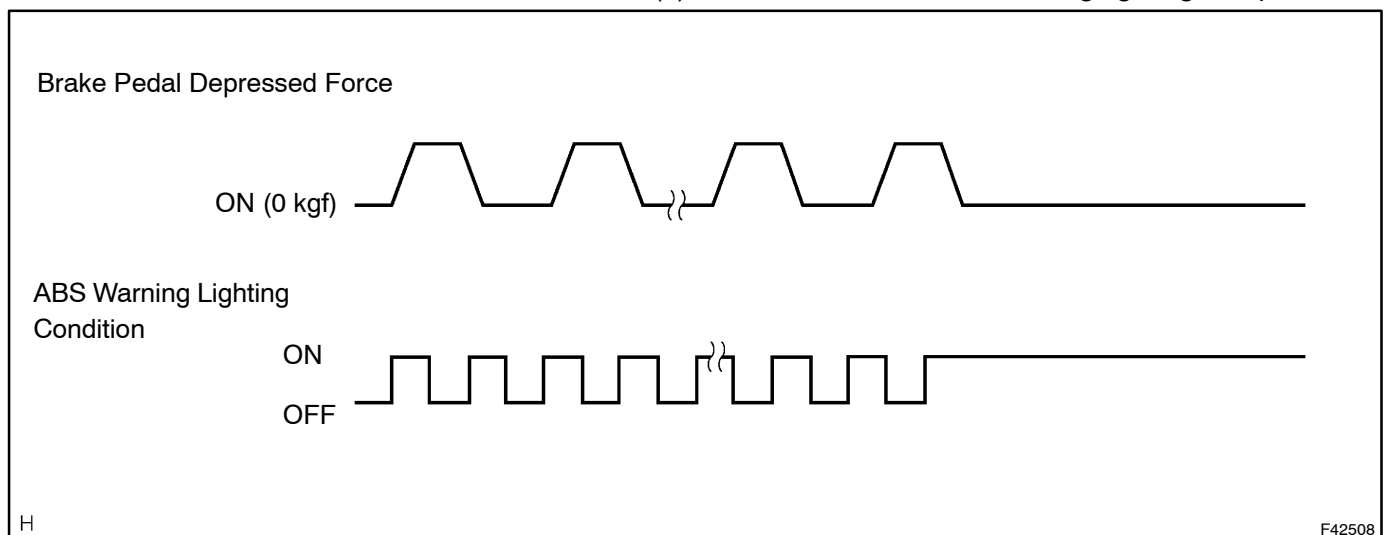
Do not start the engine.

- (2) After releasing the brake pedal for 1 second or more, depress it again by a force of 186 N (19 kgf, 42 lbf) or more.
- (3) Check that the ABS warning light lights up.
- (4) Depress the brake pedal for 1 second with the ABS warning light lit and release it.
- (5) Check that the blinking pattern of the ABS warning light returns to that in the test mode.



HINT:

- Do not depress the brake pedal several times.
 - If the ABS warning light does not light up although the brake pedal is depressed, the master cylinder pressure sensor may be defective.
- (d) Check vacuum sensor.
- (1) Depress the brake pedal several times.
 - (2) Check that the ABS warning light lights up.

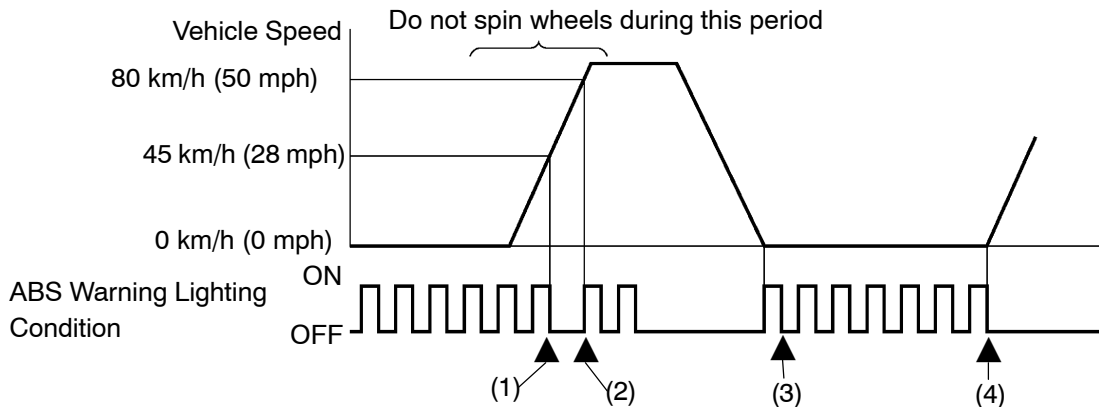


HINT:

- If the ABS warning light does not light up after depressing the brake pedal continuously, the vacuum sensor may be defective.
 - When the parking brake is released, the vacuum warning buzzer may sound.
 - Soon after the warning light changes from blinking to lighting, stop the pumping operation.
- (e) Check speed sensor.
- (1) Start the engine.
 - (2) Check that the ABS warning light blinks.
 - (3) Drive the vehicle straight forward.

When driving the vehicle with the speed faster than 90 km/h (56 mph) for several seconds, check that the ABS warning light goes off.

Lighting Condition during Speed Sensor Check (Normal)



(1): OFF after middle speed check over 45 km/h (28 mph)

^H (2): Blinking for approx. 1 sec. in high speed check over 80 km/h (50 mph), and then OFF after the check

(3): Blinking during vehicle stopped (light condition when the speed sensor check is finished normally)

(4): OFF during vehicle running (light condition when the speed sensor check is finished normally)

F42509

- (4) Stop the vehicle.

HINT:

- The sensor check may not be completed if the rear wheels are spinning.
- There is a case that the warning light will not turn off after check if starting the sensor check while steering the vehicle.
- When the sensor is abnormal, the light condition before the sensor check is finished is different from that when it is normal.

- (f) Check the ABS warning light condition after the check is completed.
Lighting condition when the speed sensor check is finished normally:

Vehicle condition	Lighting condition of ABS warning light
Vehicle stopped	Blinking (ON) (It blinks even if the test mode is not finished normally)
Vehicle running	Not blinking (OFF)

HINT:

- When the sensor check is not finished and the sensor is abnormal, the warning light is flashes even while driving.
- When the sensor check is not finished and the sensor is abnormal, the ABS will not operate.

- (g) Read the DTC:

(1) Using SST, connect terminals TC and CG of the DLC3.

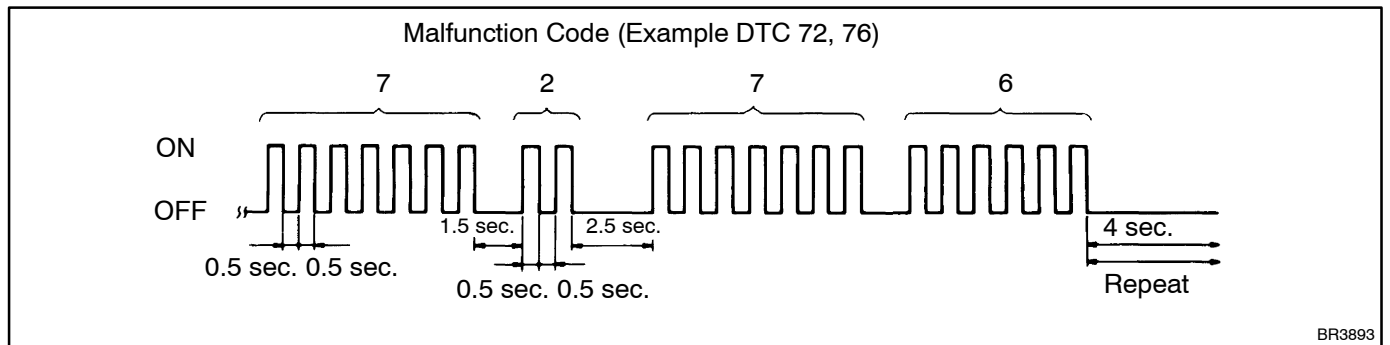
SST 09483-18040

(2) Turn the ignition switch ON.

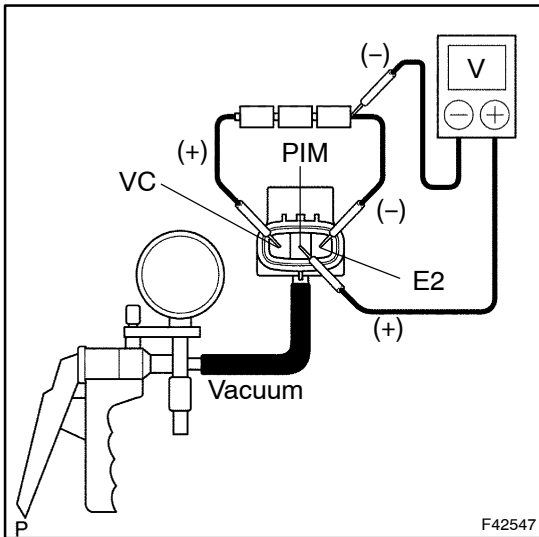
(3) Read the number of blinks of the ABS warning light.

HINT:

- See the list of the DTC shown on the 05-108.
- If all the sensors are normal, a normal code is output (A cycle of 0.25 seconds ON and 0.25 seconds OFF is repeated).
- If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed.



- (4) After performing the check, turn the ignition switch OFF, and disconnect the SST from the DLC3.



6. CHECK VACUUM SENSOR

- Connect 3 dry batteries of 1.5 V in series.
- Connect the VC terminal to the battery's positive (+) terminal, and the E2 terminal to the battery's negative (-) terminal, and then apply about 4.5 V between the VC and E2 terminals.

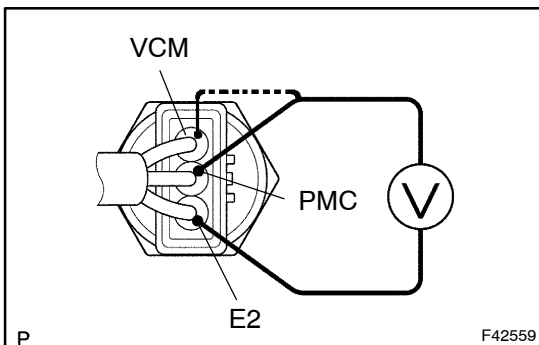
NOTICE:

Do not apply voltage of 6 V or more to terminals VC and E2.

- Connect a voltmeter to terminals PIM and E2 of the ECU, and measure the output voltage under the ambient atmospheric pressure.
- Apply vacuum to the vacuum sensor in segments from 20 kPa (150 mmHg, 5.91 in.Hg) to 100 kPa (750 mmHg, 29.53 in.Hg).
- Measure the voltage drop from above step (c) for each segment.

Standard:

Front brake caliper fluid pressure	Voltage
20 kPa (150 mmHg, 5.91 in.Hg)	1.2 V
60 kPa (450 mmHg, 17.71 in.Hg)	2.4 V
100 kPa (750 mmHg, 29.53 in.Hg)	3.6 V



7. CHECK MASTER CYLINDER PRESSURE SENSOR

- Measure the voltage between terminals VCM and E2 of the master cylinder pressure sensor.

Standard: 4.85 – 5.15 V

- Install the LSPV gauge to the front caliper bleeder plug portion, and bleed the LSPV gauge.
- Remove the air cleaner inlet and battery clamp cover.
- Start the engine and depress the brake pedal, and then check the relation between the fluid pressure and voltage between the PMC and E2 terminals of the master cylinder pressure sensor with the connector still connected.

Standard:

Front Brake Caliper Fluid Pressure	Voltage
0 MPa (0 Kgf/cm ² , 0 psi)	0.5 V
9.8 MPa (100 kgf/cm ² , 1,422 psi)	2.5 V
19.6 MPa (200 kgf/cm ² , 2,844 psi)	4.5 V

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

When removing the part, turn the ignition switch OFF.

HINT:

- Using SST 09843-18040, connect terminals TC and CG of the DLC3.
- If no abnormality is found when inspecting the parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit listed for that code. For details of each code, refer to the "See Page" under the respective "DTC No." in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area
C0200/31*1 (05-117)	Right Front Speed Sensor Circuit	<ul style="list-style-type: none"> • Right front and left front speed sensors • Each speed sensor circuit • Speed sensor rotor • Sensor installation
C0205/32*1 (05-117)	Left Front Speed Sensor Circuit	
C0210/33*1 (05-122)	Right Rear Speed Sensor Circuit	
C0215/34*1 (05-122)	Left Rear Speed Sensor Circuit	
C0226/21 (05-125)	SFR Solenoid Circuit	<ul style="list-style-type: none"> • ABS actuator • SFRH or SFRR circuit
C0236/22 (05-125)	SFL Solenoid Circuit	<ul style="list-style-type: none"> • ABS actuator • SFLH or SFLR circuit
C0246/23 (05-125)	SRR Solenoid Circuit	<ul style="list-style-type: none"> • ABS actuator • SRRH or SRRR circuit
C0256/24 (05-125)	SRL Solenoid Circuit	<ul style="list-style-type: none"> • ABS actuator • SRLH or SRLR circuit
C0273/13 (05-129)	Open Circuit in ABS Motor Relay Circuit	<ul style="list-style-type: none"> • ABS motor relay (Marking: ABS MTR) • ABS motor relay circuit • Battery
C0274/14 (05-129)	B+ Short Circuit in ABS Motor Relay Circuit	
C0278/11 (05-134)	Open Circuit in ABS Solenoid Relay Circuit	<ul style="list-style-type: none"> • ABS solenoid relay (Marking: ABS SOL) • ABS solenoid relay circuit
C0279/12 (05-134)	Short Circuit in ABS Solenoid Relay Circuit	
C1225/25 (05-125)	SMC Solenoid Circuit	<ul style="list-style-type: none"> • ABS actuator • SMCF or SMCR circuit
C1227/27 (05-125)	SRC Solenoid Circuit	<ul style="list-style-type: none"> • ABS actuator • SRCF or SRCR circuit
C1241/41 (05-139)	Low Battery Positive Voltage Or Abnormally High Battery Positive Voltage	<ul style="list-style-type: none"> • Battery • Charging system • Power source circuit
C1246/46 (05-142)	Malfunction in Master Cylinder Pressure Sensor	<ul style="list-style-type: none"> • Stop lamp switch • Master cylinder pressure sensor • Master cylinder pressure sensor circuit
C1249/49 (05-145)	Open Circuit in Stop Lamp Switch Circuit	<ul style="list-style-type: none"> • Stop lamp bulb • Stop lamp switch • Stop lamp switch circuit
C1251/51 (05-147)	Pump Motor is Locked/ Open Circuit in Pump Motor Ground	<ul style="list-style-type: none"> • ABS actuator • ABS actuator circuit
C1265/65 (05-150)	Vacuum Sensor Malfunction	<ul style="list-style-type: none"> • Vacuum sensor • Vacuum sensor circuit

C1266/66 (05-152)	Exhaust Retarder Prevention Signal Circuit	<ul style="list-style-type: none"> • EXO circuit • Skid control ECU • ECM
Always ON (05-154)	Malfunction in ABS ECU	<ul style="list-style-type: none"> • Battery • Fuse • ABS warning light circuit • Charging system • Power source circuit • Skid control ECU
Always OFF (05-157)	Malfunction in ABS ECU	

HINT:

*1: These DTC will not affect the cancellation of the ABS warning light by repairing the trouble area, so perform the following operations.

- (1) Drive the vehicle at 20 km/h (12 mph) for 30 seconds or more, and check that the ABS warning light goes off.
- (2) Clear the DTC (See page 05-99).

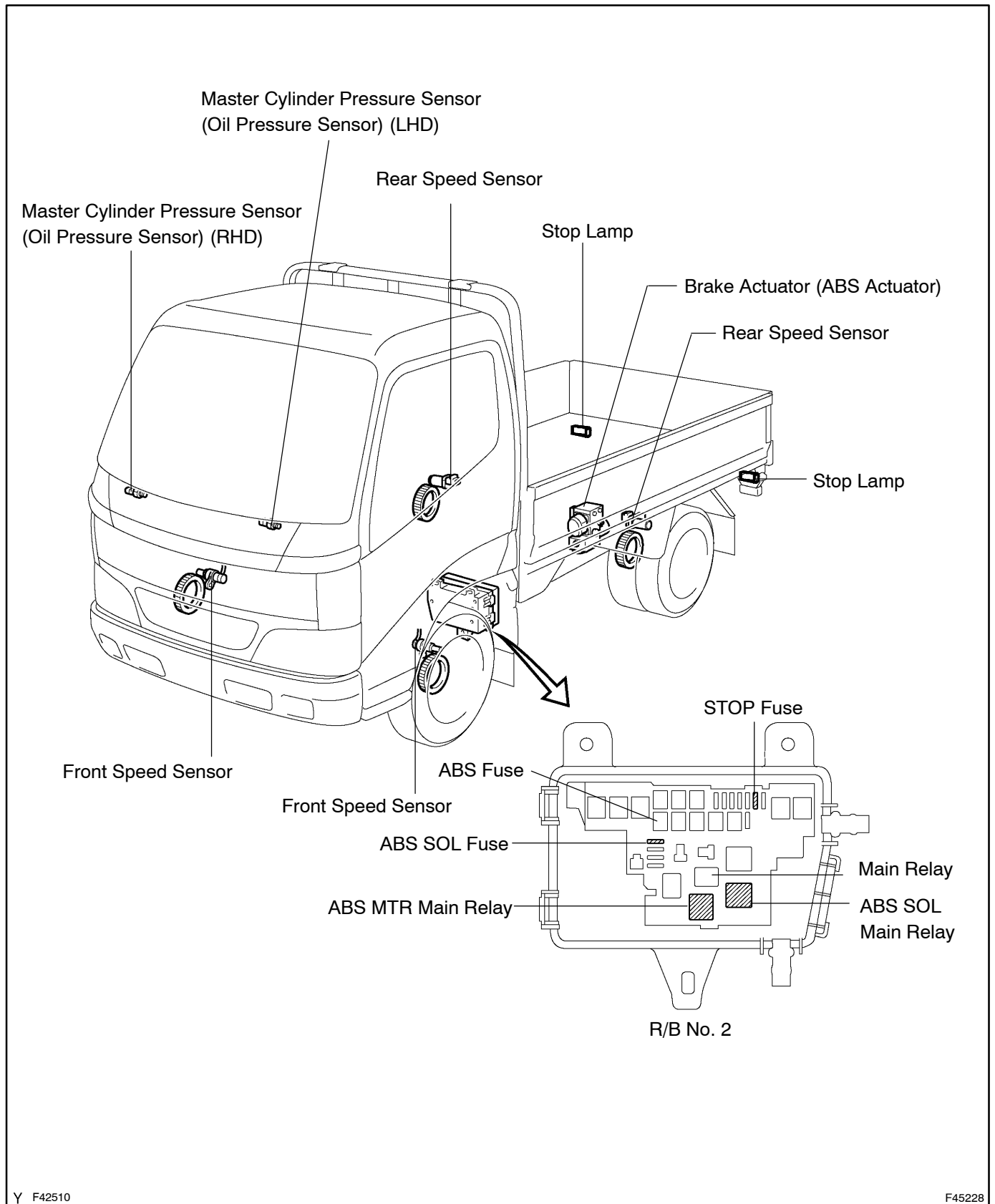
HINT:

There is a case that the hand-held tester cannot be used when the ABS warning light remains on.

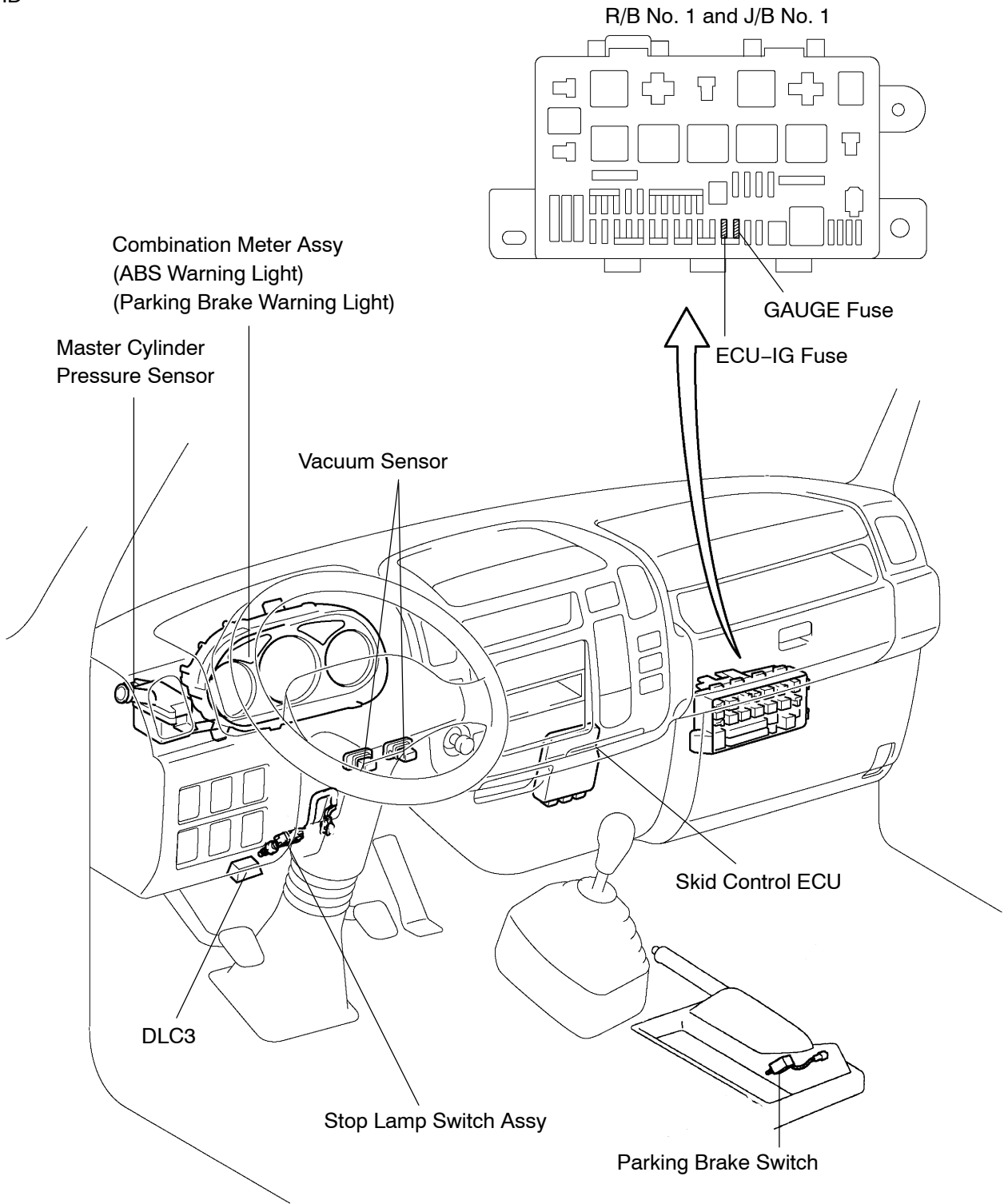
DTC of sensor check function:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output voltage of right front speed sensor	<ul style="list-style-type: none"> • Right front speed sensor • Sensor installation • Right front speed sensor rotor • Right front speed sensor circuit
C1272/72	Low output voltage of left front speed sensor	<ul style="list-style-type: none"> • Left front speed sensor • Sensor installation • Left front speed sensor rotor • Left front speed sensor circuit
C1273/73	Low output voltage of right rear speed sensor	<ul style="list-style-type: none"> • Right rear speed sensor • Sensor installation • Right rear speed sensor rotor • Right rear speed sensor circuit
C1274/74	Low output voltage of left rear speed sensor	<ul style="list-style-type: none"> • Left rear speed sensor • Sensor installation • Left rear speed sensor rotor • Left rear speed sensor circuit
C1275/75	Abnormal change in output voltage of right front speed sensor	<ul style="list-style-type: none"> • Right front speed sensor rotor • Right front speed sensor
C1276/76	Abnormal change in output voltage of left front speed sensor	<ul style="list-style-type: none"> • Left front speed sensor rotor • Left front speed sensor
C1277/77	Abnormal change in output voltage of right rear speed sensor	<ul style="list-style-type: none"> • Right rear speed sensor rotor • Right rear speed sensor
C1278/78	Abnormal change in output voltage of left rear speed sensor	<ul style="list-style-type: none"> • Left rear speed sensor rotor • Left rear speed sensor
C1281/81	Abnormal change in output signal of master cylinder pressure sensor	<ul style="list-style-type: none"> • Master cylinder pressure sensor • Master cylinder pressure sensor circuit
C1285/85	Abnormal change in output signal of vacuum sensor	<ul style="list-style-type: none"> • Vacuum sensor • Vacuum sensor circuit

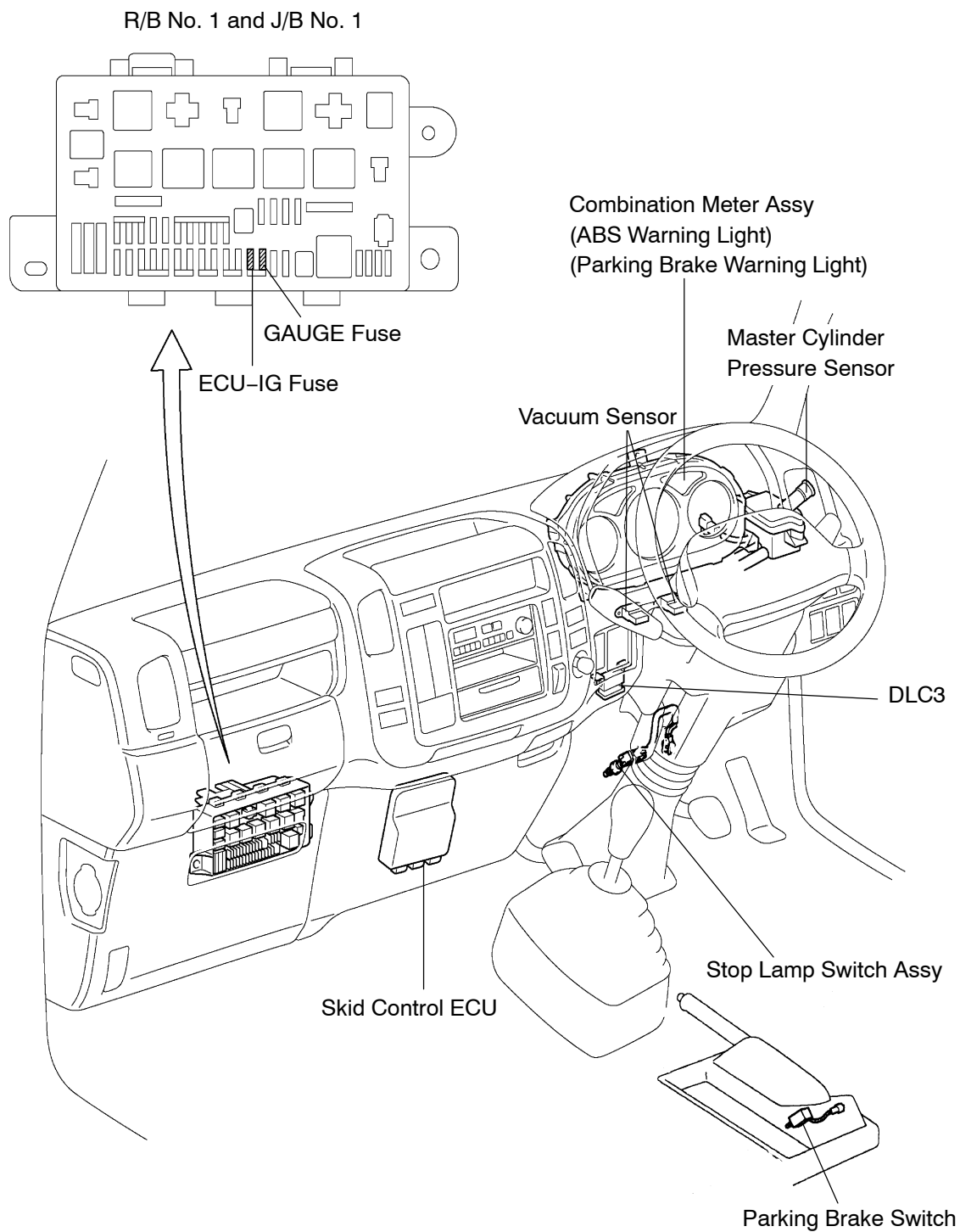
LOCATION



LHD

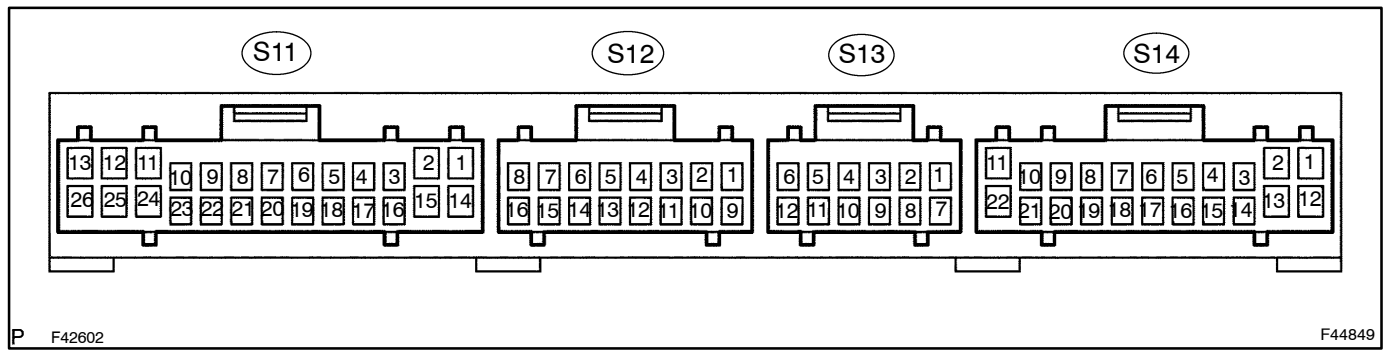


RHD



TERMINALS OF ECU

1. CHECK SKID CONTROL ECU ASSY



P F42602

F44849

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
SRLH (S11-1) ↔ GND (S14-2, 11, 13, 22)	R-W ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
SRLR (S11-2) ↔ GND (S14-2, 11, 13, 22)	R-Y ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
MT (S11-3) ↔ GND (S14-2, 11, 13, 22)	P-L ↔ W-B	IG switch ON (Motor relay is OFF)	Below 2.0
RSS (S11-5) ↔ GND (S14-2, 11, 13, 22)	GR ↔ W-B	IG switch OFF	Continued
SRRH (S11-7) ↔ GND (S14-2, 11, 13, 22)	W-L ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
SFLH (S11-8) ↔ GND (S14-2, 11, 13, 22)	B-Y ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
SMCF (S11-9) ↔ GND (S14-2, 11, 13, 22)	Y-B ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
SMCR (S11-10) ↔ GND (S14-2, 11, 13, 22)	L-R ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
AST (S11-11) ↔ GND (S14-2, 11, 13, 22)	W ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
SRCR (S11-12) ↔ GND (S14-2, 11, 13, 22)	GR ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
SFLR (S11-13) ↔ GND (S14-2, 11, 13, 22)	W-R ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
SFRH (S11-14) ↔ GND (S14-2, 11, 13, 22)	B-L ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
SFRR (S11-15) ↔ GND (S14-2, 11, 13, 22)	B-R ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
RR- (S11-16) ↔ GND (S14-2, 11, 13, 22)	W ↔ W-B	IG switch OFF	Continued
RR+ (S11-17) ↔ GND (S14-2, 11, 13, 22)	B ↔ W-B	Drive vehicle at about 30 km/h (19 mph)	Pulse generation
RL- (S11-18) ↔ GND (S14-2, 11, 13, 22)	R ↔ W-B	IG switch OFF	Continued
RL+ (S11-19) ↔ GND (S14-2, 11, 13, 22)	G ↔ W-B	Drive vehicle at about 30 km/h (19 mph)	Pulse generation
SRCF (S11-25) ↔ GND (S14-2, 11, 13, 22)	L-Y ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28
SRRR (S11-26) ↔ GND (S14-2, 11, 13, 22)	LG ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28

VCM (S12-3) ↔ GND (S14-2, 11, 13, 22)	B ↔ W-B	IG switch ON, ABS warning light OFF	4.85 - 5.15
E2 (S12-4) ↔ GND (S14-2, 11, 13, 22)	R ↔ W-B	IG switch OFF	Continued
VCP (S12-5) ↔ GND (S14-2, 11, 13, 22)	B ↔ W-B	IG switch ON, ABS warning light OFF	4.85 - 5.15
PIM (S12-6) ↔ GND (S14-2, 11, 13, 22)	W ↔ W-B	Engine idling	0.5 - 1.5
E3 (S12-7) ↔ GND (S14-2, 11, 13, 22)	R ↔ W-B	IG switch OFF	Continued
VSS (S12-8) ↔ GND (S14-2, 11, 13, 22)	Shielded ↔ W-B	IG switch OFF	Continued
PMC (S12-11) ↔ GND (S14-2, 11, 13, 22)	W ↔ W-B	IG switch ON, Stop lamp switch OFF	0.3 - 0.7
PSS (S12-12) ↔ GND (S14-2, 11, 13, 22)	Shielded ↔ W-B	IG switch OFF	Continued
VCP2 (S12-13) ↔ GND (S14-2, 11, 13, 22)	O ↔ W-B	IG switch ON, ABS warning light OFF	4.85 - 5.15
PIM2 (S12-14) ↔ GND (S14-2, 11, 13, 22)	LG ↔ W-B	Engine idling	0.5 - 1.5
E4 (S12-15) ↔ GND (S14-2, 11, 13, 22)	V ↔ W-B	IG switch OFF	Continued
VSS2 (S12-16) ↔ GND (S14-2, 11, 13, 22)	Shielded ↔ W-B	IG switch OFF	Continued
Tc (S13-2) ↔ GND (S14-2, 11, 13, 22)	R ↔ W-B	IG switch ON, DLC3 terminals TC - CG short → open	Below 1.0 → 20 - 28
FR- (S13-3) ↔ GND (S14-2, 11, 13, 22)	W ↔ W-B	IG switch OFF	Continued
FR+ (S13-4) ↔ GND (S14-2, 11, 13, 22)	B ↔ W-B	Drive vehicle at about 30 km/h (19 mph)	Pulse generation
FL- (S13-5) ↔ GND (S14-2, 11, 13, 22)	G ↔ W-B	IG switch OFF	Continued
FL+ (S13-6) ↔ GND (S14-2, 11, 13, 22)	R ↔ W-B	Drive vehicle at about 30 km/h (19 mph)	Pulse generation
Ts (S13-8) ↔ GND (S14-2, 11, 13, 22)	P ↔ W-B	IG switch ON, DLC3 terminals TS - CG short → open	Below 1.0 → 20 - 28
FSS (S13-9) ↔ GND (S14-2, 11, 13, 22)	GR ↔ W-B	IG switch OFF	Continued
BRL (S14-5) ↔ GND (S14-2, 11, 13, 22)	B ↔ W-B	IG switch ON, Parking brake switch ON	10 - 18
		IG switch ON, Parking brake switch OFF	Below 2.0
WA (S14-6) ↔ GND (S14-2, 11, 13, 22)	R-Y ↔ W-B	IG switch OFF → ON	10 - 18 for approx. 3 sec. → below 2.0
SR (S14-7) ↔ GND (S14-2, 11, 13, 22)	R-G ↔ W-B	IG switch ON, ABS warning light OFF	Below 2.0
MR (S14-8) ↔ GND (S14-2, 11, 13, 22)	B-O ↔ W-B	IG switch ON, ABS motor stops	20 - 28
STP (S14-9) ↔ GND (S14-2, 11, 13, 22)	G-W ↔ W-B	Stop lamp switch pushed in	20 - 28
		Stop lamp switch released	Below 2.0
IG1 (S14-10) ↔ GND (S14-2, 11, 13, 22)	B-R ↔ W-B	IG switch ON	20 - 28
D/G (S14-17) ↔ GND (S14-2, 11, 13, 22)	W ↔ W-B	Using hand-held tester	Communication possible

DIAGNOSTICS - ABS & BA SYSTEM

EXO (S14-18) ↔ GND (S14-2, 11, 13, 22)	V-R ↔ W-B	IG switch ON, ABS warning light OFF	18 - 28
PKB (S14-19) ↔ GND (S14-2, 11, 13, 22)	B-L ↔ W-B	IG switch ON, Parking brake switch ON	Below 2.0
		IG switch ON, Parking brake switch OFF	20 - 28
R+ (S14-21) ↔ GND (S14-2, 11, 13, 22)	V-G ↔ W-B	IG switch ON, ABS warning light OFF	20 - 28

If the result is not as specified, the ECU may have a malfunction.

HINT:

*1: 15B-FTE

*2: S05C-TB

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing the skid control ECU, sensor, etc., turn the ignition switch OFF.

Symptom	Suspected Area	See Page
* ABS does not operate	<ol style="list-style-type: none"> 1. Check DTC reconfirming that normal code is output 2. IG power source circuit 3. Speed sensor circuit 	05-98 05-139 05-117 05-122
* ABS does not operate efficiently	<ol style="list-style-type: none"> 1. Check DTC reconfirming that the normal code is output 2. Speed sensor circuit 3. Stop lamp switch circuit 	05-98 05-117 05-122 05-145
* BRAKE ASSIST	<ol style="list-style-type: none"> 1. Master cylinder pressure sensor 2. Vacuum sensor 3. Stop lamp switch circuit 	05-142 05-142 05-145
ABS warning light abnormality	<ol style="list-style-type: none"> 1. ABS warning light circuit 2. Skid control ECU 3. Combination meter and power source 	05-157 01-27 71-2
* DTC check cannot be performed	<ol style="list-style-type: none"> 1. ABS warning light circuit 2. Tc terminal circuit 	05-157 05-154 05-166
Speed sensor signal check cannot be performed	<ol style="list-style-type: none"> 1. TS terminal circuit 2. Skid control ECU 	05-168 01-27

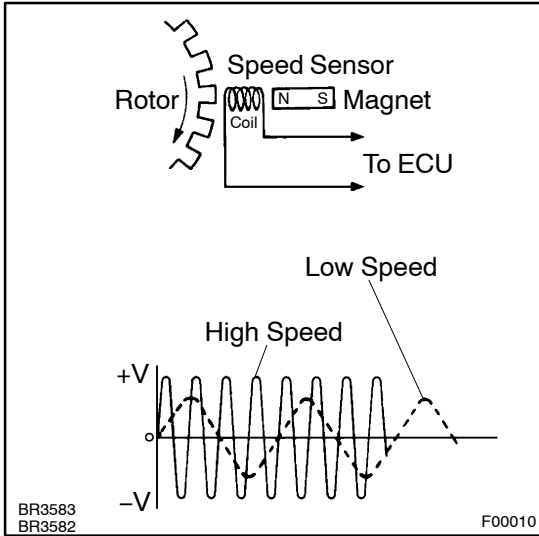
HINT:

*: Replace the skid control ECU only when the checking circuits of each failure symptom are all normal although the failure occurs.

DTC	C0200/31	RIGHT FRONT SPEED SENSOR CIRCUIT
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DTC	C0205/32	LEFT FRONT SPEED SENSOR CIRCUIT
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CIRCUIT DESCRIPTION



The speed sensor detects the wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS control systems. Each of the front and rear rotors has 48 serrations.

When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detection Condition	Trouble Area
C0200/31	Detection of any of conditions 1. through 4: 1. Vehicle speed is 10 km/h (6 mph) or more and open or short circuit in signal circuit of each vehicle speed sensor have continued for 15 sec. or more 2. Momentary interruption of each vehicle speed sensor signal has occurred more than 7 times	<ul style="list-style-type: none"> • Right front and left front speed sensors • Each speed sensor circuit • Speed sensor rotor • Sensor installation
C0205/32	3. Open circuit condition of vehicle speed sensor signal circuit has continued for more than 0.5 sec. 4. Vehicle speed is higher than 20 km/h (12 mph) and noise on abnormal wheel sensor signal continues for 5 sec. or more	

HINT:

DTC No. C0200/31 is for the right front speed sensor.

DTC No. C0205/32 is for the left front speed sensor.

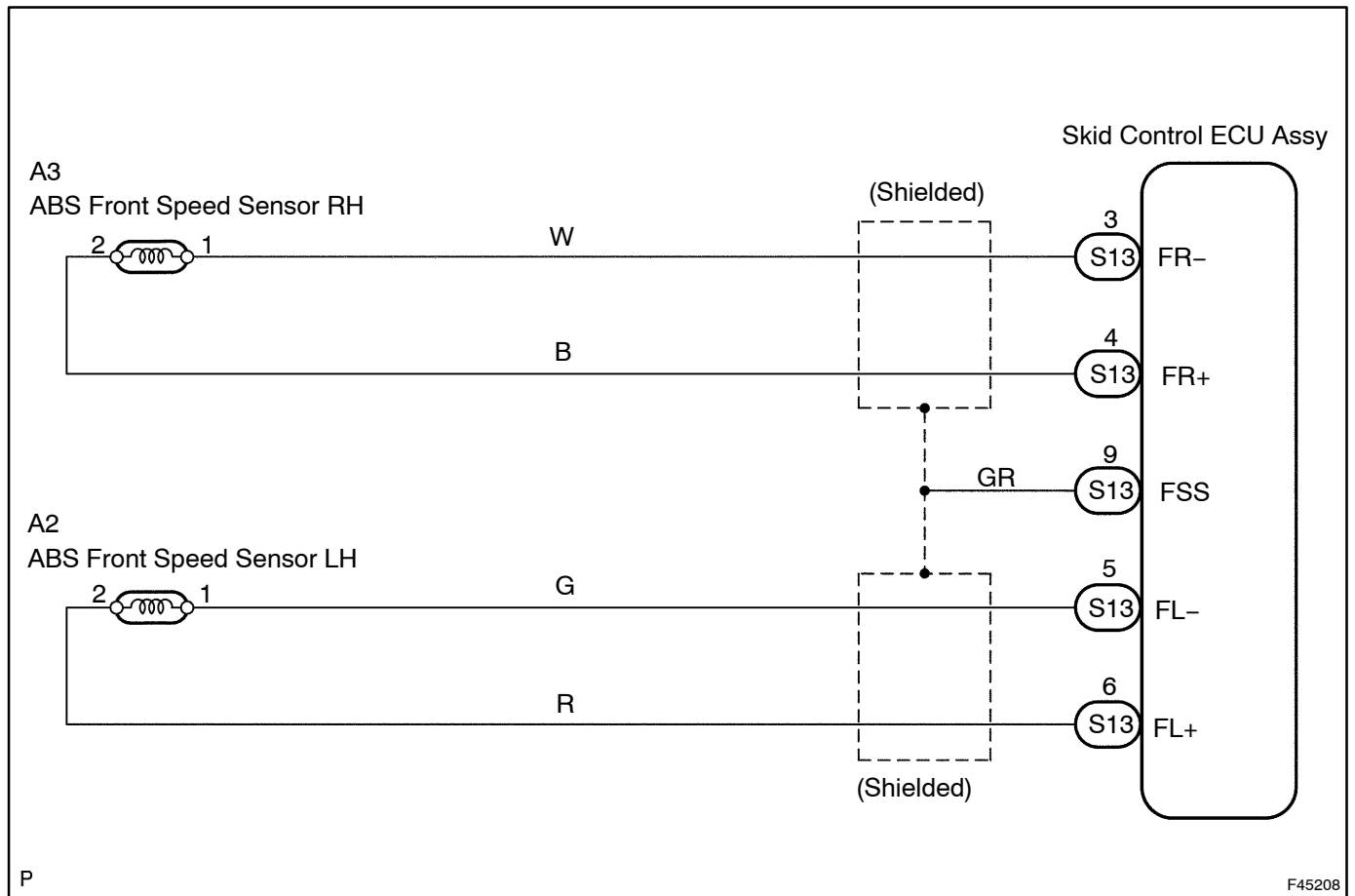
Fail-safe function:

If any trouble occurs in the speed sensor circuit, the ECU will prohibit the ABS controls.

HINT:

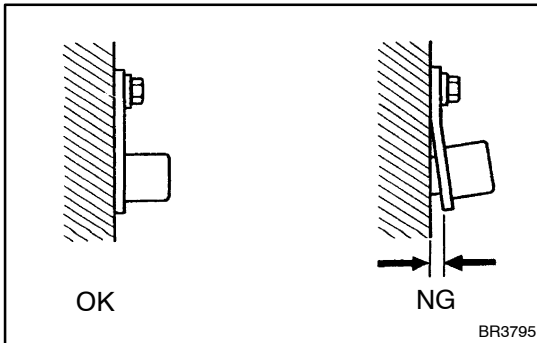
- For abnormality in one or two wheels, the BRAKE ASSIST can be performed under the condition that the brake system is normal.
- For abnormality in three or four wheels, the ECU cuts off the current to the solenoid relay and the BRAKE ASSIST is prohibited. If the brake pedal is depressed firmly, the brake force may be lowered.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT FRONT SPEED SENSOR INSTALLATION



- (a) Check the speed sensor installation.

Standard:

The installation bolt is tightened properly and there is no clearance between the sensor and front steering knuckle.

Torque: 19.1 N·m (195 kgf·cm, 14 ft·lbf)

NOTICE:

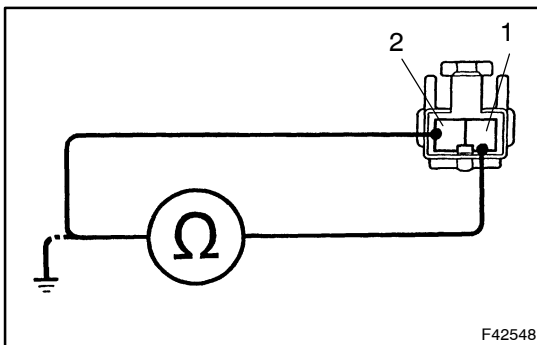
Check the speed sensor signal last (See page 05-108).

NG → REPLACE SPEED SENSOR FRONT RH

NG → REPLACE SPEED SENSOR FRONT LH

OK

2 INSPECT FRONT SPEED SENSOR



- (a) Disconnect the A2 and A3 front speed sensor connector.
 (b) Measure the resistance between terminals 1 and 2 of the speed sensor.

Standard: 0.92 – 1.22 kΩ at 20°C (68°F)

- (c) Measure the resistance between each of terminals 1 and 2 of the sensor and the body ground.

Standard: 1 MΩ or higher

NOTICE:

Check the speed sensor signal last (See page 05-108).

NG → REPLACE SPEED SENSOR FRONT RH

NG → REPLACE SPEED SENSOR FRONT LH

OK

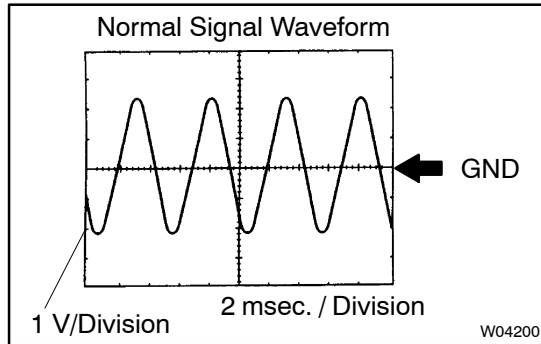
3 CHECK WIRE HARNESS (FRONT SPEED SENSOR ↔ SKID CONTROL ECU ASSY)

- (a) Check for open and short circuit in the harness and connector between the A2/3 connector of the speed sensor and the S13 ECU connectors (See page 01-27).

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4

CHECK SPEED SENSOR AND SENSOR ROTOR SERRATIONS**REFERENCE: INSPECTION USING OSCILLOSCOPE**

- (a) Connect an oscilloscope to terminals FR+, FL+ and GND of the skid control ECU connector.
- (b) Drive the vehicle at about 30 km/h (19 mph) and check the signal waveform.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform becomes shorter and the fluctuation in the output voltage becomes higher.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign objects deposited on the rotor.

OK

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

NG

5

INSPECT SPEED SENSOR TIP

- (a) Disc type and drum type:
Remove the front speed sensor (See page 32-89).
- (b) Check the sensor tip.

Standard:

No scratches or no foreign objects on the sensor tip.

NOTICE:

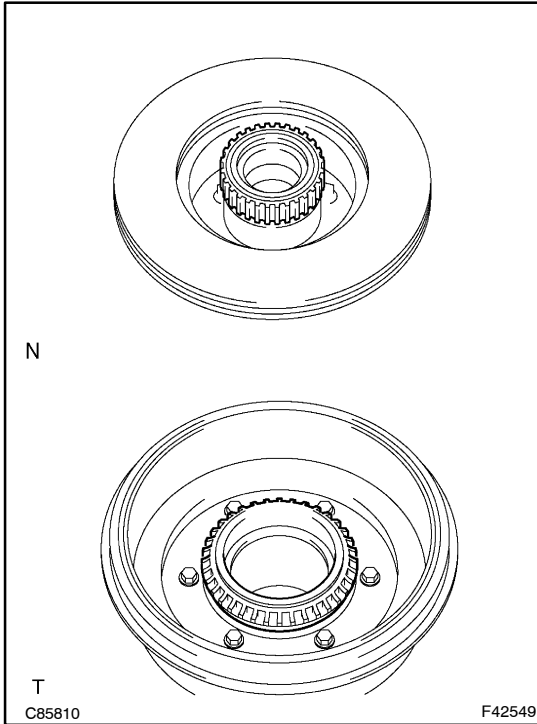
Check the speed sensor signal last (See page 05-108).

NG

CLEAN OR REPLACE SPEED SENSOR

OK

6 INSPECT SPEED SENSOR ROTOR



- (a) Disc type and drum type:
Remove the front speed sensor rotor
(See page 32-89).

- (b) Check the sensor rotor serrations.

Standard:

No scratches, no missing teeth or no foreign objects.

HINT:

If a foreign object is attached, remove it and check the output waveform after reassembling.

NOTICE:

Check the speed sensor signal last (See page 05-108).

NG

CLEAN OR REPLACE SENSOR ROTOR

OK

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

DTC	C0210/33	RIGHT REAR SPEED SENSOR CIRCUIT
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DTC	C0215/34	LEFT REAR SPEED SENSOR CIRCUIT
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CIRCUIT DESCRIPTION

Refer to DTC C0200/31, C0205/32 on page 05-117.

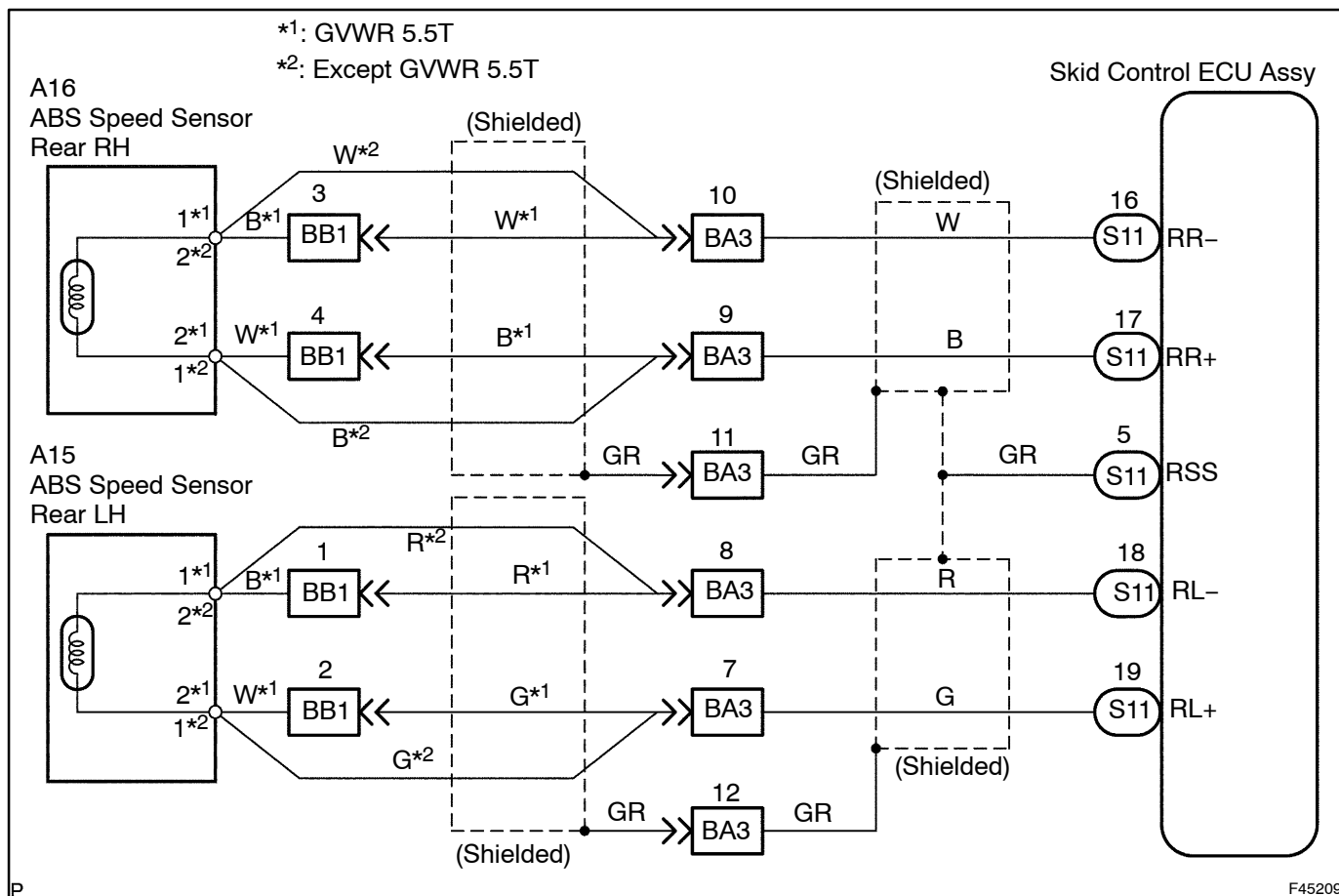
DTC No.	DTC Detection Condition	Trouble Area
C0210/33 C0215/34	Detection of any of conditions 1. through 4: 1. Vehicle speed is 10km/h (6 mph) or more and open or short circuit in the signal circuit of each vehicle speed sensor has continued for 15 sec. or more 2. Momentary interruption of each vehicle speed sensor signal has occurred more than 7 times 3. Vehicle speed is higher than 20 km/h (12 mph) and noise on the abnormal wheel sensor signal continues for 5 sec. or more 4. Open circuit condition of the vehicle speed sensor signal circuit has continued for more than 0.5 sec.	<ul style="list-style-type: none"> • Right rear and left rear speed sensors • Each speed sensor circuit • Speed sensor rotor • Sensor installation

HINT:

DTC No. C0210/33 is for the right rear speed sensor.

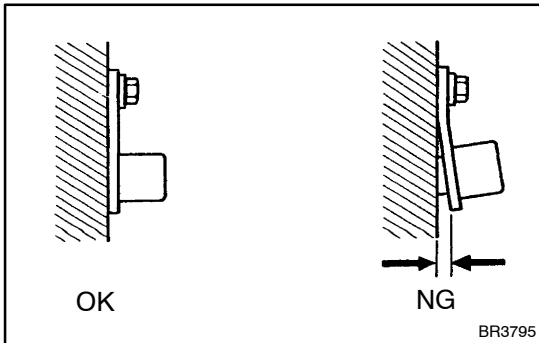
DTC No. C0215/34 is for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT REAR SPEED SENSOR INSTALLATION



- (a) Check the speed sensor installation.

Standard:

The installation bolt is tightened properly and there is no clearance between the sensor and rear axle carrier.

Torque: 19.1 N·m (195 kgf·cm, 14 ft·lbf)

NOTICE:

Check the speed sensor signal last (See page 05-108).

NG

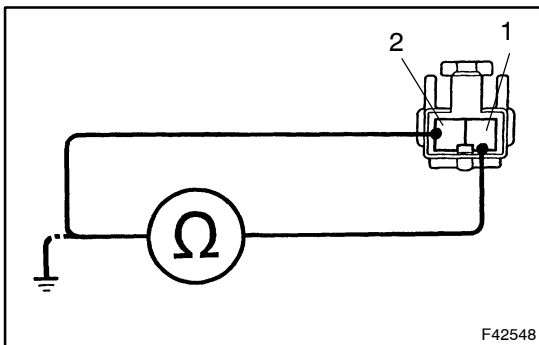
REPLACE SPEED SENSOR REAR RH

NG

REPLACE SPEED SENSOR REAR LH

OK

2 INSPECT REAR SPEED SENSOR



- (a) Make sure that there is no looseness at the connector lock part and connecting part of the connector.
 (b) Disconnect the A15 and A16 sensor connectors.
 (c) Measure the resistance between terminals 1 and 2 of the sensor.

Standard: 0.85 – 1.30 k Ω at 25 °C (77°F)

- (d) Measure the resistance between each of terminals 1 and 2 of the sensor and the body ground.

Standard: 1 M Ω or higher

NG

REPLACE SPEED SENSOR FRONT RH

NG

REPLACE SPEED SENSOR FRONT LH

OK

3 CHECK WIRE HARNESS (REAR SPEED SENSOR \leftrightarrow SKID CONTROL ECU ASSY)

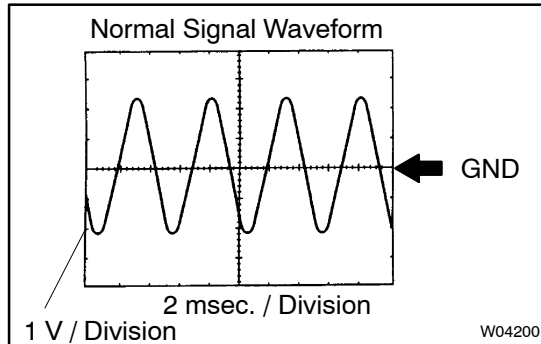
- (a) Check for open and short circuit in harness and connector between the A15/16 speed sensors and S11 ECU connector (See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4 CHECK SPEED SENSOR AND SENSOR ROTOR SERRATIONS



REFERENCE: INSPECTION USING OSCILLOSCOPE

- Connect an oscilloscope to terminals RR+, RL+ and GND of the S11 ECU.
- Drive the vehicle at about 30 km/h (19 mph) and check the signal waveform.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform becomes shorter and the fluctuation in the output voltage becomes higher.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign objects deposited on the rotor.

OK

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

NG

5 INSPECT SPEED SENSOR TIP

- Remove the speed sensor (See page 32-90).
- Check the sensor tip.

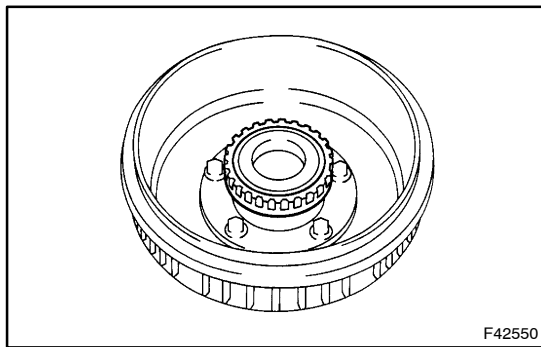
Standard: No scratches or no foreign objects on the sensor tip.

NG

CLEAN OR REPLACE SPEED SENSOR

OK

6 INSPECT SPEED SENSOR ROTOR



- Remove the rear axle hub (See page 30-62).
- Check the sensor rotor serrations.

Standard:

No scratches, no missing teeth or no foreign objects.

HINT:

If a foreign object is attached, remove it and check the output waveform after reassembling.

NG

CLEAN OR REPLACE SENSOR ROTOR

OK

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

DTC	C0226/21	SFR SOLENOID CIRCUIT
DTC	C0236/22	SFL SOLENOID CIRCUIT
DTC	C0246/23	SRR SOLENOID CIRCUIT
DTC	C0256/24	SRL SOLENOID CIRCUIT
DTC	C1225/25	SMC SOLENOID CIRCUIT
DTC	C1227/27	SRC SOLENOID CIRCUIT

CIRCUIT DESCRIPTION

This solenoid comes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders, thus the brake force is controlled.

DTC No.	DTC Detection Condition	Trouble Area
C0226/21	Open or short circuit for SFRH or SFRR circuit continues for 0.05 sec. or more at normal power voltage condition	<ul style="list-style-type: none"> • ABS actuator • SFRH or SFRR circuit
C0236/22	Open or short circuit for SFLH or SFLR circuit continues for 0.05 sec. or more at normal power voltage condition	<ul style="list-style-type: none"> • ABS actuator • SFLH or SFLR circuit
C0246/23	Open or short circuit for SRRH or SRRR circuit continues for 0.05 sec. or more at normal power voltage condition	<ul style="list-style-type: none"> • ABS actuator • SRRH or SRRR circuit
C0256/24	Open or short circuit for SRLH or SRLR circuit continues for 0.05 sec. or more at normal power voltage condition	<ul style="list-style-type: none"> • ABS actuator • SRLH or SRLR circuit
C1225/25	Open or short circuit for SMCF or SMCR circuit continues for 0.05 sec. or more at normal power voltage condition	<ul style="list-style-type: none"> • ABS actuator • SMCF or SMCR circuit
C1227/27	Open or short circuit for SRCF or SRCR circuit continues for 0.05 sec. or more at normal power voltage condition	<ul style="list-style-type: none"> • ABS actuator • SRCF or SRCR circuit

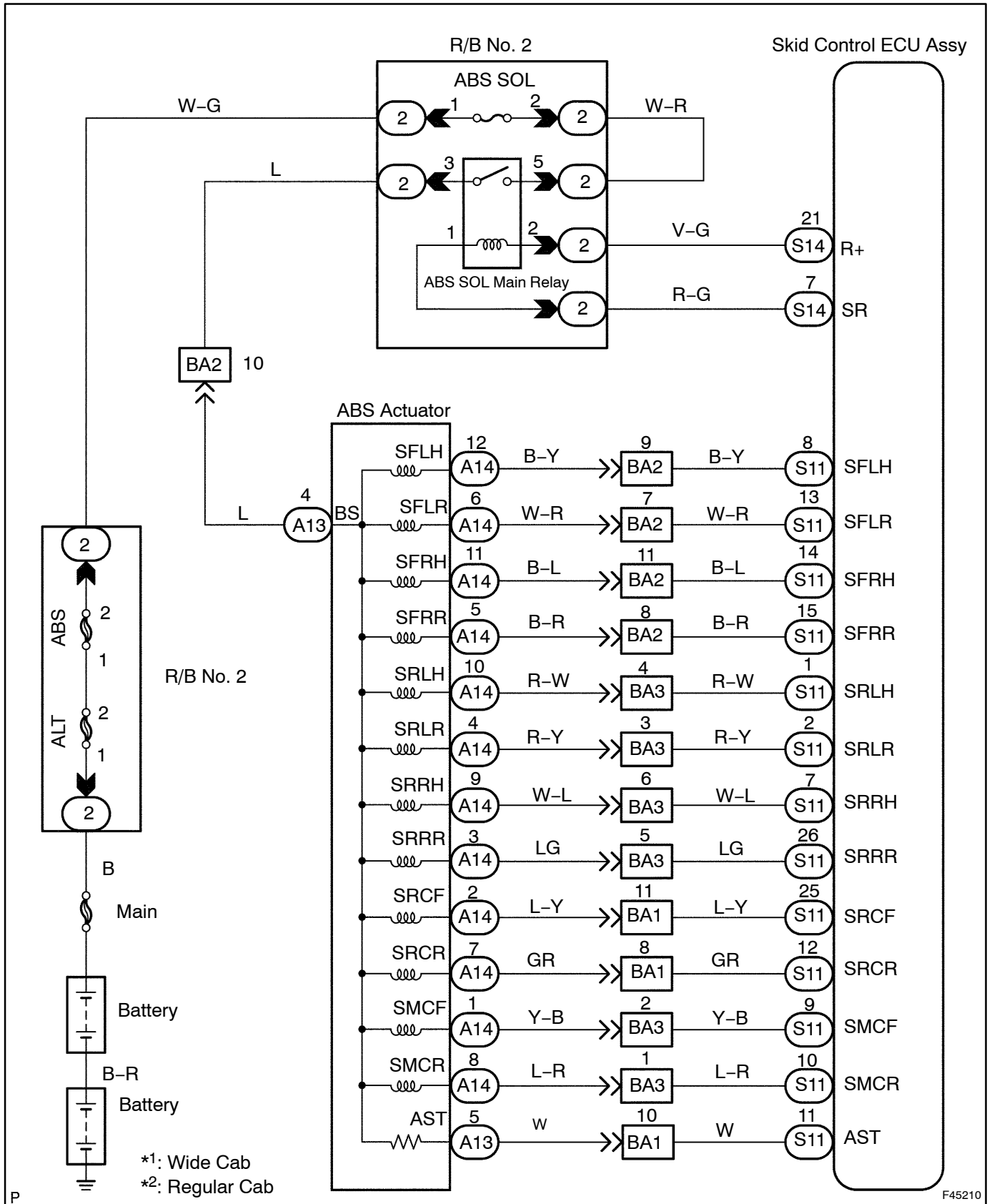
Fail-safe function:

If any trouble occurs in the actuator solenoid circuit, the ECU will cut off the current to the ABS solenoid relay and prohibit the ABS controls and BRAKE ASSIST.

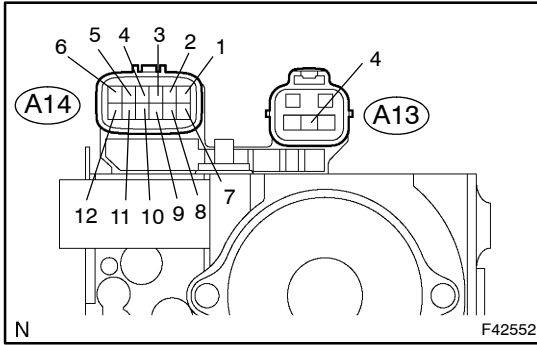
HINT:

If the brake pedal is depressed firmly, the brake force may be lowered.

WIRING DIAGRAM



1 INSPECT ABS ACTUATOR ASSY



- (a) Disconnect the 2 connectors from the ABS actuator.
- (b) Check the continuity between terminals A13-4 and A14-1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 of the ABS actuator.
Standard:
Continuity
- (c) Measure the resistance between terminal A14 -1, 8, 9, 10, 11, 12 and the A13-4 of the ABS actuator.
Standard:
Resistance: 31.7 – 35.7 Ω
- (d) Measure the resistance between terminal A14-3, 4, 5, 6 and terminal A13-4 of the ABS actuator.
Standard:
Resistance: 15.9 – 17.9 Ω
- (e) Measure the resistance between terminal A14-2, 7 and terminal A13-4 of the ABS actuator.
Standard:
Resistance: 20.5 – 23.5 Ω

HINT:

Resistance of each solenoid.

NG

REPLACE ABS ACTUATOR ASSY

OK

2 CHECK WIRE HARNESS (ABS ACTUATOR \Leftrightarrow SKID CONTROL ECU ASSY)

- (a) Check for open and short circuit in harness and connector between the S11 ECU and A13/A14 actuator connector (See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 CHECK SKID CONTROL ECU ASSY (SR TERMINAL VOLTAGE)

- (a) Remove the skid control ECU with the connectors still connected.
- (b) Turn the ignition switch ON measure the voltage between terminal of the S14 ECU connector and body ground.

Standard: 2 V or less

NG

CHECK AND REPAIR HARNESS AND ABS SOLENOID RELAY

OK

4	RECONFIRM DTC
----------	----------------------

(a) Check DTC on page 05-108.

HINT:

After erasing the DTC and driving the vehicle more than 7 km/h (4 mph), Check for DTC.

A	Malfunction Code
B	Normal Code

B	NO PROBLEM
----------	-------------------

A

5	CHECK CONTACT CONDITION (EACH CONNECTION)
----------	--

NG	REPAIR OR REPLACE HARNESS AND CONNECTOR
-----------	--

OK

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

DTC	C0273/13	OPEN CIRCUIT IN ABS MOTOR RELAY CIRCUIT
------------	-----------------	--

DTC	C0274/14	B+ SHORT CIRCUIT IN ABS MOTOR RELAY CIRCUIT
------------	-----------------	--

CIRCUIT DESCRIPTION

The ABS motor relay (Marking: ABS MTR) supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the motor relay ON and operates the ABS pump motor.

DTC No.	DTC Detection Condition	Trouble Area
C0273/13	Conditions 1. and 2. continue for 0.2 sec. or more: 1. ECU terminal IG1 voltage is 19 V to 36 V in initial check or ABS operation, and motor relay is ON, however, the contact point of the motor relay is OFF 2. ECU terminal IG1 is 19 V or less, and motor relay is ON, but contact point of the motor relay does not become ON	<ul style="list-style-type: none"> • ABS motor relay (Marking: ABS MTR) • ABS motor relay circuit • Battery
C0274/14	When motor relay is OFF and terminal MT open for 4 sec. or more, condition that contact point of motor relay is ON continues for 4 sec. or more	

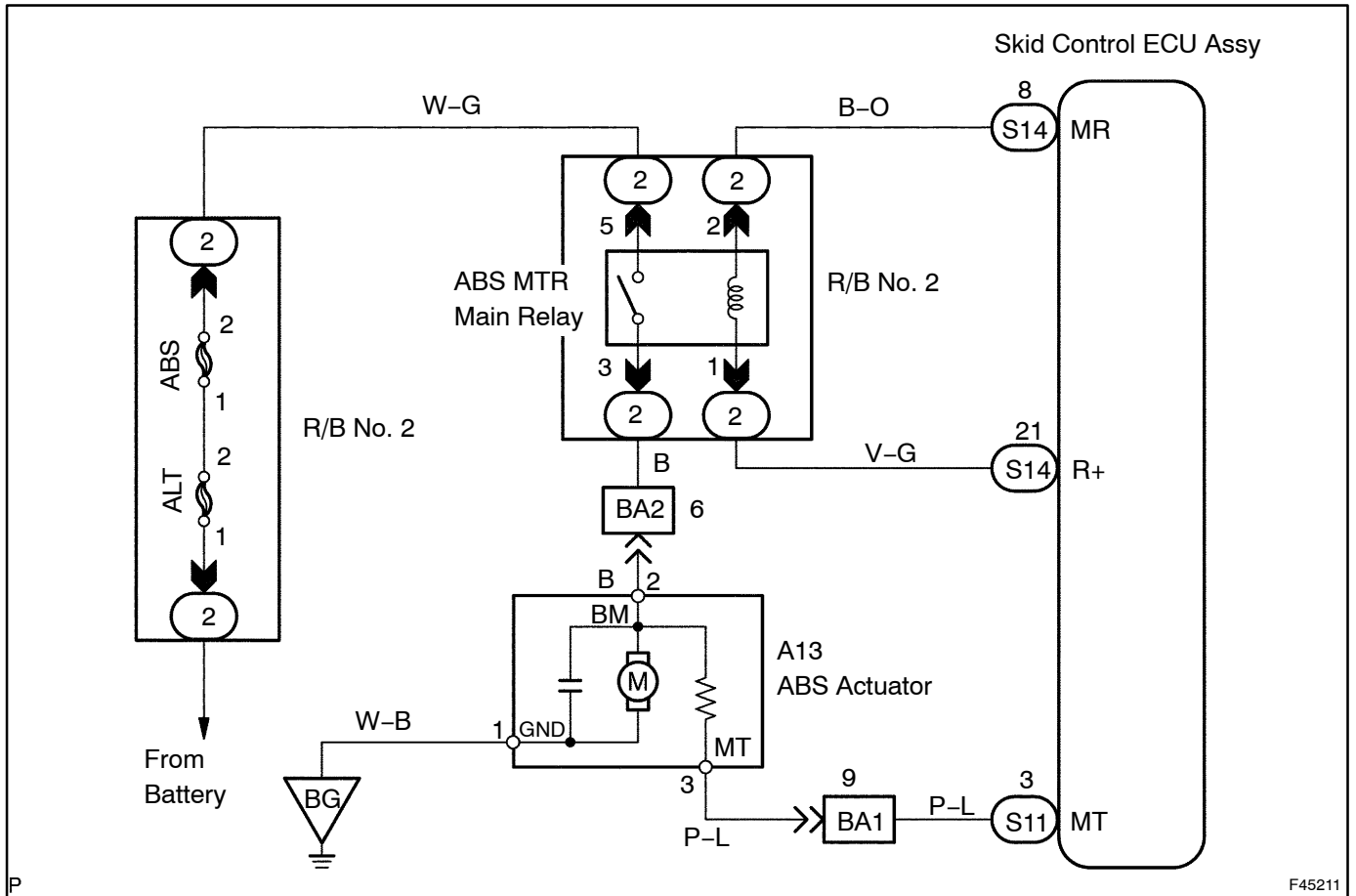
Fail-safe function:

If any trouble occurs in the ABS motor relay circuit, the ECU will cut off the current to the ABS solenoid relay and prohibit the ABS controls and BRAKE ASSIST.

HINT:

If the brake pedal is depressed firmly, the brake force may be lowered.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER (ABS MOTOR RELAY OPERATION)
----------	--

- (a) Select the item "ABS MOT RELAY" in the ACTIVE TEST and operate the ABS motor relay using the hand-held tester.
- (b) Check the operation sound of the ABS motor relay using the hand-held tester.

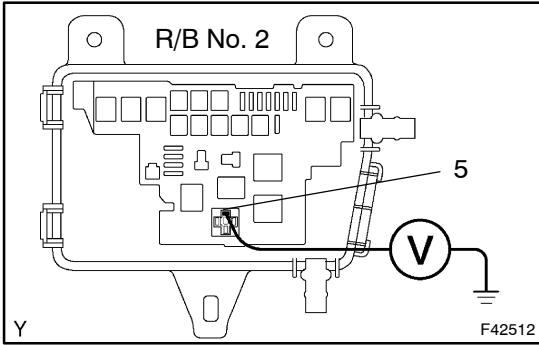
Standard:

The operation sound of the ABS pump motor is heard.

OK →	Go to step 4
-------------	---------------------

NG

2 CHECK ABS MOTOR RELAY (VOLTAGE)



- (a) Remove the ABS motor main relay from the R/B No. 2.
- (b) Measure the voltage between terminal 5 of the R/B No. 2 (for ABS motor relay) and the body ground.

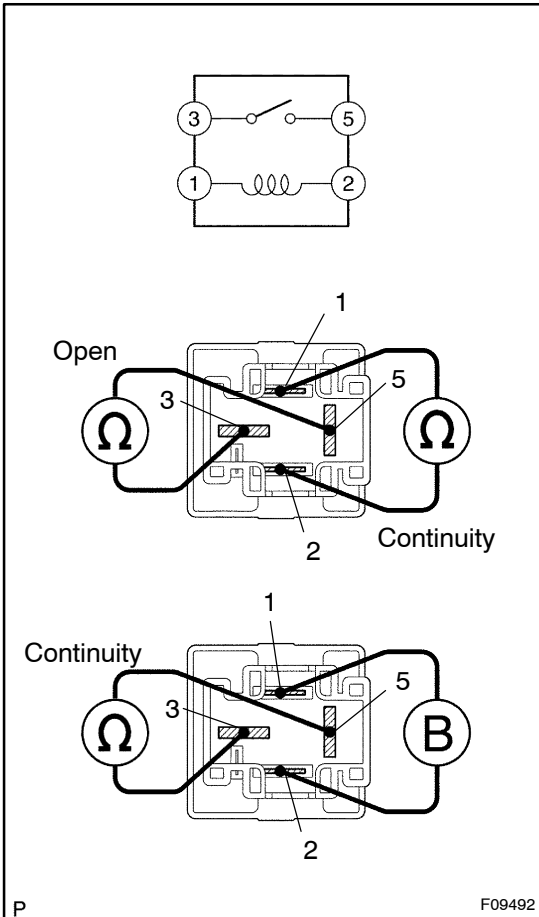
Standard:

Voltage: 20 - 28 V

NG → Go to step 8

OK

3 INSPECT ABS MOTOR RELAY (ABS MTR)



- (a) Remove the ABS motor main relay from the R/B No. 2.
- (b) Check the relay continuity.

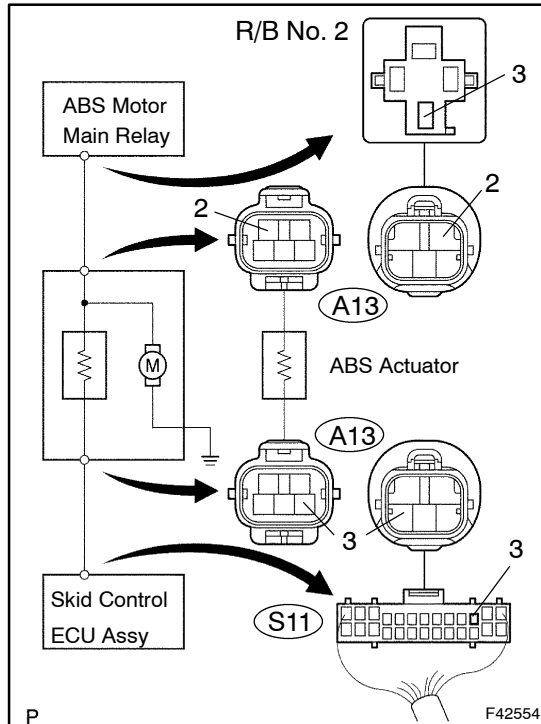
Standard:

Terminal No.	Condition	Specified Condition
1 ↔ 2	Constant	Continuity (Reference value 150 ± 30 Ω)
3 ↔ 5	Apply B+ between terminals 1 and 2	Continuity

NG → REPLACE ABS MOTOR RELAY

OK

4 CHECK WIRE HARNESS (ABS MOTOR RELAY ↔ SKID CONTROL ECU ASSY)



- (a) Check the continuity between terminal 3 of the R/B No. 2 (for ABS motor relay) and terminal MT (S11-3) of the skid control ECU.

Standard: Continuity

HINT:

There is a resistance of $33 \pm 1.65 \Omega$ between terminals A13-2 and 3 of the ABS actuator.

NG

REPAIR OR REPLACE HARNESS, CONNECTOR OR ABS ACTUATOR

OK

5 CHECK WIRE HARNESS (ABS MOTOR RELAY ↔ SKID CONTROL ECU ASSY)

- (a) Check for open and short circuit in the harness and connector between the relay and S14 ECU connectors (See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

6 RECONFIRM DTC

(a) Check the DTC (See page 05-108).

HINT:

After erasing the DTC and driving the vehicle more than 7 km/h (4 mph), Check for DTC.

A	Malfunction Code
B	Normal Code

B → **NO PROBLEM**

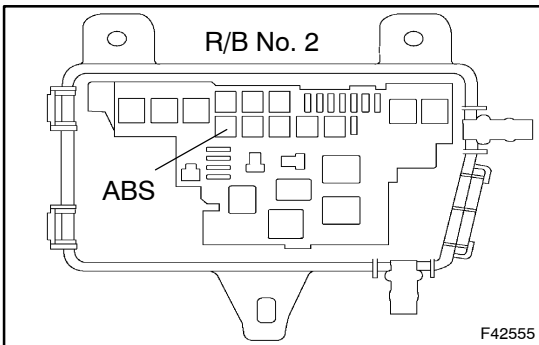
A

7 CHECK CONTACT CONDITION (EACH CONNECTION)

OK → **CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)**

NG

8 CHECK FUSE (ABS)



- (a) Remove the ABS fuse from the R/B No. 2.
 - (b) Check the continuity.
- Standard: Continuity**

NG → **REPLACE FUSE**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR

DTC	C0278/11	OPEN CIRCUIT IN ABS SOLENOID RELAY CIRCUIT
------------	-----------------	---

DTC	C0279/12	SHORT CIRCUIT IN ABS SOLENOID RELAY CIRCUIT
------------	-----------------	--

CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay will turn ON.

DTC No.	DTC Detection Condition	Trouble Area
C0278/11	Conditions 1. and 2. continue for 0.2 sec. or more: 1. ECU terminal IG1 voltage is 19 V to 36 V and solenoid relay is ON, however, contact point of solenoid relay is OFF 2. With solenoid relay ON driving, ECU terminal IG1 voltage becomes 19 V or less and contact point of solenoid relay does not become ON	<ul style="list-style-type: none"> • ABS solenoid relay (Marking: ABS SOL) • ABS solenoid relay circuit
C0279/12	Immediately after ECU terminal IG1 becomes ON, solenoid relay is OFF, however, when condition that contact point of the solenoid relay is ON continues for 0.2 sec. or more	

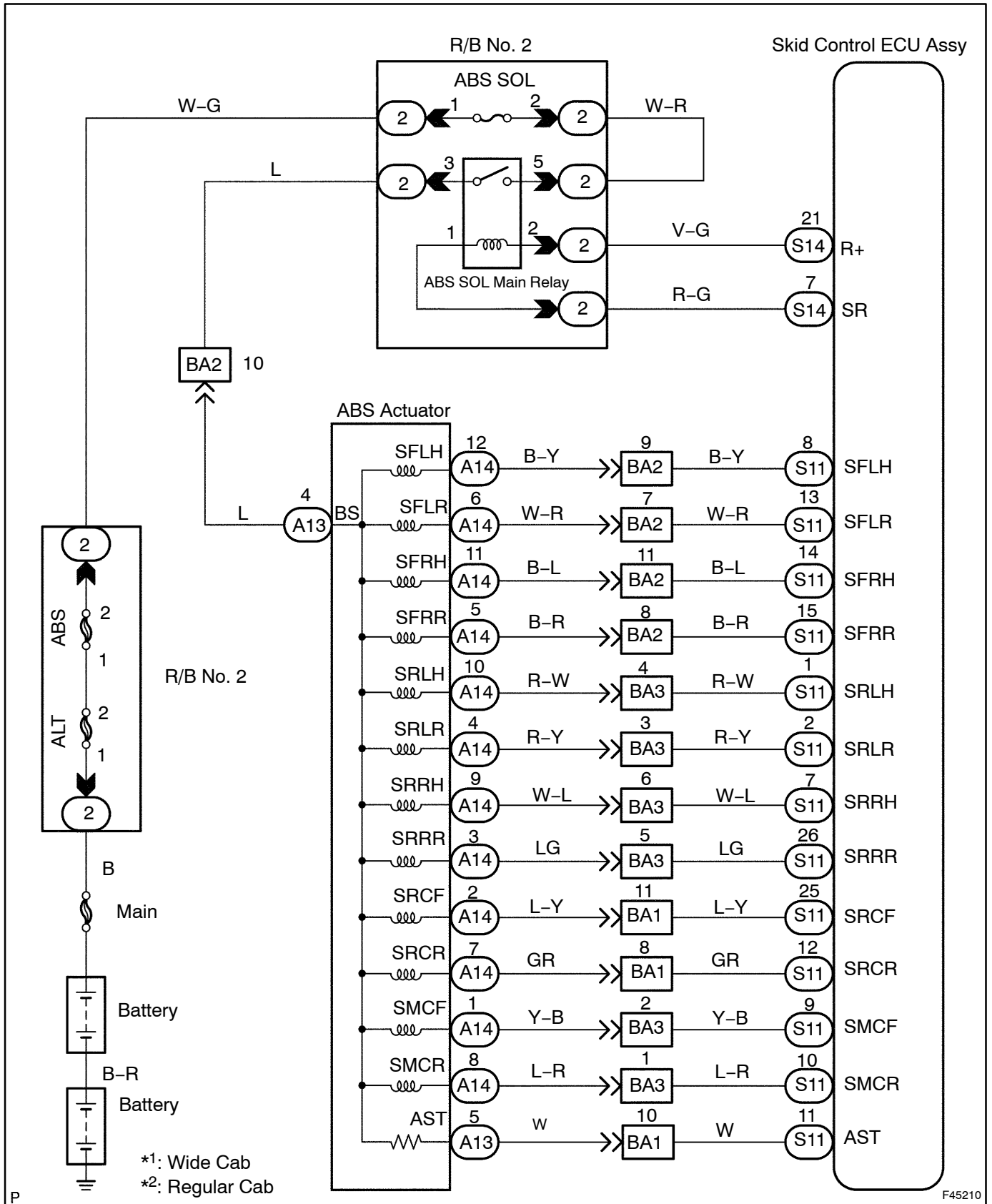
Fail-safe function:

If any trouble occurs in the ABS solenoid relay circuit, the ECU will cut off the current to the ABS solenoid relay and prohibit the ABS control and BRAKE ASSIST.

HINT:

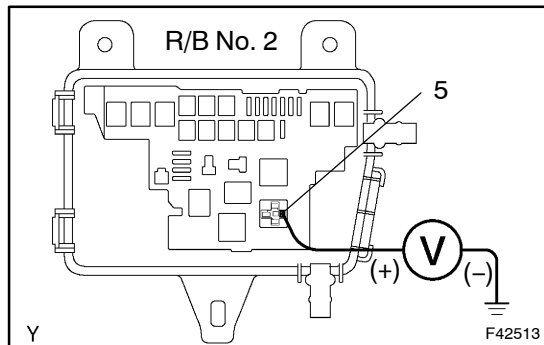
If the brake pedal is depressed firmly, the brake force may be lowered.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK ABS SOLENOID RELAY (VOLTAGE)



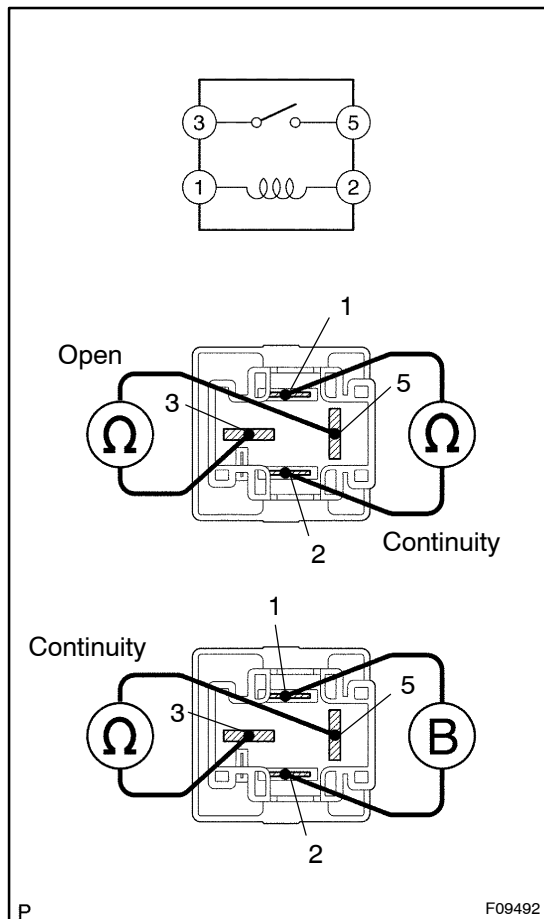
- (a) Remove the relay from the R/B No. 2.
- (b) Measure the voltage between R/B No. 2 relay terminal and the body ground.

Standard: Voltage: 20 - 28 V

NG → Go to step 7

OK

2 INSPECT ABS SOLENOID RELAY



- (a) Remove the relay.
- (b) Check the relay continuity.

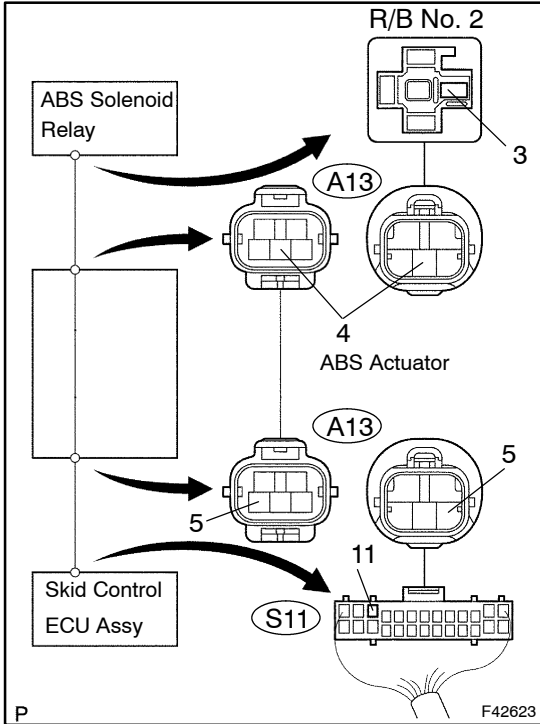
Standard:

Terminal No.	Condition	Specified Condition
1 ↔ 2	Constant	Continuity (Reference value 150 ± 30 Ω)
3 ↔ 5	Apply B+ between terminals 1 and 2	Continuity

NG → REPLACE ABS SOLENOID RELAY

OK

3 CHECK WIRE HARNESS (ABS SOLENOID RELAY ↔ SKID CONTROL ECU ASSY)



- (a) Check the continuity between terminal 3 of the R/B No. 2 (for ABS solenoid relay) and terminal AST (S11-11) of the skid control ECU.

Standard: Continuity

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4 CHECK WIRE HARNESS (ABS SOLENOID RELAY ↔ SKID CONTROL ECU ASSY)

- (a) Check for open and short circuit in the harness and connector between the relay and S14 ECU connectors (See page 01-27).

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR (CONNECTOR OR ABS ACTUATOR)

OK

5 RECONFIRM DTC

- (a) Check the DTC on page 05-108.

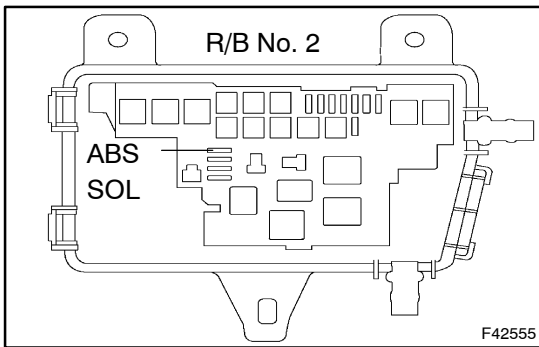
HINT:

After erasing the DTC and driving the vehicle more than 7 km/h (4 mph), check for DTC.

A	Malfunction Code
B	Normal Code

B → NO PROBLEM

A

6 CHECK CONTACT CONDITION (EACH CONNECTION)**OK****CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)****NG****REPAIR OR REPLACE HARNESS AND CONNECTOR****7 CHECK FUSE (ABS SOL)**

- (a) Remove the ABS SOL fuse from the R/B No. 2.
- (b) Check the continuity.

Standard: Continuity**NG****REPLACE FUSE****OK****REPAIR OR REPLACE HARNESS AND CONNECTOR**

DTC	C1241/41	LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE
------------	-----------------	---

CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1241/41	Vehicle speed is 3 km/h (1.9 mph) or more and voltage of ECU terminal IG remains below 19 V for more than 10 sec. or more	<ul style="list-style-type: none"> • Battery • Charging system • Power source circuit

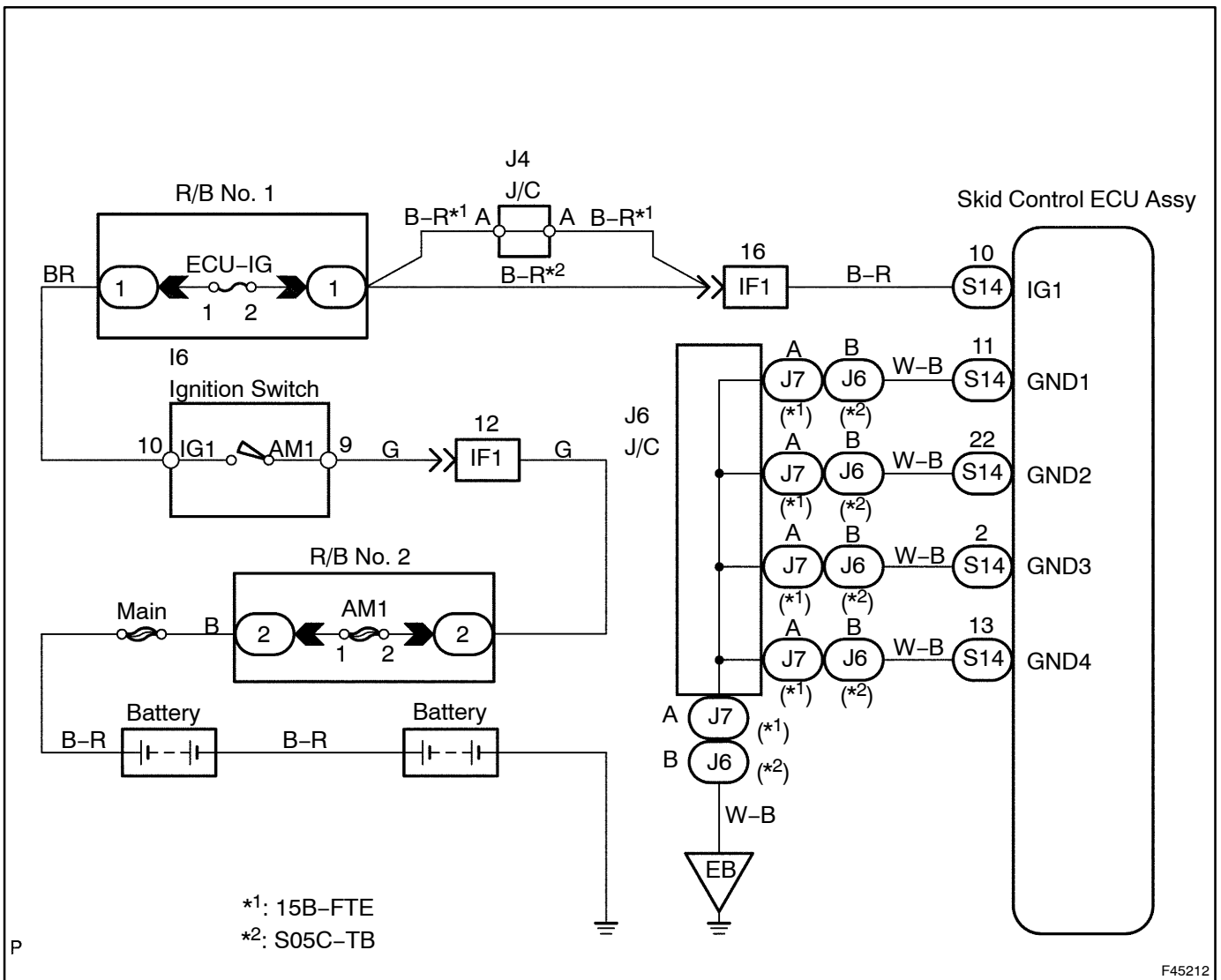
Fail-safe function:

If any trouble occurs in the power source circuit, the ECU will cut off the current to the ABS solenoid relay and prohibit the ABS controls and BRAKE ASSIST.

HINT:

If the brake pedal is depressed firmly, the brake force may be lowered.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT BATTERY

- (a) Inspect the battery positive voltage.
Standard: 20 – 28 V

NG

CHECK CHARGING SYSTEM OR BATTERY

OK

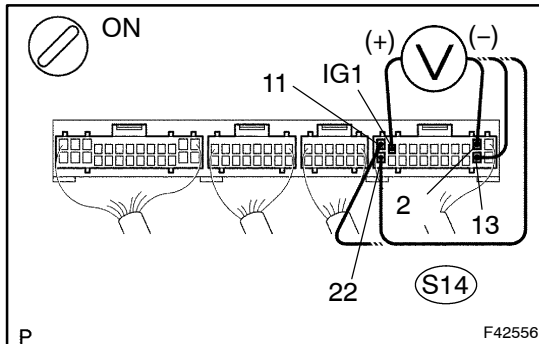
2 CHECK SKID CONTROL ECU ASSY (POWER SOURCE)

When using the hand-held tester:

- (a) Select the item "IG VOLTAGE" in the DATA LIST and read its value displayed on the hand-held tester.
 (b) Check the voltage condition output from the ECU, which is displayed on the hand-held tester.

Standard:

"Normal" is displayed.



When not using the hand-held tester:

- (c) Remove the ECU with the connectors still connected.
 (d) Turn the ignition switch ON and measure the voltage between terminal IG1 (S14 – 10) and GND (S14 – 2, 11, 13, 22) of the skid control ECU.

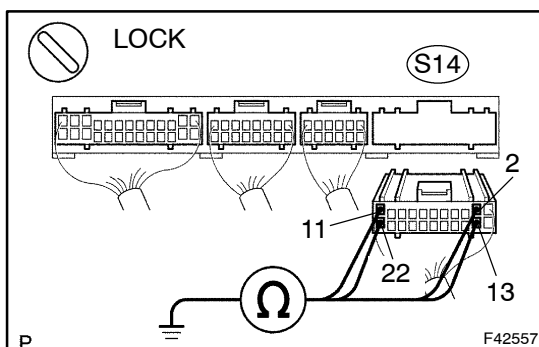
Standard: 20 – 28 V

NG

CHECK CHARGING SYSTEM OR BATTERY

NG

3 CHECK SKID CONTROL ECU ASSY (SKID CONTROL ECU ASSY ↔ BODY GROUND)



- (a) Disconnect the S14 ECU connector.
 (b) Measure the resistance between terminal GND (S14 – 2, 11, 13, 22) of the S14 ECU connector and the body ground.

Standard: 1 Ω or less

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4 CHECK WIRE HARNESS (ECU-IG FUSE ↔ SKID CONTROL ECU ASSY)

(a) Check for open and short circuit in the harness and connector between the ECU-IG fuse and S14 ECU connectors (See page 01-27).

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5 RECONFIRM DTC

(a) Check the DTC (See page 05-108).

HINT:

After erasing the DTC and driving the vehicle more than 3 km/h (1.8 mph), check for DTC.

A	Malfunction Code
B	Normal Code

B → **NO PROBLEM**

A

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

DTC	C1246/46	MALFUNCTION IN MASTER CYLINDER PRESSURE SENSOR
------------	-----------------	---

CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1246/46	Any of following 1. , 2. , 3. , 4. or 5. is detected: 1. The condition that IG1 terminal voltage is 19 to 32 V and VCM terminal voltage is out of range of 4.4 to 5.6 V continues for 1.2 sec. or more 2. Condition that PMC terminal voltage is out of range of 0.14 to 4.05 V continues for 1.2 sec. or more 3. Condition that stop lamp switch is OFF and PMC terminal voltage is more than 0.86 V or less than 0.3 V continues for 5 sec. or more 4. Vehicle speed is 7 km/h (4 mph) or more and condition that PMC terminal voltage is more than 0.86 V and voltage fluctuation is within 0.01 V continues for 30 sec. 5. Vehicle speed is 10 km/h (6.2 mph) or more and condition that PMC terminal receives noise occurs 7 times or more within 5 sec.	<ul style="list-style-type: none"> • Stop lamp switch • Master cylinder pressure sensor • Master cylinder pressure sensor circuit

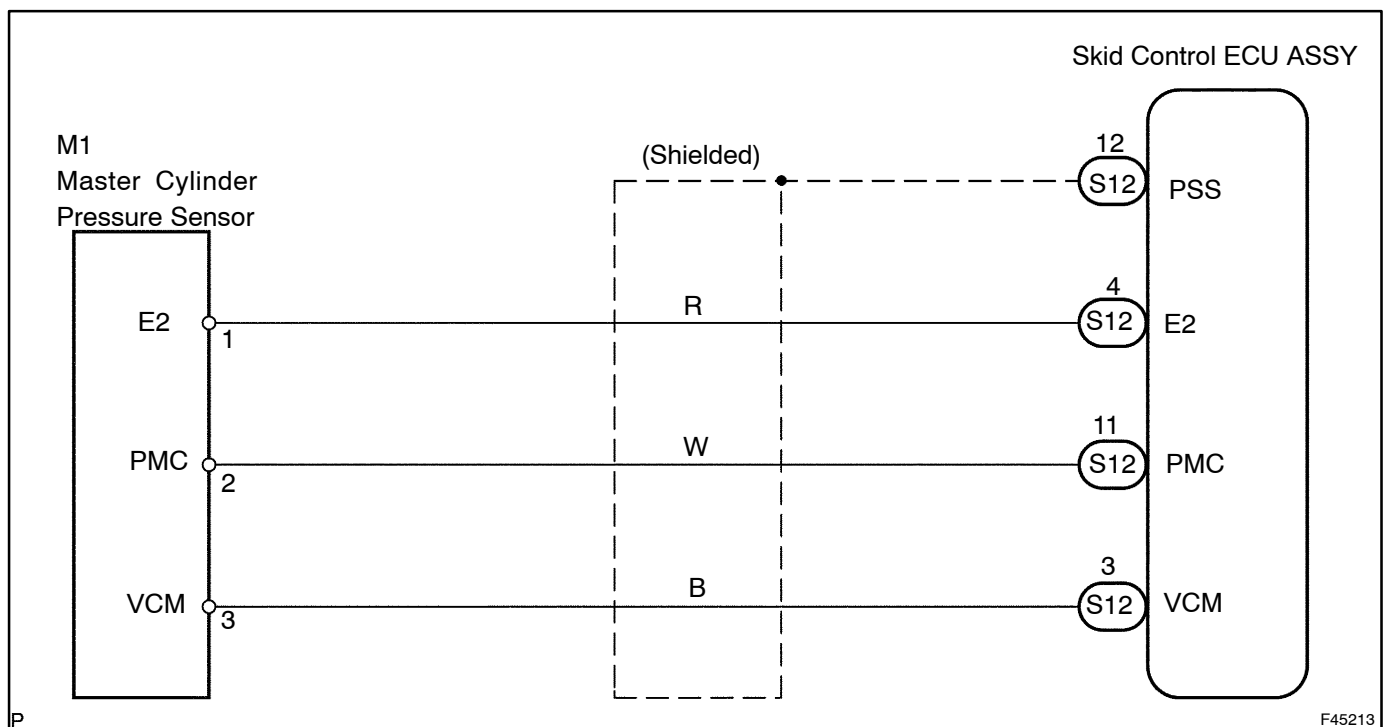
Fail-safe function:

If any trouble occurs in the master cylinder pressure sensor circuit, the ECU will prohibit the BRAKE ASSIST.

HINT:

If the brake pedal is depressed firmly, the brake force may be lowered.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1	READ VALUE OF HAND-HOLD TESTER (MASTER CYLINDER PRESSURE SENSOR OUTPUT VALUE)
----------	--

- (a) Select the item "MAS CYL PRESS1" in the DATA LIST and read its value displayed on the hand-held tester.
- (b) Check that the brake fluid pressure value of the master cylinder pressure sensor displayed on the hand-held tester is changing while depressing the brake pedal.

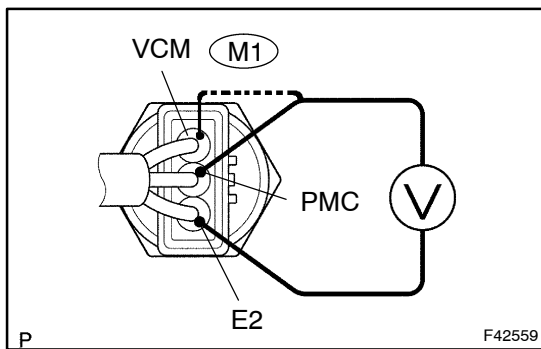
Standard:

Brake fluid pressure value is changing.

OK	Go to step 4
-----------	---------------------

NG

2	CHECK MASTER CYLINDER PRESSURE SENSOR
----------	--



- (a) Measure the voltage between terminals VCM and E2 of the M1 connector.

Standard:

4.85 - 5.15 V

- (b) Install the LSPV gauge to the front caliper bleeder plug portion and bleed the LSPV gauge.
- (c) Remove the air cleaner inlet and battery clamp cover.
- (d) Start the engine and depress the brake pedal, and then check the relation between the fluid pressure and voltage between the PMC and E2 terminals of the sensor with the M1 connector still connected.

Standard:

Front Brake Caliper Fluid Pressure	Voltage
0 MPa (0 Kgf/cm ² , 0 psi)	0.5 V
9.8 MPa (100 kgf/cm ² , 1,422 psi)	2.5 V
19.6 MPa (200 kgf/cm ² , 2,844 psi)	4.5 V

NG	REPLACE MASTER CYLINDER PRESSURE SENSOR
-----------	--

OK

3 CHECK WIRE HARNESS (MASTER CYLINDER PRESSURE SENSOR ↔ SKID CONTROL ECU ASSY)

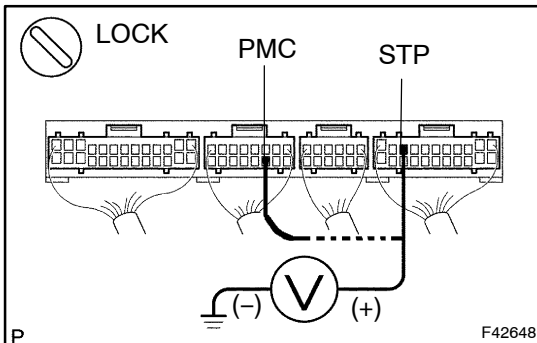
- (a) Check for open and short circuit in the harness and connector between the M1 sensor and S12 ECU (See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4 CHECK SKID CONTROL ECU ASSY (STP AND PMC TEPMINAL VOLTAGE)



- (a) Remove the ECU with the connectors still S12 connected.
 (b) Measure the voltage between terminal STP of the S12 ECU connector and the body ground when the brake pedal is depressed.

Standard:

20 – 28 V

- (c) Measure the voltage between terminal STP of the S12 ECU connector and the body ground when the brake pedal is released.

Standard:

Below 2.0 V

- (d) Check whether or not the ECU terminal STP input voltage changes when the stop lamp switch is turned on and off.
 (e) Measure the voltage between terminal PMC of the S12 ECU connector and the body ground when the stop lamp switch is turned on and off before STP ON.

Standard:

0.3 V < PMC voltage before STP ON < 0.86 V

NG

CHECK STOP LIGHT SWITCH CIRCUIT

OK

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

DTC	C1249/49	OPEN CIRCUIT IN STOP LIGHT SWITCH CIRCUIT
------------	-----------------	--

CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1249/49	ECU terminal IG1 voltage is 19 to 36 V and ABS is not operating, open circuit in stop lamp switch circuit continues for 0.3 sec. or more	<ul style="list-style-type: none"> • Stop lamp bulb • Stop lamp switch • Stop lamp switch circuit

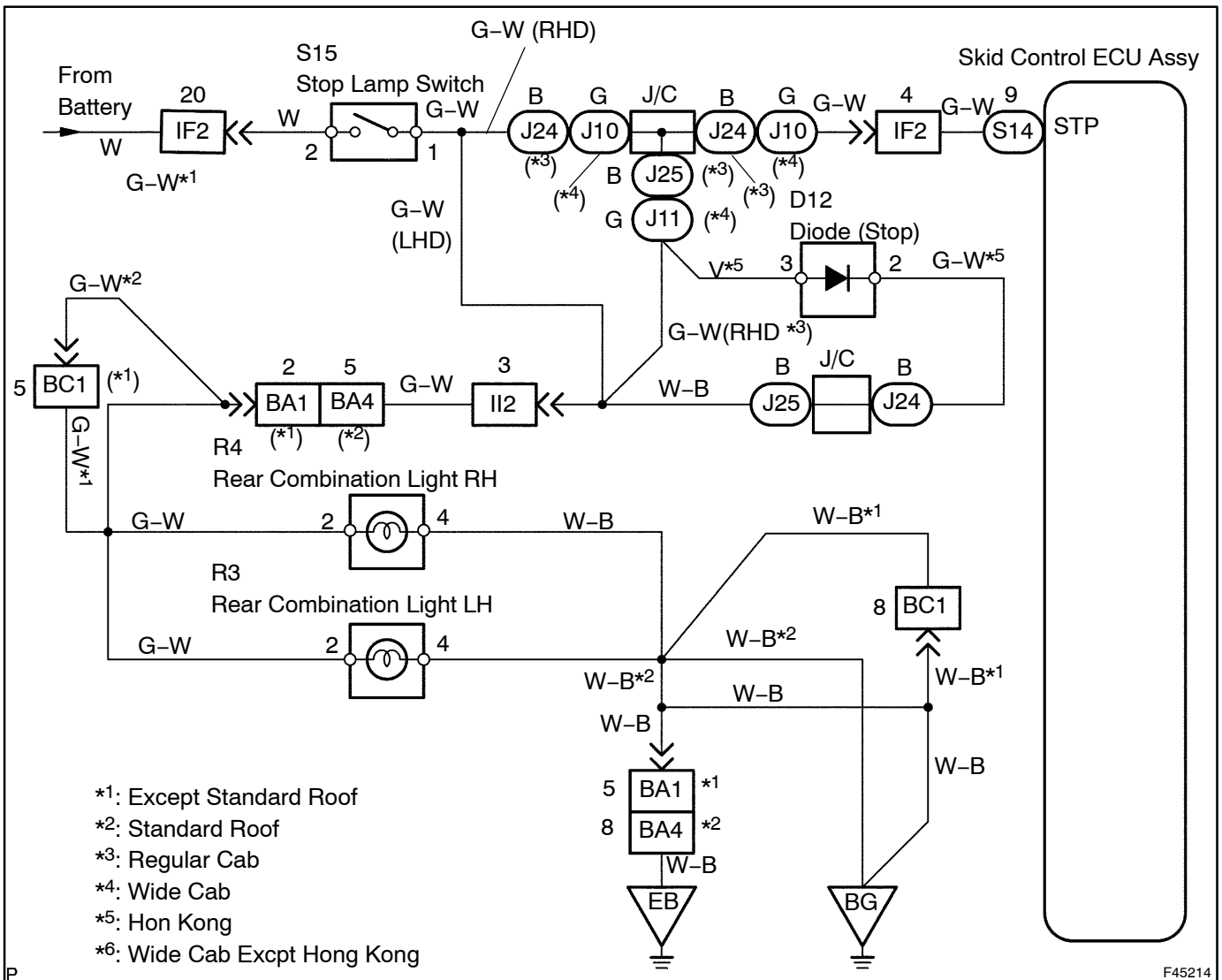
Fail-safe function:

If any trouble occurs in the stop lamp switch circuit, the ECU will cut off the current to the ABS solenoid relay and prohibit the ABS controls and BRAKE ASSIST.

HINT:

If the brake pedal is depressed firmly, the brake force may be lowered.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK STOP LAMP SWITCH ASSY (OPERATION)

- (a) Check that the stop lamp lights up when the brake pedal is depressed and turns off when the brake pedal is released.

OK → Go to step 3

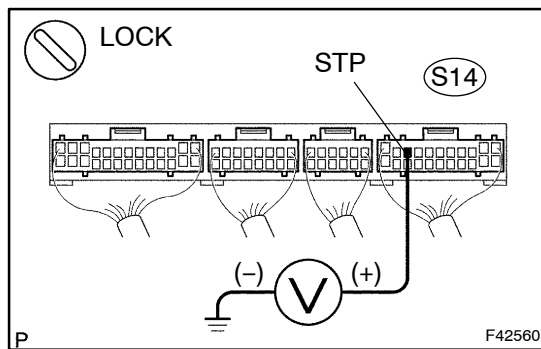
NG

2 CHECK STOP LAMP SWITCH ASSY (CIRCUIT)

NG → REPAIR OR REPLACE STOP LAMP SWITCH ASSY

OK

3 CHECK SKID CONTROL ECU ASSY (VOLTAGE)



- (a) Remove the ECU with the S14 connectors still connected.
 (b) Measure the voltage between terminal STP (S14-9) of the S14 ECU and the body ground when the brake pedal is depressed.

Standard: 20 - 28 V

OK → CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

NG

4 CHECK WIRE HARNESS (STOP LAMP SWITCH ASSY ↔ SKID CONTROL ECU ASSY)

- (a) Check for open and short circuit in the harness and connector between the S15 switch and S14 ECU connectors (See page 01-27).

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-116)

DTC	C1251/51	PUMP MOTOR IS LOCKED/OPEN CIRCUIT IN PUMP MOTOR GROUND
------------	-----------------	---

CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1251/51	Actuator pump motor does not operate correctly	<ul style="list-style-type: none"> • ABS actuator • ABS actuator circuit

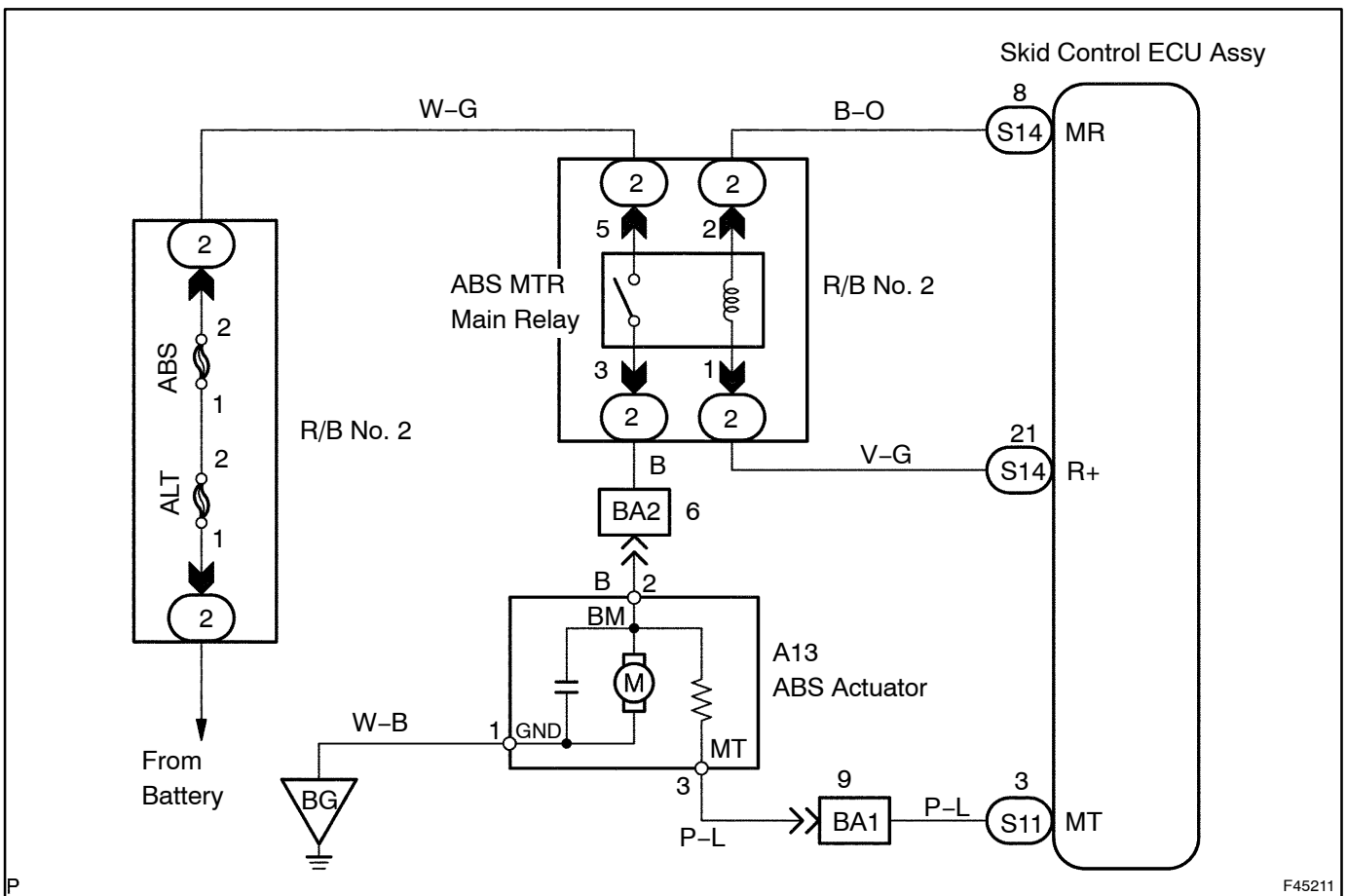
Fail-safe function:

If any trouble occurs in the ABS pump motor, the ECU will cut off the current to the ABS solenoid relay and prohibit the ABS controls and BRAKE ASSIST.

HINT:

If the brake pedal is depressed firmly, the brake force may be lowered.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1 PERFORM ACTIVE TEST BY HAND-HELD TESTER (ABS PUMP MOTOR OPERATION)

- (a) Select the item "ABS MOT RELAY" in the ACTIVE TEST and operate the ABS motor relay using the hand-held tester.
- (b) Check the operation sound of the ABS pump motor using the hand-held tester.

Standard:

The operation sound of the ABS pump motor is heard.

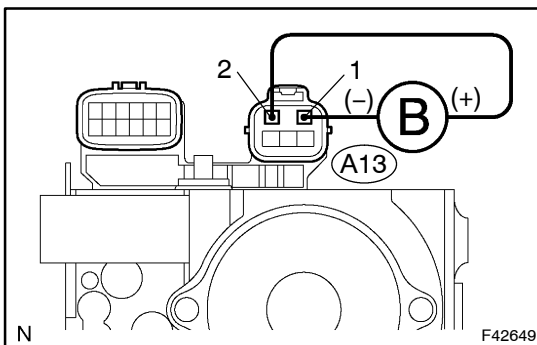
OK

Go to step 5

NG

CHECK AND REPLACE ABS ACTUATOR ASSY

2 INSPECT ABS ACTUATOR ASSY (ABS PUMP MOTOR OPERATION)



- (a) Disconnect the A13 connector.
- (b) Connect the positive (+) lead to terminal BM (A13-2) and the negative (-) lead to terminal GND (A13-1) of the A13 actuator connector, and then check that the ABS pump motor is operating.

Standard:

The operation sound of the ABS pump motor is heard.

NG

CHECK AND REPLACE ABS ACTUATOR ASSY

OK

3 CHECK WIRE HARNESS (ABS MOTOR RELAY ⇔ ABS ACTUATOR ⇔ SKID CONTROL ECU ASSY)

- (a) Check for open and short circuit in the harness and connector between the R/B No.2 motor relay, A13 actuator and S11/S14 ECU connectors (See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4 CHECK CONTINUITY (ABS ACTUATOR ↔ BODY GROUND)

- (a) Measure the resistance between terminals GND (A13-1) of the A13 actuator connector and the body ground.

Standard: 1 Ω or less

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

5 RECONFIRM DTC

- (a) Check the DTC (See page 05-108).

HINT:

After erasing the DTC and driving the vehicle more than 7 km/h (4 mph), check for DTC.

A	Normal Code
B	Malfunction Code

B

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

A

NO PROBLEM

DTC	C1265/65	VACUUM SENSOR MALFUNCTION
------------	-----------------	----------------------------------

CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1265/65	Any of following 1. , 2. , 3. , 4. or 5. is detected: 1. When ignition switch is ON and IG1 terminal voltage is within the range of 19 to 32 V, the VCP(VCP2) terminal voltage is below 4.7 V or over 5.3 V continuous 1.2 sec or more. 2. When VCP(VCP2) terminal voltage is within range of 4.4 to 5.6 V, condition that PIM(PIM2) terminal voltage is out of range of 0.4 to 4.5 V continues for 1.2 sec. 3. With engine running, depress brake pedal by 19 kgf and release it. In 1 sec., change amount of PIM (PIM2) terminal voltage becomes 0.01 V or less 5 times or more 4. PIM or PIM2 terminal receives noise 7 times or more within 5 sec. 5. Condition that voltage difference between terminals PIM and PIM2 is 344 mV or more continues for 10 sec. or more	<ul style="list-style-type: none"> • Vacuum sensor • Vacuum sensor circuit

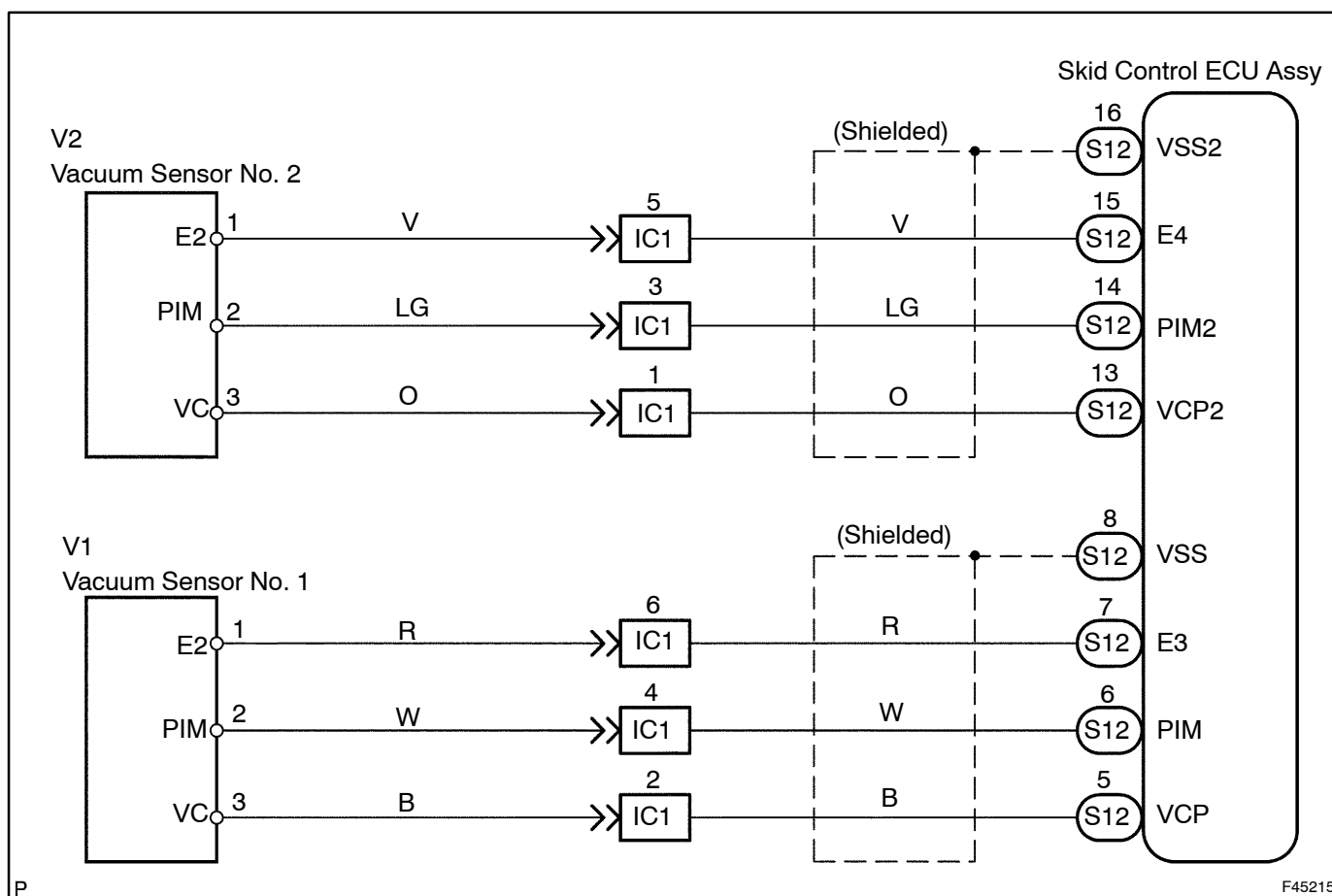
Fail safe function:

If any trouble occurs in the vacuum sensor circuit, the will ECU prohibit the BRAKE ASSIST.

HINT:

If the brake pedal is depressed firmly, the brake force may be lowered.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (VACUUM SENSOR ↔ SKID CONTROL ECU ASSY)

- (a) Check for open and short circuit in the harness and connector between the V1/V2 sensor and S12 ECU connectors (See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 CHECK VACUUM SENSOR (NO.1, NO.2)

- (a) Check the difference of voltage between the vacuum sensors.

Standard:

Difference is 340 mV or more \geq 340 mV

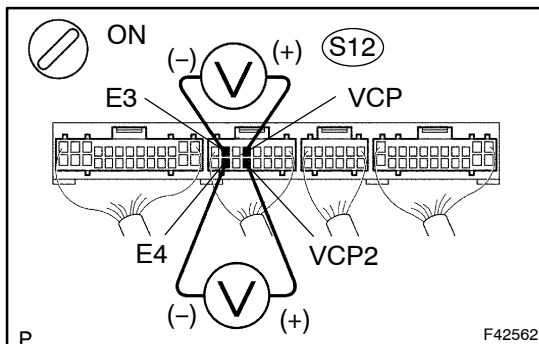
- (b) Check the vacuum sensor No. 1 and No. 2 (See page 05-98).

NG

REPLACE VACUUM SENSOR

OK

3 CHECK SKID CONTROL ECU ASSY (VCP, VCP2 TERMINAL VOLTAGE)



- (a) Remove the ECU with the connectors still S12 connected.
 (b) Turn the ignition switch ON.
 (c) Measure the voltage between terminals VCP (S12-5) and E3 (S12-7), and VCP2 (S12-13) and E4 (S12-15) of the S12 ECU connector.

Standard: Voltage: 4.5 - 5.5 V

OK

NO PROBLEM

NG

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

DTC	C1266/66	EXHAUST RETARDER PREVENTION SIGNAL CIRCUIT
------------	-----------------	---

CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1266/66	With vehicle speed of 6 km/h (4 mph) or more, open or short circuit of signal circuit continues for 0.3 sec. or more	<ul style="list-style-type: none"> • EXO circuit • Skid control ECU Assy • ECM

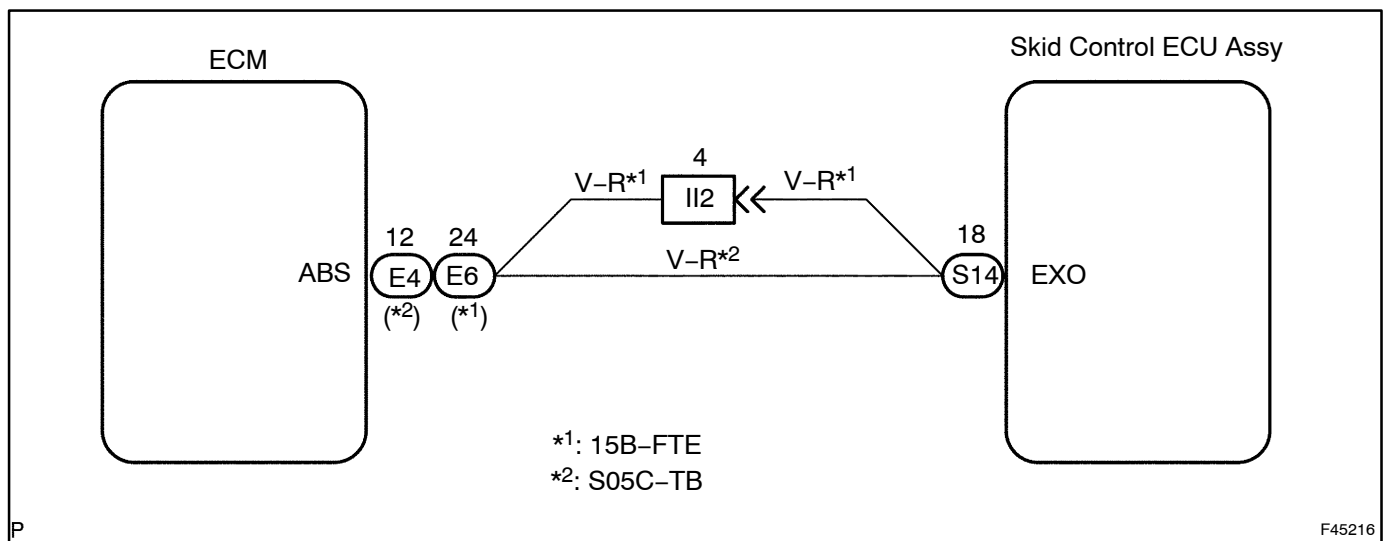
Fail-safe function:

If any trouble occurs in the EXO signal circuit, the ECU will cut off the current to the ABS solenoid relay and prohibit the ABS controls and BRAKE ASSIST.

HINT:

If the brake pedal is depressed firmly, the brake force may be lowered.

WIRING DIAGRAM



INSPECTION PROCEDURE

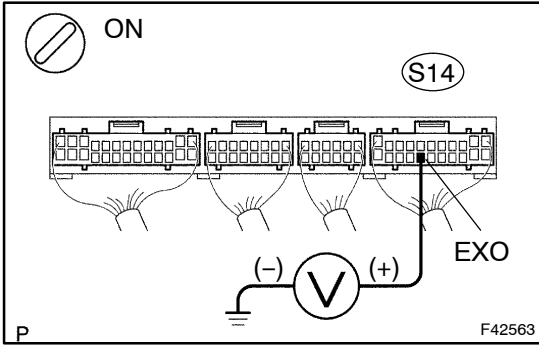
1	CHECK WIRE HARNESS (SKID CONTROL ECU ASSY ↔ ECM)
----------	---

- (a) Check for open and short circuit in the wire harness between terminal EXO (S14-18) of the S14 ECU and terminal ABS (E4-12) of the E4 ECM connectors (See page 01-27).

NG	REPAIR OR REPLACE HARNESS AND CONNECTOR
-----------	--

OK

2 INSPECT SKID CONTROL ECU ASSY (EXO TERMINAL VOLTAGE)



- (a) Remove the ECU with the S14 connectors still connected.
 - (b) Turn the ignition switch ON.
 - (c) Measure the voltage between terminal EXO (S14-18) of the S14 ECU and the body ground.
- Standard: 18 - 28 V**

NG → Go to step 4

OK

3 CHECK ECM (ABS TERMINAL)

- (a) Disconnect the S14 connector.
 - (b) Remove the ECM with the connectors still connected.
 - (c) Turn the ignition switch ON.
 - (d) Measure the voltage between terminal ABS (E4-12) of the E4 ECM and the body ground.
- Standard: 18 - 28 V**

NG → CHECK AND REPLACE ECM

OK

4 RECONFIRM DTC

- (a) Check the DTC (See page 05-108).

HINT:

After erasing the DTC and driving the vehicle more than 7 km/h (4 mph), check for DTC.

A	Malfunction Code
B	Normal Code

B → NO PROBLEM

A

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

DTC	AlwaysON	MALFUNCTION IN ABS ECU
------------	-----------------	-------------------------------

CIRCUIT DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
Always ON	Any of following 1. 2. or 3. is detected: 1. ECU connectors are disconnected from ECU 2. There is a malfunction in ECU internal circuit 3. There is a malfunction in ABS warning light circuit	<ul style="list-style-type: none"> • Battery • Fuse • ABS warning light circuit • Charging system • Power source circuit • Skid control ECU assy

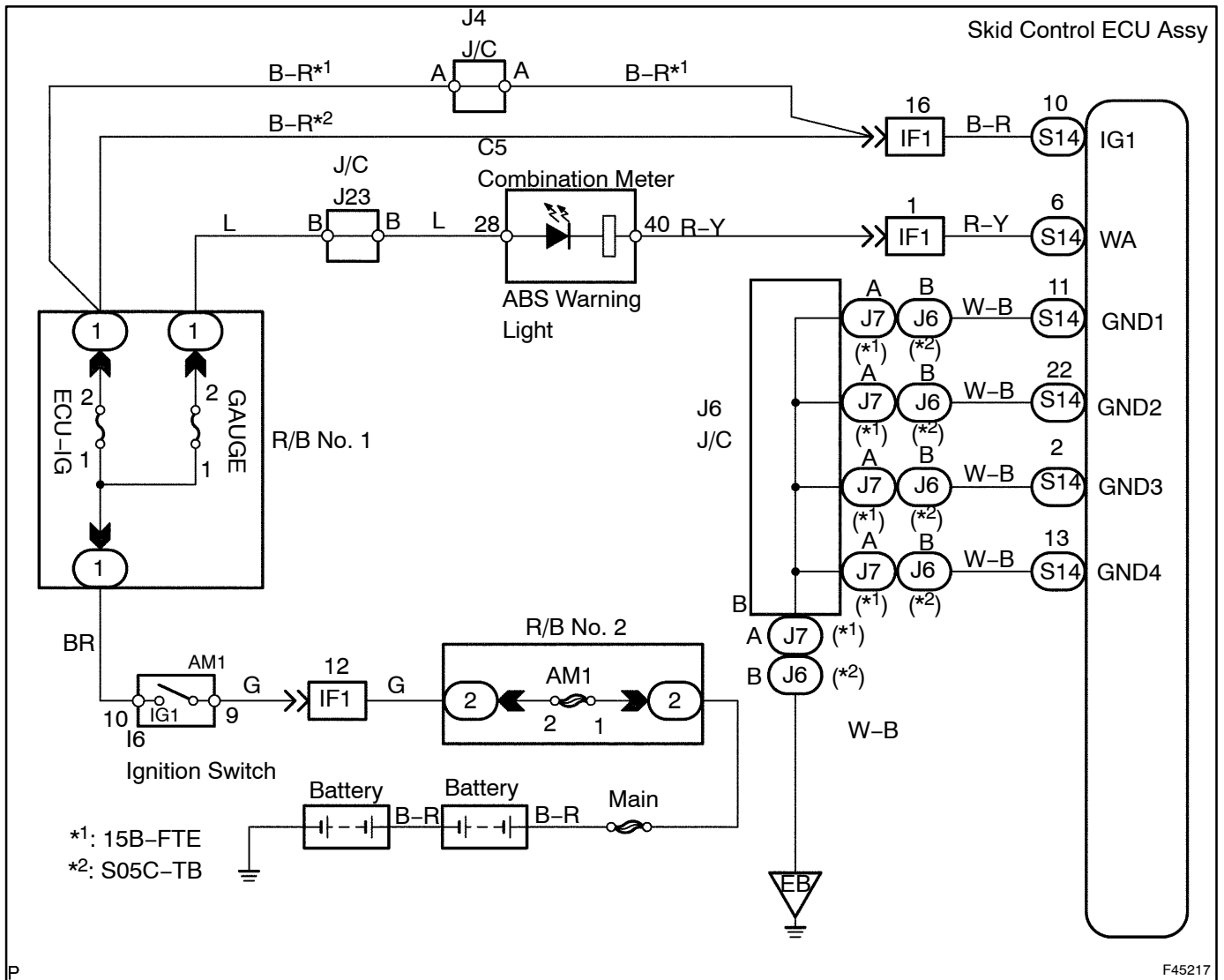
Fail-safe function:

If any trouble occurs in the ECU, the ECU will cut off the current to the ABS solenoid relay and prohibit the ABS control, and the brake system will become normal.

HINT:

There is a case that the hand-held tester cannot be used if the ECU is abnormal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT BATTERY

- (a) Inspect the battery positive voltage.
Standard: 20 – 28 V

NG → CHECK AND REPLACE CHARGING SYSTEM

OK

2 CHECK SKID CONTROL ECU ASSY (CONNECTOR SECURELY CONNECTED)

NG → CONNECT CONNECTOR

OK

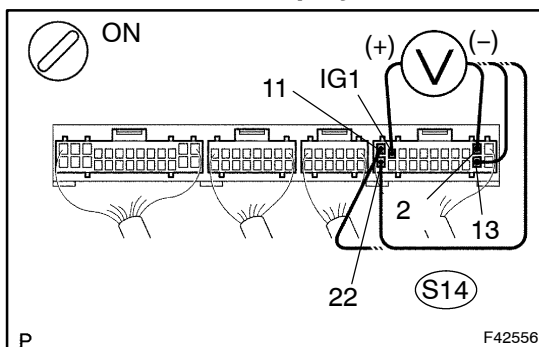
3 CHECK SKID CONTROL ECU ASSY (POWER SOURCE)

When using the hand-held tester:

- (a) Select the item "IG VOLTAGE" in the DATA LIST and read its value displayed on the hand-held tester.
 (b) Check the voltage condition output from the ECU, which is displayed on the hand-held tester.

Standard:

"Normal" is displayed.



When not using the hand-held tester:

- (c) Remove the ECU with the connectors still connected.
 (d) Turn the ignition switch ON, and measure the voltage between terminals IG1 (S14-10) and GND (S14-2, 11, 13, 22) of the S14 ECU connector.

Standard: 20 – 28 V

OK → REPAIR OR REPLACE HARNESS AND CONNECTOR

NG

4 CHECK WIRE HARNESS (BATTERY ↔ SKID CONTROL ECU ASSY)

- (a) Check for open and short circuit in the wire harness between the battery and S14 ECU connectors (See page 01-27).

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

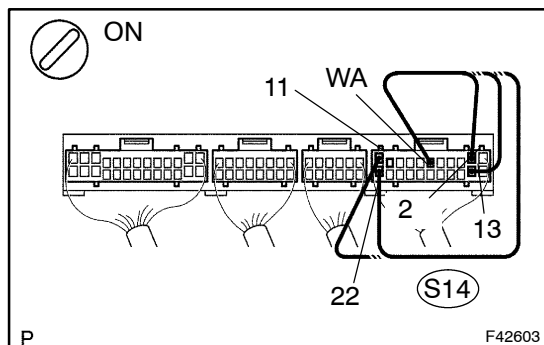
5 CHECK WIRE HARNESS (DLC3 ↔ SKID CONTROL ECU ASSY)

- (a) Check for short circuit in the harness and connector between terminal TC of the D3 DLC3 and the S13 ECU connectors (See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

6 CHECK ABS WARNING LIGHT

- (a) Turn the ignition switch OFF.
 (b) Remove the ECU with the connectors still connected.
 (c) Using a service wire, connect terminals WA (S14-6) and GND (S14-2, 11, 13, 22) of the S14 ECU connector.
 (d) Turn the ignition switch ON.
 (e) Check that the ABS warning light goes off.

OK

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

NG

7 RECONFIRM DTC

- (a) Check the DTC (See page 05-108).

HINT:

After erasing the DTC and driving the vehicle more than 30 km/h (19 mph), check for DTC.

A	Normal Code
B	Malfunction Code

B

REPAIR CIRCUIT INDICATED BY OUTPUT CODE

A

CHECK AND REPLACE COMBINATION METER ASSEMBLY

ABS WARNING LIGHT CIRCUIT (DOES NOT LIGHT UP)

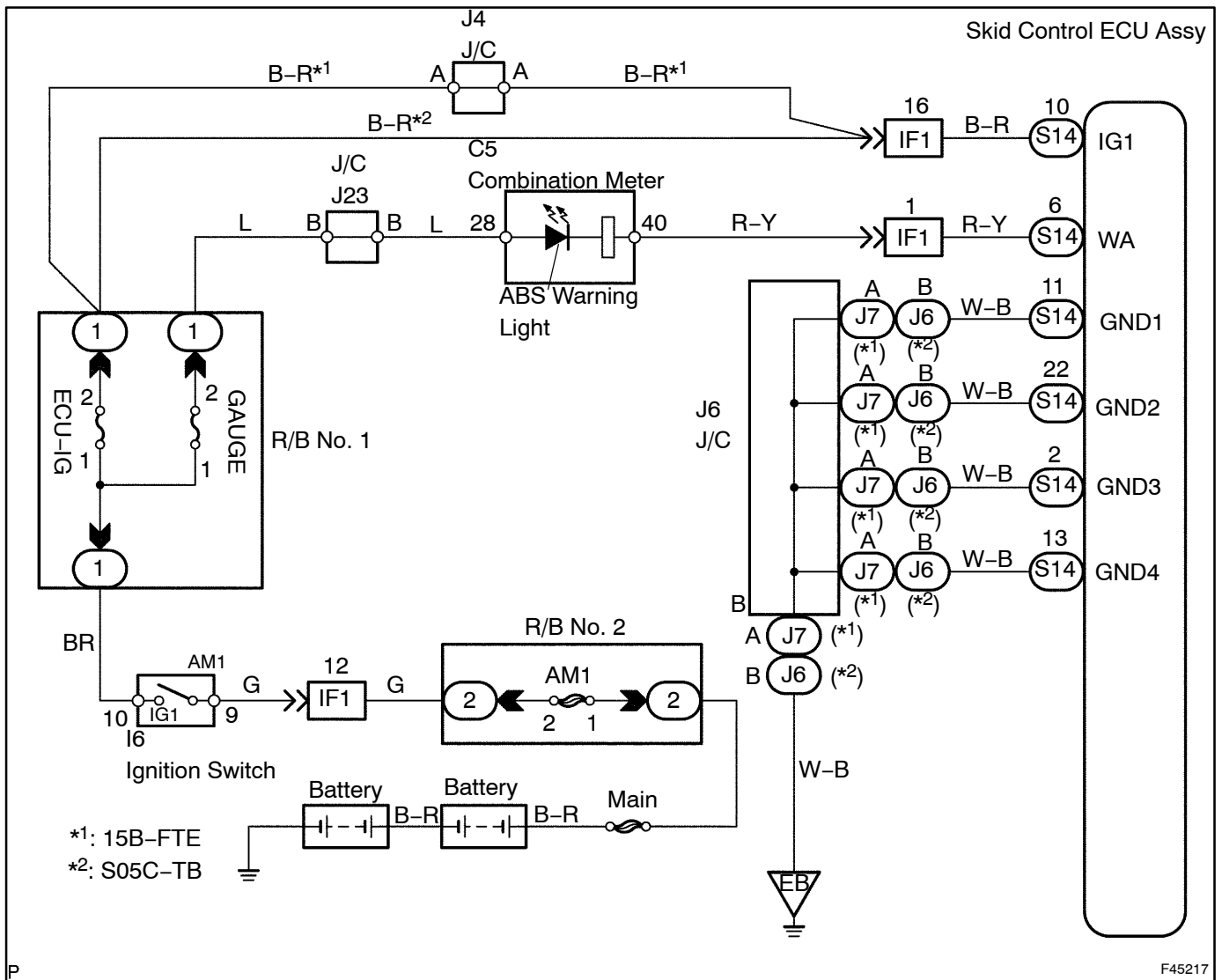
CIRCUIT DESCRIPTION

If the ECU detects trouble, it lights up the ABS warning light while prohibiting the ABS control at the same time. At this time, the ECU records a DTC in the memory.

HINT:

Connect terminals TC and CG of the DLC3 to cause the ABS warning light to blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

Troubleshoot in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	Go to step 1
ABS warning light remains ON	Always ON 05-154

1 CHECK WARNING LIGHT (EXCEPT ABS WARNING LIGHT)

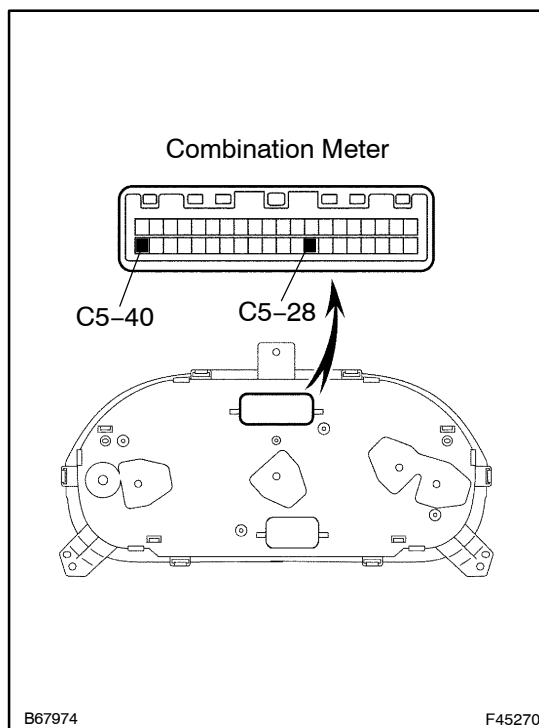
- (a) Check whether the other warning lights (except the ABS warning light) turn on for approximately 3 seconds after the ignition switch is turned ON.

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR (CONNECTOR OR GAUGE FUSE)

OK

2 INSPECT ABS WARNING LIGHT



- (a) Remove the combination meter.
 (b) Check the continuity between terminals C5 - 28 and C5 - 40.

Standard: Continuity

NG

REPLACE BULB OR COMBINATION METER ASSEMBLY (See page 71-7)

OK

3 CHECK WIRE HARNESS (COMBINATION METER ASSEMBLY ↔ SKID CONTROL ECU ASSY)

- (a) Check for open or short circuit in the harness and connector between the C5 and S14 ECU connectors (See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4	CHECK WARNING LIGHT (COMBINATION METER ASSEMBLY ↔ SKID CONTROL ECU ASSY)
----------	---

- (a) When the ignition switch is turned ON, check that the ABS warning light lights up for 3 seconds.

OK 	NO PROBLEM
---	-------------------

NG

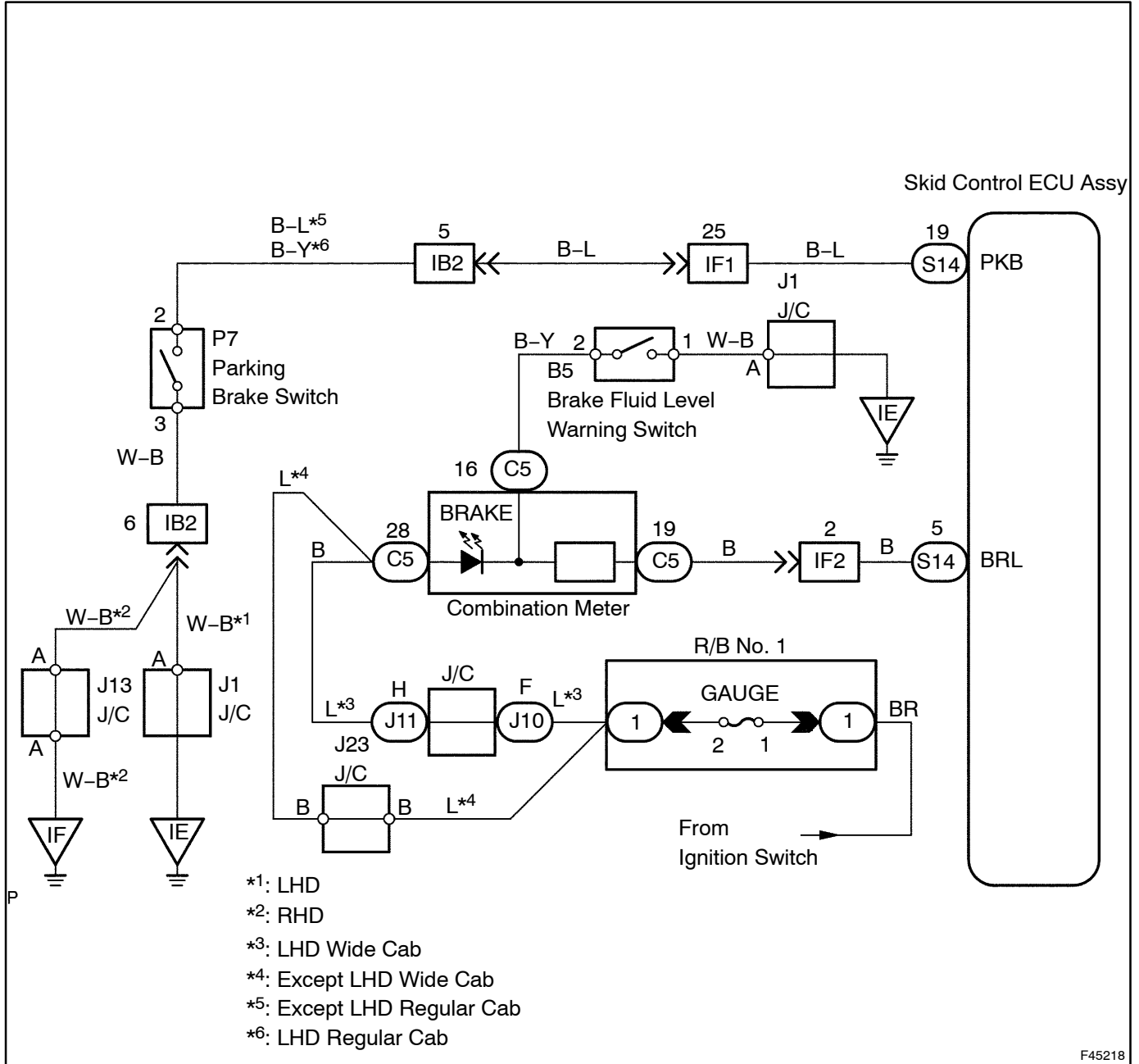
CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

BRAKE WARNING LIGHT CIRCUIT (REMAINS ON)

CIRCUIT DESCRIPTION

The brake warning light lights up when the brake fluid is insufficient and the vacuum is low.

WIRING DIAGRAM



INSPECTION PROCEDURE**1 RECONFIRM DTC**

(a) Check the DTC (See page 05-108).

HINT:

After erasing the DTC and driving the vehicle more than 30 km/h, check for DTC.

A	Normal Code
B	Malfunction Code

B**REPAIR CIRCUIT INDICATED BY OUTPUT CODE****A****2 INSPECT PARKING BRAKE SWITCH****NG****REPAIR OR REPLACE PARKING BRAKE SWITCH****OK****3 CHECK BRAKE WARNING LIGHT**

- (a) Turn the ignition switch OFF.
- (b) Remove the skid control ECU with the connectors still connected.
- (c) Using a service wire, connect terminals BRL (S14-5) and GND of the S14 ECU connector.
- (d) Turn the ignition switch ON.
- (e) Check that the brake warning light goes off.

NG**Go to step 8****OK**

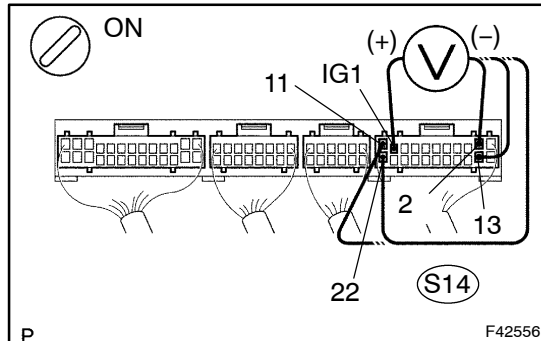
4 CHECK SKID CONTROL ECU ASSY (IG VOLTAGE)

When using hand-held tester:

- Select the item "IG VOLTAGE" in the DATA LIST and read its value displayed on the hand-held tester.
- Check the voltage condition output from the ECU, which is displayed on the hand-held tester.

Standard:

"Normal" is displayed.



When not using hand-held tester:

- Remove the ECU with the connectors still connected.
- Turn the ignition switch ON and measure the voltage between terminals IG1 (S14-10) and GND (S14-2, 11, 13, 22) of the S14 ECU connector.

Standard: 20 - 28 V

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

5 CHECK VACUUM HOSE

NG

REPAIR OR REPLACE VACUUM HOSE

NO

6 CHECK BRAKE FLUID LEVEL IN RESERVOIR

NG

CHECK AND REPAIR BRAKE FLUID LEAKAGE AND ADD FLUID

OK

7 CHECK VACUUM SENSOR (No.1, No.2)

- Check the difference of voltage between.

Standard:

Difference is 340 mV or more \geq 340 mV

- Check the sensors (See page 05-98).

NG

REPLACE VACUUM SENSOR

OK

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

8**CHECK WIRE HARNESS
(COMBINATION METER ASSEMBLY ↔ SKID CONTROL ECU ASSY)**

- (a) Check for open or short circuit in the harness and connector between the C5 meter and S14 ECU connectors (See page 01-27).

NG**REPAIR OR REPLACE HARNESS AND CONNECTOR****OK****CHECK AND REPLACE COMBINATION METER ASSEMBLY (See page 71-2)**

BRAKE WARNING LIGHT CIRCUIT (DOES NOT LIGHT UP)

CIRCUIT DESCRIPTION

Refer to ABS WARNING LIGHT CIRCUIT (REMAINS ON) on page 05-160.

WIRING DIAGRAM

Refer to ABS WARNING LIGHT CIRCUIT (REMAINS ON) on page 05-160.

INSPECTION PROCEDURE

1 CHECK COMBINATION METER (POWER SOURCE)

- (a) Turn the ignition switch ON and measure the voltage between terminals 6 of the meter connector and the body ground.

Standard: 20 - 28 V

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 CHECK BRAKE WARNING LIGHT BULB

NG

REPLACE BRAKE WARNING LIGHT BULB

OK

3 CHECK BRAKE FLUID LEVEL WARNING SWITCH CIRCUIT

NG

REPAIR OR REPLACE BRAKE FLUID LEVEL WARNING SWITCH CIRCUIT

OK

4 CHECK BRAKE WARNING LIGHT

- (a) Turn the ignition switch OFF.
 (b) Remove the skid control ECU with the connectors still connected.
 (c) Using a service wire, connect terminals BRL (S14-5) and GND (S14-2, 11, 13 or 22) of the S14 ECU.
 (d) Turn the ignition switch ON.
 (e) Check that the parking warning light goes off.

NG

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

OK

5	CHECK WIRE HARNESS (COMBINATION METER ASSEMBLY ↔ SKID CONTROL ECU ASSY)
----------	--

- (a) Check for open or short circuit in the harness and connector between the C5 meter and S14 ECU connectors (See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

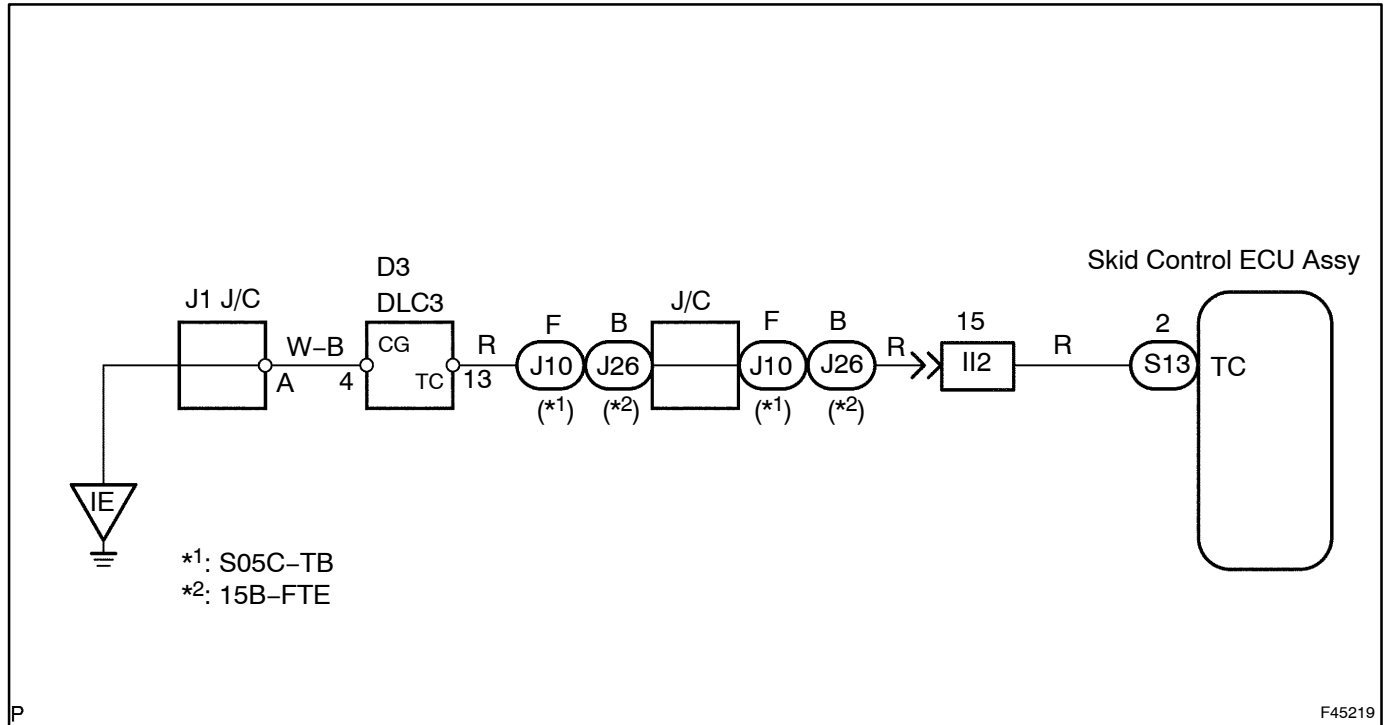
CHECK AND REPLACE COMBINATION METER ASSEMBLY (See page 71-2)

TC TERMINAL CIRCUIT

CIRCUIT DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the ECU to output DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (DLC3 ↔ SKID CONTROL ECU ASSY, DLC3 ↔ BODY GROUND)

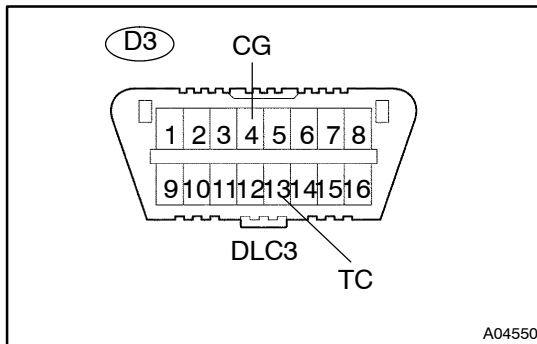
- (a) Check for open and short circuit in the harness and connector between terminal TC of the D3 DLC3 and the S13 ECU connector, and terminal CG of the D3 DLC3 and the body ground
(See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 CHECK DLC3



- (a) Turn the ignition switch ON.
(b) Measure the voltage between terminals TC and CG of the D3 DLC3.

Standard: 20 - 28 V

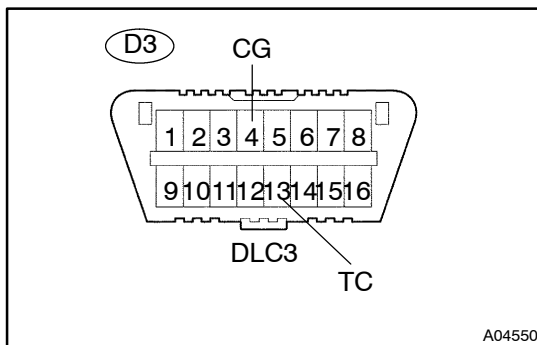
NG

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

OK

3 CHECK ABS WARNING LIGHT

SST 09843-18040



- (a) Turn the ignition switch OFF.
(b) Using SST, connect terminals TC and CG of the D3 DLC3.
(c) Turn the ignition switch ON.
(d) Check the ABS warning light.

Standard: ABS warning light blinks

OK

NO PROBLEM

NG

CHECK ABS WARNING LIGHT CIRCUIT

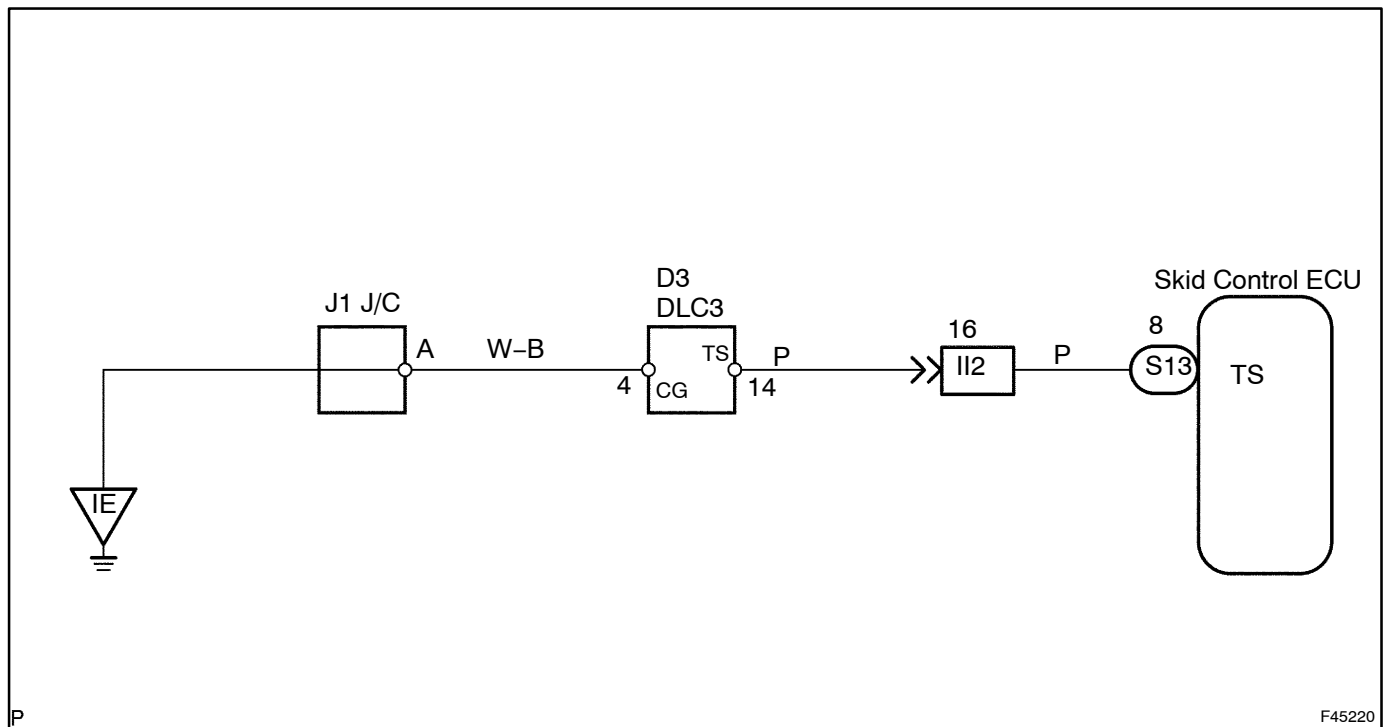
TS TERMINAL CIRCUIT

CIRCUIT DESCRIPTION

The sensor check circuit detects abnormalities in the speed sensor signal, master cylinder pressure sensor signal and vacuum sensor signal. Those abnormalities cannot be detected with the DTC check.

Switching to the sensor check mode can be performed by connecting terminals Ts and CG of the DLC3 and turning the ignition switch from OFF to ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (DLC3 ↔ SKID CONTROL ECU ASSY, DLC3 ↔ BODY GROUND)

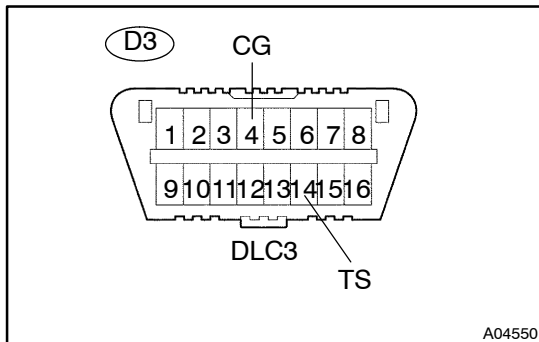
- (a) Check for open and short circuit in the harness and connector between terminal Ts of the D3 DLC3 and the S13 ECU connector, and terminal CG of the D3 DLC3 and the body ground
(See page 01-27).

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 INSPECT DLC3



- (a) Turn the ignition switch ON.
(b) Measure the voltage between terminals TS and CG of the D3 DLC3.

Standard: 20 - 28 V

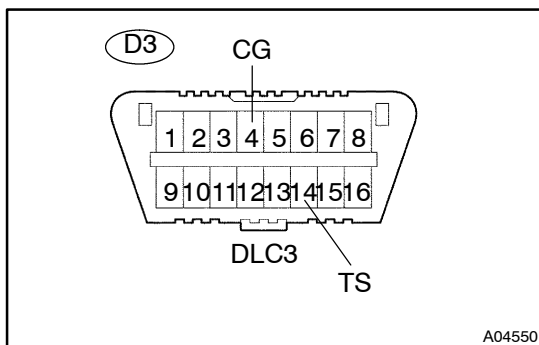
NG

CHECK AND REPLACE SKID CONTROL ECU ASSY (See page 01-27)

OK

3 CHECK ABS WARNING LIGHT

SST 09843-18040



- (a) Turn the ignition switch OFF.
(b) Using SST, connect terminals TS and CG of the D3 DLC3.
(c) Turn the ignition switch ON.
(d) Check the ABS warning light.

Standard:
ABS warning light blinks

OK

NO PROBLEM

NG

CHECK ABS WARNING LIGHT CIRCUIT

EASY & SMOOTH START SYSTEM AND BRAKE LOCK SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

05BBF-01

HINT:

Troubleshoot in accordance with the procedures on the following pages.

1	VEHICLE BROUGHT TO WORKSHOP
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2	CUSTOMER PROBLEM ANALYSIS (See page 05-173)
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3	CHECK AND CLEAR DTCS (See page 05-174)
---	--



4	PROBLEM SYMPTOM CONFIRMATION
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	SYMPTOM DOES NOT OCCUR: Go to step 5
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	SYMPTOM OCCURS: Go to step 6
--	------------------------------

5	SYMPTOM SIMULATION (See page 01-17)
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6	DTC CHECK (See page 05-174)
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	DTC IS NOT OUTPUT: Go to step 7
--	---------------------------------

	DTC IS OUTPUT: Go to step 8
--	-----------------------------

7	PROBLEM SYMPTOMS TABLE (See page 05-184)
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	CHECK FOR FLUID LEAKAGE AND Go to step 10
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8	DTC CHART (See page 05-180)
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9	CIRCUIT INSPECTION (See page 05-186)
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10	IDENTIFICATION OF PROBLEM
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11	REPAIR
-----------	---------------



12	CONFIRMATION TEST
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END

Fail-safe function:

If a failure occurs in the easy & smooth start system and the brake lock system, the ES warning lamp will light up and the ES operation will be prohibited.

CUSTOMER PROBLEM ANALYSIS CHECK

EASY & SMOOTH START SYSTEM AND BRAKE LOCK SYSTEM Check Sheet

Inspector's name : _____

Customer's Name	<hr/> <hr/>	Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent (times a day)

Symptoms	<input type="checkbox"/> ES Start does not operate.	
	<input type="checkbox"/> ES Start does not operate efficiently.	
	<input type="checkbox"/> Brake pressure increase function does not operate.	
	ES Start indicator Light Abnormal	<input type="checkbox"/> Remains ON <input type="checkbox"/> Does not Light Up

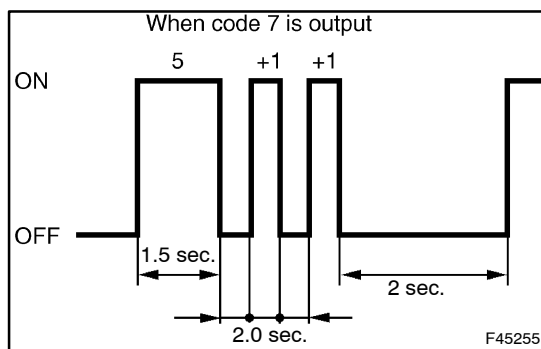
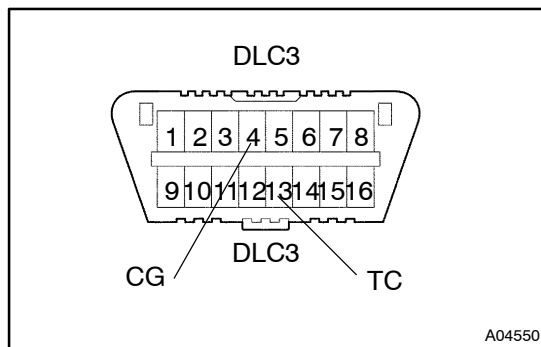
DTC Check	1st Time	<input type="checkbox"/> Normal Code <input type="checkbox"/> Malfunction Code (Code)
	2nd Time	<input type="checkbox"/> Normal Code <input type="checkbox"/> Malfunction Code (Code)

PRE-CHECK

1. DIAGNOSTIC SYSTEM

(a) Check the DTC.

(1) Turn the ignition switch ON and then turn the ES start main switch ON.



(2) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

NOTICE:

- Connecting the wrong terminals will result in damage to the system. Be sure to connect the right terminals.
- The vehicle should be stationary at this time.

(3) Read the DTC from the ES start indicator lamp on the combination meter.

HINT:

- DTC will be output by the ES start indicator lamp and buzzer in approx. 1 second.
- If no code appears, inspect the diagnostic circuit or ES start indicator lamp circuit.
- As an example, the blinking pattern for code 7 is shown on the left
- Codes are listed in the code table on page 05-180.
- If trouble exists, repair it and then clear the DTC stored. Then check for the DTC again.

(b) Method to clear the DTC.

Remove the SST from the terminals of the DLC3 while the DTC is being output.

(c) Method to save the DTC.

Turn the ignition switch OFF while the DTC is being output. Or turn the ES start main switch OFF and then remove the SST from the terminals of the DLC3.

2. CHECKING WARNING FUNCTIONS

- (a) If trouble occurs, the type of trouble is notified by means of alarms, as shown in the following table.
- (b) If a trouble is notified, troubleshoot using DTC.

Indicator lamp	Buzzer	Type	Warning contents	Countermeasures
Flashing	No signal	Unperformed adjustment warning	Initial settings have not been performed	Execute initial settings
Flashing	2 consecutive beeps	Trouble warning	Switch or sensor trouble	<ul style="list-style-type: none"> • Deactivate ES start system by moving operation cancel switch to the cancel position • Troubleshoot using diagnosis trouble codes
ON	3 consecutive beeps	Driver's seat vacant warning	<ul style="list-style-type: none"> • Door is opened while ES start system is activated • Ignition switch is turned off with the shift lever in neutral position while ES start system is activated 	Securely engage parking brake
ON	4 consecutive beeps	Vehicle moving warning	Vehicle moves when shift lever is in neutral position while ES start system is activated	<ul style="list-style-type: none"> • Securely engage parking brake • Increase foot pressure applied to brake pedal
ON	Elapsed time signal	Operating time information	ES start operating time is announced every minute After 1 minute: 1 beep After 2 minutes: 2 beeps After 10 minutes and thereafter: series of beeps repeated 5 times	<ul style="list-style-type: none"> • Securely engage parking brake • Increase foot pressure applied to brake pedal (Alarm is reset after foot pressure applied to brake pedal is increased, and it will start again with the one-minute signal.)

3. CANCEL TIMING ADJUSTMENT

- (a) Turn the ignition switch ON and then turn the ES start main switch ON.
- (b) Press either the "fast" or "slow" of the ES start timing switch for at least 0.5 seconds.
- (c) If the brakes are dragged, fast the timing; if the vehicle lags behind, slow the timing.
- (d) The fast timing can be adjusted up to 8 and the slow timing up to 5, and the settings are indicated by buzzer signals as follows.

Adjustment setting	Buzzer signal
Intermediate setting	Long beep
Slow setting	Short beep
Fast setting	2 short beeps

- (e) If the ES start timing switch is not operated for 5 seconds or more, the buzzer will signal once (short beep) and cancel timing adjustment mode will be terminated.

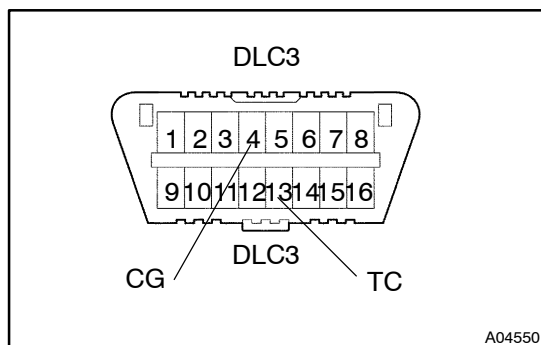
NOTICE:

Cancel timing adjustment mode cannot be activated under the following conditions: if trouble is detected by the self-diagnosis function, if the vehicle speed is 0.5 km/h or more, if the ES Start switch is OFF, or if alarm is activated.

4. CANCEL POSITION INITIAL SETTING

NOTICE:

- **The clutch pedal play must first be properly adjusted before setting the initial cancel position.**
 - **Operating the ES Start system without first adjusting the clutch pedal play may result in premature wear of brakes and clutch, or it may cause the vehicle to move on a downhill grade.**
- (a) Setting the initial cancel position (models equipped with electric governor)
 - (1) Turn the ES start main switch OFF and start the engine with the parking brake engaged.



- (2) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

- (3) Make sure that the clutch pedal has fully returned to its released position, and then press the "fast" of the ES start timing switch for 3 seconds.

HINT:

The buzzer will sound and the indicator lamp will flash at the same time.

- (4) Depress the clutch pedal.
- (5) Shift the shift lever into the 2nd gear and slowly engage the clutch.
- (6) The engine speed will drop slightly and then be restored after about 1 second. When this happens, press the "fast" of the ES start timing switch again.

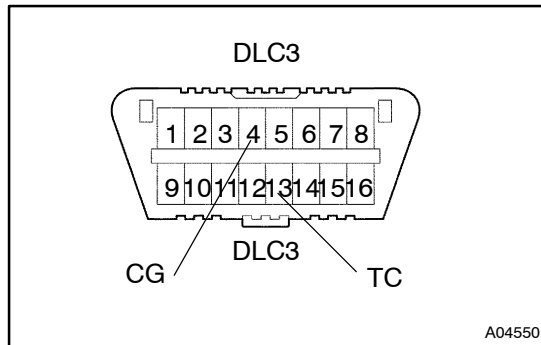
HINT:

The buzzer will sound once and the indicator lamp will go off.

- (7) Remove the SST from the terminals of the DLC3 and turn the ignition switch OFF to terminate the initial setting mode.
- (8) After setting the cancel position, operate the ES start system and make sure that the cancel position is suitable.

NOTICE:

- **Initial setting mode cannot be activated under the following conditions: if trouble is detected by the self-diagnosis function, if the vehicle speed is 0.5 km/h or more and the ES start system is in operation, if the parking brake is not engaged, or if of the DLC3 terminals TC and CG of the DLC3 are not connected.**
- (b) Setting the initial cancel position (models equipped with mechanical governor)
- (1) Turn the ES start main switch OFF and start the engine with the parking brake engaged.



- (2) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

- (3) Make sure that the clutch pedal has fully returned to its released position, and then press the "fast" of the ES start timing switch for 3 seconds.

HINT:

The buzzer will sound and the indicator lamp will flash at the same time.

- (4) Depress the clutch pedal.
- (5) Shift the shift lever into the 2nd gear and slowly engage the clutch.
- (6) When the engine speed indicated on the speedometer drops about 50 rpm, press the "fast" of the ES start timing switch again.

HINT:

The buzzer will sound once and the indicator lamp will go off.

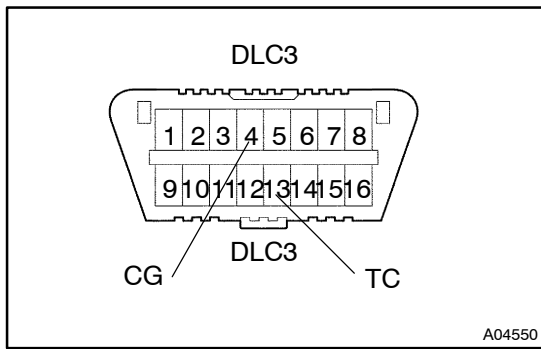
- (7) Remove the SST from the terminals of the DLC3 and turn the ignition switch OFF to terminate the initial setting mode.
- (8) After setting the cancel position, operate the ES start system and make sure that the cancel position is suitable.

NOTICE:

- **Initial setting mode cannot be activated under the following conditions: if trouble is detected by the self-diagnosis function, if the vehicle speed is 0.5 km/h or more and the ES start system is in operation, if the parking brake is not engaged, or if of the DLC3 terminals TC and CG of the DLC3 are not connected.**

5. GRADIENT SENSOR ZERO POINT ADJUSTMENT**NOTICE:**

- **The zero point needs to be adjusted after the hill holder ECU has been replaced or mandatory inspection has been performed.**
 - **Make the adjustment with the vehicle unladen on a level road surface.**
- (a) Turn the ES start main switch OFF and start the engine with the parking brake engaged.



- (b) Using SST, connect terminals TC and CG of the DLC3. SST 09843-18040
- (c) Press the "slow" of the ES start timing switch for 3 seconds.

HINT:

The buzzer will sound and the indicator lamp will flash at the same time.

- (d) Pressing the "slow" of the ES start timing switch again will store the gradient sensor input value in the ECU memory.

HINT:

The buzzer will sound once and the indicator lamp will go off.

- (e) Remove the SST from the terminals of the DLC3 and turn the ignition switch OFF to terminate the zero point adjustment mode.

NOTICE:

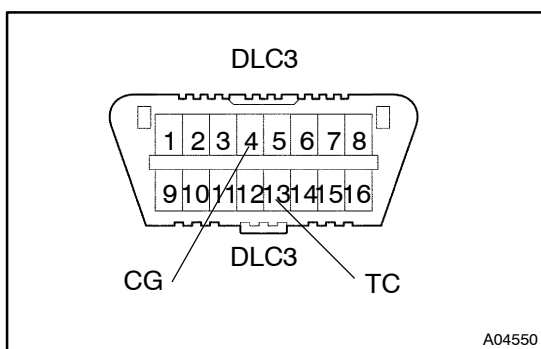
- To terminate the zero point adjustment at any time, remove the SST from the terminals of the DLC3.
- Zero point adjustment mode cannot be activated under the following conditions: if trouble is detected by the self-diagnosis function, if the vehicle speed is 0.5 km/h or more and the ES start system is in operation, if the parking brake is not engaged, or if the vehicle is not level.

6. CLUTCH STROKE SENSOR ADJUSTMENT

NOTICE:

Adjust the clutch stroke sensor after replacing the sensor.

- (a) Turn the ES start main switch OFF and turn the ignition switch to the ON position with the parking brake engaged.



- (b) Using SST, connect terminals TC and CG of the DLC3. SST 09843-18040

- (c) Press the "fast" of the ES start timing switch 3 times.

HINT:

The buzzer will sound and the indicator lamp will flash twice at the same time.

- (d) The clutch stroke sensor set point is determined according to the buzzer signal. Without depressing the clutch pedal, adjust the set point until a continuous buzzer signal is output.

Clutch stroke sensor position	Buzzer
Set point	Continuous beep
Vicinity of set point	Intermittent beep

- (e) Depress the clutch pedal and check to see if the stroke sensor is correctly set.
- (f) Press the "fast" of the ES start timing switch to store the clutch stroke sensor position in the ECU memory.

HINT:

The buzzer will sound once and the indicator lamp will go off.

- (g) Remove the SST from the terminals of the DLC3 and turn the ignition switch OFF to terminate the stroke sensor position adjustment mode.
- (h) Set the initial cancel position.

NOTICE:

- **Always set the initial cancel position after adjusting the clutch stroke sensor position.**
- **The stroke sensor position cannot be adjusted if the vehicle speed is 0.5 km/h or more and the ES start system is in operation, or if of the DLC3 terminals TC and CG of the DLC3 are not connected.**

DIAGNOSTIC TROUBLE CODE CHART

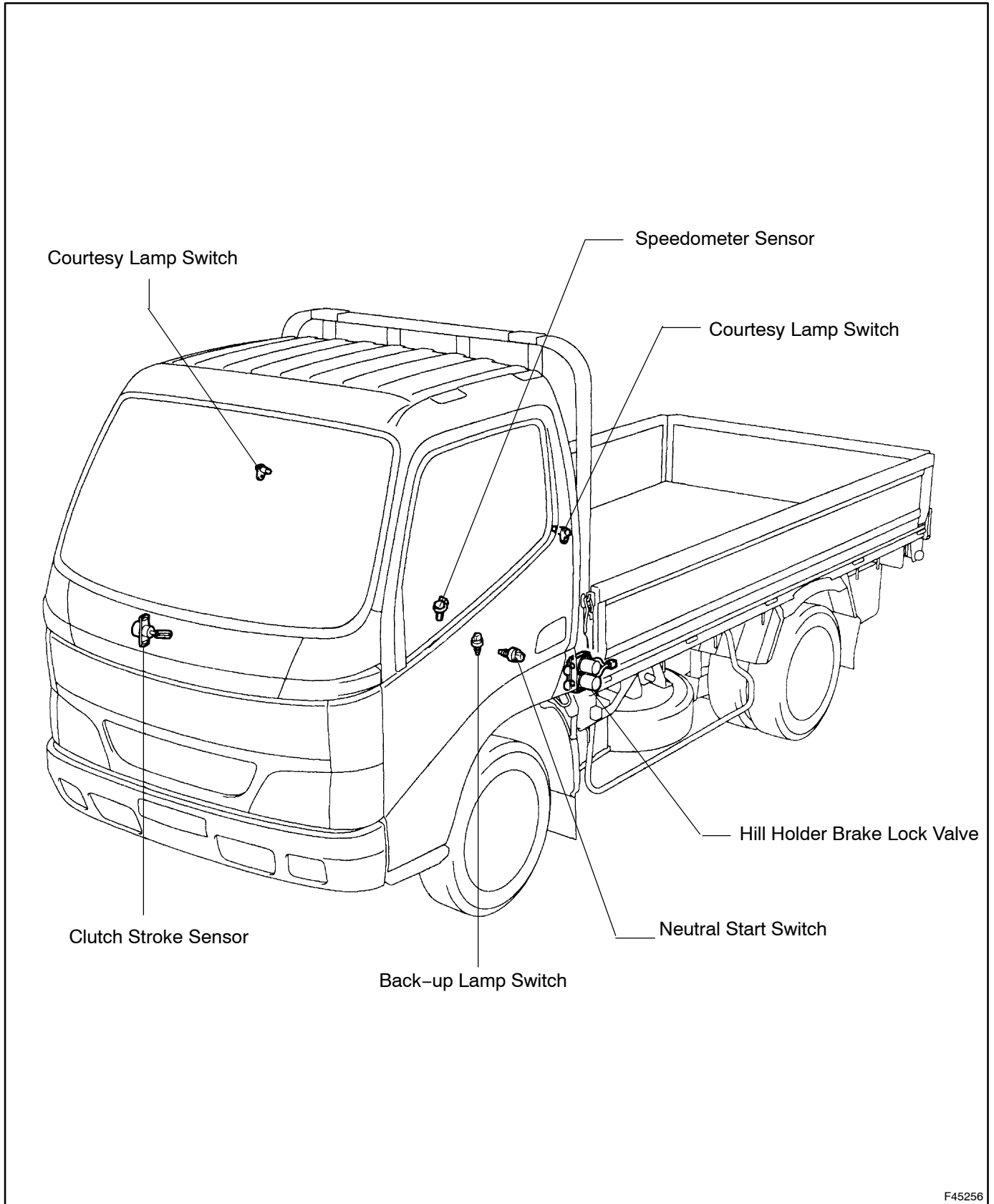
NOTICE:

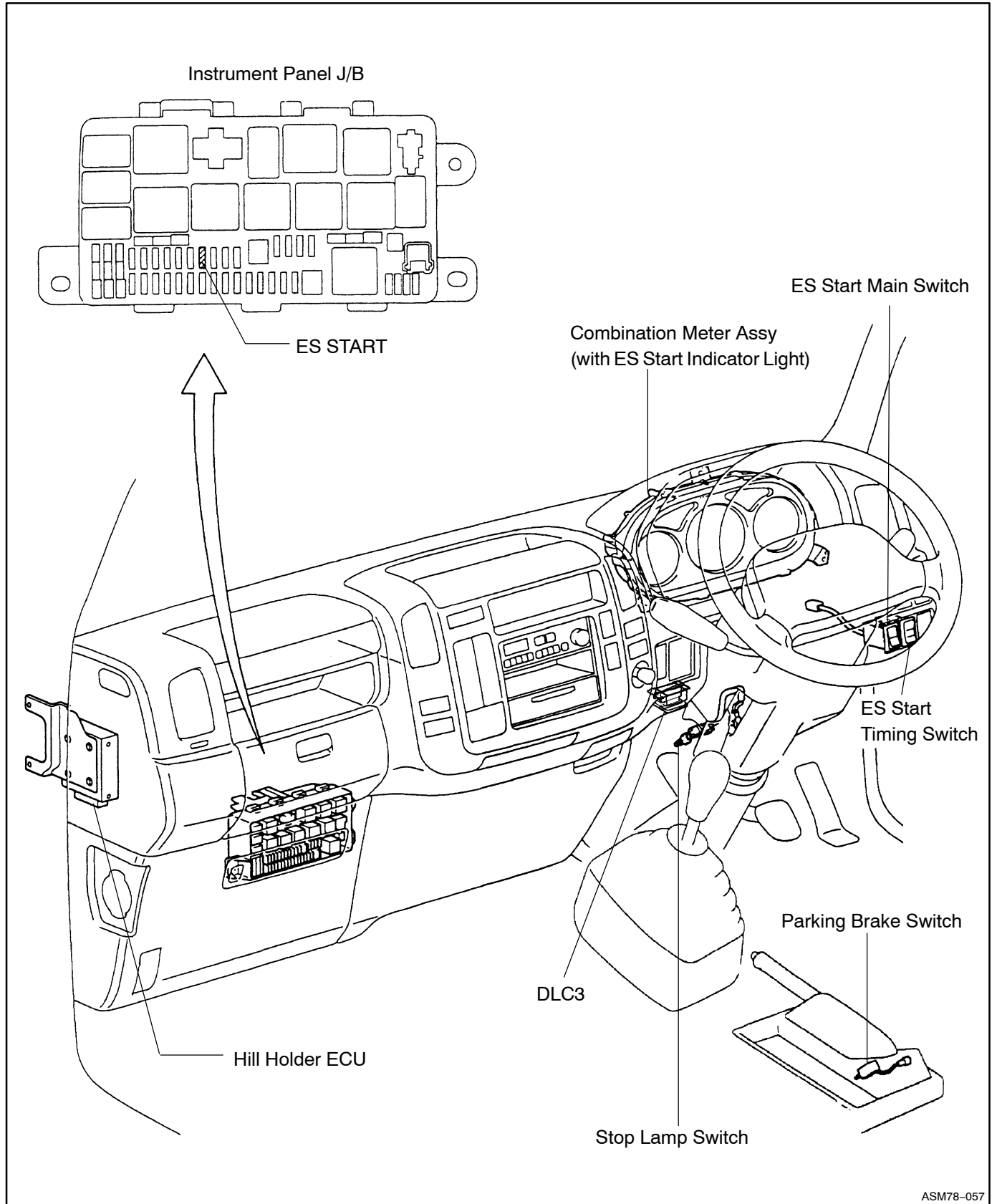
Before replacing or removing the part, turn the ignition switch OFF.

DTC No. (See Page)	Detection Item	Trouble Area
2 (05-186)	Power supply harness disconnection	<ul style="list-style-type: none"> • Battery • Charging system • Hill holder ECU
3 (05-188)	Clutch stroke sensor system malfunction	<ul style="list-style-type: none"> • Clutch stroke sensor • Hill holder ECU
4 (05-191)	Vehicle speed sensor malfunction (Speedometer sensor)	<ul style="list-style-type: none"> • Speedometer sensor • Hill holder ECU
6	Gradient sensor malfunction (in hill holder ECU)	<ul style="list-style-type: none"> • Hill holder ECU
7 (05-193)	Rear ES start valve malfunction (Hill holder brake lock valve)	<ul style="list-style-type: none"> • Hill holder brake lock valve • Hill holder ECU
9 (05-195)	Clutch stroke sensor power supply system malfunction (Clutch stroke sensor)	<ul style="list-style-type: none"> • Clutch stroke sensor • Hill holder ECU
11 (05-198)	Neutral start switch system or backup light switch* system malfunction	<ul style="list-style-type: none"> • Neutral start switch • Back-up lamp switch • Hill holder ECU
12 (05-201)	Neutral start switch system malfunction	<ul style="list-style-type: none"> • Neutral start switch • Speedometer sensor • Hill holder ECU
13 (05-204)	Stop light switch malfunction (Stop lamp switch)	<ul style="list-style-type: none"> • Stop lamp switch • Hill holder ECU
14	Controller (thermistor) malfunction	<ul style="list-style-type: none"> • Hill holder ECU
16	Controller (E. PROM) malfunction	<ul style="list-style-type: none"> • Hill holder ECU
18 (05-206)	ES Start main switch malfunction	<ul style="list-style-type: none"> • ES start main switch • Hill holder ECU
19 (05-209)	Front ES start valve malfunction (Hill holder brake lock valve)	<ul style="list-style-type: none"> • Hill holder brake lock valve • Hill holder ECU
21 (05-211)	ES start timing switch malfunction	<ul style="list-style-type: none"> • ES start timing switch • Hill holder ECU

*: Back-up lamp switch

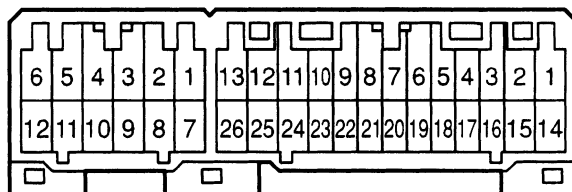
LOCATION





TERMINALS OF ECU

1. CHECK HILL HOLDER ECU



F15689

Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage (V)
VB (E16-1, E16-14) ↔ PG (E16-3, E16-16)	B-O ↔ W-B	Constant	20 - 28
KSW (E16-2, E16-15) ↔ PG (E16-3, E16-16)	B-R ↔ W-B	Ignition switch ON	20 - 28
ON (E16-9) ↔ PG (E16-3, E16-16)	R-W ↔ W-B	Ignition switch ON, ES start main switch ON → OFF	20 - 28 → Below 2
OFF (E16-22) ↔ PG (E16-3, E16-16)	L-R ↔ W-B	Ignition switch ON, ES start main switch OFF → ON	20 - 28 → Below 2
FTSW (E16-11) ↔ PG (E16-3, E16-16)	G-W ↔ W-B	ES start timing switch "fast" pressed → unpressed	20 - 28 → Below 2
SLSW (E16-24) ↔ PG (E16-3, E16-16)	P-L ↔ W-B	ES start timing switch "slow" pressed → unpressed	20 - 28 → Below 2
SSW (E16-8) ↔ PG (E16-3, E16-16)	G-W ↔ W-B	Brake pedal depressed → undepressed	20 - 28 → Below 2
RSW (E16-7) ↔ PG (E16-3, E16-16)	R-B ↔ W-B	Shift lever R position → other than R position	20 - 28 → Below 2
DIC (E16-21) ↔ PG (E16-3, E16-16)	R ↔ W-B	Constant	20 - 28
NSW (E16-6) ↔ PG (E16-3, E16-16)	B-W ↔ W-B	Shift lever neutral position → other than neutral position	20 - 28 → Below 2
DSW (E16-20) ↔ PG (E16-3, E16-16)	L-O ↔ W-B	Driver door is locked → unlocked	20 - 28 → Below 2
PSW (E16-19) ↔ PG (E16-3, E16-16)	B-L ↔ W-B	Parking brake is not used → used	20 - 28 → Below 2
ELP (E16-5) ↔ PG (E16-3, E16-16)	LG-R ↔ W-B	ES start not operated → operated	20 - 28 → Below 2
ESV (E16-4) ↔ PG (E16-3, E16-16)	BR-Y ↔ W-B	ES start not operated → operated	Below 2 → 20 - 28
ESV2 (E16-17) ↔ PG (E16-3, E16-16)	Y-B ↔ W-B	ES start not operated → operated	Below 2 → 20 - 28
CSTV (E15-1) ↔ CSTG (E15-7)	W-L ↔ L	Ignition switch ON	4.5 - 5.5
CST (E15-2) ↔ CSTG (E15-7)	L-R ↔ L	Clutch pedal depressed → undepressed	3 or more → Below 1
SS (E16-10) ↔ PG (E16-3, E16-16)	G-R ↔ W-B	Vehicle driving	Pulse generation

If the result is not as specified, the ECU may have a malfunction.

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

Symptom	Suspected Area	See Page
ES start function does not operate	<ol style="list-style-type: none"> 1. Operation have failed 2. ES start indicator does not come on and buzzer does not sound when ignition switch is turned ON 3. Function of initial setting, zero point adjustment and diagnosis indication, etc. operate 4. Unperformed adjustment warning function is operating <ul style="list-style-type: none"> • Perform the initial setting 5. Trouble warning function is operating <ul style="list-style-type: none"> • Analyze problem by diagnosis function 6. Stop lamp switch 7. Parking brake switch 8. Speedometer sensor 9. Clutch stroke sensor 10. Hill holder brake lock valve 11. Brake line 12. Hill holder ECU 	<p style="text-align: center;">-</p> <p style="text-align: center;">05-186</p> <p style="text-align: center;">05-174</p> <p style="text-align: center;">05-174</p> <p style="text-align: center;">05-174</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">05-183</p>
ES start function does not cancel the brakes	<ol style="list-style-type: none"> 1. Operation have failed 2. Unperformed adjustment warning function is operating <ul style="list-style-type: none"> • Perform the initial setting 3. Trouble warning function is operating <ul style="list-style-type: none"> • Securely set parking brake and analyze problem by diagnosis function 4. Driver's seat vacant warning function is operating <ul style="list-style-type: none"> • Securely engage parking brake 5. Vehicle moving warning function is operating <ul style="list-style-type: none"> • Securely engage parking brake and increase foot pressure applied to brake pedal 6. Operation time information function is operating <ul style="list-style-type: none"> • Securely engage parking brake and increase foot pressure applied to brake pedal 7. Neutral start switch (A/T) 8. Back-up lamp switch 9. Clutch stroke sensor 10. Hill holder brake lock valve 11. Brake line 12. Hill holder ECU 	<p style="text-align: center;">-</p> <p style="text-align: center;">05-174</p> <p style="text-align: center;">05-174</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">05-183</p>
ES start function does not cancel the brakes (Cancellation by parking brake)	<ol style="list-style-type: none"> 1. Operation have failed 2. Parking brake switch 3. Hill holder brake lock valve 4. Brake line 5. Hill holder ECU 	<p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">05-183</p>
ES start function does not cancel the brakes (Cancellation by ES start main switch)	<ol style="list-style-type: none"> 1. Operation have failed 2. ES start main switch 3. Hill holder brake lock valve 4. Brake line 5. Hill holder ECU 	<p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">05-183</p>

<p>Cancel position initial setting is impossible (It does not enter into initial setting mode)</p>	<ol style="list-style-type: none"> 1. Operation have failed 2. The following conditions are not satisfied: <ul style="list-style-type: none"> •ES start function •Zero point adjustment function •Cancel position adjustment function •Other functions 3. Warning function is operating 4. Parking brake switch 5. ES start main switch 6. ES start timing switch 7. Hill holder ECU 	<p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>05-183</p>
<p>Cancel position initial setting is impossible (It enters into initial setting mode)</p>	<ol style="list-style-type: none"> 1. Operation have failed 2. Neutral start switch 3. Back-up lamp switch 4. Clutch stroke sensor 5. ES start timing switch 6. Hill holder ECU 	<p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>05-183</p>
<p>Zero point adjustment of the gradient sensor is impossible (It does not enter into zero point adjustment mode)</p>	<ol style="list-style-type: none"> 1. Operation have failed 2. The following conditions are not satisfied: <ul style="list-style-type: none"> •ES start function •Zero point adjustment function •Cancel position adjustment function •Other functions 3. Warning function is operating 4. Parking brake switch 5. ES start main switch 6. ES start timing switch 7. Hill holder ECU 	<p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>–</p> <p>05-183</p>
<p>Zero point adjustment of the gradient sensor is impossible (It enters into zero point adjustment mode)</p>	<ol style="list-style-type: none"> 1. Operation have failed 2. ES start timing switch 3. Hill holder ECU 	<p>–</p> <p>–</p> <p>05-183</p>
<p>Brake is dragged when the vehicle is started</p>	<ol style="list-style-type: none"> 1. Make the cancel position adjustment by the fast timing switch 2. Perform the cancel position initial setting 3. Hill holder brake lock valve 4. Brake line 5. Hill holder ECU 	<p>05-174</p> <p>05-174</p> <p>–</p> <p>–</p> <p>05-183</p>
<p>Vehicle lags behind when started</p>	<ol style="list-style-type: none"> 1. Make the cancel position adjustment by the slow timing switch 2. Perform the cancel position initial setting 3. Hill holder brake lock valve 4. Brake line 5. Hill holder ECU 	<p>05-174</p> <p>05-174</p> <p>–</p> <p>–</p> <p>05-183</p>

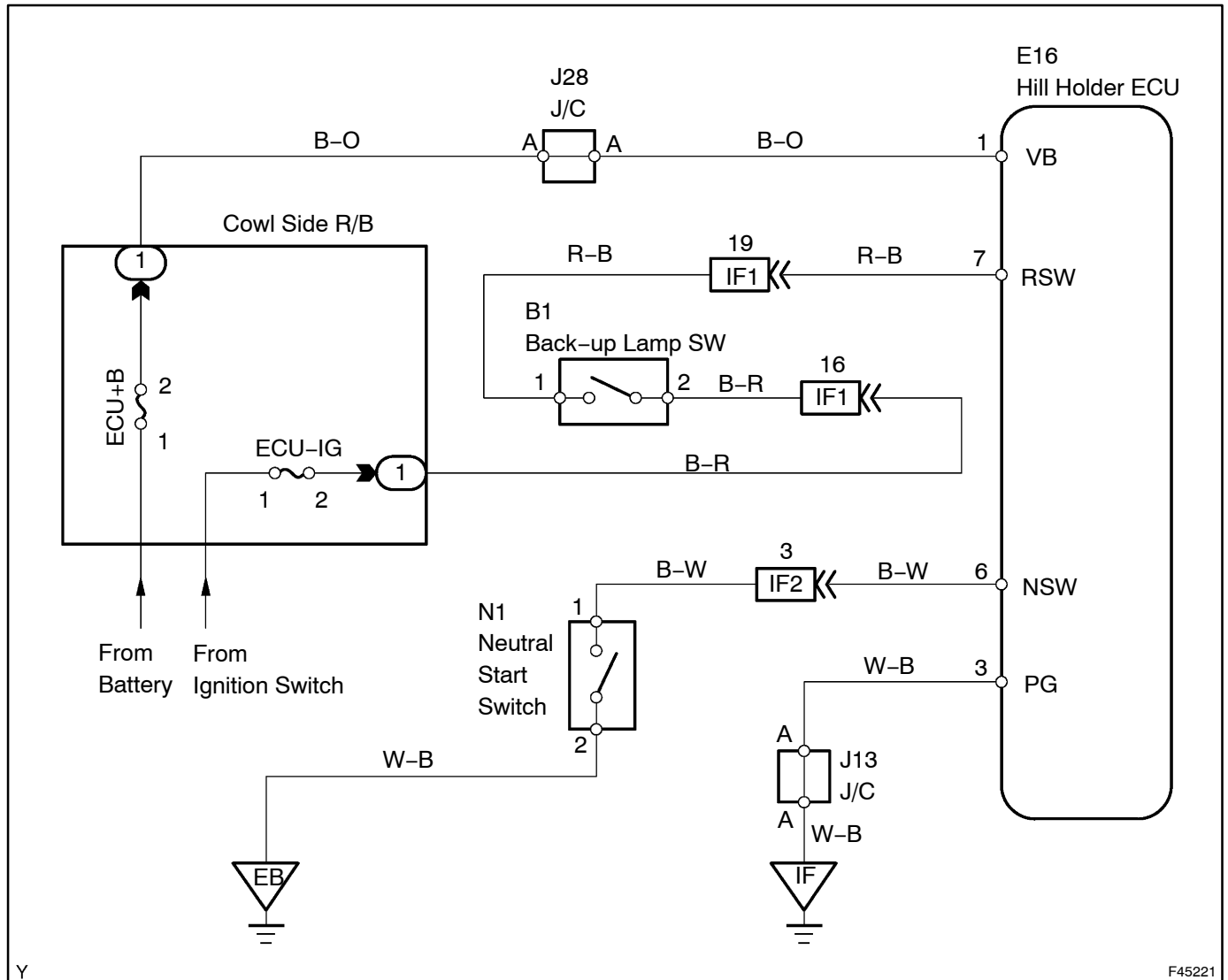
DTC	2	POWER SUPPLY HARNESS DISCONNECTION
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CIRCUIT DESCRIPTION

Power is supplied to the hill holder ECU via the ECU-B fuse.

DTC No.	DTC Detection Condition	Trouble Area
2	Power source voltage to terminal VB is less than 10 V for 2 sec.	<ul style="list-style-type: none"> • Battery • Charging system • Hill holder ECU

WIRING DIAGRAM

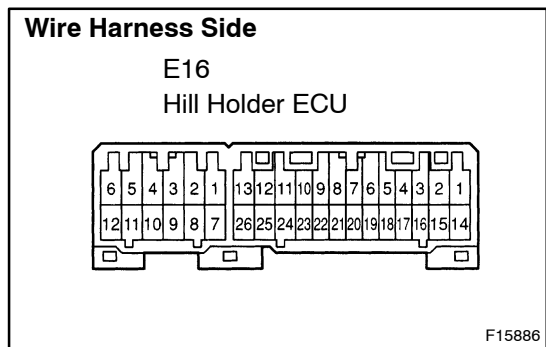


Y

F45221

INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (HILL HOLDER ECU VOLTAGE)



- (a) Check the voltage of the wire harness side connector.
Standard:

Symbols (Terminal No.)	Condition	Specified Condition
VB (E16-1, E16-14) ↔ PG (E16-3, E16-16)	Ignition switch ON	20 - 28 V

NG → REPLACE CHARGING SYSTEM OR BATTERY

OK

2 CHECK DTC

- (a) Clear the DTCs stored in the memory.
(b) Check for DTC again.

Standard: Normal code is output

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

CHECK AND REPLACE HILL HOLDER ECU

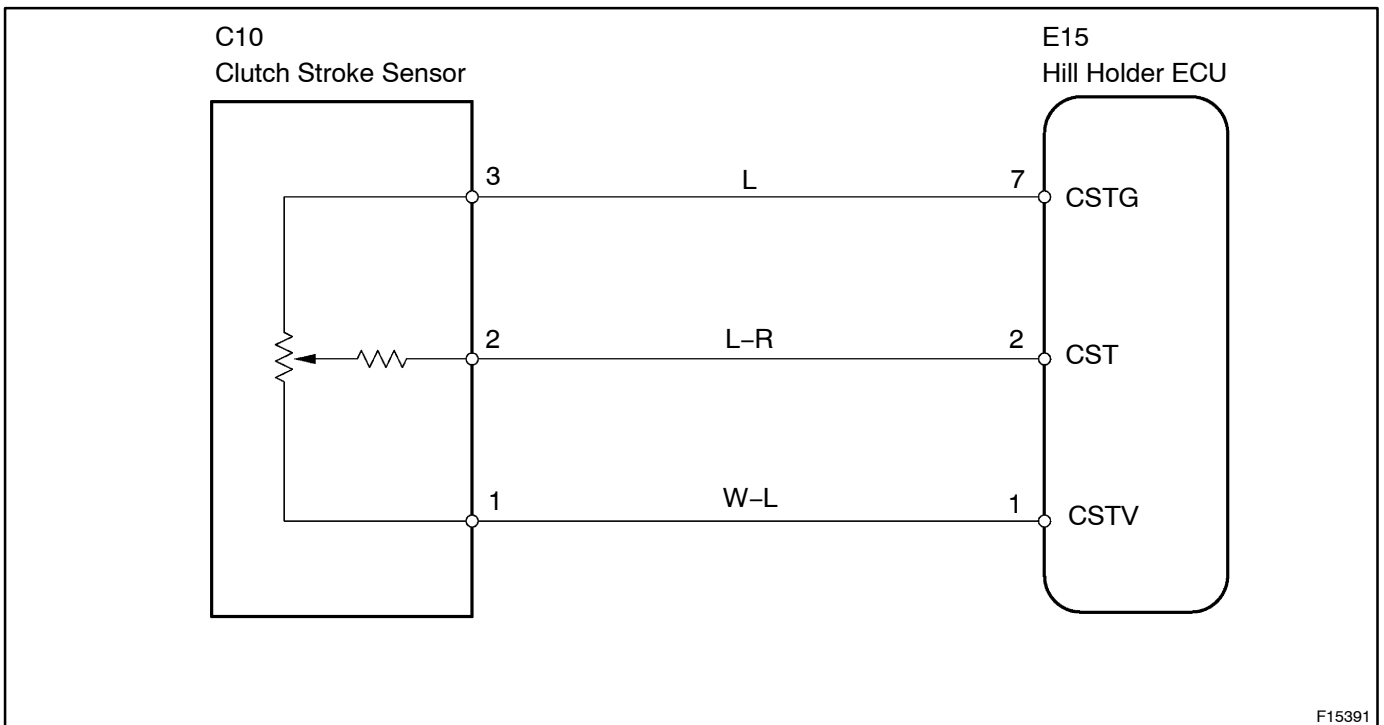
DTC	3	CLUTCH STROKE SENSOR SYSTEM MALFUNCTION
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CIRCUIT DESCRIPTION

The clutch stroke sensor detects the depressed volume of the clutch pedal and sends the signal to the hill holder ECU.

DTC No.	DTC Detection Condition	Trouble Area
3	While vehicle is accelerated to 40 km/h from 0 km/h, deference between min. voltage and max. voltage of output signals from clutch stroke sensor becomes 2 V or less continuously 5 times.	<ul style="list-style-type: none"> • Clutch stroke sensor • Hill holder ECU

WIRING DIAGRAM

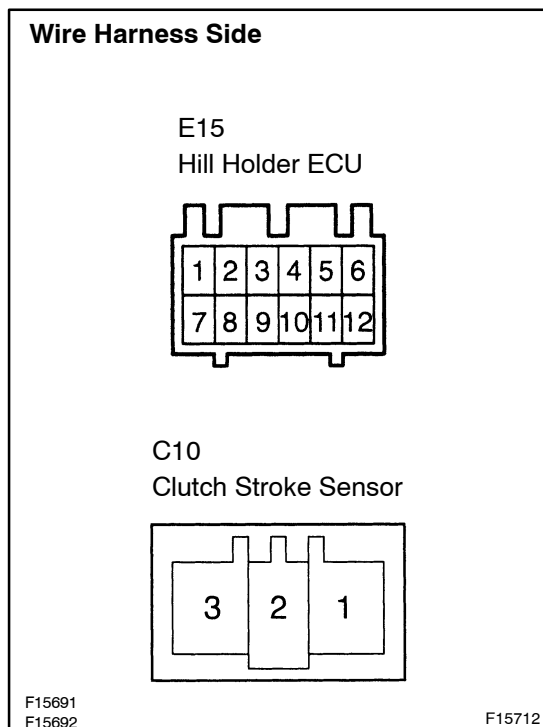


INSPECTION PROCEDURE

1 ADJUST CLUTCH STROKE SENSOR (See page 05-174)



2 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ CLUTCH STROKE SENSOR)



- (a) Disconnect the E15 ECU connector.
- (b) Disconnect the C10 sensor connector.
- (c) Check the continuity between the wire harness side connectors.

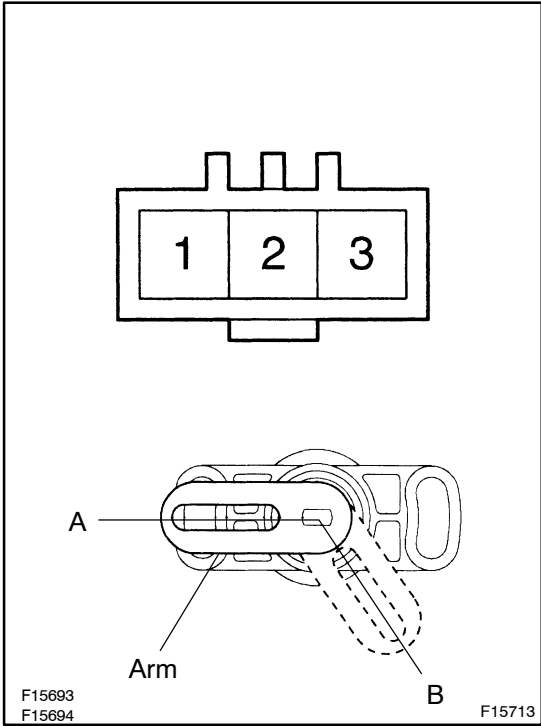
Standard:

Symbols (Terminal No.)	Specified Condition
CSTV (E15-1) ↔ - (C10-3)	Continuity
CST (E15-2) ↔ - (C10-2)	Continuity
CSTG (E15-7) ↔ - (C10-1)	Continuity

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 INSPECT CLUTCH STROKE SENSOR (See page 05-174)



(a) Check the sensor continuity.

Standard:

Terminal No.	Sensor Position	Specified Condition
1 ↔ 3	Constant	1.6 – 2.4 kΩ
2 ↔ 3	Position A	0.32 – 0.48 kΩ
2 ↔ 3	Position B	1.92 – 2.88 kΩ
2 ↔ 3	Arm is moved into position B from A	Charging

NG → **REPLACE CLUTCH STROKE SENSOR**

OK

CHECK AND REPLACE HILL HOLDER ECU

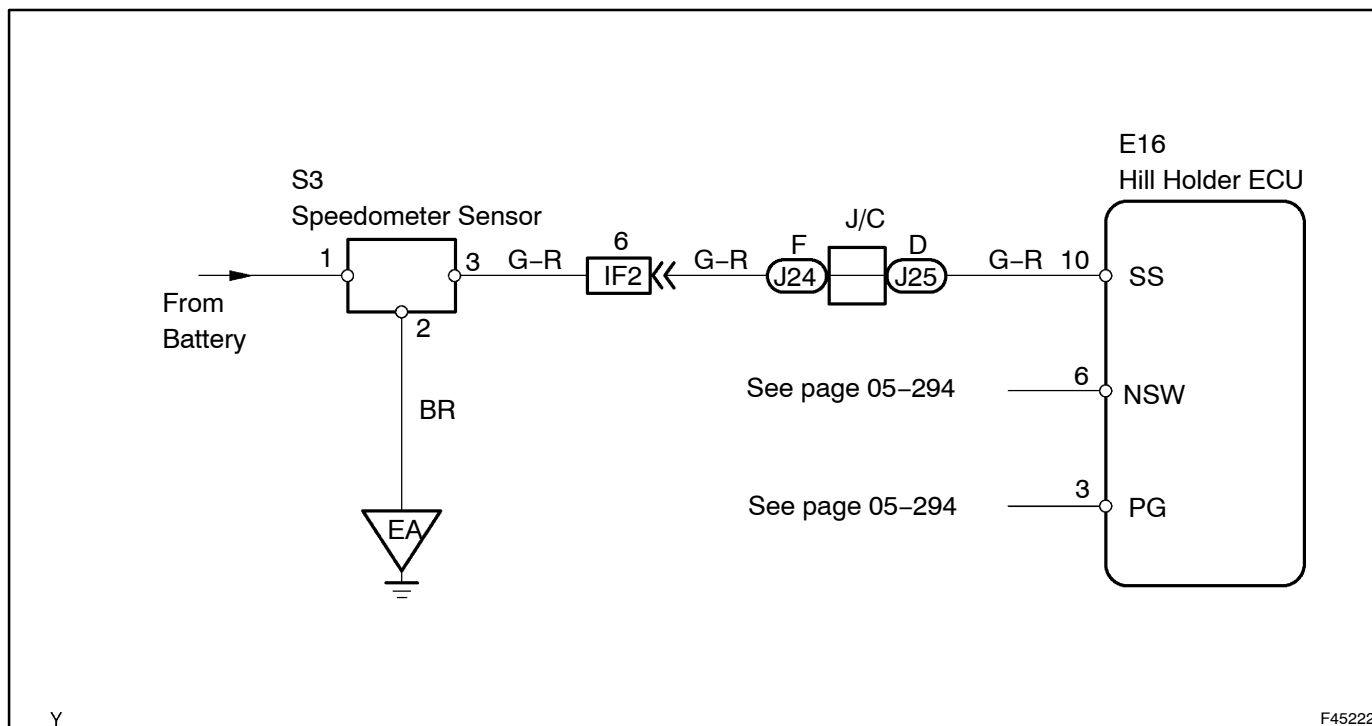
DTC	4	VEHICLE SPEED SENSOR MALFUNCTION (SPEEDOMETER SENSOR)
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CIRCUIT DESCRIPTION

The speedometer sensor detects vehicle speed and sends the signal to the hill holder ECU.

DTC No.	DTC Detection Condition	Trouble Area
4	While deceleration sensor changes with gear shifted and clutch connected, no vehicle speed pulse occurs for 20 sec.	<ul style="list-style-type: none"> • Speedometer sensor • Hill holder ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

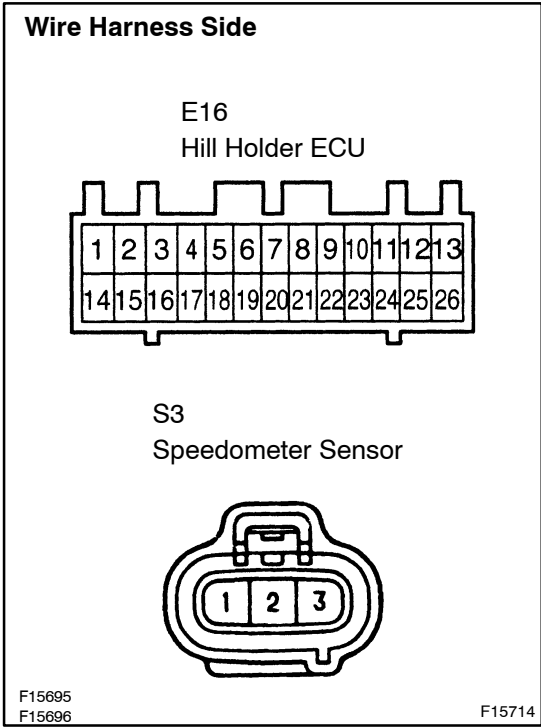
1	CHECK SPEEDOMETER (OPERATION)
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(a) Check that the speedometer is working properly.

NG	REPLACE SPEEDOMETER SENSOR
-----------	-----------------------------------

OK

2 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ SPEEDOMETER SENSOR)



- (a) Disconnect the E16 ECU connector.
- (b) Disconnect the S3 sensor connector.
- (c) Check the continuity between the wire harness side connectors.

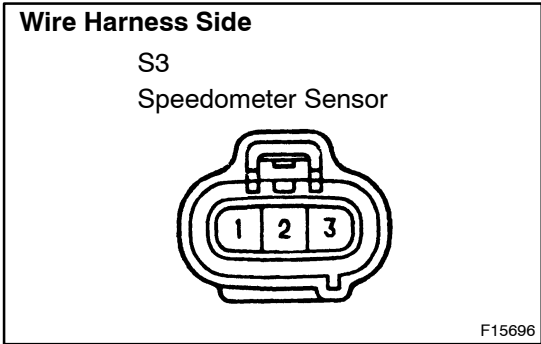
Standard:

Symbols (Terminal No.)	Specified Condition
SS (E16-10) ↔ - (S3-3)	Continuity

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 CHECK SPEEDOMETER SENSOR (POWER SOURCE)



- (a) Disconnect the S3 sensor connector.
- (b) Check the voltage of the wire harness side connector.

Standard:

Terminal No.	Condition	Specified Condition
S3-1 ↔ S3-2	Ignition switch ON	20 - 28 V

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPAIR OR REPLACE HILL HOLDER ECU

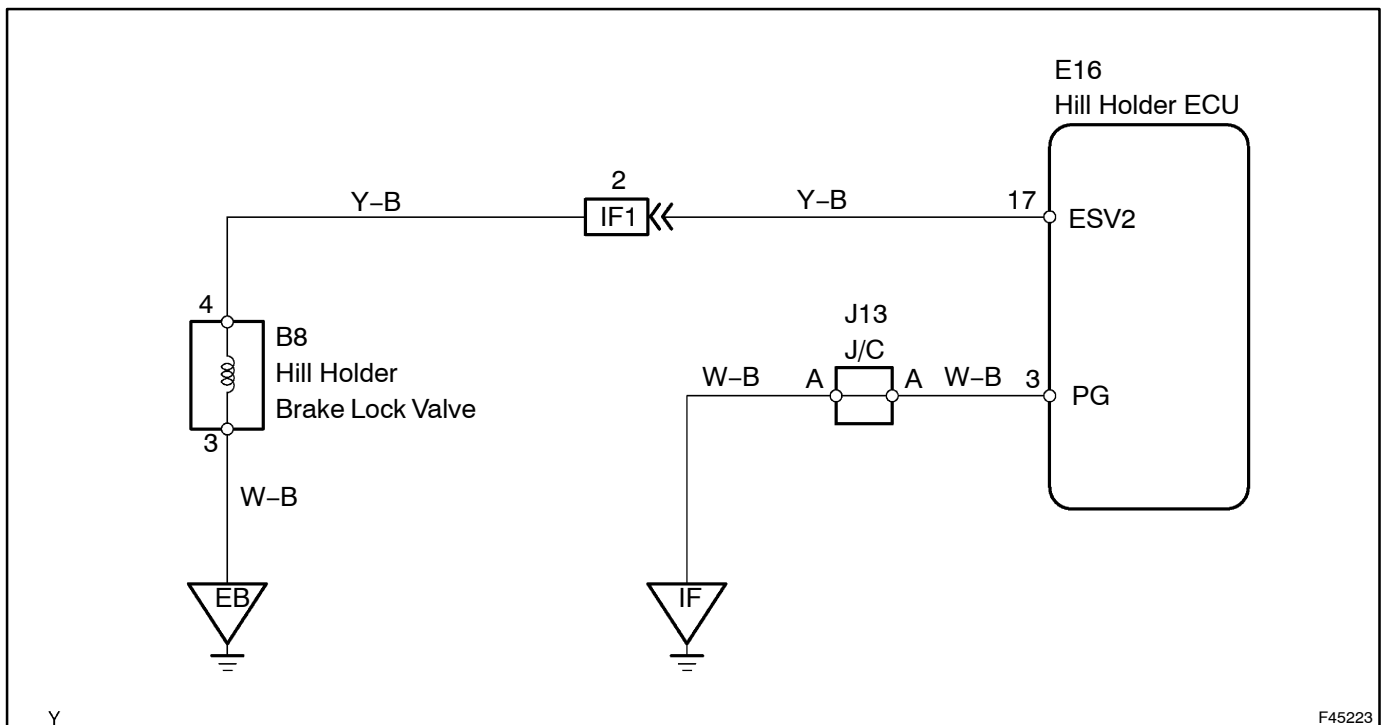
DTC	7	REAR ES START VALVE MALFUNCTION (HILL HOLDER BRAKE LOCK VALVE)
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CIRCUIT DESCRIPTION

The hill holder ECU feeds current to the hill holder brake lock valve to control it. When a command signal is input to the hill holder ECU from the ES start main switch, current is fed to the hill holder brake lock valve to operate the valve and the brake hydraulic pressure is maintained.

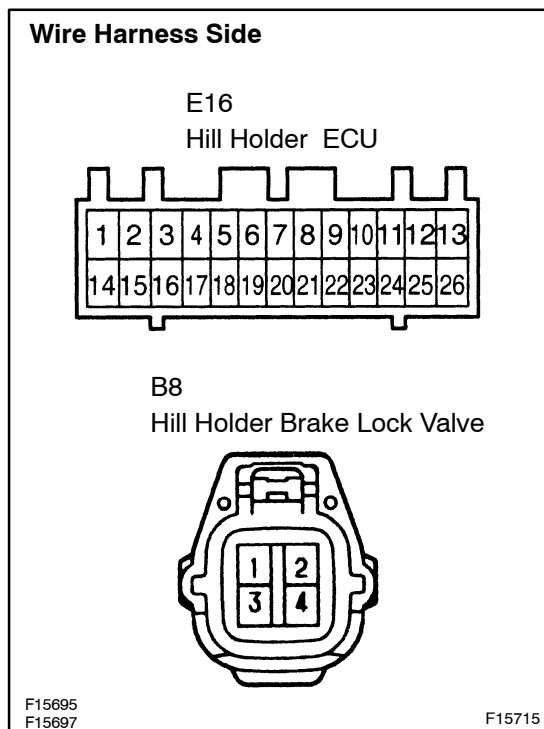
DTC No.	DTC Detection Condition	Trouble Area
7	Either condition 1. or 2. is detected: 1. Current OFF (open circuit) 2. Current ON (short circuit)	<ul style="list-style-type: none"> • Hill holder brake lock valve • Hill holder ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ HILL HOLDER BRAKE LOCK VALVE)



- (a) Disconnect the E16 ECU connector.
- (b) Disconnect the B8 valve connector.
- (c) Check the continuity between the wire harness side connectors.

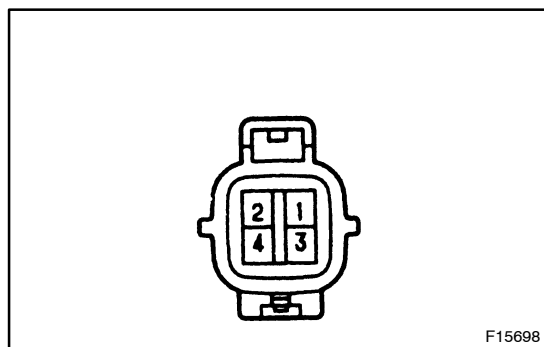
Standard:

Symbols (Terminal No.)	Specified Condition
ESV2 (E16-17) ↔ - (B8-3)	Continuity
PG (E16-3) ↔ - (B8-4)	Continuity

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 INSPECT HILL HOLDER BRAKE LOCK VALVE



- (a) Check the resistance of the hill holder brake lock valve continuity.

Standard:

Terminal No.	Condition	Specified Condition
1 ↔ 2	Constant	50 - 60 Ω
3 ↔ 4	Constant	50 - 60 Ω

NG → REPLACE HILL HOLDER BRAKE LOCK VALVE

OK

CHECK AND REPLACE HILL HOLDER ECU

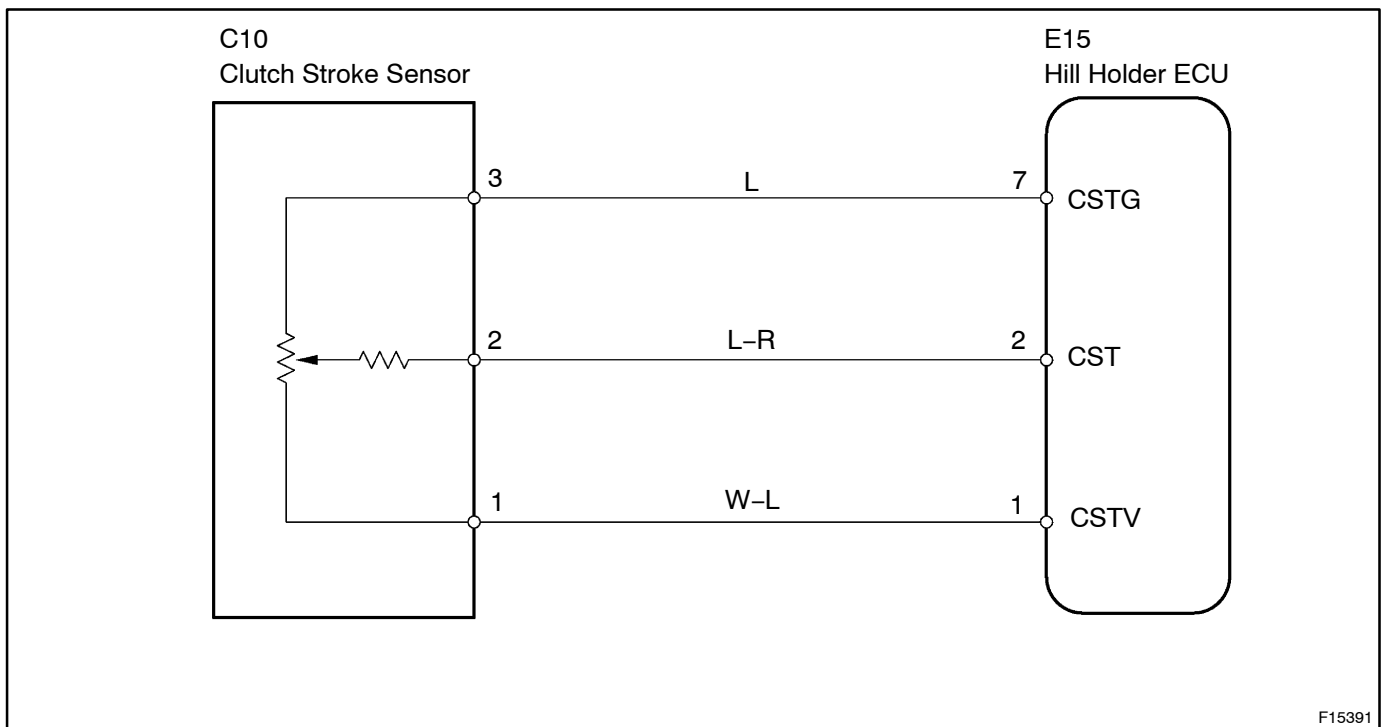
DTC	9	CLUTCH STROKE SENSOR POWER SUPPLY SYSTEM MALFUNCTION (CLUTCH STROKE SENSOR)
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CIRCUIT DESCRIPTION

The clutch stroke sensor detects the depressed volume of the clutch pedal and sends the signal to the hill holder ECU.

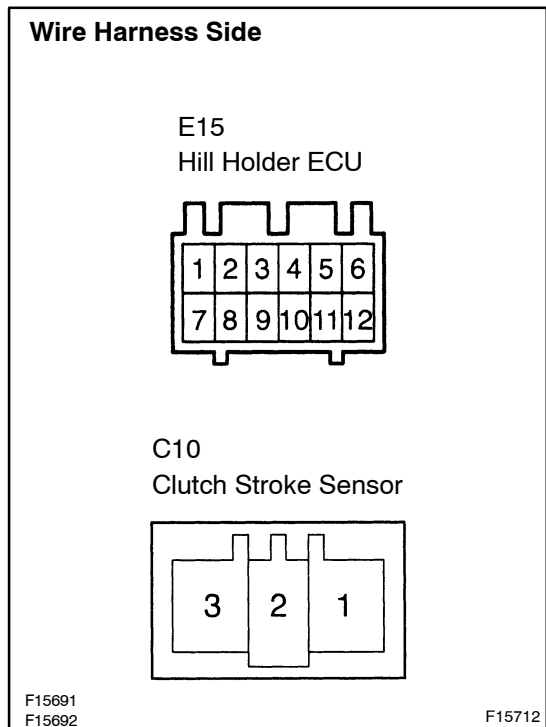
DTC No.	DTC Detection Condition	Trouble Area
9	5 V power source voltage for sensor is more than 7.5 V or less than 4.0 V for 2 sec. or more.	<ul style="list-style-type: none"> • Clutch stroke sensor • Hill holder ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ CLUTCH STROKE SENSOR)



- (a) Disconnect the E15 ECU connector.
- (b) Disconnect the C10 sensor connector.
- (c) Check the continuity between the wire harness side connectors.

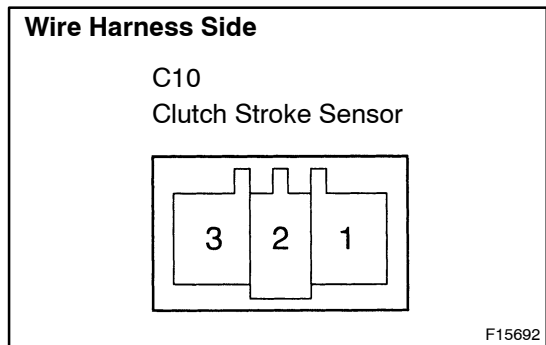
Standard:

Symbols (Terminal No.)	Specified Condition
CSTV (E15-1) ↔ - (C10-3)	Continuity
CST (E15-2) ↔ - (C10-2)	Continuity
CSTG (E15-7) ↔ - (C10-1)	Continuity

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 CHECK CLUTCH STROKE SENSOR (VOLTAGE)



- (a) Disconnect the C10 sensor connector.
- (b) Check the voltage of the wire harness side connector.

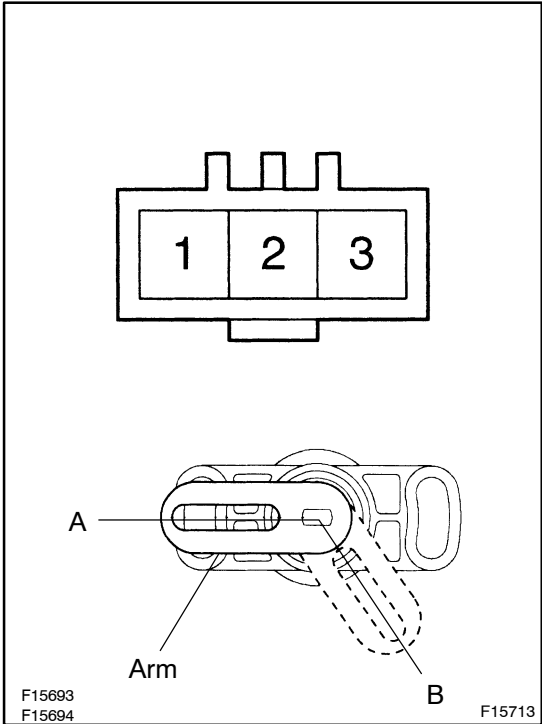
Standard:

Terminal No.	Condition	Specified Condition
C10-1 ↔ C10-3	Ignition switch ON	4 - 6 V

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 CHECK CLUTCH STROKE SENSOR (CONTINUITY)



(a) Check the clutch stroke sensor continuity.

Standard:

Terminal No.	Condition	Specified Condition
1 ↔ 3	Constant	1.6 – 2.4 kΩ
2 ↔ 3	Position A	0.32 – 0.48 kΩ
2 ↔ 3	Position B	1.92 – 2.88 kΩ
2 ↔ 3	Arm is moved into position B from A	Charging

NG → **REPLACE CLUTCH STROKE SENSOR**

OK

CHECK AND REPLACE HILL HOLDER ECU

DTC	11	NEUTRAL START SWITCH SYSTEM OR BACKUP LIGHT SWITCH* SYSTEM MALFUNCTION
------------	-----------	---

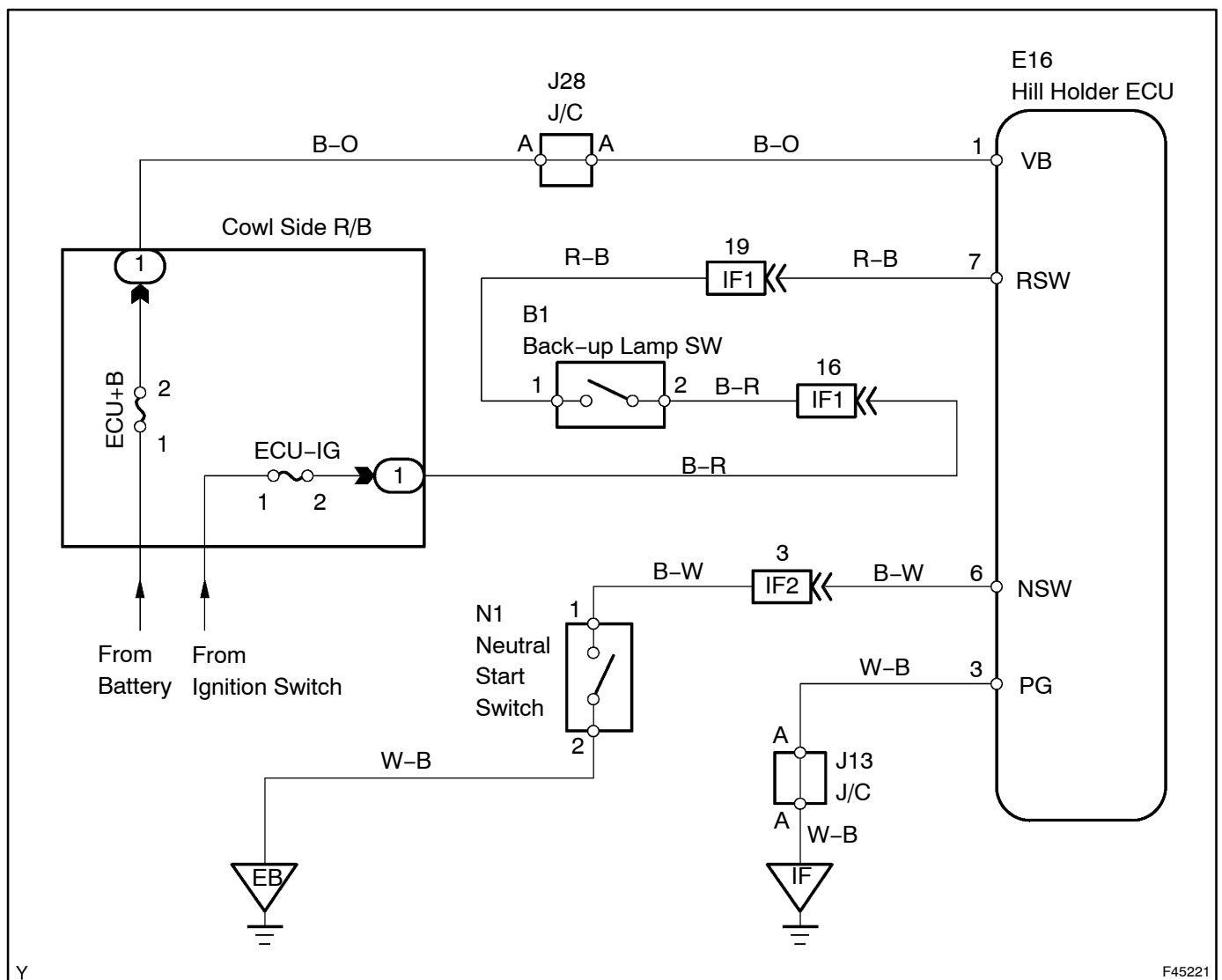
*: Back-up lamp switch

CIRCUIT DESCRIPTION

The neutral start switch and the back-up lamp switch output command signals to keep the brake hydraulic pressure and to release it to the hill holder ECU.

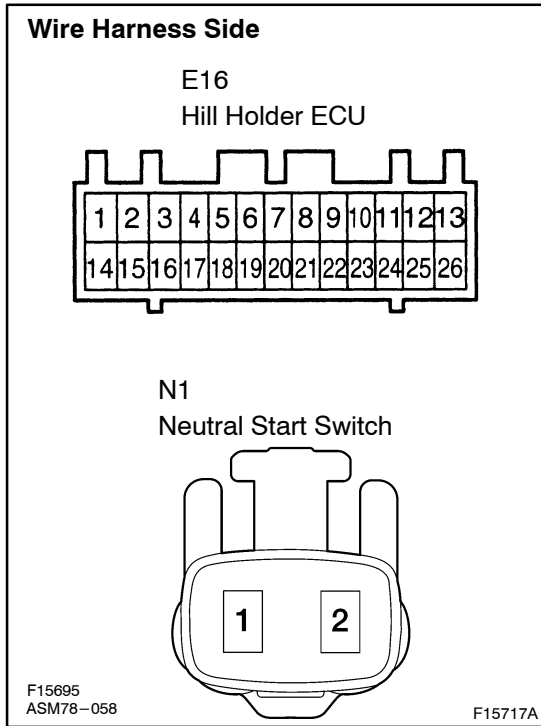
DTC No.	DTC Detection Condition	Trouble Area
11	Both of neutral start switch and back-up lamp switch are ON for 2 sec.	<ul style="list-style-type: none"> • Neutral start switch • Back-up lamp switch • Hill holder ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ NEUTRAL START SWITCH)



- (a) Disconnect the E16 ECU connector.
- (b) Disconnect the N1 switch connector.
- (c) Check the continuity between the wire harness side connectors.

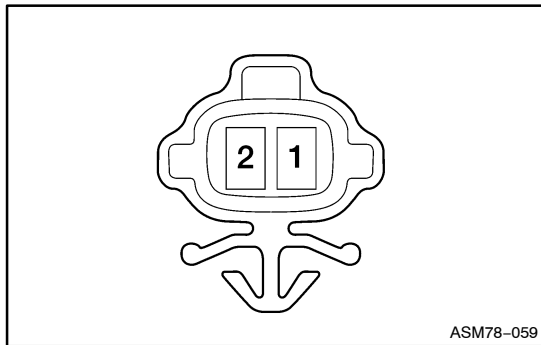
Standard:

Symbols (Terminal No.)	Specified Condition
General Ground ↔ - (N1-2)	Continuity
NSW (E16-6) ↔ - (N1-1)	Continuity

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 INSPECT NEUTRAL START SWITCH



- (a) Check the switch continuity.

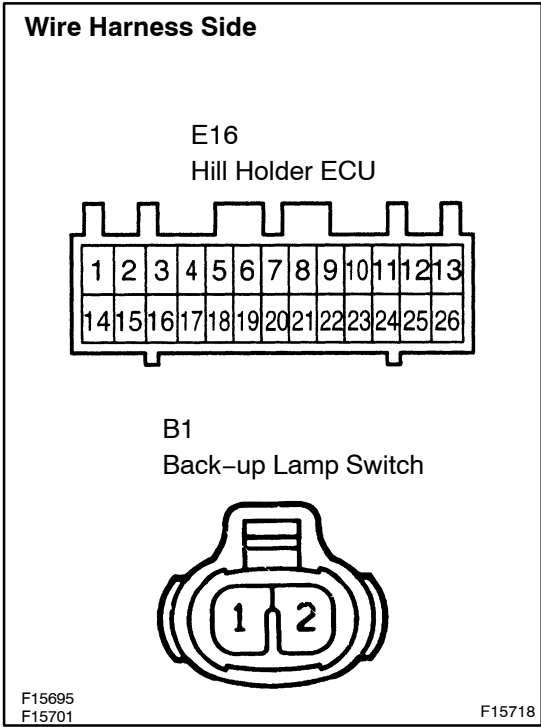
Standard:

Terminal No.	Shift Lever Position	Specified Condition
1 ↔ 2	Gear in	Continuity
1 ↔ 2	Gear neutral	No Continuity

NG REPLACE NEUTRAL START SWITCH

OK

3 CHECK HARNESS AND CONNECTOR (HILL HOLDER ECU ↔ BACK-UP LAMP SWITCH)



- (a) Disconnect the E16 ECU connector.
- (b) Disconnect the B1 switch connector.
- (c) Check the continuity between the wire harness side connectors.

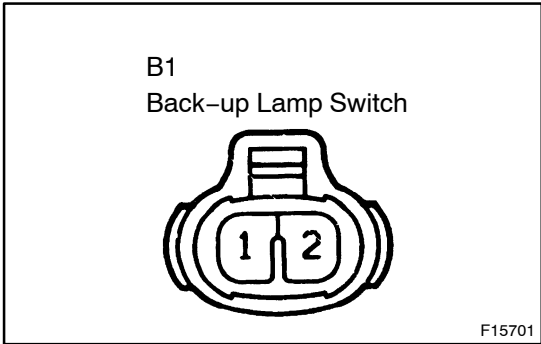
Standard:

Symbols (Terminal No.)	Specified Condition
PG (E16-7) ↔ - (B1-1)	Continuity

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 INSPECT BACK UP LAMP SWITCH ASSY (VOLTAGE)



- (a) Disconnect the B1 switch connector.
- (b) Check the voltage between the wire harness side connector and the body ground.

Standard:

Terminal No.	Switch Position	Specified Condition
B1-2 ↔ Body ground	Ignition switch ON	20-28 V

NG → **REPLACE BACK UP LAMP SWITCH ASSY**

OK

CHECK AND REPLACE HILL HOLDER ECU

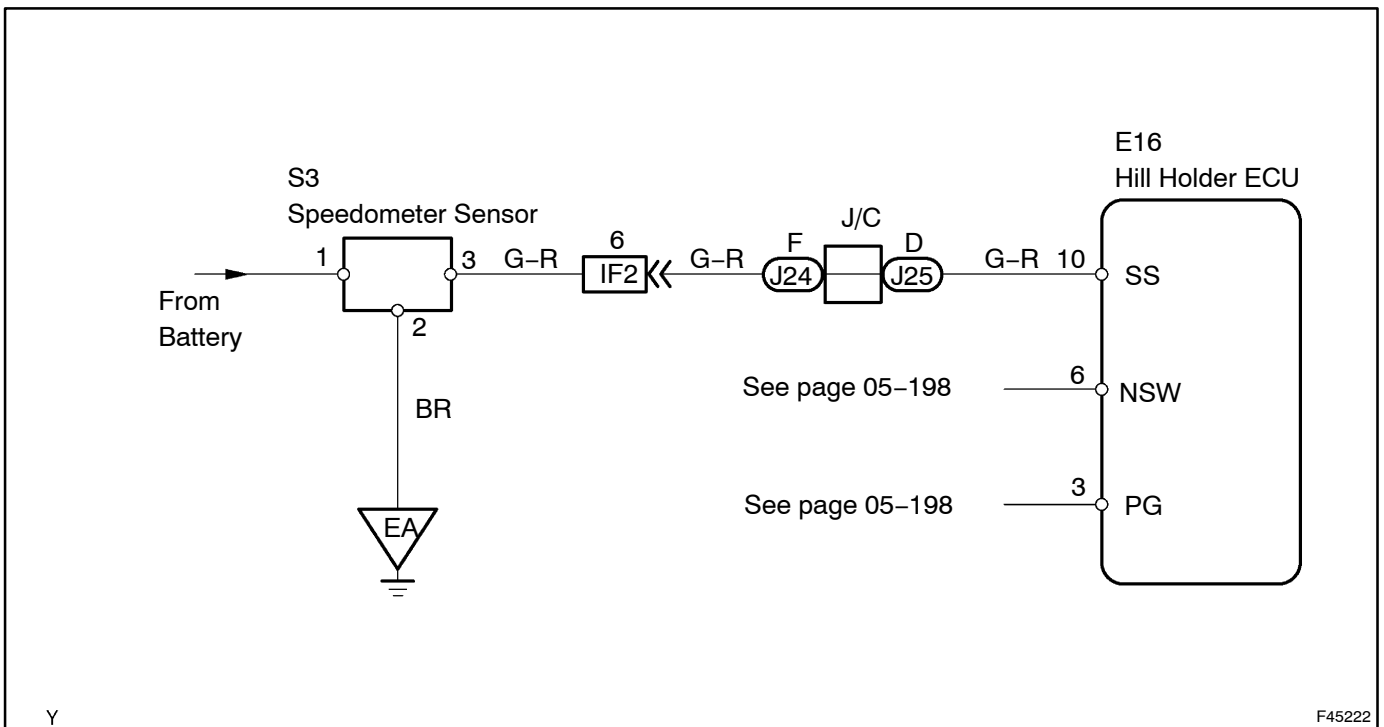
DTC	12	NEUTRAL START SWITCH SYSTEM MALFUNCTION
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CIRCUIT DESCRIPTION

The neutral start switch outputs command signals to keep the brake hydraulic pressure and to release it to the hill holder ECU.

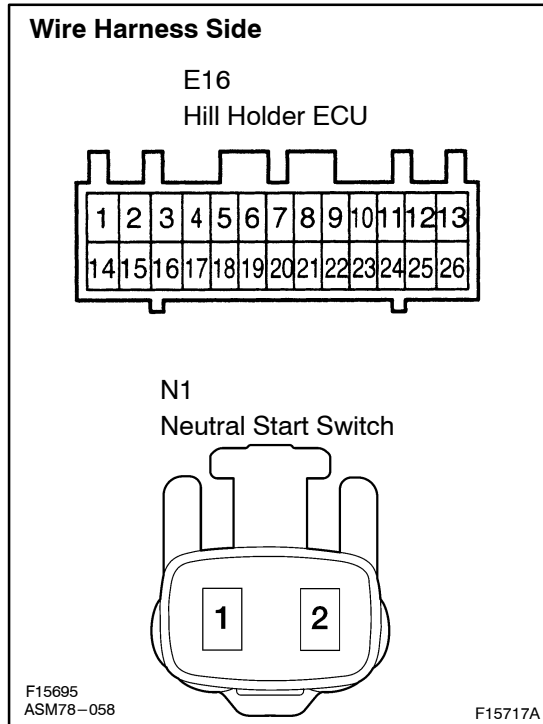
DTC No.	DTC Detection Condition	Trouble Area
12	While vehicle is accelerated to 50 km/h from 5 km/h, no gear change is detected continuously 5 times by neutral start switch	<ul style="list-style-type: none"> • Neutral start switch • Speedometer sensor • Hill holder ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ NEUTRAL START SWITCH)



- (a) Disconnect the E16 ECU connector.
- (b) Disconnect the N1 switch connector.
- (c) Check the continuity between the wire harness side connectors.

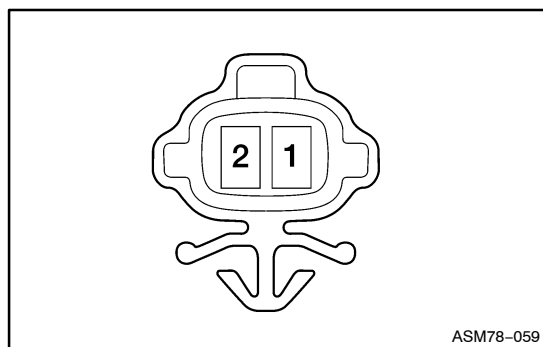
Standard:

Symbols (Terminal No.)	Specified Condition
General Ground ↔ - (N1-2)	Continuity
NSW (E16-6) ↔ - (N1-1)	Continuity

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 INSPECT NEUTRAL START SWITCH



- (a) Check the neutral start switch continuity.

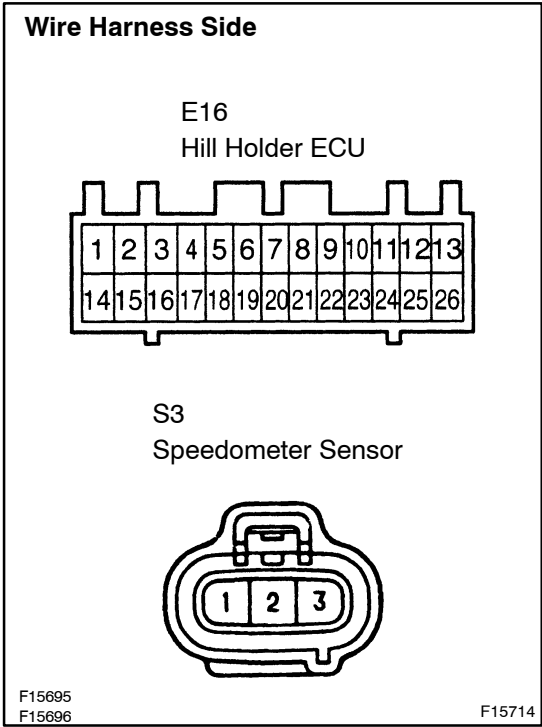
Standard:

Terminal No.	Shift lever Position	Specified Condition
1 ↔ 2	Gear in	Continuity
1 ↔ 2	Gear neutral	No Continuity

NG → REPLACE NEUTRAL START SWITCH

OK

3 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ SPEEDOMETER SENSOR)



- (a) Disconnect the E16 ECU connector.
- (b) Disconnect the S3 sensor connector.
- (c) Check the continuity between the wire harness side connectors.

Standard:

Symbols (Terminal No.)	Specified Condition
SS (E16-23) ↔ - (S3-3)	Continuity

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK SPEEDOMETER SENSOR

- (a) Clear the DTC stored in the memory.
- (b) Check for DTC again.

Standard: DTC 4 is output again.

NG → **REPLACE SPEEDOMETER SENSOR**

OK

CHECK AND REPLACE HILL HOLDER ECU

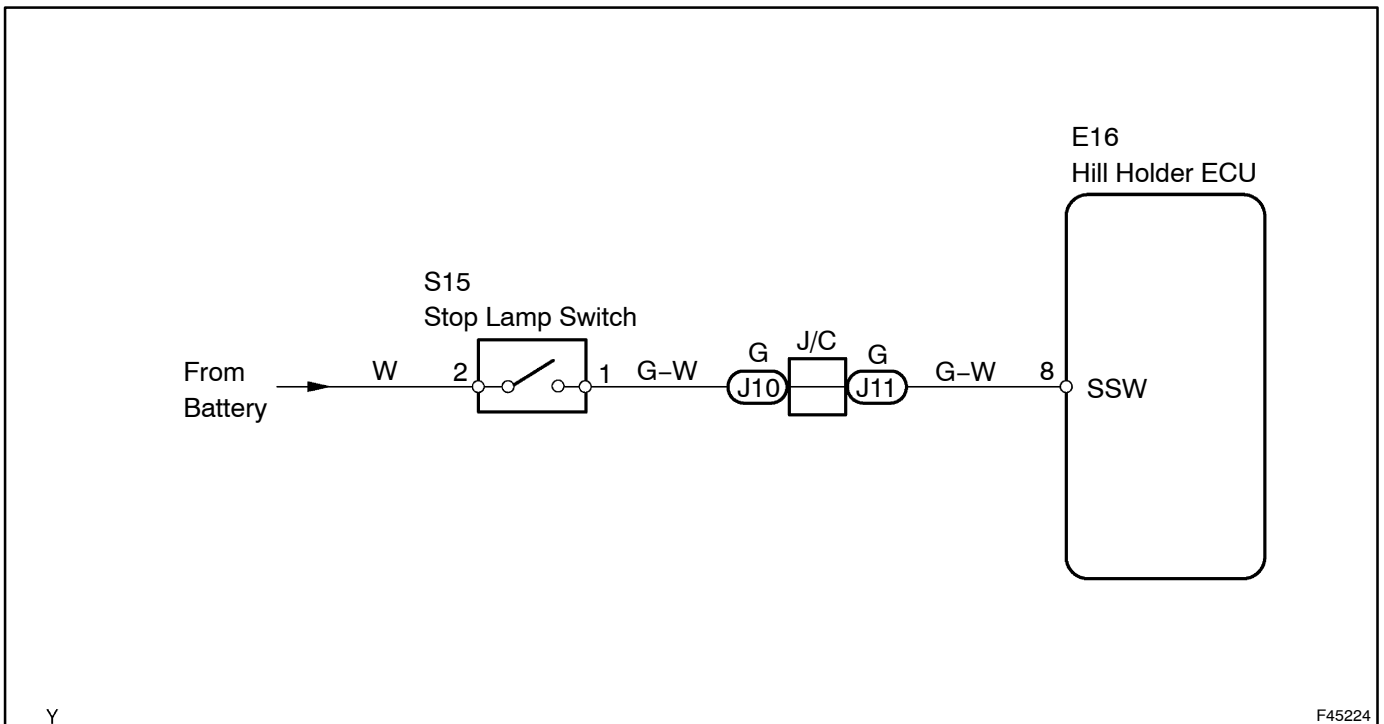
DTC	13	STOP LIGHT SWITCH MALFUNCTION (STOP LAMP SWITCH)
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CIRCUIT DESCRIPTION

The stop lamp switch monitors how the brake operates and outputs a signal to the hill holder ECU.

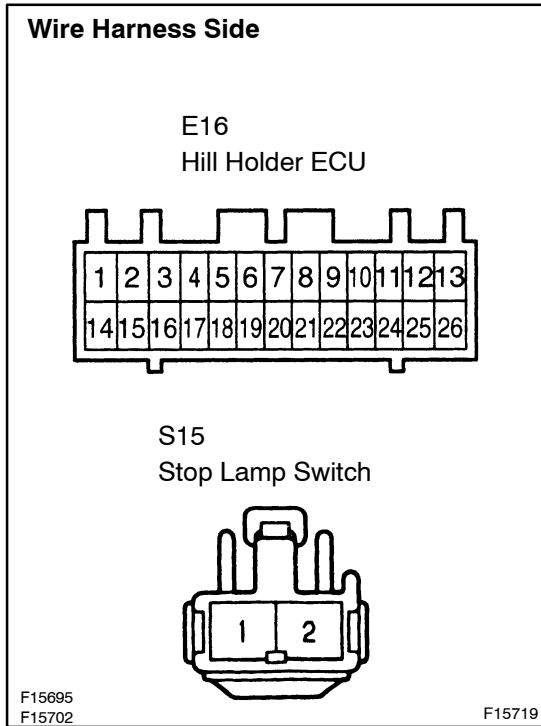
DTC No.	DTC Detection Condition	Trouble Area
13	Either condition 1. or 2. occurs continuously 5 time: 1. While vehicle is decelerated to 0.5 km/h from 50km/h, stop lamp switch does not turn ON. 2. While vehicle is accelerated to 50 km/h from 0.5km/h, stop lamp switch remains ON.	<ul style="list-style-type: none"> • Stop lamp switch • Hill holder ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ NEUTRAL START SWITCH)



- Disconnect the E16 ECU connector.
- Disconnect the S15 switch connector.
- Check the continuity between the wire harness side connectors.

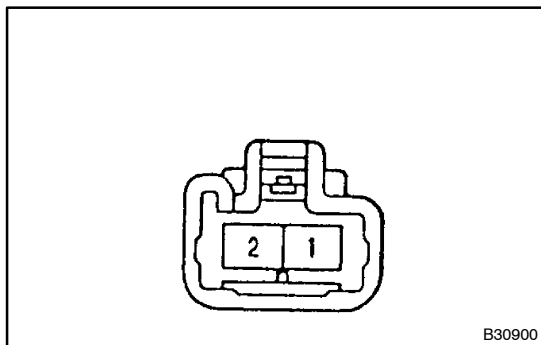
Standard:

Symbols (Terminal No.)	Specified Condition
SSW (E16-8) ↔ - (S15-2)	Continuity

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 CHECK STOP LAMP SWITCH ASSY



- Disconnect the stop lamp switch connector.
- Turn the ignition switch ON.
- Check the switch.

Standard:

Terminal No.	Condition	Specified Condition
1 ↔ 2	Free	Continuity
	Pushed	No continuity

NG → REPLACE STOP LAMP SWITCH ASSY

OK

CHECK AND REPLACE HILL HOLDER ECU

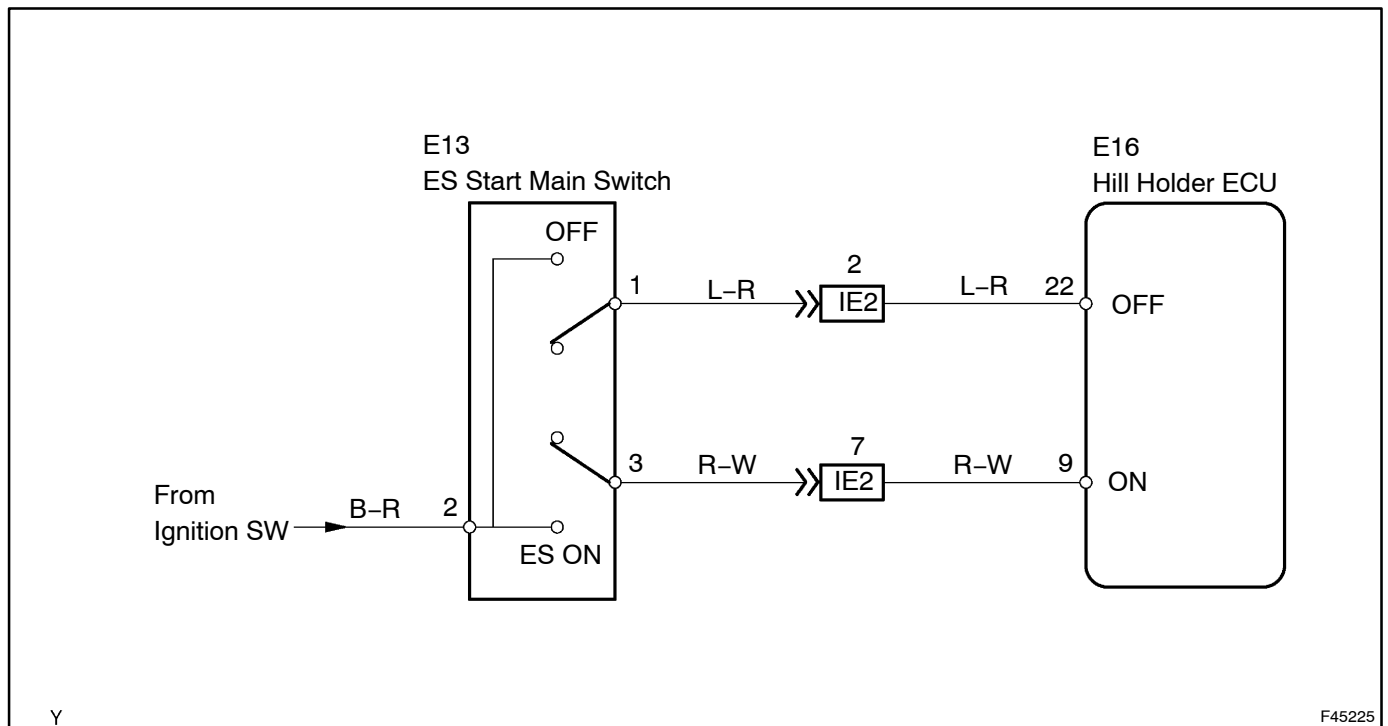
DTC	18	ES START MAIN SWITCH MALFUNCTION
------------	-----------	---

CIRCUIT DESCRIPTION

The ES start main switch can switch operation of the ES start system, to keep the brake hydraulic pressure and to release it. The hill holder ECU detects a malfunction in the ES start main switch, according to the conditions of the ON input terminal and the OFF input terminal from the ES start main switch.

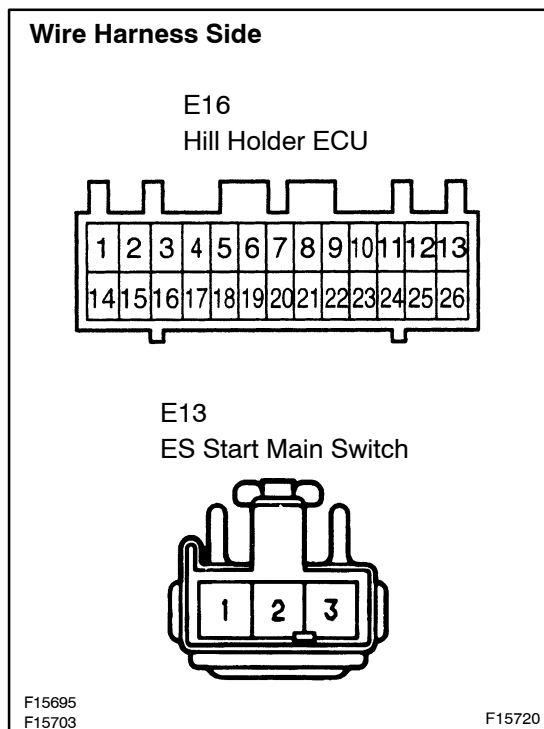
DTC No.	DTC Detection Condition	Trouble Area
18	Either condition 1. or 2. is detected: 1. Both terminals are ON for 900 ms (short circuit) 2. Both terminals are OFF for 5 seconds (open circuit)	<ul style="list-style-type: none"> • ES start main switch • Hill holder ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ ES START MAIN SWITCH)



- (a) Disconnect the E16 ECU connector.
- (b) Disconnect the E13 switch connector.
- (c) Check the continuity between the wire harness side connectors.

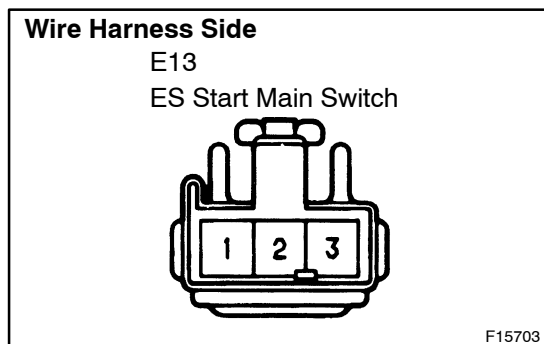
Standard:

Symbols (Terminal No.)	Specified Condition
ON (E16-22) ↔ - (E13-3)	Continuity
OFF (E16-9) ↔ - (E13-1)	Continuity

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 CHECK ES START MAIN SWITCH (VOLTAGE)



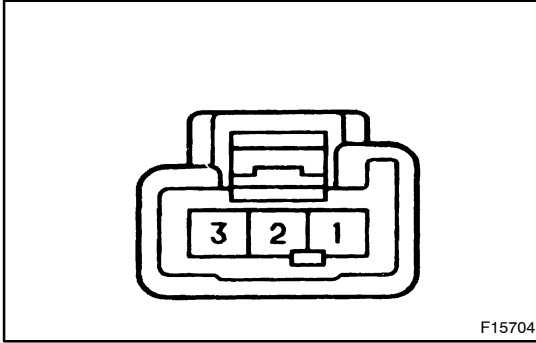
- (a) Disconnect the E13 switch connector.
- (b) Check the voltage between the wire harness side connector and the body ground.

Standard:

Terminal No.	Condition	Specified Condition
E13-2 ↔ Body ground	Ignition switch ON	20 - 28 V

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 INSPECT ES START MAIN SWITCH

(a) Check the switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
2 ↔ 3	ON	Continuity
2 ↔ 1	OFF	Continuity

NG**REPLACE ES START MAIN SWITCH****OK****CHECK AND REPLACE HILL HOLDER ECU**

DTC	19	FRONT ES START VALVE MALFUNCTION (HILL HOLDER BRAKE LOCK VALVE)
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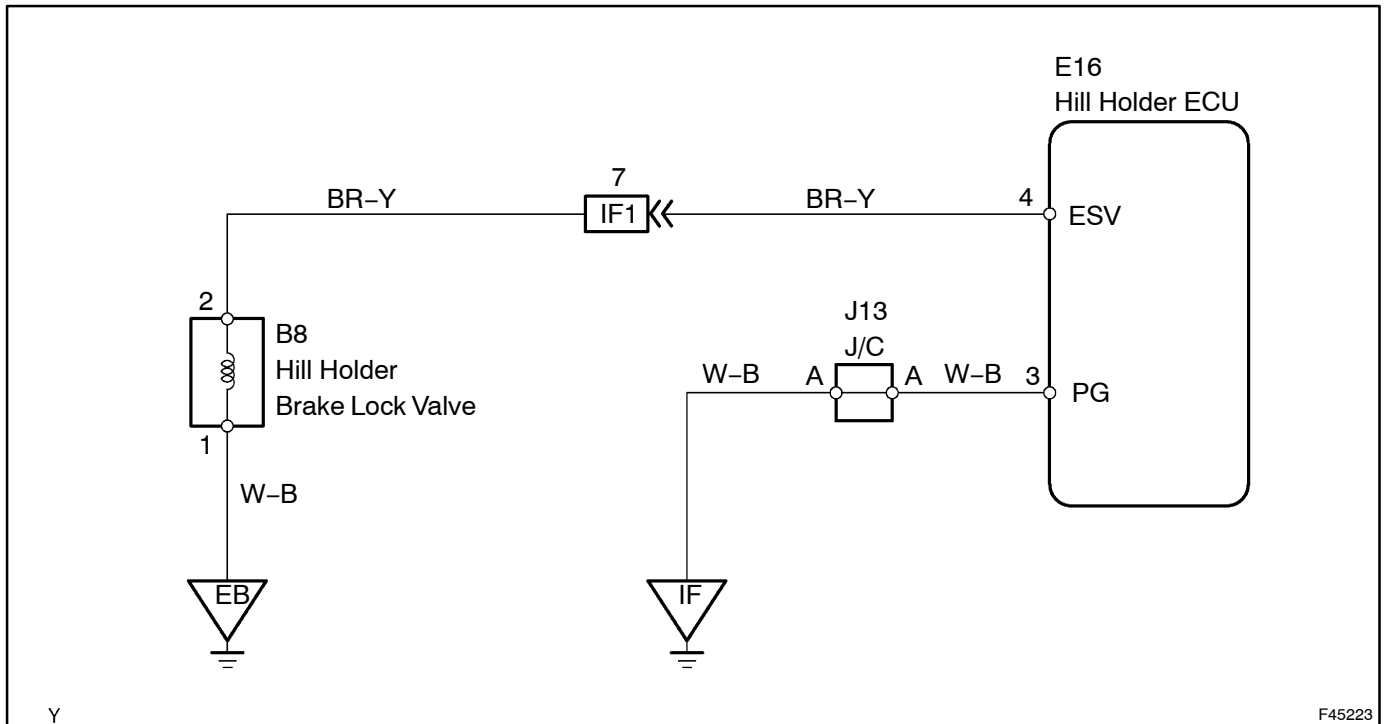
CIRCUIT DESCRIPTION

05BBV-01

The hill holder ECU feeds current to the hill holder brake lock valve to control it. When a command signal is input to the hill holder ECU from the ES start main switch, current is fed to the hill holder brake lock valve to operate the valve and the brake hydraulic pressure is maintained.

DTC No.	DTC Detection Condition	Trouble Area
19	Either condition 1. or 2. is detected: 1. Current OFF (open circuit) 2. Current ON (short circuit)	<ul style="list-style-type: none"> • Hill holder brake lock valve • Hill holder ECU

WIRING DIAGRAM

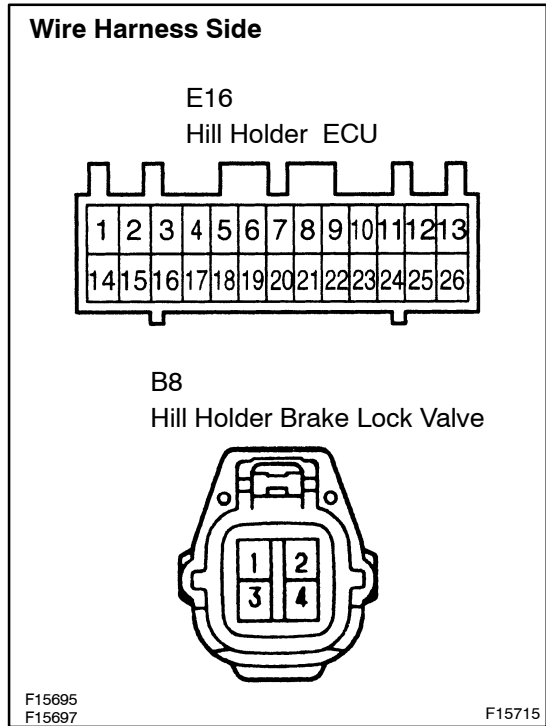


Y

F45223

INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ HILL HOLDER BRAKE LOCK VALVE)



- (a) Disconnect the E16 ECU connector.
- (b) Disconnect the B8 valve connector.
- (c) Check the continuity between the wire harness side connectors.

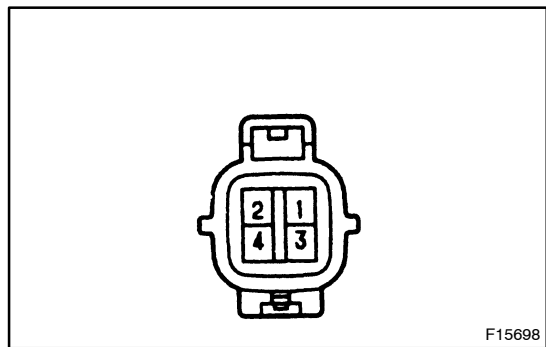
Standard:

Symbols (Terminal No.)	Specified Condition
ESV (E16-4) ↔ - (B8-2)	Continuity
PG (E16-3) ↔ - (B8-1)	Continuity

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 INSPECT HILL HOLDER BRAKE LOCK VALVE



- (a) Check the valve continuity.

Standard:

Terminal No.	Continuity	Specified Condition
1 ↔ 2	Constant	50 - 60 Ω
3 ↔ 4	Constant	50 - 60 Ω

NG REPLACE HILL HOLDER BRAKE LOCK VALVE

OK

CHECK AND REPLACE HILL HOLDER ECU

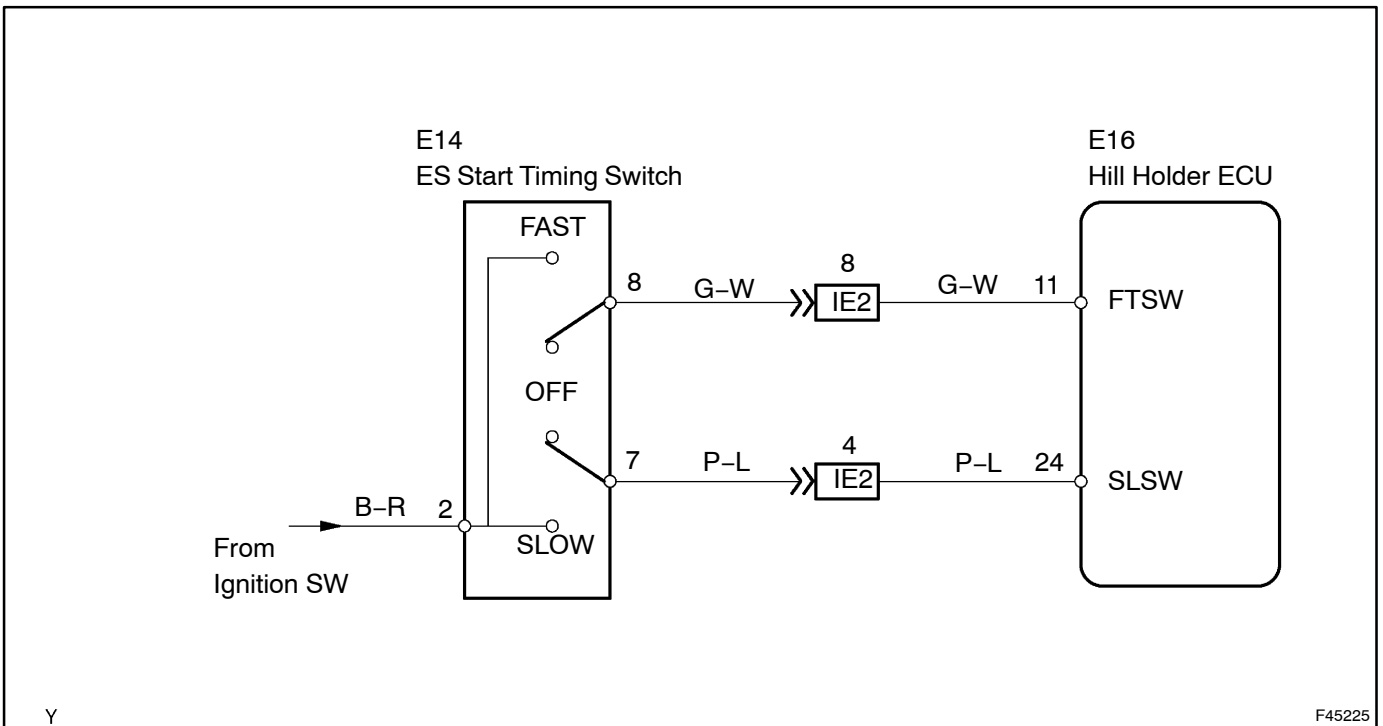
DTC	21	ES START TIMING SWITCH MALFUNCTION
------------	-----------	---

CIRCUIT DESCRIPTION

The ES start timing switch can adjust the timing of releasing the brake hydraulic pressure. When the timing switch is operated, a release timing input signal ("fast" input signal or "slow" input signal) is input to the hill holder ECU. In response to this input signal, the hill holder ECU adjusts the timing of releasing the brake hydraulic pressure.

DTC No.	DTC Detection Condition	Trouble Area
21	Both terminals are ON for 2 sec.	<ul style="list-style-type: none"> • ES start timing switch • Hill holder ECU

WIRING DIAGRAM

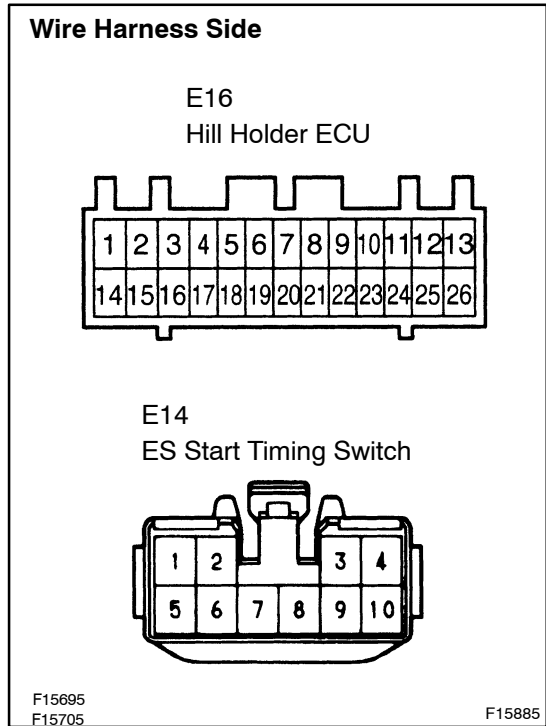


Y

F45225

INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (HILL HOLDER ECU ↔ ES START TIMING SWITCH)



- (a) Disconnect the E16 ECU connector.
- (b) Disconnect the E14 switch connector.
- (c) Check the continuity between the wire harness side connectors.

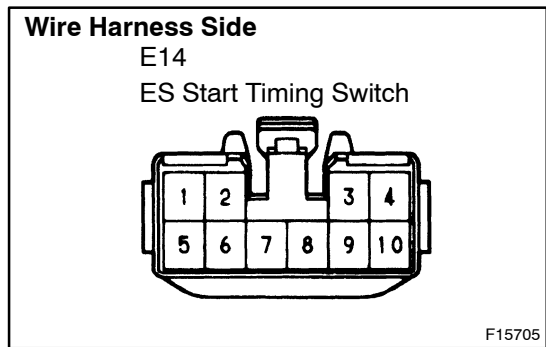
Standard:

Symbols (Terminal No.)	Specified Condition
FTSW (E16-11) ↔ - (E14-8)	Continuity
SLSW (E16-24) ↔ - (E14-7)	Continuity

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 CHECK ES START TIMING SWITCH (VOLTAGE)



- (a) Disconnect the E14 switch connector.
- (b) Check the voltage between the wire harness side connector and the body ground.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
E14-3 ↔ Body ground	Ignition switch ON	20 - 28 V

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

CHECK AND REPLACE HILL HOLDER ECU

SUPPLEMENTAL RESTRAINT SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

050YF-15

HINT:

Troubleshoot in accordance with the procedures on the following pages.

1	VEHICLE BROUGHT TO WORKSHOP
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2	CUSTOMER PROBLEM ANALYSIS (See page 05-215)
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3	DTC CHECK (PAST AND PRESENT DTC) (See page 05-216)
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	DTC IS OUTPUT: Go to step 4
--	------------------------------------

	DTC IS NOT OUTPUT: Go to step 10
--	---

4	DTC CHART (See page 05-222)
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5	CIRCUIT INSPECTION (See page 05-226 to 05-275)
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	MALFUNCTION CODE IS OUTPUT: Go to step 6
--	---

	NORMAL CODE IS OUTPUT: Go to step 10
--	---

6	IDENTIFICATION OF PROBLEM
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7	REPAIR
----------	---------------



8	CLEAR DTC (PAST AND PRESENT DTC) (See page 05-216)
----------	---



9	DTC CHECK (See page 05-222)
----------	------------------------------------

	DTC CODE IS NOT OUTPUT: Go to step 10
--	--

	DTC CODE IS OUTPUT: Go to step 4
--	---

10 SYMPTOM SIMULATION (See page 01-17)**WARNING LIGHT REMAINS OFF: Go to step 6****WARNING LIGHT IS ON: Go to step 3****11 CONFIRMATION TEST****END**

HINT:

Step 3, 4, 5, 8, 9, 11:

Diagnostic steps require the use of the hand-held tester

CUSTOMER PROBLEM ANALYSIS CHECK

SUPPLEMENTAL RESTRAINT SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		Registration No.	
		Registration Year	
		Frame No.	
Date Vehicle Brought in		Odometer Reading	km Miles

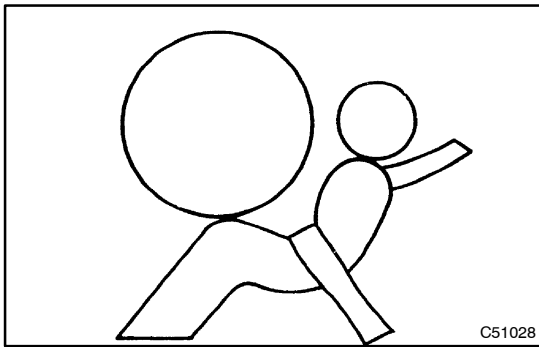
Date Problem Occurred	
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Other
Temperature	Approx. _____

Vehicle Operation	<input type="checkbox"/> Starting <input type="checkbox"/> Idling <input type="checkbox"/> Driving [<input type="checkbox"/> Constant speed <input type="checkbox"/> Acceleration <input type="checkbox"/> Deceleration <input type="checkbox"/> Other]
Road Condition	
Details of Problem	

Vehicle Inspection, Repair History before Malfunction Occurs (Including Supplemental Restraint System)	
--	--

Diagnosis System Inspection

SRS Warning Light Inspection	1st Time	<input type="checkbox"/> Remains ON <input type="checkbox"/> Sometimes Lights Up <input type="checkbox"/> Does Not Light Up
	2nd Time	<input type="checkbox"/> Remains ON <input type="checkbox"/> Sometimes Lights Up <input type="checkbox"/> Does Not Light Up
DTC Inspection	1st Time	<input type="checkbox"/> Normal Code <input type="checkbox"/> Malfunction Code [Code.]
	2nd Time	<input type="checkbox"/> Normal Code <input type="checkbox"/> Malfunction Code [Code.]



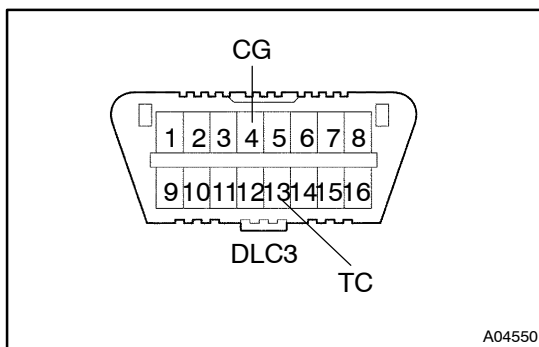
PRE-CHECK

1. CHECK SRS WARNING LIGHT

- (a) Turn the ignition switch to the ON position and check that the SRS warning light lights up.
- (b) Check that the SRS warning light goes off after approx. 6 seconds.

HINT:

- When the ignition switch is at ON position and the SRS warning light remains on or flashes, the airbag sensor assembly has detected a malfunction code.
- If the SRS warning light sometimes lights up or the SRS warning light remains on after approx. 6 seconds have elapsed even when the ignition switch is OFF, a short in the SRS warning light circuit may be the cause likely. Proceed to "SRS warning light circuit malfunction" on pages 05-269 and 05-273.



2. Using diagnosis check wire: CHECK DTC

- (a) Present troubles codes:
Output the DTC.
 - (1) Turn the ignition switch to the ON position and wait for approx. 60 seconds.
 - (2) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

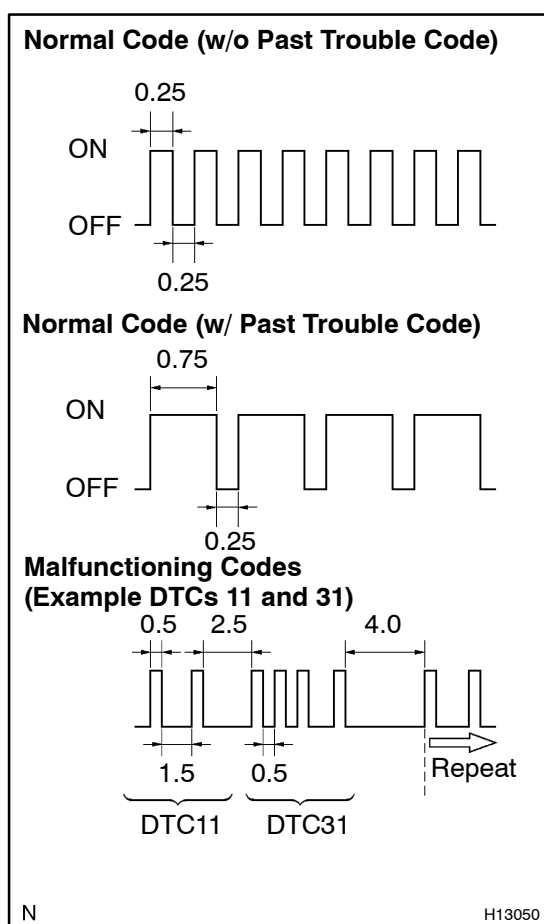
NOTICE:

Pay due attention to the terminal connecting positions in order to prevent a malfunction.

- (b) Past troubles codes:
Output the DTC.
 - (1) Using rsearvice wire, connect terminals TC and CG of the DLC3.
SST 09843-18040
 - (2) Turn the ignition switch to the ON position and wait for approx. 60 seconds.

NOTICE:

Pay due attention to the terminal connecting positions in order to prevent a malfunction.



- (c) Read the DTC.
- Read the 2-digit DTC as indicated by the number of times that the SRS warning light blinks. As an example, the blinking patterns of normal, DTCs 11 and 31 are shown in the illustration.

- Normal code indication (w/o past trouble code)
The light blinks twice per second.
- Normal code indication (w/ past trouble code)
When the past troubles code is stored in the airbag sensor assembly, the light blinks only once per second.
- Malfunction code indication
The first blinking output indicates the first digit of a 2-digit DTC. After a 1.5-second pause, the second blinking output will indicate the second digit.

If there are 2 or more codes, there will be a 2.5-second pause between outputs of each code. After all the codes have been output, there will be a 4.0-second pause and they will all be repeated.

HINT:

- If there are a number of trouble codes, the indication will start from the smallest numbered code.
- If a DTC is not output or a DTC is output without terminals connection, proceed to the TC terminal circuit inspection on page 05-371.

3. Using hand-held tester: CHECK DTC

- Connect the hand-held tester to the DLC3.
- Read the DTCs by following the prompts on the tester screen.

HINT:

Please refer to the hand-held tester operator's manual for further details.

4. Not using service wire: CLEAR DTC

- When the ignition switch is turned OFF, the diagnostic trouble code is cleared.

HINT:

DTC might not be cleared by turning the ignition switch OFF. In this case, proceed to the step 5.

5. Using service wire: CLEAR DTC

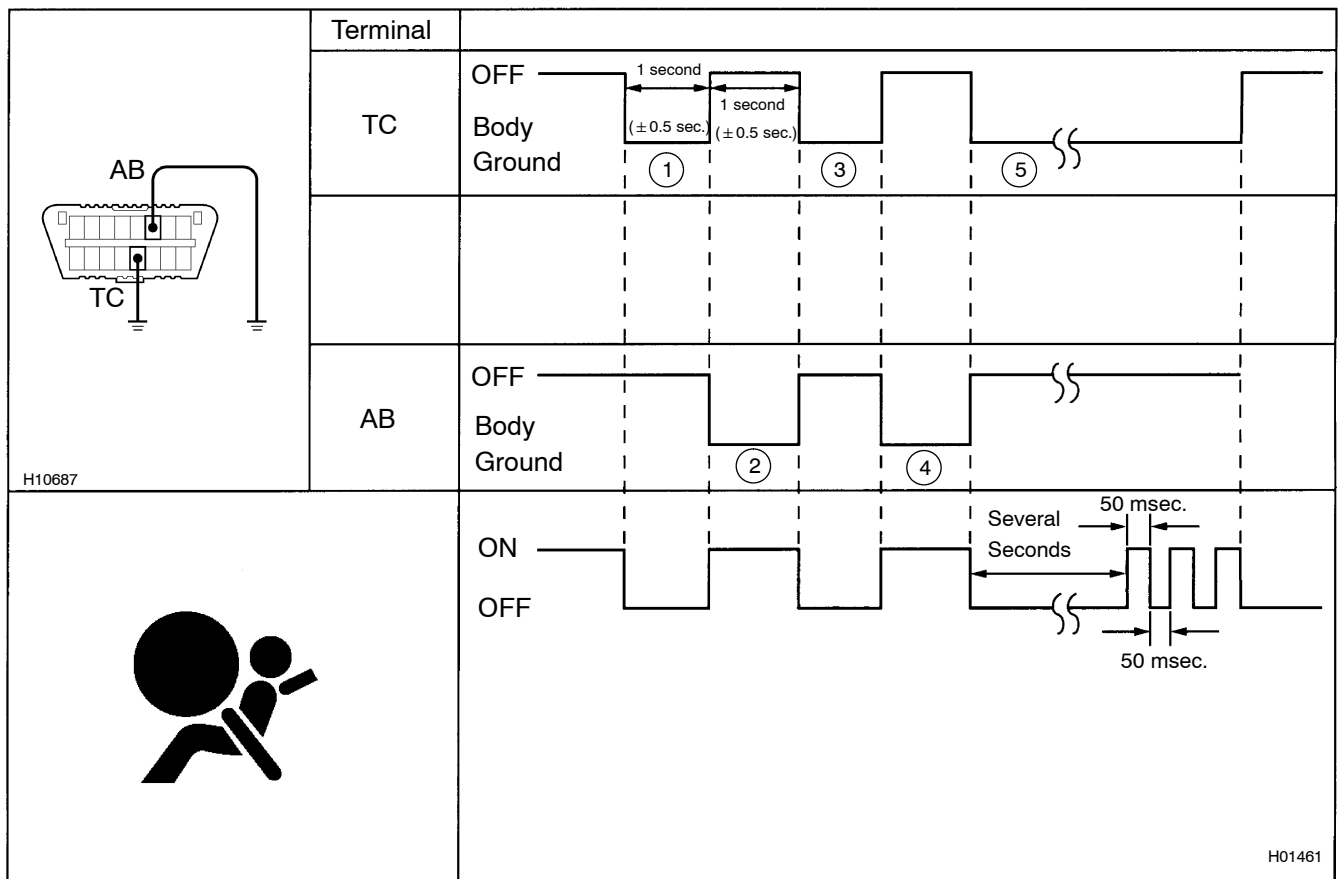
- Connect the 2 service wires to terminals TC and AB of the DLC1.
- Turn the ignition switch to ON and wait for approx. 6 seconds.

- (c) Starting with the TC terminal, alternately ground terminals TC and AB twice each in cycles of 1.0 second. Make sure that the terminals are grounded. Ensure that the terminal TC remains grounded.

HINT:

When alternately grounding terminals TC and AB, release one terminal from ground and immediately ground the other terminal within an interval of 0.2 seconds.

If several DTCs are be cleared, repeat the above procedures until all the codes are cleared.



- (d) Several seconds after performing the clear procedures, the SRS warning light will blink in a 50 msec. cycle to indicate the codes which have been cleared.

6. Using hand-held tester:**CLEAR DTC**

- (a) Connect the hand-held tester to the DLC3.
- (b) Clear the DTCs by following the prompts on the tester screen.

HINT:

Please refer to the hand-held tester operation's manual for further details.

7. RELEASE METHOD OF AIRBAG ACTIVATION PREVENTION MECHANISM

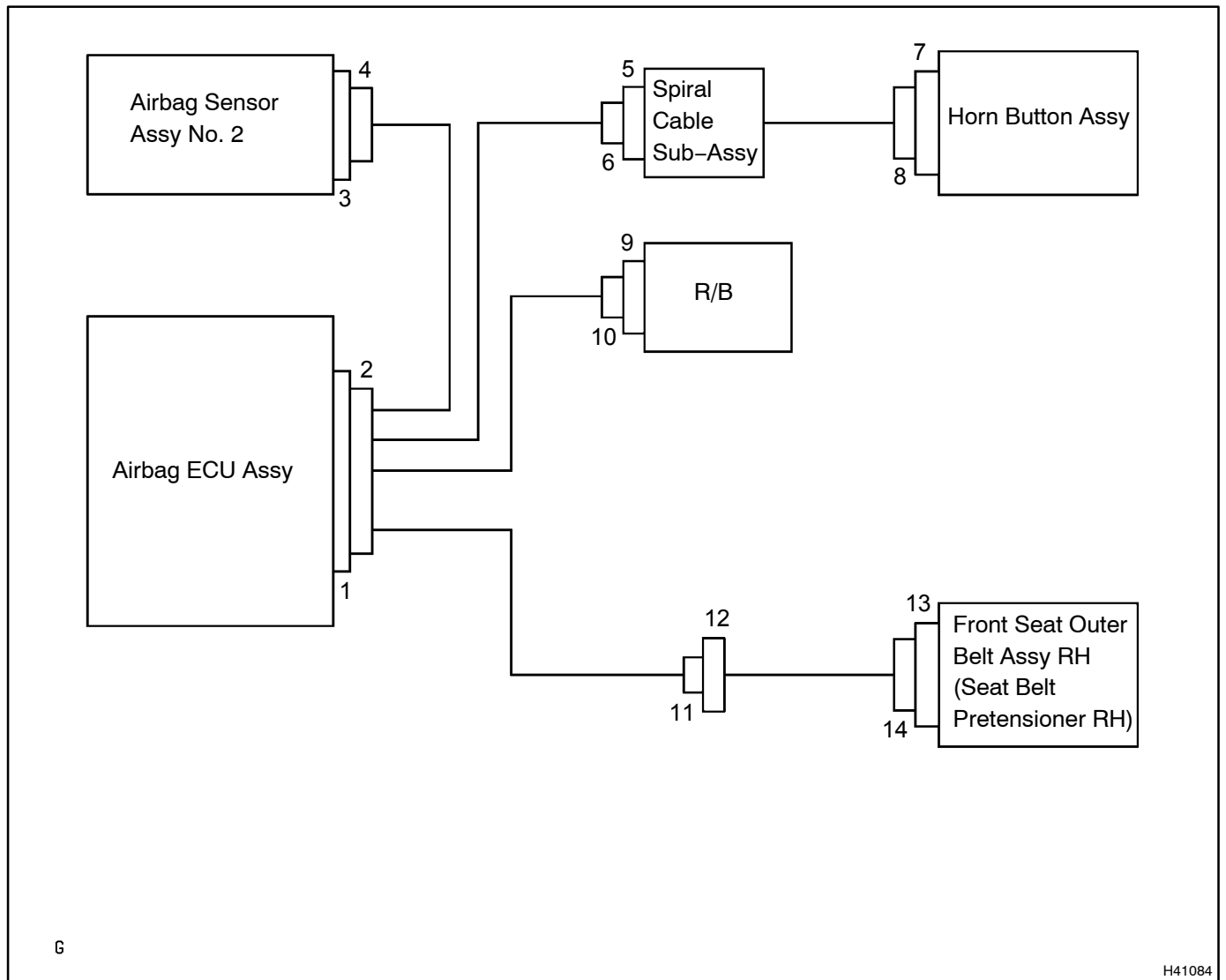
- (a) An airbag activation prevention mechanism is built into the connector for the squib circuit of the SRS. When release of the airbag activation prevention mechanism is required in the troubleshooting procedures, as shown in the illustration of the connectors on the following pages, insert a piece of paper which has the same thickness as the male terminal between the terminal and the short spring.

CAUTION:

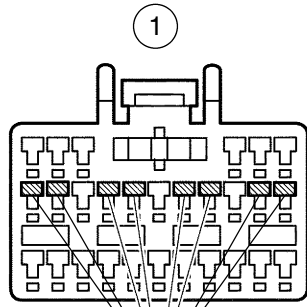
Do not release the airbag activation prevention mechanism on the squib connector.

NOTICE:

- **Do not release the airbag activation prevention mechanism unless specifically required in the troubleshooting procedures.**
- **If the paper inserted is too thick, the terminal and short spring may be damaged. So always use a piece of paper with the same thickness as the male terminal.**

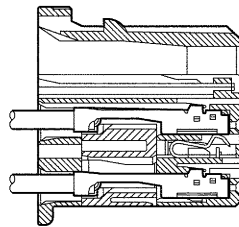


Airbag ECU Assy Connector



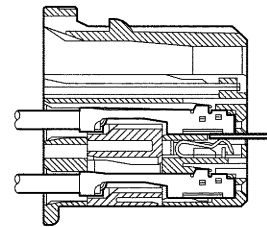
Short Spring

Before Release

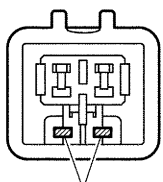


Paper

After Release

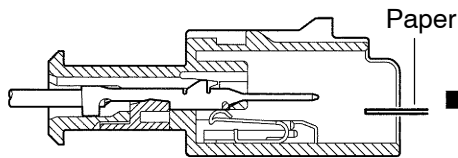


Connector (8)



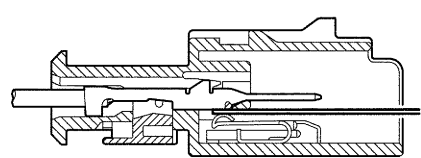
Short Spring

Before Release



Paper

After Release



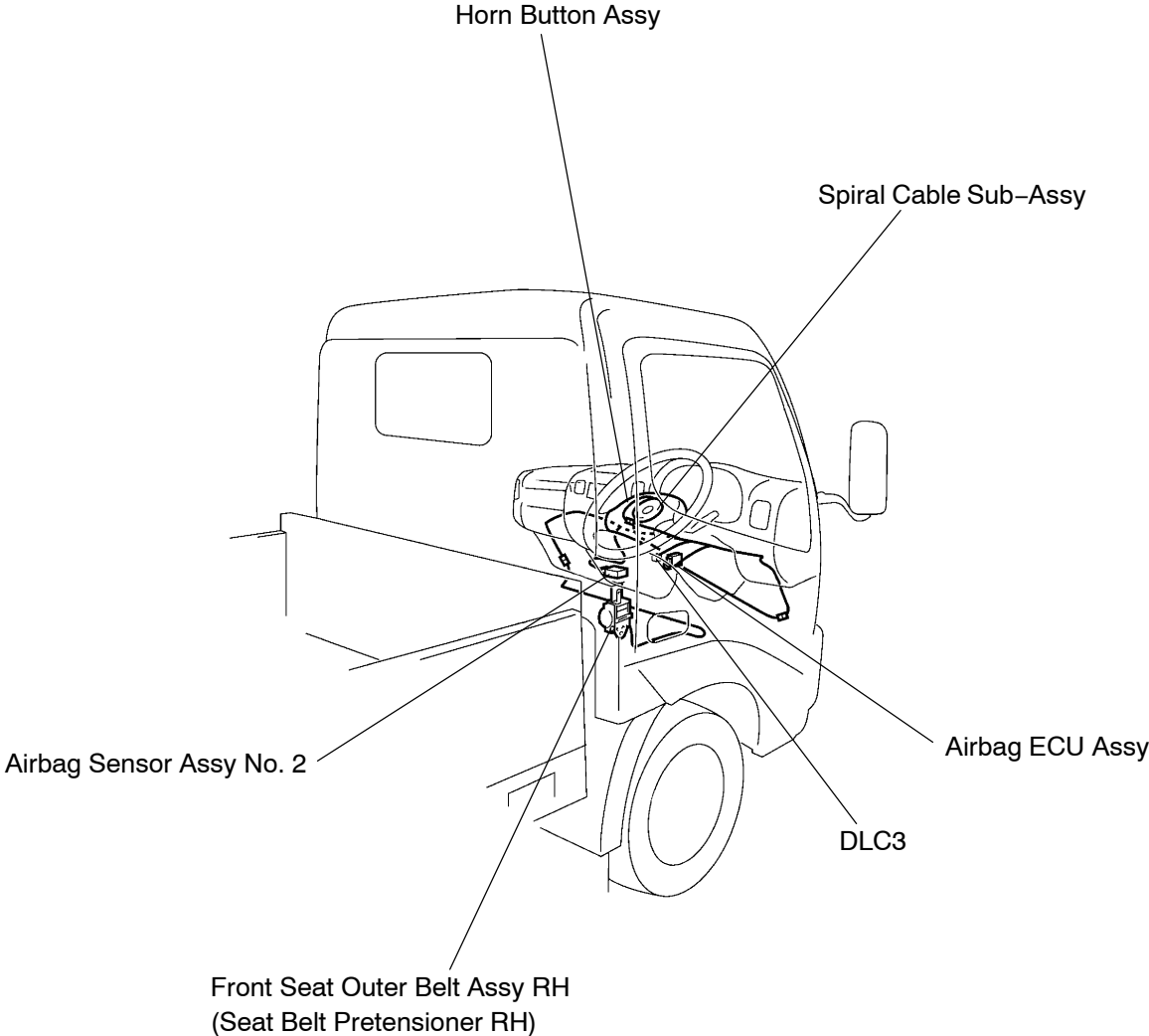
DIAGNOSTIC TROUBLE CODE CHART

DTC No. (See Page)	Detection Item	Trouble Area	SRS Warning Light
B0100/13 (05-226)	• Short in D Squib Circuit	• Horn button assy (D squib) • Spiral cable sub-assy • Airbag ECU assy • Wire harness	ON
B0101/14 (05-230)	• Open in D Squib Circuit	• Horn button assy (D squib) • Spiral cable sub-assy • Airbag ECU assy • Wire harness	ON
B0102/11 (05-234)	• Short in D Squib Circuit (To Ground)	• Horn button assy (D squib) • Spiral cable sub-assy • Wire harness	ON
B0103/12 (05-238)	• Short in D Squib Circuit (To B+)	• Horn button assy (D squib) • Spiral cable sub-assy • Wire harness	ON
B0130/63 (05-242)	• Short in P/T Squib (RH) Circuit	• Seat belt pretensioner RH (P/T squib) • Airbag ECU assy • Wire harness	Blink
B0131/64 (05-246)	• Open in P/T Squib (RH) Circuit	• Seat belt pretensioner RH (P/T squib) • Airbag ECU assy • Wire harness	Blink
B0132/61 (05-250)	• Short in P/T Squib (RH) Circuit (To Ground)	• Seat belt pretensioner RH (P/T squib) • Airbag ECU assy • Wire harness	Blink
B0133/62 (05-254)	• Short in P/T Squib (RH) Circuit (To B+)	• Seat belt pretensioner RH (P/T squib) • Airbag ECU assy • Wire harness	Blink
B1100/31 (05-258)	• Airbag ECU Assy Malfunction	• Airbag ECU assy	ON
B1135/24 (05-260)	• Harf Connection in Airbag ECU Assy Connector	• Electrical connection check mechanism • Airbag ECU assy	ON
B1148/36 (05-262)	• Short in Airbag Sensor Assy No. 2 Circuit (To B+)	• Airbag sensor assy No. 2 • Cowl wire	ON
Normal (05-266)	• System Normal	-	OFF
	• Source Voltage Drop	• Battery • Airbag ECU assy	ON

HINT:

- When the SRS warning light remains lit on and the DTC is the normal code, this means that the power source voltage drops.
If no malfunction code is stored in the memory of the airbag ECU assy and if the power source voltage returns to normal, the SRS warning light will automatically go off.
- When 2 or more codes are indicated, the codes are displayed in numeral order starting from the lowest numbered code.
- If the code that is not listed on the chart is displayed, the airbag ECU assy is faulty.

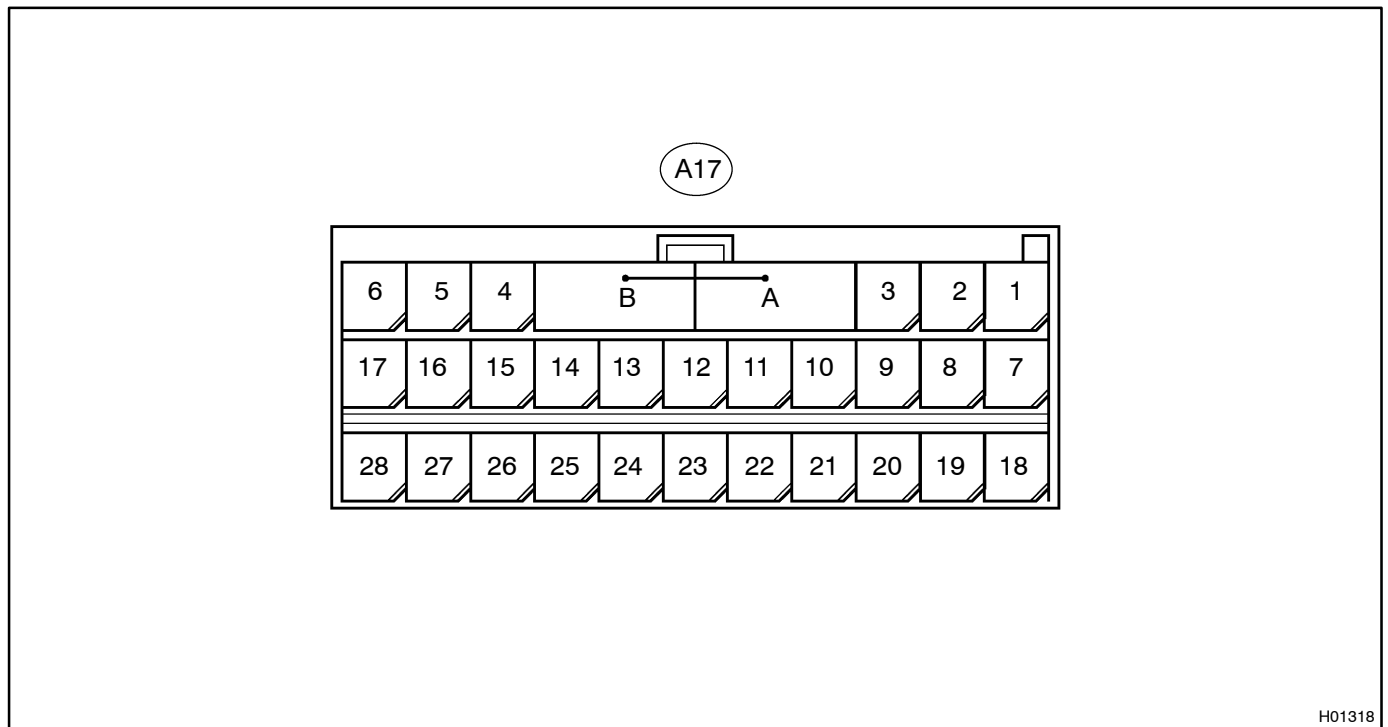
LOCATION



6

TERMINALS OF ECU

1. CHECK AIRBAG ECU ASSY



H01318

Terminal No.	Symbols	Terminal Name
A	-	Electrical Connector Check Mechanism
B	-	Electrical Connector Check Mechanism
A17-1	ACC	(AIRBAG Fuse)
A17-3	IG2	Power Source (ECU-IG2 Fuse)
A17-10	PR+	Squib (Seat Belt Pretensioner RH)
A17-11	PR-	Squib (Seat Belt Pretensioner RH)
A17-12	SIL	Diagnosis
A17-13	D-	Squib (Driver)
A17-14	D+	Squib (Driver)
A17-18	LA	SRS Warning Light
A17-20	TC	Diagnosis
A17-23	VFR	Airbag Sensor Assy No. 2
A17-25	EFR	Airbag Sensor Assy No. 2
A17-26	E2	Ground
A17-27	E1	Ground

If the result is not as specified, the ECU may have a malfunction.

PROBLEM SYMPTOMS TABLE

HINT:

Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspected Area	See Page
<ul style="list-style-type: none"> • When ignition switch is in ACC or ON position, SRS warning light sometimes lights up after approx. 6 seconds have elapsed • SRS warning remains on even when ignition switch is in the LOCK position 	<ul style="list-style-type: none"> • SRS warning light circuit malfunction (Remains on when ignition switch is in LOCK position). 	05-269
<ul style="list-style-type: none"> • With ignition switch is in ACC or ON position, SRS warning light does not light up 	<ul style="list-style-type: none"> • SRS warning light circuit malfunction (Does not light up when ignition switch is turned to ACC or ON). 	05-273
<ul style="list-style-type: none"> • No DTC is displayed • SRS warning light remains on during DTC check procedures • DTC is displayed without TC and CG terminals connection 	<ul style="list-style-type: none"> • Tc terminal circuit 	05-275

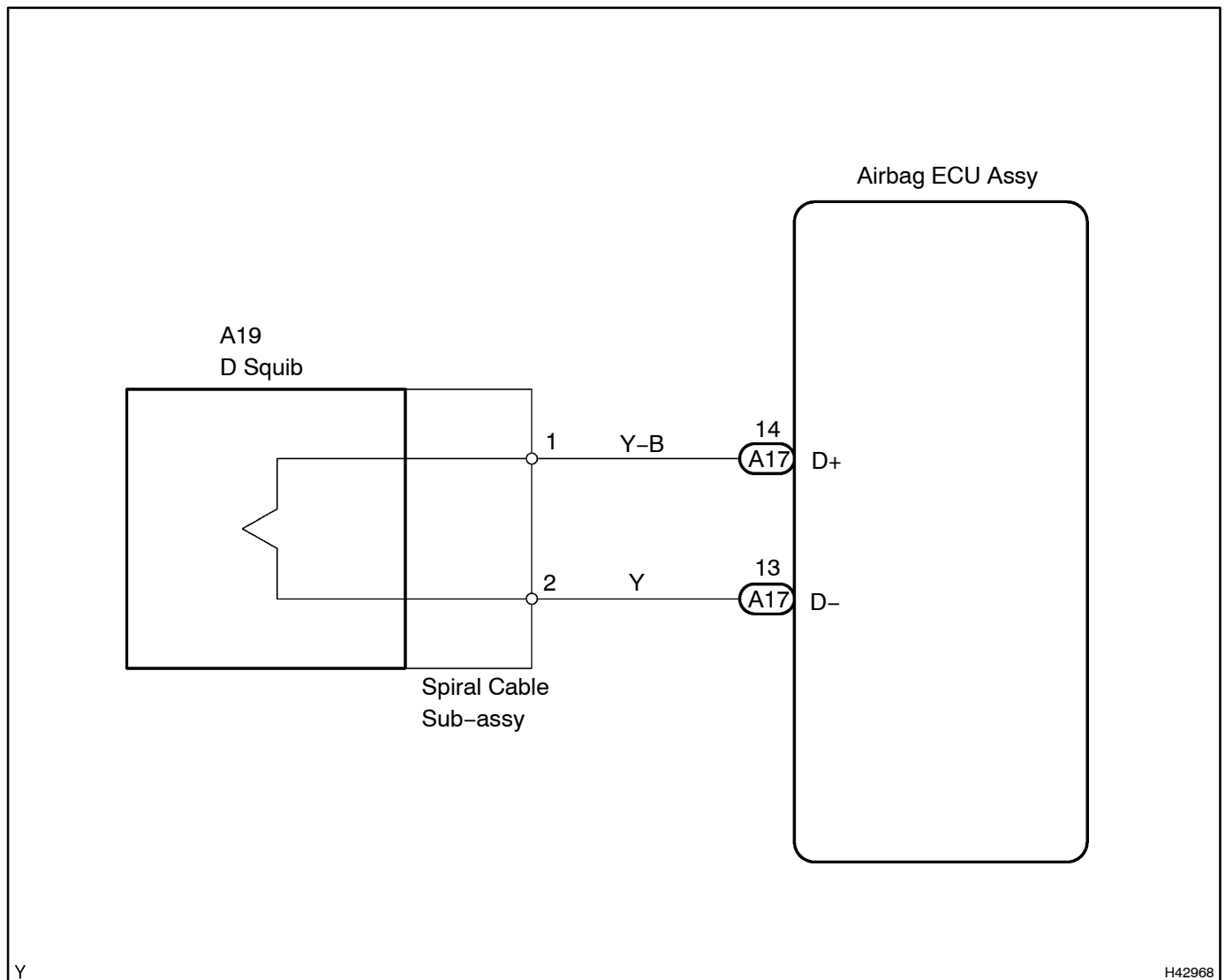
DTC	B0100/13	SHORT IN D SQUIB CIRCUIT
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CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag ECU assy, spiral cable sub-assy and horn button assy. The airbag will deploy if the airbag deployment conditions are satisfied. DTC B0100/13 is recorded when a short is detected in the D squib circuit.

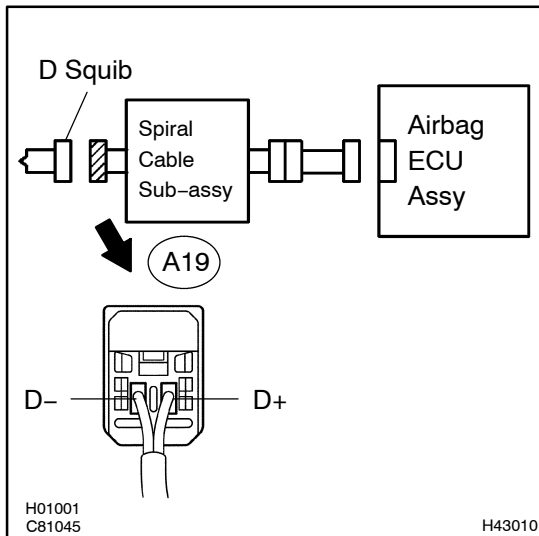
DTC No.	DTC Detection Condition	Trouble Area
B0100/13	<ul style="list-style-type: none"> • Short circuit between D+ wire harness and D- wire harness of squib • D squib malfunction • Spiral cable sub-assy malfunction • Airbag ECU assy malfunction 	<ul style="list-style-type: none"> • Horn button assy (D squib) • Spiral cable sub-assy • Airbag ECU assy • Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK D SQUIB CIRCUIT (AIRBAG ECU ASSY ↔ HORN BUTTON ASSY)



- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Disconnect the connectors between the airbag ECU Assy and the horn button Assy.
- Release the airbag activation prevention mechanism of the connector (on the airbag ECU Assy side) between the airbag ECU Assy and the spiral cable sub-assy (See page 05-216).
- For the connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and the horn button Assy, measure the resistance between terminals D+ and D- of the A19 connector.

OK:

Resistance: 1 MΩ or higher

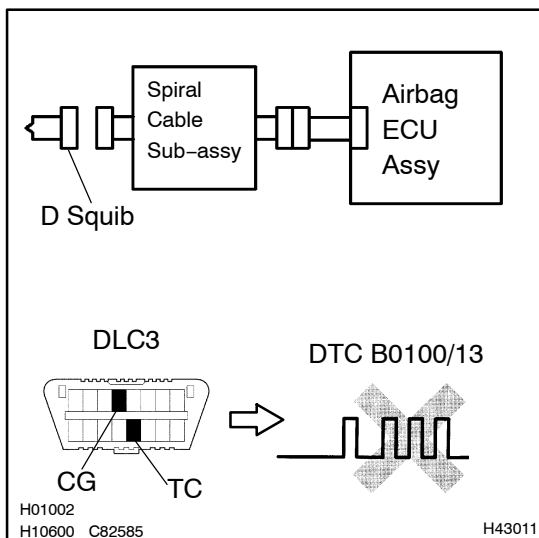
NG

Go to step 4

OK

2 CHECK AIR BAG ECU ASSY

SST 09843-18040



- Connect the connector to the airbag ECU Assy.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

OK:

DTC B0100/13 is not output.

HINT:

Codes other than code B0100/13 may be output at this time, but they are not relevant to this check.

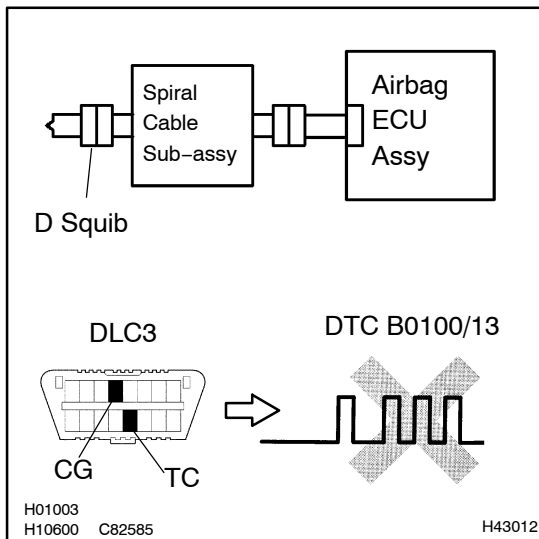
NG

REPLACE AIR BAG ECU ASSY

OK

3 CHECK D SQUIB

SST 09843-18040



- Turn the ignition switch to LOCK.
- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Connect the horn button connector.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

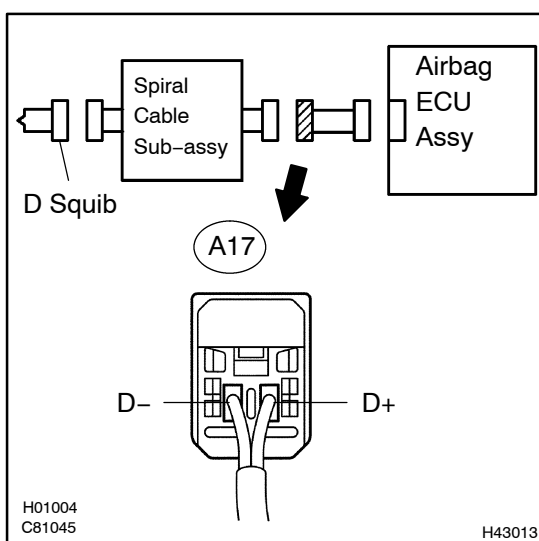
OK:**DTC B0100/13 is not output.****HINT:**

Codes other than code B0100/13 may be output at this time, but they are not relevant to this check.

NG**REPLACE HORN BUTTON ASSY****OK**

USE SIMULATION METHOD TO CHECK

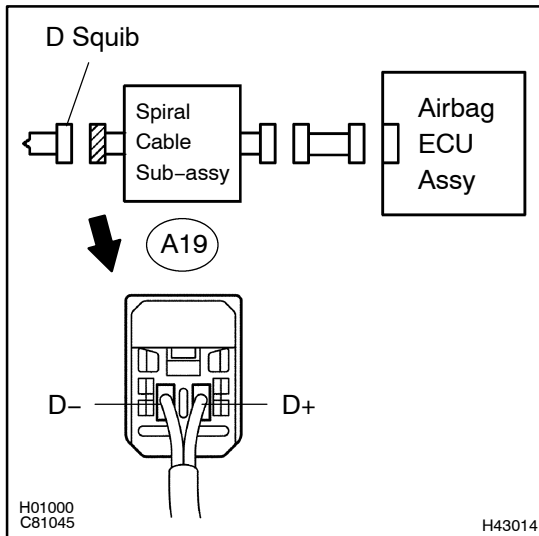
4 CHECK COWL WIRE (AIRBAG ECU ASSY ↔ SPIRAL CABLE SUB-ASSY)



- Disconnect the connectors of the cowl wire harness.
- Release the airbag activation prevention mechanism of the connector (on the airbag ECU assy side) between the airbag ECU assy and the spiral cable sub-assy (See page 05-216).
- For the connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and airbag ECU assy, measure the resistance between terminals D+ and D- of the A17 connector.

OK:**Resistance: 1 MΩ or higher****NG****REPAIR OR REPLACE COWL WIRE**

OK

5 CHECK SPIRAL CABLE SUB-ASSY

- (a) Release the airbag activation prevention mechanism of the spiral cable connector (on the airbag ECU assy side) (See page 05-216).
- (b) For the connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and the horn button assy, measure the resistance between terminals D+ and D- of the A19 connector.

OK:**Resistance: 1 MΩ or higher**

NG

REPLACE SPIRAL CABLE SUB-ASSY

OK

USE SIMULATION METHOD TO CHECK

DTC	B0101/14	OPEN IN D SQUIB CIRCUIT
------------	-----------------	--------------------------------

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag ECU Assy, spiral cable sub-assy and horn button Assy.

The airbag will deploy if the airbag deployment conditions are satisfied.

DTC B0101/14 is recorded when an open is detected in the D squib circuit.

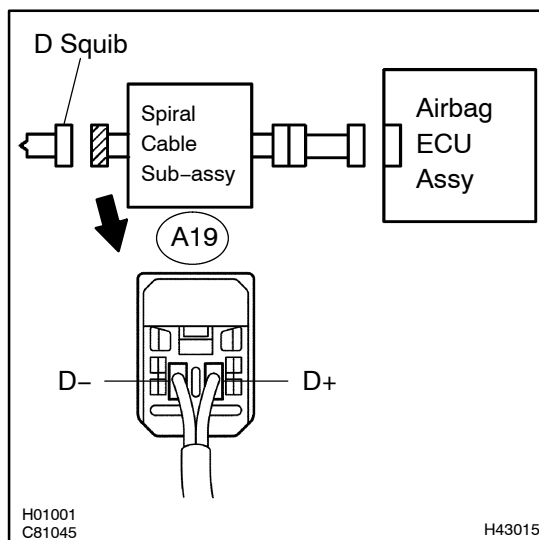
DTC No.	DTC Detection Condition	Trouble Area
B0101/14	<ul style="list-style-type: none"> • Open circuit in D+ wire harness or D- wire harness of squib • D squib malfunction • Spiral cable sub-assy malfunction • Airbag ECU Assy malfunction 	<ul style="list-style-type: none"> • Horn button Assy (D squib) • Spiral cable sub-assy • Airbag ECU Assy • Wire harness

WIRING DIAGRAM

See page 05-226.

INSPECTION PROCEDURE

1	CHECK D SQUIB CIRCUIT (AIRBAG ECU ASSY ↔ HORN BUTTON ASSY)
----------	---



- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Disconnect the connectors between the airbag ECU Assy and the horn button Assy.
- For the connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and the horn button Assy, measure the resistance between terminals D+ and D- of the A19 connector.

OK:

Resistance: Below 1 Ω

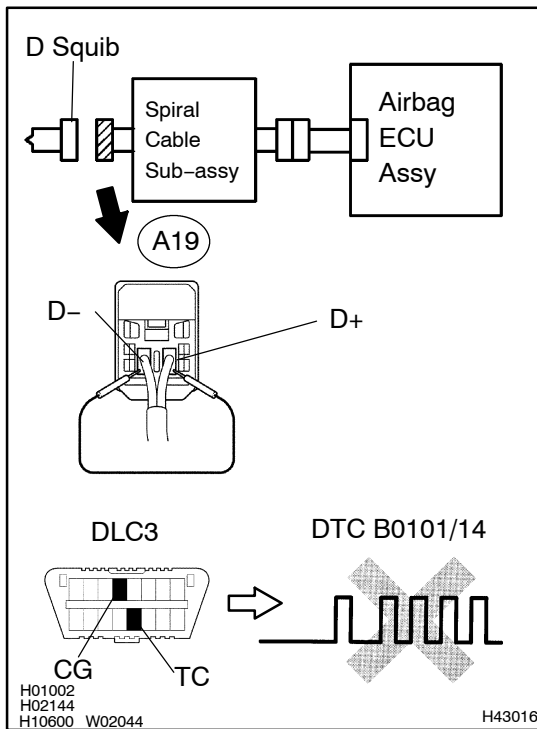
NG

Go to step 4

OK

2 CHECK AIR BAG ECU ASSY

SST 09843-18040



- Connect the connector to the airbag ECU Assy.
- Using a service wire, connect terminals D+ and D- of the A17 connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and the horn button Assy.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

OK:**DTC B0101/14 is not output.**

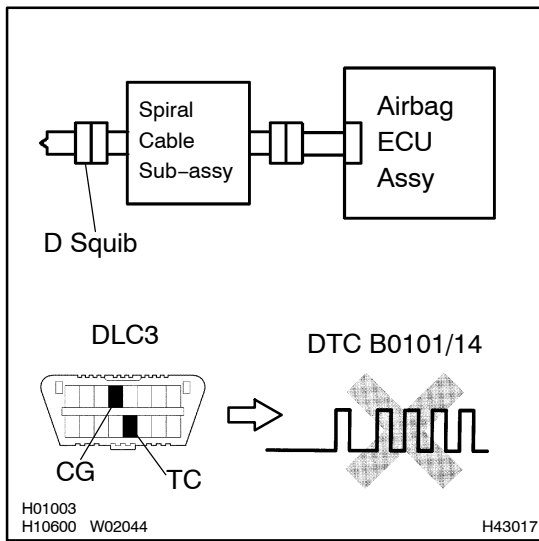
HINT:

Codes other than code B0101/14 may be output at this time, but they are not relevant to this check.

NG**REPLACE AIR BAG ECU ASSY****OK**

3 CHECK D SQUIB

SST 09843-18040



- Turn the ignition switch to LOCK.
- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Connect the horn button connector.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

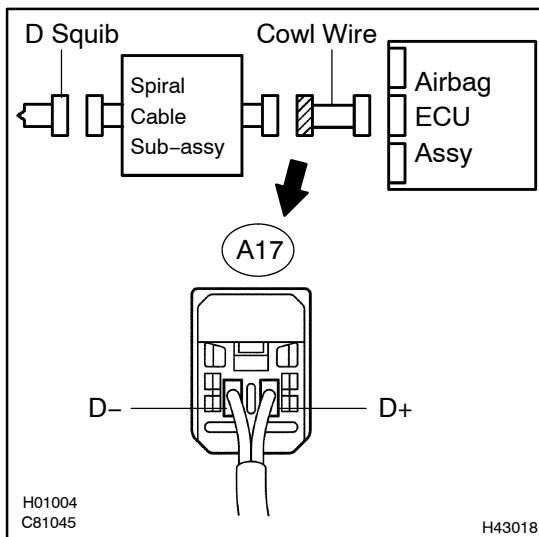
OK:**DTC B0101/14 is not output.****HINT:**

Codes other than code B0101/14 may be output at this time, but they are not relevant to this check.

NG**REPLACE HORN BUTTON ASSY****OK**

USE SIMULATION METHOD TO CHECK

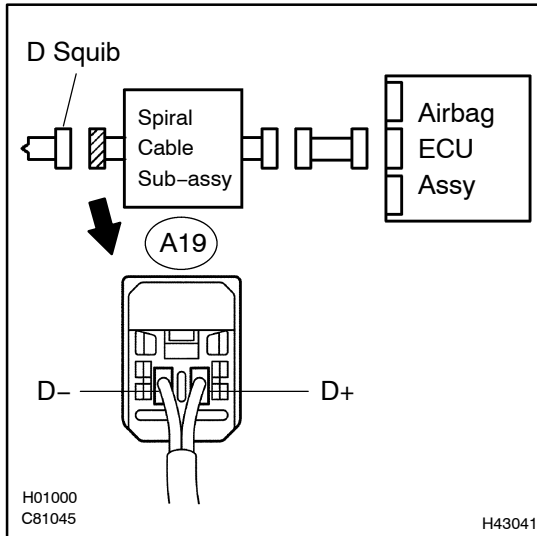
4 CHECK COWL WIRE (AIRBAG ECU ASSY ↔ SPIRAL CABLE SUB-ASSY)



- Disconnect the connectors of the cowl wire.
- For the connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and the horn button Assy, measure the resistance between terminals D+ and D- of the A17 connector.

OK:**Resistance: Below 1 Ω****NG****REPAIR OR REPLACE COWL WIRE****OK**

5 CHECK SPIRAL CABLE SUB-ASSY



- (a) For the connector (on the spiral cable sub-assy side) between the airbag ECU Assy and the spiral cable sub-assy, measure the resistance between terminals D+ and D- of the A19 connector.

OK:

Resistance: Below 1 Ω

NG

REPLACE SPIRAL CABLE SUB-ASSY

OK

USE SIMULATION METHOD TO CHECK

DTC	B0102/11	SHORT IN D SQUIB CIRCUIT (TO GROUND)
------------	-----------------	---

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag ECU Assy, spiral cable sub-assy and horn button Assy.

The SRS will deploy if the SRS deployment conditions are satisfied.

DTC B0102/11 is recorded when a ground short is detected in the D squib circuit.

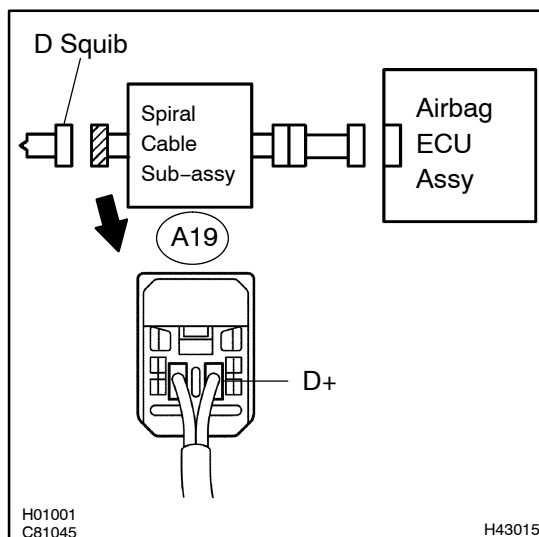
DTC No.	DTC Detection Condition	Trouble Area
B0102/11	<ul style="list-style-type: none"> • Short circuit in D squib wire harness (to ground) • D squib malfunction • Spiral cable sub-assy malfunction • Airbag ECU Assy malfunction 	<ul style="list-style-type: none"> • Horn button Assy (D squib) • Spiral cable sub-assy • Airbag ECU Assy • Wire harness

WIRING DIAGRAM

See page 05-226.

INSPECTION PROCEDURE

1	CHECK D SQUIB CIRCUIT(AIRBAG ECU ASSY-HORN BUTTON ASSY)
----------	--



- (a) Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- (b) Disconnect the connector between the airbag ECU Assy and the horn button Assy.
- (c) For the connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and the horn button Assy, measure the resistance between terminal D+ of the A19 connector and the body ground.

OK:

Resistance: 1 MΩ or higher

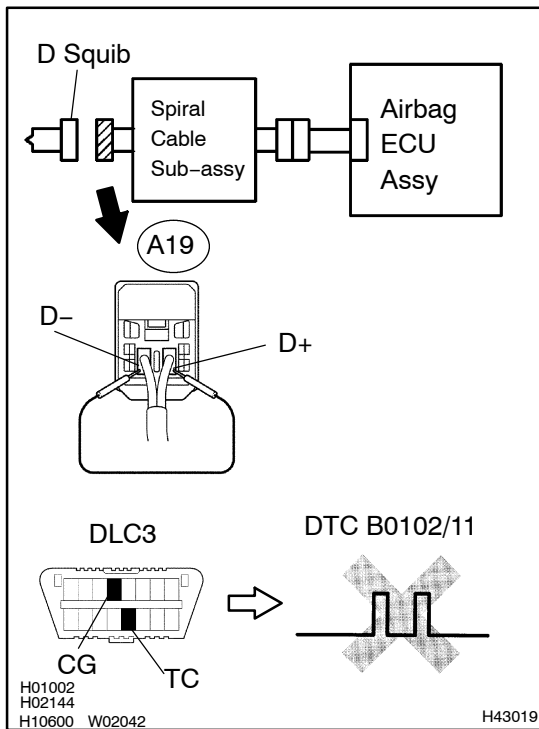
NG →

Go to step 5

OK

2 CHECK AIR BAG ECU ASSY

SST 09843-18040



- Connect the connector to the airbag ECU Assy.
- Using a service wire, connect terminals D+ and D- of the A19 connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and the horn button Assy.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

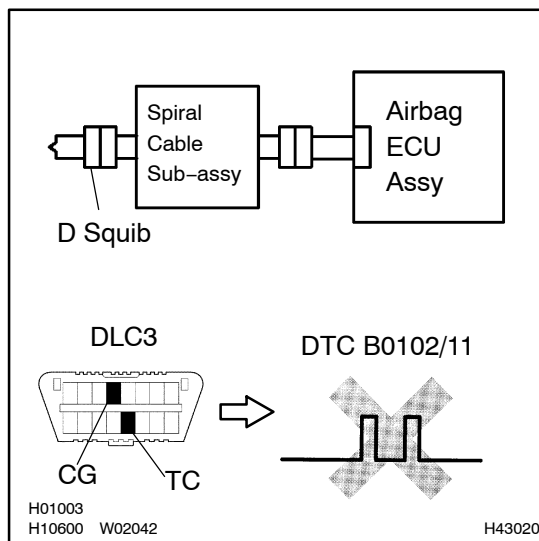
OK:**DTC B0102/11 is not output.****HINT:**

Codes other than code B0102/11 may be output at this time, but they are not relevant to this check.

NG**REPLACE AIR BAG ECU ASSY****OK**

3 CHECK D SQUIB

SST 09843-18040



- Turn the ignition switch to LOCK.
- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Connect the horn button connector.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Check for DTC (See page 05-216).

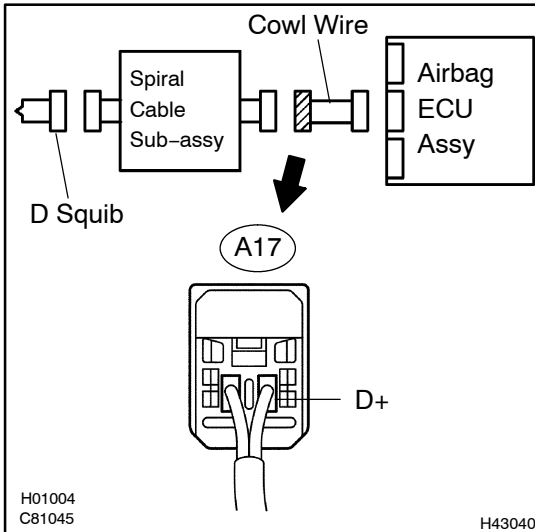
OK:**DTC B0102/11 is not output.****HINT:**

Codes other than code B0102/11 may be output at this time, but they are not relevant to this check.

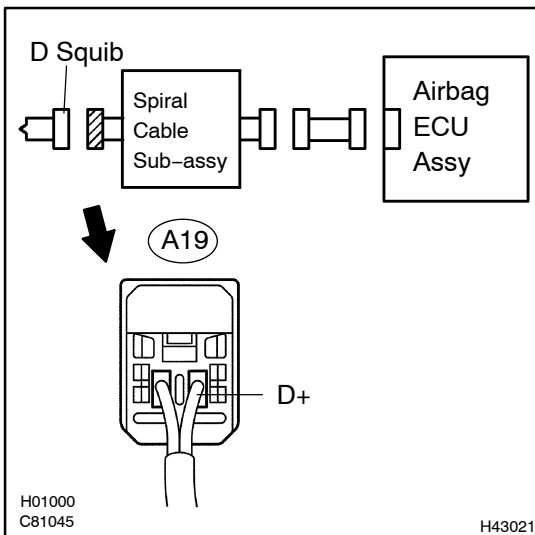
NG**REPLACE HORN BUTTON ASSY****OK**

4 USE SIMULATION METHOD TO CHECK

NG**Go to step 1****OK****REPLACE ALL SRS COMPONENTS INCLUDING THE WIRE HARNESS**

5 CHECK COWL WIRE(AIRBAG ECU ASSY-SPIRAL CABLE SUB-ASSY)

- (a) Disconnect the connectors of the cowl wire.
- (b) For the connector (on the spiral cable sub-assy side) between the airbag ECU Assy and the spiral cable sub-assy, measure the resistance between terminal D+ of the A17 connector and the body ground.

OK:**Resistance: 1 MΩ or higher****NG****REPAIR OR REPLACE COWL WIRE****OK****6 CHECK SPIRAL CABLE SUB-ASSY**

- (a) For the connector (on the spiral cable sub-assy side) between the horn button Assy and spiral cable sub-assy, measure the resistance between terminal D+ of the A19 connector and the body ground.

OK:**Resistance: 1 MΩ or higher****NG****REPLACE SPIRAL CABLE SUB-ASSY****OK****7 USE SIMULATION METHOD TO CHECK****NG****Go to step 1****OK****REPLACE ALL SRS COMPONENTS INCLUDING THE WIRE HARNESS**

DTC	B0103/12	SHORT IN D SQUIB CIRCUIT (TO B+)
------------	-----------------	---

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag ECU Assy, spiral cable sub-assy and horn button Assy. The SRS will deploy if the SRS deployment conditions are satisfied.

DTC B0103/12 is recorded when a B+ short is detected in the D squib circuit.

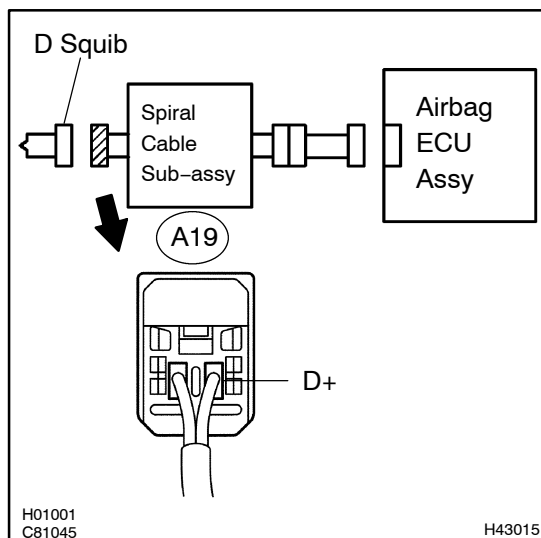
DTC No.	DTC Detection Condition	Trouble Area
B0103/12	<ul style="list-style-type: none"> • Short circuit in D squib wire harness (to B+) • D squib malfunction • Spiral cable sub-assy malfunction • Airbag ECU Assy malfunction 	<ul style="list-style-type: none"> • Horn button Assy (D squib) • Spiral cable sub-assy • Airbag ECU Assy • Wire harness

WIRING DIAGRAM

See page 05-226.

INSPECTION PROCEDURE

1	CHECK D SQUIB CIRCUIT (AIRBAG ECU ASSY ↔ HORN BUTTON ASSY)
----------	---



- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Disconnect the connector between the airbag ECU Assy and the horn button Assy.
- Connect the negative (-) terminal cable to the battery and turn the ignition switch to ON.
- For the connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and the horn button Assy, measure the voltage between terminal D+ of the A19 connector and the body ground.

OK:

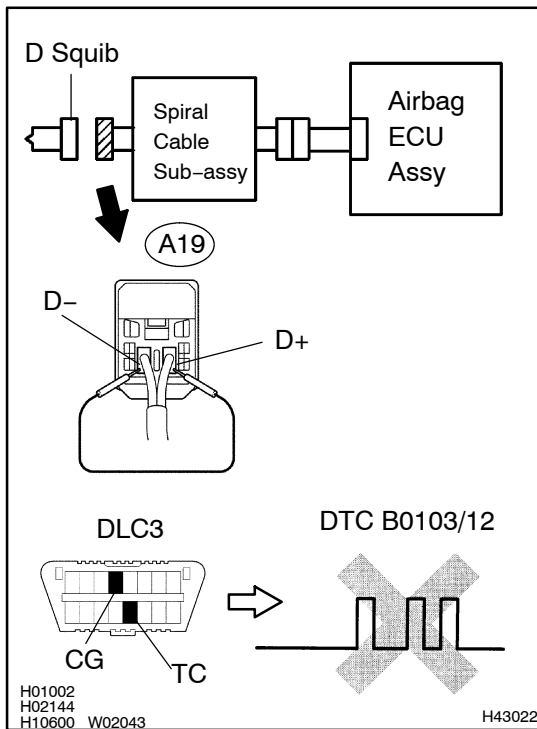
Voltage: Below 1 V

NG	Go to step 5
-----------	---------------------

OK

2 CHECK AIR BAG ECU ASSY

SST 09843-18040



- Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
- Connect the connector to the airbag ECU Assy.
- Using a service wire connect terminals D+ and D- of the A19 connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and the horn button Assy.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

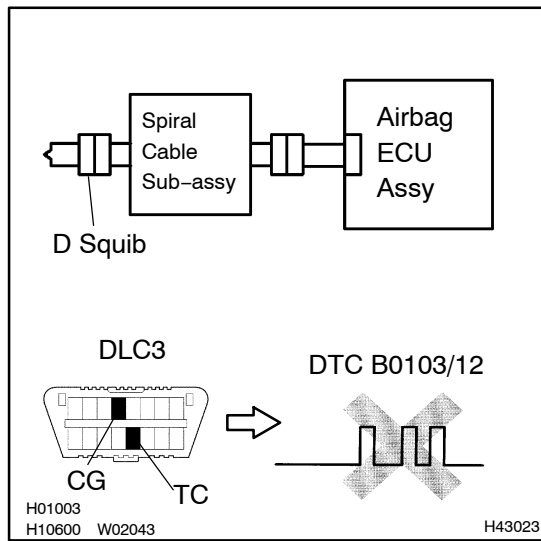
OK:**DTC B0103/12 is not output.****HINT:**

Codes other than code B0103/12 may be output at this time, but they are not relevant to this check.

NG**REPLACE AIR BAG ECU ASSY****OK**

3 CHECK D SQUIB

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- Turn the ignition switch to LOCK.
- Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
- Connect the horn button connector.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

OK:**DTC B0103/12 is not output.**

HINT:

Codes other than code B0103/12 may be output at this time, but they are not relevant to this check.

NG

REPLACE HORN BUTTON ASSY

OK

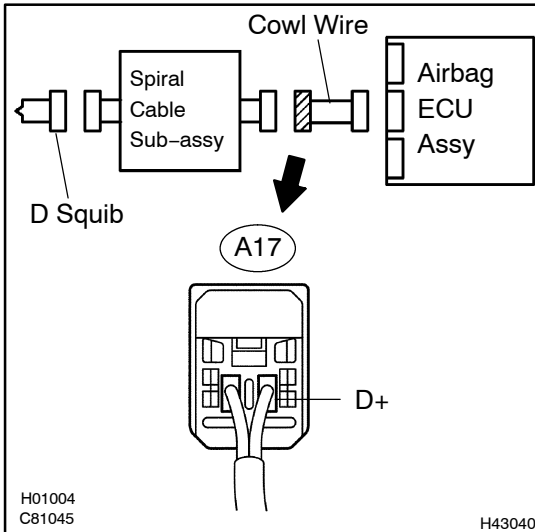
4 USE SIMULATION METHOD TO CHECK

NG

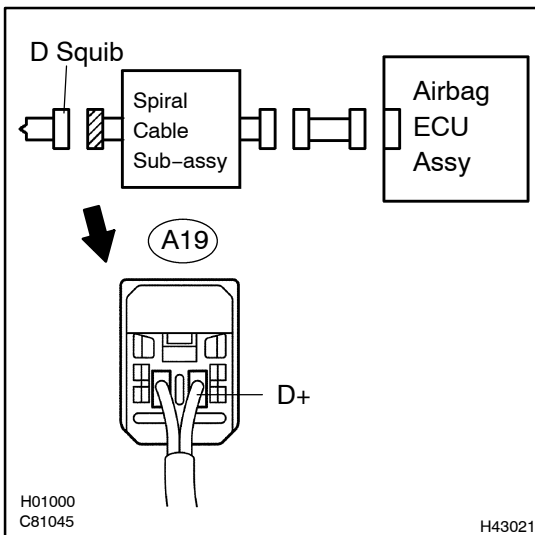
Go to step 1

OK

REPLACE ALL SRS COMPONENTS INCLUDING THE WIRE HARNESS

5 CHECK COWL WIRE (AIRBAG ECU ASSY ↔ SPIRAL CABLE SUB-ASSY)

- (a) Turn the ignition switch to LOCK.
- (b) Disconnect the connectors of the cowl wire.
- (c) For the cowl wire connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and airbag ECU assy, measure the voltage between terminal D+ and the body ground.

OK:**Voltage: Below 1 V****NG****REPAIR OR REPLACE COWL WIRE****OK****6 CHECK SPIRAL CABLE SUB-ASSY**

- (a) For the connector (on the spiral cable sub-assy side) between the spiral cable sub-assy and the horn button assy, measure the voltage between terminal D+ and the body ground.

OK:**Voltage: Below 1 V****NG****REPLACE SPIRAL CABLE SUB-ASSY****OK****7 USE SIMULATION METHOD TO CHECK****NG****Go to step 1****OK****REPLACE ALL SRS COMPONENTS INCLUDING THE WIRE HARNESS**

DTC	B0130/63	SHORT IN P/T SQUIB (RH) CIRCUIT
------------	-----------------	--

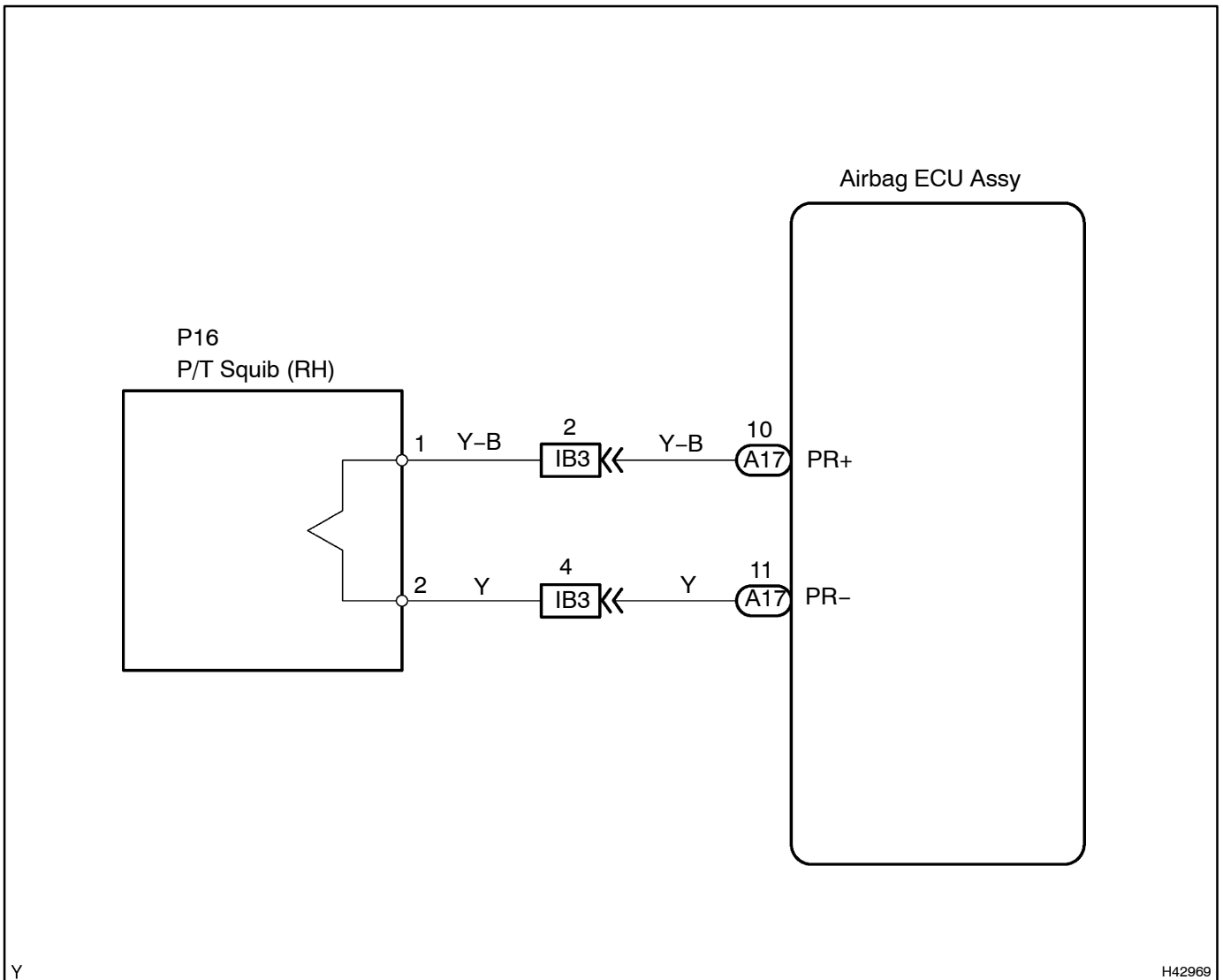
CIRCUIT DESCRIPTION

The P/T squib (RH) circuit consists of the airbag ECU Assy and seat belt pretensioner (RH). The SRS will deploy if the SRS deployment conditions are satisfied.

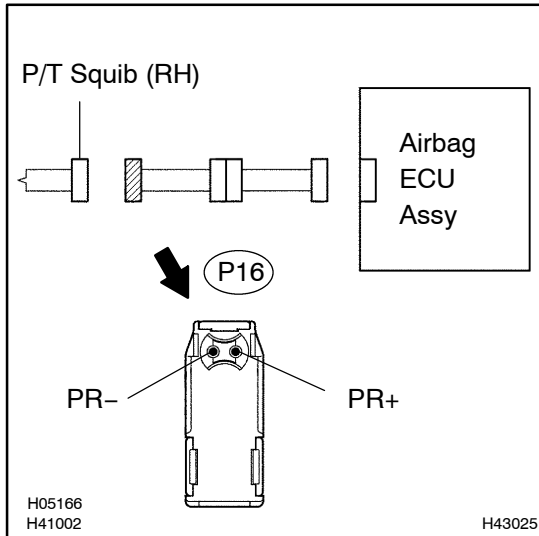
DTC B0130/63 is recorded when a short is detected in the P/T squib (RH) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B0130/63	<ul style="list-style-type: none"> • Short circuit between PR+ wire harness and PR- wire harness of squib • P/T squib (RH) malfunction • Airbag ECU Assy malfunction 	<ul style="list-style-type: none"> • Seat belt pretensioner RH (P/T squib) • Airbag ECU Assy • Wire harness

WIRING DIAGRAM



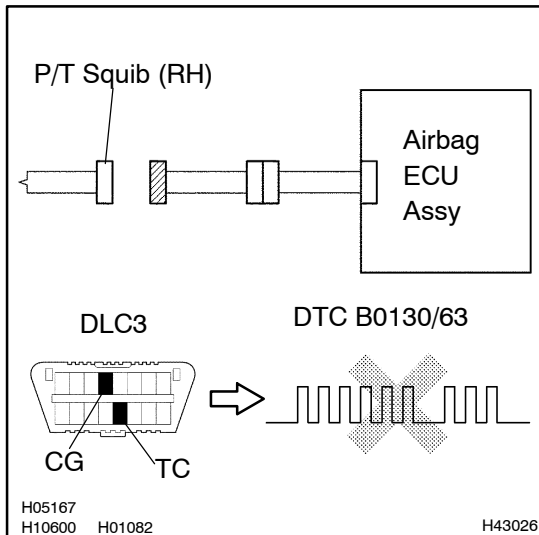
INSPECTION PROCEDURE

**1 CHECK P/T SQUIB(RH) CIRCUIT
(AIRBAG ECU ASSY ↔ FRONT SEAT OUTER BELT ASSY RH)**


- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Disconnect the connector between the airbag ECU Assy and the seat belt pretensioner (RH).
- Release the airbag activation prevention mechanism of the connector (on the airbag ECU Assy side) between the airbag ECU Assy and the seat belt pretensioner (RH) (See page 05-216).
- For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag ECU Assy, measure the resistance between terminals PR+ and PR- of the P16 connector.

OK:**Resistance: 1 MΩ or higher****NG****Go to step 4****OK**
2 CHECK AIR BAG ECU ASSY

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- Connect the connector to the airbag ECU Assy.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

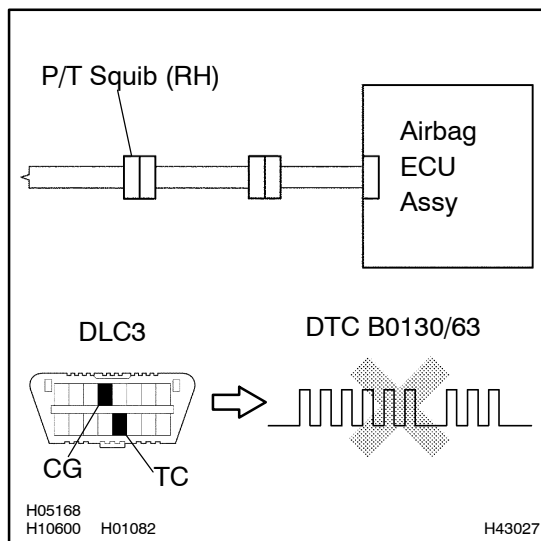
OK:**DTC B0130/63 is not output.****HINT:**

Codes other than code B0130/63 may be output at this time, but they are not relevant to this check.

NG**REPLACE AIR BAG ECU ASSY****OK**

3 CHECK P/T SQUIB (RH)

SST 09843-18040



- Turn the ignition switch to LOCK.
- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Connect the seat belt pretensioner (RH) connector.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

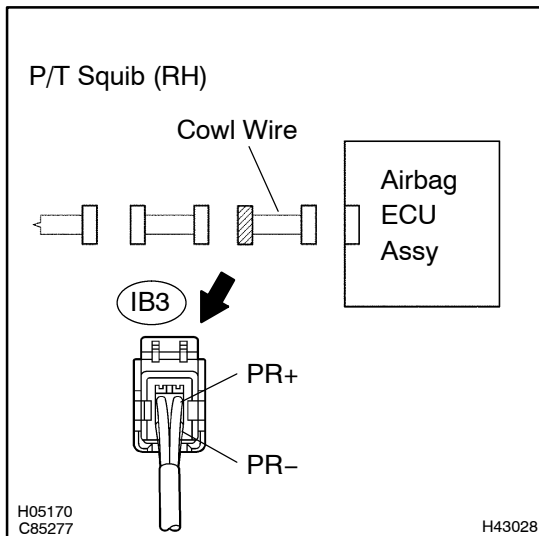
OK:**DTC B0130/63 is not output.**

HINT:

Codes other than code B0130/63 may be output at this time, but they are not relevant to this check.

NG**REPLACE FRONT SEAT OUTER BELT ASSY RH****OK****USE SIMULATION METHOD TO CHECK**

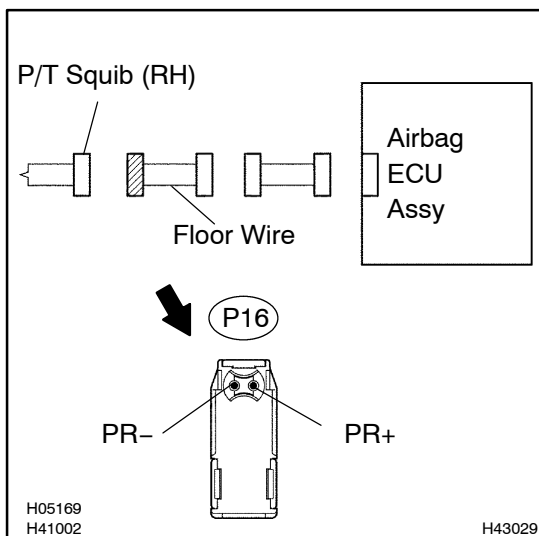
4

**CHECK COWL WIRE
(AIRBAG ECU ASSY ↔ FRONT SEAT OUTER BELT ASSY RH)**

- Disconnect the connector between the airbag ECU assy and the seat belt pretensioner (RH).
- Disconnect the connectors of the cowl wire.
- Release the airbag activation prevention mechanism of the cowl wire connector (on the airbag ECU assy side) (See page 05-216).
- For the cowl wire connector (on the seat belt pretensioner side), measure the resistance between terminals PR+ and PR- of the IB3 connector.

OK:**Resistance: 1 MΩ or higher****NG****REPAIR OR REPLACE COWL WIRE****OK**

5

**CHECK FLOOR WIRE
(AIRBAG ECU ASSY ↔ FRONT SEAT OUTER BELT ASSY RH)**

- Release the airbag activation prevention mechanism of the floor wire connector (on the airbag ECU assy side) (See page 05-216).
- For the floor wire connector (on the seat belt pretensioner side), measure the resistance between terminals PR+ and PR- of the P16 connector.

OK:**Resistance: 1 MΩ or higher****NG****REPAIR OR REPLACE FLOOR WIRE****OK****USE SIMULATION METHOD TO CHECK**

DTC	B0131/64	OPEN IN P/T (RH) CIRCUIT
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CIRCUIT DESCRIPTION

The P/T squib circuit (RH) consists of the airbag ECU assy and seat belt pretensioner (RH).

The SRS will deploy if the SRS deployment conditions are satisfied.

DTC B0131/64 is recorded when an open is detected in the P/T squib (RH) circuit.

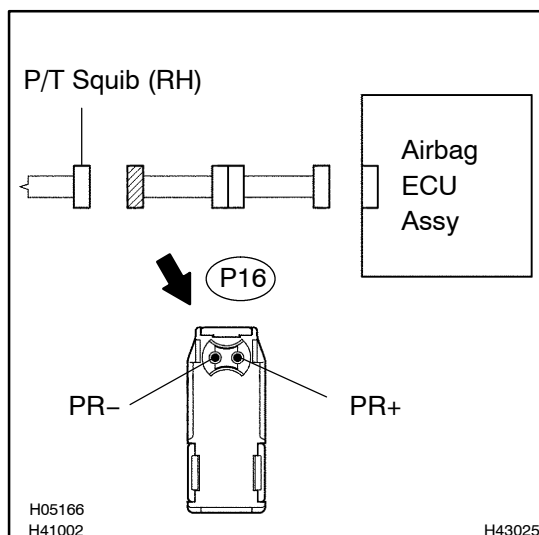
DTC No.	DTC Detection Condition	Trouble Area
B0131/64	<ul style="list-style-type: none"> • Open circuit in PR+ wire harness or PR- wire harness of squib • P/T squib (RH) malfunction • Airbag ECU assy malfunction 	<ul style="list-style-type: none"> • Seat belt pretensioner RH (P/T squib) • Airbag ECU assy • Wire harness

WIRING DIAGRAM

See page 05-242.

INSPECTION PROCEDURE

1	CHECK P/T SQUIB(RH) CIRCUIT (AIRBAG ECU ASSY ↔ FRONT SEAT OUTER BELT ASSY RH)
----------	--



- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Disconnect the connector between the airbag ECU assy and the seat belt pretensioner (RH).
- For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag ECU assy, measure the resistance between terminals PR+ and PR- of the P16 connector.

OK:

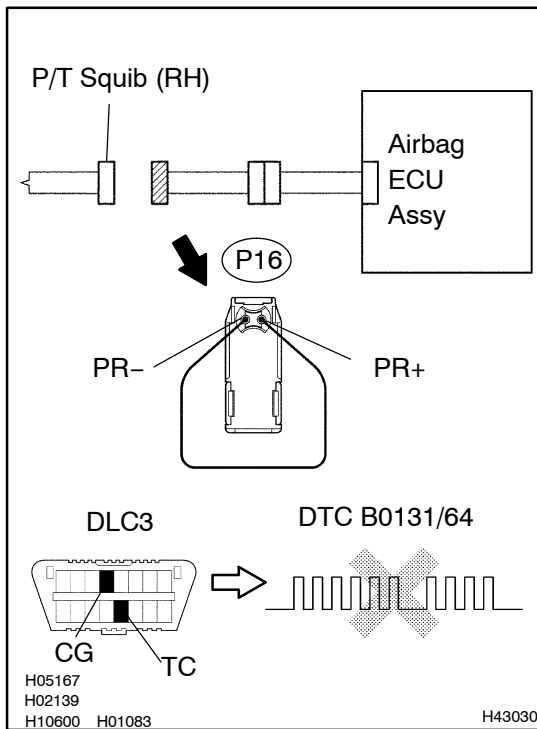
Resistance: Below 1 Ω

NG	Go to step 4
-----------	---------------------

OK

2 CHECK AIR BAG ECU ASSY

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- Connect the connector to the airbag ECU assy.
- Using a service wire, connect terminals PR+ and PR- of the P16 connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag ECU assy.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

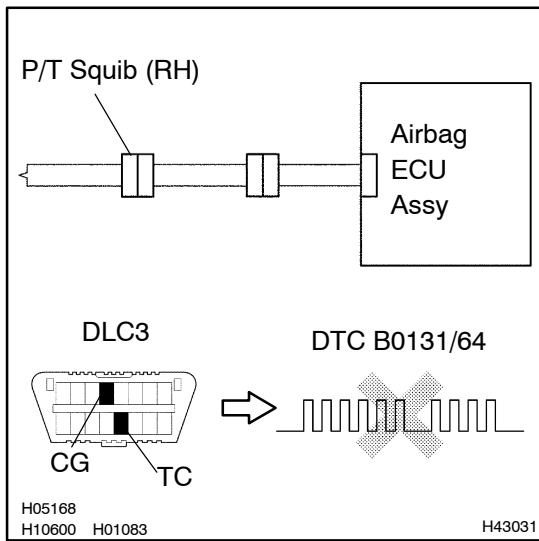
OK:**DTC B0131/64 is not output.****HINT:**

Codes other than code B0131/64 may be output at this time, but they are not relevant to this check.

NG**REPLACE AIR BAG ECU ASSY****OK**

3 CHECK P/T SQUIB (RH)

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- Turn the ignition switch to LOCK.
- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Connect the seat belt pretensioner (RH) connector.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

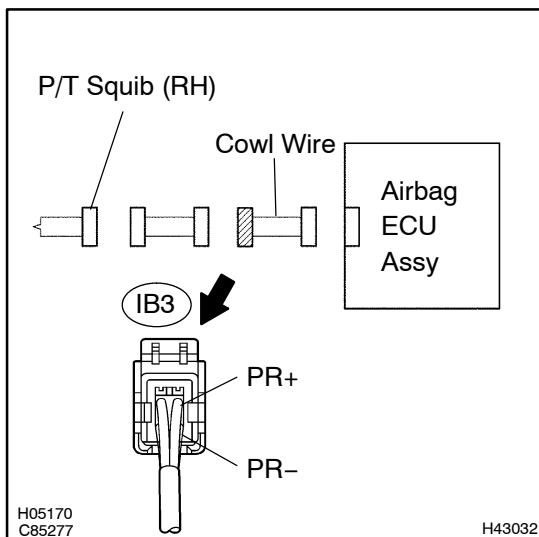
OK:**DTC B0131/64 is not output.****HINT:**

Codes other than code B0131/64 may be output at this time, but they are not relevant to this check.

NG**REPLACE FRONT SEAT OUTER BELT ASSY RH****OK**

USE SIMULATION METHOD TO CHECK

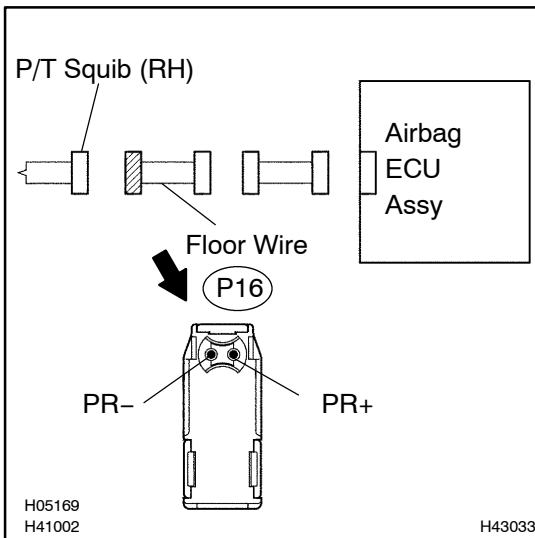
4 CHECK COWL WIRE (AIRBAG ECU ASSY ↔ FRONT SEAT OUTER BELT ASSY RH)



- Disconnect the connectors of the cowl wire.
- For the cowl wire connector (on the seat belt pretensioner side), measure the resistance between terminals PR+ and PR- of the IB3 connector.

OK:**Resistance: Below 1 Ω****NG****REPAIR OR REPLACE COWL WIRE****OK**

5

**CHECK FLOOR WIRE
(AIRBAG ECU ASSY ↔ FRONT SEAT OUTER BELT ASSY RH)**


- (a) Disconnect the connectors of the floor wire.
 (b) For the floor wire connector (on the seat belt pretensioner side) between the airbag ECU Assy and the seat belt pretensioner (RH), measure the resistance between terminals PR+ and PR- of the P16 connector.

OK:**Resistance: Below 1 Ω** **NG****REPAIR OR REPLACE FLOOR WIRE****OK****USE SIMULATION METHOD TO CHECK**

DTC	B0132/61	SHORT IN P/T SQUIB (RH) CIRCUIT (TO GROUND)
------------	-----------------	--

CIRCUIT DESCRIPTION

The P/T squib (RH) circuit consists of the airbag ECU Assy and seat belt pretensioner (RH).

The SRS will deploy if the SRS deployment conditions are satisfied.

DTC B0132/61 is recorded when a ground short is detected in the P/T squib (RH) circuit.

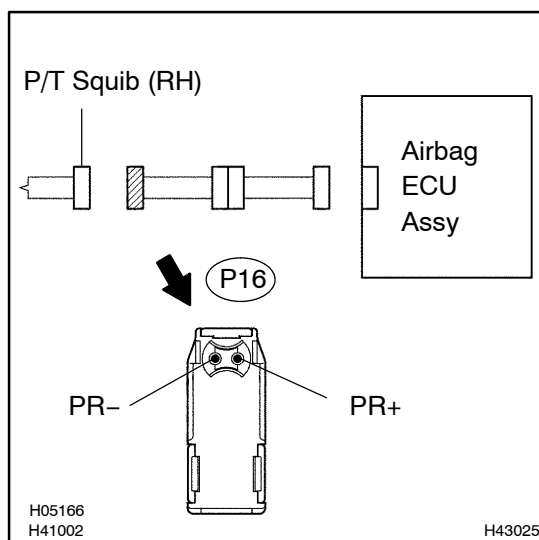
DTC No.	DTC Detection Condition	Trouble Area
B0132/61	<ul style="list-style-type: none"> • Short circuit in P/T squib (RH) wire harness (to ground) • P/T squib (RH) malfunction • Airbag ECU Assy malfunction 	<ul style="list-style-type: none"> • Seat belt pretensioner RH (P/T squib) • Airbag ECU Assy • Wire harness

WIRING DIAGRAM

See page 05-242.

INSPECTION PROCEDURE

1	CHECK P/T SQUIB(RH) CIRCUIT (AIRBAG ECU ASSY ⇔ FRONT SEAT OUTER BELT ASSY RH)
----------	--



- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Disconnect the connector between the airbag ECU Assy and the seat belt pretensioner (RH).
- For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag ECU Assy, measure the resistance between terminal PR+ of the P16 connector and the body ground.

OK:

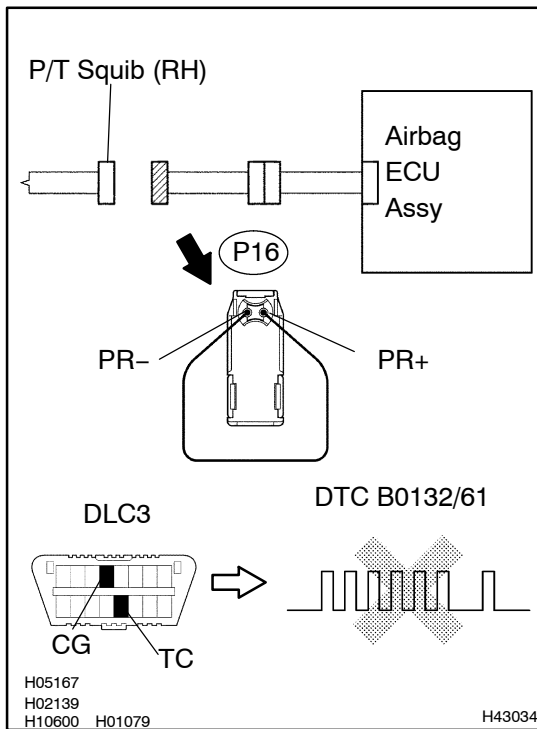
Resistance: 1 MΩ or higher

NG	Go to step 5
-----------	---------------------

OK

2 CHECK AIR BAG ECU ASSY

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- Connect the connector to the airbag ECU assy.
- Using a service wire, connect terminals PR+ and PR- of the P16 connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag ECU assy.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

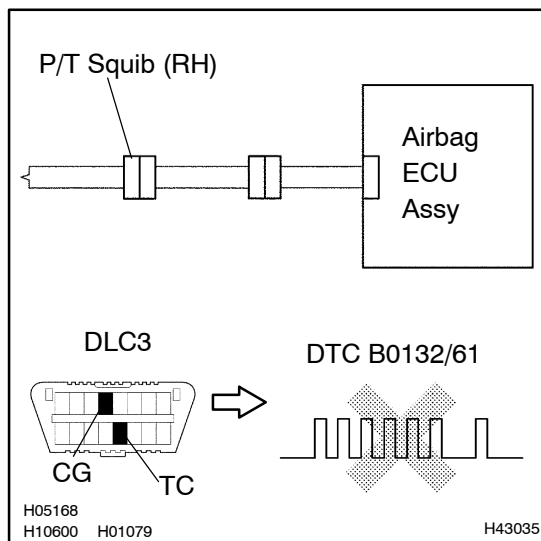
OK:**DTC B0132/61 is not output.****HINT:**

Codes other than code B0132/61 may be output at this time, but they are not relevant to this check.

NG**REPLACE AIR BAG ECU ASSY****OK**

3 CHECK P/T SQUIB (RH)

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- (a) Turn the ignition switch to LOCK.
- (b) Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- (c) Connect the seat belt pretensioner (RH) connector.
- (d) Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- (e) Turn the ignition switch to ON and wait at least for 20 seconds.
- (f) Clear the DTC stored in the memory (See page 05-216).
- (g) Turn the ignition switch to LOCK and wait at least for 20 seconds.
- (h) Turn the ignition switch to ON and wait at least for 20 seconds.
- (i) Check for DTC (See page 05-216).

DTC B0132/61 is not output.

HINT:

Codes other than code B0132/61 may be output at this time, but they are not relevant to this check.

NG

REPLACE FRONT SEAT OUTER BELT ASSY RH

OK

4 USE SIMULATION METHOD TO CHECK

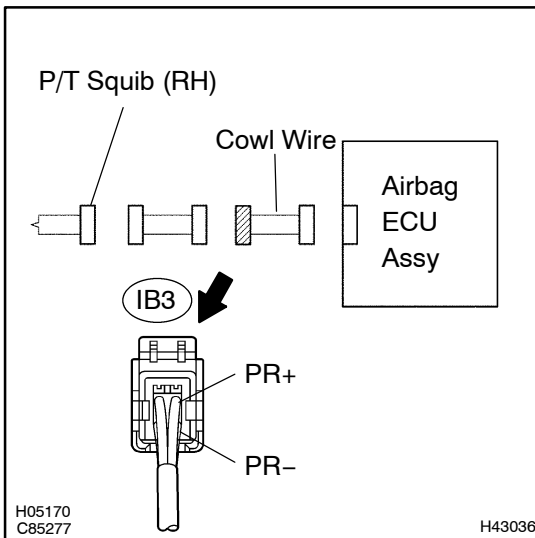
NG

Go to step 1

OK

REPLACE ALL SRS COMPONENTS INCLUDING THE WIRE HARNESS

5 CHECK COWL WIRE (AIRBAG ECU ASSY ↔ FRONT SEAT OUTER BELT ASSY RH)



- (a) Disconnect the connectors of the cowl wire and floor wire.
- (b) For the cowl wire connector (on the seat belt pretensioner side), measure the resistance between terminal PR+ of the IB3 connector and the body ground.

OK:

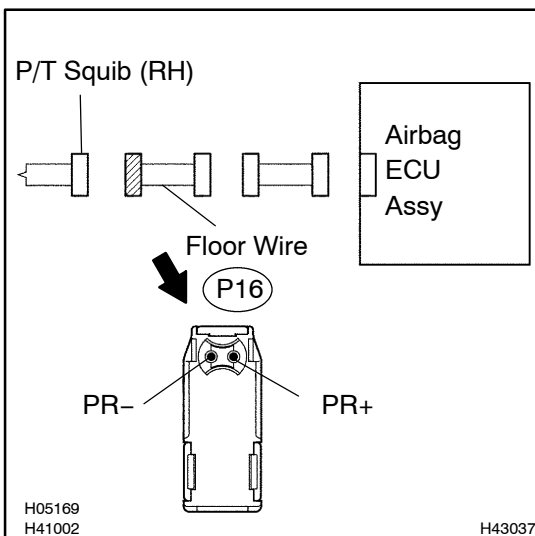
Resistance: 1 MΩ or higher

NG

REPAIR OR REPLACE COWL WIRE

OK

6 CHECK FLOOR WIRE (AIRBAG ECU ASSY ↔ FRONT SEAT OUTER BELT ASSY RH)



- (a) For the floor wire connector (on the seat belt pretensioner side), measure the resistance between terminal PR+ of the P16 connector and the body ground.

OK:

Resistance: 1 MΩ or higher

NG

REPAIR OR REPLACE FLOOR WIRE

OK

7 USE SIMULATION METHOD TO CHECK

NG

Go to step 1

OK

REPLACE ALL SRS COMPONENTS INCLUDING THE WIRE HARNESS

DTC	B0133/62	SHORT IN P/T SQUIB (RH) CIRCUIT (TO B+)
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CIRCUIT DESCRIPTION

The P/T squib (RH) circuit consists of the airbag ECU Assy and seat belt pretensioner (RH).

The SRS will deploy if the SRS deployment conditions are satisfied.

DTC B0133/62 is recorded when a B+ short is detected in the P/T squib (RH) circuit.

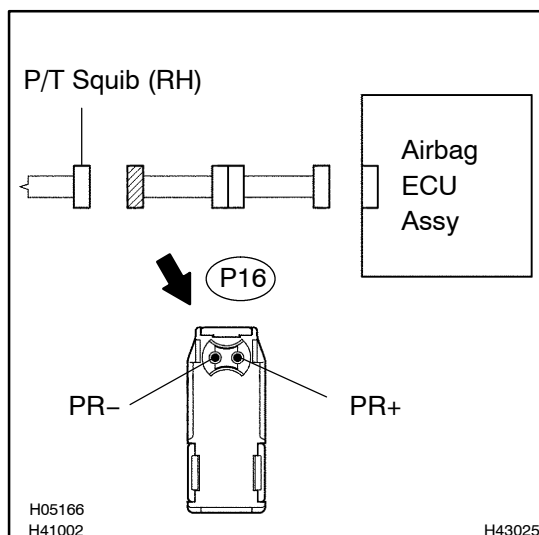
DTC No.	DTC Detection Condition	Trouble Area
B0133/62	<ul style="list-style-type: none"> • Short circuit in seat belt pretensioner (RH) wire harness (to B+) • P/T squib (RH) malfunction • Airbag ECU Assy malfunction 	<ul style="list-style-type: none"> • Seat belt pretensioner RH (P/T squib) • Airbag ECU Assy • Wire harness

WIRING DIAGRAM

See page 05-242.

INSPECTION PROCEDURE

1	CHECK P/T SQUIB(RH) CIRCUIT (AIRBAG ECU ASSY ↔ FRONT SEAT OUTER BELT ASSY RH)
----------	--



- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Disconnect the connector between the airbag ECU Assy and the seat belt pretensioner (RH).
- Connect the negative (-) terminal cable to the battery and turn the ignition switch to ON.
- For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag ECU Assy measure the voltage between terminal PR+ of the P16 connector and the body ground.

OK:

Voltage: Below 1 V

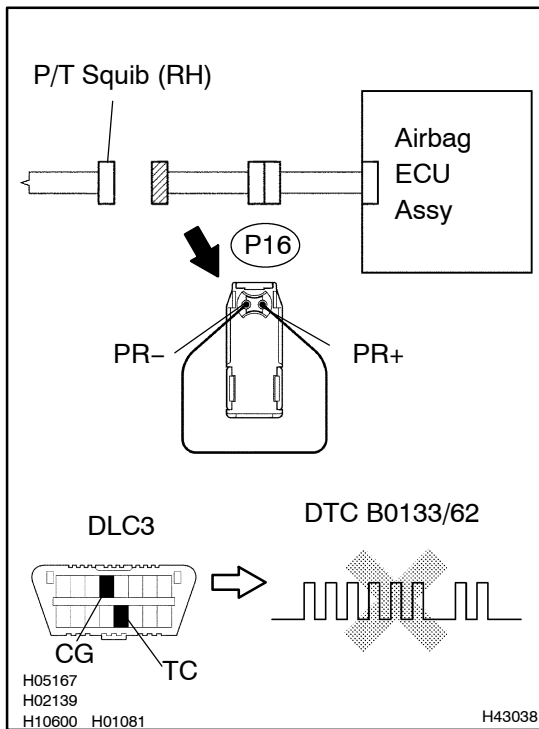
NG

Go to step 5

OK

2 CHECK AIR BAG ECU ASSY

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- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Connect the connector to the airbag ECU Assy.
- Using a service wire, connect terminals PR+ and PR- of the P16 connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag ECU Assy.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

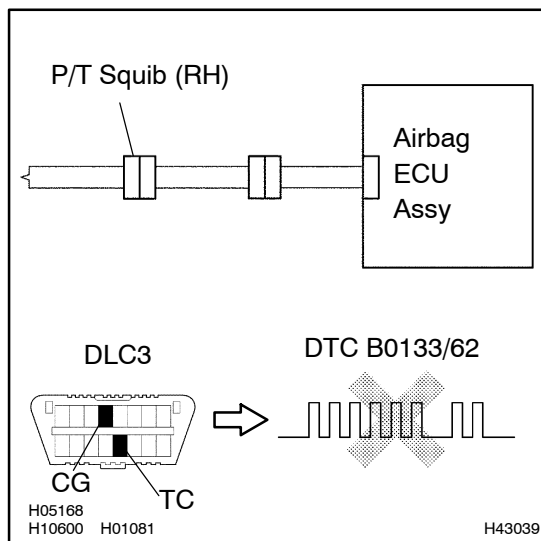
OK:**DTC B0133/62 is not output.****HINT:**

Codes other than code B0133/62 may be output at this time, but they are not relevant to this check.

NG**REPLACE AIR BAG ECU ASSY****OK**

3 CHECK P/T SQUIB (RH)

SST 09843-18040



- Turn the ignition switch to LOCK.
- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Connect the seat belt pretensioner (RH) connector.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

OK:**DTC B0133/62 is not output.**

HINT:

Codes other than code B0133/62 may be output at this time, but they are not relevant to this check.

NG

REPLACE FRONT SEAT OUTER BELT ASSY RH

OK

4 USE SIMULATION METHOD TO CHECK

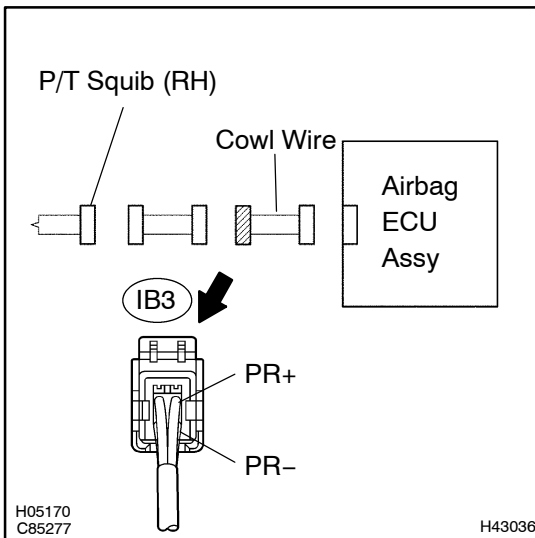
NG

Go to step 1

OK

REPLACE ALL SRS COMPONENTS INCLUDING THE WIRE HARNESS

5 CHECK COWL WIRE (AIRBAG ECU ASSY ↔ FRONT SEAT OUTER BELT ASSY RH)



- Disconnect the connectors of the cowl wire and floor wire.
- For the cowl wire connector (on the seat belt pretensioner side) measure the voltage between terminal PR+ of the IB3 connector and the body ground.

OK:

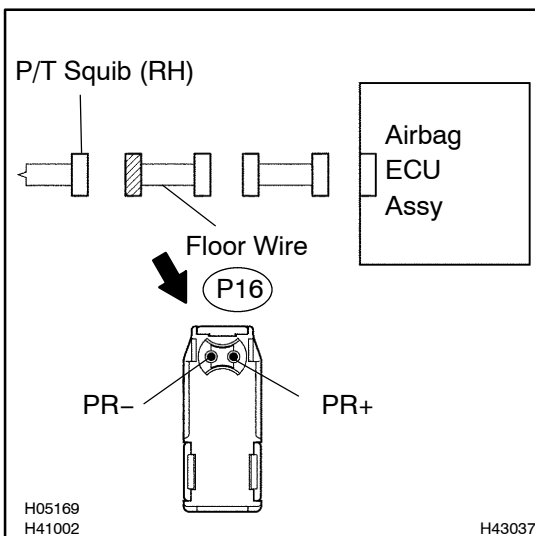
Voltage: Below 1 V

NG

REPAIR OR REPLACE COWL WIRE

OK

6 CHECK FLOOR WIRE (AIRBAG ECU ASSY- FRONT SEAT OUTER BELT ASSY RH)



- For the floor wire connector (on the seat belt pretensioner side) measure the voltage between terminal PR+ of the P16 connector and the body ground.

OK:

Voltage: Below 1 V

NG

REPAIR OR REPLACE FLOOR WIRE

OK

7 USE SIMULATION METHOD TO CHECK

NG

Go to step 1

OK

REPLACE ALL SRS COMPONENTS INCLUDING THE WIRE HARNESS

DTC	B1100/31	AIRBAG ECU ASSY MALFUNCTION
------------	-----------------	------------------------------------

CIRCUIT DESCRIPTION

The airbag ECU assy consists of the airbag ECU assy, safing sensor, drive circuit, diagnosis circuit, ignition control circuit, etc.

It receives signals from the airbag sensor, judges whether or not the SRS should be activated, and detects a malfunction in the diagnosis system.

DTC B1100/31 is recorded when a malfunction is detected in the airbag ECU assy.

DTC No.	DTC Detection Condition	Trouble Area
B1100/31	• Airbag ECU assy malfunction	• Airbag ECU assy

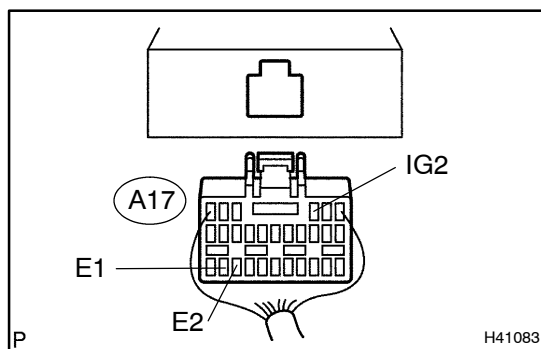
INSPECTION PROCEDURE

HINT:

When a malfunction code other than code B1100/31 is displayed at the same time, first repair the malfunction indicated by the malfunction code other than code B1100/31.

INSPECTION PROCEDURE

1	CHECK VOLTAGE AT IG2 OF AIRBAG ECU ASSY
----------	--



- (a) Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- (b) Disconnect the A17 connector of the airbag ECU assy.
- (c) Connect the negative (-) terminal cable to the battery and turn the ignition switch to ON.
- (d) Measure the voltage between terminal E1 (E2) and terminal IG2 of the A17 airbag ECU connector.

OK:

Voltage: 20 - 28 V

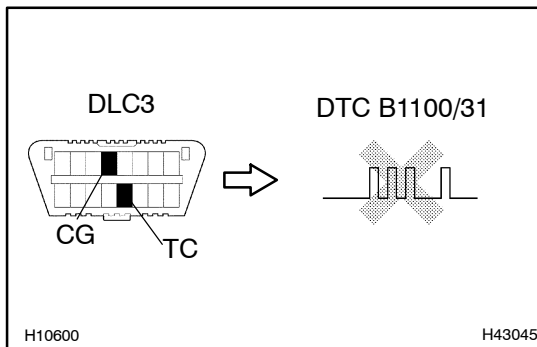
NG

REPAIR OR REPLACE COWL WIRE

OK

2 CHECK AIR BAG ECU ASSY

SST 09843-18040



- (a) Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- (b) Connect the connectors of all the SRS components.
- (c) Clear the DTC stored in the memory (See page 05-216).
- (d) Turn the ignition switch to LOCK and wait at least for 20 seconds.
- (e) Turn the ignition switch to ON and wait at least for 60 seconds.
- (f) Repeat steps (a) and (b) at least 5 times.
- (g) Check for DTC (See page 05-216).

OK:**DTC B1100/31 is not output.**

HINT:

Codes other than code B1100/31 may be output at this time, but they are not relevant to this check.

NG**REPLACE AIR BAG ECU ASSY****OK****USE SIMULATION METHOD TO CHECK**

DTC	B1135/24	HARF CONNECTION IN AIRBAG ECU ASSY CONNECTOR
------------	-----------------	---

CIRCUIT DESCRIPTION

The airbag ECU assy detects PARTIAL of the connector.

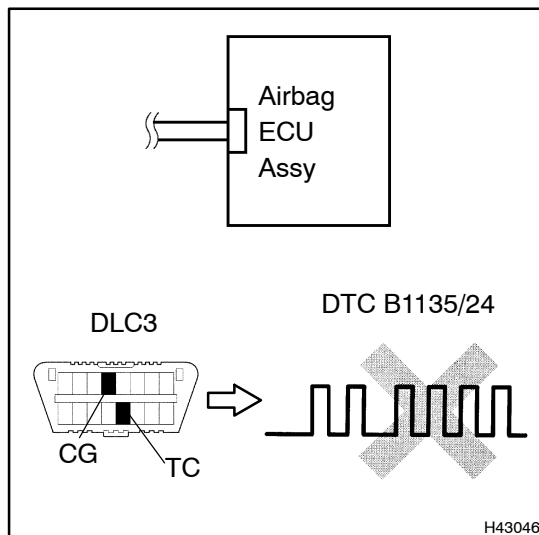
DTC B1135/24 is recorded when the airbag ECU assy detects an open circuit in the electrical connection check mechanism of the airbag sensor connector or in the airbag sensor circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1135/24	<ul style="list-style-type: none"> Malfunction of electrical connection check mechanism of airbag ECU assy connector Airbag ECU assy malfunction 	<ul style="list-style-type: none"> Electrical connection check mechanism Airbag ECU assy

INSPECTION PROCEDURE

1	CHECK AIR BAG ECU ASSY
----------	-------------------------------

SST 09843-18040



- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

OK:

DTC B1135/24 is not output.

HINT:

Codes other than code B1135/24 may be output at this time, but they are not relevant to this check.

NG

Go to step 2

OK

USE SIMULATION METHOD TO CHECK

2 CHECK AIRBAG ECU ASSY CONNECTOR

- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Check the connection of the airbag ECU assy connector.

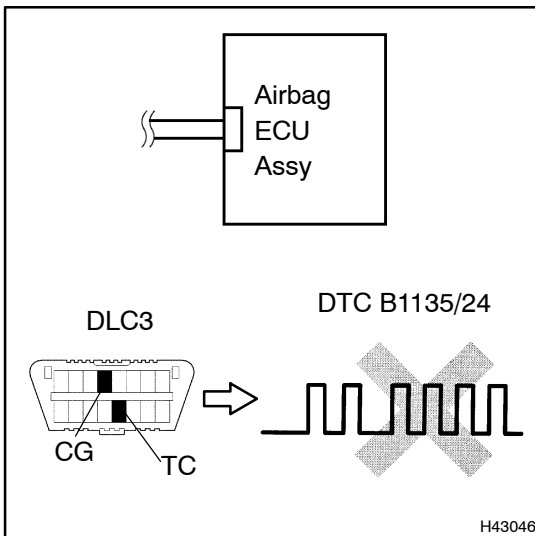
NG

CONNECT CONNECTOR

OK

3 CHECK AIR BAG ECU ASSY

SST 09843-18040



- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

OK:

DTC B1135/24 is not output.

HINT:

Codes other than code B1135/24 may be output at this time, but they are not relevant to this check.

NG

REPAIR OR REPLACE AIRBAG ECU ASSY CONNECTOR

OK

USE SIMULATION METHOD TO CHECK

DTC	B1148/36	SHORT IN AIRBAG SENSOR ASSY NO. 2 CIRCUIT (TO B+)
------------	-----------------	--

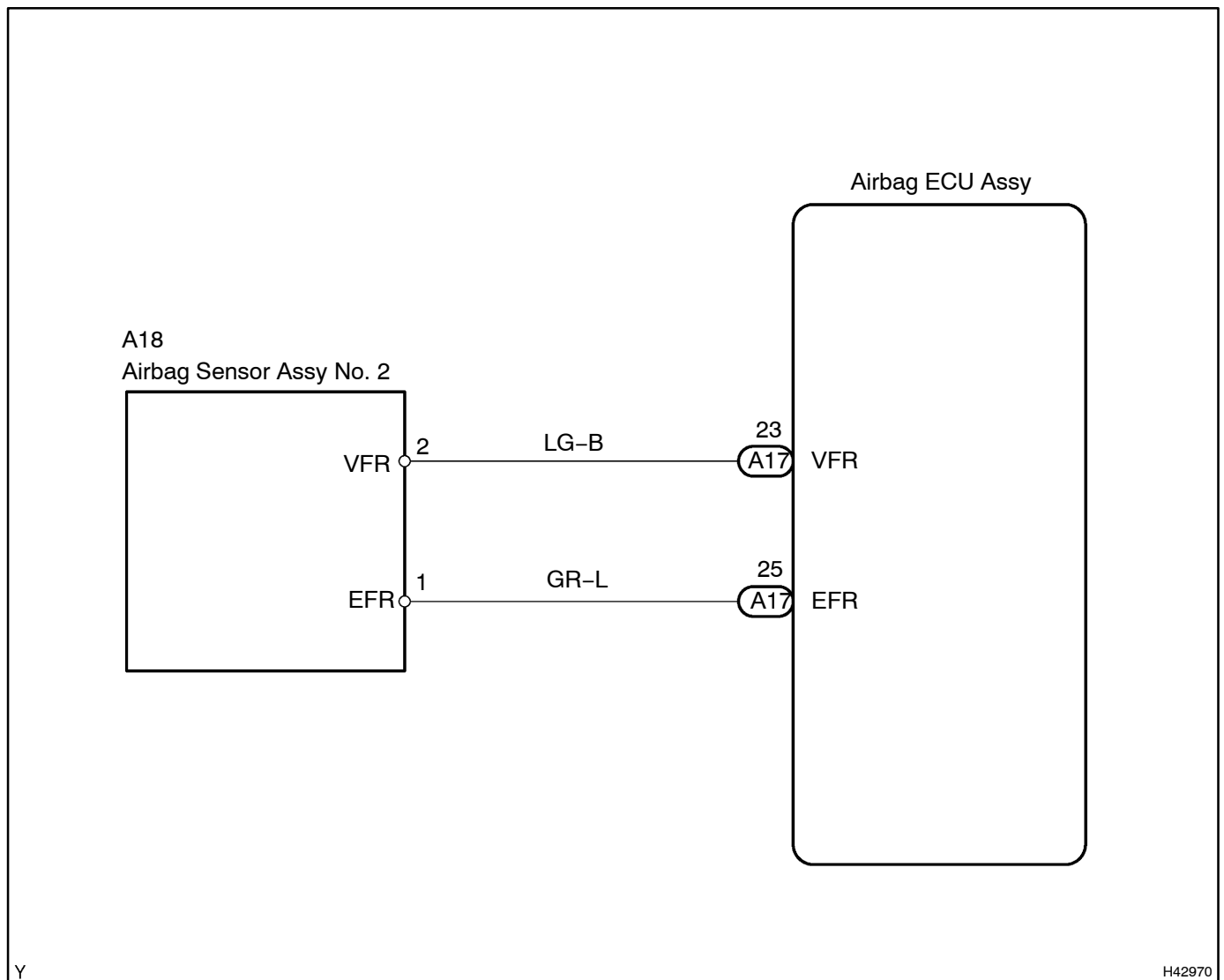
CIRCUIT DESCRIPTION

The airbag sensor assy No. 2 consists of the diagnosis circuit, frontal deceleration sensor, etc. It receives signals from the frontal deceleration sensor, judges whether the SRS should be activated or not, and detects a malfunction in the diagnosis system.

DTC B1148/36 is recorded when a malfunction is detected in the airbag sensor assy No. 2.

DTC No.	DTC Detection Condition	Trouble Area
B1135/24	• Airbag sensor assy No. 2 malfunction	• Airbag sensor assy No. 2 • Cowl wire

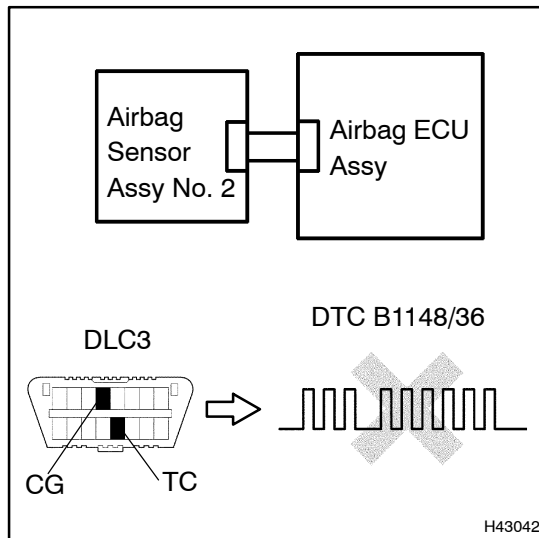
WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK AIR BAG SENSOR ASSY NO.2

SST 09843-18040



- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

OK:**DTC B1148/36 is not output.**

HINT:

Codes other than code B1148/36 may be output at this time, but they are not relevant to this check.

NG**Go to step 2****OK**

USE SIMULATION METHOD TO CHECK

2 CHECK AIRBAG SENSOR ASSY NO.2 CONNECTOR

- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Check the connection of the airbag sensor assy No. 2 connector.

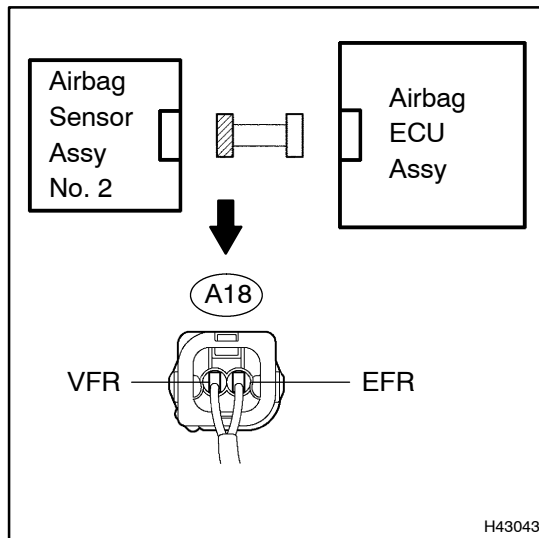
NG**CONNECT CONNECTORS****OK**

3 CHECK AIRBAG ECU ASSY CONNECTOR

- Check the connection of the airbag ECU assy connector.

NG**CONNECT CONNECTORS****OK**

4

**CHECK COWL WIRE
(AIRBAG ECU ASSY ↔ AIRBAG SENSOR ASSY NO.2)**


- (a) Disconnect the connector between the airbag ECU assy and the airbag sensor assy No. 2.
- (b) For the connector (on the airbag sensor assy No. 2 side) between the airbag ECU assy and the airbag sensor assy No. 2, measure the resistance between VFR, EFR and body ground.

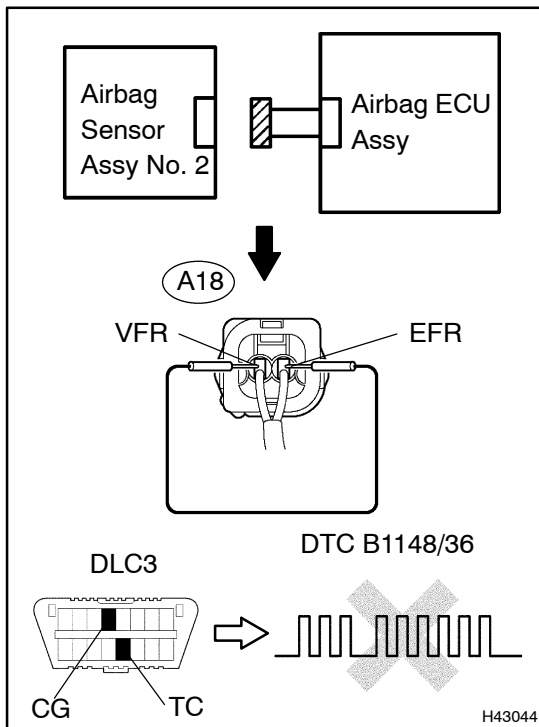
OK:**Resistance: 1 MΩ or higher**

- (c) Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- (d) Turn the ignition switch to ON.
- (e) For the connector (on the airbag sensor assy No. 2 side) between the airbag ECU assy and the airbag sensor assy No. 2, measure the voltage between VFR or EFR of the A18 connector and body ground.

OK:**Voltage: Below 1 V****NG****REPAIR OR REPLACE COWL WIRE****OK**

5 CHECK AIR BAG SENSOR ASSY NO.2

SST 09843-18040



- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Connect the connector to the airbag ECU Assy.
- Using a service wire, connect terminals VFR and EFR of the A18 connector (on the airbag sensor Assy No. 2 side) between the airbag ECU Assy and the airbag sensor Assy No. 2.
- Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- Turn the ignition switch to ON and wait at least for 20 seconds.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Check for DTC (See page 05-216).

OK:**DTC B1148/36 is not output.****HINT:**

Codes other than code B1148/36 may be output at this time, but they are not relevant to this check.

NG**REPLACE AIR BAG SENSOR ASSY NO.2****OK****USE SIMULATION METHOD TO CHECK**

POWER SOURCE VOLTAGE DROP

CIRCUIT DESCRIPTION

The SRS has a voltage-increase circuit (DC-DC converter) in the airbag ECU Assy in the case that the power source voltage drops.

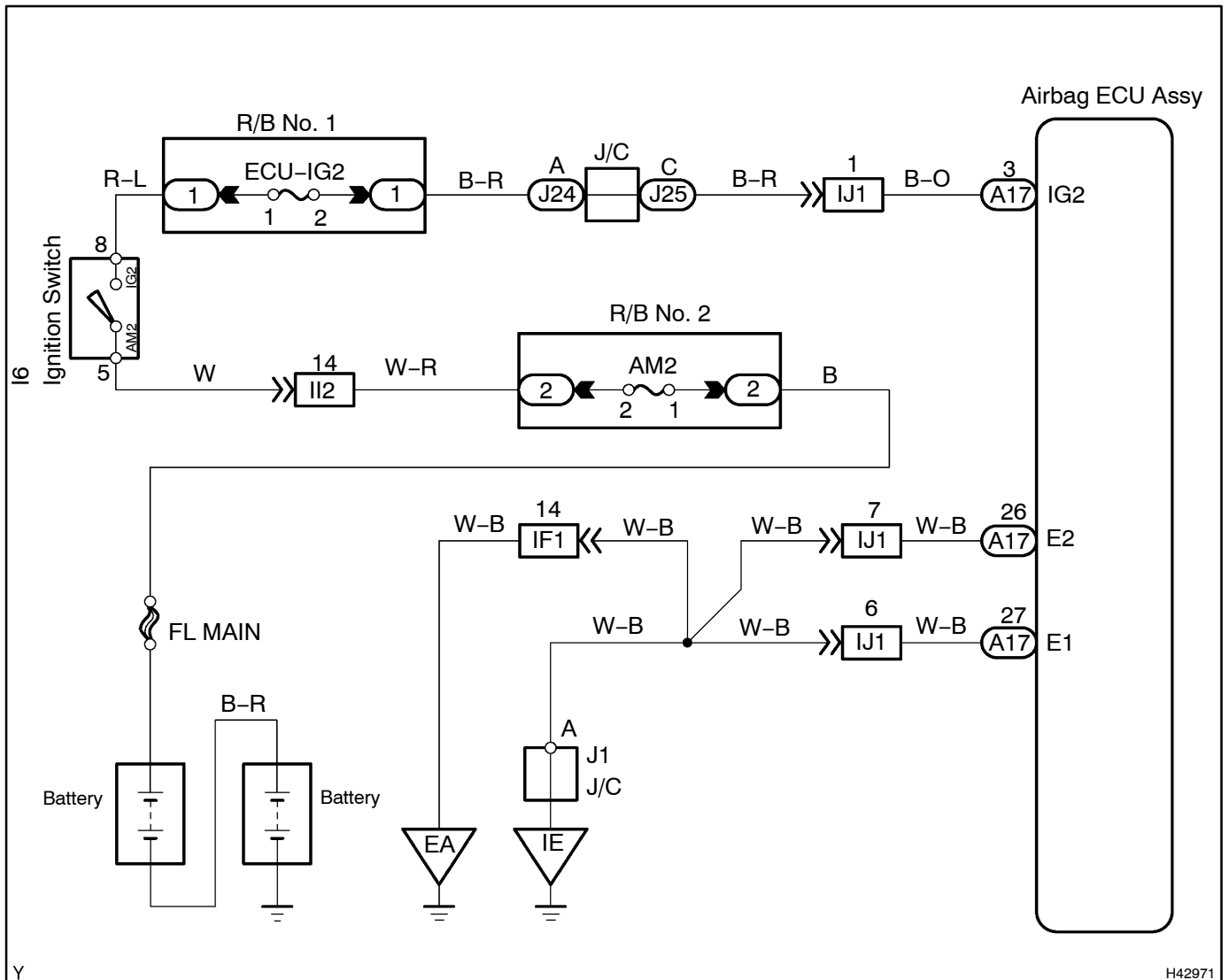
When the power source voltage drops below the normal voltage, the voltage-increase circuit (DC-DC converter) functions to increase the voltage of the SRS to has normal voltage.

The diagnosis system malfunction display for this circuit is different from that for the other circuits. When the SRS warning light remains lit on and the DTC is a normal code, power source voltage drop is indicated.

When no malfunction of this circuit is not recorded in the airbag ECU Assy and the source voltage returns to normal, the SRS warning light automatically goes off.

DTC No.	Diagnosis
(Normal)	Power source voltage drop

WIRING DIAGRAM



INSPECTION PROCEDURE

1 PREPARE FOR INSPECTION

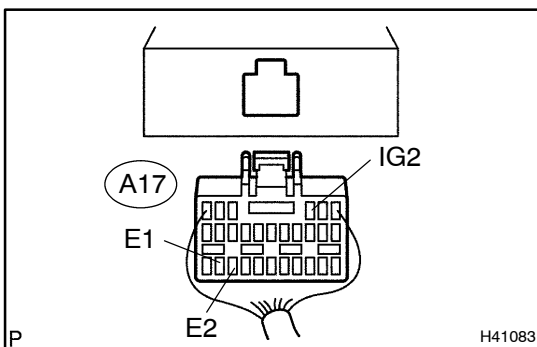
- (a) Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- (b) Remove the horn button assy (See page 60-6).
- (c) Disconnect the P16 seat belt pretensioner connectors (See page 60-3).
- (d) Disconnect the connectors of the A17 airbag ECU assy (See page 60-19).
- (e) Disconnect the connector of the A18 airbag sensor assy No. 2 (See page 60-22).

CAUTION:

Store the horn button assy so that the airbag deployment direction facing upward.



2 CHECK SOURCE VOLTAGE



- (a) Connect the negative (-) terminal cable to the battery. Turn the ignition switch to ON and wait at least for 60 seconds.
- (b) Measure the voltage between terminal E1 (E2) and each terminal of IG1 and IG2 of the A18 connector and operate the electric system (defogger, wiper, headlight, heater blower, etc.).

OK:

Voltage: 20 - 28 V

NG

REPAIR OR REPLACE HARNESS BETWEEN BATTERY AND AIRBAG SENSOR ASSEMBLY, AND CHARGING SYSTEM

OK

3 CHECK SRS WARNING LIGHT TURN OFF

- (a) Turn the ignition switch to LOCK.
- (b) Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- (c) Connect the A19 horn button connector.
- (d) Connect the P16 seat belt pretensioner connectors.
- (e) Connect the A17 airbag ECU assy connector.
- (f) Connect A18 the airbag sensor No. 2.
- (g) Connect the negative (-) terminal cable to the battery.
- (h) Turn the ignition switch to ON and wait at least for 60 seconds.
- (i) Operate the electric system (defogger, wiper, headlight, heater blower, etc.) and check that the SRS warning light goes off.

OK:

SRS warning light does not light up.

NG

REPAIR OR REPLACE HARNESS BETWEEN BATTERY AND AIRBAG SENSOR ASSEMBLY, AND CHARGING SYSTEM

OK

4 CHECK AIR BAG ECU ASSY

SST 09843-18040

- (a) Turn the ignition switch to LOCK.
- (b) Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- (c) Connect the A17 airbag ECU connector.
- (d) Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
- (e) Turn the ignition switch to ON and wait at least for 20 seconds.
- (f) Clear the DTC stored in the memory (See page 05-216).
- (g) Turn the ignition switch to LOCK and wait at least for 20 seconds.
- (h) Turn the ignition switch to ON and wait at least for 60 seconds.
- (i) Check for DTC (See page 05-216).

OK:**DTC is not output.****NG****REPLACE AIR BAG ECU ASSY****OK****USE SIMULATION METHOD TO CHECK**

SRS WARNING LIGHT CIRCUIT MALFUNCTION (REMAINS ON WHEN IGNITION SWITCH IS IN LOCK POSITION)

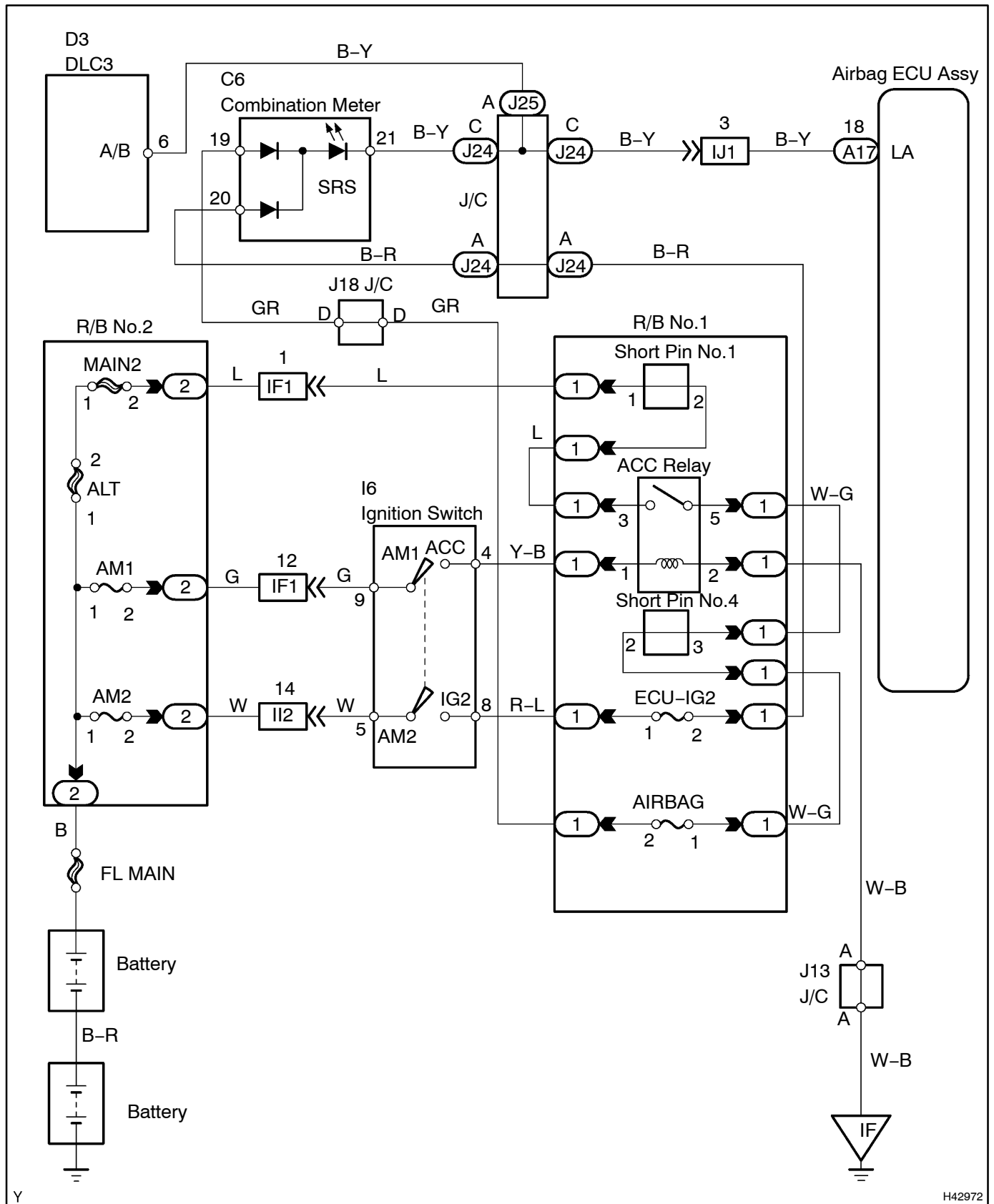
CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.

When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from the LOCK position to the ON position and then turns off automatically.

If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality. When terminals Tc and CG of the DLC3 are connected, DTC is displayed by the number of blinks of the SRS warning light.

WIRING DIAGRAM



Y

H42972

INSPECTION PROCEDURE

1 CHECK CONNECTOR

- Turn the ignition switch to LOCK.
- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Disconnect the A17 airbag ECU connector.
- Connect the negative (-) terminal cable to the battery.
- Check the connection of the SRS warning light.

OK:

The connectors are connected.

NG

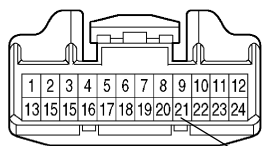
CONNECT CONNECTORS

OK

2 CHECK COMBINATION METER ASSEMBLY

Wire Harness Side

C6
Combination Meter



Y

SRS

F45226

- Disconnect the C6 connector from the combination meter.
- Connect the negative (-) terminal cable to the battery and turn the ignition switch to ON.
- Measure the resistance between terminal SRS of the C6 connector and the body ground.

OK:

Voltage: 8 V or higher

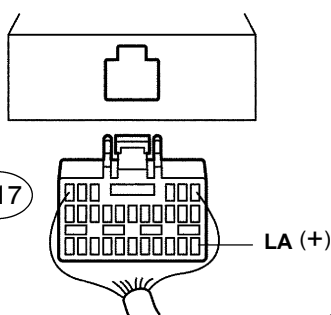
NG

REPLACE COMBINATION METER ASSEMBLY

OK

3 CHECK COWL WIRE (AIRBAG ECU ASSY ↔ COMBINATION METER ASSY)

A17



C88366

- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Disconnect the A17 connector from the airbag ECU.
- Measure the resistance between terminal LA of the A17 connector and the body ground.

OK:

Resistance: 1 MΩ or higher

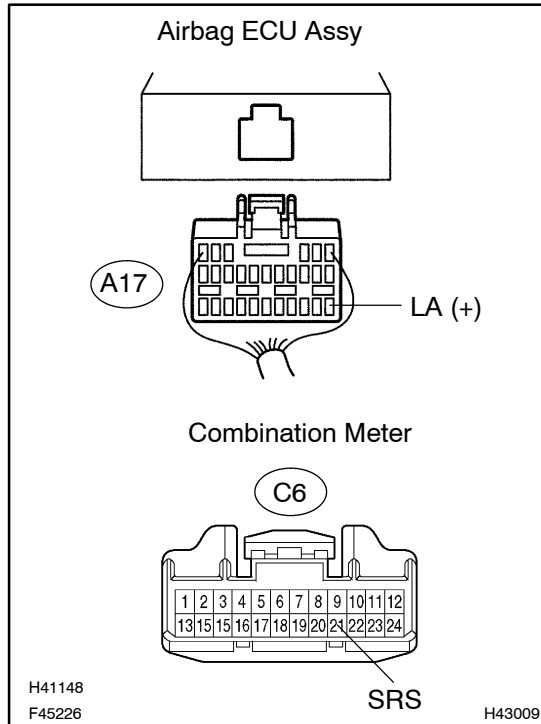
NG

REPAIR OR REPLACE COWL WIRE

OK

REPLACE AIR BAG ECU ASSY

4

CHECK COWL WIRE (AIRBAG ECU ASSY ↔ COMBINATION METER ASSY)

- (a) For the connector (on the airbag ECU assy side) between the airbag ECU assy and the combination meter measure the resistance between terminals SRS and LA.

OK:**Resistance: Below 1 Ω** **NG****REPAIR OR REPLACE COWL WIRE****OK****REPLACE AIR BAG ECU ASSY**

SRS WARNING LIGHT CIRCUIT MALFUNCTION (DOES NOT LIGHT UP, WHEN IGNITION SWITCH IS TURNED TO ACC OR ON)

CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.

When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from the LOCK position to the ON position and then turns off automatically.

If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality. When terminals TC and CG of the DLC3 are connected, DTC is displayed by blinking the number of blinks of the SRS warning light.

WIRING DIAGRAM

See page 05-269.

INSPECTION PROCEDURE

1 CHECK SOURCE VOLTAGE

- Connect the negative (-) terminal cable to the battery.
- Turn the ignition switch to ON.
- Measure the voltage of the battery.

OK:

Voltage: 20 - 28 V

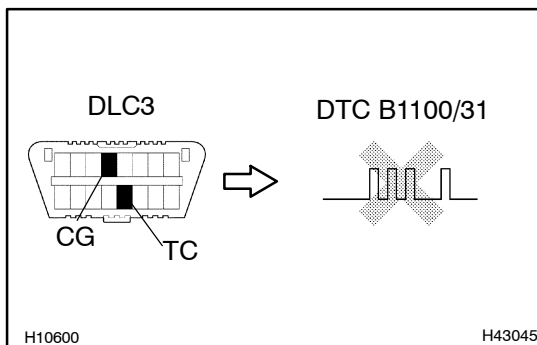
NG

REPAIR OR REPLACE HARNESS BETWEEN BATTERY AND AIRBAG SENSOR ASSEMBLY, AND CHARGING SYSTEM

OK

2 CHECK AIR BAG ECU ASSY

SST 09843-18040



- Disconnect the negative (-) terminal cable from the battery and wait at least for 90 seconds.
- Connect the connectors of all the SRS components.
- Clear the DTC stored in the memory (See page 05-216).
- Turn the ignition switch to LOCK and wait at least for 20 seconds.
- Turn the ignition switch to ON and wait at least for 60 seconds.
- Repeat steps (a) and (b) at least 5 times.
- Check for DTC (See page 05-216).

OK:

DTC B1100/31 is not output.

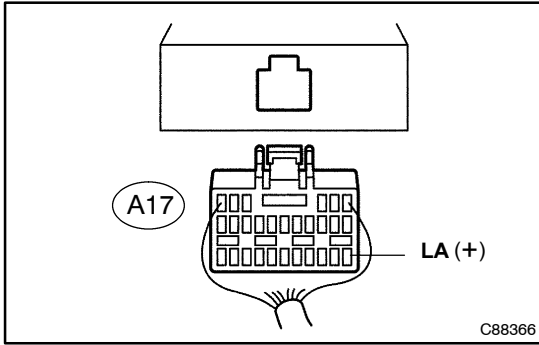
HINT:

Codes other than code B1100/31 may be output at this time, but they are not relevant to this check.

NG

REPLACE AIR BAG ECU ASSY

OK

3**CHECK WIRE HARNESS (COMBINATION METER ASSY ↔ BATTERY)**

- (a) Connect the negative (-) terminal cable to the battery and turn the ignition switch to ON.
- (b) Disconnect the C6 connector from the combination meter.
- (c) Disconnect the A17 connector from the airbag ECU assembly.
- (d) Measure the voltage between terminal LA of the A17 connector and the body ground.

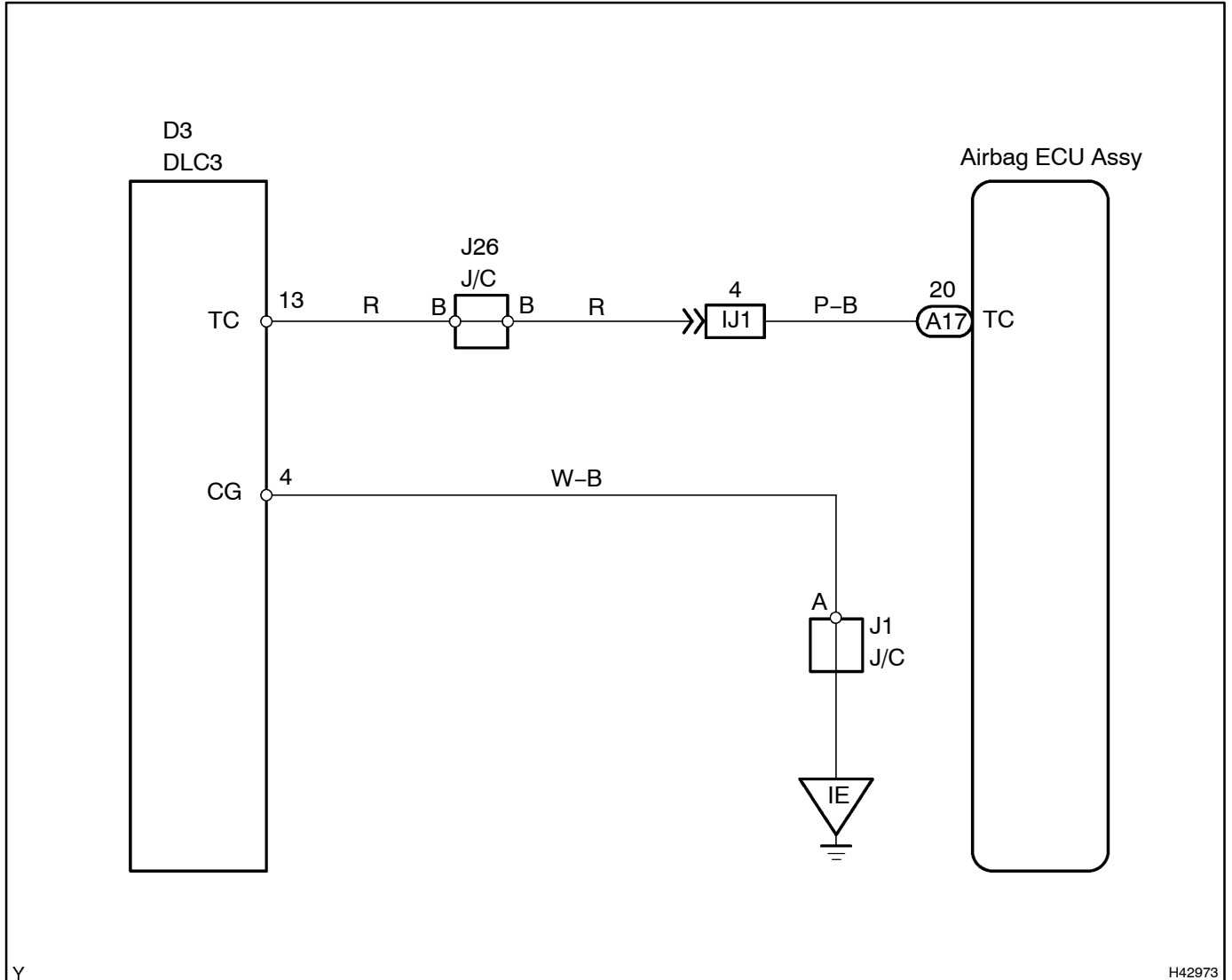
OK:**Voltage: Below 1 V****NG****REPAIR OR REPLACE WIRE HARNESS
(COMBINATION METER ↔ BATTERY)****OK****REPLACE COMBINATION METER ASSEMBLY**

TC TERMINAL CIRCUIT

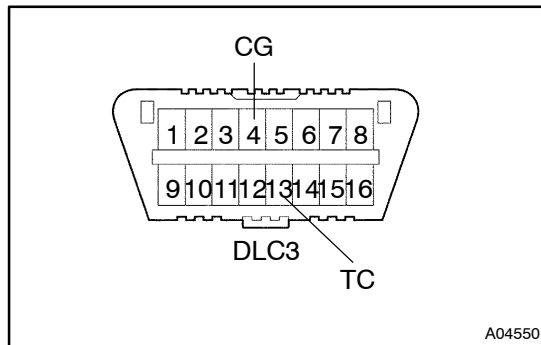
CIRCUIT DESCRIPTION

When terminals TC and CG of the DLC3 are connected, the airbag sensor assembly is switched to DTC output mode. The DTCs are displayed by blinking of the SRS warning light.

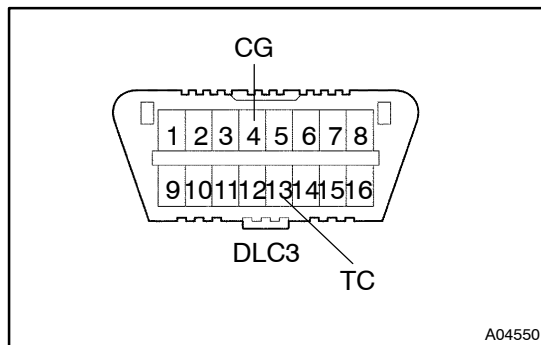
WIRING DIAGRAM



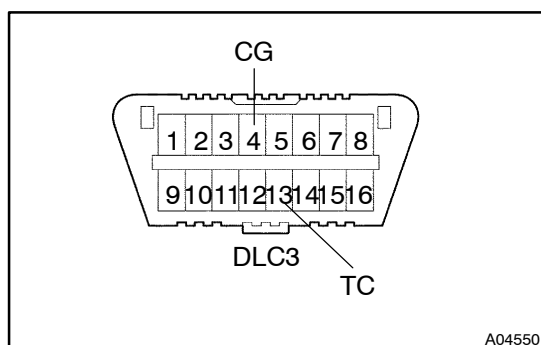
INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (OPEN) (DLC3 ⇔ BATTERY)

- (a) Turn the ignition switch to ON.
- (b) Measure the resistance between terminals TC and CG of D3 DLC3.

OK:**Measure: Below 1 Ω****NG****REPAIR OR REPLACE HARNESS
(DLC3 ⇔ BATTERY)****OK****2 CHECK WIRE HARNESS (OPEN) (DLC3 ⇔ BATTERY)**

- (a) Measure the voltage between terminal TC of D3 DLC3 and body ground.

OK:**Voltage: 20 – 28 V****NG****REPAIR OR REPLACE HARNESS
(DLC3 ⇔ BATTERY)****OK****3 CHECK WIRE HARNESS (SHORT) (DLC3 ⇔ BATTERY)**

- (a) Turn the ignition switch to LOCK.
- (b) Disconnect negative (-) terminal cable from the battery, and wait at least for 90 seconds.
- (c) Measure the resistance between terminals TC and CG of the D3 DLC3.

OK:**Resistance: 1 MΩ or Higher****NG****REPAIR OR REPLACE HARNESS
(DLC3 ⇔ BATTERY)****OK****REPLACE AIR BAG ECU ASSY**

AUDIO SYSTEM

DESCRIPTION

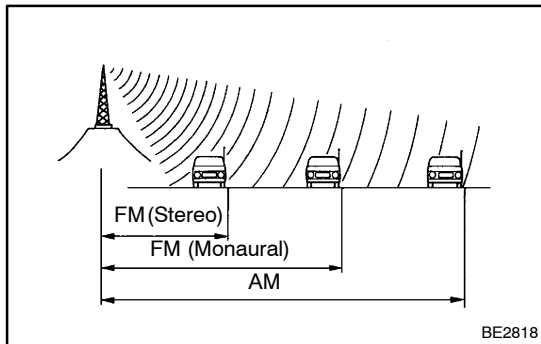
05BBE-01

1. RADIO WAVE BAND

The radio wave bands used in radio broadcasting are as follows:

Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave		AM		FM	
Modulation	Amplitude modulation			Frequency modulation	

- LF: Low Frequency
- MF: Medium Frequency
- HF: High Frequency
- VHF: Very High Frequency



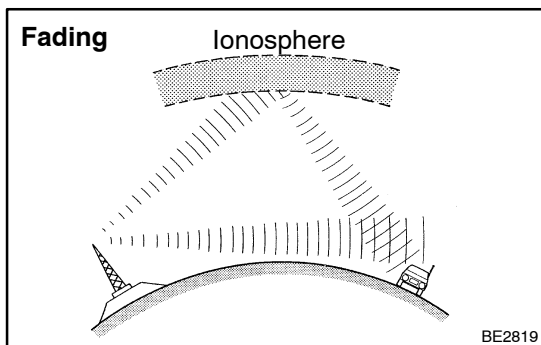
2. SERVICE AREA

There are great differences in the size of the service areas for AM and FM broadcasts. Sometimes FM stereo broadcasts cannot be received in an area where AM broadcasts can be received very clearly. Not only does FM stereo broadcasts have the smallest service area, but they also pick up static and other types of interference ("noise") easily.

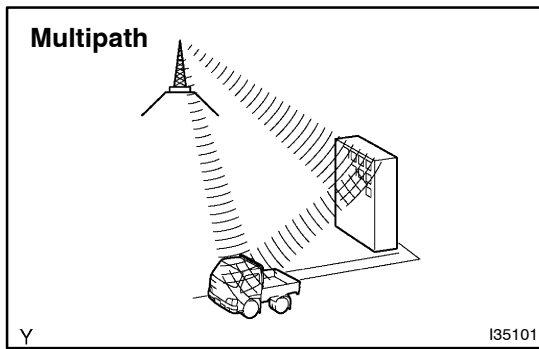
3. RECEPTION PROBLEMS

HINT:

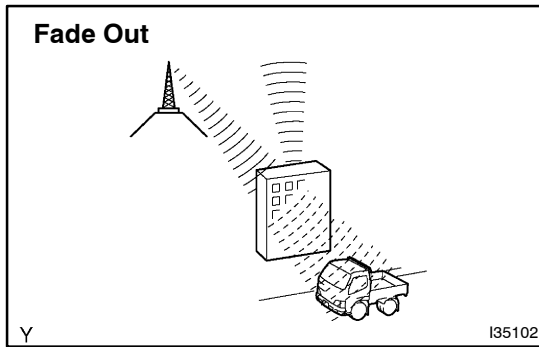
Besides the problem of static, there are also the problems called "fading", "multipath" and "fade out". These problems are caused not by electrical noise but by the nature of the radio waves themselves.



- (a) Fading
Besides electrical interference, AM broadcasts are also susceptible to other types of interference, especially at night. This is because AM radio waves bounce off the ionosphere at night. These radio waves then interfere with the signals from the same transmitter which reach the vehicle's antenna directly. This type of interference is called "fading".



- (b) **Multipath**
Interference caused by reflection of radio waves against obstructions is called "Multipath". Multipath occurs when radio signals emitted from the broadcast transmitter antenna are reflected against tall buildings or mountains and interfere with other signals which is to be received directly.



- (c) **Fade Out**
Because of the frequency higher than that of AM, FM radio wave tends to be reflected against obstructions such as tall buildings or mountains. For this reason, FM signals often seem to gradually disappear or fade out as the vehicle goes behind those obstructions. This phenomenon is called "fade out".

4. NOISE PROBLEMS

- (a) For noise troubleshooting, it is very important to clearly understand the customer's claim. Use the following table to diagnose the phenomenon.

Radio wave	Condition in which noise occurs	Probable cause
AM	Noise occurs at a specific place.	Strong possibility of foreign noise.
	Noise occurs when listening to faint broadcasting.	The same program may be broadcasted by some local stations. If the program is the same, one of those may be tuned in.
FM	Noise occurs only at night.	Strong possibility of beat from a distant broadcasting.
	Noise occurs at a specific place while driving.	Strong possibility of multipath noise and fading noise caused by changes of FM frequency.

HINT:

If the condition where the noise occurs does not meet any of the above, find out the cause based on "Reception Problems". Refer to the description about Multipath and Fading mentioned previously.

5. COMPACT DISC PLAYER

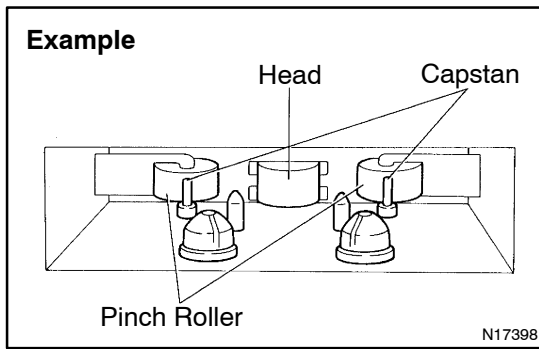
- (a) Compact disc (hereafter called "CD") players use a laser beam pick-up to read the digital signals recorded on the CD and reproduce analog signals of the music, etc. There are 12 cm (4.7 in.) and 8 cm (3.2 in.) discs available for the CD player.

HINT:

Never attempt to disassemble or apply oil to any part of the player unit. Do not insert any object into the magazine except for a disc.

NOTICE:

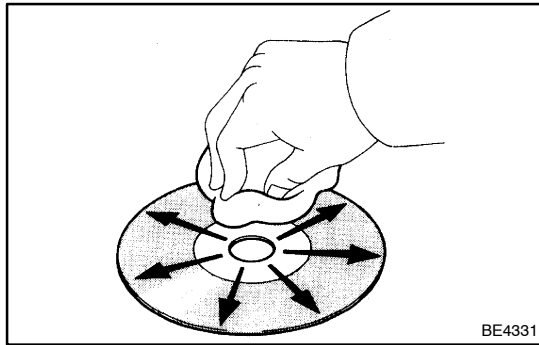
CD players use an invisible laser beam which could cause hazardous radiation exposure. Be sure to operate the player correctly as instructed.



6. MAINTENANCE

Tape Player / Head Cleaning:

- (a) Raise the slot cover with your finger.
Using a pencil or similar object, push in the guide.
- (b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.



7. MAINTENANCE

CD Player / Disc Cleaning:

If a disc gets dirty, clean the disc by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:

Do not use a conventional record cleaner or anti-static preservative.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Troubleshoot in accordance with the procedures on the following pages.

1	VEHICLE BROUGHT TO WORKSHOP
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2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (See page 05-281)
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3	PROBLEM SYMPTOMS TABLE (See page 05-284)
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4	ADJUST, REPAIR OR REPLACE
----------	----------------------------------



5	CONFIRMATION TEST
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END

CUSTOMER PROBLEM ANALYSIS CHECK

AUDIO SYSTEM Check Sheet

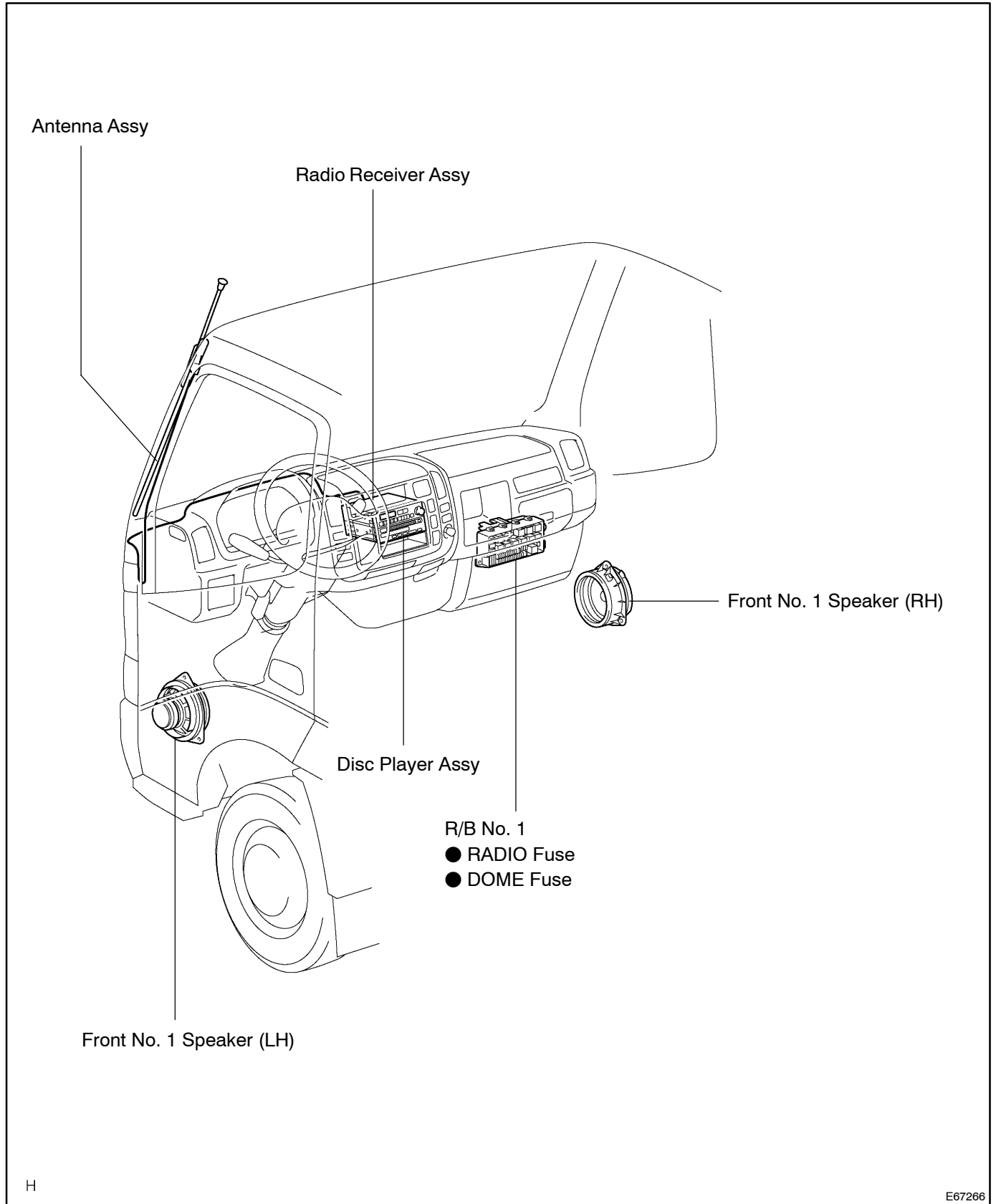
Inspector's name: _____

Customer's Name		Registration No.	
		Registration Year/Date	
		Frame No.	
Date Vehicle Brought in	/ /	Odometer Reading	km Mile

Date of First Occurrence	/ /
Frequency of Problem Occurrence	<input type="checkbox"/> Always <input type="checkbox"/> Intermittent (Times a day)

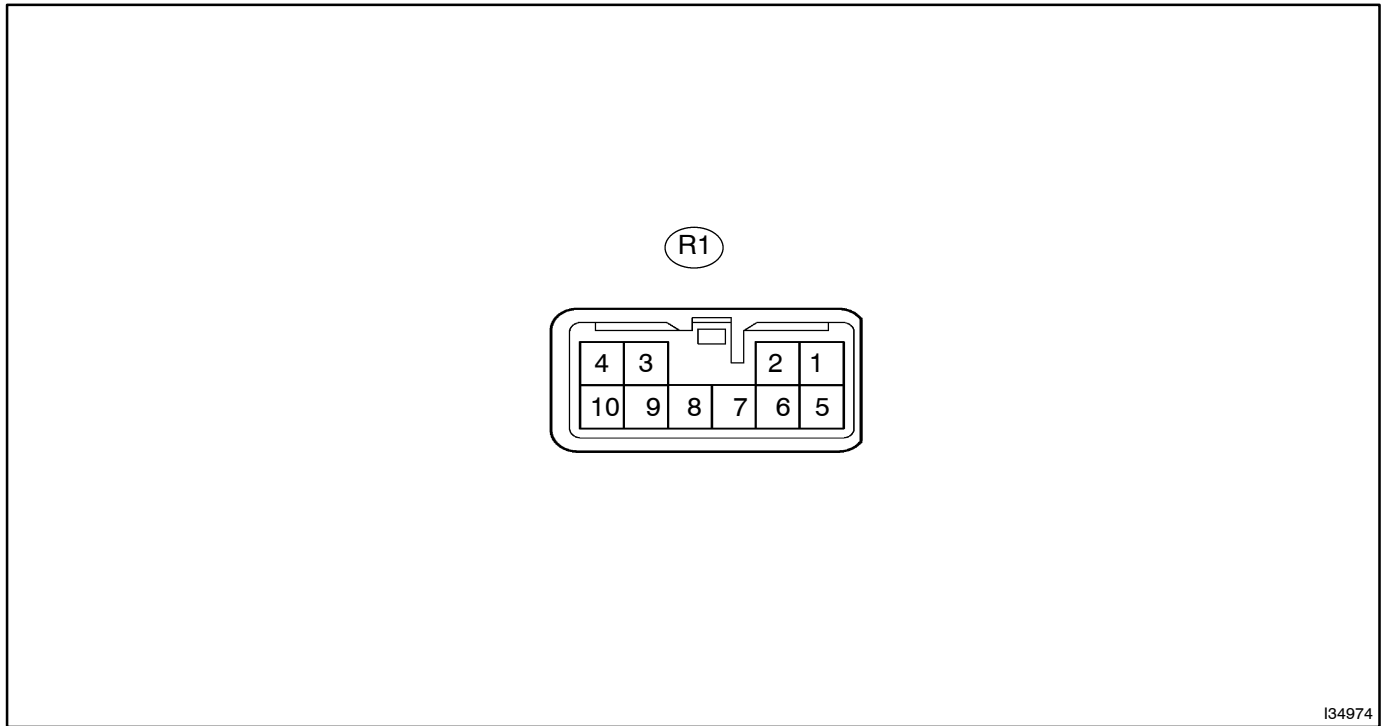
Problem Symptom	<input type="checkbox"/> Switch
	<input type="checkbox"/> Radio
	<input type="checkbox"/> CD
	<input type="checkbox"/> Noise

LOCATION



TERMINALS OF ECU

1. CHECK RADIO RECEIVER ASSY



I34974

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
FR+ (R1-1) ↔ GND (R1-7)	LG ↔ W-B	Radio switch is ON	A waveform synchronized with sounds is output
FL+ (R1-2) ↔ GND (R1-7)	P ↔ W-B	Radio switch is ON	A waveform synchronized with sounds is output
ACC (R1-3) ↔ GND (R1-7)	GR ↔ W-B	Ignition switch ACC or ON	20 - 28 V
+B (R1-4) ↔ GND (R1-7)	L-Y ↔ W-B	Constant	20 - 28 V
FR- (R1-5) ↔ GND (R1-7)	L ↔ W-B	Radio switch is ON	A waveform synchronized with sounds is output
FL- (R1-6) ↔ GND (R1-7)	V ↔ W-B	Radio switch is ON	A waveform synchronized with sounds is output
GND (R1-7) ↔ Body ground	W-B ↔ -	Constant	Continuity

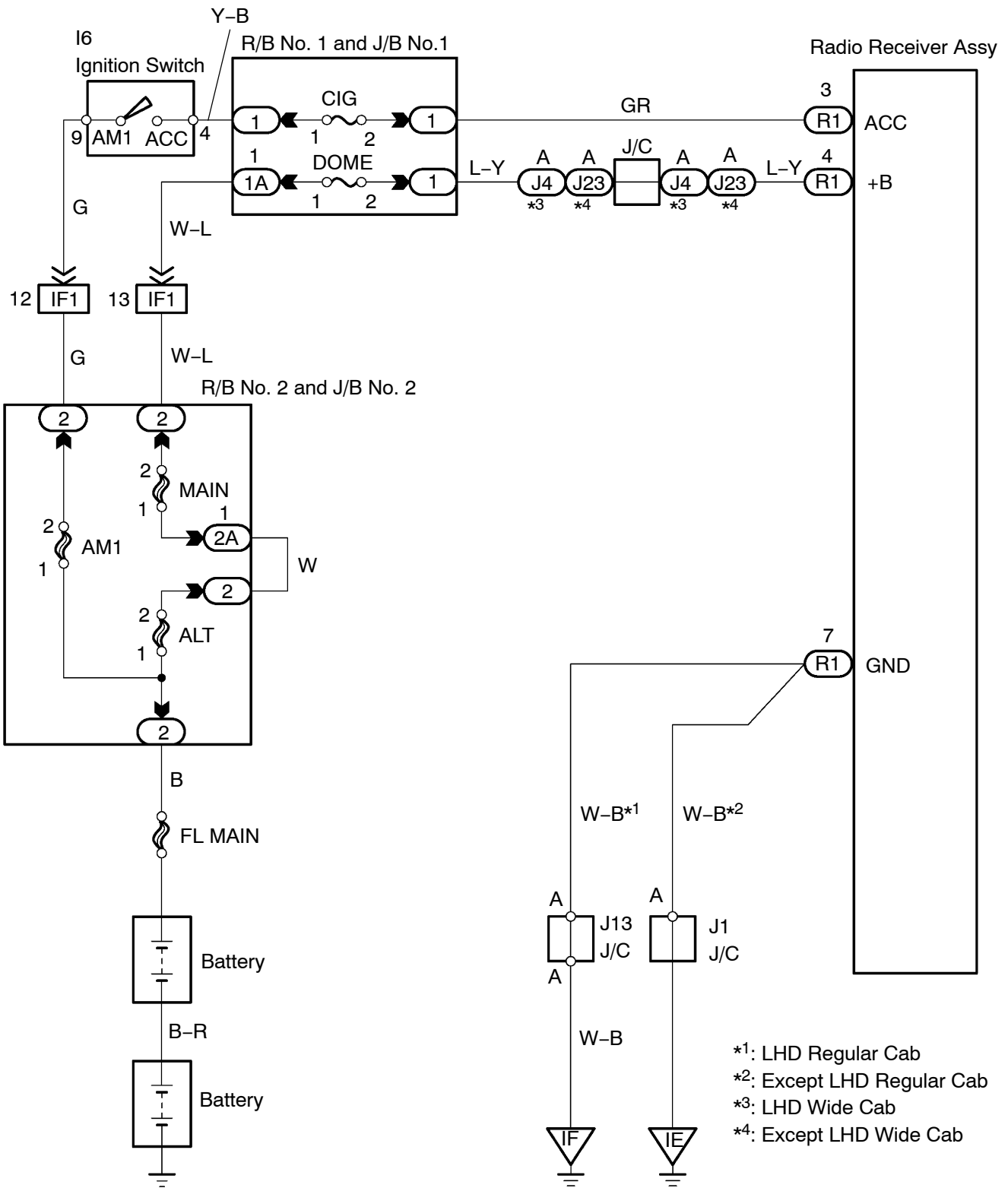
PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See Page
Pressing power switch does not start system.	1. Radio receiver assy power source circuit 2. Radio receiver assy	05-285
Turning on light switch does not light up night time illumination of radio receiver.	1. Radio receiver assy ILL terminal circuit 2. Radio receiver assy	05-288
No sound is heard from speaker in all modes.	1. Speaker circuit 2. Radio receiver assy power source circuit 3. Radio receiver assy	05-290
Sound quality is bad in all modes (Volume is too low).	1. Speaker circuit 2. Radio receiver assy power source circuit 3. Radio receiver assy	05-293
Radio broadcast cannot be received (Bad reception).	1. Antenna circuit 2. Radio receiver assy	05-296
Noise occurs.	-	05-298
Cassette tape cannot be inserted or played.	1. Cassette tape 2. Radio receiver assy power source circuit 3. Radio receiver assy	05-299
Cassette tape cannot be ejected.	1. Cassette tape 2. Radio receiver assy power source circuit 3. Radio receiver assy	05-303
Sound quality is bad only when playing tape (Volume is too low).	1. Cassette tape 2. Radio receiver assy	05-305
Tape is tangled due to incorrect tape speed or auto-reverse malfunction.	1. Cassette tape 2. Radio receiver assy	05-306
CD cannot be inserted or is ejected right after insertion.	1. CD 2. Radio receiver assy power source circuit 3. Radio receiver assy	05-307
Although system is powered, CD cannot be played.	1. CD 2. Radio receiver assy power source circuit 3. Radio receiver assy	05-310
CD cannot be taken out.	1. CD 2. Radio receiver assy power source circuit 3. Radio receiver assy	05-313
Sound quality is bad only when CD is played (Volume is too low).	1. CD	-
CD sound skips.	1. CD 2. Radio receiver assy installation	05-316

PRESSING POWER SWITCH DOES NOT START SYSTEM

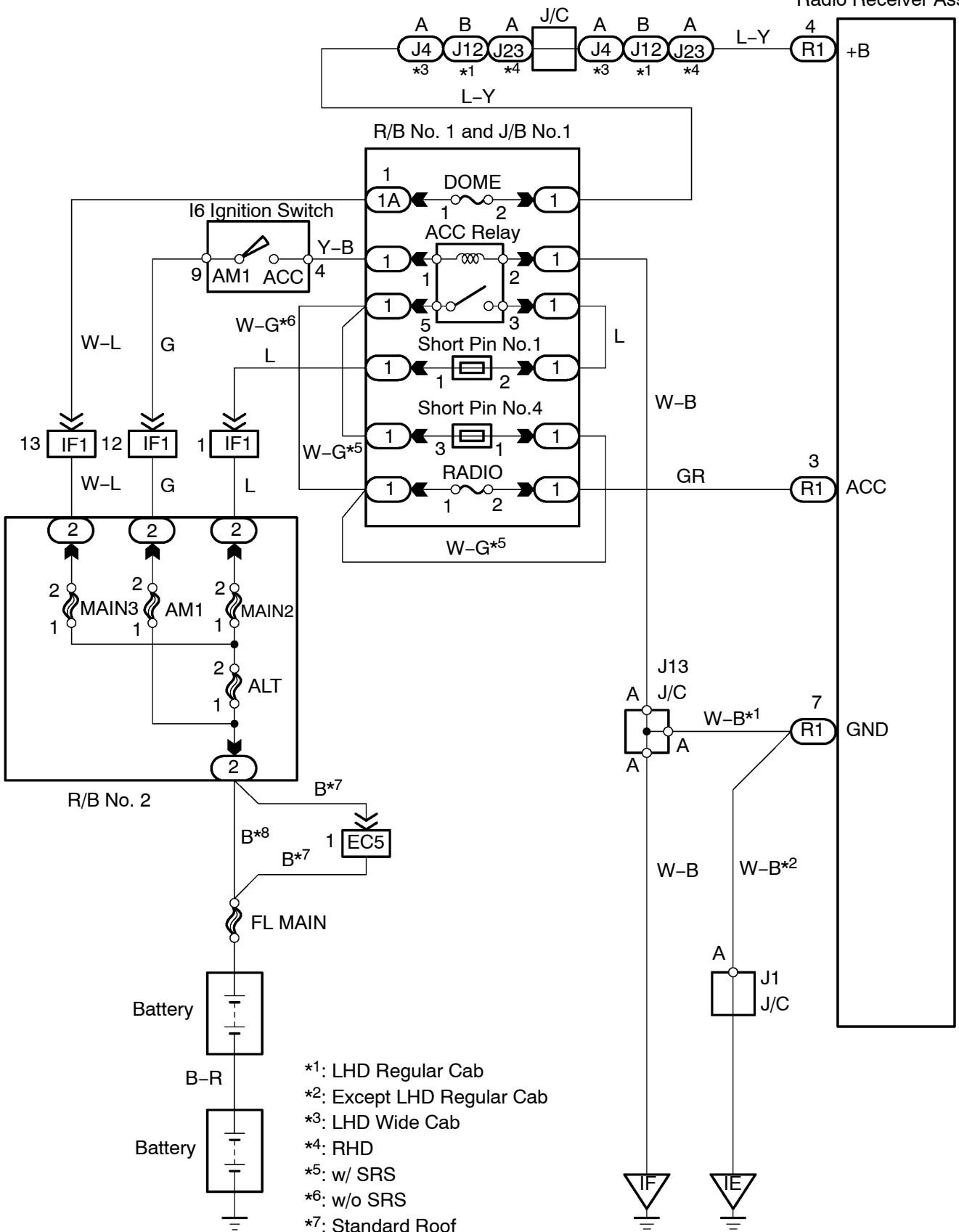
WIRING DIAGRAM

14B, S05C-B, S05C-TA, W04D-J



15B-FTE, S05C-TB

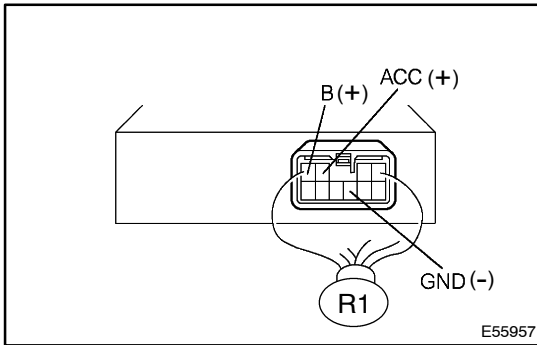
Radio Receiver Assy



- *1: LHD Regular Cab
- *2: Except LHD Regular Cab
- *3: LHD Wide Cab
- *4: RHD
- *5: w/ SRS
- *6: w/o SRS
- *7: Standard Roof
- *8: Except Standard Roof

INSPECTION PROCEDURE

1 CHECK RADIO RECEIVER ASSY (+B, ACC, GND)



- (a) Remove the radio receiver with the connectors still connected.
- (b) Check the voltage between the terminals of the R1 connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
+B (R1-4) ↔ GND (R1-7)	Constant	20 - 28 V
ACC (R1-3) ↔ GND (R1-7)	Ignition switch ACC or ON	20 - 28 V

- (c) Check the continuity between the terminal of the R1 connector and body ground.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
GND (R1-7) ↔ Body ground	Constant	Continuity

NG

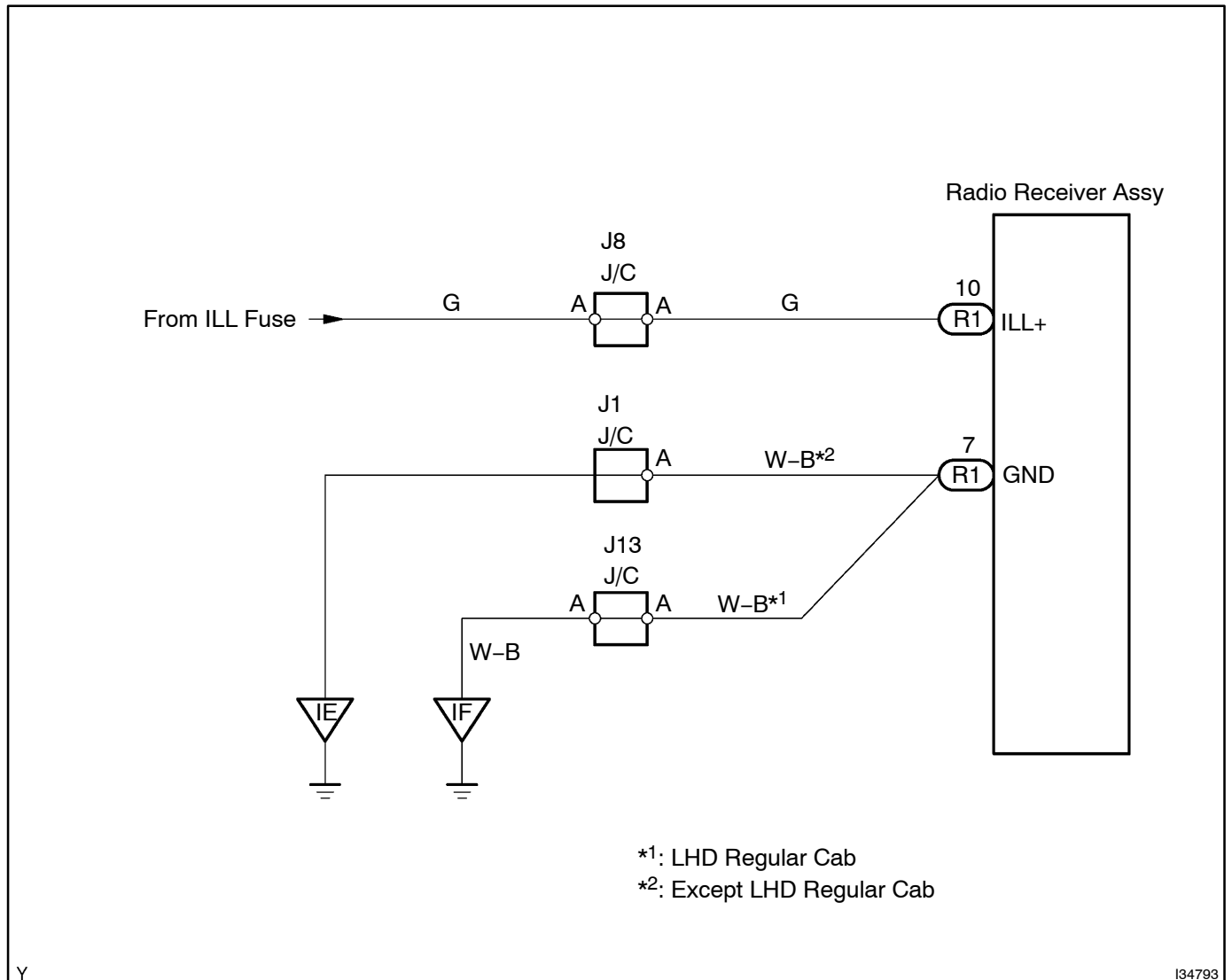
REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPAIR OR REPLACE RADIO RECEIVER ASSY

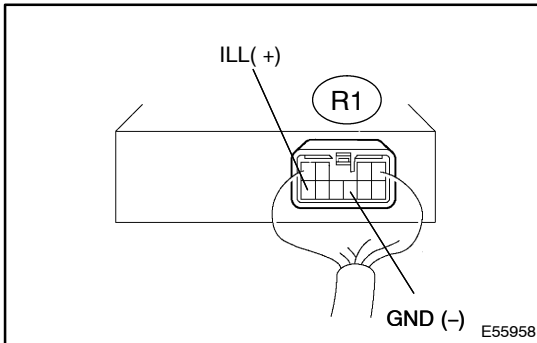
TURNING ON LIGHT SWITCH DOES NOT LIGHT UP NIGHT TIME ILLUMINATION OF RADIO RECEIVER

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK RADIO RECEIVER ASSY (ILL+)



- (a) Remove the radio receiver with the connectors still connected.
- (b) Check the voltage between the terminals of the R1 connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
ILL+ (R1-10) ↔ GND (R1-7)	light control switch TAIL	20 - 28 V

NG

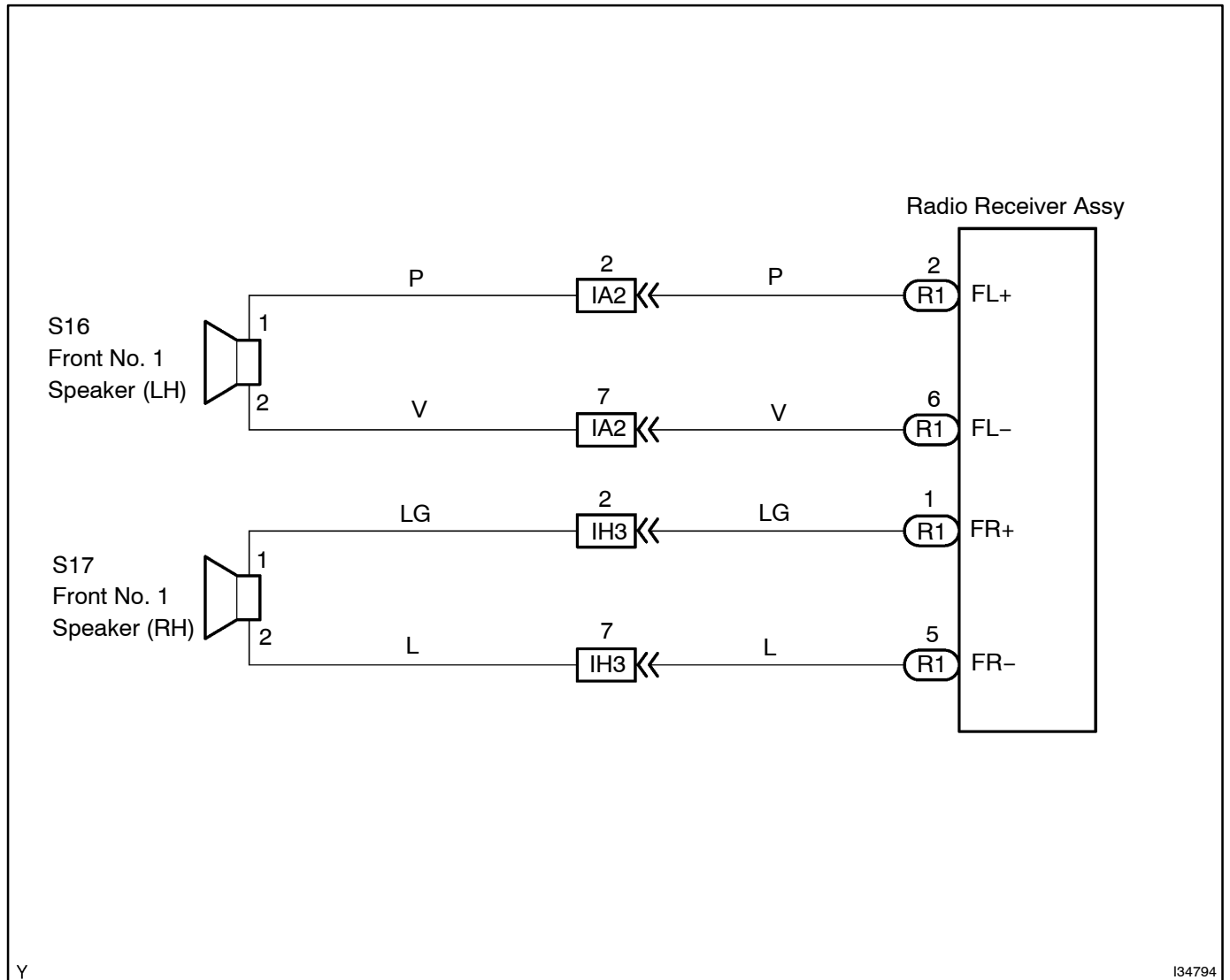
REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPAIR OR REPLACE RADIO RECEIVER ASSY

NO SOUND IS HEARD FROM SPEAKER IN ALL MODES

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK LCD (LIQUID CRYSTAL DISPLAY) FOR LIGHTING

- (a) Turn the ignition switch to ACC.
 (b) Turn the radio receiver to ON.

Standard: LCD illumination of the radio receiver lights up.

NG → Go to step 5

OK

2 CONTROL FADER AND ADJUST SOUND BALANCE

- (a) Operate the radio receiver to adjust the fader and the balance to identify the speaker that does not sound.

(A)	(B)
A specific speaker does not sound.	All speakers do not sound.

B → Go to step 5

A

3 CHECK FRONT NO.1 SPEAKER ASSY

- (a) Disconnect the connector of the speaker.
 (b) Check the resistance between the terminals of the speaker.

Standard value: 2 - 9 Ω

NOTICE:

The speaker should not be removed for checking.

NG → REPLACE FRONT NO.1 SPEAKER ASSY

OK

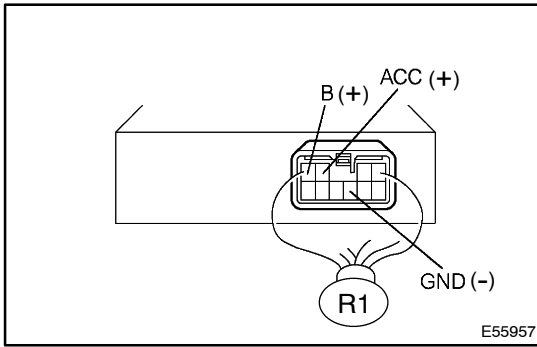
4 CHECK WIRE HARNESS (RADIO RECEIVER ASSY ↔ SPEAKER)

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

CHECK RADIO RECEIVER ASSY

5 CHECK RADIO RECEIVER ASSY (+B, ACC, GND)



- (a) Remove the radio receiver with the connectors still connected.
- (b) Check the voltage between the terminals of the R1 connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
+B (R1-4) ↔ GND (R1-7)	Constant	20 - 28 V
ACC (R1-3) ↔ GND (R1-7)	Ignition switch ACC or ON	20 - 28 V

- (c) Check the continuity between the terminal of the R1 connector and body ground.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
GND (R1-7) ↔ Body ground	Constant	Continuity

NG

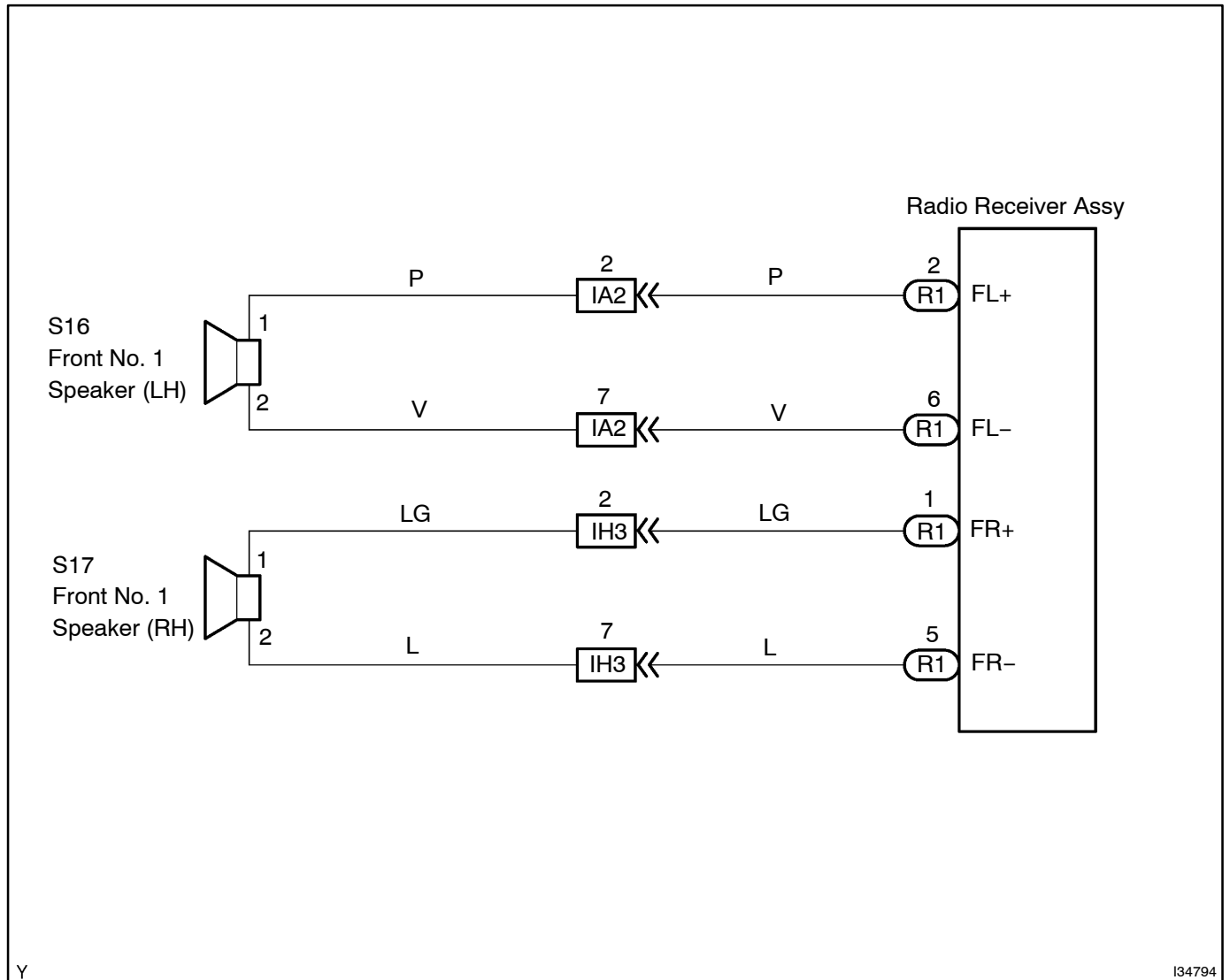
REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPAIR OR REPLACE RADIO RECEIVER ASSY

SOUND QUALITY IS BAD IN ALL MODES (VOLUME IS TOO LOW)

WIRING DIAGRAM



INSPECTION PROCEDURE**1 ADJUST SOUND QUALITY**

- (a) Operate the radio receiver to adjust the sound quality.
Standard: The sound quality returns to be normal.

OK

BAD SOUND QUALITY

NG

2 COMPARE IT WITH ANOTHER CAR OF SAME MODEL

- (a) Compare with the vehicle of the same type which does not have a trouble in order to see if there is any difference in the condition of trouble occurrence.
Standard: No difference is found.

OK

SETTING

NG

3 CHECK WIRE HARNESS (RADIO RECEIVER ASSY ↔ SPEAKER)

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4 CHECK FRONT NO.1 SPEAKER ASSY

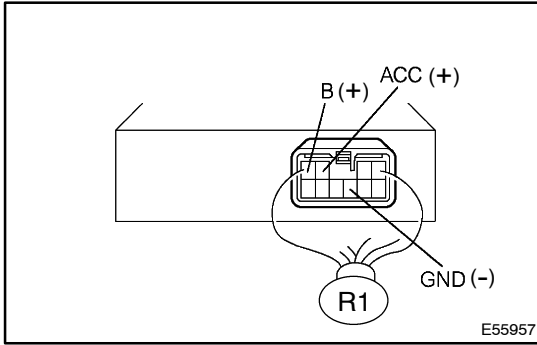
- (a) Disconnect the connector of the speaker.
(b) Check the resistance between the terminals of the speaker.
Standard value: 2 - 9 Ω

NOTICE:**The speaker should not be removed for checking.**

NG

REPLACE FRONT NO.1 SPEAKER ASSY

OK

5 CHECK RADIO RECEIVER ASSY (+B, ACC, GND)

- (a) Remove the radio receiver with the connectors still connected.
- (b) Check the voltage between the terminals of the R1 connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
+B (R1-4) ↔ GND (R1-7)	Constant	20 - 28 V
ACC (R1-3) ↔ GND (R1-7)	Ignition switch ACC or ON	20 - 28 V

- (c) Check the continuity between the terminal of the R1 connector and body ground.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
GND (R1-7) ↔ Body ground	Constant	Continuity

NG**REPAIR OR REPLACE HARNESS AND CONNECTOR****OK****REPAIR OR REPLACE RADIO RECEIVER ASSY**

RADIO BROADCAST CANNOT BE RECEIVED (BAD RECEPTION)

INSPECTION PROCEDURE

1 CHECK IF RADIO AUTO-SEARCH FUNCTIONS PROPERLY

- (a) Operate the auto-search of the radio and check that operation is normal.

Standard: The operation returns to be normal.

OK

REPAIR OR REPLACE RADIO RECEIVER ASSY

NG

2 CHECK OPTIONAL COMPONENT

- (a) Check for optional components.

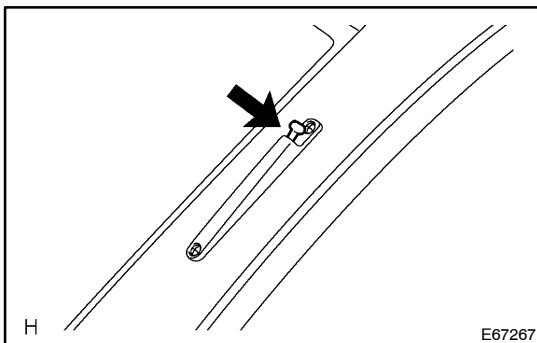
Standard: An optional component is installed.

OK

EFFECT FROM OPTIONAL COMPONENT

NG

3 CHECK ANTENNA FOR NOISE PRODUCTION

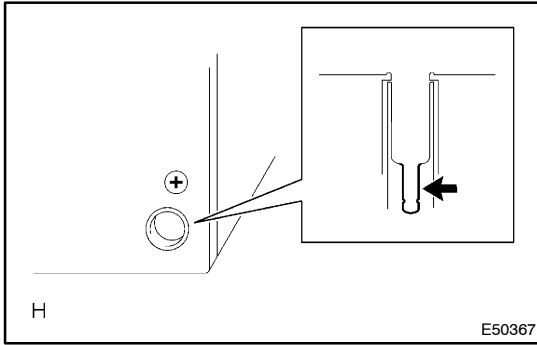


- (a) With the ignition switch at ACC, turn on the radio and choose the AM mode.
- (b) Check that putting the screwdriver on the antenna of the antenna assy makes noise in the speaker.
- Standard: Noise occurs.**

OK

REPAIR OR REPLACE RADIO RECEIVER ASSY

NG

4 CHECK RADIO RECEIVER ASSY

- (a) Remove the antenna plug of the radio receiver.
- (b) With the radio receiver connector connected, turn the ignition switch to ACC.
- (c) Turn on the radio and choose the AM mode.
- (d) Check that putting a thin flat-head screwdriver or a metal such as thin wire on the antenna jack of the radio receiver makes noise in the speaker.

Standard: Noise occurs.

NG**REPAIR OR REPLACE RADIO RECEIVER ASSY****OK****REPLACE ANTENNA ASSY**

NOISE OCCURS

INSPECTION PROCEDURE

1 CHECK SPEAKER INSTALLATION

(a) Check that each speaker is securely installed.

Standard: Malfunction disappears.

HINT:

The radio is equipped with noise prevention system that does not work against the regular use of the radio, thereby excessively large noise cannot occur in the radio. If large noise occurs, check whether or not the ground on the antenna installation part and the proper noise-prevention equipment are all installed, and whether or not the wiring is improperly arranged.

Condition in which noise occurs	Noise type
Depressing the acceleration pedal increases noise, and stopping the engine erases the noise immediately.	Alternator noise
Noise occurs during A/C or heater operation.	Blower motor noise
Rapid acceleration during the drive on the unpaved road or after the IG switch is turned ON makes noise.	Fuel pump noise
Pressing and then releasing the horn switch, and holding down the horn switch make noise.	Horn noise
Stopping the engine erases small noise that has been heard.	Ignition noise
Noise occurs in turn with blink of the turn signal flash.	Flasher noise
Noise occurs during window washer operation.	Washer noise
Noise occurs during engine running, and it continues to occur after the engine is stopped.	Water temperature sensor noise
Noise occurs during wiper operation.	Wiper noise
Noise occurs when brake pedal is depressed.	Stop light switch noise
Others.	Static electricity on the vehicle

HINT:

- Identify the condition under which the noise occurs, and check the noise filter on the related part.
- Make sure first that there is no noise from outside. Failing to do so makes the noise occurrence source detection impossible and leads to misunderstanding.
- The noise should be removed in the descending order of loudness.

NG

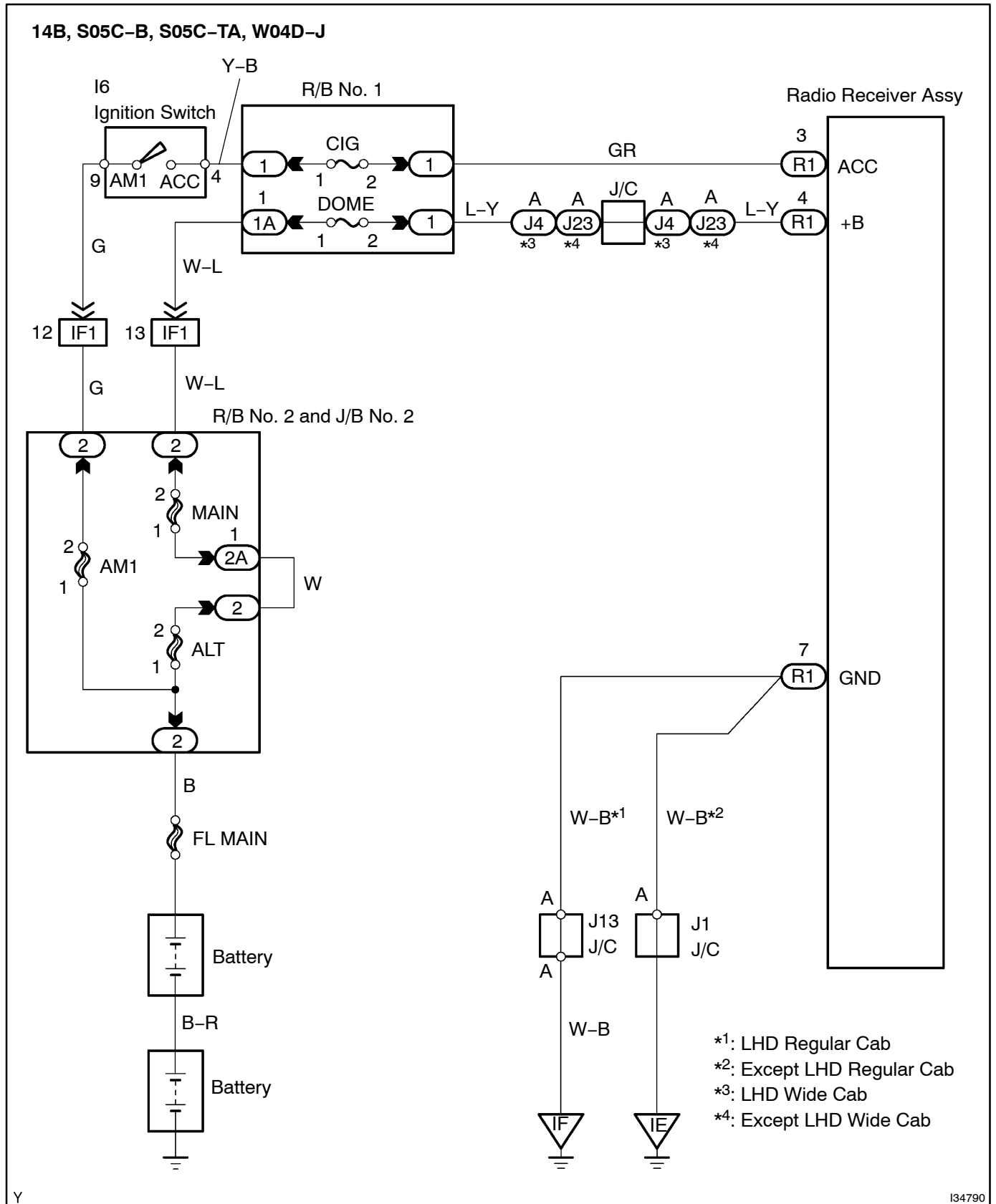
INSTALL IT PROPERLY

OK

IDENTIFY NOISE SOURCE

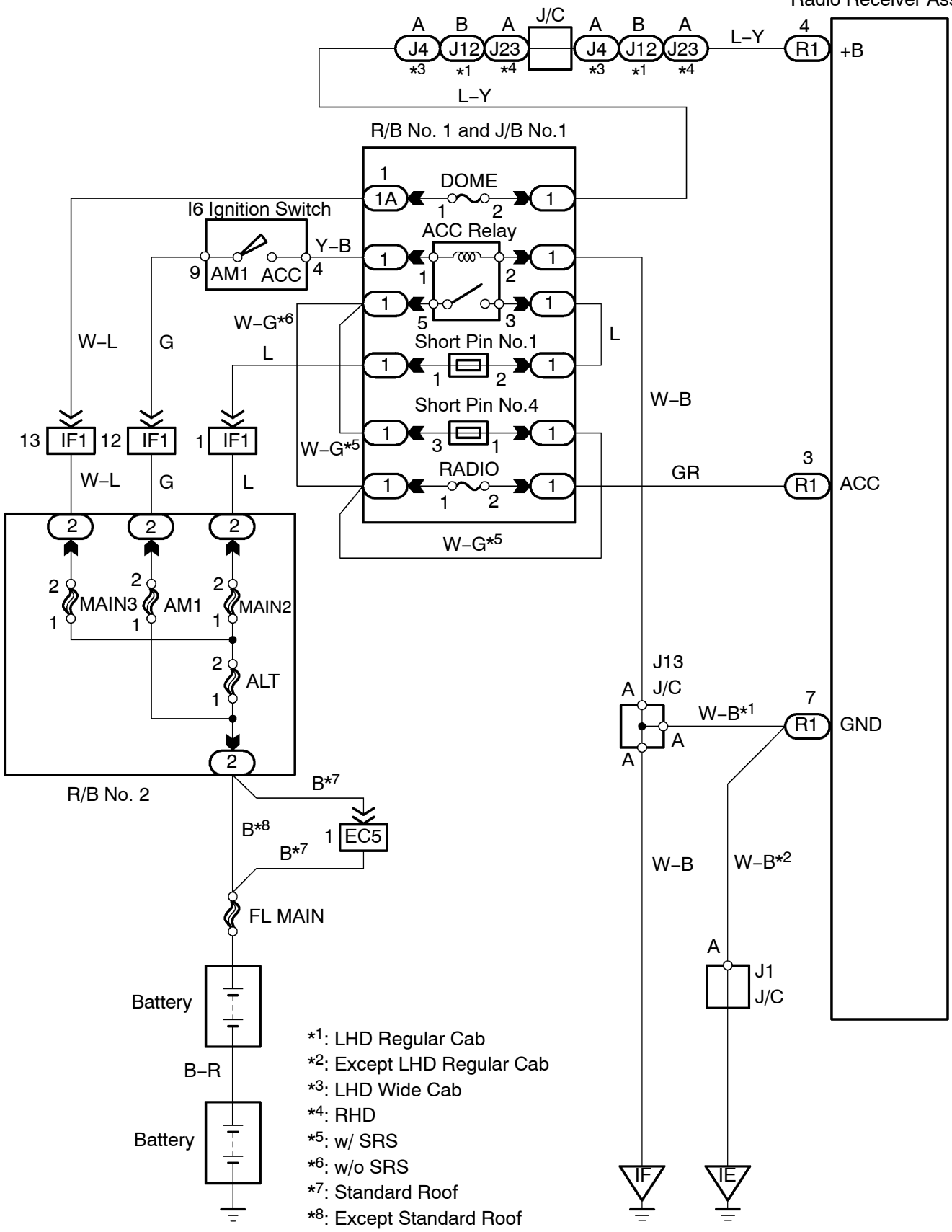
CASSETTE TAPE CANNOT BE INSERTED OR PLAYED

WIRING DIAGRAM



15B-FTE, S05C-TB

Radio Receiver Assy



- *1: LHD Regular Cab
- *2: Except LHD Regular Cab
- *3: LHD Wide Cab
- *4: RHD
- *5: w/ SRS
- *6: w/o SRS
- *7: Standard Roof
- *8: Except Standard Roof

INSPECTION PROCEDURE**1 CHECK FOR ANY FOREIGN OBJECT**

- (a) Check that no foreign object or defect is detected in the cassette tape player of the radio receiver.
Standard: No foreign object and defect are detected.

NG**REMOVE FOREIGN OBJECT****OK****2 CHECK CASSETTE TAPE**

- (a) Check that the cassette tape is a normal tape in which music or voice is recorded.
Standard: The cassette tape is normal.

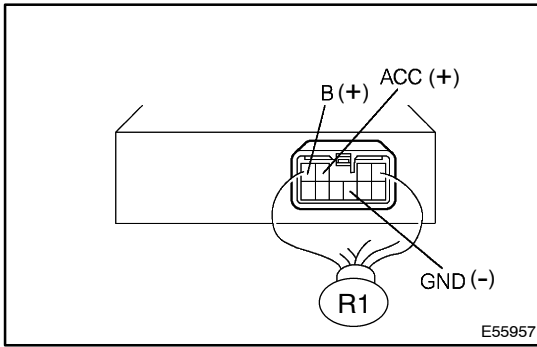
NG**CASSETTE TAPE FAULTY****OK****3 REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK**

- (a) Replace the faulty cassette tape with the normal one in order to see if the same trouble occurs again.
Standard: The function is recovered to be normal.

OK**CASSETTE TAPE FAULTY****NG****4 CHECK IF RADIO AUTO-SEARCH FUNCTIONS PROPERLY**

- (a) Operate the auto-search of the radio receiver and check that operation is normal.
Standard: The operation returns to be normal.

OK**REPAIR OR REPLACE RADIO RECEIVER ASSY****NG**

5 CHECK RADIO RECEIVER ASSY (+B, ACC, GND)


- (a) Remove the radio receiver with the connectors still connected.
- (b) Check the voltage between the terminals of the R1 connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
+B (R1-4) ↔ GND (R1-7)	Constant	20 - 28 V
ACC (R1-3) ↔ GND (R1-7)	Ignition switch ACC or ON	20 - 28 V

- (c) Check the continuity between the terminal of the R1 connector and body ground.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
GND (R1-7) ↔ Body ground	Constant	Continuity

NG
REPAIR OR REPLACE HARNESS AND CONNECTOR
OK
REPAIR OR REPLACE RADIO RECEIVER ASSY

CASSETTE TAPE CANNOT BE EJECTED

WIRING DIAGRAM

Refer to CASSETTE TAPE CANNOT BE INSERTED OR PLAYED on page 05-299.

INSPECTION PROCEDURE

1 CHECK IF RADIO AUTO-SEARCH FUNCTIONS PROPERLY

- (a) Operate the auto-search of the radio receiver and check that operation is normal.
Standard: Malfunction disappears.

NG → Go to step 5

OK

2 PRESS "EJECT" AND CHECK OPERATION

- (a) Press the cassette tape EJECT switch of the radio receiver for 2 sec. or more and check that the cassette tape is ejected.
Standard: The cassette tape is ejected.

NG → REPLACE RADIO RECEIVER ASSY

OK

3 CHECK CASSETTE TAPE

- (a) Check that the ejected cassette tape does not have the label peeled, cassette body deformation and others.
Standard: No fault is found in the cassette tape.

NG → CASSETTE TAPE FAULTY

OK

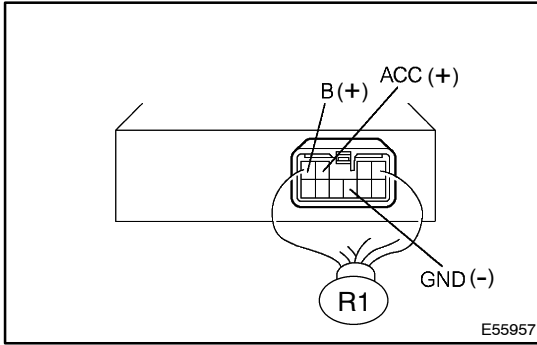
4 REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK

- (a) Replace the faulty cassette tape with the normal one in order to see if the same trouble occurs again.
Standard: Malfunction disappears.

OK → CASSETTE TAPE FAULTY

NG

5 CHECK RADIO RECEIVER ASSY (+B, ACC, GND)



- (a) Remove the radio receiver with the connectors still connected.
- (b) Check the voltage between the terminals of the R1 connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
+B (R1-4) ↔ GND (R1-7)	Constant	20 - 28 V
ACC (R1-3) ↔ GND (R1-7)	Ignition switch ACC or ON	20 - 28 V

- (c) Check the continuity between the terminal of the R1 connector and body ground.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
GND (R1-7) ↔ Body ground	Constant	Continuity

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE RADIO RECEIVER ASSY

SOUND QUALITY IS BAD ONLY WHEN PLAYING TAPE

INSPECTION PROCEDURE

1 REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK

- (a) Replace the faulty cassette tape with the normal one in order to see if the same trouble occurs again.
Standard: Malfunction disappears.

OK → CASSETTE TAPE FAULTY

NG

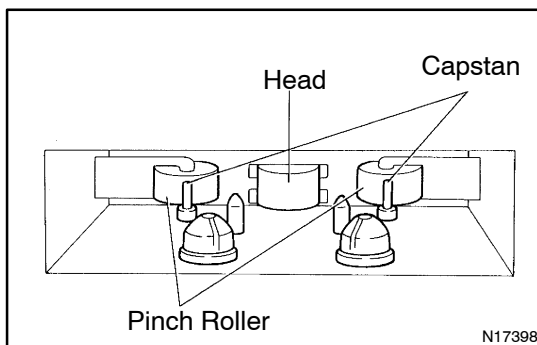
2 CHECK FOR ANY FOREIGN OBJECT

- (a) Check that no foreign object and defect are detected in the cassette tape player of the radio receiver.
Standard: No foreign object and defect are detected.

NG → REMOVE FOREIGN OBJECT

OK

3 CLEAN HEAD AND CHECK OPERATION



- (a) Raise the cassette door with your finger. Next, using a pencil or similar object, push in the guide.
 (b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.
 (c) Check that the same trouble occurs again.
Standard: Malfunction disappear.

OK → HEAD DIRTY

NG

REPAIR OR REPLACE RADIO RECEIVER ASSY

TAPE IS TANGLED DUE TO INCORRECT TAPE SPEED OR AUTO-REVERSE MALFUNCTION

INSPECTION PROCEDURE

1 CHECK FOR ANY FOREIGN OBJECT

- (a) Check that no foreign object and defect are detected in the cassette tape player of the radio receiver.
Standard: No foreign object and defect are detected.

NG → REMOVE FOREIGN OBJECT

OK

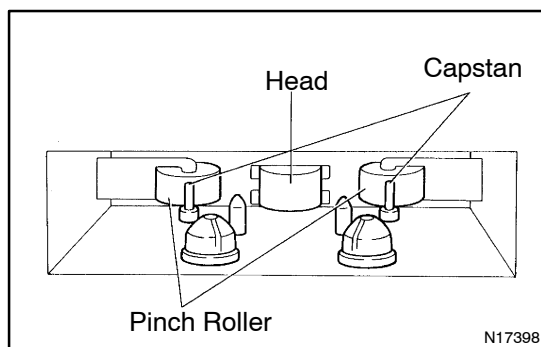
2 REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK (90MIN. OR LESS)

- (a) Replace the faulty cassette tape with the normal one (90 min. or less) to see if the same trouble occurs again.
Standard: Malfunction disappear.

OK → CASSETTE TAPE FAULTY

NG

3 CLEAN HEAD AND CHECK OPERATION



- (a) Raise the cassette door with your finger. Next, using a pencil or similar object, push in the guide.
 (b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.
 (c) Check that the same trouble occurs again.
Standard: Malfunction disappears.

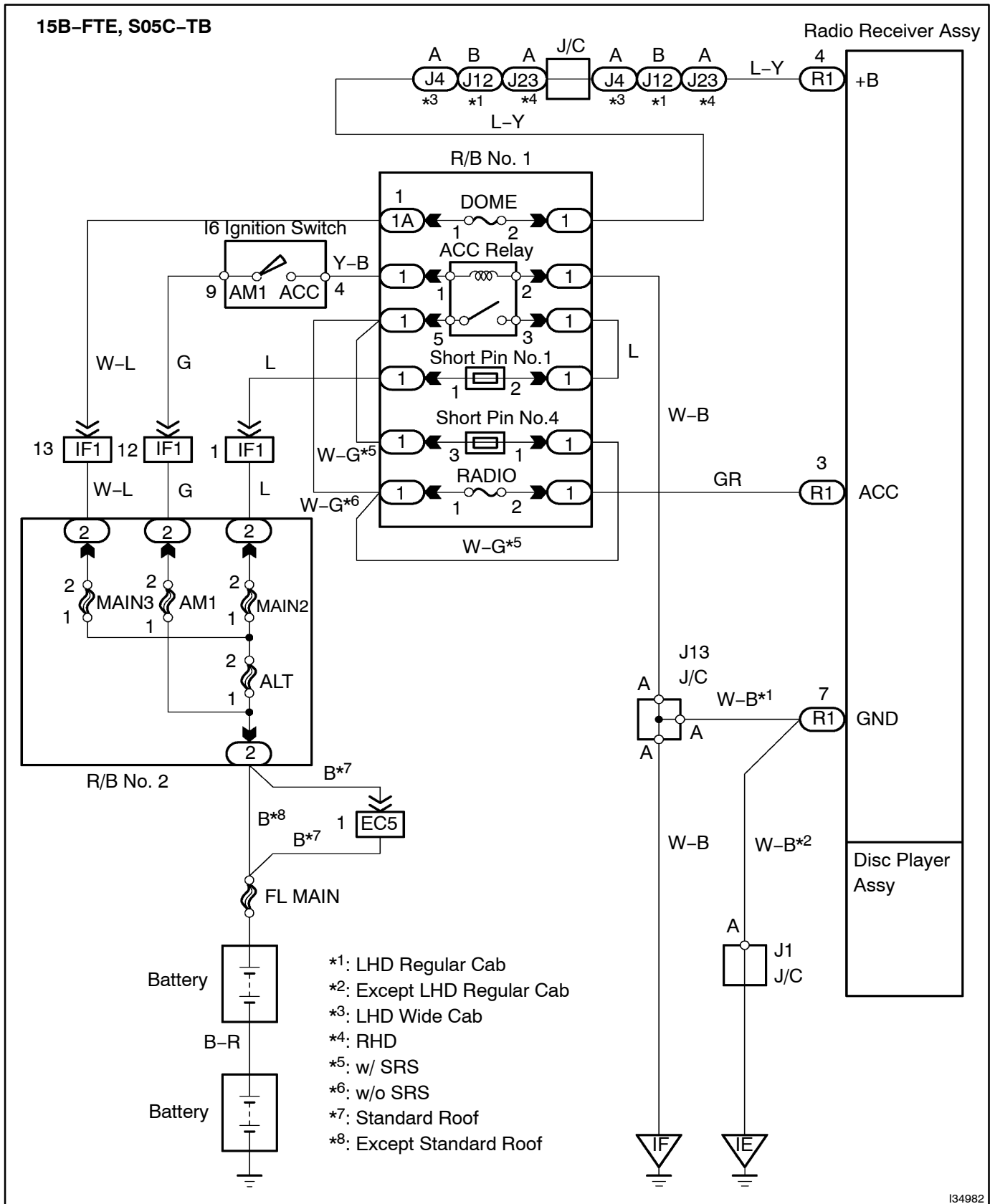
OK → HEAD DIRTY

NG

REPAIR OR REPLACE RADIO RECEIVER ASSY

CD CANNOT BE INSERTED OR IS EJECTED RIGHT AFTER INSERTION

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK IF A PROPER CD IS INSERTED

- (a) Make sure that the CD is a normal audio CD and that there is no deformation, flaw, stain, burr and other defects on the CD.

Standard: Normal audio CD.

Reference:

- Translucent or different-shaped CD cannot be played.
- CD-ROM for personal computers (with music recorded in) and recorded CD-R may not be played.

NG → CD FAULTY

OK

2 CHECK IF A CD IS PROPERLY INSERTED

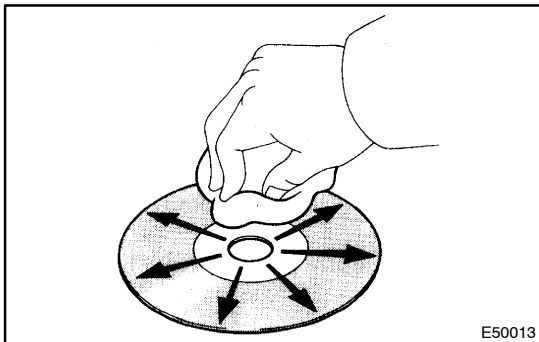
- (a) Check whether or not the CD is inserted upside down.

Standard: The CD is properly inserted.

NG → SET CD CORRECTLY

OK

3 CD CLEANING



- (a) Clean the CD by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:

Do not use a conventional record cleaner or anti-static preservative.

Standard: Malfunction disappears.

OK → CD DIRTY

NG

4 REPLACE CD WITH ANOTHER AND RECHECK

- (a) Replace the faulty CD with the normal one in order to see if the same trouble occurs again.

Standard: Malfunction disappears.

OK → CD FAULTY

NG

5 CHECK IF RADIO AUTO-SEARCH FUNCTIONS PROPERLY

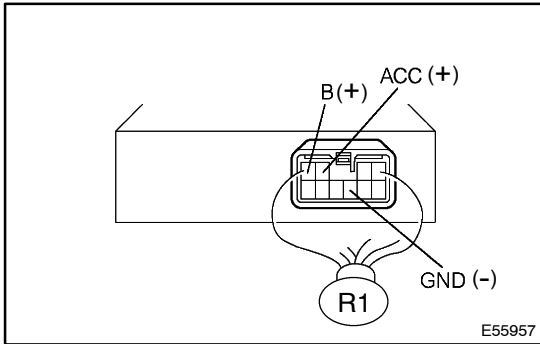
(a) Operate the auto-search of the radio receiver and check that operation is normal.

Standard: Malfunction disappears.

OK REPAIR OR REPLACE DISC PLAYER ASSY

NG

6 CHECK RADIO RECEIVER ASSY (+B, ACC, GND)



(a) Remove the radio receiver with the connectors still connected.

(b) Check the voltage between the terminals of the R1 connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
+B (R1-4) ↔ GND (R1-7)	Constant	20 - 28 V
ACC (R1-3) ↔ GND (R1-7)	Ignition switch ACC or ON	20 - 28 V

(c) Check the continuity between the terminal of the R1 connector and body ground.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
GND (R1-7) ↔ Body ground	Constant	Continuity

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPAIR OR REPLACE RADIO RECEIVER ASSY

ALTHOUGH SYSTEM IS POWERED, CD CANNOT BE PLAYED

WIRING DIAGRAM

Refer to CD CANNOT BE INSERTED OR IS EJECTED RIGHT AFTER INSERTION on page 05-307.

INSPECTION PROCEDURE

1 CHECK IF A PROPER CD IS INSERTED

- (a) Make sure that the CD is a normal audio CD and that there is no deformation, flaw, stain, burr and other defects on the CD.

Standard: Normal audio CD.

Reference:

- Translucent or different-shaped CD cannot be played.
- CD-ROM for personal computers (with music recorded in) and recorded CD-R may not be played.

NG

CD FAULTY

OK

2 CHECK IF A CD IS PROPERLY INSERTED

- (a) Check whether or not the CD is inserted upside down.

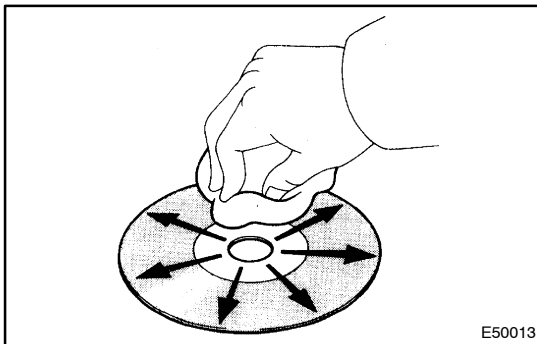
Standard: The CD properly inserted.

NG

SET CD CORRECTLY

OK

3 CD CLEANING



- (a) Clean the CD by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:

Do not use a conventional record cleaner or anti-static preservative.

Standard: Malfunction disappear.

OK

CD DIRTY

NG

4	REPLACE CD WITH ANOTHER AND RECHECK
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- (a) Replace the faulty CD with the normal one in order to see if the same trouble occurs again.

Standard: Malfunction disappears.

OK

CD FAULTY

NG

5	CHECK IF RADIO AUTO-SEARCH FUNCTIONS PROPERLY
----------	--

- (a) Operate the auto-search of the radio and check that operation is normal.

Standard: Malfunction disappears.

NG

Go to step 7

OK

6	DID TEMPERATURE IN CABIN CHANGE RAPIDLY?
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- (a) Check whether or not the rapid temperature change has occurred in the cabin.

Standard: The rapid temperature change has occurred.

Reference:

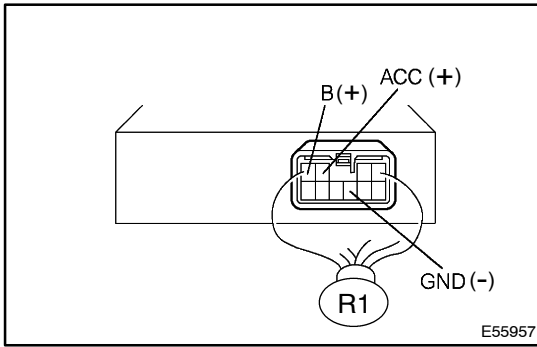
The rapid temperature change creates condensation inside the disc player, which may disable CD from being played.

OK

CONDENSATION DUE TO TEMPERATURE CHANGE (LEAVE IT AS IT IS FOR A WHILE BEFORE USING)

NG

REPAIR OR REPLACE DISC PLAYER ASSY

7 CHECK RADIO RECEIVER ASSY (+B, ACC, GND)


- (a) Remove the radio receiver with the connectors still connected.
 (b) Check the voltage between the terminals of the R1 connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
+B (R1-4) ↔ GND (R1-7)	Constant	20 - 28 V
ACC (R1-3) ↔ GND (R1-7)	Ignition switch ACC or ON	20 - 28 V

- (c) Check the continuity between the terminal of the R1 connector and body ground.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
GND (R1-7) ↔ Body ground	Constant	Continuity

NG
REPAIR OR REPLACE HARNESS AND CONNECTOR
OK
REPAIR OR REPLACE RADIO RECEIVER ASSY

CD CANNOT BE TAKEN OUT

WIRING DIAGRAM

Refer to CD CANNOT BE INSERTED OR IS EJECTED RIGHT AFTER INSERTION on page 05-307.

INSPECTION PROCEDURE

1 CHECK IF RADIO AUTO-SEARCH FUNCTIONS PROPERLY

- (a) Operate the auto-search of the radio receiver and check that operation is normal.
Standard: Malfunction disappears.

NG → Go to step 5

OK

2 PRESS "EJECT" AND CHECK OPERATION

- (a) Press the CD EJECT switch of the radio receiver for 2 sec. or more in order to see if the CD is ejected.
Standard: CD is ejected.

Reference:

If the CD is not ejected, send the vehicle for repair.

Do not try to forcibly drag it out.

NG → REPAIR OR REPLACE DISC PLAYER ASSY

OK

3 CHECK IF A PROPER CD IS INSERTED

- (a) Make sure that the CD is a normal audio CD and that there is no deformation, flaw, stain, burr and other defects on the CD.

Standard: Normal audio CD.

Reference:

- Translucent or different-shaped CD cannot be played.
- CD-ROM for personal computers (with music recorded in) and recorded CD-R may not be played.

NG → CD FAULTY

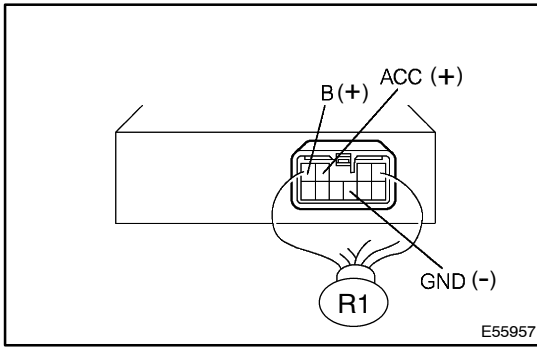
OK

4 REPLACE CD WITH ANOTHER AND RECHECK

- (a) Replace the faulty CD with the normal one in order to see if the same trouble occurs again.
Standard: Malfunction disappears.

OK → CD FAULTY

NG

5 CHECK RADIO RECEIVER ASSY (+B, ACC, GND)


- (a) Remove the radio receiver with the connectors still connected.
 (b) Check the voltage between the terminals of the R1 connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
+B (R1-4) ↔ GND (R1-7)	Constant	20 - 28 V
ACC (R1-3) ↔ GND (R1-7)	Ignition switch ACC or ON	20 - 28 V

- (c) Check the continuity between the terminal of the R1 connector and body ground.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
GND (R1-7) ↔ Body ground	Constant	Continuity

NG
REPAIR OR REPLACE HARNESS AND CONNECTOR
OK
REPAIR OR REPLACE RADIO RECEIVER ASSY

SOUND QUALITY IS BAD ONLY WHEN CD IS PLAYED (VOLUME IS TOO LOW)**INSPECTION PROCEDURE****1 REPLACE CD WITH ANOTHER AND RECHECK**

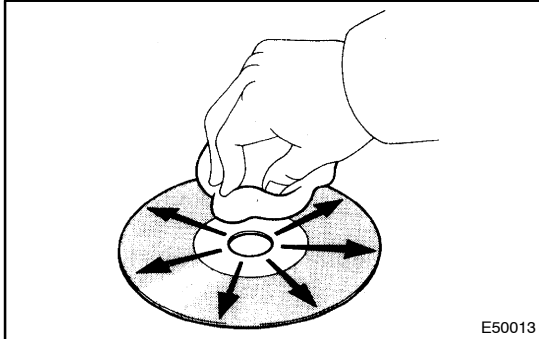
- (a) Replace the faulty CD with the normal one in order to see if the same trouble occurs again.
Standard: Malfunction disappears.

OK **CD FAULTY****NG****REPAIR OR REPLACE DISC PLAYER ASSY**

CD SOUND SKIPS

INSPECTION PROCEDURE

1 CD CLEANING



- (a) Clean the CD by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:

Do not use a conventional record cleaner or anti-static preservative.

Standard: Malfunction disappears.

OK

CD DIRTY

NG

2 REPLACE CD WITH ANOTHER AND RECHECK

- (a) Replace the faulty CD with the normal one in order to see if the same trouble occurs again.
Standard: Malfunction disappears.

OK

CD FAULTY

NG

3 CHECK WHEN THIS HAPPENS

- (a) Check that in what condition the sound skipping occurs.
Standard: Driving on the bumpy road.

OK

Go to step 5

NG

4 COMPARE IT WITH ANOTHER CAR OF SAME MODEL

- (a) Compare with the vehicle of the same type which does not have a trouble in order to see if there is any difference in the condition of trouble occurrence.
Standard: No difference is found.

OK

SETTING

NG

5 CHECK DISC PLAYER ASSY INSTALLING CONDITION

- (a) Check the installation condition of the disc player.

Standard: Installed properly.

NG

INSTALL DISC PLAYER ASSY PROPERLY

OK

6 DID TEMPERATURE IN CABIN CHANGE RAPIDLY?

- (a) Check whether or not the rapid temperature change has occurred in the cabin.

Standard: The rapid temperature change has occurred.

Reference:

The rapid temperature change creates condensation inside the disc player, which may disable CD from being played.

OK

CONDENSATION DUE TO TEMPERATURE CHANGE (LEAVE IT AS IT IS FOR A WHILE BEFORE USING)

NG

REPAIR OR REPLACE DISC PLAYER ASSY

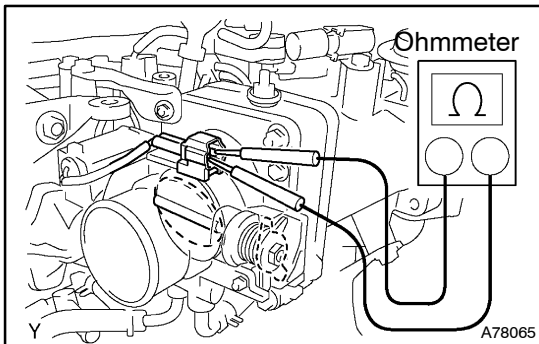
ENGINE CONTROL SYSTEM

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BODY ASSY (15B-FTE)	10-4
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ECM (15B-FTE)	10-5
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ECD SYSTEM (15B-FTE)

INSPECTION

100DS-01



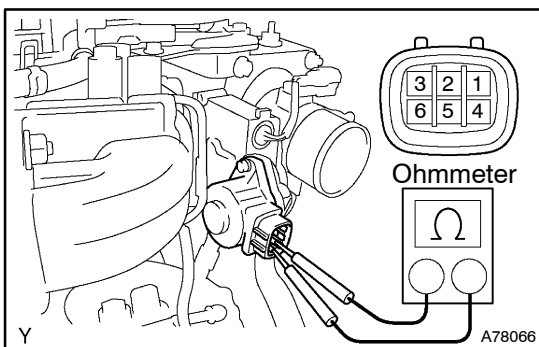
1. INSPECT THROTTLE FULL SWITCH

- Disconnect the switch connector.
- Using an ohmmeter, check the continuity between the terminals.

Standard:

Throttle Valve Position	Specified Condition
Fully closed	No continuity
Fully open	Continuity

- Reconnect the switch connector.

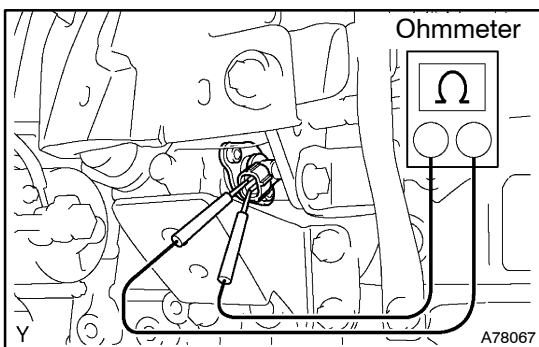


2. INSPECT THROTTLE CONTROL MOTOR

- Disconnect the motor connector.
- Using an ohmmeter, measure the resistance between terminals 1 and 2, 2 and 3, 4 and 5, and 5 and 6.

Resistance: 72 – 88 Ω at 20°C (68°F)

- Reconnect the motor connector.



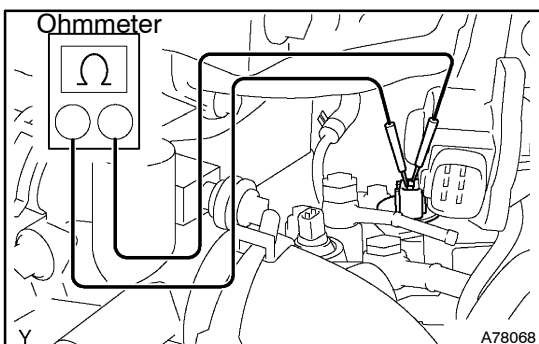
3. INSPECT TIMING CONTROL VALVE

- Disconnect the valve connector.
- Using an ohmmeter, measure the resistance between the terminals.

Resistance: 10 – 14 Ω at 20°C (68°F)

If the resistance is not specified, replace the injection pump assy (See page 11-64).

- Reconnect the valve connector.



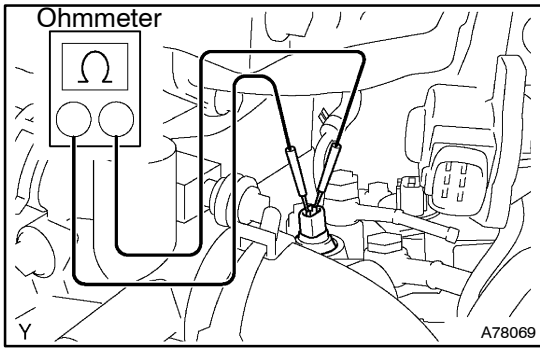
4. INSPECT SPILL CONTROL VALVE

- Disconnect valve connector.
- Using an ohmmeter, measure the resistance between the terminals.

Resistance: 1 – 3 Ω at 20°C (68°F)

If the resistance is not specified, replace the injection pump assy (See page 11-64).

- Reconnect the valve connector.



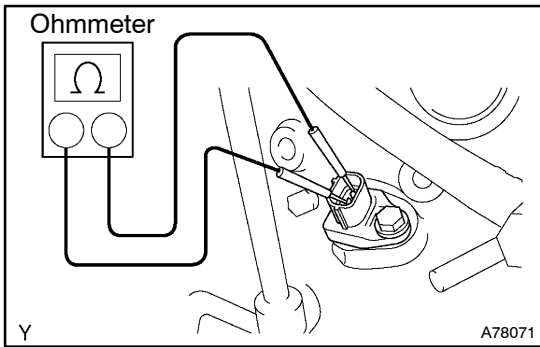
5. INSPECT ENGINE SPEED SENSOR

- (a) Disconnect the sensor connector.
- (b) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 1 – 3 Ω at 20°C (68°F)

If the resistance is not specified, replace the injection pump assembly (See page 11-64).

- (c) Reconnect the sensor connector.



6. INSPECT CRANKSHAFT POSITION SENSOR

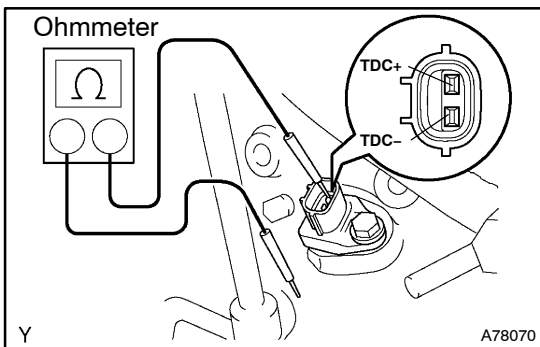
NOTICE:

”Cold” and ”Hot” in the following sentences express the temperature of the sensors themselves. ”Cold” is from -10°C (14°F) to 50°C (122°F) and ”Hot” is from 50°C (122°F) to 100°C (212°F).

- (a) Disconnect the sensor connector.
- (b) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Cold	19 – 32 Ω
Hot	24 – 37 Ω



- (c) Using an ohmmeter, measure the resistance between TDC- terminal and body.

Resistance: 10 MΩ or more

If the resistance is not as specified, replace the sensor.

6 N·m (60 kgf·cm, 53 in·lbf)

HINT:

Apply engine oil to a new O-ring on the sensor, and install them.

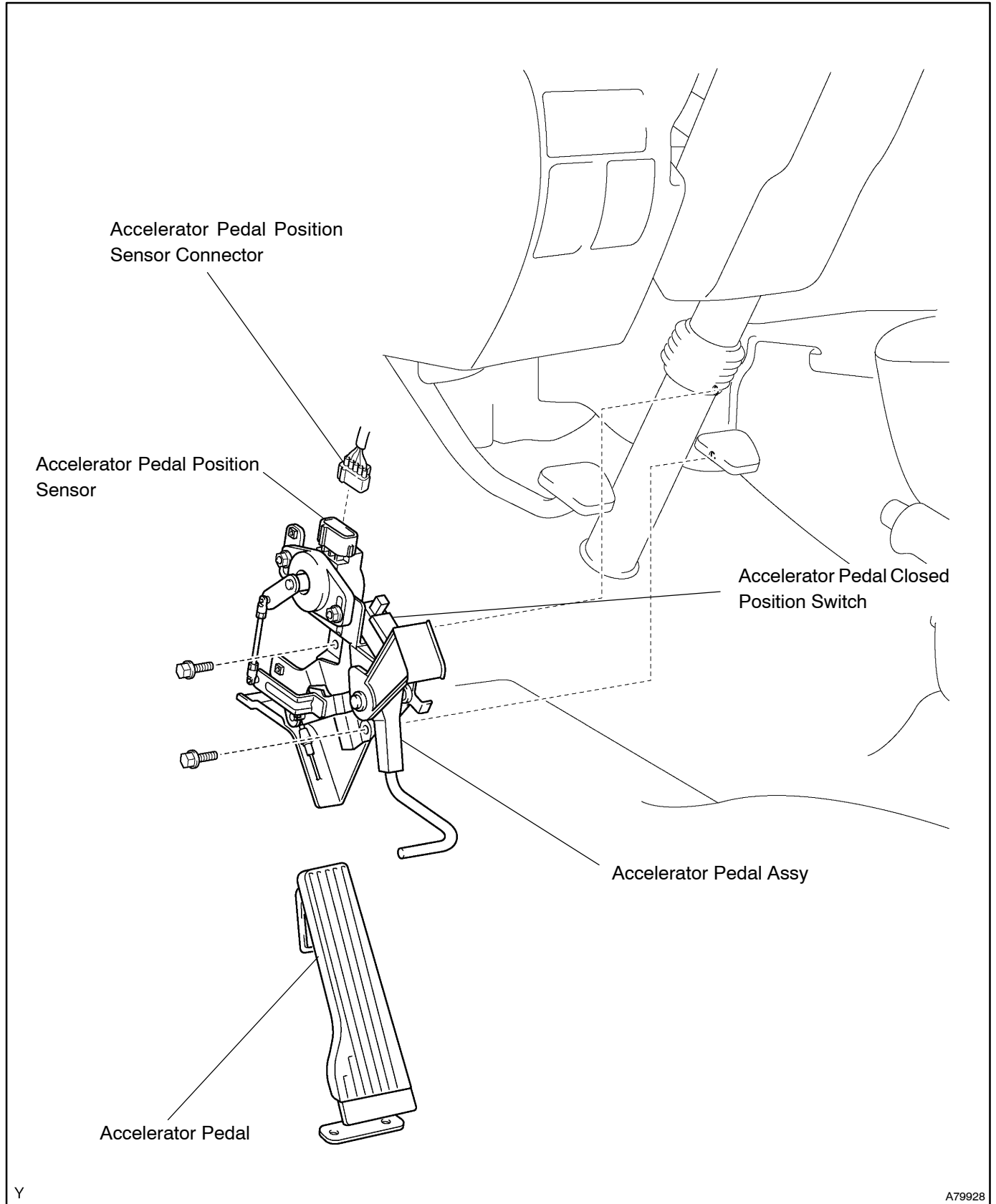
NOTICE:

Be careful not drop and shock the sensor.

- (d) Reconnect the sensor connector.

ACCELERATOR PEDAL POSITION SENSOR (15B-FTE) COMPONENTS

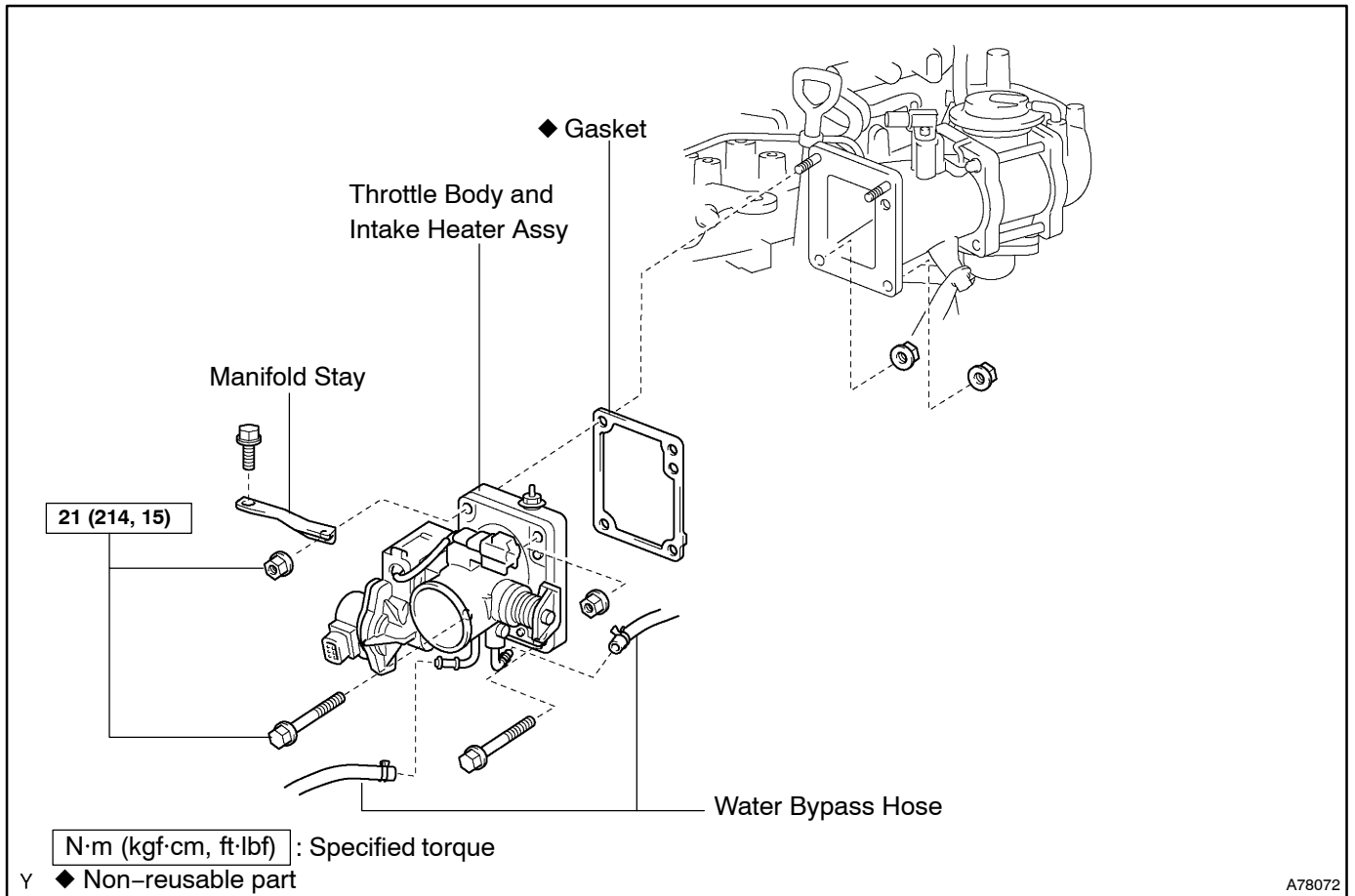
100DU-01



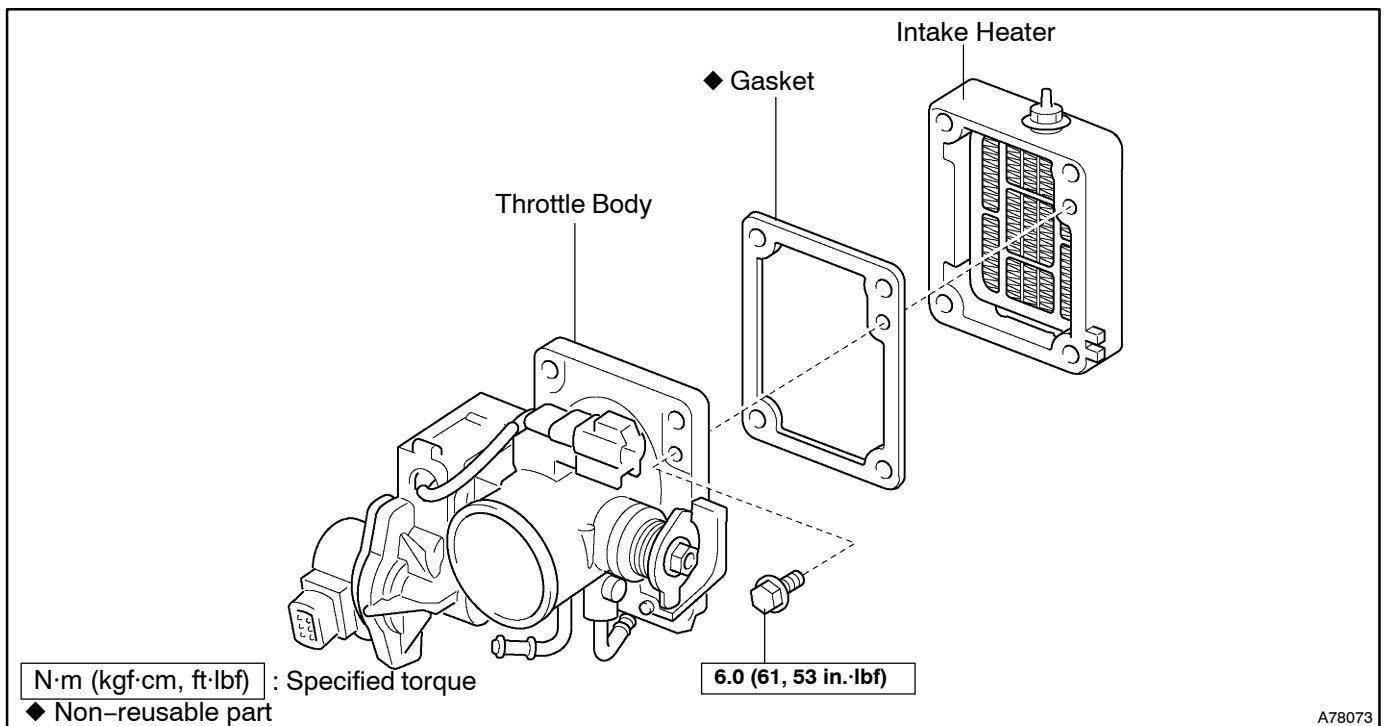
DIESEL THROTTLE BODY ASSY (15B-FTE)

COMPONENTS

100DT-01



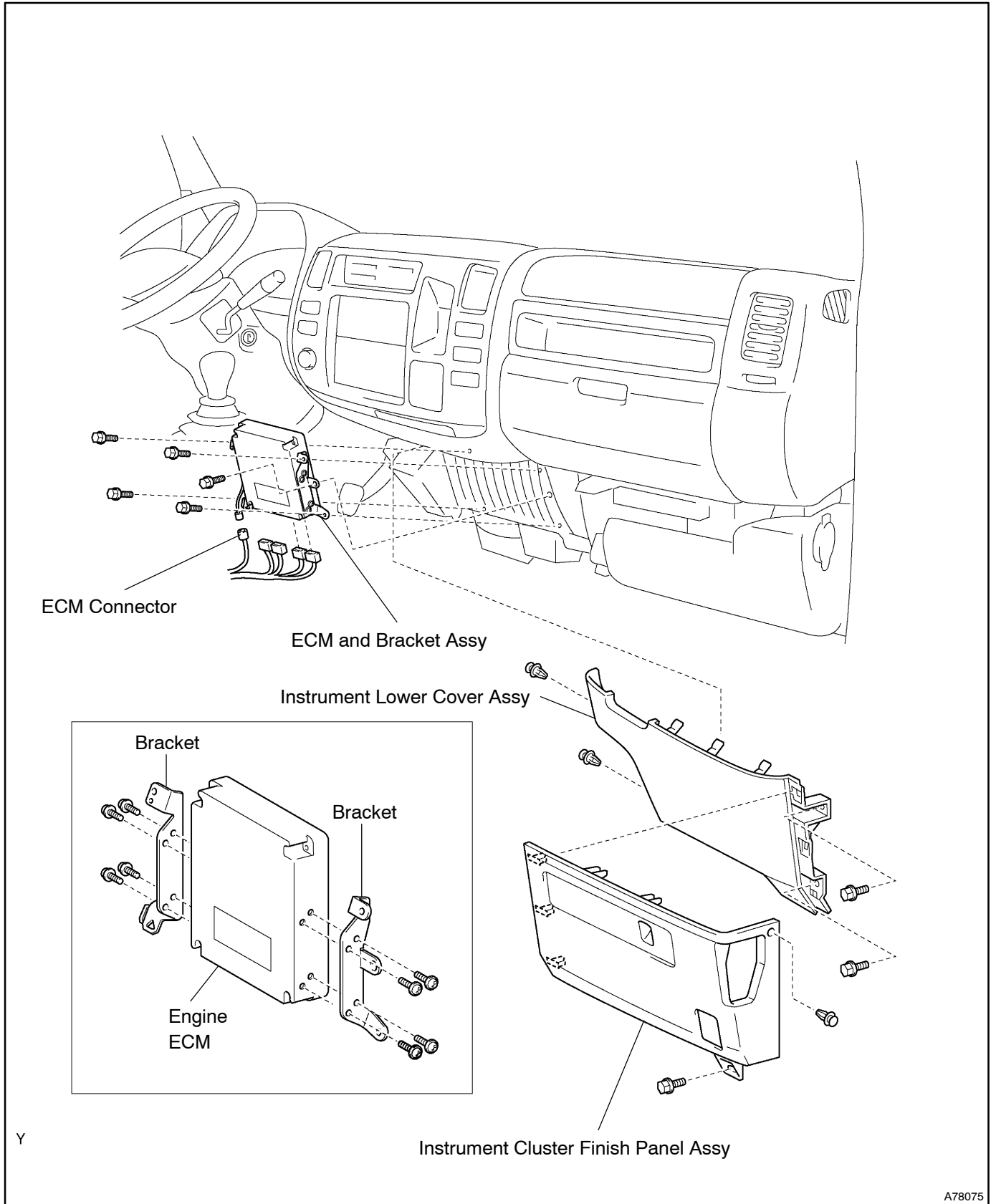
A78072



A78073

ECM (15B-FTE) COMPONENTS

100DV-01

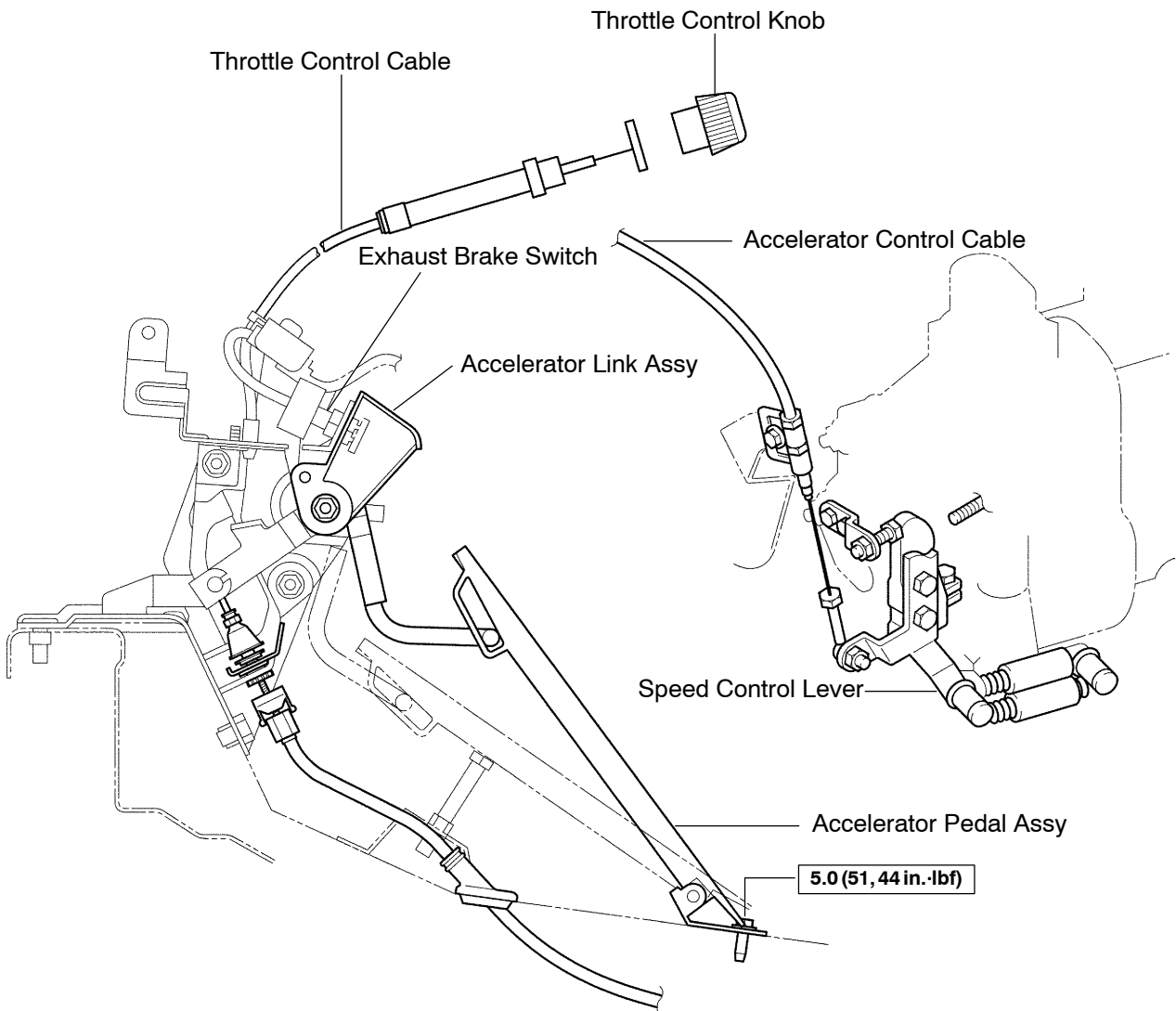


Y

ACCELERATOR LINK ASSY (S05C-B) COMPONENTS

100DW-01

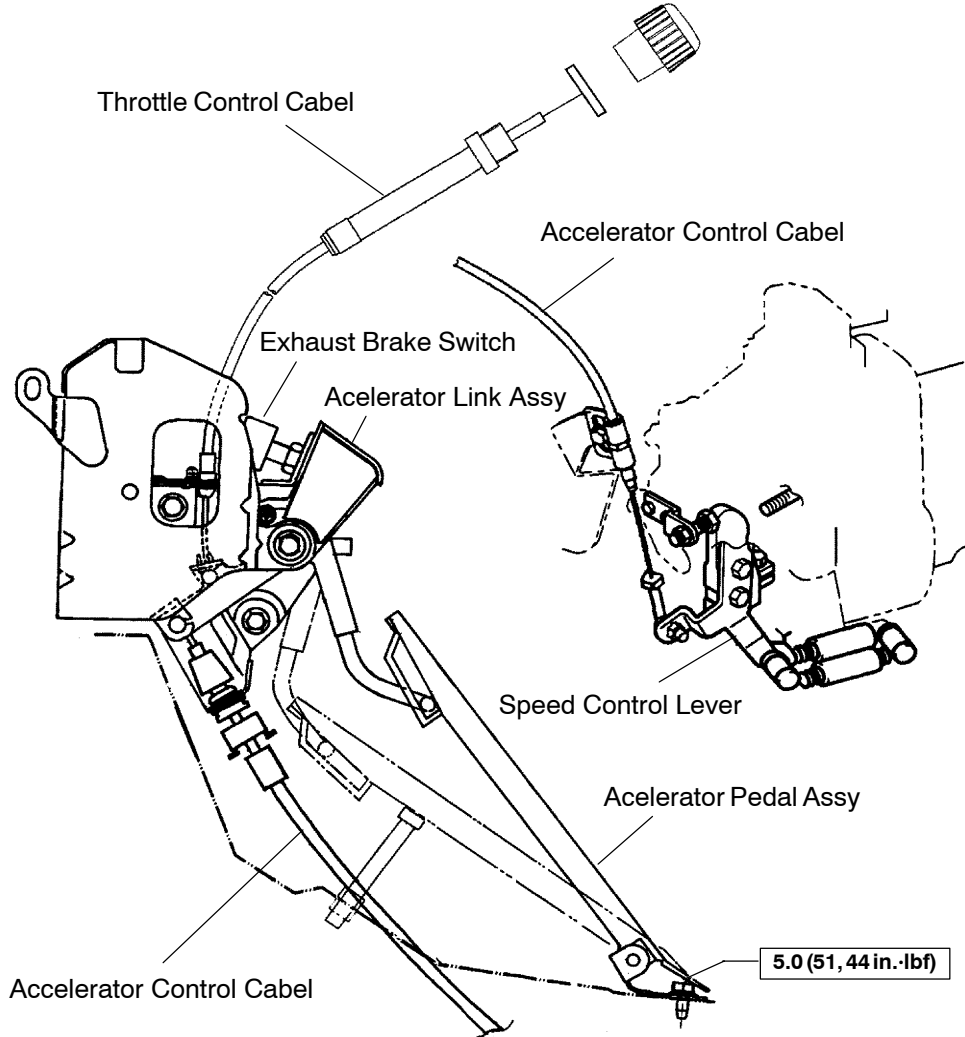
LHD Models



P N·m (kgf·cm, ft·lbf) : Specified torque

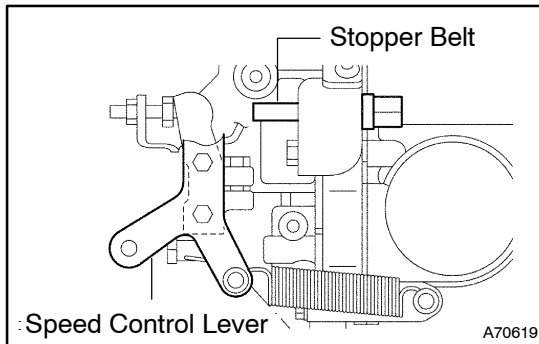
A70618

RHD Models



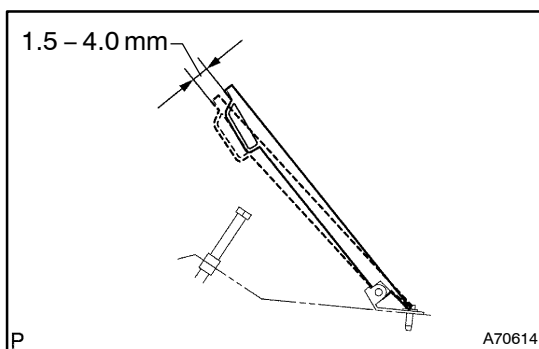
N·m (kgf·cm, ft·lbf) : Specified torque

ADJUSTMENT



1. ADJUST OUTLINE

- (a) When the accelerator pedal is depressed fully, the governor speed control lever shall come into contact with the stopper bolt.



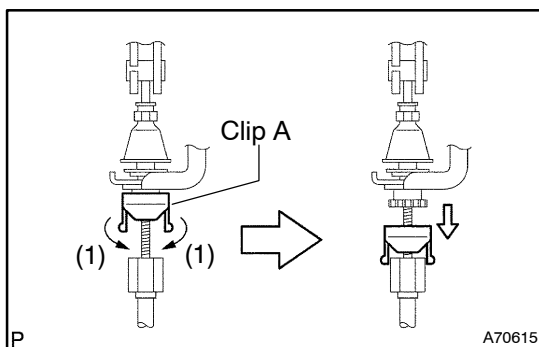
2. ADJUST ACCELERATOR PEDAL PLAY

- (a) Adjust the pedal play.

Pedal play: 1.5 - 4.0 mm (0.06 - 0.16 in.)

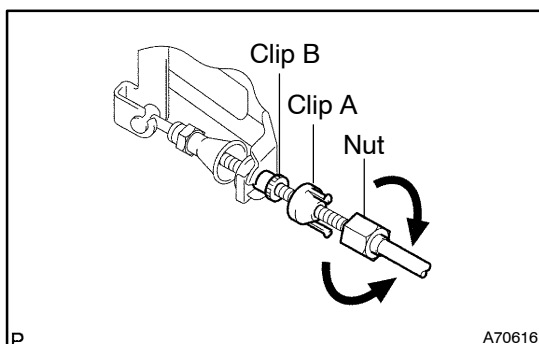
NOTICE:

When the pedal is returned the exhaust brake switch shall be pushed in.



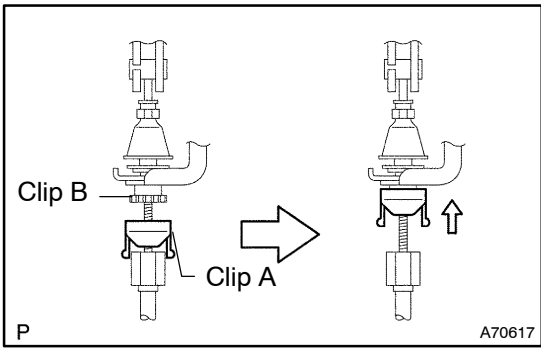
3. ADJUST ACCELERATOR CONTROL CABLE

- (a) Grasp the lock of clip A of the accelerator cable on the side of the accelerator link assembly in direction(1) and lower clip A.



- (b) Turn the nut of the cable and adjust the play of the accelerator pedal.

- (1) Turn to right (the wire becomes loose) when there is no play.
 (2) Turn to the left (the wire is tightened) when the play is large.



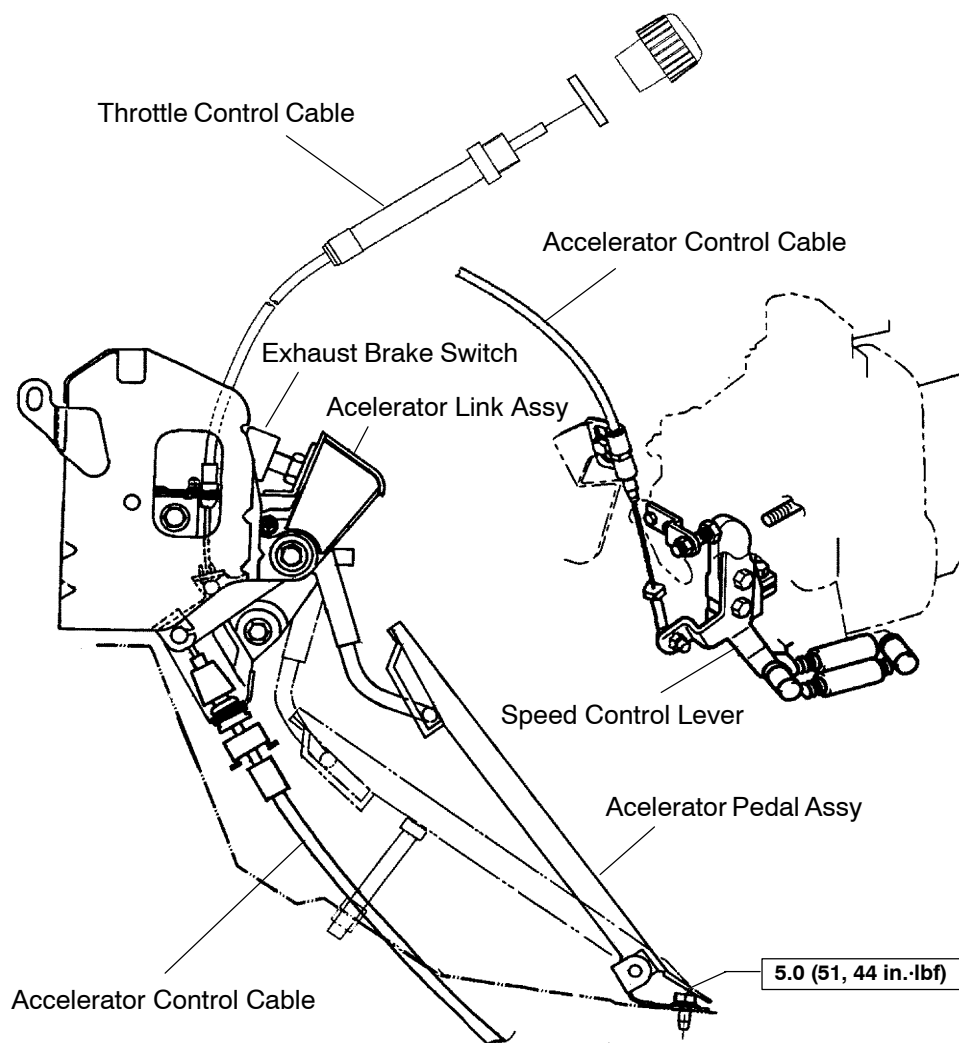
(c) After adjustment of the pedal play, fix clip A to clip B.

ACCELERATOR LINK ASSY (S05C-TA)

COMPONENTS

100DX-01

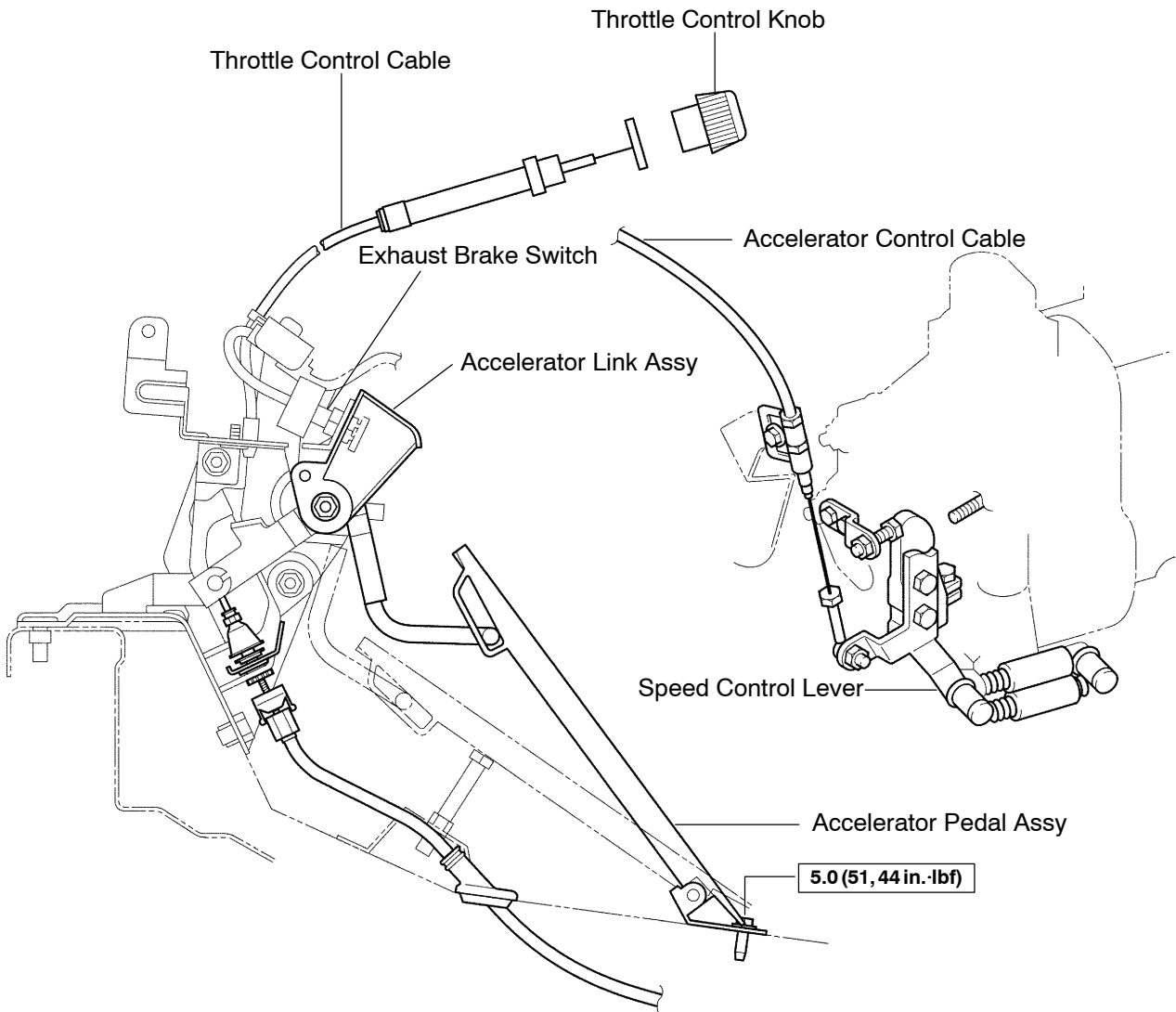
RHD Models



N·m (kgf·cm, ft·lbf) : Specified torque

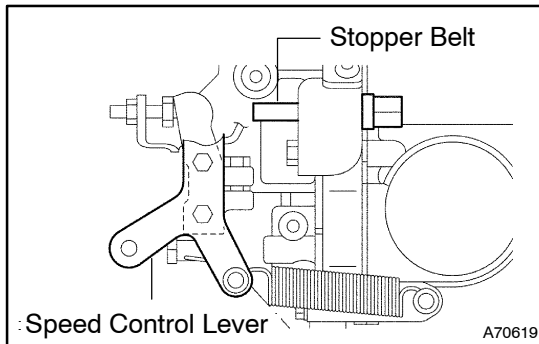
A79287

LHD Models



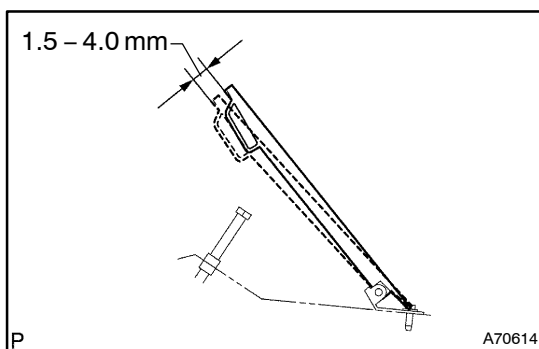
N·m (kgf·cm, ft·lbf) : Specified torque

ADJUSTMENT



1. ADJUST OUTLINE

- (a) When the accelerator pedal is depressed fully, the governor speed control lever shall come into contact with the stopper bolt.

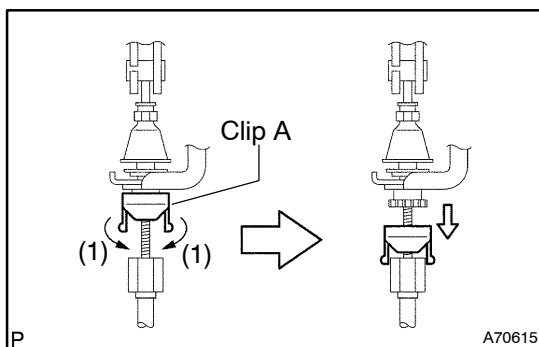


2. ADJUST ACCELERATOR PEDAL PLAY

- (a) Adjust the pedal play.
Pedal play: 1.5 - 4.0 mm (0.06 - 0.16 in.)

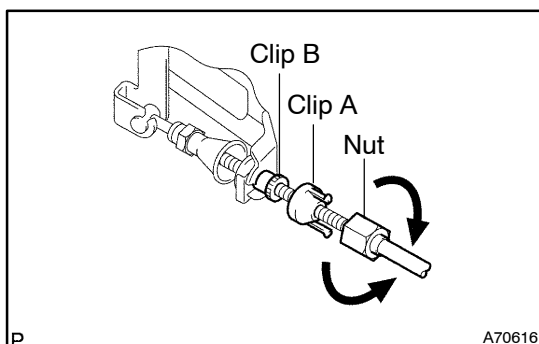
NOTICE:

When the pedal is returned the exhaust brake switch shall be pushed in.



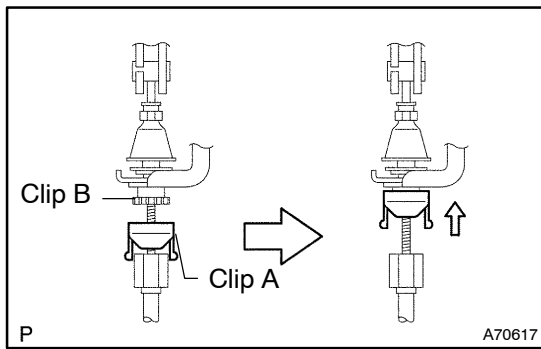
3. ADJUST ACCELERATOR CONTROL CABLE

- (a) Grasp the lock of clip A of the accelerator cable on the side of the accelerator link assembly in direction(1) and lower clip A.



- (b) Turn the nut of the cable and adjust the play of the accelerator pedal.

- (1) Turn to right (the wire becomes loose) when there is no play.
 (2) Turn to the left (the wire is tightened) when the play is large.

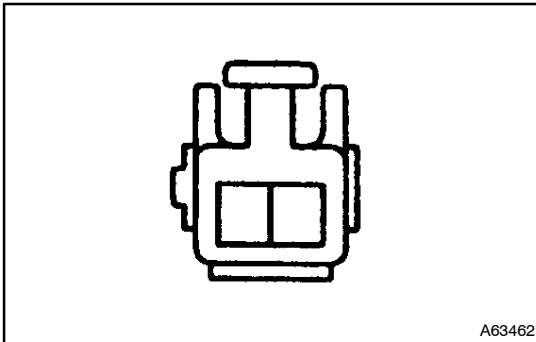


(c) After adjustment of the pedal play, fix clip A to clip B.

ECD SYSTEM (S05C-TB)

INSPECTION

1007R-02



1. INSPECT ACCELERATOR PEDAL SWITCH

- (a) Disconnect the switch connector.
- (b) Using an ohmmeter, check the continuity between the terminals.

Standard:

Accelerator Pedal Position	Specified Condition
Fully closed	No Continuity
Fully open	Continuity

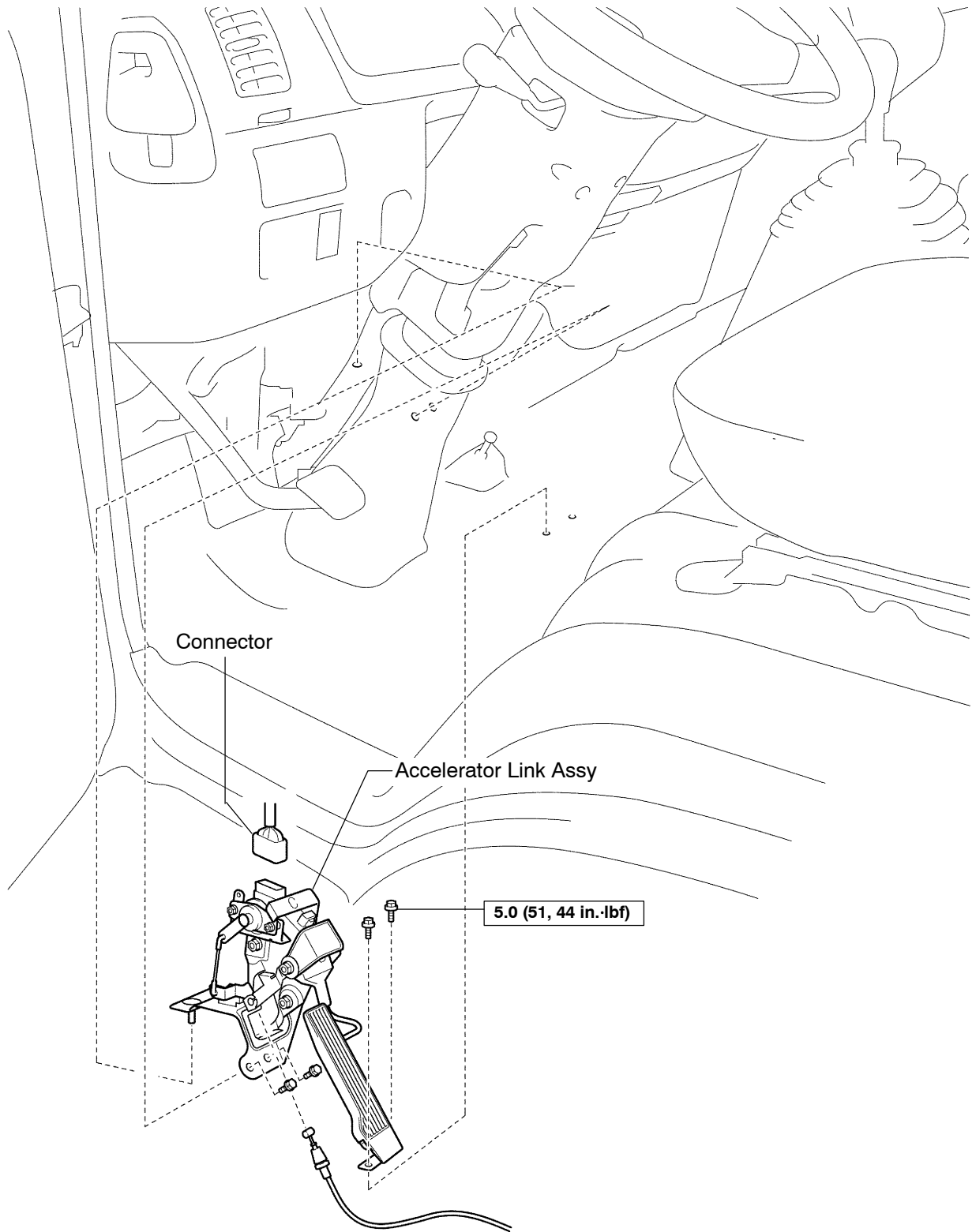
IF the is not as continuity, replace the switch.

- (c) Reconnect the switch connector.

ACCELERATOR LINK ASSY (S05C-TB) COMPONENTS

100DZ-01

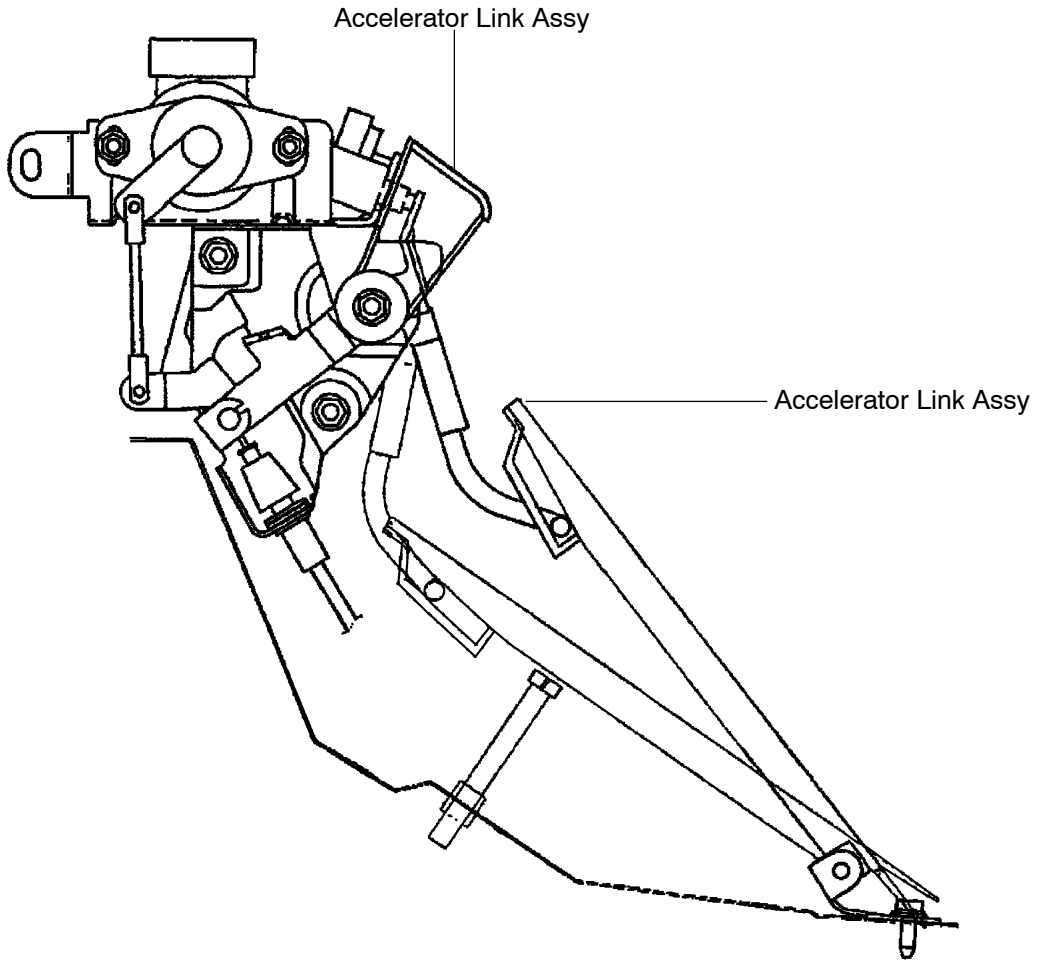
LHD Models



P N·m (kgf·cm, ft·lbf) : Specified torque

A54216

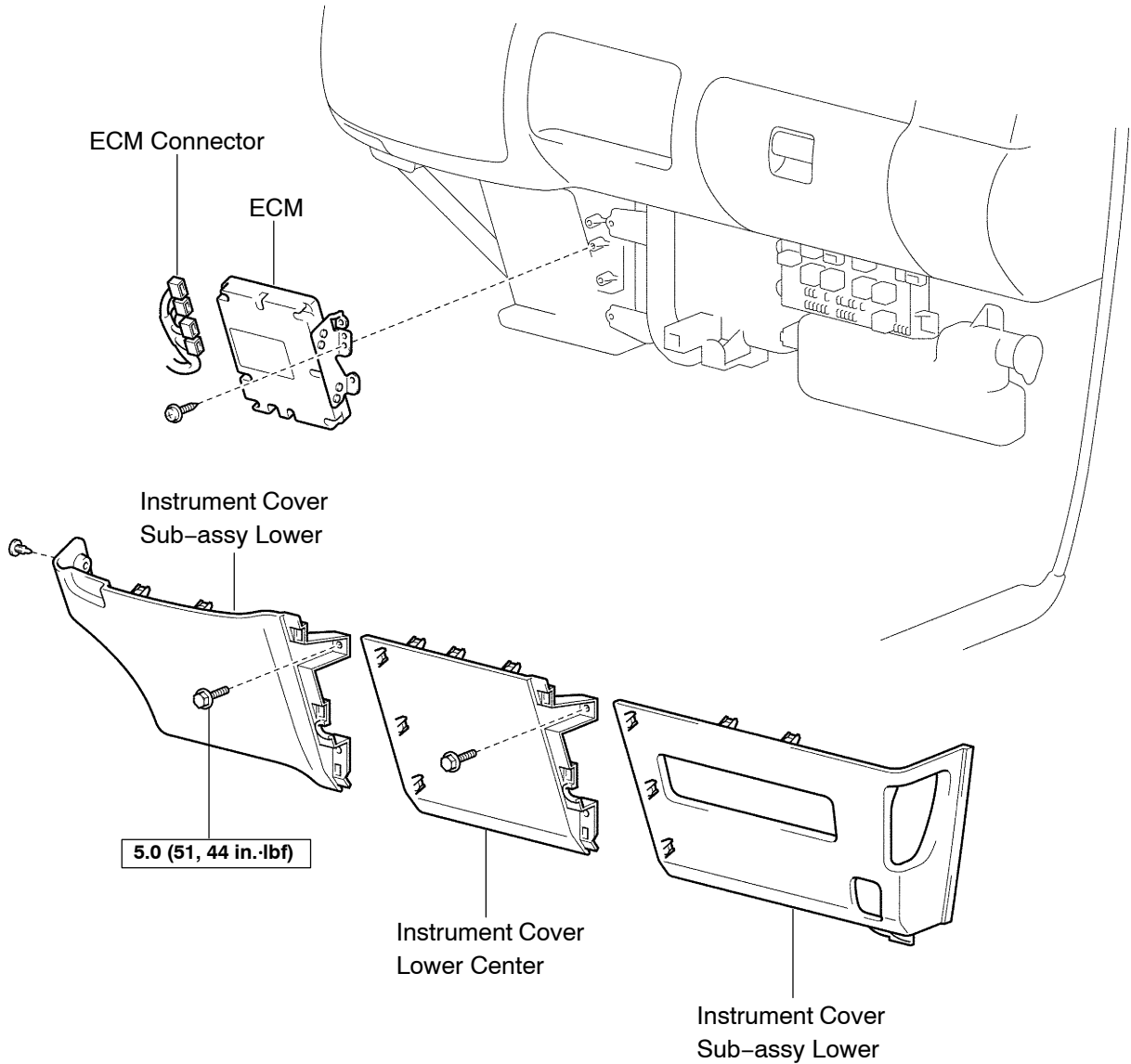
RHD Models



ECM (S05C-TB) COMPONENTS

100E0-01

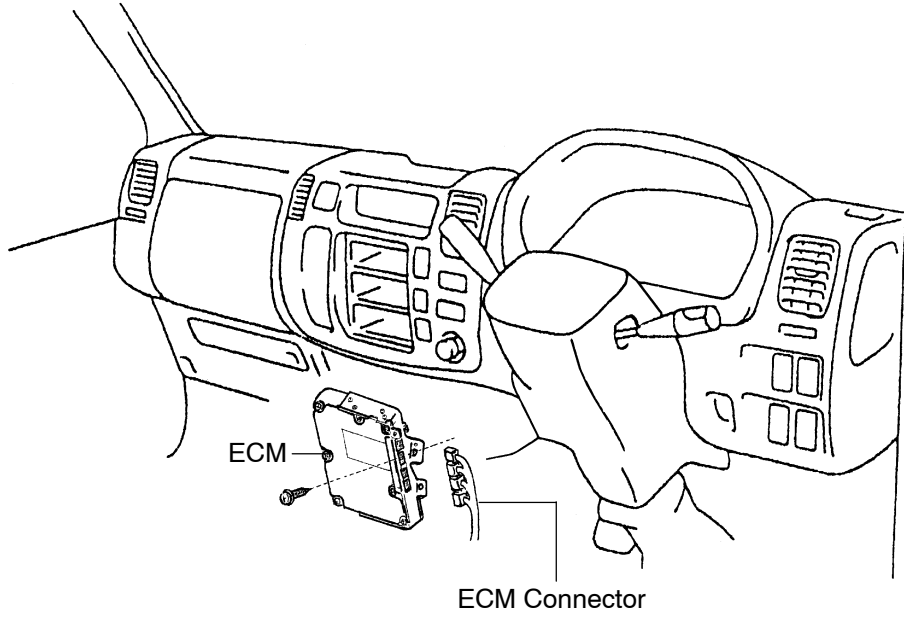
LHD Models



N·m (kgf·cm, ft·lbf) : Specified torque

A54215

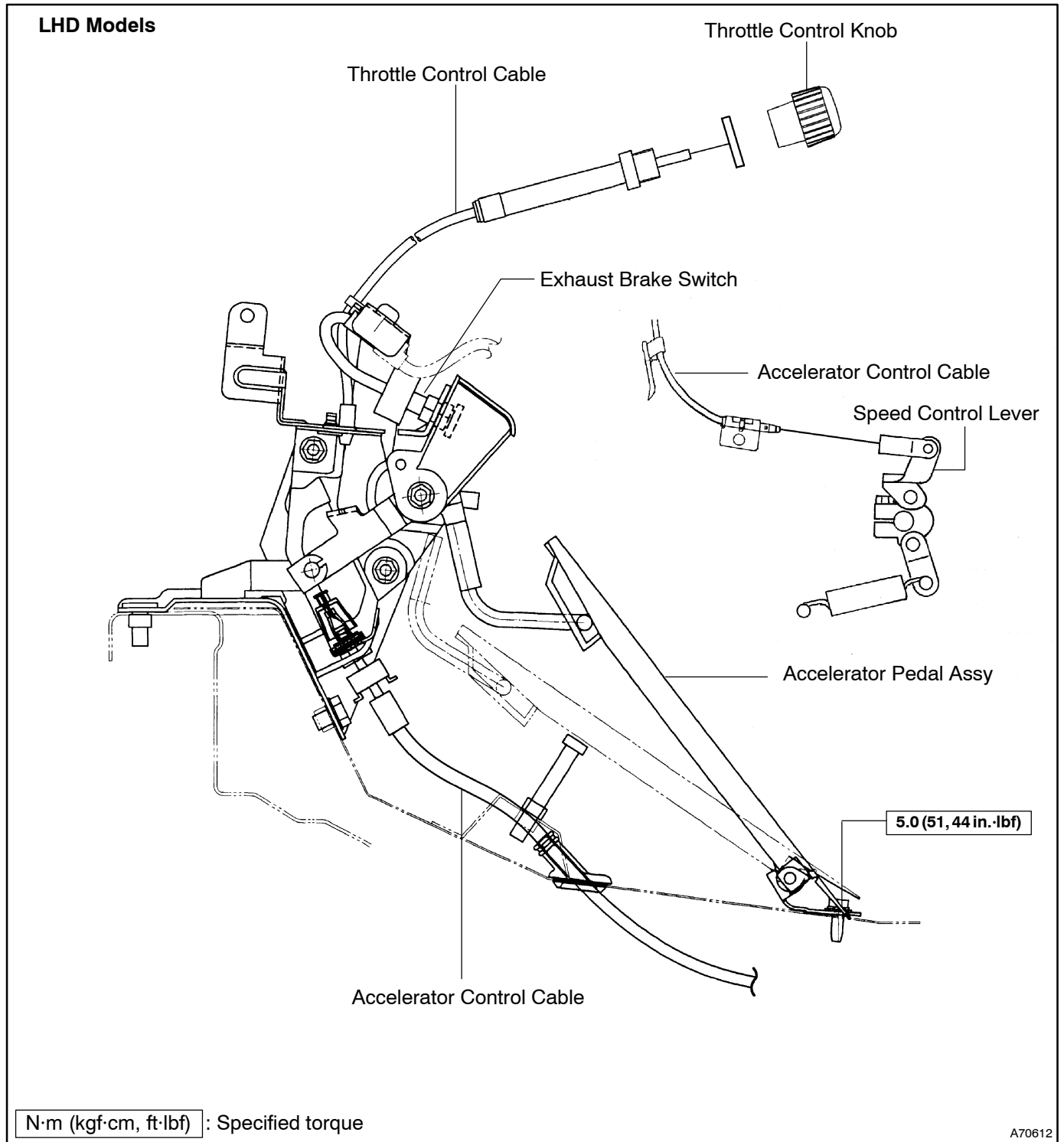
RHD Models



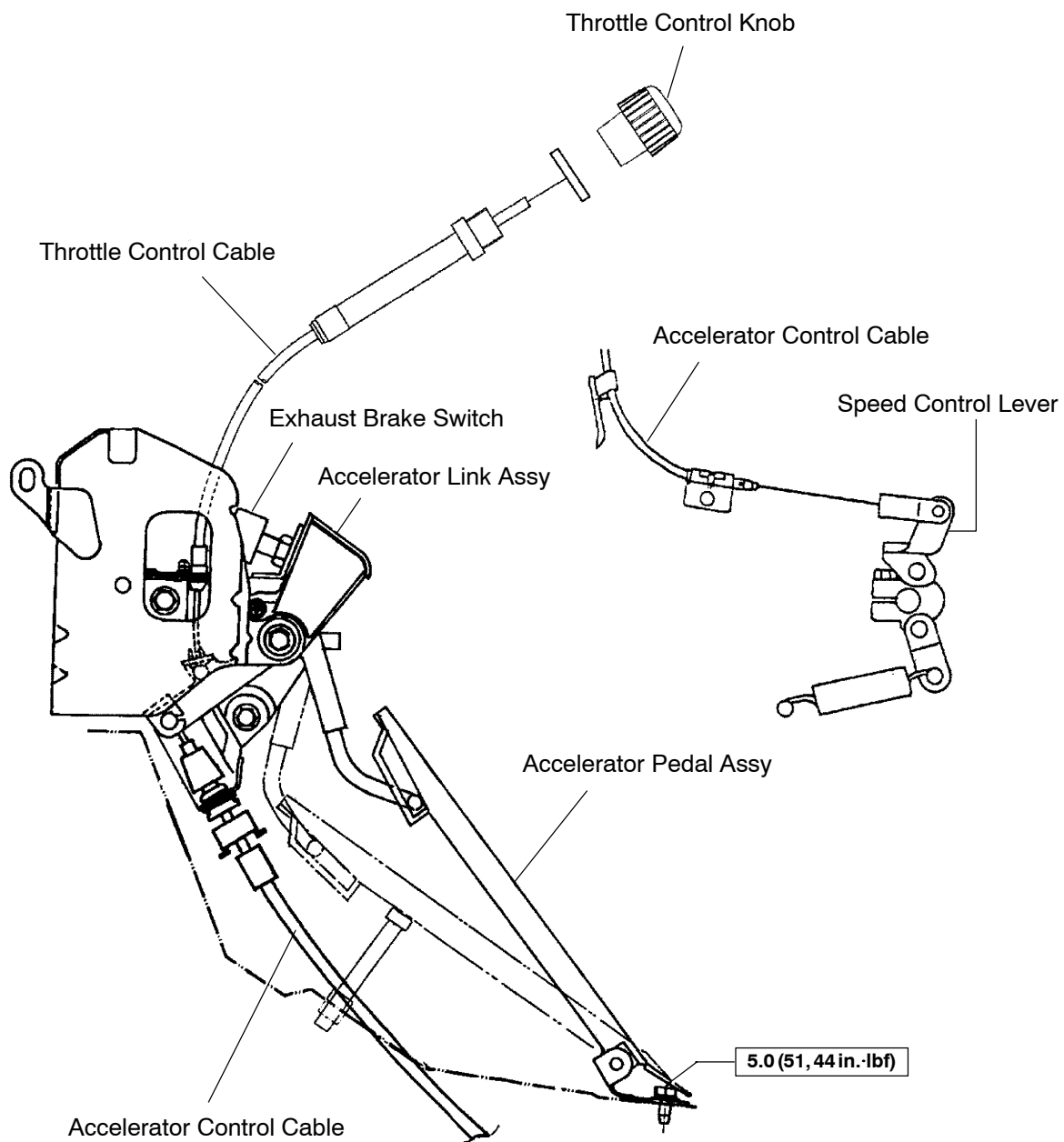
ACCELERATOR LINK ASSY (W04D-J)

COMPONENTS

100E1-01

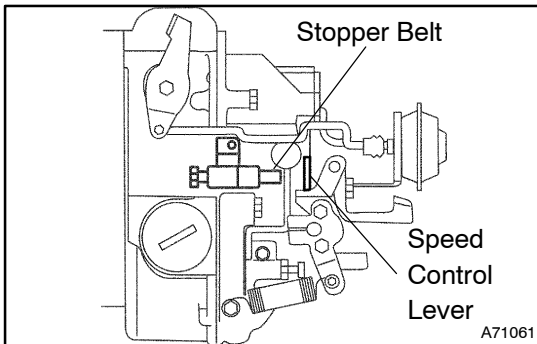


RHD Models



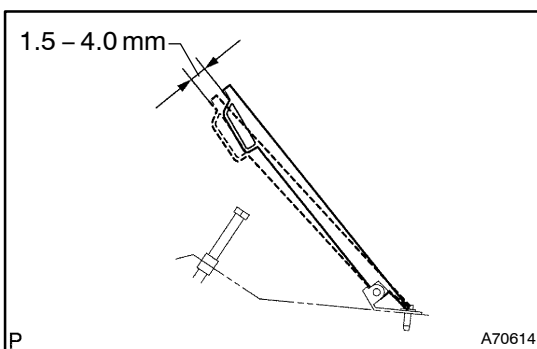
N·m (kgf·cm, ft·lbf) : Specified torque

ADJUSTMENT



1. ADJUST OUTLINE

- (a) When the accelerator pedal is depressed fully, the governor speed control lever shall come into contact with the stopper bolt.



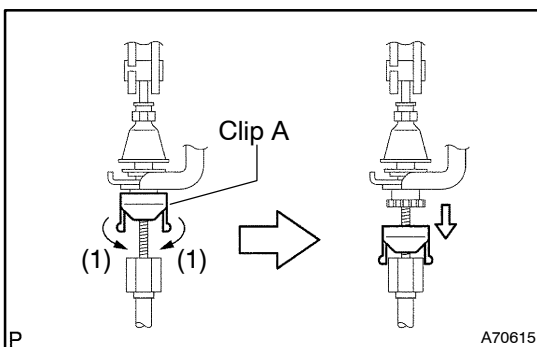
2. ADJUST ACCELERATOR PEDAL PLAY

- (a) Adjust the pedal play.

Pedal play: 1.5 - 4.0 mm (0.06 - 0.16 in.)

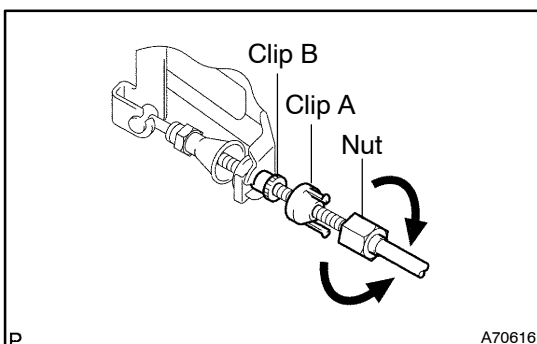
NOTICE:

When the pedal is returned the exhaust brake switch shall be pushed in.



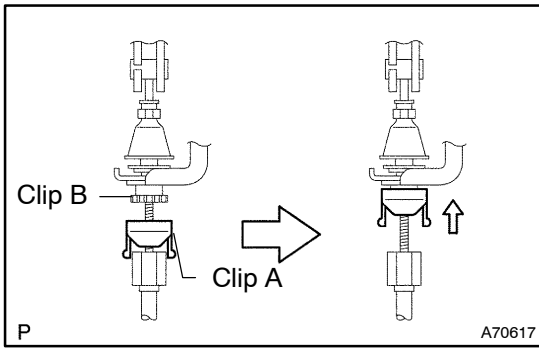
3. ADJUST ACCELERATOR CONTROL CABLE

- (a) Grasp the lock of clip A of the accelerator cable on the side of the accelerator link assembly in direction (1) and lower clip A.



- (b) Turn the nut of the cable and adjust the play of the accelerator pedal.

- (1) Turn to right (the wire becomes loose) when there is no play.
 (2) Turn to the left (the wire is tightened) when the play is large.



(c) After adjustment of the pedal play, fix clip A to clip B.

FUEL

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FUEL SYSTEM (14B)

110RK-01

ON-VEHICLE INSPECTION

1. FUEL CUT SOLENOID ASSY

(a) Check the operation.

(1) Check that the engine stops when the fuel cut solenoid connector is disconnected while idling.

2. FUEL CUT SOLENOID ASSY (FCV SYSTEM)

(a) Check the operation.

(1) Check the FCV operating sound after the water temperature sensor connector is disconnected while idling.

3. POWER BALANCE

(a) Check the power balance.

(1) Check how the engine revolution changes and how the engine oscillates while idling by loosening and tightening the flare nut for the injection pipe on the nozzle side as slowly as possible.

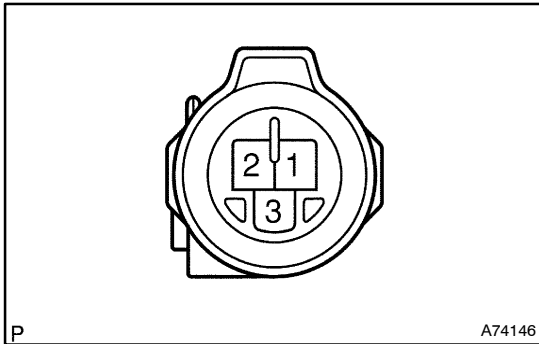
NOTICE:

To prevent the fuel from spilling out, use cloth to cover it.

HINT:

- The engine revolution does not decrease, or there is a cylinder which has little change (→ Power of the cylinder is weak).
- There are some cylinders which engine revolutions become stable by loosening the flare nut and draining a little amount of the fuel injection (→ Power of the cylinder is strong).

INSPECTION

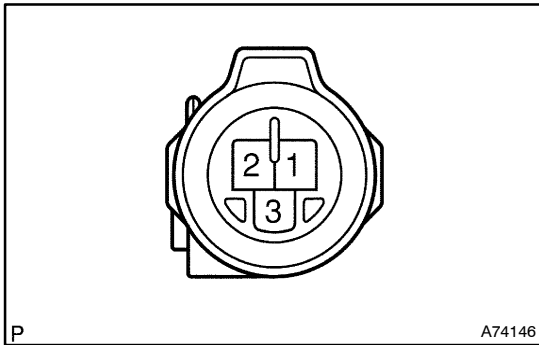


1. INSPECT FUEL CUT SOLENOID ASSY

- (a) Check the continuity.
- (1) Using the electrical tester, check the continuity between terminal 3 of the connector and body ground.

Standard: Continuity

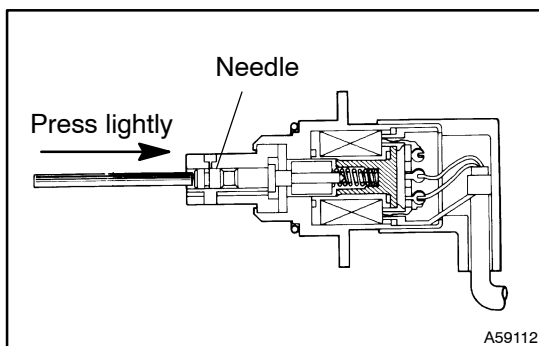
- (b) Inspect the operation.
- (1) Check that the solenoid is sucked when the battery positive is connected to a terminal of the fuel cut solenoid assembly and the body is grounded.
- (2) Check that the solenoid recovers if connection between the body and ground is cut under the (1) condition.



- (c) Check the continuity.
- (1) Using the electrical tester, check the continuity between terminal 1 of the connector and body ground.

Standard: Continuity

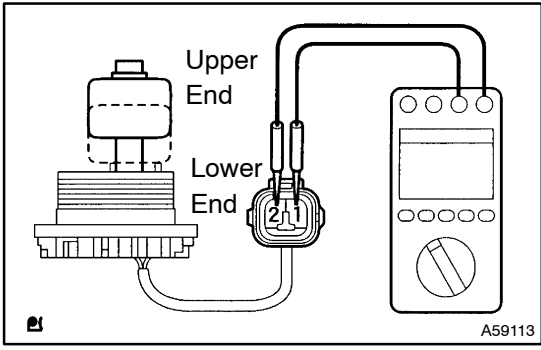
- (d) Inspect the operation.
- (1) Check that the solenoid is sucked when the battery positive is connected to a terminal of the fuel cut solenoid assembly (FCV) and the body is grounded.



- (2) Check that the needle moves smoothly without resistance when the needle on the tip of the fuel cut solenoid assembly (FCV) is lightly pressed.

HINT:

Stroke of the needle: 0.68 mm (0.0268 in.)



2. INSPECT LEVEL WARNING SWITCH

- (a) Using the electrical tester, check the continuity.
 - (1) Check the continuity between the terminals.

Standard:

Float Position	Specified Condition
Upper end of float	Continuity
Lower end of float	No continuity

FUEL FILTER ELEMENT (14B)

REPLACEMENT

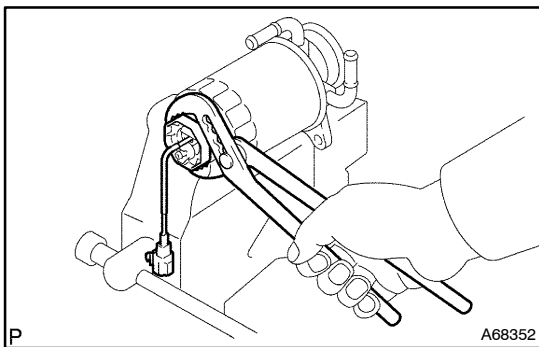
1. DRAIN FUEL

2. REMOVE DIESEL FUEL FILTER ASSY

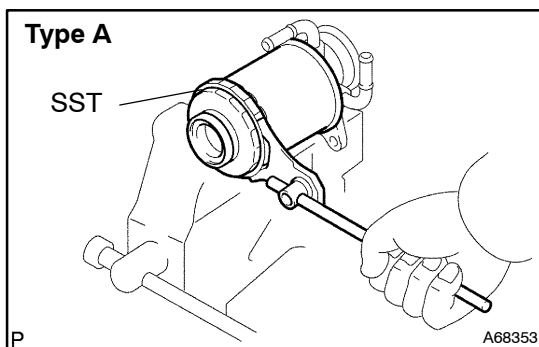
- (a) Loosen the filter drain plug, and then drain fuel.
- (b) Disconnect the fuel main tube fuel hose No. 1.
- (c) Disconnect the fuel filter fuel hose.
- (d) Disconnect the level warning switch connector.
- (e) Disconnect the fuel heater connector.

3. REMOVE FUEL FILTER ELEMENT

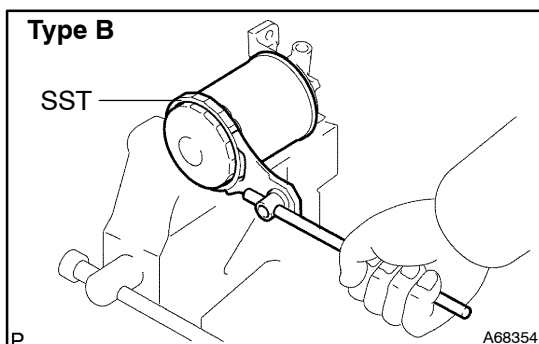
- (a) Remove the 2 bolts and fuel filter.



- (b) Fix the fuel filter cap with a vise.
- (c) Using pliers, remove the level warning switch.



- (d) Type A:
Using SST, remove the fuel filter element.
SST 09228-64040



- (e) Type B:
Using SST, remove the fuel filter element.
SST 09228-10002

4. INSTALL FUEL FILTER ELEMENT

- (a) Apply a light coat of fuel to the gasket, and then thoroughly tighten the fuel filter by hand.

NOTICE:

Do not use SST when tightening the element.

- (b) With a new gasket for the warning switch, thoroughly tighten the level warning switch by hand .

- (c) Tighten the fuel filter assy with the 2 bolts.
Torque: 18 N·m (183 kgf·cm, 13 ft·lbf)
- (d) Connect the fuel heater connector.
- (e) Connect the level warning switch connector.
- (f) Connect the fuel filter fuel hose.
- (g) Connect the fuel main tube fuel hose No. 1.

5. INSTALL DIESEL FUEL FILTER ASSY

6. ADD FUEL

7. BLEED FUEL

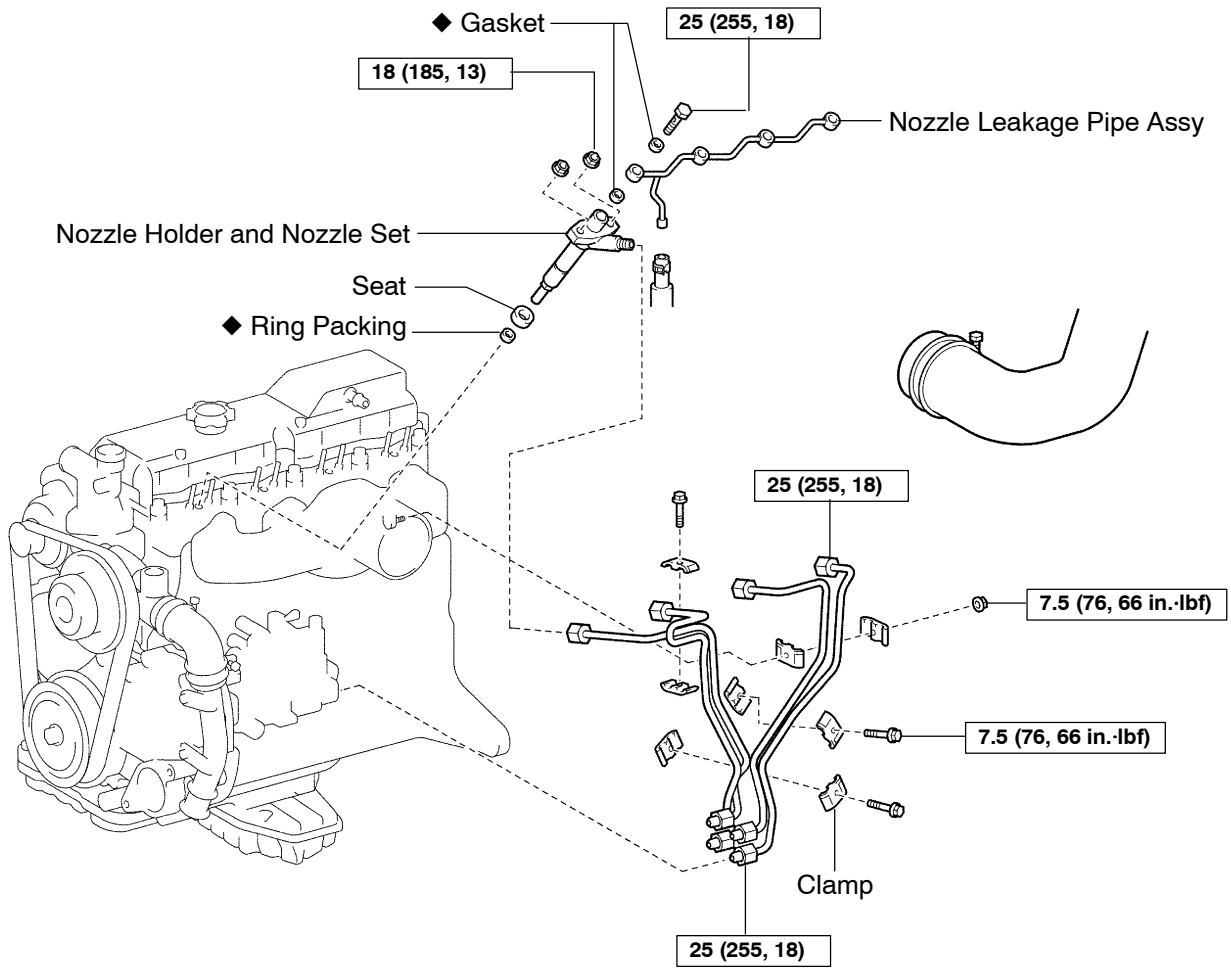
- (a) Move the priming pump up and down which is placed in the upper part of the fuel filter assembly and fill the fuel in the fuel system.

8. INSPECT FOR FUEL LEAKS

- (a) Start the engine and check that there is no leakage in the fuel system.

NOZZLE HOLDER AND NOZZLE SET (14B) COMPONENTS

110QA-01



N·m (kgf·cm, ft·lbf) : Specified torque

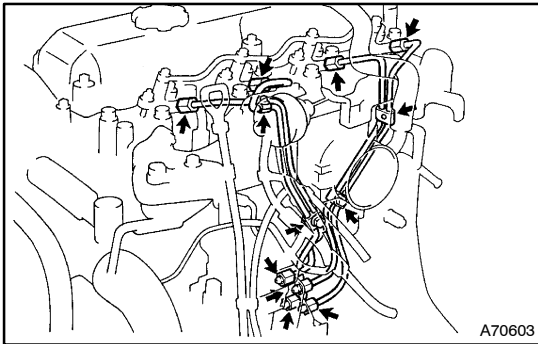
◆ Non-reusable part

P

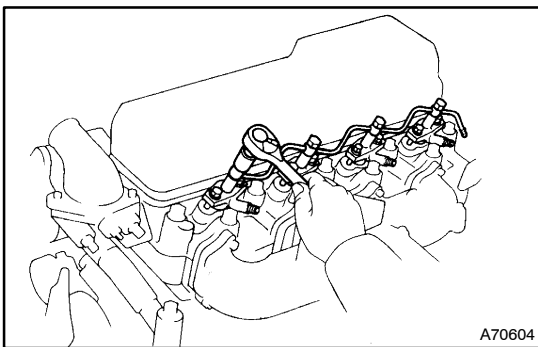
A68355

REPLACEMENT

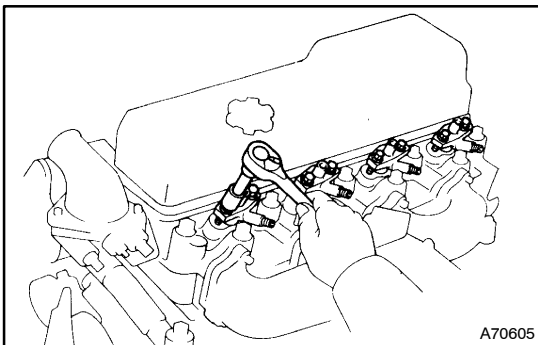
1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL



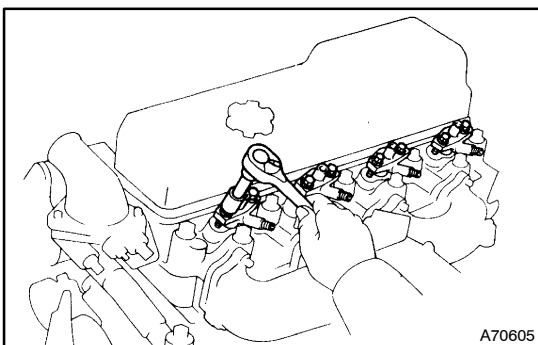
3. REMOVE INJECTION PIPE SET
 - (a) Loosen the union nuts of the 4 injection pipes.
SST 09023-12700
 - (b) Remove the 3 bolts, nut, 4 injection pipes and clamps.



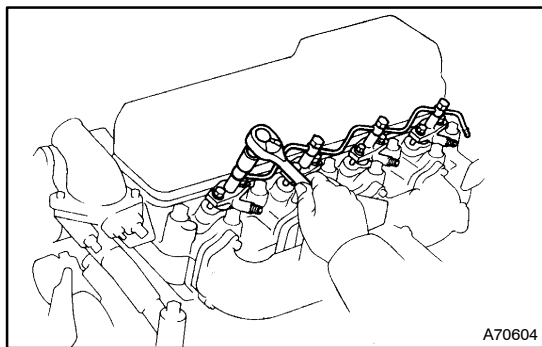
4. REMOVE NOZZLE LEAKAGE PIPE ASSY
 - (a) Disconnect the fuel hose from the leakage pipe.
 - (b) Remove the 4 hollow bolts, leakage pipe and 8 gaskets.



5. REMOVE NOZZLE HOLDER AND NOZZLE SET
 - (a) Remove the 2 nuts, nozzle, ring packing and seat.
 - (b) Remove the 2 nuts and nozzle holder.

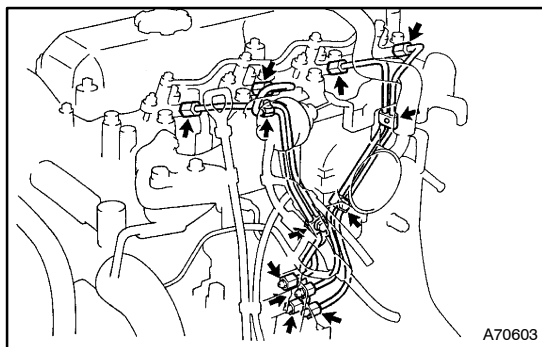


6. INSTALL NOZZLE HOLDER AND NOZZLE SET
 - (a) Install a new nozzle sheet gasket and ring packing to the cylinder head.
 - (b) Install the nozzle holder with the 2 nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

**7. INSTALL NOZZLE LEAKAGE PIPE ASSY**

- (a) Install a new washer and nozzle leakage pipe to the cylinder head.

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

**8. INSTALL INJECTION PIPE SET**

- (a) Temporarily install a flare nut respectively on the nozzle side and pump side.

- (b) Install the injection pipe clamp to the injection pipe.

Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)

- (c) Tighten the flare nuts completely.

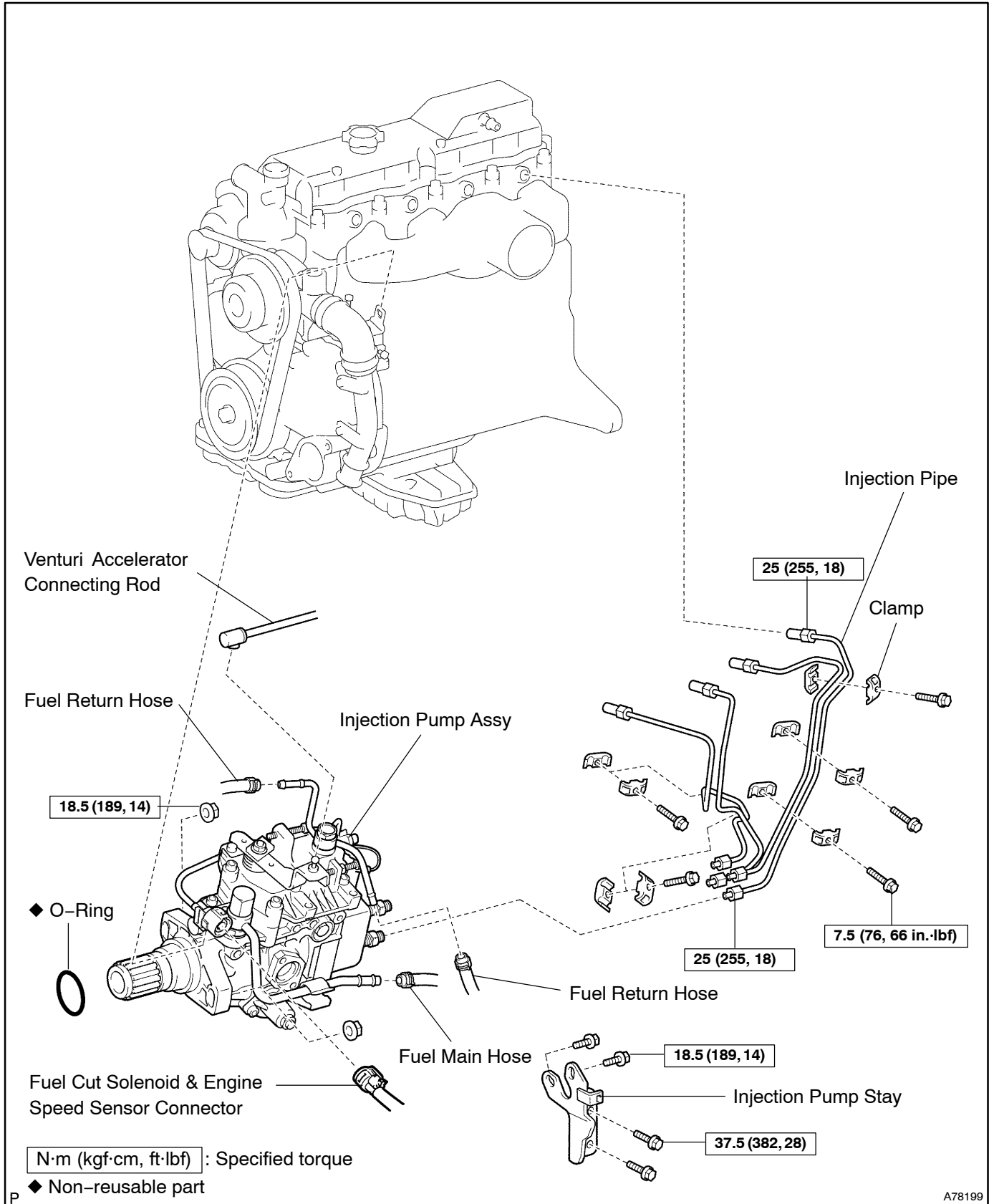
SST 09023-12700

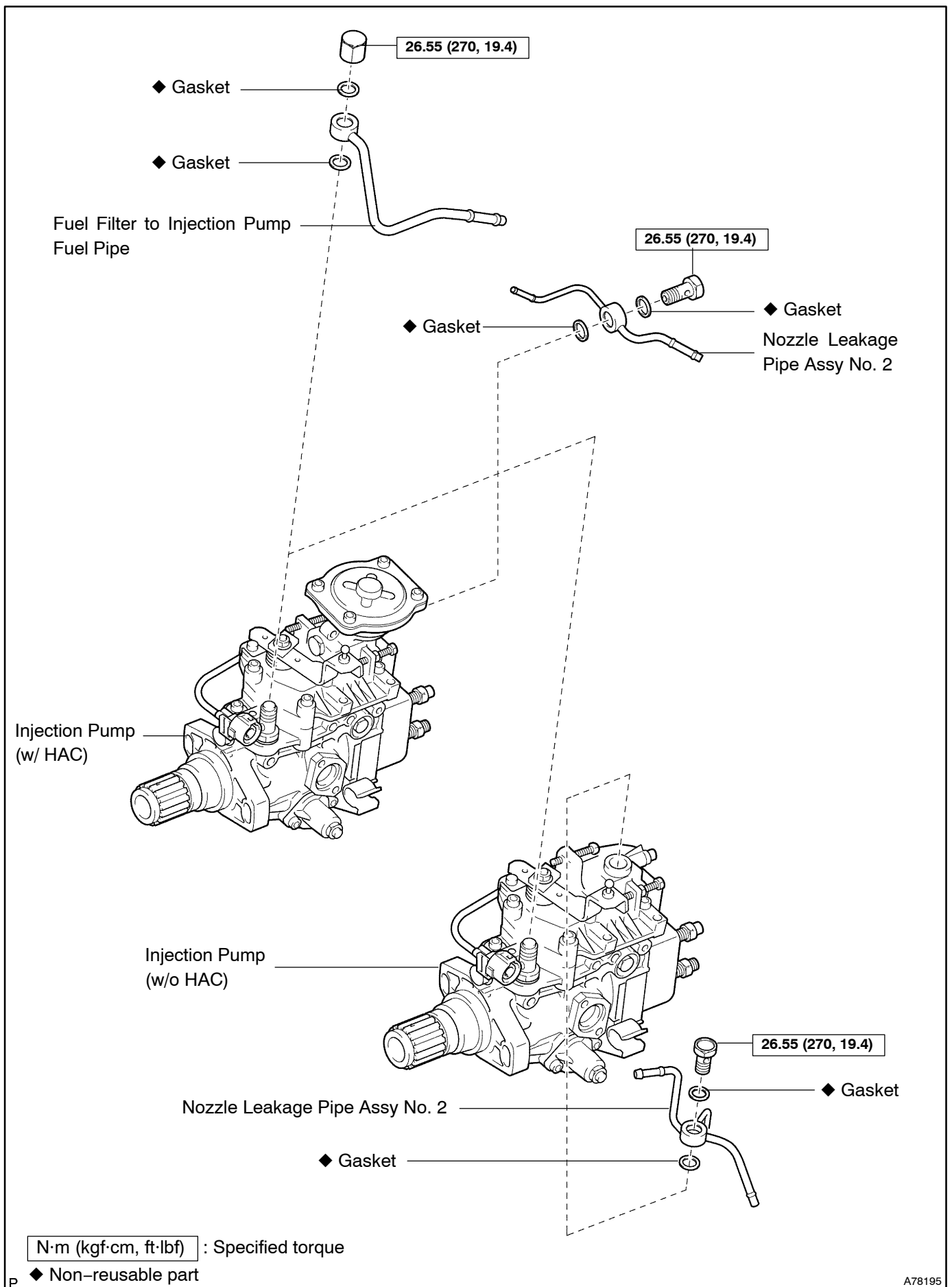
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

9. ADD FUEL**10. BLEED FUEL (See page 11-4)****11. CONNECT BATTERY NEGATIVE TERMINAL****12. INSPECT FOR FUEL LEAKS**

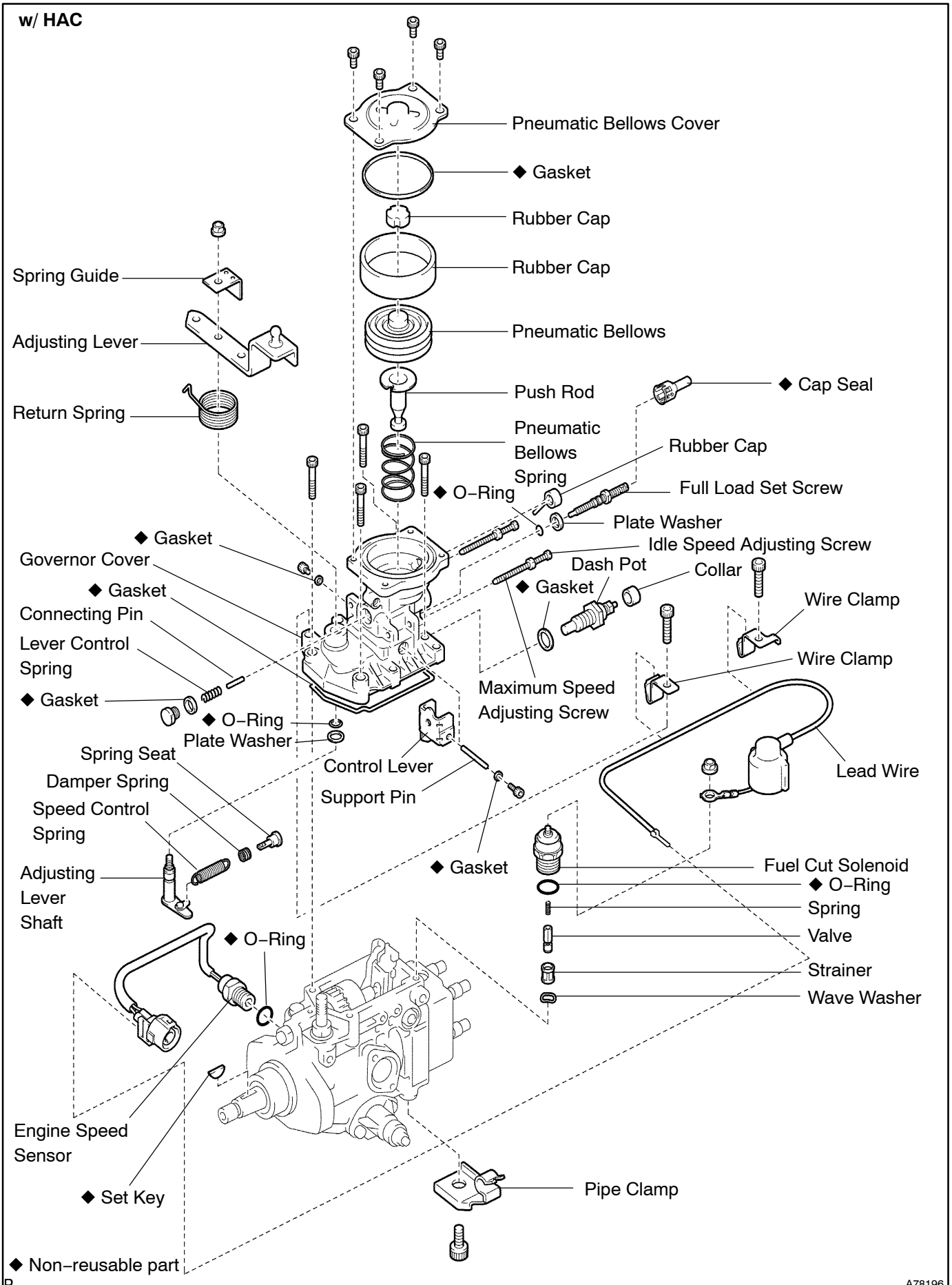
INJECTION PUMP ASSY (14B) COMPONENTS

110PT-01

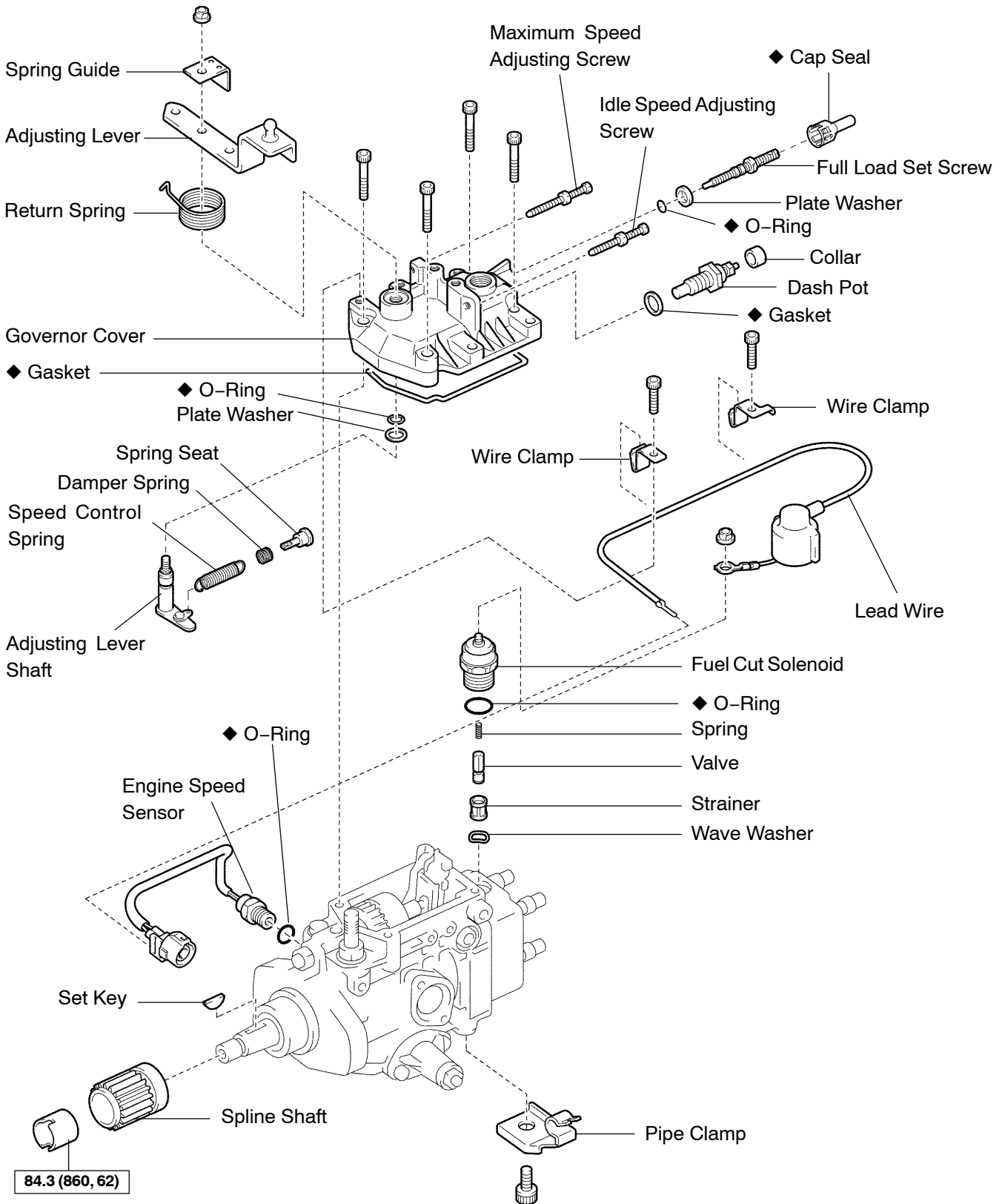




FUEL - INJECTION PUMP ASSY (14B)



w/o HAC

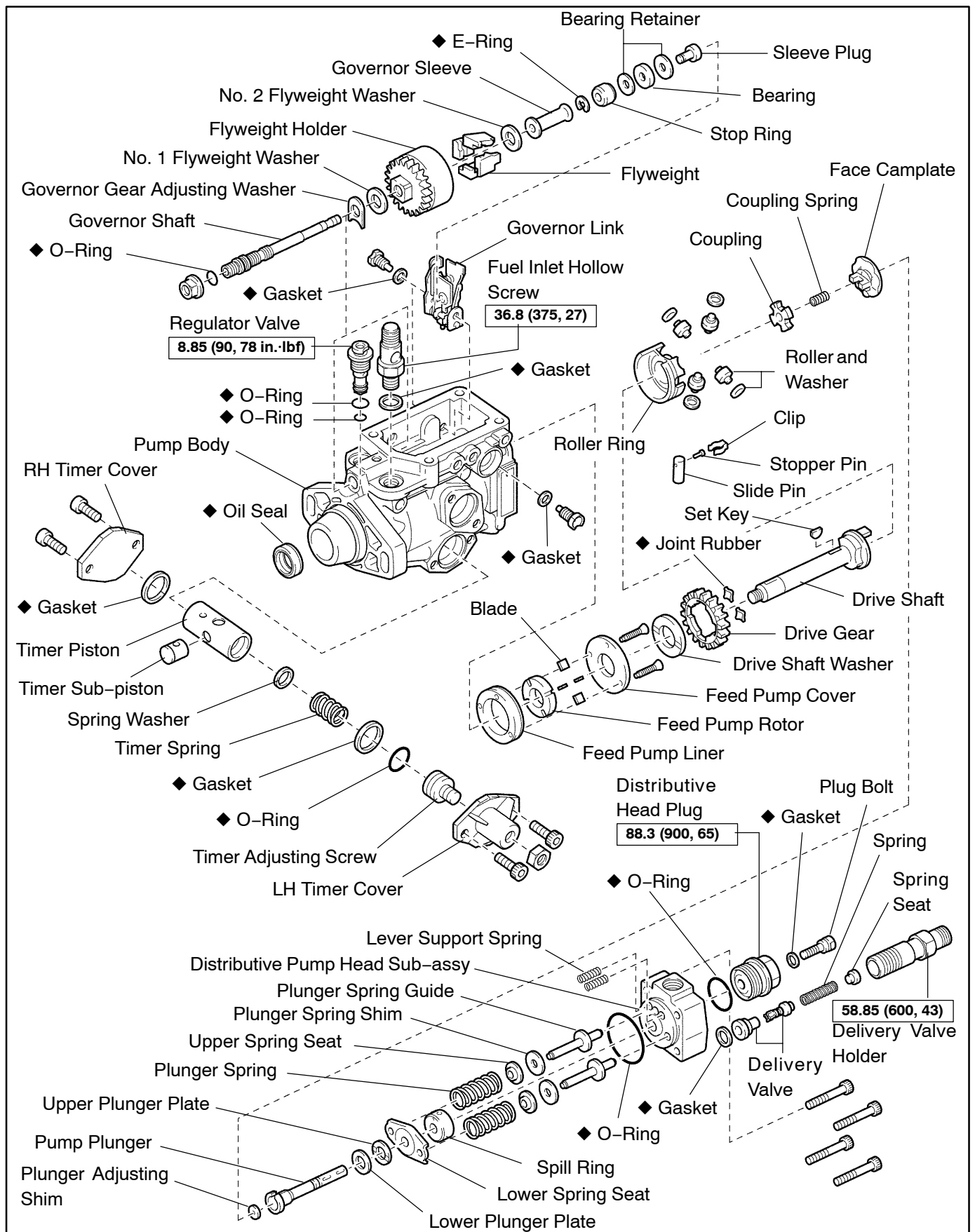


84.3 (860, 62)

N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

FUEL - INJECTION PUMP ASSY (14B)

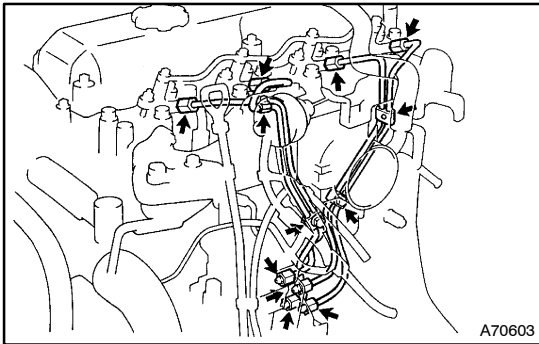


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

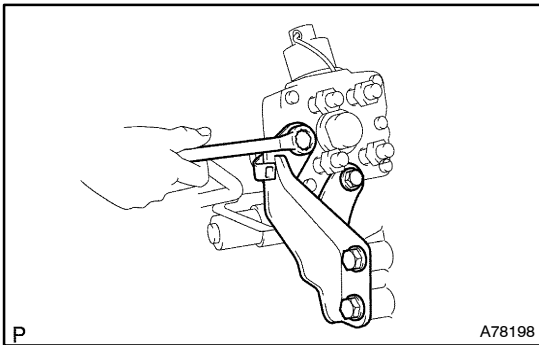
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DISCONNECT VENTURI ACCELERATOR CONNECTING ROD

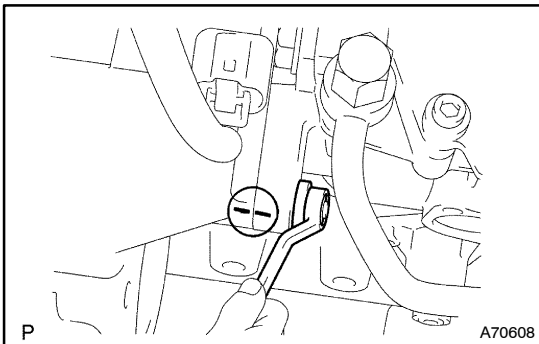


3. REMOVE FUEL PIPE SET
 - (a) Loosen the union nuts of the 4 injection pipes.
SST 09023-12700
 - (b) Remove the 3 bolts, nut, 4 injection pipes and clamps.

4. DISCONNECT FUEL MAIN HOSE
5. DISCONNECT FUEL RETURN HOSE
6. DISCONNECT FUEL CUT SOLENOID & ENGINE SPEED SENSOR CONNECTOR

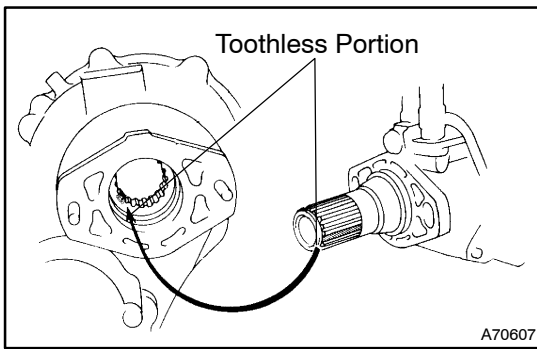


7. REMOVE INJECTION PUMP ASSY
 - (a) Remove the 4 bolts and injection pump stay.

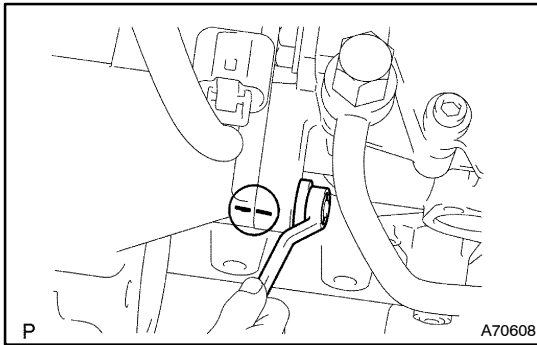


- (b) Before removing the injection pump, check if the matchmarks are aligned. If not, place new matchmarks for reinstallation.
- (c) Remove the 2 nuts and injection pump.

8. REMOVE FUEL FILTER TO INJECTION PUMP FUEL PIPE
9. REMOVE NOZZLE LEAKAGE PIPE ASSY NO.2
10. INSTALL NOZZLE LEAKAGE PIPE ASSY NO.2
Torque: 26.55 N·m (260 kgf·cm, 19 ft·lbf)
11. INSTALL FUEL FILTER TO INJECTION PUMP FUEL PIPE
Torque: 26.55 N·m (260 kgf·cm, 19 ft·lbf)

**12. INSTALL INJECTION PUMP ASSY**

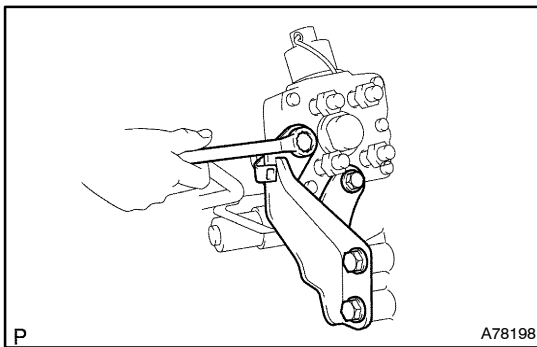
- (a) Install a new O-ring to the pump.
- (b) Apply a light coat of engine oil on the O-ring.
- (c) Align the spline toothless portions of the injection pump and injection pump drive gear, and install the injection pump.



- (d) Align the matchmarks of the injection pump flange and timing gear case.

- (e) Install the injection pump with the 2 nuts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

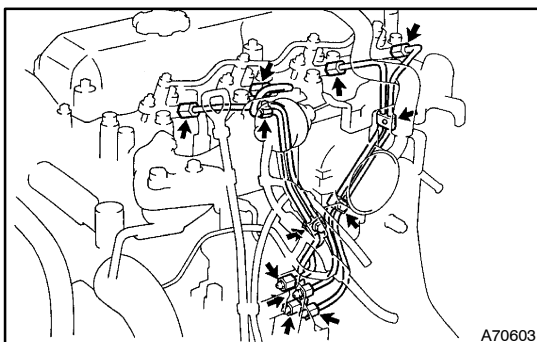


- (f) Install the injection pump stay with the 4 bolts.

Torque:

18.5 N·m (189 kgf·cm, 14 ft·lbf) for 12 mm head bolt

37.5 N·m (382 kgf·cm, 28 ft·lbf) for 14 mm head bolt

13. CONNECT FUEL CUT SOLENOID & ENGINE SPEED SENSOR CONNECTOR**14. CONNECT FUEL RETURN HOSE****15. CONNECT FUEL MAIN HOSE****16. INSTALL FUEL PIPE SET**

- (a) Temporarily install a flare nut respectively on the nozzle side and pump side.

- (b) Install the injection pipe clamp to the injection pipe.

Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)

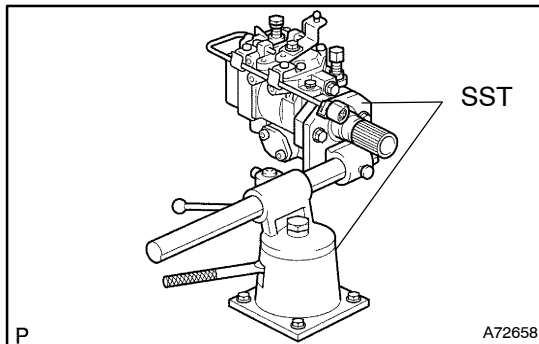
- (c) Tighten the flare nuts completely.

SST 09023-12700

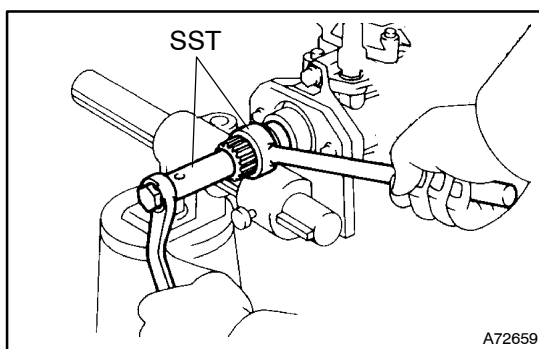
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

17. CONNECT VENTURI ACCELERATOR CONNECTING ROD**18. CONNECT BATTERY NEGATIVE TERMINAL****19. BLEED FUEL****20. ADJUST INJECTION TIMING****21. INSPECT FOR FUEL LEAKS**

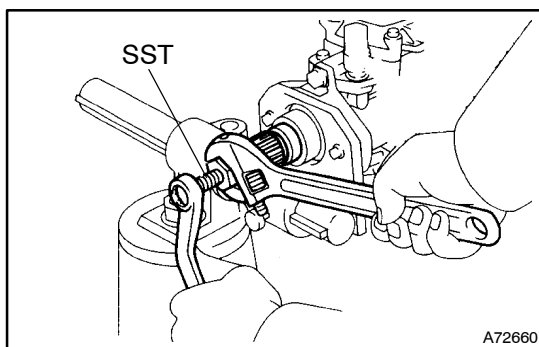
OVERHAUL



1. **SUPPORT INJECTION PUMP ASSY TO SST (STAND)**
SST 09241-76022, 09245-54010

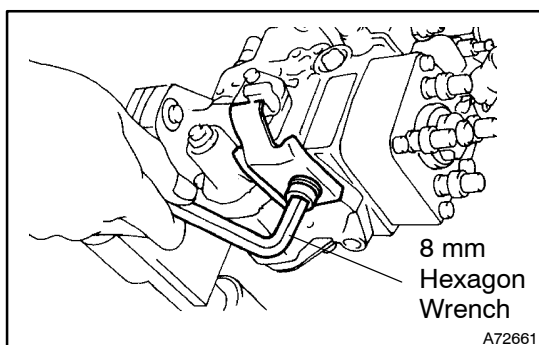


2. **REMOVE SPLINE SHAFT**
 - (a) Using SST, remove the round nut.
SST 09260-58010 (09266-76011, 09278-46020)

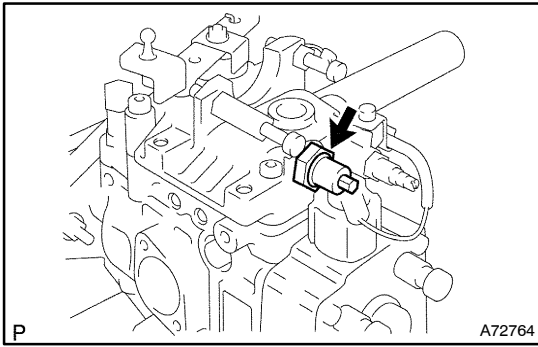


- (b) Using SST, remove the spline shaft.
SST 09260-58010 (09267-76011)

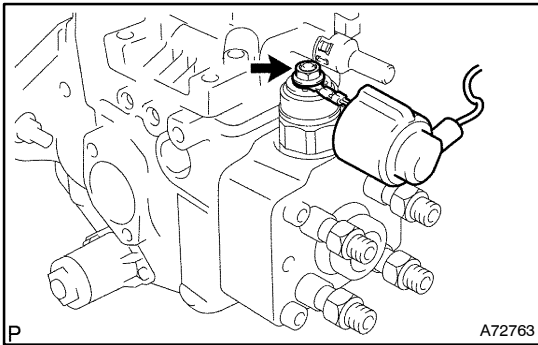
3. **REMOVE DRIVE SHAFT KEY FOR SPLINE SHAFT**



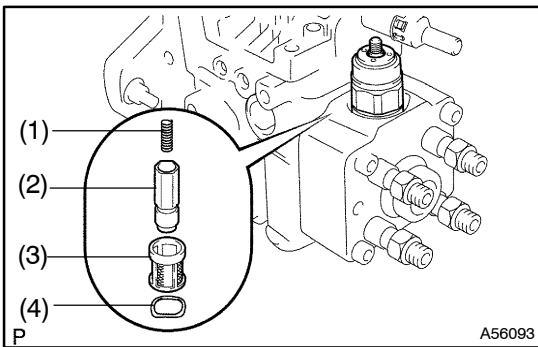
4. **REMOVE FUEL PIPE CLAMP**
 - (a) Using an 8 mm hexagon wrench, remove the bolt, plate washer and clamp.

**5. REMOVE DASH POT**

- (a) Remove the dash pot and gasket.

**6. REMOVE FUEL CUT SOLENOID ASSY**

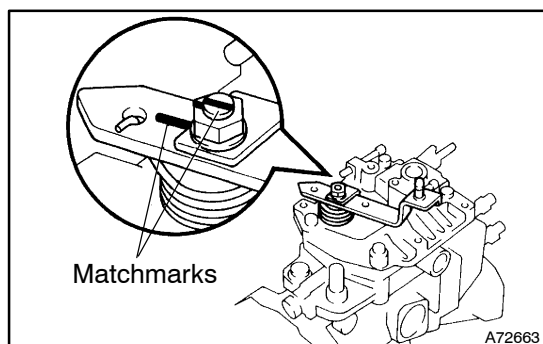
- (a) Disconnect the lead wires from the 2 wire clamps on the governor cover.
 (b) Disconnect the lead wire of the engine speed sensor from the connector.
 (c) Disconnect the dust cover from the fuel cut solenoid.
 (d) Remove the nut and lead wire.



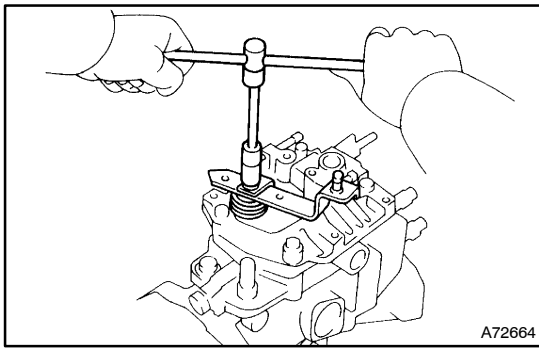
- (e) Remove the fuel cut solenoid, O-ring, spring (1), valve (2), strainer (3) and wave washer (4).

7. REMOVE ENGINE SPEED SENSOR

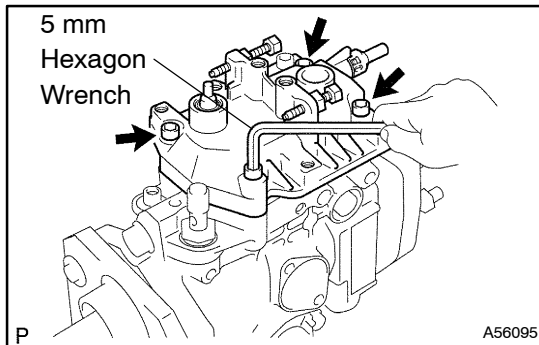
- (a) Remove the engine speed sensor and O-ring.

**8. REMOVE ADJUSTING LEVER SUB-ASSY**

- (a) Place the matchmarks on the adjusting lever and shaft.

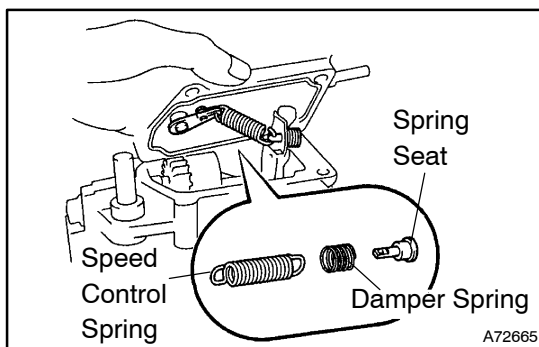


- (b) Remove the nut, spring guide, adjusting lever and return spring.

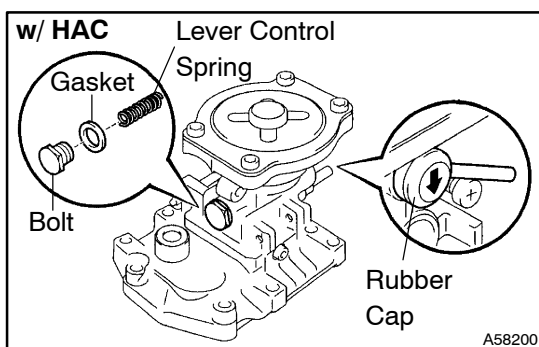


9. REMOVE GOVERNOR COVER SUB-ASSY

- (a) w/ HAC:
Remove the idle speed adjusting screw.
- (b) Using a 5 mm hexagon wrench, remove the 4 bolts.

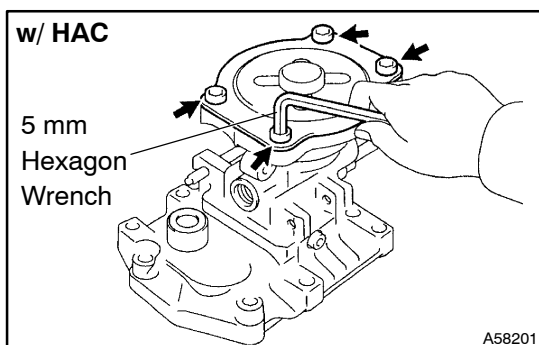


- (c) Disconnect the adjusting lever shaft from the governor cover, and remove the governor cover and gasket.
- (d) Remove the adjusting lever shaft, speed control spring, spring seat and damper spring from the governor link.
- (e) Remove the O-ring and plate washer from the adjusting lever shaft.

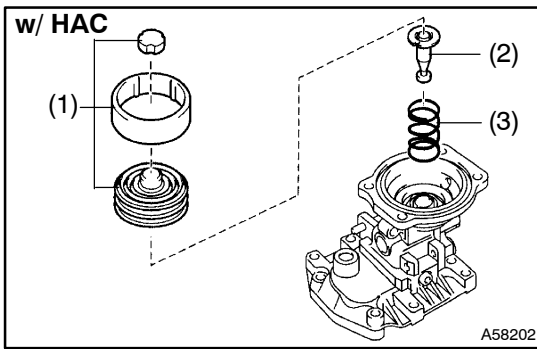


**10. w/ HAC:
DISASSEMBLE HIGH ALTITUDE COMPENSATOR**

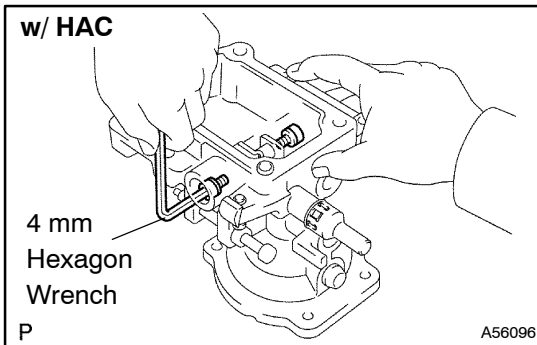
- (a) Remove the bolt, gasket and lever control spring.
- (b) Remove the rubber cap.



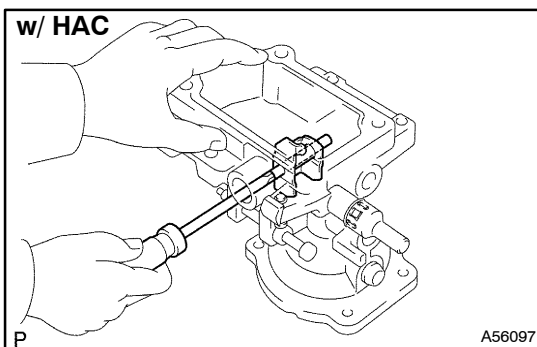
- (c) Remove the pneumatic bellows.
- (1) Using a 5 mm hexagon wrench, remove the 4 bolts, pneumatic bellows cover and gasket.



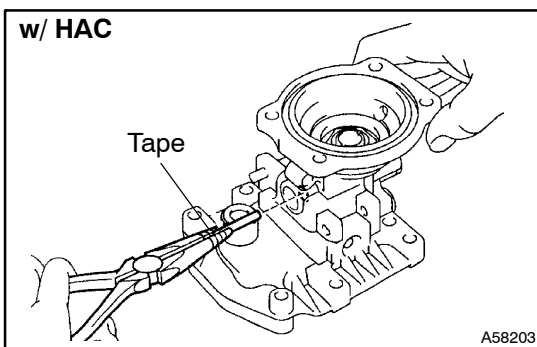
- (2) Remove the pneumatic bellows and 2 rubber caps (1), push rod (2) and pneumatic bellows spring (3).



- (d) Remove the control lever.
 (1) Using a 4 mm hexagon wrench, remove the 2 bolts and gaskets.



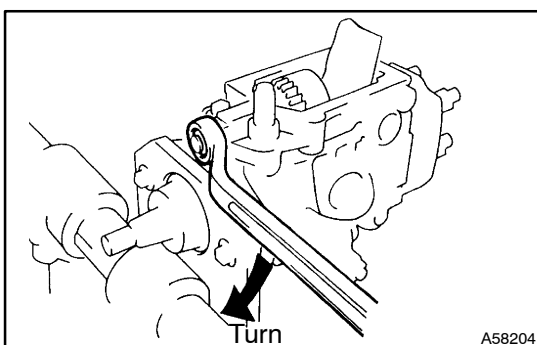
- (2) Using a small screwdriver, push out the support pin and remove the control lever.



- (3) Using needle nose pliers, remove the connecting pin.

NOTICE:

Be careful not to damage the connecting pin. Tape the tip of the pliers.

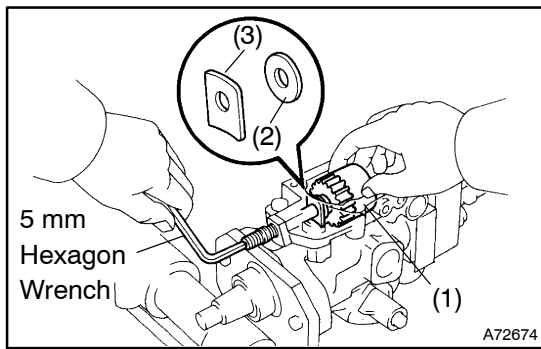


11. REMOVE GOVERNOR SHAFT AND FLYWEIGHT HOLDER

- (a) Check the flyweight holder thrust clearance (See step 47).
 (b) Remove the governor shaft lock nut by turning it clockwise.

NOTICE:

The governor shaft and lock nut have LH threads.

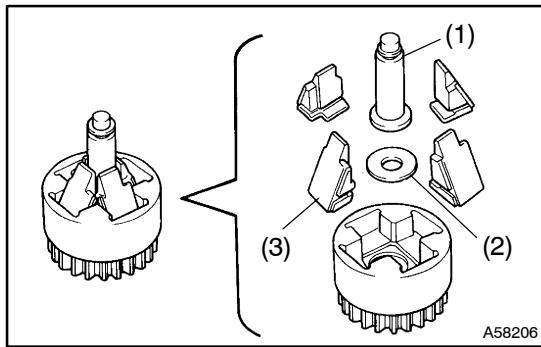


- (c) Using a 5 mm hexagon wrench, remove the governor shaft by turning it clockwise, and remove the flyweight holder assembly (1), No. 1 flyweight washer (2) and governor gear adjusting washer (3).

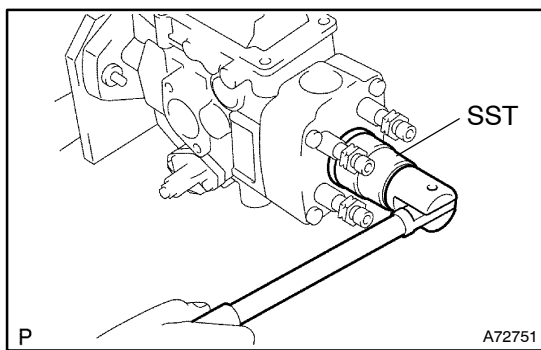
NOTICE:

Be careful not to drop the 2 washers into the pump housing.

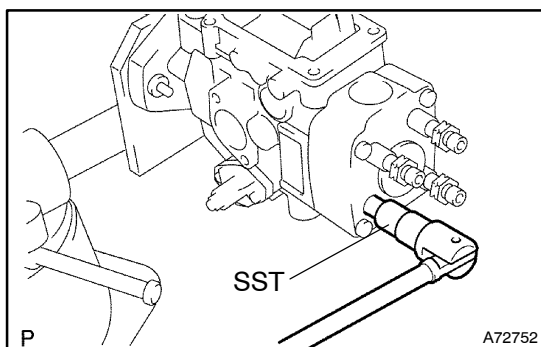
- (d) Remove the O-ring from the governor shaft.



- (e) Remove the governor sleeve (1), No. 2 flyweight washer (2) and 4 flyweights (3) from the flyweight holder.

**12. REMOVE DISTRIBUTIVE HEAD PLUG**

- (a) Using SST, remove the distributive head plug and O-ring.
SST 09260-54012 (09262-54010)

**13. REMOVE INJECTION PUMP DELIVERY VALVE SUB-ASSY**

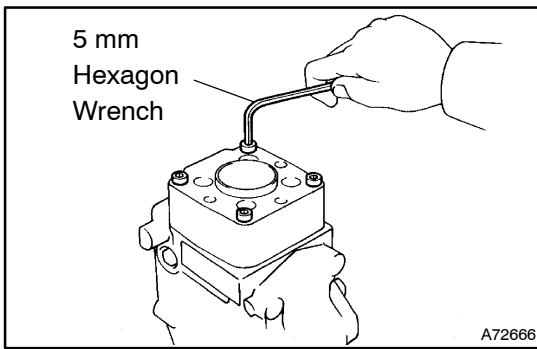
- (a) Using SST, remove the 4 delivery valve holders, springs and spring seats.
SST 09260-54012 (09269-54020)
- (b) Remove the 4 delivery valves and gaskets.

NOTICE:

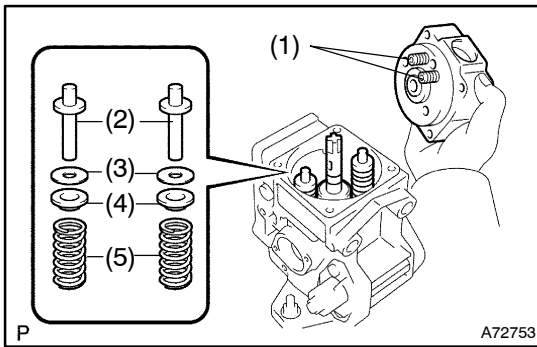
Do not touch the sliding surfaces of the delivery valve by hand.

HINT:

Arrange the delivery valves, springs, spring seats and holders in order.

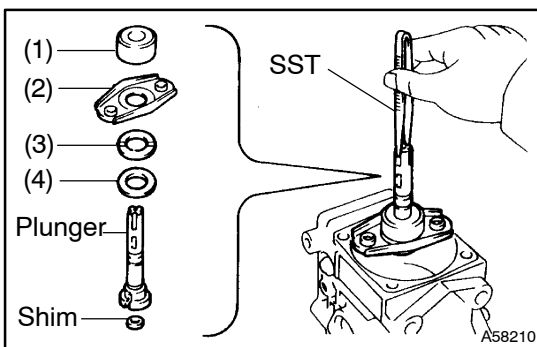
**14. REMOVE DISTRIBUTIVE PUMP HEAD SUB-ASSY**

- (a) Using a 5 mm hexagon wrench, remove the 4 bolts.



- (b) Remove the distributive head and 2 lever support springs (1), 2 plunger spring guides (2), 2 plunger spring shims (3), 2 upper spring seats (4) and 2 plunger springs (5).

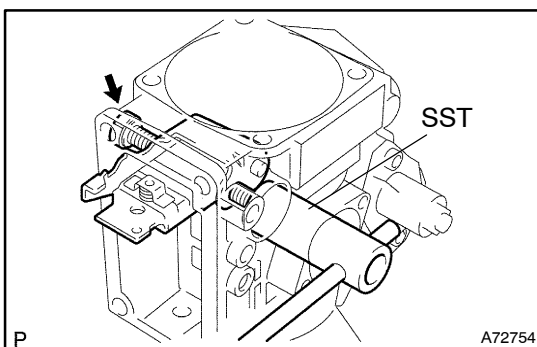
- (c) Remove the O-ring from the distributive head.

**15. REMOVE PUMP PLUNGER**

- (a) Using SST, remove the pump plunger, plunger adjusting shim together with the spill ring (1), lower spring seat (2), upper plunger plate (3) and lower plunger plate (4).
SST 09260-54012 (09269-54030)

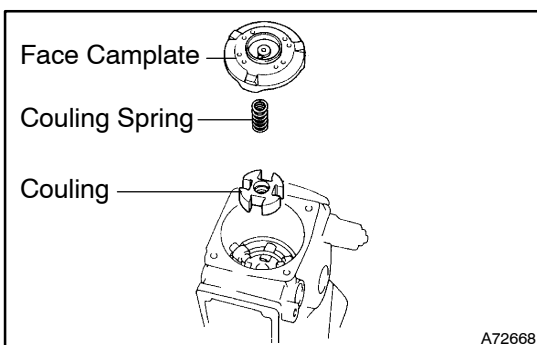
NOTICE:

Do not touch the sliding surfaces of the pump plunger by hand.

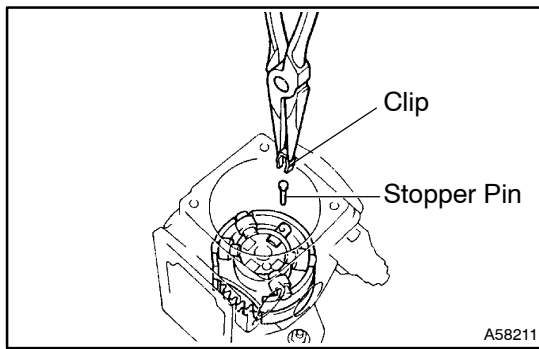
**16. REMOVE GOVERNOR LINK**

- (a) Using SST, remove the 2 support bolts, 2 gaskets and governor link.

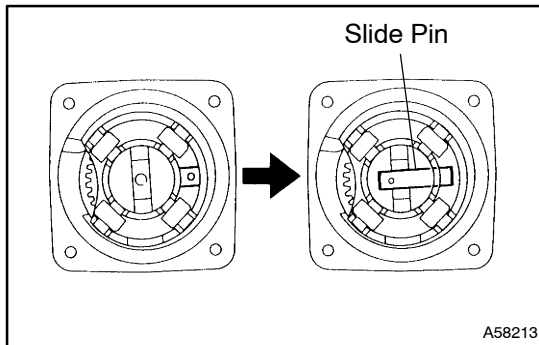
SST 09260-54012 (09269-54040)

**17. REMOVE FACE CAMPLATE SUB-ASSY**

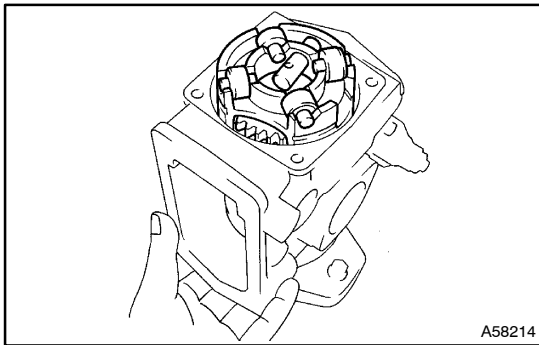
- (a) Remove the face camplate, coupling spring and coupling.

**18. REMOVE ROLLER RING AND DRIVE SHAFT**

- (a) Remove the clip and stopper pin.



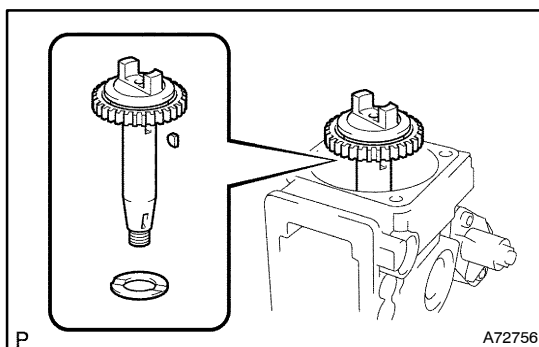
- (b) Push the slide pin toward inside.



- (c) Push the drive shaft, and remove the roller ring, 4 rollers and washers assembly.

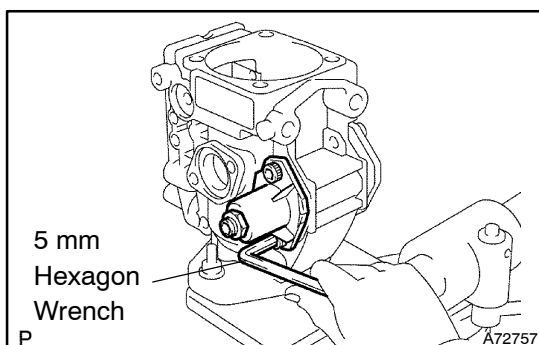
NOTICE:

- **Be careful not to drop the rollers.**
- **Do not alter the positions or assembly of the rollers.**

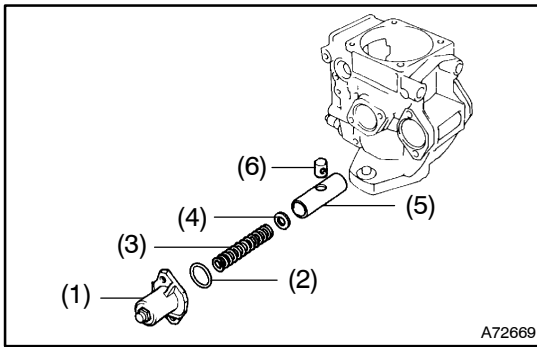


- (d) Remove the drive shaft, governor drive gear, 2 joint rubbers assembly, set key and drive shaft washer.

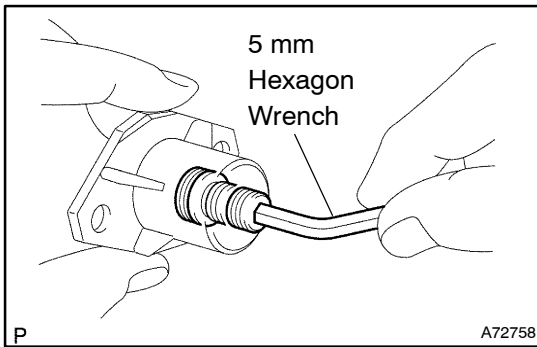
- (e) Remove the drive gear and 2 joint rubbers from the drive shaft.

**19. REMOVE TIMER PISTON ASSY**

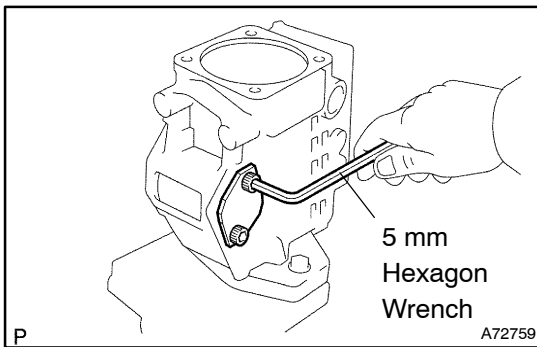
- (a) Using a 5 mm hexagon wrench, remove the 2 LH timer cover bolts.



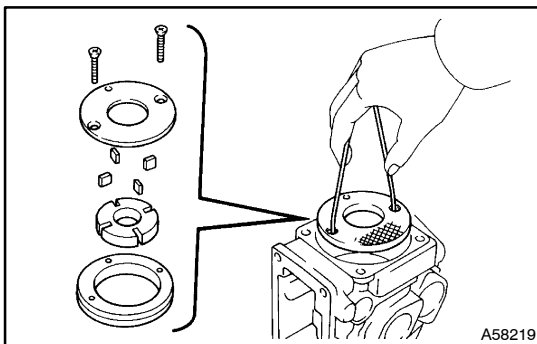
- (b) Remove the LH timer cover, timer adjusting screw, nut assembly (1), gasket (2), timer spring (3), spring washer (4), timer piston (5) and timer sub-piston (6).



- (c) Remove the nut from the LH timer cover.
 (d) Using a 5 mm hexagon wrench, remove the timer adjusting screw.
 (e) Remove the O-ring from the timer adjusting ring.



- (f) Using a 5 mm hexagon wrench, remove the 2 bolts, RH timer cover and gasket.

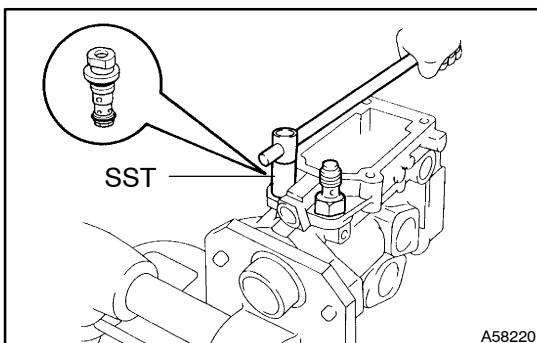


20. REMOVE FUEL FEED PUMP SUB-ASSY

- (a) Remove the 2 screws.
 (b) Using a piece of wire, remove the feed pump cover.
 (c) Remove the feed pump rotor, 4 blades and liner.

NOTICE:

- Be careful not to interchange the blade positions.
- Be careful not to damage the pump body.

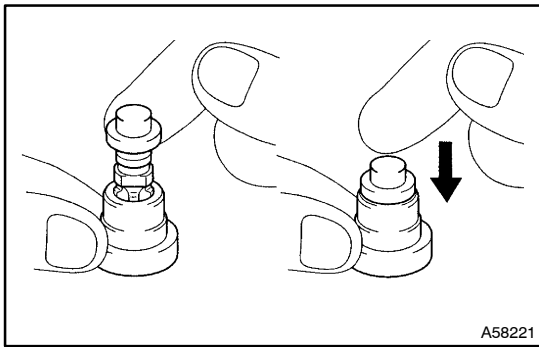


21. REMOVE REGULATOR VALVE SUB-ASSY

- (a) Using SST, remove the regulator valve and 2 O-rings.
 SST 09260-54012 (09262-54020)

22. REMOVE FUEL INLET HOLLOW SCREW

- (a) Remove the hollow screw and gasket.



23. INSPECT INJECTION PUMP DELIVERY VALVE SUB-ASSY

NOTICE:

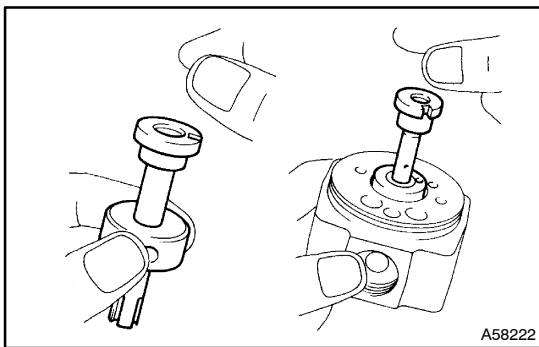
Do not touch the sliding surfaces of the pump plunger and delivery valves.

- (a) Pull up the valve and release it. Check that the valve smoothly falls into the valve seat.

If operation is not as specified, replace the valve as a set.

HINT:

Before using a new valve set, wash off the rust prevention compound with light oil or gasoline. Then wash the new valve set again with diesel fuel and perform the above check.



24. INSPECT PUMP PLUNGER AND SPILL RING

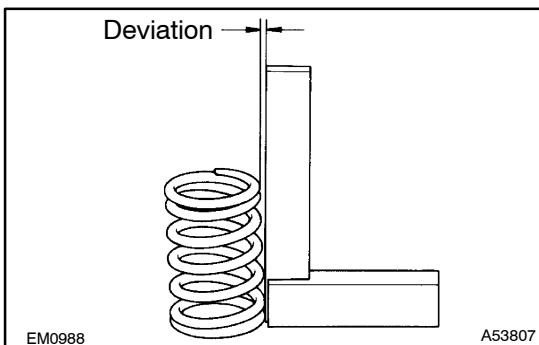
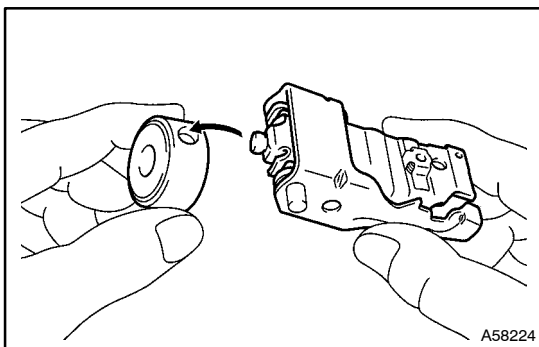
- (a) Tilt the spill ring (distributive head) slightly, and pull out the plunger.
- (b) Check that the plunger smoothly falls into the spill ring (distributive head) by its own weight when released.
- (c) Rotate the plunger, and repeat the test at various positions.

If the plunger is stuck at any position, replace the parts as a set.

NOTICE:

Do not touch the sliding surface of the pump plunger.

- (d) Insert the governor link ball pin into the spill ring, and check that it moves smoothly without any play.

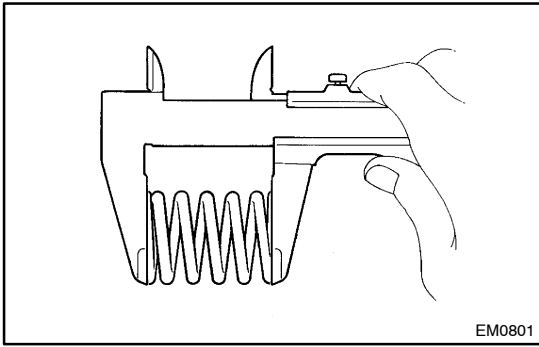


25. INSPECT SPRING

- (a) Using a steel square, check the deviation of the plunger springs.

Maximum deviation: 2.0 mm (0.079 in.)

If the deviation is greater than the maximum, replace both springs.

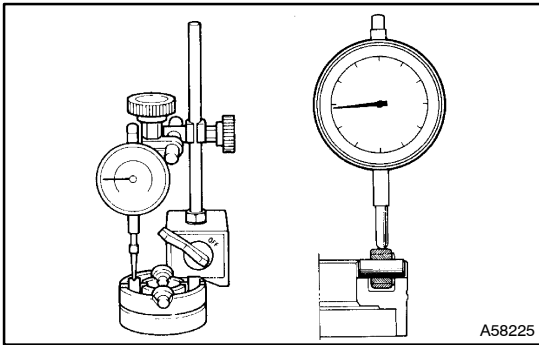


- (b) Using vernier calipers, measure the free length of each spring.

Spring free length:

Delivery valve spring	19.4 mm (0.764 in.)
Plunger spring	32.4 mm (1.276 in.)
Coupling spring	15.4 mm (0.606 in.)
Pneumatic bellows spring (w/ HAC)	30.0 mm (1.181 in.)

If the free length is not as specified, replace the spring.

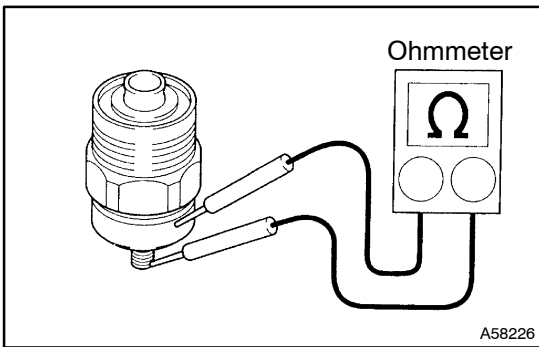


26. INSPECT ROLLER RING AND ROLLER

- (a) Using a dial indicator, measure the roller height.

Maximum roller height variation: 0.02 mm (0.0008 in.)

If the variation is greater than the maximum, replace the roller ring and roller as a set.

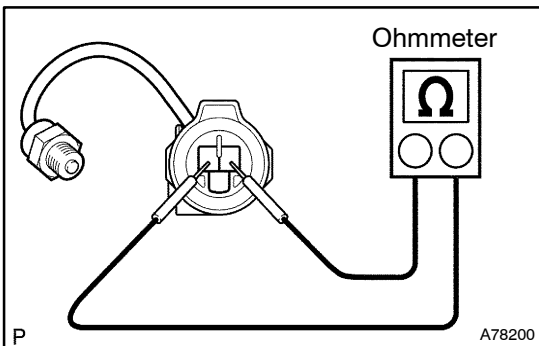


27. INSPECT FUEL CUT SOLENOID ASSY

- (a) Using an ohmmeter, measure the resistance between the terminal and solenoid body.

Resistance: 9.5 – 11.9 Ω at 20°C (68°F)

If the resistance is not as specified, replace the solenoid.

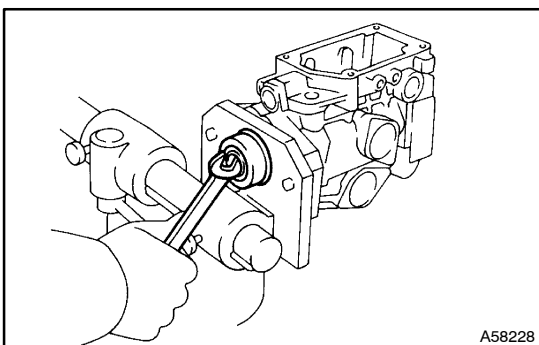


28. INSPECT ENGINE SPEED SENSOR

- (a) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 650 – 970 Ω at 20°C (68°F)

If the resistance is not as specified, replace the sensor.

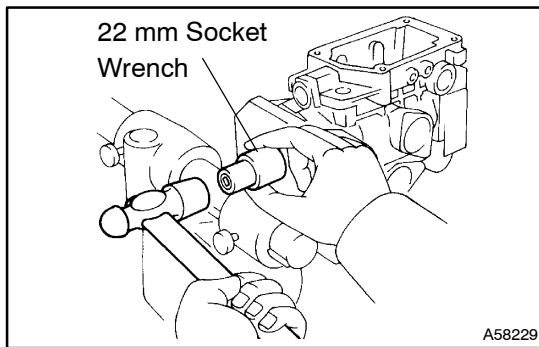


29. REMOVE OIL SEAL

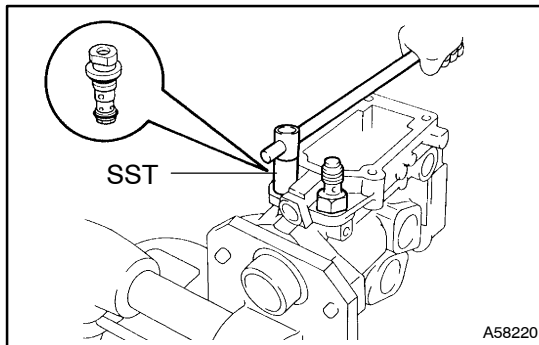
- (a) Using a wrench, pry out the oil seal.

NOTICE:

Be careful not to damage the pump body.

**30. INSTALL OIL SEAL**

- (a) Apply MP grease to the lip of a new oil seal.
- (b) Using a 22 mm socket wrench, tap in the oil seal until its surface is flush with the pump body.

**31. INSTALL FUEL INLET HOLLOW SCREW**

- (a) Install a new gasket and the hollow screw.

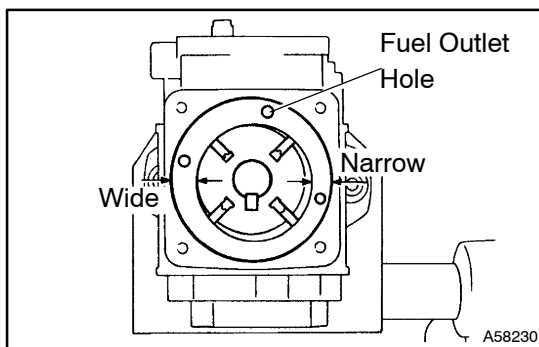
Torque: 36.8 N·m (375 kgf·cm, 27 ft·lbf)

32. INSTALL REGULATOR VALVE SUB-ASSY

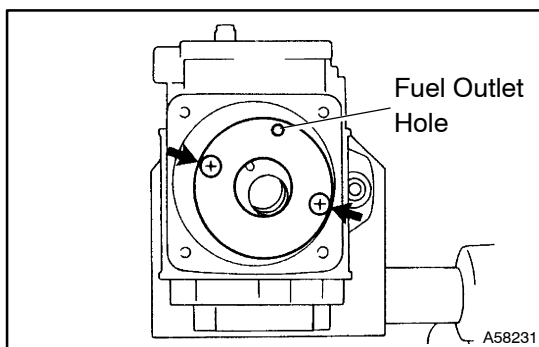
- (a) Install the 2 O-rings to the regulator valve.
- (b) Using SST, install the regulator valve.

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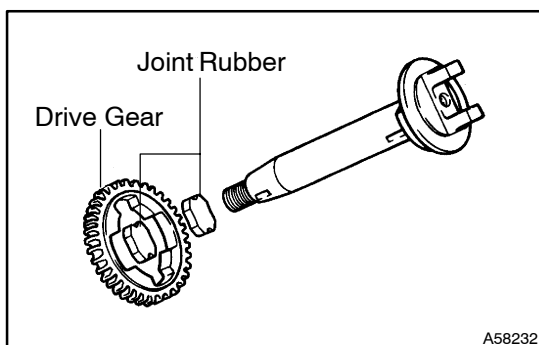
Torque: 8.85 N·m (90 kgf·cm, 78 in·lbf)

**33. INSTALL FUEL FEED PUMP SUB-ASSY**

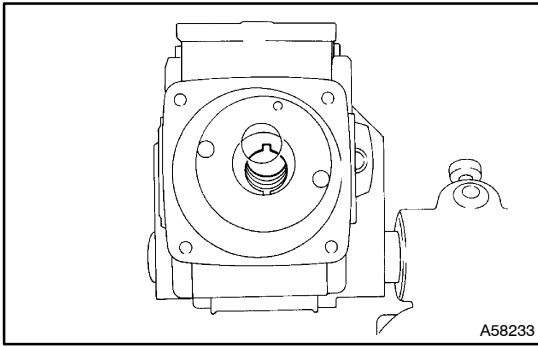
- (a) Install the liner, rotor and 4 blades.
- (b) Check that the liner and blades are facing to the correct direction, as shown in the illustration.
- (c) Check that the blades move smoothly.



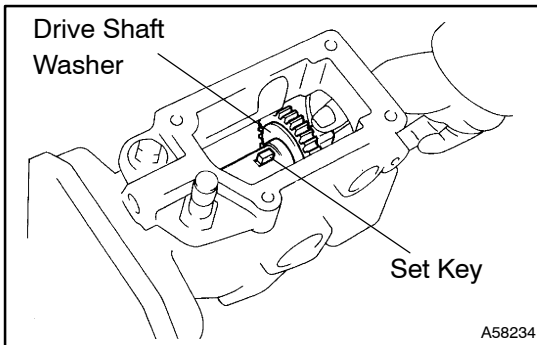
- (d) Align the fuel outlet holes of the cover and liner.
 - (e) Install the pump cover with the 2 screws.
- Torque: 2.95 N·m (30 kgf·cm, 26 in·lbf)**
- (f) Check that the rotor moves smoothly.

**34. INSTALL DRIVE SHAFT SUB-ASSY**

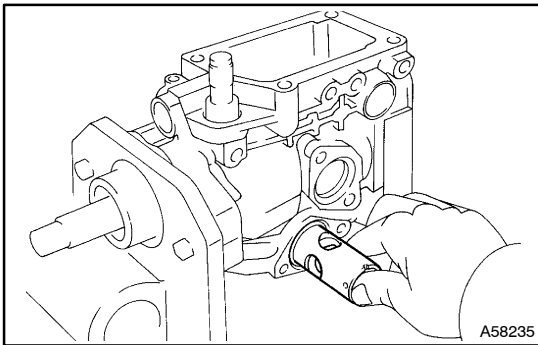
- (a) Install the drive gear on the drive shaft assembly, as shown in the illustration.
- (b) Install 2 new joint rubbers into the drive gear.



- (c) Position the key groove of the feed pump rotor upward.

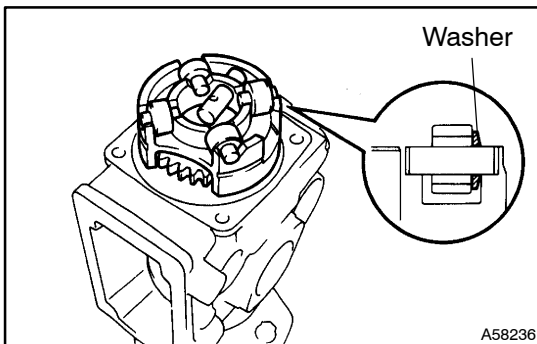


- (d) Install the set key and drive shaft washer on the drive shaft and insert the drive shaft.
 (e) Check that the drive shaft turns without caught.



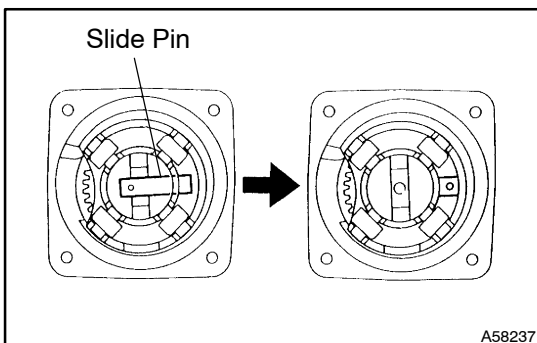
35. INSTALL TIMER PISTON ASSY

- (a) Apply grease to the timer piston.
 (b) Install the sub-piston into the timer piston.
 (c) Insert the timer piston into the pump housing.

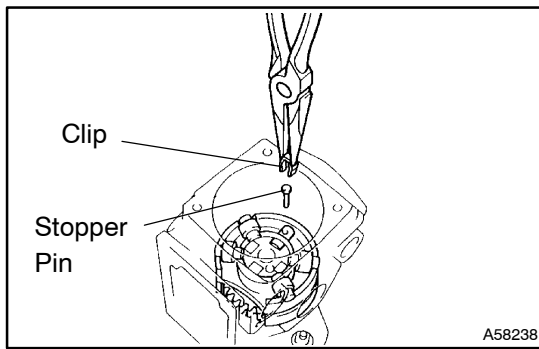


36. INSTALL ROLLER RING SUB-ASSY

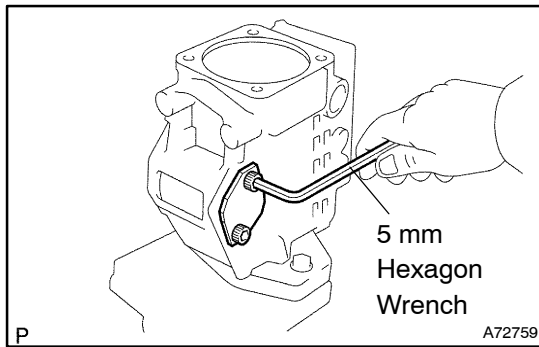
- (a) Turn the drive shaft by approx. 90° clockwise or counter-clockwise.
 (b) Install the slide pin, 4 rollers and washers on the roller ring.
 (c) Check that the roller is facing the flat surface of the washer.
 (d) Install the roller ring into the pump housing.



- (e) Carefully install the slide pin into the sub-piston.



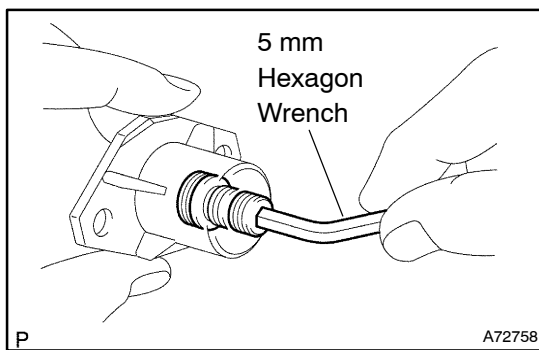
- (f) Install the stopper pin and clip.



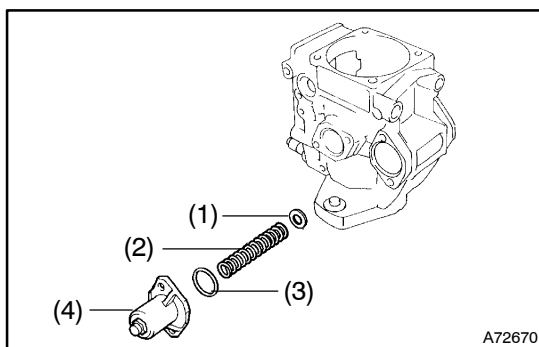
37. INSTALL TIMER SPRING

- (a) Using a 5 mm hexagon wrench, install a new O-ring and the RH timer cover with the 2 bolts.

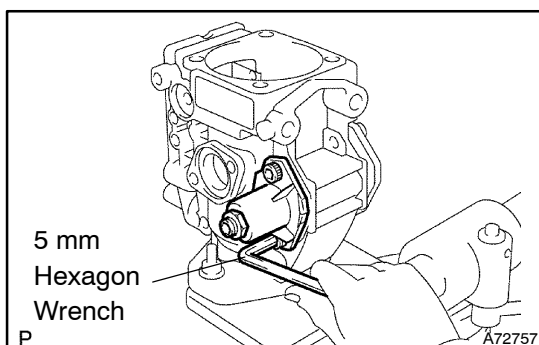
Torque: 8.35 N·m (85 kgf·cm, 74 in·lbf)



- (b) Install a new O-ring to the timer adjusting screw.
- (c) Using a 5 mm hexagon wrench, install the timer adjusting screw to the LH timer cover and temporarily install the nut.

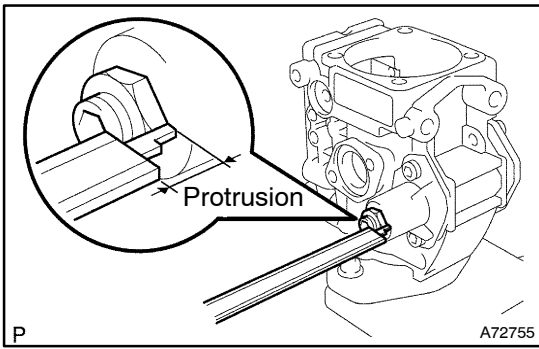


- (d) Install the spring washer (1), timer spring (2), a new gasket (3), the LH timer cover, timer adjusting screw and nut assembly.



- (e) Using a 5 mm hexagon wrench, install the 2 LH timer cover bolts.

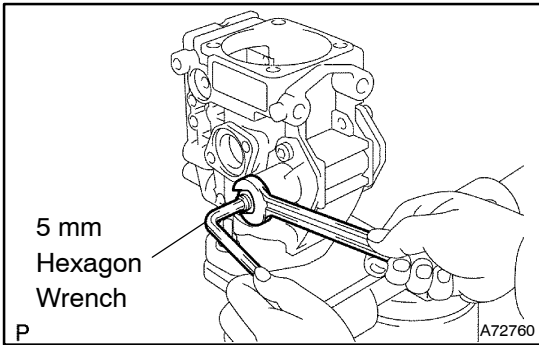
Torque: 8.35 N·m (85 kgf·cm, 74 in·lbf)



38. ADJUST TIMER ADJUSTING SCREW

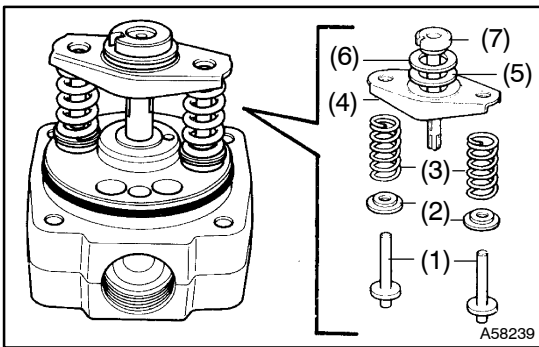
- (a) Using vernier calipers, measure the protrusion of the adjusting screw from the timer cover.

Protrusion: 7.5 – 8.0 mm (0.295 – 0.315 in.)



- (b) Using a 5 mm hexagon wrench, adjust the protrusion of the adjusting screw from the timer cover.

Torque: 14.2 N·m (145 kgf·cm, 10 ft·lbf)

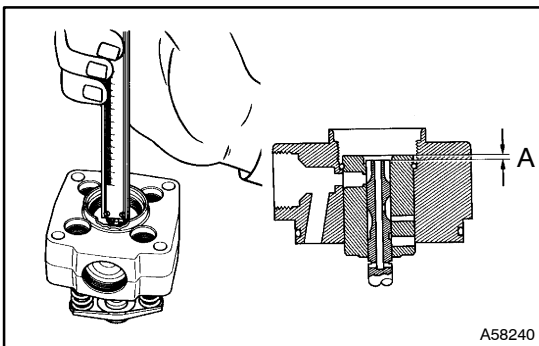


39. ADJUST PLUNGER SPRING SHIM

- (a) Install the 2 plunger spring guides (1), 2 upper spring seats (2), 2 plunger springs (3), lower spring seat (4), upper plunger plate (5), lower plunger plate (6) and pump plunger to the distributive head.

HINT:

Do not assemble the plunger spring shims at this time.



- (b) Using vernier calipers, measure clearance A indicated in the illustration.

- (c) Determine the plunger spring shim size by using these formula and chart.

New plunger spring shim thickness = 5.9 – A

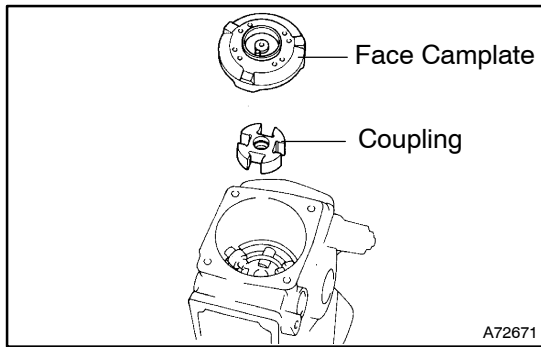
A Measured plunger position

Plunger spring shim selection chart:

Measured clearance	Shim thickness
More than 5.4 mm (0.213 in.)	0.5 mm (0.020 in.)
5.1 – 5.3 mm (0.201 – 0.209 in.)	0.8 mm (0.031 in.)
4.9 – 5.0 mm (0.193 – 0.197 in.)	1.0 mm (0.039 in.)
4.7 – 4.8 mm (0.185 – 0.189 in.)	1.2 mm (0.047 in.)
4.4 – 4.6 mm (0.173 – 0.181 in.)	1.5 mm (0.059 in.)
4.1 – 4.3 mm (0.161 – 0.169 in.)	1.8 mm (0.071 in.)
Less than 4.0 mm (0.157 in.)	2.0 mm (0.079 in.)

HINT:

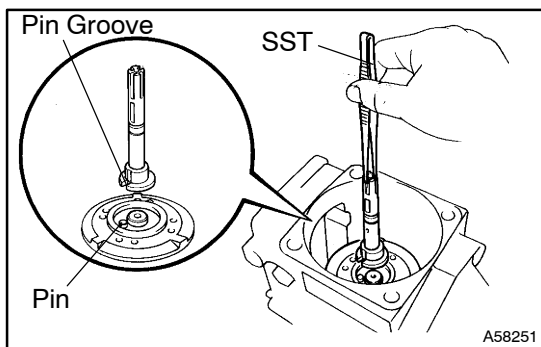
- For an intermediate measurement between the sizes listed, apply the next larger size. For example, if the thickness is 1.6 mm (0.063 in.) by calculation, use a 1.8 mm (0.071 in.) shim.
- Select 2 shims which have the same thickness.

**40. ADJUST PLUNGER SHIM**

- (a) Install the coupling and face camplate.

NOTICE:

Do not assemble the coupling spring.



- (b) Clean the plunger adjusting shim and contacting surface area.
- (c) Align the pin groove of the pump plunger with the face camplate pin.
- (d) Using SST, install the used plunger adjusting shim and pump plunger.

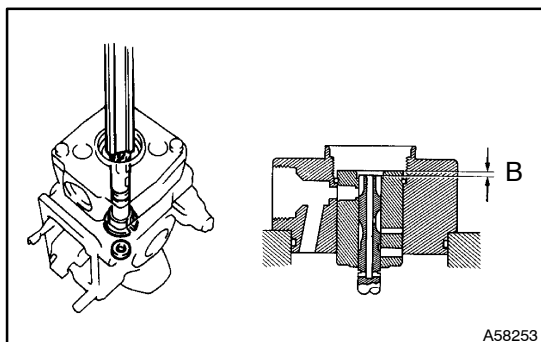
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- (e) Install the distributive head with the 4 bolts.

Torque: 11.75 N·m (120 kgf·cm, 9 ft·lbf)

NOTICE:

Be careful not to damage the pump plunger.



- (f) Using vernier calipers, measure dimension B indicated in the illustration.

- (g) Determine the plunger adjusting shim size by using these formula and chart:

$\text{New adjusting shim thickness} = T + (B - 3.3)$

T ... Thickness of used shim

B ... Measured plunger position

Plunger adjusting shim selection chart:

		Measured clearance																			
		mm																			
		2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.1	3.2	3.2 - 3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4
Installed shim	1.9											2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.9
	2.0									1.9		2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.9	
	2.1								1.9	1.9		2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.9		
	2.2							1.9	1.9	2.0		2.4	2.5	2.6	2.7	2.8	2.9	2.9			
	2.3						1.9	1.9	2.0	2.1		2.5	2.6	2.7	2.8	2.9	2.9				
	2.4					1.9	1.9	2.0	2.1	2.2		2.6	2.7	2.8	2.9	2.9					
	2.5				1.9	1.9	2.0	2.1	2.2	2.3		2.7	2.8	2.9	2.9						
	2.6			1.9	1.9	2.0	2.1	2.2	2.3	2.4		2.8	2.9	2.9							
	2.7		1.9	1.9	2.0	2.1	2.2	2.3	2.4	2.5		2.9	2.9								
	2.8	1.9	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6		2.9									
mm	2.9	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7											

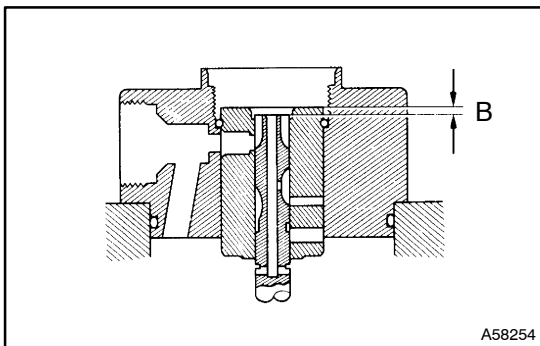
A56057

Plunger adjusting shim thickness:

1.9 mm (0.075 in.)	2.5 mm (0.098 in.)
2.0 mm (0.079 in.)	2.6 mm (0.102 in.)
2.1 mm (0.083 in.)	2.7 mm (0.106 in.)
2.2 mm (0.087 in.)	2.8 mm (0.110 in.)
2.3 mm (0.091 in.)	2.9 mm (0.114 in.)
2.4 mm (0.094 in.)	-

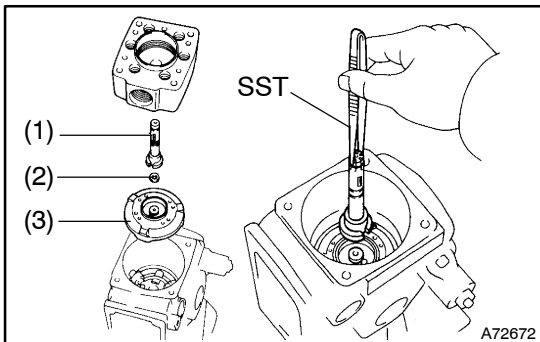
EXAMPLE:

The 2.4 mm (0.094 in.) shim is installed and measured clearance is 3.7 mm (0.146 in.). Replace the 2.4 mm (0.094 in.) shim with a 2.8 mm (0.110 in.) shim.

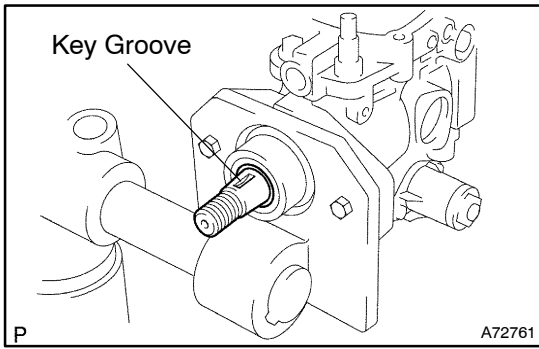


- (h) Install a new plunger adjusting shim, and recheck dimension B.

Dimension B: 3.2 - 3.4 mm (0.126 - 0.134 in.)

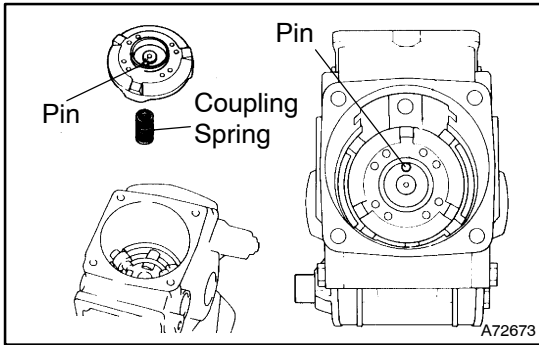


- (i) Remove the distributive head.
- (j) Using SST, remove the pump plunger (1), plunger adjusting shim (2) and face camplate (3).
SST 09260-54012 (09269-54030)

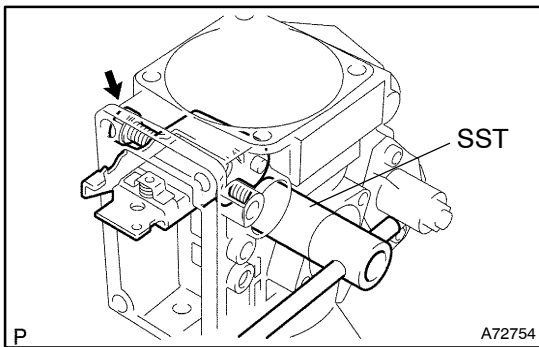


41. INSTALL FACE CAMPLATE SUB-ASSY

- (a) Turn the drive shaft, and face the key groove upward.



- (b) Install the coupling spring and camplate with the camplate pin facing the governor cover side.



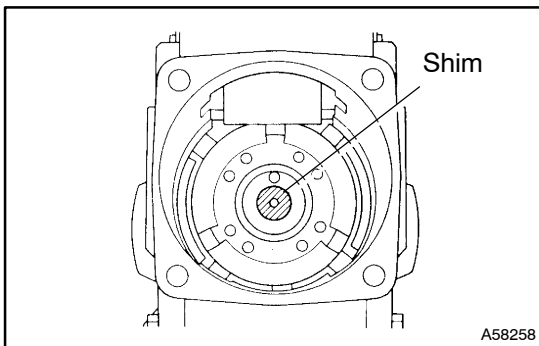
42. INSTALL GOVERNOR LINK

- (a) Using SST, install the governor link with 2 new gaskets and the 2 support bolts.

Torque: 13.75 N·m (140 kgf·cm, 10 ft·lbf)

SST 09260-54012 (09269-54040)

- (b) Check that the governor link smoothly moves.

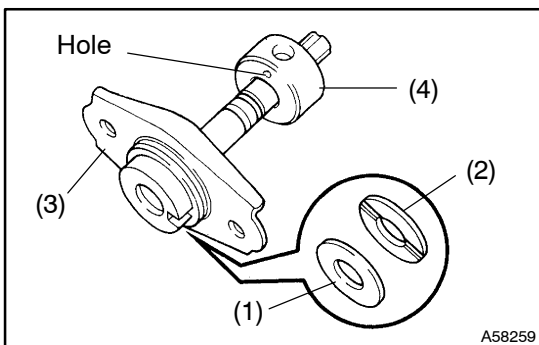


43. INSTALL PUMP PLUNGER

- (a) Place the selected new plunger adjusting shim on the center of the camplate.

NOTICE:

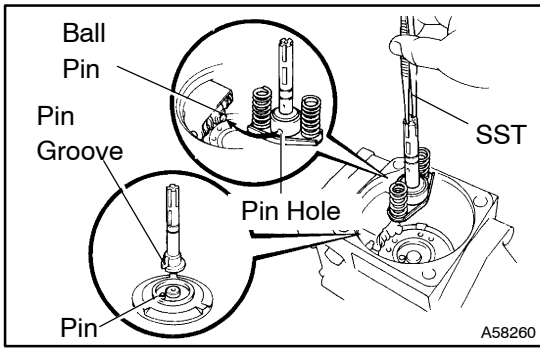
Do not apply grease to the shim.



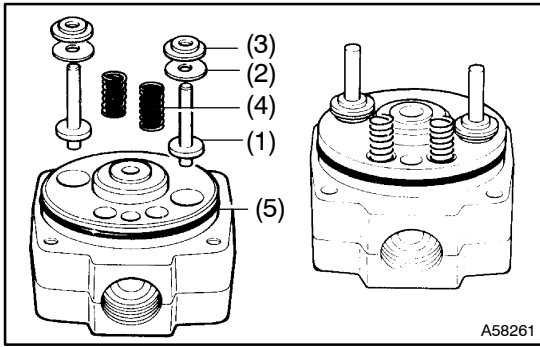
- (b) Install the lower plunger plate (1), upper plunger plate (2), lower spring seat (3) and spill ring (4) to the pump plunger.

HINT:

The hole of the spill ring should face the lower spring seat.

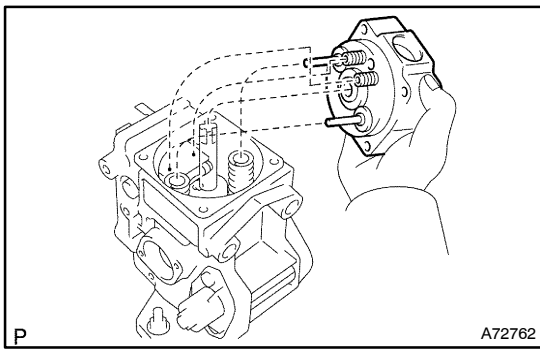


- (c) Align the pin groove of the plunger with the pin of the face camplate.
- (d) Align the ball pin of the governor link with the pin hole of the spill ring.
- (e) Using SST, install the pump plunger and 2 plunger springs.
SST 09260-54012 (09269-54030)



44. INSTALL DISTRIBUTIVE PUMP HEAD SUB-ASSY

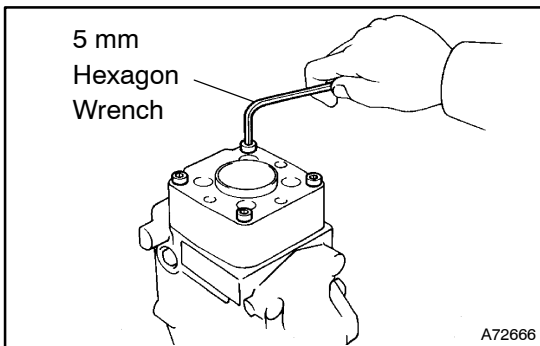
- (a) Apply grease to the 2 plunger spring guides (1), 2 new selected plunger spring shims (2), 2 upper spring seats (3), 2 lever support springs (4) and a new O-ring (5), and install them to the distributive head.



- (b) Install the distributive head.

NOTICE:

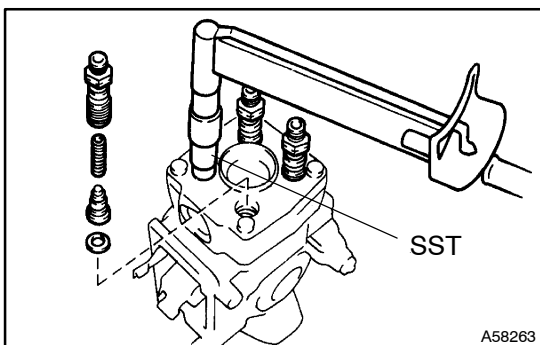
Be careful not to damage the pump plunger.



- (c) Using a 5 mm hexagon wrench, install the 4 bolts. Uniformly tighten the bolts in several passes.
Torque: 11.75 N·m (120 kgf·cm, 9 ft·lbf)

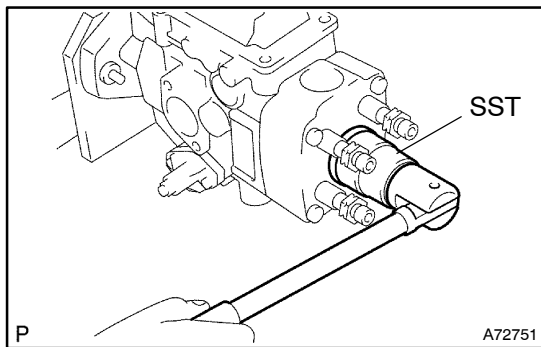
HINT:

Use the bolt which length is 45 mm (1.77 in.).

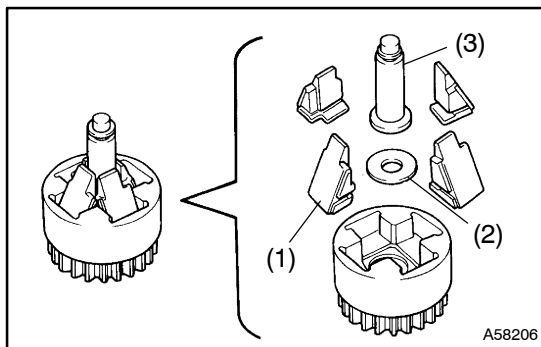


45. INSTALL INJECTION PUMP DELIVERY VALVE SUB-ASSY

- (a) Install 4 new gaskets and the 4 valves into the distributive head.
- (b) Install the spring seat and spring into the delivery valve holder.
- (c) Using SST, install the 4 delivery valve holders.
SST 09260-54012 (09269-54020)
Torque: 58.85 N·m (600 kgf·cm, 43 ft·lbf)

**46. INSTALL DISTRIBUTIVE HEAD PLUG**

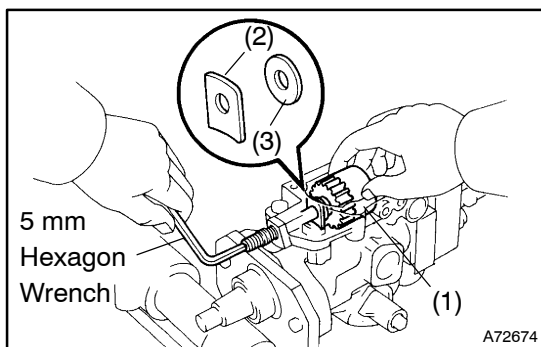
- (a) Install a new O-ring to the head plug.
- (b) Using SST, install the head plug.
SST 09260-54012 (09262-54010)
Torque: 88.3 N·m (900 kgf·cm, 65 ft·lbf)

**47. INSTALL GOVERNOR SHAFT AND FLYWEIGHT HOLDER**

- (a) Install the 4 flyweights (1), No. 2 flyweight washer (2) and governor sleeve (3) to the flyweight holder.

HINT:

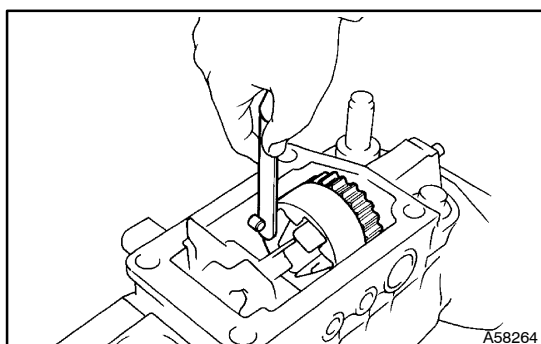
Replace the 4 flyweights as a set.



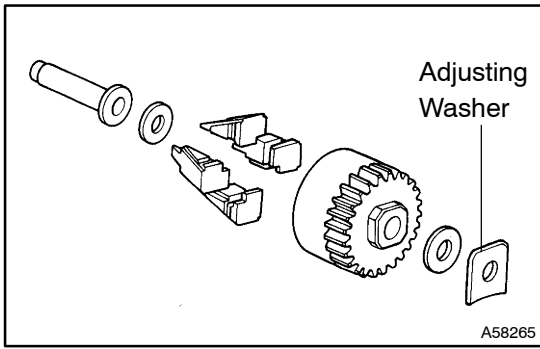
- (b) Install a new O-ring to the governor shaft.
- (c) Place the flyweight holder assembly (1) in position, and install the governor gear adjusting washer (2) and No.1 flyweight washer (3) between the flyweight holder and pump housing.
- (d) Install the governor shaft through the governor gear adjusting washer, No.1 flyweight washer and flyweight holder assembly.
- (e) Using a 5 mm hexagon wrench, turn the governor shaft counterclockwise.

HINT:

The governor shaft has LH threads.



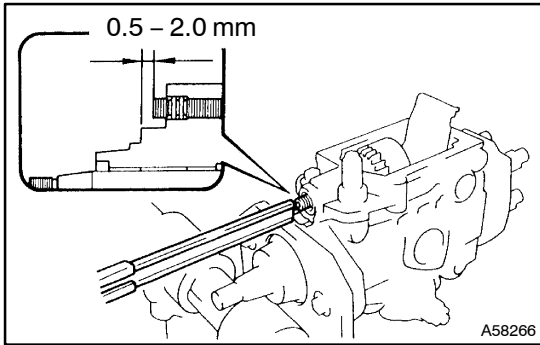
- (f) Check the flyweight holder thrust clearance.
 - (1) Using a feeler gauge, measure the thrust clearance between the housing pin and flyweight holder.
Thrust clearance: 0.15 - 0.35 mm (0.0059 - 0.0138 in.)



If the thrust clearance is not as specified, adjust it with a governor gear adjusting washer.

Governor gear adjusting washer thickness:

1.05 mm (0.0413 in.)	1.65 mm (0.0650 in.)
1.25 mm (0.0492 in.)	1.85 mm (0.0728 in.)
1.45 mm (0.0571 in.)	-



48. ADJUST PROTRUSION OF GOVERNOR SHAFT

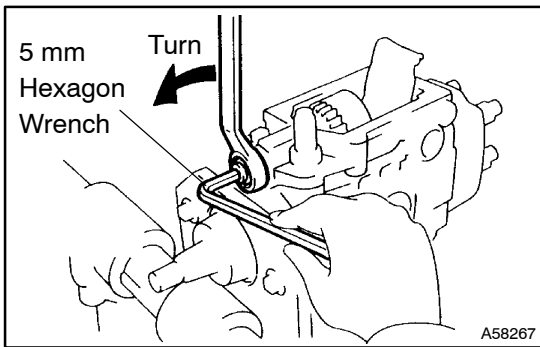
(a) Using vernier calipers, measure the protrusion of the governor shaft.

Protrusion: 0.5 - 2.0 mm (0.020 - 0.079 in.)

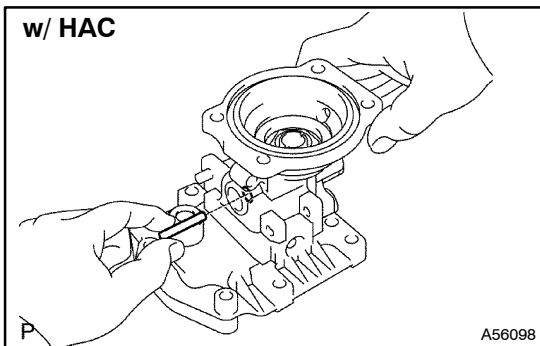
If the protrusion is not as specified, adjust it by turning the governor shaft.

HINT:

The governor cover shaft has LH threads.



(b) Using a 5 mm hexagon wrench, install and tighten the nut while holding the governor shaft.

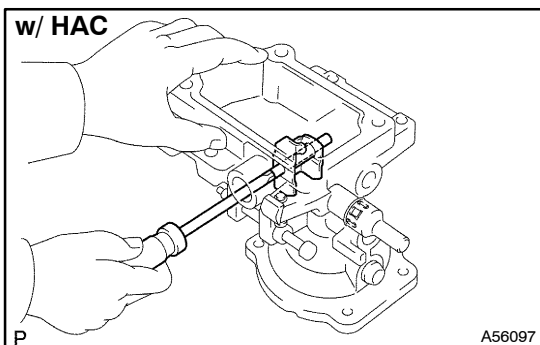


49. w/ HAC:

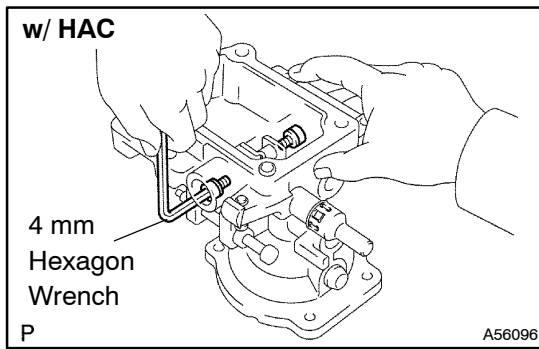
ASSEMBLE HIGH ALTITUDE COMPENSATOR

(a) Install the control lever.

(1) Insert the connecting pin into the governor cover.

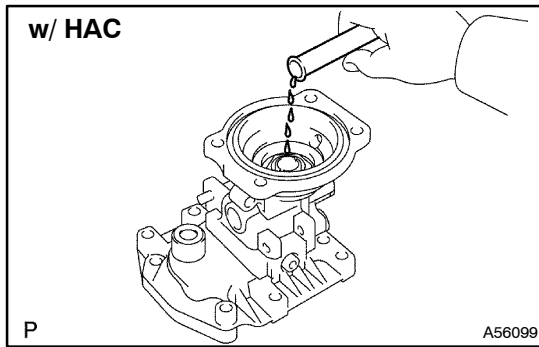


(2) Using a small screwdriver, install the control lever with the support pin.



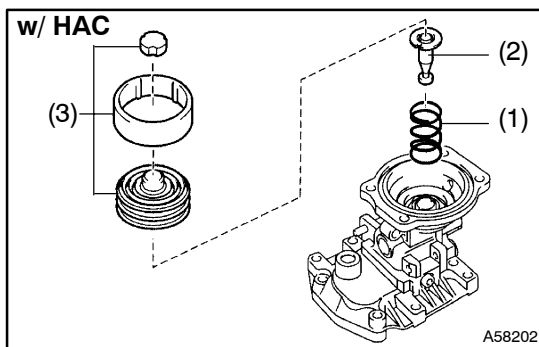
- (3) Using a 4 mm hexagon wrench, install 2 new gaskets and the 2 bolts.

Torque: 6.85 N·m (70 kgf·cm, 61 in·lbf)

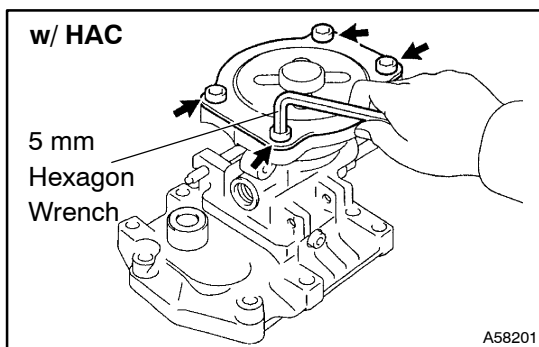


- (b) Install the pneumatic bellows.

- (1) Pour 3.0 – 4.0 cc (0.18 – 0.24 cu in.) of engine oil into the bushing hole.

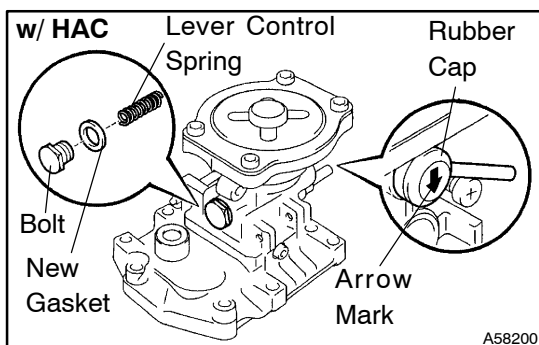


- (2) Install the pneumatic bellows spring (1), push rod (2), the pneumatic bellows and 2 rubber caps (3).



- (3) Using a 5 mm hexagon wrench, install a new gasket and the pneumatic bellows cover with the 4 bolts.

Torque: 7.35 N·m (75 kgf·cm, 65 in·lbf)



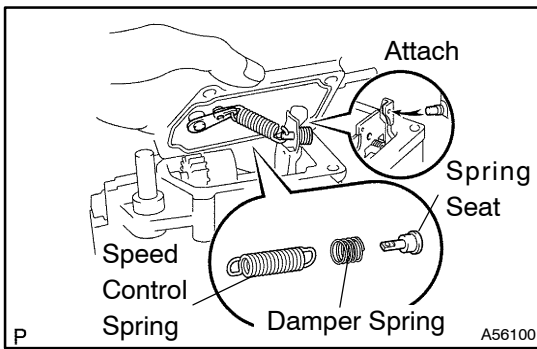
- (c) Install the rubber cap.

- (1) Install the rubber cap with the arrow mark facing downward.

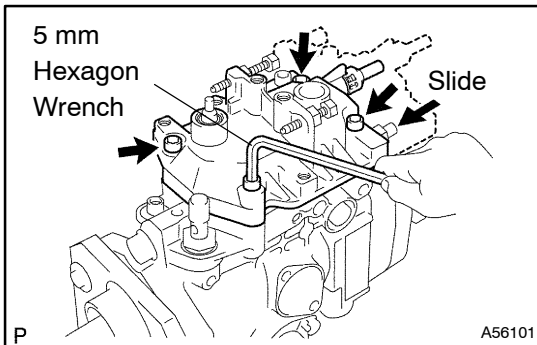
- (d) Install the lever control spring.

- (1) Install the lever control spring with a new gasket and the bolt.

Torque: 12.75 N·m (125 kgf·cm, 9 ft·lbf)

**50. INSTALL GOVERNOR COVER SUB-ASSY**

- (a) Install the plate washer and a new O-ring to the adjusting lever shaft.
- (b) Install the damper spring, spring seat, speed control spring and adjusting lever shaft to the governor link.



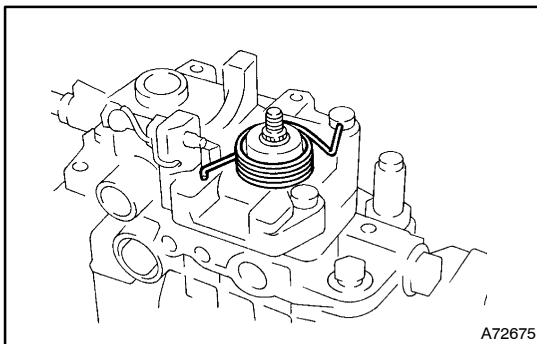
- (c) Slide the governor cover forward.
- (d) Using a 5 mm hexagon wrench, install the governor cover with the 4 bolts. Uniformly tighten the bolts in several passes.

Torque: 8.35 N·m (85 kgf·cm, 74 in·lbf)

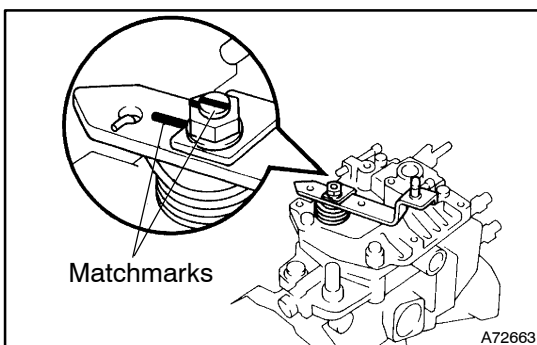
HINT:

Use the bolt which length is 35 mm (1.38 in.).

- (e) w/ HAC:
Install the idle speed adjusting screw.

**51. INSTALL ADJUSTING LEVER SUB-ASSY**

- (a) Place the return spring on the governor cover, as shown in the illustration.



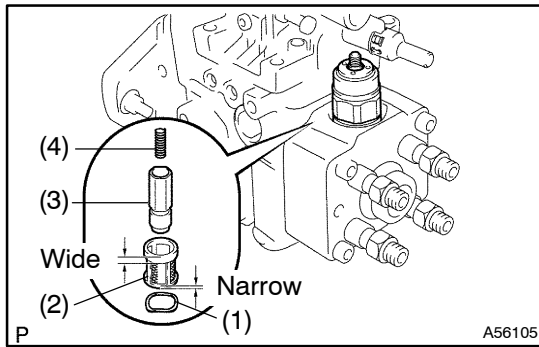
- (b) Hook the return springs to the adjusting lever, and turn and place the adjusting lever on the governor shaft, as shown in the illustration.
- (c) Align the matchmarks of the adjusting lever shaft and adjusting lever.
- (d) Install the adjusting lever and spring guide with the nut.

Torque: 8.35 N·m (85 kgf·cm, 74 in·lbf)

52. INSTALL ENGINE SPEED SENSOR

- (a) Install a new O-ring to the engine speed sensor.
- (b) Install the engine speed sensor.

Torque: 20.6 N·m (210 kgf·cm, 15 ft·lbf)

**53. INSTALL FUEL CUT SOLENOID ASSY**

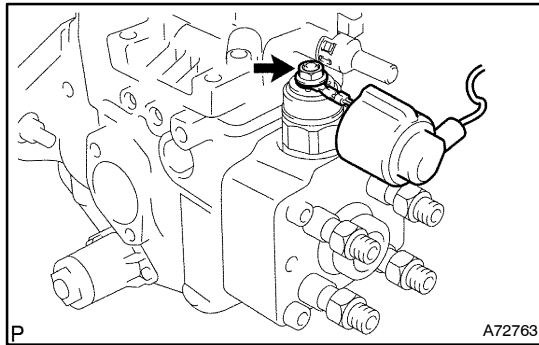
- (a) Install the wave washer (1), strainer (2), valve (3) and spring.

NOTICE:

Be careful of the strainer (2) installation direction.

- (b) Install a new O-ring to the fuel cut solenoid.
 (c) Install the fuel cut solenoid.

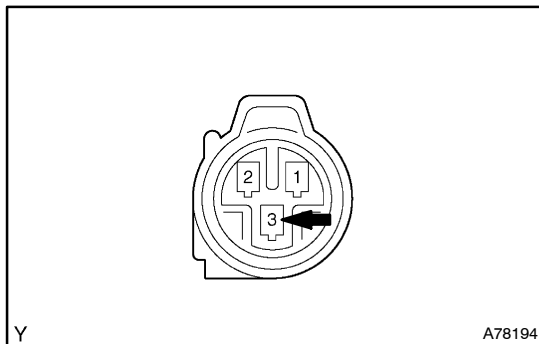
Torque: 22.1 N·m (225 kgf·cm, 16 ft·lbf)



- (d) Install the lead wire to the fuel cut solenoid with the nut.

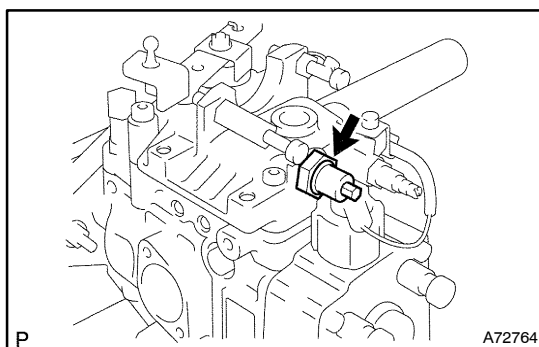
Torque: 1.7 N·m (17.5 kgf·cm, 15 in·lbf)

- (e) Install the dust cover to the fuel cut solenoid.



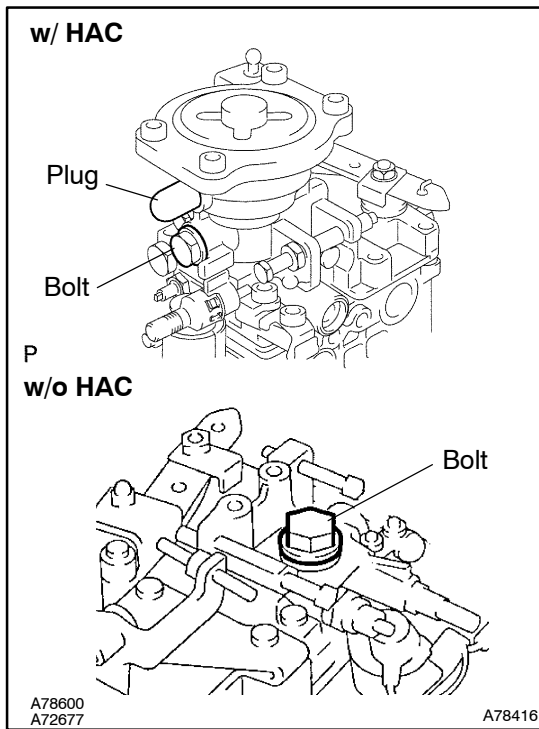
- (f) Connect the lead wire of the engine speed sensor to terminal 3 of the connector.

- (g) Install the lead wires to the 2 wire clamps on the governor cover.

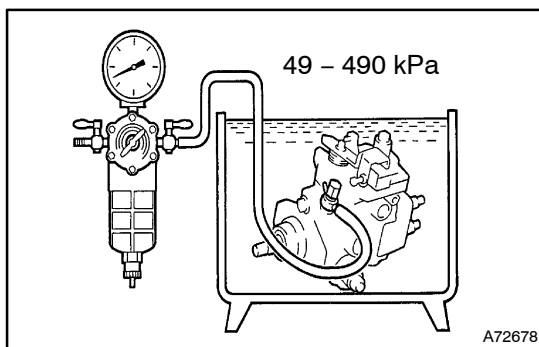
**54. INSTALL DASH POT**

- (a) Install a new gasket and the dash pot.

Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

**55. INSPECT AIRTIGHTNESS**

- (a) Plug each port with a bolt and plug.



- (b) Connect an air hose to the fuel inlet pipe and immerse the injection pump in diesel fuel.
- (c) Apply 49 kPa (0.5 kgf/cm², 7 psi) of pressure and confirm that there are no leaks.
- (d) Check that there is no leak with 490 kPa (5.0 kgf/cm², 71 psi) of pressure applied.
- (e) Remove the bolt and plug from the overflow port and idle-up actuator.

56. REMOVE INJECTION PUMP ASSY FROM SST (STAND)

SST 09241-76022, 09245-54010

57. INSTALL DRIVE SHAFT KEY FOR SPLINE SHAFT

ADJUSTMENT

1. INSTALL INJECTION PUMP ASSY

- (a) The specifications for test nozzle and nozzle holders are as follows.

Test nozzle: DN12SD12 (DENSO)

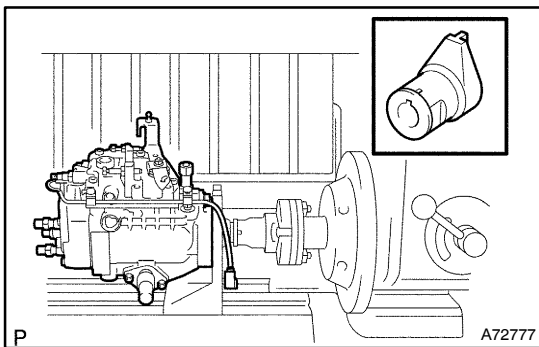
Test nozzle opening pressure:

14,220 – 15,200 kPa

(145 – 155 kgf/cm², 2,062 – 2,205 psi)

- (b) Check the accuracy of the tachometer.

Allowable error: ± 40 rpm

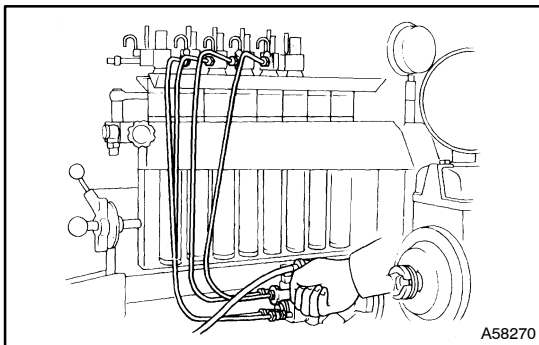


- (c) Install the angle gauge stand.

- (d) Mount the injection pump body on the pump tester.

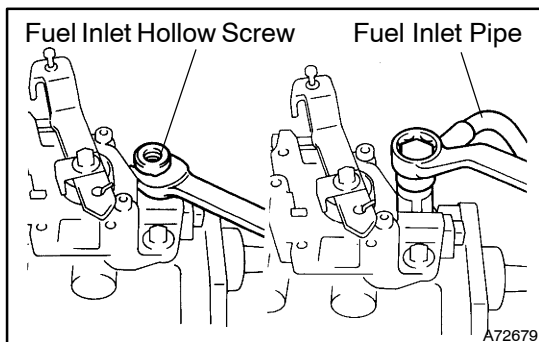
HINT:

Place a mark on the key groove portion of the coupling.



- (e) Install an injection pipe with these specifications.

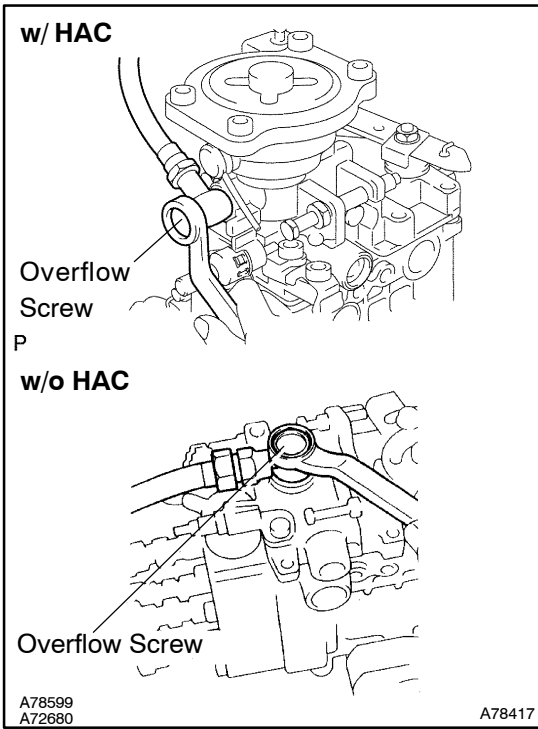
Outside diameter	6.0 mm (0.236 in.)
Inside diameter	2.0 mm (0.079 in.)
Length	840 mm (33.07 in.)
Minimum bending radius	25 mm (0.98 in.) or more



- (f) Remove the fuel inlet hollow screw.

- (g) Connect the fuel inlet pipe with an adapter.

Torque: 26.55 N·m (260 kgf·cm, 19 ft·lbf)



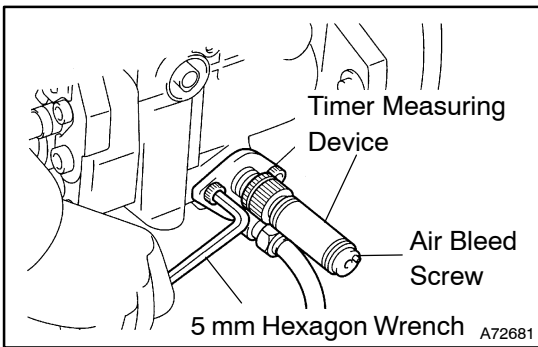
- (h) Install an overflow hose with the 2 gaskets and an overflow screw.

Torque: 26.55 N·m (260 kgf·cm, 19 ft·lbf)

HINT:

Always use the overflow screw installed on the pump for adjustment.

- (i) Using a 5 mm hexagon wrench, remove the 2 bolts and RH timer cover.



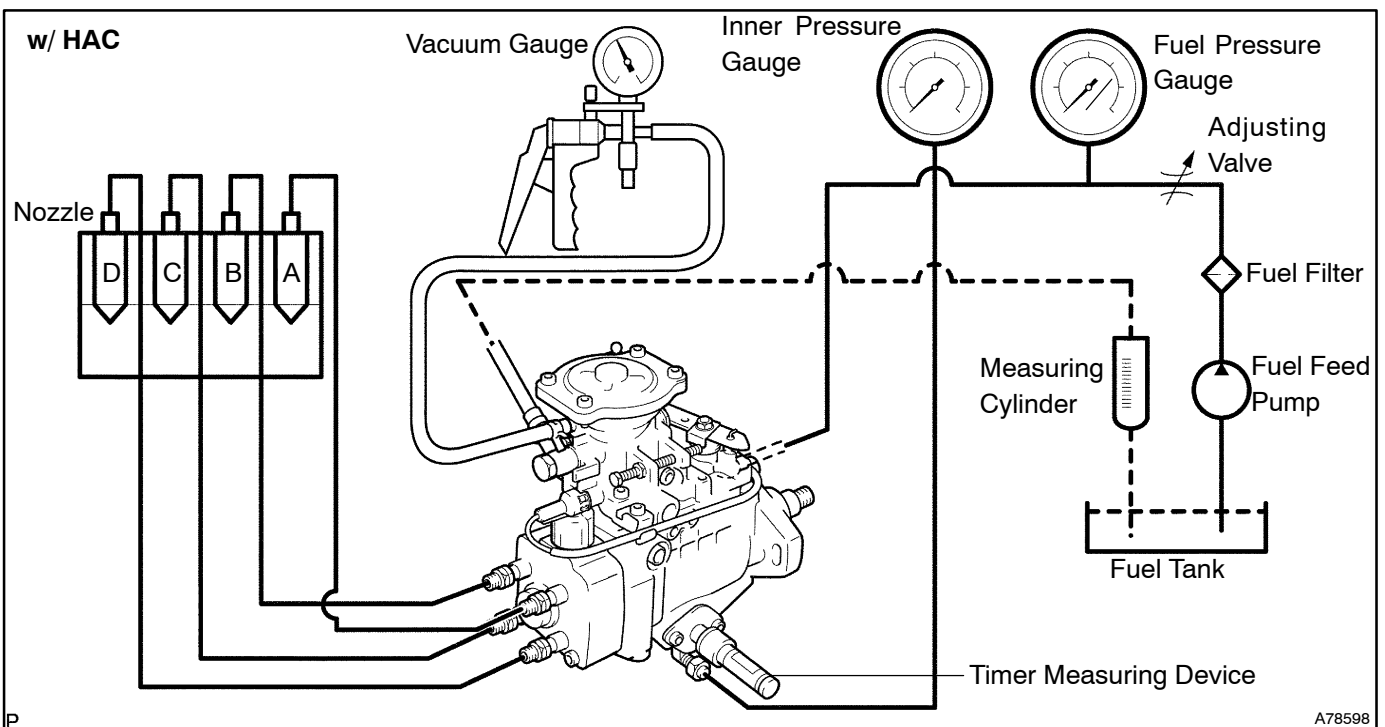
- (j) Install the inner pressure gauge with the timer measuring device.

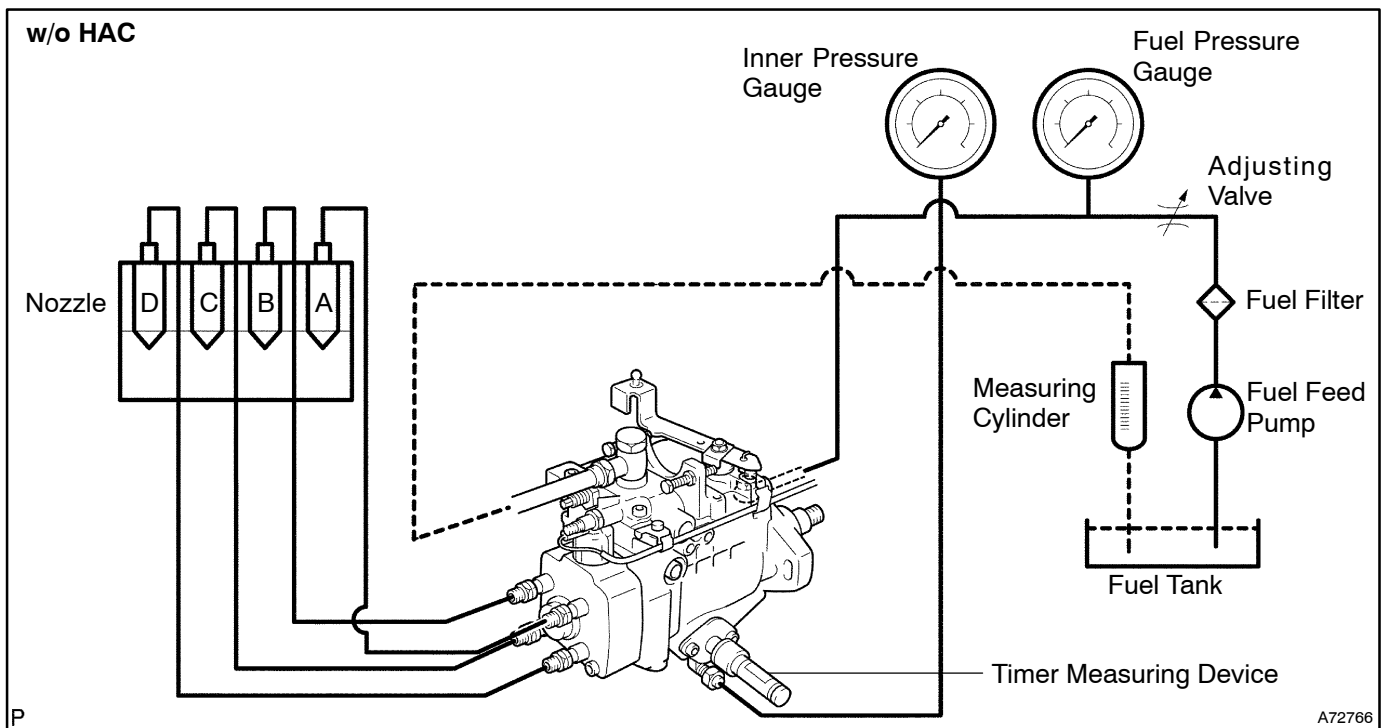
Part No. 95095-10231, 95095-10480 (DENSO made)

Torque: 8.35 N·m (85 kgf·cm, 74 in·lbf)

HINT:

Bleed the air by turning the air bleed screw.





(k) Apply about 6 V of DC power to the fuel cut solenoid.

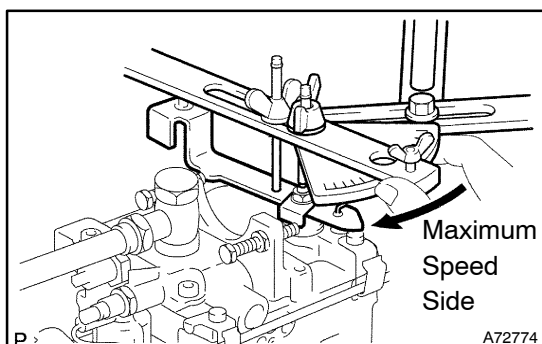
NOTICE:

- When applying voltage to the solenoid, position the battery as far from the solenoid as possible so that spark does not occur.
- When connecting the battery cable, connect the solenoid side first.

HINT:

Connect the battery through a 10 W bulb.

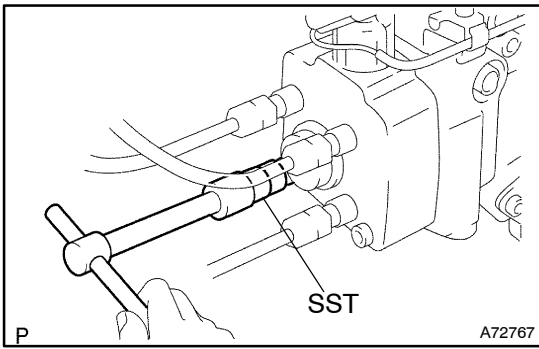
(l) Check that the pressure for feeding fuel to the injection pump is 20 kPa (0.2 kgf/cm², 2.8 psi) and that the fuel temperature for pump testing is 40 – 45°C (104 – 113°F).



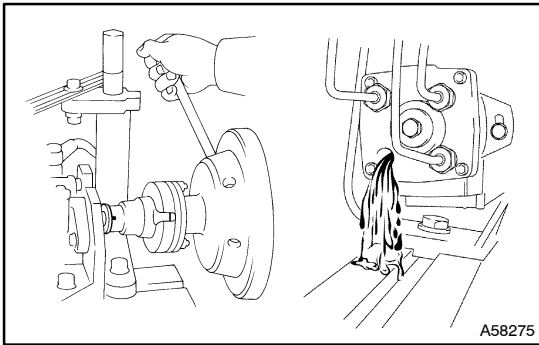
(m) Install an angle gauge to the stand, and set it to the adjusting lever.

Part No. 95095-10360 (Stand w/ angle gauge)

(n) Secure the adjusting lever fully on the maximum speed side.



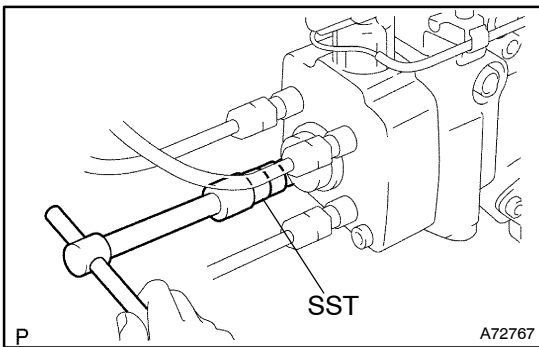
- (o) Check the installation direction of the camplate as follows:
- (1) Disconnect the injection pipe from the position marked "C" on the distributive head.
 - (2) Using SST, remove the delivery valve holder.
SST 09260-54012 (09269-54020)



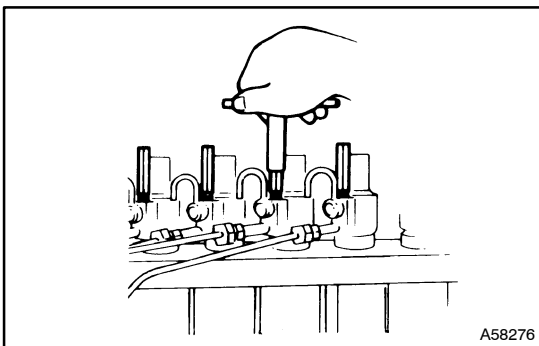
- (3) Check that fuel flows out when the mark is in the position, as shown in the illustration.
If not, it is improperly assembled.
- (4) Disassemble and change the camplate position by turning 180° in the opposite direction.

HINT:

At this time, disconnect the fuel cut solenoid wire harness.



- (5) Using SST, install the delivery valve holder.
SST 09260-54012 (09269-54020)
Torque: 58.85 N·m (600 kgf·cm, 43 ft·lbf)
- (6) Connect the injection pipe.



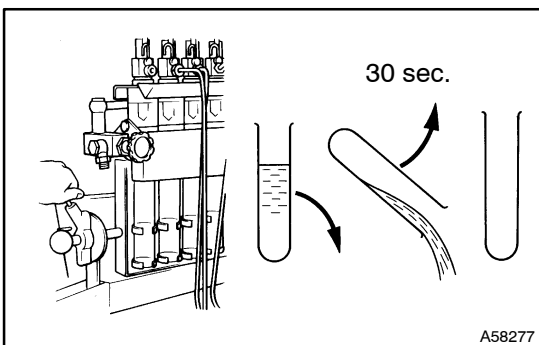
- (p) Bleed air from the injection pipes.
- (q) Race the injection pump for 5 minutes at 1,200 rpm.

HINT:

Replace the overflow screw with a hollow screw for this operation.

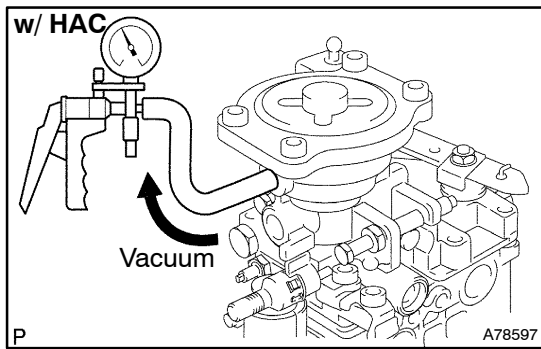
NOTICE:

Check that there is no fuel leakage or abnormal noise.



HINT:

- Using a measuring cylinder, measure the volume of each injection cylinder.
- Before measuring the injection volume, tilt the cylinder for at least 30 seconds to discard all the fuel.



2. INSPECT HIGH ALTITUDE COMPENSATOR FOR AIR TIGHTNESS

- Apply 73 kPa (548 mmHg, 21.56 in.Hg) of vacuum to the high altitude compensator.
- Measure how much time it takes for vacuum to drop to 72 kPa (540 mmHg, 21.26 in.Hg).

Vacuum drop: 5 sec. or more

3. SET FULL LOAD INJECTION VOLUME

- Set the adjusting lever to the maximum position.
- w/ HAC:
Apply 97.3 kPa (730 mmHg, 28.73 in.Hg) of vacuum to the high altitude compensator.
- Measure the injection volume.

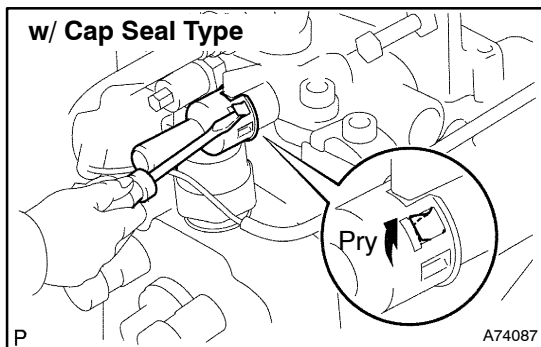
Injection volume:

w/ HAC

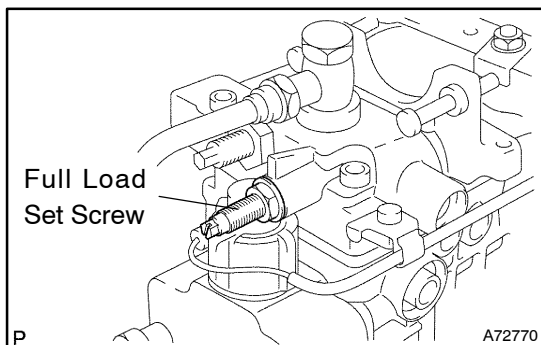
Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)
1,100	200	13.0 - 13.6 (0.79 - 0.83)

w/o HAC

Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)
1,100	200	12.4 - 13.0 (0.76 - 0.79)



- w/ Cap seal type:
Remove the cap seal.
 - Disconnect the dust cover from the fuel cut solenoid.
 - Using a small screwdriver, pry the 4 claws.
 - Remove the cap seal.
- w/ Wire seal type:
Cut off the wire seal.



- Adjust the injection volume by turning the full load set screw.

HINT:

The injection volume will increase about 3 cc (0.18 cu in.) with each 1/2 turns of the screw.

4. SET MAXIMUM SPEED

- Set the adjusting lever to the maximum position.
- w/ HAC:
Apply 97.3 kPa (730 mmHg, 28.73 in.Hg) of vacuum to the high altitude compensator.

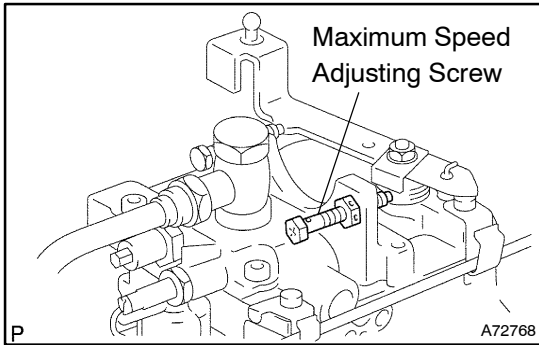
(c) Measure the injection volume.

Injection volume:
w/ HAC

Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)
2,075	200	3.4 - 5.8 (0.21 - 0.35)

w/o HAC

Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)
2,075	200	1.8 - 4.2 (0.11 - 0.26)



(d) Cut off the seal wire.

(e) Adjust the injection volume with the maximum speed adjusting screw.

5. ADJUST PUMP INNER PRESSURE

(a) Set the adjusting lever to the maximum position.

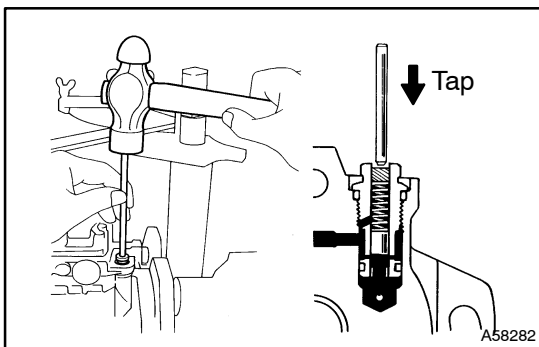
(b) w/ HAC:

Apply 97.3 kPa (730 mmHg, 28.73 in.Hg) of vacuum to the high altitude compensator.

(c) Measure the pump inner pressure at each pump rpm.

Pump inner pressure:

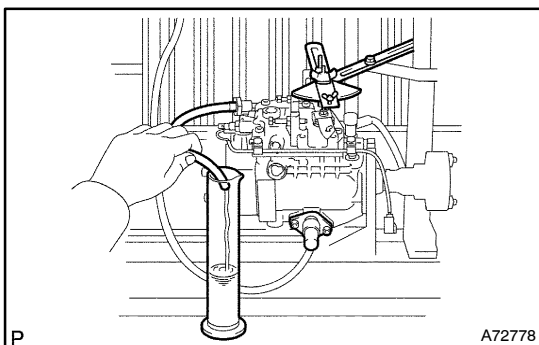
Pump rpm	Inner	kPa (kgf/cm ² , psi)
400	216 - 275	(2.2 - 2.8, 31 - 40)
1,700	667 - 726	(6.8 - 7.4, 97 - 105)



When the pressure is low, adjust the pressure by lightly tapping the regulator valve piston while watching the pressure gauge.

HINT:

When the pressure is too high or the regulator valve is tapped excessively, replace the regulator valve.



6. INSPECT OVERFLOW VOLUME

(a) Set the adjusting lever to the maximum position.

(b) w/ HAC:

Apply 97.3 kPa (730 mmHg, 28.73 in.Hg) of vacuum to the high altitude compensator.

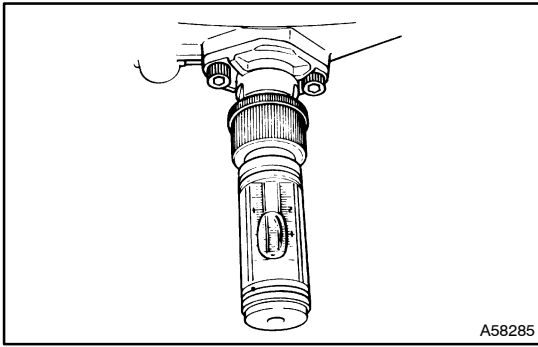
(c) Measure the overflow volume at the pump rpm.

Overflow volume:

Pump rpm	Overflow volume cc/min. (cu in./min.)
400	650 - 1,083 (39.7 - 66.1)

HINT:

Always use the overflow screw installed on the pump for adjustment.



7. ADJUST TIMER

- (a) Set the timer measuring device at zero.
- (b) w/ HAC:
Apply 97.3 kPa (730 mmHg, 28.73 in.Hg) of vacuum to the high altitude compensator.
- (c) Measure the timer piston stroke at each rpm.

Timer piston stroke:

w/ HAC

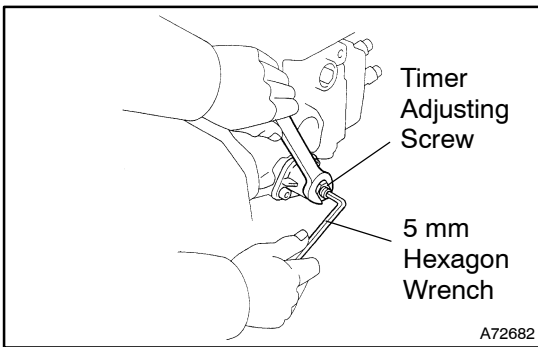
Pump rpm	Piston stroke	mm (in.)
1,000	0.20 - 1.20 (0.0079 - 0.0472)	
1,400	3.20 - 4.20 (0.1260 - 0.1654)	
1,700	4.76 - 5.24 (0.1874 - 0.2064)	

w/o HAC

Pump rpm	Piston stroke	mm (in.)
1,200	0.9 - 1.9 (0.0354 - 0.0748)	
1,500	3.1 - 4.1 (0.1220 - 0.1614)	
1,700	4.76 - 5.24 (0.1874 - 0.2064)	

HINT:

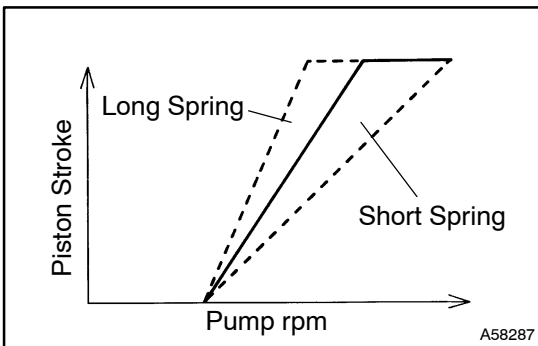
Check that the hysteresis is within 0.3 mm (0.012 in.).



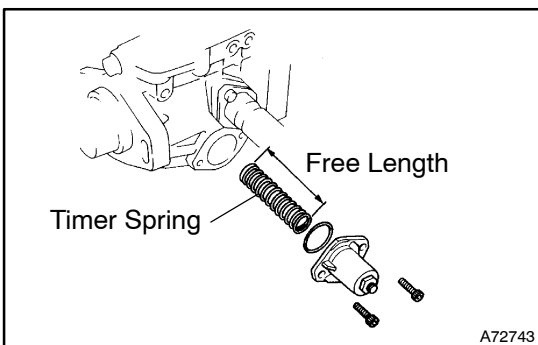
- (d) Using a 5 mm hexagon wrench, adjust the timer by turning the timer adjusting screw.

HINT:

Turn the adjusting screw clockwise when reducing the stroke and turn it counterclockwise when increasing the stroke.



- (e) Check the timer stroke for characteristic tendency.



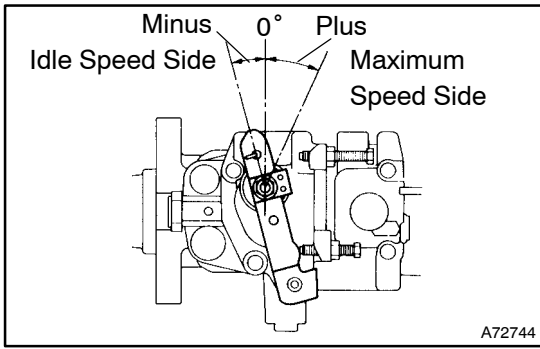
If the tendency is not as specified, select and replace the timer spring.

Timer spring free length:

56.5 mm (2.224 in.)	57.1 mm (2.248 in.)	57.8 mm (2.276 in.)
---------------------	---------------------	---------------------

HINT:

The timer stroke increases with a long spring but decreases with a short spring.



8. ADJUST FULL LOAD INJECTION VOLUME

- (a) Check that the adjusting lever angle for the adjustment below is as shown in the illustration.

Adjusting lever angle:

A (Maximum speed side)	B (Idle speed side)
Plus 21 - 31°	Minus 12 - 22°

- (b) w/ HAC:
Apply 97.3 kPa (730 mmHg, 28.73 in.Hg) of vacuum to the high altitude compensator.
- (c) Measure the full load injection volume.

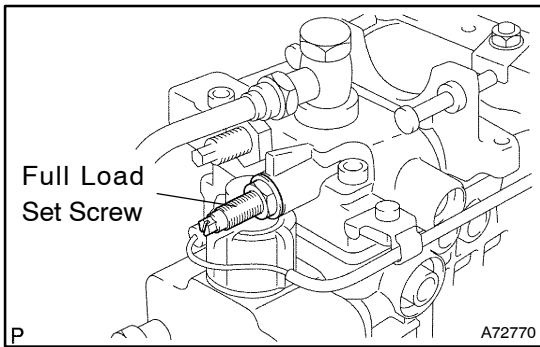
Injection volume:

w/ HAC

Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)
1,100	200	13.0 - 13.6 (0.79 - 0.83)

w/o HAC

Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)
1,100	200	12.4 - 13.0 (0.76 - 0.79)



- (d) Adjust the injection volume by turning the full load set screw.

HINT:

The injection volume increases about 3 cc (0.18 cu in.) with each 1/2 turns of the screw.

9. ADJUST MAXIMUM SPEED

- (a) w/ HAC:
Apply 97.3 kPa (730 mmHg, 28.73 in.Hg) of vacuum to the high altitude compensator.
- (b) Measure the injection volume at each pump rpm.

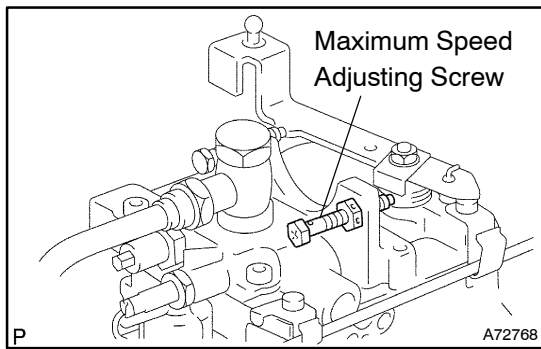
Injection volume:

w/ HAC

Adusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)	Remark
Plus 21 - 31°	2,075	200	3.4 - 5.8 (0.21 - 0.35)	Adjust
	2,250	200	1.2 (0.07) or less	-

w/o HAC

Adusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)	Remark
Plus 21 - 31°	2,075	200	1.8 - 4.2 (0.11 - 0.26)	Adjust
	2,250	200	1.2 (0.07) or less	-



- (c) Adjust the injection volume by turning the maximum speed adjusting screw.

10. INSPECT INJECTION VOLUME

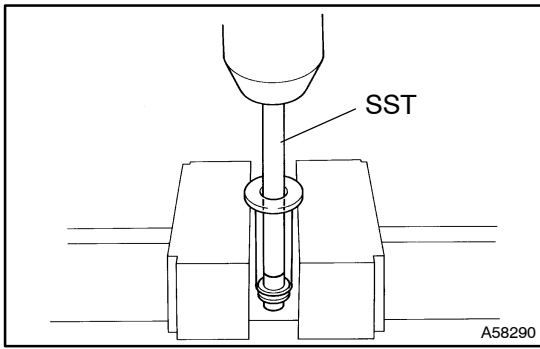
- (a) Measure the injection volume at each pump rpm and HAC vacuum (w/ HAC).

Injection volume: w/ HAC

Adjusting lever angle	Pump rpm	HAC vacuum kPa (mmHg, in.Hg)	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)	Variation limit cc (cu in.)	Remark
Plus 21 – 31°	100	97.3 (730, 28.73)	200	12.6 – 17.4 (0.77 – 1.06)	1.4 (0.09)	Volume during starting
	500	97.3 (730, 28.73)	200	9.3 – 10.9 (0.57 – 0.67)	0.7 (0.04)	–
	700	97.3 (730, 28.73)	200	10.6 – 12.2 (0.65 – 0.74)	0.7 (0.04)	–
	900	97.3 (730, 28.73)	200	12.1 – 13.7 (0.74 – 0.84)	0.7 (0.04)	–
	1,100	97.3 (730, 28.73)	200	13.0 – 13.6 (0.79 – 0.83)	0.7 (0.04)	Basic full load injection volume
		70.7 (530, 20.88)	200	7.8 – 9.8 (0.48 – 0.60)	–	–
1,700	97.3 (730, 28.73)	200	10.0 – 11.6 (0.61 – 0.71)	0.7 (0.04)	–	

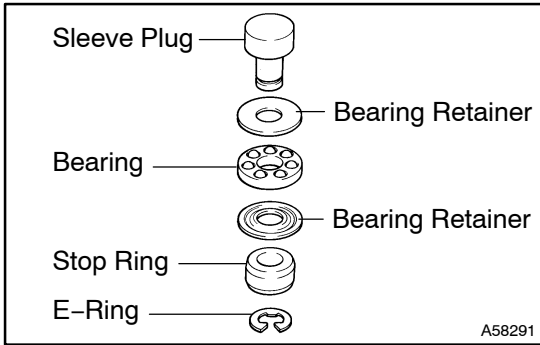
w/o HAC

Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)	Variation limit cc (cu in.)	Remark
Plus 21 – 31°	100	200	12.6 – 17.4 (0.77 – 1.06)	1.4 (0.09)	Volume during starting
	500	200	9.1 – 10.3 (0.56 – 0.63)	0.7 (0.04)	–
	700	200	10.3 – 11.5 (0.63 – 0.70)	0.7 (0.04)	–
	900	200	11.7 – 12.9 (0.71 – 0.79)	0.7 (0.04)	–
	1,100	200	12.4 – 13.0 (0.76 – 0.79)	0.7 (0.04)	Basic full load injection volume
	1,700	200	10.5 – 11.7 (0.64 – 0.71)	0.7 (0.04)	–

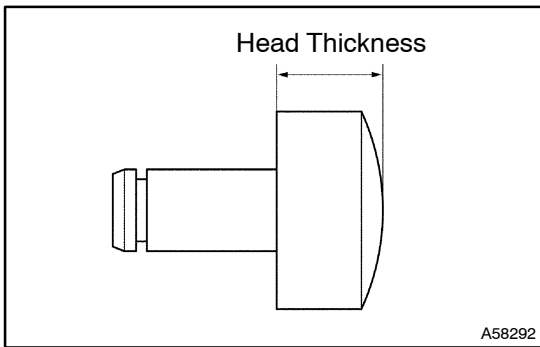


If the injection volume at 100 rpm is not as specified, replace the governor sleeve plus as follows:

- (1) Using SST and a press, press out the sleeve plug assembly from the governor sleeve.
SST 09236-00101 (09237-00070)



- (2) Remove the E-ring, stop ring, bearing and 2 bearing retainers from the sleeve plug.



- (3) Measure the head thickness of the sleeve plug, and select a new sleeve plug.

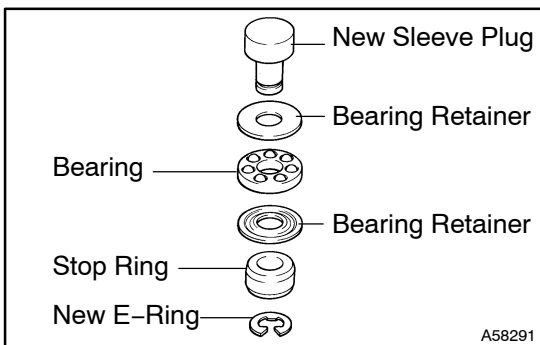
Governor sleeve plug head thickness:

3.0 mm (0.118 in.)	3.6 mm (0.142 in.)	4.2 mm (0.165 in.)
3.1 mm (0.122 in.)	3.7 mm (0.146 in.)	4.3 mm (0.169 in.)
3.2 mm (0.126 in.)	3.8 mm (0.150 in.)	4.5 mm (0.177 in.)
3.3 mm (0.130 in.)	3.9 mm (0.154 in.)	4.7 mm (0.185 in.)
3.4 mm (0.134 in.)	4.0 mm (0.157 in.)	-
3.5 mm (0.138 in.)	4.1 mm (0.161 in.)	-

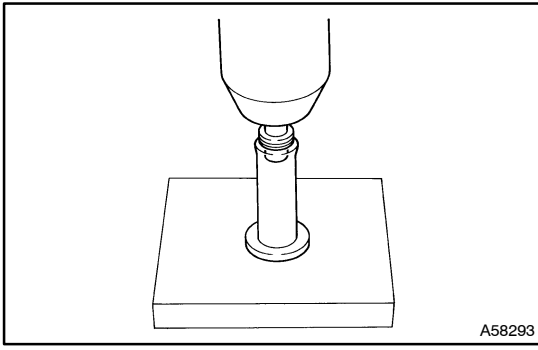
HINT:

Lengthening the plug by 0.1 mm (0.004 in.) will decrease injection volume by 0.6 cc (0.04 cu in.).

If the variation limit is greater than that specified, replace the delivery valve.

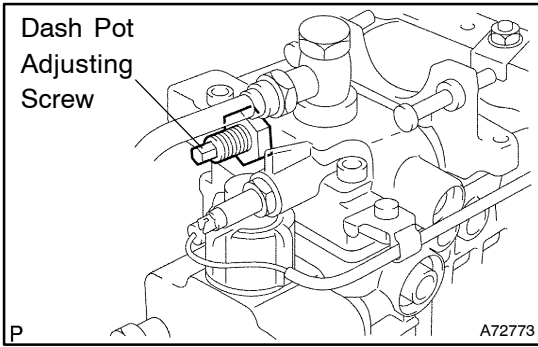


- (4) Install the bearing, 2 retainers and stop ring to the new sleeve plug with a new E-ring.



A58293

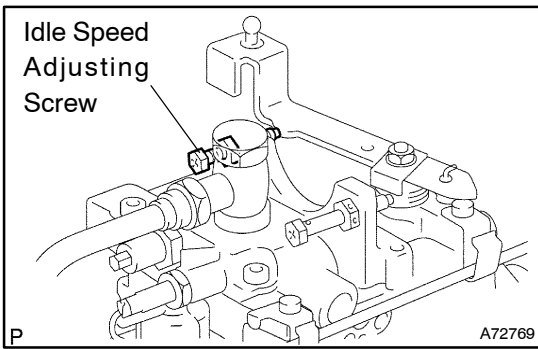
- (5) Using a press, press in the sleeve plug assembly to the governor sleeve.



A72773

11. ADJUST IDLE SPEED

- (a) Using pliers, remove the dash pot collar.
- (b) Fully loosen the dash pot adjusting screw.



A72769

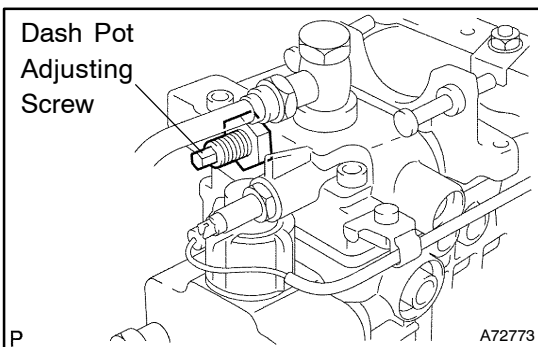
- (c) Pre-set idle speed:
Adjust the injection volume by turning the idle speed adjusting screw.

**Injection volume:
w/ HAC**

Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)
325	200	q = 3.8 - 4.2 (0.23 - 0.26)

w/o HAC

Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)
350	200	q = 4.0 - 4.4 (0.24 - 0.27)



A72773

- (d) Adjust the injection volume by turning the dash pot adjusting screw.

HINT:

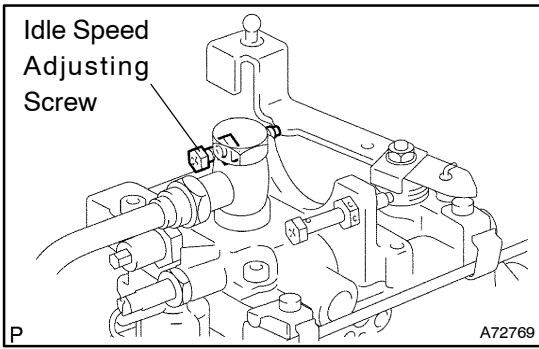
The stroke decreases with clockwise turn and increases with counterclockwise turn.

**Injection volume:
w/ HAC**

Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)
325	200	q plus 0.14 - 0.46 (0.01 - 0.03)

w/o HAC

Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)
350	200	q plus 0.14 - 0.46 (0.01 - 0.03)



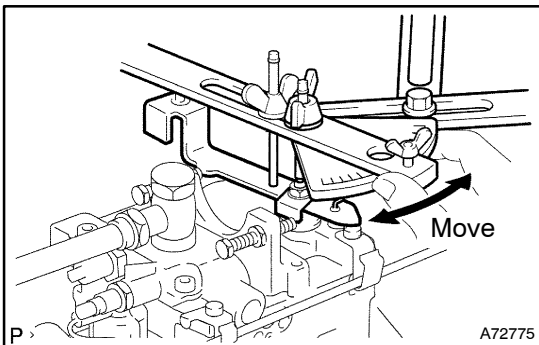
- (e) Adjust the injection volume by turning the idle speed adjusting screw.

**Injection volume:
w/ HAC**

Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)	Variation limit cc (cu in.)
Minus 12 - 22°	325	200	1.1 - 2.7 (0.07 - 0.16)	0.5 (0.03)

w/o HAC

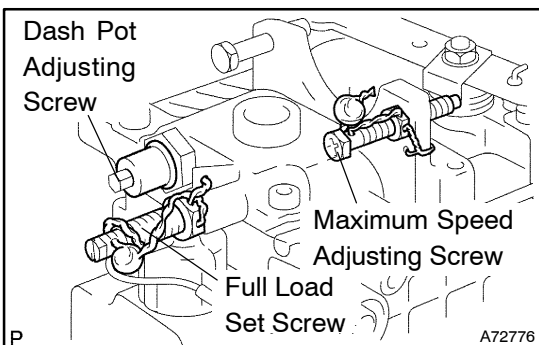
Adjusting lever angle	Pump rpm	No. of measuring strokes	Injection volume of each cylinder cc (cu in.)	Variation limit cc (cu in.)
Minus 12 - 22°	350	200	1.3 - 2.9 (0.08 - 0.18)	0.5 (0.03)



12. INSPECT ADJUSTING LEVER SUB-ASSY

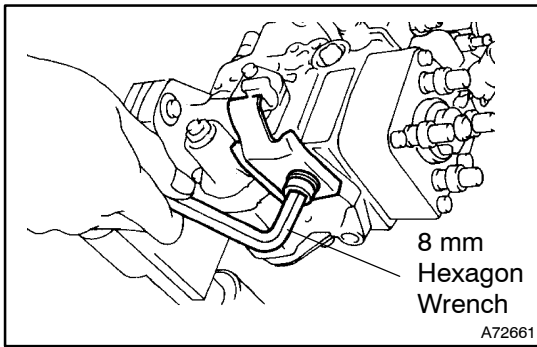
- (a) Check that the injection stops when the fuel cut solenoid harness is removed.
Pump revolution: 100 rpm
- (b) Check the adjusting lever movement.
Adjusting lever angle: 38 - 48°

13. REMOVE INJECTION PUMP ASSY FROM TESTER



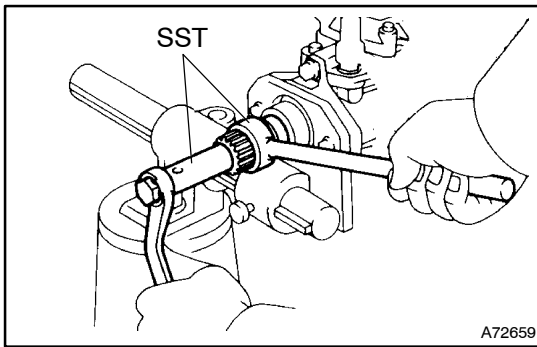
14. FIX PARTS

- (a) Seal the full load set screw and maximum speed adjusting screw with new lead seals.
- (b) Seal the dash pot adjusting screw with a new collar.

**15. INSTALL FUEL PIPE CLAMP**

- (a) Using an 8 mm hexagon wrench, install the clamp with the plate washer and bolt.

Torque: 21.55 N·m (220 kgf·cm, 16 ft·lbf)

**16. INSTALL SPLINE SHAFT**

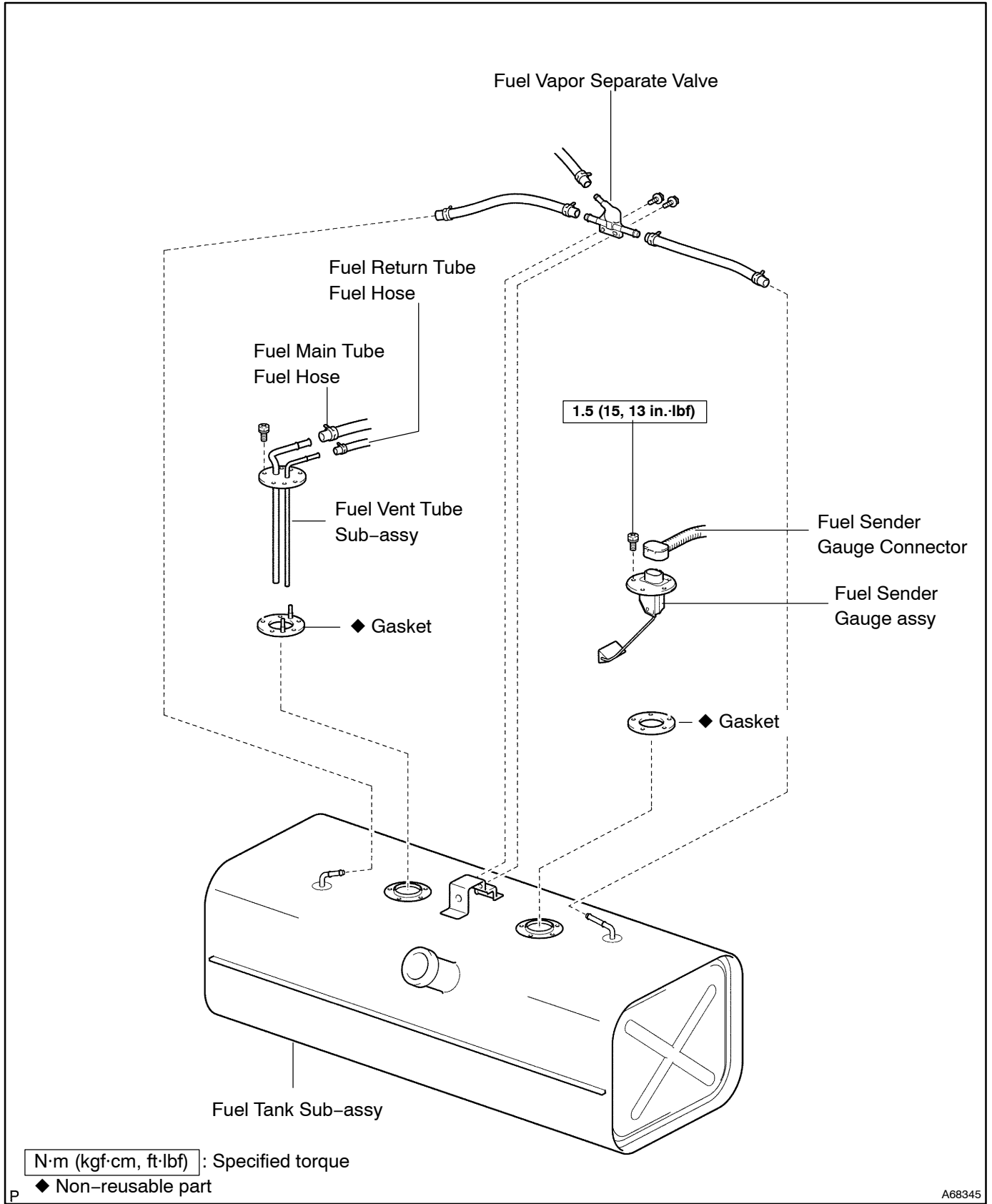
- (a) Align the set key groove of the spline shaft with the set key.

- (b) Using SST, install the spline shaft with the round nut.
SST 09260-58010 (09266-76011, 09278-46020)

Torque: 84.3 N·m (860 kgf·cm, 62 ft·lbf)

FUEL TANK ASSY (14B) COMPONENTS

110QC-01



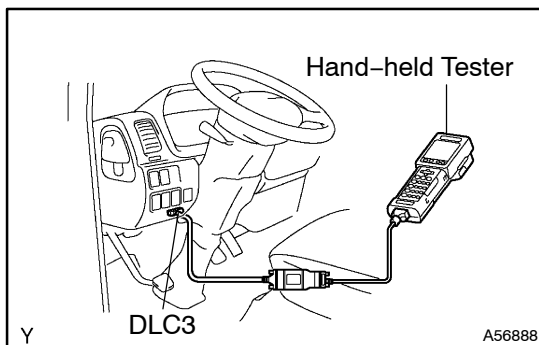
REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT**
2. **DISCONNECT BATTERY NEGATIVE TERMINAL**
3. **DRAIN FUEL**
4. **DISCONNECT FUEL SENDER GAUGE CONNECTOR**
5. **DISCONNECT FUEL MAIN TUBE**
6. **DISCONNECT FUEL RETURN TUBE**
7. **DISCONNECT CHECK VALVE FUEL HOSE**
8. **REMOVE FUEL TANK ASSY**
 - (a) Take out the fuel tank band, and then remove the fuel tank.
9. **REMOVE FUEL SENDER GAUGE ASSY**
 - (a) Remove the 5 screws and fuel sender gauge from the fuel tank.
10. **REMOVE FUEL TANK VENT TUBE SUB-ASSY**
 - (a) Remove the 6 bolts and fuel tank vent tube.
11. **REMOVE FUEL VAPOR SEPARATE VALVE**
 - (a) Remove the 2 bolts and fuel vapor separate valve.
12. **INSTALL FUEL VAPOR SEPARATE VALVE**
 - (a) Install the fuel vapor separate valve with the 2 bolts.
13. **INSTALL FUEL TANK VENT TUBE SUB-ASSY**
 - (a) With a new gasket, install the fuel tank bent tube with the bolts.
14. **INSTALL FUEL SENDER GAUGE ASSY**
 - (a) With a new gasket, install the fuel sender gauge with the 5 screws.
Torque: 1.5 N·m (15 kgf·cm, 13 in·lbf)
15. **INSTALL FUEL TANK ASSY**
 - (a) Install the tank and fuel tank band.
Torque: 13 N·m (132 kgf·cm, 10 ft·lbf)
16. **CONNECT CHECK VALVE FUEL HOSE**
17. **CONNECT FUEL RETURN TUBE**
18. **CONNECT FUEL RETURN TUBE**
19. **CONNECT FUEL SENDER GAUGE CONNECTOR**
20. **ADD FUEL**
21. **CONNECT BATTERY NEGATIVE TERMINAL**
22. **BLEED FUEL**
23. **INSPECT FOR FUEL LEAKS**

FUEL SYSTEM (15B-FTE)

ON-VEHICLE INSPECTION

110PY-01



1. CHECK FUEL LEAK

CAUTION:

- During ACTIVE TEST mode, engine speed goes high and combustion noise becomes loud, so pay attention.
- During ACTIVE TEST mode, fuel becomes highpressure, so take much care not to expose your eyes, hands, or body to the fuel.

- (a) Check that there are no leaks from any part of the fuel system when the engine stops.

If there is fuel leakage, replace those parts.

- (b) While cranking or starting the engine, check that there are no leaks from any part of the fuel system.

If there is fuel leakage, replace those parts.

- (c) Disconnect the return hose from the injection pump.
 (d) While cranking the engine, check fuel leakage from the return pipe.

If there is fuel leakage, replace the injection pump assy (See page 11-64).

- (e) Connect the hand-held tester to the DLC3.
 (f) Start the engine and push the hand-held tester main switch ON.
 (g) Select the FUEL LEAK test of ACTIVE TEST mode on the hand-held tester.
 (h) If you have no hand-held tester, depress the accelerator pedal quickly and fully to increase the engine speed at maximum and keep it for 2 seconds. Repeat this operation several times.
 (i) Check that there are no leaks from any part of the fuel system.

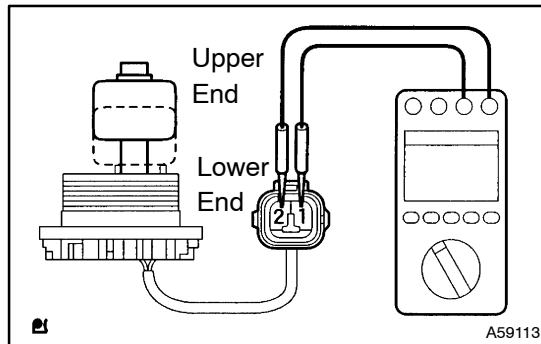
NOTICE:

If the leakage from the return pipe is less than 10 cc (0.6 cu in.) in a minute, it is acceptable.

If there is fuel leakage, replace those parts.

- (j) Reconnect the return hose to the injection pump assy.

INSPECTION



1. INSPECT LEVEL WARNING SWITCH

- (a) Using the electrical tester, check the continuity.
 (1) Check the continuity between the terminals.

Standard:

Float position	Specified Condition
Upper end of float	Continuity
Lower end of float	No continuity

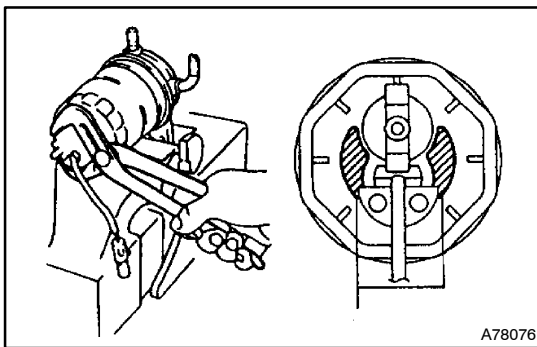
If there no continuity, replace the warning switch.

FUEL FILTER ELEMENT (15B-FTE)

110Q0-01

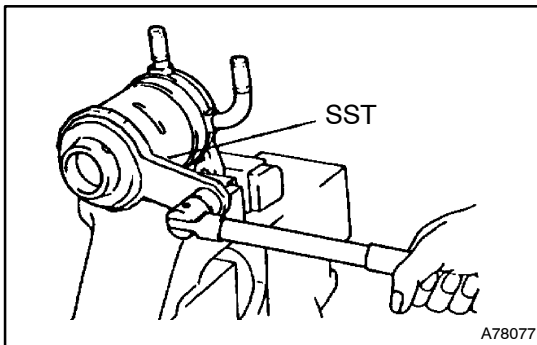
REPLACEMENT

1. **DRAIN FUEL**
2. **REMOVE DIESEL FUEL FILTER ASSY**
 - (a) Loosen the filter drain plug, and then drain fuel.
 - (b) Disconnect the fuel main tube fuel hose No. 1.
 - (c) Disconnect the fuel filter fuel hose.
 - (d) Disconnect the level warning switch connector.
 - (e) Disconnect the fuel heater connector.
 - (f) Remove the 2 bolts and fuel filter assy.



3. REMOVE FUEL FILTER ELEMENT

- (a) Fix the fuel filter cap with a vise.
- (b) Using a water pump pryer, remove the level warning switch.



- (c) Using SST, remove the fuel filter element.
SST 09228-64040

4. INSTALL FUEL FILTER ELEMENT

- (a) Apply a light coat of fuel to the gasket, and then thoroughly tighten the fuel filter element by hand.

NOTICE:

Do not use SST when tightening the element.

- (b) With a new gasket for the warning switch, thoroughly tighten the level warning switch by hand .

5. INSTALL DIESEL FUEL FILTER ASSY

- (a) Tighten the fuel filter assy with the 2 bolts.
Torque: 18 N·m (183 kgf·cm, 13 ft·lbf)
- (b) Connect the fuel heater connector.
- (c) Connect the level warning switch connector.
- (d) Connect the fuel filter fuel hose.
- (e) Connect the fuel main tube fuel hose No. 1.

6. ADD FUEL

7. BLEED FUEL

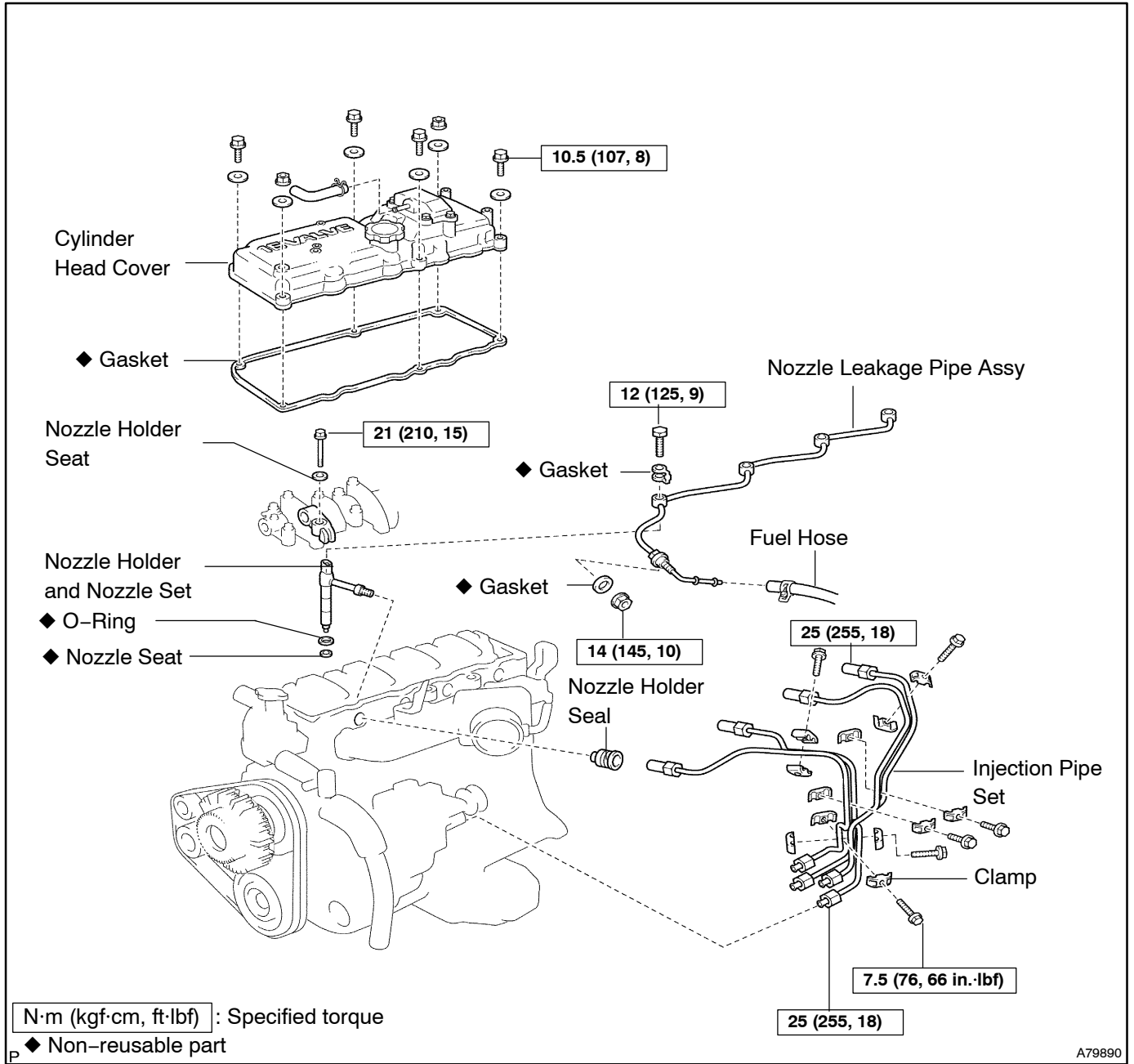
- (a) Move the priming pump up and down which is placed in the upper part of the fuel filter assy and fill the fuel in the fuel system.

8. INSPECT FOR FUEL LEAKS

- (a) Start the engine and check that there is no leakage in the fuel system.

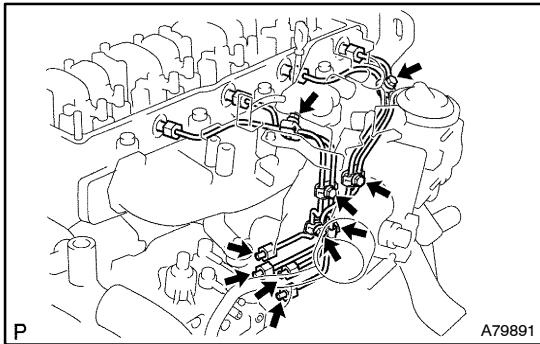
NOZZLE HOLDER AND NOZZLE SET (15B-FTE) COMPONENTS

110Q1-01



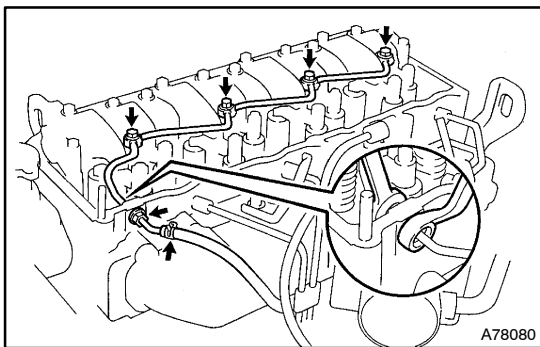
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL
3. REMOVE CYLINDER HEAD COVER



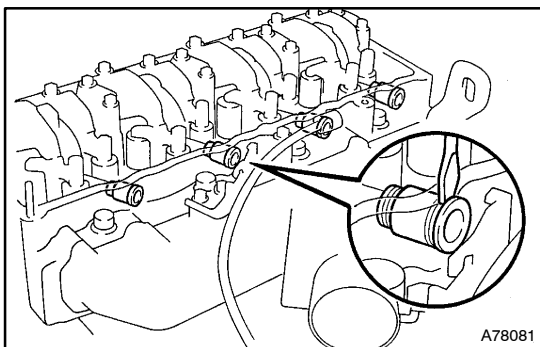
4. REMOVE INJECTION PIPE SET

- (a) Loosen the union nuts of the 4 injection pipes.
SST 09023-12700
- (b) Remove the 4 bolts, 2 nuts, 4 injection pipes and 6 clamps.



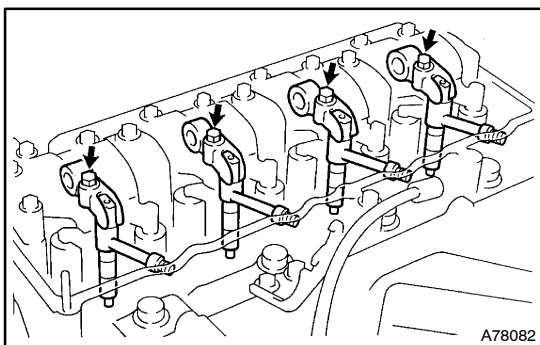
5. REMOVE NOZZLE LEAKAGE PIPE ASSY

- (a) Disconnect the fuel return hose from the nozzle leakage pipe.
- (b) Remove the nut holding the nozzle leakage pipe to the cylinder head.
- (c) Remove the 4 hollow bolts, 5 gaskets and nozzle leakage pipe.



6. REMOVE NOZZLE HOLDER SEAL

- (a) Using a screwdriver, pry out the nozzle holder seals from the cylinder head.

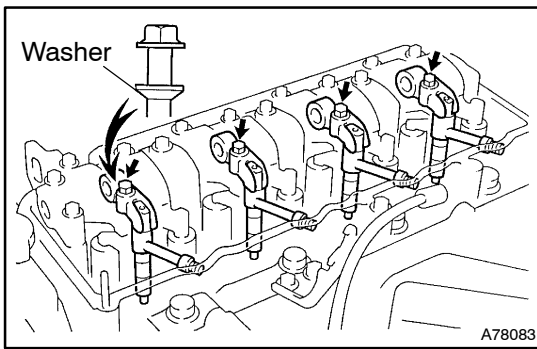


7. REMOVE NOZZLE HOLDER AND NOZZLE SET

- (a) Remove the bolt holding the nozzle holder clamp to the cylinder head.
- (b) Remove the 4 injection nozzles and seats from the cylinder head.
- (c) Remove the O-ring from the injection nozzle.

HINT:

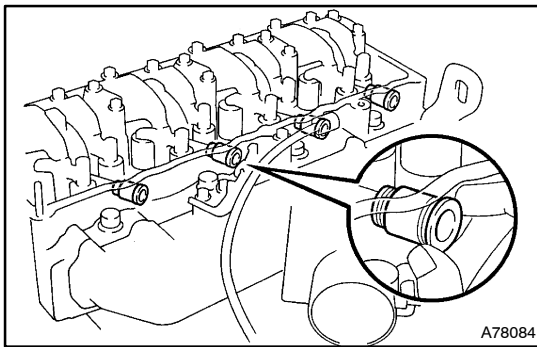
Arrange the injection nozzles in connect order.

**8. INSTALL NOZZLE HOLDER AND NOZZLE SET**

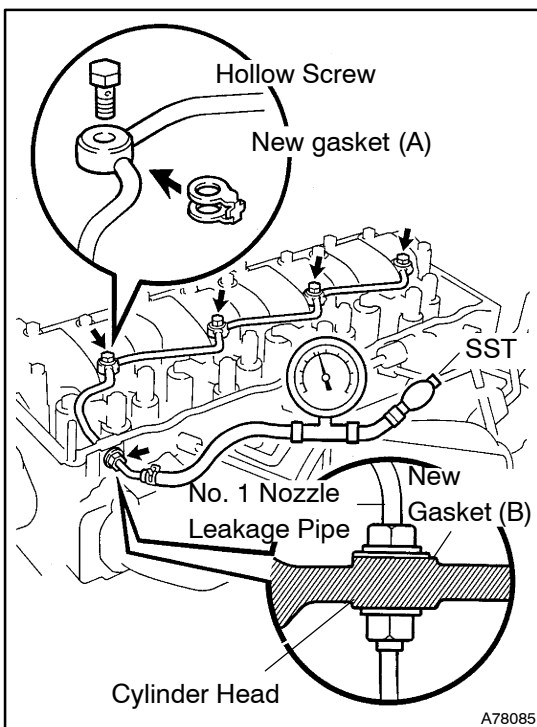
- (a) Install a new O-ring to the injection nozzle.
- (b) Place 4 new nozzle seats into the injection nozzle holes of the cylinder head.
- (c) Install the injection nozzles with the nozzle holder clamp, washer and bolt to the cylinder head.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

- (d) Inspect the valve clearance (See page 14-49).

**9. INSTALL NOZZLE HOLDER SEAL**

- (a) Install the 4 new nozzle holder seals to the cylinder head with your hand.

**10. INSTALL NOZZLE LEAKAGE PIPE ASSY**

- (a) Install the 5 new gaskets, nozzle leakage pipe to the cylinder head and 2 injection nozzle with the 4 hollow screws and nut.

Torque:

Hollow screw: 12 N·m (125 kgf·cm, 9 ft·lbf)

Nut: 14 N·m (145 kgf·cm, 10 ft·lbf)

NOTICE:

Install the gasket (A) so that its connecting part is between the pipe as shown in the illustration.

- (b) Using SST (turbocharger pressure gauge), apply the SST to the fuel return side of the nozzle leakage pipe, and maintain 49 kPa (0.5 kgf/cm², 7.1 psi) of pressure for 10 seconds to check that there are no leaks.

SST 09023-12700

- (c) Connect the fuel return hose to the nozzle leakage pipe.

11. INSTALL INJECTION PIPE SET

- (a) Temporarily install a flare nut respectively on the nozzle side and pump side.

- (b) Install the injection pipe clamp to the injection pipe.

Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)

- (c) Tighten the flare nuts completely.

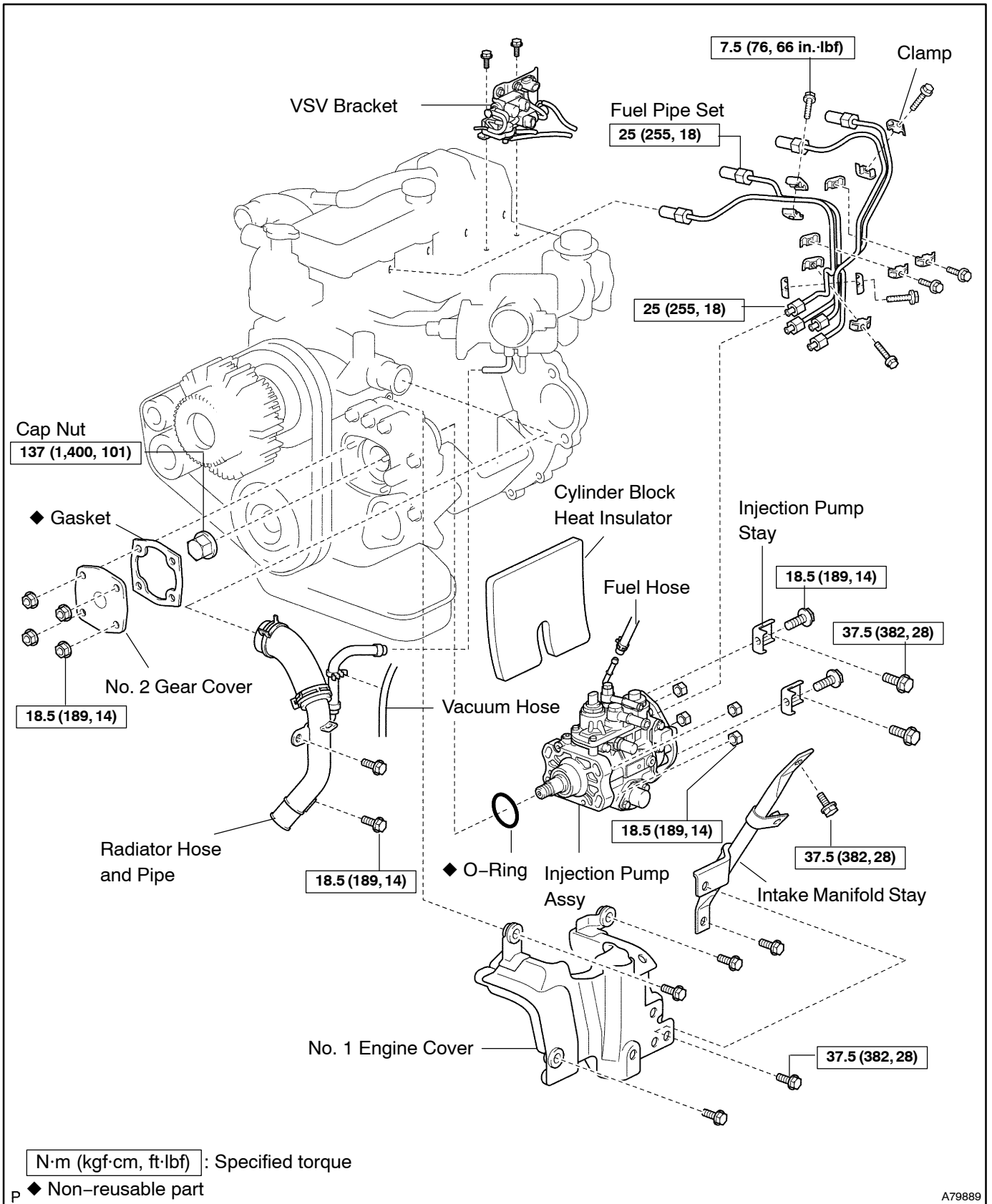
SST 09023-12700

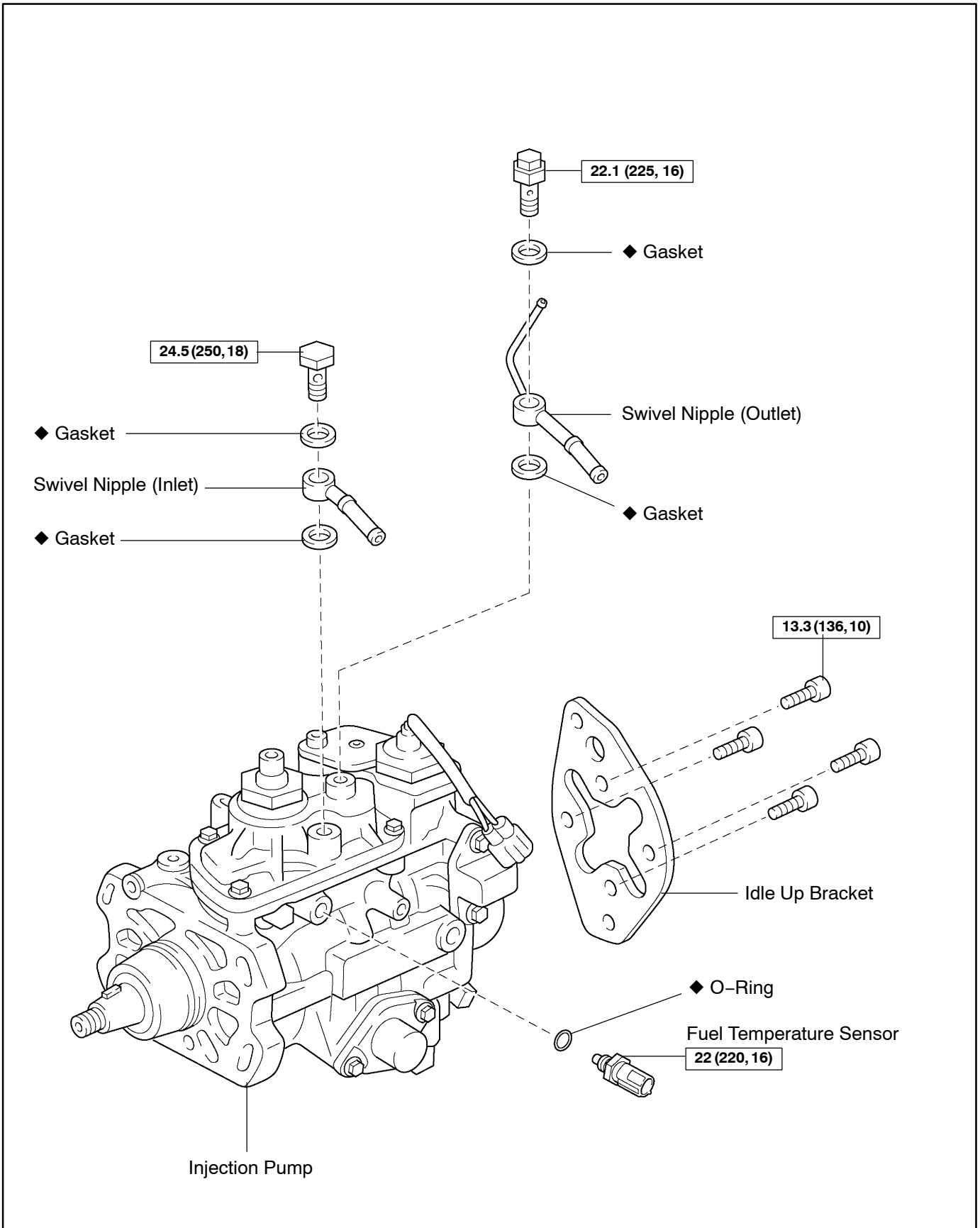
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

12. ADD FUEL**13. BLEED FUEL (See page 11-57)****14. CONNECT BATTERY NEGATIVE TERMINAL****15. INSPECT FOR FUEL LEAKS**

INJECTION PUMP ASSY (15B-FTE) COMPONENTS

110Q4-01



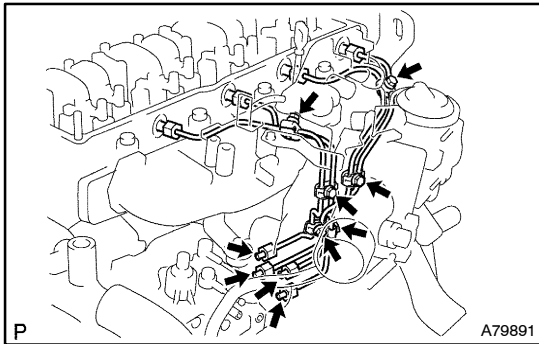


N

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL
3. DRAIN ENGINE COOLANT

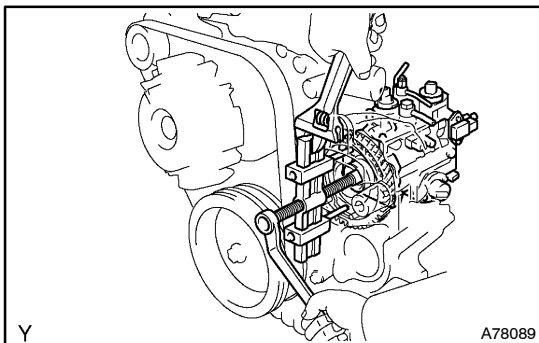
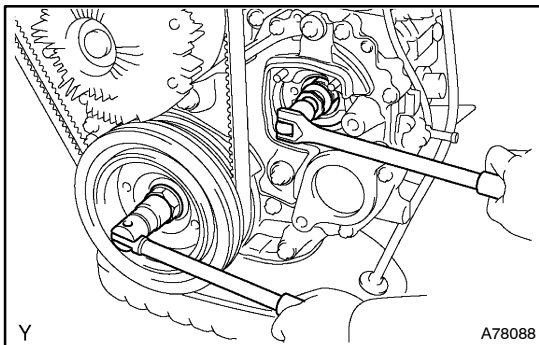


4. REMOVE FUEL PIPE SET
 - (a) Remove the 2 bolts and VSV bracket.
 - (b) Loosen the union nuts of the 4 injection pipes.
SST 09023-12700
 - (c) Remove the 3 bolts, 2 nuts, 4 injection pipes and clamps.

5. DISCONNECT FUEL MAIN HOSE
6. DISCONNECT FUEL RETURN HOSE

7. REMOVE INJECTION PUMP ASSY

- (a) Disconnect the connectors.
- (b) Remove the 2 bolts and radiator hose and pipe.
- (c) Remove 4 bolts and No. 1 engine cover.
- (d) Remove the 2 bolts and intake manifold stay.
- (e) Remove the 4 bolts and 2 injection pump stay.
- (f) Remove the 4 nuts and No. 2 gear cover.
- (g) Hold the crankshaft pulley, and remove the injection pump drive gear nut.
- (h) Remove the 2 injection pump stay with the 4 bolts.
- (i) Remove the 4 nuts holding the injection pump to the timing gear case.

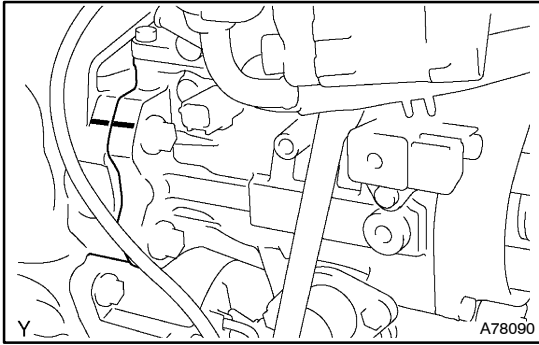


- (j) Using SST, remove the injection pump.
SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)

8. REMOVE FUEL OUTLET PIPE
9. REMOVE FUEL INLET PIPE
10. INSTALL FUEL INLET PIPE
11. INSTALL FUEL OUTLET PIPE

12. INSTALL INJECTION PUMP ASSY

- (a) Apply a light coat of engine oil on the O-ring.
- (b) Install a new O-ring to the injection pump.
- (c) Place the No. 1 cylinder block insulator.
- (d) Align the set key on the drive shaft with the key groove of the injection pump drive gear.
- (e) Temporarily install the 2 injection pump bracket.



- (f) Align the matchmarks of the injection pump and timing gear case.
- (g) Install the 4 nuts holding the injection pump to the timing gear case.
- (h) Tighten the 4 bolts of injection pump stay, completely.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

Torque:

Injection pump stay to injection pump:

18.5 N·m (189 kgf·cm, 14 ft·lbf)

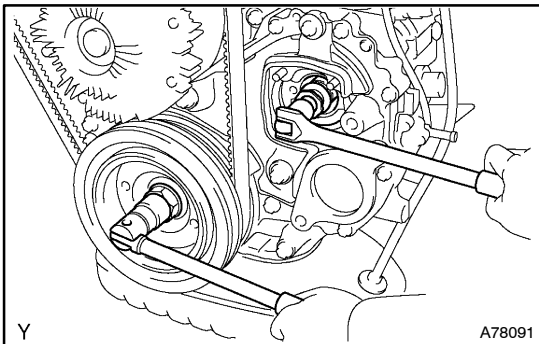
Injection pump stay to cylinder block:

37.5 N·m (382 kgf·cm, 28 ft·lbf)

NOTICE:

Before tightening to the standard torque, check whether the pump stay is up against the injection pump.

If there is a gap, loosen the bolts joining the pump stay to the cylinder block and set the pump stay against the injection pump.



- (i) Hold the crankshaft pulley, and install the injection pump drive gear nut.

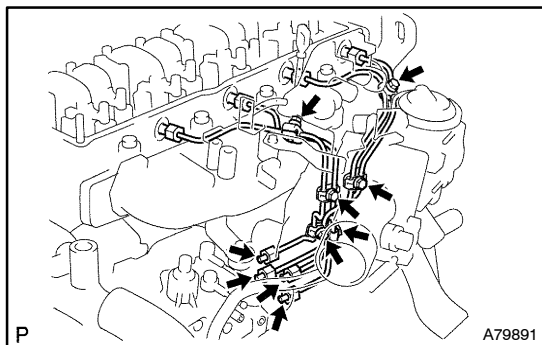
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)

NOTICE:

Do not turn the crankshaft pulley. The valve heads will hit against the piston top.

- (j) Install the No. 2 gear cover with the 4 nuts.
- (k) Install the intake manifold stay with the 4 bolts.
- (l) Install the No. 1 engine cover with the 4 bolts.
- (m) Install the radiator hose and pipe with the 2 bolts.
- (n) Connect the connectors.

13. CONNECT FUEL RETURN HOSE**14. CONNECT FUEL MAIN HOSE**

**15. INSTALL FUEL PIPE SET**

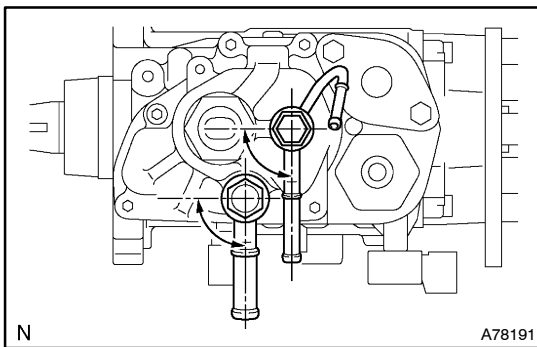
- (a) Temporarily install a flare nut respectively on the nozzle side and pump side.
- (b) Install the injection pipe clamp to the injection pipe.
Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)
- (c) Tighten the flare nuts completely.
SST 09023-12700
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)
- (d) Install the VSV bracket with the 2 bolts.

16. ADD FUEL**17. ADD COOLANT****18. CONNECT BATTERY NEGATIVE TERMINAL****19. BLEED FUEL (See page 11-57)****20. ADJUST INJECTION TIMING (See page 14-40)****21. INSPECT FOR FUEL LEAKS****22. INSPECT CHECK FOR ENGINE COOLANT LEAKS**

OVERHAUL

1. **REMOVE IDLE-UP BRACKET**
 - (a) Remove the 4 screws and bracket.
2. **REMOVE SWIVEL NIPPLE (INLET)**
 - (a) Remove the union, 2 gaskets and nipple.
3. **REMOVE SWIVEL NIPPLE (OUTLET)**
 - (a) Remove the union, 2 gaskets and nipple.
4. **REMOVE FUEL TEMPERATURE SENSOR**
 - (a) Remove the sensor and O-ring.
5. **INSTALL FUEL TEMPERATURE SENSOR**
 - (a) Install a new O-ring to the sensor.
 - (b) Install the sensor.

Torque: 21.6 N·m (220 kgf·cm, 16 ft·lbf)



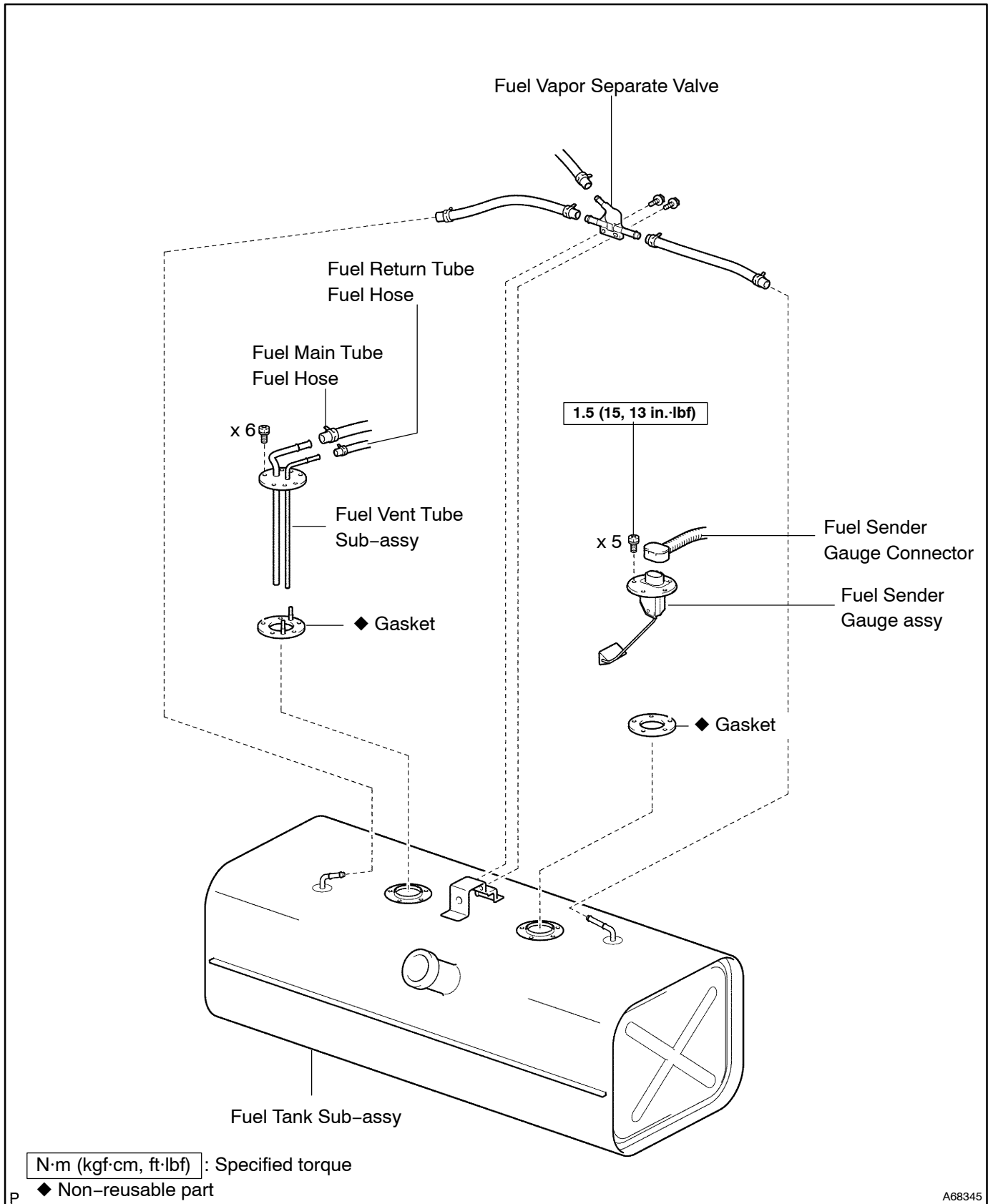
6. **INSTALL SWIVEL NIPPLE (INLET)**
 - (a) Install the nipple with 2 new gaskets and the union, as shown in the illustration.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)
7. **INSTALL SWIVEL NIPPLE (OUTLET)**
 - (a) Install the nipple with 2 new gaskets and the union, as shown in the illustration.
Torque: 22.1 N·m (225 kgf·cm, 16 ft·lbf)

8. **INSTALL IDLE-UP BRACKET**
 - (a) Install the bracket with the 4 screws.
Torque: 13.3 N·m (136 kgf·cm, 10 ft·lbf)

FUEL TANK ASSY (15B-FTE)

COMPONENTS

11005-01



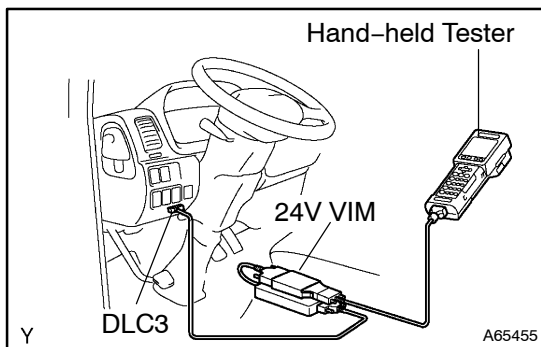
REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT**
2. **DISCONNECT BATTERY NEGATIVE TERMINAL**
3. **DRAIN FUEL**
4. **DISCONNECT FUEL SENDER GAUGE CONNECTOR**
5. **DISCONNECT FUEL MAIN TUBE**
6. **DISCONNECT FUEL RETURN TUBE**
7. **DISCONNECT CHECK VALVE FUEL HOSE**
8. **REMOVE FUEL TANK ASSY**
 - (a) Take out the fuel tank band, and then remove the fuel tank.
9. **REMOVE FUEL SENDER GAUGE ASSY**
 - (a) Remove the 5 screws and fuel sender gauge from the fuel tank.
10. **REMOVE FUEL TANK VENT TUBE SUB-ASSY**
 - (a) Remove the 6 bolts and fuel tank vent tube.
11. **REMOVE FUEL VAPOR SEPARATE VALVE**
 - (a) Remove the 2 bolts and fuel vapor separate valve.
12. **INSTALL FUEL VAPOR SEPARATE VALVE**
 - (a) Install the fuel vapor separate valve with the 2 bolts.
13. **INSTALL FUEL TANK VENT TUBE SUB-ASSY**
 - (a) With a new gasket, install the fuel tank bent tube with the bolts.
14. **INSTALL FUEL SENDER GAUGE ASSY**
 - (a) With a new gasket, install the fuel sender gauge with the 5 screws.
Torque: 1.5 N·m (15 kgf·cm, 13 in·lbf)
15. **INSTALL FUEL TANK ASSY**
 - (a) Install the tank and fuel tank band.
Torque: 13 N·m (132 kgf·cm, 10 ft·lbf)
16. **CONNECT CHECK VALVE FUEL HOSE**
17. **CONNECT FUEL RETURN TUBE**
18. **CONNECT FUEL RETURN TUBE**
19. **CONNECT FUEL SENDER GAUGE CONNECTOR**
20. **ADD FUEL**
21. **CONNECT BATTERY NEGATIVE TERMINAL**
22. **BLEED FUEL (See page 11-57)**
23. **INSPECT FOR FUEL LEAKS**

FUEL SYSTEM (S05C-B)

ON-VEHICLE INSPECTION

110QE-01



1. CHECK FUEL LEAK

CAUTION:

- During ACTIVE TEST mode, engine speed goes high and combustion noise becomes loud, so pay attention.
- During ACTIVE TEST mode, fuel becomes highpressure, so take much care not to expose your eyes, hands, or body to the fuel.

NOTICE:

Be sure to use the 24 V VIM, because the hand-held tester will be destroyed if you do not use the 24 V VIM.

- Check that there are no leaks from any part of the fuel system when the engine stops.

If there is fuel leakage, replace those parts.

- While cranking or starting the engine, check that there are no leaks from any part of the fuel system.

If there is fuel leakage, replace those parts.

- Disconnect the return hose from the injection pump assy.
- While cranking the engine, check fuel leakage from the return pipe.

If there is fuel leakage, replace the injection pump assy (See page 11-83).

- Connect the hand-held tester to the DLC3.
- Start the engine and push the hand-held tester main switch ON.
- Select the FUEL LEAK test of ACTIVE TEST mode on the hand-held tester.
- If you have no hand-held tester, depress the accelerator pedal quickly and fully to increase the engine speed at maximum and keep it for 2 seconds. Repeat this operation several times.
- Check that there are no leaks from any part of the fuel system.

NOTICE:

If the leakage from the return pipe is less than 10 cc (0.6 cu in.) in a minute, it is acceptable.

If there is fuel leakage, replace those parts.

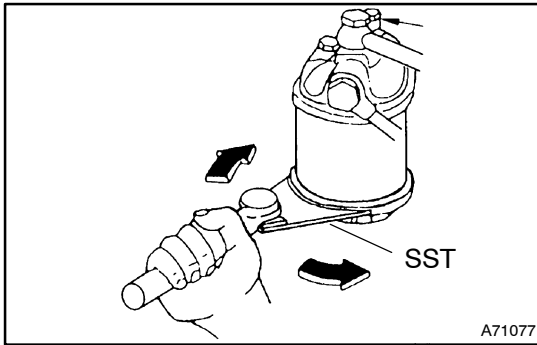
- Reconnect the return hose to the injection pump assy.

FUEL FILTER ELEMENT (S05C-B)

110JF-02

REPLACEMENT

1. DRAIN FUEL
2. REMOVE DIESEL FUEL FILTER ASSY
 - (a) Remove the 3 fuel pipes.
 - (b) Remove the 2 bolts and fuel filter assy.



3. REMOVE FUEL FILTER ELEMENT
 - (a) Mount the fuel filter in a soft jaw vise.
 - (b) Using SST, remove the fuel filter element.
SST 09228-34010

4. INSTALL FUEL FILTER ELEMENT

- (a) Remove the dust on installation surface.
- (b) Apply a light coat of fuel to the gasket of new fuel filter.
- (c) Install the fuel filter by turning it lightly to the right by hand until it comes in contact with the surface of the fuel filter cover.

NOTICE:

Do not use SST in tightening the element by hand.

- (d) Then using the SST, tighten the fuel filter about 240° (2/3 turn).
SST 09228-34010

NOTICE:

- Replace the new gasket.
- Do not reuse the element.
- Attention the gasket to damage.

5. INSTALL DIESEL FUEL FILTER ASSY

- (a) Tighten the fuel filter assy with the 2 bolts.
Torque: 55 N·m (561 kgf·cm, 40 ft·lbf)
- (b) Using a new gasket, install the fuel pipe to the fuel filter assy with the union bolts.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

6. ADD FUEL

7. BLEED FUEL

CAUTION:

At time of air venting, pay attention to the following items.

- Pay attention to fuel spilling from the pump air bleeder and the fuel filter drain pipe at the time of air venting.
Apply rags etc. to the respective parts being worked on and take care to prevent spilling of fuel onto the surroundings.
 - If starting is difficult or if the engine stops some time after starting, the air has not been vented sufficiently and should be repeated.
- (a) Loosen the priming pump knob of the injection pump by hand and pull out the knob.
 - (b) Push the knob by hand and move it up and down for pumping.

- (c) When pushing the knob becomes harder, loosen the fuel filter drain bolt and vent the air through the drain pipe.
- (d) Tighten the fuel filter drain bolt provisionally.
- (e) Repeat the steps (b) to (d) until air no longer comes from the drain pipe and then tighten the drain bolt with the correct torque.

Torque: 6.9 N·m (70 kgf·cm, 61 in·lbf)

- (f) Again move the priming pump knob of the injection pump up and down for pumping.
- (g) When pushing the knob becomes harder, loosen the air bleeder of the pump and vent the air.
- (h) Tighten the air bleeder provisionally.
- (i) Repeat the steps (f) to (h) and when air no longer comes out from the air bleeder tighten the air bleeder with the correct torque.

Torque: 5.9 N·m (60 kgf·cm, 52 in·lbf)

- (j) Again pump until pushing the knob becomes harder, and finally lock the knob by tightening it in the pushed in condition.
- (k) Again confirm the tightening of all parts and then start the engine.

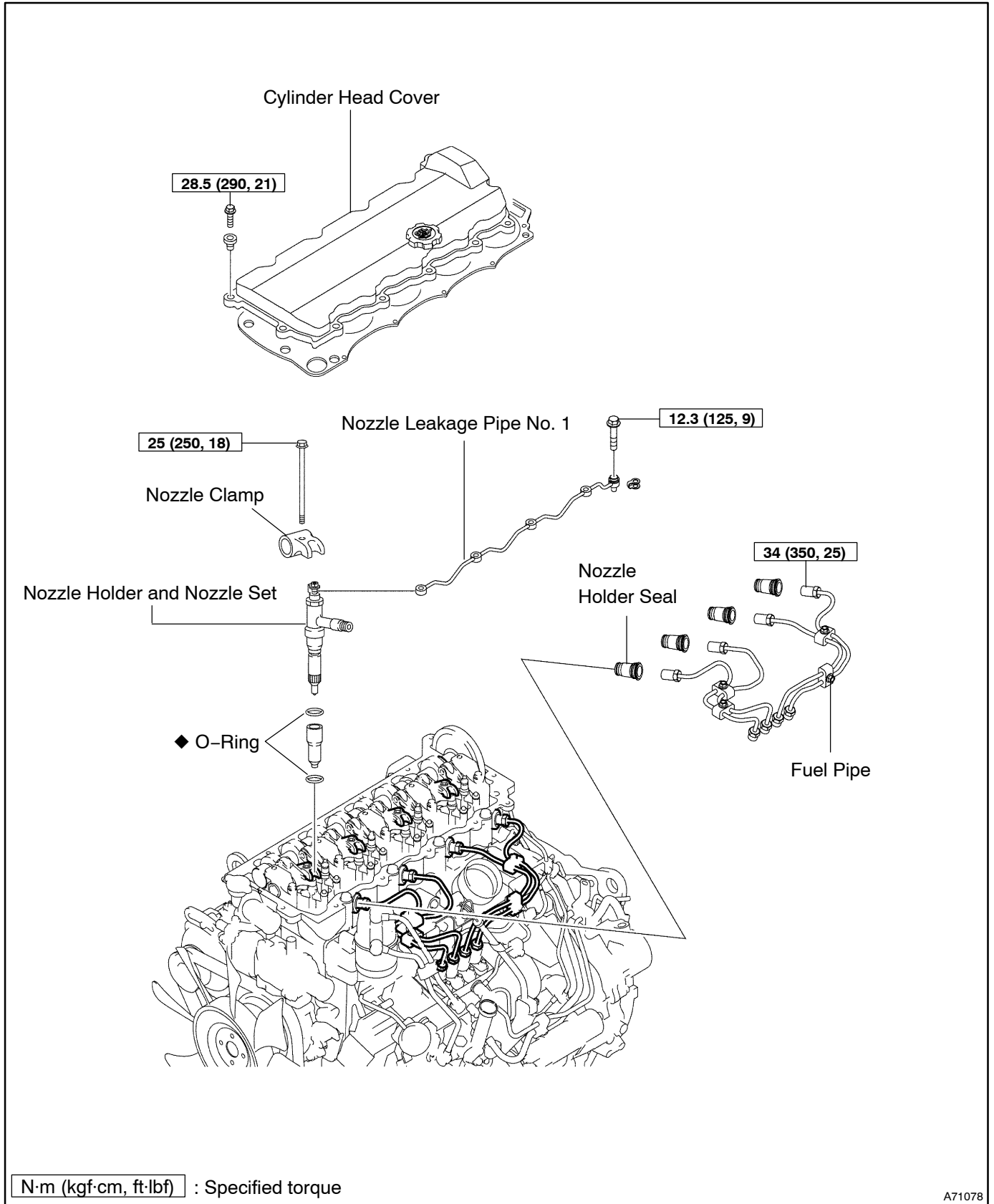
NOTICE:

- **When starting the engine, do not use the starter for 15 seconds continuously to prevent it from burned out. And also take an interval of 30 seconds before re-starting to protect the battery.**
- **For the above reason, do not bleed the air by cranking the engine with the starter.**

8. INSPECT FOR FUEL LEAKS

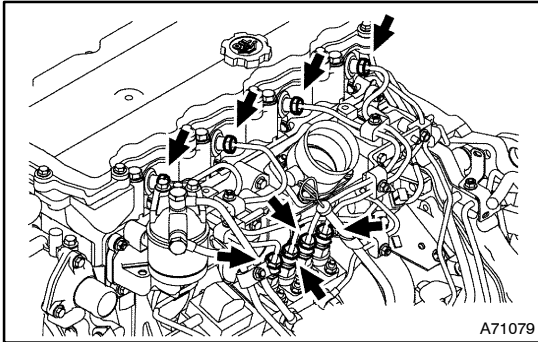
NOZZLE HOLDER AND NOZZLE SET (S05C-B) COMPONENTS

110QF-01



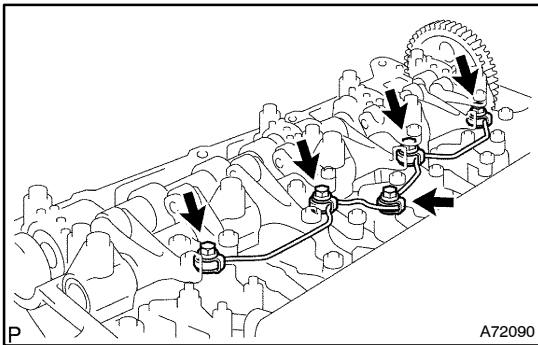
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL
3. REMOVE CYLINDER HEAD COVER

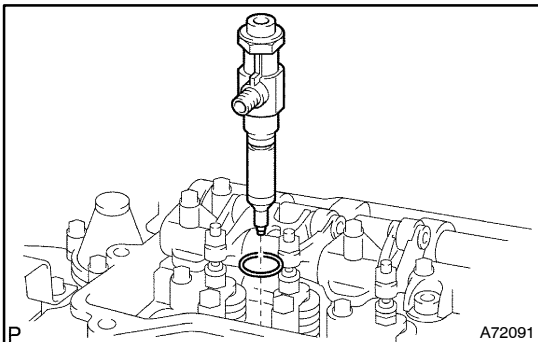


4. REMOVE INJECTION PIPE SET
 - (a) Loosen the 4 union nuts from the 4 injection nozzles.

5. REMOVE NOZZLE HOLDER SEAL



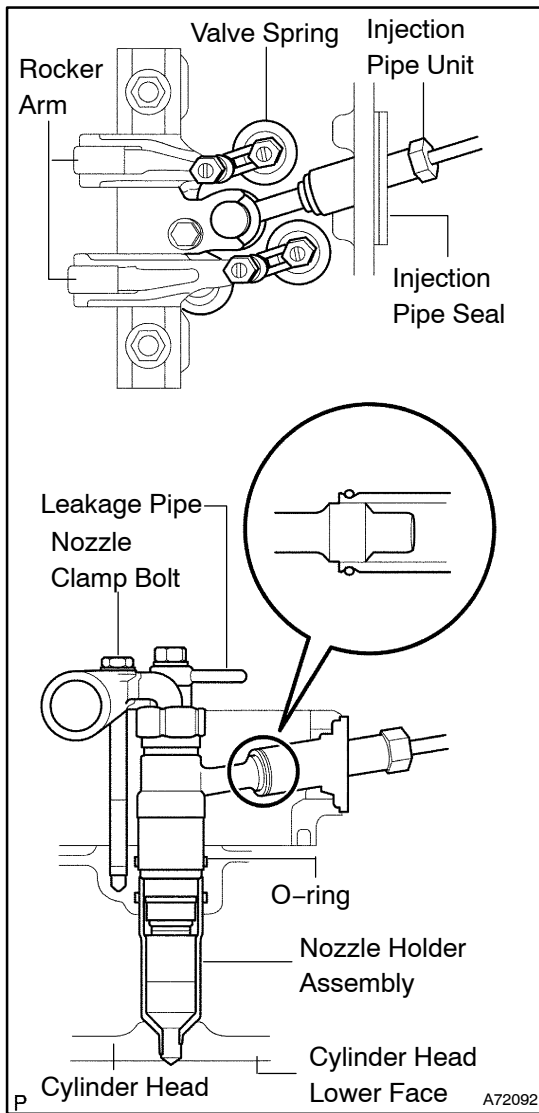
6. REMOVE NOZZLE LEAKAGE PIPE NO.1
 - (a) Remove the 5 joint bolts, fuel return pipe and 5 gaskets.



7. REMOVE NOZZLE HOLDER AND NOZZLE SET
 - (a) Remove the 4 bolts, 4 washers, 4 nozzle holder clamps, 4 injection nozzles and 4 seats.
 - (b) Remove the O-rings from the injection nozzle.
If difficult, use a SST, sliding hammer for easier removal.
SST 09420-1442

NOTICE:

Replace the 2 O-rings with a new one.



8. INSTALL NOZZLE HOLDER AND NOZZLE SET

- (a) Install a new O-ring into the groove of the cylinder head.
- (b) Make sure that there is no dirt or foreign particles at the sealing part between the nozzle holder and related parts (O-ring, nozzle sleeve and injection pipe seal), and connecting part between the nozzle holder and nut of the injection pipe.
- (c) Insert the nozzle holder taking care not to contact the valve spring as shown in the figure.

NOTICE:

Apply engine oil to the O-ring and be careful that the O-ring is not caught.

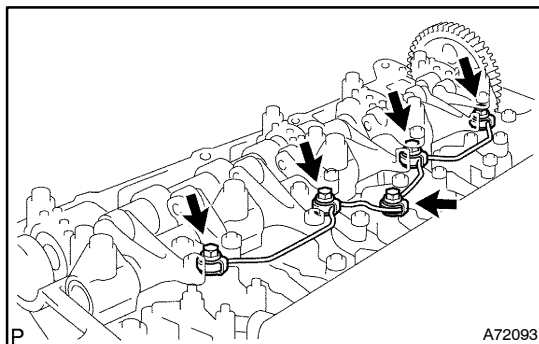
- (d) Cover the end of the injection pipe seal with the nozzle holder as shown in the figure and tighten the bolts to fasten the injection pipe seal to the cam housing.
- (e) Tighten the nut of the injection pipe provisionally.
- (f) Tighten the nozzle clamp bolt.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

NOTICE:

After tightening the bolt, make sure that the rocker arm moves smoothly.

- (g) Tighten the nut of the injection pipe.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)
- (h) Install the leakage pipe.

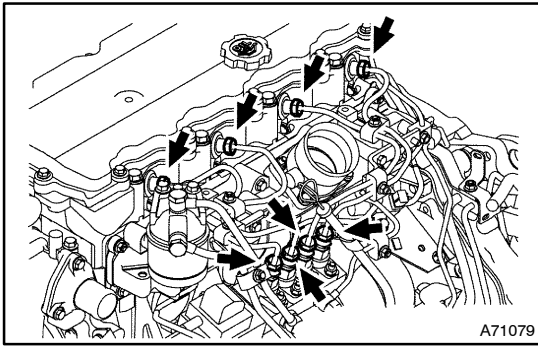


9. INSTALL NOZZLE LEAKAGE PIPE NO.1

- (a) Install 5 new gaskets and the return pipe with the 5 joint bolts.

Torque: 12.3 N·m (125 kgf·cm, 9 ft·lbf)

10. INSTALL NOZZLE HOLDER SEAL

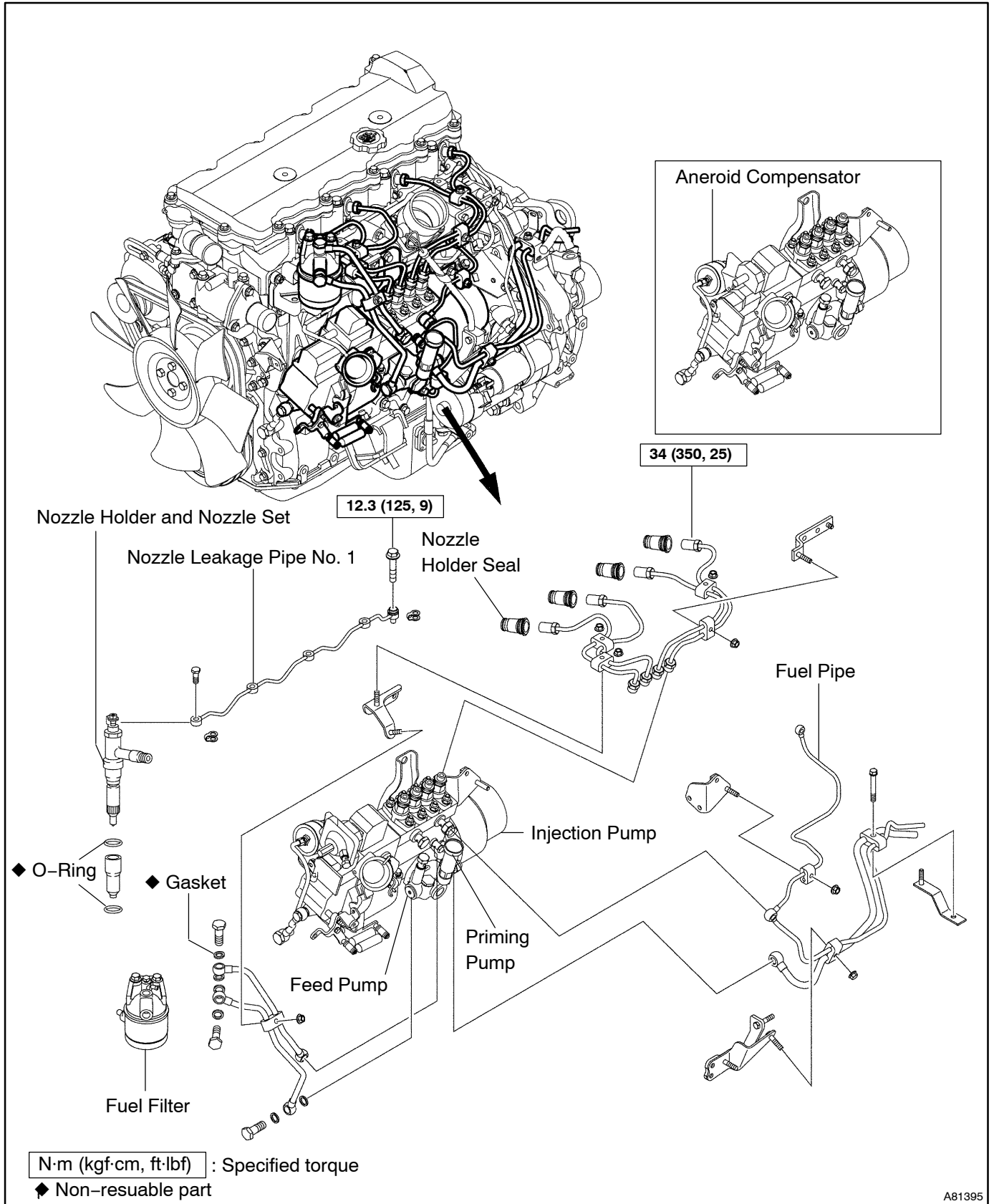
**11. INSTALL INJECTION PIPE SET**

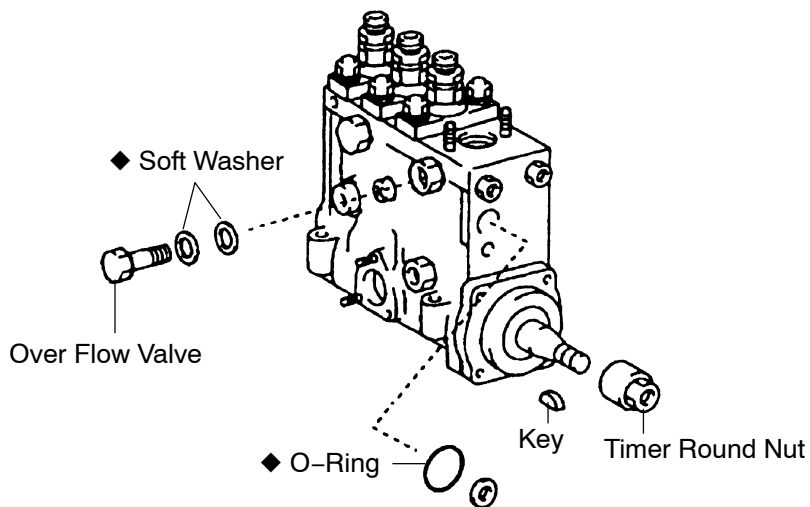
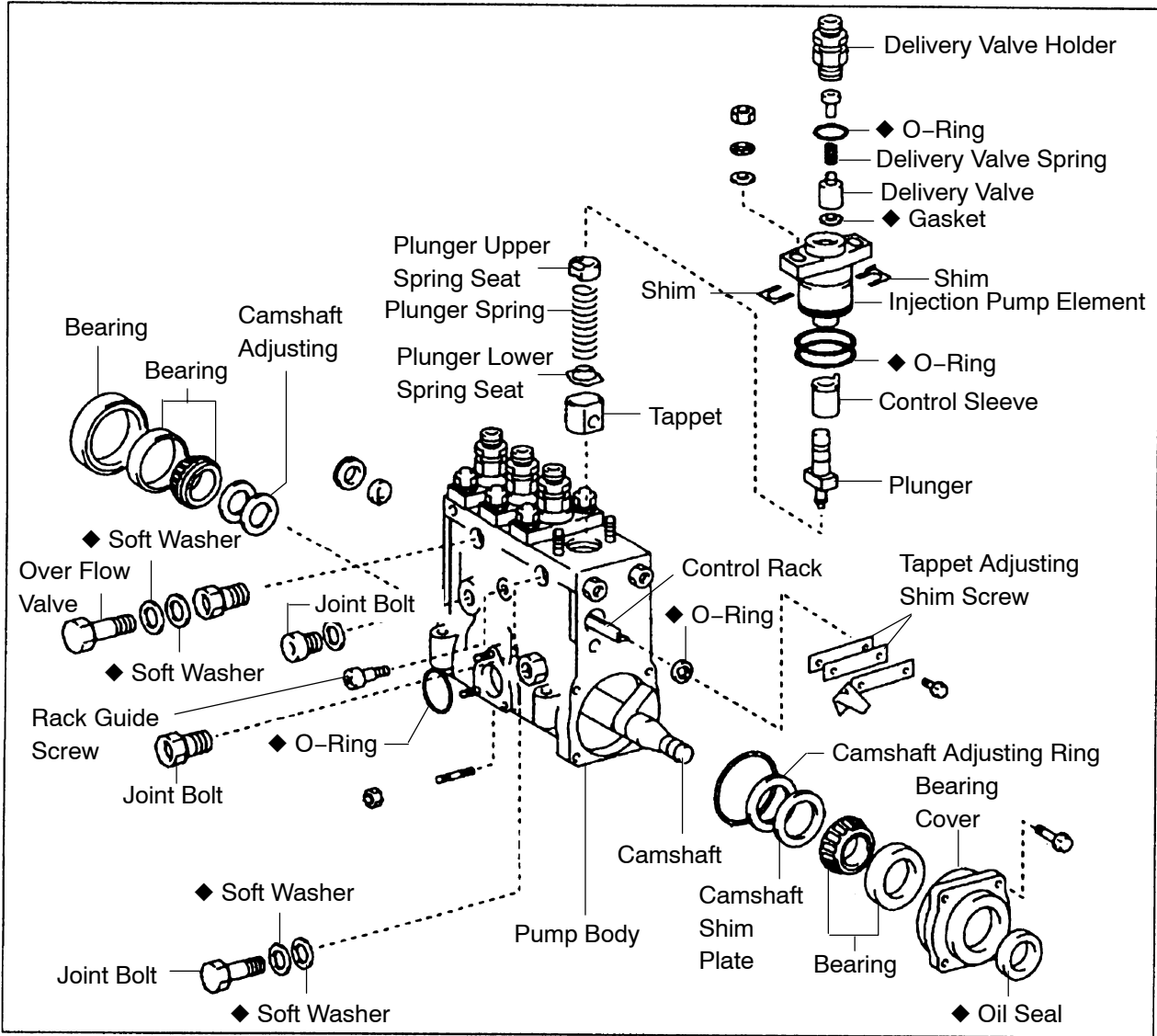
- (a) Tighten the 4 union nuts to the 4 injection pipes.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

12. INSTALL CYLINDER HEAD COVER**13. ADD FUEL****14. BLEED FUEL (See page 11-71)****15. CONNECT BATTERY NEGATIVE TERMINAL****16. INSPECT FOR FUEL LEAKS**

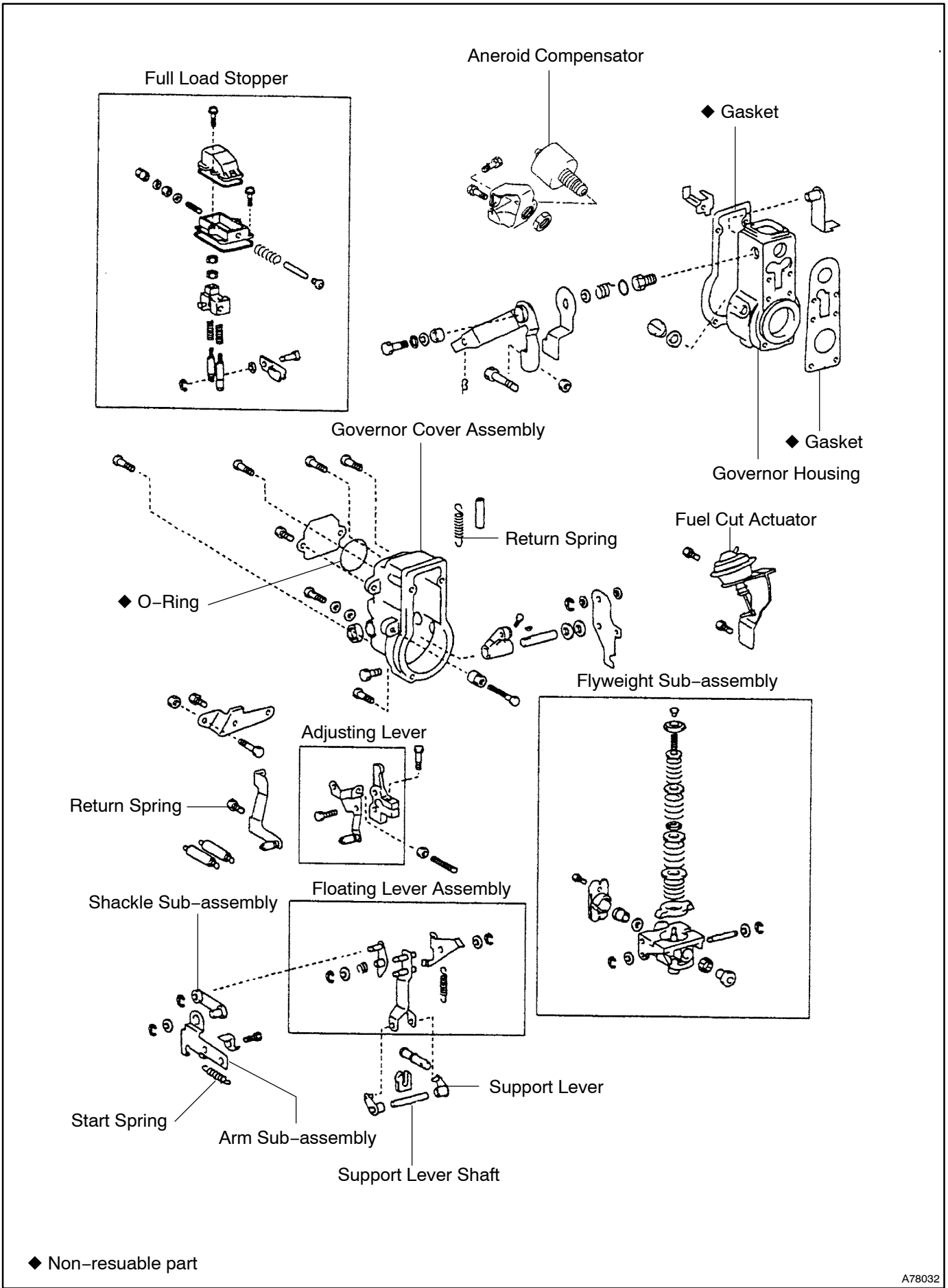
INJECTION PUMP ASSY (S05C-B) COMPONENTS

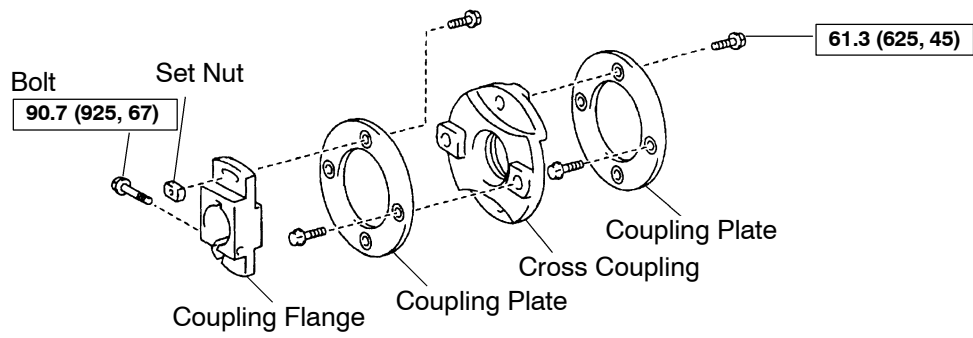
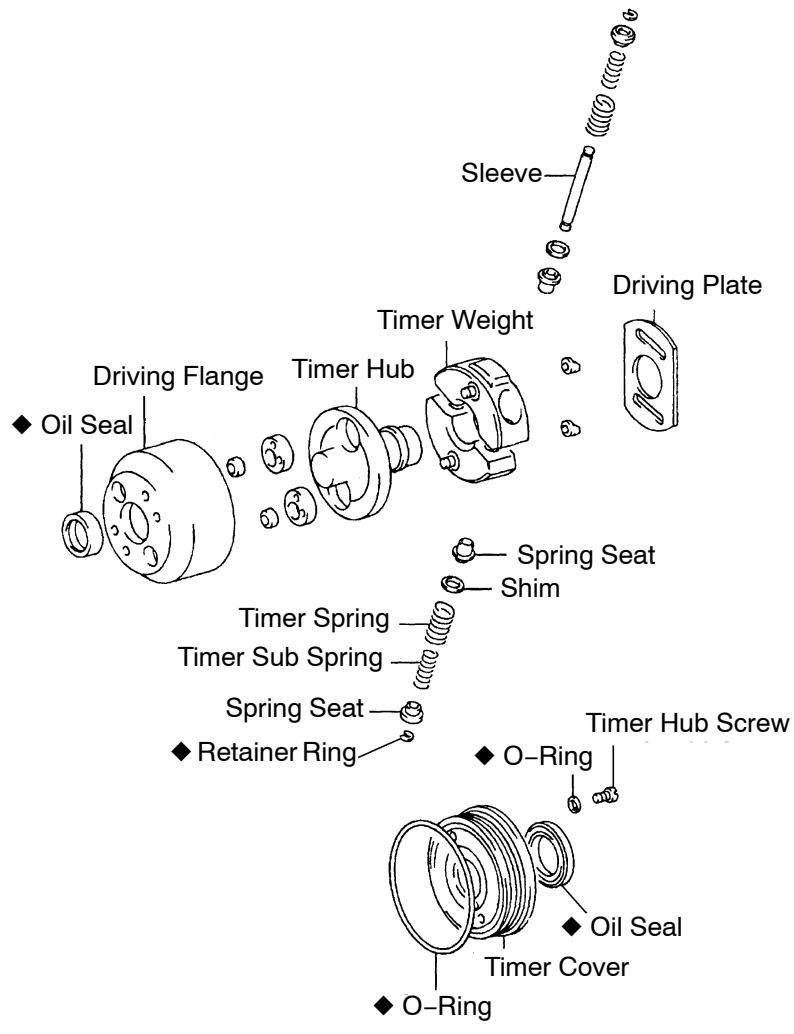
110JK-02





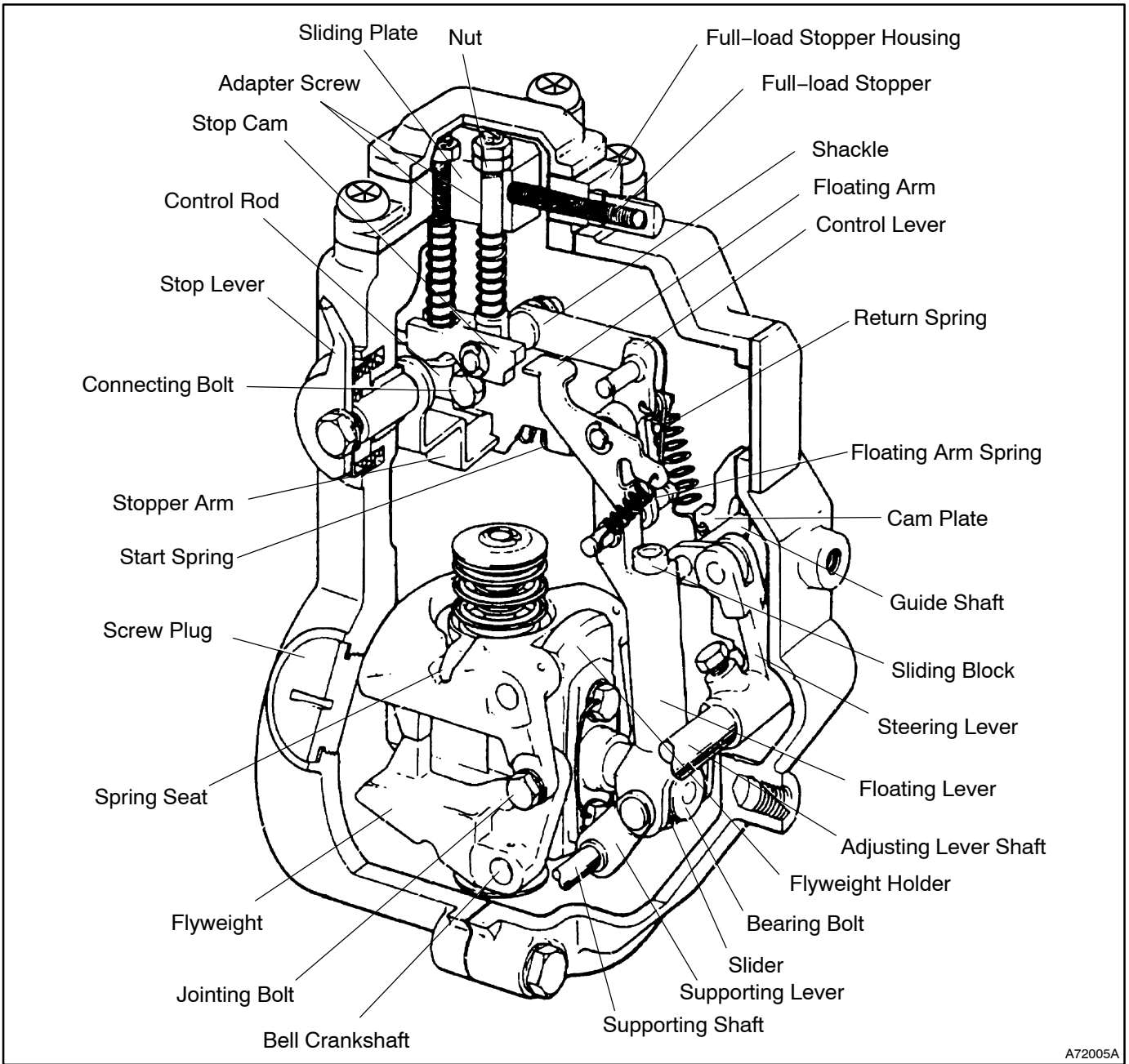
◆ Non-resuable part



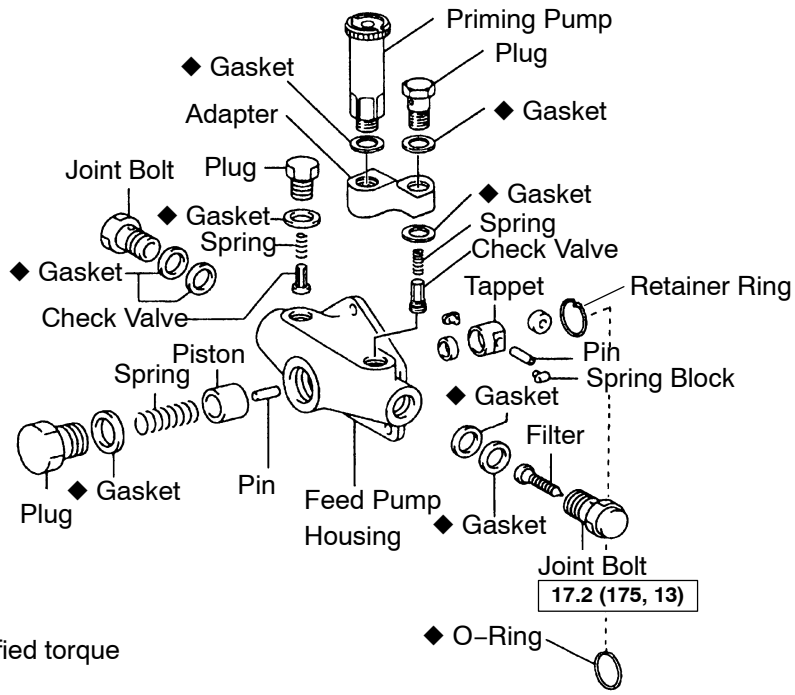


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-resuable part



Feed Pump (KE-Type)

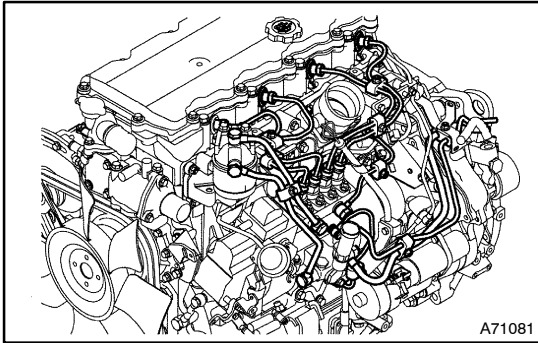


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-resuable part

REPLACEMENT

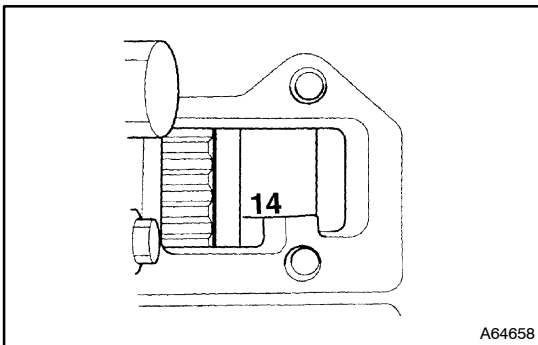
1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL
3. REMOVE OIL LEVEL GAUGE SUB-ASSY
4. REMOVE INTAKE AIR PIPE
5. REMOVE INJECTION PIPE SET (See page 11-74)



A71081

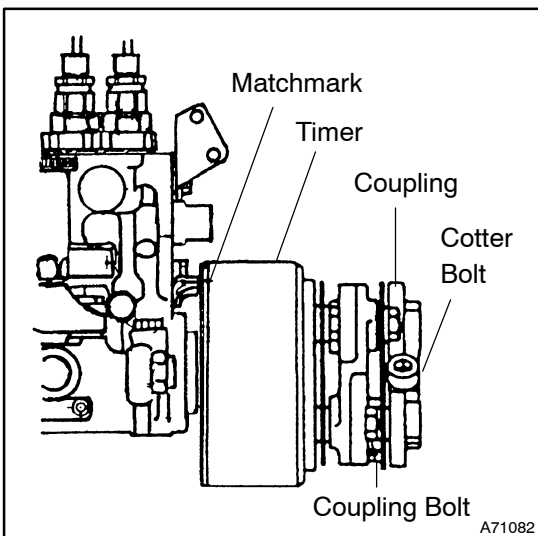
6. REMOVE FUEL PIPE SET
 - (a) Remove the illustrated fuel pipe.

7. REMOVE DIESEL FUEL FILTER ASSY (See page 11-71)



A64658

8. REMOVE INJECTION PUMP ASSY
 - (a) Turn the flywheel clockwise in the engine direction and align the No. 1 cylinder mark to the pointer in the flywheel hosing inspection opening.



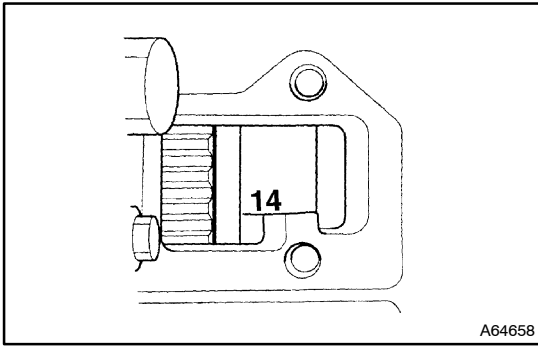
A71082

- (b) Adjust the top dead center of the No. 1 cylinder and timing mark of the injection pump.
- (c) Remove the coupling bolt.
- (d) Loosen the cotter bolt.

NOTICE:

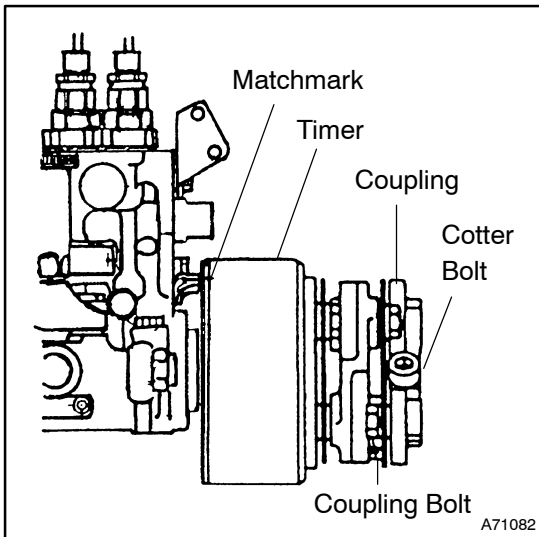
Loosen the cotter bolt and be careful not to apply excess pressure to the laminated coupling when installing the injection pump.

- (e) Remove the 4 bolts.
- (f) Remove the injection pump.



9. INSTALL INJECTION PUMP ASSY

- (a) Turn the crankshaft counterclockwise, as viewed from the flywheel side, and then align the timing mark in the check window of the flywheel housing with a mark of 1/4. At this time, the No. 1 cylinder or the No. 4 cylinder is in the top dead center, and therefore set the No. 1 cylinder in the top dead center as follows.



- (b) Check that the timing mark of the injection pump is correctly set in the top dead center of the No. 1 cylinder. At this time a slight difference is acceptable. If the timing mark is set in the 180 degrees opposite direction, the injection pump is set in the top dead center of the No. 4 cylinder. At this time, adjust the injection pump to be in the top dead center of the No. 1 cylinder by turning the flywheel one revolution.

- (c) Check that the cotter bolt is loose, and then install the injection pump to the bracket.

Torque: 22.1 N·m (225 kgf·cm, 16 ft·lbf)

- (d) Install the 2 coupling bolts temporarily, align the timing mark of the injection pump, and then tighten the bolt.

Torque: 61.3 N·m (625 kgf·cm, 45 ft·lbf)

NOTICE:

Check that no clearance exists between the laminated plates. And also check that the flange has not been deformed by pressing the laminated plates.

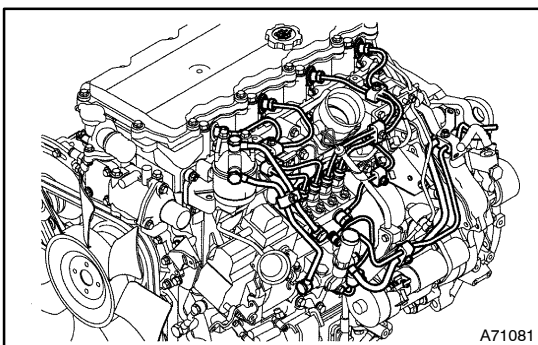
- (e) Tighten the cotter bolt.

Torque: 90.7 N·m (925 kgf·cm, 67 ft·lbf)

NOTICE:

Check that the laminated plates have not been deformed, or have not been under excess pressure.

10. INSTALL DIESEL FUEL FILTER ASSY (See page 11-71)



11. INSTALL FUEL PIPE SET

- (a) Install the 4 fuel pipes.

12. INSTALL INJECTION PIPE SET (See page 11-74)

13. INSTALL INTAKE AIR PIPE

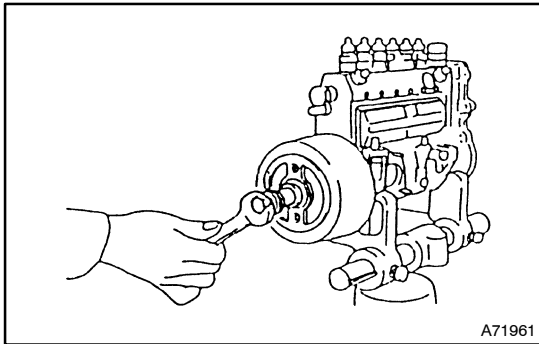
14. INSTALL OIL LEVEL GAUGE SUB-ASSY

15. ADD FUEL

16. BLEED FUEL (See page 11-71)

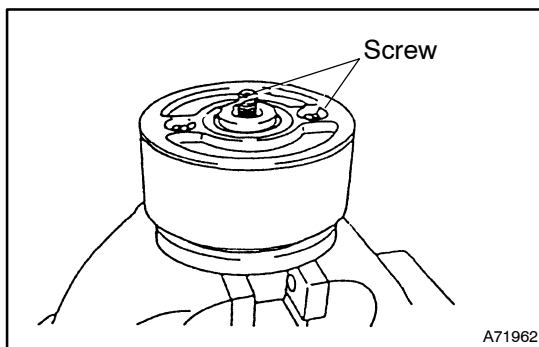
17. **CONNECT BATTERY NEGATIVE TERMINAL**
18. **INSPECT FOR FUEL LEAKS**

OVERHAUL



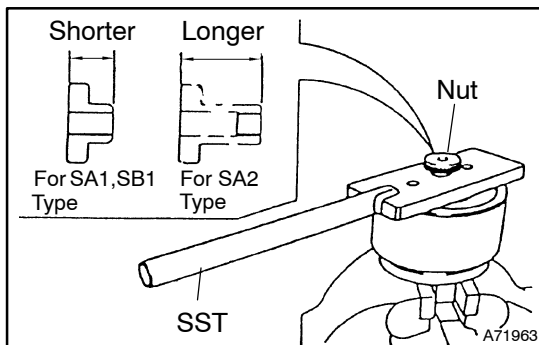
1. REMOVE TIMER FROM INJECTION PUMP

- (a) Remove the timer round nut from the timer.
- (b) Remove the timer from the injection pump.



2. REMOVE TIMER COVER

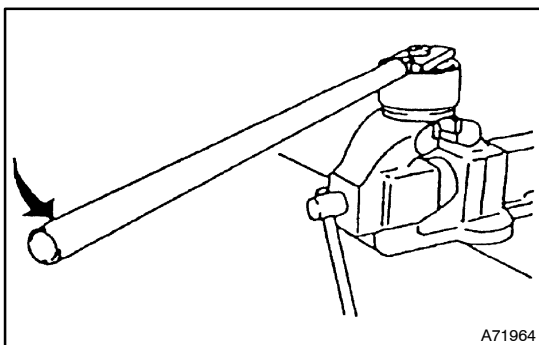
- (a) Remove the 2 timer hub screws.



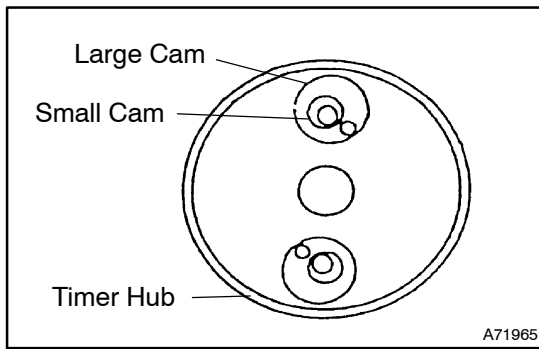
- (b) Install the SST on the cover, and fix with the nut.
SST 09512-2210

NOTICE:

Do not tighten the nut but leave loosened.



- (c) Set the extension bar on the timer wrench, then loosen and remove the timer cover.

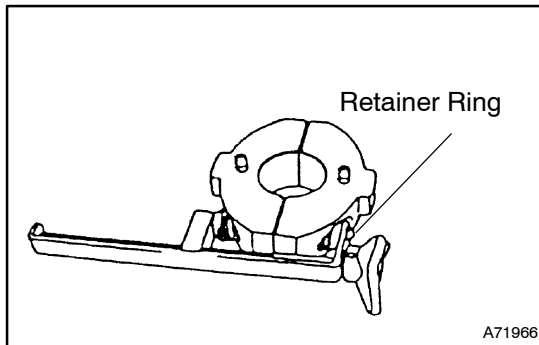


3. REMOVE TIMER WEIGHT

- (a) Remove the timer weight (with spring, timer weight rod etc.).

NOTICE:

Leave timer cams on timer hub.

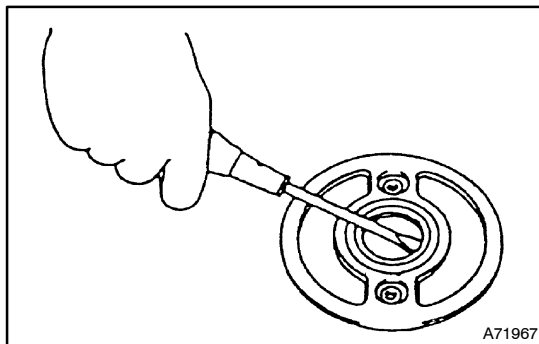


4. REMOVE TIMER CAMS AND TIMER HUB

- (a) Compress the time spring, then remove the retainer ring.

NOTICE:

Remember the position of timer cams.

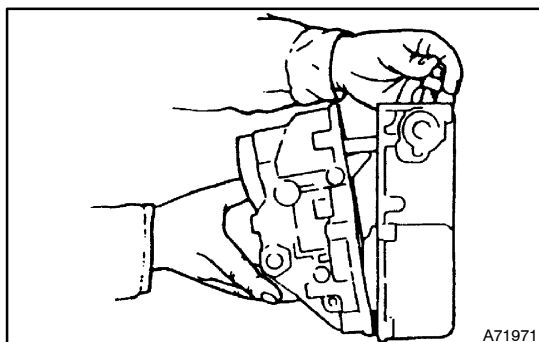


5. REMOVE OIL SEAL

- (a) Using a screwdriver, remove the oil seals from the timer cover and driving flange.

NOTICE:

- Breaking of the lead seals or crimp caps by anyone other than pump manufacture authorized service stations to make these adjustments will void the warranty.
- If fuel pump or governor difficulties are suspected, consult only pump manufacture authorized service stations, where the problem can be corrected and the injection pump lead seals and crimp caps can be reinstalled as required.

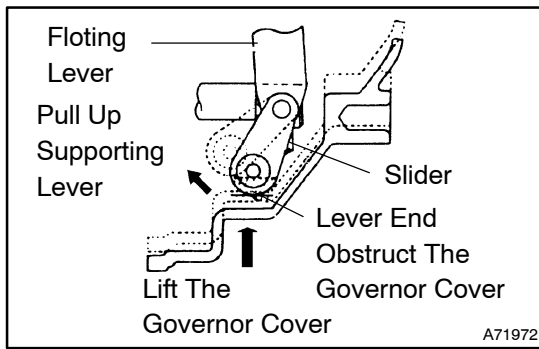


6. REMOVE GOVERNOR COVER

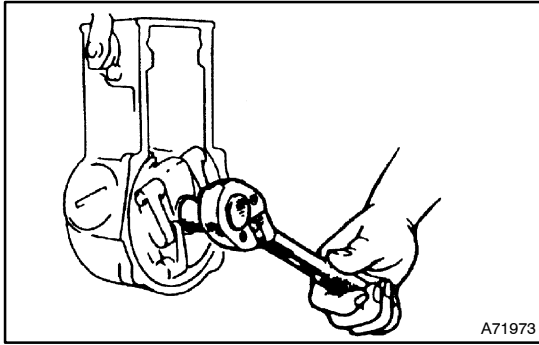
- (a) With the adjusting lever held in its 'idling' position, detach the governor cover by lifting it up in such a way that the sliding block can slide out of the slit in the floating lever.

NOTICE:

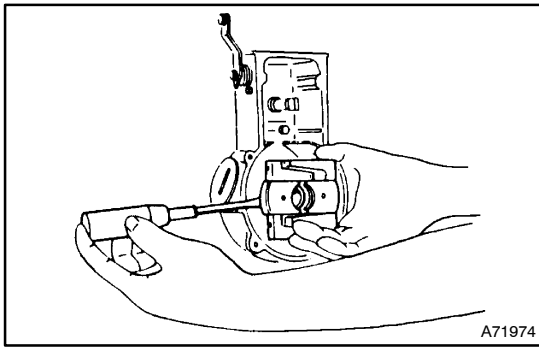
- Disconnect the special bolts or crimp caps by anyone other than HINO or pump manufacture authorized service stations to make these adjustment will void the warranty.
- If fuel pump or governor difficulties are suspected, consult only HINO or pump manufacture authorized service stations, where the problem can be corrected and the injection pump lead seals and crimp caps can be reinstalled as required.

**NOTICE:**

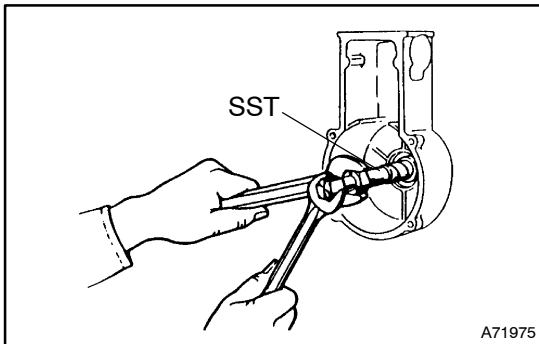
Before lifting the governor cover, be sure to pull up the supporting lever as shown by dotted lines in the figure, so that its lower end may not obstruct the lifting of the governor cover.

**7. REMOVE FLYWEIGHT ROUND NUT****NOTICE:**

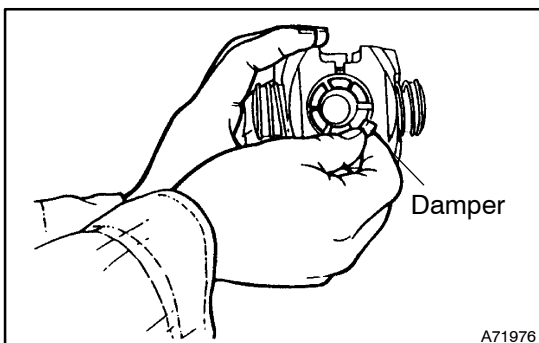
Use the holding spanner to keep the camshaft from rotating.

**8. REMOVE FLYWEIGHT SUB-ASSY**

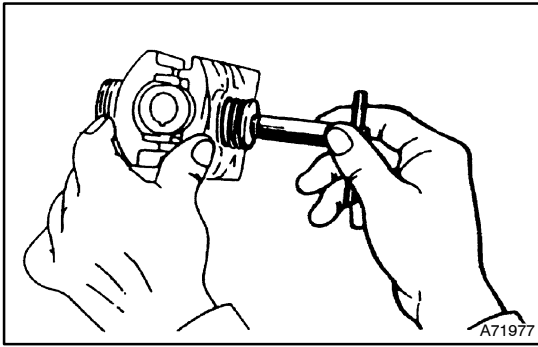
- (a) Remove the flyweight using a screwdriver to pull it out slowly.



- (b) Remove the camshaft bushing.
SST 09512-1920



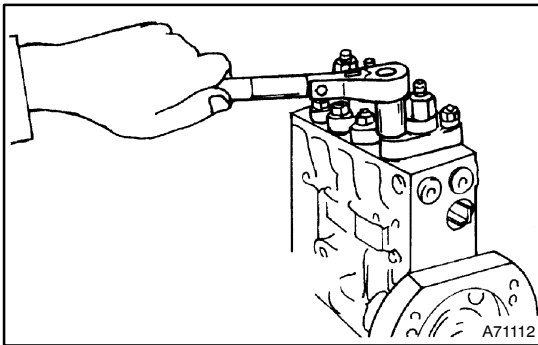
- (c) Remove the damper from the flyweight.



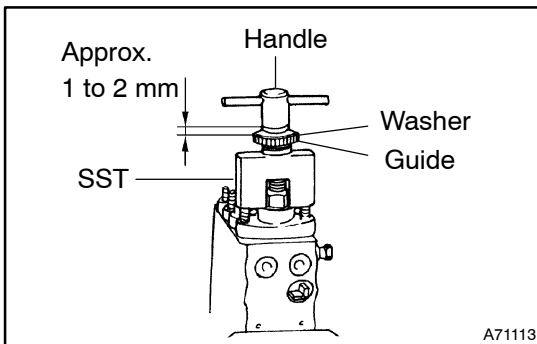
- (d) Remove the flyweight.
 (1) Remove the adjusting nut with SST, and disassemble the inner parts of the flyweight.

NOTICE:

- **Breaking of the lead seals or crimp caps by anyone other than pump manufacture authorized service stations to make these adjustments will void the warranty.**
- **If fuel pump or governor difficulties are suspected, consult only pump manufacture authorized service stations, where the problem can be corrected and the injection pump lead seals and crimp caps can be reinstalled as required.**
- **Measure and record the fuel delivery characteristics of the pump before disassembling it.**
- **Keep the parts for each cylinder in separate groups and in an orderly arrangement. Parts to be replaced and parts to be used again must be kept separately.**

**9. REMOVE DELIVERY VALVE GROUP**

- (a) Remove the nut that secures the cylinder.

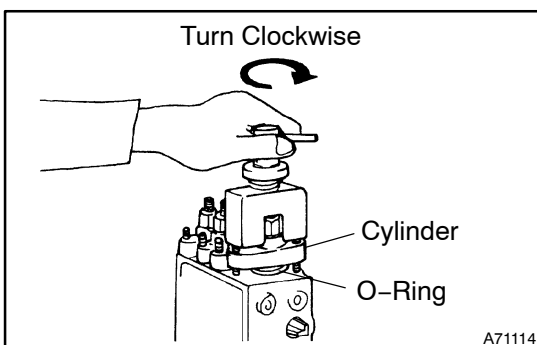


- (b) Turn the guide until the clearance between the washer and the handle is approx. 1 to 2 mm (0.039 - 0.078 in.), to set the SST.

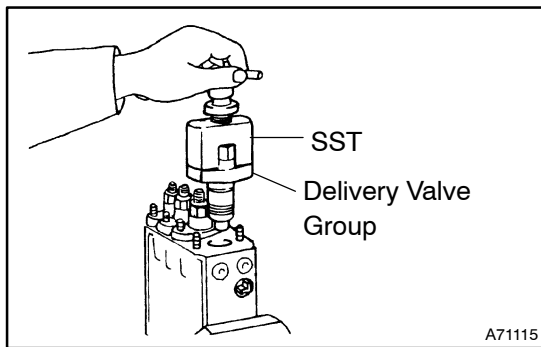
SST 09512-1920

NOTICE:

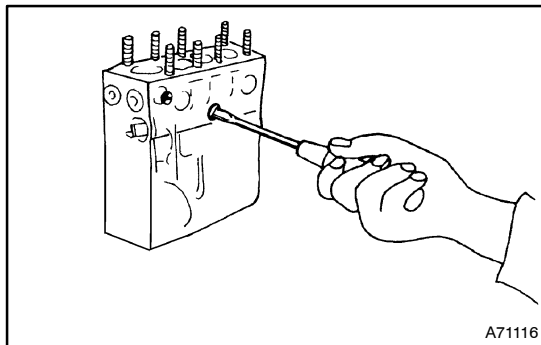
The guide of the SST is left-hand threaded.



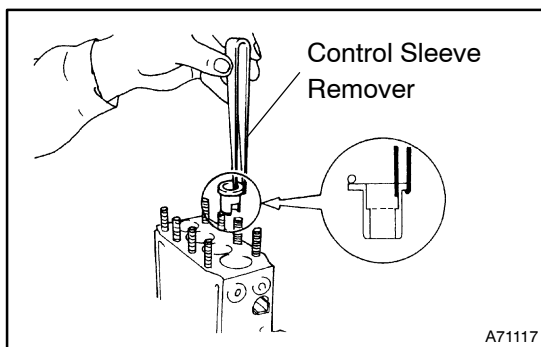
- (c) Turn the handle clockwise into the deliver valve holder. Continue until the O-ring in the cylinder comes off the pump housing.



- (d) Pull the SST upward to remove the delivery valve assembly.



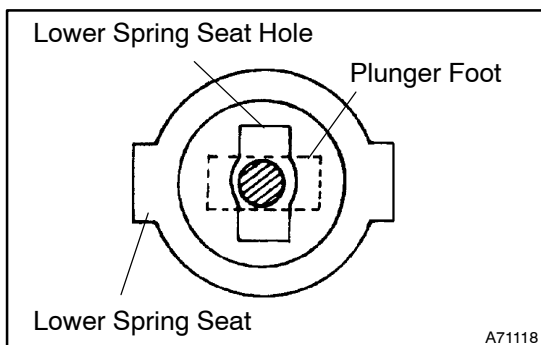
- (e) Remove the rack guide screw.



- (f) Remove the control sleeve.
- (1) Pull the control rack to the left (viewed from the feed pump) as far as it goes.
 - (2) Hook the end of the control sleeve remover onto the groove of the control sleeve and remove it.

NOTICE:

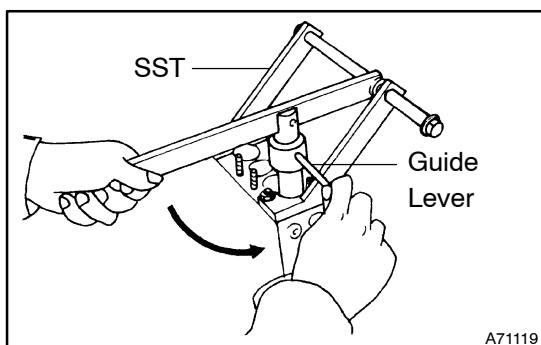
Set the camshaft at bottom dead center before removing the control sleeve.



- (g) Remove the plunger.
Bring the camshaft of the cylinder to top dead center.

NOTICE:

- **Do not mix up the plungers since they must be put back into the same cylinders.**
- **Handle the plunger very gently, in order not to damage it.**
- **Keep the removed plungers in a pan containing clean diesel fuel.**

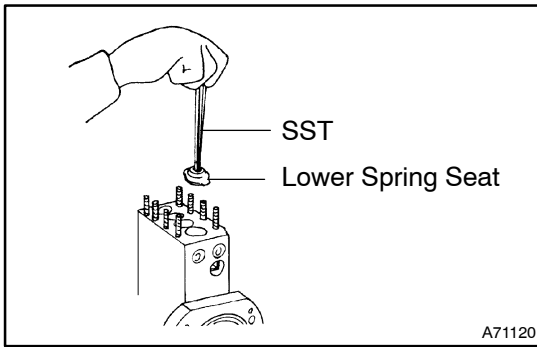


- (h) Remove the upper spring seat.
Pushing the handle down to push in the plunger spring, turn the guide lever 90° (in either direction) to remove the upper spring seat from the stopper pin.
SST 09512-1930

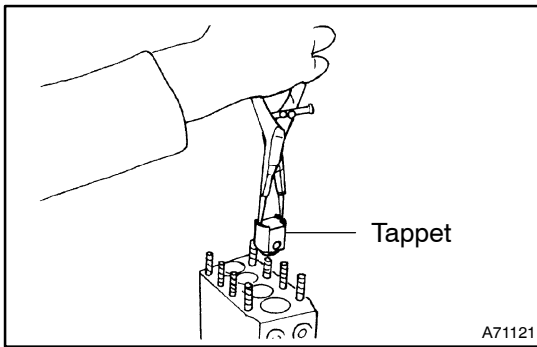
NOTICE:

First bring the cam of the cylinder to bottom dead center.

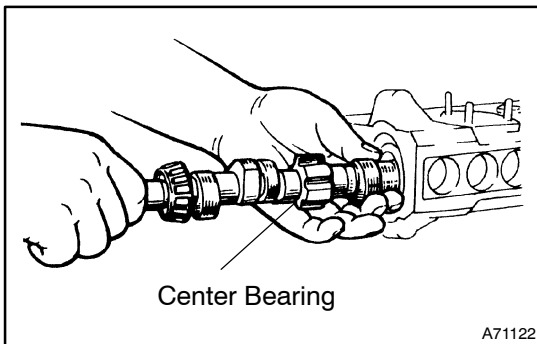
- (i) Remove the upper seat and plunger spring.



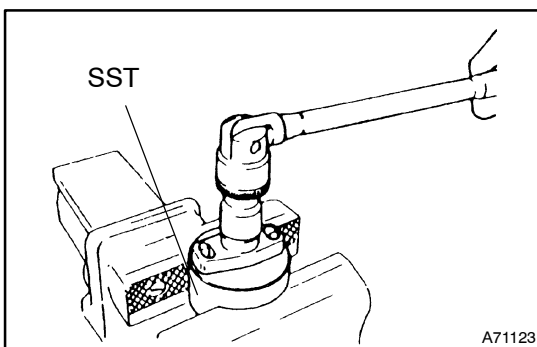
- (j) Using SST, remove the lower spring seat.
SST 09269-54030



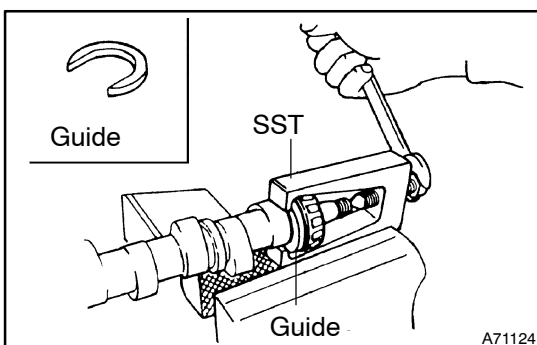
- (k) Remove the tappet.



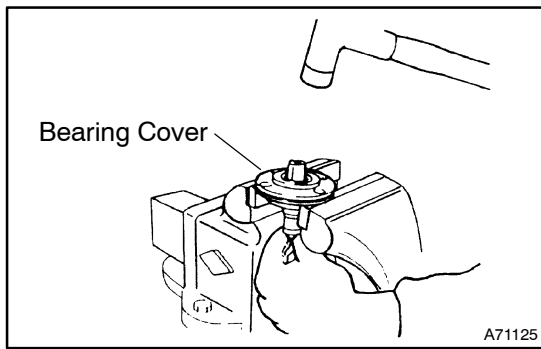
- (l) Remove the camshaft from the injection pump body.
- (1) Remove the center bearing two set screws.
 - (2) Loosen the bearing cover set screws.
 - (3) Lightly tap the camshaft with a plastic hammer from the governor side and remove the camshaft and bearing cove at the same time.



- (m) Disassemble the delivery valve group.
Mount the delivery valve assembly in the SST, and remove the delivery valve holder.
SST 09512-1910



- (n) Remove the taper bearing from the camshaft.
remove the taper bearing from the drive end of the camshaft using the SST.
SST 09287-58010
- (1) Use the guide to remove the bearing at the governor side.



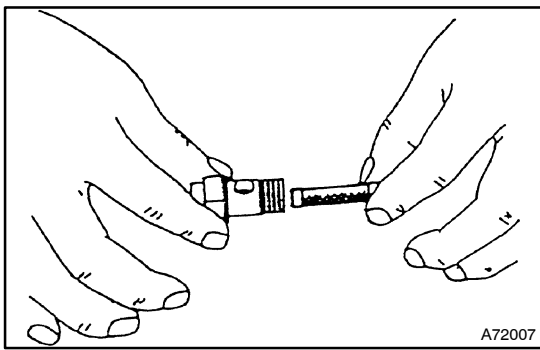
- (2) Tap out the outer race in the bearing cover.

10. REMOVE PRIMING PUMP AND CHECK VALVES

- (a) Unscrew the priming pump and remove the spring and inlet check valve.
 (b) Remove the outlet check valve and spring.

11. REMOVE TAPPET

- (a) Remove the retainer ring and pull out the tappet.



12. REMOVE FILTER FROM INLET PIPE JOINT

- (a) Clean the filter with clean diesel fuel.

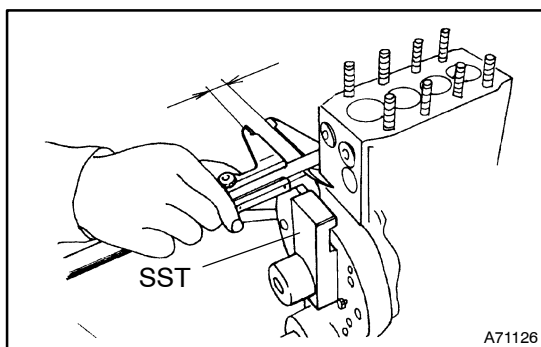
13. INSTALL TAPPET

14. INSTALL RETAINER RING

15. INSTALL PISTON

- (a) Insert the piston and spring in the housing and screw on the chamber plug with a new gasket.

16. INSTALL PLUG AND CHECK VALVES

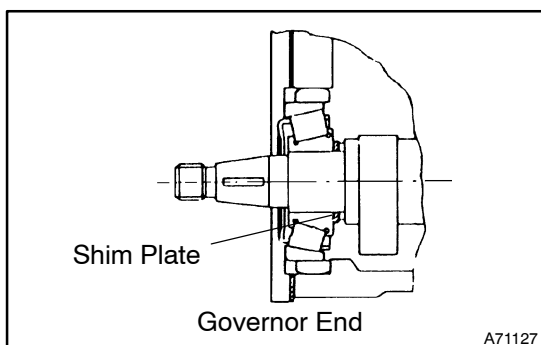


17. INSPECT CAMSHAFT PROTRUDING LENGTH

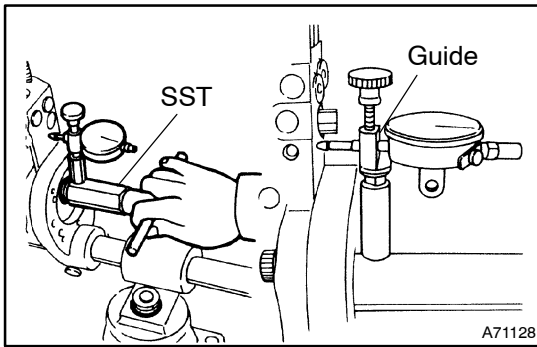
- (a) Measure the distance from the surface of the end of the pump housing to the surface of the end of the SST (where the tapered section of the camshaft starts).

SST 09510-1170

Standard length: 16 - 17 mm (0.63 - 0.67 in.)



- (b) If the specification is not met, use appropriate shim plates at the governor end of camshaft until the specification is met.

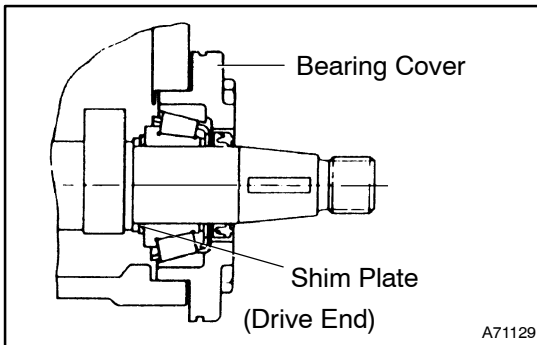
**18. INSPECT CAMSHAFT END PLAY**

- (a) Using SST, measure the thrust clearance of the camshaft with a dial gauge.

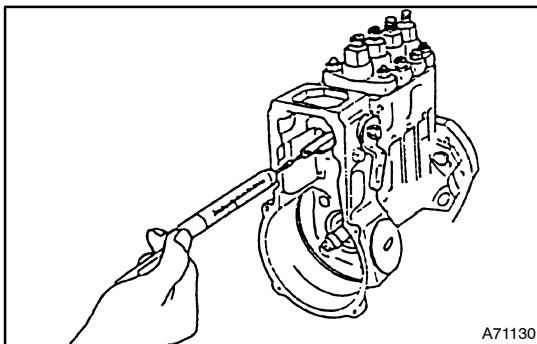
SST 09512-1150

Standard end play:

0.03 - 0.05 mm (0.0012 - 0.0020 in.)



If the specification is not met, use, appropriate shim plates at the drive end of camshaft until the specification is met.

**19. INSPECT SLIDING RESISTANCE OF CONTROL RACK**

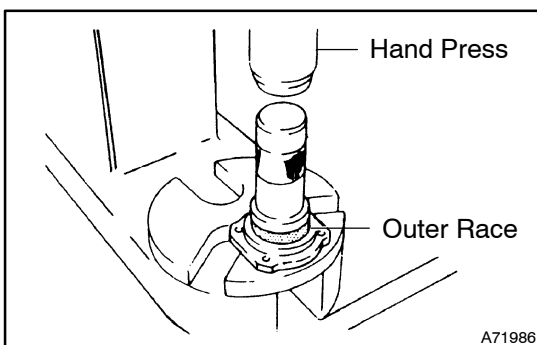
- (a) After the pump body has been assembled, attach a spring scale to the control rack and check and check that the control rack slides smoothly through its entire stroke.

Assembly standard:

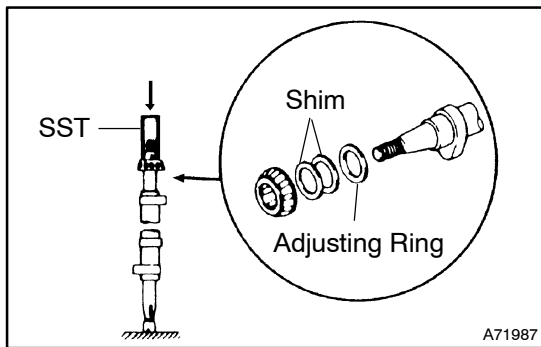
Less than 0.98 N (100 gf, 3.52 ozf)

NOTICE:

- wash all parts with clean diesel fuel before installing them, and any defective or damaged parts must be replaced.
- Do not allow dust or other foreign particles to enter the pump during assembly.
- Apply grease to O-rings and oil seals before installing them.
- Assemble the parts in correct order and to correct tightening torques, assembled dimensions etc.
- Reassembly takes place in the reverse order of disassembly.

**20. INSTALL BEARING**

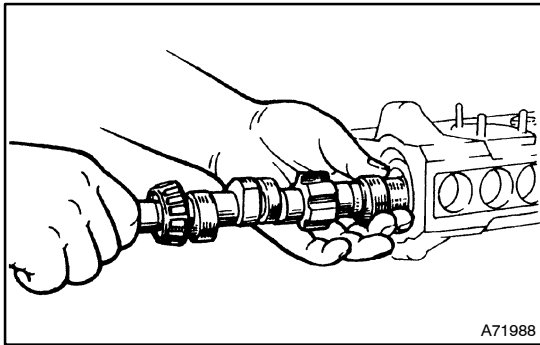
- (a) Put on the bearing outer race, and press-fit it into the bearing cover using a hand press.



- (b) Install the adjustment ring, shim and bearing, in that order, on the camshaft.

NOTICE:

Put a round nut on the other end of the camshaft to protect the threads.

**21. INSTALL CAMSHAFT**

- (a) Place the center bearing on the camshaft and insert the camshaft into the pump housing, and tighten the center bearing setting screws.

Torque:

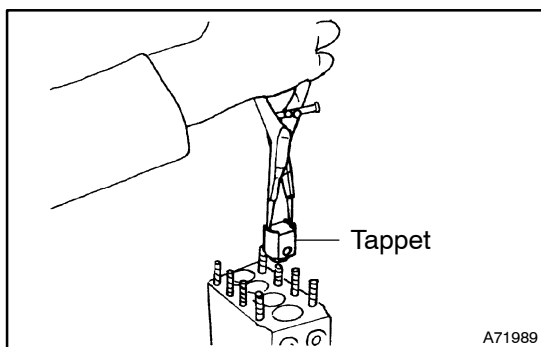
6.87 - 8.82 N·m (70 - 90 kgf·cm, 5.1 - 6.5 ft·lbf)

22. INSTALL BEARING COVER AND GOVERNOR HOUSING**Torque:****Bearing cover:**

15.7 N·m (160 kgf·cm, 12 ft·lbf)

Governor housing:

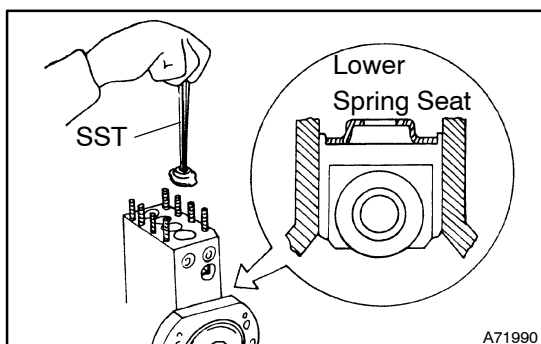
18.6 N·m (190 kgf·cm, 14 ft·lbf)

**23. INSTALL TAPPET**

- (a) Install the tappet.

NOTICE:

Position the groove provided in the tappet in the axial direction of the camshaft, and position it accurately so that the tappet is retained in position by the tappet retainer pin which is driven inside the pump housing.

**24. INSTALL LOWER SPRING SEAT**

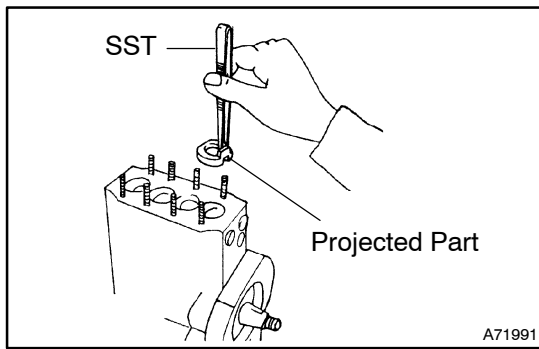
- (a) Using SST, install the lower spring seat.

SST 09269-54030

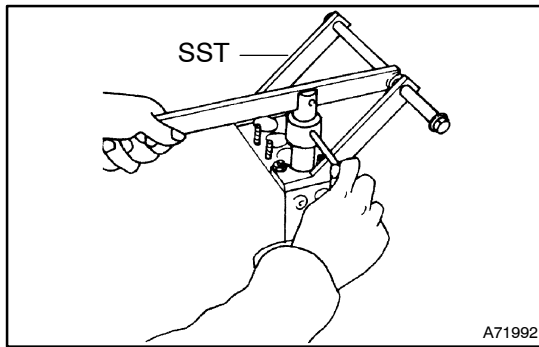
NOTICE:

Be sure that the flanger of the lower spring seat is accurately seated in the groove of the tappet.

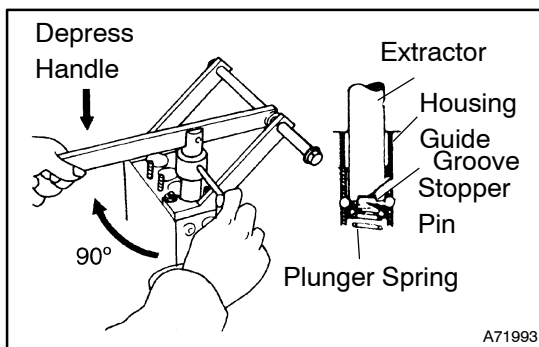
- (b) This is very important since an inaccurately positioned seat may cause damage to the pump.

**25. INSTALL UPPER SPRING SEAT**

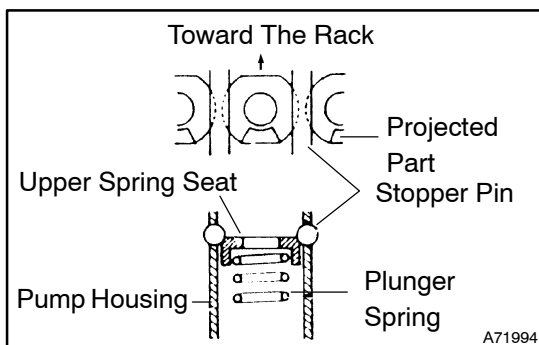
- (a) Using SST, insert the upper spring seat with the projected part of the seat facing at the drive end of the housing.
SST 09269-54030



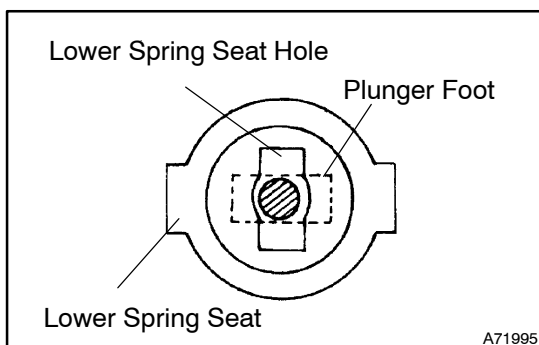
- (b) Attach the upper spring extractor, and fit the guide groove on the extractor to the projected part of the upper spring seat.
SST 09512-1930



- (c) Push the handle down to compress the plunger spring, turn the guide lever 90° towards you, and installing the upper spring seat underneath the stopper pin which is driven inside the pump housing.

**NOTICE:**

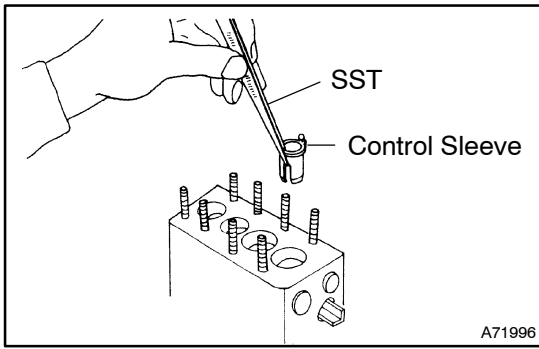
- **First bring the cam of the cylinder to bottom dead center.**
- **Check that the spring is accurately retained by the stopper pin.**
- **Check that the projected part of the upper spring seat faces away from the rack.**

**26. INSTALL PLUNGER**

- (a) Put the flange of the plunger leg through the hole provided in the lower spring seat, with the part number marking facing the spill side (away from the feed pump), then turn it clockwise 90°.

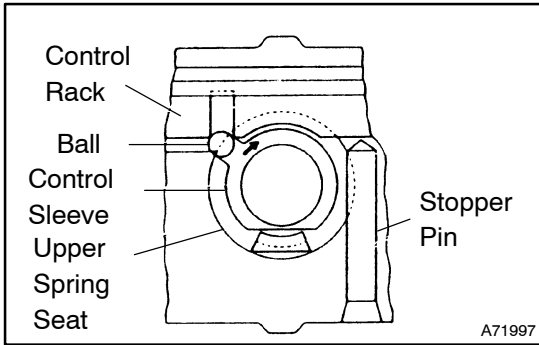
NOTICE:

- **The plunger can be installed more easily if the cam of the cylinder is at top dead center.**
- **Grip the plunger at the top, and pull up to check that it does not come out.**



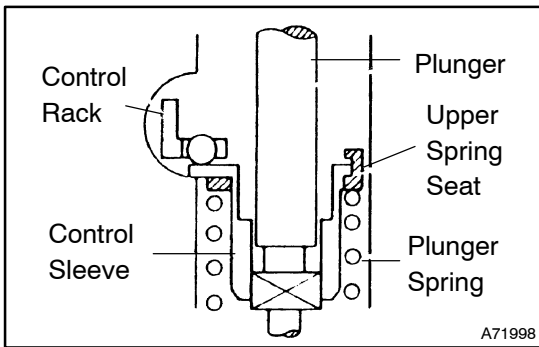
27. INSTALL CONTROL SLEEVE

- (a) Insert the control rack.
- (b) Using SST, install the control sleeve.
SST 09269-54030



NOTICE:

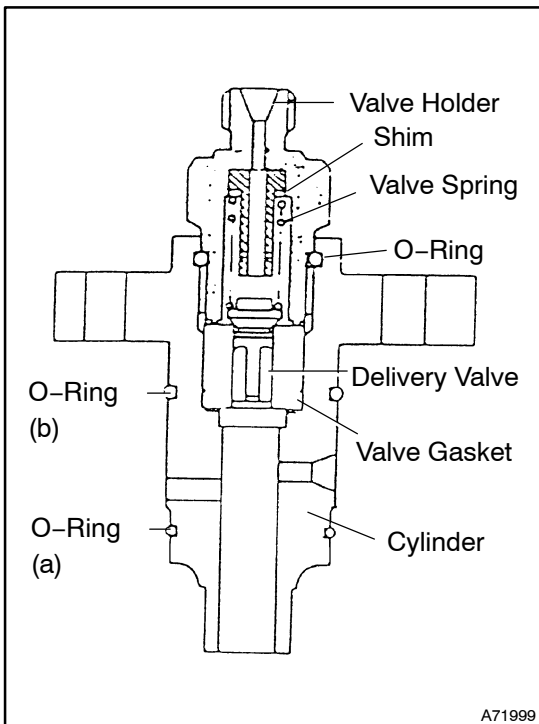
Position the flanges of the control sleeve and the plunger, and the projected part of the upper spring seat correctly before inserting the control sleeve.



- (c) Move the control rack until the ball in the control sleeve is accurately inside the groove provided in the control rack.

NOTICE:

- The plunger may slip out of its position during installation. Check the following for a second time.
- The vertical groove of the plunger must face the spill side.
- The plunger must not come out when it is pulled up.

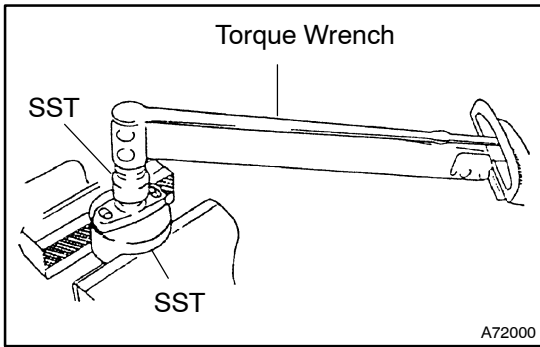


28. INSTALL DELIVERY VALVE GROUP

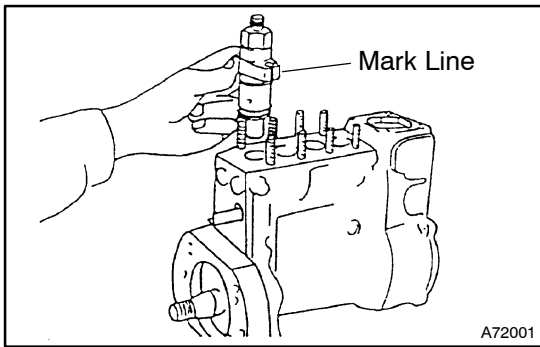
- (a) Install the valve gasket, delivery valve, valve spring, shim, and the valve holder in that order inside the cylinder.

NOTICE:

- Apply grease to each O-ring first to protect it from damage. Install O-ring (a) and (b) in that order.
- Use new valve gaskets and O-rings. Never reuse them.



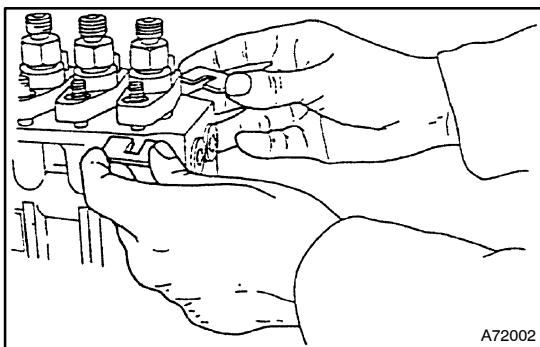
- (b) Using SST, put the delivery valve, and tighten the delivery valve on the delivery valve group.
 SST 09512-1910
Tightening torque:
88.3 N·m (900 kgf·cm, 65 ft·lbf)



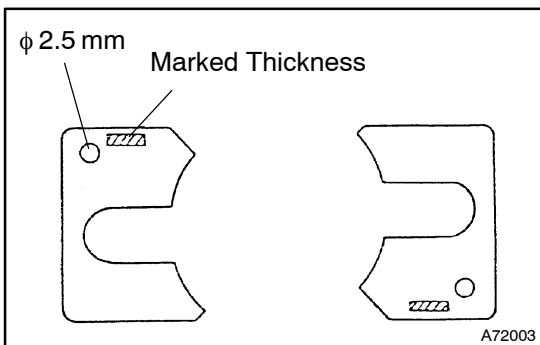
- (c) Apply a small amount of grease to the O-rings and the outside of the cylinder, position the cylinder with the marked line on its flange facing the spill side of the feed pump, slip the cylinder over the plunger, moving the control rack in and out, and insert the delivery valve group inside the pump body.

NOTICE:

- **Install the cylinder in the correct position. This is very important since, otherwise, the relative position of the feed hole and the spill port will be reversed and the characteristics of the injection volume will be different.**
- **Each time a cylinder is inserted, move the control rack to check that it slides smoothly.**

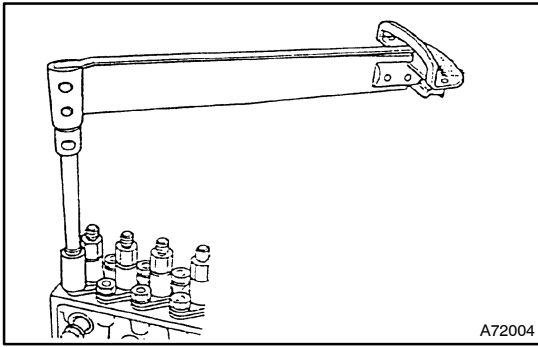


- (d) Put pair of shims under the flange of the cylinder.



NOTICE:

- **Use a pair of shims of the same thickness at the sides of each cylinder.**
- **Install the shims with the thickness marking facing up (They cannot be installed upside down since the valve holder cover will be in the way).**
- **Push each shim completely in until it touches the cylinder.**



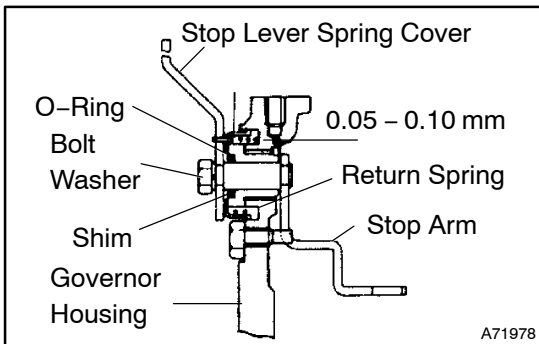
- (e) Tighten the nuts finger tight. Then, tighten the nuts alternately to their specified torque.

Torque:

19.1 N·m (195 kgf·cm, 14 ft·lbf)

NOTICE:

- Wash all parts with clean diesel fuel before installing them, and any defective or damaged parts must be replaced.
- Do not allow dust or other foreign matter to enter the pump during assembly.
- Apply grease to O-rings and oil seals before installing them.
- Assemble the parts in correct order and to correct tightening torque, assembled dimensions etc.
- Assembly takes place in the reverse order of disassembly.



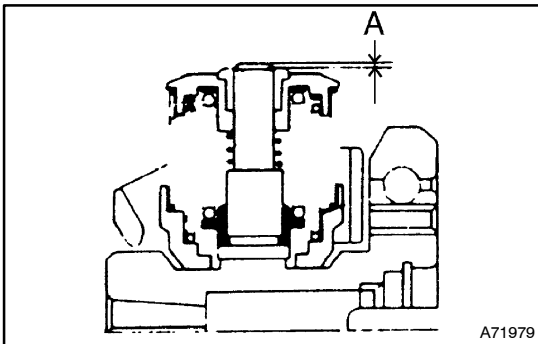
29. INSTALL STOP LEVER

- (a) Install the stop lever as shown.
 (b) Measure the thrust clearance of the stop arm.

Thrust clearance: 0.05 - 0.10 mm (0.0020 - 0.0039 in.)

NOTICE:

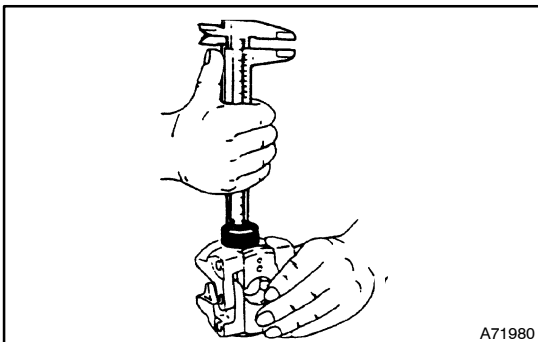
The O-ring should be coated with grease before being fitted.



30. INSTALL FLYWEIGHT

NOTICE:

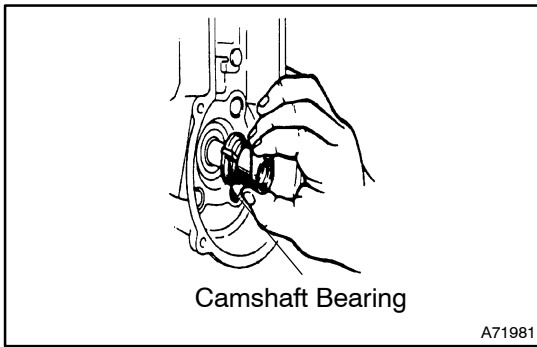
Be sure to install the spring inner seat correctly, its 'LAPPED' surface should face downwards.



- (a) Tighten the adjusting nut.

Protrusion of adjusting nut A:

-0.4 mm to 0.2 mm (-0.016 in. to 0.008 in.)

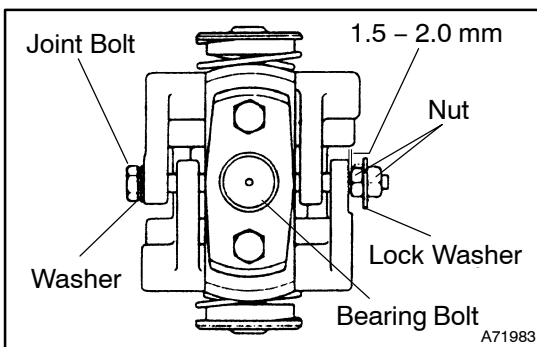
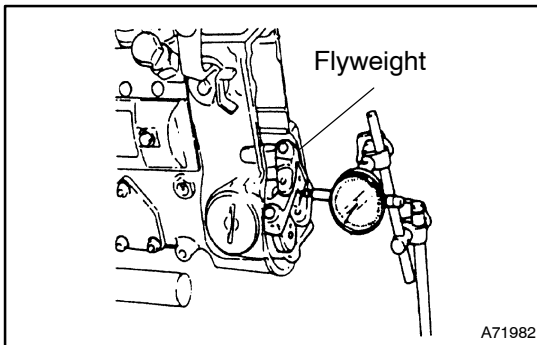


31. IF EQUIPPED WITH DAMPER, ADJUST DAMPER THRUST CLEARANCE

- (a) This provides a clearance between the flyweight and the camshaft bushing.
- (1) Temporarily install the camshaft bushing on the camshaft.
 - (2) Install the flyweight without the dampers.
 - (3) Temporarily fit the governor round nut.
 - (4) Apply a dial gauge to the end face of the flyweight, and measure the thrust clearance.

Thrust clearance: 0.02 – 0.10 mm (0.0008 – 0.0039 in.)

If not within specification, adjust the clearance by inserting shims between the camshaft bushing and the governor round nut.



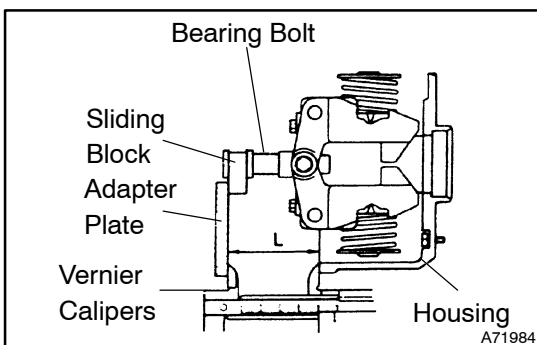
32. INSTALL BEARING BOLT

- (a) Measure the free play of the jointing bolt along its axis.
- Standard free play: 1.5 – 2.0 mm (0.059 – 0.079 in.)**

NOTICE:

Make sure the bearing bolt can be moved smoothly through the guide bushing.

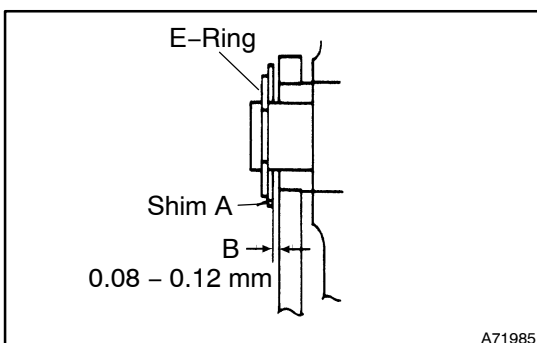
- (b) Measure the fitting dimension of the bearing bolt.



- (1) While pulling on the bearing bolt, measure the dimension 'L' with calipers.

Fitting dimension:

49.7 – 50.1 mm (1.957 – 1.972 in.)

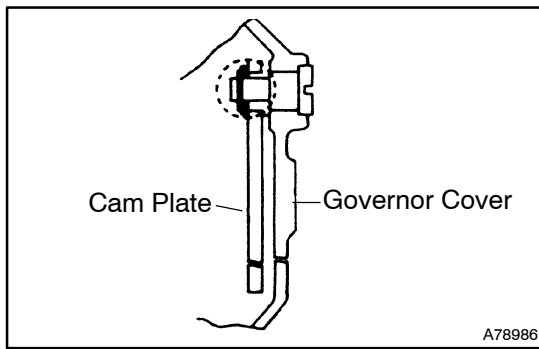


33. INSTALL GOVERNOR COVER

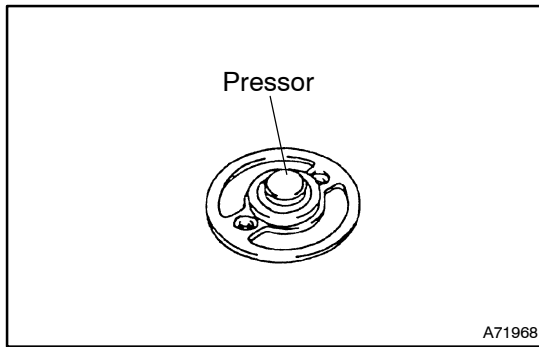
- (a) Install the cam plate on the governor cover and shim with E-ring.

NOTICE:

Shim A about 0.5 mm (0.02 in.) in thickness should be installed with the E-ring.



- (b) Measure the cam plate thrust clearance B.
Thrust clearance B:
0.08 - 0.12 mm (0.0032 - 0.0047 in.)

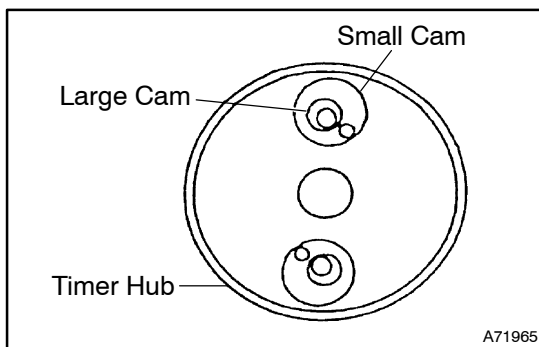


34. INSTALL OIL SEAL

- (a) Using the commercial tool (pressor), push the oil seals into the timer cover and driving flange.

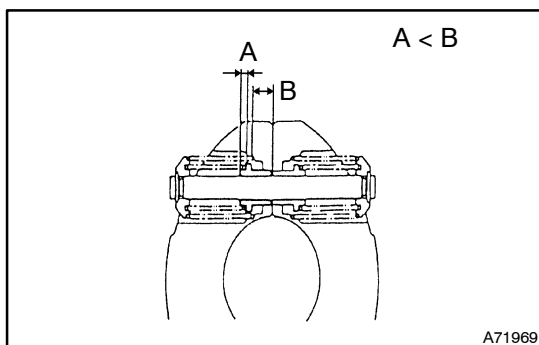
NOTICE:

The oil seals must be replaced with new ones.



35. INSTALL TIMER CAMS AND TIMER HUB

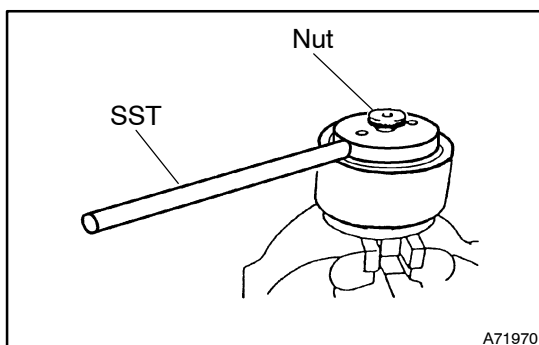
- (a) Install the timer hub and timer cams to the driving flange as shown in the illustration.



36. INSTALL TIMER SPRING TO TIMER WEIGHT

NOTICE:

Take care of the spring seat direction.



37. INSTALL TIMER COVER

NOTICE:

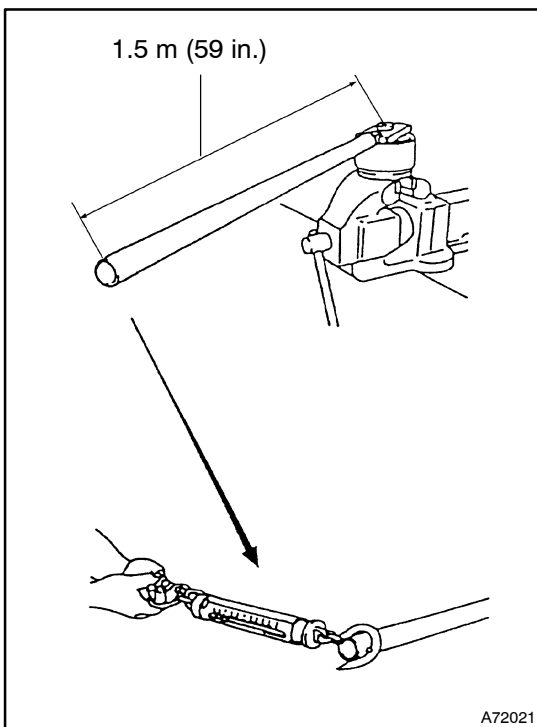
The O-ring must be replaced with new one.

- (a) Install the SST on the cover and fix with the nut.
 SST 09512-2210

NOTICE:

- **Do not tighten the nut but leave loosened.**
- **Since a new timer cover is coated with adhesive, it is unnecessary to apply fresh adhesive to a new timer cover when replacing.**

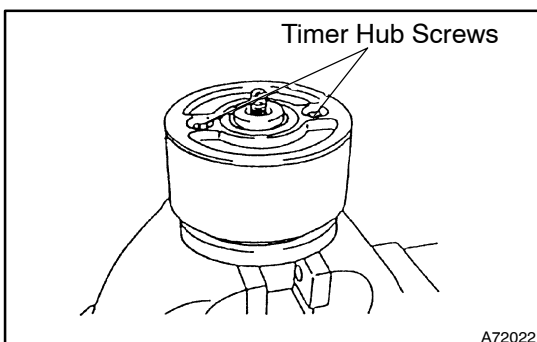
- If reusing the timer cover, apply 4 to 6 dot of adhesive to 2 or 3 threads of the screw of the flange.
Adhesive:
Part No. 08833-00070, THREE BOND 1342 or equivalent
- Since the timer cover is attached with adhesive, a torque of approximately 70 kgf/m is necessary when removing it.
- Fully remove the adhesive on the threads of the screw when overhauling. If too much adhesive is applied, excessive will stick to the O-ring, resulting in oil leakage.



- (b) Hook a spring balancer between the two socket bolts at the end of the extension bar, then pull the spring balancer until it shows 196.14 – 228.49 N (20 – 23.3 kgf, 45 – 51 lbf) to tighten up the timer cover.

Tightening torque:

294 – 343 N·m (3,000 – 3,500 kgf·cm, 217 – 253 ft·lbf)

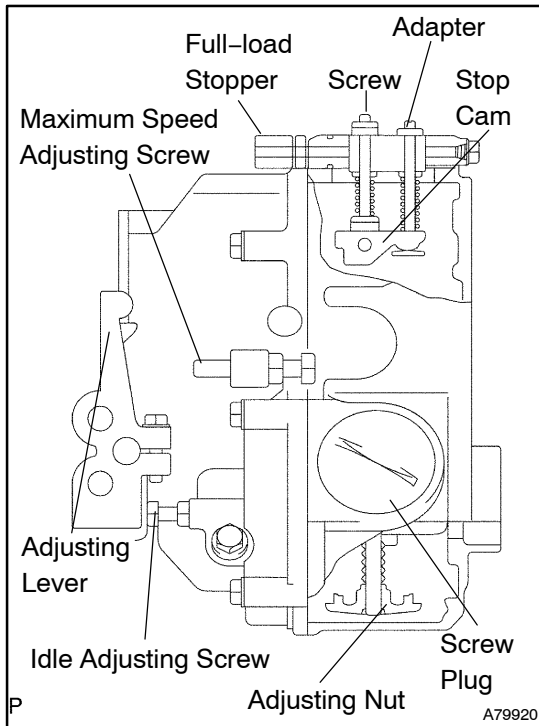


38. FILL PUMP TIMER OIL INTO TIMER THEN TIGHTEN TIMER HUB SCREWS

Oil grade: SAE 90

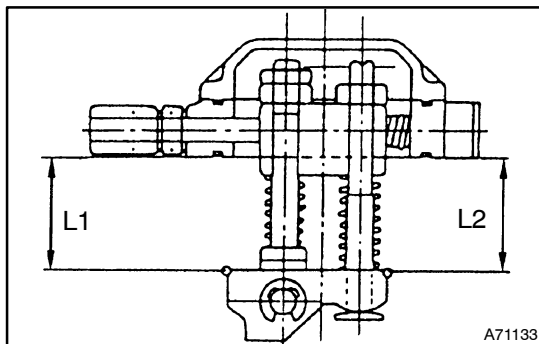
Oil volume: 140 – 160 cm³ (8.54 – 9.76 cu.in.)

ADJUSTMENT



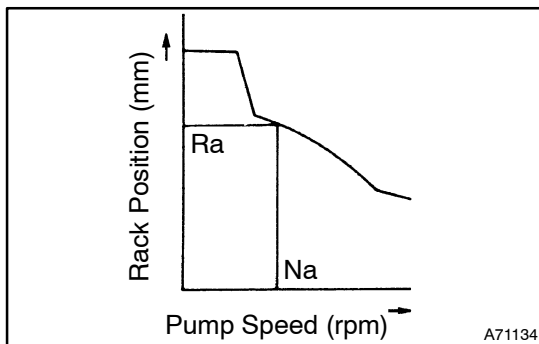
1. PREPARATION

- (a) Connect the rack measuring device to the control rack and set to '0'.
- (b) Connect the fuel line.
- (c) Refill the camshaft chamber with engine oil.
- (d) Install the angle gauge on the adjusting lever.
- (e) Using SST, remove the full-load stopper housing cover.
SST 09512-2510, 09512-2520



2. STEPS IN GOVERNOR ADJUSTMENT

- (a) Preliminary adjustment of stop cam.
L1 = L2 = 25.5 mm (1.00 in.)



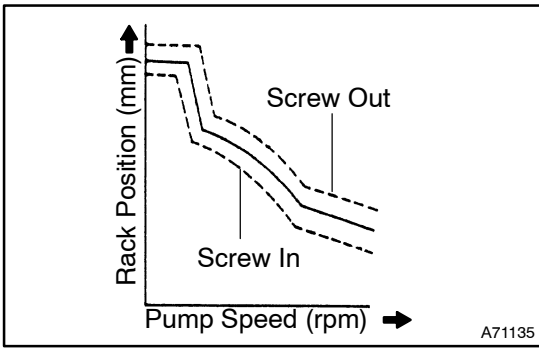
- (b) Adjustment of idling speed control.

NOTICE:

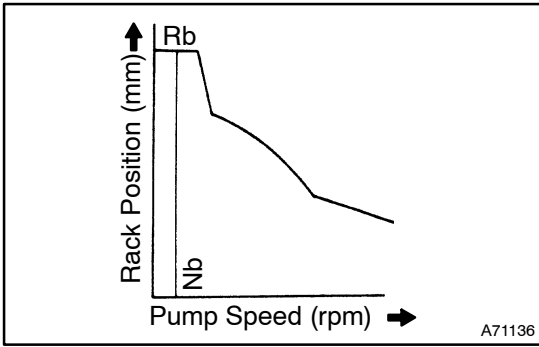
The adjusting lever should always be in the 'IDLING' position during adjustment of the idling speed control.

- (1) At a pump speed of N_a rpm, measure the control rack position R_a mm.

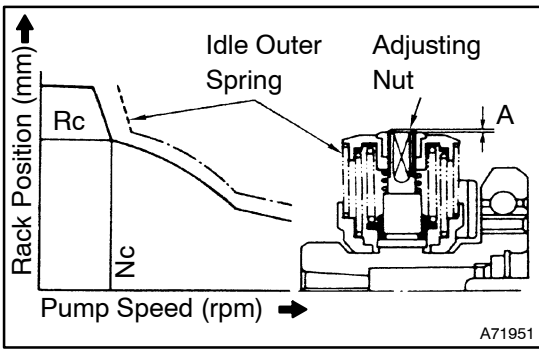
If not within specification, adjust with the idle adjusting screw.



NOTICE:
The idle adjusting screw will change the governor characteristics as shown on the left.



- (2) At a pump speed of Nb rpm, measure the control rack position Rb mm.

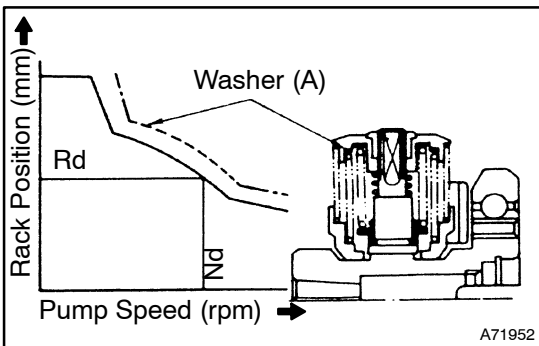


- (3) At a pump speed Nc rpm, measure the control rack position Rc mm.

If not within specification, replace the idle outer spring.

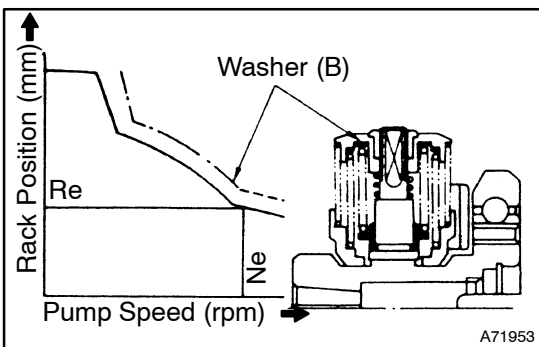
NOTICE:
Protrusion of the adjusting nut should be within **-0.4 mm (-0.016 in.) to 0.2 mm (0.008 in.)**.

- (4) At a pump speed of Nd rpm, measure the control rack position Rd mm.

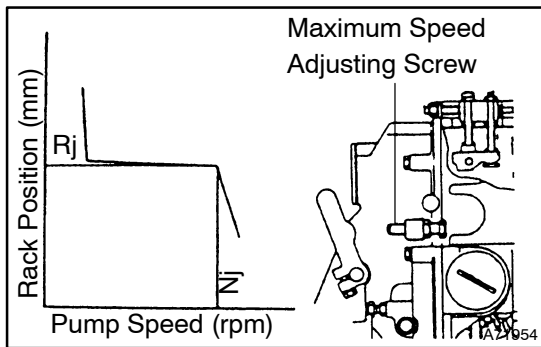


If not within specification, replace the washer (A).

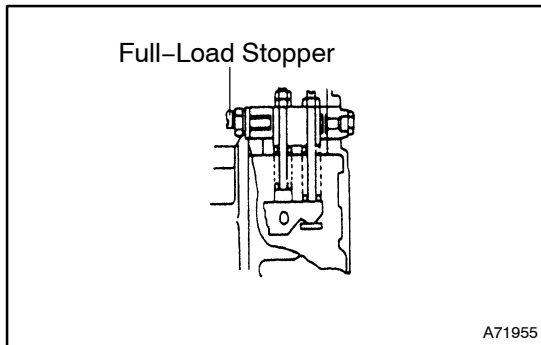
- (5) At a pump speed of Ne rpm, measure the control rack position Re mm.



If not within specification, replace the washer (B).



- (c) Preliminary adjusting of maximum speed control.
At a pump speed of N_j rpm, measure the control rack position R_j mm.
If not within specification, adjust with the maximum speed adjusting screw.



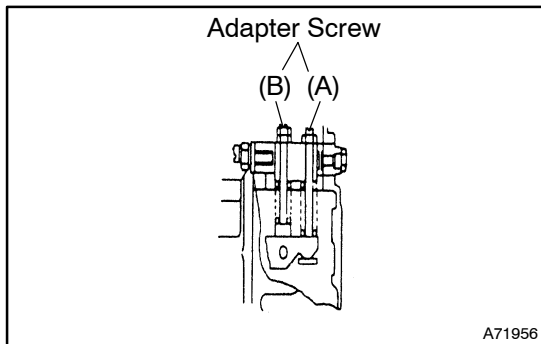
- (d) Adjustment of medium speed control.

NOTICE:

The adjusting lever should always be in the 'FULL-LOAD' position during adjustment of the medium speed control.

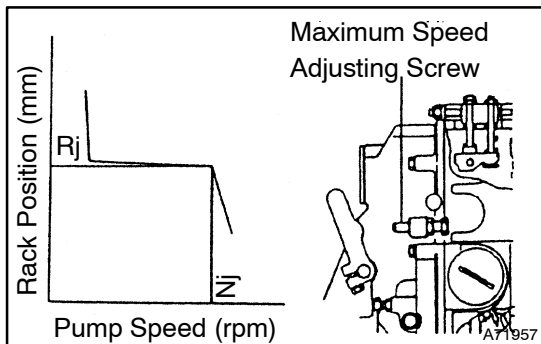
- (1) At a pump speed of N_f rpm, measure the control rack position R_f mm.

If not within specification, adjust by turning the full-load stopper.



- (2) At a pump speed of N_g , N_h and N_i rpm measure the control rack position R_g , R_h and R_i . Each speed and rack position.

If not within specification, adjust with the adapter screw (A) and (B).



- (e) Adjustment of maximum speed control.

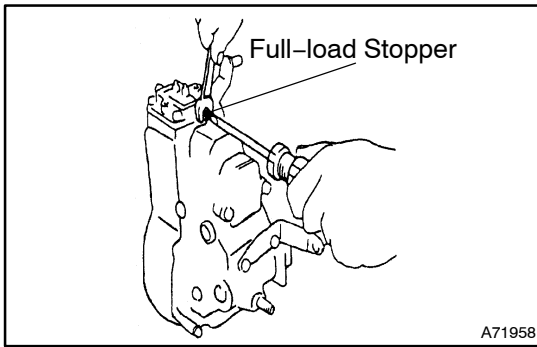
NOTICE:

Adjusting lever should be in the 'FULL-LOAD' position.

- (1) At a pump speed of N_j rpm, measure the control rack position R_j mm.

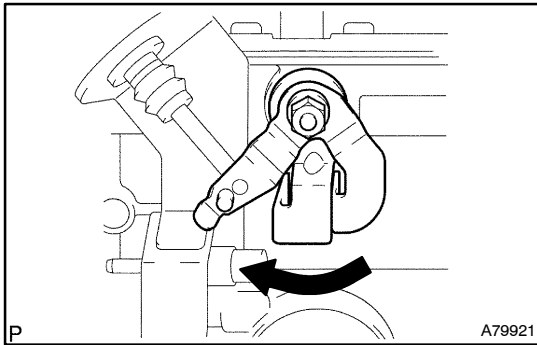
If not within specification, adjust with the maximum speed adjusting screw.

- (2) Confirm the rack position R_m and R_n mm, pump speed of N_m and N_n rpm. Each speed and rack position.



- (f) Adjusting of fuel injection volume under 'FULL-LOAD'. Measure the injection volume in the 'FULL-LOAD' position.

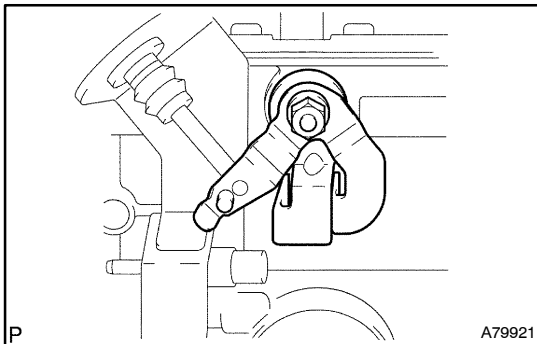
If the average injection volume is not at standard value, adjust with the 'FULL-LOAD' stopper.



- (g) Inspection of stop lever operation. Adjusting lever at 'IDLING' position and pump speed at '0' rpm, the control rack position should be less than Rq mm.

3. INSTALL FULL-LOAD STOPPER HOUSING COVER AND FULL-LOAD STOPPER CAP

- (a) Using SST, install full-load stopper housing cover.
SST 09512-2510, 09512-2520



4. GOVERNOR EXTERNAL LEAD SEALS AND CRIMP CAPS

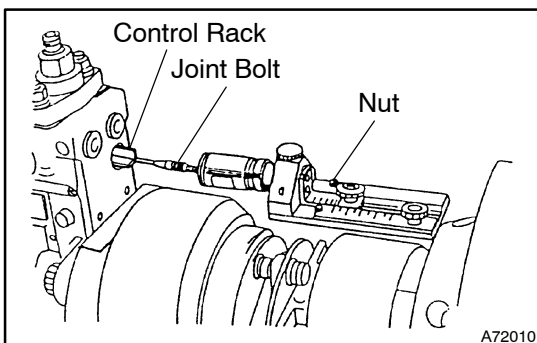
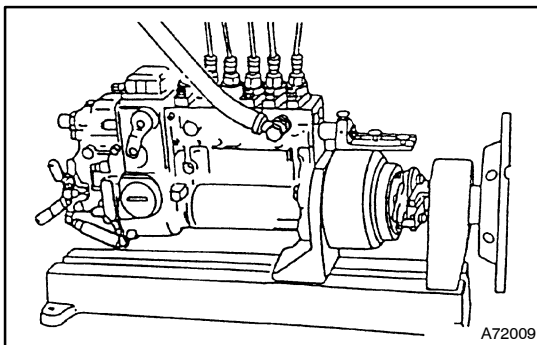
NOTICE:

All adjusting devices on the fuel injection pump governor, except the low idle adjustment screw, are wired and lead sealed and crimp capped as a protection for the customer. This is to prevent unauthorized readjustment which may cause engine malfunction and/or engine failure.

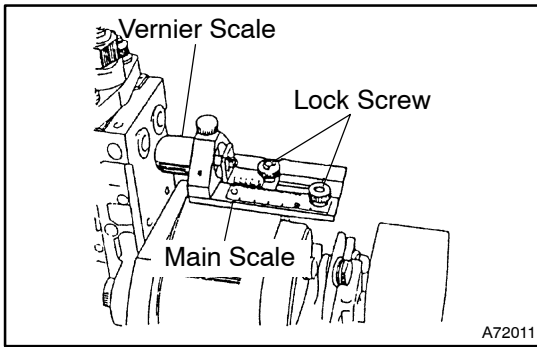
Periodically check to insure that these seals are not broken as this will void the warranty.

5. PREPARATION

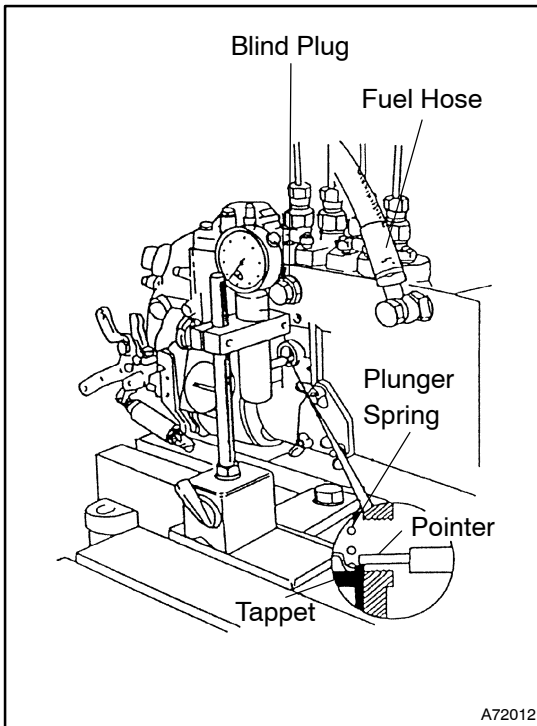
- (a) Mount the injection pump correctly on the pump tester.



- (b) Attach a rack measuring device to the control rack and set to 0.
Part No. 95091-00170 (DENSO) for equipped with R901 governor
- (c) Install calibration nozzles and lines.

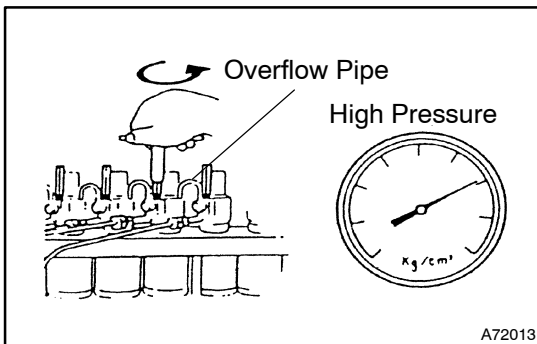


- (d) Fill the pump camshaft chamber with engine oil.

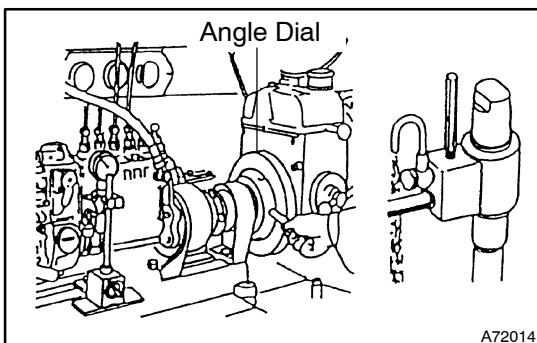


6. ADJUST INJECTION TIMING

- (a) Preparation of the pre-stroke
- (1) Remove the screw plug from the pre-stroke measuring hole of the first cylinder.
 - (2) Remove the overflow valve, attach the inlet adaptor and connect the fuel hose of the pump tester. Close the fuel port of the injection pump with a blind plug.
 - (3) Install a pre-stroke measuring instrument. Bring the tappet of the first cylinder to its bottom dead center, and set the pointer tip on the tappet.
- (b) Measure the pre-stroke (No. 1 plunger)
- (1) Set the control rack at full-load position.
 - (2) Loosen the overflow screw of each nozzle holder.



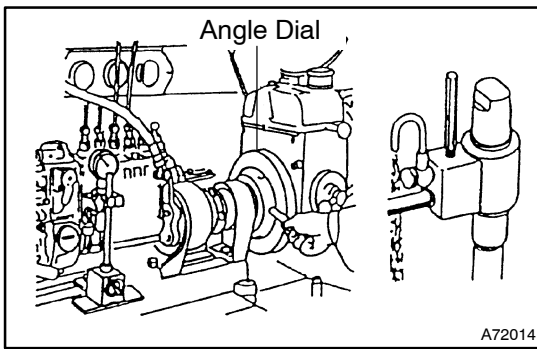
- (3) Operate the high-pressure pump of the pump tester and let fuel run out of the overflow line.



- (4) Move the angle dial to set the first cylinder of the pump to bottom dead center and adjust the pre-stroke gauge to zero.

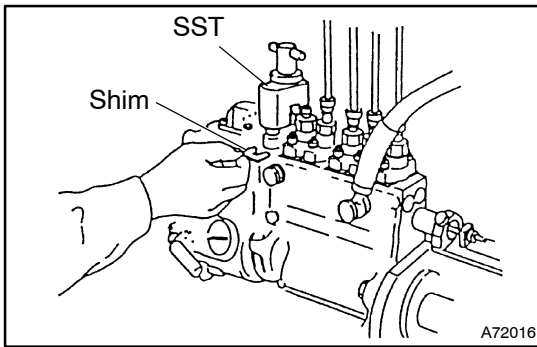
NOTICE:

Bottom dead center is the point at which the pointer of the dial gauge does not move even when the angle dial is rotated while fuel is flowing from the overflow line.



- (5) Turn the camshaft clockwise the angle dial and read the dial gauge when the fuel stops running out of the overflow line. This reading is the pre-stroke value of the pump.

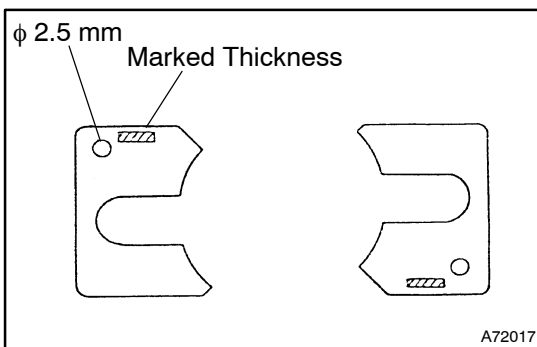
If the pre-stroke value is not within specification, change the shims between the cylinder flange and the pump housing.



- (c) Adjust the pre-stroke.

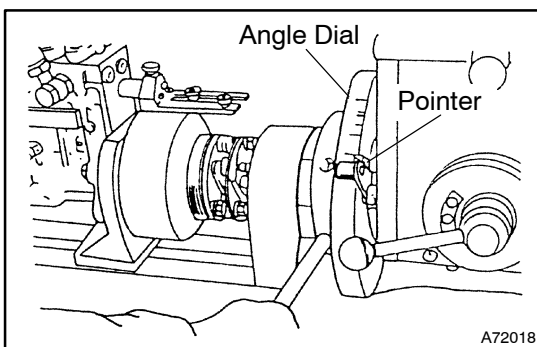
- (1) Use SST to lift the cylinder and install the proper shim.

SST 09512-1920



NOTICE:

- Insert a pair of shims of same thickness to the cylinder (If different thickness shims are used the rack will not move smoothly and hunting and other problems will result).
- Use only on e shim on each side.
- Always install the shims with the thickness marking facing up.



- (d) Adjust the injection interval.

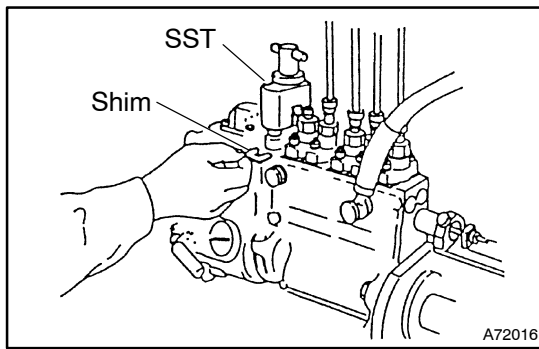
- (1) Using the No. 1 cylinder injection starting point as a base, inspect and adjust the injection interval in the order of injection.

Injection interval: 89° 45' - 90° 15'

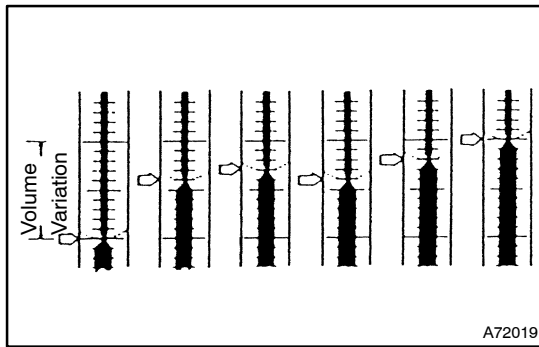
Injection order: 1 - 3 - 4 - 2

- (2) If the injection intervals are not within specification, adjust by using the same procedure as for pre-stroke adjustment.

- (3) After adjustment, make sure the injection timing is correct.

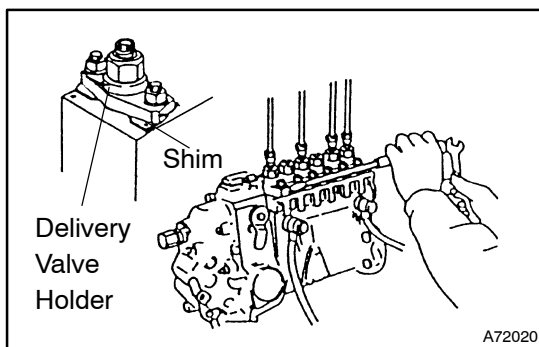


- (e) Measuring and adjusting the injection volume
- (1) Connect the fuel line and the overflow valve in their correct positions.



- (f) Measure the injection volume for each control rack position and pump revolution.

- (1) To adjust the injection volume, loosen the delivery valve holder tightening nut and rotate the delivery valve holder.



- (2) After adjustment has been completed tighten the nuts alternately to torque.

Torque:

19.1 N·m (195 kgf·cm, 14 ft·lbf)

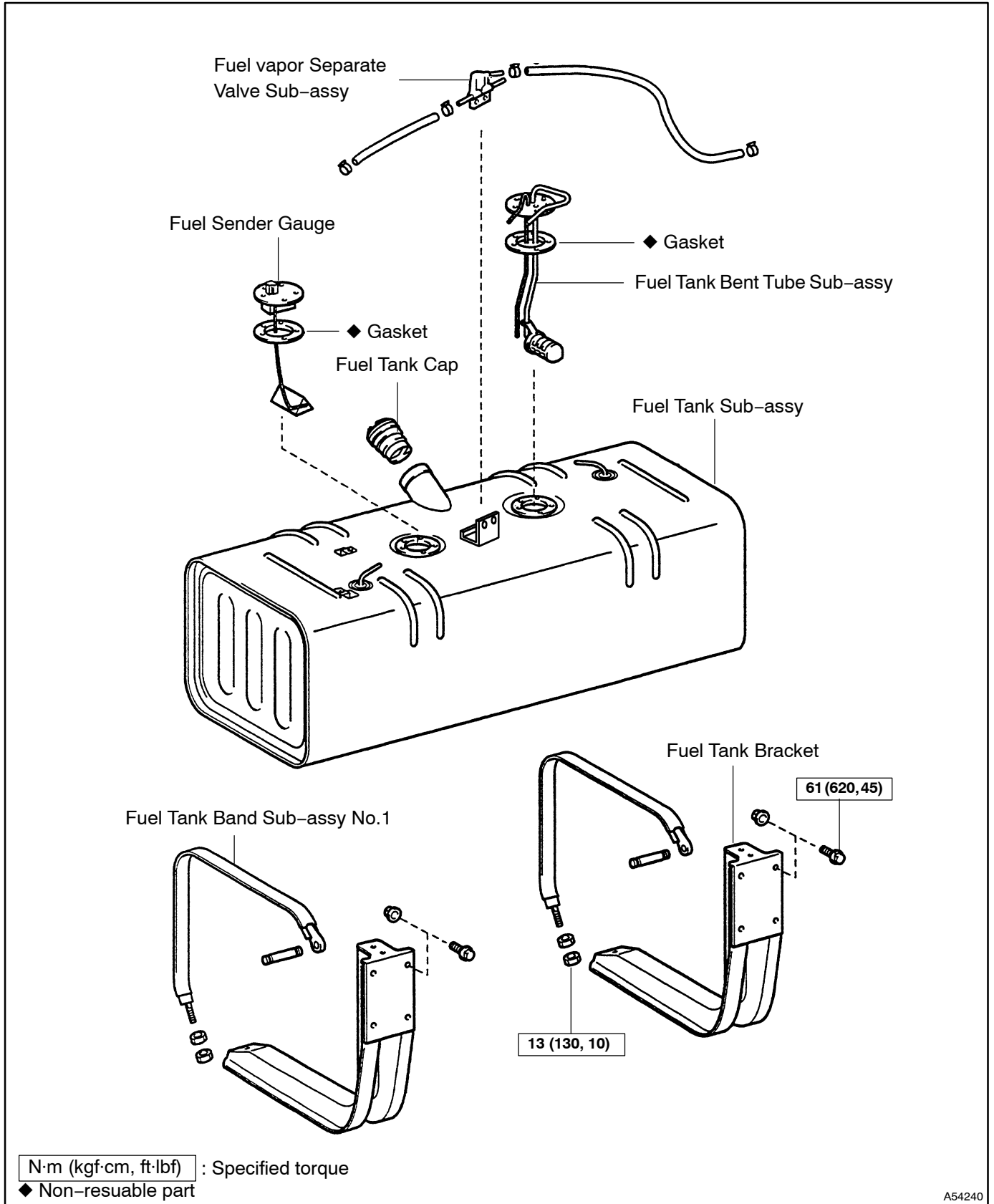
7. INSPECT TIMER ADVANCE

- (a) Set a stroboscope on a pump tester.
- (b) Check the timer advance.

If the angle is not within specification, adjust with an appropriate shim.

FUEL TANK ASSY (S05C-B) COMPONENTS

110JI-02



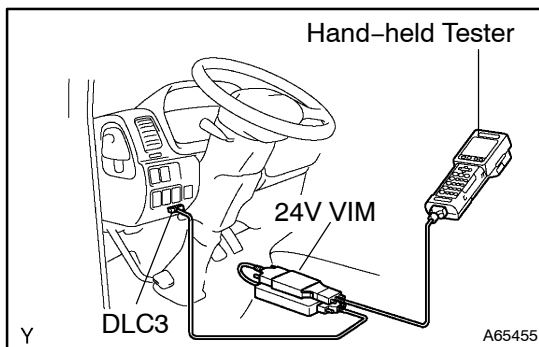
REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT**
2. **DISCONNECT BATTERY NEGATIVE TERMINAL**
3. **DRAIN FUEL**
4. **DISCONNECT FUEL SENDER GAUGE CONNECTOR**
5. **DISCONNECT NO. 2 FUEL HOSE MAIN TUBE**
6. **DISCONNECT NO. 3 FUEL MAIN HOSE MAIN TUBE**
7. **DISCONNECT FUEL VAPOUR SEPARATE VALVE SUB-ASSY**
8. **REMOVE FUEL TANK BAND SUB-ASSY NO.1**
 - (a) Take out the fuel tank band, and then remove the fuel tank.
9. **REMOVE FUEL TANK SUB-ASSY**
10. **REMOVE FUEL SENDER GAUGE**
 - (a) Remove the 5 screws and fuel sender gauge from the fuel tank.
11. **REMOVE FUEL TANK VENT TUBE SUB-ASSY**
 - (a) Remove the 6 bolts and fuel tank vent tube.
12. **INSTALL FUEL TANK VENT TUBE SUB-ASSY**
 - (a) With a new gasket, install the fuel tank bent tube with the 6 bolts.
Torque: 5.0 N·m (50 kgf·cm, 44 in·lbf)
13. **INSTALL FUEL SENDER GAUGE**
 - (a) With a new gasket, install the fuel sender gauge with the 5 screws.
Torque: 1.5 N·m (15 kgf·cm, 13 in·lbf)
14. **INSTALL FUEL TANK SUB-ASSY**
15. **INSTALL FUEL TANK BAND SUB-ASSY NO.1**
 - (a) Install the tank and fuel tank bands.
Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)
16. **INSTALL FUEL VAPOUR SEPARATE VALVE SUB-ASSY**
17. **INSTALL MAIN TUBE, NO.3 FUEL HOSE**
18. **INSTALL MAIN TUBE, NO.2 FUEL HOSE**
19. **CONNECT FUEL SENDER GAUGE CONNECTOR**
20. **ADD FUEL**
21. **CONNECT BATTERY NEGATIVE TERMINAL**
22. **BLEED FUEL (See page 11-156)**
23. **INSPECT FOR FUEL LEAKS (See page 11-155)**

FUEL SYSTEM (S05C-TA)

ON-VEHICLE INSPECTION

110DI-02



1. CHECK FUEL LEAK

CAUTION:

- During ACTIVE TEST mode, engine speed goes high and combustion noise becomes loud, so pay attention.
- During ACTIVE TEST mode, fuel becomes highpressure, so take much care not to expose your eyes, hands, or body to the fuel.

NOTICE:

Be sure to use the 24 V VIM, because the hand-held tester will be destroyed if you do not use the 24 V VIM.

- Check that there are no leaks from any part of the fuel system when the engine stops.

If there is fuel leakage, replace those parts.

- While cranking or starting the engine, check that there are no leaks from any part of the fuel system.

If there is fuel leakage, replace those parts.

- Disconnect the return hose from the injection pump assy.
- While cranking the engine, check fuel leakage from the return pipe.

If there is fuel leakage, replace the injection pump assy

(See page 11-125).

- Connect the hand-held tester to the DLC3.
- Start the engine and push the hand-held tester main switch ON.
- Select the FUEL LEAK test of ACTIVE TEST mode on the hand-held tester.
- If you have no hand-held tester, depress the accelerator pedal quickly and fully to increase the engine speed at maximum and keep it for 2 seconds. Repeat this operation several times.
- Check that there are no leaks from any part of the fuel system.

NOTICE:

If the leakage from the return pipe is less than 10 cc (0.6 cu.in.) in a minute, it is acceptable.

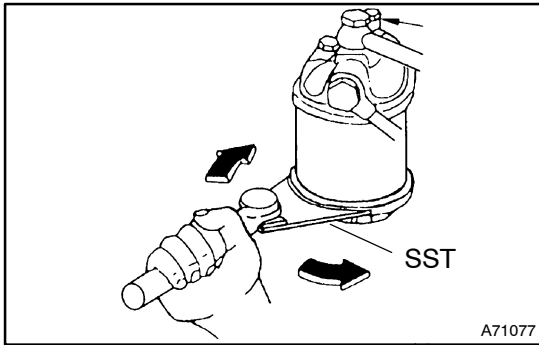
If there is fuel leakage, replace those parts.

- Reconnect the return hose to the injection pump assy.

FUEL FILTER ELEMENT (S05C-TA)

REPLACEMENT

1. DRAIN FUEL
2. REMOVE DIESEL FUEL FILTER ASSY
 - (a) Remove the 3 fuel pipes.
 - (b) Remove the 2 bolts and fuel filter assy.



3. REMOVE FUEL FILTER ELEMENT
 - (a) Mount the fuel filter in a soft jaw vise.
 - (b) Using SST, remove the fuel filter element.
SST 09228-34010

4. INSTALL FUEL FILTER ELEMENT

- (a) Remove the dust on installation surface.
- (b) Apply a light coat of fuel to the gasket of new fuel filter.
- (c) Install the fuel filter by turning it lightly to the right by hand until it comes in contact with the surface of the fuel filter cover.

NOTICE:

Do not use SST in tightening the element by hand.

- (d) Then using the SST, tighten the fuel filter about 240° (2/3 turn).
SST 09228-34010

NOTICE:

- Replace the new gasket.
 - Do not reuse the element.
 - Attention the gasket to damage.
5. INSTALL FUEL FILTER ASSEMBLY

- (a) Tighten the fuel filter assy with the 2 bolts.
Torque: 55 N·m (561 kgf·cm, 40 ft·lbf)
- (b) Using a new gasket, install the fuel pipe to the fuel filter assy with the union bolts.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

6. INSTALL DIESEL FUEL FILTER ASSY

7. ADD FUEL
8. BLEED FUEL

CAUTION:

At time of air venting, pay attention to the following items.

- Pay attention to fuel spilling from the pump air bleeder and the fuel filter drain pipe at the time of air venting.
Apply rags etc. to the respective parts being worked on and take care to prevent spilling of fuel onto the surroundings.
 - If starting is difficult or if the engine stops some time after starting, the air has not been vented sufficiently and should be repeated.
- (a) Loosen the priming pump knob of the injection pump by hand and pull out the knob.

- (b) Push the knob by hand and move it up and down for pumping.
- (c) When pushing the knob becomes harder, loosen the fuel filter drain bolt and vent the air through the drain pipe.
- (d) Tighten the fuel filter drain bolt provisionally.
- (e) Repeat the steps (b) to (d) until air no longer comes from the drain pipe and then tighten the drain bolt with the correct torque.

Torque: 6.9 N·m (70 kgf·cm, 61 in·lbf)

- (f) Again move the priming pump knob of the injection pump up and down for pumping.
- (g) When pushing the knob becomes harder, loosen the air bleeder of the pump and vent the air.
- (h) Tighten the air bleeder provisionally.
- (i) Repeat the steps (f) to (h) and when air no longer comes out from the air bleeder tighten the air bleeder with the correct torque.

Torque: 5.9 N·m (60 kgf·cm, 52 in·lbf)

- (j) Again pump until pushing the knob becomes harder, and finally lock the knob by tightening it in the pushed in condition.
- (k) Again confirm the tightening of all parts and then start the engine.

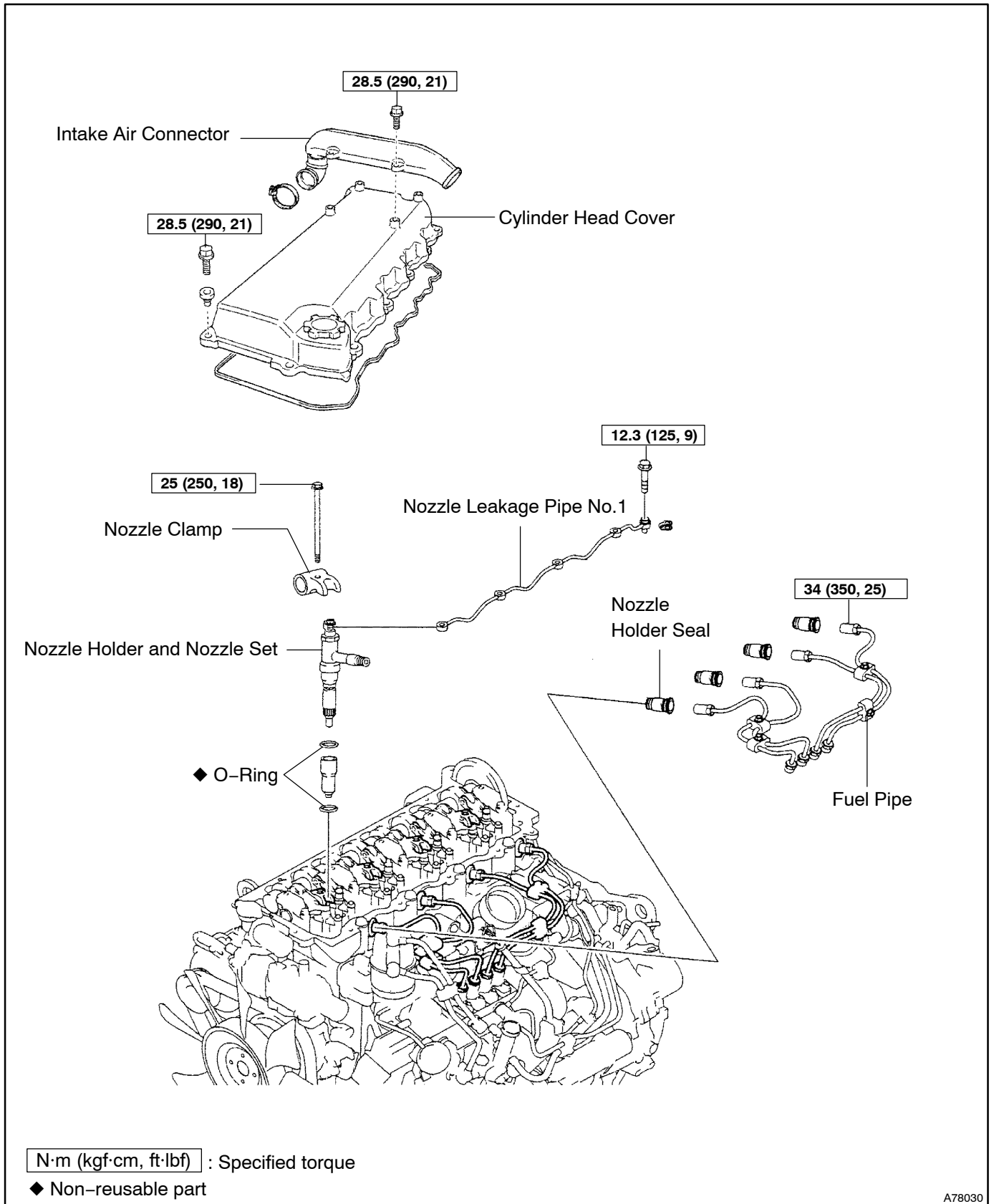
NOTICE:

- **When starting the engine, do not use the starter for 15 seconds continuously to prevent it from burned out. And also take an interval of 30 seconds before re-starting to protect the battery.**
- **For the above reason, do not bleed the air by cranking the engine with the starter.**

9. INSPECT FOR FUEL LEAKS

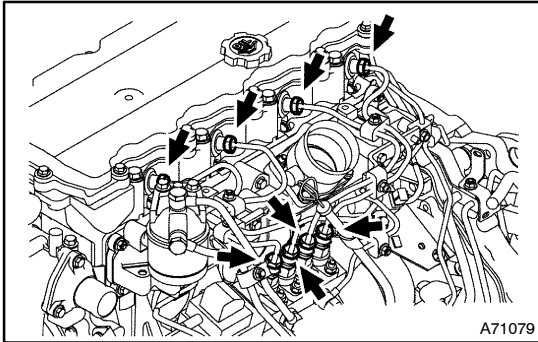
NOZZLE HOLDER AND NOZZLE SET (S05C-TA) COMPONENTS

110DJ-02



REPLACEMENT

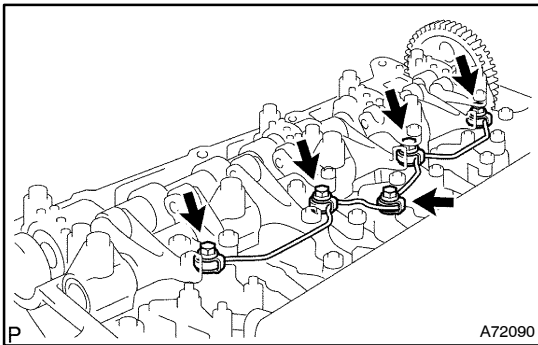
1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL
3. REMOVE CYLINDER HEAD COVER



4. REMOVE INJECTION PIPE SET

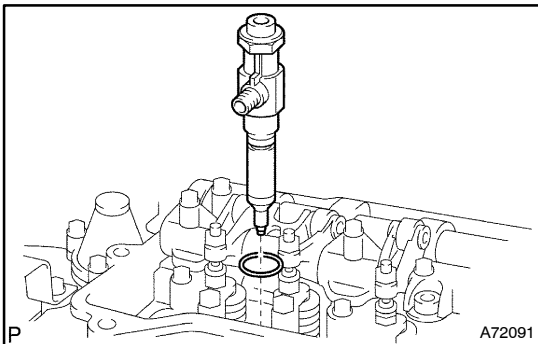
- (a) Loosen the 4 union nuts from the 4 injection nozzles.

5. REMOVE NOZZLE HOLDER SEAL



6. REMOVE NOZZLE LEAKAGE PIPE NO.1

- (a) Remove the 5 joint bolts, fuel return pipe and 5 gaskets.



7. REMOVE NOZZLE HOLDER AND NOZZLE SET

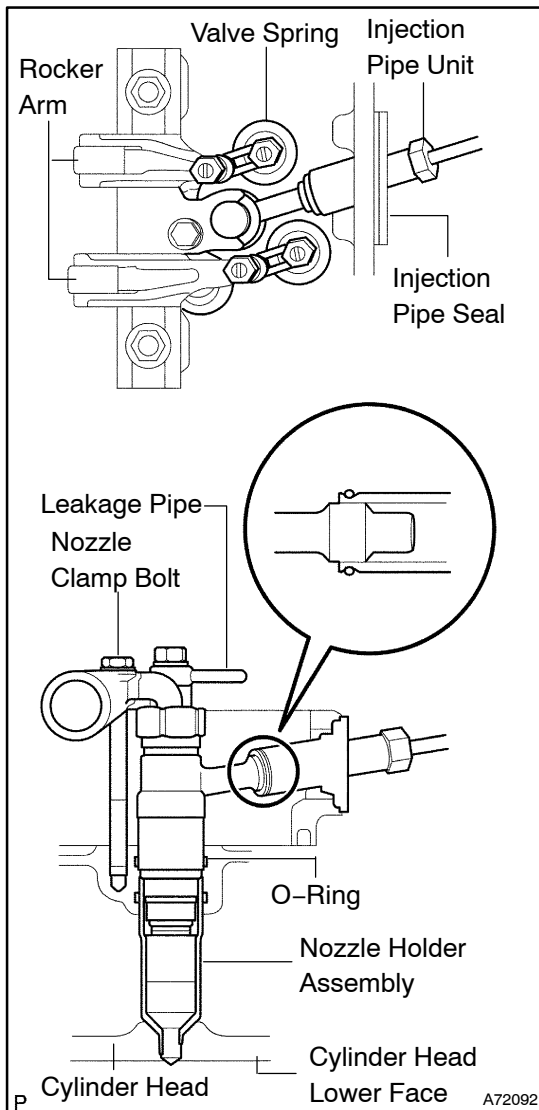
- (a) Remove the 4 bolts, 4 washers, 4 nozzle holder clamps, 4 injection nozzles and 4 seats..
- (b) Remove the O-rings from the injection nozzle.

If difficult, use a SST, sliding hammer for easier removal.

SST 09420-1442

NOTICE:

Replace the 2 O-rings with a new one.

**8. INSTALL NOZZLE HOLDER AND NOZZLE SET**

- (a) Install a new O-ring into the groove of the cylinder head.
- (b) Make sure that there is no dirt or foreign particles at the sealing part between the nozzle holder and related parts (O-ring, nozzle sleeve and injection pipe seal), and connecting part between the nozzle holder and nut of the injection pipe.
- (c) Insert the nozzle holder taking care not to contact the valve spring as shown in the figure.

NOTICE:

Apply engine oil to the O-ring and be careful that the O-ring is not caught.

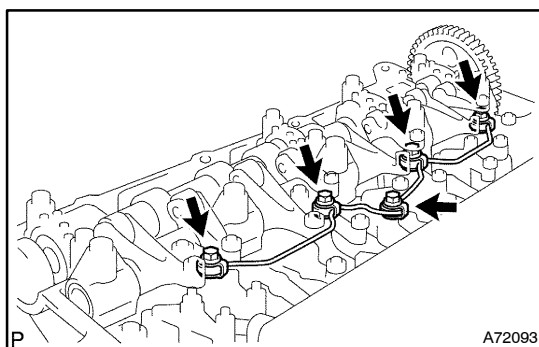
- (d) Cover the end of the injection pipe seal with the nozzle holder as shown in the figure and tighten the bolts to fasten the injection pipe seal to the cam housing.
- (e) Tighten the nut of the injection pipe provisionally.
- (f) Tighten the nozzle clamp bolt.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

NOTICE:

After tightening the bolt, make sure that the rocker arm moves smoothly.

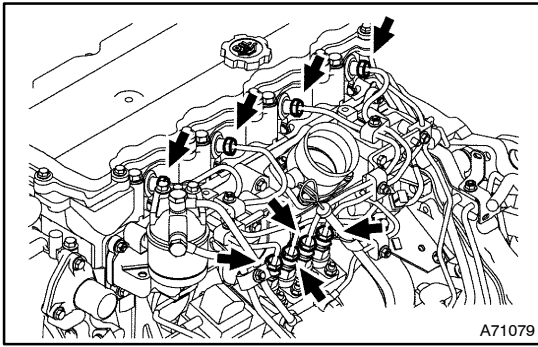
- (g) Tighten the nut of the injection pipe.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)
- (h) Install the leakage pipe.

**9. INSTALL NOZZLE LEAKAGE PIPE NO.1**

- (a) Install 5 new gaskets and the return pipe with the 5 joint bolts.

Torque: 12.3 N·m (125 kgf·cm, 9 ft·lbf)

10. INSTALL NOZZLE HOLDER SEAL

**11. INSTALL INJECTION PIPE SET**

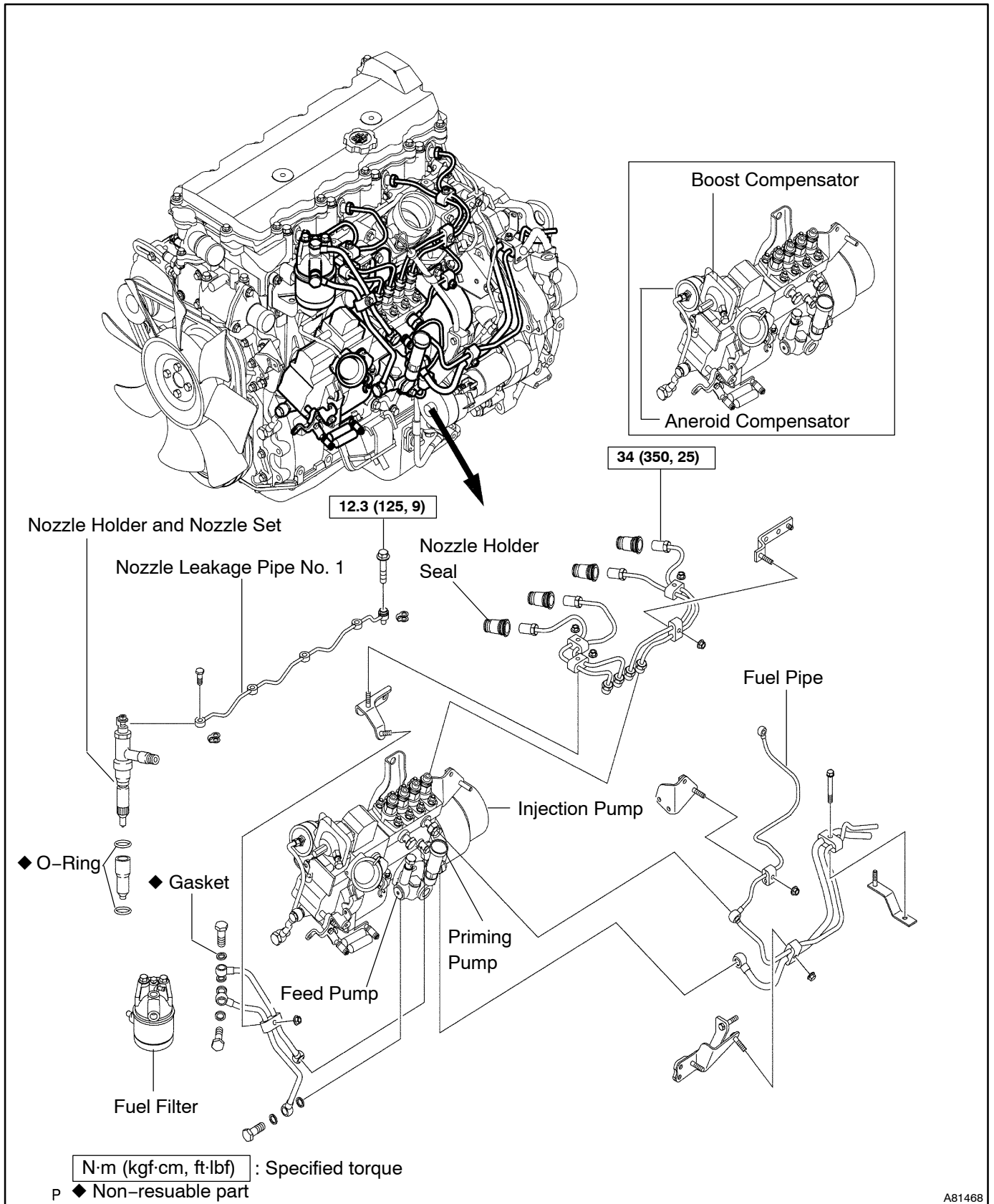
- (a) Tighten the 4 union nuts to the 4 injection pipes.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

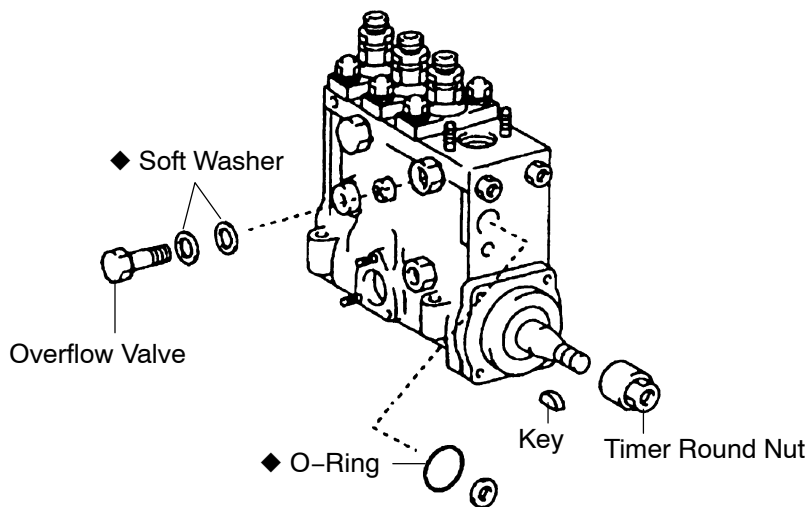
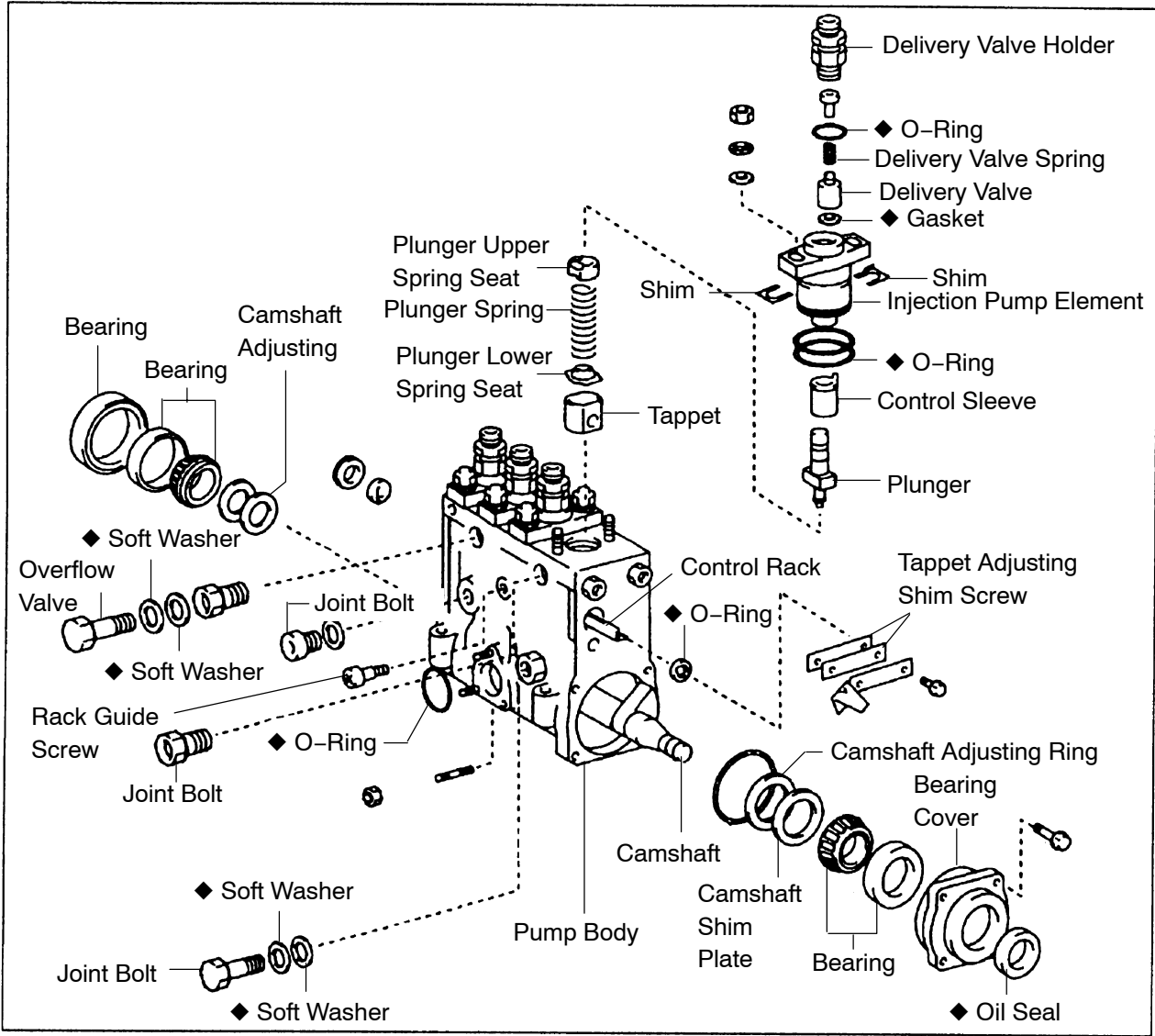
12. INSTALL CYLINDER HEAD COVER**13. ADD FUEL****14. BLEED FUEL (See page 11-112)****15. CONNECT BATTERY NEGATIVE TERMINAL****16. INSPECT FOR FUEL LEAKS**

INJECTION PUMP ASSY (S05C-TA)

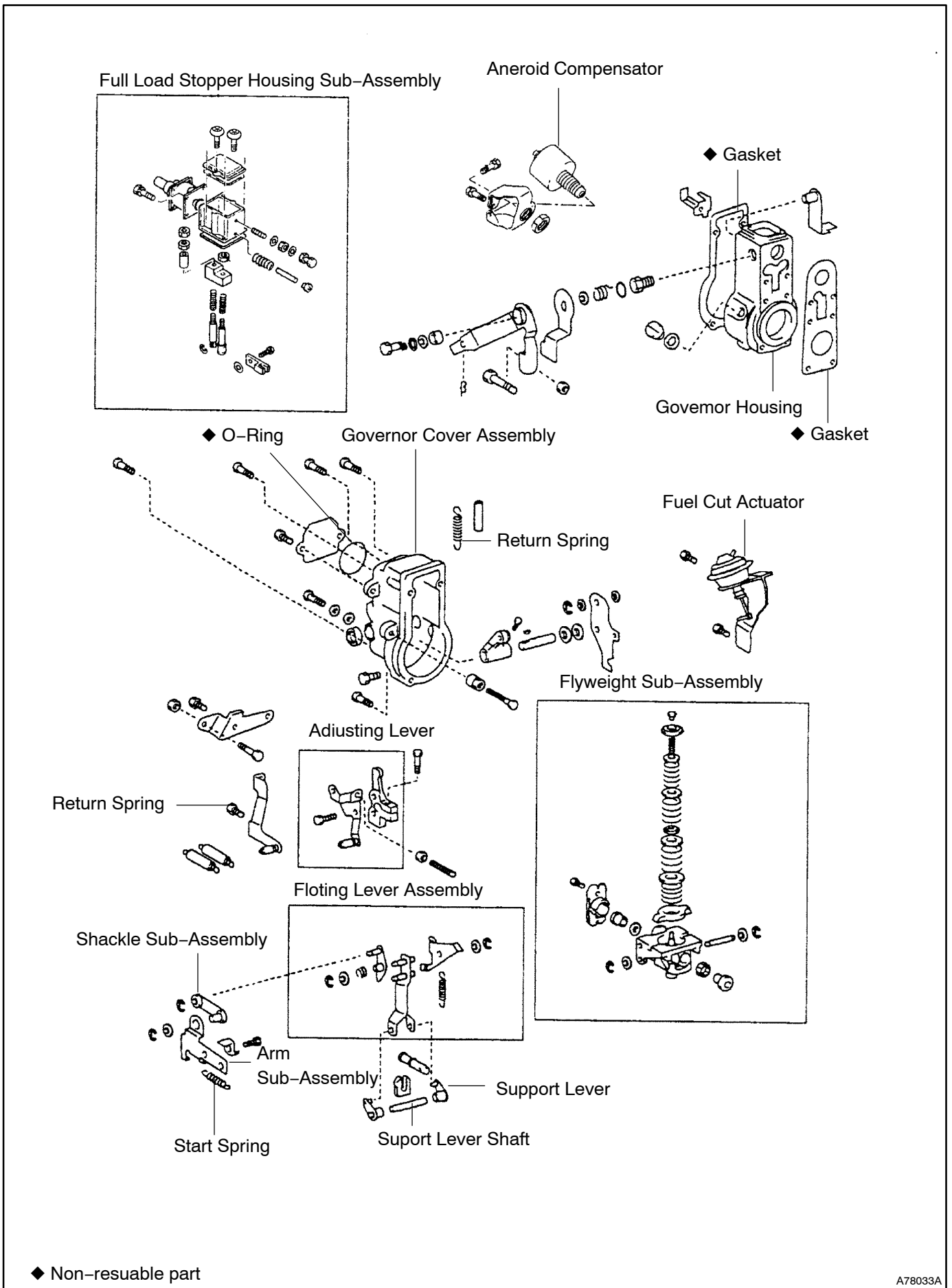
COMPONENTS

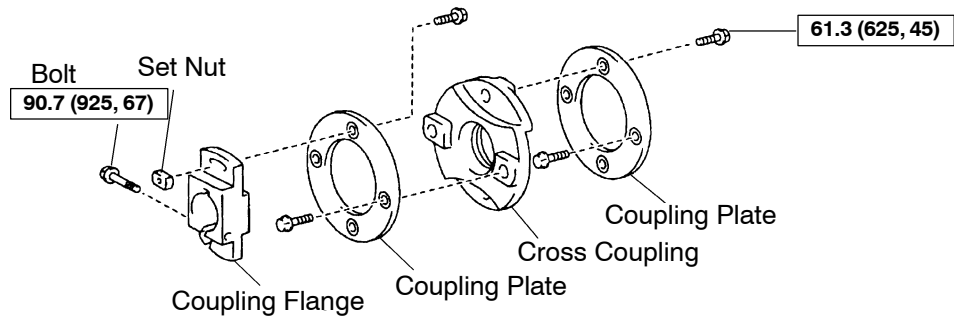
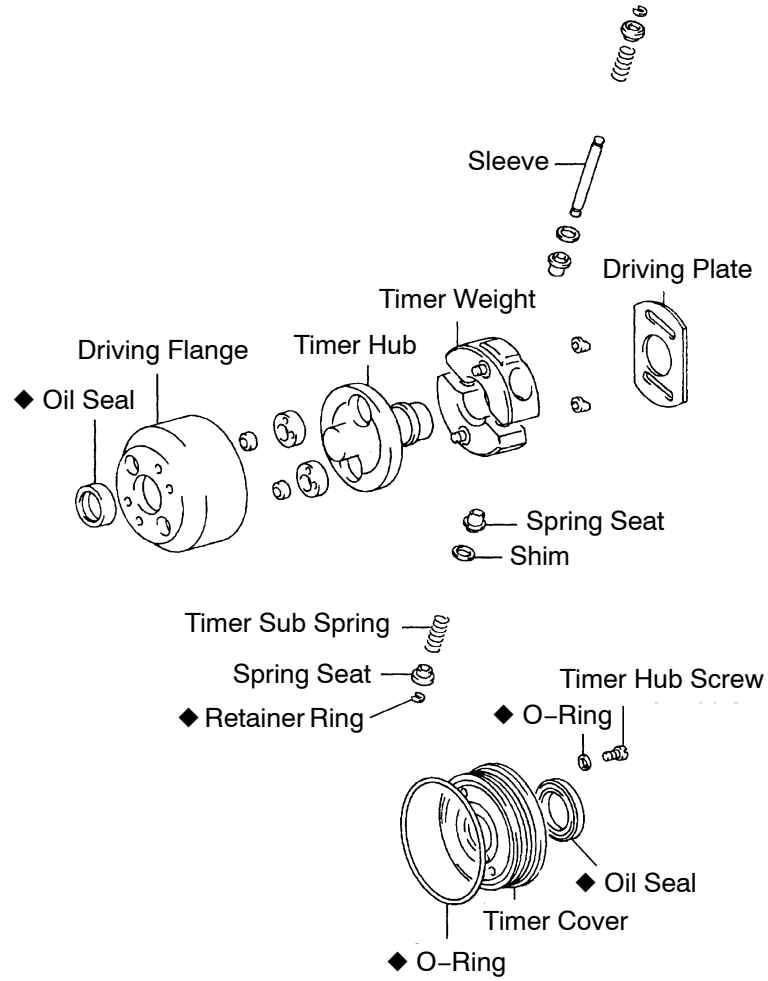
110QI-01





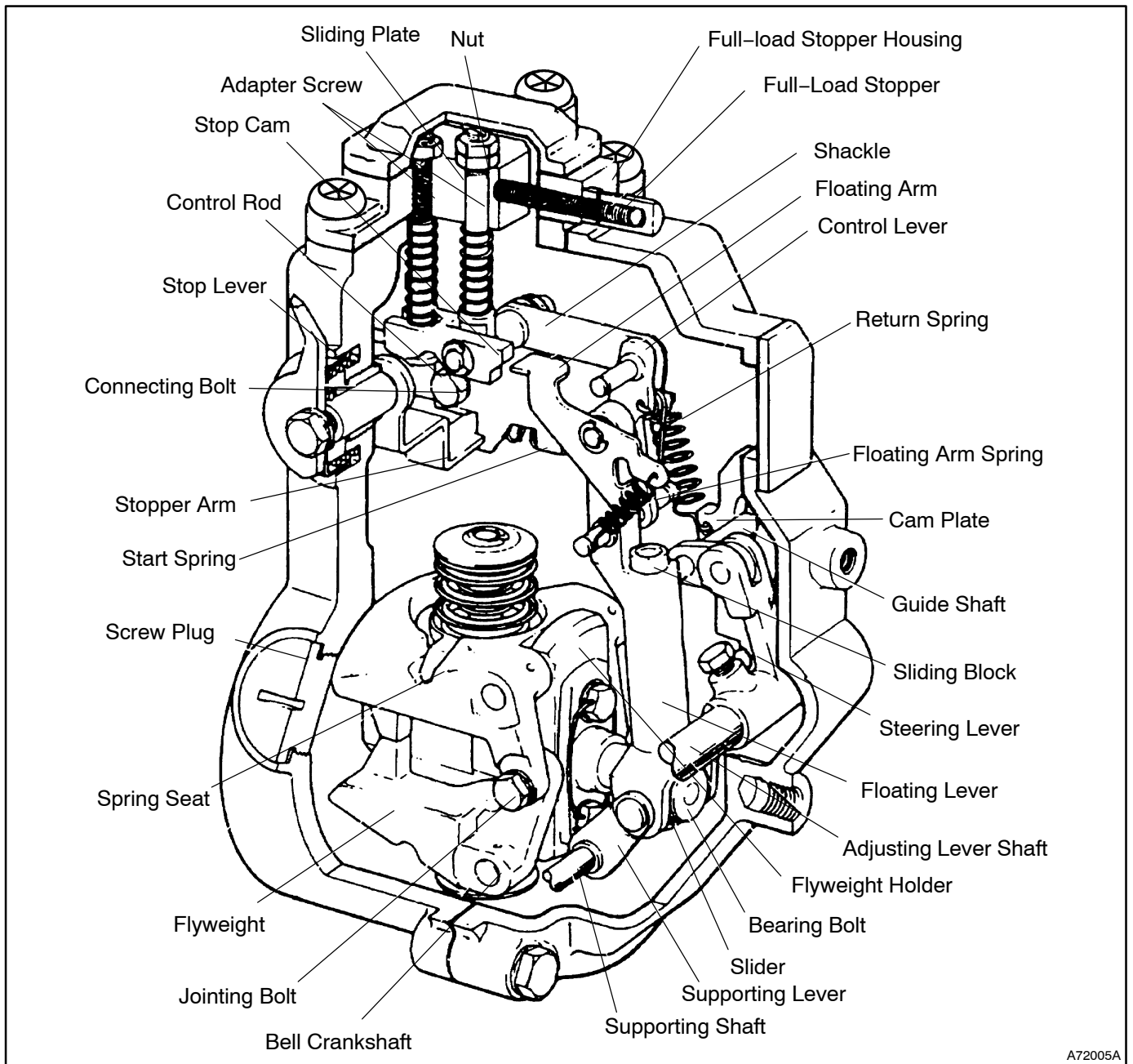
◆ Non-resuable part



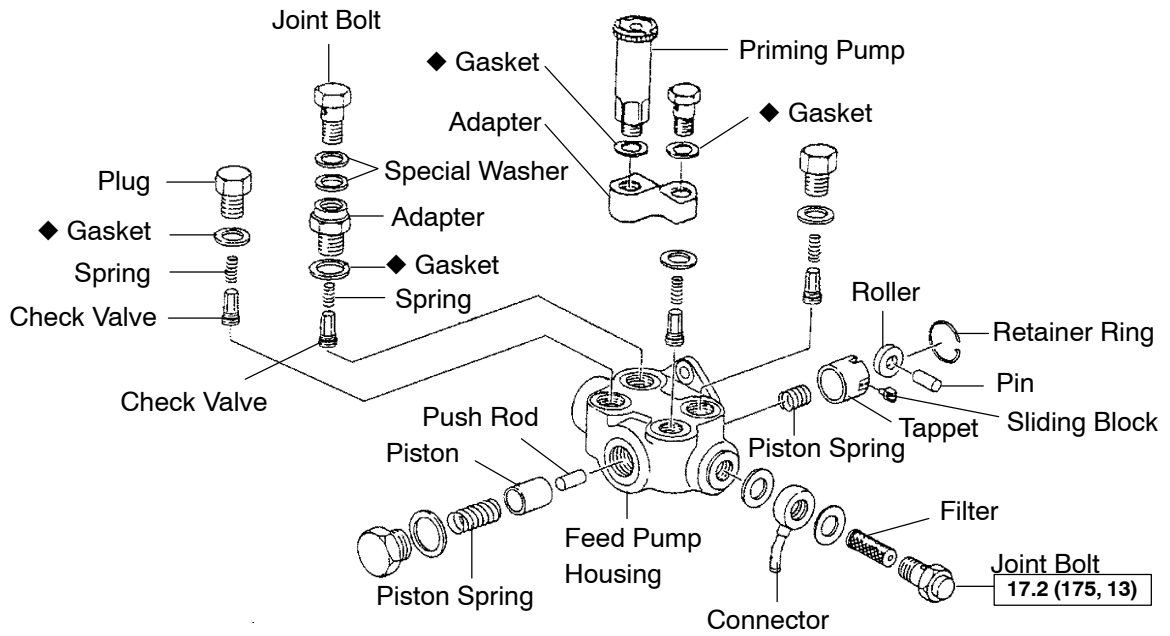


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-resuable part

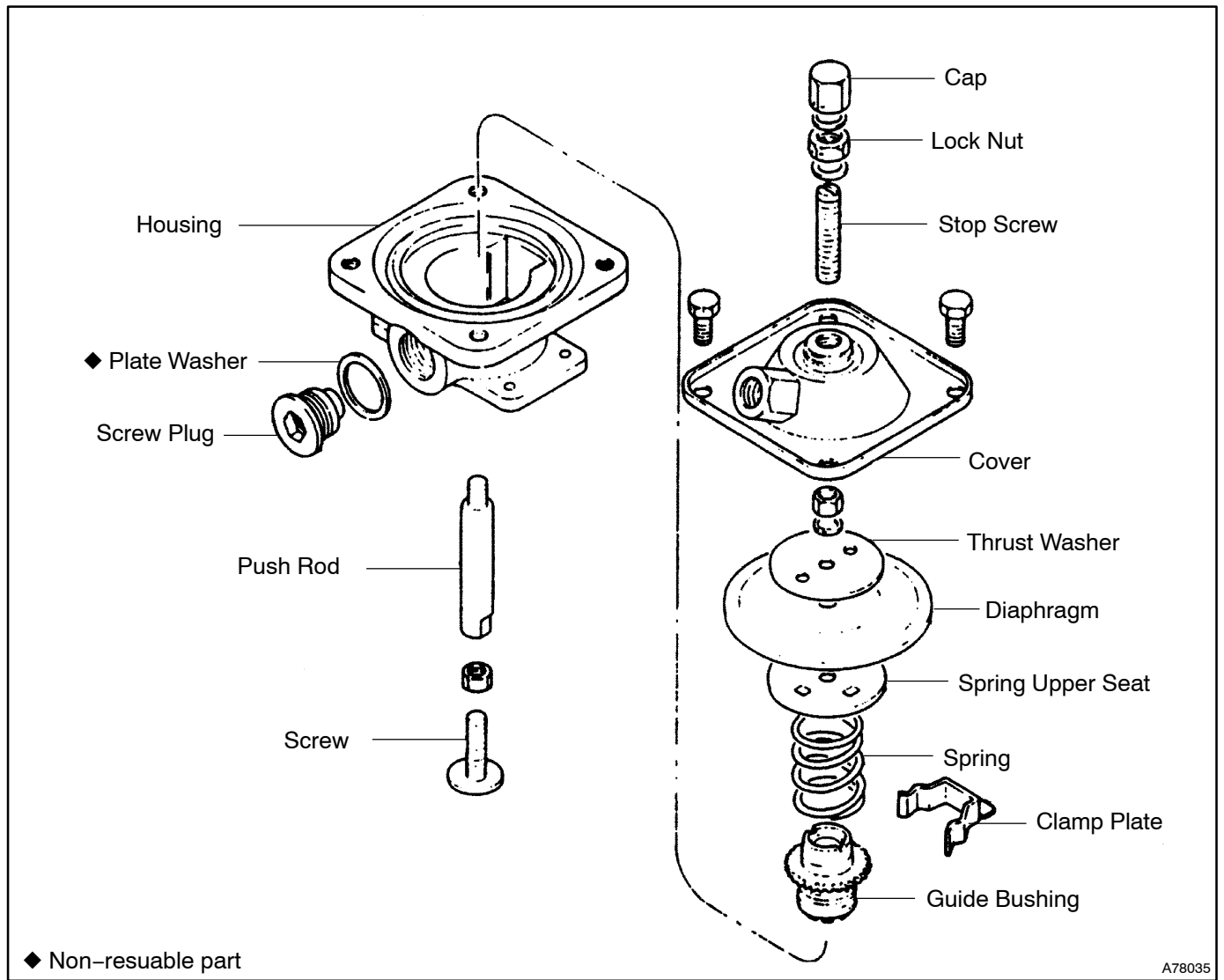


Feed Pump (KD-Type)



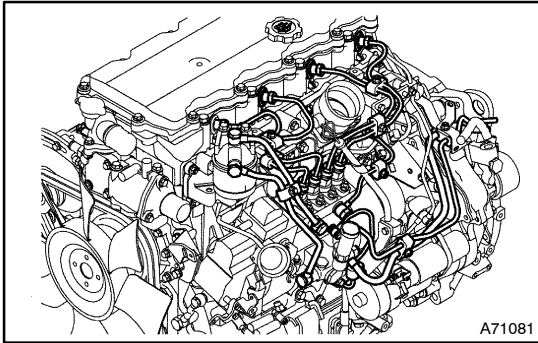
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-resuable part



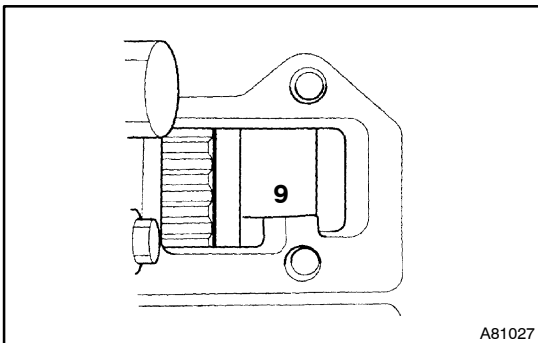
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL
3. REMOVE INTAKE AIR CONNECTOR
4. REMOVE OIL LEVEL GAUGE SUB-ASSY
5. REMOVE INTAKE AIR PIPE
6. REMOVE INJECTION PIPE SET (See page 11-115)

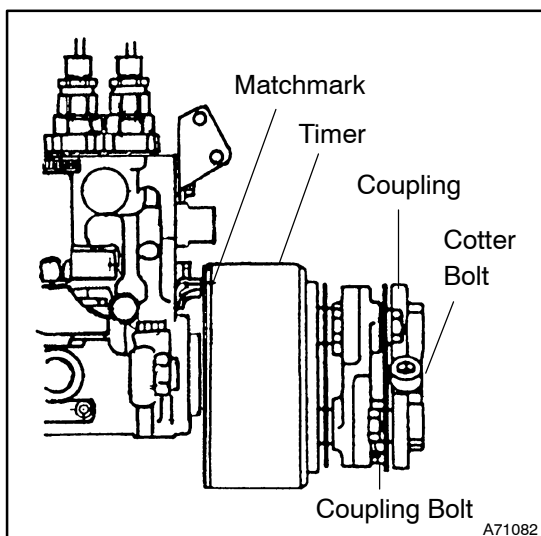


7. REMOVE FUEL PIPE SET
 - (a) Remove the illustrated fuel pipe.

8. REMOVE DIESEL FUEL FILTER ASSY (See page 11-112)



9. REMOVE INJECTION PUMP ASSY
 - (a) Turn the flywheel clockwise in the engine direction and align the No. 1 cylinder mark to the pointer in the flywheel hosing inspection opening.

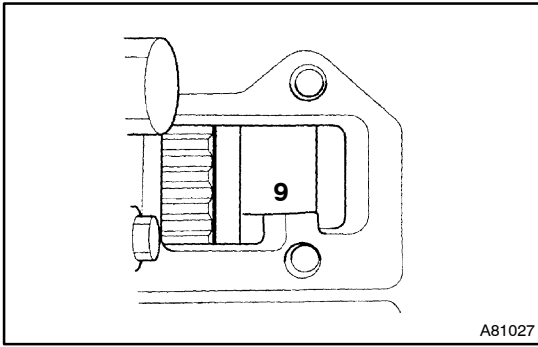


- (b) Adjust the top dead center of the No. 1 cylinder and timing mark of the injection pump.
- (c) Remove the coupling bolt.
- (d) Loosen the cotter bolt.

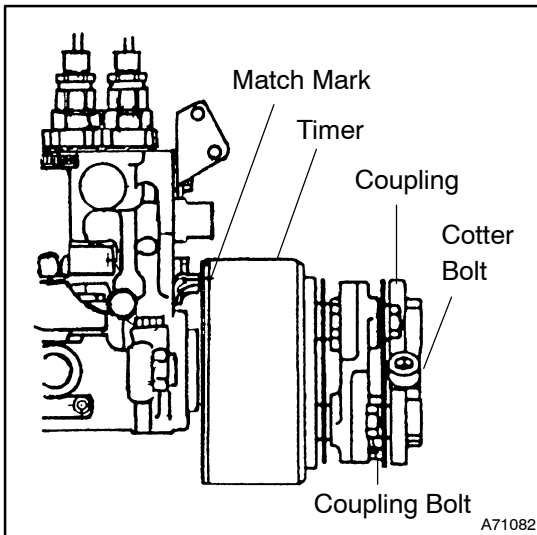
NOTICE:

Loosen the cotter bolt and be careful not to apply excess pressure to the laminated coupling when installing the injection pump.

- (e) Remove the 4 bolts.
- (f) Remove the injection pump.

**10. INSTALL INJECTION PUMP ASSY**

- (a) Turn the crankshaft counterclockwise, as viewed from the flywheel side, and then align the timing mark in the check window of the flywheel housing with a mark of 1/4. At this time, the No. 1 cylinder or the No. 4 cylinder is in the top dead center, and therefore set the No. 1 cylinder in the top dead center as follows.



- (b) Check that the timing mark of the injection pump is correctly set in the top dead center of the No. 1 cylinder. At this time a slight difference is acceptable. If the timing mark is set in the 180 degrees opposite direction, the injection pump is set in the top dead center of the No. 4 cylinder. At this time, adjust the injection pump to be in the top dead center of the No. 1 cylinder by turning the flywheel one revolution.
- (c) Check that the cotter bolt is loose, and then install the injection pump to the bracket.
Torque: 22.1 N·m (225 kgf·cm, 16 ft·lbf)
- (d) Install the 2 coupling bolts temporarily, align the timing mark of the injection pump, and then tighten the bolt.
Torque: 61.3 N·m (625 kgf·cm, 45 ft·lbf)

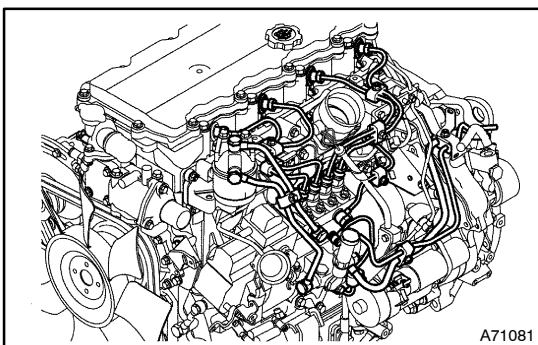
NOTICE:

Check that no clearance exists between the laminated plates. And also check that the flange has not been deformed by pressing the laminated plates.

- (e) Tighten the cotter bolt.
Torque: 90.7 N·m (925 kgf·cm, 67 ft·lbf)

NOTICE:

Check that the laminated plates have not been deformed, or have not been under excess pressure.

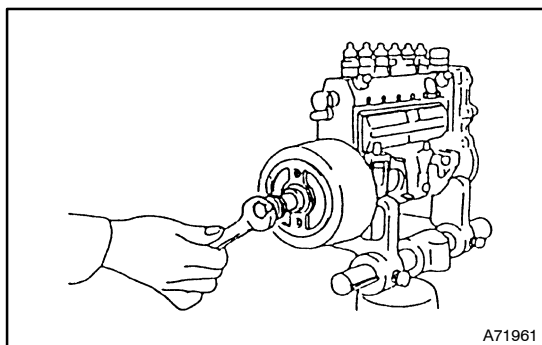
11. INSTALL DIESEL FUEL FILTER ASSY (See page 11-112)**12. INSTALL FUEL PIPE SET**

- (a) Install the fuel pipes.

13. INSTALL INJECTION PIPE SET (See page 11-115)**14. INSTALL INTAKE AIR PIPE****15. INSTALL OIL LEVEL GAUGE SUB-ASSY****16. INSTALL INTAKE AIR CONNECTOR****17. ADD FUEL**

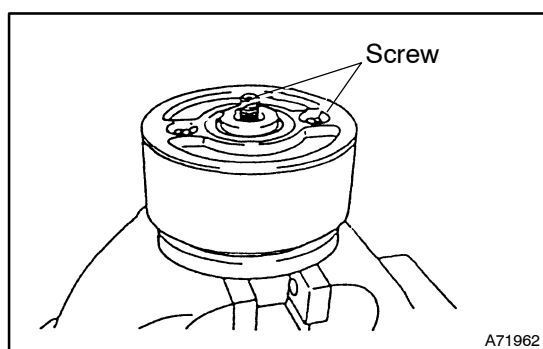
18. BLEED FUEL (See page 11-112)
19. CONNECT BATTERY NEGATIVE TERMINAL
20. INSPECT FOR FUEL LEAKS

OVERHAUL



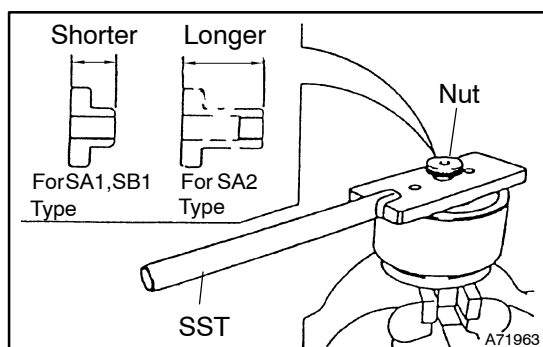
1. REMOVE TIMER FROM INJECTION PUMP

- (a) Remove the timer round nut from the timer.
- (b) Remove the timer from the injection pump.



2. REMOVE TIMER COVER

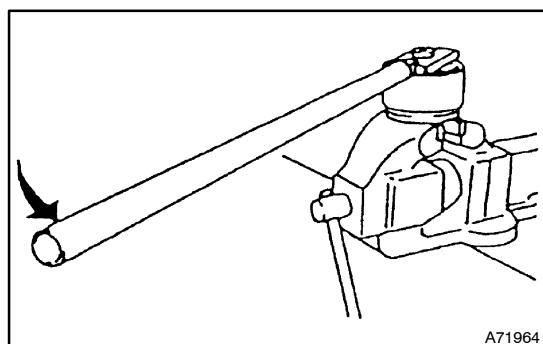
- (a) Remove the 2 timer hub screws.



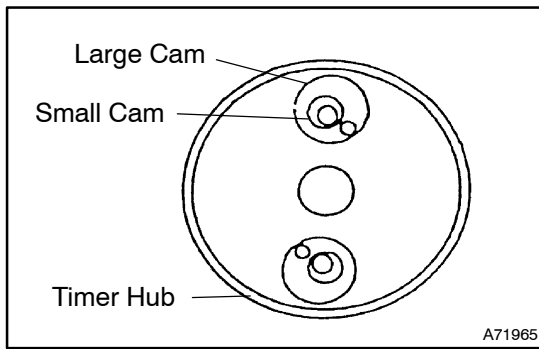
- (b) Install the SST on the cover, and fix with the nut.
SST 09512-2210

NOTICE:

Do not tighten the nut but leave loosened.



- (c) Set the extension bar on the timer wrench, then loosen and remove the timer cover.

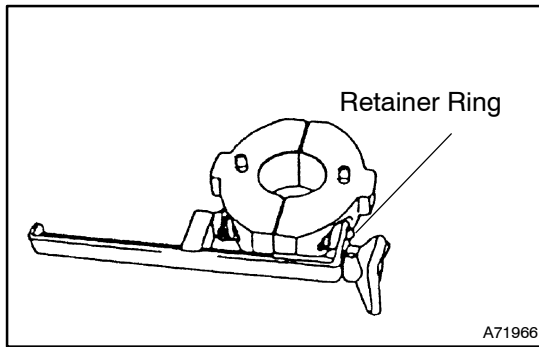


3. REMOVE TIMER WEIGHT

- (a) Remove the timer weight (with spring, timer weight rod etc.).

NOTICE:

Leave timer cams on timer hub.

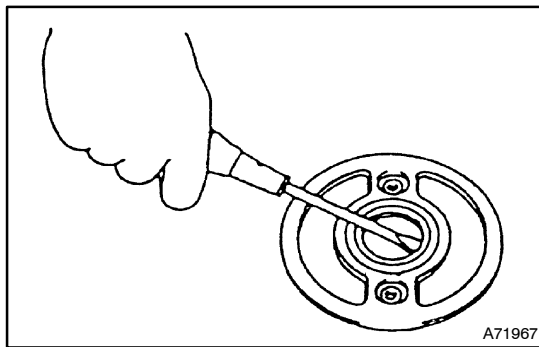


4. REMOVE TIMER CAMS AND TIMER HUB

- (a) Compress the time spring, then remove the retainer ring.

NOTICE:

Remember the position of timer cams.

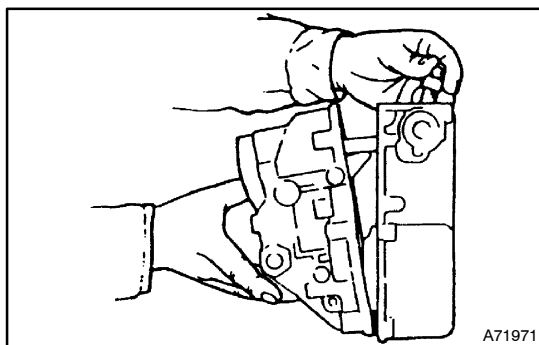


5. REMOVE OIL SEAL

- (a) Using a screwdriver, remove the oil seals from the timer cover and driving flange.

NOTICE:

- Breaking of the lead seals or crimp caps by anyone other than pump manufacture authorized service stations to make these adjustments will void the warranty.
- If fuel pump or governor difficulties are suspected, consult only pump manufacture authorized service stations, where the problem can be corrected and the injection pump lead seals and crimp caps can be reinstalled as required.

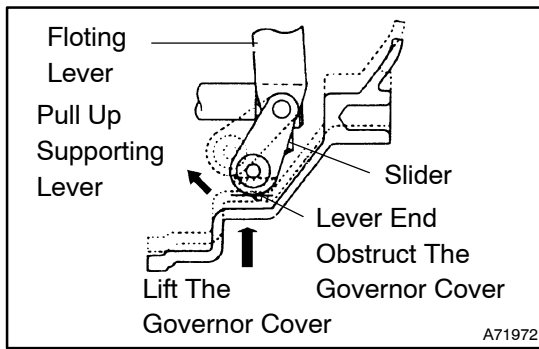


6. REMOVE GOVERNOR COVER

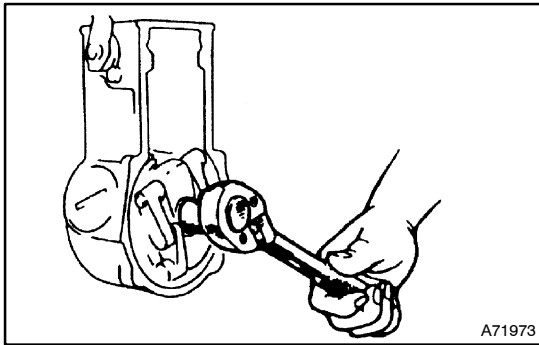
- (a) With the adjusting lever held in its 'idling' position, detach the governor cover by lifting it up in such a way that the sliding block can slide out of the slit in the floating lever.

NOTICE:

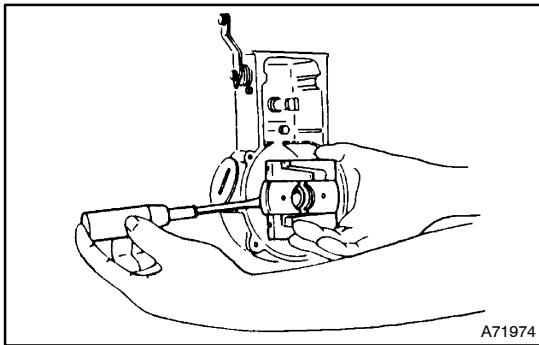
- Disconnect the special bolts or crimp caps by anyone other than HINO or pump manufacture authorized service stations to make these adjustment will void the warranty.
- If fuel pump or governor difficulties are suspected, consult only HINO or pump manufacture authorized service stations, where the problem can be corrected and the injection pump lead seals and crimp caps can be reinstalled as required.

**NOTICE:**

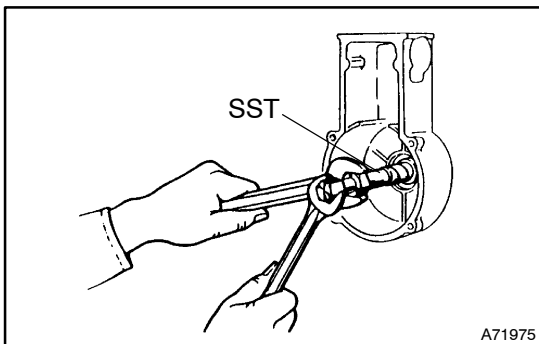
Before lifting the governor cover, be sure to pull up the supporting lever as shown by dotted lines in the figure, so that its lower end may not obstruct the lifting of the governor cover.

**7. REMOVE FLYWEIGHT ROUND NUT****NOTICE:**

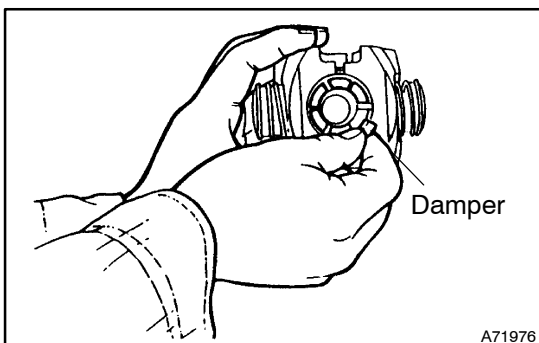
Use the holding spanner to keep the camshaft from rotating.

**8. REMOVE FLYWEIGHT SUB-ASSY**

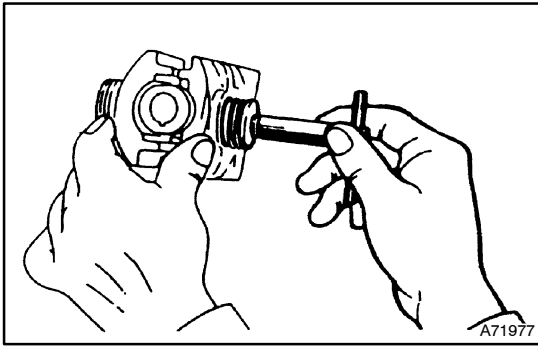
- (a) Remove the flyweight using a screwdriver to pull it out slowly.



- (b) Remove the camshaft bushing.
SST 09512-2260



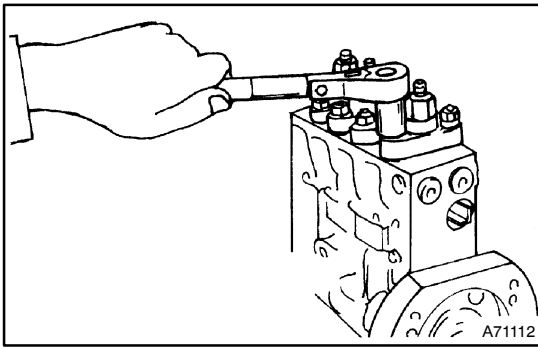
- (c) Remove the damper from the flyweight.



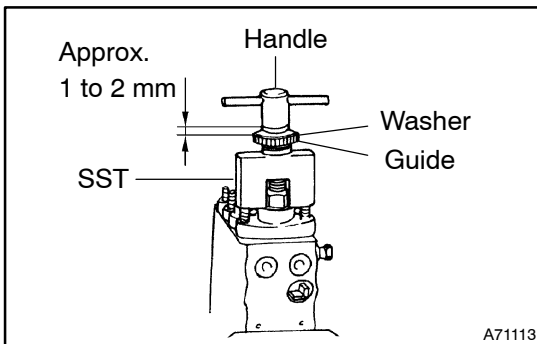
- (d) Remove the flyweight.
- (1) Remove the adjusting nut with SST, and disassemble the inner parts of the flyweight sub-assembly.

NOTICE:

- **Breaking of the lead seals or crimp caps by anyone other than pump manufacture authorized service stations to make these adjustments will void the warranty.**
- **If fuel pump or governor difficulties are suspected, consult only pump manufacture authorized service stations, where the problem can be corrected and the injection pump lead seals and crimp caps can be reinstalled as required.**
- **Measure and record the fuel delivery characteristics of the pump before disassembling it.**
- **Keep the parts for each cylinder in separate groups and in an orderly arrangement. Parts to be replaced and parts to be used again must be kept separately.**

**9. REMOVE DELIVERY VALVE GROUP**

- (a) Remove the nut that secures the cylinder.

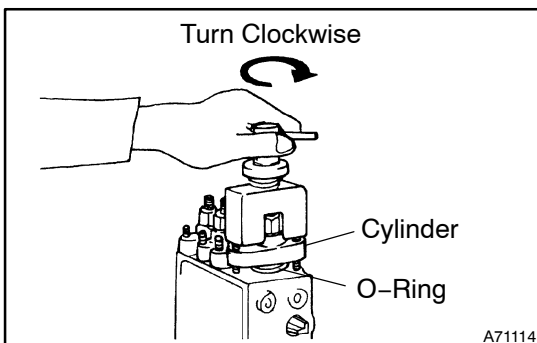


- (b) Turn the guide until the clearance between the washer and the handle is approx. 1 to 2 mm (0.039 - 0.078 in.), to set the SST.

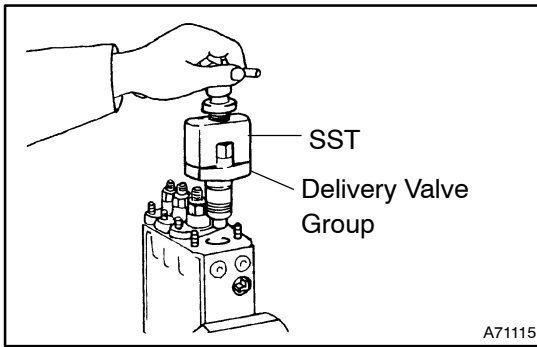
SST 09512-1920

NOTICE:

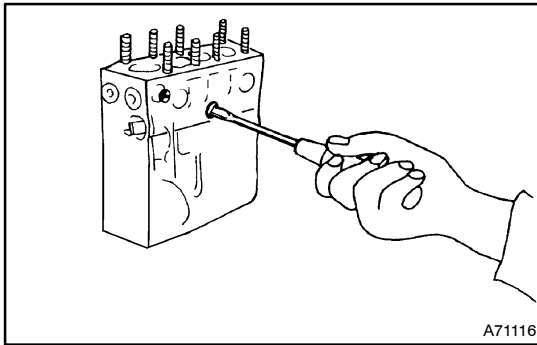
The guide of the SST is left-hand threaded.



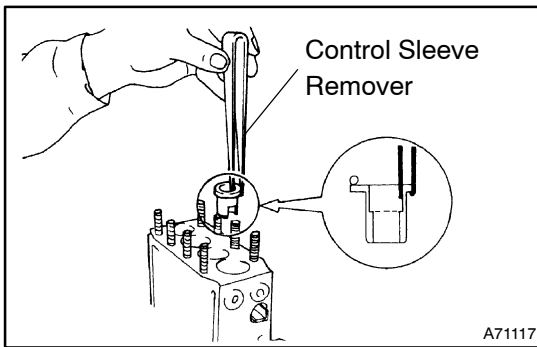
- (c) Turn the handle clockwise into the deliver valve holder. Continue until the O-ring in the cylinder comes off the pump housing.



- (d) Pull the SST upward to remove the delivery valve assembly.



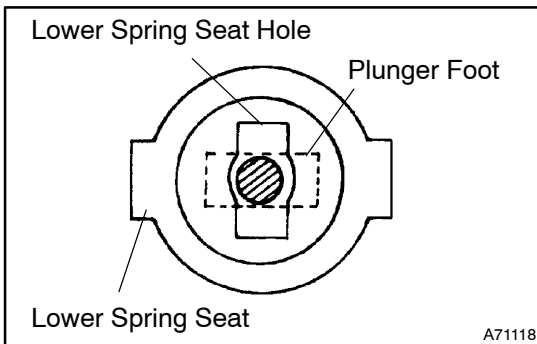
- (e) Remove the rack guide screw.



- (f) Remove the control sleeve.
- (1) Pull the control rack to the left (viewed from the feed pump) as far as it goes.
 - (2) Hook the end of the control sleeve remover onto the groove of the control sleeve and remove it.

NOTICE:

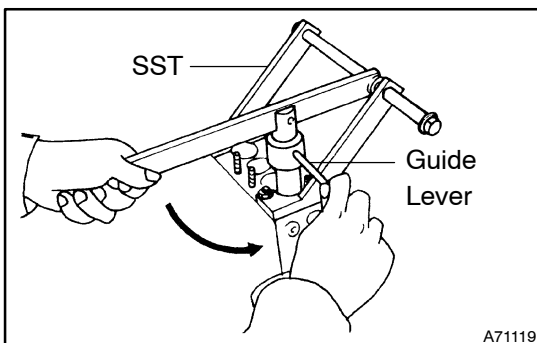
Set the camshaft at bottom dead center before removing the control sleeve.



- (g) Remove the plunger.
Bring the camshaft of the cylinder to top dead center.

NOTICE:

- **Do not mix up the plungers since they must be put back into the same cylinders.**
- **Handle the plunger very gently, in order not to damage it.**
- **Keep the removed plungers in a pan containing clean diesel fuel.**

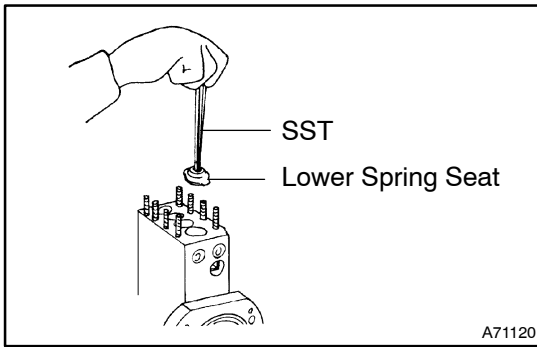


- (h) Remove the upper spring seat.
Pushing the handle down to push in the plunger spring, turn the guide lever 90° (in either direction) to remove the upper spring seat from the stopper pin.
SST 09512-1930

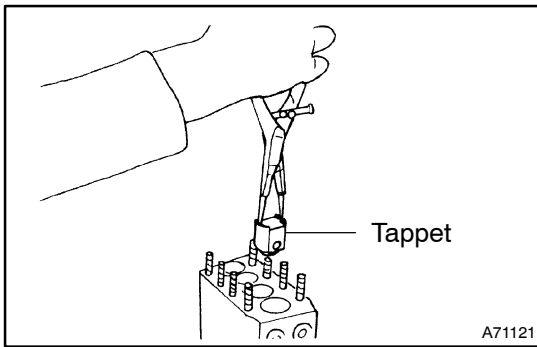
NOTICE:

First bring the cam of the cylinder to bottom dead center.

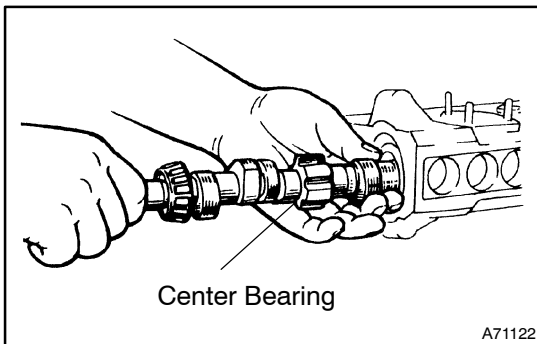
- (i) Remove the upper seat and plunger spring.



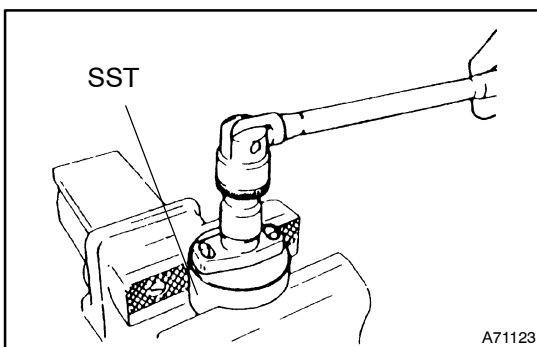
- (j) Using SST, remove the lower spring seat.
SST 09269-54030



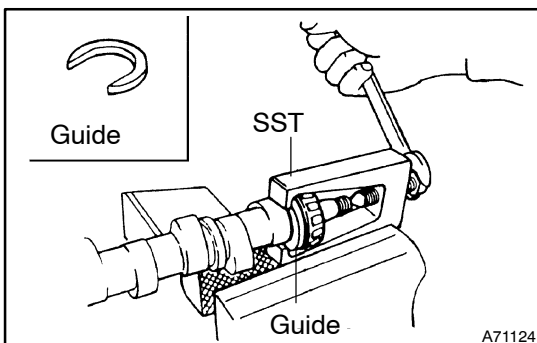
- (k) Remove the tappet.



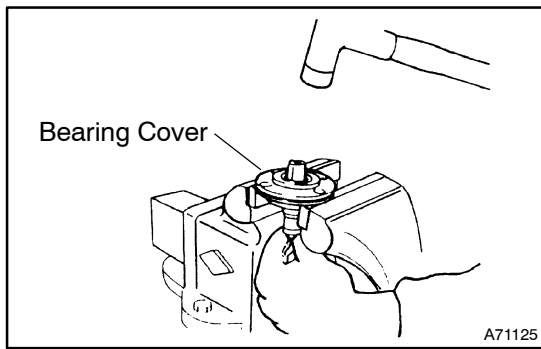
- (l) Remove the camshaft from the injection pump body.
 (1) Remove the center bearing two set screws.
 (2) Loosen the bearing cover set screws.
 (3) Lightly tap the camshaft with a plastic hammer from the governor side and remove the camshaft and bearing cove at the same time.



- (m) Disassemble the delivery valve group.
Mount the delivery valve assembly in the SST, and remove the delivery valve holder.
SST 09512-1910



- (n) Remove the taper bearing from the camshaft.
remove the taper bearing from the drive end of the camshaft using the SST.
SST 09287-58010
 (1) Use the guide to remove the bearing at the governor side.



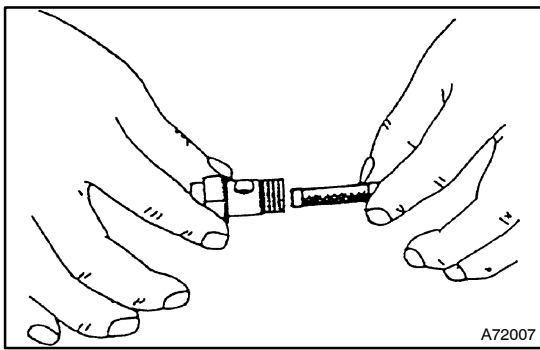
- (2) Tap out the outer race in the bearing cover.
SST 09269-54030

10. REMOVE PRIMING PUMP AND CHECK VALVES

- (a) Unscrew the priming pump and remove the spring and inlet check valve.
(b) Remove the outlet check valve and spring.

11. REMOVE TAPPET

- (a) Remove the retainer ring and pull out the tappet.



12. REMOVE FILTER FROM INLET PIPE JOINT

- (a) Clean the filter with clean diesel fuel.

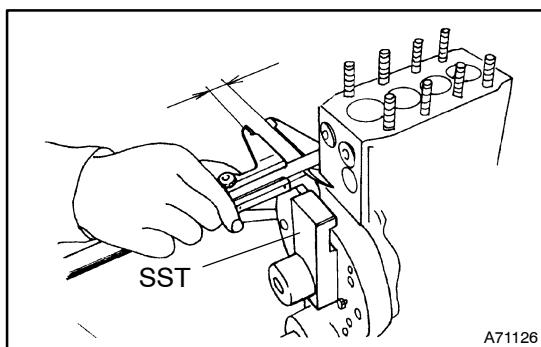
13. INSTALL TAPPET

14. INSTALL RETAINER RING

15. INSTALL PISTON

- (a) Insert the piston and spring in the housing and screw on the chamber plug with a new gasket.

16. INSTALL PLUG AND CHECK VALVES

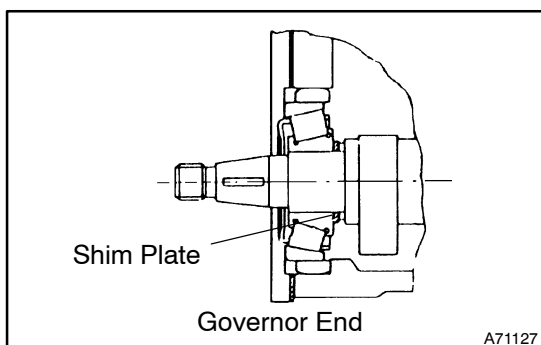


17. INSPECT CAMSHAFT PROTRUDING LENGTH

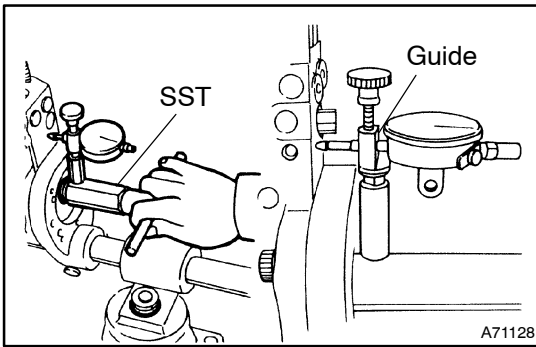
- (a) Measure the distance from the surface of the end of the pump housing to the surface of the end of the SST (where the tapered section of the camshaft starts).

SST 09510-1170

Standard length: 16 - 17 mm (0.63 - 0.67 in.)



- (b) If the specification is not met, use appropriate shim plates at the governor end of camshaft until the specification is met.

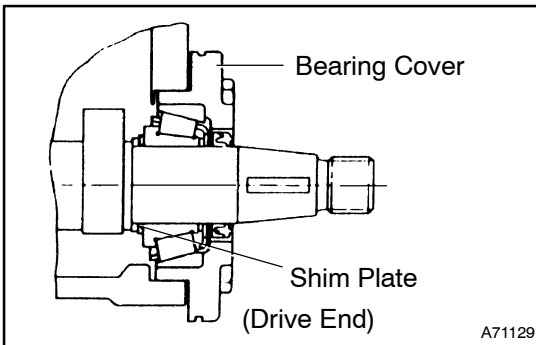
**18. INSPECT CAMSHAFT END PLAY**

- (a) Using SST, measure the thrust clearance of the camshaft with a dial gauge.

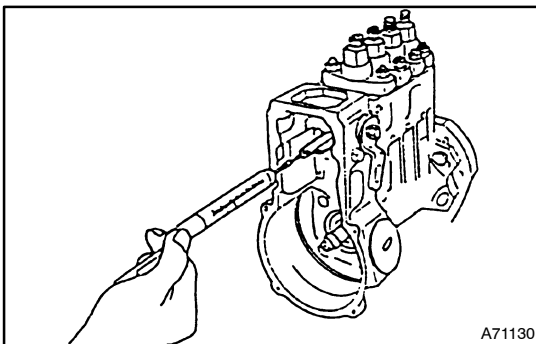
SST 09512-1150

Standard end play:

0.03 - 0.05 mm (0.0012 - 0.0020 in.)



- (b) If the specification is not met, use, appropriate shim plates at the drive end of camshaft until the specification is met.

**19. INSPECT SLIDING RESISTANCE OF CONTROL RACK**

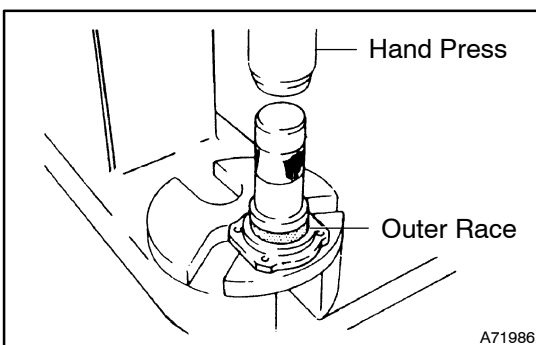
- (a) After the pump body has been assembled, attach a spring scale to the control rack and check and check that the control rack slides smoothly through its entire stroke.

Assembly standard:

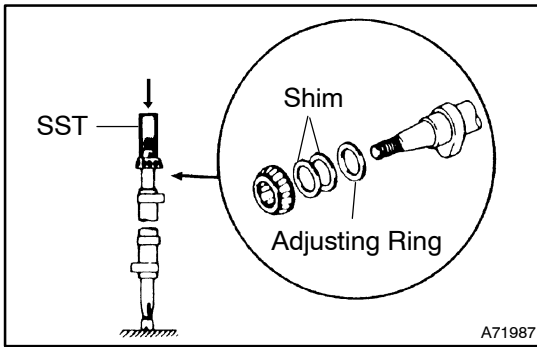
Less than 0.98 N (100 gf, 3,52 ozf)

NOTICE:

- wash all parts with clean diesel fuel before installing them, and any defective or damaged parts must be replaced.
- Do not allow dust or other foreign particles to enter the pump during assembly.
- Apply grease to O-rings and oil seals before installing them.
- Assemble the parts in correct order and to correct tightening torques, assembled dimensions etc.
- Reassembly takes place in the reverse order of disassembly.

**20. INSTALL BEARING**

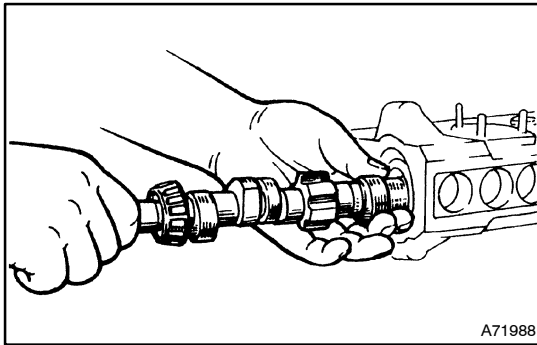
- (a) Put on the bearing outer race, and press-fit it into the bearing cover using a hand press.



- (b) Install the adjustment ring, shim and bearing, in that order, on the camshaft.

NOTICE:

Put a round nut on the other end of the camshaft to protect the threads.

**21. INSTALL CAMSHAFT**

- (a) Place the center bearing on the camshaft and insert the camshaft into the pump housing, and tighten the center bearing setting screws.

Torque:

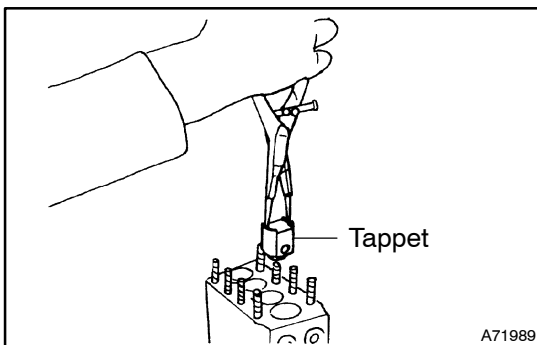
6.87 - 8.82 N·m (70 - 90 kgf·cm, 5.1 - 6.5 ft·lbf)

22. INSTALL BEARING COVER AND GOVERNOR HOUSING**Torque:****Bearing cover:**

15.7 N·m (160 kgf·cm, 12 ft·lbf)

Governor housing:

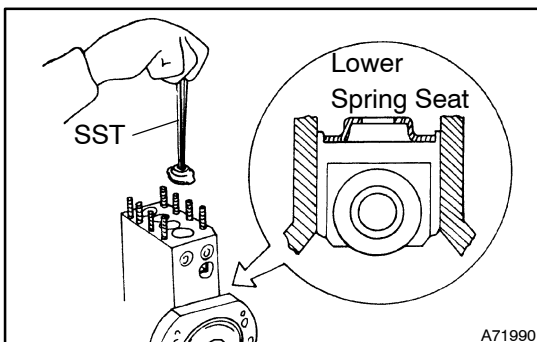
18.6 N·m (190 kgf·cm, 14 ft·lbf)

**23. INSTALL TAPPET**

- (a) Install the tappet.

NOTICE:

Position the groove provided in the tappet in the axial direction of the camshaft, and position it accurately so that the tappet is retained in position by the tappet retainer pin which is driven inside the pump housing.

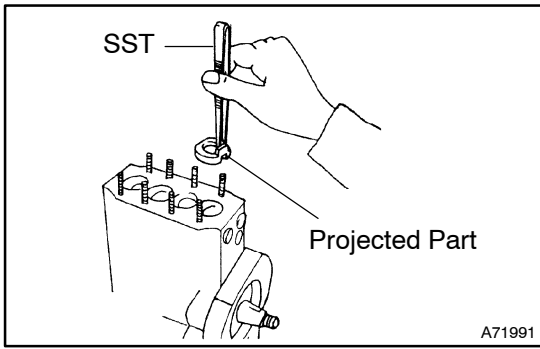
**24. INSTALL LOWER SPRING SEAT**

- (a) Using SST, install the lower spring seat.
SST 09269-54030

NOTICE:

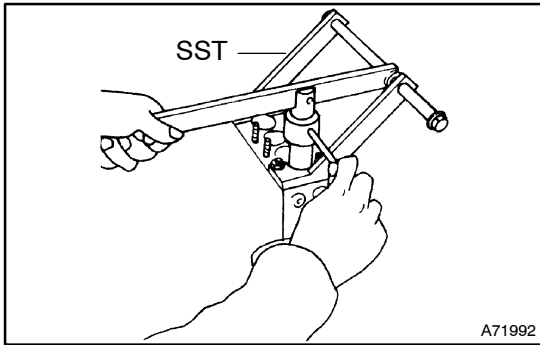
Be sure that the flanger of the lower spring seat is accurately seated in the groove of the tappet.

- (b) This is very important since an inaccurately positioned seat may cause damage to the pump.

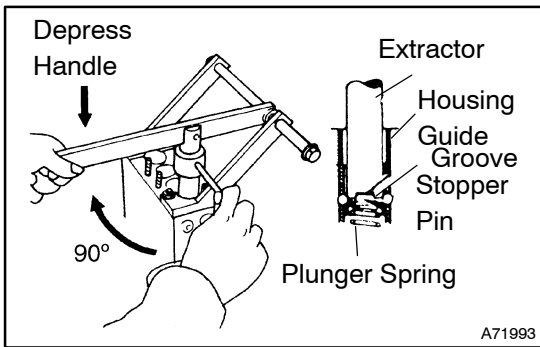


25. INSTALL UPPER SPRING SEAT

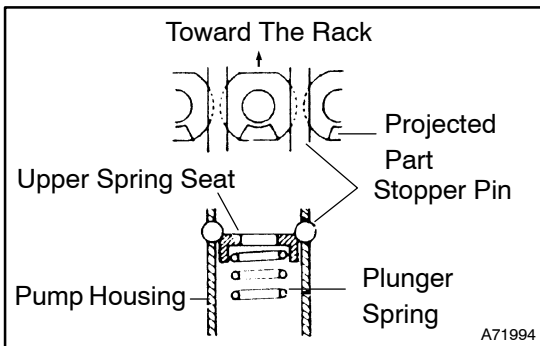
- (a) Using SST, insert the upper spring seat with the projected part of the seat facing at the drive end of the housing.
SST 09269-54030



- (b) Attach the upper spring extractor, and fit the guide groove on the extractor to the projected part of the upper spring seat.
SST 09512-1930

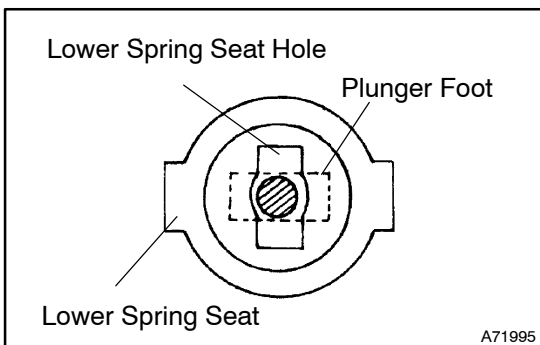


- (c) Push the handle down to compress the plunger spring, turn the guide lever 90° towards you, and installing the upper spring seat underneath the stopper pin which is driven inside the pump housing.



NOTICE:

- **First bring the cam of the cylinder to bottom dead center.**
- **Check that the spring is accurately retained by the stopper pin.**
- **Check that the projected part of the upper spring seat faces away from the rack.**

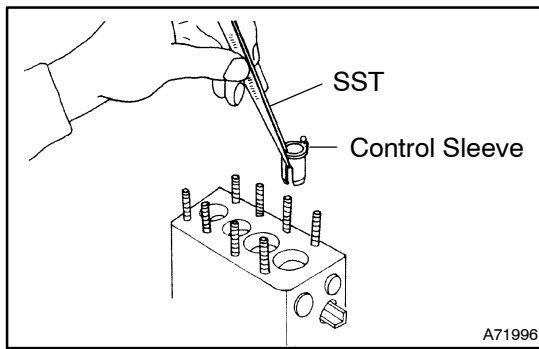


26. INSTALL PLUNGER

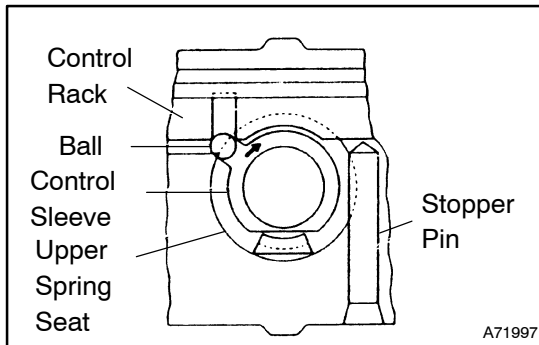
- (a) Put the flange of the plunger leg through the hole provided in the lower spring seat, with the part number marking facing the spill side (away from the feed pump), then turn it clockwise 90°.

NOTICE:

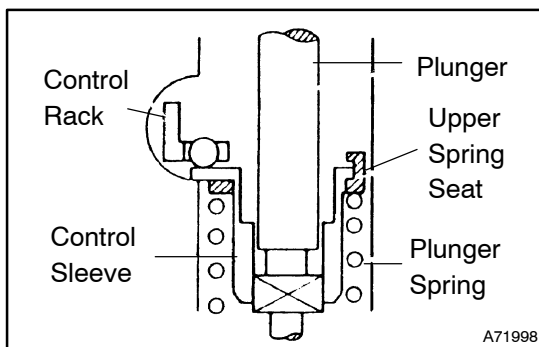
- **The plunger can be installed more easily if the cam of the cylinder is at top dead center.**
- **Grip the plunger at the top, and pull up to check that it does not come out.**

**27. INSTALL CONTROL SLEEVE**

- (a) Insert the control rack.
- (b) Using SST, install the control sleeve.
SST 09269-54030

**NOTICE:**

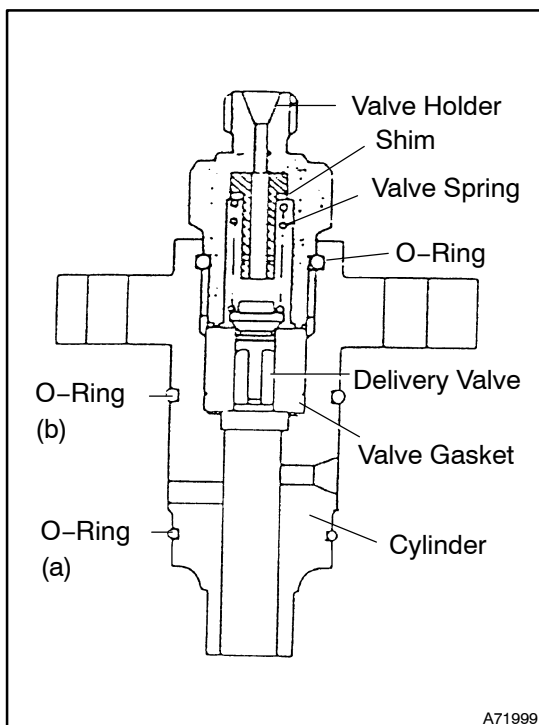
Position the flanges of the control sleeve and the plunger, and the projected part of the upper spring seat correctly before inserting the control sleeve.



- (c) Move the control rack until the ball in the control sleeve is accurately inside the groove provided in the control rack.

NOTICE:

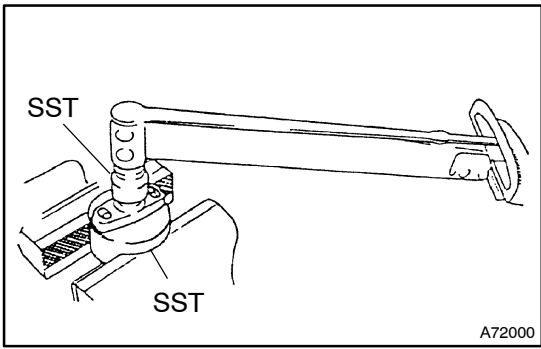
- **The plunger may slip out of its position during installation. Check the following for a second time.**
- **The vertical groove of the plunger must face the spill side.**
- **The plunger must not come out when it is pulled up.**

**28. INSTALL DELIVERY VALVE GROUP**

- (a) Install the valve gasket, delivery valve, valve spring, shim, and the valve holder in that order inside the cylinder.

NOTICE:

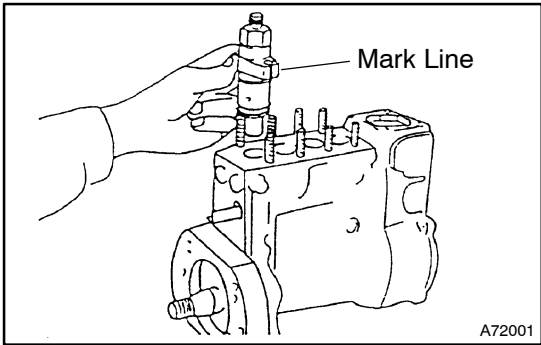
- **Apply grease to each O-ring first to protect it from damage. Install O-ring (a) and (b) in that order.**
- **Use new valve gaskets and O-rings. Never reuse them.**



- (b) Using SST, put the delivery valve, and tighten the delivery valve on the delivery valve group.
SST 09512-1910

Torque:

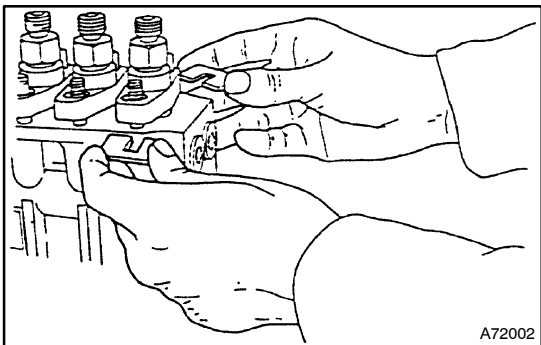
88.3 N·m (900 kgf·cm, 65 ft·lbf)



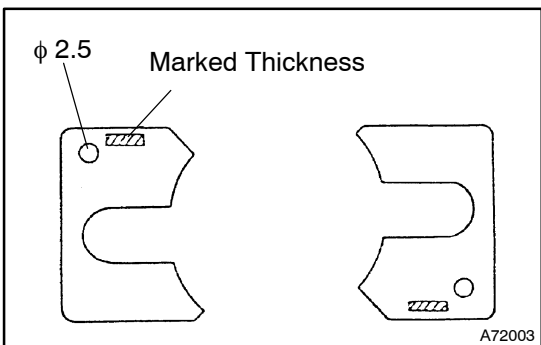
- (c) Apply a small amount of grease to the O-rings and the outside of the cylinder, position the cylinder with the marked line on its flange facing the spill side of the feed pump, slip the cylinder over the plunger, moving the control rack in and out, and insert the delivery valve group inside the pump body.

NOTICE:

- **Install the cylinder in the correct position. This is very important since, otherwise, the relative position of the feed hole and the spill port will be reversed and the characteristics of the injection volume will be different.**
- **Each time a cylinder is inserted, move the control rack to check that it slides smoothly.**

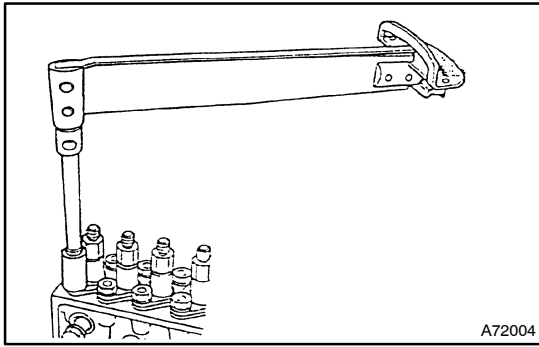


- (d) Put pair of shims under the flange of the cylinder.



NOTICE:

- **Use a pair of shims of the same thickness at the sides of each cylinder.**
- **Install the shims with the thickness marking facing up. (They cannot be installed upside down since the valve holder cover will be in the way).**
- **Push each shim completely in until it touches the cylinder.**



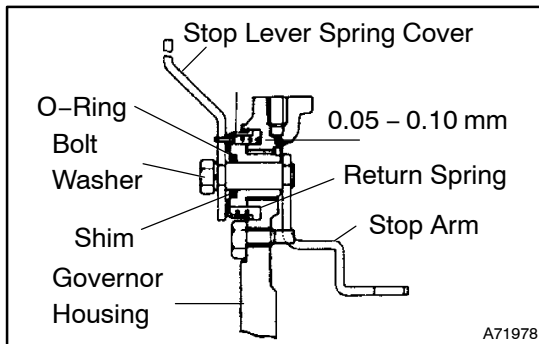
- (e) Tighten the nuts finger tight. Then, tighten the nuts alternately to their specified torque.

Torque:

19.1 N·m (195 kgf·cm, 14 ft·lbf)

NOTICE:

- Wash all parts with clean diesel fuel before installing them, and any defective or damaged parts must be replaced.
- Do not allow dust or other foreign matter to enter the pump during assembly.
- Apply grease to O-rings and oil seals before installing them.
- Assemble the parts in correct order and to correct tightening torque, assembled dimensions etc.
- Assembly takes place in the reverse order of disassembly.



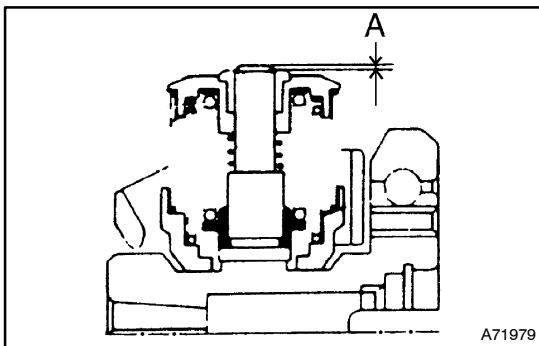
29. INSTALL STOP LEVER

- (a) Install the stop lever as shown.
 (b) Measure the thrust clearance of the stop arm.

Thrust clearance: 0.05 - 0.10 mm (0.0020 - 0.0039 in.)

NOTICE:

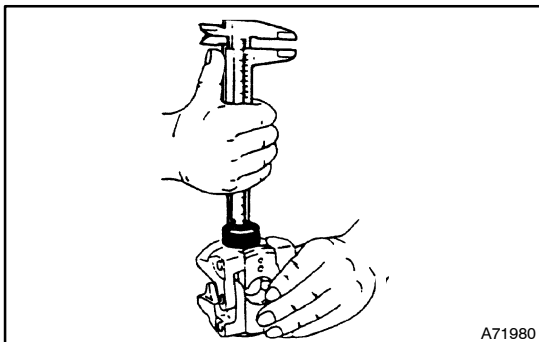
The O-ring should be coated with grease before being fitted.



30. INSTALL FLYWEIGHT

NOTICE:

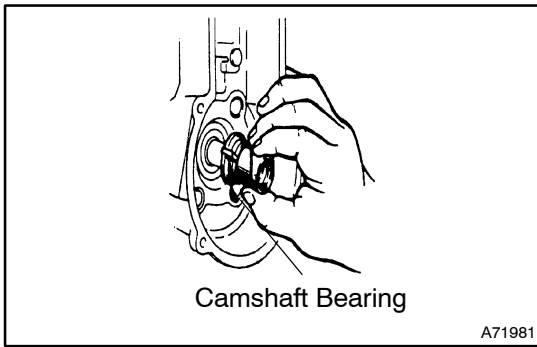
Be sure to install the spring inner seat correctly, its 'LAPPED' surface should face downwards.



- (a) Tighten the adjusting nut.

Protrusion of adjusting nut A:

-0.4 mm to 0.2 mm (-0.016 in. to 0.008 in.)

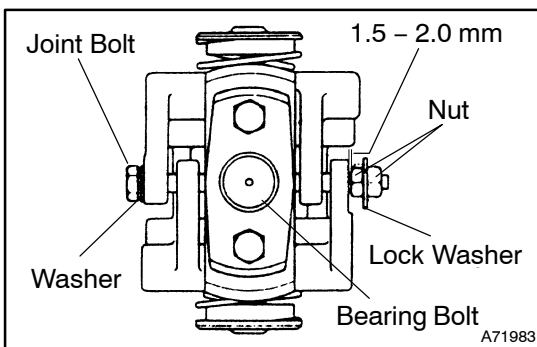
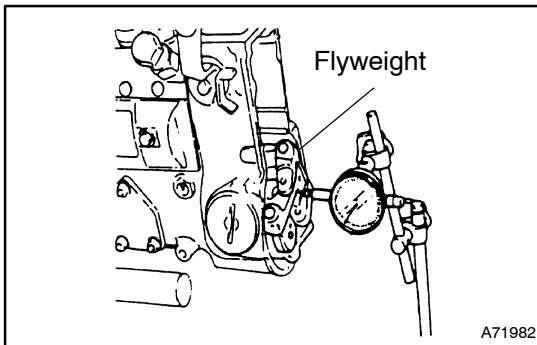


31. IF EQUIPPED WITH DAMPER, ADJUST DAMPER THRUST CLEARANCE

- (a) This provides a clearance between the flyweight and the camshaft bushing.
- (1) Temporarily install the camshaft bushing on the camshaft.
 - (2) Install the flyweight without the dampers.
 - (3) Temporarily fit the governor round nut.
 - (4) Apply a dial gauge to the end face of the flyweight, and measure the thrust clearance.

Thrust clearance: 0.02 – 0.10 mm (0.0008 – 0.0039 in.)

If not within specification, adjust the clearance by inserting shims between the camshaft bushing and the governor round nut.



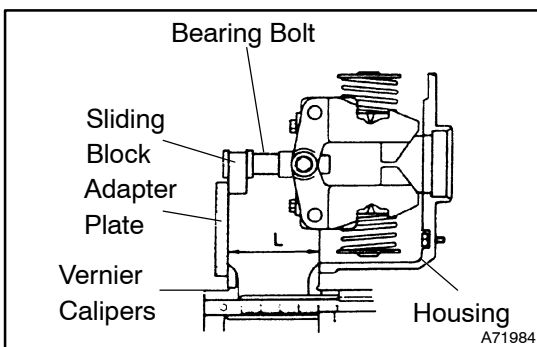
32. INSTALL BEARING BOLT

- (a) Measure the free play of the jointing bolt along its axis.
- Standard free play: 1.5 – 2.0 mm (0.059 – 0.079 in.)**

NOTICE:

Make sure the bearing bolt can be moved smoothly through the guide bushing.

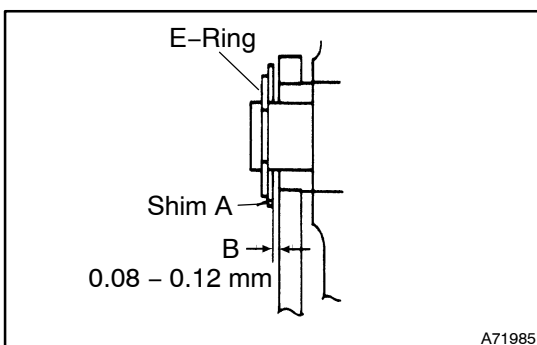
- (b) Measure the fitting dimension of the bearing bolt.



- (1) While pulling on the bearing bolt, measure the dimension 'L' with calipers.

Fitting dimension:

49.7 – 50.1 mm (1.957 – 1.972 in.)

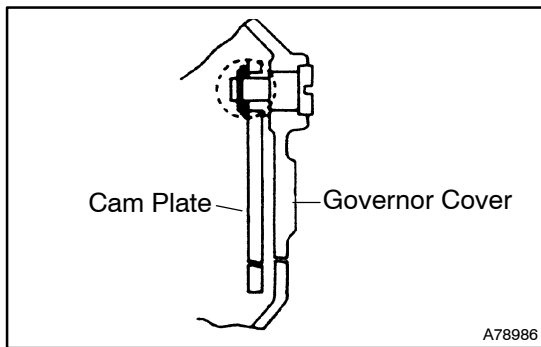


33. INSTALL GOVERNOR COVER

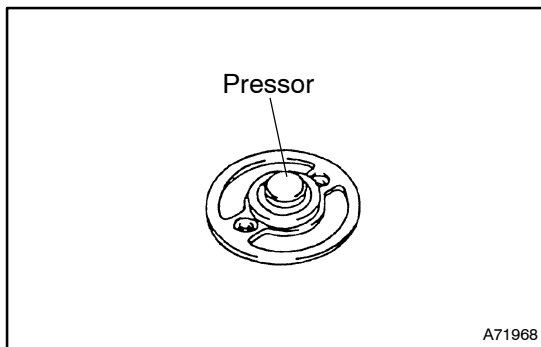
- (a) Install the cam plate on the governor cover and shim with E-ring.

NOTICE:

Shim A about 0.5 mm (0.02 in.) in thickness should be installed with the E-ring.



- (b) Measure the cam plate thrust clearance B.
Thrust clearance B:
0.08 - 0.12 mm (0.0032 - 0.0047 in.)

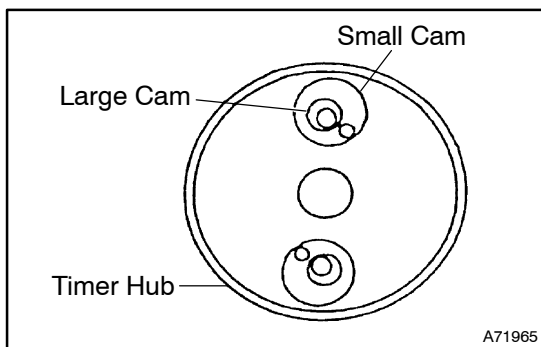


34. INSTALL OIL SEAL

- (a) Using the commercial tool (pressor), push the oil seals into the timer cover and driving flange.

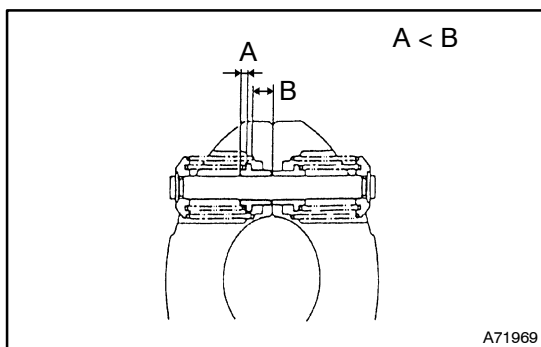
NOTICE:

The oil seals must be replaced with new ones.



35. INSTALL TIMER CAMS AND TIMER HUB

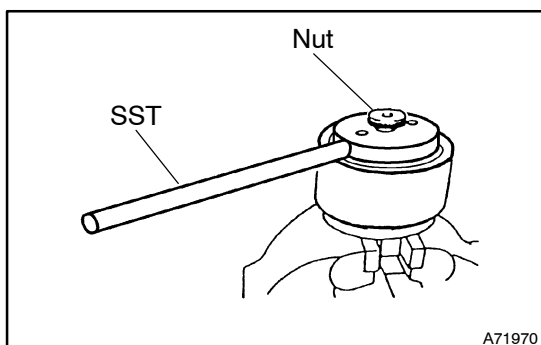
- (a) Install the timer hub and timer cams to the driving flange as shown in the illustration.



36. INSTALL TIMER SPRING TO TIMER WEIGHT

NOTICE:

Take care of the spring seat direction.



37. INSTALL TIMER COVER

NOTICE:

The O-ring must be replaced with new one.

- (a) Install the SST on the cover and fix with the nut.
 SST 09512-2210

NOTICE:

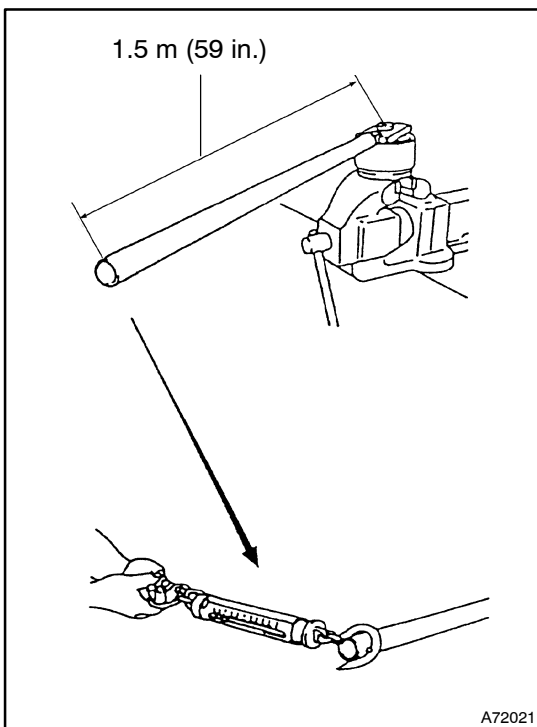
- **Do not tighten the nut but leave loosened.**
- **Since a new timer cover is coated with adhesive, it is unnecessary to apply fresh adhesive to a new timer cover when replacing.**

- If reusing the timer cover, apply 4 to 6 dot of adhesive to 2 or 3 threads of the screw of the flange.

Adhesive:

Part No. 08833-00070, THREE BOND 1342 or equivalent

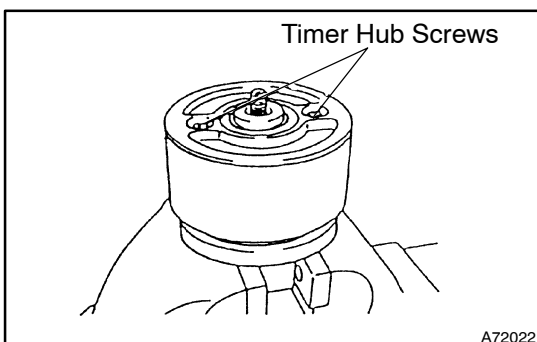
- Since the timer cover is attached with adhesive, a torque of approximately 70 kgf/m is necessary when removing it.
- Fully remove the adhesive on the threads of the screw when overhauling. If too much adhesive is applied, excessive will stick to the O-ring, resulting in oil leakage.



- (b) Hook a spring balancer between the two socket bolts at the end of the extension bar, then pull the spring balancer until it shows 196.14 – 228.49 N (20 – 23.3 kgf, 45 – 51 lbf) to tighten up the timer cover.

Torque:

294 – 343 N·m (3,000 – 3,500 kgf·cm, 217 – 253 ft·lbf)



38. FILL PUMP TIMER OIL INTO TIMER THEN TIGHTEN TIMER HUB SCREWS

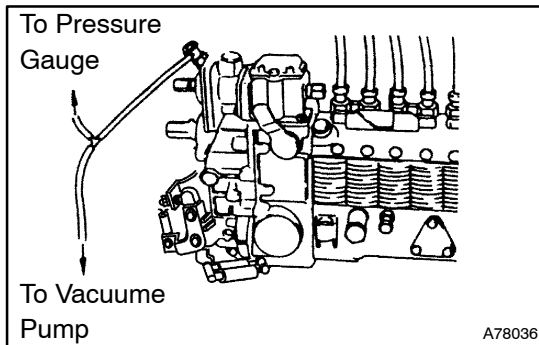
Oil grade: SAE 90

Oil volume: 140 – 160cc (8.54 – 9.76 cu.in.)

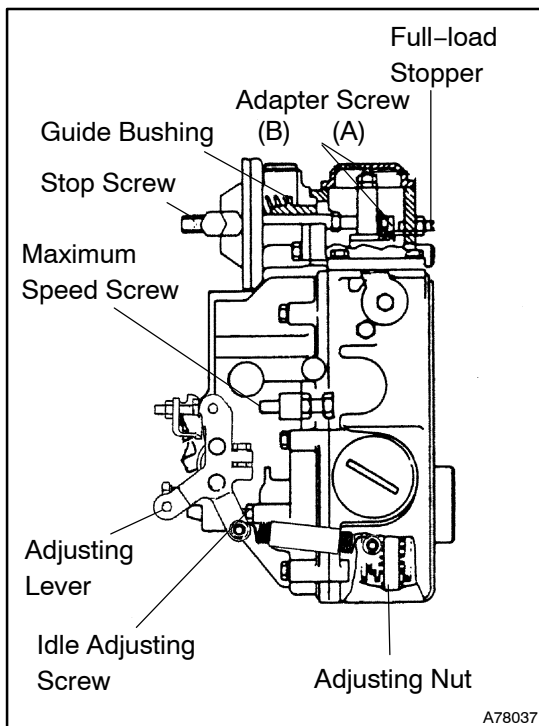
ADJUSTMENT

1. PREPARATION

- (a) Connect the rack measuring device to the control rack and set to '0'.
- (b) Connect the fuel line.
- (c) Refill the camshaft chamber with engine oil.
- (d) Install the angle gauge on the adjusting lever.
- (e) Using SST, remove the full-load stopper housing cover.
SST 09512-2510, 09512-2520

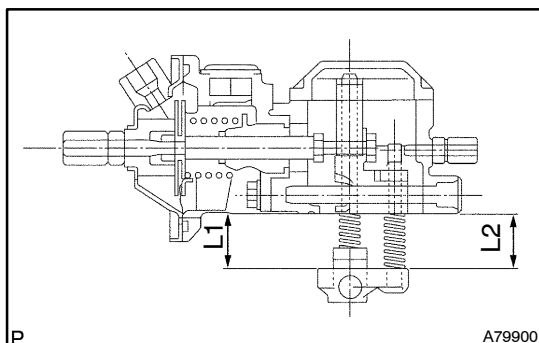


- (f) Connect the boost line to the boost compensator port from the vacuum pump on a test bench via a "T" connection to a pressure gauge.

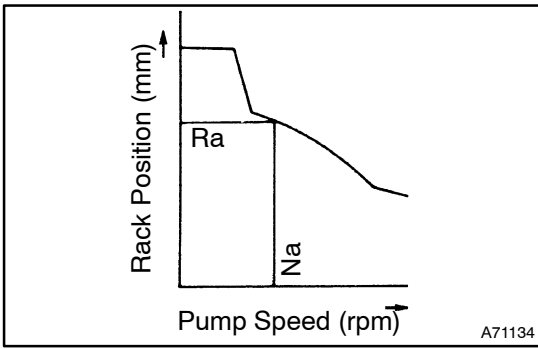


2. STEPS IN GOVERNOR ADJUSTMENT

- (a) Perform governor testing and adjustment in the following sequence.
 - (1) Preliminary adjustment of stop cam
 - (2) Adjustment of idling speed control
 - (3) Preliminary adjustment of maximum speed control
 - (4) Adjustment of medium speed control
 - (5) Adjustment of maximum speed control
 - (6) Adjustment of fuel injection volume under full-load
 - (7) Inspection of stop lever operation



- (b) Preliminary adjustment of stop cam.
L1 = L2 = 25.5 mm (1.004 in.)



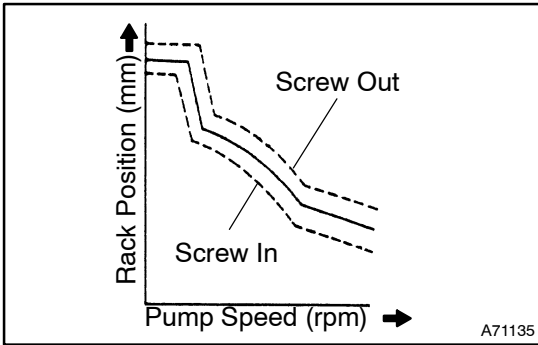
(c) Adjustment of idling speed control.

NOTICE:

The adjusting lever should always be in the 'IDLING' position during adjustment of the idling speed control.

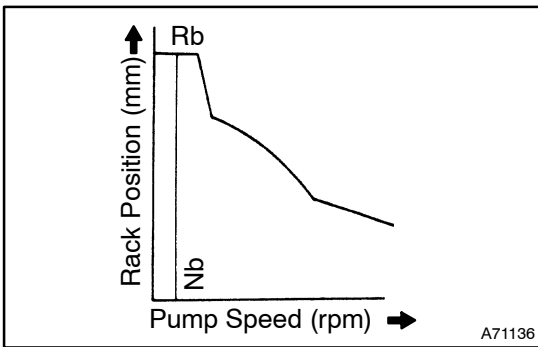
- (1) At a pump speed of Na rpm, measure the control rack position Ra mm.

If not within specification, adjust with the idle adjusting screw.

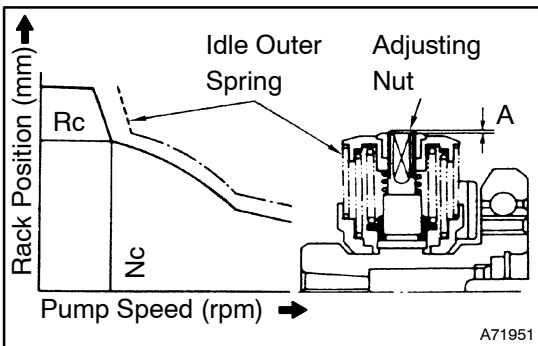


NOTICE:

The idle adjusting screw will change the governor characteristics as shown on the left.



- (2) At a pump speed of Nb rpm, measure the control rack position Rb mm.

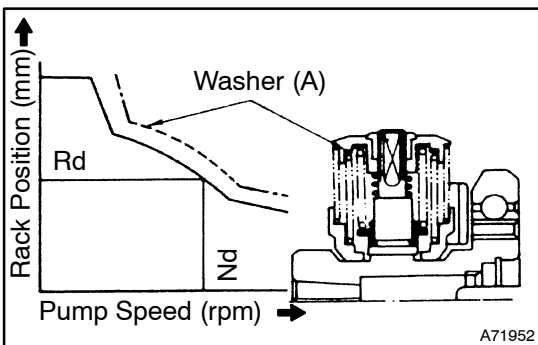


- (3) At a pump speed Nc rpm, measure the control rack position Rc mm.

If not within specification, replace the idle outer spring.

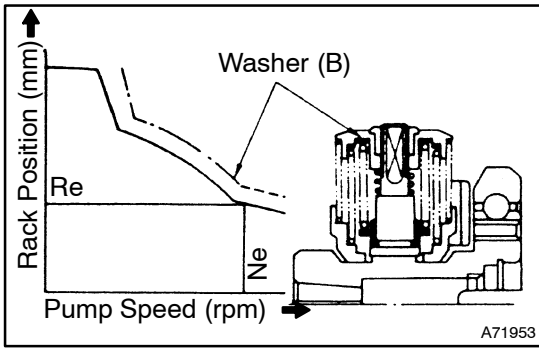
NOTICE:

Protrusion of the adjusting nut should be within -0.4 mm (-0.016 in.) to 0.2 mm (0.008 in.).



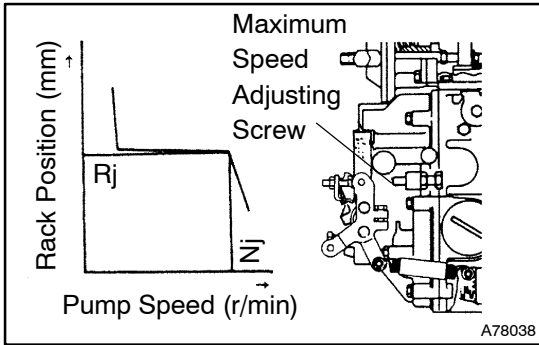
- (4) At a pump speed of Nd rpm, measure the control rack position Rd mm.

If not within specification, replace the washer (A).



- (5) At a pump speed of N_e rpm, measure the control rack position R_e mm.

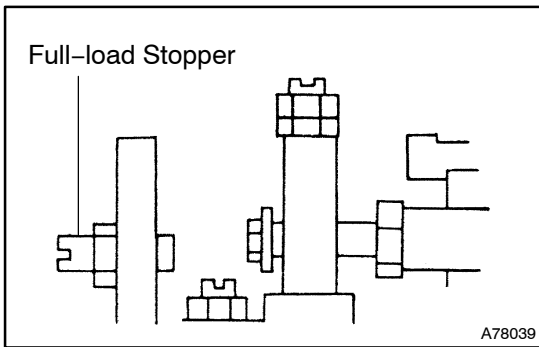
If not within specification, replace the washer (B).



- (d) Preliminary adjusting of maximum speed control

- (1) Apply a 13.3 kPa (100 mmHg) boost pressure to the boost compensator.
- (2) The adjusting lever should be in the "FULL-LOAD" position.
- (3) At the pump speed of N_j rpm, measure the control rack position R_j mm.

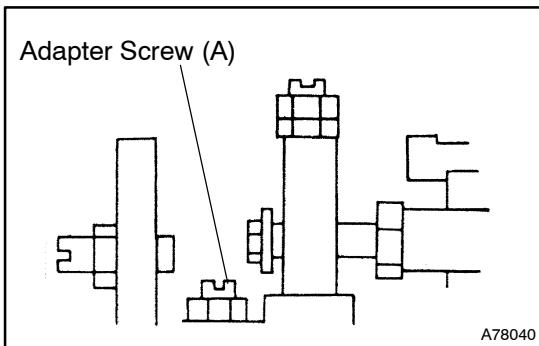
If not within specification, adjust with the maximum speed adjusting screw.



- (e) Adjustment of medium speed control

NOTICE:

- The adjusting lever should always be in the 'FULL-LOAD' position during adjustment of the medium speed control.
- Apply a 13.3 kPa (100 mmHg) boost pressure to the boost compensator.

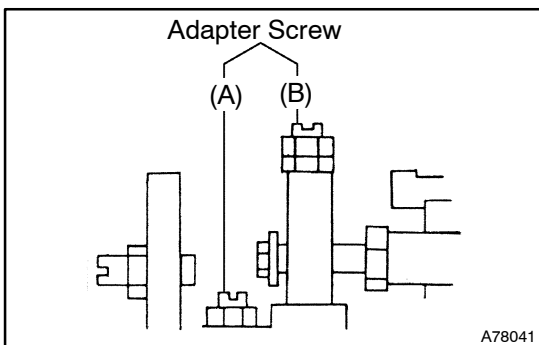


- (1) At a pump speed of N_f rpm, measure the control rack position R_f mm.

If not within specification, adjust by turning the full-load stopper.

- (2) At a pump speed of N_g rpm, measure the control rack position R_g mm.

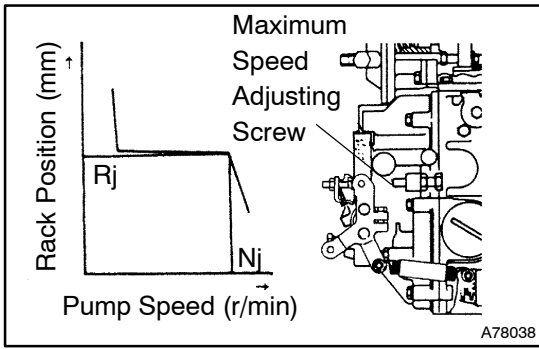
If not within specification, adjust with the adapter screw (A).



- (3) At a pump speed of N_h rpm, measure the control rack position R_h mm.

If not within specification, adjust with the adapter screw (A) and (B).

- (4) Confirm the rack position R_i mm with at a pump speed of N_j rpm.



(f) Adjustment of maximum speed control

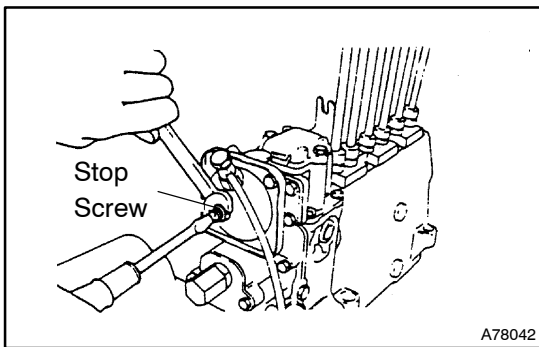
NOTICE:

- The adjusting lever should always be in the 'FULL-LOAD' position.
- Apply a 13.3 kPa (100 mmHg) boost pressure to the boost compensator.

(1) At a pump speed of N_j rpm, measure the control rack position R_j mm.

If not within specification, adjust with the maximum speed adjusting screw.

(2) Confirm the rack position R_m and R_n mm, with at a pump speed N_m and N_n rpm.



(g) Adjustment of the boost compensator

NOTICE:

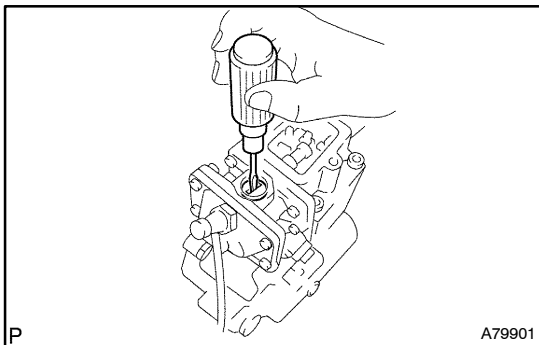
The adjusting lever should be in the 'FULL-LOAD' position during adjustment of the boost compensator.

(1) Without boost pressure, at a pump speed of 300 rpm, measure the injection volume and read the rack position.

If not within specification, adjust the volume with the stop screw.

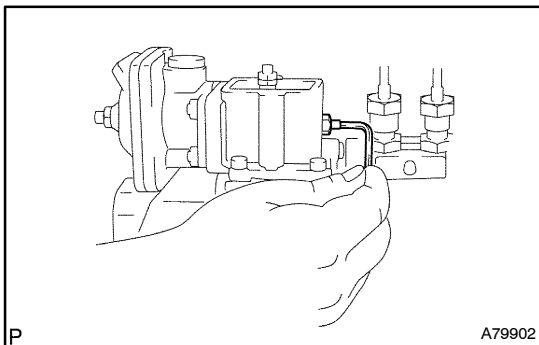
(2) Apply a boost pressure to the boost compensator. At a pump speed of 300 rpm, adjust with the guide bushing to adjust the rack position.

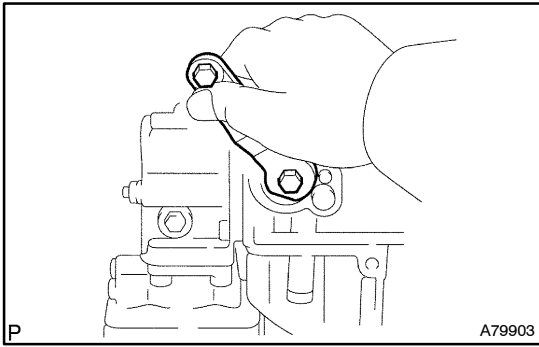
(3) Apply a boost pressure to the boost compensator. At a pump speed of 300 rpm, confirm the rack position.



(h) Adjusting of fuel injection volume under "FULL-LOAD". Measure the injection volume in the "FULL-LOAD" position. Apply a P mmHg boost pressure to the boost compensator.

If the average injection volume is not at standard value, adjust with the "FULL-LOAD" stopper.

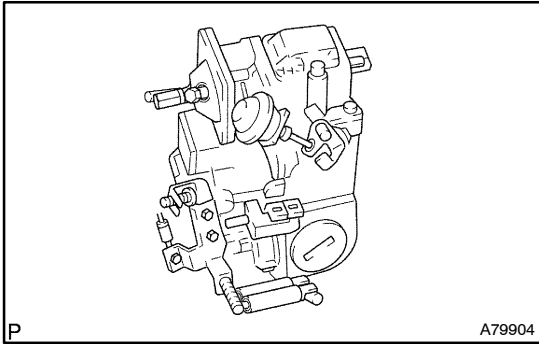




- (i) Inspection of stop lever operation.
 - (1) Adjusting lever at "IDLING" position and pump speed at "0" rpm, the control rack position should be Rq mm.

3. INSTALL FULL-LOAD STOPPER HOUSING COVER AND FULL-LOAD STOPPER CAP

- (a) Using SST, install full-load stopper housing cover.
SST 09512-2510, 09512-2520



4. GOVERNOR EXTERNAL LEAD SEALS AND CRIMP CAPS

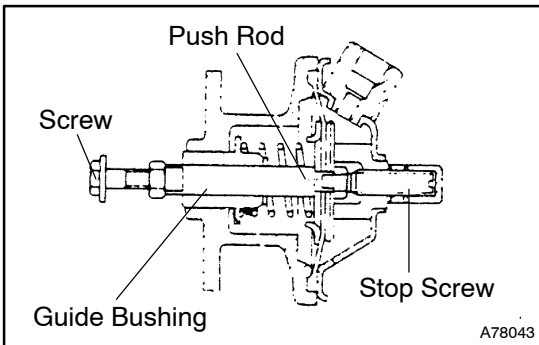
NOTICE:

All adjusting devices on the fuel injection pump governor, except the low idle adjustment screw, are wired and lead sealed and crimp capped as a protection for the customer. This is to prevent unauthorized readjustment which may cause engine malfunction and/or engine failure.

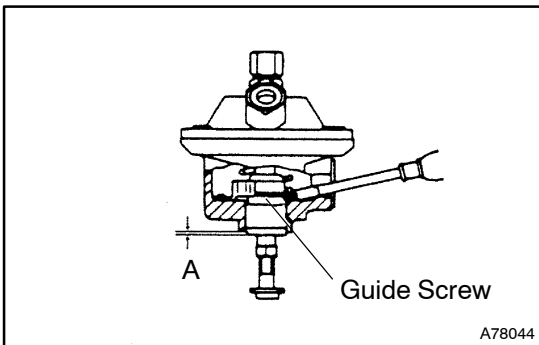
Periodically check to insure that these seals are not broken as this will void the warranty.

5. PRE-ADJUSTMENT OF BOOST COMPENSATOR

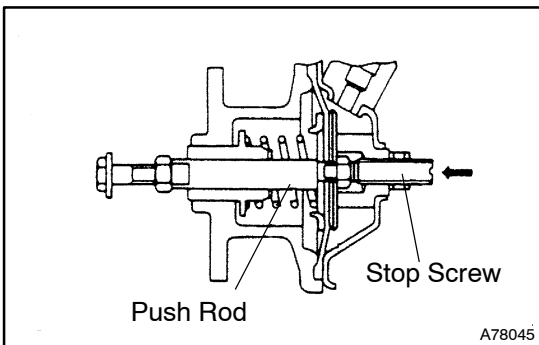
- (a) Before installing the boost compensator on the full-load stopper housing, should be pre-adjustment the boost compensator as follows.

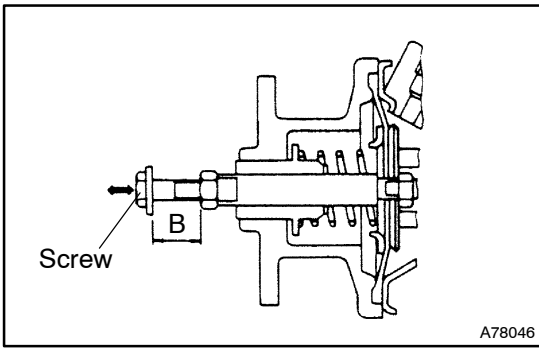


- (b) Turn the guide bushing with a screw driver inserted through the screw plug hole and set the "A" clearance to zero.

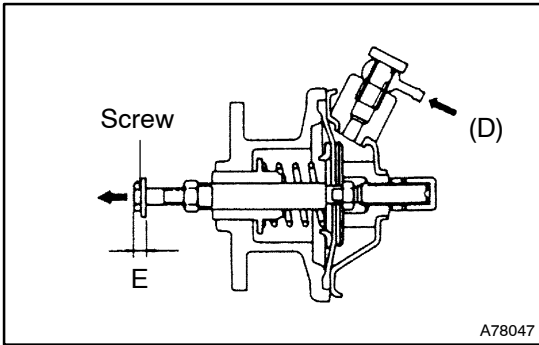


- (c) Tighten the stop screw until it comes in contact with the push rod end, then further tighten the stop screw by 1/2 turn.

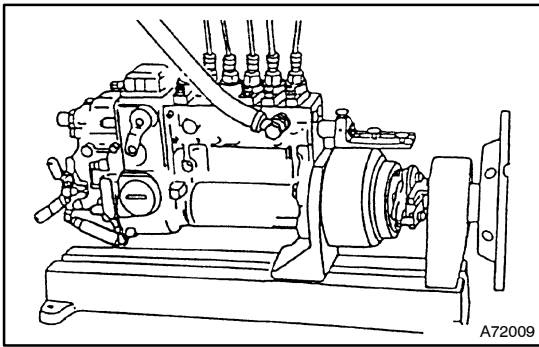




- (d) Set length "B" by means of the adjust with screw indicated in figure.
Length "B": 13.5 mm (0.531 in.)

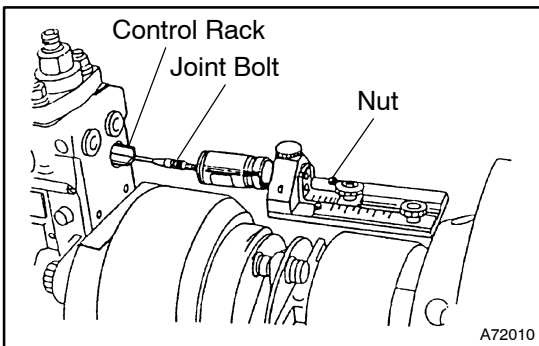


- (e) Check screw traveling length, "E" while apply 133.3 kPa (1,000 mmHg) boost pressure to port "D".
Traveling length "E": 4 - 5 mm (0.158 - 0.196 in.)
- (f) Check the boost compensator air seal. While applied 133.3 kPa (1,000 mmHg) boost pressure to port "D" the time required for pressure to drop to 130.7 kPa (980 mmHg) should be more than 10 seconds.

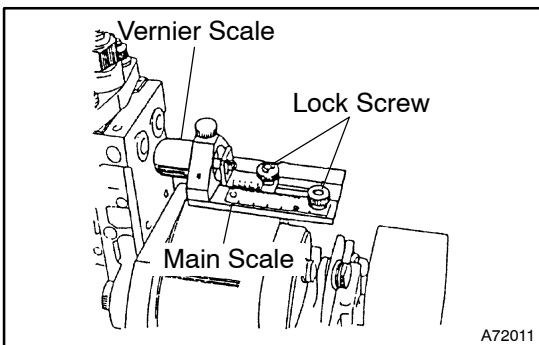


6. PREPARATION

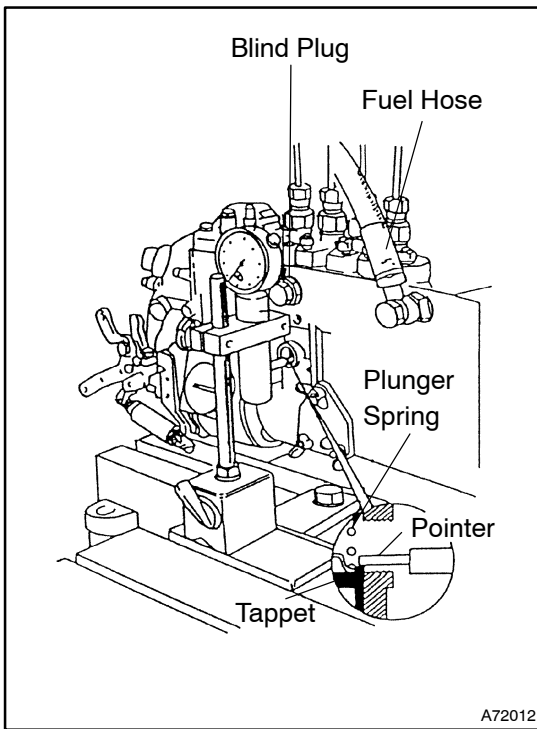
- (a) Mount the injection pump correctly on the pump tester.



- (b) Attach a rack measuring device to the control rack and set to Zero.
Part No. 95091-00170(DENSO) for equipped with R901 governor
- (c) Install calibration nozzles and lines.

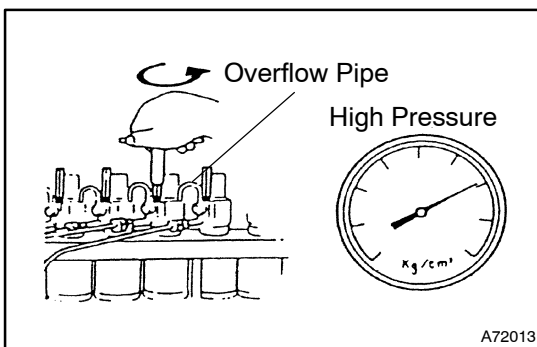


- (d) Fill the pump camshaft chamber with engine oil.

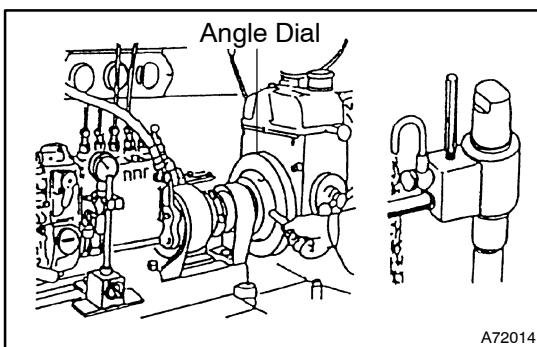


7. ADJUST INJECTION TIMING

- (a) Preparation of the pre-stroke
- (1) Remove the screw plug from the pre-stroke measuring hole of the first cylinder.
 - (2) Remove the overflow valve, attach the inlet adaptor and connect the fuel hose of the pump tester. Close the fuel port of the injection pump with a blind plug.
 - (3) Install a pre-stroke measuring instrument. Bring the tappet of the first cylinder to its bottom dead center, and set the pointer tip on the tappet.
- (b) Measure the pre-stroke (No. 1 plunger)
- (1) Set the control rack at full-load position.
 - (2) Loosen the overflow screw of each nozzle holder.



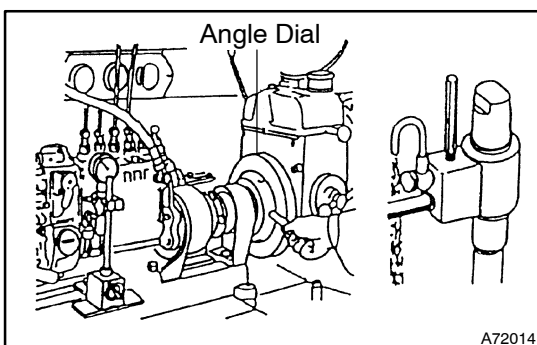
- (3) Operate the high-pressure pump of the pump tester and let fuel run out of the overflow line.



- (4) Move the angle dial to set the first cylinder of the pump to bottom dead center and adjust the pre-stroke gauge to zero.

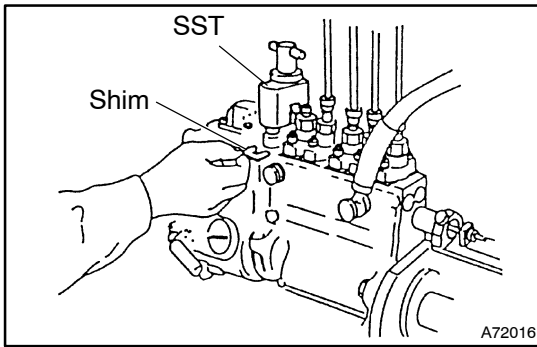
NOTICE:

Bottom dead center is the point at which the pointer of the dial gauge does not move even when the angle dial is rotated while fuel is flowing from the overflow line.

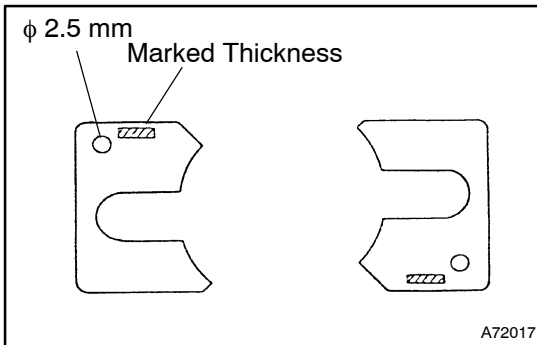


- (5) Turn the camshaft clockwise the angle dial and read the dial gauge when the fuel stops running out of the overflow line. This reading is the pre-stroke value of the pump.

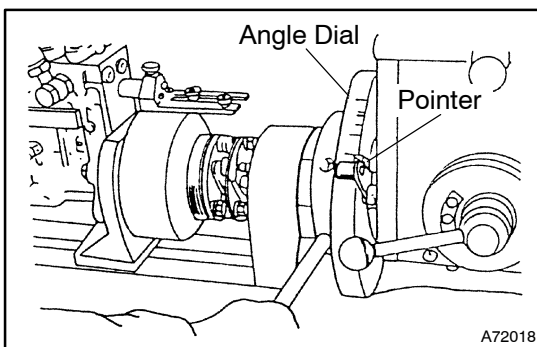
If the pre-stroke value is not within specification, change the shims between the cylinder flange and the pump housing.



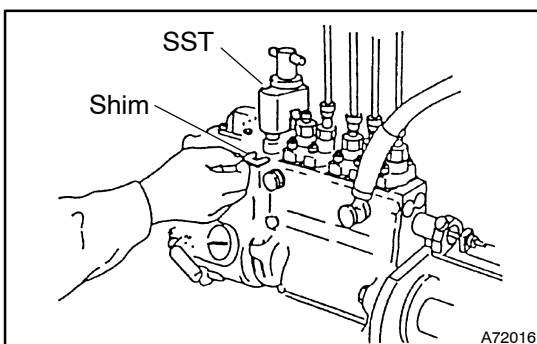
- (c) Adjust the pre-stroke.
- (1) Use SST to lift the cylinder and install the proper shim.
- SST 09512-1920

**NOTICE:**

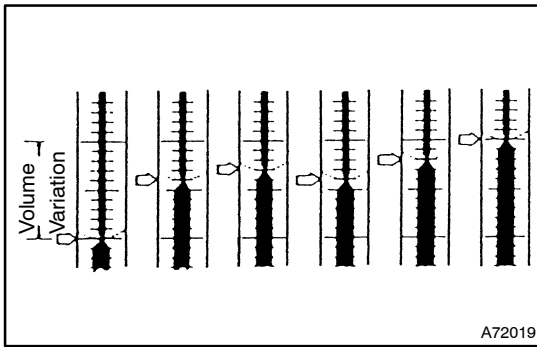
- Insert a pair of shims of same thickness to the cylinder (If different thickness shims are used the rack will not move smoothly and hunting and other problems will result).
- Use only one shim on each side.
- Always install the shims with the thickness marking facing up.



- (d) Adjust the injection interval.
- (1) Using the No. 1 cylinder injection starting point as a base, inspect and adjust the injection interval in the order of injection.
- Injection interval: 89° 45' - 90° 15'**
- Injection order: 1 - 3 - 4 - 2**
- (2) If the injection intervals are not within specification, adjust by using the same procedure as for pre-stroke adjustment.
 - (3) After adjustment, make sure the injection timing is correct.

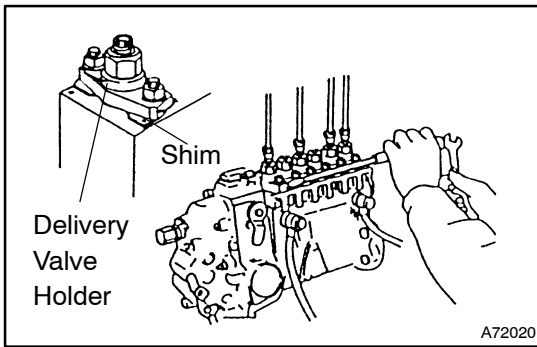


- (e) Measuring and adjusting the injection volume
- (1) Connect the fuel line and the overflow valve in their correct positions.



(f) Measure the injection volume for each control rack position and pump revolution.

(1) To adjust the injection volume, loosen the delivery valve holder tightening nut and rotate the delivery valve holder.



(2) After adjustment has been completed tighten the nuts alternately to torque.

Torque:

19.1 N·m (195 kgf·cm, 14 ft·lbf)

8. INSPECT TIMER ADVANCE

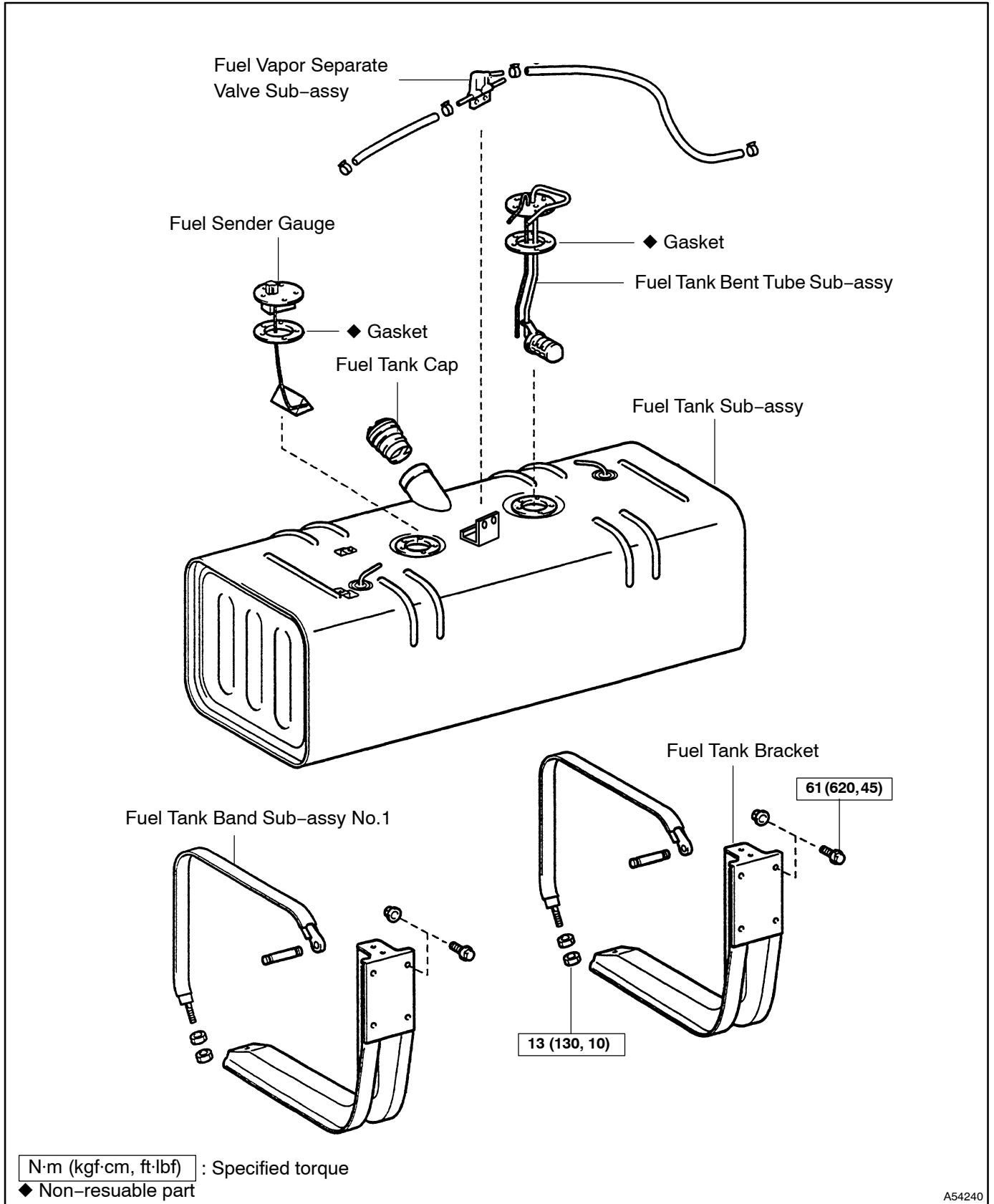
(a) Set a stroboscope on a pump tester.

(b) Check the timer advance.

If the angle is not within specification, adjust with an appropriate shim.

FUEL TANK SUB-ASSY (S05C-TA) COMPONENTS

110QL-01



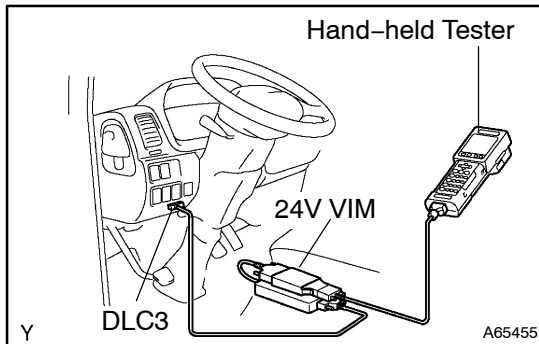
REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT**
2. **DISCONNECT BATTERY NEGATIVE TERMINAL**
3. **DRAIN FUEL**
4. **DISCONNECT FUEL SENDER GAUGE CONNECTOR**
5. **DISCONNECT MAIN TUBE, NO.2 FUEL HOSE**
6. **DISCONNECT MAIN TUBE, NO.3 FUEL HOSE**
7. **DISCONNECT FUEL VAPOUR SEPARATE VALVE SUB-ASSY**
8. **REMOVE FUEL TANK BAND SUB-ASSY NO.1**
 - (a) Take out the fuel tank band, and then remove the fuel tank.
9. **REMOVE FUEL TANK SUB-ASSY**
10. **REMOVE FUEL SENDER GAUGE**
 - (a) Remove the 5 screws and fuel sender gauge from the fuel tank.
11. **REMOVE FUEL TANK VENT TUBE SUB-ASSY**
 - (a) Remove the 6 bolts and fuel tank vent tube sub-assy.
12. **INSTALL FUEL TANK VENT TUBE SUB-ASSY**
 - (a) With a new gasket, install the fuel tank bent tube with the 6 bolts.
Torque: 5.0 N·m (50 kgf·cm, 44 in·lbf)
13. **INSTALL FUEL SENDER GAUGE**
 - (a) With a new gasket, install the fuel sender gauge with the 5 screws.
Torque: 1.5 N·m (15 kgf·cm, 13 in·lbf)
14. **INSTALL FUEL TANK SUB-ASSY**
15. **INSTALL FUEL TANK BAND SUB-ASSY NO.1**
 - (a) Install the tank and fuel tank band.
Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)
16. **INSTALL FUEL VAPOUR SEPARATE VALVE SUB-ASSY**
17. **INSTALL MAIN TUBE, NO.3 FUEL HOSE**
18. **INSTALL MAIN TUBE, NO.2 FUEL HOSE**
19. **CONNECT FUEL SENDER GAUGE CONNECTOR**
20. **ADD FUEL**
21. **CONNECT BATTERY NEGATIVE TERMINAL**
22. **BLEED FUEL (See page 11-112)**
23. **INSPECT FOR FUEL LEAKS (See page 11-111)**

FUEL SYSTEM (S05C-TB)

ON-VEHICLE INSPECTION

110DI-03



1. CHECK FUEL LEAK

CAUTION:

- During ACTIVE TEST mode, engine speed goes high and combustion noise becomes loud, so pay attention.
- During ACTIVE TEST mode, fuel becomes highpressure, so take much care not to expose your eyes, hands, or body to the fuel.

NOTICE:

Be sure to use the 24 V VIM, because the hand-held tester will be destroyed if you do not use the 24 V VIM.

- (a) Check that there are no leaks from any part of the fuel system when the engine stops.

If there is fuel leakage, replace those parts.

- (b) While cranking or starting the engine, check that there are no leaks from any part of the fuel system.

If there is fuel leakage, replace those parts.

- (c) Disconnect the return hose from the common rail.
 (d) While cranking the engine, check fuel leakage from the return pipe.

If there is fuel leakage, replace the common rail assembly (See page 11-169).

- (e) Connect the hand-held tester to the DLC3.
 (f) Start the engine and push the hand-held tester main switch ON.
 (g) Select the FUEL LEAK test of ACTIVE TEST mode on the hand-held tester.
 (h) If you have no hand-held tester, depress the accelerator pedal quickly and fully to increase the engine speed at maximum and keep it for 2 seconds. Repeat this operation several times.
 (i) Check that there are no leaks from any part of the fuel system.

NOTICE:

If the leakage from the return pipe is less than 10 cc (0.6 cu in.) in a minute, it is acceptable.

If there is fuel leakage, replace those parts.

- (j) Reconnect the return hose to the common rail.

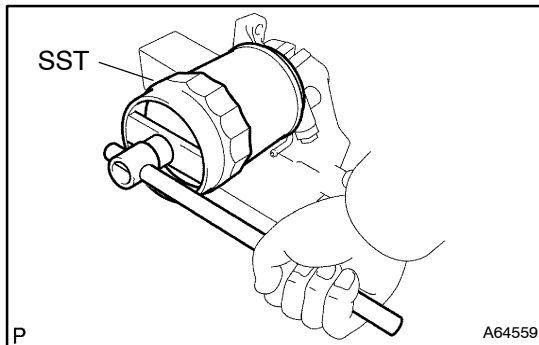
FUEL FILTER ELEMENT (S05C-TB)

110D6-04

REPLACEMENT

1. REMOVE DIESEL FUEL FILTER ASSY

- (a) Remove the 3 fuel pipes.
- (b) Remove the 2 bolts and fuel filter assy.



2. REMOVE FUEL FILTER ELEMENT

- (a) Mount the fuel filter in a soft jaw vise.
- (b) Using SST, remove the fuel filter element.

SST 09228-78010

3. INSTALL FUEL FILTER ELEMENT

- (a) Remove the dust on installation surface.
- (b) Apply a light coat of fuel to the gasket of new fuel filter.
- (c) Install the fuel filter by turning it lightly to the right by hand until it comes in contact with the surface of the fuel filter cover.

NOTICE:

Do not use SST in tightening the element by hand.

- (d) Then using the SST, tighten the fuel filter about 240° (2/3 turn).
- SST 09228-78010

NOTICE:

- Replace the new gasket.
- Do not reuse the element.
- Attention the gasket to damage.

4. INSTALL DIESEL FUEL FILTER ASSY

- (a) Tighten the fuel filter assembly with the 2 bolts.
Torque: 55 N·m (561 kgf·cm, 40 ft·lbf)
- (b) Using a new gasket, install the fuel pipe to the fuel filter assembly with the union bolts.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

5. ADD FUEL

6. BLEED FUEL

CAUTION:

At time of air venting, pay attention to the following items.

- Pay attention to fuel spilling from the supply pump air bleeder and the fuel filter drain pipe at the time of air venting.
Apply rags etc. to the respective parts being worked on and take care to prevent spilling of fuel onto the surroundings.
 - If starting is difficult or if the engine stops some time after starting, the air has not been vented sufficiently and should be repeated.
- (a) Loosen the priming pump knob of the supply pump by hand and pull out the knob.
 - (b) Push the knob by hand and move it up and down for pumping.

- (c) When pushing the knob becomes harder, loosen the fuel filter drain bolt and vent the air through the drain pipe.
- (d) Tighten the fuel filter drain bolt provisionally.
- (e) Repeat the steps (b) to (d) until air no longer comes from the drain pipe and then tighten the drain bolt with the correct torque.

Torque: 6.9 N·m (70 kgf·cm, 61 in·lbf)

- (f) Again move the priming pump knob of the supply pump up and down for pumping.
- (g) When pushing the knob becomes harder, loosen the air bleeder of the supply pump and vent the air.
- (h) Tighten the air bleeder provisionally.
- (i) Repeat the steps (f) to (h) and when air no longer comes out from the air bleeder tighten the air bleeder with the correct torque.

Torque: 5.9 N·m (60 kgf·cm, 52 in·lbf)

- (j) Again pump until pushing the knob becomes harder, and finally lock the knob by tightening it in the pushed in condition.
- (k) Again confirm the tightening of all parts and then start the engine.

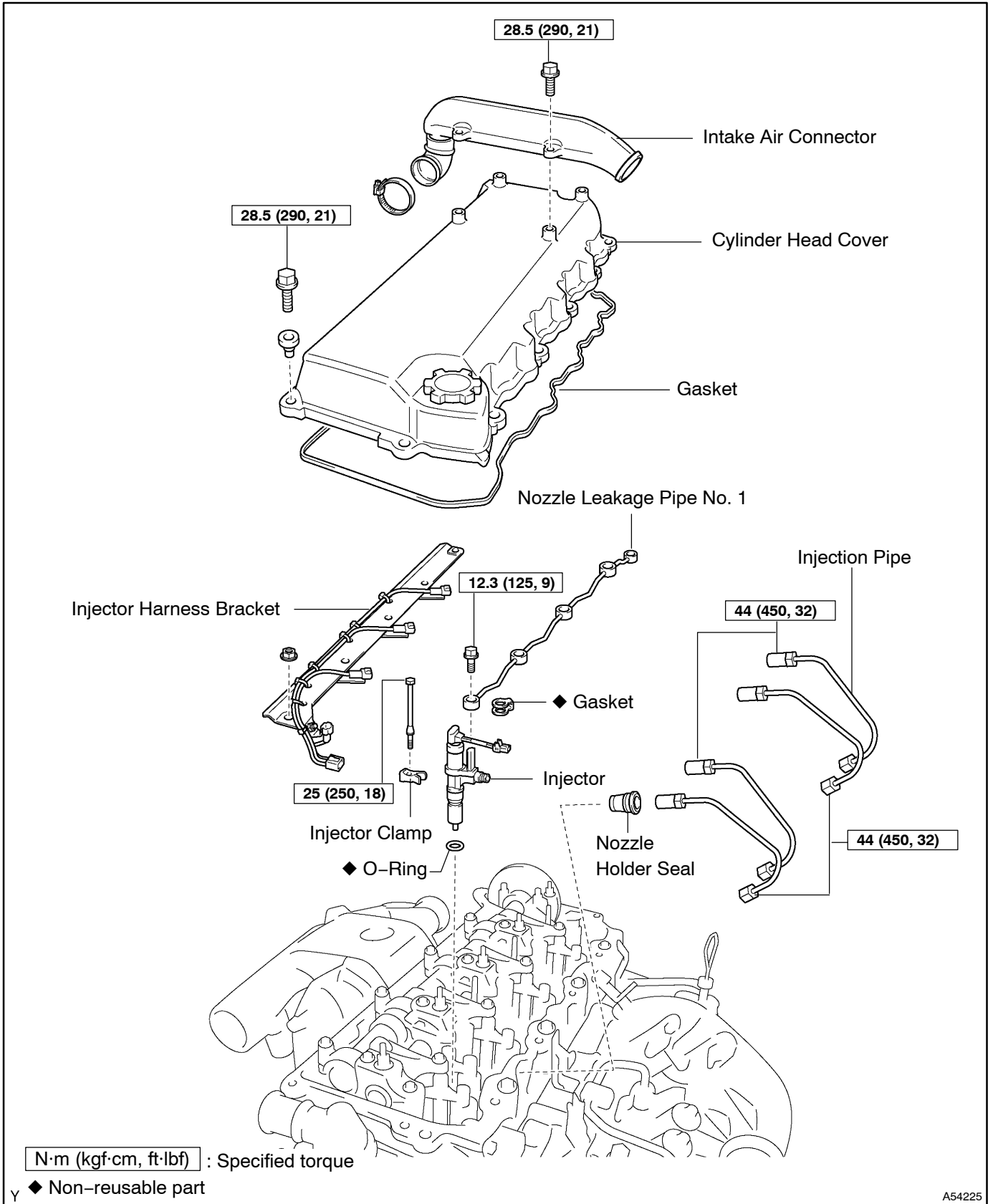
NOTICE:

- **When starting the engine, do not use the starter for 15 seconds continuously to prevent it from burned out. And also take an interval of 30 seconds before re-starting to protect the battery.**
- **For the above reason, do not bleed the air by cranking the engine with the starter.**

7. INSPECT FOR FUEL LEAKS

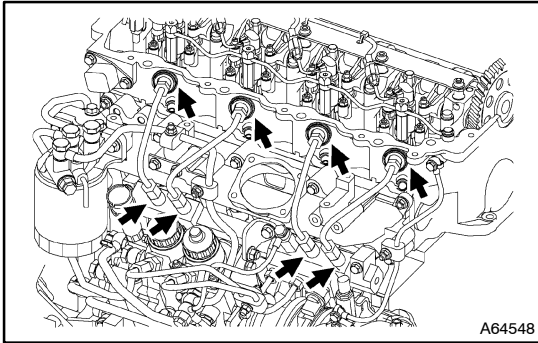
INJECTOR ASSY (S05C-TB)

COMPONENTS



REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL
3. DISCONNECT ENGINE WIRE
4. REMOVE CYLINDER HEAD COVER
5. REMOVE INTAKE AIR CONNECTOR



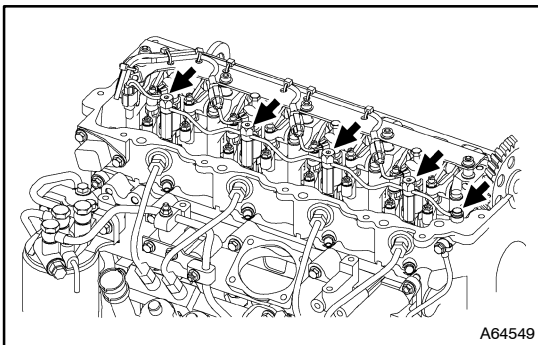
6. REMOVE INJECTION PIPE SET

- (a) Loosen the 4 union nuts from the 4 injector.

NOTICE:

- After removing the fuel pipe, affix the gum tape to the common rail for preventing dust.
- After removing the fuel pipe, put a vinyl bag and rubber band to prevent mixing foreign objects over the injectors inlet.

7. REMOVE NOZZLE HOLDER SEAL

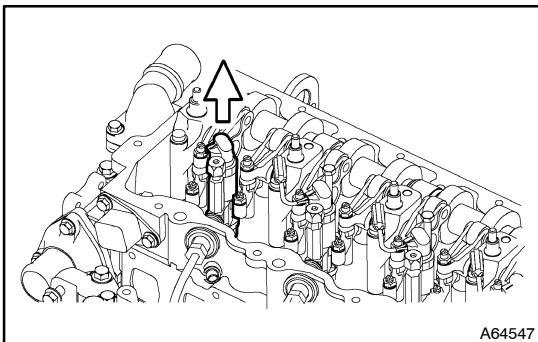


8. REMOVE NOZZLE LEAKAGE PIPE NO.1

- (a) Remove the 5 joint bolts, fuel return pipe and 5 gaskets.

9. REMOVE INJECTOR HARNESS BRACKET

- (a) Disconnect the injector connectors.
- (b) Remove the 5 nuts and injector harness bracket.

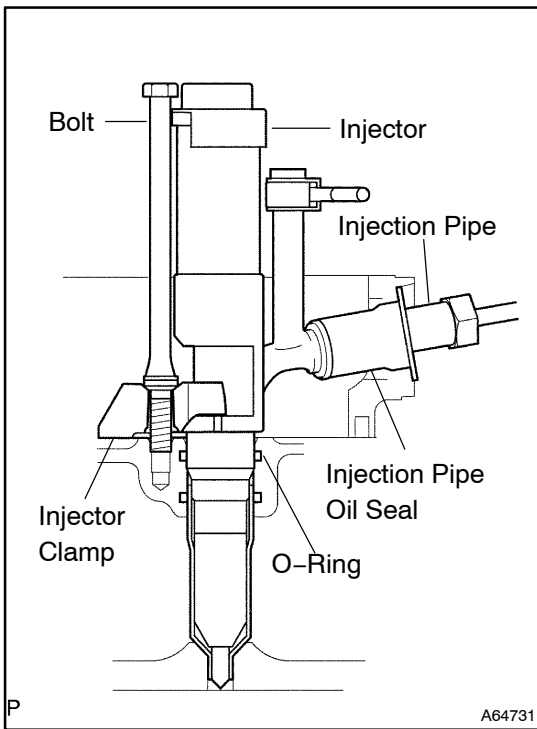


10. REMOVE INJECTOR ASSY

- (a) Remove the 4 bolts, 4 injector clamps and 4 injectors.
- (b) Remove the O-rings from the cylinder head.

NOTICE:

Start the operation after the fuel is cooled off because the fuel temperature in the injector return pipe right after driving the vehicle may be extremely high (approx. 100°C (212°F)).



11. INSTALL INJECTOR ASSY

- (a) Install a new O-ring into the groove of the cylinder head, and then insert the injector.

NOTICE:

Apply engine oil to the O-ring, so that the O-ring will not be caught.

- (b) Install the injector clamp, and install the injector temporarily.

NOTICE:

Do not fix the injector clamp before the injection pipe is temporarily installed.

- (c) Cover the injector with a new injection pipe oil seal, and then install the plate and nut.

NOTICE:

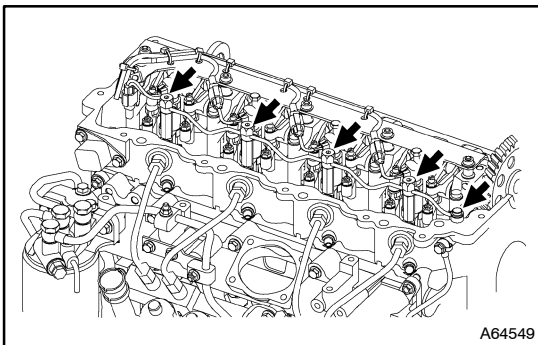
Be careful not to put excessive force to the injector when applying the injection pipe oil seal to it. If the injection pipe oil seal and injector are moved even slightly, it may cause oil leakage or faulty assembling of the injection pipe.

- (d) Assemble the injection pipe temporarily, and tighten the installation bolt of the injector clamp.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

12. INSTALL INJECTOR HARNESS BRACKET

- (a) Install the injector harness bracket with the 5 nuts.
 (b) Connect the connectors.

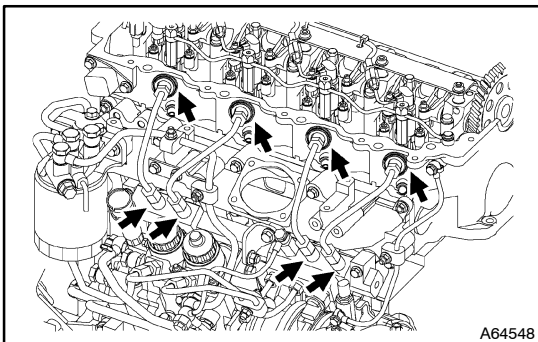


13. INSTALL NOZZLE LEAKAGE PIPE NO.1

- (a) Install 5 new gaskets and the return pipe with the 5 joint bolts.

Torque: 12.3 N·m (125 kgf·cm, 9 ft·lbf)

14. INSTALL NOZZLE HOLDER SEAL



15. INSTALL INJECTION PIPE SET

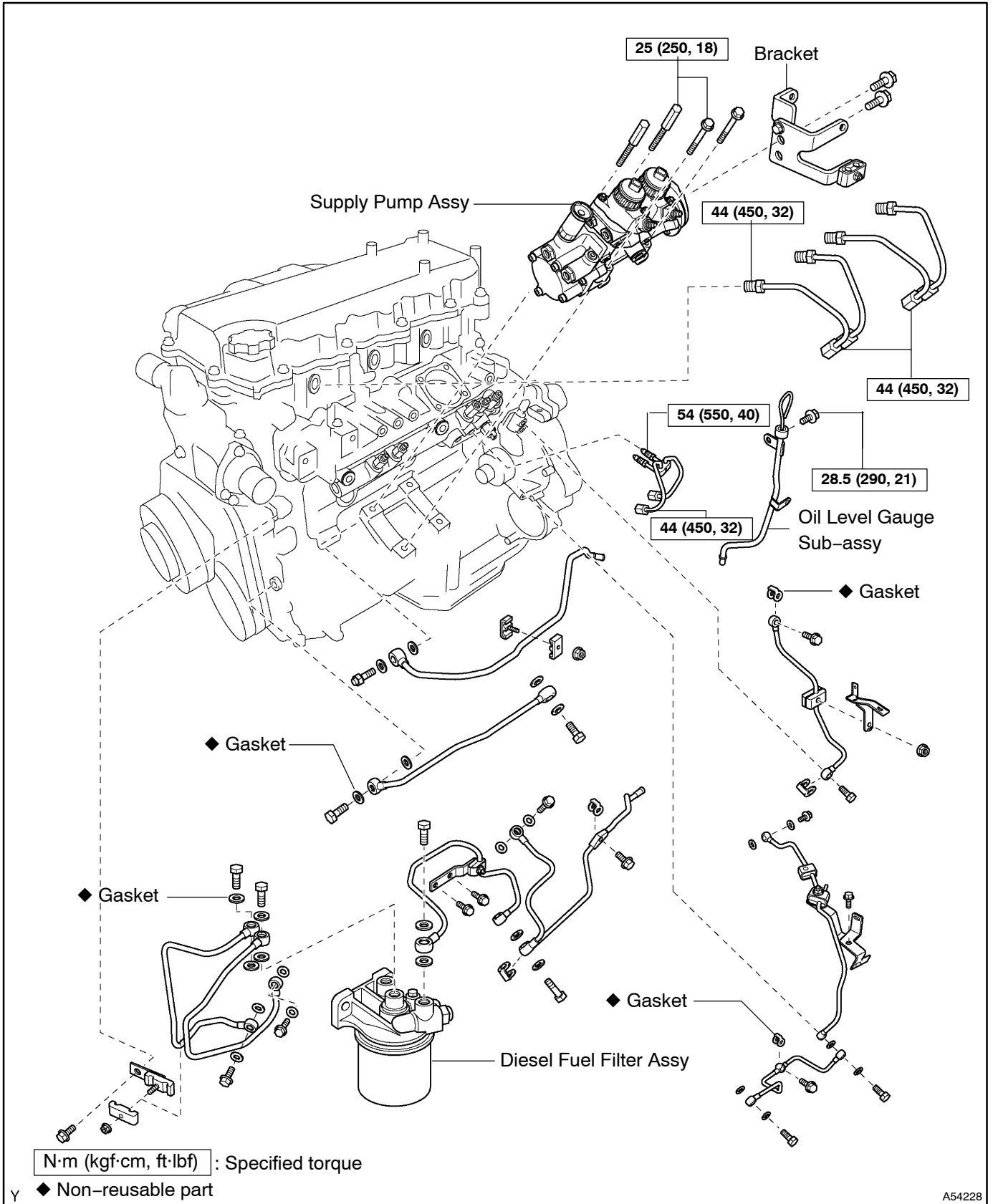
- (a) Tighten the 4 union nuts to the 4 injection pipes.

Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

16. **INSTALL CYLINDER HEAD COVER**
17. **INSTALL INTAKE AIR CONNECTOR**
18. **INSTALL ENGINE WIRE**
19. **ADD FUEL**
20. **BLEED FUEL (See page 11-156)**
21. **INSTALL BATTERY NEGATIVE TERMINAL**
22. **INSPECT FOR FUEL LEAKS**

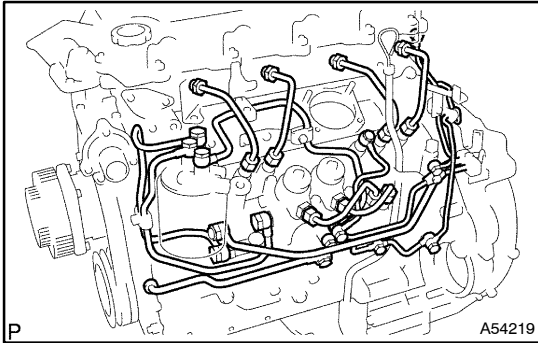
SUPPLY PUMP ASSY (S05C-TB) COMPONENTS

110DL-02



REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL
3. REMOVE INTAKE AIR CONNECTOR
4. DISCONNECT HARNESS AND CONNECTOR
5. REMOVE OIL LEVEL GAUGE SUB-ASSY
6. REMOVE INTAKE AIR PIPE
7. REMOVE INJECTION PIPE SET (See page 11-159)

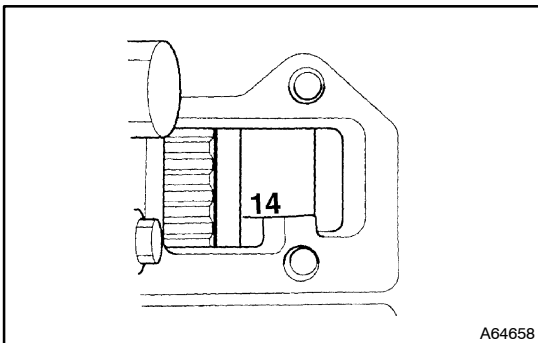


8. REMOVE FUEL PIPE SET
 - (a) Remove the illustrated fuel pipe.

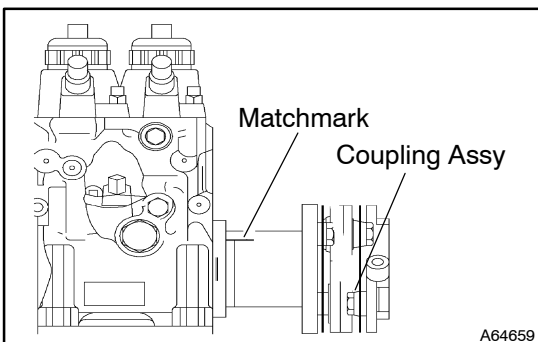
9. REMOVE DIESEL FUEL FILTER ASSY (See page 11-156)
10. REMOVE SUPPLY PUMP ASSY

NOTICE:

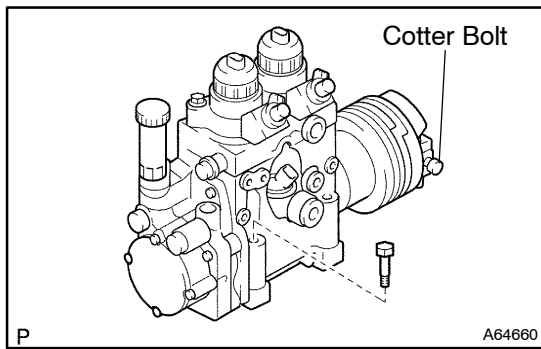
The fuel in the common-rail may have a high temperature (approx. 100°C (212°F)) immediately after driving. Perform the operation after the engine cools off because there is a danger of fire or burning.



- (a) Turn the flywheel clockwise in the engine direction and align the No. 1 cylinder mark to the pointer in the flywheel hosing inspection opening.



- (b) Adjust the top dead center of the No. 1 cylinder and timing mark of the supply pump.
- (c) Remove the coupling bolt.

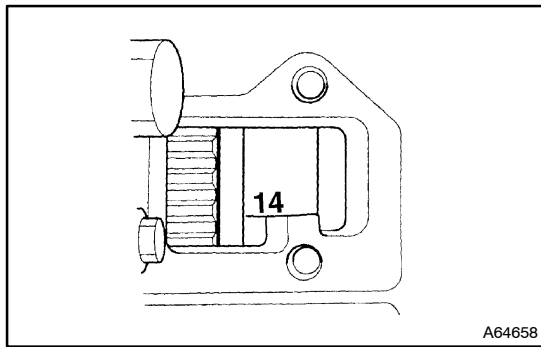


- (d) Loosen the cotter bolt.

NOTICE:

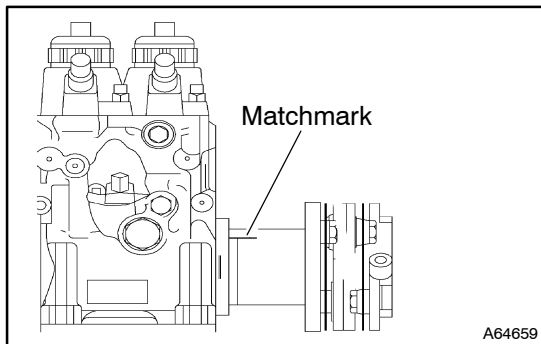
Loosen the cotter bolt and be careful not to apply excess pressure to the laminated coupling when installing the supply pump.

- (e) Remove the 4 bolts.
 (f) Remove the supply pump assy.

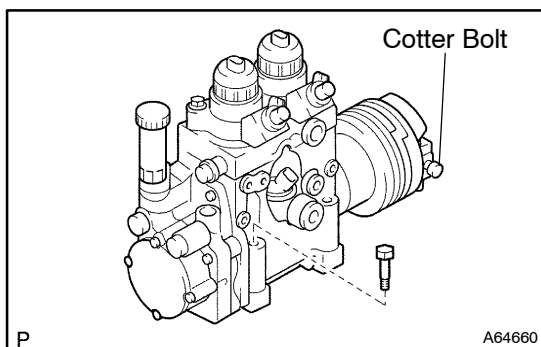


11. INSTALL SUPPLY PUMP ASSY

- (a) Turn the crankshaft counterclockwise, as viewed from the flywheel side, and then align the timing mark in the check window of the flywheel housing with a mark of 1/4. At this time, the No. 1 cylinder or the No. 4 cylinder is in the top dead center, and therefore set the No. 1 cylinder in the top dead center as follows.

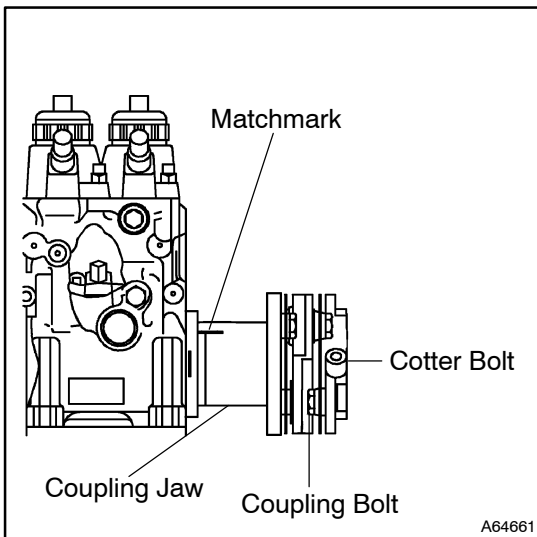


- (b) Check that the timing mark of the supply pump is correctly set in the top dead center of the No. 1 cylinder. At this time a slight difference is acceptable. If the timing mark is set in the 180 degrees opposite direction, the supply pump is set in the top dead center of the No. 4 cylinder. At this time, adjust the supply pump to be in the top dead center of the No. 1 cylinder by turning the flywheel one revolution.



- (c) Check that the cotter bolt is loose, and then install the supply pump to the bracket.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)



- (d) Install the 2 coupling bolts temporarily, align the timing mark of the supply pump, and then tighten the bolt.

Torque: 61.3 N·m (625 kgf·cm, 45 ft·lbf)

NOTICE:

Check that no clearance exists between the laminated plates. And also check that the flange has not been deformed by pressing the laminated plates.

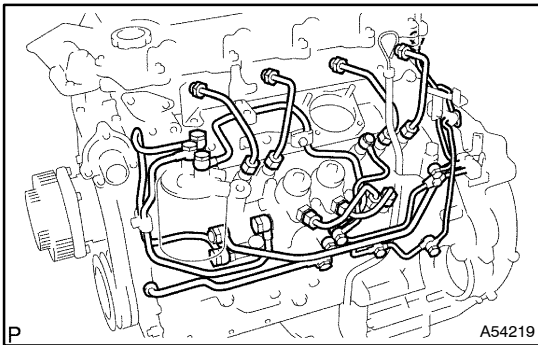
- (e) Tighten the cotter bolt.

Torque: 90.7 N·m (925 kgf·cm, 67 ft·lbf)

NOTICE:

Check that the laminated plates have not been deformed, or have not been under excess pressure.

12. INSTALL DIESEL FUEL FILTER ASSY (See page 11-156)



13. INSTALL FUEL PIPE SET

- (a) Install the fuel pipes.

- 14. INSTALL INJECTION PIPE SET (See page 11-159)**
15. INSTALL INTAKE AIR PIPE
16. INSTALL OIL LEVEL GAUGE SUB-ASSY
17. INSTALL HARNESS AND CONNECTOR
18. INSTALL INTAKE AIR CONNECTOR
19. ADD FUEL
20. BLEED FUEL (See page 11-156)
21. INSTALL BATTERY NEGATIVE TERMINAL
22. INSPECT FOR FUEL LEAKS (See page 11-155)

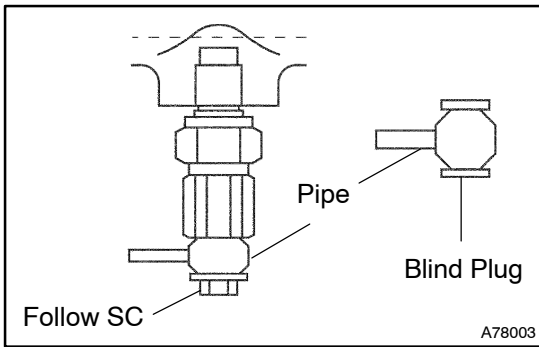
COMMON RAIL ASSY (S05C-TB)

110QM-01

ON-VEHICLE INSPECTION

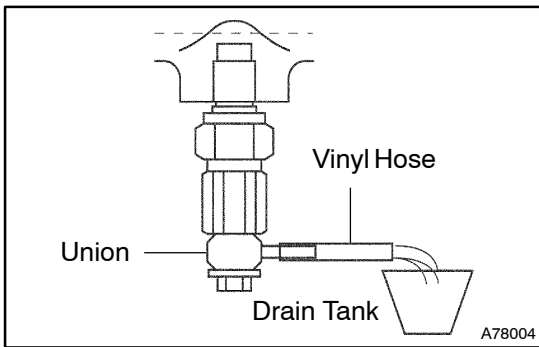
1. INSPECT PRESSURE SENSOR

- (a) If the malfunction indicator lamp come on, and the following malfunction is displayed at the diagnosis system, have the fuel pressure sensor replace.
- Open and short in the fuel pressure sensor circuit for common rail (DTC No. 49, 83).
 - Common rail pressure does not change in a certain time while the engine is running (DTC No. 84).



2. INSPECT PRESSURE LIMITER

- (a) Remove the follow SC from the pressure limiter.
 (b) Set up blind plug to the pipe end.



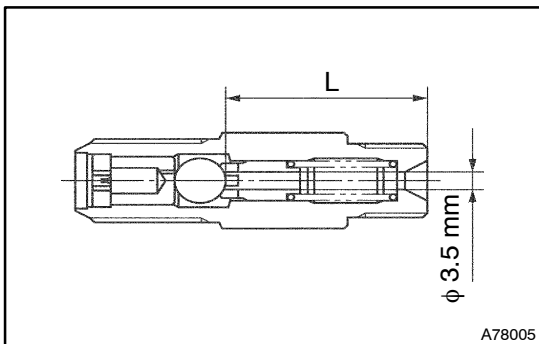
- (c) Install union to the pressure limiter.
 (d) Set a vinyl hose to the union and set a drain tank.
 (e) Start the engine.

If the fuel flow continuously, replace the pressure limiter.

CAUTION:

When the pressure limiter is working flow out high pressure and high temperature fuel.

Serious injury could result from scalding hot fuel and blown out under pressure.

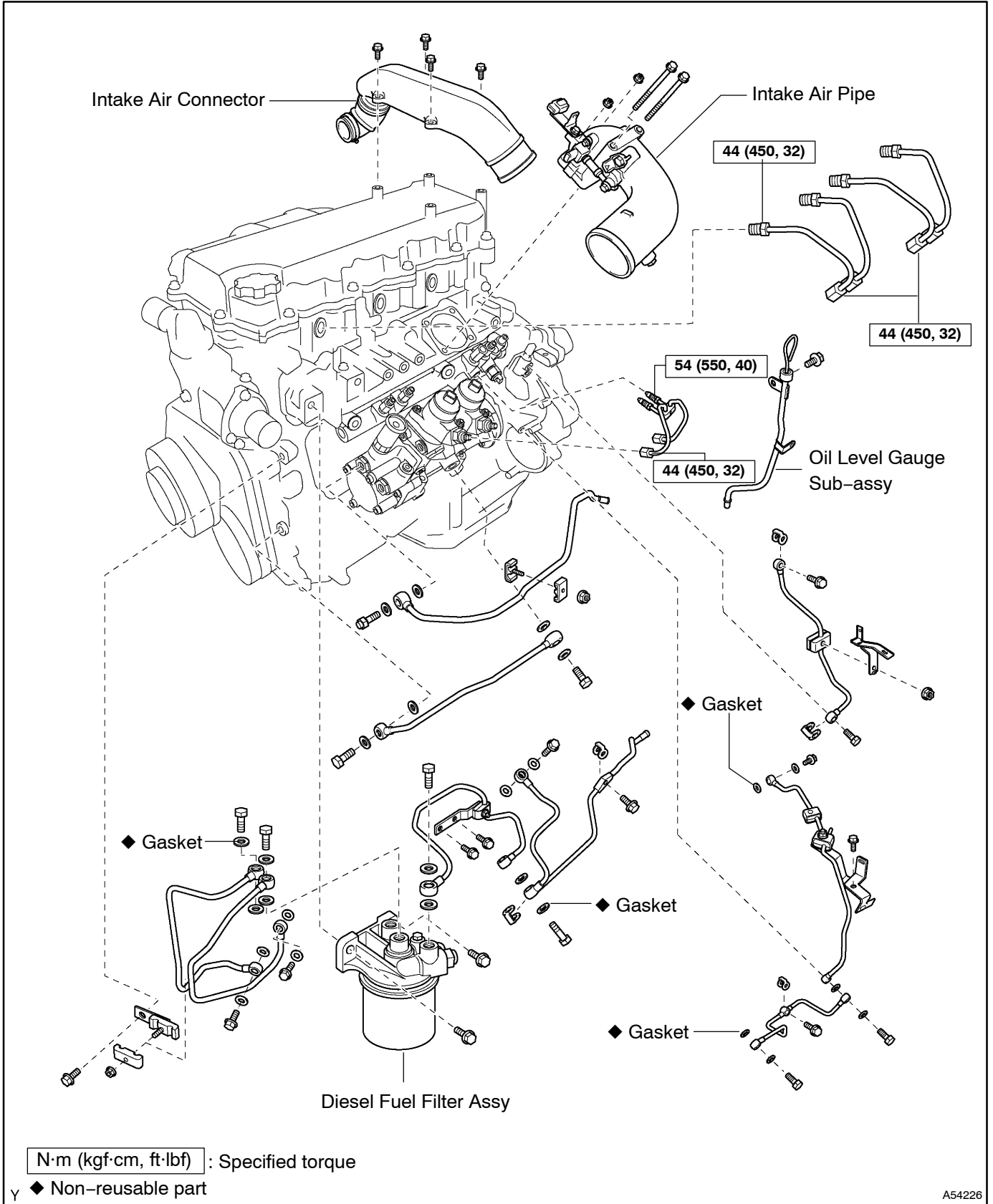


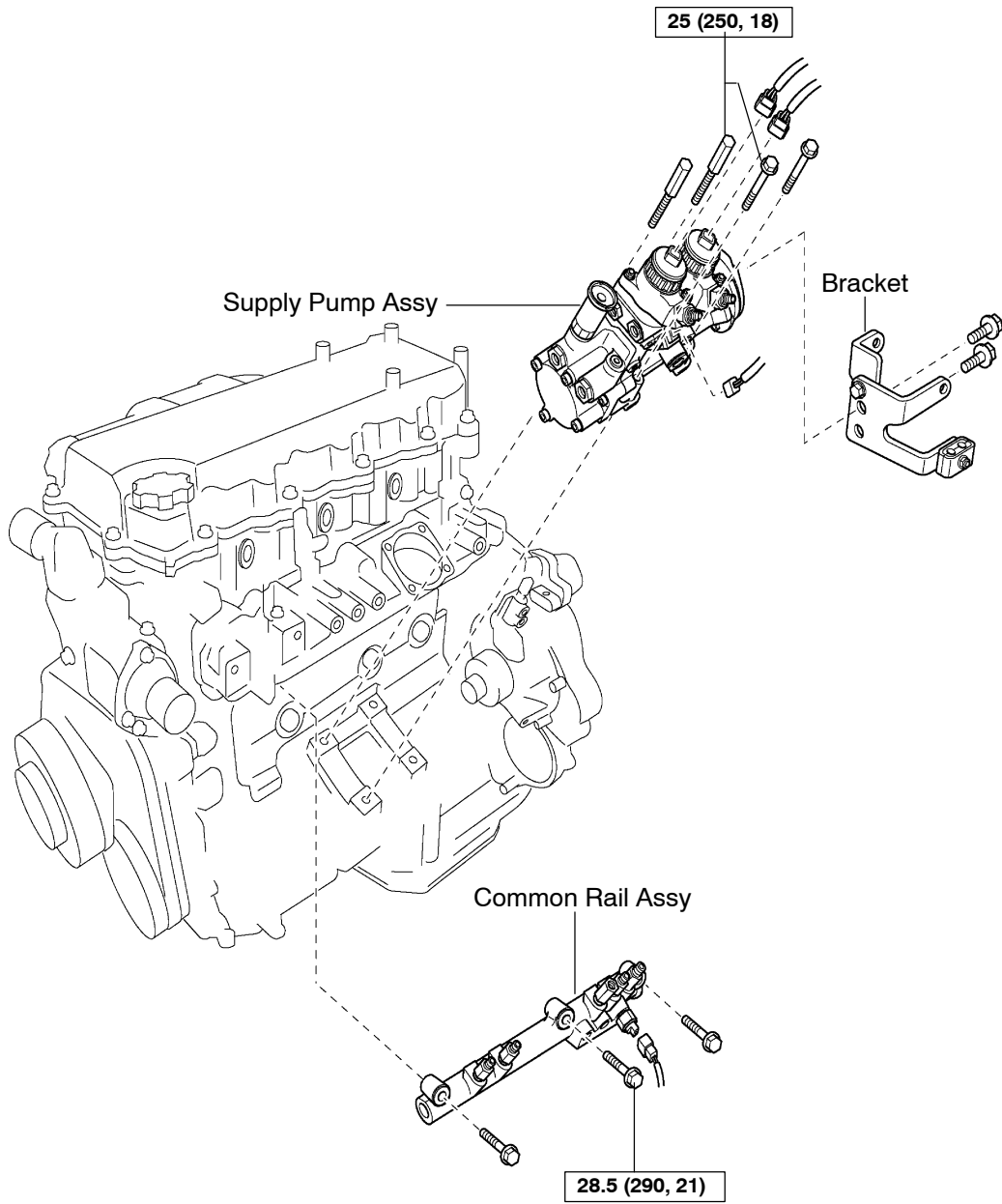
3. INSPECT FLOW DAMPER

- (a) Measure the depth (L) as left illustration.
 If the L is less than 33 mm (1.30 in.), replace the flow damper.
 (b) Start the engine and change the engine speed idling to full racing with the accelerator.

If the fuel control cylinder balance system malfunction is displayed at the diagnosis system (DTC No. 79), replace the injector of the trouble cylinder. But it is not refined, replace the flow damper.

COMPONENTS



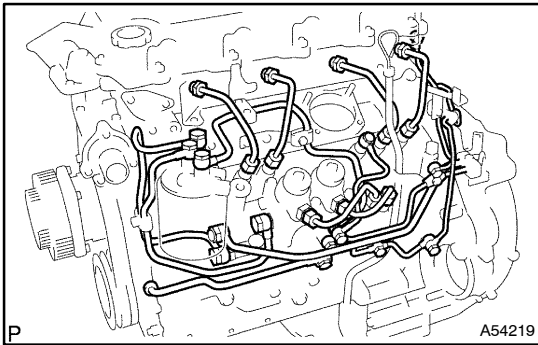


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

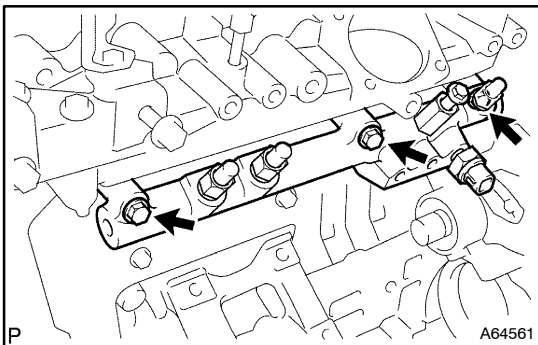
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL
3. REMOVE INTAKE AIR CONNECTOR
4. DISCONNECT HARNESS AND CONNECTOR
5. REMOVE OIL LEVEL GAUGE SUB-ASSY
6. REMOVE INTAKE AIR PIPE
7. REMOVE INJECTION PIPE SET (See page 11-159)

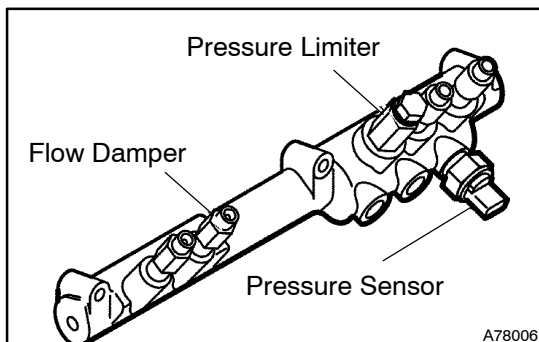


8. REMOVE FUEL PIPE SET
 - (a) Remove the illustrated fuel pipe.

9. REMOVE DIESEL FUEL FILTER ASSY (See page 11-156)
10. REMOVE SUPPLY PUMP ASSY (See page 11-163)



11. REMOVE COMMON RAIL ASSY
 - (a) Disconnect the connectors.
 - (b) Remove the 3 bolts and common rail.



12. REMOVE FLOW DAMPER WITH GASKET
13. REMOVE PRESSURE LIMITER WITH GASKET

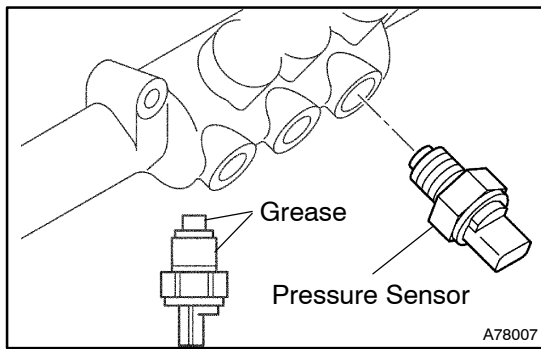
NOTICE:

Be careful not to damper the seal surface.

14. REMOVE PRESSURE SENSOR

NOTICE:

- Taking out pressure sensor is not reusable part. Because, if you reuse it, its thread may be broken.
- Every parts of the common rail should be washed clean carefully laying thread side of parts below.

**15. INSTALL PRESSURE SENSOR**

- (a) Apply grease to the pressure sensor as shown in the illustration.

Grease: 95758-00010(DENSO)

NOTICE:

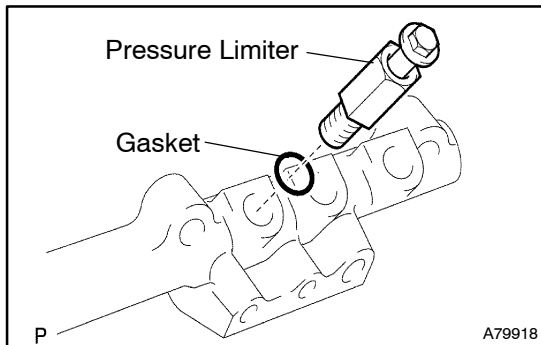
Be careful to prevent dust from entering inside.

- (b) Tighten the new pressure sensor.

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

NOTICE:

Don't touch the terminal of the connector.

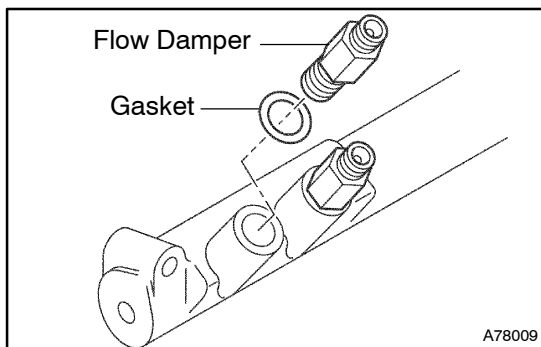
**16. INSTALL PRESSURE LIMITER**

- (a) Install the pressure limiter with a new gasket.

Torque: 172 N·m (1,750 kgf·cm, 127 ft·lbf)

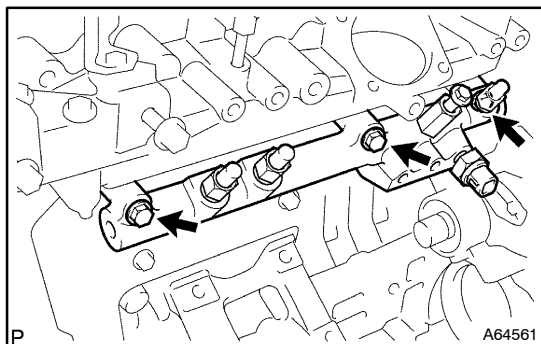
NOTICE:

- Tighten the 24 mm width across flats.
- Don't tighten the 22 mm width.

**17. INSTALL FLOW DAMPER**

- (a) Install the flow damper with a new gasket.

Torque: 172 N·m (1,750 kgf·cm, 127 ft·lbf)

**18. INSTALL COMMON RAIL ASSY**

- (a) Install the common rail with the 3 bolts.

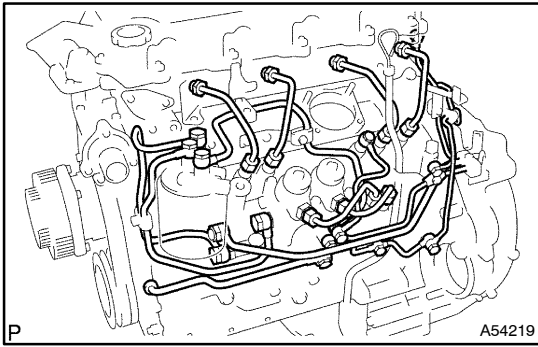
- (b) Connect the connectors.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

NOTICE:

- Be careful to prevent dust from entering inside the common rail and parts when the mounting is performed. Dust and foreign matter must not adhere to the seats of the parts and common rail main unit.
- After the operation is completed, wipe off the fuel which leaked and start the engine. Make sure that the fuel does not leak again.

19. INSTALL SUPPLY PUMP ASSY (See page 11-163)**20. INSTALL DIESEL FUEL FILTER ASSY (See page 11-156)**

**21. INSTALL FUEL PIPE SET**

- (a) Install the fuel pipes.

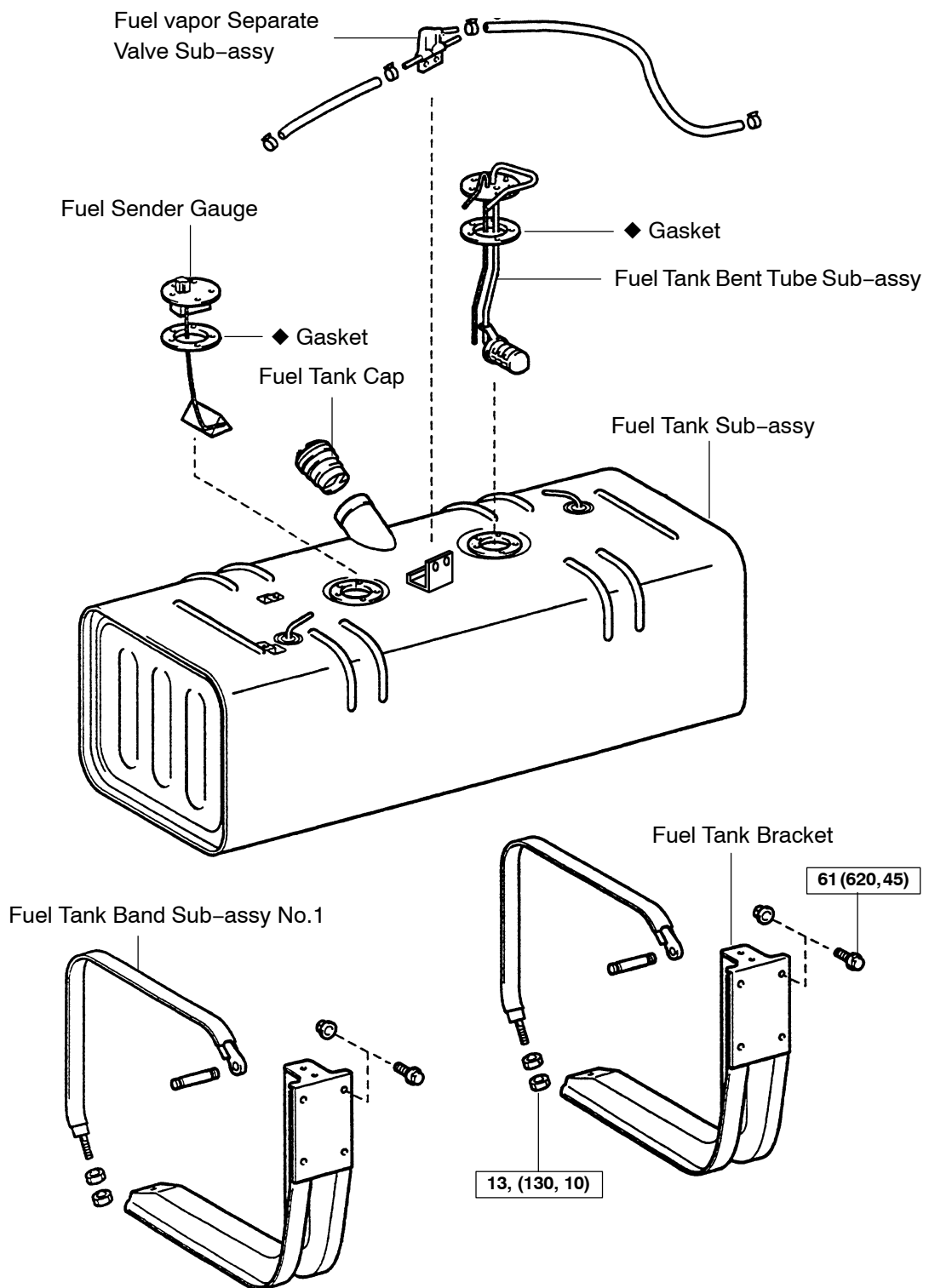
- 22. INSTALL INJECTION PIPE SET (See page 11-159)**
- 23. INSTALL INTAKE AIR PIPE**
- 24. INSTALL OIL LEVEL GAUGE SUB-ASSY**
- 25. INSTALL HARNESS AND CONNECTOR**
- 26. INSTALL INTAKE AIR CONNECTOR**
- 27. ADD FUEL**
- 28. BLEED FUEL (See page 11-156)**
- 29. INSTALL BATTERY NEGATIVE TERMINAL**
- 30. INSPECT FOR FUEL LEAKS (See page 11-155)**

FUEL TANK SUB-ASSY (S05C-TB)

COMPONENTS

11000-01

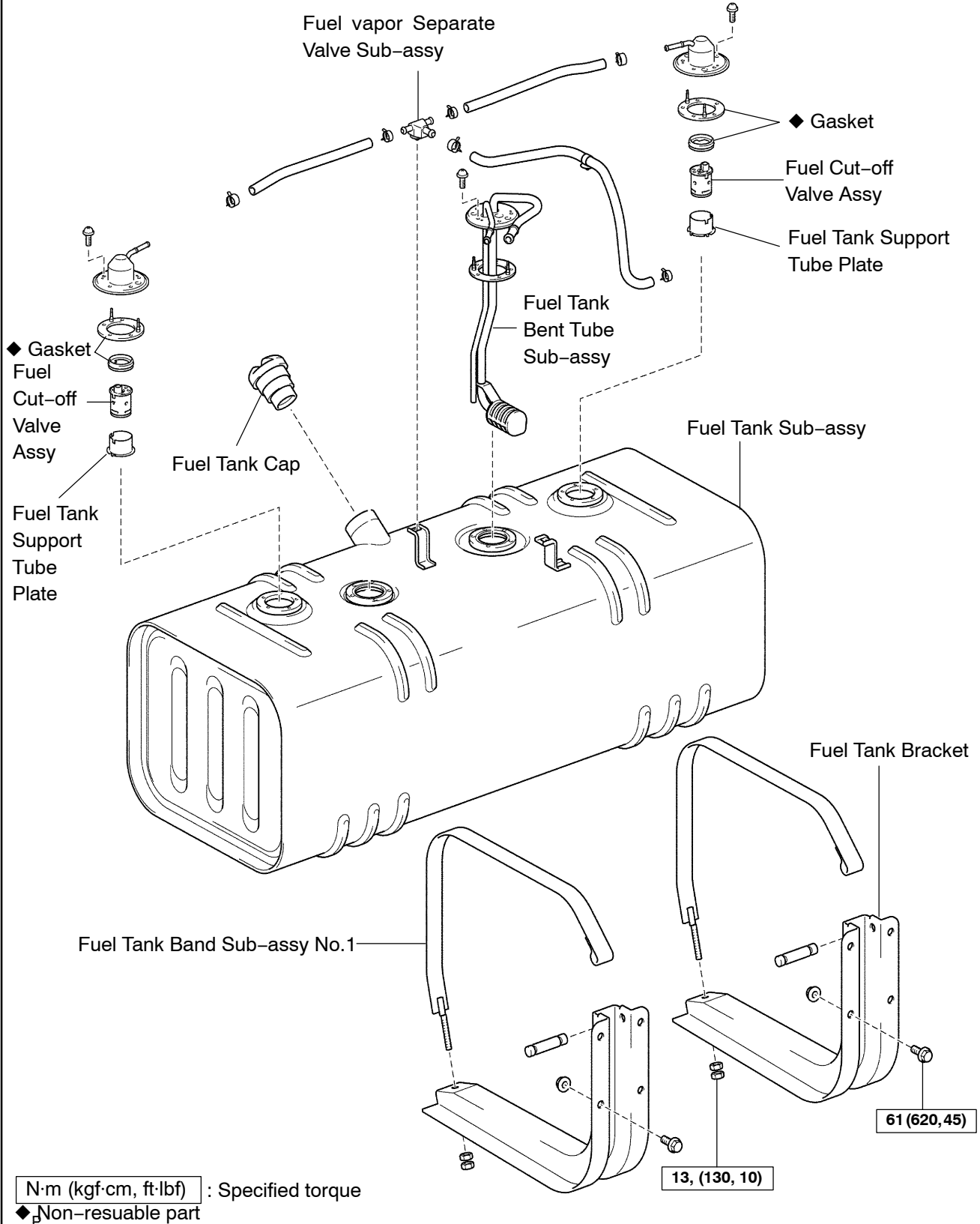
100 Liter Tank (Standard)



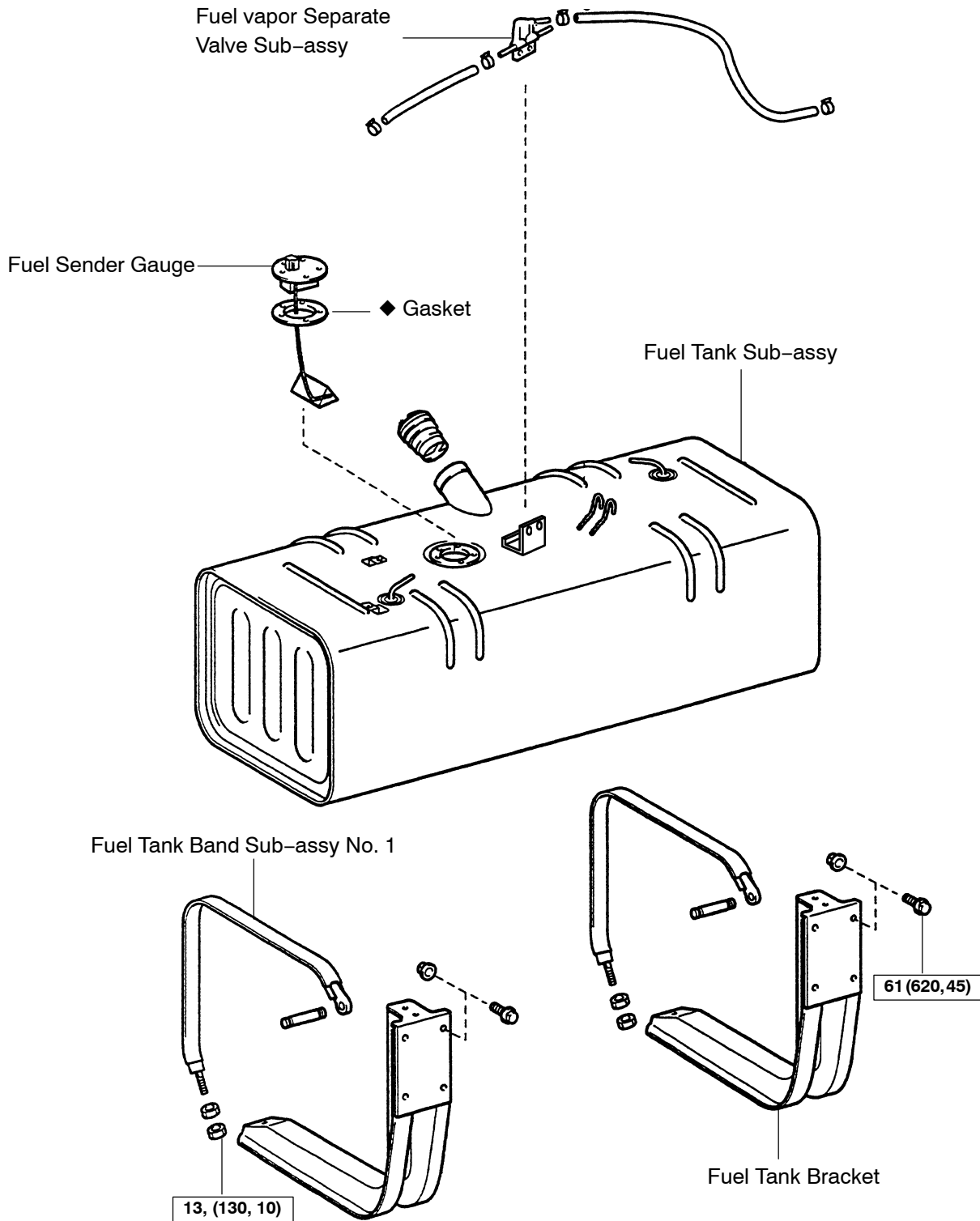
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-resuable part

100 Liter Tank (Euro)



90, 108 Liter Tank



N·m (kgf·cm, ft·lbf) : Specified torque
 ◆ Non-resuable part

REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT**
2. **DISCONNECT BATTERY NEGATIVE TERMINAL**
3. **DRAIN FUEL**
4. **DISCONNECT FUEL SENDER GAUGE CONNECTOR**
5. **DISCONNECT MAIN TUBE, NO.2 FUEL HOSE**
6. **DISCONNECT MAIN TUBE, NO.3 FUEL HOSE**
7. **DISCONNECT FUEL VAPOUR SEPARATE VALVE SUB-ASSY**
8. **REMOVE FUEL TANK BAND SUB-ASSY NO.1**
 - (a) Take out the fuel tank band, and then remove the fuel tank.
9. **REMOVE FUEL TANK SUB-ASSY**
10. **REMOVE FUEL SENDER GAUGE**
 - (a) Remove the 5 screws and fuel sender gauge from the fuel tank.
11. **REMOVE FUEL TANK VENT TUBE SUB-ASSY**
 - (a) Remove the 6 bolts and fuel tank vent tube.
12. **REMOVE FUEL CUT OFF VALVE ASSY**
 - (a) Remove the 4 screws and fuel cut off valve from the fuel tank.
13. **INSTALL FUEL CUT OFF VALVE ASSY**
 - (a) With a new gasket, install the fuel cut-off valve with the 6 bolts.
Torque: 3.5 N·m (35 kgf·cm, 30 in·lbf)
14. **INSTALL FUEL TANK VENT TUBE SUB-ASSY**
 - (a) With a new gasket, install the fuel tank bent tube with the 6 bolts.
Torque: 5.0 N·m (50 kgf·cm, 44 in·lbf)
15. **INSTALL FUEL SENDER GAUGE**
 - (a) With a new gasket, install the fuel sender gauge with the 5 screws.
Torque: 1.5 N·m (15 kgf·cm, 13 in·lbf)
16. **INSTALL FUEL TANK SUB-ASSY**
17. **INSTALL FUEL TANK BAND SUB-ASSY NO.1**
 - (a) Install the tank and fuel tank band.
Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)
18. **INSTALL FUEL VAPOUR SEPARATE VALVE SUB-ASSY**
19. **INSTALL MAIN TUBE, NO.3 FUEL HOSE**
20. **INSTALL MAIN TUBE, NO.2 FUEL HOSE**
21. **CONNECT FUEL SENDER GAUGE CONNECTOR**
22. **ADD FUEL**
23. **CONNECT BATTERY NEGATIVE TERMINAL**
24. **BLEED FUEL (See page 11-156)**
25. **INSPECT FOR FUEL LEAKS (See page 11-155)**

FUEL SYSTEM (W04D-J)

110QP-01

ON-VEHICLE INSPECTION

1. CHECK FUEL LEAK

(a) Check that there are no leaks from any part of the fuel system when the engine stops.

If there is fuel leakage, replace those parts.

(b) While cranking or starting the engine, check that there are no leaks from any part of the fuel system.

If there is fuel leakage, replace those parts.

(c) Disconnect the return hose from the injection pump.

(d) While cranking the engine, check fuel leakage from the return pipe.

(e) Check that there are no leaks from any part of the fuel system.

NOTICE:

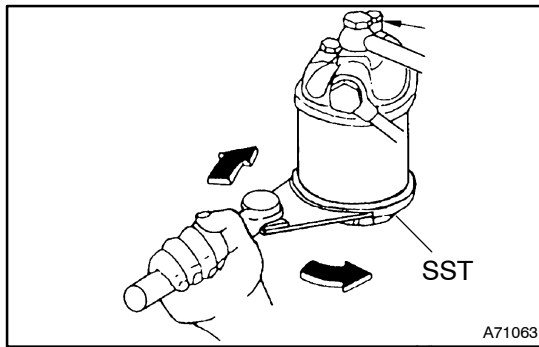
If the leakage from the return pipe is less than 10 cc (0.6 cu in.) in a minute, it is acceptable.

FUEL FILTER ELEMENT (W04D-J)

110QQ-01

REPLACEMENT

1. **DRAIN FUEL**
2. **REMOVE DIESEL FUEL FILTER ASSY**
 - (a) Remove the 7 fuel pipes.
 - (b) Remove the 2 bolts and fuel filter assy.



3. **REMOVE FUEL FILTER ELEMENT**
 - (a) Mount the fuel filter in a soft jaw vise.
 - (b) Using SST, remove the fuel filter element.
SST 09228-34010

4. **INSTALL FUEL FILTER ELEMENT**

- (a) Remove the dust on installation surface.
- (b) Apply a light coat of fuel to the gasket of new fuel filter.
- (c) Install the fuel filter by turning it lightly to the right by hand until it comes in contact with the surface of the fuel filter cover.

NOTICE:

Do not use SST in tightening the element by hand.

- (d) Then using the SST, tighten the fuel filter about 240° (2/3 turn).
SST 09228-34010

NOTICE:

- **Replace the new gasket.**
- **Do not reuse the element.**
- **Attention the gasket to damage.**

5. **INSTALL DIESEL FUEL FILTER ASSY**

- (a) Tighten the fuel filter assy with the 2 bolts.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)
- (b) Using a new gasket, install the fuel pipe to the fuel filter assembly with the union bolts.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

6. **ADD FUEL**

7. **BLEED FUEL**

CAUTION:

At time of air venting, pay attention to the following items.

- **Pay attention to fuel spilling from the supply pump air bleeder and the fuel filter drain pipe at the time of air venting.**
Apply rags etc. to the respective parts being worked on and take care to prevent spilling of fuel onto the surroundings.
 - **If starting is difficult or if the engine stops some time after starting, the air has not been vented sufficiently and should be repeated.**
- (a) Loosen the priming pump knob of the injection pump by hand and pull out the knob.
 - (b) Push the knob by hand and move it up and down for pumping.

- (c) When pushing the knob becomes harder, loosen the fuel filter drain bolt and vent the air through the drain pipe.
- (d) Tighten the fuel filter drain bolt provisionally.
- (e) Repeat the steps (b) to (d) until air no longer comes from the drain pipe and then tighten the drain bolt with the correct torque.

Torque: 6.9 N·m (70 kgf·cm, 61 in·lbf)

- (f) Again move the priming pump knob of the injection pump up and down for pumping.
- (g) When pushing the knob becomes harder, loosen the air bleeder of the supply pump and vent the air.
- (h) Tighten the air bleeder provisionally.
- (i) Repeat the steps (f) to (h) and when air no longer comes out from the air bleeder tighten the air bleeder with the correct torque.

Torque: 5.9 N·m (60 kgf·cm, 52 in·lbf)

- (j) Again pump until pushing the knob becomes harder, and finally lock the knob by tightening it in the pushed in condition.
- (k) Again confirm the tightening of all parts and then start the engine.

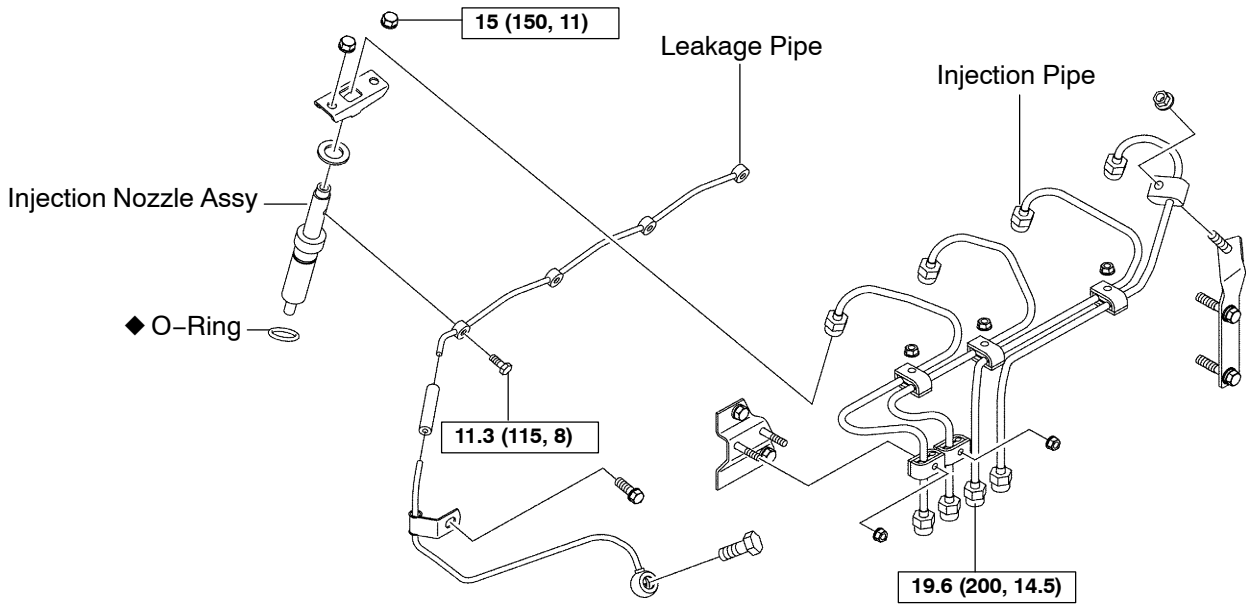
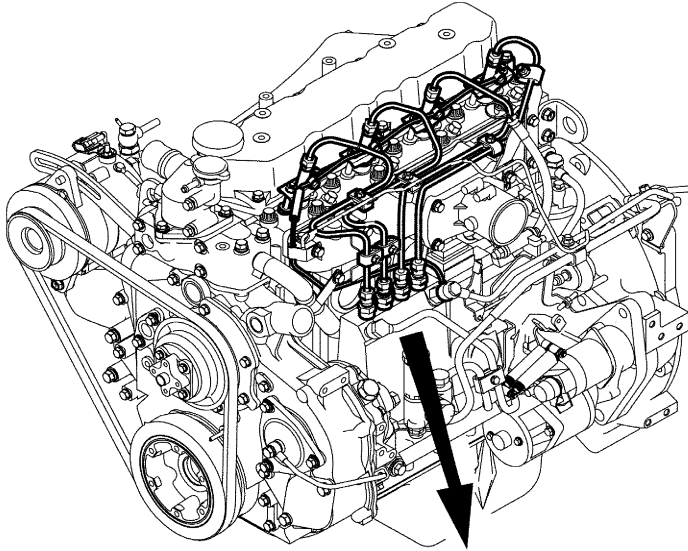
NOTICE:

- **When starting the engine, do not use the starter for 15 seconds continuously to prevent it from burned out. And also take an interval of 30 seconds before re-starting to protect the battery.**
- **For the above reason, do not bleed the air by cranking the engine with the starter.**

8. INSPECT FOR FUEL LEAKS

NOZZLE HOLDER AND NOZZLE SET (W04D-J) COMPONENTS

110QR-01



N·m (kgf·cm, ft·lbf) : Specified torque

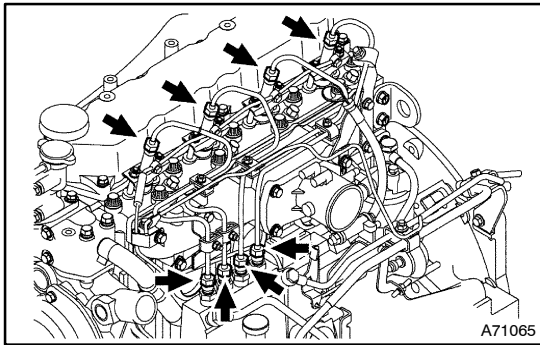
◆ Non-resuable part

NOZZLE HOLDER AND NOZZLE SET (W04D-J)

110QS-01

REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL

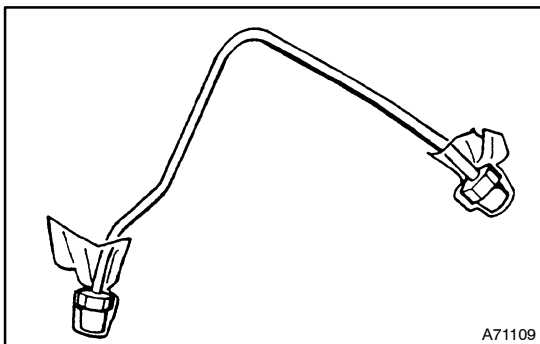
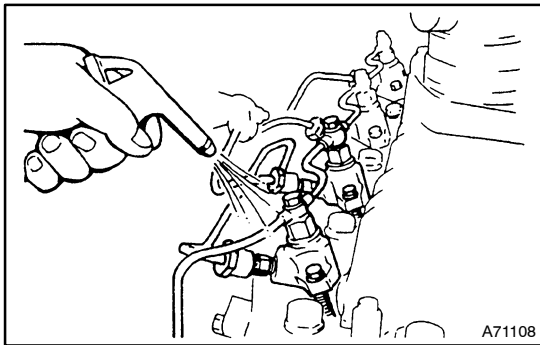


3. REMOVE INJECTION PIPE SET

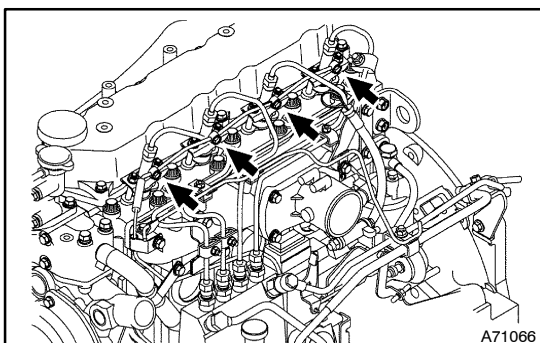
- (a) Loosen the 4 union nuts from the 4 nozzle holders and nozzle set.

NOTICE:

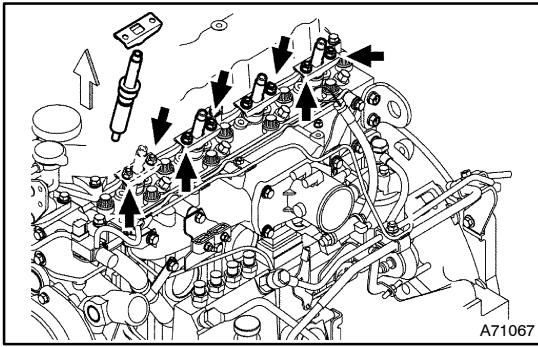
- After removing the fuel pipe, affix the gum tape to the common rail for preventing dust.
- After removing the fuel pipe, put a vinyl bag and rubber band to prevent mixing foreign objects over the injectors inlet.
- If foreign matter is allowed to enter the combustion chamber, engine trouble may result.



- Cover open ends of the pipes and fuel injection pump to prevent entry of dirt.



- (b) Remove the 4 joint bolts, fuel return pipe and 4 gaskets.

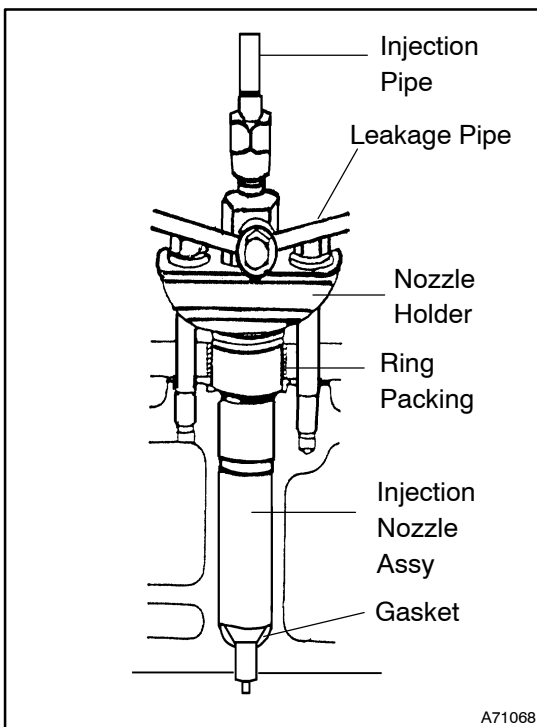


4. REMOVE NOZZLE HOLDER AND NOZZLE SET

- (a) Remove the 8 bolts, 4 nozzle holder and 4 nozzle sets.
- (b) Remove the 4 shims, 4 ring packings and 4 gaskets from the cylinder head.

NOTICE:

- Start the operation after the fuel is cooled off because the fuel temperature in the injector return pipe right after driving the vehicle may be extremely high (approx. 100°C (212°F)).
- After removal of the nozzle holder, cover the nozzle holder with cloth. Also cover the cylinder head with a cloth to prevent dust from getting in.



5. INSTALL NOZZLE HOLDER AND NOZZLE SET

- (a) Install a new gasket, the packing ring and shim into the groove of the cylinder head, and then insert the nozzle holder and nozzle set.

NOTICE:

Apply engine oil to the O-ring, so that the O-ring will not be caught.

- (b) Install the nozzle holder, and install the nozzle set temporarily.

NOTICE:

- Do not fix the injector clamp before the injection pipe is temporarily installed.
- Be careful not to put excessive force to the injector when applying the injection pipe oil seal to it. If the injection pipe oil seal and injector are moved even slightly, it may cause oil leakage or faulty assembling of the injection pipe.

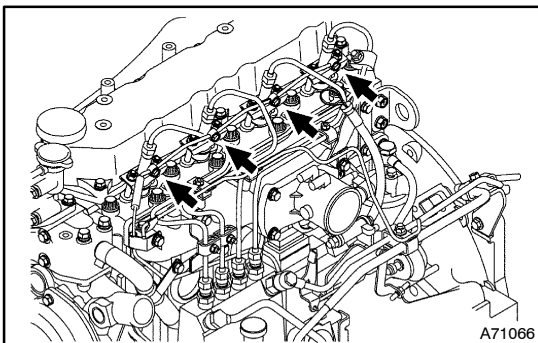
- (c) Assemble the injection pipe temporarily, and tighten the installation bolt of the nozzle holder.

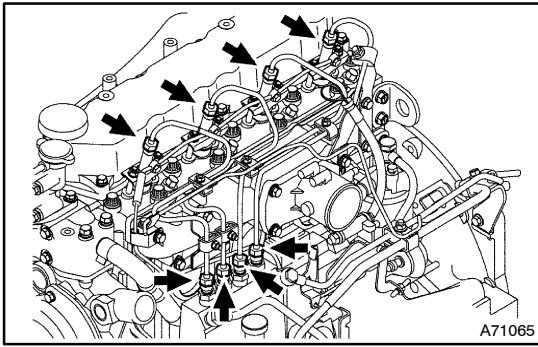
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

6. INSTALL INJECTION PIPE SET

- (a) Install 4 new gaskets and the leakage pipe with the 4 joint bolts.

Torque: 11.3 N·m (115 kgf·cm, 8 ft·lbf)



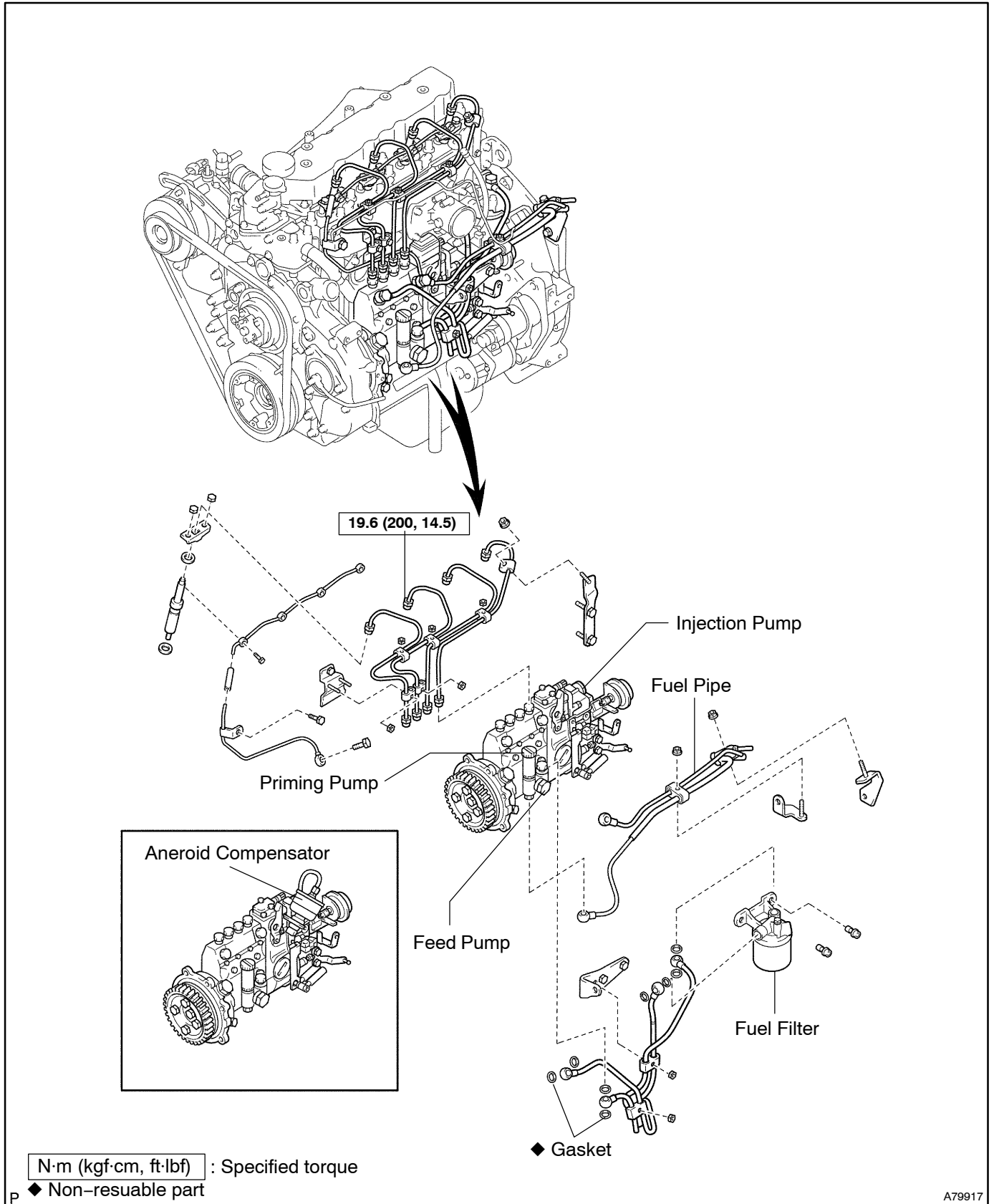


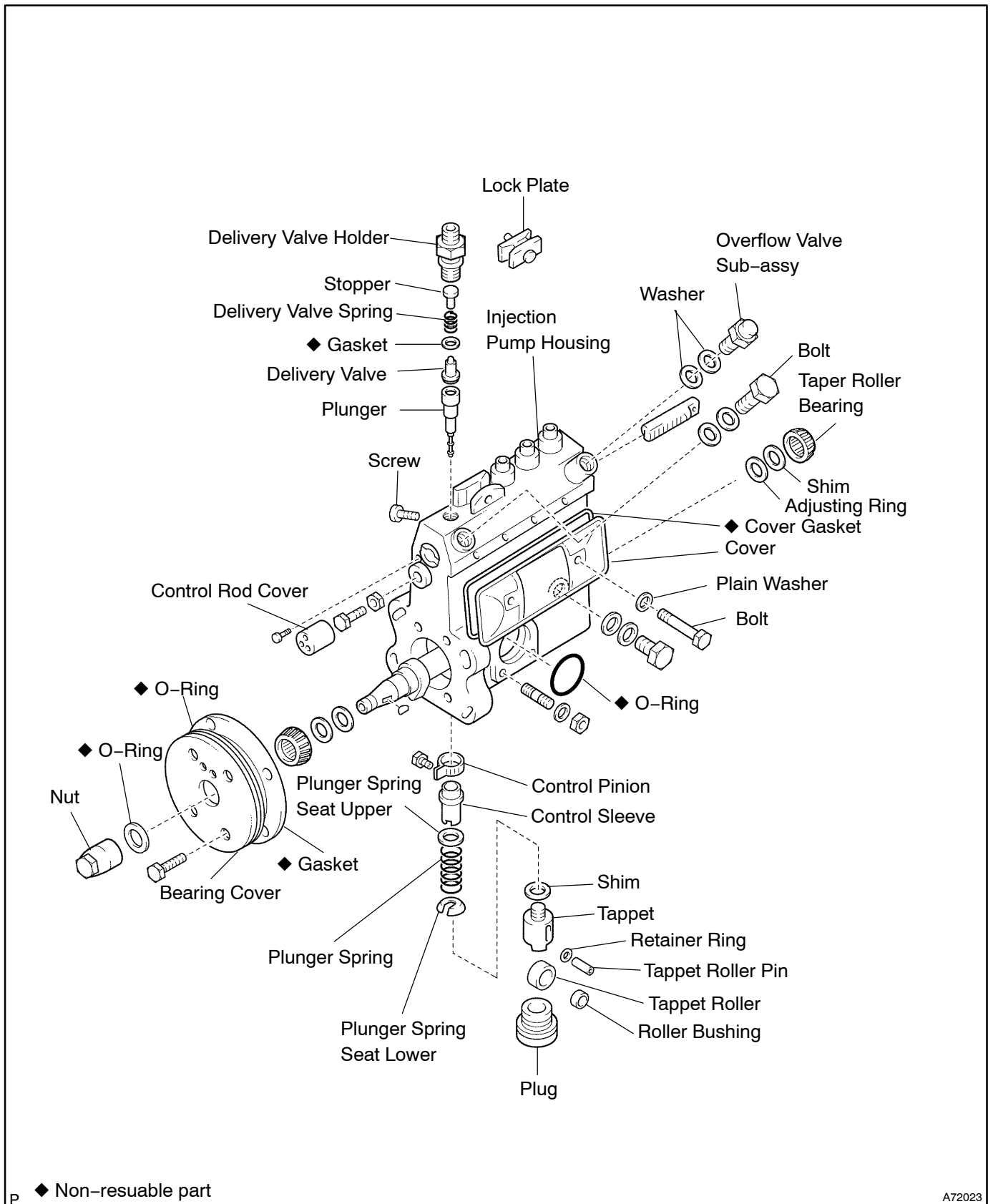
- (b) Tighten the 4 union nuts to the 4 injection pipes.
Torque: 19.6 N·m (200 kgf·cm, 14.5 ft·lbf)

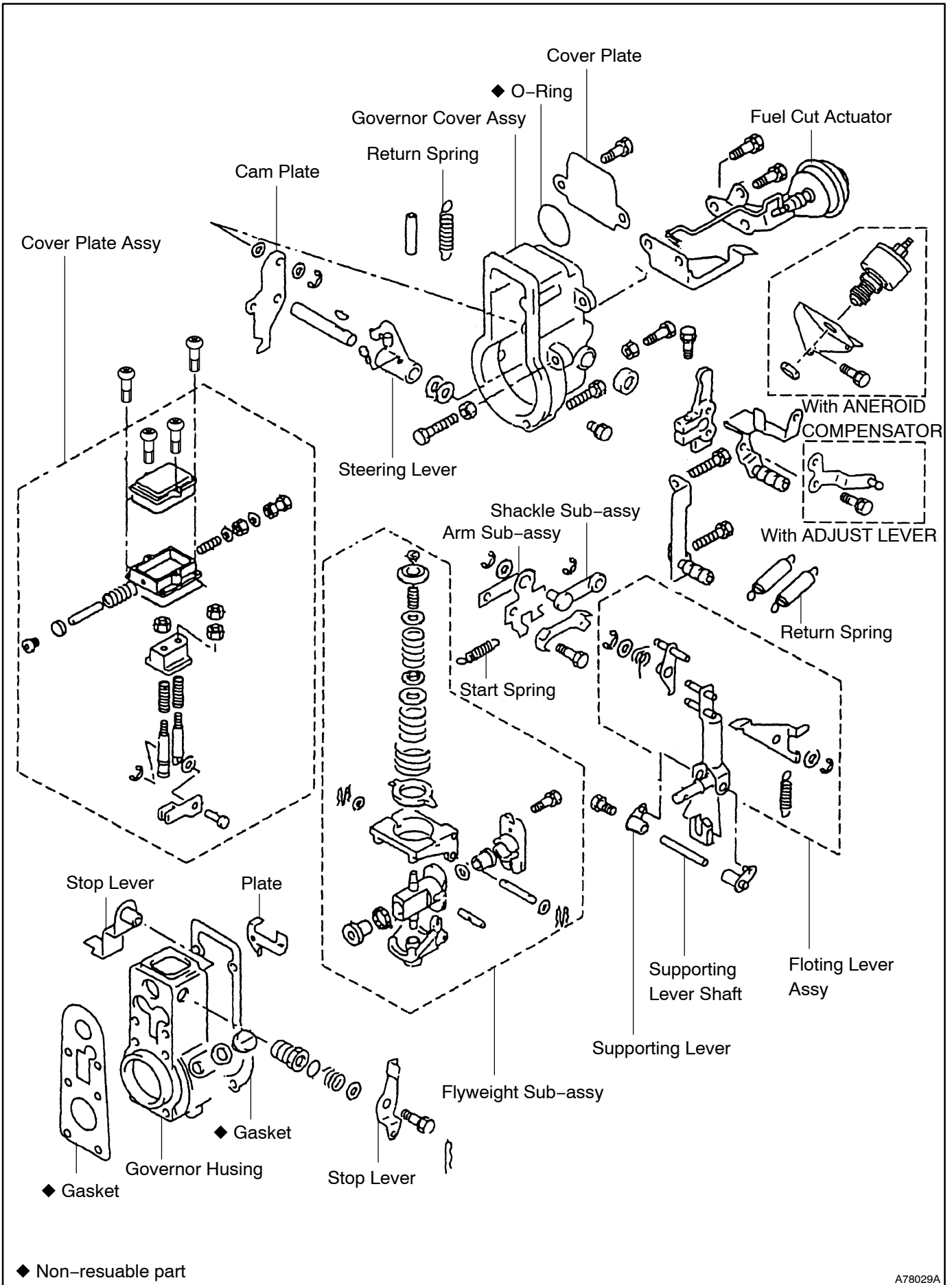
7. **ADD FUEL**
8. **BLEED FUEL (See page 11-177)**
9. **CONNECT BATTERY NEGATIVE TERMINAL**
10. **INSPECT FOR FUEL LEAKS**

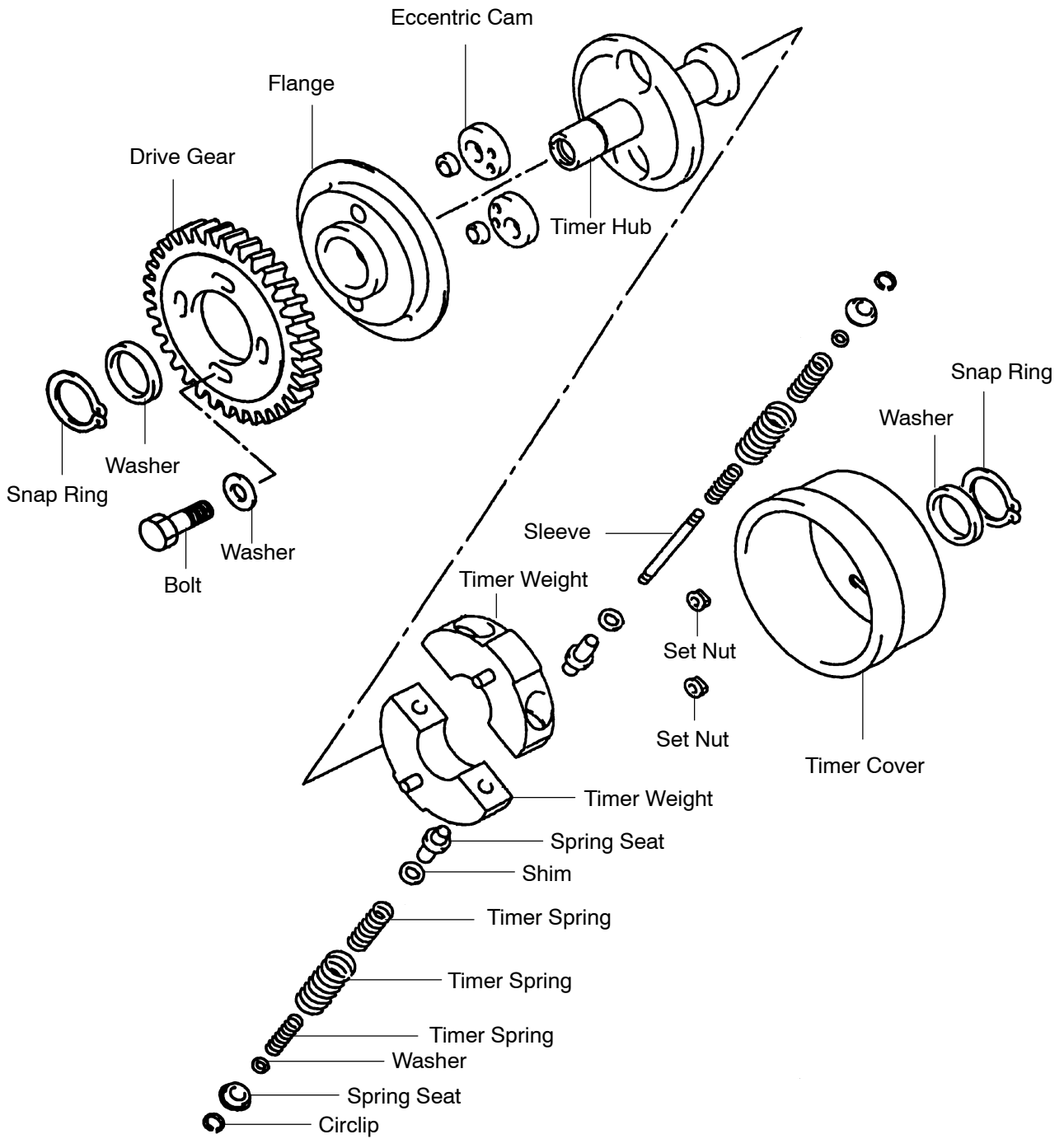
INJECTION PUMP ASSY (W04D-J) COMPONENTS

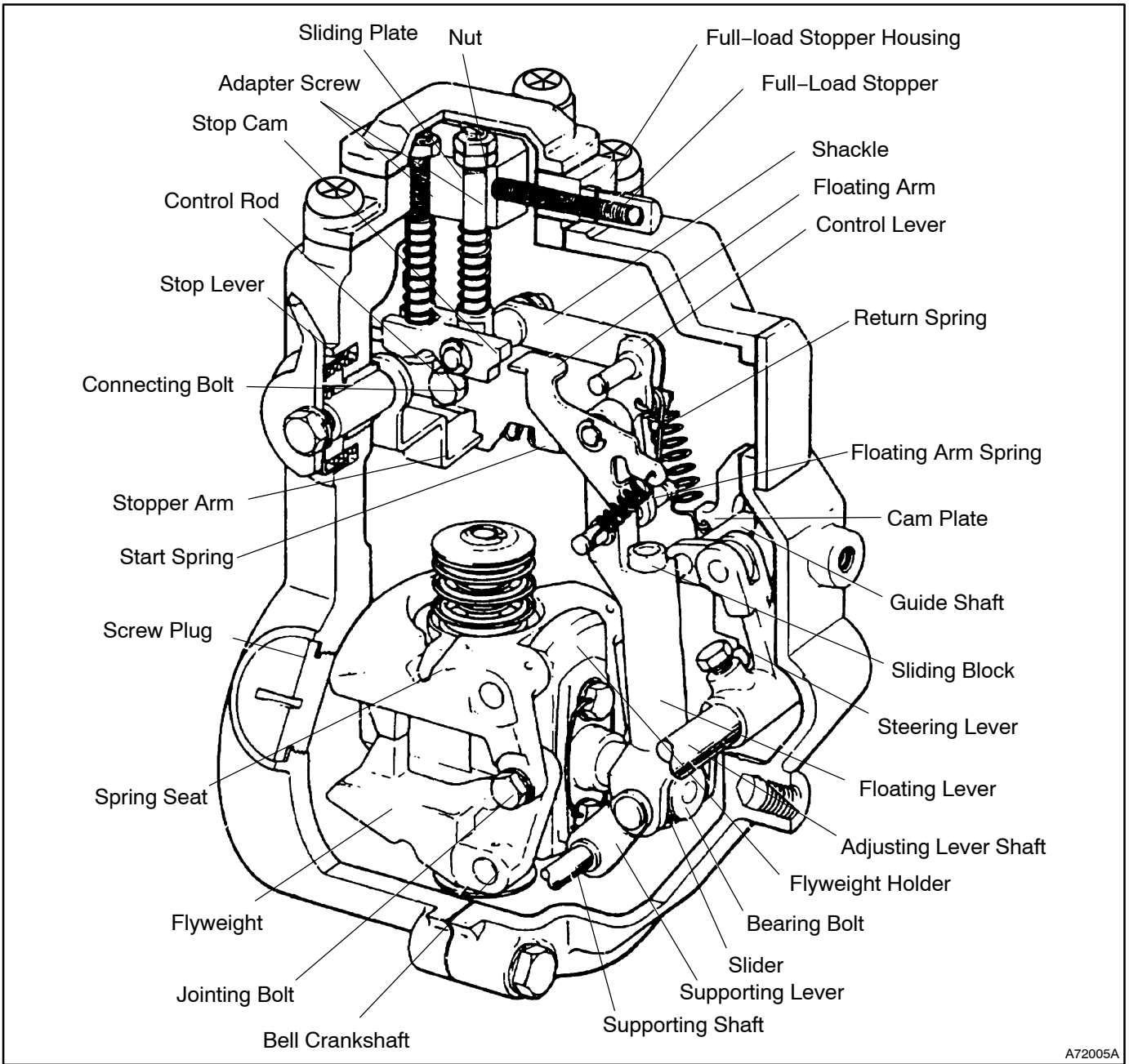
110QT-01

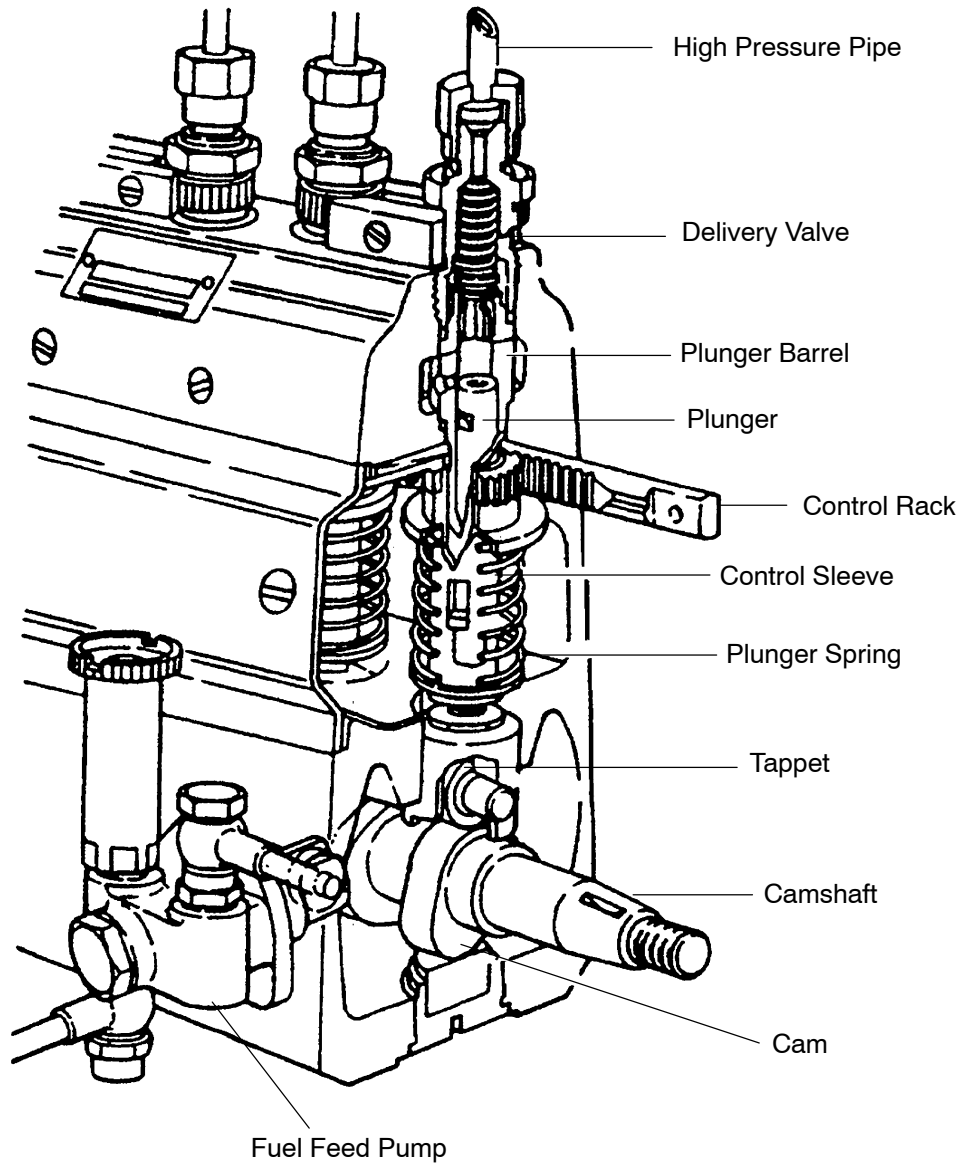




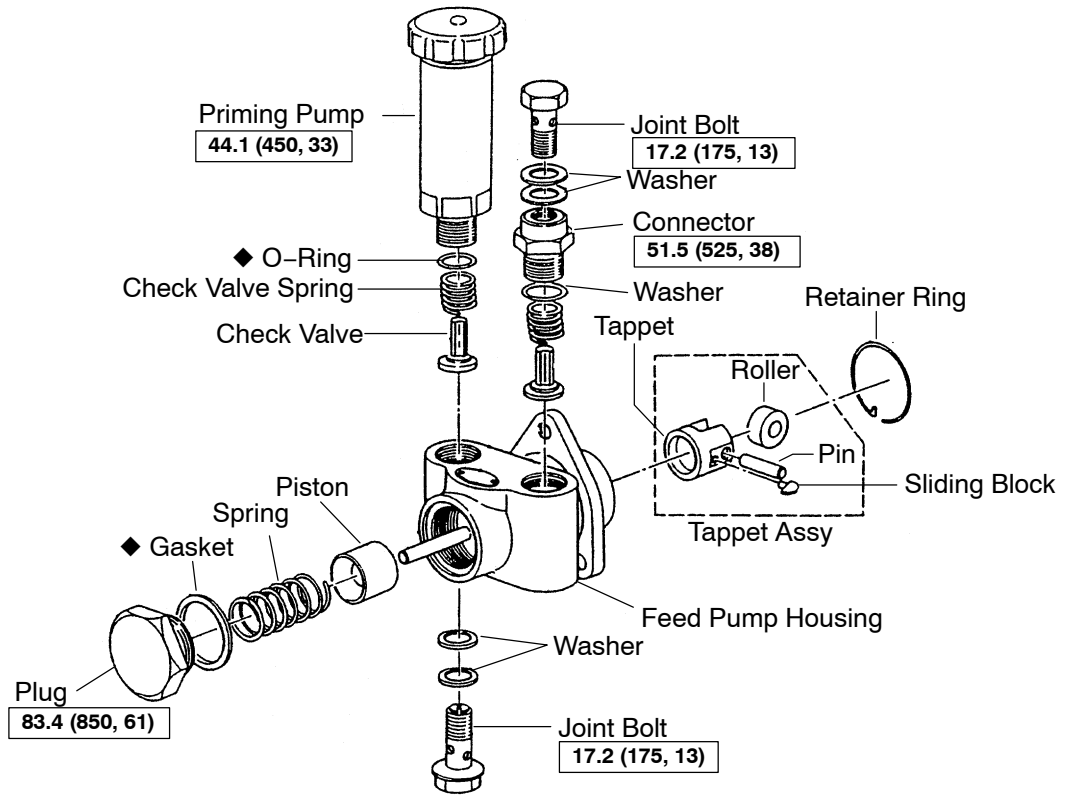








Feed Pump (KS-Type)

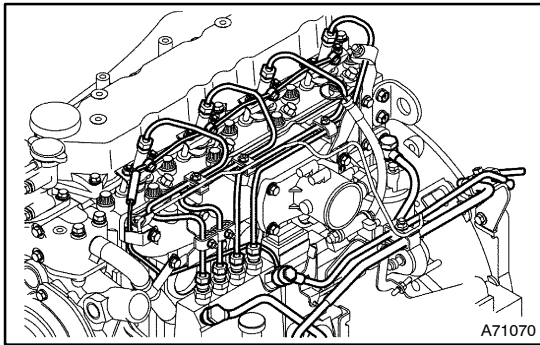


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-resuable part

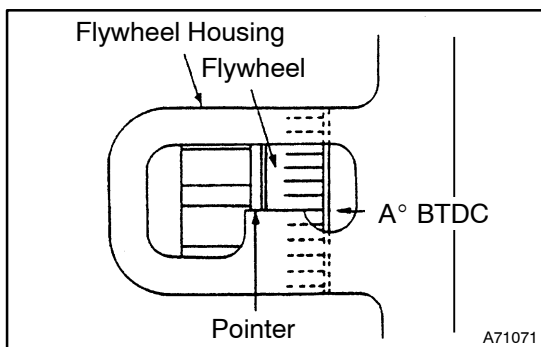
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN FUEL
3. REMOVE OIL LEVEL GAGE SUB-ASSY
4. REMOVE INTAKE AIR PIPE
5. REMOVE INJECTION PIPE SET (See page 11-180)

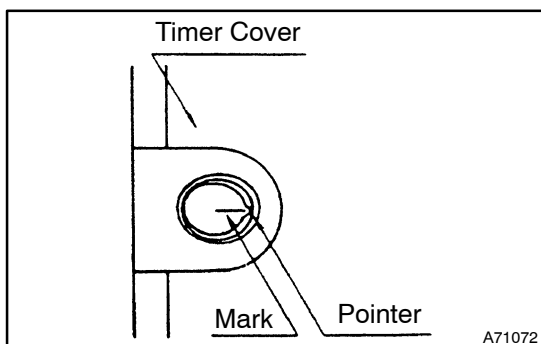


6. REMOVE FUEL PIPE SET
 - (a) Remove the illustrated fuel pipe.

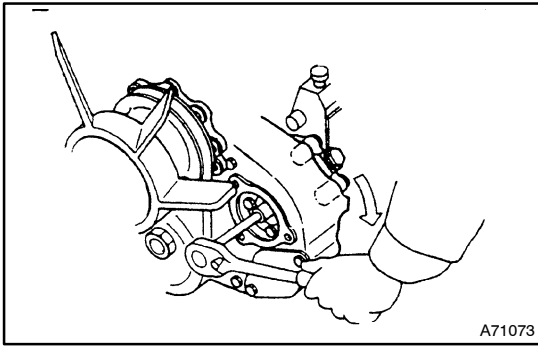
7. REMOVE DIESEL FUEL FILTER ASSY (See page 11-177)



8. REMOVE INJECTION PUMP ASSY
 - (a) Disconnect the fuel lines, oil lines and engine control lines.
 - (b) Turn the crankshaft counterclockwise viewed from the flywheel side to align the injection timing marks on the flywheel at A° before top dead center for No. 1 cylinder on compression stroke.
Injection timing A° : 12°



- (c) Remove the timing inspection hole plug.
- (d) Check that the injection timing mark on the automatic timer is aligned with timer cover pointer.



- (e) Rotate the drive gear cover clockwise to align the injection timing and then tighten the drive gear fitting bolts.

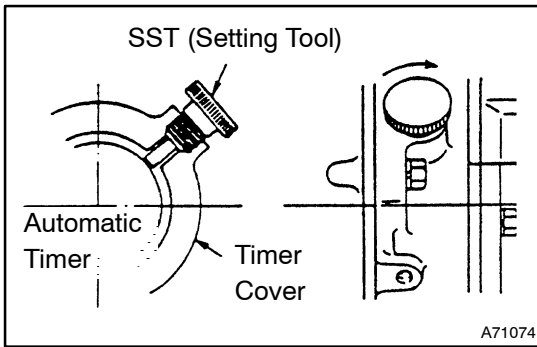
Torque:

29.42 – 34.32 N·m (300 – 350 kgf·cm, 22 – 25 ft·lbf)

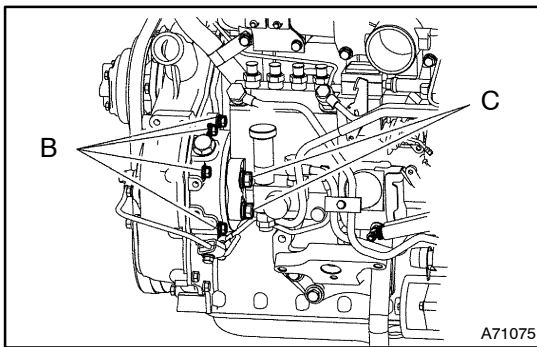
If not, remove the timing gear cover and then loosen the drive gear fitting bolts.

NOTICE:

Do not remove the drive gear fitting bolts.



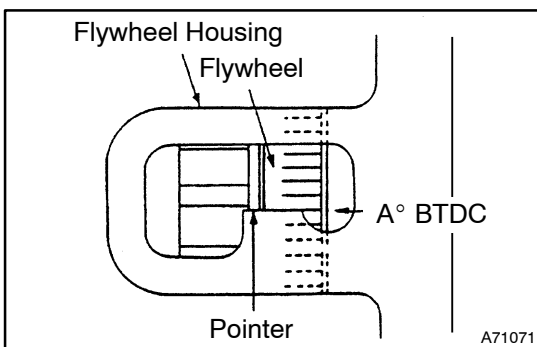
- (f) Lock the automatic timer with a SST.
SST 09512-2100



- (g) Loosen the timer cover fitting bolts (B) and then remove the injection pump with timer cover.

NOTICE:

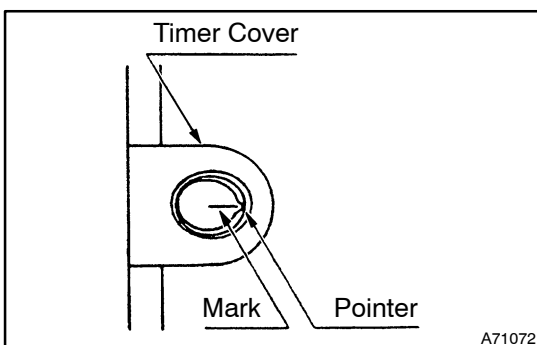
Do not loosen the injection pump body fitting nuts (C).



9. INSTALL INJECTION PUMP ASSY

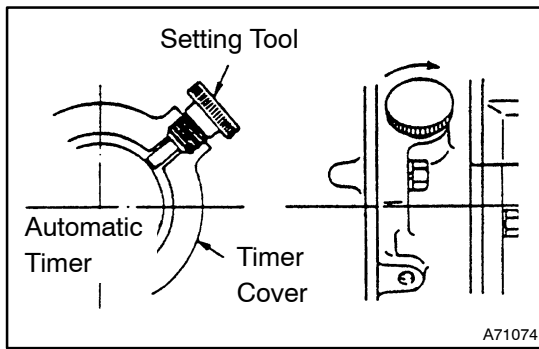
- (a) Check that the injection timing mark on the flywheel is aligned with flywheel housing pointer.

Injection timing A°: 12°

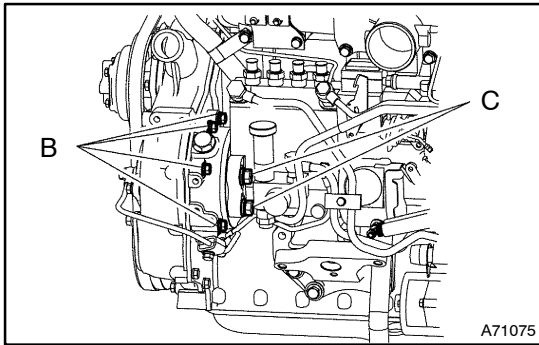


- (b) Check that the injection timing mark on the automatic timer is aligned with timer cover pointer.

If not, adjust the injection timing.



- (c) Lock the automatic timer with a SST.
SST 09512-2100



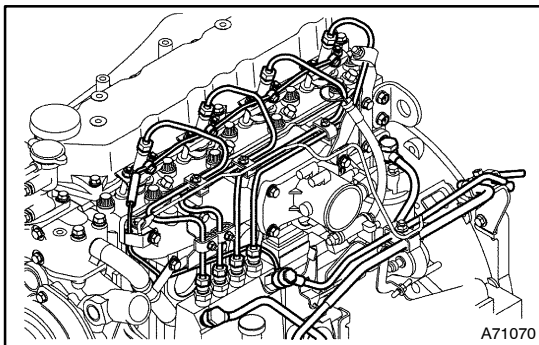
- (d) Install the injection pump with timer cover.

Torque:

18.64 - 25.49 N·m (190 - 260 kgf·cm, 14 - 18 ft·lbf)

- (e) Remove and install the timing inspection hole plug.
(f) Connect the fuel lines, oil lines and engine control lines.

10. INSTALL DIESEL FUEL FILTER ASSY (See page 11-177)



11. INSTALL FUEL PIPE SET

- (a) Install the fuel pipes.

12. INSTALL INJECTION PIPE SET (See page 11-180)

13. INSTALL INTAKE AIR PIPE

14. INSTALL OIL LEVEL GAUGE SUB-ASSY

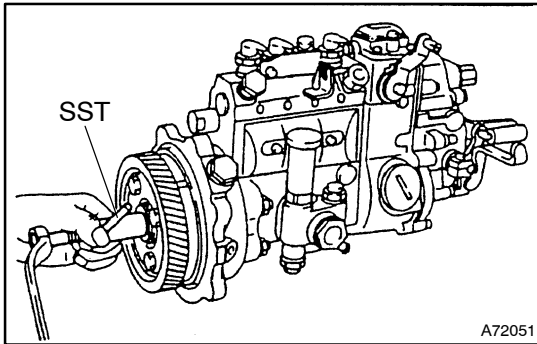
15. ADD FUEL

16. BLEED FUEL (See page 11-177)

17. CONNECT BATTERY NEGATIVE TERMINAL

18. INSPECT FOR FUEL LEAKS

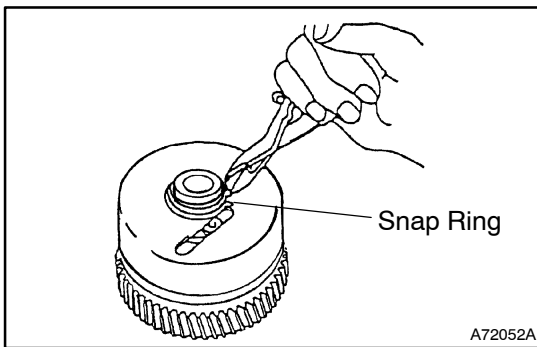
OVERHAUL



1. REMOVE TIMER ASSY

(a) Using SST, remove the timer assy.

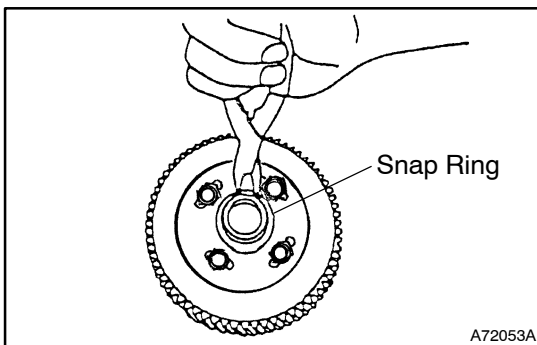
SST 09950-40011



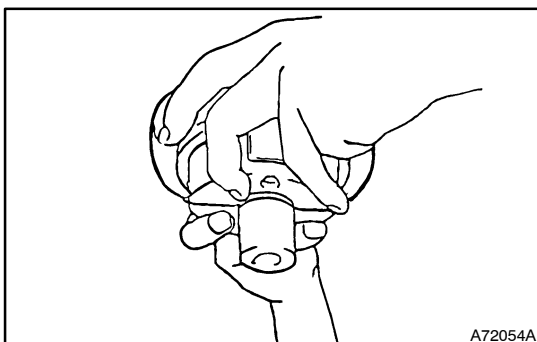
(b) Remove the snap ring on the timer cover side, and then remove the washer.

(c) Remove the timer cover.

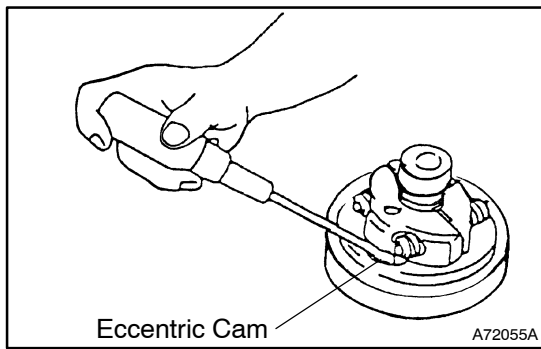
(d) Remove the fix bolts and gear.



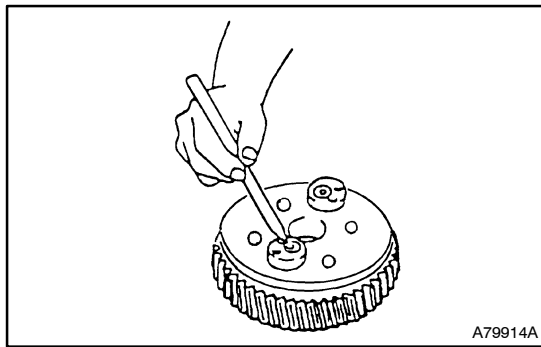
(e) With the flange side up, remove the snap ring and washer.



(f) Hold the weight in place so that the flange and hub do not come out, and carefully turn over.



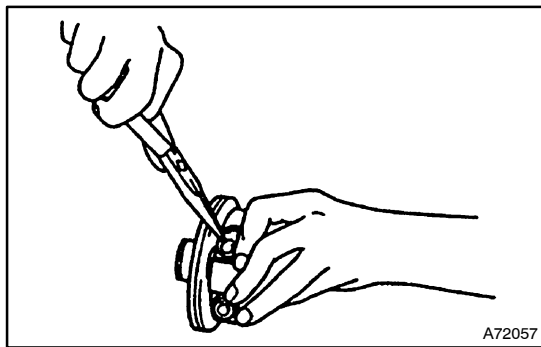
- (g) Press the large eccentric cam and small eccentric cam toward the flange



- (h) Take precautions not to allow the large eccentric cam and small eccentric cam to slip out of place, and pull the hub straight out with the weight still assembled.
- (i) Place alignment marks on the large eccentric cam, small eccentric cam and drive pin, then remove the eccentric cams.

NOTICE:

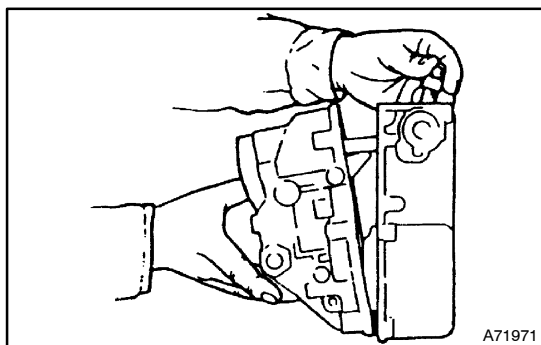
- **Be sure the alignment marks are clearly visible.**
- **Write down the way the cam is assembled.**



- (j) Compress the timer spring and remove the circlip. Then take out the spring seat, washer, timer spring, spring seat and spring support.

NOTICE:

- **Breaking of the lead seals or crimp caps by anyone other than or pump manufacture authorized service stations to make these adjustment will void the warranty.**
- **If fuel pump or governor difficulties are suspected, consult only or pump manufacture authorized service stations, where the problem can be corrected and the injection pump lead seals and crimp caps can be reinstalled as required.**

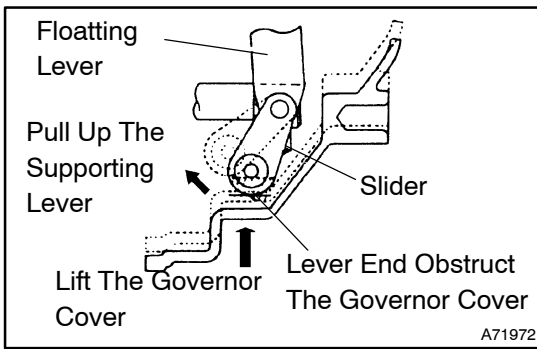


2. REMOVE GOVERNOR COVER

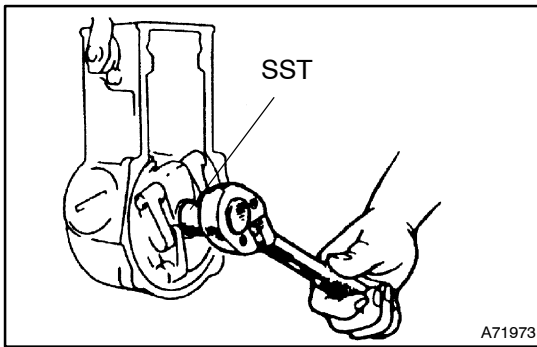
- (a) With the adjusting lever held in its "idling" position, detach the governor cover by lifting it up in such a way that the sliding block can slide out of the slit in the floating lever.

NOTICE:

- **Disconnect the special bolts or crimp caps by anyone other than HINO or pump manufacture authorized service stations to make these adjustment will void the warranty.**
- **If fuel pump or governor difficulties are suspected, consult only HINO or pump manufacture authorized service stations, where the problem can be corrected and the injection pump lead seals and crimp caps can be reinstalled as required.**

**NOTICE:**

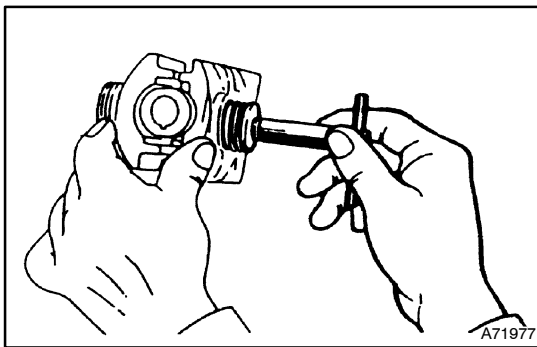
Before lifting the governor cove, be sure to pull up the supporting lever as shown by dotted lines in the figure, so that its lower end may not obstruct the lifting of the governor cover.

**3. REMOVE FLYWEIGHT ROUND NUT**

- (a) Using SST, remove the flyweight round nut.
SST 09269-54050

NOTICE:

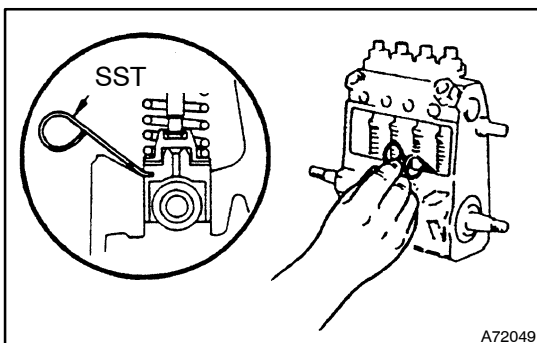
Use the holding spanning to keep the camshaft from rotating.

**4. REMOVE FLYWEIGHT SUB-ASSY**

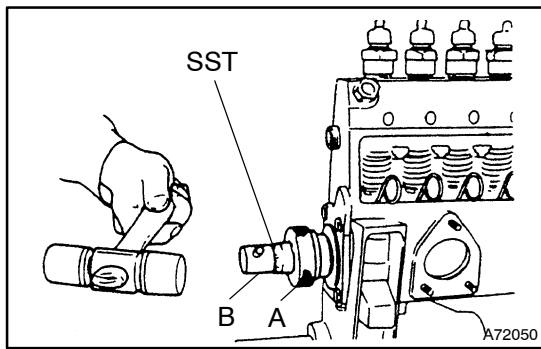
- (a) Remove the adjusting nut with weight spring nut wrench, and disassemble the inner parts of the flyweight sub-assembly.

NOTICE:

- Breaking of the lead seals or crimp caps by anyone other than pump manufacture authorized service stations to make these adjustment will void the warranty.
- If fuel pump or governor difficulties are suspected, consult only or pump manufacture authorized service stations, where the problem can be corrected and the injection pump lead seals and crimp caps can be reinstalled as required.
- Measure and record the fuel delivery characteristics of the pump before disassembling it.
- Keep the parts for each cylinder in separate groups and in an orderly arrangement. Parts to be replaced and parts to be used again must be kept separately.

**5. INSERT TAPPET INSERTER IN TAPPET HOLE**

- (a) Turn the camshaft and insert SST each tappet hole when their tappet is at the highest position.
SST 09274-46011

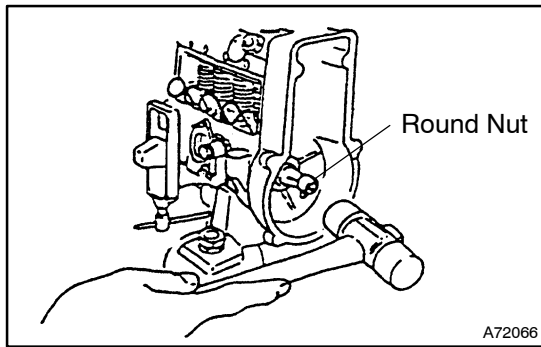


6. MEASURE CAMSHAFT END PLAY

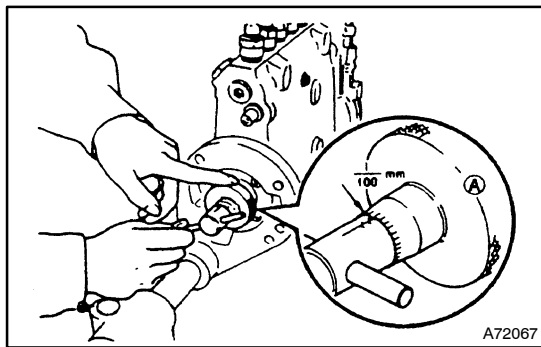
- (a) Mount SST on the camshaft drive end and be sure tighten "B".

SST 09512-1150

- (b) By turning "A", create a clearance of about 1 mm (0.04 in.) between "A" and the bearing cover.
- (c) Lightly strike the end "B" 3 or 4 times with a plastic hammer.



- (d) Lightly tighten "A" until it comes into contact with the bearing cover.
- (e) Lightly strike the camshaft governor end 3 or 4 times a plastic hammer.

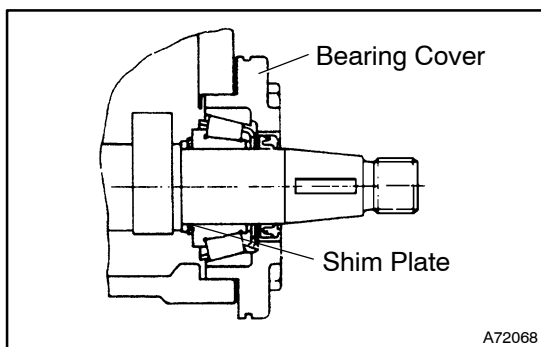


- (f) Lightly turn "A" until it comes into contact with the bearing cover, then read the clearance.

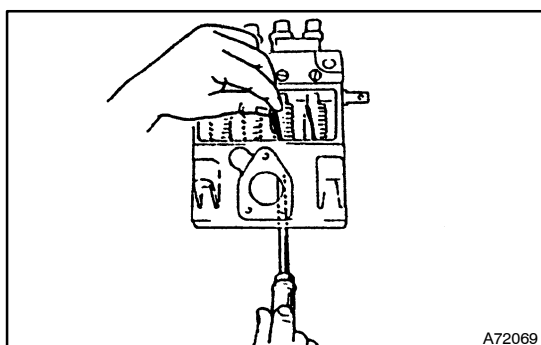
Assembly standard:

0.03 - 0.05 mm (0.0012 - 0.0019 in.)

Service limit: 0.10 mm (0.0039 in.)



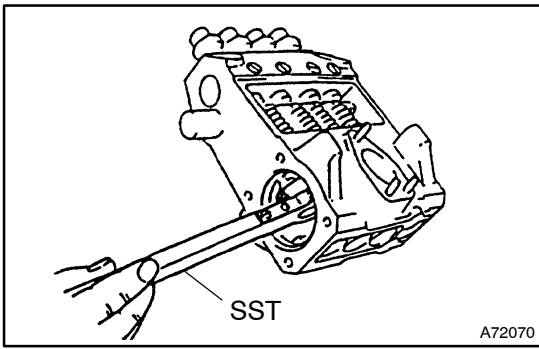
- (g) If the specification is not met, use appropriate shim plates at the drive end of camshaft.



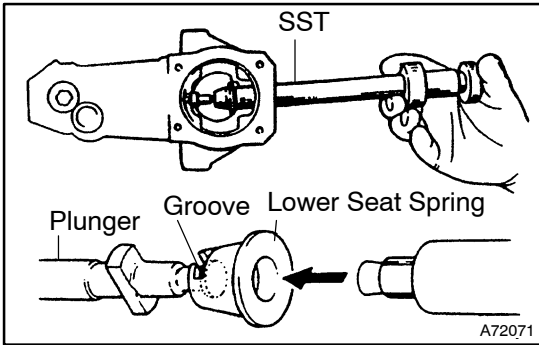
7. REMOVE TAPPET ASSEMBLY

- (a) Push the tappet with the tappet roller clamp and remove the tappet inspector.

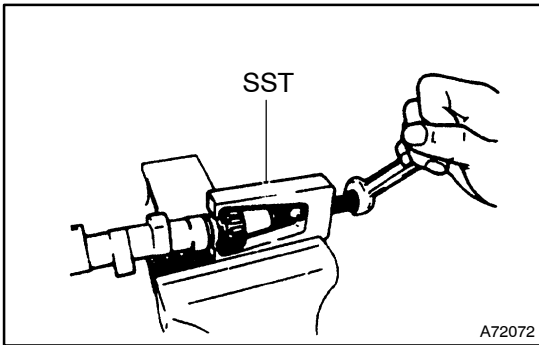
SST 09272-76011



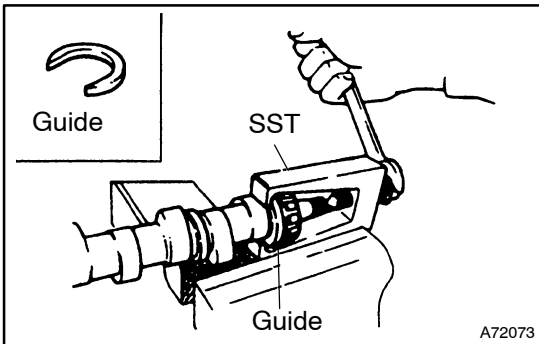
- (b) Using SST, remove the tappet through the camshaft bearing hole.
SST 09272-76011



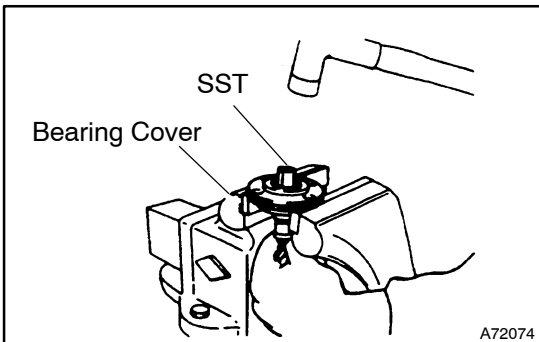
- 8. REMOVE PLUNGERS, SPRINGS AND CONTROL SLEEVE
SST 09275-46010



- 9. REMOVE TAPER BEARING FROM CAMSHAFT
- (a) Using SST, remove the taper bearing from the drive end of the camshaft.
SST 09287-58010



- (b) Use the guide to remove the bearing at the governor side.



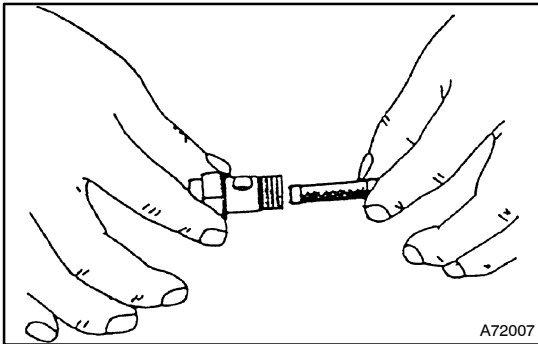
- (c) Using SST, to tap out the outer race in the bearing cover.
SST 09512-1430

10. REMOVE PRIMING PUMP AND CHECK VALVES

- (a) Unscrew the priming pump and remove the spring and inlet check valve.
- (b) Remove the outlet check valve and spring.

11. REMOVE TAPPET

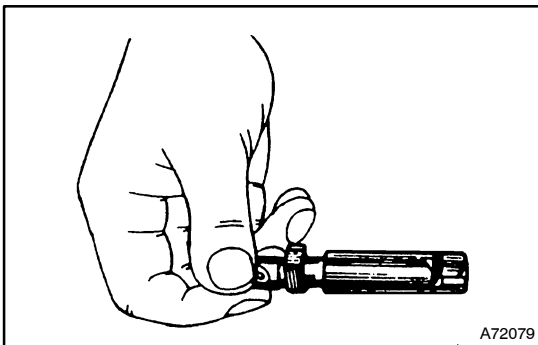
- (a) Remove the retainer ring and pull out the tappet.

**12. REMOVE FILTER FROM INLET PIPE JOINT**

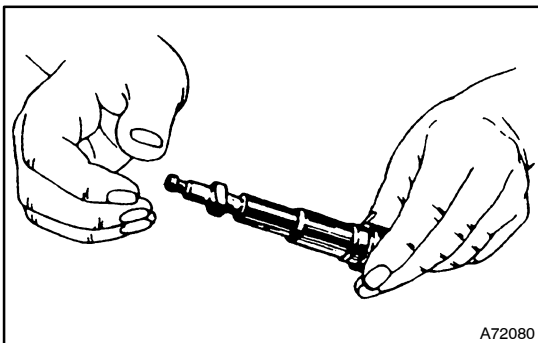
- (a) Clean the filter with clean diesel fuel.

13. INSTALL TAPPET**14. INSTALL RETAINER RING****NOTICE:**

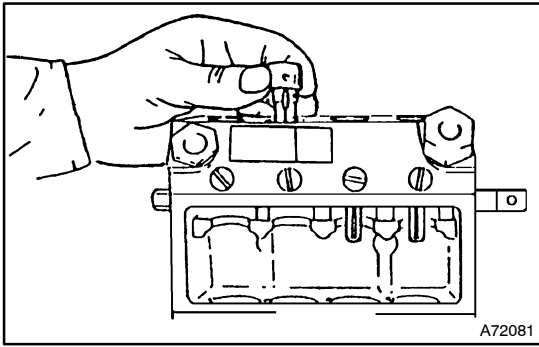
- Wash all parts with clean diesel fuel before installing them, and any defective or damaged parts must be replaced.
- Do not allow dust or other foreign matter to enter the pump during assembly.
- Apply grease to O-rings and oil seals before installing them.
- Assemble the parts in correct order and to correct tightening torques, assembled dimensions etc.
- Assembly takes place in the reverse order of disassembly.

**15. INSTALL PLUNGER BARRELS**

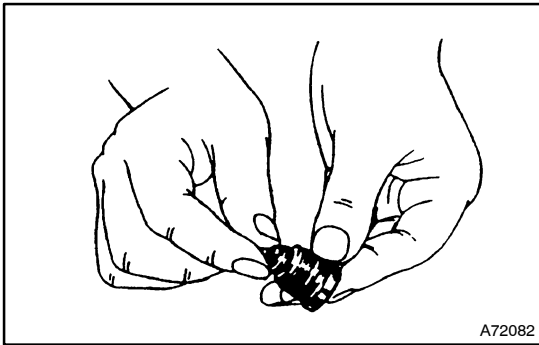
- (a) Before install the plunger barrels should be inspect the plunger barrels and plungers for wear, scratches, or discoloration.



- (b) Tilt the plunger to about 60° pull the plunger out approximately 10 to 15 mm (0.39 to 0.59 in.) and release it to see if it slides down smoothly from its own weight.

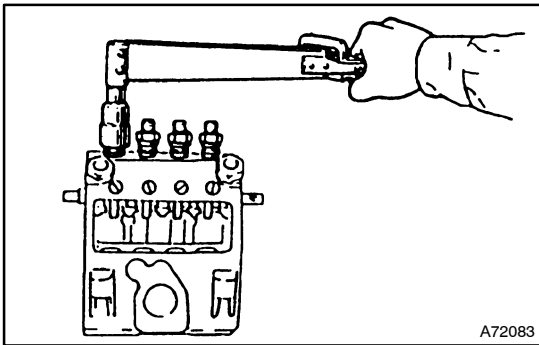


- (c) Match the plunger notch with the injection pump housing knock pin.



16. INSTALL DELIVERY VALVES, SPRINGS AND HOLDERS

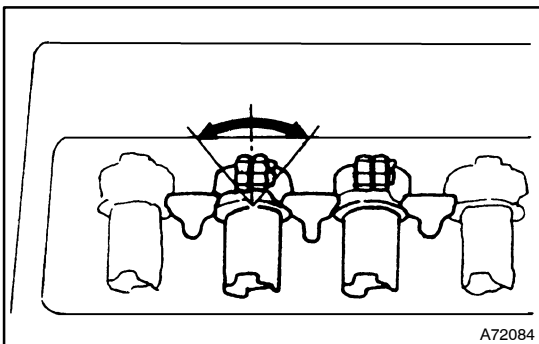
- (a) Before install the delivery valves, inspect the delivery valves for scratches on the valve seat or the piston sections.



- (b) Install the gasket, spring, shim and stopper on the delivery valve.
- (c) Provisionally tighten the delivery valve holder with a new O-ring by hand.

NOTICE:

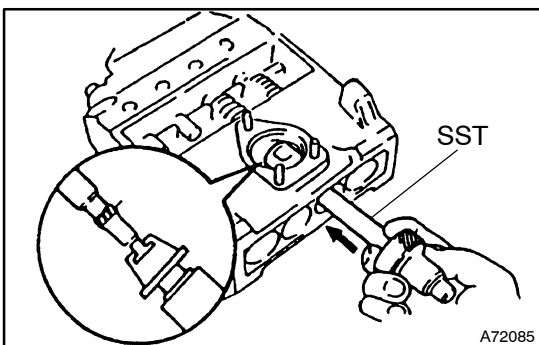
Tighten the delivery valve holder after installing the plunger.



17. INSTALL CONTROL SLEEVES ON BARRELS

NOTICE:

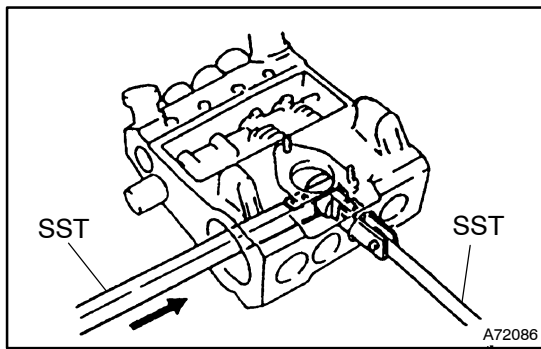
Make sure that the control sleeve swings evenly right and left when the control rack is moved to the right and left.



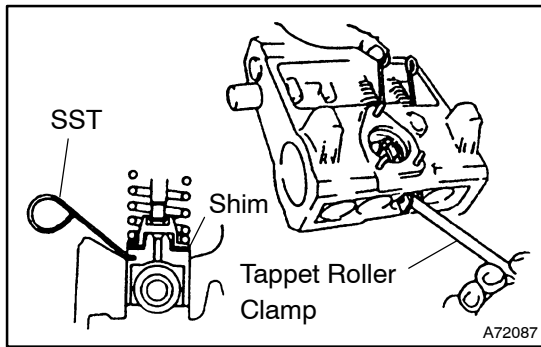
18. INSTALL PLUNGER AND TAPPET

- (a) Using SST, assembly the plunger and spring lower seat, inserting the driving face marked with a number and the lower seat notch part upward (cove plate side).

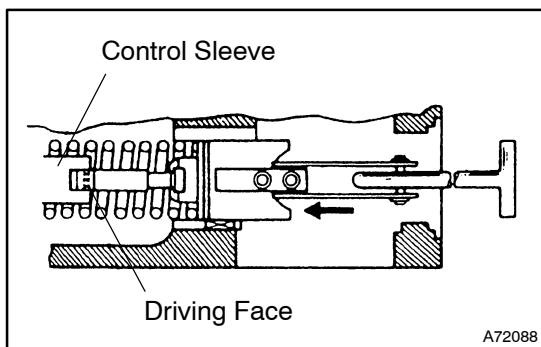
SST 09275-46010



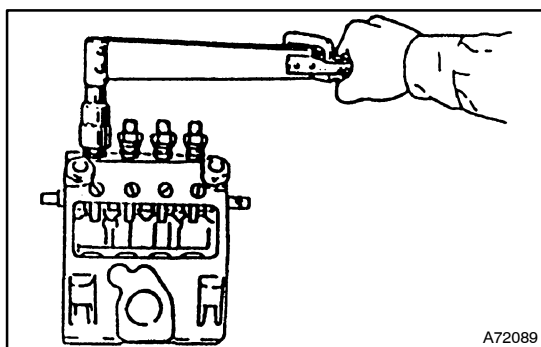
- (b) Using SST, install the tappet to the pump housing with the adjusting shim.
SST 09272-76011, 09273-76011



- (c) Using the tappet roller clamp to press in the tappet and hold it in with the SST.
SST 09274-46011

**NOTICE:**

- Check that the driving face of the plunger fits to the groove of the control sleeve before inserting the tappet.
- When inserting the tappet, check that the control rack slides smoothly and without catching.



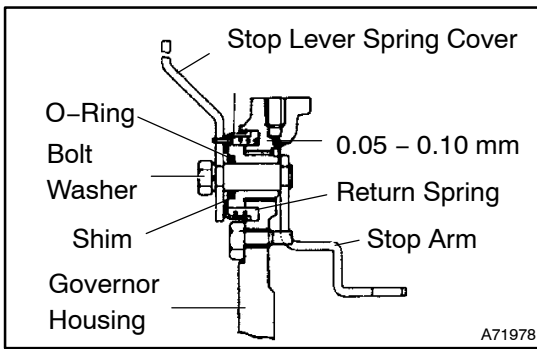
- (d) When one delivery valve holder is tightened, move the control rack to the right and left and inspect the tightness of the rack.

Torque:

36.8 N·m (375 kgf·cm, 27 ft·lbf)

NOTICE:

- Wash all parts with clean diesel fuel before installing them and any defective or damaged parts must be replaced.
- Do not allow dust or other foreign matter to enter the pump during assembly.
- Apply grease to O-rings and oil seals before installing them.
- assemble the parts in correct order and to correct tightening torques, assembled dimensions etc.
- Assembly takes place in the reverse order of disassembly.

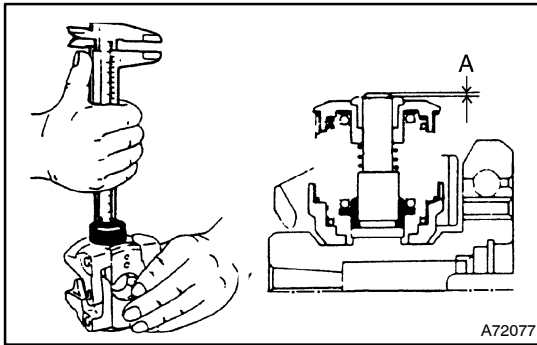
**19. INSTALL STOP LEVER**

- (a) Install the stop lever as shown.
- (b) Measure the thrust clearance of the stop arm.

Thrust clearance: 0.05 - 0.10 mm (0.0020 - 0.0039 in.)

NOTICE:

The O-ring should be coated with grease before being fitted.

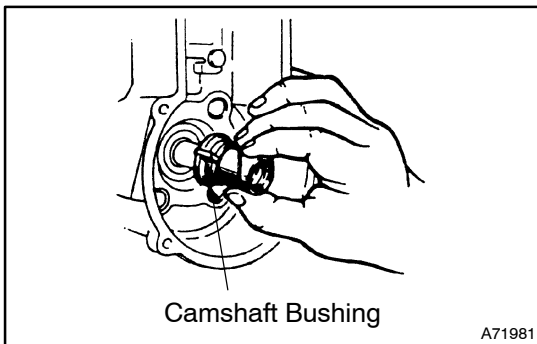
**20. INSTALL FLYWEIGHT****NOTICE:**

Be sure to install the spring inner seat in correctly, its "LAPPED" surface should face downwards.

- (a) Tighten the adjusting nut with a spring nut wrench.

Protrusion of adjusting nut:

-0.4 mm to 0.2 mm (-0.015 in. to 0.007 in.)

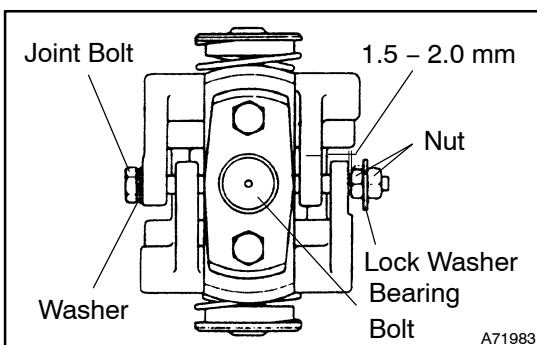
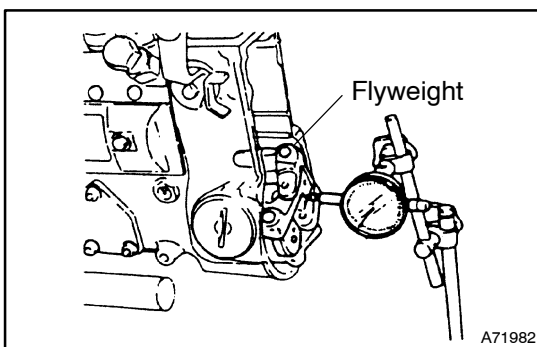
**21. IF EQUIPPED WITH DAMPER, ADJUST DAMPER THRUST CLEARANCE**

- (a) This provides a clearance between the flyweight and the camshaft bushing.
 - (1) Temporarily install the camshaft bushing on the camshaft.
 - (2) Install the flyweight without the dampers.
 - (3) Temporarily fit the governor round nut.

- (4) Apply a dial gauge to the end face of the flyweight, and measure the thrust clearance.

Thrust clearance: 0.02 - 0.10 mm (0.0008 - 0.0039 in.)

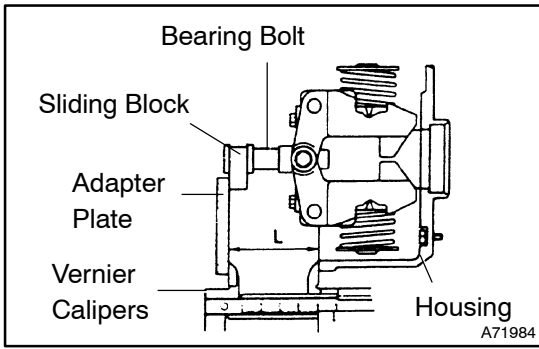
If not within specification, adjust the clearance by inserting shims between the camshaft bushing and the governor round nut.

**22. INSTALL BEARING BOLT**

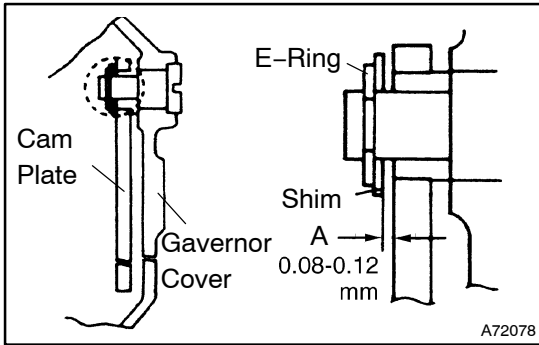
- (a) Measure the free play of the jointing bolt along its axis.
- Standard free play: 1.5 - 2.0 mm (0.059 - 0.079 in.)**

NOTICE:

Make sure the bearing bolt can be moved smoothly through the guide bushing.



- (b) Measure the fitting dimension of the bearing bolt.
 (1) While pulling on the bearing bolt, measure the dimension "L" with calipers.
Fitting dimension: 49.7 – 50.1 mm (1.957 – 1.972 in.)



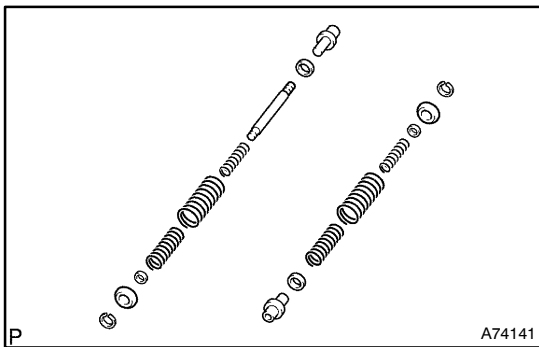
23. INSTALL GOVERNOR COVER

- (a) Install the cam plate on the governor cover and shim with E-ring.

NOTICE:

Shim A about 0.5 mm (0.02 in.) in thickness should be installed with the E-ring.

- (b) Measure the cam plate thrust clearance.
Thrust clearance: 0.08 – 0.12 mm (0.0032 – 0.0047 in.)

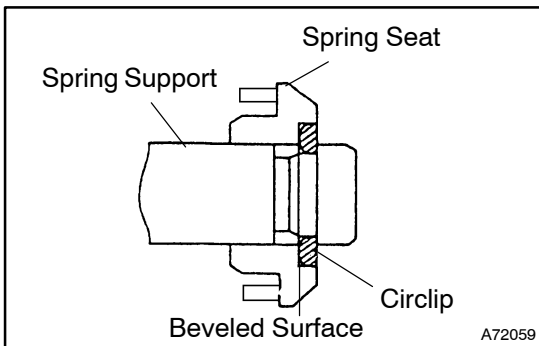


24. INSTALL TIMER HUB AND WEIGHT

- (a) Reassemble the parts by reversion the order of disassembly, taking special care regarding the following points.

NOTICE:

Apply SAE #30 oil to all sliding surface.

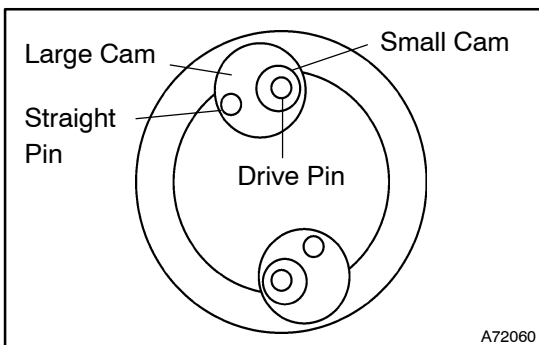


25. INSTALL HUB AND TIMER WEIGHT ASSEMBLY

- (a) Install the spring to the weight.

NOTICE:

- **When assembling the weight to the hub be sure to note the spring seat's correct facing direction.**
- **Insert the circlip so that the beveled surface is toward the spring seat.**

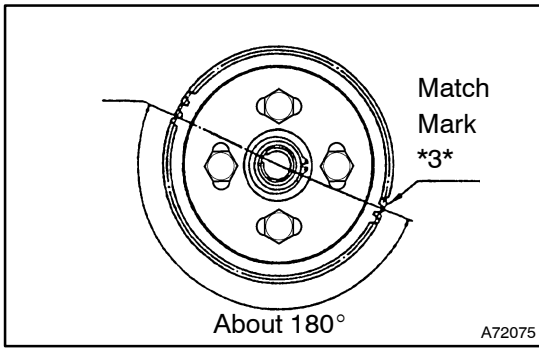


26. INSTALL HUB AND DRIVE GEAR

- (a) Carefully watch the alignment marks on the large eccentric cam, small eccentric cam and drive pin, then reassemble them to that they are in the same positions as that which you wrote down at the time of disassembly.

NOTICE:

The large and small eccentric cams come in right and left turning types, and differ depending on the advance angle characteristics.



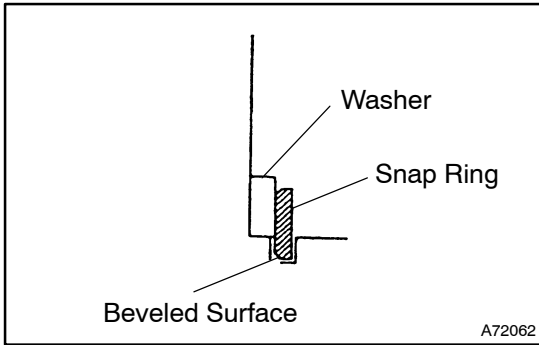
- (b) When assembling align the hole in the large eccentric cam and align the hub hole in the small eccentric cam with the weights straight pin.

NOTICE:

- Do not attempt to force the parts in unreasonably.
- Confirm that the hub's key groove and the drive gears alignment mark are offset by about 180°.

Torque:

0.23 N·m (2.3 kgf·cm, 0.17 in.·lbf)



- (c) Turn over the drive gear while holding the weight in place, then insert the snap ring, taking care that the beveled surface does toward the washer side.

27. INSTALL TIMER COVER

NOTICE:

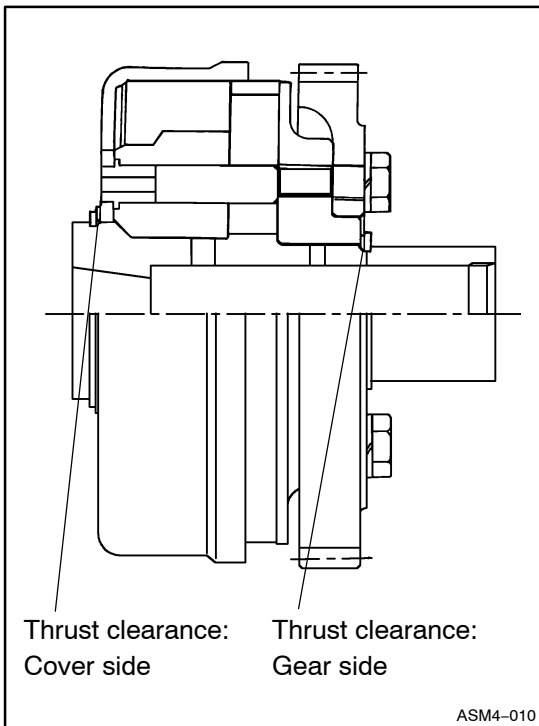
- Align the protrusion on the timer roller with the groove on the timer cover.
- Assemble the snapping so that the beveled surface goes toward the washer side.
- Since a new timer cover is coated with adhesive, it is unnecessary to apply fresh adhesive to a new timer cover when replacing.
- If reusing the timer cover, apply 4 to 6 dots of adhesive to 2 or 3 threads of the screw of the flange.

Adhesive:

Part No. 08833-00070, THREE BOND 1342 or equivalent

- Since the timer cover is attached with adhesive, a torque of approximately 70 kgf·m is necessary when removing it.
- Fully remove the adhesive on the threads of the screw when overhauling. If too much adhesive is applied, excessive will stick to the O-ring, resulting in oil leakage.

Thrust clearance:

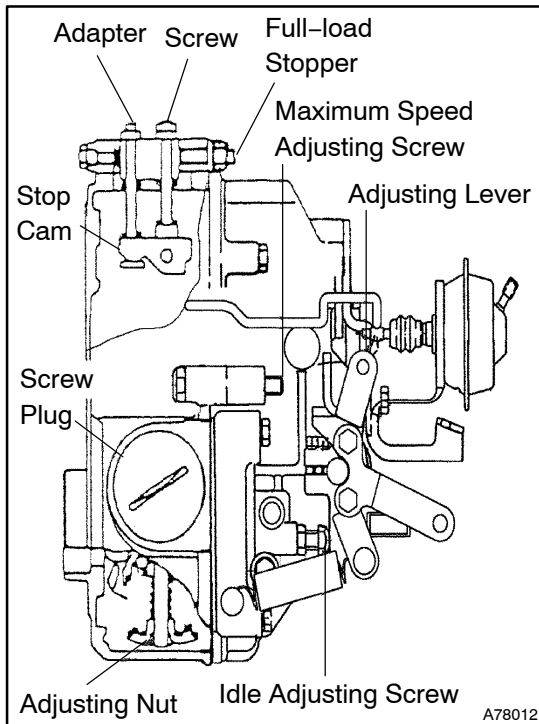


Cover side	0.12 - 0.22 mm (0.00472 - 0.00866 in.)
Gear side	0.02 - 0.12 mm (0.00079 - 0.00472 in.)

ADJUSTMENT

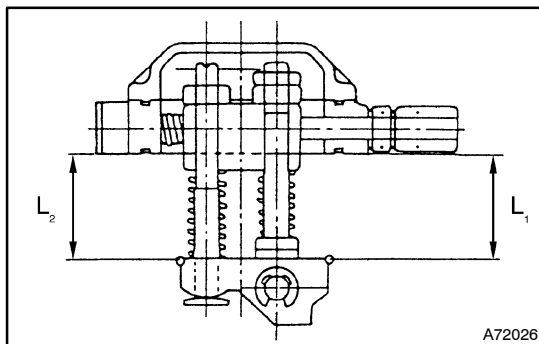
1. PREPARATION

- Connect the rack measuring device to the control rack and set to "0".
- Connect the fuel line.
- Refill the camshaft chamber with engine oil.
- Install the angle gauge on the adjusting lever.
- Using SST, remove the full-load stopper housing cover.
SST 09512-2510, 09512-2520

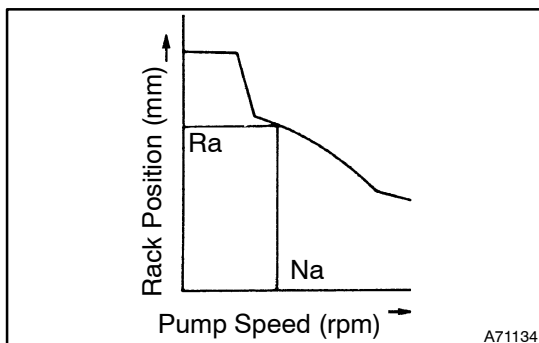


2. STEPS IN GOVERNOR ADJUSTMENT

- Perform governor testing and adjustment in the following sequence.
- Preliminary adjustment of stop cam
- Adjustment of idling speed control
- Preliminary adjustment of maximum speed control
- Adjustment of medium speed control
- Adjustment of maximum speed control
- Adjustment of fuel injection volume under full-load
- Inspection of stop lever operation



- Preliminary adjustment of stop cam
 $L_1 = L_2 = 23.5 \text{ mm (0.925 in.)}$



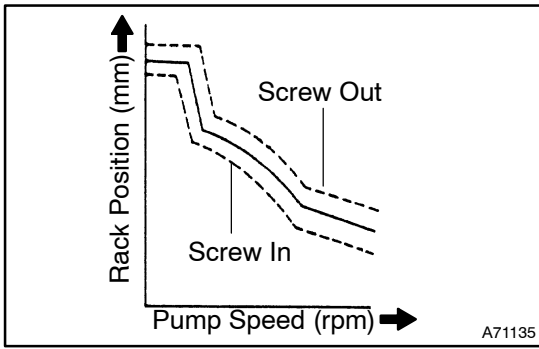
- Adjustment of idling speed control

NOTICE:

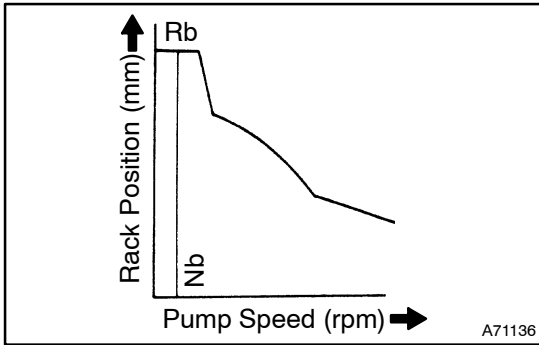
The adjusting lever should always be in the "IDLING" position during adjustment of the idling speed control.

- At a pump speed of N_a rpm, measure the control rack position R_a mm.

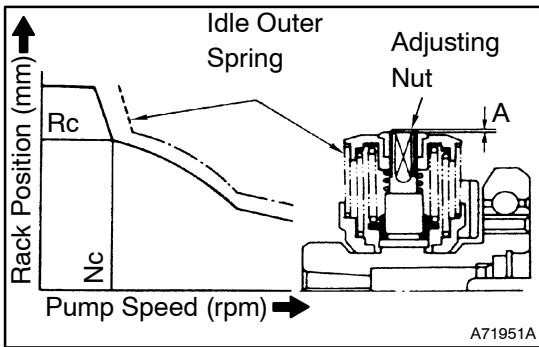
If not within specification, adjust with the idle adjusting screw.



NOTICE:
The idle adjusting screw will change the governor characteristics as shown on the left.



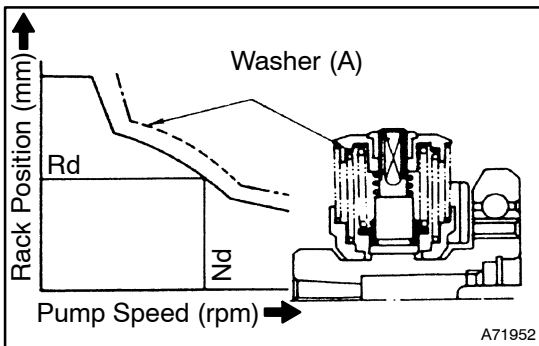
- (2) At a pump speed of Nb rpm, measure the control rack position Rb mm.



- (3) At a pump speed of Nc rpm, measure the control rack position Rc mm.

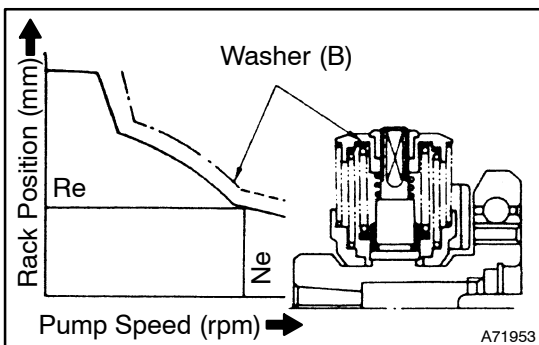
If not within specification, replace the idle outer spring.

NOTICE:
Protrusion of the adjusting nut should be within -0.4 mm (-0.015 in.) to 0.2 mm (0.007 in.).



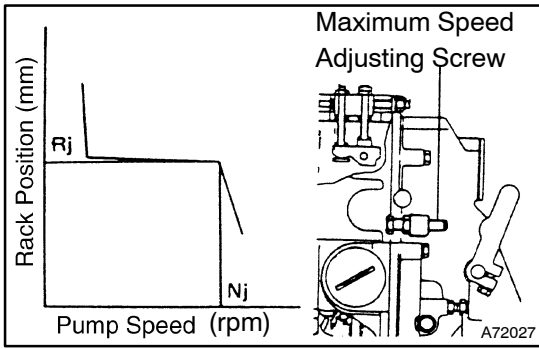
- (4) At a pump speed of Nd rpm, measure the control rack position Rd mm.

If not within specification, replace the washer (A).

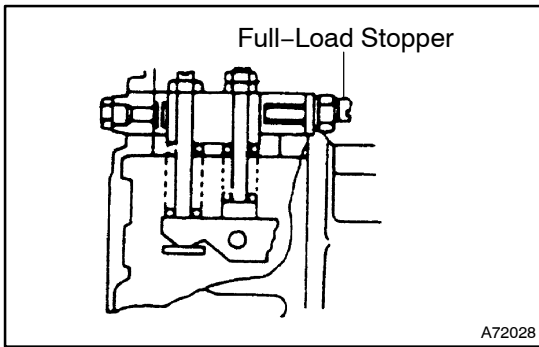


- (5) At a pump speed of Ne rpm, measure the control rack position Re mm.

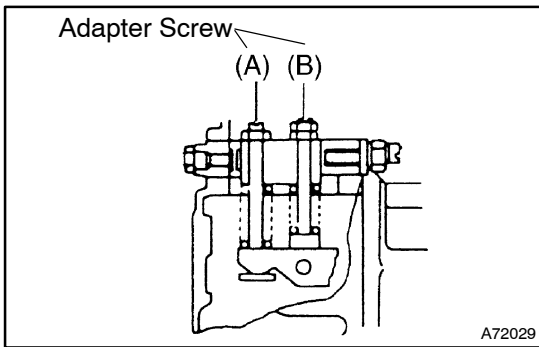
If not within specification, replace the washer (B).



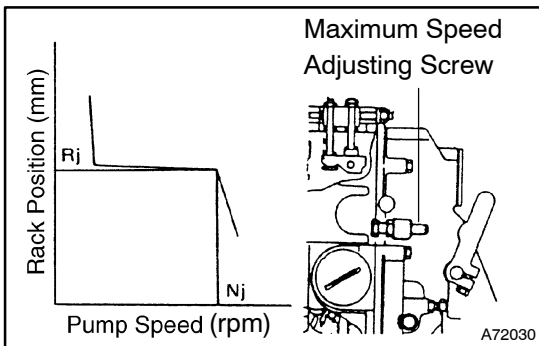
- (k) Preliminary adjusting of maximum speed control.
At the pump speed of N_j rpm, measure the control rack position R_j mm.
If not within specification, adjust with the maximum speed adjusting screw.



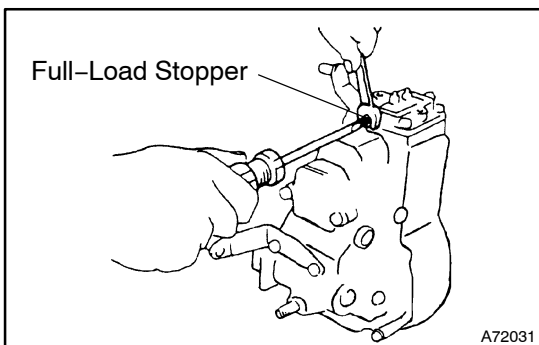
- (l) Adjustment of medium speed control.
NOTICE:
The adjusting lever should always be in the "FULL-LOAD" position during adjustment of the medium speed control.
(1) At the pump speed of N_j rpm, measure the control rack position R_j mm.
If not within specification, adjust with the full-load stopper.



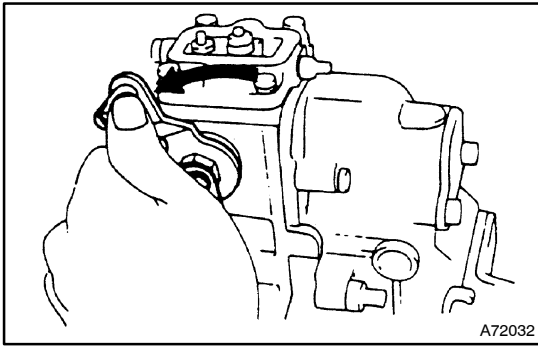
- (2) At a pump speed of N_g , N_h and N_i rpm measure the control rack position R_g , R_h and R_i .
If not within specification, adjust within the adapter screw (A) and (B).



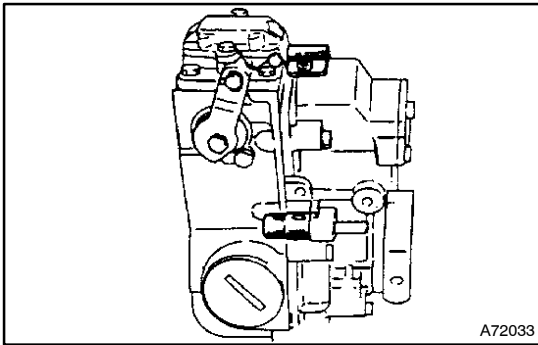
- (m) Adjustment of maximum speed control.
NOTICE:
Adjusting lever should be in the "FULL-LOAD" position.
(1) At the pump speed of N_j rpm, measure the control rack position R_j mm.
If not within specification, adjust with the maximum speed adjusting screw.
(2) Confirm the rack position R_m and R_n mm, with at a pump speed N_m and N_n r/min.



- (n) Adjusting of fuel injection volume under "FULL-LOAD".
Measure the injection volume in the "FULL-LOAD" position.
If the average injection volume is not at standard value, adjust with the "FULL-LOAD" stopper.



- (o) Inspection of stop lever operation.
Adjusting lever at "IDLING" position and pump speed at "0" rpm, the control rack position should be less than Rq mm.



3. INSTALL FULL-LOAD STOPPER HOUSING COVER AND FULL-LOAD STOPPER CAP

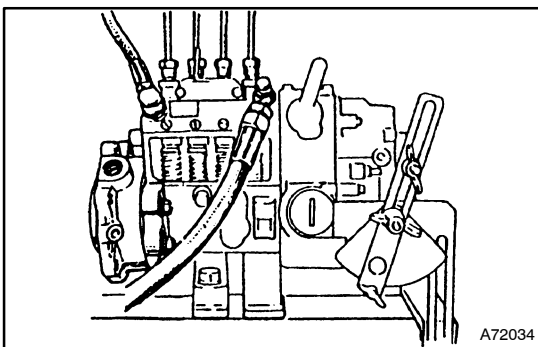
- (a) Using SST, install full-load stopper housing cover.
SST 09512-2510, 09512-2520

4. GOVERNOR EXTERNAL LEAD SEAL AND CRIMP CAPS

NOTICE:

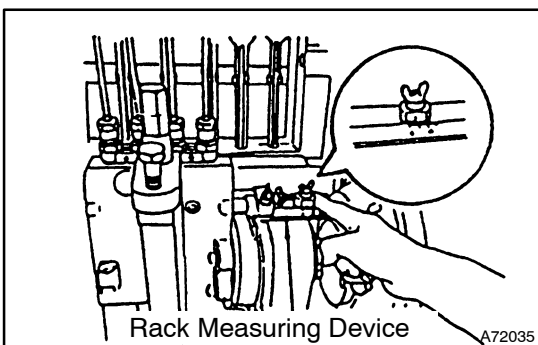
All adjusting devices on the fuel injection pump governor, except the low idle adjustment screw, are wired and lead sealed and crimp cap as a protection for the customer.

This is to prevent unauthorized readjustment which may cause engine malfunction and/or engine failure. Periodically check to insure that these seals are not broken as this will void the warranty.



5. PREPARATION

- (a) Mount the injection pump correctly on the pump tester.



- (b) Attach a rack measuring device to the control rack and set to "0".
(c) Install calibration nozzles and lines of the following specifications.

(1) Nozzle

Nozzle type: 12SD12

Opening pressure:

17.16 MPa (175 kgf·cm², 2,490 psi)

(2) Line

Outside diameter: 6.0 mm (0.24 in.)

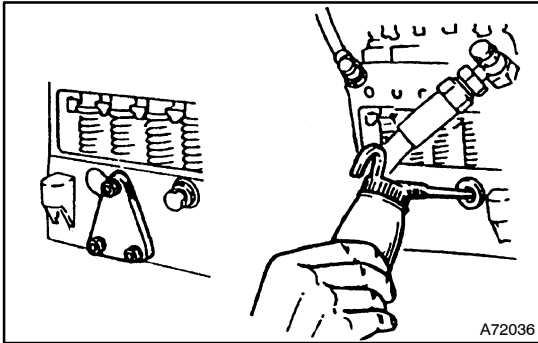
Inner diameter: 2.0 mm (0.08 in.)

Length: 600 mm (23.6 in.)

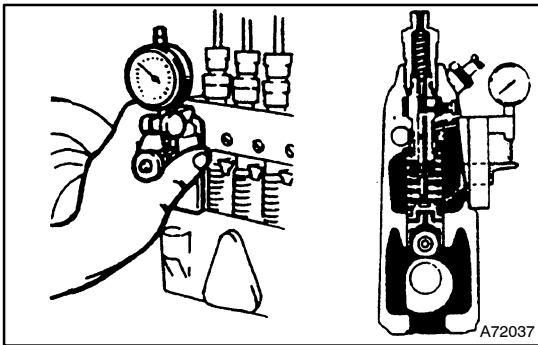
(d) Calibration oil

(1) Calibration oil: SAE J967C

(2) Oil temperature: 40 – 45°C (104 – 113°F)



(e) Install the cover on the feed pump mounting surface and fill the pump camshaft chamber with engine oil.



6. ADJUST INJECTION TIMING

(a) Preparation of the pre-stroke.

(1) Remove the plate cover.

(2) Install a pre-stroke measuring instrument.

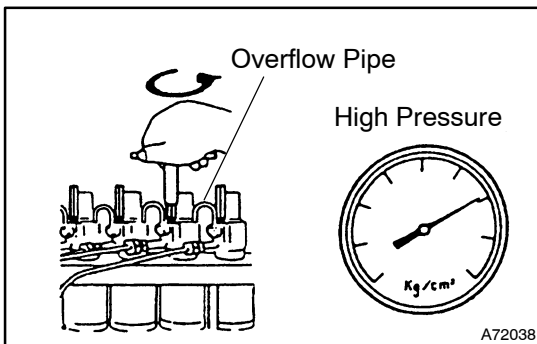
Bring the tappet of the first cylinder to its bottom dead center, and set the pointer trip on the tappet.

(b) Measure the pre-stroke (No. 1 plunger)

(1) Set the control rack at full-load position.

(2) Loosen the overflow screw of each nozzle holder.

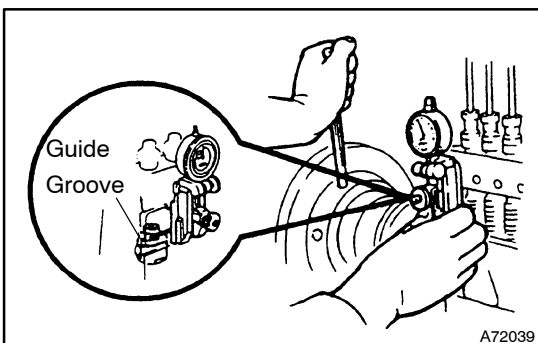
(3) Operate the high-pressure pump of the pump tester and let fuel run out of the overflow line.

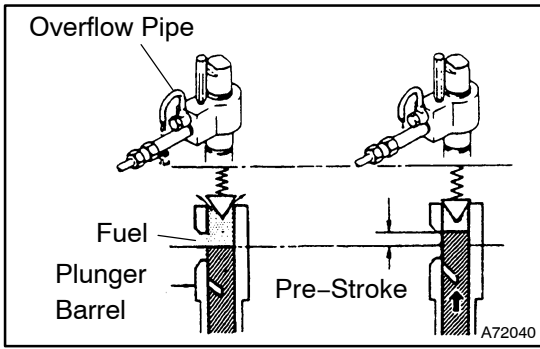


(4) Move the angle dial to set the first cylinder of the pump to bottom dead center and adjust the pre-stroke gauge to zero.

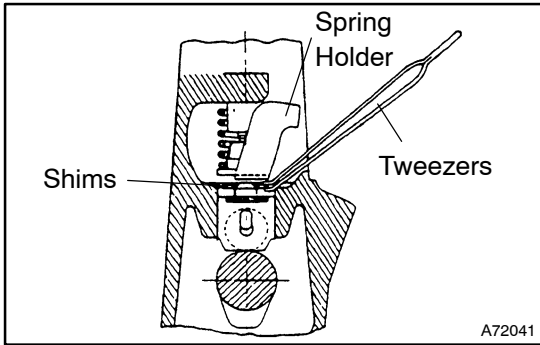
NOTICE:

Bottom dead center is the point at which the pointer of the dial gauge does not move even when the angle dial is rotated while fuel is flowing from the overflow line.

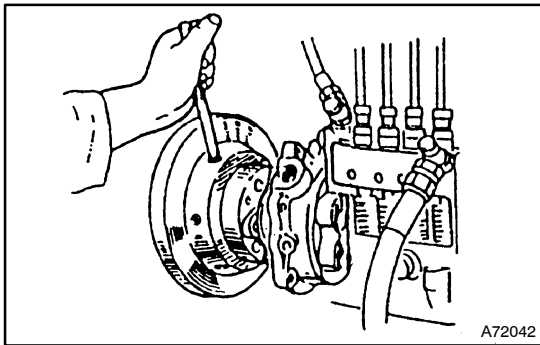




- (5) Turn the camshaft clockwise with the angle dial and read the dial gauge when the fuel stops running out of the overflow line. This reading is the pre-stroke value of the pump.



- (6) If the pre-stroke value is not within specification, adjust by changing the tappet adjusting shim.
SST 09280-46010

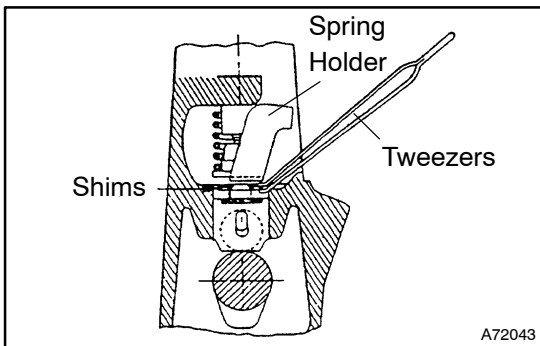


7. ADJUST INJECTION INTERVAL

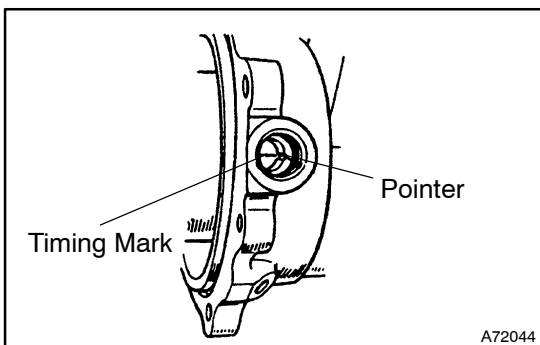
- (a) Using the No. 1 cylinder injection starting point as a base, inspect and adjust the injection interval in the order of injection.

Injection interval: 89° 45' - 90° 15'

Injection order: 1 - 3 - 4 - 2

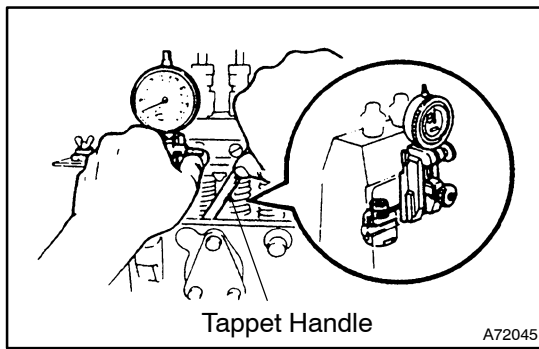


- (b) If the injection intervals are not within specification, adjust by using the same procedure as for pre-stroke adjustment.



- (c) Set the No. 1 cylinder at the injection starting point, and check that the marks on the timer and the marks on the pump body are aligned.

If the timing marks are not aligned, make a new mark on the timer and erase the old mark.



8. CHECK TAPPET TOP CLEARANCE

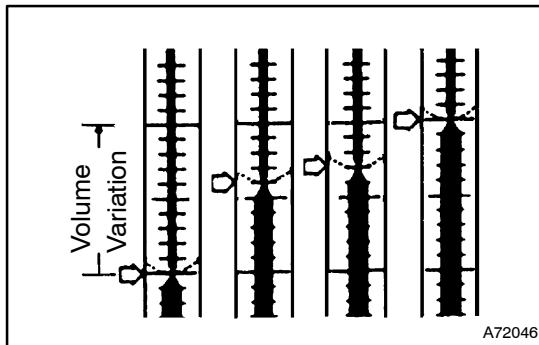
- (a) Set the No. 1 cylinder at the injection starting point, then move the tappet with SST.

SST 09512-1410

Tappet Top Clearance: More than 0.2 mm (0.0079 in.)

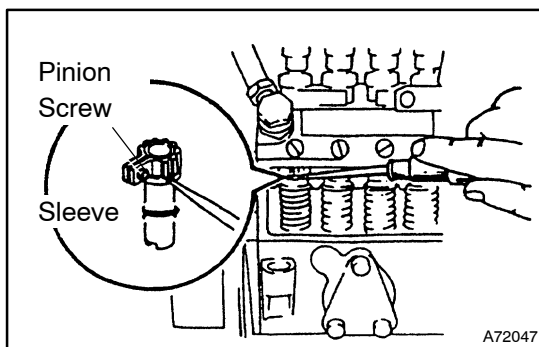
- (b) Follow the above procedure to check the other cylinders (No. 2 through No. 6).

If the tappet clearance is less than 0.2 mm (0.0079 in.), recheck the pre-stroke.



9. ADJUST INJECTION VOLUME

- (a) Measure the injection volume for each control rack position and pump revolution.

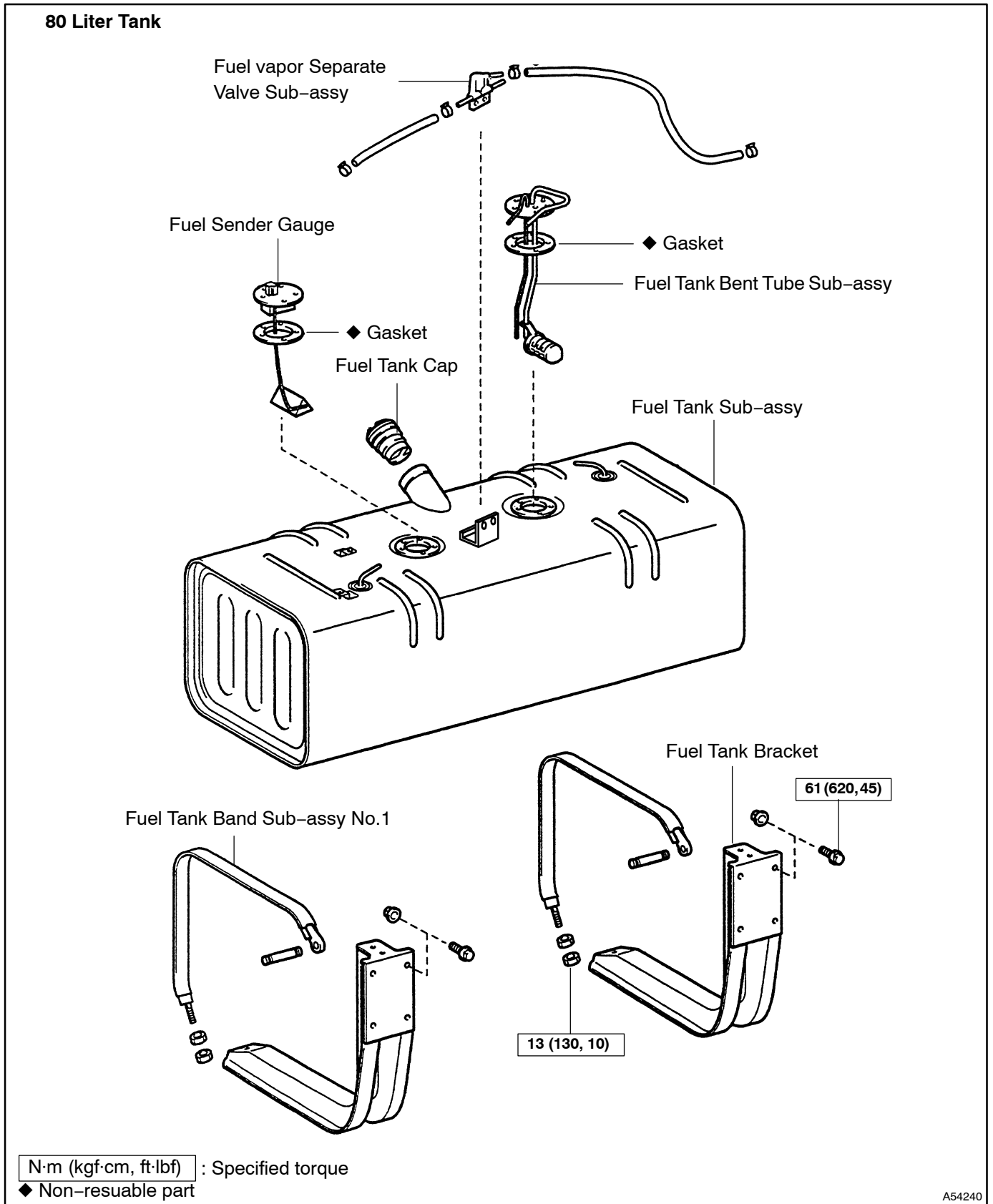


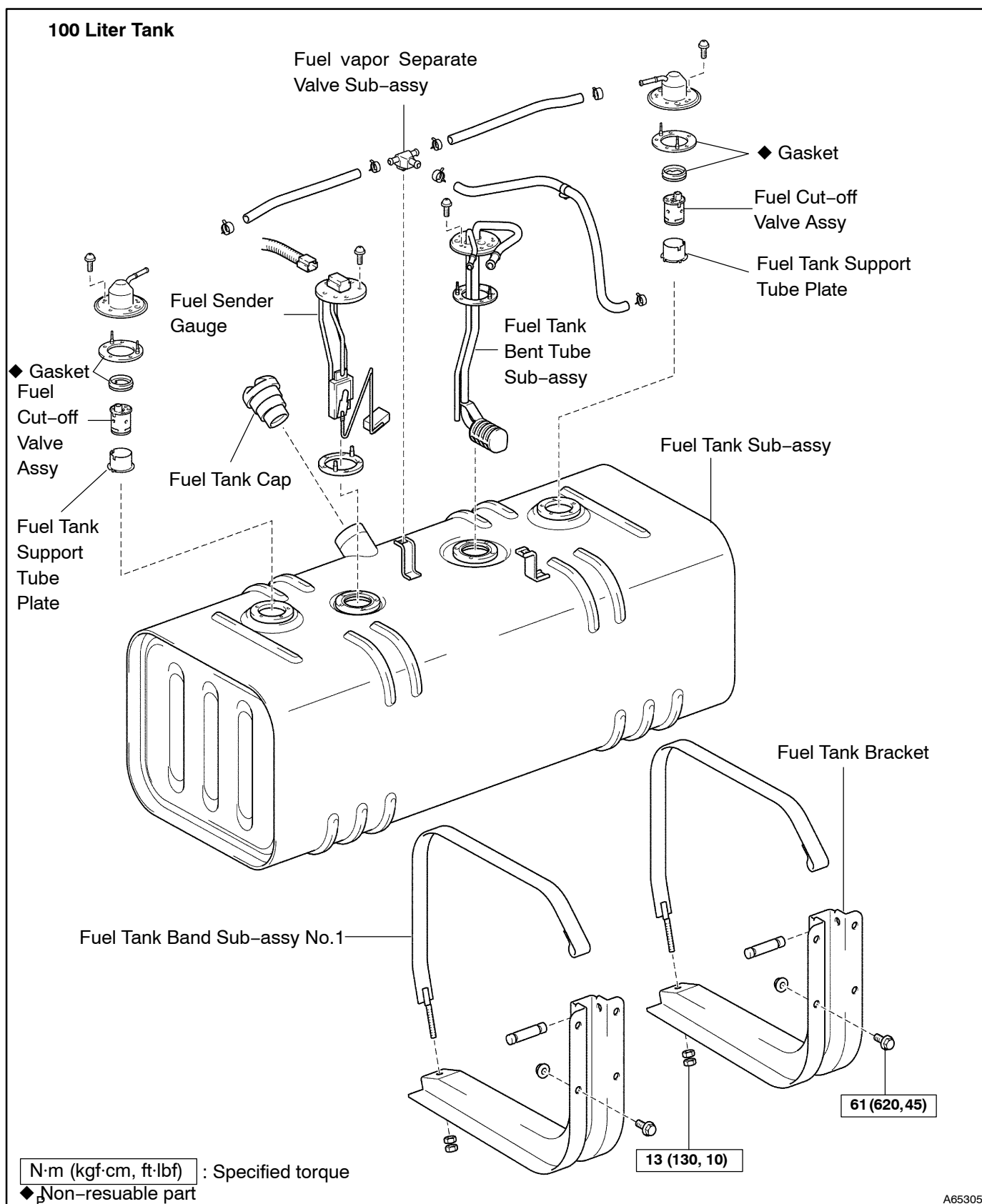
- (b) To adjust the injection volume, loosen the pinion screw and insert the adjusting pin into the hole in the control sleeve, then move the sleeve slightly.

FUEL TANK ASSY (W04D-J)

COMPONENTS

110QX-01





REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT**
2. **DISCONNECT BATTERY NEGATIVE TERMINAL**
3. **DRAIN FUEL**
4. **DISCONNECT FUEL SENDER GAUGE CONNECTOR**
5. **DISCONNECT FUEL MAIN TUBE NO.2**
6. **DISCONNECT FUEL MAIN TUBE NO.3**
7. **DISCONNECT FUEL VAPOUR SEPARATE VALVE SUB-ASSY**
8. **REMOVE FUEL TANK BAND SUB-ASSY NO.1**
 - (a) Take out the fuel tank band, and then remove the fuel tank.
9. **REMOVE FUEL TANK ASSY**
10. **REMOVE FUEL SENDER GAUGE**
 - (a) Remove the 5 screws and fuel sender gauge from the fuel tank.
11. **REMOVE FUEL TANK VENT TUBE SUB-ASSY**
 - (a) Remove the 6 bolts and fuel tank vent tube.
12. **INSTALL FUEL TANK VENT TUBE SUB-ASSY**
 - (a) With a new gasket, install the fuel tank bent tube with the 6 bolts.
Torque: 5.0 N·m (50 kgf·cm, 44 in·lbf)
13. **INSTALL FUEL SENDER GAUGE**
 - (a) With a new gasket, install the fuel sender gauge with the 5 screws.
Torque: 1.5 N·m (15 kgf·cm, 13 in·lbf)
14. **INSTALL FUEL TANK ASSY**
15. **INSTALL FUEL TANK BAND SUB-ASSY NO.1**
 - (a) Install the tank and fuel tank band.
Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)
16. **INSTALL FUEL VAPOUR SEPARATE VALVE SUB-ASSY**
17. **INSTALL FUEL MAIN TUBE NO.3**
18. **INSTALL FUEL MAIN TUBE NO.2**
19. **CONNECT FUEL SENDER GAUGE CONNECTOR**
20. **ADD FUEL**
21. **CONNECT BATTERY NEGATIVE TERMINAL**
22. **BLEED FUEL (See page 11-177)**
23. **INSPECT FOR FUEL LEAKS**

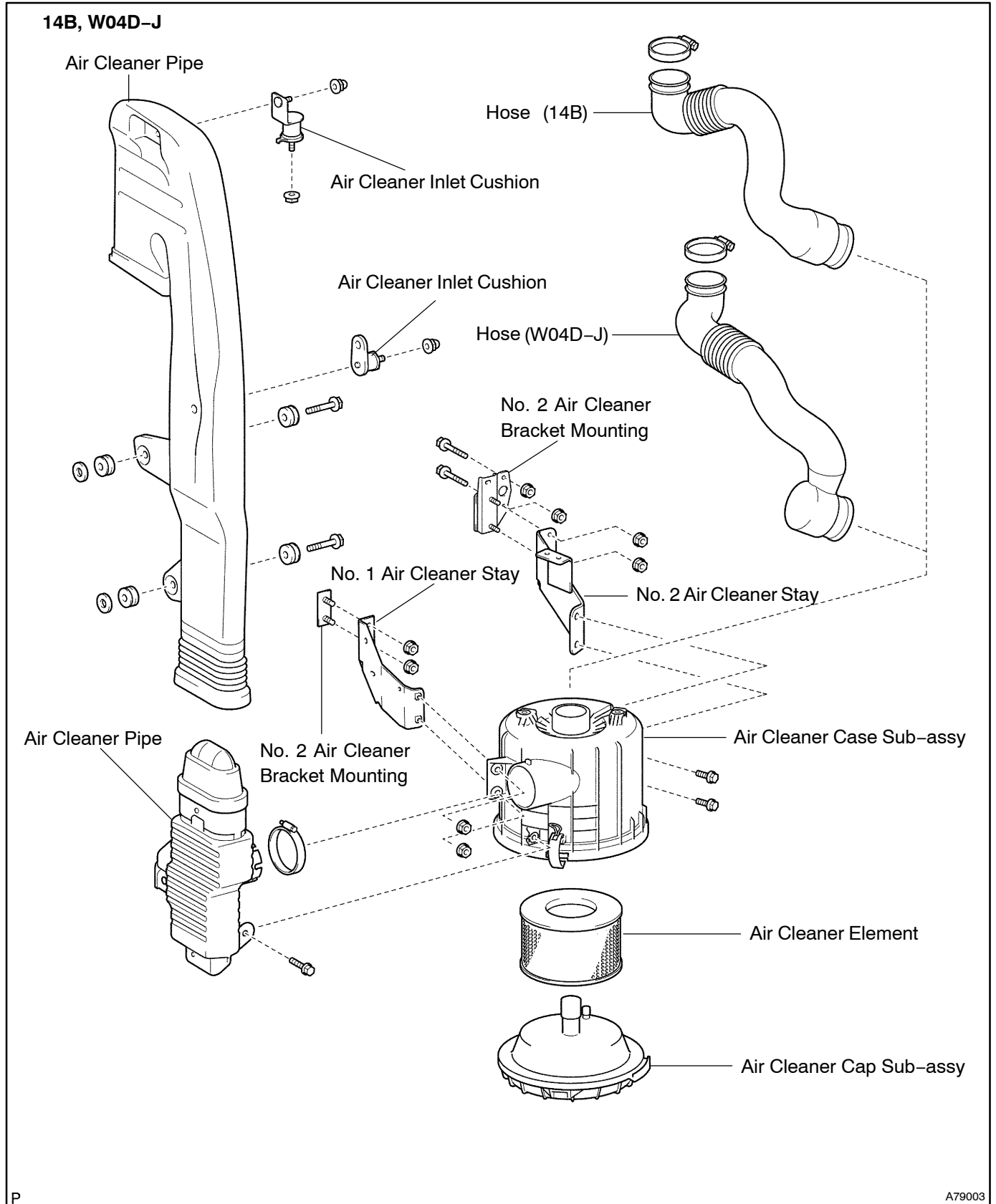
INTAKE

AIR CLEANER ASSY	
(STANDARD CAB MODELS)	13-1
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(WIDE CAB MODELS)	13-3
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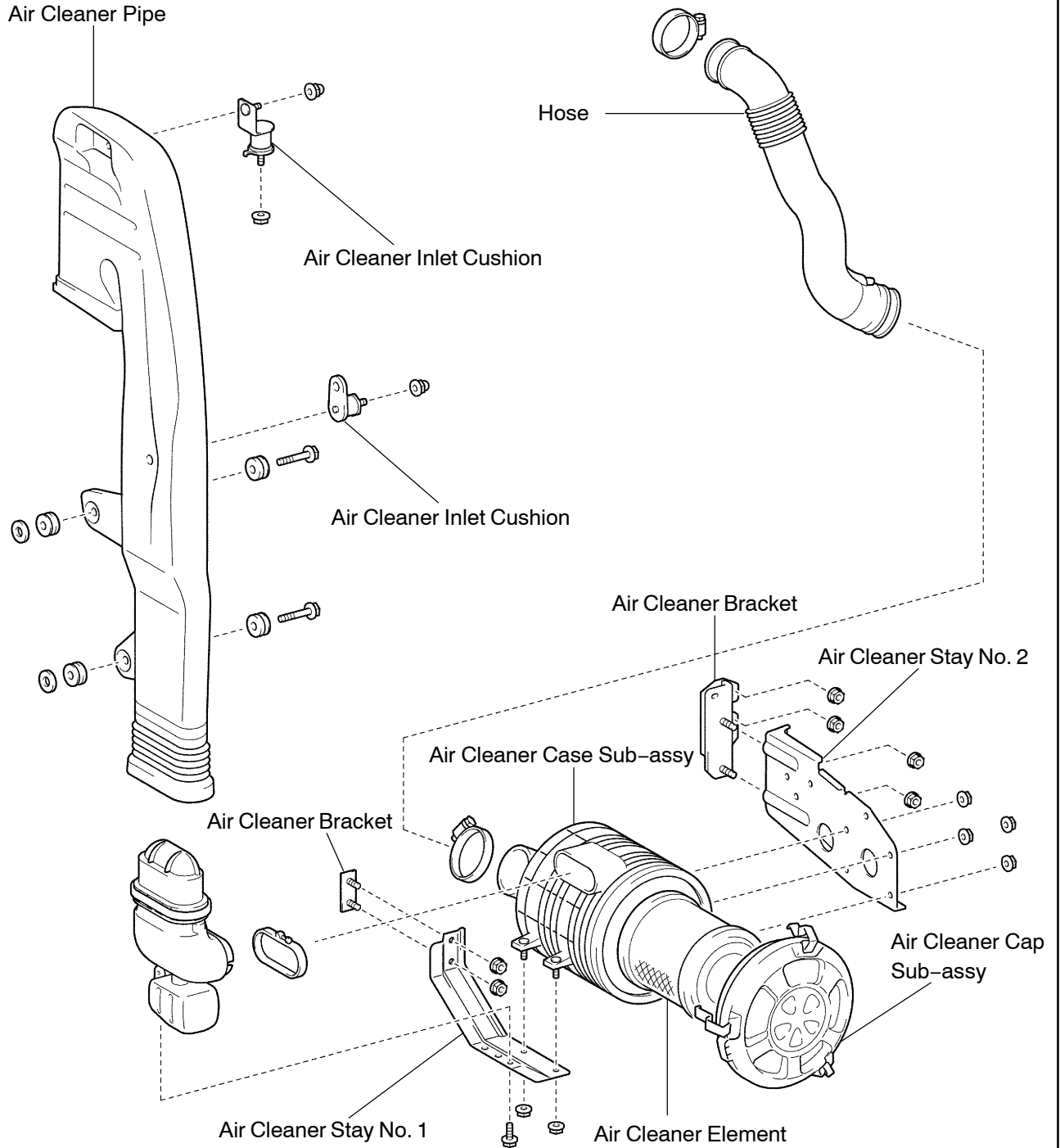
AIR CLEANER ASSY (STANDARD CAB MODELS)

COMPONENTS

13061-01



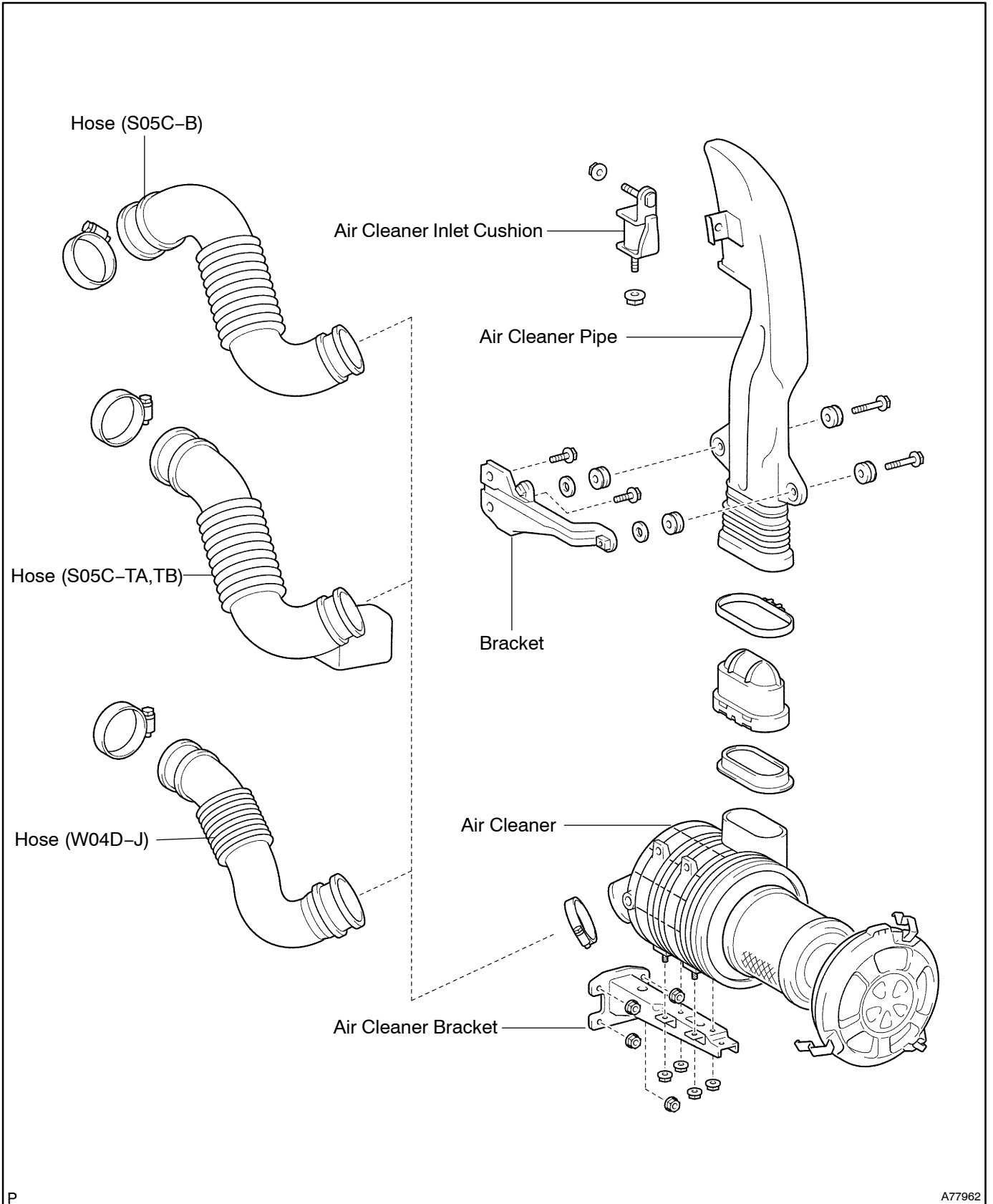
15B-FTE



AIR CLEANER ASSY (WIDE CAB MODELS)

COMPONENTS

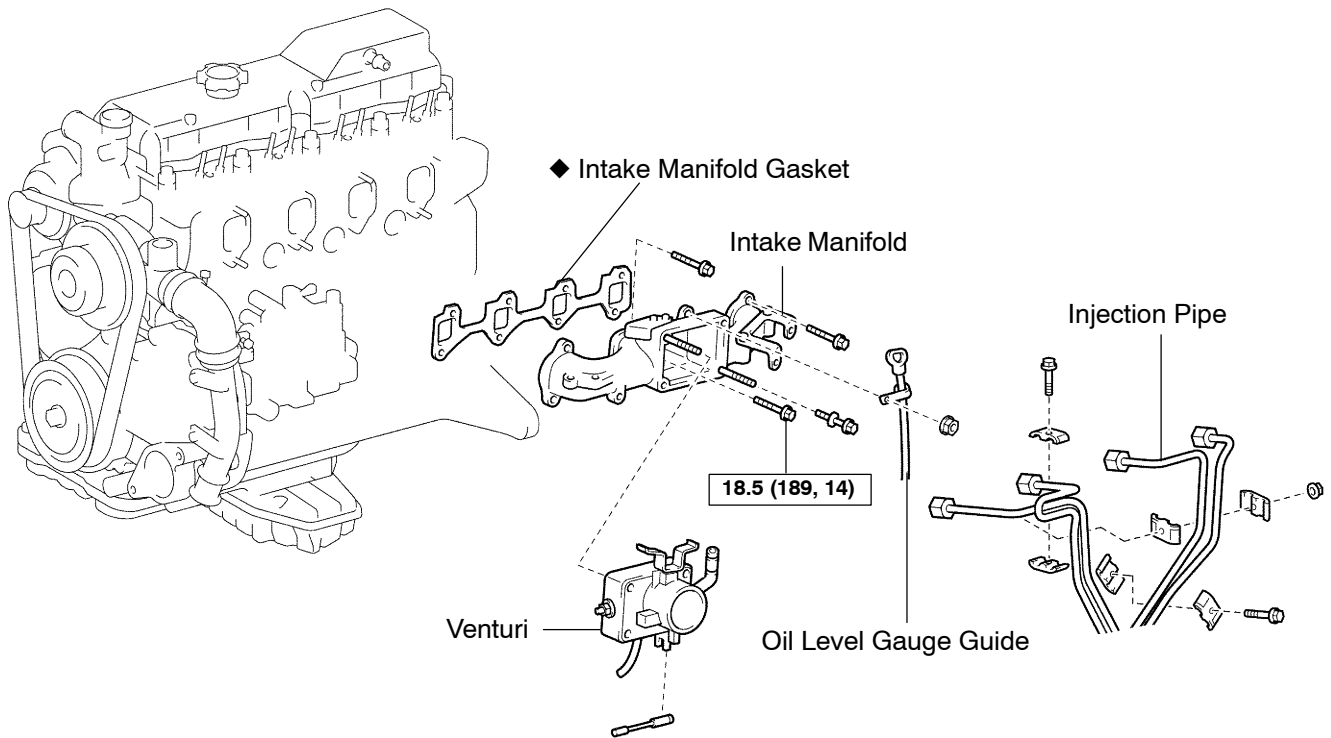
13062-01



INTAKE MANIFOLD GASKET COMPONENTS

13063-01

14B



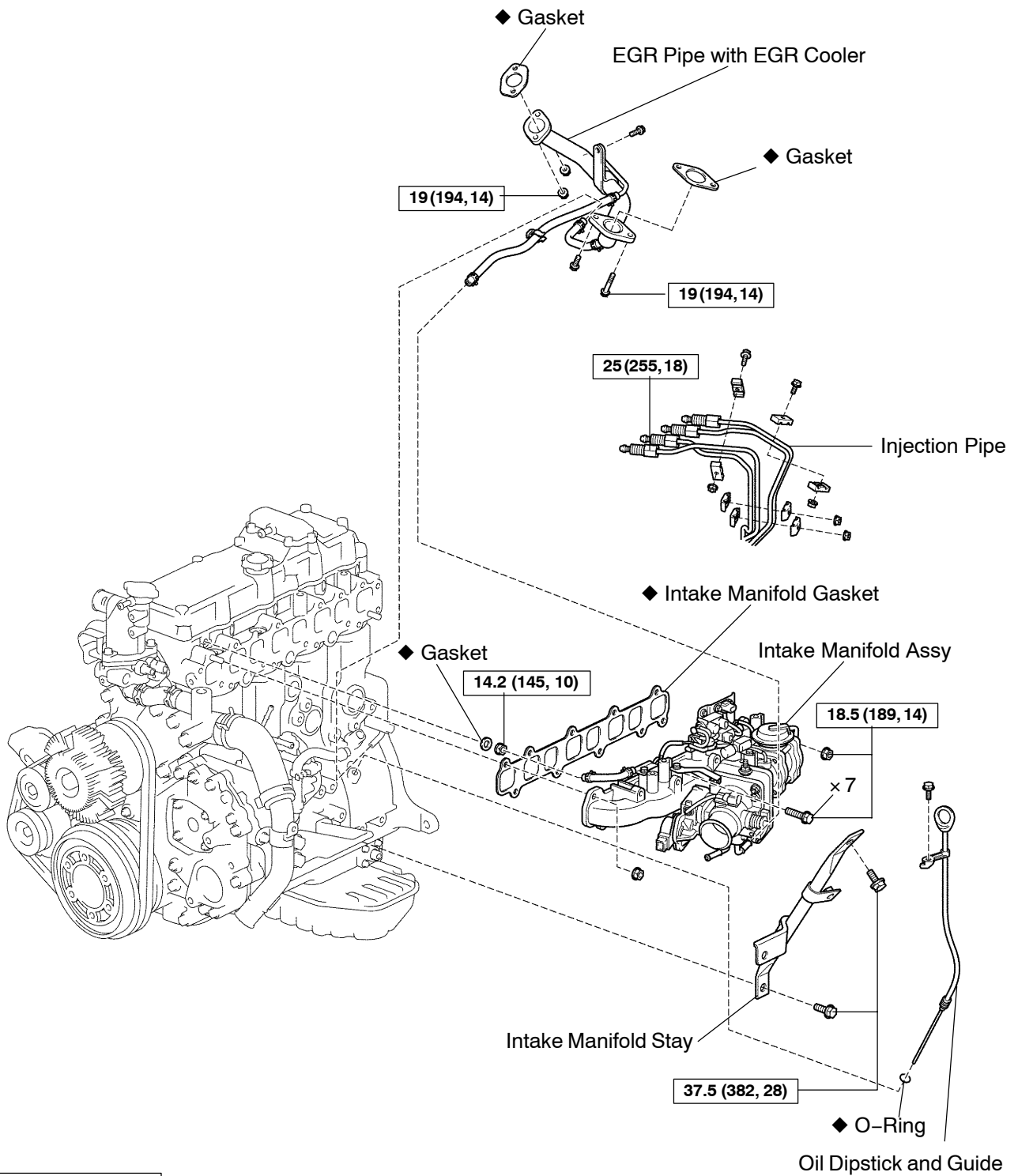
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-resuable part

P

A77963

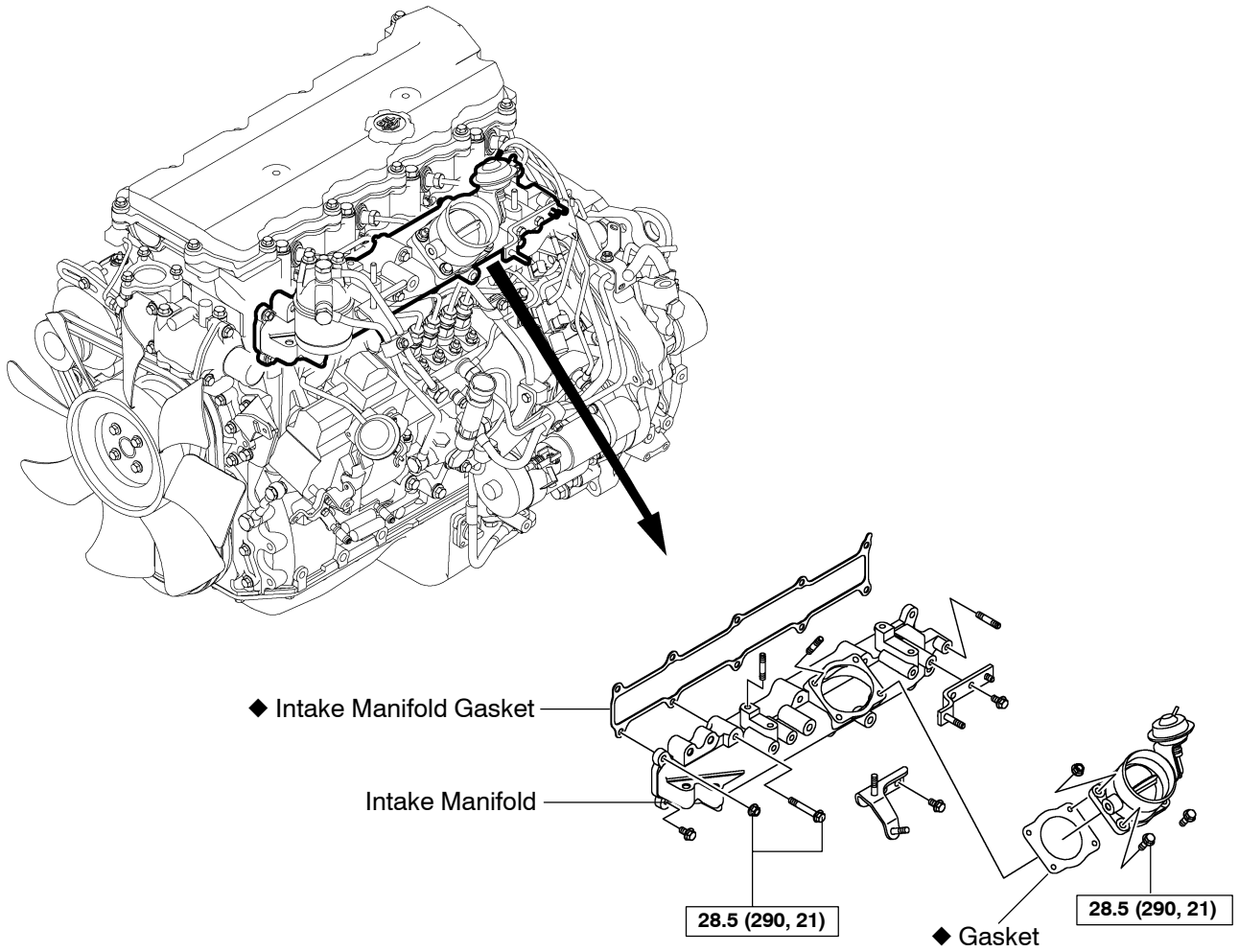
15B-FTE



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-resuable part

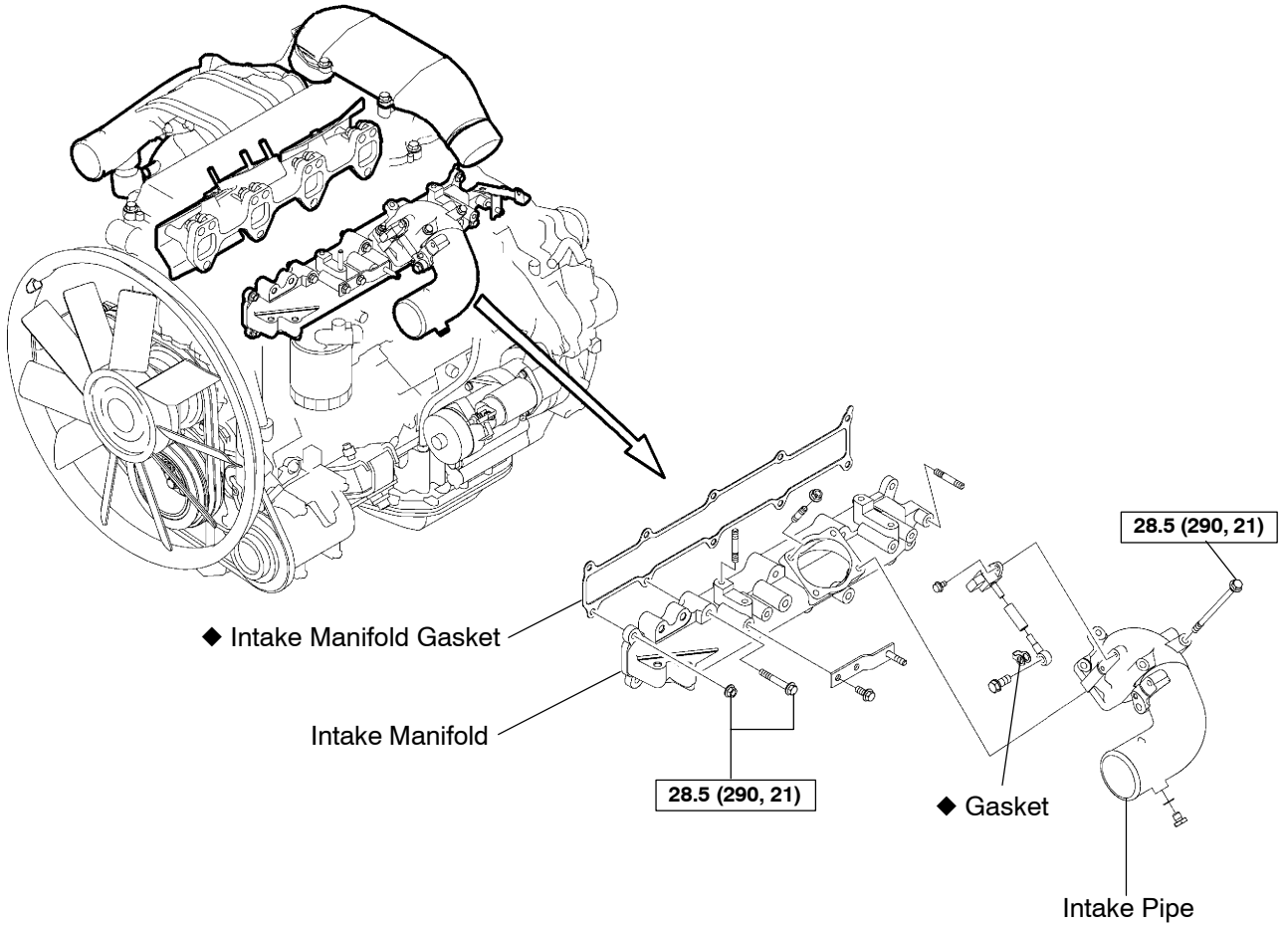
S05C-B



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

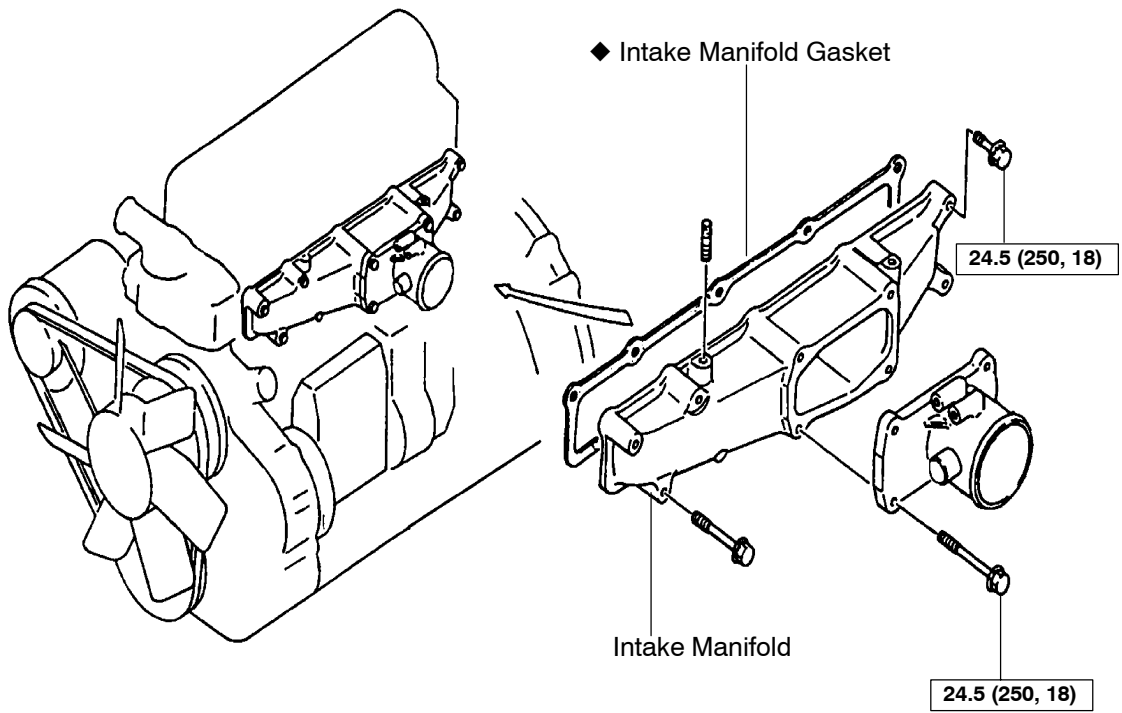
S05C-TA, TB



$\boxed{\text{N}\cdot\text{m (kgf}\cdot\text{cm, ft}\cdot\text{lbf)}}$: Specified torque

P ◆ Non-resuable part

W04D-J



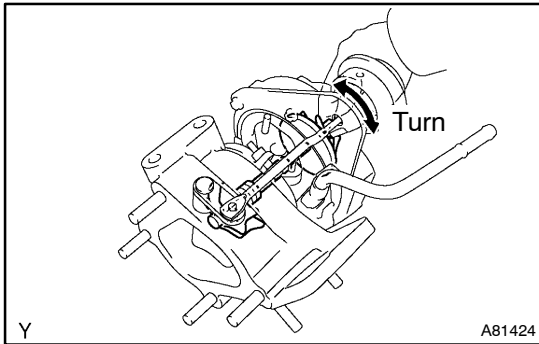
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-resuable part

TURBOCHARGER SUB-ASSY (15B-FTE)

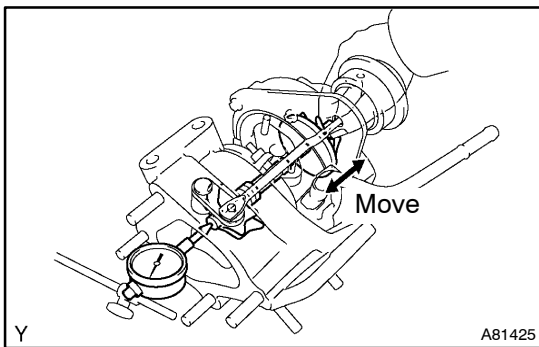
OVERHAUL

13068-01



1. INSPECT BEARING HOUSING SUB-ASSY

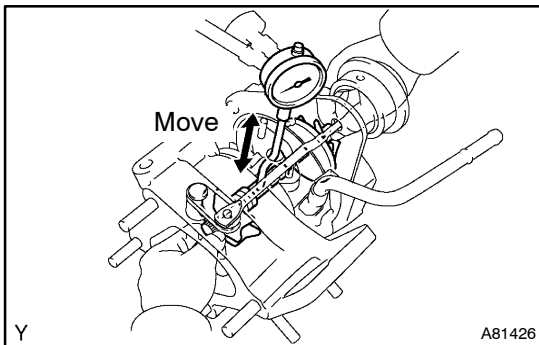
- (a) Check that the turbine shaft smoothly turns. If the turbine shaft turns remarkably heavily or is stuck, replace the bearing housing. At that time, also check that the turbine housing interferes with the compressor housing.



- (b) Inspect the axial play of the turbine shaft.
- (1) Using a dial indicator, insert the needle of the dial indicator into the exhaust side.
 - (2) Moving the turbine shaft in the axial direction, measure the axial play of the turbine shaft.

Maximum play: 0.08 mm (0.0031 in.) or less

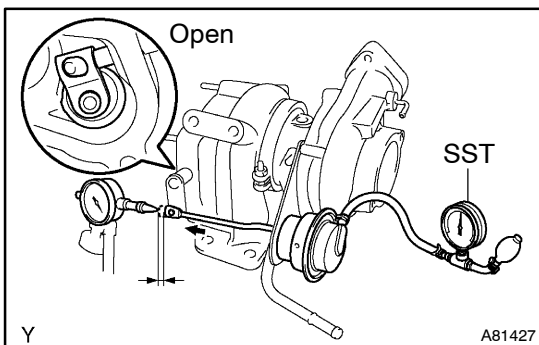
If the axial play is greater than the maximum, replace the bearing housing. At that time, check also that the turbine housing interferes with the compressor housing.



- (c) Inspect the radial play of the turbine shaft.
- (1) Set a dial indicator in the center of the turbine shaft by inserting the dial indicator needle into the oil outlet hole
 - (2) Move the turbine shaft in a radial direction and measure the radial play of the turbine shaft.

Maximum play: 0.11 mm (0.0043 in.) or less

If the radial play is greater than the maximum, replace the bearing housing. At that time, check also that the turbine housing interferes with the compressor housing.



2. INSPECT W/BACKET ACTUATOR ASSY

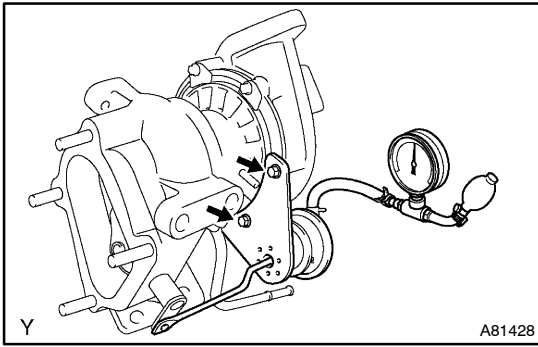
- (a) Disconnect the actuator hose from the compressor housing.
- (b) Using SST and a dial indicator, read the graduation of SST when the actuator push rod is 2 mm (0.079 in.).
SST 09992-00242
Standard pressure:
152 - 165 kPa (1.55 - 1.68 kgf/cm², 22 - 23.9 psi)
- (c) Check that the actuator push rod is moved and the waste gate valve is opened.

NOTICE:

Do not apply more than 147 kPa (1.50 kgf/cm², 21.2 psi) of pressure to the actuator.

If operation is not as specified, replace the turbocharger.

- (d) Reconnect the actuator hose to the compressor housing.



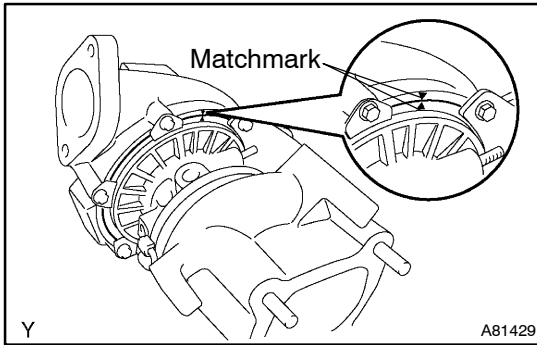
3. REMOVE W/BRACKET ACTUATOR ASSY

- (a) Remove the actuator hose from the compressor housing.
- (b) Using SST, move the actuator push rod.
SST 09992-00242

NOTICE:

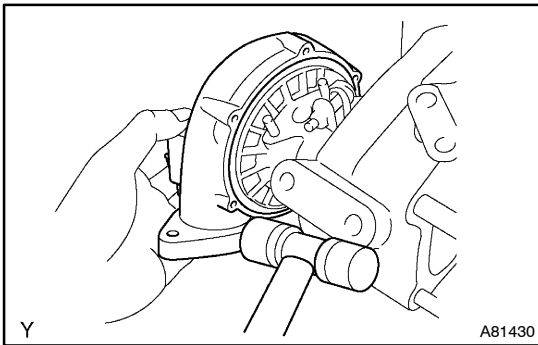
Do not apply more than 185 kPa (1.89 kgf/cm², 26.9 psi) of pressure to the actuator.

- (c) Remove the 2 bolts, E-ring and actuator.
- (d) Remove the actuator hose.



4. REMOVE COMPRESSOR HOUSING SUB-ASSY

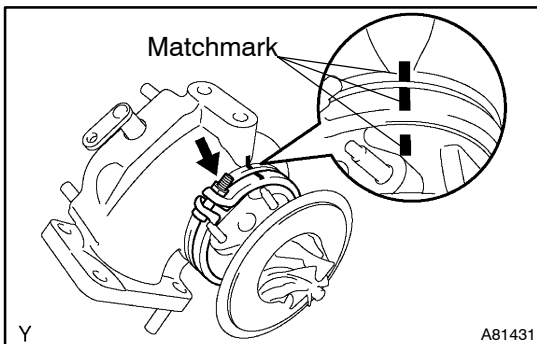
- (a) Place the matchmarks on the compressor housing and bearing housing.
- (b) Remove the 3 bolts.



- (c) Using a plastic-faced hammer, tap out the compressor housing.

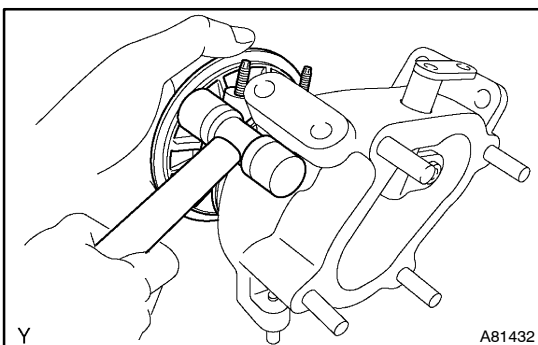
NOTICE:

- Remove the housing as straight as possible and do not allow the turbine wheel to interfere with the turbine housing.
- Do not tap the bearing housing.



5. REMOVE TURBINE HOUSING

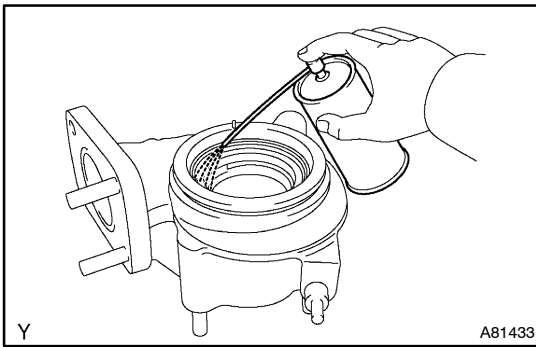
- (a) Place the matchmarks on the V-band, turbine housing and bearing housing.
- (b) Remove the bolt, nut and V-band.



- (c) Using a plastic-faced hammer, tap out the bearing housing.

NOTICE:

- Remove the housing as straight as possible and do not allow the turbine wheel to interfere with the turbine housing.
- Do not tap the bearing housing.

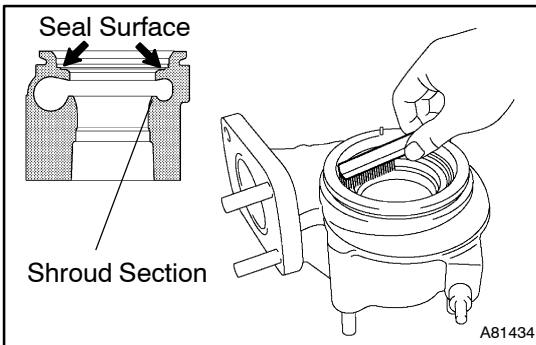


6. CLEAN TURBINE HOUSING

- (a) Spray the engine conditioner to the section where the carbon dirt is adhered.

NOTICE:

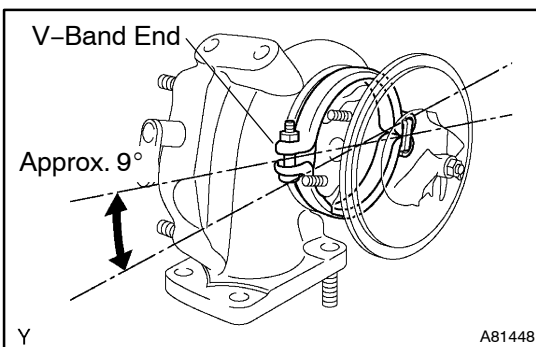
Be careful not to erase the matchmark of the turbine housing.



- (b) Using a wire brush, remove all the carbon dirt inside the turbine housing.

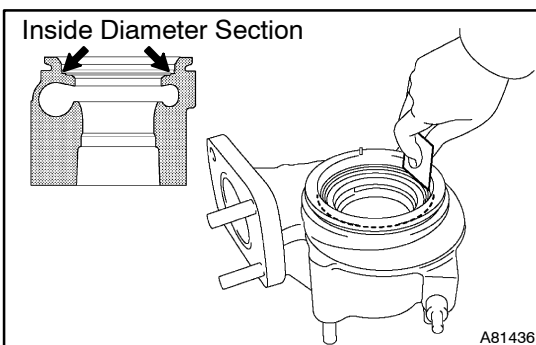
NOTICE:

Clean the seal surface and shroud section thoroughly, as shown in the illustration. Also clean the waste gate valve seat thoroughly.



HINT:

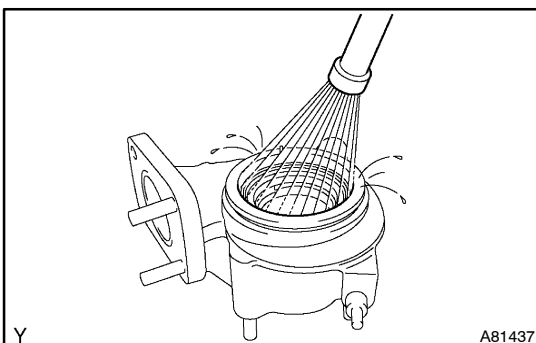
When the carbon dirt is heavily adhered, remove it using a scraper.



- (c) Clean the inside diameter section with a sandpaper (No.100) until the metal surface appears.

NOTICE:

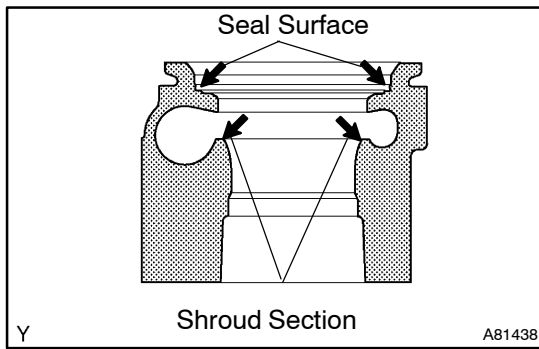
If the cleaning is not enough, the installation of the bearing housing will become harder, so clean it well.



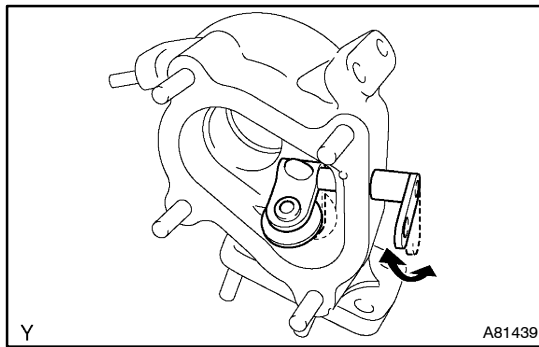
- (d) Wash the turbine housing with compressed air or a steam cleaner.

NOTICE:

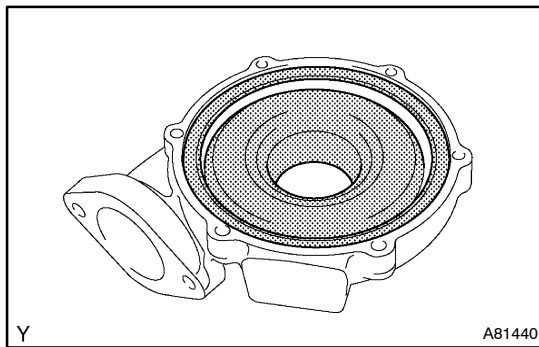
Wash the turbine housing well without leaving any irregular objects.



- (e) Check that there is no severe damage on the seal surface.
- (f) Check that there is no bore made by the interference with the turbine wheel in the shroud section.
- If the turbine housing has remarkable damage or bore, replace the turbocharger.



- (g) Move the waste gate valve link and check that it turns smoothly without stick.
- If the link is badly turning, clean it again. If it is badly turning even after cleaning, replace the turbocharger.



- (h) Clean the compressor housing.

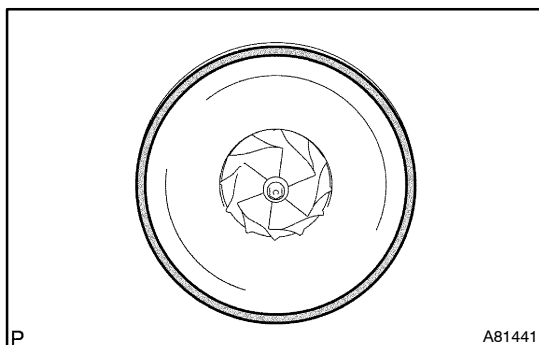
NOTICE:

Be careful not to drop any oil on the contact surfaces.

- (1) Using a razor blade and gasket scraper, remove all the old packing (FIPG).
- (2) Thoroughly clean all the components to remove all the loose materials.
- (3) Using a non-residue solvent, clean both sealing surfaces.
- (4) Wipe off the dirt from the inside of the housing with a shop rag.
- (5) Check that there is no severe interference with the impeller wheel.

If there is burr made by a slight interference damage, remove it with a sandpaper (No.400) and blow the dust with compressed air.

If the housing has heavy damage, replace the turbocharger.

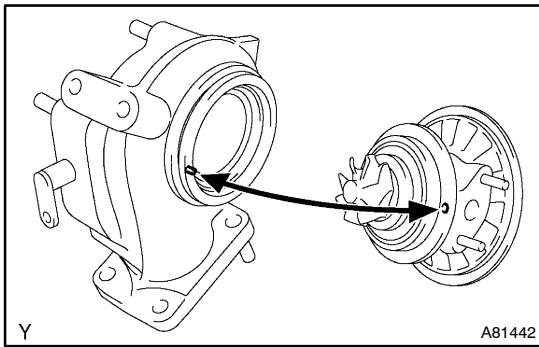


- (i) Clean the bearing housing.

NOTICE:

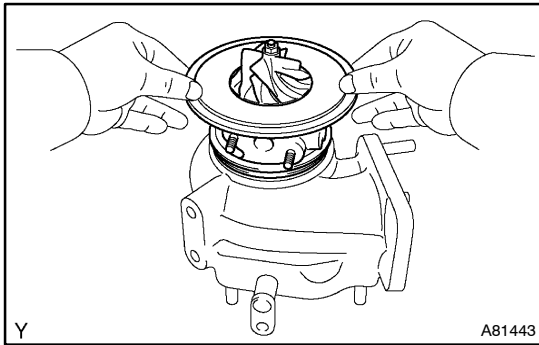
Be careful not to drop any oil on the contact surfaces.

- (1) Using a razor blade and gasket scraper, remove all the old packing (FIPG).



7. INSTALL TURBINE HOUSING

- (a) Align the pin of the turbine housing with the pin hole of the bearing housing.

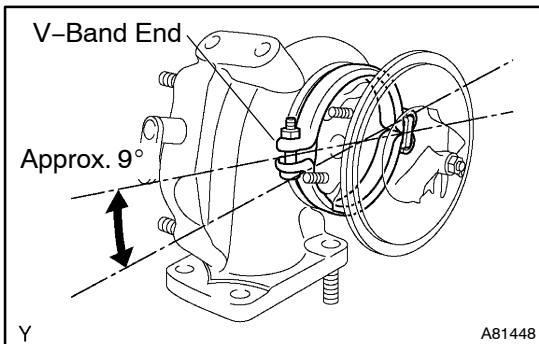


- (b) Install the bearing housing to the turbine housing.

NOTICE:

Install the bearing housing straight, and be careful not to damage the turbine wheel.

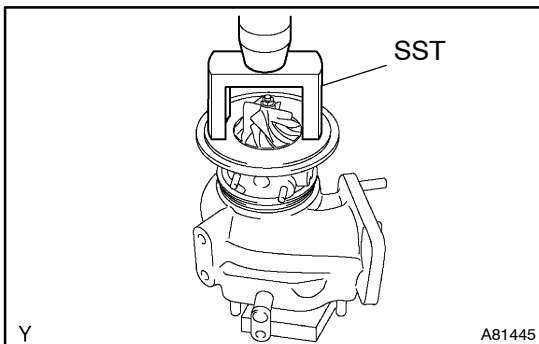
If pressing in the bearing housing by hand is difficult due to hard engagement, perform step (c) below.



HINT:

Apply a little penetrate rust prevention lubricant onto the engagement section to make the installation easier.

If pressing in the bearing housing by hand is difficult due to hard engagement, perform step (c) below.

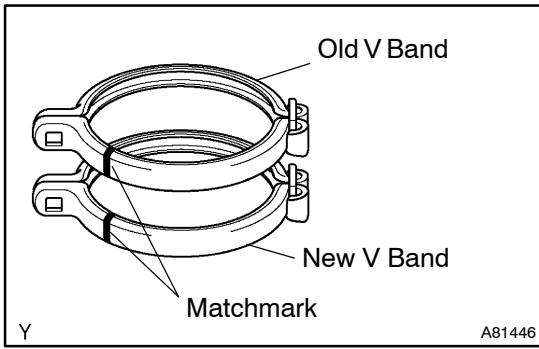


- (c) If that the engagement of the bearing housing is hard, use SST and a press to install the bearing housing while checking the smooth rotation of the impeller wheel.

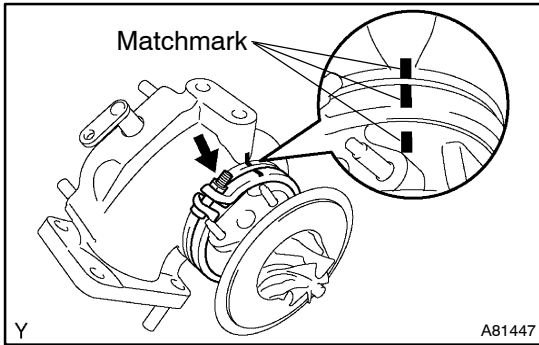
SST 09350-32014 (09351-32070)

NOTICE:

- **Do not hold the turbine housing with the stud bolts.**
- **Be sure to install the bearing housing straight without tilting, because the shaft may be bent and it cause the irregular noise.**
- **Press in the bearing housing slowly. When the rotation of the immediately and perform the operation again.**
- **After the installation, check that the turbine shaft turns smoothly.**

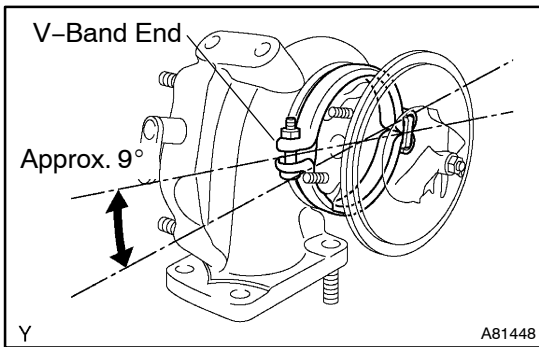


- (d) Place a new and old (used) V-bands in line, then reprint the matchmark position on the old V-band onto a new one.



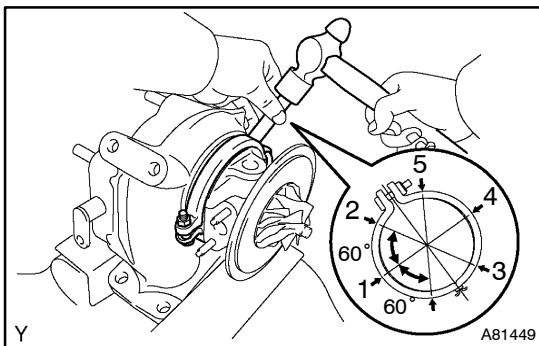
- (e) Align the matchmarks on the new V-band, turbine housing and bearing housing, and temporarily install a new bolt and nut.

Torque: 8.3 N·m (85 kgf·cm, 74 in·lbf)



HINT:

When the matchmarks are erased, make the matching openings meet at the position, as shown in the illustration.



- (f) Using a brass bar and hammer, lightly hit the V-band 2 or 3 times at each place in the order of 1 through 5, as shown in the illustration.

- (g) Tighten the nut with the specified torque.

Torque: 8.3 N·m (85 kgf·cm, 74 in·lbf)

- (h) Using a brass bar and hammer, hit the V-band 2 or 3 times lightly at each place in the order of 1 through 4 as shown in the illustration.

- (i) Tighten the nut completely.

Torque: 8.3 N·m (85 kgf·cm, 74 in·lbf)

8. INSTALL COMPRESSOR HOUSING SUB-ASSY

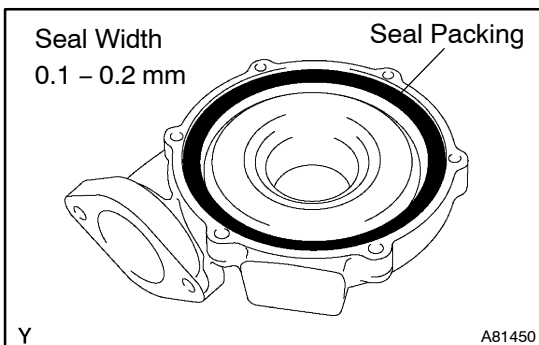
- (a) If of reusing the compressor housing and bearing housing:

- (1) Apply seal packing to the bearing housing, as shown in the illustration.

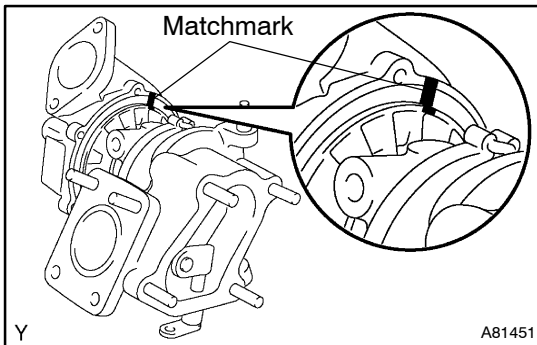
Seal packing: Part No. 08826-00080, or equivalent

NOTICE:

Do not apply an excessive amount of seal packing to the surface.



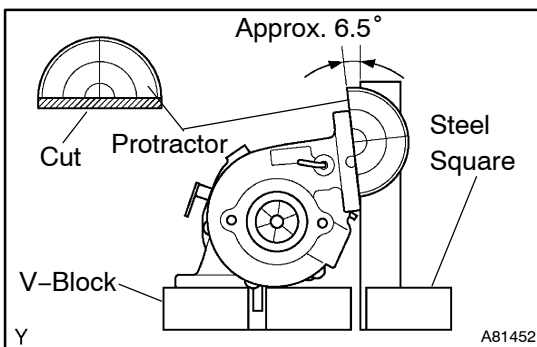
- Install a nozzle that has an opening of 0.1 – 0.2 mm (0.004 – 0.008 in.).
- Parts must be assembled within 5 minutes after the application. Otherwise, the material must be removed and seal packing must be reapplied.
- Immediately remove the nozzle from the tube and reinstall the cap.



- (2) Align the matchmarks on the compressor housing and bearing housing, and install them.

NOTICE:

- **Do not allow the impeller wheel to interfere with the compressor housing.**
- **Check that the turbine shaft smoothly turns.**



- (3) Using a steel square and protractor, check the installation angle of the outlet port of the compressor housing, as shown in the illustration.

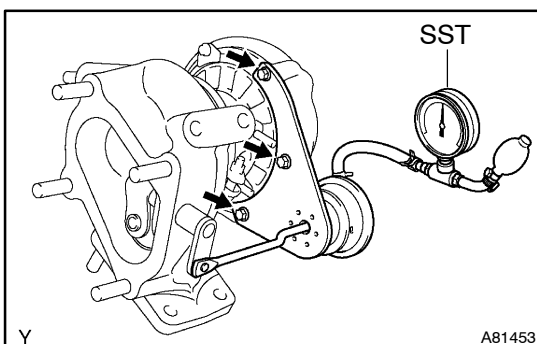
- (4) Temporarily install the 3 clamp plates and 3 bolts.

- (b) If using a new compressor housing and/or bearing housing:

- (1) Temporarily install the compressor housing on the bearing housing, make the installation angle of the outlet port of the compressor housing meet at the position shown in the illustration and place the matchmarks.

- (2) Remove the compressor housing.

- (3) The following procedures are the same as that of re-using the compressor housing and/or bearing housing.

**9. INSTALL W/BRACKET ACTUATOR ASSY**

- (a) Using SST, move the actuator push rod.

NOTICE:

Do not apply more than 185 kPa (1.89 kgf/cm², 26.9 psi) of pressure to the actuator.

- (b) Connect the actuator push rod to the waste gate valve link with a new E-ring.

- (c) Install the actuator to the compressor housing with the 3 bolts. Uniformly tighten the 6 bolts in several passes.

Torque: 4.7 N·m (48 kgf·cm, 42 in.·lbf)

- (d) Remove the SST.

- (e) Connect the actuator hose.

10. INSTALL TURBO OIL INLET PIPE SUB-ASSY

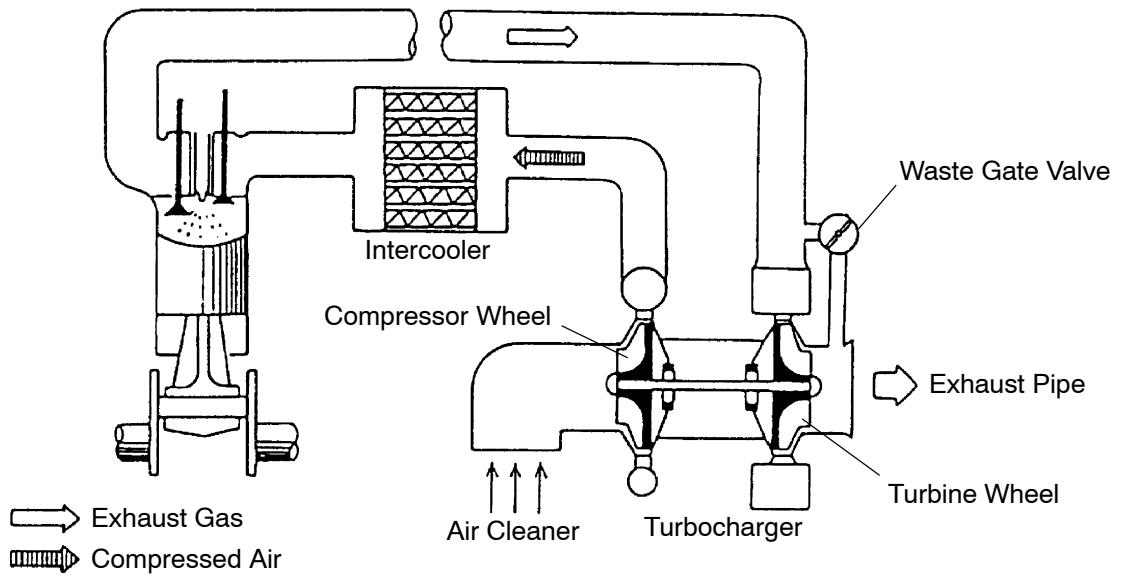
- (a) Install a new gasket and the water pipe with the union bolt.

Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

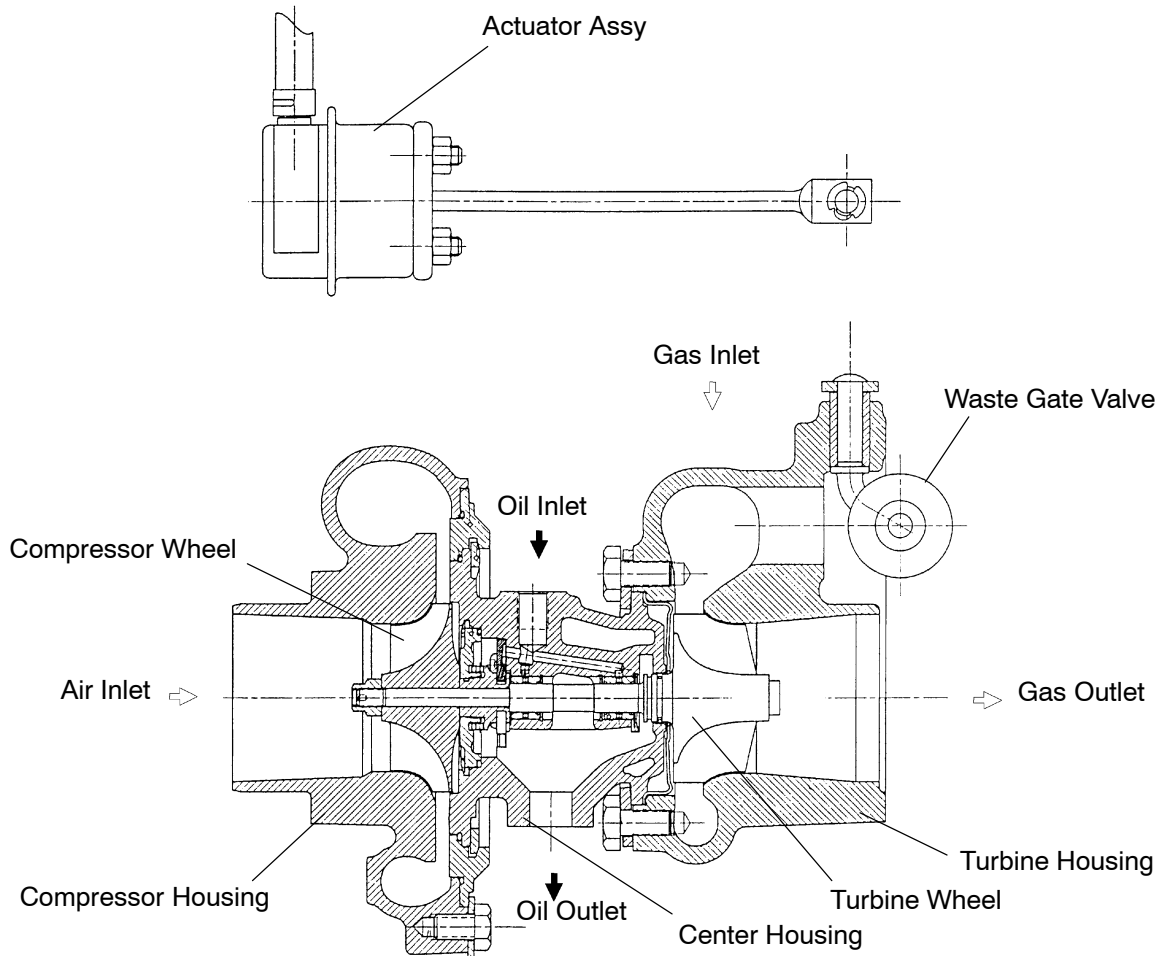
TURBOCHARGER SUB-ASSY (S05C-TA, S05C-TB)

13089-01

LOCATION



Turbocharger



A64396
A64388

A64406

ON-VEHICLE INSPECTION

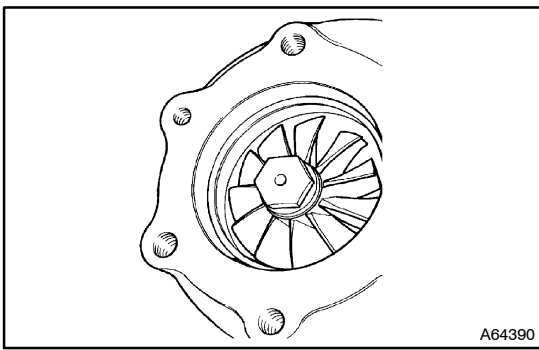
1. INSPECT TURBOCHARGER EXTERIOR AND INSTALLATION

- (a) Visually check for missing or loose nuts and bolts.
- (b) Visually check for loose or damaged intake and exhaust pipes.
- (c) Visually check for damaged oil supply and drain lines.
- (d) Visually check for cracked or deteriorating turbocharger housings.
- (e) Visually check for external oil or coolant leakage.

Correct all the problems about the installation. If the turbocharger parts are damaged, overhaul the unit after the remaining procedures of this troubleshooting about the installation.

CAUTION:

Operation of the turbocharger without the intake pipe and air cleaner connected can result in personal injury and also damage to the equipment, such as foreign objects entering the turbocharger.



2. INSPECT TURBINE WHEEL AND HOUSING

- (a) Remove the ducting from the turbine outlet. Using a flash-light, check the rub on the turbine wheel and housing, evidence of oil leakage or damage due to foreign objects. Damage to the turbine, due to foreign objects, is not usually visible through the turbine outlet unless the damage becomes severe.

- (1) Check for rub on the wheel and housing.

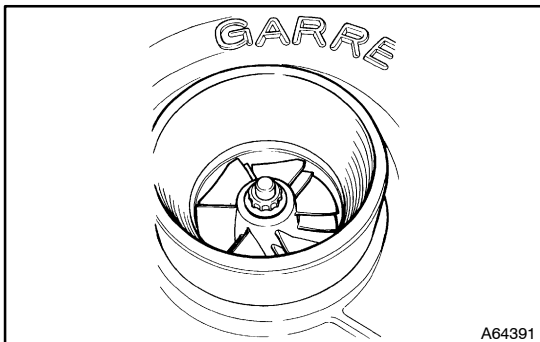
If wheel rub is found when the housing is securely attached to the hardware, then the turbocharger is way be damaged internally and must be overhauled.

- (2) Check for oil leakage.

If oil deposits are found, determine whether the oil has come from the engine exhaust or the turbocharger center housing. If the oil has come from the engine, consult the chapter of ENGINE MECHANICAL and correct the problem. If oil deposits on the wheel are heavy, the turbocharger should be disassembled, cleaned, and overhauled, as necessary.

- (3) Check for damage due to foreign objects.

If the turbine is obviously damaged due to foreign objects, the turbocharger must be overhauled. Such damage destroys the wheel's balance and causes internal damage to the seal bores and journal bearings. Be sure to find the source of the foreign object. In many cases, the object has come from the engine, and the engine may have damage, as well.



3. INSPECT COMPRESSOR WHEEL AND HOUSING

- (a) Remove the ducting from the compressor inlet. Using a flash-light, check the rub on the compressor wheel and housing, evidence of oil leakage and damage due to foreign objects.

- (1) Check for rub on the wheel and housing.

If wheel rub is found when the housing is securely attached to the hardware, then the turbocharger is way be damaged internally and must be overhauled.

(2) Check for oil leakage.

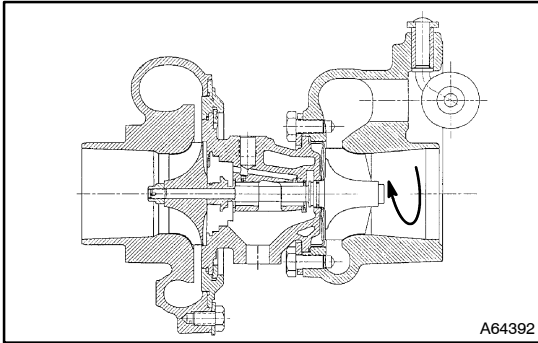
Oil leakage into the compressor can be caused by long periods of idling on a restricted oil drain line, a restricted air intake system, and frequent use of the engine as a brake. In this case, nothing is wrong with either the engine or the turbocharger, but frequent clean-up of the compressor wheel and housing is recommended.

(3) Check for damage due to foreign objects.

If the compressor wheel has been damaged by foreign objects, overhaul the turbocharger.

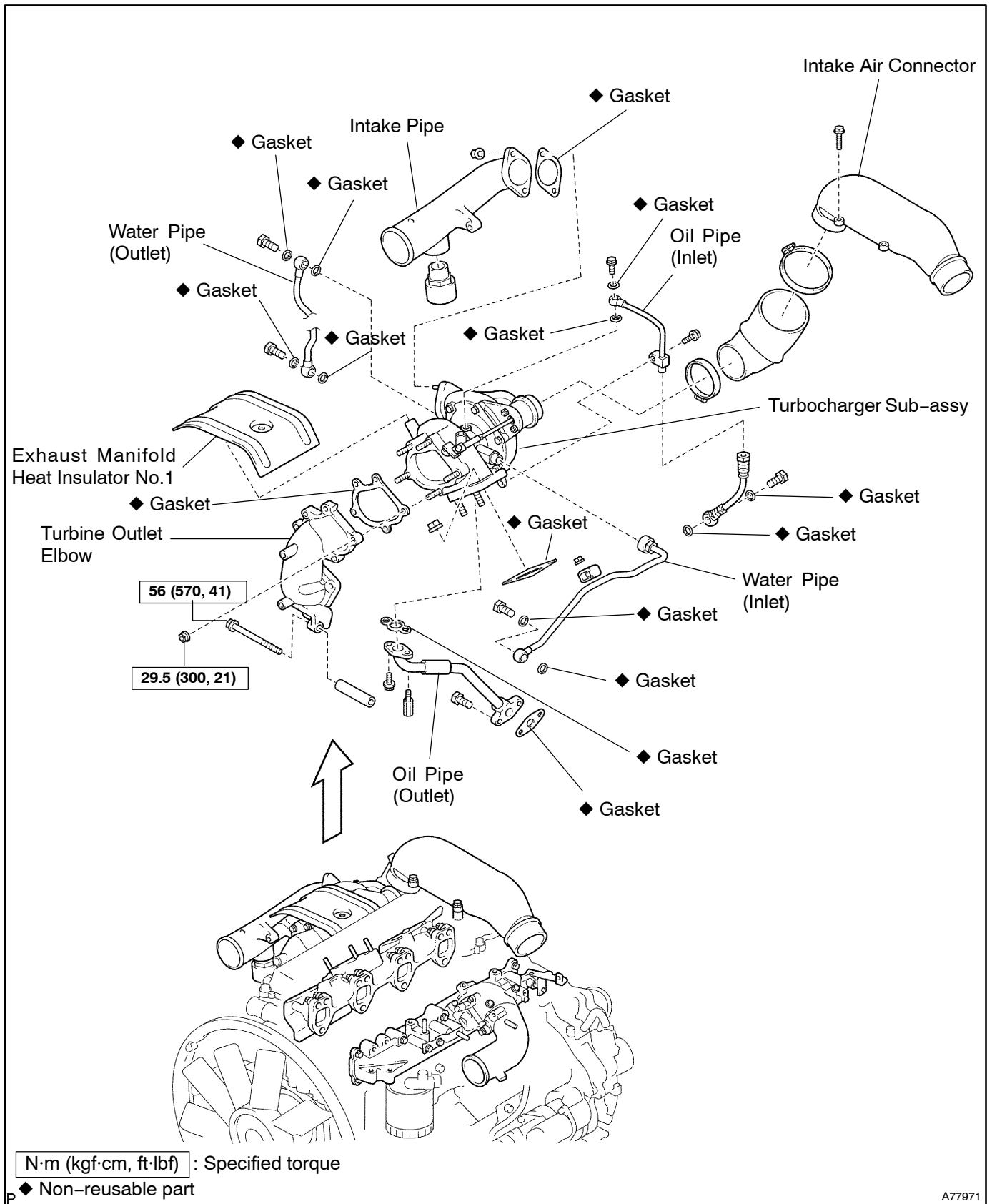
4. INSPECT ROTATING ASSEMBLY FOR NOISE OR EXCESSIVE PLAY

If no damage is visible in the turbine and compressor areas, spin the rotating assembly by hand. It should spin freely without drag or grinding noise.



A64392

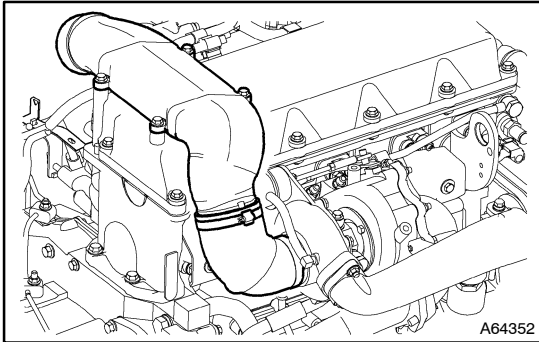
COMPONENTS



OVERHAUL

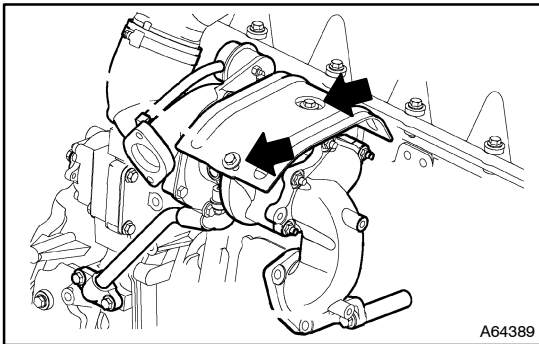
CAUTION:

Do not work on the turbocharger while it is still hot. This could result in personal injury.



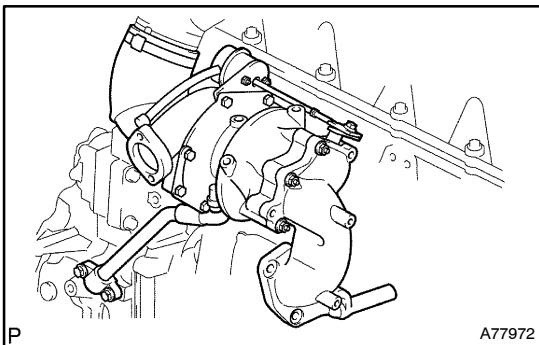
1. REMOVE INTAKE AIR CONNECTOR

- (a) Remove the 4 bolts.
- (b) Loosen the rubber hoses.
- (c) Remove the intake air connector.



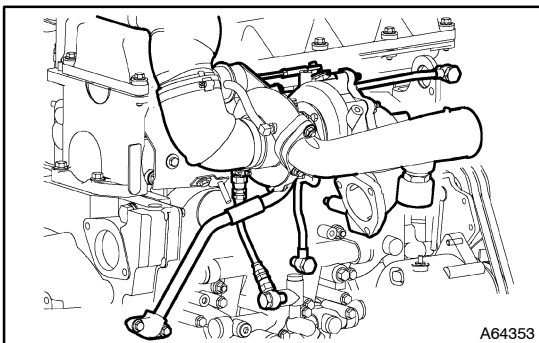
2. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.1

- (a) Remove the 2 bolts and insulator.



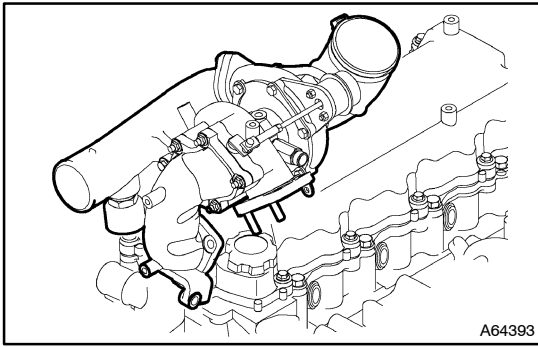
3. REMOVE TURBINE OUTLET ELBOW

- (a) Remove the 2 bolts, 5 nuts and outlet elbow.

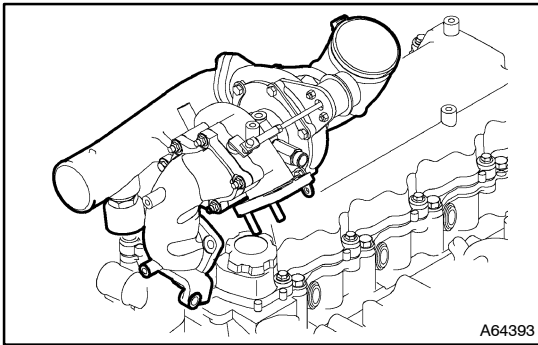


4. REMOVE TURBOCHARGER SUB-ASSY

- (a) Remove the clamp bolt and oil inlet pipe.
- (b) Remove the water pipes.
- (c) Remove the oil outlet pipe.



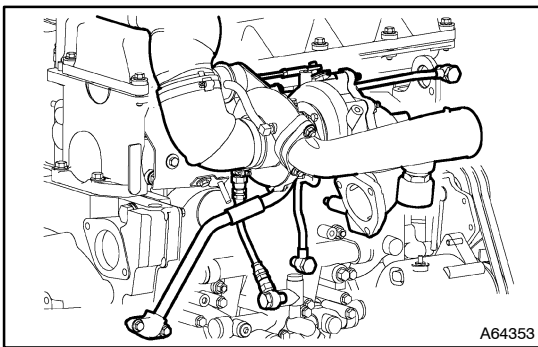
- (d) Remove the turbocharger from the exhaust manifold.



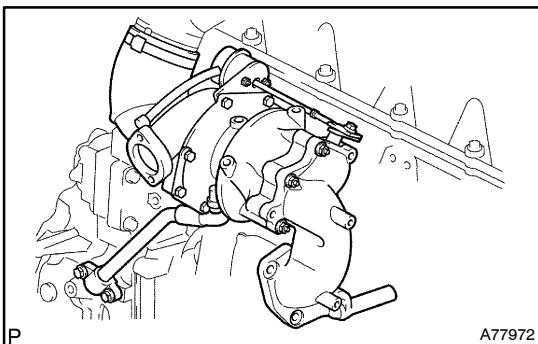
5. INSTALL TURBOCHARGER SUB-ASSY

- (a) Install a new gasket and the turbocharger on the 2 bolts exhaust manifold.

Torque: 56 N·m (570 kgf·cm, 41 ft·lbf)



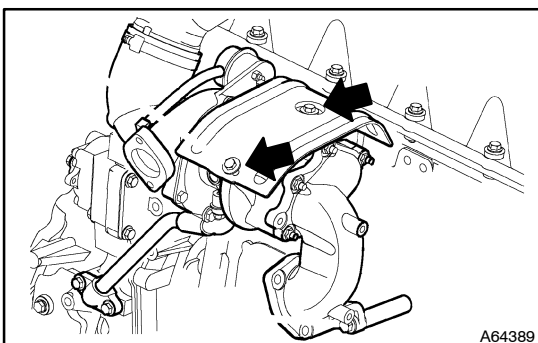
- (b) Install the oil outlet pipe.
 (c) Install the water pipes.
 (d) Install the oil inlet pipe and clamp bolt.



6. INSTALL TURBINE OUTLET ELBOW

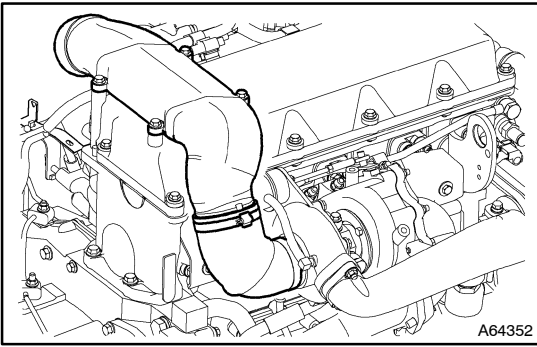
- (a) Temporarily install the outlet elbow with the bolts and nuts.
 (b) Tighten the 2 bolts and 5 nuts.

Torque: 29.5 N·m (300 kgf·cm, 21 ft·lbf)



7. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.1

- (a) Install the insulator with the 2 bolts.

**8. INSTALL INTAKE AIR CONNECTOR**

- (a) Connect the rubber hoses to the intake pipe.
- (b) Install the intake air connector with the bolts.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

INSPECTION

1. INSPECT RADIAL BEARING CLEARANCE

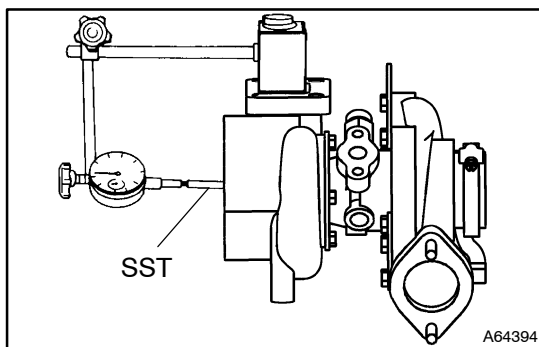
- (a) Remove the 3 bolts of the actuator and hose.
- (b) Remove the retainer and measured it.
- (c) Attach a turbocharger gauge set to the unit so that the dial indicator plunger could extend through the oil drain port and contacts the shaft of the turbine wheel assembly.
- (d) Using SST and a dial indicator, check the turbine rotor for radial play.

SST 09992-00600

Standard play: 0.05 – 0.13 mm (0.0020 – 0.0051 in.)

Maximum play: 0.13 mm (0.0051 in.)

If the radial play is greater than the maximum, the turbocharger is worn or damaged internally and must be overhauled.



2. INSPECT AXIAL BEARING CLEARANCE

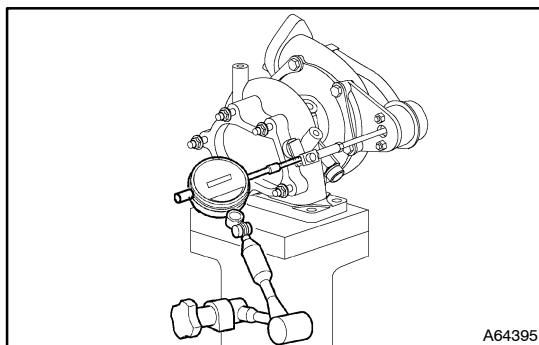
- (a) Using SST (end play gauge) and a dial indicator, check the turbine rotor (exhaust side) for axial play.

SST 09992-00600

Standard play: 0.01 – 0.10 mm (0.0004 – 0.0039 in.)

Maximum play: 0.10 mm (0.0039 in.)

If the axial play is greater than the maximum, the turbocharger is worn or damaged internally and must be overhauled.



3. INSPECT WASTE GATE PERFORMANCE

- (a) Remove the waste gate sensing hose.
- (b) Attach a dial gauge set to the turbocharger so that the dial gauge resets on the end of the actuator rod in the plane of the rod, as applicable.
- (c) Set the dial indicator to 0.
- (d) While gently tapping the turbine housing with a soft mallet, use SST to apply air pressure so that the dial gauge pointer shows the following value.

SST 09992-00242

Rod movement: 0.38 mm (0.015 in.)

- (e) Make sure that air pressure is within the specified value.

Air pressure:

148 – 153 kPa (1.5 – 1.6 kgf/cm², 21 – 23 psi)

- (f) Release the air pressure at the sensing port. Note that the dial gauge pointer returns exactly to 0.
- (g) Repeat steps (d) through (f) several times to make sure that the air pressure has been accurately measured.

If the air pressure is not within the specified value, the replaced turbine housing assembly or actuator assembly.

NOTICE:

Operation of the engine with the waste gate calibrated to some value other than that specified can result in reduced performance or severe engine damage.

- (h) Reinstall the waste gate sensing hose.

ENGINE MECHANICAL

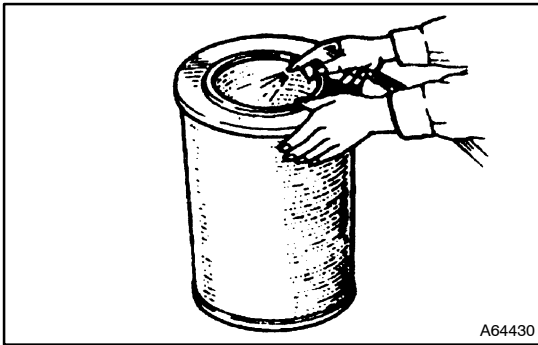
ENGINE (14B)	14-1	ENGINE (S05C-TA)	14-103
ADJUSTMENT	14-1	ADJUSTMENT	14-103
DRIVE BELT (14B)	14-8	VALVE CLEARANCE (S05C-TA)	14-108
REPLACEMENT	14-8	ADJUSTMENT	14-108
VALVE CLEARANCE (14B)	14-10	ENGINE ASSY (S05C-TA)	14-111
ADJUSTMENT	14-10	REMOVAL AND INSTALLATION	14-111
ENGINE ASSY (14B)	14-12	ENGINE	
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PARTIAL ENGINE ASSY (14B)	14-16	REMOVAL AND INSTALLATION	14-122
COMPONENTS	14-16	ENGINE MOUNTING (S05C-TA)	14-129
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CYLINDER HEAD GASKET (14B)	14-22	ENGINE (S05C-TB)	14-130
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DRIVE BELT (15B-FTE)	14-47	COMPONENTS PARTS (S05C-TB)	14-148
REPLACEMENT	14-47	REMOVAL AND INSTALLATION	14-148
VALVE CLEARANCE (15B-FTE)	14-49	ENGINE MOUNTING (S05C-TB)	14-155
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ENGINE ASSY (15B-FTE)	14-52	ENGINE (W04D-J)	14-156
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CAMSHAFT (15B-FTE)	14-68	REPLACEMENT	14-172
REPLACEMENT	14-68	ENGINE MOUNTING (W04D-J)	14-177
ENGINE (S05C-B)	14-77	COMPONENTS	14-177
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VALVE CLEARANCE (S05C-B)	14-82		
ADJUSTMENT	14-82		
ENGINE ASSY (S05C-B)	14-85		
REPLACEMENT	14-85		
ENGINE			
COMPONENTS PARTS (S05C-B)	14-95		
REPLACEMENT	14-95		
ENGINE MOUNTING (S05C-B)	14-102		
COMPONENTS	14-102		

ENGINE (14B)

ADJUSTMENT

1416Q-01

1. INSPECT COOLANT (See page 16-3)
2. INSPECT ENGINE OIL (See page 17-1)
3. INSPECT BATTERY SPECIFIC GRAVITY

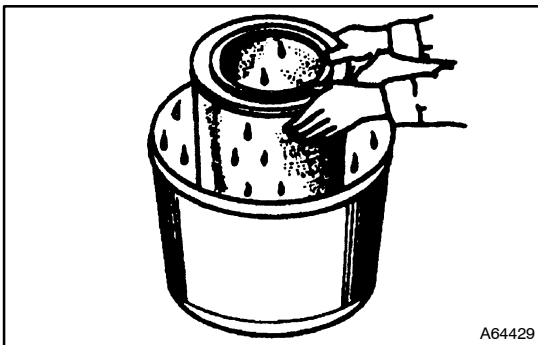


4. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY

- (a) Non-Washable type:
Visually check that the filter is not excessively dirty or oily.
- (b) Using an air gun, remove dry dirt or dust, Air pressure: less than 690 kPa (7.0 kgf/cm², 100 psi).

HINT:

- Always blow air from the inside of the element to the outside. Never strike or bang the filter to remove dirt or dust.
- If the air pressure is too high and the element deformed, the engine will be in trouble.



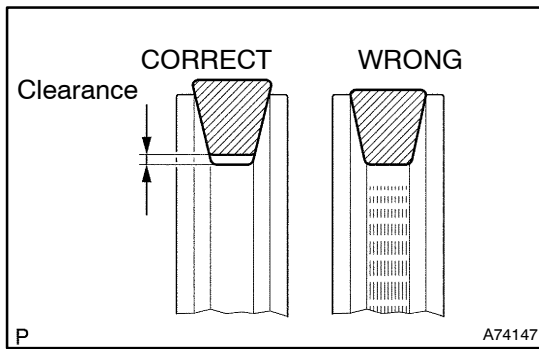
- (c) Washable type:
Wash the element by soaking it in a non-sudsy detergent solution for approx. 30 minutes.
- (d) Rinse the element with clean water and dry it completely with compressed air.

HINT:

- Check that the inside of the element is not soiled with dust, etc.
- When using an oven to dry the element, the temperature should be set below 80°C (176°F).
- Never install the element before it is completely dried.
- Make sure that the dried element is not broken and that the packing is not broken nor deformed.

NOTICE:

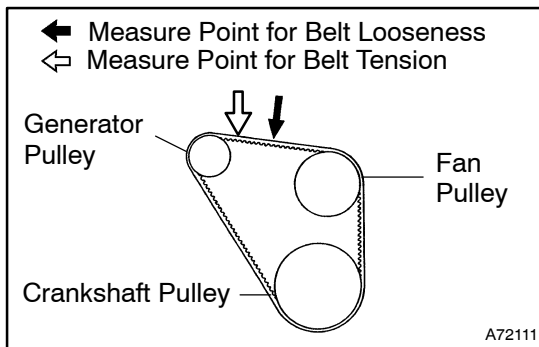
Never use other solvents, such as kerosene and gasoline to clean the elements. Use of these could cause the engine to overrun and damage the engine.



5. INSPECT V BELT

- (a) Visually check the V belt for cracks, oiliness or wear. Check that the belt does not touch the bottom of the pulley groove.

If necessary, replace the V belt.



- (b) Check the drive belt deflection by pressing on the belt at the points indicated illustration with 98 N (10 kgf, 22 lbf) of pressure.

Deflection:

New Belt mm (in.)	Used Belt mm (in.)
8.0 - 11 (0.31 - 0.43)	11 - 16 (0.43 - 0.63)

- (c) Reference:

Using a belt tension gauge, measure the belt tension.

Tension:

New Belt N (kgf)	Used Belt N (kgf)
421 - 657 (43 - 67)	245 - 441 (25 - 45)

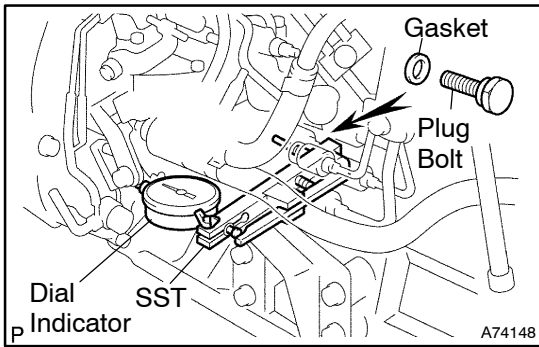
HINT:

Belt tension gauge:

DENSO BTG-20 (95506-00020)

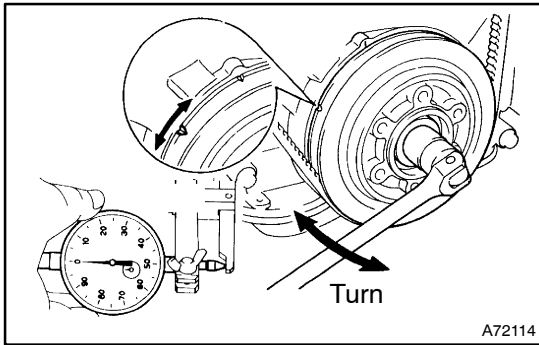
NOTICE:

- Check that the drive belt deflection at the specified point.
- When installing a new belt, set its tension value as specified.
- When checking a belt that has been used for over 5 minutes, confirm that the deflection value is within the specified one.
- When reinstalling a belt that has been used for over 5 minutes, check the belt, based on the used deflection value.
- The tension and deflection value of the V belt should be checked after 2 revolution of engine cranking.
- When using a belt tension gauge, confirm the accuracy first using a master gauge.



6. INSPECT INJECTION TIMING

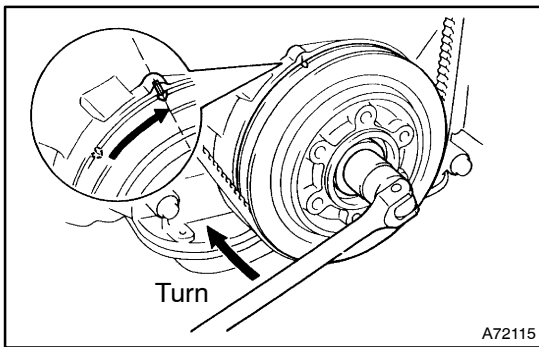
- (a) Remove the plug bolt and gasket from the distributive head plug of the injection pump.
- (b) Install SST (plunger stroke measurement tool) and a dial indicator to the plug bolt hole of the distributive head plug. SST 09275-54011



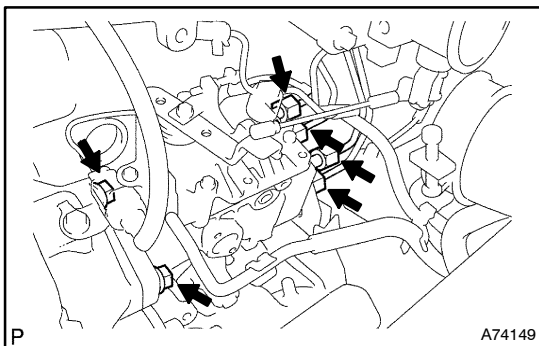
- (c) Slowly rotate the crankshaft pulley counterclockwise and set the dial indicator at 0 mm (0 in.) when the dial indicator reaches the minimum value.
- (d) Turn the crankshaft left and right and check that the dial indicator shows the minimum value.

NOTICE:

Check that the minimum value is set at 0 mm (0 in.)



- (e) Slowly rotate the crankshaft pulley clockwise until its groove is aligned with the groove of the timing gear cover.
- (f) Measure the plunger stroke.
Plunger stroke: 1.31 - 1.37 mm (0.0516 - 0.0539 in.)

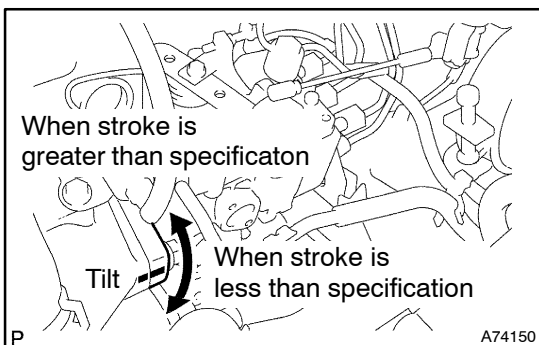


7. ADJUST INJECTION TIMING

- (a) Loosen the nuts.
 - (1) Loosen the 4 union nuts holding the injection pipes to the injection pump.
 - (2) Loosen the 2 nuts holding the injection pump to the timing gear case.

NOTICE:

Do not turn the nuts by more than 90°.



- (b) Adjust the plunger stroke by slightly tilting the injection pump body (See step (h)).
When the stroke is less than specification, tilt the pump forward the engine.
When the stroke is greater than the specification, tilt the pump opposite to the engine.

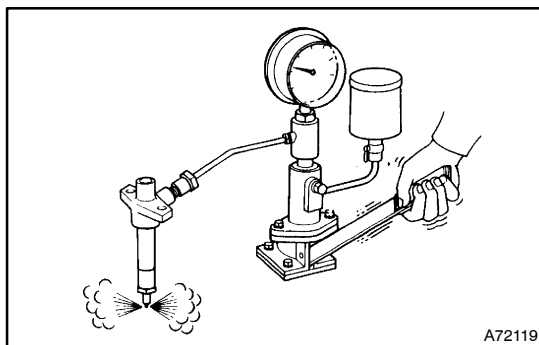
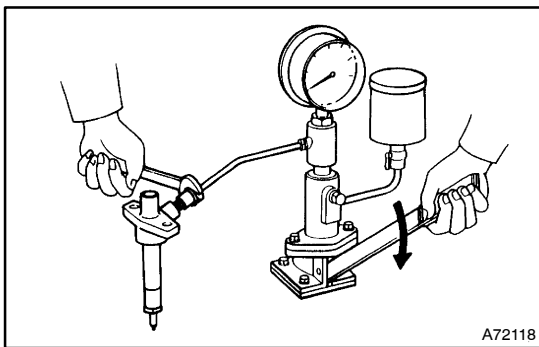
- (c) Tighten the nuts and bolts:
 - (1) Tighten the 2 nuts holding the injection pump to the timing gear case.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

- (2) Tighten the 4 bolts holding the injection pipes to the injection pump.

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

- (d) Recheck the plunger stroke.
 (e) Remove the metal plate.
 (f) Remove the SST and a dial indicator.
 SST 09275-54011
 (g) Install a new gasket and the plug bolt of the distributive head plug.
Torque: 25.5 N·m (260 kgf·cm, 19 ft·lbf)
 (h) Tighten the injection pump stay bolts.
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)
 (i) Start the engine and check for fuel leaks.



8. ADJUST INJECTION PRESSURE

- (a) Install the injection nozzle to the injection nozzle hand tester and bleed air from the union nut.

CAUTION:

Do not place your fingers over the nozzle injection hole.

- (b) Pump the tester handle a few times as fast as possible to discharge the carbons from the injection hole.
 (c) Pump the tester handle slowly and observe the pressure gauge.
 (d) Read the pressure gauge just as the injection pressure begins to drop.

Opening pressure:

New nozzle

19,610 – 20,590 kPa

(200 – 210 kgf/cm², 2,840 – 2,990 psi)

Used nozzle

17,650 – 20,590 kPa

(180 – 210 kgf/cm², 2,560 – 2,990 psi)

HINT:

Proper nozzle operation can be determined by swishy sound. If the opening pressure is not as specified, disassemble the nozzle holder and change the adjusting shim on the top of the pressure spring.

Adjusted opening pressure:

17,650 – 20,590 kPa

(180 – 210 kgf/cm², 2,560 – 2,990 psi)

Adjusting shim thickness:

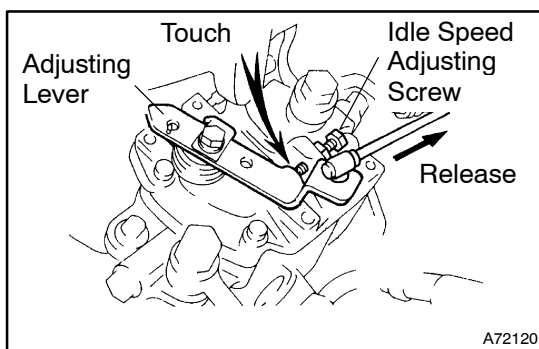
mm (in.)

0.700 (0.0276)	1.125 (0.0443)	1.425 (0.0561)
0.750 (0.0295)	1.150 (0.0453)	1.450 (0.0571)
0.800 (0.0315)	1.175 (0.0463)	1.475 (0.0581)
0.850 (0.0335)	1.200 (0.0472)	1.500 (0.0591)
0.900 (0.0354)	1.225 (0.0482)	1.550 (0.0610)
0.950 (0.0374)	1.250 (0.0492)	1.600 (0.0630)

0.975 (0.0384)	1.275 (0.0502)	1.650 (0.0650)
1.000 (0.0394)	1.300 (0.0512)	1.700 (0.0669)
1.025 (0.0404)	1.325 (0.0522)	1.750 (0.0689)
1.050 (0.0413)	1.350 (0.0531)	1.800 (0.0709)
1.075 (0.0423)	1.375 (0.0541)	-
1.100 (0.0433)	1.400 (0.0551)	-

HINT:

- Changing the adjusting shim thickness by 0.025 mm (0.0010 in.) changes the injection pressure by about 373 kPa (3.8 kgf/cm², 54 psi).
 - Only one adjusting shim should be used.
- (e) Check that there is no dripping after the injection.

**9. ADJUST IDLE SPEED**

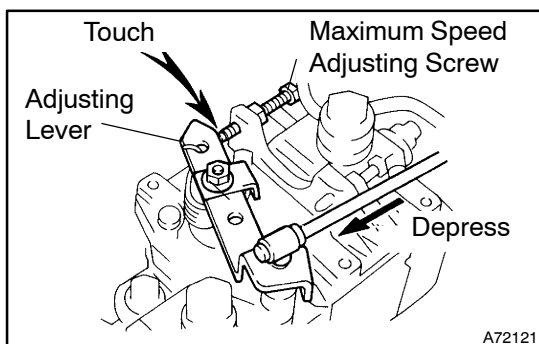
- (a) Connect the tachometer.
 (b) Warm up the engine.
 (c) Check that the adjusting lever touches the idle speed adjusting screw when the accelerator pedal is released.

If not, adjust the accelerator linkage.

- (d) Start the engine.
 (e) Check the idle speed.

Idle speed: 650 – 750 rpm

- (f) Adjust the idle speed.
- (1) Disconnect the accelerator linkage.
 - (2) Loosen the lock nut of the idle speed adjusting screw.
 - (3) Adjust the idle speed by turning the idle speed adjusting screw.
 - (4) Securely tighten the lock nut, and recheck the idle speed.
 - (5) Reconnect the accelerator linkage.

**10. ADJUST MAXIMUM SPEED**

- (a) Check that the adjusting lever touches the maximum speed adjusting screw when the accelerator pedal is fully-depressed.

If not, adjust the accelerator linkage.

- (b) Start the engine.
 (c) Fully depress the accelerator pedal all the way.
 (d) Check the maximum speed.

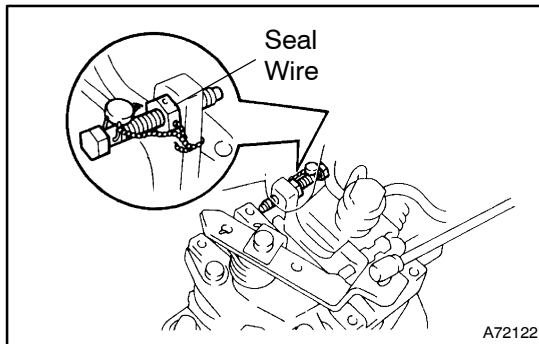
Maximum speed: 4,050 – 4,250 rpm

- (e) Adjust the maximum speed.
- (1) Disconnect the accelerator linkage.
 - (2) Cut off the seal wire of the maximum speed adjusting screw.
 - (3) Loosen the lock nut of the maximum speed adjusting screw.

- (4) Adjust the maximum speed by turning the maximum speed adjusting screw.

HINT:

Adjust at max speed. Then, raise the engine speed and recheck the maximum speed.



- (5) Securely tighten the lock nut.
- (6) Recheck the maximum speed.
- (7) Reconnect the accelerator linkage.
- (8) After the adjustment, adjust the accelerator linkage.
- (9) Seal the maximum speed adjusting screw with a new seal wire.

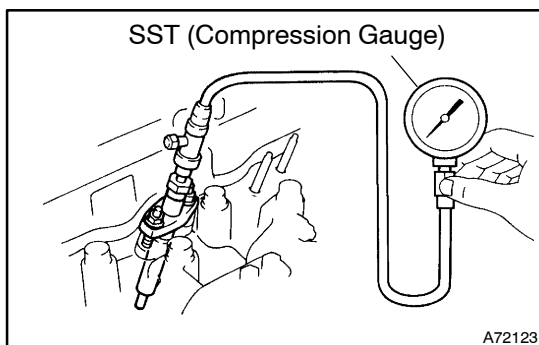
11. INSPECT COMPRESSION**HINT:**

If there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

- (a) Warm up and stop the engine.
- (b) Remove the nozzle assy (See page 11-7).
- (c) Disconnect the fuel cut solenoid connector.
- (d) Install the gasket and SST (attachment) to the injection nozzle hole with the 2 nuts.

SST 09992-00025 (09992-00250, 09992-00211)

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)



- (e) Connect SST (compression gauge) to the SST (attachment).
- (f) Fully open the throttle valve, and start the engine.
- (g) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain engine revolution of 250 rpm or more.

- (h) Repeat steps (a) through (d) for each cylinder.

NOTICE:

This measurement must be performed in as short a time as possible.

Compression pressure:

2,942 kPa (30.0 kgf/cm², 427 psi) or more

Minimum pressure: 1,961 kPa (20.0 kgf/cm², 284 psi)

Difference between each cylinder:

196 kPa (2.0 kgf/cm², 28 psi) or less

- (i) If any cylinder has low pressure, pour a small amount of engine oil into the cylinder through the injection nozzle hole. Then repeat steps (a) through (d) for the cylinder with low pressure.
 - If adding oil helps the pressure, the piston rings and/or cylinder bore may be worn or damaged.

- If pressure stays low, a valve may be sticking or seating improperly, or there may be leakage through the gasket.
- (j) Remove the SST.
SST 09992-00025 (09992-00250, 09992-00211)
- (k) Connect the fuel cut solenoid connector.
- (l) Install the nozzle assy (See page 11-7).
- (m) Start the engine and check for leaks.

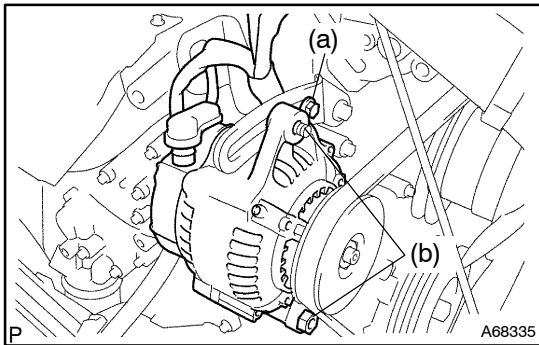
12. INSPECT DIESEL SMOKE

DRIVE BELT (14B)

1416R-01

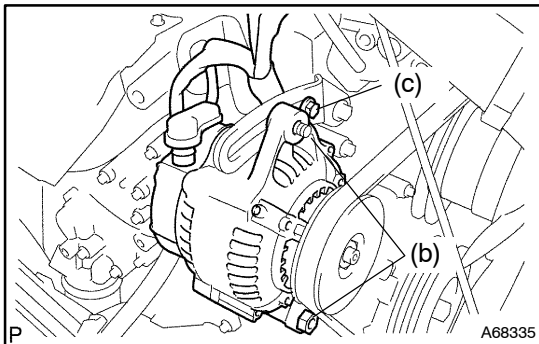
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
3. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE) (See page 14-23)
4. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
5. REMOVE FLOOR SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-23)
6. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE) (See page 14-23)
7. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
8. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
9. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-23)



10. REMOVE V BELT

- (a) Remove the bolt and wire clamp.
- (b) Loosen the 2 bolts and remove the V belt.



11. INSTALL V BELT

- (a) Install the V belt and adjust the belt tension (See page 14-1).
- (b) Tighten the 2 bolts.

Torque:

14 mm head 35 N·m (360 kgf·cm, 26 ft·lbf)

17 mm head 37.5 N·m (382 kgf·cm, 28 ft·lbf)

- (c) Install the wire clamp with the bolt.

12. INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-23)
13. INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
14. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
15. INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
16. INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
17. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)
(See page 33-11)

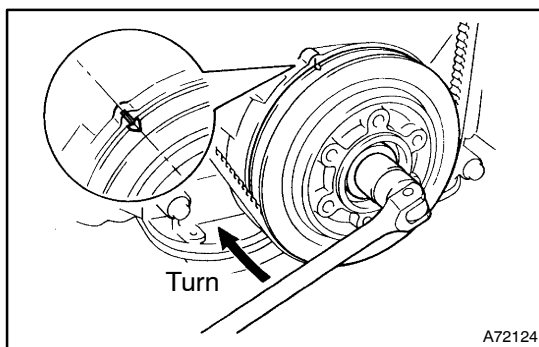
18. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)**
19. **CONNECT BATTERY NEGATIVE TERMINAL**

VALVE CLEARANCE (14B)

1416S-01

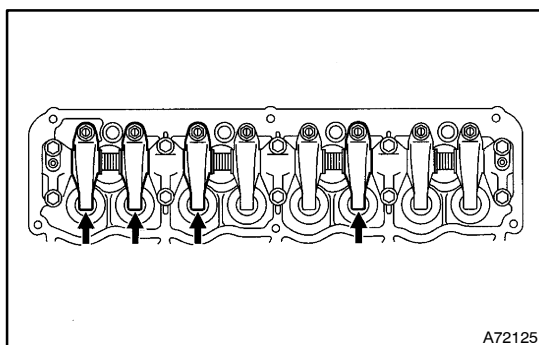
ADJUSTMENT

1. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
2. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE) (See page 14-23)
3. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
4. REMOVE FLOOR SHIFT SHIFTER LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-23)
5. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE) (See page 14-23)
6. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
7. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
8. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-23)
9. REMOVE OIL FILLER CAP SUB-ASSY
10. REMOVE CYLINDER HEAD COVER SUB-ASSY (See page 14-23)



11. SET NO. 1 CYLINDER TO TDC/COMPRESSION

- (a) Turn the crankshaft pulley clockwise, and align its groove with the groove of the timing gear cover.
- (b) Check that the valve rocker arm on the No. 1 cylinder is loose and valve rocker arm on the No. 4 cylinder is tight. If not, turn the crankshaft 1 revolution (360°) and align the mark as above.



12. INSPECT VALVE CLEARANCE

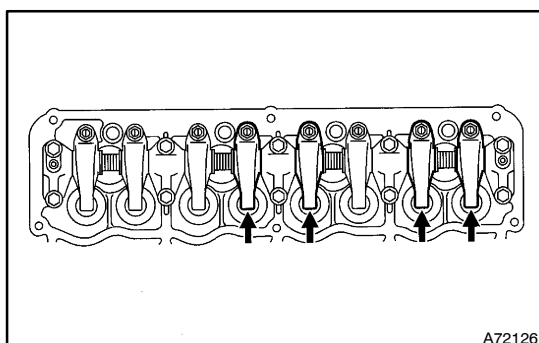
- (a) Check only the 4 valves indicated in the illustration.
 - (1) Using a feeler gauge, measure the clearance between the adjusting screw on the valve rocker arm and the valve step cap.
 - (2) Record the out-of-specification valve clearance measurements.

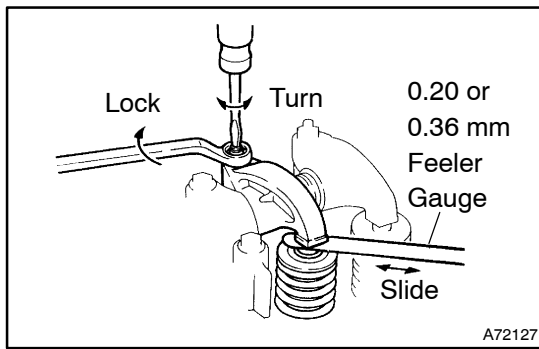
Valve clearance (Hot):

0.20 mm (0.008 in.) for Intake

0.36 mm (0.014 in.) for Exhaust

- (b) Turn the crankshaft pulley 1 revolution (360°) and align the mark as above (See step 11).
- (c) Check only the 4 valves indicated as shown in the illustration. Measure the valve clearance (See step (a)).



**13. ADJUST VALVE CLEARANCE**

- (a) Loosen the lock nut on the valve rocker arm, and loosen the adjusting screw.
- (b) Insert a 0.20 mm (0.008 in.) feeler gauge for intake or 0.36 mm (0.014 in.) feeler gauge for exhaust between the adjusting screw on the valve rocker arm and the valve step cap.
- (c) Turn the adjusting screw on the valve rocker arm until the feeler gauge slides with a very slight drag, and lock the adjusting screw with the lock nut.
- (d) Recheck the valve clearance.

14. **INSTALL CYLINDER HEAD COVER SUB-ASSY (See page 14-23)**
15. **INSTALL OIL FILLER CAP SUB-ASSY**
16. **INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)**
(See page 14-23)
17. **INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)**
18. **INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)**
19. **INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)**
20. **INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)**
(See page 72-2)
21. **ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)**
(See page 33-11)
22. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)**

ENGINE ASSY (14B)

1416T-01

REPLACEMENT

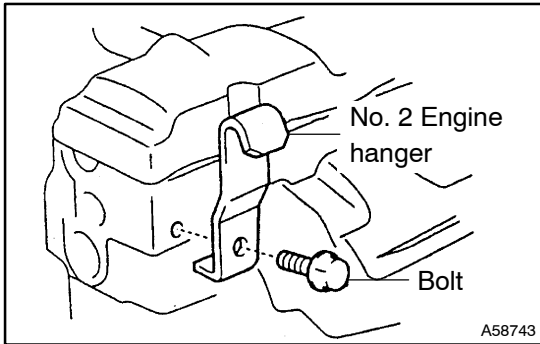
1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE
4. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
5. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE) (See page 14-23)
6. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
7. REMOVE FLOOR SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
8. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE) (See page 14-23)
9. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)
10. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE)
11. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-23)
12. DISCONNECT RADIATOR HOSE INLET
13. DISCONNECT RADIATOR HOSE OUTLET
14. REMOVE FAN SHROUD (See page 16-11)
15. REMOVE RADIATOR ASSY (See page 16-11)
16. DISCONNECT ENGINE WIRE
17. REMOVE AIR HOSE NO.1
18. DISCONNECT ACCEL CONTROL W/ THROTTLE CABLE ASSY
19. DISCONNECT FUEL MAIN HOSE
20. DISCONNECT FUEL RETURN HOSE
21. DISCONNECT TIE ROD END SUB-ASSY RH (See pages 30-50 and 30-55)
22. DISCONNECT TIE ROD END SUB-ASSY LH (See pages 30-50 and 30-55)
23. REMOVE PROPELLER SHAFT ASSY (See pages 30-4 and 30-14)
24. DISCONNECT CLUTCH RELEASE CYLINDER ASSY

HINT:

Disconnect the clutch release cylinder assembly with the hose connected, and then it should be hung with rope.

25. REMOVE EXHAUST PIPE ASSY FRONT (See page 15-8)
26. DISCONNECT FLOOR SHIFT CABLE TRANSMISSION CONTROL SHIFT
 - (a) Remove the clip and nut, and then disconnect the shift cable from the transmission.
27. DISCONNECT FLOOR SHIFT CABLE TRANSMISSION CONTROL SELECT
 - (a) Remove the clip and nut, and then disconnect the select cable from the transmission.
28. REMOVE FRONT AXLE I-BEAM
 - (a) Remove the steering knuckles (See pages 30-50 and 30-55).
 - (b) Remove the front spring (See pages 26-5 and 26-13).
 - (c) Remove the front axle I-beam.
29. REMOVE ENGINE W/ TRANSMISSION ASSEMBLY
 - (a) Using an engine lifter to hold the engine, separate the mount of the transmission.
 - (b) Disconnect the parking brake cable No. 3 (for vehicles with center brake).

- (c) First remove the engine front mounting bracket RH and LH, and then remove the engine assembly together with the transmission.



- (d) Install the No. 2 engine hanger in the correct direction.
Part No.:

No. 2 engine hanger	12282-54060
Bolt	91612-61022

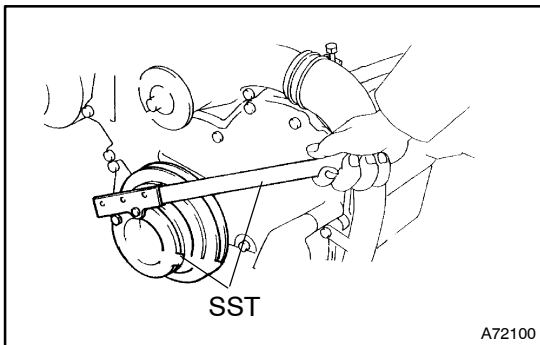
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

- (e) Using a chain block and engine sling device, hang up the engine assembly so as not tilt it.

CAUTION:

Do not attempt to hang the engine by hooking the chain to any other part.

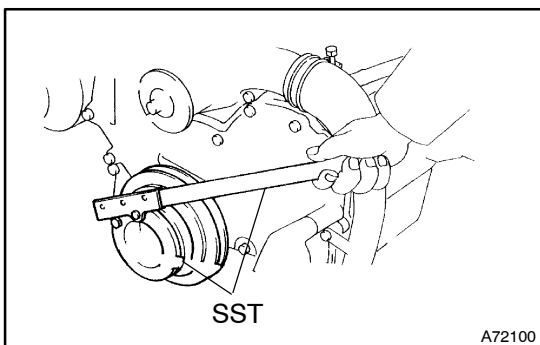
- 30. REMOVE ENGINE WIRE
- 31. REMOVE STARTER ASSY (See page 19-3)
- 32. REMOVE MANUAL TRANSMISSION ASSY (See page 41-3)
- 33. REMOVE CLUTCH COVER ASSY (See page 42-24)
- 34. REMOVE CLUTCH DISC ASSY (See page 42-24)



35. REMOVE FLYWHEEL SUB-ASSY

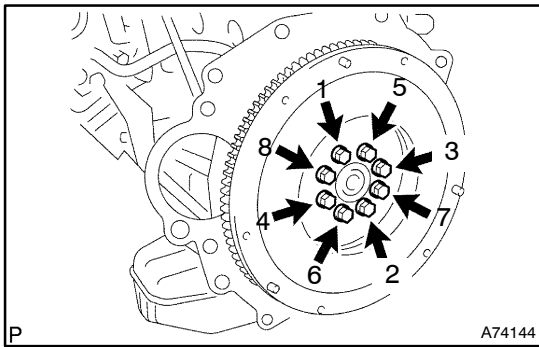
- (a) Using SST to fix the crankshaft pulley, remove the flywheel.
SST 09213-58013 (91111-50845), 09330-00021

- 36. REMOVE REAR END PLATE
- 37. INSTALL REAR END PLATE



38. INSTALL FLYWHEEL SUB-ASSY

- (a) Using SST, fix the crankshaft pulley.
SST 09213-58013 (91111-50845), 09330-00021
- (b) Apply adhesive to 2 or 3 threads of the mounting bolt end.
Adhesive:
Part No. 08833-00080 THREE BOND 1344 or equivalent



(c) Install the bolts, as shown in the illustration.

Torque: 160 N·m (1,635 kgf·cm, 121 ft·lbf)

NOTICE:

Do not start the engine within 1 hour after the installation.

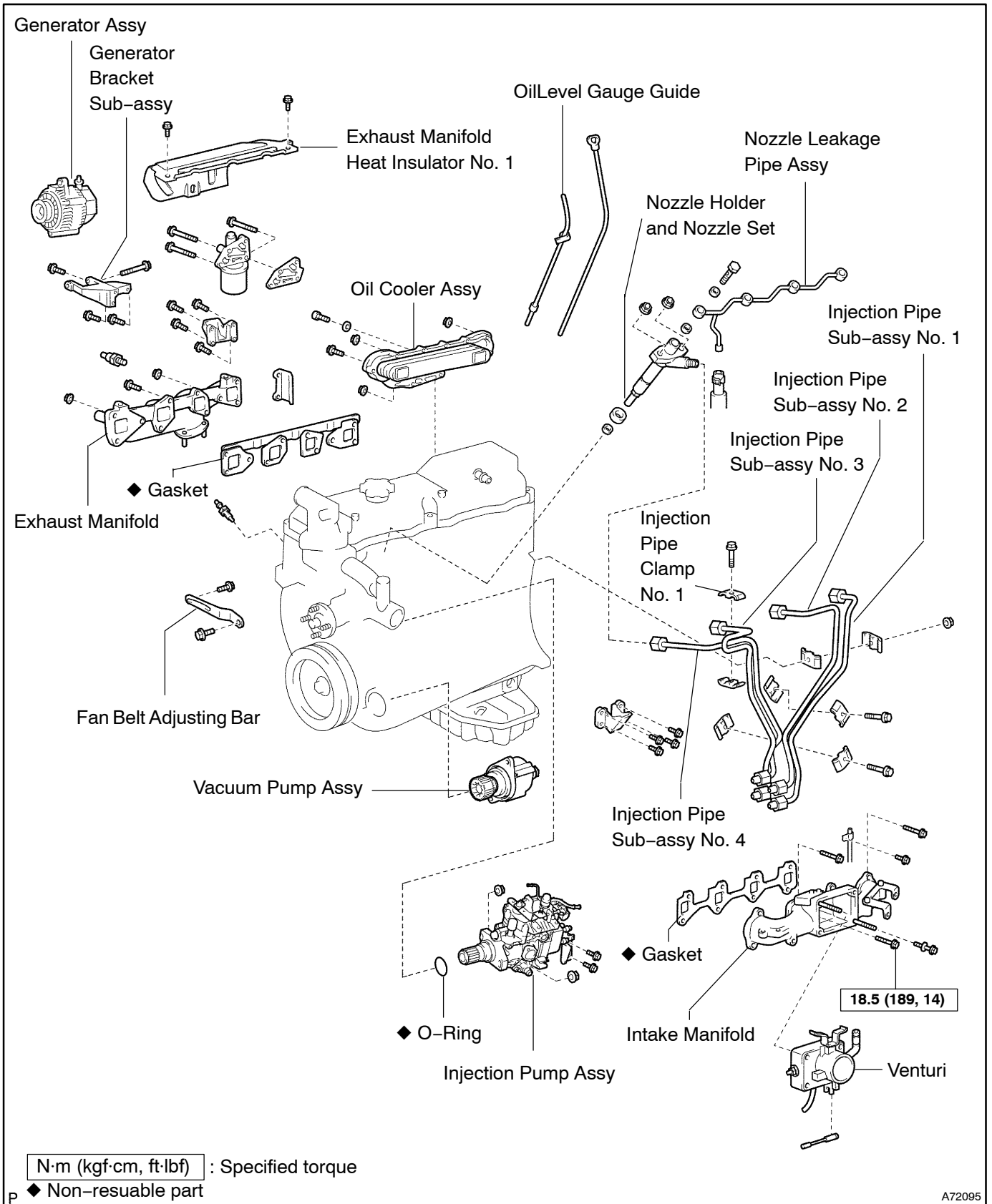
39. **INSTALL CLUTCH DISC ASSY (See page 42-24)**
40. **INSTALL CLUTCH COVER ASSY (See page 42-24)**
41. **INSTALL MANUAL TRANSMISSION ASSY (See page 41-3)**
42. **INSTALL STARTER ASSY (See page 19-3)**
43. **INSTALL ENGINE WIRE**
44. **INSTALL FRONT AXLE I-BEAM**
 - (a) Install the front axle I-beam.
 - (b) Install the front spring (See page 26-5 and 26-13).
 - (c) Install the steering knuckles (See page 30-50 and 30-55).
45. **INSTALL ENGINE W/ TRANSMISSION ASSEMBLY**
 - (a) Using an engine lifter, install the engine assembly with the transmission.
Torque:
61 N·m (622 kgf·cm, 45 ft·lbf) for mounting bracket RH, LH to frame
42 N·m (430 kgf·cm, 31 ft·lbf) for mounting bracket RH, LH to mounting insulator FR
98 N·m (1000 kgf·cm, 72 ft·lbf) for mounting bracket RR to mounting bracket RR No. 2
 - (b) Remove the No. 2 engine hanger.
46. **INSTALL FLOOR SHIFT CABLE TRANSMISSION CONTROL SELECT**
 - (a) Install the control cable with the clip and nut.
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)
47. **INSTALL FLOOR SHIFT CABLE TRANSMISSION CONTROL SHIFT**
 - (a) Install the control cable with the clip and nut.
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)
48. **INSTALL EXHAUST PIPE ASSY FRONT**
49. **INSTALL CLUTCH RELEASE CYLINDER ASSY (See page 42-21)**
50. **INSTALL PROPELLER SHAFT ASSY (See pages 30-4 and 30-14)**
51. **INSTALL TIE ROD END SUB-ASSY LH (See pages 30-50 and 30-55)**
52. **INSTALL TIE ROD END SUB-ASSY RH (See pages 30-50 and 30-55)**
53. **INSTALL FUEL RETURN HOSE**
54. **INSTALL FUEL MAIN HOSE**
55. **INSTALL ACCEL CONTROL W/ THROTTLE CABLE ASSY**
56. **INSTALL AIR HOSE NO.1**
57. **INSTALL ENGINE WIRE**
58. **INSTALL RADIATOR ASSY (See page 16-11)**
59. **INSTALL FAN SHROUD (See page 16-11)**
60. **INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)**
(See page 14-23)
61. **INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)**
62. **INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)**
63. **INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 14-23)**

64. **INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)**
(See page 72-2)
65. **ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)**
(See page 33-11)
66. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)**
67. **REFILL ENGINE COOLANT**
68. **BLEED FUEL (See page 11-4)**
69. **CONNECT BATTERY NEGATIVE TERMINAL**
70. **CHECK FOR ENGINE COOLANT LEAKS**
71. **INSPECT FOR FUEL LEAKS**
72. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT (See page 26-2)**

PARTIAL ENGINE ASSY (14B)

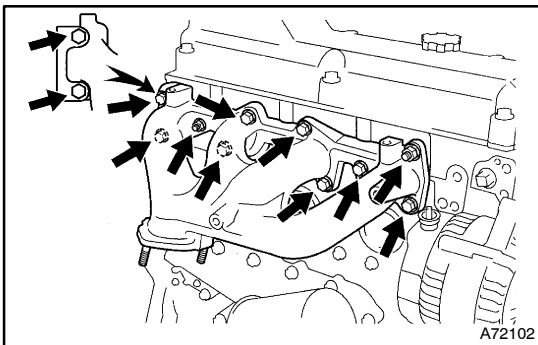
COMPONENTS

1416U-01



REPLACEMENT

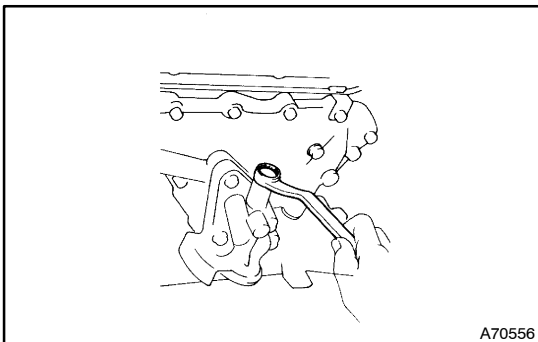
1. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
2. REMOVE ENGINE ASSY (See page 14-12)
3. REMOVE GENERATOR ASSY (See page 19-6)
4. REMOVE FAN BELT ADJUSTING BAR
 - (a) Remove the bolt and adjusting bar.
5. REMOVE GENERATOR BRACKET SUB-ASSY
 - (a) Remove the 3 bolts and generator bracket.
6. REMOVE INJECTION PIPE CLAMP NO.1
7. REMOVE INJECTION PIPE SUB-ASSY NO.4 (See page 11-7)
8. REMOVE INJECTION PIPE SUB-ASSY NO.3 (See page 11-7)
9. REMOVE INJECTION PIPE SUB-ASSY NO.2 (See page 11-7)
10. REMOVE INJECTION PIPE SUB-ASSY NO.1 (See page 11-7)
11. REMOVE INJECTION PUMP ASSY (See page 11-14)
12. REMOVE ENGINE MOUNTING BRACKET FRONT NO.1 RH
 - (a) Remove the 4 bolts and mounting bracket.
13. REMOVE ENGINE MOUNTING BRACKET FRONT NO.1 LH
 - (a) Remove the 4 bolts and mounting bracket.
14. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.1
 - (a) Remove the 3 bolts and heat insulator.



15. REMOVE EXHAUST MANIFOLD

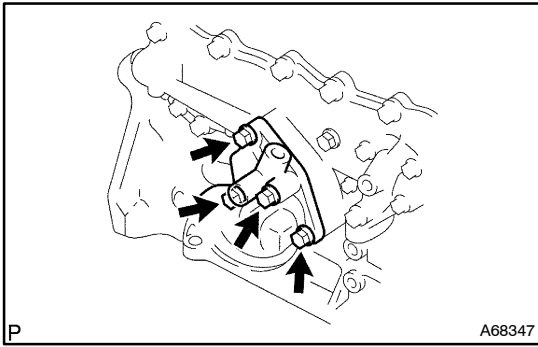
- (a) Remove the 8 bolts, 2 nuts, exhaust manifold, No. 2 heat insulator and gasket.

16. REMOVE OIL FILTER SUB-ASSY (See page 17-2)

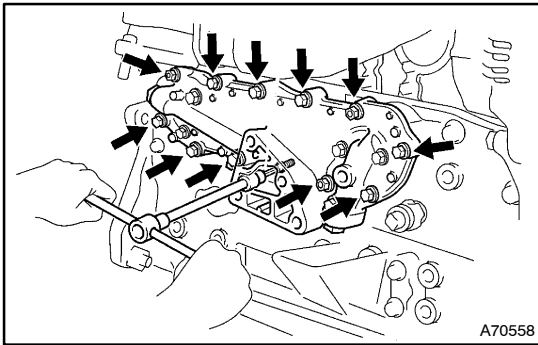


17. REMOVE OIL FILTER BRACKET SUB-ASSY

- (a) Remove the plug, gasket, spring relief valve and gasket.

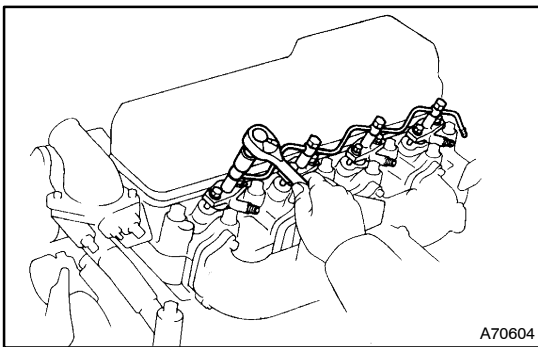


- (b) Remove the 4 bolts, bracket and gasket.



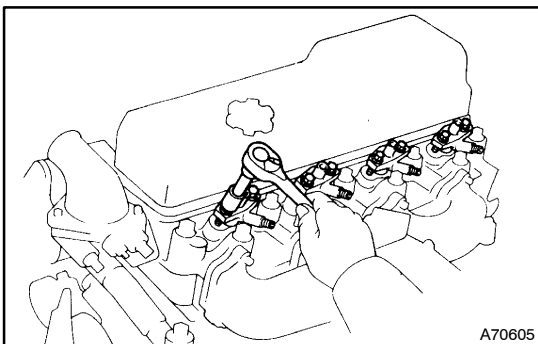
18. REMOVE OIL COOLER ASSY

- (a) Using a 6 mm hexagon wrench, remove the bolt and washer.
 (b) Remove the 8 bolts, 3 nuts, oil cooler case and gasket.



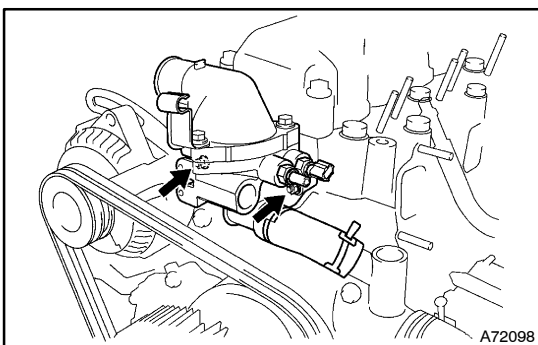
19. REMOVE NOZZLE LEAKAGE PIPE ASSY

- (a) Disconnect the fuel hose from the leakage pipe.
 (b) Remove the 4 hollow bolts, leakage pipe and 8 gaskets.



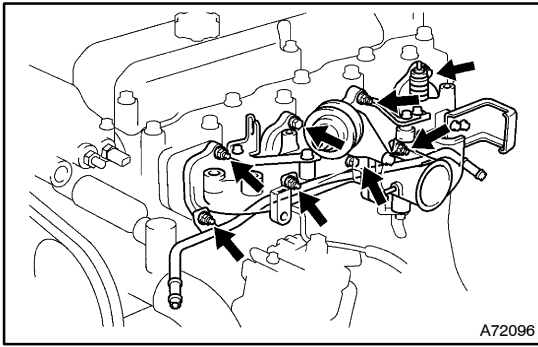
20. REMOVE NOZZLE HOLDER AND NOZZLE SET

- (a) Remove the 2 nuts, nozzle, ring packing and seat.
 (b) Remove the 2 nuts, nozzle holder and nozzle set.

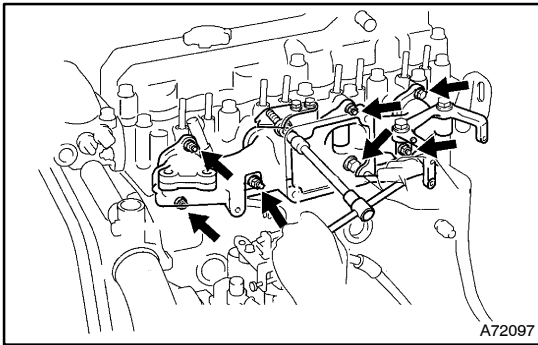


21. REMOVE WATER OUTLET HOUSING

- (a) Remove the 2 nuts holding the water outlet housing to the cylinder head.
 (b) Disconnect the water bypass hose from the water pump and remove the water outlet housing.

**22. REMOVE INTAKE MANIFOLD**

- (a) Remove the bolt and nut holding the water bypass pipe to the bolt and oil level gauge.
- (b) Remove the bolt and oil level gauge guide.



- (c) Using a 6 mm hexagon wrench, remove the bolt.
- (d) Remove the 5 nuts and intake manifold and gasket.

23. REMOVE WATER TEMPERATURE SENDER GAGE ASSY**24. REMOVE ENGINE OIL PRESSURE SWITCH ASSY**

- (a) Using SST, remove the engine oil pressure switch.
SST 09816-30010

25. REMOVE VACUUM PUMP ASSY

- (a) Remove the 2 bolts and vacuum pump.

26. INSTALL VACUUM PUMP ASSY

- (a) Install the vacuum pump with the 2 bolts.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

27. INSTALL ENGINE OIL PRESSURE SWITCH ASSY

- (a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

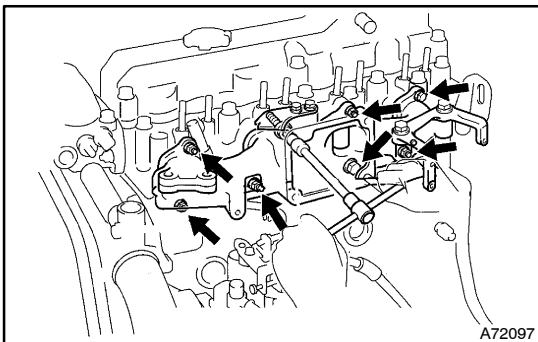
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

NOTICE:

Do not start the engine within 1 hour after the installation.

- (b) Using SST, install the oil pressure switch.
SST 09816-30010

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

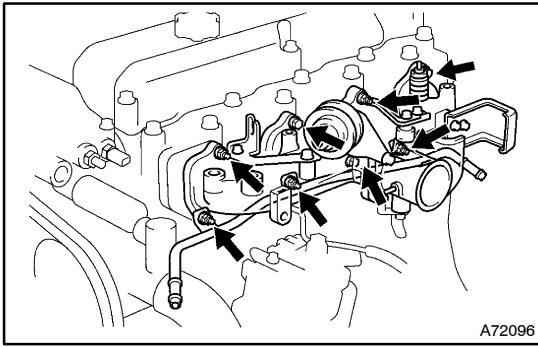
28. INSTALL WATER TEMPERATURE SENDER GAGE ASSY**29. INSTALL INTAKE MANIFOLD**

- (a) Install a new gasket, the intake manifold and oil level gauge guide with the bolt and 5 nuts.

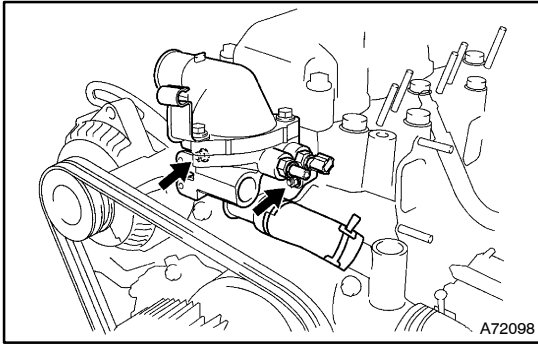
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

- (b) Using a 6 mm hexagon wrench, install the bolt.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)



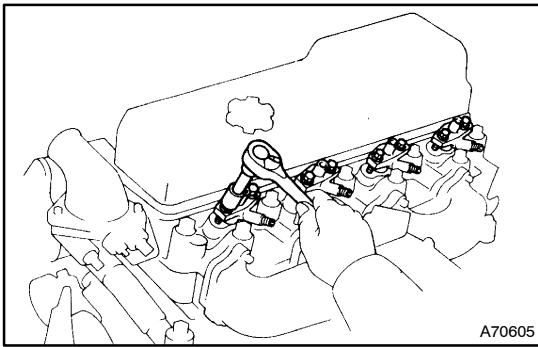
- (c) Install the bolt and nut to hold the water bypass pipe to the intake manifold and venturi.



30. INSTALL WATER OUTLET HOUSING

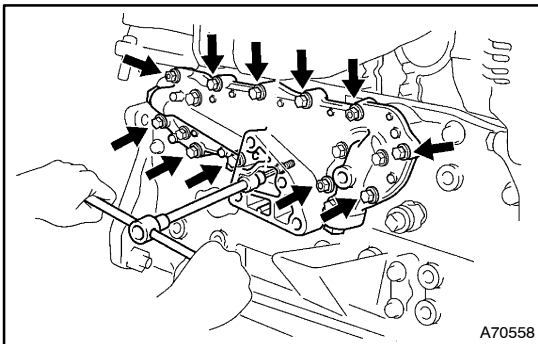
- (a) Connect the water bypass hose to the water pump.
 (b) Install the water outlet housing with the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)



31. INSTALL NOZZLE HOLDER AND NOZZLE SET

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



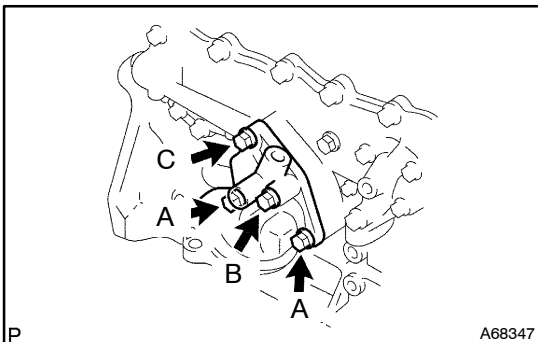
32. INSTALL OIL COOLER ASSY

- (a) Install a new gasket, the oil cooler case with the 8 bolts and 3 nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

- (b) Using a 6 mm wrench, install the washer and bolt.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)



33. INSTALL OIL FILTER BRACKET SUB-ASSY

- (a) Install a new gasket and the oil filter bracket with the 4 bolts.

Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

HINT:

Bolt length:

A 70 mm (2.95 in.)

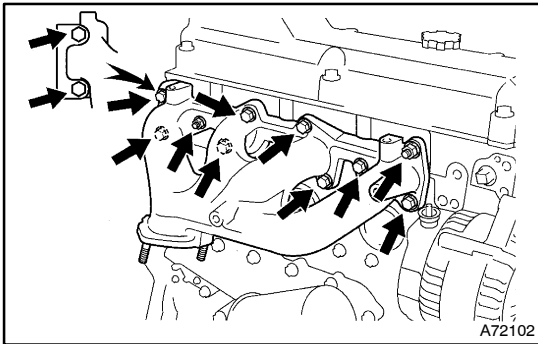
B 55 mm (2.17 in.)

C 35 mm (1.38 in.)

- (b) Install the relief valve and spring with a new gasket and the relief valve.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

34. INSTALL OIL FILTER SUB-ASSY (See page 17-2)



35. INSTALL EXHAUST MANIFOLD

- (a) Install a new gasket, the exhaust manifold and the No. 2 heat insulator with the 8 bolts and new 2 nuts.

Torque: 47.5 N·m (484 kgf·cm, 35 ft·lbf)

36. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.1

- (a) Install the heat insulator with the 3 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

37. INSTALL ENGINE MOUNTING BRACKET FRONT NO.1 LH

- (a) Install the mounting bracket with the 4 bolts.

Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

38. INSTALL ENGINE MOUNTING BRACKET FRONT NO.1 RH

- (a) Install the mounting bracket with the 4 bolts.

Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

39. INSTALL INJECTION PUMP ASSY (See page 11-14)

40. INSTALL INJECTION PIPE SUB-ASSY NO.1 (See page 11-7)

41. INSTALL INJECTION PIPE SUB-ASSY NO.2 (See page 11-7)

42. INSTALL INJECTION PIPE SUB-ASSY NO.3 (See page 11-7)

43. INSTALL INJECTION PIPE SUB-ASSY NO.4 (See page 11-7)

44. INSTALL INJECTION PIPE CLAMP NO.1

45. INSTALL GENERATOR BRACKET SUB-ASSY

- (a) Install the generator bracket with the 3 bolts.

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

46. INSTALL FAN BELT ADJUSTING BAR

- (a) Install the adjusting bar with the bolt.

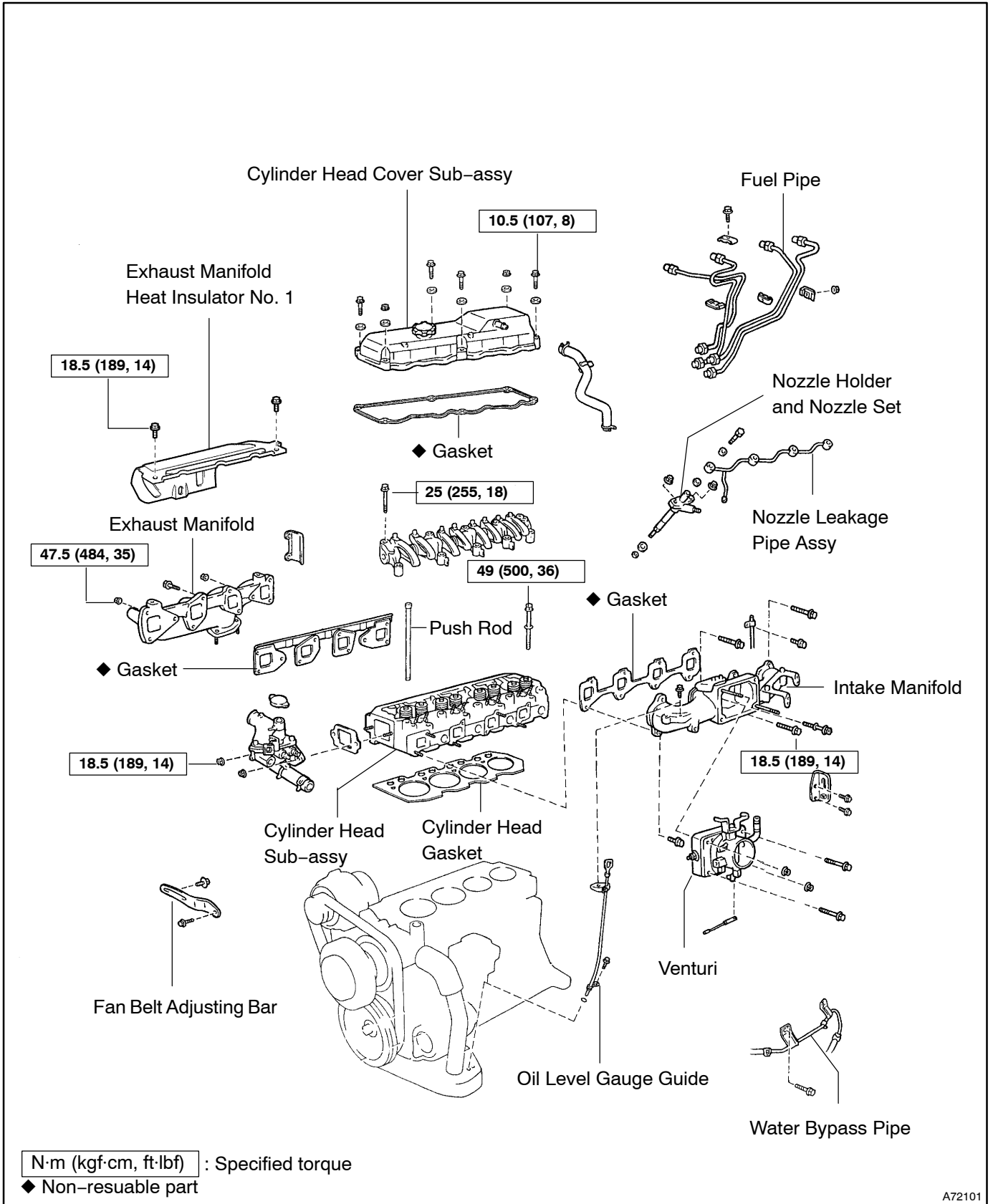
Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

47. INSTALL GENERATOR ASSY (See page 19-6)

48. INSTALL ENGINE ASSY (See page 14-12)

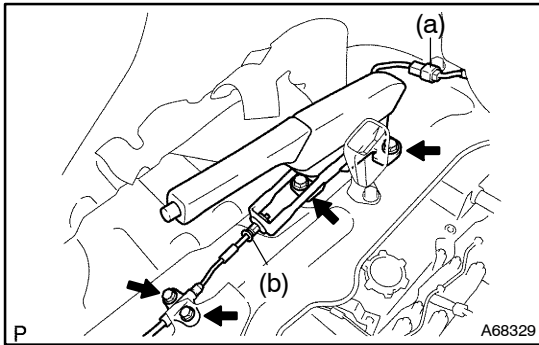
CYLINDER HEAD GASKET (14B) COMPONENTS

1416W-01



REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE OIL
3. DRAIN ENGINE COOLANT
4. DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE
5. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
6. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE)

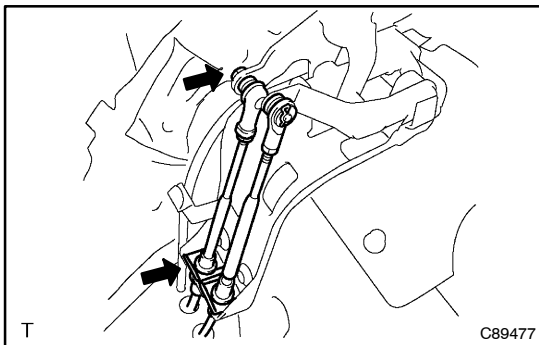


7. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE)

- (a) Disconnect the parking barake switch connector.
- (b) Fixing the adjusting nut, loosen the lock nut.
- (c) Remove the 4 bolts and parking brake lever assy.

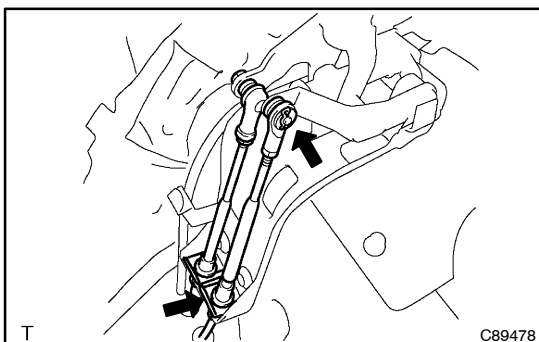
8. REMOVE FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
9. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE)

- (a) Remove the 3 clips and shift lever boot cover.

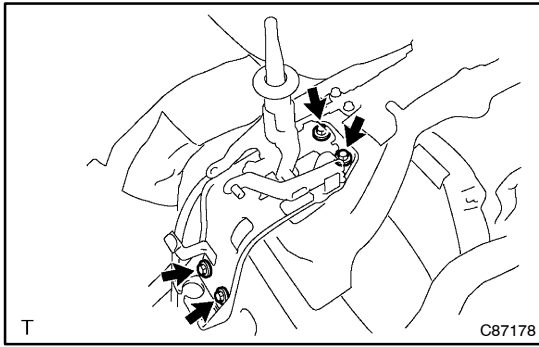


10. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE)

- (a) Remove the nut, and disconnect the shift cable from the floor shift assy.
- (b) Remove the clip, and disconnect the shift cable from the floor shift lever retainer.

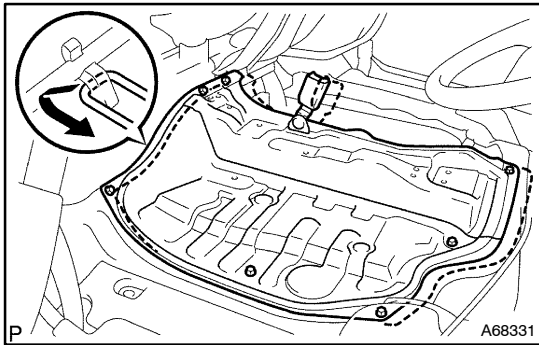


- (c) Remove the clip, and disconnect the select cable from the floor shift assy.
- (d) Remove the clip, and disconnect the select cable from the shift lever retainer.



11. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE)

- (a) Remove the 4 bolts and floor shift.



12. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

- (a) Remove the floor mat.
 (b) Remove the 7 bolts and the engine service hole sub cover.

HINT:

As shown in the illustration, slide and remove the engine service hole sub cover, because there is a hook inside.

13. REMOVE RADIATOR ASSY (See page 16-17)

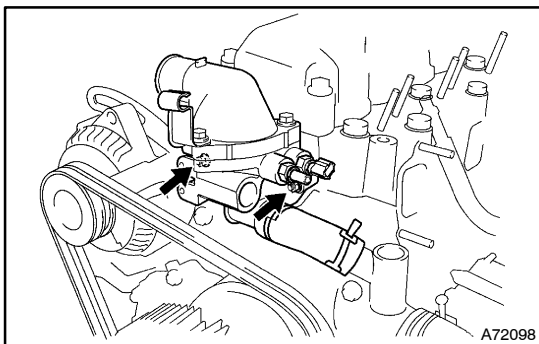
14. DISCONNECT ENGINE WIRE

15. REMOVE OIL LEVEL GAUGE GUIDE

- (a) Remove the bolt and gauge guide.

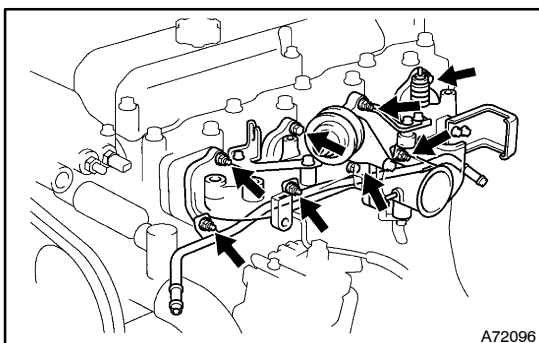
16. DISCONNECT ACCELERATOR CONTROL W/ THROTTLE CABLE ASSY

17. REMOVE FUEL PIPE SET (See page 11-7)



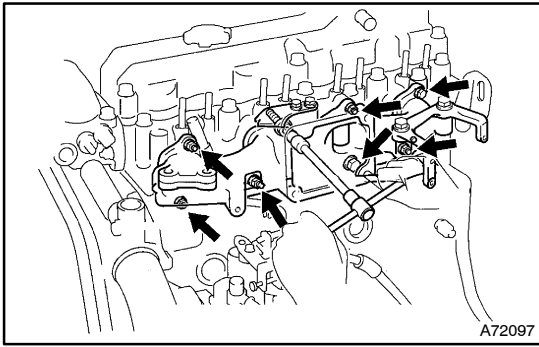
18. REMOVE WATER OUTLET HOUSING

- (a) Remove the 2 nuts holding the water outlet housing to the cylinder head.
 (b) Disconnect the water bypass hose from the water pump, and remove the water outlet housing.

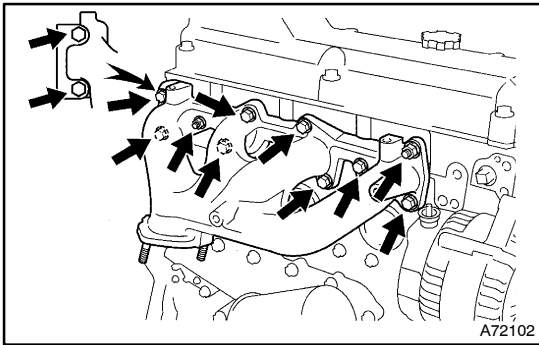


19. REMOVE INTAKE MANIFOLD

- (a) Remove the bolt and nut holding the water bypass pipe to the intake manifold and venturi.
 (b) Remove the bolt and oil level gauge guide.

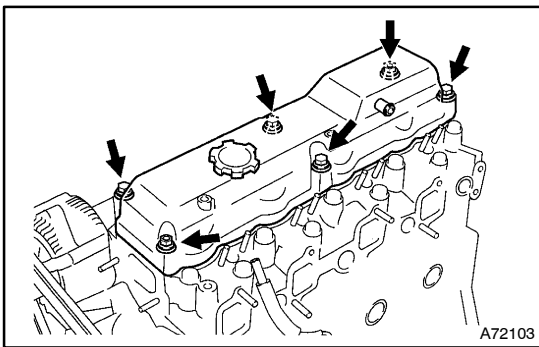


- (c) Using a 6 mm hexagon wrench, remove the bolt.
- (d) Remove the 5 nuts, intake manifold and gasket.



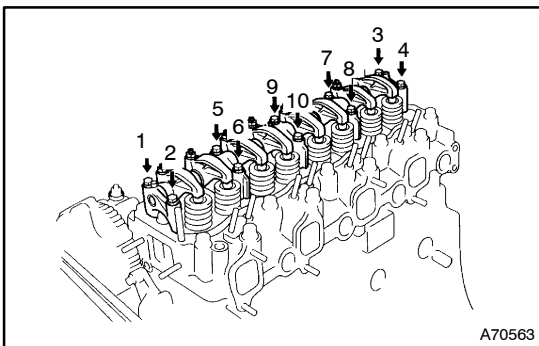
20. REMOVE EXHAUST MANIFOLD

- (a) Remove the exhaust front pipe (See page 15-8).
- (b) Remove the 3 bolts and exhaust manifold heat insulator No. 1.
- (c) Remove the 8 bolts, 2 nuts, exhaust manifold, No. 2 heat insulator and gasket.



21. REMOVE CYLINDER HEAD COVER SUB-ASSY

- (a) Remove the 4 bolts, 2 nuts, 6 cushions, cylinder head cover and gasket.



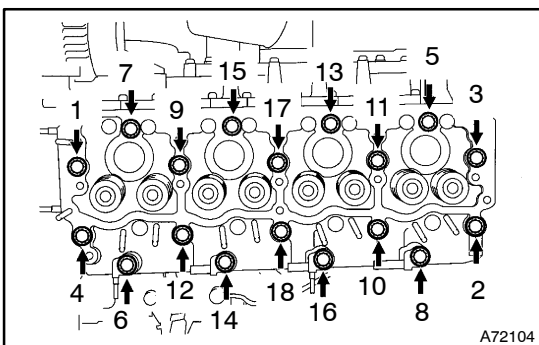
22. REMOVE CYLINDER HEAD SUB-ASSY

- (a) Loosen the lock nuts and adjusting screws.
- (b) Uniformly loosen the 10 bolts and remove them, in several passes, in the order shown.
- (c) Remove the 8 push rods in order, beginning from the No. 1 push rod.

HINT:

Arrange the push rods in the correct order.

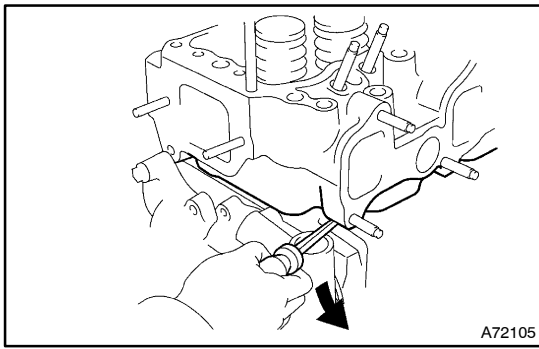
- (d) Remove the rocker shaft assembly.



- (e) Uniformly loosen and remove the 18 cylinder head bolts, in several passes, in the order shown.

NOTICE:

Removing the bolts in the incorrect order will result in warpage or cracks on the head.



- (f) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.

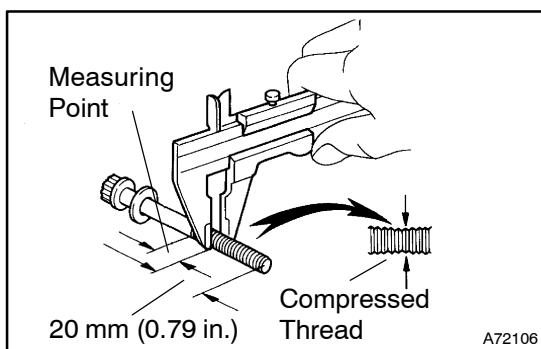
HINT:

If the cylinder head is difficult to be lifted off, insert a screwdriver between the cylinder head and block to pry it up.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

23. REMOVE CYLINDER HEAD GASKET



24. INSPECT CYLINDER HEAD SET BOLT

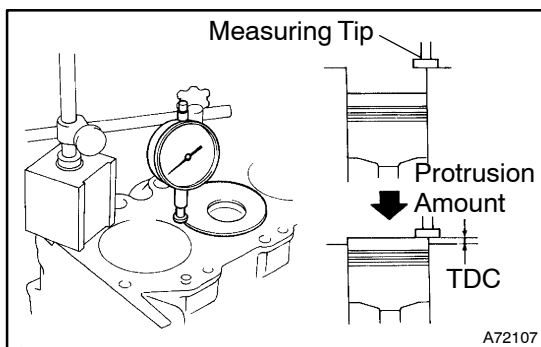
- (a) Using vernier calipers, measure the minimum outer diameter of the compressed threads at the measuring point.

Standard diameter:

11.800 – 12.000 mm (0.4646 – 0.4724 in.)

Minimum outer diameter: 11.60 mm (0.4567 in.)

If the diameter is less than the minimum, replace the bolt.

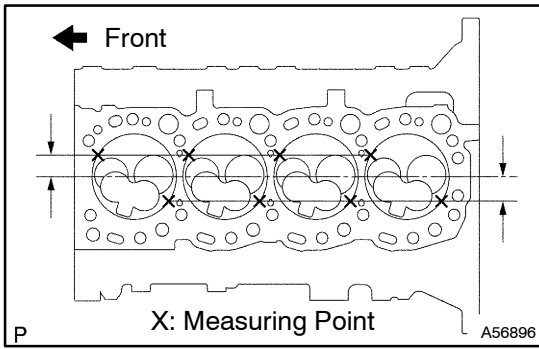


25. INSTALL CYLINDER HEAD GASKET

- (a) Check the piston protrusions for each cylinder.
- (1) Clean the cylinder block with solvent.
 - (2) Set the piston of the cylinder to be measured to slightly before TDC.
 - (3) Place a dial indicator on the cylinder block, and set the dial indicator at 0 mm (0 in.).

HINT:

- Use a dial indicator measuring tip as shown in the illustration.
- Make sure that the measuring tip is square to the cylinder block gasket surface and piston head when taking the measurements.
- (4) Find the point where the piston head protrudes most by slowly turning the crankshaft clockwise and counterclockwise.



- (5) Measure each cylinder at 2 places as shown in the illustration, making a total of 8 measurements.
- (6) For the piston protrusion value of each cylinder, use the average of the 2 measurements of each cylinder.

Protrusion: 0.535 – 0.985 mm (0.0211 – 0.0388 in.)

When removing piston and connecting rod assembly:

If the protrusion is not as specified, remove the piston and connecting rod assembly and reinstall it.

- (b) Select a new cylinder head gasket.

HINT:

There are 3 sizes of new cylinder head gaskets, marked 1.5, 1.6 or 1.7 accordingly.

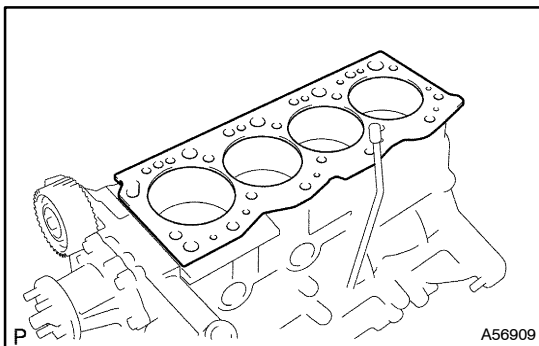
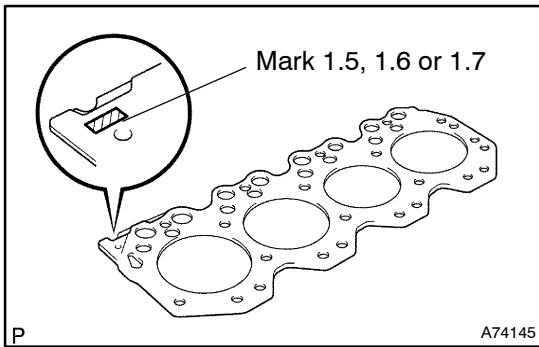
New installed cylinder head gasket thickness:

Mark 1.5	1.47 – 1.53 mm (0.0579 – 0.0602 in.)
Mark 1.6	1.57 – 1.63 mm (0.0618 – 0.0642 in.)
Mark 1.7	1.67 – 1.73 mm (0.0657 – 0.0681 in.)

Select the largest piston protrusion value from the measurements made, then select a new appropriate gasket from the table below.

Protrusion:

Piston Protrusion	mm (in.)	Gasket size
0.535 – 0.785	(0.0211 – 0.0309)	Use 1.5
0.785 – 0.885	(0.0309 – 0.0348)	Use 1.6
0.885 – 0.985	(0.0348 – 0.0388)	Use 1.7



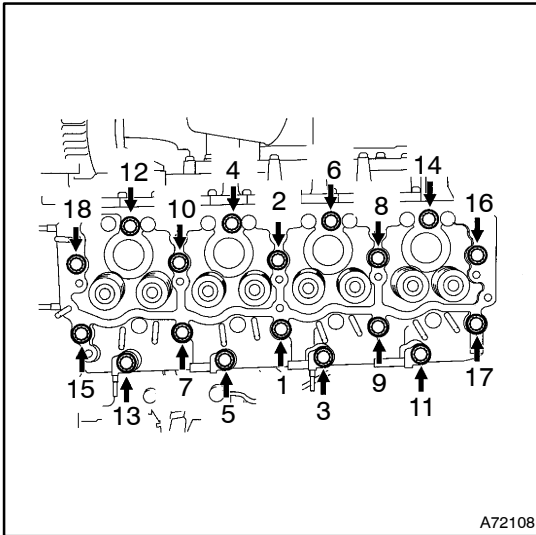
26. INSTALL CYLINDER HEAD SUB-ASSY

- (a) Place the cylinder head on the cylinder block.
 - (1) Place a new cylinder head gasket in position on the cylinder block.

NOTICE:

Be careful of the installation direction.

- (2) Place the cylinder head in position on the cylinder head gasket.



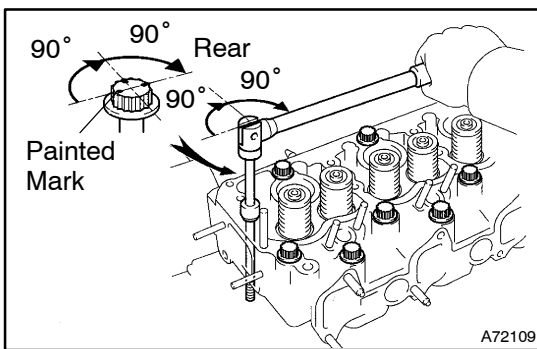
(b) Install the cylinder head bolts.

HINT:

- The cylinder head bolts are tightened in 3 progressive steps (steps (2), (4) and (5)).
 - If any bolts is broken or deformed, replace it.
- (1) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
 - (2) Install and uniformly tighten the 18 cylinder head bolts, in several passes, in the order shown.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

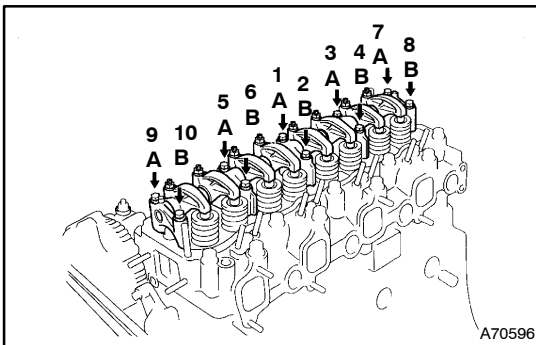
If any of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.



- (3) Mark the front of the cylinder head bolt with paint.
- (4) Retighten the cylinder head bolts by 90° in the numerical order shown.
- (5) Retighten the cylinder head bolts by an additional 90°.
- (6) Check that the painted mark is now facing rearward.

(c) Install the push rods.

(d) Place the rocker arm adjusting screws with the heads of the push rods.



(e) Install the 10 bolts and uniformly tighten them, in several passes, in the order shown.

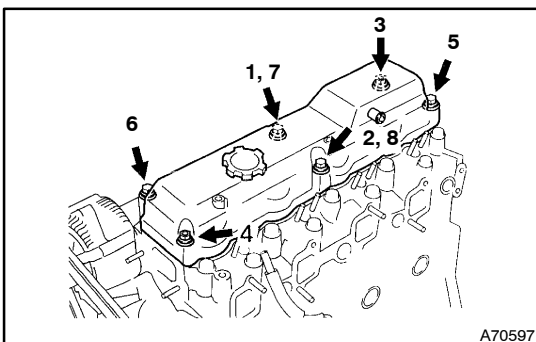
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

Bolt length:

63 mm (2.48 in.) for A

53 mm (2.08 in.) for B

(f) Adjust the valve clearance (See page 14-10).

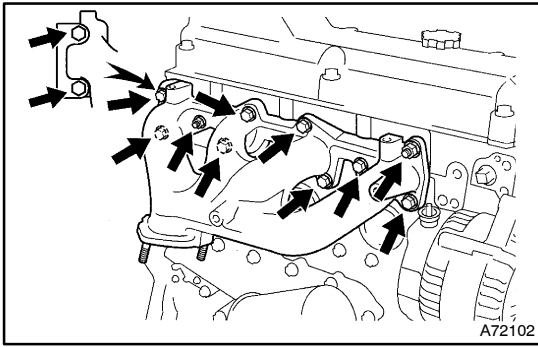


27. INSTALL CYLINDER HEAD COVER SUB-ASSY

(a) Install the gasket to the cylinder head cover.

(b) Install the cylinder head cover and uniformly tighten it with the 6 cushions, 4 bolts and 2 nuts, in several passes, in the order shown.

Torque: 10.5 N·m (107 kgf·cm, 8 ft·lbf)

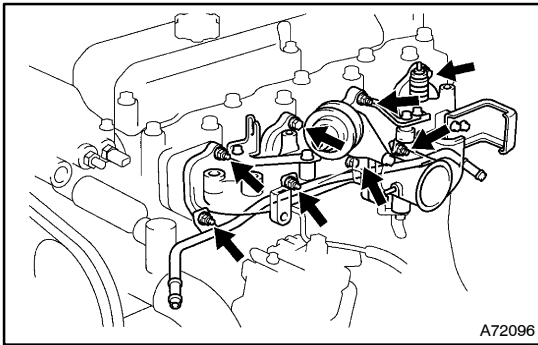
**28. INSTALL EXHAUST MANIFOLD**

- (a) Install a new gasket, the exhaust manifold and No. 2 heat insulator with the 8 bolts and new 2 nuts.

Torque: 47.5 N·m (484 kgf·cm, 35 ft·lbf)

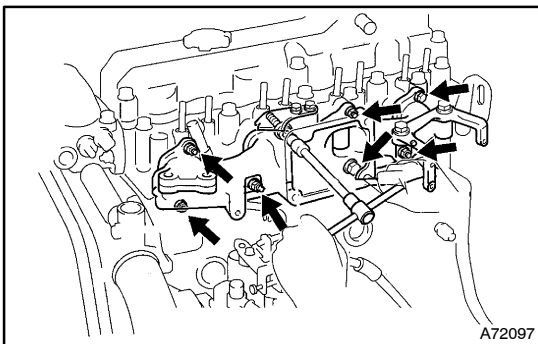
- (b) Install the exhaust front pipe (See page 15-8).
 (c) Install the heat insulator No. 1 with the 3 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

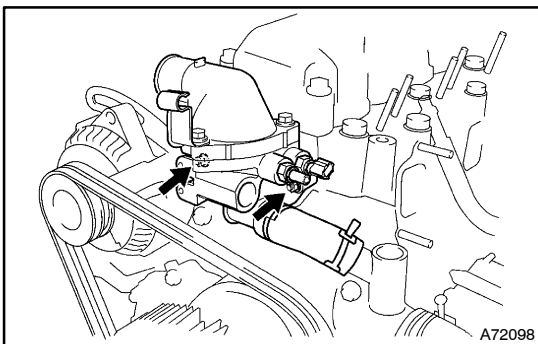
**29. INSTALL INTAKE MANIFOLD**

- (a) Remove the bolt and nut holding the water bypass pipe to the intake manifold and venturi.

- (b) Remove the bolt and oil level gauge guide.



- (c) Using a 6 mm hexagon wrench, remove the bolt.
 (d) Remove the 5 nuts, intake manifold and gasket.

**30. INSTALL WATER OUTLET HOUSING**

- (a) Connect the water bypass hose to the water pump.

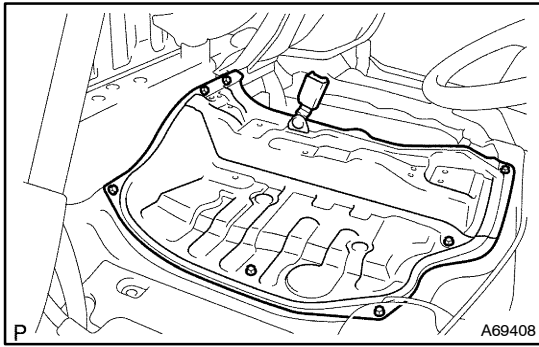
- (b) Install the water outlet housing with the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

31. INSTALL FUEL PIPE SET (See page 11-7)**32. INSTALL ACCELERATOR CONTROL W/ THROTTLE CABLE ASSY****33. INSTALL OIL LEVEL GAUGE GUIDE**

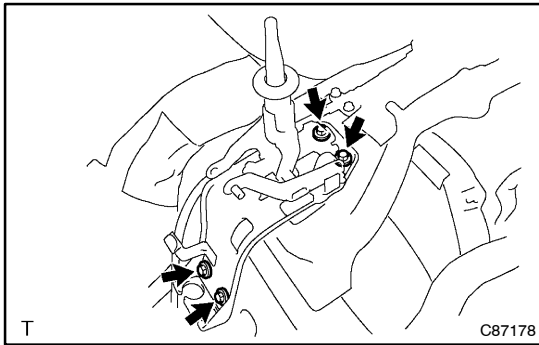
- (a) Install the oil level gauge guide with the bolt.

34. INSTALL ENGINE WIRE**35. INSTALL RADIATOR ASSY (See page 16-11)**



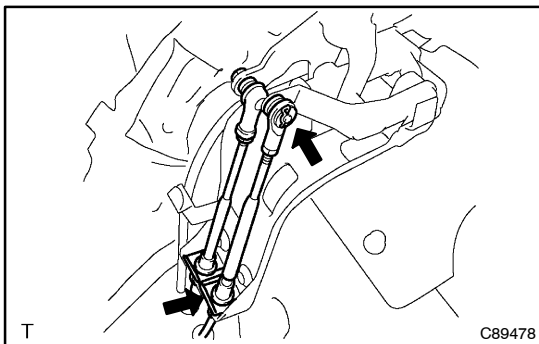
36. INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

- (a) Install the engine service hole sub cover with the 7 bolts.
Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)
- (b) Install the floor mat.



37. INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE)

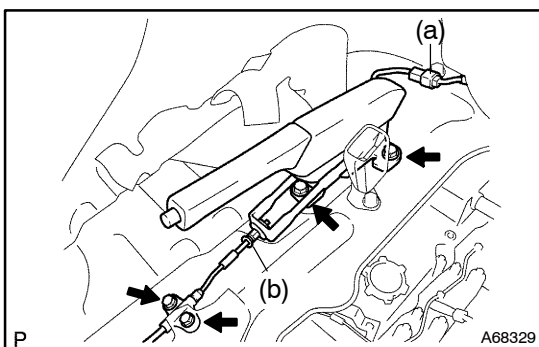
- (a) Install the floor shift to the floor with the 4 bolts.
Torque: 18 N·m (183 kgf·cm, 13 ft·lbf)



38. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE)

- (a) Install the select cable to the shift lever retainer with the clip.
- (b) Install the select cable to the floor shift with the clip.
- (c) Install the shift cable to the shift lever retainer with the clip.
- (d) Temporarily install the shift cable to the floor shift assy with the nut.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)



39. INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE)

- (a) Install the parking brake lever with the 4 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
- (b) Connect the parking brake switch connector.

40. INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)

41. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)
(See page 33-11)

42. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)

43. REFILL ENGINE COOLANT

44. CONNECT BATTERY NEGATIVE TERMINAL

45. ADD FUEL

46. BLEED FUEL (See page 11-4)

47. CHECK FOR ENGINE COOLANT LEAKS

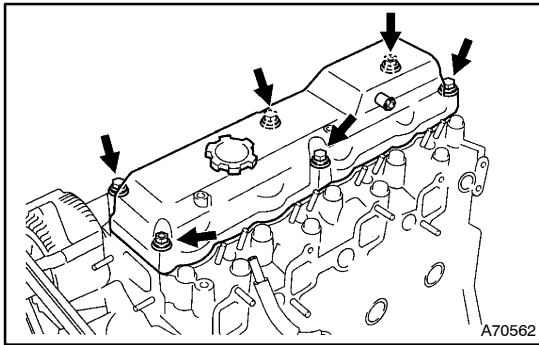
48. INSPECT FOR FUEL LEAKS

CAMSHAFT (14B)

1416Y-01

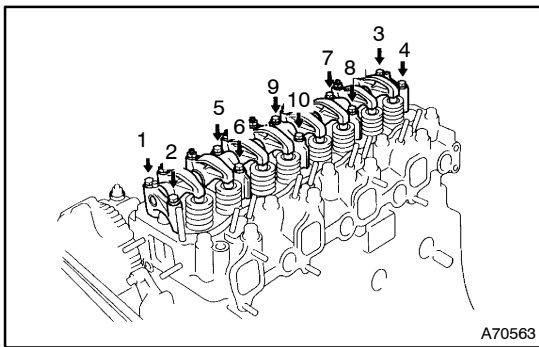
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. DRAIN ENGINE OIL
4. REMOVE RADIATOR ASSY (See page 16-11)
5. SET NO. 1 CYLINDER TO TDC/COMPRESSION
6. REMOVE NOZZLE ASSY (See page 11-7)



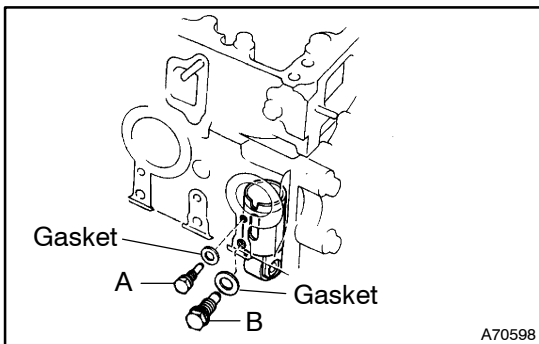
7. REMOVE CYLINDER HEAD COVER SUB-ASSY

- (a) Remove the 4 bolts, 2 nuts, 6 cushions, cylinder head cover and gasket.

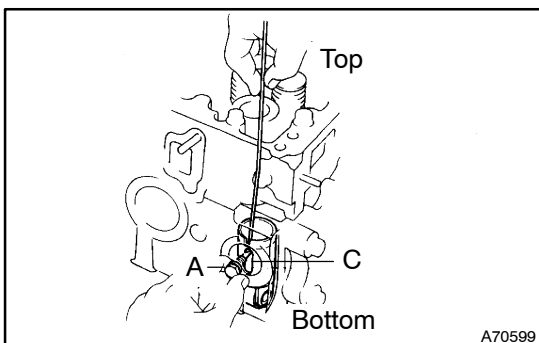


8. REMOVE VALVE ROCKER SHAFT ASSY

- (a) Loosen the lock nuts and adjusting screws.
- (b) Uniformly loosen the 10 bolts and remove them, in several passes, in the order shown.
- (c) Remove the valve rocker shaft assy.



- (d) Remove the bolts (A), (B) and gaskets.



- (e) Using a wire, lift up the valve lifter until long hole (C) of the valve lifter moves up to the position of the installation hole for the bolt (A).

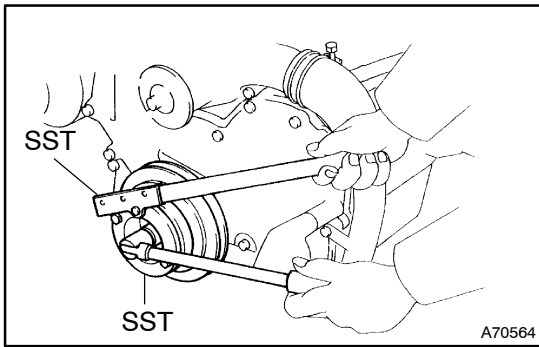
HINT:

If the lifter is lifted up too high it may miss the position.

- (f) Install the bolt (A).
- (g) Check that bolt (A) prevents the valve lifter from falling.

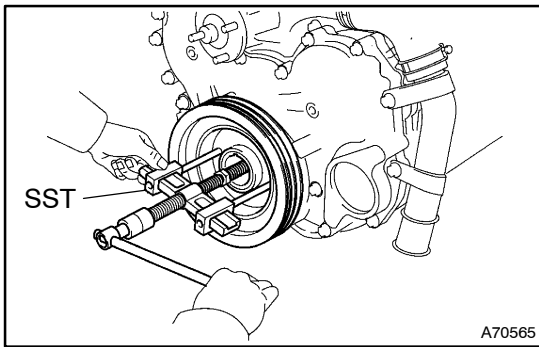
NOTICE:

Be careful not to scratch the valve lifter.

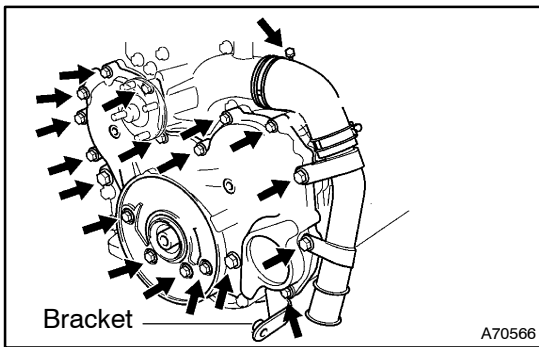


9. REMOVE CRANKSHAFT PULLEY

- (a) Using SST, remove the mount bolt.
 SST 09213-58013 (90201-08131, 91111-50845),
 09330-00021

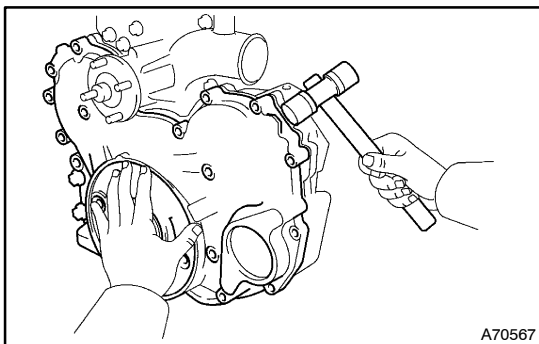


- (b) Using SST, remove the crankshaft pulley.
 SST 09950-50013 (09951-05010, 09952-05010,
 09953-05010, 09953-05020, 09954-05030)



10. REMOVE TIMING GEAR COVER

- (a) Remove the 2 bolts holding the radiator pipe to the timing gear cover.
 (b) Disconnect the radiator hose from the water pump. Then remove the radiator pipe.
 (c) Remove the bolt and oil stick guide.
 (d) Remove the 15 mount bolts and bracket.



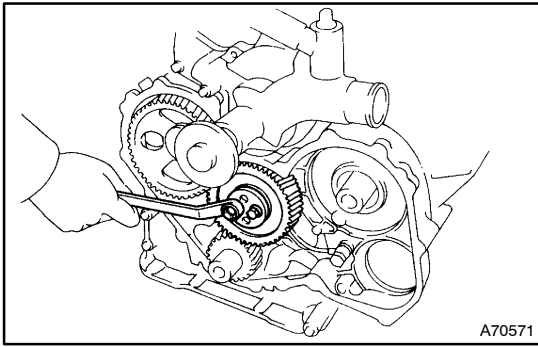
- (e) Using a plastic-faced hammer, lightly tap out the timing gear cover.
 (f) Remove the timing gear cover gasket.
 (g) Using a plastic-faced hammer, lightly tap out the gear and remove the injection pump drive gear.

11. REMOVE INJECTION PUMP DRIVE GEAR

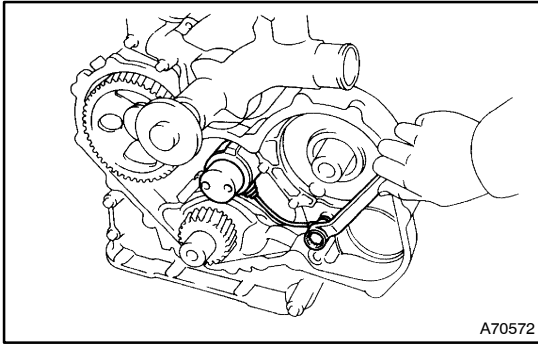
- (a) Remove the injection pump drive gear.

12. REMOVE VACUUM PUMP ASSY

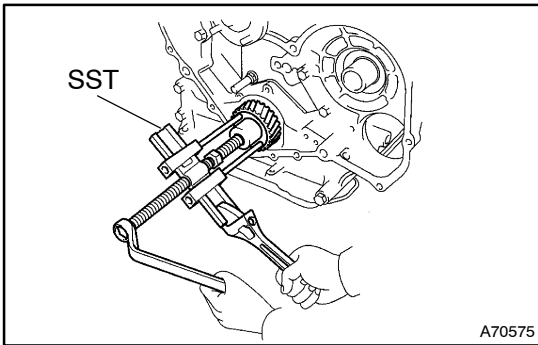
- (a) Disconnect the vacuum pump hose.
 (b) Remove the 2 bolts and vacuum pump.
 (c) Remove the 2 O-rings.

**13. REMOVE IDLE GEAR NO.1**

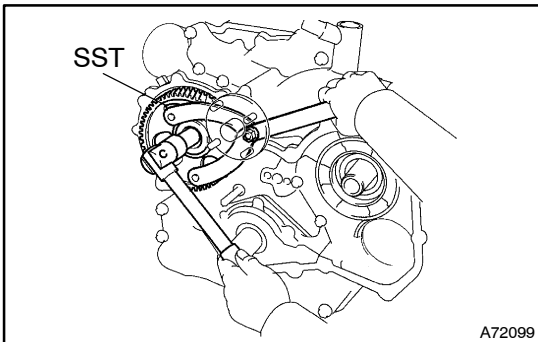
- (a) Remove the 2 bolts, thrust plate and idle gear.

**14. REMOVE IDLE GEAR SHAFT SUB-ASSY**

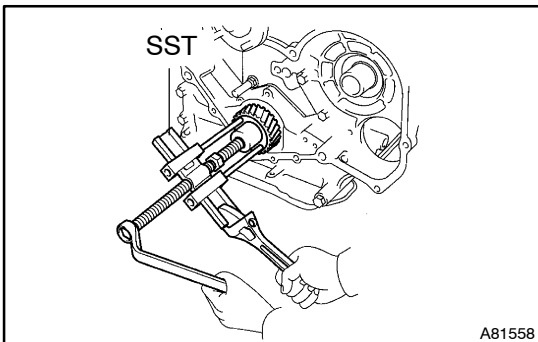
- (a) Remove the union bolt and idle gear shaft.

**15. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET**

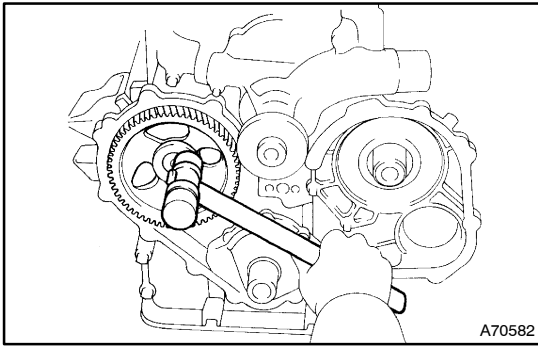
- (a) Using SST, remove the timing gear.
 SST 09950-50013 (09951-05010, 09952-05010, 09953-05010, 09953-05020)

**16. REMOVE CAMSHAFT**

- (a) Using SST, remove the mounting bolt and plate washer.
 SST 09960-10010 (09962-01000, 09963-01000),



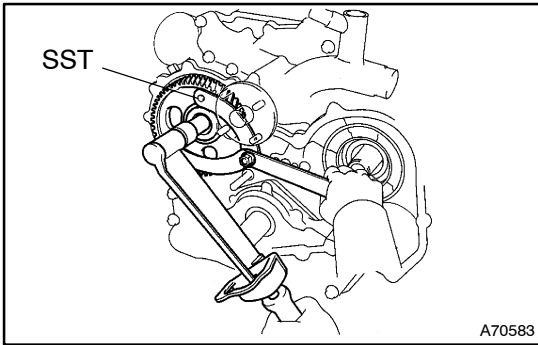
- (b) Using SST, remove the timing gear.
 SST 09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04051)
 (c) Remove the camshaft.

**17. INSTALL CAMSHAFT**

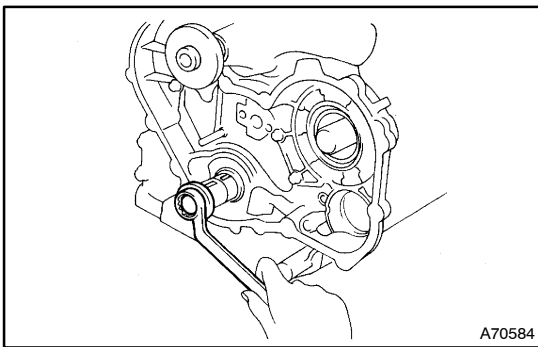
- (a) Install the camshaft.
- (b) Align the timing gear set key with the key groove of the timing gear.
- (c) Using a plastic-faced hammer, lightly tap in the camshaft timing gear.

NOTICE:

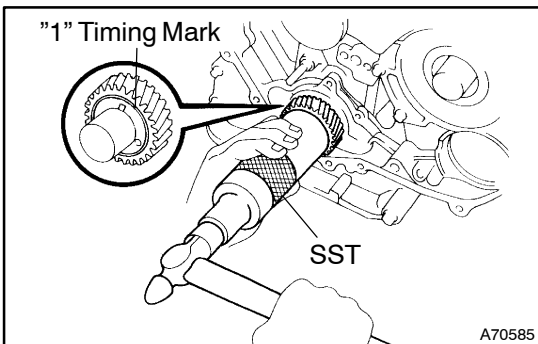
Avoid any impact to the camshaft.



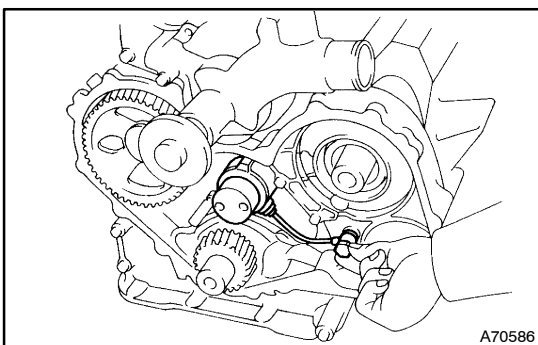
- (d) Using SST, install the plate washer and mount bolt.
SST 09960-10010 (09962-01000, 09963-01000)
Torque: 37.5 N·m (382 kgf·cm, 28 ft·lbf)

**18. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET**

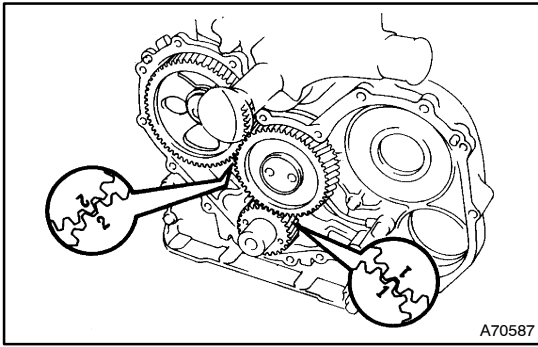
- (a) Check that the set key on crankshaft faces upward.
If not, turn the crankshaft with a crankshaft pulley mount bolt.



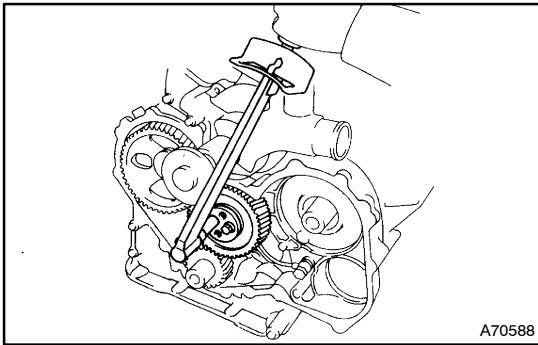
- (b) Put the timing gear on the crankshaft with the timing mark 1 of the timing gear facing forward.
- (c) Align the timing gear set key with the key groove of the crankshaft timing gear.
- (d) Using SST and a hammer, tap in the crankshaft timing gear.
SST 09608-06041

**19. INSTALL IDLE GEAR SHAFT SUB-ASSY****NOTICE:**

Do not tighten the union bolt.

**20. INSTALL IDLE GEAR NO.1**

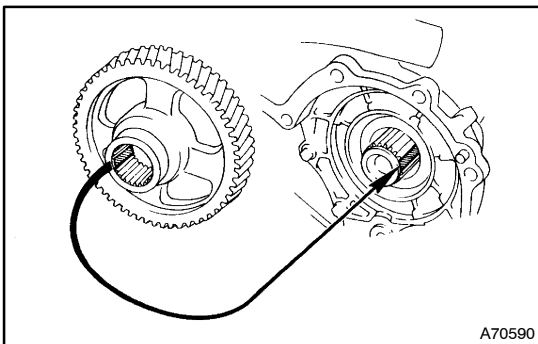
- (a) Align idle gear timing marks 1 and 2 with crankshaft gear timing mark 1 and camshaft gear timing mark 2 respectively, and mesh the gears.



- (b) Apply a light coat of engine oil on the threads and under the bolt heads.

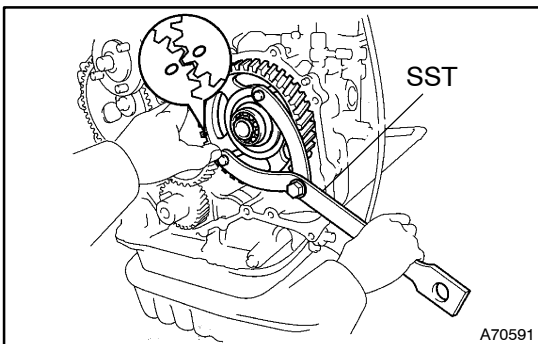
- (c) Install the thrust plate with the 2 bolts.

Torque: 47.5 N·m (484 kgf·cm, 35 ft·lbf)

**21. INSTALL INJECTION PUMP DRIVE GEAR**

- (a) Apply MP grease to the drive gear spline, bearing and injection pump spline.

- (b) Align the spline toothless portions of the injection pump drive gear and injection pump, and install the injection pump drive gear.



- (c) Using SST, align idle gear timing mark 0 with injection pump drive gear timing mark 0, and mesh the gears.
SST 09960-10010 (09962-01000, 09963-01000)

22. INSTALL VACUUM PUMP ASSY

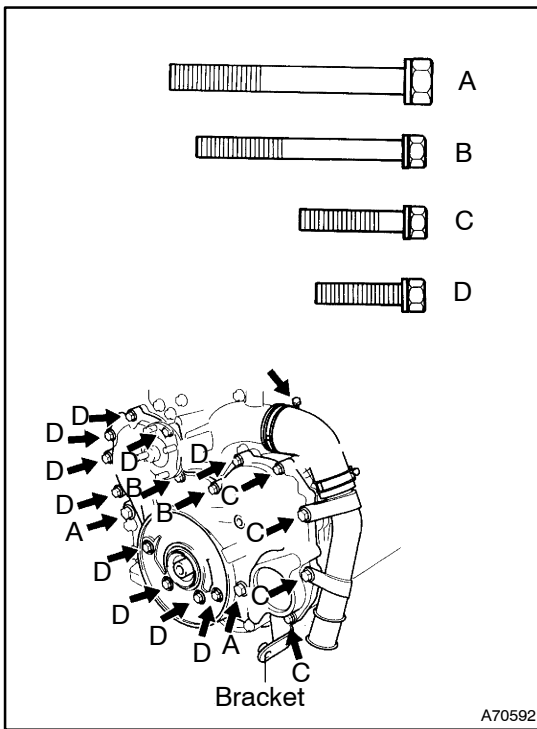
- (a) Install 2 new O-rings to the vacuum pump.

- (b) Install the vacuum pump with the 2 bolts.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

- (c) Connect the vacuum pump hose.

23. INSPECT TIMING GEAR BACKLASH**24. INSPECT IDLE GEAR NO. 1 THRUST CLEARANCE**

**25. INSTALL TIMING GEAR COVER**

- Install a new gasket and the timing gear cover.
- Align the 2 knock pins of the oil pump, and lightly tap in the timing gear cover using a plastic-faced hammer.
- Install the bracket and 15 mount bolts.

Torque:**44 N·m (449 kgf·cm, 32 ft·lbf) for 14 mm head****21 N·m (214 kgf·cm, 15 ft·lbf) for 12 mm head****HINT:**

Bolt length:

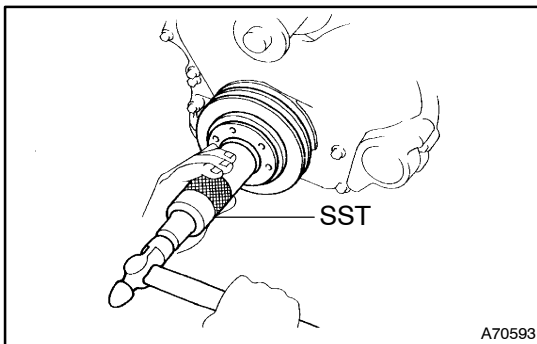
A 80 mm (3.15 in.) for 14 mm head

B 77 mm (3.03 in.) for 12 mm head

C 40 mm (1.57 in.) for 12 mm head

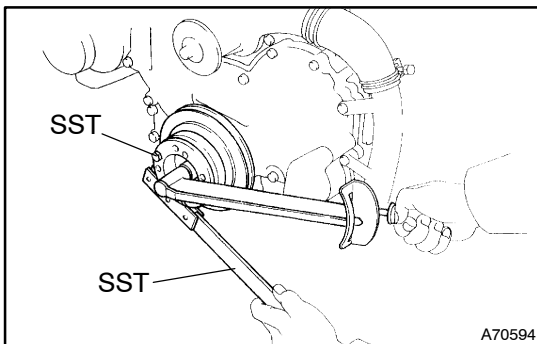
D 35 mm (1.38 in.) for 12 mm head

- Connect the radiator hose to the water pump.
- Install the radiator pipe with the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)**26. INSTALL CRANKSHAFT PULLEY**

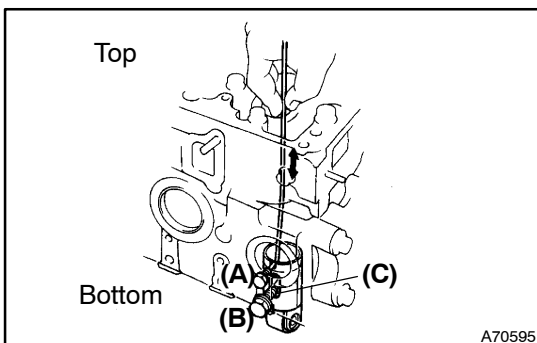
- Align the pulley set key with the key groove of the pulley.
- Using SST and a hammer, tap in the pulley.

SST 09608-06041



- Apply a light coat of engine oil on the threads and under the bolt head.

- Using SST, install and torque the pulley mount bolt.

SST 09213-58012 (90201-08131, 91111-50845),
09330-00021**Torque: 294 N·m (3,000 kgf·cm, 217 ft·lbf)****27. INSTALL VALVE ROCKER SHAFT ASSY**

- Remove the bolt (A) and let the lifter slide down.
- Install the bolts (A) and (B) with new gaskets.

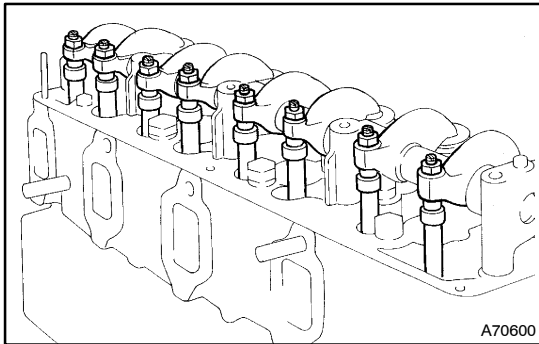
Torque:**9.4 N·m (96 kgf·cm, 6.8 in·lbf) for Bolt A****37.5 N·m (382 kgf·cm, 28 ft·lbf) for Bolt B****HINT:**

When installing bolt (B), check that the hole for bolt (B) is aligned with long hole (C) of the valve lifter.

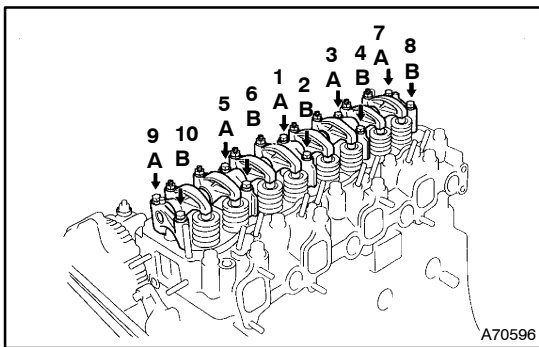
- (c) Check that the valve lifter can move up and down within the limit of long hole (C).

NOTICE:

Be careful not to scratch the valve lifter.



- (d) Place the rocker shaft assembly on the cylinder head.
 (e) Align the rocker arm adjusting screws with the heads of the push rods.



- (f) Install the 10 bolts and uniformly tighten them, in several passes, in the order shown.

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

HINT:

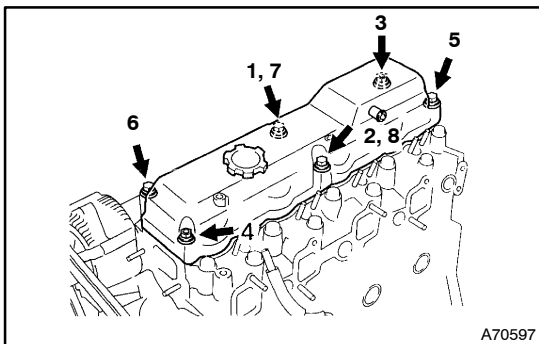
Bolt length:

63 mm (2.48 in.) for A

53 mm (2.08 in.) for B

28. INSPECT VALVE CLEARANCE (See page 14-10)

29. ADJUST VALVE CLEARANCE (See page 14-10)



30. INSTALL CYLINDER HEAD COVER SUB-ASSY

- (a) Install the gasket to the cylinder head cover.
 (b) Install the cylinder head cover and uniformly tighten it with the 6 cushions, 4 bolts and 2 nuts, in several passes, in the order shown.

Torque: 10.5 N·m (107 kgf·cm, 8 ft·lbf)

31. INSTALL NOZZLE ASSY (See page 11-7)

32. INSTALL RADIATOR ASSY (See page 16-11)

33. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)
 (See page 33-11)

34. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)

35. ADD ENGINE OIL

36. REFILL ENGINE COOLANT

37. BLEED FUEL (See page 11-4)

38. CONNECT BATTERY NEGATIVE TERMINAL

39. CHECK ENGINE OIL LEVEL

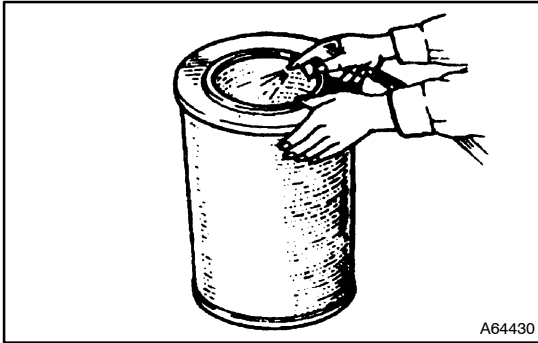
- 40. CHECK FOR ENGINE COOLANT LEAKS
- 41. CHECK FOR ENGINE OIL LEAKS
- 42. INSPECT FOR FUEL LEAKS
- 43. INSPECT VALVE CLEARANCE (See page 14-10)

ENGINE (15B-FTE)

14179-01

ADJUSTMENT

1. INSPECT COOLANT
2. INSPECT ENGINE OIL
3. INSPECT BATTERY SPECIFIC GRAVITY

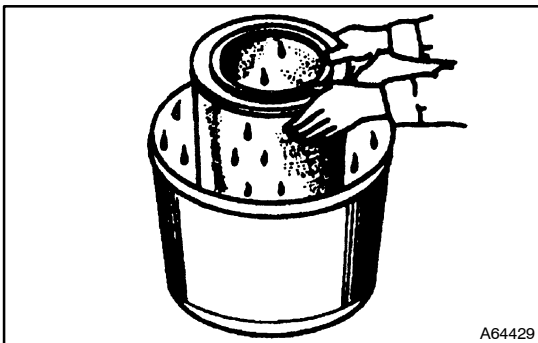


4. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY

- (a) Non-Washable type:
Visually check that the filter is not excessively dirty or oily.
- (b) Using an air gun, remove dry dirt or dust, Air pressure: less than 690 kPa (7.0 kgf/cm², 100 psi).

HINT:

- Always blow air from the inside of the element to the outside. Never strike or bang the filter to remove dirt or dust.
- If the air pressure is too high and the element deformed, the engine will be in trouble.



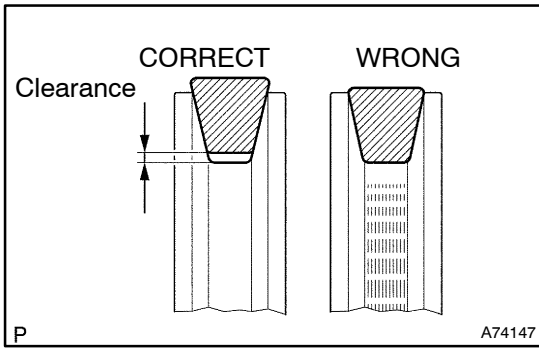
- (c) Washable type:
Wash the element by soaking it in a non-sudsy detergent solution for approx. 30 minutes.
- (d) Rinse the element with clean water and dry it completely with compressed air.

HINT:

- Check that the inside of the element is not soiled with dust, etc.
- When using an oven to dry the element, the temperature should be set below 80°C (176°F).
- Never install the element before it is completely dried.
- Make sure that the dried element is not broken and that the packing is not broken nor deformed.

NOTICE:

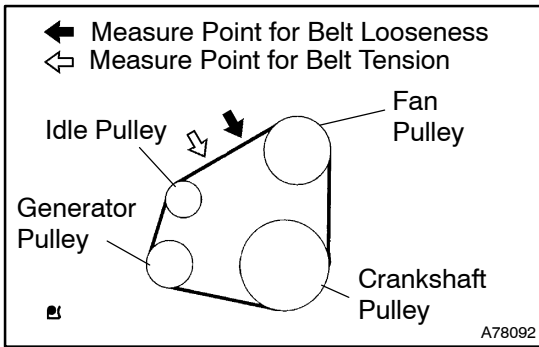
Never use other solvents, such as kerosene and gasoline to clean the elements. Use of these could cause the engine to overrun and damage the engine.



5. INSPECT V BELT

- (a) Visually check the V belt for cracks, oiliness or wear. Check that the belt does not touch the bottom of the pulley groove.

If necessary, replace the V belt.



- (b) Check the drive belt deflection by pressing on the belt at the points indicated in the illustration with 98 N (10 kgf, 22 lbf) of pressure.

Deflection:

New Belt mm (in.)	Used Belt mm (in.)
12 - 16 (0.47 - 0.62)	14 - 19 (0.55 - 0.74)

- (c) Reference:

Using a belt tension gauge, measure the belt tension.

Tension:

New belt N (kgf)	Used belt N (kgf)
275 - 510 (28 - 52)	196 - 392 (19 - 39)

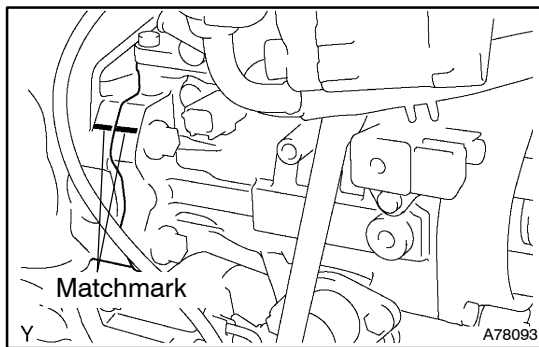
HINT:

Belt tension gauge:

DENSO BTG-20 (95506-00020)

NOTICE:

- Check that the drive belt deflection at the specified point.
- When installing a new belt, set its tension value as specified.
- When checking a belt that has been used for over 5 minutes, confirm that the deflection value is within the specified one.
- When reinstalling a belt that has been used for over 5 minutes, check the belt, based on the used deflection value.
- The tension and deflection value of the V belt should be checked after 2 revolution of engine cranking.
- When using a belt tension gauge, confirm the accuracy first using a master gauge.



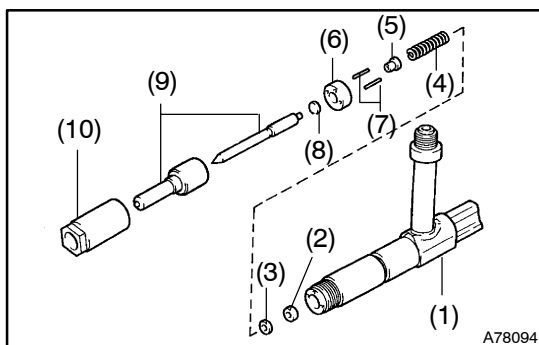
6. INSPECT INJECTION TIMING

- (a) Check the matchmark of the injection pump flange is aligned with the matchmark of the timing gear case.

7. ADJUST INJECTION TIMING

SST 09275-54011

- (a) Loosen the nuts and bolts:
- (1) Loosen the 2 bolts holding injection pump to the injection pump stays.
 - (2) Loosen the 4 nuts holding injection pump to the timing gear case.
- (b) Align the matchmarks by slightly tilting the injection pump.
- (c) Tighten the nuts and bolts:
- (1) Tighten the 4 nuts holding injection pump to timing gear cover.
- Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)**
- (2) Tighten the 2 bolts holding injection pump to injection pump stays.
- Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)**

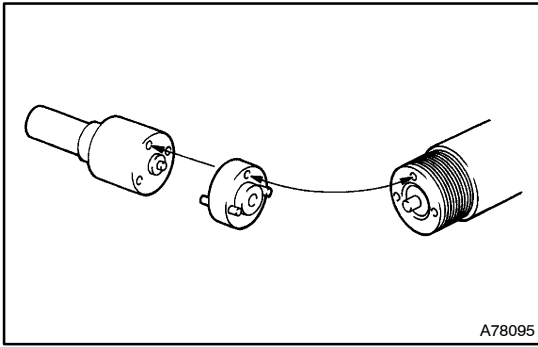


8. ADJUST INJECTION PRESSURE

- (a) Check the No. 2 opening pressure (assemble these parts):
- (1) Nozzle holder body
 - (2) No. 1 pressure spring seat
 - (3) No. 2 Adjusting shim
 - (4) No. 2 pressure spring
 - (5) SST
 - (6) Tip packing
 - (7) Straight pins
 - (8) No. 3 Adjusting shim
 - (9) Nozzle assembly
 - (10) Retaining nut
- SST 09268-17020

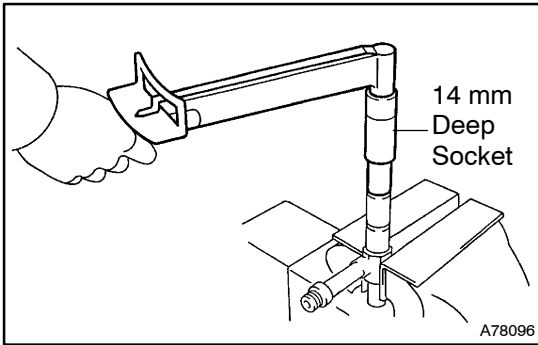
NOTICE:

Do not assemble the No. 1 pressure spring, No. 1 pressure pin and adjusting shim for adjustment of the No. 1 opening pressure.



HINT:

Align the holes of the nozzle body, tip packing and nozzle holder body.

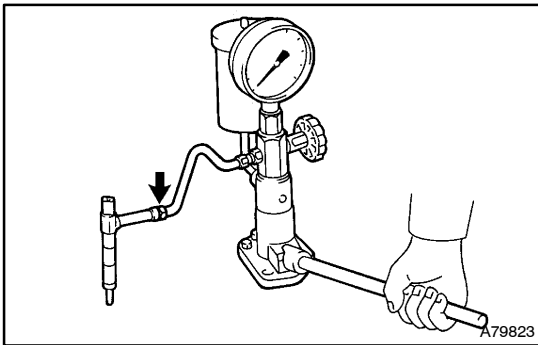


- (b) Using a 14 mm deep socket wrench, tighten the retaining nut.

Torque: 29.4 N·m (300 kgf·cm², 22 ft·lbf)

NOTICE:

Over torquing could cause the nozzle deformation and the needle adhesion or other defects.

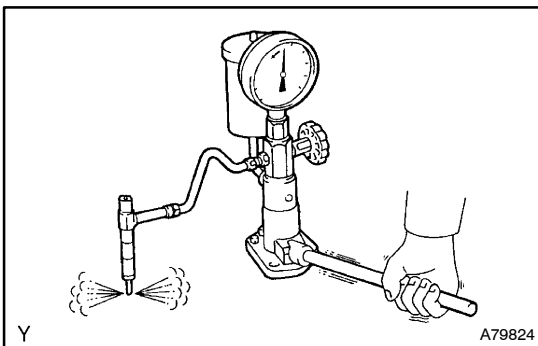


- (c) Install the injection nozzle to the injection nozzle hand tester and bleed air from the union nut.

CAUTION:

Do not place your finger over the nozzle injection hole.

- (d) Pump the tester handle a few times as fast as possible to discharge the carbon from the injection hole.



- (e) Pump the tester handle slowly and observe the pressure gauge.
- (f) Read the pressure gauge just as the injection pressure begins to drop.

No. 2 opening pressure (Inspection pressure):
25.5 – 26.48 MPa
(260 – 270 kgf/cm², 3,698 – 3,840 psi)

HINT:

Proper nozzle operation can be determined by a swishing sound.

If the opening pressure is not as specified, disassemble the nozzle and change the adjusting shim on the top of the No. 2 pressure spring.

Adjusting shim thickness:

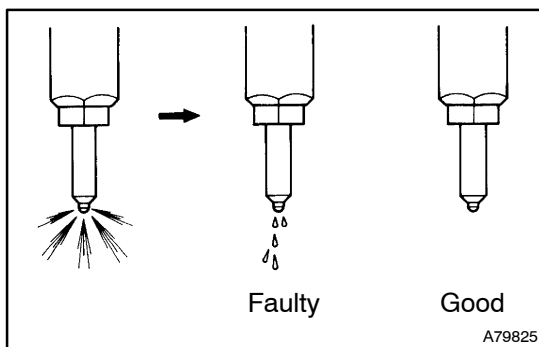
mm (in.)

mm (in.)	mm (in.)	mm (in.)
0.700 (0.0276)	1.225 (0.0482)	1.625 (0.0640)
0.750 (0.0295)	1.250 (0.0492)	1.650 (0.0650)
0.800 (0.0315)	1.275 (0.0502)	1.675 (0.0659)
0.850 (0.0335)	1.300 (0.0512)	1.700 (0.0669)
0.900 (0.0354)	1.325 (0.0521)	1.725 (0.0679)

mm (in.)	mm (in.)	mm (in.)
0.950 (0.0374)	1.350 (0.0531)	1.750 (0.0689)
0.975 (0.0384)	1.375 (0.0541)	1.775 (0.0699)
1.000 (0.0394)	1.400 (0.0551)	1.800 (0.0709)
1.025 (0.0404)	1.425 (0.0561)	1.850 (0.0728)
1.050 (0.0413)	1.450 (0.0571)	1.900 (0.0748)
1.075 (0.0423)	1.475 (0.0581)	1.950 (0.0768)
1.100 (0.0433)	1.500 (0.0591)	2.000 (0.0787)
1.125 (0.0443)	1.525 (0.0600)	2.050 (0.0807)
1.150 (0.0453)	1.550 (0.0610)	2.100 (0.0827)
1.175 (0.0463)	1.575 (0.0620)	2.150 (0.0846)
1.200 (0.0472)	1.600 (0.0630)	-

HINT:

- Varying the adjusting shim thickness by 0.025 mm (0.0010 in.) changes the injection pressure by about 373 kPa (3.8 kgf/cm², 54 psi).
- Only one adjusting shim should be used.



- (g) There should be no dripping after injection.
- (h) After checking the No. 2 opening pressure, disassemble the nozzle.
- (i) Adjust the No. 1 opening pressure.
- (1) Assemble the nozzle holder body, No. 1 adjusting shim for adjustment of No. 1 opening pressure, No.1 pressure spring, pressure pin, No. 1 pressure spring seat, No. 2 adjusting shim selected in step 1 above, No. 2 pressure spring, No. 2 pressure spring seat, tip packing, straight pins, No. 3 adjusting shim and nozzle assembly, and finger tighten the retaining nut.

HINT:

- Align the holes of the nozzle body, the distance piece and the nozzle holder body.
 - When the thickness of the original used adjusting shim is not known, use a shim 1.5 mm (0.59 in.) thick instead.
- (2) Read the pressure gauge just as the injection pressure begins to drop.

No. 1 opening pressure:**17.65 – 18.63 MPa****(180 – 190 kgf/cm², 2,560 – 2,700 psi)****HINT:**

Proper nozzle operation can be determined by a swishing sound.

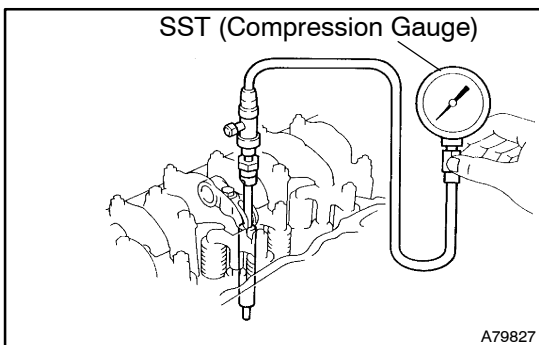
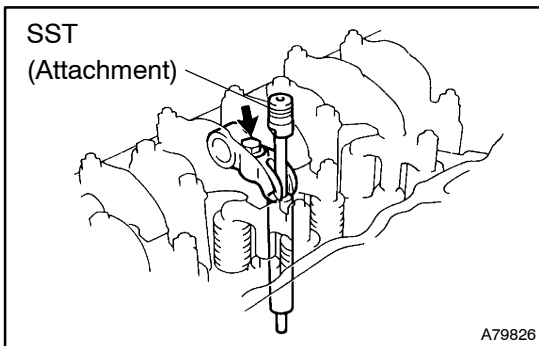
If the opening pressure is not as specified, disassemble the nozzle and change the No. 2 adjusting shim.

No. 2 pressure spring washer (adjusting shim) thickness:

mm (in.)	mm (in.)	mm (in.)
0.800 (0.0315)	1.275 (0.0502)	1.750 (0.0689)
0.825 (0.0325)	1.300 (0.0512)	1.775 (0.0699)
0.850 (0.0335)	1.325 (0.0521)	1.800 (0.0709)
0.875 (0.0344)	1.350 (0.0531)	1.825 (0.0719)
0.900 (0.0354)	1.375 (0.0541)	1.850 (0.0728)
0.925 (0.0364)	1.400 (0.0551)	1.875 (0.0738)
0.950 (0.0374)	1.425 (0.0561)	1.900 (0.0748)
0.975 (0.0384)	1.450 (0.0571)	1.925 (0.0758)
1.000 (0.0394)	1.475 (0.0581)	1.950 (0.0768)
1.025 (0.0404)	1.500 (0.0591)	1.975 (0.0778)
1.050 (0.0413)	1.525 (0.0600)	2.000 (0.0787)
1.075 (0.0423)	1.550 (0.0610)	2.025 (0.0797)
1.100 (0.0433)	1.575 (0.0620)	2.050 (0.0807)
1.125 (0.0443)	1.600 (0.0630)	2.075 (0.0817)
1.150 (0.0453)	1.625 (0.0640)	2.100 (0.0827)
1.175 (0.0463)	1.650 (0.0650)	2.125 (0.0837)
1.200 (0.0472)	1.675 (0.0659)	2.150 (0.0846)
1.225 (0.0482)	1.700 (0.0669)	2.175 (0.0856)
1.250 (0.0492)	1.725 (0.0679)	2.200 (0.0866)

HINT:

- Varying the adjusting shim thickness by 0.025 mm (0.0010 in.) changes the injection pressure by about 373 kpa (3.8 kgf/cm², 54 psi).
- Only one adjusting shim should be used.
(3) There should be no dripping after injection.



9. INSPECT COMPRESSION

NOTICE:

When measuring the compression pressure of each, the other 3 injection nozzles must be installed in the cylinder head.

- Remove the injection nozzle (See page 11-60).
- Install the gasket and SST (attachment) to the injection nozzles hole with the nozzle holder clamp and bolt.
SST 09992-00400
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)
- Connect SST (compression gauge) to the SST (attachment).
SST 09992-00025 (09992-00211)
- Fully open the throttle valve, and start the engine.
- While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain engine revolution of 250 rpm or more.

- Repeat steps (a) through (d) for each cylinder.

NOTICE:

This measurement must be done in as short a time as possible.

Compression pressure:

3,000 kPa (31.0 kgf/cm², 441 psi) or more

Minimum pressure: 1,960 kPa (20.0 kgf/cm², 284 psi)

Difference between each cylinder:

196 kPa (2.0 kgf/cm², 28 psi) or less

- (g) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the injection nozzle hole and repeat steps (a) through (e) for the cylinder with low compression.
- If adding oil helps the compression, chances are that the piston rings and/or cylinder bore are worn or damaged.
 - If pressure stays low, a valve may be sticking or seating improperly, or there may be leakage past the gasket.
- (h) Remove the SST.
SST 09992-00025 (09992-00211), 09992-00400
- (i) Reinstall the injection nozzle.
- (j) Connect (fuel cut solenoid) connector.
- (k) Install the injection pipes.
- (l) Install the nozzle leakage pipe.
- (m) Install the cylinder head cover.
- (n) Start the engine and check for leaks.

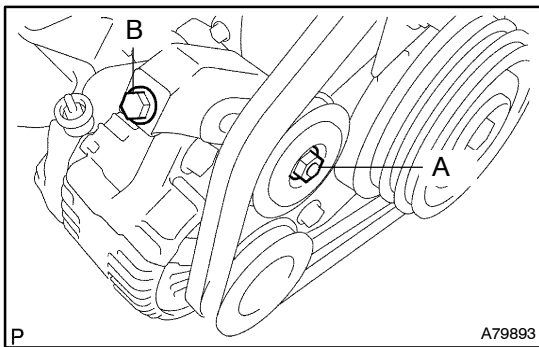
10. INSPECT DIESEL SMOKE

DRIVE BELT (15B-FTE)

REPLACEMENT

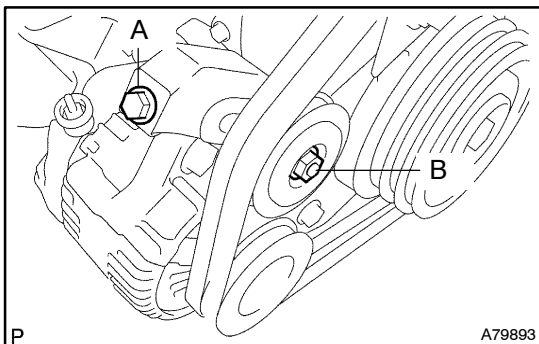
1417A-01

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
3. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE) (See page 33-3)
4. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-3)
5. REMOVE FLOOR SHIFT SHIFTER LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 41-11)
6. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFTER LEVER BOOT COVER (W/O TILT CAB CAB TYPE) (See page 41-11)
7. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)
8. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)
9. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-62)



10. REMOVE V BELT

- (a) Loosen the nut.
- (b) By turning the adjusting bolt, remove the V belt.



11. INSTALL V BELT

- (a) Install the V belt and adjust the belt tension
(See page 14-40).
- (b) Tighten the nut.

Torque: 26 N·m (260 kgf·cm, 19 ft·lbf)

12. INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-62)
13. INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)
14. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)
15. INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-3)
16. INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
17. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)
(See page 33-2)

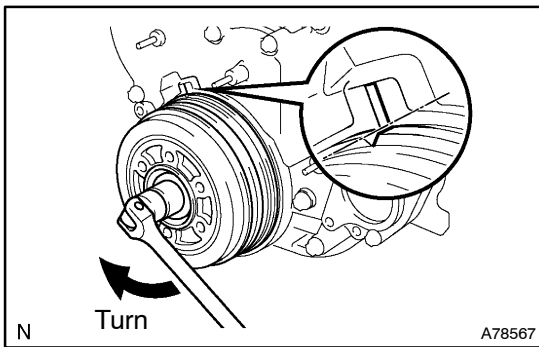
18. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-2)**
19. **CONNECT BATTERY NEGATIVE TERMINAL**

VALVE CLEARANCE (15B-FTE)

ADJUSTMENT

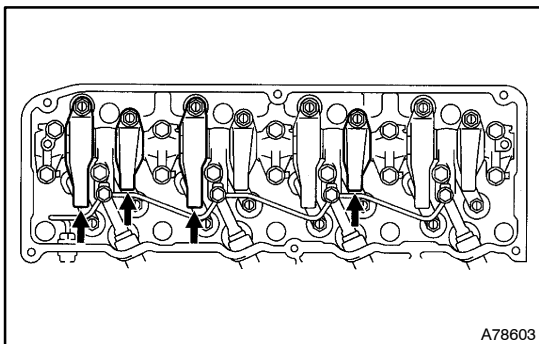
1417B-01

1. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
2. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE) (See page 33-3)
3. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-3)
4. REMOVE FLOOR SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 41-11)
5. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE) (See page 41-11)
6. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)
7. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)
8. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-62)
9. REMOVE OIL FILLER CAP SUB-ASSY
10. REMOVE CYLINDER HEAD COVER SUB-ASSY (See page 14-62)



11. SET NO. 1 CYLINDER TO TDC/COMPRESSION

- (a) Turn the crankshaft pulley clockwise, and align its groove with the groove of the timing gear cover.
- (b) Check that the valve rocker arm on the No. 1 cylinder is loose and valve rocker arm on the No. 4 cylinder is tight. If not, turn the crankshaft 1 revolution (360°) and align the mark as above.



12. INSPECT VALVE CLEARANCE

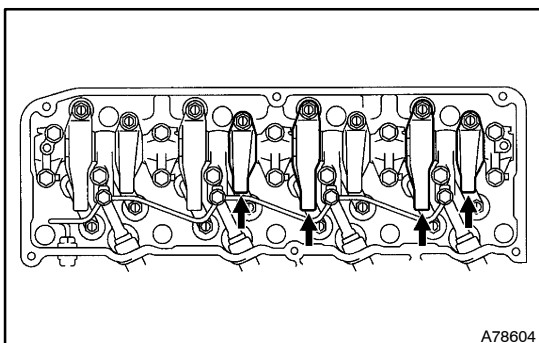
- (a) Check only the 4 valves indicated in the illustration.
 - (1) Using a feeler gauge, measure the clearance between the adjusting screw on the valve rocker arm and the valve step cap.
 - (2) Record the out-of-specification valve clearance measurements.

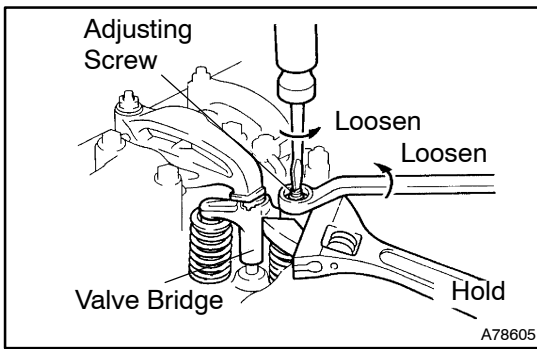
Valve clearance (Hot):

0.20 mm (0.008 in.) for Intake

0.36 mm (0.014 in.) for Exhaust

- (b) Turn the crankshaft pulley 1 revolution (360°) and align the mark as above (See step 11).
- (c) Check only the 4 valves indicated as shown in the illustration. Measure the valve clearance (See step (a)).

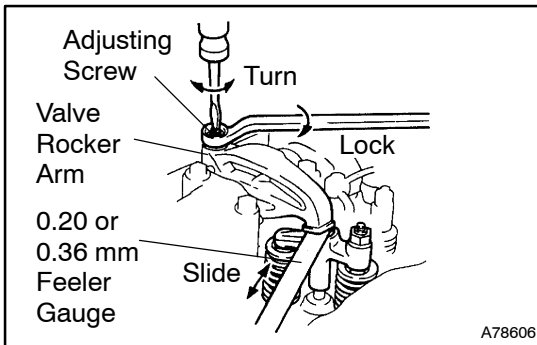


**13. ADJUST VALVE CLEARANCE**

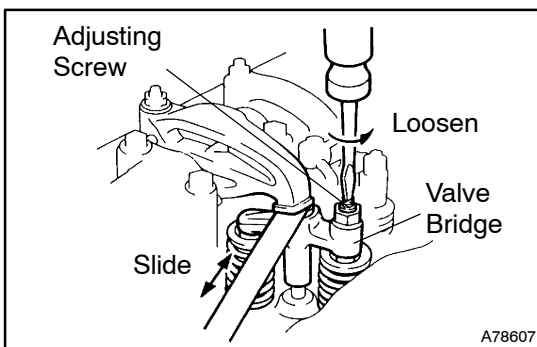
- (a) Recheck the valve clearance.
- (b) Loosen the lock nut on the valve bridge, and loosen the adjusting screw until the adjusting screw and valve stem are completely separated.

NOTICE:

Hold the valve bridge with a wrench, and loosen the lock nut. Do not apply torque to the valve bridge.

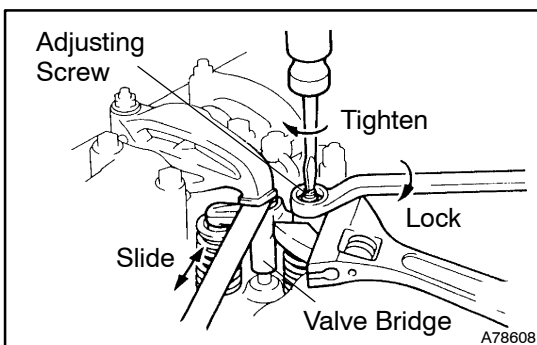


- (c) Loosen the lock nut on the valve rocker arm, and loosen the adjusting screw.
- (d) Insert a 0.20 mm (0.008 in.) feeler gauge for intake or 0.36 mm (0.014 in.) feeler gauge for exhaust between the adjusting screw on the valve rocker arm and the valve bridge.
- (e) Turn the adjusting screw on the valve rocker arm until the feeler gauge slides with a very slight drag, and lock the adjusting screw with the lock nut.



- (f) With the feeler gauge inserted, check that the resistance of the feeler gauge remains the same when the adjusting screw on the valve bridge is loosened.

If the resistance of the feeler gauge changes, perform the above operations again from step (b).

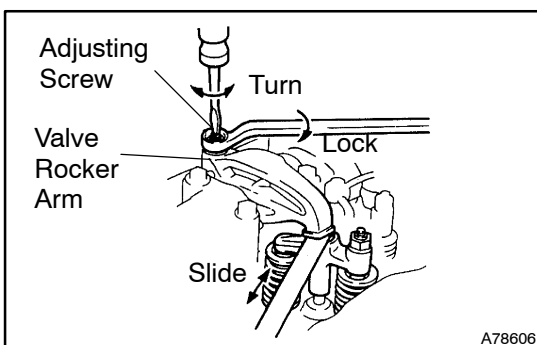


- (g) Tighten the adjusting screw on the valve bridge, and lock the adjusting screw with the lock nut when the resistance of the feeler gauge begins to get stronger.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

NOTICE:

Hold the valve bridge with a wrench, and lock the adjusting screw with the lock nut. Do not apply torque to the valve bridge.



- (h) Loosen the lock nut on the valve rocker arm.
- (i) Turn the adjusting screw on the valve rocker arm until the feeler gauge slides with a very slight drag, and lock the adjusting screw with the lock nut.
- (j) Recheck the valve clearance.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

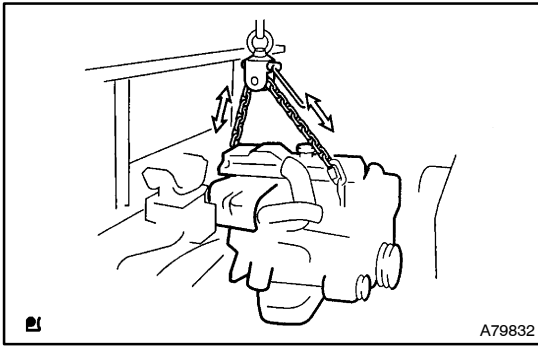
14. **INSTALL CYLINDER HEAD COVER SUB-ASSY (See page 14-62)**
15. **INSTALL OIL FILLER CAP SUB-ASSY**
16. **INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-62)**
17. **INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)**
18. **INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB
TYPE) (See page 41-19)**
19. **INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-3)**
20. **INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)**
21. **ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)
(See page 33-2)**
22. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-2)**

ENGINE ASSY (15B-FTE)

1417C-01

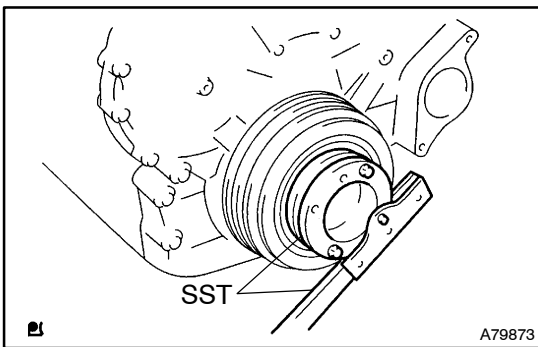
REPLACEMENT

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **DRAIN ENGINE COOLANT**
3. **DRAIN POWER STEERING FLUID**
4. **DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE**
5. **REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)**
(See page 72-2)
6. **REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE) (See page 33-3)**
7. **REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-3)**
8. **REMOVE FLOOR SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)**
(See page 41-11)
9. **REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE) (See page 41-11)**
10. **REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)**
11. **REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)**
12. **REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)**
(See page 14-62)
13. **REMOVE ENGINE UNDER COVER**
14. **REMOVE EXHAUST PIPE ASSY FRONT**
15. **REMOVE MANUAL TRANSMISSION ASSY (See page 41-3)**
16. **REMOVE FUEL MAIN TUBE SUB-ASSY**
 - (a) Loosen the fuel tank cap to reduce the pressure inside the fuel tank.
 - (b) Remove the main tube so that fuel does not splash around.
17. **REMOVE FUEL RETURN TUBE**
18. **DISCONNECT AIR HOSE NO. 1**
19. **DISCONNECT AIR HOSE NO.2**
20. **DISCONNECT AIR HOSE NO.3**
21. **REMOVE RADIATOR ASSY (See page 16-27)**
22. **REMOVE A/C COMPRESSOR FROM ENGINE**
23. **REMOVE OIL RESERVOIR TO PUMP HOSE NO.1**
24. **REMOVE PRESSURE FEED HOSE**
25. **REMOVE FRONT FENDER APRON SUB-ASSY RH**
26. **REMOVE FENDER APRON SUB-ASSY LH**
27. **REMOVE AIR CLEANER ASSY**
 - (a) Remove the 4 nuts and air cleaner.
28. **REMOVE AIR CLEANER STAY NO.1**
 - (a) Disconnect the relay block.
 - (b) Remove the 4 bolts and air cleaner stay.
29. **REMOVE CAB MOUNTING BRACKET SUB-ASSY NO.3**
 - (a) Disconnect the 2 vacuum hoses.
 - (b) Remove the 8 bolts and cab mounting bracket.

**30. REMOVE ENGINE ASSY**

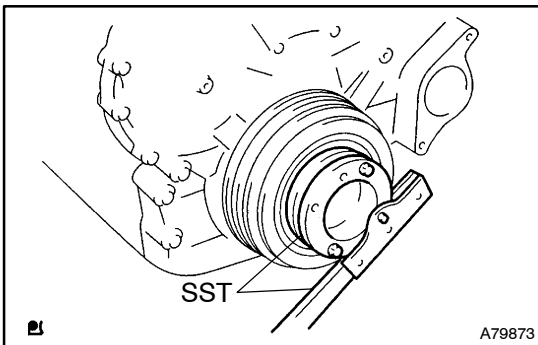
- (a) Using an engine lifter, hold the engine and separate the mount.

- 31. REMOVE STARTER ASSY (See page 19-3)**
32. REMOVE CLUTCH COVER ASSY (See page 42-24)
33. REMOVE CLUTCH DISC ASSY (See page 42-24)

**34. REMOVE FLYWHEEL SUB-ASSY**

- (a) Using SST, fix the crankshaft pulley and remove the flywheel.

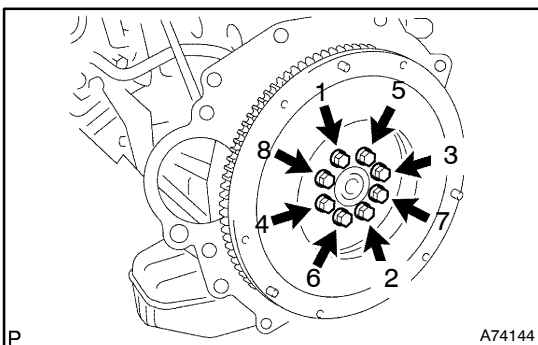
SST 09213-58013 (91111-50845), 09330-00021

**35. INSTALL FLYWHEEL SUB-ASSY**

- (a) Using SST, fix the crankshaft pulley.
 SST 09213-58013 (91111-50845), 09330-00021
 (b) Apply adhesive to 2 or 3 threads of the mounting bolt end.

Adhesive:

Part No. 08833-00080 THREE BOND 1344 or equivalent



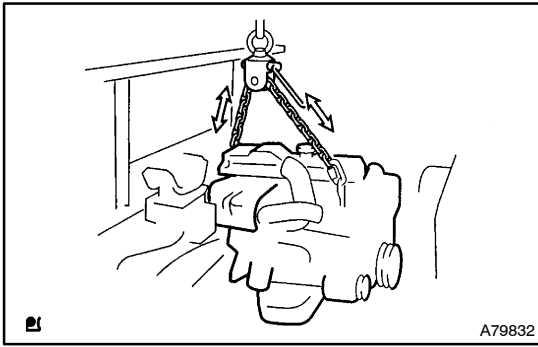
- (c) Install the bolts, as shown in the illustration.

Torque: 198 N·m (2,015 kgf·cm, 146 ft·lbf)

NOTICE:

Do not start the engine within 1 hour after the installation.

- 36. INSTALL CLUTCH DISC ASSY (See page 42-24)**
37. INSTALL CLUTCH COVER ASSY (See page 42-24)
38. INSTALL STARTER ASSY (See page 19-3)

**39. INSTALL ENGINE ASSY**

- (a) Using an engine lifter, install the engine.
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

40. REMOVE CAB MOUNTING BRACKET SUB-ASSY NO.3

- (a) Install the cab mounting bracket with the 8 bolts.

Torque: 120 N·m (1,250 kgf·cm, 88 ft·lbf)

- (b) Connect the vacuum hose and connector.

41. INSTALL AIR CLEANER STAY NO.1

- (a) Install the air cleaner stay with the 4 bolts.

Torque: 40 N·m (410 kgf·cm, 29 ft·lbf)

42. REMOVE AIR CLEANER ASSY

- (a) Install the air cleaner with the 4 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

43. INSTALL FENDER SIDE APRON SUB-ASSY LH**44. INSTALL FRONT FENDER APRON SUB-ASSY RH**

Torque: 11.5 N·m (117 kgf·cm, 8 ft·lbf)

45. INSTALL PRESSURE FEED HOSE**46. INSTALL OIL RESERVOIR TO PUMP HOSE NO.1****47. INSTALL A/C COMPRESSOR****48. INSTALL RADIATOR ASSY (See page 16-27)****49. CONNECT AIR HOSE NO.3****50. CONNECT AIR HOSE NO.2****51. CONNECT AIR HOSE NO. 1****52. CONNECT FUEL RETURN TUBE****53. CONNECT FUEL MAIN TUBE SUB-ASSY****54. INSTALL MANUAL TRANSMISSION ASSY (See page 41-3)****55. INSTALL EXHAUST PIPE ASSY FRONT**

- (a) Install a new gasket.

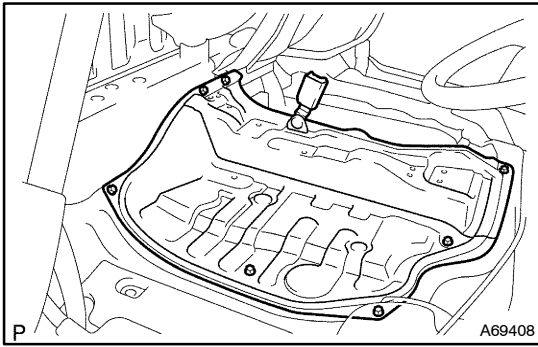
- (b) Install the exhaust pipe with the 3 nuts.

Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)

- (c) Install the exhaust pipe clamp with the bolt.

Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)

56. INSTALL ENGINE UNDER COVER**57. ADJUST FAN AND GENERATOR V BELT (See page 14-47)**



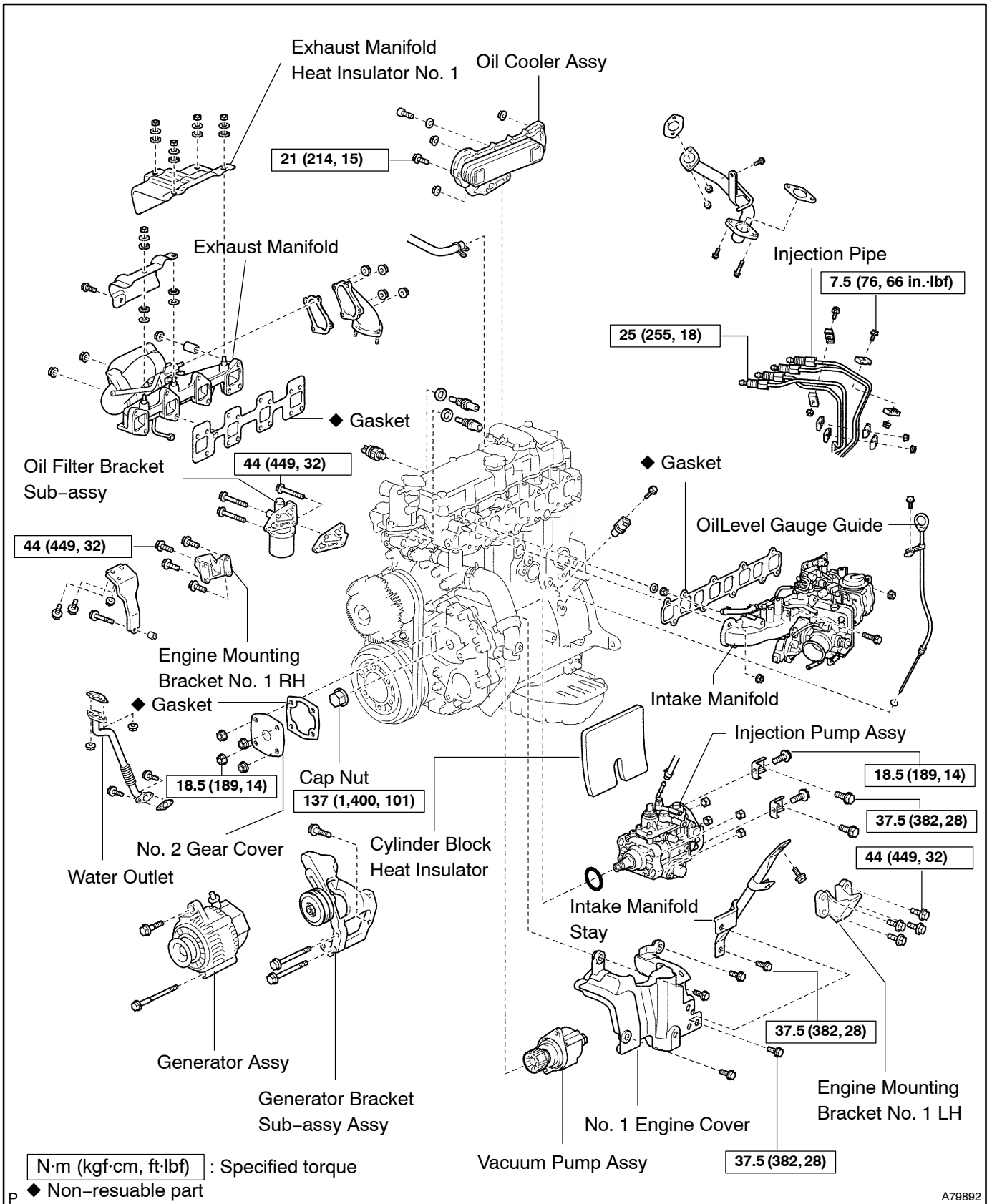
- 58. INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)**
Torque: 11.5 N·m (115 kgf·cm, 8 ft·lbf)
(a) Install the floor mat.

- 59. INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)**
60. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)
61. INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-3)
62. INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE) (See page 72-2)
63. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE) (See page 33-2)
64. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-2)
65. REFILL ENGINE COOLANT
66. BLEED FUEL (See page 11-57)
67. CONNECT BATTERY NEGATIVE TERMINAL
68. CHECK FOR ENGINE COOLANT LEAKS
69. INSPECT FOR FUEL LEAKS
70. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT (See page 26-2)

PARTIAL ENGINE ASSY (15B-FTE)

COMPONENTS

1417G-01

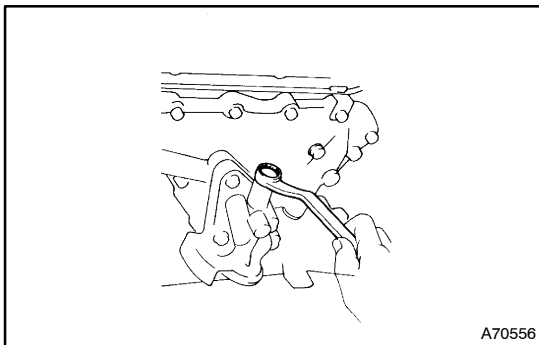


PARTIAL ENGINE ASSY (15B-FTE)

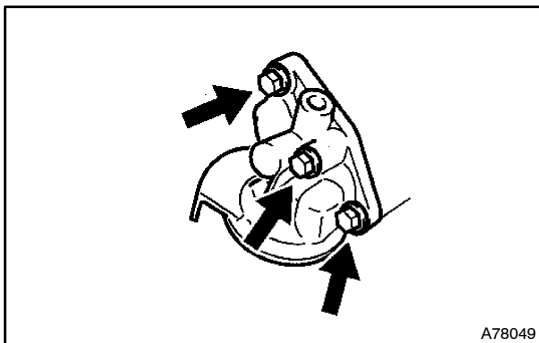
1417H-01

REPLACEMENT

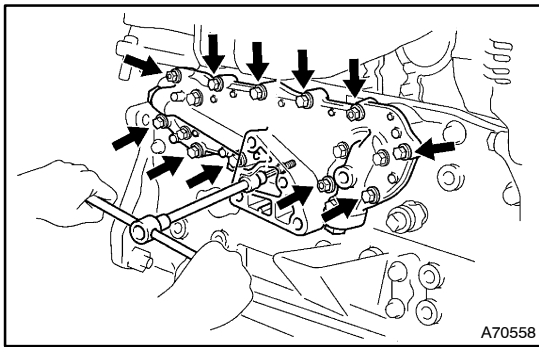
1. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-62)
2. REMOVE ENGINE ASSY (See page 14-52)
3. REMOVE GENERATOR ASSY (See page 19-6)
4. REMOVE GENERATOR BRACKET SUB-ASSY
 - (a) Remove the 4 bolts and generator bracket.
5. REMOVE INJECTION PIPE SUB-ASSY NO.4 (See page 11-60)
6. REMOVE INJECTION PIPE SUB-ASSY NO.3 (See page 11-60)
7. REMOVE INJECTION PIPE SUB-ASSY NO.2 (See page 11-60)
8. REMOVE INJECTION PIPE SUB-ASSY NO.1 (See page 11-60)
9. REMOVE INJECTION PUMP ASSY (See page 11-64)
10. REMOVE ENGINE MOUNTING BRACKET FRONT NO.1 RH
 - (a) Remove the 4 bolts and mounting bracket.
11. REMOVE ENGINE MOUNTING BRACKET FRONT NO.1 LH
 - (a) Remove the 4 bolts and mounting bracket.
12. REMOVE EXHAUST MANIFOLD (See page 15-2)
13. REMOVE OIL FILTER SUB-ASSY (See page 17-18)



14. REMOVE OIL FILTER BRACKET SUB-ASSY
 - (a) Remove the plug, gasket, spring relief valve and gasket.



- (b) Remove the 3 bolts, bracket and gasket.

**15. REMOVE OIL COOLER ASSY**

- (a) Using a 6 mm hexagon wrench, remove the bolt and washer.
- (b) Remove the 8 bolts, 3 nuts, oil cooler case and gasket.

16. REMOVE WATER OUTLET HOUSING

- (a) Remove the 2 nuts holding the water outlet housing to the cylinder head.
- (b) Disconnect the water bypass hose from the water pump, and remove the water outlet housing.

17. REMOVE INTAKE MANIFOLD (See page 13-4)**18. REMOVE CRANKSHAFT POSITION SENSOR****19. REMOVE ENGINE OIL PRESSURE SWITCH ASSY**

- (a) Using SST, remove the pressure switch.
SST 09816-30010

20. REMOVE VACUUM PUMP ASSY

- (a) Remove the 2 bolts and vacuum pump.

21. INSTALL VACUUM PUMP ASSY

- (a) Install the vacuum pump with the 2 bolts.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

22. INSTALL ENGINE OIL PRESSURE SWITCH ASSY

- (a) Apply adhesive to 2 or 3 threads of the pressure switch.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

NOTICE:

Do not start the engine within 1 hour after the installation.

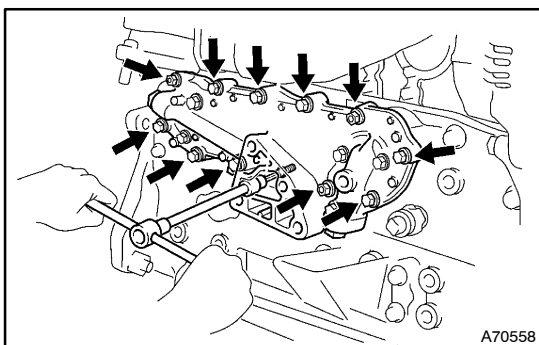
- (b) Using SST, install the oil pressure switch.
SST 09816-30010

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

23. INSTALL CRANKSHAFT POSITION SENSOR**24. INSTALL INTAKE MANIFOLD (See page 13-4)****25. INSTALL WATER OUTLET HOUSING**

- (a) Connect the water bypass hose to the water pump.
- (b) Install the water outlet housing with the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

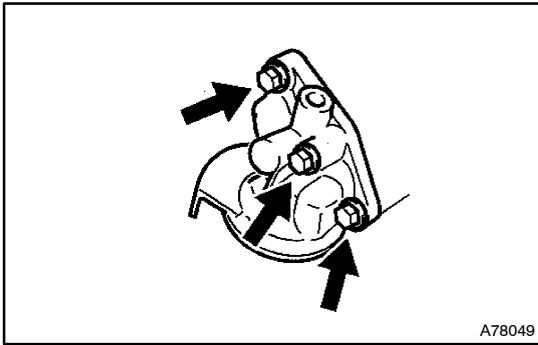
**26. INSTALL OIL COOLER ASSY**

- (a) Install a new gasket, the oil cooler case with the 8 bolts and 3 nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

- (b) Using a 6 mm wrench, install the washer and bolt.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

**27. INSTALL OIL FILTER BRACKET SUB-ASSY**

- (a) Install a new gasket and the oil filter bracket with the 3 bolts.

Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

HINT:

Bolt length:

A 70 mm (2.95 in.)

B 55 mm (2.17 in.)

C 35 mm (1.38 in.)

- (b) Install the relief valve and spring with a new gasket and the relief valve.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

28. INSTALL OIL FILTER SUB-ASSY (See page 17-18)**29. INSTALL EXHAUST MANIFOLD (See page 15-2)****30. INSTALL ENGINE MOUNTING BRACKET FRONT NO.1 LH**

- (a) Install the engine mounting bracket with the 4 bolts.

Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

31. INSTALL ENGINE MOUNTING BRACKET FRONT NO.1 RH

- (a) Install the engine mounting bracket with the 4 bolts.

Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

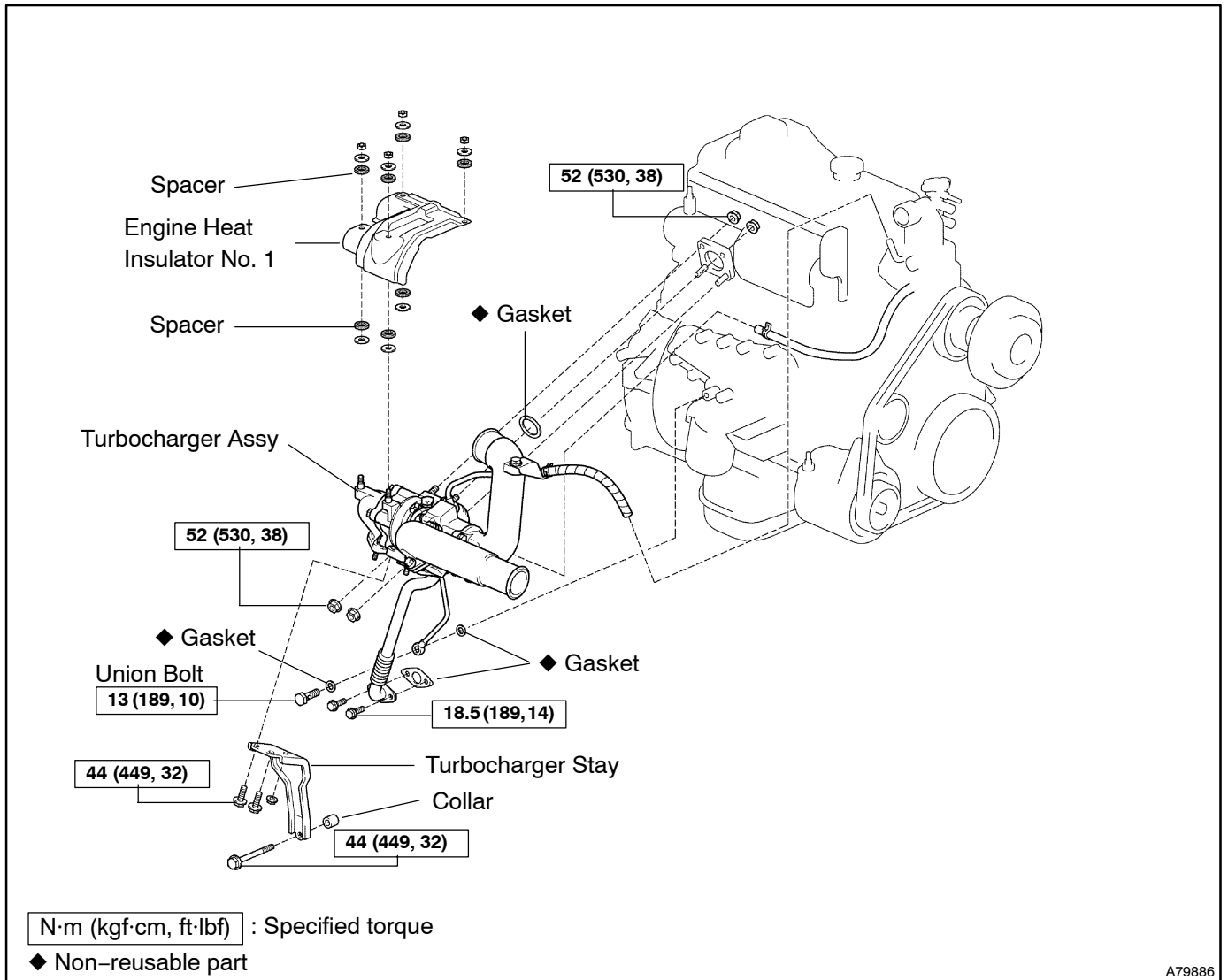
32. INSTALL INJECTION PUMP ASSY (See page 11-64)**33. INSTALL INJECTION PIPE SUB-ASSY NO.1 (See page 11-60)****34. INSTALL INJECTION PIPE SUB-ASSY NO.2 (See page 11-60)****35. INSTALL INJECTION PIPE SUB-ASSY NO.3 (See page 11-60)****36. INSTALL INJECTION PIPE SUB-ASSY NO.4 (See page 11-60)****37. INSTALL GENERATOR BRACKET SUB-ASSY**

- (a) Install the generator bracket with the 4 bolts.

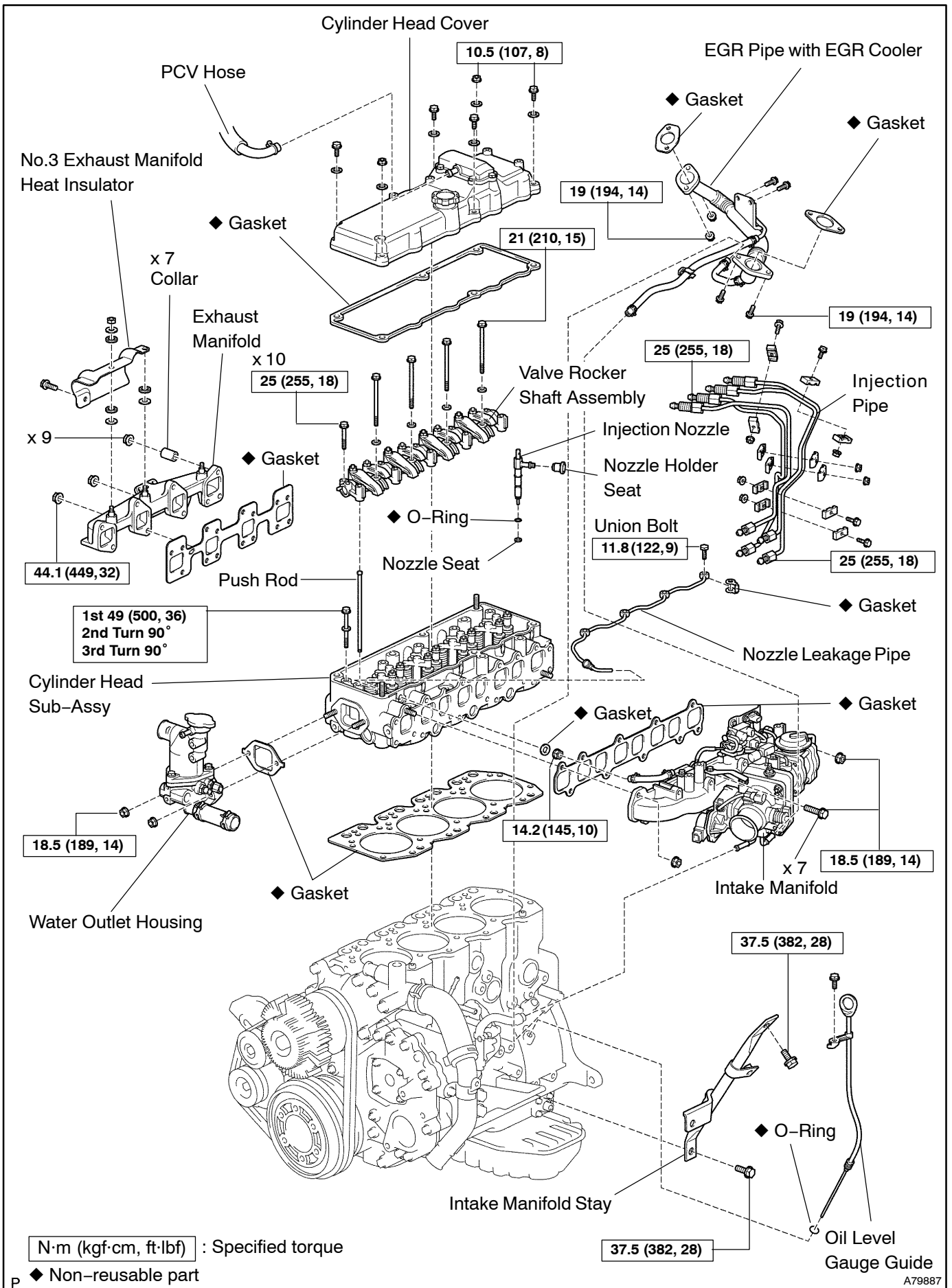
38. INSTALL GENERATOR ASSY (See page 19-6)**39. INSTALL ENGINE ASSY (See page 14-52)**

CYLINDER HEAD GASKET (15B-FTE) COMPONENTS

1417D-01

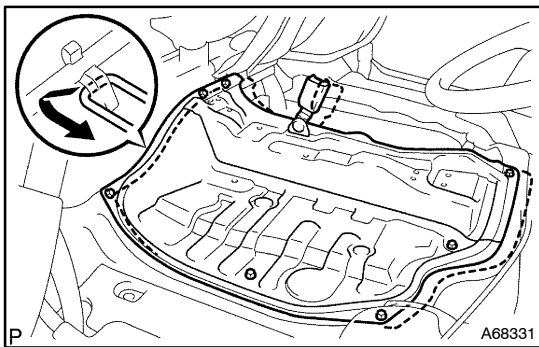


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REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE OIL
3. DRAIN ENGINE COOLANT
4. DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE
5. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
6. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE) (See page 33-3)
7. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-3)
8. REMOVE FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 41-11)
9. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE)
 - (a) Remove the 3 clips and shift lever boot cover.
10. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)
11. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)



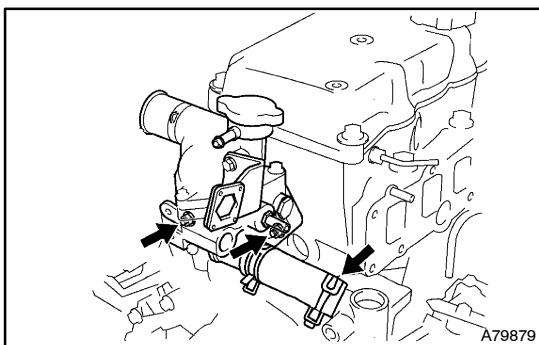
12. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

- (a) Remove the floor mat.
- (b) Remove the 7 bolts and the engine service hole sub cover

HINT:

As shown in the illustration, slide and remove the engine service hole sub cover, because there is a hook inside.

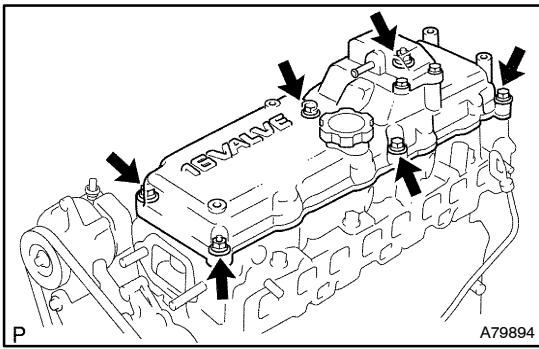
13. DISCONNECT ENGINE WIRE
14. SEPARATE A/C COMPRESSOR (See page 55-33)



15. REMOVE WATER OUTLET HOUSING

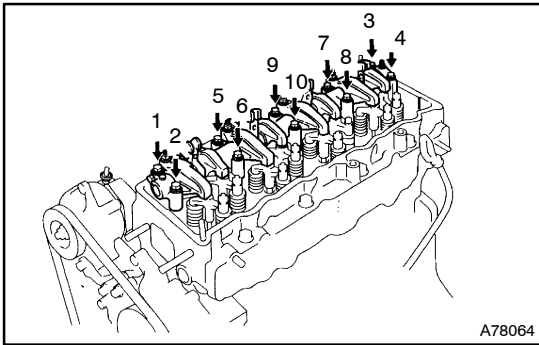
- (a) Remove the 2 nuts holding the water outlet housing to the cylinder head.
- (b) Disconnect the water bypass hose from the water pump, and remove the water outlet housing.

16. REMOVE FUEL PIPE SET (See page 11-60)
17. REMOVE OIL LEVEL GAUGE GUIDE
18. REMOVE INTAKE MANIFOLD (See page 13-4)
19. REMOVE EXHAUST MANIFOLD (See page 15-2)



20. REMOVE CYLINDER HEAD COVER SUB-ASSY

- (a) Remove the 4 bolts, 2 nuts, 6 cushions, cylinder head cover and gasket.



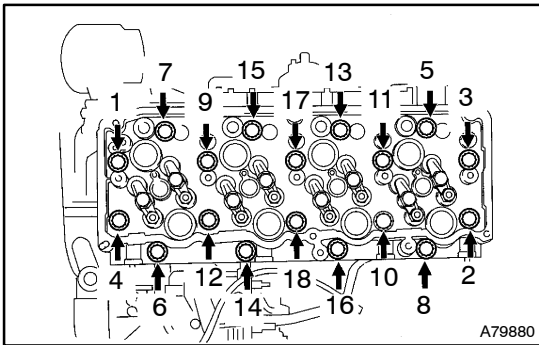
21. REMOVE CYLINDER HEAD SUB-ASSY

- (a) Remove the nozzle leakage pipe (See page 11-60).
- (b) Loosen the lock nuts and adjusting screws.
- (c) Uniformly loosen and remove the 10 bolts, in several passes, in the order shown.
- (d) Remove the valve rocker shaft assy.
- (e) Remove the 8 push rods in order, beginning from the No. 1 push rod.

HINT:

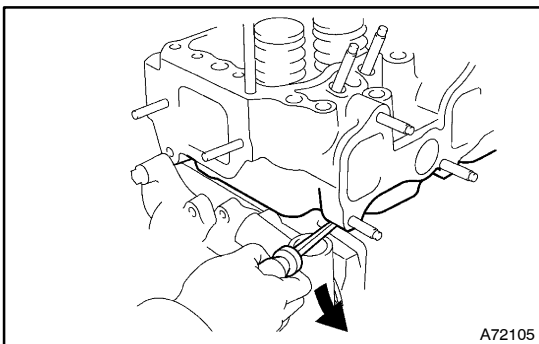
Arrange the push rods in correct order.

- (f) Uniformly loosen and remove the 18 cylinder head bolts, in several passes, in the order shown.



NOTICE:

Removing the bolts in the incorrect order will result in warpage or cracks on the head.



- (g) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.

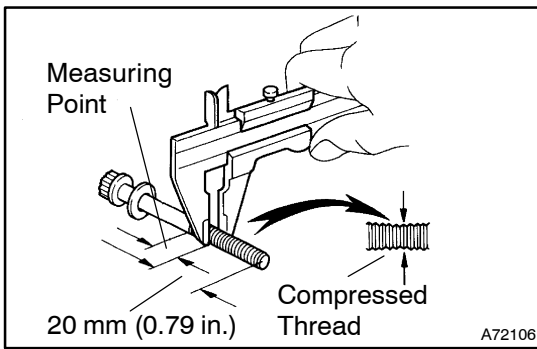
HINT:

If the cylinder head is difficult to be lifted off, insert a screwdriver between the cylinder head and block to pry it up.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

22. REMOVE CYLINDER HEAD GASKET

**23. INSPECT CYLINDER HEAD SET BOLT**

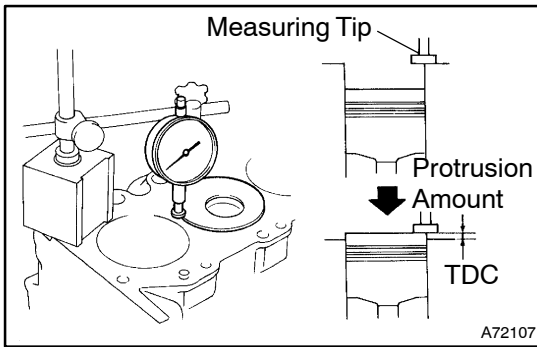
- (a) Using vernier calipers, measure the minimum outer diameter of the compressed threads at the measuring point.

Standard outer diameter:

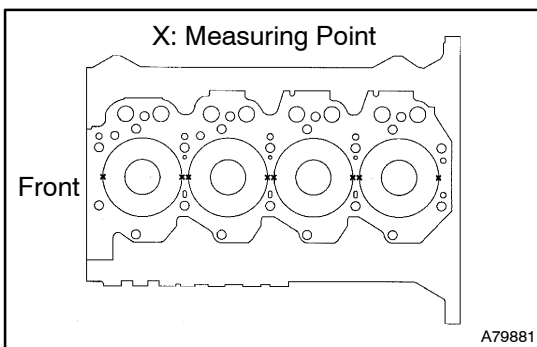
11.800 – 12.000 mm (0.4646 – 0.4724 in.)

Minimum outer diameter: 11.60 mm (0.4567 in.)

If the outer diameter is less than the minimum, replace the bolt.

**24. INSTALL CYLINDER HEAD GASKET**

- (a) Check the piston protrusions for each cylinder.
- (1) Clean the cylinder block with solvent.
 - (2) Set the piston of the cylinder to be measured to slightly before TDC.
 - (3) Place a dial indicator on the cylinder block, and set the dial indicator at 0 mm (0 in.).

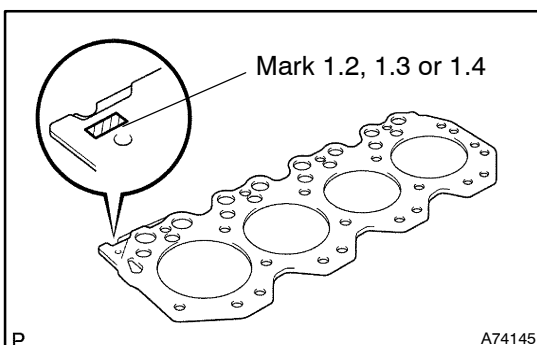
**HINT:**

- Use a dial indicator measuring tip as shown in the illustration.
 - Make sure that the measuring tip is square to the cylinder block gasket surface and piston head when taking the measurements.
- (4) Find the point where the piston head protrudes most by slowly turning the crankshaft clockwise and counterclockwise.
 - (5) Measure each cylinder at 2 places as shown in the illustration, making a total of 8 measurements.
 - (6) For the piston protrusion value of each cylinder, use the average of the 2 measurements of each cylinder.

Protrusion: 0.255 – 0.705 mm (0.0100 – 0.0278 in.)

When removing piston and connecting rod assembly:

If the protrusion is not as specified, remove the piston and connecting rod assembly and reinstall it.



- (b) Select a new cylinder head gasket.

HINT:

There are 3 sizes of new cylinder head gaskets, marked 1.2, 1.3 or 1.4 accordingly.

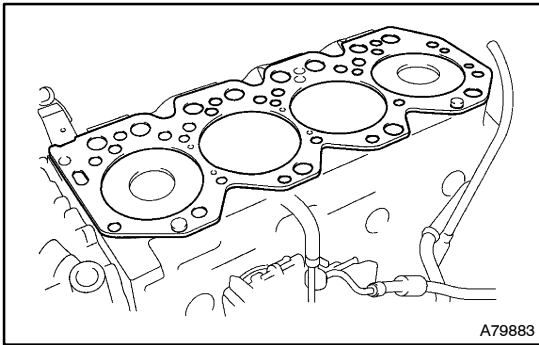
New installed cylinder head gasket thickness:

Mark 1.2	1.17 – 1.23 mm (0.0461 – 0.0484 in.)
Mark 1.3	1.27 – 1.33 mm (0.0500 – 0.0524 in.)
Mark 1.4	1.37 – 1.43 mm (0.0539 – 0.0563 in.)

Select the largest piston protrusion value from the measurements made, then select a new appropriate gasket from the table below.

Protrusion:

Piston protrusion	mm (in.)	Gasket size
0.255 - 0.505	(0.0100 - 0.0199)	Use 1.2
0.506 - 0.605	(0.0200 - 0.0238)	Use 1.3
0.606 - 0.705	(0.0240 - 0.0278)	Use 1.4



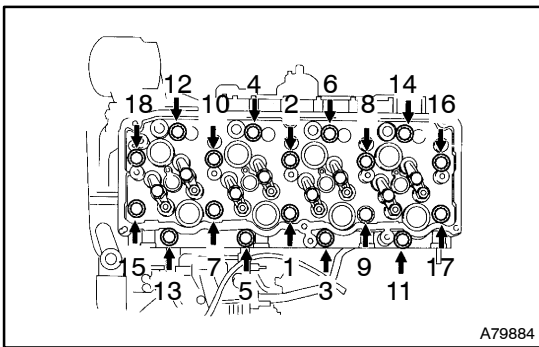
25. INSTALL CYLINDER HEAD SUB-ASSY

- (a) Place the cylinder head on the cylinder block.
 - (1) Place a new cylinder head gasket in position on the cylinder block.

NOTICE:

Be careful of the installation direction.

- (2) Place the cylinder head in position on the cylinder head gasket.



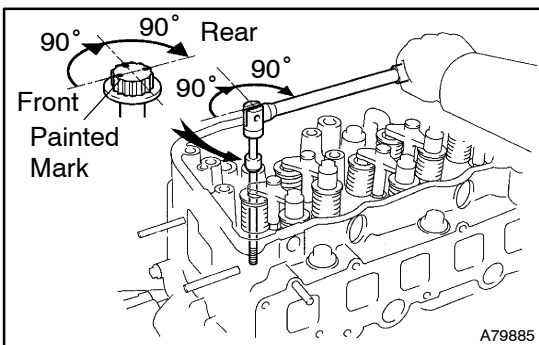
- (b) Install the cylinder head bolts.

HINT:

- The cylinder head bolts are tightened in 3 progressive steps (steps (2), (4) and (5)).
- If any bolts is broken or deformed, replace it.
 - (1) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
 - (2) Install and uniformly tighten the 18 cylinder head bolts, in several passes, in the order shown.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

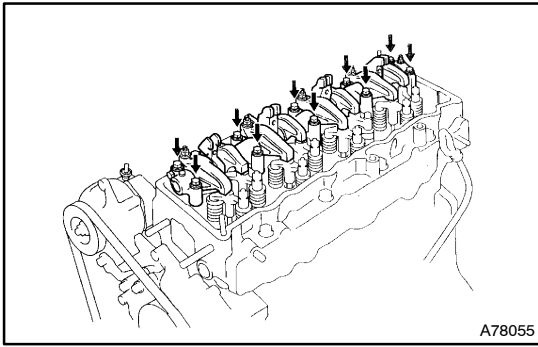
If any of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.



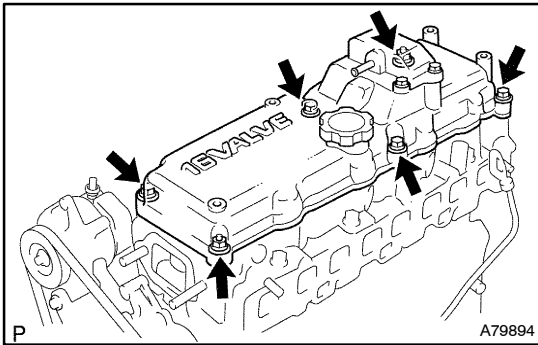
- (3) Mark the front of the cylinder head bolt with paint.
- (4) Retighten the cylinder head bolts by 90° in the numerical order shown.
- (5) Retighten the cylinder head bolts by an additional 90°.
- (6) Check that the painted mark is now facing rearward.

26. INSTALL CYLINDER HEAD COVER SUB-ASSY

- (a) Install the push rods.
- (b) Place the rocker arm adjusting screws with the heads of the push rods.



- (c) Instal and uniformly tighten the 10 bolts, in several passes, in the sequence shown.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)



27. INSTALL CYLINDER HEAD COVER SUB-ASSY

- (a) Install nozzle leakage pipe (See page 11-60).
 (b) Install the gasket to the cylinder head cover.
 (c) Install the cylinder head cover and uniformly tighten them with the 6 cushions, 4 bolts and 2 nuts, in several passes, in the order shown.
Torque: 10.5 N·m (107 kgf·cm, 8 ft·lbf)

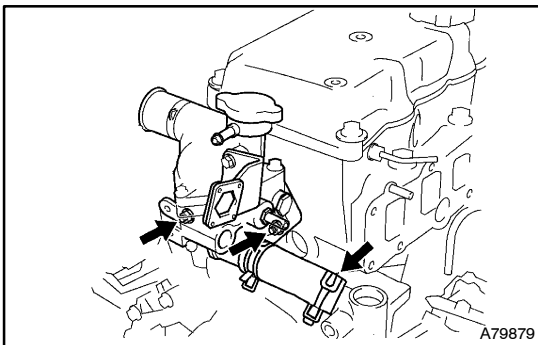
28. INSTALL EXHAUST MANIFOLD (See page 15-2)

29. INSTALL INTAKE MANIFOLD (See page 13-4)

30. INSTALL OIL LEVEL GAUGE GUIDE

- (a) Install the oil level gauge guide with the bolt.

31. INSTALL FUEL PIPE SET (See page 11-60)



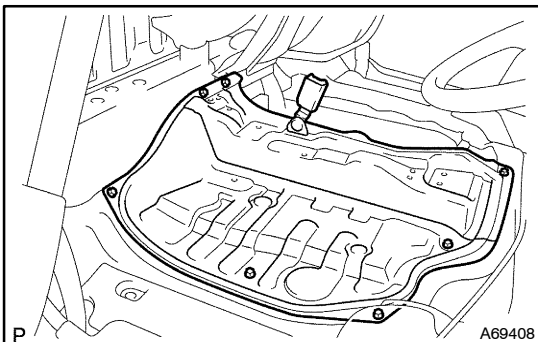
32. INSTALL WATER OUTLET HOUSING

- (a) Connect the water bypass hose to the water pump.
 (b) Install the water outlet housing with the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

33. INSTALL A/C COMPRESSOR (See page 55-33)

34. INSTALL ENGINE WIRE



35. INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

- (a) Install the engine service hole sub cover with the 7 bolts.
Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)
 (b) Install the floor mat.

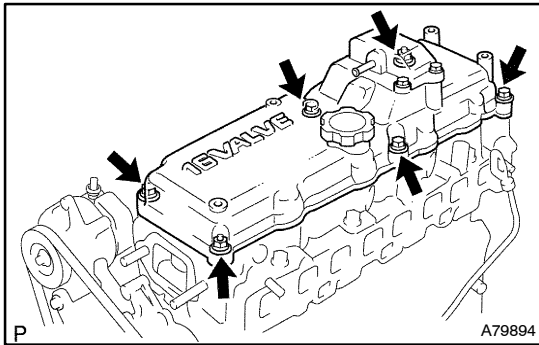
36. **INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)**
37. **INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)**
38. **INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-3)**
39. **INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE) (See page 72-2)**
40. **ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE) (See page 33-2)**
41. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-2)**
42. **REFILL ENGINE COOLANT**
43. **CONNECT BATTERY NEGATIVE TERMINAL**
44. **ADD FUEL**
45. **BLEED FUEL (See page 11-57)**
46. **CHECK FOR ENGINE COOLANT LEAKS**
47. **INSPECT FOR FUEL LEAKS**

CAMSHAFT (15B-FTE)

1417F-01

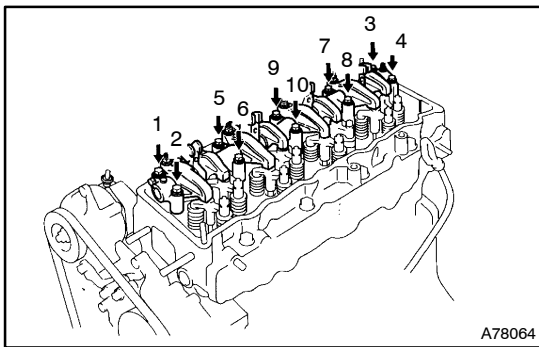
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. DRAIN ENGINE OIL
4. REMOVE RADIATOR ASSY (See page 16-27)
5. SET NO. 1 CYLINDER TO TDC/COMPRESSION
6. REMOVE NOZZLE ASSY (See page 11-60)



7. REMOVE CYLINDER HEAD COVER SUB-ASSY

- (a) Remove the 4 bolts, 2 nuts, 6 cushions, cylinder head cover and gasket.



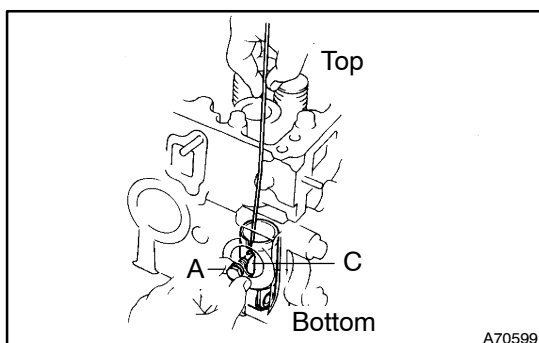
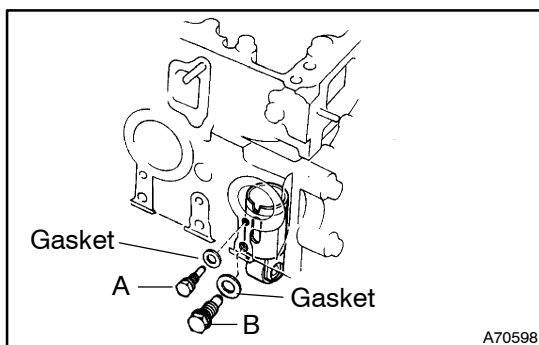
8. REMOVE VALVE ROCKER SHAFT ASSY

- (a) Remove the nozzle leakage pipe (See page 11-60).
- (b) Loosen the lock nuts and adjusting screws.
- (c) Uniformly loosen and remove the 10 bolts, in several passes, in the order shown.
- (d) Remove the valve rocker shaft assy.
- (e) Remove the 8 push rods in order, beginning from the No. 1 push rod.

HINT:

Arrange the push rods in correct order.

- (f) Remove bolts (A), (B) and gaskets.



- (g) Using a wire, lift up the valve lifter until long hole (C) of the valve lifter moves up to the position of the installation hole for bolt (A).

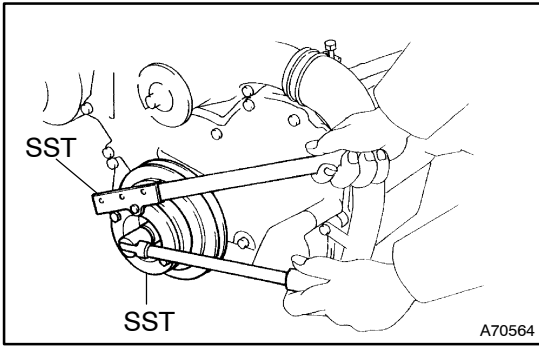
HINT:

If the lifter is lifted up too high, it may miss the position.

- (h) Install bolt (A).
- (i) Check that bolt (A) prevents the valve lifter from falling.

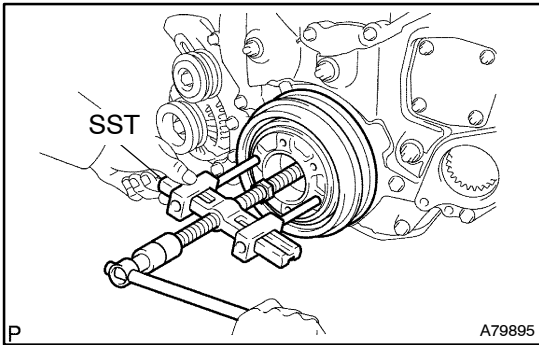
NOTICE:

Be careful not to scratch the valve lifter.

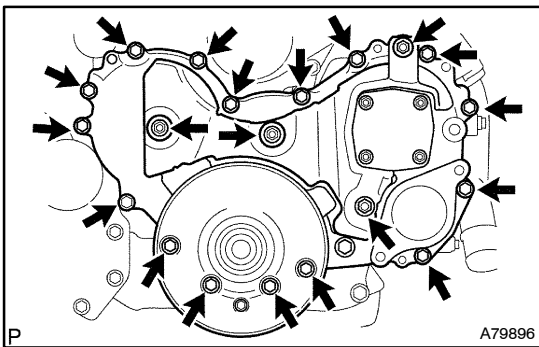


9. REMOVE CRANKSHAFT PULLEY

- (a) Using SST, remove the mounting bolt.
SST 09213-58013 (90201-08131, 91111-50845), 09330-00021

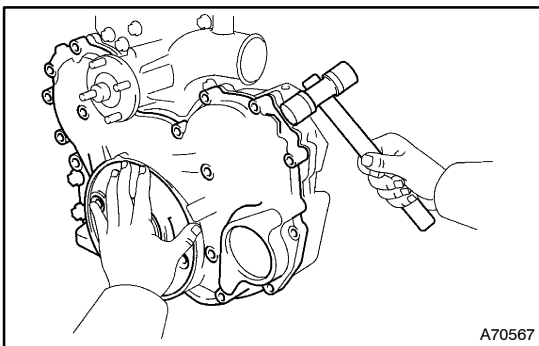


- (b) Using SST, remove the crankshaft pulley.
SST 09950-50013 (09951-05010, 09952-05010, 09953-05010, 09953-05020, 09954-05030)

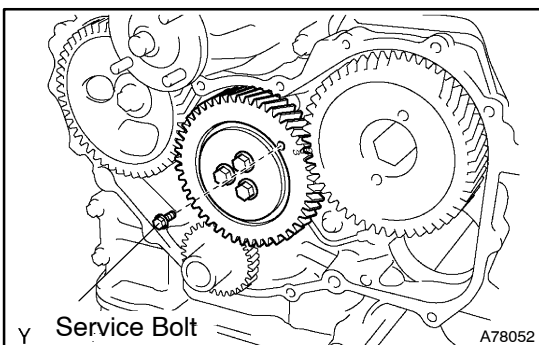


10. REMOVE TIMING GEAR COVER

- (a) Remove the 4 nuts and cover.
- (b) Remove the 17 mounting bolts.



- (c) Using a plastic-faced hammer, lightly tap out the timing gear cover.
- (d) Remove the timing gear cover gasket.
- (e) Using a plastic-faced hammer, lightly tap out the gear and remove the injection pump drive gear.



11. REMOVE IDLER GEAR NO.1

- (a) Secure the idler sub-gear to the idler gear with a service bolt.

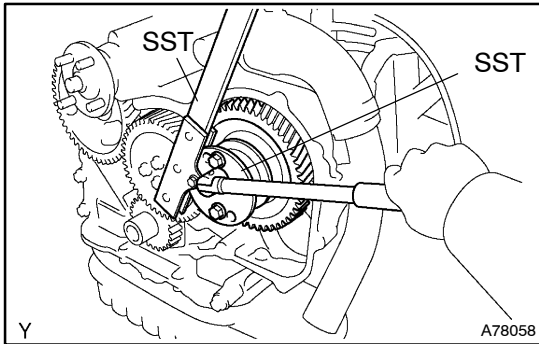
Recommended service bolt:

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	30.0 mm (1.18 in.)

HINT:

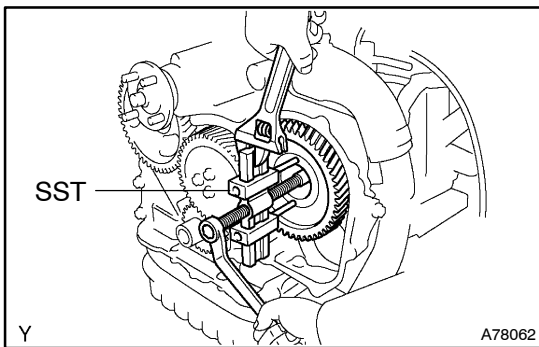
Since there is spring force to be applied to the sub-gear when removing the idler gear, a service bolt should be used.

- (b) Remove the 3 bolts, thrust plate and idle gear.

**12. REMOVE INJECTION PUMP DRIVE GEAR**

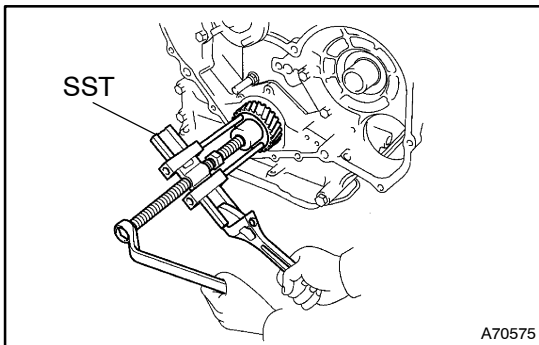
- (a) Using SST, remove the pulley bolt.

SST 09213-58013 (90201-08131, 91111-50845),
09330-00021



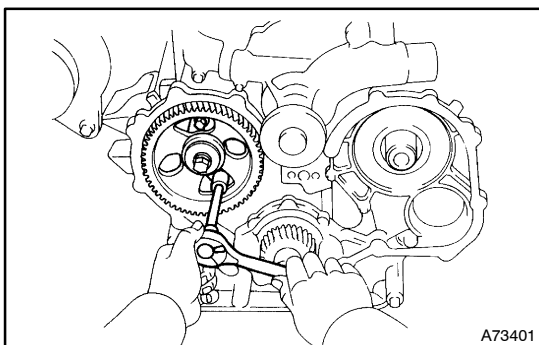
- (b) Using SST, remove the drive gear.

SST 09950-50013 (09951-05010, 09952-05010,
09953-05010, 09954-05030)

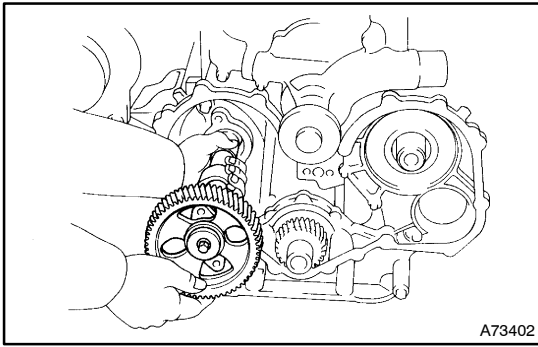
**13. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET**

- (a) Using SST, remove the timing gear or sprocket.

SST 09950-50013 (09951-05010, 09952-05010,
09953-05010, 09953-05020)



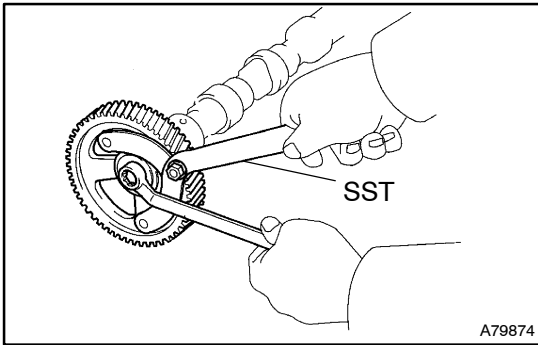
- (b) Remove the 2 bolts holding the thrust plate to the cylinder block or sprocket.



(c) Carefully pull out the camshaft and timing gear assembly.

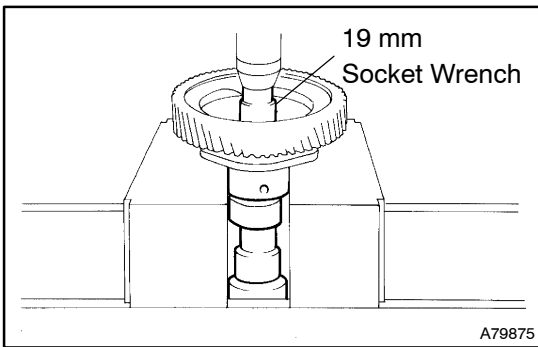
NOTICE:

Be careful not damage the camshaft bearing.

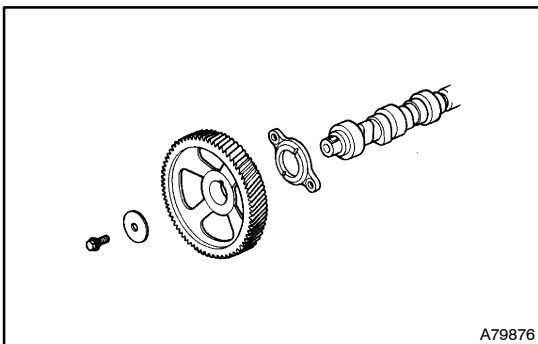


14. REMOVE CAMSHAFT

(a) Using SST, remove the mount bolt and plate washer.
SST 09960-10010 (09962-01000, 09963-01000)

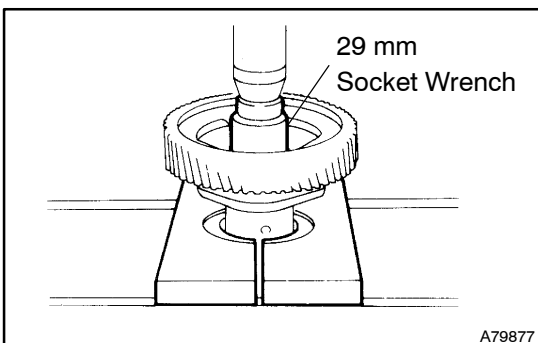


(b) Using a 19 mm socket wrench and press, press out the camshaft.

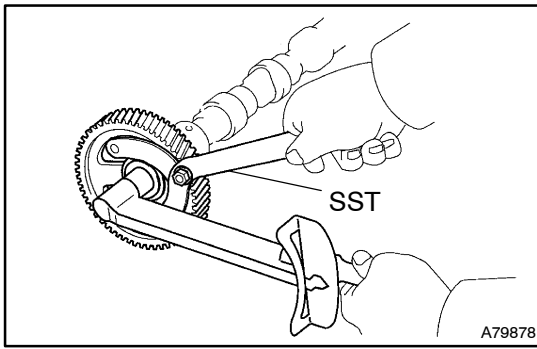


15. INSTALL CAMSHAFT

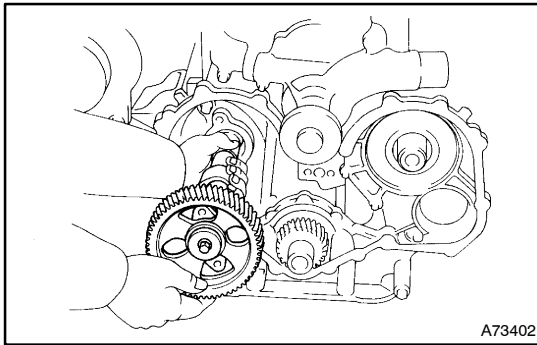
(a) Install the timing gear set key to the camshaft.
(b) Assemble the camshaft, thrust plate and timing gear as shown.



(c) Using 29 mm socket wrench and press, align the timing gear set key with the key groove of the timing gear, and press in the camshaft timing gear.



- (d) Using SST, install the plate washer and bolt.
SST 09960-10010 (09962-01000, 09963-01000)
Torque 57 N·m (581 kgf·cm, 42 ft·lbf)

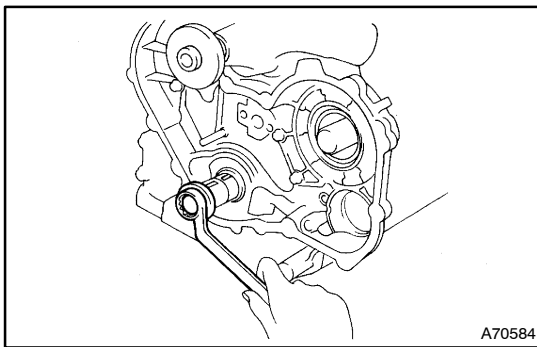


- (e) Install the camshaft timing gear or sprocket into the cylinder block.

NOTICE:

Be careful not to damage the camshaft bearing.

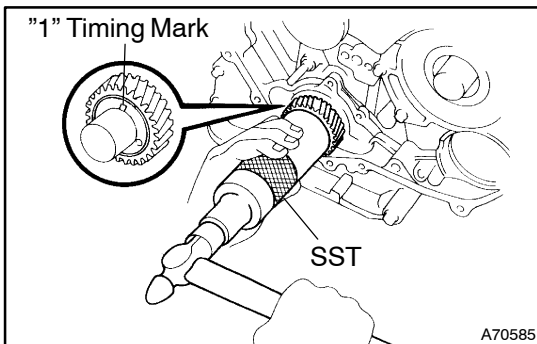
- (f) Install and torque the 2 bolts.
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)



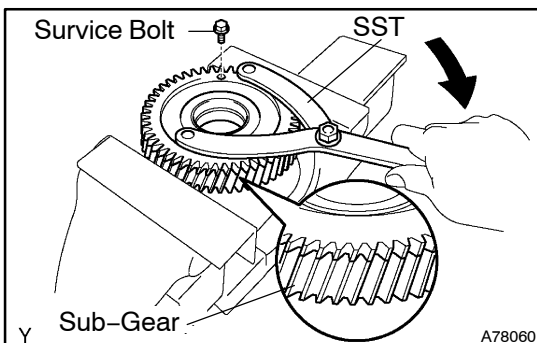
16. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET

- (a) Check that the set key on crankshaft timing gear or sprocket faces upward.

If not, turn the crankshaft with a crankshaft pulley mount bolt.



- (b) Put the timing gear on the crankshaft with timing mark 4 of the timing gear facing forward.
- (c) Align the timing gear set key with the key groove of the crankshaft timing gear.
- (d) Using SST and a hammer, tap in the crankshaft timing gear.
SST 09608-06041



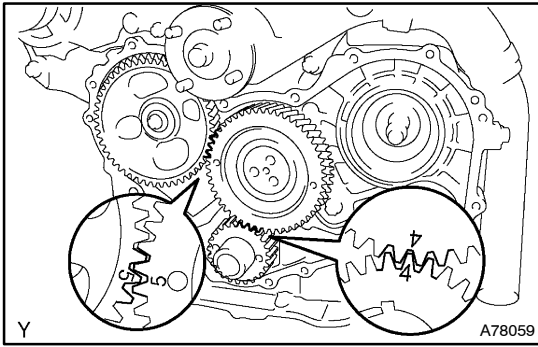
17. INSTALL IDLE GEAR NO.1

- (a) When the sub-gear and the idle gear have shifted, do the following work (1) and (2).

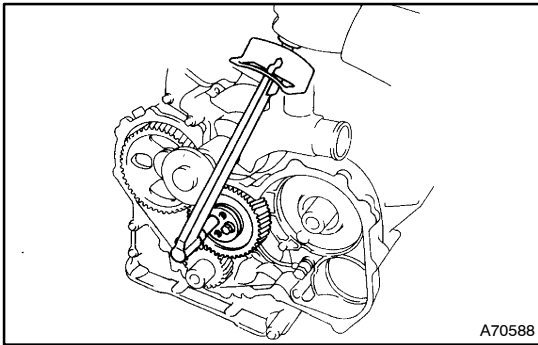
- (1) Using SST, align the holes of the idle gear and sub-gear by turning the sub-gear clockwise, and install a service bolt.

SST 09960-10010 (09962-01000, 09963-00500)

- (2) Align the gear teeth of the idle gear and sub-gear, and tighten the service bolt.



- (b) Align the idle gear timing marks 4 and 5 with crankshaft gear timing mark 4 and camshaft gear timing mark 5 respectively, and mesh the gears.

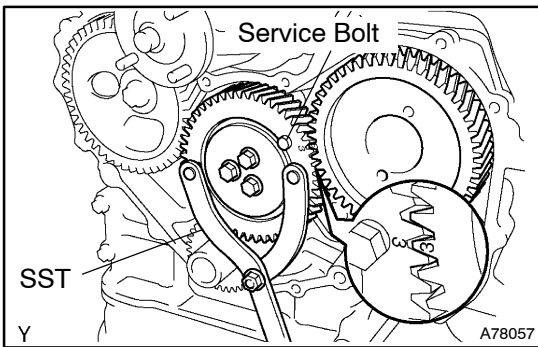


- (c) Apply a light coat of engine oil on the threads and under the bolt heads.
 (d) Install the thrust plate with the 3 bolts.

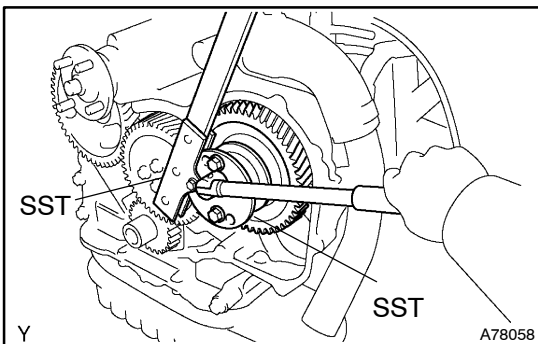
Torque: 47.5 N·m (484 kgf·cm, 35 ft·lbf)

18. INSTALL INJECTION PUMP DRIVE GEAR

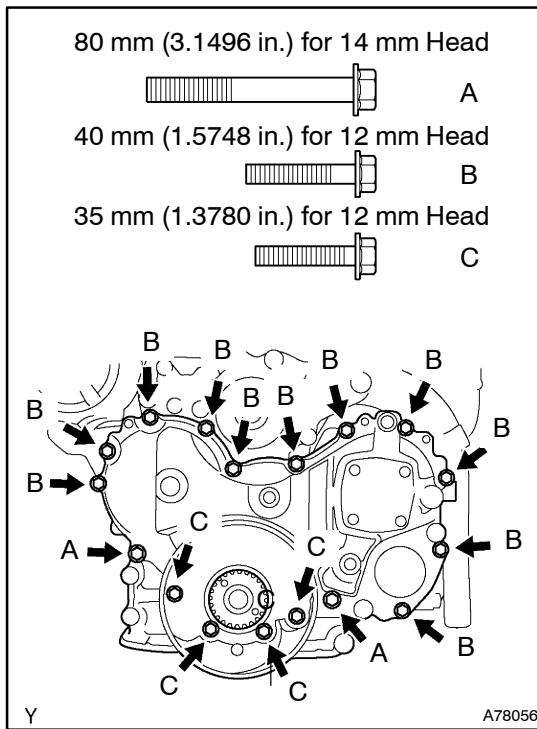
- (a) Align the drive gear set key with the key groove of the drive gear.



- (b) Using SST, align idle gear timing mark 3 with drive gear timing mark 3, and mesh the gears.
 SST 09960-10010 (09962-01000, 09963-01000),



- (c) Using SST, install the drive gear nut.
 SST 09330-00021
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)
 (d) Remove the service bolt.

**19. INSTALL TIMING GEAR COVER**

- (a) Install a new gasket and the timing gear cover with the 17 bolts.

Torque:

44 N·m (449 kgf·cm, 32 ft·lbf) for bolt A

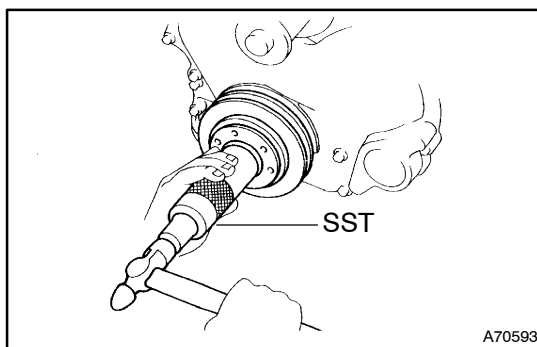
21 N·m (214 kgf·cm, 15 ft·lbf) for bolt B, C

HINT:

Each bolt length is indicated in the illustration.

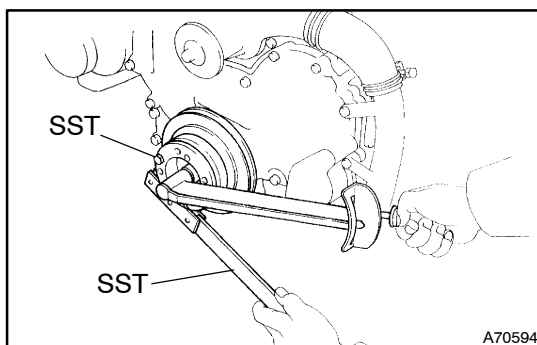
- (b) Connect the radiator hose to the water pump.
(c) Install the radiator pipe with the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

**20. INSTALL CRANKSHAFT PULLEY**

- (a) Align the pulley set key with the key groove of the pulley.
(b) Using SST and a hammer, tap in the pulley.

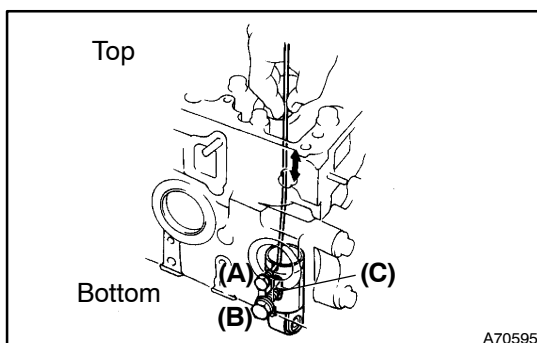
SST 09608-06041



- (c) Apply a light coat of engine oil on the threads and under the bolt head.

- (d) Using SST, install and torque the pulley mounting bolt.
SST 09213-58013 (90201-08131, 91111-50845),
09330-00021

Torque: 403 N·m (4,110 kgf·cm, 297 ft·lbf)

**21. INSTALL VALVE ROCKER SHAFT ASSY**

- (a) Remove bolt (A) and let the lifter slide down.
(b) Install bolts (A) and (B) with new gaskets.

Torque:

9.4 N·m (96 kgf·cm, 6.8 in·lbf) for bolt (A)

37.5 N·m (382 kgf·cm, 28 ft·lbf) for bolt (B)

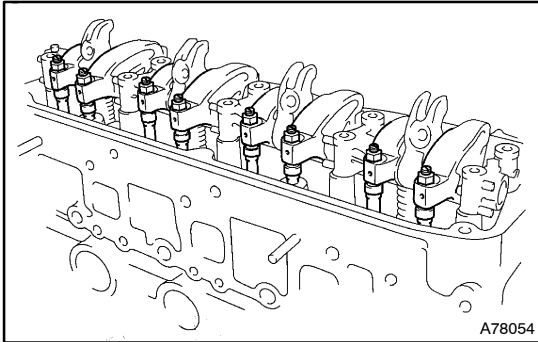
HINT:

When installing bolt (B), check that the hole for bolt (B) is aligned with long hole (C) of the valve lifter.

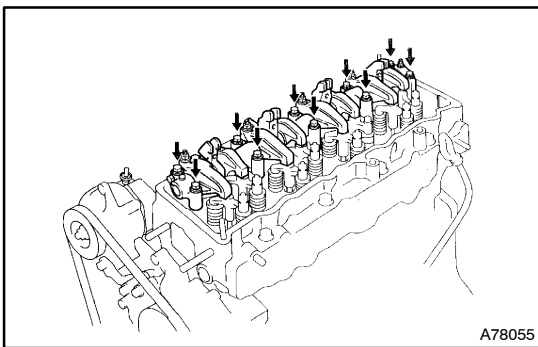
- (c) Check that the valve lifter can move up and down within the limit of long hole (C).

NOTICE:

Be careful not to scratch the valve lifter.



- (d) Place the rocker shaft assembly on the cylinder head.
 (e) Align the rocker arm adjusting screws with the heads of the push rods.

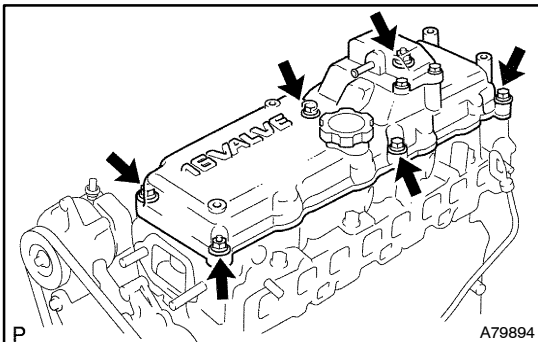


- (f) Instal and uniformly tighten the 10 bolts, in several passes, in the sequence shown.

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

22. INSPECT VALVE CLEARANCE (See page 14-49)

23. ADJUST VALVE CLEARANCE (See page 14-49)



24. INSTALL CYLINDER HEAD COVER SUB-ASSY

- (a) Install nozzle leakage pipe (See page 11-60).
 (b) Install the gasket to the cylinder head cover.
 (c) Install the cylinder head cover and uniformly tighten them with the 6 cushions, 4 bolts and 2 nuts, in several passes, in the order shown.

Torque: 10.5 N·m (107 kgf·cm, 8 ft·lbf)

25. CONNECT PCV HOSE

26. INSTALL FUEL PIPE SET (See page 11-60)

27. INSTALL RADIATOR ASSY (See page 16-27)

**28. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)
 (See page 33-2)**

29. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-2)

30. ADD ENGINE OIL

31. REFILL ENGINE COOLANT

32. BLEED FUEL (See page 11-57)

33. CONNECT BATTERY NEGATIVE TERMINAL

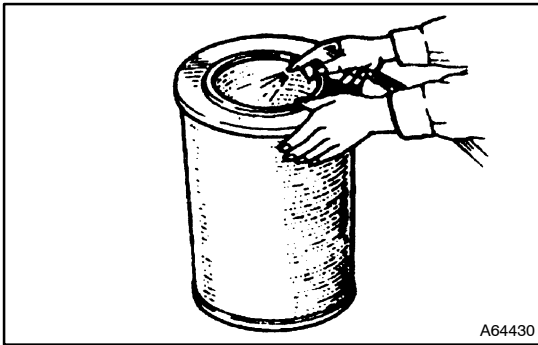
34. CHECK ENGINE OIL LEVEL
35. CHECK FOR ENGINE COOLANT LEAKS
36. CHECK FOR ENGINE OIL LEAKS
37. INSPECT FOR FUEL LEAKS
38. INSPECT VALVE CLEARANCE (See page 14-49)

ENGINE (S05C-B)

ADJUSTMENT

1416Z-01

1. INSPECT ENGINE COOLANT
2. INSPECT ENGINE OIL
3. INSPECT BATTERY

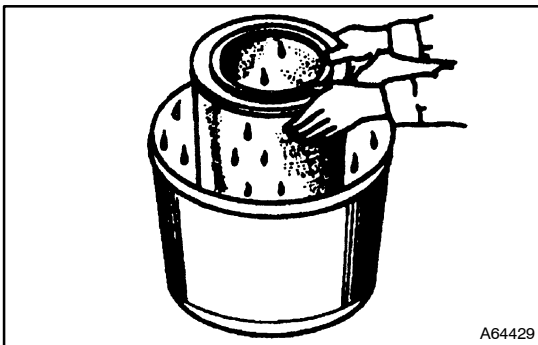


4. Non-Washable type: INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY

- (a) Visually check that the filter is not excessively dirty or oily.
- (b) To remove dry dirt or dust, use a compressed air gun (Air pressure: lower than 690 kPa (7.0 kgf/cm², 100 psi)). Always blow off from the inside of the element to the outside. Never strike or bang the filter to remove dirt or dust.

HINT:

If the compressed air is too high and the element has deformation, the engine will be in trouble.



5. Washable type: INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY

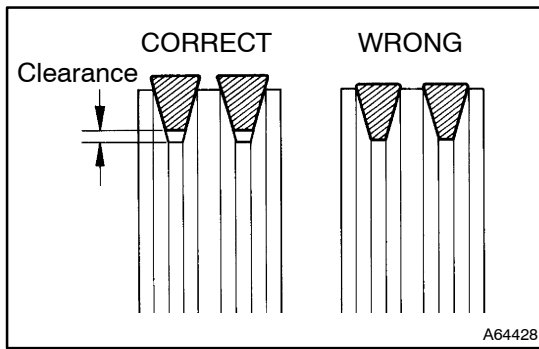
- (a) Wash the element by soaking it in a non-sudsy detergent solution for approx. 30 minutes.
- (b) Rinse the element with clean water and dry it completely with compressed air.

HINT:

- Check to see that the inside of the element is not soiled with dust etc.
- If drying the element in an oven, drying should be done at below 80°C (176°F).
- Never reinstall the element until it is completely dry.
- Make sure that the dried element is not broken and that the packing is not broken nor deformed.

NOTICE:

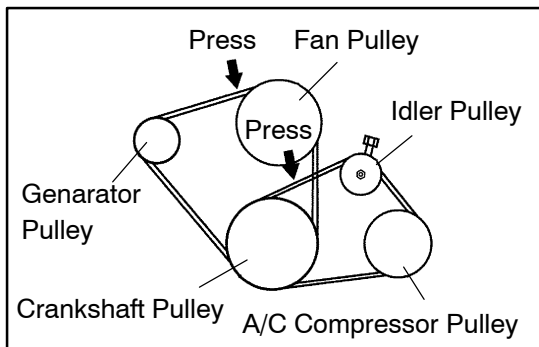
Never use kerosene, gasoline or other solvents to clean the elements. Use of these could cause the engine to overrunning of the engine and damage the engine.



6. INSPECT V BELT

- (a) Visually check the belt for cracks, oiliness or wear. Check that the belt does not touch the bottom of the pulley groove.

If necessary, replace the belts as a set.



- (b) Measure the V belt deflection by pressing on the belt at the points indicated in the illustration with 98 N (10 kgf, 22 lbf) of pressure.

Deflection:

Generator belt	New belt	5.5 – 6.5 mm (0.217 – 0.256 in.)
	Used belt	6.5 – 7.5 mm (0.256 – 0.295 in.)
A/C belt	New belt	7.0 – 8.5 mm (0.276 – 0.335 in.)
	Used belt	8.5 – 10.0 mm (0.335 – 0.394 in.)

- (c) Reference:

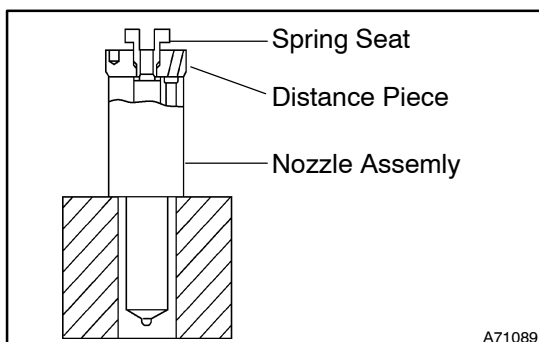
Using a belt tension gauge, measure the belt tension.

Tension:

New belt	374 – 471 N (38 – 48 kg, 84 – 106 lb)
Used belt	275 – 373 N (28 – 38 kg, 62 – 84 lb)

HINT:

- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.

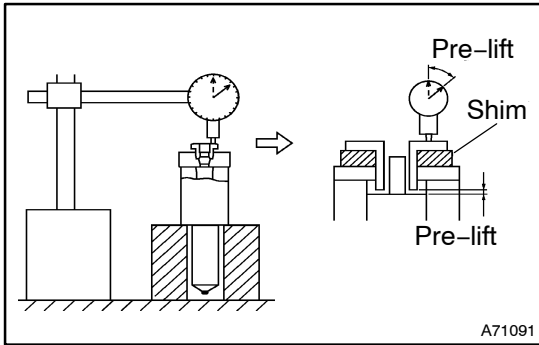
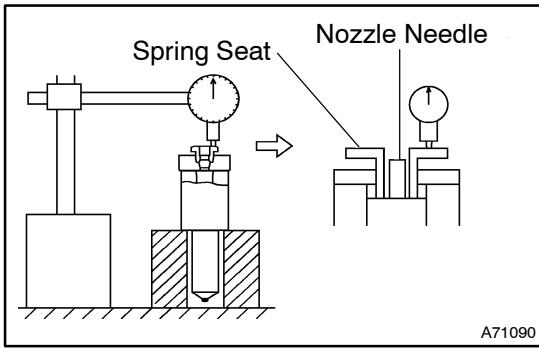


7. ADJUST NOZZLE HOLDER AND NOZZLE SET

- (a) Disassemble the nozzle holder and nozzle set.
- (b) Adjust the pre-lift.
- (1) The nozzle assembly, distance piece, and spring seat are attached.

NOTICE:

Each part must be washed carefully to eliminate any debris.



- (2) The hole in the pin on the distance piece are lined up and the dial gauge is pushed down until it contacts the distance piece. Next, set the dial gauge to "0".

- (3) Install the pre-lift adjusting shim.

- (4) Measure the pre-lift.

If the pre-lift out of the assembly standard, suitable shims are then used to adjust this pre-lift value to a standard value.

Pre-lift: 0.095 – 0.115 mm (0.0038 – 0.0045 in.)

HINT:

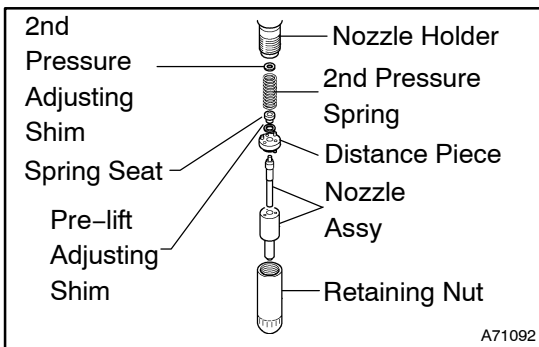
- Thick shims = increase the pre-lift
- Thin shims = decrease the pre-lift

Pre-lift adjusting shim line-up

Shim size:

1.30 – 1.42 mm (0.052 – 0.055 in.) (Jump at 0.02)

1.44 – 1.70 mm (0.057 – 0.066 in.) (Jump at 0.02)



- (c) Adjust the 1st opening pressure.

- (1) Attach the 2nd opening pressure adjusting shim, 2nd pressure spring and adjusted parts to the bottom of the nozzle holder.

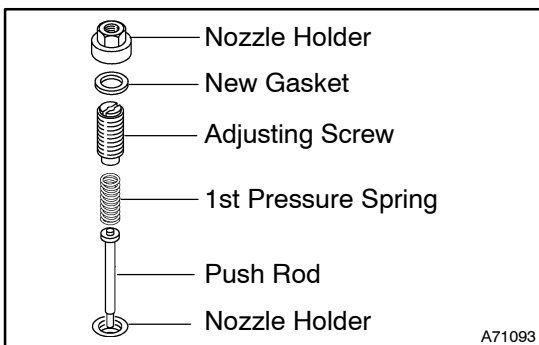
- (2) Using a wrench, tighten the retaining nut.

NOTICE:

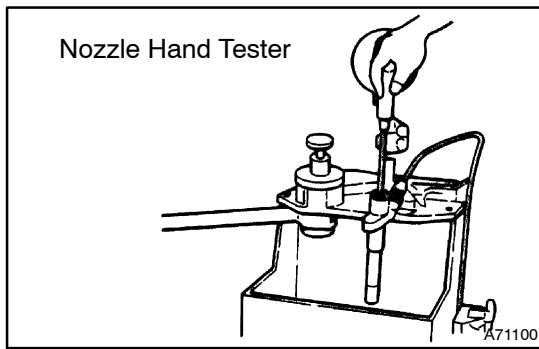
- **Adjust the first opening pressure. Then the 2nd opening pressure is adjusted at the same time.**
- **Exchange parts is nozzle assy and opening pressure adjusting shim. Do not exchange other parts.**

Torque: 63.7 N·m (650 kgf·cm, 47 ft·lbf)

- (3) Insert the push rod and 1st pressure spring to the nozzle holder body. Tighten the adjusting screw.



- (4) Assemble the new gasket, tighten temporarily the cap nut.



- (5) Mount the above stated nozzle holder on the nozzle hand tester to determine the pressure at the start of injection.

This value is used as the 1st opening pressure. The adjusting screw is tightened or loosened to keep this value within a set range.

1st opening pressure (with new parts):

16.67 – 17.45 MPa

(170 – 178 kgf/cm², 2,418 – 2,532 psi)

1st opening pressure (with reused parts):

16.18 – 16.97 MPa

(165 – 173 kgf/cm², 2,347 – 2,461 psi)

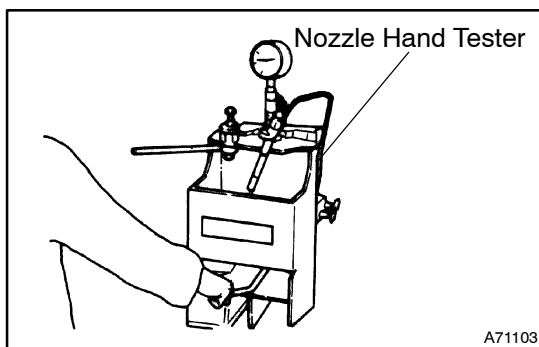
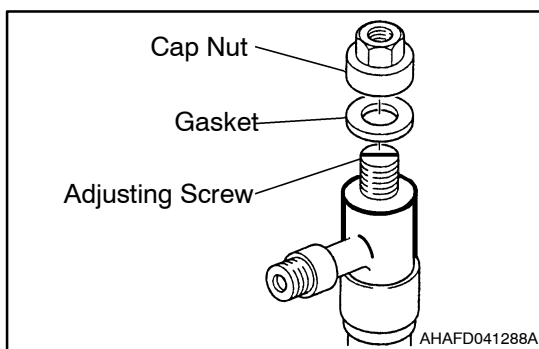
HINT:

- Tighten the adjusting screw increases pressure.
 - Loosening adjusting screw decreases pressure.
- (6) After adjustment, a gasket is installed and the cap nut is tightened down to anchor the adjusting screw.

NOTICE:

Make sure that the adjusting screw does not turn at the same time.

Torque: 53.9 N·m (550 kgf·cm, 40 ft·lbf)



- (7) The nozzle holder is mounted on the nozzle hand tester and a check is made to determine if the pressure at the start of injection (1st opening pressure) is within the standard range.

1st opening pressure (with new parts):

16.67 MPa (170 kgf/cm², 2,414 psi)

1st opening pressure (with reused parts):

16.18 MPa (165 kgf/cm², 2,343 psi)

The opening pressure is not as specified, readjust with the adjusting screw.

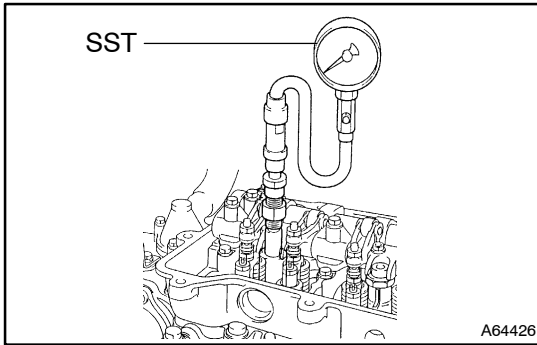
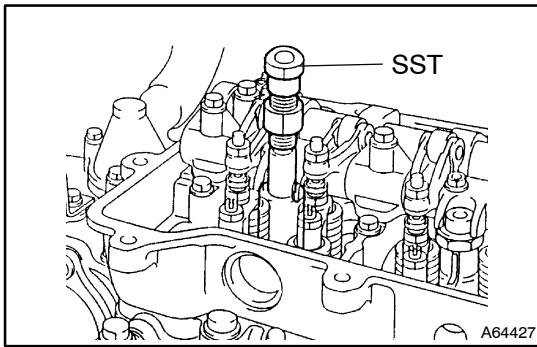
8. INSPECT DIESEL SMOKE

9. INSPECT CYLINDER COMPRESSION PRESSURE

HINT:

If the power is short, the oil consumption is excessive, and the fuel economy is poor, measure the compression pressure.

- (a) Allow the engine to warm up to the normal operating temperature.
- (b) Remove the intake air connector.
- (c) Remove the cylinder head cover.
- (d) Remove the injection pipes.



(e) Check the compression pressure.

NOTICE:

When measuring each compression pressure, the other 3 injection nozzles must be installed in the cylinder head.

- (1) Remove the injector.
- (2) Install the gasket and SST (attachment) to the injection nozzle hole with the holder clamp and bolt.

SST 09552-1060, 09552-1090

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

- (3) Connect SST (compression gauge) to the SST (attachment).

SST 09992-00025 (09992-00211)

- (4) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain the engine revolution of 280 rpm or more.

- (5) Repeat steps (2) through (4) for each cylinder.

NOTICE:

This measurement must be done as short a time as possible.

Compression pressure:

3,400 – 3,700 kPa (35 – 38 kgf/cm², 498 – 540 psi)

Minimum pressure: 2,700 kPa (28 kgf/cm², 398 psi)

Difference between each cylinder:

290 kPa (3.0 kgf/cm², 43 psi) or less

- (6) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the injector hole and repeat steps (2) through (4) for the cylinder with low compression.

- If the compression becomes high by adding oil, it shows that the piston rings and/or cylinder bore are worn or damaged.
- If the pressure remains low, a valve may be sticking or seating improperly, or there may be leakage through the gasket.

- (7) Remove the SST.

SST 09992-00025 (09992-00211), 09552-1060, 09552-1090

- (8) Reinstall the injector or injection nozzle (See page 11-74).

- (f) Reinstall the injection pipes.
- (g) Reinstall the cylinder head cover.
- (h) Reinstall the intake air connector.
- (i) Start the engine and check for leaks.

VALVE CLEARANCE (S05C-B)

140WW-02

ADJUSTMENT

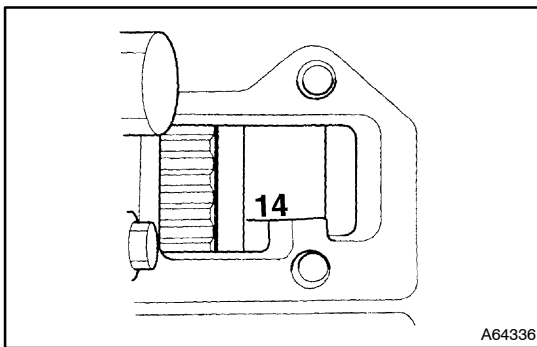
HINT:

Inspect and adjust the valve clearance when the engine is cold.

1. REMOVE INTAKE AIR CONNECTOR
2. REMOVE CYLINDER HEAD COVER

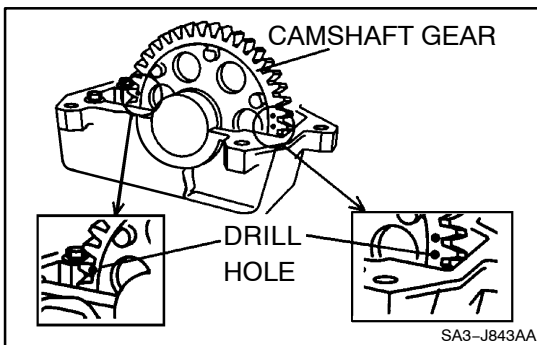
NOTICE:

Clean all dust from around the cylinder head cover before removing it to prevent foreign particles from getting in.



3. INSPECT VALVE CLEARANCE

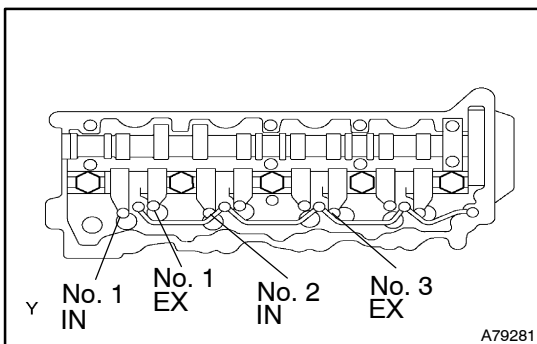
- (a) Turn the crankshaft to align mark 14 on the outer periphery of the flywheel with the pointer of the flywheel housing.



- (b) Among three drill holes on the camshaft gear, when two drill holes are on horizontal position, and the rest of the drill hole is visible, the No. 1 piston is at the Top Dead Center of the compression stroke.

HINT:

If the rest of the drill hole is invisible by camshaft housing, the No. 4 piston is at the Top Dead Center of the compression stroke.

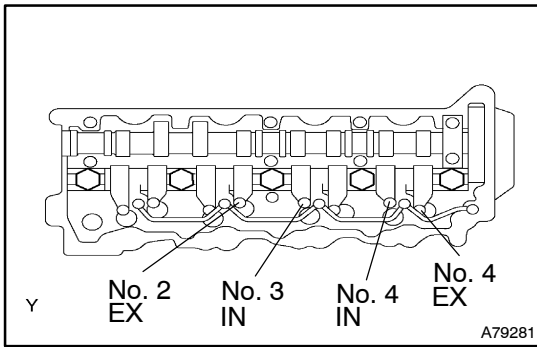


- (c) Check only those valves indicated in the illustration.
 - (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
 - (2) Record the measurements of the valve clearance that is out-of-specification.

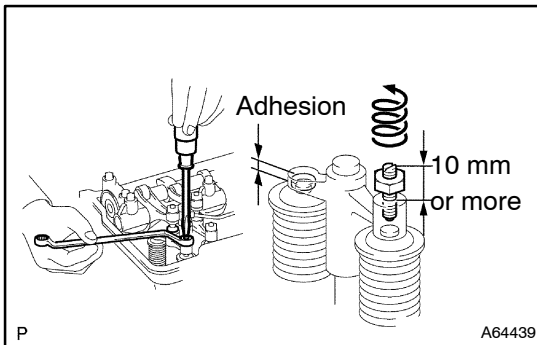
Valve clearance (Cold):

Intake	0.30 mm (0.012 in.)
Exhaust	0.45 mm (0.018 in.)

If the clearance is out of the standard range, adjust the valve clearance.



- (d) Turn the crankshaft one revolution (360°) and align the marks as shown above (See step (a)).
- (e) Check only the valves indicated in the illustration. Measure the valve clearance (See step (c)).

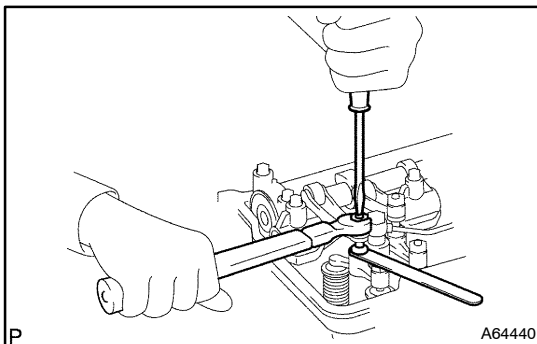


4. ADJUST VALVE CLEARANCE

- (a) Loosen the adjusting screw nut of the cross head completely.

HINT:

- The adjusting screw must protrude by 10 mm (0.3931 in.) or more from the valve bridge upper surface.
- Unless the adjusting screw is completely loose to the valve stem, the following adjustments may be adversely affected.

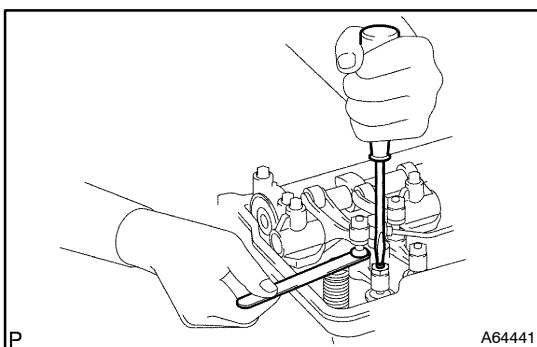


- (b) Insert a 30 mm (0.012 in.) feeler gauge for the intake or 0.45 mm (0.018 in.) feeler gauge for the exhaust between the rocker arm and valve bridge. Adjust the clearance with the adjusting screw of the rocker arm. Tighten the lock nut.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

HINT:

The feeling of the feeler gauge during the clearance adjustment is the same as before.



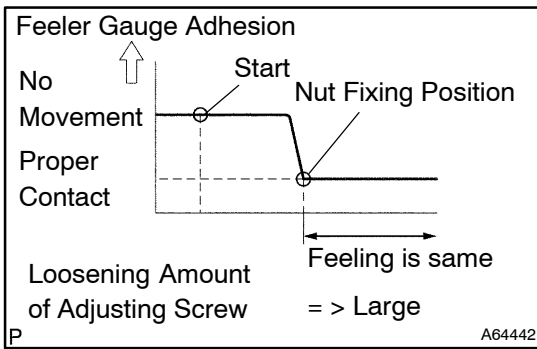
- (c) With the feeler gauge inserted, loosen the adjusting screw of the valve bridge. Make sure that the feeler gauge is not felt loose.

HINT:

If it is loose, repeat the following steps.

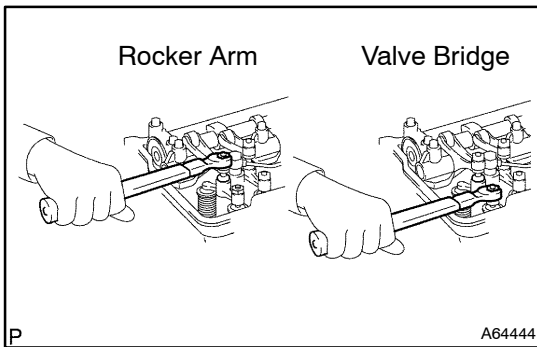
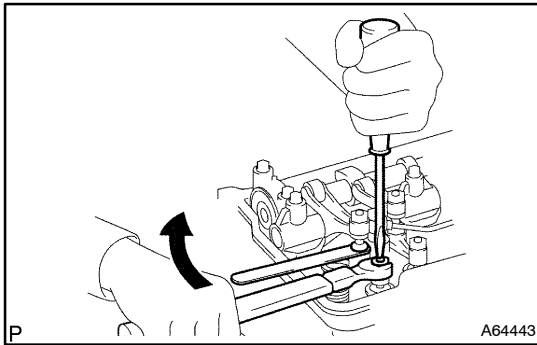
- (d) Tighten the adjusting screw of the valve bridge until the feeler gauge does not move.
- (e) While loosening the adjusting screw of the valve bridge gradually, adjust the valve clearance. Tighten the lock nut of the valve bridge when the feeler gauge is felt correct.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)



HINT:

- The feeling of the feeler gauge during the clearance adjustment is the same as before.
- Do not over-loosen the adjusting screw so that this will cause the valve bridge to come off from the valve stem. The feeler gauge may have excessive clearance between the adjusting screw of the valve bridge and the valve. This does not allow the correct adjustment.
- The adjustable valve clearance, when either the No. 1 or No. 4 piston is at the TDC of the compression stroke, is shown in the following chart. After completing the valve clearance adjustment when the No. 1 piston is at the TDC of the compression stroke, turn the crankshaft one complete revolution and make the No. 4 piston be at the TDC of the compression stroke (The arrow printed on the camshaft points down and the underline is horizontal) and adjust the rest of the valve clearances.

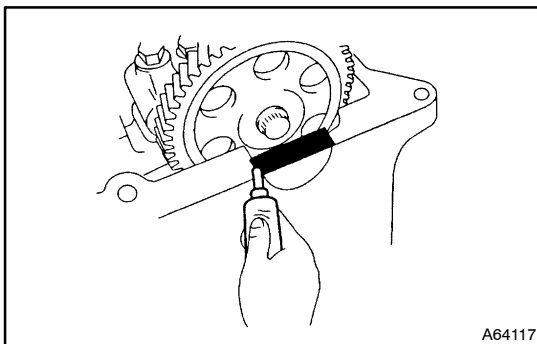


- (f) Finally, tighten all the lock nuts of the rocker arm and the cross head with the following torque and make sure that they are all tight (the nuts do not turn).

HINT:

Never over-tighten them with more than the following torque.

Torque: 28 N·m (280 kgf·cm, 20 ft·lbf)

**5. INSTALL CYLINDER HEAD COVER**

- Clean the matching face of the cylinder head and cover.
- Apply seal packing to the front and rear ends of the cylinder head, and install it onto the cylinder head within 20 minutes.

Seal packing: Part No. 08826-00080 or equivalent

Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.

- Tighten the mounting bolt of the head cover through the silent block and fix the head cover on the cylinder head.

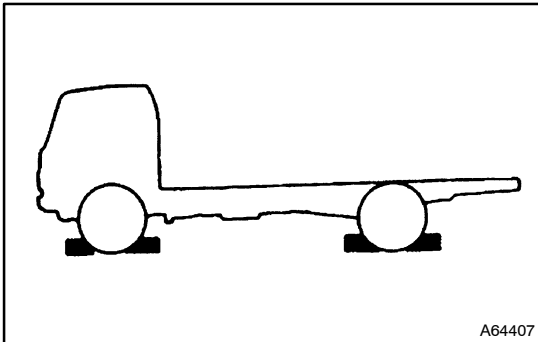
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

6. INSTALL INTAKE AIR CONNECTOR

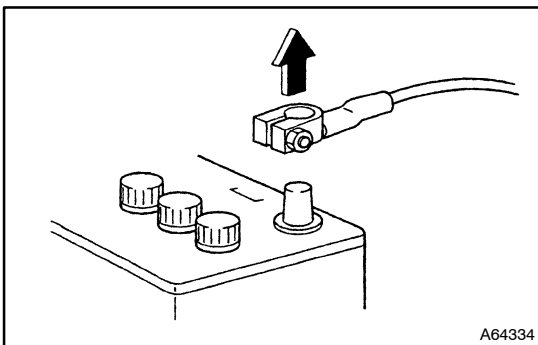
ENGINE ASSY (S05C-B)

REPLACEMENT

14170-01



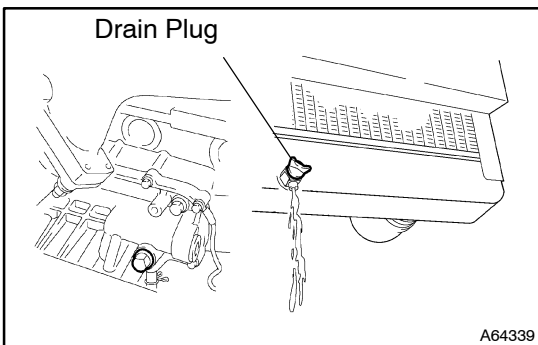
1. **BLOCK WHEEL OF VEHICLE**
 - (a) Park the vehicle on the level ground.
 - (b) Block the wheels.



2. **DISCONNECT NEGATIVE TERMINAL CABLE FROM BATTERY**

NOTICE:

Always disconnect the negative (-) terminal cable when servicing the engine.



3. **DRAIN ENGINE COOLANT**

CAUTION:

To avoid danger of burns, do not drain the coolant while the engine and radiator are still hot.

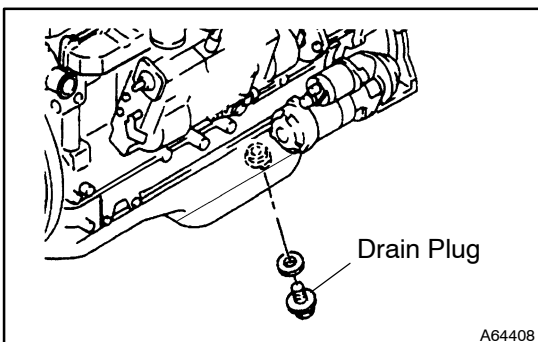
- (a) Drain the coolant from the radiator and engine.

Coolant capacity:

15.2 liters (16.0 US qts, 13.4 Imp. qts)

HINT:

The coolant can be drained more easily by removing the filler cap.



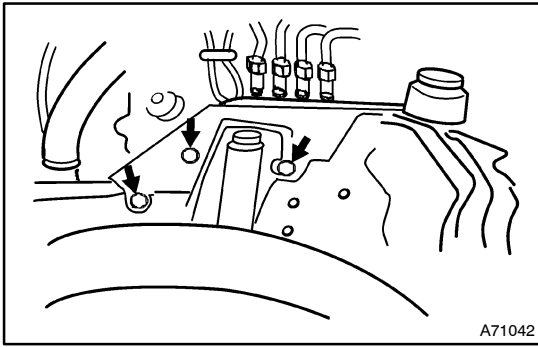
4. **DRAIN ENGINE OIL**

- (a) Drain the engine oil through the drain plug.

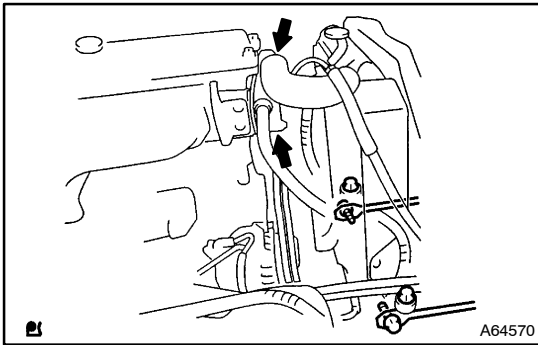
Oil capacity:

With oil filter: 10.6 liters (11.2 US qts, 9.3 Imp. qts)

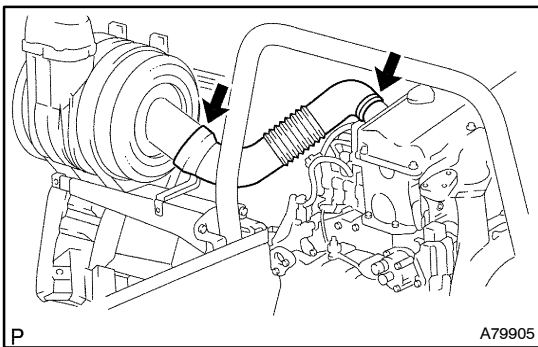
With out oil filter: 8.6 liters (9.1 US qts, 7.6 Imp. qts)



- 5. REMOVE SPLASH BOARD**
 (a) Remove the LH and RH splash boards.

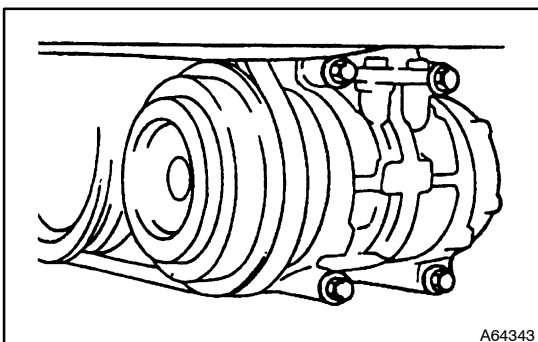


- 6. DISCONNECT HEATER HOSE**
7. DISCONNECT RADIATOR HOSE

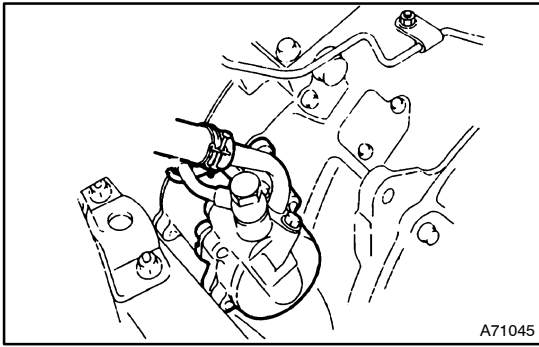


- 8. DISCONNECT AIR CLEANER HOSE**

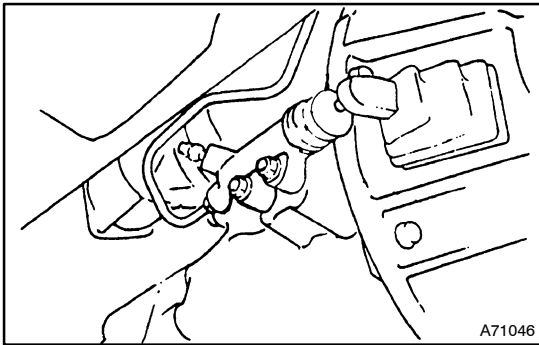
- 9. REMOVE REAR CAB MOUNTING BRACKET**
10. REMOVE AIR CLEANER TOGETHER WITH BRACKET



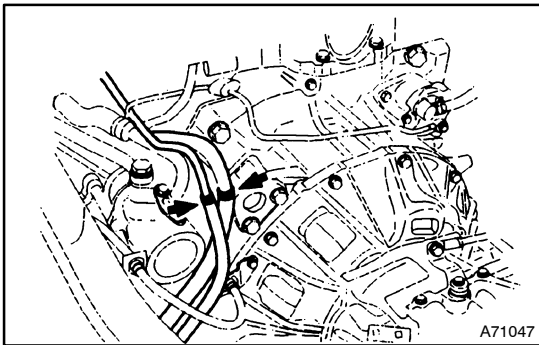
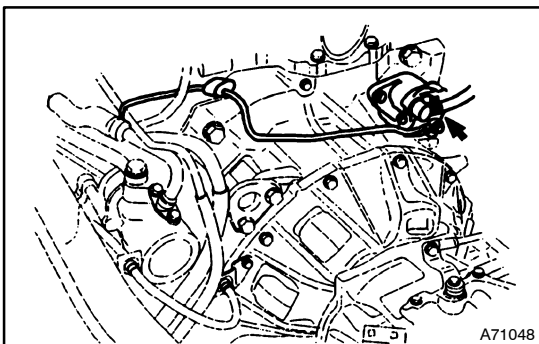
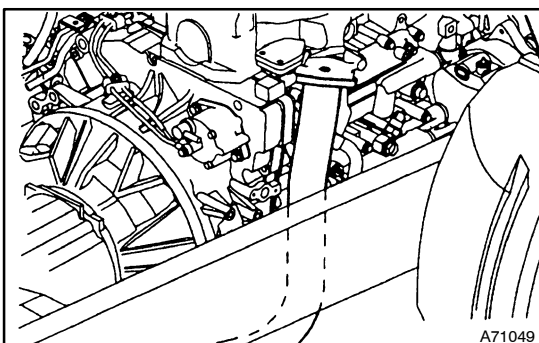
- 11. DISCONNECT A/C COMPRESSOR FROM ENGINE**
 (a) Loosen the tension pulley, and then remove the V belt.
 (b) Remove the A/C compressor.
 HINT:
 Suspend on the chassis side by rope or wire with the hose installed.

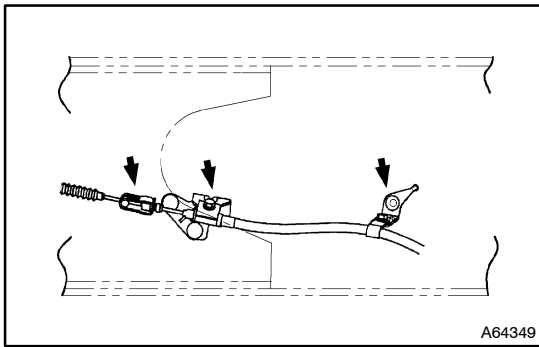
**12. DISCONNECT VANE PUMP ASSY FROM ENGINE****HINT:**

Suspend on the chassis side by rope or wire with the hose installed.

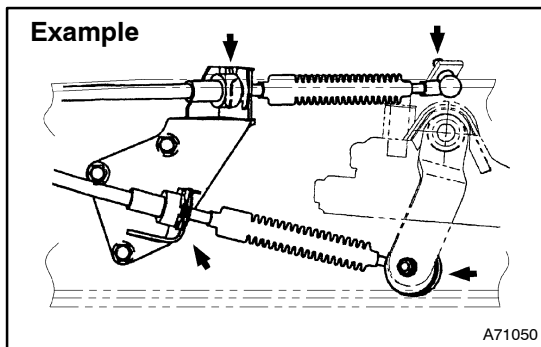
**13. REMOVE CLUTCH RELEASE CYLINDER ASSY**

- (a) Remove the bracket of the clutch hose.
- (b) Remove the release cylinder together with the lines.

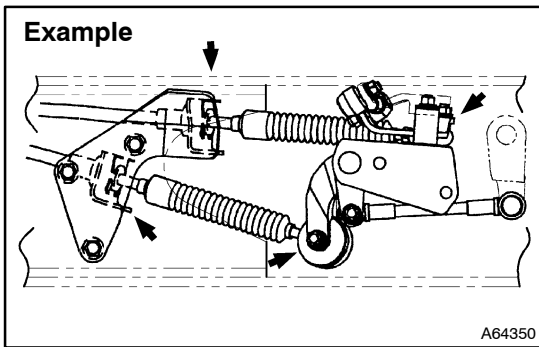
**14. DISCONNECT FUEL HOSE****15. DISCONNECT VACUUM HOSE****16. REMOVE EXHAUST PIPE ASSY**



17. DISCONNECT PARKING BRAKE CABLE ASSY



18. DISCONNECT TRANSMISSION CONTROL CABLE ASSY

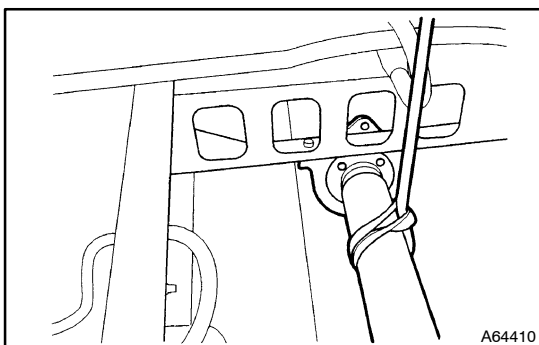


19. DISCONNECT ELECTRICAL WIRE

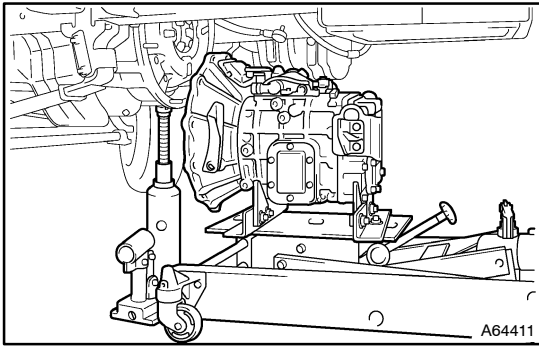
HINT:

Do not disconnect the wire harness in the engine side but the chassis side.

- (a) Disconnect the generator part wire harness.
- (b) Disconnect the starter part wire harness.
- (c) Disconnect the transmission part wire harness.
- (d) Disconnect the oil pressure switch part wire harness.



20. REMOVE PROPELLER SHAFT ASSY

**21. REMOVE TRANSMISSION ASSY**

- (a) Place a jack under the bottom of the flywheel housing.
- (b) Place a transmission jack under the transmission.

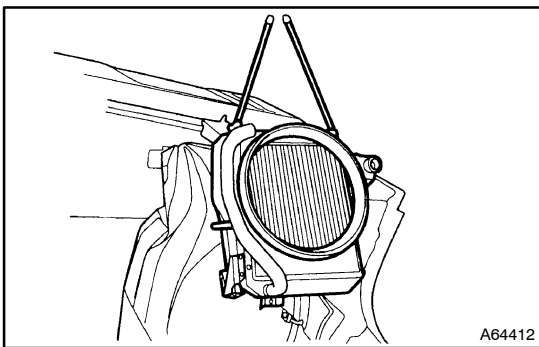
NOTICE:

The engine must be suspended with a hoist until disassembly of the transmission completes.

- (c) Remove the mounting bolt of the mounting rubber behind the transmission.
- (d) Remove the mounting bolt of the transmission at the clutch housing, and then remove the transmission.

HINT:

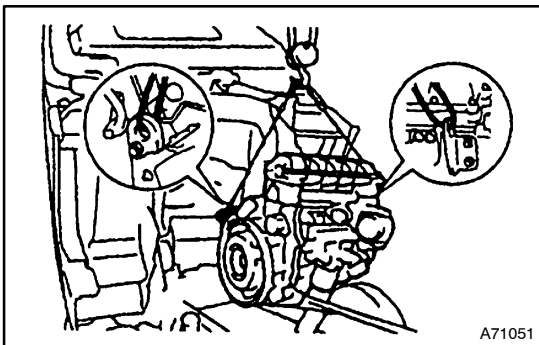
Jack up and align the transmission with the engine, and then pull the transmission straight out.

**22. REMOVE RADIATOR ASSY**

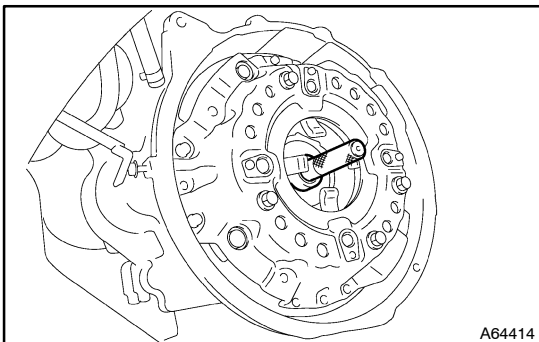
- (a) Remove the 2 bolts of the radiator mounting bracket and the 2 bolts of the stay
- (b) Remove the radiator.

HINT:

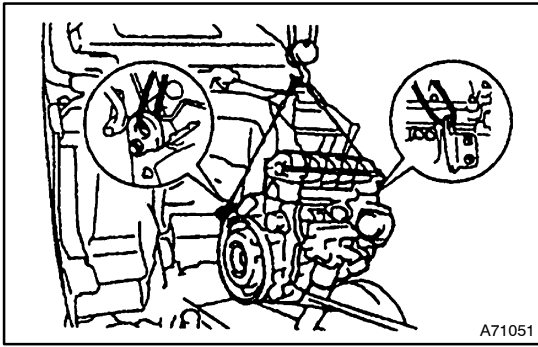
Attach a hoist to the radiator.

**23. REMOVE ENGINE ASSY**

- (a) Attach hoists to the engine hangers at the front and rear ends of the engine, and lift the engine slightly.
- (b) Remove the engine mounting from the frame.
- (c) Remove the engine.
- (d) Mount the engine on a work stand.

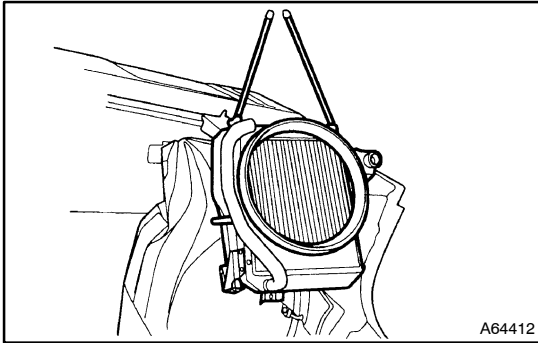
24. REMOVE CLUTCH COVER AND DISC**25. INSTALL CLUTCH DISC AND COVER****HINT:**

Center the clutch disc.

**26. INSTALL ENGINE ASSY**

- (a) Using a hoist, lift up the engine hangers at the front and rear ends of the engine, and install it on the frame.
- (b) Tighten the engine mounting nut.

Torque: 100 N·m (1,020 kgf·cm, 74 ft·lbf)

**27. INSTALL RADIATOR ASSY**

- (a) After installing the radiator hose at the engine side, fix it with the clamp.

HINT:

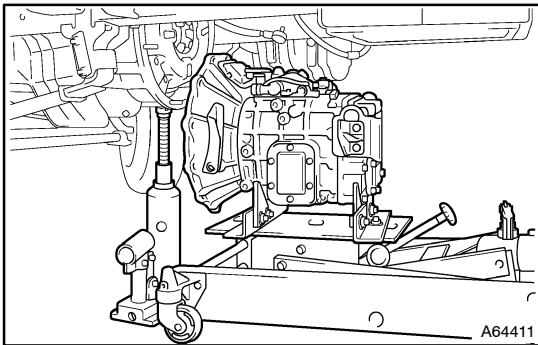
Place a hoist on the radiator.

Torque:

18 N·m (184 kgf·cm, 13 ft·lbf) for bolts

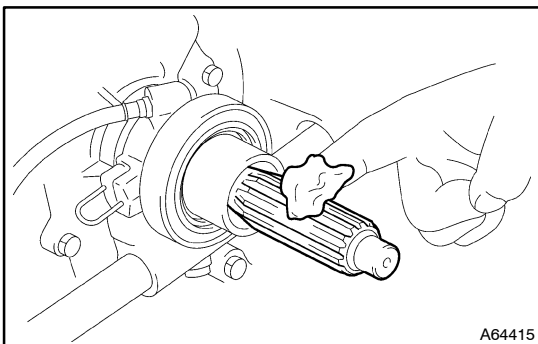
7.5 N·m (76 kgf·cm, 63 in·lbf) for nuts

- (b) After installing the radiator side fan shroud into the engine side securely, fix it with the clamp.

**28. INSTALL TRANSMISSION ASSY**

- (a) Engage the jack with the flywheel housing bottom surface.
- (b) Engage the transmission jack with the transmission.
- (c) Mount the transmission to the engine, and tighten the clutch housing mounting bolt.

Torque: 43.1 N·m (440 kgf·cm, 32 ft·lbf)

**HINT:**

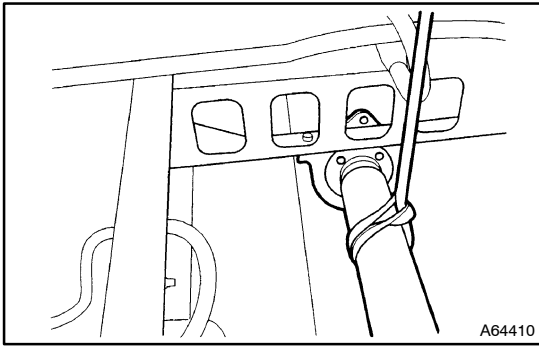
- Apply clutch spline grease to the input shaft spline.

Grease:

Part No. 08887-01706, CLUTCH SPLINE GREASE or equivalent

- Be sure to install the transmission straight while matching the engine angle with the transmission angle, using a jack.
- (d) Tighten the mounting rubber mounting nut at the back of the transmission.

Torque: 65 N·m (650 kgf·cm, 48 ft·lbf)

**29. INSTALL PROPELLER SHAFT ASSY**

- (a) Tighten the flange nut.

Torque:

63.9 – 85.5 N·m (650 – 870 kgf·cm, 47 – 63 ft·lbf)

HINT:

Use a hoist for the propeller shaft.

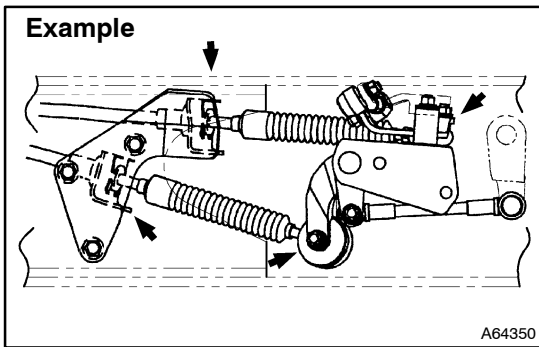
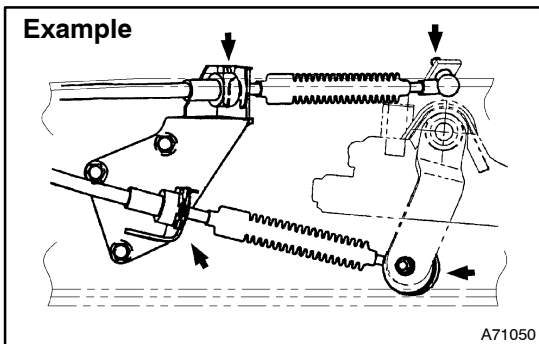
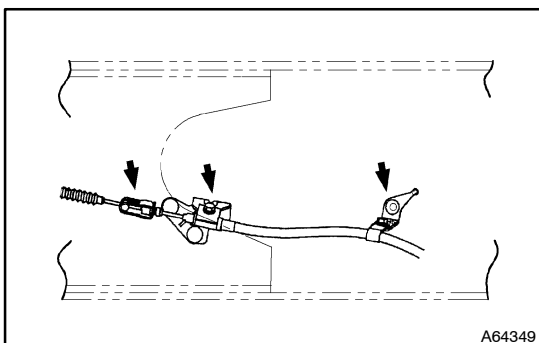
- (b) Tighten the center bearing support mounting nut.

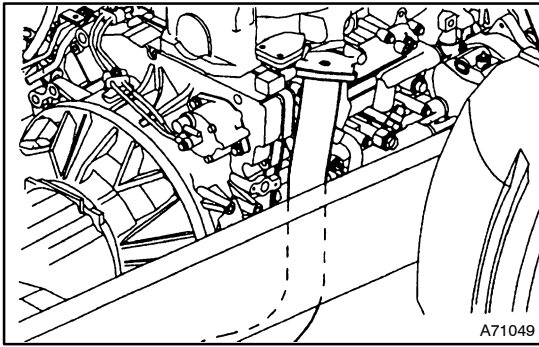
Torque:

37.4 – 49.2 N·m (380 – 500 kgf·cm, 27 – 36 ft·lbf)

30. CONNECT ELECTRICAL WIRE

- (a) Connect the generator part wire harness.
 (b) Connect the starter part wire harness.
 (c) Connect the transmission part wire harness.
 (d) Connect the oil pressure switch part wire harness.

**31. CONNECT TRANSMISSION CONTROL CABLE ASSY****32. CONNECT PARKING BRAKE CABLE ASSY**

**33. INSTALL EXHAUST PIPE ASSY****HINT:**

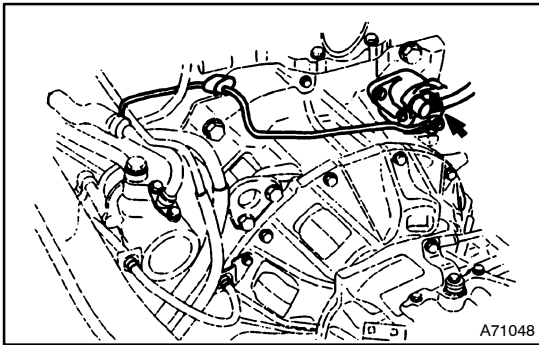
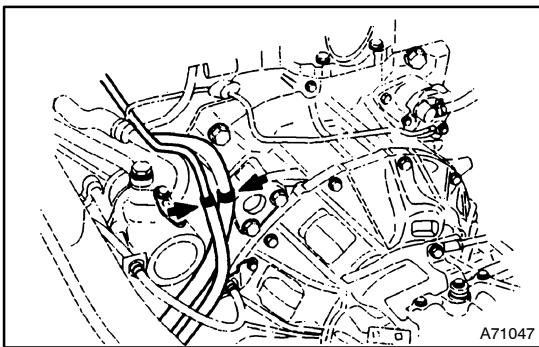
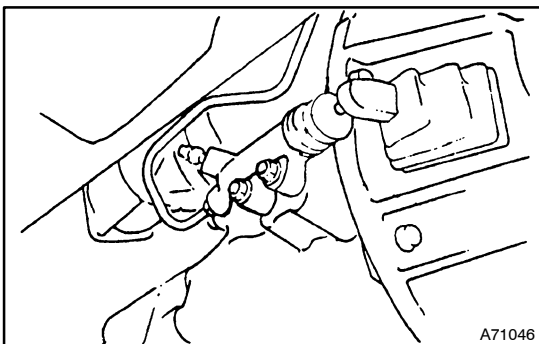
Be sure to use a new gasket.

- (a) Install the exhaust pipe.

Torque: 70 N·m (700 kgf·cm, 52 ft·lbf)

- (b) Install the muffler.

Torque: 29.5 N·m (301 kgf·cm, 22 ft·lbf)

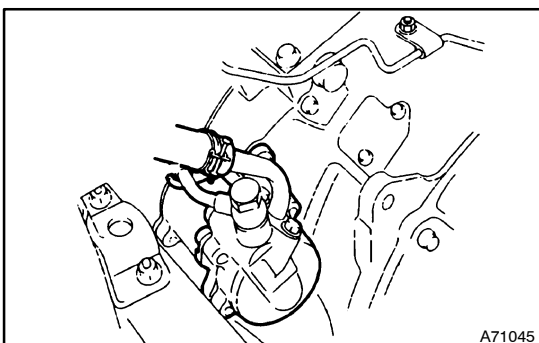
**34. CONNECT VACUUM HOSE****35. CONNECT FUEL HOSE****36. INSTALL CLUTCH RELEASE CYLINDER ASSY**

- (a) Install the release cylinder to the lines.

HINT:

Check and adjust the push rod dimension.

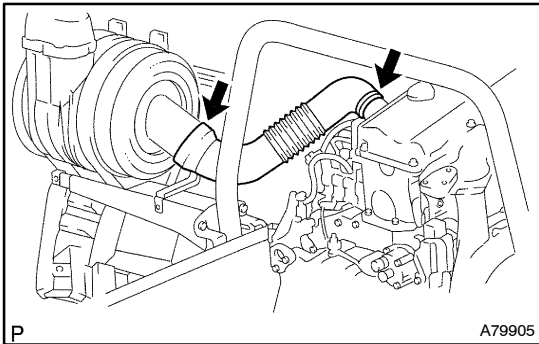
- (b) Install the clevis pin and return spring at the lever.
 (c) Install the wiring clip of the clutch hose.

**37. INSTALL VANE PUMP ASSY**

Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

38. INSTALL REAR CAB MOUNTING BRACKET

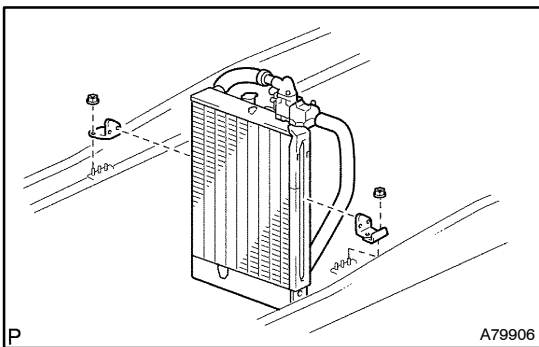
Torque: 55 N·m (565 kgf·cm, 41 ft·lbf)



P A79905

39. INSTALL AIR CLEANER HOSE

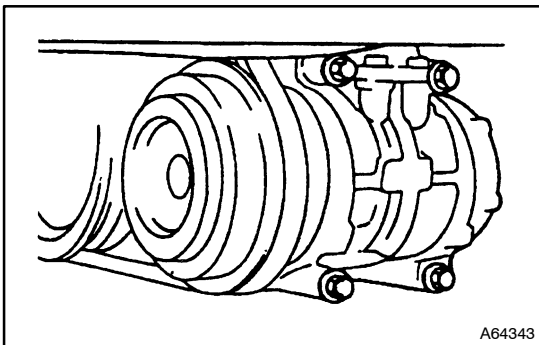
- (a) Install the air cleaner hose to the bracket.
- (b) Install the air cleaner with the air hose connected to the engine.



P A79906

40. FIX RADIATOR ASSY TO FRAME

- (a) Install the radiator mounting.
- (b) Install the reservoir hose.



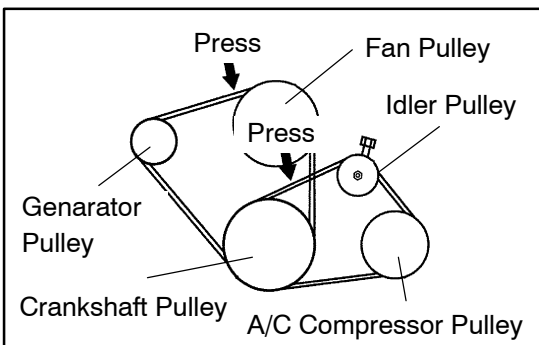
A64343

41. INSTALL A/C COMPRESSOR FROM ENGINE

- (a) Install the A/C compressor with the 4 bolts.
Torque: 29.5 N·m (300 kgf·cm, 22 ft·lbf)

HINT:

For the coolant charging procedure (gas charging), observe the air conditioner manufacturer's instructions.



- (b) Install the V belt.
 - (1) Turn the adjusting bolt until the V belt becomes tight, and then tighten the tension pulley lock nut.
Torque: 41.3 N·m (420 kgf·cm, 30 ft·lbf)
- (c) Adjust the V belt deflection.
 - (1) Apply a load of approx. 10 kg (22 lb) by pressing the V belt with your thumb.

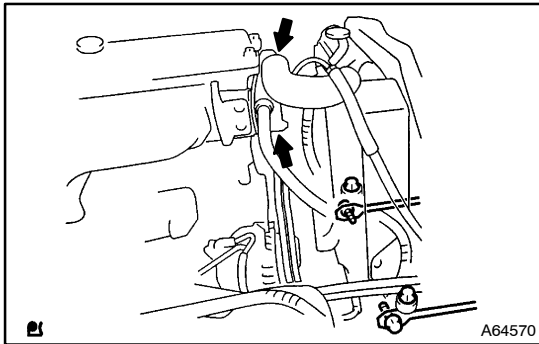
V belt tension:

New belt	7.0 – 8.5 mm (0.276 – 0.335 in.)
Used belt	8.5 – 10.0 mm (0.335 – 0.394 in.)

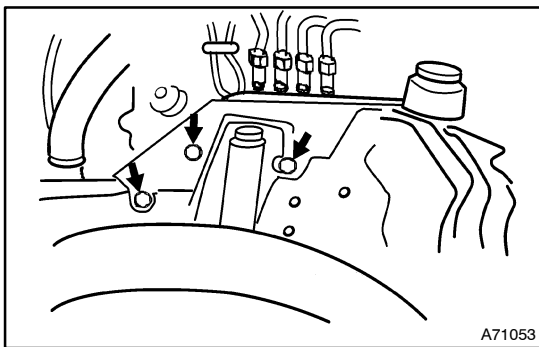
HINT:

- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.

- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for approx. 5 minutes and recheck the belt tension.



- 42. INSTALL RADIATOR HOSE**
43. INSTALL HEATER HOSE



- 44. INSTALL SPLASH BOARD**
 (a) Install the LH and RH splash boards.

45. CONNECT NEGATIVE TERMINAL CABLE TO BATTERY

46. ADD ENGINE OIL

Oil capacity: 10 liters (10.6 US qts, 8.8 Imp. qts)

47. ADD ENGINE COOLANT

- (a) Add coolant slowly until the system is filled up to the filter opening, then install the cap securely.

Coolant capacity: 18.2 liters (19.3 US qts, 16 Imp. qts)

HINT:

Trapped air in the cooling system can cause overheat.

48. BLEED FUEL (See page 11-71)

49. INSPECT FOR ENGINE COOLANT LEAKS

50. INSPECT FOR FUEL LEAKS

51. INSPECT FOR EXHAUST GAS LEAK

ENGINE COMPONENTS PARTS (S05C-B)

140WY-02

REPLACEMENT

1. PREPARATION

- (a) Clean the engine.
 - (1) Cover the openings with tape.
 - (2) Using a steam cleaner, clean the engine.

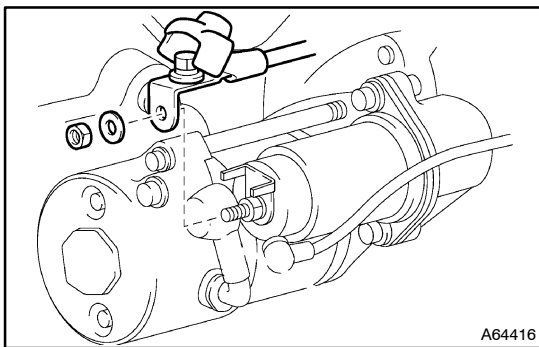
NOTICE:

Do not apply steam directly to the electrical component (generator, starter, etc.).

- (b) Mount the engine on a work stand.

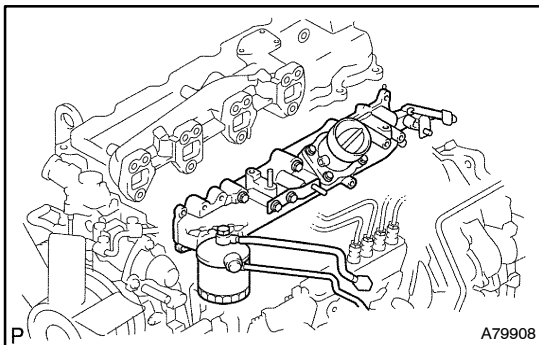
2. DISCONNECT ELECTRICAL WIRE ASSY

- (a) Remove the clip of the wire harness.
- (b) Disconnect the negative (-) terminal of the battery.
- (c) Disconnect the electrical unit, switch and sensor.



3. REMOVE STARTER ASSY

- (a) Put alignment marks on the harness and the starter terminal, and then remove the harness.
- (b) Remove the starter from the engine.



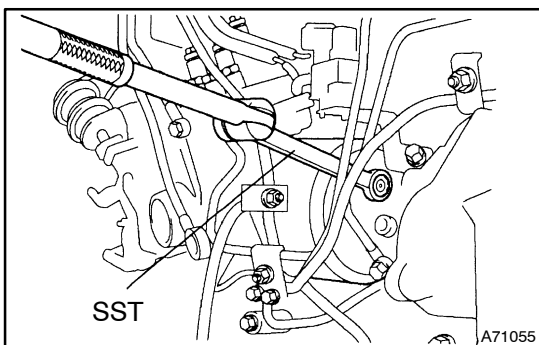
4. REMOVE EXHAUST MANIFOLD

- (a) Remove the insulators.
- (b) Remove the exhaust manifold.

5. REMOVE INTAKE PIPE

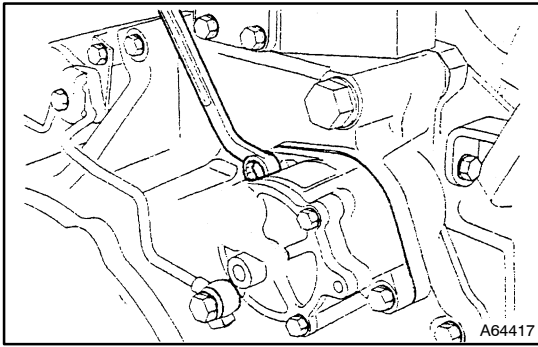
6. REMOVE INTAKE MANIFOLD

- (a) Remove the injection pipe and fuel filter assembly.

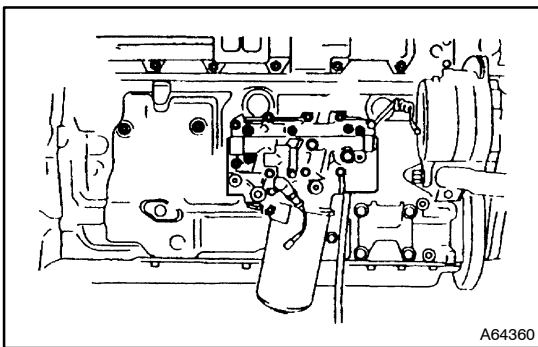


7. REMOVE INJECTION PUMP ASSY

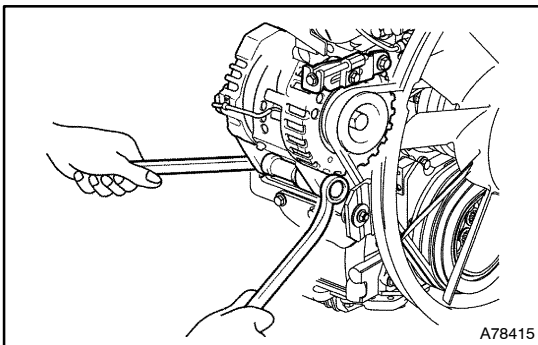
- (a) Remove the through bolt of the coupling.
- (b) Using SST, loosen the adjusting bolt with the wrench.
SST S0951-12500

**8. REMOVE VACUUM PUMP ASSY**

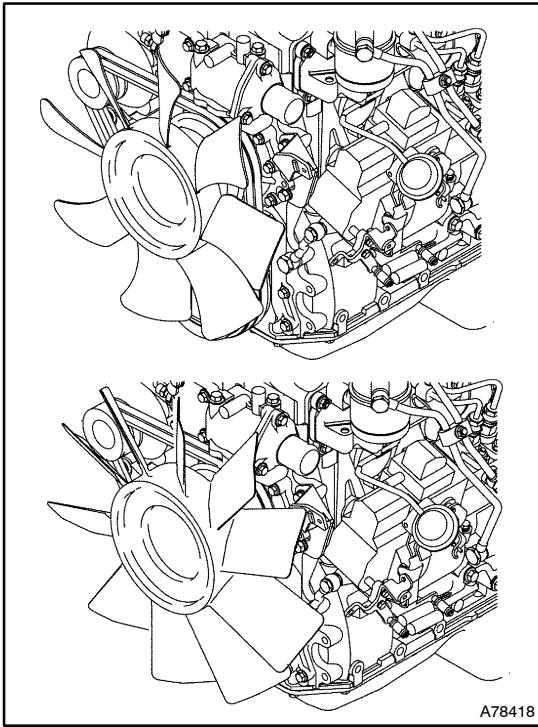
- (a) Remove the vacuum lines.
- (b) Remove the 2 bolts, vacuum pump and 2 O-rings.

9. REMOVE OIL FILTER SUB-ASSY (See page 17-35)**10. REMOVE OIL COOLER ASSY**

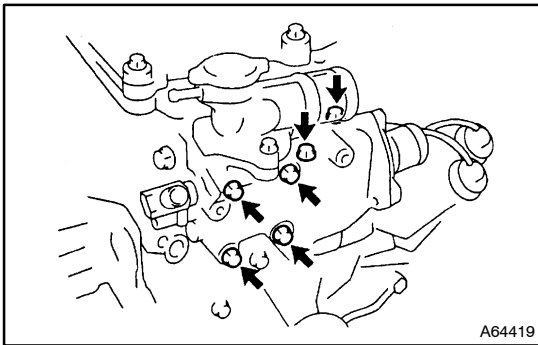
- (a) Remove the oil lines.
- (b) Remove the oil cooler.

**11. REMOVE V BELT AND GENERATOR**

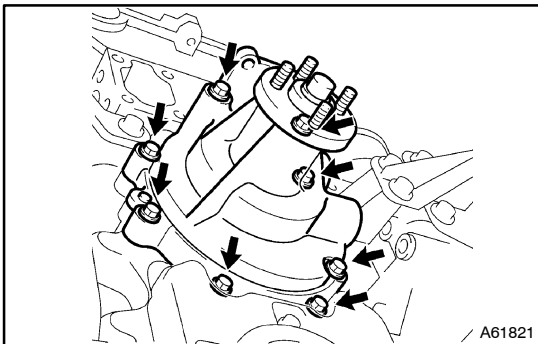
- (a) Loosen the V belt adjusting bolt.
- (b) Loosen the through bolt.
- (c) Remove the V belt, and then remove the generator.



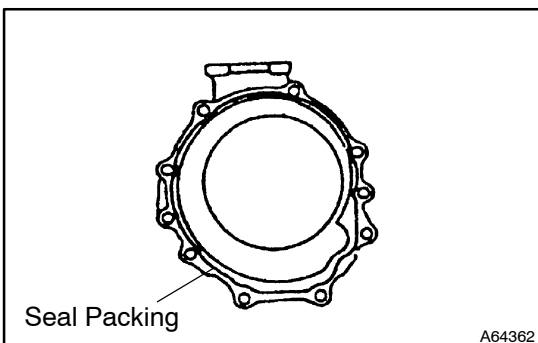
12. REMOVE FAN
13. REMOVE FAN PULLEY



14. REMOVE THERMOSTAT CASE



15. REMOVE WATER PUMP ASSY

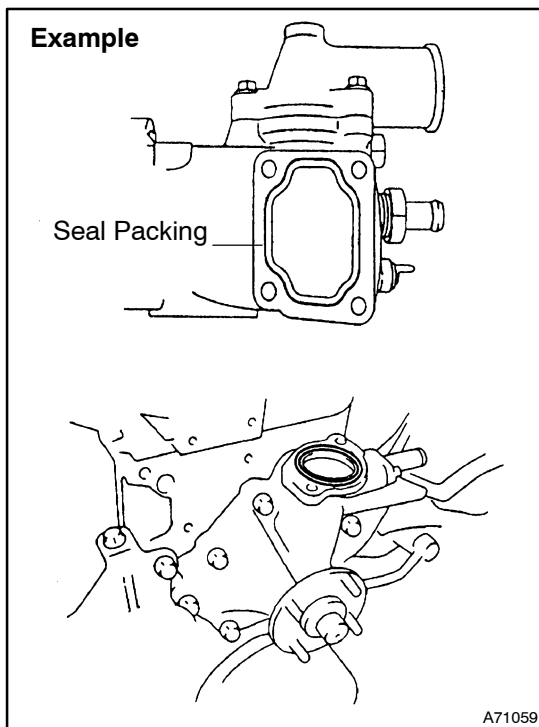


16. INSTALL WATER PUMP ASSY

- (a) Clean the cylinder block mounting surface of the water pump.
- (b) Apply seal packing to the water pump and install it onto the cylinder block within 20 minutes.
Seal packing: Part No. 08826-00100 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
- Do not start the engine for 2 hours after the installation.



17. INSTALL THERMOSTAT CASE

- Make sure that the O-ring is attached to the upper flange face of the water pump.
- Clean the cylinder head mounting surface of the thermostat case.
- Apply seal packing to the thermostat case and install it onto the cylinder head within 20 minutes.

Seal packing: Part No. 08826-00100 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

HINT:

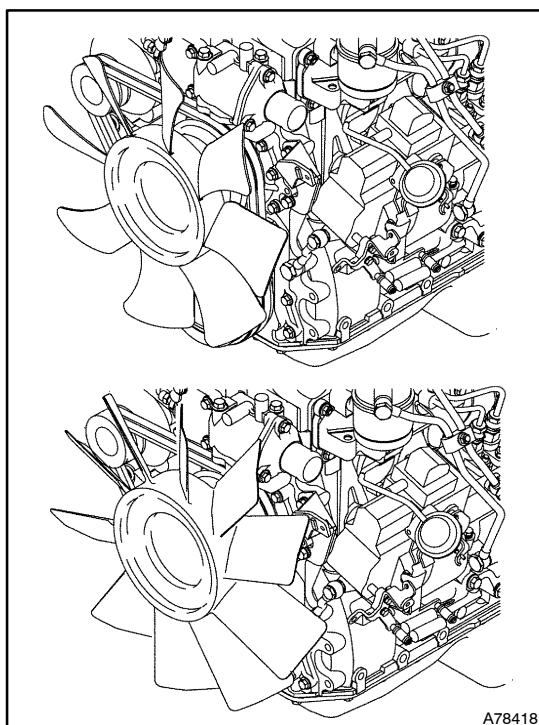
- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
 - Do not start the engine for 2 hours after the installation.
- Tighten the 4 side ones of the thermostat case mounting bolts.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

- Tighten the 2 upper ones of the water pump mounting bolts.

Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

- Install the cooling line.



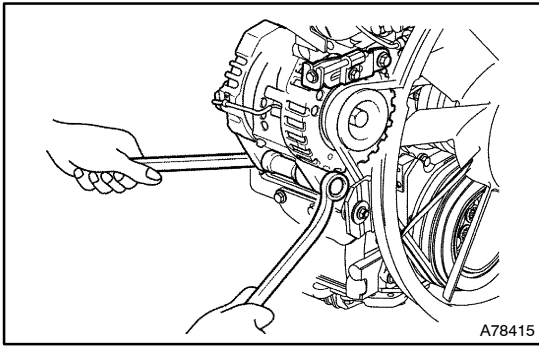
18. INSTALL FAN PULLEY

- Install the fan pulley and fan spacer.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

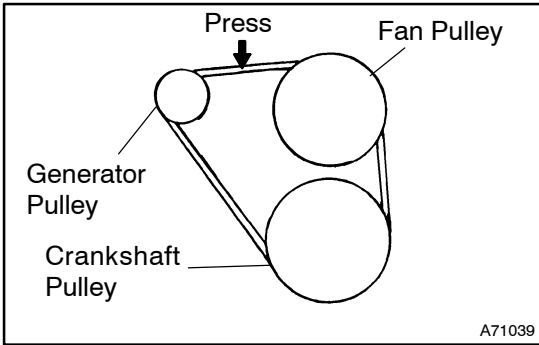
19. INSTALL FAN

Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)



20. INSTALL GENERATOR AND V BELT

(a) Attach the generator provisionally, and install the V belt.



(b) Press the center point of the V belt with a load of approx. 98 N (10 kgf, 22 lbf) and adjust the V belt deflection so that it should be within the standard value.

V belt tension:

New belt	5.5 - 6.5 mm (0.217 - 0.256 in.)
Used belt	6.5 - 7.5 mm (0.256 - 0.295 in.)

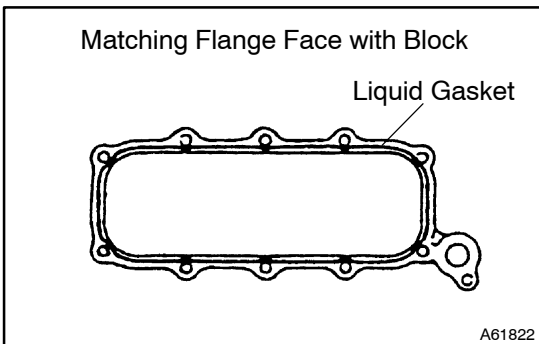
HINT:

- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for approx. 5 minutes and recheck the belt tension.

(c) Tighten the V belt adjusting bolt.

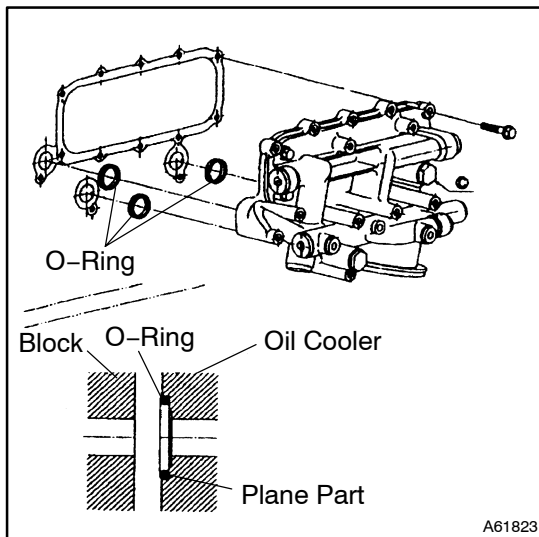
(d) Tighten the through bolt.

Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)



21. INSTALL OIL COOLER ASSY

(a) Clean the cylinder block mounting surface of the oil cooler.



(b) Insert new O-rings into the O-ring groove of the oil cooler.

HINT:

Face the flat area of the O-ring toward the oil cooler for installation.

(c) Apply seal packing to the oil cooler housing and install it onto the cylinder block within 20 minutes.

Seal packing: Part No. 08826-00100 or equivalent

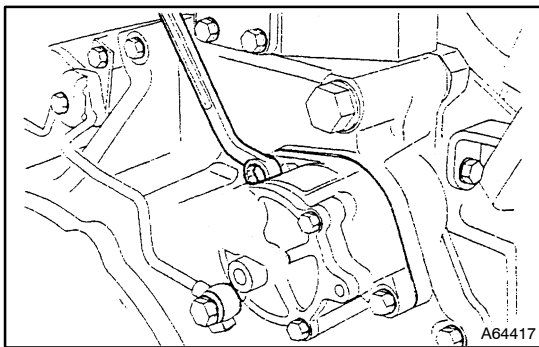
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

HINT:

If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.

(d) Install the oil line.

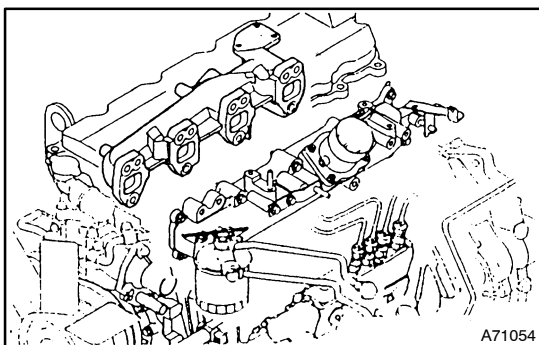
22. INSTALL OIL FILTER SUB-ASSY (See page 17-35)



23. INSTALL VACUUM PUMP ASSY

Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

24. INSTALL INJECTION PUMP ASSY (See page 11-83)

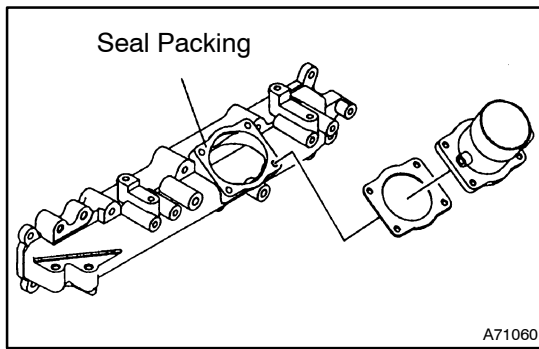


25. INSTALL INTAKE MANIFOLD

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

Be sure to use a new gasket.

**26. INSTALL INTAKE PIPE**

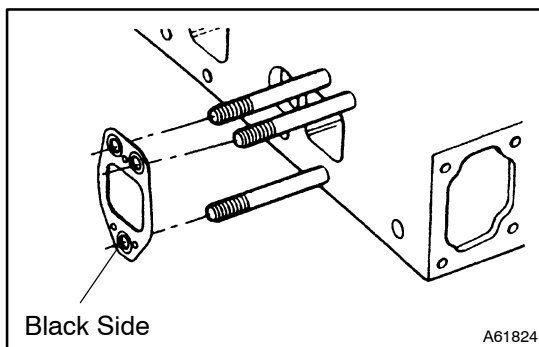
- (a) Clean the matching face of the intake manifold and intake pipe.
- (b) Apply seal packing to the intake manifold and install it onto the intake manifold within 20 minutes.

Seal packing: Part No. 08826-00080 or equivalent
Coating width: 1.5 – 2.5 mm (0.059 – 0.098 in.)

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

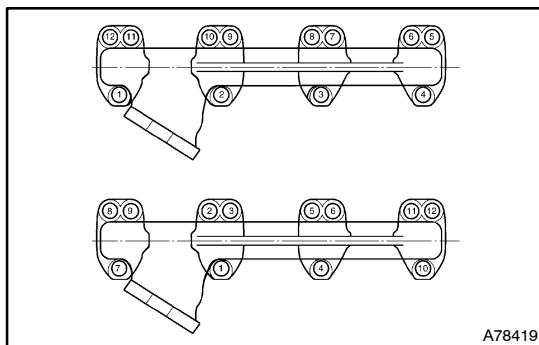
If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.

**27. INSTALL EXHAUST MANIFOLD**

- (a) Install a new exhaust manifold gasket so that the black side could face the exhaust manifold.

HINT:

Be sure to use new gaskets.



- (b) Install the exhaust manifold onto the cylinder head and tighten the inner mounting nuts, in the order shown in the illustration.

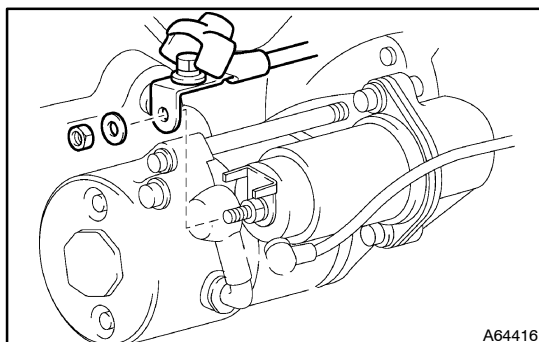
Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)

- (c) Tighten the same nuts according to the same procedure again.

Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)

HINT:

Be sure to carry out the tightening procedure in order.

**28. INSTALL STARTER ASSY**

- (a) Tighten the bolts and nuts.

Torque: 154 N·m (1,570 kgf·cm, 114 ft·lbf)

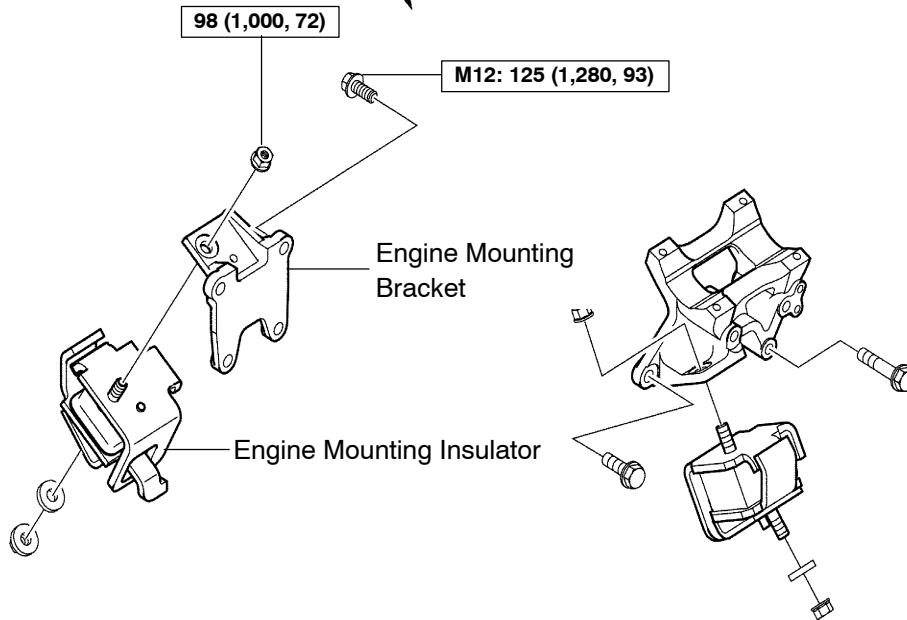
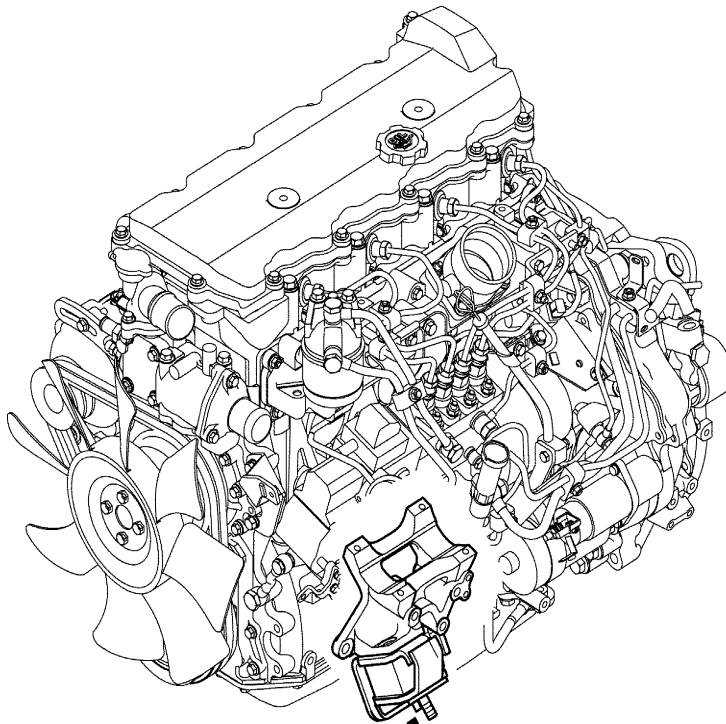
- (b) Connect the harness at the alignment marks.

- (c) Connect the battery cable.

Torque: 13.5 N·m (137 kgf·cm, 10 ft·lbf)

29. CONNECT ELECTRICAL WIRE ASSY

ENGINE MOUNTING (S05C-B) COMPONENTS



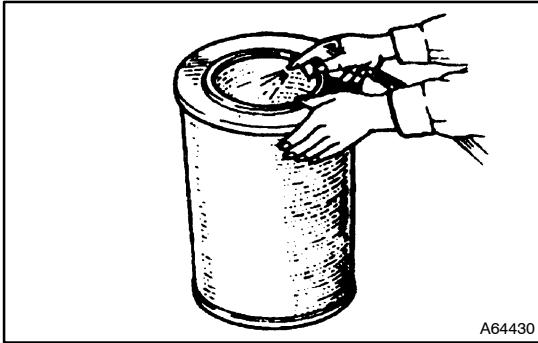
N·m (kgf·cm, ft·lbf) : Specified torque

ENGINE (S05C-TA)

ADJUSTMENT

14171-01

1. INSPECT ENGINE COOLANT
2. INSPECT ENGINE OIL
3. INSPECT BATTERY

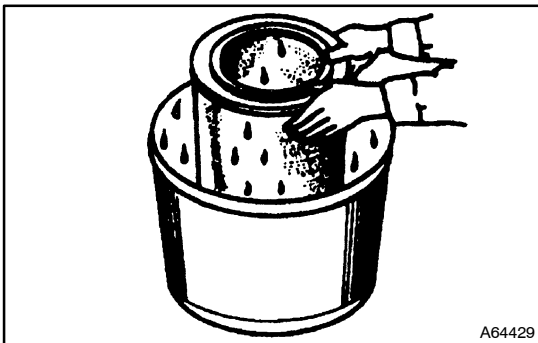


4. Non-Washable type: INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY

- (a) Visually check that the filter is not excessively dirty or oily.
- (b) To remove dry dirt or dust, use a compressed air gun (Air pressure: lower than 690 kPa (7.0 kgf/cm², 100 psi)). Always blow off from the inside of the element to the outside. Never strike or bang the filter to remove dirt or dust.

HINT:

If the compressed air is too high and the element has deformation, the engine will be in trouble.



5. Washable type: INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY

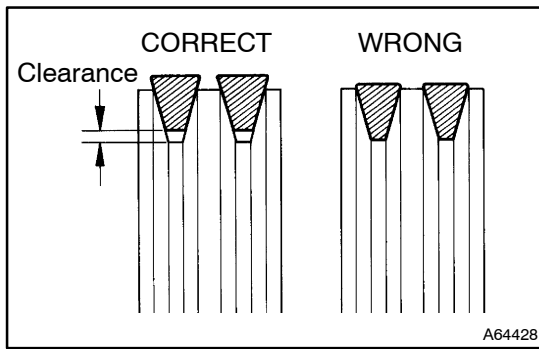
- (a) Wash the element by soaking it in a non-sudsy detergent solution for approx. 30 minutes.
- (b) Rinse the element with clean water and dry it completely with compressed air.

HINT:

- Check to see that the inside of the element is not soiled with dust etc.
- If drying the element in an oven, drying should be done at below 80°C (176°F).
- Never reinstall the element until it is completely dry.
- Make sure that the dried element is not broken and that the packing is not broken nor deformed.

NOTICE:

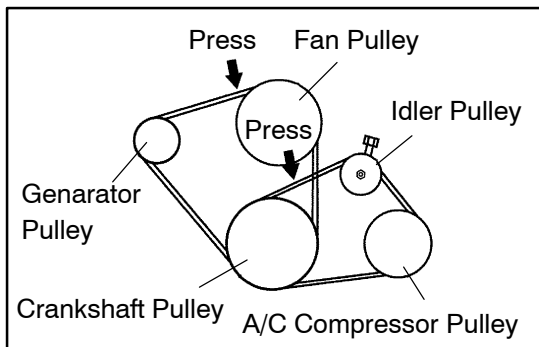
Never use kerosene, gasoline or other solvents to clean the elements. Use of these could cause the engine to overrunning of the engine and damage the engine.



6. INSPECT V BELT

- (a) Visually check the belt for cracks, oiliness or wear. Check that the belt does not touch the bottom of the pulley groove.

If necessary, replace the belts as a set.



- (b) Measure the belt deflection by pressing on the belt at the points indicated in the illustration with 98 N (10 kgf, 22 lbf) of pressure.

Deflection:

Generator belt	New belt	5.5 – 6.5 mm (0.217 – 0.256 in.)
	Used belt	6.5 – 7.5 mm (0.256 – 0.295 in.)
A/C belt	New belt	7.0 – 8.5 mm (0.276 – 0.335 in.)
	Used belt	8.5 – 10.0 mm (0.335 – 0.394 in.)

- (c) Reference:

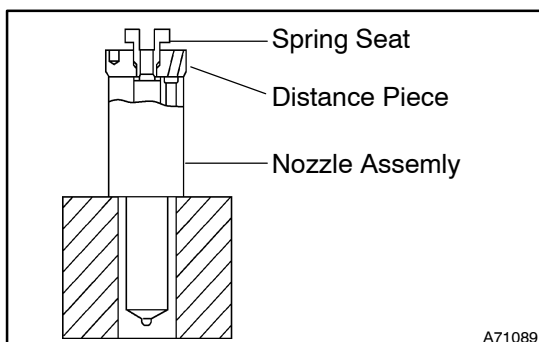
Using a belt tension gauge, measure the belt tension.

Tension:

New belt	374 – 471 N (38 – 48 kg, 84 – 106 lb)
Used belt	275 – 373 N (28 – 38 kg, 62 – 84 lb)

HINT:

- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.

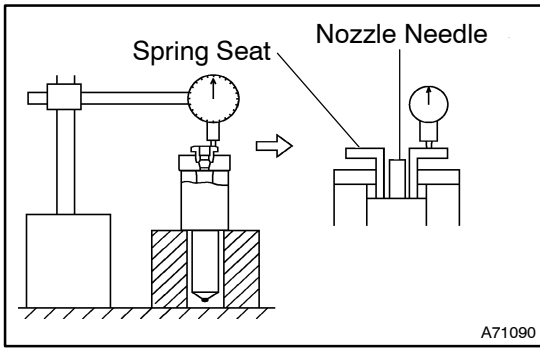


7. ADJUST NOZZLE HOLDER AND NOZZLE SET

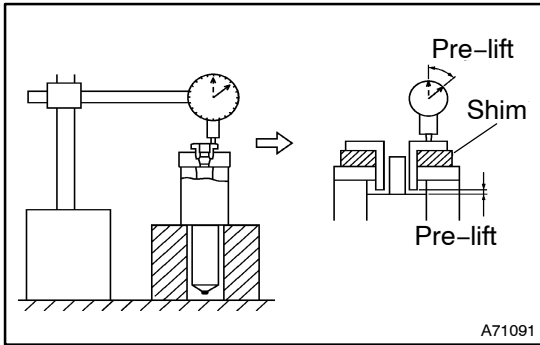
- (a) Disassemble the nozzle holder and nozzle set.
- (b) Adjust the pre-lift.
- (1) The nozzle assembly, distance piece, and spring seat are attached.

NOTICE:

Each part must be washed carefully to eliminate any debris.



- (2) The hole in the pin on the distance piece are lined up and the dial gauge is pushed down until it contacts the distance piece. Next, set the dial gauge to "0".



- (3) Install the pre-lift adjusting shim.
- (4) Measure the pre-lift.

If the pre-lift out of the assembly standard, suitable shims are then used to adjust this pre-lift value to a standard value.

Pre-lift: 0.077 - 0.113 mm (0.0030 - 0.0044 in.)

HINT:

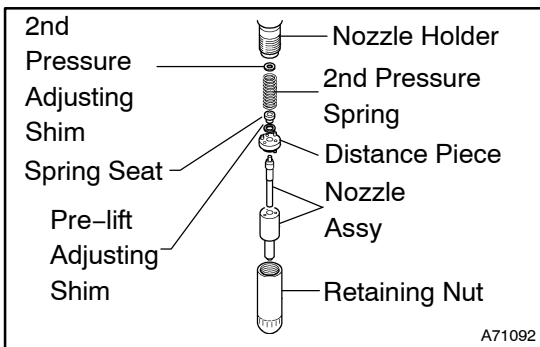
- Thick shims = increase the pre-lift
- Thin shims = decrease the pre-lift

Pre-lift adjusting shim line-up

Shim size:

1.30 - 1.42 mm (0.052 - 0.055 in.) (Jump at 0.02)

1.44 - 1.70 mm (0.057 - 0.066 in.) (Jump at 0.02)



- (c) Adjust the 1st opening pressure.

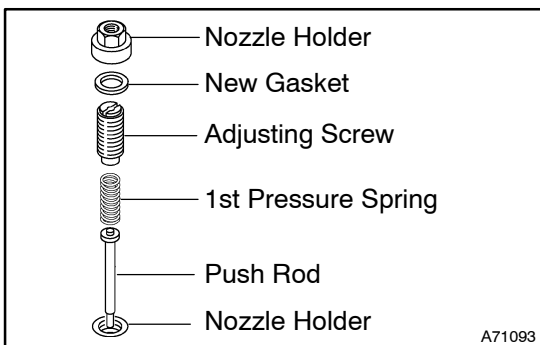
- (1) Attach the 2nd opening pressure adjusting shim, 2nd pressure spring and adjusted parts to the bottom of the nozzle holder.
- (2) Using a wrench, tighten the retaining nut.

NOTICE:

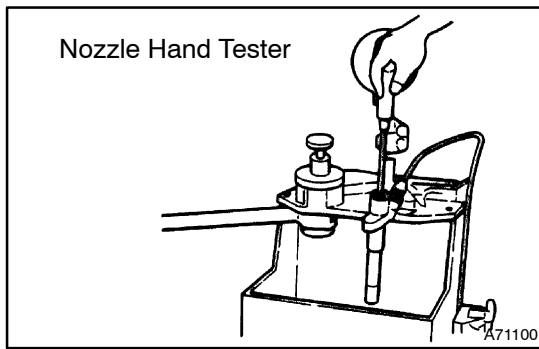
- **Adjust the first opening pressure. Then the 2nd opening pressure is adjusted at the same time.**
- **Exchange parts is nozzle assy and opening pressure adjusting shim. Do not exchange other parts.**

Torque: 63.7 N·m (650 kgf·cm, 47 ft·lbf)

- (3) Insert the push rod and 1st pressure spring to the nozzle holder body. Tighten the adjusting screw.



- (4) Assemble the new gasket, tighten temporarily the cap nut.



- (5) Mount the above stated nozzle holder on the nozzle hand tester to determine the pressure at the start of injection.

This value is used as the 1st opening pressure. The adjusting screw is tightened or loosened to keep this value within a set range.

1st opening pressure (with new parts):

18.14 – 18.92 MPa

(185 – 193 kgf/cm², 2,632 – 2,746 psi)

1st opening pressure (with reused parts):

17.65 – 18.44 MPa

(180 – 188 kgf/cm², 2,561 – 2,674 psi)

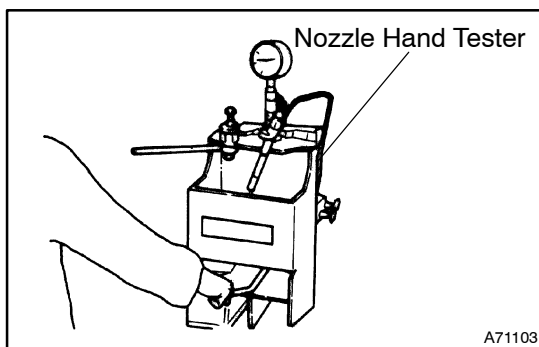
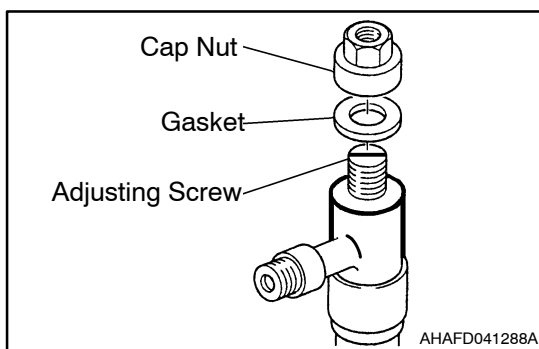
HINT:

- Tighten the adjusting screw increases pressure.
 - Loosening adjusting screw decreases pressure.
- (6) After adjustment, a gasket is installed and the cap nut is tightened down to anchor the adjusting screw.

NOTICE:

Make sure that the adjusting screw does not turn at the same time.

Torque: 53.9 N·m (550 kgf·cm, 40 ft·lbf)



- (7) The nozzle holder is mounted on the nozzle hand tester and a check is made to determine if the pressure at the start of injection (1st opening pressure) is within the standard range.

1st opening pressure (with new parts):

16.67 MPa (170 kgf/cm², 2,414 psi)

1st opening pressure (with reused parts):

16.18 MPa (165 kgf/cm², 2,343 psi)

The opening pressure is not as specified, readjust with the adjusting screw.

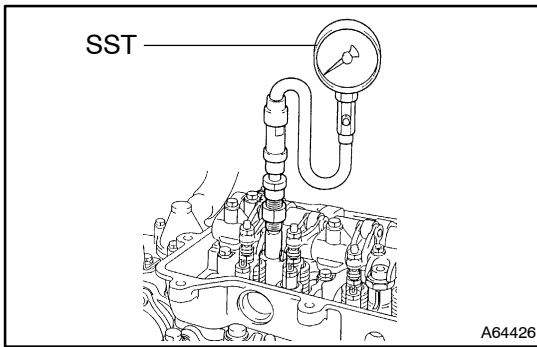
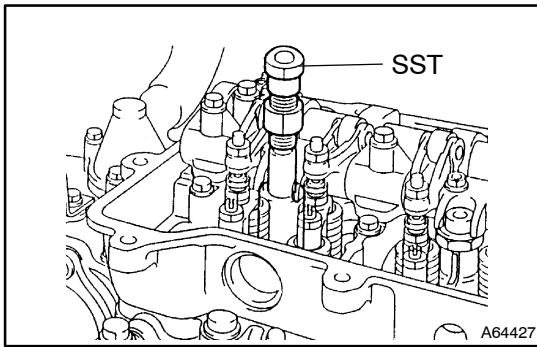
8. INSPECT DIESEL SMOKE

9. INSPECT CYLINDER COMPRESSION PRESSURE

HINT:

If the power is short, the oil consumption is excessive, and the fuel economy is poor, measure the compression pressure.

- Allow the engine to warm up to the normal operating temperature.
- Remove the intake air connector.
- Remove the cylinder head cover.
- Remove the injection pipes.



(e) Check the compression pressure.

NOTICE:

When measuring each compression pressure, the other 3 injection nozzles must be installed in the cylinder head.

- (1) Remove the injector.
- (2) Install the gasket and SST (attachment) to the injection nozzle hole with the holder clamp and bolt.

SST 09552-1060, 09552-1090

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

- (3) Connect SST (compression gauge) to the SST (attachment).

SST 09992-00025 (09992-00211)

- (4) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain the engine revolution of 280 rpm or more.

- (5) Repeat steps (2) through (4) for each cylinder.

NOTICE:

This measurement must be done as short a time as possible.

Compression pressure:

3,400 – 3,700 kPa (35 – 38 kgf/cm², 498 – 540 psi)

Minimum pressure: 2,700 kPa (28 kgf/cm², 398 psi)

Difference between each cylinder:

290 kPa (3.0 kgf/cm², 43 psi) or less

- (6) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the injector hole and repeat steps (2) through (4) for the cylinder with low compression.

- If the compression becomes high by adding oil, it shows that the piston rings and/or cylinder bore are worn or damaged.
- If the pressure remains low, a valve may be sticking or seating improperly, or there may be leakage through the gasket.

- (7) Remove the SST.

SST 09552-1060, 09552-1090, 09992-00025 (09992-00211)

- (8) Reinstall the injector or injection nozzle (See page 11-115).

- (f) Reinstall the injection pipes.
- (g) Reinstall the cylinder head cover.
- (h) Reinstall the intake air connector.
- (i) Start the engine and check for leaks.

VALVE CLEARANCE (S05C-TA)

140NC-02

ADJUSTMENT

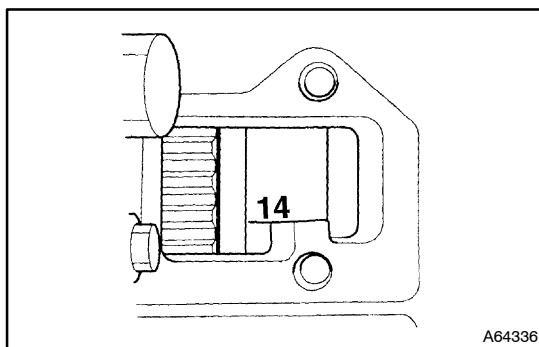
HINT:

Inspect and adjust the valve clearance when the engine is cold.

1. REMOVE INTAKE AIR CONNECTOR
2. REMOVE CYLINDER HEAD COVER SUB-ASSY

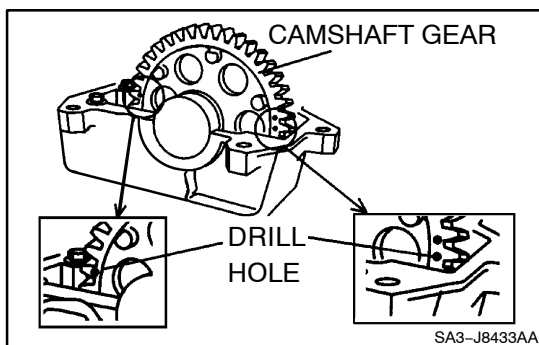
NOTICE:

Clean all dust from around the cylinder head cover before removing it to prevent foreign particles from getting in.



3. INSPECT VALVE CLEARANCE

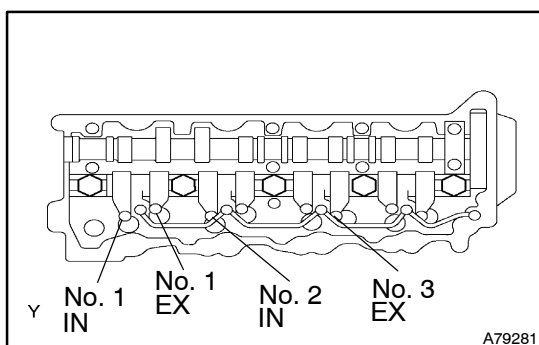
- (a) Turn the crankshaft to align mark 14 on the outer periphery of the flywheel with the pointer of the flywheel housing.



- (b) Among three drill holes on the camshaft gear, when two drill holes are on horizontal position, and the rest of the drill hole is visible, the No. 1 piston is at the Top Dead Center of the compression stroke.

HINT:

If the rest of the drill hole is invisible by camshaft housing, the No. 4 piston is at the Top Dead Center of the compression stroke.

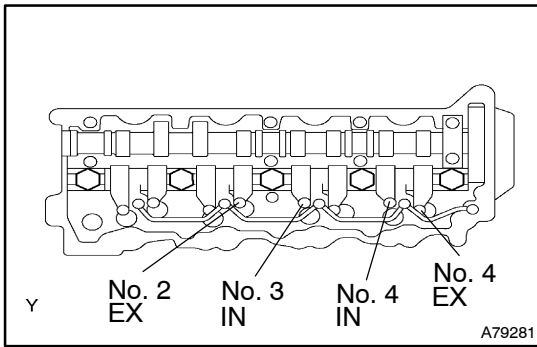


- (c) Check only those valves indicated in the illustration.
 - (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
 - (2) Record the measurements of the valve clearance that is out-of-specification.

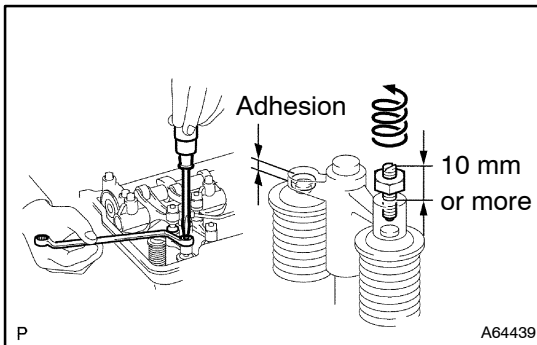
If the clearance is out of the standard range, adjust the valve clearance using the following.

Valve clearance (Cold):

Intake	0.30 mm (0.012 in.)
Exhaust	0.45 mm (0.018 in.)



- (d) Turn the crankshaft one revolution (360°) and align the marks as shown above (See step (a)).
- (e) Check only the valves indicated in the illustration. Measure the valve clearance (See step (c)).

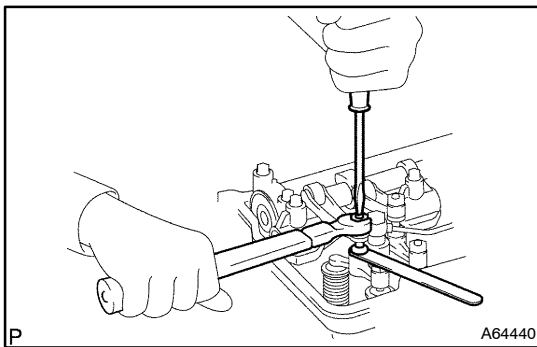


4. ADJUST VALVE CLEARANCE

- (a) Loosen the adjusting screw nut of the cross head completely.

HINT:

- The adjusting screw must protrude by 10 mm (0.3931 in.) or more from the valve bridge upper surface.
- Unless the adjusting screw is completely loose to the valve stem, the following adjustments may be adversely affected.

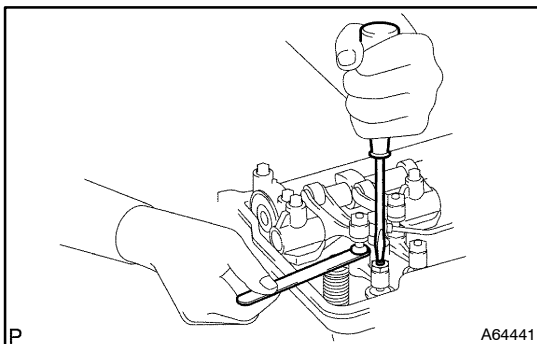


- (b) Insert a 30 mm (0.012 in.) feeler gauge for the intake or 0.45 mm (0.018 in.) feeler gauge for the exhaust between the rocker arm and valve bridge. Adjust the clearance with the adjusting screw of the rocker arm. Tighten the lock nut.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

HINT:

The feeling of the feeler gauge during the clearance adjustment is the same as before.



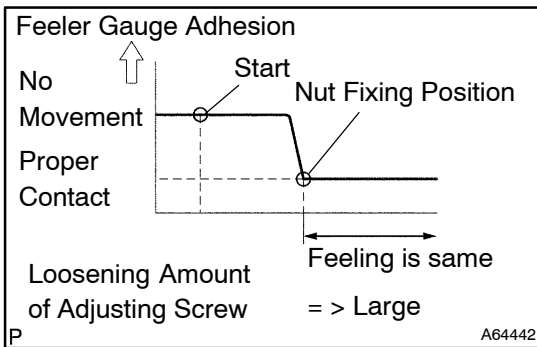
- (c) With the feeler gauge inserted, loosen the adjusting screw of the valve bridge. Make sure that the feeler gauge is not felt loose.

HINT:

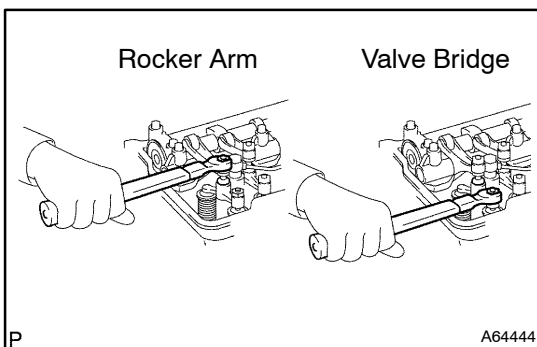
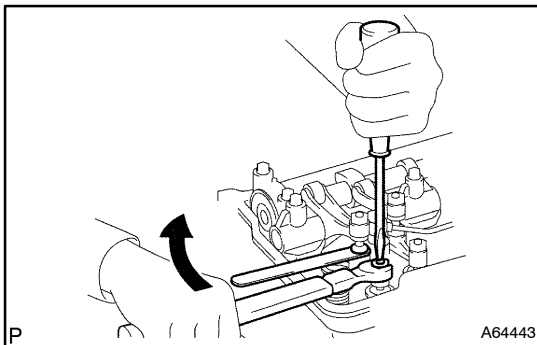
If it is loose, repeat the following steps.

- (d) Tighten the adjusting screw of the valve bridge until the feeler gauge does not move.
- (e) While loosening the adjusting screw of the valve bridge gradually, adjust the valve clearance. Tighten the lock nut of the valve bridge when the feeler gauge is felt correct.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

**HINT:**

- The feeling of the feeler gauge during the clearance adjustment is the same as before.
- Do not over-loosen the adjusting screw so that this will cause the valve bridge to come off from the valve stem. The feeler gauge may have excessive clearance between the adjusting screw of the valve bridge and the valve. This does not allow the correct adjustment.
- The adjustable valve clearance, when either the No. 1 or No. 4 piston is at the TDC of the compression stroke, is shown in the following chart. After completing the valve clearance adjustment when the No. 1 piston is at the TDC of the compression stroke, turn the crankshaft one complete revolution and make the No. 4 piston be at the TDC of the compression stroke (The arrow printed on the camshaft points down and the underline is horizontal) and adjust the rest of the valve clearances.

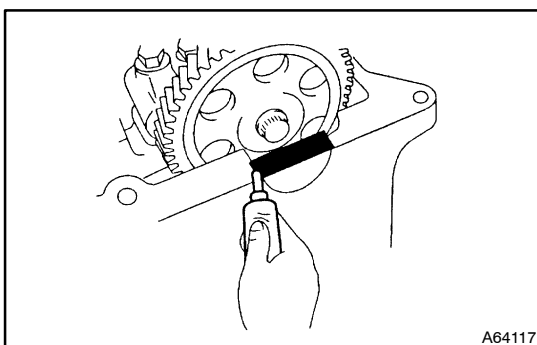


- (f) Finally, tighten all the lock nuts of the rocker arm and the cross head with the following torque and make sure that they are all tight (the nuts do not turn).

HINT:

Never over-tighten them with more than the following torque.

Torque: 28 N·m (280 kgf·cm, 20 ft·lbf)

**5. INSTALL CYLINDER HEAD COVER SUB-ASSY**

- Clean the matching face of the cylinder head and cover.
- Apply seal packing to the front and rear ends of the cylinder head, and install it onto the cylinder head within 20 minutes.

Seal packing: Part No. 08826-00080 or equivalent

Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.

- Tighten the mounting bolt of the head cover through the silent block and fix the head cover on the cylinder head.

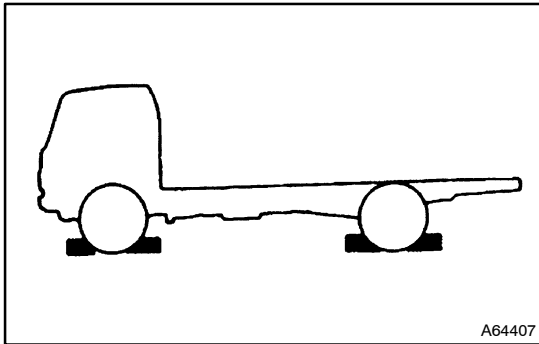
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

6. INSTALL INTAKE AIR CONNECTOR

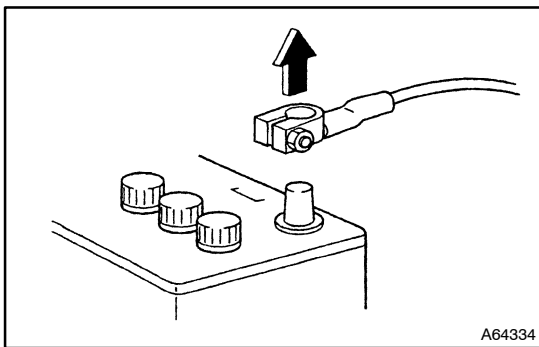
ENGINE ASSY (S05C-TA)

REMOVAL AND INSTALLATION

14172-01



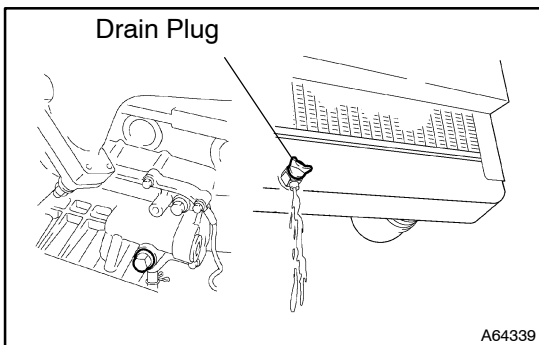
1. **BLOCK WHEEL OF VEHICLE**
 - (a) Park the vehicle on the level ground.
 - (b) Block the wheels.



2. **DISCONNECT NEGATIVE TERMINAL CABLE FROM BATTERY**

NOTICE:

Always disconnect the negative (-) terminal cable when servicing the engine.



3. **DRAIN ENGINE COOLANT**

CAUTION:

To avoid danger of burns, do not drain the coolant while the engine and radiator are still hot.

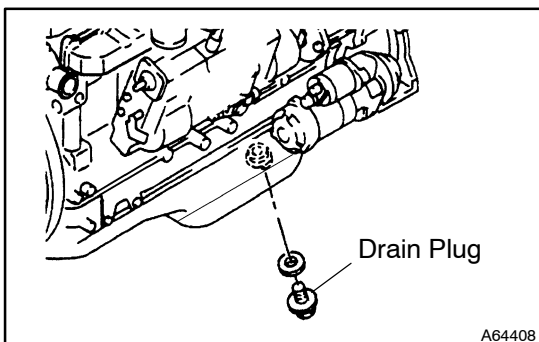
- (a) Drain the coolant from the radiator and engine.

Coolant capacity:

15.2 liters (16.0 US qts, 13.4 Imp. qts)

HINT:

The coolant can be drained more easily by removing the filler cap.



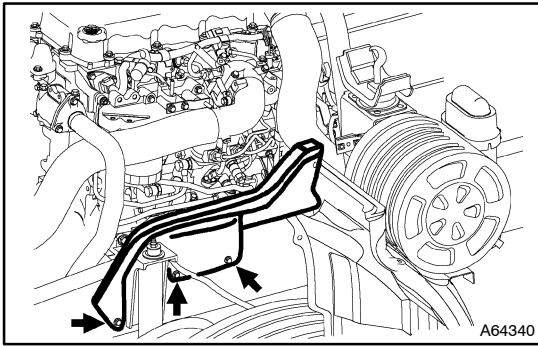
4. **DRAIN ENGINE OIL**

- (a) Drain the engine oil through the drain plug.

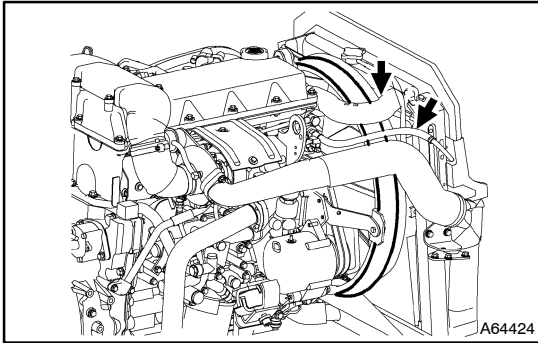
Oil capacity:

w/ oil filter: 10.6 liters (11.2 US qts, 9.3 Imp. qts)

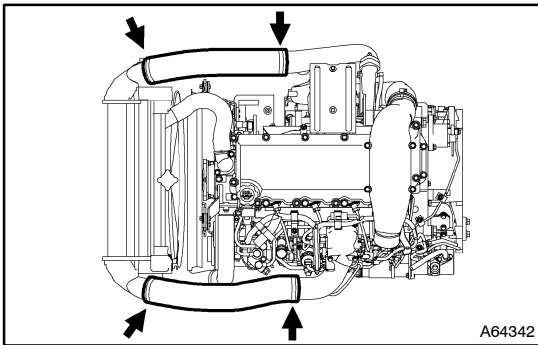
w/o oil filter: 8.6 liters (9.1 US qts, 7.6 Imp. qts)



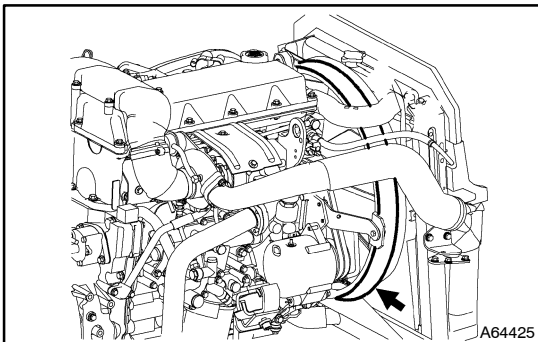
- 5. REMOVE SPLASH BOARD**
 (a) Remove the LH and RH splash boards.



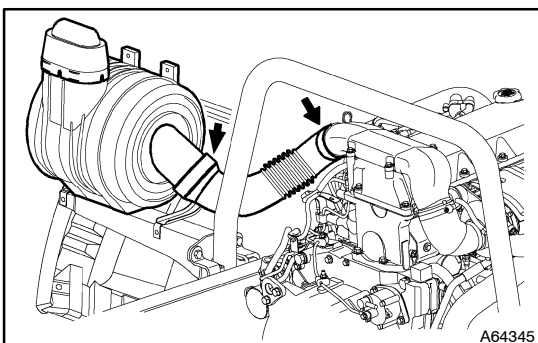
- 6. DISCONNECT RADIATOR HOSE**
7. DISCONNECT HEATER HOSE



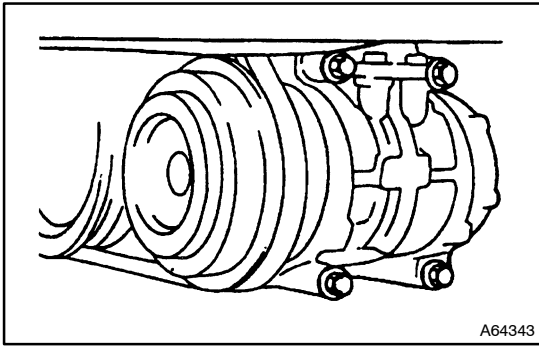
- 8. DISCONNECT INTERCOOLER HOSE**



- 9. REMOVE FAN SHROUD SEAL HOLDER**



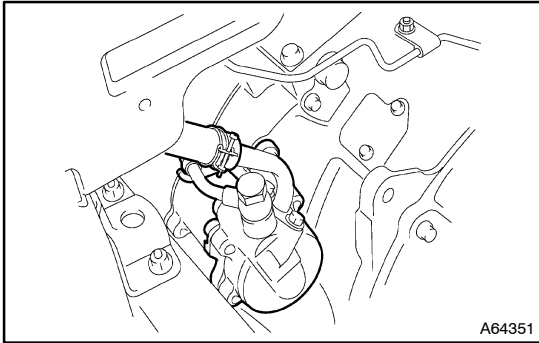
- 10. DISCONNECT AIR CLEANER HOSE**
11. REMOVE REAR CAB MOUNTING BRACKET
12. REMOVE AIR CLEANER TOGETHER WITH BRACKET

**13. DISCONNECT A/C COMPRESSOR FROM ENGINE**

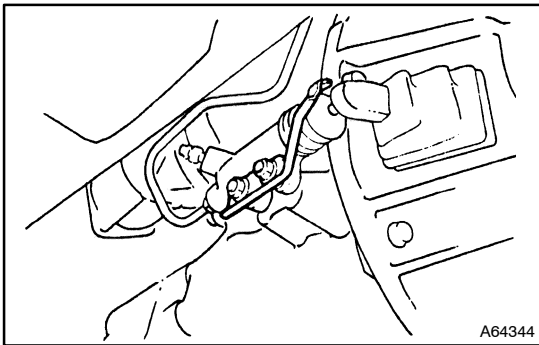
- (a) Loosen the tension pulley, and then remove the V belt.
- (b) Remove the A/C compressor.

HINT:

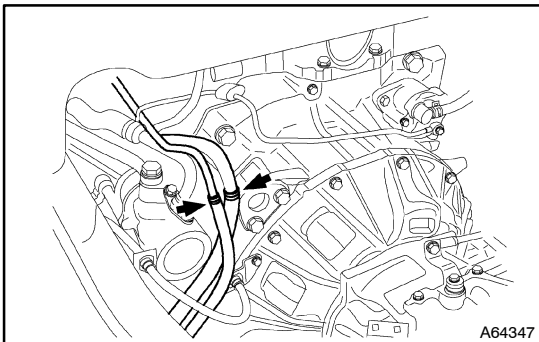
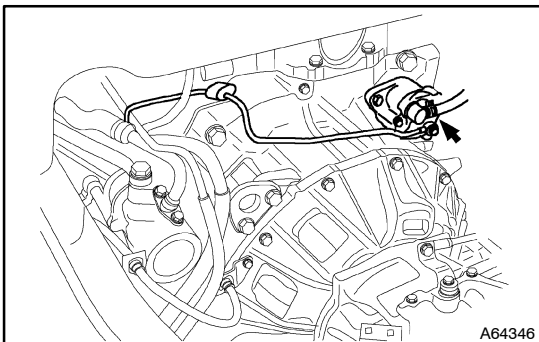
Suspend on the chassis side by rope or wire with the hose installed.

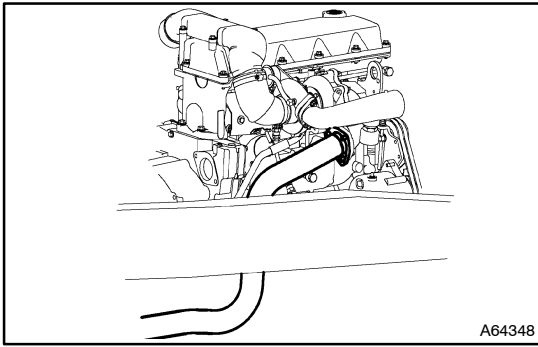
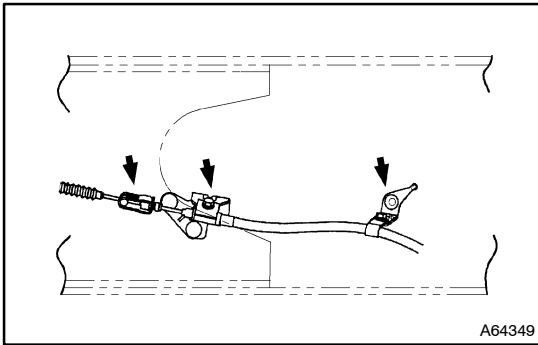
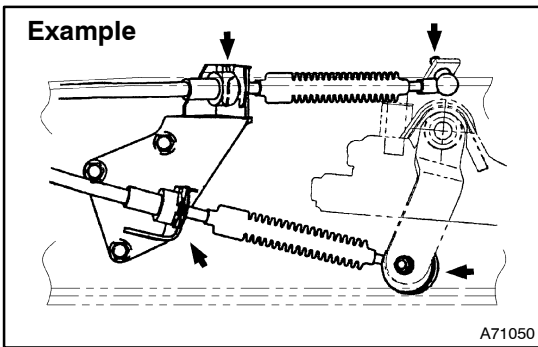
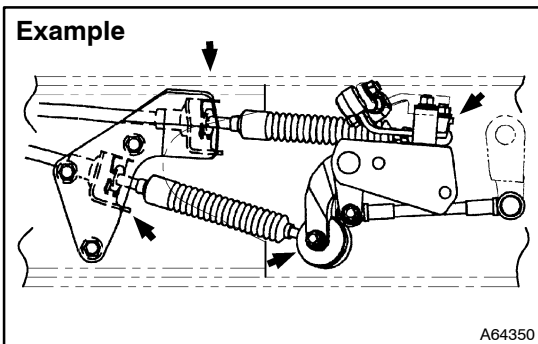
**14. DISCONNECT VANE PUMP ASSY FROM ENGINE****HINT:**

Suspend on the chassis side by rope or wire with the hose installed.

**15. REMOVE CLUTCH RELEASE CYLINDER ASSY**

- (a) Remove the bracket of the clutch hose.
- (b) Remove the release cylinder together with the lines.

**16. DISCONNECT FUEL HOSE****17. DISCONNECT VACUUM HOSE**

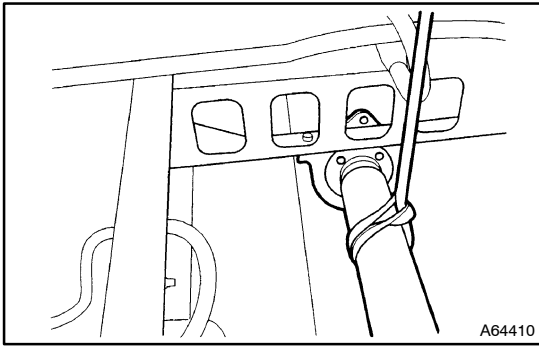
**18. REMOVE EXHAUST PIPE ASSY****19. DISCONNECT PARKING BRAKE CABLE ASSY****20. DISCONNECT TRANSMISSION CONTROL CABLE ASSY****21. DISCONNECT ELECTRICAL WIRE**

- (a) Disconnect the engine main wire harness.

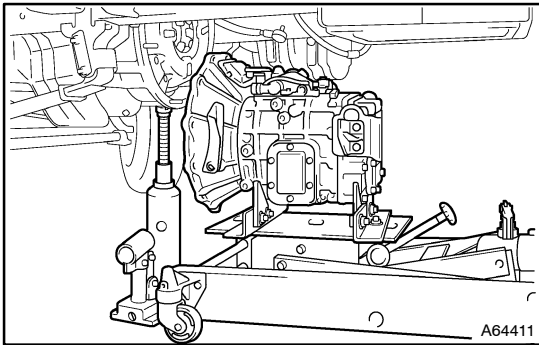
HINT:

Do not disconnect the wire harness in the engine side but the chassis side.

- (b) Disconnect the generator part wire harness.
 (c) Disconnect the starter part wire harness.
 (d) Disconnect the transmission part wire harness.
 (e) Disconnect the oil pressure switch part wire harness.



22. REMOVE PROPELLER SHAFT ASSY



23. REMOVE MANUAL TRANSMISSION ASSY

- Place a jack under the bottom of the flywheel housing.
- Place a transmission jack under the transmission.

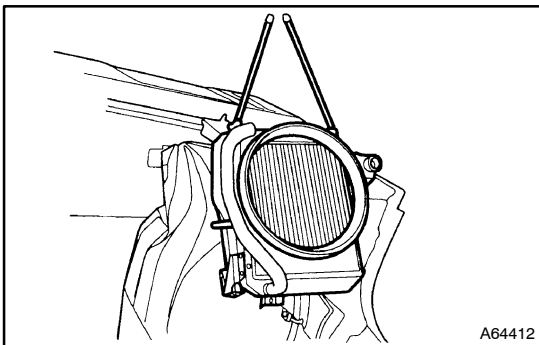
NOTICE:

The engine must be suspended with a hoist until disassembly of the transmission completes.

- Remove the mounting bolt of the mounting rubber behind the transmission.
- Remove the mounting bolt of the transmission at the clutch housing, and then remove the transmission.

HINT:

Jack up and align the transmission with the engine, and then pull the transmission straight out.

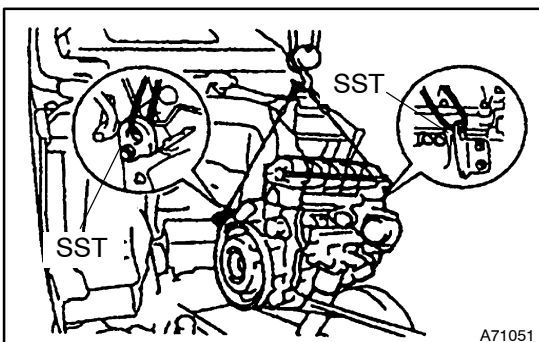


24. REMOVE RADIATOR ASSY

- Remove the 2 bolts of the radiator mounting bracket and the 2 bolts of the stay
- Remove the radiator.

HINT:

Attach a hoist to the radiator.



25. REMOVE ENGINE ASSY

- Install SST (engine hangers) to the front and rear of the engine in the correct direction.

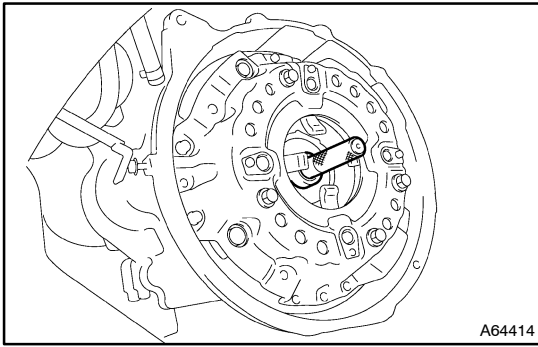
Bolt part No.:

90031-09508 (Front), 90031-19120 (Rear)

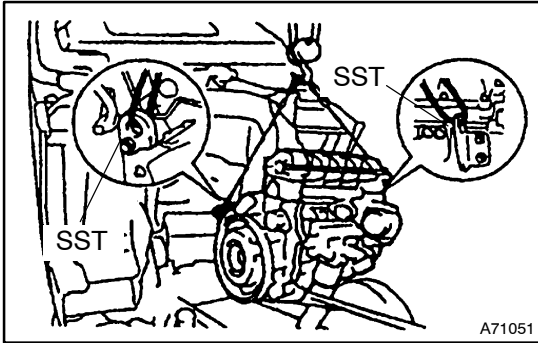
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)

- Attach hoists to the engine hangers at the front and rear ends of the engine, and lift the engine slightly.
- Remove the engine mounting from the frame.
- Remove the engine.
- Mount the engine on a work stand.

26. REMOVE CLUTCH COVER AND DISC

**27. INSTALL CLUTCH DISC AND COVER****HINT:**

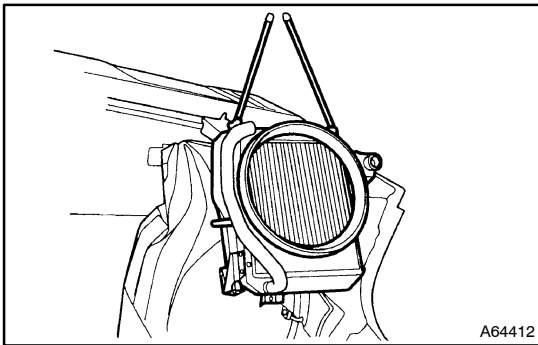
Center the clutch disc.

**28. INSTALL ENGINE ASSY**

(a) Using a hoist, lift up the engine hangers at the front and rear ends of the engine, and install it on the frame.

(b) Tighten the engine mounting nut.

Torque: 100 N·m (1,020 kgf·cm, 74 ft·lbf)

**29. INSTALL RADIATOR ASSY**

(a) After installing the radiator hose at the engine side, fix it with the clamp.

HINT:

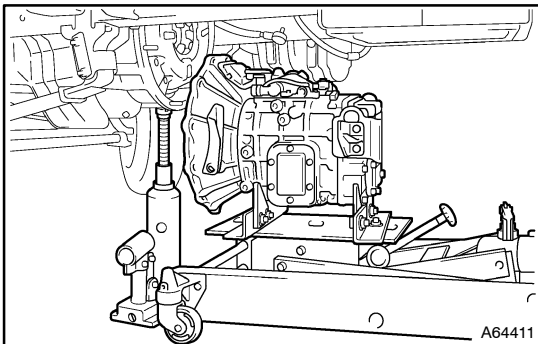
Place a hoist on the radiator.

Torque:

18 N·m (184 kgf·cm, 13 ft·lbf) for bolts

7.5 N·m (76 kgf·cm, 63 in·lbf) for nuts

(b) After installing the radiator side fan shroud into the engine side securely, fix it with the clamp.

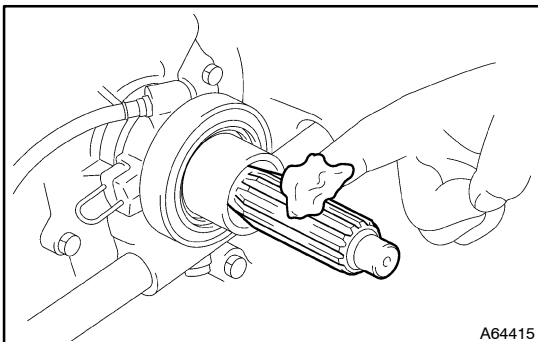
**30. INSTALL MANUAL TRANSMISSION ASSY**

(a) Engage the jack with the flywheel housing bottom surface.

(b) Engage the transmission jack with the transmission.

(c) Mount the transmission to the engine, and tighten the clutch housing mounting bolt.

Torque: 43.1 N·m (440 kgf·cm, 32 ft·lbf)

**HINT:**

- Apply clutch spline grease to the input shaft spline.

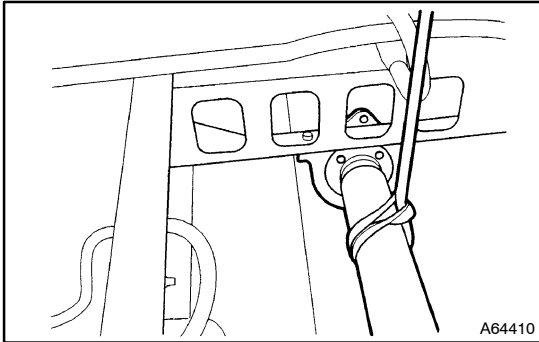
Grease:

Part No. 08887-01706, CLUTCH SPLINE GREASE or equivalent

- Be sure to install the transmission straight while matching the engine angle with the transmission angle, using a jack.

(d) Tighten the mounting rubber mounting nut at the back of the transmission.

Torque: 65 N·m (650 kgf·cm, 48 ft·lbf)



31. INSTALL PROPELLER SHAFT ASSY

- (a) Tighten the flange nut.

Torque:

63.9 – 85.5 N·m (650 – 870 kgf·cm, 47 – 63 ft·lbf)

HINT:

Use a hoist for the propeller shaft.

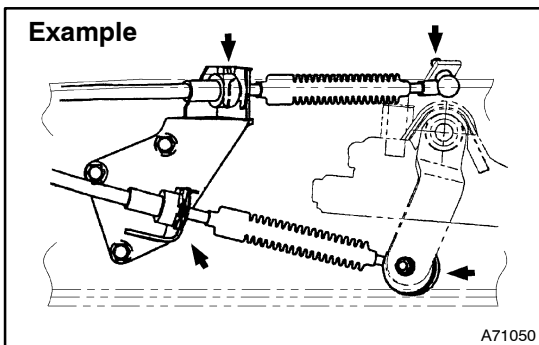
- (b) Tighten the center bearing support mounting nut.

Torque:

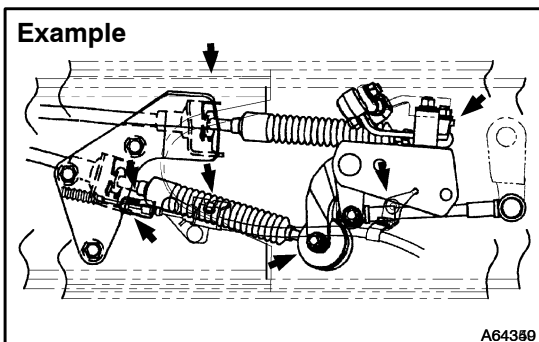
37.4 – 49.2 N·m (380 – 500 kgf·cm, 27 – 36 ft·lbf)

32. CONNECT ELECTRICAL WIRE

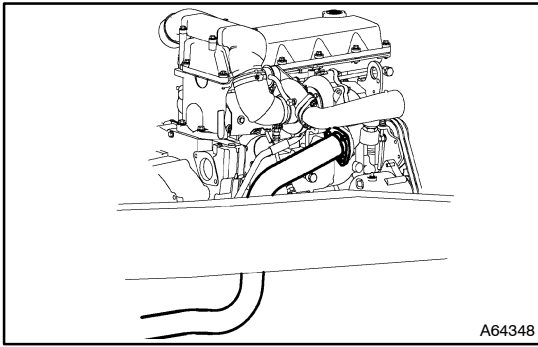
- (a) Connect the engine main wire harness.
- (b) Connect the generator part wire harness.
- (c) Connect the starter part wire harness.
- (d) Connect the transmission part wire harness.
- (e) Connect the oil pressure switch part wire harness.



33. CONNECT TRANSMISSION CONTROL CABLE ASSY



34. CONNECT PARKING BRAKE CABLE ASSY

**35. INSTALL EXHAUST PIPE ASSY****HINT:**

Be sure to use a new gasket.

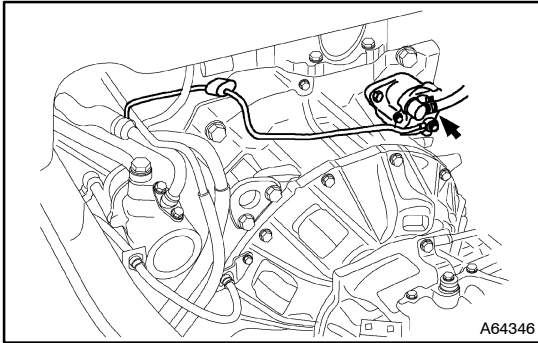
- (a) Install the exhaust pipe.

Torque: 70 N·m (700 kgf·cm, 52 ft·lbf)

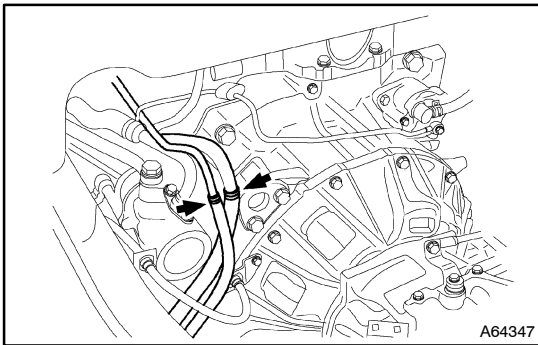
- (b) Install the muffler.

Torque: 29.5 N·m (301 kgf·cm, 22 ft·lbf)

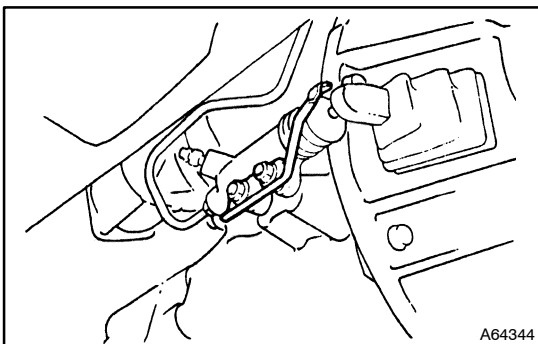
A64348

**36. CONNECT VACUUM HOSE**

A64346

**37. CONNECT FUEL HOSE**

A64347

**38. INSTALL CLUTCH RELEASE CYLINDER ASSY**

- (a) Install the release cylinder to the lines.

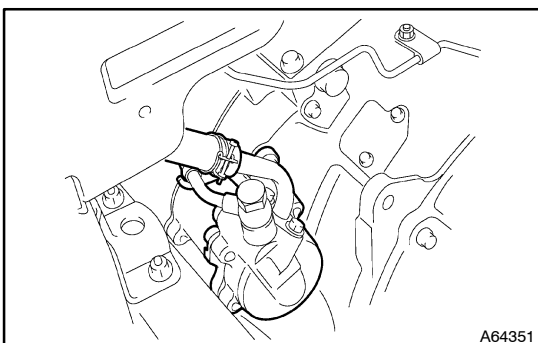
HINT:

Check and adjust the push rod dimension.

- (b) Install the clevis pin and return spring at the lever.

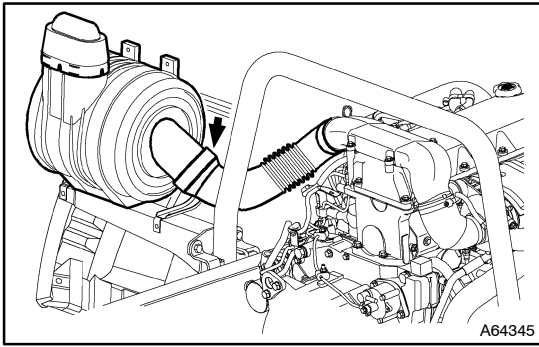
- (c) Install the wiring clip of the clutch hose.

A64344

**39. INSTALL VANE PUMP ASSY**

Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

A64351

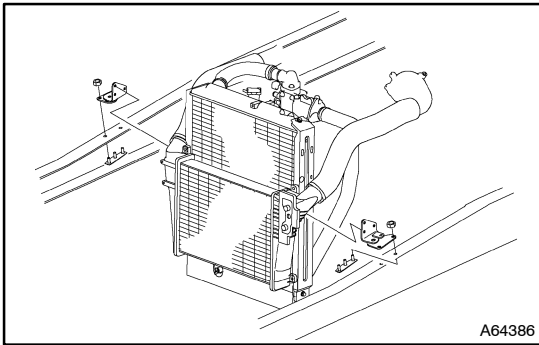


40. INSTALL REAR CAB MOUNTING BRACKET

Torque: 55 N·m (565 kgf·cm, 41 ft·lbf)

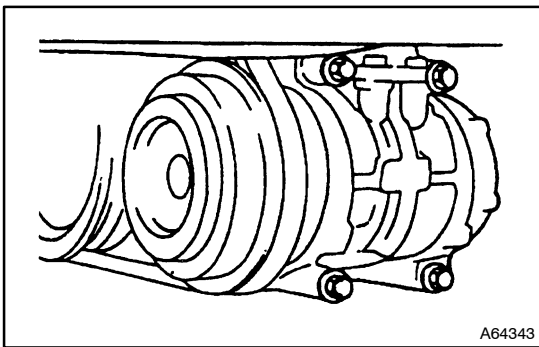
41. INSTALL AIR CLEANER HOSE

- (a) Install the air cleaner hose to the bracket.
- (b) Install the air cleaner with the air hose connected to the engine.



42. FIX RADIATOR ASSY TO FRAME

- (a) Install the radiator mounting.
- (b) Install the reservoir hose.



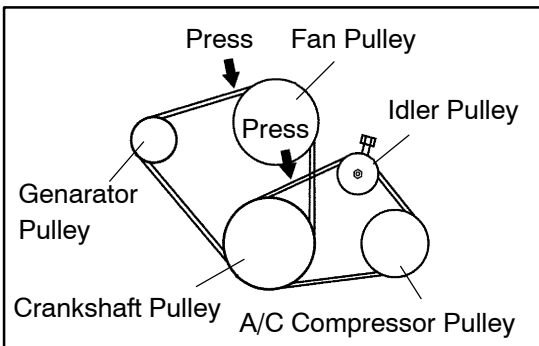
43. INSTALL A/C COMPRESSOR

- (a) Install the A/C compressor with the 4 bolts.

Torque: 29.5 N·m (300 kgf·cm, 22 ft·lbf)

HINT:

For the coolant charging procedure (gas charging), observe the air conditioner manufacturer's instructions.



- (b) Install the V belt.

- (1) Turn the adjusting bolt until the V belt becomes tight, and then tighten the tension pulley lock nut.

Torque: 41.3 N·m (420 kgf·cm, 30 ft·lbf)

- (c) Adjust the V belt deflection.

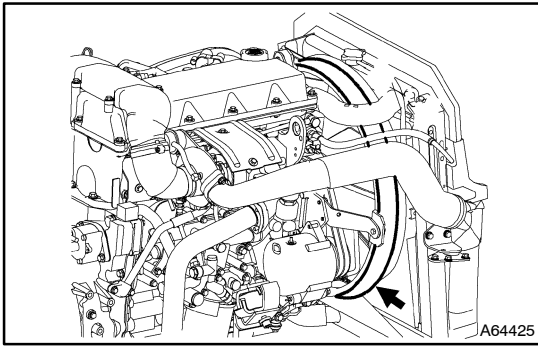
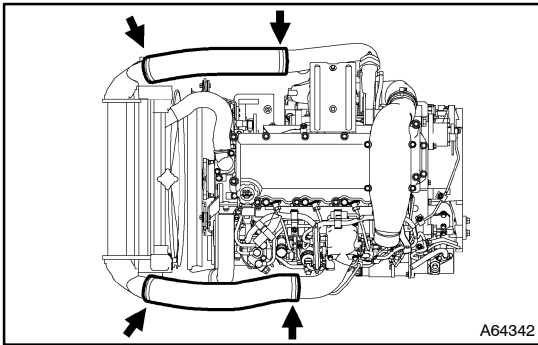
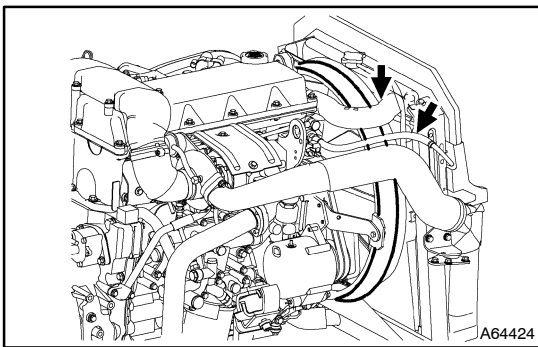
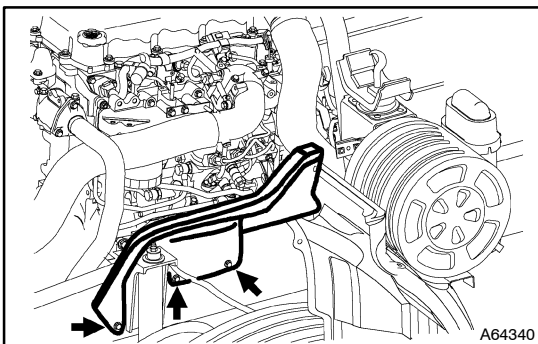
- (1) Apply a load of approx. 10 kg (22 lb) by pressing the belt with your thumb.

Deflection:

New belt	7.0 – 8.5 mm (0.276 – 0.335 in.)
Used belt	8.5 – 10.0 mm (0.335 – 0.394 in.)

HINT:

- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for approx. 5 minutes and recheck the belt tension.

**44. INSTALL FAN SHROUD SEAL HOLDER****45. INSTALL INTERCOOLER HOSE****46. INSTALL RADIATOR HOSE**
47. INSTALL HEATER HOSE**48. INSTALL SPLASH BOARD**
(a) Install the LH and RH splash boards.**49. CONNECT NEGATIVE TERMINAL CABLE TO BATTERY****50. ADD ENGINE OIL**

Oil capacity: 8.6 liters (9.1 US qts, 7.6 Imp. qts)

51. ADD ENGINE COOLANT

(a) Add coolant slowly until the system is filled up to the filter opening, then install the cap securely.

Coolant capacity: 16.5 liters (17.4 US qts, 14.5 Imp. qts)

HINT:

Trapped air in the cooling system can cause overheating.

52. BLEED FUEL (See page 11-112)**53. INSPECT FOR ENGINE COOLANT LEAKS**

- 54. INSPECT FOR FUEL LEAKS
- 55. INSPECT FOR EXHAUST GAS LEAK

ENGINE COMPONENTS PARTS (S05C-TA)

140NF-02

REMOVAL AND INSTALLATION

1. PREPARATION

- (a) Clean the engine.
 - (1) Cover the openings with tape.
 - (2) Using a steam cleaner, clean the engine.

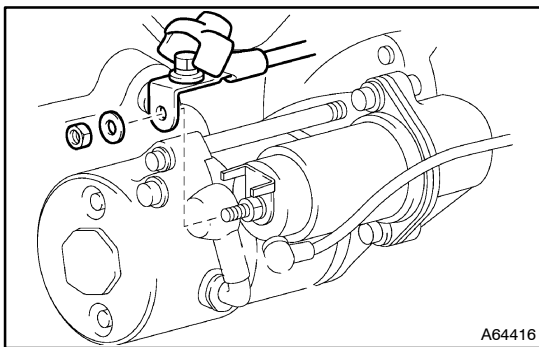
NOTICE:

Do not apply steam directly to the electrical component (generator, starter, etc.).

- (b) Mount the engine on a work stand.

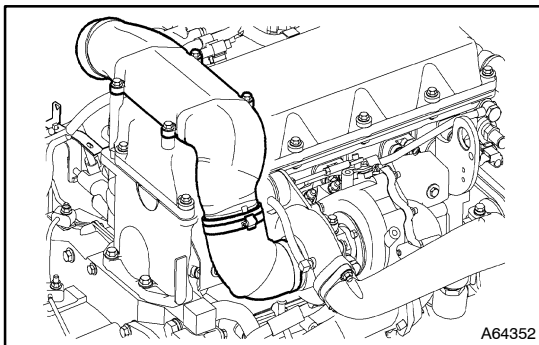
2. REMOVE ELECTRICAL WIRE ASSY

- (a) Remove the clip of the wire harness.
- (b) Disconnect the negative (-) terminal of the battery.
- (c) Disconnect the electrical unit, switch and sensor.



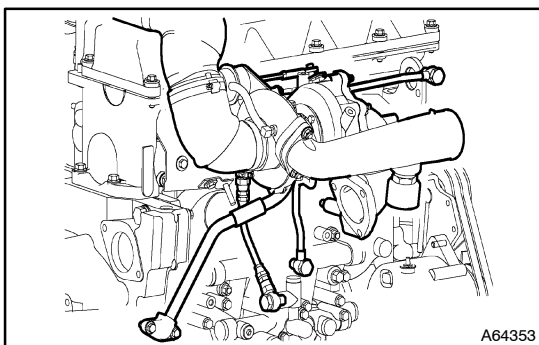
3. REMOVE STARTER ASSY

- (a) Put alignment marks on the harness and the starter terminal, and then remove the harness.
- (b) Remove the starter from the engine.

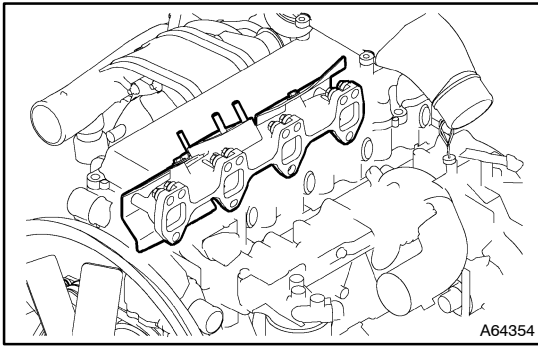


4. REMOVE TURBOCHARGER ASSY

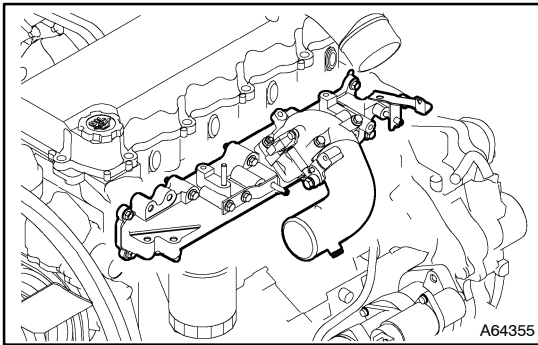
- (a) Remove the insulator.
- (b) Remove the suction pipe.
- (c) Remove the intake pipe.



- (d) Remove the oil pipe.
- (e) Remove the water pipe.
- (f) Remove the exhaust pipe.
- (g) Remove the 4 bolts.

**5. REMOVE EXHAUST MANIFOLD**

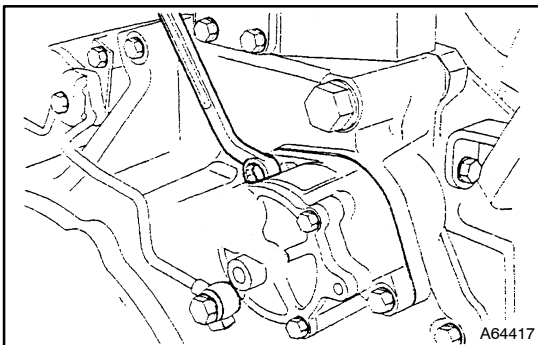
- (a) Remove the insulators.
- (b) Remove the exhaust manifold and gasket.

**6. REMOVE INTAKE PIPE**

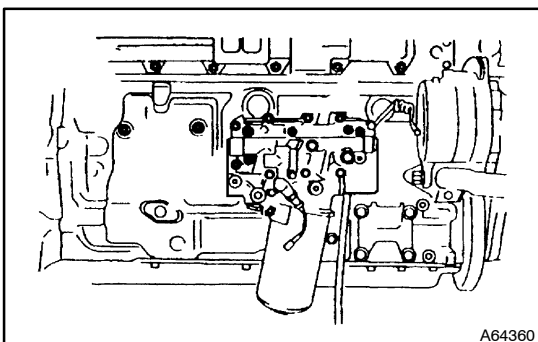
- (a) Remove the injection pipe and fuel filter assembly.

7. REMOVE INTAKE MANIFOLD

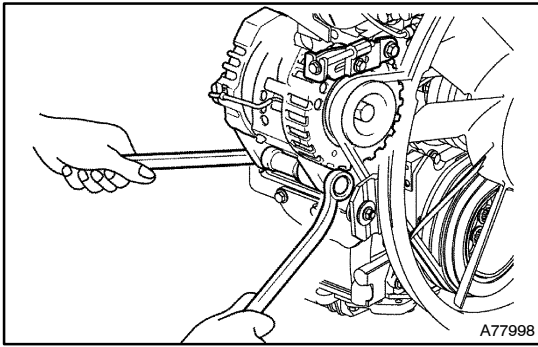
- (a) Remove the intake manifold and gasket.

8. REMOVE INJECTION PUMP ASSY (See page 11-125)**9. REMOVE VACUUM PUMP ASSY**

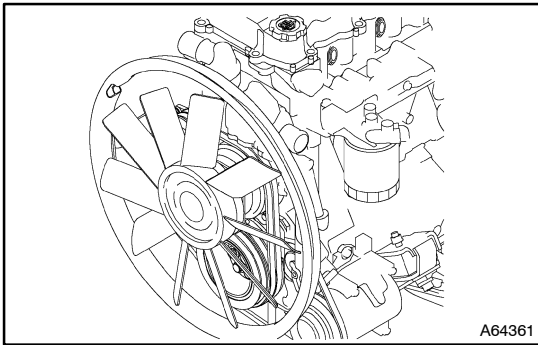
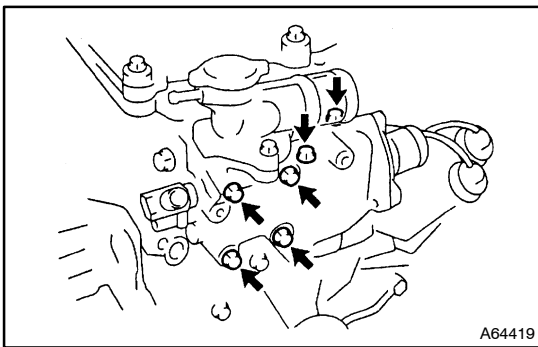
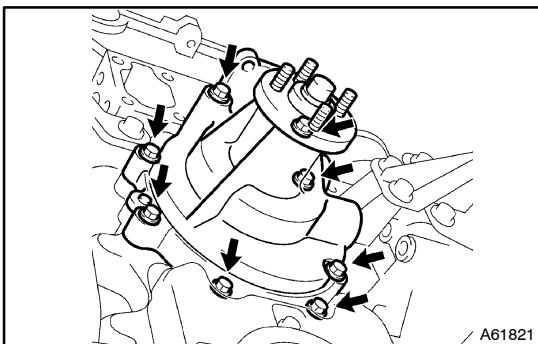
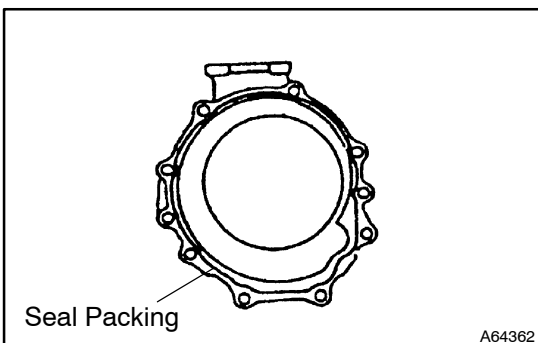
- (a) Remove the vacuum lines.
- (b) Remove the 2 bolts, vacuum pump and 2 O-rings.

**10. REMOVE OIL FILTER SUB-ASSY (See page 17-40)****11. REMOVE OIL COOLER ASSY**

- (a) Remove the oil lines.
- (b) Remove the oil cooler.

**12. REMOVE V BELT AND GENERATOR**

- (a) Loosen the V belt adjusting bolt.
- (b) Loosen the through bolt.
- (c) Remove the V belt, and then remove the generator.

**13. REMOVE FAN****14. REMOVE FLUID COUPLING ASSY****15. REMOVE FAN PULLEY****16. REMOVE THERMOSTAT CASE****17. REMOVE WATER PUMP ASSY****18. INSTALL WATER PUMP ASSY**

- (a) Clean the cylinder block mounting surface of the water pump.
- (b) Apply seal packing to the water pump and install it onto the cylinder block within 20 minutes.

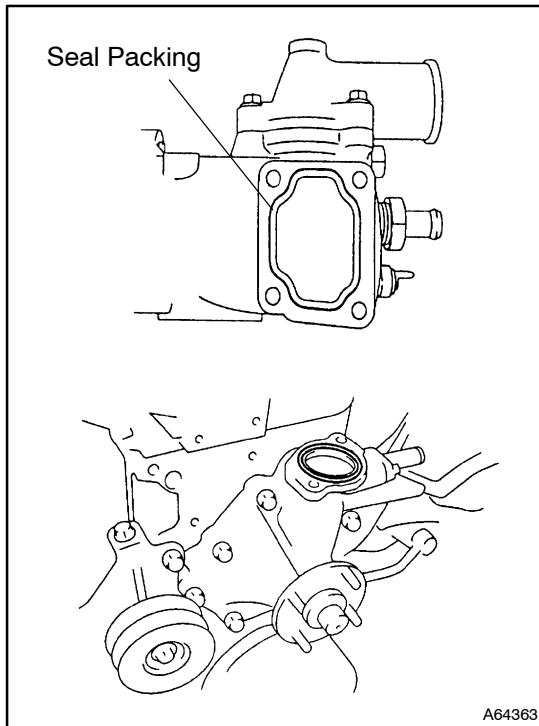
Seal packing: Part No. 08826-00100 or equivalent

Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

Seal Packing

A64362



HINT:

- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
- Do not start the engine for 2 hours after the installation.

19. INSTALL THERMOSTAT CASE

- (a) Make sure that the O-ring is attached to the upper flange face of the water pump.
- (b) Clean the cylinder head mounting surface of the thermostat case.
- (c) Apply seal packing to the thermostat case and install it onto the cylinder head within 20 minutes.

Seal packing: Part No. 08826-00100 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

HINT:

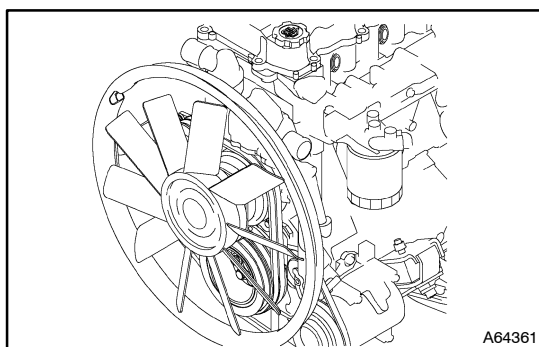
- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
 - Do not start the engine for 2 hours after the installation.
- (d) Tighten the 4 side ones of the thermostat case mounting bolts.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

- (e) Tighten the 2 upper ones of the water pump mounting bolts.

Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

- (f) Install the cooling line.

**20. INSTALL FAN PULLEY**

- (a) Install the fan pulley and fan spacer.

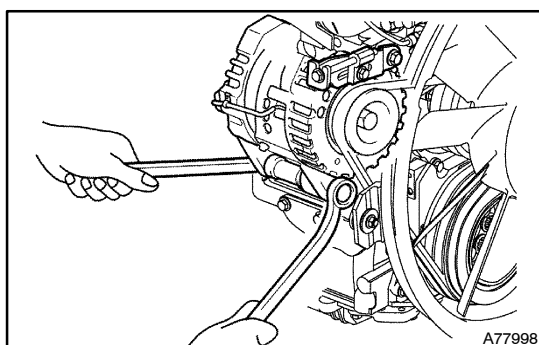
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

21. INSTALL FLUID COUPLING ASSY

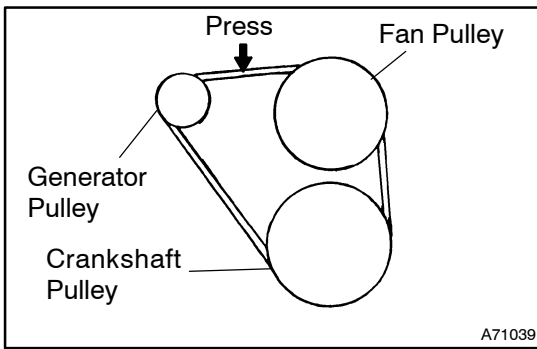
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

22. INSTALL FAN

Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

**23. INSTALL GENERATOR AND V BELT**

- (a) Attach the generator provisionally, and install the V belt.



- (b) Press the center point of the V belt with a load of approx. 98 N (10 kgf, 22 lb) and adjust the V belt deflection so that it should be within the standard value.

V belt deflection:

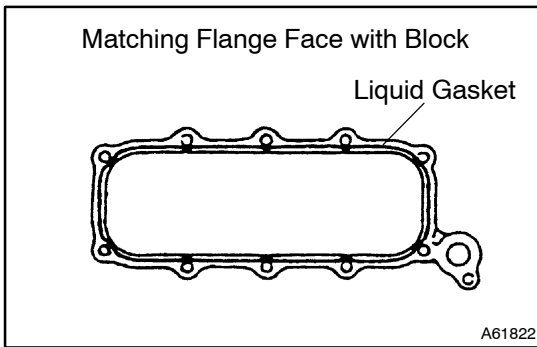
New belt	5.5 – 6.5 mm (0.217 – 0.256 in.)
Used belt	6.5 – 7.5 mm (0.256 – 0.295 in.)

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

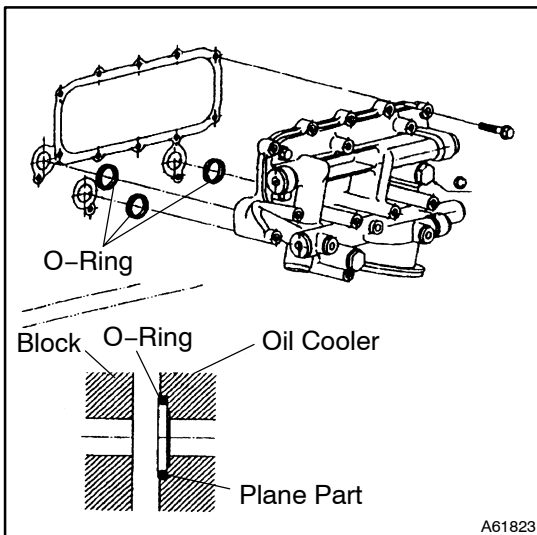
- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
 - "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
 - After installing a new belt, run the engine for approx. 5 minutes and recheck the belt tension.
- (c) Tighten the V belt adjusting bolt.
 (d) Tighten the through bolt.

Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)



24. INSTALL OIL COOLER ASSY

- (a) Clean the cylinder block mounting surface of the oil cooler.



- (b) Insert the O-ring into the O-ring groove of the oil cooler.

HINT:

Face the flat area of the O-ring toward the oil cooler for installation.

- (c) Apply seal packing to the oil cooler housing and install it onto the cylinder block within 20 minutes.

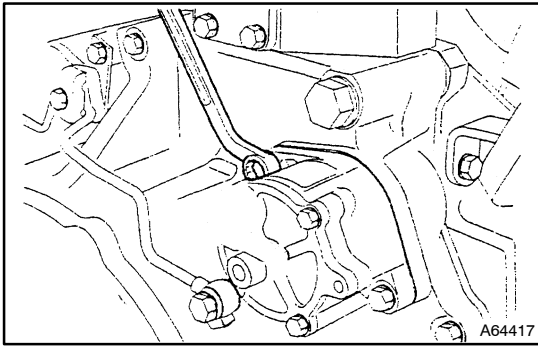
Seal packing: Part No. 08826-00100 or equivalent
Coating width: 1.5 – 2.5 mm (0.059 – 0.098 in.)

HINT:

If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.

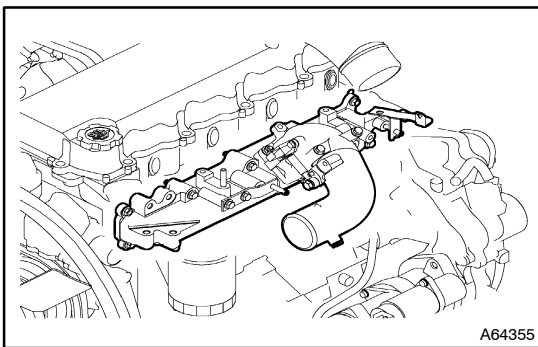
- (d) Install the oil line.

25. INSTALL OIL FILTER SUB-ASSY (See page 17-40)



- 26. INSTALL VACUUM PUMP ASSY**
Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

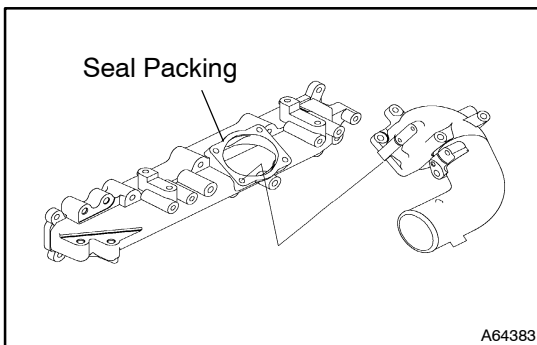
27. INSTALL INJECTION PUMP ASSY (See page 11-115)



- 28. INSTALL INTAKE MANIFOLD**
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

Be sure to use a new gasket.



29. INSTALL INTAKE PIPE

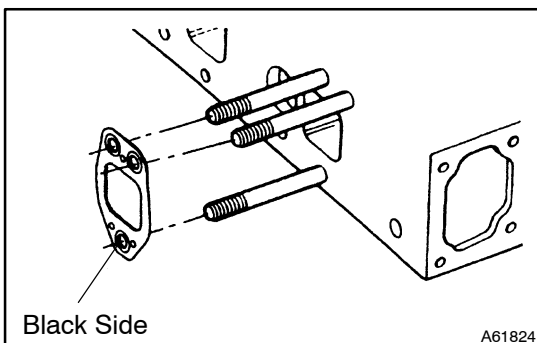
- (a) Clean the matching face of the intake manifold and intake pipe.
 (b) Apply seal packing to the intake manifold and install it onto the intake manifold within 20 minutes.

Seal packing: Part No. 08826-00080 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.

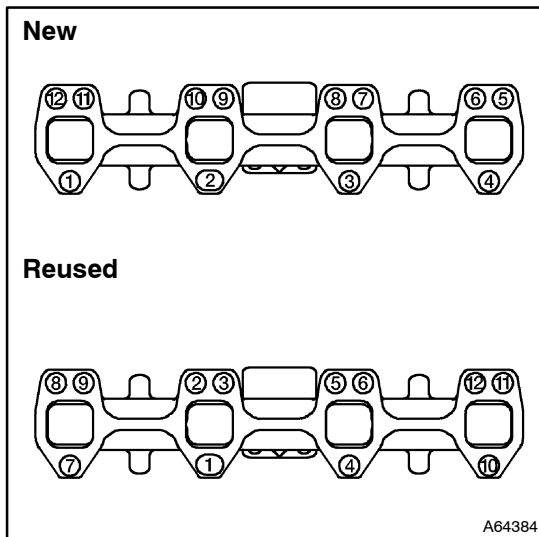


30. INSTALL EXHAUST MANIFOLD

- (a) Install the exhaust manifold gasket so that the black side could face the exhaust manifold.

HINT:

Be sure to use new gaskets.



- (b) Install the exhaust manifold onto the cylinder head and tighten the inner mounting nuts, in the order shown in the illustration.

Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)

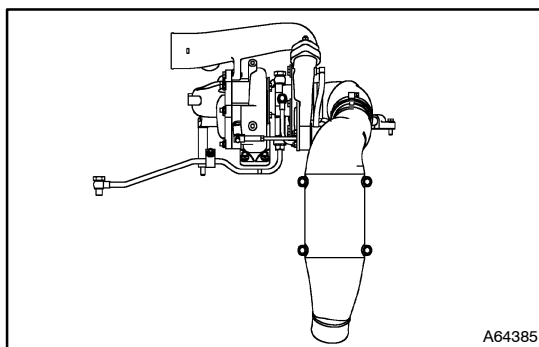
- (c) Tighten the same nuts according to the same procedure again.

Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)

HINT:

Be sure to carry out the tightening procedure in order.

- (d) Install the insulators.

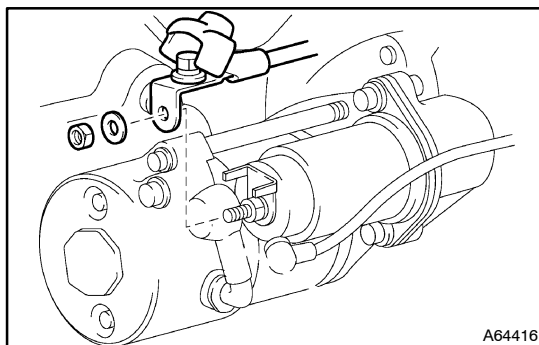


31. INSTALL TURBOCHARGER ASSY

Torque: 56 N·m (570 kgf·cm, 41 ft·lbf)

HINT:

Be sure to use new gaskets.



32. INSTALL STARTER ASSY

- (a) Tighten the bolts and nuts.

Torque: 154 N·m (1,570 kgf·cm, 114 ft·lbf)

- (b) Connect the harness at the alignment marks.

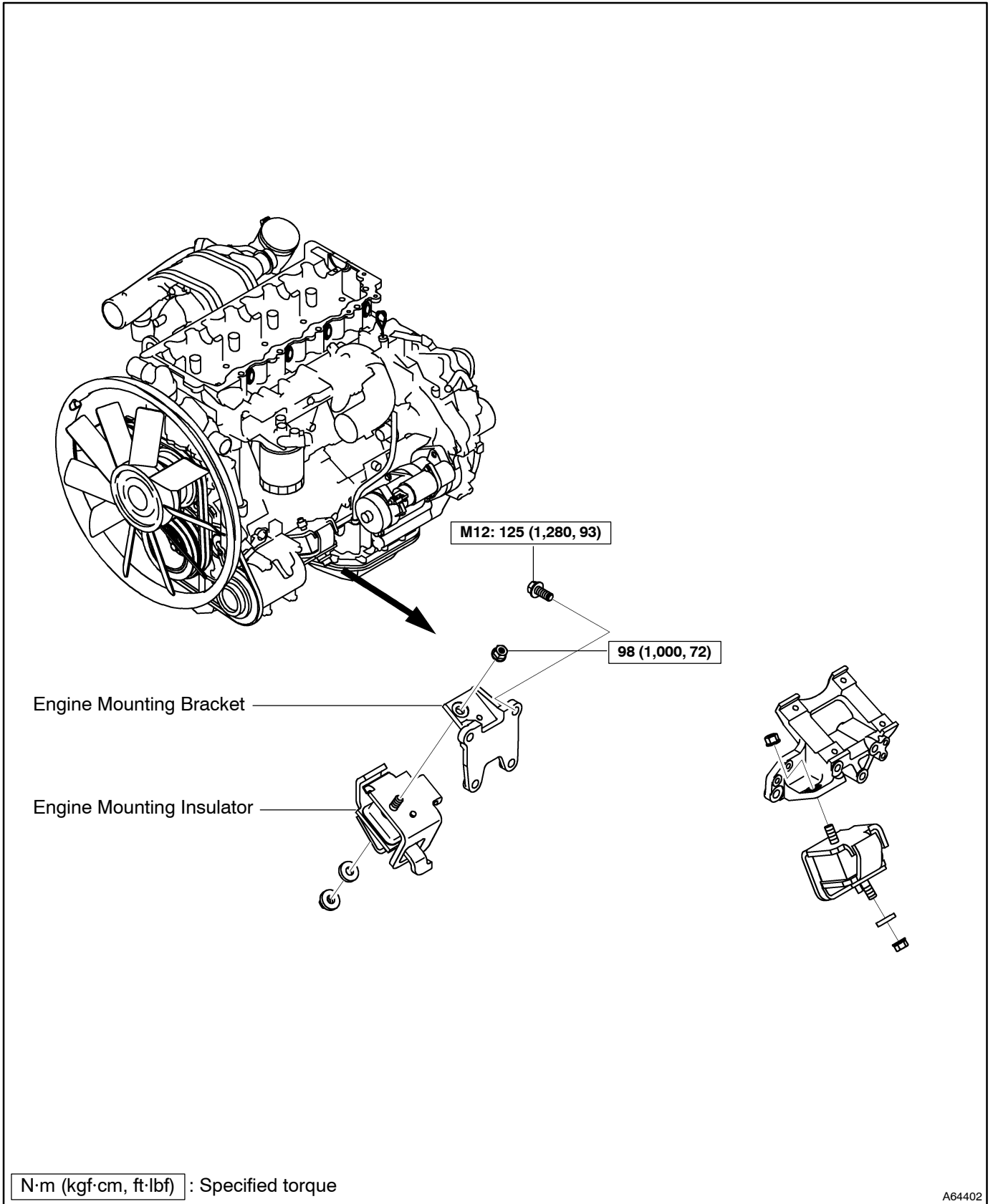
- (c) Connect the battery cable.

Torque: 13.5 N·m (137 kgf·cm, 10 ft·lbf)

33. INSTALL ELECTRICAL WIRE ASSY

ENGINE MOUNTING (S05C-TA) COMPONENTS

140ND-02

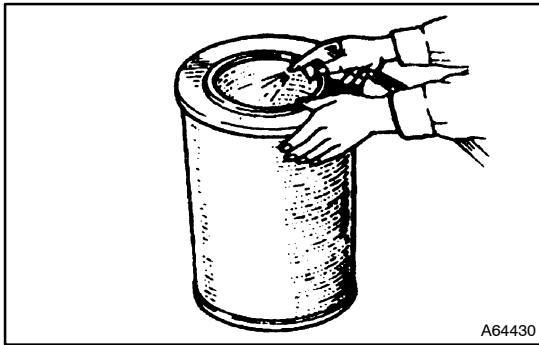


ENGINE (S05C-TB)

140NB-02

ADJUSTMENT

1. INSPECT ENGINE COOLANT
2. INSPECT ENGINE OIL
3. INSPECT BATTERY

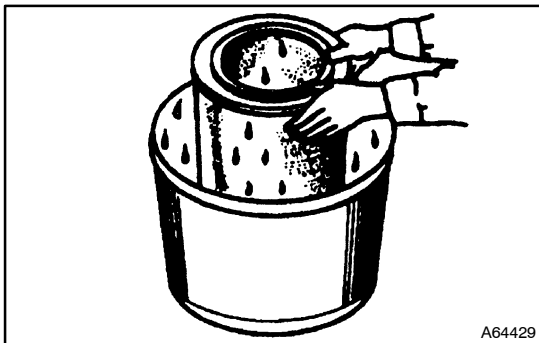


4. Non-Washable type: INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY

- (a) Visually check that the filter is not excessively dirty or oily.
- (b) To remove dry dirt or dust, use a compressed air gun (Air pressure: lower than 690 kPa (7.0/kgf·cm², 100 psi)). Always blow off from the inside of the element to the outside. Never strike or bang the filter to remove dirt or dust.

HINT:

If the compressed air is too high and the element has deformation, the engine will be in trouble.



5. Washable type: INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY

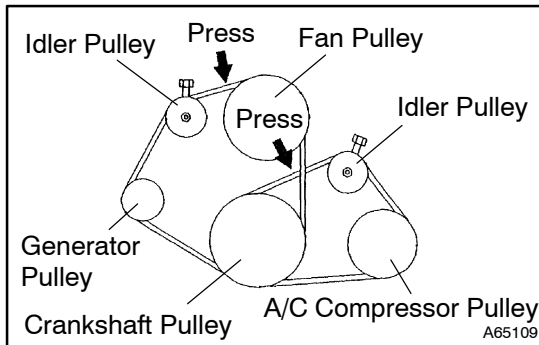
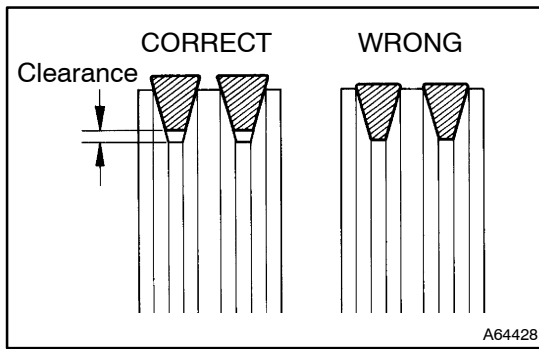
- (a) Wash the element by soaking it in a non-sudsy detergent solution for approx. 30 minutes.
- (b) Rinse the element with clean water and dry it completely with compressed air.

HINT:

- Check to see that the inside of the element is not soiled with dust etc.
- If drying the element in an oven, drying should be done at below 80°C (176°F).
- Never reinstall the element until it is completely dry.
- Make sure that the dried element is not broken and that the packing is not broken nor deformed.

NOTICE:

Never use kerosene, gasoline or other solvents to clean the elements. Use of these could cause the engine to overrunning of the engine and damage the engine.



6. INSPECT V BELT

- (a) Visually check the belt for cracks, oiliness or wear. Check that the belt does not touch the bottom of the pulley groove.

If necessary, replace the belts as a set.

- (b) Measure the belt deflection by pressing on the belt at the points indicated in the illustration with 98 N (10 kgf, 22 lbf) of pressure.

Deflection:

Generator belt	New belt	5.5 – 6.5 mm (0.217 – 0.256 in.)
	Used belt	6.5 – 7.5 mm (0.256 – 0.295 in.)
A/C belt	New belt	7.0 – 8.5 mm (0.276 – 0.335 in.)
	Used belt	8.5 – 10.0 mm (0.335 – 0.394 in.)

- (c) Reference:

Using a belt tension gauge, measure the belt tension.

Tension:

New belt	374 – 471 N (38 – 48 kg, 84 – 106 lb)
Used belt	275 – 373 N (28 – 38 kg, 62 – 84 lb)

HINT:

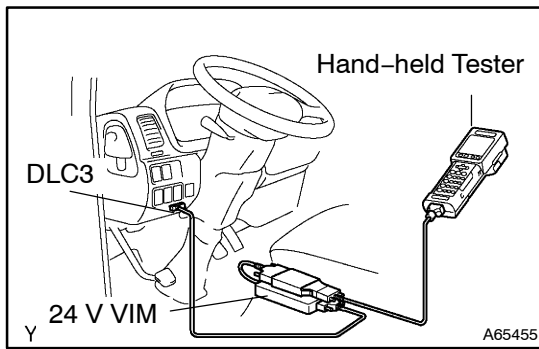
- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.

7. INSPECT IDLE SPEED AND MAXIMUM SPEED

HINT:

Check should be done under the following conditions.

- Engine at normal operating temperature.
- Air cleaner installed.
- All pipes and hoses of air induction system connected.
- All accessories switched OFF.
- All vacuum lines properly connected.
- ECD system wiring connectors fully plugged.
- Valve clearance set correctly.

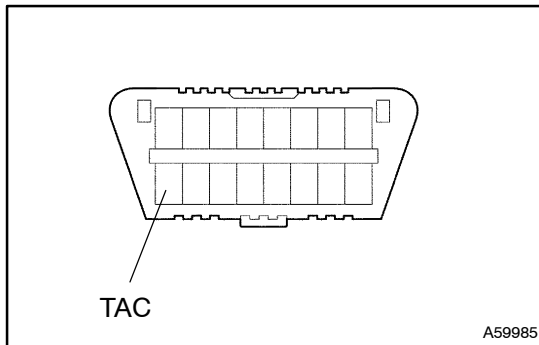


- (a) Connect a hand-held tester to the DLC3.

NOTICE:

Be sure to use the 24 V VIM, because the hand-held tester will be destroyed if you do not use the 24 V VIM.

- (b) Refer to the hand-held tester operator's manual for further details.



If you have no hand-held tester, connect a tachometer tester probe to terminal 9 (TAC) of the DLC3 with SST.

SST 09843-18030

- (c) Inspect the idle speed.

- (1) Start the engine, and check the idle speed.

Idle speed: 640 - 660 rpm

If the idle speed is not as specified, check the troubleshooting in the DI section.

- (d) Inspect the maximum speed.

- (1) Start the engine.

- (2) Depress the accelerator pedal all the way.

- (3) Check the maximum speed.

Maximum speed: 3,240 - 3,300 rpm

If the maximum speed is not as specified, check the troubleshooting in the DI section.

- (e) Disconnect a hand-held tester from the DLC3.

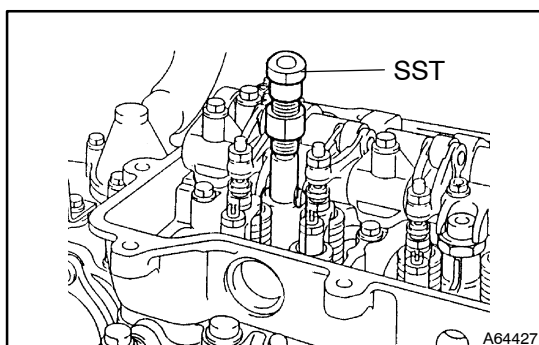
8. INSPECT DIESEL SMOKE

9. INSPECT CYLINDER COMPRESSION PRESSURE

HINT:

If the power is short, the oil consumption is excessive, and the fuel economy is poor, measure the compression pressure.

- (a) Allow the engine to warm up to the normal operating temperature.
- (b) Remove the intake air connector.
- (c) Remove the cylinder head cover.
- (d) Remove the injection pipes.



- (e) Check the compression pressure.

NOTICE:

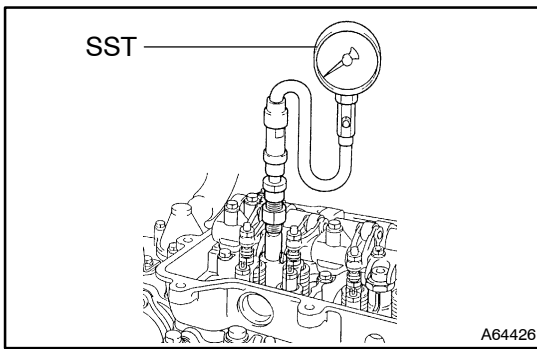
When measuring each compression pressure, the other 3 injectors must be installed in the cylinder head.

- (1) Remove the injector.

- (2) Install the gasket and SST (attachment) to the injection nozzle hole with the holder clamp and bolt.

SST 09552-1060, 09552-1090

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)



- (3) Connect SST (compression gauge) to the SST (attachment).

SST 09992-00025 (09992-00211)

- (4) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain the engine revolution of 280 rpm or more.

- (5) Repeat steps (2) through (4) for each cylinder.

NOTICE:

This measurement must be done as short a time as possible.

Compression pressure:

3,400 – 3,700 kPa (35 – 38 kgf/cm², 498 – 540 psi)

Minimum pressure: 2,700 kPa (28 kgf/cm², 398 psi)

Difference between each cylinder:

290 kPa (3.0 kgf/cm², 43 psi) or less

- (6) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the injector hole and repeat steps (2) through (4) for the cylinder with low compression.

- If the compression becomes high by adding oil, it shows that the piston rings and/or cylinder bore are worn or damaged.
- If the pressure remains low, a valve may be sticking or seating improperly, or there may be leakage through the gasket.

- (7) Remove the SST.

SST 09552-1060, 09552-1090, 09992-00025 (09992-00211)

- (8) Reinstall the injector or injection nozzle (See page 11-159).

- (f) Reinstall the injection pipes.
 (g) Reinstall the cylinder head cover.
 (h) Reinstall the intake air connector.
 (i) Start the engine and check for leaks.

VALVE CLEARANCE (S05C-TB)

140NC-03

ADJUSTMENT

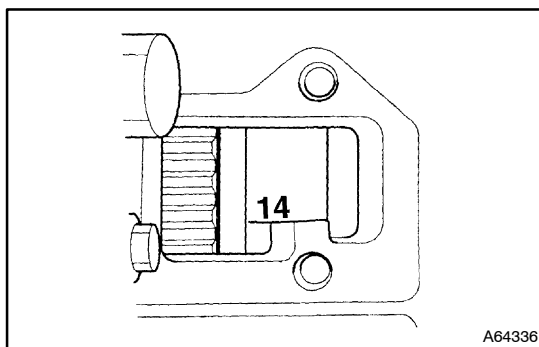
HINT:

Inspect and adjust the valve clearance when the engine is cold.

1. REMOVE INTAKE AIR CONNECTOR
2. REMOVE CYLINDER HEAD COVER SUB-ASSY

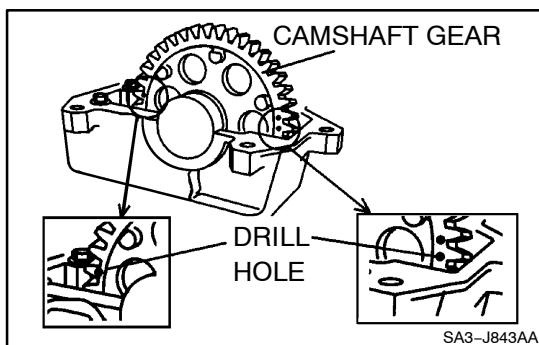
NOTICE:

Clean all dust from around the cylinder head cover before removing it to prevent foreign particles from getting in.



3. INSPECT VALVE CLEARANCE

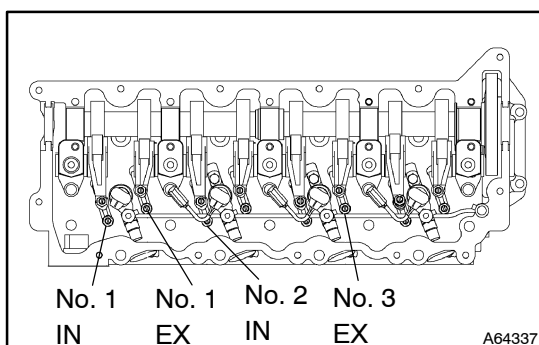
- (a) Turn the crankshaft to align mark 14 on the outer periphery of the flywheel with the pointer of the flywheel housing.



- (b) Among three drill holes on the camshaft gear, when two drill holes are on horizontal position, and the rest of the drill hole is visible, the No.1 piston is at the Top Dead Center of the compression stroke.

HINT:

If the rest of the drill hole is invisible by camshaft housing, the No.4 piston is at the Top Dead Center of the compression stroke.

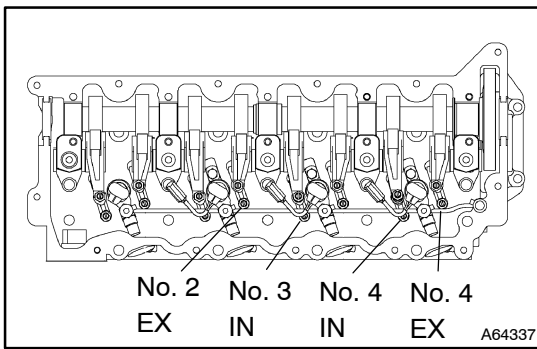


- (c) Check only those valves indicated in the illustration.
 - (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
 - (2) Record the measurements of the valve clearance that is out-of-specification.

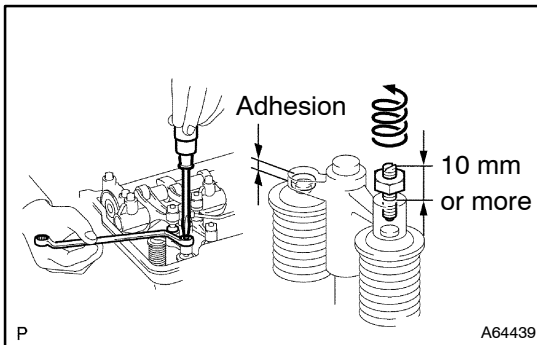
If the clearance is out of the standard range, adjust the valve clearance using the following.

Valve clearance (Cold):

Intake	0.30 mm (0.012 in.)
Exhaust	0.45 mm (0.018 in.)



- (d) Turn the crankshaft one revolution (360°) and align the marks as shown above (See step (a)).
- (e) Check only the valves indicated in the illustration. Measure the valve clearance (See step (c)).

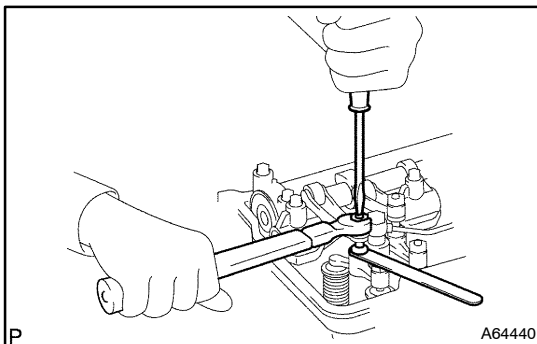


4. ADJUST VALVE CLEARANCE

- (a) Loosen the adjusting screw nut of the cross head completely.

HINT:

- The adjusting screw must protrude by 10 mm (0.3931 in.) or more from the valve bridge upper surface.
- Unless the adjusting screw is completely loose to the valve stem, the following adjustments may be adversely affected.

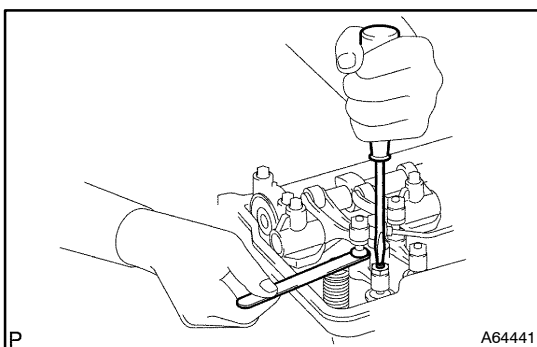


- (b) Insert a 30 mm (0.012 in.) feeler gauge for the intake or 0.45 mm (0.018 in.) feeler gauge for the exhaust between the rocker arm and valve bridge. Adjust the clearance with the adjusting screw of the rocker arm. Tighten the lock nut.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

HINT:

The feeling of the feeler gauge during the clearance adjustment is the same as before.



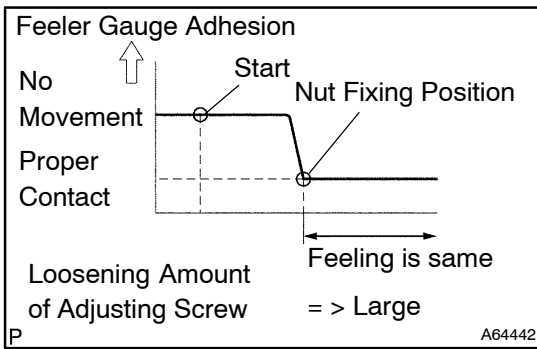
- (c) With the feeler gauge inserted, loosen the adjusting screw of the valve bridge. Make sure that the feeler gauge is not felt loose.

HINT:

If it is loose, repeat the following steps.

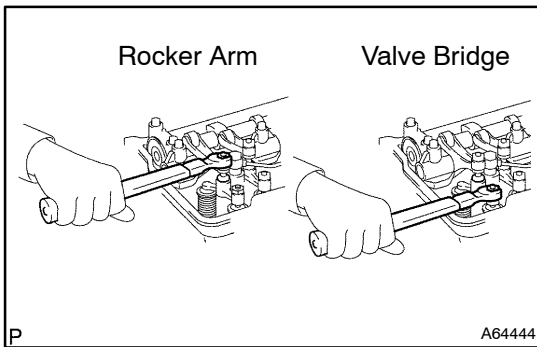
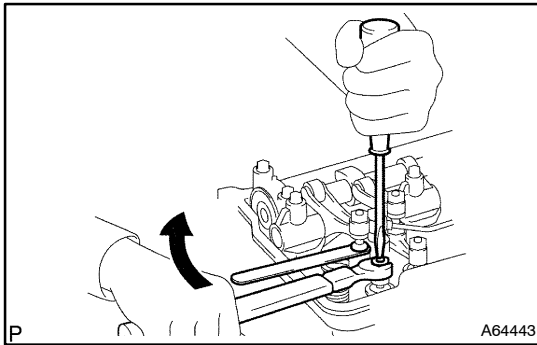
- (d) Tighten the adjusting screw of the valve bridge until the feeler gauge does not move.
- (e) While loosening the adjusting screw of the valve bridge gradually, adjust the valve clearance. Tighten the lock nut of the valve bridge when the feeler gauge is felt correct.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)



HINT:

- The feeling of the feeler gauge during the clearance adjustment is the same as before.
- Do not over-loosen the adjusting screw so that this will cause the valve bridge to come off from the valve stem. The feeler gauge may have excessive clearance between the adjusting screw of the valve bridge and the valve. This does not allow the correct adjustment.
- The adjustable valve clearance, when either the No. 1 or No. 4 piston is at the TDC of the compression stroke, is shown in the following chart. After completing the valve clearance adjustment when the No. 1 piston is at the TDC of the compression stroke, turn the crankshaft one complete revolution and make the No. 4 piston be at the TDC of the compression stroke (The arrow printed on the camshaft points down and the underline is horizontal) and adjust the rest of the valve clearances.

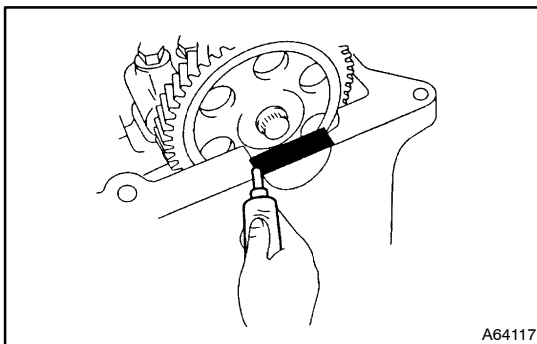


- (f) Finally, tighten all the lock nuts of the rocker arm and the cross head with the following torque and make sure that they are all tight (the nuts do not turn).

HINT:

Never over-tighten them with more than the following torque.

Torque: 28 N·m (280 kgf·cm, 20 ft·lbf)

**5. INSTALL CYLINDER HEAD COVER SUB-ASSY**

- Clean the matching face of the cylinder head and cover.
- Apply seal packing to the front and rear ends of the cylinder head, and install it onto the cylinder head within 20 minutes.

Seal packing: Part No. 08826-00080 or equivalent

Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.

- Tighten the mounting bolt of the head cover through the silent block and fix the head cover on the cylinder head.

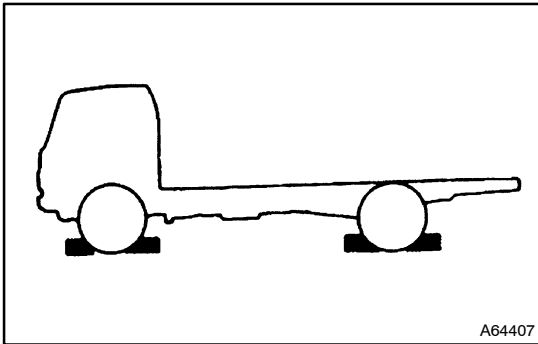
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

6. INSTALL INTAKE AIR CONNECTOR

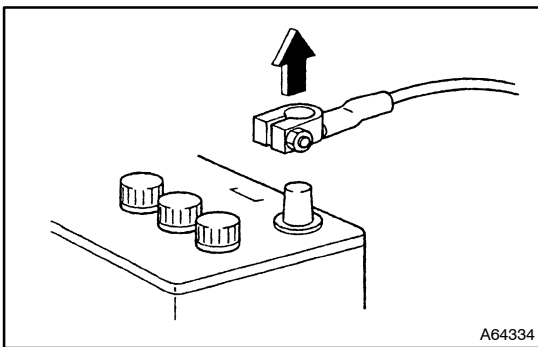
ENGINE ASSY (S05C-TB)

REMOVAL AND INSTALLATION

14173-01



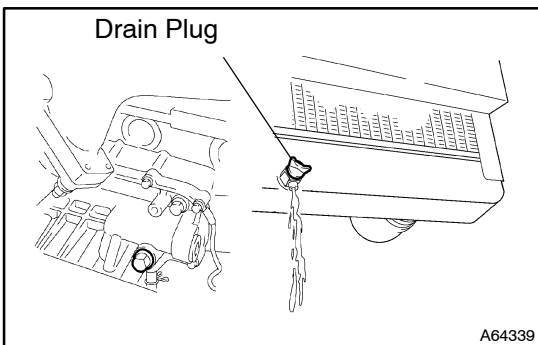
1. **BLOCK WHEEL OF VEHICLE**
 - (a) Park the vehicle on the level ground.
 - (b) Block the wheels.



2. **DISCONNECT NEGATIVE TERMINAL CABLE FROM BATTERY**

NOTICE:

Always disconnect the negative (-) terminal cable when servicing the engine.



3. **DRAIN ENGINE COOLANT**

CAUTION:

To avoid danger of burns, do not drain the coolant while the engine and radiator are still hot.

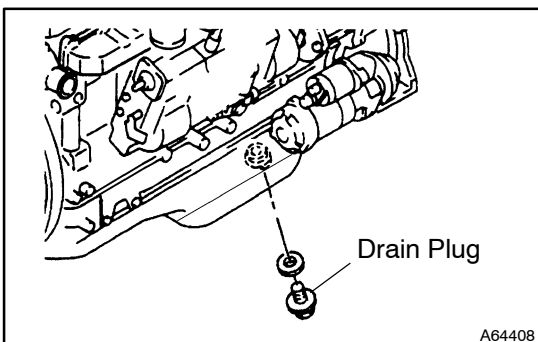
- (a) Drain the coolant from the radiator and engine.

Coolant capacity:

15.2 liters (16.0 US qts, 13.4 Imp. qts)

HINT:

The coolant can be drained more easily by removing the filler cap.



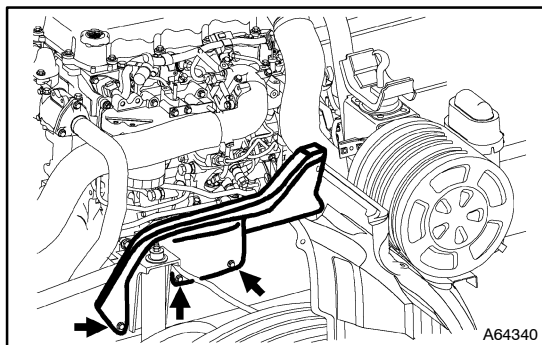
4. **DRAIN ENGINE OIL**

- (a) Drain the engine oil through the drain plug.

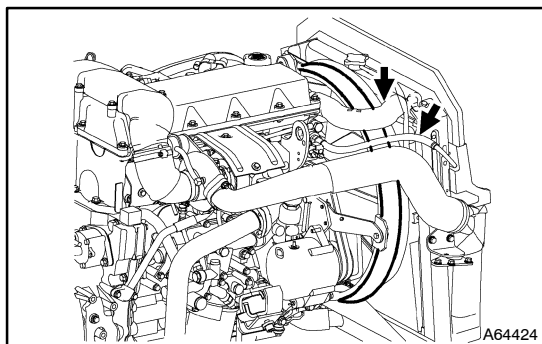
Oil capacity:

w/ oil filter: 10.6 liters (11.2 US qts, 9.3 Imp. qts)

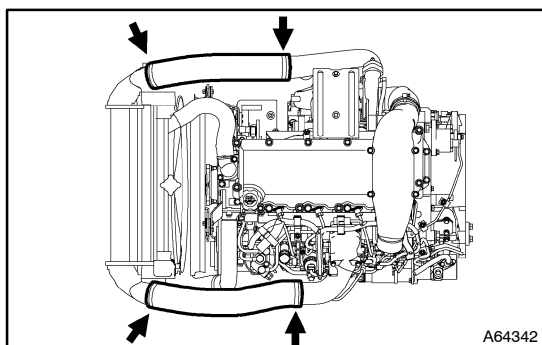
w/o oil filter: 8.6 liters (9.1 US qts, 7.6 Imp. qts)



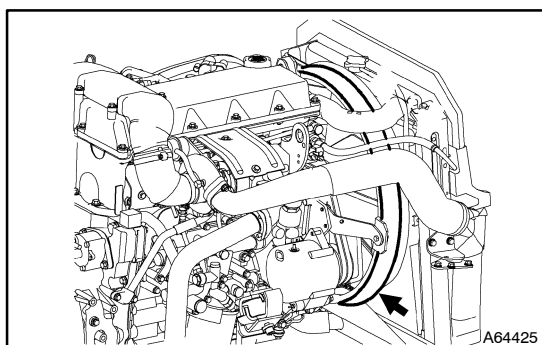
- 5. REMOVE SPLASH BOARD**
 (a) Remove the LH and RH splash boards.



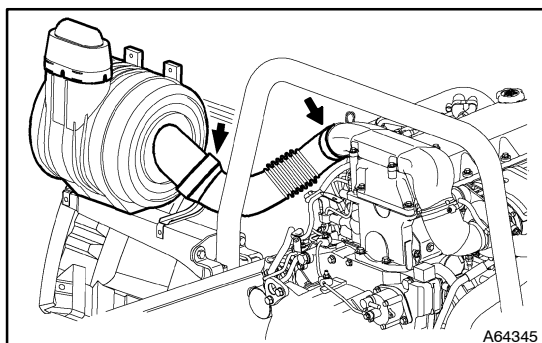
- 6. DISCONNECT RADIATOR HOSE**
7. DISCONNECT HEATER HOSE



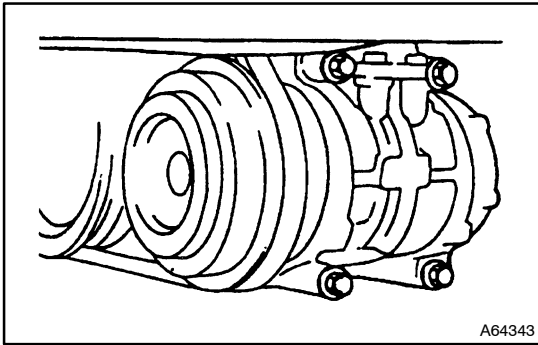
- 8. DISCONNECT INTERCOOLER HOSE**



- 9. REMOVE FAN SHROUD SEAL HOLDER**



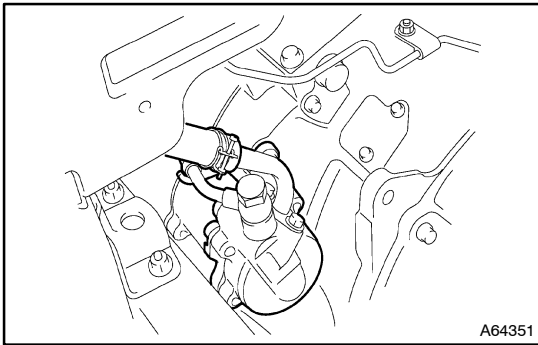
- 10. DISCONNECT AIR CLEANER HOSE**
11. REMOVE REAR CAB MOUNTING BRACKET
12. REMOVE AIR CLEANER TOGETHER WITH BRACKET

**13. DISCONNECT A/C COMPRESSOR FROM ENGINE**

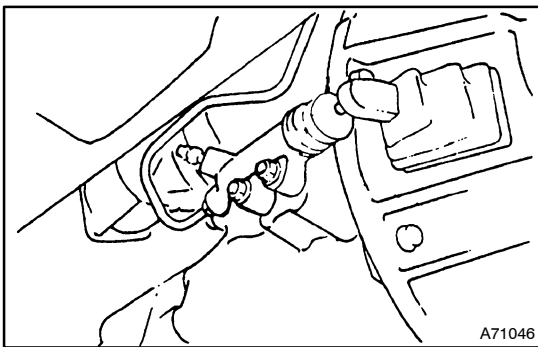
- (a) Loosen the tension pulley, and then remove the V belt.
- (b) Remove the A/C compressor.

HINT:

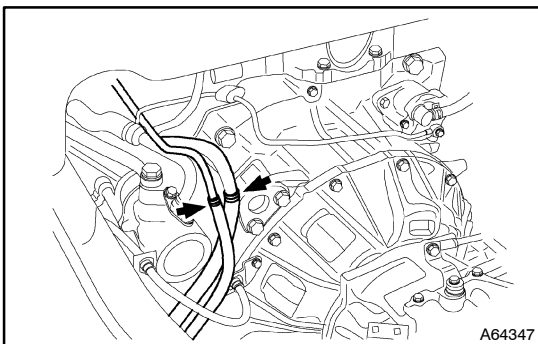
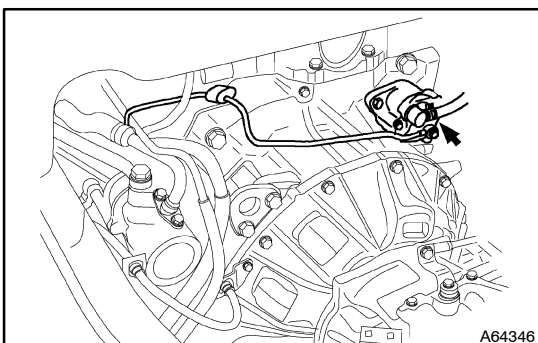
Suspend on the chassis side by rope or wire with the hose installed.

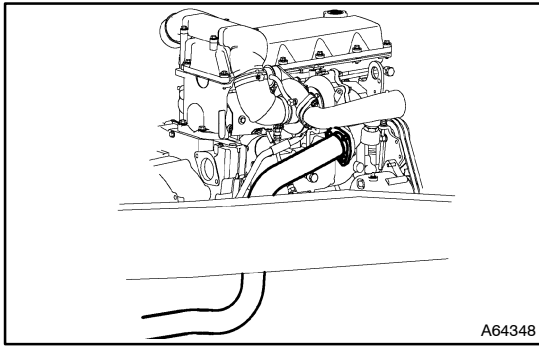
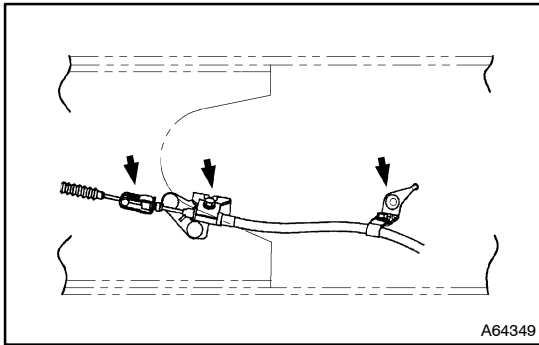
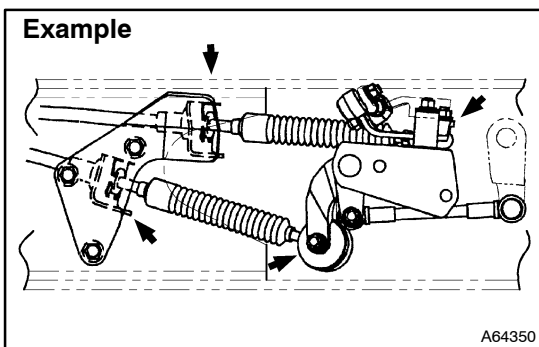
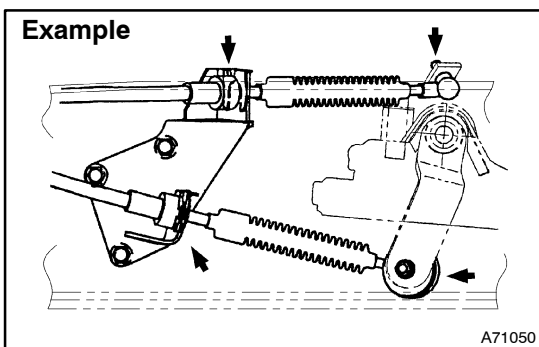
**14. DISCONNECT VANE PUMP ASSY FROM ENGINE****HINT:**

Suspend on the chassis side by rope or wire with the hose installed.

**15. REMOVE CLUTCH RELEASE CYLINDER ASSY**

- (a) Remove the bracket of the clutch hose.
- (b) Remove the release cylinder together with the lines.

**16. DISCONNECT FUEL HOSE****17. DISCONNECT VACUUM HOSE**

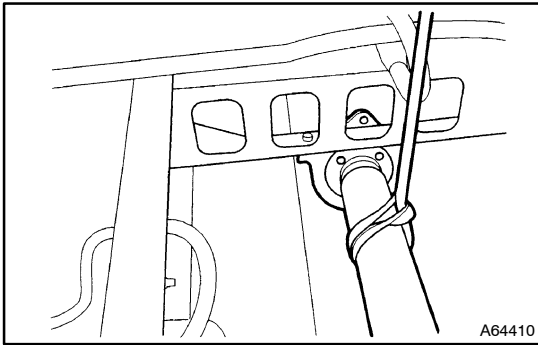
**18. REMOVE EXHAUST PIPE ASSY****19. DISCONNECT PARKING BRAKE CABLE ASSY****20. DISCONNECT TRANSMISSION CONTROL CABLE ASSY****21. DISCONNECT ELECTRICAL WIRE**

- (a) Disconnect the engine main wire harness.

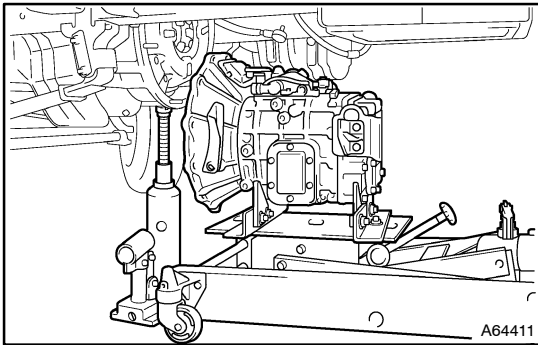
HINT:

Do not disconnect the wire harness in the engine side but the chassis side.

- (b) Disconnect the generator part wire harness.
 (c) Disconnect the starter part wire harness.
 (d) Disconnect the transmission part wire harness.
 (e) Disconnect the oil pressure switch part wire harness.



22. REMOVE PROPELLER SHAFT ASSY



23. REMOVE MANUAL TRANSMISSION ASSY

- Place a jack under the bottom of the flywheel housing.
- Place a transmission jack under the transmission.

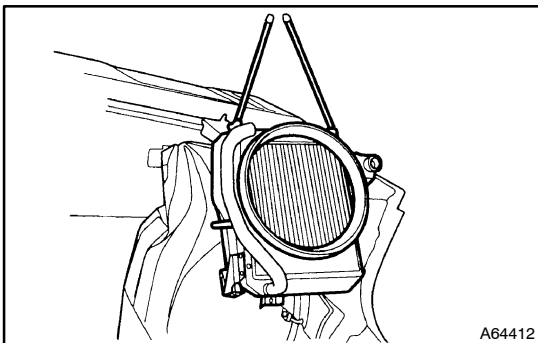
NOTICE:

The engine must be suspended with a hoist until disassembly of the transmission completes.

- Remove the mounting bolt of the mounting rubber behind the transmission.
- Remove the mounting bolt of the transmission at the clutch housing, and then remove the transmission.

HINT:

Jack up and align the transmission with the engine, and then pull the transmission straight out.

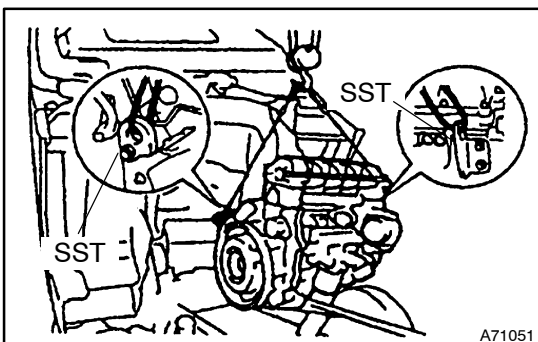


24. REMOVE RADIATOR ASSY

- Remove the 2 bolts of the radiator mounting bracket and the 2 bolts of the stay
- Remove the radiator.

HINT:

Attach a hoist to the radiator.



25. REMOVE ENGINE ASSY

- Install SST (engine hangers) to the front and rear of the engine in the correct direction.

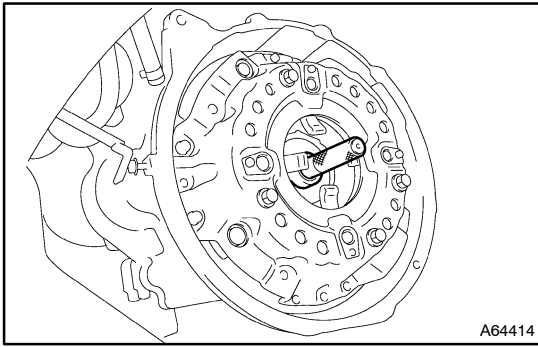
Bolt part No.:

90031-09508 (Front), 90031-19120 (Rear)

Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)

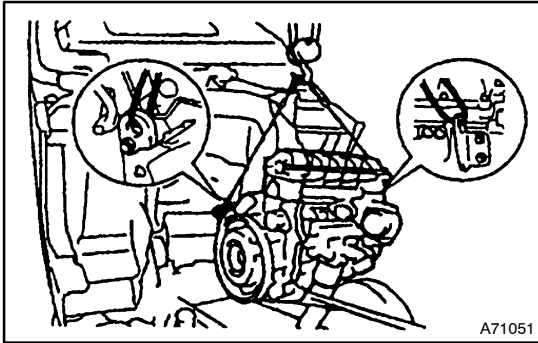
- Attach hoists to the engine hangers at the front and rear ends of the engine, and lift the engine slightly.
- Remove the engine mounting from the frame.
- Remove the engine.
- Mount the engine on a work stand.

26. REMOVE CLUTCH COVER AND DISC

**27. INSTALL CLUTCH DISC AND COVER**

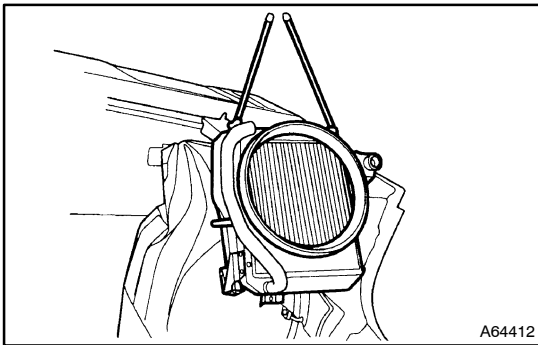
HINT:

Center the clutch disc.

**28. INSTALL ENGINE ASSY**

(a) Using a hoist, lift up the engine hangers at the front and rear ends of the engine, and install it on the frame.

(b) Tighten the engine mounting nut.

Torque: 100 N·m (1,020 kgf·cm, 74 ft·lbf)**29. INSTALL RADIATOR ASSY**

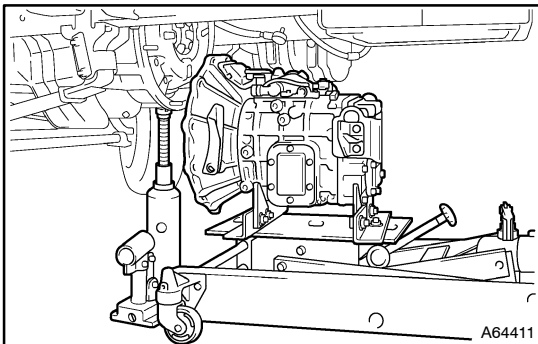
(a) After installing the radiator hose at the engine side, fix it with the clamp.

HINT:

Place a hoist on the radiator.

Torque:**18 N·m (184 kgf·cm, 13 ft·lbf) for bolts****7.5 N·m (76 kgf·cm, 63 in·lbf) for nuts**

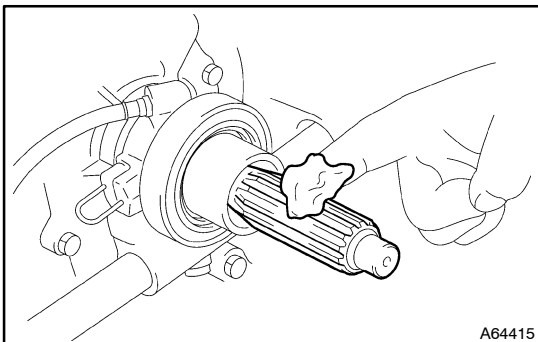
(b) After installing the radiator side fan shroud into the engine side securely, fix it with the clamp.

**30. INSTALL MANUAL TRANSMISSION ASSY**

(a) Engage the jack with the flywheel housing bottom surface.

(b) Engage the transmission jack with the transmission.

(c) Mount the transmission to the engine, and tighten the clutch housing mounting bolt.

Torque: 43.1 N·m (440 kgf·cm, 32 ft·lbf)

HINT:

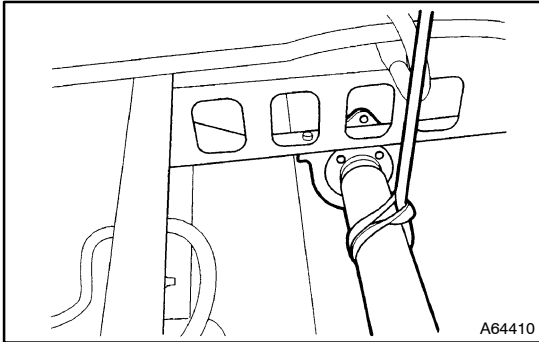
- Apply clutch spline grease to the input shaft spline.

Grease:**Part No. 08887-01706, CLUTCH SPLINE GREASE or equivalent**

- Be sure to install the transmission straight while matching the engine angle with the transmission angle, using a jack.

(d) Tighten the mounting rubber mounting nut at the back of the transmission.

Torque: 65 N·m (650 kgf·cm, 48 ft·lbf)



31. INSTALL PROPELLER SHAFT ASSY

- (a) Tighten the flange nut.

Torque:

63.9 - 85.5 N·m (650 - 870 kgf·cm, 47 - 63 ft·lbf)

HINT:

Use a hoist for the propeller shaft.

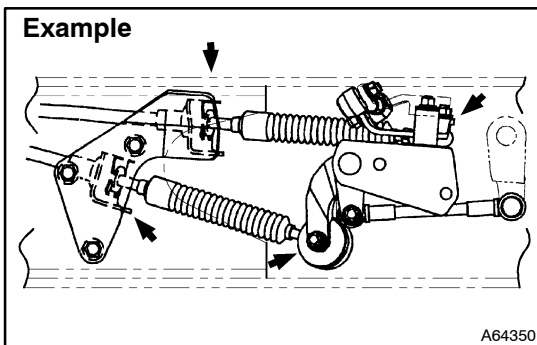
- (b) Tighten the center bearing support mounting nut.

Torque:

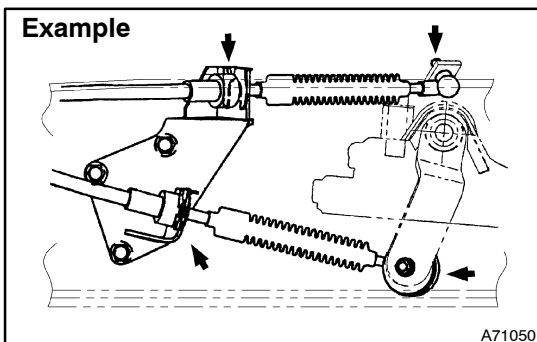
37.4 - 49.2 N·m (380 - 500 kgf·cm, 27 - 36 ft·lbf)

32. CONNECT ELECTRICAL WIRE

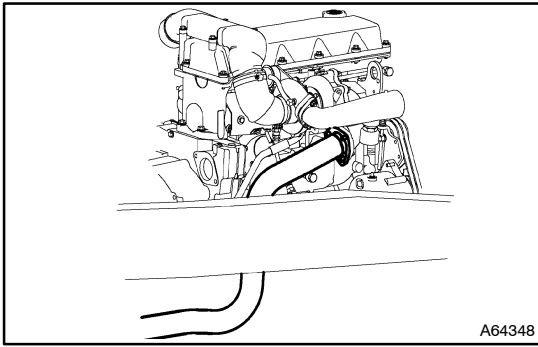
- (a) Connect the engine main wire harness.
- (b) Connect the generator part wire harness.
- (c) Connect the starter part wire harness.
- (d) Connect the transmission part wire harness.
- (e) Connect the oil pressure switch part wire harness.



33. CONNECT TRANSMISSION CONTROL CABLE ASSY



34. CONNECT PARKING BRAKE CABLE ASSY

**35. INSTALL EXHAUST PIPE ASSY****HINT:**

Be sure to use a new gasket.

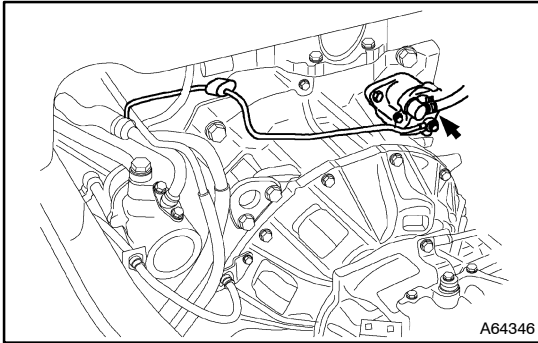
- (a) Install the exhaust pipe.

Torque: 70 N·m (700 kgf·cm, 52 ft·lbf)

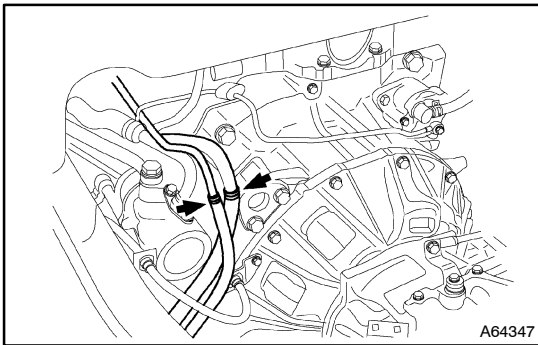
- (b) Install the muffler.

Torque: 29.5 N·m (301 kgf·cm, 22 ft·lbf)

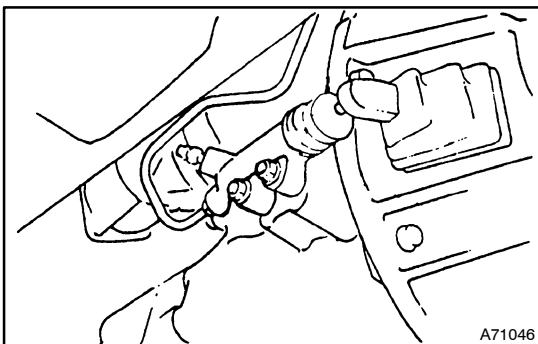
A64348

**36. CONNECT VACUUM HOSE**

A64346

**37. CONNECT FUEL HOSE**

A64347

**38. INSTALL CLUTCH RELEASE CYLINDER ASSY**

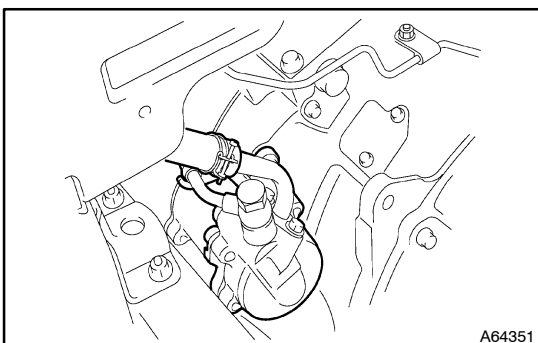
- (a) Install the release cylinder to the lines.

HINT:

Check and adjust the push rod dimension.

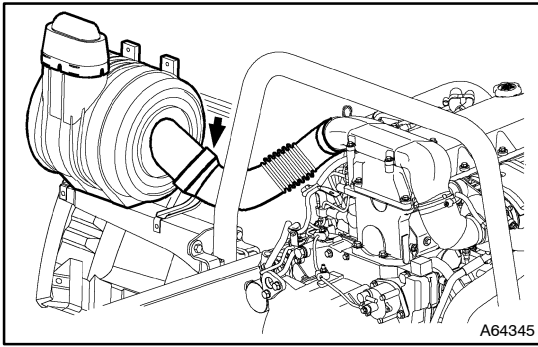
- (b) Install the clevis pin and return spring at the lever.
 (c) Install the wiring clip of the clutch hose.

A71046

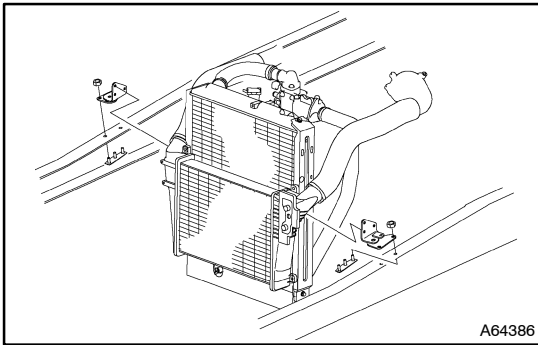
**39. INSTALL VANE PUMP ASSY**

Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

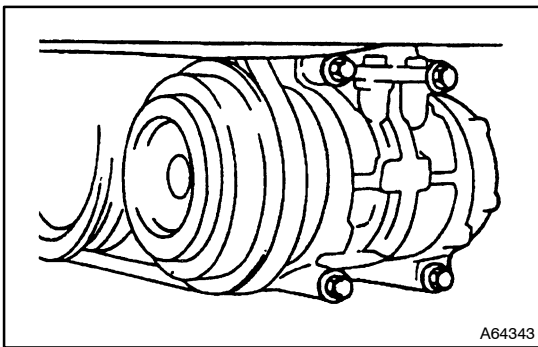
A64351

**40. INSTALL REAR CAB MOUNTING BRACKET****Torque: 55 N·m (565 kgf·cm, 41 ft·lbf)****41. INSTALL AIR CLEANER HOSE**

- (a) Install the air cleaner hose to the bracket.
- (b) Install the air cleaner with the air hose connected to the engine.

**42. FIX RADIATOR ASSY TO FRAME**

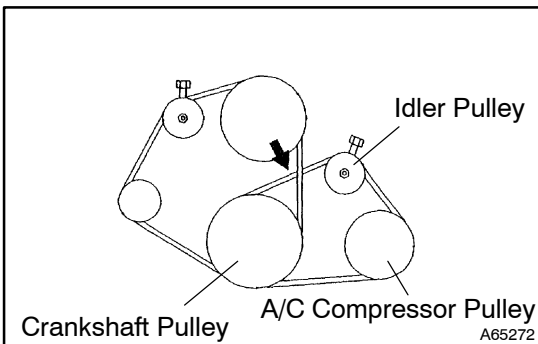
- (a) Install the radiator mounting.
- (b) Install the reservoir hose.

**43. INSTALL A/C COMPRESSOR**

- (a) Install the A/C compressor with the 4 bolts.

Torque: 29.5 N·m (300 kgf·cm, 22 ft·lbf)**HINT:**

For the coolant charging procedure (gas charging), observe the air conditioner manufacturer's instructions.



- (b) Install the V belt.

- (1) Turn the adjusting bolt until the V belt becomes tight, and then tighten the tension pulley lock nut.

Torque: 41.3 N·m (420 kgf·cm, 30 ft·lbf)

- (c) Adjust the V belt deflection.

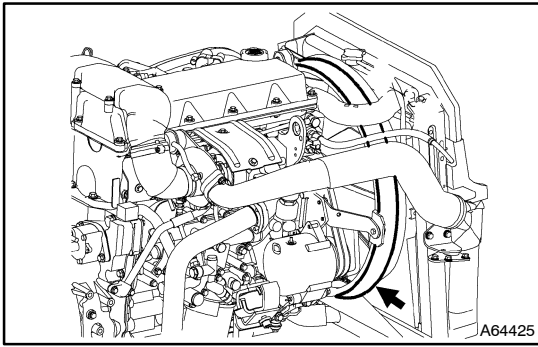
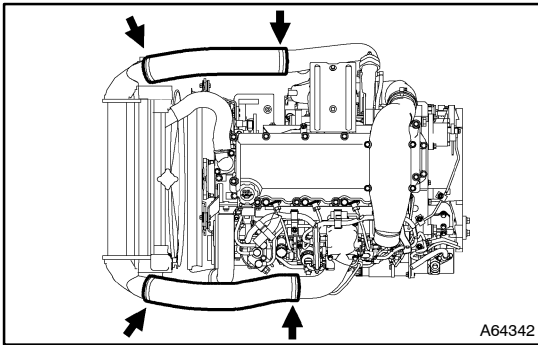
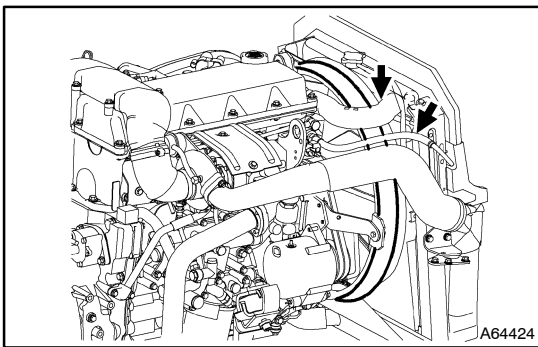
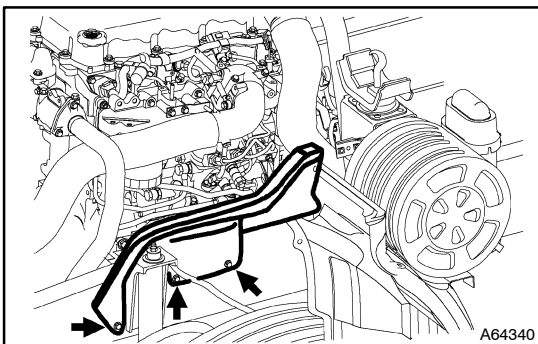
- (1) Apply a load of approx. 10 kg (22 lb) by pressing the V belt with your thumb.

V belt deflection:

New belt	7.0 – 8.5 mm (0.276 – 0.335 in.)
Used belt	8.5 – 10.0 mm (0.335 – 0.394 in.)

HINT:

- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for approx. 5 minutes and recheck the belt tension.

**44. INSTALL FAN SHROUD SEAL HOLDER****45. INSTALL INTERCOOLER HOSE****46. INSTALL RADIATOR HOSE**
47. INSTALL HEATER HOSE**48. INSTALL SPLASH BOARD**
(a) Install the LH and RH splash boards.**49. CONNECT NEGATIVE TERMINAL CABLE TO BATTERY****50. ADD ENGINE OIL**

Oil capacity: 8.6 liters (9.1 US qts, 7.6 Imp. qts)

51. ADD ENGINE COOLANT

(a) Add coolant slowly until the system is filled up to the filter opening, then install the cap securely.

Coolant capacity: 16.5 liters (17.4 US qts, 14.5 Imp. qts)

HINT:

Trapped air in the cooling system can cause overheating.

52. BLEED FUEL (See page 11-156)**53. INSPECT FOR ENGINE COOLANT LEAKS**

- 54. INSPECT FOR FUEL LEAKS
- 55. INSPECT FOR EXHAUST GAS LEAK

ENGINE COMPONENTS PARTS (S05C-TB)

140NF-03

REMOVAL AND INSTALLATION

1. PREPARATION

- (a) Clean the engine.
 - (1) Cover the openings with tape.
 - (2) Using a steam cleaner, clean the engine.

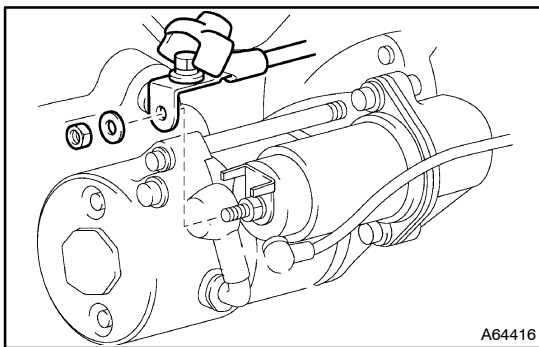
NOTICE:

Do not apply steam directly to the electrical component (generator, starter, etc.).

- (b) Mount the engine on a work stand.

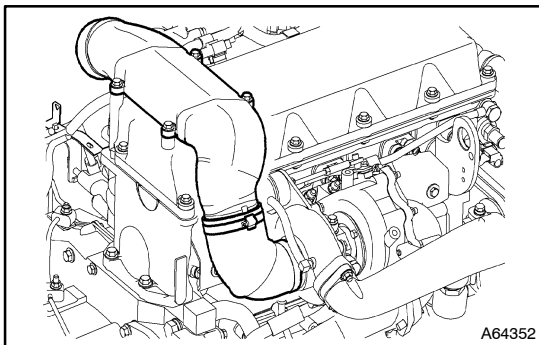
2. REMOVE ELECTRICAL WIRE ASSY

- (a) Remove the clip of the wire harness.
- (b) Disconnect the negative (-) terminal of the battery.
- (c) Disconnect the electrical unit, switch and sensor.



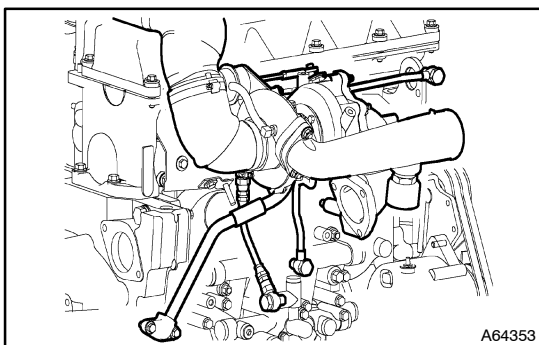
3. REMOVE STARTER ASSY

- (a) Put alignment marks on the harness and the starter terminal, and then remove the harness.
- (b) Remove the starter from the engine.

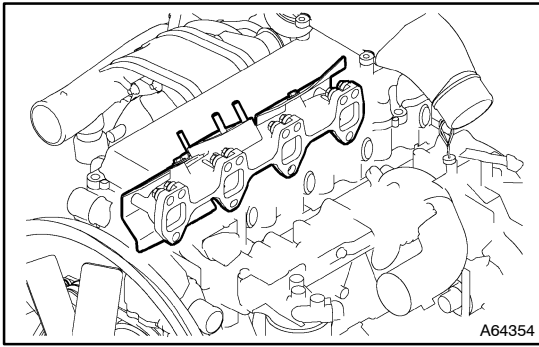


4. REMOVE TURBOCHARGER ASSY

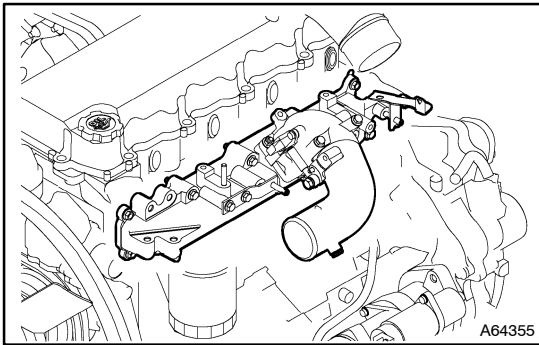
- (a) Remove the insulator.
- (b) Remove the suction pipe.
- (c) Remove the intake pipe.



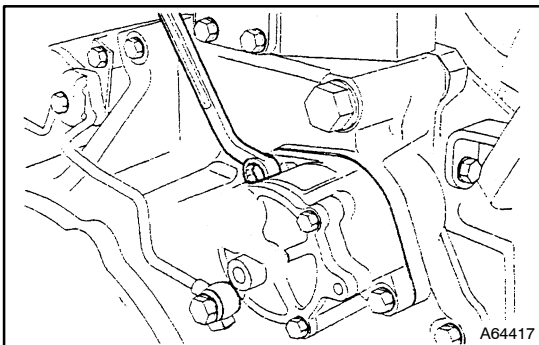
- (d) Remove the oil pipe.
- (e) Remove the water pipe.
- (f) Remove the exhaust pipe.
- (g) Remove the 4 bolts.

**5. REMOVE EXHAUST MANIFOLD**

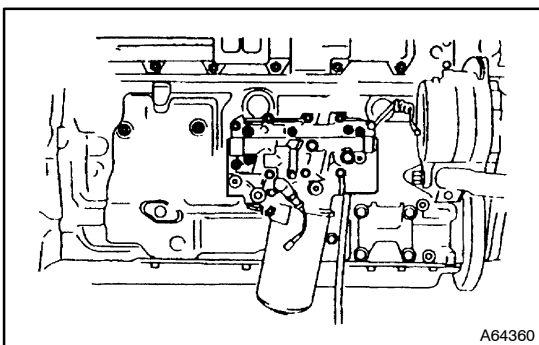
- (a) Remove the insulators.
- (b) Remove the exhaust manifold.

**6. REMOVE INTAKE PIPE****7. REMOVE INTAKE MANIFOLD**

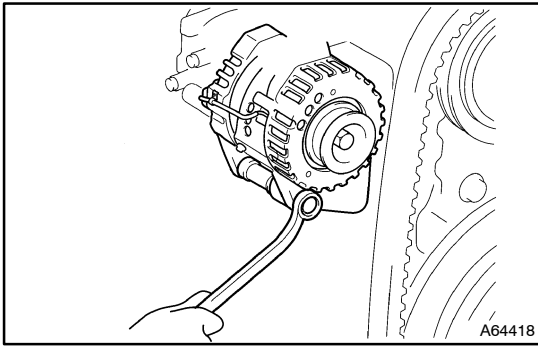
- (a) Remove the injection pipe and fuel filter assembly.

8. REMOVE COMMON RAIL ASSY (See page 11-169)**9. REMOVE SUPPLY PUMP ASSY (See page 11-163)****10. REMOVE VACUUM PUMP ASSY**

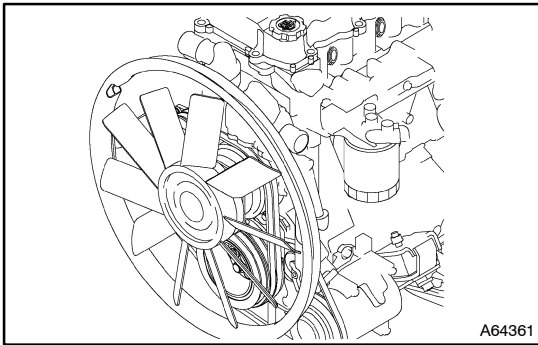
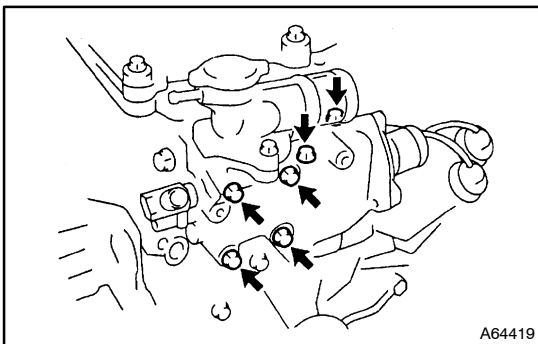
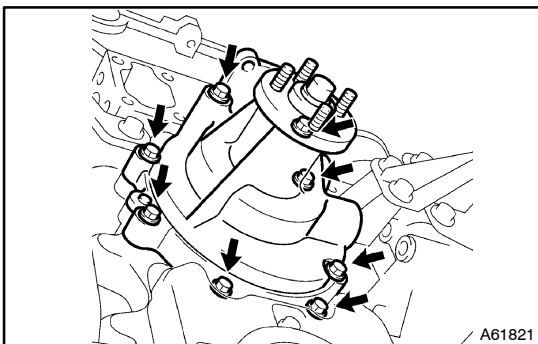
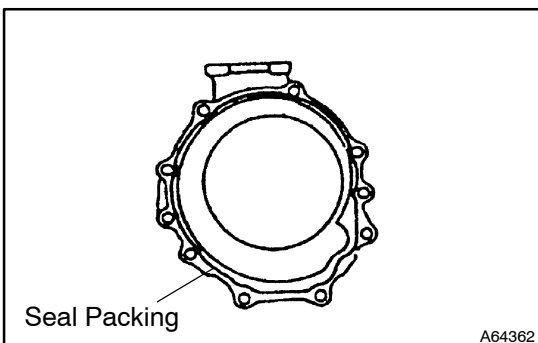
- (a) Remove the vacuum lines.
- (b) Remove the 2 bolts, vacuum pump and 2 O-rings.

**11. REMOVE OIL FILTER SUB-ASSY (See page 17-45)****12. REMOVE OIL COOLER ASSY**

- (a) Remove the oil lines.
- (b) Remove the oil cooler.

**13. REMOVE V BELT AND GENERATOR**

- (a) Loosen the V belt adjusting bolt.
- (b) Loosen the through bolt.
- (c) Remove the V belt, and then remove the generator.

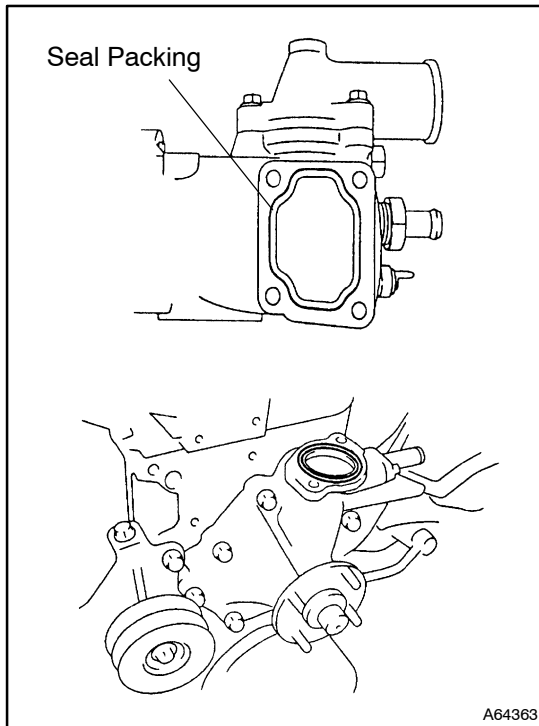
**14. REMOVE FAN****15. REMOVE FLUID COUPLING ASSY****16. REMOVE FAN PULLEY****17. REMOVE THERMOSTAT CASE****18. REMOVE WATER PUMP ASSY****19. INSTALL WATER PUMP ASSY**

- (a) Clean the cylinder block mounting surface of the water pump.
- (b) Apply seal packing to the water pump and install it onto the cylinder block within 20 minutes.

Seal packing: Part No. 08826-00100 or equivalent

Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

**HINT:**

- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
- Do not start the engine for 2 hours after the installation.

20. INSTALL THERMOSTAT CASE

- (a) Make sure that the O-ring is attached to the upper flange face of the water pump.
- (b) Clean the cylinder head mounting surface of the thermostat case.
- (c) Apply seal packing to the thermostat case and install it onto the cylinder head within 20 minutes.

Seal packing: Part No. 08826-00100 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

HINT:

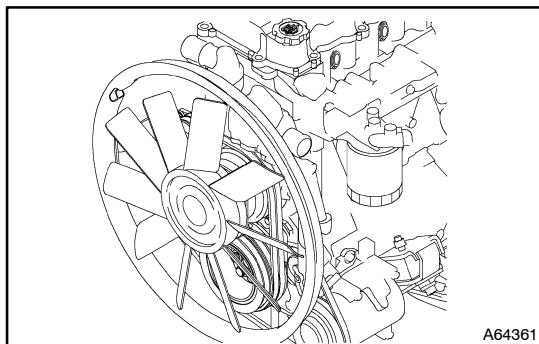
- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
 - Do not start the engine for 2 hours after the installation.
- (d) Tighten the 4 side ones of the thermostat case mounting bolts.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

- (e) Tighten the 2 upper ones of the water pump mounting bolts.

Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

- (f) Install the cooling line.

**21. INSTALL FAN PULLEY**

- (a) Install the fan pulley and fan spacer.

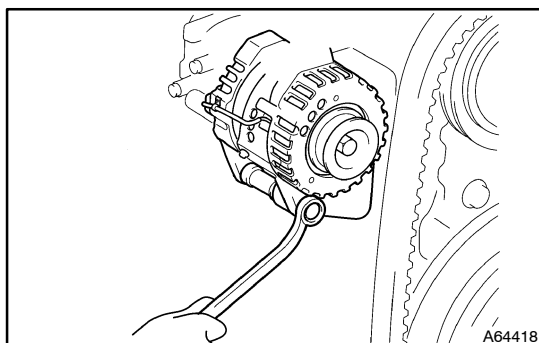
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

22. INSTALL FLUID COUPLING ASSY

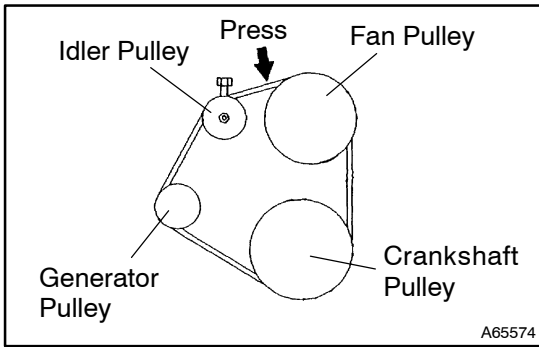
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

23. INSTALL FAN

Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

**24. INSTALL GENERATOR AND V BELT**

- (a) Attach the generator provisionally, and install the V belt.



- (b) Press the center point of the V belt with a load of approx. 98 N (10 kgf, 22 lb) and adjust the V belt deflection so that it should be within the standard value.

V belt deflection:

New belt	5.5 – 6.5 mm (0.217 – 0.256 in.)
Used belt	6.5 – 7.5 mm (0.256 – 0.295 in.)

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

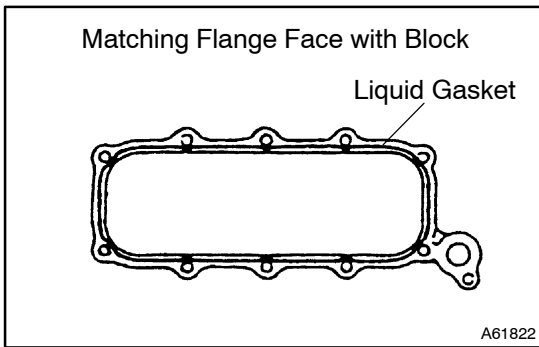
HINT:

- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for approx. 5 minutes and recheck the belt tension.

- (c) Tighten the V belt adjusting bolt.

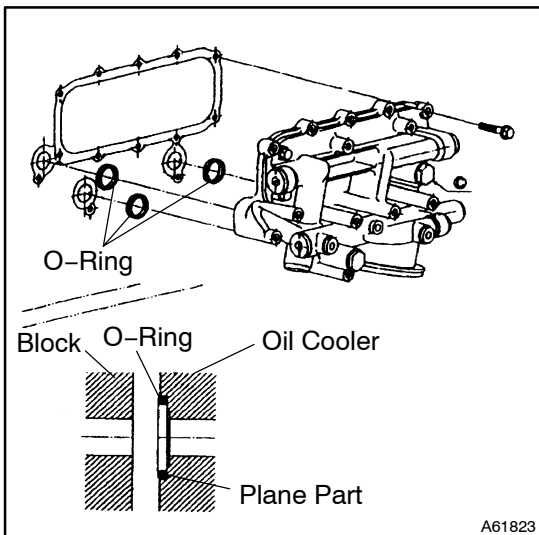
- (d) Tighten the through bolt.

Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)



25. INSTALL OIL COOLER ASSY

- (a) Clean the cylinder block mounting surface of the oil cooler.



- (b) Insert the O-ring into the O-ring groove of the oil cooler.

HINT:

Face the flat area of the O-ring toward the oil cooler for installation.

- (c) Apply seal packing to the oil cooler housing and install it onto the cylinder block within 20 minutes.

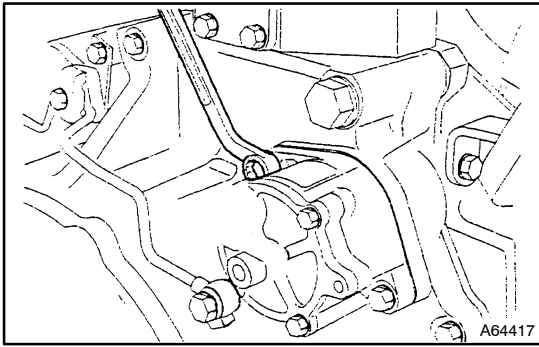
Seal packing: Part No. 08826-00100 or equivalent
Coating width: 1.5 – 2.5 mm (0.059 – 0.098 in.)

HINT:

If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.

- (d) Install the oil line.

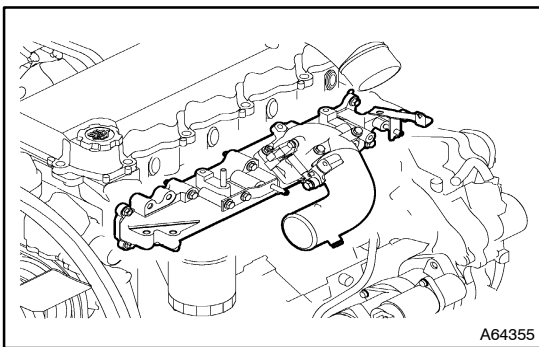
26. INSTALL OIL FILTER SUB-ASSY (See page 17-45)



- 27. INSTALL VACUUM PUMP ASSY**
Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

28. INSTALL SUPPLY PUMP ASSY (See page 11-163)

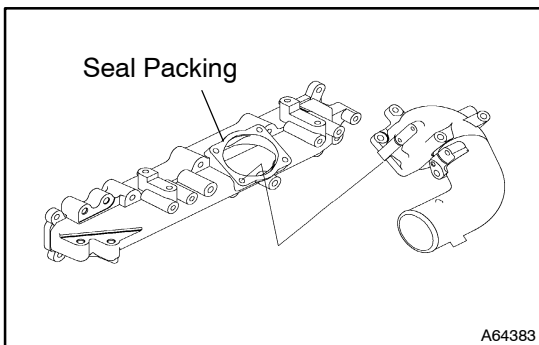
29. INSTALL COMMON RAIL ASSY (See page 11-169)



- 30. INSTALL INTAKE MANIFOLD**
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

Be sure to use a new gasket.



- 31. INSTALL INTAKE PIPE**

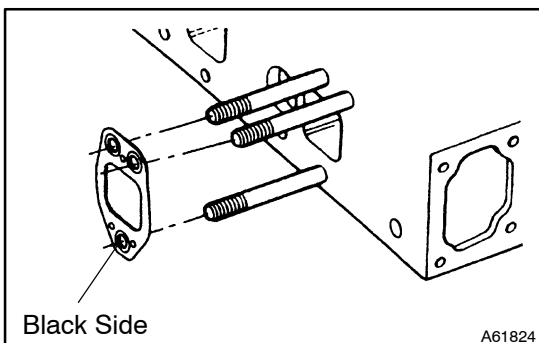
- (a) Clean the matching face of the intake manifold and intake pipe.
 (b) Apply seal packing to the intake manifold and install it onto the intake manifold within 20 minutes.

Seal packing: Part No. 08826-00080 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

HINT:

If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.

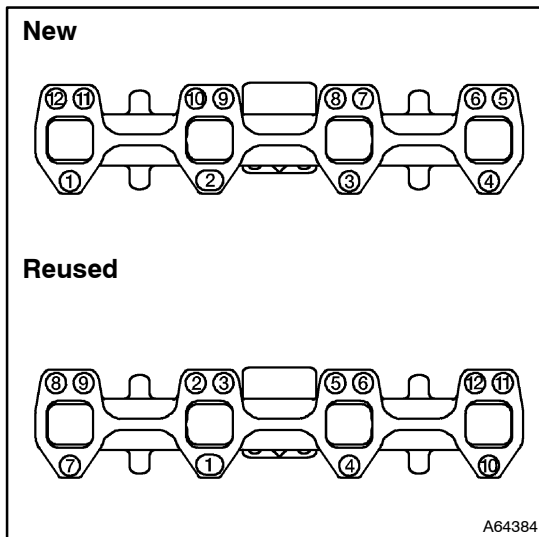


- 32. INSTALL EXHAUST MANIFOLD**

- (a) Install the exhaust manifold gasket so that the black side could face the exhaust manifold.

HINT:

Be sure to use new gaskets.



- (b) Install the exhaust manifold onto the cylinder head and tighten the inner mounting nuts, in the order shown in the illustration.

Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)

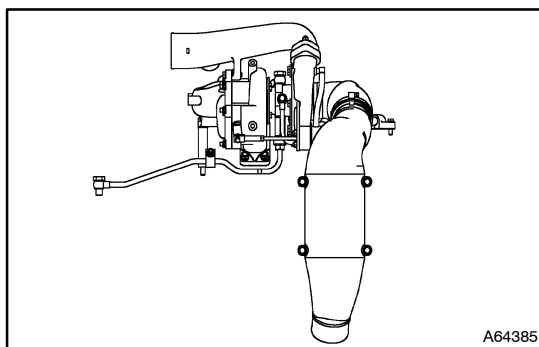
- (c) Tighten the same nuts according to the same procedure again.

Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)

HINT:

Be sure to carry out the tightening procedure in order.

- (d) Install the insulators.

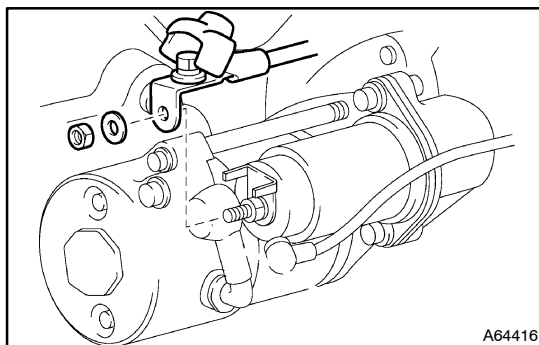


33. INSTALL TURBOCHARGER ASSY

Torque: 56 N·m (570 kgf·cm, 41 ft·lbf)

HINT:

Be sure to use new gaskets.



34. INSTALL STARTER ASSY

- (a) Tighten the bolts and nuts.

Torque: 154 N·m (1,570 kgf·cm, 114 ft·lbf)

- (b) Connect the harness at the alignment marks.

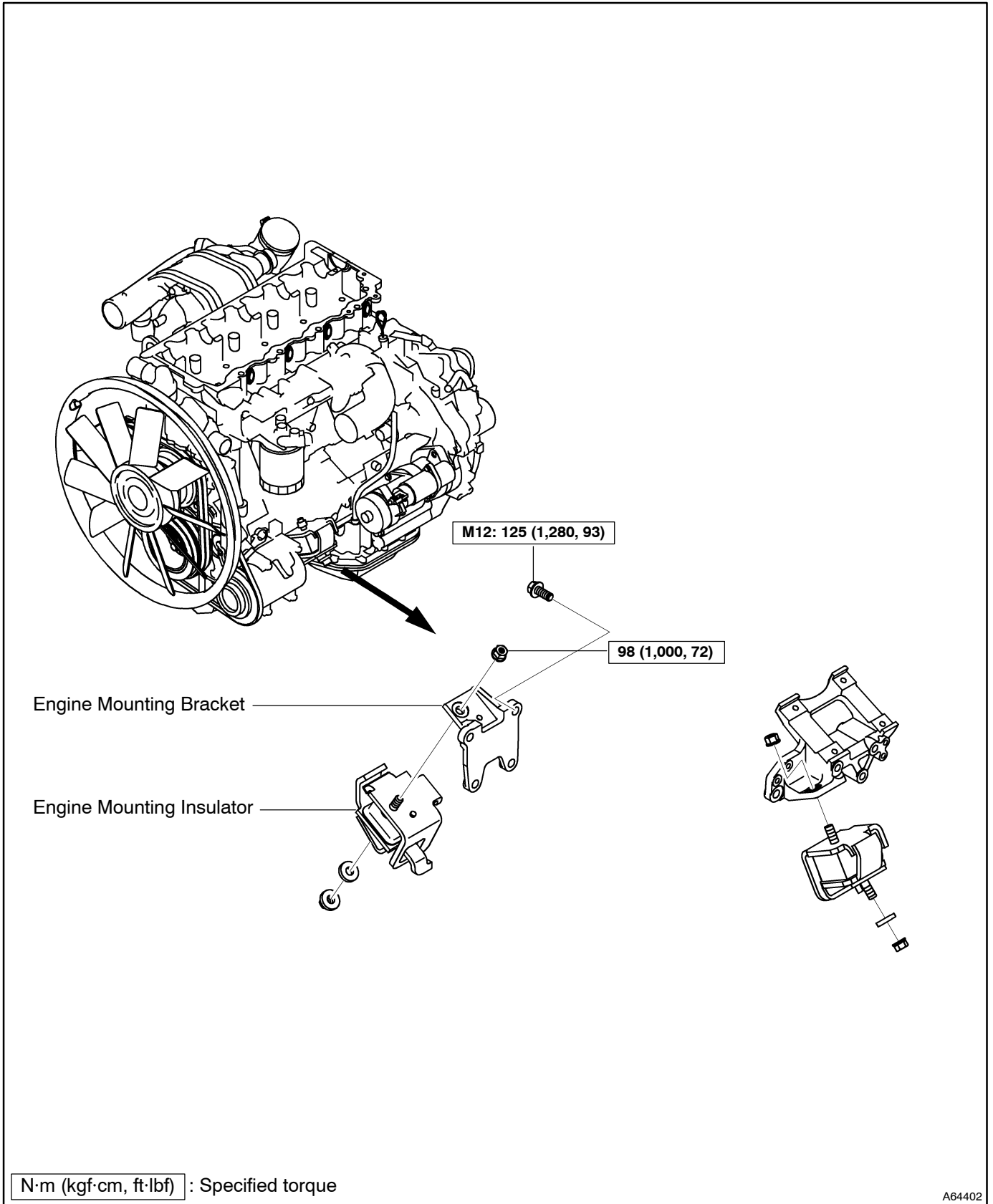
- (c) Connect the battery cable.

Torque: 13.5 N·m (137 kgf·cm, 10 ft·lbf)

35. INSTALL ELECTRICAL WIRE ASSY

ENGINE MOUNTING (S05C-TB) COMPONENTS

140ND-03

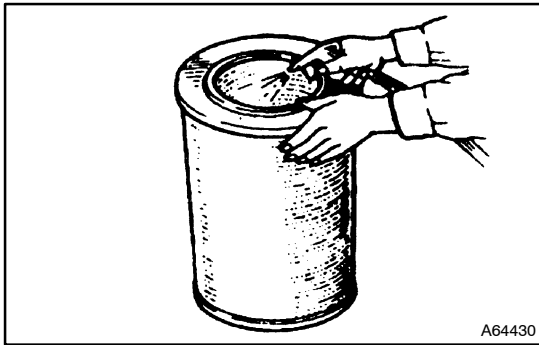


ENGINE (W04D-J)

14174-01

ADJUSTMENT

1. INSPECT ENGINE COOLANT (See page 16-81)
2. INSPECT ENGINE OIL (See page 17-49)
3. INSPECT BATTERY

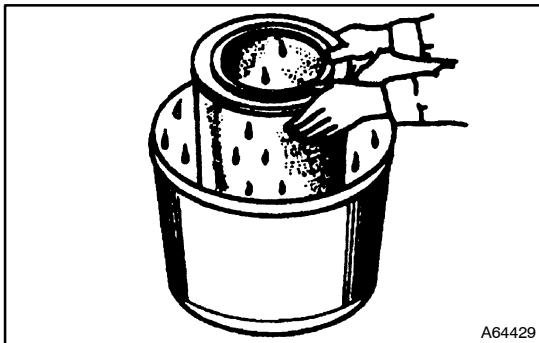


4. Non-Washable type: INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY

- (a) Visually check that the filter is not excessively dirty or oily.
- (b) To remove dry dirt or dust, use a compressed air gun (Air pressure: lower than 690 kPa (7.0 kgf/cm², 100 psi)). Always blow off from the inside of the element to the outside. Never strike or bang the filter to remove dirt or dust.

HINT:

If the compressed air is too high and the element has deformation, the engine will be in trouble.



5. Washable type: INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY

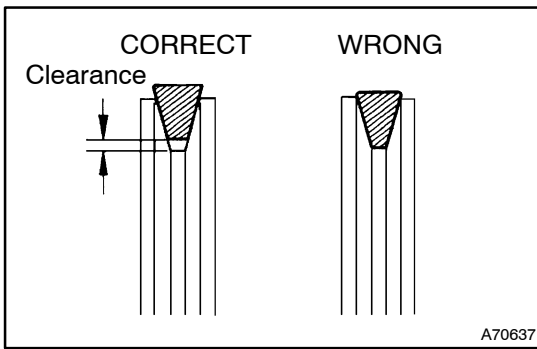
- (a) Wash the element by soaking it in a non-sudsy detergent solution for approx. 30 minutes.
- (b) Rinse the element with clean water and dry it completely with compressed air.

HINT:

- Check to see that the inside of the element is not soiled with dust etc.
- If drying the element in an oven, drying should be done at below 80°C (176°F).
- Never reinstall the element until it is completely dry.
- Make sure that the dried element is not broken and that the packing is not broken nor deformed.

NOTICE:

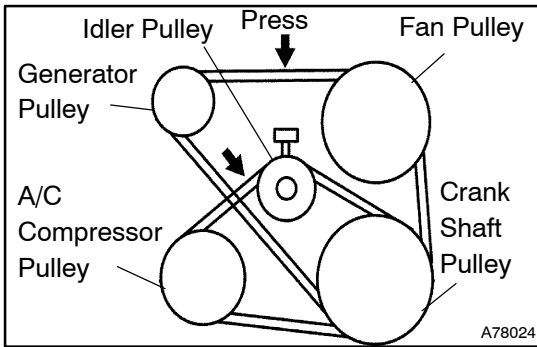
Never use kerosene, gasoline or other solvents to clean the elements. Use of these could cause the engine to overrunning of the engine and damage the engine.



6. INSPECT V BELT

- (a) Visually check the belt for cracks, oiliness or wear. Check that the belt does not touch the bottom of the pulley groove.

If necessary, replace the belts as a set.



- (b) Measure the belt deflection by pressing on the belt at the points indicated in the illustration with 98 N (10 kgf, 22 lbf) of pressure.

Deflection:

Generator belt		10.0 – 15.0 mm (0.394 – 0.591 in.)
A/C belt	New belt	7.0 – 8.5 mm (0.276 – 0.335 in.)
	Used belt	8.5 – 10.0 mm (0.335 – 0.394 in.)

- (c) Reference:

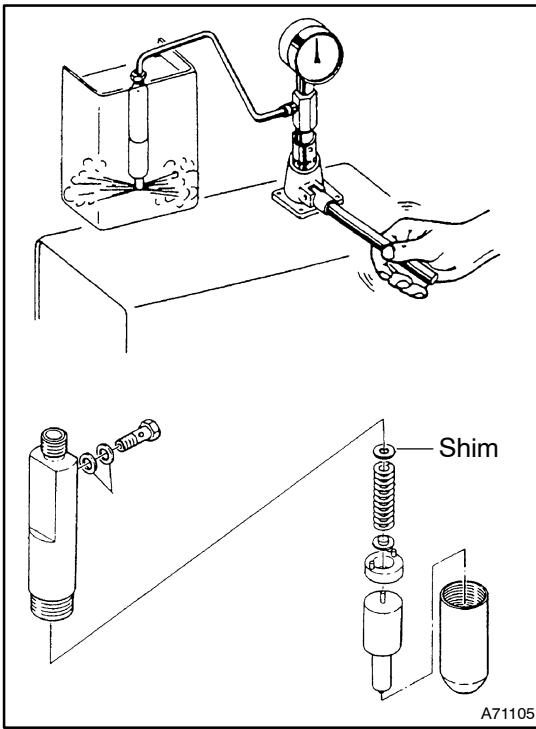
Using a belt tension gauge, measure the belt tension.

Tension:

New belt	374 – 471 N (38 – 48 kgf, 84 – 106 lb)
Used belt	275 – 373 N (28 – 38 kgf, 62 – 84 lb)

HINT:

- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.



7. ADJUST INJECTION PRESSURE

- (a) Connect the nozzle holder with a nozzle tester and move lever at the rate of about 50 to 60 times per minute.

1st opening pressure (with new parts):

21.6 – 22.6 MPa

(220 – 230 kgf/cm², 3,130 – 3,272 psi)

1st opening pressure (with reused parts):

21.6 – 22.4 MPa

(220 – 228 kgf/cm², 3,130 – 3,243 psi)

NOTICE:

- **Diesel fuel is flammable.**
This nozzle adjusting should be done in a well ventilated room and away from any open flames or electric sparks.
- **The spray must always be covered.** Keep your face and body away from the spray. This is because of the risk of fuel oil getting in your eyes or passing into your body.

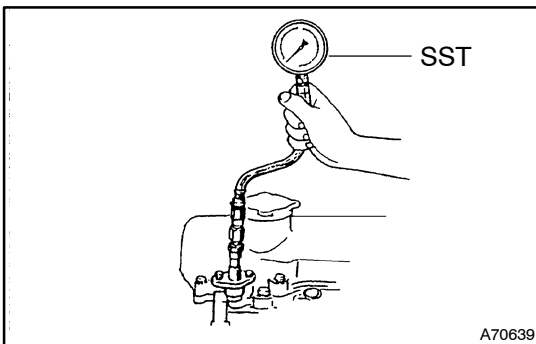
If the injection pressure is not as specified, change the shim.

8. INSPECT CYLINDER COMPRESSION PRESSURE

HINT:

If the power is short, the oil consumption is excessive, and the fuel economy is poor, measure the compression pressure.

- (a) Allow the engine to warm up to the normal operating temperature.
- (b) Remove the injection pipes.



- (c) Check the compression pressure.

NOTICE:

When measuring each compression pressure, the other 3 injection nozzles must be installed in the cylinder head.

- (1) Remove the injection nozzle.
- (2) Install the gasket and SST (attachment) to the injection nozzle hole with the adapter and bolt.

SST 09408-1041, 09552-1070

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

- (3) Connect SST (compression gauge) to the SST (attachment).

SST 09992-00025 (09992-00211)

- (4) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain the engine revolution of 280 rpm or more.

- (5) Repeat steps (2) through (4) for each cylinder.

NOTICE:

This measurement must be done as short a time as possible.

Compression pressure:

3,540 – 3,820 kPa (36 – 39 kgf/cm², 512 – 554 psi)

Minimum pressure: 2,750 kPa (28 kgf/cm², 399 psi)

Difference between each cylinder:

290 kPa (3.0 kgf/cm², 43 psi) or less

(6) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the injector hole and repeat steps (2) through (4) for the cylinder with low compression.

- If the compression becomes high by adding oil, it shows that the piston rings and/or cylinder bore are worn or damaged.
- If the pressure remains low, a valve may be sticking or seating improperly, or there may be leakage through the gasket.

(7) Remove the SST.

SST 09992-00025 (09992-00211), 09408-1041, 09552-1070

(8) Reinstall the injector (See page 11-180).

- (d) Reinstall the injection pipes.
- (e) Reinstall the cylinder head cover.
- (f) Reinstall the intake air connector.
- (g) Start the engine and check for leaks.

VALVE CLEARANCE (W04D-J)

14175-01

ADJUSTMENT

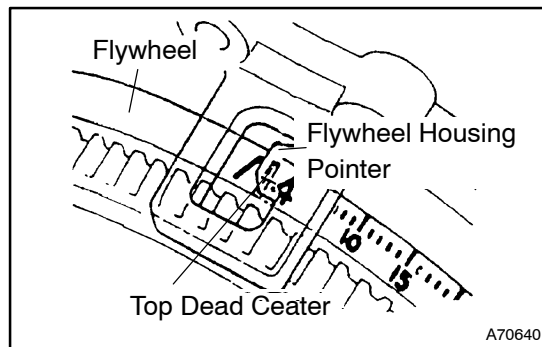
HINT:

Inspect and adjust the valve clearance when the engine is cold.

1. REMOVE CYLINDER HEAD COVER

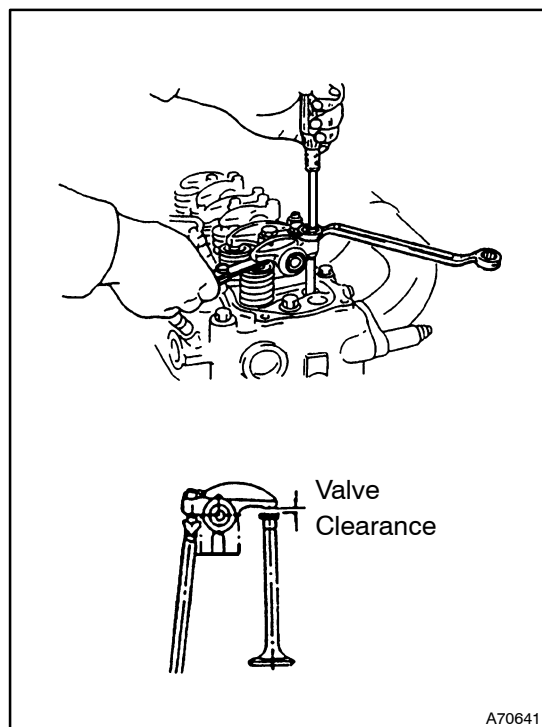
NOTICE:

Clean all dust from around the cylinder head cover before removing it prevent foreign particles from getting in.



2. ADJUST VALVE CLEARANCE

- (a) Set the No. 1 piston to top dead center on compression stroke.



- (b) With the No. 1 piston positioned at top dead center on compression stroke, adjust the No. 1 valve clearance using a thickness gauge.
- (c) The thickness gauge should move with a very slight pull.
- (d) Adjust the clearance with the adjusting screw of the rocker arm.

Tighten the lock nut.

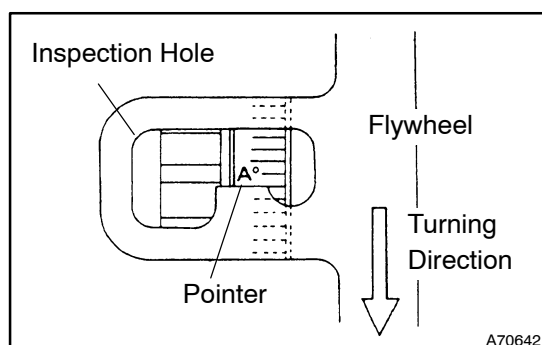
Torque: 44.1 N·m (450 kgf·cm, 32 ft·lbf)

Valve clearance:

Intake	0.35 mm (0.012 in.)
Exhaust	0.55 mm (0.022 in.)

- (e) Adjust the other valves.
- Turn the crankshaft counterclockwise 180° viewed from flywheel side. Adjust the valve clearance for each cylinder in the firing order.

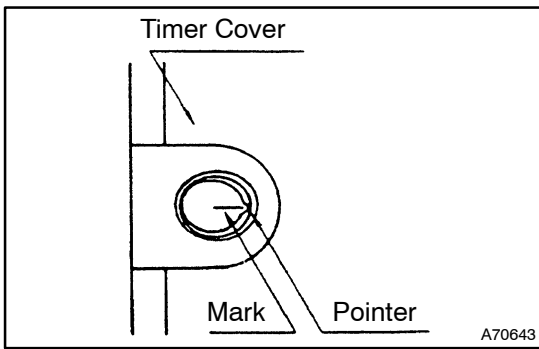
Firing order: 1 - 3 - 4 - 2 (A number of a cylinder is to be counted in order from the timing gear side)



3. INSPECT INJECTION TIMING

- (a) Turn the crankshaft counterclockwise viewed from the flywheel side to align the injection timing mark on the flywheel or crankshaft pulley damper at A° before top dead center for No. 1 cylinder on compression stroke with the pointer.

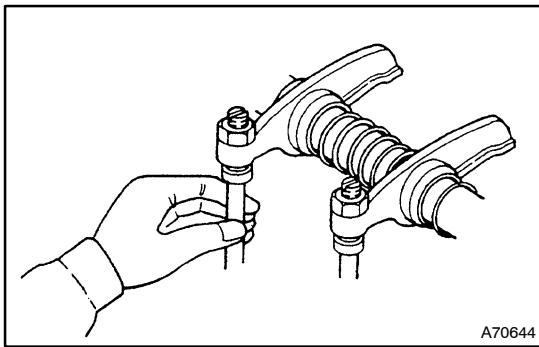
Injection timing A°: 12°



- (b) Check that the injection timing mark (the scribe line, not the notch) on the timer housing is aligned with the pointer (the scribe line) timing plate on the pump housing.
If not, adjust the injection timing.

NOTICE:

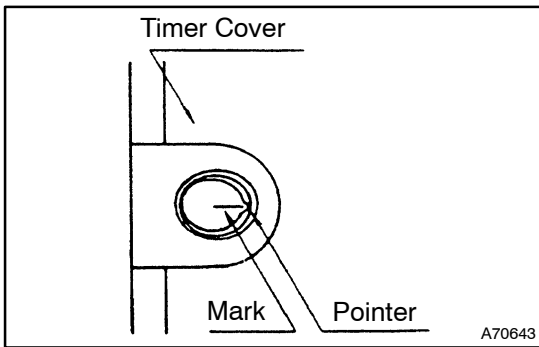
When adjusting the injection timing, refer to "11-190" in section 14-172 for details.



4. METHOD FOR DETERMINING IF NO.1 OR NO.4 PISTON IS AT TOP DEAD CENTER ON COMPRESSION STROKE

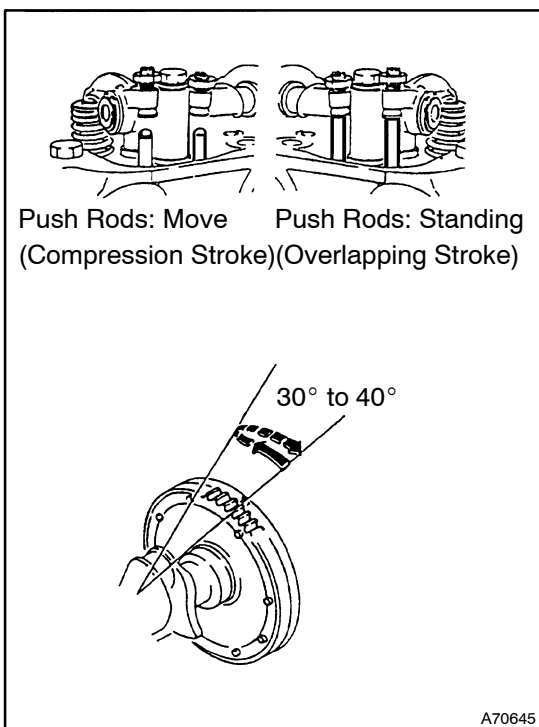
NOTICE:

- Turning the crankshaft, align the mark "1-4" on the flywheel with the pointer on the flywheel housing.
- In this position either the No. 1 or No. 4 piston is at the top dead center on compression stroke.



- (a) If both No. 1 intake and exhaust rocker arms can be moved easily by hand, the No. 1 piston is at top dead center on compression stroke.
(b) If the injection timing mark is nearly aligned with the pointer, the No. 1 piston is at top dead center on compression stroke.

If not, turn the crankshaft 1 complete revolution and align marks as above.



- (c) While locking at the push rods of No. 1 and No. 4 pistons, turn the crankshaft counterclockwise and clockwise about 30° to 40° (see left figure).

If the piston whose exhaust and inlet push rods do not move during the interval, it is at the top dead center on compression stroke.

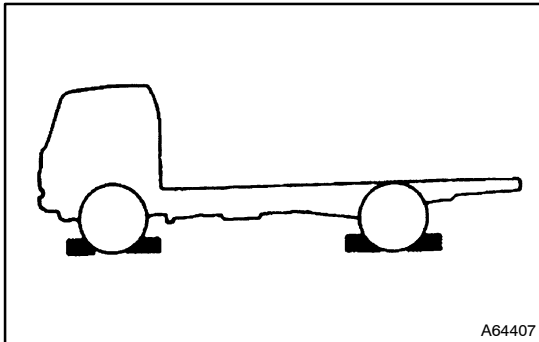
If the piston whose push rods have moved, it is at the compression of the exhaust and begun of the intake stroke (overlapping stroke).

5. INSTALL CYLINDER HEAD COVER

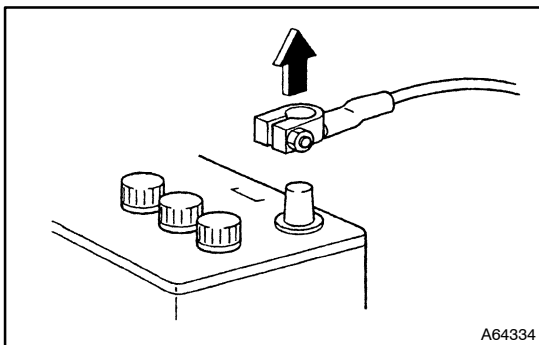
ENGINE ASSY (W04D-J)

REPLACEMENT

14178-01



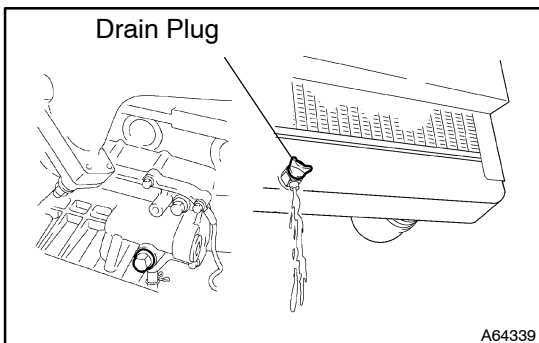
1. **BLOCK WHEEL OF VEHICLE**
 - (a) Park the vehicle on the level ground.
 - (b) Block the wheels.



2. **DISCONNECT NEGATIVE TERMINAL CABLE FROM BATTERY**

NOTICE:

Always disconnect the negative (-) terminal cable when servicing the engine.



3. **DRAIN ENGINE COOLANT**

CAUTION:

To avoid danger of burns, do not drain the coolant while the engine and radiator are still hot.

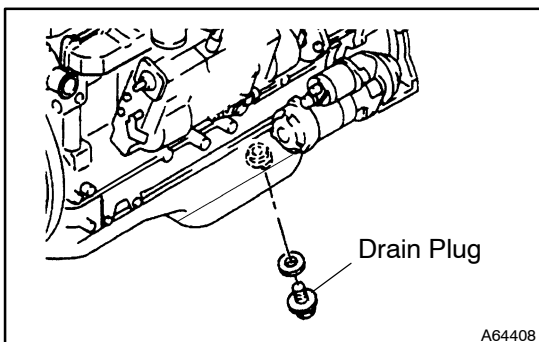
- (a) Drain the coolant from the radiator and engine.

Coolant capacity:

13.0 liters (13.8 US qts, 11.4 Imp. qts)

HINT:

The coolant can be drained more easily by removing the filler cap.



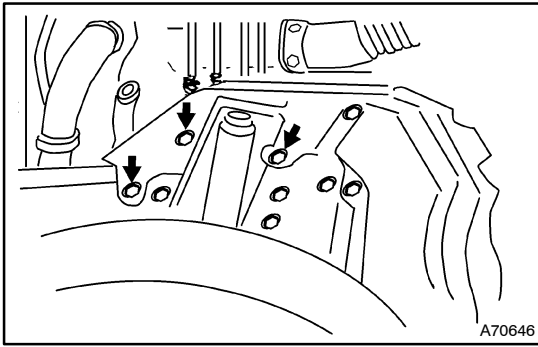
4. **DRAIN ENGINE OIL**

- (a) Drain the engine oil through the drain plug.

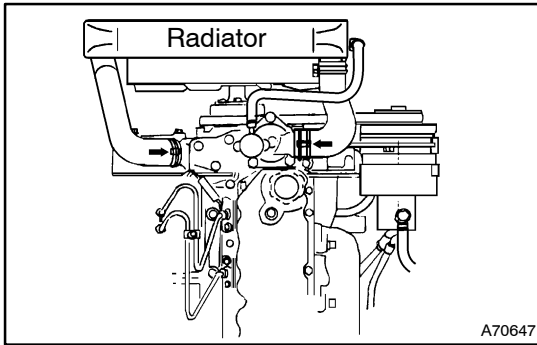
Oil capacity:

With oil filter: 8.7 liters (9.2 US qts, 7.6 Imp. qts)

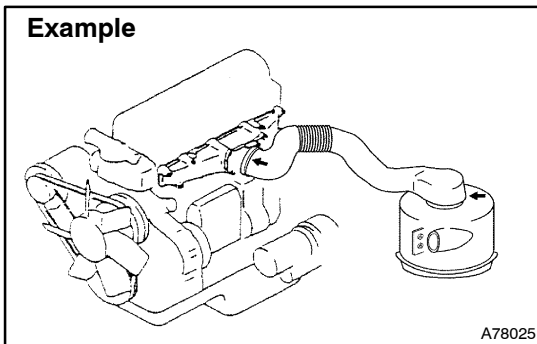
With out oil filter: 7.5 liters (8.0 US qts, 6.6 Imp. qts)



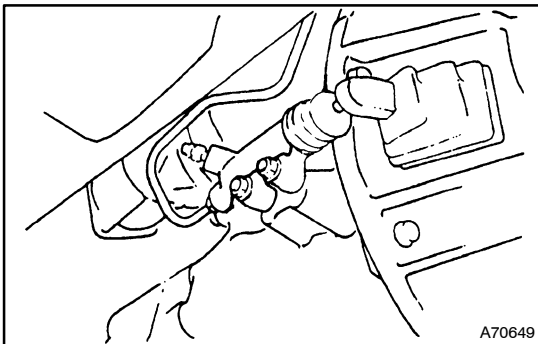
- 5. REMOVE SPLASH BOARD**
 (a) Remove the LH and RH splash boards.



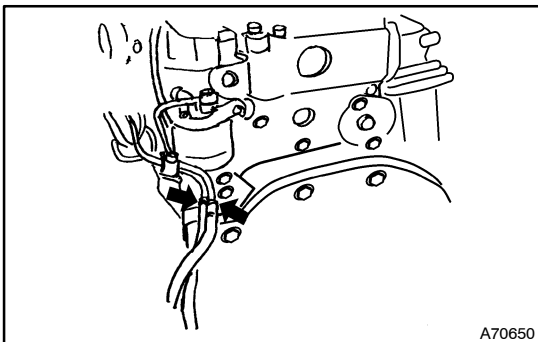
- 6. DISCONNECT RADIATOR HOSE**



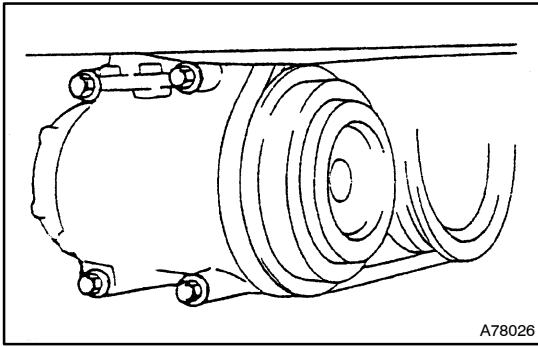
- 7. DISCONNECT AIR CLEANER HOSE**
8. REMOVE REAR CAB MOUNTING BRACKET



- 9. REMOVE CLUTCH RELEASE CYLINDER ASSY**
 (a) Remove the bracket of the clutch hose.
 (b) Remove the release cylinder together with the lines.



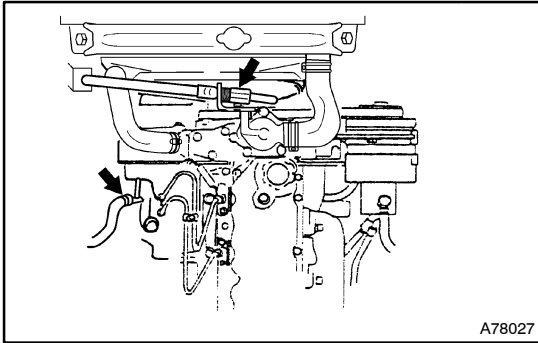
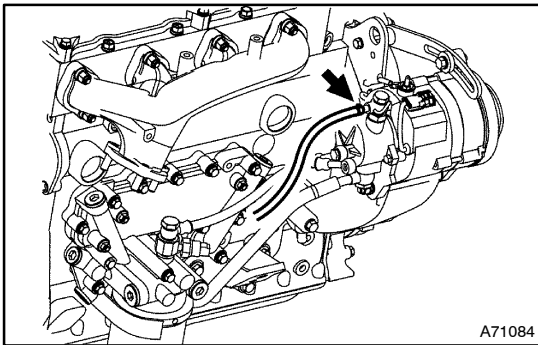
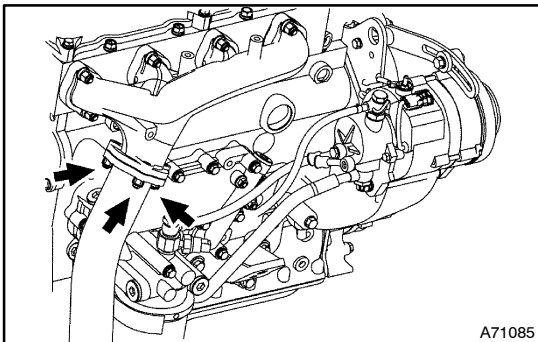
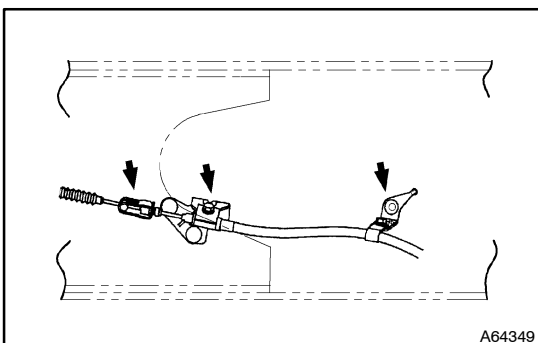
- 10. DISCONNECT FUEL HOSE**

**11. w/ A/C:****DISCONNECT A/C COMPRESSOR FROM ENGINE**

- (a) Loosen the tension pulley, and then remove the V belt.
- (b) Remove the A/C compressor.

HINT:

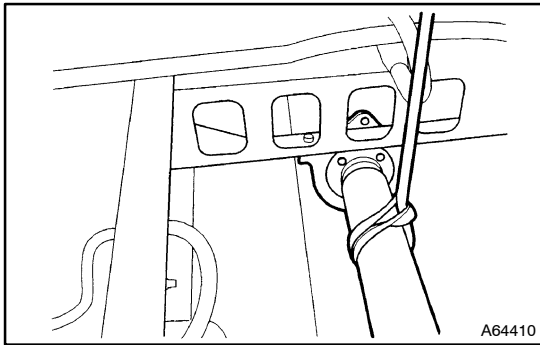
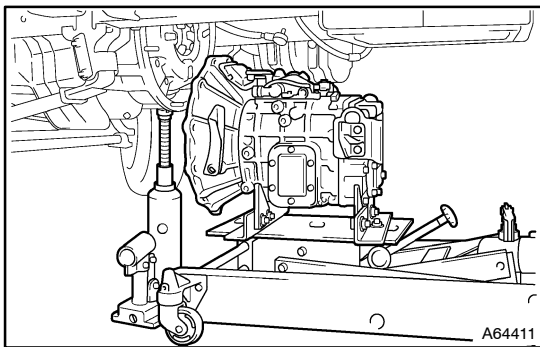
Suspend on the chassis side by rope or wire with the hose installed.

**12. w/ Power steering:****DISCONNECT POWER STEERING HOSE****13. DISCONNECT VACUUM HOSE****14. REMOVE EXHAUST PIPE ASSY****15. DISCONNECT PARKING BRAKE CABLE ASSY**

16. DISCONNECT TRANSMISSION CONTROL CABLE ASSY**17. DISCONNECT ELECTRICAL WIRE****HINT:**

Do not disconnect the wire harness in the engine side but the chassis side.

- (a) Disconnect the generator part wire harness.
- (b) Disconnect the starter part wire harness.
- (c) Disconnect the transmission part wire harness.
- (d) Disconnect the oil pressure switch part wire harness.

**18. REMOVE PROPELLER SHAFT ASSY****19. REMOVE TRANSMISSION ASSY**

- (a) Place a jack under the bottom of the flywheel housing.
- (b) Place a transmission jack under the transmission.

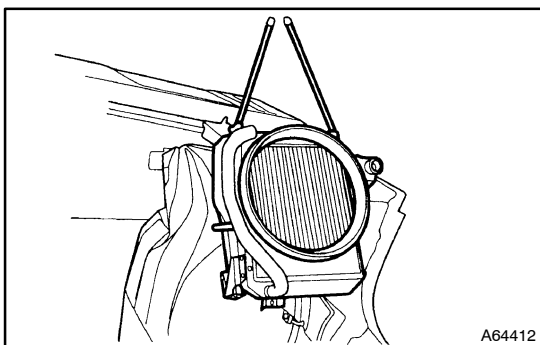
NOTICE:

The engine must be suspended with a hoist until disassembly of the transmission completes.

- (c) Remove the mounting bolt of the mounting rubber behind the transmission.
- (d) Remove the mounting bolt of the transmission at the clutch housing, and then remove the transmission.

HINT:

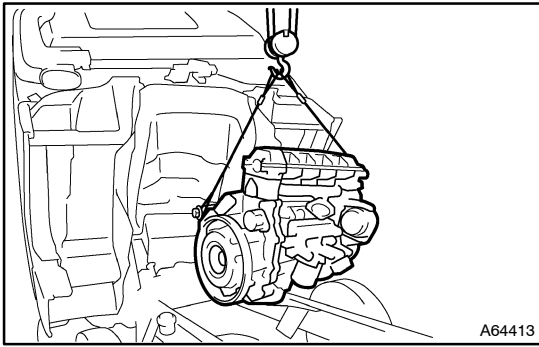
Jack up and align the transmission with the engine, and then pull the transmission straight out.

**20. REMOVE RADIATOR ASSY**

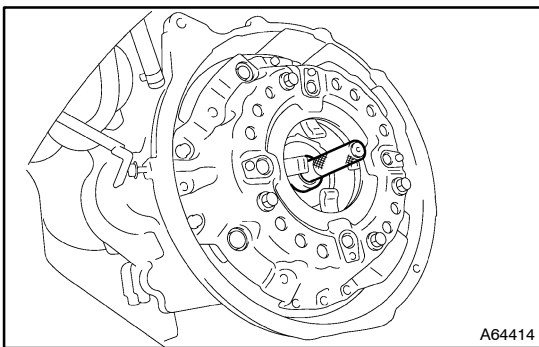
- (a) Remove the 2 bolts of the radiator mounting bracket and the 2 bolts of the stay
- (b) Remove the radiator.

HINT:

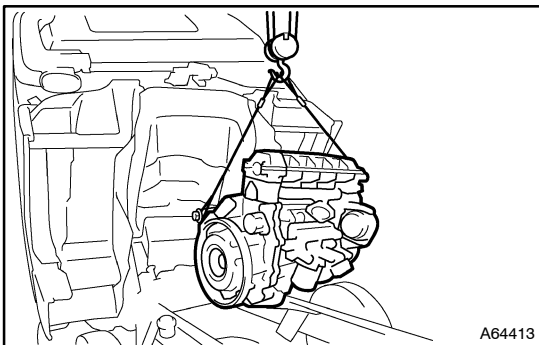
Attach a hoist to the radiator.

**21. REMOVE ENGINE ASSY**

- (a) Attach hoists to the engine hangers at the front and rear ends of the engine, and lift the engine slightly.
- (b) Remove the engine mounting from the frame.
- (c) Remove the engine.
- (d) Mount the engine on a work stand.

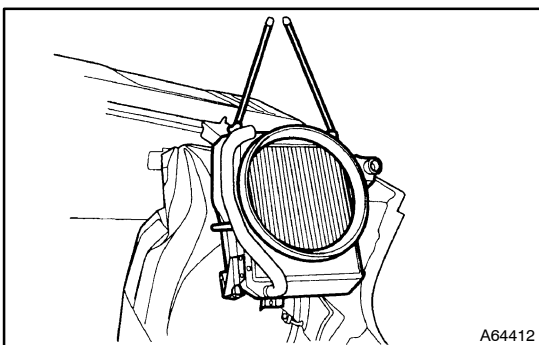
22. REMOVE CLUTCH COVER AND DISC**23. INSTALL CLUTCH DISC AND COVER****HINT:**

Center the clutch disc.

**24. INSTALL ENGINE ASSY**

- (a) Using a hoist, lift up the engine hangers at the front and rear ends of the engine, and install it on the frame.
- (b) Tighten the engine mounting nut.

Torque: 100 N·m (1,020 kgf·cm, 74 ft·lbf)

**25. INSTALL RADIATOR ASSY**

- (a) After installing the radiator hose at the engine side, fix it with the clamp.

HINT:

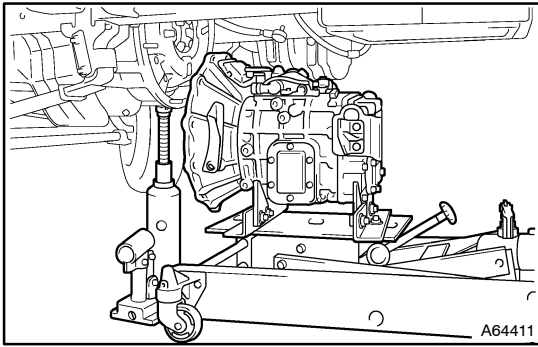
Place a hoist on the radiator.

Torque:

18 N·m (184 kgf·cm, 13 ft·lbf) for bolts

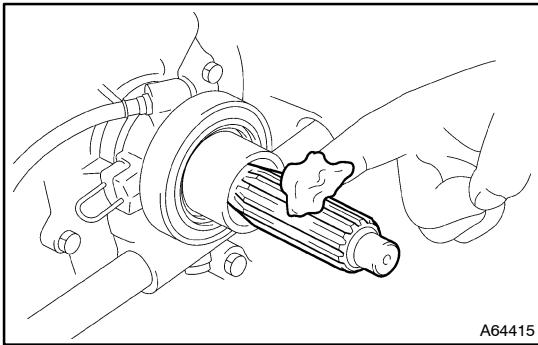
7.5 N·m (76 kgf·cm, 63 in·lbf) for nuts

- (b) After installing the radiator side fan shroud into the engine side securely, fix it with the clamp.

**26. INSTALL TRANSMISSION ASSY**

- (a) Engage the jack with the flywheel housing bottom surface.
- (b) Engage the transmission jack with the transmission.
- (c) Mount the transmission to the engine, and tighten the clutch housing mounting bolt.

Torque: 43.1 N·m (440 kgf·cm, 32 ft·lbf)

**HINT:**

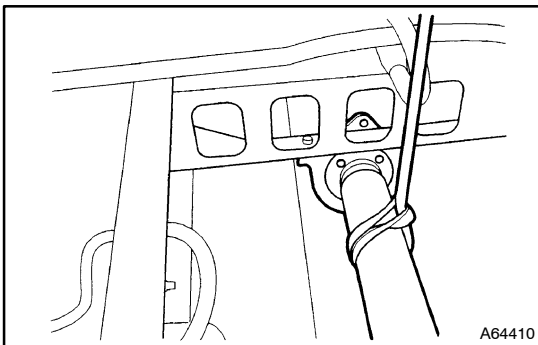
- Apply clutch spline grease to the input shaft spline.

Grease:

Part No. 08887-01706, CLUTCH SPLINE GREASE or equivalent

- Be sure to install the transmission straight while matching the engine angle with the transmission angle, using a jack.
- (d) Tighten the mounting rubber mounting nut at the back of the transmission.

Torque: 65 N·m (650 kgf·cm, 48 ft·lbf)

**27. INSTALL PROPELLER SHAFT ASSY**

- (a) Tighten the flange nut.

Torque:

63.9 - 85.5 N·m (650 - 870 kgf·cm, 47 - 63 ft·lbf)

HINT:

Use a hoist for the propeller shaft.

- (b) Tighten the center bearing support mounting nut.

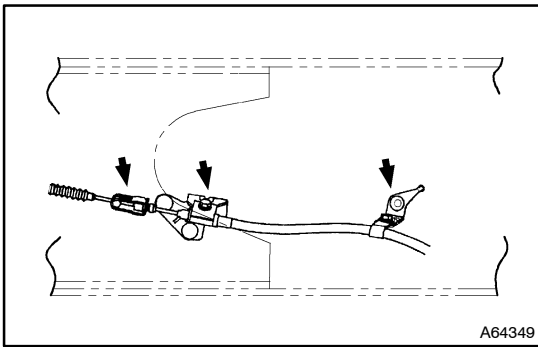
Torque:

37.4 - 49.2 N·m (380 - 500 kgf·cm, 27 - 36 ft·lbf)

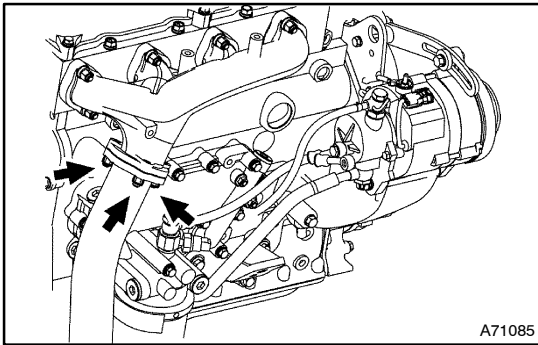
28. CONNECT ELECTRICAL WIRE

- (a) Connect the generator part wire harness.
- (b) Connect the starter part wire harness.
- (c) Connect the transmission part wire harness.
- (d) Connect the oil pressure switch part wire harness.

29. CONNECT TRANSMISSION CONTROL CABLE ASSY



30. CONNECT PARKING BRAKE CABLE ASSY

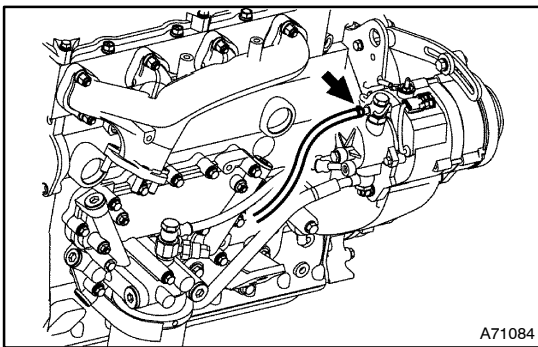


31. INSTALL EXHAUST PIPE ASSY

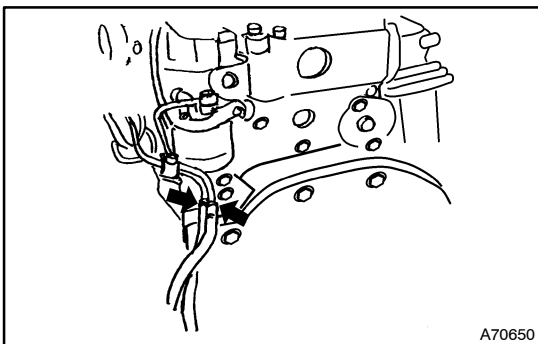
HINT:

Be sure to use a new gasket.

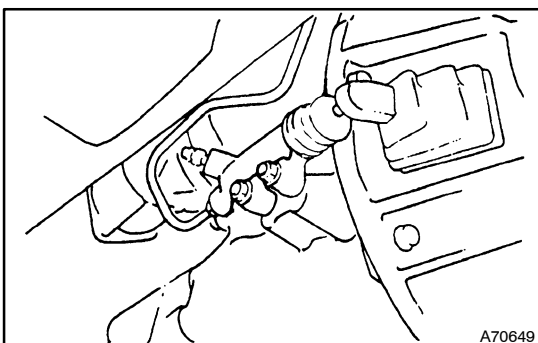
- (a) Install the exhaust pipe.
Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)
- (b) Install the muffler.
Torque: 29.5 N·m (301 kgf·cm, 22 ft·lbf)



32. CONNECT VACUUM HOSE



33. CONNECT FUEL HOSE



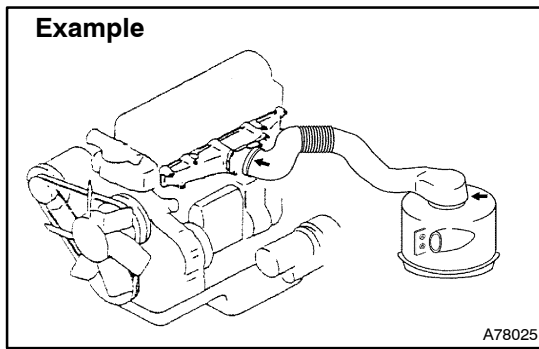
34. INSTALL CLUTCH RELEASE CYLINDER ASSY

- (a) Install the release cylinder to the lines.

HINT:

Check and adjust the push rod dimension.

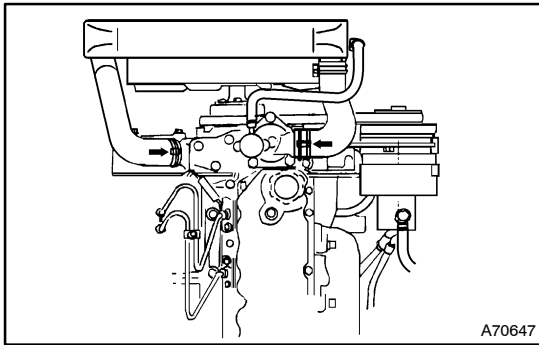
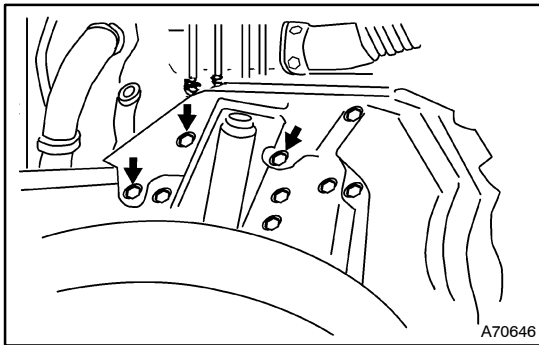
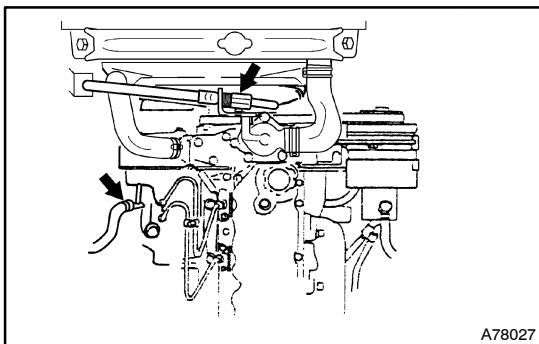
- (b) Install the clevis pin and return spring at the lever.
- (c) Install the wiring clip of the clutch hose.

**35. INSTALL REAR CAB MOUNTING BRACKET**

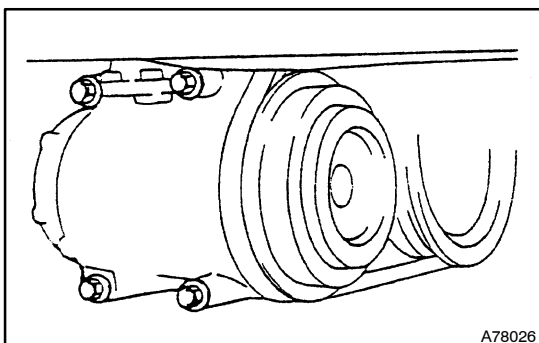
Torque: 55 N·m (565 kgf·cm, 41 ft·lbf)

36. INSTALL AIR CLEANER HOSE

- (a) Install the air cleaner with the air hose connected to the engine.

**37. INSTALL RADIATOR HOSE****38. INSTALL SPLASH BOARD****39. w/Power steering:**

INSTALL POWER STEERING HOSE

**40. w/ A/C:**

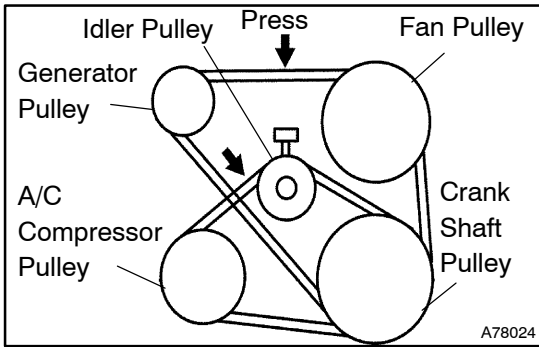
INSTALL A/C COMPRESSOR

- (a) Install the A/C compressor with the 4 bolts.

Torque: 29.5 N·m (300 kgf·cm, 22 ft·lbf)

HINT:

For the coolant changing procedure (gas charging), observe the air conditioner manufacturer's instructions.



- (b) Install the V belt.
 - (1) Turn the adjusting bolt until the V belt becomes tight, and then tighten the tension pulley lock nut.
- Torque: 41.3 N·m (420 kgf·cm, 30 ft·lbf)**
- (c) Adjust the V belt deflection.
 - (1) Apply a load of approx. 10 kg (22 lb) by pressing the V belt with your thumb.

V belt deflection:

New belt	7.0 – 8.5 mm (0.276 – 0.335 in.)
Used belt	8.5 – 10.0 mm (0.335 – 0.394 in.)

HINT:

- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for approx. 5 minutes and recheck the belt tension.

41. CONNECT NEGATIVE TERMINAL CABLE TO BATTERY

42. ADD ENGINE OIL

Oil capacity: 8.7 liters (9.2 US qts, 7.6 Imp. qts)

43. ADD ENGINE COOLANT

- (a) Add coolant slowly until the system is filled up to the filter opening, then install the cap securely.

Capacity:

Standard	12.92 liters (13.7 US qts, 11.3 Imp. qts)
Wide	12.1 liters (12.8 US qts, 10.6 Imp. qts)

HINT:

Trapped air in the cooling system can cause overheat.

44. BLEED FUEL (See page 11-177)

45. INSPECT FOR ENGINE COOLANT LEAKS

46. INSPECT FOR FUEL LEAKS

47. INSPECT FOR EXHAUST GAS LEAK

ENGINE COMPONENTS PARTS (W04D-J)

14177-01

REPLACEMENT

1. PREPARATION

- (a) Clean the engine.
 - (1) Cover the openings with tape.
 - (2) Using a steam cleaner, clean the engine.

NOTICE:

Do not apply steam directly to the electrical component (generator, starter, etc.).

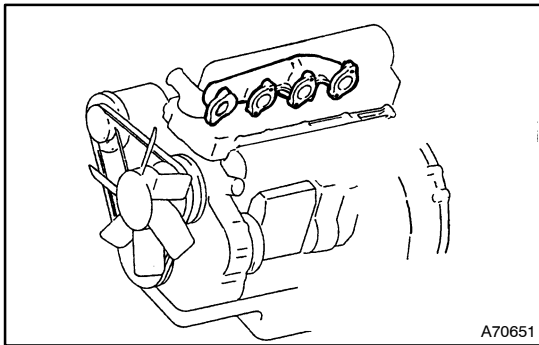
- (b) Mount the engine on a work stand.

2. DISCONNECT ELECTRICAL WIRE ASSY

- (a) Remove the clip of the wire harness.
- (b) Disconnect the negative (-) terminal of the battery.
- (c) Disconnect the electrical unit, switch and sensor.

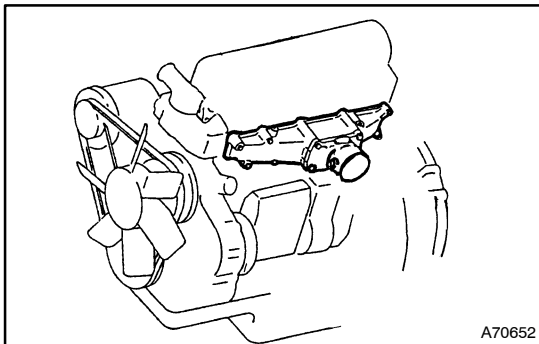
3. REMOVE STARTER ASSY

- (a) Put alignment marks on the harness and the starter terminal, and then remove the harness.
- (b) Remove the starter from the engine.



4. REMOVE EXHAUST MANIFOLD

- (a) Remove the exhaust manifold.



5. REMOVE INTAKE PIPE

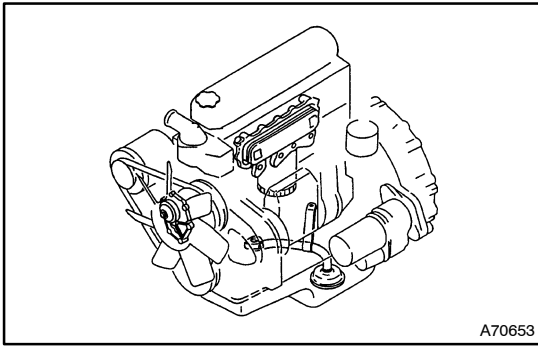
6. REMOVE INTAKE MANIFOLD

- (a) Remove the injection pipe and fuel filter assy.

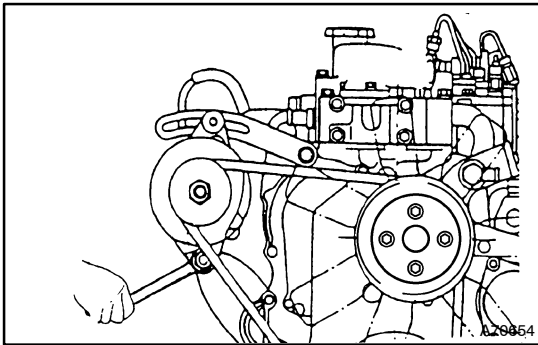
7. REMOVE INJECTION PUMP ASSY

(See page 11-190)

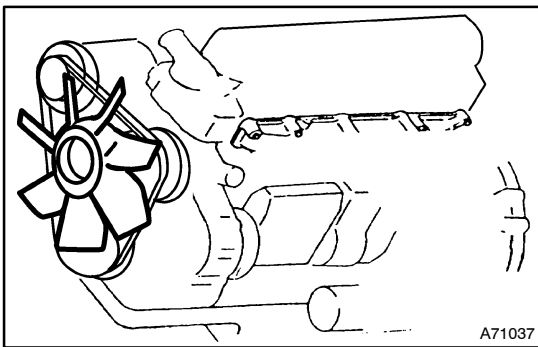
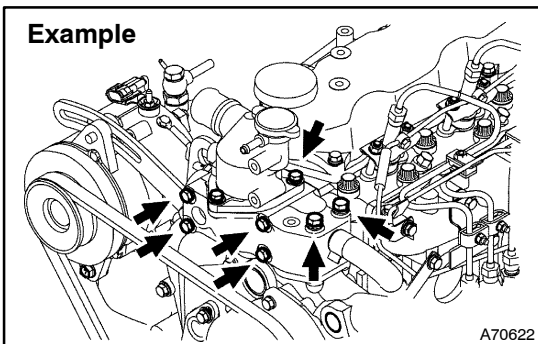
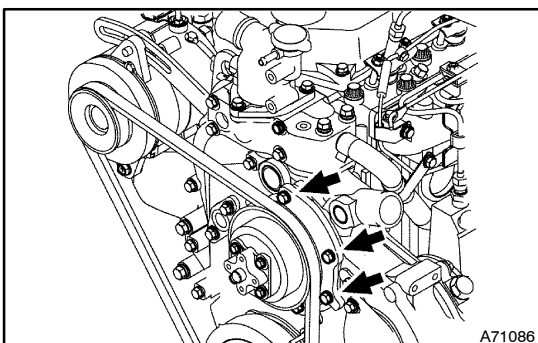
8. REMOVE OIL FILTER SUB-ASSY (See page 17-50)

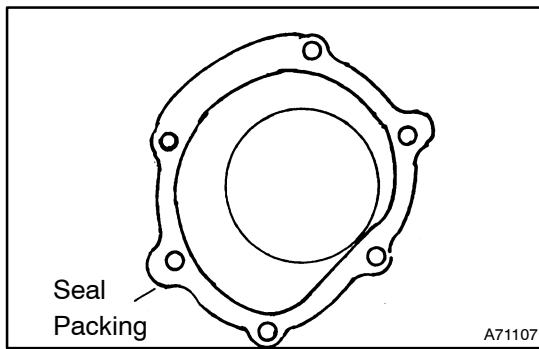
**9. REMOVE OIL COOLER ASSY**

- (a) Remove the oil lines.
- (b) Remove the oil cooler.

**10. REMOVE V BELT AND GENERATOR**

- (a) Loosen the V belt adjusting bolt.
- (b) Loosen the through bolt.
- (c) Remove the V belt, and then remove the generator.

**11. REMOVE FAN****12. REMOVE FAN PULLEY****13. REMOVE THERMOSTAT CASE****14. REMOVE WATER PUMP ASSY**

**15. INSTALL WATER PUMP ASSY**

- (a) Clean the cylinder block mounting surface of the water pump.
- (b) Apply seal packing to the water pump and install it onto the cylinder block within 20 minutes.

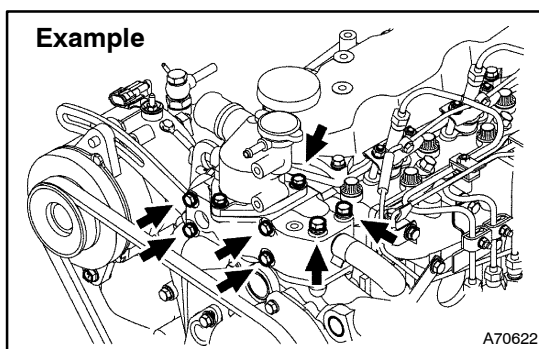
Seal packing: Part No. 08826-00100 or equivalent

Coating width: 1.5 – 2.5 mm (0.059 – 0.098 in.)

Torque: 22.1 N·m (225 kgf·cm, 16 ft·lbf)

HINT:

- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
- Do not start the engine for 2 hours after the installation.

**16. INSTALL THERMOSTAT CASE**

- (a) Clean the cylinder head mounting surface of the thermostat case.
- (b) Apply seal packing to the thermostat case and install it onto the cylinder head within 20 minutes.

Seal packing: Part No. 08826-00100 or equivalent

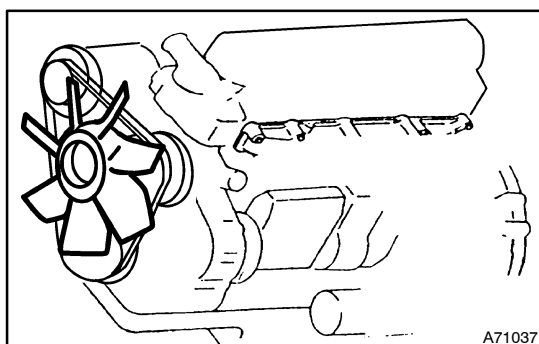
Coating width: 1.5 – 2.5 mm (0.059 – 0.098 in.)

HINT:

- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
 - Do not start the engine for 2 hours after the installation.
- (c) Tighten the 4 side ones of the thermostat case mounting bolts.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)
 - (d) Tighten the 3 upper ones of the timing gear case bolts.

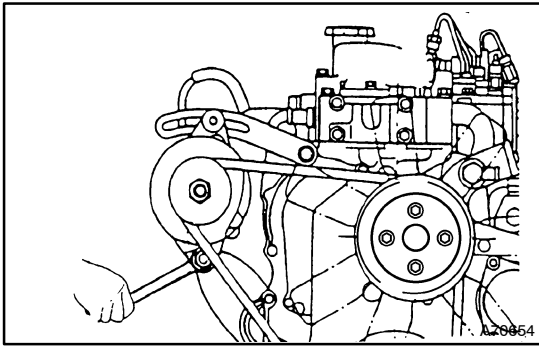
Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)
 - (e) Install the cooling line.

**17. INSTALL FAN PULLEY**

- (a) Install the fan pulley and fan spacer.

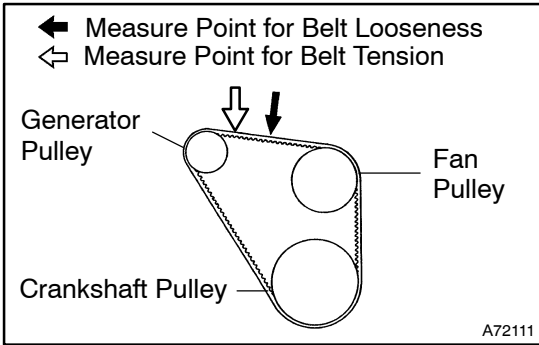
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

18. INSTALL FAN



19. INSTALL GENERATOR AND V BELT

(a) Attach the generator provisionally, and install the V belt.



(b) Press the center point of the V belt with a load of approx. 98 N (10 kgf, 22 lbf) and adjust the V belt deflection so that it should be within the standard value.

V belt deflection: 10 - 15 mm (0.394 - 0.591 in.)

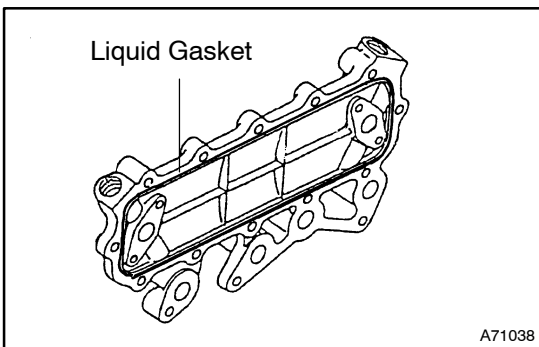
HINT:

- "New belt" refers to a belt which has been used for less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for approx. 5 minutes and recheck the belt tension.

(c) Tighten the V belt adjusting bolt.

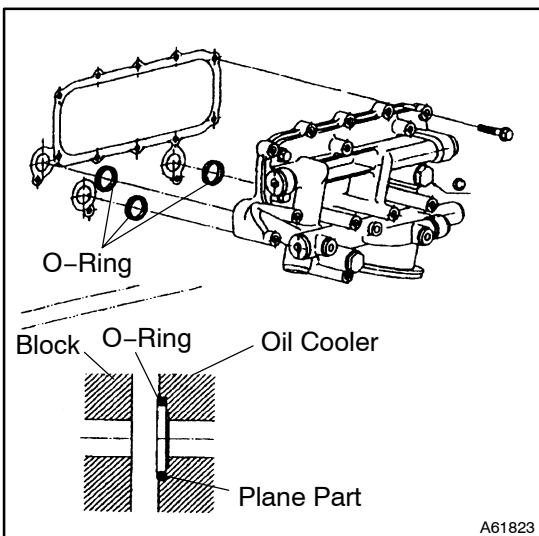
(d) Tighten the through bolt.

Torque: 46.6 N·m (475 kgf·cm, 34 ft·lbf)



20. INSTALL OIL COOLER ASSY

(a) Clean the cylinder block mounting surface of the oil cooler.



(b) Insert new O-rings into the O-ring groove of the oil cooler.

HINT:

Face the flat area of the O-ring toward the oil cooler for installation.

(c) Apply seal packing to the oil cooler housing and install it onto the cylinder block within 20 minutes.

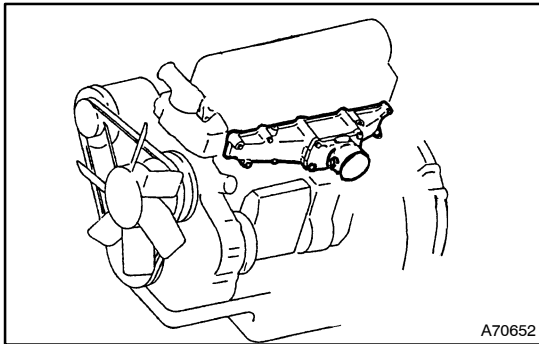
Seal packing: Part No. 08826-00100 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

HINT:

If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.

(d) Install the oil line.

21. **INSTALL OIL FILTER SUB-ASSY (See page 17-50)**
22. **INSTALL INJECTION PUMP ASSY (See page 11-190)**

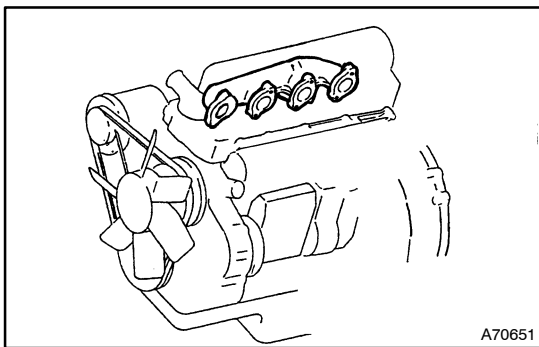


23. **INSTALL INTAKE MANIFOLD**
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

HINT:

Be sure to use a new gasket.

- (a) Clean the matching face of the intake manifold.



24. **INSTALL EXHAUST MANIFOLD**

- (a) Install the exhaust manifold gasket so that the black side could face the exhaust manifold.

HINT:

Be sure to use new gaskets.

Torque: 47.1 N·m (480 kgf·cm, 34.7 ft·lbf)

25. **INSTALL STARTER ASSY**

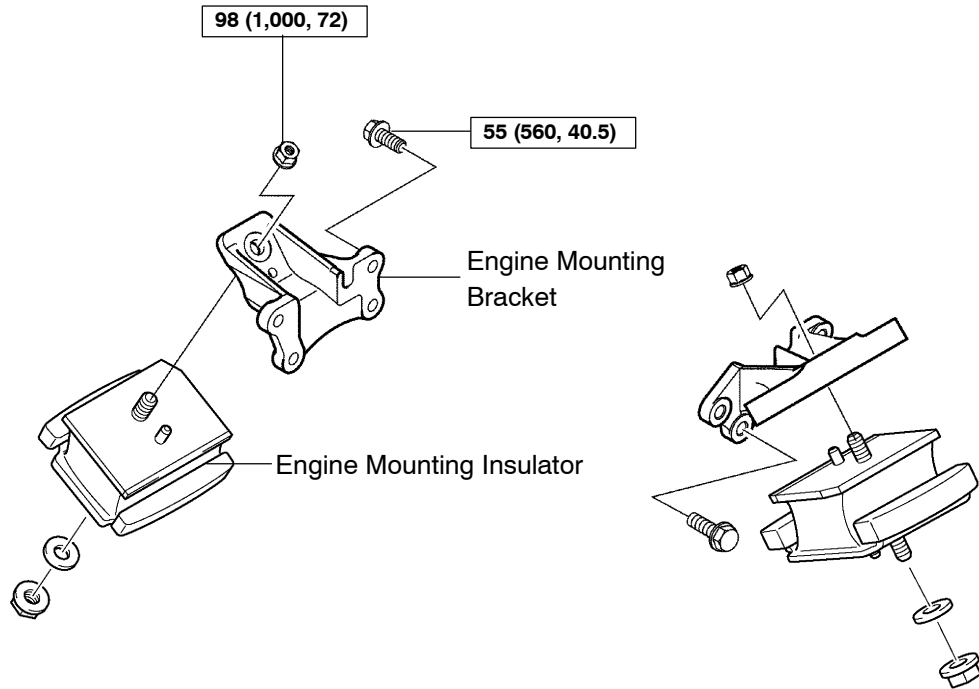
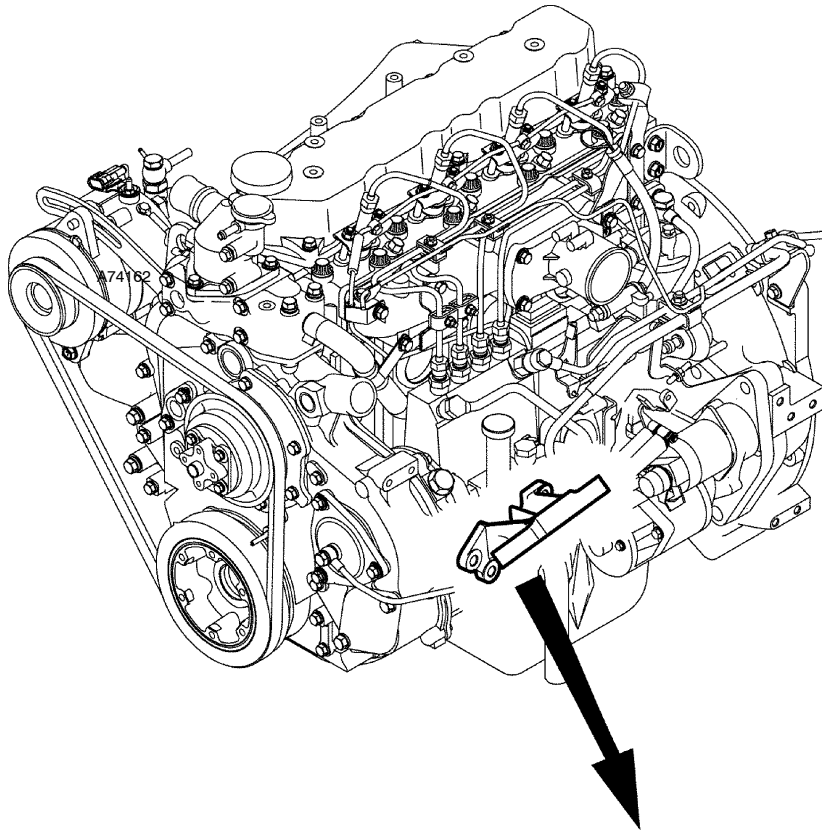
- (a) Tighten the bolts and nuts.
Torque: 154 N·m (1,570 kgf·cm, 114 ft·lbf)
(b) Connect the harness at the alignment marks.
(c) Connect the battery cable.

Torque: 13.5 N·m (137 kgf·cm, 10 ft·lbf)

26. **CONNECT ELECTRICAL WIRE ASSY**

ENGINE MOUNTING (W04D-J) COMPONENTS

14178-01



N·m (kgf·cm, ft·lbf) : Specified torque

A71087

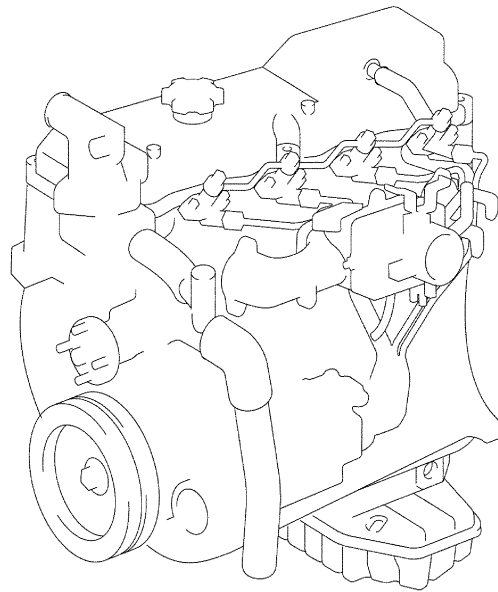
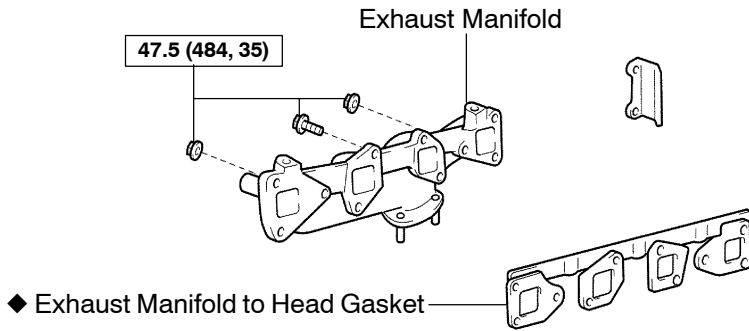
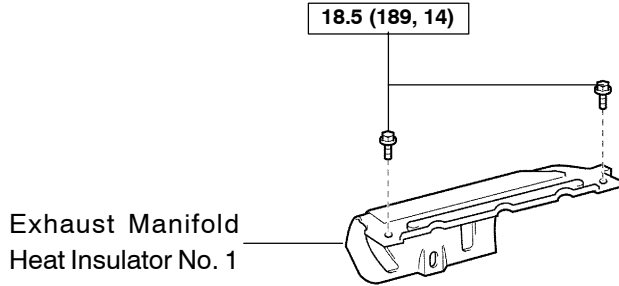
EXHAUST

EXHAUST MANIFOLD	
TO HEAD GASKET (14B)	15-1
COMPONENTS	15-1
EXHAUST MANIFOLD	
TO HEAD GASKET (15B-FTE)	15-2
COMPONENTS	15-2
EXHAUST MANIFOLD	
TO HEAD GASKET (S05C-B)	15-3
COMPONENTS	15-3
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HEAD GASKET (S05C-TA, S05C-TB)	15-4
COMPONENTS	15-4
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TO HEAD GASKET (W04D-J)	15-5
COMPONENTS	15-5
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(14B, 15B-FTE)	15-6
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EXHAUST PIPE ASSY	
(S05C-B)	15-10
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REMOVAL AND INSTALLATION	15-12
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EXHAUST PIPE ASSY	
(S05C-TA, S05C-TB)	15-14
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REMOVAL AND INSTALLATION	15-19
INSPECTION	15-20
EXHAUST PIPE ASSY	
(W04D-J)	15-21
COMPONENTS	15-21
REMOVAL AND INSTALLATION	15-22
INSPECTION	15-23

EXHAUST MANIFOLD TO HEAD GASKET (14B)

COMPONENTS

1508Q-01



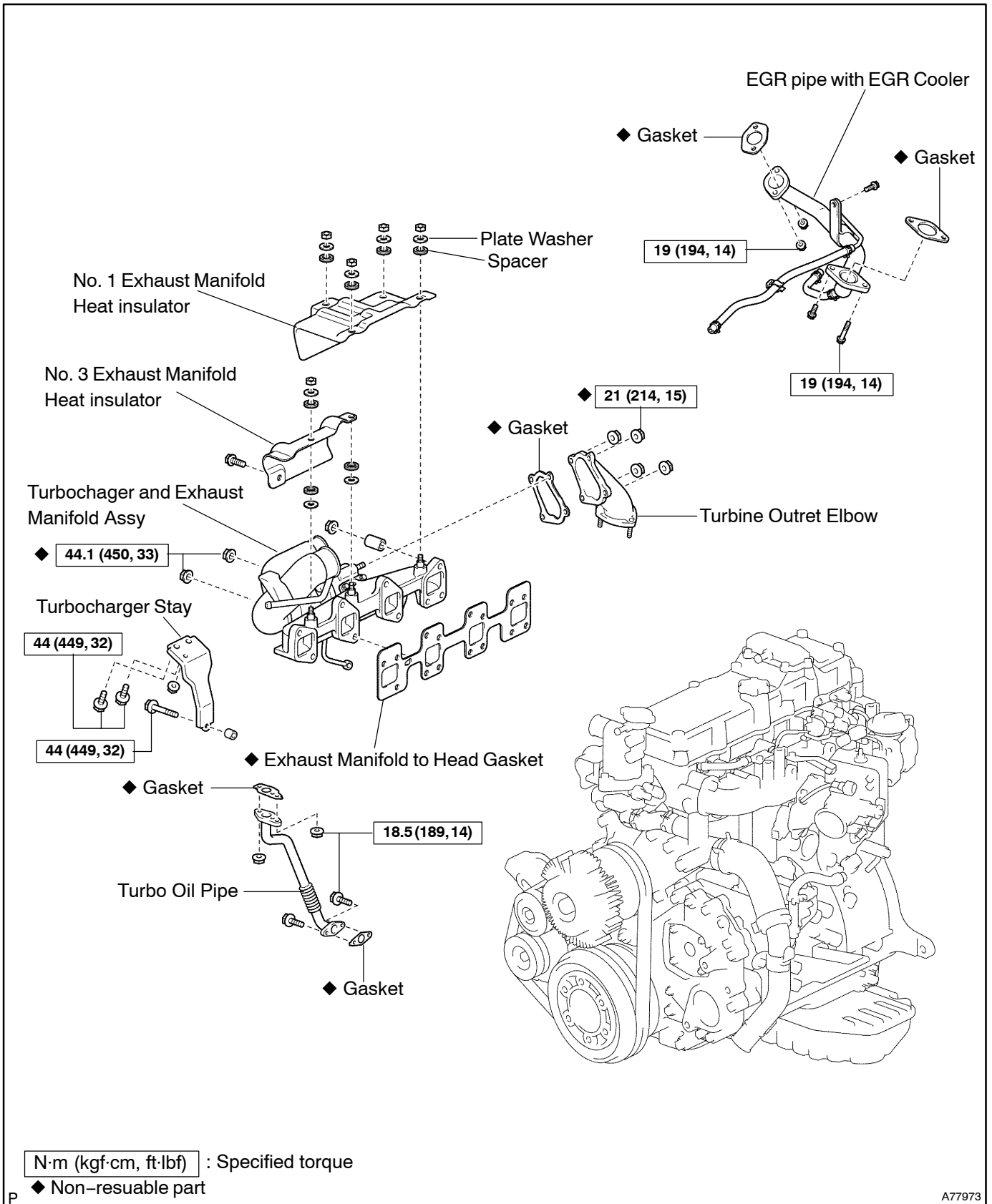
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-resuable part

EXHAUST MANIFOLD TO HEAD GASKET (15B-FTE)

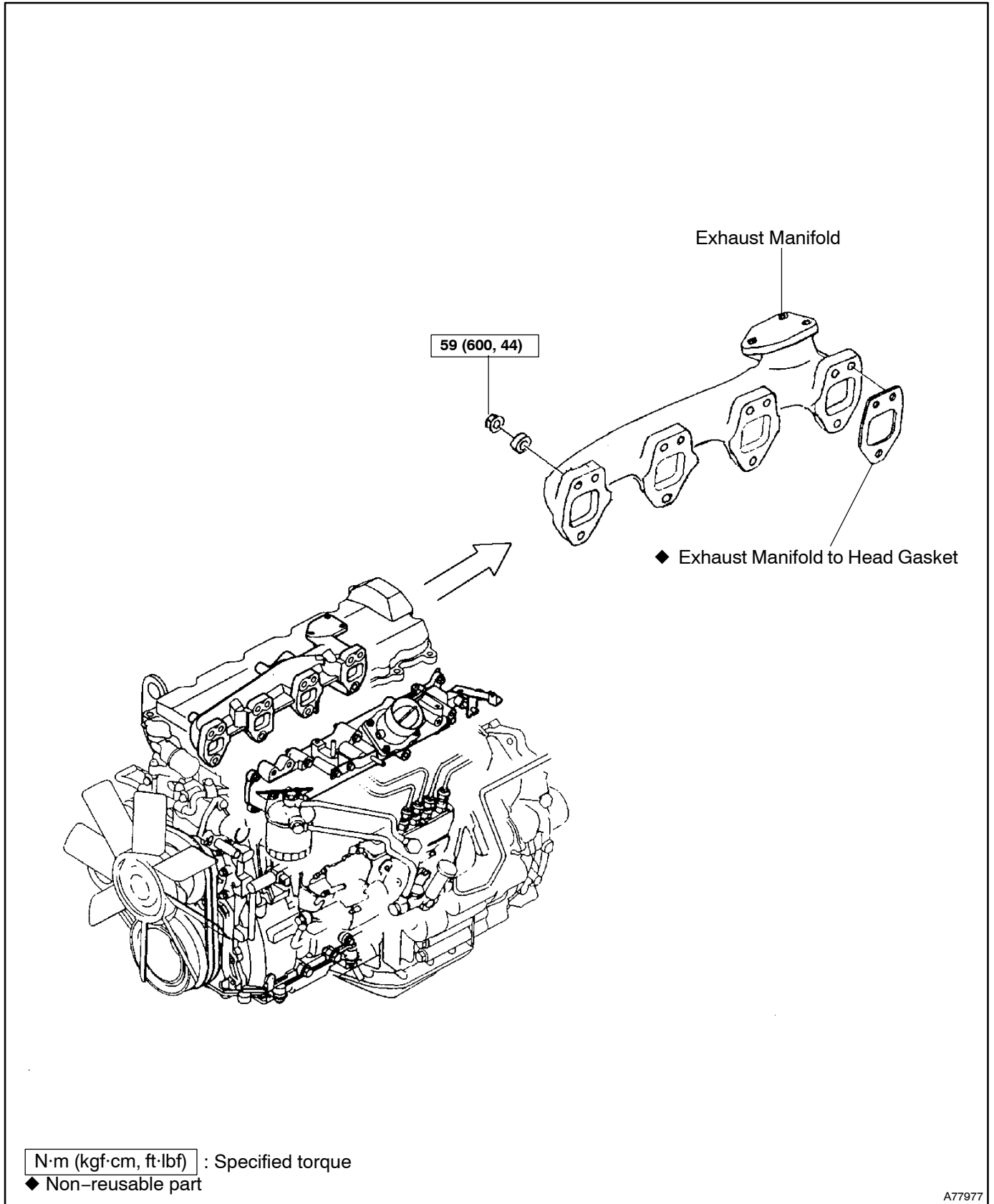
1508R-01

COMPONENTS



EXHAUST MANIFOLD TO HEAD GASKET (S05C-B) COMPONENTS

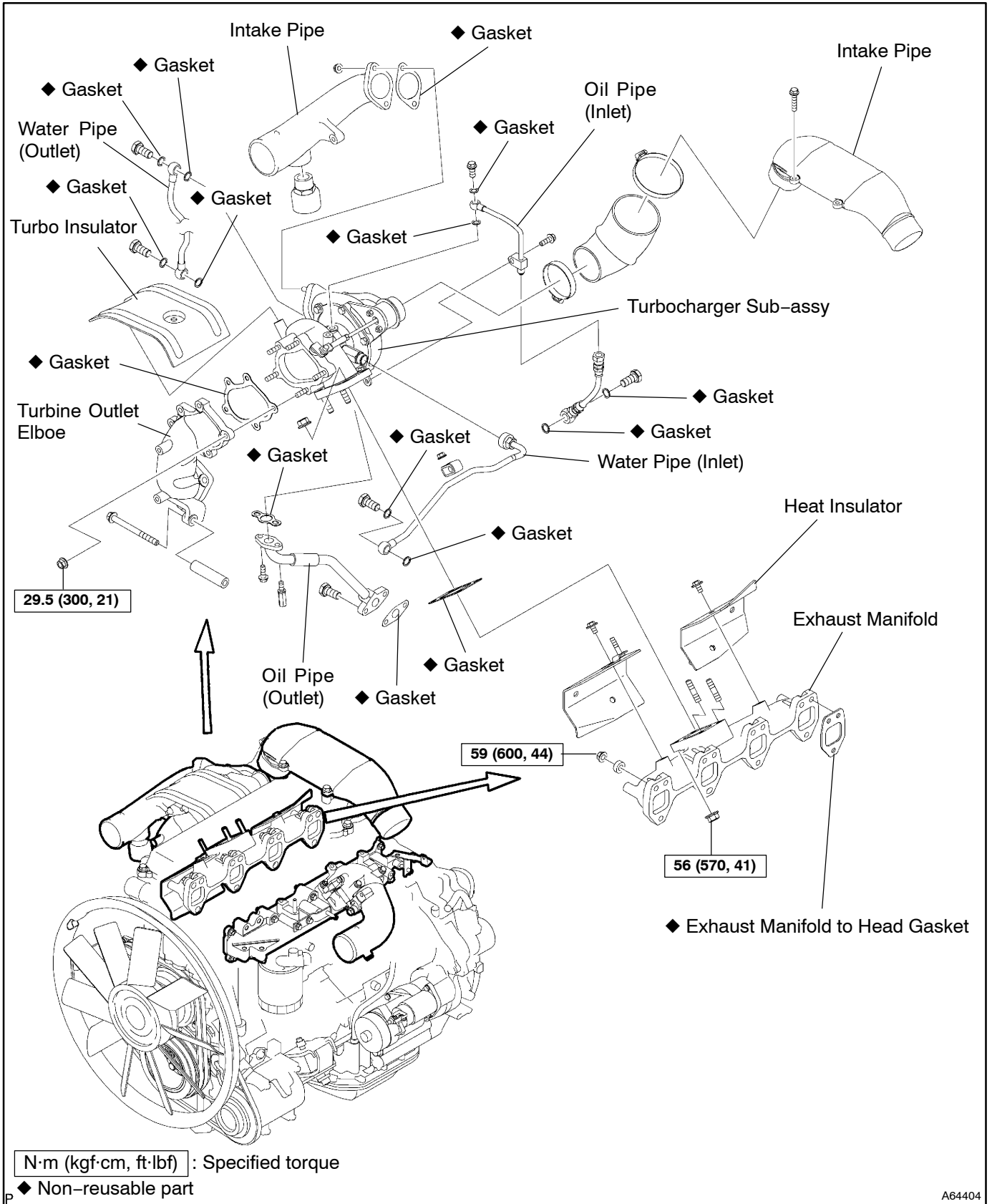
1508V-01



EXHAUST MANIFOLD TO HEAD GASKET (S05C-TA, S05C-TB)

COMPONENTS

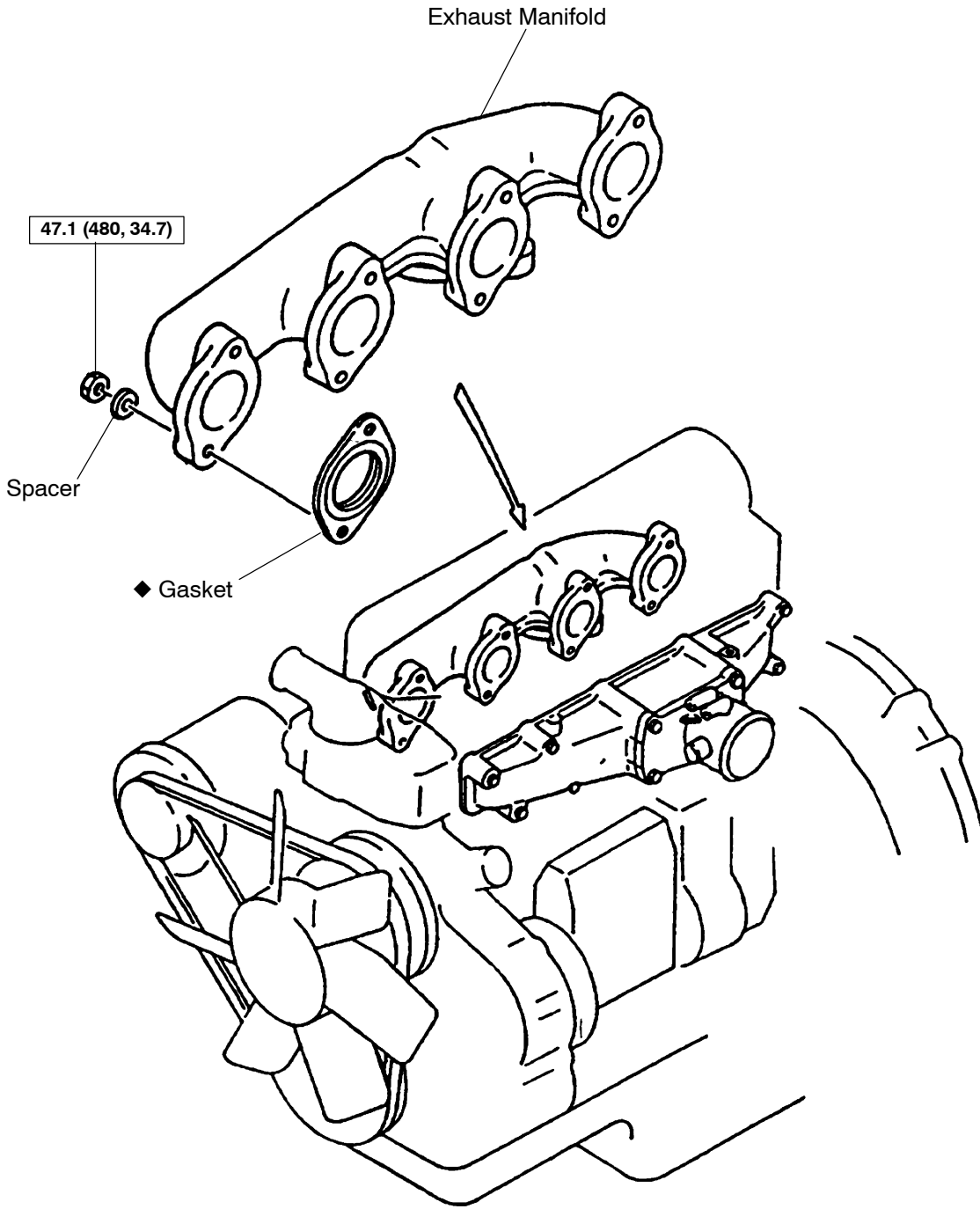
1508Z-01



EXHAUST MANIFOLD TO HEAD GASKET (W04D-J) COMPONENTS

15093-01

EXAMPLE:



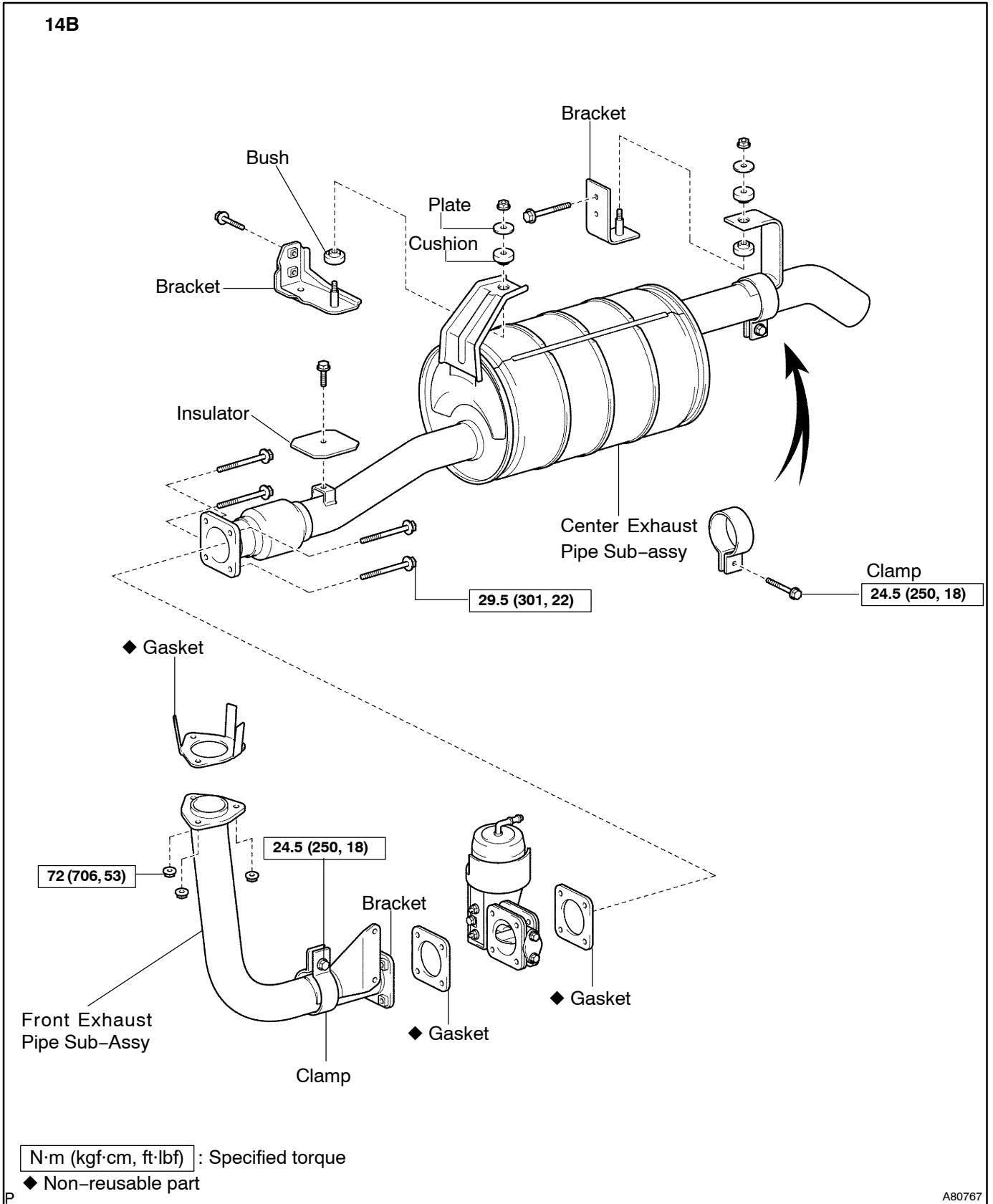
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

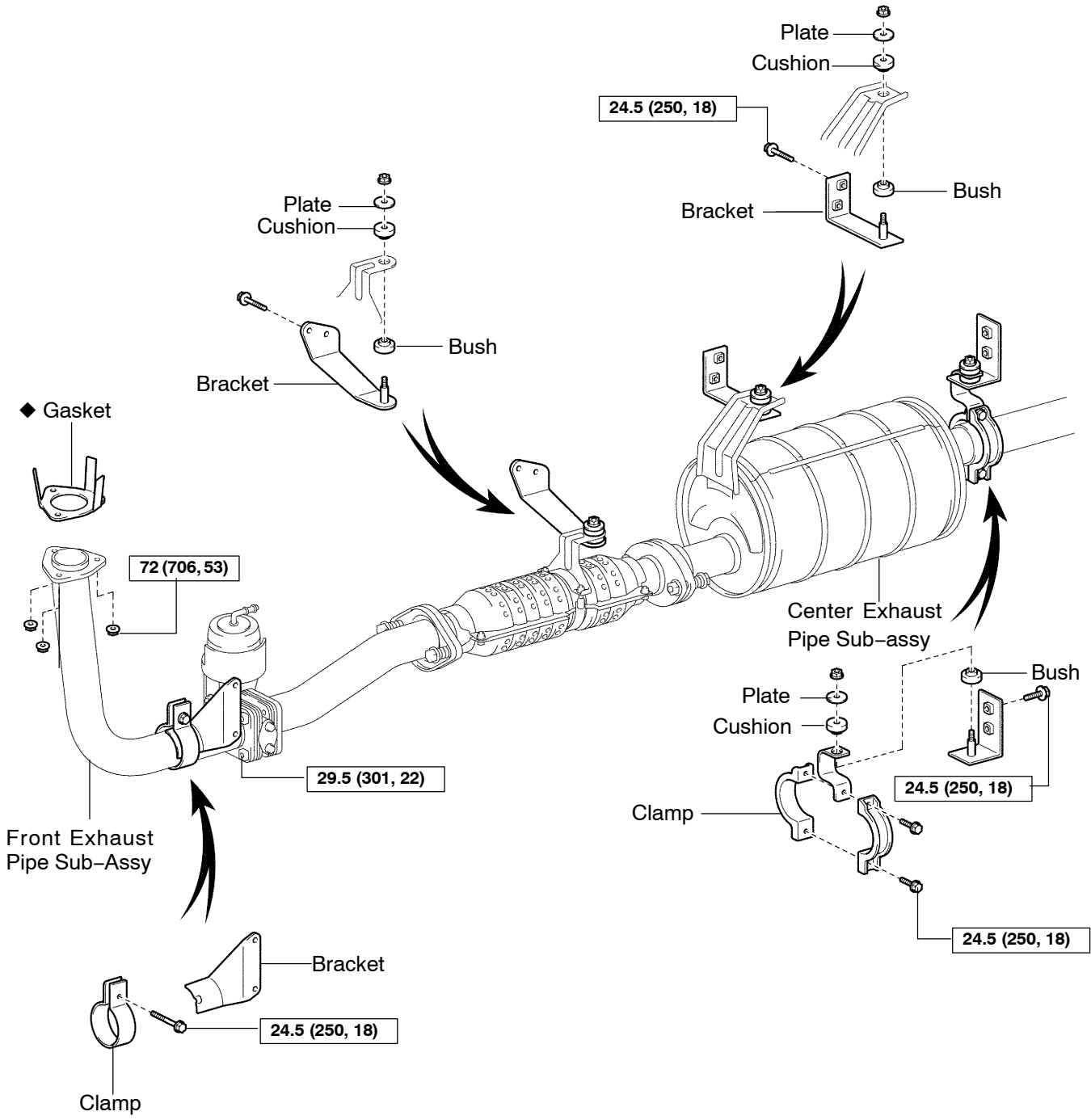
EXHAUST PIPE ASSY (14B, 15B-FTE)

COMPONENTS

1508S-02



15B-FTE



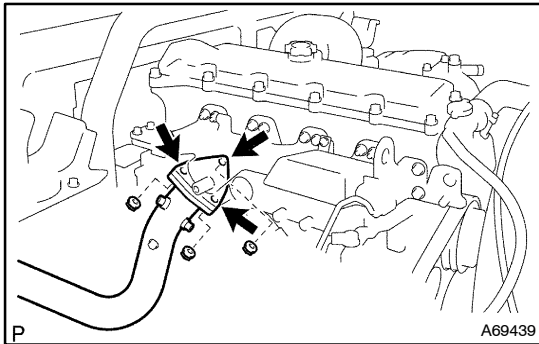
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

REMOVAL AND INSTALLATION

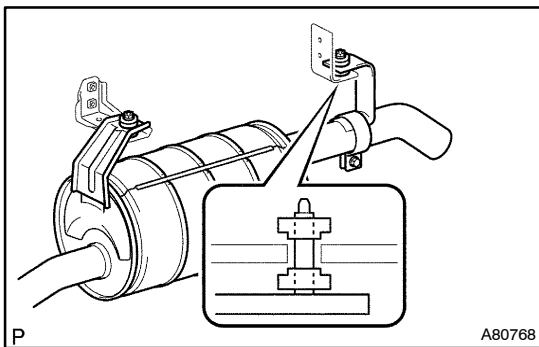
CAUTION:

Do not touch the exhaust manifold while it is hot. You could be severely burned.



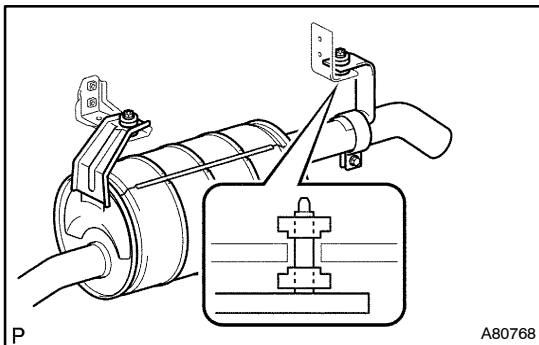
1. DISCONNECT FRONT EXHAUST PIPE ASSY FROM EXHAUST MANIFOLD

- (a) Remove the 3 nuts and front exhaust pipe assy.



2. REMOVE CENTER EXHAUST PIPE ASSY

- (a) Remove the 4 bolts and center exhaust pipe assy from the front exhaust pipe assy.

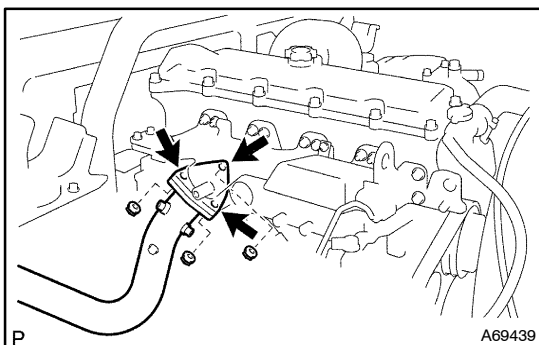


3. INSTALL CENTER EXHAUST PIPE ASSY

NOTICE:

If the position of the tailpipe is incorrectly positioned, exhaust fumes may blow onto passers-by, which could result in burning.

- (a) Install the 4 bolts and center exhaust pipe assy to the front exhaust pipe assy.



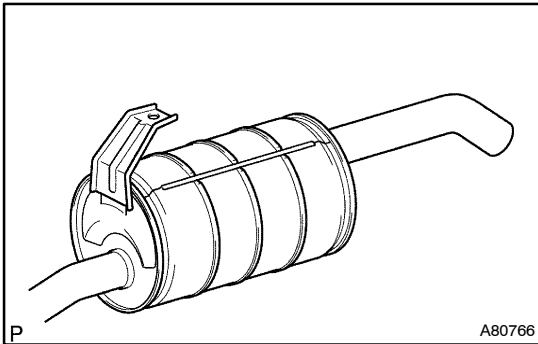
4. CONNECT FRONT EXHAUST PIPE ASSY TO EXHAUST MANIFOLD

Torque: 72 N·m (706 kgf·cm, 53 ft·lbf)

HINT:

- Replace the gasket with a new one.
 - The mounting portion of the exhaust manifold is subjected to heat and is likely to come loose, and so special nuts should be employed. Be sure to use the correct nuts.
- (a) Connect the front exhaust pipe assy with the 3 nuts.

INSPECTION



1. INSPECT CENTER EXHAUST PIPE ASSY

- (a) Inspect the pipe assy for rust holes and dents caused by stones.

HINT:

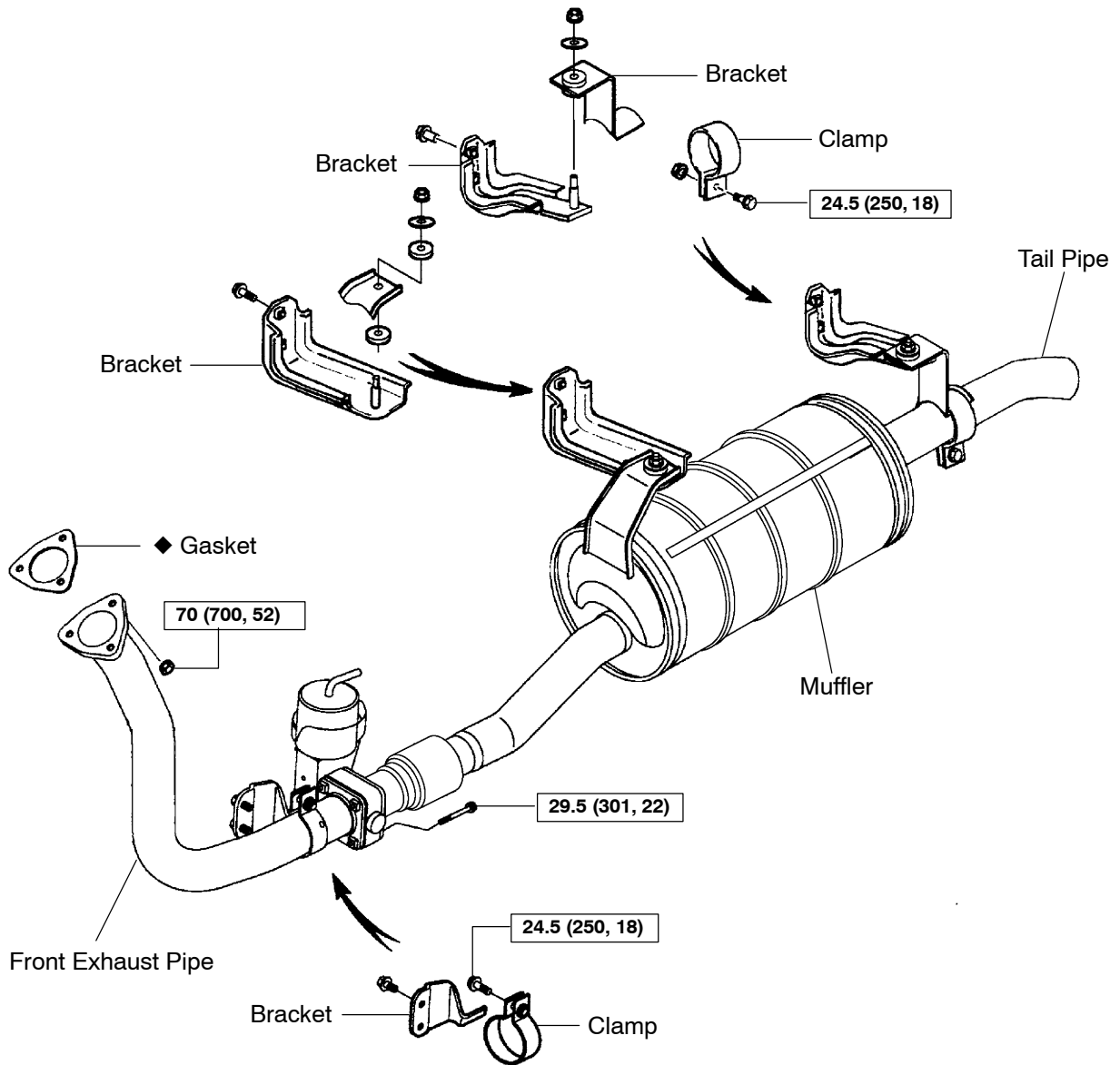
- Be particularly careful in the inspection.
- If there are holes or cracks in the exhaust muffler and pipe, the exhaust noise will increase and may exceed the noise regulation value. In addition, hot gas may blow out, resulting in fire.
- If the exhaust muffler and pipe are severely dented by flying stones, etc., the exhaust resistance will increase. It causes the output of the exhaust gas to decrease and also the fuel consumption to increase.

EXHAUST PIPE ASSY (S05C-B)

COMPONENTS

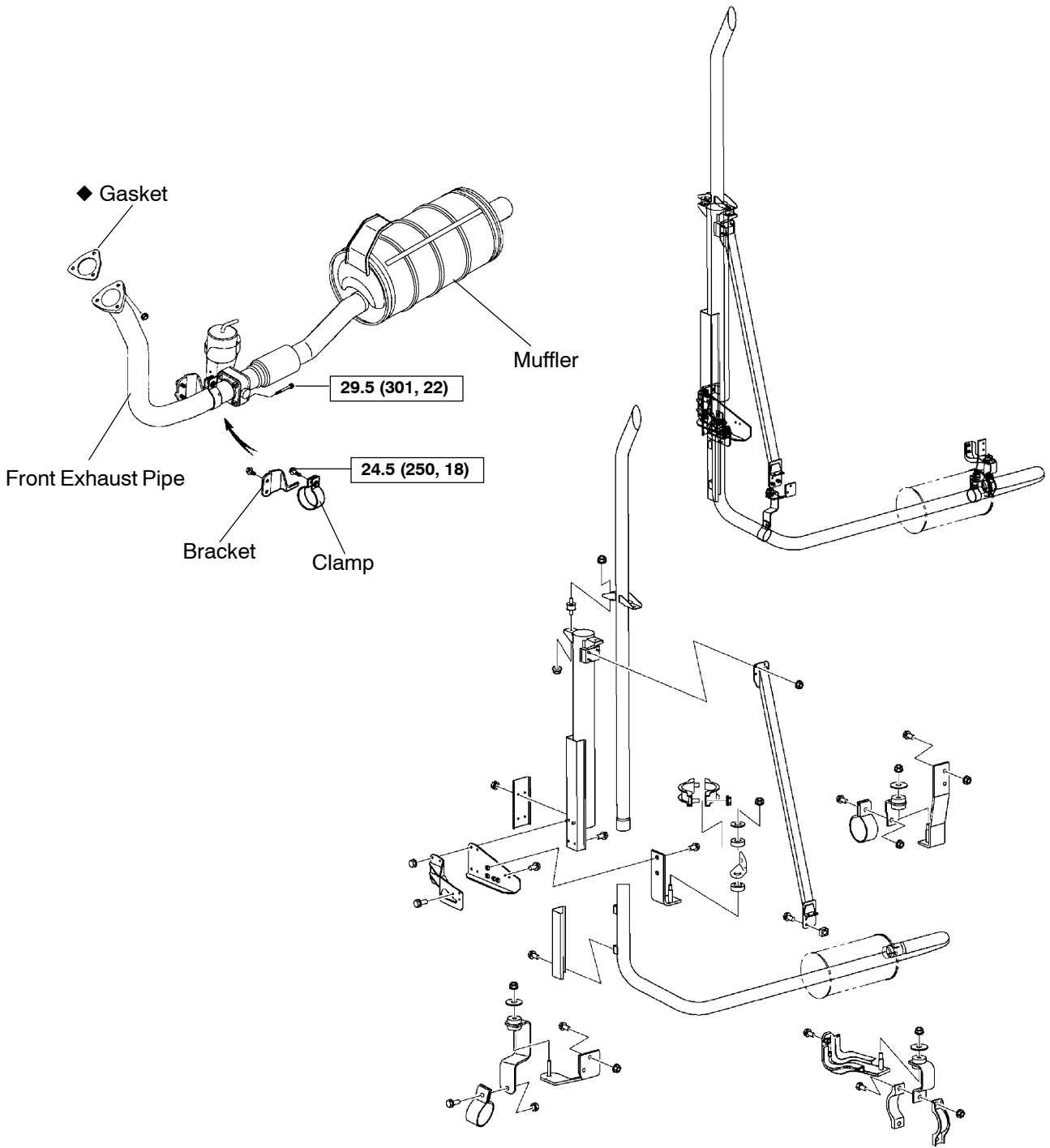
1508W-02

EXAMPLE: Short Tail



H N·m (kgf·cm, ft·lbf) : Specified torque
 ◆ Non-reusable part

EXAMPLE: Stuck Tail



N·m (kgf·cm, ft·lbf) : Specified torque

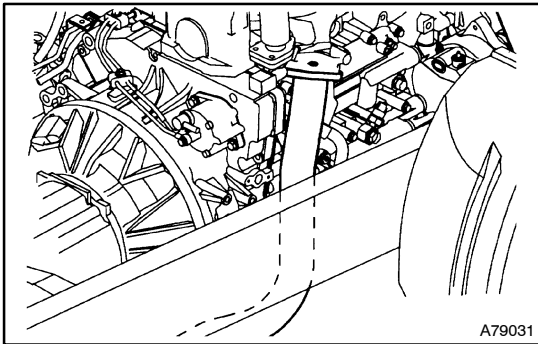
◆ Non-reusable part

H

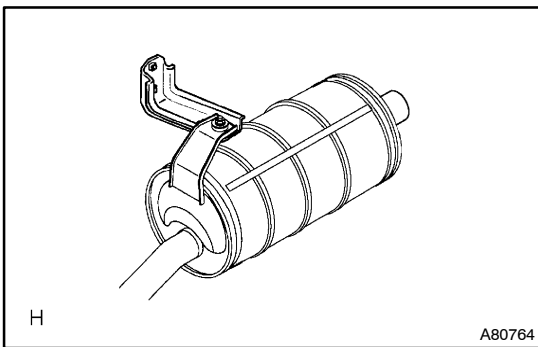
REMOVAL AND INSTALLATION

CAUTION:

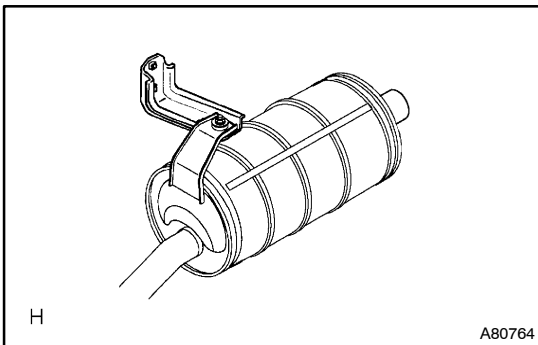
Do not touch the exhaust manifold while it is hot. You could be severely burned.



1. **DISCONNECT FRONT EXHAUST PIPE ASSY**
 - (a) Remove the 3 nuts and front exhaust pipe assy.



2. **REMOVE CENTER EXHAUST PIPE ASSY**
 - (a) Remove the 4 bolts and center exhaust pipe assy from the front exhaust pipe assy.

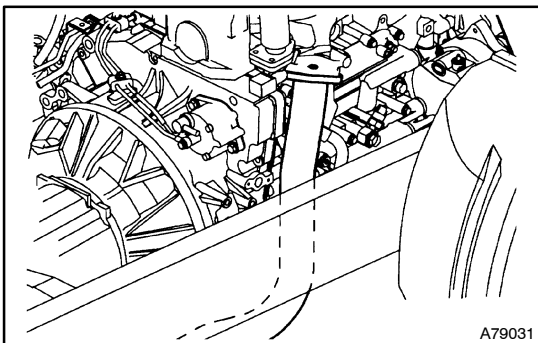


3. **INSTALL CENTER EXHAUST PIPE ASSY**

NOTICE:

If the position of the tailpipe is incorrect, exhaust fumes may blow onto passers-by, which could result in burning.

- (a) Install the 4 bolts and center exhaust pipe assy to the front exhaust pipe assy.

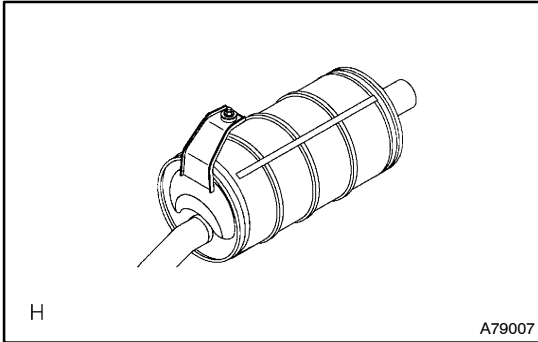


4. **CONNECT FRONT EXHAUST PIPE ASSY**
Torque: 70 N·m (700 kgf·cm, 52 ft·lbf)

HINT:

- Replace the gasket with a new one.
 - The mounting portion of the exhaust manifold is subjected to heat and is likely to come loose, and so special nuts should be employed. Be sure to use the correct nuts.
- (a) Connect the front exhaust pipe assy with the 3 nuts.

INSPECTION



1. INSPECT CENTER EXHAUST PIPE ASSY

- (a) Inspect the pipe assy for rust holes and dents caused by flying stones.

HINT:

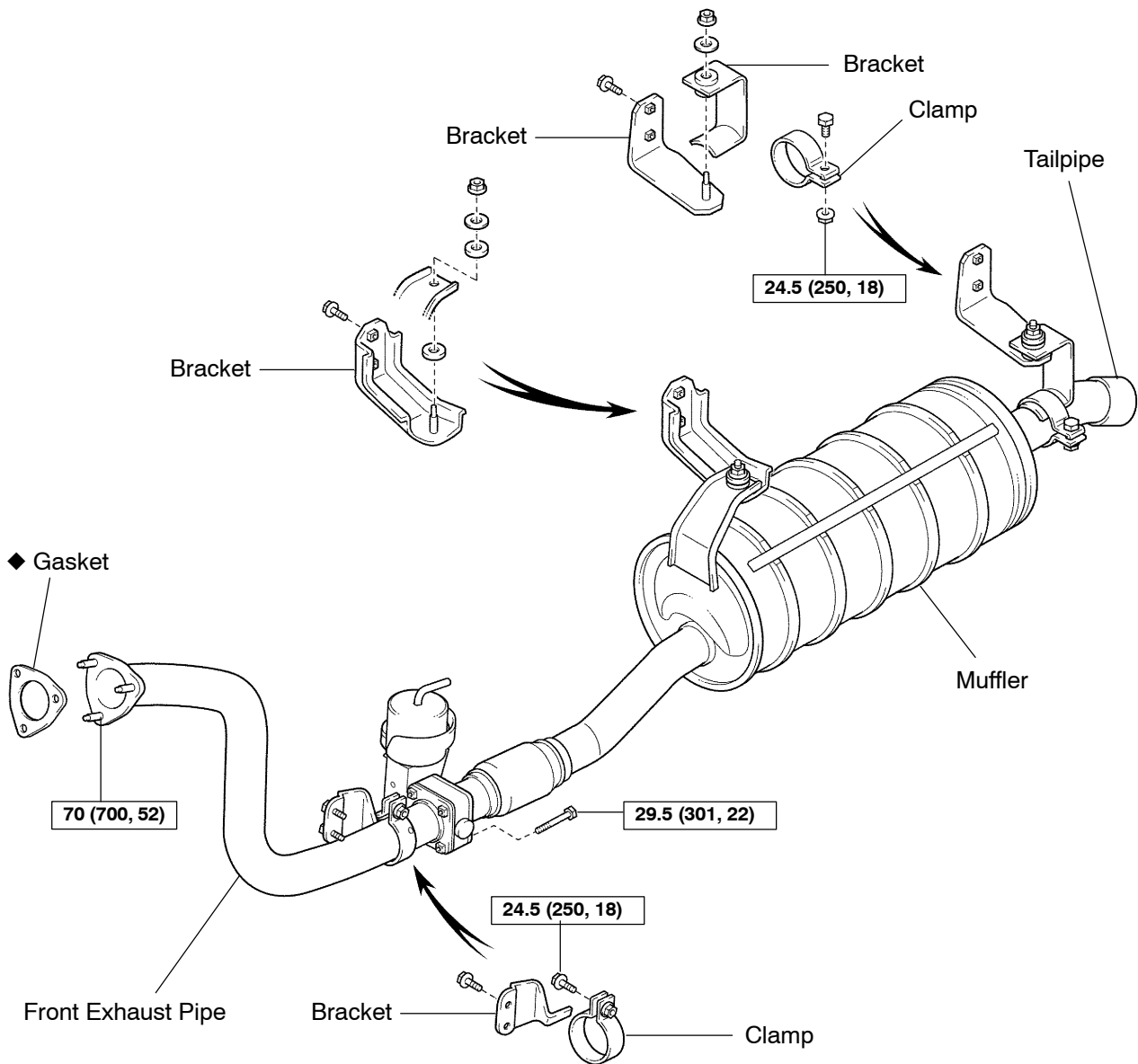
- Be particularly careful in the inspection.
- If there are holes or cracks in the exhaust muffler and pipe, the exhaust noise will increase and may exceed the noise regulation value. In addition, hot gas may blow out, resulting in fire.
- If the exhaust muffler and pipe are severely dented by flying stones, etc., the exhaust resistance will increase. It causes the output of the exhaust gas to decrease and also the fuel consumption to increase.

EXHAUST PIPE ASSY (S05C-TA, S05C-TB)

15090-02

COMPONENTS

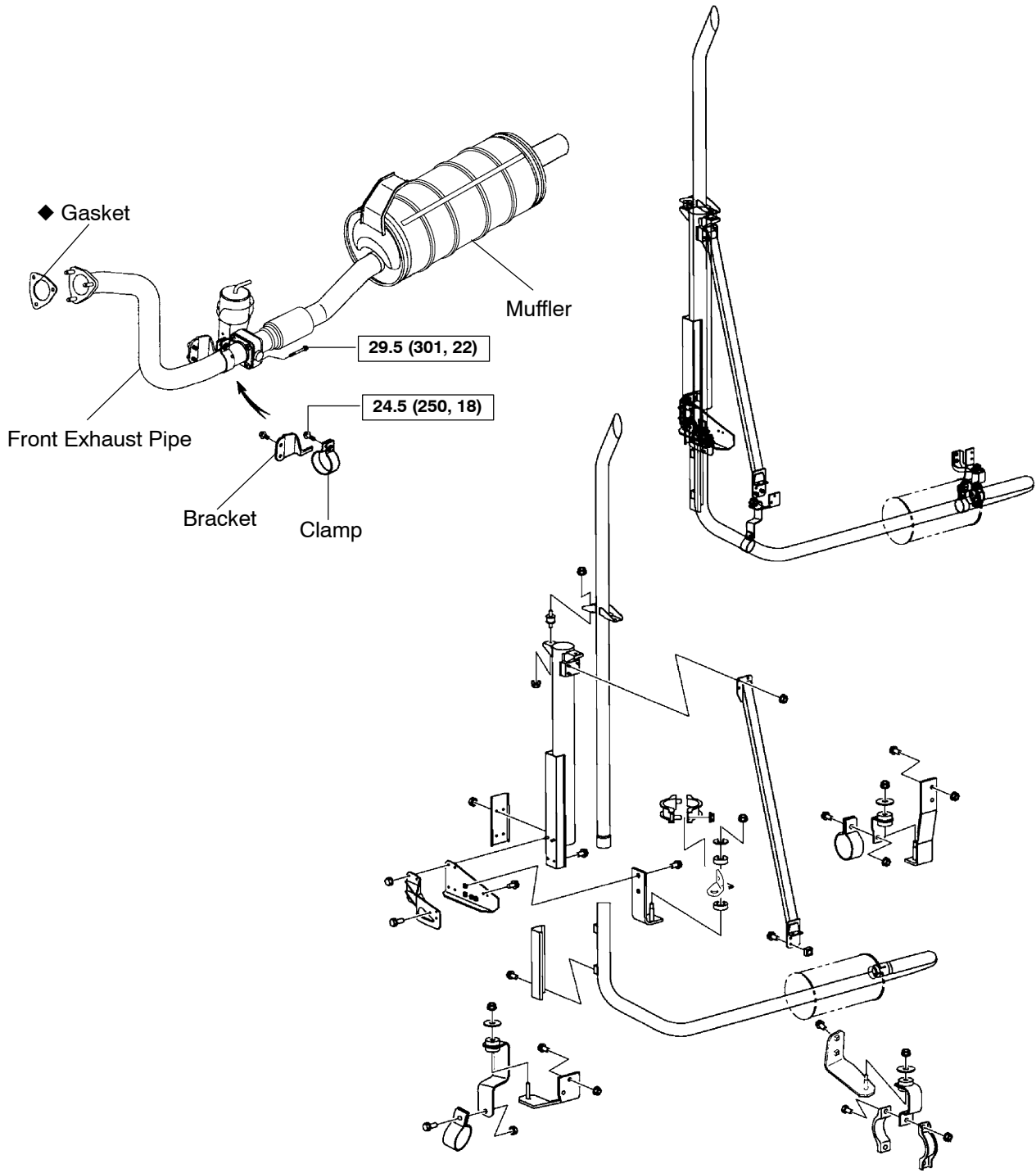
EXAMPLE: Short Tail



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

EXAMPLE: Stuck Tail

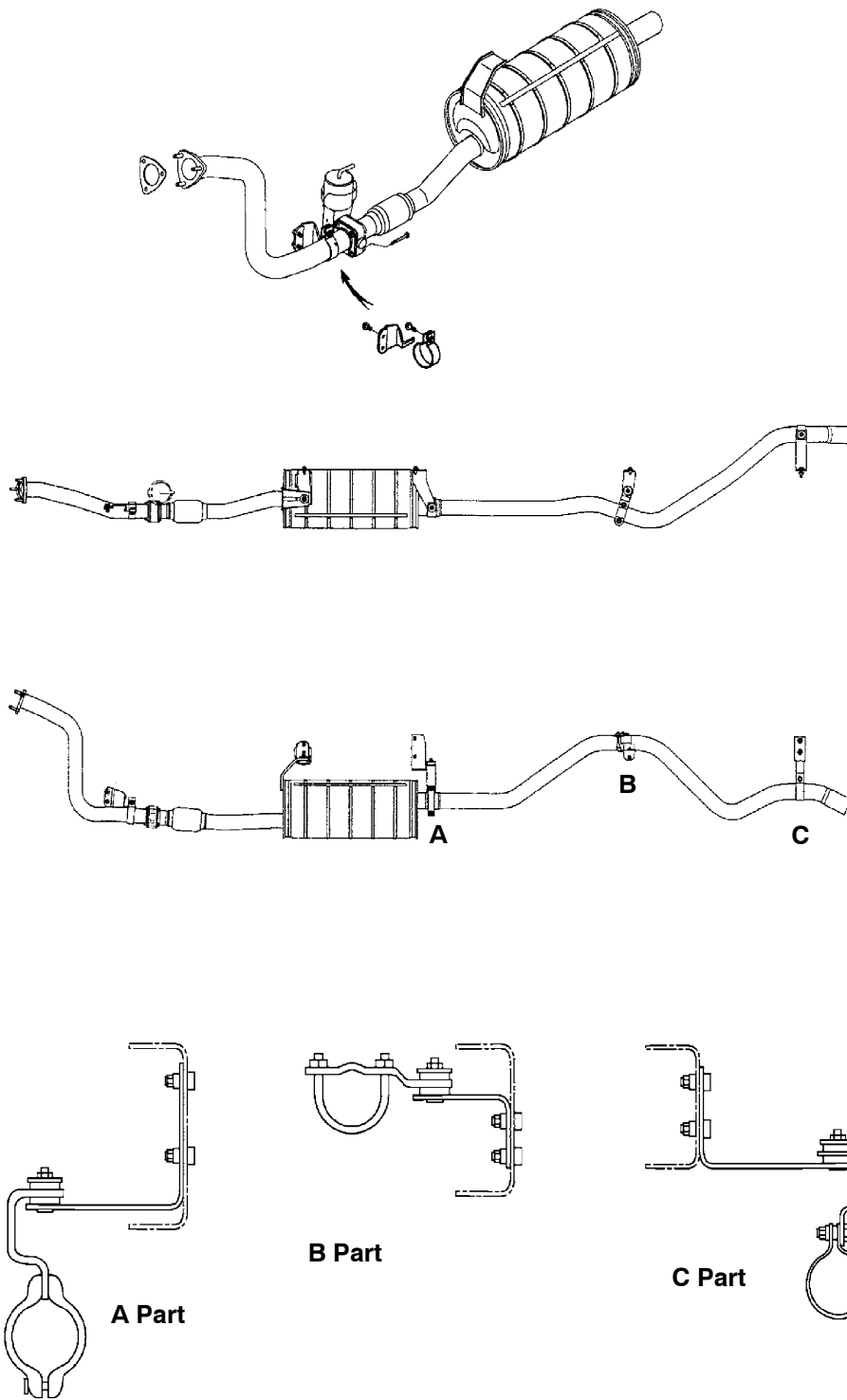


$\boxed{\text{N}\cdot\text{m (kgf}\cdot\text{cm, ft}\cdot\text{lbf)}}$: Specified torque

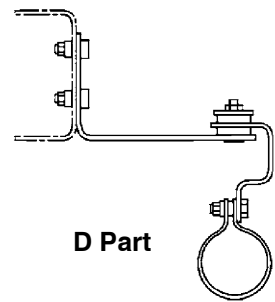
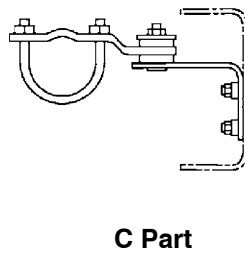
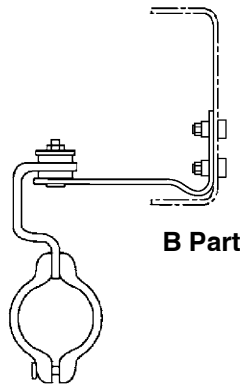
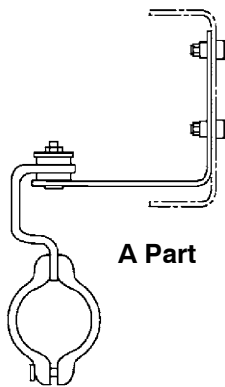
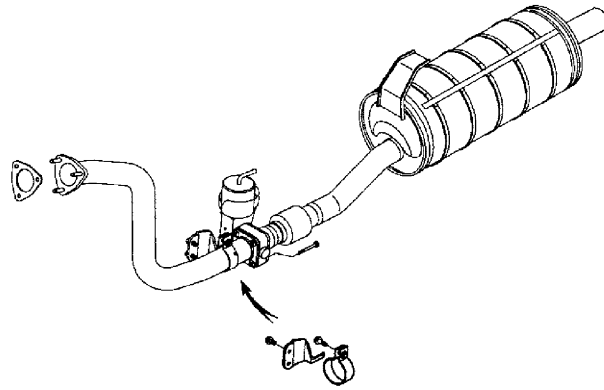
H

◆ Non-reusable part

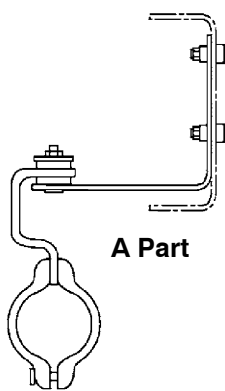
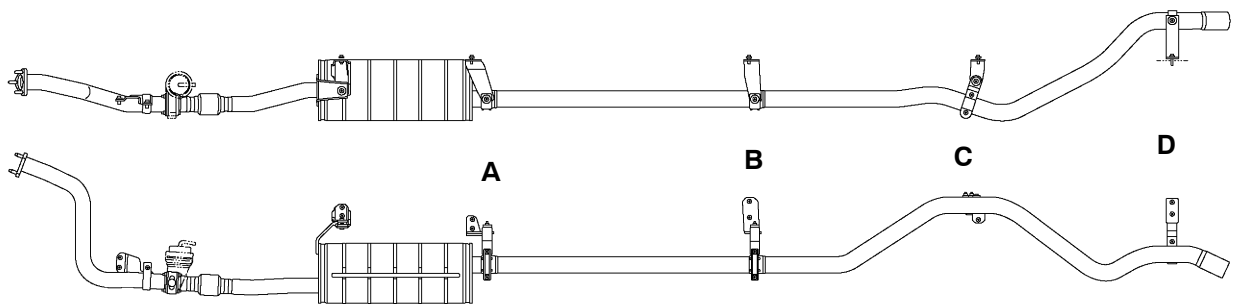
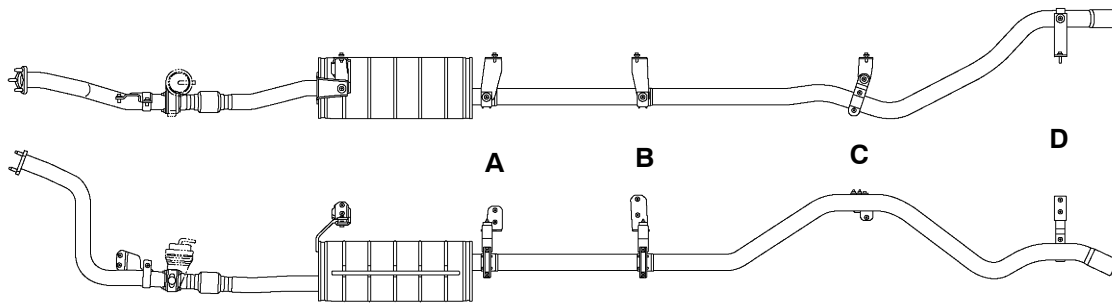
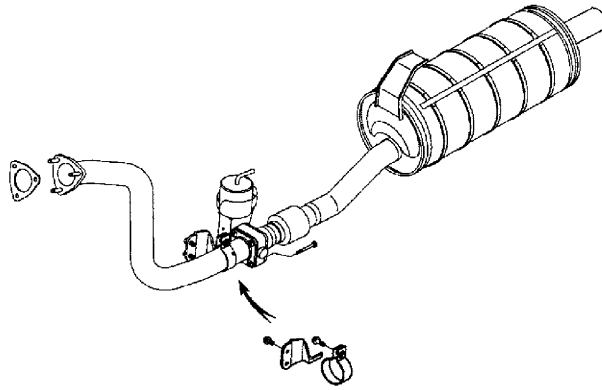
EXAMPLE: Long Tail (Standard Cab)



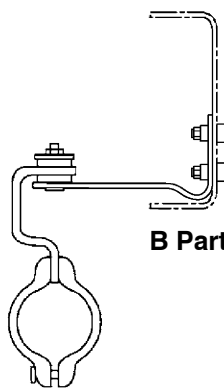
EXAMPLE: Long Tail (Wide Cab)



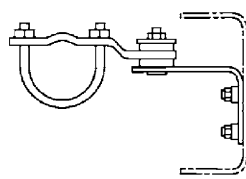
EXAMPLE: Long Tail (Wide Cab)



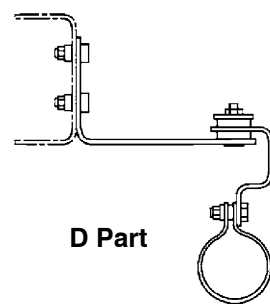
A Part



B Part



C Part

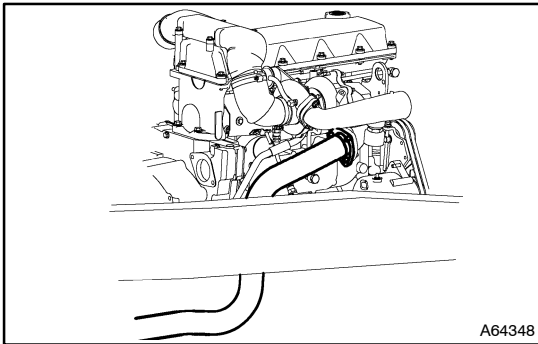


D Part

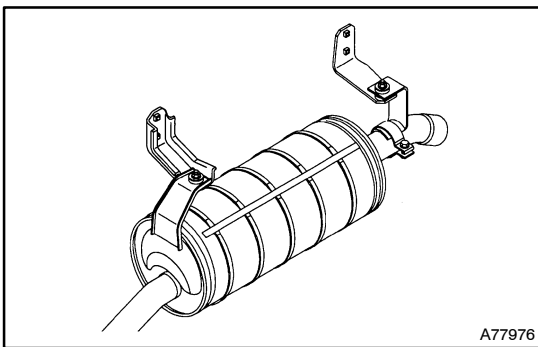
REMOVAL AND INSTALLATION

CAUTION:

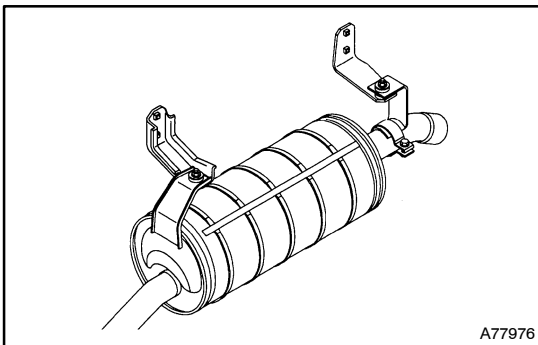
Do not touch the exhaust manifold while it is hot. You could be severely burned.



1. **DISCONNECT FRONT EXHAUST PIPE ASSY**
 - (a) Remove the 3 nuts and front exhaust pipe assy.



2. **REMOVE CENTER EXHAUST PIPE ASSY**
 - (a) Remove the 4 bolts and center exhaust pipe assy from the front exhaust pipe assy.

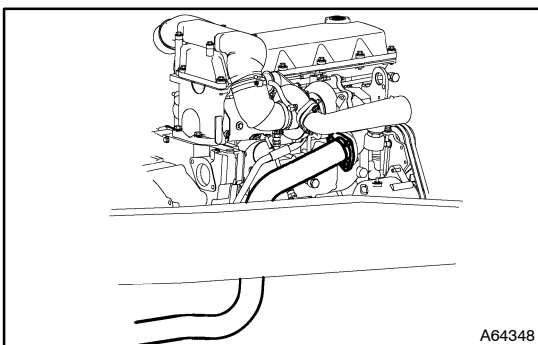


3. **INSTALL CENTER EXHAUST PIPE ASSY**

NOTICE:

If the tailpipe is incorrectly positioned, exhaust fumes may blow onto passers-by, which could result in burning.

- (a) Install the 4 bolts and center exhaust pipe assy to the front exhaust pipe assy.

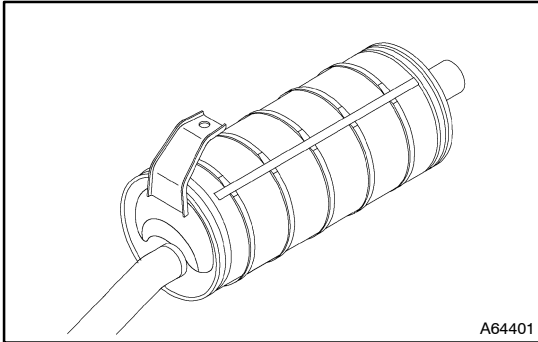


4. **CONNECT FRONT EXHAUST PIPE ASSY**
Torque: 70 N·m (700 kgf·cm, 52 ft·lbf)

HINT:

- Replace the gasket with a new one.
 - The mounting portion of the exhaust manifold is subjected to heat and is likely to come loose, and so special nuts should be employed. Be sure to use the correct nuts.
- (a) Connect the front exhaust pipe assy with 3 nuts.

INSPECTION



1. INSPECT CENTER EXHAUST PIPE ASSY

- (a) Inspect the pipe assy for rust holes and dents caused by flying stones.

HINT:

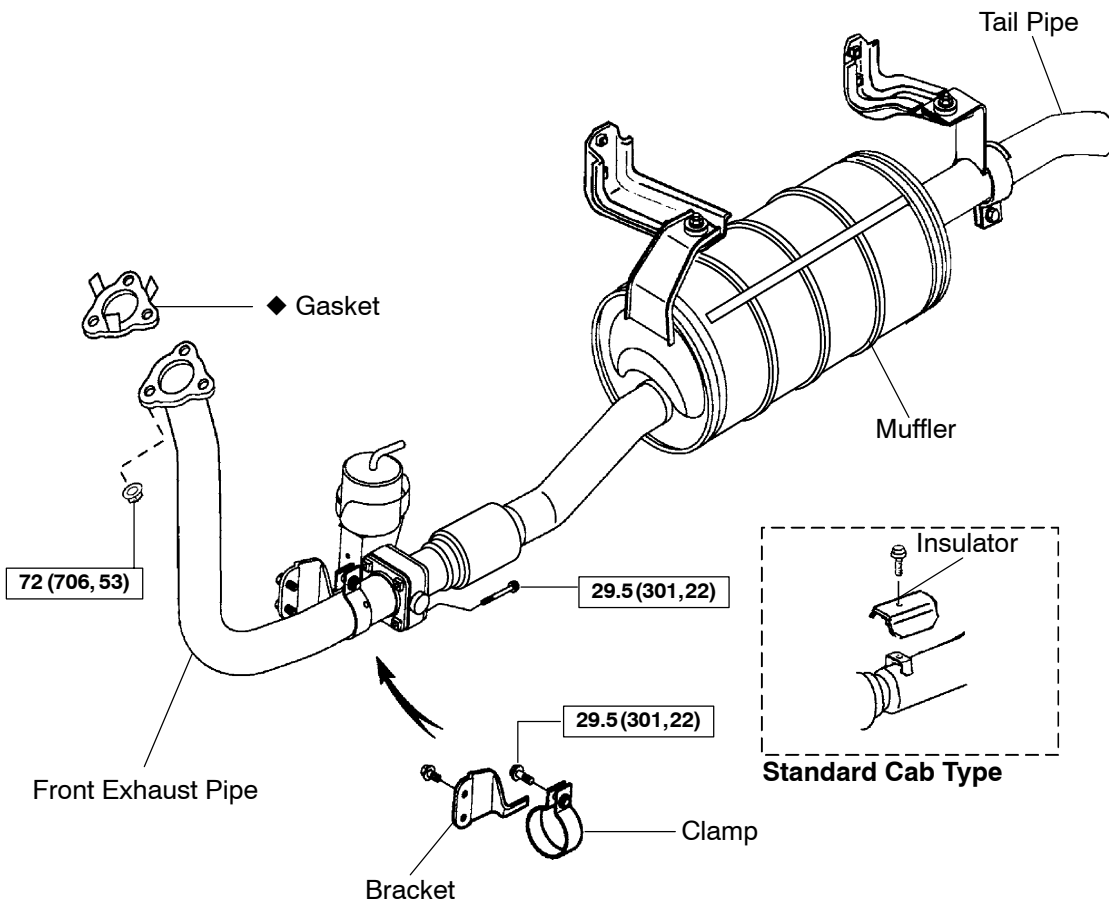
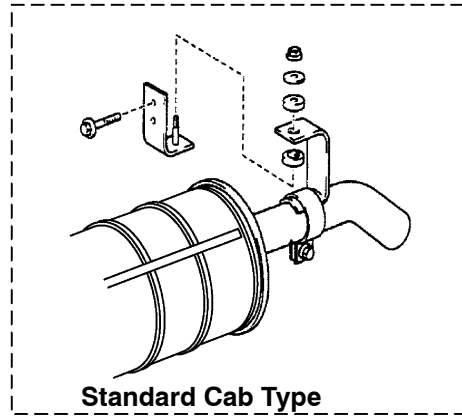
- Be particularly careful in the inspection.
- If there are holes or cracks in the exhaust muffler and pipe, the exhaust noise will increase and may exceed the noise regulation value. In addition, hot gas may blow out, resulting in fire.
- If the exhaust muffler and pipe are severely dented by flying stones, etc., the exhaust resistance will increase. It causes the output of the exhaust gas to decrease and also the fuel consumption to increase.

EXHAUST PIPE ASSY (W04D-J)

COMPONENTS

15094-02

Wide Cab Type



H

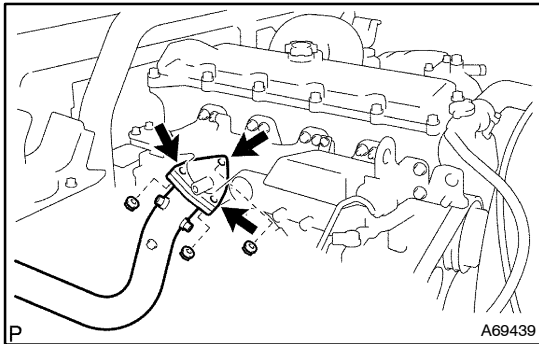
N·m (kgf·cm, ft·lbf)

 : Specified torque
◆ Non-reusable part

REMOVAL AND INSTALLATION

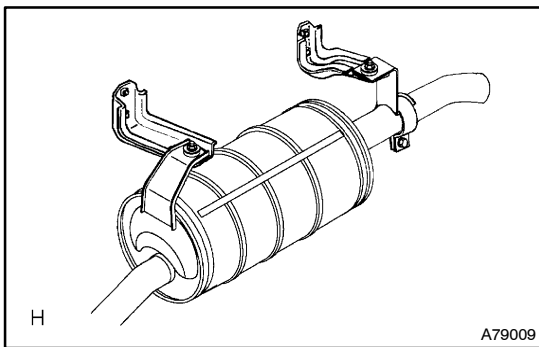
CAUTION:

Do not touch the exhaust manifold while it is hot. You could be severely burned.



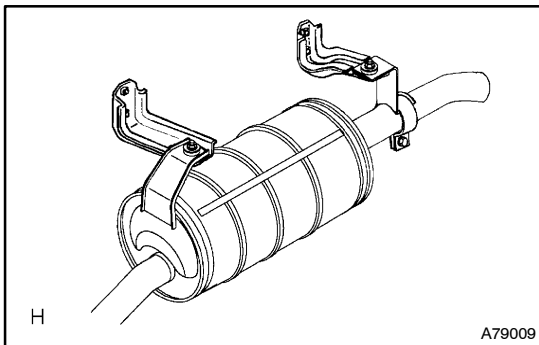
1. DISCONNECT FRONT EXHAUST PIPE ASSY

- (a) Remove the 3 nuts and front exhaust pipe assy.



2. REMOVE CENTER EXHAUST PIPE ASSY

- (a) Remove the 4 bolts and center exhaust pipe assy from the front exhaust pipe assy.

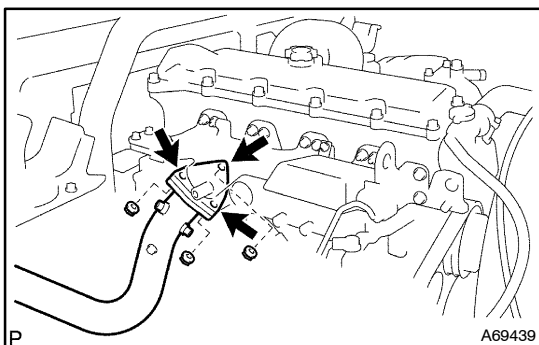


3. INSTALL CENTER EXHAUST PIPE ASSY

NOTICE:

If the the tailpipe is incorrectly positioned, exhaust fumes may blow onto passers-by, which could result in burning.

- (a) Install the 4 bolts and center exhaust pipe assy to the front exhaust pipe assy.



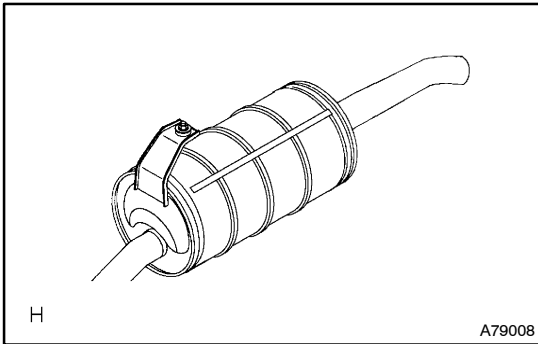
4. CONNECT FRONT EXHAUST PIPE ASSY

Torque: 72 N·m (706 kgf·cm, 53 ft·lbf)

HINT:

- Replace the gasket with a new one.
 - The mounting portion of the exhaust manifold is subjected to heat and is likely to come loose, and so special nuts should be employed. Be sure to use the correct nuts.
- (a) Connect the front exhaust pipe assy with the 3 bolts.

INSPECTION



1. INSPECT CENTER EXHAUST PIPE ASSY

- (a) Inspect the pipe assy for rust holes and dents caused by flying stones.

HINT:

- Be particularly careful in the inspection.
- If there are holes or cracks in the exhaust muffler and pipe, the exhaust noise will increase and may exceed the noise regulation value. In addition, hot gas may blow out, resulting in fire.
- If the exhaust muffler and pipe are severely dented by flying stones, etc., the exhaust resistance will increase. It causes the output of the exhaust gas to decrease and also the fuel consumption to increase.

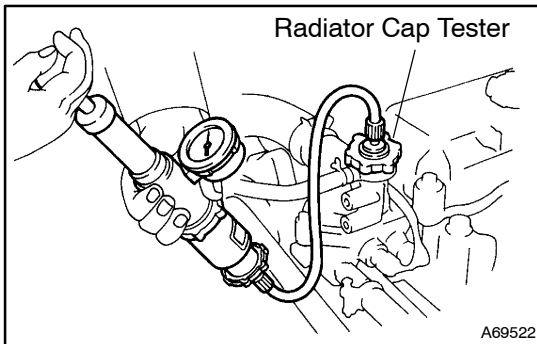
COOLING

COOLING SYSTEM (14B)	16-1	THERMOSTAT (S05C-TA)	16-54
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COOLING SYSTEM (14B)

ON-VEHICLE INSPECTION

160JU-01



1. INSPECT COOLING SYSTEM FOR LEAKS

- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Warm up the engine.
- (c) Stop the engine when it is warmed up.
- (d) Pump the radiator cap tester to 118 kPa (1.2 kgf/cm², 17.1 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and cylinder head.

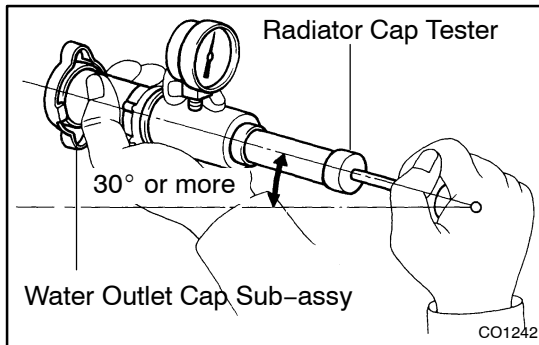
2. REINSTALL RADIATOR CAP

INSPECTION

1. INSPECT WATER OUTLET CAP SUB-ASSY

CAUTION:

To avoid the danger of being burned, do not remove the water outlet cap sub-assy while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



- (a) Inspect the water outlet cap sub-assy.

NOTICE:

- If the water outlet cap sub-assy has contaminations, always rinse it with water.
- Before using a water outlet cap sub-assy tester, wet the relief valve and pressure valve with engine coolant or water.
- When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.

- (b) Using a water outlet cap sub-assy tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push 3 seconds or more

NOTICE:

Push the pump at a constant speed.

If no air is coming from the vacuum valve, replace the water outlet cap sub-assy.

- (c) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

Push the pump at a constant speed.

If no air is not coming from the vacuum valve, replace the water outlet cap sub-assy.

- (d) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

This pump speed applies for the first pump only (in order to close the vacuum valve). After this, the pump speed is reduced.

Standard opening pressure:

74 – 103 kPa (0.75 – 1.05 kgf/cm², 10.7 – 14.9 psi)

Minimum opening pressure:

59 kPa (0.6 kgf/cm², 8.5 psi)

HINT:

Use the maximum reading on the tester as the opening pressure.

If the opening pressure is less than the minimum, replace the water outlet cap sub-assy.

ENGINE COOLANT (14B)

160JW-01

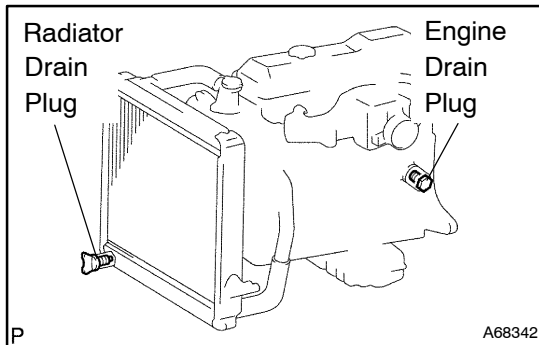
REPLACEMENT

1. DRAIN ENGINE COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

- (a) Remove the radiator cap.



- (b) Loosen the radiator drain plug and engine drain plug, and drain the coolant.

- (c) Close the drain plugs.

Torque: 13 N·m (133 kgf·cm, 9.6 in·lbf)

2. REFILL ENGINE COOLANT

- (a) Slowly fill the system with coolant.
- Use of improper coolants may damage the engine cooling system.
 - Use "Toyota Super Long Life Coolant" or equivalent and mix it with plain water according to the manufacturer's directions.
 - Using coolant which includes ethylene-glycol more than 50 % (freezing protection down to -35°C (-31°F)) or 60 % (freezing protection down to -50°C (-58°F)) is recommended but not more than 70 %.

NOTICE:

- **Do not use an alcohol type coolant or plain water alone.**
- **The coolant should be mixed with plain water (preferably demineralized water or distilled water).**

Capacity: 11.4 liters (12 US qts, 10 Imp. qts)

- (b) Reinstall the radiator cap.
- (c) Start the engine, and bleed air from the cooling system.
- Open the heater water valve.
 - Warm up the engine.
 - Stop the engine, and wait until the engine coolant.
- (d) Refill the radiator reservoir with coolant until it reaches the "full" line.

3. CHECK FOR ENGINE COOLANT LEAKS

4. CHECK ENGINE COOLANT SPECIFIC GRAVITY CORRECTLY

THERMOSTAT (14B)

160JX-01

REPLACEMENT

HINT:

The removal of the thermostat would have an adverse effect, causing a lowering of the cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

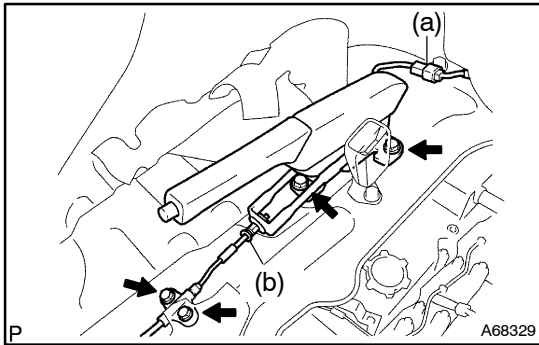
1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **DRAIN ENGINE COOLANT**
3. **DISCONNECT RADIATOR HOSE INLET**
4. **REMOVE THERMOSTAT**
 - (a) Remove the 3 bolts and thermostat case cover from the water outlet housing.
 - (b) Remove the thermostat.
 - (c) Remove the gasket from the thermostat.
5. **INSTALL THERMOSTAT**
 - (a) Install a new gasket to the thermostat.
 - (b) Install the thermostat.
 - (c) Install the thermostat case cover with the 3 bolts.
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)
6. **INSTALL RADIATOR HOSE INLET**
7. **REFILL ENGINE COOLANT**
8. **CONNECT BATTERY NEGATIVE TERMINAL**
9. **CHECK FOR ENGINE COOLANT LEAKS**

WATER PUMP ASSY (14B)

REPLACEMENT

160JY-01

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
4. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE)

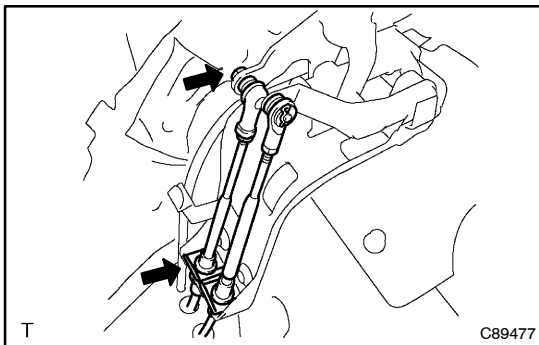


5. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE)

- (a) Disconnect the parking barake switch connector.
- (b) Fixing the adjusting nut, loosen the lock nut.
- (c) Remove the 4 bolts and parking brake lever.

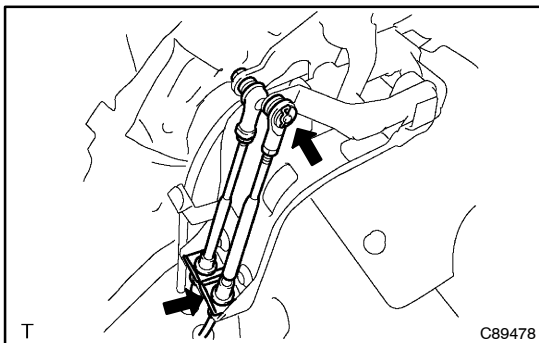
6. REMOVE FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
7. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE)

- (a) Remove the 3 clips and shift lever boot cover.

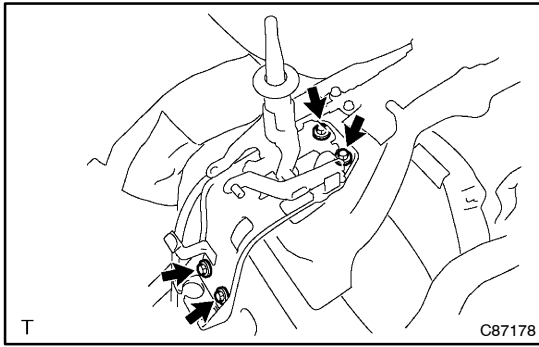


8. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE)

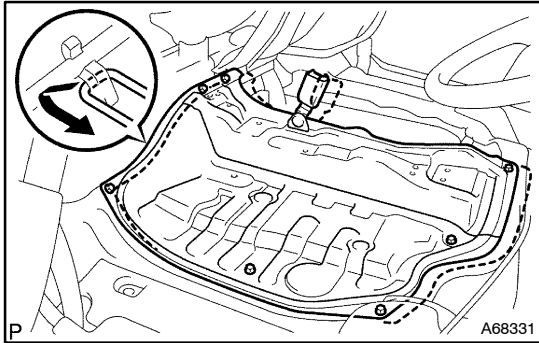
- (a) Remove the nut, and disconnect the shift cable from the floor shift.
- (b) Remove the clip, and disconnect the shift cable from the floor shift lever retainer.



- (c) Remove the clip, and disconnect the select cable from the floor shift.
- (d) Remove the clip, and disconnect the select cable from the shift lever retainer.



9. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE)



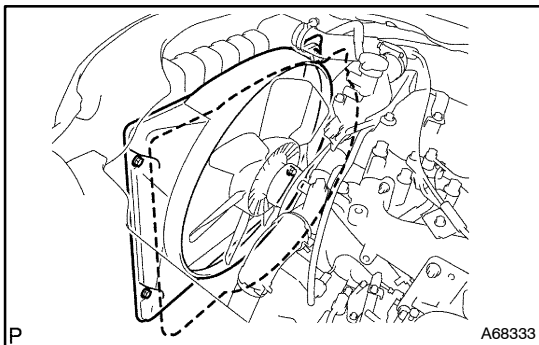
10. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

- (a) Remove the floor mat.
- (b) Remove the 7 bolts and engine service hole sub cover.

HINT:

As shown in the illustration, slide and remove the engine service hole sub cover, because there is a hook inside.

- 11. DISCONNECT RADIATOR HOSE INLET**
- 12. DISCONNECT RADIATOR HOSE OUTLET**

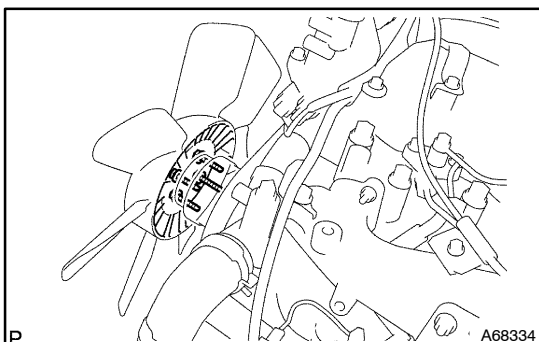


13. REMOVE FAN SHROUD

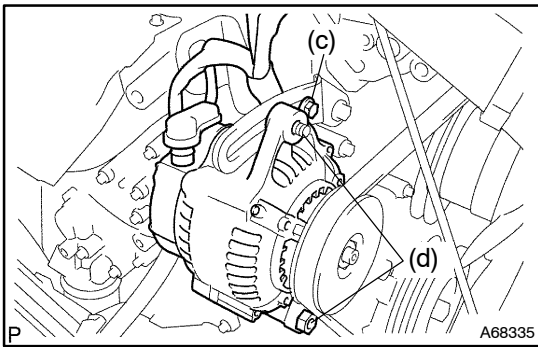
- (a) Remove the 4 bolts, and move the fan shroud in the illustrated direction.

NOTICE:

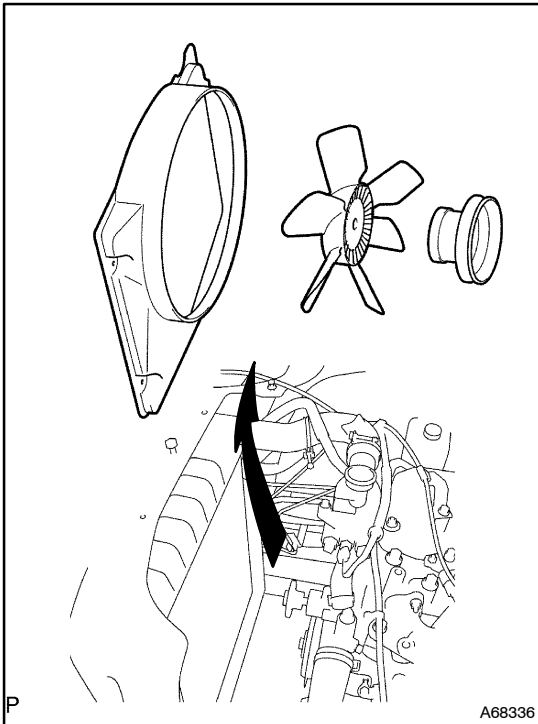
Be careful not to damage the radiator core and the drive belt.



- (b) Loosen the fan bolts.



- (c) Remove the bolt and wire clamp.
- (d) Loosen the 2 bolts and remove the drive belt.



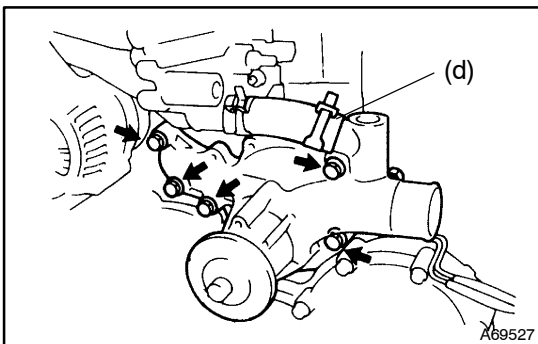
- (e) Remove the 4 bolts, fan shroud, fan and pulley.

NOTICE:

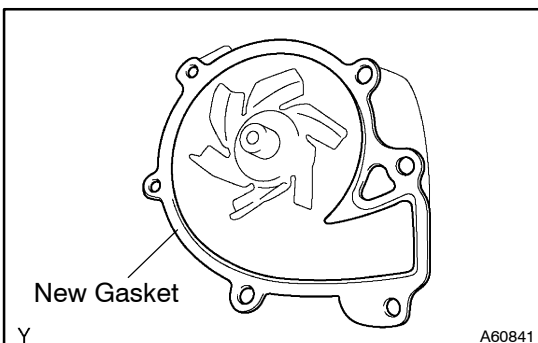
Be careful not to damage the radiator core.

14. REMOVE WATER PUMP ASSY

- (a) Remove the 2 bolts.
- (b) Disconnect the radiator hose from the water pump, and remove the radiator pipe.

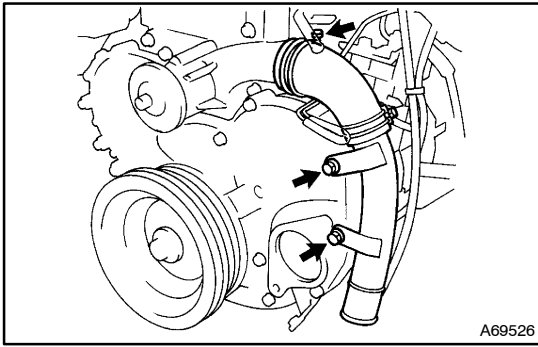


- (c) Remove the 5 bolts.
- (d) Disconnect the water bypass hose to the water pump, and remove the water pump and gasket.

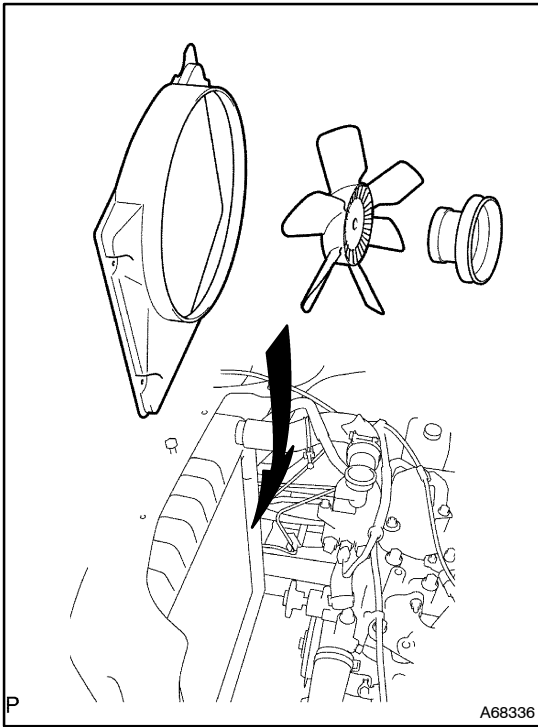
**15. INSTALL WATER PUMP ASSY**

- (a) Install a new gasket to the water pump cover.
- (b) Place a new gasket in position on the cylinder block.
- (c) Connect the water bypass hose to the water pump.
- (d) Temporarily install the water pump with the 5 bolts.
- (e) Tighten the bolts.

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)



- (f) Connect the radiator hose to the water pump.
 - (g) Install the radiator pipe with the 2 bolts.
- Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)**



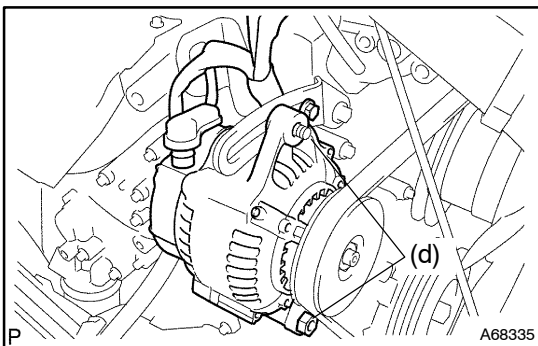
16. INSTALL FAN SHROUD

- (a) Install the fan shroud, fan and pulley.

NOTICE:

Be careful not to damage the radiator core.

- (b) Temporarily tighten the fan bolts.

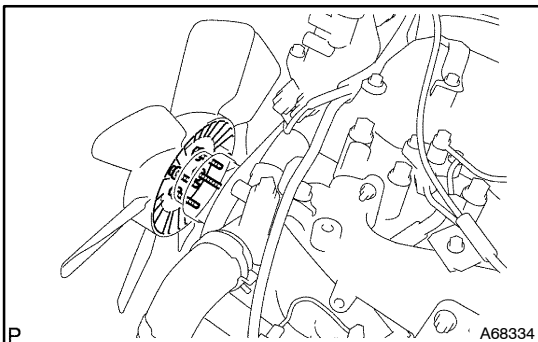


- (c) Install the drive belt and adjust the belt tension (See page 14-1).
- (d) Tighten the 2 bolts.

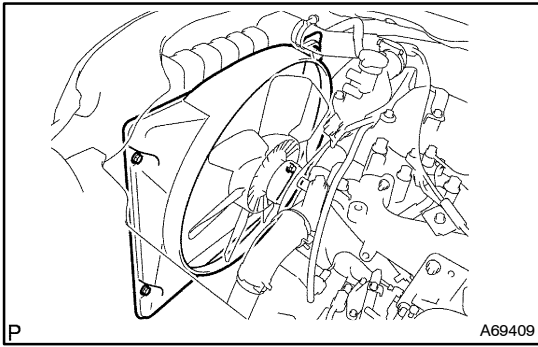
Torque:

14 mm head 35 N·m (360 kgf·cm, 26 ft·lbf)

17 mm head 37.5 N·m (382 kgf·cm, 28 ft·lbf)



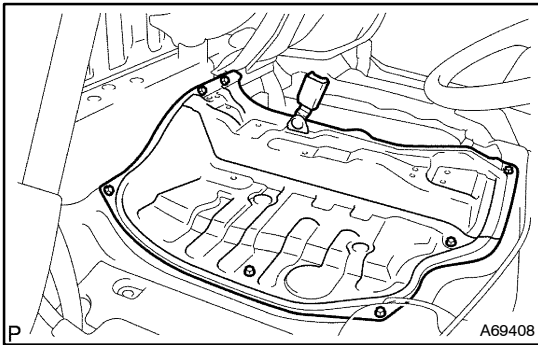
- (e) Tighten the 4 bolts.
- Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)**



- (f) Install the fan shroud with the 4 bolts.
Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)

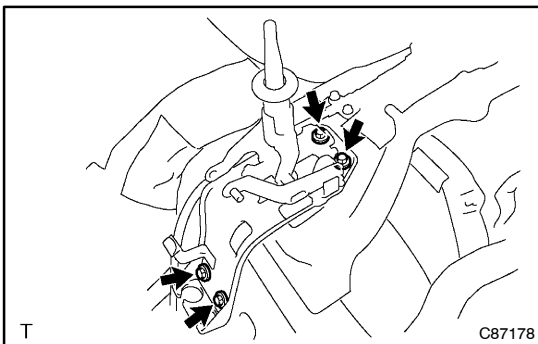
NOTICE:

Be careful not to damage the radiator core and the drive belt.



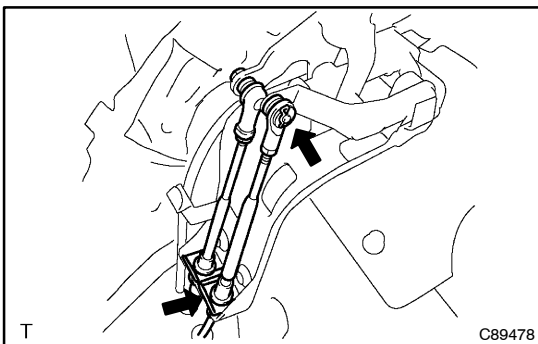
17. INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

- (a) Install the engine service hole sub cover with the 7 bolts.
Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)
 (b) Install the floor mat.



18. INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE)

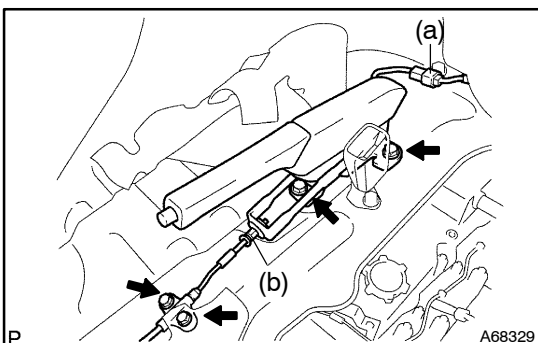
- (a) Install the floor shift assy to the floor with the 4 bolts.
Torque: 18 N·m (183 kgf·cm, 13 ft·lbf)



19. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE)

- (a) Install the select cable to the shift lever retainer with the clip.
 (b) Install the select cable to the floor shift with the clip.
 (c) Install the shift cable to the shift lever retainer with the clip.
 (d) Temporarily install the shift cable to the floor shift with the nut.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)



20. INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE)

- (a) Install the parking brake lever with the 4 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
 (b) Connect the parking brake switch connector.

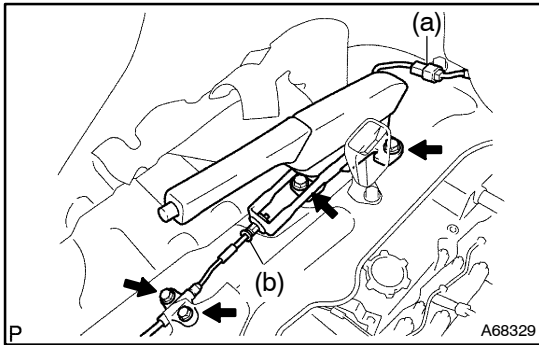
21. **INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)**
(See page 72-2)
22. **ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)**
(See page 33-11)
23. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)**
24. **REFILL ENGINE COOLANT**
25. **CONNECT BATTERY NEGATIVE TERMINAL**
26. **CHECK FOR ENGINE COOLANT LEAKS**

RADIATOR ASSY (14B)

REPLACEMENT

160JZ-01

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE
4. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
5. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE)

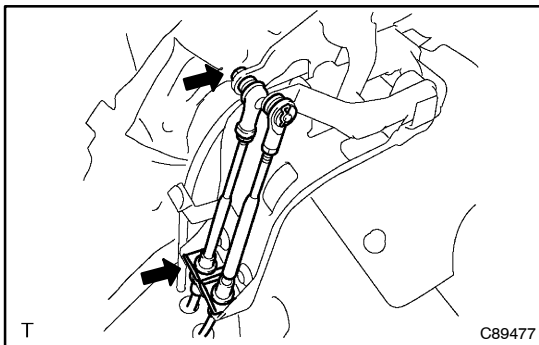


6. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE)

- (a) Disconnect the parking barake switch connector.
- (b) Fixing the adjusting nut, loosen the lock nut.
- (c) Remove the 4 bolts and parking brake lever.

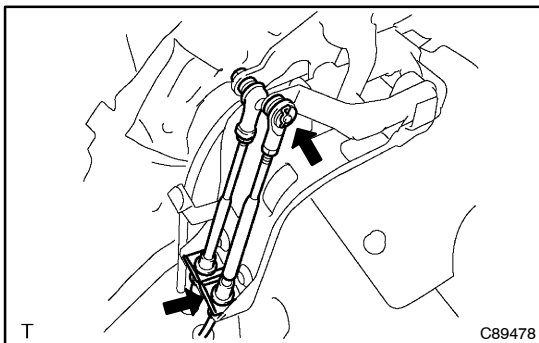
7. REMOVE FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
8. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE)

- (a) Remove the 3 clips and shift lever boot cover.

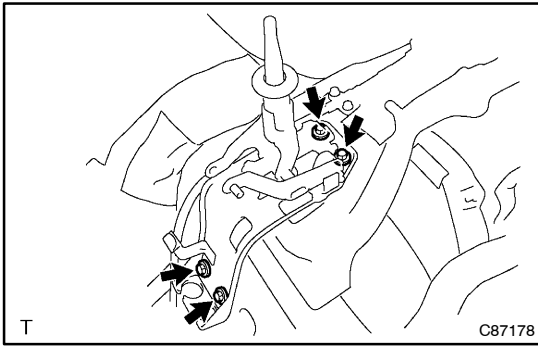


9. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE)

- (a) Remove the nut, and disconnect the shift cable from the floor shift.
- (b) Remove the clip, and disconnect the shift cable from the floor shift lever retainer.

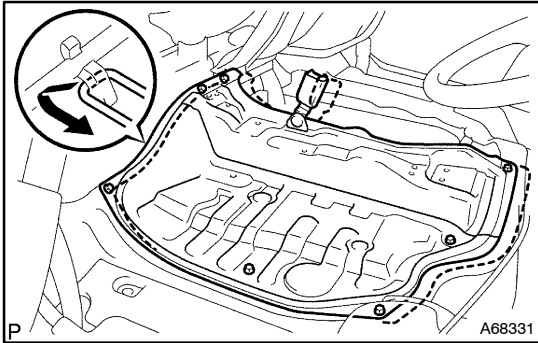


- (c) Remove the clip, and disconnect the select cable from the floor shift.
- (d) Remove the clip, and disconnect the select cable from the shift lever retainer.



10. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE)

- (a) Remove the 4 bolts and floor shift.



11. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

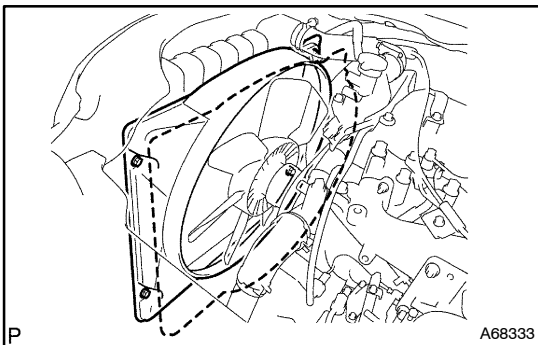
- (a) Remove the floor mat.
 (b) Remove the 7 bolts and engine service hole sub cover.

HINT:

As shown in the illustration, slide and remove the engine service hole sub cover, because there is a hook inside.

12. DISCONNECT RADIATOR HOSE INLET

13. DISCONNECT RADIATOR HOSE OUTLET

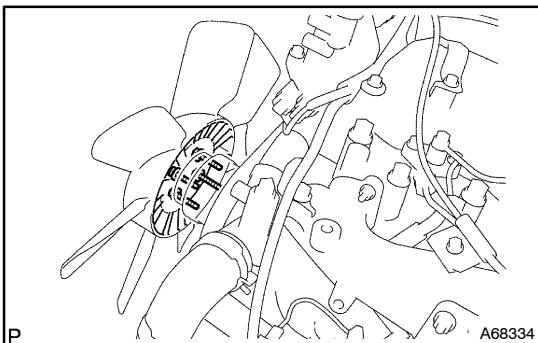


14. REMOVE FAN SHROUD

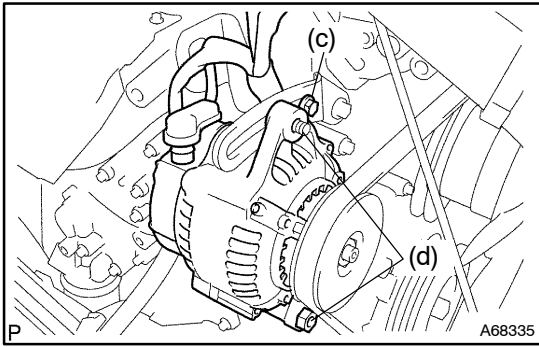
- (a) Remove the 4 bolts, and move the fan shroud in the illustrated direction.

NOTICE:

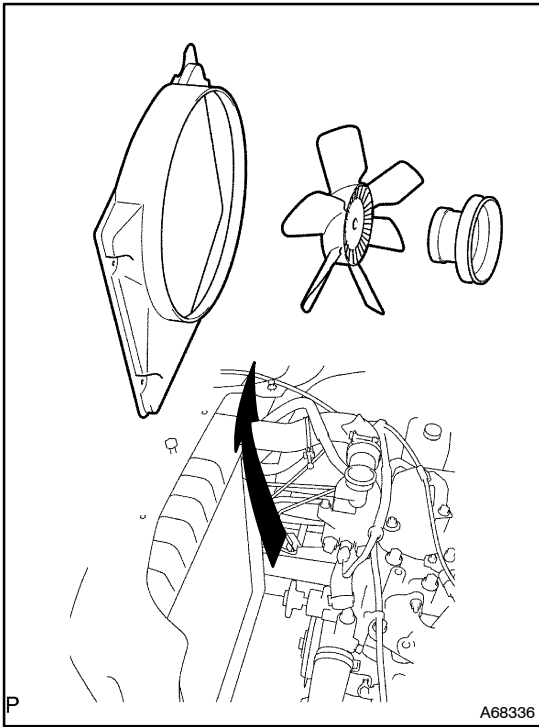
Be careful not to damage the radiator core and the drive belt.



- (b) Loosen the fan bolts.



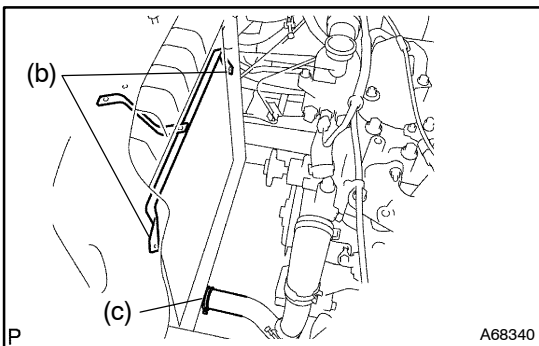
- (c) Remove the bolt and wire clamp.
- (d) Loosen the 2 bolts and remove the drive belt.



- (e) Remove the 4 bolts and fan shroud, fan and pulley together.

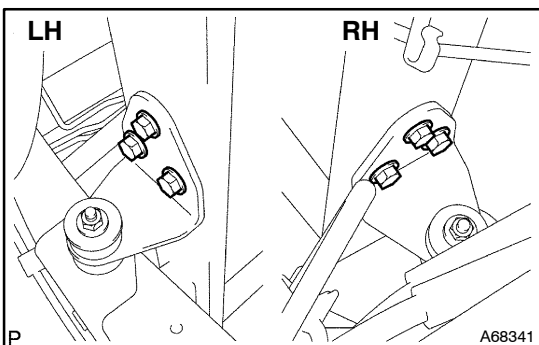
NOTICE:

Be careful not to damage the radiator core.

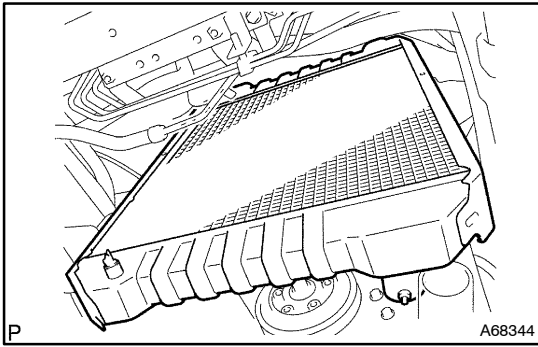


15. REMOVE RADIATOR ASSY

- (a) Disconnect the throttle wire and engine wire harness.
- (b) Disconnect the radiator outlet hose.
- (c) Remove the 2 bolts from the stay.



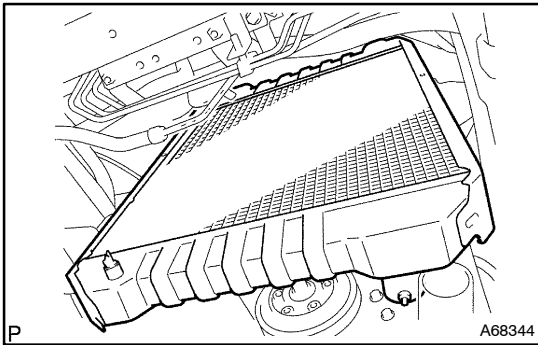
- (d) Remove the 6 bolts and 2 nuts from the stay on the radiator mounting brackets.



(e) Remove the radiator.

NOTICE:

Be careful not to damage the radiator core.

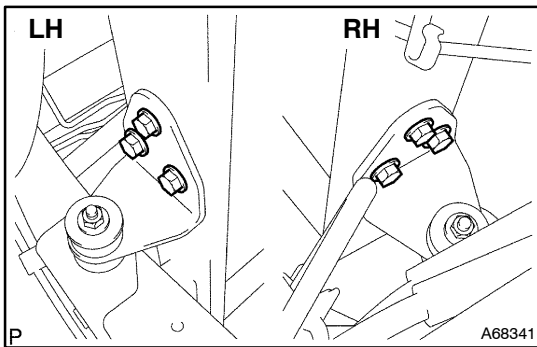


16. INSTALL RADIATOR ASSY

(a) Install the radiator.

NOTICE:

Be careful not to damage the radiator core.

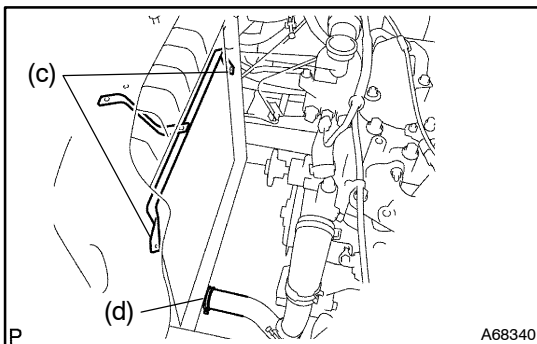


(b) Install the radiator with the 6 bolts and 2 nuts.

Torque:

18 N·m (184 kgf·cm, 13 ft·lbf) for bolt

7.5 N·m (76 kgf·cm, 66 in·lbf) for nut

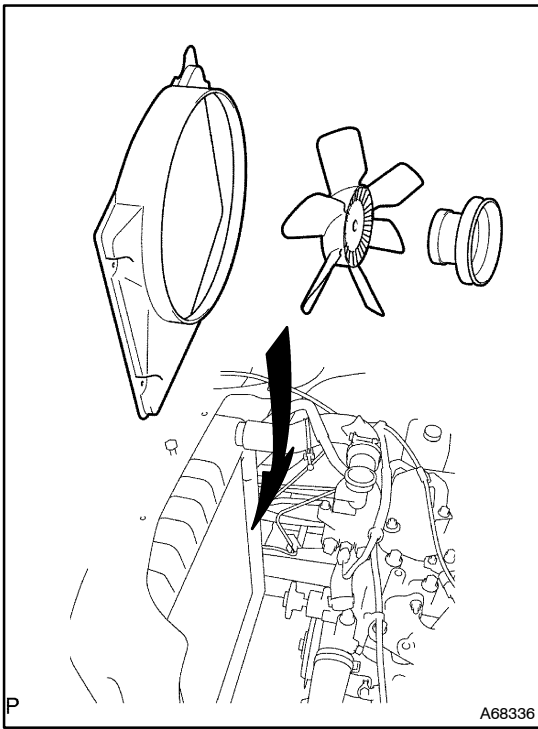


(c) Install the stay with the 2 bolts.

Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)

(d) Connect the radiator outlet hose.

(e) Connect the throttle wire and engine wire harness.

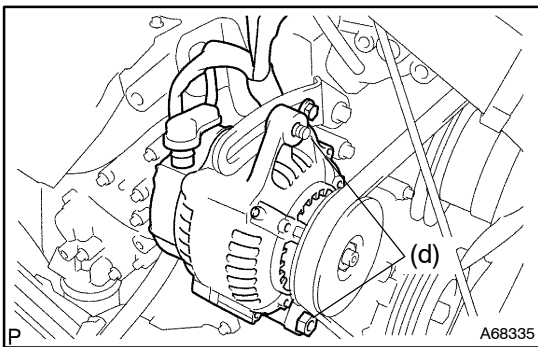
**17. INSTALL FAN SHROUD**

- (a) Install the fan shroud, fan and pulley.

NOTICE:

Be careful not to damage the radiator core.

- (b) Temporarily tighten the fan bolts.



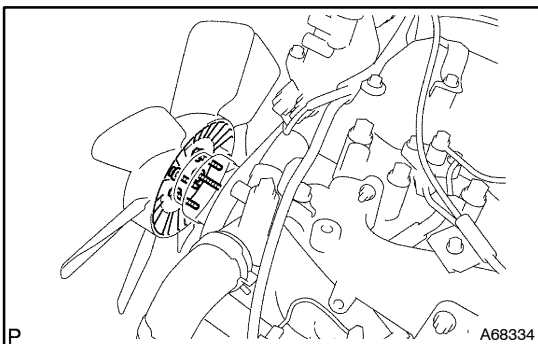
- (c) Install the drive belt and adjust the belt tension (See page 14-1).

- (d) Tighten the 2 bolts.

Torque:

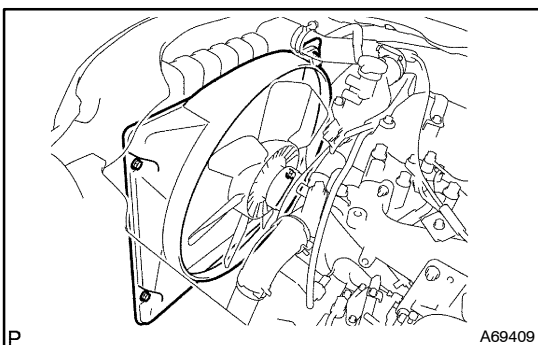
35 N·m (360 kgf·cm, 26 ft·lbf) for 14 mm head

37.5 N·m (382 kgf·cm, 28 ft·lbf) for 17 mm head



- (e) Tighten the 4 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

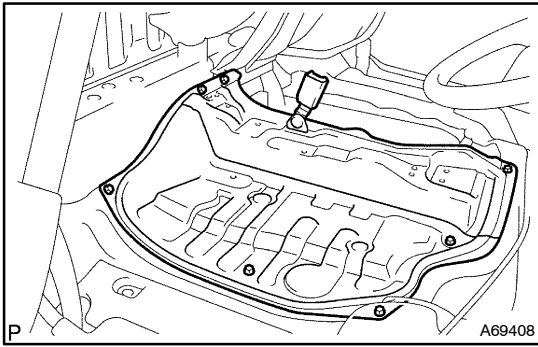


- (f) Install the fan shroud with the 4 bolts.

Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)

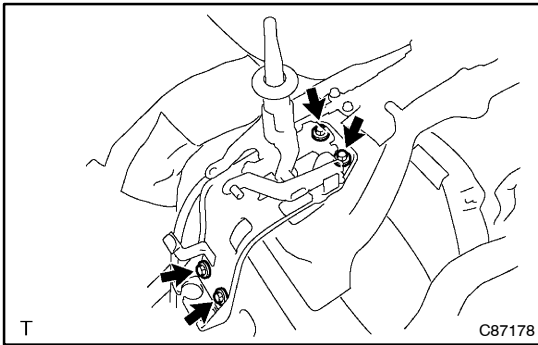
NOTICE:

Be careful not to damage the radiator core and the drive belt.



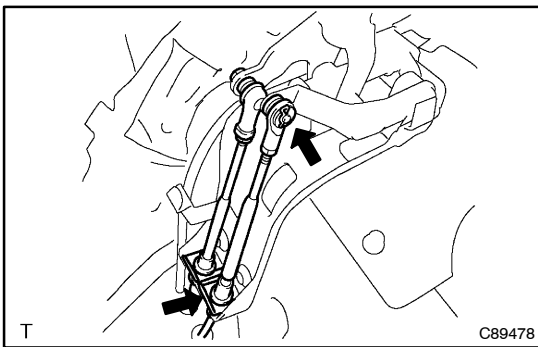
18. INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

- (a) Install the engine service hole sub cover with the 7 bolts.
Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)
- (b) Install the floor mat.



19. INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE)

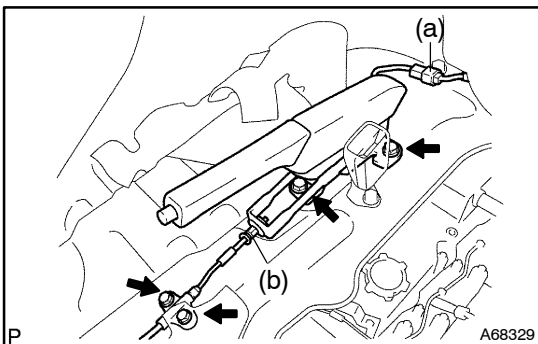
- (a) Install the floor shift to the floor with the 4 bolts.
Torque: 18 N·m (183 kgf·cm, 13 ft·lbf)



20. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE)

- (a) Install the select cable to the shift lever retainer with the clip.
- (b) Install the select cable to the floor shift assy with the clip.
- (c) Install the shift cable to the shift lever retainer with the clip.
- (d) Temporarily install the shift cable to the floor shift with the nut.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)



21. INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE)

- (a) Install the parking brake lever with the 4 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
- (b) Connect the parking barake switch connector.

22. INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)

23. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)
(See page 33-11)

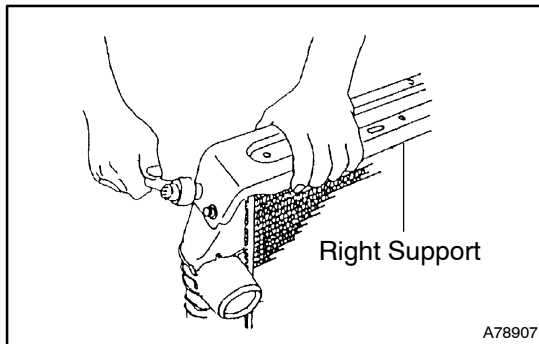
24. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)

25. REFILL ENGINE COOLANT

26. CONNECT BATTERY NEGATIVE TERMINAL

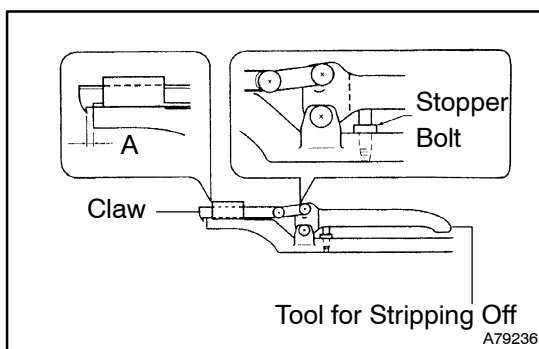
27. CHECK FOR ENGINE COOLANT LEAKS

OVERHAUL



1. REMOVE LEFT AND RIGHT SIDE PLATE

- (a) Remove the all square head M8 (4 or 8) bolts to remove the left and the right side plate.
- (b) Remove the side seal and radiator packing.
- (c) Remove the drain cock.



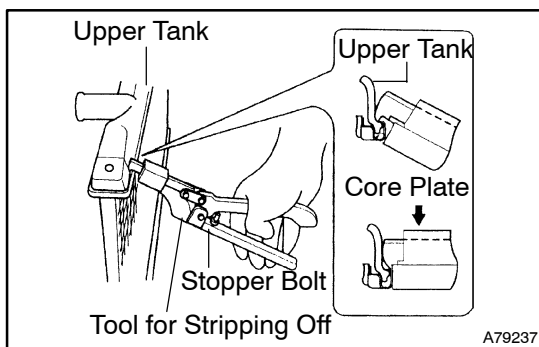
2. REMOVE UPPER AND LOWER TANKS

- (a) Adjust the dimension of the portion A of the illustration by means of a stopper bolt so that it may become 0.2 to 0.3 mm under the condition that the handle of the SST is gripped by means of a stopper bolt.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

Be sure to adjust it to prevent an eventual damage of the claw.

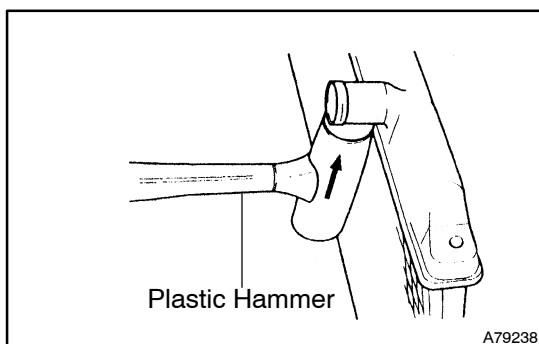


- (b) As the aluminum radiator adopts an integral caulking construction by the core plate, remove the upper and the lower tanks by lifting up the core plate in such a way that the latter may not be damaged. Release the calking by using the stripping off tool and by gripping it until it hits the stopper bolt of the handle as shown on the illustration.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

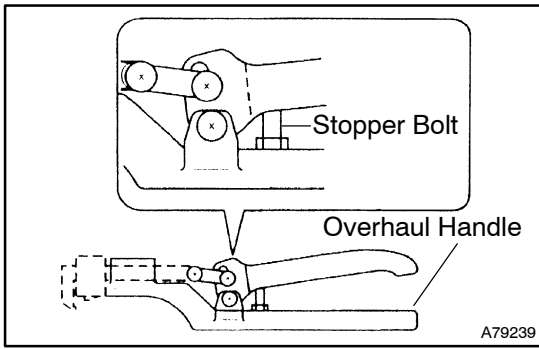
Don't lift up the core plate more than 90°.



- (c) Remove the upper and lower tanks by lightly tapping the radiator hose fitting position.

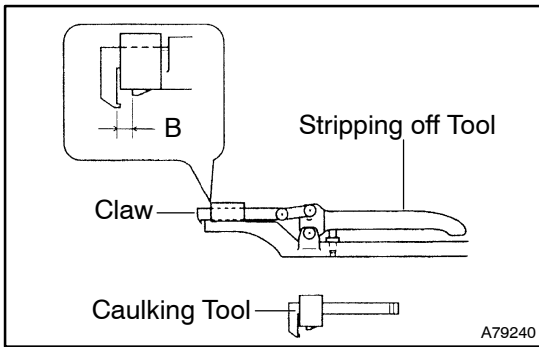
NOTICE:

- Remember mounting direction of the core sub-assembly.
- Remount it in such a way that the original direction can be maintained.

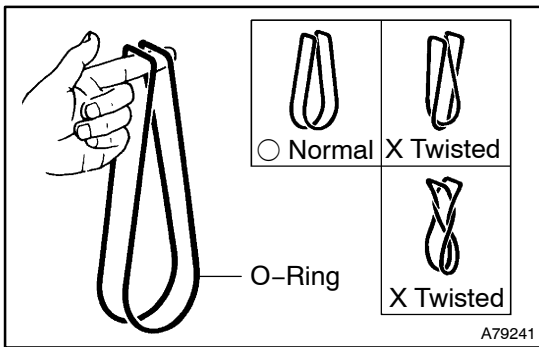


3. FIT CAULKING TOOL ON OVERHAUL HANDLE BY MARKING

- (a) Use of the hole of position on the illustration (either of the 2 holes will do).
SST 09230-01010 (09231-01010, 09231-01020), 09231-14010



- (b) Adjust with the stopper bolt so that the dimension of part B in the figure is within the range of the reference value when the handle is gripped.

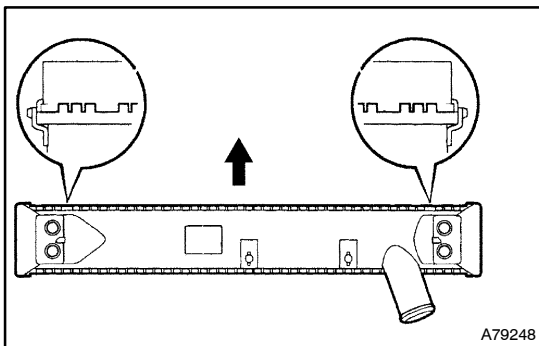


4. INSTALL UPPER AND LOWER TANKS

- (a) After having checked that there remains no foreign matter on the fitting position, mount a new O-ring in such a way that it will not be twisted.

NOTICE:

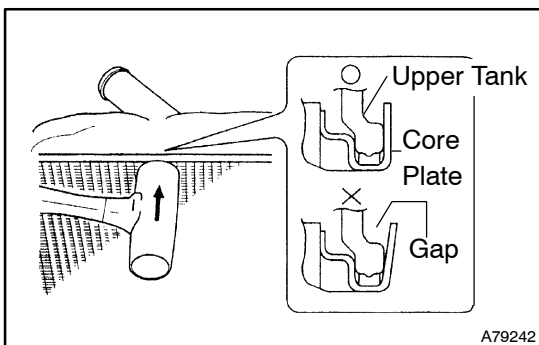
When cleaning the fitting position, lightly rub the said portion by using a sand paper, etc.



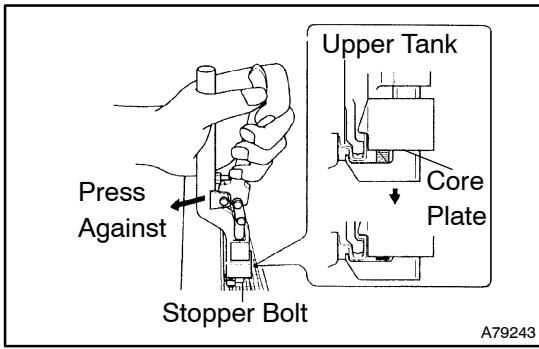
- (b) The notch in the radiator core shall be at the front side as shown in the figure.

NOTICE:

As the construction of the core has directionality in front back direction, do not install it with reversed orientation.



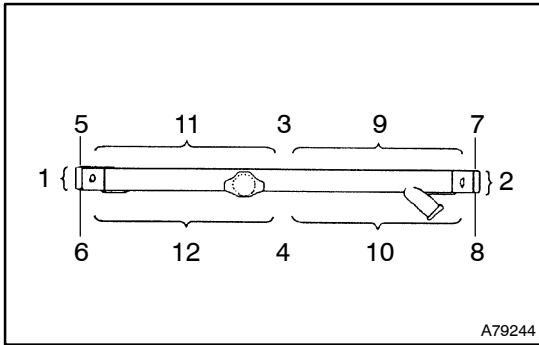
- (c) Set the upper and the lower tanks so that they will not be damaged.
- (d) Clap the core plate to obtain a contact with the upper and the lower tanks.



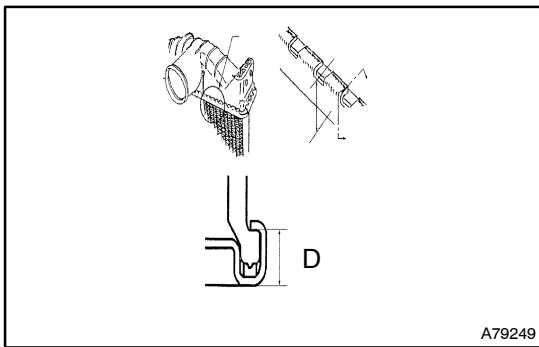
- (e) Press the caulking tool against the core plate as shown in the illustration. Perform temporary caulking by gripping the handle until it knocks at the stopper bolt of the handle.

NOTICE:

- For the positions where the caulking tool is not usable, perform the caulking by using pliers.



- Perform the caulking according to the following sequence.



- (f) Check the dimension D after caulking.
Standard dimension: 8.45 – 8.85 mm (0.33 – 0.34 in.)
- (g) In the event that the said dimension does not fall within the standard limit, adjust the stopper bolt of the handle once again and perform the caulking again.

NOTICE:

Check the caulking dimensions at both ends of the core plate as well as around the central portion where the caulking has not been applied (under the pipe, etc.).

- (h) Others:
Mark for the first repair for the second repair at a well visible place in the upper tank.

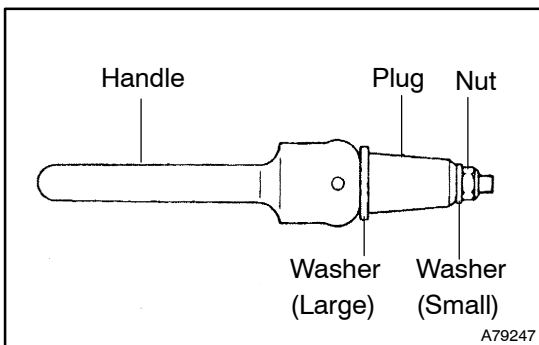
NOTICE:

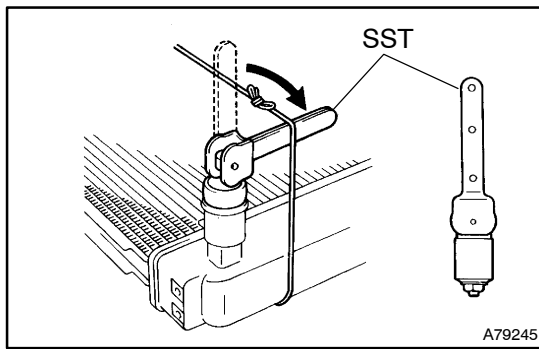
Re-caulking should be limited to 2 times. If it is necessary to recaulk more than twice, replace the part in question.

5. CHECK FOR WATER LEAKS

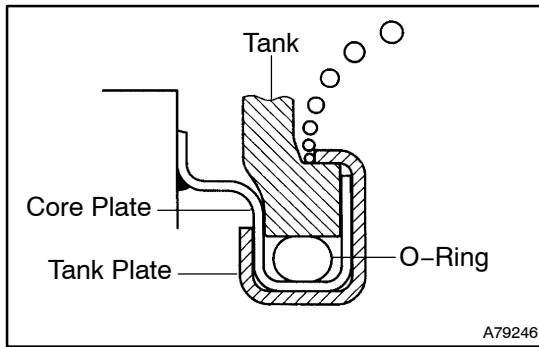
- (a) Assemble the plug handle as shown in the illustration and tighten the nut until the washer, the plug and the handle have light contact.

SST 09230-01010 (09231-00030, 09231-00050)





- (b) Using SST, plug the inlet and outlet pipes of the radiator.
SST 09230-01010 (09231-00030, 09231-00050)
- (c) Using a radiator cap tester, apply pressure to the radiator.
Test pressure: 177 kPa (1.8 kgf/cm², 25 psi)

**HINT:**

On the radiators with resin tanks, there is a clearance between the core plate and tank plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before performing the water leak test, first swirl the radiator around in the water until all air bubbles disappear.

6. INSTALL RADIATOR COCK

- (a) Install a new O-ring.

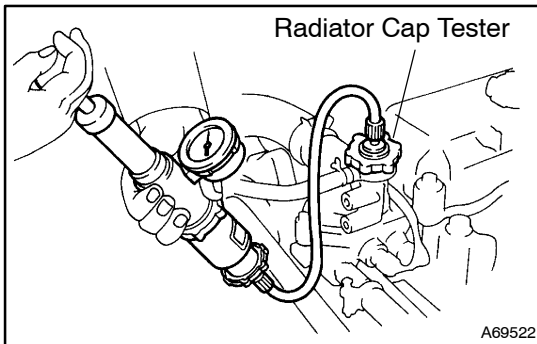
7. INSTALL LEFT AND RIGHT SIDE PLATE

- (a) Install the all square head bolts to remove the left and the right side plate.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

COOLING SYSTEM (15B-FTE) ON-VEHICLE INSPECTION

160K1-01



1. INSPECT COOLING SYSTEM FOR LEAKS

- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Warm up the engine.
- (c) Stop the engine when it is warmed up.
- (d) Pump the radiator cap tester to 118 kPa (1.2 kgf/cm², 17.1 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and cylinder head.

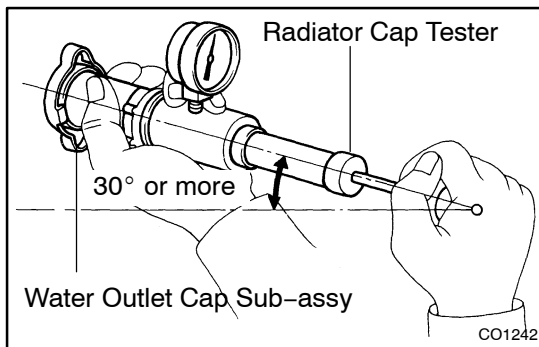
2. REINSTALL RADIATOR CAP

INSPECTION

1. INSPECT WATER OUTLET CAP SUB-ASSY

CAUTION:

To avoid the danger of being burned, do not remove the water outlet cap sub-assy while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



- (a) Inspect the water outlet cap sub-assy.

NOTICE:

- If the water outlet cap sub-assy has contaminations, always rinse it with water.
- Before using a water outlet cap sub-assy tester, wet the relief valve and pressure valve with engine coolant or water.
- When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.

- (b) Using a water outlet cap sub-assy tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push 3 seconds or more

NOTICE:

Push the pump at a constant speed.

If no air is coming from the vacuum valve, replace the water outlet cap sub-assy.

- (c) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

Push the pump at a constant speed.

If no air is not coming from the vacuum valve, replace the water outlet cap sub-assy.

- (d) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

This pump speed applies for the first pump only (in order to close the vacuum valve). After this, the pump speed is reduced.

Standard opening pressure:

93 – 123 kPa (0.95 – 1.25 kgf/cm², 13.5 – 17.1 psi)

Minimum opening pressure:

78 kPa (0.8 kgf/cm², 11.4 psi)

HINT:

Use the maximum reading on the tester as the opening pressure.

If the opening pressure is less than the minimum, replace the water outlet cap sub-assy.

ENGINE COOLANT (15B-FTE)

160K3-01

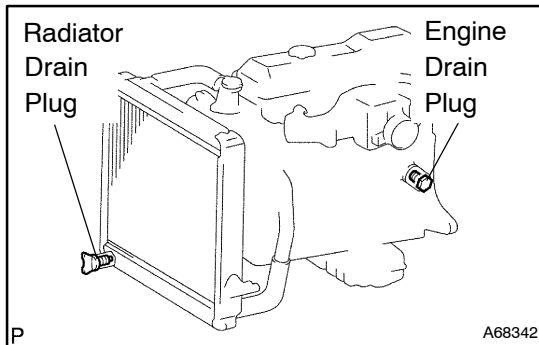
REPLACEMENT

1. DRAIN ENGINE COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

- (a) Remove the radiator cap.



- (b) Loosen the radiator drain plug and engine drain plug, and drain the coolant.

- (c) Close the drain plugs.

Torque: 13 N·m (132 kgf·cm, 9.5 ft·lbf)

2. REFILL ENGINE COOLANT

- (a) Slowly fill the system with coolant.
- Use of improper coolants may damage the engine cooling system.
 - Use "Toyota Super Long Life Coolant" or equivalent and mix it with plain water according to the manufacturer's directions.
 - Using coolant which includes ethylene-glycol more than 50 % (freezing protection down to -35°C (-31°F)) or 60 % (freezing protection down to -50°C (-58°F)) is recommended but not more than 70 %.

NOTICE:

- **Do not use an alcohol type coolant or plain water alone.**
- **The coolant should be mixed with plain water (preferably demineralized water or distilled water).**

Capacity: 11.4 liters (12 US qts, 10 Imp. qts)

- (b) Reinstall the radiator cap.
- (c) Start the engine, and bleed air from the cooling system.
- Open the heater water valve.
 - Warm up the engine.
 - Stop the engine, and wait until the engine coolant.
- (d) Refill the radiator reservoir with coolant until it reaches the "full" line.

3. CHECK FOR ENGINE COOLANT LEAKS

4. CHECK ENGINE COOLANT SPECIFIC GRAVITY CORRECTLY

THERMOSTAT (15B-FTE)

160K4-01

REPLACEMENT

HINT:

The removal of the thermostat would have an adverse effect, causing a lowering of the cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

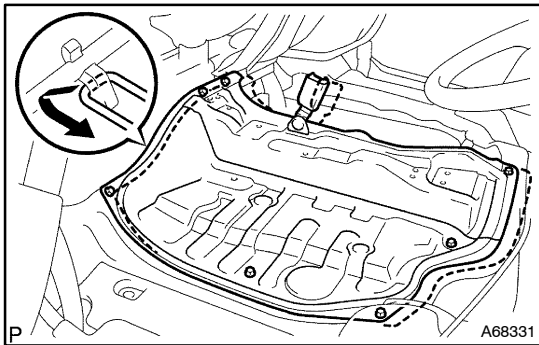
1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **DRAIN ENGINE COOLANT**
3. **DISCONNECT RADIATOR HOSE INLET**
4. **REMOVE THERMOSTAT**
 - (a) Remove the 3 bolts and thermostat case cover from the water outlet housing.
 - (b) Remove the thermostat.
 - (c) Remove the gasket from the thermostat.
5. **INSTALL THERMOSTAT**
 - (a) Install a new gasket to the thermostat.
 - (b) Install the thermostat.
 - (c) Install the thermostat case cover with the 3 bolts.
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)
6. **INSTALL RADIATOR HOSE INLET**
7. **REFILL ENGINE COOLANT**
8. **CONNECT BATTERY NEGATIVE TERMINAL**
9. **CHECK FOR ENGINE COOLANT LEAKS**

WATER PUMP ASSY (15B-FTE)

160K5-01

REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
4. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE)
5. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-11)
6. REMOVE FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
7. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE) (See page 41-19)
 - (a) Remove the 3 clips and shift lever boot cover.
8. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE)
9. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE)



10. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

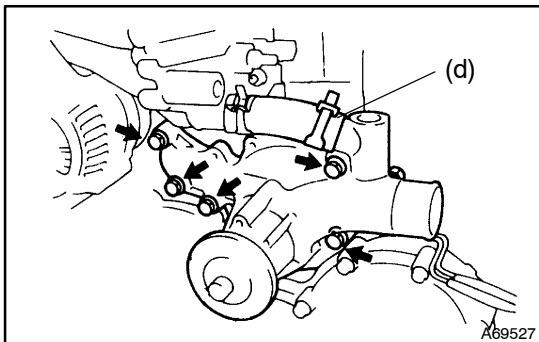
- (a) Remove the floor mat.
- (b) Remove the 7 bolts and engine service hole sub cover.

HINT:

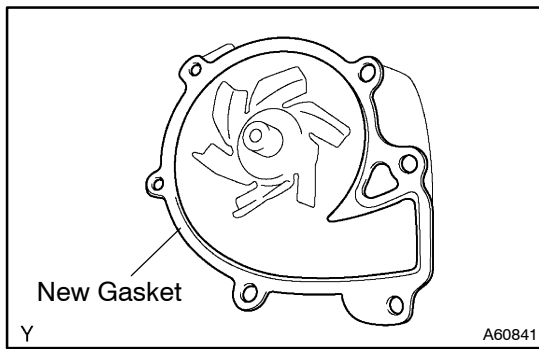
As shown in the illustration, slide and remove the engine service hole sub cover, because there is a hook inside.

11. DISCONNECT RADIATOR HOSE INLET
12. DISCONNECT RADIATOR HOSE OUTLET
13. REMOVE FAN SHROUD
14. REMOVE WATER PUMP ASSY

- (a) Remove the 2 bolts.
- (b) Disconnect the radiator hose from the water pump, and remove the radiator pipe.

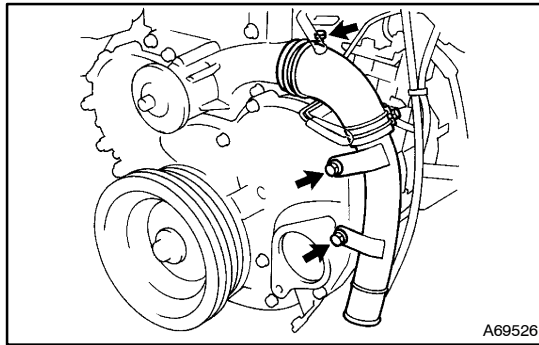


- (c) Remove the 5 bolts.
- (d) Disconnect the water bypass hose to the water pump, and remove the water pump and gasket.

**15. INSTALL WATER PUMP ASSY**

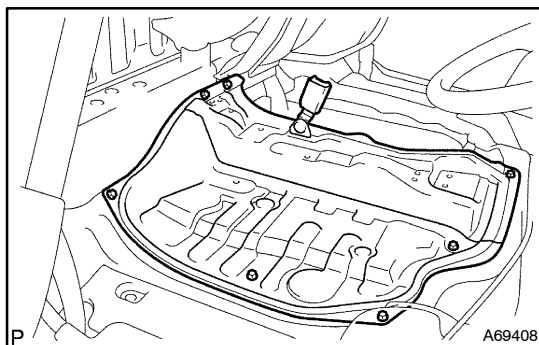
- (a) Install a new gasket to the water pump cover.
- (b) Place a new gasket in position on the cylinder block
- (c) Connect the water bypass hose to the water pump.
- (d) Temporarily install the water pump with the 5 bolts.
- (e) Tighten the bolts.

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)



- (f) Connect the radiator hose to the water pump.
- (g) Install the radiator pipe with the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

16. INSTALL FAN SHROUD**17. INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)**

- (a) Install the engine service hole sub cover with the 7 bolts.
Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)
- (b) Install the floor mat.

18. INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)

19. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)

20. INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-11)

21. INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE) (See page 72-2)

22. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE) (See page 33-11)

23. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)

24. REFILL ENGINE COOLANT

25. CONNECT BATTERY NEGATIVE TERMINAL

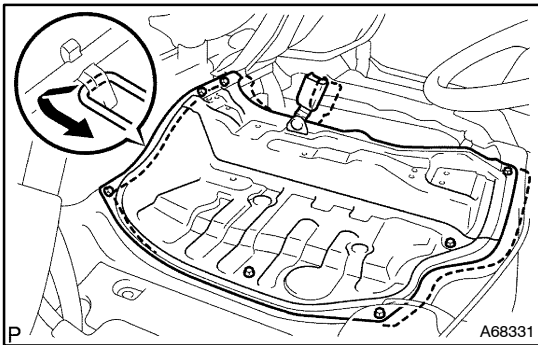
26. CHECK FOR ENGINE COOLANT LEAKS

RADIATOR ASSY (15B-FTE)

160K6-01

REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE
4. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
5. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE)
6. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-11)
7. REMOVE FLOOR SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
8. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE)
 - (a) Remove the 3 clips and shift lever boot cover.
9. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)
10. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE)



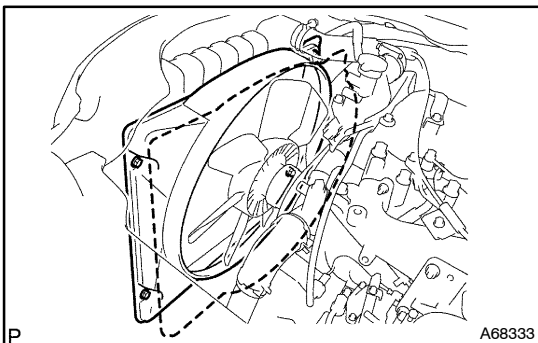
11. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

- (a) Remove the floor mat.
- (b) Remove the 7 bolts and engine service hole sub cover.

HINT:

As shown in the illustration, slide and remove the engine service hole sub cover, because there is a hook inside.

12. DISCONNECT RADIATOR HOSE INLET
13. DISCONNECT RADIATOR HOSE OUTLET

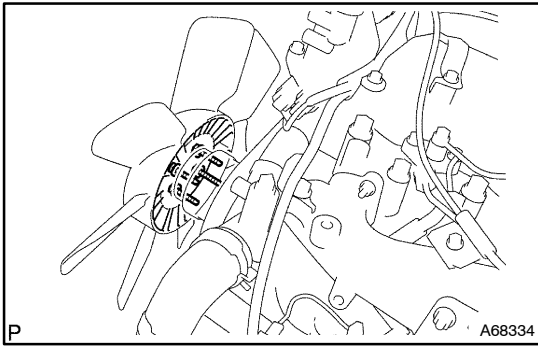


14. REMOVE FAN SHROUD

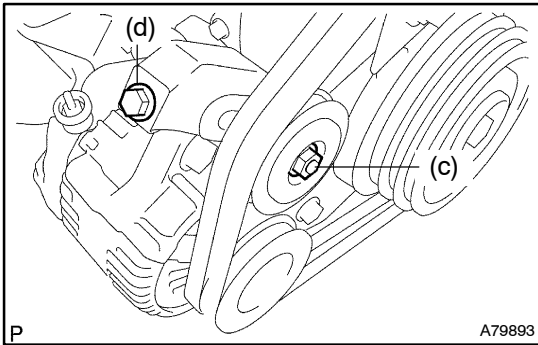
- (a) Remove the 4 bolts, and move the fan shroud in the illustrated direction.

NOTICE:

Be careful not to damage the radiator core and the drive belt.

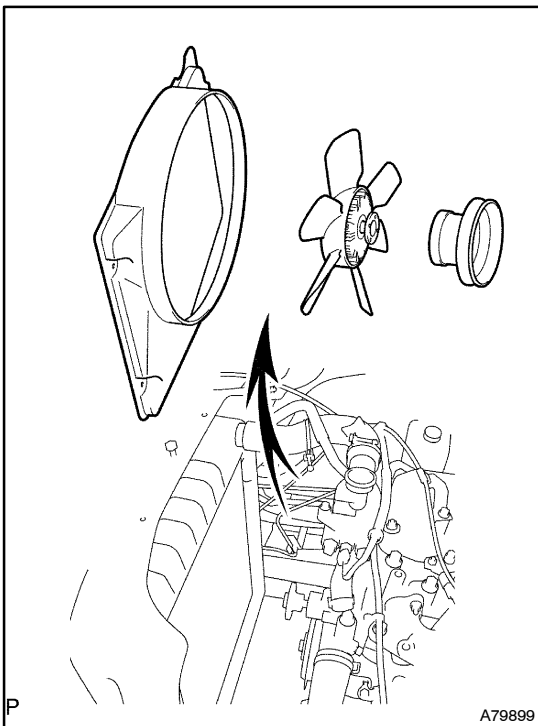


(b) Loosen the fan nuts.



(c) Loosen the nut.

(d) By turning the adjusting bolt, remove the V belt.



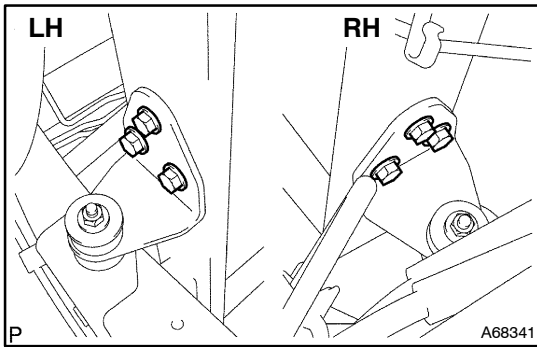
(e) Remove the 4 nuts and fan shroud, fan and pulley together.

NOTICE:

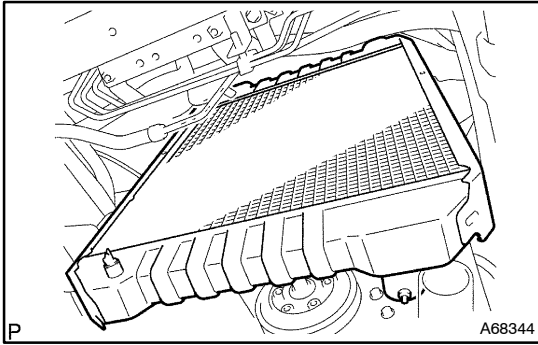
Be careful not to damage the radiator core.

15. REMOVE RADIATOR ASSY

(a) Disconnect the radiator outlet hose.



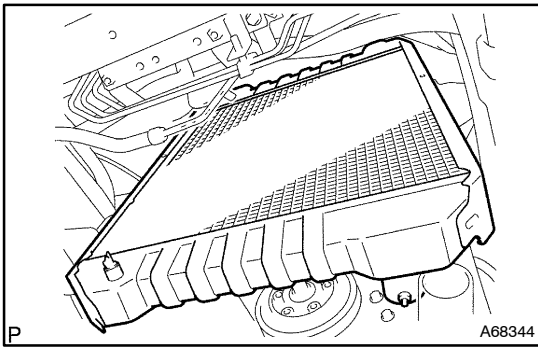
- (b) Remove the 6 bolts and 2 nuts from the stay on the radiator mounting brackets.



- (c) Remove the radiator assy.

NOTICE:

Be careful not to damage the radiator core.

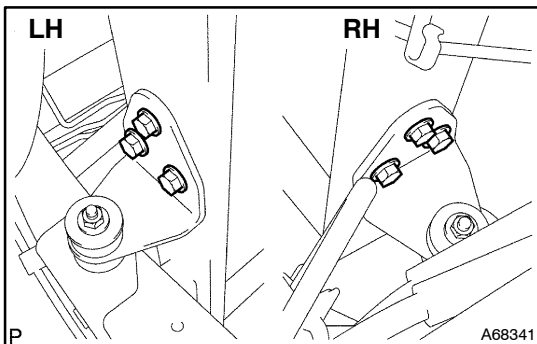


16. INSTALL RADIATOR ASSY

- (a) Install the radiator.

NOTICE:

Be careful not to damage the radiator core.



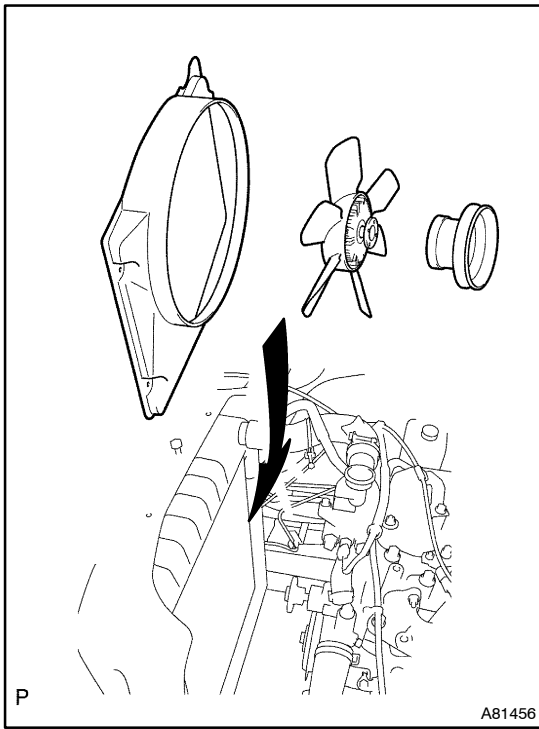
- (b) Install the radiator with the 6 bolts and 2 nuts.

Torque:

18 N·m (184 kgf·cm, 13 ft·lbf) for bolt

7.5 N·m (76 kgf·cm, 66 in·lbf) for nut

- (c) Connect the radiator outlet hose.

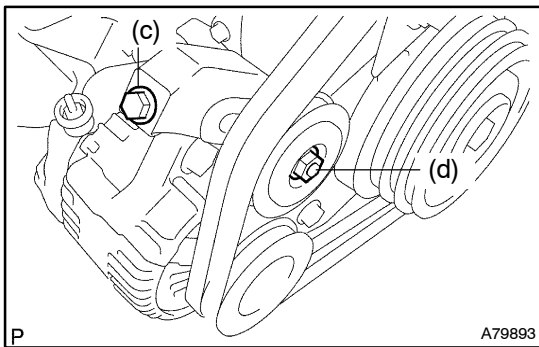
**17. INSTALL FAN SHROUD**

(a) Install the fan shroud, fan and pulley.

NOTICE:

Be careful not to damage the radiator core.

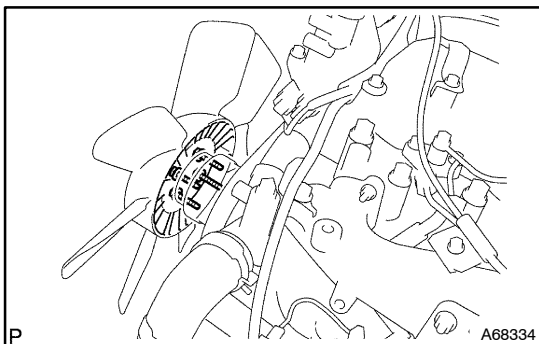
(b) Temporarily tighten the fan nuts.



(c) Install the V belt and adjust the belt tension (See page 14-40).

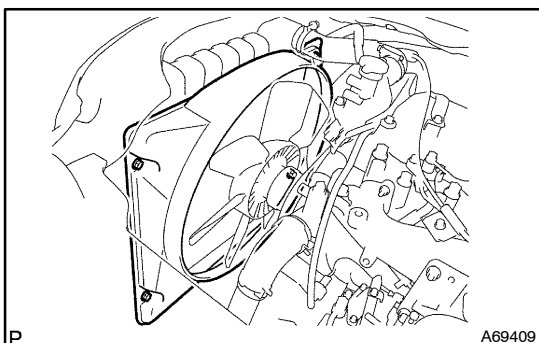
(d) Tighten the nut.

Torque: 26 N·m (260 kgf·cm, 19 ft·lbf)



(e) Tighten the 4 nuts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

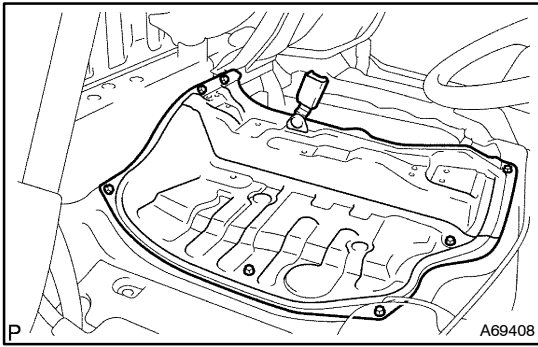


(f) Install the fan shroud with the 4 bolts.

Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)

NOTICE:

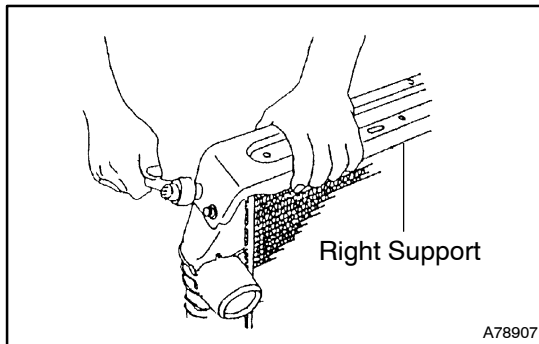
Be careful not to damage the radiator core and the drive belt.



- 18. INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)**
- (a) Install the engine service hole sub cover with the 7 bolts.
Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)
 - (b) Install the floor mat.

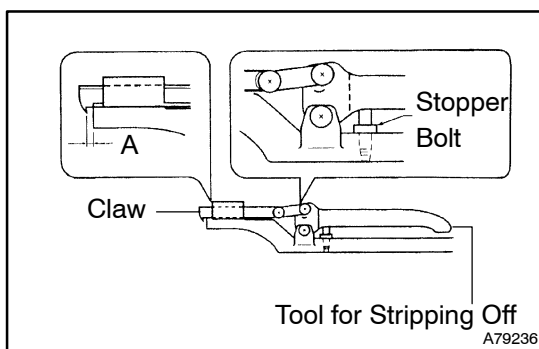
- 19. **INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)**
- 20. **INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)**
- 21. **INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-11)**
- 22. **INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE) (See page 72-2)**
- 23. **ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE) (See page 33-11)**
- 24. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)**
- 25. **REFILL ENGINE COOLANT**
- 26. **CONNECT BATTERY NEGATIVE TERMINAL**
- 27. **CHECK FOR ENGINE COOLANT LEAKS**

OVERHAUL



1. REMOVE LEFT AND RIGHT SIDE PLATE

- (a) Remove the all square head M8 (4 or 8) bolts to remove the left and the right side plate.
- (b) Remove the side seal and radiator packing.
- (c) Remove the drain cock.



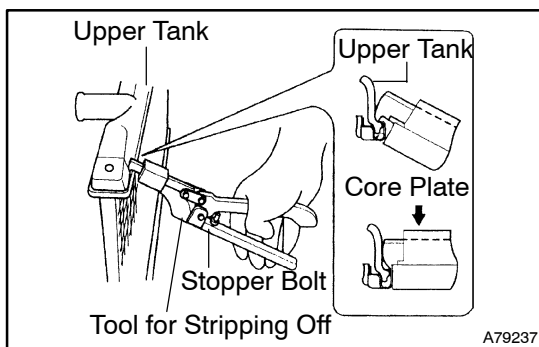
2. REMOVE UPPER AND LOWER TANKS

- (a) Adjust the dimension of the portion A of the illustration by means of a stopper bolt so that it may become 0.2 to 0.3 mm under the condition that the handle of the SST is gripped by means of a stopper bolt.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

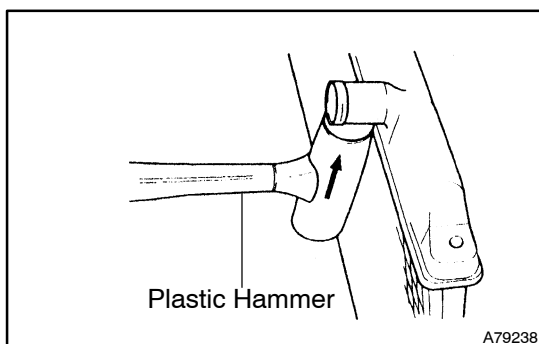
Be sure to adjust it to prevent an eventual damage of the claw.



- (b) As the aluminum radiator adopts an integral caulking construction by the core plate, remove the upper and the lower tanks by lifting up the core plate in such a way that the latter may not be damaged. Release the calking by using the stripping off tool and by gripping it until it hits the stopper bolt of the handle as shown on the illustration.

NOTICE:

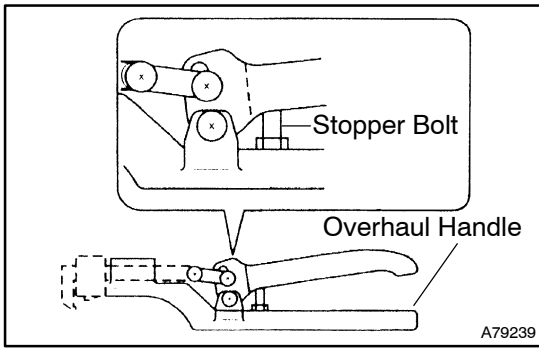
Don't lift up the core plate more than 90°.



- (c) Remove the upper and lower tanks by lightly tapping the radiator hose fitting position.

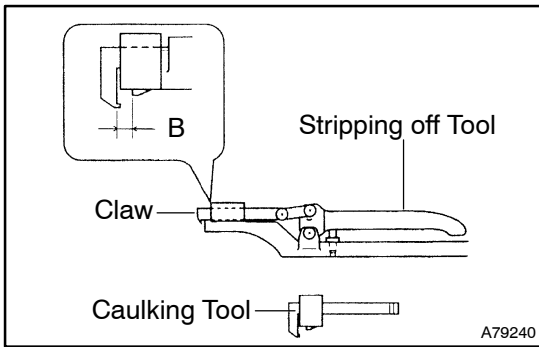
NOTICE:

- Remember mounting direction of the core sub-assembly.
- Remount it in such a way that the original direction can be maintained.

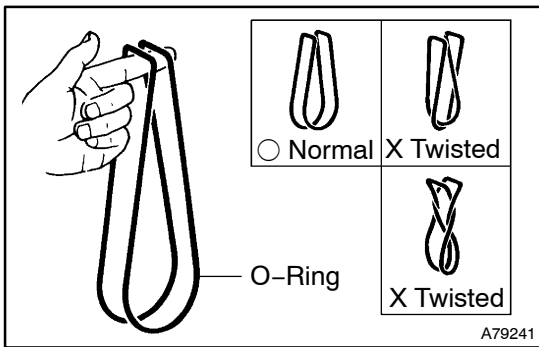


3. FIT CAULKING TOOL ON OVERHAUL HANDLE BY MARKING

- (a) Use of the hole of position on the illustration (either of the 2 holes will do).
SST 09230-01010 (09231-01010, 09231-01020), 09231-14010



- (b) Adjust with the stopper bolt so that the dimension of part B in the figure is within the range of the reference value when the handle is gripped.

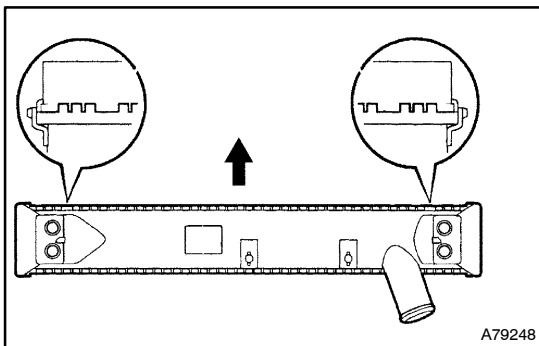


4. INSTALL UPPER AND LOWER TANKS

- (a) After having checked that there remains no foreign matter on the fitting position, mount a new O-ring in such a way that it will not be twisted.

NOTICE:

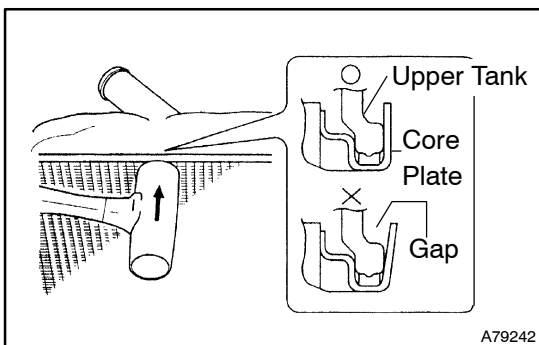
When cleaning the fitting position, lightly rub the said portion by using a sand paper, etc.



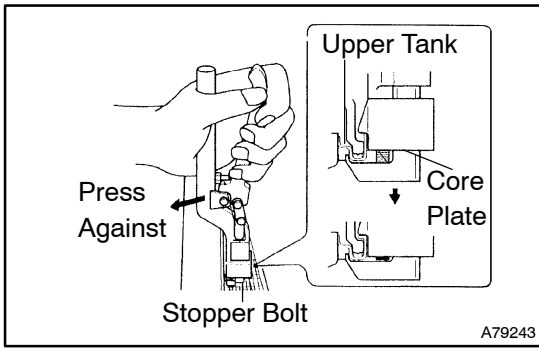
- (b) The notch in the radiator core shall be at the front side as shown in the figure.

NOTICE:

As the construction of the core has directionality in front back direction, do not install it with reversed orientation.



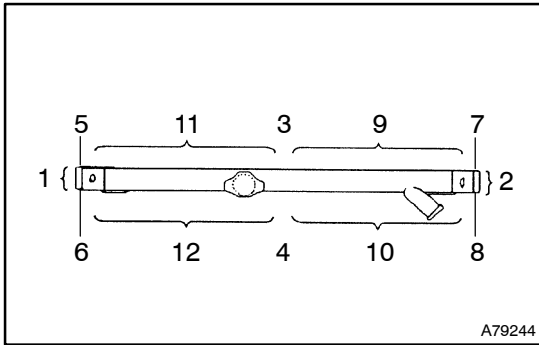
- (c) Set the upper and the lower tanks so that they will not be damaged.
- (d) Clap the core plate to obtain a contact with the upper and the lower tanks.



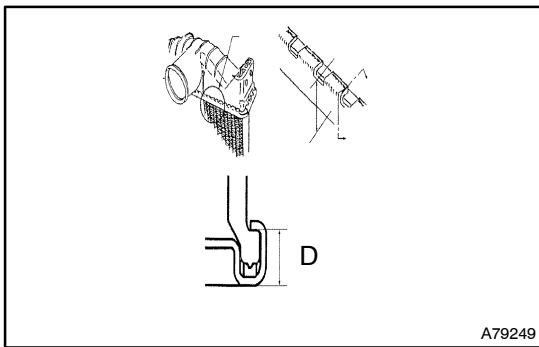
- (e) Press the caulking tool against the core plate as shown in the illustration. Perform temporary caulking by gripping the handle until it knocks at the stopper bolt of the handle.

NOTICE:

- For the positions where the caulking tool is not usable, perform the caulking by using pliers.



- Perform the caulking according to the following sequence.



- (f) Check the dimension D after caulking.
Standard dimension: 8.45 – 8.85 mm (0.33 – 0.34 in.)
- (g) In the event that the said dimension does not fall within the standard limit, adjust the stopper bolt of the handle once again and perform the caulking again.

NOTICE:

Check the caulking dimensions at both ends of the core plate as well as around the central portion where the caulking has not been applied (under the pipe, etc.).

- (h) Others:
Mark for the first repair for the second repair at a well visible place in the upper tank.

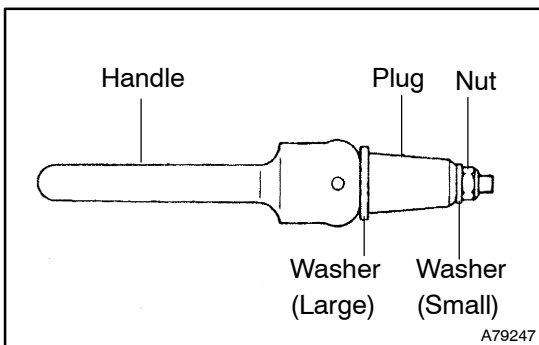
NOTICE:

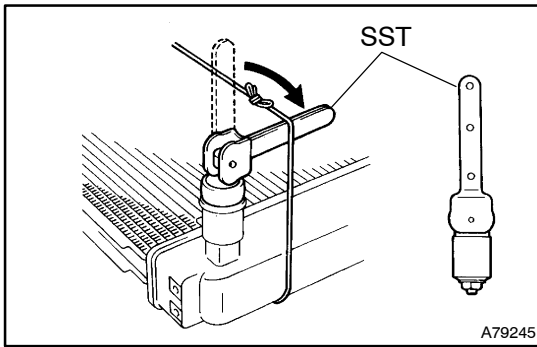
Re-caulking should be limited to 2 times. If it is necessary to recaulk more than twice, replace the part in question.

5. CHECK FOR WATER LEAKS

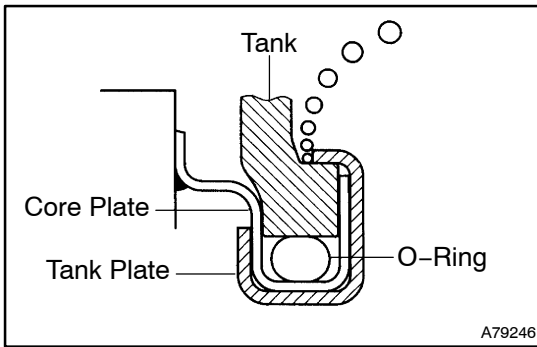
- (a) Assemble the plug handle as shown in the illustration and tighten the nut until the washer, the plug and the handle have light contact.

SST 09230-01010 (09231-00030, 09231-00050)





- (b) Using SST, plug the inlet and outlet pipes of the radiator.
 (c) Using a radiator cap tester, apply pressure to the radiator.
Test pressure: 177 kPa (1.8 kgf/cm², 25 psi)

**HINT:**

On the radiators with resin tanks, there is a clearance between the core plate and tank plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before performing the water leak test, first swirl the radiator around in the water until all air bubbles disappear.

6. INSTALL RADIATOR COCK

- (a) Install a new O-ring.

7. INSTALL LEFT AND RIGHT SIDE PLATE

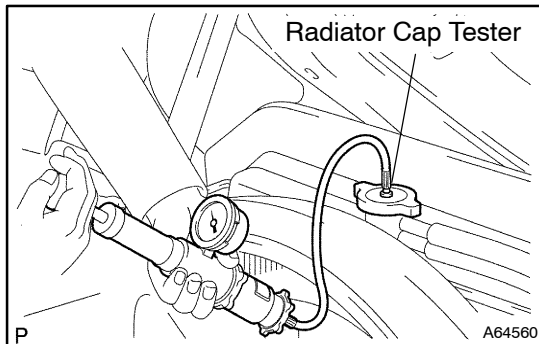
- (a) Install the all square head bolts to remove the left and the right side plate.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

COOLING SYSTEM (S05C-B)

ON-VEHICLE INSPECTION

160FY-02



1. INSPECT COOLING SYSTEM FOR LEAKS

- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Warm up the engine.
- (c) Pump it to 137 kPa (1.3 kgf/cm², 19.9 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

2. REINSTALL RADIATOR CAP

3. MAINTAIN AND INSPECT FAN AND FAN CLUTCH

- (a) During maintenance and inspection, be careful not to drop or strike the fan coupling or fan itself. The resulting damage may lower the performance of the fan. Also, note that the fan is made of plastic and may become damaged or deformed if force is applied to it.
- (b) Do not replace the fan unless it is faulty. When replacing the fan, replace it with the same type as the one which was removed.

If the fan is replaced with one of a larger capacity due to overheating or, conversely is replaced with one of a smaller capacity due to over cooling, the cooling performance may be in fact reduced and durability may be jeopardized.

- (c) Check the temperature detector (bimetal) to see if there is any mud or dust on it.

If the bimetal is covered with mud or dust, the fan performance will be erratic, and may result in overheating or over cooling.

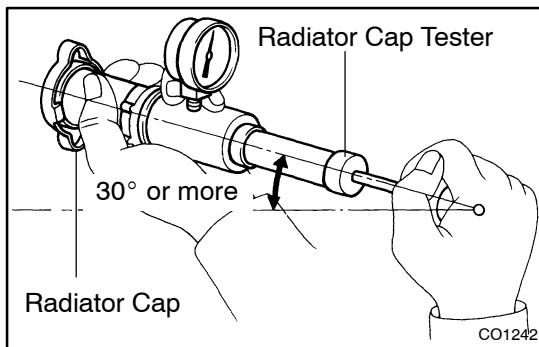
- (d) In such case, carefully remove, mud and dust adhering to the surface of the bimetal, using a wire brush, or the like.
- (e) Take particular care not to apply excessive force. Do not paint the fan or fan clutch.
- (f) Do not place any paint or other reagents which are likely to dissolve plastic in contact with the fan.

INSPECTION

1. INSPECT RADIATOR CAP SUB-ASSY

CAUTION:

To avoid the danger or being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



(a) Inspect the radiator cap.

NOTICE:

- If the radiator cap has contaminations, always rinse it with water.
- Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.
- When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.

(b) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push/(3 seconds or more)

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(c) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(d) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.

Standard opening pressure:

93 – 123 kPa (0.75 – 1.05 kgm/cm², 13.5 – 17.1 psi)

Minimum opening pressure:

78 kPa (0.6 kgf/cm², 11.4 psi)

HINT:

Use the tester's maximum reading as the opening pressure. If the opening pressure is less than minimum, replace the radiator cap.

ENGINE COOLANT (S05C-B)

160G0-02

REPLACEMENT

1. DRAIN ENGINE COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

- (a) Remove the radiator cap.
- (b) Loosen the radiator drain plug and engine drain plug, and drain the coolant.
- (c) Close the drain plugs.

2. REFILL ENGINE COOLANT

- (a) Slowly fill the system with coolant.
 - Use of improper coolants may damage engine cooling system.
 - Use "Toyota Super Long Life Coolant" or equivalent and mix it with plain water according to the manufacturer's directions.
 - Using of coolant which includes more than 50 % (freezing protection down to -35°C (-31°F)) or 60 % (freezing protection down to -50°C (-58°F)) of ethylene-glycol is recommended but not more than 70 %.

NOTICE:

- Do not use an alcohol type coolant or plain water alone.
- The coolant should be mixed with plain water (preferably demineralized water or distilled water).

Capacity:

w/ heater	18.1 liters (19.2 US qts, 15.8 Imp. qts)
w/o heater	17.5 liters (18.6 US qts, 15.3 Imp. qts)

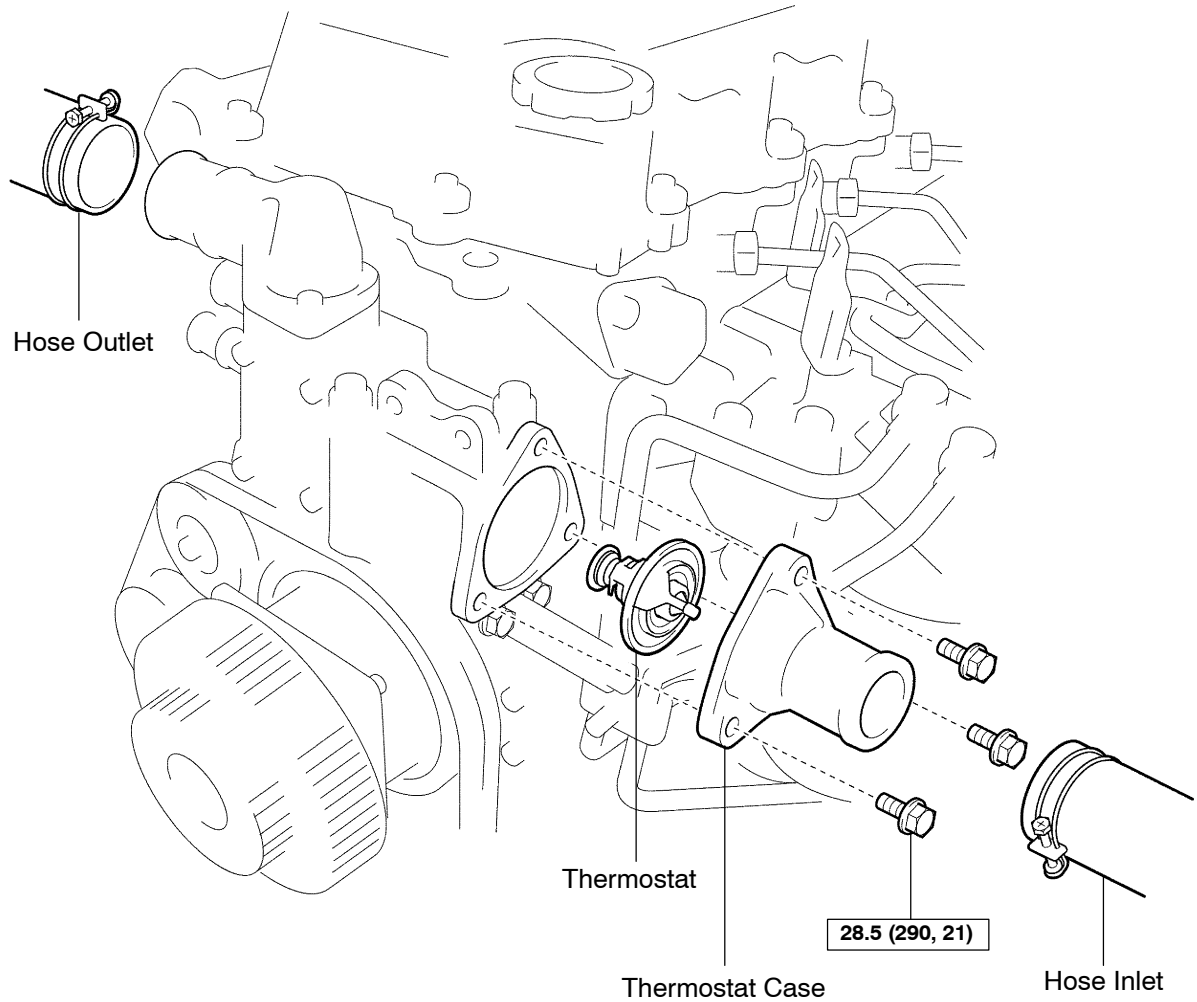
- (b) Reinstall the radiator cap.
- (c) Start the engine, and bleed the cooling system.
- (d) Refill the radiator reservoir with coolant until it reaches the "full" line.

3. CHECK FOR ENGINE COOLANT LEAKS

4. CHECK ENGINE COOLANT SPECIFIC GRAVITY CORRECTLY

THERMOSTAT (S05C-B) COMPONENTS

160BT-02



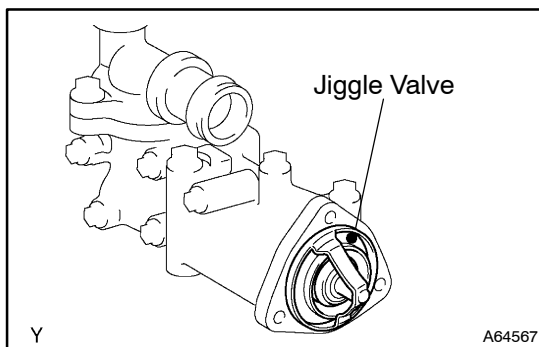
P N·m (kgf·cm, ft·lbf) : Specified torque

REPLACEMENT

HINT:

Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **DRAIN ENGINE COOLANT**
3. **DISCONNECT RADIATOR HOSE INLET**
4. **REMOVE THERMOSTAT**
 - (a) Remove the 3 bolts and thermostat case cover from the water outlet housing.
 - (b) Remove the thermostat.
 - (c) Remove the gasket from the thermostat.
5. **INSTALL THERMOSTAT**
 - (a) Install a new gasket to the thermostat.



- (b) Install the thermostat with the jiggle valve upward.

HINT:

Remove water or dust adhering to the water outlet housing.

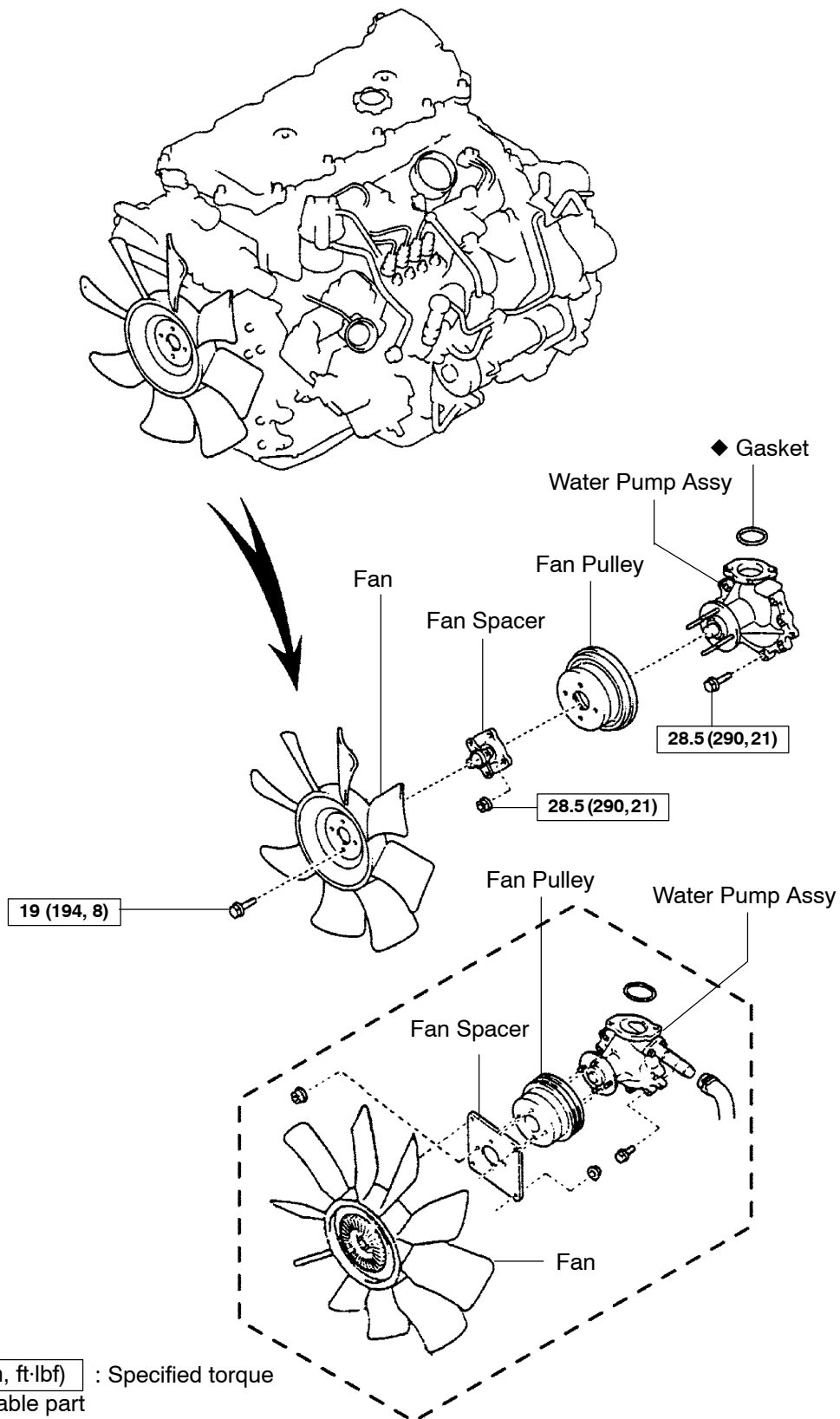
- (c) Install the thermostat case cover with the 3 bolts.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

6. **INSTALL RADIATOR HOSE INLET**
7. **REFILL ENGINE COOLANT**
8. **INSTALL BATTERY NEGATIVE TERMINAL**
9. **CHECK FOR ENGINE COOLANT LEAKS**

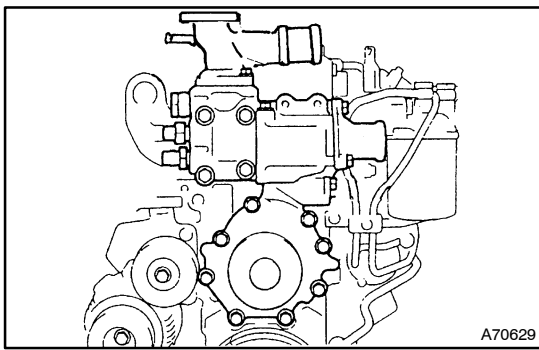
WATER PUMP ASSY (S05C-B) COMPONENTS

160G3-02

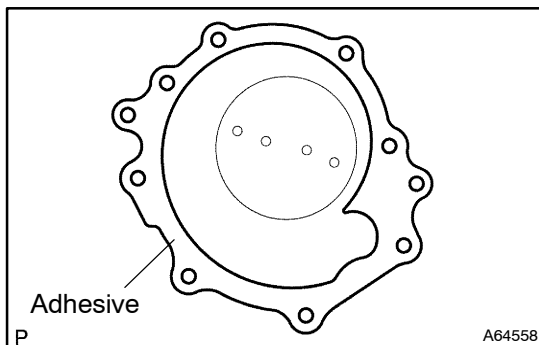


REPLACEMENT

1. **DRAIN ENGINE COOLANT**
2. **DISCONNECT RADIATOR HOSE INLET**
3. **DISCONNECT RADIATOR HOSE OUTLET**
4. **REMOVE FAN**
 - (a) Stretch the belt tight, and loosen the 4 pump pulley set nuts.
 - (b) Remove the drive belt.
 - (c) Remove the 4 nuts, pump pulley and fan spacer.
 - (d) Remove the 4 nuts holding the fan with coupling.
5. **REMOVE WATER OUTLET HOUSING**
 - (a) Remove the 6 bolts and water outlet housing.



6. **REMOVE WATER PUMP ASSY**
 - (a) Remove the 8 bolts and water pump.



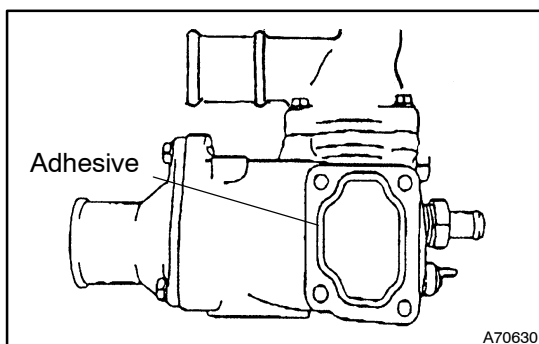
7. **INSTALL WATER PUMP ASSY**
 - (a) Apply seal packing to the illustrated position, and then adjust the knock pin of the cylinder block to install the water pump.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

NOTICE:

Clean the installation surface.



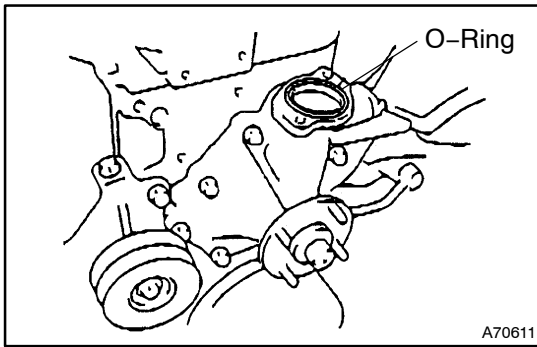
8. **INSTALL WATER OUTLET HOUSING**
 - (a) Apply seal packing to the illustrated position.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

NOTICE:

Clean the installation surface.



- (b) Connect the water hoses, and install a new O-ring into the groove on the upper surface of the water pump.
- (c) Install the water outlet housing temporarily with the 6 bolts.
- (d) Tighten the 4 bolts completely placed on the cylinder head side.
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)
- (e) Tighten the 2 bolts completely placed on the water pump side.
Torque: 55 N·m (560 kgf·cm, 40 ft·lbf)
- (f) Connect the 2 water hoses.

9. INSTALL FAN

- (a) Install the fan pulley and fan spacer temporarily with the 4 nuts.
- (b) Install the V belt.
- (c) Holding the V belt, tighten the 4 bolt completely to install the fan pulley and fan spacer properly.
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)
- (d) Install the fan with the 4 bolts.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

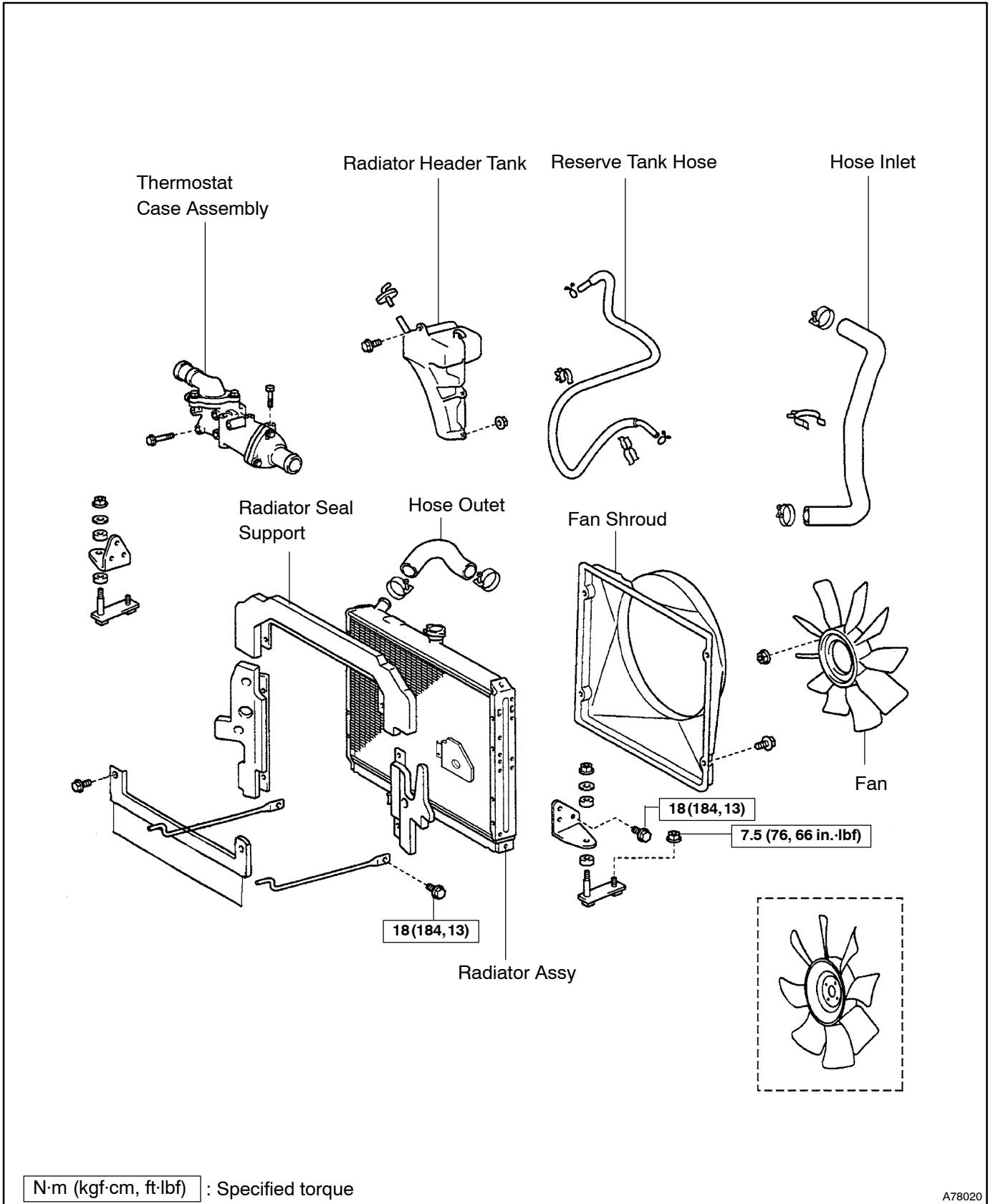
10. REFILL ENGINE COOLANT

11. CHECK FOR ENGINE COOLANT LEAKS

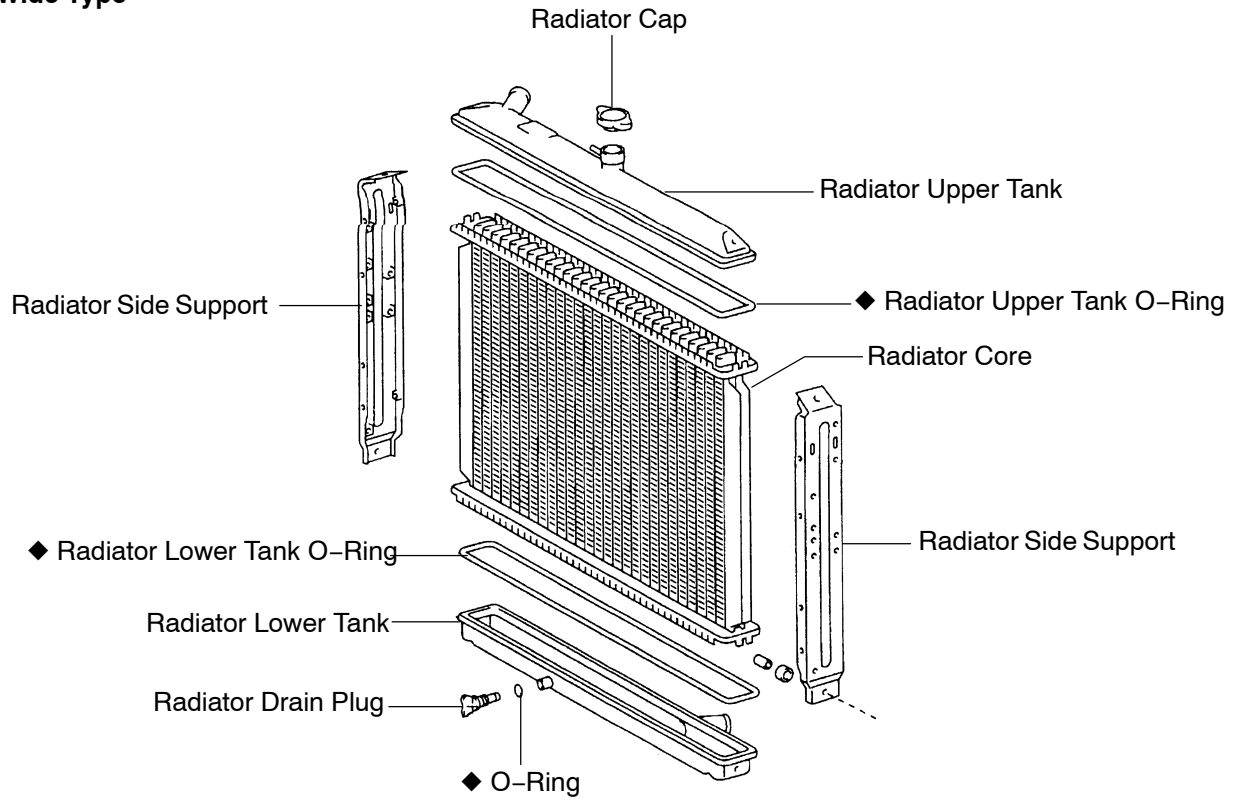
RADIATOR ASSY (S05C-B)

COMPONENTS

160K8-01



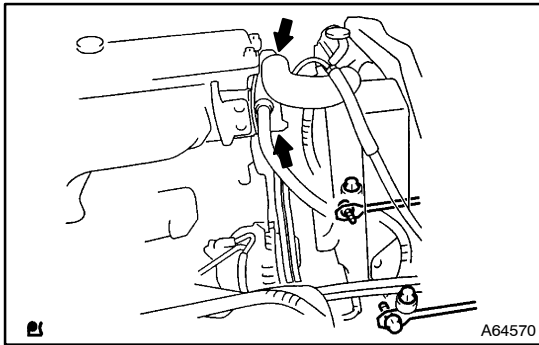
Wide Type



◆ Non-reusable part

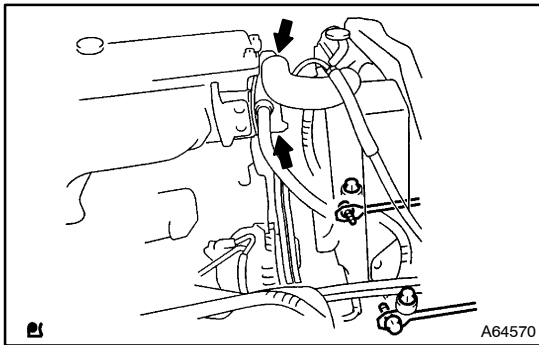
REPLACEMENT

1. DRAIN ENGINE COOLANT
2. DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE
3. DISCONNECT RADIATOR HOSE INLET
4. DISCONNECT RADIATOR HOSE OUTLET



5. REMOVE RADIATOR ASSY

- (a) Disconnect the heater hose and air conditioner hose together with the brackets from the radiator.
- (b) Remove the 2 nuts and 2 bolts from stay at on the radiator mounting bracket to remove the radiator together with the fan shroud.
- (c) Take out the fan shroud from the radiator.

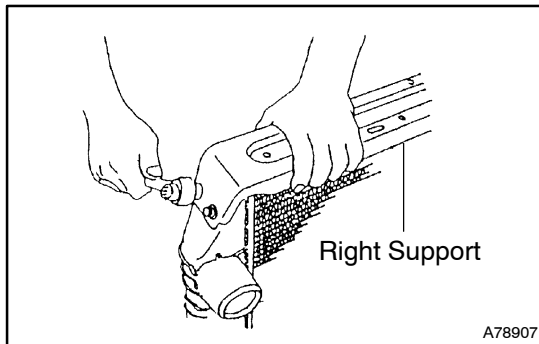


6. INSTALL RADIATOR ASSY

- (a) Install the fan shroud to the radiator.
- (b) Install the radiator with the 2 bolts and 2 nuts.
Torque:
18 N·m (184 kgf·cm, 13 ft·lbf) for bolt
7.5 N·m (76 kgf·cm, 66 in·lbf) for nut
- (c) Install the heater hose and air conditioner hose to the radiator.

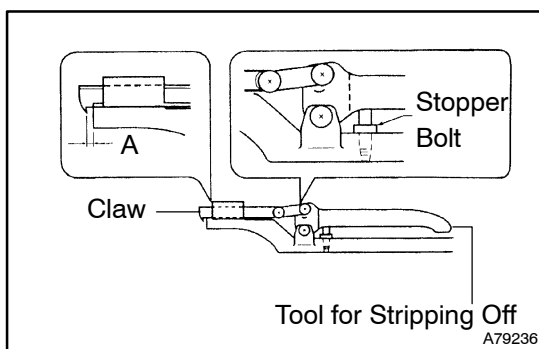
7. REFILL ENGINE COOLANT
8. CHECK FOR ENGINE COOLANT LEAKS

OVERHAUL



1. REMOVE LEFT AND RIGHT SIDE PLATE

- (a) Remove the all square head M8 (4 or 8) bolts to remove the left and the right side plate.
- (b) Remove the side seal and radiator packing.
- (c) Remove the drain cock.



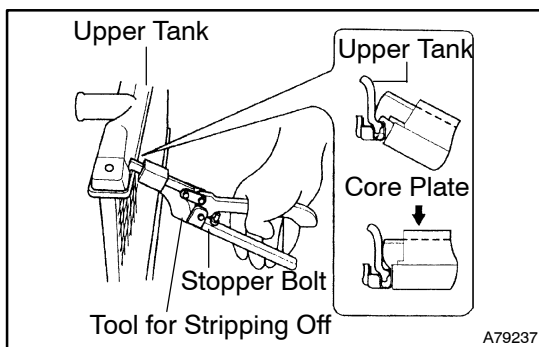
2. REMOVE UPPER AND LOWER TANKS

- (a) Adjust the dimension of the portion A of the illustration by means of a stopper bolt so that it may become 0.2 to 0.3 mm under the condition that the handle of the SST is gripped by means of a stopper bolt.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

Be sure to adjust it to prevent an eventual damage of the claw.

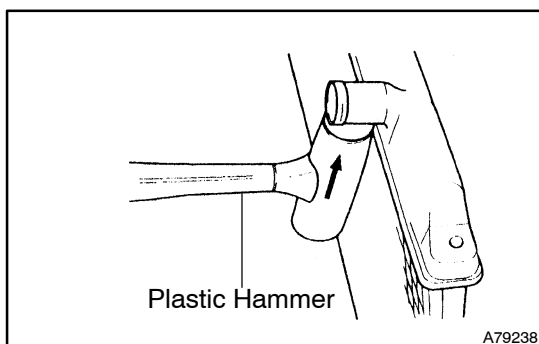


- (b) As the aluminum radiator adopts an integral caulking construction by the core plate, remove the upper and the lower tanks by lifting up the core plate in such a way that the latter may not be damaged. Release the calking by using the stripping off tool and by gripping it until it hits the stopper bolt of the handle as shown on the illustration.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

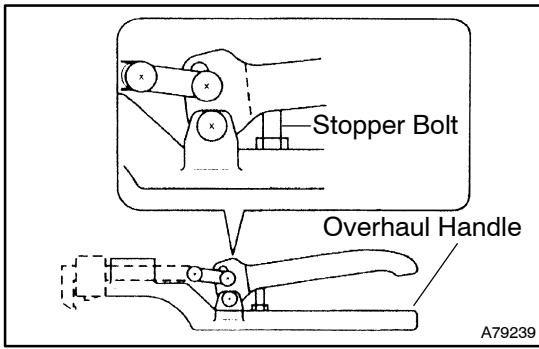
Don't lift up the core plate more than 90°.



- (c) Remove the upper and lower tanks by lightly tapping the radiator hose fitting position.

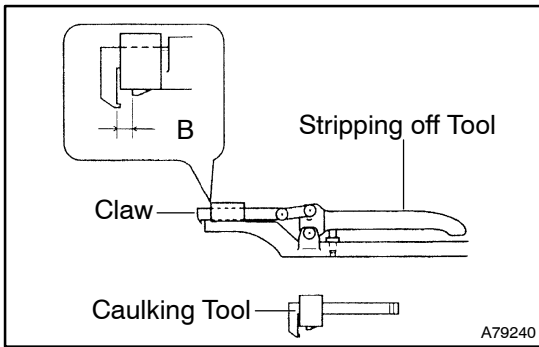
NOTICE:

- Remember mounting direction of the core sub-assembly.
- Remount it in such a way that the original direction can be maintained.

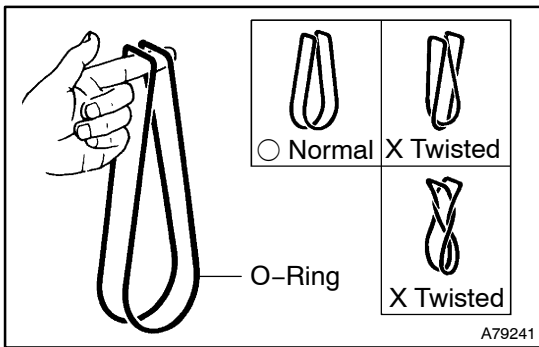


3. FIT CAULKING TOOL ON OVERHAUL HANDLE BY MARKING

- (a) Use of the hole of position on the illustration (either of the 2 holes will do).
SST 09230-01010 (09231-01010, 09231-01020), 09231-14010



- (b) Adjust with the stopper bolt so that the dimension of part B in the figure is within the range of the reference value when the handle is gripped.

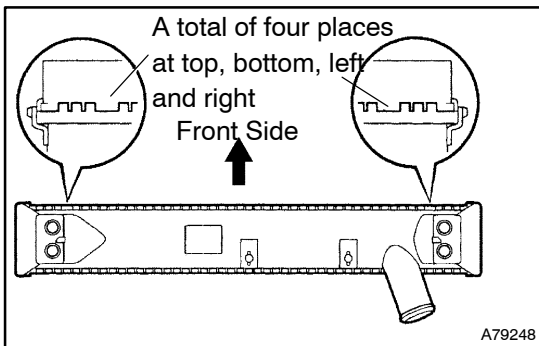


4. INSTALL UPPER AND LOWER TANKS

- (a) After having checked that there remains no foreign matter on the fitting position, mount a new O-ring in such a way that it will not be twisted.

NOTICE:

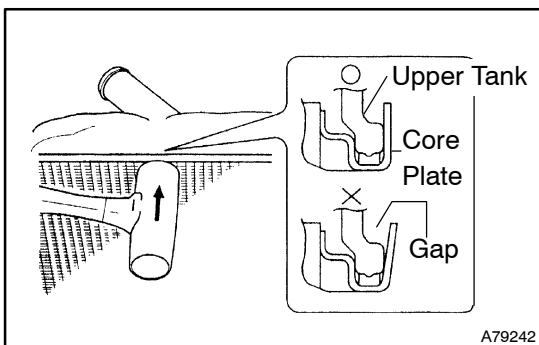
When cleaning the fitting position, lightly rub the said portion by using a sand paper, etc.



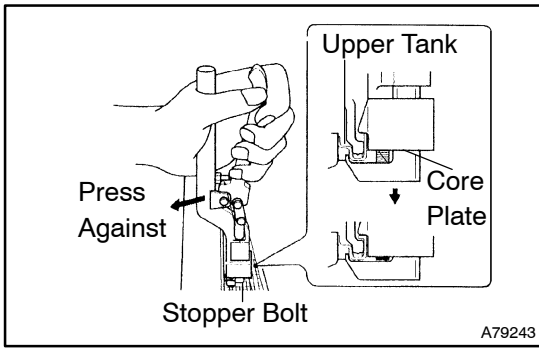
- (b) The notch in the radiator core shall be at the front side as shown in the figure.

NOTICE:

As the construction of the core has directionality in front back direction, do not install it with reversed orientation.



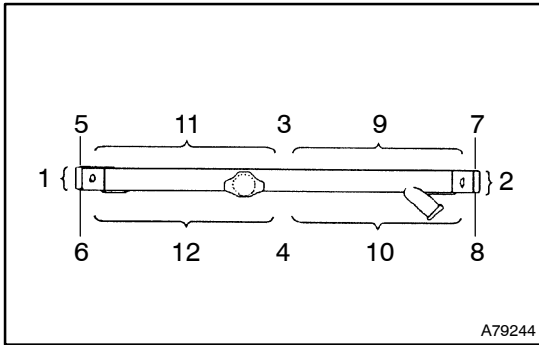
- (c) Set the upper and the lower tanks so that they will not be damaged.
- (d) Clap the core plate to obtain a contact with the upper and the lower tanks.



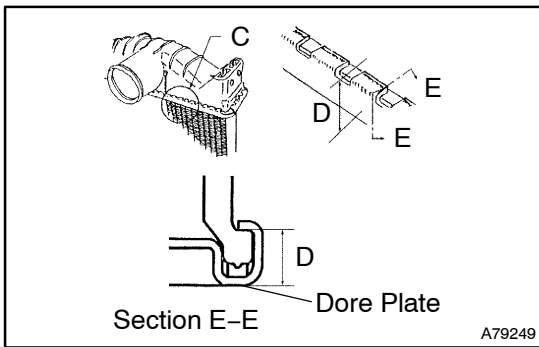
- (e) Press the caulking tool against the core plate as shown in the illustration. Perform temporary caulking by gripping the handle until it knocks at the stopper bolt of the handle.

NOTICE:

- For the positions where the caulking tool is not usable, perform the caulking by using pliers.



- Perform the caulking according to the following sequence.



- (f) Check the dimension D after caulking.
Standard dimension: 7.4 - 7.8 mm (0.29 - 0.30 in.)
- (g) In the event that the said dimension does not fall within the standard limit, adjust the stopper bolt of the handle once again and perform the caulking again.

NOTICE:

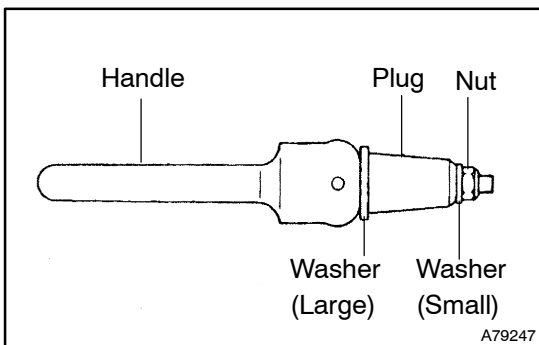
Check the caulking dimensions at both ends of the core plate as well as around the central portion where the caulking has not been applied (under the pipe, etc.).

- (h) Others:
Mark for the first repair for the second repair at a well visible place in the upper tank.

NOTICE:

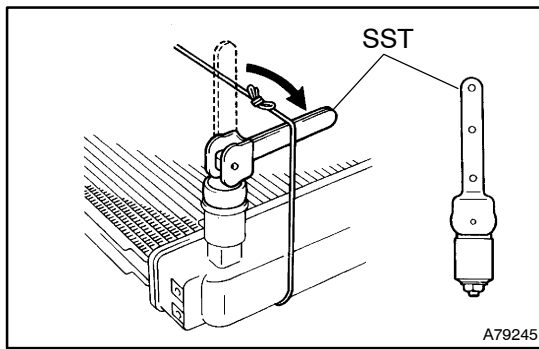
Re-caulking should be limited to 2 times. If it is necessary to recaulk more than twice, replace the part in question.

5. CHECK FOR WATER LEAKS

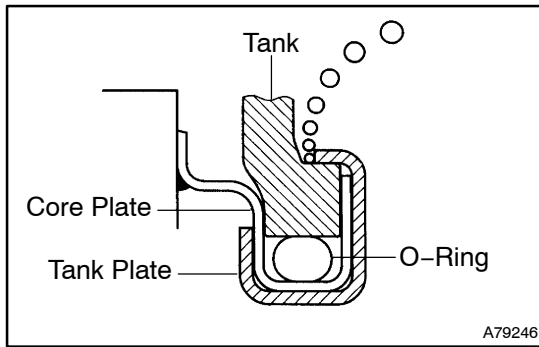


- (a) Assemble the plug handle as shown in the illustration and tighten the nut until the washer, the plug and the handle have light contact.

SST 09230-01010 (09231-00030, 09231-00050)



- (b) Using SST, plug the inlet and outlet pipes of the radiator.
SST 09230-01010 (09231-00030, 09231-00050)
- (c) Using a radiator cap tester, apply pressure to the radiator.
Test pressure: 137 kPa (1.4 kgf/cm², 20 psi)

**HINT:**

On the radiators with resin tanks, there is a clearance between the core plate and tank plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before performing the water leak test, first swirl the radiator around in the water until all air bubbles disappear.

6. INSTALL RADIATOR COCK

- (a) Install a new O-ring.

7. INSTALL LEFT AND RIGHT SIDE PLATE

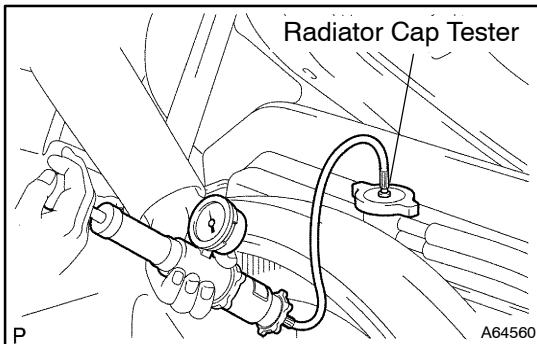
- (a) Install the all square head bolts to remove the left and the right side plate.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

COOLING SYSTEM (S05C-TA)

ON-VEHICLE INSPECTION

1608Q-03



1. INSPECT COOLING SYSTEM FOR LEAKS

- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Warm up the engine.
- (c) Pump it to 137 kPa (1.3 kgf/cm², 19.9 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

2. REINSTALL RADIATOR CAP

3. MAINTAIN AND INSPECT FAN AND FAN CLUTCH

- (a) During maintenance and inspection, be careful not to drop or strike the fan coupling or fan itself. The resulting damage may lower the performance of the fan. Also, note that the fan is made of plastic and may become damaged or deformed if force is applied to it.
- (b) Do not replace the fan unless it is faulty. When replacing the fan, replace it with the same type as the one which was removed.

If the fan is replaced with one of a larger capacity due to overheating or, conversely is replaced with one of a smaller capacity due to over cooling, the cooling performance may be in fact reduced and durability may be jeopardized.

- (c) Check the temperature detector (bimetal) to see if there is any mud or dust on it.

If the bimetal is covered with mud or dust, the fan performance will be erratic, and may result in overheating or over cooling.

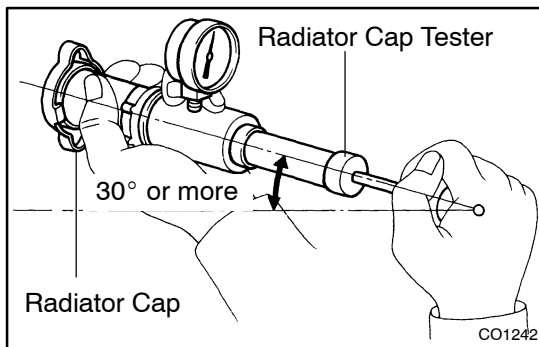
- (d) In such case, carefully remove, mud and dust adhering to the surface of the bimetal, using a wire brush, or the like.
- (e) Take particular care not to apply excessive force. Do not paint the fan or fan clutch.
- (f) Do not place any paint or other reagents which are likely to dissolve plastic in contact with the fan.

INSPECTION

1. INSPECT RADIATOR CAP SUB-ASSY

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



- (a) Inspect the radiator cap.

NOTICE:

- If the radiator cap has contaminations, always rinse it with water.
- Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.
- When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.

- (b) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push/(3 seconds or more)

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

- (c) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

- (d) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.

Standard opening pressure:

93 – 123 kPa (0.75 – 1.05 kgf/cm², 13.5 – 17.1 psi)

Minimum opening pressure:

78 kPa (0.6 kgf/cm², 11.4 psi)

HINT:

Use the tester's maximum reading as the opening pressure. If the opening pressure is less than minimum, replace the radiator cap.

ENGINE COOLANT (S05C-TA)

160BS-03

REPLACEMENT

1. DRAIN ENGINE COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

- (a) Remove the radiator cap.
- (b) Loosen the radiator drain plug and engine drain plug, and drain the coolant.
- (c) Close the drain plugs.

2. REFILL ENGINE COOLANT

- (a) Slowly fill the system with coolant.
 - Use of improper coolants may damage engine cooling system.
 - Use "Toyota Long Life Coolant" or equivalent and mix it with plain water according to the manufacturer's directions.
 - Using of coolant which includes more than 50 % (freezing protection down to -35°C (-31°F)) or 60% (freezing protection down to -50°C (-58°F)) of ethylene-glycol is recommended but not more than 70 %.

NOTICE:

- Do not use an alcohol type coolant or plain water alone.
- The coolant should be mixed with plain water (preferably demineralized water or distilled water).

Capacity:

w/ heater	18.2 liters (19.3 US qts, 15.9 Imp. qts)
w/o heater	17.6 liters (18.7 US qts, 15.4 Imp. qts)

- (b) Reinstall the radiator cap.
- (c) Start the engine, and bleed the cooling system.
- (d) Refill the radiator reservoir with coolant until it reaches the "full" line.

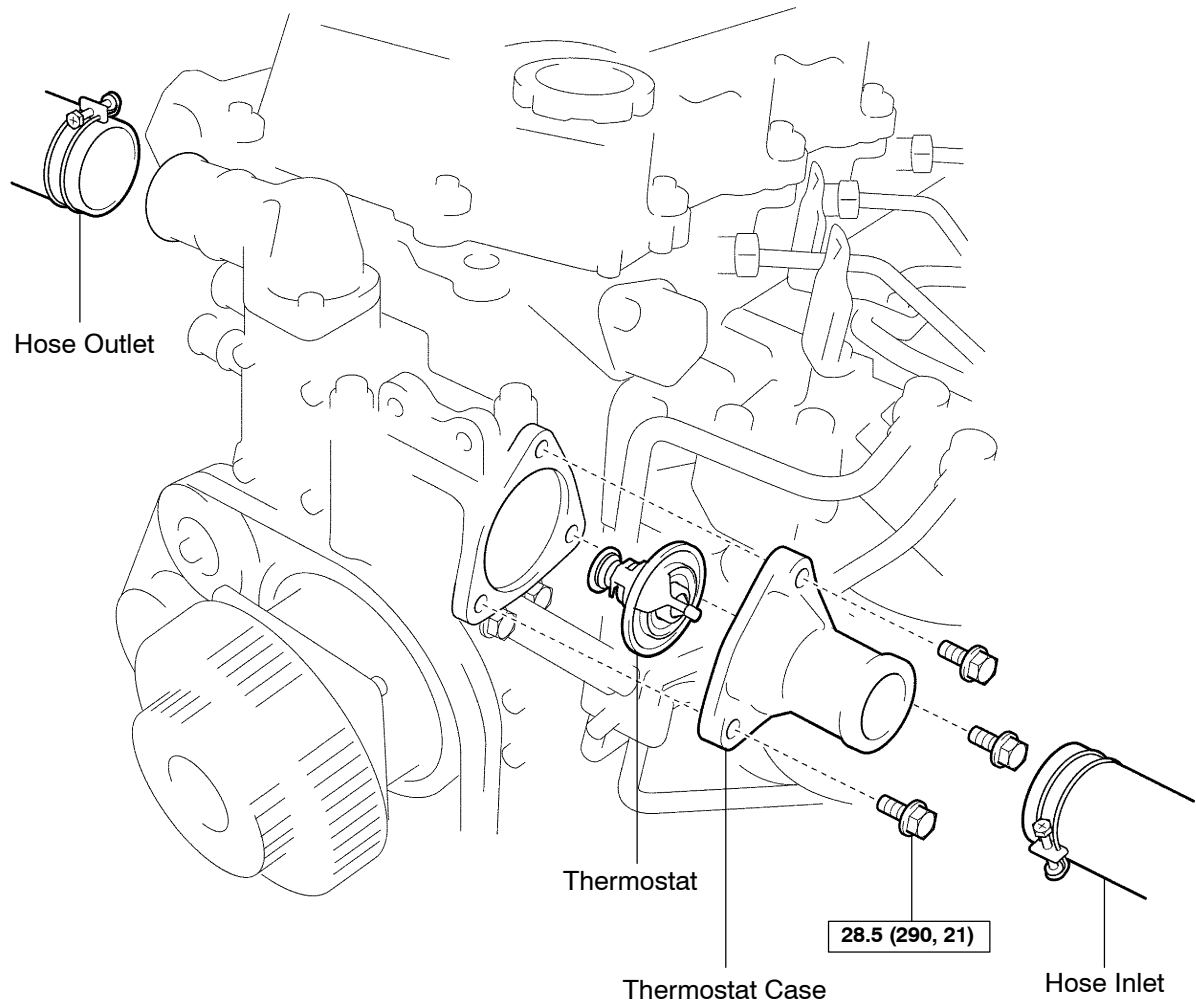
3. CHECK FOR ENGINE COOLANT LEAKS

4. CHECK ENGINE COOLANT SPECIFIC GRAVITY CORRECTLY

THERMOSTAT (S05C-TA)

COMPONENTS

160BT-04



P **N·m (kgf·cm, ft·lbf)** : Specified torque

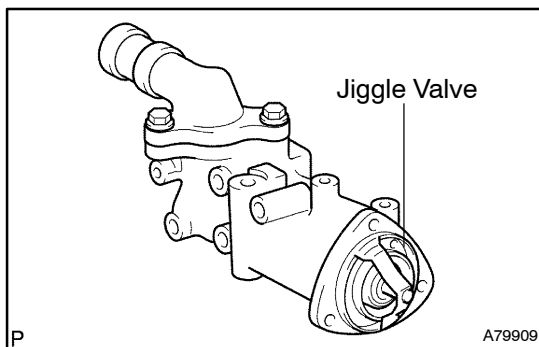
A54220

REPLACEMENT

HINT:

Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **DRAIN ENGINE COOLANT**
3. **DISCONNECT RADIATOR HOSE INLET**
4. **REMOVE THERMOSTAT**
 - (a) Remove the 3 bolts and thermostat case cover from the water outlet housing.
 - (b) Remove the thermostat.
 - (c) Remove the gasket from the thermostat.
5. **INSTALL THERMOSTAT**
 - (a) Install a new gasket to the thermostat.



- (b) Install the thermostat with the jiggle valve upward.

HINT:

Remove water or dust adhering to the water outlet housing.

- (c) Install the thermostat case cover with the 3 bolts.

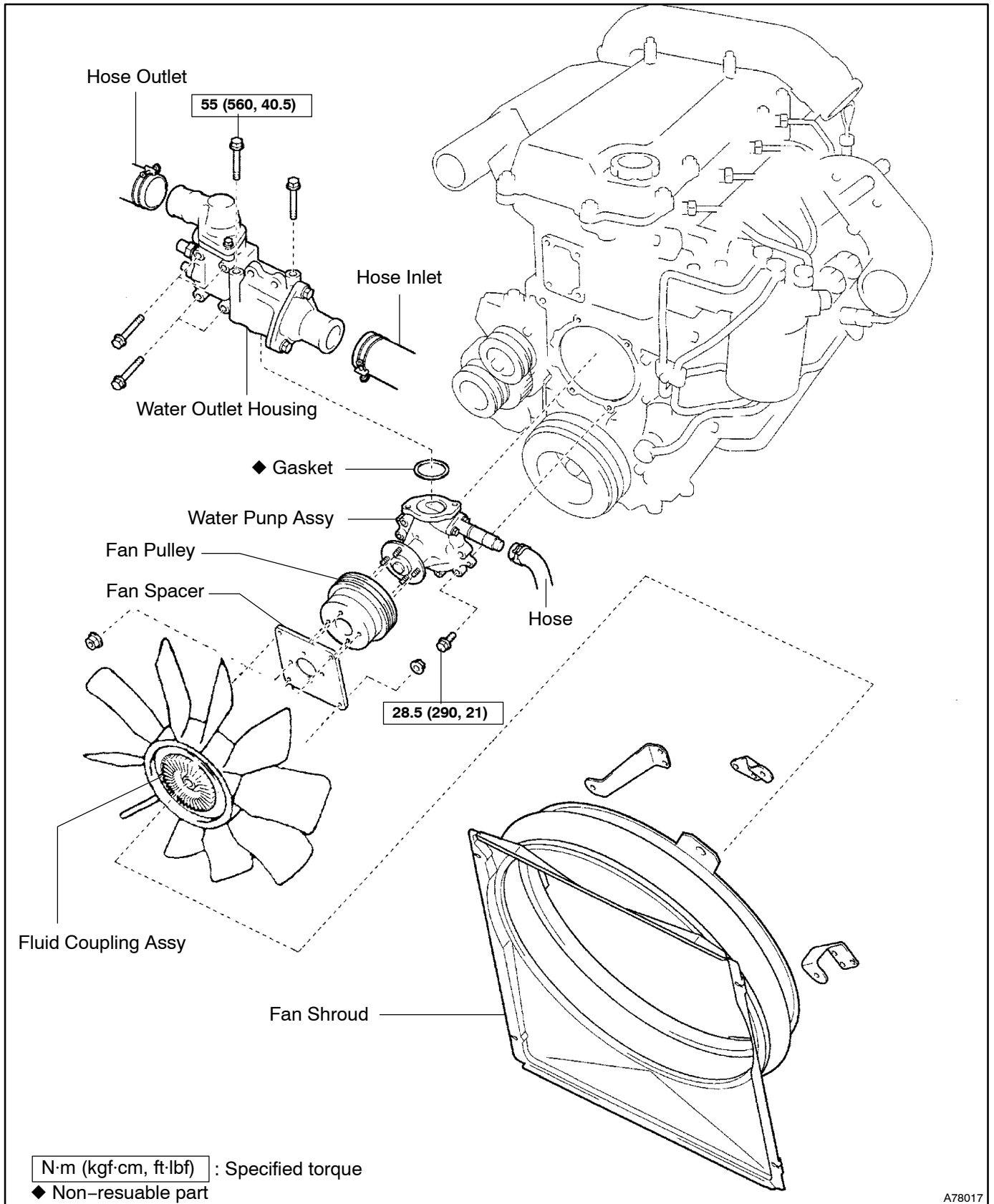
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

6. **INSTALL RADIATOR HOSE INLET**
7. **REFILL ENGINE COOLANT**
8. **INSTALL BATTERY NEGATIVE TERMINAL**
9. **CHECK FOR ENGINE COOLANT LEAKS**

WATER PUMP ASSY (S05C-TA)

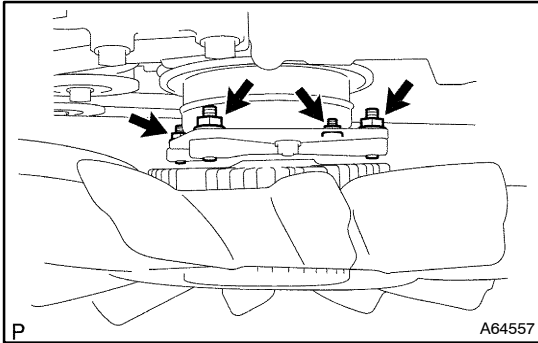
COMPONENTS

160BV-03

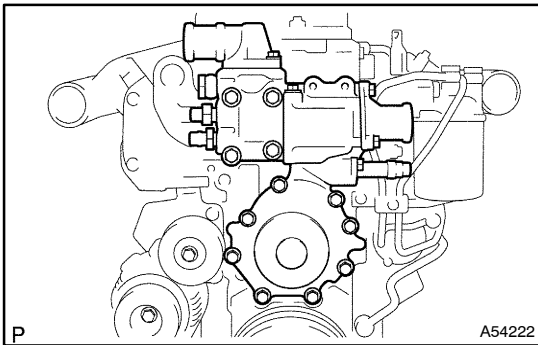


REPLACEMENT

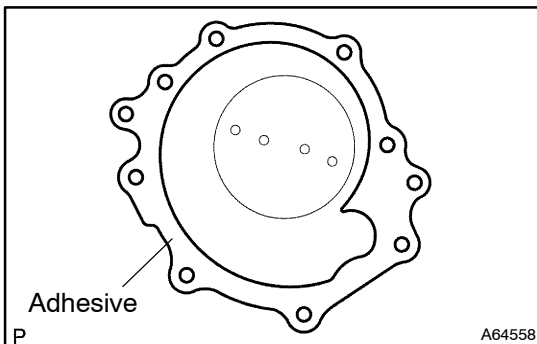
1. **DRAIN ENGINE COOLANT**
2. **DISCONNECT RADIATOR HOSE INLET**
3. **DISCONNECT RADIATOR HOSE OUTLET**
4. **REMOVE V-RIBBED BELT**
 - (a) Stretch the belt tight, and loosen the 4 pump pulley set nuts.
 - (b) Remove the drive belt.
 - (c) Remove the 4 nuts, pump pulley and fan spacer.



5. **REMOVE FLUID COUPLING ASSY**
 - (a) Remove the 4 nuts holding the fan with coupling.



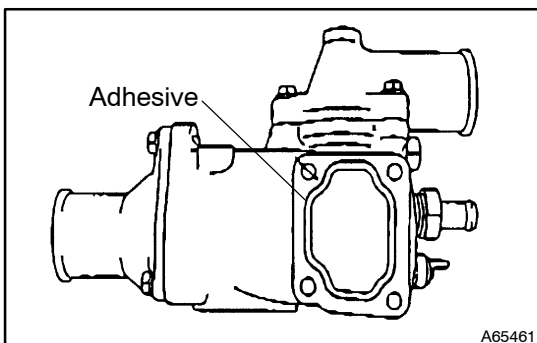
6. **REMOVE WATER OUTLET HOUSING**
 - (a) Remove the 6 bolts and water outlet housing.
7. **REMOVE WATER PUMP ASSY**
 - (a) Remove the 8 bolts and water pump.



8. **INSTALL WATER PUMP ASSY**
 - (a) Apply seal packing to the illustrated position, and then adjust the knock pin of the cylinder block to install the water pump.

Adhesive:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

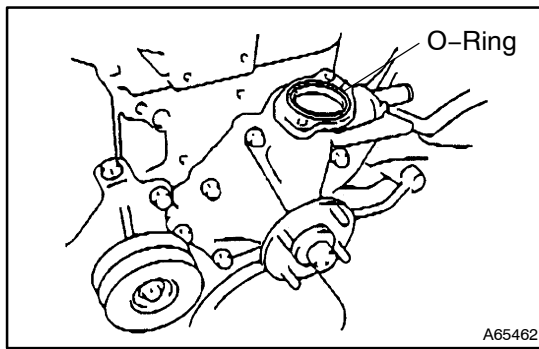
NOTICE:
Clean the installation surface.



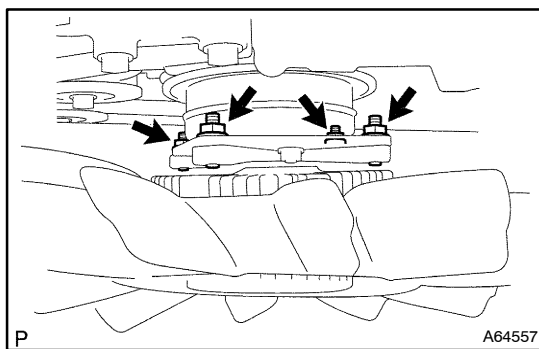
9. **INSTALL WATER OUTLET HOUSING**
 - (a) Apply seal packing to the illustrated position.

Adhesive:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

NOTICE:
Clean the installation surface.



- (b) Connect the water hoses. Install a new O-ring into the groove on the upper surface of the water pump.
- (c) Install the water outlet housing temporarily with the 6 bolts.
- (d) Tighten the 4 bolts completely placed on the cylinder head side.
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)
- (e) Tighten the 2 bolts completely placed on the water pump side.
Torque: 55 N·m (560 kgf·cm, 40 ft·lbf)
- (f) Connect the 2 water hoses.



10. INSTALL FLUID COUPLING ASSY

- (a) Install the fan pulley and fan spacer temporarily with the 4 nuts.
- (b) Install the V belt.
- (c) Holding the V belt, tighten the 4 nuts completely to install the fan pulley and fan spacer properly.
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)
- (d) Install the fan clutch with the 4 nuts.
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)
- (e) Install the fan with the 4 nuts.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

11. INSTALL V-RIBBED BELT

- (a) Temporarily install the pump pull with the 4 nuts.
- (b) Install the drive belt.
- (c) Stretch the belt tight and torque the 4 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

12. INSTALL RADIATOR HOSE OUTLET

13. INSTALL RADIATOR HOSE INLET

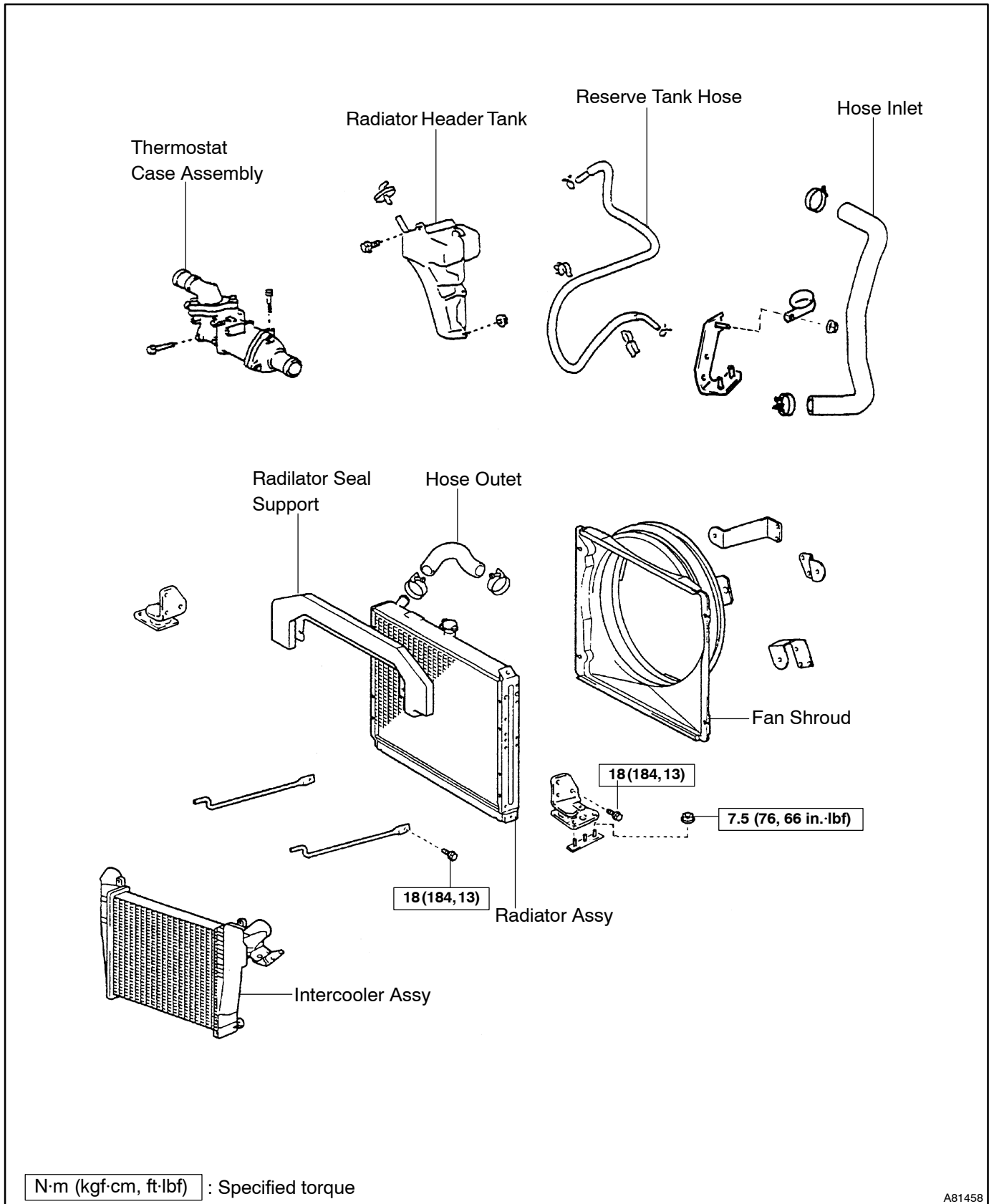
14. REFILL ENGINE COOLANT

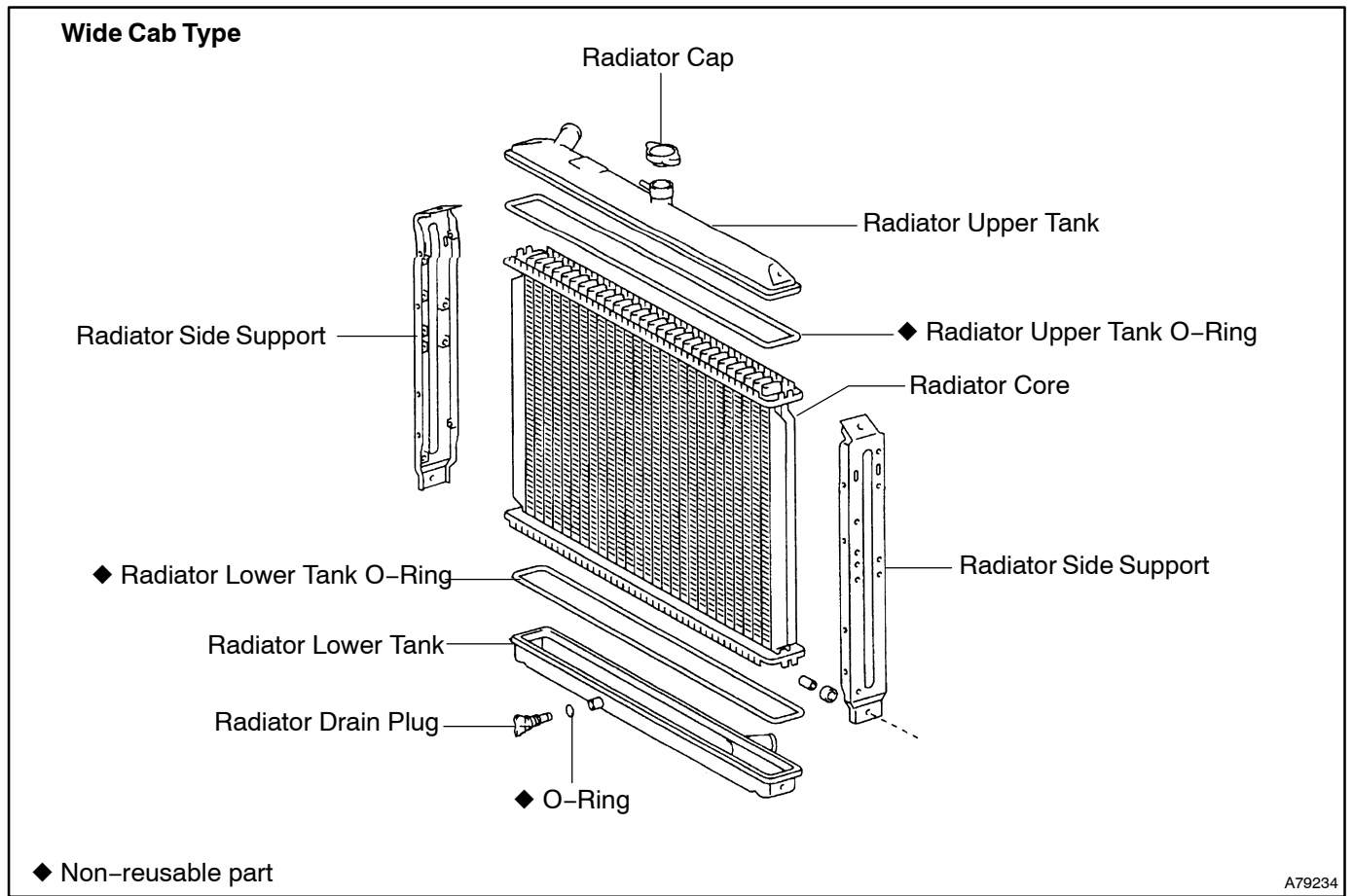
15. CHECK FOR ENGINE COOLANT LEAKS

RADIATOR ASSY (S05C-TA)

COMPONENTS

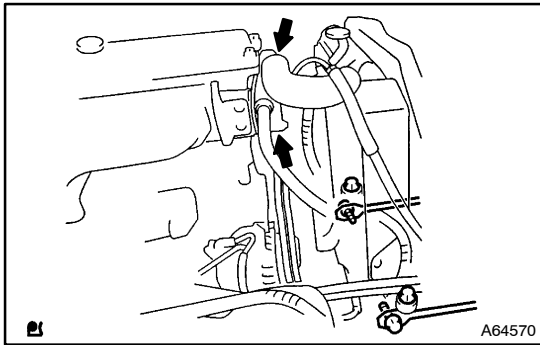
160KF-01





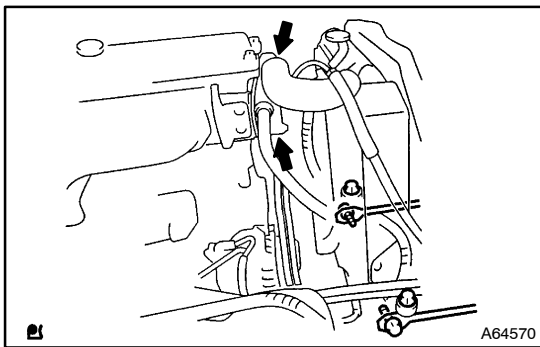
REPLACEMENT

1. DRAIN ENGINE COOLANT
2. DISCONNECT RADIATOR RESERVOIR TANK HOSE
3. DISCONNECT RADIATOR HOSE INLET
4. DISCONNECT RADIATOR HOSE OUTLET



5. REMOVE RADIATOR ASSY

- (a) Disconnect the heater hose and air conditioner hose together with the brackets from the radiator.
- (b) Remove the 2 nuts and 2 bolts from stay at on the radiator mounting bracket to remove the radiator together with the fan shroud.
- (c) Take out the fan shroud from the radiator.
- (d) Remove the intercooler from the radiator.



6. INSTALL RADIATOR ASSY

- (a) Install the intercooler to the radiator.
- (b) Install the fan shroud to the radiator.
- (c) Install the radiator with the 2 bolts and 2 nuts.

Torque:

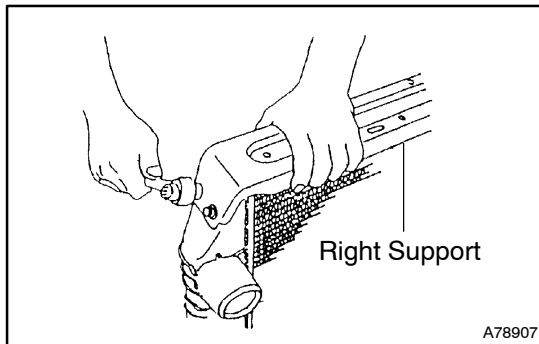
18 N·m (184 kgf·cm, 13 ft·lbf) for bolt

7.5 N·m (76 kgf·cm, 66 in·lbf) for nut

- (d) Install the heater hose and air conditioner hose to the radiator.

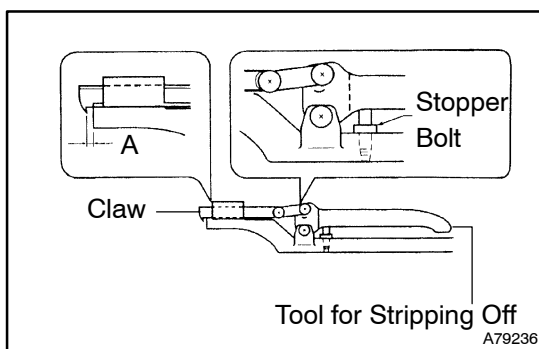
7. INSTALL RADIATOR HOSE OUTLET
8. INSTALL RADIATOR HOSE INLET
9. INSTALL RADIATOR RESERVOIR TANK HOSE
10. REFILL ENGINE COOLANT
11. CHECK FOR ENGINE COOLANT LEAKS

OVERHAUL



1. REMOVE LEFT AND RIGHT SIDE PLATE

- (a) Remove the all square head M8 (4 or 8) bolts to remove the left and the right side plate.
- (b) Remove the side seal and radiator packing.
- (c) Remove the drain cock.



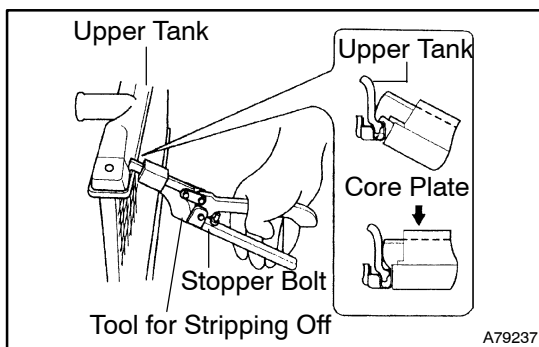
2. REMOVE UPPER AND LOWER TANKS

- (a) Adjust the dimension of the portion A of the illustration by means of a stopper bolt so that it may become 0.2 to 0.3 mm under the condition that the handle of the SST is gripped by means of a stopper bolt.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

Be sure to adjust it to prevent an eventual damage of the claw.

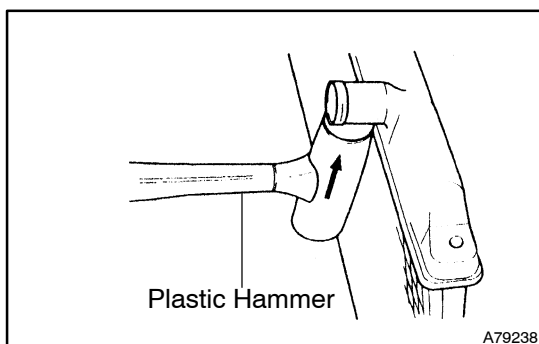


- (b) As the aluminum radiator adopts an integral caulking construction by the core plate, remove the upper and the lower tanks by lifting up the core plate in such a way that the latter may not be damaged. Release the calking by using the stripping off tool and by gripping it until it hits the stopper bolt of the handle as shown on the illustration.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

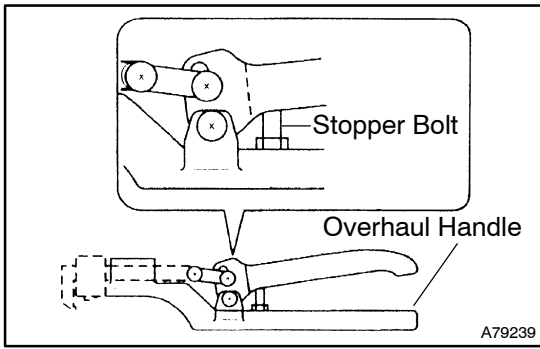
Don't lift up the core plate more than 90°.



- (c) Remove the upper and lower tanks by lightly tapping the radiator hose fitting position.

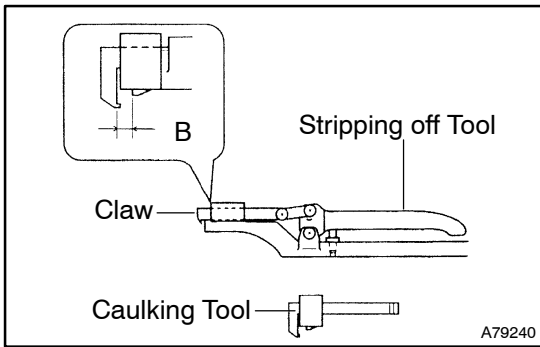
NOTICE:

- Remember mounting direction of the core sub-assembly.
- Remount it in such a way that the original direction can be maintained.

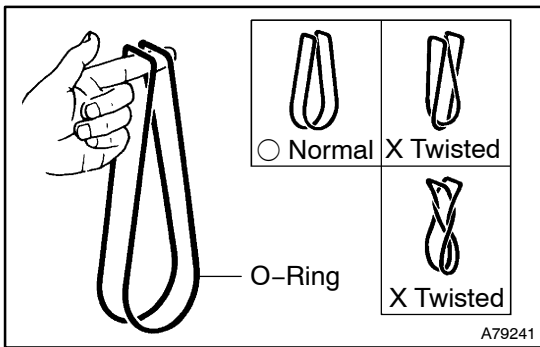


3. FIT CAULKING TOOL ON OVERHAUL HANDLE BY MARKING

- (a) Use of the hole of position on the illustration (either of the 2 holes will do).
SST 09230-01010 (09231-01010, 09231-01020), 09231-14010



- (b) Adjust with the stopper bolt so that the dimension of part B in the figure is within the range of the reference value when the handle is gripped.

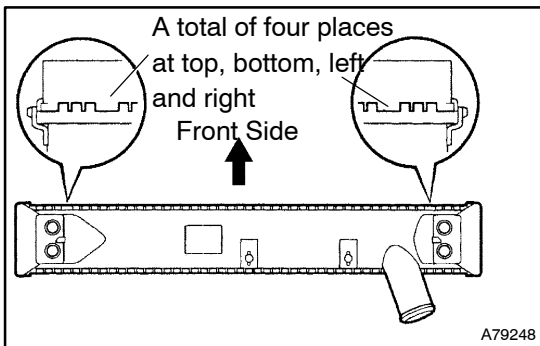


4. INSTALL UPPER AND LOWER TANKS

- (a) After having checked that there remains no foreign matter on the fitting position, mount a new O-ring in such a way that it will not be twisted.

NOTICE:

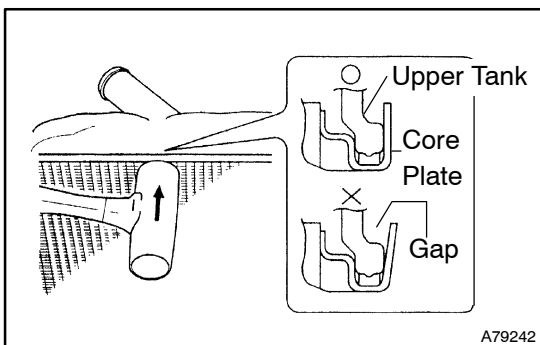
When cleaning the fitting position, lightly rub the said portion by using a sand paper, etc.



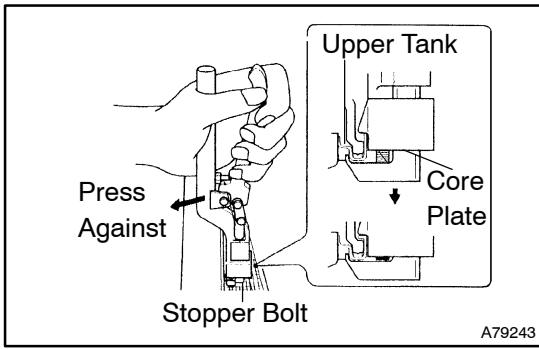
- (b) The notch in the radiator core shall be at the front side as shown in the figure.

NOTICE:

As the construction of the core has directionality in front back direction, do not install it with reversed orientation.



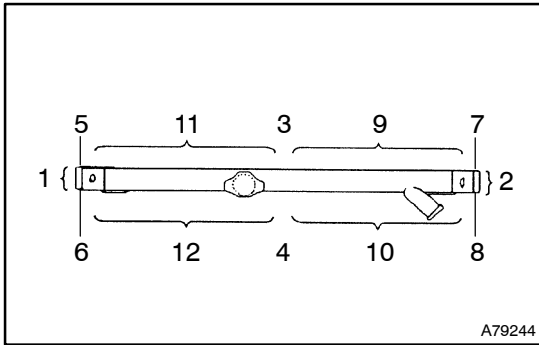
- (c) Set the upper and the lower tanks so that they will not be damaged.
- (d) Clap the core plate to obtain a contact with the upper and the lower tanks.



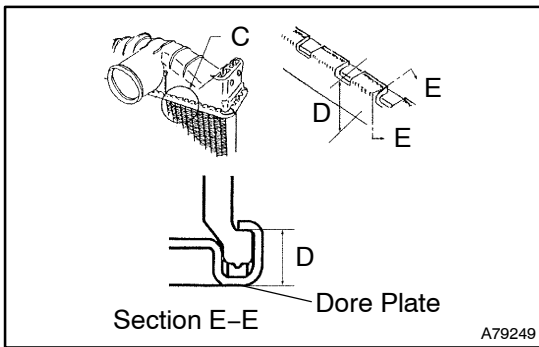
- (e) Press the caulking tool against the core plate as shown in the illustration. Perform temporary caulking by gripping the handle until it knocks at the stopper bolt of the handle.

NOTICE:

- For the positions where the caulking tool is not usable, perform the caulking by using pliers.



- Perform the caulking according to the following sequence.



- (f) Check the dimension D after caulking.
Standard dimension: 7.4 - 7.8 mm (0.29 - 0.30 in.)
- (g) In the event that the said dimension does not fall within the standard limit, adjust the stopper bolt of the handle once again and perform the caulking again.

NOTICE:

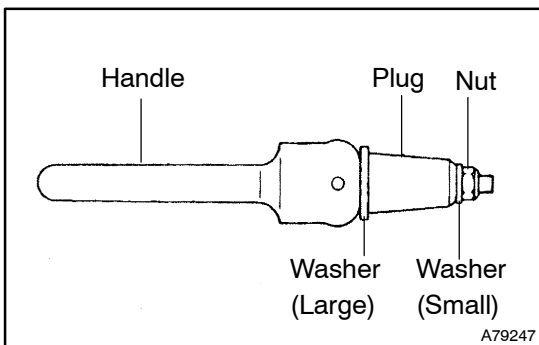
Check the caulking dimensions at both ends of the core plate as well as around the central portion where the caulking has not been applied (under the pipe, etc.).

- (h) Others:
Mark for the first repair for the second repair at a well visible place in the upper tank.

NOTICE:

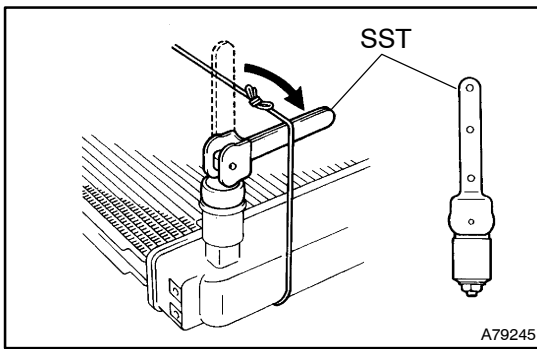
Re-caulking should be limited to 2 times. If it is necessary to recaulk more than twice, replace the part in question.

5. CHECK FOR WATER LEAKS

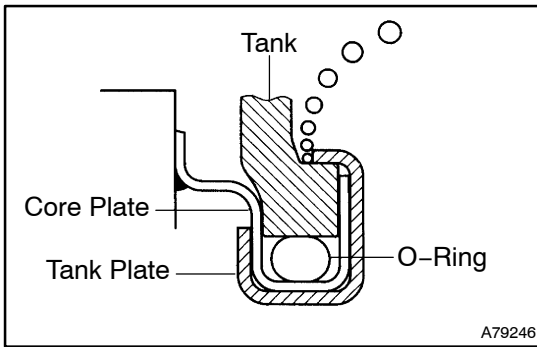


- (a) Assemble the plug handle as shown in the illustration and tighten the nut until the washer, the plug and the handle have light contact.

SST 09230-01010 (09231-00030, 09231-00050)



- (b) Using SST, plug the inlet and outlet pipes of the radiator.
SST 09230-01010 (09231-00030, 09231-00050)
- (c) Using a radiator cap tester, apply pressure to the radiator.
Test pressure: 137 kPa (1.4 kgf/cm², 20 psi)

**HINT:**

On the radiators with resin tanks, there is a clearance between the core plate and tank plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before performing the water leak test, first swirl the radiator around in the water until all air bubbles disappear.

6. INSTALL RADIATOR COCK

- (a) Install a new O-ring.

7. INSTALL LEFT AND RIGHT SIDE PLATE

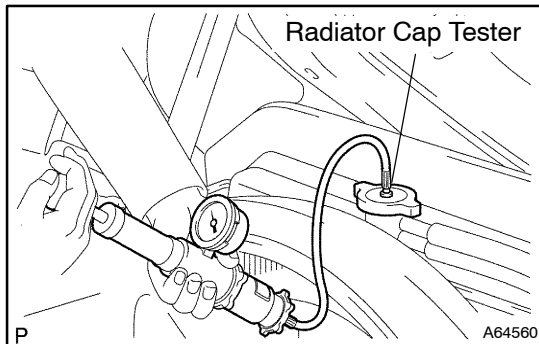
- (a) Install the all square head bolts to remove the left and the right side plate.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

COOLING SYSTEM (S05C-TB)

ON-VEHICLE INSPECTION

1608Q-02



1. INSPECT COOLING SYSTEM FOR LEAKS

- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Warm up the engine.
- (c) Pump it to 137 kPa (1.3 kgf/cm², 19.9 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

2. REINSTALL RADIATOR CAP

3. MAINTAIN AND INSPECT FAN AND FAN CLUTCH

- (a) During maintenance and inspection, be careful not to drop or strike the fan coupling or fan itself. The resulting damage may lower the performance of the fan. Also, note that the fan is made of plastic and may become damaged or deformed if force is applied to it.
- (b) Do not replace the fan unless it is faulty. When replacing the fan, replace it with the same type as the one which was removed.

If the fan is replaced with one of a larger capacity due to overheating or, conversely is replaced with one of a smaller capacity due to over cooling, the cooling performance may be in fact reduced and durability may be jeopardized.

- (c) Check the temperature detector (bimetal) to see if there is any mud or dust on it.

If the bimetal is covered with mud or dust, the fan performance will be erratic, and may result in overheating or over cooling.

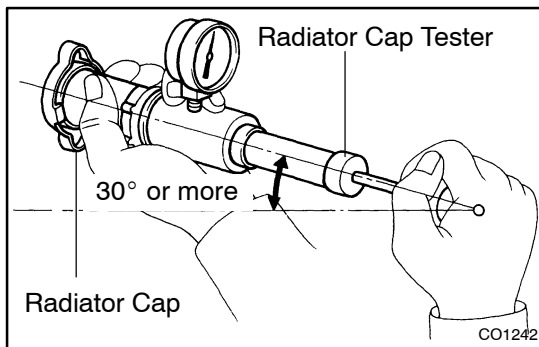
- (d) In such case, carefully remove, mud and dust adhering to the surface of the bimetal, using a wire brush, or the like.
- (e) Take particular care not to apply excessive force. Do not paint the fan or fan clutch.
- (f) Do not place any paint or other reagents which are likely to dissolve plastic in contact with the fan.

INSPECTION

1. INSPECT RADIATOR CAP SUB-ASSY

CAUTION:

To avoid the danger or being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



- (a) Inspect the radiator cap.

NOTICE:

- If the radiator cap has contaminations, always rinse it with water.
- Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.
- When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.

- (b) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push/(3 seconds or more)

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

- (c) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

- (d) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.

Standard opening pressure:

93 – 123 kPa (0.75 – 1.05 kgm/cm², 13.5 – 17.1 psi)

Minimum opening pressure:

78 kPa (0.6 kgf/cm², 11.4 psi)

HINT:

Use the tester's maximum reading as the opening pressure. If the opening pressure is less than minimum, replace the radiator cap.

ENGINE COOLANT (S05C-TB)

160BS-02

REPLACEMENT

1. DRAIN ENGINE COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

- (a) Remove the radiator cap.
- (b) Loosen the radiator drain plug and engine drain plug, and drain the coolant.
- (c) Close the drain plugs.

2. REFILL ENGINE COOLANT

- (a) Slowly fill the system with coolant.
 - Use of improper coolants may damage engine cooling system.
 - Use "Toyota Long Life Coolant" or equivalent and mix it with plain water according to the manufacturer's directions.
 - Using of coolant which includes more than 50 % (freezing protection down to -35°C (-31°F)) or 60% (freezing protection down to -50°C (-58°F)) of ethylene-glycol is recommended but not more than 70 %.

NOTICE:

- Do not use an alcohol type coolant or plain water alone.
- The coolant should be mixed with plain water (preferably demineralized water or distilled water).

Capacity:

w/ heater	18.2 liters (19.3 US qts, 15.9 Imp. qts)
w/o heater	17.6 liters (18.7 US qts, 15.4 Imp. qts)

- (b) Reinstall the radiator cap.
- (c) Start the engine, and bleed the cooling system.
- (d) Refill the radiator reservoir with coolant until it reaches the "full" line.

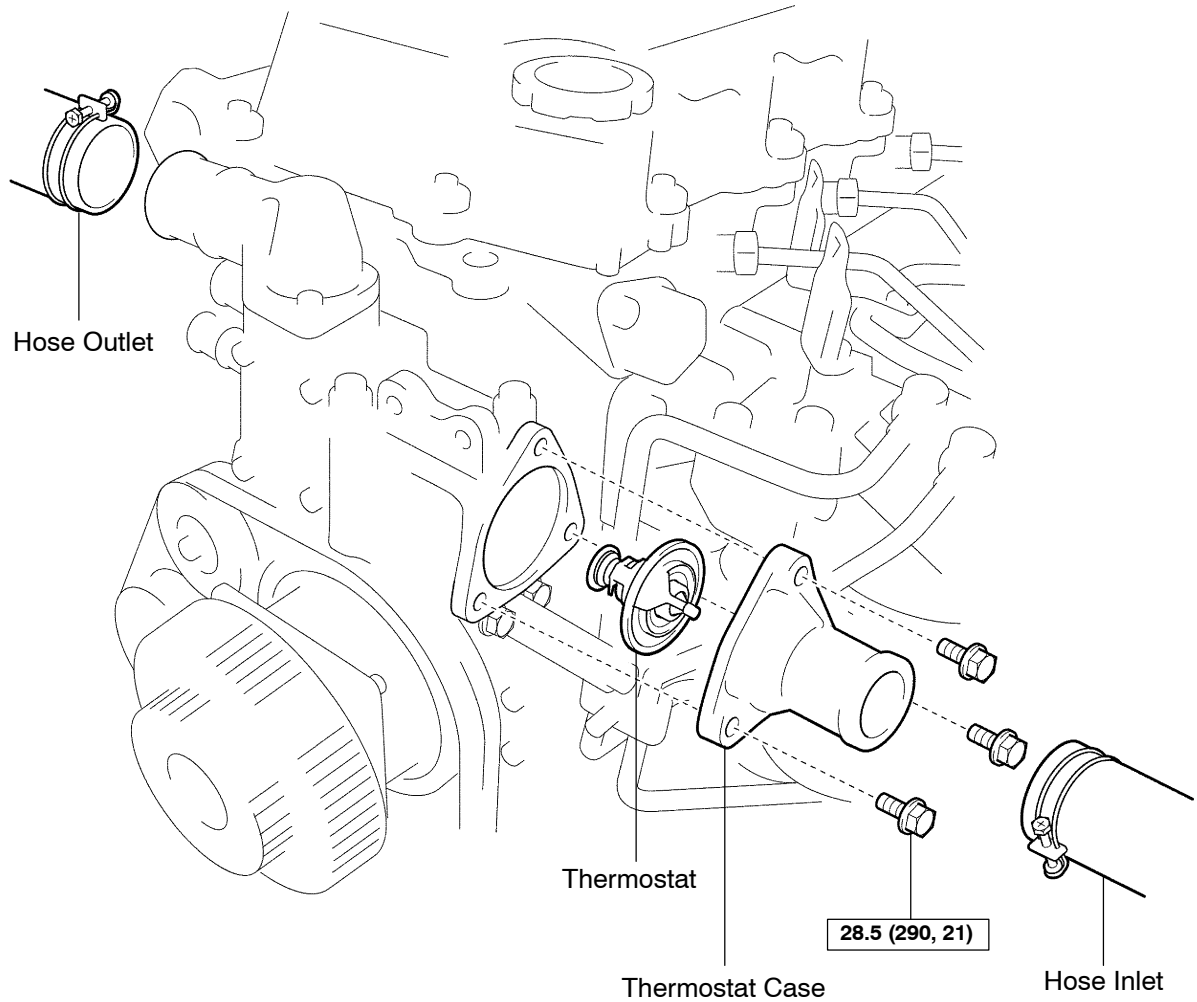
3. CHECK FOR ENGINE COOLANT LEAKS

4. CHECK ENGINE COOLANT SPECIFIC GRAVITY CORRECTLY

THERMOSTAT (S05C-TB)

COMPONENTS

160BT-03



P N·m (kgf·cm, ft·lbf) : Specified torque

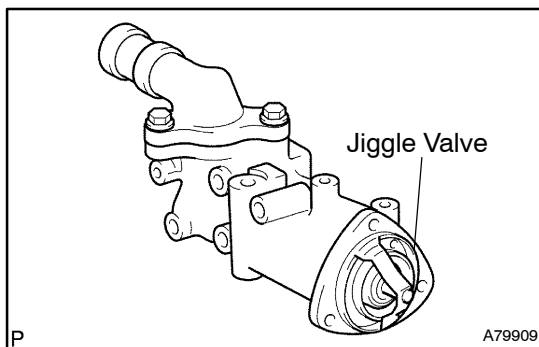
A54220

REPLACEMENT

HINT:

Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **DRAIN ENGINE COOLANT**
3. **DISCONNECT RADIATOR HOSE INLET**
4. **REMOVE THERMOSTAT**
 - (a) Remove the 3 bolts and thermostat case cover from the water outlet housing.
 - (b) Remove the thermostat.
 - (c) Remove the gasket from the thermostat.
5. **INSTALL THERMOSTAT**
 - (a) Install a new gasket to the thermostat.



- (b) Install the thermostat with the jiggle valve upward.

HINT:

Remove water or dust adhering to the water outlet housing.

- (c) Install the thermostat case cover with the 3 bolts.

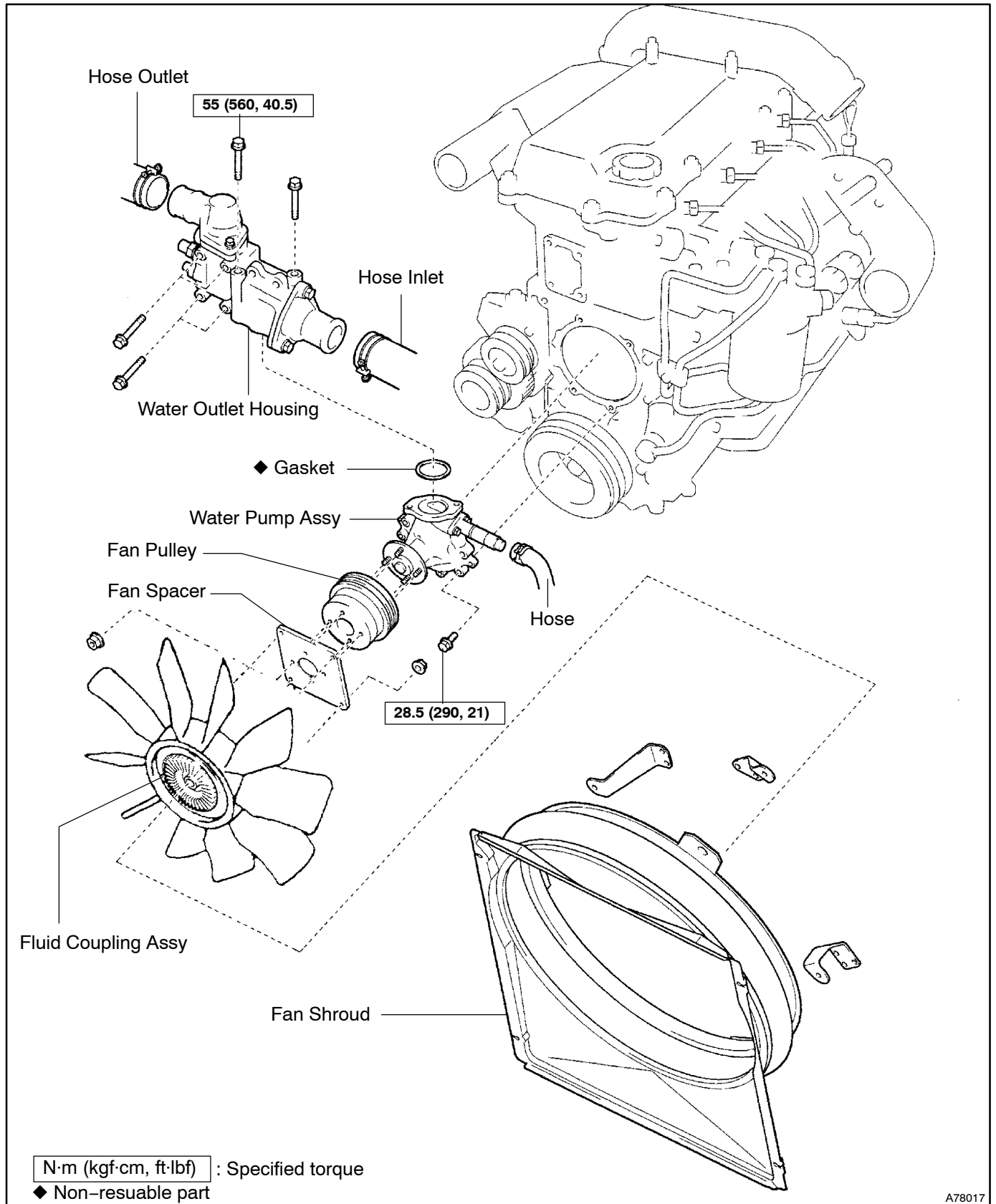
Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

6. **INSTALL RADIATOR HOSE INLET**
7. **REFILL ENGINE COOLANT**
8. **INSTALL BATTERY NEGATIVE TERMINAL**
9. **CHECK FOR ENGINE COOLANT LEAKS**

WATER PUMP ASSY (S05C-TB)

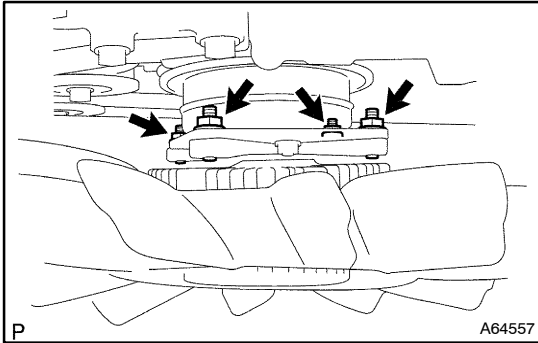
COMPONENTS

160BV-02



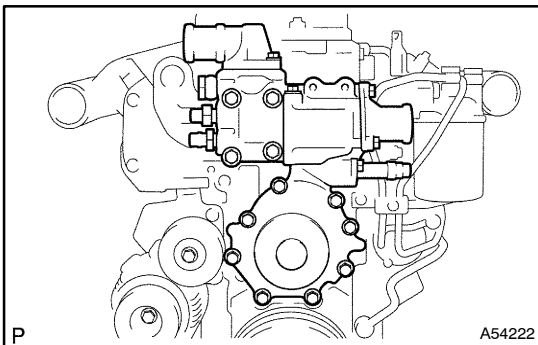
REPLACEMENT

1. **DRAIN ENGINE COOLANT**
2. **DISCONNECT RADIATOR HOSE INLET**
3. **DISCONNECT RADIATOR HOSE OUTLET**
4. **REMOVE V-RIBBED BELT**
 - (a) Stretch the belt tight, and loosen the 4 pump pulley set nuts.
 - (b) Remove the drive belt.
 - (c) Remove the 4 nuts, pump pulley and fan spacer.

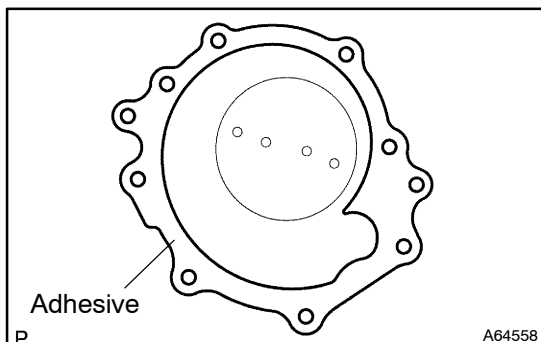


5. **REMOVE FLUID COUPLING ASSY**
 - (a) Remove the 4 nuts holding the fan with coupling.

6. **REMOVE WATER OUTLET HOUSING**
 - (a) Remove the 6 bolts and water outlet housing.



7. **REMOVE WATER PUMP ASSY**
 - (a) Remove the 8 bolts and water pump.



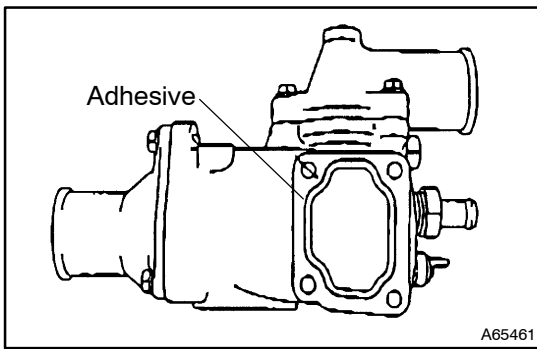
8. **INSTALL WATER PUMP ASSY**
 - (a) Apply seal packing to the illustrated position, and then adjust the knock pin of the cylinder block to install the water pump.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

NOTICE:

Clean the installation surface.



9. INSTALL WATER OUTLET HOUSING

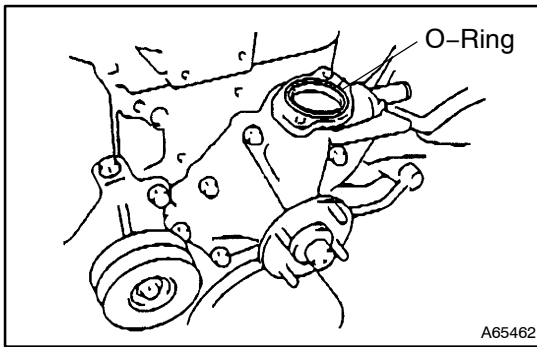
- (a) Apply seal packing to the illustrated position.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

NOTICE:

Clean the installation surface.



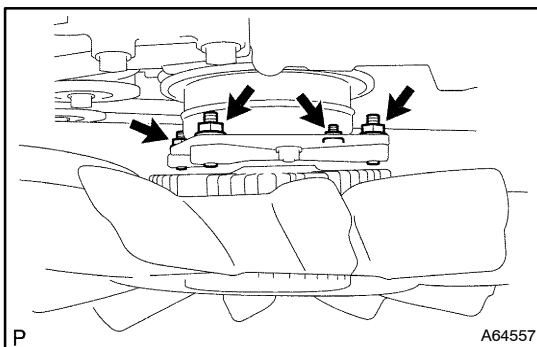
- (b) Connect the water hoses. Install a new O-ring into the groove on the upper surface of the water pump.
 (c) Install the water outlet housing temporarily with the 6 bolts.
 (d) Tighten the 4 bolts completely placed on the cylinder head side.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

- (e) Tighten the 2 bolts completely placed on the water pump side.

Torque: 55 N·m (560 kgf·cm, 40 ft·lbf)

- (f) Connect the 2 water hoses.



10. INSTALL FLUID COUPLING ASSY

- (a) Install the fan pulley and fan spacer temporarily with the 4 nuts.

- (b) Install the V belt

- (c) Holding the V belt, tighten the 4 nuts completely to install the fan pulley and fan spacer properly.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

- (d) Install the fan clutch with the 4 nuts.

Torque: 28.5 N·m (290 kgf·cm, 21 ft·lbf)

- (e) Install the fan with the 4 nuts.

Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

11. INSTALL V-RIBBED BELT

- (a) Temporarily install the pump pull with the 4 nuts.

- (b) Install the drive belt.

- (c) Stretch the belt tight and torque the 4 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

12. INSTALL RADIATOR HOSE OUTLET

13. INSTALL RADIATOR HOSE INLET

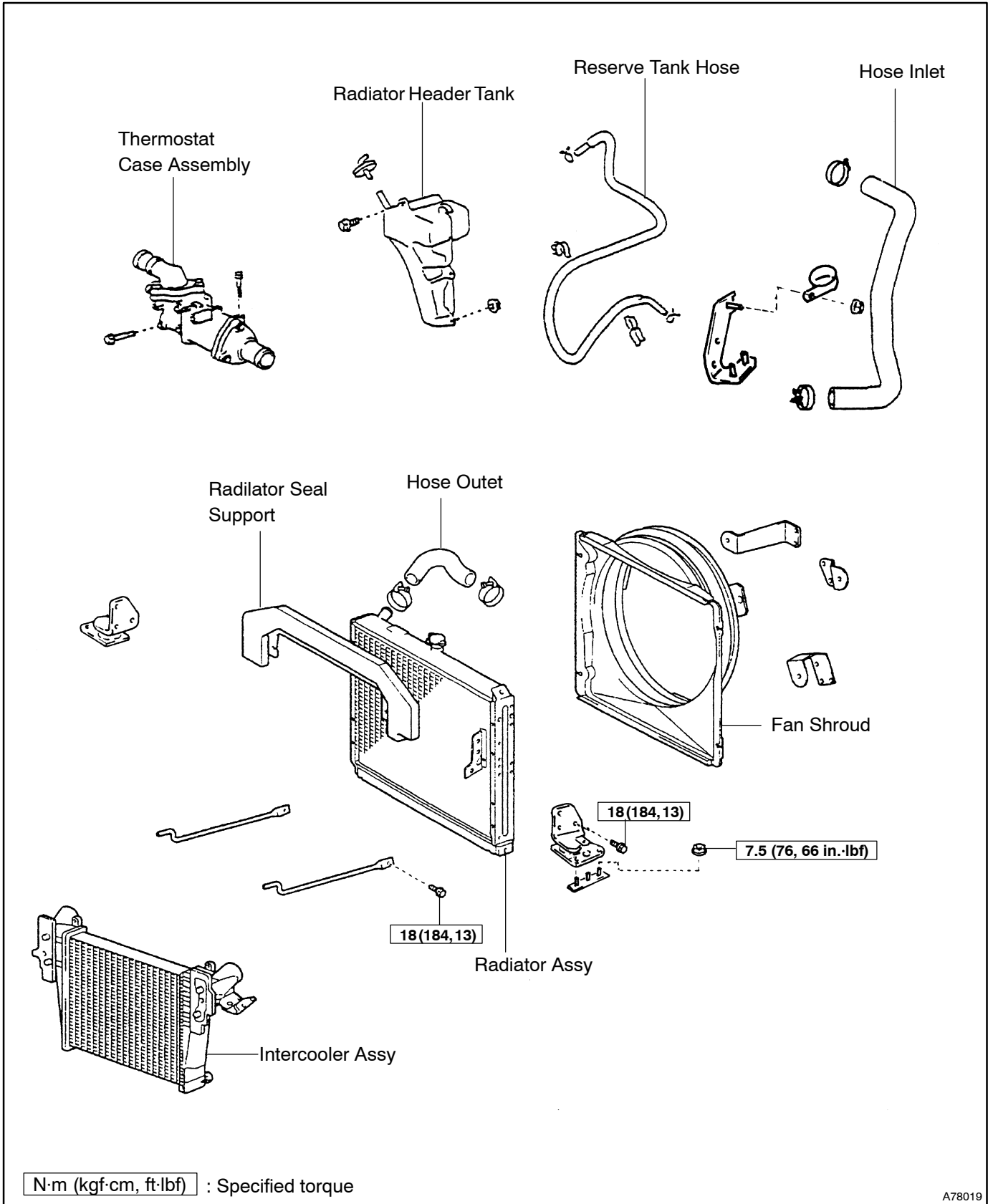
14. REFILL ENGINE COOLANT

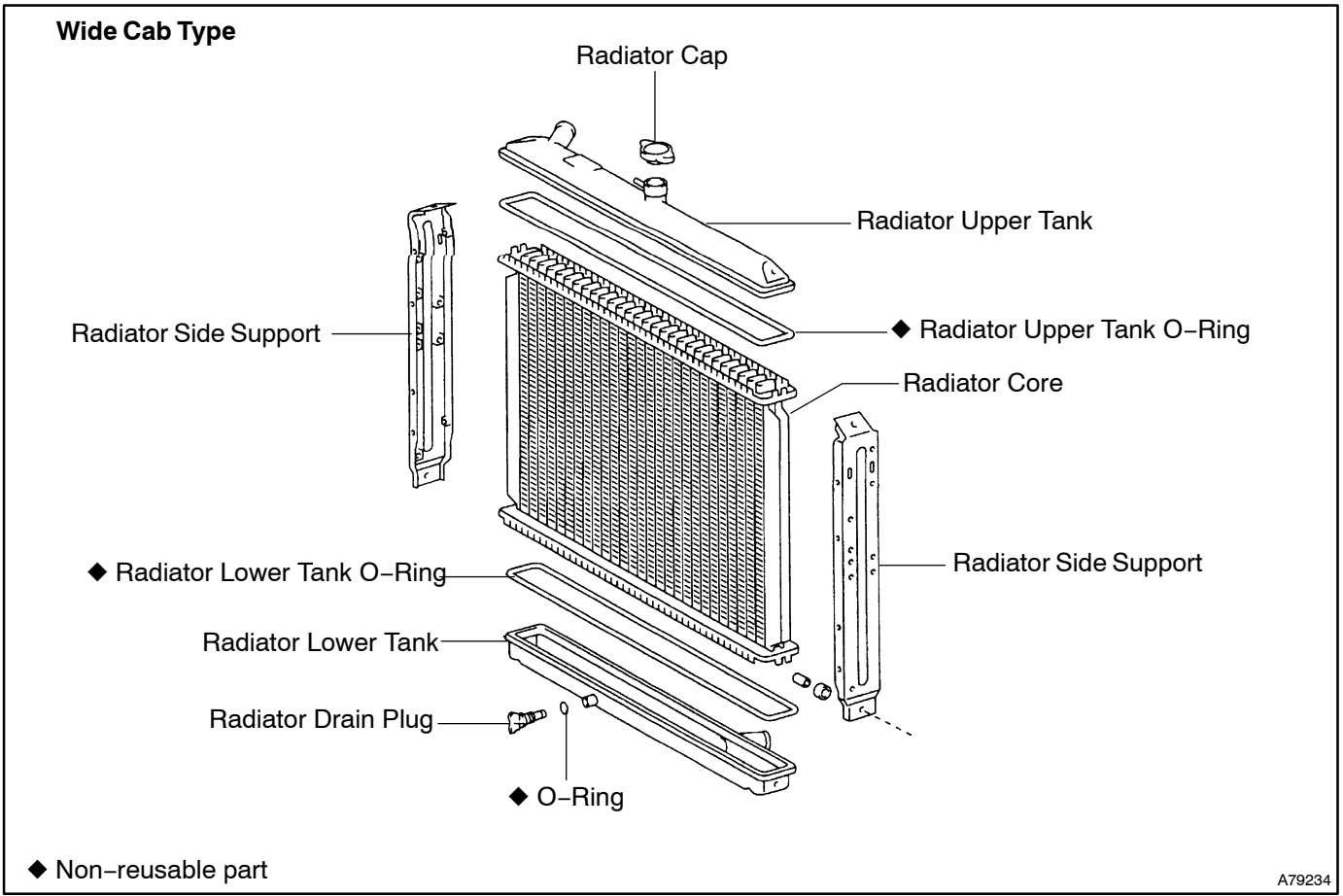
15. CHECK FOR ENGINE COOLANT LEAKS

RADIATOR ASSY (S05C-TB)

COMPONENTS

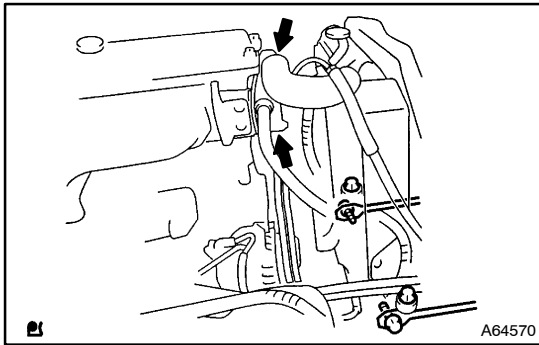
160KC-01





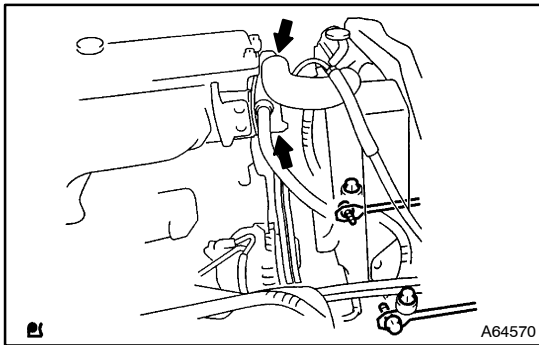
REPLACEMENT

1. DRAIN ENGINE COOLANT
2. DISCONNECT RADIATOR RESERVOIR TANK HOSE
3. DISCONNECT RADIATOR HOSE INLET
4. DISCONNECT RADIATOR HOSE OUTLET



5. REMOVE RADIATOR ASSY

- (a) Disconnect the heater hose and air conditioner hose together with the brackets from the radiator.
- (b) Remove the 2 nuts and 2 bolts from stay at on the radiator mounting bracket to remove the radiator together with the fan shroud.
- (c) Take out the fan shroud from the radiator.
- (d) Remove the intercooler from the radiator.



6. INSTALL RADIATOR ASSY

- (a) Install the intercooler to the radiator.
- (b) Install the fan shroud to the radiator.
- (c) Install the radiator with the 2 bolts and 2 nuts.

Torque:

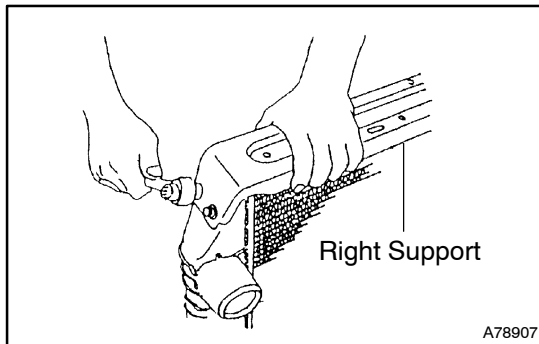
18 N·m (184 kgf·cm, 13 ft·lbf) for bolt

7.5 N·m (76 kgf·cm, 66 in·lbf) for nut

- (d) Install the heater hose and air conditioner hose to the radiator.

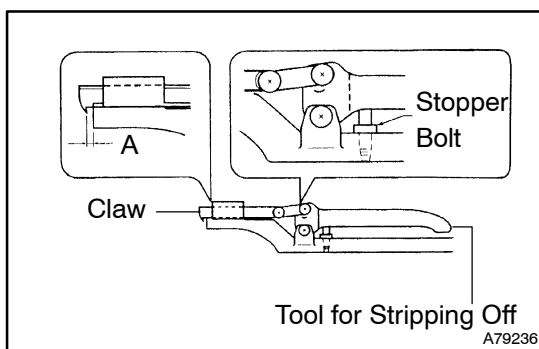
7. INSTALL RADIATOR HOSE OUTLET
8. INSTALL RADIATOR HOSE INLET
9. INSTALL RADIATOR RESERVOIR TANK HOSE
10. REFILL ENGINE COOLANT
11. CHECK FOR ENGINE COOLANT LEAKS

OVERHAUL



1. REMOVE LEFT AND RIGHT SIDE PLATE

- (a) Remove the all square head M8 bolts (4 or 8) to remove the left and the right side plate.
- (b) Remove the side seal and radiator packing.
- (c) Remove the drain cock.



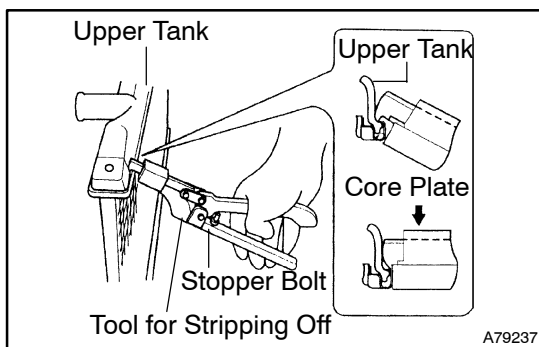
2. REMOVE UPPER AND LOWER TANKS

- (a) Adjust the dimension of the portion A of the illustration by means of a stopper bolt so that it may become 0.2 to 0.3 mm under the condition that the handle of the SST is gripped by means of a stopper bolt.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

Be sure to adjust it to prevent an eventual damage of the claw.

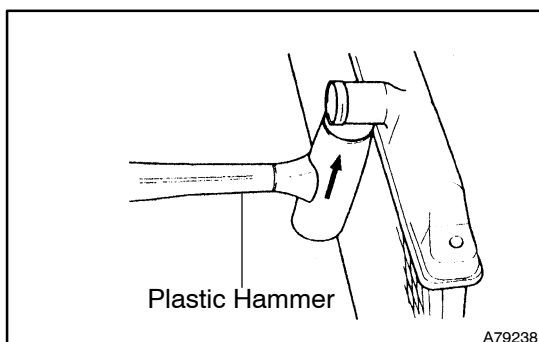


- (b) As the aluminum radiator adopts an integral caulking construction by the core plate, remove the upper and the lower tanks by lifting up the core plate in such a way that the latter may not be damaged. Release the calking by using the stripping off tool and by gripping it until it hits the stopper bolt of the handle as shown on the illustration.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

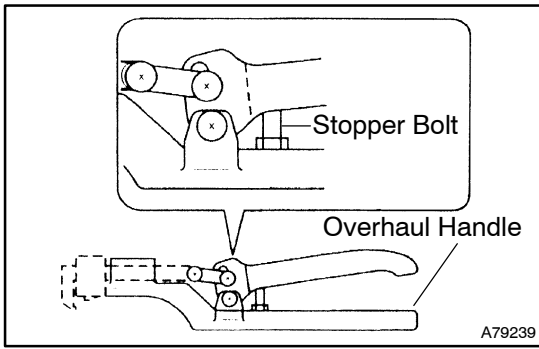
Don't lift up the core plate more than 90°.



- (c) Remove the upper and lower tanks by lightly tapping the radiator hose fitting position.

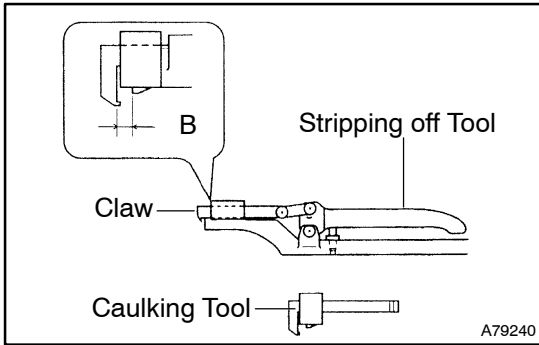
NOTICE:

- Remember mounting direction of the core sub-assembly.
- Remount it in such a way that the original direction can be maintained.

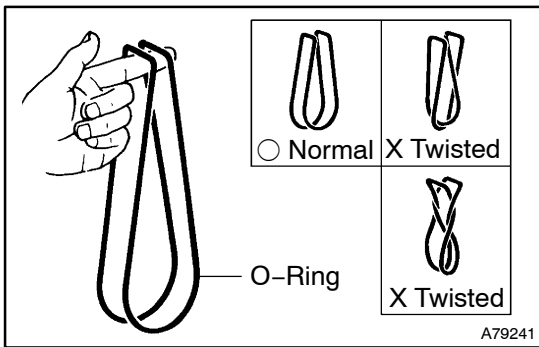


3. FIT CAULKING TOOL ON OVERHAUL HANDLE BY MARKING

- (a) Use of the hole of position on the illustration (either of the 2 holes will do).
SST 09230-01010 (09231-01010, 09231-01020), 09231-14010



- (b) Adjust with the stopper bolt so that the dimension of part B in the figure is within the range of the reference value when the handle is gripped.

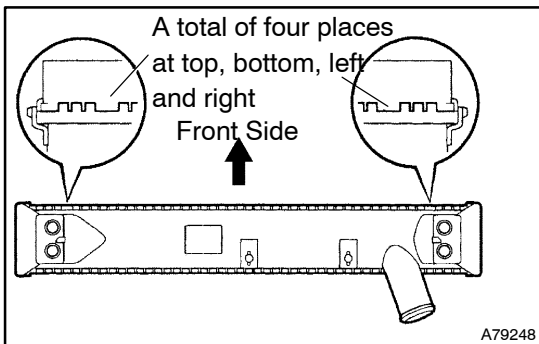


4. INSTALL UPPER AND LOWER TANKS

- (a) After having checked that there remains no foreign matter on the fitting position, mount a new O-ring in such a way that it will not be twisted.

NOTICE:

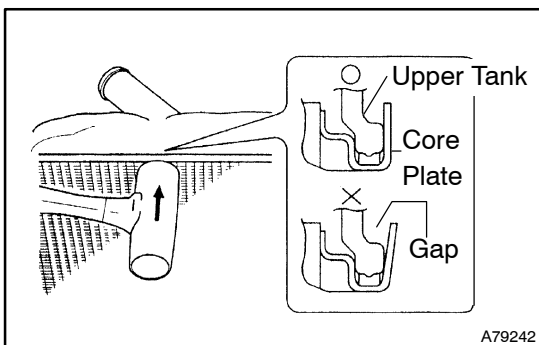
When cleaning the fitting position, lightly rub the said portion by using a sand paper, etc.



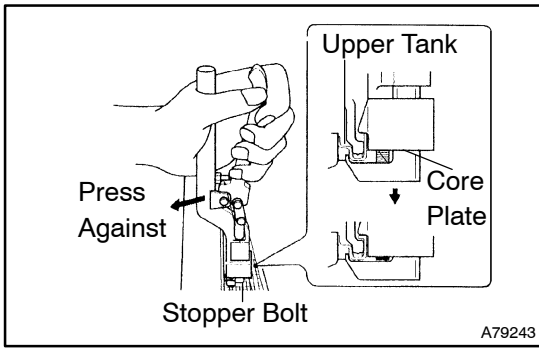
- (b) The notch in the radiator core shall be at the front side as shown in the figure.

NOTICE:

As the construction of the core has directionality in front back direction, do not install it with reversed orientation.



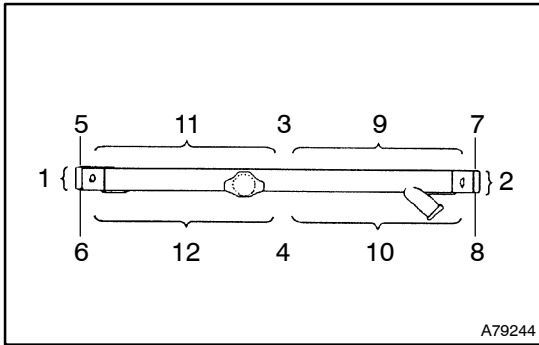
- (c) Set the upper and the lower tanks so that they will not be damaged.
- (d) Clap the core plate to obtain a contact with the upper and the lower tanks.



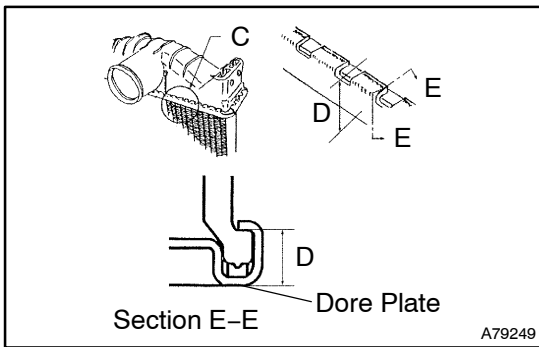
- (e) Press the caulking tool against the core plate as shown in the illustration. Perform temporary caulking by gripping the handle until it knocks at the stopper bolt of the handle.

NOTICE:

- For the positions where the caulking tool is not usable, perform the caulking by using pliers.



- Perform the caulking according to the following sequence.



- (f) Check the dimension D after caulking.
Standard dimension: 7.4 - 7.8 mm (0.29 - 0.30 in.)
- (g) In the event that the said dimension does not fall within the standard limit, adjust the stopper bolt of the handle once again and perform the caulking again.

NOTICE:

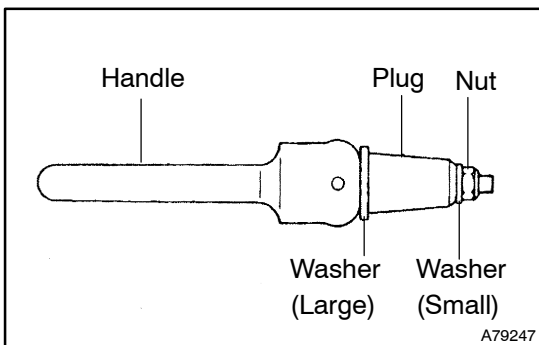
Check the caulking dimensions at both ends of the core plate as well as around the central portion where the caulking has not been applied (under the pipe, etc.).

- (h) Others:
Mark for the first repair for the second repair at a well visible place in the upper tank.

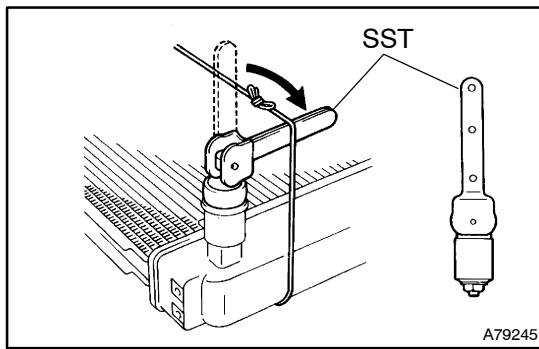
NOTICE:

Re-caulking should be limited to 2 times. If it is necessary to recaulk more than twice, replace the part in question.

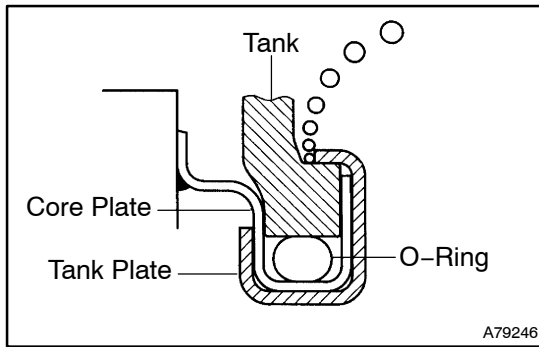
5. CHECK FOR WATER LEAKS



- (a) Assemble the plug handle as shown in the illustration and tighten the nut until the washer, the plug and the handle have light contact.
SST 09230-01010 (09231-00030, 09231-00050)



- (b) Using SST, plug the inlet and outlet pipes of the radiator.
SST 09230-01010 (09231-00030, 09231-00050)
- (c) Using a radiator cap tester, apply pressure to the radiator.
Test pressure: 137 kPa (1.4 kgf/cm², 20 psi)

**HINT:**

On the radiators with resin tanks, there is a clearance between the core plate and tank plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before performing the water leak test, first swirl the radiator around in the water until all air bubbles disappear.

6. INSTALL RADIATOR COCK

- (a) Install a new O-ring.

7. INSTALL LEFT AND RIGHT SIDE PLATE

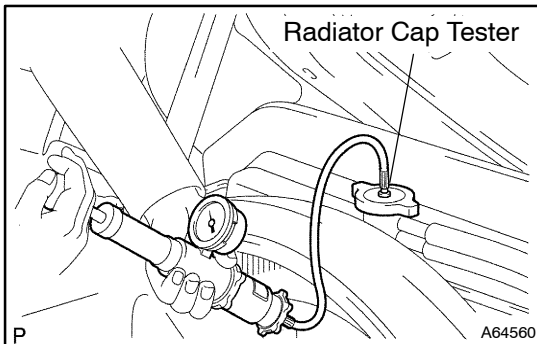
- (a) Install the all square head bolts to remove the left and the right side plate.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

COOLING SYSTEM (W04D-J)

ON-VEHICLE INSPECTION

160KH-01



1. INSPECT COOLING SYSTEM FOR LEAKS

- (a) Fill the radiator with coolant and attach a radiator cap tester.
- (b) Warm up the engine.
- (c) Pump it to 137 kPa (1.3 kgf/cm², 19.9 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

2. REINSTALL RADIATOR CAP

3. MAINTAIN AND INSPECT FAN AND FAN CLUTCH

- (a) During maintenance and inspection, be careful not to drop or strike the fan coupling or fan itself. The resulting damage may lower the performance of the fan. Also, note that the fan is made of plastic and may become damaged or deformed if force is applied to it.
- (b) Do not replace the fan unless it is faulty. When replacing the fan, replace it with the same type as the one which was removed.

If the fan is replaced with one of a larger capacity due to overheating or, conversely is replaced with one of a smaller capacity due to over cooling, the cooling performance may be in fact reduced and durability may be jeopardized.

- (c) Check the temperature detector (bimetal) to see if there is any mud or dust on it.

If the bimetal is covered with mud or dust, the fan performance will be erratic, and may result in overheating or over cooling.

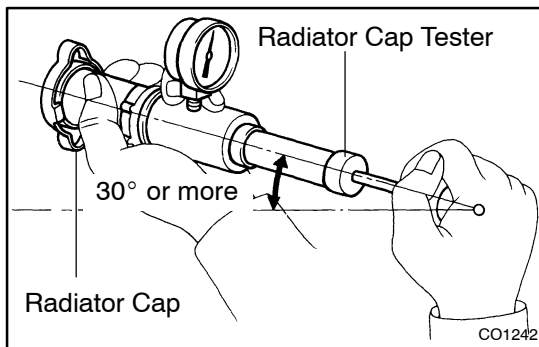
- (d) In such case, carefully remove, mud and dust adhering to the surface of the bimetal, using a wire brush, or the like.
- (e) Take particular care not to apply excessive force. Do not paint the fan or fan clutch.
- (f) Do not place any paint or other reagents which are likely to dissolve plastic in contact with the fan.

INSPECTION

1. INSPECT WATER OUTLET CAP SUB-ASSY

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



(a) Inspect the radiator cap.

NOTICE:

- If the radiator cap has contaminations, always rinse it with water.
- Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.
- When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.

(b) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push/(3 seconds or more)

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(c) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(d) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.

Standard opening pressure:

74 – 102 kPa (0.4 – 0.6 kgf/cm², 6 – 8 psi)

Minimum opening pressure:

78 kPa (0.6 kgf/cm², 11.4 psi)

HINT:

Use the tester's maximum reading as the opening pressure. If the opening pressure is less than minimum, replace the radiator cap.

ENGINE COOLANT (W04D-J)

160KJ-01

REPLACEMENT

1. DRAIN ENGINE COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

- (a) Remove the radiator cap.
- (b) Loosen the radiator drain plug and engine drain plug, and drain the coolant.
- (c) Close the drain plugs.

2. REFILL ENGINE COOLANT

- (a) Slowly fill the system with coolant.
 - Use of improper coolants may damage engine cooling system.
 - Use "Toyota Super Long Life Coolant" or equivalent and mix it with plain water according to the manufacturer's directions.
 - Using of coolant which includes more than 50 % (freezing protection down to -35°C (-31°F)) or 60% (freezing protection down to -50°C (-58°F)) of ethylene-glycol is recommended but not more than 70 %.

NOTICE:

- Do not use an alcohol type coolant or plain water alone.
- The coolant should be mixed with plain water (preferably demineralized water or distilled water).

Capacity:

Standard cab type	12.92 liters (13.7 US qts, 11.3 Imp. qts)
Wide cab type	12.1 liters (12.8 US qts, 10.6 Imp. qts)

- (b) Reinstall the radiator cap.
- (c) Start the engine, and bleed the cooling system.
- (d) Refill the radiator reservoir with coolant until it reaches the "full" line.

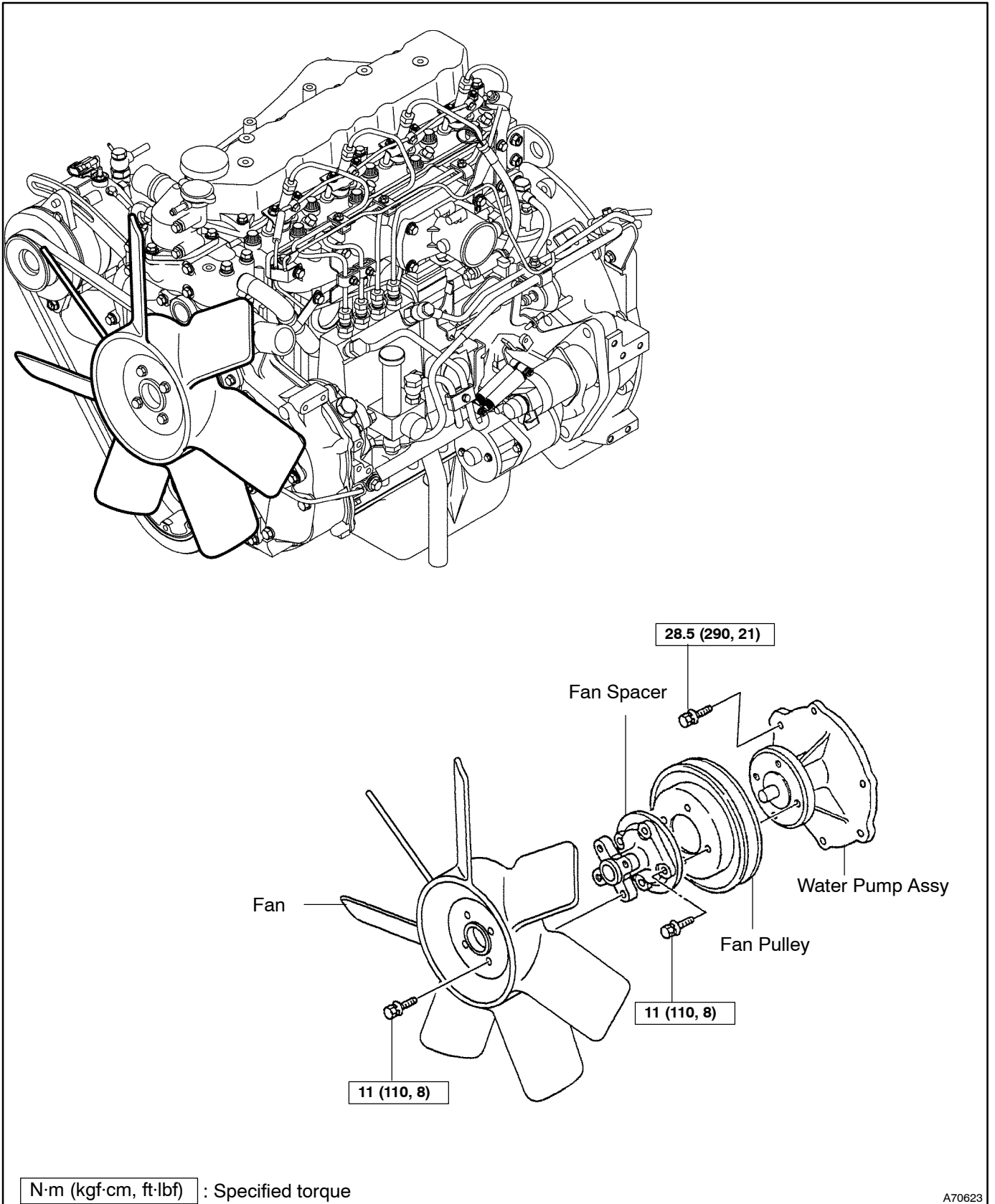
3. CHECK FOR ENGINE COOLANT LEAKS

4. CHECK ENGINE COOLANT SPECIFIC GRAVITY CORRECTLY

WATER PUMP ASSY (W04D-J)

COMPONENTS

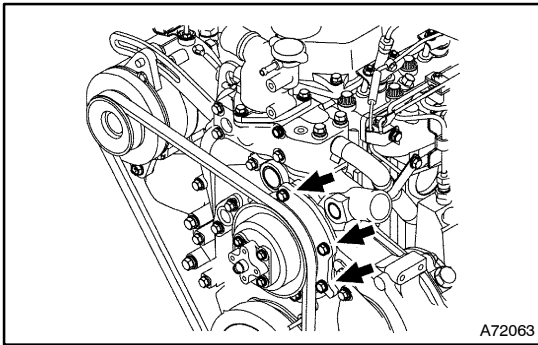
160KK-01



REPLACEMENT

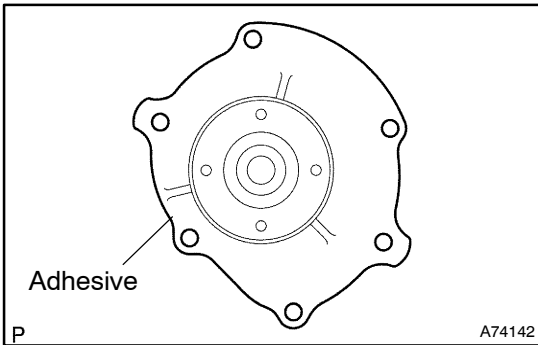
1. DRAIN ENGINE COOLANT
2. DISCONNECT RADIATOR HOSE INLET
3. DISCONNECT RADIATOR HOSE OUTLET
4. REMOVE FAN

- (a) Stretch the belt tight, and loosen the 4 pump pulley set bolts.
- (b) Remove the drive belt.
- (c) Remove the 4 bolts, pump pulley and fan spacer.
- (d) Remove the 4 bolts.



5. REMOVE WATER PUMP ASSY

- (a) Remove the 6 bolts and water pump.



6. INSTALL WATER PUMP ASSY

- (a) Apply seal packing to the illustrated position, and then adjust the knock pin of the cylinder block to install the water pump.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

NOTICE:

Clean the installation surface.

7. INSTALL FAN

- (a) Install the fan pulley and fan spacer temporarily with the 4 bolts.
- (b) Install the V belt
- (c) Holding the V belt, tighten the 4 bolts completely to install the fan pulley and fan spacer properly.

Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

- (d) Install the fan with the 4 bolts.

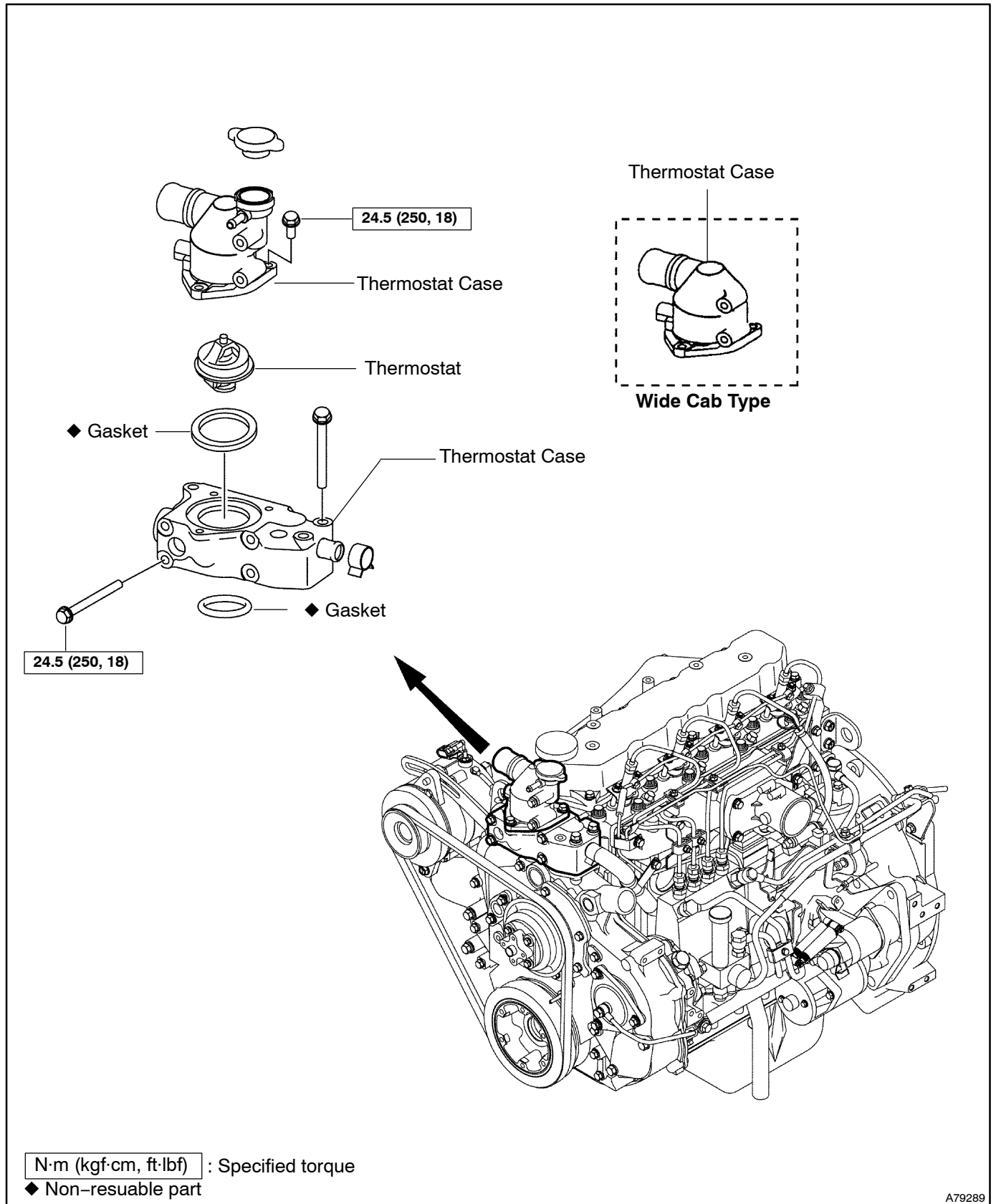
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

8. REFILL ENGINE COOLANT

9. CHECK FOR ENGINE COOLANT LEAKS

THERMOSTAT (W04D-J) COMPONENTS

160KM-01

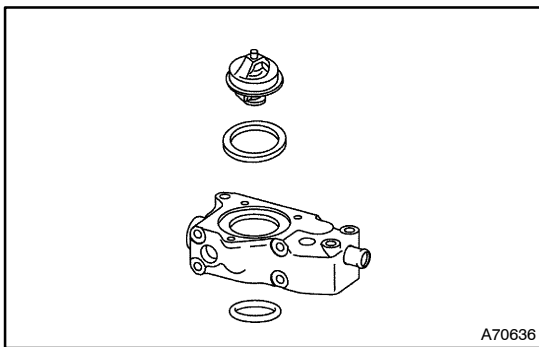


REPLACEMENT

HINT:

Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **DRAIN ENGINE COOLANT**
3. **DISCONNECT RADIATOR HOSE INLET**
4. **REMOVE THERMOSTAT**
 - (a) Remove the 3 bolts and thermostat case cover from the thermostat case.
 - (b) Remove the thermostat.
 - (c) Remove the gasket from the thermostat.



5. **INSTALL THERMOSTAT**

- (a) Install a new gasket to the thermostat.
- (b) Install the thermostat with the jiggle valve upward.
- (c) Install the thermostat case cover with the 3 bolts.
- (d) Apply seal packing to cylinder head position.

Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

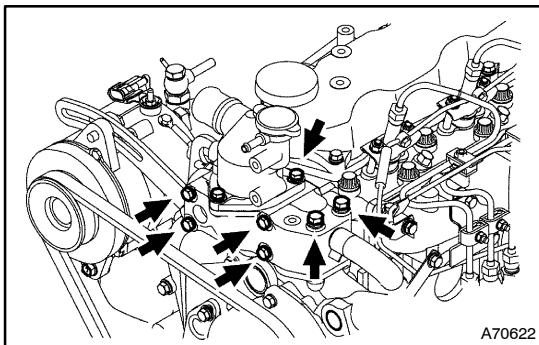
NOTICE:

Clean the installation surface.

- (e) Tighten the 4 bolts completely placed on the cylinder head side.

Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)
- (f) Tighten the 3 bolts completely placed on the timing gear case side.

Torque: 51 N·m (520 kgf·cm, 37.5 ft·lbf)
- (g) Connect the 2 water hoses.



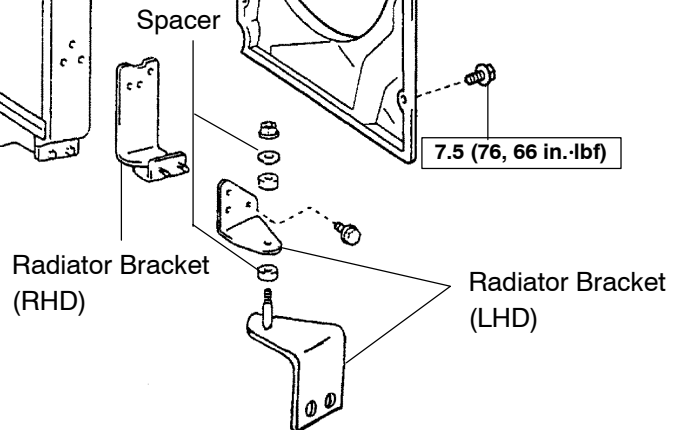
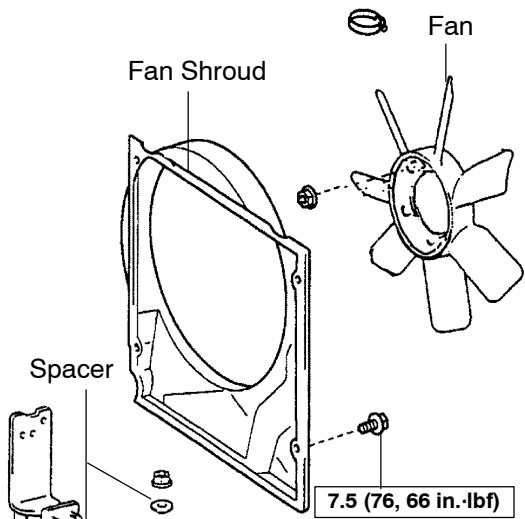
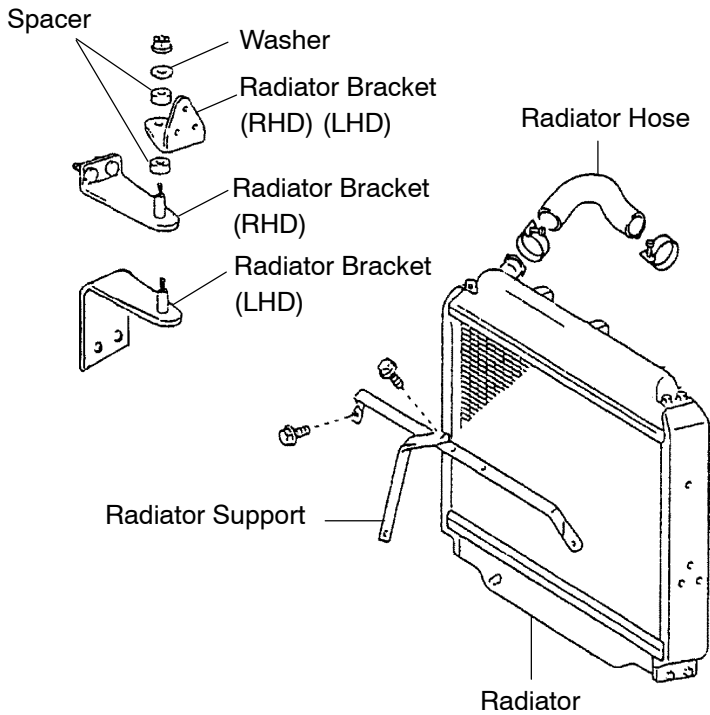
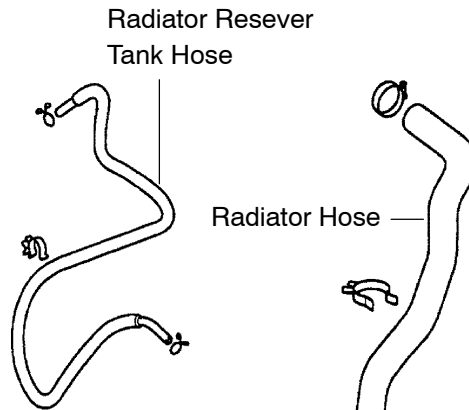
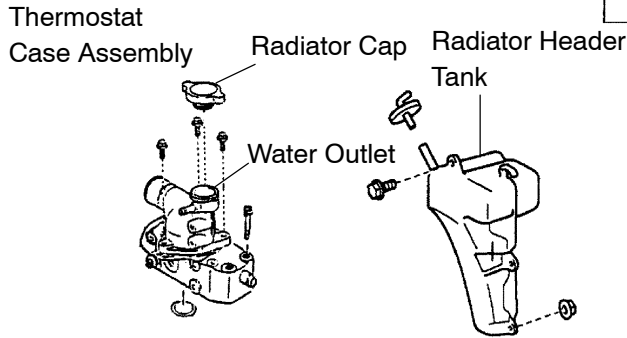
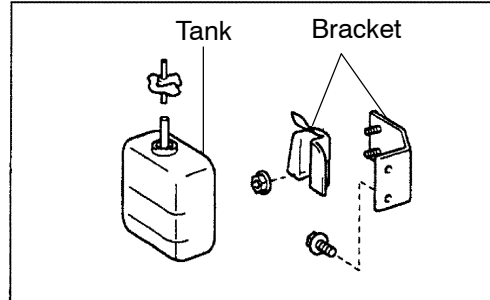
6. **INSTALL RADIATOR HOSE INLET**
7. **REFILL ENGINE COOLANT**
8. **CONNECT BATTERY NEGATIVE TERMINAL**
9. **CHECK FOR ENGINE COOLANT LEAKS**

RADIATOR ASSY (W04D-J)

COMPONENTS

160KO-01

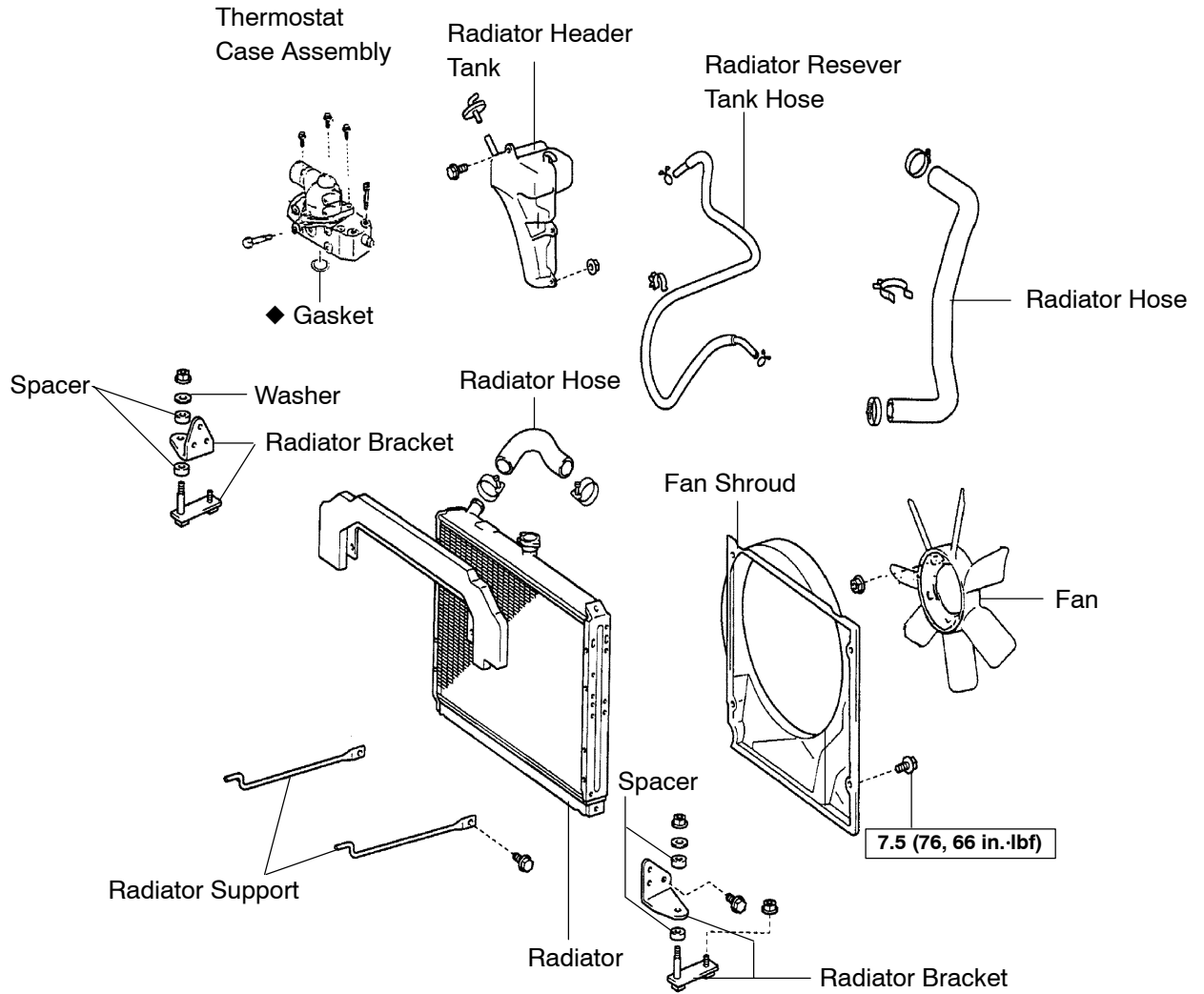
Standard Cab Type



N·m (kgf·cm, ft·lbf) : Specified torque

A78014

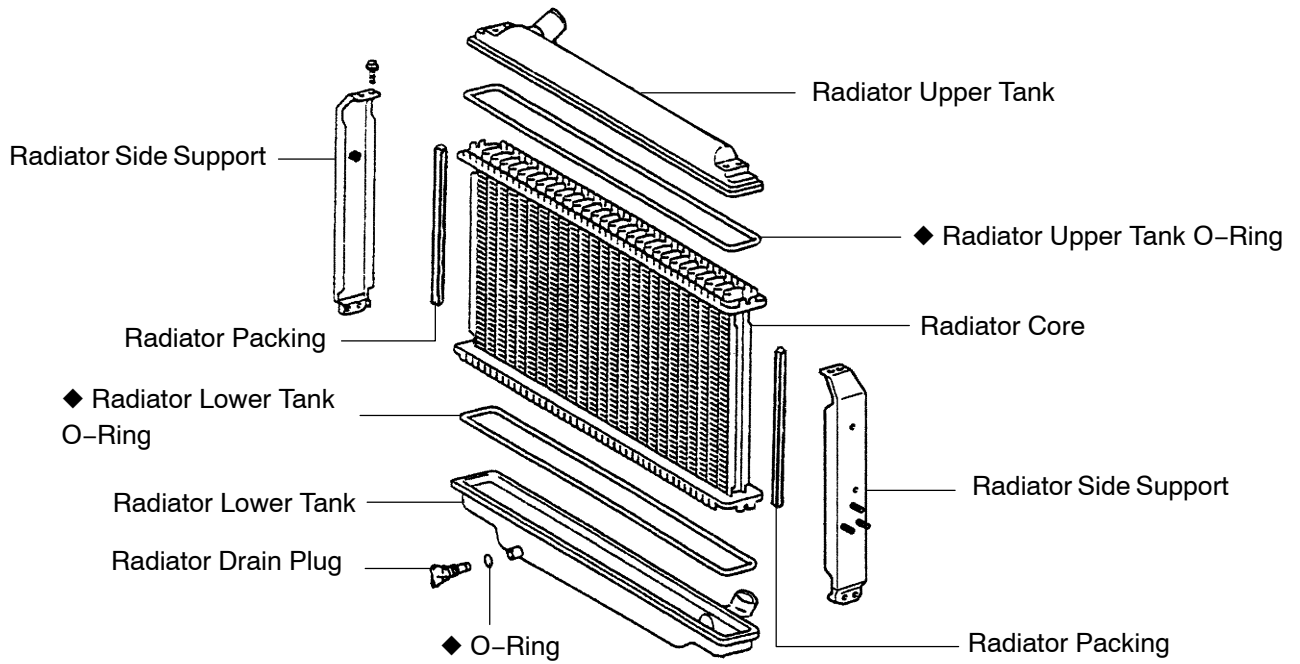
Wide Cab Type



N·m (kgf·cm, ft·lbf) : Specified torque

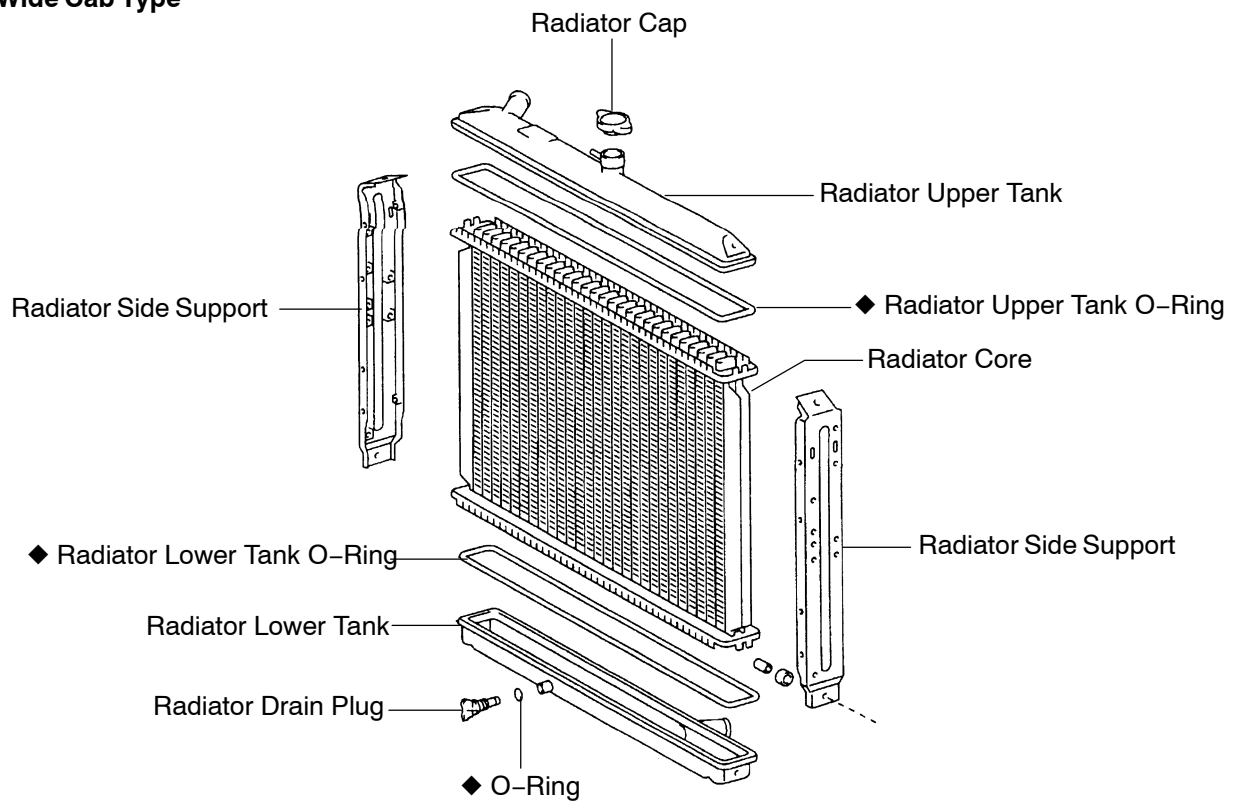
◆ Non-reusable part

Standard Cab Type



A79235

Wide Cab Type

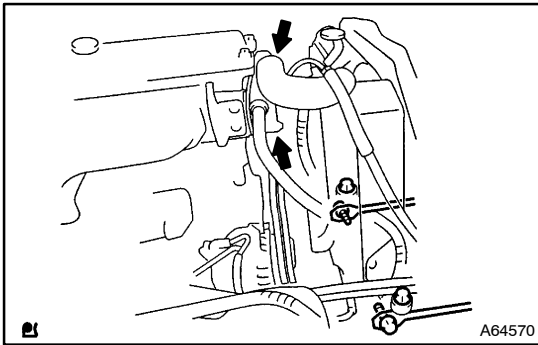


◆ Non-reusable part

A79234

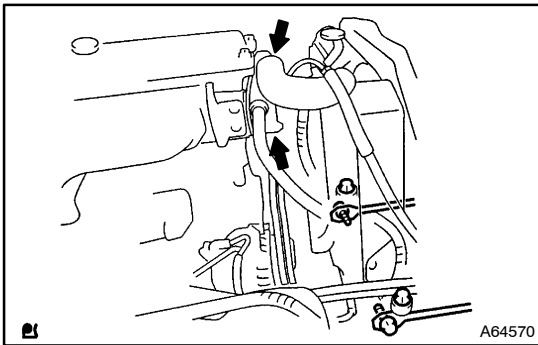
REPLACEMENT

1. DRAIN ENGINE COOLANT
2. DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE
3. DISCONNECT RADIATOR HOSE INLET
4. DISCONNECT RADIATOR HOSE OUTLET



5. REMOVE RADIATOR ASSY

- (a) Disconnect the heater hose and air conditioner hose together with the brackets from the radiator.
- (b) Remove the 2 nuts and 2 bolts from the stay on the radiator mounting bracket to remove the radiator together with the fan shroud.
- (c) Take out the fan shroud from the radiator.

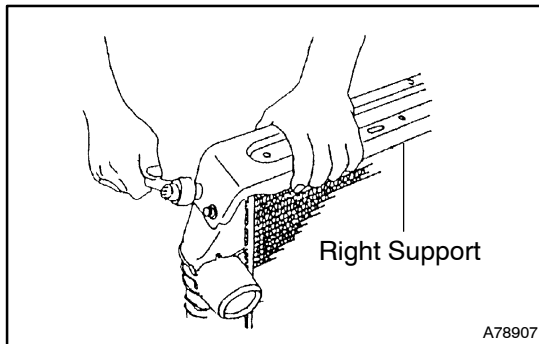


6. INSTALL RADIATOR ASSY

- (a) Install the fan shroud to the radiator.
- (b) Install the radiator with the 2 bolts and 2 nuts.
Torque:
18 N·m (184 kgf·cm, 13 ft·lbf) for bolt
7.5 N·m (76 kgf·cm, 66 in·lbf) for nut
- (c) Install the heater hose and air conditioner hose to the radiator.

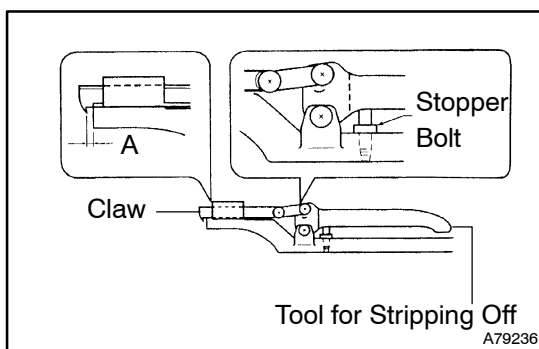
7. REFILL ENGINE COOLANT
8. CHECK FOR ENGINE COOLANT LEAKS

OVERHAUL



1. REMOVE LEFT AND RIGHT SIDE PLATE

- (a) Remove the all square head M8 (4 or 8) bolts to remove the left and the right side plate.
- (b) Remove the side seal and radiator packing.
- (c) Remove the drain cock.



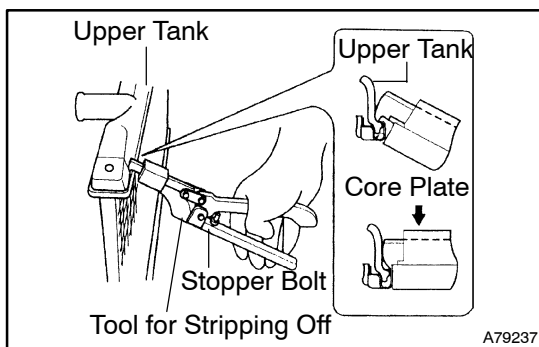
2. REMOVE UPPER AND LOWER TANKS

- (a) Adjust the dimension of the portion A of the illustration by means of a stopper bolt so that it may become 0.2 to 0.3 mm under the condition that the handle of the SST is gripped by means of a stopper bolt.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

Be sure to adjust it to prevent an eventual damage of the claw.

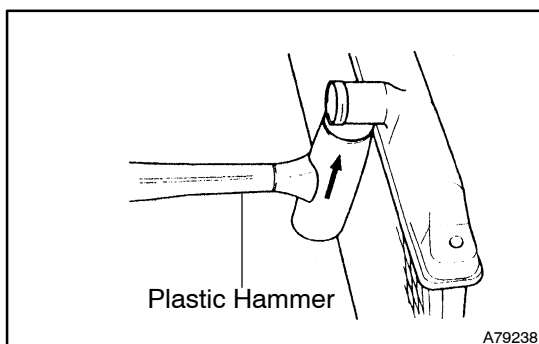


- (b) As the aluminum radiator adopts an integral caulking construction by the core plate, remove the upper and the lower tanks by lifting up the core plate in such a way that the latter may not be damaged. Release the calking by using the stripping off tool and by gripping it until it hits the stopper bolt of the handle as shown on the illustration.

SST 09230-01010 (09231-01010, 09231-01030)

NOTICE:

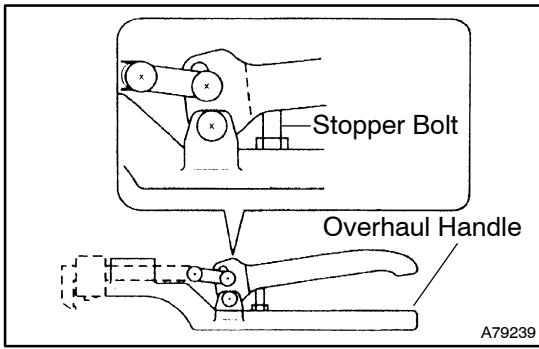
Don't lift up the core plate more than 90°.



- (c) Remove the upper and lower tanks by lightly tapping the radiator hose fitting position.

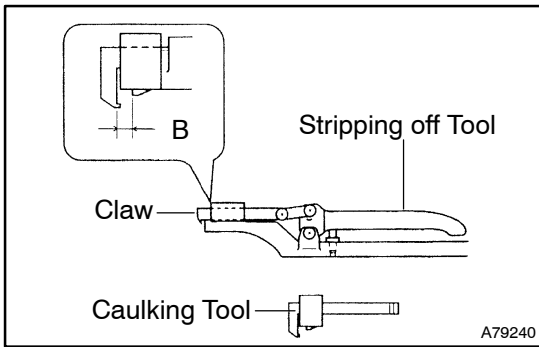
NOTICE:

- Remember mounting direction of the core sub-assembly.
- Remount it in such a way that the original direction can be maintained.

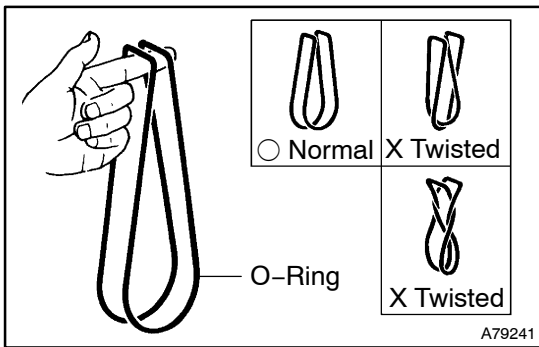


3. FIT CAULKING TOOL ON OVERHAUL HANDLE BY MARKING

- (a) Use of the hole of position on the illustration (either of the 2 holes will do).
SST 09230-01010 (09231-01010, 09231-01020), 09231-14010



- (b) Adjust with the stopper bolt so that the dimension of part B in the figure is within the range of the reference value when the handle is gripped.

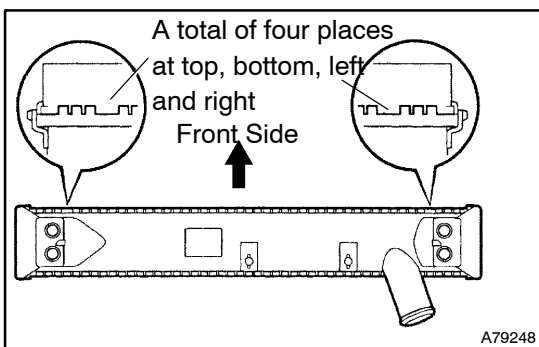


4. INSTALL UPPER AND LOWER TANKS

- (a) After having checked that there remains no foreign matter on the fitting position, mount a new O-ring in such a way that it will not be twisted.

NOTICE:

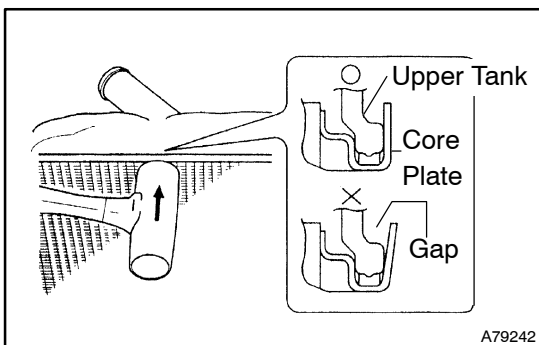
When cleaning the fitting position, lightly rub the said portion by using a sand paper, etc.



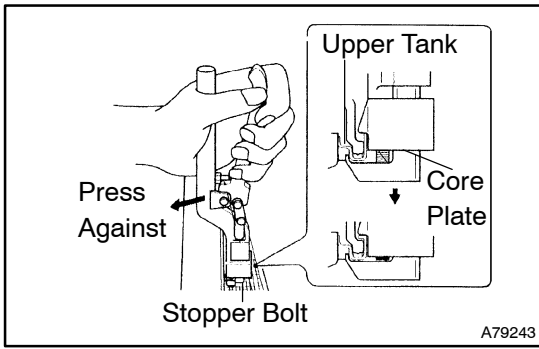
- (b) The notch in the radiator core shall be at the front side as shown in the figure.

NOTICE:

As the construction of the core has directionality in front back direction, do not install it with reversed orientation.



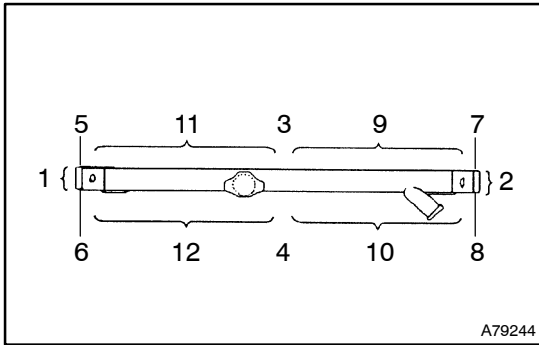
- (c) Set the upper and the lower tanks so that they will not be damaged.
- (d) Clap the core plate to obtain a contact with the upper and the lower tanks.



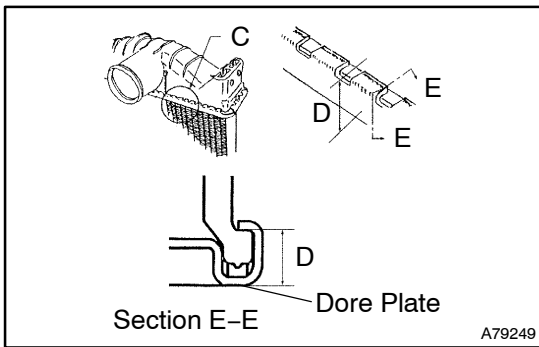
- (e) Press the caulking tool against the core plate as shown in the illustration. Perform temporary caulking by gripping the handle until it knocks at the stopper bolt of the handle.

NOTICE:

- For the positions where the caulking tool is not usable, perform the caulking by using pliers.



- Perform the caulking according to the following sequence.



- (f) Check the dimension D after caulking.
Standard dimension (Standard cab type):
8.45 – 8.85 mm (0.33 – 0.34 in.)
Standard dimension (Wide cab type):
7.4 – 7.8 mm (0.29 – 0.30 in.)
- (g) In the event that the said dimension does not fall within the standard limit, adjust the stopper bolt of the handle once again and perform the caulking again.

NOTICE:

Check the caulking dimensions at both ends of the core plate as well as around the central portion where the caulking has not been applied (under the pipe, etc.).

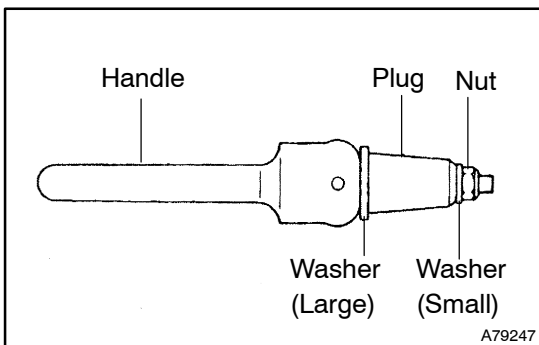
- (h) Others:
 Mark for the first repair for the second repair at a well visible place in the upper tank.

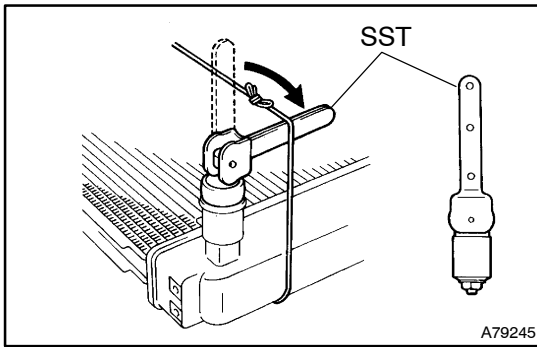
NOTICE:

Re-caulking should be limited to 2 times. If it is necessary to recaulk more than twice, replace the part in question.

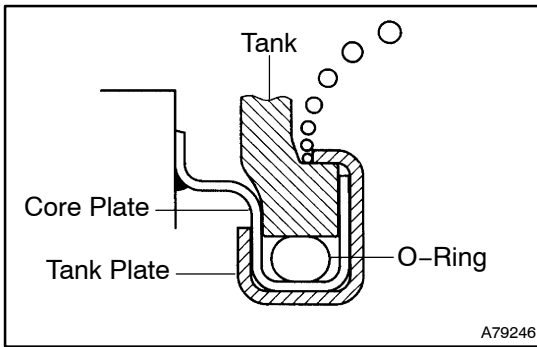
5. CHECK FOR WATER LEAKS

- (a) Assemble the plug handle as shown in the illustration and tighten the nut until the washer, the plug and the handle have light contact.





- (b) Using SST, plug the inlet and outlet pipes of the radiator.
SST 09230-01010 (09231-00030, 09231-00050)
- (c) Using a radiator cap tester, apply pressure to the radiator.
Test pressure (Standard cab type):
177 kPa (1.8 kgf/cm², 25 psi)
Test pressure (Wide cab type):
137 kPa (1.4 kgf/cm², 20 psi)

**HINT:**

On the radiators with resin tanks, there is a clearance between the core plate and tank plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before performing the water leak test, first swirl the radiator around in the water until all air bubbles disappear.

6. INSTALL RADIATOR COCK

- (a) Install a new O-ring.

7. INSTALL LEFT AND RIGHT SIDE PLATE

- (a) Install the all square head bolts to remove the left and the right side plate.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

LUBRICATION

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LUBRICATION SYSTEM (14B)

170EC-01

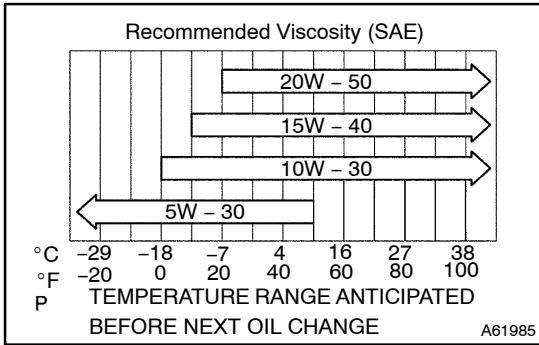
ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL

- (a) Warm up the engine. Then stop the engine, and leave it for 5 minutes.
 - (b) Check that the oil level is between the "L" and "F" marks on the dipstick.
- If low, check for leakage and add oil up to the "F" mark.

NOTICE:

Do not add engine oil above the "F" mark.



2. CHECK ENGINE OIL QUALITY

- (a) Check the oil for deterioration, entry of water, discoloring or thinning.
- (b) If the quality is visibly poor, replace the oil.

Oil grade:

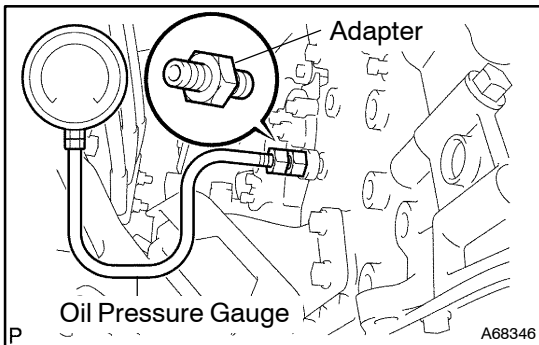
API CF-4 or CF (You may also use API CE or CD)

HINT:

If you use SAE 10W-30 or higher viscosity oil in extremely low temperature, the engine may become difficult to start, so SAE 5W-30 engine oil is recommended.

3. REMOVE OIL PRESSURE SWITCH ASSY

- (a) Using SST, remove the engine oil pressure switch assembly.
SST 09816-30010



4. INSTALL OIL PRESSURE GAUGE

- (a) Install the oil pressure gauge.

5. CHECK OIL PRESSURE

Oil pressure:

At idle	29 kPa (0.3 kgf/cm ² , 4.3 psi) or more
At 3,000 rpm	245 - 588 kPa (2.5 - 6.0 kgf/cm ² , 36 - 85 psi)

6. INSTALL OIL PRESSURE SWITCH ASSY

- (a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

NOTICE:

Do not start the engine within 1 hour after the installation.

- (b) Using SST, install the oil pressure switch.
SST 09816-30010

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

7. CHECK FOR ENGINE OIL LEAKS

OIL FILTER SUB-ASSY (14B)

170ED-01

REPLACEMENT

CAUTION:

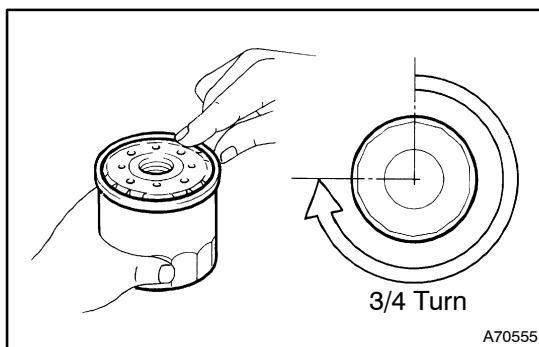
- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less hand cleaner to remove any used engine oil. Do not use gasoline, thinners, or solvents.
- In order to preserve the environment, used oil and used oil filter must be disposed of only at designated disposal sites.

1. DRAIN ENGINE OIL

- Remove the oil filler cap.
- Remove the oil drain plug, and drain the oil into a container.

2. REMOVE OIL FILTER SUB-ASSY

SST 09228-44011



3. INSTALL OIL FILTER SUB-ASSY

- Using SST, remove the oil filter.
SST 09228-44011
- Check and clean the oil filter installation surface.
- Apply clean engine oil to the rubber gasket of a new oil filter.
- Lightly screw the oil filter into place, and tighten it by hand until the rubber gasket contacts the installation surface.
- Using SST, tighten the oil filter by an additional 3/4 turn to seat the filter.

4. ADD ENGINE OIL

- Clean the drain plug, and install a new gasket and the drain plug.

Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

- Add fresh engine oil.

Oil capacity:

Drain and refill	w/ oil filter change	9.3 liters (9.8 US qts, 8.2 Imp. qts)
	w/o oil filter change	8.4 liters (8.9 US qts, 7.4 Imp. qts)
Dry fill		10 liters (10.6 US qts, 8.8 Imp. qts)

- Reinstall the oil filler cap.

5. CHECK ENGINE OIL LEVEL

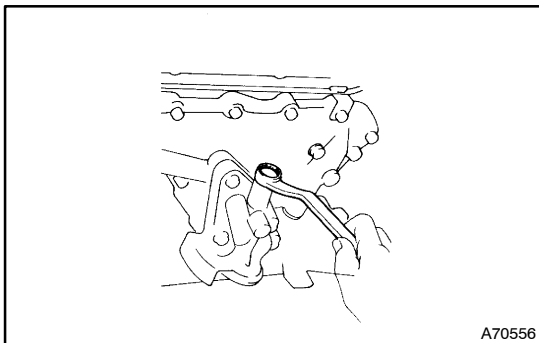
6. CHECK FOR ENGINE OIL LEAKS

OIL COOLER ASSY (14B)

170EE-01

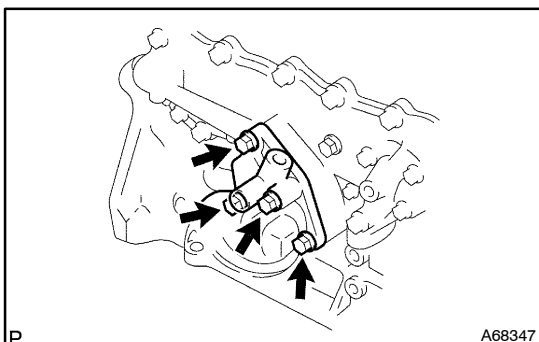
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE OIL
3. DRAIN ENGINE COOLANT
4. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
5. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE)
6. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-11)
7. REMOVE FLOOR SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
8. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE)
9. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)
10. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)
11. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-23)
12. REMOVE OIL FILTER SUB-ASSY (See page 17-2)
13. REMOVE EXHAUST PIPE ASSY FRONT
 - (a) Remove the 4 bolts, 3 nuts and the exhaust pipe.

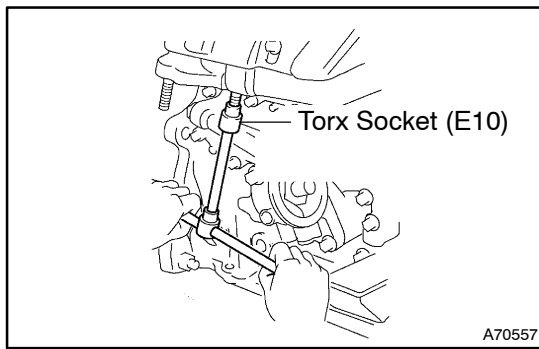


14. REMOVE OIL FILTER BRACKET SUB-ASSY

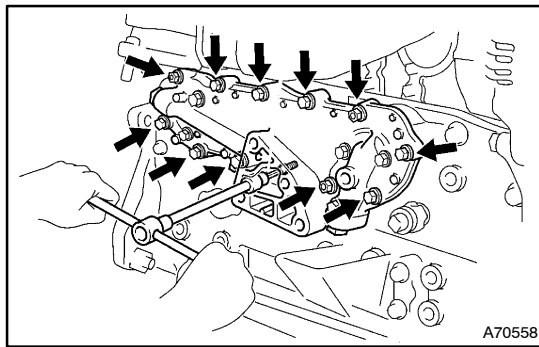
- (a) Remove the plug, gasket, spring relief valve and gasket.



- (b) Remove the 4 bolts, bracket and gasket.

**15. REMOVE MANIFOLD TO EXHAUST PIPE STUD BOLT**

- (a) Using a torx socket (E10), remove the stud bolt.

**16. REMOVE OIL COOLER CASE**

- (a) Using a 6 mm hexagon wrench, remove the bolt and washer.
 (b) Remove the 8 bolts, 3 nuts, oil cooler case and gasket.

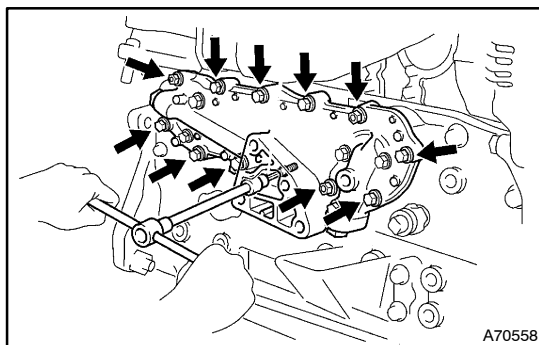
17. REMOVE OIL COOLER ASSY

- (a) Remove the 4 nuts, oil cooler assy and gasket.

18. INSTALL OIL COOLER ASSY

- (a) Install 2 new gaskets and the oil cooler assy to the oil cooler case with the 4 nuts.

Torque: 16 N·m (163 kgf·cm, 12 ft·lbf)

**19. INSTALL OIL COOLER CASE**

- (a) Install a new gasket, the oil cooler case with the 8 bolts and 3 nuts. Uniformly tighten the bolts and nuts in several passes.

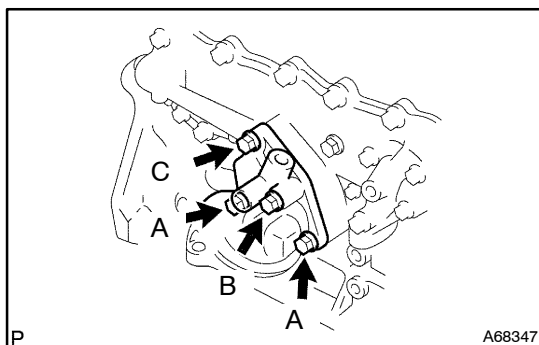
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

- (b) Using a 6 mm wrench, install the washer and bolt.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

20. INSTALL MANIFOLD TO EXHAUST PIPE STUD BOLT

Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

**21. INSTALL OIL FILTER BRACKET SUB-ASSY**

- (a) Install a new gasket and the oil filter bracket with the 4 bolts.

Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

HINT:

Bolt length:

A 70 mm (2.95 in.)

B 55 mm (2.17 in.)

C 35 mm (1.38 in.)

- (b) Install the relief valve and spring with a new gasket and the relief valve.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

22. INSTALL EXHAUST PIPE ASSY FRONT

- (a) Install the exhaust pipe assy front with the 4 bolts and 3 nuts.

23. INSTALL OIL FILTER SUB-ASSY (See page 17-2)

24. INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)

(See page 14-23)

25. INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)

26. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)

27. INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-11)

28. INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)

(See page 72-2)

29. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)

(See page 33-2)

30. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-2)

31. REFILL ENGINE COOLANT

32. ADD ENGINE OIL

33. CONNECT BATTERY NEGATIVE TERMINAL

34. CHECK FOR ENGINE COOLANT LEAKS

35. CHECK ENGINE OIL LEVEL

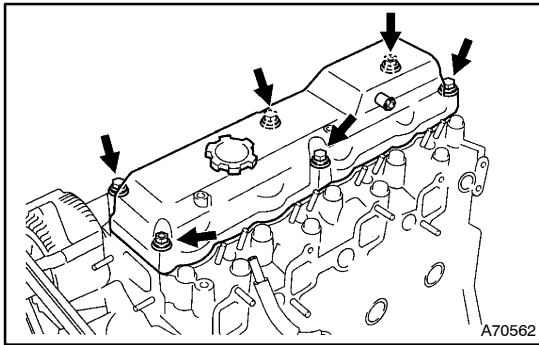
36. CHECK FOR ENGINE OIL LEAKS

OIL PUMP ASSY (14B)

170EG-01

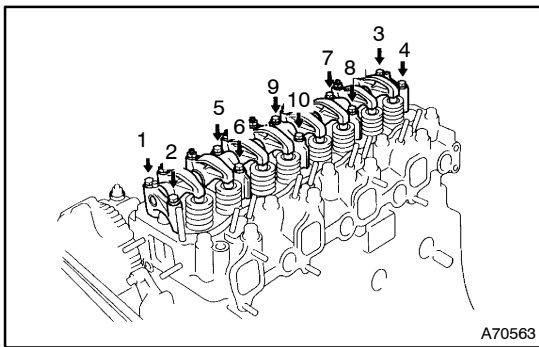
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. DRAIN ENGINE OIL
4. REMOVE RADIATOR ASSY (See page 16-11)
5. SET NO. 1 CYLINDER TO TDC/COMPRESSION
6. REMOVE FUEL PIPE SET (See page 11-7)



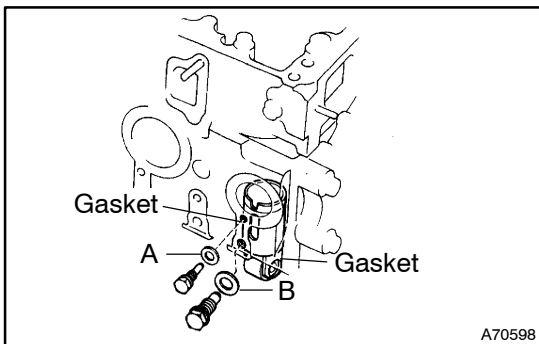
7. REMOVE CYLINDER HEAD COVER SUB-ASSY

- (a) Remove the 4 bolts, 2 nuts, 6 cushions, cylinder head cover and gasket.

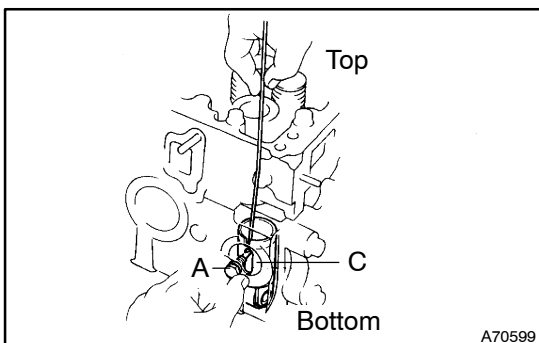


8. REMOVE VALVE ROCKER SHAFT ASSY

- (a) Loosen the lock nuts and adjusting screws.
- (b) Uniformly loosen and remove the 10 bolts, in several passes, in the order shown.
- (c) Remove the valve rocker shaft assy.



- (d) Remove bolts (A), (B) and the gaskets.



- (e) Using a wire, lift up the valve lifter until long hole (C) of the valve lifter moves up to the position of the installation hole for bolt (A).

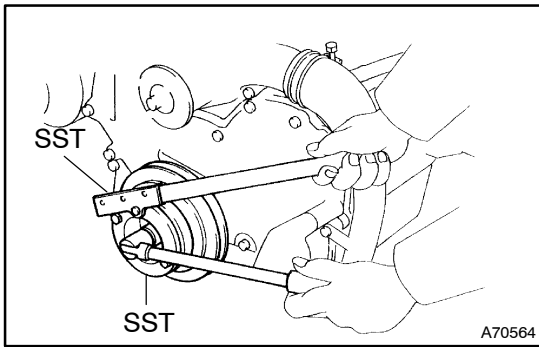
HINT:

If the lifter is lifted up too high, it may miss the position.

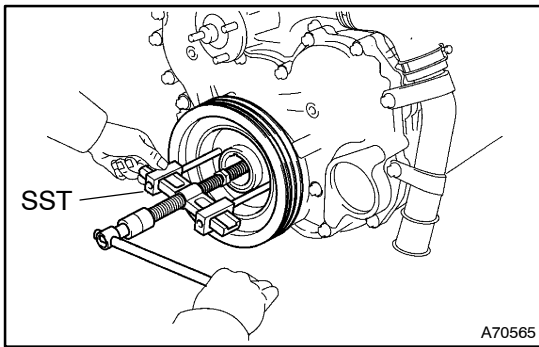
- (f) Install bolt (A).
- (g) Check that bolt (A) prevents the valve lifter from falling.

NOTICE:

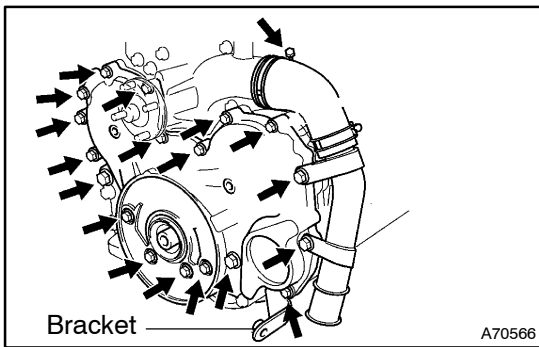
Be careful not to scratch the valve lifter.

**9. REMOVE CRANKSHAFT PULLEY**

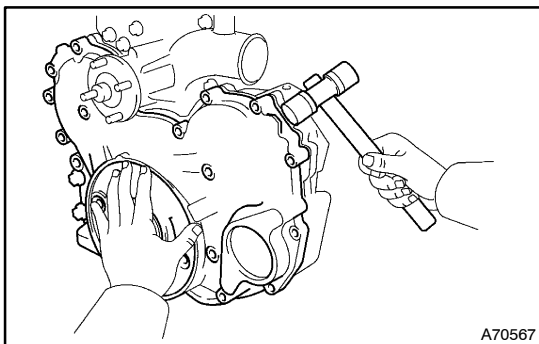
- (a) Using SST, remove the mounting bolt.
SST 09213-58013 (90201-08131, 91111-50845),
09330-00021



- (b) Using SST, remove the crankshaft pulley.
SST 09950-50013 (09951-05010, 09952-05010,
09953-05010, 09953-05020, 09954-05030)

**10. REMOVE TIMING GEAR COVER**

- (a) Remove the 2 bolts holding the radiator pipe to the timing gear cover.
(b) Disconnect the radiator hose from the water pump. Then remove the radiator pipe.
(c) Remove the bolt and oil stick guide.
(d) Remove the 15 mounting bolts and bracket.



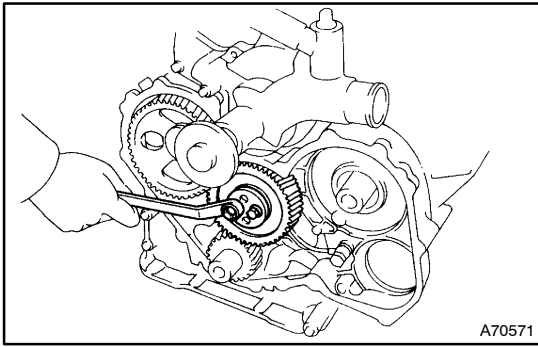
- (e) Using a plastic-faced hammer, lightly tap out the timing gear cover.
(f) Remove the timing gear cover gasket.
(g) Using a plastic-faced hammer, lightly tap out the gear and remove the injection pump drive gear.

11. REMOVE INJECTION PUMP DRIVE GEAR

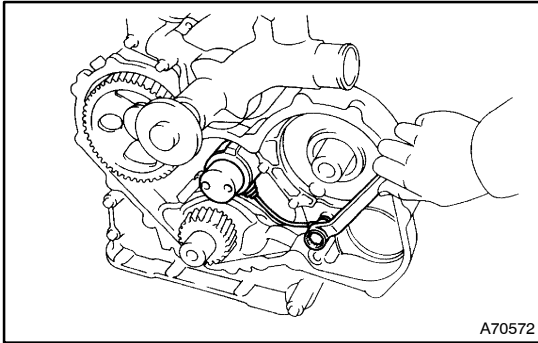
- (a) Remove the injection pump drive gear.

12. REMOVE VACUUM PUMP ASSY

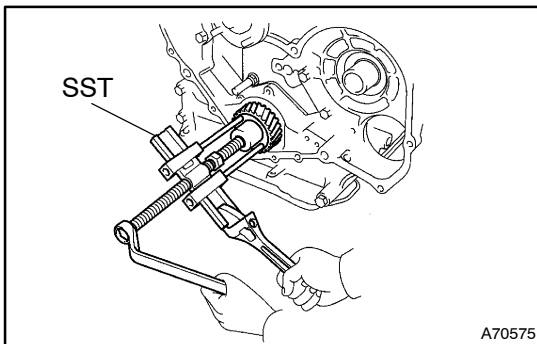
- (a) Disconnect the vacuum pump hose
(b) Remove the 2 bolts and vacuum pump.
(c) Remove the 2 O-rings.

**13. REMOVE IDLE GEAR NO.1**

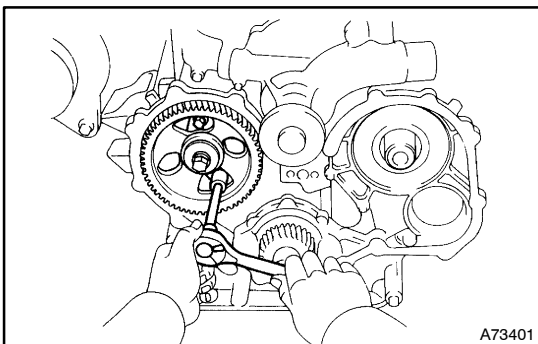
- (a) Remove the 2 bolts, thrust plate and idle gear No. 1.

**14. REMOVE IDLE GEAR SHAFT SUB-ASSY**

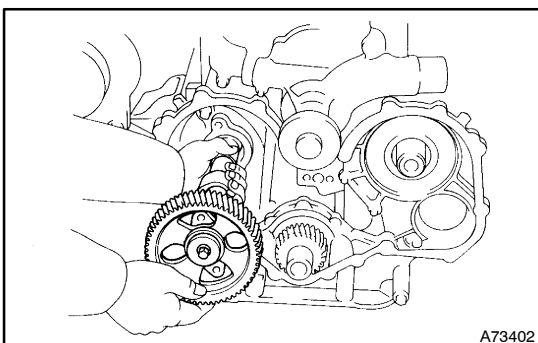
- (a) Remove the union bolt and idle gear shaft.

**15. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET**

- (a) Using SST, remove the timing gear or sprocket.
 SST 09950-50013 (09951-05010, 09952-05010,
 09953-05010, 09953-05020, 09954-05030)

**16. REMOVE CAMSHAFT TIMING GEAR OR SPROCKET**

- (a) Remove the 2 bolts holding the thrust plate to the cylinder block or sprocket.

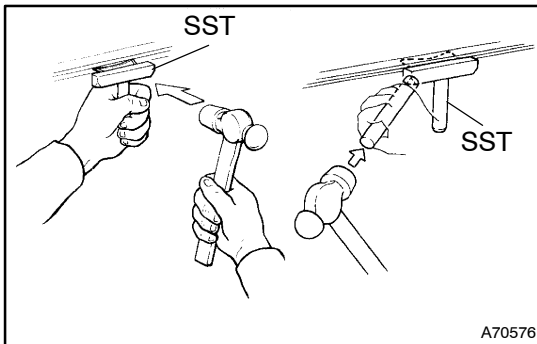


- (b) Carefully pull out the camshaft and timing gear assembly.

NOTICE:

Be careful not to damage the camshaft bearing.

17. REMOVE INJECTION PUMP ASSY

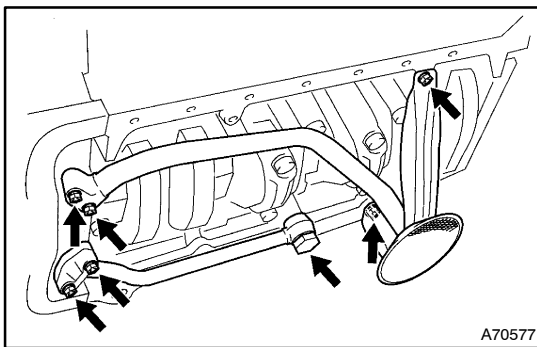


18. REMOVE OIL PAN SUB-ASSY

- (a) Remove the 17 bolts and 7 nuts.
- (b) Insert the blade of SST between the cylinder block and oil pan, and cut off the applied sealer and remove the oil pan.
SST 09032-00100

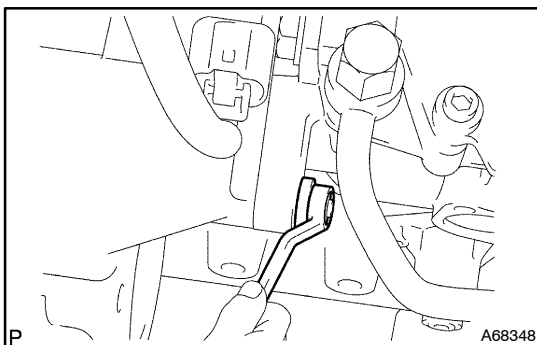
NOTICE:

- Do not use SST on the timing gear case side and rear oil seal retainer side.
- Be careful not to damage the oil pan flange.



19. REMOVE OIL STRAINER SUB-ASSY

- (a) Remove the 2 bolts, 2 nuts, oil strainer and gasket.
- (b) Remove the union bolt, 2 nuts, oil pipe and 3 gaskets.

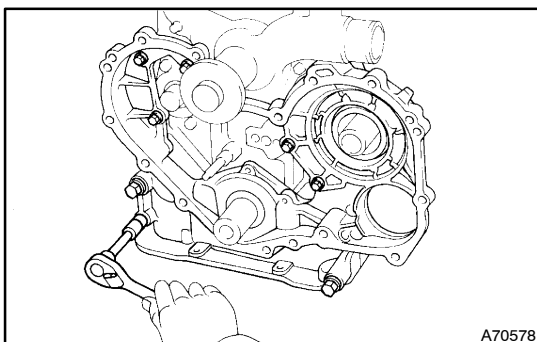


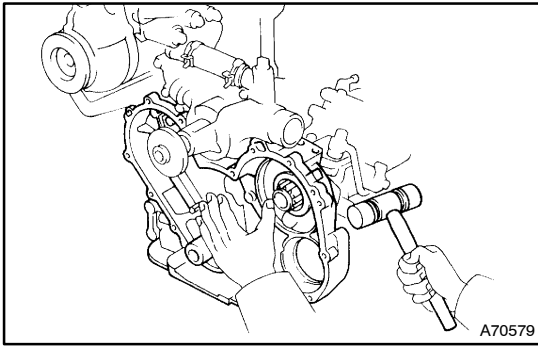
20. REMOVE OIL PUMP (TIMING GEAR CASE SUB-ASSY)

HINT:

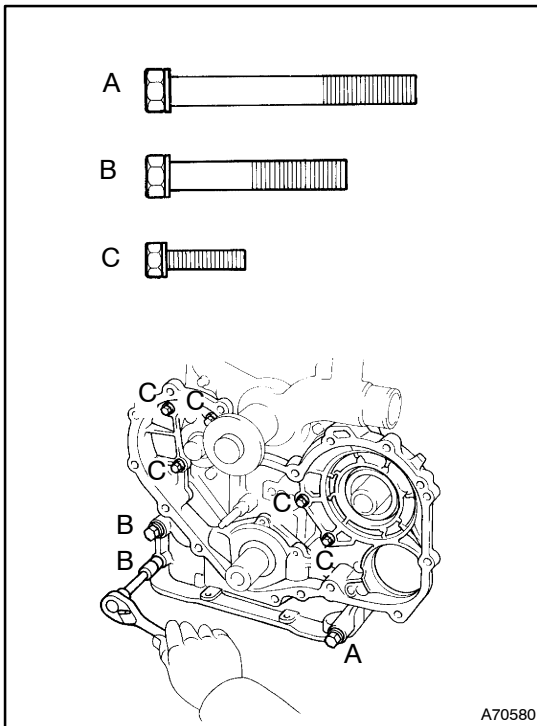
Before removing the 2 nuts holding the injection pump flange to the timing gear case, check if the matchmarks are aligned. If not, place new matchmarks for the reinstallation.

- (a) Remove the 2 nuts holding the injection pump to the timing gear case.
- (b) Remove the 8 bolts holding the timing gear case to the cylinder block.





- (c) Using a plastic-faced hammer, lightly tap out the timing gear case and gasket.



21. INSTALL OIL PUMP (TIMING GEAR CASE SUB-ASSY)

- (a) Place a new gasket and the timing gear case in position.
 (b) Install and uniformly tighten the 8 bolts in several passes.

Torque:

44 N·m (449 kgf·cm, 32 ft·lbf) for 14 mm head

18.5 N·m (189 kgf·cm, 14 ft·lbf) for 12 mm head

HINT:

Bolt length:

A 85 mm (3.35 in.) for 14 mm head

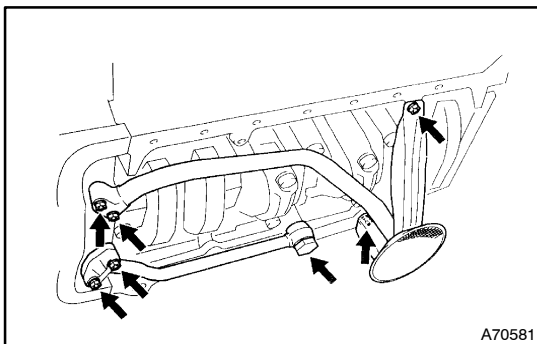
B 60 mm (2.36 in.) for 14 mm head

C 25 mm (0.98 in.) for 12 mm head

- (c) Align the matchmarks on the injection pump and timing gear case.

- (d) Install the 2 nuts holding the injection pump flange to the timing gear case.

Torque 18.5 N·m (189 kgf·cm, 14 ft·lbf)



22. INSTALL OIL STRAINER SUB-ASSY

- (a) Install a new gasket and the oil strainer with the 2 bolts and 2 nuts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

- (b) Install 3 new gaskets and oil pipe with the union bolt and 2 nuts.

Torque:

50 N·m (510 kgf·cm, 37 ft·lbf) for union bolt

18.5 N·m (189 kgf·cm, 14 ft·lbf) for nut

23. INSTALL OIL PAN SUB-ASSY

- (a) Remove any old packing (FIPG) materials.

NOTICE:

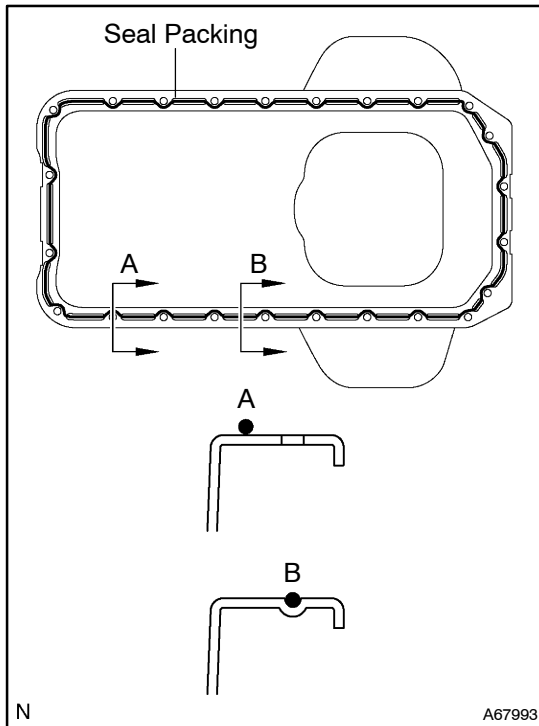
Be careful not to drop any oil on the contact surfaces of the oil pan and cylinder block.

- (1) Using a razor blade and gasket scraper, remove all the old packing (FIPG) materials from the gasket surfaces and sealing groove.
- (2) Thoroughly clean all the components to remove all the loose materials.

- (3) Using a non-residue solvent, clean both sealing surfaces.

NOTICE:

Do not use a solvent which will affect the painted surfaces.



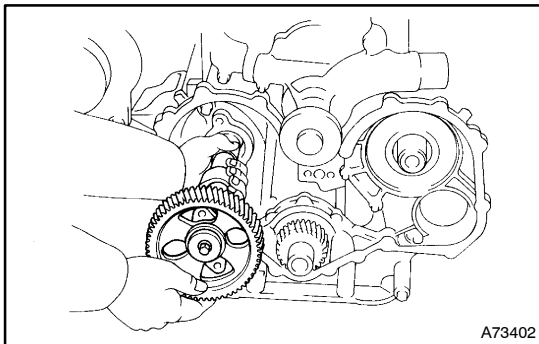
- (b) Apply seal packing to the oil pan as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

- Install the nozzle which opening has been cut 4 – 5 mm (0.16 – 0.20 in.).
- The parts must be assembled within 5 minutes after seal packing is applied. Otherwise the material must be removed and reapplied.
- Immediately remove the nozzle from the tube and reinstall cap.

- (c) Install the oil pan with the 17 bolts and 7 nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

24. INSTALL INJECTION PUMP ASSY**25. INSTALL CAMSHAFT TIMING GEAR OR SPROCKET**

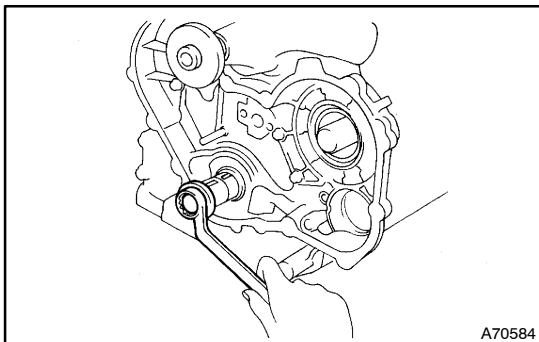
- (a) Install the camshaft timing gear or sprocket into the cylinder block.

NOTICE:

Be careful not to damage the camshaft bearing.

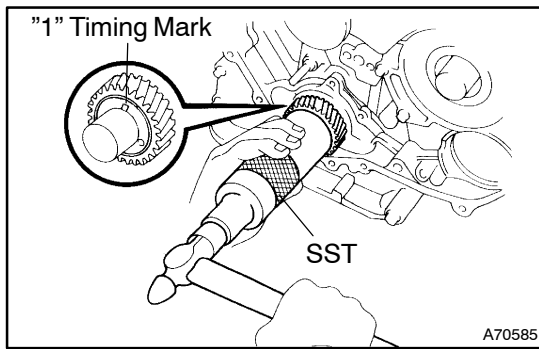
- (b) Install the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

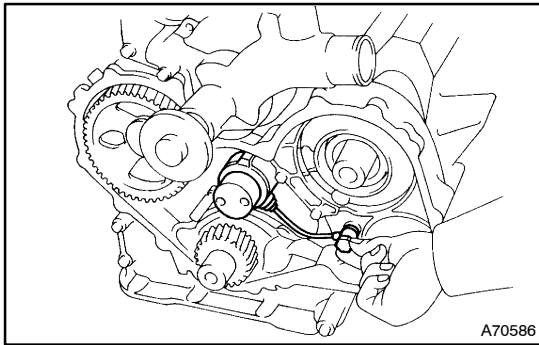
**26. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET**

- (a) Check that the set key on crankshaft timing gear or sprocket faces upward.

If not, turn the crankshaft with a crankshaft pulley mount bolt.



- (b) Put the timing gear on the crankshaft with the "1" timing mark of the timing gear facing forward.
- (c) Align the timing gear set key with the key groove of the crankshaft timing gear.
- (d) Using SST and a hammer, tap in the crankshaft timing gear.
SST 09608-06041

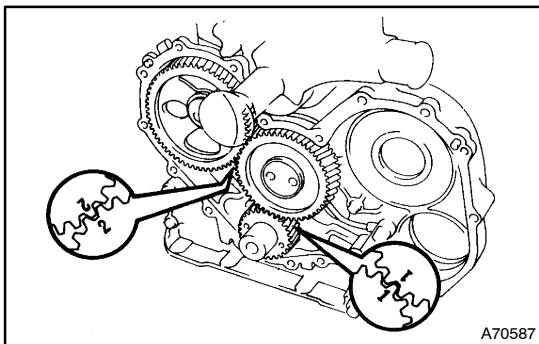


27. INSTALL IDLE GEAR SHAFT SUB-ASSY

- (a) Temporarily install the idle gear shaft with the union bolt.

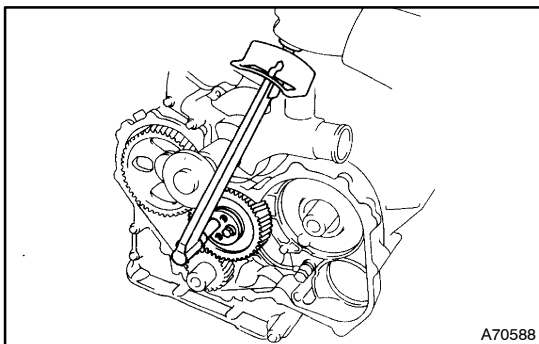
NOTICE:

Do not tighten the union bolt.



28. INSTALL IDLE GEAR NO.1

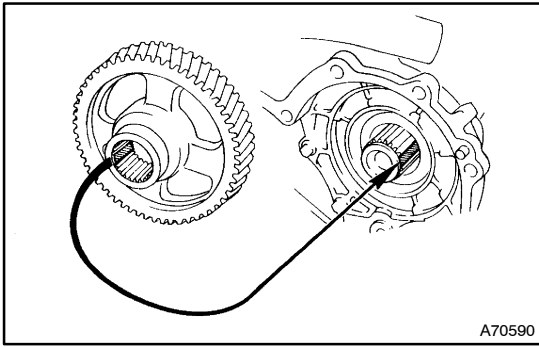
- (a) Align the idle gear timing marks "1" and "2" with the crankshaft gear timing mark "1" and camshaft gear timing mark "2" respectively, and mesh the gears.



- (b) Apply a light coat of engine oil on the threads and under the bolt heads.
- (c) Install the thrust plate with the 2 bolts. Torque the bolts.
Torque: 47.5 N·m (484 kgf·cm, 35 ft·lbf)
- (d) Tighten the union bolt.
Torque: 13 N·m (132 kgf·cm, 9.5 ft·lbf)

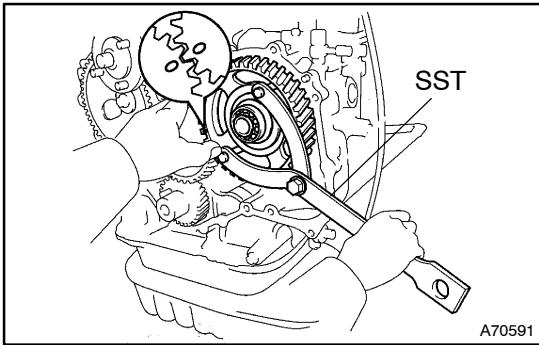
29. INSTALL VACUUM PUMP ASSY

- (a) Install 2 new O-rings to the vacuum pump.
- (b) Install the vacuum pump with the 2 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
- (c) Connect the vacuum pump hose.

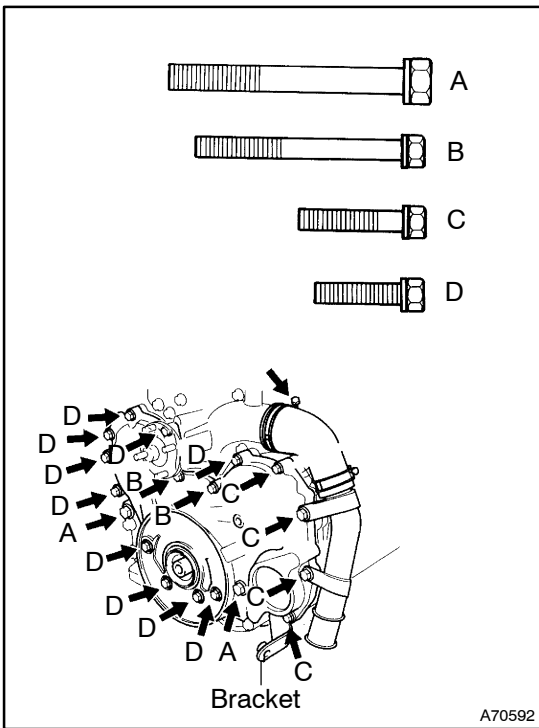


30. INSTALL INJECTION PUMP DRIVE GEAR

- (a) Apply MP grease to the drive gear spline, bearing and injection pump spline.
- (b) Align the spline toothless portions of the injection pump drive gear and injection pump, and install the injection pump drive gear.



- (c) Using SST, align the idle gear timing mark "0" with the injection pump drive gear timing mark "0", and mesh the gears.
SST 09960-10010 (09962-01000, 09963-01000)



31. INSTALL TIMING GEAR COVER

- (a) Install a new gasket and the timing gear cover.
- (b) Align the 2 knock pins of the oil pump, and lightly tap in the timing gear cover using a plastic-faced hammer.
- (c) Install the bracket and 15 mount bolts.

Torque:

44 N·m (449 kgf·cm, 32 ft·lbf) for 14 mm head

21 N·m (214 kgf·cm, 15 ft·lbf) for 12 mm head

HINT:

Bolt length:

A 80 mm (3.15 in.) for 14 mm head

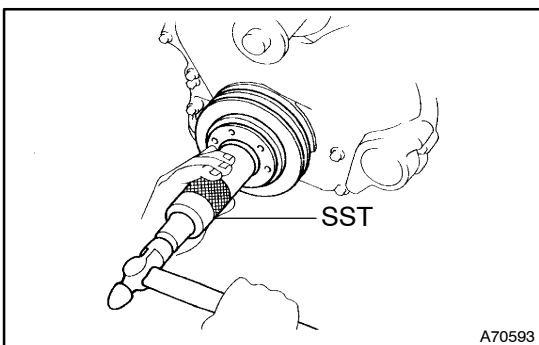
B 77 mm (3.03 in.) for 12 mm head

C 40 mm (1.57 in.) for 12 mm head

D 35 mm (1.38 in.) for 12 mm head

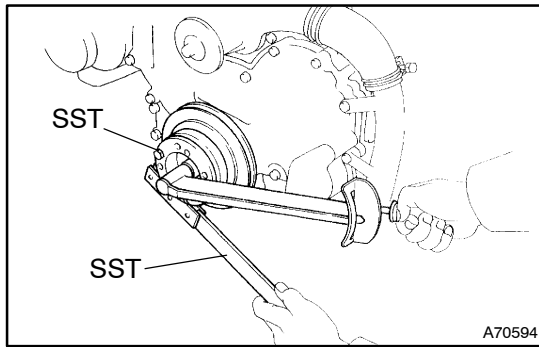
- (d) Connect the radiator hose to the water pump.
- (e) Install the radiator pipe with the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

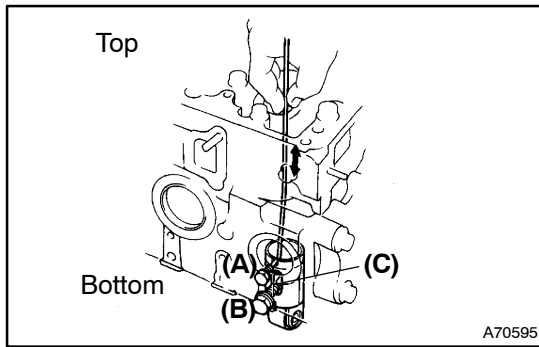


32. INSTALL CRANKSHAFT PULLEY

- (a) Align the pulley set key with the key groove of the pulley.
- (b) Using SST and a hammer, tap in the pulley.
SST 09608-06041



- (c) Apply a light coat of engine oil on the threads and under the bolt head.
- (d) Using SST, install and torque the pulley mount bolt.
Torque: 294 N·m (3,000 kgf·cm, 217 ft·lbf)
SST 09213-58013 (90201-08131, 91111-50845),
09330-00021



33. INSTALL VALVE ROCKER SHAFT ASSY

- (a) Remove bolt (A) and let the lifter slide down.
- (b) Install bolts (A) and (B) with new gaskets.

Torque:

9.4 N·m (96 kgf·cm, 6.8 in·lbf) for bolt (A)

37.5 N·m (382 kgf·cm, 28 ft·lbf) bolt (B)

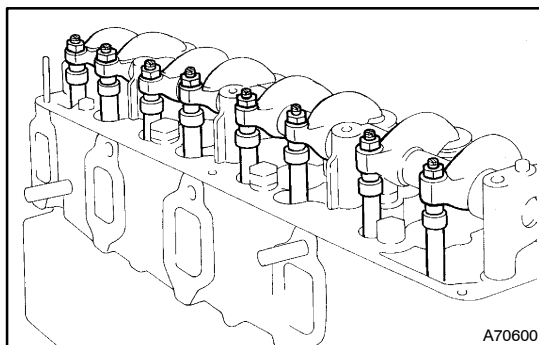
HINT:

When installing bolt (B), check that the hole for bolt (B) is aligned with long hole (C) of the valve lifter.

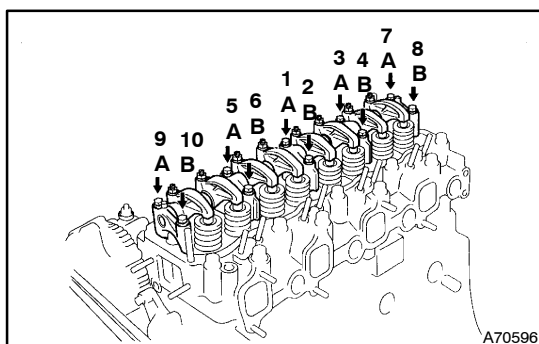
- (c) Check that the valve lifter can move up and down within the limit of long hole (C).

NOTICE:

Be careful not to scratch the valve lifter.



- (d) Place the rocker shaft assembly on the cylinder head.
- (e) Align the rocker arm adjusting screws with the heads of the push rods.



- (f) Install the 10 bolts and uniformly tighten them, in several passes, in the order shown.

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

HINT:

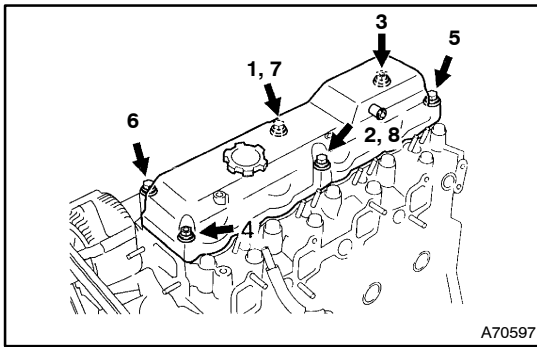
Bolt length:

63 mm (2.48 in.) for A

53 mm (2.08 in.) for B

34. INSPECT VALVE CLEARANCE

35. ADJUST VALVE CLEARANCE

**36. INSTALL CYLINDER HEAD COVER SUB-ASSY**

- (a) Install the gasket to the cylinder head cover.
- (b) Install the cylinder head cover and uniformly tighten them with the 6 cushions, 4 bolts and 2 nuts, in several passes, in the order shown.

Torque: 10.5 N·m (107 kgf·cm, 8 ft·lbf)

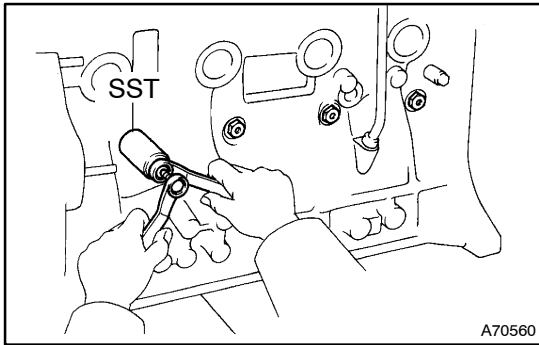
37. **INSTALL FUEL PIPE SET (See page 11-7)**
38. **INSTALL RADIATOR ASSY (See page 16-11)**
39. **ADJUST FAN AND GENERATOR V BELT (See page 14-1)**
40. **ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)**
(See page 33-2)
41. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-2)**
42. **ADD ENGINE OIL**
43. **REFILL ENGINE COOLANT**
44. **BLEED FUEL (See page 11-4)**
45. **CONNECT BATTERY NEGATIVE TERMINAL**
46. **CHECK ENGINE OIL LEVEL**
47. **CHECK FOR ENGINE COOLANT LEAKS**
48. **CHECK FOR ENGINE OIL LEAKS**
49. **INSPECT FOR FUEL LEAKS**

SUB-ASSY OIL NOZZLE NO.1 (14B)

170EF-01

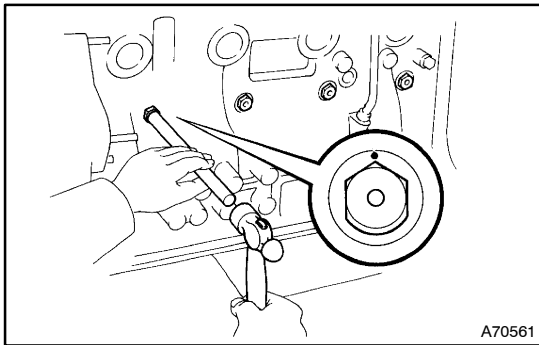
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE OIL
3. REMOVE INJECTION PUMP ASSY (See page 11-14)
4. REMOVE OIL CHECK VALVE SUB-ASSY



5. REMOVE SUB-ASSY OIL NOZZLE NO.1

- (a) Using SST, remove the sub-assy oil nozzle No. 1.
SST 09219-56010



6. INSTALL SUB-ASSY OIL NOZZLE NO.1

- (a) Install a new O-ring to the sub-assy oil nozzle No. 1.
- (b) Apply a light coat of engine oil on the O-ring.
- (c) Align the head point of the oil nozzle with the alignment mark of the cylinder block.
- (d) Using a brass bar and hammer, tap in the 4 nozzles.

7. INSTALL OIL CHECK VALVE SUB-ASSY

- (a) Install a new gasket and check the valve sub-assy.

Torque: 35N·m (360 kgf·cm, 26 ft·lbf)

8. INSTALL INJECTION PUMP ASSY (See page 11-14)
9. BLEED FUEL (See page 11-4)
10. ADD ENGINE OIL
11. CONNECT BATTERY NEGATIVE TERMINAL
12. CHECK ENGINE OIL LEVEL
13. CHECK FOR ENGINE OIL LEAKS
14. INSPECT FOR FUEL LEAKS

LUBRICATION SYSTEM (15B-FTE)

170E7-01

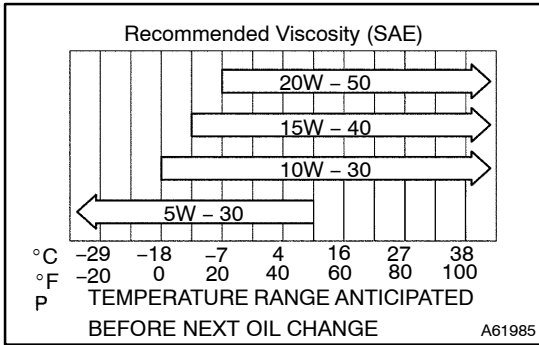
ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL

- (a) Warm up the engine. Then stop the engine, and leave it for 5 minutes.
 - (b) Check that the oil level is between the "L" and "F" marks on the dipstick.
- If low, check for leakage and add oil up to the "F" mark.

NOTICE:

Do not add engine oil above the "F" mark.



2. CHECK ENGINE OIL QUALITY

- (a) Check the oil for deterioration, entry of water, discoloring or thinning.
- (b) If the quality is visibly poor, replace the oil.

Oil grade:

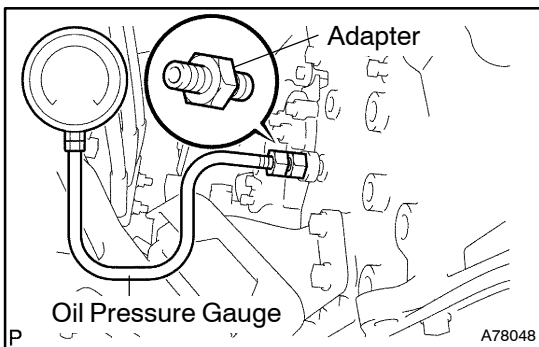
API CF-4 or CF (You may also use API CE or CD)

HINT:

If you use SAE 10W-30 or higher viscosity oil in extremely low temperature, the engine may become difficult to start, so SAE 5W-30 engine oil is recommended.

3. REMOVE OIL PRESSURE SWITCH ASSY

- (a) Using SST, remove the engine oil pressure switch assembly.
SST 09816-30010



4. INSTALL OIL PRESSURE GAUGE

- (a) Install the oil pressure gauge.

5. CHECK OIL PRESSURE

Oil pressure:

At idle	130 kPa (1.3 kgf/cm ² , 18 psi) or more
At 2,200 rpm	320 kPa (3.2 kgf/cm ² , 45 psi)

6. INSTALL OIL PRESSURE SWITCH ASSY

- (a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

NOTICE:

Do not start the engine within 1 hour after the installation.

- (b) Using SST, install the oil pressure switch.
SST 09816-30010

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

7. CHECK FOR ENGINE OIL LEAKS

OIL FILTER SUB-ASSY (15B-FTE)

170E8-01

REPLACEMENT

CAUTION:

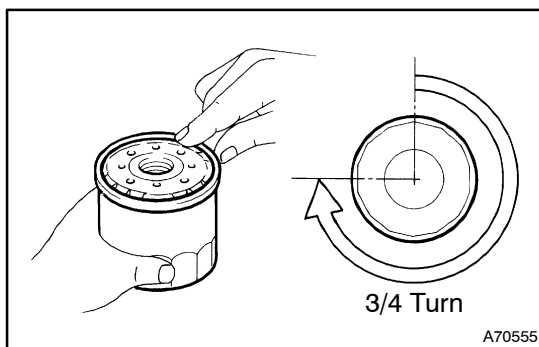
- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less hand cleaner to remove any used engine oil. Do not use gasoline, thinners, or solvents.
- In order to preserve the environment, used oil and used oil filter must be disposed of only at designated disposal sites.

1. DRAIN ENGINE OIL

- Remove the oil filler cap.
- Remove the oil drain plug, and drain the oil into a container.

2. REMOVE OIL FILTER SUB-ASSY

SST 09228-10002



3. INSTALL OIL FILTER SUB-ASSY

- Using SST, remove the oil filter.
SST 09228-10002
- Check and clean the oil filter installation surface.
- Apply clean engine oil to the rubber gasket of a new oil filter.
- Lightly screw the oil filter into place, and tighten it by hand until the rubber gasket contacts the installation surface.
- Using SST, tighten the oil filter by an additional 3/4 turn to seat the filter.

4. ADD ENGINE OIL

- Clean the drain plug, and install a new gasket and the drain plug.

Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

- Add fresh engine oil.

Oil capacity:

Drain and refill	w/ oil filter change	9.3 liters (9.8 US qts, 8.2 Imp. qts)
	w/o oil filter change	8.4 liters (8.9 US qts, 7.4 Imp. qts)
Dry fill		9.9 liters (10.5 US qts, 8.7 Imp. qts)

- Reinstall the oil filler cap.

5. CHECK ENGINE OIL LEVEL

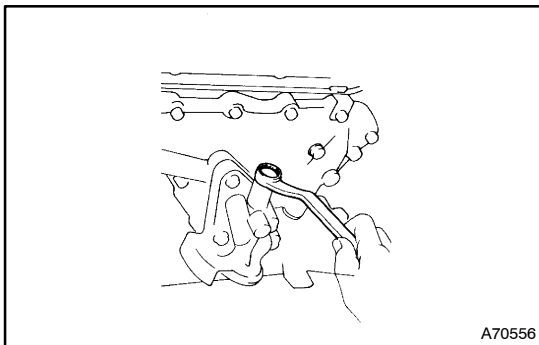
6. CHECK FOR ENGINE OIL LEAKS

OIL COOLER ASSY (15B-FTE)

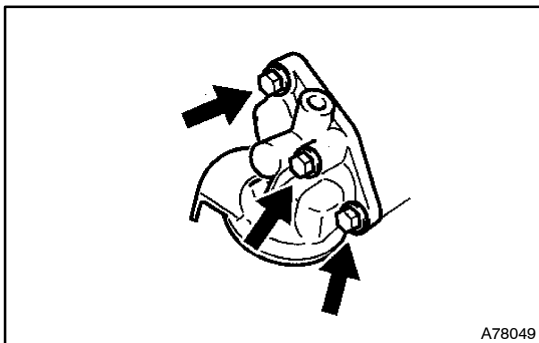
170E9-01

REPLACEMENT

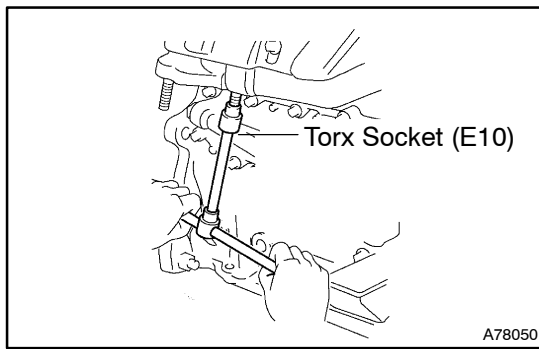
1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE OIL
3. DRAIN ENGINE COOLANT
4. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)
(See page 72-2)
5. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE) (See page 33-11)
6. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE)
(See page 33-11)
7. REMOVE FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY (W/O TILT CAB CAB TYPE)
8. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE)
9. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)
10. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)
11. REMOVE ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)
(See page 14-62)
12. REMOVE OIL FILTER SUB-ASSY (See page 17-18)
13. REMOVE TURBO OIL PIPE AND TURBOCHARGER STAY
14. REMOVE EXHAUST PIPE ASSY FRONT
 - (a) Remove the 4 bolts, 3 nuts and the exhaust pipe.



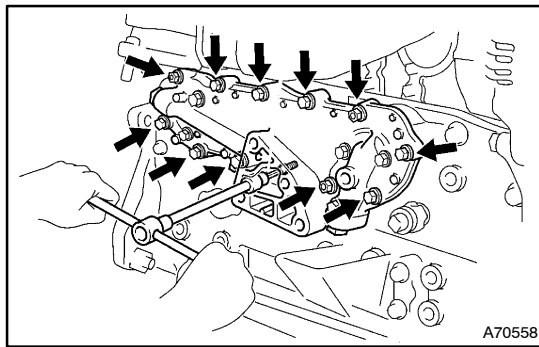
15. REMOVE OIL FILTER BRACKET SUB-ASSY
 - (a) Remove the plug, gasket, spring relief valve and gasket.



- (b) Remove the 3 bolts, bracket and gasket.

**16. REMOVE MANIFOLD TO EXHAUST PIPE STUD BOLT**

- (a) Using a torx socket (E10), remove the stud bolt.

**17. REMOVE OIL COOLER CASE**

- (a) Using a 6 mm hexagon wrench, remove the bolt and washer.
 (b) Remove the 8 bolts, 3 nuts, oil cooler case and gasket.

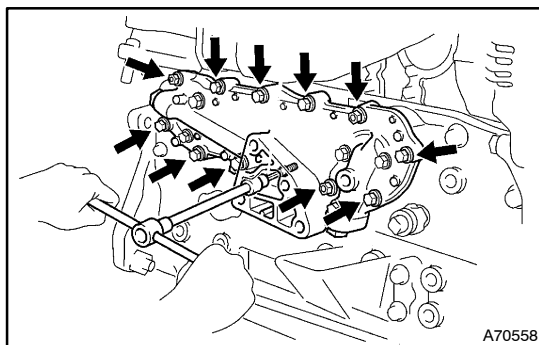
18. REMOVE OIL COOLER ASSY

- (a) Remove the 4 nuts, oil cooler assy and gasket.

19. INSTALL OIL COOLER ASSY

- (a) Install 2 new gaskets and the oil cooler assy to the oil cooler case with the 4 nuts.

Torque: 16 N·m (163 kgf·cm, 12 ft·lbf)

**20. INSTALL OIL COOLER CASE**

- (a) Install a new gasket, the oil cooler case with the 8 bolts and 3 nuts. Uniformly tighten the bolts and nuts in several passes.

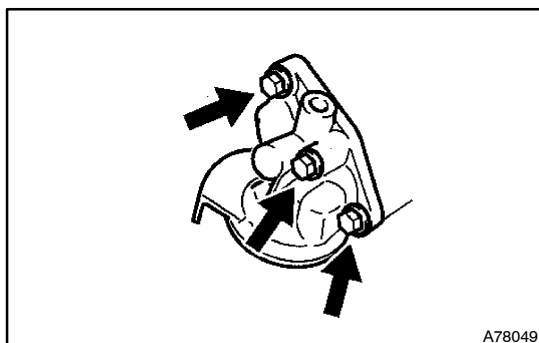
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

- (b) Using a 6 mm wrench, install the washer and bolt.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

21. INSTALL MANIFOLD TO EXHAUST PIPE STUD BOLT

Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

**22. INSTALL OIL FILTER BRACKET SUB-ASSY**

- (a) Install a new gasket and the oil filter bracket with the 3 bolts.

Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)

HINT:

Bolt length:

A 70 mm (2.95 in.)

B 55 mm (2.17 in.)

C 35 mm (1.38 in.)

- (b) Install the relief valve and spring with a new gasket and the relief valve.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

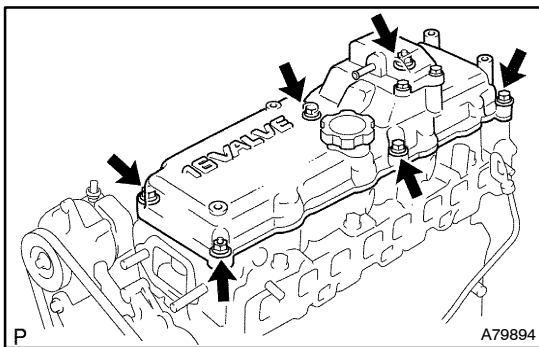
- 23. **INSTALL TURBO OIL PIPE AND TURBOCHARGER STAY**
- 24. **INSTALL EXHAUST PIPE ASSY FRONT**
 - (a) Install the exhaust pipe front with the 4 bolts and 3 nuts.
- 25. **INSTALL OIL FILTER SUB-ASSY (See page 17-18)**
- 26. **INSTALL ENGINE SERVICE HOLE SUB COVER SUB-ASSY (W/O TILT CAB CAB TYPE)**
(See page 14-62)
- 27. **INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41-11)**
- 28. **INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41-19)**
- 29. **INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33-11)**
- 30. **INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE)**
(See page 72-2)
- 31. **ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)**
(See page 33-11)
- 32. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)**
- 33. **REFILL ENGINE COOLANT**
- 34. **ADD ENGINE OIL**
- 35. **CONNECT BATTERY NEGATIVE TERMINAL**
- 36. **CHECK FOR ENGINE COOLANT LEAKS**
- 37. **CHECK ENGINE OIL LEVEL**
- 38. **CHECK FOR ENGINE OIL LEAKS**

OIL PUMP ASSY (15B-FTE)

170EA-01

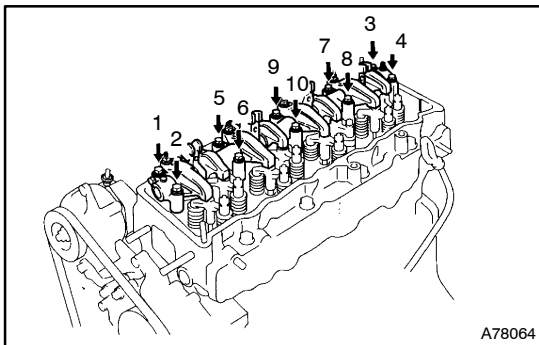
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. DRAIN ENGINE OIL
4. REMOVE RADIATOR ASSY
5. SET NO. 1 CYLINDER TO TDC/COMPRESSION
6. DISCONNECT PCV HOSE
7. REMOVE FUEL PIPE SET (See page 11-60)



8. REMOVE CYLINDER HEAD COVER SUB-ASSY

- (a) Remove the 4 bolts, 2 nuts, 6 cushions, cylinder head cover and gasket.



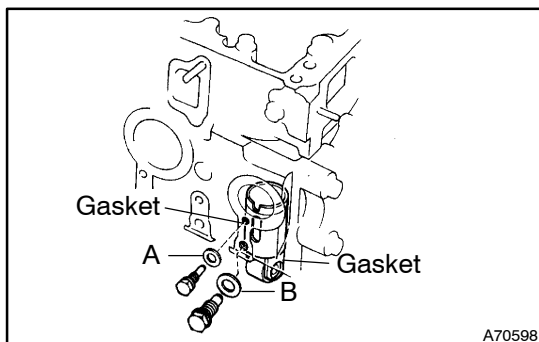
9. REMOVE VALVE ROCKER SHAFT ASSY

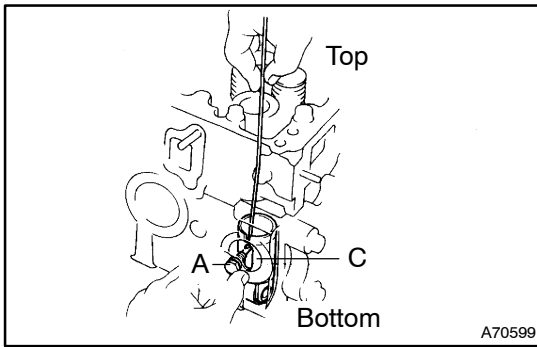
- (a) Remove the nozzle leakage pipe (See page 11-60).
- (b) Loosen the lock nuts and adjusting screws.
- (c) Uniformly loosen and remove the 10 bolts, in several passes, in the order shown.
- (d) Remove the valve rocker shaft assy.
- (e) Remove the 8 push rods in order, beginning from the No. 1 push rod.

HINT:

Arrange the push rods in correct order.

- (f) Remove bolts (A), (B) and the gaskets.





- (g) Using a wire, lift up the valve lifter until long hole (C) of the valve lifter moves up to the position of the installation hole for bolt (A).

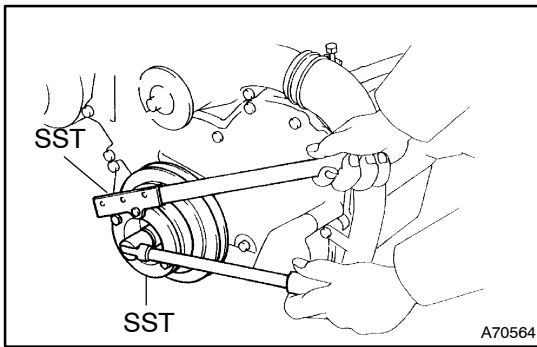
HINT:

If the lifter is lifted up too high, it may miss the position.

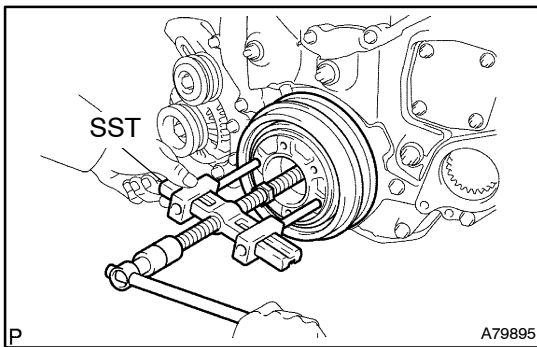
- (h) Install bolt (A).
 (i) Check that bolt (A) prevents the valve lifter from falling.

NOTICE:

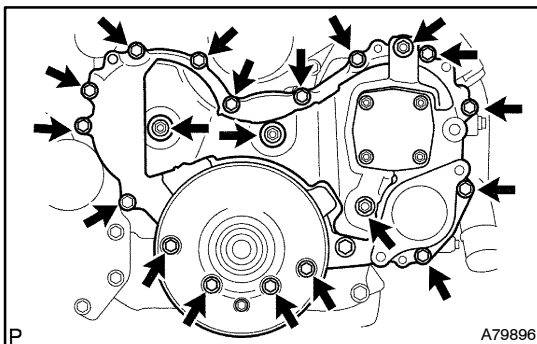
Be careful not to scratch the valve lifter.

**10. REMOVE CRANKSHAFT PULLEY**

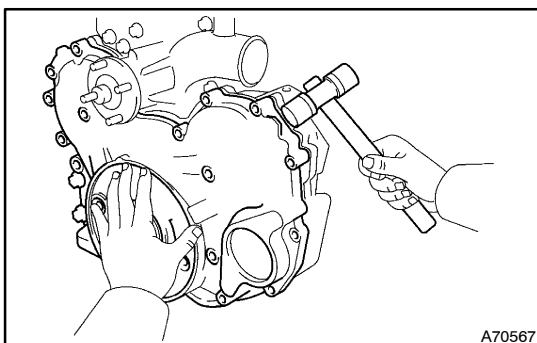
- (a) Using SST, remove the mounting bolt.
 SST 09213-58013 (90201-08131, 91111-50845),
 09330-00021



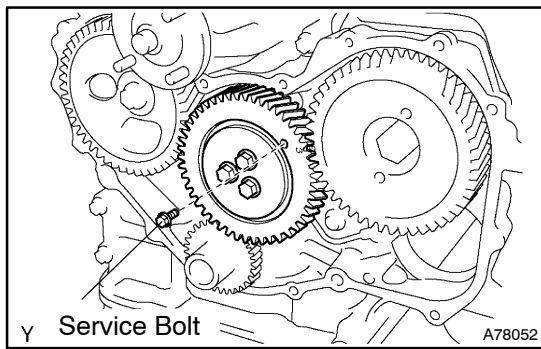
- (b) Using SST, remove the crankshaft pulley.
 SST 09950-50013 (09951-05010, 09952-05010,
 09953-05010, 09954-05030)

**11. REMOVE TIMING GEAR COVER**

- (a) Remove the 4 nuts and cover.
 (b) Remove the 17 mounting bolts.



- (c) Using a plastic-faced hammer, lightly tap out the timing gear cover.
 (d) Remove the timing gear cover gasket.
 (e) Using a plastic-faced hammer, lightly tap out the gear and remove the injection pump drive gear.

**12. REMOVE IDLE GEAR NO.1**

- (a) Install a service bolt to the idle gear.

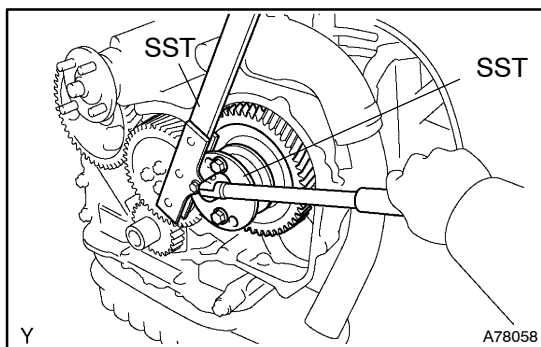
Torque 5.5 N·m (55 kgf·cm, 48 ft·lbf)**Recommended service bolt:**

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	30.0 mm (1.18 in.)

HINT:

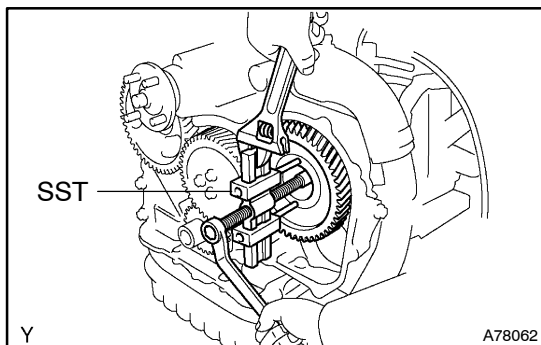
Since there is spring force to be applied to the sub-gear when removing the idler gear, a service bolt should be used.

- (b) Remove the 3 bolts, thrust plate and idle gear.

**13. REMOVE INJECTION PUMP DRIVE GEAR**

- (a) Using SST, remove the pulley bolt.

SST 09213-58013 (90201-08131, 91111-50845),
09330-00021



- (b) Using SST, remove the drive gear.

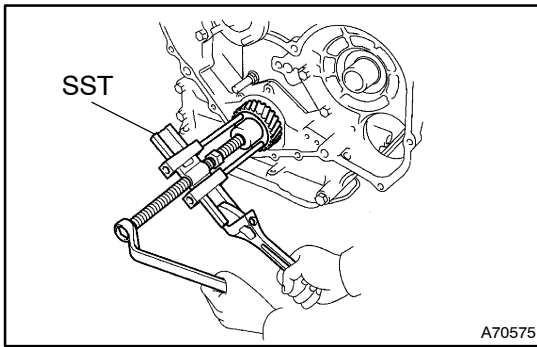
SST 09950-50013 (09951-05010, 09952-05010,
09953-05010, 09954-05030)

14. REMOVE VACUUM PUMP ASSY

- (a) Disconnect the vacuum pump hose
- (b) Remove the 2 bolts and vacuum pump.
- (c) Remove the 2 O-rings.

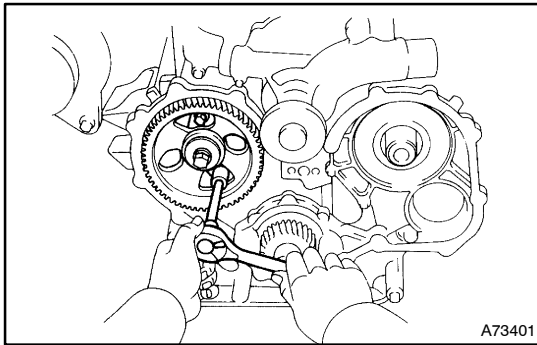
15. REMOVE IDLE GEAR SHAFT SUB-ASSY

- (a) Remove the union bolt and idle gear shaft.



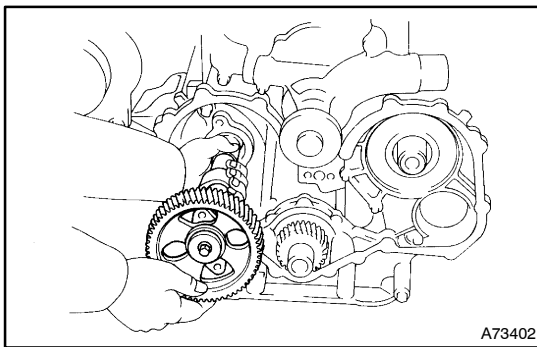
16. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

- (a) Using SST, remove the timing gear or sprocket.
 SST 09950-50013 (09951-05010, 09952-05010, 09953-05010, 09953-05020, 09954-05030)



17. REMOVE CAMSHAFT TIMING GEAR OR SPROCKET

- (a) Remove the 2 bolts holding the thrust plate to the cylinder block.

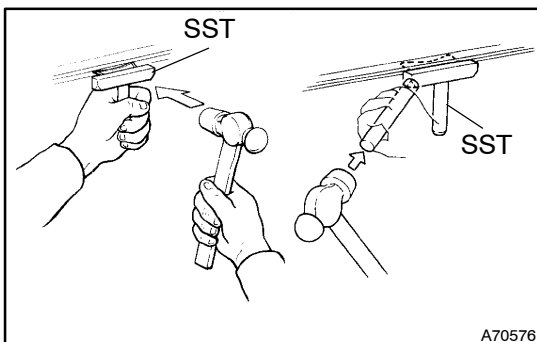


- (b) Carefully pull out the camshaft and timing gear assembly.

NOTICE:

Be careful not damage the camshaft bearing.

18. REMOVE INJECTION PUMP ASSY (See page 11-64)

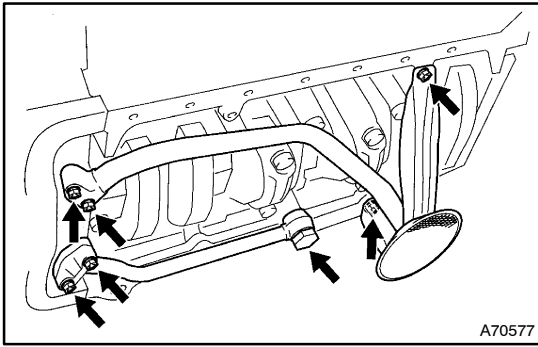


19. REMOVE OIL PAN SUB-ASSY

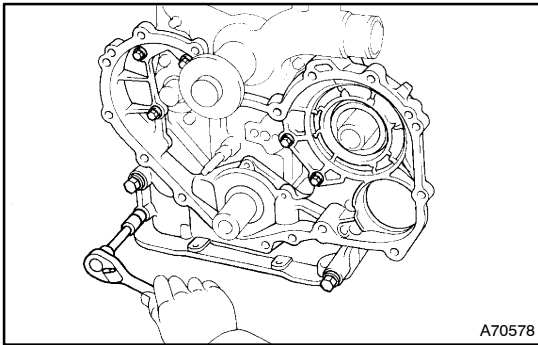
- (a) Remove the 17 bolts and 7 nuts.
 (b) Insert the blade of SST between the cylinder block and oil pan, and cut off the applied sealer and remove the oil pan.
 SST 09032-00100

NOTICE:

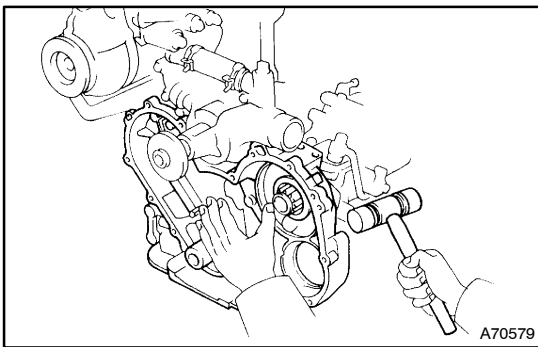
- Do not use SST on the timing gear case side and rear oil seal retainer side.
- Be careful not to damage the oil pan flange.

**20. REMOVE OIL STRAINER SUB-ASSY**

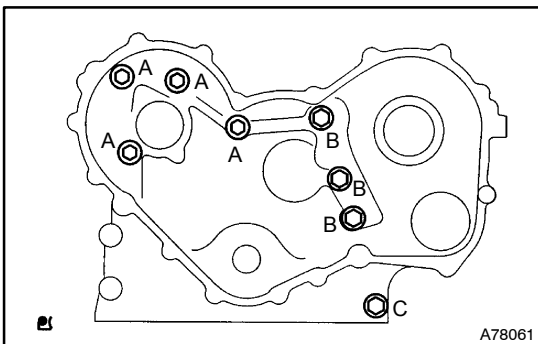
- (a) Remove the 2 bolts, 2 nuts, oil strainer and gasket.
- (b) Remove the union bolt, 2 nuts, oil pipe and 3 gaskets.

**21. REMOVE OIL PUMP (TIMING GEAR CASE SUB-ASSY)**

- (a) Remove the 8 bolts holding the timing gear case to the cylinder block.



- (b) Using a plastic-faced hammer, lightly tap out the timing gear case and gasket.

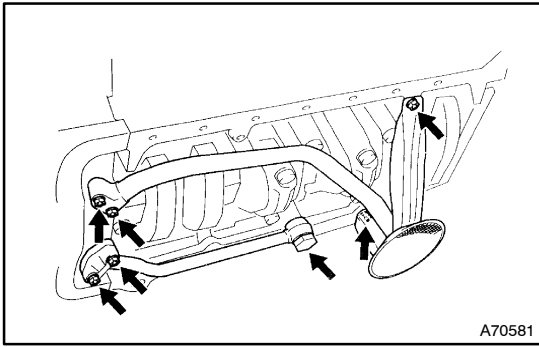
**22. INSTALL OIL PUMP (TIMING GEAR CASE SUB-ASSY)**

- (a) Place a new gasket and the timing gear case in position.
- (b) Install and uniformly tighten the 8 bolts in several passes.

Torque:**18.5 N·m (189 kgf·cm, 14 ft·lbf) for bolt A****52 N·m (530 kgf·cm, 38 ft·lbf) for bolt B****44 N·m (449 kgf·cm, 32 ft·lbf) for bolt C**

- (c) Align the matchmarks on the injection pump and timing gear case.
- (d) Install the 2 nuts holding the injection pump flange to the timing gear case.

Torque 18.5 N·m (189 kgf·cm, 14 ft·lbf)



23. INSTALL OIL STRAINER SUB-ASSY

- (a) Install a new gasket and the oil strainer with the 2 bolts and 2 nuts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

- (b) Install 3 new gaskets and oil pipe with the union bolt and 2 nuts.

Torque:

50 N·m (510 kgf·cm, 37 ft·lbf) for Union bolt

18.5 N·m (189 kgf·cm, 14 ft·lbf) for Nut

24. INSTALL OIL PAN SUB-ASSY

- (a) Remove any old packing (FIPG) materials.

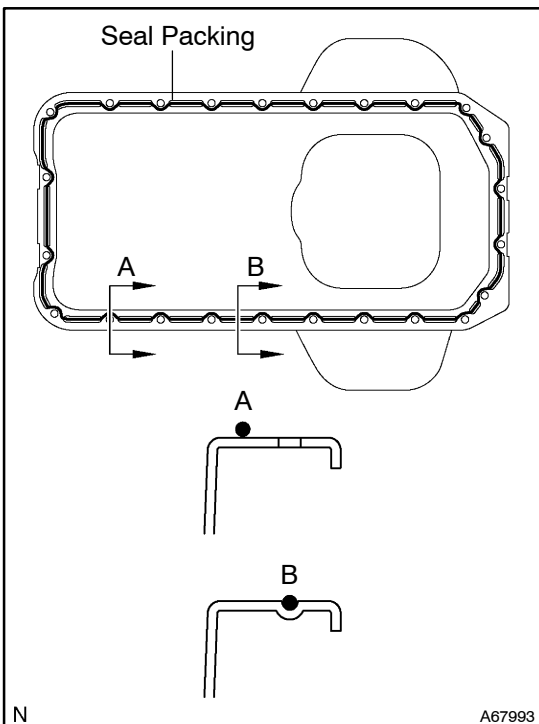
NOTICE:

Be careful not to drop any oil on the contact surfaces of the oil pan and cylinder block.

- (1) Using a razor blade and gasket scraper, remove all the old packing (FIPG) materials from the gasket surfaces and sealing groove.
- (2) Thoroughly clean all the components to remove all the loose materials.
- (3) Using a non-residue solvent, clean both sealing surfaces.

NOTICE:

Do not use a solvent which will affect the painted surfaces.



- (b) Apply seal packing to the oil pan as shown in the illustration.

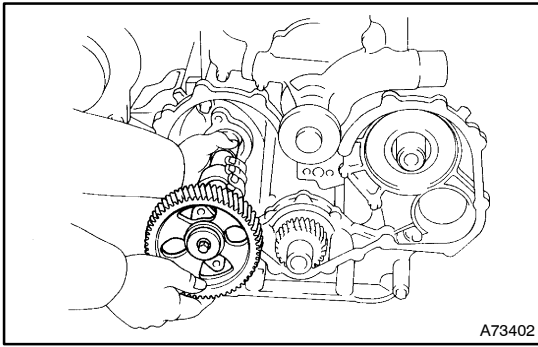
Seal packing: Part No. 08826-00080 or equivalent

- Install the nozzle which opening has been cut 4 – 5 mm (0.16 – 0.20 in.).
- The parts must be assembled within 5 minutes after seal packing is applied. Otherwise the material must be removed and reapplied.
- Immediately remove the nozzle from the tube and reinstall cap.

- (c) Install the oil pan with the 17 bolts and 7 nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

25. INSTALL INJECTION PUMP ASSY (See page 11-64)

**26. INSTALL CAMSHAFT TIMING GEAR OR SPROCKET**

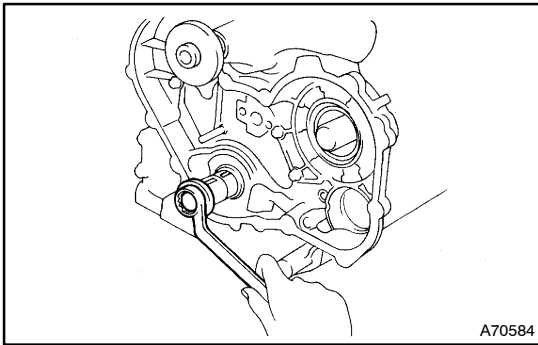
- (a) Install the camshaft timing gear into the cylinder block.

NOTICE:

Be careful not to damage the camshaft bearing.

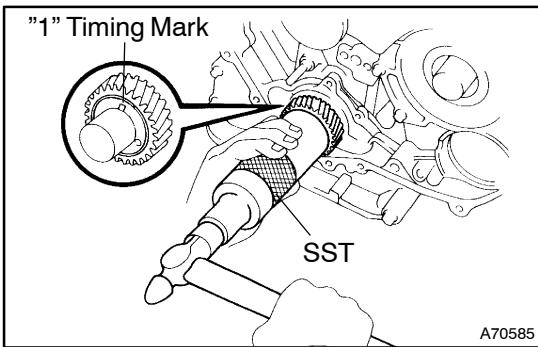
- (b) Install the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

**27. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET**

- (a) Check that the set key on crankshaft timing gear or sprocket faces upward.

If not, turn the crankshaft with a crankshaft pulley mount bolt.

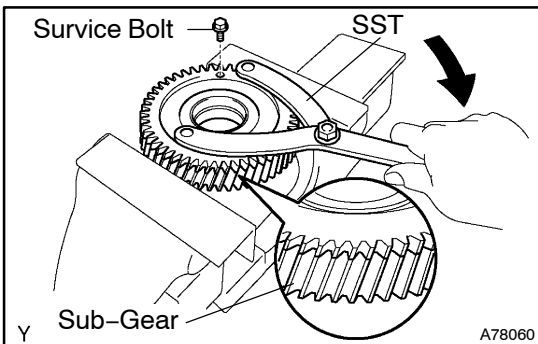


- (b) Put the timing gear on the crankshaft with the "4" timing mark of the timing gear facing forward.

- (c) Align the timing gear set key with the key groove of the crankshaft timing gear.

- (d) Using SST and a hammer, tap in the crankshaft timing gear.

SST 09608-06041

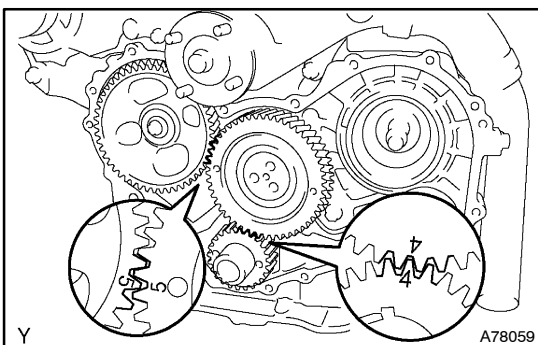
**28. INSTALL IDLE GEAR SHAFT SUB-ASSY**

- (a) When the sub-gear and the idle gear have shifted, do the following work (1) and (2).

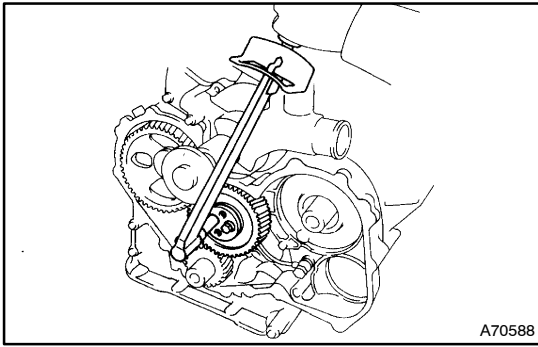
- (1) Using SST, align the holes of the idle gear and sub-gear by turning the sub-gear clockwise, and install a service bolt.

SST 09960-10010 (09962-01000, 09963-00500)

- (2) Align the gear teeth of the idle gear and sub-gear, and tighten the service bolt.

**29. INSTALL IDLE GEAR NO.1**

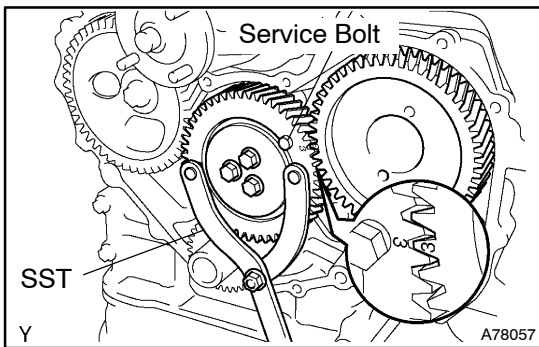
- (a) Align the idle gear timing marks "4" and "5" with the crankshaft gear timing mark "4" and camshaft gear timing mark "5" respectively, and mesh the gears.



- (b) Apply a light coat of engine oil on the threads and under the bolt heads.
- (c) Install the thrust plate with the 3 bolts.
Torque: 47.5 N·m (484 kgf·cm, 35 ft·lbf)
- (d) Tighten the union bolt.
Torque: 13 N·m (132 kgf·cm, 9.5 ft·lbf)

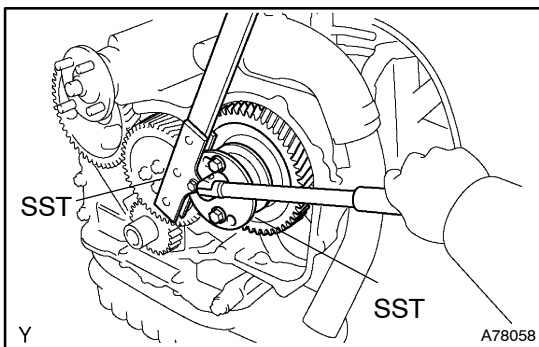
30. INSTALL VACUUM PUMP ASSY

- (a) Install 2 new O-rings to the vacuum pump.
- (b) Install the vacuum pump with the 2 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
- (c) Connect the vacuum pump hose.

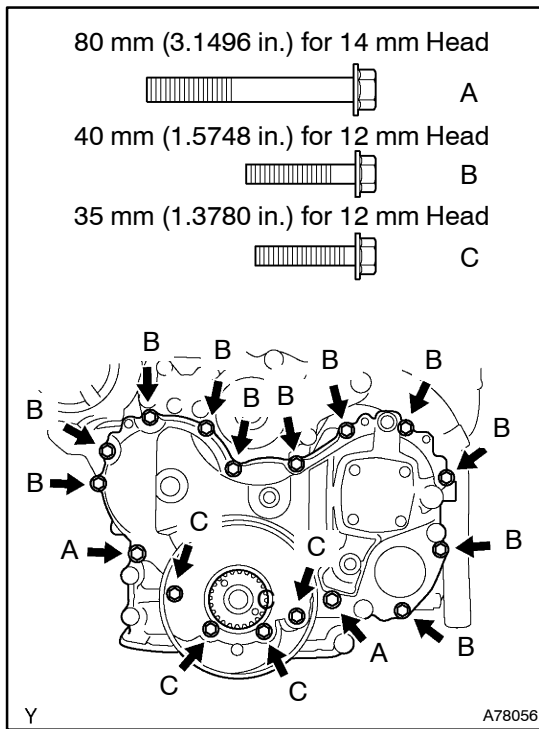


31. INSTALL INJECTION PUMP DRIVE GEAR

- (a) Align the drive gear set key with the key groove of the drive gear.
- (b) Using SST, align the idle gear timing mark 3 with the drive gear timing mark 3, and mesh the gears.
SST 09960-10010 (09962-01000, 09963-01000)



- (c) Using SST, install the drive gear nut.
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)
- (d) Remove the service bolt.
SST 09213-58013 (90201-08131, 09963-01000, 91111-50845), 09330-00021

**32. INSTALL TIMING GEAR COVER**

- (a) Install a new gasket and the timing gear cover with the 17 bolts.

Torque:

44 N·m (449 kgf·cm, 32 ft·lbf) for bolt A

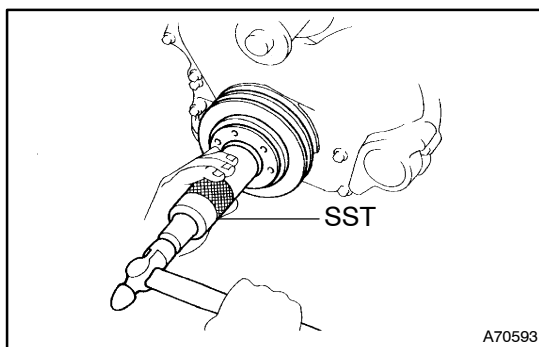
21 N·m (214 kgf·cm, 15 ft·lbf) for bolt B, C

HINT:

Each bolt length is indicated in the illustration.

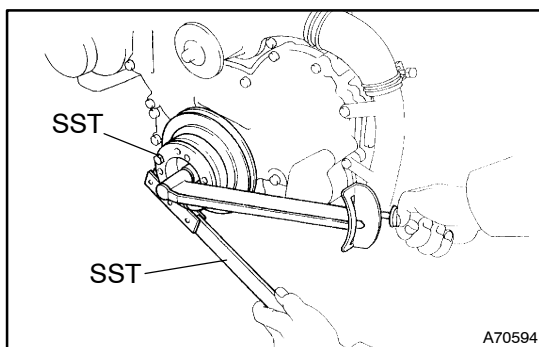
- (b) Connect the radiator hose to the water pump.
(c) Install the radiator pipe with the 2 bolts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

**33. INSTALL CRANKSHAFT PULLEY**

- (a) Align the pulley set key with the key groove of the pulley.
(b) Using SST and a hammer, tap in the pulley.

SST 09608-06041

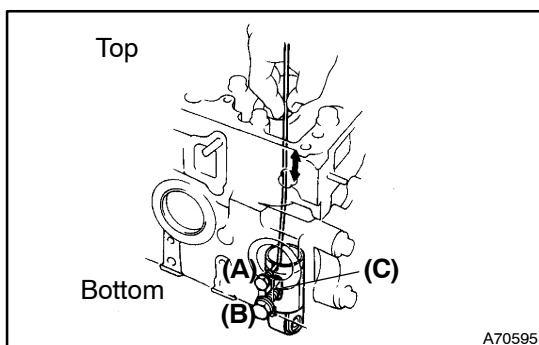


- (c) Apply a light coat of engine oil on the threads and under the bolt head.

- (d) Using SST, install and torque the pulley mount bolt.

SST 09213-58013 (90201-08131, 91111-50845),
09330-00021

Torque: 403 N·m (4,110 kgf·cm, 298 ft·lbf)

**34. INSTALL VALVE ROCKER SHAFT ASSY**

- (a) Remove bolt (A) and let the lifter slide down.
(b) Install bolts (A) and (B) with new gaskets.

Torque:

9.4 N·m (96 kgf·cm, 6.8 in·lbf) for bolt (A)

37.5 N·m (382 kgf·cm, 28 ft·lbf) for bolt (B)

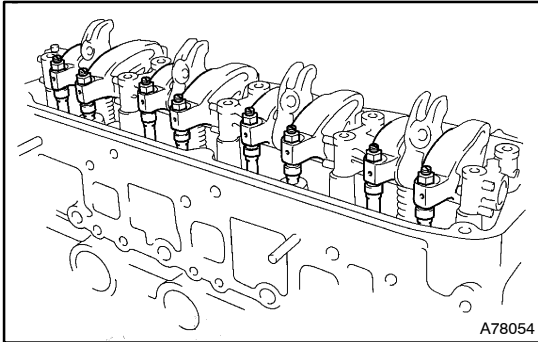
HINT:

When installing bolt (B), check that the hole for bolt (B) is aligned with long hole (C) of the valve lifter.

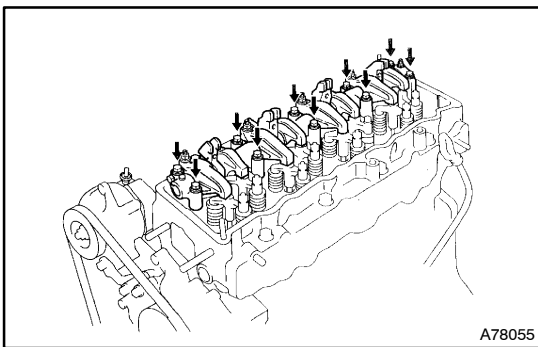
- (c) Check that the valve lifter can move up and down within the limit of long hole (C).

NOTICE:

Be careful not to scratch the valve lifter.



- (d) Place the rocker shaft assembly on the cylinder head.
 (e) Align the rocker arm adjusting screws with the heads of the push rods.

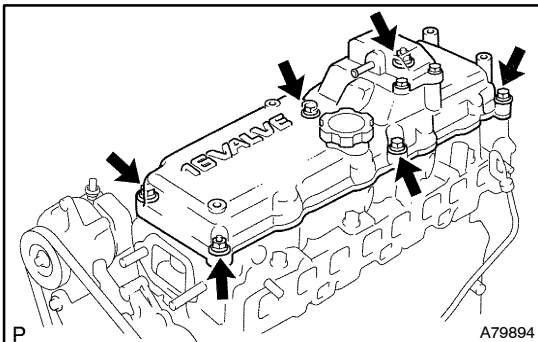


- (f) Instal and uniformly tighten the 10 bolts, in several passes, in the sequence shown.

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

35. INSPECT VALVE CLEARANCE (See page 14-49)

36. ADJUST VALVE CLEARANCE (See page 14-49)



37. INSTALL CYLINDER HEAD COVER SUB-ASSY

- (a) Install nozzle leakage pipe (See page 11-60).
 (b) Install the gasket to the cylinder head cover.
 (c) Install the cylinder head cover and uniformly tighten them with the 6 cushions, 4 bolts and 2 nuts, in several passes, in the order shown.

Torque: 10.5 N·m (107 kgf·cm, 8 ft·lbf)

38. INSTALL PCV HOSE

39. INSTALL FUEL PIPE SET (See page 11-60)

40. INSTALL RADIATOR ASSY (See page 16-27)

41. ADJUST FAN AND GENERATOR V BELT (See page 14-47)

42. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE)
 (See page 33-2)

43. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-2)

44. ADD ENGINE OIL

45. REFILL ENGINE COOLANT

46. BLEED FUEL (See page 11-57)

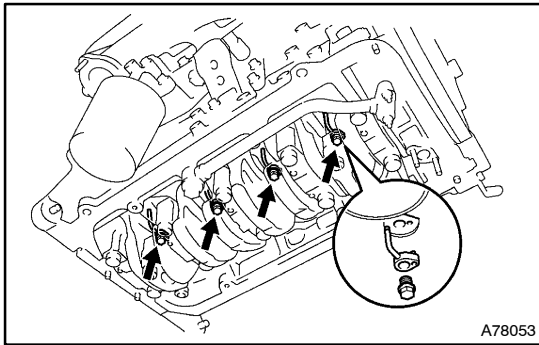
47. **CONNECT BATTERY NEGATIVE TERMINAL**
48. **CHECK ENGINE OIL LEVEL**
49. **CHECK FOR ENGINE COOLANT LEAKS**
50. **CHECK FOR ENGINE OIL LEAKS**
51. **INSPECT FOR FUEL LEAKS**

SUB-ASSY OIL NOZZLE NO.1 (15B-FTE)

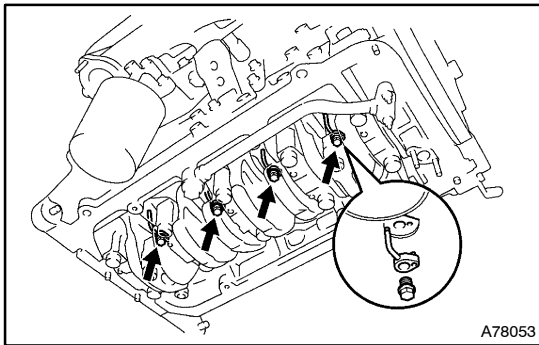
170EB-01

REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE OIL
3. REMOVE OIL PAN AND OIL STRAINER (See page 17-22)



4. REMOVE SUB-ASSY OIL NOZZLE NO.1
 - (a) Remove the 4 check valves and oil nozzles.



5. INSTALL SUB-ASSY OIL NOZZLE NO.1
 - (a) Align the pin of the oil nozzle with the pin hole of the cylinder block.
 - (b) Install the oil nozzle with the check valve. Install the 4 oil nozzles and 4 check valves.

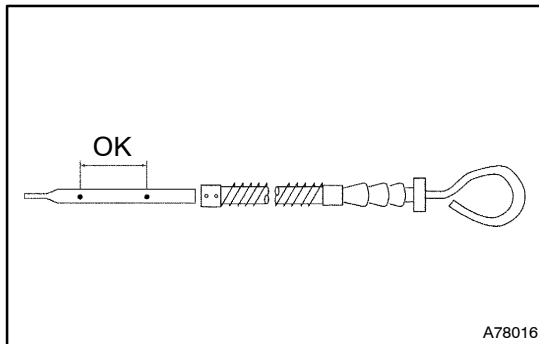
Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)

6. INSTALL OIL PAN AND OIL STRAINER (See page 17-22)
7. BLEED FUEL (See page 11-57)
8. ADD ENGINE OIL
9. CONNECT BATTERY NEGATIVE TERMINAL
10. CHECK ENGINE OIL LEVEL
11. CHECK FOR ENGINE OIL LEAKS
12. INSPECT FOR FUEL LEAKS

LUBRICATION SYSTEM (S05C-B)

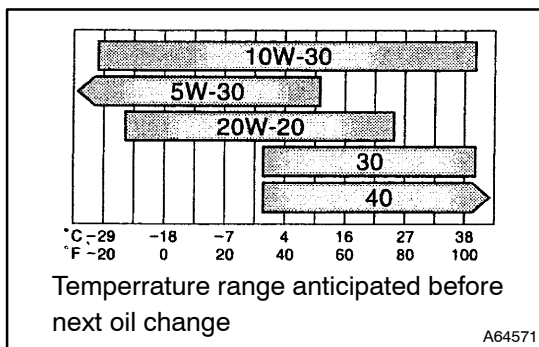
ON-VEHICLE INSPECTION

170AP-02



1. CHECK ENGINE OIL LEVEL

- Pull out the oil level gauge, then remove the attached oil by wiping it with a cloth.
 - Fully insert the gauge again, then pull it out gently.
 - Oil must be attached within the range of the cut part.
- If oil is short, apply some oil from the oil filler. However, if the oil is excessively dirty, exchange the oil with new one.



2. CHECK ENGINE OIL QUALITY

- Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is visibly poor, replace the oil.

Oil grade:

API CF-4 or CF (You may also use API CE or CD)

If you use SAE 10W-30 or higher viscosity oil in extremely low temperatures, the engine may become difficult to start, so SAE 5W-30 engine oil is recommended.



3. CHECK OIL PRESSURE

- Check the oil pressure warning lamp when the oil and coolant temperature is hot (about 80°C (176°F)).
If the warning lamp is lit, check the oil level.
- Check the oil deterioration.
If oil quality is poor, replace with a suitable grade oil.
- Remove the oil pressure switch and install the oil pressure gauge.
- Measure the oil pressure at oil temperature 103°C (217°F).

Oil pressure:

At idle	49 kPa (0.5 kgf/cm ² , 7.1 psi) or more
At 3,000 rpm	590 kPa (6.0 kgf/cm ² , 85 psi) or more

OIL FILTER SUB-ASSY (S05C-B)

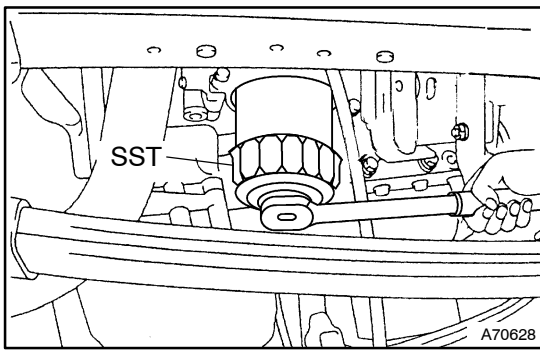
170E4-01

REPLACEMENT

CAUTION:

- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less hand cleaner to remove any used engine oil. Do not use gasoline, thinners, or solvents.
- In order to preserve the environment, used oil and used oil filters must be disposed of only at designated disposal sites.

1. DRAIN ENGINE OIL

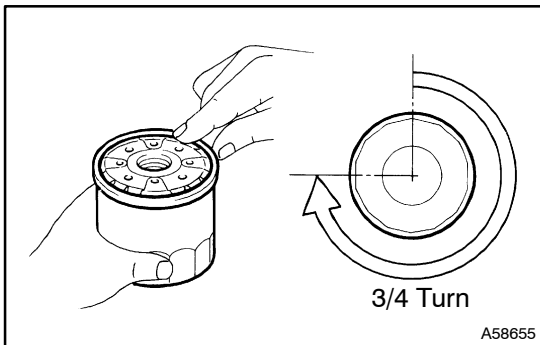


2. REMOVE OIL FILTER SUB-ASSY

- Remove the oil filter bottom to drain plug and pull out the engine oil.
- Using SST, remove the oil filter.
SST 09503-1120

NOTICE:

Make ure that the O-rings are not on the oil cooler case side.



3. INSTALL OIL FILTER SUB-ASSY

- Remove the dust on installation surface of oil cooler case side.
- Apply the engine oil to the O-ring on new oil filter.
- Install the oil filter by turning it lightly to the right by hand until it comes in contact with the surface of the oil cooler. Then using the SST, tighten the oil filter about 270° - 360° (3/4 - 1 turn).
SST 09503-1120

NOTICE:

- Do not reuse the O-ring.
- Attention the O-ring to damage.

4. ADD ENGINE OIL

- Clean the drain plug, and install a new gasket on it.

Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)

- Fill with fresh engine oil.

Oil capacity

Drain and refill	w/ oil filter change	10.0 liters (10.6 US qts, 8.8 Imp. qts)
	w/o oil filter change	8.0 liters (8.5 US qts, 7.0 Imp. qts)

- Reinstall the oil filler cap.

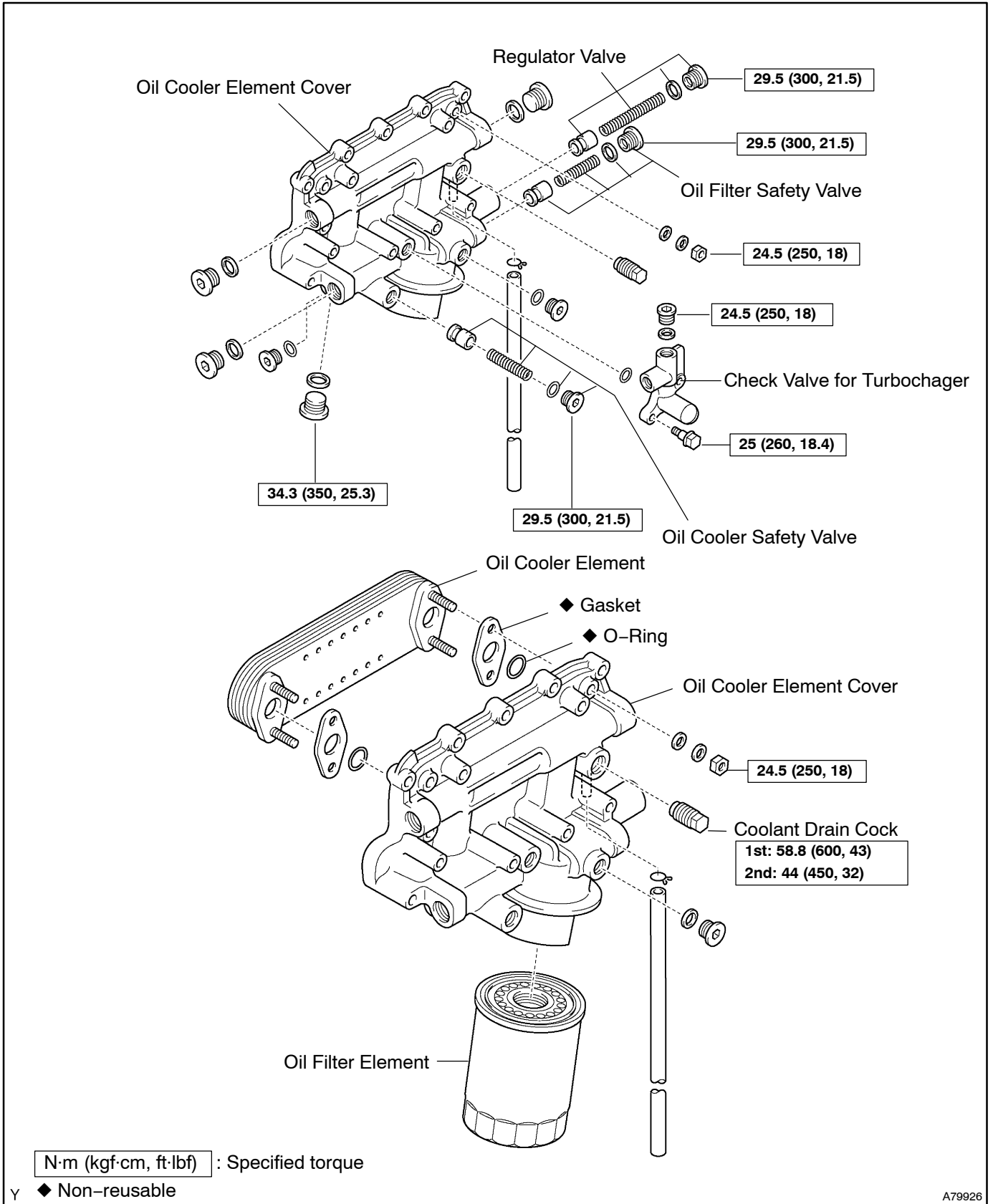
5. CHECK ENGINE OIL LEVEL

6. CHECK FOR ENGINE OIL LEAKS

OIL W/BRACKET COOLER ASSY (S05C-B)

COMPONENTS

170E5-01



REPLACEMENT

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **DRAIN ENGINE COOLANT**
3. **DRAIN ENGINE OIL**
4. **REMOVE EXHAUST PIPE ASSY FRONT**
5. **REMOVE VENTILATION PIPE**
6. **REMOVE OIL W/BRACKET COOLER ASSY**
 - (a) Disconnect the oil pressure switch connector.
 - (b) Remove the union bolt and gasket, and disconnect pipe and hoses.
 - (c) Remove the 13 bolts, oil w/bracket cooler assy and O-ring.
7. **REMOVE OIL PRESSURE SWITCH**
8. **REMOVE OIL COOLER ASSY**
 - (a) Remove the nut, and oil cooler element from the oil cooler element cover.
 - (b) Remove the plug, each valve and spring from the oil cooler element cover.
9. **REMOVE DRAIN PLUG**
10. **INSTALL DRAIN PLUG**

Torque:

1st 58.8 N·m (600 kgf·cm, 43 ft·lbf)

2nd 44 N·m (450 kgf·cm, 32 ft·lbf)
11. **INSTALL OIL COOLER ASSY**
 - (a) Tighten the nut and install the oil cooler element onto the oil cooler element cover.

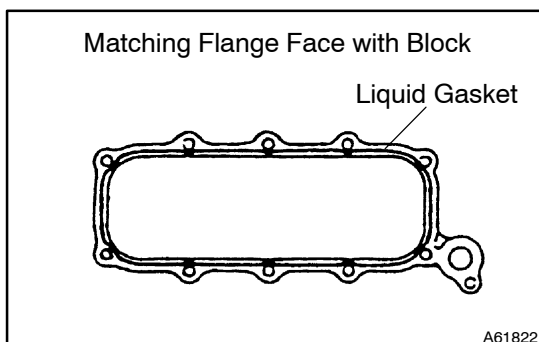
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)
 - (b) Install each valve and the spring onto the oil cooler element cover and tighten the plug.

Torque: 29.5 N·m (300 kgf·cm, 21 ft·lbf)
12. **INSTALL OIL PRESSURE SWITCH**
 - (a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

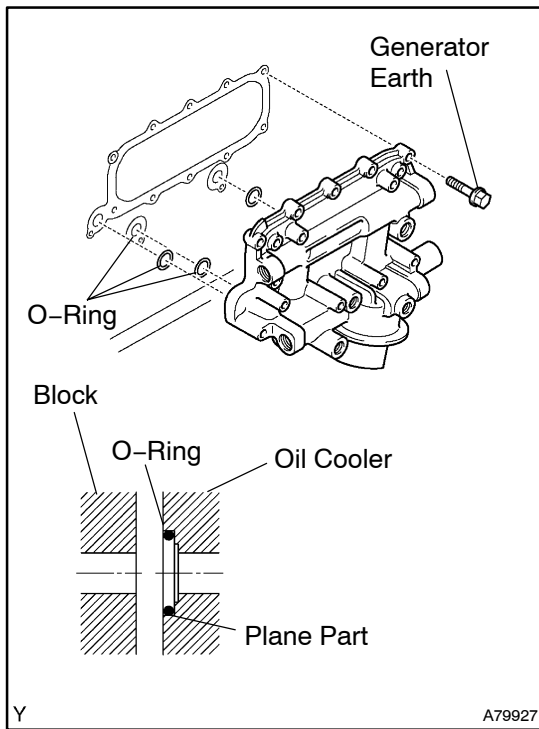
Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
 - (b) Install the oil pressure switch.

Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)



13. **INSTALL OIL W/BRACKET COOLER ASSY**
 - (a) Clean the cylinder block mounting surface of the oil w/bracket cooler assy.



- (b) Insert new O-rings into the O-ring grooves of the oil cooler.

HINT:

Face the flat area of the O-ring toward the oil cooler for installation.

- (c) Apply seal packing to the oil cooler housing and install it onto the cylinder block within 20 minutes.

Seal packing: Part No. 08826-00080 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

HINT:

- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
 - When installing the oil cooler, the earth wire of the generator must be tightened with the coolant pipe bracket for turbocharger.
- (d) Install new O-rings and oil w/bracket cooler assy with the 13 bolts.
- Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)**
- (e) Connect the oil pressure switch connector.
- (f) Install the 2 pipes together with the new gaskets and the union bolt to the oil cooler assembly.

14. INSTALL VENTILATION PIPE

HINT:

Apply liquid gasket to the part of the flywheel housing where the pipe is inserted.

15. INSTALL EXHAUST PIPE ASSY FRONT

16. REFILL ENGINE COOLANT

17. ADD ENGINE OIL

18. CONNECT BATTERY NEGATIVE TERMINAL

19. CHECK FOR ENGINE COOLANT LEAKS

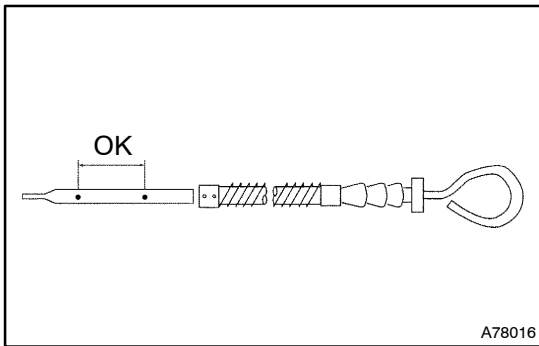
20. CHECK ENGINE OIL LEVEL

21. CHECK FOR ENGINE OIL LEAKS

LUBRICATION SYSTEM (S05C-TA)

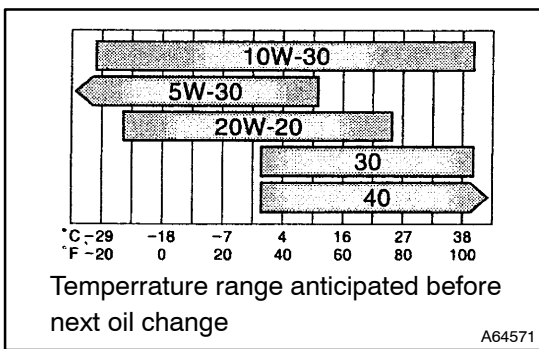
ON-VEHICLE INSPECTION

17076-02



1. CHECK ENGINE OIL LEVEL

- (a) Pull out the oil level gauge, then remove the attached oil by wiping it with a cloth.
 - (b) Fully insert the gauge again, then pull it out gently.
 - (c) Oil must be attached within the range of the cut part.
- If oil is short, apply some oil from the oil filler. However, if the oil is excessively dirty, exchange the oil with new one.



2. CHECK ENGINE OIL QUALITY

- (a) Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is visibly poor, replace the oil.

Oil grade:

API CF-4 or CF (You may also use API CE or CD)

If you use SAE 10W-30 or higher viscosity oil in extremely low temperatures, the engine may become difficult to start, so SAE 5W-30 engine oil is recommended.



3. CHECK OIL PRESSURE

- (a) Check the oil pressure warning lamp when the oil and coolant temperature is hot (about 80°C (176°F)).

If the warning lamp is lit, check the oil level.

- (b) Check the oil deterioration.

If oil quality is poor, replace with a suitable grade oil.

- (c) Remove the oil pressure switch and install the oil pressure gauge.

- (d) Measure the oil pressure at oil temperature 103°C (217°F).

Oil pressure:

At idle	49 kPa (0.5 kgf/cm ² , 7.11 psi) or more
At 3,000 rpm	590 kPa (6.0 kgf/cm ² , 85 psi) or more

OIL FILTER SUB-ASSY (S05C-TA)

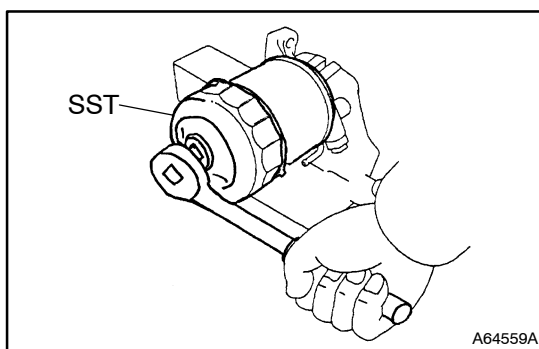
17077-02

REPLACEMENT

CAUTION:

- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less hand cleaner to remove any used engine oil. Do not use gasoline, thinners, or solvents.
- In order to preserve the environment, used oil and used oil filters must be disposed of only at designated disposal sites.

1. DRAIN ENGINE OIL

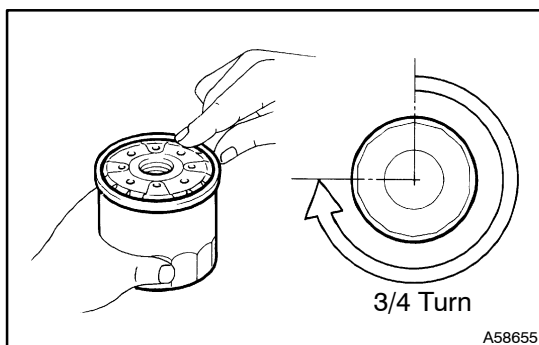


2. REMOVE OIL FILTER SUB-ASSY

- Remove the oil filter bottom to drain plug and pull out the engine oil.
- Using SST, remove the oil filter.
SST 09503-1090

NOTICE:

Make sure that the O-rings are not on the oil cooler case side.



3. INSTALL OIL FILTER SUB-ASSY

- Remove the dust on installation surface of oil cooler case side.
- Apply the engine oil to the O-ring on new oil filter.
- Install the oil filter by turning it lightly to the right by hand until it comes in contact with the surface of the oil cooler. Then using the SST, tighten the oil filter about 270° - 360° (3/4 - 1 turn).
SST 09503-1090

NOTICE:

- Do not reuse the O-ring.
- Attention the O-ring to damage.

4. INSTALL ENGINE OIL

- Clean the drain plug, and install a new gasket on it.

Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)

- Fill with fresh engine oil.

Oil capacity:

Drain and refill	w/ oil filter change	10.6 liters (11.3 US qts, 9.3 Imp. qts)
	w/o oil filter change	8.6 liters (9.1 US qts, 7.5 Imp. qts)

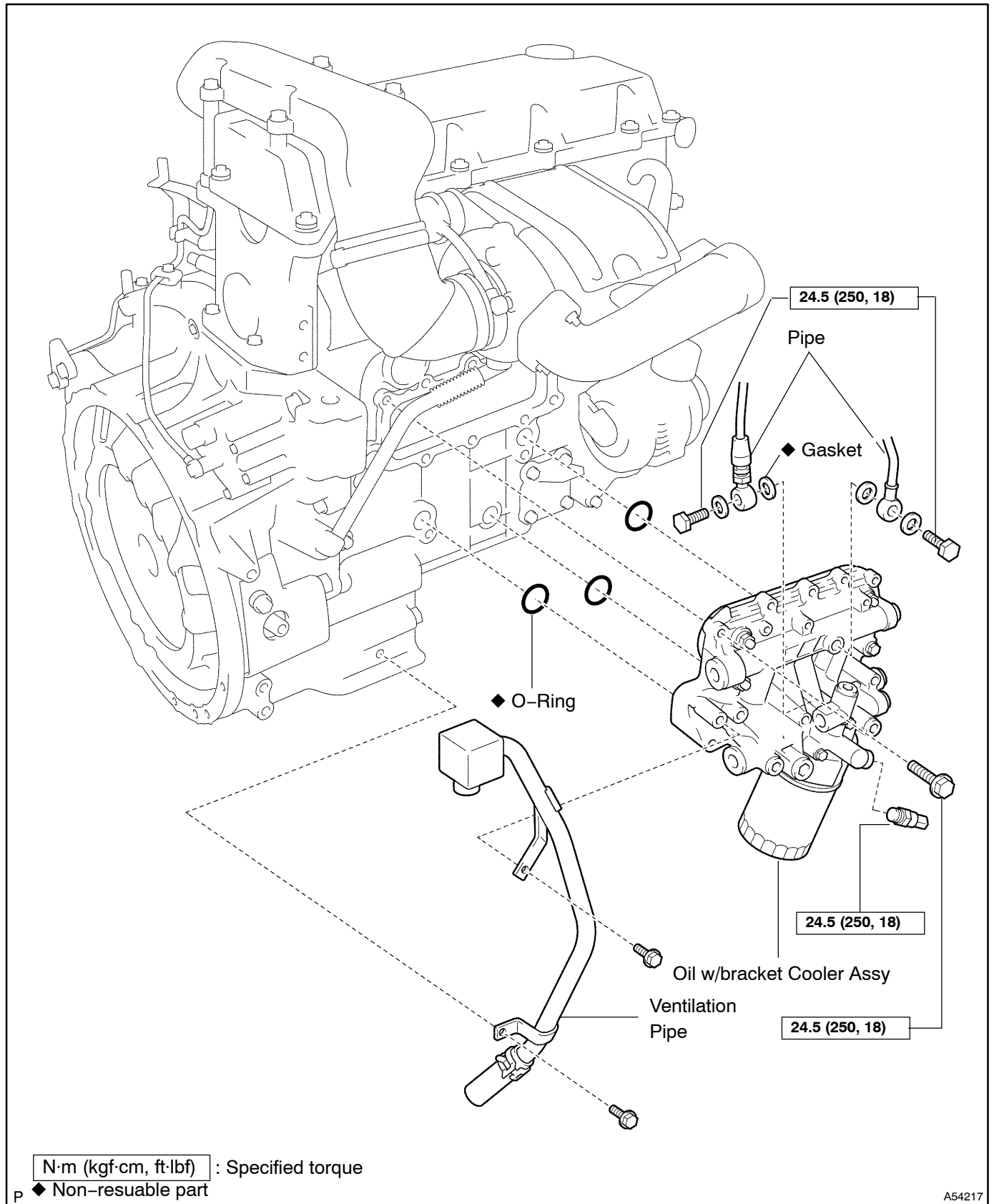
- Reinstall the oil filler cap.

5. CHECK FOR ENGINE OIL LEAKS

6. CHECK ENGINE OIL LEVEL

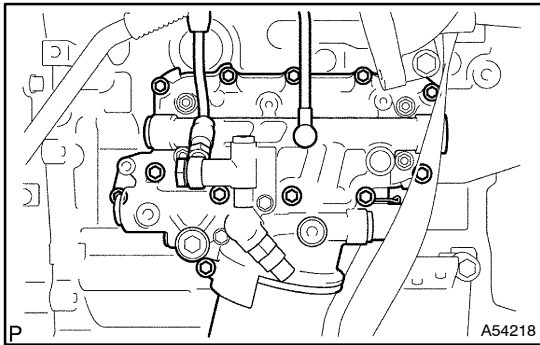
OIL W/BRACKET COOLER ASSY (S05C-TA) COMPONENTS

17078-02



REPLACEMENT

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **DRAIN ENGINE COOLANT**
3. **DRAIN ENGINE OIL**
4. **REMOVE EXHAUST PIPE ASSY FRONT**
5. **REMOVE VENTILATION PIPE**



6. **REMOVE OIL W/BRACKET COOLER ASSY**

- (a) Disconnect the oil pressure switch connector.
- (b) Remove the union bolt and gasket, and disconnect pipe and hoses.
- (c) Remove the 13 bolts, oil w/bracket cooler assy and O-ring.

7. **REMOVE OIL PRESSURE SWITCH**

8. **REMOVE OIL COOLER ASSY**

- (a) Remove the nut, and remove the oil cooler element from the oil cooler element cover.
- (b) Remove the plug and remove each valve and spring from the oil cooler element cover.

9. **REMOVE DRAIN PLUG**

10. **INSTALL DRAIN PLUG**

Torque:

29.5 N·m (300 kgf·cm, 21.5 ft·lbf) (1st)

19.6 N·m (200 kgf·cm, 14.5 ft·lbf) (2nd)

11. **INSTALL OIL COOLER ASSY**

- (a) Tighten the nut and install the oil cooler element onto the oil cooler element cover.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)
- (b) Install each valve and spring onto the oil cooler element cover and tighten the plug.
Torque: 29.5 N·m (300 kgf·cm, 21 ft·lbf)

12. **INSTALL VENTILATION PIPE**

HINT:

Apply liquid gasket to the part of the flywheel housing where the pipe is inserted.

13. **INSTALL OIL PRESSURE SWITCH**

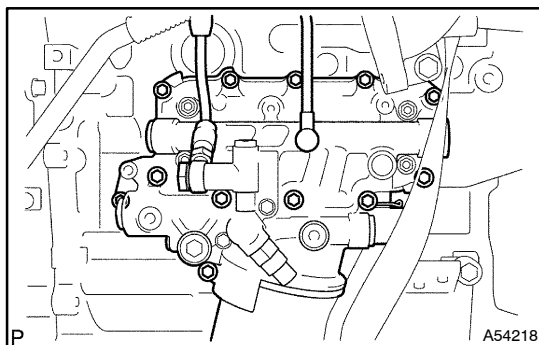
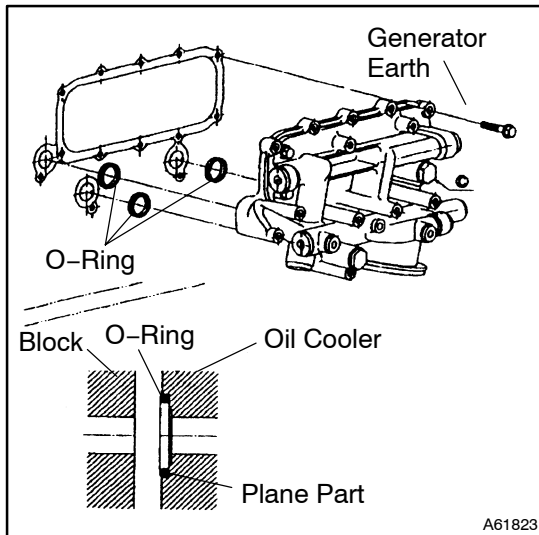
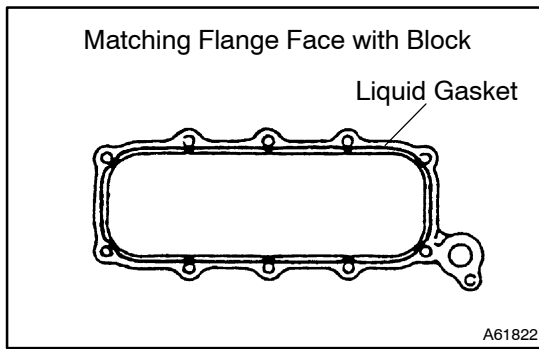
- (a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

- (b) Install the oil pressure switch.

Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)



14. INSTALL OIL W/BRACKET COOLER ASSY

- (a) Clean the cylinder block mounting surface of the oil cooler.

- (b) Insert the O-ring into the O-ring groove of the oil cooler.
HINT:

Face the flat area of the O-ring toward the oil cooler for installation.

- (c) Apply seal packing to the oil cooler housing and install it onto the cylinder block within 20 minutes.

Seal packing: Part No. 08826-00080 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

HINT:

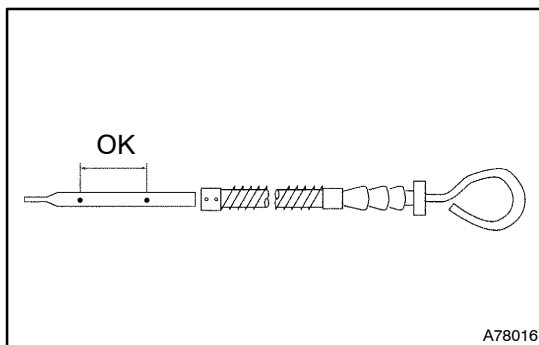
- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
 - When installing the oil cooler, the earth wire of the generator must be tightened with the coolant pipe bracket for turbocharger.
- (d) Install the new O-rings and oil w/bracket cooler assy with the 13 bolts.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)
- (e) Connect the oil pressure switch connector.
- (f) Install the 2 pipes together with the new gaskets and union bolt to the oil w/bracket cooler assembly.

15. EXHAUST PIPE ASSY FRONT
16. REPLACE ENGINE OIL
17. CHECK FOR ENGINE OIL LEAKS
18. REFILL ENGINE COOLANT
19. INSTALL BATTERY NEGATIVE TERMINAL
20. CHECK FOR ENGINE COOLANT LEAKS

LUBRICATION SYSTEM (S05C-TB)

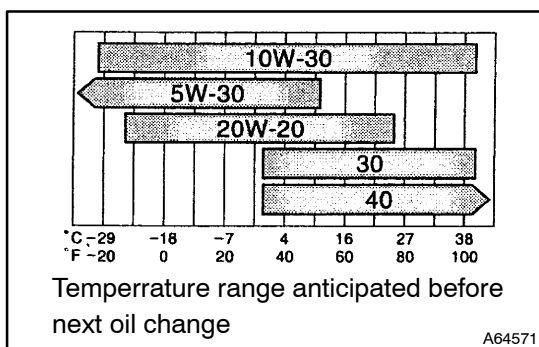
ON-VEHICLE INSPECTION

17076-03



1. CHECK ENGINE OIL LEVEL

- (a) Pull out the oil level gauge, then remove the attached oil by wiping it with a cloth.
 - (b) Fully insert the gauge again, then pull it out gently.
 - (c) Oil must be attached within the range of the cut part.
- If oil is short, apply some oil from the oil filler. However, if the oil is excessively dirty, exchange the oil with new one.



2. CHECK ENGINE OIL QUALITY

- (a) Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is visibly poor, replace the oil.

Oil grade:

API CF-4 or CF (You may also use API CE or CD)

If you use SAE 10W-30 or higher viscosity oil in extremely low temperatures, the engine may become difficult to start, so SAE 5W-30 engine oil is recommended.



3. CHECK OIL PRESSURE

- (a) Check the oil pressure warning lamp when the oil and coolant temperature is hot (about 80°C (176°F)).

If the warning lamp is lit, check the oil level.

- (b) Check the oil deterioration.

If oil quality is poor, replace with a suitable grade oil.

- (c) Remove the oil pressure switch and install the oil pressure gauge.

- (d) Measure the oil pressure at oil temperature 103°C (217°F).

Oil pressure:

At idle	49 kPa (0.5 kgf/cm ² , 7.11 psi) or more
At 3,000 rpm	590 kPa (6.0 kgf/cm ² , 85 psi) or more

OIL FILTER SUB-ASSY (S05C-TB)

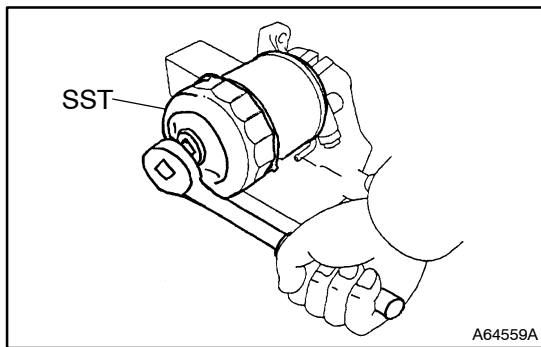
17077-03

REPLACEMENT

CAUTION:

- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less hand cleaner to remove any used engine oil. Do not use gasoline, thinners, or solvents.
- In order to preserve the environment, used oil and used oil filters must be disposed of only at designated disposal sites.

1. DRAIN ENGINE OIL

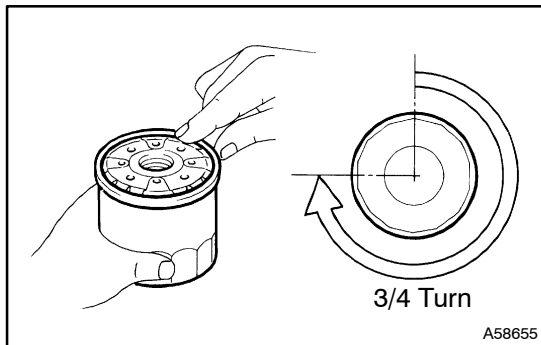


2. REMOVE OIL FILTER SUB-ASSY

- Remove the oil filter bottom to drain plug and pull out the engine oil.
- Using SST, remove the oil filter.
SST 09503-1090

NOTICE:

Make sure that the O-rings are not on the oil cooler case side.



3. INSTALL OIL FILTER SUB-ASSY

- Remove the dust on installation surface of oil cooler case side.
- Apply the engine oil to the O-ring on new oil filter.
- Install the oil filter by turning it lightly to the right by hand until it comes in contact with the surface of the oil cooler. Then using the SST, tighten the oil filter about 270° - 360° (3/4 - 1 turn).
SST 09503-1090

NOTICE:

- Do not reuse the O-ring.
- Attention the O-ring to damage.

4. INSTALL ENGINE OIL

- Clean the drain plug, and install a new gasket on it.

Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)

- Fill with fresh engine oil.

Oil capacity:

Drain and refill	w/ oil filter change	10.6 liters (11.3 US qts, 9.3 Imp. qts)
	w/o oil filter change	8.6 liters (9.1 US qts, 7.5 Imp. qts)

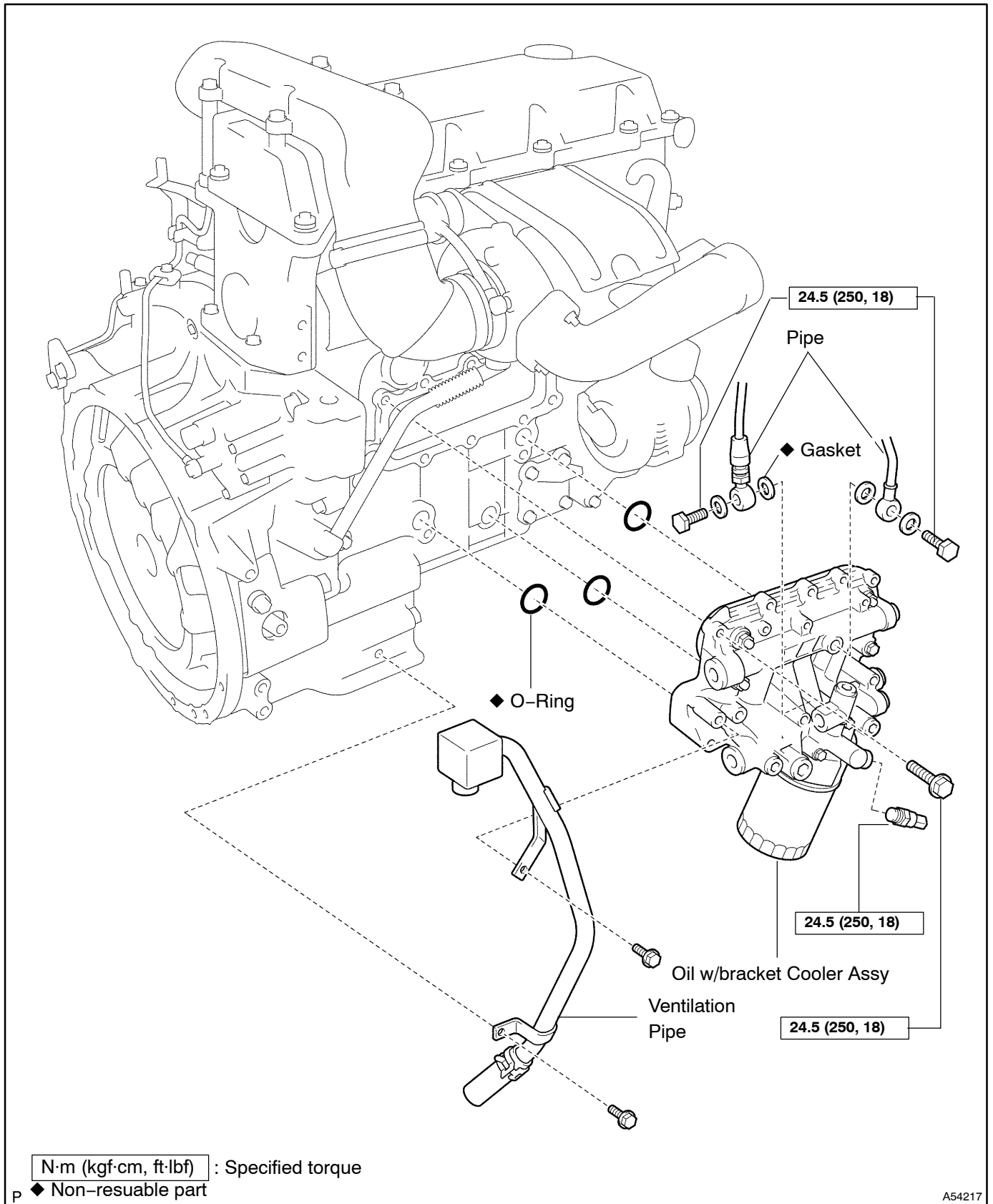
- Reinstall the oil filler cap.

5. CHECK FOR ENGINE OIL LEAKS

6. CHECK ENGINE OIL LEVEL

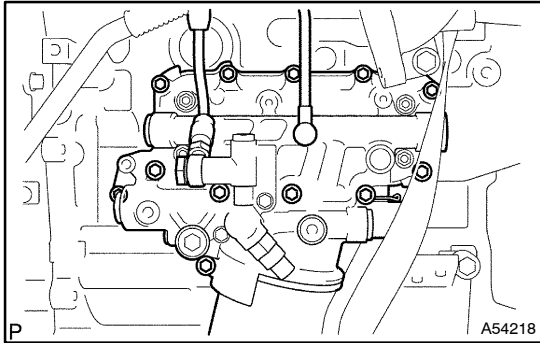
OIL W/BRACKET COOLER ASSY (S05C-TB) COMPONENTS

17078-03



REPLACEMENT

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **DRAIN ENGINE COOLANT**
3. **DRAIN ENGINE OIL**
4. **REMOVE EXHAUST PIPE ASSY FRONT**
5. **REMOVE VENTILATION PIPE**



6. **REMOVE OIL W/BRACKET COOLER ASSY**

- (a) Disconnect the oil pressure switch connector.
- (b) Remove the union bolt and gasket, and disconnect pipe and hoses.
- (c) Remove the 13 bolts, oil w/bracket cooler assy and O-ring.

7. **REMOVE OIL PRESSURE SWITCH**

8. **REMOVE OIL COOLER ASSY**

- (a) Remove the nut, and remove the oil cooler element from the oil cooler element cover.
- (b) Remove the plug and remove each valve and spring from the oil cooler element cover.

9. **REMOVE DRAIN PLUG**

10. **INSTALL DRAIN PLUG**

Torque:

29.5 N·m (300 kgf·cm, 21.5 ft·lbf) (1st)

19.6 N·m (200 kgf·cm, 14.5 ft·lbf) (2nd)

11. **INSTALL OIL COOLER ASSY**

- (a) Tighten the nut and install the oil cooler element onto the oil cooler element cover.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)
- (b) Install each valve and spring onto the oil cooler element cover and tighten the plug.
Torque: 29.5 N·m (300 kgf·cm, 21 ft·lbf)

12. **INSTALL VENTILATION PIPE**

HINT:

Apply liquid gasket to the part of the flywheel housing where the pipe is inserted.

13. **INSTALL OIL PRESSURE SWITCH**

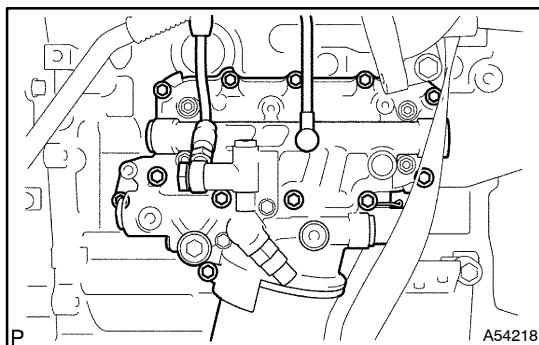
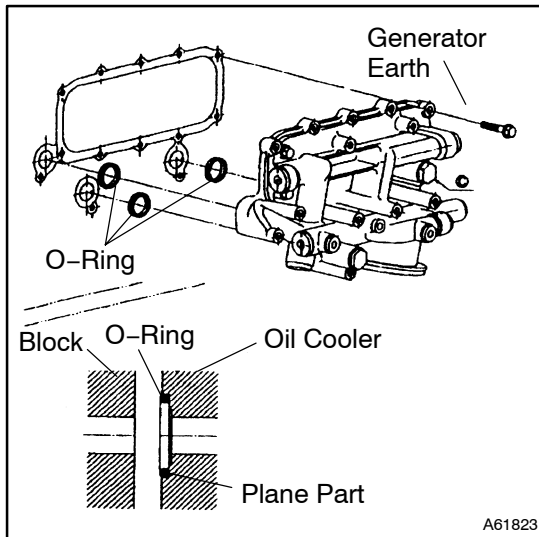
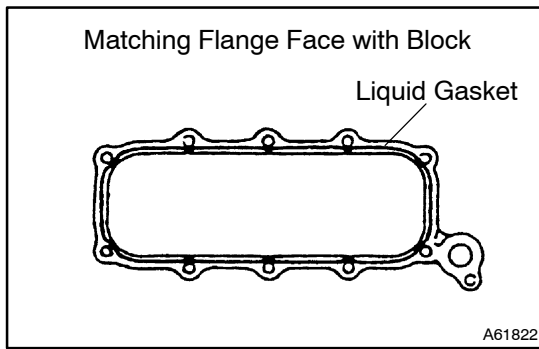
- (a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

- (b) Install the oil pressure switch.

Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)



14. INSTALL OIL W/BRACKET COOLER ASSY

- (a) Clean the cylinder block mounting surface of the oil cooler.

- (b) Insert the O-ring into the O-ring groove of the oil cooler.
HINT:

Face the flat area of the O-ring toward the oil cooler for installation.

- (c) Apply seal packing to the oil cooler housing and install it onto the cylinder block within 20 minutes.

Seal packing: Part No. 08826-00080 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

HINT:

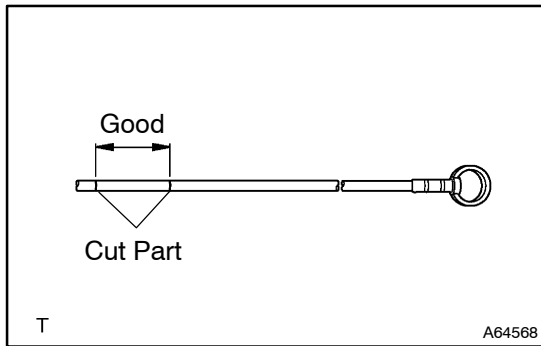
- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.
 - When installing the oil cooler, the earth wire of the generator must be tightened with the coolant pipe bracket for turbocharger.
- (d) Install the new O-rings and oil w/bracket cooler assy with the 13 bolts.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)
- (e) Connect the oil pressure switch connector.
- (f) Install the 2 pipes together with the new gaskets and union bolt to the oil w/bracket cooler assembly.

15. EXHAUST PIPE ASSY FRONT
16. REPLACE ENGINE OIL
17. CHECK FOR ENGINE OIL LEAKS
18. REFILL ENGINE COOLANT
19. INSTALL BATTERY NEGATIVE TERMINAL
20. CHECK FOR ENGINE COOLANT LEAKS

LUBRICATION SYSTEM (W04D-J)

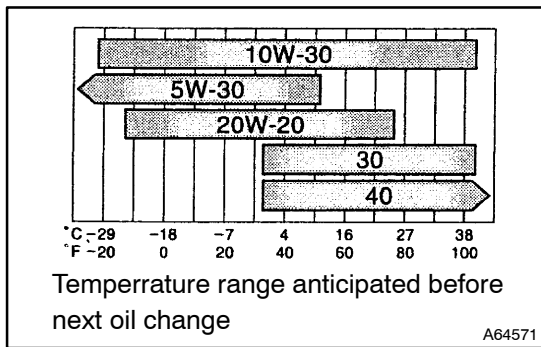
ON-VEHICLE INSPECTION

170E0-01



1. CHECK ENGINE OIL LEVEL

- (a) Pull out the oil level gauge, then remove the attached oil by wiping it with a cloth.
- (b) Fully insert the gauge again, then pull it out gently.
- (c) Oil must be attached within the range of the cut part. If oil is short, apply some oil from the oil filler. However, if the oil is excessively dirty, exchange the oil with new one.



2. CHECK ENGINE OIL QUALITY

- (a) Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is visibly poor, replace the oil.

Oil grade:

API CF-4 or CF (You may also use API CE or CD)

If you use SAE 10W-30 or higher viscosity oil in extremely low temperatures, the engine may become difficult to start, so SAE 5W-30 engine oil is recommended.



3. CHECK OIL PRESSURE

- (a) Check the oil pressure warning lamp when the oil and coolant temperature is hot (about 80°C (176°F)). If the warning lamp is lit, check the oil level.
- (b) Check the oil deterioration. If oil quality is poor, replace with a suitable grade oil.
- (c) Remove the oil pressure switch and install the oil pressure gauge.
- (d) Measure the oil pressure at coolant temperature 110°C (231°F).

Oil pressure:

At idle	225.5 kPa (2.3 kgf/cm ² , 32.4 psi) or more
At 3,000 rpm	402 kPa (4.1 kgf/cm ² , 57 psi) or more

OIL FILTER SUB-ASSY (W04D-J)

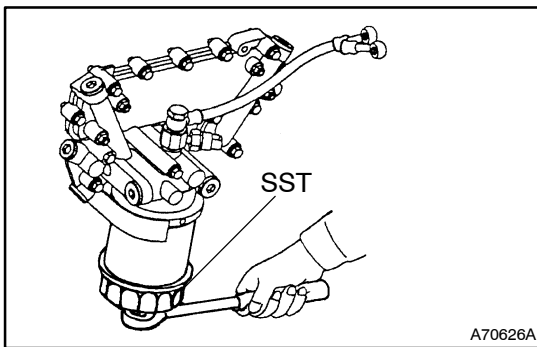
170E1-01

REPLACEMENT

CAUTION:

- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less hand cleaner to remove any used engine oil. Do not use gasoline, thinners, or solvents.
- In order to preserve the environment, used oil and used oil filters must be disposed of only at designated disposal sites.

1. DRAIN ENGINE OIL

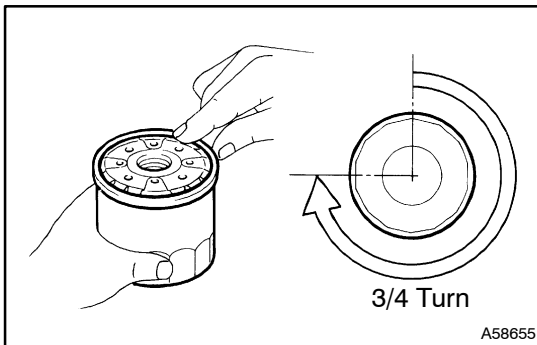


2. REMOVE OIL FILTER SUB-ASSY

- Remove the oil filter bottom to drain plug and pull out the engine oil.
- Using SST, remove the oil filter.
SST 09503-1120

NOTICE:

Make sure that the O-rings are not on the oil cooler case side.



3. INSTALL OIL FILTER SUB-ASSY

- Remove the dust on installation surface of oil cooler case side.
- Apply the engine oil to the O-ring on new oil filter.
- Install the oil filter by turning it lightly to the right by hand until it comes in contact with the surface of the oil cooler. Then using the SST, tighten the oil filter about 270° - 360° (3/4 - 1 turn).
SST 09503-1120

NOTICE:

- Do not reuse the O-ring.
- Attention the O-ring to damage.

4. ADD ENGINE OIL

- Clean the drain plug, and install a new gasket on it.

Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

- Fill with fresh engine oil.

Oil capacity:

Drain and refill	w/ oil filter change	8.7 liters (9.2 US qts, 7.6 Imp. qts)
	w/o oil filter change	7.5 liters (8.0 US qts, 6.6 Imp. qts)

- Reinstall the oil filler cap.

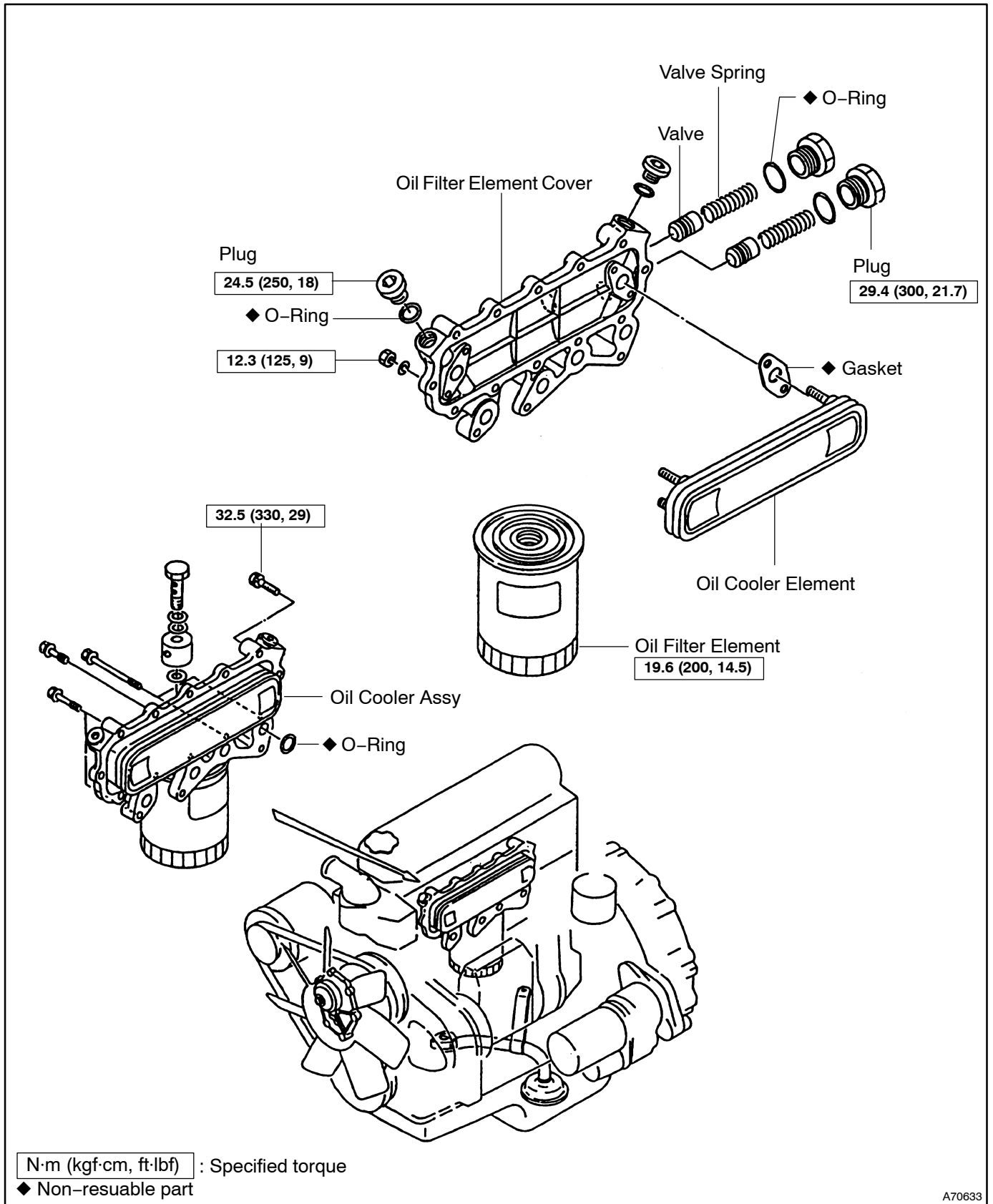
5. CHECK ENGINE OIL LEVEL

6. CHECK FOR ENGINE OIL LEAKS

OIL COOLER ASSY (W04D-J)

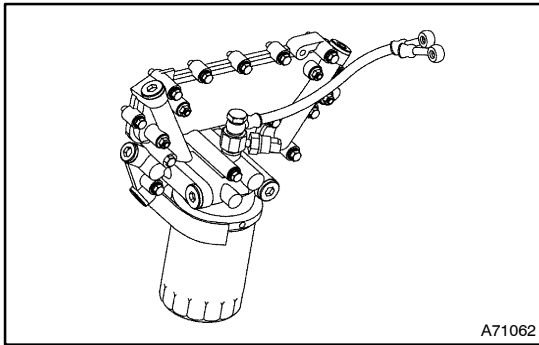
COMPONENTS

170E2-01



REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. DRAIN ENGINE OIL
4. REMOVE EXHAUST PIPE ASSY FRONT



5. REMOVE OIL COOLER CASE

- (a) Disconnect the oil pressure switch connector.
- (b) Remove the union bolt and gasket, and disconnect pipe and hoses.
- (c) Remove the 15 bolts, oil cooler assy and O-ring.

6. REMOVE OIL PRESSURE SWITCH

7. REMOVE OIL COOLER ASSY

- (a) Remove the nut, oil cooler element from the oil cooler element cover.
- (b) Remove the plug, each valve and spring from the oil cooler element cover.

8. INSTALL OIL COOLER ASSY

- (a) Tighten the nut and install the oil cooler element onto the oil cooler element cover.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)
- (b) Install each valve and spring onto the oil cooler element cover and tighten the plug.
Torque: 29.5 N·m (300 kgf·cm, 21 ft·lbf)

9. INSTALL OIL PRESSURE SWITCH

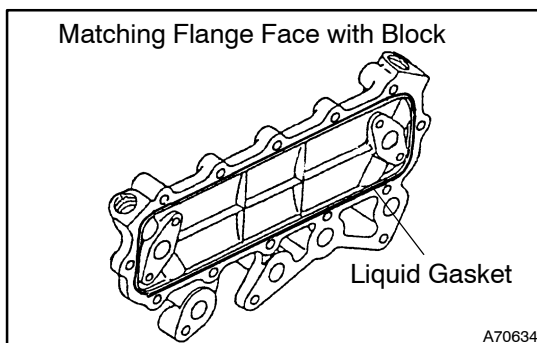
- (a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

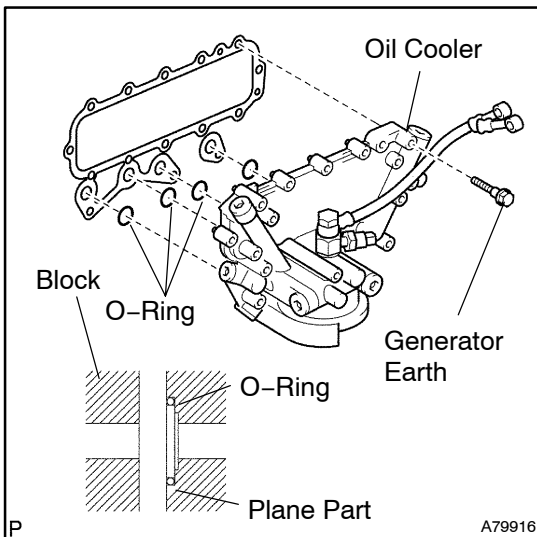
- (b) Install the oil pressure switch.

Torque: 12.3 N·m (125 kgf·cm, 9 ft·lbf)



10. INSTALL OIL COOLER CASE

- (a) Clean the cylinder block mounting surface of the oil cooler.



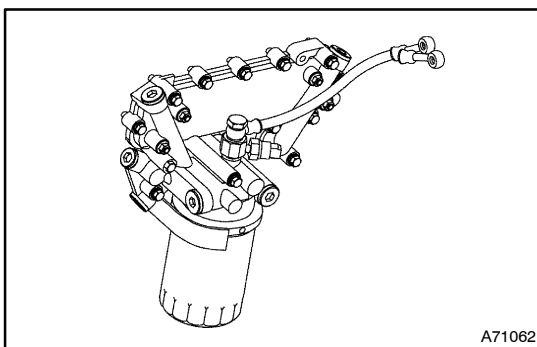
(b) Insert the O-ring into the O-ring groove of the oil cooler.
HINT:
 Face the flat area of the O-ring toward the oil cooler for installation.

(c) Apply seal packing to the oil cooler housing and install it onto the cylinder block within 20 minutes.

Seal packing: Part No. 08826-00080 or equivalent
Coating width: 1.5 - 2.5 mm (0.059 - 0.098 in.)

HINT:

- If more than 20 minutes have passed since the seal packing is applied, do not assemble the parts. After removing the seal packing completely, reapply it to assemble them.



(d) Install new O-rings and oil w/bracket cooler assy with the 13 bolts.

Torque: 32.5 N·m (330 kgf·cm, 29 ft·lbf)

(e) Connect the oil pressure switch connector.

(f) Install the 2 pipes together with the new gaskets and union bolt to the oil cooler assembly.

11. **INSTALL EXHAUST PIPE ASSY FRONT**
12. **REFILL ENGINE COOLANT**
13. **ADD ENGINE OIL**
14. **CONNECT BATTERY NEGATIVE TERMINAL**
15. **CHECK FOR ENGINE COOLANT LEAKS**
16. **CHECK ENGINE OIL LEVEL**
17. **CHECK FOR ENGINE OIL LEAKS**

STARTING & CHARGING

STARTING SYSTEM	19-1
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STARTER ASSY	19-3
COMPONENTS	19-3
CHARGING SYSTEM	19-5
ON-VEHICLE INSPECTION	19-5
GENERATOR ASSY	19-6
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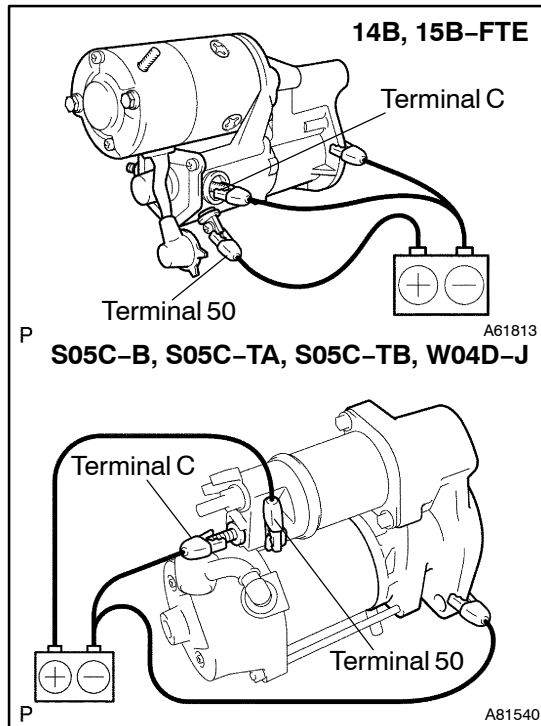
STARTING SYSTEM

INSPECTION

190MA-01

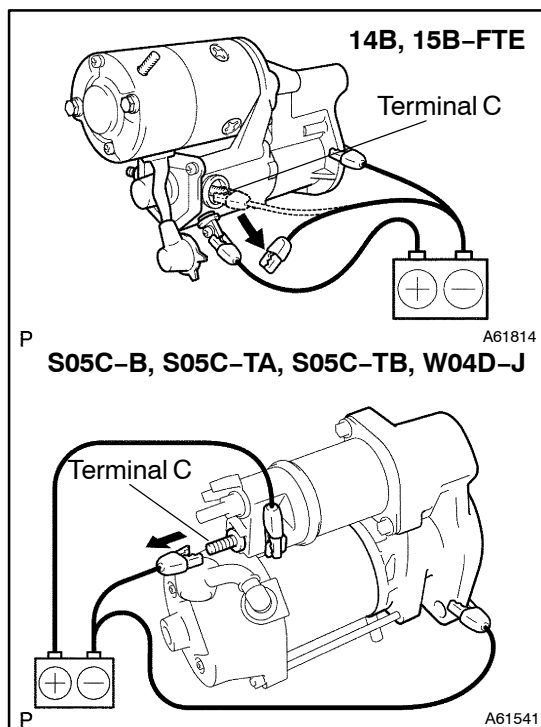
NOTICE:

These tests must be performed within 3 to 5 seconds to prevent the coil from burning.

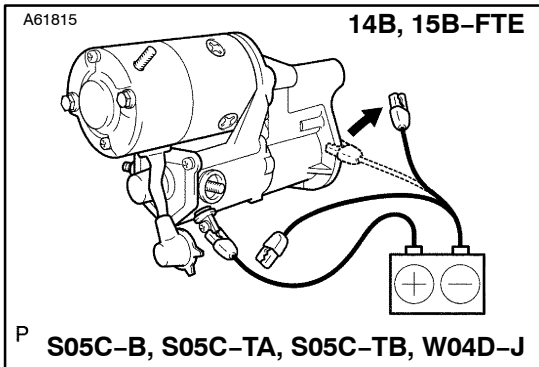


1. PERFORM PULL-IN/HOLDING TEST

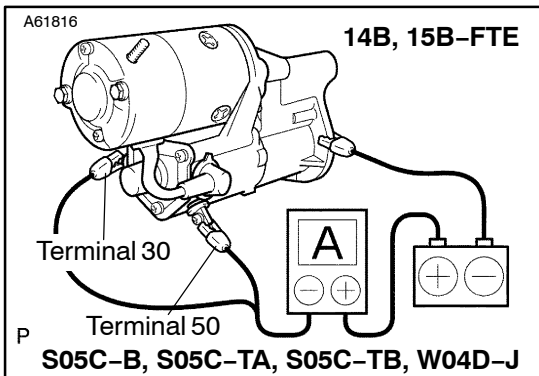
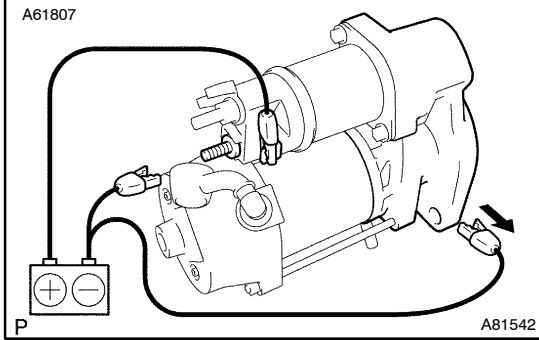
- (a) Disconnect the lead wire from terminal C.
- (b) Connect the battery to the magnetic switch, as shown in the illustration.
- (c) Check that the pinion gear moves outside.



- (d) Disconnect the negative lead from terminal C.
- (e) Check that the magnetic clutch keeps the pinion gear moving outside.



- (f) Disconnect the negative lead from the switch body.
- (g) Check that the pinion gear returns.
- (h) Connect the lead wire to the terminal C.



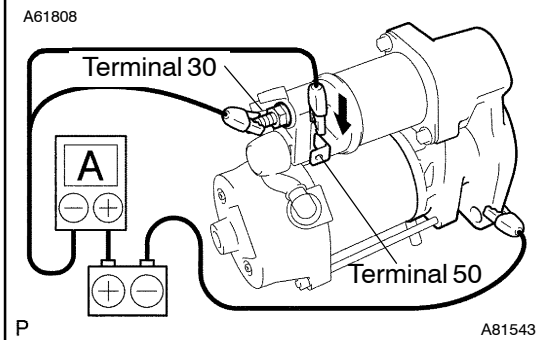
2. PERFORM OPERATION TEST WITHOUT LOAD

- (a) Connect the battery and ammeter to the starter, as shown in the illustration.
- (b) Check that the pinion gear smoothly rotates.
- (c) Measure the current when the pinion gear rotates.

Standard current:

14B, 15B-FTE	90A or less
S05C-B, S05C-TA, S05C-TB, W04D-J	100A or less

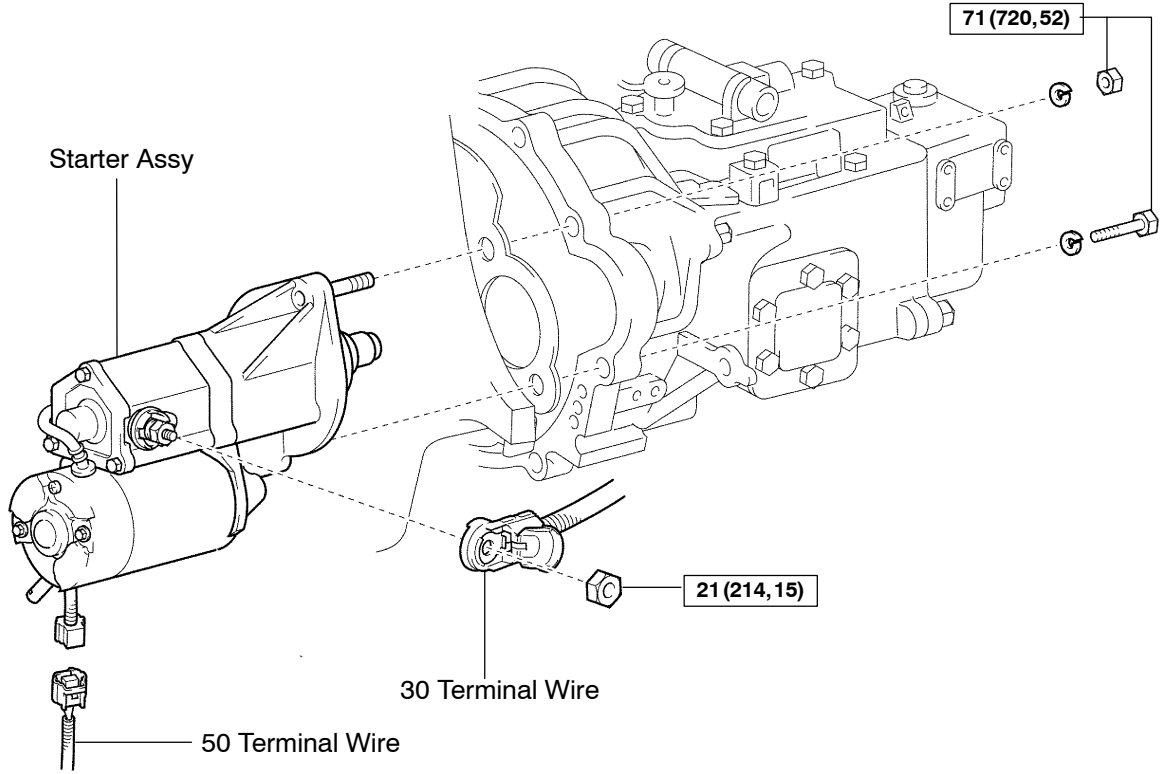
If the current is not as specified, check the starter assembly.



STARTER ASSY COMPONENTS

190MB-02

14B, 15B-FTE

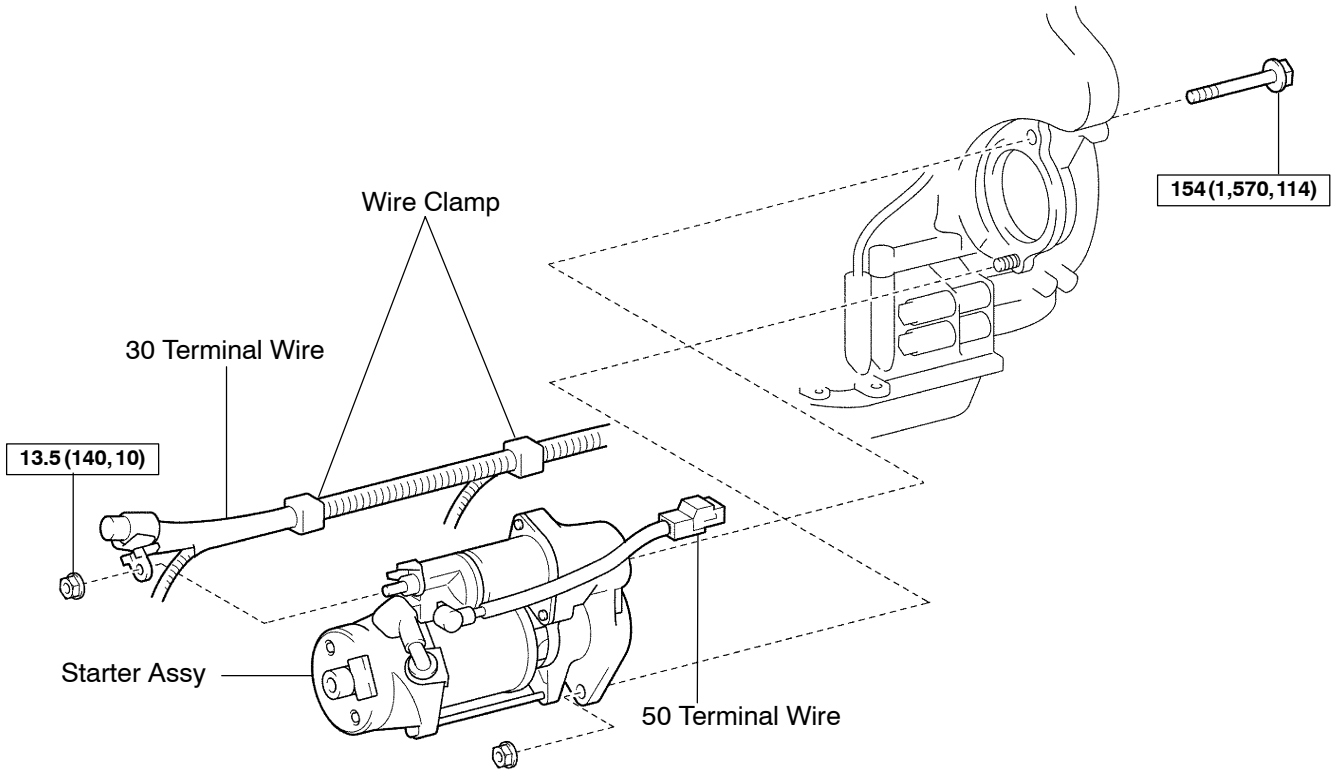


N·m (kgf·cm, ft·lbf) : Specified Torque

P

A71206

S05C-B, S05C-TA, S05C-TB

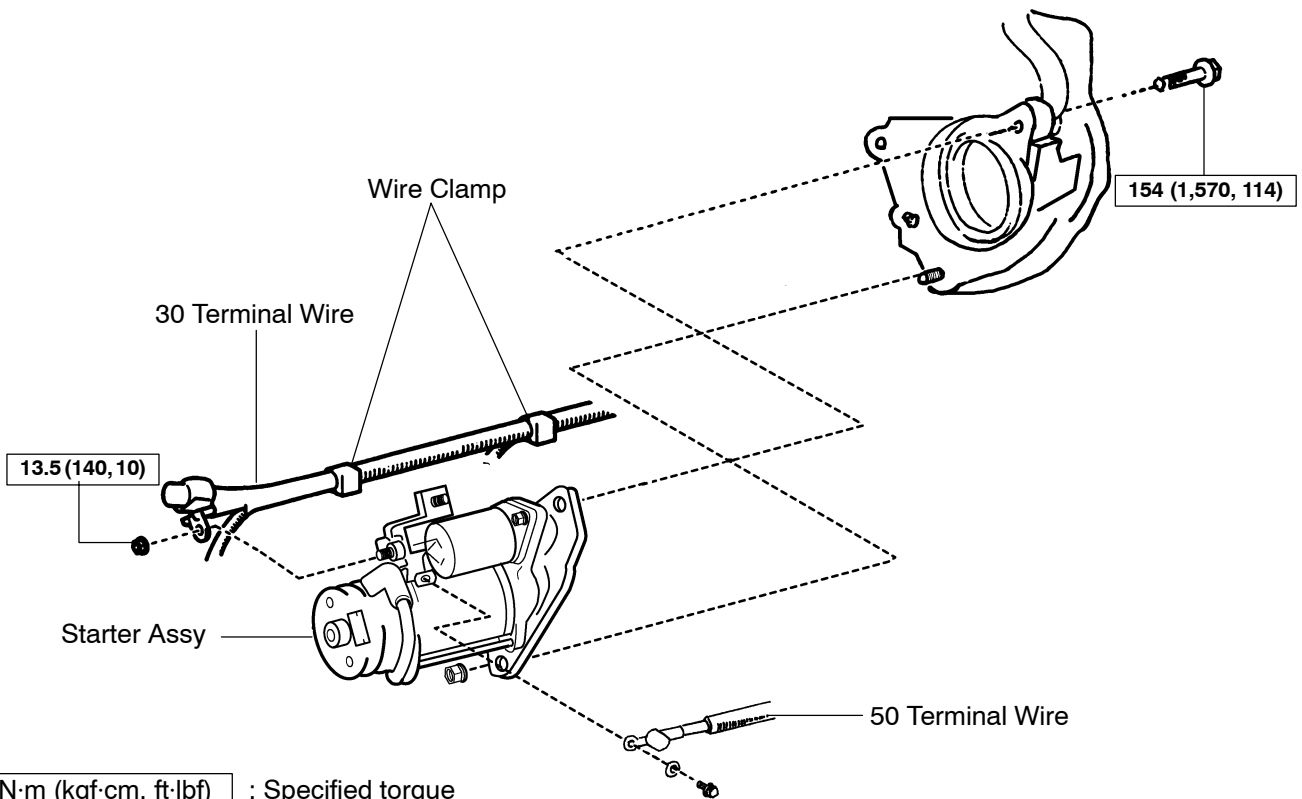


N·m (kgf·cm, ft·lbf) : Specified torque

P

A71208

W04D-J



N·m (kgf·cm, ft·lbf) : Specified torque

A71210

CHARGING SYSTEM

ON-VEHICLE INSPECTION

190MC-01

CAUTION:

- Check that the battery cables are connected to the correct terminals.
- Disconnect the battery cables when quickly charging the battery is charged quickly.
- Do not perform inspections using a tester with high voltage insulation resistance.
- Never disconnect the battery while the engine is running.
- Do not check whether or not the generator generates voltage with terminal F connected to the other terminal.
- Check that the +B terminal wire is tightened onto +B terminal of the generator and the fuse box.

1. CHECK BATTERY ELECTROLYTE LEVEL

- (a) Check the electrolyte quantity of each cell.

Maintenance-free battery:

If it is under the low level, replace the battery.

Except Maintenance-free battery:

If it is under the low level, add distilled water.

2. Except Maintenance-free battery: CHECK BATTERY SPECIFIC GRAVITY

- (a) Check the specific gravity of each cell.

Standard specific gravity: 1.25 – 1.29 at 20°C (68°F)

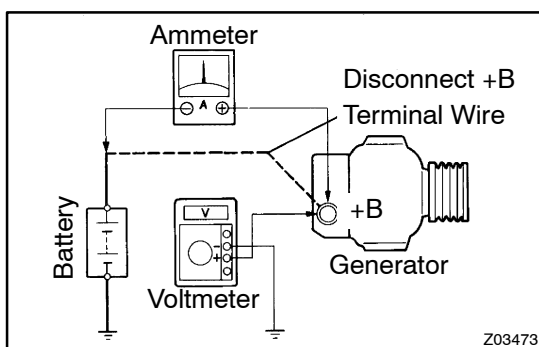
If the specific gravity is less than the specification, charge the battery.

3. CHECK GENERATOR WIRING AND ABNORMAL NOISES

- (a) Check that the wiring is in normal condition.
 (b) Check that there is no abnormal noise in the generator while the engine is running.

4. CHECK CHARGE WARNING LIGHT CIRCUIT

- (a) Check that the charge warning light is ON when the ignition switch is turned ON.
 (b) Check that the light goes off when the engine is started.



5. INSPECT CHARGING CIRCUIT WITHOUT LOAD

- (a) Connect a voltmeter and ammeter to the charging circuit, as shown in the illustration.
 (b) Check the charging circuit.
 (1) Check the amperage and voltage when racing the engine from idling to 2,000 rpm.

Standard:

Amperage	10 A or less
Voltage	26.0 – 29.6 V

If the value is not specified, check the generator.

6. INSPECT CHARGING CIRCUIT WITH LOAD

- (a) With the engine running at 2,000 rpm, turn on the high beam headlights and turn the heater blower switch at HI to the HI position.
 (b) Check the reading on the ammeter.

Standard amperage: 30 A or more

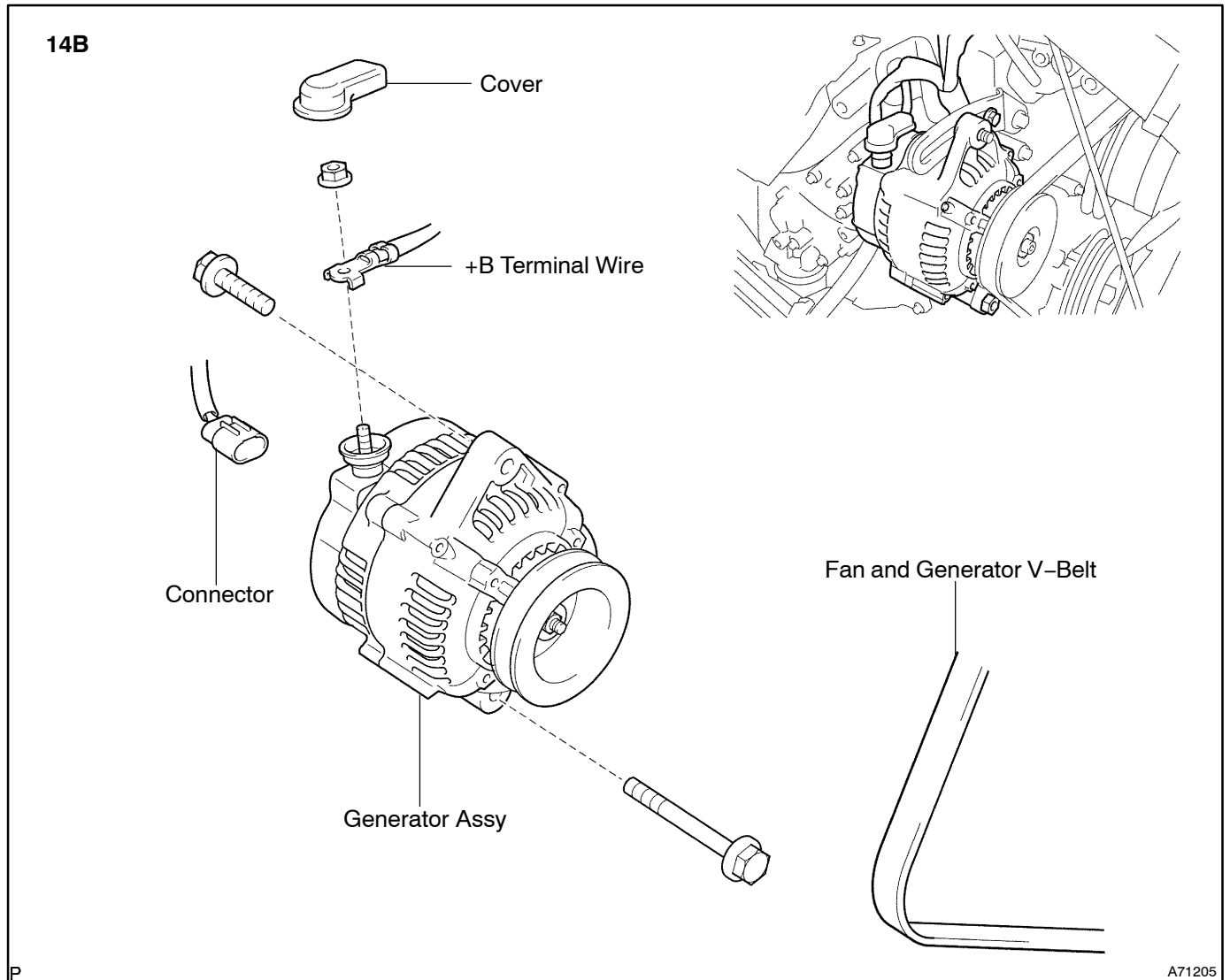
If the ammeter reading is less than the standard amperage, inspect the generator.

HINT:

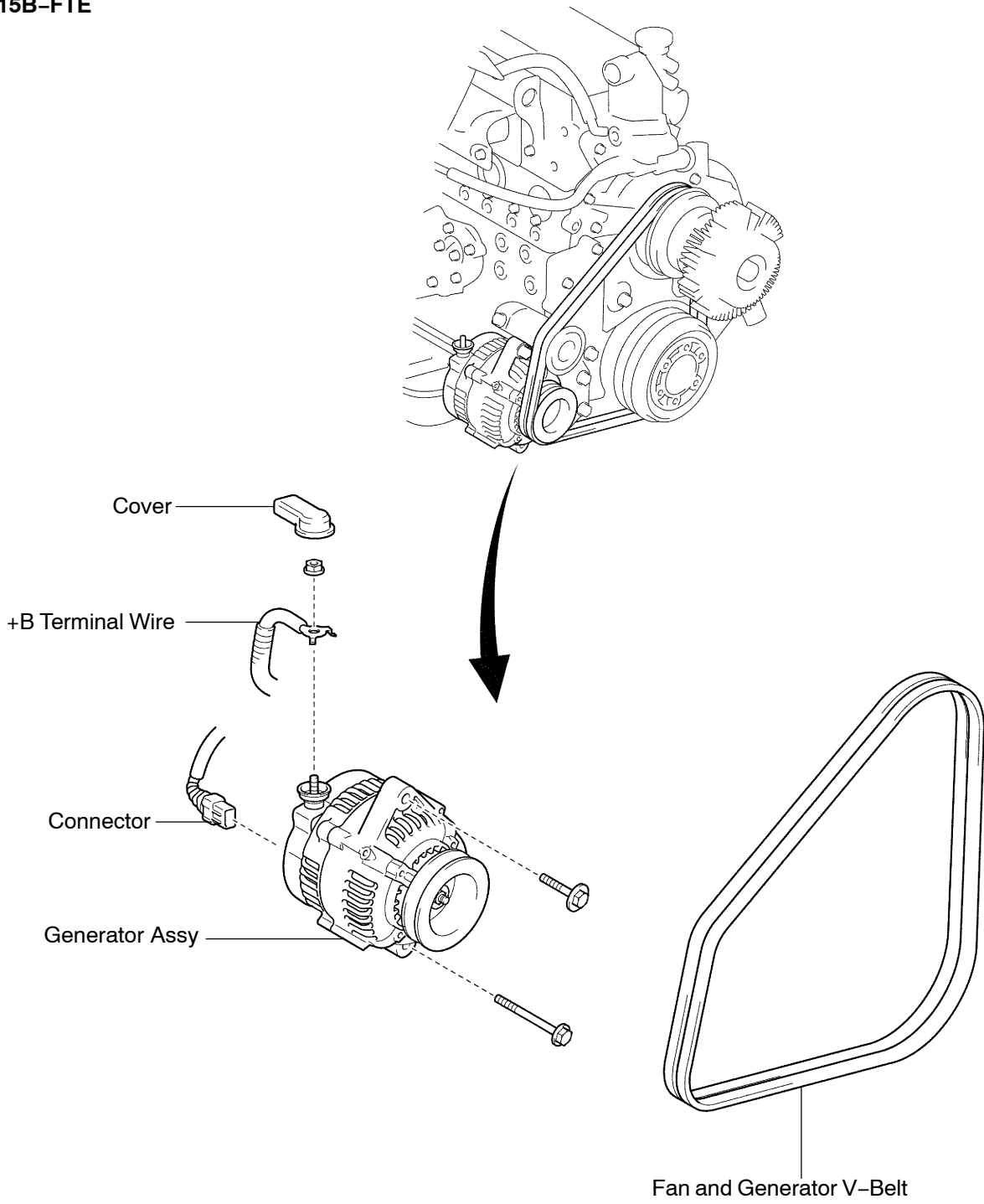
If the battery is fully charged, the indication will sometimes become less than the standard amperage.

GENERATOR ASSY COMPONENTS

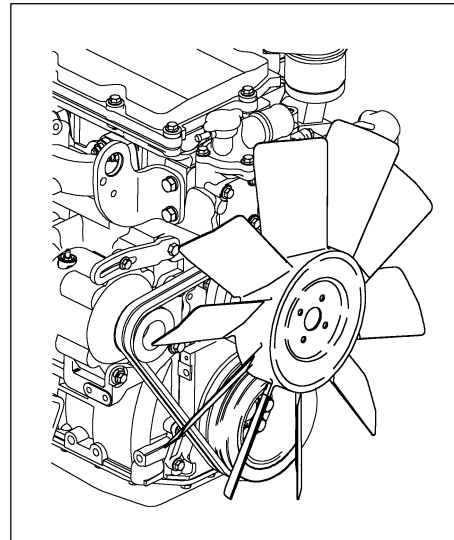
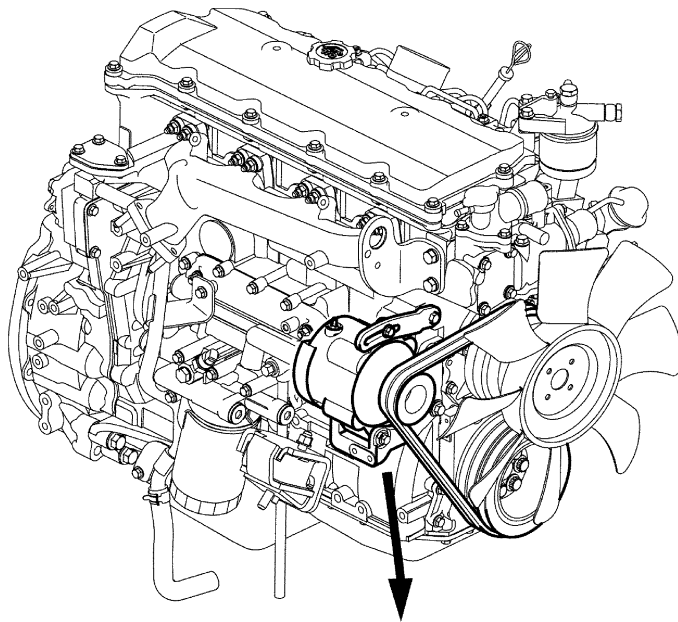
190MD-01



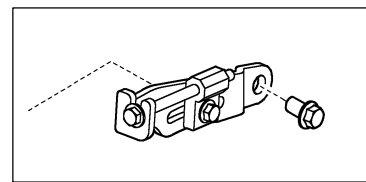
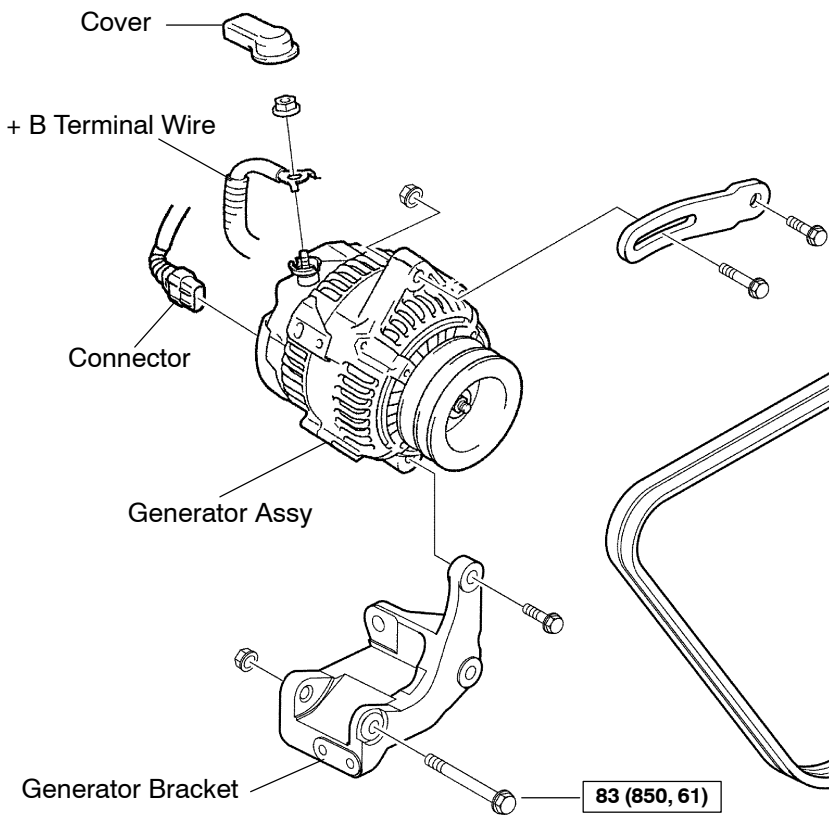
15B-FTE



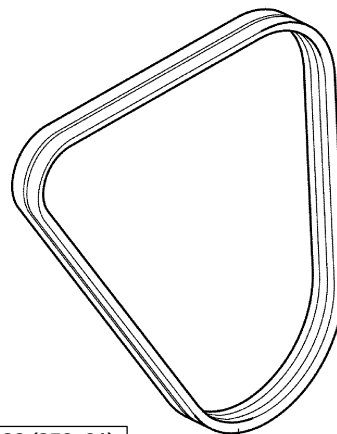
S05C-B



Varlation



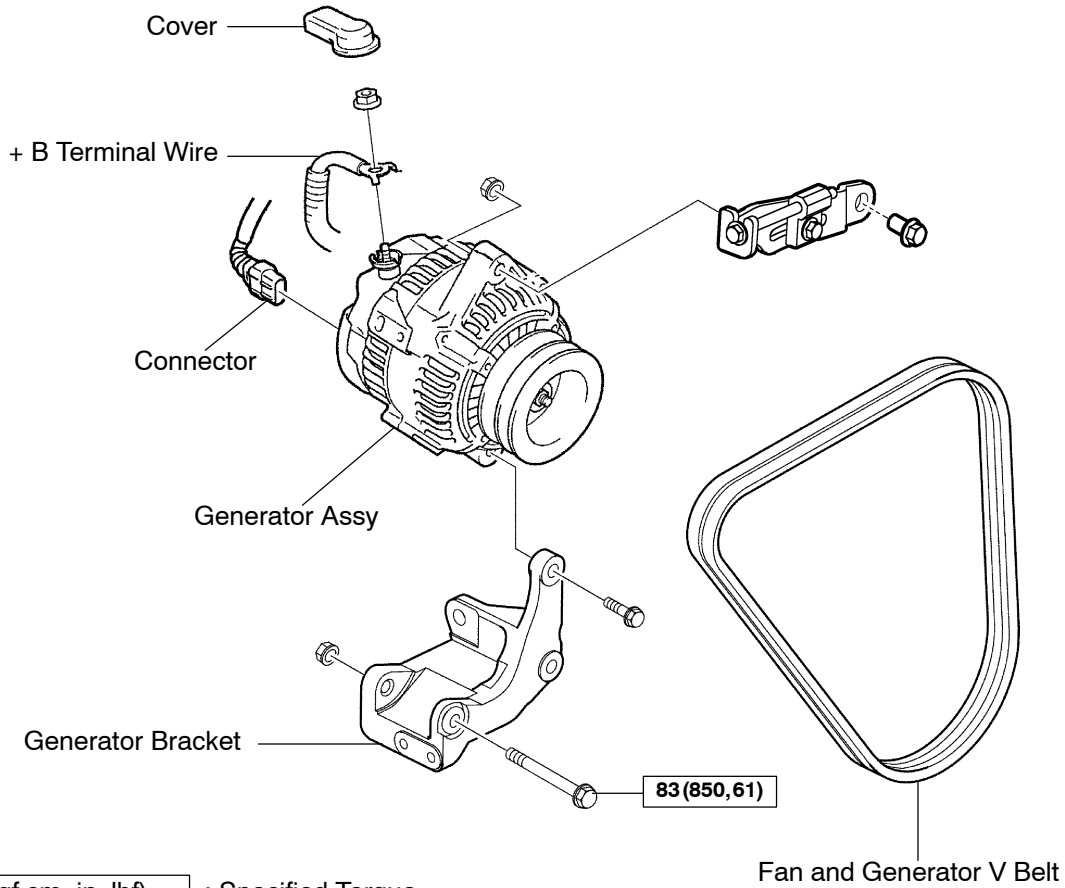
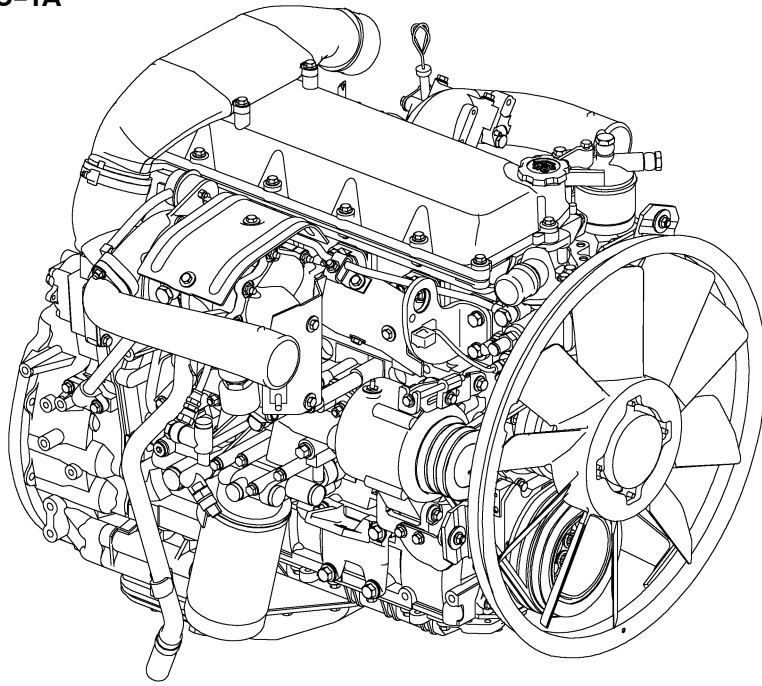
Varlation



Fan and Generator V-Belt

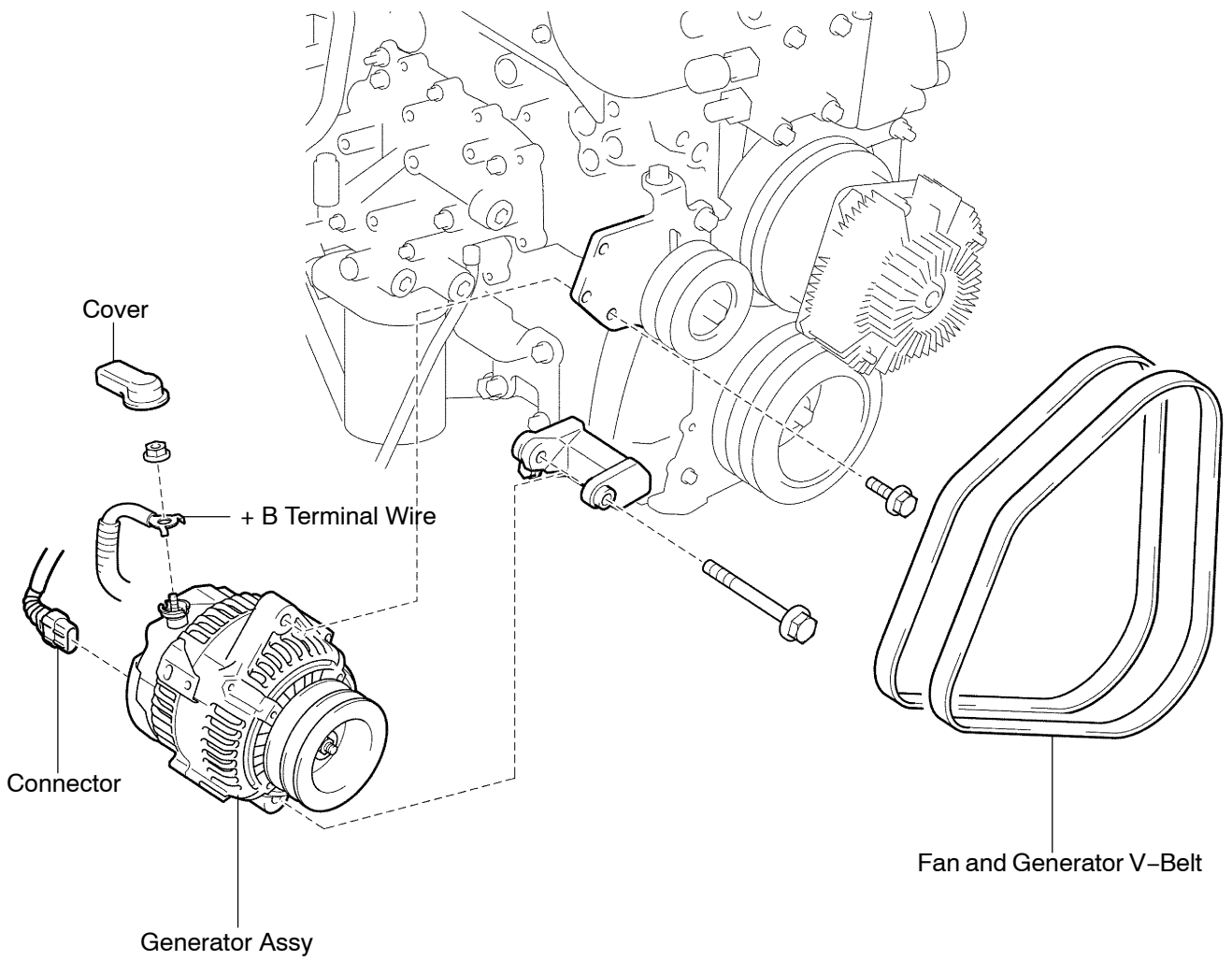
N·m (kgf·cm, in.·lbf) : Specified Torque

S05C-TA

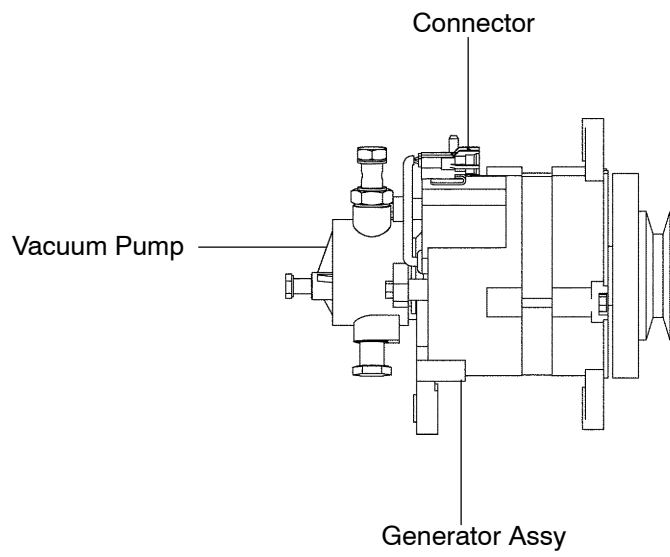
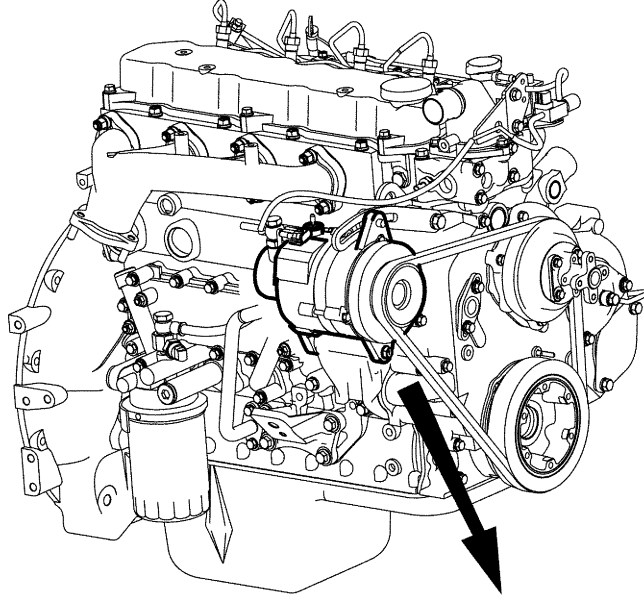


N·m (kgf·cm, in.·lbf) : Specified Torque

S05C-TB



W04D-J



FRONT SUSPENSION

TROUBLESHOOTING	26-1
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FRONT SPRING ASSY LH	
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TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

260D0-01

Use the table below to help you find a cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspected Area	See Page
Wander/pulls	3. Tire (Worn or improperly inflated)	28-1
	4. Wheel alignment (Incorrect)	26-2
	5. Steering linkage (Loose or worn)	51-54
	6. Hub bearing (Worn)	30-33
		30-39
		30-44
	7. Steering gear (Out of adjustment or broken)	51-43
	8. Suspension parts (Worn)	-
Bottoming	1. Vehicle (Overloaded)	-
	2. Spring (Weak)	26-7
		26-17
	3. Shock absorber (Worn)	26-24
Sways/pitches	1. Tire (Worn or improperly inflated)	28-1
	2. Shock absorber (Worn)	26-24
Front wheel shimmy	1. Tire (Worn or improperly inflated)	28-1
	2. Wheel (Out of balance)	28-1
	3. Shock absorber (Worn)	26-24
	4. Wheel alignment (Incorrect)	26-2
	5. Hub bearing (Worn)	30-33
		30-39
		30-44
6. Steering linkage (Loose or worn)	51-54	
	51-43	
Abnormal tire wear	1. Tire (Worn or improperly inflated)	28-1
	2. Wheel alignment (Incorrect)	26-2
	3. Shock absorber (Worn)	26-24
	4. Suspension parts (Worn)	-

FRONT WHEEL ALIGNMENT

260D1-01

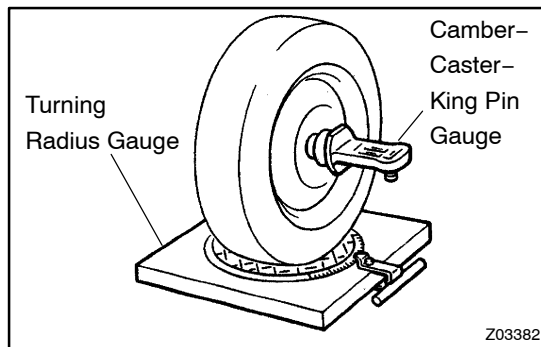
INSPECTION

HINT:

Type A: Regular cab, Wide cab 2.0 t except Oceania

Type B: Wide cab over 2.0 t, Oceania wide cab 2.0 t & Regular cab

1. INSPECT TIRE (See page 28-1)



2. INSPECT CAMBER, CASTER AND STEERING AXIS INCLINATION

- Put the vehicle on a turning radius gauge.
- Using a screwdriver, remove the hub grease cap.
- Remove the cotter pin and adjusting lock cap.
- Install a camber-caster-king pin gauge.

HINT:

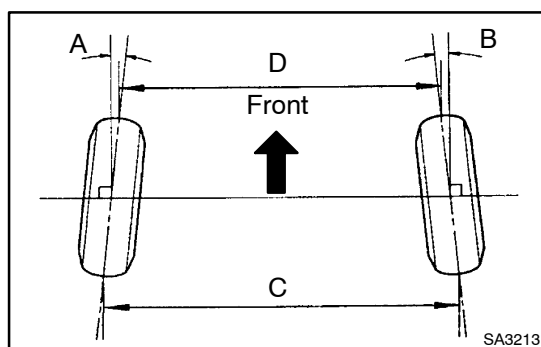
For the details of equipments, follow the manufacture's instructions.

- Measure the camber, caster and steering axis inclination.

Standard:

Model	Type	Camber	Caster	Steering Axis Inclination
Regular cab	A	$0^{\circ} 30' \pm 1^{\circ}$	$2^{\circ} 30' \pm 1^{\circ}$	$7^{\circ} 30' \pm 1^{\circ}$
Wide cab Oceania & Hong Kong 2.0 t	B	$0^{\circ} 30' \pm 1^{\circ}$	$2^{\circ} 30' \pm 1^{\circ}$	$7^{\circ} 30' \pm 1^{\circ}$
Wide cab 2.0 t (Rubber bush type)	A	$0^{\circ} 30' \pm 1^{\circ}$	$2^{\circ} 30' \pm 1^{\circ}$	$7^{\circ} 30' \pm 1^{\circ}$
Wide cab 2.0 t (Metal bush type)	A	$0^{\circ} 30' \pm 1^{\circ}$	$1^{\circ} 30' \pm 1^{\circ}$	$7^{\circ} 30' \pm 1^{\circ}$
Wide cab over 2.0 t	B	$1^{\circ} 00' \pm 1^{\circ}$	$2^{\circ} 00' \pm 1^{\circ}$	$7^{\circ} 00' \pm 1^{\circ}$

If the results are not as specified, check and replace the suspension part.



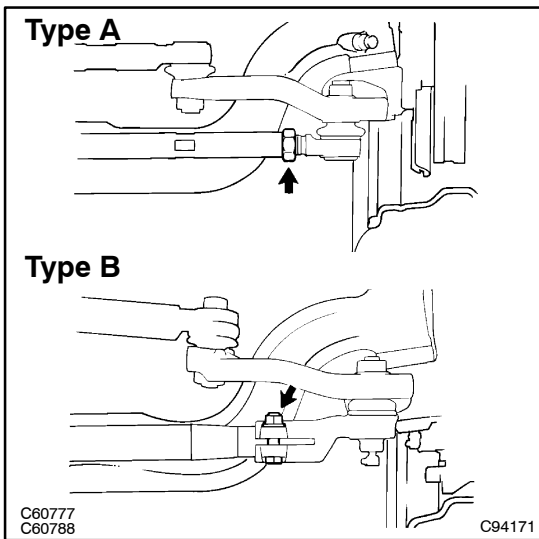
3. INSPECT TOE-IN

- Check that the toe-in is within the specified range.

Standard:

Toe-in (Total)	A + B	$0^{\circ} - 0^{\circ} 09' (0^{\circ} - 0.15^{\circ})$
	C - D	0 - 2 mm (0 - 0.08 in.)

If the toe-in is not as specified, proceed to the next step.



4. ADJUST TOE-IN

- (a) Loosen the tie rod end lock nut.
- (b) Using a pipe wrench, turn the tie rod by an equal amount to adjust the toe-in.

HINT:

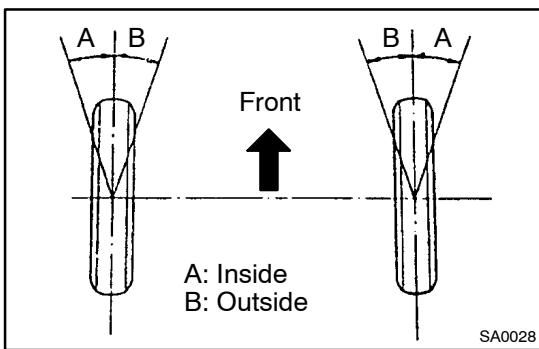
Adjust the toe-in to the intermediate value of the specified range.

- (c) Tighten the tie rod end lock nut.

Torque:

137 N·m (1,400 kgf·cm, 101 ft·lbf) for type A

74 N·m (760 kgf·cm, 55 ft·lbf) for type B



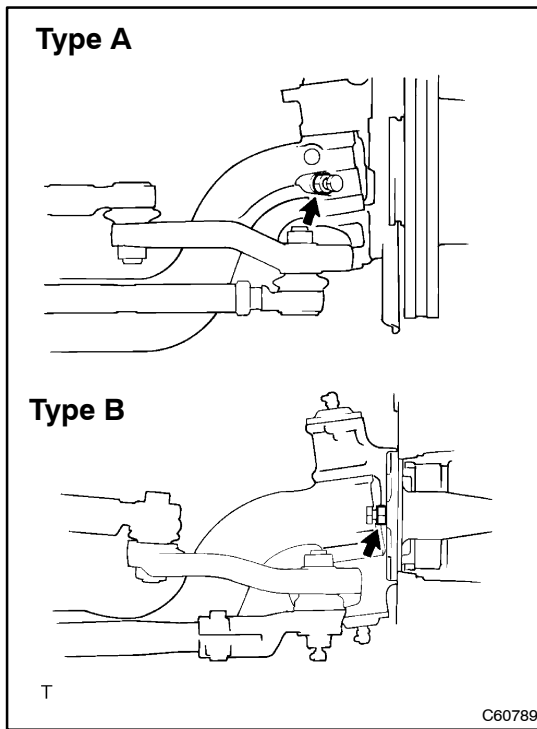
5. INSPECT WHEEL ANGLE

- (a) Fully steer the steering wheel and measure the turning angle.

Wheel angle:

Model	Type	Front Tire Size	Inside	Outside (Reference)
Regular cab	A	7.00-16-10, 12 7.00R-16-10, 12	33 - 36°	28°
Regular cab Oceania	A	195/75R15	42 - 45°	31° 30'
		185/85R16	36 - 39°	29°
Wide cab 2.0 t Oceania	B	195/85R16	46 - 49°	35°
Wide cab 2.0 t Hong Kong	A	205/85R16	48 - 51°	36°
Wide cab 2.0 t	A	7.00-16-10	48 - 51°	36°
Wide cab over 2.0 t	B	7.50-16-10, 12, 14 7.50R-16-10, 12, 14 205/85R16 205/75R17.5 215/85R16 225/80R17.5	47 - 50°	36° 30'

If the right and left inside wheel angles differ from the specified values, check the length of the right and left tie rod ends.



6. ADJUST WHEEL ANGLE

- (a) Fixing the knuckle stopper bolt, loosen the nut.
- (b) Adjust the knuckle stopper bolt length.
- (c) Fixing the knuckle stopper bolt, tighten the nut.

Torque:

43 N·m (440 kgf·cm, 32 ft·lbf) for type A

74 N·m (760 kgf·cm, 55 ft·lbf) for type B

HINT:

When the steering wheel is fully turned, make sure that the wheel is not touching the body or brake flexible hose.

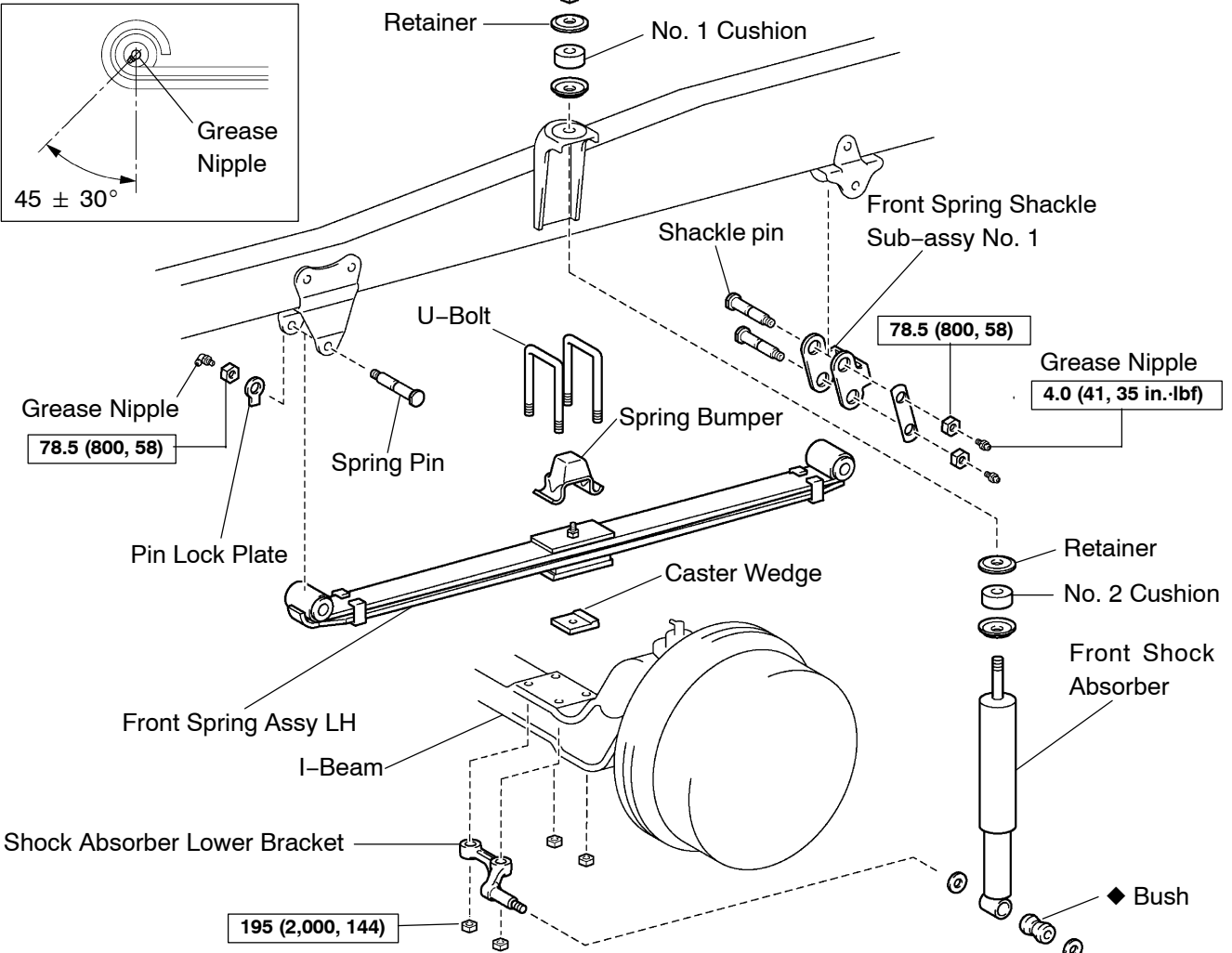
FRONT SPRING ASSY LH (METAL BUSH TYPE)

260D2-01

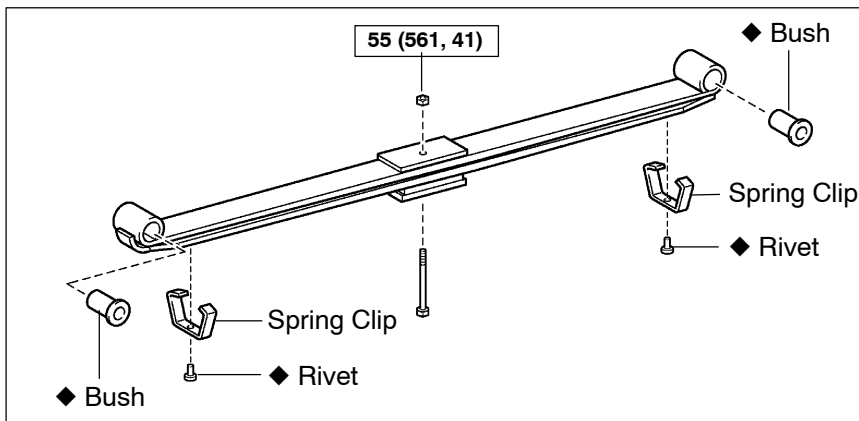
COMPONENTS

w/o Stabilizer

Front Side of Front Spring Assy LH



Front Spring Assy LH

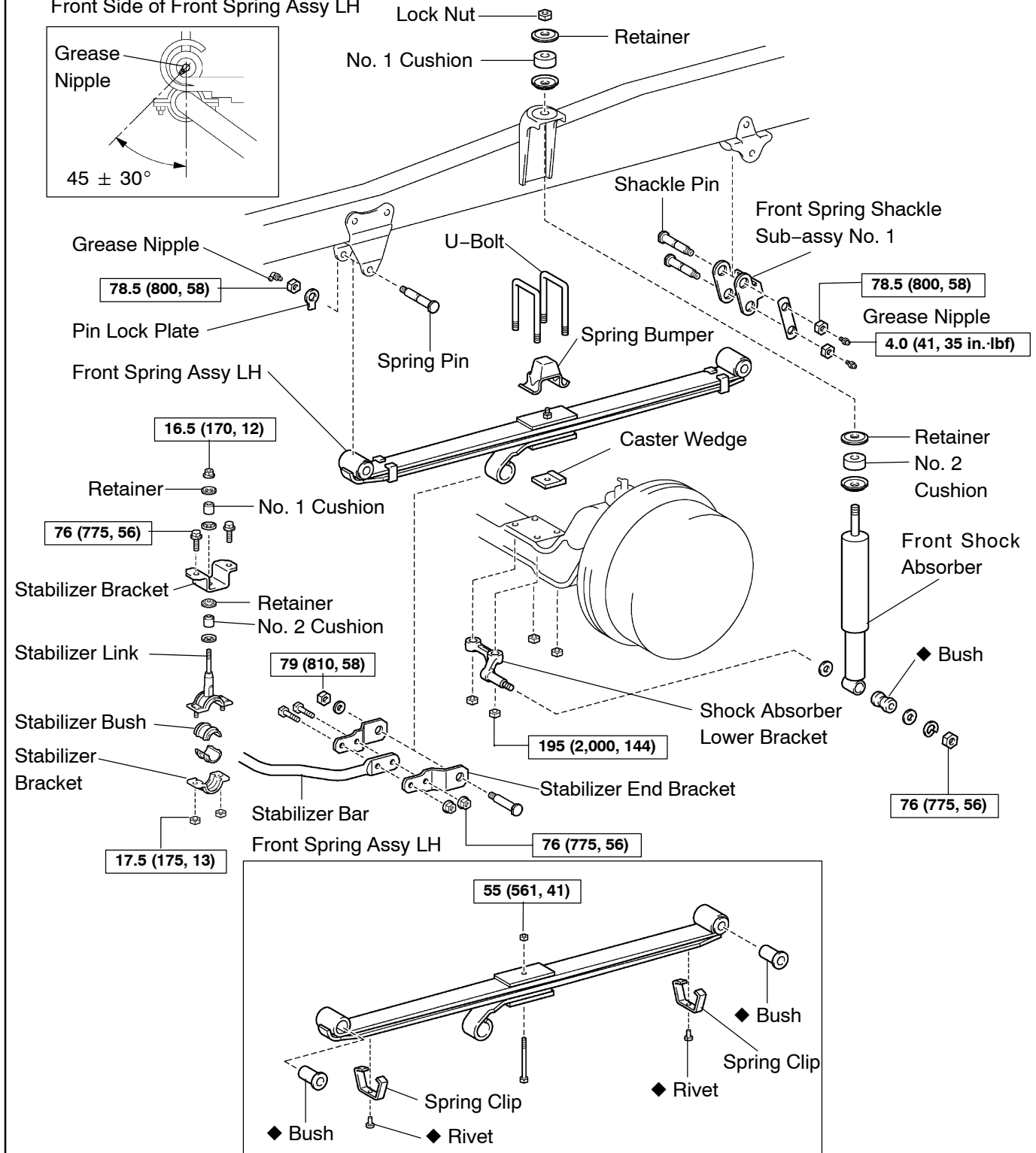
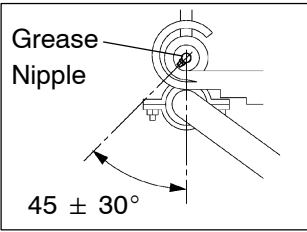


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

w/ Stabilizer

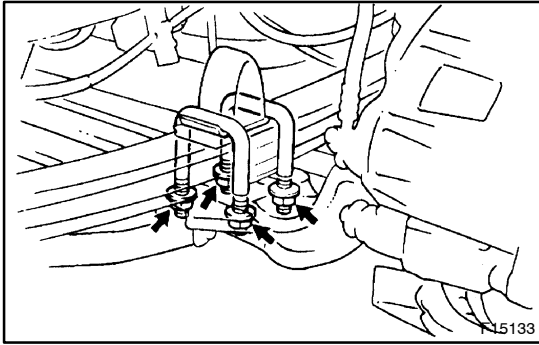
Front Side of Front Spring Assy LH



N·m (kgf-cm, ft·lbf) : Specified torque
◆ Non-reusable part

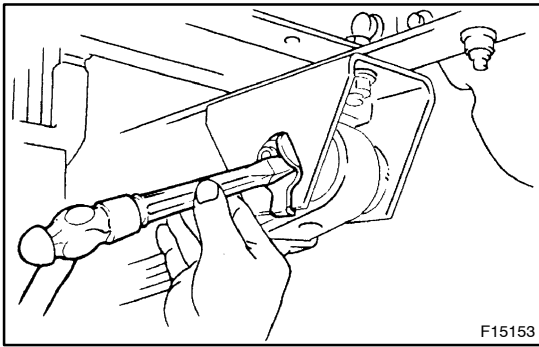
OVERHAUL

1. REMOVE FRONT WHEEL LH
2. REMOVE FRONT SHOCK ABSORBER
3. REMOVE FRONT STABILIZER BAR (W/ STABILIZER)



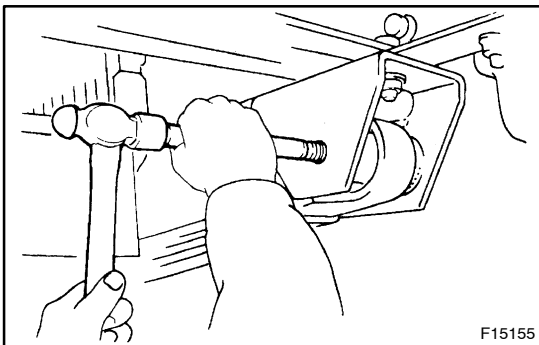
4. REMOVE U-BOLT

- (a) Remove the 4 nuts, shock absorber lower bracket, 2 U-bolts and spring bumper.

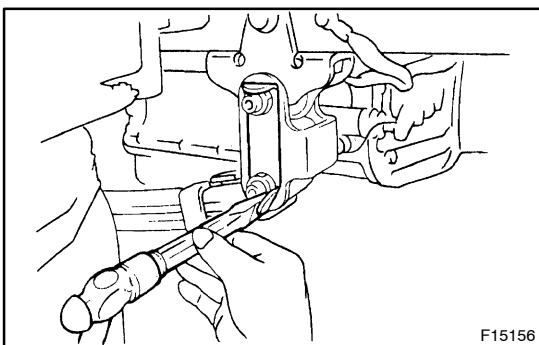


5. REMOVE FRONT SPRING ASSY LH

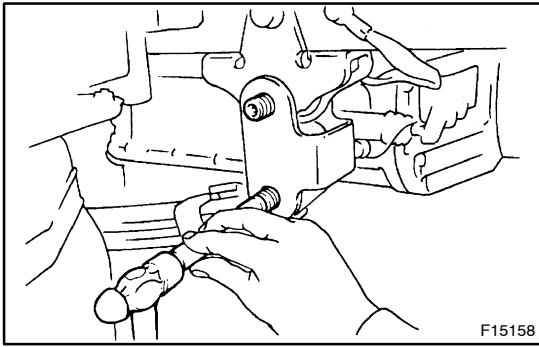
- (a) Remove the grease nipples from the spring pins.
- (b) Using a chisel and hammer, unlock the lock washer.
- (c) Remove the nut and lock washer.



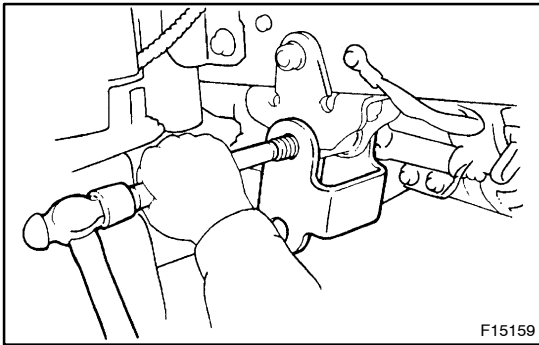
- (d) Using a hammer and brass bar, tap out the spring pin.



- (e) Using a chisel and hammer, unlock the lock plate.
- (f) Remove the nut.

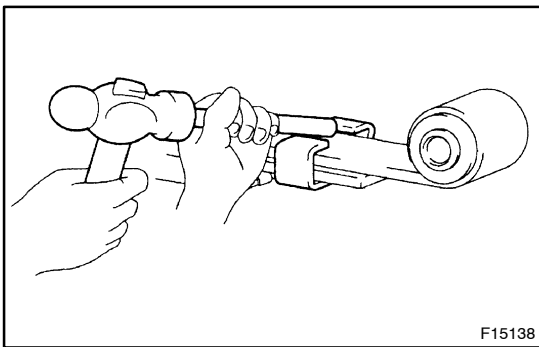


- (g) Using a hammer and brass bar, tap out the spring pin, 2 washers and the spring.



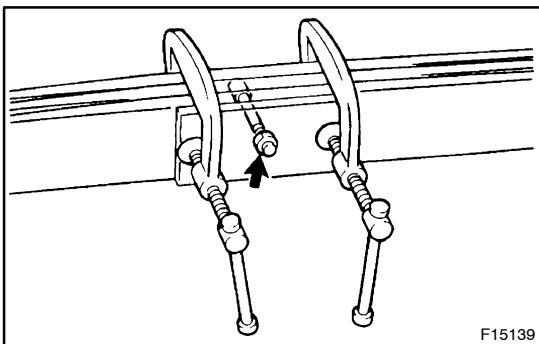
6. REMOVE FRONT SPRING SHACKLE SUB-ASSY NO.1

- (a) Remove the nut and lock plate.
 (b) Using a hammer and brass bar, tap out the spring pin, 2 washers and the spring shackle.

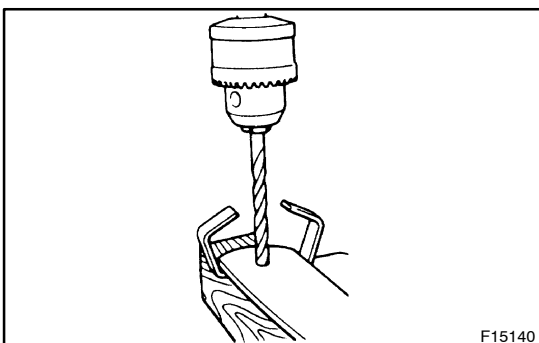


7. DISASSEMBLE FRONT SPRING ASSY LH

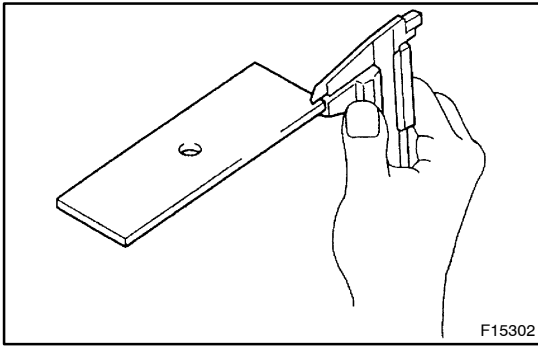
- (a) Using a hammer and brass bar, tap out the 2 spring clips.



- (b) Fix the spring with a vise, as shown in the illustration.
 (c) Remove the nut, center bolt and spacers, inter leaves and springs.



- (d) Using a drill, remove the rivet and spring clip.

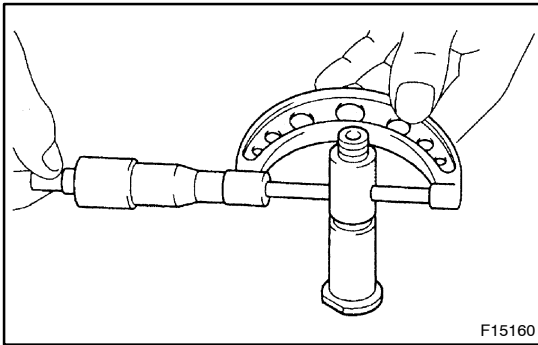
**8. INSPECT FRONT SPRING ASSY LH**

- (a) Using vernier calipers, measure the inter leaf thickness.

Thickness:

Standard	1.0 mm (0.04 in.)
Minimum	0.5 mm (0.02 in.)

If the thickness is less than the minimum, replace the inter leaf.

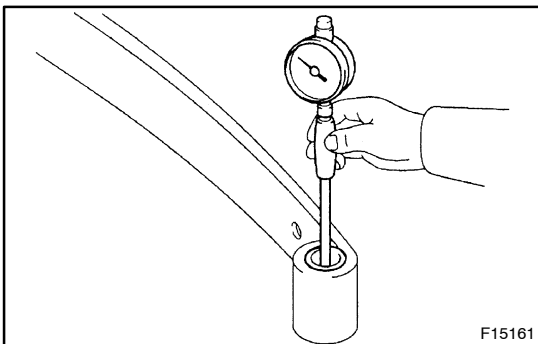


- (b) Using a micrometer, measure the the diameter of the spring pin.

Diameter:

Standard	25.0 mm (0.984 in.)
Minimum	24.7 mm (0.972 in.)

If the diameter is less than the minimum, replace the spring pin.



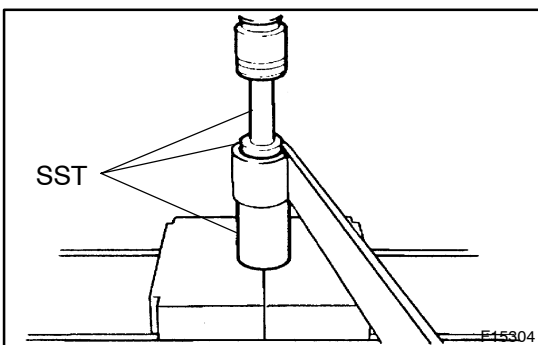
- (c) Check the gap between the spring bush and pin.

- (1) Using a cylinder gauge, measure the inner diameter of the spring bush.
- (2) Subtract the the spring pin diameter from the spring bush diameter to obtain the gap.

Gap:

Standard	0.02 - 0.125 mm (0.001 - 0.005 in.)
Maximum	0.50 mm (0.020 in.)

If the gap is greater than the maximum, replace the spring bush and pin.

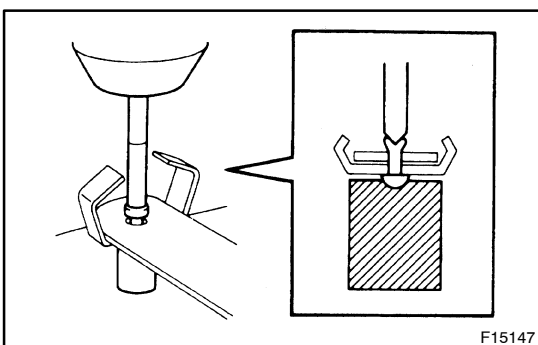
**9. REPLACE BUSH**

- (a) Using SST and a press, press out the bush.

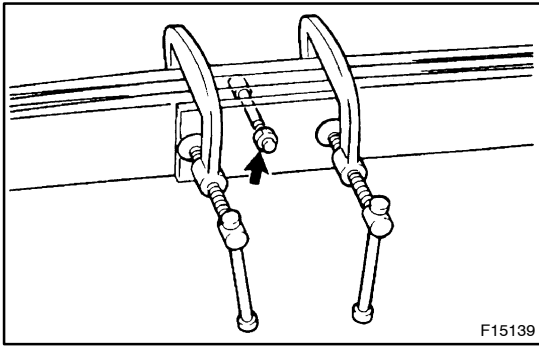
SST 09309-60010, 09950-60010 (09951-00300),
09950-70010 (09951-07100)

- (b) Using SST and a press, press in a new bush.

SST 09950-60010 (09951-00300), 09950-70010
(09951-07100)

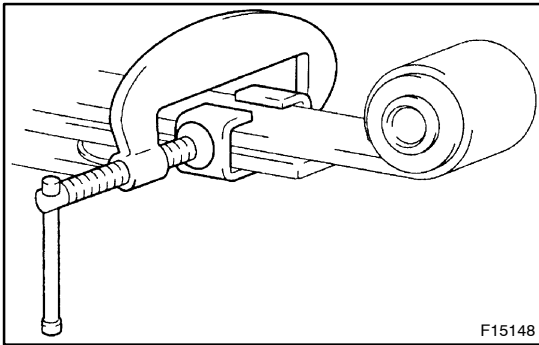
**10. ASSEMBLE FRONT SPRING ASSY LH**

- (a) Install the spring clip with a new rivet.
- (b) Using a chisel and press, caulk the rivet.
- (c) Check that the spring clip is not loose.
- (d) Install the spacers and inter leaves between the springs.

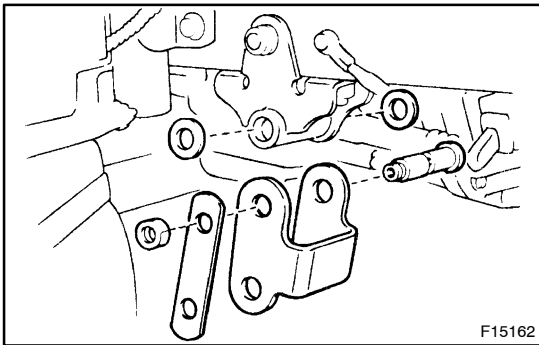


- (e) Fix the springs with a vise and install the center bolt and the nut.

Torque: 55 N·m (561 kgf·cm, 41 ft·lbf)

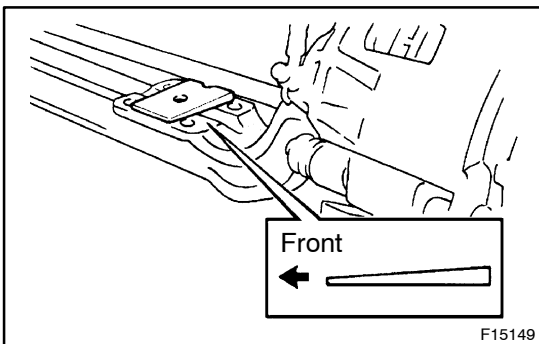


- (f) Using a vise, caulk the 2 spring clips.
 (g) Check that there is no gap between the spring clip and the spring side.



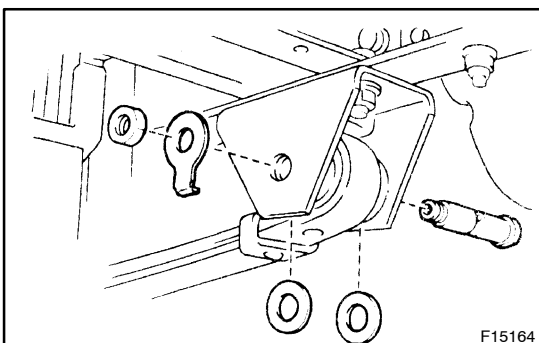
11. INSTALL FRONT SPRING SHACKLE SUB-ASSY NO.1

- (a) Apply grease to the spring pin.
Grease: Special grease for Chassis
 (b) Install the 2 washers, spring shackle, spring pin, lock plate and nut.



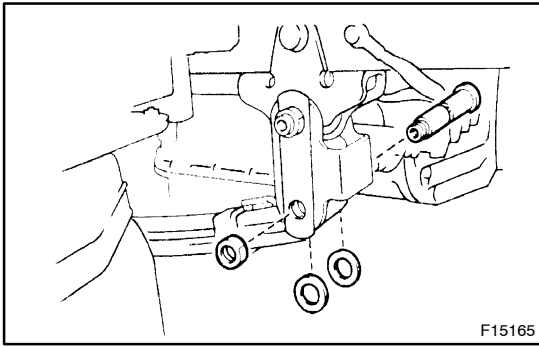
12. INSTALL FRONT SPRING ASSY LH

- (a) Install the caster wedge to the I-beam.
 (b) Place the spring on the caster wedge.
 (c) Apply grease to the spring pins.
Grease: Special grease for Chassis

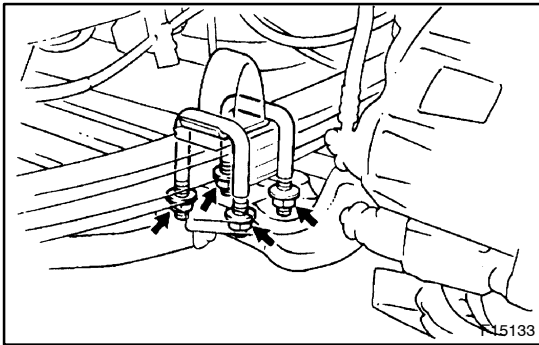


- (d) Install the front side of the spring, 2 washers, spring pin, lock washer and nut.

FRONT SUSPENSION - FRONT SPRING ASSY LH (METAL BUSH TYPE)



- (e) Install the rear side of the spring with the 2 washers, spring pin and nut.
- (f) Install the grease nipples to the spring pins.

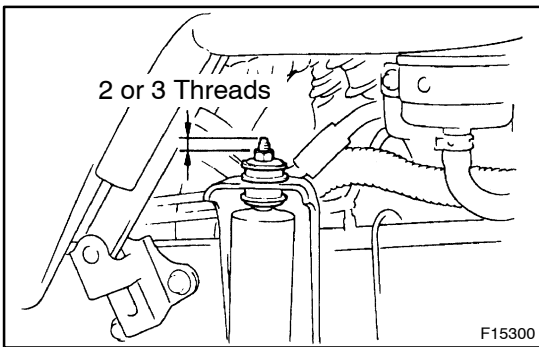


13. INSTALL U-BOLT

- (a) Install the spring bumper, 2 U-bolts and shock absorber lower bracket with the 4 nuts.

Torque: 195 N·m (2,000 kgf·cm, 144 ft·lbf)

14. INSTALL FRONT STABILIZER BAR (W/ STABILIZER)



15. INSTALL FRONT SHOCK ABSORBER

- (a) Install the nut so that the projecting length of the bolt corresponds to the specified value.

Projecting length:

Regular cab models	7 - 9 mm (0.276 - 0.354 in.)
Wide cab models	2 - 3 threads

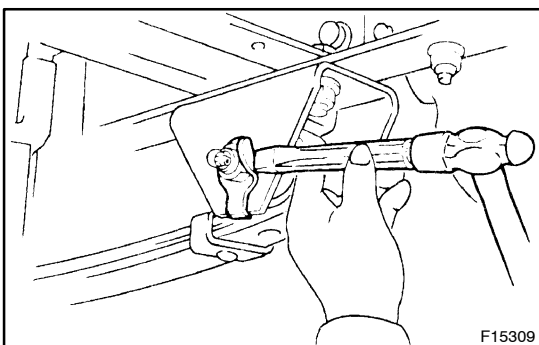
16. INSTALL FRONT WHEEL LH

17. TIGHTEN SUSPENSION PART

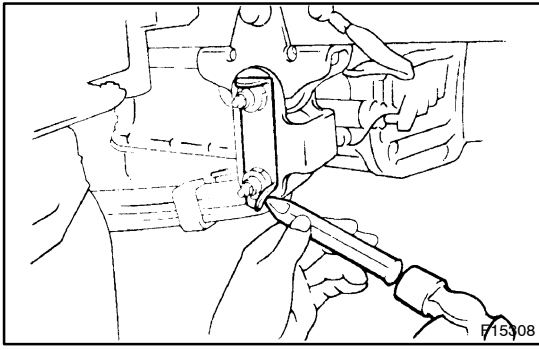
- (a) Rock the vehicle several times up and down to settle the front suspension in unloaded condition.
- (b) Tighten the nuts and bolts of the front suspension parts.

Torque:

Part Tightened	N·m	kgf·cm	ft·lbf
Spring pin x Nut	78.5	800	58
Front shock absorber x Shock absorber lower bracket	76	775	56
Stabilizer link x Stabilizer bracket (w/ stabilizer)	17.5	180	13



- (c) Using a chisel and hammer, caulk the lock washer.



- (d) Using a chisel and hammer, caulk the lock plate.

18. APPLY GREASE

- (a) Using a grease gun, apply grease to the spring pins.

Grease: Special grease for Chassis

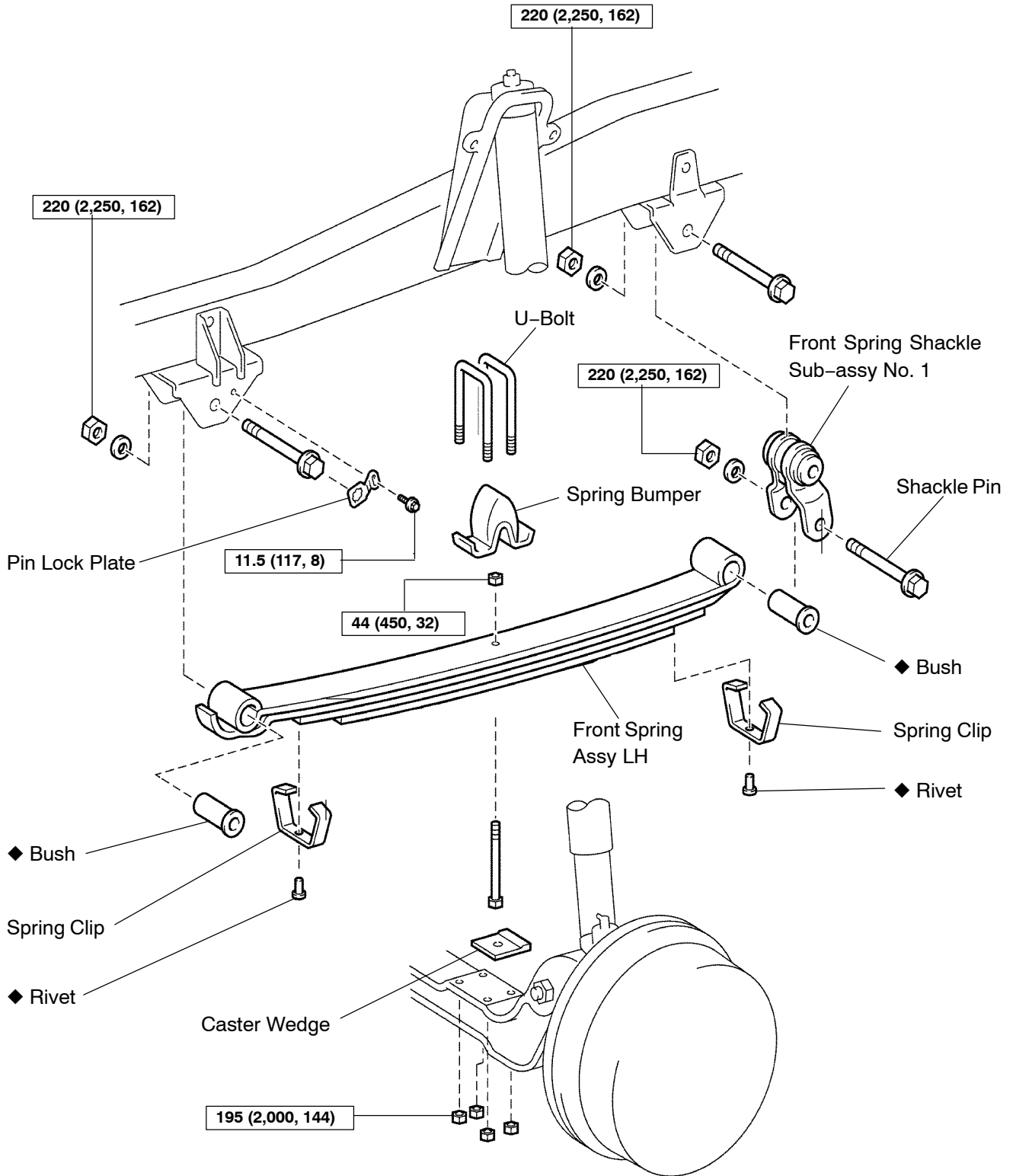
19. ADJUST FRONT WHEEL ALIGNMENT (See page 26-2)

FRONT SPRING ASSY LH (RUBBER BUSH TYPE)

260D4-01

COMPONENTS

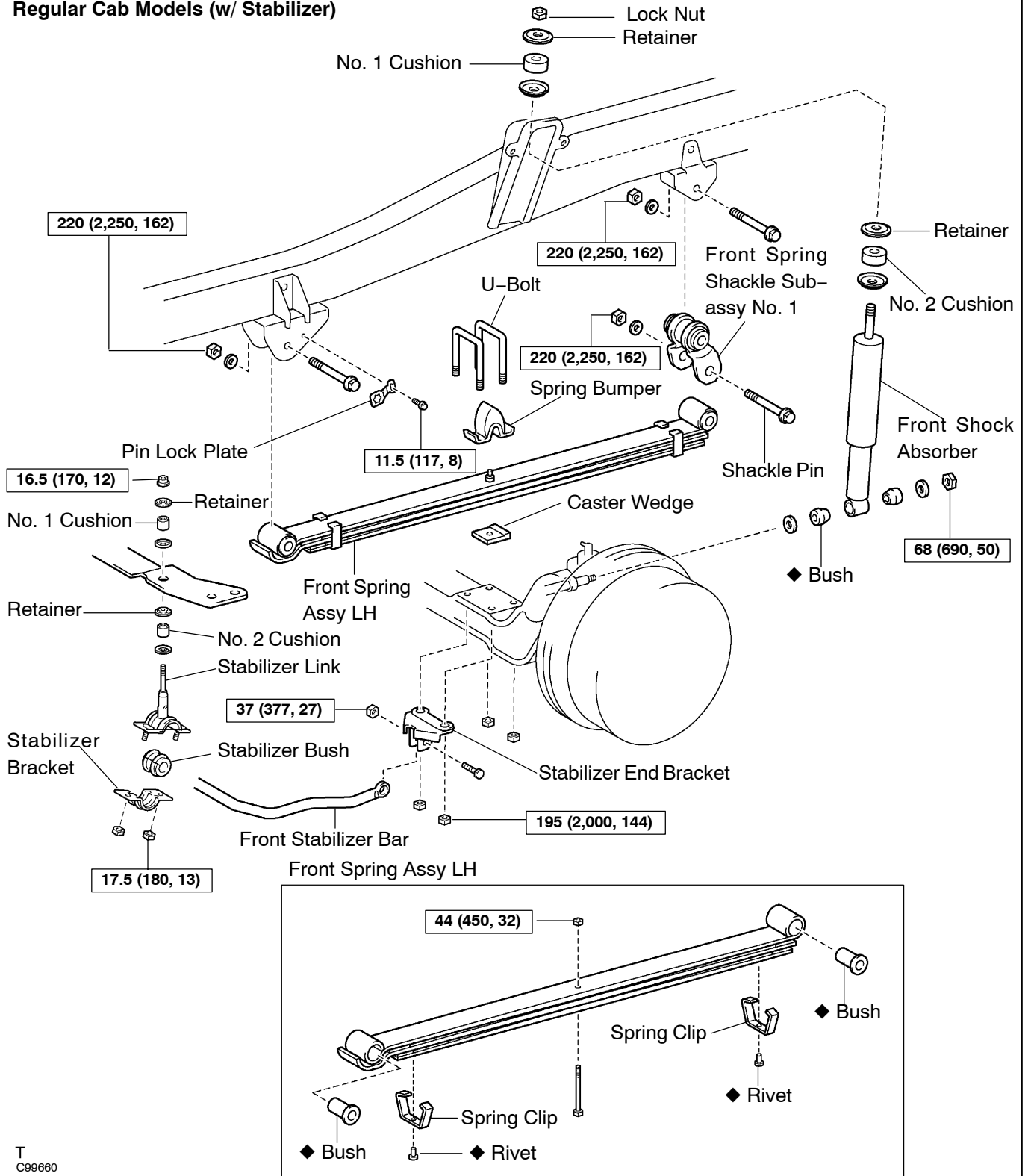
Regular Cab Models (w/o Stabilizer)



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

Regular Cab Models (w/ Stabilizer)



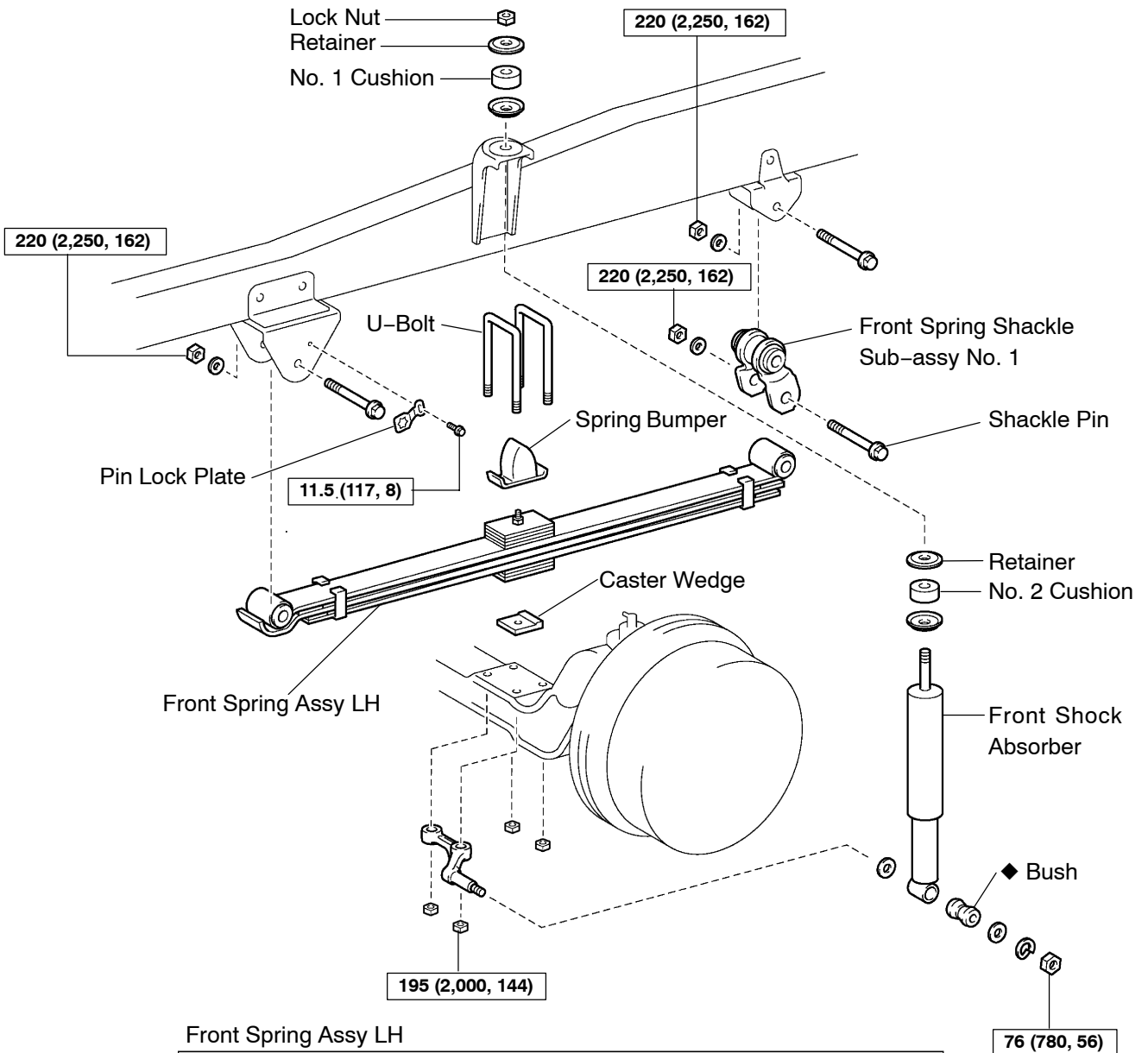
T
C99660

N·m (kgf·cm, ft·lbf) : Specified torque

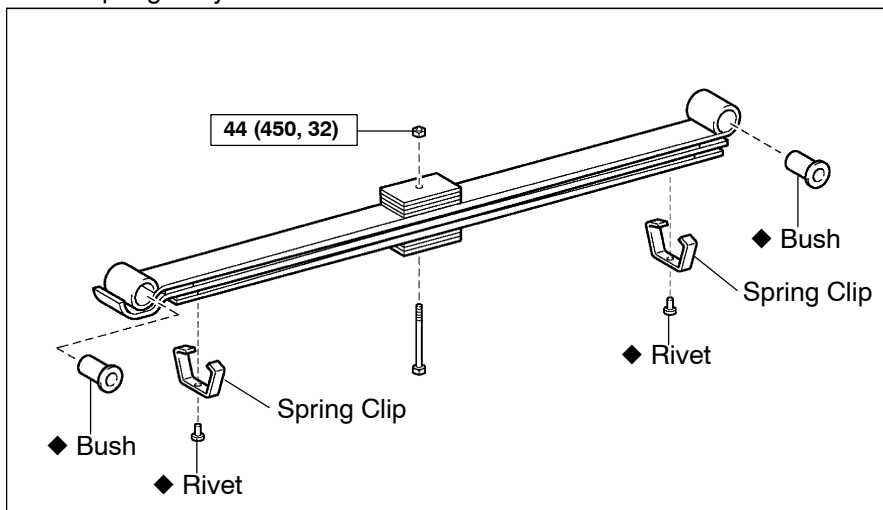
◆ Non-reusable part

FRONT SUSPENSION - FRONT SPRING ASSY LH (RUBBER BUSH TYPE)

Wide Cab 2.0 t Models (w/o Stabilizer)



Front Spring Assy LH

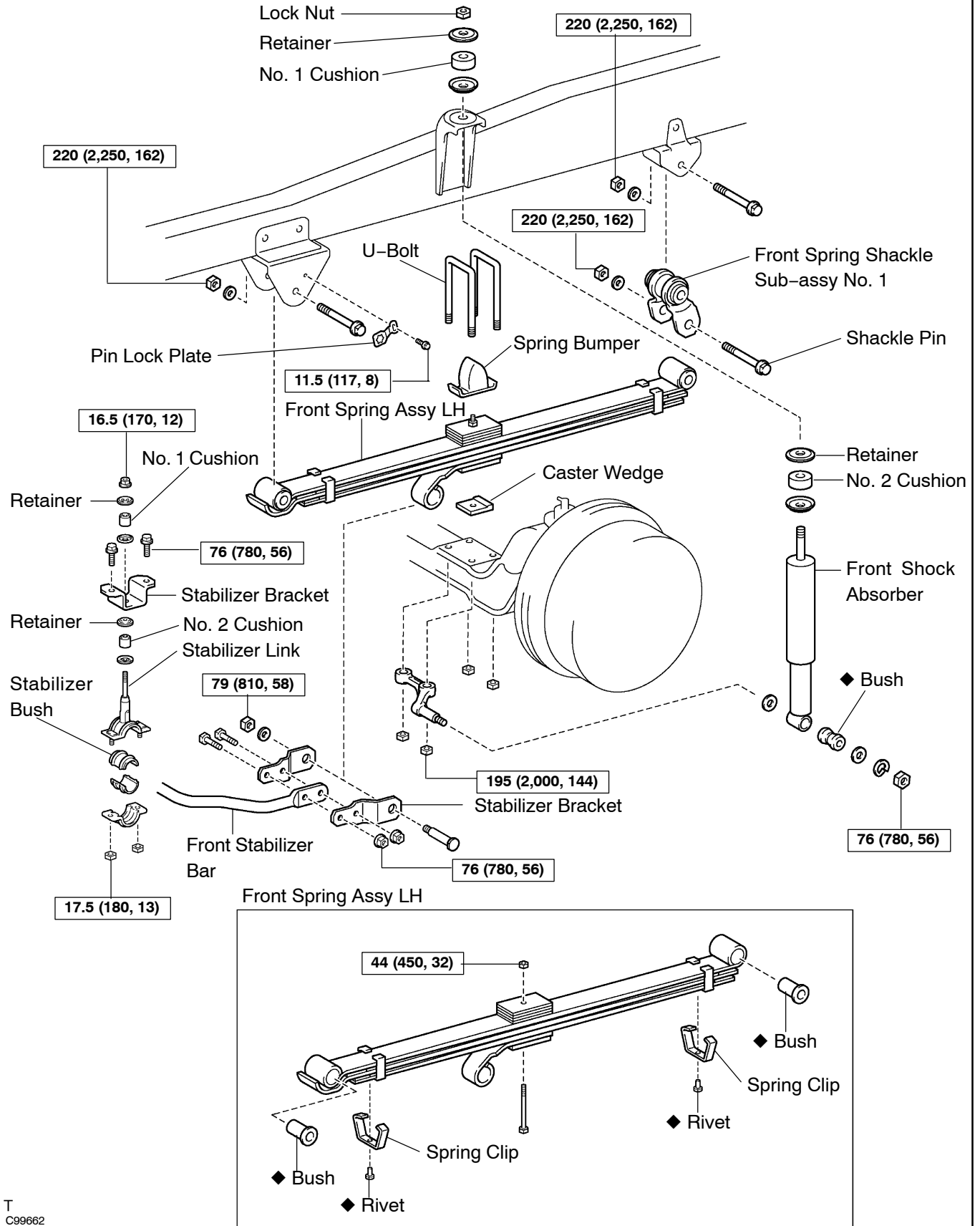


T
C99661

N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

Wide Cab 2.0 t Models (w/ Stabilizer)



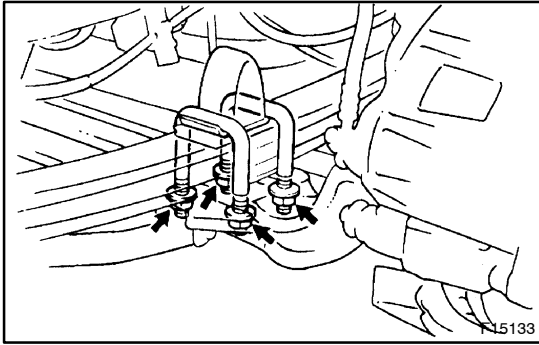
T
C99662

N·m (kgf·cm, ft·lbf) : Specified torque

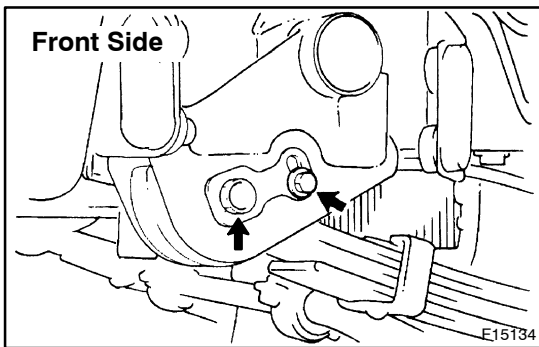
◆ Non-reusable part

OVERHAUL

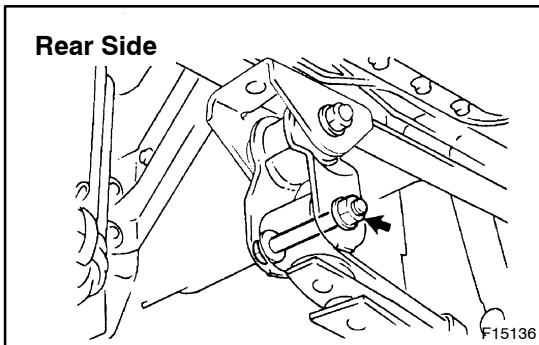
1. REMOVE FRONT WHEEL LH
2. REMOVE FRONT SHOCK ABSORBER
3. REMOVE FRONT STABILIZER BAR (W/ STABILIZER)



4. REMOVE U-BOLT
 - (a) Regular cab (w/o Stabilizer):
Remove the 4 nuts, 2 U-bolts and spring bumper.
 - (b) Regular cab (w/o Stabilizer):
Remove the 4 nuts, stabilizer end bracket, 2 U-bolts and spring bumper.
 - (c) Wide cab:
Remove the 4 nuts, shock absorber lower bracket, 2 U-bolts and spring bumper.

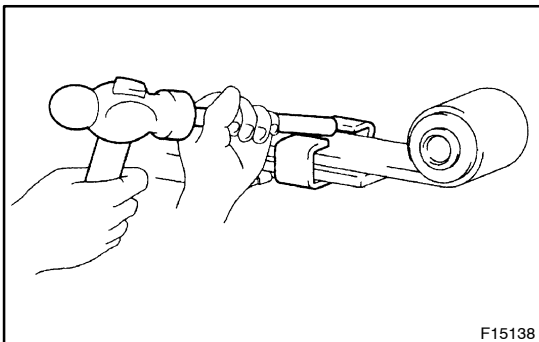


5. REMOVE FRONT SPRING ASSY LH
 - (a) Remove the bolt and lock plate.
 - (b) Remove the nut, washer and through bolt on the front end.

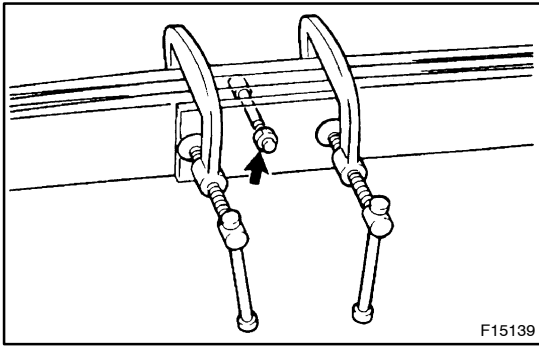


- (c) Remove the nut, washer, through bolt and spring on the rear end.

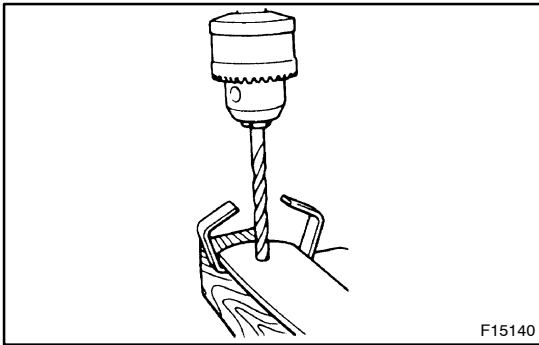
6. REMOVE FRONT SPRING SHACKLE SUB-ASSY NO.1
 - (a) Remove the nut, washer, through bolt and spring shackle.



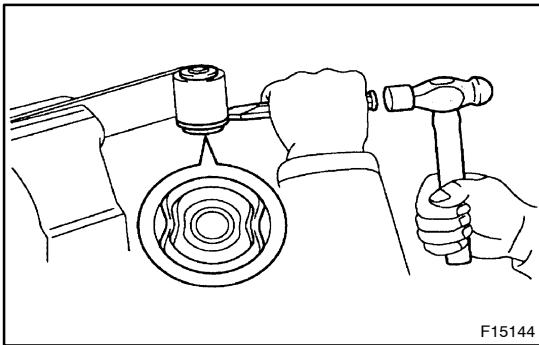
7. DISASSEMBLE FRONT SPRING ASSY LH
 - (a) Using a hammer and brass bar, tap out the 2 spring clips.



- (b) Fix the spring with a vise, as shown in the illustration.
 (c) Remove the nut, center bolt and spacers, inter leafs and springs.

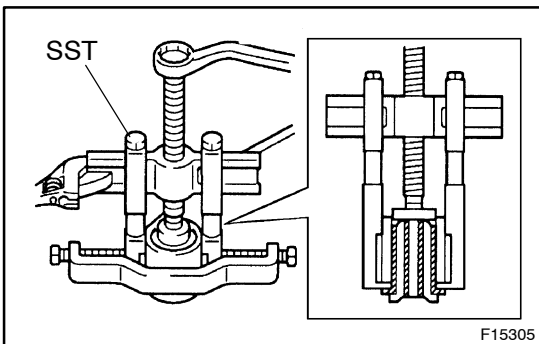


- (d) Using a drill, remove the rivet and spring clip.

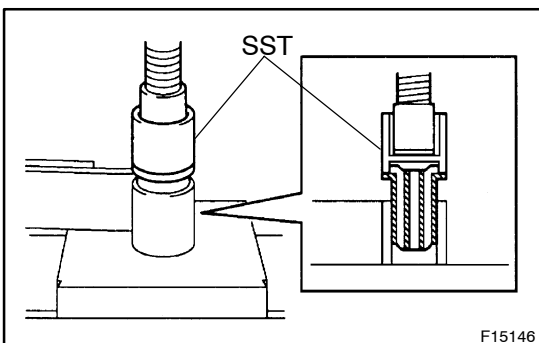


8. REPLACE BUSH

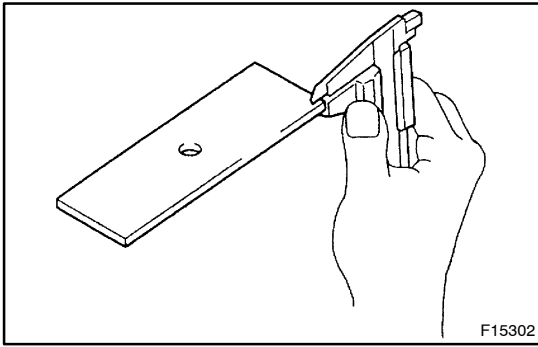
- (a) Fix the spring with a vise.
 (b) Using a chisel and hammer, bend the bush rib in 2 places.



- (c) Using SST, remove the bush.
 SST 09950-40011 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04051, 09957-04010, 09958-04011), 09950-60010 (09951-00300)



- (d) Using SST and a press, press in a new bush.
 SST 09726-27012 (09726-02041)



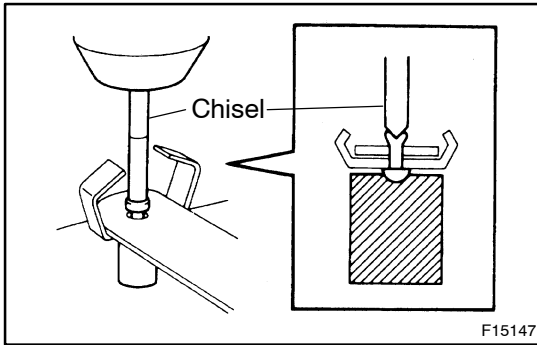
9. INSPECT FRONT SPRING ASSY LH

- (a) Using vernier calipers, measure the inter leaf thickness.

Thickness:

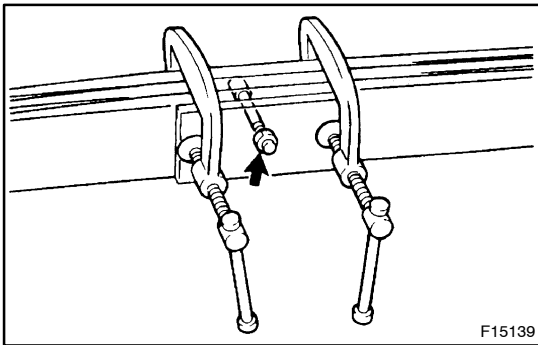
Standard	1.0 mm (0.04 in.)
Minimum	0.5 mm (0.02 in.)

If the thickness is less than the minimum, replace the inter leaf.



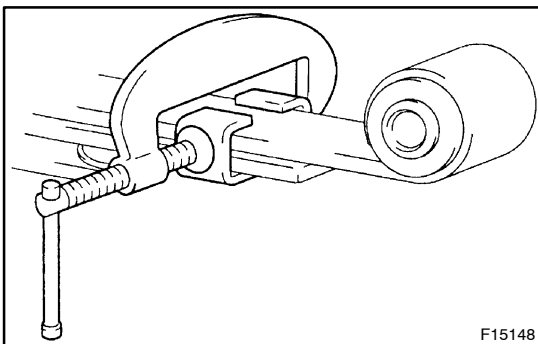
10. ASSEMBLE FRONT SPRING ASSY LH

- (a) Install the spring clip with a new rivet.
 (b) Using a chisel and press, caulk the rivet.
 (c) Check that the spring clip is not loose.
 (d) Install the spacers and inter leaves between the springs.



- (e) Fix the springs with a vise and install the center bolt and nut.

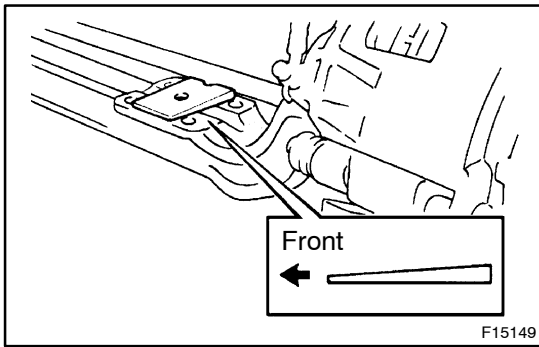
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)



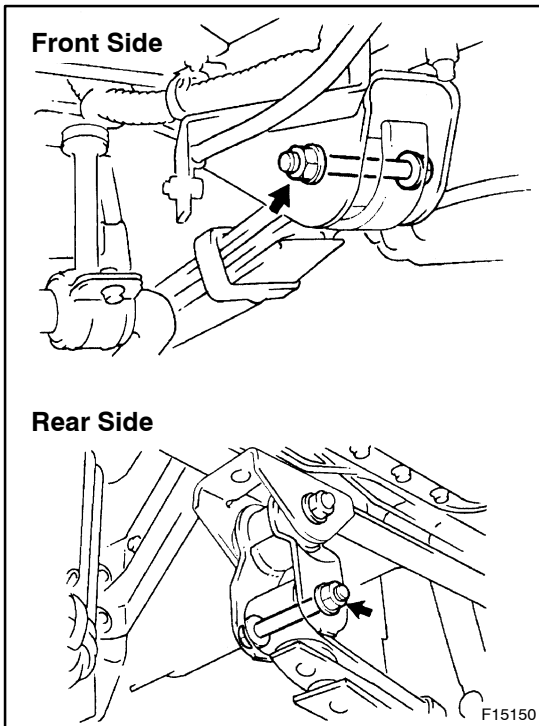
- (f) Using a vise, caulk the 2 spring clips.
 (g) Check that there is no gap between the spring clip and spring side.

11. INSTALL FRONT SPRING SHACKLE SUB-ASSY NO.1

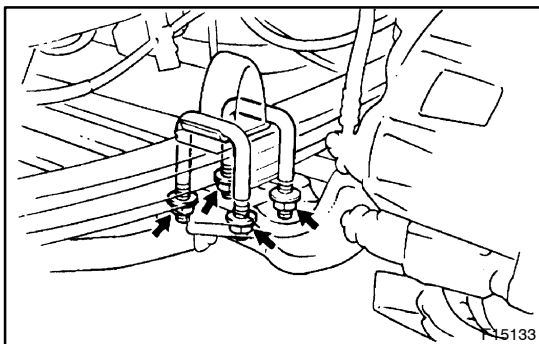
- (a) Install the spring shackle with the through bolt, washer and nut.

**12. INSTALL FRONT SPRING ASSY LH**

- (a) Install the castor wedge to the I-beam.
- (b) Place the spring on the castor wedge.

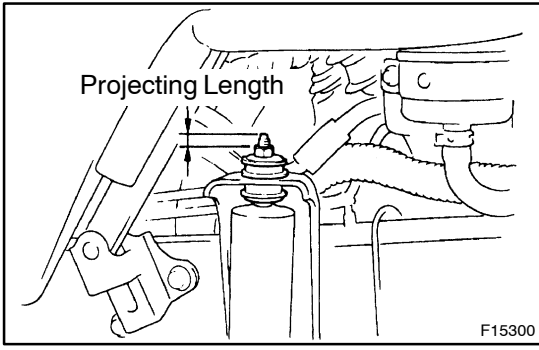


- (c) Install the spring with the 2 through bolts, 2 washers and 2 nuts.

**13. INSTALL U-BOLT**

- (a) w/o Stabilizer:
Install the spring bumper and 2 U-bolts with the 4 nuts.
Torque: 195 N·m (2,000 kgf·cm, 144 ft·lbf)
- (b) w/o Stabilizer:
Install the spring bumper, 2 U-bolts and stabilizer end bracket with the 4 nuts.
Torque: 195 N·m (2,000 kgf·cm, 144 ft·lbf)
- (c) Wide cab:
Install the spring bumper, 2 U-bolts and shock absorber lower bracket with the 4 nuts.
Torque: 195 N·m (2,000 kgf·cm, 144 ft·lbf)

14. INSTALL FRONT STABILIZER BAR (W/ STABILIZER)



15. INSTALL FRONT SHOCK ABSORBER

- (a) Install the nut so that the projecting length of the bolt corresponds to the specified value.

Projecting length:

Regular cab models	7 - 9 mm (0.276 - 0.354 in.)
Wide cab models	2 - 3 threads

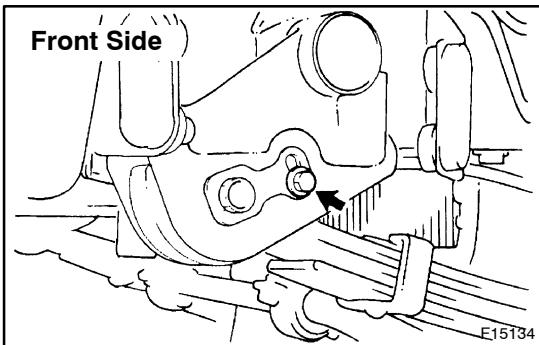
16. INSTALL FRONT WHEEL LH

17. TIGHTEN SUSPENSION PART

- (a) Rock the vehicle several times up and down to settle the front suspension in unloaded condition.
- (b) Tighten the nuts and bolts of the front suspension parts.

Torque:

Part Tightened	N-m	kgf-cm	ft-lbf
Front spring shackle x Frame	220	2,250	162
Front spring assy LH x Front spring shackle	220	2,250	162
Front spring assy LH x Frame	220	2,250	162
Front shock absorber x Shock absorbar pin (Regular cab models)	68	690	50
Front shock absorber x Shock absorbar lower bracket (Wide cab models)	76	780	56
Stabilizer link x Stabilizer bracket (w/ stabilizer)	17.5	180	13



- (c) Install the lock plate with the bolt.

Torque: 11.5 N-m (117 kgf-cm, 8 ft-lbf)

18. ADJUST FRONT WHEEL ALIGNMENT (See page 26-2)

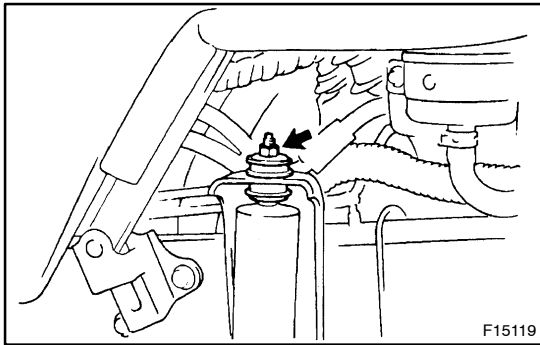
FRONT SHOCK ABSORBER REPLACEMENT

260D6-01

HINT:

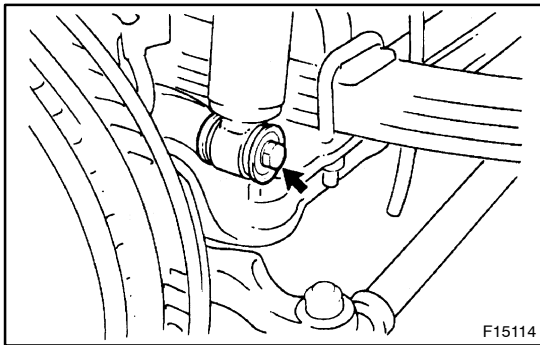
COMPONENTS: See page 26-5 or 26-13

1. REMOVE FRONT WHEEL

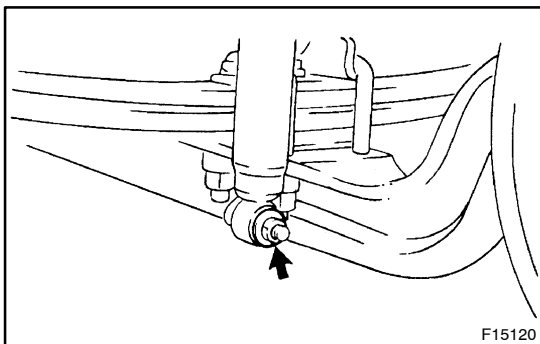


2. REMOVE FRONT SHOCK ABSORBER

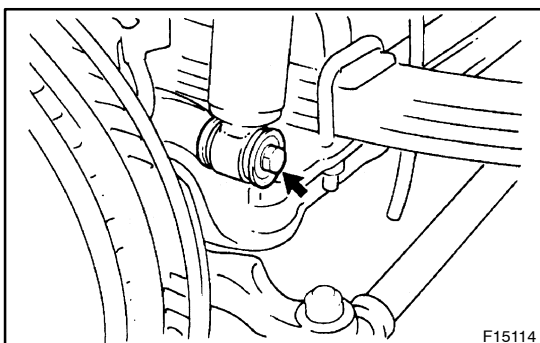
- (a) Fixing the piston rod by a monkey wrench, remove the nut.
- (b) Remove the 2 retainers and cushion.



- (c) Regular cab models:
Remove the bolt, 2 washers, 2 bushes and shock absorber.



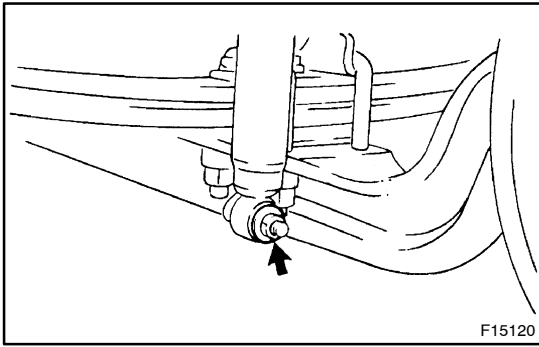
- (d) Wide cab models:
Remove the nut, 2 washers, 2 bushes and shock absorber.
- (e) Remove the 2 retainers and cushion from the shock absorber.



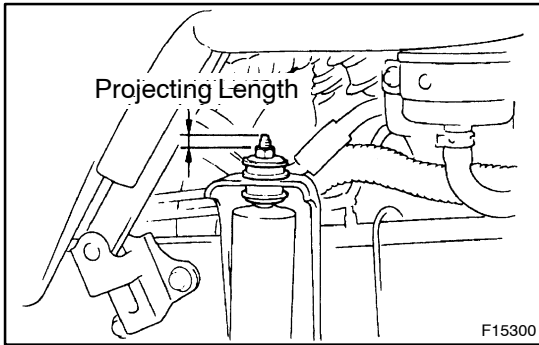
3. INSTALL FRONT SHOCK ABSORBER

- (a) Regular cab models:
Install the shock absorber lower side with new 2 bushes, 2 retainers and bolt.

FRONT SUSPENSION - FRONT SHOCK ABSORBER



- (b) Wide cab models:
Install the shock absorber lower side with 2 new bushes, the 2 retainers and nut.
- (c) Install the 2 retainers and new cushion to the shock absorber upper side.
- (d) Install the shock absorber upper side and 2 retainers and new bush.



- (e) Install the nut so that the projecting length of the bolt corresponds to the specified value.

Projecting length:

Regular cab models	7 - 9 mm (0.276 - 0.354 in.)
Wide cab models	2 - 3 threads

4. INSTALL FRONT WHEEL**5. TIGHTEN SUSPENSION PART**

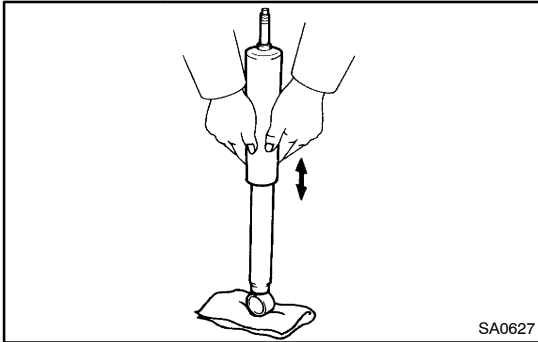
- (a) Remove the jack and stands.
- (b) Rock the vehicle several times up and down to settle the front suspension in unloaded condition.
- (c) Tighten the bolt or nut of the shock absorber lower side.

Torque:

68 N·m (690 kgf·cm, 50 ft·lbf) for standard cab models

76 N·m (780 kgf·cm, 56 ft·lbf) for wide cab models

INSPECTION



1. **INSPECT FRONT SHOCK ABSORBER**
 - (a) Compress and extend the shock absorber rod, and check that there is no abnormal resistance or unusual operation sound.

REAR SUSPENSION

TRUBLESHOOTING	27-1
PROBLEM SYMPTOMS TABLE	27-1
REAR LH SPRING ASSY	
(METAL BUSH TYPE)	27-2
COMPONENTS	27-2
OVERHAUL	27-3
REAR LH SPRING ASSY	
(RUBBER BUSH TYPE)	27-9
COMPONENTS	27-9
OVERHAUL	27-11

TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

270D8-01

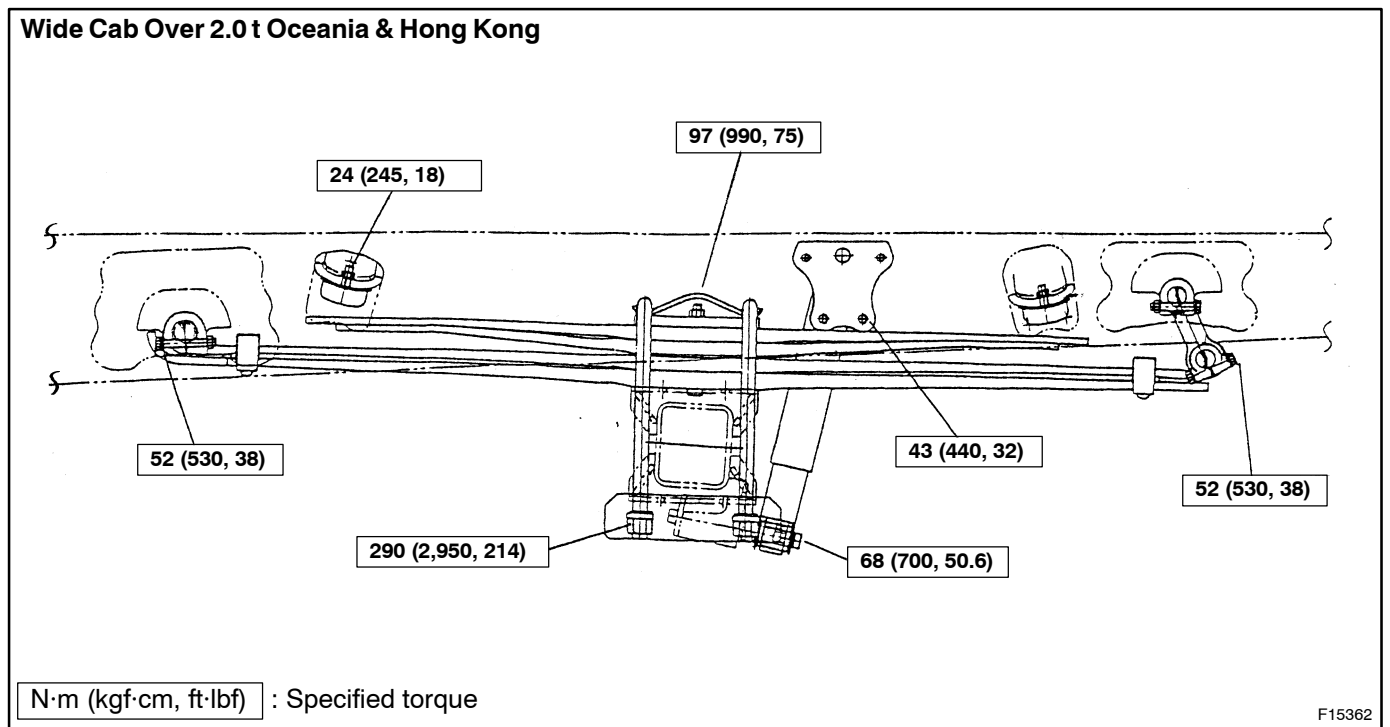
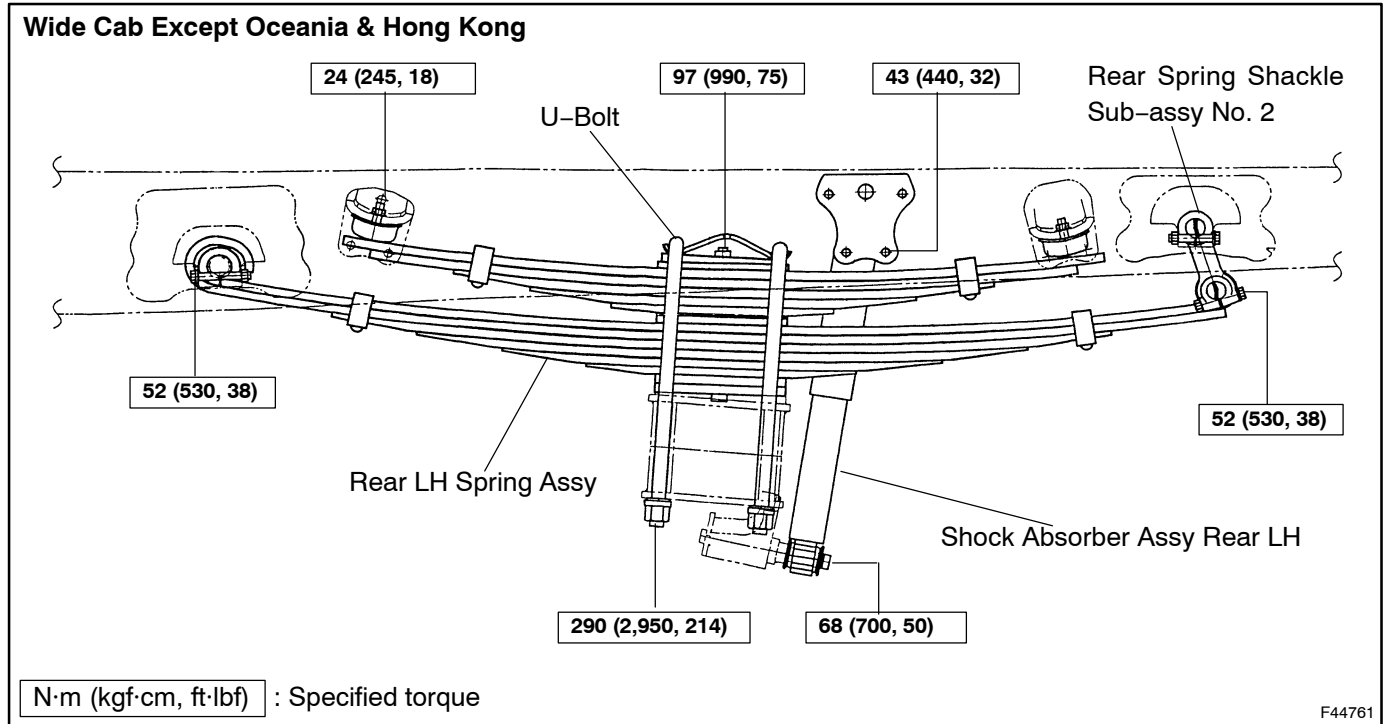
Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspected Area	See Page
Wander/pulls	<ol style="list-style-type: none"> 1. Tire (Worn or improperly inflated) 2. Hub bearing (Worn) 3. Suspension parts (Worn) 	28-1 30-61 30-66 -
Bottoming	<ol style="list-style-type: none"> 1. Vehicle (Overloaded) 2. Spring (Weak) 3. Shock absorber (Worn) 	- 27-2 27-9 -
Sways/pitches	<ol style="list-style-type: none"> 1. Tire (Worn or improperly inflated) 2. Shock absorber (Worn) 	28-1 -
Rear wheel shimmy	<ol style="list-style-type: none"> 1. Tire (Worn or improperly inflated) 2. Wheel (Out of balance) 3. Shock absorber (Worn) 4. Hub bearing (Worn) 	28-1 28-1 - 30-61 30-66
Abnormal tire wear	<ol style="list-style-type: none"> 1. Tire (Worn or improperly inflated) 2. Shock absorber (Worn) 3. Suspension parts (Worn) 	28-1 - -

REAR LH SPRING ASSY (METAL BUSH TYPE)

270D4-01

COMPONENTS

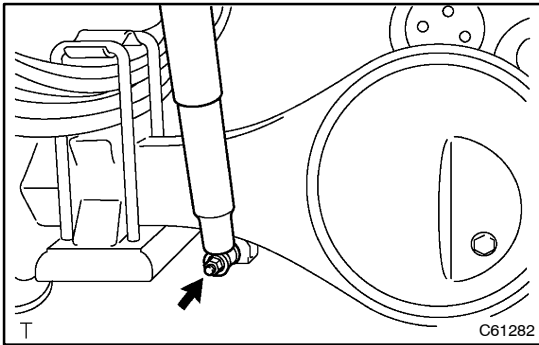


OVERHAUL

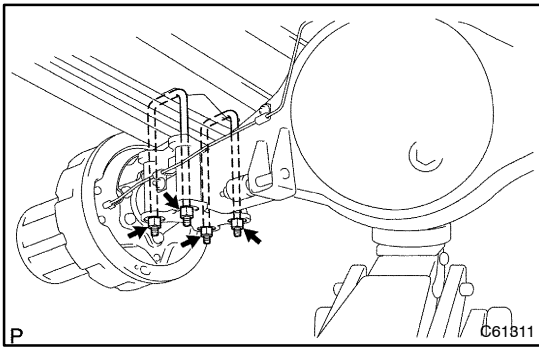
1. SUPPORT FRAME

- (a) Jack up and support the frame on stands.
- (b) Support the rear axle housing using a jack.
- (c) Lower the axle housing until the rear spring tension is free, and keep it at this position.

2. REMOVE REAR TIRE

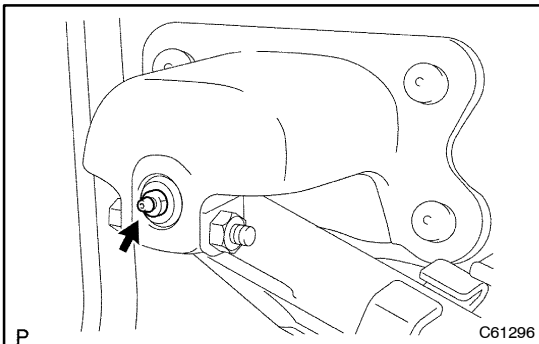


3. DISCONNECT SHOCK ABSORBER ASSY REAR LH



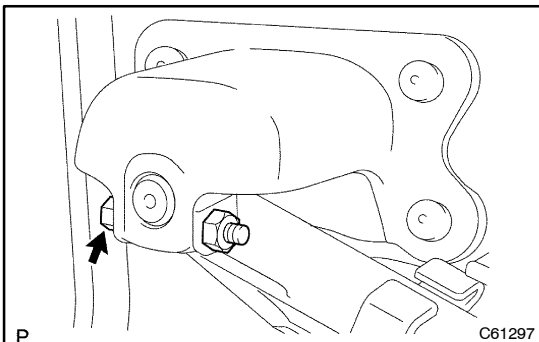
4. REMOVE U-BOLT

- (a) Remove the 4 nuts, rear spring seat, retainer and 2 U-bolts.

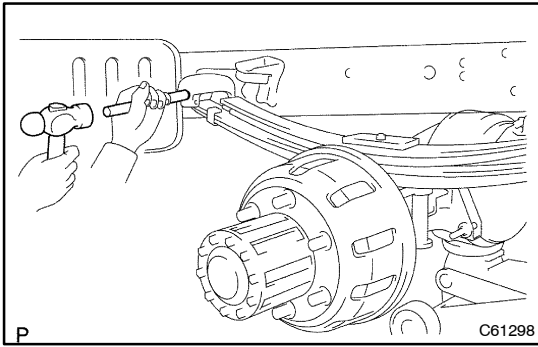


5. REMOVE REAR LH SPRING ASSY

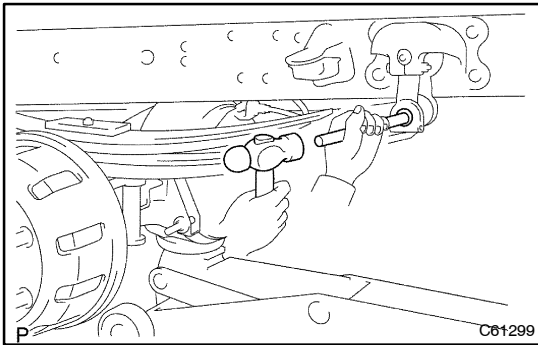
- (a) Remove the grease nipple.



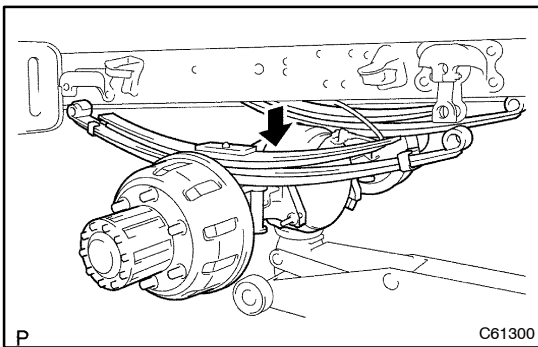
- (b) Remove the nut, washer and bolt.



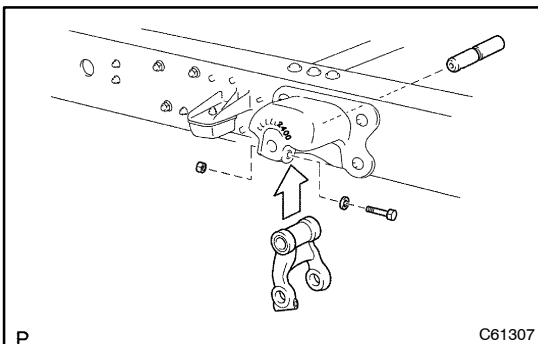
- (c) Using a hammer and brass bar, tap out the spring pin.
- (d) Remove the grease nipple (rear side).
- (e) Remove the the nut, washer and bolt (rear side).



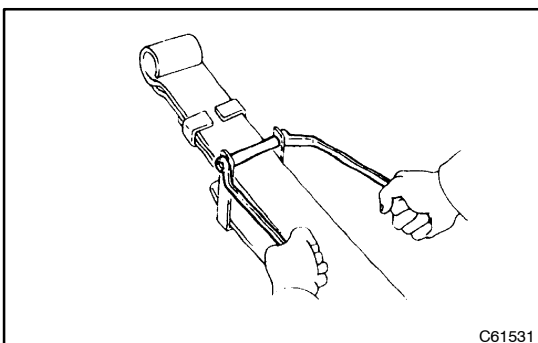
- (f) Using a hammer and brass bar, tap out the spring pin.
- NOTICE:**
Be careful not to drop the spring when removing the spring pin.



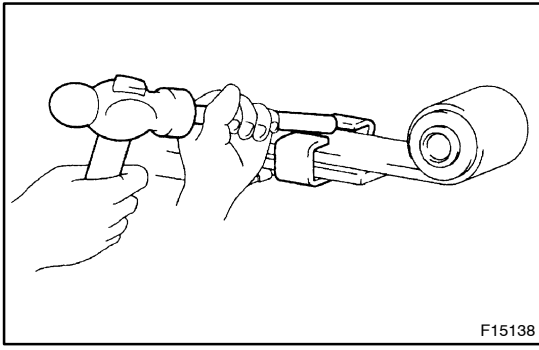
- (g) Lower the jack and remove the spring.



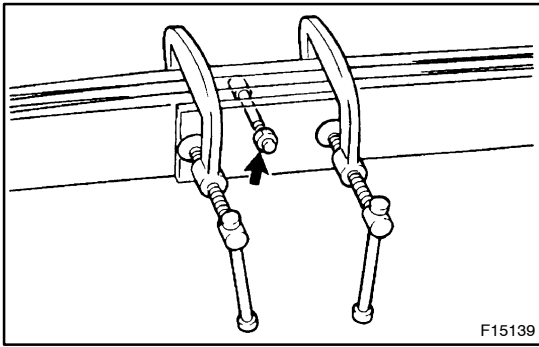
- 6. REMOVE REAR SPRING SHACKLE SUB-ASSY NO.2**
- (a) Remove the grease nipple.
 - (b) Remove the nut, washer, bolt, spring pin and shackle.



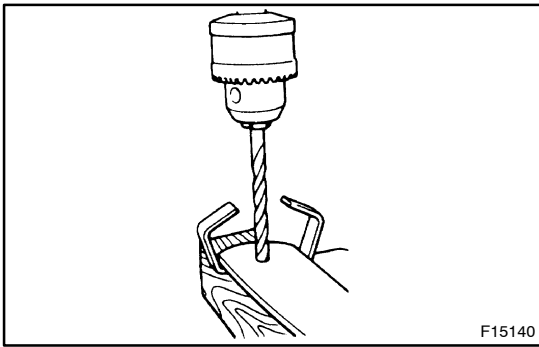
- 7. DISASSEMBLE REAR LH SPRING ASSY**
- (a) Remove the spring clip, bolt and nut.



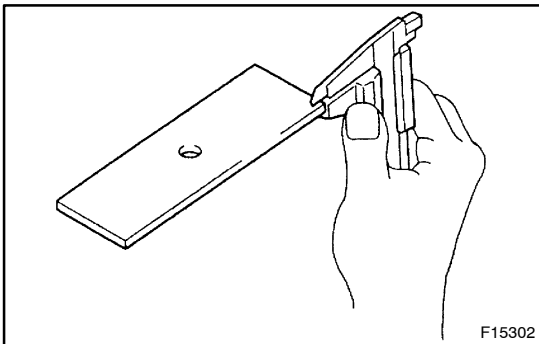
(b) Using a hammer and brass bar, tap out the 2 spring clips.



(c) Fix the spring with a vise, as shown in the illustration.
 (d) Remove the nut, center bolt and spacers, inter leafs and springs.



(e) Using a drill, remove the rivet and the spring clip.



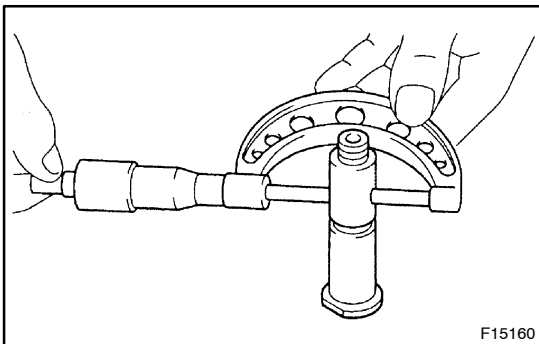
8. INSPECT REAR LH SPRING ASSY

(a) Using vernier calipers, measure the inter leaf thickness.

Thickness:

Standard	1.0 mm (0.04 in.)
Minimum	0.5 mm (0.02 in.)

If the thickness is less than the minimum, replace the inter leaf.

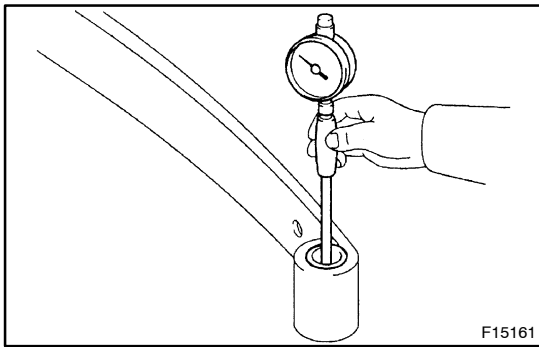


(b) Using a micrometer, measure the diameter of the spring pin.

Diameter:

Standard	25.0 mm (0.984 in.)
Minimum	24.7 mm (0.972 in.)

If the diameter is less than the minimum, replace the spring pin.

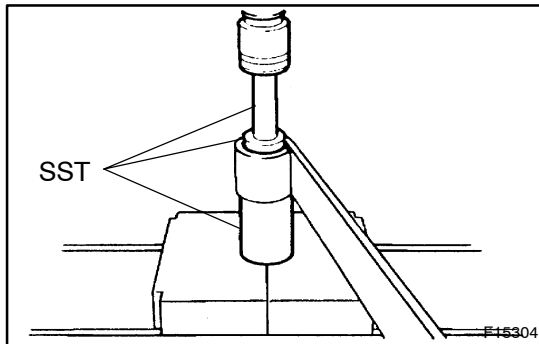


- (c) Check the gap between the spring bush and pin.
- (1) Using a cylinder gauge, measure the inner diameter of the spring bush.
 - (2) Subtract the the spring pin diameter from the spring bush diameter to obtain the gap.

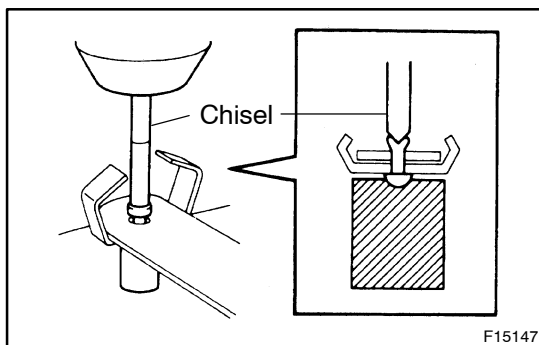
Gap:

Standard	0.02 - 0.125 mm (0.001 - 0.005 in.)
Maximum	0.50 mm (0.020 in.)

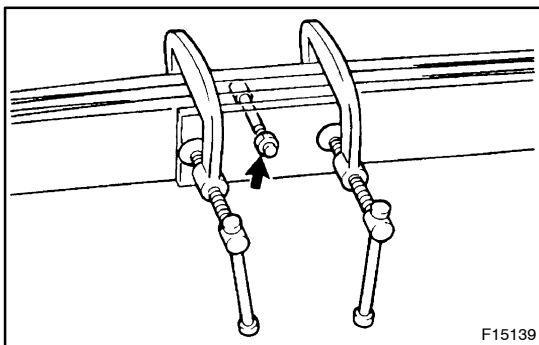
If the gap is greater than the maximum, replace the spring bush and pin.

**9. REPLACE BUSH**

- (a) Using SST and a press, press out the bush.
SST 09309-60010, 09950-60010 (09951-00300), 09950-70010 (09951-07100)
- (b) Using SST and a press, press in a new bush.
SST 09950-60010 (09951-00300), 09950-70010 (09951-07100)

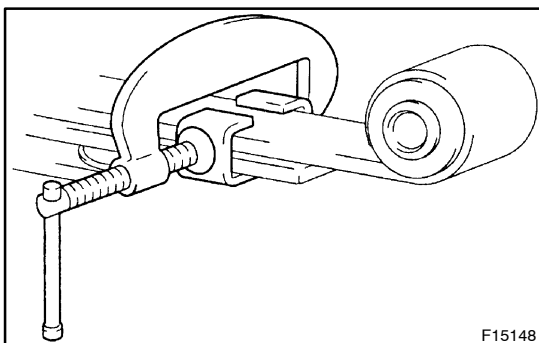
**10. ASSEMBLE REAR LH SPRING ASSY**

- (a) Install the spring clip with a new rivet.
- (b) Using a chisel and press, caulk the rivet.
- (c) Check that the spring clip is not loose.
- (d) Install the spacers and inter leafs between the springs.

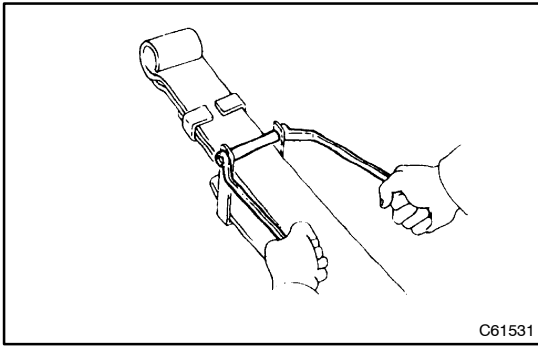


- (e) Fix the springs with a vise and install the center bolt and nut.

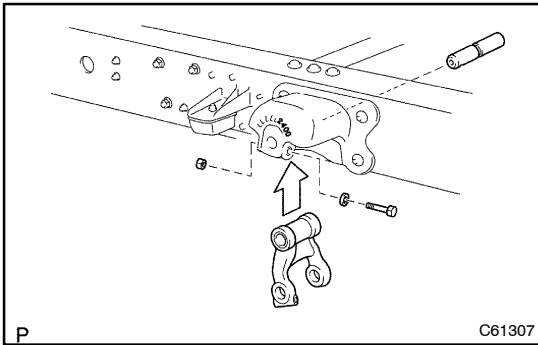
Torque: 97 N·m (990 kgf·cm, 75 ft·lbf)



- (f) Using a vise, caulk the 2 clips.
- (g) Check that there is no gap between the spring clip and the spring side.

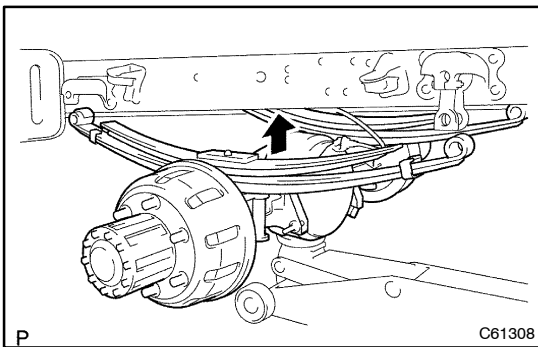


- (h) Install the spring clip, bolt and nut.



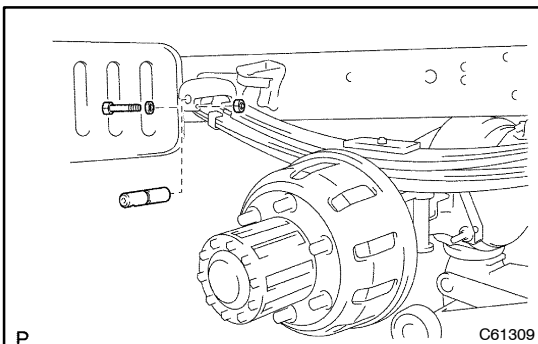
11. INSTALL REAR SPRING SHACKLE SUB-ASSY NO.2

- (a) Apply grease to the spring pin.
Grease: Special grease for chassis
- (b) Install the shackle with the spring pin, washer, bolt and nut.
- (c) Install the grease nipple.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

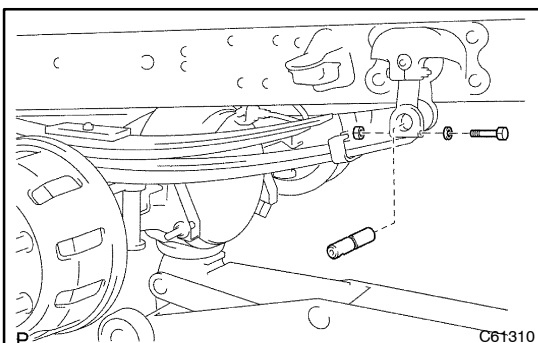


12. INSTALL REAR LH SPRING ASSY

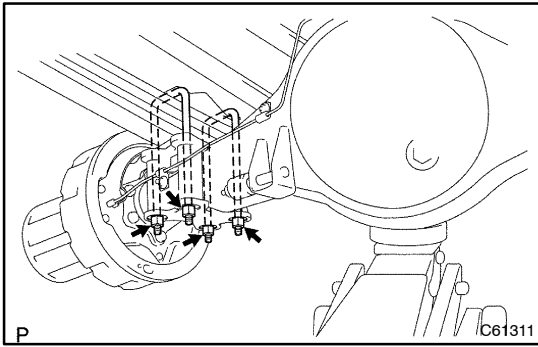
- (a) Place the spring on the rear axle housing.
- (b) Align the hole of the rear axle housing with the head of the spring center bolt.
- (c) Jack up the rear axle housing.
- (d) Apply grease to the spring pin.
Grease: Special grease for chassis



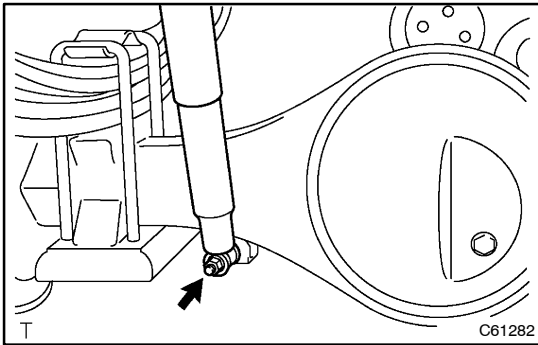
- (e) Connect the front side spring with the spring pin, and install the washer, bolt and nut.
- (f) Install the grease nipple.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)
- (g) Apply grease to the spring pin.
Grease: Chassis grease special



- (h) Connect the front side spring with the spring pin, and install the washer, bolt and nut.
- (i) Install the grease nipple.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

**13. INSTALL U-BOLT**

- (a) Install the rear spring seat, retainer, 2 U-bolts and 4 nuts.
Torque: 290 N·m (2,950 kgf·cm, 213 ft·lbf)

**14. CONNECT SHOCK ABSORBER ASSY REAR LH****15. INSTALL REAR TIRE****16. INSPECT REAR SUSPENSION**

- (a) Remove the jack and stands.
 (b) Rock the vehicle several times up and down to settle the front suspension in unloaded condition.
 (c) Tighten the nuts and bolts of the front suspension parts.

Torque:

Part Tightened	N·m	kgf·cm	ft·lbf
Bolt and nut of spring pin	52	530	38
Rear shock absorber x Rear axle housing	68	700	50

17. APPLY GREASE

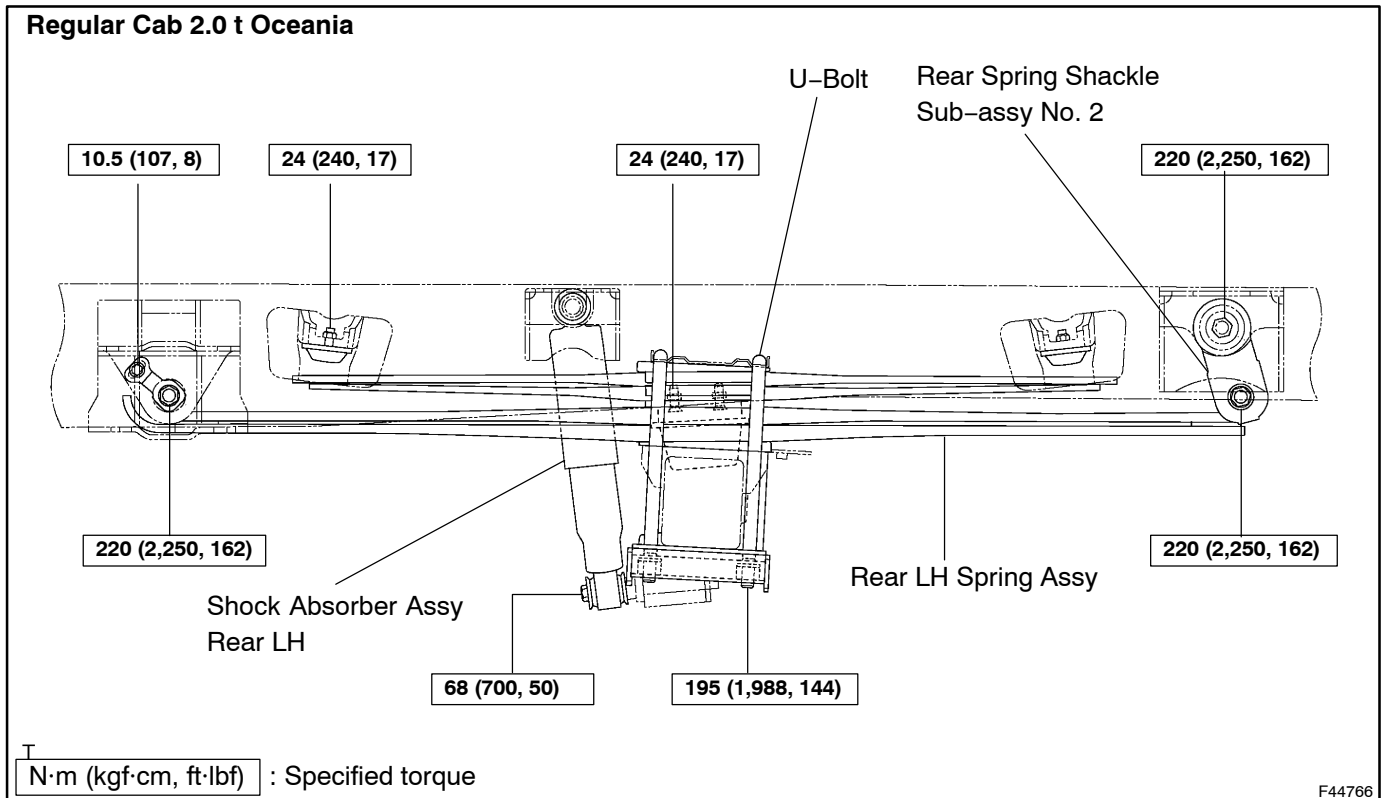
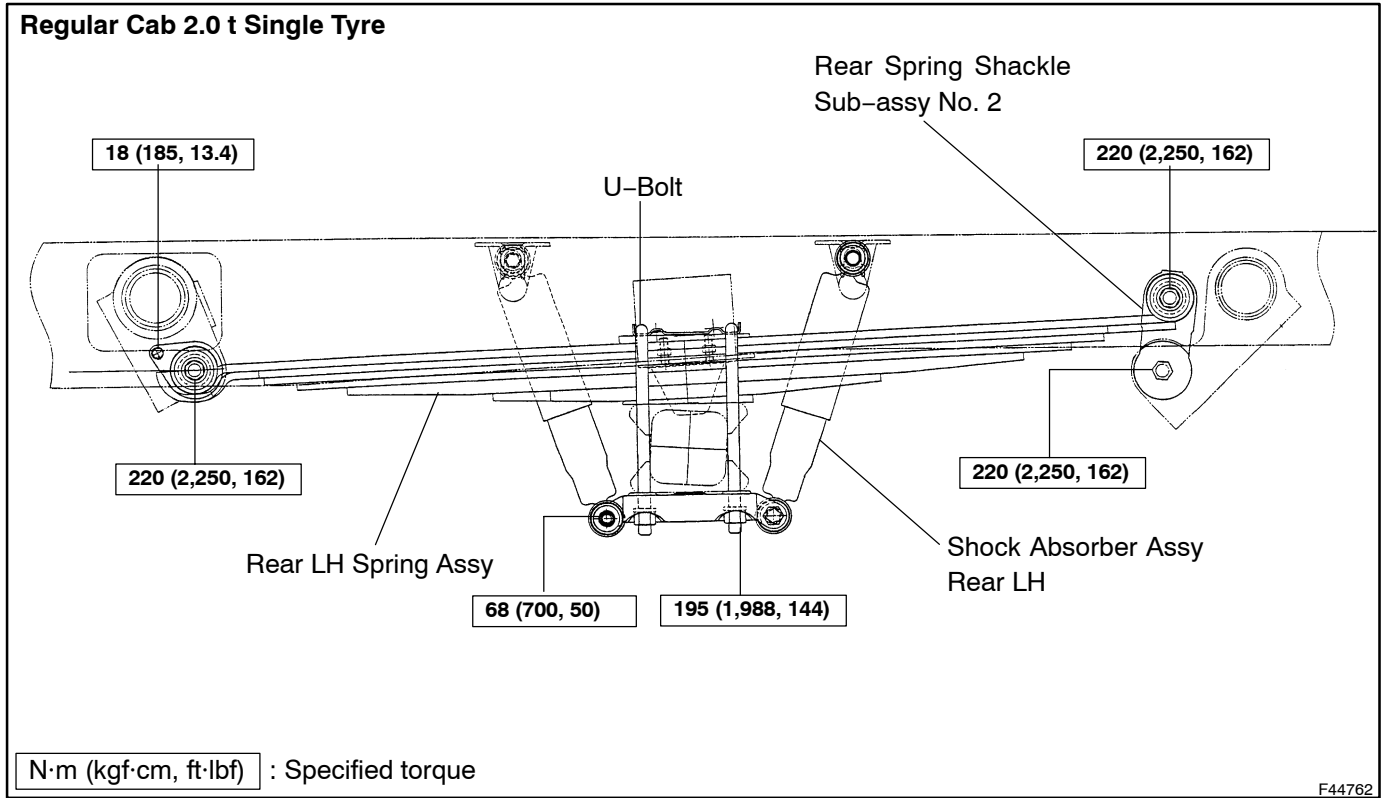
- (a) Using a grease gun, apply grease to the spring pins.

Grease: Special grease for chassis

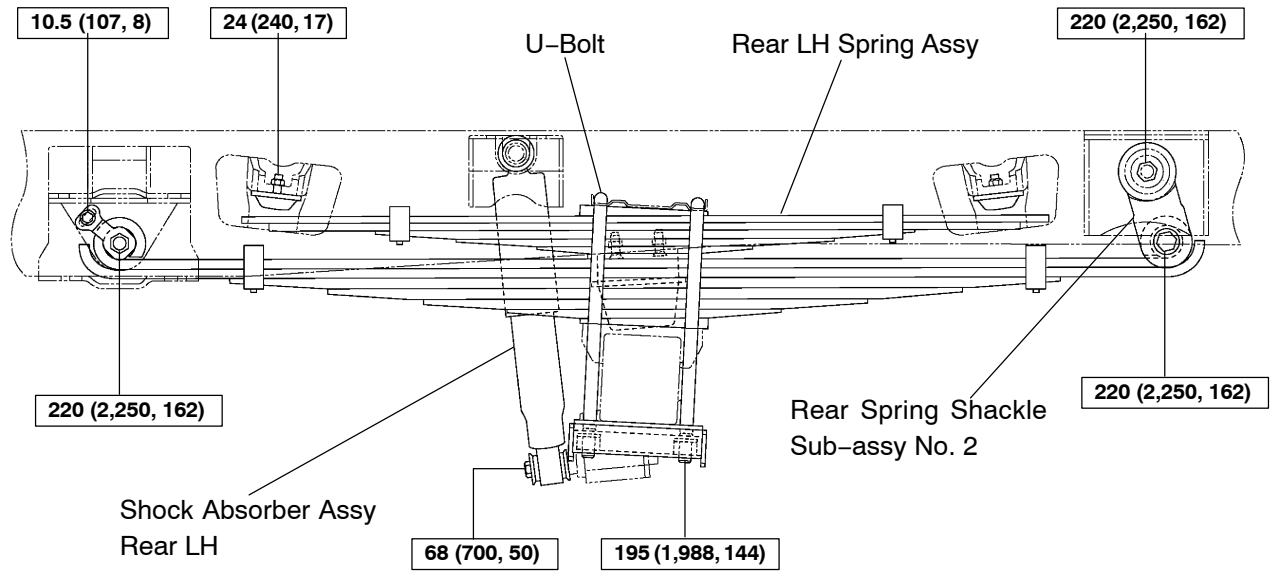
REAR LH SPRING ASSY (RUBBER BUSH TYPE)

COMPONENTS

270D6-01



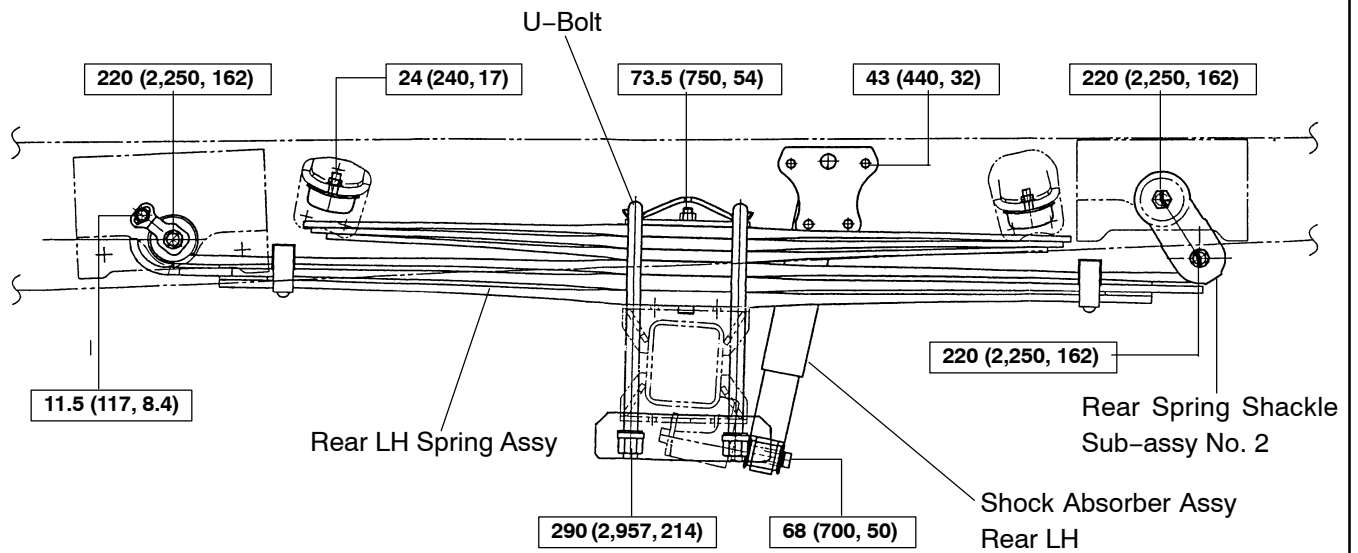
Regular Cab 2.0 t & 3.0 t



^T N·m (kgf·cm, ft·lbf) : Specified torque

F44767

Wide Cab 2.0 t Oceania & Hong Kong



N·m (kgf·cm, ft·lbf) : Specified torque

F44765

OVERHAUL

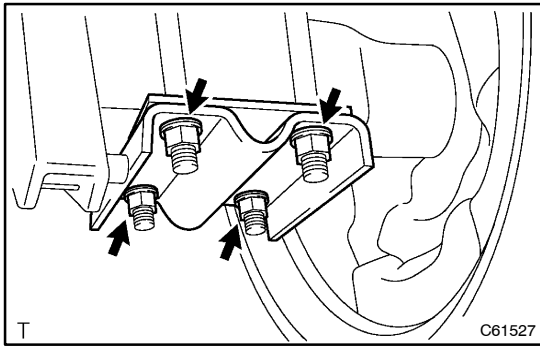
1. SUPPORT FRAME

- (a) Jack up and support the frame on stands.
- (b) Support the rear axle housing using a jack.
- (c) Lower the axle housing until the rear spring tension is free, and keep it at this position.

2. REMOVE REAR TIRE

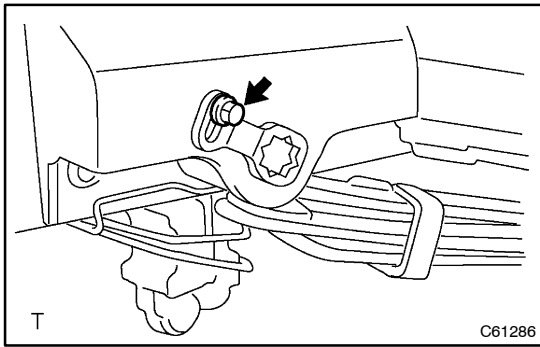
3. DISCONNECT SHOCK ABSORBER ASSY REAR LH

- (a) Remove the bolt and washer, and disconnect the rear shock absorber from the rear axle housing.



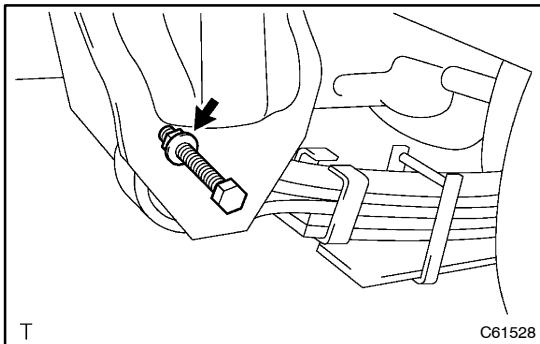
4. REMOVE U-BOLT

- (a) Remove the 4 nuts, U-bolt spring seat, spring seat upper and 2 U-bolts.

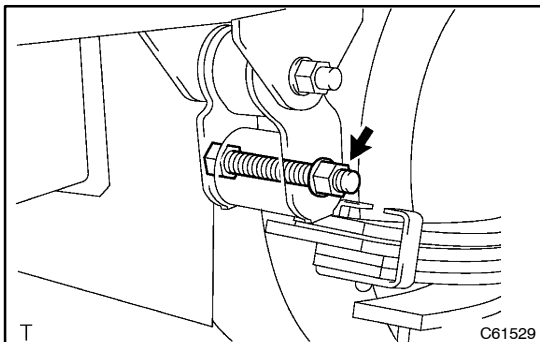


5. REMOVE REAR LH SPRING ASSY

- (a) Remove the bolt and spring pin support.



- (b) Remove the nut and through bolt.

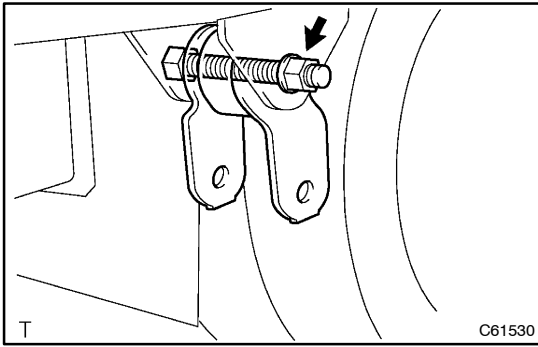


- (c) Remove the nut and through bolt.

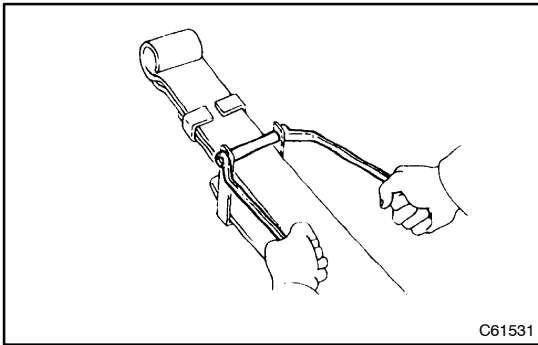
NOTICE:

Be careful not to drop the spring when removing the through bolt.

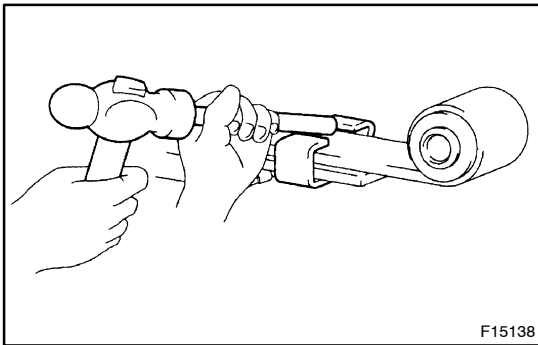
- (d) Lower the jack and remove the spring.

**6. REMOVE REAR SPRING SHACKLE SUB-ASSY NO.2**

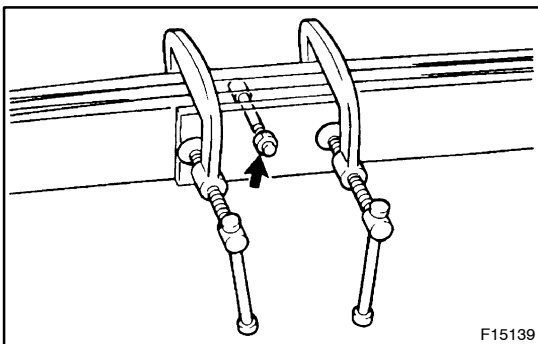
- (a) Remove the nut, through bolt and shackle.

**7. DISASSEMBLE REAR LH SPRING ASSY**

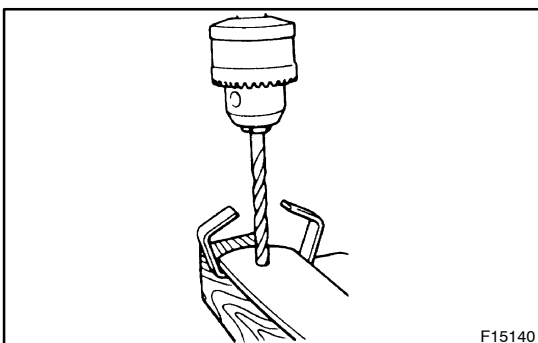
- (a) Remove the spring clip, bolt and nut.



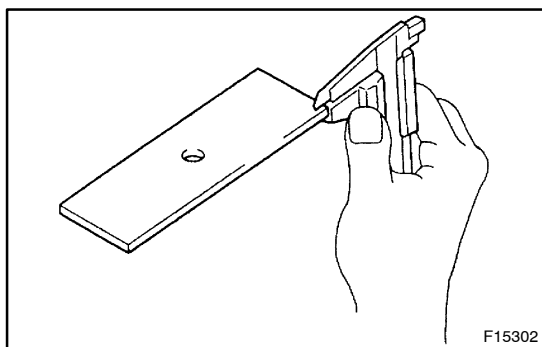
- (b) Using a hammer and brass bar, tap out the 2 spring clips.



- (c) Fix the spring with a vise, as shown in the illustration.
 (d) Remove the nut, center bolt and spacers, inter leaves and springs.



- (e) Using a drill, remove the rivet and the spring clip.

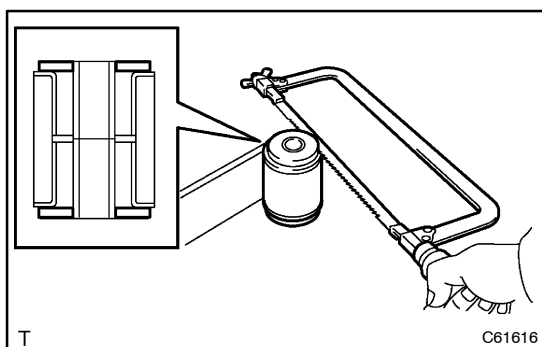
**8. INSPECT REAR LH SPRING ASSY**

- (a) Using vernier calipers, measure the inter leaf thickness.

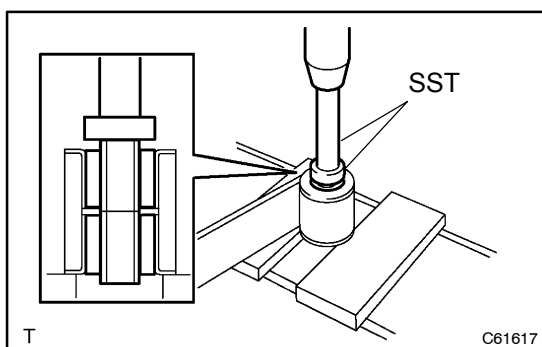
Thickness:

Standard	1.0 mm (0.04 in.)
Minimum	0.5 mm (0.02 in.)

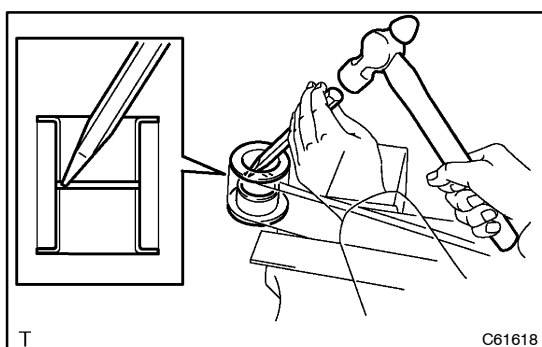
If the thickness is less than the minimum, replace the inter leaf.

**9. REPLACE BUSH**

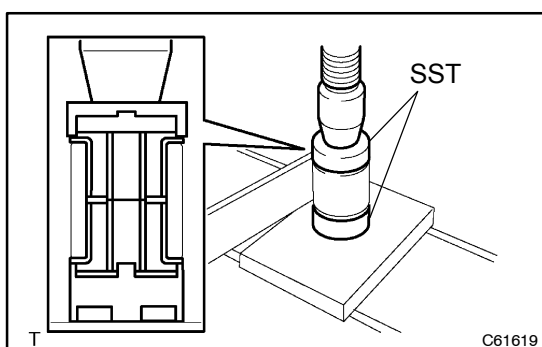
- (a) Fix the spring with a vise.
 (b) Using a hack saw blade, cut the both ends of the bush.



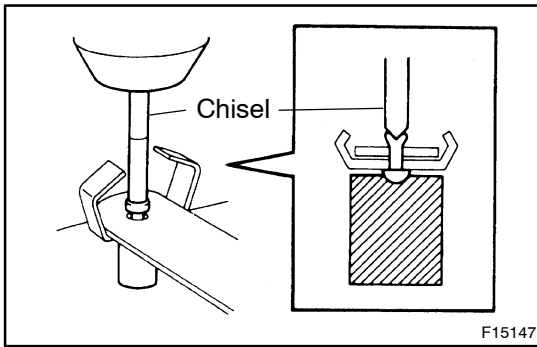
- (c) Using SST and a press, press out the 2 bushes.
 SST 09950-60010 (09951-00350), 09950-70010
 (09951-07100)



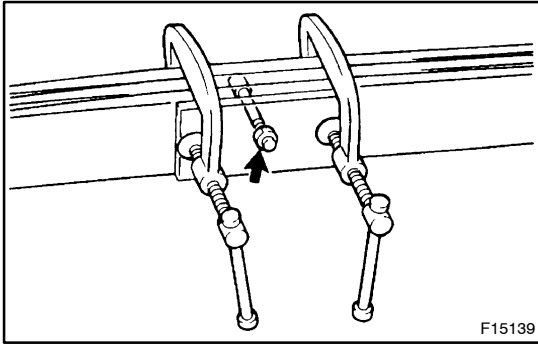
- (d) Using a chisel and hammer, tap out the 2 outer tubes.



- (e) Using SST and a press, press in 2 new bushes.
 SST 09710-28012 (09710-07062), 09710-30041
 (09710-03211)

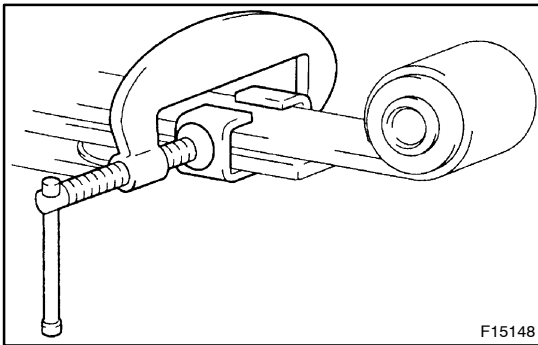


- 10. ASSEMBLE REAR LH SPRING ASSY**
- Install the spring clip with a new rivet.
 - Using a chisel and press, caulk the rivet.
 - Check that the spring clip is not loose.
 - Install the spacers and inter leafs between the springs.

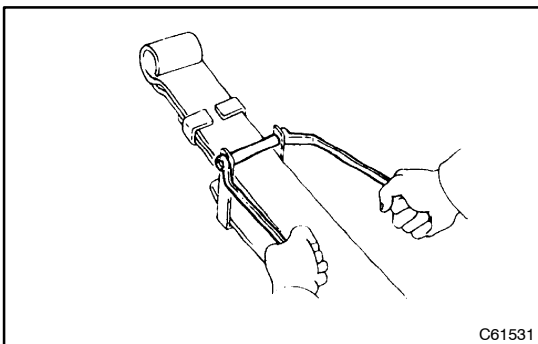


- Fix the springs with a vise and install the center bolt and nut.

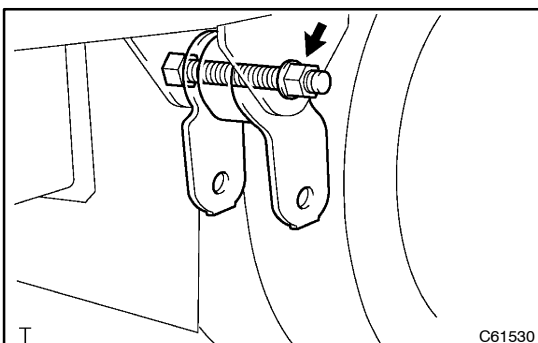
Torque: 73.5 N·m (750 kgf·cm, 54 ft·lbf)



- Using a vise, caulk the 2 clips.
- Check that there is no gap between the spring clip and spring side.



- Install the spring clip, bolt and nut.



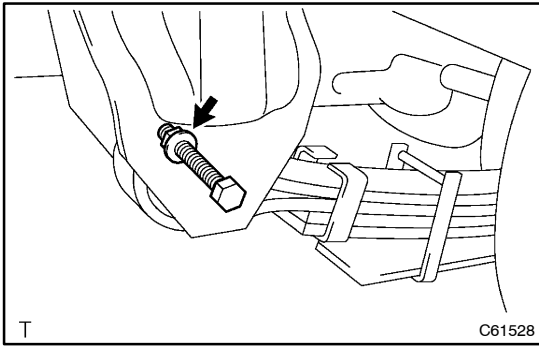
11. INSTALL REAR SPRING SHACKLE SUB-ASSY NO.2

- Install the shackle with the through bolt and nut.

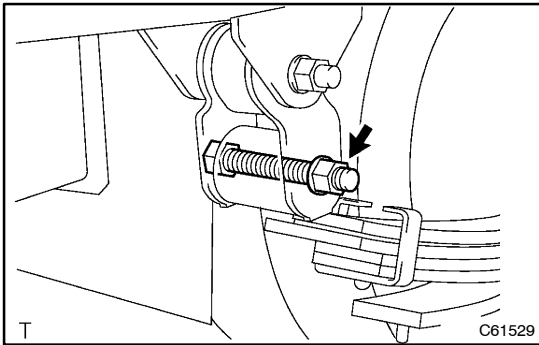
12. INSTALL REAR LH SPRING ASSY

- Place the spring on the rear axle housing.
- Align the hole of the rear axle housing with the head of the spring center bolt.
- Jack up the rear axle housing.

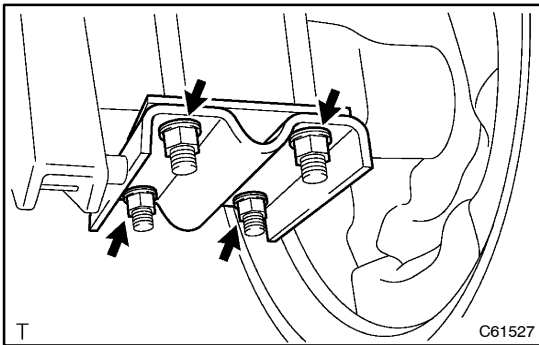
REAR SUSPENSION - REAR LH SPRING ASSY (RUBBER BUSH TYPE)



(d) Install the through bolt and nut.



(e) Install the through bolt and nut.



13. INSTALL U-BOLT

(a) Install the spring seat upper, U-bolt spring seat, 2 U-bolts and 4 nuts.

Torque:

195 N·m (1,988 kgf·cm, 144 ft·lbf) for regular cab
290 N·m (2,957 kgf·cm, 214 ft·lbf) for wide cab

14. INSTALL SHOCK ABSORBER ASSY REAR LH

(a) Install the 2 washers and connect the shock absorber with the bolt.

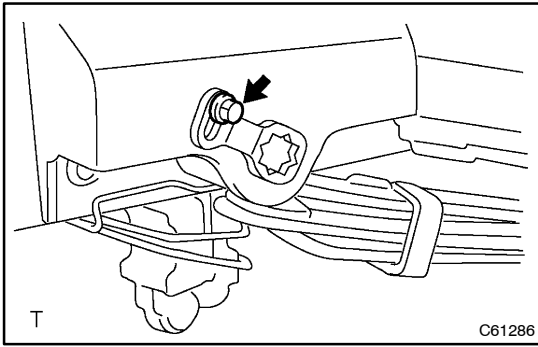
15. INSTALL REAR TIRE

16. INSPECT REAR SUSPENSION

- (a) Remove the jack and stands.
- (b) Rock the vehicle several times up and down to settle the front suspension in unloaded condition.
- (c) Tighten the nuts and bolts of the front suspension parts.

Torque:

Part Tightened	N·m	kgf·cm	ft·lbf
Rear spring shackle x Frame	220	2,250	162
Rear spring assy LH x Rear spring shackle	220	2,250	162
Rear spring assy LH x Frame	220	2,250	162
Rear shock absorber x Rear axle housing	68	700	50



(d) Install the bolt.

Torque:

10.5 N·m (107 kgf·cm, 8 ft·lbf) for regular cab

11.5 N·m (117 kgf·cm, 8.4 ft·lbf) for wide cab

TIRE & WHEEL

TIRE AND WHEEL	28-1
INSPECTION	28-1



TIRE AND WHEEL

INSPECTION

2803G-01

1. INSPECT TIRE

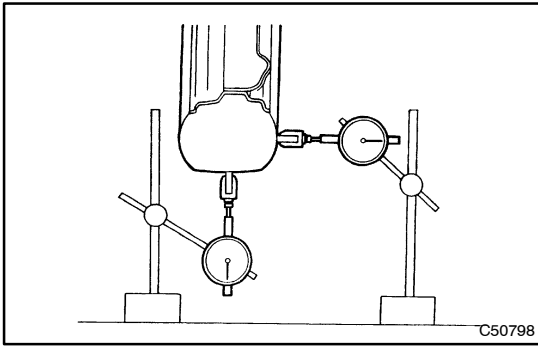
(a) Check the tires for wear and inflation pressure.

Cold the inflation pressure:

Cab Type	Countries	Models	Tire Size		Inflation Pressure, kPa (kgf/cm ² , psi)			
			Front	Rear	Front	Rear		
Regular cab	Oceania	BU300R-TQMMWQ3	195/75R-15	195/75R-15	600 (6.0, 87)	600 (6.0, 87)		
		BU300R-TKMMWQ3	185/85R-16	185/85R-16	600 (6.0, 87)	600 (6.0, 87)		
		BU340R-TKMMWQ3			600 (6.0, 87)	600 (6.0, 87)		
Wide cab	Oceania	XZU404R-TKMMWQ3	195/85R16	195/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU404R-HKMMWQ3	195/85R16	195/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-TKMMWQ3	195/85R16	195/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-HKMMWQ3	195/85R16	195/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-TKFQWQ3	205/85R16	205/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-HKFQWQ3	205/85R16	205/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-TKFRWQ3	215/85R16	215/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-HKFRWQ3	215/85R16	215/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU424R-TKFRWQ3	215/85R16	215/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU424R-HKFRWQ3	215/85R16	215/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU424R-TKFTWQ3	225/80R17.5	225/80R17.5	700 (7.0, 102)	700 (7.0, 102)		
		XZU424R-HKFTWQ3	225/80R17.5	225/80R17.5	700 (7.0, 102)	700 (7.0, 102)		
		XZU434R-TKFTWQ3	225/80R17.5	225/80R17.5	700 (7.0, 102)	700 (7.0, 102)		
		XZU434R-HKFTWQ3	225/80R17.5	225/80R17.5	700 (7.0, 102)	700 (7.0, 102)		
Wide cab	Hong Kong	XZU414R-TKMRW3	215/85R16	215/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU414R-HKMRW3						
		XZU424R-TKMRW3						
		XZU424R-HKMRW3						
		XZU404R-TKMMW3	205/85R16	205/85R16	600 (6.0, 87)	600 (6.0, 87)		
		XZU404R-HKMMW3						
		XZU414R-TKMMW3						
		XZU414R-HKMMW3						
		XZU424R-TKMMW3						
		XZU424R-HKMMW3						
Regular cab	G.C.C.	WU300L-TBMLSV	7.00-16-10 7.00R16-10	7.00-16-12 7.00R16-12	500 (5.0, 73) 525 (5.25, 76)	575 (5.75, 83) 600 (6.0, 87)		
		WU300L-TBMMSV	7.00-16-10 7.00R16-10	7.00-16-10 7.00R16-10	500 (5.0, 73) 525 (5.25, 76)	500 (5.0, 73) 525 (5.25, 76)		
		WU340L-TKMMSV	7.00-16-12 7.00R16-12	7.00-16-12 7.00R16-12	575 (5.75, 83) 600 (6.0, 87)	575 (5.75, 83) 600 (6.0, 87)		
			7.00-16-12 7.00R16-12	7.00-16-12 7.00R16-12	575 (5.75, 83) 600 (6.0, 87)	575 (5.75, 83) 600 (6.0, 87)		
		Regular cab	General Countries	BU303R-TBMLS3	7.00-16-10	7.00-16-12	500 (5.0, 73)	575 (5.75, 83)
				BU303L-TBMLS3	7.00R16-10	7.00R16-12	525 (5.25, 76)	600 (6.0, 87)
BU303R-TBMMS3	7.00-16-10			7.00-16-10	500 (5.0, 73)	500 (5.0, 73)		
BU303L-TBMMS3	7.00R16-10			7.00R16-10	525 (5.25, 76)	525 (5.25, 76)		
BU343R-TKMMS3	7.00-16-12			7.00-16-12	575 (5.75, 83)	575 (5.75, 83)		
BU343L-TKMMS3	7.00R16-12			7.00R16-12	600 (6.0, 87)	600 (6.0, 87)		
BU343R-TKMQS3	7.00-16-12			7.00-16-12	575 (5.75, 83)	575 (5.75, 83)		
BU343L-TKMQS3	7.00R16-12			7.00R16-12	600 (6.0, 87)	600 (6.0, 87)		
WU300L-HBMLS3	7.00-16-10	7.00-16-12	500 (5.0, 73)	575 (5.75, 83)				
	7.00R16-10	7.00R16-12	525 (5.25, 76)	600 (6.0, 87)				

TIRE & WHEEL - TIRE AND WHEEL

Regular cab	General Countries	WU300L-HBMMS3	7.00-16-10	7.00-16-10	500 (5.0, 73)	500 (5.0, 73)
		WU340L-HKMMS3	7.00R16-10	7.00R16-10	525 (5.25, 76)	525 (5.25, 76)
Wide cab	G.C.C.	WU410L-TKMRSV3	7.50-16-10 7.50R16-10	7.50-16-10 7.50R16-10	525 (5.25, 76) 575 (5.75, 83)	525 (5.25, 76) 575 (5.75, 83)
		XZU412L-TKMRSV3	7.50-16-12	7.50-16-12	600 (6.0, 87)	600 (6.0, 87)
		XZU412L-HKMRSV3	7.50R16-12	7.50R16-12	650 (6.5, 94)	650 (6.5, 94)
		XZU412L-TKMTSV3	7.50-16-14	7.50-16-14	650 (6.5, 94)	650 (6.5, 94)
		XZU412L-HKMTSV3	7.50R16-14	7.50R16-14	700 (7.0, 102)	700 (7.0, 102)
		XZU422L-TKMRSV3	7.50-16-12	7.50-16-12	600 (6.0, 87)	600 (6.0, 87)
		XZU422L-HKMRSV3	7.50R16-12	7.50R16-12	650 (6.5, 94)	650 (6.5, 94)
		XZU422L-TKMTSV3	7.50-16-14	7.50-16-14	650 (6.5, 94)	650 (6.5, 94)
XZU422L-HKMTSV3	7.50R16-14	7.50R16-14	700 (7.0, 102)	700 (7.0, 102)		
Wide cab	General Countries	WU410R-HKMMS3	7.00-16-10	7.00-16-10	500 (5.0, 73)	500 (5.0, 73)
		WU410L-HKMMS3	7.00R16-10	7.00R16-10	525 (5.25, 76)	525 (5.25, 76)
		WU410R-TKMQS3				
		WU410R-HKMQS3	7.50-16-10	7.50-16-10	525 (5.25, 76)	525 (5.25, 76)
		WU410L-TKMQS3	7.50R16-10	7.50R16-10	575 (5.75, 83)	575 (5.75, 83)
		WU410L-HKMQS3				
		WU410R-TKMRS3	7.50-16-12 7.50R16-12	7.50-16-12 7.50R16-12	600 (6.0, 87) 650 (6.5, 94)	600 (6.0, 87) 650 (6.5, 94)
		XZU412R-TKMRS3				
		XZU412R-HKMRS3				
		XZU412L-TKMRS3				
		XZU412L-HKMRS3	7.50-16-12	7.50-16-12	600 (6.0, 87)	600 (6.0, 87)
		XZU422R-TKMRS3	7.50R16-12	7.50R16-12	650 (6.5, 94)	650 (6.5, 94)
		XZU422R-HKMRS3				
		XZU422L-TKMRS3				
		XZU422L-HKMRS3				
		XZU422L-HKMTS3	7.50-16-14 7.50R16-14	7.50-16-14 7.50R16-14	650 (6.5, 94) 700 (7.0, 102)	650 (6.5, 94) 700 (7.0, 102)
		XZU412R-TKMMW3	7.00-16-10	7.00-16-10	500 (5.0, 73)	500 (5.0, 73)
		XZU412R-HKMMW3	7.00R16-10	7.00R16-10	525 (5.25, 76)	525 (5.25, 76)
		XZU412R-TKMQW3	7.50-16-10	7.50-16-10	525 (5.25, 76)	525 (5.25, 76)
		XZU412R-HKMQW3	7.50R16-10	7.50R16-10	575 (5.75, 83)	575 (5.75, 83)
		XZU412L-TKMMW3	7.00-16-10	7.00-16-10	500 (5.0, 73)	500 (5.0, 73)
		XZU412L-HKMMW3	7.00R16-10	7.00R16-10	525 (5.25, 76)	525 (5.25, 76)
		XZU412L-TKMQW3	7.50-16-10	7.50-16-10	525 (5.25, 76)	525 (5.25, 76)
		XZU412L-HKMQW3	7.50R16-10	7.50R16-10	575 (5.75, 83)	575 (5.75, 83)
		XZU412L-TKMRW3	7.50-16-12	7.50-16-12	600 (6.0, 87)	600 (6.0, 87)
		XZU412L-HKMRW3	7.50R16-12	7.50R16-12	650 (6.5, 94)	650 (6.5, 94)
		XZU412L-TKMTW3	7.50-16-14	7.50-16-14	650 (6.5, 94)	650 (6.5, 94)
		XZU412L-HKMTW3	7.50R16-14	7.50R16-14	700 (7.0, 102)	700 (7.0, 102)
		XZU422L-TKMRW3	7.50-16-12	7.50-16-12	600 (6.0, 87)	600 (6.0, 87)
		XZU422L-HKMRW3	7.50R16-12	7.50R16-12	650 (6.5, 94)	650 (6.5, 94)
		XZU422L-TKMTW3	7.50-16-14	7.50-16-14	650 (6.5, 94)	650 (6.5, 94)
		XZU422L-HKMTW3	7.50R16-14	7.50R16-14	700 (7.0, 102)	700 (7.0, 102)
XZU414L-TKMMW3	7.00-16-10 7.00R16-10	7.00-16-10 7.00R16-10	500 (5.0, 73) 525 (5.25, 76)	500 (5.0, 73) 525 (5.25, 76)		
XZU424L-TKMRW3	7.50-16-12 7.50R16-12	7.50-16-12 7.50R16-12	600 (6.0, 87) 650 (6.5, 94)	600 (6.0, 87) 650 (6.5, 94)		
XZU424L-TKMTW3	7.50-16-14	7.50-16-14	650 (6.5, 94)	650 (6.5, 94)		
XZU424L-HKMTW3	7.50R16-14	7.50R16-14	700 (7.0, 102)	700 (7.0, 102)		



- (b) Using a dial indicator, check the tire runout.
Tire runout: 3.0 mm (0.039 in.) or less

DIFFERENTIAL

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DIFFERENTIAL SYSTEM

2907L-01

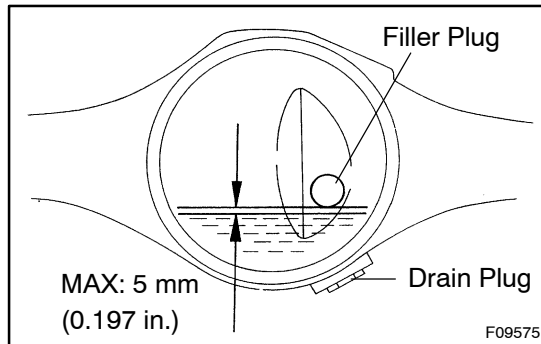
PRECAUTION

1. Before overhaul, clean the outside of the differential assembly to prevent sand or mud from entering inside the differential carrier during overhaul.
2. Always arrange the disassembled parts in order and protect them from dust.
3. Before installation, thoroughly clean and dry each part and then apply hypoid gear oil to it. Do not use alkaline cleaner for aluminum or rubber parts and ring gear set bolts. Also, do not clean the rubber parts, such as O-rings and oil seals, with white gasoline.
4. Coat all the sliding surfaces and rotating parts with hypoid gear oil.
5. When holding a component part with a vice, be sure to place an aluminum sheet under the part. Do not put it directly on the vice.
6. Be careful not to damage the contact surfaces of the case. Such damage may cause oil leakage.
7. Before applying sealant, remove the deposits of the oil sealant and clean the part to be sealed using white gasoline.
8. Do not supply oil immediately after installing the sealed parts. Leave it for at least an hour.
9. Damage on the surface being contact with an oil seal, O-ring and gasket may cause oil leakage. Special attention should be paid.
10. When press-fitting an oil seal, be careful not to damage the oil seal lip and outside periphery.
11. When replacing a bearing, replace the inner and outer races as a set.

DIFFERENTIAL OIL REPLACEMENT

2907M-01

1. DRAIN DIFFERENTIAL OIL



2. ADD DIFFERENTIAL OIL

Oil type: Hypoid gear oil API GL-5

Recommended oil viscosity: SAE 90

Capacity:

Differential Type	litters (US qts, Imp. qts)
B265	3.4 (3.6, 3.0)
B305	5.2 (5.5, 4.8)
SH13	3.7 (3.9, 3.4)

Torque for drain and filler plugs:

Differential Type	N·m (kgf·cm, ft·lbf)
B265	50 (510, 37)
B305	
SH13	98 (1000, 72)

REAR DIFFERENTIAL CARRIER OIL SEAL (B265, B305) COMPONENTS

2907N-01

B305 (12") Type

◆ 270 (2,750, 199)

◆ Oil Seal

Companion Flange

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

F09602

B265 (10.5") Type

◆ Oil Seal

Companion Flange

◆ 304 (3100, 224)

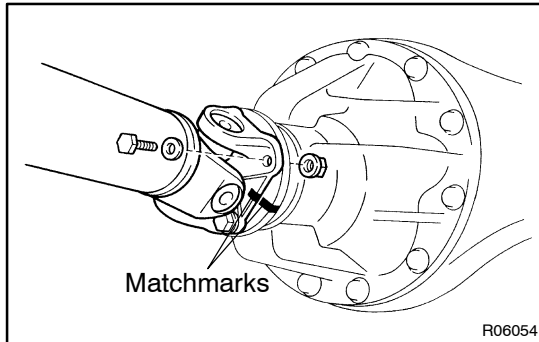
Dust Cover

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

F15338

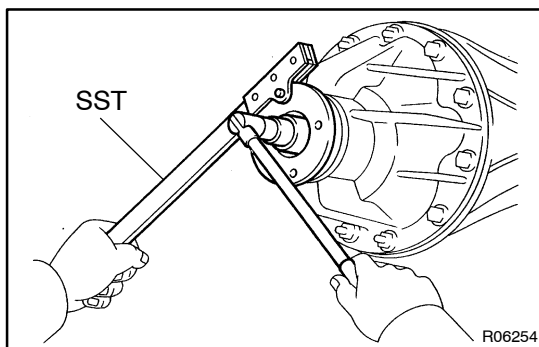
REPLACEMENT (B265, B305)

1. DRAIN DIFFERENTIAL OIL (See page 29-2)



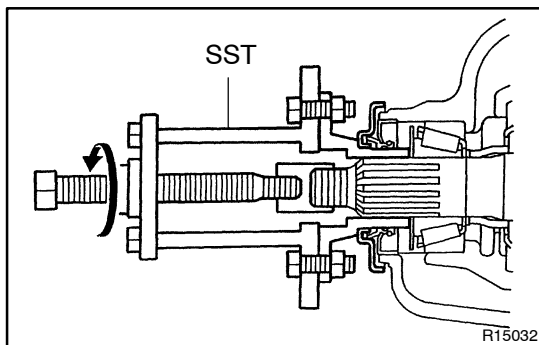
2. DISCONNECT PROPELLER SHAFT ASSY

- (a) Place matchmarks on the flanges.
- (b) Remove the 4 nuts, bolts and washers, and disconnect the rear propeller shaft.

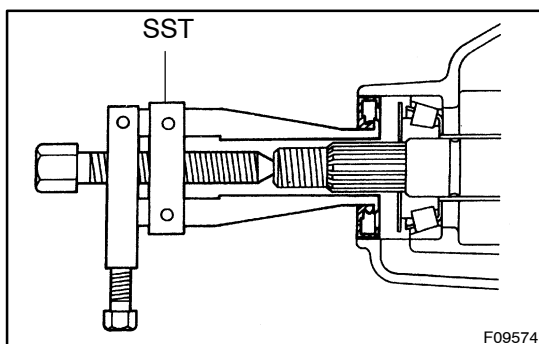


3. REMOVE REAR DRIVE PINION COMPANION FLANGE SUB-ASSY REAR

- (a) Using a chisel and a hammer, loosen the staked part of the nut.
- (b) Using SST, hold the flange and remove the nut.
SST 09330-00021

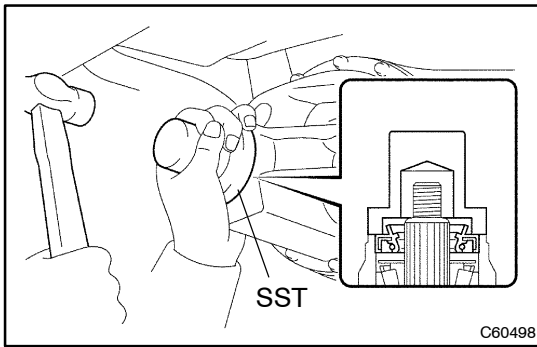


- (c) Using SST, remove the companion flange.
SST B265 (10.5"): 09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03040)
B305 (12"): 09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03050)

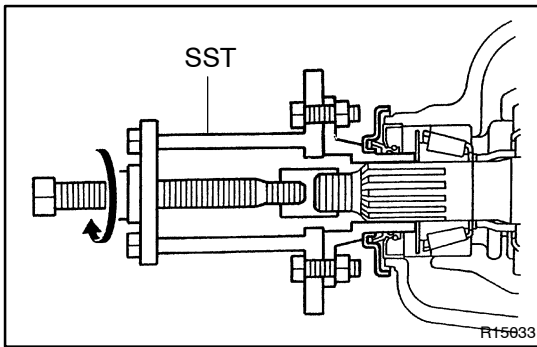


4. REMOVE REAR DIFFERENTIAL CARRIER OIL SEAL

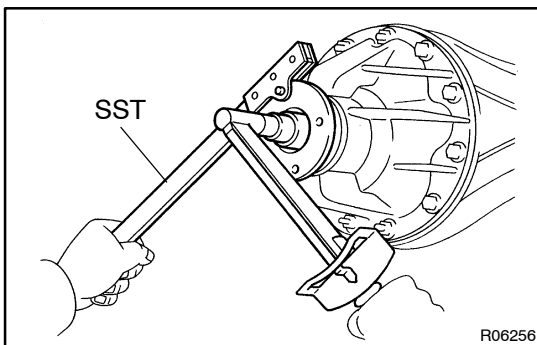
- (a) Using SST, remove the oil seal.
SST 09308-10010

**5. INSTALL REAR DIFFERENTIAL CARRIER OIL SEAL**

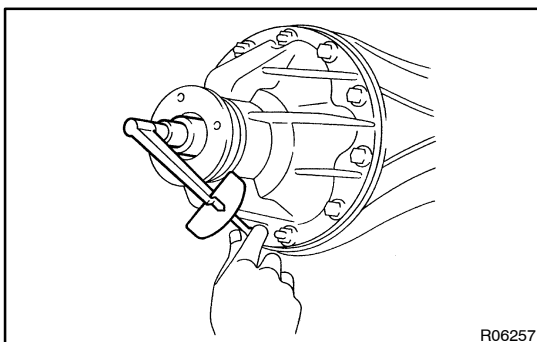
- (a) Apply MP grease to the lip of a new oil seal.
- (b) Using SST and a hammer, tap in the oil seal.
SST 09223-78010 (for B265, B305 model)
Oil seal drive in depth: 0 mm (0 in.)

**6. INSTALL REAR DRIVE PINION COMPANION FLANGE SUB-ASSY REAR**

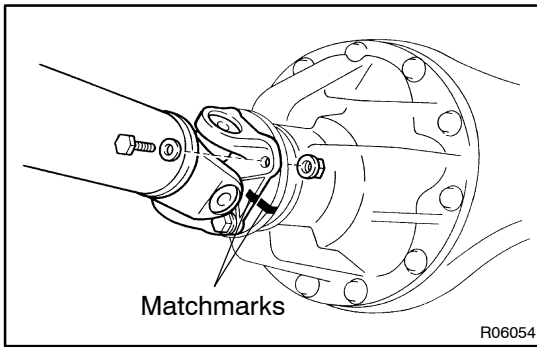
- (a) Using SST, install the companion flange on the drive pinion.
SST B265 (10.5"): 09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03040)
B305 (12"): 09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03050)
- (b) Apply a light coat of gear oil on the threads of a new companion flange nut.



- (c) Using SST, hold the flange and tighten the nut.
SST 09330-00021

Torque:**B265: 304 N·m (3,100 kgf·cm, 224 ft·lbf)****B305: 270 N·m (2,750 kgf·cm, 199 ft·lbf)****7. INSPECT TOTAL PRELOAD**

- (a) Using a torque wrench, measure the maximum torque within the backlash between the drive pinion and ring gear when the companion flange begins to rotate.
Preload: 1.20 - 3.15 N·m (12.3 - 32.1 kgf·cm, 8.9 - 23.2 in·lbf)

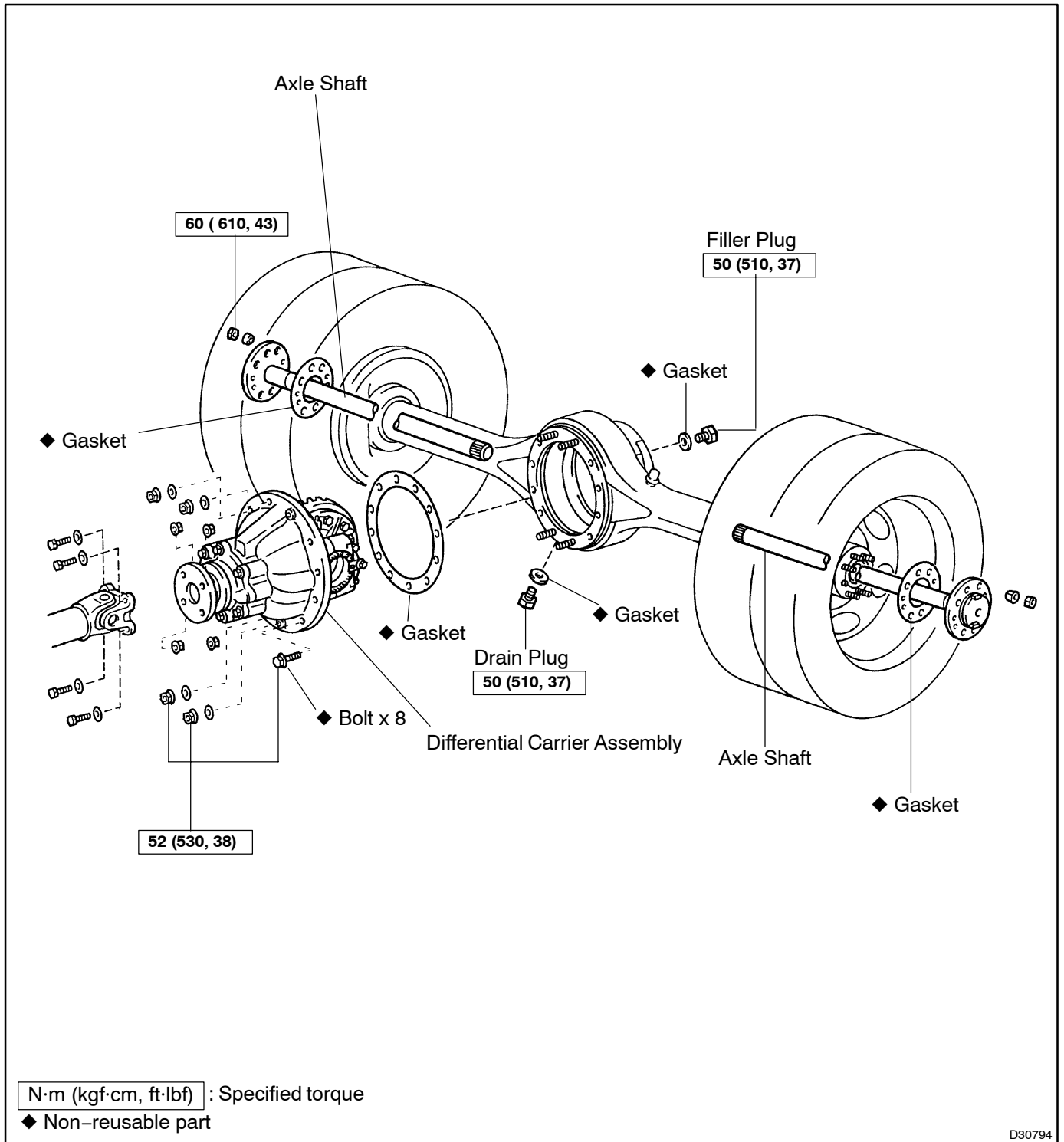
**8. INSTALL PROPELLER SHAFT ASSY**

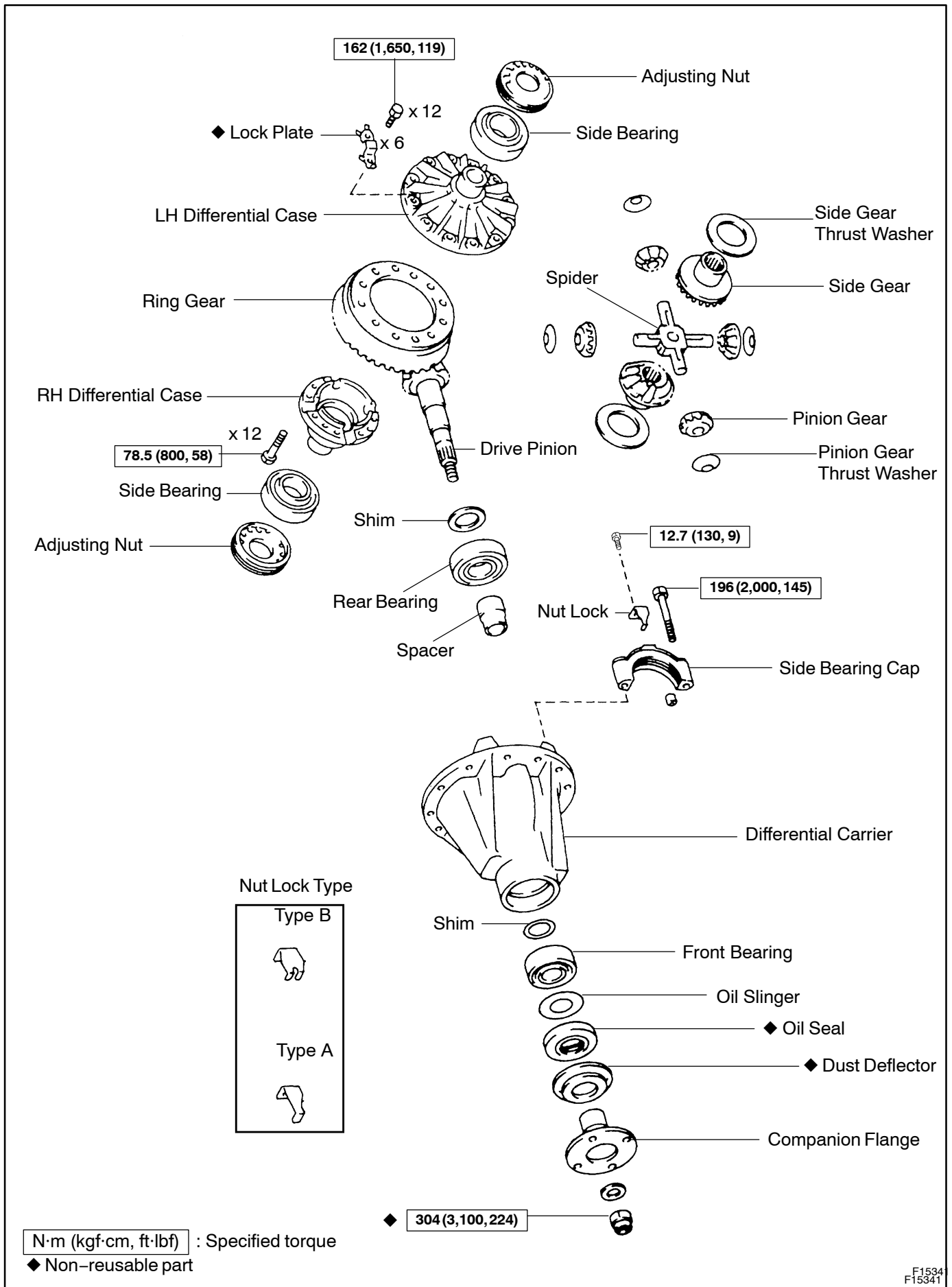
- (a) Align the matchmarks and connect the propeller shaft to the companion flange with the 4 bolts, washers and nuts.
- (b) Tighten the nuts (See page 30-4 or 30-11).

9. ADD DIFFERENTIAL OIL (See page 29-2)

DIFFERENTIAL CARRIER ASSY REAR (B265) COMPONENTS

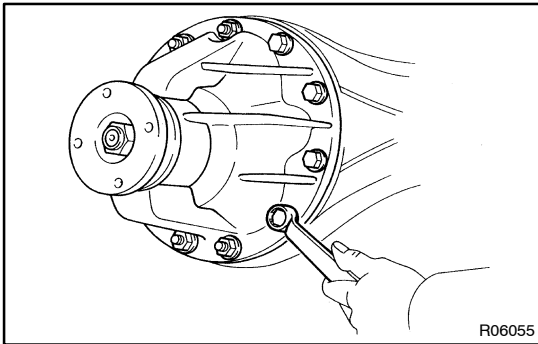
2907T-01





OVERHAUL

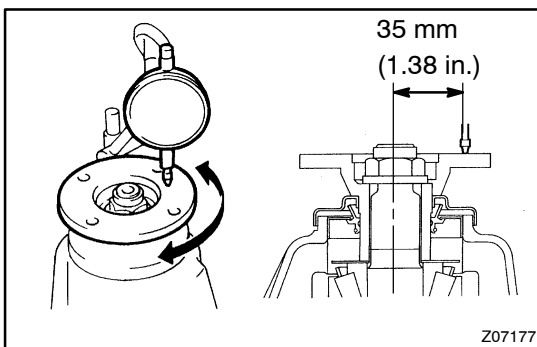
1. DRAIN DIFFERENTIAL OIL (See page 29-2)
2. REMOVE REAR AXLE SHAFT (See page 30-72 or 30-75)
3. REMOVE PROPELLER SHAFT ASSY (See page 30-6 or 30-14)



4. REMOVE DIFFERENTIAL CARRIER ASSY REAR
 - (a) Remove the 8 bolts, 4 nuts, 4 washers and the differential carrier assy, and then remove the gasket.

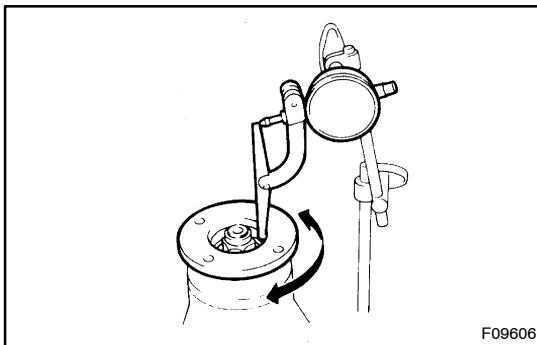
NOTICE:

Be careful not to damage the installation surface.



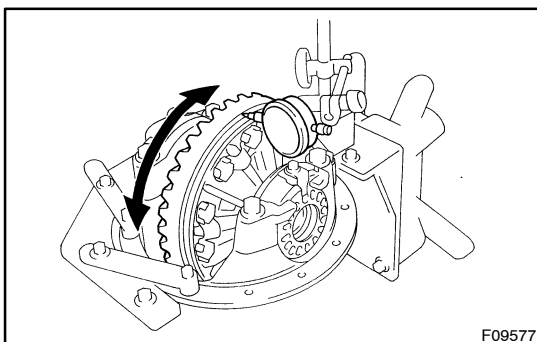
5. INSPECT DIFFERENTIAL CARRIER ASSY REAR
 - (a) Check the companion flange.
 - (1) Using a dial indicator, measure the longitudinal runout.

Maximum longitudinal runout: 0.10 mm (0.0039 in.)



- (2) Using a dial indicator, measure the lateral runout .
- Maximum lateral runout: 0.15 mm (0.0059 in.)**

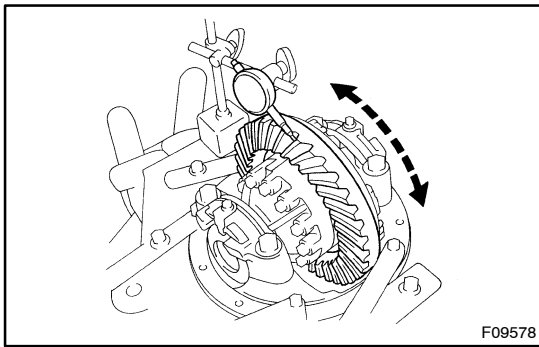
If the runout is greater than the maximum, replace the companion flange.



- (b) Check the ring gear.
 - (1) Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.10 mm (0.0039 in.)

If the runout is greater than the maximum, replace the ring gear.



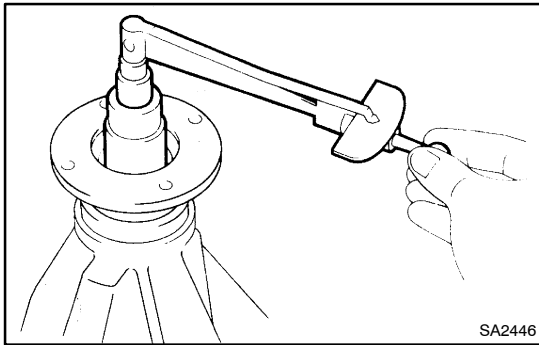
- (2) Using a dial indicator, measure the ring gear backlash.

Backlash: 0.15 – 0.20 mm (0.0059 – 0.0079 in.)

HINT:

Perform the measurements at 3 or more positions around the circumference of the ring gear.

If the backlash is not as specified, adjust the side bearing preload as necessary.



- (c) Check the drive pinion preload.

- (1) Using a torque wrench, measure the maximum torque within the backlash between the drive pinion and ring gear when the companion flange begins to rotate.

Drive pinion preload:

0.78 – 1.27 N·m (8 – 13 kgf·cm, 6.9 – 11.3 in.·lbf)

If the preload is not as specified, check around the drive pinion bearings.

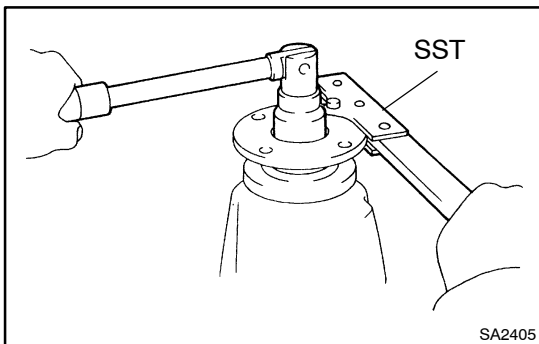
- (d) Check the total preload.

- (1) Using a torque wrench, measure the maximum torque without the backlash between the drive pinion and ring gear when the companion flange begins to rotate.

Total preload:

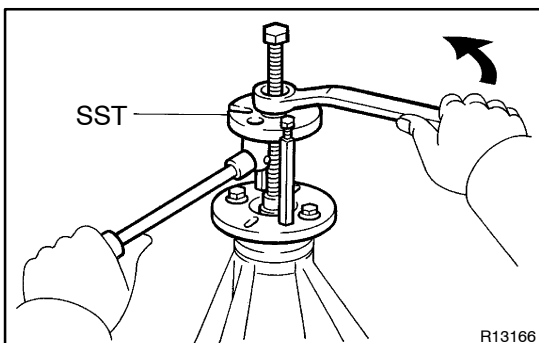
Drive pinion preload + 0.2 – 0.39 N·m (2 – 4 kgf·cm, 1.7 – 3.5 in.·lbf)

If the preload is not as specified, inspect the differential carrier assembly.

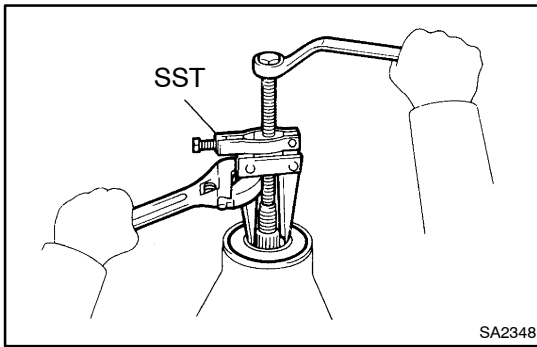


6. REMOVE REAR DRIVE PINION COMPANION FLANGE SUB-ASSY REAR

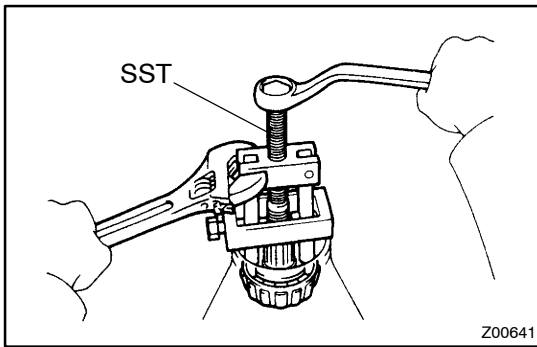
- (a) Using a chisel and a hammer, unstick the nut.
 (b) Using SST, hold the flange and remove the nut.
 SST 09330-00021



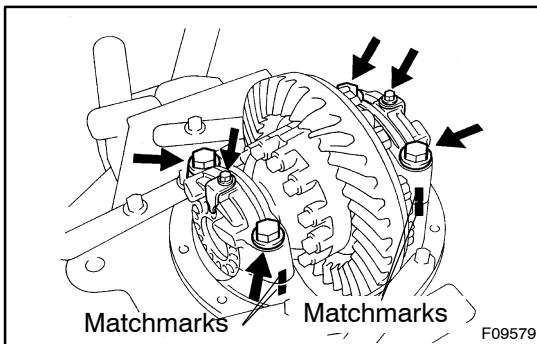
- (c) Using SST, remove the companion flange.
 SST 09950-30011 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03040)



- 7. REMOVE REAR DIFFERENTIAL CARRIER OIL SEAL**
 (a) Using SST, remove the oil seal from the differential carrier.
 SST 09308-10010
- 8. REMOVE REAR DIFFERENTIAL DRIVE PINION OIL SLINGER**



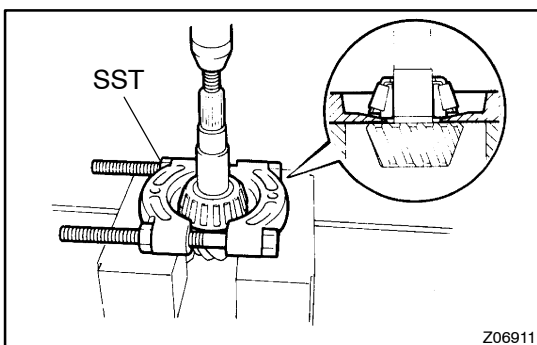
- 9. REMOVE FRONT BEARING**
 (a) Using SST, remove the bearing from the drive pinion.
 SST 09556-22010
- If the front bearing is damaged or worn, replace the bearing.
- (b) Remove the 2 shims.
 (c) Remove the bearing spacer.



- 10. REMOVE REAR DIFFERENTIAL CASE SUB-ASSY**
 (a) Place matchmarks on the bearing cap and differential carrier.
 (b) Remove the 2 adjusting nut locks.
 (c) Remove the 4 bolts, 2 bearing caps and adjusting nuts.
 (d) Remove the differential case together with bearing outer races from the carrier.

HINT:

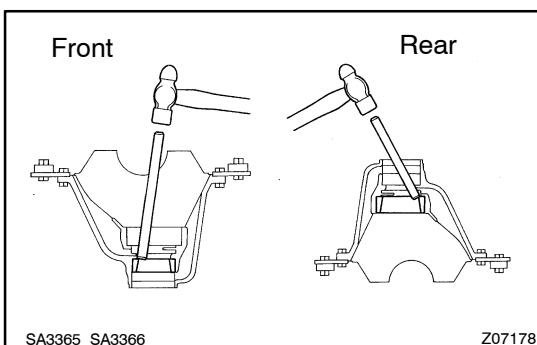
Tag the removed parts to show the location for installation.



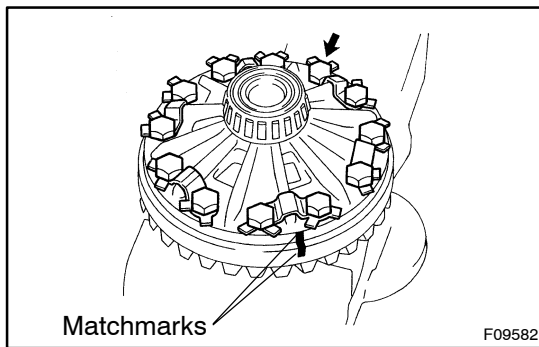
- 11. REMOVE DRIVE PINION REAR BEARING**
 (a) Using SST and a press, press out the bearing from the drive pinion.
 SST 09950-00020

HINT:

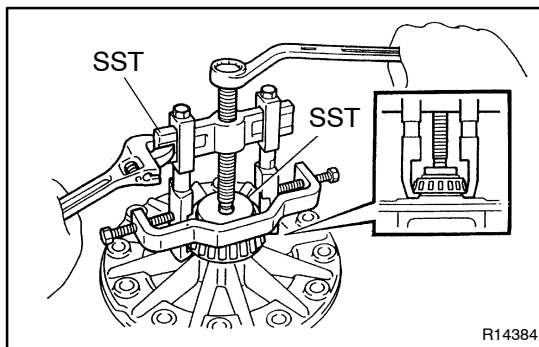
If the drive pinion or ring gear is damaged, replace them as a set.



- 12. REMOVE FRONT AND REAR BEARING OUTER RACES**
 (a) Using a bar and hammer, tap out the outer races.

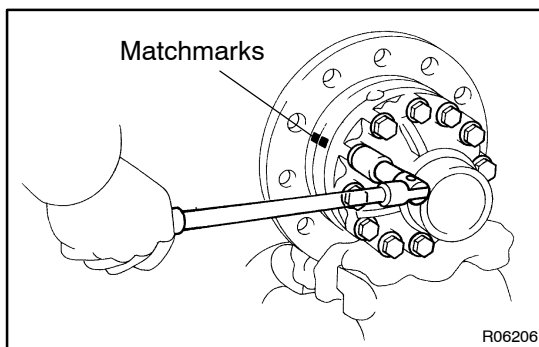
**13. REMOVE RING GEAR**

- (a) Place matchmarks on the ring gear and differential case.
- (b) Using a screwdriver, unstake the lock plates.
- (c) Remove the 12 bolts and 6 lock plates.
- (d) Using a plastic hammer, remove the ring gear to separate it from the differential case.

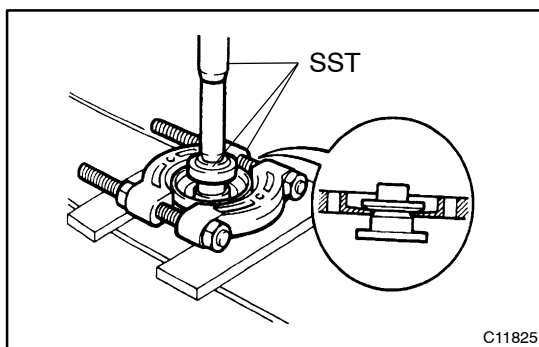
**14. REMOVE REAR DIFFERENTIAL CASE BEARING**

- (a) Using SST, remove the 2 side bearings from the differential case.

SST 09950-40011 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09957-04010, 09958-04011) 09950-60010 (09951-00480)

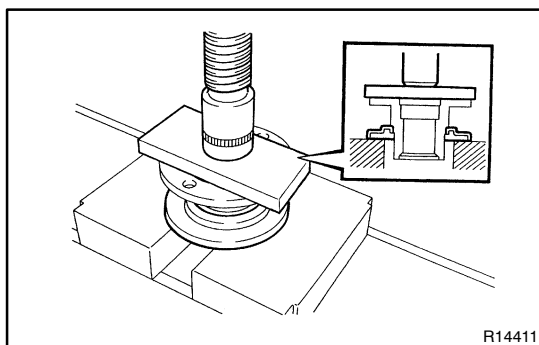
**15. REMOVE PINION AND SIDE GEARS**

- (a) Place matchmarks on the LH and RH cases.
- (b) Protect the ring gear attaching face with a cloth and secure it in a vice. Then remove the 12 bolts.
- (c) Using a plastic hammer, separate the LH and RH cases.
- (d) Remove the 4 pinion gear thrust washers.
- (e) Remove the 4 pinion gears.
- (f) Remove the 2 side gears.
- (g) Remove the 2 side gears thrust washers.
- (h) Remove the spider.

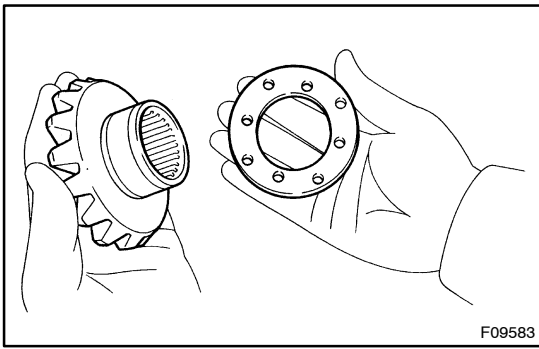
**16. REMOVE REAR DIFFERENTIAL DUST DEFLECTOR**

- (a) Using SST and a press, press out the dust deflector from the companion flange.

SST 09950-60010 (09951-00480), 09950-70010 (09951-07150) 09950-00020

**17. INSTALL REAR DIFFERENTIAL DUST DEFLECTOR**

- (a) Using a press, press in a new dust deflector.



18. ADJUST DIFFERENTIAL SIDE GEAR BACKLASH

(a) Install the thrust washer on the side gears.

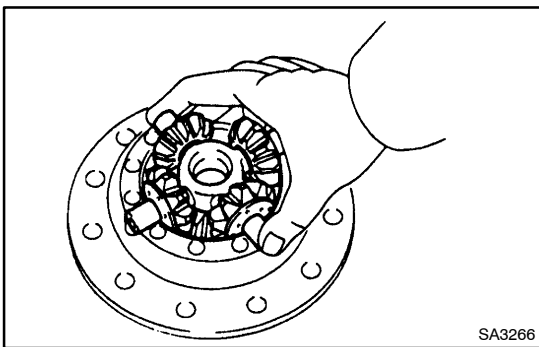
HINT:

Select thrust washers that allow the backlash to be within the specification.

Thrust washer:

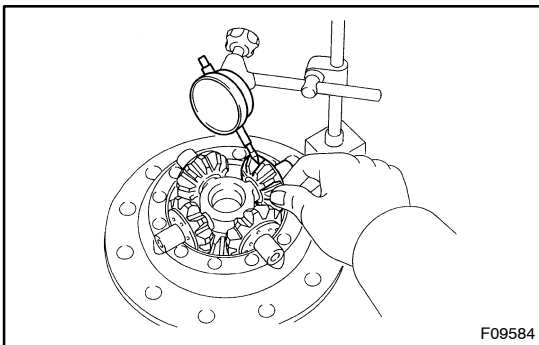
1.55 mm (0.0610 in.)	1.60 mm (0.0630 in.)
1.65 mm (0.0650 in.)	1.70 mm (0.0670 in.)
1.75 mm (0.0689 in.)	1.80 mm (0.0709 in.)
1.85 mm (0.0728 in.)	1.90 mm (0.0748 in.)
1.95 mm (0.0768 in.)	2.00 mm (0.0787 in.)
2.05 mm (0.0807 in.)	2.10 mm (0.0827 in.)

(b) Install the side gear to the LH case.



(c) Install the 4 pinion gears and thrust washers to the spider.

(d) Install the spider with the pinion gears to the LH case.



(e) Holding the side gear, measure the side gear backlash.

Backlash: 0.02 – 0.20 mm (0.0008 – 0.0079 in.)

HINT:

- Measure the backlash at the RH case and LH case.
- If the backlash is not within the specification, install a thrust washer with a different thickness.
- Use thrust washers with the same thickness on both the right and left sides.

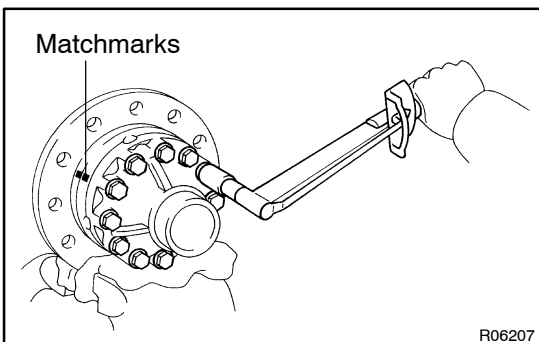
(f) Install the side gear and thrust washer to the RH case.

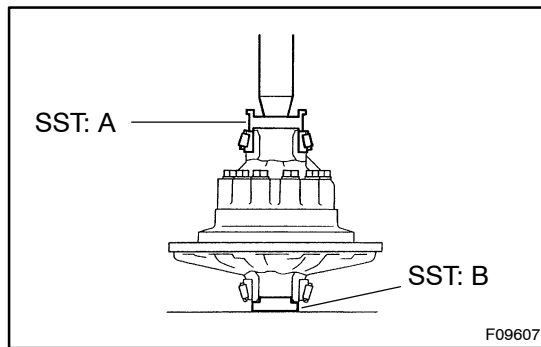
(g) Apply gear oil to each part.

(h) Align the matchmarks on the LH and RH cases.

(i) Install the 12 bolts.

Torque: 78.5 N·m (800 kgf·cm, 58 ft·lbf)

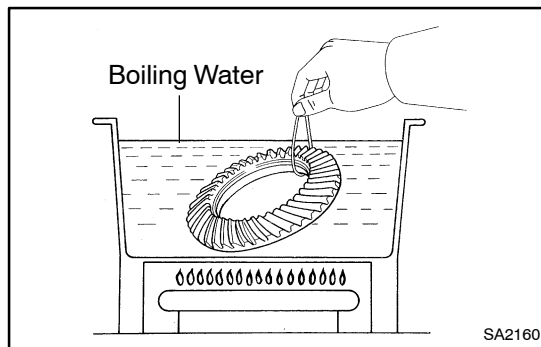


**19. INSTALL REAR DIFFERENTIAL CASE BEARING**

- (a) Using SST and a press, install the 2 side bearings to the differential case.

SST A: 09316-20011

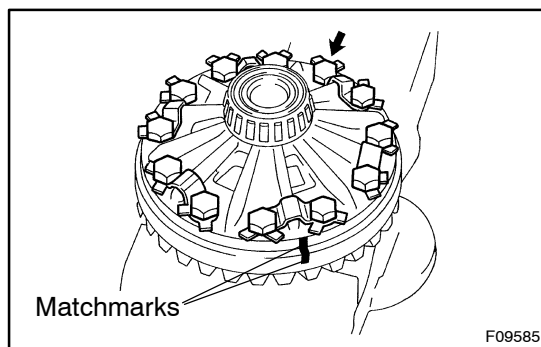
B: 09950-60010 (09951-00500)

**20. INSTALL RING GEAR**

- (a) Heat the ring gear in boiling water.
- (b) Clean the contact surfaces of the differential case and ring gear.
- (c) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.

HINT:

Align the matchmarks on the ring gear and the differential case.



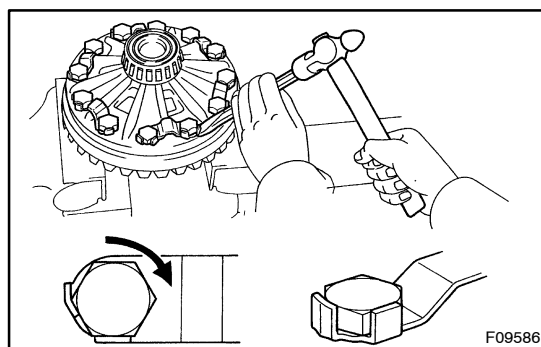
- (d) Install 6 new lock plates and temporarily install the 12 bolts so that the bolt holes in the ring gear and differential case are not misaligned.

NOTICE:

The ring gear set bolts should not be tightened until the ring gear has sufficiently cooled down.

- (e) After the ring gear has sufficiently cooled down, tighten the ring gear set bolts.

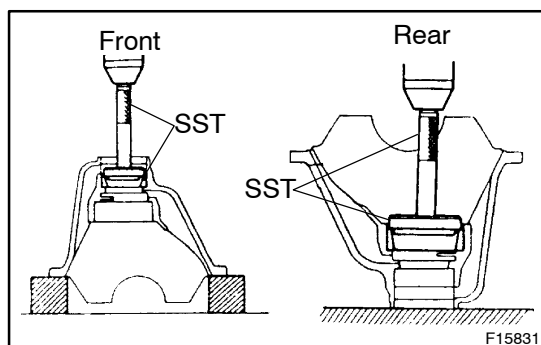
Torque: 161.8 N·m (1,650 kgf·cm, 119 ft·lbf)



- (f) Using a hammer and a chisel, stake the lock plates.

HINT:

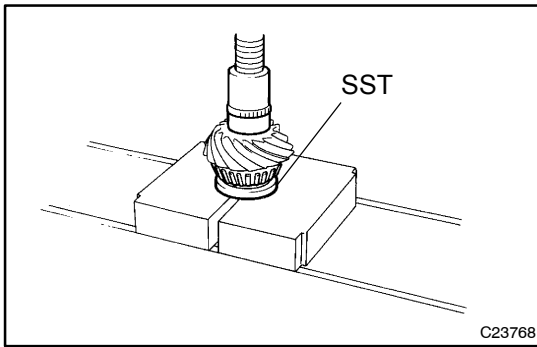
Stake one claw flush with the flat surface of the nut. Since the claw touches the protruding portion of the nut, stake the half of it on the tightening side.

**21. INSTALL FRONT AND REAR BEARING OUTER RACE**

- (a) Using SST and a press, press in new outer races.

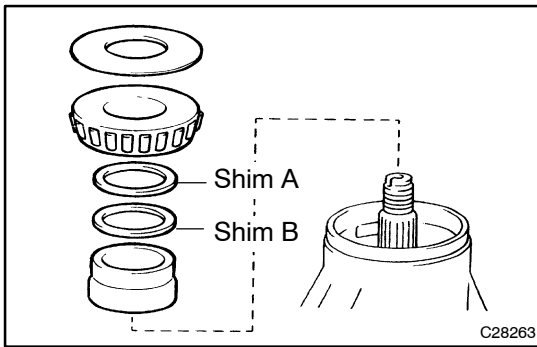
SST Front: 09950-60020 (09951-00780),
09950-70010 (09951-07150)

Rear: 09950-60020 (09951-01030),
09950-70010 (09951-07150)



22. INSTALL DRIVE PINION REAR TAPERED ROLLER BEARING

- (a) Using SST and a press, press in the bearing onto the drive pinion.
SST 09506-35010



23. ADJUST DRIVE PINION PRELOAD

HINT:

When reusing the drive pinion bearings, skip steps (e), (f), (g) and (h).

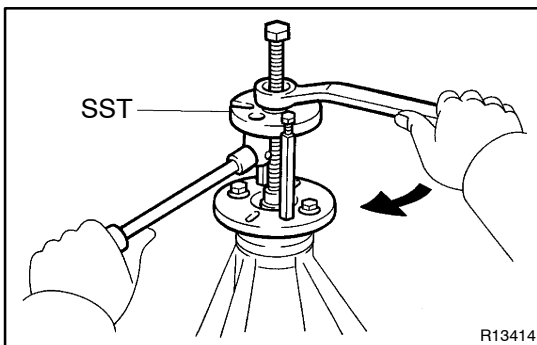
- (a) Install the drive pinion, spacer, shims A and B, front bearing and oil slinger.

HINT:

- When replacing the drive pinion bearings, install the thickest shim A and B.
- Assemble and install the oil seal after adjusting the total preload.

Shim A: 90564-35035

Shim B: 90564-35040



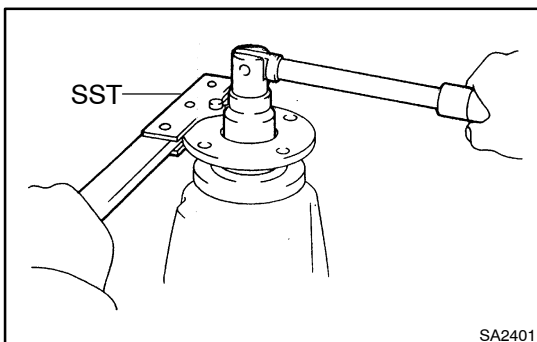
- (b) Using SST, install the companion flange.

SST 09950-30011 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03040)

- (c) Install a new nut.

HINT:

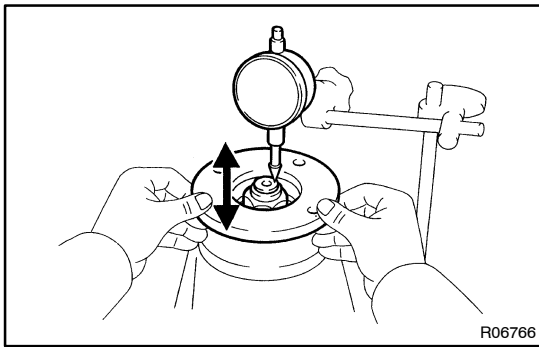
Coat the threads of the nut with gear oil.



- (d) Using SST, hold the flange and tighten the nut.

SST 09330-00021

Torque: 304 N·m (3,100 kgf·cm, 224 ft·lbf)

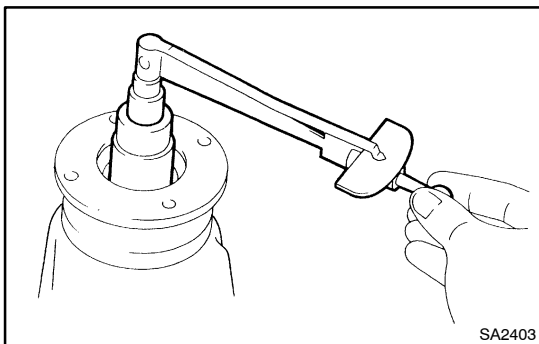


- (e) Using a dial indicator, measure the drive pinion axial play and make a note of it.
- (f) Calculate the value "T".
 $T = 4.89 \text{ mm (0.1925 in.)} - \text{Drive pinion axial play}$
- (g) Select shims A and B so that the sum of the 2 shims is closest to value "T".

Shim thickness:

Shim A thickness mm (in.) at interval of 0.1 (0.0039)	Shim B thickness mm (in.) at interval of 0.01 (0.0004)
1.90 (0.0748)	1.80 (0.0709)
2.00 (0.0787)	1.81 (0.0713)
2.10 (0.0827)	1.82 (0.0717)
2.20 (0.0866)	1.83 (0.0720)
2.30 (0.0906)	1.84 (0.0724)
2.40 (0.0945)	1.85 (0.0728)
2.50 (0.0948)	1.86 (0.0732)
2.60 (0.1024)	1.87 (0.0736)
2.70 (0.1063)	1.88 (0.0740)
2.80 (0.1102)	1.89 (0.0744)
2.90 (0.1142)	-
3.00 (0.1181)	-

- (h) Remove the companion flange, front oil slinger, front bearing and 2 shims.
- (i) Install the selected shims, front oil slinger and companion flange (See steps (a) to (d)).



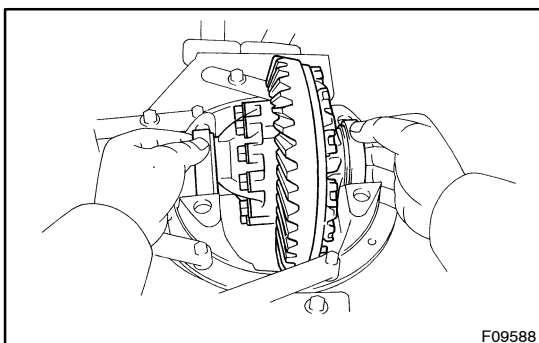
- (j) Using a torque wrench, measure the drive pinion preload.
Preload (at starting):

New bearing	1.86 – 5.39 N·m (19 – 55 kgf·cm, 16.5 – 47.7 in·lbf)
Reused bearing	0.78 – 1.27 N·m (8 – 13 kgf·cm, 6.9 – 11.3 in·lbf)

HINT:

Measure the preload after snagging the bearing down by rotating it left and right several times.

If the preload is not as specified, adjust by increasing or decreasing the thickness of shims.



24. INSTALL REAR DIFFERENTIAL CASE SUB-ASSY

- (a) Place the bearing outer races on their respective bearings.

NOTICE:

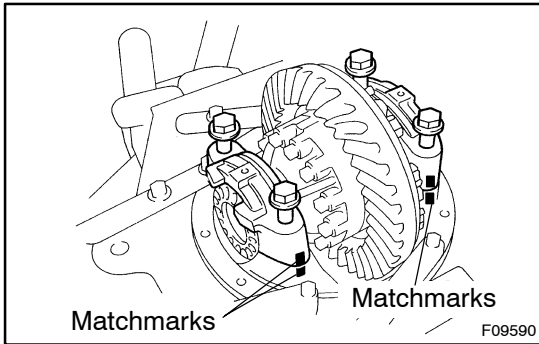
Check the left and right outer races are not interchanged.

- (b) Install the differential case.

HINT:

Check that there is backlash between the ring gear and drive pinion.

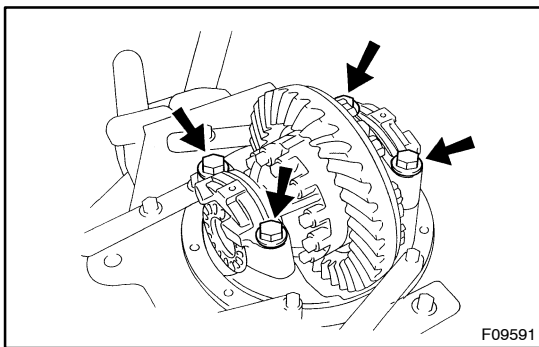
- (c) Install the 2 adjusting nuts on the carrier, making sure that the nuts are properly threaded.



- (d) Align the matchmarks on the cap and carrier. Screw in the 2 bearing cap bolts 2 or 3 turns and press down the bearing cap by hand.

HINT:

If the bearing cap does not tightly fit the carrier, the adjusting nuts may not be properly threaded. Reinstall the adjusting nuts if necessary.



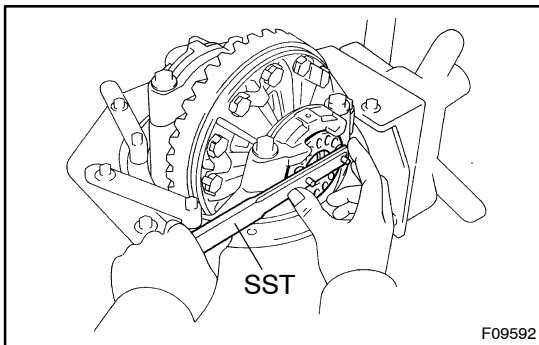
25. ADJUST SIDE BEARING PRELOAD

- (a) Tighten the 4 bearing cap bolts to the specified torque, and then loosen them to the point where the adjusting nuts can be turned using SST.

SST 09504-00011

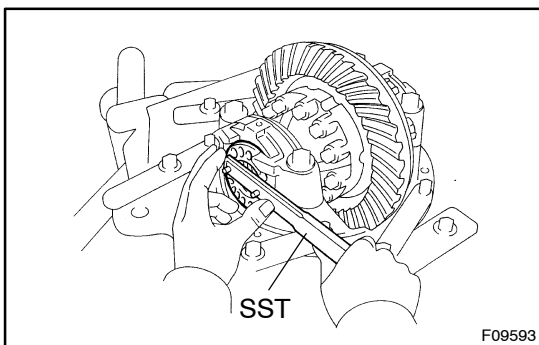
Torque: 196 N·m (2,000 kgf·cm, 145 ft·lbf)

- (b) Fully tighten the 4 bearing cap bolts by hand.

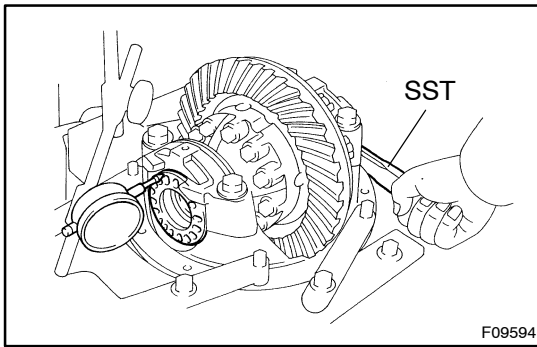


- (c) Using SST, tighten the adjusting nut on the ring gear side until the ring has a backlash of approximately 0.18 mm (0.007 in.).

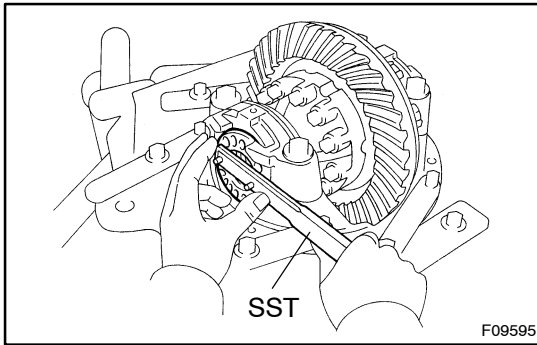
SST 09504-00011



- (d) While turning the ring gear, use the SST to fully tighten the adjusting nut on the drive pinion side.
- (e) After the bearings are settled, loosen the adjusting nut on the drive pinion side.



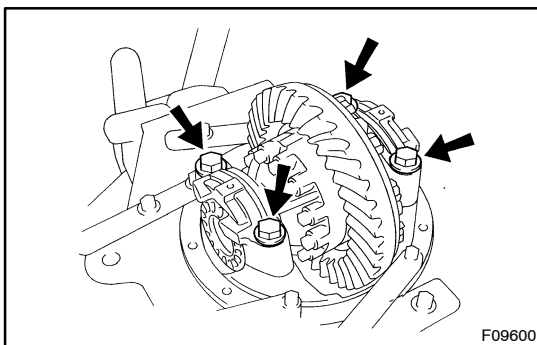
- (f) Place a dial indicator on the top of the bearing inner race on the ring gear side.
- (g) Adjust the side bearing for zero preload by tightening the other adjusting nut until the pointer on the indicator begins to move.



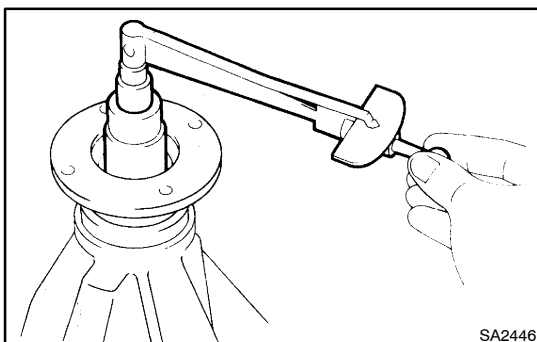
- (h) Using SST, tighten the adjusting nut 1 – 1.5 notches from the zero preload position.
SST 09504-00011
- (i) Using a dial indicator, adjust the ring gear backlash so that it will be within the specification.
Backlash: 0.15 – 0.20 mm (0.0059 – 0.0079 in.)

HINT:

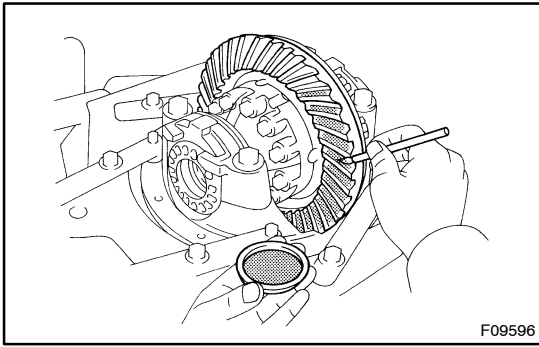
The backlash should be adjusted by turning the left and right adjusting nuts by equal amounts. For example, loosen the nut on the left side one notch and torque the nut on the right side one notch.



- (j) Tighten the bearing cap bolts.
Torque: 196 N·m (2,000 kgf·cm, 145 ft·lbf)
- (k) Recheck the ring gear backlash.
Backlash: 0.15 – 0.20 mm (0.0059 – 0.0079 in.)

**26. INSPECT TOTAL PRELOAD**

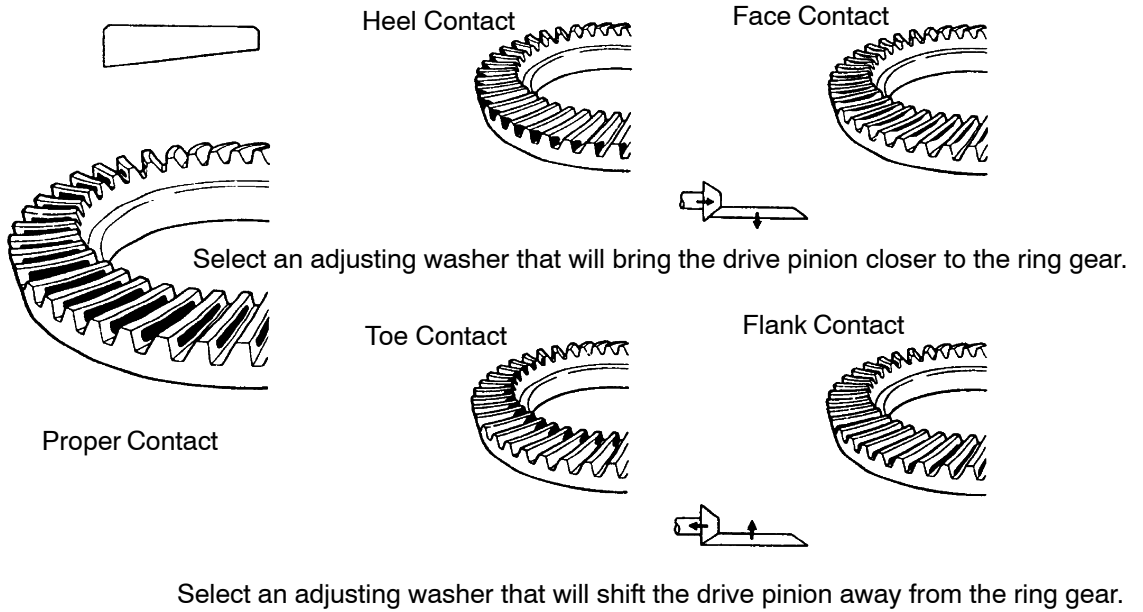
- (a) Using a torque wrench, measure the total preload.
Total preload:
Drive pinion preload + (0.2 – 0.39) N·m (2 – 4 kgf·cm, 1.7 – 3.5 in.·lbf)



27. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

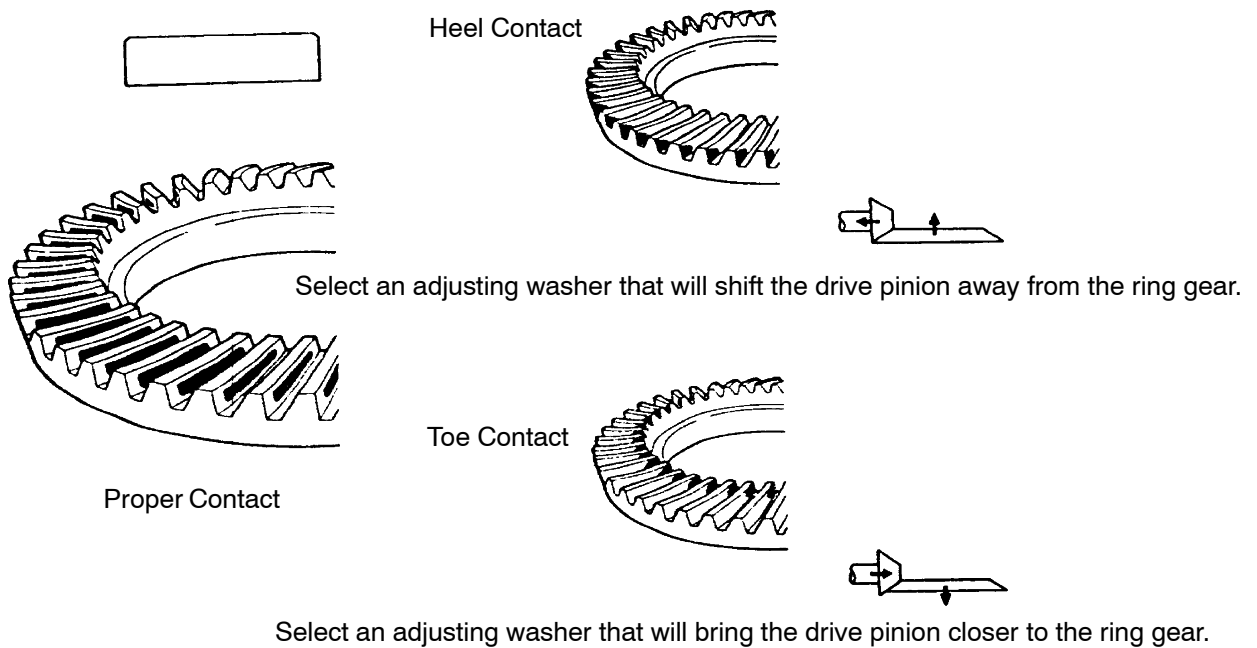
- (a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead.
- (b) Turn the companion flange in both directions to inspect the ring gear for proper tooth contact.

Taper Cut Gear Type:

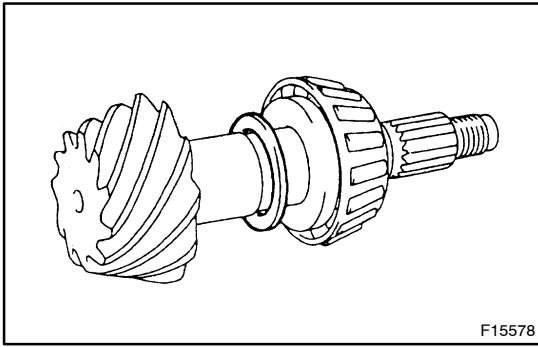


D30850

Straight Cut Gear Type:



D30851



If the teeth are not properly contacting, use the following chart to select a proper shim for correction.

NOTICE:

- When the gear is a straight cut gear type and the tooth have face contact or flank contact, replace the ring gear and the drive pinion as a set.
- In the case of face contact or flank contact, the gear may be able to be adjusted within the specified range of backlash.

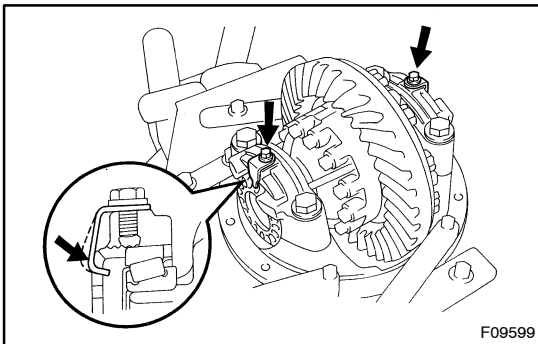
Shim thickness:

1.05 mm (0.0413 in.)	1.35 mm (0.0531 in.)
1.075 mm (0.0423 in.)	1.375 mm (0.0541 in.)
1.10 mm (0.0433 in.)	1.40 mm (0.0551 in.)
1.125 mm (0.0443 in.)	1.425 mm (0.0561 in.)
1.15 mm (0.0453 in.)	1.45 mm (0.0571 in.)
1.175 mm (0.0463 in.)	1.475 mm (0.0581 in.)
1.20 mm (0.0472 in.)	1.50 mm (0.0591 in.)
1.225 mm (0.0482 in.)	1.525 mm (0.0600 in.)
1.25 mm (0.0492 in.)	1.55 mm (0.0610 in.)
1.275 mm (0.0502 in.)	-
1.30 mm (0.0512 in.)	-
1.325 mm (0.0522 in.)	-

HINT:

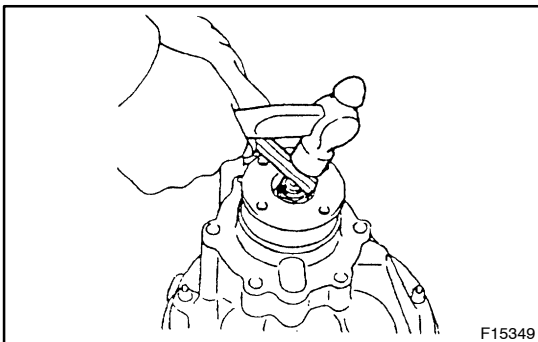
Use one or more shims for adjustment.

28. CHECK TOTAL PRELOAD (See step 26)
29. CHECK RING GEAR BACKLASH (See step 5)
30. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See step 27)
31. CHECK RUNOUT OF COMPANION FLANGE (See step 5)



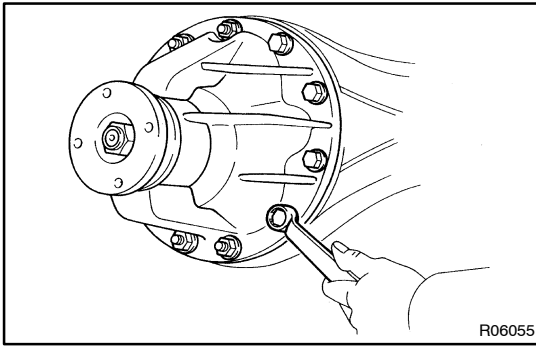
32. INSTALL ADJUSTING NUT LOCKS

- (a) Install 2 new nut locks on the bearing caps.
Torque: 12.7 N·m (130 kgf·cm, 9.4 ft·lbf)



33. STAKE DRIVE PINION NUT

- (a) Using a chisel and a hammer, caulk the nut.

**34. INSTALL DIFFERENTIAL CARRIER ASSY REAR**

- (a) Clean the contact surface of the differential case and rear axle housing.
- (b) Apply adhesive to the 8 bolts and new gasket.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

- (c) Install the new gasket to the axle housing.
- (d) Install the differential carrier assy with the 8 bolts, 4 nuts and 4 washers.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

35. INSTALL PROPELLER SHAFT ASSY (See page 30-4 or 30-11)

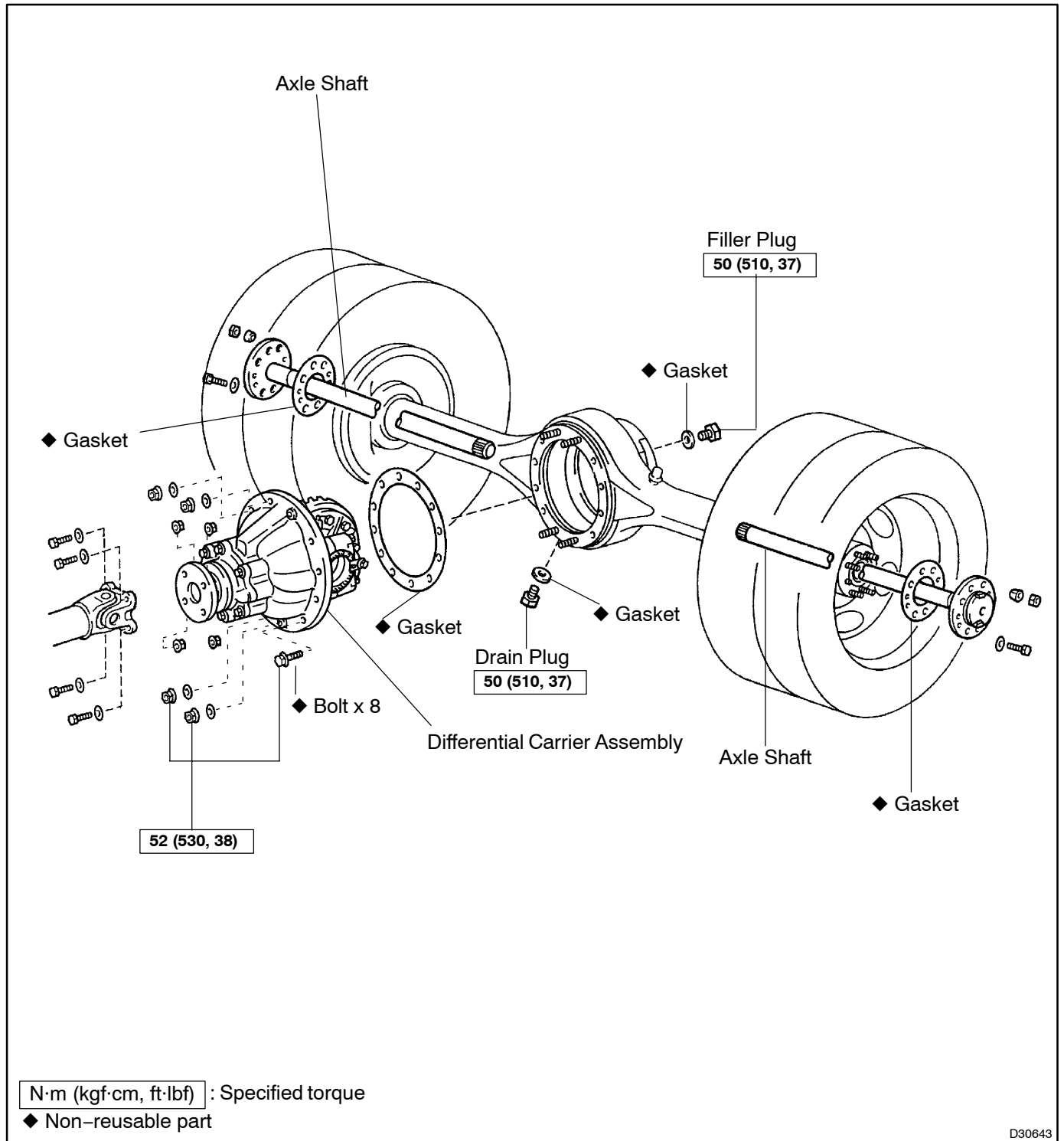
36. INSTALL REAR AXLE SHAFT (See page 30-73 or 30-75)

37. ADD DIFFERENTIAL OIL (See page 29-2)

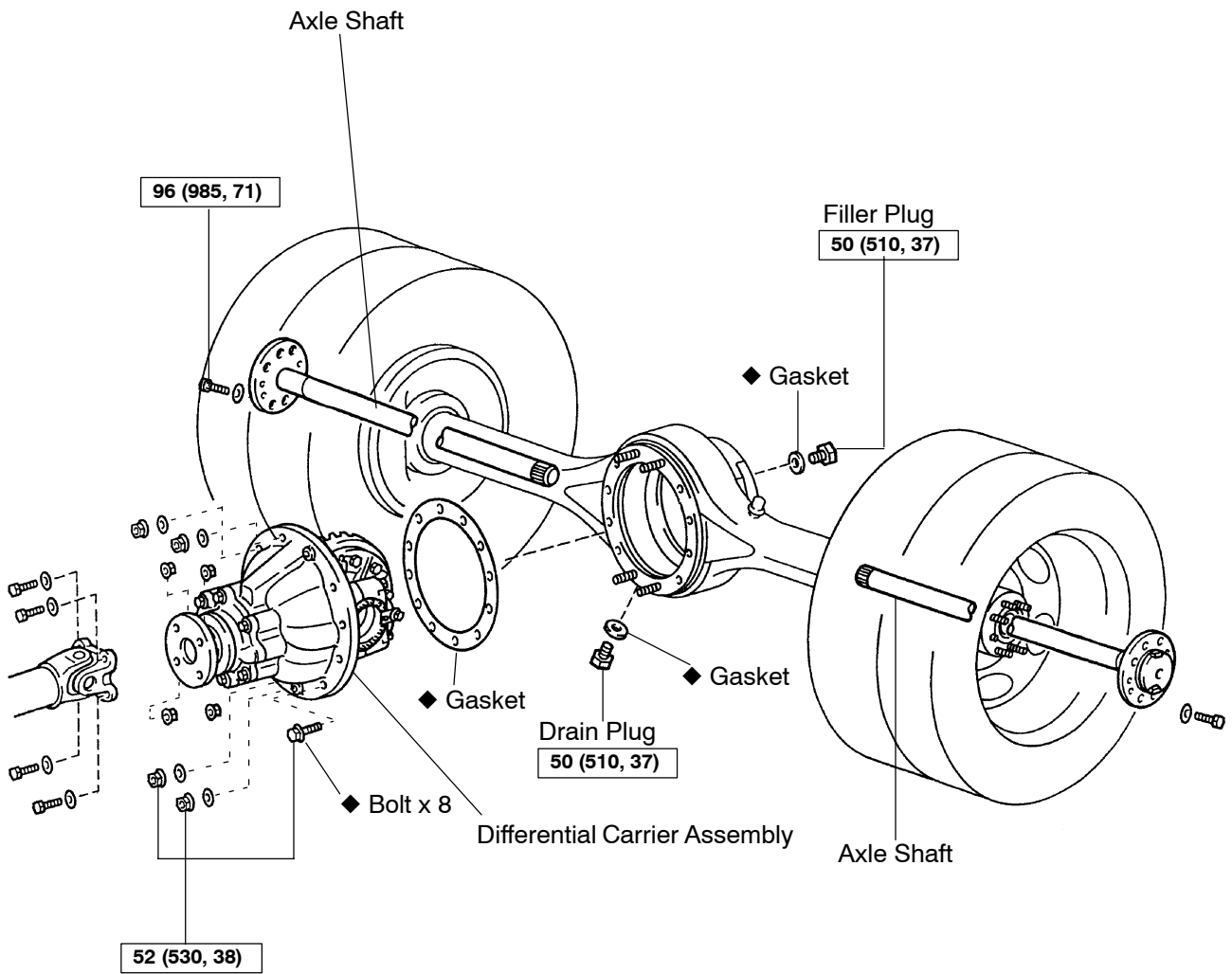
DIFFERENTIAL CARRIER ASSY REAR (B305)

COMPONENTS

2907R-01

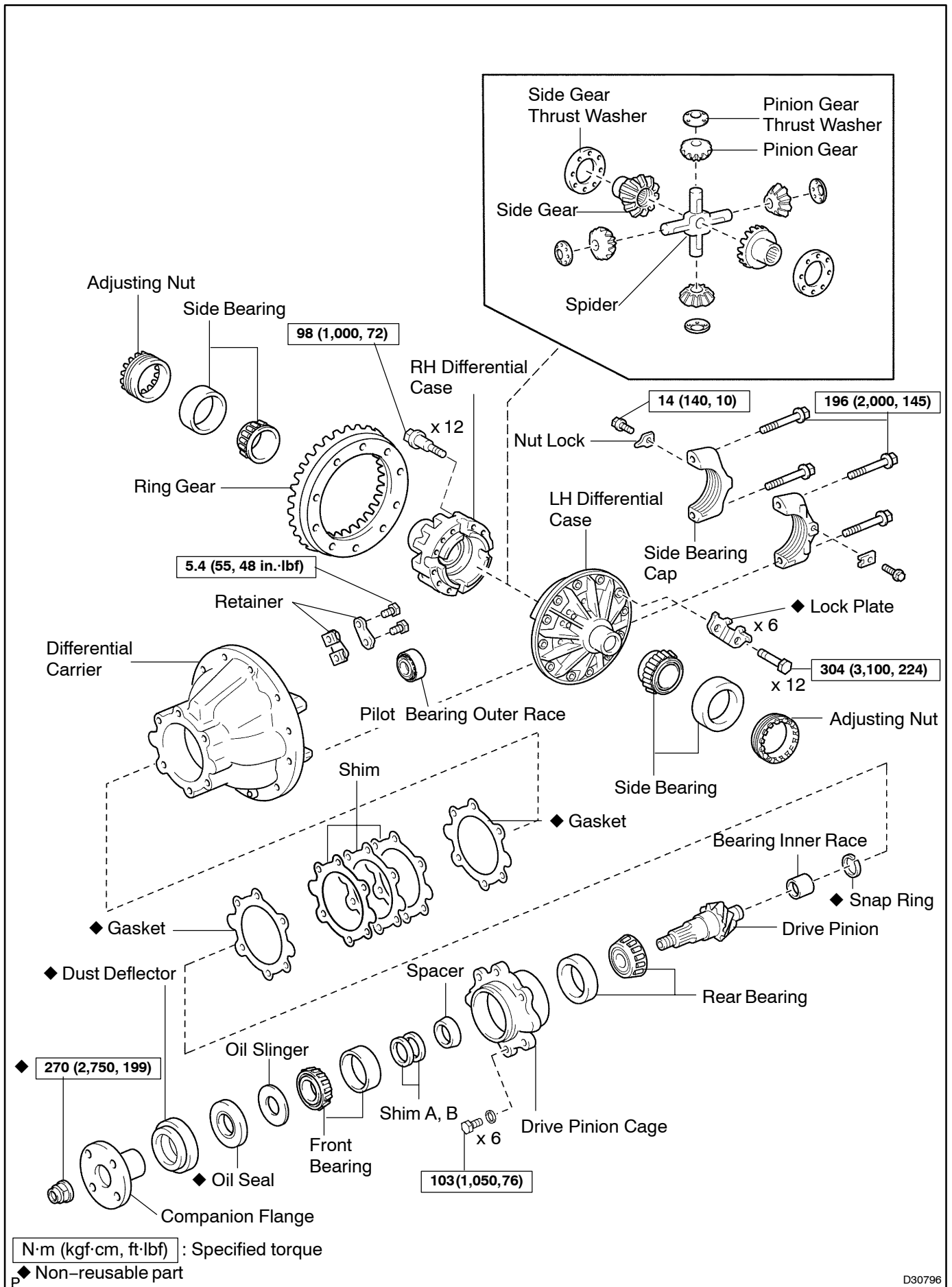


Regular Cab 4t, Wide Cab 3t or More



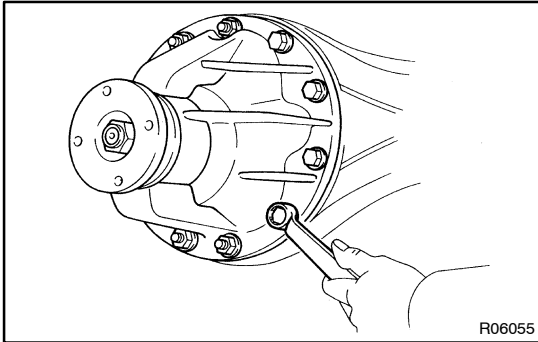
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part



OVERHAUL

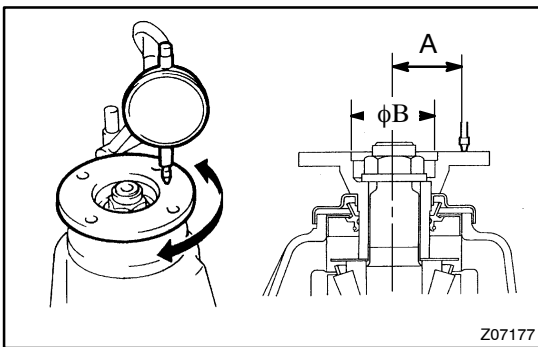
1. DRAIN DIFFERENTIAL OIL
2. REMOVE REAR AXLE SHAFT (See page 30-72 or 30-75)
3. REMOVE PROPELLER SHAFT ASSY (See page 30-6 or 30-14)



4. REMOVE DIFFERENTIAL CARRIER ASSY REAR
 - (a) Remove the 8 bolts, 4 nuts, 4 washers and the differential carrier assy, and then remove the gasket.

NOTICE:

Be careful not to damage the installation surface.

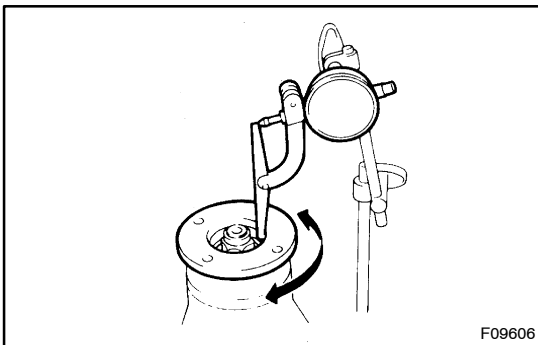


5. INSPECT DIFFERENTIAL CARRIER ASSY REAR
 - (a) Check the companion flange.
 - (1) Using a dial indicator, measure the longitudinal runout.

Maximum longitudinal runout:

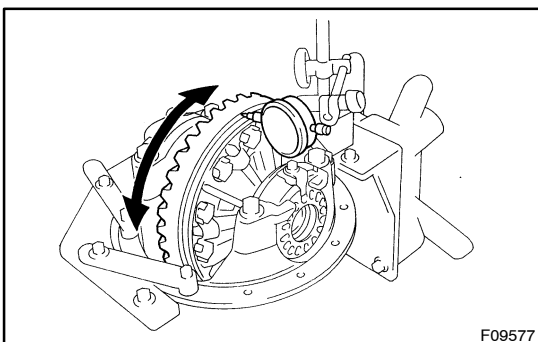
$\phi B = \phi 46, A = 35$: 0.10 mm (0.0039 in.)

$\phi B = \phi 70, A = 38$: 0.11 mm (0.0043 in.)



- (2) Using a dial indicator, measure the lateral runout .
- Maximum lateral runout: 0.10 mm (0.0039 in.)**

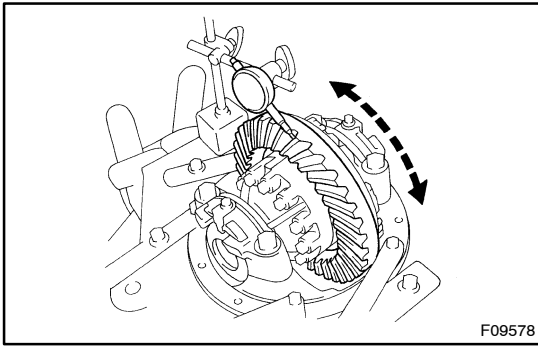
If the runout is greater than the maximum, replace the companion flange.



- (b) Check the ring gear.
 - (1) Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.10 mm (0.0039 in.)

If the runout is greater than the maximum, replace the ring gear.



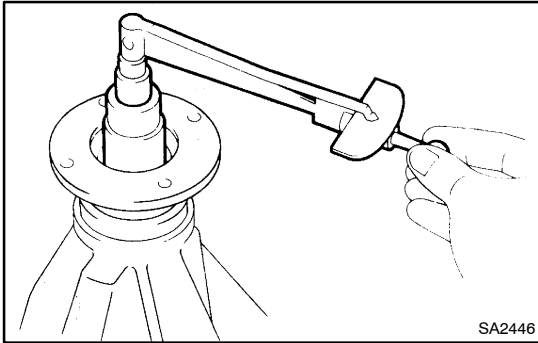
- (2) Using a dial indicator, measure the ring gear backlash.

Backlash: 0.15 – 0.20 mm (0.0059 – 0.0079 in.)

HINT:

Perform the measurements at 3 or more positions around the circumference of the ring gear.

If the backlash is not as specified, adjust the side bearing preload as necessary.



- (c) Check the drive pinion preload.

- (1) Using a torque wrench, measure the maximum torque within the backlash between the drive pinion and ring gear when the companion flange begins to rotate.

Drive pinion preload:

0.78 – 1.27 N·m (8 – 13 kgf·cm, 6.9 – 11.3 in.·lbf)

If the preload is not as specified, check around the drive pinion bearings.

- (d) Check the total preload.

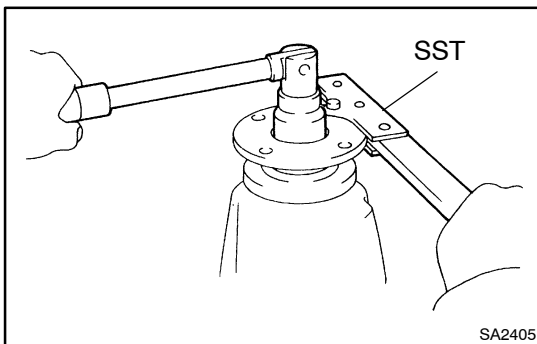
- (1) Using a torque wrench, measure the maximum torque without the backlash between the drive pinion and ring gear when the companion flange begins to rotate.

Total preload:

Drive pinion preload

+(0.2–0.39) N·m (2 – 4 kgf·cm, 1.7 – 3.5 in.·lbf)

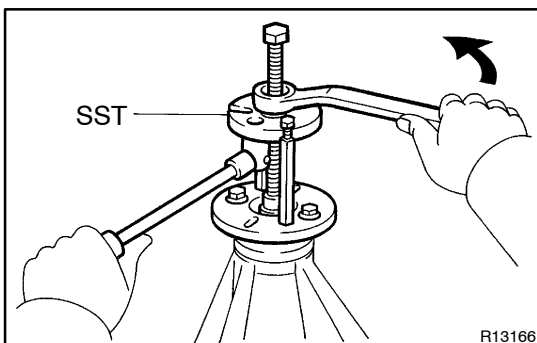
If the preload is not as specified, inspect the differential carrier assembly.



6. REMOVE REAR DRIVE PINION COMPANION FLANGE SUB-ASSY REAR

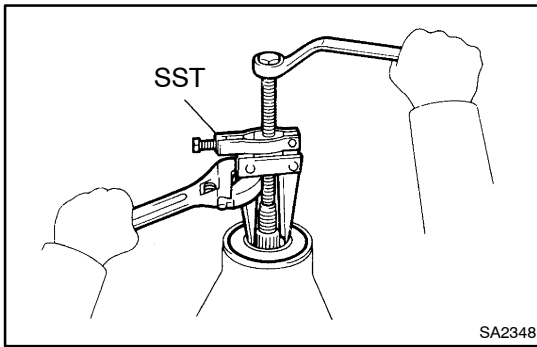
- (a) Using a chisel and a hammer, unstake the nut.
 (b) Using SST, hold the flange and remove the nut.

SST 09330-00021

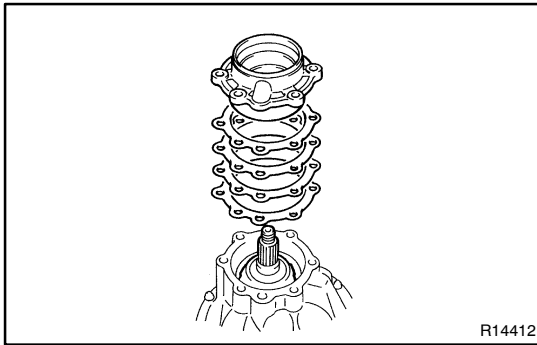


- (c) Using SST, remove the companion flange.

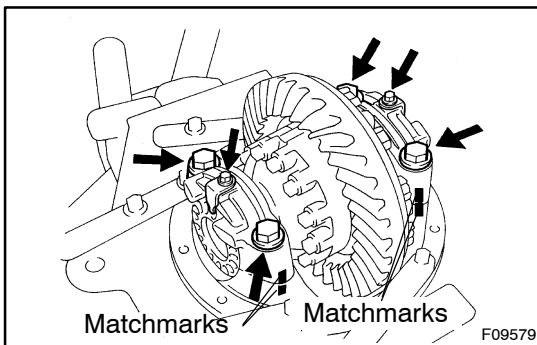
SST 09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03050)



- 7. REMOVE REAR DIFFERENTIAL CARRIER OIL SEAL**
 (a) Using SST, remove the oil seal from the differential carrier.
 SST 09308-10010
- 8. REMOVE REAR DIFFERENTIAL DRIVE PINION OIL SLINGER**



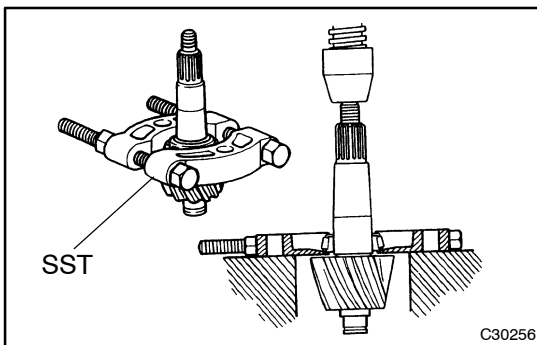
- 9. REMOVE DIFFERENTIAL DRIVE PINION BEARING CAGE**
 (a) Remove the 6 bolts, 6 washers and drive pinion cage.
 (b) Remove the 2 gaskets, cage adjusting shims and drive pinion.



- 10. REMOVE REAR DIFFERENTIAL CASE SUB-ASSY**
 (a) Place matchmarks on the bearing cap and differential carrier.
 (b) Remove the 2 adjusting nut locks.
 (c) Remove the 4 bolts, 2 bearing caps and adjusting nuts.
 (d) Remove the differential case together with bearing outer races from the carrier.

HINT:

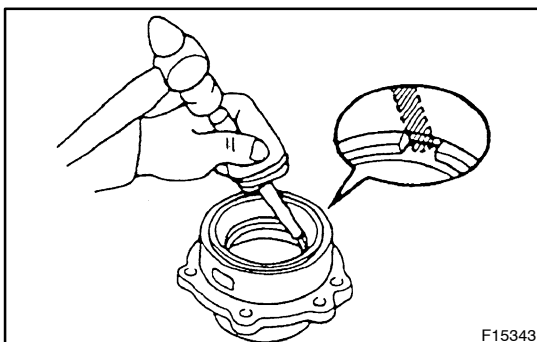
Tag the removed parts to show the location for installation.

**11. REMOVE DRIVE PINION REAR BEARING**

- (a) Using SST and a press, press out the bearing from the drive pinion.
 SST 09950-00020

HINT:

If the drive pinion or ring gear is damaged, replace them as a set.

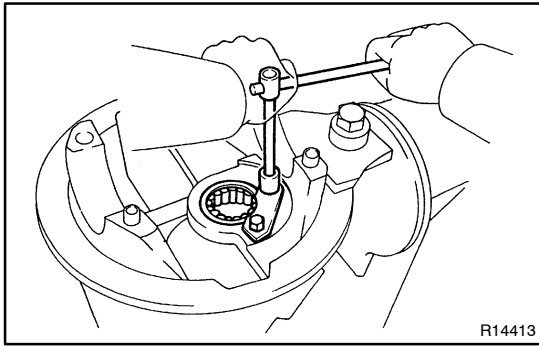
**12. REMOVE FRONT BEARING OUTER RACE**

- (a) Using a brass bar and a hammer, tap out the bearing outer race by hitting it on the groove of the bearing cage.

NOTICE:

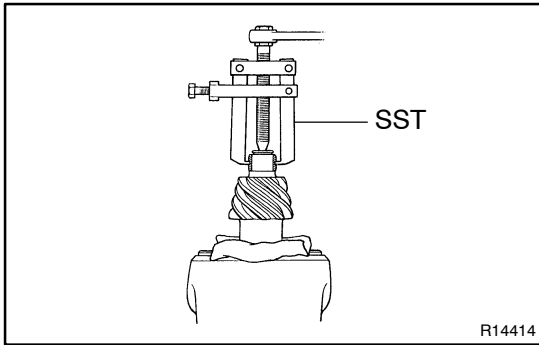
Do not damage the inner surface of the cage.

13. REMOVE REAR BEARING OUTER RACE

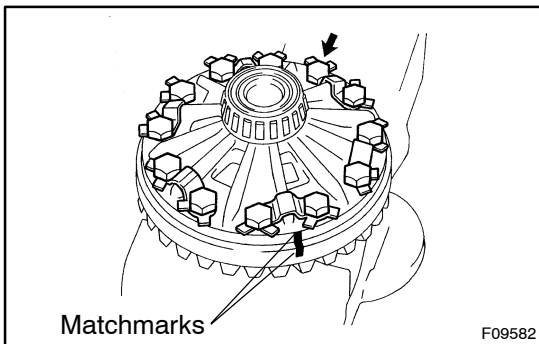


14. REMOVE DIFFERENTIAL DRIVE PINION CYLINDRICAL ROLLER BEARING

- (a) Remove the 2 bolts, 2 nuts and 2 bearing retainers.
- (b) Remove the bearing from the differential carrier.

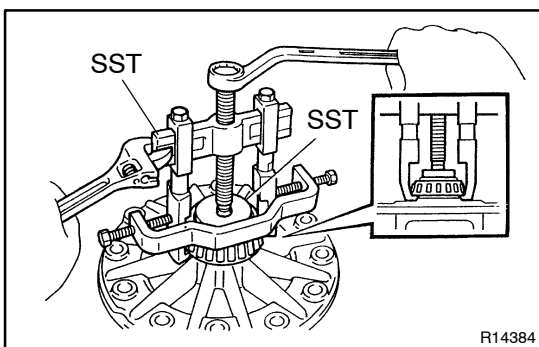


- (c) Using a snap ring expander, remove the snap ring.
- (d) Using a grinder, make groove on the inner race.
- (e) Using SST, remove the inner race from the drive pinion.
SST 09286-46011



15. REMOVE RING GEAR

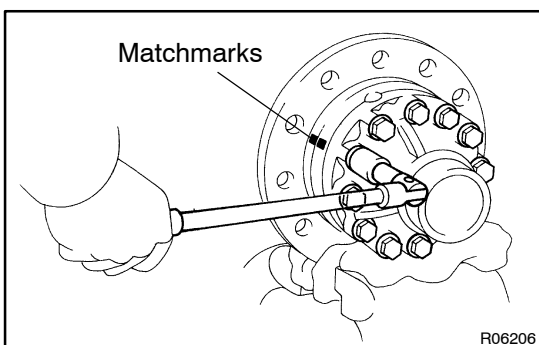
- (a) Place matchmarks on the ring gear and differential case.
- (b) Using a screwdriver, unstick the lock plates.
- (c) Remove the 12 bolts and 6 lock plates.
- (d) Using a plastic hammer, remove the ring gear to separate it from the differential case.



16. REMOVE REAR DIFFERENTIAL CASE BEARING

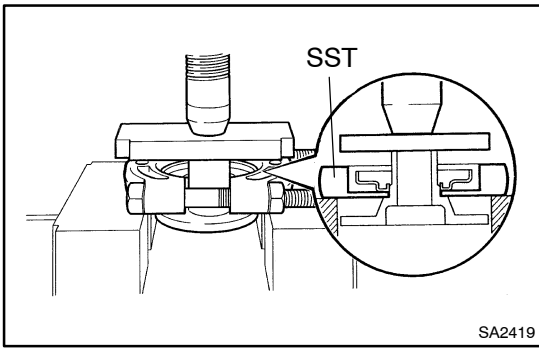
- (a) Using SST, remove the 2 side bearings from the differential case.

SST 09950-40011 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04061, 09957-04010, 09958-04011) 09950-60010 (09951-00560)



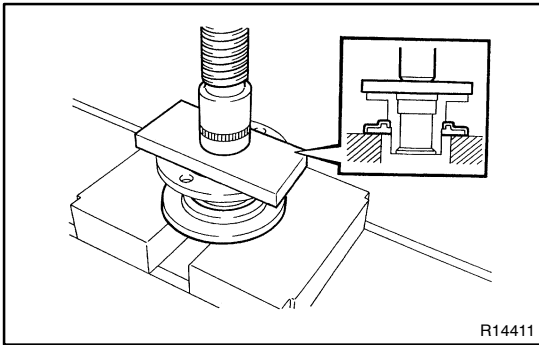
17. REMOVE PINION AND SIDE GEARS

- (a) Place matchmarks on the LH and RH cases.
- (b) Protect the ring gear attaching face with a cloth and secure it in a vice. Then, remove the 12 bolts.
- (c) Using a plastic hammer, separate the LH and RH cases.
- (d) Remove the 4 pinion gear thrust washers.
- (e) Remove the 4 pinion gears.
- (f) Remove the 2 side gears.
- (g) Remove the 2 side gears thrust washers.
- (h) Remove the spider.



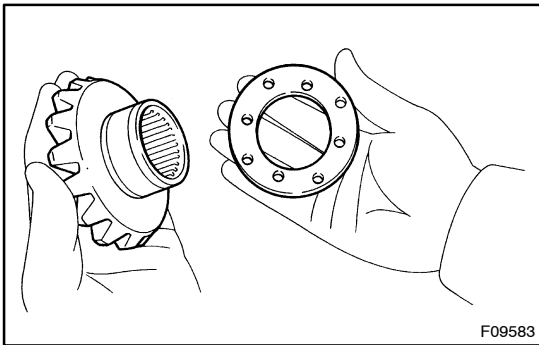
SA2419

- 18. REMOVE REAR DIFFERENTIAL DUST DEFLECTOR**
 (a) Using SST and a press, press out the dust deflector from the companion flange.
 SST 09950-00020



R14411

- 19. INSTALL REAR DIFFERENTIAL DUST DEFLECTOR**
 (a) Using a press, press in a new dust deflector.



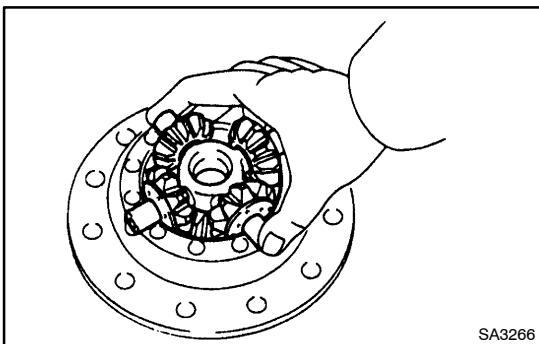
F09583

- 20. ADJUST DIFFERENTIAL SIDE GEAR BACKLASH**
 (a) Install the thrust washer on the side gears.
HINT:
 Select thrust washers that allow the backlash to be within the specification.

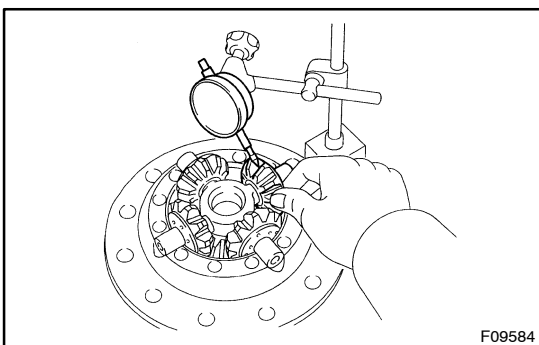
Thrust washer:

1.40 mm (0.0551 in.)	1.50 mm (0.0591 in.)
1.60 mm (0.0630 in.)	1.70 mm (0.0699 in.)

- (b) Install the side gear to the LH case.
 (c) Install the 4 pinion gears and thrust washers to the spider.
 (d) Install the spider with the pinion gears to the LH case.

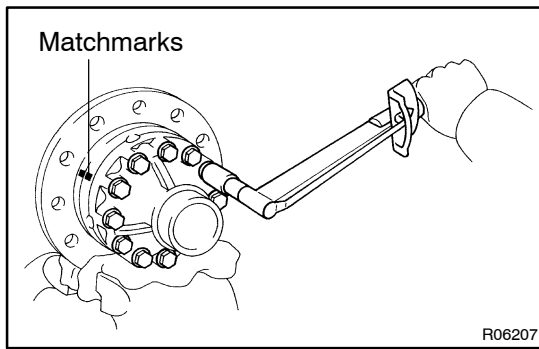


SA3266

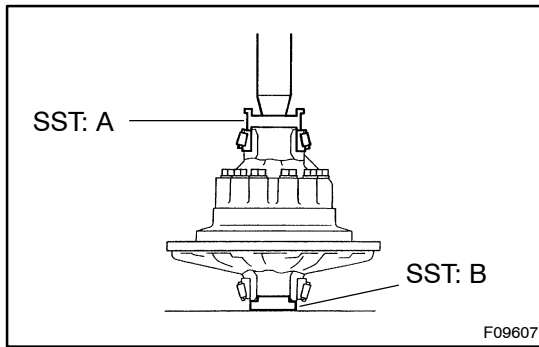


F09584

- (e) Holding the side gear, measure the side gear backlash.
Backlash: 0.02 - 0.20 mm (0.0008 - 0.0079 in.)
HINT:
- Measure the backlash at the RH case and LH case.
 - If the backlash is not within the specification, install a thrust washer with a different thickness.
 - Use thrust washers with the same thickness on both the right and left sides.
- (f) Install the side gear and thrust washer to the RH case.
 (g) Apply gear oil to each part.

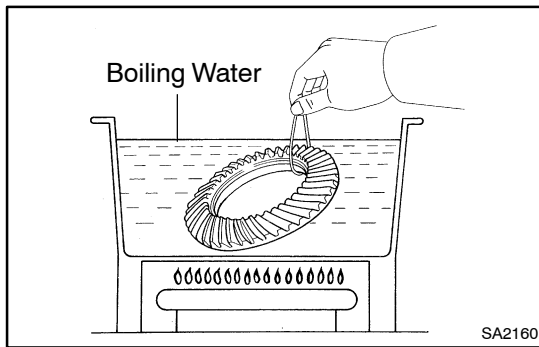


- (h) Align the matchmarks on the LH and RH cases.
 (i) Install the 12 bolts.
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)



21. INSTALL REAR DIFFERENTIAL CASE BEARING

- (a) Using SST and a press, press in the 2 side bearings to the differential case.
 SST A: 09608-32010
 B: 09950-60010 (09951-00560)

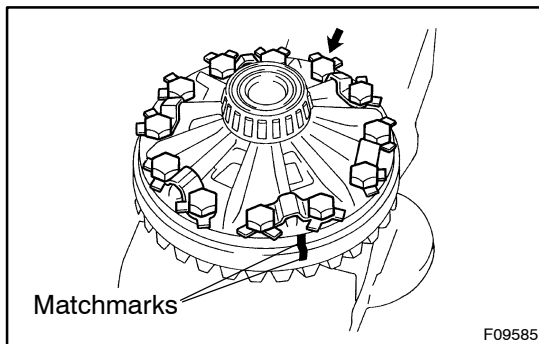


22. INSTALL RING GEAR

- (a) Heat the ring gear in boiling water.
 (b) Clean the contact surfaces of the differential case and ring gear.
 (c) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.

HINT:

Align the matchmarks on the ring gear and the differential case.

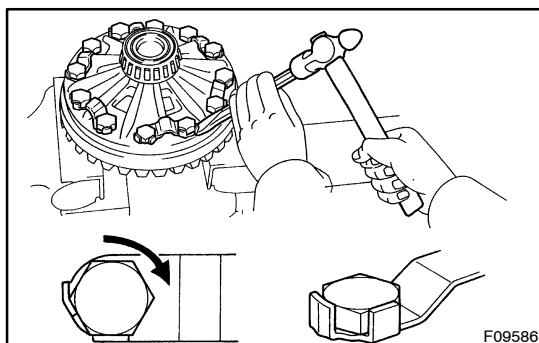


- (d) Install 6 new lock plates and temporarily install the 12 bolts so that the bolt holes in the ring gear and differential case are not misaligned.

NOTICE:

The ring gear set bolts should not be tightened until the ring gear has sufficiently cooled down.

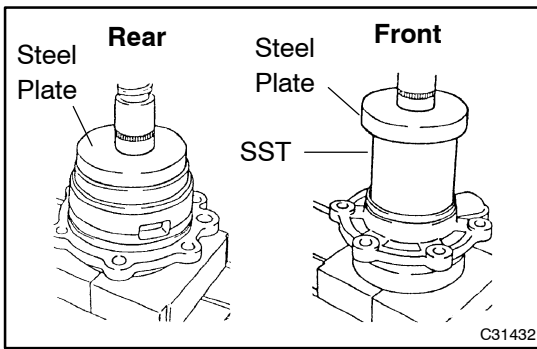
- (e) After the ring gear has sufficiently cooled down, tighten the ring gear set bolts.
Torque: 304 N·m (3,100 kgf·cm, 224 ft·lbf)



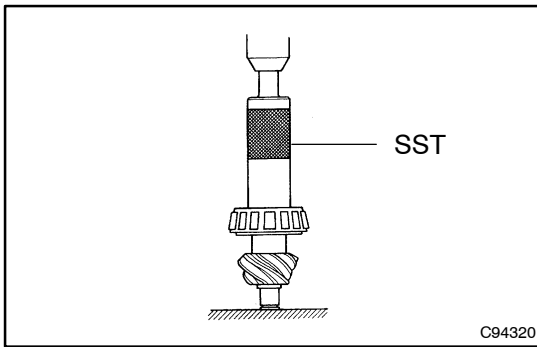
- (f) Using a hammer and a chisel, stake the lock plates.

HINT:

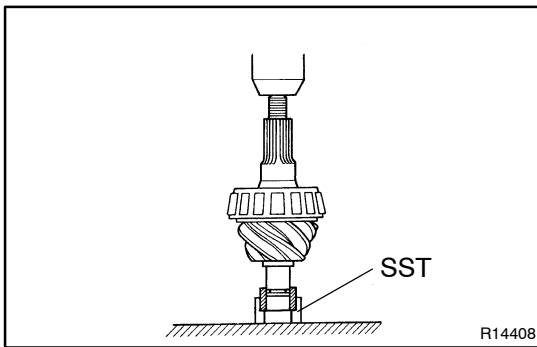
Stake one claw flush with the flat surface of the nut. Since the claw touches the protruding portion of the nut, stake the half of it on the tightening side.

**23. INSTALL FRONT AND REAR BEARING OUTER RACE**

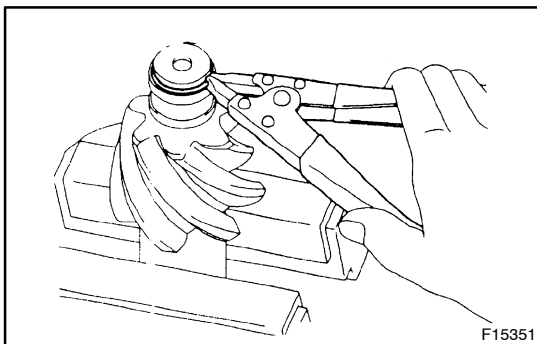
- (a) Using SST and a press, press in new outer races.
SST 09527-17011

**24. INSTALL REAR DRIVE PINION FRONT TAPERED ROLLER BEARING**

- (a) Using SST and a press, press in the rear bearing onto the drive pinion.
SST 09316-60011 (09316-00011)

**25. INSTALL DIFFERENTIAL DRIVE PINION CYLINDRICAL ROLLER BEARING**

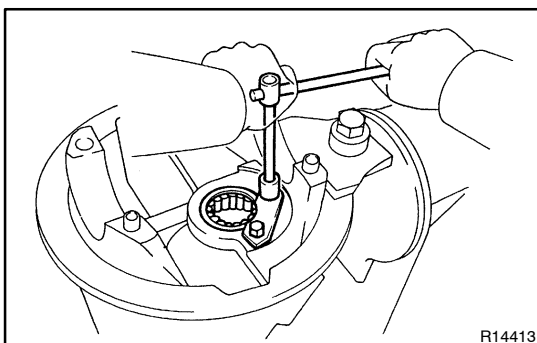
- (a) Using SST and a press, press in a new bearing inner race.
SST 09710-22021 (09710-01051)



- (b) Using a snap ring expander, install a new snap ring in the groove on the drive pinion tip.

NOTICE:

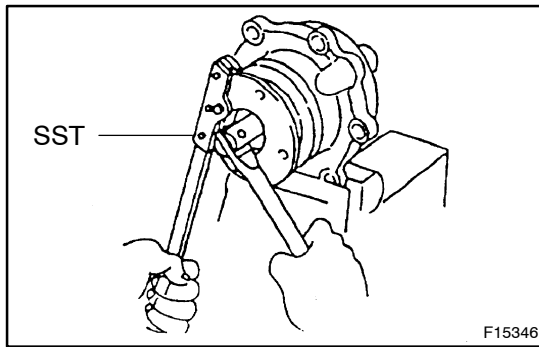
Use a cloth or similar object as a cover, at the time of snap ring installation, to prevent the snap ring from flying off.



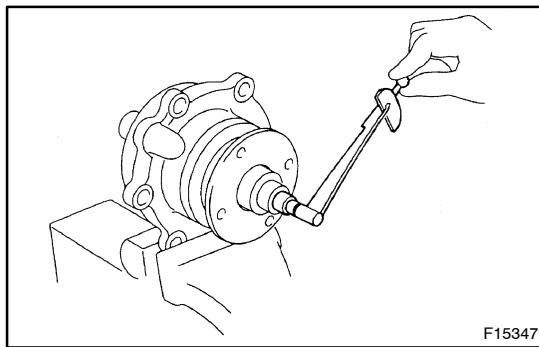
- (c) Install the bearing with the 2 retainers, 2 bolts and 2 nuts.
Torque: 5.4 N·m (55 kgf·cm, 48 in·lbf)

26. ADJUST DRIVE PINION PRELOAD (REUSING BEARING)

- (a) Install the drive pinion to the bearing cage.
- (b) Install the bearing spacer to the bearing cage.
- (c) Install the bearing shims A and B to the bearing cage.
- (d) Install the front bearing to the bearing cage.
- (e) Install the oil slinger to the bearing cage.
- (f) Install the companion flange to the bearing cage.
- (g) Using rags, fix the bearing cage in a vice.
- (h) Apply hypoid gear oil to a new nut.



- (i) Using SST, hold the flange and tighten the pinion nut.
SST 09330-00021
Torque: 270 N·m (2,750 kgf·cm, 199 ft·lbf)
- (j) Turn the companion flange several times forward and backward to settle the bearing.



- (k) Using a torque wrench, measure the drive pinion preload.
Drive pinion preload:
0.78 - 1.27 N·m (8 - 13 kgf·cm, 6.9 - 11.3 in.·lbf)

HINT:

Record the measured value for recording the total preload.

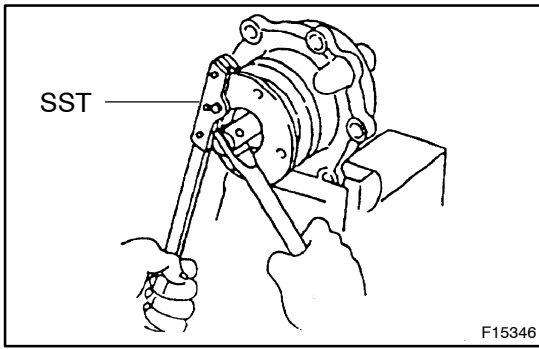
- (l) When the measured value is not within the range of the standard value, increase or decrease the number of the shims to adjust the preload so that it will be within the range of the reference value.

Shim thickness:**mm (in.)**

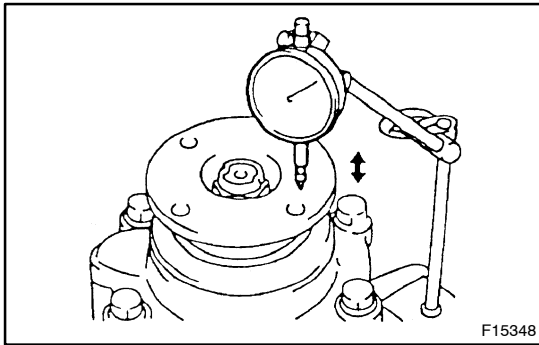
Shim A (interval of 0.1 mm (0.0039 in.))			Shim B (interval of 0.01 mm (0.0004 in.))		
1.90 (0.0748)	2.00 (0.0787)	2.10 (0.0827)	1.80 (0.0709)	1.81 (0.0713)	1.82 (0.0717)
2.20 (0.0866)	2.30 (0.0906)	2.40 (0.0945)	1.83 (0.0720)	1.84 (0.0724)	1.85 (0.0728)
2.50 (0.0984)	2.60 (0.1024)	2.70 (0.1063)	1.86 (0.0732)	1.87 (0.0736)	1.88 (0.0740)
2.80 (0.1102)	2.90 (0.1142)	3.00 (0.1181)	1.89 (0.0744)	-	-
3.10 (0.1220)	3.20 (0.1260)	3.30 (0.1299)	-	-	-

27. ADJUST DRIVE PINION PRELOAD (USING NEW BEARING)

- (a) Install the drive pinion to the bearing cage.
- (b) Install the bearing spacer to the bearing cage.
- (c) Install the bearing shims A and B to the bearing cage.
Shim A: 90564-45039, Shim B: 90564-45050
- (d) Install the front bearing to the bearing cage.
- (e) Install the oil slinger to the bearing cage.
- (f) Install the companion flange to the bearing cage.
- (g) Using rags, fix the bearing cage in a vice.
- (h) Apply hypoid gear oil to a new nut.



- (i) Using SST, hold the flange, and then tighten the pinion nut.
SST 09330-00021
Torque: 270 N·m (2,750 kgf·cm, 199 ft·lbf)



- (j) Set a dial gauge at the right angle to the companion flange surface and measure the bearing play in the vertical direction.
- (k) Subtract the measured play from the total thickness of the installed shims A and B and select the shim with the thickness closest to this value.

Shims thickness:

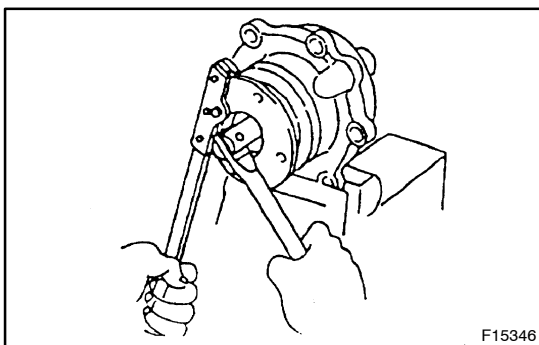
mm (in.)

Shim A (interval of 0.1 mm (0.0039 in.))			Shim B (interval of 0.01 mm (0.0004 in.))		
1.90 (0.0748)	2.00 (0.0787)	2.10 (0.0827)	1.80 (0.0709)	1.81 (0.0713)	1.82 (0.0717)
2.20 (0.0866)	2.30 (0.0906)	2.40 (0.0945)	1.83 (0.0720)	1.84 (0.0724)	1.85 (0.0728)
2.50 (0.0984)	2.60 (0.1024)	2.70 (0.1063)	1.86 (0.0732)	1.87 (0.0736)	1.88 (0.0740)
2.80 (0.1102)	2.90 (0.1142)	3.00 (0.1181)	1.89 (0.0744)	-	-
3.10 (0.1220)	3.20 (0.1260)	3.30 (0.1299)	-	-	-

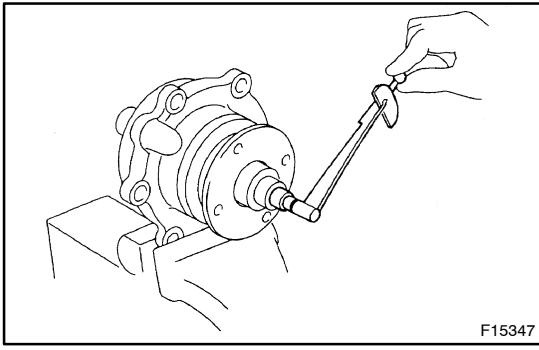
Reference:

Shim A (max. thickness) + shim B (max. thickness) - bearing play = Approximate value of the total shim thickness to be obtained.

- (l) Remove the provisionally installed shims A and B, and install the selected shims A and B (See the above step on the chart).



- (m) Using SST, hold the flange and tighten the pinion nut.
SST 09330-00021
Torque: 270 N·m (2,750 kgf·cm, 199 ft·lbf)
- (n) Turn the companion flange several times forward and backward to settle the bearing.



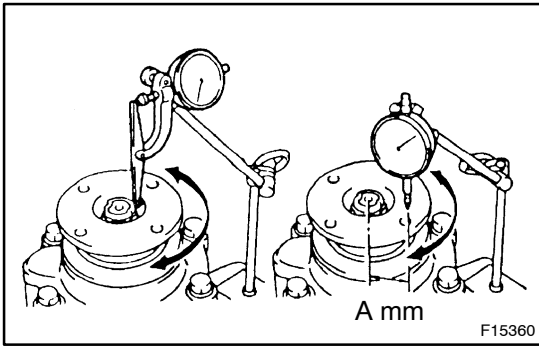
- (o) Using a torque wrench, measure the drive pinion preload.
Drive pinion preload:
1.47 – 5.00 N·m (15 – 51 kgf·cm, 13 – 44 in.·lbf)

HINT:

Record the measured value for recording the total preload.

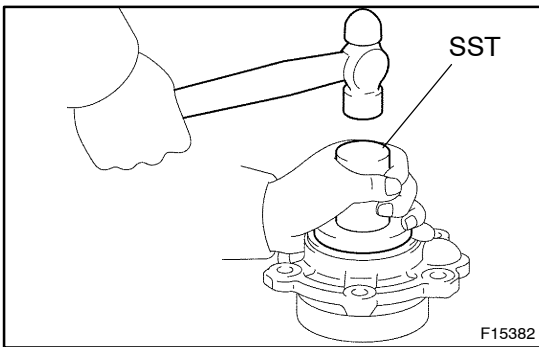
- (p) When the measured value is not within the range of the standard value, increase or decrease the number of the shims to adjust the preload so that it will be within the range of the reference value.

28. INSPECT REAR DRIVE PINION COMPANION FLANGE SUB-ASSY REAR (See step 5)



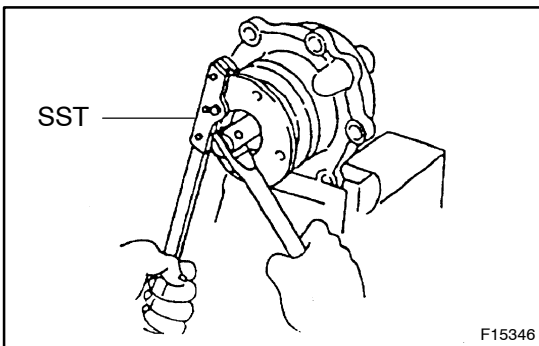
29. INSTALL REAR DIFFERENTIAL CARRIER OIL SEAL

- (a) Coat a new oil seal with MP grease.
- (b) Using SST and a hammer, tap in a new oil seal to the bearing cage.
SST 09223-78010



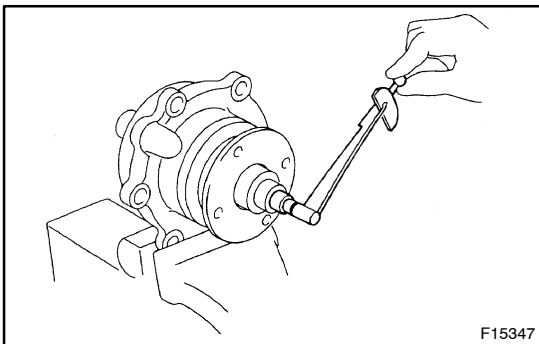
30. INSTALL REAR DRIVE PINION COMPANION FLANGE SUB-ASSY REAR

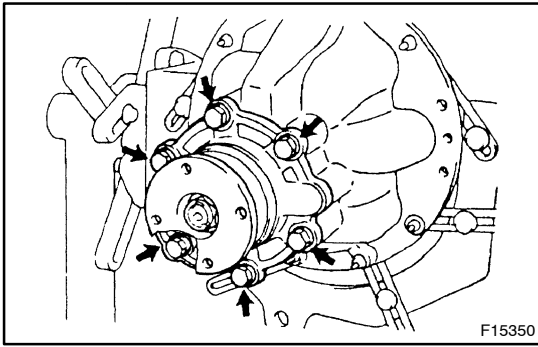
- (a) Install the companion flange and plate washer to the drive pinion.
- (b) Using SST, hold the flange and tighten the pinion nut.
SST 09330-00021
Torque: 270 N·m (2,750 kgf·cm, 199 ft·lbf)



- (c) Using a torque wrench, measure the drive pinion preload.
Drive pinion preload:

Using new bearing	1.47 – 5.00 N·m (15 – 51 kgf·cm, 13 – 44 in.·lbf)
Reusing bearing	0.78 – 1.27 N·m (8 – 13 kgf·cm, 6.9 – 11.3 in.·lbf)

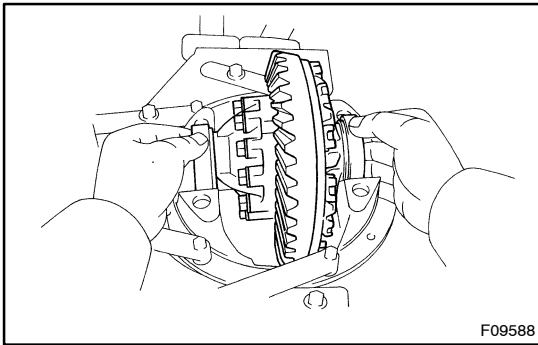




31. INSTALL DIFFERENTIAL DRIVE PINION BEARING CAGE

- (a) Install the differential drive pinion bearing cage with the 6 bolts.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)



32. INSTALL REAR DIFFERENTIAL CASE SUB-ASSY

- (a) Place the bearing outer races on their respective bearings.

NOTICE:

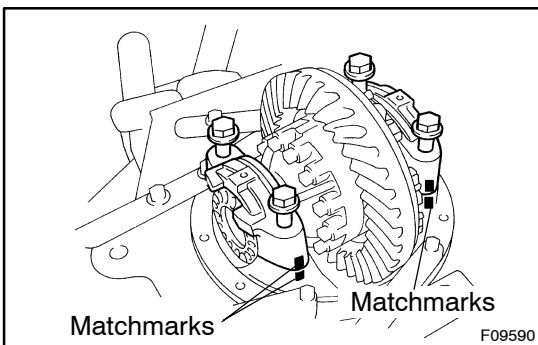
Check that the left and right outer races are not interchanged.

- (b) Install the differential case.

HINT:

Check that there is backlash between the ring gear and drive pinion.

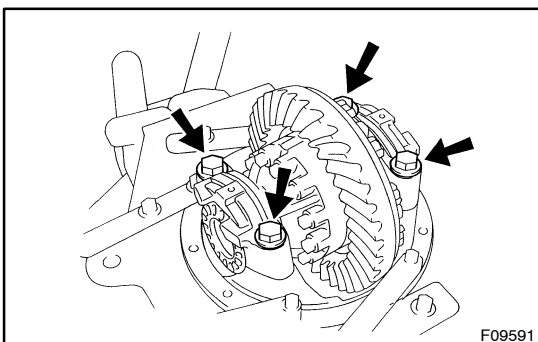
- (c) Install the 2 adjusting nuts on the carrier, making sure that the nuts are properly threaded.



- (d) Align the matchmarks on the cap and carrier. Screw in the 2 bearing cap bolts 2 or 3 turns and press down the bearing cap by hand.

HINT:

If the bearing cap does not tightly fit the carrier, the adjusting nuts may not be properly threaded. Reinstall the adjusting nuts if necessary.



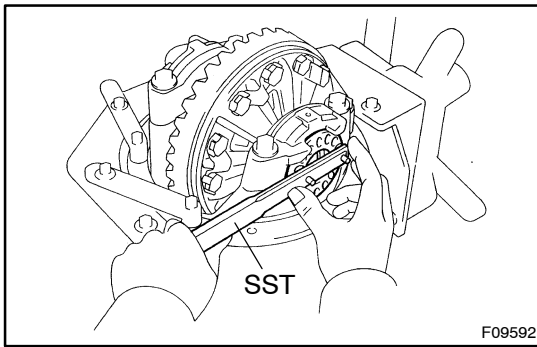
33. ADJUST SIDE BEARING PRELOAD

- (a) Tighten the 4 bearing cap bolts to the specified torque, and then loosen them to the point where the adjusting nuts can be turned using SST.

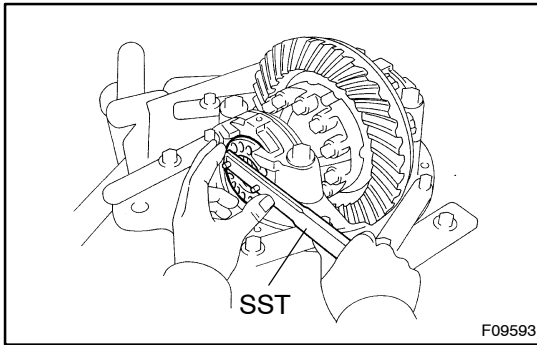
SST 09504-00011

Torque: 196 N·m (2,000 kgf·cm, 145 ft·lbf)

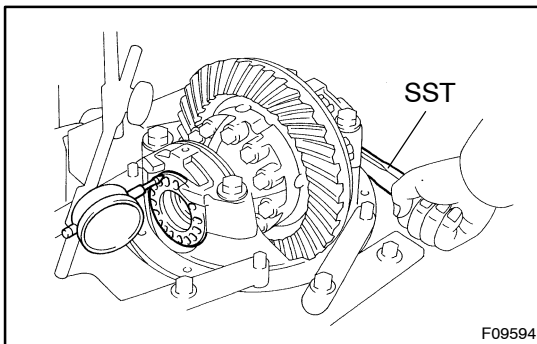
- (b) Fully tighten the 4 bearing cap bolts by hand.



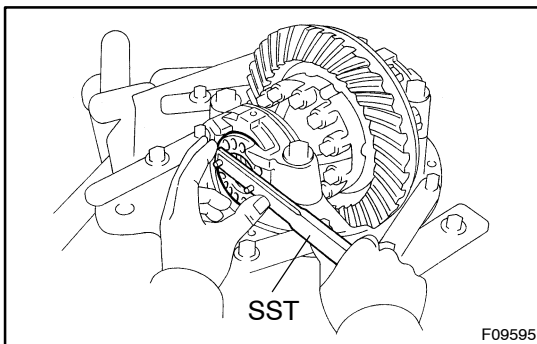
- (c) Using SST, tighten the adjusting nut on the ring gear side until the ring has a backlash of approx. 0.18 mm (0.0072 in.).
SST 09504-00011.



- (d) While turning the ring gear, use the SST to fully tighten the adjusting nut on the drive pinion side.
(e) After the bearings are settled, loosen the adjusting nut on the drive pinion side.



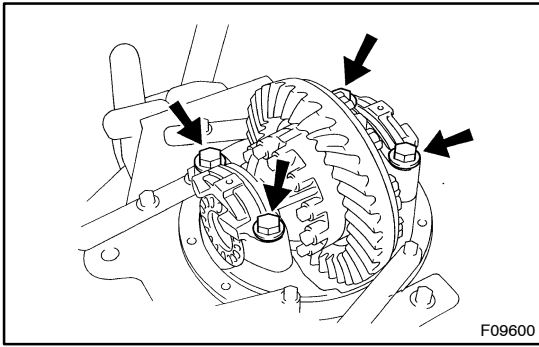
- (f) Place a dial indicator on the top of the bearing inner race on the ring gear side.
(g) Adjust the side bearing for zero preload by tightening the other adjusting nut until the pointer on the indicator begins to move.



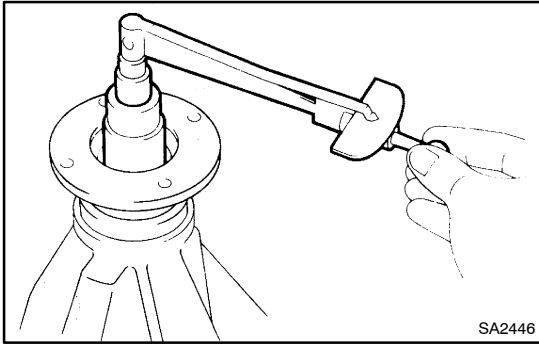
- (h) Using SST, tighten the adjusting nut 1 - 1.5 notches from the zero preload position.
SST 09504-00011
(i) Using a dial indicator, adjust the ring gear backlash so that it will be within the specification.
Backlash: 0.15 - 0.20 mm (0.0059 - 0.0079 in.)

HINT:

The backlash should be adjusted by turning the left and right adjusting nuts by equal amounts. For example, loosen the nut on the left side one notch and torque the nut on the right side one notch.

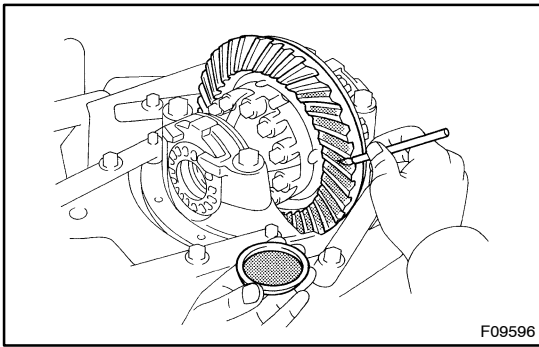


- (j) Tighten the bearing cap bolts.
Torque: 196 N·m (2,000 kgf·cm, 145 ft·lbf)
- (k) Recheck the ring gear backlash.
Backlash: 0.15 – 0.20 mm (0.0059 – 0.0079 in.)



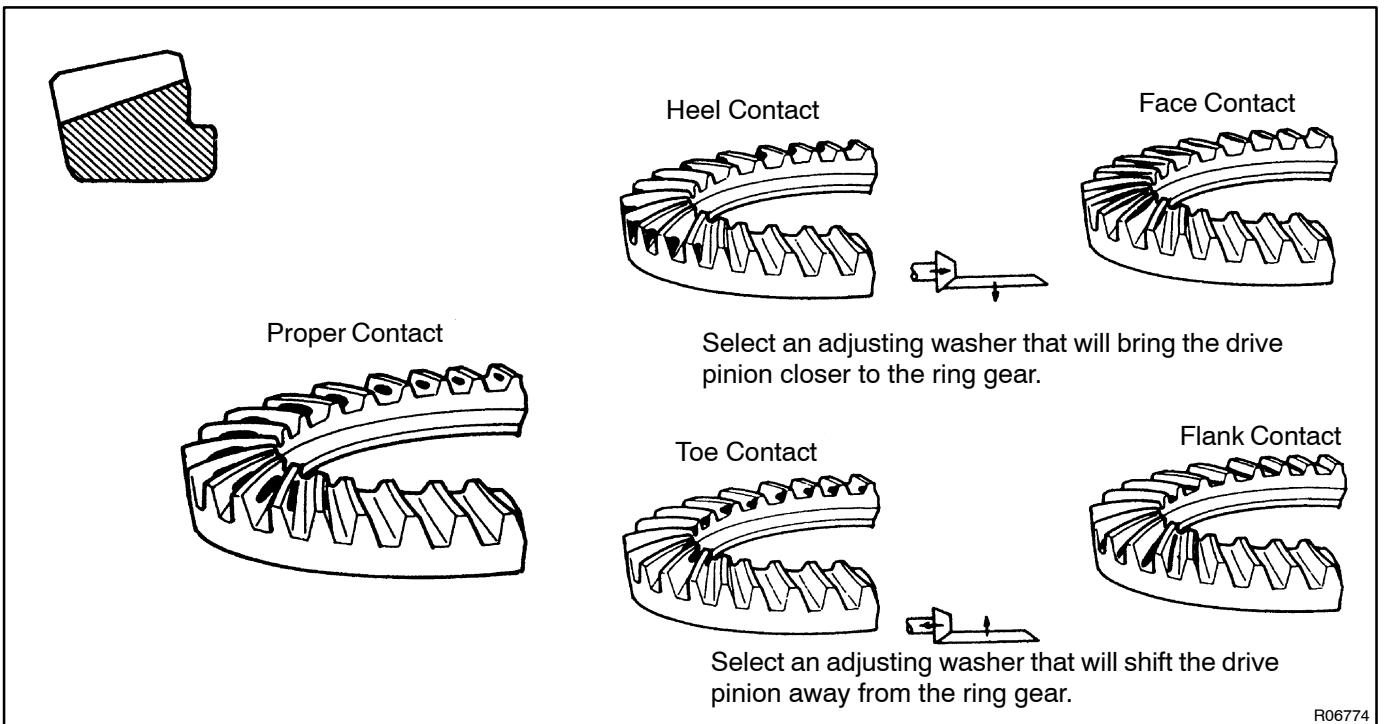
34. MEASURE TOTAL PRELOAD

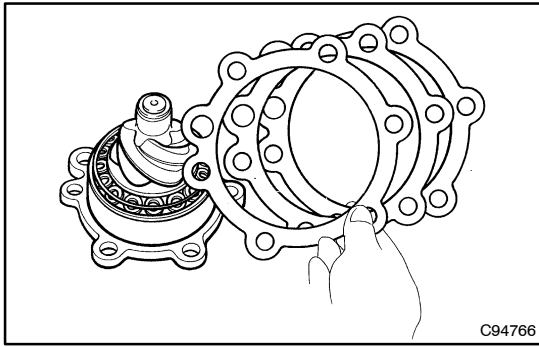
- (a) Using a torque wrench, measure the total preload.
Total preload:
Drive pinion preload + (0.2 – 0.39) N·m (2 – 4 kgf·cm, 1.7 – 3.5 in.·lbf)



35. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

- (a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead.
- (b) Turn the companion flange in both directions to inspect the ring gear for proper tooth contact.





If the teeth are not properly contacting, use the value below to select a proper shim for correction.

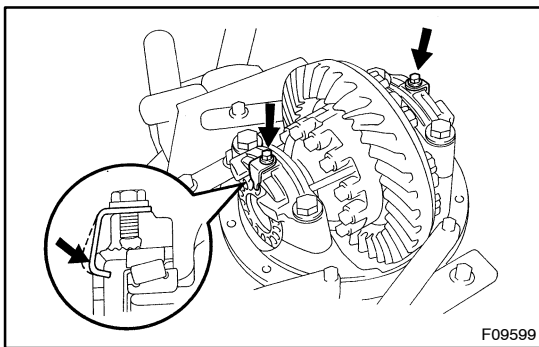
Thickness:

0.10 mm (0.0039 in.)	0.15 mm (0.0059 in.)
0.25 mm (0.0098 in.)	0.45 mm (0.0177 in.)

HINT:

Use one or more shims for adjustment.

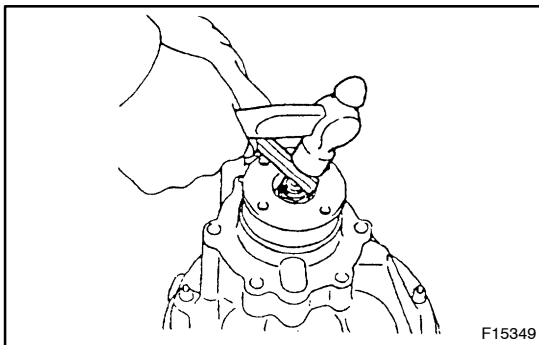
36. CHECK TOTAL PRELOAD (See step 34)
37. CHECK RING GEAR BACKLASH (See step 5)
38. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See step 35)
39. CHECK RUNOUT OF COMPANION FLANGE (See step 5)



40. INSTALL ADJUSTING NUT LOCKS

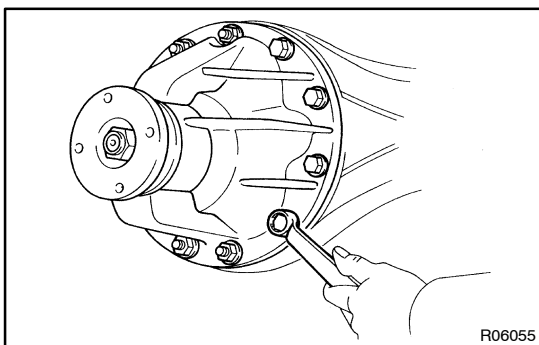
- (a) Install 2 new nut locks on the bearing caps.

Torque: 14 N·m (140 kgf·cm, 10 ft·lbf)



41. STAKE DRIVE PINION NUT

- (a) Using a chisel and a hammer, caulk the nut.



42. INSTALL DIFFERENTIAL CARRIER ASSY REAR

- (a) Clean the contact surface of the differential case and rear axle housing.

Part No. 08833-00100, THREE BOND 1360K or equivalent

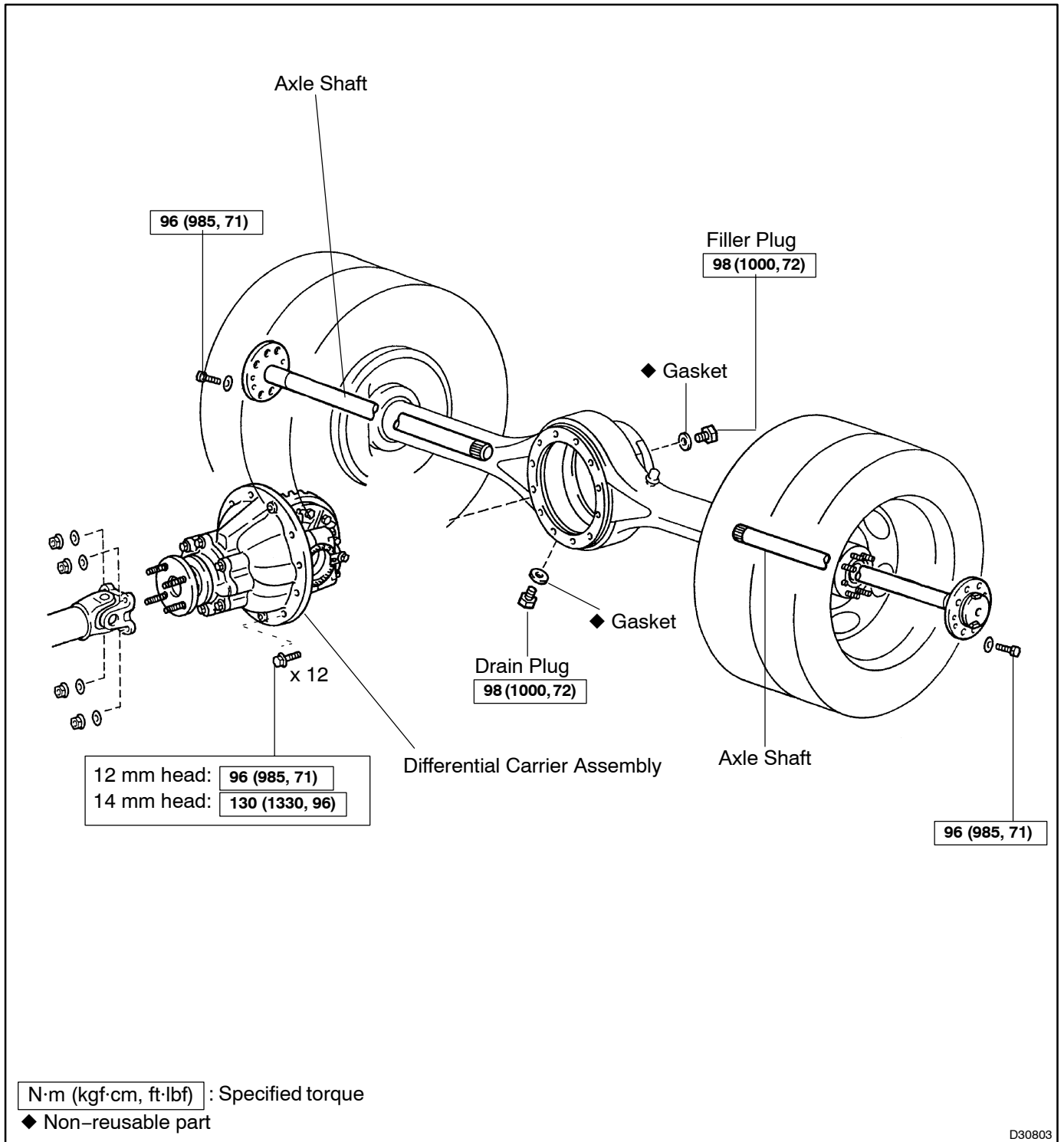
- (b) Apply sealant to the 8 bolts and a new gasket.
- (c) Install the differential carrier assy with the 8 bolts, 4 nuts and 4 washers.

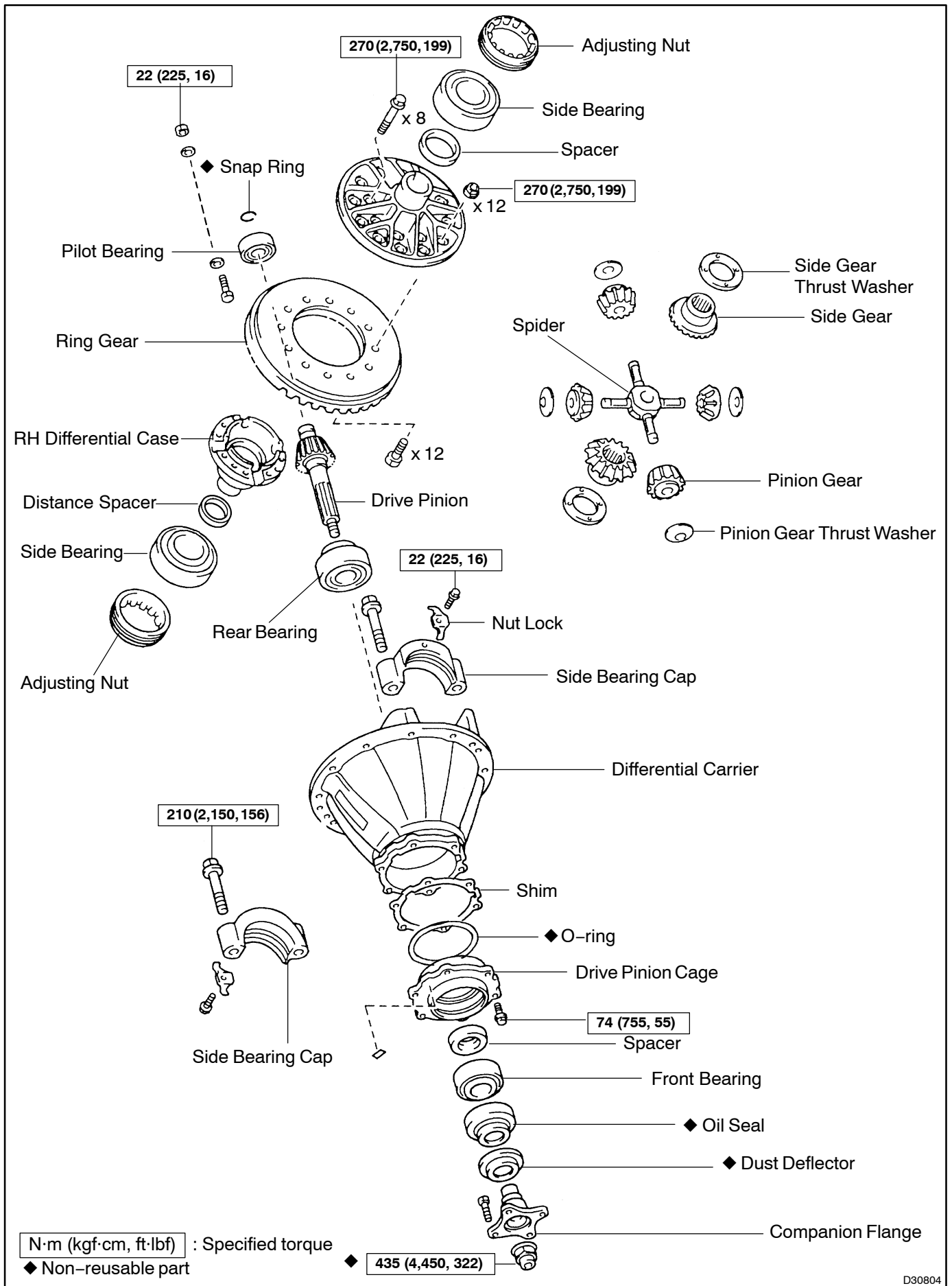
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

43. INSTALL PROPELLER SHAFT ASSY (See page 30-4 or 30-11)
44. INSTALL REAR AXLE SHAFT (See page 30-73 or 30-75)
45. ADD DIFFERENTIAL OIL (See page 29-2)

DIFFERENTIAL CARRIER ASSY REAR (SH13) COMPONENTS

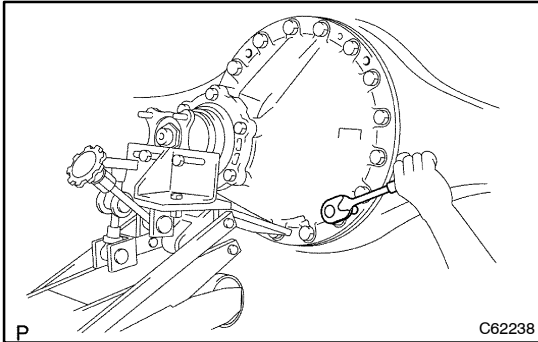
2907P-01





OVERHAUL

1. DRAIN DIFFERENTIAL OIL (See page 29-2)
2. REMOVE REAR AXLE SHAFT (See page 30-75)
3. REMOVE PROPELLER SHAFT ASSY (See page 30-11)

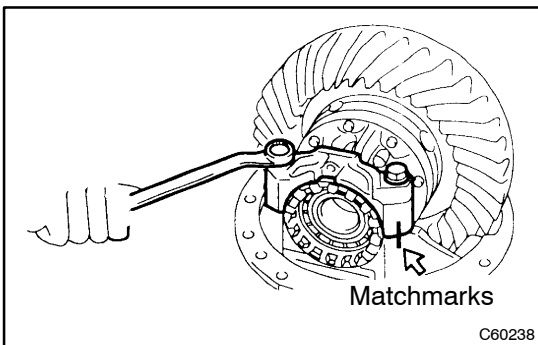


4. REMOVE REAR DIFFERENTIAL CARRIER ASSY

- (a) Using a jack, support the differential carrier.
- (b) Remove the 12 bolts and differential carrier.

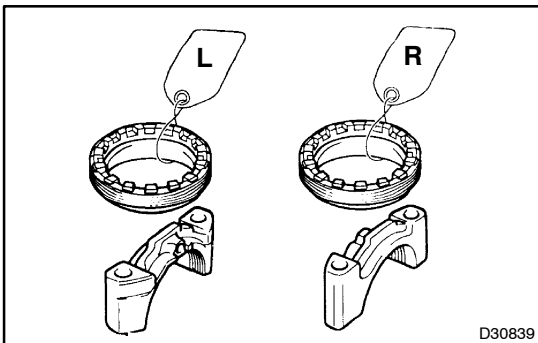
NOTICE:

Be careful not to damage the installation surface.



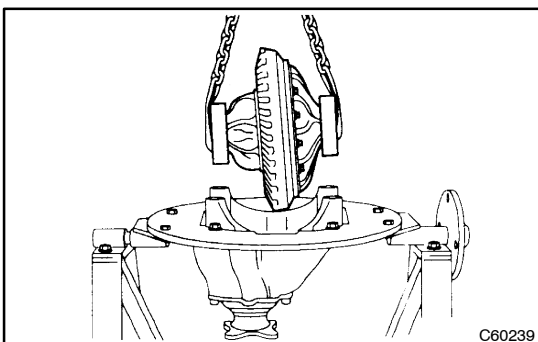
5. REMOVE REAR DEFFERENTIAL CASE SUB-ASSY

- (a) Place matchmarks on the bearing cap and differential carrier.
- (b) Remove the 2 adjusting nut locks.
- (c) Remove the 4 bolts, 2 bearing caps and adjusting nuts.
- (d) Remove the differential case with bearing outer races from the carrier.



HINT:

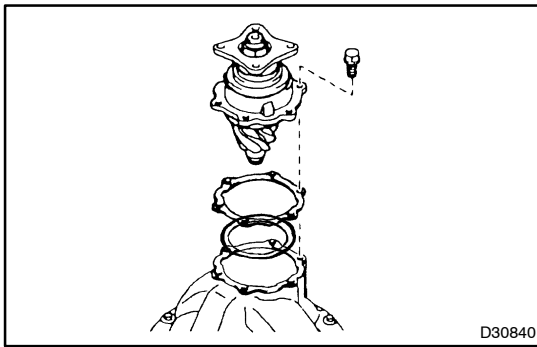
Tag the removed parts to show the location for installation.



- (e) Using a chain block, remove the differential gear assy from the differential carrier.
- (f) Remove the side bearing outer race.

HINT:

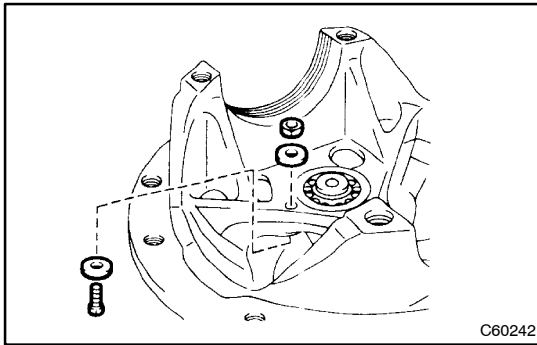
Tag the removed parts to show the location for installation.

**6. REMOVE DRIVE PINION SUB-ASSY**

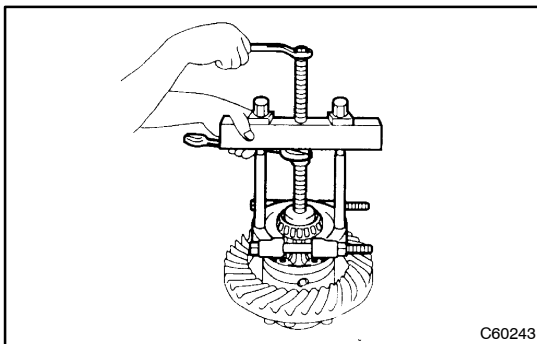
- (a) Remove the 6 bolts.
- (b) Remove the drive pinion assy, shims and O-ring from the differential carrier.

HINT:

For easy removal, Remove the outer races, using a brass bar and hammer.

**7. REMOVE PILOT BEARING OUTER RACE**

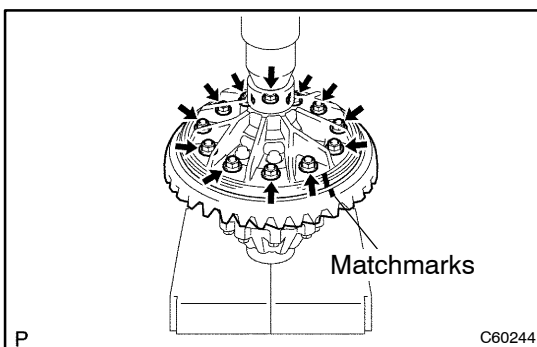
- (a) Remove the bolt, nut and 2 bearing retainers.
- (b) Remove the pilot bearing outer race from the differential carrier.

**8. REMOVE SIDE BEARING INNER RACE**

- (a) Using SST, remove the 2 side bearing inner races from the differential case.

SST 09950-60020, (09951-00680), 09950-40011, (09957-04010), 09950-00020, 09950-00030.

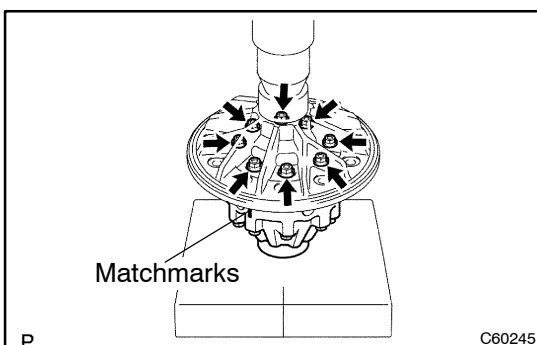
If reusing the bearings, arrange them so that right bearing and left bearings can be distinguished.

**9. REMOVE RING GEAR**

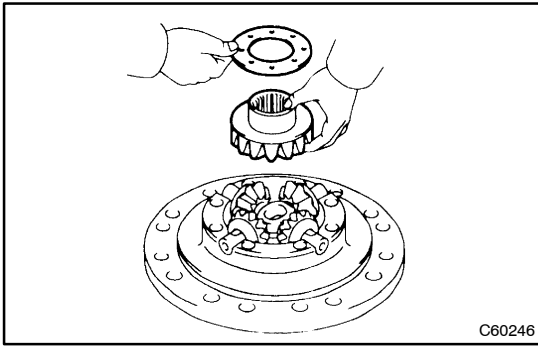
- (a) Place matchmarks on the ring gear and differential case.
- (b) Using a press, fix the differential carrier.
- (c) Remove the 12 bolts and 12 nuts.
- (d) Using a plastic hammer, remove the ring gear to separate it from the differential case.

NOTICE:

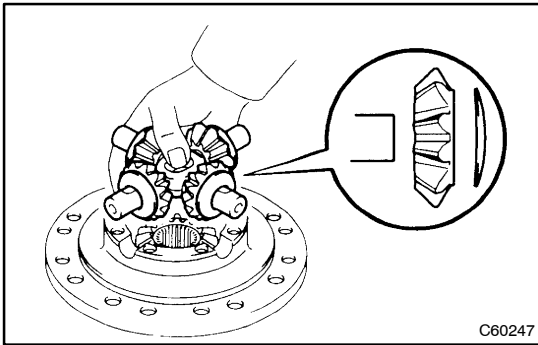
Be careful not to drop the ring gear.

**10. REMOVE DIFFERENTIAL CASE**

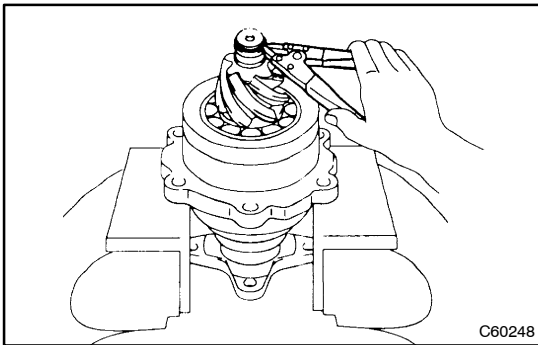
- (a) Place matchmarks on the LH and RH cases.
- (b) Remove the 8 bolts.
- (c) Using a plastic hammer, separate the LH and RH cases.

**11. REMOVE REAR DIFFERENTIAL SPIDER**

- (a) Remove the side gear thrust washer and side gear.



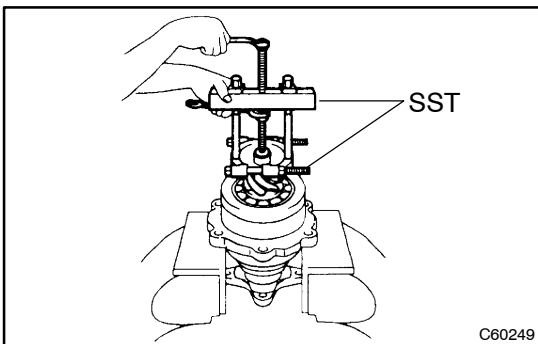
- (b) Remove the 4 pinion gear thrust washers, 4 pinion gears and spider.
 (c) Remove the side gear thrust washers and side gear.

**12. REMOVE PILOT BEARING INNER RACE**

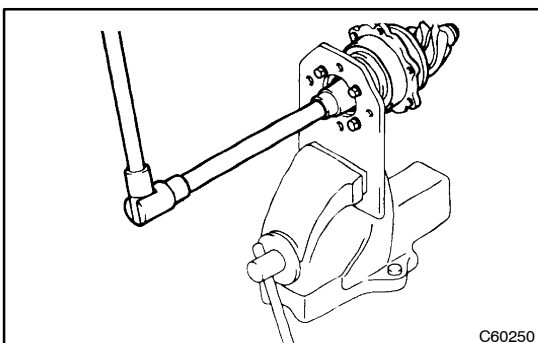
- (a) Using a snap ring expander, remove the snap ring.
 (b) Using a grinder, make a groove to the inner race.

NOTICE:

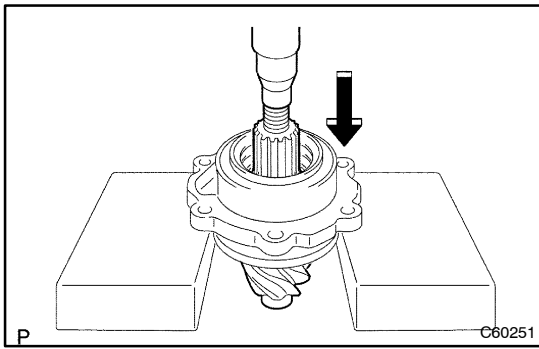
Use a cloth or similar object as a cover, at the time of snap ring installation, to prevent the snap ring from flying off.



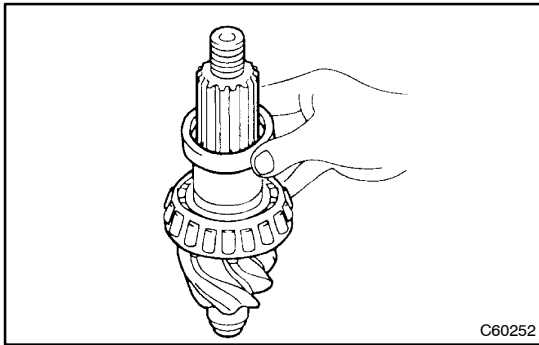
- (c) Using SST , remove the inner race from the drive pinion.
 SST 09950-00030, 09950-00020

**13. REMOVE REAR DRIVE PINION COMPANION FLANGE**

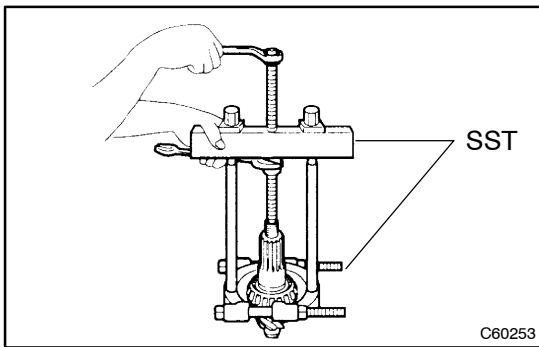
- (a) Using a chisel and a hammer, unstick the lock nut.
 (b) Using a vise, hold the drive pinion assy.
 (c) Remove the lock nut and companion flange.

**14. REMOVE DIFFERENTIAL DRIVE PINION**

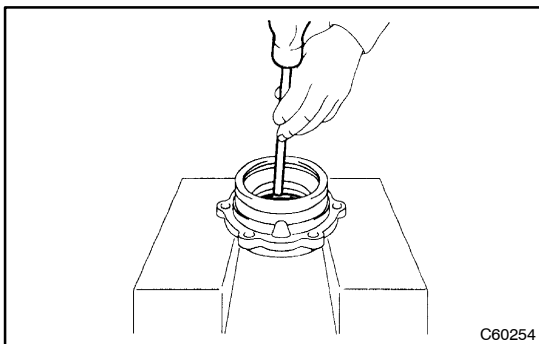
- (a) Using a press, press out the drive pinion from the drive pinion cage.



- (b) Remove the drive pinion bearing spacer.



- (c) Using SST, remove the rear bearing inner race.
SST 09950-00030, 09950-00020

**15. REMOVE FRONT BEARING OUTER RACE**

- (a) Using a brass bar and a hammer, tap out the bearing oil seal.
(b) Using a brass bar and a hammer, tap out the bearing outer race.

NOTICE:

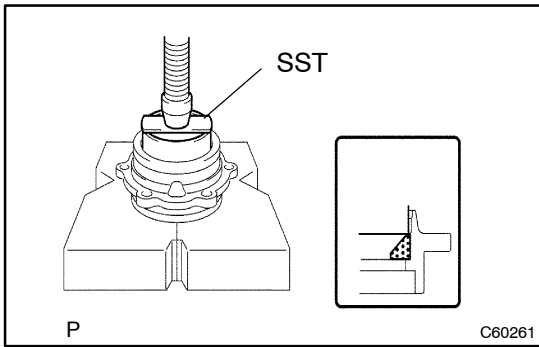
Do not damage the inner surface of the cage.

16. REMOVE REAR BEARING OUTER RACE

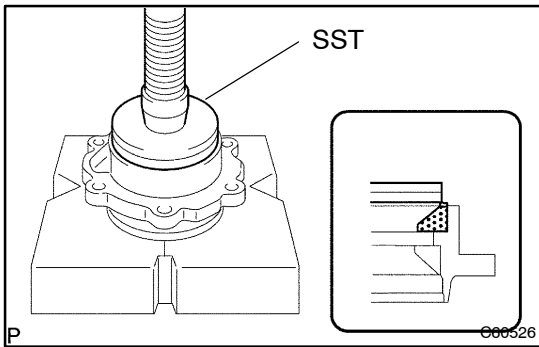
- (a) Using a brass bar and a hammer, tap out the bearing outer race.

NOTICE:

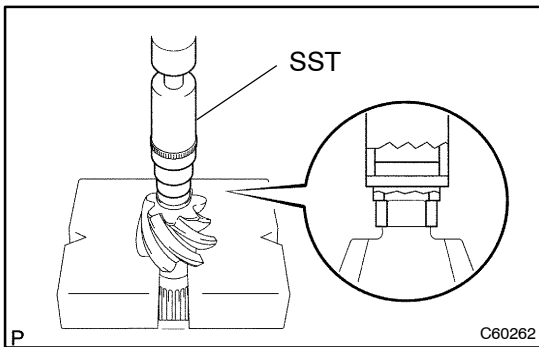
Do not damage the inner surface of the cage.

**17. INSTALL FRONT BEARING OUTER RACE**

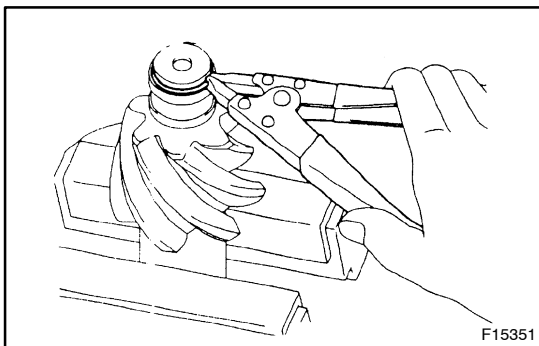
- (a) Using SST and a press, press in the front bearing outer race onto the differential cage.
SST 09518-36020

**18. INSTALL REAR BEARING OUTER RACE**

- (a) Using SST and a press, press in the rear bearing outer race onto the differential cage.
SST 09223-78010

**19. INSTALL PILOT BEARING INNER RACE**

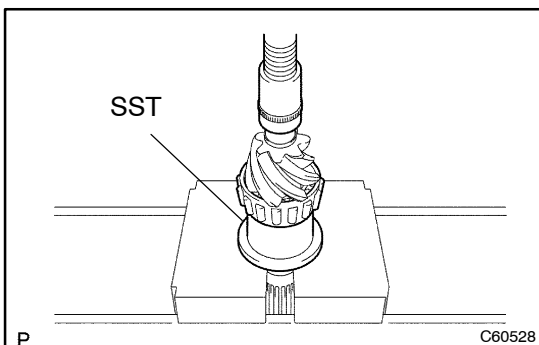
- (a) Using SST and a press, press in the pilot bearing inner race onto the shaft of the drive pinion.
SST 09316-60011 (09316-00011, 09316-00071)



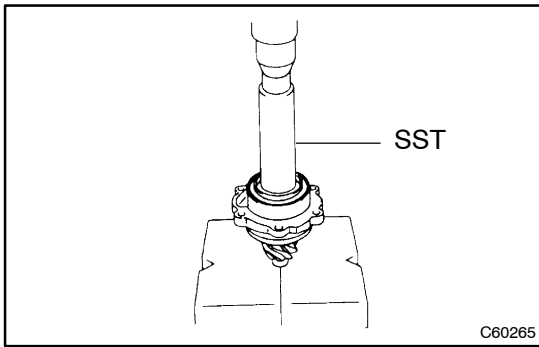
- (b) Using a snap ring expander, install a new snap ring in the groove on the drive pinion tip.

NOTICE:

Use a cloth or similar object as a cover, at the time of snap ring installation, to prevent the snap ring from flying off.

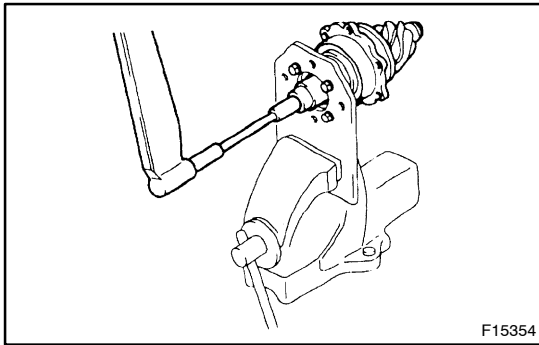
**20. INSTALL REAR BEARING INNER RACE**

- (a) Using SST and a press, install the rear bearing inner race onto the drive pinion.
SST 09315-00022
- (b) Install the differential drive pinion bearing spacer.



21. INSTALL FRONT BEARING INNER RACE

- (a) Using SST and a press, install the drive pinion cage and front bearing inner race onto the drive pinion.
SST 09316-60011(09316-00011)



22. ADJUST DIFFERENTIAL DRIVE PINION PRELOAD

- (a) Install the flange yoke and lock nut on the drive pinion, and fix the drive pinion assembly in a vise.
- (b) Using a deep socket wrench (36 mm), tighten the lock nut.
Torque: 435 N·m (4,450 kgf·cm, 322 ft·lbf)

NOTICE:

Do not install an oil seal before preload measurement.



- (c) Using a torque wrench, measure the preload at the lock nut part.

Preload:

New bearing	1.97 – 2.94 N·m (20 – 30 kgf·cm, 17 – 26 in.·lbf)
Reused bearing	1.47 – 2.45 N·m (15 – 25 kgf·cm, 13 – 22 in.·lbf)

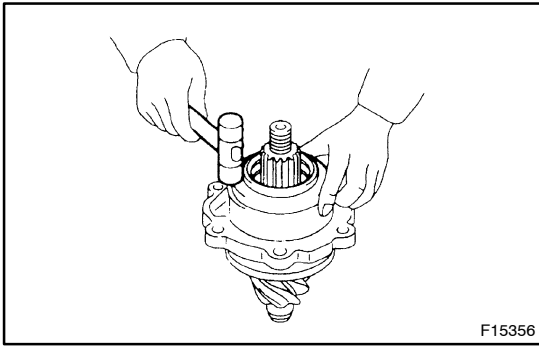
NOTICE:

When either bearing is new, use the preload for a new bearing.

- (d) When the measured value exceeds the specified preload, select a spacer by increasing or decreasing the value and adjust the preload.

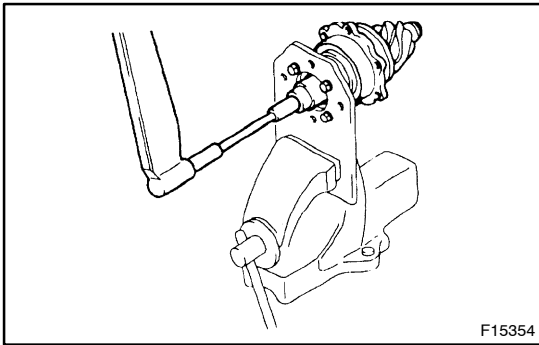
Spacer thickness:

13.900 mm (0.5472 in.)	14.150 mm (0.5571 in.)
13.925 mm (0.5482 in.)	14.175 mm (0.5581 in.)
13.950 mm (0.5492 in.)	14.200 mm (0.5591 in.)
13.975 mm (0.5502 in.)	14.225 mm (0.5600 in.)
14.000 mm (0.5512 in.)	14.250 mm (0.5610 in.)
14.025 mm (0.5522 in.)	14.275 mm (0.5620 in.)
14.050 mm (0.5531 in.)	14.300 mm (0.5630 in.)
14.075 mm (0.5541 in.)	14.325 mm (0.5640 in.)
14.100 mm (0.5551 in.)	14.350 mm (0.5650 in.)
14.125 mm (0.5561 in.)	14.375 mm (0.5659 in.)

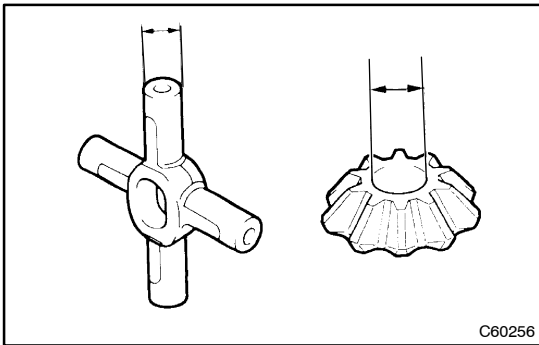


- 23. INSTALL REAR DIFFERENTIAL CARRIER OIL SEAL**
 (a) After preload adjustment, remove the companion flange and use a plastic hammer to tap in a new oil seal into the differential carrier cage.

NOTICE:
Hit the oil seal uniformly to drive it in.



- 24. INSTALL REAR DRIVE PINION COMPANION FLANGE**
 (a) Install the companion flange with the lock nut.
Torque: 435 N·m (4,450 kgf·cm, 322 ft·lbf)
 (b) Using a chisel and a hammer, caulk the lock nut positively at the shaft groove (2 places).

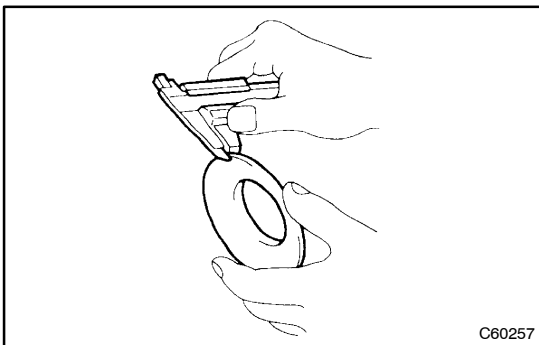


- 25. INSPECT SPIDER BEARING**
 (a) Using a micrometer, measure the outer diameter of the spider. Using a caliper gauge, measure the inner diameter of the pinion.
 (b) Measure the clearance by subtracting the outer diameter of the spider from the inner diameter of the pinion.

Clearance:

Standard	0.140 – 0.261 mm (0.0055 – 0.0103 in.)
Maximum	0.40 mm (0.0157 in.)

If the clearance is greater than the maximum, replace the spider or pinion gear.



- 26. INSPECT SIDE GEAR THRUST WASHER AND PINION THRUST WASHER**

- (a) Using a vernier caliper, measure the thickness of the side gear thrust washer and pinon gear thrust washer.

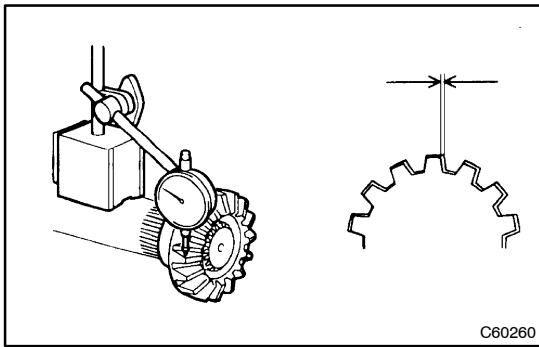
Thickness of side gear thrust washer:

Standard	1.9 – 2.1 mm (0.0748 – 0.0827 in.)
Minimum	1.7 mm (0.0669 in.)

Thickness of pinion gear thrust washer:

Standard	1.5 – 1.7 mm (0.0590 – 0.0669 in.)
Minimum	1.3 mm (0.0512 in.)

If the value is less than the minimum, replace the side gear thrust washer or pinion gear thrust washer.

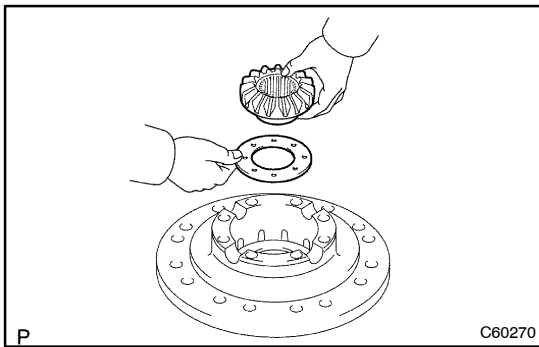
**27. INSPECT DIFFERENTIAL SIDE GEAR**

- (a) Using a dial gauge, measure the free play of the normal rotating direction of the axle shaft spline.

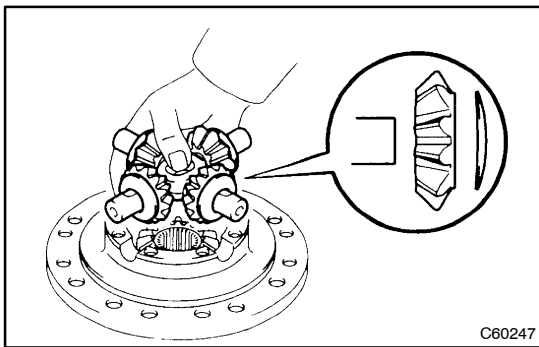
Free play:

Standard	0.054 – 0.148 mm (0.0021 – 0.0058 in.)
Maximum	0.5 mm (0.0197 in.)

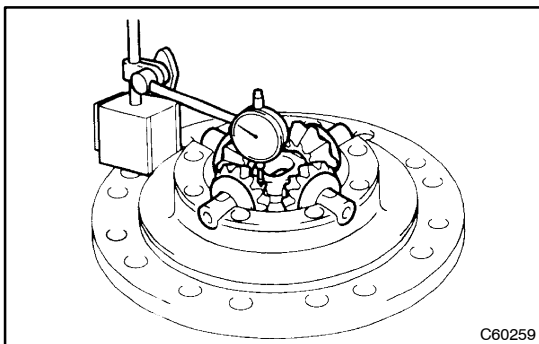
If the value is greater than the maximum, replace the differential side gear or the axle shaft.

**28. INSTALL REAR DIFFERENTIAL SPIDER**

- (a) Install the thrust washer on the side gear.



- (b) Install the 4 pinion gears and thrust washers to the spider.
 (c) Install the spider with the pinion gears to the LH case.

**29. ADJUST DIFFERENTIAL SIDE GEAR BACKLASH**

- (a) Using a dial gauge, measure the side gear backlash.

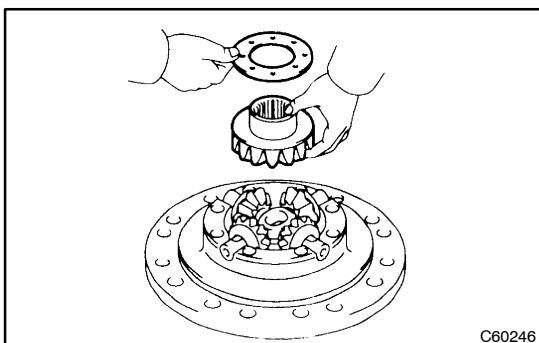
Backlash:

Standard	0.20 – 0.60 mm (0.0079 – 0.0236 in.)
Maximum	0.90 mm (0.0354 in.)

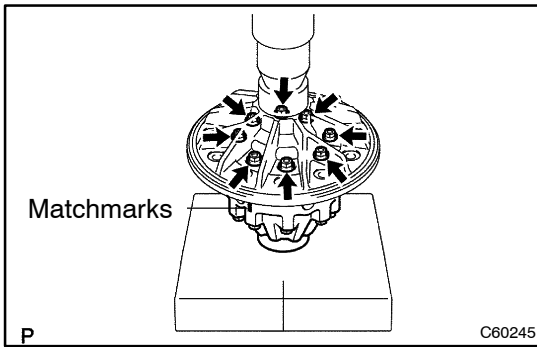
If the backlash is greater than the maximum, replace the parts.

HINT:

Measure the backlash at the RH case and LH case.

**30. INSTALL REAR DIFFERENTIAL SIDE GEAR**

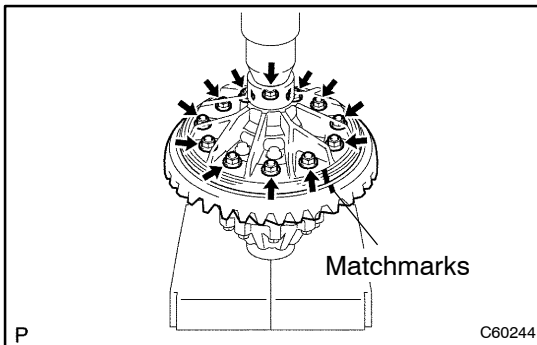
- (a) Install the side gear and thrust washer to the RH case.
 (b) Apply gear oil to each part.

**31. INSTALL DIFFERENTIAL CASE**

- (a) Align the matchmarks on the differential cases LH and RH.
- (b) Using a press, fix the differential.
- (c) Apply sealant to the threads of the 8 bolts and install them.

Part No. 08833-00100, THREE BOND 1360K or equivalent

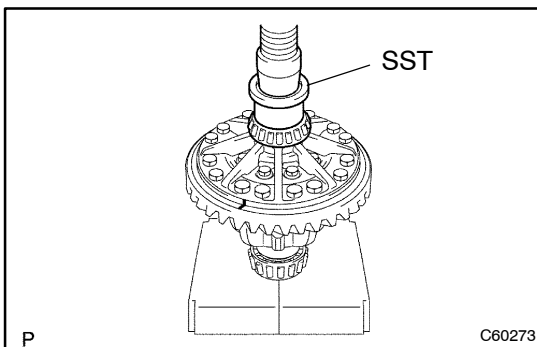
Torque: 270 N·m (2750 kgf·cm, 199 ft·lbf)

**32. INSTALL DIFFERENTIAL RING GEAR**

- (a) Align the matchmarks on the ring gear and the differential.
- (b) Using a press, fix the differential.
- (c) Apply sealant to the threads of the 12 bolts and install them.

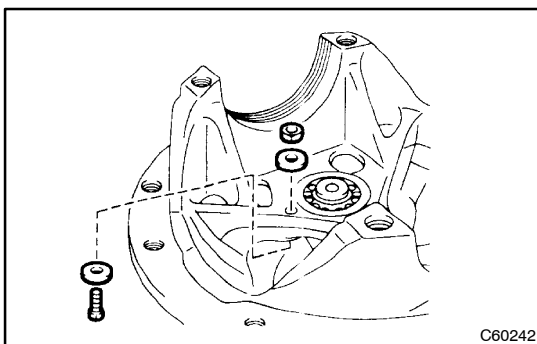
Part No. 08833-00100, THREE BOND 1360K or equivalent

Torque: 270 N·m (2750 kgf·cm, 199 ft·lbf)

**33. INSTALL SIDE BEARING INNER RACE**

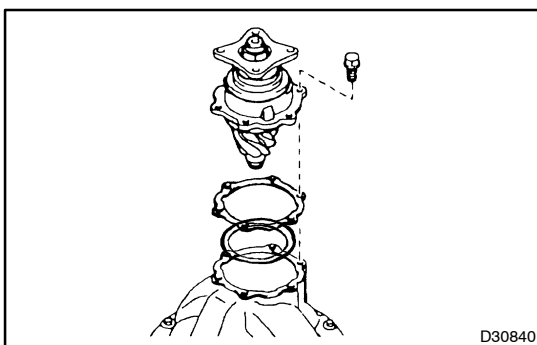
- (a) Install the distance spacer to the differential case RH.
- (b) Using SST and a press, install the 2 side bearing inner races to the differential case.

SST 09223-15020

**34. INSTALL PILOT BEARING OUTER RACE**

- (a) Install the bearing with the 2 retainers, bolt and nut.

Torque: 22 N·m (225 kgf·cm, 16 ft·lbf)

**35. INSTALL DRIVE PINION SUB-ASSY**

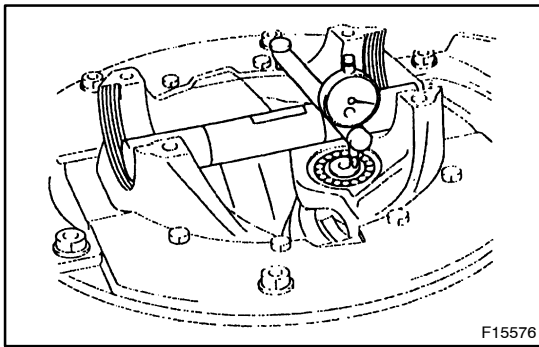
- (a) Apply bearing grease to a new O-ring.
- (b) Install the O-ring to the groove of the differential carrier cage.

NOTICE:

Be sure to use a new O-ring.

The work is facilitated when the grooves of the differential case and the drive pinion assembly are matched.

- (c) Tighten it temporarily with bolts.



- (d) Measure the depth from the installation surface of the side bearing to the tip of the drive pinion. (This depth is the conical distance.)

Conical distance (Reference): 21.5 mm (0.846 in.)

HINT:

- Make a note of the dimension of the error when manufactured stamped on the pinion tip before the installation of the drive pinion, then use it to calculate the conical distance.
 - The conical distance is the basic dimension when the tooth contact of the drive pinion and the ring gear is adjusted. Setting them in this dimension makes the tooth contact best. Additionally, because of machine processing, dimension of the error when manufactured against the standard dimension is stamped on the tip of the pinion. The dimension that takes dimension of the error when manufactured and the standard dimension into account is the basic dimension.
- (e) Depending on the difference between the measured value and reference value (conical distance), adjust the thickness of the shim.

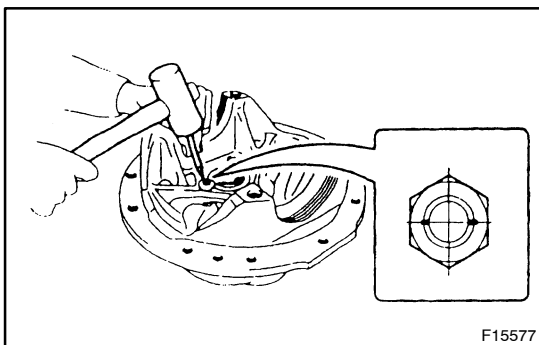
Shim thickness:

0.30 mm (0.0118 in.)	0.45 mm (0.0177 in.)
0.40 mm (0.0157 in.)	0.50 mm (0.0197 in.)

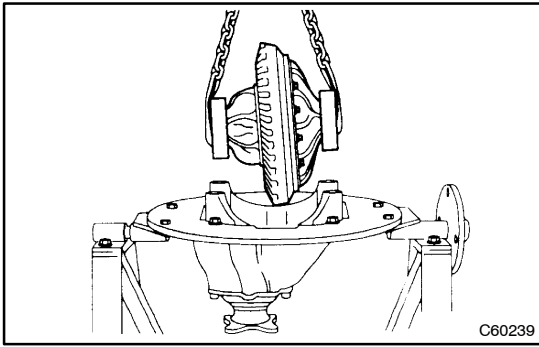
HINT:

- Basic value = Standard value + Dimension of the error when manufactured
 - When dimension of the error when manufactured is stamped by -20 , the actual dimension of the error when manufactured means -0.2 mm. (Standard value + Dimension of the error when manufactured = Basic Dimension [21.5 mm + $(-0.2$ mm) = 21.3 mm])
- (f) Tighten the drive pinion sub-assy with 6 bolts.

Torque: 74 N·m (755 kgf·cm, 55 ft·lbf)



- (g) Using a punch, caulk the 2 portions of the pilot bearing lock nut.



- 36. INSTALL REAR DEFFERENTIAL CASE SUB-ASSY**
 (a) Place the bearing outer races on their respective bearings.

NOTICE:

Check that the left and right outer races are not interchanged.

- (b) Using a chain block, install the differential case.

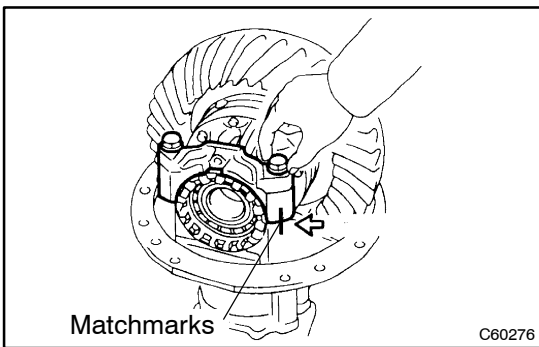
HINT:

Tilting the differential gear assy, install the differential carrier.

- (c) Install the 2 adjusting nuts on the carrier, making sure the nuts are properly threaded.

HINT:

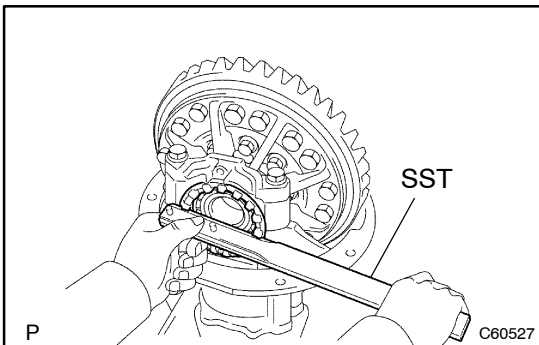
Making the 2 adjusting nuts horizontal to the side bearing, insert them from the top of the differential carrier.



- (d) Align the matchmarks on the cap and carrier. Temporally install the side bearing caps with the bolt.

HINT:

If the bearing cap does not tightly fit the carrier, the adjusting nuts may not be properly threaded. Reinstall the adjusting nuts if necessary.

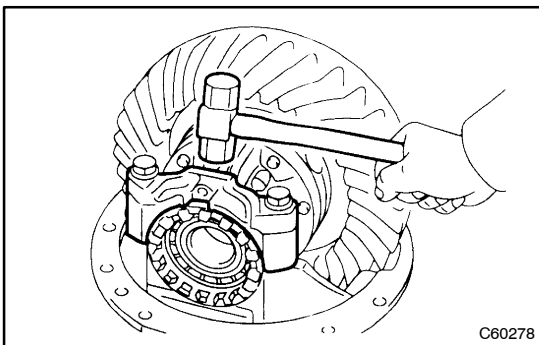


37. INSPECT BACKLASH BETWEEN PINION AND RING GEAR

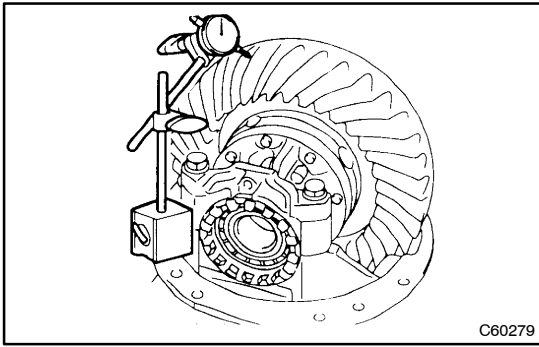
- (a) Using SST, fully tighten the adjusting nut on the ring gear side. Then, loosen the nut by the 1/4 rotation.

SST 09504-00011

- (b) Use the same procedures on the other side.



- (c) Using a brass bar, lightly tap the top of the side bearing cap so that the bearing fits.



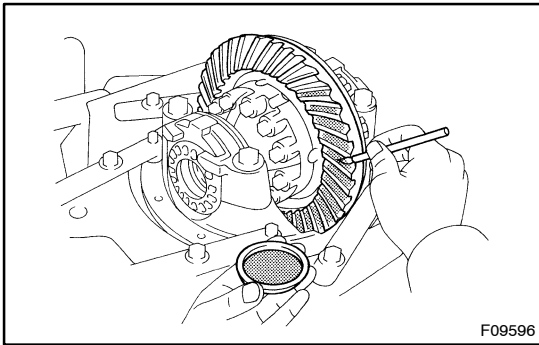
- (d) Using a dial gauge, measure the backlash.
Backlash: 0.20 - 0.28 mm (0.0079 - 0.0110 in.)

HINT:

Perform the measurements at 3 or more positions around the circumference of the ring gear, and adjust the side bearing pre-load as necessary.

- (e) The backlash should be adjusted by turning the left and right adjusting nuts by equal amounts. For example, loosen the nut on the left side one notch and torque the nut on the right side one notch.

38. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION



- (a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead.
- (b) Turn the companion flange in the both directions to inspect the ring gear for proper tooth contact.

Heel Contact

Select an adjusting washer that will bring the drive pinion closer to the ring gear.

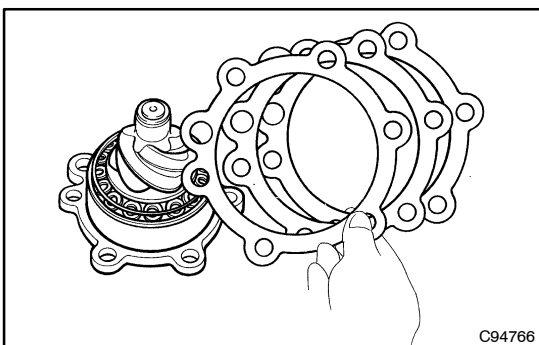
Face Contact

Proper Contact

Toe Contact

Select an adjusting washer that will shift the drive pinion away from the ring gear.

Flank Contact



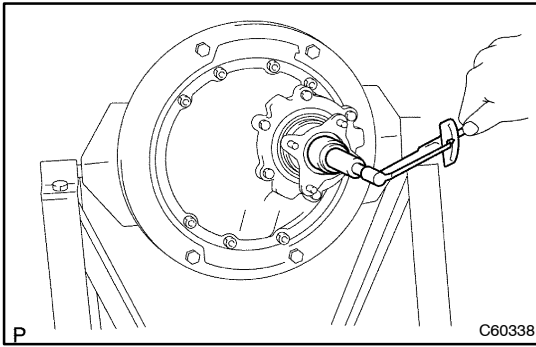
If the teeth are not properly contacting, use the value below to select a proper shim for correction.

Shim thickness:

0.30 mm (0.0118 in.)	0.40 mm (0.0157 in.)
0.45 mm (0.0177 in.)	0.50 mm (0.0197 in.)

HINT:

Use one or more shims for adjustment.

**39. MEASURE TOTAL PRELOAD**

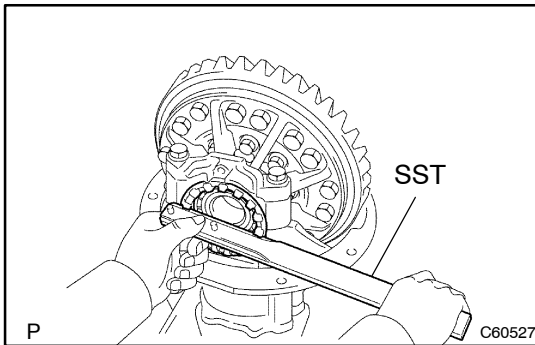
- (a) Using a torque wrench, measure the total preload.

Preload (New bearing) :

Drive pinion preload + (0.3 – 0.4) N·m (3 – 4 kgf·cm, 2.6 – 3.5 in·lbf)

Preload (Reused bearing) :

Drive pinion preload + (0.2 – 0.35) N·m (2 – 3.5 kgf·cm, 1.7 – 3.0 in·lbf)

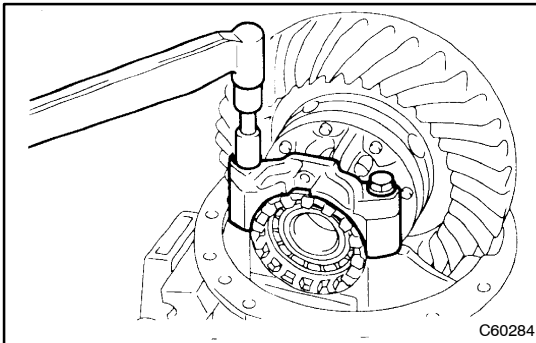


If the result is not as specified, then turn the left/right adjusting nuts using SST to adjust the preload.

SST 09504-00011

NOTICE:

When adjusting with the adjusting nuts, tighten one and another by an equal amount so that the adjustment of the backlash will not be out of order.



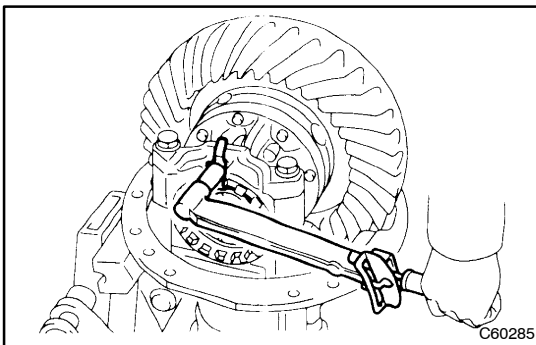
- (b) Tighten the bearing cap with the 4 bolts.

Torque: 210 N·m (2,150 kgf·cm, 156 ft·lbf)

- (c) Inspect total preload.

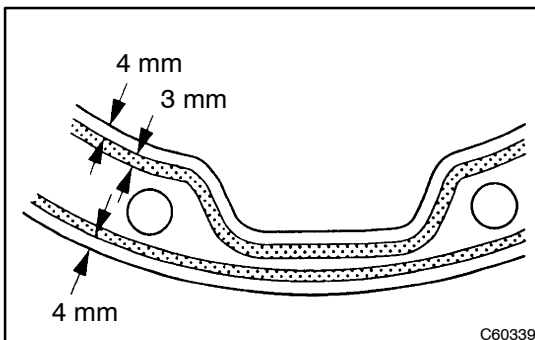
- (d) Recheck the ring gear backlash.

Backlash: 0.20 – 0.28 mm (0.0079 – 0.0110 in.)

**40. INSTALL REAR DIFFERENTIAL BEARING ADJUSTING NUT LOCK**

- (a) Install 2 new nut locks on the bearing caps.

Torque: 22 N·m (225 kgf·cm, 16 ft·lbf)

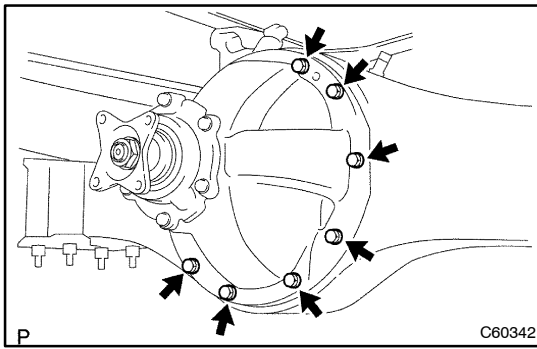
**41. INSTALL REAR DIFFERENTIAL CARRIER ASSY**

- (a) Clean the contact surface of the differential case and rear axle housing.

- (b) Apply seal packing to the rear axle housing, and install the differential carrier assembly with the 8 bolts, 4 nuts and 4 washers within 20 minutes.

Seal packing: Three bond 1215 or 1216

Coating width: 3 mm (0.118 in.)



- (c) Using a jack, install the differential carrier assy into the axle housing with the 12 bolts.

Torque:

M12: 96.6 N·m (985 kgf·cm, 71 ft·lbf)

M14: 130 N·m (1,330 kgf·cm, 96 ft·lbf)

42. **INSTALL PROPELLER SHAFT ASSY (See page 30-4 or 30-11)**
43. **INSTALL REAR AXLE SHAFT (See page 30-72 or 30-75,)**
44. **ADD DIFFERENTIAL OIL (See page 29-2)**

DRIVE SHAFT / PROPELLER SHAFT

DRIVE SHAFT, PROPELLER SHAFT,			
AXLE	30-1	REAR AXLE SHAFT (5 HUB BOLTS)	30-71
PROBLEM SYMPTOMS TABLE	30-1	COMPONENTS	30-71
ON-VEHICLE INSPECTION	30-2	REPLACEMENT	30-72
PROPELLER SHAFT ASSY (B-TYPE)	30-4	REAR AXLE SHAFT (6 HUB BOLTS)	30-74
COMPONENTS	30-4	COMPONENTS	30-74
OVERHAUL	30-6	REPLACEMENT	30-75
PROPELLER SHAFT ASSY (LE-TYPE)	30-11	REAR AXLE AXLE LH HUB BOLT	30-76
COMPONENTS	30-11	REPLACEMENT	30-76
OVERHAUL	30-14		
PROPELLER INTERMEDIATE SHAFT			
ASSY (B-TYPE)	30-22		
OVERHAUL	30-22		
PROPELLER INTERMEDIATE SHAFT			
ASSY (LE-TYPE)	30-29		
OVERHAUL	30-29		
FRONT AXLE HUB SUB-ASSY LH			
(DISC BRAKE)	30-33		
COMPONENTS	30-33		
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FRONT AXLE HUB SUB-ASSY LH			
(5-BOLTS DRUM BRAKE)	30-39		
COMPONENTS	30-39		
OVERHAUL	30-40		
FRONT AXLE HUB SUB-ASSY LH			
(6-BOLTS DRUM BRAKE)	30-44		
COMPONENTS	30-44		
OVERHAUL	30-45		
STEERING KNUCKLE LH			
(5 HUB BOLTS)	30-50		
COMPONENTS	30-50		
OVERHAUL	30-51		
STEERING KNUCKLE LH			
(6 HUB BOLTS)	30-55		
COMPONENTS	30-55		
OVERHAUL	30-56		
FRONT AXLE LH HUB BOLT	30-60		
REPLACEMENT	30-60		
REAR AXLE HUB LH (5 HUB BOLTS)	30-61		
COMPONENTS	30-61		
OVERHAUL	30-62		
REAR AXLE HUB LH (6 HUB BOLTS)	30-66		
COMPONENTS	30-66		
OVERHAUL	30-67		

DRIVE SHAFT, PROPELLER SHAFT, AXLE

PROBLEM SYMPTOMS TABLE

300ID-01

HINT:

Use the table below to help you find a cause of the problem. The numbers indicate the priority of a likely cause of the problem. Check each part in order. If necessary, replace these parts.

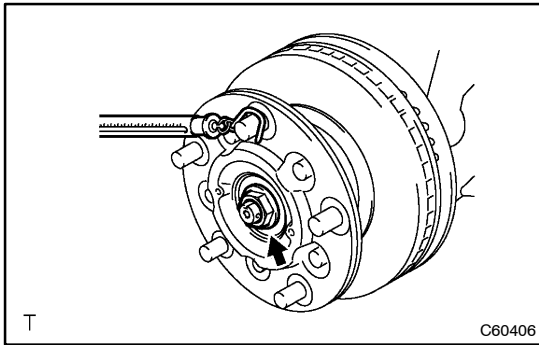
Symptom	Suspected Area	See Page
Wander/pulls	1. Tires (Worn or improperly inflated)	28-1
	2. Wheel alignment (Incorrect)	26-2
	3. Steering linkage (Loosen or worn)	-
	4. Hub bearings (Loosen or worn)	30-34
		30-40
		30-45
	30-62	
	30-67	
	5. Steering gear (Out of adjustment or broken)	-
	6. Suspension parts (Worn out)	-
Front wheel shimmy	1. Tires (Worn or improperly inflated)	28-1
	2. Wheels (Out of balance)	28-1
	3. Shock absorber (Worn out)	26-22
	4. Wheel alignment (Incorrect)	26-2
	5. Ball joints (Worn)	26-7
		26-17
		30-34
		30-40
	30-45	
	30-62	
	30-67	
	7. Steering linkage (Loosen or worn)	-
	8. Steering gear (Out of adjustment or broken)	-
Noise	1. Center bearing (Worn)	30-6
		30-14
	2. Spider bearing (Worn or stuck)	30-6
		30-14
Vibration	1. Propeller shaft (Runout)	30-6
		30-14
	2. Propeller shaft (Imbalance)	-

ON-VEHICLE INSPECTION

1. Front wheel:

INSPECT PRELOAD

- (a) Remove the front tire.
- (b) Move the front axle hub 2 or 3 times over the full range to settle down the bearing.
- (c) Loosen the lock nut so that it can be turned by hand (approx. 60°).
- (d) Using a plastic hammer, lightly hit the spindle tip.



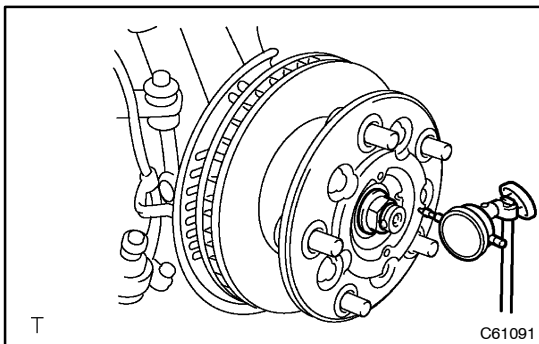
- (e) Using a socket wrench (35 mm) and spring tension gauge, tighten the lock nut within the range of the reference value for the starting torque.

Preload (at starting):

5 hub bolts: 4.9 – 14.2 N (0.5 – 1.4 kgf, 1.1 – 3.1 lbf)

6 hub bolts: 17.7 – 44.1 N (1.8 – 4.5 kgf, 4.0 – 10.0 lbf)

- (f) Confirm the smooth rotation of the front axle hub.
- (g) Install the front tire.



2. Front wheel:

INSPECT BEARING AXIAL PLAY

- (a) Remove the front tire.
- (b) Check the bearing for play in the axial direction near the inner circumference of the front axle hub (flange part).

Maximum: 0.05 mm (0.0020 in.)

- (c) Install the front tire.

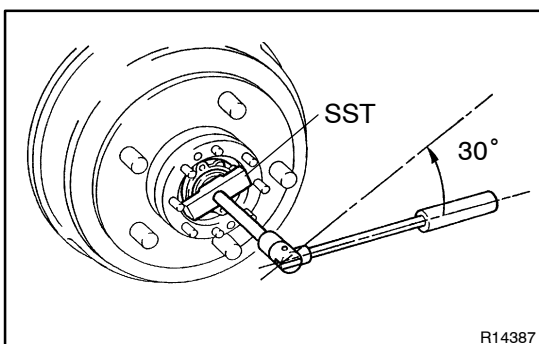
3. Rear wheel for 5 hub bolts type:

INSPECT PRELOAD

- (a) Settle down the bearing by turning the hub several times.
- (b) Using SST, tighten the lock nut again.

SST 09513-36020

Torque: 56 N·m (575 kgf·cm, 42 ft·lbf)

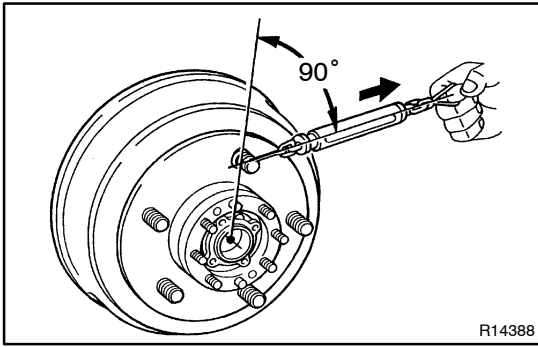


- (c) Using SST, loosen the lock nut until it can be turned by hand.

SST 09513-36020

HINT:

Loosen the lock nut by 30°.



(d) Using a spring tension gauge, measure the preload.

Preload (at starting):

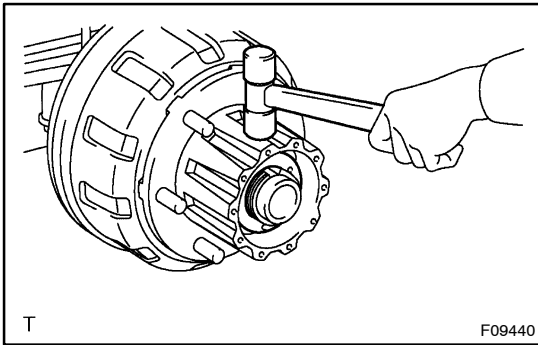
9.8 – 29.4 N (1.0 – 3.0 kgf, 2.2 – 6.6 lbf)

NOTICE:

Adjust the gap so that the brake drum and the brake shoe do not come into contact.

If the preload is not within the specification, adjust the preload by tightening or loosening the lock nut.

(e) Check that the axle hub rotates smoothly.



4. Rear wheel for 6 hub bolts type:

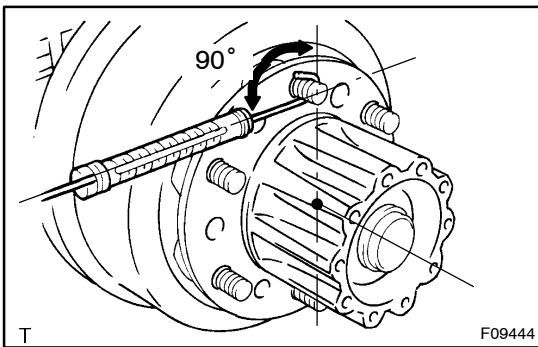
ADJUST PRELOAD

(a) Using a plastic hammer, tap the axle hub.

(b) Turn the axle hub and check that the bearing returns.

NOTICE:

Adjust the gap so that the brake drum and the brake shoe do not come into contact.



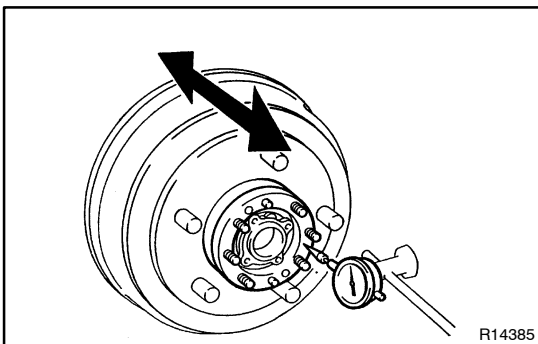
(c) Using a spring tension gauge, measure the preload at the hub bolt.

Preload (at rotating):

35.3 – 53.0 N (3.6 – 5.4 kgf, 7.9 – 11.9 lbf)

If the preload is not within the specification, adjust the preload by tightening or loosening the lock nut.

(d) Check that the axle hub rotates smoothly.



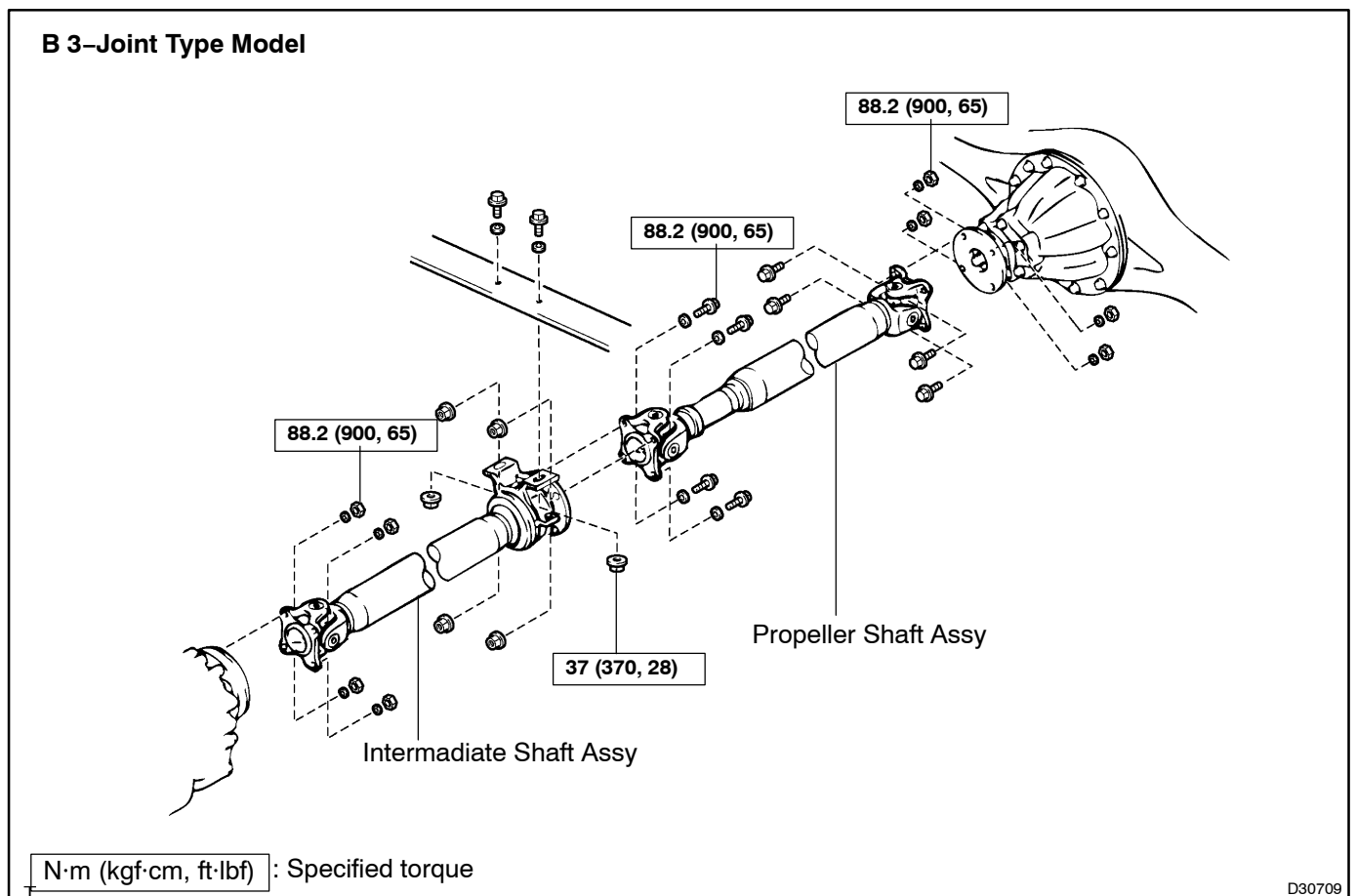
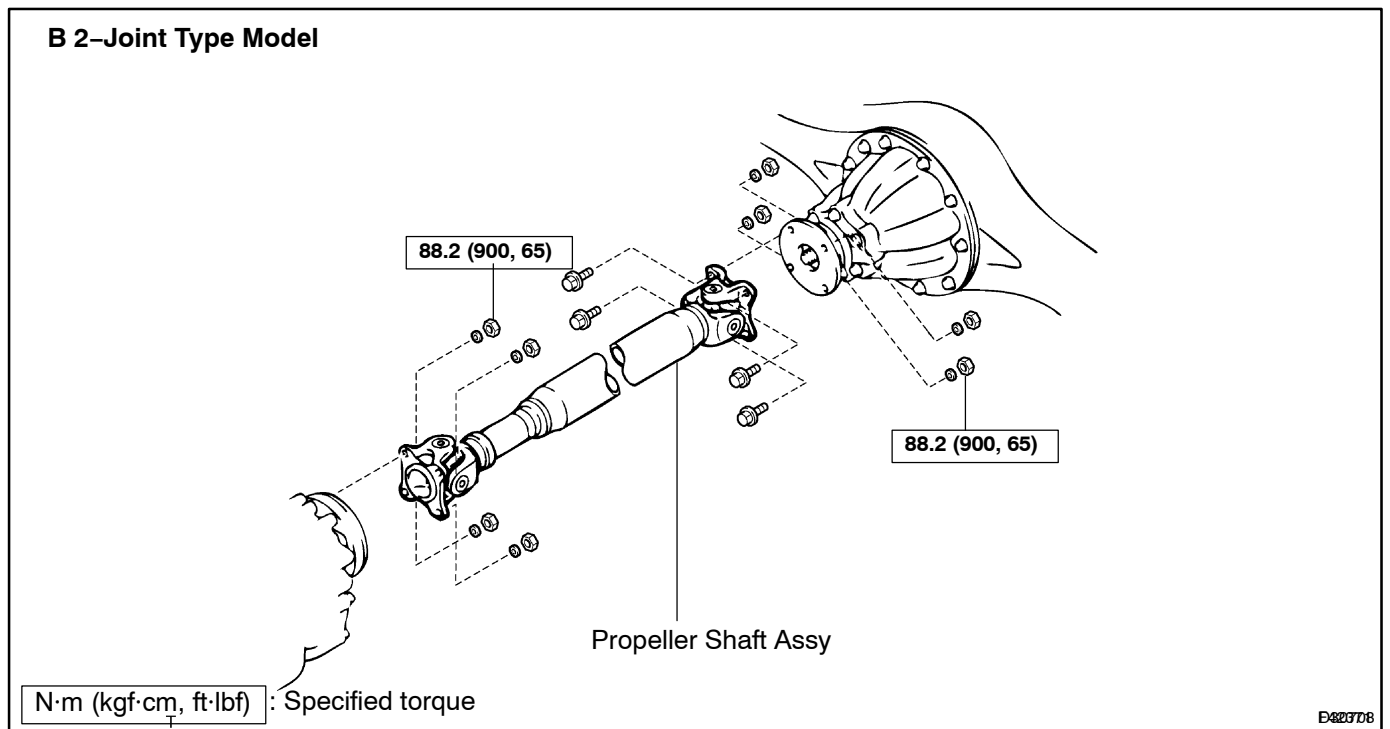
5. Rear wheel:

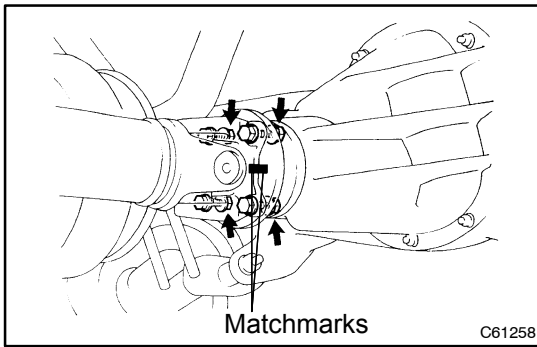
INSPECT AXLE HUB AXIAL PLAY

Axial play: 0.10 mm (0.0039 in.) or less

PROPELLER SHAFT ASSY (B-TYPE) COMPONENTS

300IF-01

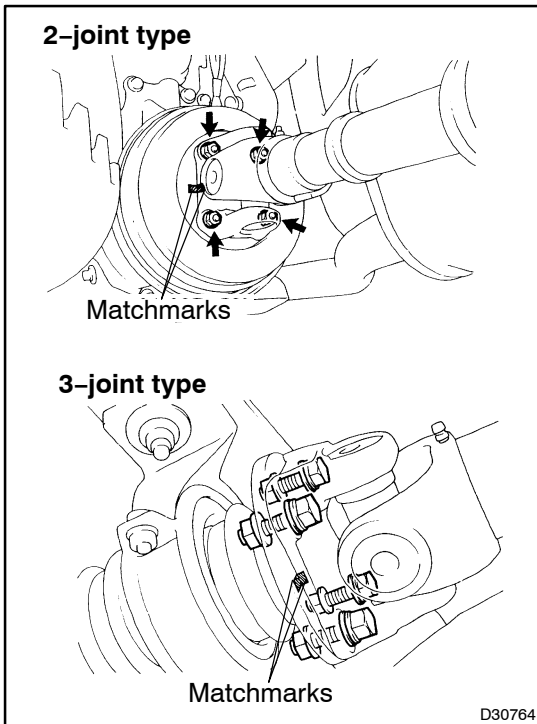




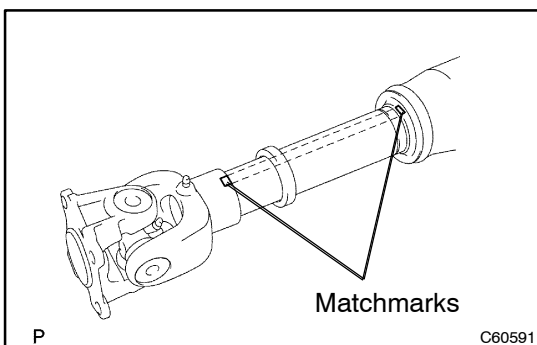
OVERHAUL

1. REMOVE PROPELLER SHAFT ASSY

- (a) Place matchmarks on the propeller shaft flange and differential.
- (b) Remove the 4 nuts, 4 bolts and 4 washers.

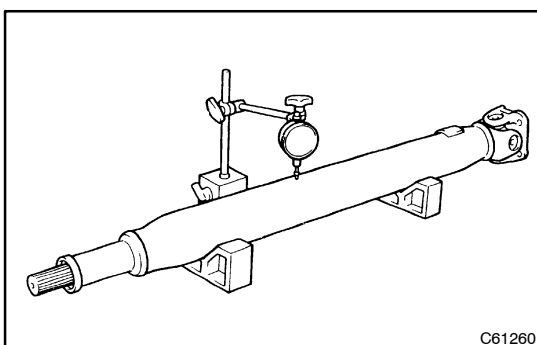


- (c) 2-joint type:
Place matchmarks on the propeller shaft flange and parking brake drum.
- (d) 3-joint types:
Place matchmarks on the propeller shaft flange and intermediate shaft.
- (e) Remove the 4 nuts, 4 washers and 4 bolts.
- (f) Remove the propeller shaft.



2. REMOVE SLEEVE YOKE

- (a) Place matchmarks on universal joint sleeve yoke and propeller shaft.
- (b) Remove the universal joint sleeve yoke assembly from the propeller shaft.

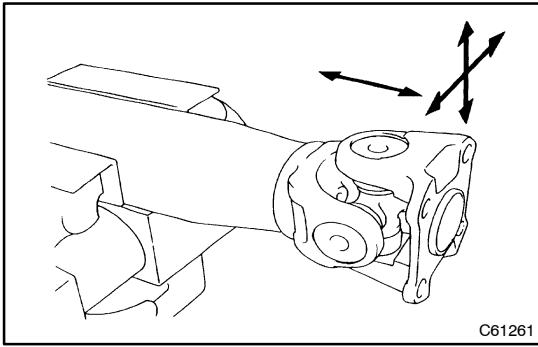


3. INSPECT PROPELLER SHAFT ASSY

- (a) Using a dial indicator, check the shaft runout.

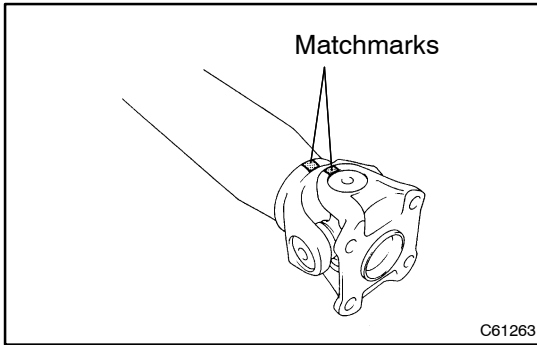
Maximum runout: 0.8 mm (0.031 in.)

If the shaft runout is greater than maximum, replace the shaft.

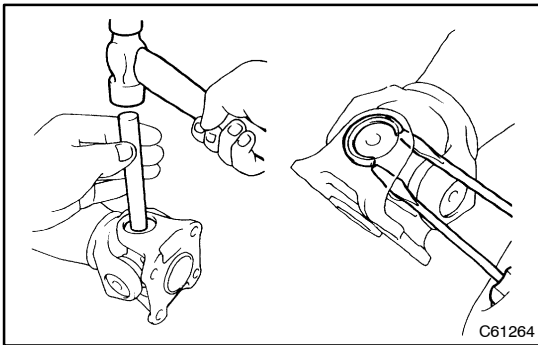
**4. INSPECT UNIVERSAL JOINT SPIDER ASSY**

- (a) Check the spider bearings for wear or damage.
- (b) Shake the spider in the axial direction and right angle direction strongly with both hands, and check that there is no looseness in the spider and needle roller bearing.

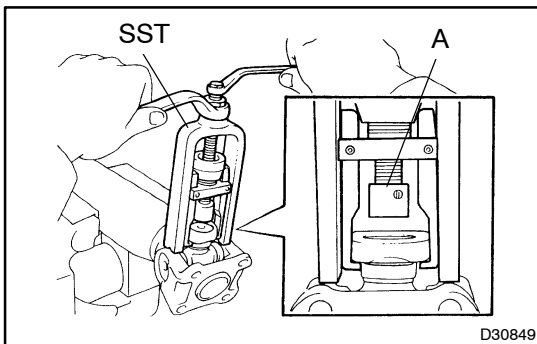
If necessary, replace the spider bearing.

**5. REMOVE UNIVERSAL JOINT SPIDER ASSY**

- (a) Place matchmarks on the propeller shaft and yoke.



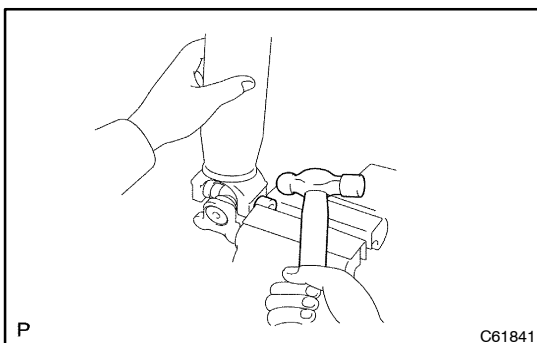
- (b) Using a brass bar and a hammer and tap the center of the cup lightly.
- (c) Using 2 screwdrivers and a hammer to remove the 4 spider bearing hole snap rings.



- (d) Using SST to push out the spider bearing until just before contact between the universal joint spider and the yoke.
SST 09332-25010

NOTICE:

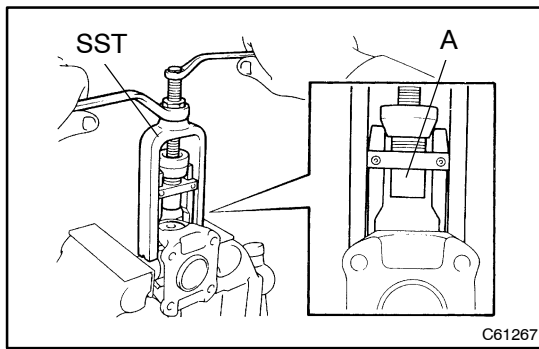
- Take sufficient care that the part A of the SST will not hit the spider bearing.
- Do not use the SST in inclined position.



- (e) Clamp the outer race of the spider bearing in a vice, and remove the spider bearing by hitting the yoke part with a hammer.

NOTICE:

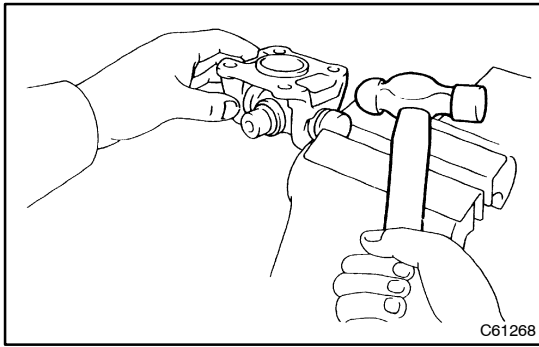
Never hit the shaft part.



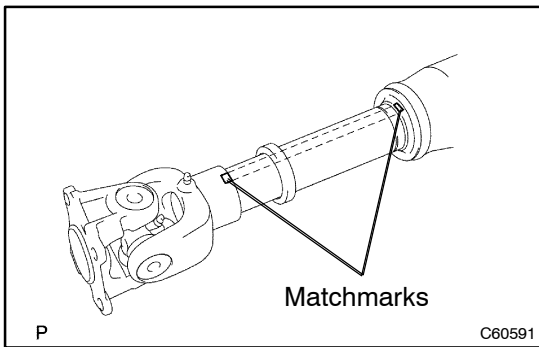
- (f) Install the remove bearing outer race on the universal joint spider and fix it in a vice.
- (g) Using SST and drive the spider bearing out of the yoke.
SST 09332-25010

NOTICE:

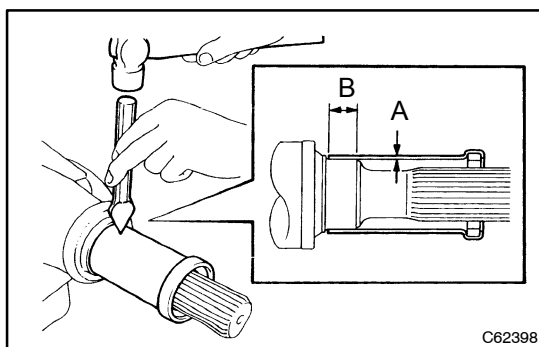
- Take sufficient care that the part A of the SST will not hit the spider bearing.
- Do not use the SST in inclined position.



- (h) Clamp the outer race of the spider bearing in a vice and hit the yoke part with a hammer to remove the spider bearing.
- (i) Remove the universal joint spider.

**6. REMOVE REAR PROPELLER SHAFT SLIDING SHAFT DUST COVER SUB-ASSY**

- (a) Sleeve yoke removal
- (1) Apply match marks to the sleeve yoke and propeller shaft.
 - (2) Pull the sleeve yoke off the propeller shaft.



- (b) Dust cover removal
- (1) Cut the press-fit part of the dust cover with a hacksaw or similar in a spiral, split it with a chisel, and remove it.

NOTICE:

- Do not damage the propeller shaft.
- Replace the propeller shaft if it has been damaged.

HINT:

- A (Dust cover thickness) : 1.2 mm
- B (Dust cover press-fit amount) : 20.9 - 21.1 mm

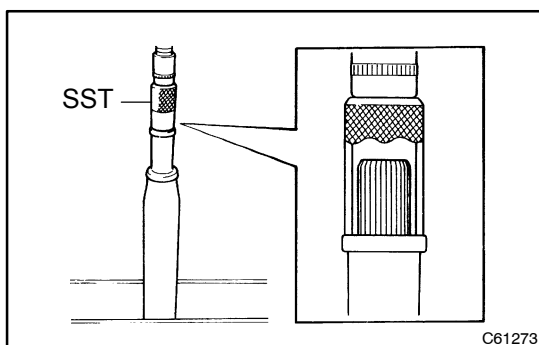
- (c) Dust cover installation

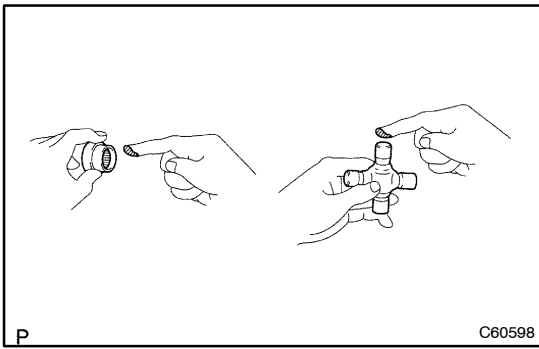
- (1) Using SST and a press to press-fit a new dust cover.

SST 09636-20010

NOTICE:

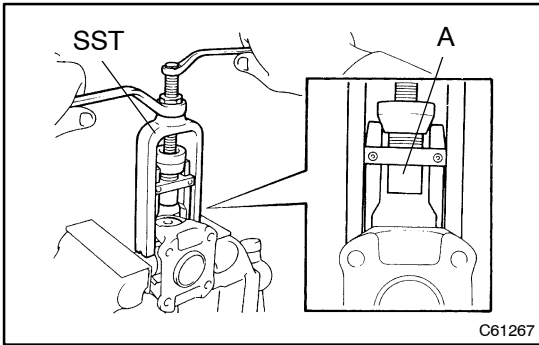
Perform press-fitting with the universal joint in straight condition.





7. INSTALL SPIDER BEARING

- (a) Remove the old grease in the bearing case and needle roller and apply enough MP grease.



8. INSTALL UNIVERSAL JOINT SPIDER ASSY

- (a) Install the universal joint spider on the yoke, and using SST to press-fit the spider bearing into the yoke until the snap ring groove becomes visible.

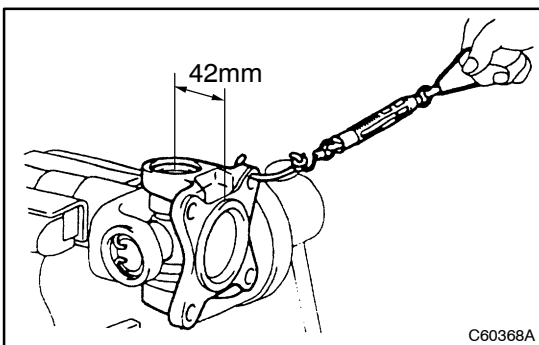
SST 09332-25010

- (b) Select the snap rings on both sides so that the play of the universal joint spider in axial direction becomes 0 mm.

Select snap rings with the same thickness on both sides.

Sorts and discrimination of the retainer ring

Discrimination	Thickness mm (in.)
1	1.98 - 2.00 (0.0780 - 0.0787)
2	2.00 - 2.02 (0.0787 - 0.0795)
3	2.02 - 2.04 (0.0795 - 0.0803)
4	2.04 - 2.06 (0.0803 - 0.0811)
5	2.06 - 2.08 (0.0811 - 0.0819)
6	2.08 - 2.10 (0.0819 - 0.0827)
7	2.10 - 2.12 (0.0827 - 0.0835)
8	2.12 - 2.14 (0.0835 - 0.0843)
9	2.14 - 2.16 (0.0843 - 0.0850)
10	2.16 - 2.18 (0.0850 - 0.0858)



9. INSPECT UNIVERSAL JOINT ROTATING TORQUE

- (a) Using a spring tension gauge, hang the hook of the spring tension gauge on the bolt hole of the flange yoke and measure the rotating force.

Standard rotating torque (at starting):

0.5 - 2.8 N·m (5.1 - 28.6 kgf·cm, 4.4 - 24.8 in·lbf)

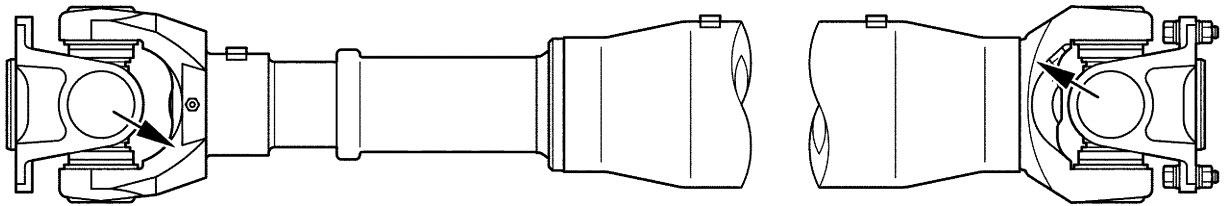
NOTICE:

Measurement of rotating force should be done at 2 positions for each universal joint by 90° on the opposite directions (flange yoke side and end yoke side).

When the rotating force is lighter than the standard, use one lank thicker retainer snap ring and one lank thinner snap ring when it is heavier.

10. INSTALL PROPELLER SHAFT ASSY

- (a) Remove the old grease on the spline and sliding sections.
- (b) Remove any rust and dirt on the spline sections.
- (c) Apply bearing grease to the spline and sliding sections.
- (d) Align the matchmarks of the sliding yoke and sleeve yoke, and insert the sleeve yoke.

SPIDER GREASE FITTING ASSEMBLY DIRECTION
Propeller Shaft

P

← : Grease Fitting Direction

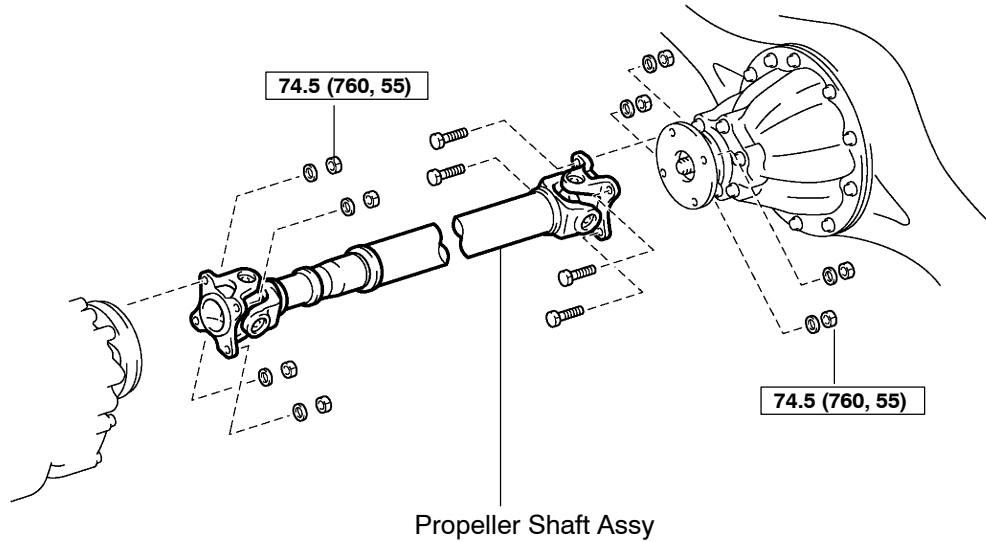
C60589

PROPELLER SHAFT ASSY (LE-TYPE)

COMPONENTS

300H-01

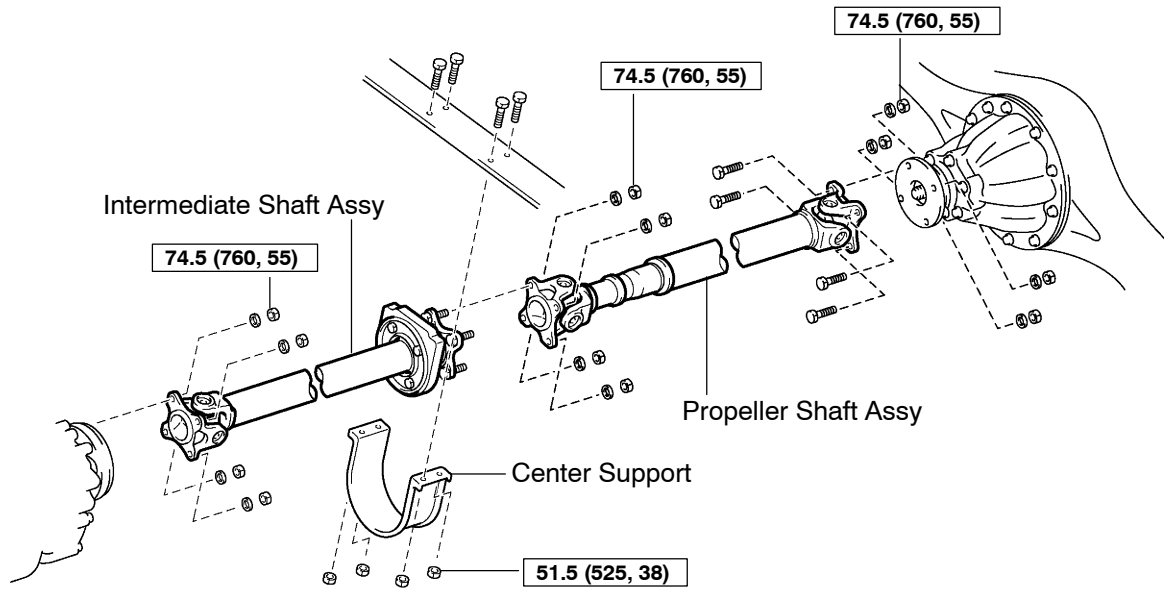
LE 2-Joint Type Model



T **N·m (kgf·cm, ft·lbf)** : Specified torque

F42371

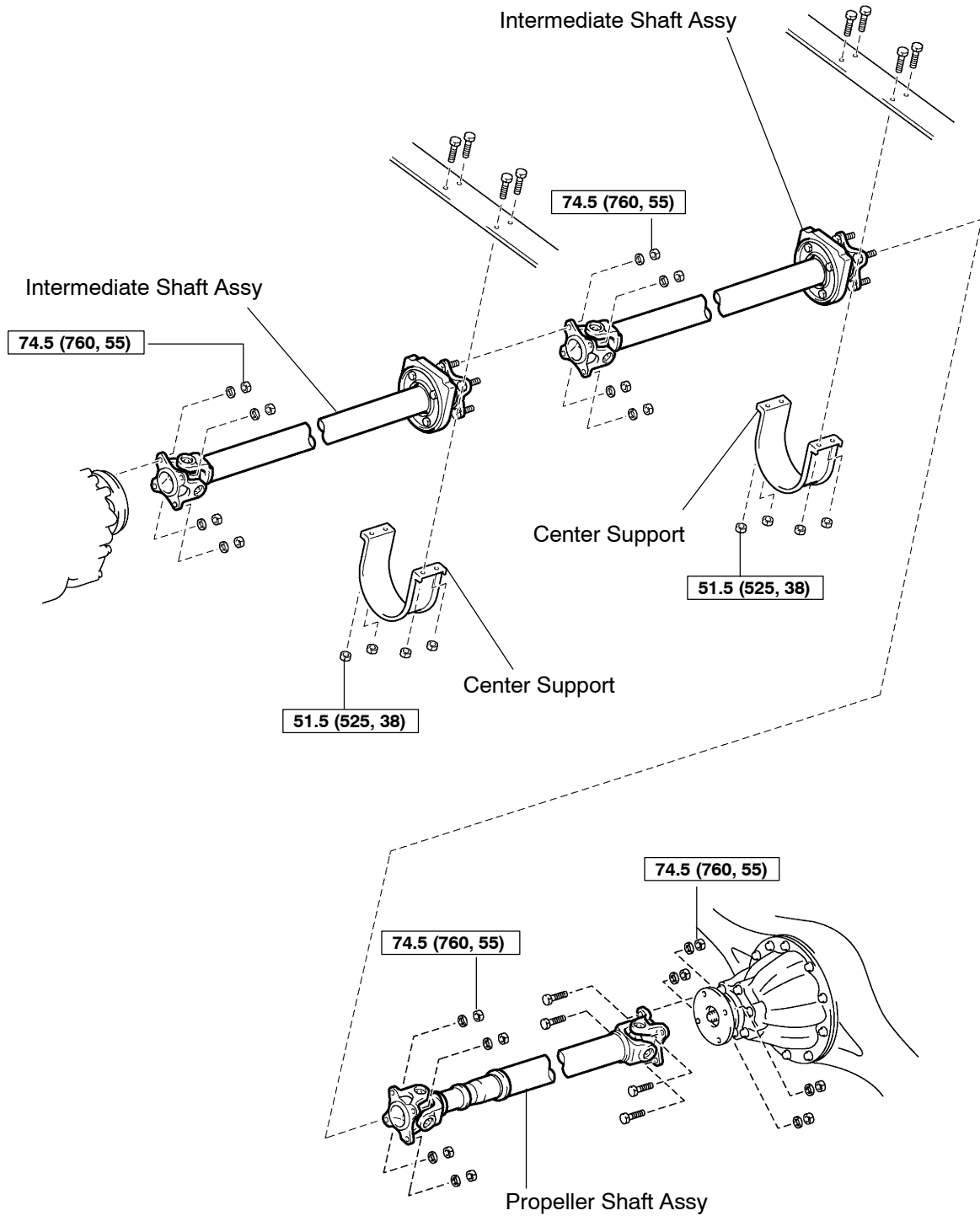
LE 3-Joint Type Model



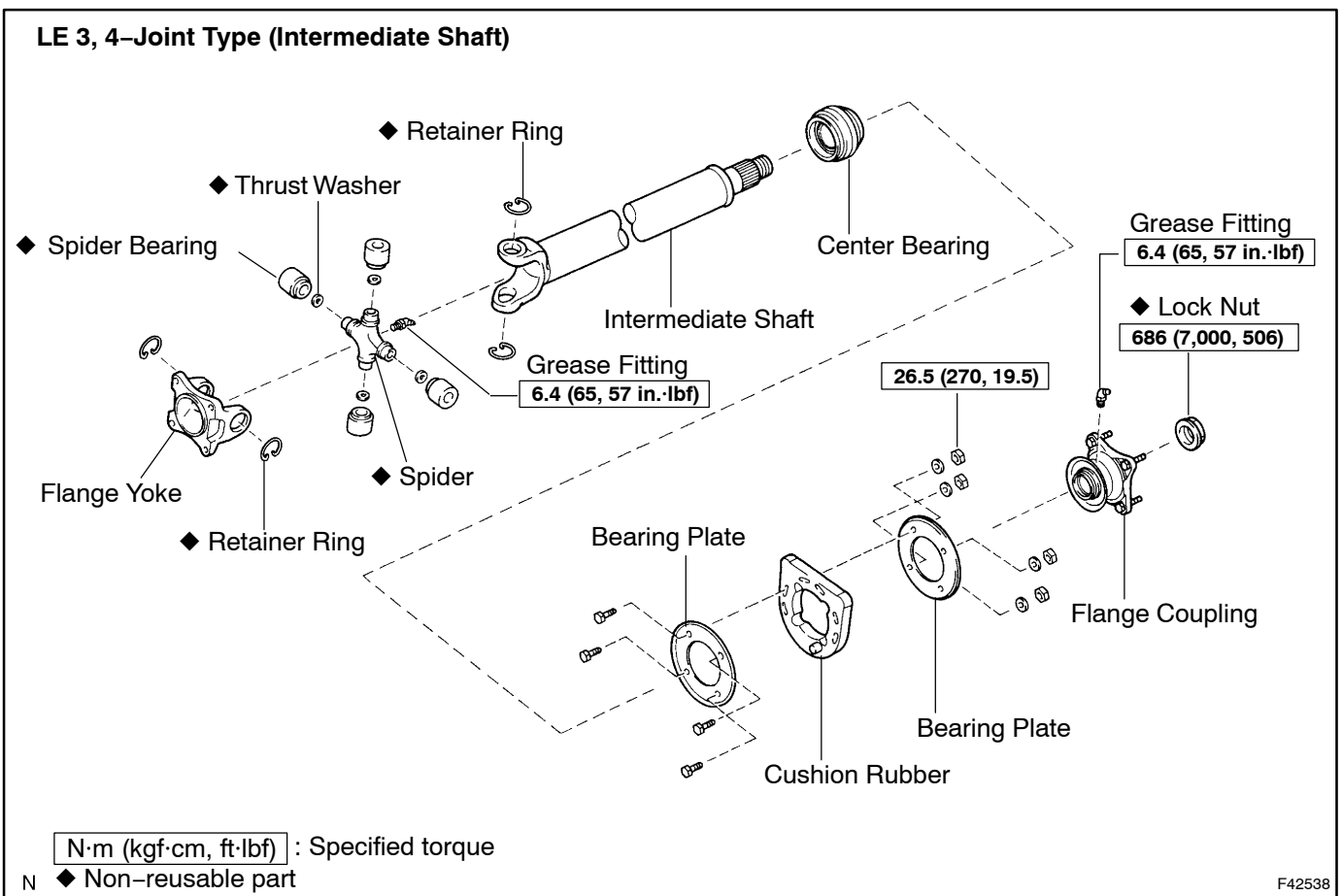
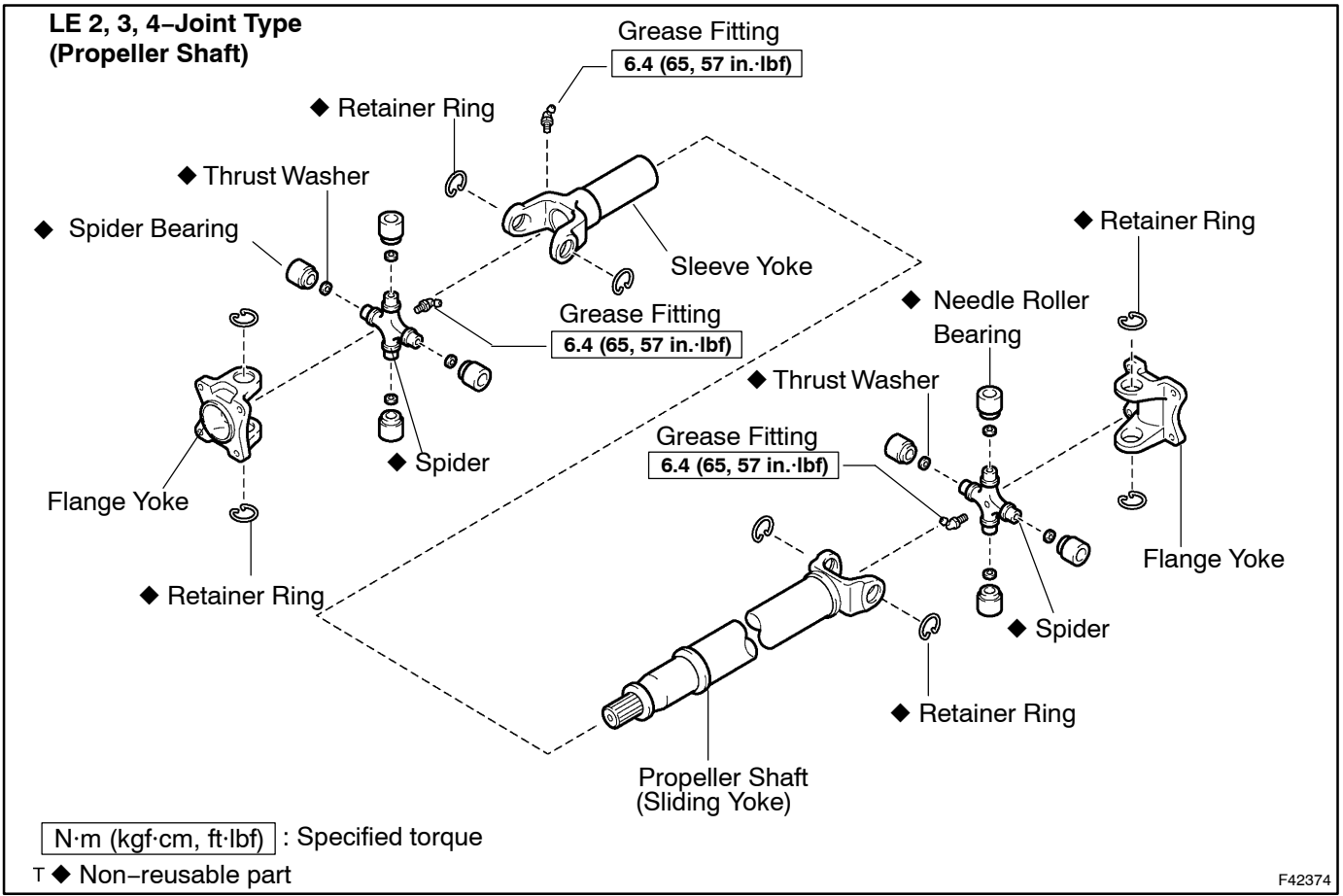
N·m (kgf·cm, ft·lbf) : Specified torque

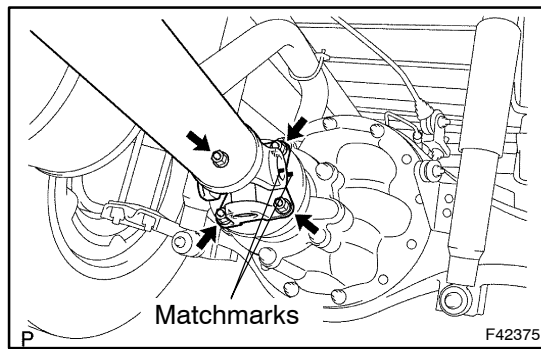
F42372A

LE 4-Joint Type Model



N·m (kgf·cm, ft·lbf) : Specified torque

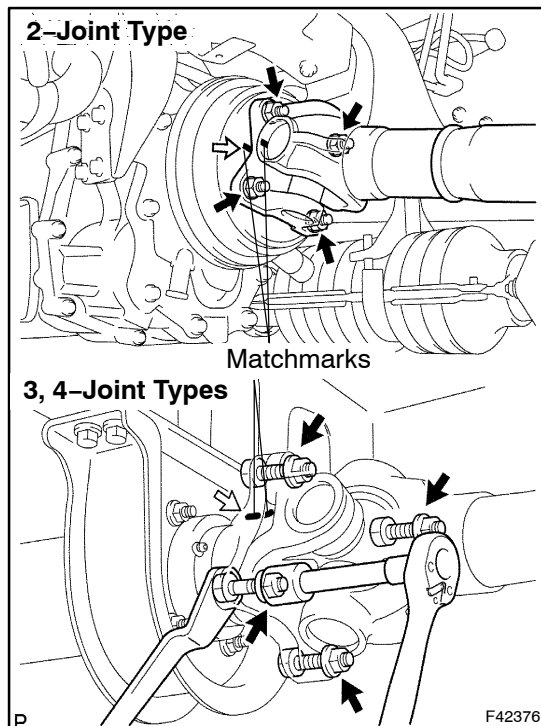




OVERHAUL

1. REMOVE PROPELLER SHAFT ASSY

- (a) Place matchmarks on the propeller shaft flange and differential.
- (b) Remove the 4 nuts, 4 bolts and 4 washers.



- (c) 2-joint type:
Place matchmarks on the propeller shaft flange and parking brake drum.
- (d) 3, 4-joint types:
Place matchmarks on the propeller shaft flange and intermediate shaft.
- (e) Remove the 4 nuts, 4 washers and 4 bolts.
- (f) Remove the propeller shaft.

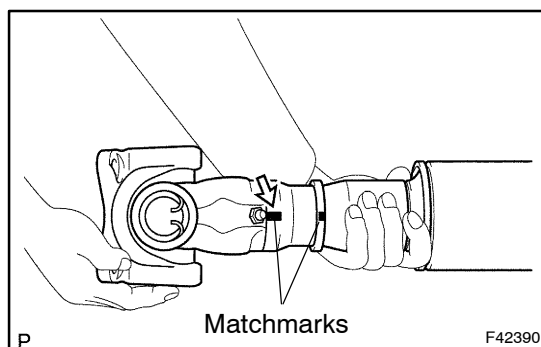
2. INSPECT PROPELLER SHAFT ASSY

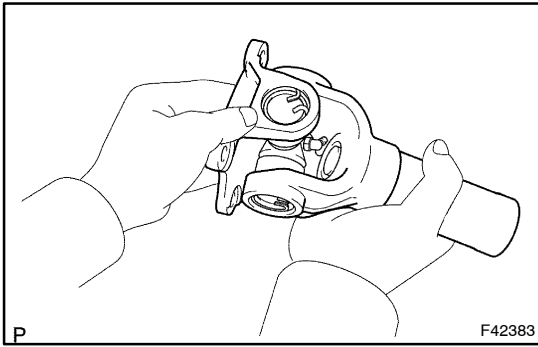
- (a) Using a dial indicator, check the shaft runout.
Standard runout: 0 – 0.6 mm (0 – 0.024 in.)
Maximum runout: 1.0 mm (0.039 in.)

If the runout is greater than the maximum, replace the shaft assy.

3. REMOVE SLEEVE YOKE

- (a) Place matchmarks on the sleeve yoke and sliding yoke.
- (b) Remove the sleeve yoke from the sliding yoke.

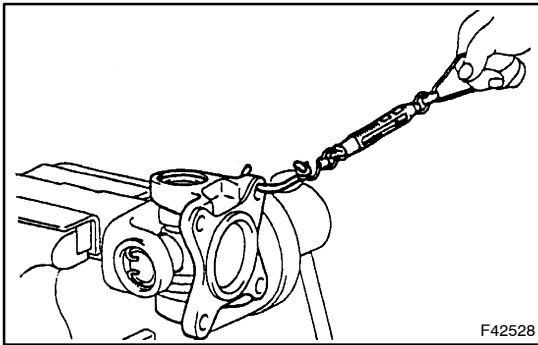




4. INSPECT UNIVERSAL JOINT SPIDER ASSY

- (a) Check the spider bearings for wear or damage.
- (b) Strongly shake the spider in the axial direction and right angle direction with both hands, and check that there is no looseness in the spider and needle roller bearing.

If necessary, replace the spider bearing.



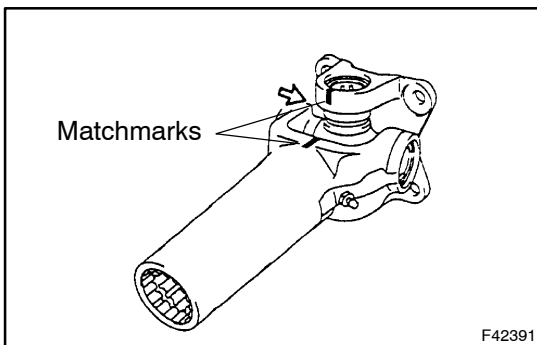
- (c) Using a spring tension gauge, hang the hook of the spring tension gauge on the bolt hole of the flange yoke, and then measure the rotating torque.

Standard rotating torque (at starting):

1.47 - 2.94 N·m (15 - 30 kgf·cm, 13 - 26 in.·lbf)

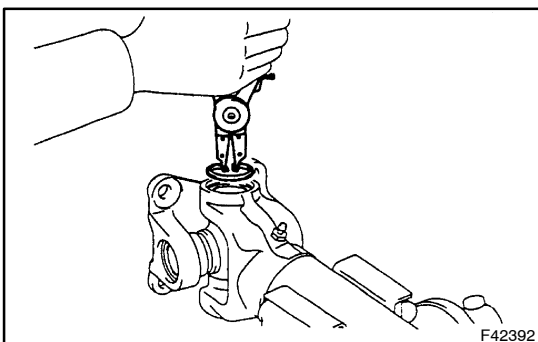
NOTICE:

- The rotating torque should be measured at 2 positions of each universal joint by turning it by 90° in both directions (flange yoke side and end yoke side).
- When the rotating force is lighter than the standard, use a thicker retainer ring, and a thinner retainer ring when it is heavier.



5. REMOVE UNIVERSAL JOINT SPIDER ASSY

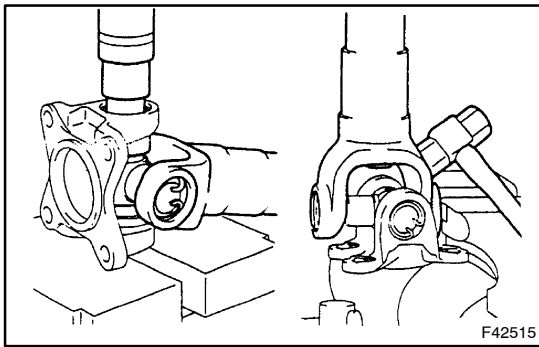
- (a) Place matchmarks on the flange yoke and sleeve yoke.



- (b) Using snap ring pliers, remove the retainer ring.

CAUTION:

Pay attention when installing and removing the retainer ring, because you may be injured by the flying retainer ring.

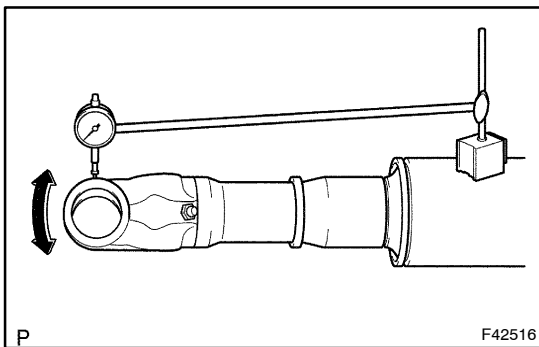


- (c) Using a press, extrude the spider bearing just until the spider and yoke come into contact.

HINT:

Disassembly becomes easier if you remove the grease fitting in advance, because it will allow you to have more extruding area.

- (d) Fix the spider bearing with a vice, lightly hit the yoke of the propeller shaft with a hammer and remove the spider bearing.
- (e) Remove the spider bearing on the opposite side as well in the same procedures shown in the (c) and (d).



6. INSPECT FREE PLAY OF SLIDING YOKE

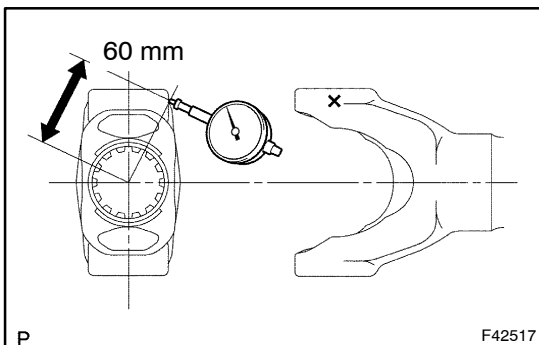
- (a) Fixing the sliding yoke horizontally with a vise, place a dial indicator onto the yoke of the sleeve yoke to measure the free play.

Standard free play:

0.062 – 0.174 mm (0.0024 – 0.0069 in.)

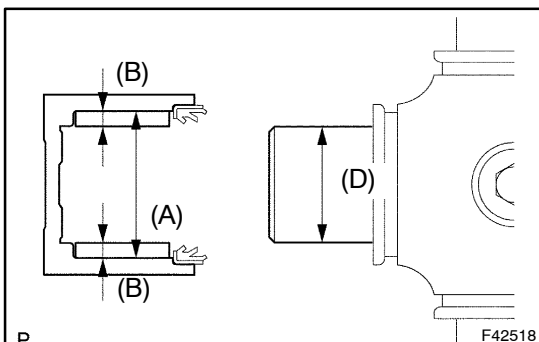
Maximum free play: 0.25 mm (0.0098 in.)

If the free play is greater than the maximum, replace the sliding yoke.



HINT:

Place the dial indicator at a spot of 60 mm (2.36 in.) away from the center of the sliding yoke.



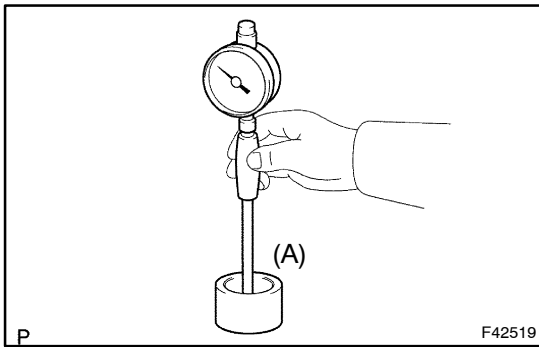
7. INSPECT CLEARANCE OF SPIDER JOURNAL AND NEEDLE ROLLER BEARING

- (a) Measure the diameter of the spider journal and the bore diameter of the needle roller bearing. If the clearance is greater than the maximum, change the spider journal or the needle roller bearing.

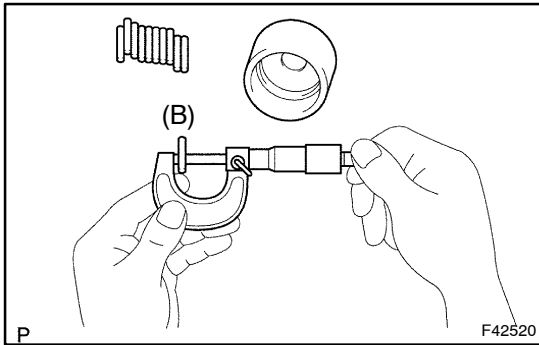
Standard clearance : $A - (B \times 2 - D)$

0.024 – 0.064 mm (0.0009 – 0.0025 in.)

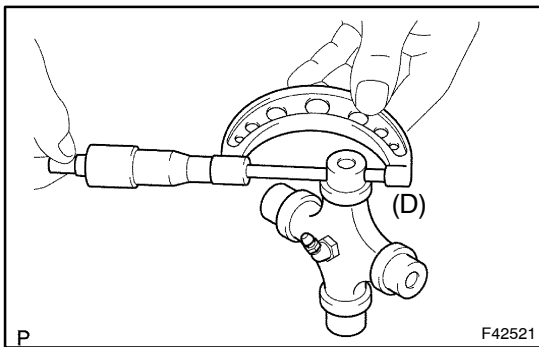
Maximum clearance: 0.1 mm (0.0039 in.)



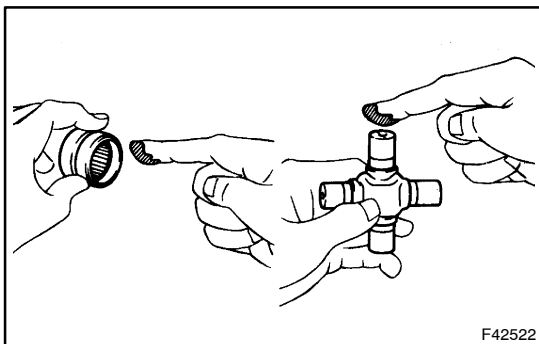
- (1) Using a dial indicator, measure the bore diameter (A) of the bearing case of the needle roller bearing.



- (2) Using a micrometer, measure the diameter (B) of the needle roller.

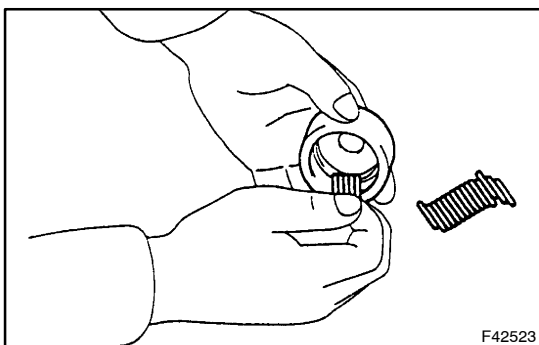


- (3) Using a micrometer, measure the diameter (D) of the journal of the spider.

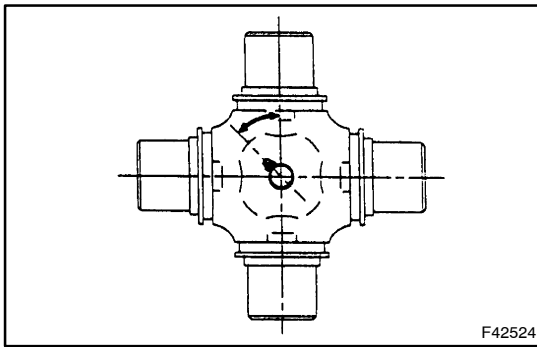


8. INSTALL UNIVERSAL JOINT SPIDER ASSY

- (a) Apply MP grease to a new spider, bearing case and the both sides of the thrust washer.



- (b) Insert the thrust washer and needle roller into the bearing case.

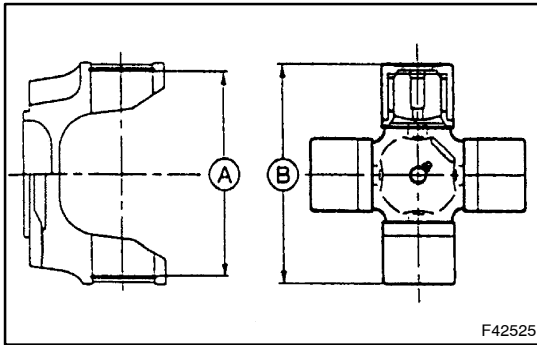


(c) Install the grease fitting onto the spider section.

NOTICE:

Turn the direction of the grease fitting by 45° toward the journal section of the spider.

(d) Install the bearing case with needle roller bearing to the spider.

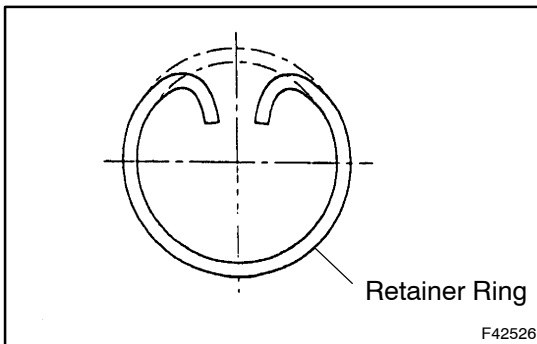


(e) Measure the size of groove "A" of the retainer ring of the yoke.

(f) After inserting the thrust washer and spider bearing into the spider journal section, measure the size of the universal joint "B".

NOTICE:

Size "B" should be measured with the universal joint fixed to the vice, because the spider and needle roller bearing will come stuck.



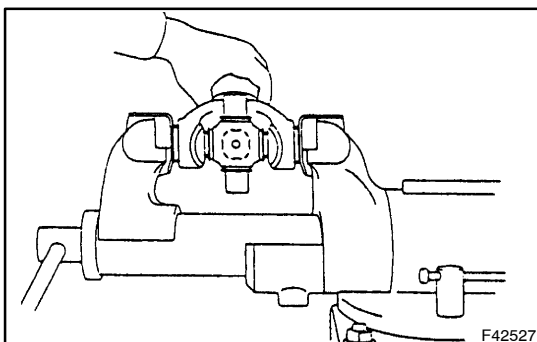
(g) Select the thickness of the retainer ring to make sizes "A" and "B" equal.

Thickness of the retainer ring:

Discrimination (Color)	Thickness mm (in.)
White	1.50 (0.0591)
Red	1.55 (0.0610)
Green	1.60 (0.0630)
Blue	1.65 (0.0650)
Yellow	1.70 (0.0669)

NOTICE:

- Use a new retainer ring.
- Use retainer rings having the same thickness as much as possible on both ends.

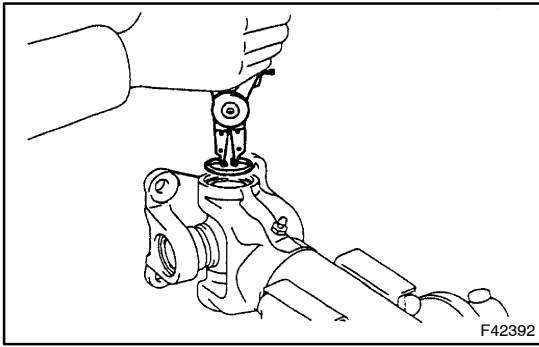


(h) Insert the spider into the yoke, and press in the needle roller bearing with a vice.

(i) Press in the needle roller bearing also to the opposite end in the same way specified in step.

CAUTION:

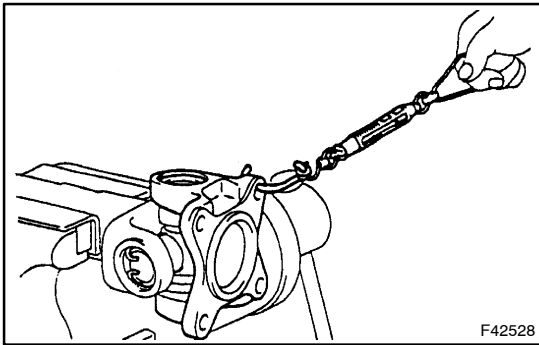
Pay attention when removing and replacing the retainer ring, because you may be injured by flying retainer ring.



(j) Using snap ring pliers, install the retainer ring.

NOTICE:

Pay attention when removing and installing the retainer ring, because you may be injured by the flying retainer ring.



9. INSPECT UNIVERSAL JOINT SPIDER ASSY

(a) Using a spring tension gauge, hang the hook of the spring tension gauge on the bolt hole of the flange yoke and measure the rotating torque.

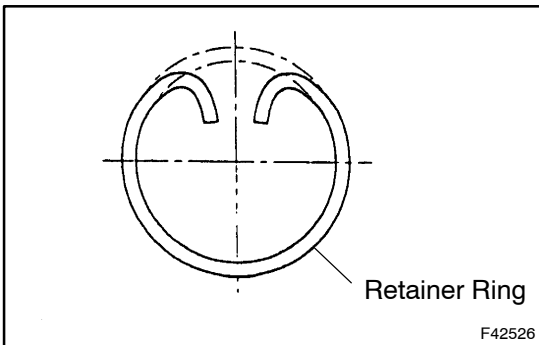
Standard rotating torque (at starting):

1.47 - 2.94 N·m (15 - 30 kgf·cm, 13 - 26 in.·lbf)

NOTICE:

The rotating torque should be measured at 2 positions of each universal joint by turning it by 90° in both directions (flange yoke side and end yoke side).

When the rotating torque is lighter than the standard, use a thicker retainer ring, and a thinner retainer ring when it is heavier.



Thickness of the retainer ring:

Discrimination (Color)	Thickness mm (in.)
White	1.50 (0.0591)
Red	1.55 (0.0610)
Green	1.60 (0.0630)
Blue	1.65 (0.0650)
Yellow	1.70 (0.0669)

10. INSTALL SLEEVE YOKE

- (a) Remove the old grease on the spline and sliding sections.
- (b) Remove the rust and dirt on the spline sections.
- (c) Apply bearing grease to the spline and sliding sections.
- (d) Align the matchmarks of the sliding yoke and sleeve yoke, and insert the sleeve yoke.

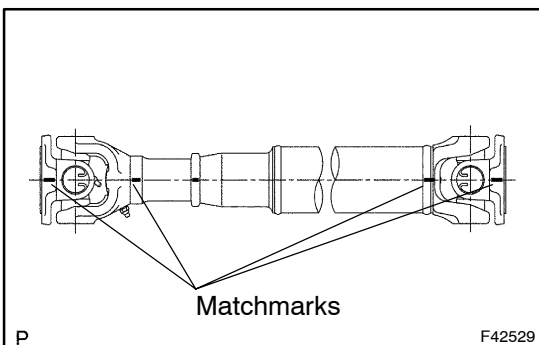
NOTICE:

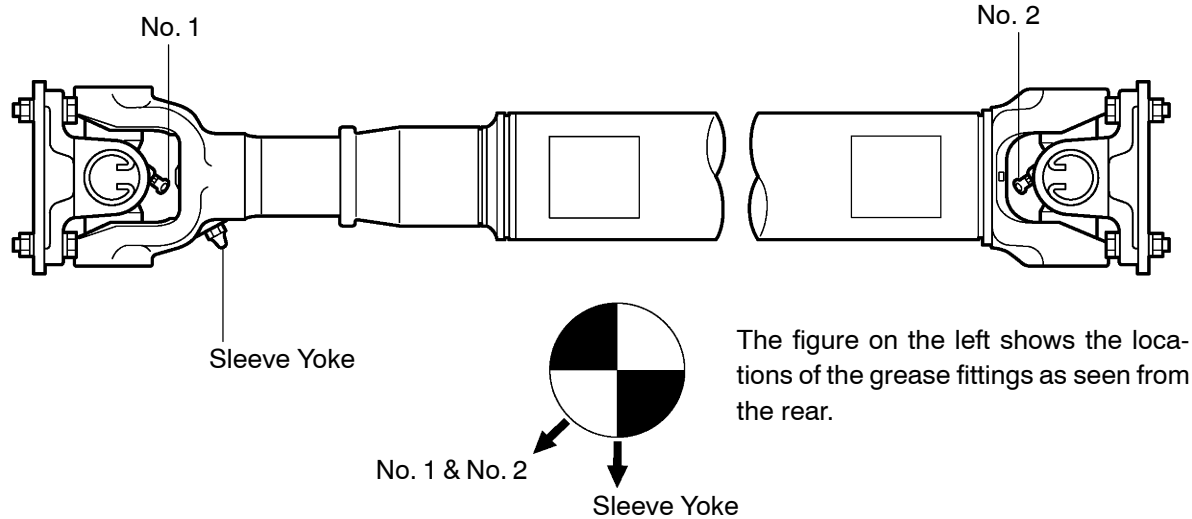
Because each yoke has a phase mark, align the matchmarks on the same line at the time of the installation.

11. INSPECT PROPELLER SHAFT ASSY

HINT:

When replacing the spider bearing, be sure that the grease fitting assembly hole is facing the direction shown in the illustration.



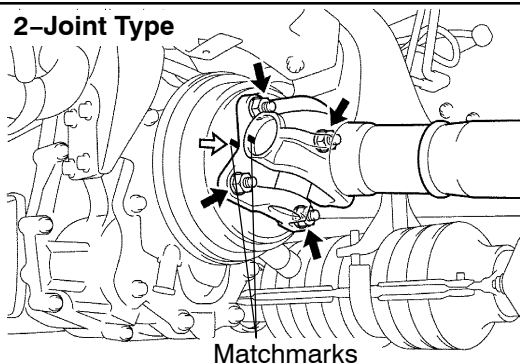
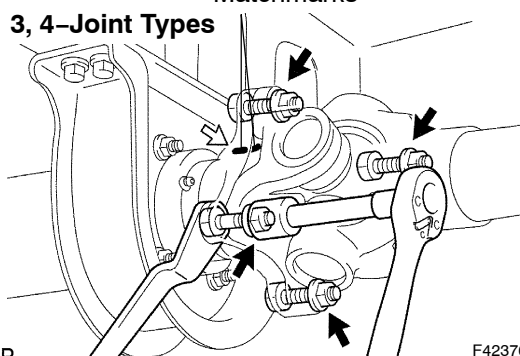
SPIDER GREASE FITTING ASSEMBLY DIRECTION**Propeller Shaft**

The figure on the left shows the locations of the grease fittings as seen from the rear.

HINT:

↑ Fill up the grease fitting assembly hole with MP grease.

F42530

2-Joint Type**3, 4-Joint Types**

F42376

12. INSTALL PROPELLER SHAFT ASSY**(a) 2-joint type:**

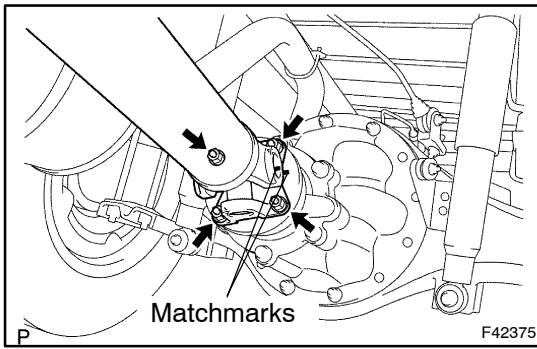
Align the matchmarks on the propeller shaft flange and parking brake drum down or flange.

(b) 3, 4-joint types:

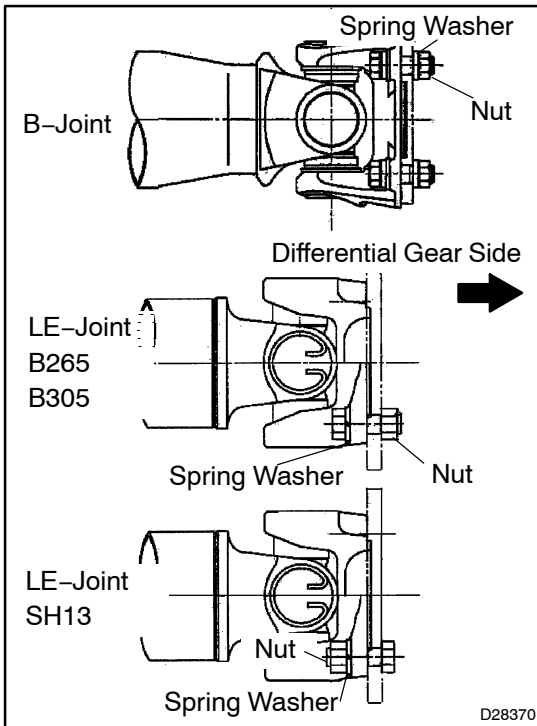
Align the matchmarks on the propeller shaft flange and intermediate shaft down or flange.

(c) Install the 4 bolts, 4 washers and 4 nuts.

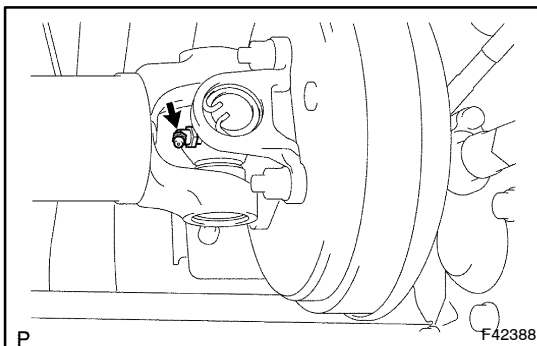
Torque: 74.5 N·m (760 kgf·cm, 55 ft·lbf)



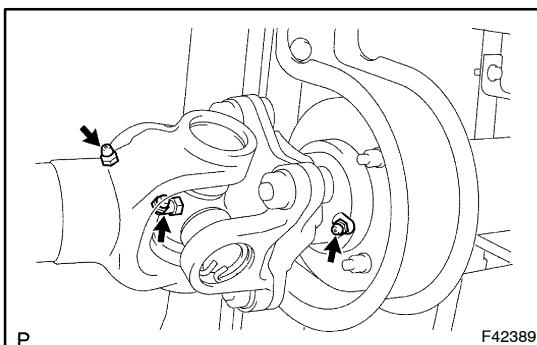
- (d) Align the matchmarks on the yoke and differential flange.
 (e) Install the 4 bolts, 4 washers and 4 nuts.
Torque: 74.5 N·m (760 kgf·cm, 55 ft·lbf)

**NOTICE:**

The bolt insertion direction and spring washer location differ depending on the type of the differential carrier on the installation side.



- (f) Apply sufficient amount of MP grease from each grease fitting position of the universal joint, center bearing and sliding yoke.
 (1) For the universal joint section, apply grease until it overflows from the bearing sealing.



- (2) For the sliding yoke section, apply grease until it overflows from the center cap.

PROPELLER INTERMEDIATE SHAFT ASSY (B-TYPE)

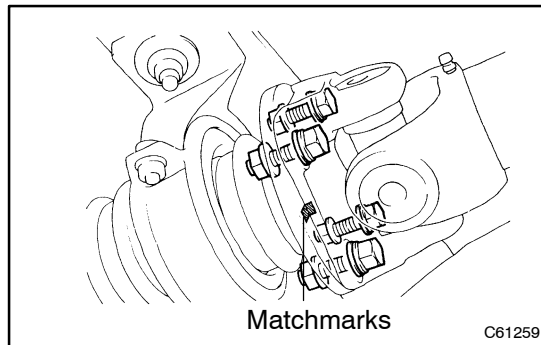
300J-01

OVERHAUL

HINT:

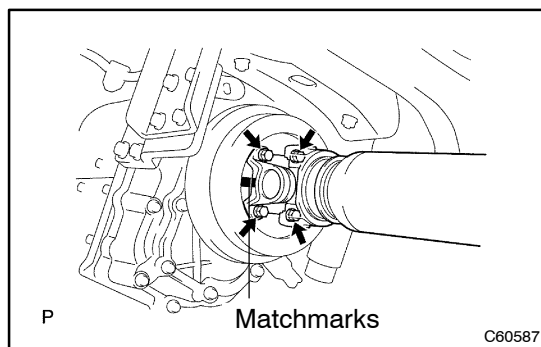
COMPONENTS: See page 30-4, 30-5

1. REMOVE PROPELLER SHAFT ASSY (See page 30-6)

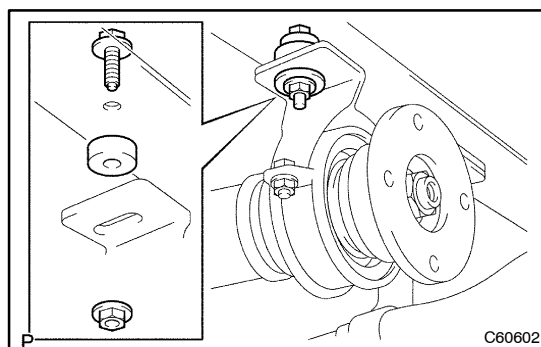


2. REMOVE PROPELLER INTERMEDIATE SHAFT ASSY

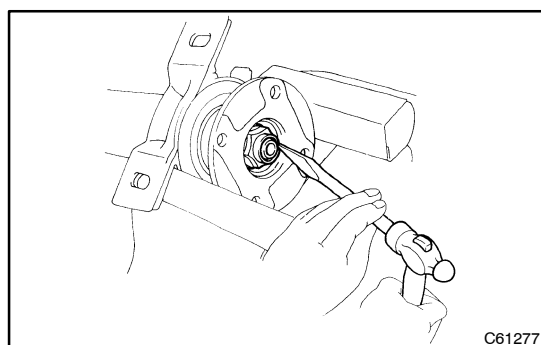
- (a) Place matchmarks on the intermediate shaft flange and the flange yoke of the propeller shaft assy.
- (b) Remove the 4 bolts, 4 nuts and 4 washers.
- (c) Remove the intermediate shaft.



- (d) Place matchmarks on the universal joint flange and parking brake drum.
- (e) Remove the propeller shaft guard.



- (f) Remove the propeller intermediate shaft assy.

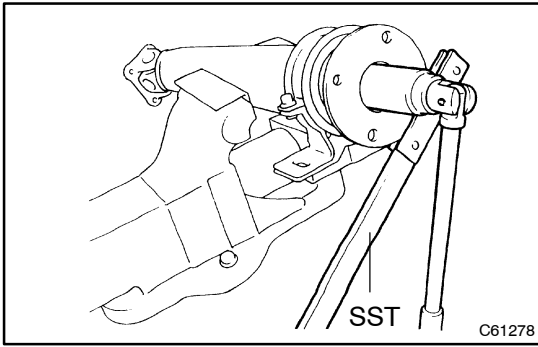


3. REMOVE CENTER SUPPORT BEARING ASSY NO.1

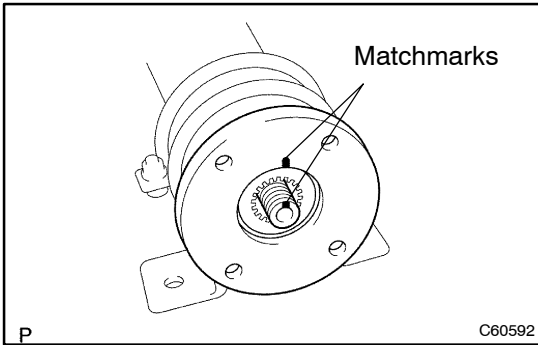
- (a) Using a chisel and hammer, loosen the staked part of the lock nut.

NOTICE:

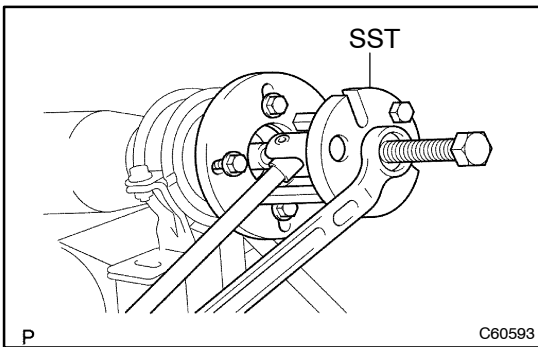
Completely loosen the staked part of the lock nut, otherwise the screw of the propeller shaft may be damaged.



- (b) Using SST, fix the flange.
SST 09330-00021
- (c) Using a socket wrench (30 mm), remove the lock nut and washer.



- (d) Place matchmarks on the intermediate shaft and flange coupling.

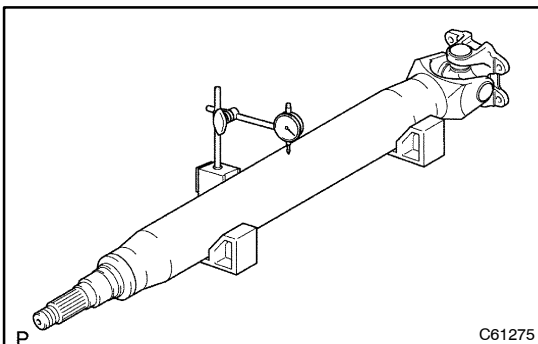


- (e) Using SST, separate the flange from the propeller shaft.
SST 09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03030, 09956-03030)

NOTICE:

Apply oil to the thread and the tip of center bolt for using SST.

- (f) Remove the center support bearing.

**4. INSPECT PROPELLER INTERMEDIATE SHAFT ASSY**

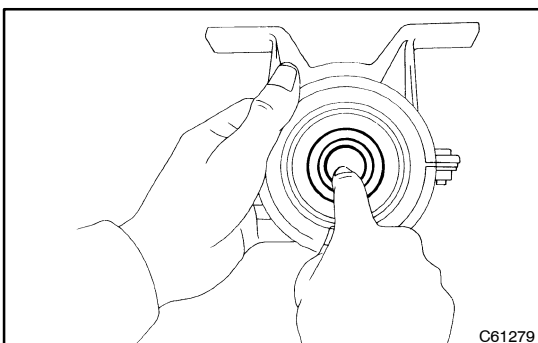
- (a) Using a dial indicator, check the shaft runout.

Maximum runout: 0.8 mm (0.031 in.)

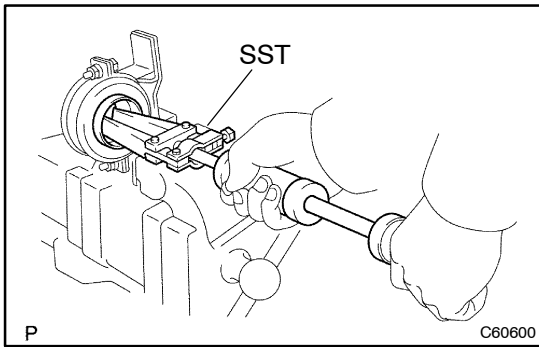
If the runout is greater than the maximum, replace the shaft.

NOTICE:

Set the dial indicator perpendicularly to the shaft center.

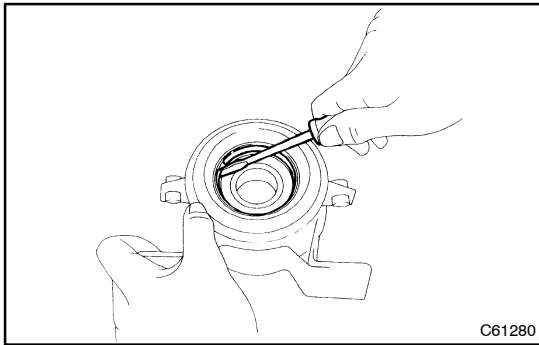
**5. INSPECT CENTER SUPPORT BEARING ASSY NO.1**

- (a) When turning the center bearing by hand, check that it turns smoothly without catching and that there is no crack or damage.

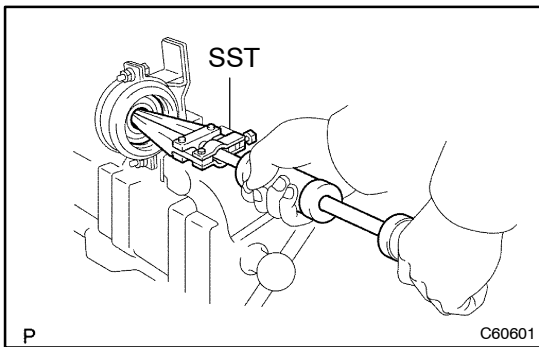


6. REPLACE DUST DEFLECTORS AND BEARING

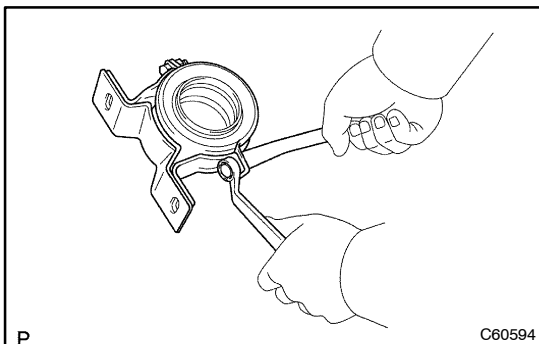
- (a) Using SST, drive out the dust deflectors.
SST 09308-00010



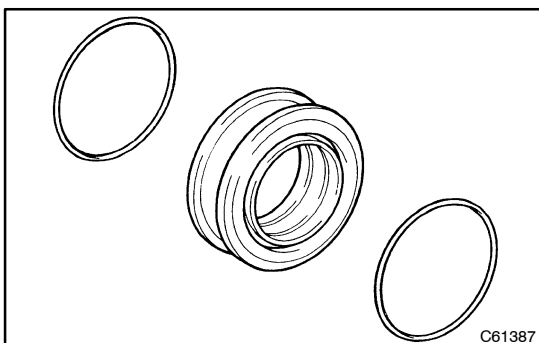
- (b) Using a screwdriver, pry out the retainer rings from the bearing both sides.



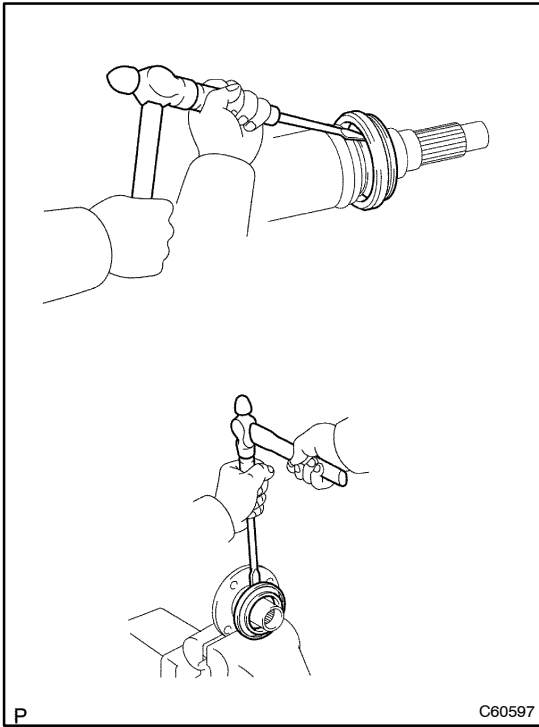
- (c) Using SST, drive out the center support bearing.
SST 09308-00010



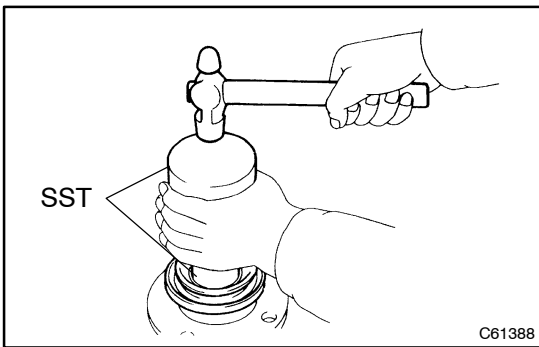
- (d) Separate the center support bearing housings.



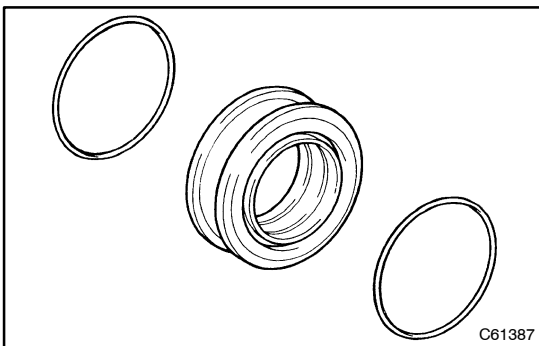
- (e) Remove the set rings from the center support bearing cushion.



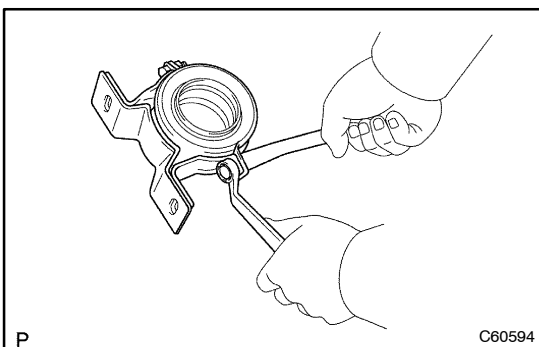
- (f) Using a flat head screwdriver and a hammer, tap out the dust deflector from the universal joint flange.



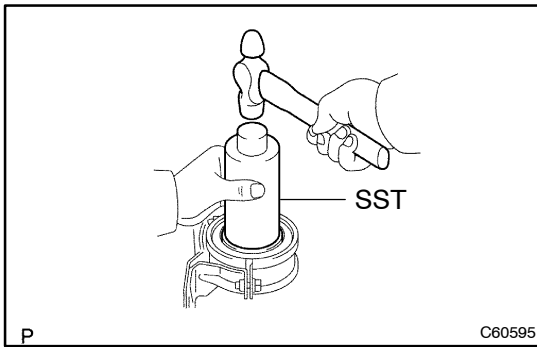
- (g) Using SST and a hammer, tap in new dust deflector to the intermediate shaft and universal joint flange.
SST 09309-37010, 09710-28021 (09710-08031)



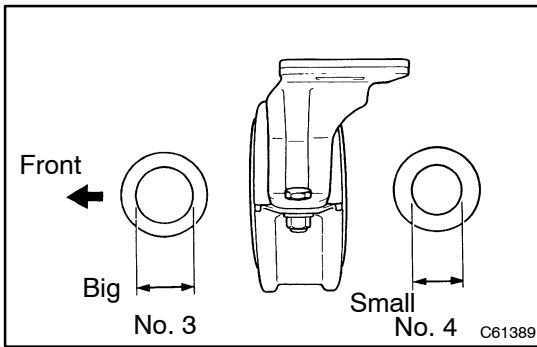
- (h) Install the set rings to the center support bearing cushion.



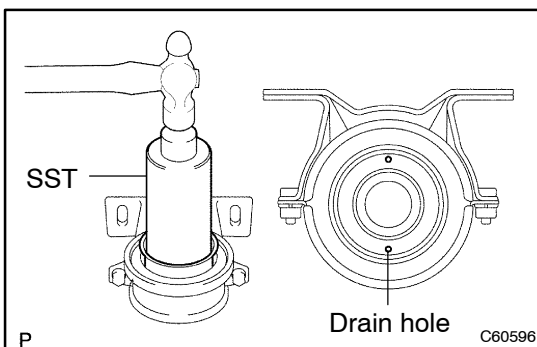
- (i) Assemble the center support housing.
Torque: 24.6 N·m (250 kgf·cm, 18 ft·lbf)



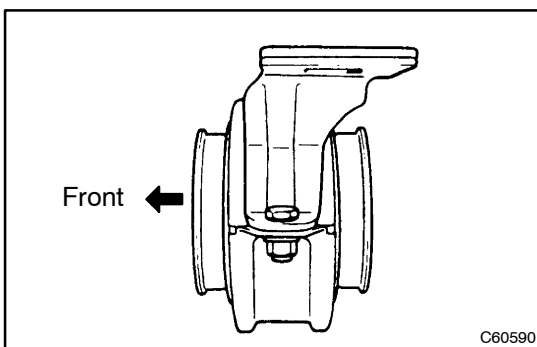
- (j) Using SST, tap in the bearing.
SST 09316-60011 (09316-00011)



- (k) Lightly apply MP grease to the dust deflector fitting surface of the center bearing.
(l) Install the dust deflector No. 3 and No. 4, as shown in the illustration.



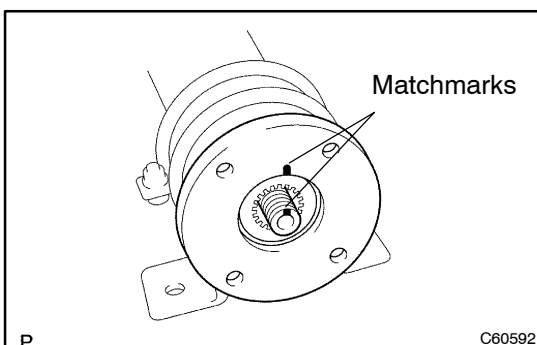
- (m) Using SST and a hammer, install the dust deflector so that the drain holes are perpendicular to the vehicle.
SST 09316-60011 (09316-00011)



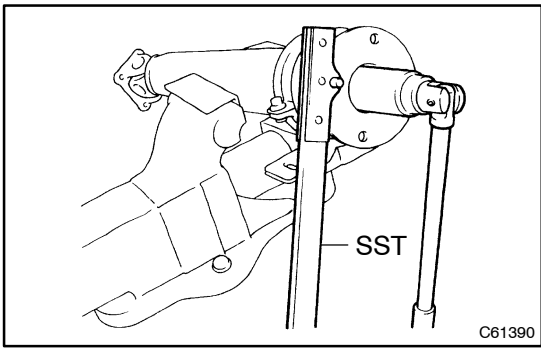
- (n) Install the center support bearing assy to the intermediate shaft.

NOTICE:

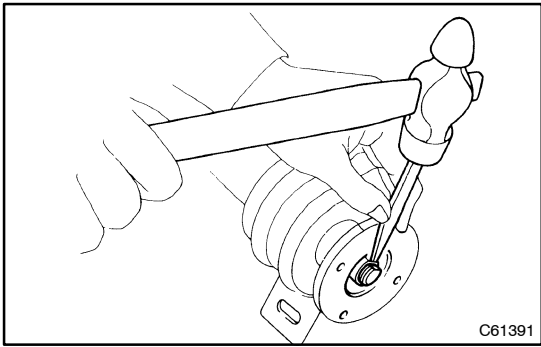
Install the center bearing assy, as shown in the illustration.



- (o) After aligning the matchmarks of the flange coupling and shaft, insert the flange coupling into the spline of the shaft.



- (p) Using SST, fix the flange and tighten a new lock nut with a socket wrench (30 mm).
 SST 09330-00021
Torque: 166.7 N·m (1700 kgf·cm, 123 ft·lbf)

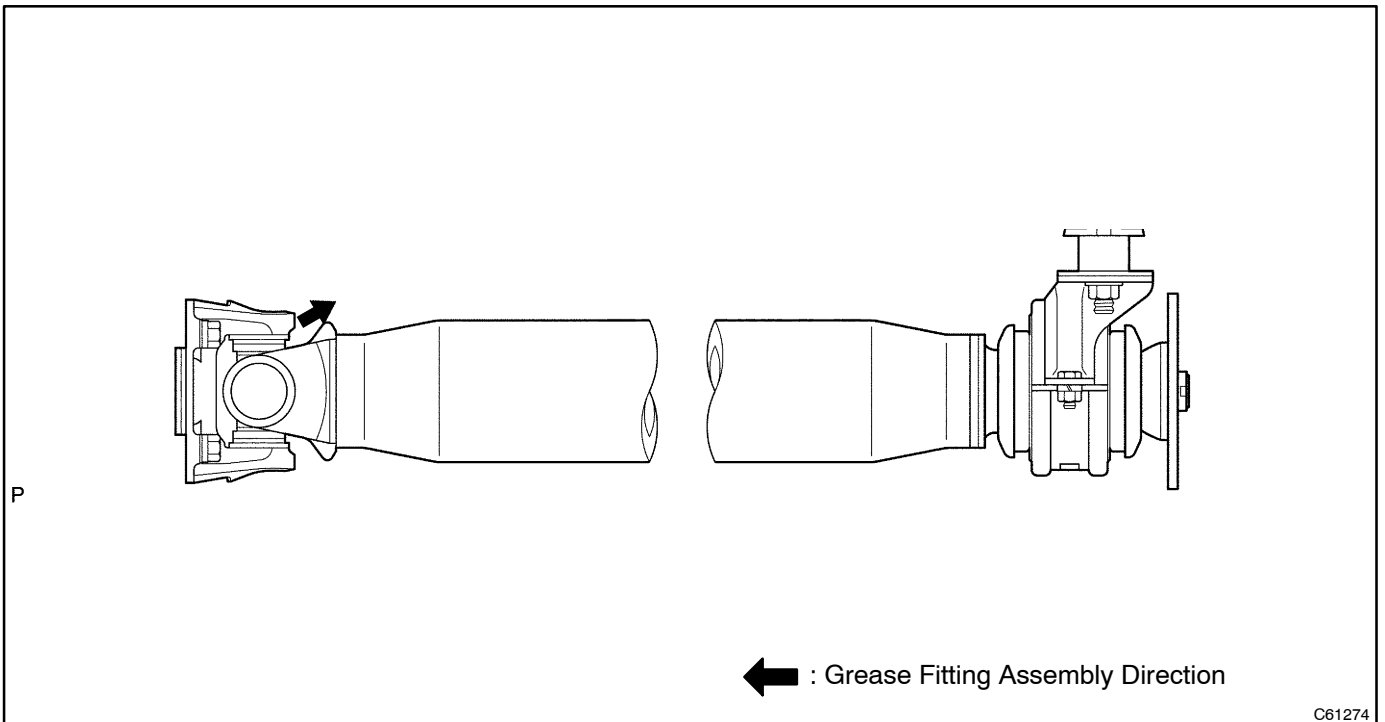


- (q) Using a chisel and a hammer, stake the lock nut.

7. INSPECT PROPELLER INTERMEDIATE SHAFT ASSY

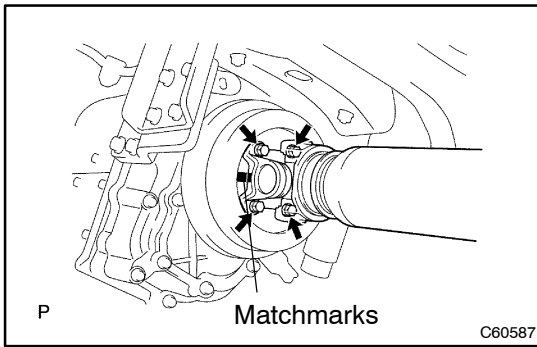
HINT:

When replacing the spider bearing, be sure that the grease fitting assembly hole is facing the direction shown in the illustration.

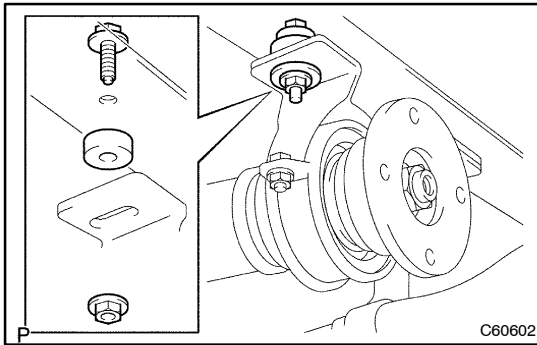


P

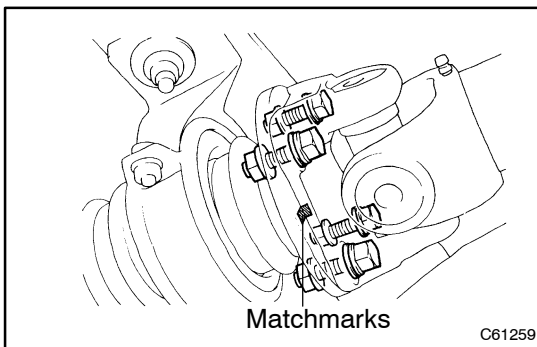
← : Grease Fitting Assembly Direction



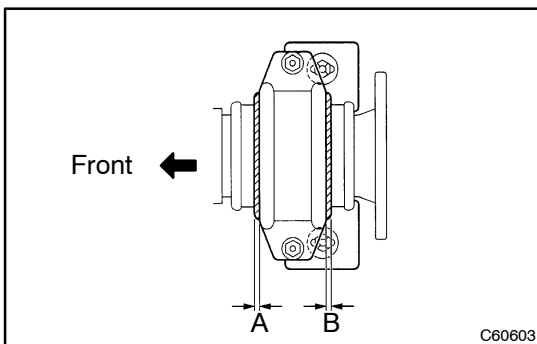
- 8. INSTALL PROPELLER INTERMEDIATE SHAFT ASSY**
- (a) Align the matchmarks on the yoke and parking brake drum down or flange.
 - (b) Install the 4 bolts, 4 washers and 4 nuts.
Torque: 88.2 N·m (900 kgf·cm, 65 ft·lbf)



- (c) Temporarily attach the center support bearing bracket.



- (d) Align the matchmarks on the intermediate shaft assy and propeller shaft assy.
- (e) Install the 4 bolts, 4 nuts and 4 washers.
Torque: 88.2 N·m (900 kgf·cm, 65 ft·lbf)



- (f) Adjust the cushion rubber so that the front and rear ends of the rubber have the same distance (A and B) from the housing, when no one is present in the vehicle. Then tighten the nuts.
Torque: 37 N·m (370 kgf·cm, 27 ft·lbf)
- (g) After completing the installation, make sure that the bracket center line is at the right angle to the intermediate shaft.

9. INSTALL PROPELLER SHAFT ASSY (See page 30-4)

PROPELLER INTERMEDIATE SHAFT ASSY (LE-TYPE)

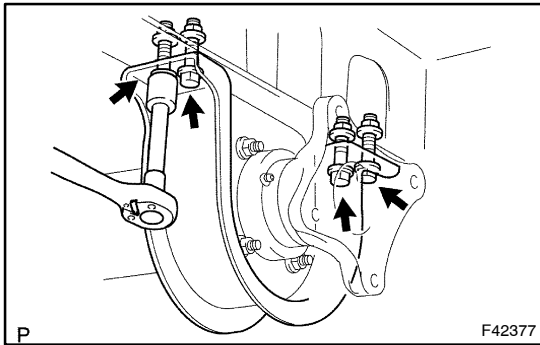
300IK-01

OVERHAUL

HINT:

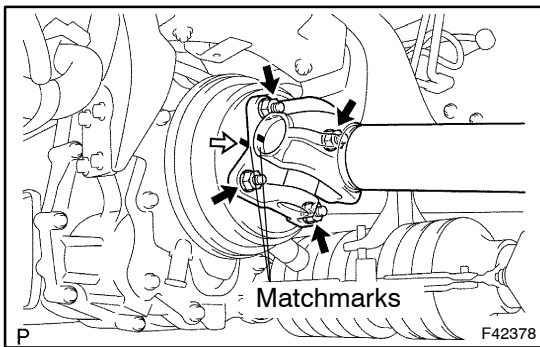
COMPONENTS: See page 30-11, 30-12

1. REMOVE PROPELLER SHAFT ASSY (See page 30-14)



2. REMOVE PROPELLER INTERMEDIATE SHAFT ASSY

(a) Remove the 4 bolts, 4 nuts and center support from the frame crossmember.



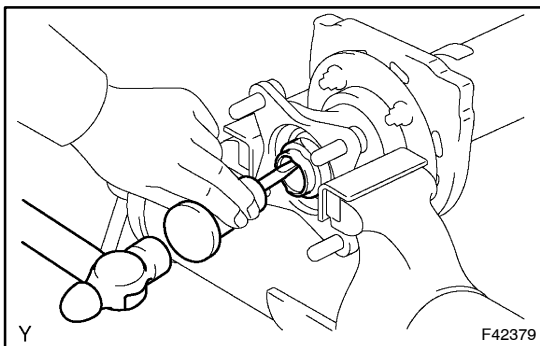
(b) Place matchmarks on the intermediate shaft flange and parking brake drum.

(c) Remove the 4 nuts and 4 washers.

(d) Remove the intermediate shaft.

HINT:

For the 4-joint type, remove another intermediate shaft as well.



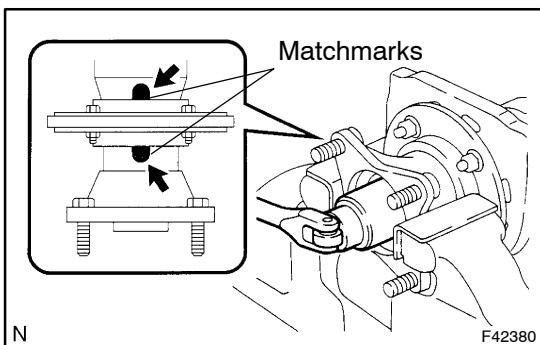
3. REMOVE UNIVERSAL JOINT FLANGE SUB-ASSY

(a) Fix the flange coupling at the center bearing section with a vice.

(b) Using a chisel and hammer, loosen the staked part of the lock nut.

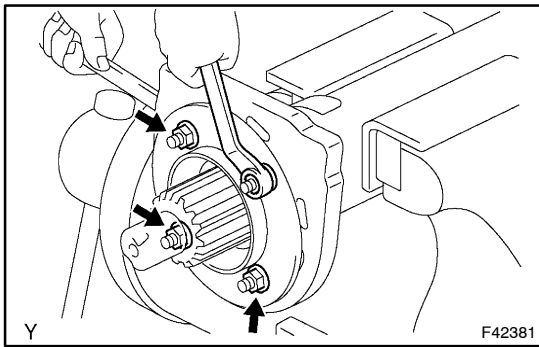
NOTICE:

Completely loosen the staked part of the lock nut, otherwise the screw of the propeller shaft may be damaged.



(c) Place matchmarks on the intermediate shaft and flange coupling.

(d) Using a socket wrench (41 mm), remove the lock nut and flange coupling from the propeller shaft.



- 4. REMOVE CENTER SUPPORT BEARING ASSY NO.1**
- (a) Remove the 4 bolts, 4 nuts and 4 washers holding the bearing plate to the cushion rubber, and then remove the bearing plate and cushion rubber.
 - (b) Lightly hit the periphery of the center bearing, and pull it out from the propeller shaft assembly.

5. INSPECT CENTER SUPPORT BEARING ASSY NO.1

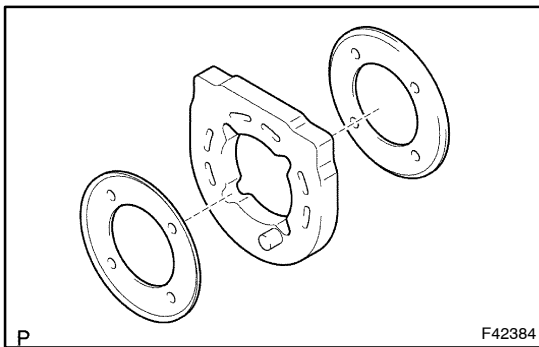
- (a) When turning the center bearing by hand, check that it turns smoothly without catching and that there is no crack or damage.

If there is any defect, change it.

- (b) If there is any damage in the lip of the center bearing case, change it.

NOTICE:

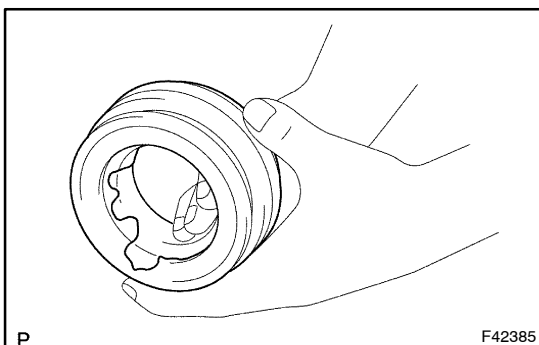
Do not soak the center bearing in the cleaner.



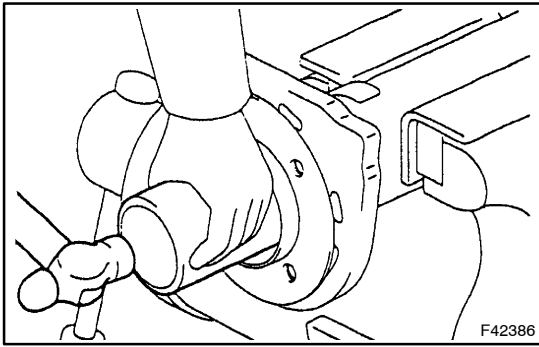
- 6. INSPECT CUSHION RUBBER AND BEARING PLATE**
- (a) If there is any scratch or crack on the surface of the cushion rubber or damage in the bearing plate, replace them.
- 7. INSPECT PROPELLER INTERMEDIATE SHAFT ASSY**
- (a) Using a dial indicator, check the shaft runout.
Standard runout: 0 - 0.6 mm (0 - 0.024 in.)
Maximum runout: 1.0 mm (0.039 in.)

If the runout is greater than the maximum, replace the shaft.

- 8. INSPECT UNIVERSAL JOINT SPIDER ASSY**
(See page 30-16)
- 9. REMOVE UNIVERSAL JOINT SPIDER ASSY**
(See page 30-15)
- 10. INSPECT CLEARANCE OF SPIDER JOURNAL AND NEEDLE ROLLER BEARING** (See page 30-16)
- 11. INSTALL UNIVERSAL JOINT SPIDER ASSY**
(See page 30-17)
- 12. INSPECT UNIVERSAL JOINT SPIDER ASSY**
(See page 30-19)



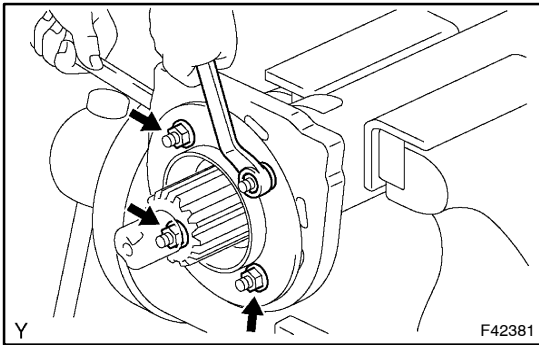
- 13. INSTALL CENTER SUPPORT BEARING ASSY NO.1**
- (a) Apply MP grease to the inside of the center bearing.



- (b) After inserting the bearing plate in the propeller shaft, drive in the center bearing.

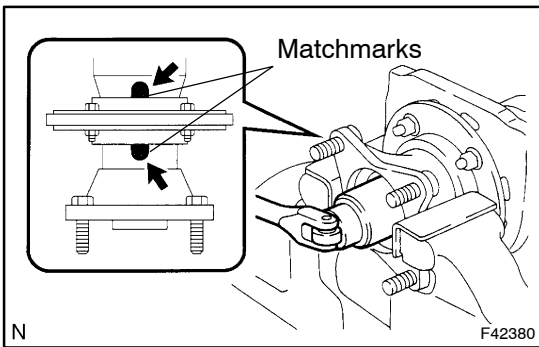
NOTICE:

- **When driving in the center bearing, pay attention not to damage it.**
- **Use lithium type bearing grease for the bearing.**



- (c) After inserting the cushion rubber, install the 2 bearing plates with the 4 bolts, and 4 nuts.

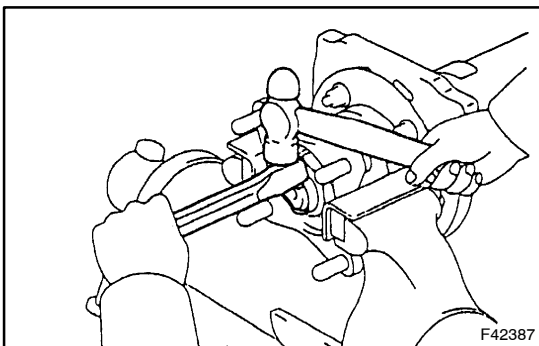
Torque: 26.5 N·m (270 kgf·cm, 19.5 ft·lbf)



14. INSTALL UNIVERSAL JOINT FLANGE SUB-ASSY

- (a) After aligning the matchmarks of the flange coupling and shaft, insert the flange coupling into the spline of the shaft.

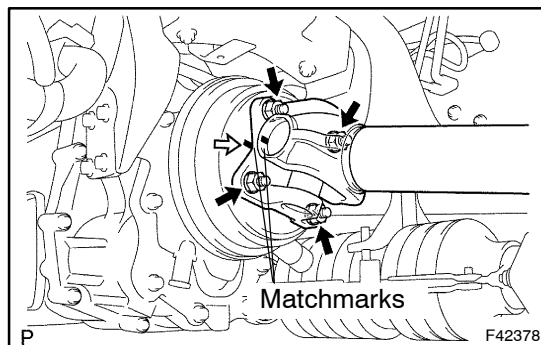
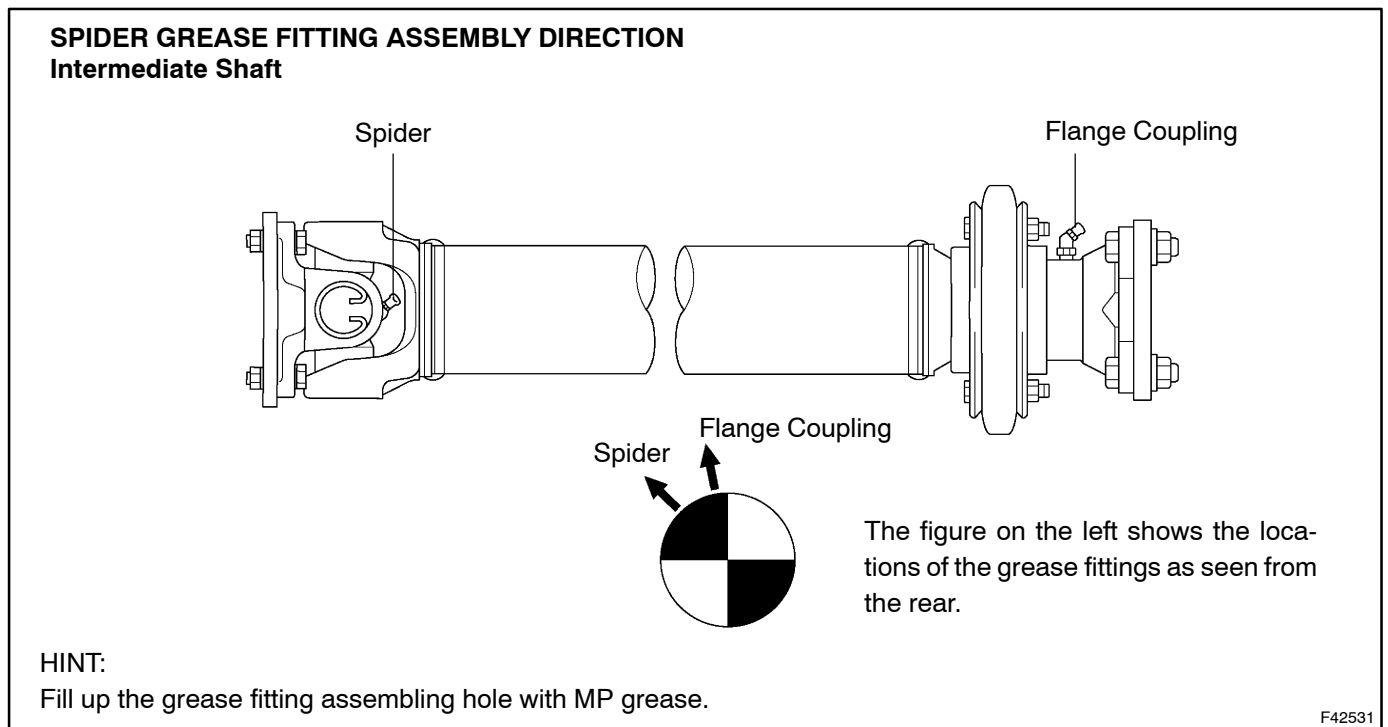
- (b) Using a socket wrench (41 mm), tighten a new lock nut.
Torque: 686 N·m (7,000 kgf·cm, 506 ft·lbf)



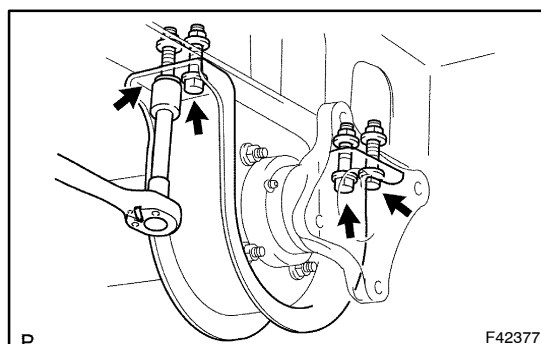
- (c) Using a chisel and hammer, stake the lock nut.

15. INSPECT PROPELLER INTERMEDIATE SHAFT ASSY**HINT:**

When replacing the spider bearing, be sure that the grease fitting assembly hole is facing the direction shown in the illustration.

**16. INSTALL PROPELLER INTERMEDIATE SHAFT ASSY**

- (a) Align the matchmarks on the yoke and parking brake drum down or flange.
- (b) Install the 4 bolts, 4 washers and 4 nuts.
Torque: 74.5 N·m (760 kgf·cm, 55 ft·lbf)

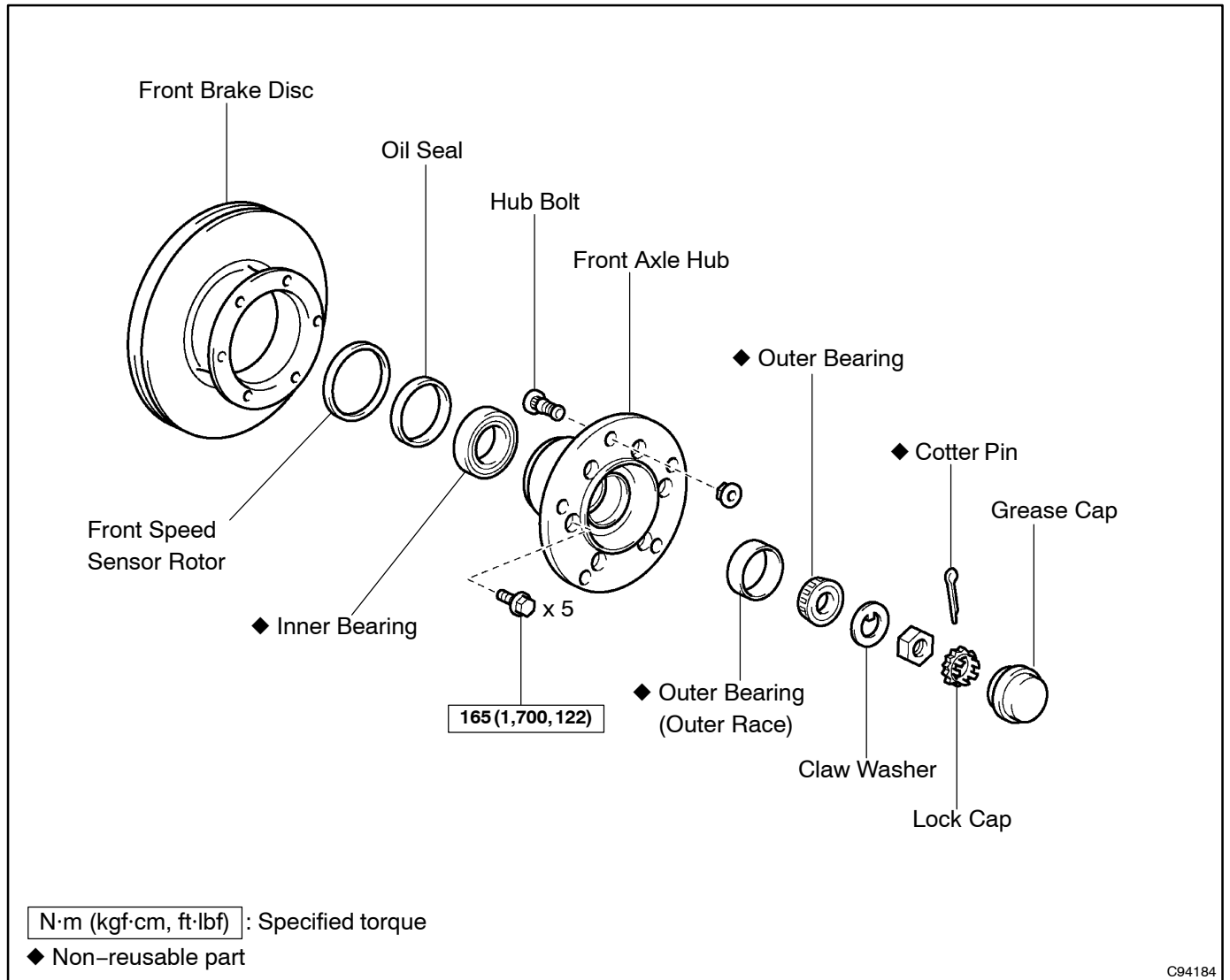


- (c) Install the center support to the frame crossmember with the 4 bolts, and 4 nuts .
Torque: 51.5 N·m (525 kgf·cm, 38 ft·lbf)

17. INSTALL PROPELLER SHAFT ASSY (See page 30-14)

FRONT AXLE HUB SUB-ASSY LH (DISC BRAKE) COMPONENTS

300IL-01



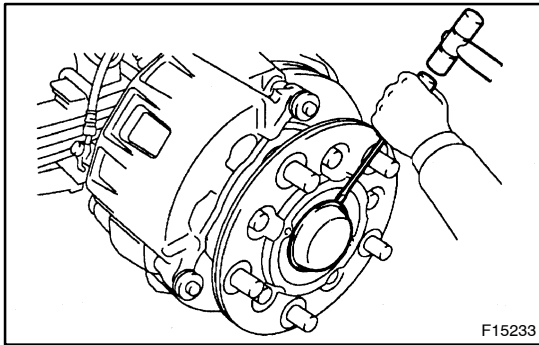
C94184

OVERHAUL

HINT:

On the RH side, use the same procedures as on the LH side.

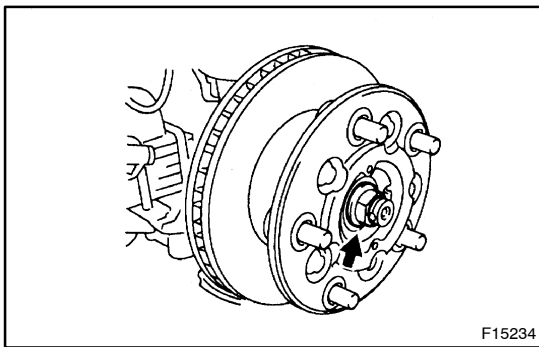
1. REMOVE FRONT WHEEL
2. REMOVE SKID CONTROL SENSOR (W/ SKID CONTROL)
3. REMOVE DISC BRAKE CYLINDER ASSY LH (See page 32-37)



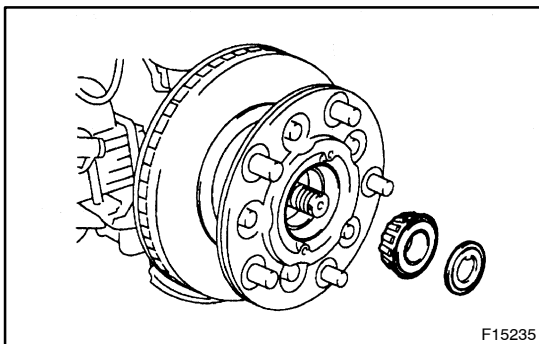
4. REMOVE FRONT AXLE HUB OUTER LH BEARING
 - (a) Using a screwdriver and hammer, remove the front hub grease cap by tapping the cap circumference.

NOTICE:

If there is a notable deformation, replace the cap with a new one.



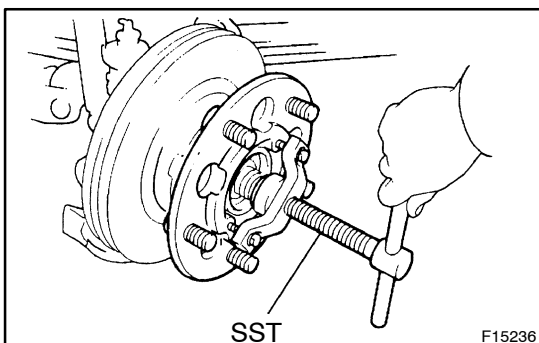
- (b) Remove the cotter pin and lock cap.
- (c) Remove the lock nut.



- (d) Remove the claw washer and outer bearing (inner race).

NOTICE:

Do not drop the bearing.

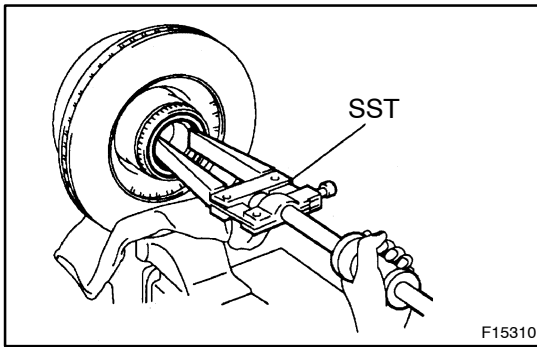


5. REMOVE FRONT AXLE HUB SUB-ASSY LH

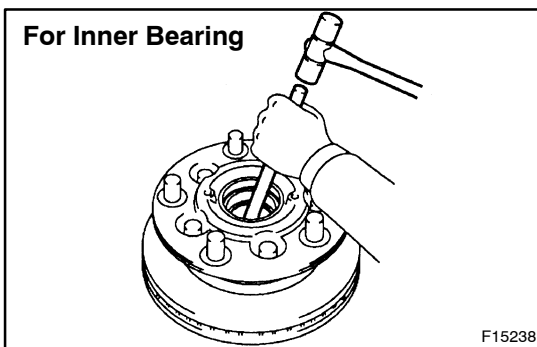
NOTICE:

When the front axle hub with brake disc cannot be removed by hand, use SST to remove the front axle hub with disc.

SST 09510-36010

**6. REMOVE FRONT AXLE HUB LH OIL SEAL**

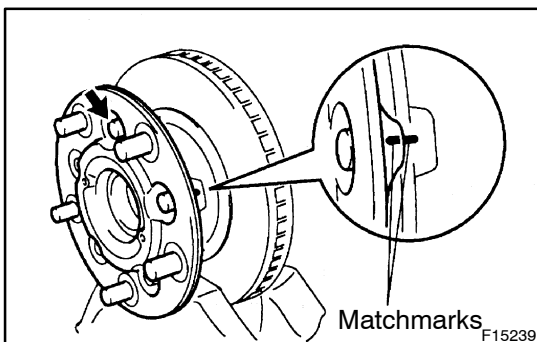
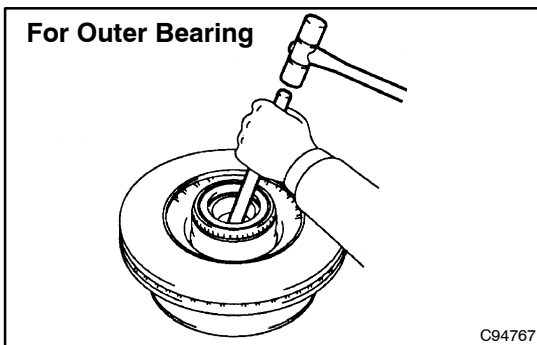
- (a) Using a vice, fix the front axle hub with the front disc between the soft jaws and rags.
- (b) Using SST, drive out the front axle hub oil seal.
SST 09308-00010

7. REMOVE FRONT AXLE HUB INNER LH BEARING**8. REMOVE BEARING OUTER RACE**

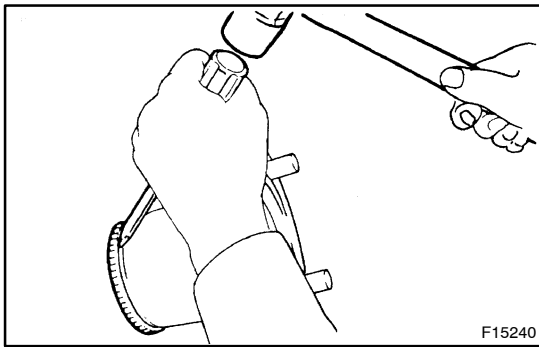
- (a) Remove the grease from the axle hub.
- (b) Using a brass bar and hammer, tap out the outer races.

NOTICE:

- Apply the brass bar from the notch of the axle hub.
- Do not damage the front disc.
- Remove the bearing outer race only when replacing the bearing.

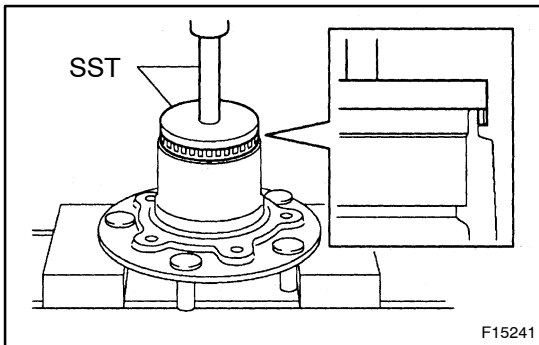
**9. REMOVE FRONT DISC**

- (a) Using a vice, fix the front disc between the soft jaws and rags.
- (b) Apply matchmarks to the front disc and the front axle hub.
- (c) Remove the 5 bolts, and remove the front axle hub from the front disc.



10. REMOVE SKID CONTROL ROTOR FRONT (W/ SKID CONTROL)

- (a) Using a screwdriver and hammer, tap out the sensor rotor.



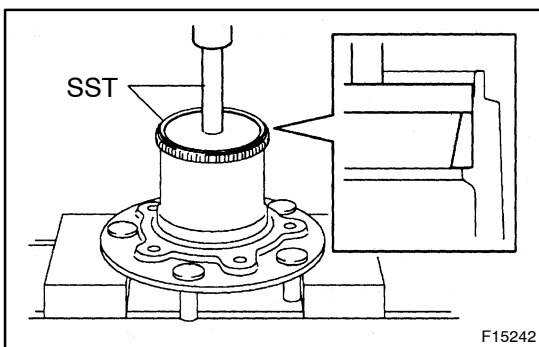
11. INSTALL SKID CONTROL ROTOR FRONT (W/ SKID CONTROL)

- (a) Using SST and a press, press in the sensor rotor to the end surface.

NOTICE:

- Press the sensor rotor slowly and uniformly.
- Do not damage the rotor.

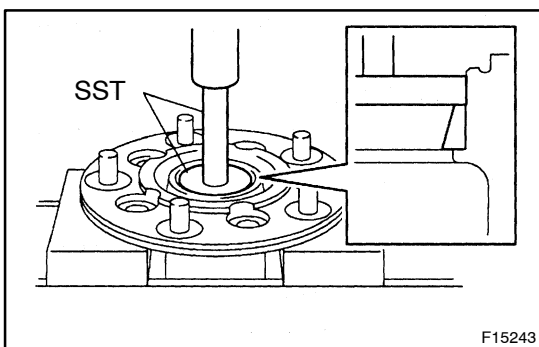
SST 09950-70010 (09951-07150), 09519-25010



12. INSTALL BEARING OUTER RACE

- (a) Using SST and a press, press in a new outer race of the inner bearing until it comes into contact with the mounting surface.

SST 09951-00900, 09950-70010, (09951-07150)



- (b) Using SST and a press, press-fit a new outer race of the outer bearing until it comes into contact with the mounting surface.

SST 09950-60020 (09951-00720) 09950-70010 (09951-07150)

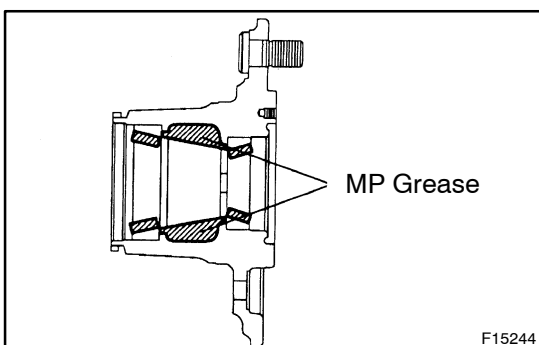
NOTICE:

- Press the outer race slowly and uniformly.
- Do not damage the outer race.

- (c) Fill MP grease as shown in the illustration.

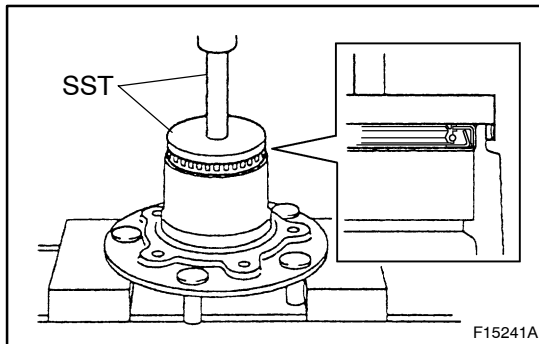
NOTICE:

Mixing of different types of grease and entry of dust into the grease should be avoided, because this can cause grease deterioration or seizure.



13. INSTALL FRONT AXLE HUB INNER LH BEARING

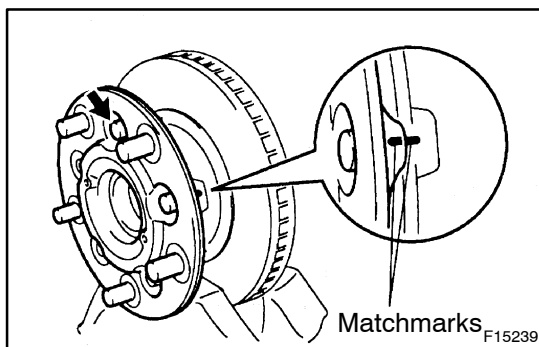
- (a) Pack the MP grease into the bearing.
- (b) Install a new bearing to the axle hub.

**14. INSTALL FRONT AXLE HUB LH OIL SEAL**

- (a) Using SST and a press, press in a new hub oil seal to the end surface.
SST 09519-25010, 09950-70010 (09951-07150)

NOTICE:

- Press the oil seal slowly.
 - Do not damage the oil seal.
- (b) Apply MP grease to the oil seal.

**15. INSTALL FRONT DISC**

- (a) Align the matchmarks of the brake disc and the front axle hub, and then install them with the 5 bolts.

Torque: 165 N·m (1,700 kgf·cm, 122 ft·lbf)

NOTICE:

Clean the mounting surfaces of the brake disc and axle hub before the installation.

16. INSTALL FRONT AXLE HUB SUB-ASSY LH

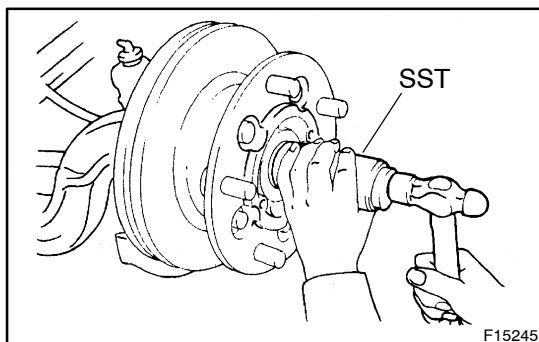
- (a) Clean the spindle part of the steering knuckle and lightly apply MP grease.
- (b) Install the front axle hub with brake disc onto the steering knuckle.

NOTICE:

Do not damage the oil seal.

17. INSTALL FRONT AXLE HUB OUTER LH BEARING

- (a) Install the outer bearing and claw washer.

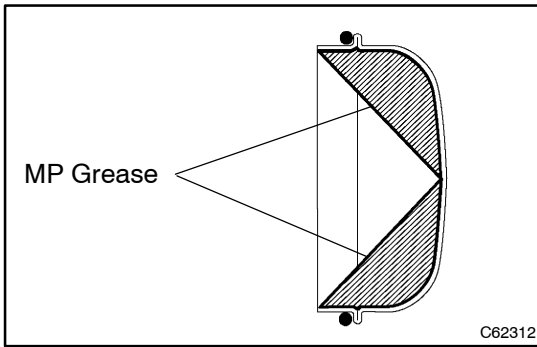


If it is difficult to install the bearing, lightly tap the bearing with SST and hammer.

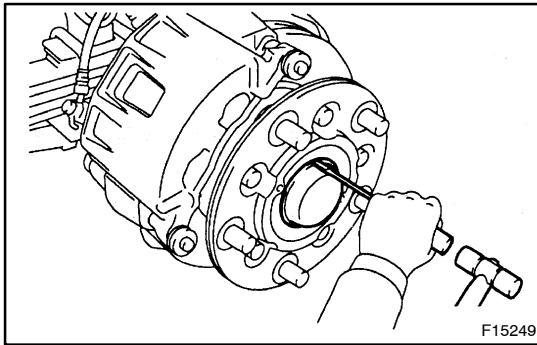
SST 09309-37010

- (b) Install the bearing lock nut while turning the axle hub.
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)

18. ADJUST PRELOAD (See page 30-2)**19. INSPECT AXLE HUB AXIAL PLAY (See page 30-2)**

**20. INSTALL FRONT AXLE HUB GREASE CAP LH**

- (a) Install the lock cap and a new cotter pin.
- (b) Fill the grease cap with MP grease, as shown in the illustration.

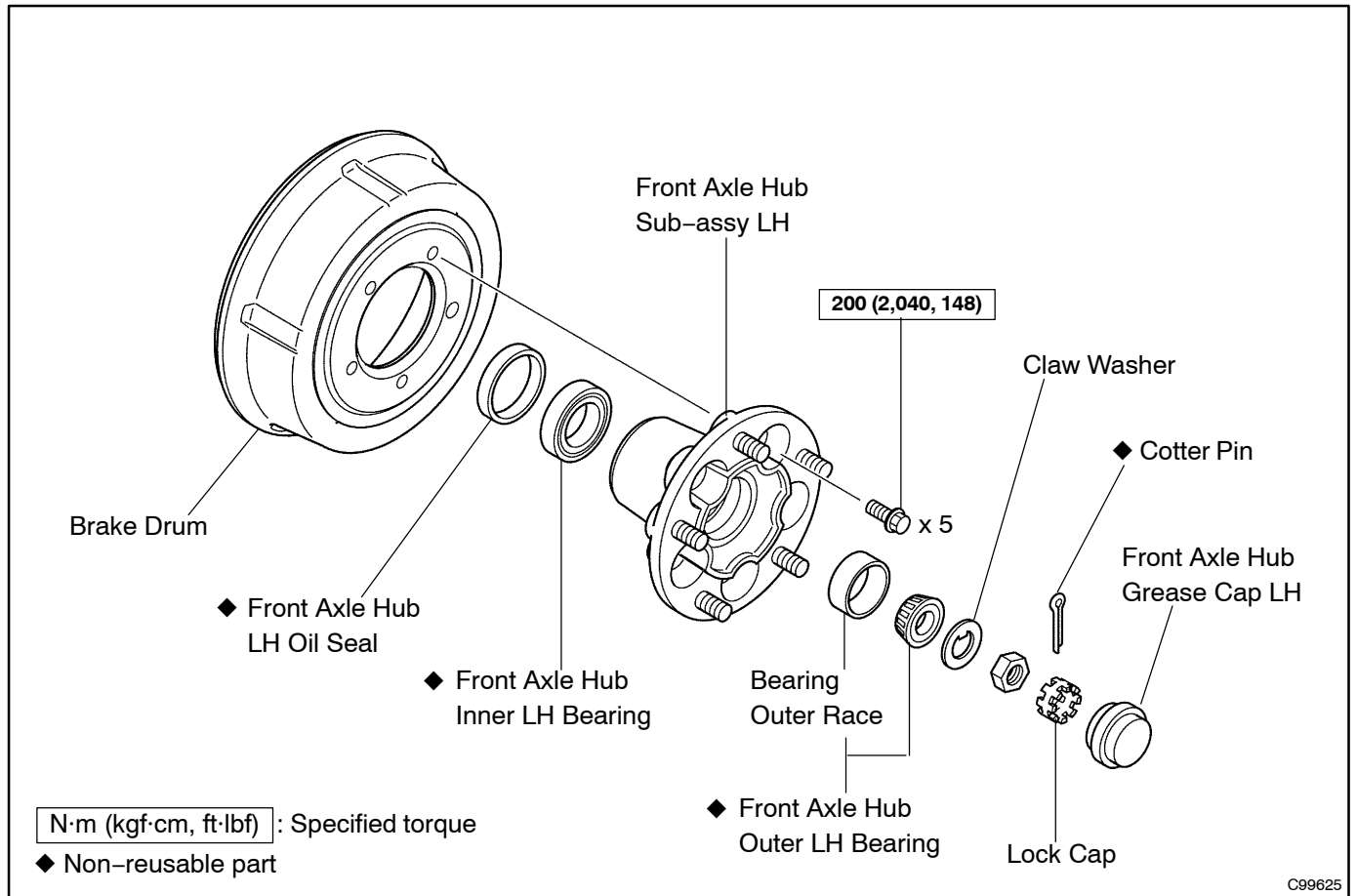


- (c) Using a screwdriver and hammer, install the front hub grease cap.

- 21. INSTALL DISC BRAKE CYLINDER ASSY LH (See page 32-37)**
- 22. INSTALL SKID CONTROL SENSOR(W/ SKID CONTROL)**
- 23. INSTALL FRONT WHEEL**

FRONT AXLE HUB SUB-ASSY LH (5-BOLTS DRUM BRAKE) COMPONENTS

300IN-01



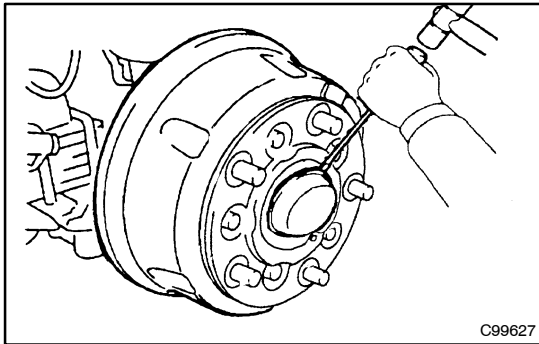
C99625

OVERHAUL

HINT:

On the RH side, use the same procedures as on the LH side.

1. REMOVE FRONT WHEEL

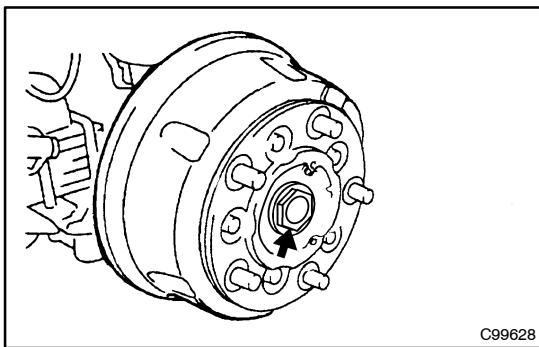


2. REMOVE FRONT AXLE HUB OUTER LH BEARING

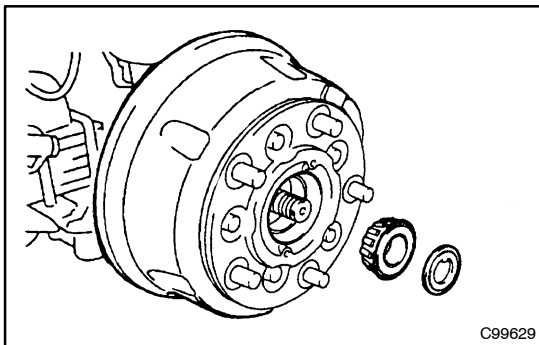
- (a) Using a screwdriver and hammer, remove the front hub grease cap by tapping the cap circumference.

NOTICE:

If there is a notable deformation, replace the cap with a new one.



- (b) Remove the cotter pin and lock cap.
(c) Remove the lock nut.

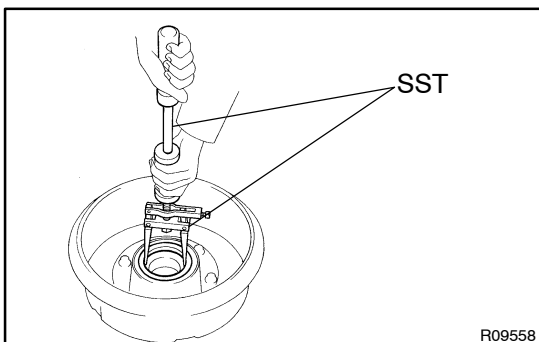


- (d) Remove the claw washer and outer bearing (inner race).

NOTICE:

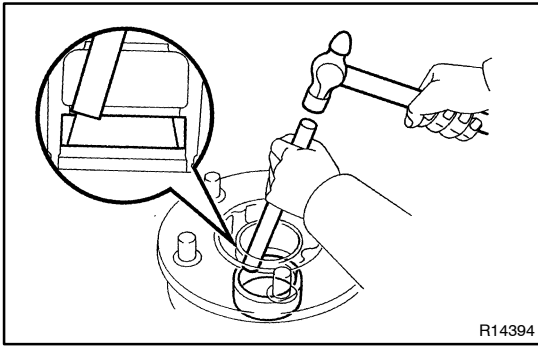
Do not drop the bearing.

3. REMOVE AXLE HUB W/DRUM



4. REMOVE FRONT AXLE HUB LH OIL SEAL

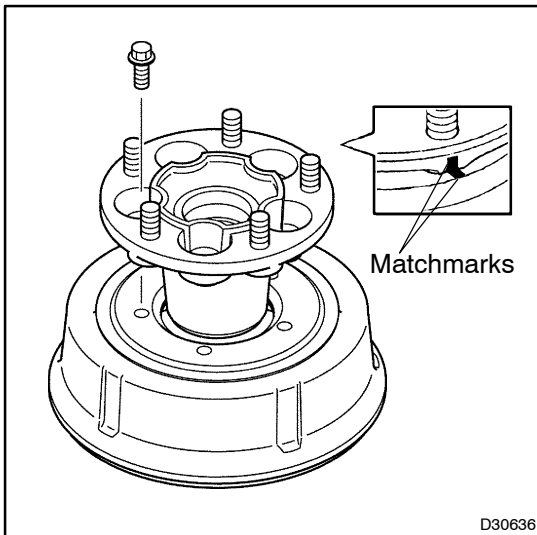
- (a) Using SST, drive out the oil seal.
SST 09308-00010

**5. REMOVE BEARING OUTER RACE**

- (a) Using a brass bar and hammer, tap out the inner and outer bearing outer races.

NOTICE:

- Apply the brass bar from the notch part of the axle hub.
- Do not damage the brake drum.
- Remove the bearing outer race only when replacing the bearing.

**6. REMOVE FRONT AXLE HUB SUB-ASSY LH**

- (a) Place matchmarks on the front axle hub and the brake drum.

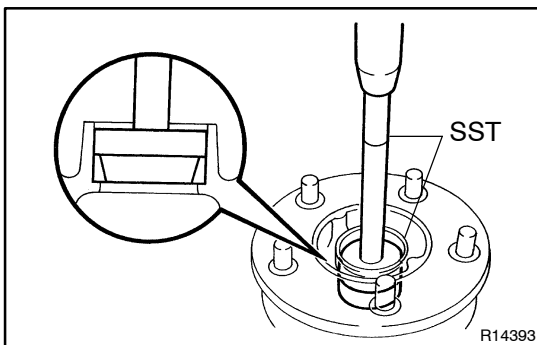
- (b) Remove the 5 bolts and brake drum from the axle hub.

7. INSTALL FRONT AXLE HUB SUB-ASSY LH

- (a) Align the matchmarks.

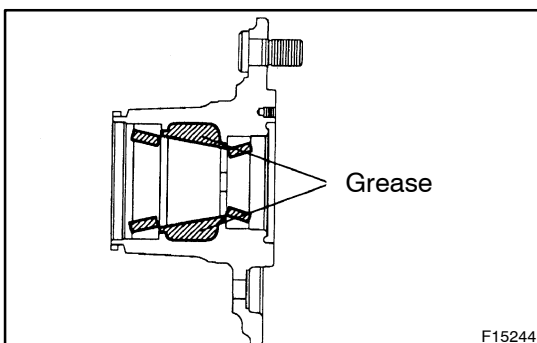
- (b) Install the brake drum to the axle hub with the 5 bolts.

Torque: 200 N·m (2,040 kgf·cm, 148 ft·lbf)

**8. INSTALL BEARING OUTER RACE**

- (a) Using SST and a press, press in new bearing outer races of the inner and outer bearing.

SST 09950-60020 (09951-00720, 09951-00900),
09950-70010 (09951-07150)

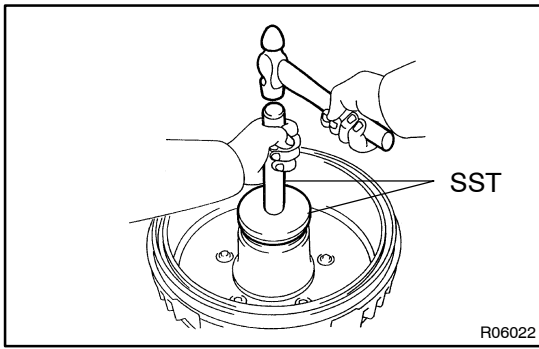


- (b) Apply MP grease, as shown in the illustration.

9. INSTALL FRONT AXLE HUB INNER BEARING

- (a) Pack MP grease in the bearing.

- (b) Install the bearing.

**10. INSTALL FRONT AXLE HUB LH OIL SEAL**

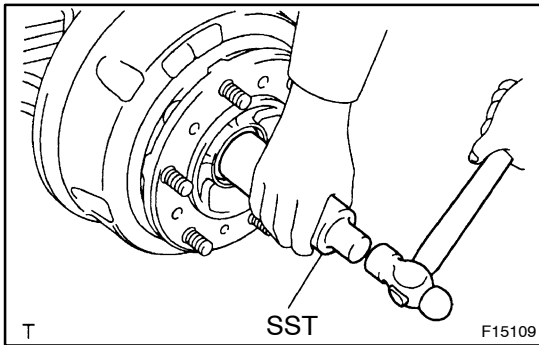
- (a) Using SST and a hammer, tap in a new oil seal to the axle hub.
SST 09950-60020 (09951-01030), 09950-70010 (09951-07150)
- (b) Coat the lip of the oil seal with MP grease.

11. INSTALL AXLE HUB W/DRUM

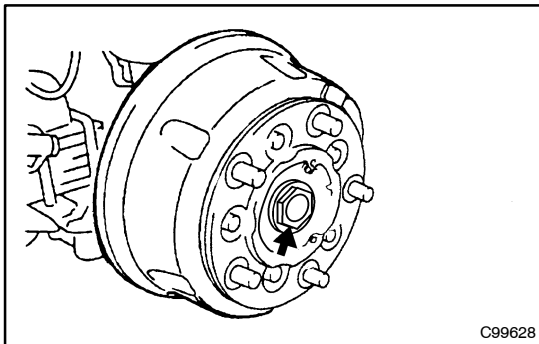
- (a) Clean the spindle part of the steering knuckle.
- (b) Apply MP grease to the spindle part of the steering knuckle.
- (c) Install the front axle hub with the drum brake on the steering knuckle.

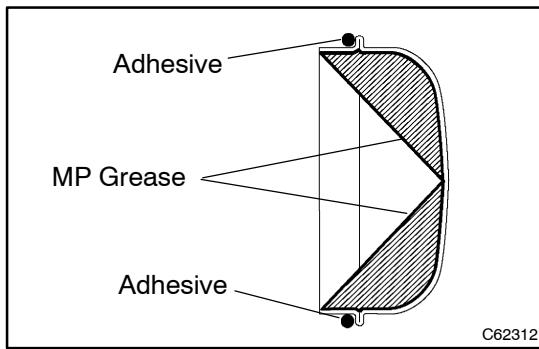
NOTICE:

Because the front axle hub with brake drum is heavy, it must be supported securely.

**12. INSTALL FRONT AXLE HUB OUTER LH BEARING**

- (a) Using SST and a hammer, tap in the outer bearing to the knuckle.
SST 09309-37010, 09316-60011
- (b) Install the claw washer.
- (c) Fill MP grease so that there should be no gap in the space between the outer bearing and claw washer.
- (d) Install the lock nut while turning the axle hub.
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf) for others
- (e) Loosen the lock nut so that it can be turned by hand (approx. 60°)

**13. ADJUST PRELOAD (See page 30-2)****14. INSPECT AXLE HUB AXIAL PLAY (See page 30-2)**

**15. INSTALL FRONT AXLE HUB GREASE CAP LH**

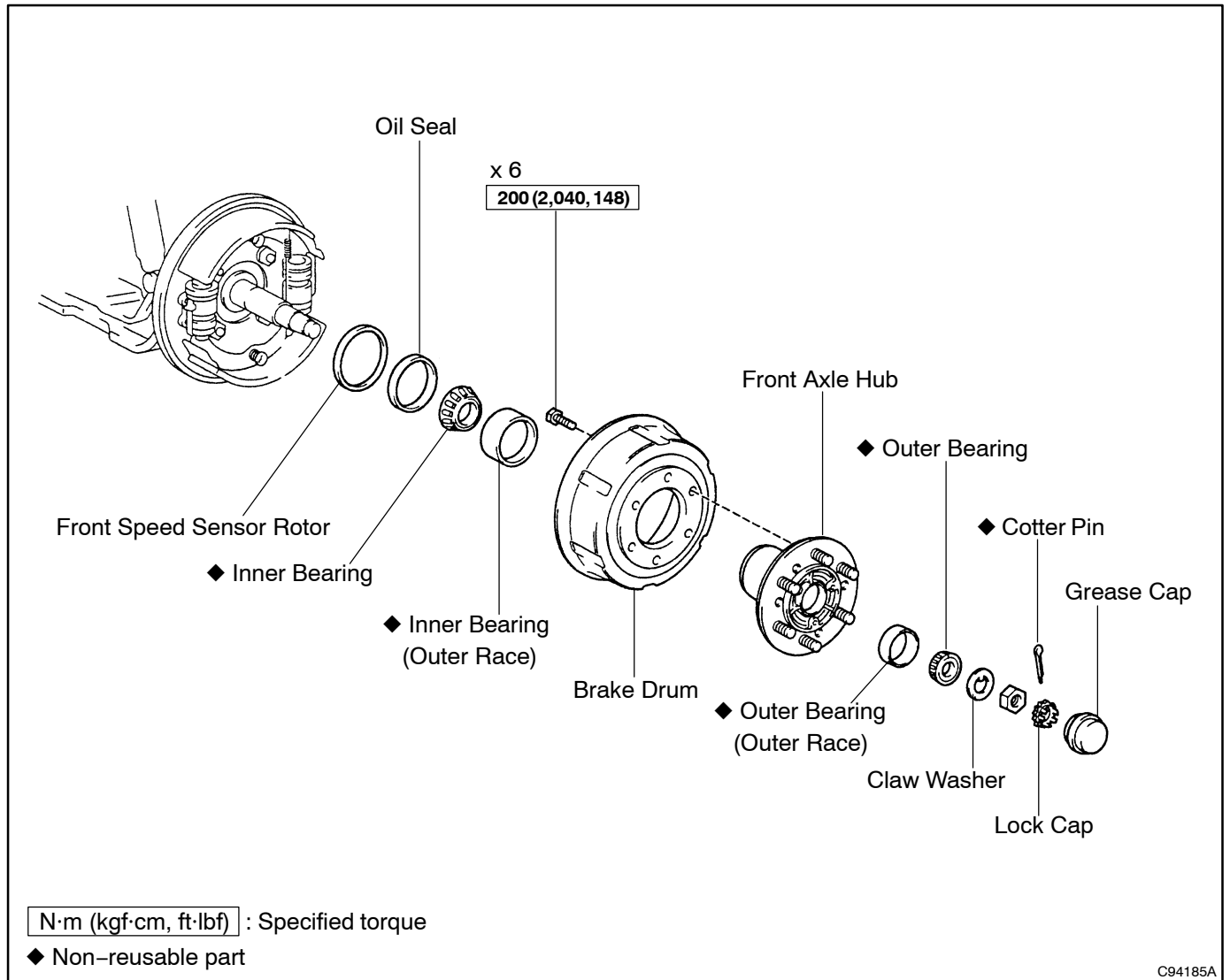
- (a) Install the lock cap and a new cotter pin.
- (b) Fill the grease cap with MP grease, as shown in the illustration.
- (c) Apply adhesive to the grease cap, as shown in the illustration.

Adhesive: Three Bond 1215

- (d) Using a screwdriver and hammer, tap in the front hub grease cap.

16. INSTALL FRONT WHEEL

FRONT AXLE HUB SUB-ASSY LH (6-BOLTS DRUM BRAKE) COMPONENTS

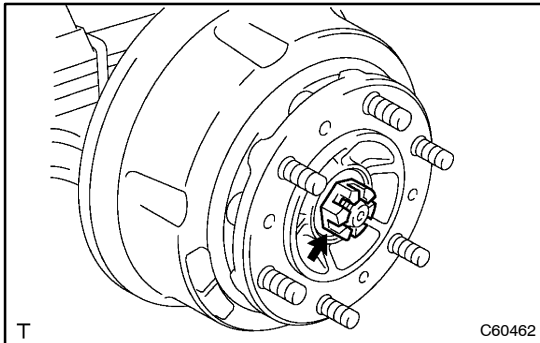


OVERHAUL

HINT:

On the RH side, use in the same procedures as on the LH side.

1. **REMOVE FRONT WHEEL**
2. **REMOVE SKID CONTROL SENSOR (W/ SKID CONTROL)**

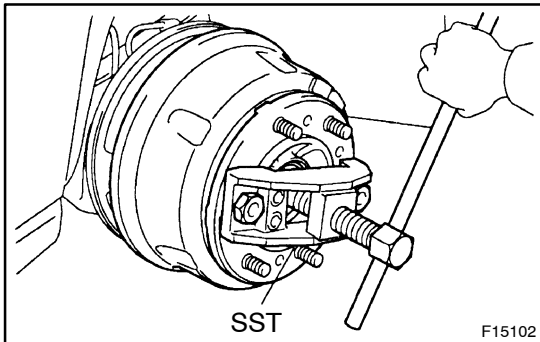


3. REMOVE FRONT AXLE HUB OUTER LH BEARING

- (a) Remove the cotter pin.
- (b) Remove the lock cap and nut.
- (c) Remove the claw washer and bearing.

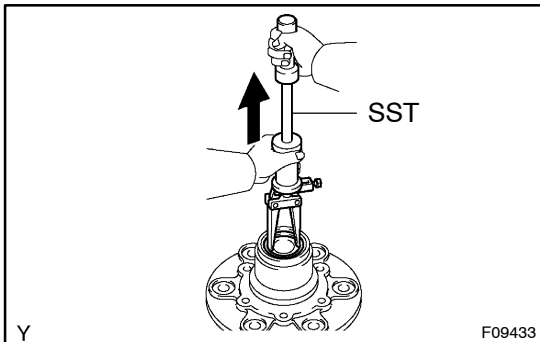
NOTICE:

Be careful not to drop the outer bearing.



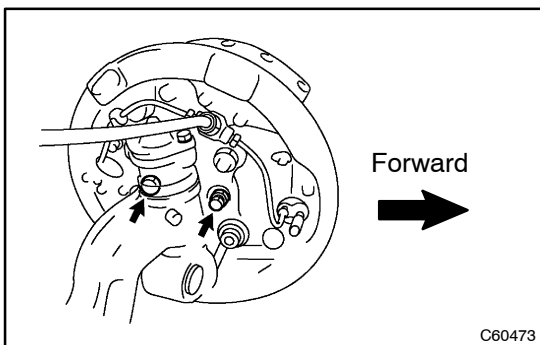
4. REMOVE FRONT AXLE HUB SUB-ASSY LH

- (a) Using SST, drive out the drum and axle hub.
SST 09520-00031 or 09650-2051



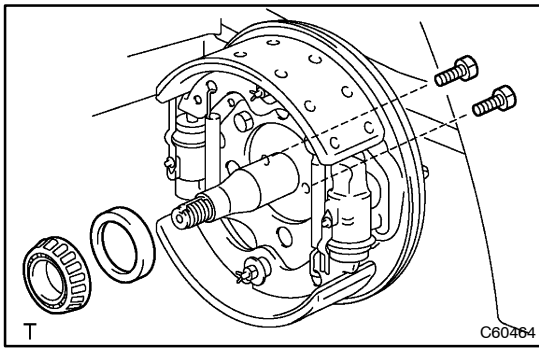
5. REMOVE FRONT AXLE HUB LH OIL SEAL

- (a) Using SST, remove the oil seal.
SST 09308-00010
- (b) Remove the bearing from the axle hub.



6. REMOVE FRONT AXLE HUB INNER LH BEARING

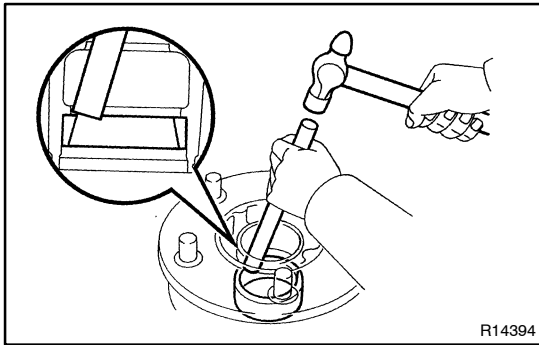
- (a) Remove the stopper bolts of the steering knuckle.



(b) Using 2 bolts (M12 x 40 mm length), remove the bearing.

NOTICE:

Tighten these 2 bolts equally.

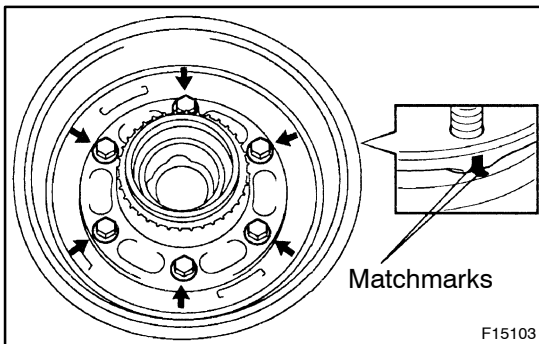


7. REMOVE BEARING OUTER RACE

(a) Using a brass bar and hammer, tap out the inner and outer bearing outer races.

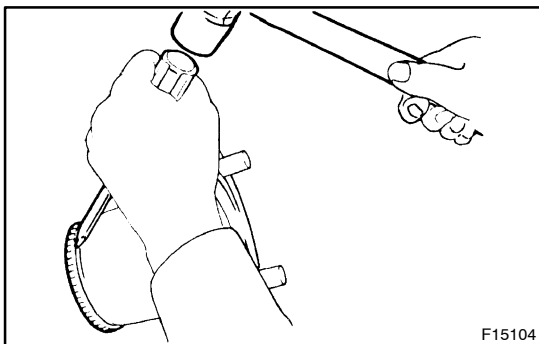
NOTICE:

- Apply the brass bar from the notch part of the axle hub.
- Do not damage the front drum.
- Remove the bearing outer race only when replacing the bearing.



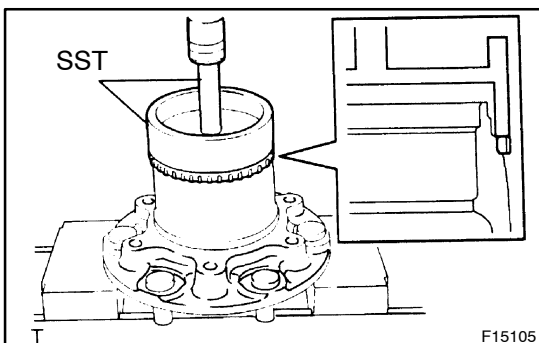
8. REMOVE BRAKE DRUM

- (a) Place matchmarks on the front axle hub and the brake drum.
- (b) Remove the 6 bolts, and separate the brake drum and axle hub.



9. REMOVE SKID CONTROL ROTOR FRONT (W/ SKID CONTROL)

(a) Using a screwdriver and hammer, tap out the sensor rotor.

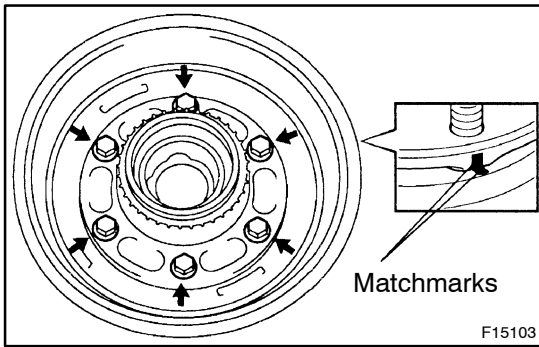


10. INSTALL SKID CONTROL ROTOR FRONT (W/ SKID CONTROL)

(a) Using SST and a press, press in the sensor rotor.
SST 09950-70010 (09951-07150), 09785-36010

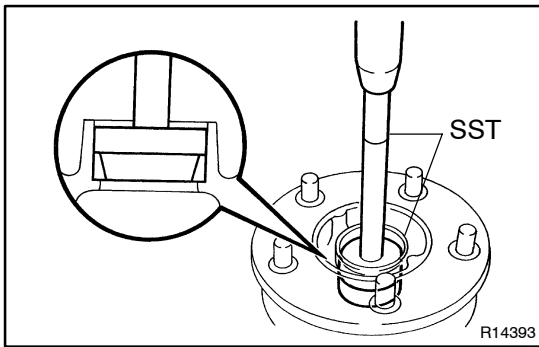
NOTICE:

- Press the sensor rotor slowly and uniformly.
- Be careful not to damage the speed sensor rotor.

**11. INSTALL BRAKE DRUM**

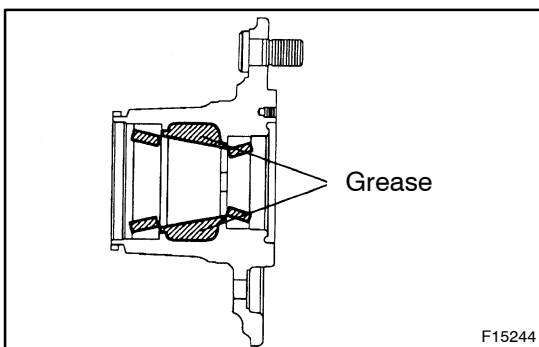
- (a) Align the matchmarks on the brake drum and the front axle hub, and then install them with the 6 bolts.

Torque: 200 N·m (2040 kgf·cm, 148 ft·lbf)

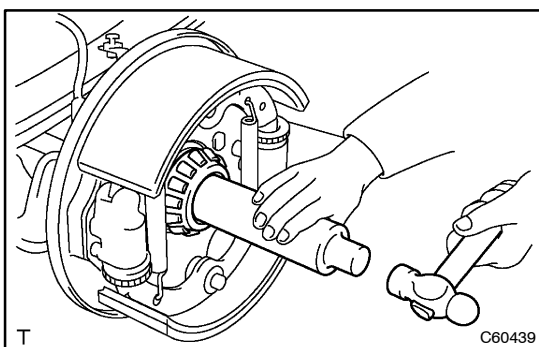
**12. INSTALL BEARING OUTER RACE**

- (a) Using SST and a press, press in new bearing outer races.

SST 09950-60020 (09951-00720, 09951-00900),
09950-70010 (09951-07150)

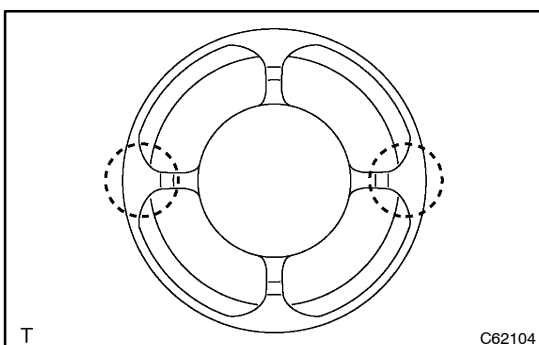


- (b) Apply MP grease, as shown in the illustration.

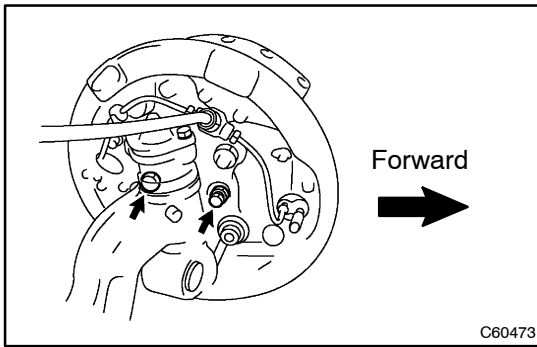
**13. INSTALL FRONT AXLE HUB INNER LH BEARING**

- (a) Pack MP grease in the bearing.
- (b) Using SST and a hammer, tap in the bearing and oil seal guide at the same time.

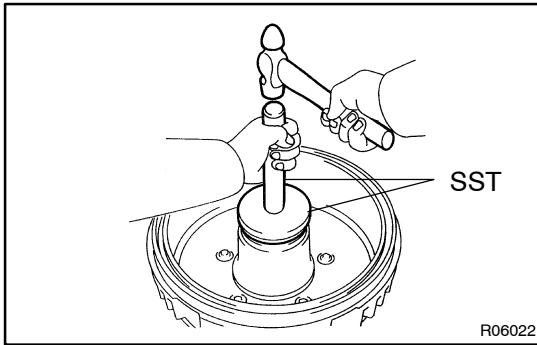
SST 09316-60011 (09316-00011)

**HINT:**

Tap in the oil seal guide so that the parts marked by the dotted lines match the service holes of the brake drum assembly.



- (c) Install the knuckle stopper bolts.
Torque: 74 N·m (760 kgf·cm, 55 ft·lbf)



14. INSTALL FRONT AXLE HUB LH OIL SEAL

- (a) Using SST and a hammer, tap in a new oil seal to the axle hub.
 SST 09950-60020 (09951-01030), 09950-70010 (09951-07150)
- (b) Coat the lip of the oil seal with MP grease.

15. INSTALL FRONT AXLE HUB SUB-ASSY LH

- (a) Clean the spindle part of the steering knuckle.

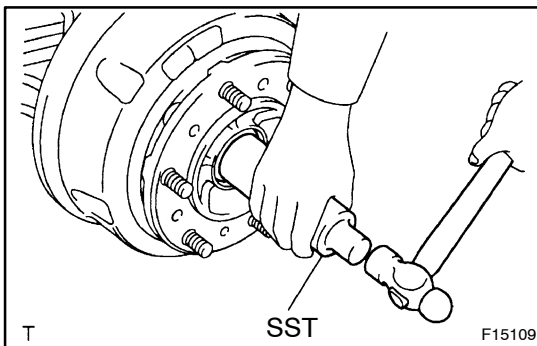
HINT:

Apply MP grease to the spindle part of the steering knuckle.

- (b) Install the front axle hub with the drum brake on the steering knuckle.

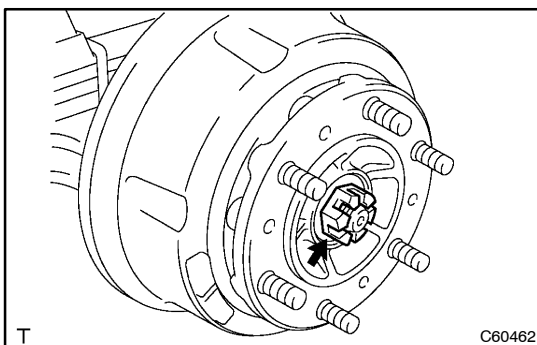
NOTICE:

Because the front axle hub with brake drum is heavy, it must be supported securely.



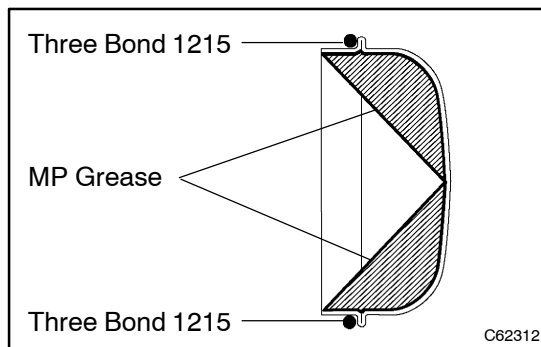
16. INSTALL FRONT AXLE HUB OUTER LH BEARING

- (a) Using SST and a hammer, tap in the outer bearing to the knuckle.
 SST 09316-60011 (09316-00011)
- (b) Install the claw washer.
- (c) Fill MP grease so that there should be no gap in the space between the outer bearing and claw washer.



- (d) Install the lock nut while turning the axle hub.
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)

17. ADJUST PRELOAD (See page 30-2)
18. INSPECT AXLE HUB AXIAL PLAY (See page 30-2)



19. INSTALL FRONT AXLE HUB GREASE CAP LH

- (a) Install the lock cap and a new cotter pin.
- (b) Fill the grease cap with MP grease, as shown in the illustration.
- (c) Apply adhesive to the grease cap, as shown in the illustration.

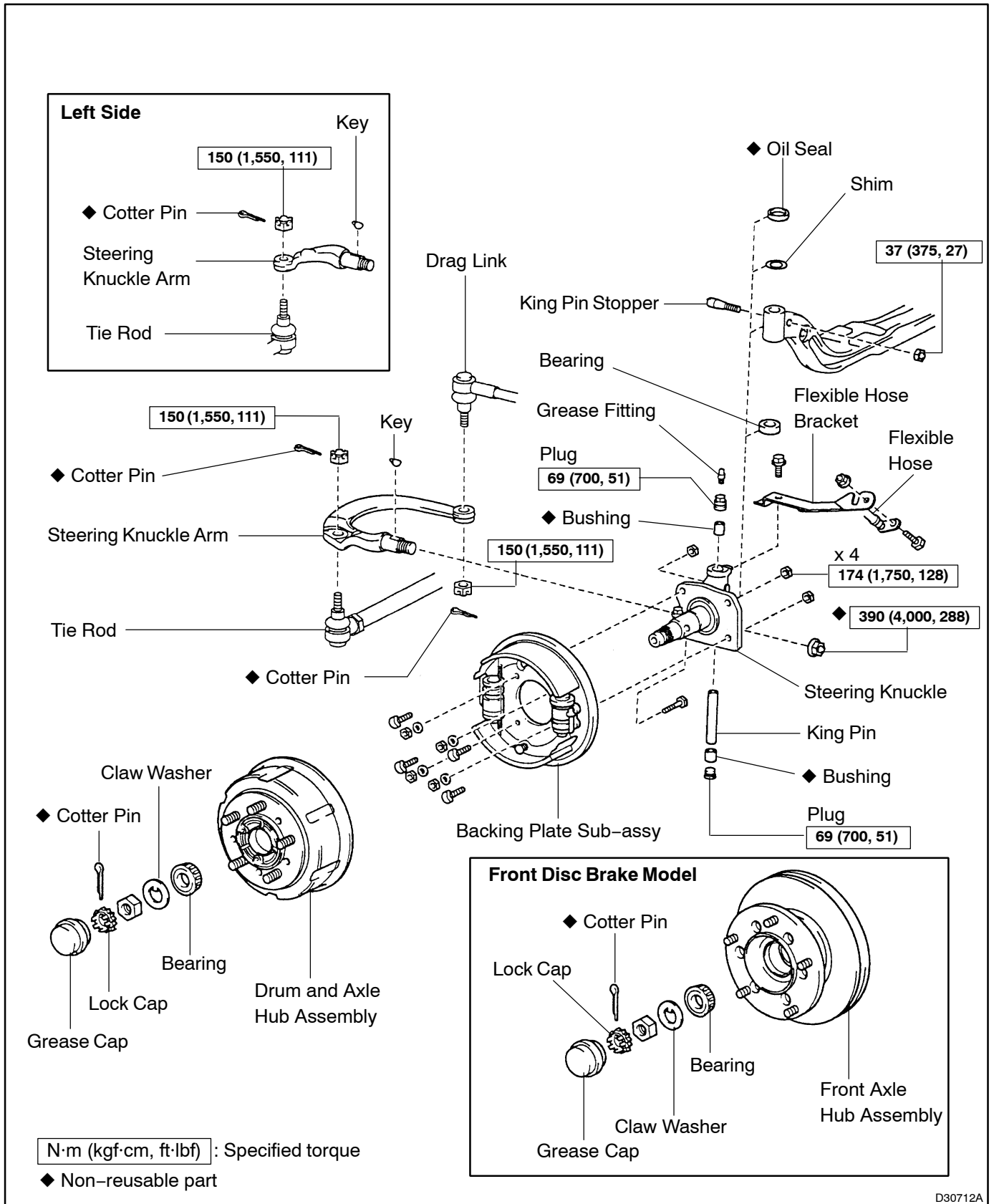
Adhesive: Three Bond 1215

- (d) Using a screwdriver and hammer, install the front hub grease cap.

20. INSTALL SKID CONTROL SENSOR (W/ SKID CONTROL)
21. INSTALL FRONT WHEEL

STEERING KNUCKLE LH (5 HUB BOLTS) COMPONENTS

300IR-01



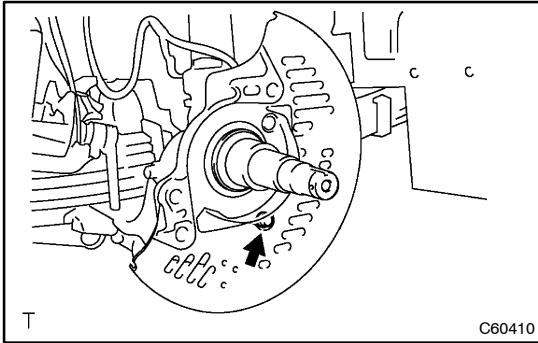
OVERHAUL

HINT:

On the RH side, use the same procedures as on the LH side.

This explanation is in case of disc brake, But in case of drum brake in the same procedures.

1. REMOVE FRONT AXLE HUB SUB-ASSY LH (See page 30-40)

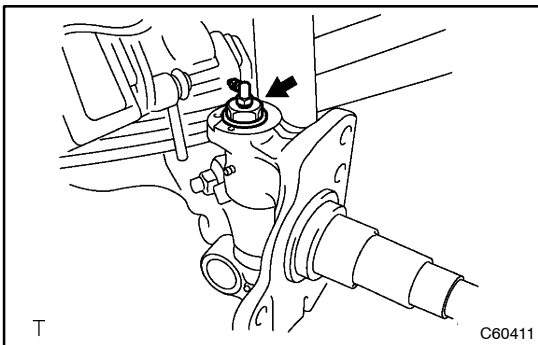


2. REMOVE DISC BRAKE DUST COVER SUB-ASSY (BACKING PLATE SUB-ASSY) FRONT LH

- (a) Remove the nut and bolt, and then disconnect the flexible hose from the bracket on the steering knuckle.
- (b) Remove the bolt and flexible hose bracket from the steering knuckle.
- (c) Remove the 4 bolts and dust cover from the steering knuckle.

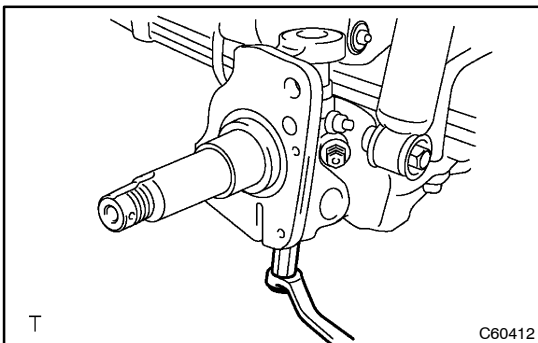
3. REMOVE STEERING KNUCKLE ARM LH

- (a) Remove the cotter pin and nut, and disconnect the drag link from the steering knuckle arm.
- (b) Remove the cotter pin and nut, and disconnect the tie rod end from the steering knuckle arm.
- (c) Remove the nut and steering knuckle arm.

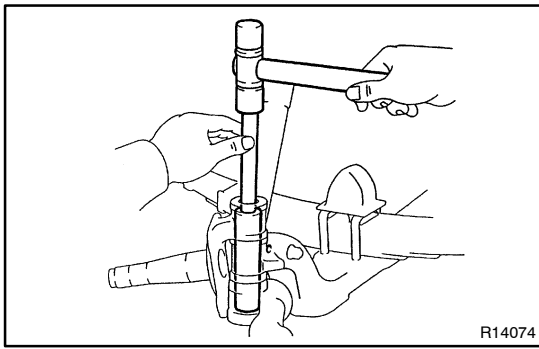


4. REMOVE STEERING KNUCKLE LH

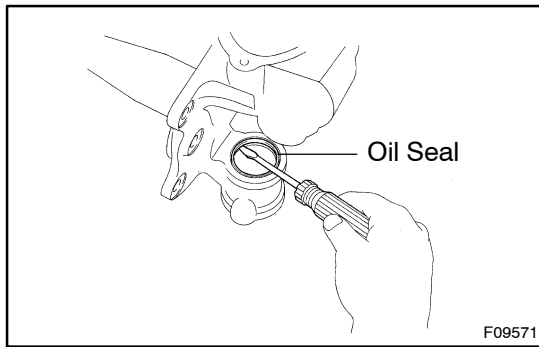
- (a) Remove the upper steering knuckle plug.



- (b) Remove the lower steering knuckle plug.
- (c) Remove the nut from the king pin stopper.
- (d) Using a plastic hammer, remove the king pin stopper.

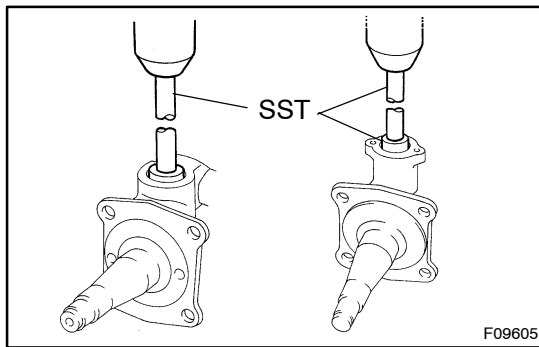


- (e) Using a brass bar and hammer, tap out the king pin.
 (f) Remove the steering knuckle, shim and bearing.



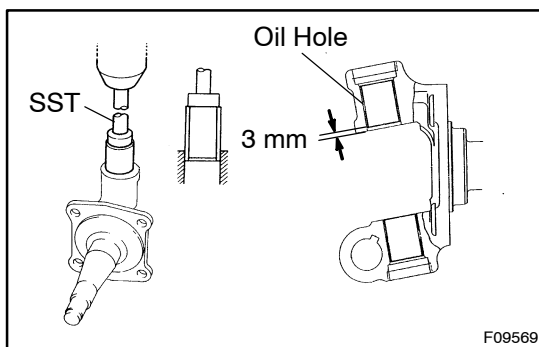
5. REMOVE OIL SEAL

- (a) Using a screwdriver, pry out the oil seal.



6. REMOVE BUSHES

- (a) Using SST and a press, press out the upper and lower bushings.
 SST 09601-37011, 09950-70010 (09951-07150)



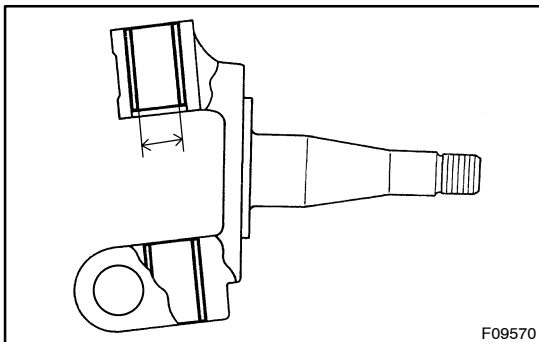
7. INSTALL BUSHES

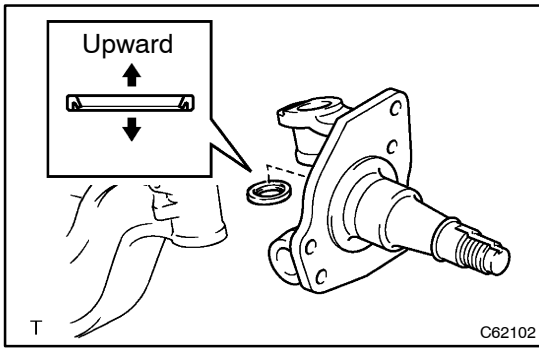
- (a) Using SST and a press, press in new upper and lower bushings.
 SST 09601-37011, 09950-70010 (09951-07150)

HINT:

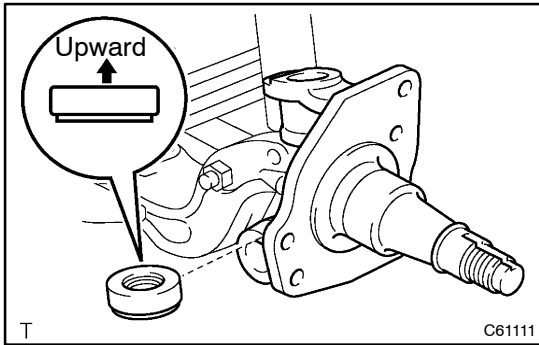
- Press in the upper bushing with its oil hole facing inward until the bushing edge comes in 3 mm (0.118 in.) from the knuckle lower edge.
- Press in the lower bushing with its oil hole facing outward until the bushing and knuckle upper edge become even.

- (b) Measure the bushing inner diameter.
Inner diameter: 28.01 – 28.03 mm (1.1028 – 1.1035 in.)

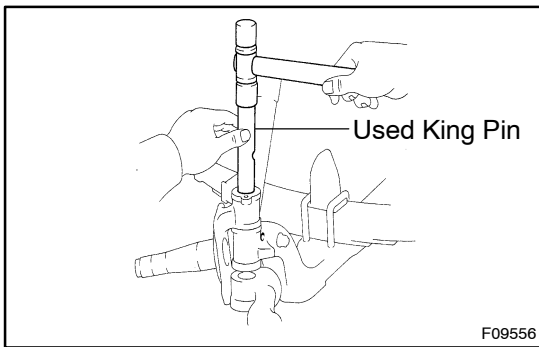




- 8. INSTALL OIL SEAL**
 (a) Install a new oil seal.



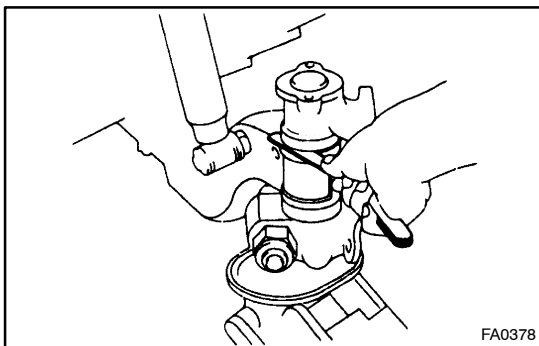
- 9. INSTALL BEARING**
 (a) Install the bearing



- 10. INSTALL STEERING KNUCKLE LH**
 (a) Place the shim and bearing.
 (b) Using a plastic hammer, tap in the king pin.

HINT:

Apply MP grease to the bushing, I-beam and bearing inside.

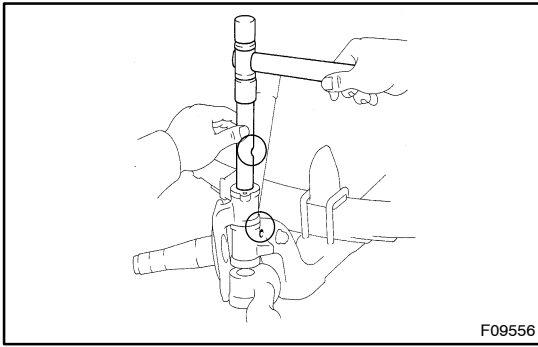


- (c) Using a jack, raise the steering knuckle.
 (d) Measure the clearance between the I-beam and knuckle.
Thrust clearance: 0.10 mm (0.039 in.) or less
 (e) Select the shim.

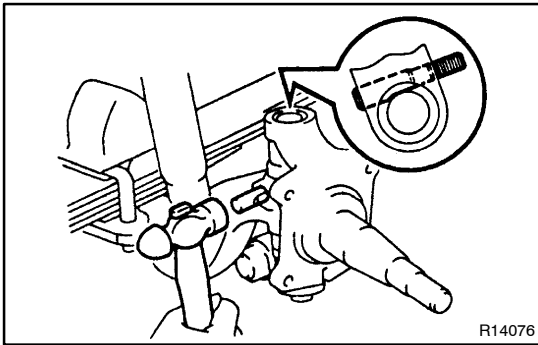
Standard thickness:

1.7 mm (0.067 in.)	2.1 mm (0.083 in.)
1.8 mm (0.071 in.)	2.2 mm (0.087 in.)
1.9 mm (0.075 in.)	2.3 mm (0.091 in.)
2.0 mm (0.079 in.)	2.4 mm (0.094 in.)

- (f) Remove the jack.
 (g) Using a brass bar and hammer, remove the king pin, shim and bearing.
 (h) Place the selected shim and bearing.
 (i) Position the hole downward and the notched position of the king pin forward to the hole side.



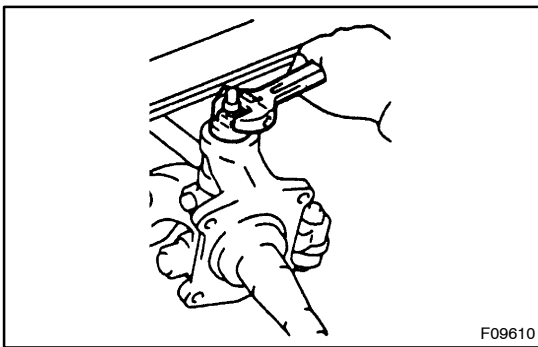
- (j) Using a plastic hammer, tap in the king pin until the stopper pin hole aligns with the notched position.



- (k) Using a hammer, tap in the king pin and stopper, and install the nut.

Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)

- (l) Check that the steering knuckle turns smoothly.



- (m) Install the upper and lower steering knuckle plugs.
Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

11. INSTALL STEERING KNUCKLE ARM LH

- (a) Install the steering knuckle arm with the nut.
Torque: 390 N·m (4,000 kgf·cm, 288 ft·lbf)
- (b) Connect the tie rod end, and install the nut and cotter pin.
Torque: 150 N·m (1,550 kgf·cm, 111 ft·lbf)
- (c) Connect the drag link, and install the nut and cotter pin.
Torque: 150 N·m (1,550 kgf·cm, 111 ft·lbf)

12. INSTALL DISC BRAKE DUST COVER SUB-ASSY FRONT LH

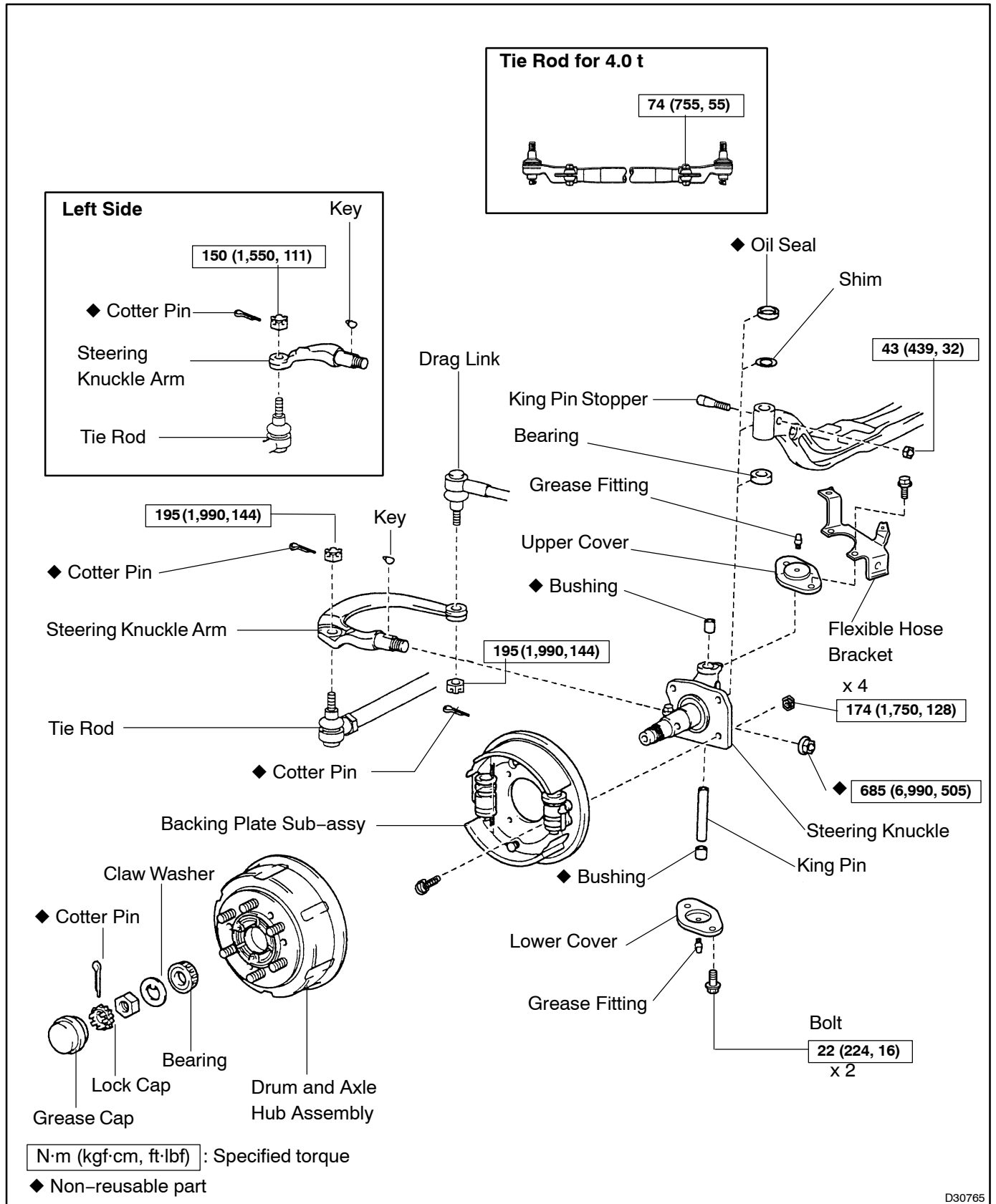
- (a) Install the dust cover with the 4 bolts.
- (b) Install the flexible hose bracket with the bolt.
- (c) Connect the flexible hose with the bolt and nut.

13. INSTALL FRONT AXLE HUB SUB-ASSY LH (See page 30-42)

14. ADJUST FRONT WHEEL ALIGNMENT (See page 26-2)

STEERING KNUCKLE LH (6 HUB BOLTS) COMPONENTS

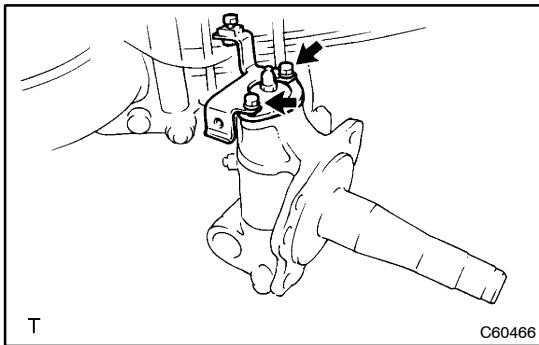
300IT-01



OVERHAUL

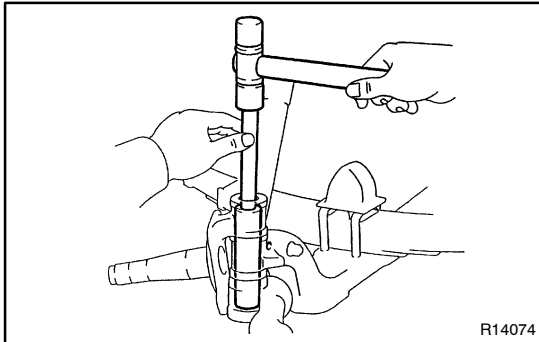
HINT:

- COMPONENTS: See page 30-55
 - On the RH side use the same procedures as on the LH side.
1. **REMOVE FRONT AXLE HUB SUB-ASSY LH (See page 30-45)**
 2. **REMOVE BRAKE BACKING PLATE SUB-ASSY FRONT LH**
 - (a) Remove the 4 nuts, 4 bolts and brake backing plate.
 - (b) Support the brake backing plate securely.
 3. **REMOVE STEERING KNUCKLE ARM LH**
 - (a) Remove the cotter pin and nut, and disconnect the drag link from the steering knuckle arm.
 - (b) Remove the cotter pin and nut, and disconnect the tie rod end from the steering knuckle arm.
 - (c) Remove the nut and steering knuckle arm.

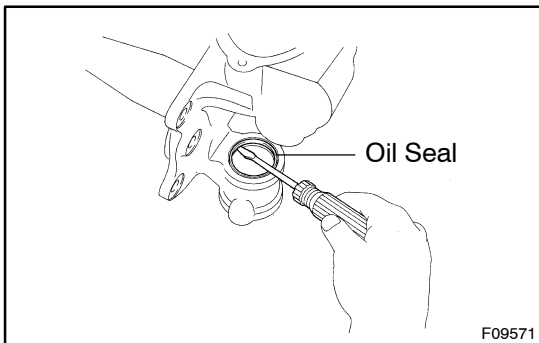


4. REMOVE STEERING KNUCKLE LH

- (a) Remove the upper and lower steering knuckle covers.
- (b) Remove the nut from the king pin stopper.
- (c) Using a plastic hammer, tap out the king pin stopper.

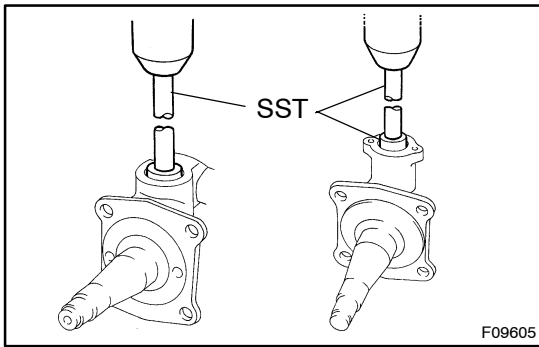


- (d) Using a brass bar and hammer, tap out the king pin.
- (e) Remove the steering knuckle, shim and bearing.



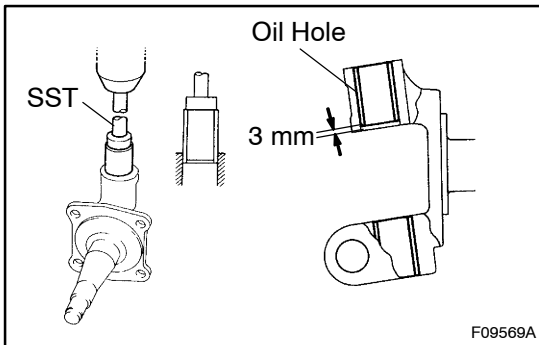
5. REMOVE OIL SEAL

- (a) Using a screwdriver, pry out the oil seal.



6. REMOVE BUSHES

- (a) Using SST and a press, pry out the upper and lower bushings.
SST 09601-37011, 09950-70010 (09951-07150)



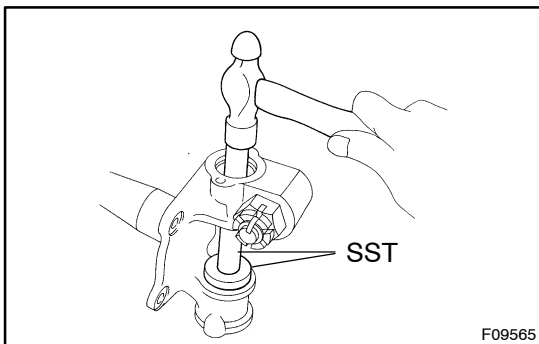
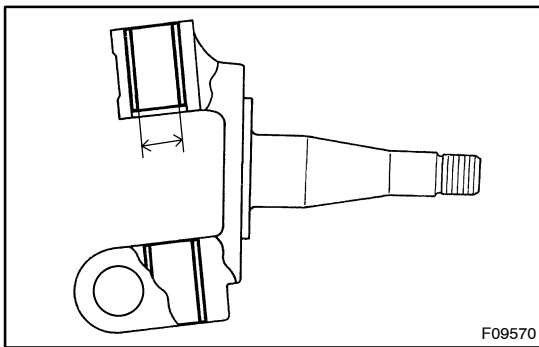
7. INSTALL BUSHES

- (a) Using SST and a press, press in new upper and lower bushings.
SST 09601-37011, 09950-70010 (09951-07150)

HINT:

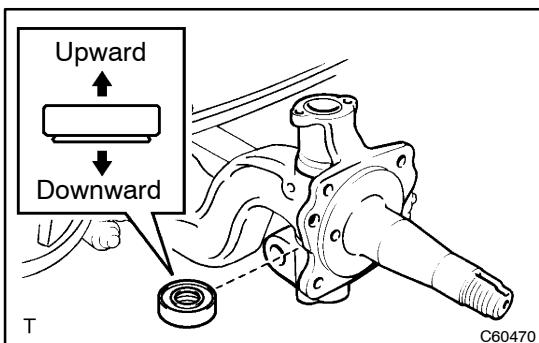
- Press in the upper bushing with its oil hole facing inward until the bushing edge comes in 3 mm (0.118 in.) from the knuckle lower edge.
 - Press in the lower bushing with its oil hole facing outward until the bushing and knuckle upper edge become even.
- (b) Measure the bushing inner diameter.

Inner diameter: 35.01 – 35.03 mm (1.3784 – 1.3791 in.)

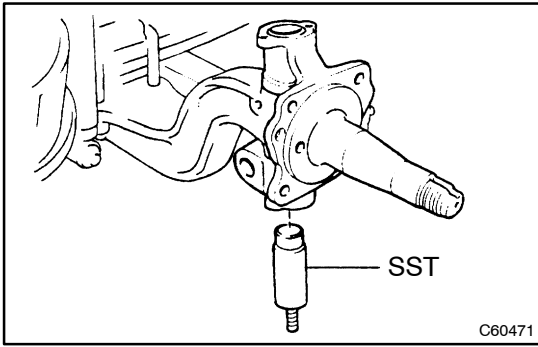


8. INSTALL OIL SEAL

- (a) Using SST and a hammer, tap in a new oil seal.
SST 09950-60010 (09951-00410), 09950-70010 (09951-07200)



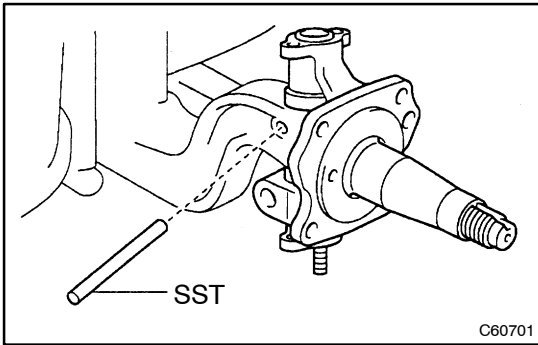
9. INSTALL BEARING

**10. INSTALL STEERING KNUCKLE LH**

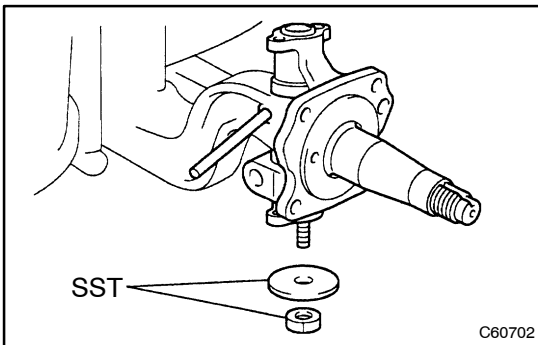
- (a) Using SST and a plastic hammer, tap in the king pin.
SST 09657-1131

HINT:

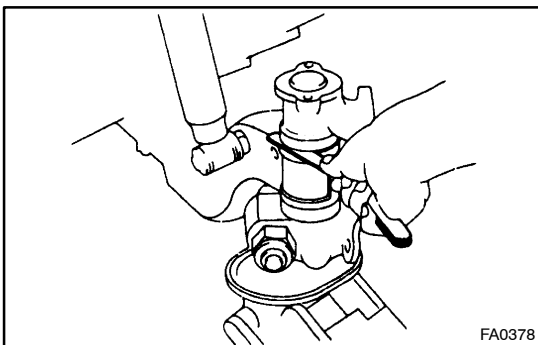
Apply MP grease to the bushing, I-beam and bearing inside.



- (b) Insert SST to the hole of the lock pin and fix the guide in the I-beam.
SST 09712-1080



- (c) Insert SSTs to the thread of the guide, and turn the nut until the nut begins to fix.
SST 09654-1080, 9201-12100

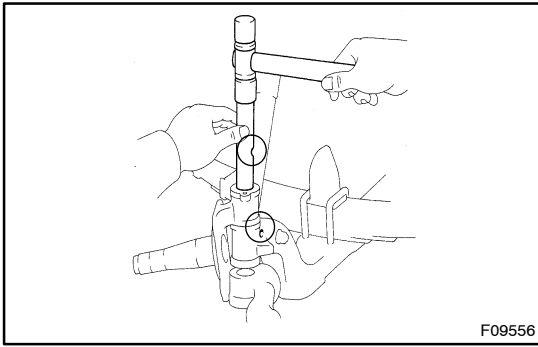


- (d) Using a jack, raise the steering knuckle.
(e) Measure the clearance between the I-beam and knuckle.
Thrust clearance: 0.10 mm (0.039 in.) or less
(f) Select the shim.

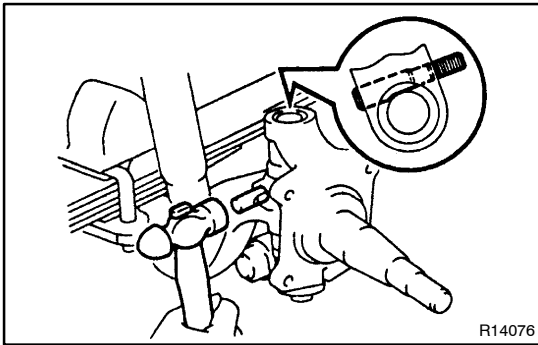
Standard thickness:

1.9 mm (0.075 in.)	2.3 mm (0.091 in.)
2.0 mm (0.079 in.)	2.4 mm (0.094 in.)
2.1 mm (0.083 in.)	2.5 mm (0.098 in.)
2.2 mm (0.087 in.)	2.6 mm (0.102 in.)

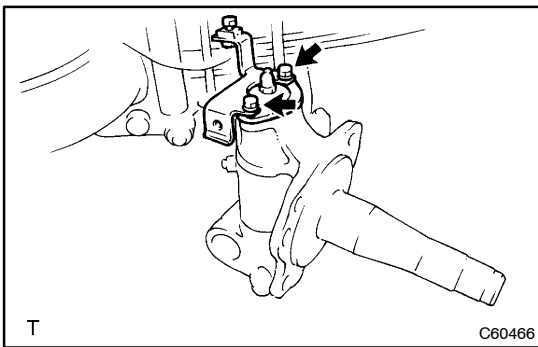
- (g) Remove the jack.
(h) Using a brass bar and hammer, remove the king pin, shim and bearing.
(i) Place the selected shim and bearing.
(j) Position the hole downward and the notched position of the king pin forward to the hole side.



- (k) Using a plastic hammer, tap in the king pin until the stopper pin hole aligns with the notched position.



- (l) Using a hammer, tap in the king pin, stopper, and install the nut.
Torque: 43 N·m (439 kgf·cm, 32 ft·lbf)
 (m) Check that the steering knuckle turns smoothly.



- (n) Install the upper and lower steering knuckle covers.
Torque: 22 N·m (224 kgf·cm, 16 ft·lbf)

11. INSTALL STEERING KNUCKLE ARM LH

- (a) Install the steering knuckle arm with the nut.
Torque: 685 N·m (6,990 kgf·cm, 505 ft·lbf)
 (b) Connect the tie rod end, and install the nut and cotter pin.
Torque: 195 N·m (1,990 kgf·cm, 144 ft·lbf)
 (c) Connect the drag link, and install the nut and cotter pin.
Torque: 195 N·m (1,990 kgf·cm, 144 ft·lbf)

12. INSTALL BRAKE BACKING PLATE SUB-ASSY FRONT LH

- (a) Install the brake backing plate sub-assy with the 4 bolts and 4 nuts.

13. INSTALL FRONT AXLE HUB SUB-ASSY LH (See page 30-48)

14. ADJUST FRONT WHEEL ALIGNMENT (See page 26-2)

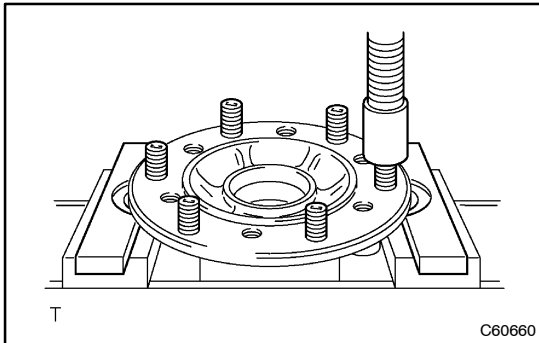
FRONT AXLE LH HUB BOLT REPLACEMENT

300IV-01

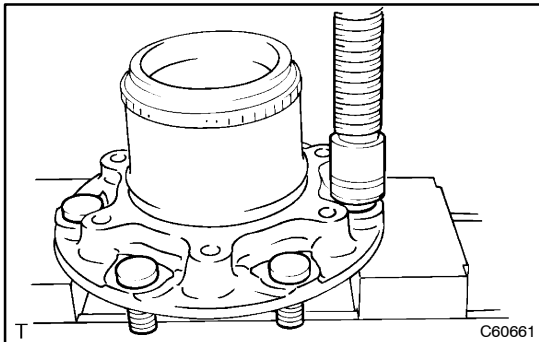
HINT:

On the RH side, use the same procedures as on the LH side.

1. **REMOVE FRONT AXLE HUB SUB-ASSY LH (See page 30-34, 30-40 and 30-45)**



2. **REMOVE FRONT AXLE LH HUB BOLT**

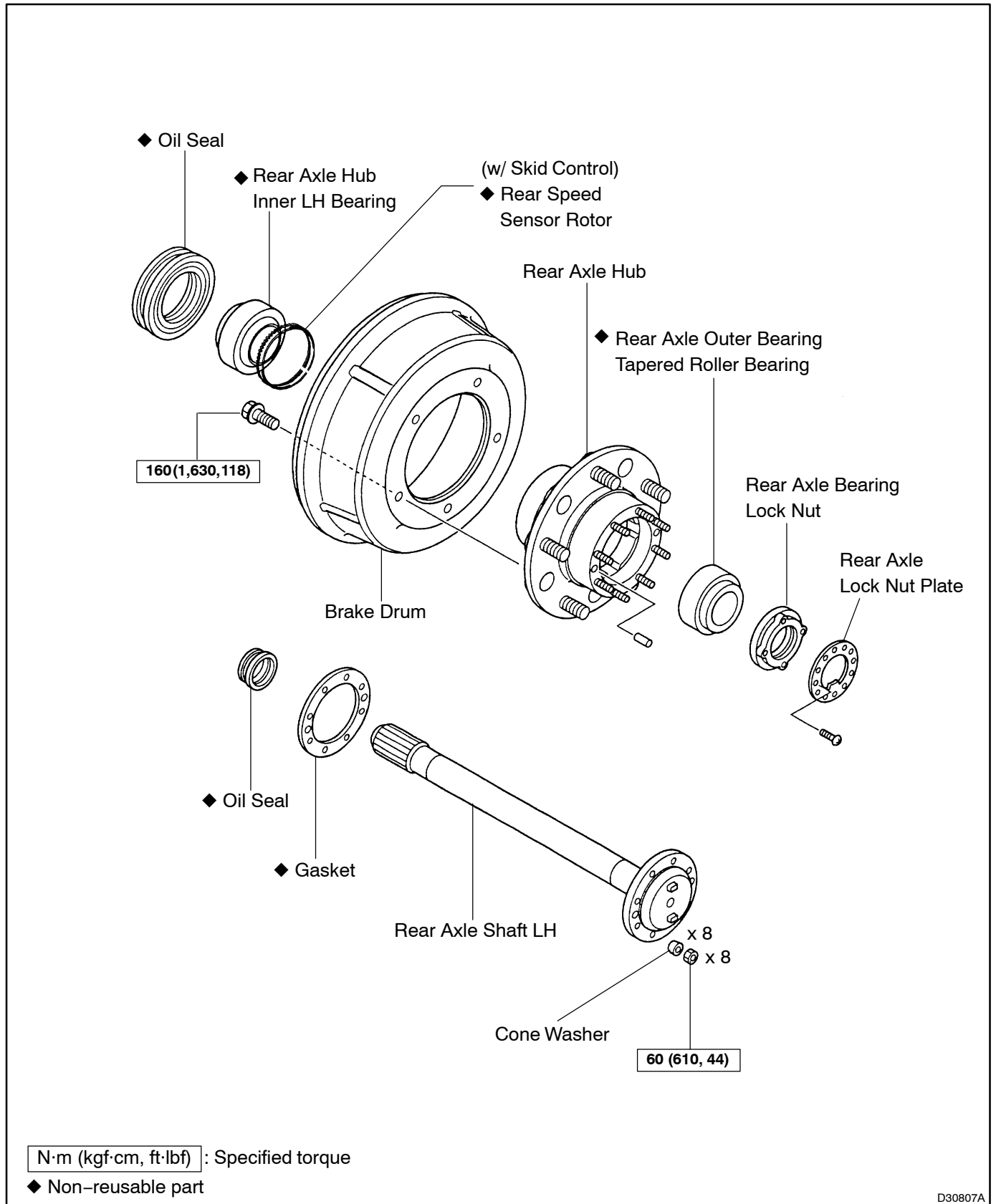


3. **INSTALL FRONT AXLE LH HUB BOLT**

4. **INSTALL FRONT AXLE HUB SUB-ASSY LH (See page 30-37, 30-42 and 30-48)**

REAR AXLE HUB LH (5 HUB BOLTS) COMPONENTS

300W-01

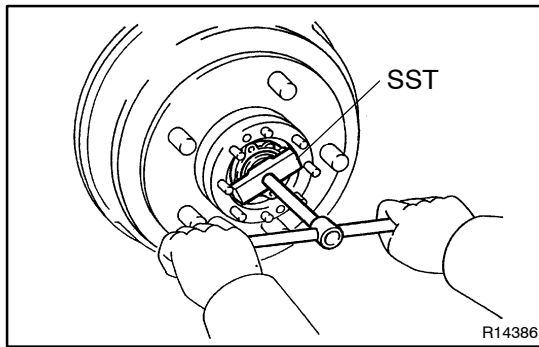


OVERHAUL

HINT:

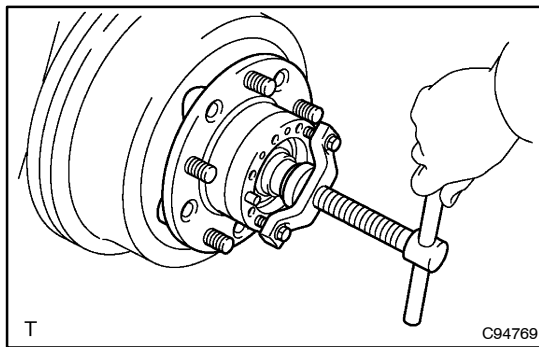
On the RH side, use the same procedures as on the LH side.

1. **REMOVE REAR AXLE SHAFT (See page 30-72)**
2. **REMOVE REAR AXLE SHAFT LH OIL SEAL (See page 30-72)**



3. REMOVE REAR AXLE BEARING LOCK NUT

- (a) Remove the 2 screws and lock plate.
- (b) Using SST, remove the lock nut.
SST 09513-36020



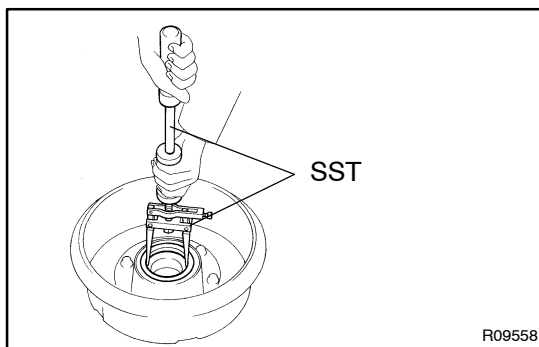
4. REMOVE LH HUB & BRAKE DRUM REAR AXLE

- (a) Using SST, remove the rear axle hub.
SST 09510-36010

NOTICE:

Be careful not to drop the outer bearing.

5. REMOVE REAR AXLE OUTER BEARING TAPERED ROLLER BEARING



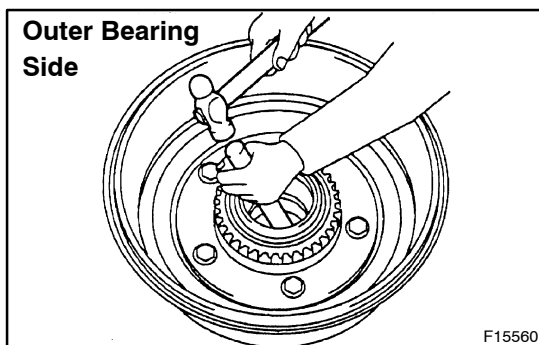
6. REMOVE REAR AXLE HUB INNER LH BEARING

- (a) Using SST, drive out the oil seal.
SST 09308-00010
- (b) Remove the inner bearing from the axle hub.

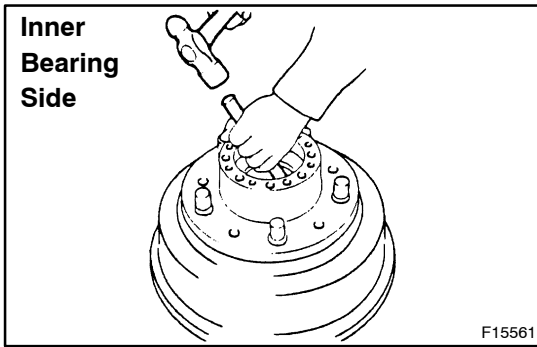
7. REMOVE BEARING OUTER RACE

NOTICE:

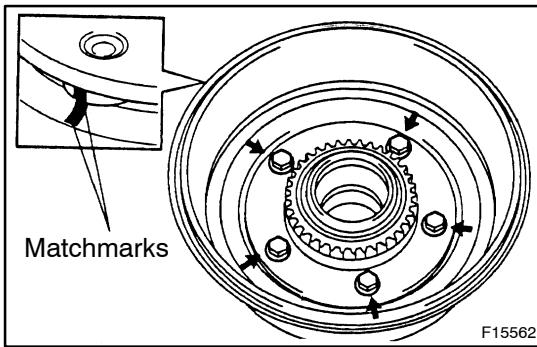
- Apply the brass bar to the cut-out of the axle hub to hit the outer race.
- Do not damage the brake drum.



- (a) Using a brass bar and hammer, tap out the outer race for the outer bearing.

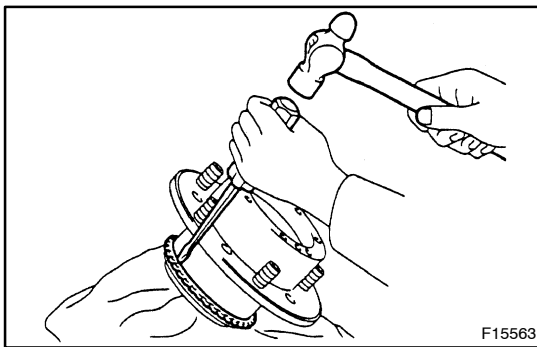


- (b) Using a brass bar and hammer, tap out the outer race for the inner bearing.



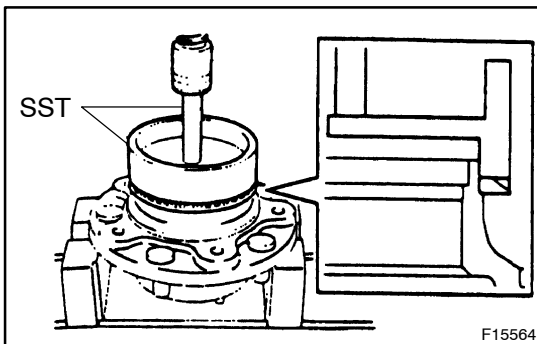
8. REMOVE REAR AXLE HUB LH

- (a) Place matchmarks on the drum and axle hub.
 (b) Remove the 5 bolts, and separate the brake drum and axle hub.



9. REMOVE SKID CONTROL ROTOR REAR (W/ SKID CONTROL)

- (a) Using a screwdriver and hammer, tap out the rotor.



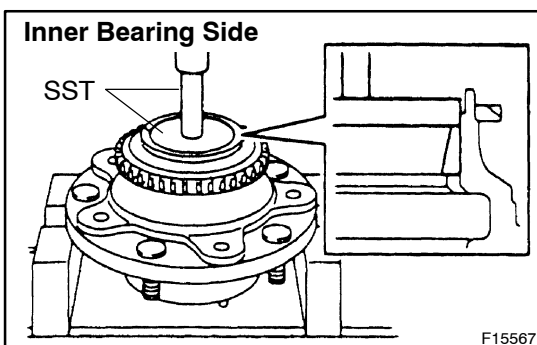
10. INSTALL SKID CONTROL ROTOR REAR (W/ SKID CONTROL)

- (a) Using SST and a press, press-fit a new rotor until it reaches the installation surface.

SST 09950-70010 (09951-07150), 09785-36010

NOTICE:

- Press-fitting should be done slowly and evenly.
- Do not damage the rotor.

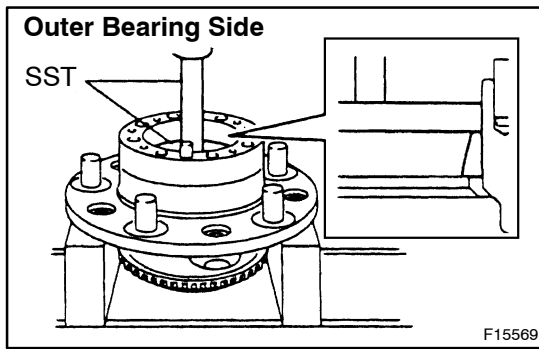


11. INSTALL BEARING OUTER RACE

NOTICE:

- Press-fitting should be done slowly and evenly.
 - Do not damage the outer race.
- (a) Using SST and a press, press-fit a new rear axle hub inner bearing outer race until it reaches the installation surface.

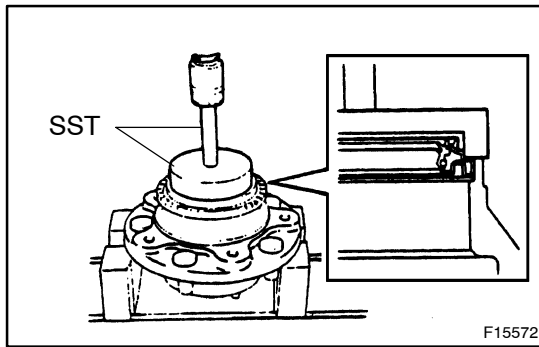
SST 09950-70010 (09951-07150), 09951-01100



- (b) Using SST and a press, press-fit a new rear axle outer bearing roller bearing outer race until it reaches the installation surface.

SST 09950-70010 (09951-07150), 09951-01000

12. INSTALL REAR AXLE HUB INNER LH BEARING



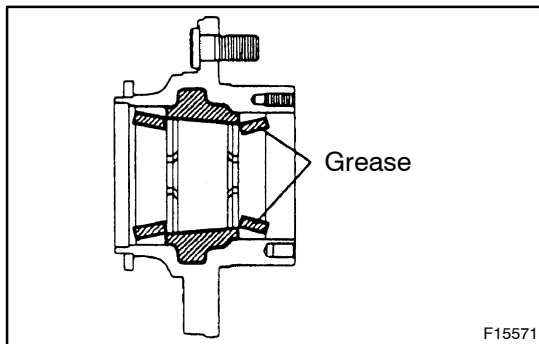
13. INSTALL REAR AXLE HUB LH OIL SEAL

- (a) Using SST and a press, press-fit a new oil seal to the end surface.

SST 09950-70010 (09951-07150), 09518-36030

NOTICE:

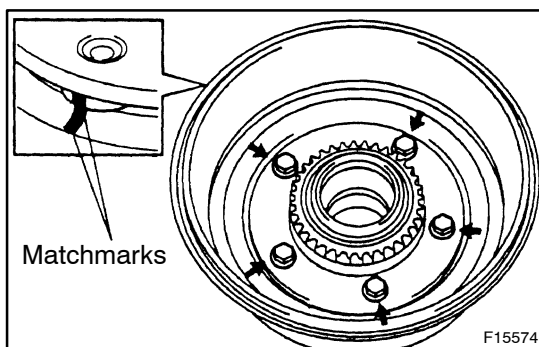
- Press-fitting should be done slowly and evenly.
- Do not damage the oil seal.



- (b) Apply some MP grease into the illustrated portion of the axle hub.

NOTICE:

Different kinds of grease and foreign objects, such as trash, cause deterioration or burn-out of the grease. Be sure not to make them together.



14. INSTALL REAR AXLE HUB LH

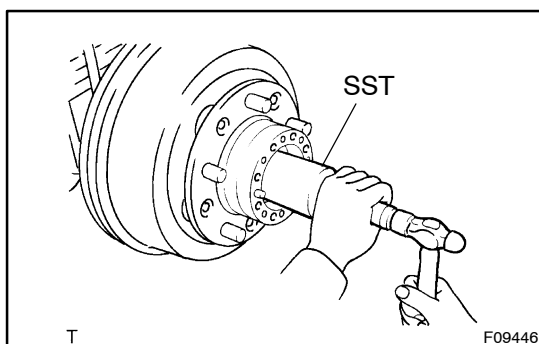
- (a) Align the matchmarks and install the axle hub to the drum with the 5 bolts.

Torque: 160 N·m (1,630 kgf·cm, 118 ft·lbf)

15. INSTALL REAR AXLE HUB LH & BRAKE DRUM

NOTICE:

Be careful not to damage the axle hub oil seal.



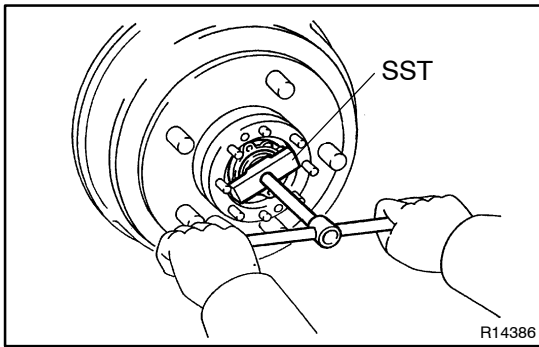
16. INSTALL REAR AXLE HUB OUTER BEARING

- (a) Using SST and a hammer, lightly tap in the outer bearing.

SST 09214-76011

NOTICE:

Be careful not to damage the bearing.

**17. INSTALL REAR AXLE BEARING LOCK NUT**

(a) Using SST, install the lock nut.

SST 09513-36020

Torque: 56 N·m (575 kgf·cm, 42 ft·lbf)

18. ADJUST PRELOAD (See page 30-2)

19. INSPECT AXLE HUB AXIAL PLAY (See page 30-3)

20. INSTALL REAR AXLE LOCK NUT PLATE

(a) Install the lock nut plate with the 2 screws.

Torque: 5.5 N·m (55 kgf·cm, 48 in·lbf)

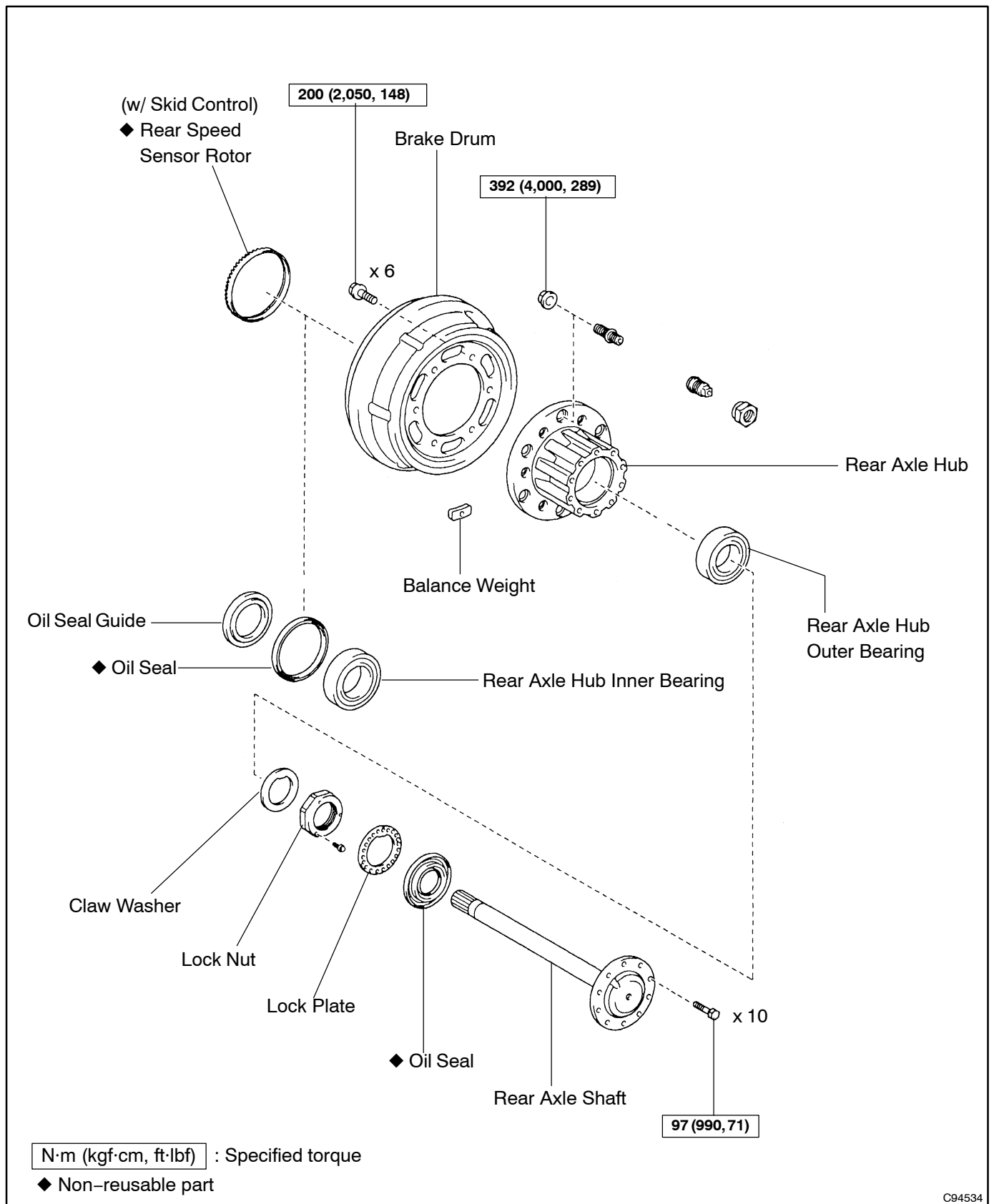
21. INSTALL REAR AXLE SHAFT LH OIL SEAL (See page 30-73)

22. INSTALL REAR AXLE SHAFT (See page 30-73)

REAR AXLE HUB LH (6 HUB BOLTS)

COMPONENTS

300Y-01

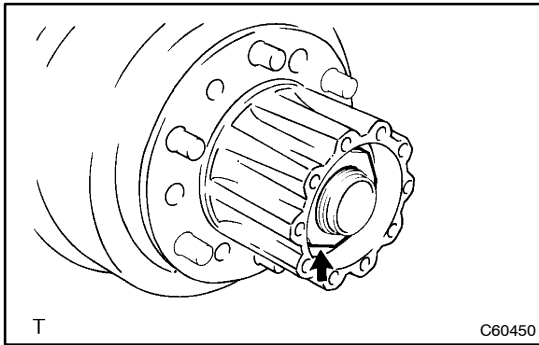


OVERHAUL

HINT:

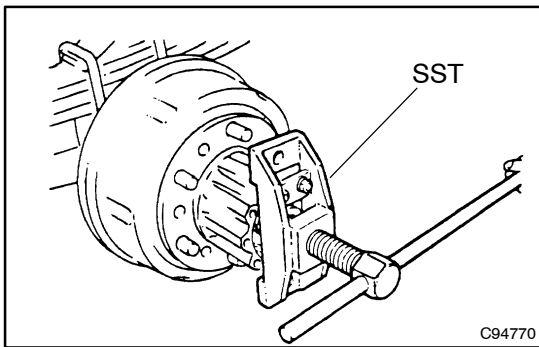
On the RH side, use the same procedures as on the LH side.

1. REMOVE REAR AXLE SHAFT (See page 30-75)
2. REMOVE REAR AXLE SHAFT LH OIL SEAL (See page 30-75)



3. REMOVE REAR AXLE BEARING LOCK NUT

- (a) Remove the 3 bolts, 3 washers and lock plate.
- (b) Using SST, remove the lock nut.
SST 09513-36030 or 09839-9401
- (c) Remove the claw washer.



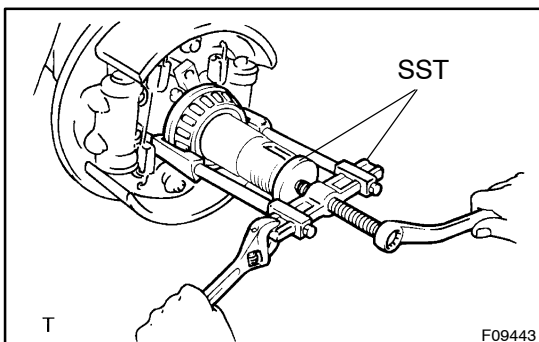
4. REMOVE REAR AXLE HUB LH & BRAKE DRUM

- (a) Using SST, remove the rear axle hub.
SST 09520-00031 or 09650-2051

NOTICE:

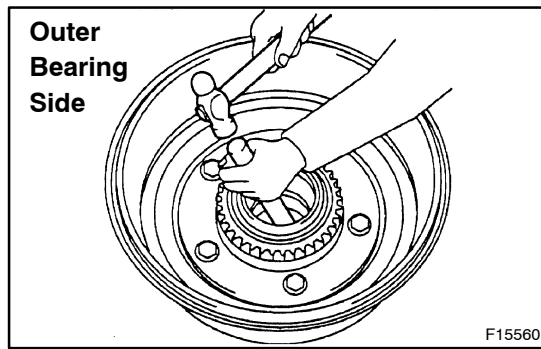
Be careful not to drop the outer bearing.

5. REMOVE REAR AXLE HUB OUTER BEARING TAPERED ROLLER BEARING
6. REAR AXLE SHAFT LH OIL SEAL



7. REMOVE REAR AXLE HUB INNER LH BEARING

- (a) Using SST, remove the inner bearing and oil seal guide.
SST 09950-60010 (09951-00580), 09950-40011 (09951-04020, 09952-04010, 09953-04020, 09954-04030, 09955-04021, 09957-04010)



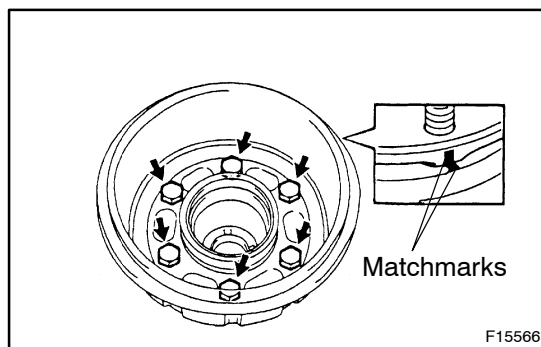
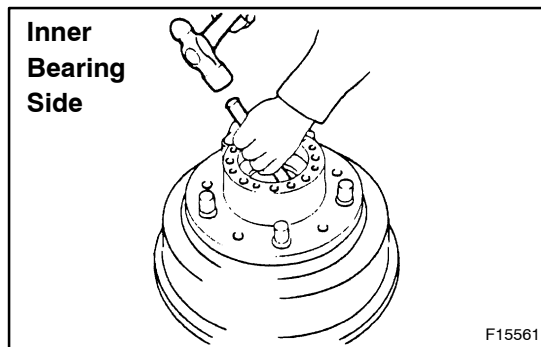
8. REMOVE BEARING OUTER RACE

NOTICE:

- Apply the brass bar to the cut-out of the axle hub to hit the outer race.
- Do not damage the drum brake.

(a) Using a brass bar and hammer, tap out the outer race for the outer bearing.

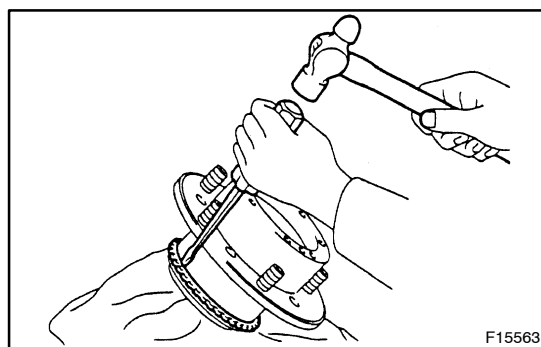
(b) Using a brass bar and hammer, tap out the outer race for the inner bearing.



9. REMOVE REAR AXLE HUB LH

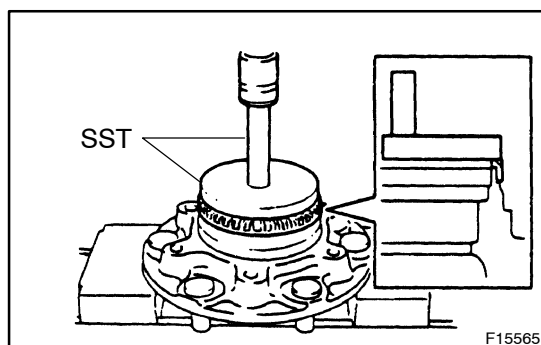
(a) Place matchmarks on the drum and axle hub.

(b) Remove the 6 bolts, and separate the brake drum and axle hub.



10. REMOVE SKID CONTROL ROTOR REAR (W/ SKID CONTROL)

(a) Using a screwdriver and hammer, tap out the rotor.



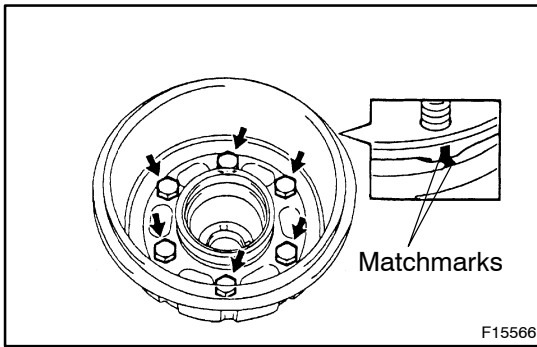
11. INSTALL SKID CONTROL ROTOR REAR (W/ SKID CONTROL)

(a) Using SST and a hammer, tap in the new rotor.

SST 09951-01600, 09950-70010 (09951-07150)

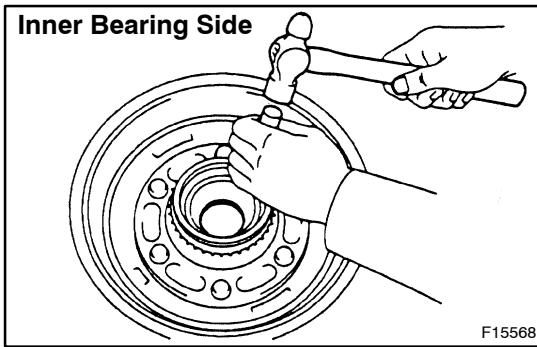
NOTICE:

- Press fitting should be down slowly and evenly.
- Do not damage the rotor.

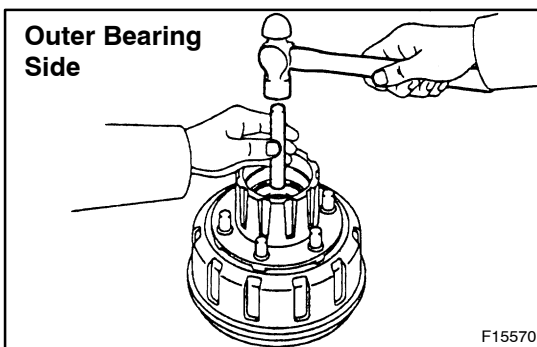
**12. INSTALL REAR AXLE HUB LH**

- (a) Align the matchmarks, and install the axle hub to the drum with the 6 bolts.

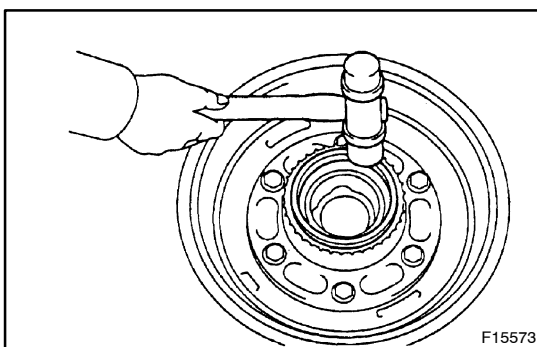
Torque: 200 N·m (2,050 kgf·cm, 148 ft·lbf)

**13. INSTALL BEARING OUTER RACE**

- (a) Using a brass bar and hammer, tap in the rear axle hub inner bearing outer race to the axle hub.



- (b) Using a brass bar and hammer, tap in the rear axle hub outer bearing outer race to the axle hub.

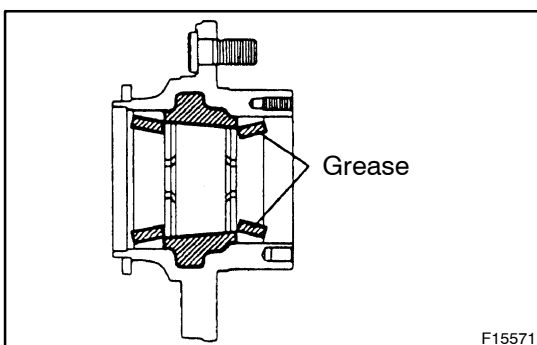
**14. INSTALL REAR AXLE HUB LH OIL SEAL**

- (a) Using a plastic hammer, tap in a new oil seal to the axle hub.

NOTICE:

- **Strike the oil seal so that it can be aligned with the end of the axle hub.**
- **Clean the surface where the oil seal comes.**

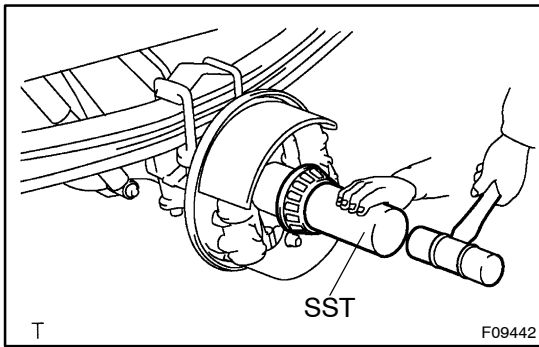
- (b) Coat the oil seal with MP grease.



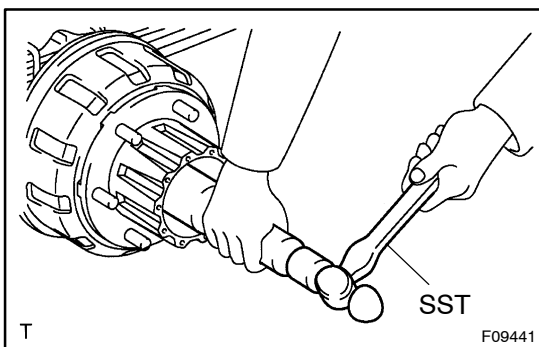
- (c) Apply some MP grease into the illustrated portion of the axle hub.

NOTICE:

Different kinds of grease and foreign objects, such as trash, cause deterioration or burn-out of the grease. Be sure not to make them together.

**15. INSTALL REAR AXLE HUB LH BEARING**

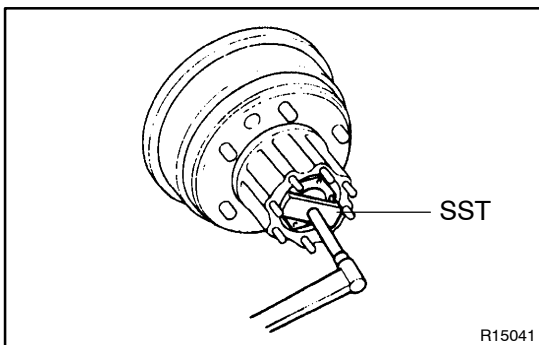
- (a) Using SST and a hammer, tap in the oil seal guide and inner bearing.
SST 09513-36040
- (b) Coat the bearing with MP grease.

16. INSTALL REAR AXLE HUB LH & BRAKE DRUM**17. INSTALL REAR AXLE OUTER BEARING**

- (a) Using SST and a hammer, tap in the outer bearing.
SST 09214-76011

NOTICE:

Be careful not to damage the bearing.

**18. INSTALL REAR AXLE BEARING LOCK NUT**

- (a) Install the lock nut.
- (b) Settle down the bearing by turning the hub several times.
- (c) Using SST, tighten the lock nut.
SST 09513-36030 or 09839-9401
Torque: 539 N·m (5500 kgf·cm, 397 ft·lbf)
- (d) Loosen the lock nut until it can be tuned by hand.

19. ADJUST PRELOAD (See page 30-3)**20. INSPECT AXLE HUB AXIAL PLAY (See page 30-3)****21. INSTALL REAR AXLE LOCK NUT PLATE**

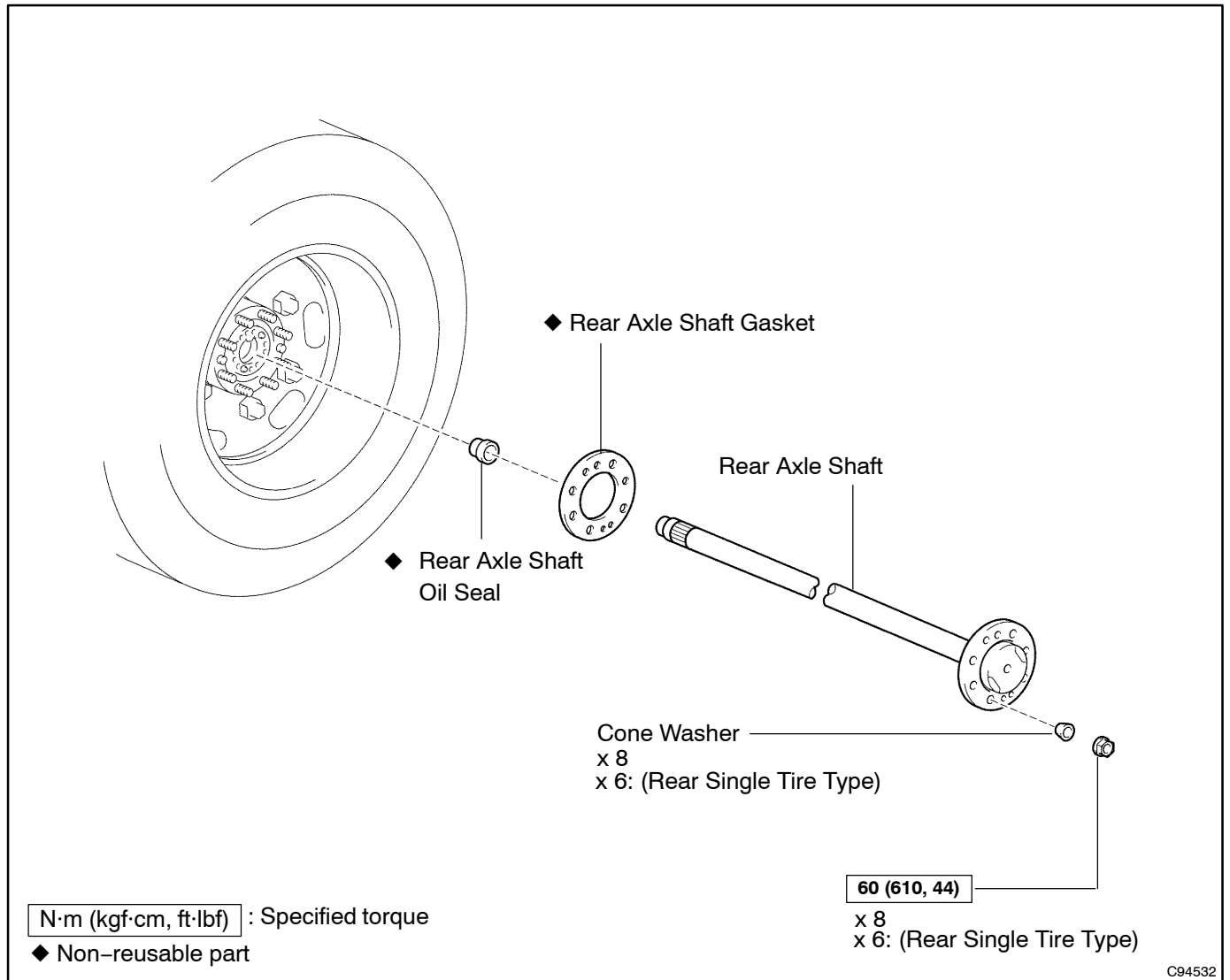
- (a) Install the lock plate with the 3 bolts.

Torque: 9.6 N·m (98 kgf·cm, 84 in·lbf)

22. INSTALL REAR AXLE SHAFT LH OIL SEAL (See page 30-75)**23. INSTALL REAR AXLE SHAFT (See page 30-75)**

REAR AXLE SHAFT (5 HUB BOLTS) COMPONENTS

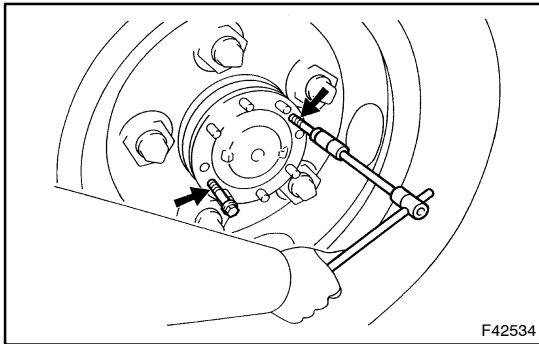
300J0-01



REPLACEMENT

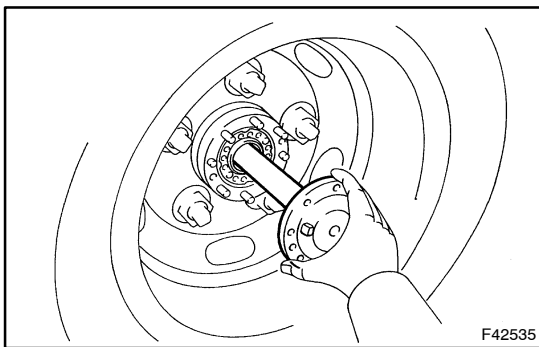
HINT:

On the RH side, use the same procedures as on the LH side.



1. REMOVE REAR AXLE SHAFT

- (a) Remove the 6 or 8 nuts and 6 or 8 cone washers.
- (b) Install the 2 service bolts and turn each bolt evenly in order.



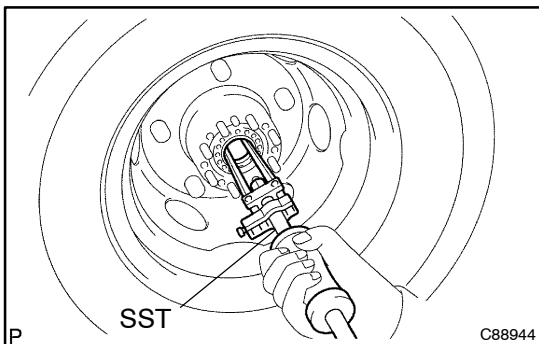
- (c) Remove the rear axle shaft.

NOTICE:

Be careful not to damage the oil seal while the rear axle shaft splines removal.

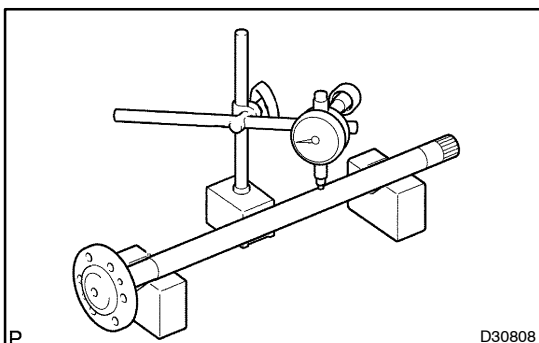
- (d) Remove the 2 service bolts from the axle shaft.

2. REMOVE REAR AXLE SHAFT GASKET LH



3. REMOVE REAR AXLE SHAFT OIL SEAL

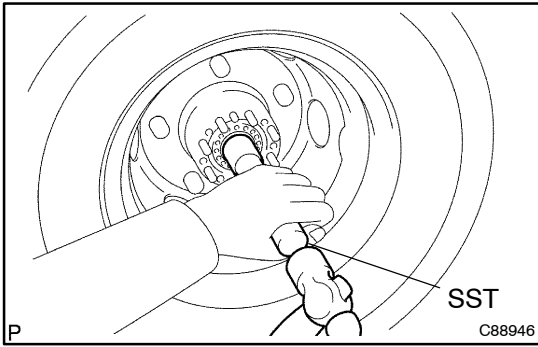
- (a) Using SST, drive out the oil seal.
SST 09308-00010



4. INSPECT REAR AXLE SHAFT

- (a) Using a dial indicator, measure the rear axle shaft runout.
Maximum runout: 0.8 mm (0.031 in.)

If the runout is greater than the maximum, replace the rear axle shaft.



5. INSTALL REAR AXLE SHAFT OIL SEAL

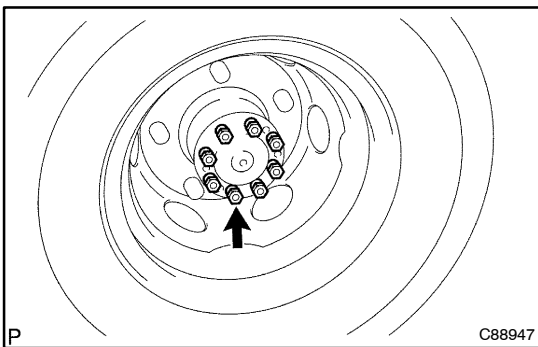
- (a) Coat a new oil seal with MP grease.
- (b) Using SST, install the new oil seal.
SST 09517-12010

NOTICE:

Be careful not to damage the oil seal.

6. INSTALL REAR AXLE SHAFT GASKET LH

- (a) Install a new gasket.

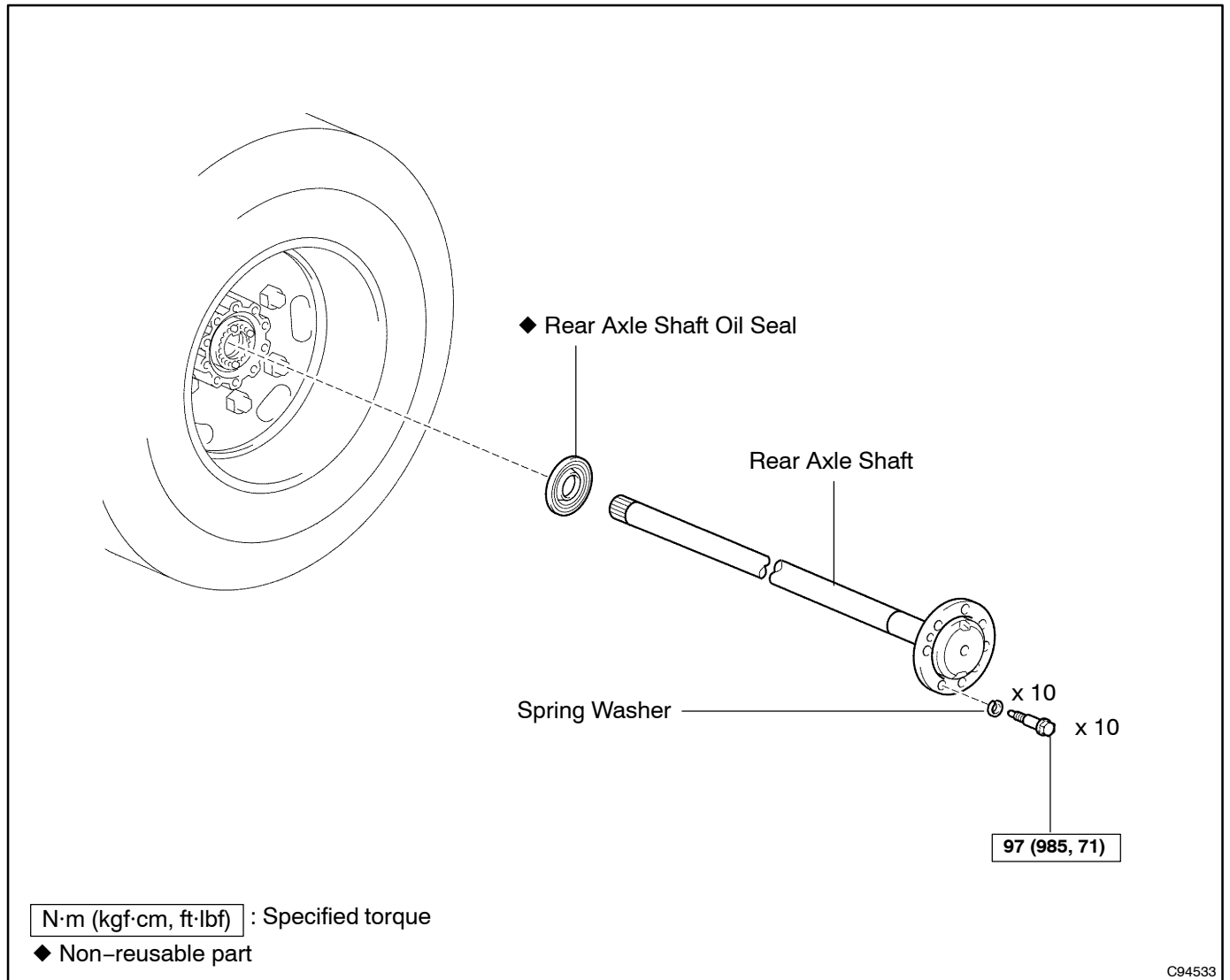


7. INSTALL REAR AXLE SHAFT

- (a) Install the rear axle shaft.
- (b) Install the 6 or 8 cone washers and 6 or 8 nuts.
Torque: 60 N·m (610 kgf·cm, 44 ft·lbf)

REAR AXLE SHAFT (6 HUB BOLTS) COMPONENTS

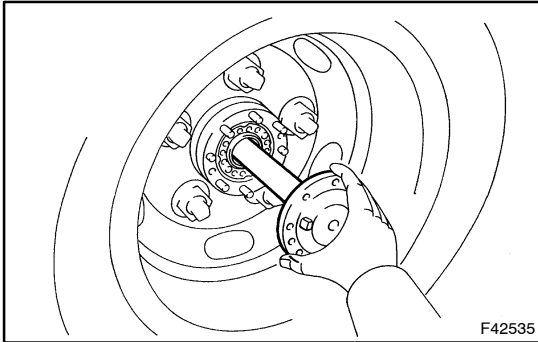
300J2-01



REPLACEMENT

HINT:

On the RH side, use the same procedures as on the LH side.

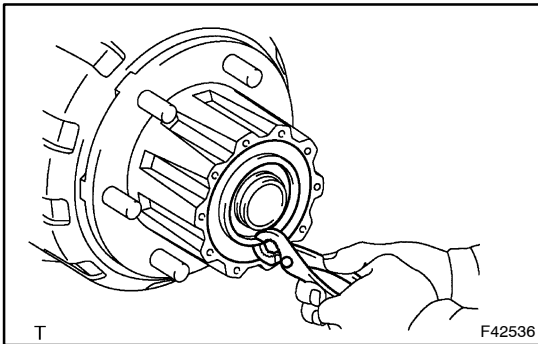


1. REMOVE REAR AXLE SHAFT

- (a) Remove the 10 bolts and 10 washers.
- (b) Remove the rear axle shaft.

NOTICE:

Be careful not to damage the oil seal while the rear axle shaft splines removal.

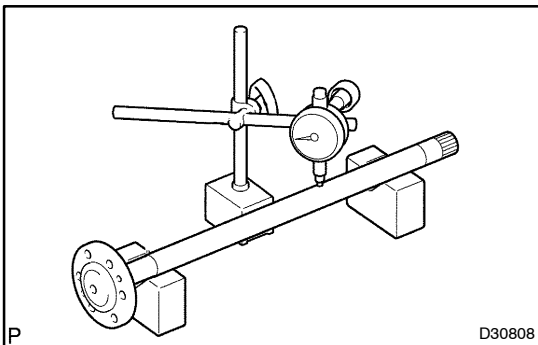


2. REMOVE REAR AXLE SHAFT OIL SEAL

- (a) Using pliers, remove the oil seal.

NOTICE:

- **Be careful not to damage the axle tube.**
- **Do not use a screwdriver.**
- **Do not pry up the oil seal.**

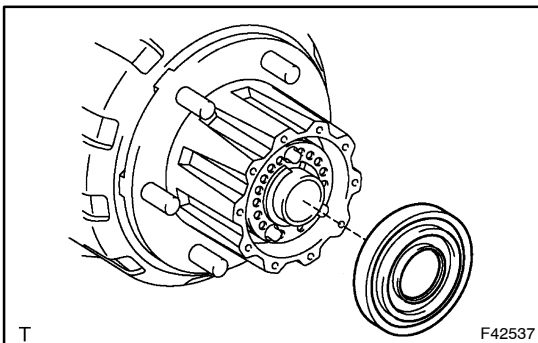


3. INSPECT REAR AXLE SHAFT

- (a) Using a dial indicator, measure the rear axle shaft runout.

Maximum runout: 0.8 mm (0.031 in.)

If the runout is greater than the maximum, replace the rear axle shaft.



4. INSTALL REAR AXLE SHAFT OIL SEAL

- (a) Push in a new oil seal to the axle hub.

NOTICE:

Be careful not to damage the oil seal.

5. INSTALL REAR AXLE SHAFT

- (a) Install the rear axle shaft.
- (b) Install the 10 bolts and 10 washers.

Torque: 97 N·m (985 kgf·cm, 71 ft·lbf)

REAR AXLE LH HUB BOLT

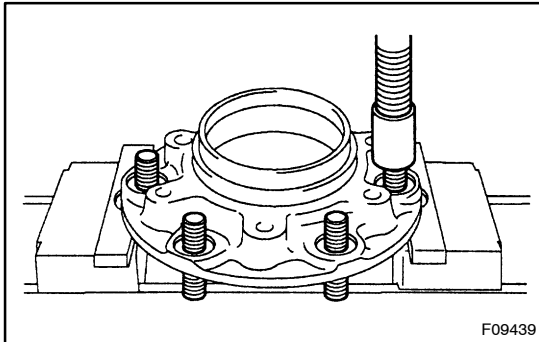
REPLACEMENT

HINT:

On the RH side, use the same procedures as on the LH side.

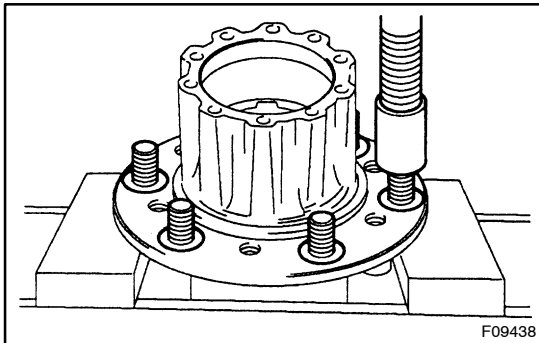
In case of 5 hub bolts, use the same procedures as Front axle LH hub bolt. (See Page 30-60)

1. REMOVE REAR AXLE HUB LH (See page 30-62, 30-67)



2. REMOVE REAR AXLE LH HUB BOLT

- (a) Unstake the bolt and remove the nut.
- (b) Using a press, remove the hub bolt.



3. INSTALL REAR AXLE LH HUB BOLT

- (a) Using a press, in a new hub bolt.
- (b) Install a new nut, and tighten the nut.
Torque: 390 N·m (4,000 kgf·cm, 289 ft·lbf)
- (c) Using a punch and a hammer, caulk the 3 portions of the bolt thread.

4. INSTALL REAR AXLE HUB LH (See page 30-64, 30-70)

BRAKE

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BRAKE SYSTEM

320TN-01

PRECAUTION

- Care must be taken to replace each part properly because it could affect the performance of the brake system and result in a driving hazard. Replace the parts with parts having the same part number or equivalent.
- It is very important to keep the parts and area clean when repairing the brake system.
- If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.

PROBLEM SYMPTOMS TABLE

Use the table below to help you find a cause of the problem. The numbers indicate the priority of a likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspected Area	See Page	
Low pedal or spongy pedal	3. Fluid leaks in brake system	-	
	4. Air in brake system	32-4	
	5. Piston seals (Worn or damaged)	32-37	
	6. Rear brake shoe clearance(Out of adjustment)	32-53	
	7. Master cylinder (Faulty)	32-10	
	8. Booster push rod (Out of adjustment)	32-10	
	Brake drag	1. Brake pedal free play (Minimum)	32-7
		2. Parking brake lever travel (Out of adjustment)	33-2
3. Parking brake wire (Sticking)		33-3	
4. Rear brake shoe clearance (Out of adjustment)		32-53	
5. Pad or lining (Cracked or distorted)		32-37	
		32-42	
		32-52	
6. Piston (Stuck)		32-37	
		32-42	
		32-53	
		32-42	
	32-53		
	32-42		
	32-53		
	32-19		
	32-17		
	32-10		
Brake pull	1. Piston (Stuck)	32-37	
		32-42	
		32-53	
	2. Pad or lining (Oily)	32-37	
		32-42	
		32-53	
	3. Piston (Frozen)	32-37	
		32-42	
		32-53	
	4. Disc (Scored)	32-37	
	5. Pad or lining (Cracked or distorted)	32-37	
	32-42		
	32-53		

BRAKE - BRAKE SYSTEM

Hard pedal but brake inefficient	<ol style="list-style-type: none"> 1. Fluid leaks in brake system 2. Air in brake system 3. Pad or lining (Worn) 4. Pad or lining (Cracked or distorted) 5. Rear brake shoe clearance (Out of adjustment) 6. Pad or lining (Oily) 7. Pad or lining (Glazed) 8. Disc (Scored) 9. Booster push rod (Out of adjustment) 10. Vacuum leaks in booster system 	<p style="text-align: center;">-</p> <p>32-4</p> <p>32-37</p> <p>32-42</p> <p>32-53</p> <p>32-37</p> <p>32-42</p> <p>32-53</p> <p>32-53</p> <p>32-37</p> <p>32-42</p> <p>32-53</p> <p>32-37</p> <p>32-42</p> <p>32-53</p> <p>32-37</p> <p>32-19</p> <p>32-17</p>
Noise from brakes	<ol style="list-style-type: none"> 1. Pad or lining (Cracked or distorted) 2. Disc (Scored) 3. Pad support plate (Loose) 4. Sliding pin (Worn) 5. Pad or lining (Dirty) 6. Pad or lining (Glazed) 7. Anchor, return or tension spring (Faulty) 8. Anti-squeal shim (Damaged) 9. Shoe hold-down spring (Damaged) 	<p>32-37</p> <p>32-42</p> <p>32-53</p> <p>32-37</p> <p>32-37</p> <p>32-37</p> <p>32-37</p> <p>32-42</p> <p>32-53</p> <p>32-37</p> <p>32-42</p> <p>32-53</p> <p>32-42</p> <p>32-53</p> <p>32-37</p> <p>32-42</p> <p>32-53</p>

BRAKE FLUID

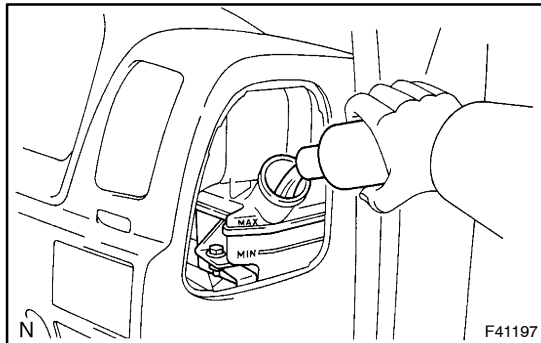
BLEEDING

HINT:

If any work is done on the brake system or if there seems to be trouble in the air in the brake lines, bleed air from the system.

NOTICE:

Wash off any brake fluid that has come into contact with the painted surface.



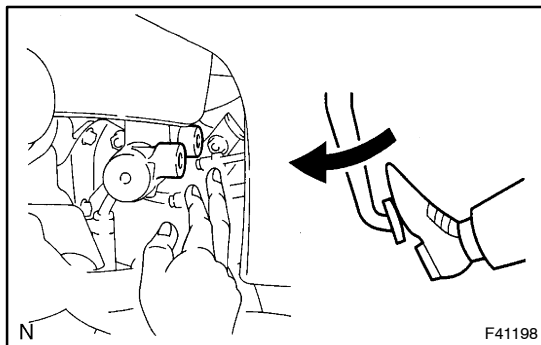
1. FILL RESERVOIR WITH BRAKE FLUID

- (a) Check the fluid level in the reservoir after bleeding each wheel. Add fluid, if necessary.

Fluid: SAE J1703 or FMVSS No. 116 DOT3

2. BLEED MASTER CYLINDER

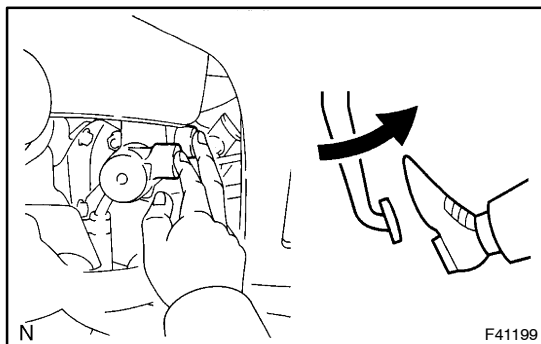
- (a) Disconnect the brake lines from the master cylinder.
SST 09023-00100



- (b) Slowly depress the brake pedal and hold it.

HINT:

If the master cylinder has been disassembled or if the reservoir becomes empty, bleed air from the master cylinder.



- (c) Close the outer holes with your fingers, and release the brake pedal.

- (d) Repeat (b) and (c) 3 or 4 times.

- (e) Using SST, connect the 2 brake lines to the master cylinder.

SST 09023-00100

Torque:

12.9 N·m (131 kgf·cm, 9.4 ft·lbf) for use with SST

15 N·m (155 kgf·cm, 11 ft·lbf)

HINT:

Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

3. BLEED BRAKE LINE

- (a) Wheel equipped with drum brake:
Connect a vinyl tube to the brake wheel cylinder.
- (b) Wheel equipped with disc brake:
Connect a vinyl tube to the brake caliper.
- (c) Depress the brake pedal several times, then loosen the bleeder plug with the pedal held down.

- (d) At the point where the fluid stops coming out, tighten the bleeder plug, and then release the brake pedal.
- (e) Repeat (c) and (d) until all the air in the fluid is bled out.
- (f) Repeat the above procedures to bleed the air out of the brake line for each wheel.

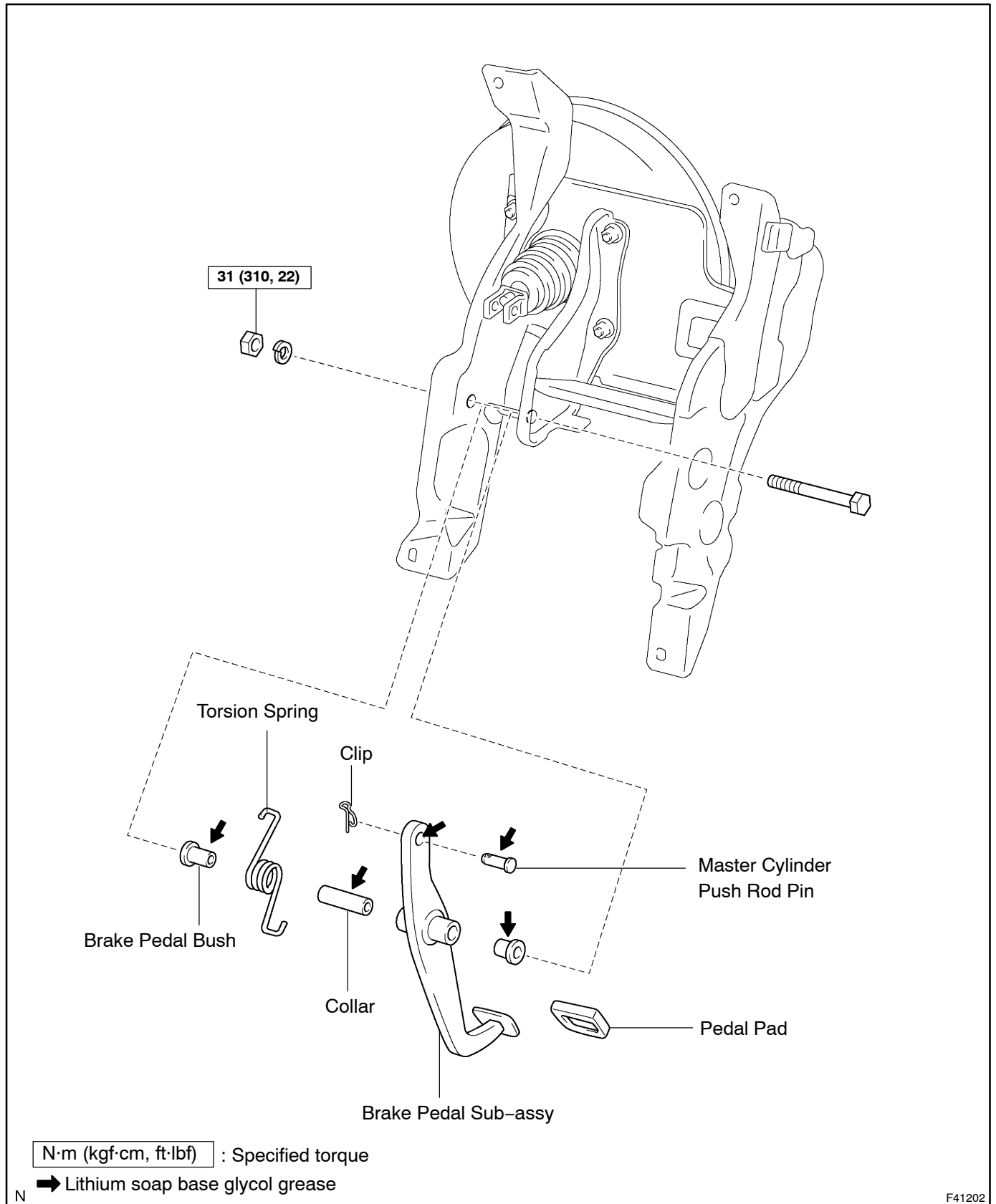
Torque:**Front bleeder plug****2 ton (disc & drum), regular cab 3 ton: 11 N·m (110 kgf·cm, 8.0 ft·lbf)****Wide cab over 2 ton (drum): 9.5 N·m (95 kgf·cm, 83 in·lbf)****Rear bleeder plug****Regular cab, wide cab 2 ton: 11 N·m (110 kgf·cm, 8.0 ft·lbf)****Wide cab over 2 ton: 9.5 N·m (95 kgf·cm, 83 in·lbf)****4. CHECK FLUID LEVEL IN RESERVOIR**

- (a) Check the fluid level, and add fluid if necessary.

Fluid: SAE J1703 or FMVSS No. 116 DOT3

BRAKE PEDAL SUB-ASSY COMPONENTS

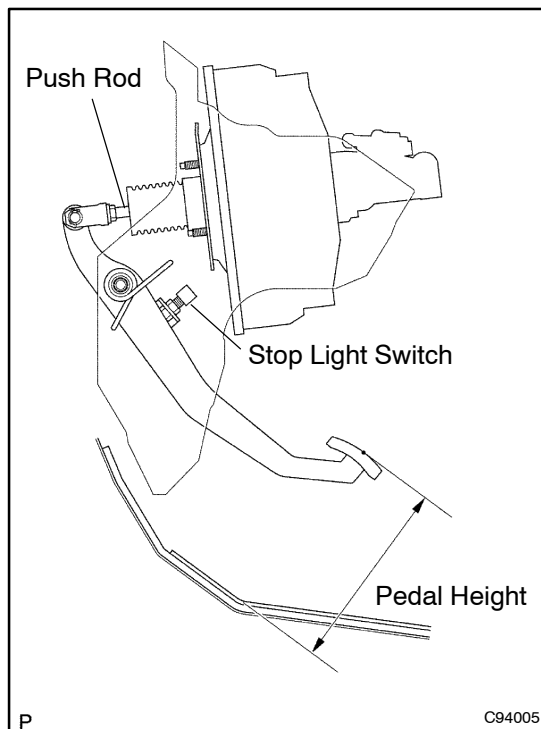
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ADJUSTMENT



1. CHECK AND ADJUST BRAKE PEDAL HEIGHT

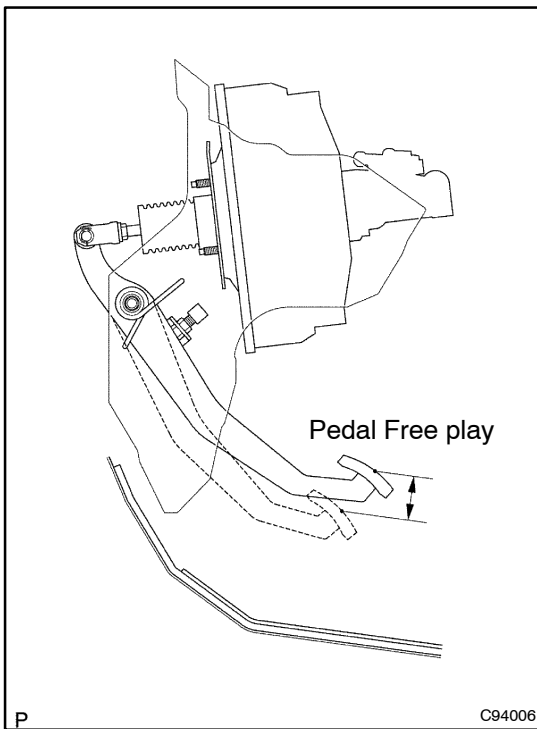
- (a) Inspect the brake pedal height.

Pedal height from polyvinyl chloride mat:

	Pedal hight from polyvinyl chloride mat	Pedal stroke (Reference)
w/o ABS	209 – 219 mm (8.23 – 8.62 in.)	155 mm (6.10 in.)
w/o ABS Oceania	209 – 219 mm (8.23 – 8.62 in.)	181 mm (7.13 in.)
w/ ABS	189 – 199 mm (7.44 – 7.83 in.)	155 mm (6.10 in.)

- (b) Adjust the brake pedal height.

- (1) Remove the instrument finish panel lower.
 - (2) Disconnect the connector from the stop light switch.
 - (3) Loosen the stop light switch lock nut, and remove the stop light switch.
 - (4) Loosen the clevis lock nut.
 - (5) Adjust the pedal height by turning the pedal push rod.
 - (6) Tighten the push rod lock nut.
- Torque: 25.5 N·m (260 kgf·cm, 19 ft·lbf)**
- (7) Install the stop light switch.
 - (8) Connect the connector to the stop light switch.
 - (9) Depress the brake pedal 5 – 15 mm (0.20 – 0.59 in.), and turn the stop light switch to lock the nut in the position where the stop light goes off.
 - (10) After the installation, depress the brake pedal 5 – 15 mm (0.20 – 0.59 in.), and then check that the stop light lights up.



2. CHECK PEDAL FREE PLAY

- Stop the engine and depress the brake pedal several times until there is no more vacuum left in the booster.
- Depress the pedal until the beginning of the resistance is felt. Then measure the pedal free play, as shown in the illustration.

Pedal free play: 1 – 3 mm (0.04 – 0.12 in.)

HINT:

Standard:

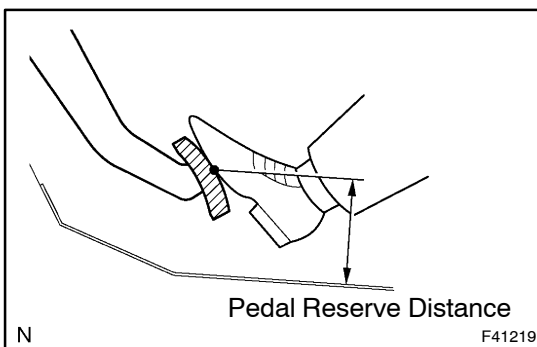
The free play to the 1st point of resistance is caused by the play between the clevis and pin. It is 1 – 3 mm (0.04 – 0.12 in.) from the pedal.

If incorrect, check the stop light switch clearance.

If the clearance is normal, then troubleshoot the brake system.

Stop light switch clearance:

0.5 – 2.4 mm (0.020 – 0.094 in.)



3. CHECK PEDAL RESERVE DISTANCE

- Release the parking brake lever.
- With the engine running, depress the brake pedal and measure the pedal reserve distance, as shown in the illustration.

Pedal reserve distance from polyvinyl chloride mat:

490 N (50 kgf, 110 lbf):

More than 30 mm (1.18 in.)

If incorrect, troubleshoot the brake system.

REPLACEMENT

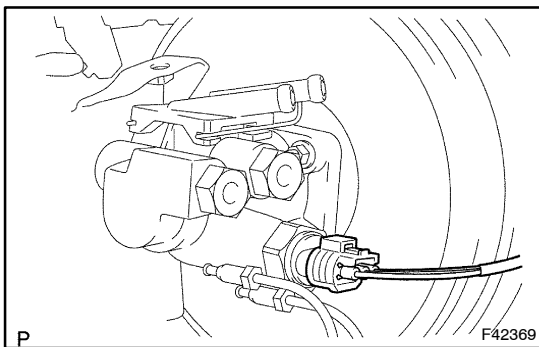
1. **REMOVE INSTRUMENT PANEL ASSY (See page 71-11, 71-17)**
2. **REMOVE BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY (See page 32-10)**
3. **REMOVE BRAKE PEDAL BRACKET ASSEMBLY (See page 32-19)**
4. **REMOVE BRAKE PEDAL SUB-ASSY**
 - (a) Remove the clip and master cylinder push rod pin.
 - (b) Remove the bolt, nut and pedal.
 - (c) Remove the torsion spring, 2 brake pedal bushes and collar from the pedal sub-assy.
 - (d) Remove the pedal pad.
5. **INSTALL BRAKE PEDAL SUB-ASSY**
 - (a) Install the pedal pad.
 - (b) Install 2 new brake pedal bushes, collar and torsion spring to the pedal.
 - (c) Install the pedal assy with the bolt and nut.
Torque: 31 N·m (310 kgf·cm, 22 ft·lbf)
 - (d) Install the master cylinder push rod pin and clip.
6. **INSTALL BRAKE PEDAL BRACKET ASSEMBLY (See page 32-19)**
7. **INSTALL BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY (See page 32-10)**
8. **INSTALL INSTRUMENT PANEL ASSY (See page 71-11, 71-17)**
9. **CHECK AND ADJUST BRAKE PEDAL HEIGHT (See page 32-7)**
10. **CHECK PEDAL FREE PLAY (See page 32-7)**
11. **CHECK PEDAL RESERVE DISTANCE (See page 32-7)**

BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY

320TT-01

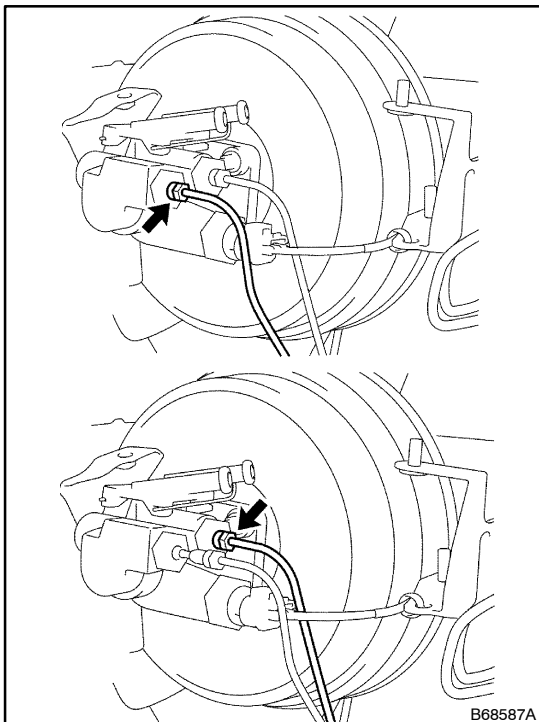
OVERHAUL

1. REMOVE OIL RESERVOIR TANK COVER LH (LHD STEERING POSITION TYPE)
2. REMOVE OIL RESERVOIR TANK COVER RH (RHD STEERING POSITION TYPE)
3. DRAIN BRAKE FLUID
4. REMOVE STEERING COLUMN ASSY (See page 50-8)
5. REMOVE INSTRUMENT CLUSTER FINISH PANEL
6. REMOVE COMBINATION METER ASSEMBLY
 - (a) Remove the 3 screws from the combination meter.
 - (b) Disconnect the 4 connectors, and remove the combination meter.

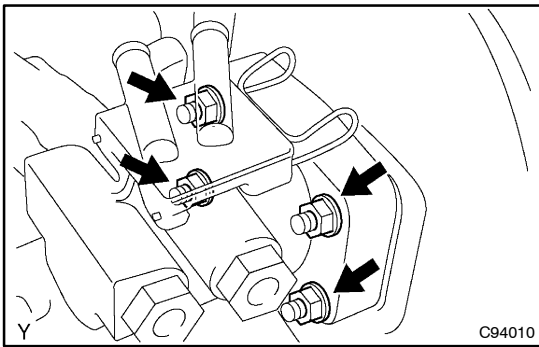


7. REMOVE BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY

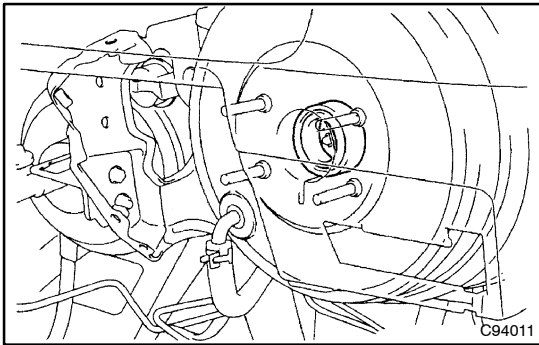
- (a) ABS Type only:
Disconnect the oil pressure sensor connector.



- (b) Using SST, disconnect the 2 brake tubes from the master cylinder.
SST 09023-00100



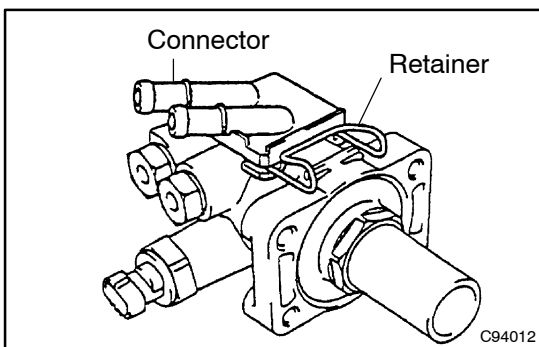
- (c) Remove the 4 nuts, and pull out the master cylinder together with brake master cylinder support.



- (d) Remove the piston seal.

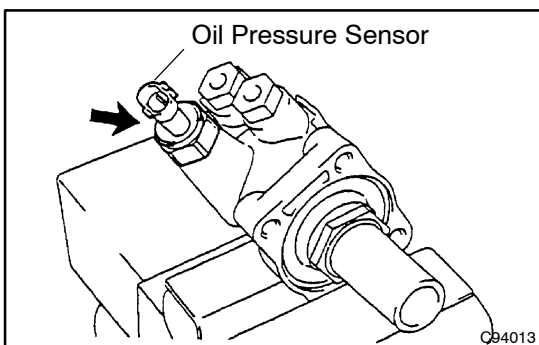
NOTICE:

Projection volume of the push rod in the brake booster can be adjusted, however, do not move the push rod when only the cup and others are replaced. If it is moved, adjustment of the projection length of the booster push rod will be necessary.



8. REMOVE BRAKE MASTER CYLINDER RESERVOIR CONNECTOR

- (a) Pull out the retainer, and remove the connector and 2 grommets.

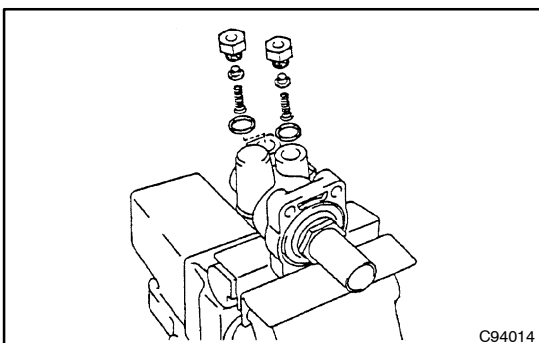


9. REMOVE OIL PRESSURE SENSOR

- (a) Carefully mount the master cylinder in a soft jaw vise.
(b) Remove the oil pressure sensor, back-up ring and O-ring.

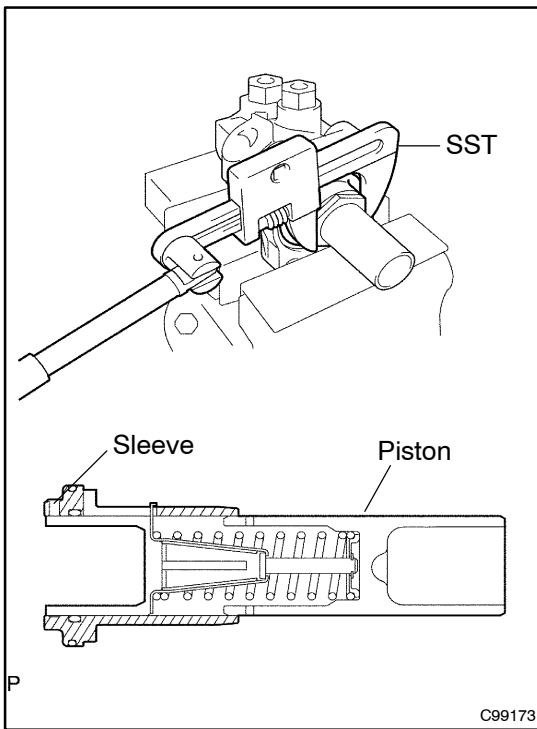
NOTICE:

Remove the oil pressure sensor only if it is faulty and it has to be replaced.



10. REMOVE MASTER CYLINDER FLUID OUTLET PLUG

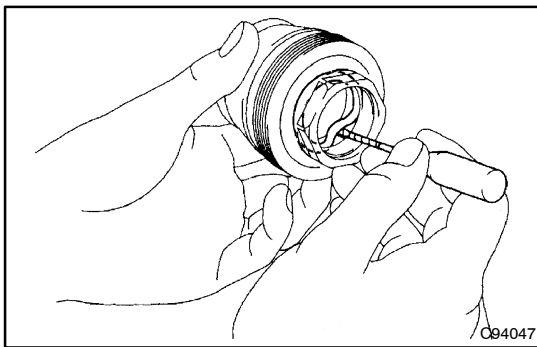
- (a) Remove the 2 plugs, 2 check valve seats, 2 springs and 2 gaskets.

**11. REMOVE BRAKE MASTER CYLINDER KIT**

- (a) Using SST, remove the cap.
- (b) Take out both the piston and sleeve as a unit from the master cylinder body, tilting the sleeve forward and backward, and right and left.

NOTICE:

- Do not take out the piston only from the master cylinder body.
- Do not damage the inside of the master cylinder body.



- (c) Using a small screwdriver, remove the secondary cup from the cap.

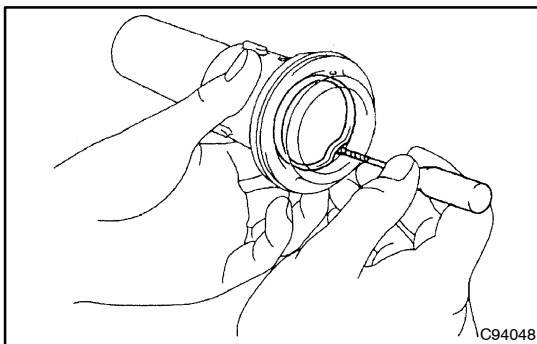
HINT:

Tape the screwdriver tip before use.

NOTICE:

Do not damage the inside of the cap.

- (d) Remove the secondary piston.



- (e) Using a small screwdriver, remove the pressure cup from the sleeve.

HINT:

Tape the screwdriver tip before use.

NOTICE:

- Do not damage the inside and outside of the sleeve.
- Do not pull the piston.

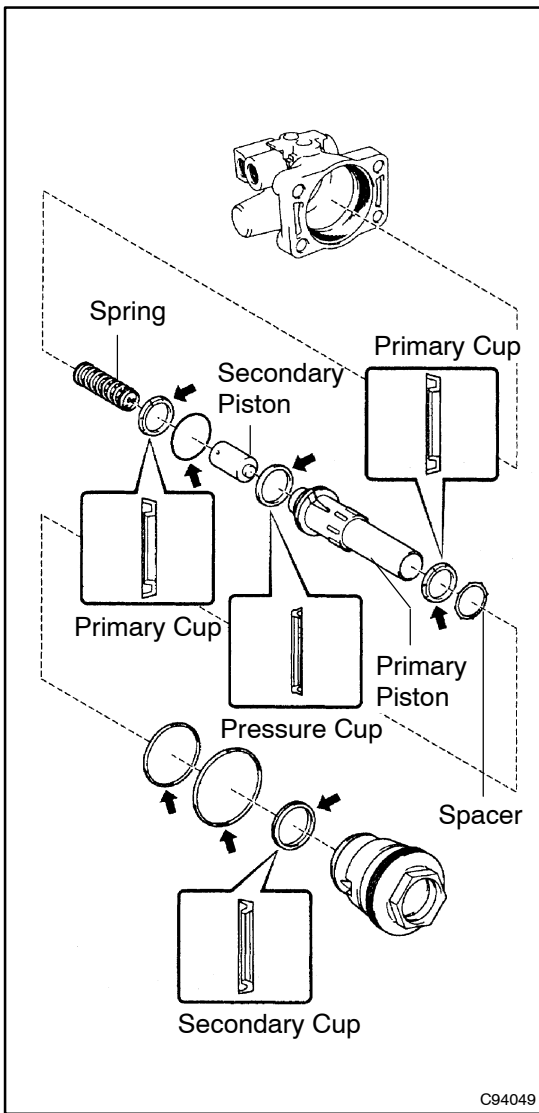
12. INSPECT BRAKE MASTER CYLINDER

- (a) Check the cylinder bore for rust or scoring.

HINT:

Clean the disassembled parts with compressed air.

If necessary, clean or replace the cylinder.



13. INSTALL BRAKE MASTER CYLINDER KIT

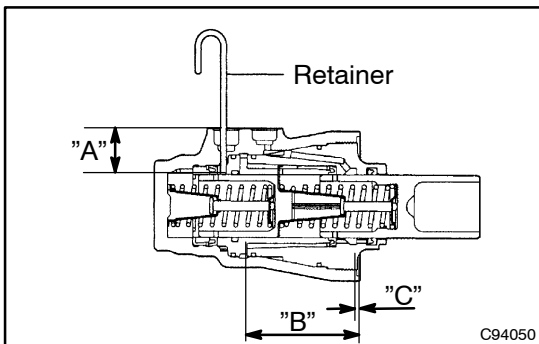
NOTICE:

Before reassembly, apply lithium soap base glycol grease to the rubber parts indicated by the arrows in the illustration.

- (a) Install the pressure cup, secondary piston and secondary cup.
- (b) Equip the secondary piston with the primary cup, and then install it into the master cylinder body (check that the cup does not turn over).
- (c) Match the primary piston with the positioning mark of the master cylinder body, and install it straightforward (at this time, securely push in the sleeve).

NOTICE:

- In order not to damage the inside of the cylinder body, be sure to match the projection with the hollow of the master cylinder body and insert it straightly.
- Be sure to check that there is a spacer.
- Check the cup and spring direction.

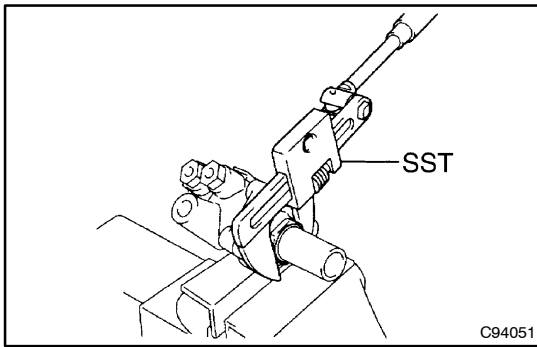


- (d) Insert the retainer for fixing the connector into the hole in order to check whether the sleeve has been securely set to the depth, and then check the dimensions "A" and "B" as shown in the illustration.

Dimension:

"A"	Front and rear drum brake w/o ABS	21.1 – 21.5 mm (0.830 – 0.846)
	Front disc brake or w/ ABS	22.7 – 23.1 mm (0.894 – 0.909 in.)
"B"		57.5 – 58.1 mm (2.264 – 2.287 in.)

- (e) Check that there is nothing attached in the screw groove.



- (f) Using SST, tighten the cap with the retainer inserted into the hole.

Torque:

7.8 N·m (80 kgf·cm, 69 in·lbf) for use with SST

11.8 N·m (120 kgf·cm, 8.68 ft·lbf)

HINT:

Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).

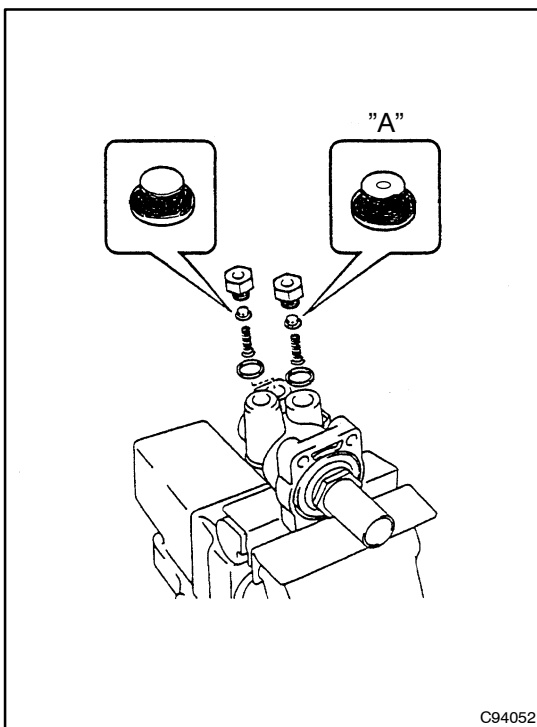
- (g) Check dimension "C" after tightening the cap.

Dimension "C": 1.23 - 1.97 mm (0.0484 - 0.0776 in.)

- (h) Pull out the retainer from the hole, and insert the 2 grommets into the connector. Then install it to the body, and fix the connector with the retainer.

NOTICE:

Take care for the retainer installation direction.



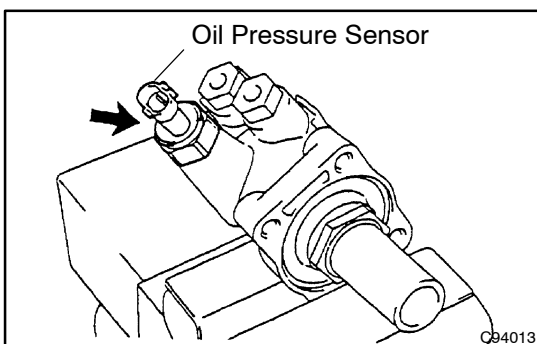
14. INSTALL MASTER CYLINDER FLUID OUTLET PLUG

- (a) Install the 2 gaskets, 2 springs, 2 check valve seats and 2 plugs.

Torque: 64 N·m (630 kgf·cm, 46 ft·lbf)

NOTICE:

For vehicles with the front disc brake, use the valve seat with a hole in the upper part as in "A"; otherwise, brake drag will result.



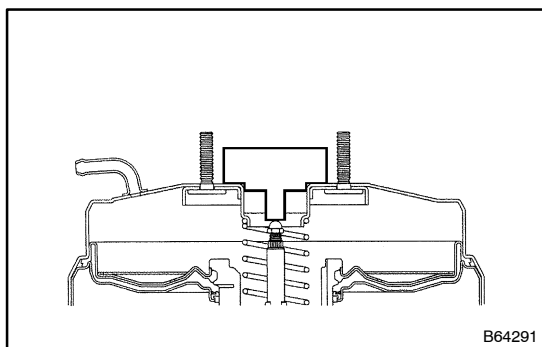
15. INSTALL OIL PRESSURE SENSOR

- (a) w/ ABS system equipped model:

Install a new O-ring, back-up ring and oil pressure sensor.

Torque: 64 N·m (630 kgf·cm, 46 ft·lbf)

16. INSTALL BRAKE MASTER CYLINDER RESERVOIR CONNECTOR



17. INSPECT AND ADJUST BRAKE BOOSTER PUSH ROD

- (a) Apply chalk to the tip of the accessory tool belonging to the supply master cylinder subassembly.
- (b) Attach the accessory tool to the brake booster and check the gap between the accessory tool and the push rod.

Clearance: 0 mm (0 in.)

NOTICE:

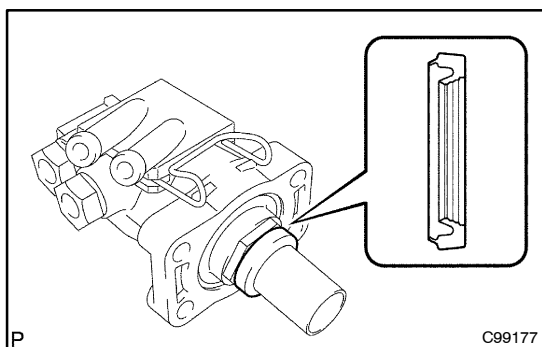
When there is a gap between the accessory tool and the booster shell (when the accessory tool has no contact), the gap is judged as too small, and when no chalk becomes attached to the tip of the push rod, the gap is judged as too large, and gap adjustment is performed.

18. ADJUST BRAKE BOOSTER PUSH ROD

- (a) When the standard is not met, depress the brake pedal and adjust the length of the push rod with the booster push rod in extended condition.

NOTICE:

Perform adjustment when no negative pressure is applied to the booster. (Depress the brake pedal several times with the engine stopped to get rid of the negative pressure of the booster).

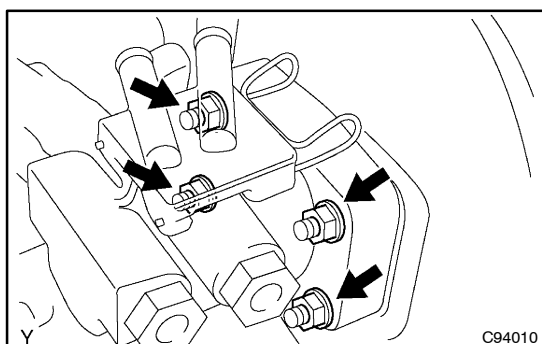


19. INSTALL BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY

- (a) Install the seal, which has been removed from the brake booster, to the master cylinder.

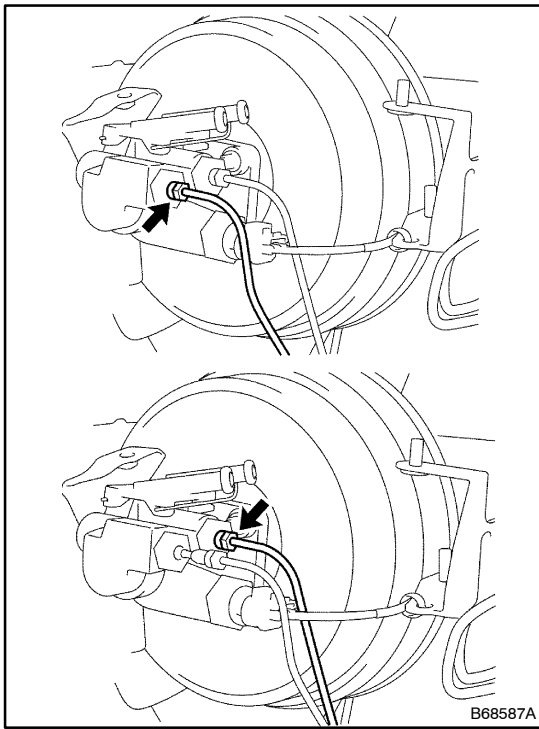
NOTICE:

If the master cylinder is installed with the seal on the booster, the seal might come off. To prevent this, attach the seal should be attached onto the master cylinder first, and then install the master cylinder to the booster finally.



- (b) Install the master cylinder, which is equipped with the brake master cylinder support, with the 4 nuts.

Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)



- (c) Using SST, connect the 2 brake lines to the master cylinder.
SST 09023-00100
Torque:
12.9 N·m (131 kgf·cm, 9.4 ft·lbf) for use with SST
15 N·m (155 kgf·cm, 11 ft·lbf)
- (d) Disconnect the oil pressure sensor connector.

20. INSTALL COMBINATION METER ASSEMBLY

- (a) Connect the 4 connectors and install the combination meter.
(b) Install the 3 screws to the combination meter.

21. INSTALL INSTRUMENT CLUSTER FINISH PANEL

22. INSTALL STEERING COLUMN ASSY (See page 50-8)

23. FILL RESERVOIR WITH BRAKE FLUID (See page 32-4)

24. BLEED MASTER CYLINDER (See page 32-4)

25. BLEED BRAKE LINE (See page 32-4)

26. CHECK FLUID LEVEL IN RESERVOIR

27. INSTALL OIL RESERVOIR TANK COVER LH (LHD STEERING POSITION TYPE)

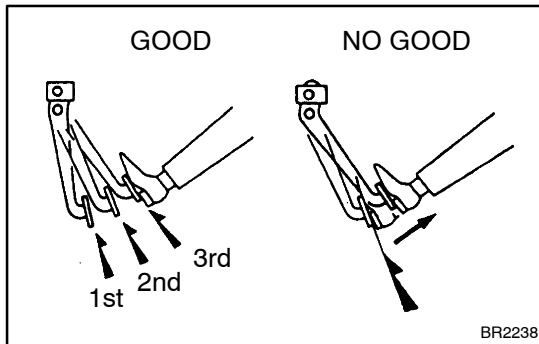
28. INSTALL OIL RESERVOIR TANK COVER RH (RHD STEERING POSITION TYPE)

29. CHECK BRAKE FLUID LEAKAGE

BRAKE BOOSTER ASSY

ON-VEHICLE INSPECTION

320TU-01



1. INSPECT BRAKE BOOSTER

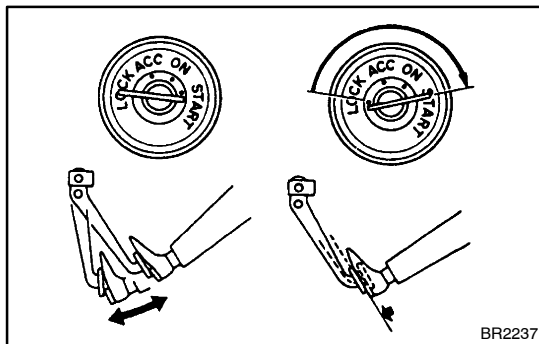
(a) Check the air tightness.

- (1) Start the engine and stop it after 1 or 2 minutes, and then slowly depress the brake pedal several times.

When the pedal goes down more the furthest in the 1st time but gradually rises after the 2nd or 3rd time, air in the booster is tight.

- (2) Depress the brake pedal while the engine is running, and stop the engine with the pedal depressed.

If there is no difference in the pedal reserve distance after holding the pedal for 30 seconds, the booster is airtight.



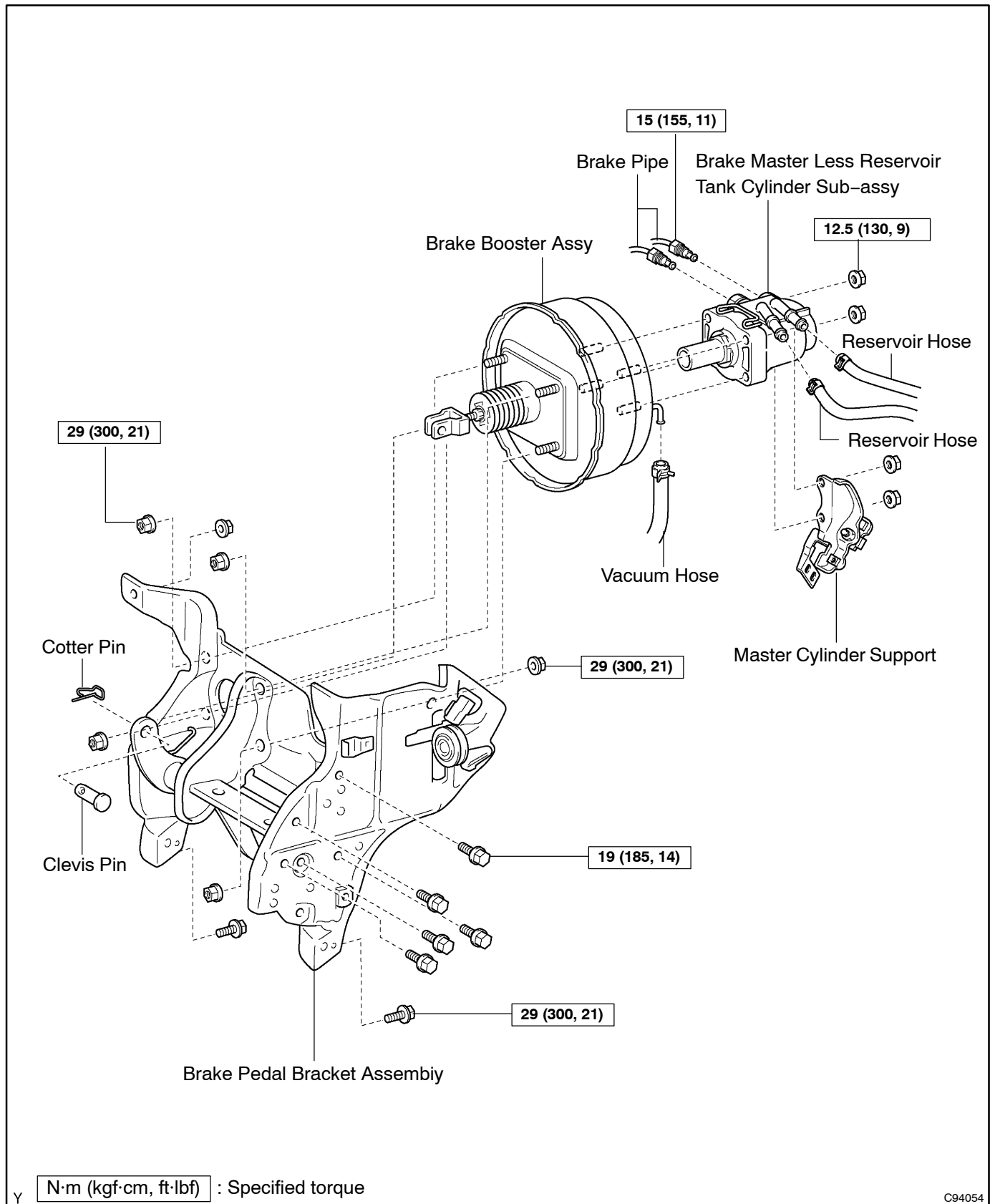
(b) Check the operation of the brake pedal.

- (1) Depress the brake pedal several times with the ignition switch OFF, and check that there is no difference in the pedal reserve distance.

- (2) Depress the brake pedal and start the engine.

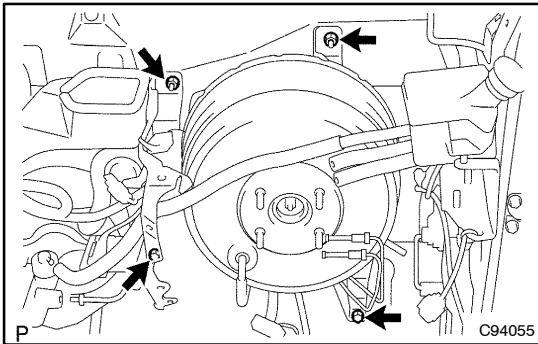
If the pedal goes down slightly, the operation is normal.

COMPONENTS

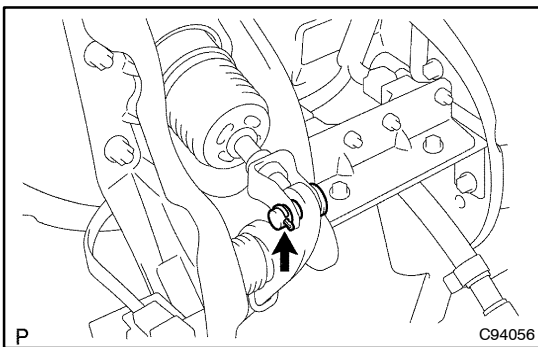


REPLACEMENT

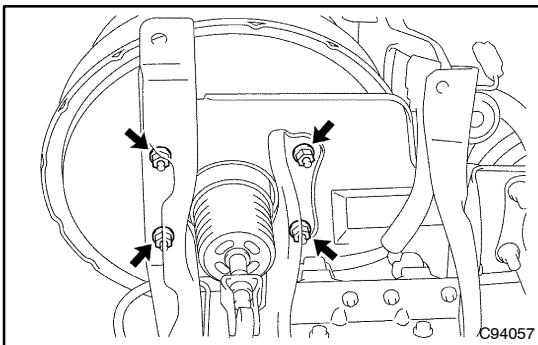
1. REMOVE INSTRUMENT PANEL ASSY (See page 71-11, 71-17)
2. REMOVE BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY
(See page 32-10)



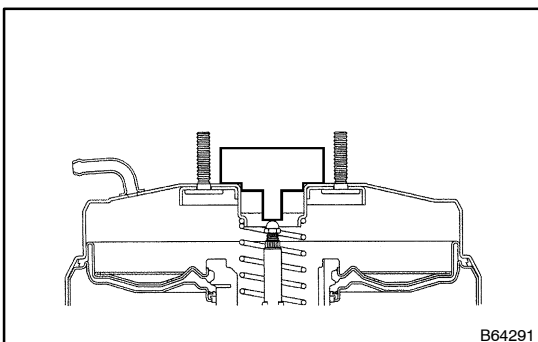
3. REMOVE BRAKE PEDAL BRACKET ASSEMBLY
 - (a) Disconnect the vacuum hose, and remove the 2 nuts and 2 bolts.
 - (b) Remove the pedal bracket together with the brake booster assembly.



4. REMOVE BRAKE BOOSTER ASSY
 - (a) Remove the cotter pin and clevis pin.
 - (b) Remove the vacuum hose.



- (c) Remove the 4 nuts and pull out the brake booster.



5. INSPECT BRAKE BOOSTER PUSH ROD
 - (a) Apply chalk to the tip of the accessory tool belonging to the supply master cylinder sub-assy.
 - (b) Attach the accessory tool to the brake booster and check the clearance between the accessory tool and the push rod.

Clearance: 0 mm (0 in.)

NOTICE:

When there is a clearance between the accessory tool and the booster shell (when the accessory tool has no contact), the clearance is too small, and when no chalk is attached to the tip of the push rod, the clearance is too large. In the case, adjust the clearance.

6. ADJUST BRAKE BOOSTER PUSH ROD

- (a) When the clearance between the accessory tool and the push rod is not 0, depress the brake pedal and adjust the length of the push rod with the booster push rod in extended condition.

NOTICE:

Perform the adjustment when no negative pressure is applied to the booster. (Depress the brake pedal several times with the engine stopped so that no negative pressure will be in the booster).

7. INSTALL BRAKE BOOSTER ASSY

- (a) Install the brake booster with the 4 nuts.

Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)

- (b) Install the vacuum hose.
(c) Install the clevis pin to the clevis through the brake pedal.
(d) Secure the clevis pin with a new cotter pin.

8. INSTALL BRAKE PEDAL BRACKET ASSEMBLY

- (a) Install the pedal bracket to the brake booster.
(b) With the 2 nuts and 2 bolts.

Torque: 29 N·m (300 kgf·cm, 21 ft·lbf)

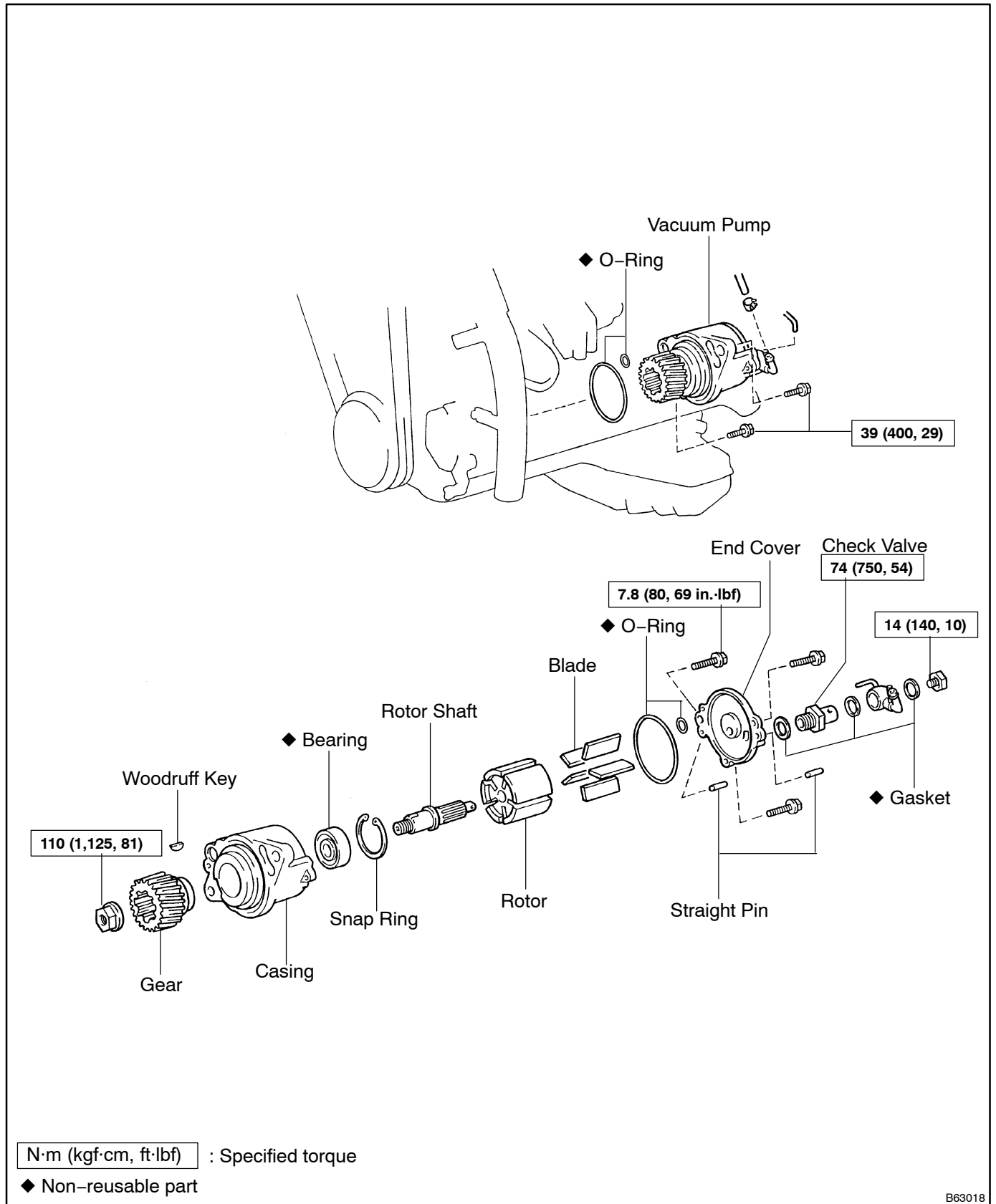
- (c) Connect the vacuum hose.

9. INSTALL BRAKE MASTER LESS RESERVOIR TANK CYLINDER SUB-ASSY (See page 32-10)**10. INSTALL INSTRUMENT PANEL ASSY (See page 71-11, 71-17)****11. CHECK AND ADJUST BRAKE PEDAL HEIGHT (See page 32-7)****12. CHECK PEDAL FREE PLAY (See page 32-7)****13. CHECK PEDAL RESERVE DISTANCE (See page 32-7)**

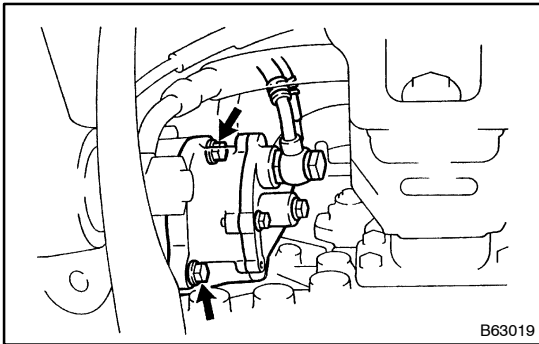
VACUUM PUMP ASSY (14B, 15B-FTE)

COMPONENTS

320TX-01

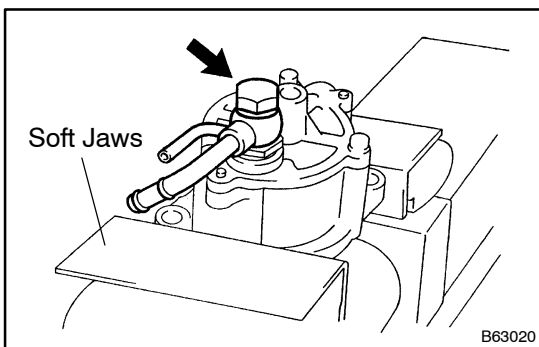


OVERHAUL



1. REMOVE VACUUM PUMP ASSY

- (a) Disconnect the 2 vacuum hoses from the vacuum pump.
- (b) Remove the 2 bolts and pump from the engine.
- (c) Remove the 2 O-rings.



2. REMOVE VACUUM PUMP UNION

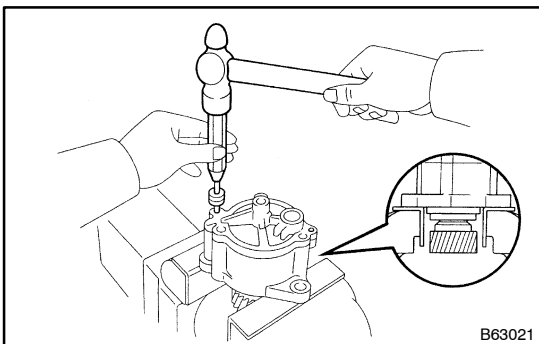
- (a) Place the vacuum pump on a vise, as shown in the illustration.
- (b) Remove the union bolt, union and 2 gaskets.

NOTICE:

Do not tighten the vise too tightly.

3. REMOVE CHECK VALVE

- (a) Remove the check valve and gasket.



4. REMOVE END COVER

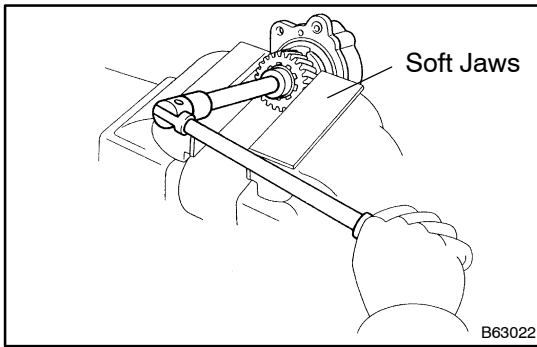
- (a) Remove the 3 bolts.
- (b) Place the vacuum pump on a vise, as shown in the illustration.

NOTICE:

Do not tighten the vice.

- (c) Using a pin punch and a hammer, tap out the 2 straight pins.
- (d) Remove the end cover and 2 O-rings.

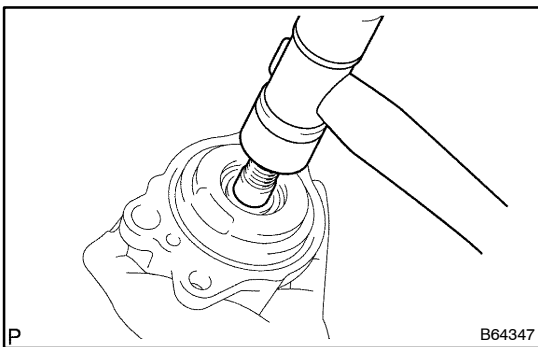
5. REMOVE VACUUM PUMP BLADE A

**6. REMOVE VACUUM PUMP GEAR**

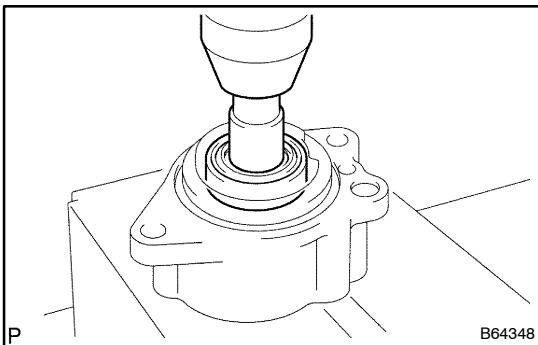
- (a) Using soft jaws on a vise, clamp the gear in the vise.
- (b) Remove the gear lock nut.
- (c) Remove the gear and woodruff key.

7. REMOVE SNAP RING

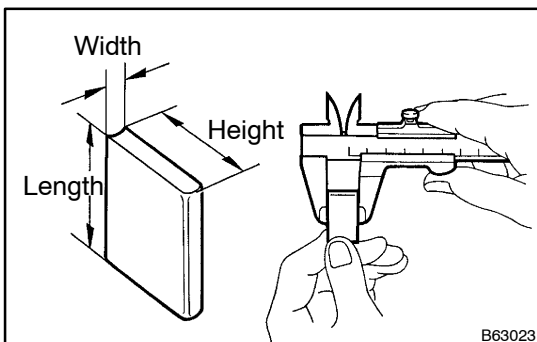
- (a) Using snap ring pliers, remove the snap ring.

**8. REMOVE SHAFT**

- (a) Using a plastic hammer, tap out the rotor shaft.

**9. REMOVE BALL BEARING**

- (a) Using a press and 17 mm socket, press out the bearing.

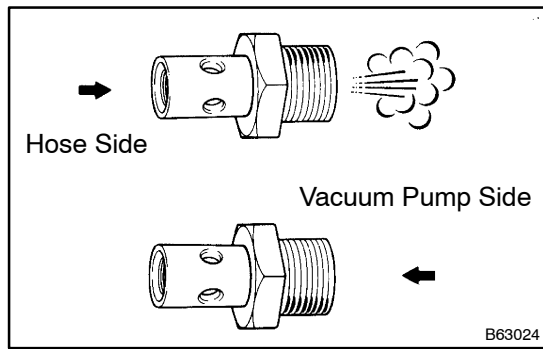
**10. INSPECT VACUUM PUMP BLADE A**

- (a) Check the blades for wear or damage.
- (b) Using vernier calipers, measure the dimensions of the blades.

Minimum length:

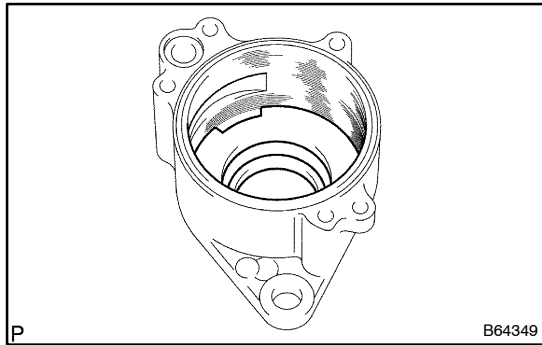
Minimum Height	16.50 mm (0.6496 in.)
Minimum Width	5.95 mm (0.2343 in.)
Minimum Length	44.60 mm (1.7559 in.)

If necessary, replace the blade.

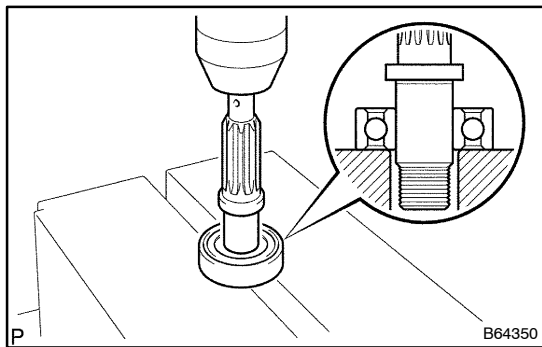
**11. INSPECT CHECK VALVE**

- (a) Check that air flows from the hose side to the pump side.
- (b) Check that air does not flow from the pump side to the hose side.

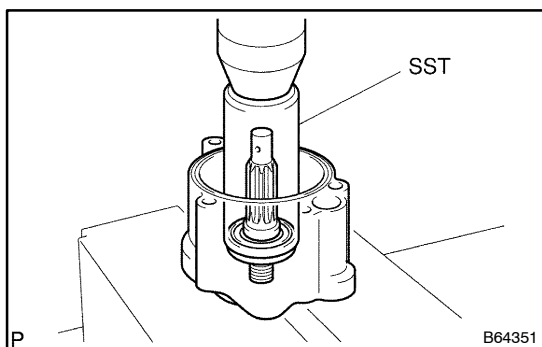
If necessary, replace the check valve.

**12. INSPECT VACUUM PUMP CASE**

- (a) Inspect the inside surface on the casing for scoring.
- If necessary, replace the vacuum pump assembly.

**13. INSTALL BALL BEARING**

- (a) Using a press, press in a new bearing to the rotor shaft.

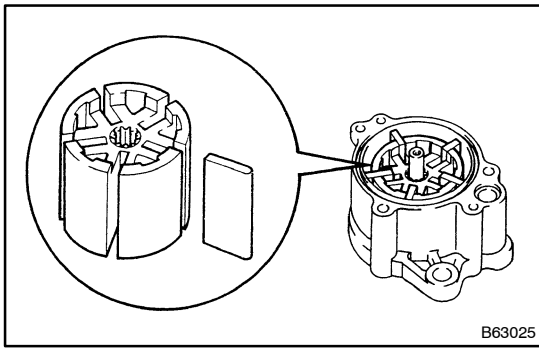
**14. INSTALL SHAFT**

- (a) Using SST and press, press in the rotor shaft to the casing.

SST 09608-04031

15. INSTALL SNAP RING

- (a) Using snap ring pliers, install the snap ring.

**16. INSTALL VACUUM PUMP ROTOR SUB-ASSY**

- (a) Apply engine oil to the rotor and install it to the rotor shaft.

17. INSTALL VACUUM PUMP BLADE A

- (a) Apply engine oil to the blades.
 (b) Install the 5 blades with the round end facing outward.
 (c) Make sure that the blades and rotor surfaces are even.

18. INSTALL END COVER

- (a) Place the vacuum pump on a vise.

NOTICE:

Do not tighten the vise.

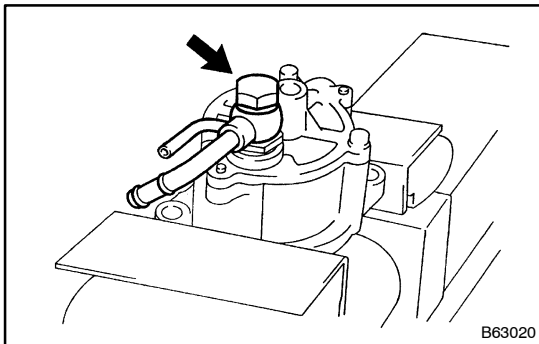
- (b) Install 2 new O-rings.
 (c) Install the end cover in place and temporarily install the 3 bolts.
 (d) Using a pin punch and hammer, tap in the 2 straight pins.
 (e) Tighten the 3 bolts.

Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)

19. INSTALL CHECK VALVE

- (a) Install the check valve with a new gasket.

Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)

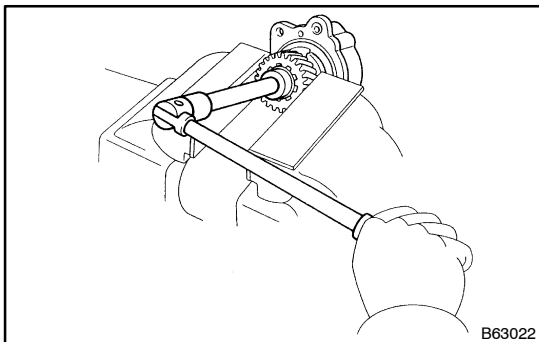
**20. INSTALL VACUUM PUMP UNION**

- (a) Install the vacuum hose union with 2 new gaskets, and install and torque the union bolt.

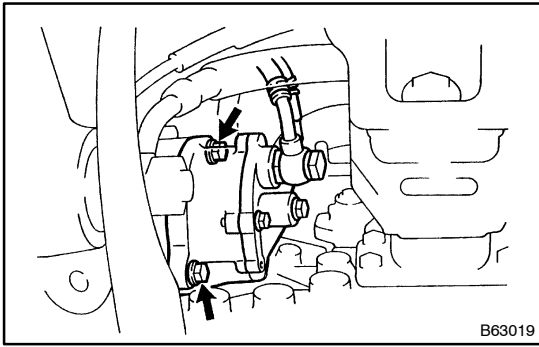
Torque: 14 N·m (140 kgf·cm, 10 ft·lbf)

HINT:

Align and insert the union pin into the matching hole of the casing.

**21. INSTALL VACUUM PUMP GEAR**

- (a) Temporarily install the woodruff key, gear and lock nut to the pump.
 (b) Using soft jaws on a vise, mount the gear in the vise.
 (c) Tighten the gear lock nut.

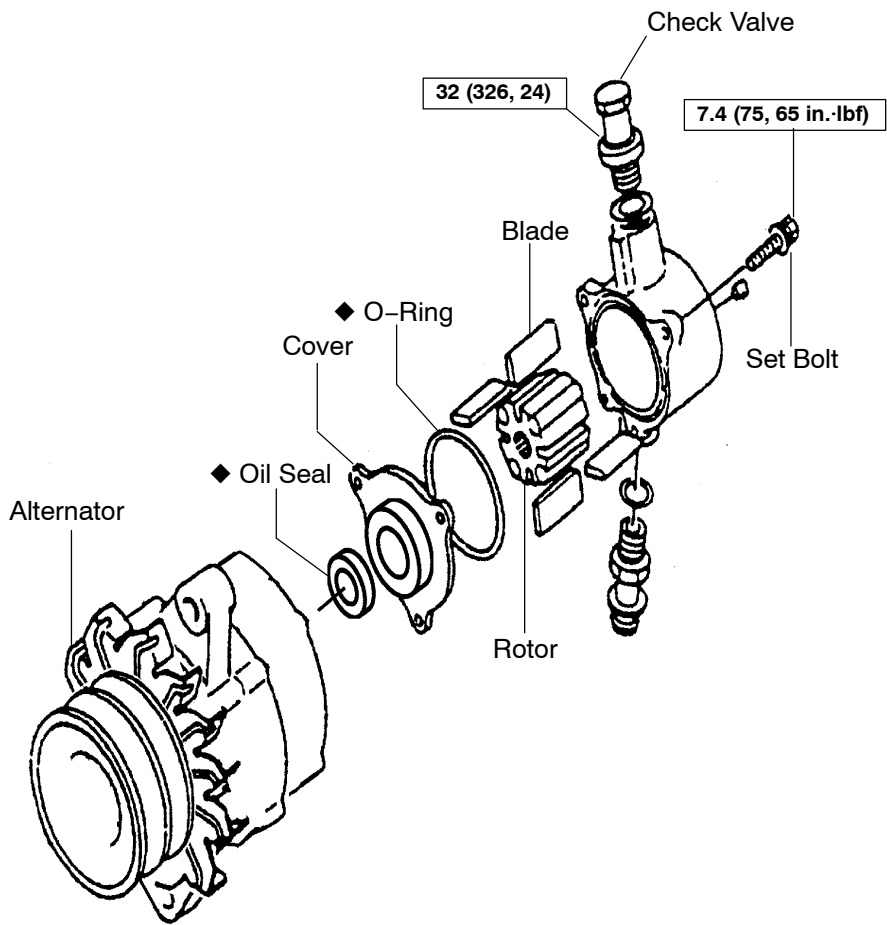
**22. INSTALL VACUUM PUMP ASSY**

- (a) Install the 2 O-rings.
- (b) Install the vacuum pump with the 2 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
- (c) Connect the 2 vacuum hoses to the vacuum pump.

VACUUM PUMP ASSY (W04D-J)

COMPONENTS

320TZ-01



N·m (kgf·cm, ft·lbf) : Specified torque

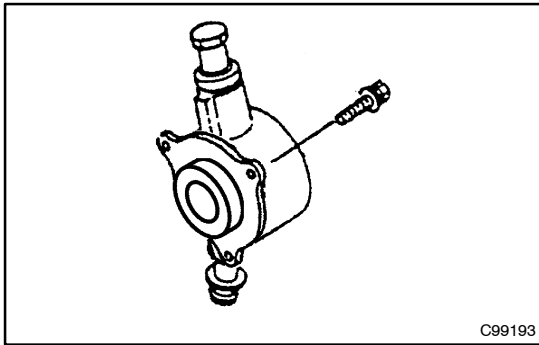
◆ Non-reusable part

C99192

OVERHAUL

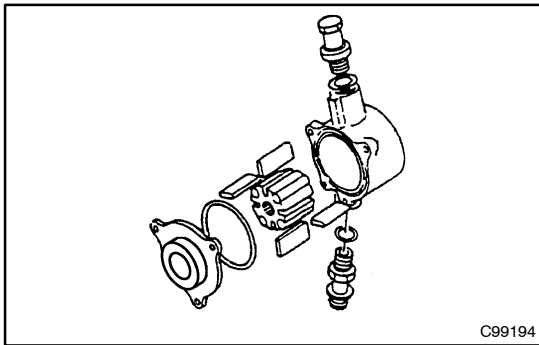
1. REMOVE GENERATOR W/ VACUUM PUMP ASSY

- (a) Disconnect the negative (-) terminal of the battery.
- (b) Disconnect the +B terminal and electrical wiring harness connector.
- (c) Remove the clip and disconnect the vacuum hose.
- (d) Remove the vacuum pump together with the generator.



2. REMOVE VACUUM PUMP ASSY

- (a) Remove the 3 pump set bolts.
- (b) Remove the vacuum pump from the alternator.

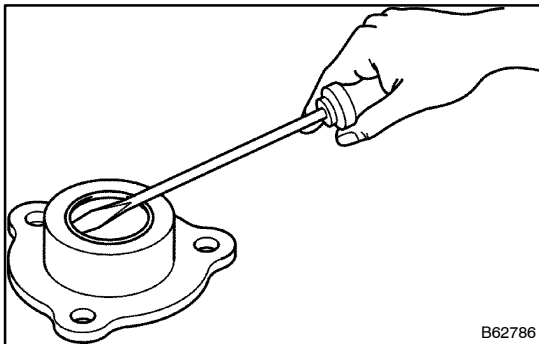


3. REMOVE VACUUM PUMP BLADE A

- (a) Remove the cover.
- (b) Remove the rotor, blade A and O-ring.

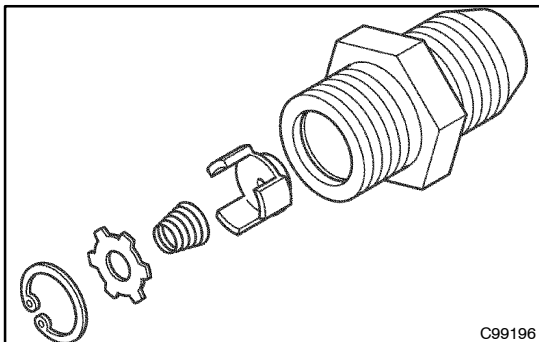
NOTICE:

Do not tighten a vise.



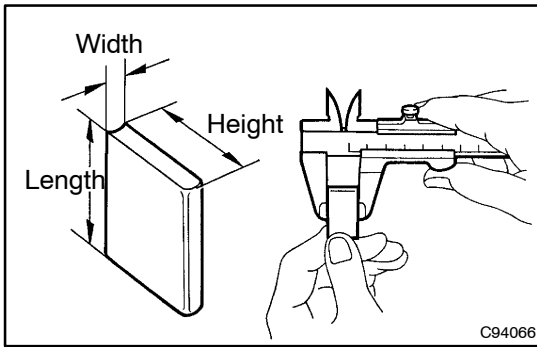
4. REMOVE OIL SEAL

- (a) Using a screwdriver, pry out the oil seal.



5. REMOVE CHECK VALVE SUB-ASSY

- (a) Using snap ring pliers, remove the check valve.

**6. INSPECT VACUUM PUMP BLADE A**

- (a) Check the blades for wear or damage.
- (b) Using a vernier calipers, measure the dimensions of the blades.

Minimum Dimension:

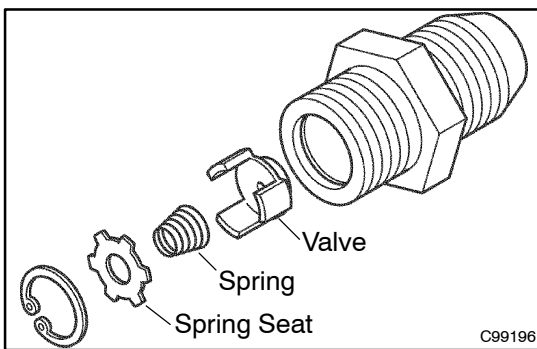
Minimum Height	14.8 mm (0.583 in.)
Minimum Width	4.8 mm (0.189 in.)
Minimum Length	38.9 mm (1.531 in.)

If necessary, replace the blade.

7. INSPECT VACUUM PUMP CASE

- (a) Inspect the inside surface on the case for scoring.

If necessary, replace the vacuum pump assembly.

**8. INSPECT CHECK VALVE SUB-ASSY**

- (a) Check the valve, spring seat and spring for damage.

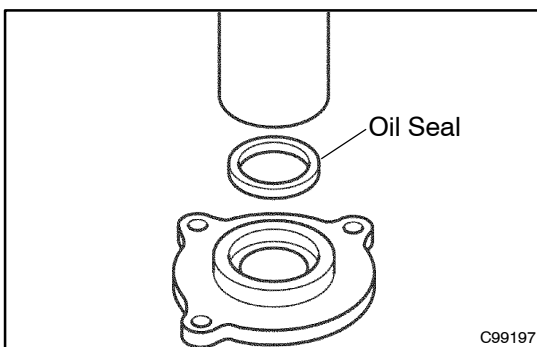
If necessary, replace it.

9. INSTALL CHECK VALVE SUB-ASSY

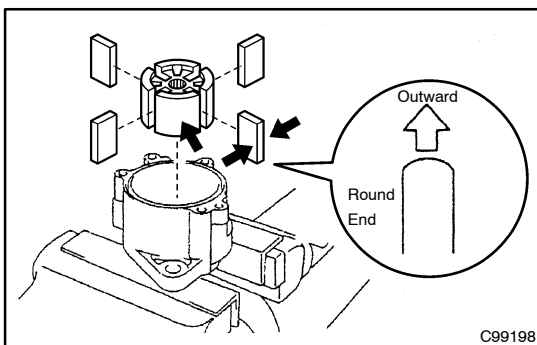
- (a) Using snap ring pliers, install the check valve.

HINT:

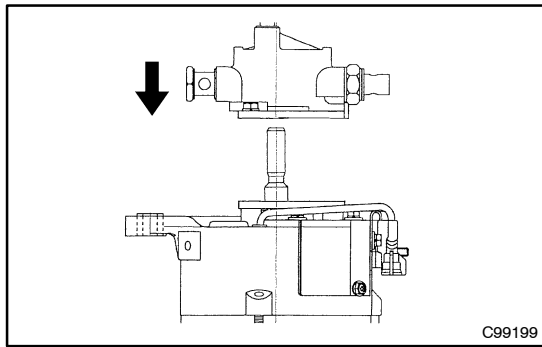
Check the spring inserting direction, as shown in the illustration, and inspect the check valve.

**10. INSTALL OIL SEAL**

- (a) Using a suitable tool, press in the oil seal to the cover.

**11. INSTALL VACUUM PUMP BLADE A**

- (a) Apply engine oil to the rotor blades.
- (b) Install the rotor into the housing.
- (c) Install the blades with the round end facing outward.



12. INSTALL VACUUM PUMP ASSY

- (a) Put the O-ring in the cover, and install the vacuum pump.
- (b) Stand the generator, and install the vacuum pump to the alternator rotor shaft.
- (c) Tighten the set bolts.

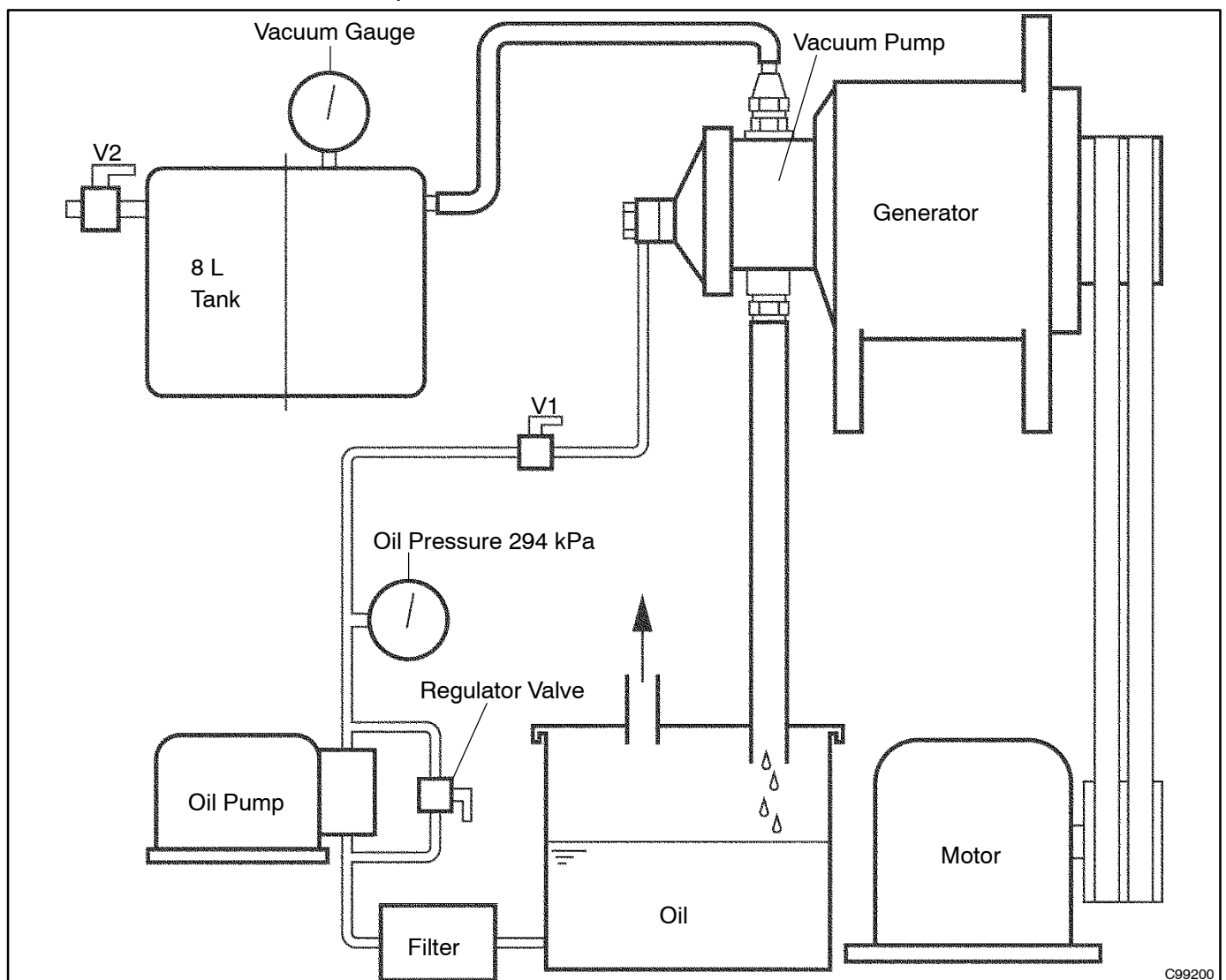
Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)

- (d) Install the check valve.

Torque: 32 N·m (326 kgf·cm, 24 ft·lbf)

13. INSPECT VACUUM PUMP ASSY

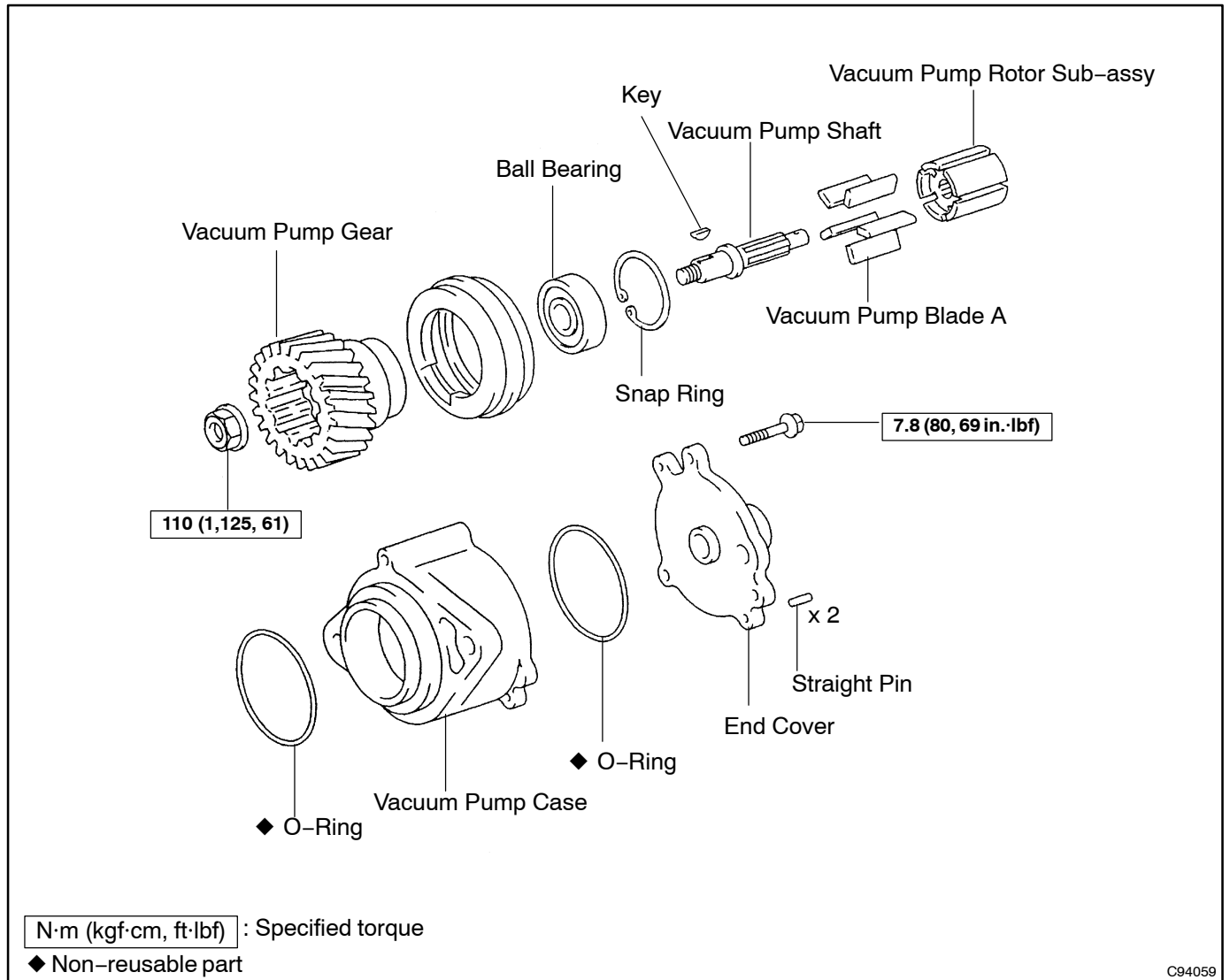
- (a) Set the vacuum pump to the bench tester, as shown below.
- (b) Open valve V1, leaving valve V2 open.
 - (1) With the vacuum pump running steady at 1000 rpm, close valve while measuring the time. Measure the time until the pressure reaches 294 kPa.



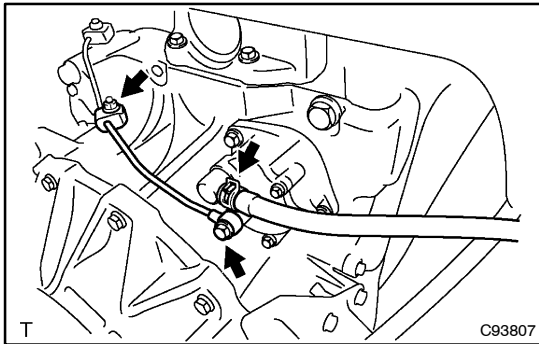
14. INSTALL GENERATOR W/ VACUUM PUMP ASSY

VACUUM PUMP ASSY (S05C-B, S05C-TA, S05C-TB) COMPONENTS

320U1-01

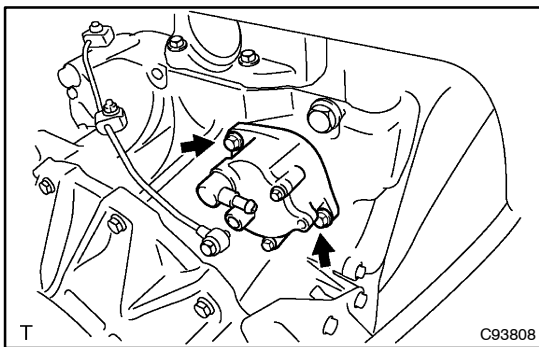


OVERHAUL

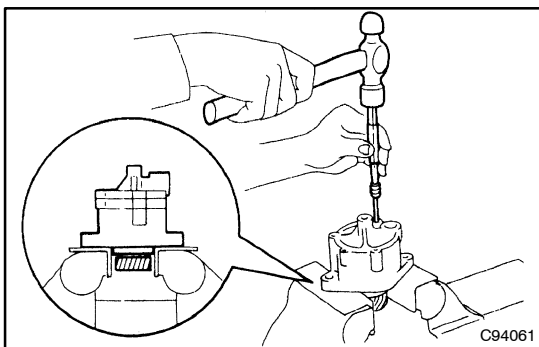


1. REMOVE VACUUM PUMP ASSY

- (a) Remove the clip and disconnect the vacuum hose.
- (b) Remove the bolt and clip for tube.
- (c) Remove the union bolt and gasket, and disconnect the union tube.



- (d) Remove the 2 bolts and pump from the engine.
- (e) Remove the O-ring.



2. REMOVE END COVER

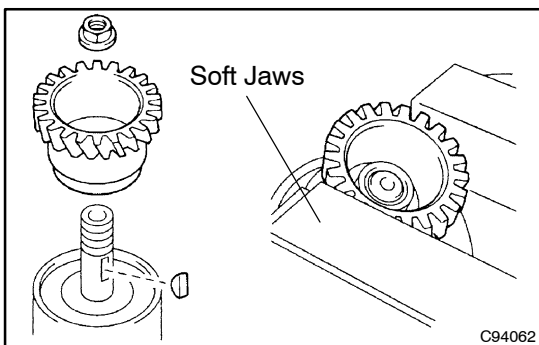
- (a) Place the vacuum pump on a vise.
- (b) Remove the 3 bolts.
- (c) Using a pin punch and hammer, tap out the 2 straight pins.
- (d) Remove the end cover and O-ring.

NOTICE:

Do not tighten the vise.

3. REMOVE VACUUM PUMP ROTOR SUB-ASSY

4. REMOVE VACUUM PUMP BLADE A

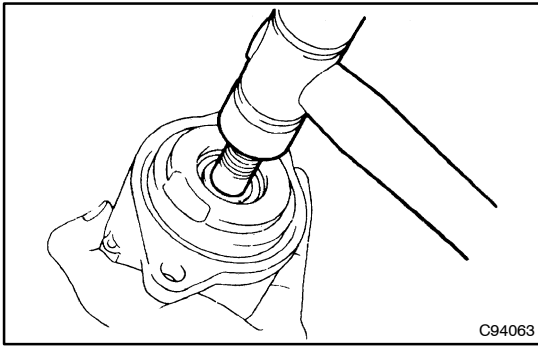


5. REMOVE VACUUM PUMP GEAR

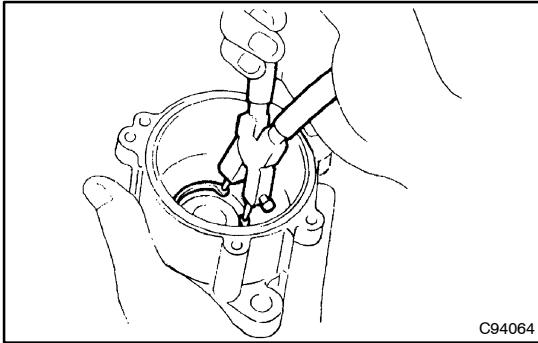
- (a) Using soft jaws on a vise, clamp the gear in the vise
- (b) Remove the gear lock nut.
- (c) Remove the gear and key.

NOTICE:

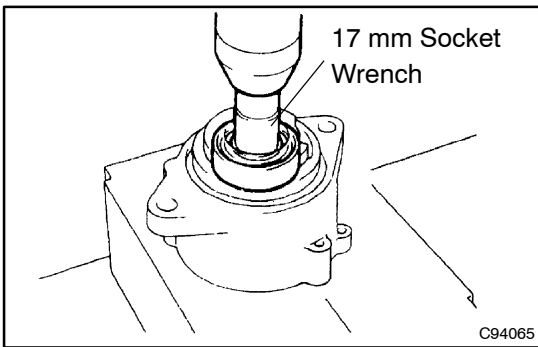
Do not tighten the vise.

**6. REMOVE VACUUM PUMP SHAFT**

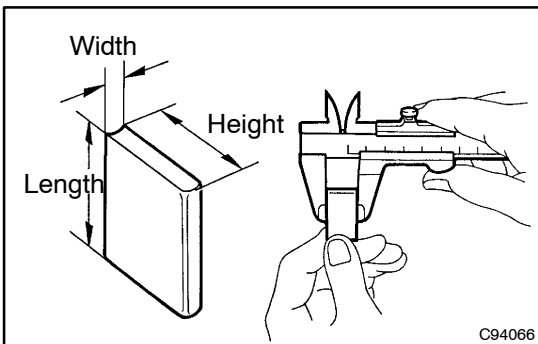
- (a) Using a plastic hammer, tap out the pump shaft.



- (b) Using snap ring pliers, remove the snap ring.

**7. REMOVE BALL BEARING**

- (a) Using a press and 17 mm socket wrench, press out the bearing.

**8. INSPECT VACUUM PUMP BLADE A**

- (a) Check the blades for wear or damage.
 (b) Using a vernier calipers, measure the dimensions of the blades.

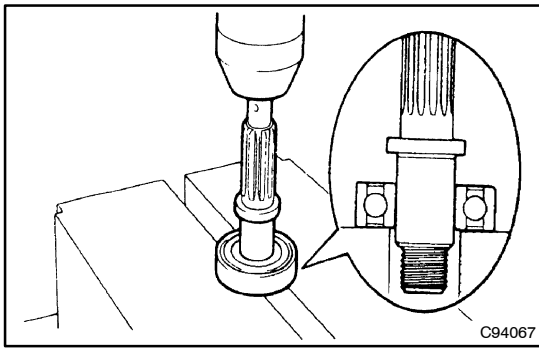
Minimum dimension:

Minimum Height	16.50 mm (0.6496 in.)
Minimum Width	5.95 mm (0.2343 in.)
Minimum Length	44.96 mm (1.7701 in.)

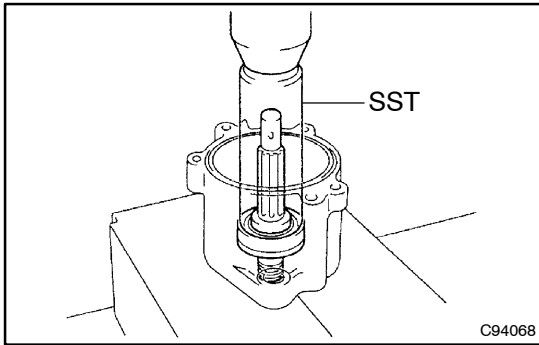
If necessary, replace the blade.

9. INSPECT VACUUM PUMP CASE

- (a) Inspect the inside surface on the case for scoring.
 If necessary, replace the vacuum pump assembly.

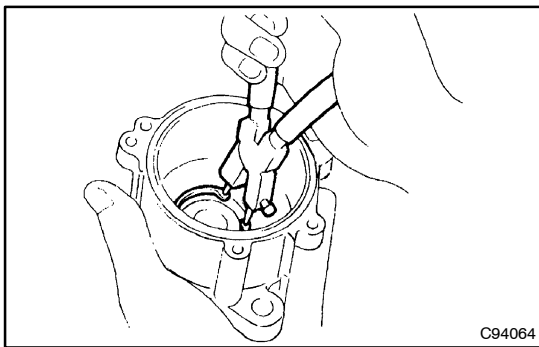
**10. INSTALL BALL BEARING**

- (a) Using a press, press in a new bearing to the pump shaft.

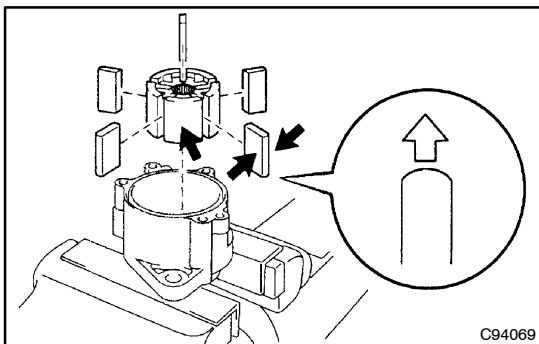
**11. INSTALL VACUUM PUMP SHAFT**

- (a) Using SST and a press, press in the pump shaft to the case.

SST 09608-04031



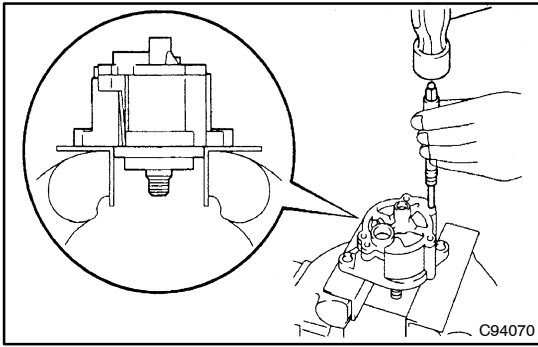
- (b) Using snap ring pliers, install the snap ring.

**12. INSTALL VACUUM PUMP ROTOR SUB-ASSY**

- (a) Apply engine oil to the rotor, and install it to the rotor shaft.

13. INSTALL VACUUM PUMP BLADE A

- (a) Apply engine oil to the blades.
 (b) Install the 5 blades with the round end facing outward.
 (c) Make sure that the blades and rotor surface are even.

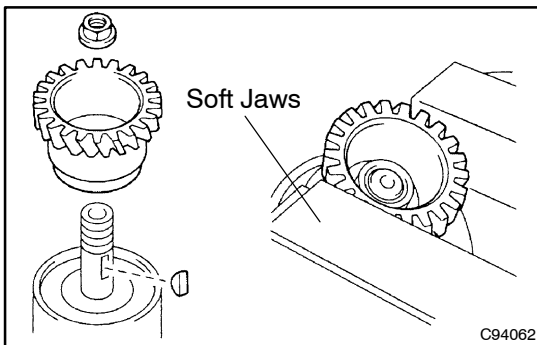
**14. INSTALL END COVER**

- (a) Place the vacuum pump on a vise.
- (b) Install a new O-ring.
- (c) Install the end cover in place, and temporarily install the 3 bolts.
- (d) Using a pin punch and hammer, tap in the 2 straight pins.
- (e) Tighten the 3 bolts.

Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)

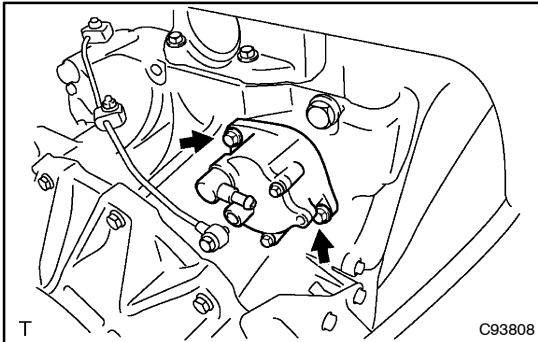
NOTICE:

Do not tighten the vise.

**15. INSTALL VACUUM PUMP GEAR**

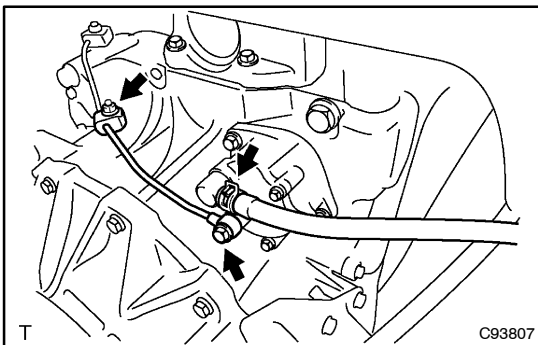
- (a) Temporarily install the key, gear and lock nut to the pump.
- (b) Using soft jaws on a vise, clamp the gear in the vise.
- (c) Tighten the gear lock nut.

Torque: 110 N·m (1,125 kgf·cm, 81 ft·lbf)

**16. INSTALL VACUUM PUMP ASSY**

- (a) Install a new O-ring to the pump.
- (b) Install the pump to the engine with the 2 bolts.

Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)



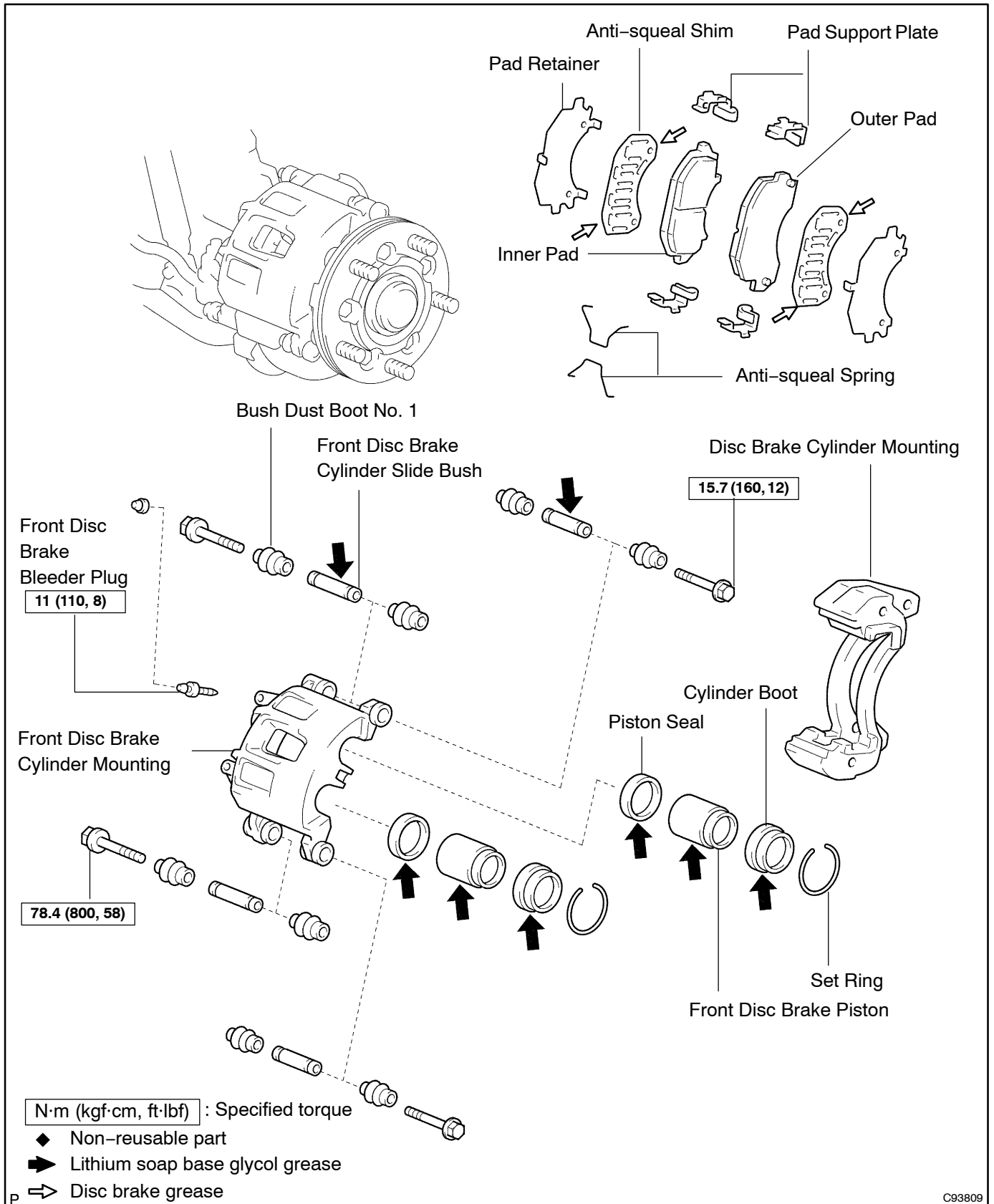
- (c) Install the union bolt and a new gasket, and then connect the union tube.

Torque: 13.7 N·m (140 kgf·cm, 10 ft·lbf)

- (d) Install the bolt and clip to the tube.
- (e) Install the clip and connect the vacuum hose.

FRONT DISC BRAKE COMPONENTS

320U3-01



OVERHAUL

1. REMOVE FRONT WHEEL
2. DRAIN BRAKE FLUID
3. REMOVE FRONT DISC BRAKE CYLINDER SUB-ASSY

(a) Remove the union bolt and gasket from the caliper, then disconnect the flexible hose from the caliper.

HINT:

Use a container to catch the brake fluid ,because it drains out.

(b) Remove the 4 bolts and caliper.

4. REMOVE FRONT DISC BRAKE PAD KIT

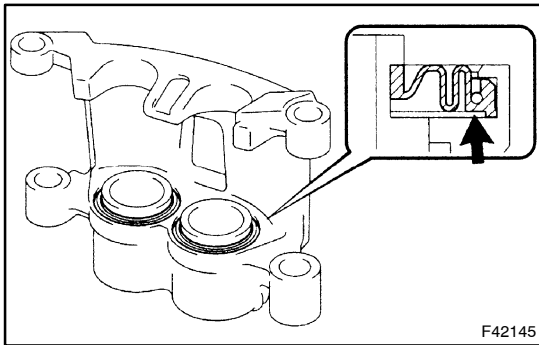
- (a) Remove the 2 anti-squeal springs.
- (b) Remove the 2 brake pads.
- (c) Remove the 2 anti-squeal shims and 2 pad retainers from the pad.

NOTICE:

The anti-squeal springs and support plates can be used again if they have sufficient rebound, no deformation, no cracks or no wear, and have had all rust, dirt and foreign particles cleaned off.

5. REMOVE FRONT DISC BRAKE PAD SUPPORT PLATE
6. REMOVE FRONT DISC BRAKE CYLINDER SLIDE BUSH
7. REMOVE BUSH DUST BOOT NO.1

(a) Remove the 4 bush dust boots from the disc brake cylinder.



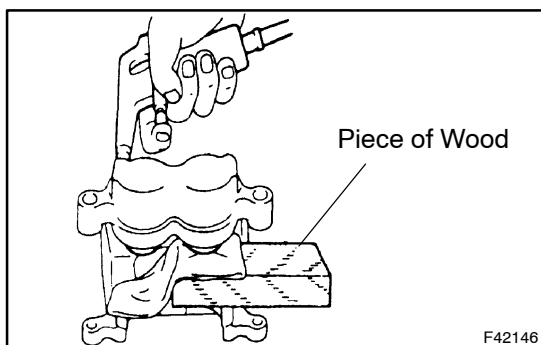
8. REMOVE CYLINDER BOOT

(a) Using a screwdriver, remove the 2 cylinder boot set rings from the caliper.

(b) Remove the 2 cylinder boots from the caliper.

NOTICE:

At the time of the installation, engage the boots securely in the caliper groove.



9. REMOVE FRONT DISC BRAKE PISTON

(a) Insert thick rags or an equivalent between the piston and cylinder to prevention of the piston scratches.

(b) Clamp a piece of wood wound with rags securely, so that the piston on the one side will not fly.

(c) Using compressed air to remove the pistons in order from the cylinder.

CAUTION:

Do not place your fingers in front of the piston when using compressed air.

NOTICE:

- The removal of the piston always must be performed with a piston fixed on the one side.
- Do not splash fluid.

10. REMOVE PISTON SEAL

(a) Using a screwdriver, remove the 2 piston seals from the cylinder.

NOTICE:

Do not damage the caliper inside and seal groove.

11. REMOVE FRONT DISC BRAKE BLEEDER PLUG

- (a) Remove the bleeder plug cap and bleeder plug.

12. INSPECT BRAKE CYLINDER AND PISTON

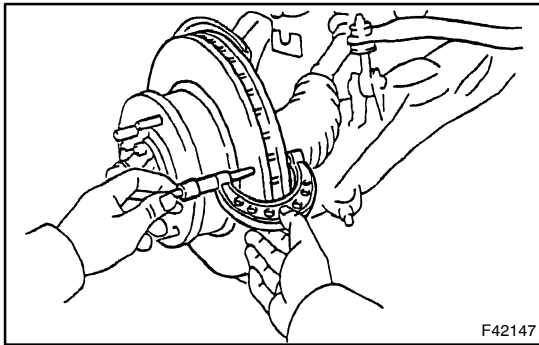
- (a) Check the cylinder bore and piston for rust or scoring.

13. MEASURE PAD LINING THICKNESS

- (a) Using vernier calipers, measure the pad lining thickness.

Minimum thickness: 3.0 mm (0.118 in.)

Replace the pad if of the pad has the minimum thickness or if it shows signs of uneven wear.

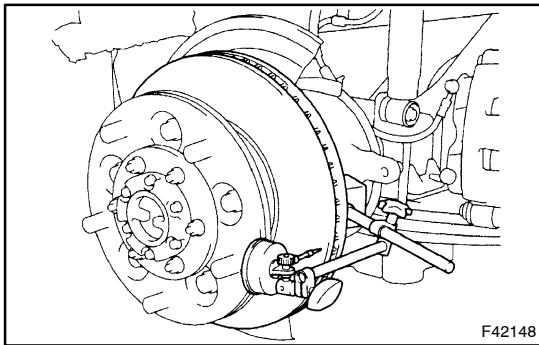
**14. INSPECT DISC THICKNESS**

- (a) Using a micrometer, measure the disc thickness.

Standard thickness: 35.0 mm (1.378 in.)

Minimum thickness: 33.0 mm (1.299 in.)

Replace the disc if the thickness of the disc is at the minimum or less. Replace the disc or grind it on a lathe if it is scored or is worn unevenly.

**15. INSPECT DISC RUNOUT**

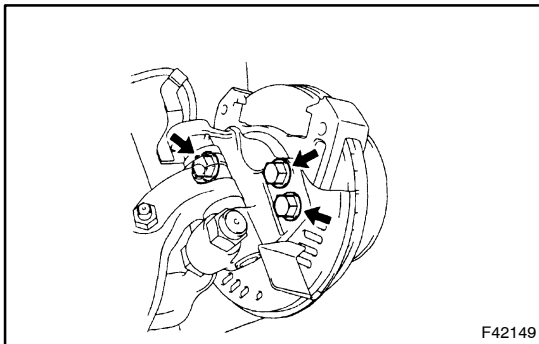
- (a) Using a dial indicator, measure the disc runout at a position of 10 mm (0.39 in.) from the outside edge.

Maximum disc runout: 0.12 mm (0.0047 in.)

If the bearing play and axle hub runout are normal, replace the disc or grind it on an "On-car brake lathe".

HINT:

Before measuring the runout, confirm that the front bearing preload is within the specified range (See page 30-2).

**16. REPLACE FRONT DISC**

- (a) Remove the 3 bolts and disc brake cylinder mounting.
 (b) Remove the front axle hub (See page 30-34).
 (c) Remove the disc from the axle hub (See page 30-34).
 (d) Install a new disc and torque the 5 bolts.
Torque: 165 N·m (1,680 kgf·cm, 122 ft·lbf)
 (e) Install the axle hub and adjust the front bearing preload (See page 30-2).
 (f) Install the disc brake cylinder mounting with the 3 bolts.
Torque: 265 N·m (2,700 kgf·cm, 195 ft·lbf)

17. TEMPORARILY TIGHTEN FRONT DISC BRAKE BLEEDER PLUG

- (a) Temporarily tighten the bleeder plug, and install the bleeder plug cap.

18. INSTALL PISTON SEAL

- (a) Apply lithium soap base glycol grease to a new piston seal.
 (b) Install the piston seal to the disc brake cylinder.

19. INSTALL FRONT DISC BRAKE PISTON

- (a) Apply lithium soap base glycol grease to the piston.
- (b) Install the piston to the disc brake cylinder.

NOTICE:

Do not forcibly screw the piston into the disc brake cylinder.

20. INSTALL CYLINDER BOOT

- (a) Apply lithium soap base glycol grease to a new cylinder boot. Then install the cylinder boot to the disc brake cylinder.

HINT:

Install the boot securely in the grooves of the cylinder and piston.

- (b) Using a screwdriver, install the set ring.

NOTICE:

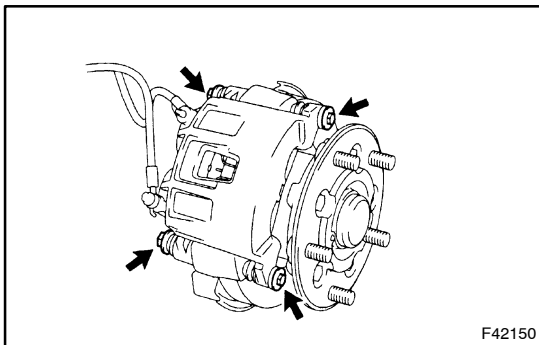
Do not damage the cylinder boot.

21. INSTALL BUSH DUST BOOT NO.1

- (a) Apply lithium soap base glycol grease to the seal surface of the 4 new bush dust boots.
- (b) Install the 4 bush dust boots to the disc brake cylinder.

22. INSTALL FRONT DISC BRAKE CYLINDER SLIDE BUSH**23. INSTALL FRONT DISC BRAKE PAD SUPPORT PLATE****24. INSTALL FRONT DISC BRAKE PAD KIT**

- (a) Install the 2 anti-squeal shims and 2 pad retainers to the pad.
- (b) Install the 2 brake pads.
- (c) Install the 2 anti-squeal springs.

**25. INSTALL FRONT DISC BRAKE CYLINDER SUB-ASSY**

- (a) Install the 4 bolts and caliper.

Torque:

78.4 N·m (800 kgf·cm, 58 ft·lbf) for inside

15.7 N·m (160 kgf·cm, 12 ft·lbf) for outside

- (b) Install the union bolt and a new gasket to the caliper, and then connect the flexible hose to the caliper.

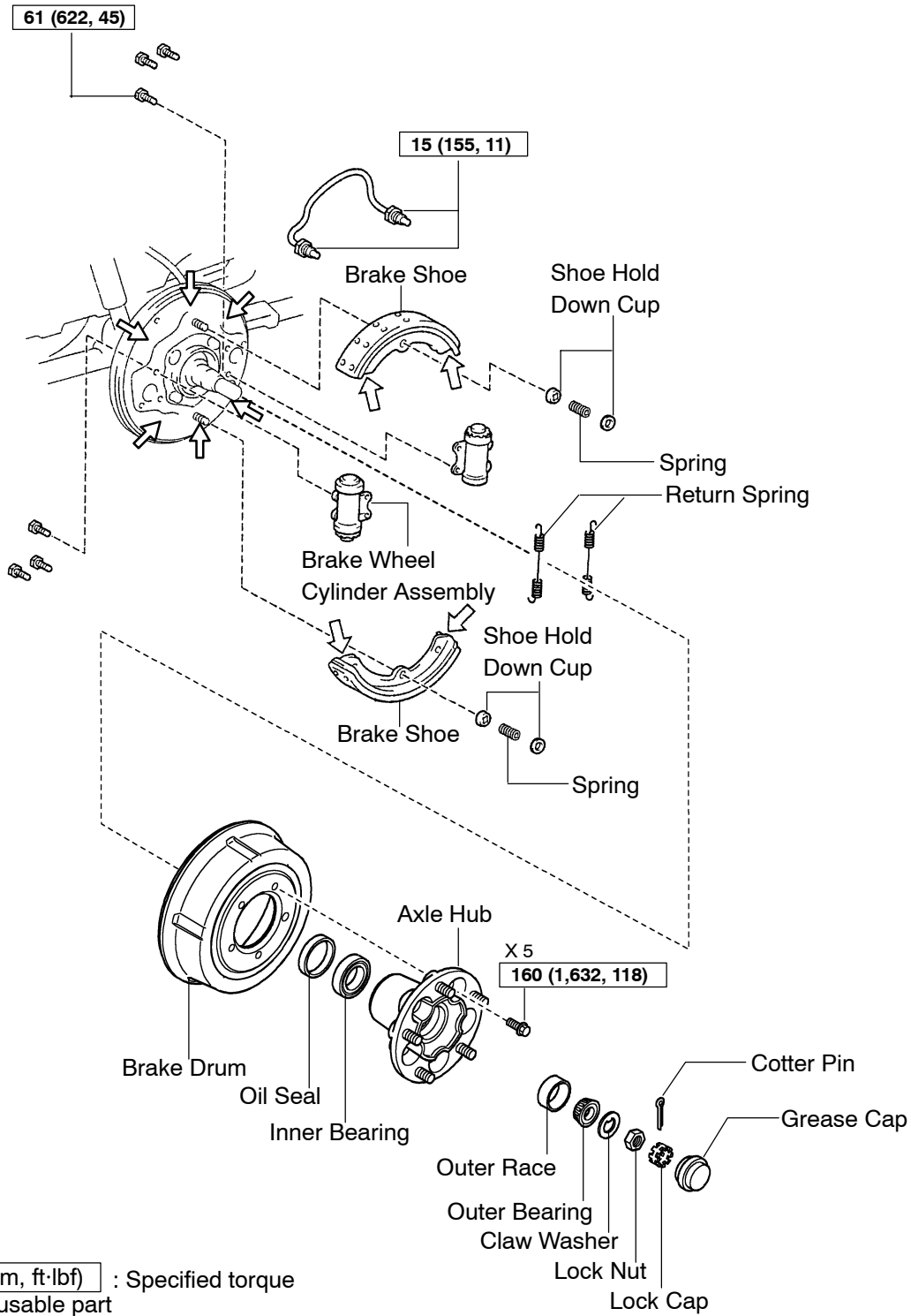
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

26. BLEED BRAKE LINE (See page 32-4)**27. CHECK FLUID LEVEL IN RESERVOIR (See page 32-4)****28. CHECK BRAKE FLUID LEAKAGE****29. INSTALL FRONT WHEEL**

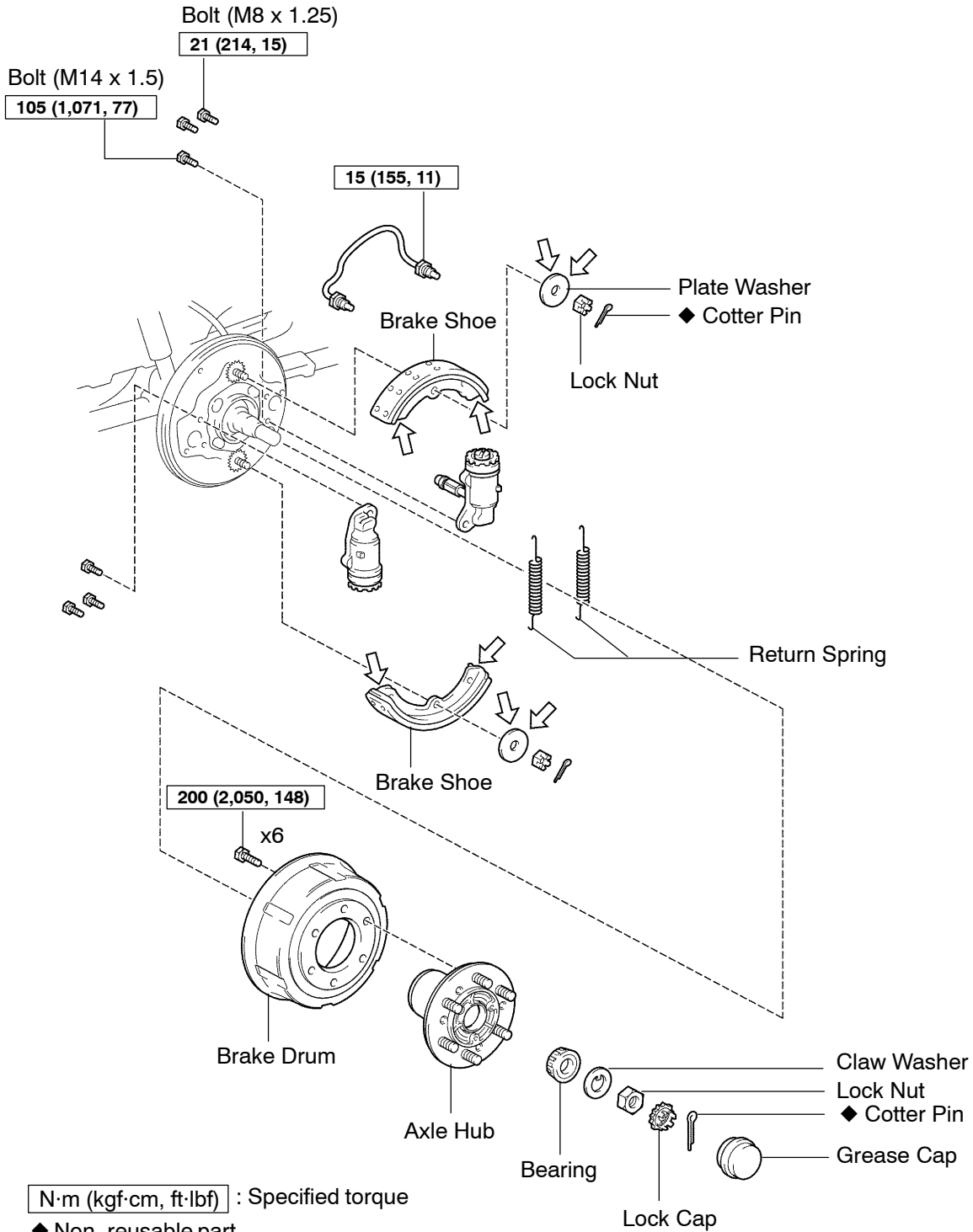
FRONT DRUM BRAKE COMPONENTS

320UF-01

Regular Cab,
Wide Cab 2.0 t

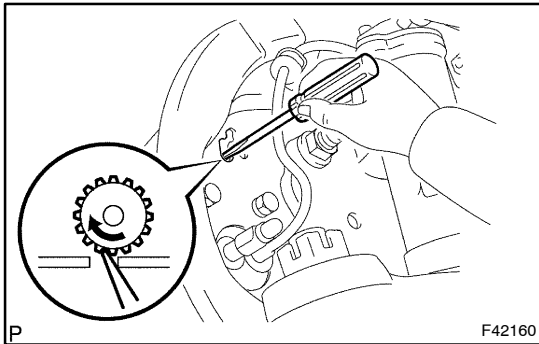


Wide Cab Over 2.0 t



OVERHAUL

1. DRAIN BRAKE FLUID



2. REMOVE BRAKE DRUM

- (a) Remove the drum together with the axle hub (See pages 30-40 and 30-45).

HINT:

If the brake drum cannot be easily removed, perform the following steps:

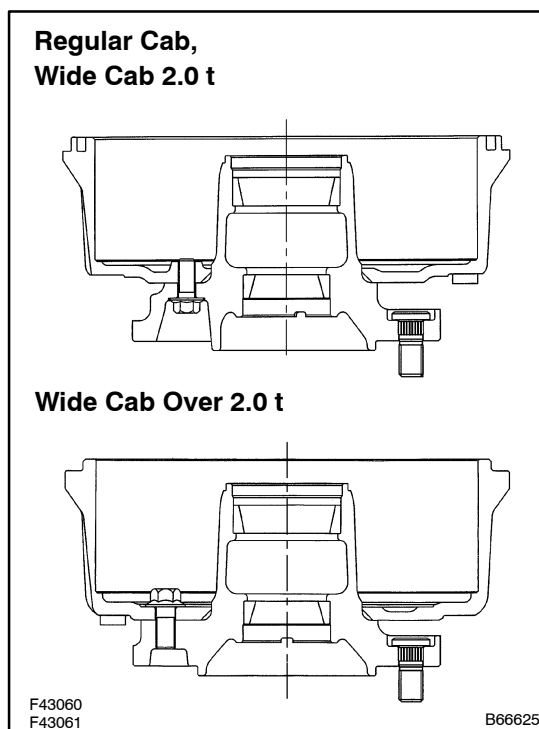
Insert a screwdriver into the hole in the backing plate, and reduce the brake shoe adjustment volume by turning the adjusting nut.

- (b) Place matchmarks on the axle hub and the drum.

- (c) Remove the bolts and retainer ring, and separate the drum from the axle hub.

HINT:

Bolts inserting direction are shown in the illustration.



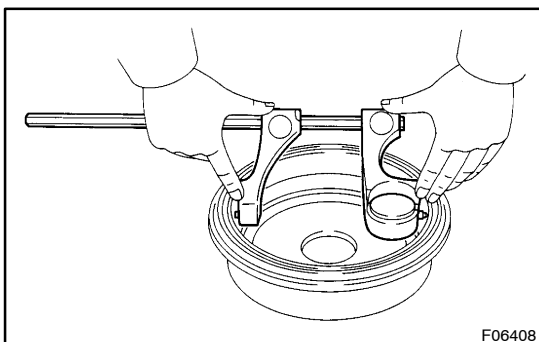
3. MEASURE BRAKE DRUM INSIDE DIAMETER

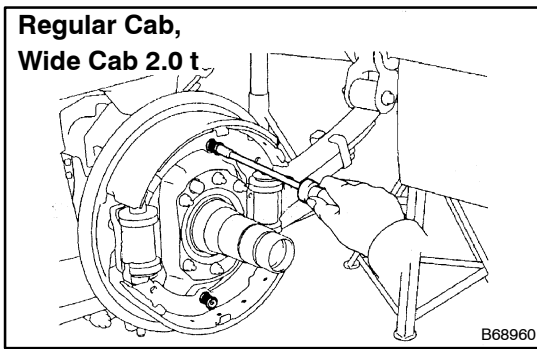
- (a) Using a brake drum gauge or equivalent, measure the inside diameter of the drum.

Inside diameter:

Standard	320 mm (12.598 in.)
Maximum	322 mm (12.677 in.)

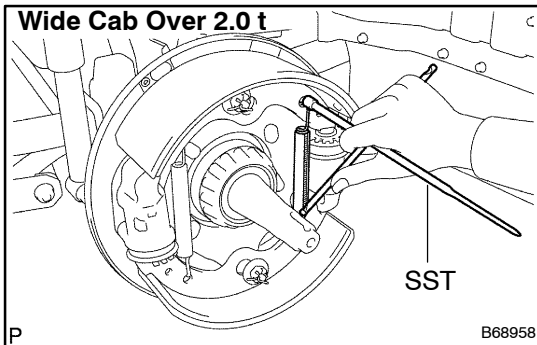
If the drum is scored or worn, the brake drum may be lathed to the maximum inside diameter.



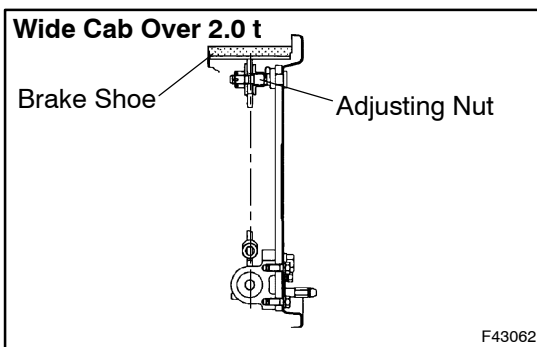


4. REMOVE BRAKE SHOES

- (a) Regular cab 2.0 t & 3.0 t, wide cab 2.0 t:
Using SST, remove the shoe hold-down cups and springs.
SST 09718-00010
- (b) Remove the 2 brake shoes.

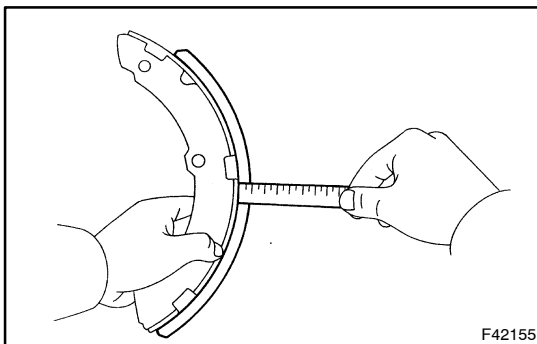


- (c) Wide cab over 2.0 t:
Using SST, remove the 2 return springs.
SST 09703-30010
- (d) Remove the cotter pin from each shoe.
- (e) Remove the nut and plate washer from each shoe.
- (f) Remove the 2 brake shoes.



NOTICE:

- Do not loosen the adjusting nuts.
- The adjusting nuts have been adjusted the shoe squareness.



5. MEASURE DRUM BRAKE SHOE LINING THICKNESS

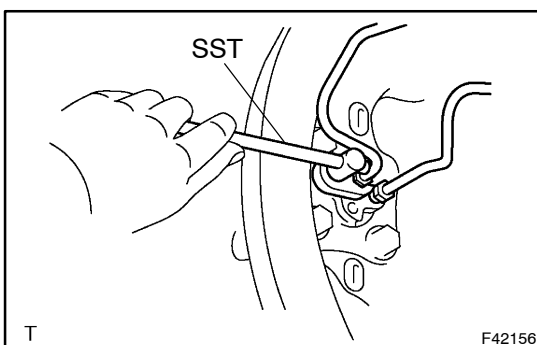
- (a) Using a ruler, measure the shoe lining thickness.

Minimum thickness: 4.0 mm (0.157 in.)

If the shoe lining thickness is less than the minimum or the lining shows signs of uneven wear, replace the brake shoes.

HINT:

If any of the brake shoes have to be replaced, replace all the front brake shoes in order to maintain even braking effect.



6. REMOVE FRONT OR UPPER FRONT WHEEL BRAKE CYLINDER ASSY

- (a) Using SST, disconnect the brake line from the wheel cylinders. Use a container to catch the brake fluid.
SST 09023-00100
- (b) Remove the bolts and wheel cylinder.

7. REMOVE REAR OR LOWER FRONT WHEEL BRAKE CYLINDER ASSY**HINT:**

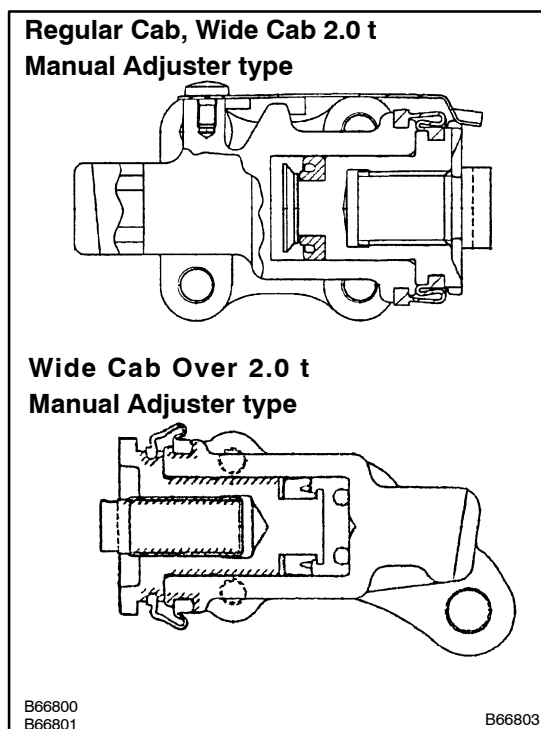
Remove the cylinder assy on the rear or lower side using the same procedures as on the front or upper side.

8. REMOVE FRONT WHEEL CYLINDER CUP KIT

- (a) Remove the piston head, adjuster wheel and boot.
- (b) Remove the piston assembly.
- (c) Remove the adjuster and shaft assembly.
- (d) Rear side cylinder only:
Remove the bleeder plug.

9. INSPECT BRAKE WHEEL CYLINDER

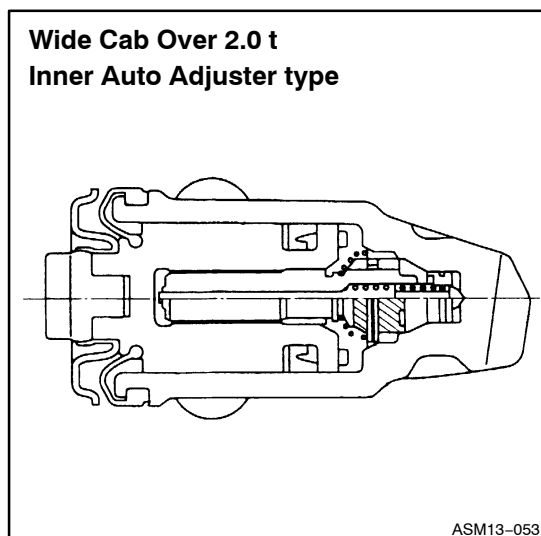
- (a) Check the wheel cylinder for wear, rust or scoring.

**10. INSTALL FRONT WHEEL CYLINDER CUP KIT**

- (a) Regular cab 2.0 t & 3.0 t, manual adjuster:
 - (1) Apply lithium soap base glycol grease to new parts indicated by the arrows as shown in the illustration.
- (b) Wide cab over 2.0 t manual adjuster:
Install the piston back-up ring.
 - (1) Install the cup, paying attention to its orientation.
 - (2) Insert the adjuster shaft assembly into the piston.

NOTICE:

Screw the assembly all the way so that the thread does not catch.

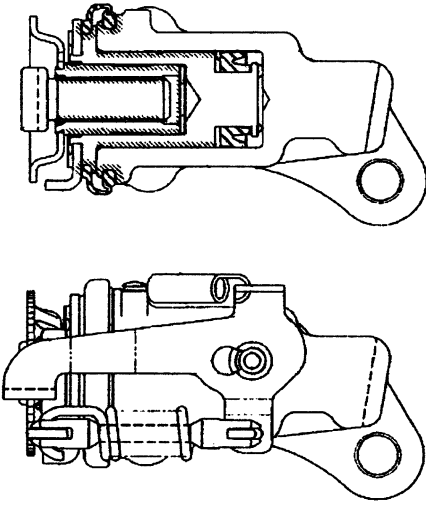


- (c) Insert the piston assembly into the wheel cylinder.
- (d) Install the boot.
- (e) Install the piston head, boot protector and adjuster wheel.
- (f) Rear side cylinder only:
Temporarily tighten the bleeder plug, and install the bleeder plug cap.

NOTICE:

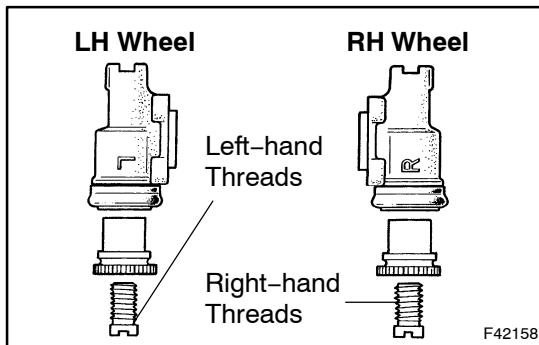
- **Install the piston head according to the orientation of the brake shoe, and store it securely inside the piston.**
- **Install the adjuster wheel and the boot protector in the correct installation sequence and according to the width of the two piston sides.**
- **When there are no problems, do not remove the locator spring and locator from the adjuster.**

**Wide Cab Over 2.0 t
Outer Auto Adjuster type**



ASM13-049

If they have been removed, screw them all the way into the adjuster shaft for proper installation.



F42158

HINT:

There are 2 kinds of adjusting nuts and bolts. Make sure that each location has its correct adjusting nuts and bolts.

RH wheel (R mark) - Right-hand threads

LH wheel (L mark) - Left-hand threads

11. INSTALL REAR OR LOWER FRONT WHEEL BRAKE CYLINDER ASSY

- (a) Apply brake grease to the shoe contact part of the backing plate.
- (b) Install the 2 bolts and wheel cylinder.

Regular cab wide cab 2.0 t:

Torque:

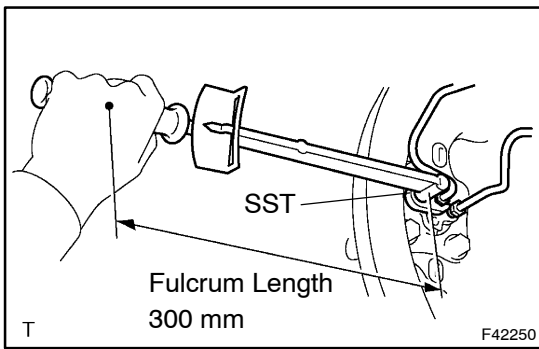
M10 x 1.25 bolt: 61 N·m (622 kgf·cm, 45 ft·lbf)

Wide cab over 2.0 t:

Torque:

M8 x 1.25 bolt: 21 N·m (214 kgf·cm, 15 ft·lbf)

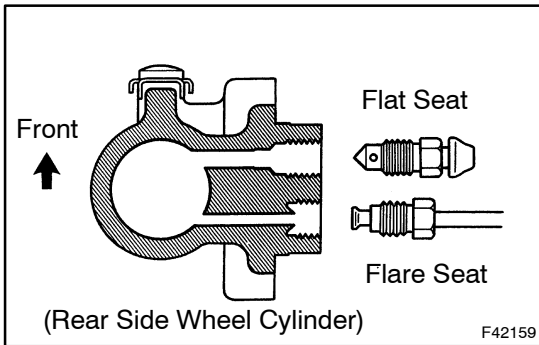
M14 x 1.5 bolt: 105 N·m (1,071 kgf·cm, 77 ft·lbf)



- (c) Using , connect the brake line to the wheel cylinder.
SST 09023-00100
- (d) SST
- Torque:**
12.9 N·m (131 kgf·cm, 9.4 ft·lbf) for use with SST
15 N·m (155 kgf·cm, 11 ft·lbf)

HINT:

Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).



HINT:

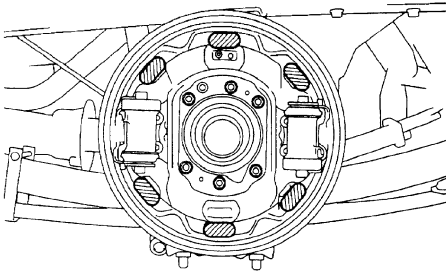
- There are 2 types of the rear side wheel cylinder union seats, flat seat type and flared seat type, as shown in the illustration.
- Both union seats of the rear side wheel cylinder are flared.

12. INSTALL FRONT OR UPPER FRONT WHEEL BRAKE CYLINDER ASSY

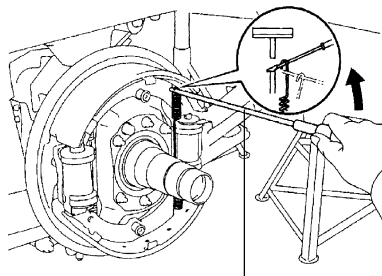
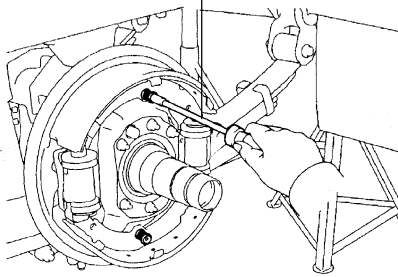
HINT:

Install the cylinder assy on the front or upper side using the same procedures as on the rear or lower side.

**Regular Cab,
Wide Cab 2.0 t**



09718-00010



F43065
F43066
F43067

09703-30010

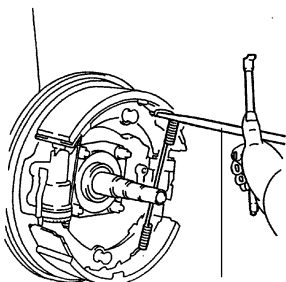
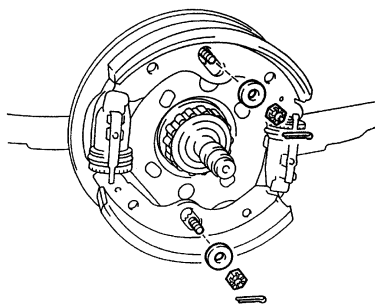
B66628

13. INSTALL BRAKE SHOES

- (a) Regular cab 2.0 t & 3.0 t, wide cab 2.0 t:
Apply brake grease to the shoe contact part of the backing plate.
- (b) Install the brake shoe assembly on the backing plate.
- (c) Using SST, install the shoe hold-down spring cup, pin and spring.
SST 09718-00010
- (d) Using SST, install the front tension spring.
 - (1) Install the front tension spring in the outside brake shoe.
 - (2) Install the rear tension spring in the inside brake shoe.

SST 09703-30010

Wide Cab Over 2.0 t



09703-30010

B64345
B64346

B66629

- (e) Wide cab over 2.0 t:
Apply brake grease to the contact surface of the brake shoe with the wheel cylinder.
- (f) Install the brake shoe assembly on the backing plate so that the elongated hole of the brake shoe assembly is in the tire rotation direction.
- (g) Tighten the plain washer and nut by hand, and install a cotter pin within 1/3 to 1/2 turns in the loosening direction.
- (h) Using SST, install the 2 return springs.
SST 09703-30010

HINT:

- While pressing the shoe against the backing plate side, install the shoe to the backing plate by tightening the nut by hand.
- Loosen the nut by 2/6 - 3/6 turns to install a new cotter pin.

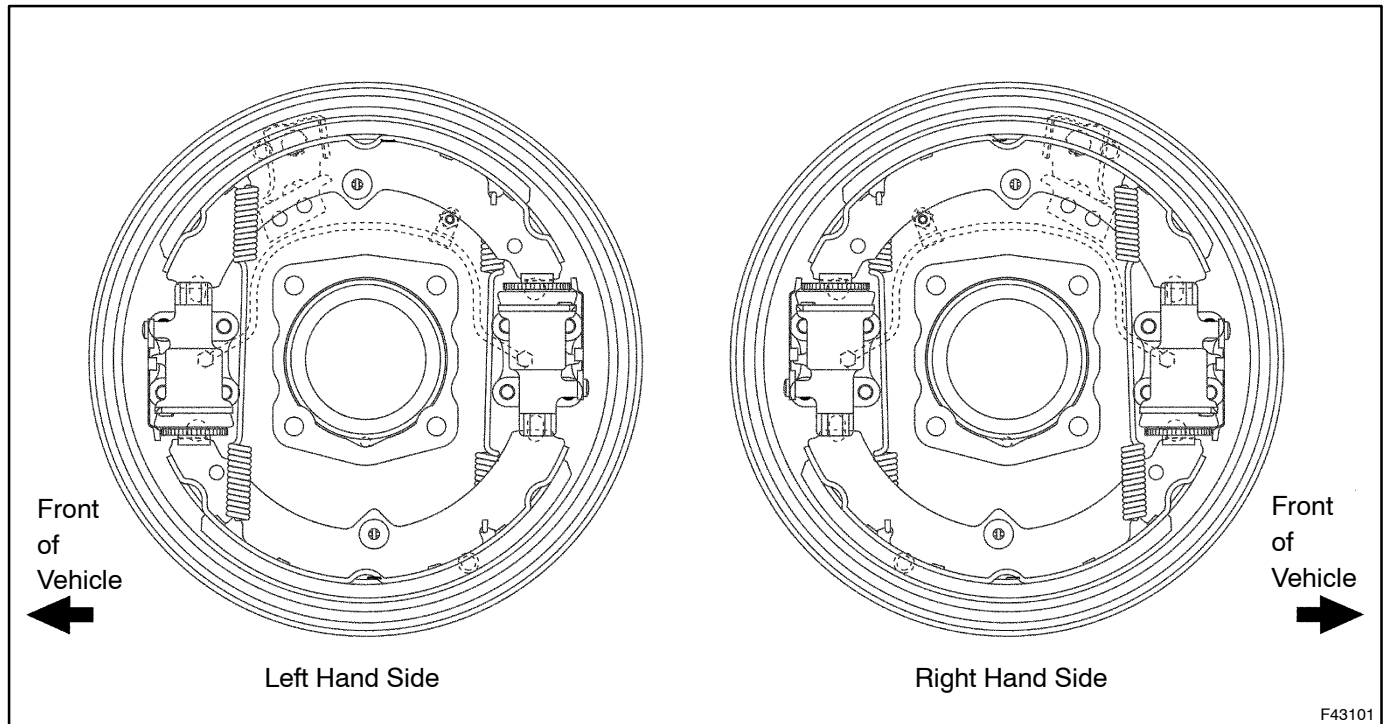
14. INSPECT FRONT DRUM BRAKE INSTALLATION

(a) Check that each part has been installed correctly.

NOTICE:

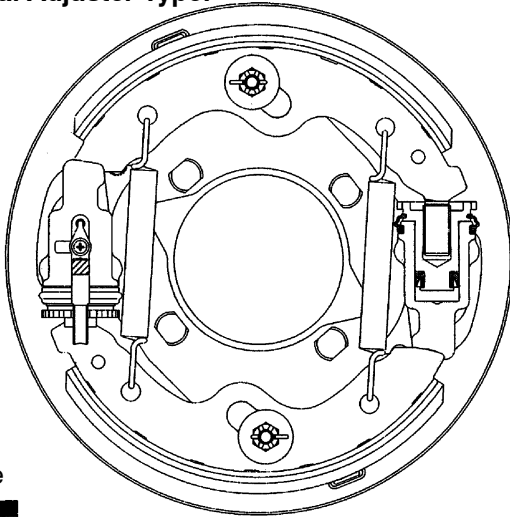
- Confirm that the wheel cylinder boot is not damaged and that grease or other lubricant does not stick.
- Confirm that no oil, moisture, etc. do not stick to the shoe lining surface.

Regular cab, wide cab 2.0 t:

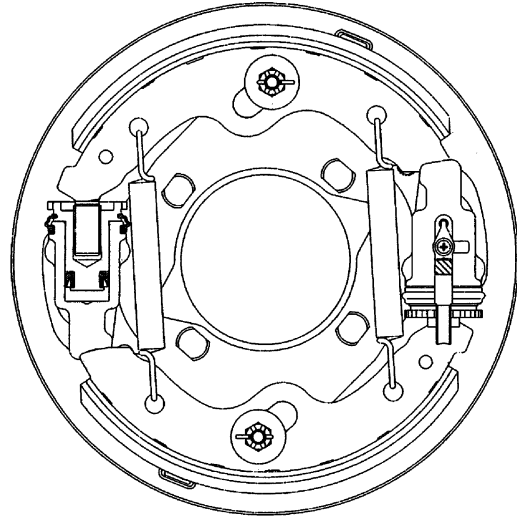


Wide Cab Over 2.0 t:

Manual Adjuster Type:

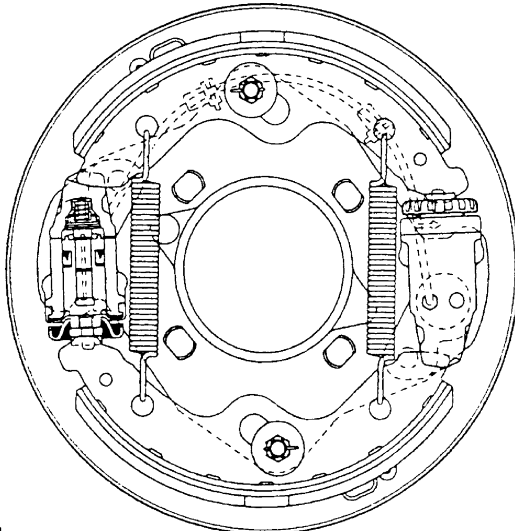


Left Hand Side

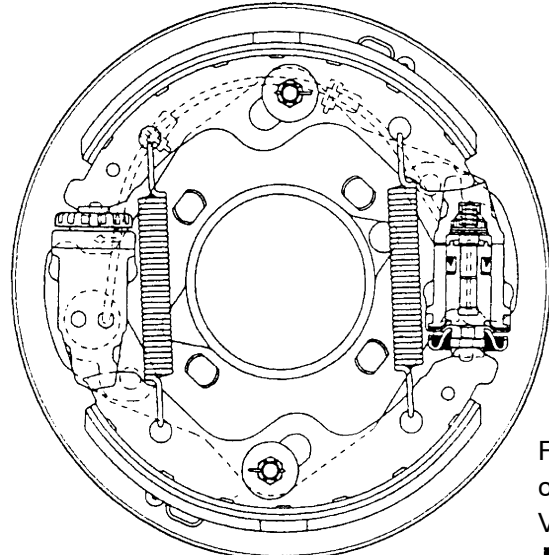


Right Hand Side

Inner Auto Adjuster Type:

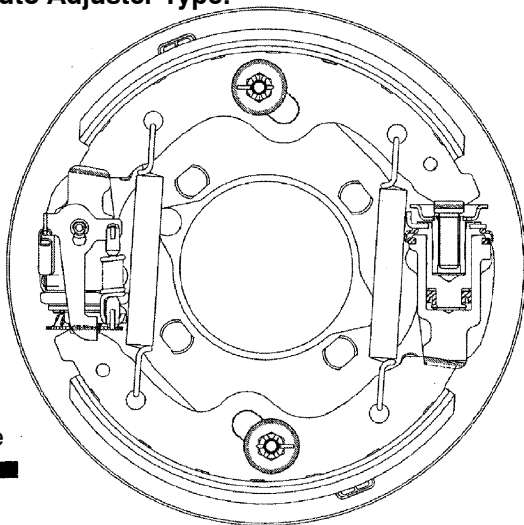


Left Hand Side

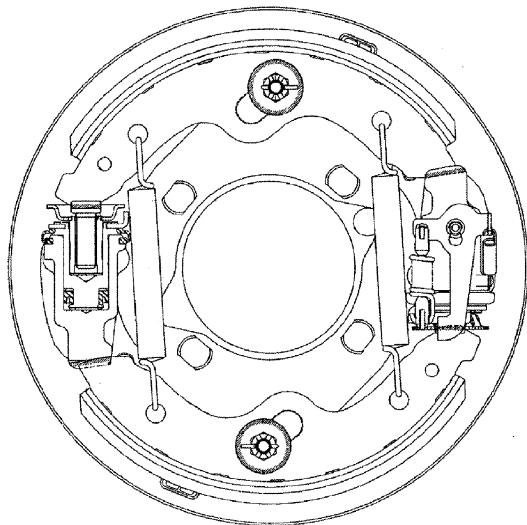


Right Hand Side

Outer Auto Adjuster Type:



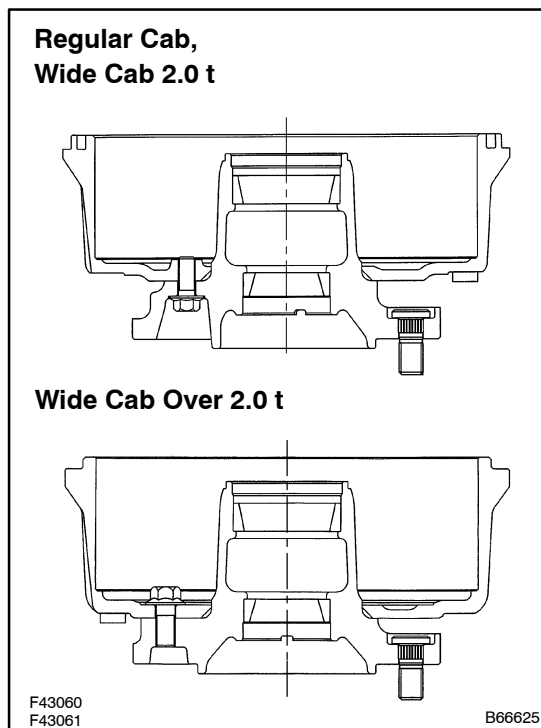
Left Hand Side



Right Hand Side

ASM13-054
F42165
ASM13-055

ASM13-056

**15. INSTALL BRAKE DRUM**

- (a) Match the matchmarks, and assemble the drum and the hub.

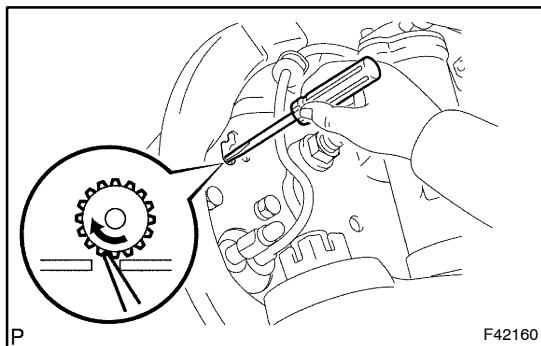
Torque:

200 N·m (2,050 kgf·cm, 148 ft·lbf) for WU and XZU type

- (b) Install the drum to the axle hub (See pages 30-40 and 30-45).

16. ADJUST FRONT DRUM BRAKE SHOE CLEARANCE

- (a) Regular cab 2.0 t & 3.0 t, wide cab:
Rotate the adjusting wheel to shoe expanding direction until the drum barely rotates by hand.
- (b) Return the adjusting wheel 5 notches to shoe contact direction. After the shoe is contracted if there is drag with the drum cannot rotate by hand, adjust the gap again, or remove the drum and check the brake installation condition.
- (c) The plug of service hole on the backside of the back plate is removed when adjusting the gap. Securely install the plug to prevent foreign matter from coming in.



- (d) Wide cab over 2.0 t:
Remove the shoe adjusting hole plug from the backing plate.
- (e) Using a screwdriver, rotate the wheel cylinder adjusting nut in the direction opposite to the arrow mark as shown in the illustration.
- (f) Adjust the brake shoe gap so that the clearance between the brake drum and shoe becomes 0.
- (g) Using a screwdriver, return the adjusting nut in the arrow mark direction.

**Standard number of notches to be backed off:
10 - 14 notches**

- (h) Rotate the tire and confirm the smooth rotation.
- (i) Install the shoe adjusting hole plug.
- (j) Check that the pedal reserve distance is correct (See page 32-7).

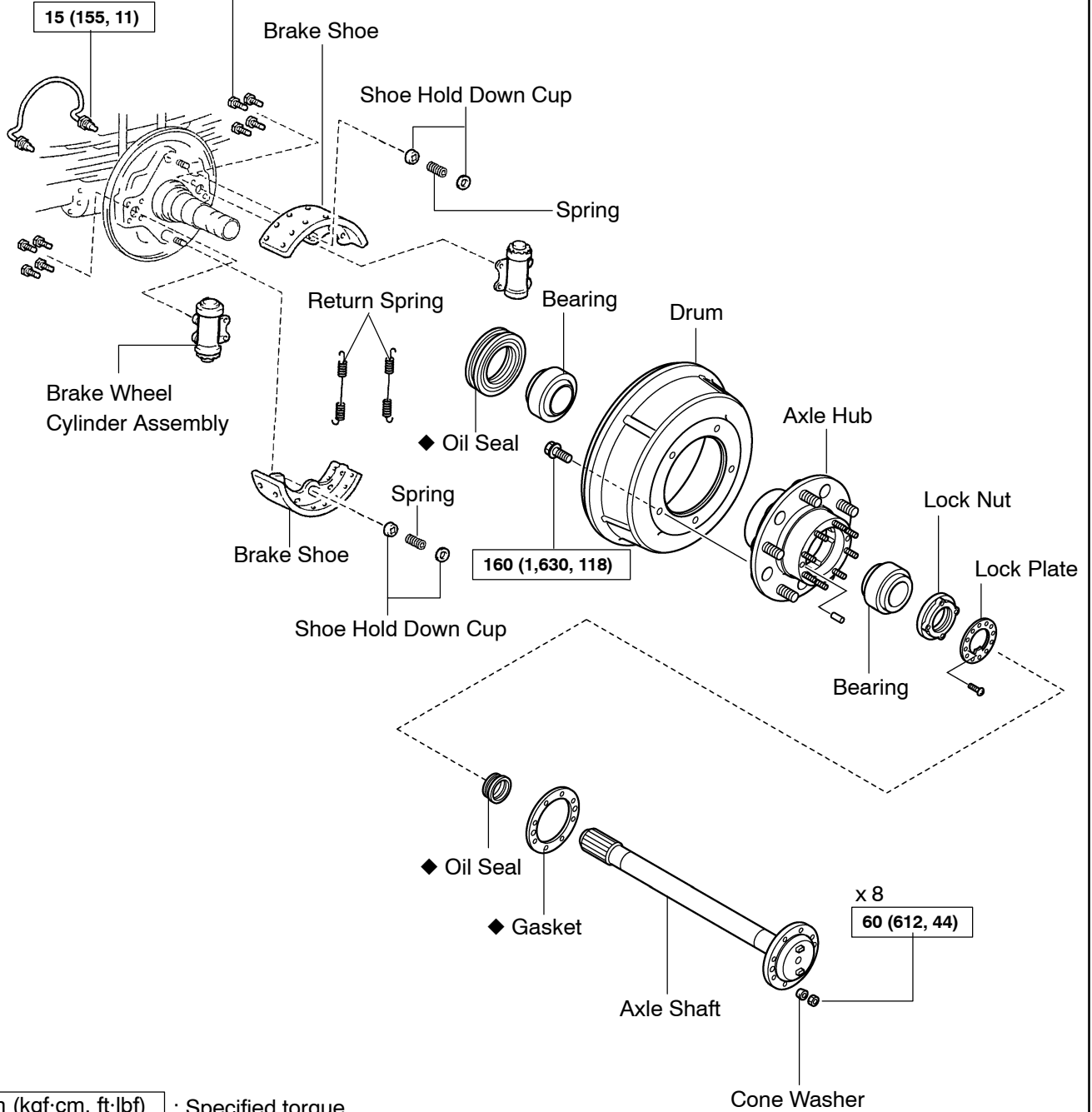
17. BLEED BRAKE LINE (See page 32-4)**18. CHECK FLUID LEVEL IN RESERVOIR (See page 32-4)****19. CHECK BRAKE FLUID LEAKAGE**

REAR DRUM BRAKE COMPONENTS

320UH-01

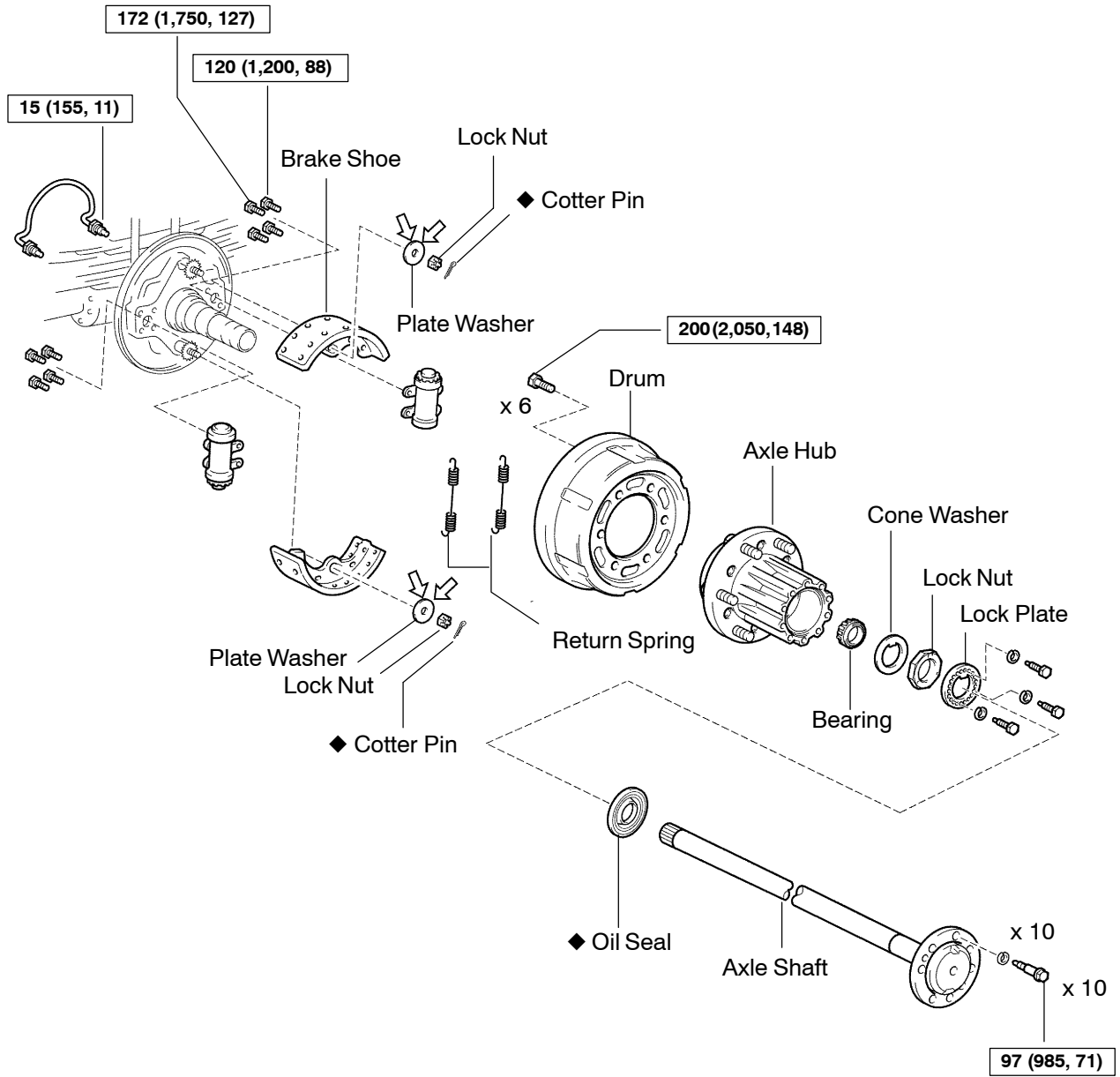
Regular Cab, Wide Cab 2.0 t

- 26 (265, 192)** : Regular Cab 2.0 t for Oceania 195/75R 15 Type
- 61 (622, 45)** : Regular Cab except 195/75R 15 Type, Wide Cab 2.0 t



N·m (kgf·cm, ft·lbf) : Specified torque
 ◆ Non-reusable part

Wide Cab Over 2.0 t

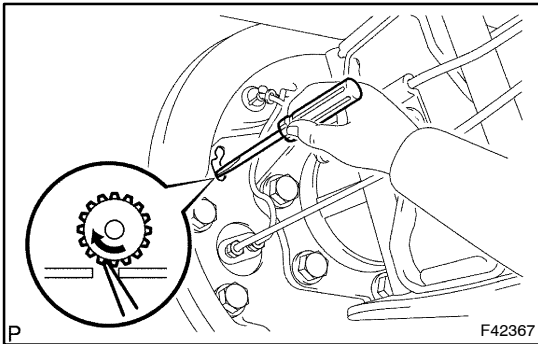


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

OVERHAUL

1. REMOVE REAR TIRE



2. REMOVE REAR BRAKE DRUM

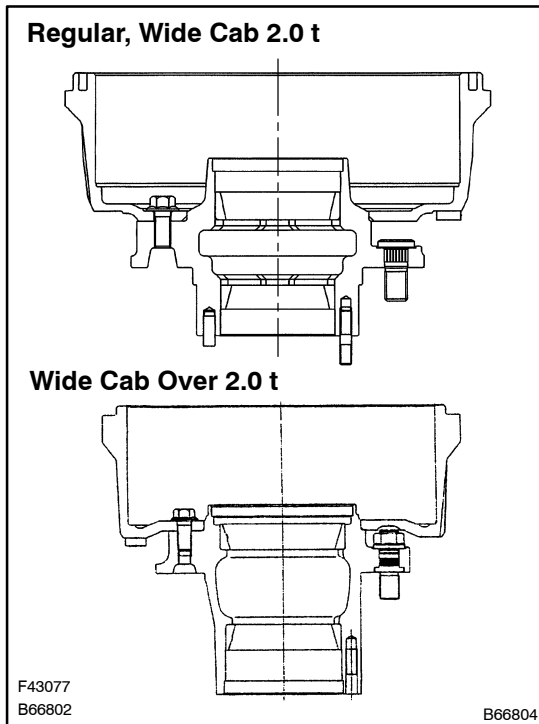
- (a) Remove the axle shaft (See pages 30-72 and 30-75).
- (b) Remove the drum together with the axle hub (See pages 30-40 and 30-45).

HINT:

- If the brake drum cannot be easily removed, perform the following.

Insert a screwdriver through the hole in the backing plate, and reduce the brake shoe adjustment volume by turning the adjusting nut.

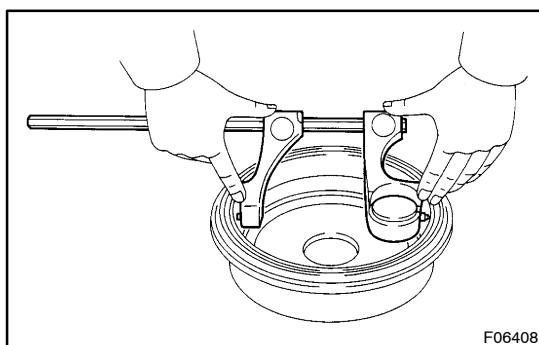
- (c) Place matchmarks on the axle hub and the drum.



- (d) Remove the bolts and retainer ring, and separate the drum from the axle hub.

HINT:

Bolts inserting direction are shown in the illustration.



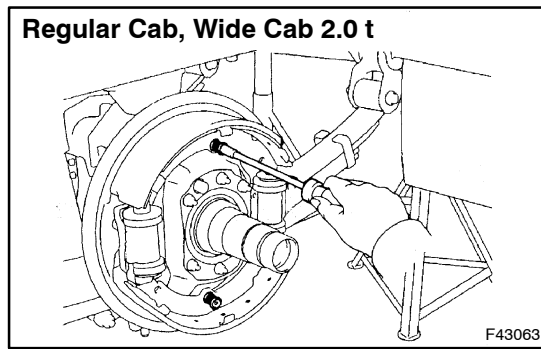
3. INSPECT BRAKE DRUM INSIDE DIAMETER

- (a) Using a brake drum gauge or equivalent, measure the inside diameter of the drum.

Inside diameter:

Standard	320 mm (12.598 in.)
Maximum	322 mm (12.677 in.)

If the drum is scored or worn, the brake drum may be lathed to the maximum inside diameter.



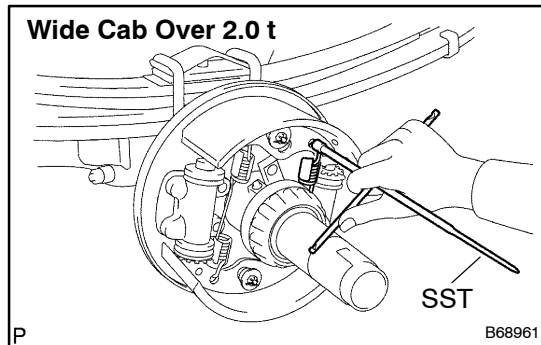
4. REMOVE BRAKE SHOES

(a) Regular cab, wide cab 2.0 t:

- (1) Using SST, remove the shoe hold-down pins, cups and springs.

SST 09718-00010

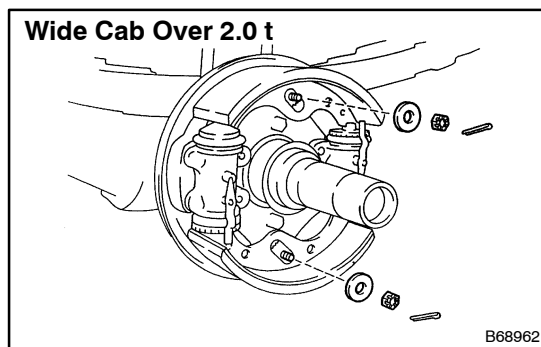
- (2) Remove the 2 brake shoes.



(b) Wide cab over 2.0 t:

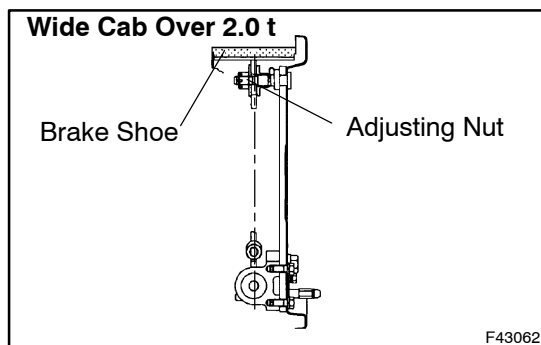
- (1) Using SST, remove the 2 return springs.

SST 09703-30010



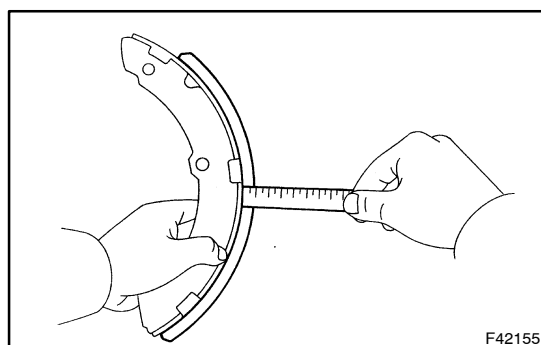
(c) Wide cab over 2.0 t:

- (1) Remove the brake shoe.
- (2) Remove the cotter pin from each shoe.
- (3) Remove the nut and plate washer from each shoe.
- (4) Remove the 2 brake shoes.



NOTICE:

- Do not loosen the adjusting nuts.
- The adjusting nuts have been adjusted the shoe squareness.



5. INSPECT REAR DRUM BRAKE SHOE LINING THICKNESS

(a) Using a ruler, measure the shoe lining thickness.

Minimum thickness: 4.0 mm (0.157 in.)

If the shoe lining thickness is less than the minimum or the lining shows signs of uneven wear, replace the brake shoes.

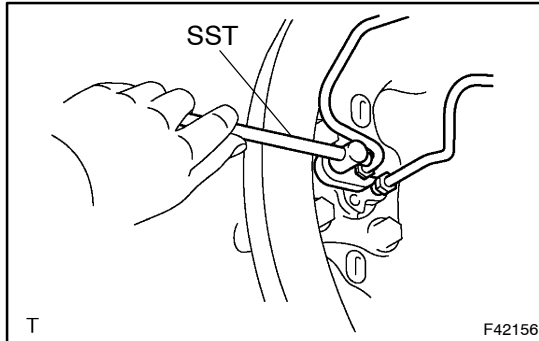
HINT:

If any of the brake shoes have to be replaced, replace all the rear brake shoes in order to maintain even braking effect.

6. INSPECT BRAKE DRUM AND REAR DRUM BRAKE SHOE LINING FOR PROPER CONTACT

- (a) Apply chalk to the inside of the drum, and slide the brake shoe along the surface so that the shoe can fit.

If the contact condition between the brake lining and drum is improper, repair the lining with a shoe grinder or replace the brake shoe assembly.

**7. REMOVE LH, FRONT OR UPPER REAR WHEEL BRAKE CYLINDER ASSY**

- (a) Remove the brake line clamp.
 (b) Using SST, disconnect the brake line from the wheel cylinders. Use a container to catch the brake fluid.
 SST 09023-00100
 (c) Remove the 2 bolts and wheel cylinder.

8. REMOVE LH, REAR OR LOWER REAR WHEEL BRAKE CYLINDER ASSY

HINT:

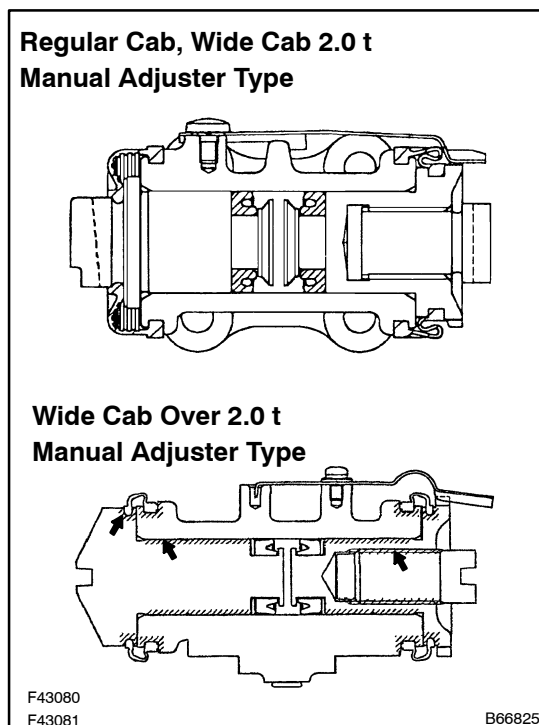
Remove the cylinder assy on the rear or lower side using the same procedures as on the front or upper side.

9. REMOVE REAR WHEEL CYLINDER CUP KIT

- (a) Remove the piston head, adjuster wheel and the boot.
 (b) Remove the piston assembly.
 (c) Remove the adjuster and shaft assembly.
 (d) Front side wheel cylinder only:
 Remove the bleeder plug.

10. INSPECT BRAKE WHEEL CYLINDER

- (a) Check the wheel cylinder for wear, rust or scoring.

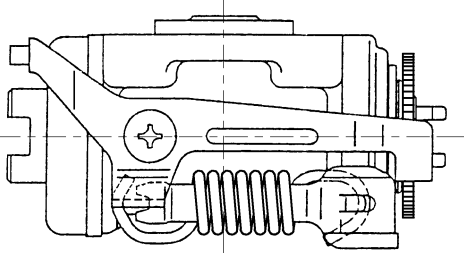
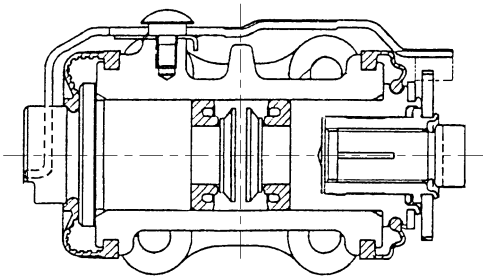
**11. INSTALL REAR WHEEL CYLINDER CUP KIT**

- (a) Apply lithium soap base glycol grease to new parts indicated by the arrows as shown in the illustration.
 (b) Apply brake fluid to the inner surface of the cylinder.
 (c) Except inner auto adjuster type:
 Install the piston back-up ring.
 (d) Install the cup, paying attention to its orientation.
 (e) Except inner auto adjuster type:
 (1) Insert the adjuster shaft assembly into the piston.

NOTICE:

Screw the assembly all the way so the thread does not catch.

**Regular Cab, Wide Cab 2.0 t
Outer Auto Adjuster Type**



ASM13-052

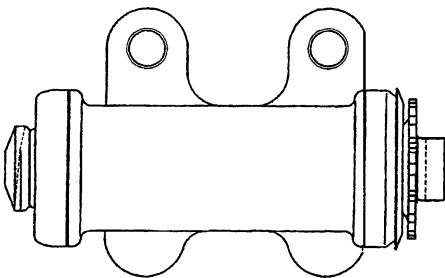
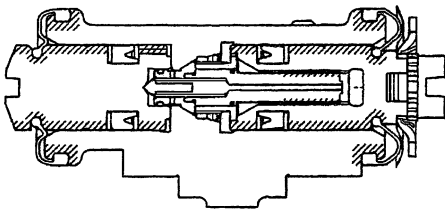
- (f) Insert the piston assembly into the wheel cylinder.
- (g) Install the 2 boots.
- (h) Install the piston head, boot protector and adjuster wheel.

NOTICE:

- Install the piston head according to the orientation of the brake shoe, and store it securely inside the piston.
- Install the adjuster wheel and the boot protector in the correct installation sequence and according to the width of the two piston sides.

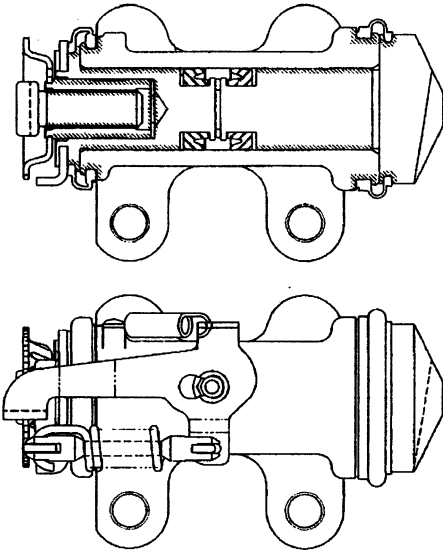
If they have been removed, screw them all the way into the adjuster shaft for proper installation.

**Wide Cab, Over 2.0 t
Inner Auto Adjuster Type**

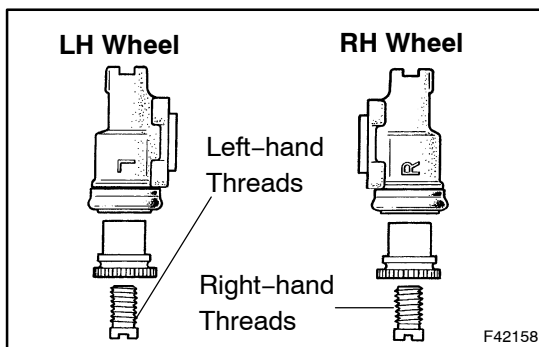


ASM13-050

**Wide Cab Over 2.0 t
Outer Auto Adjuster Type**



ASM13-051



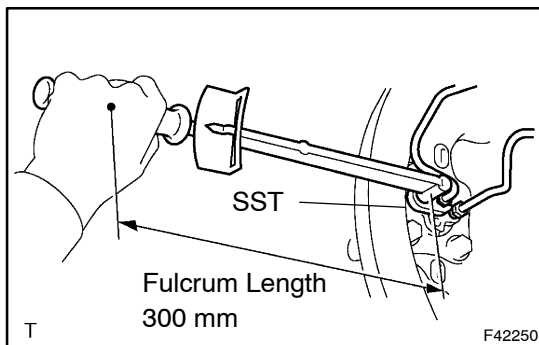
F42158

HINT:

There are 2 kinds of adjusting nuts and bolts.
Make sure that each location has its correct adjusting nuts and bolts.

RH wheel (R mark) - Right-hand threads

LH wheel (L mark) - Left-hand threads



T

F42250

12. INSTALL LH, FRONT OR UPPER REAR WHEEL BRAKE CYLINDER ASSY

- (a) Apply brake grease to the shoe contact part of the backing plate.
- (b) Install the bolt and wheel cylinder.

Torque:

**26 N·m (265 kgf·cm, 19 ft·lbf) for regular cab 2.0 t
Oceania 195/75R 15 tyre.**

Torque:

**61 N·m (622 kgf·cm, 45 ft·lbf) for regular cab except
195/75R 15 tyre, and wide cab 2.0 t.**

Torque:

**120 N·m (1,200 kgf·cm, 88 ft·lbf)
for wide cab over 2.0 t.**

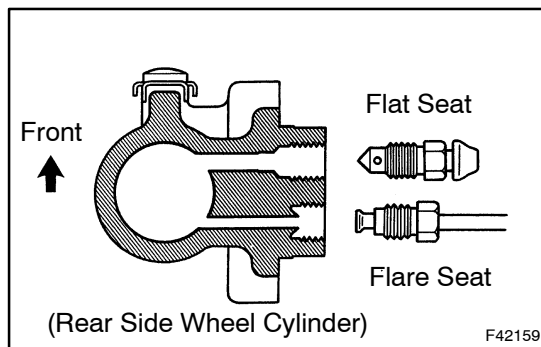
- (c) Using SST, connect the brake line to the wheel cylinder.
SST 09023-00100

Torque:

**12.9 N·m (131 kgf·cm, 9.4 ft·lbf) for use with SST
15 N·m (155 kgf·cm, 11 ft·lbf)**

HINT:

Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).



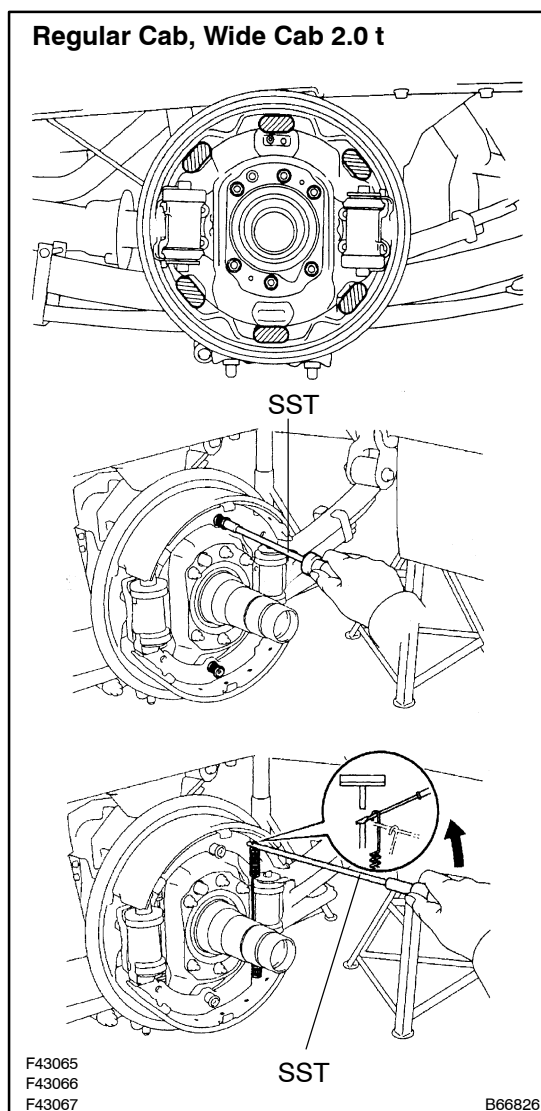
HINT:

- There are 2 types of the front side wheel cylinder union seats, flat seat type and flared seat type, as shown in the illustration.
- Both union seats of the rear side wheel cylinder are flared.

13. INSTALL LH, REAR OR LOWER REAR WHEEL BRAKE CYLINDER ASSY

HINT:

Install the cylinder assy on the rear or lower side in the same procedures as on the front or upper side.



14. INSTALL BRAKE SHOES

(a) Regular cab, wide cab 2.0 t:

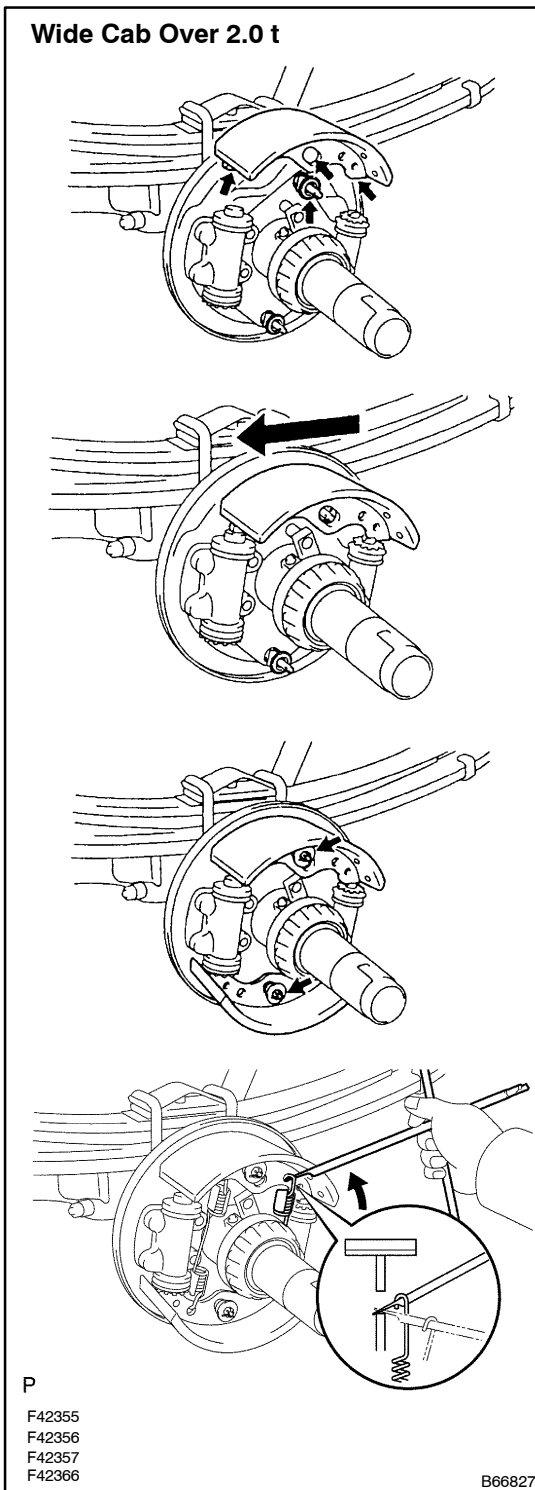
- (1) Apply brake grease to the shoe contact part of the backing plate.
- (2) Install the brake shoe assembly on the backing plate.
- (3) Using SST, install the shoe hold-down spring cup, pin and spring.

SST 09718-00010

(b) Using SST, install the front tension spring.

- (1) Install the rear tension spring to inside and outside from brake shoe

SST 09703-30010



- (c) Wide cab over 2.0 t:
- (1) Apply brake grease to the contact surface of the brake shoe with the wheel cylinder.
 - (2) Install the brake shoe assembly on the backing plate so that the elongated hole of the brake shoe assembly is in the tire rotation direction.
 - (3) Tighten the plain washer and the nut by hand and install a cotter pin within 1/3 to 1/2 turns in the loosening direction.
 - (4) Using SST, install the 2 return springs.
- SST 09703-30010

15. CHECK REAR DRUM BRAKE INSTALLATION

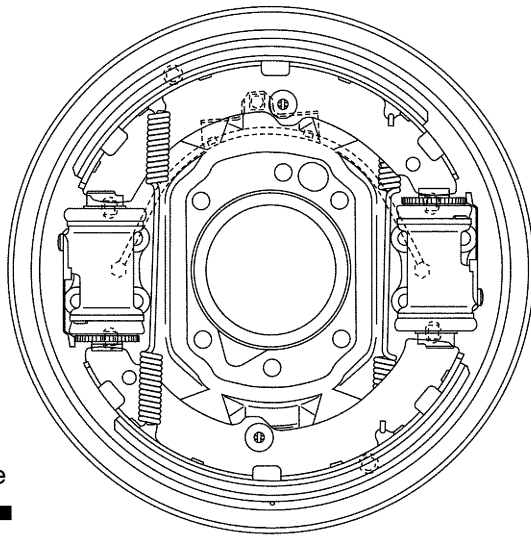
- (a) Check that each part has been installed correctly.

NOTICE:

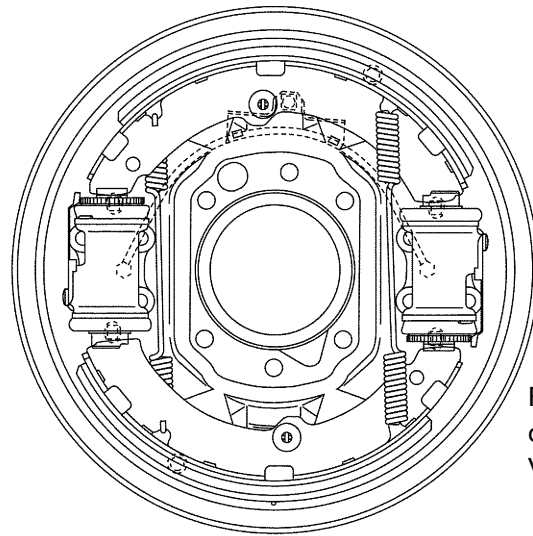
- Confirm that the wheel cylinder boot is not damaged and that no grease or other lubricant does not stick.
- Confirm that no oil, moisture, etc. do not stick to the shoe lining surface.

Regular cab, wide cab 2.0 t:

Manual Adjuster Type:

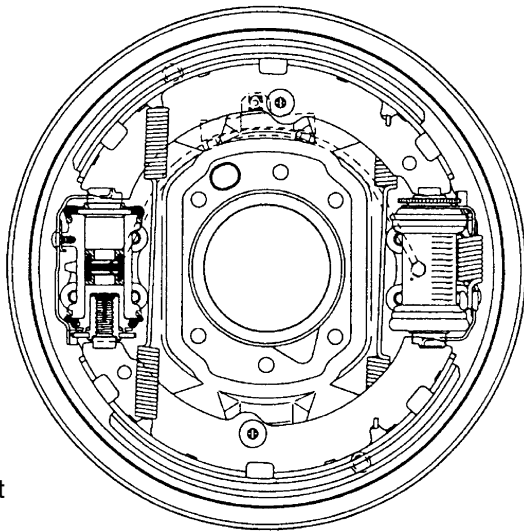


Left Hand Side

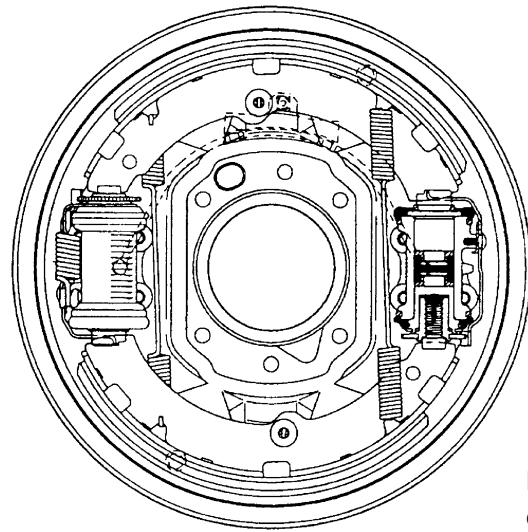


Right Hand Side

Auto Adjuster Type:



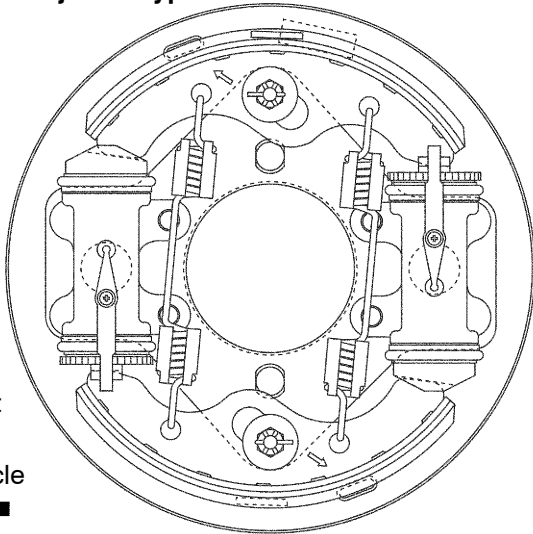
Left Hand Side



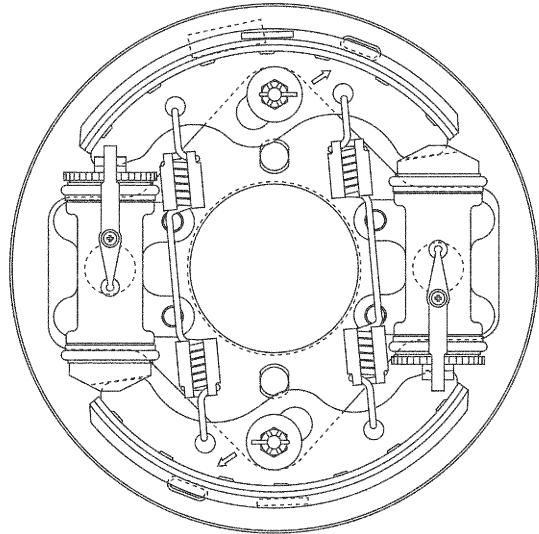
Right Hand Side

Wide cab over 2.0 t:

Manual Adjuster Type:

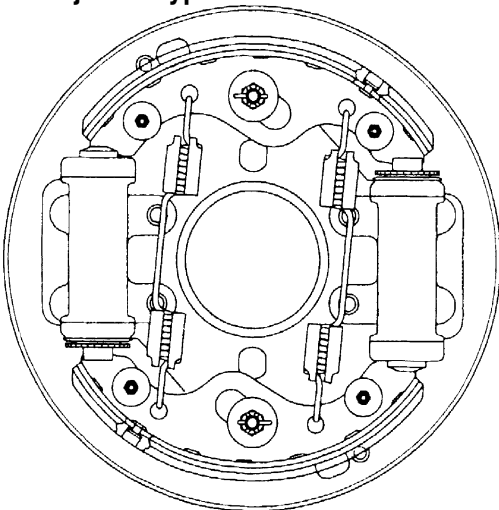


Left Hand Side

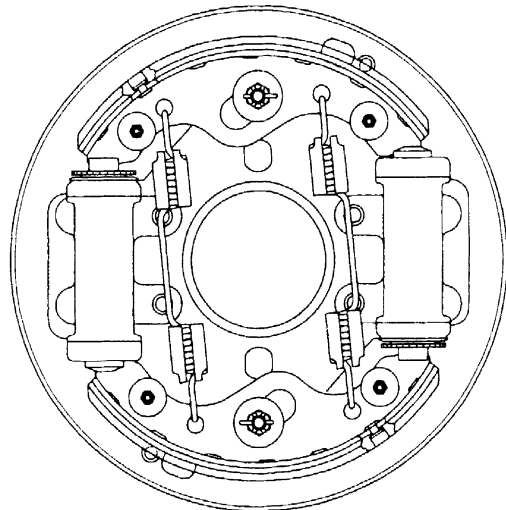


Right Hand Side

Inner Auto Adjuster Type:

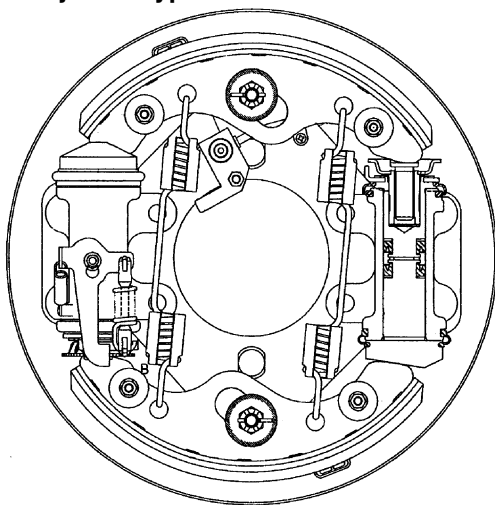


Left Hand Side

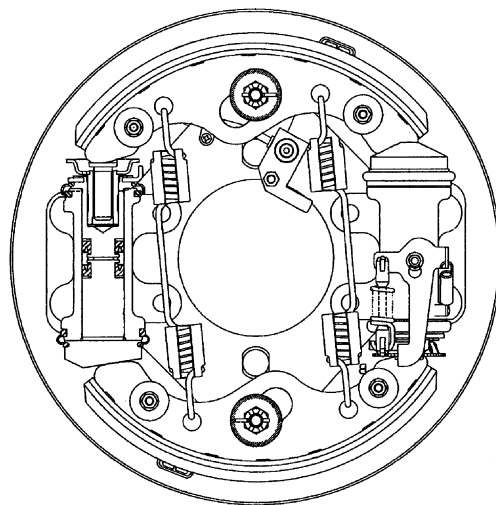


Right Hand Side

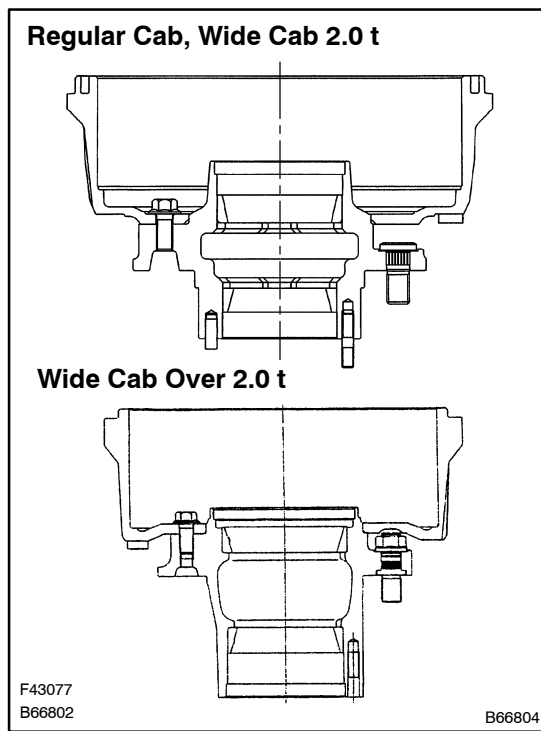
Outer Auto Adjuster Type:



Left Hand Side



Right Hand Side

**16. INSTALL REAR BRAKE DRUM**

- (a) Match the matchmarks, and assemble the drum and the hub.

Torque:

160 N·m (1632 kgf·cm, 118 ft·lbf) for Regular cab, wide cab 2.0 t

200 N·m (2,050 kgf·cm, 148 ft·lbf) for wide cab over 2.0 t

- (b) Install the drum to the axle hub (See pages 30-40 and 30-45).
- (c) Install the axle shaft (See pages 30-40 and 30-45).

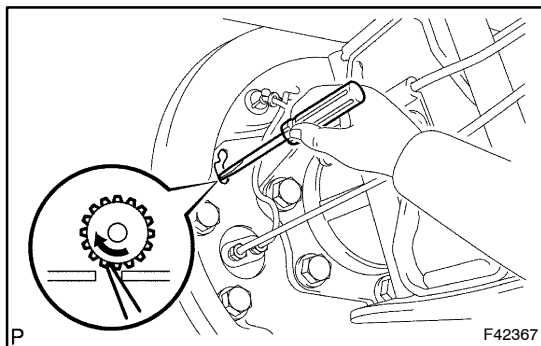
17. ADJUST REAR DRUM BRAKE SHOE CLEARANCE

- (a) Standard cab, wide cab 2.0 t:

Rotate the adjusting wheel to shoe expanding direction until the drum barely rotates by hand.

- (b) Return the adjusting wheel 5 notches to shoe contact direction. After the shoe is contracted if there is drag with the drum cannot rotate by hand, adjust the gap again, or remove the drum and check the brake installation condition.

- (c) The plug of service hole on the backside of the back plate is removed when adjusting the gap. Securely install the plug to prevent foreign matter from coming in.



- (d) Wide cab over 2.0 t:

Remove the shoe adjusting hole plug from the backing plate.

- (e) Using a screwdriver, rotate the wheel cylinder adjusting nut in the direction opposite to the arrow mark as shown in the illustration.

- (f) Adjust the brake shoe gap so that the clearance between the brake drum and shoe becomes 0.

- (g) Using a screwdriver, return the adjusting nut in the arrow mark direction.

**Standard number of notches to be backed off:
10 - 14 notches**

- (h) Rotate the tire and confirm the smooth rotation.

- (i) Install the shoe adjusting hole plug.

- (j) Check that the pedal reserve distance is correct (See page 32-7).

18. INSTALL REAR TIRE**19. FILL RESERVOIR WITH BRAKE FLUID (See page 32-4)****20. BLEED MASTER CYLINDER (See page 32-4)****21. BLEED BRAKE LINE (See page 32-4)**

22. CHECK FLUID LEVEL IN RESERVOIR
23. CHECK BRAKE FLUID LEAKAGE

ABS & TRACTION ACTUATOR ASSY

320U5-01

ON-VEHICLE INSPECTION

1. When using hand-held tester:

CHECK ACTUATOR OPERATION

- (a) Connect hand-held tester.
 - (1) Connect the hand-held tester to the DLC3.
 - (2) Start the engine and run it at idle.
 - (3) Select the ACTIVE TEST mode on the hand-held tester.

HINT:

Refer to the hand-held tester operator's manual for further details.

- (b) Check the actuator motor operation.
 - (1) With the motor relay ON, check the actuator motor operation noise.
 - (2) Turn the motor relay OFF.
 - (3) Depress the brake pedal and hold it for about 15 seconds. Check that the brake pedal cannot be depressed any more.
 - (4) With the motor relay ON, check that the pedal does not pulsate.

NOTICE:

Do not keep the motor relay ON for more than 5 seconds continuously. When operating it continuously, set an interval of more than 20 seconds.

- (5) Turn the motor relay OFF and release the brake pedal.
- (c) Check right front wheel operation.

NOTICE:

Never turn ON the solenoid which is not specified below.

- (1) With the brake pedal depressed, perform the following steps.
- (2) Turn the SFRH and SFRR solenoids ON simultaneously, and check that the pedal cannot be depressed any more.

NOTICE:

Do not continuously keep solenoid ON for more than 10 seconds. When operating it continuously, set an interval of more than 20 seconds.

- (3) Turn the SFRH and SFRR solenoids OFF simultaneously, and check that the pedal can be depressed.
- (4) Turn the motor relay ON, and check that the pedal returns.

NOTICE:

Do not continuously keep the motor relay ON for more than 5 seconds. When operating it continuously, set an interval of more than 20 seconds.

- (5) Turn the motor relay OFF and release the brake pedal.
- (d) Check other wheel operations.

As in the same procedure, check the solenoids of other wheels.

HINT:

Left front wheel: SFLH, SFLR

Rear wheel: SRH, SRR

- (e) Clear the DTC (See page 05-98).

2. When not using hand-held tester: CHECK ACTUATOR OPERATION

HINT:

Using the brake actuator checker (SST), check the operation of the actuator. If the actuator does not operate, check operation of the sub-wire harness G according to the instructions on pages 05-129 and 05-134. If the solenoid and/or pump motor relay are abnormal, replace the relays and inspect the actuator operation again.

(a) Inspect the battery voltage.

Battery voltage: 20 - 28 V

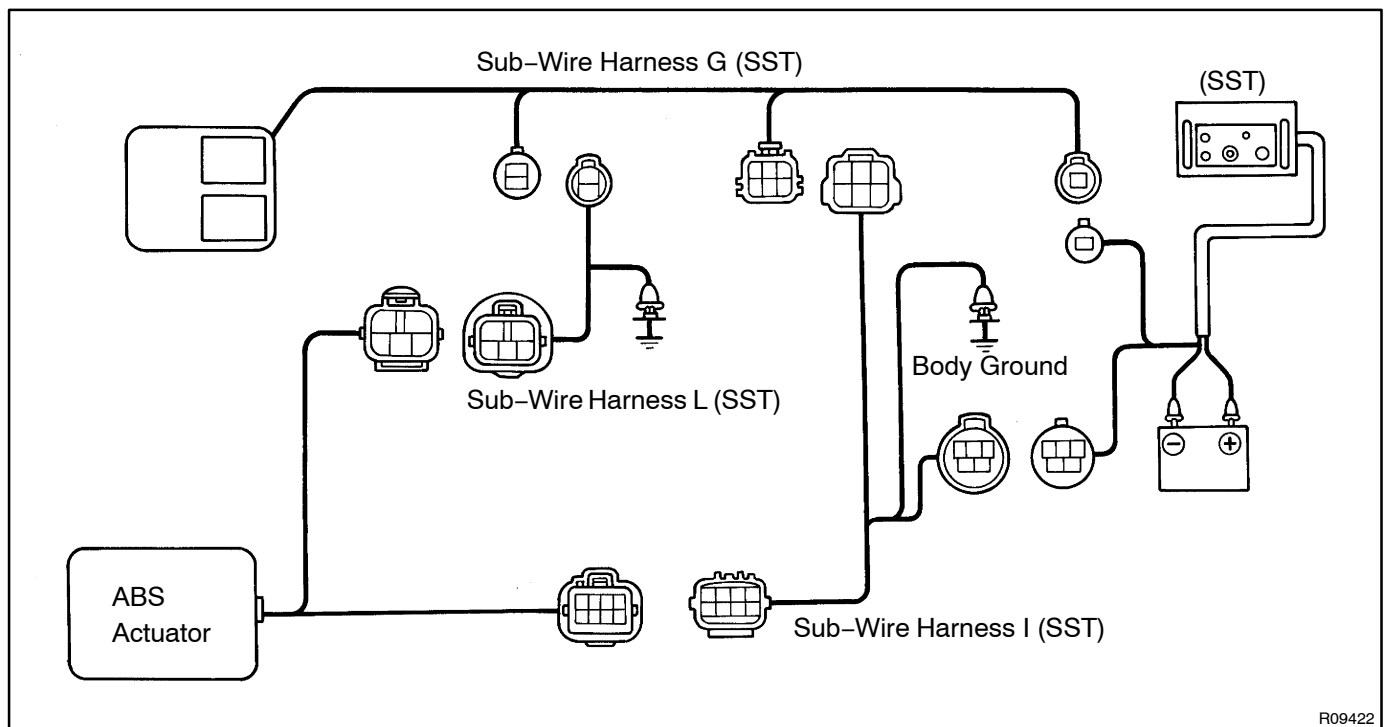
(b) Disconnect the 2 connectors from the brake actuator.

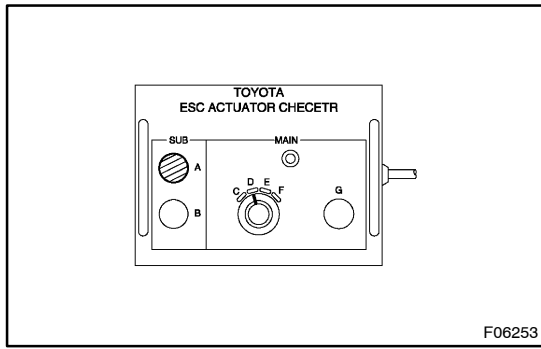
(c) Connect the actuator checker (SST) to the brake actuator.

(1) Connect the actuator checker (SST) to the actuator, control relay and body side wire harness through the sub-wire harness G, I and L (SST), as shown in the illustration.

SST 09990-00150, 09990-00250, 09990-00300, 09990-00360

(2) Connect the red cable of the checker to the battery positive (+) terminal and black cable to the negative (-) terminal. Connect the black cable of the sub-wire harness to the battery negative (-) terminal or the body ground.





(d) Check the brake actuator operation of the front RH wheel.
HINT:
The functions of the actuator checker switches are shown in the table below.

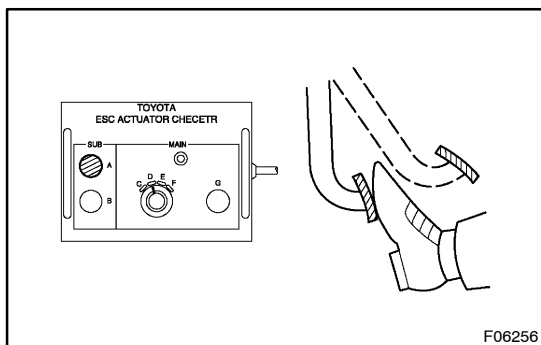
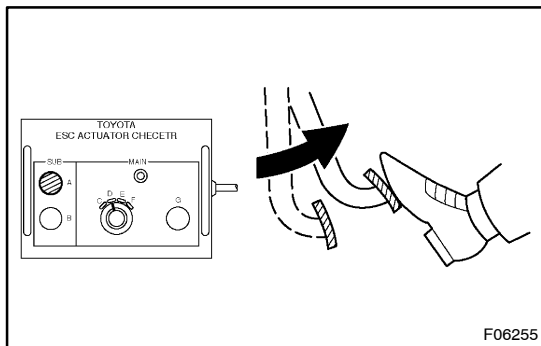
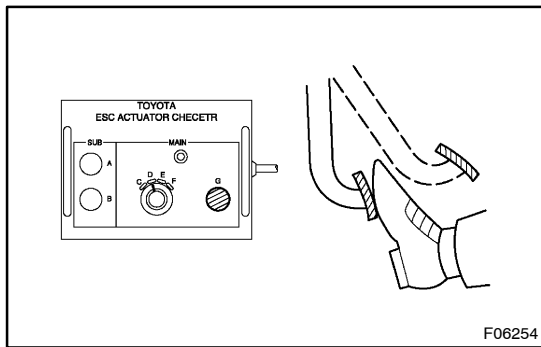
A	Motor ON/OFF
B	Front LH solenoid ON/OFF
C	-
D	Front RH solenoid
E	-
F	Rear solenoid
G	Solenoid ON/OFF

- (1) Start the engine and run it at idle.
- (2) Turn the select switch of the actuator checker to the "D" position.
- (3) Push the "A" switch and hold it for a few seconds. Make sure that you can hear the motor running sound.
- (4) Depress the brake pedal and hold it until step 7 is completed.
- (5) Push in the "G" push switch and hold it for a few seconds, and check that the brake pedal does not go down any more.

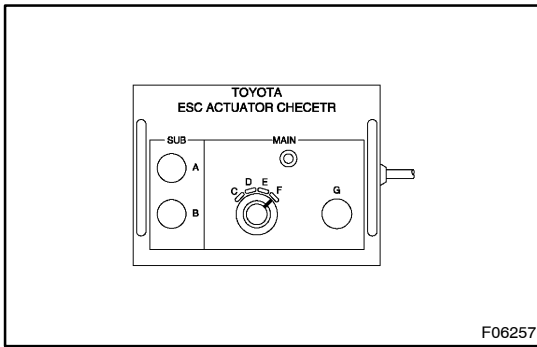
NOTICE:

Do not keep the "G" push switch held down for more than 10 seconds.

- (6) Release the "G" push switch and check that the pedal goes down further more.
- (7) Push in the "A" switch and check that the pedal returns.
- (8) Release the brake pedal.



- (9) Push in the "A" switch and hold it for a few seconds.
- (10) Depress the brake pedal and hold it for about 15 seconds. As you hold the pedal down, push in the "A" switch for a few seconds, and check that the brake pedal does not pulsate.
- (11) Release the brake pedal.



- (e) Check the operation of the rear wheel.
- (1) Turn the select switch to the "F" position.
 - (2) Repeat 3 to 11 of step d, checking the actuator operation in the same way.

(f) Inspect the operation of the front wheel.

HINT:

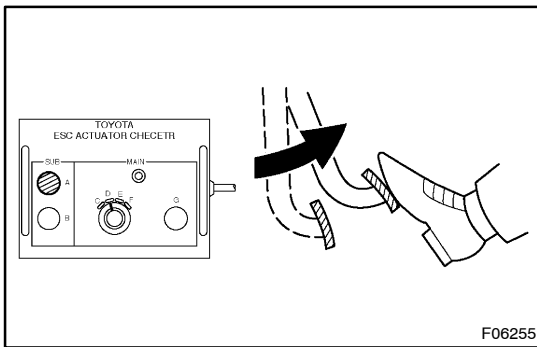
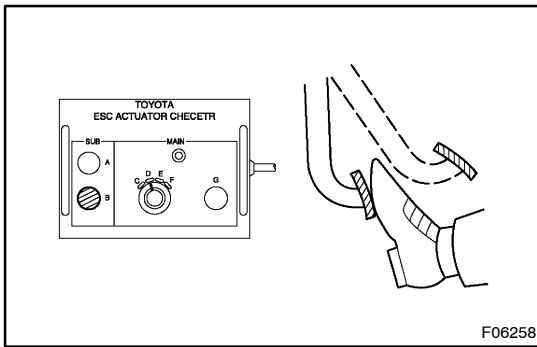
Push in the "B" switch instead of the "G" switch, and inspect it in any selector switch position.

- (1) Push in the "A" switch and hold it for a few seconds.
- (2) Depress the brake pedal and hold it until step 5 is completed.
- (3) Push in the "B" switch and hold it for a few seconds, and check that the brake pedal does not go down any more.

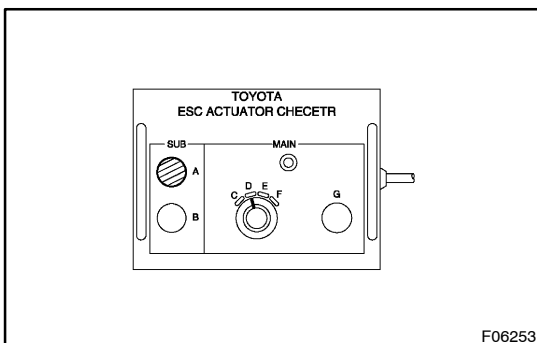
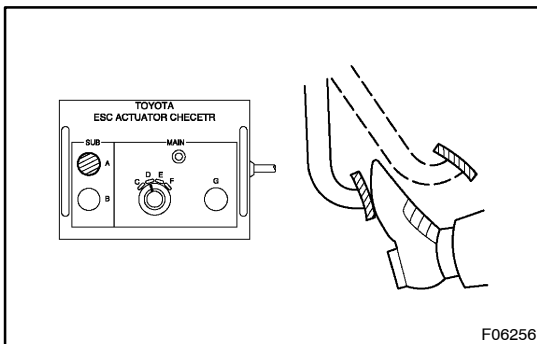
NOTICE:

Do not keep the "B" switch held down for more than 10 seconds.

- (4) Release the "B" switch and check that the pedal goes down further.
- (5) Push in the "A" switch and check that the pedal returns.
- (6) Release the brake pedal.



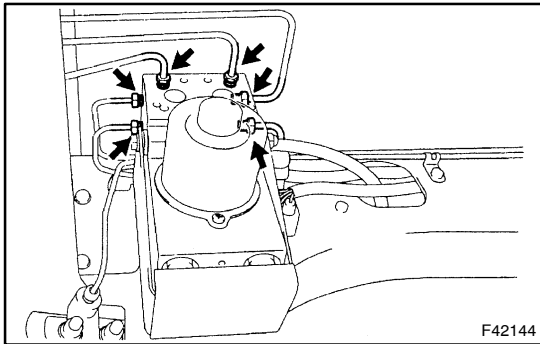
- (7) Push in the "A" switch and hold it for a few seconds.
- (8) Depress the brake pedal and hold it for about 15 seconds. As you hold the pedal down, push in the "A" switch for a few seconds, and check that the brake pedal does not pulsate.
- (9) Release the brake pedal.



- (g) Push the "A" switch.
- (1) Push in the "A" switch and hold it for a few seconds.
 - (2) Stop the engine.
- (h) Disconnect the actuator checker (SST) and 3 sub-wire harness (SST) from the actuator.
SST 09990-00150, 09990-00250, 09990-00300, 09990-00360
- (i) Connect the 2 connectors to the actuator.

REPLACEMENT

1. DRAIN BRAKE FLUID



2. DISCONNECT BRAKE LINE

- (a) Using SST, disconnect the 6 brake lines from the brake actuator.
SST 09023-00100

3. REMOVE ABS & TRACTION ACTUATOR ASSY

- (a) Disconnect the connectors at 2 places.
(b) Remove the 3 nuts and actuator.

4. INSTALL ABS & TRACTION ACTUATOR ASSY

- (a) Install the actuator with the 3 nuts.
Torque: 5.4 N·m (55 kgf·cm, 48 in·lbf)
(b) Connect the 2 connectors.

5. INSTALL BRAKE LINE

- (a) Using SST, connect the 6 brake lines.
SST 09023-00100
Torque:
12.9 N·m (131 kgf·cm, 9.4 ft·lbf) for use with SST
15 N·m (155 kgf·cm, 11 ft·lbf)

HINT:

Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

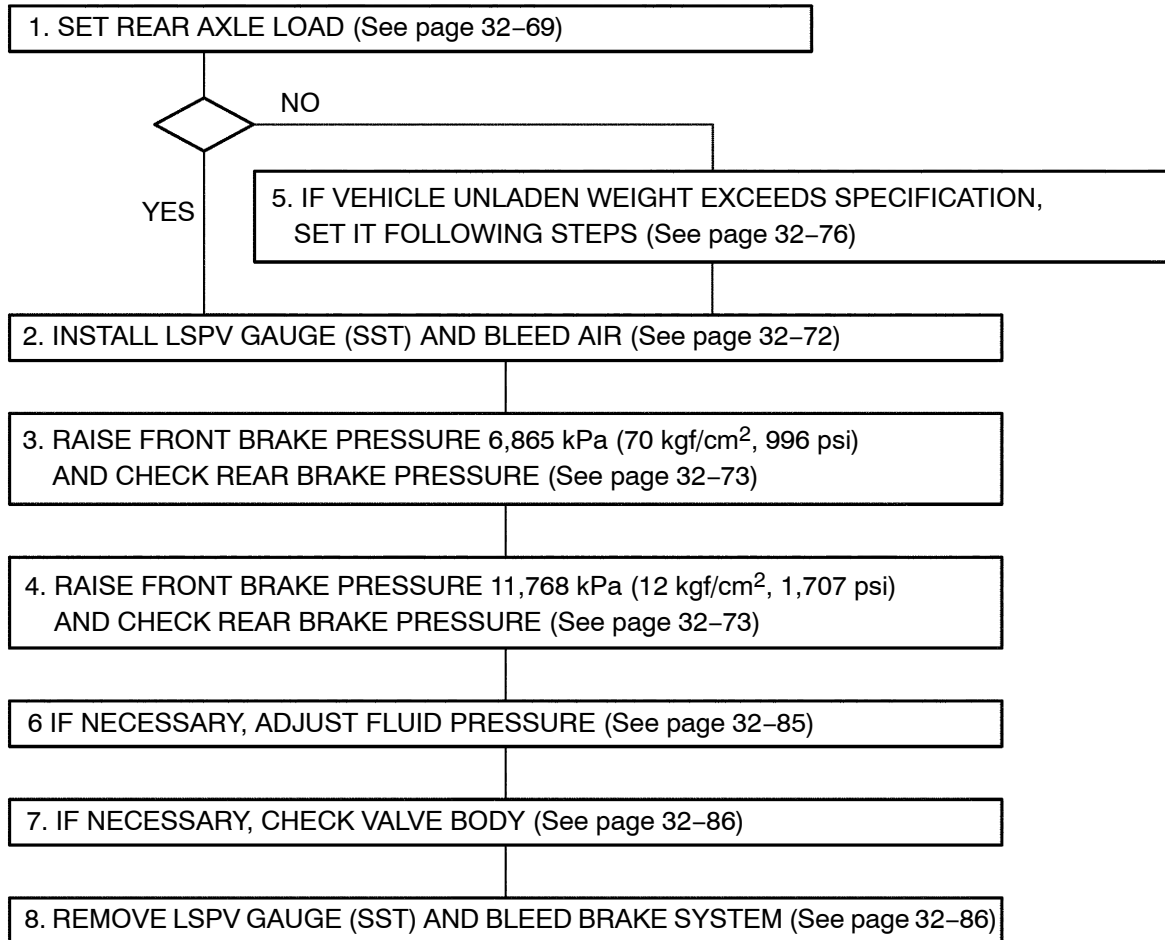
6. **FILL RESERVOIR WITH BRAKE FLUID (See page 32-4)**
7. **BLEED MASTER CYLINDER (See page 32-4)**
8. **BLEED BRAKE LINE (See page 32-4)**
9. **CHECK FLUID LEVEL IN RESERVOIR (See page 32-4)**
10. **CHECK BRAKE FLUID LEAKAGE**
11. **CHECK BRAKE ACTUATOR WITH HAND-HELD TESTER OR ACTUATOR CHECKER (See page 32-64)**

LOAD SENSING PROPORTIONING VALVE

ON-VEHICLE INSPECTION

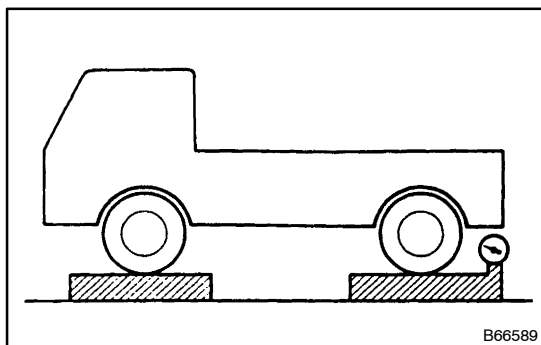
320U7-01

PROCEDURE FLOW OF ON-VEHICLE INSPECTION



P

B66689



B66589

1. SET REAR AXLE LOAD

XZU302-TPMLS3	1,000 kg (2,200 lb)
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HINT:

If the vehicle unladen weight exceeds the specification, set it by following step 5.

Rear axle load (including vehicle weight) table for the BU series:

Model	Front brake	Rear axle load kg (lb)
BU300R-TKMMWQ3	Disc	1,350 (3,030)
BU300R-TQMMWQ3	Disc	1,350 (3,030)
BU303L-TBMLS	Drum	1,300 (2,920)

BU303L-TBMLS3	Drum	1,300 (2,920)
BU303L-TBMMS	Drum	1,600 (3,590)
BU303L-TBMMS3	Drum	1,600 (3,590)
BU303L-TBMMS3	Disc	1,200 (2,700)
BU303R-TBMLS	Drum	1,300 (2,920)
BU303R-TBMLS3	Drum	1,300 (2,920)
BU303R-TBMMS	Drum	1,600 (3,590)
BU303R-TBMMS	Disc	1,200 (2,700)
BU303R-TBMMS3	Drum	1,600 (3,590)
BU303R-TBMMS3	Disc	1,200 (2,700)
BU340R-TKMMWQ3	Disc	1,400 (3,140)
BU343L-TKMMS	Drum	1,600 (3,590)
BU343L-TKMMS	Disc	1,150 (2,580)
BU343L-TKMMS3	Drum	1,600 (3,590)
BU343L-TKMMS3	Disc	1,150 (2,580)
BU343L-TKMQS	Drum	1,600 (3,590)
BU343L-TKMQS	Disc	1,200 (2,700)
BU343L-TKMQS3	Drum	1,600 (3,590)
BU343L-TKMQS3	Disc	1,200 (2,700)
BU343R-TKMMS	Drum	1,600 (3,590)
BU343R-TKMMS	Disc	1,150 (2,580)
BU343R-TKMMS3	Drum	1,600 (3,590)
BU343R-TKMMS3	Disc	1,150 (2,580)
BU343R-TKMQS	Drum	1,600 (3,590)
BU343R-TKMQS	Disc	1,200 (2,700)
BU343R-TKMQS3	Drum	1,600 (3,590)
BU343R-TKMQS3	Disc	1,200 (2,700)
BU410L-TKFQWR3	Drum	1,730 (3,890)
BU410L-TKFRWR3	Drum	1,650 (3,710)
BU420L-TKFQWR3	Drum	1,730 (3,890)
BU420L-TKFRWR3	Drum	1,650 (3,710)
BV303L-TBMMS	Disc	1,200 (2,700)

Rear axle load (including vehicle weight) table for the WU series:

Model	Front brake	Rear axle load kg (lb)
WU300L-HBMLS	Drum	1,300 (2,920)
WU300L-HBMLS3	Drum	1,300 (2,920)
WU300L-HBMMS	Drum	1,600 (3,590)
WU300L-HBMMS	Disc	1,250 (2,810)
WU300L-HBMMS3	Drum	1,600 (3,590)
WU300L-HBMMS3	Disc	1,250 (2,810)
WU300L-TBMLSV	Drum	1,300 (2,920)
WU300L-TBMLSV3	Drum	1,300 (2,920)
WU300L-TBMMSV	Drum	1,600 (3,590)
WU300L-TBMMSV	Disc	1,250 (2,810)
WU300L-TBMMSV3	Drum	1,600 (3,590)
WU300L-TBMMSV3	Disc	1,250 (2,810)
WU340L-HKMMS	Drum	1,600 (3,590)
WU340L-HKMMS	Disc	1,150 (2,580)
WU340L-HKMMS3	Drum	1,600 (3,590)
WU340L-HKMMS3	Disc	1,150 (2,580)
WU340L-TKMMSV	Drum	1,600 (3,590)
WU340L-TKMMSV	Disc	1,150 (2,580)

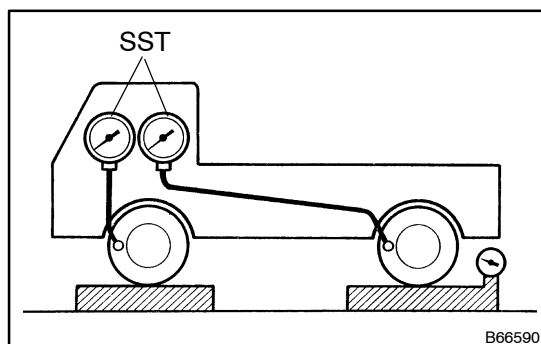
BRAKE - LOAD SENSING PROPORTIONING VALVE

WU340L-TKMMSV3	Drum	1,600 (3,590)
WU340L-TKMMSV3	Disc	1,150 (2,580)
WU410L-HKMMS3	Drum	1,550 (3,480)
WU410L-HKMQS	Drum	1,730 (3,890)
WU410L-HKMQS3	Drum	1,730 (3,890)
WU410L-TKMQS	Drum	1,730 (3,890)
WU410L-TKMQS3	Drum	1,730 (3,890)
WU410L-TKMQSV	Drum	1,730 (3,890)
WU410L-TKMQSV3	Drum	1,730 (3,890)
WU410R-HKMMS3	Drum	1,550 (3,480)
WU410R-HKMQS	Drum	1,730 (3,890)
WU410R-HKMQS3	Drum	1,730 (3,890)
WU410R-TKMQS	Drum	1,730 (3,890)
WU410R-TKMQS3	Drum	1,730 (3,890)
WU410R-TKMRS	Drum	1,650 (3,710)
WU410R-TKMRS3	Drum	1,650 (3,710)

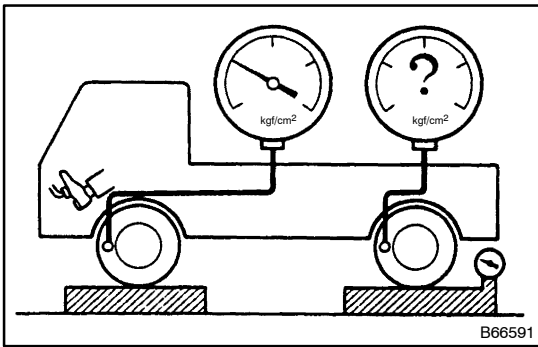
Rear axle load (including vehicle weight) table for the XZU series:

Model	Front brake	Rear axle load kg (lb)
XZU300L-TKMMWR3	Drum	1,650 (3,710)
XZU300L-TKMQR3	Drum	1,780 (4,000)
XZU320L-TMMQR3	Drum	1,730 (3,890)
XZU330L-TKMQR3	Drum	1,550 (3,480)
XZU330L-TKMQR3	Drum	1,600 (3,590)
XZU340L-TKMQR3	Drum	1,650 (3,710)
XZU404R-HKMMWQ3	Disc	1,400 (3,140)
XZU404R-TKMMWQ3	Disc	1,400 (3,140)
XZU412L-HKMMW3	Drum	1,550 (3,480)
XZU412L-HKMQR3	Drum	1,730 (3,890)
XZU412L-HKMRS	Drum	1,650 (3,710)
XZU412L-HKMRS3	Drum	1,650 (3,710)
XZU412L-HKMRSV	Drum	1,650 (3,710)
XZU412L-HKMRSV3	Drum	1,650 (3,710)
XZU412L-HKMRW3	Drum	1,650 (3,710)
XZU412L-HKMTSV	Drum	1,730 (3,890)
XZU412L-HKMTSV3	Drum	1,730 (3,890)
XZU412L-HKMTW3	Drum	1,730 (3,890)
XZU412L-TKMMW3	Drum	1,550 (3,480)
XZU412L-TKMQR3	Drum	1,730 (3,890)
XZU412L-TKMRS	Drum	1,650 (3,710)
XZU412L-TKMRS3	Drum	1,650 (3,710)
XZU412L-TKMRSV	Drum	1,650 (3,710)
XZU412L-TKMRSV3	Drum	1,650 (3,710)
XZU412L-TKMRW3	Drum	1,650 (3,710)
XZU412L-TKMTSV	Drum	1,730 (3,890)
XZU412L-TKMTSV3	Drum	1,730 (3,890)
XZU412L-TKMTW3	Drum	1,730 (3,890)
XZU412R-HKMMW	Drum	1,550 (3,480)
XZU412R-HKMMW3	Drum	1,550 (3,480)
XZU412R-HKMQR	Drum	1,730 (3,890)
XZU412R-HKMQR3	Drum	1,730 (3,890)
XZU412R-HKMRS	Drum	1,650 (3,710)
XZU412R-HKMRS3	Drum	1,650 (3,710)

XZU412R-TKMMW	Drum	1,550 (3,480)
XZU412R-TKMMW3	Drum	1,550 (3,480)
XZU412R-TKMqw	Drum	1,730 (3,890)
XZU412R-TKMqw3	Drum	1,730 (3,890)
XZU412R-TKMRS	Drum	1,650 (3,710)
XZU412R-TKMRS3	Drum	1,650 (3,710)
XZU414L-TKMMW3	Drum	1,550 (3,480)
XZU414R-HKMMWQ3	Disc	1,300 (2,920)
XZU414R-TKMMWQ3	Disc	1,300 (2,920)
XZU422L-HKMRS	Drum	1,650 (3,710)
XZU422L-HKMRS3	Drum	1,650 (3,710)
XZU422L-HKMRSV	Drum	1,650 (3,710)
XZU422L-HKMRSV3	Drum	1,650 (3,710)
XZU422L-HKMRW3	Drum	1,650 (3,710)
XZU422L-HKMTS3	Drum	1,650 (3,710)
XZU422L-HKMTSV	Drum	1,650 (3,710)
XZU422L-HKMTSV3	Drum	1,650 (3,710)
XZU422L-HKMTW3	Drum	1,650 (3,710)
XZU422L-TKMRS	Drum	1,650 (3,710)
XZU422L-TKMRS3	Drum	1,650 (3,710)
XZU422L-TKMRSV	Drum	1,650 (3,710)
XZU422L-TKMRSV3	Drum	1,650 (3,710)
XZU422L-TKMRW3	Drum	1,650 (3,710)
XZU422L-TKMTSV	Drum	1,650 (3,710)
XZU422L-TKMTSV3	Drum	1,650 (3,710)
XZU422L-TKMTW3	Drum	1,650 (3,710)
XZU422R-HKMRS3	Drum	1,650 (3,710)
XZU422R-TKMRS	Drum	1,650 (3,710)
XZU422R-TKMRS3	Drum	1,650 (3,710)
XZU424L-HKMTW3	Drum	1,650 (3,710)
XZU424L-TKMRW3	Drum	1,650 (3,710)
XZU424L-TKMTWN3	Drum	1,650 (3,710)
XZU422L-HKMTS	Drum	1,650 (3,710)
XZU422R-HKMRS	Drum	1,650 (3,710)



2. **INSTALL LSPV GAUGE (SST) AND BLEED AIR**
SST 09709-29018



3. RAISE FRONT BRAKE PRESSURE 6,865 kPa (70 kgf/cm², 996 psi) AND CHECK REAR BRAKE PRESSURE

XZU302-TPMLS3	5.8 MPa ± 0.49 MPa (59 ± 5 kgf/cm ² , 839 ± 71 psi)
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HINT:

Gradually depress on the brake pedal until the pressure reaches the specified value. Do not overshoot the specified pressure. Read the value of rear pressure 2 seconds after adjusting to the specified fluid pressure.

4. RAISE FRONT BRAKE PRESSURE 11,768 kPa (120 kgf/cm², 1,707 psi) AND CHECK REAR BRAKE PRESSURE

Rear brake fluid pressure:

7,400 kPa ± 686 kPa (75 ± 7 kgf/cm², 1,067 ± 100 psi)

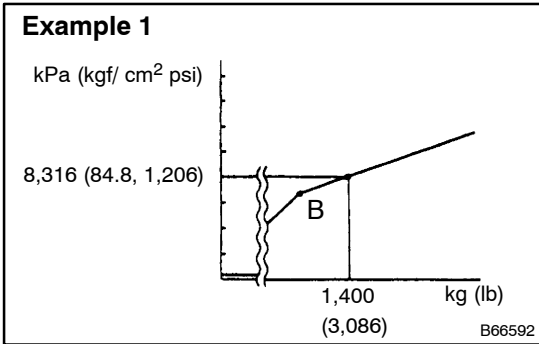
Rear brake fluid pressure table for the BU series:

Model	Front brake	Rear brake pressure MPa (kgf/cm ² , psi)
BU300R-TKMMWQ3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU300R-TQMMWQ3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303L-TBMLS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303L-TBMLS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303L-TBMMS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303L-TBMMS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303L-TBMMS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303R-TBMLS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303R-TBMLS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303R-TBMMS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303R-TBMMS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU303R-TBMMS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU340R-TKMMWQ3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMMS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMMS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMMS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMMS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMQS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMQS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMQS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343L-TKMQS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMMS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMMS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMMS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMMS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMQS	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMQS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMQS3	Drum	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU343R-TKMQS3	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)
BU410L-TKFQWR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
BU410L-TKFRWR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
BU420L-TKFQWR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
BU420L-TKFRWR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
BU303L-TBMMS	Disc	5.6 ± 0.49 (57 ± 5, 810 ± 70)

BRAKE - LOAD SENSING PROPORTIONING VALVE

XZU412L-HKMRW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMTSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMTSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-HKMTW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMMW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMqw3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMRSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMRSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMRW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMTSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMTSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412L-TKMTW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMMW	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMMW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMqw	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMqw3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-HKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMMW	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMMW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMqw	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMqw	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU412R-TKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU414L-TKMMW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU414R-HKMMWQ3	Disc	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU414R-TKMMWQ3	Disc	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMRSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMRSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMRW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMTS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMTSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMTSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-HKMTW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMRSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMRSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMRW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMTSV	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMTSV3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422L-TKMTW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422R-HKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422R-TKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422R-TKMRS3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU424L-HKMTW3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU424L-TKMR3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU424L-TKMTWN3	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)

XZU422L-HKMTS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)
XZU422R-HKMRS	Drum	5.4 ± 0.49 (55 ± 5, 780 ± 70)



5. IF VEHICLE UNLADEN WEIGHT EXCEEDS SPECIFICATION, SET IT BY FOLLOWING STEPS

(a) Make a graph of rear axle load and brake fluid pressure as shown in example 1 or 2, using the applicable data of A B C point data table.

(b) Input the rear axle load on the applicable graph and find out the fluid pressure crossover point.

Example: When the rear axle load is 1,400 kg (3,086 lb), the fluid pressure crossover point is 8,316 kPa (84.8 kgf/cm², 1,206 psi).

(c) Calculate the rear brake pressure when the front brake pressure is 7,845 kPa (80 kgf/cm², 1,138 psi) using the following formula.

X: Fluid Pressure Crossover Point

$$X + (80 - X) \times 0.37$$

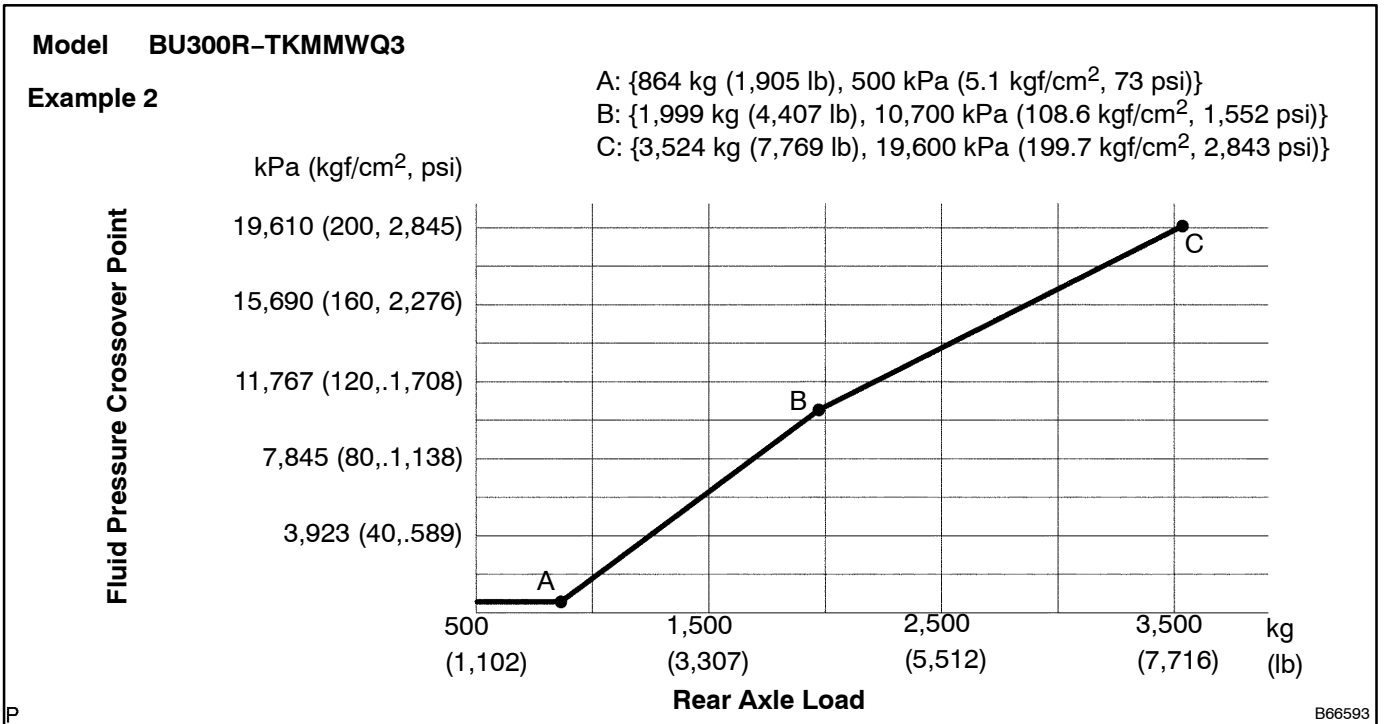
Example:

X: 8,316 kPa (84.8 kgf/cm², 1,206 psi)

$$84.8 + (80 - 84.8) \times 0.37 = 83.024$$

Rear brake pressure: 8,140 kPa (83.0 kgf/cm², 1,181 psi)

Service limit: ± 490 kPa (5 kgf/cm², 71 psi)



A B C point data table for the BU series:

Model	Front Brake	A		B		C	
		kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)
BU300R-TKMMWQ3	Disc	864 (1,905)	500 (5.1, 73)	1,999 (4,407)	10,700 (108.6, 1,552)	3,524 (7,769)	19,600 (199.7, 2,843)
BU300R-TQMMWQ3	Disc	864 (1,905)	500 (5.1, 73)	1,985 (4,376)	10,500 (107.3, 1,523)	3,527 (7,776)	19,600 (199.7, 2,843)
BU303L-TBMLS	Drum	1,009 (2,224)	500 (5.1, 73)	1,078 (2,377)	1,600 (15.8, 232)	2,556 (5,635)	10,200 (103.5, 1,479)
BU303L-TBMLS3	Drum	1,009 (2,224)	500 (5.1, 73)	1,078 (2,377)	1,600 (15.8, 232)	2,556 (5,635)	10,200 (103.5, 1,479)
BU303L-TBMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	14,100 (143.5, 2,045)
BU303L-TBMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	13,100 (134.1, 1,900)
BU303L-TBMMS	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	16,600 (169.8, 2,408)
BU303L-TBMMS Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	15,700 (160.5, 2,277)
BU303L-TBMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	14,100 (143.5, 2,045)
BU303L-TBMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	13,100 (134.1, 1,900)
BU303L-TBMMS3	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	16,600 (169.8, 2,408)
BU303L-TBMMS3 Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	15,700 (160.5, 2,277)
BU303R-TBMLS	Drum	1,009 (2,224)	500 (5.1, 73)	1,078 (2,377)	1,600 (15.8, 232)	2,556 (5,635)	10,200 (103.5, 1,479)
BU303R-TBMLS3	Drum	1,009 (2,224)	500 (5.1, 73)	1,078 (2,377)	1,600 (15.8, 232)	2,556 (5,635)	10,200 (103.5, 1,479)
BU303R-TBMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	14,100 (143.5, 2,045)
BU303R-TBMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	13,100 (134.1, 1,900)
BU303R-TBMMS	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	16,600 (169.8, 2,408)
BU303R-TBMMS Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	15,700 (160.5, 2,277)
BU303R-TBMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	14,100 (143.5, 2,045)
BU303R-TBMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,642 (8,029)	13,100 (134.1, 1,900)
BU303R-TBMMS3	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	16,600 (169.8, 2,408)
BU303R-TBMMS3 Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,839 (4,053)	9,000 (91.3, 1,305)	3,642 (8,029)	15,700 (160.5, 2,277)
BU340R-TKMMWQ3	Disc	914 (2,015)	500 (5.1, 73)	1,999 (4,407)	10,200 (104, 1,479)	3,311 (7,300)	18,100 (184.6, 2,625)
BU343L-TKMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	13,200 (134.3, 1,915)
BU343L-TKMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	12,300 (126, 1,784)
BU343L-TKMMS	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	16,100 (163.9, 2,335)
BU343L-TKMMS Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	15,300 (155.6, 2,219)

BU343L-TKMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	13,200 (134.3, 1,915)
BU343L-TKMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	12,300 (126, 1,784)
BU343L-TKMMS3	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	16,100 (163.9, 2,335)
BU343L-TKMMS3 Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	15,300 (155.6, 2,219)
BU343L-TKMQS	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	13,300 (135.5, 1,929)
BU343L-TKMQS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	12,500 (127.4, 1,813)
BU343L-TKMQS	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,900 (161.8, 2,306)
BU343L-TKMQS Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,100 (153.7, 2,190)
BU343L-TKMQS3	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	13,300 (135.5, 1,929)
BU343L-TKMQS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	12,500 (127.4, 1,813)
BU343L-TKMQS3	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,900 (161.8, 2,306)
BU343L-TKMQS3 Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,100 (153.7, 2,190)
BU343R-TKMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	13,200 (134.3, 1,915)
BU343R-TKMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	12,300 (126, 1,784)
BU343R-TKMMS	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	16,100 (163.9, 2,335)
BU343R-TKMMS Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	15,300 (155.6, 2,219)
BU343R-TKMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	13,200 (134.3, 1,915)
BU343R-TKMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,424 (7,549)	12,300 (126, 1,784)
BU343R-TKMMS3	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	16,100 (163.9, 2,335)
BU343R-TKMMS3 Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,424 (7,549)	15,300 (155.6, 2,219)
BU343R-TKMQS	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	13,300 (135.5, 1,929)
BU343R-TKMQS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	12,500 (127.4, 1,813)
BU343R-TKMQS	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,900 (161.8, 2,306)
BU343R-TKMQS Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,100 (153.7, 2,190)
BU343R-TKMQS3	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	13,300 (135.5, 1,929)
BU343R-TKMQS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,869 (4,119)	6,600 (67, 957)	3,429 (7,560)	12,500 (127.4, 1,813)
BU343R-TKMQS3	Disc (OPT)	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,900 (161.8, 2,306)
BU343R-TKMQS3 Reinforced rear spring	Disc	525 (1,157)	500 (5.1, 73)	1,869 (4,119)	9,100 (93.3, 1,320)	3,429 (7,560)	15,100 (153.7, 2,190)
BU410L-TKFQWR3	Drum	1,247 (2,750)	500 (5.1, 73)	1,912 (4,215)	6,100 (61.7, 885)	4,134 (9,114)	12,200 (124.3, 1,769)

BRAKE - LOAD SENSING PROPORTIONING VALVE

BU410L-TKFQWR3 Reinforced rear spring	Drum	1,135 (2,502)	500 (5.1, 73)	2,246 (4,951)	8,000 (82, 1,160)	4,134 (9,114)	13,800 (141.3, 2,002)
BU410L-TKFRWR3	Drum	1,060 (2,336)	500 (5.1, 73)	2,244 (4,947)	8,600 (87.8, 1,247)	4,891 (10,783)	16,000 (162.8, 2,321)
BU410L-TKFRWR3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,163 (4,769)	8,000 (82, 1,160)	4,891 (10,783)	14,200 (145.3, 2,060)
BU420L-TKFQWR3	Drum	1,247 (2,750)	500 (5.1, 73)	1,925 (4,243)	6,200 (62.8, 899)	4,060 (8,951)	11,900 (121.7, 1,726)
BU420L-TKFQWR3 Reinforced rear spring	Drum	1,140 (2,512)	500 (5.1, 73)	2,259 (4,980)	8,200 (83.2, 1,189)	4,060 (8,951)	13,700 (139.4, 1,987)
BU420L-TKFRWR3	Drum	1,060 (2,336)	500 (5.1, 73)	2,244 (4,947)	8,600 (87.8, 1,247)	4,829 (10,646)	15,700 (159.9, 2,277)
BU420L-TKFRWR3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,163 (4,769)	8,000 (82, 1,160)	4,829 (10,646)	14,000 (142.9, 2,031)

A B C point data table for the WU series:

Model	Front Brake	A		B		C	
		kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)
WU300L-HBMLS	Drum	1,009 (2,224)	500 (5.1, 73)	1,015 (2,237)	600 (6.1, 87)	2,497 (5,505)	9,200 (93.8, 1,334)
WU300L-HBMLS3	Drum	1,009 (2,224)	500 (5.1, 73)	1,015 (2,237)	600 (6.1, 87)	2,497 (5,505)	9,200 (93.8, 1,334)
WU300L-HBMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,900 (141.8, 2,016)
WU300L-HBMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,000 (132.6, 1,885)
WU300L-HBMMS	Disc (OPT)	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	16,200 (164.8, 2,350)
WU300L-HBMMS Reinforced rear spring	Disc	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	15,300 (155.6, 2,219)
WU300L-HBMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,900 (141.8, 2,016)
WU300L-HBMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,000 (132.6, 1,885)
WU300L-HBMMS3	Disc (OPT)	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	16,200 (164.8, 2,350)
WU300L-HBMMS3 Reinforced rear spring	Disc	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	15,300 (155.6, 2,219)
WU300L-TBMLSV	Drum	1,009 (2,224)	500 (5.1, 73)	1,015 (2,237)	600 (6.1, 87)	2,497 (5,505)	9,200 (93.8, 1,334)
WU300L-TBMLSV3	Drum	1,009 (2,224)	500 (5.1, 73)	1,015 (2,237)	600 (6.1, 87)	2,497 (5,505)	9,200 (93.8, 1,334)
WU300L-TBMMSV	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,900 (141.8, 2,016)
WU300L-TBMMSV Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,000 (132.6, 1,885)
WU300L-TBMMSV	Disc (OPT)	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	16,200 (164.8, 2,350)
WU300L-TBMMSV Reinforced rear spring	Disc	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	15,300 (155.6, 2,219)
WU300L-TBMMSV3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,900 (141.8, 2,016)
WU300L-TBMMSV3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,589 (7,912)	13,000 (132.6, 1,885)
WU300L-TBMMSV3	Disc (OPT)	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	16,200 (164.8, 2,350)
WU300L-TBMMSV3 Reinforced rear spring	Disc	575 (1,268)	500 (5.1, 73)	1,839 (4,053)	8,600 (88, 1,247)	3,589 (7,912)	15,300 (155.6, 2,219)

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WU340L-HKMMS	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	13,000 (132.6, 1,885)
WU340L-HKMMS Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	12,200 (124.6, 1,769)
WU340L-HKMMS	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,900 (162.2, 2,306)
WU340L-HKMMS Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,100 (154.2, 2,190)
WU340L-HKMMS3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	13,000 (132.6, 1,885)
WU340L-HKMMS3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	12,200 (124.6, 1,769)
WU340L-HKMMS3	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,900 (162.2, 2,306)
WU340L-HKMMS3 Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,100 (154.2, 2,190)
WU340L-TKMMSV	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	13,000 (132.6, 1,885)
WU340L-TKMMSV Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	12,200 (124.6, 1,769)
WU340L-TKMMSV	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,900 (162.2, 2,306)
WU340L-TKMMSV Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,100 (154.2, 2,190)
WU340L-TKMMSV3	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	13,000 (132.6, 1,885)
WU340L-TKMMSV3 Reinforced rear spring	Drum	925 (2,039)	500 (5.1, 73)	1,839 (4,053)	6,400 (65, 928)	3,374 (7,438)	12,200 (124.6, 1,769)
WU340L-TKMMSV3	Disc (OPT)	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,900 (162.2, 2,306)
WU340L-TKMMSV3 Reinforced rear spring	Disc	475 (1,047)	500 (5.1, 73)	1,839 (4,053)	9,300 (94.6, 1,349)	3,374 (7,438)	15,100 (154.2, 2,190)
WU410L-HKMMS3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,344 (7,372)	11,800 (120.6, 1,711)
WU410L-HKMMS3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,581)	9,000 (91.3, 1,305)	3,344 (7,372)	13,400 (136.2, 1,944)
WU410L-HKMQS	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-HKMQS Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410L-HKMQS3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-HKMQS3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410L-TKMQS	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-TKMQS Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410L-TKMQS3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-TKMQS3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410L-TKMQSV	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410L-TKMQSV Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410L-TKMQSV3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)

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WU410L-TKMQS3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410R-HKMMS3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,344 (7,372)	11,800 (120.6, 1,711)
WU410R-HKMMS3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,581)	9,000 (91.3, 1,305)	3,344 (7,372)	13,400 (136.2, 1,944)
WU410R-HKMQS	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410R-HKMQS Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410R-HKMQS3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410R-HKMQS3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410R-TKMQS	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410R-TKMQS Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410R-TKMQS3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65, 928)	4,168 (9,189)	12,500 (127.9, 1,813)
WU410R-TKMQS3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,168 (9,189)	14,100 (144.2, 2,045)
WU410R-TKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.4, 1,305)	5,009 (11,043)	16,500 (167.8, 2,393)
WU410R-TKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.7, 1,218)	5,009 (11,043)	14,700 (150.1, 2,132)
WU410R-TKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.4, 1,305)	5,009 (11,043)	16,500 (167.8, 2,393)
WU410R-TKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.7, 1,218)	5,009 (11,043)	14,700 (150.1, 2,132)

A B C point data table for the XZU series:

Model	Front Brake	A		B		C	
		kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)	kg (lb)	kPa (kg/ cm ² , psi)
XZU300L-TKMMWR3	Drum	991 (2,185)	500 (5.1, 73)	2,179 (4,803)	8,300 (84.9, 1,204)	2,555 (5,633)	12,900 (132, 1,871)
XZU300L-TKMQR3	Drum	1,121 (2,471)	500 (5.1, 73)	2,152 (4,745)	7,300 (74.4, 1,059)	2,943 (6,488)	13,000 (132.4, 1,885)
XZU320L-TMMQR3	Drum	1,127 (2,485)	500 (5.1, 73)	2,406 (5,304)	8,700 (89, 1,262)	4,246 (9,361)	16,400 (167.1, 2,379)
XZU330L-TKMQR3	Drum	875 (1,929)	500 (5.1, 73)	1,908 (4,206)	7,100 (72.9, 1,030)	4,247 (9,363)	16,300 (166, 2,364)
XZU330L-TKMSWR3	Drum	1,095 (2,414)	500 (5.1, 73)	2,012 (4,436)	8,400 (85.6, 1,218)	4,994 (11,010)	17,000 (173.3, 2,466)
XZU340L-TKMSWR3	Drum	1,145 (2,524)	500 (5.1, 73)	2,012 (4,436)	8,000 (81.2, 1,160)	4,815 (10,615)	16,000 (163, 2,321)
XZU404R-HKMMWQ3	Disc	879 (1,938)	500 (5.1, 73)	1,622 (3,576)	6,300 (63.8, 914)	3,307 (7,291)	11,800 (119.9, 1,711)
XZU404R-TKMMWQ3	Disc	879 (1,938)	500 (5.1, 73)	1,622 (3,576)	6,300 (63.8, 914)	3,307 (7,291)	11,800 (119.9, 1,711)
XZU412L-HKMMW3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412L-HKMMW3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412L-HKMQR3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412L-HKMQR3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)

XZU412L-HKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-HKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-HKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-HKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-HKMRSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-HKMRSV Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-HKMRSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-HKMRSV3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-HKMRW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,929 (10,867)	16,300 (166, 2,364)
XZU412L-HKMRW3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,929 (10,867)	14,600 (149, 2,118)
XZU412L-HKMTSV	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,812 (12,813)	15,600 (159.5, 2,263)
XZU412L-HKMTSV3	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,812 (12,813)	15,600 (159.5, 2,263)
XZU412L-HKMTW3	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,772 (12,725)	15,600 (159.5, 2,263)
XZU412L-TKMMW3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412L-TKMMW3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412L-TKMQW3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412L-TKMQW3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412L-TKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-TKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-TKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-TKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-TKMRSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-TKMRSV Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-TKMRSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412L-TKMRSV3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412L-TKMRW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,929 (10,867)	16,300 (165.8, 2,364)
XZU412L-TKMRW3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,929 (10,867)	14,600 (149, 2,118)
XZU412L-TKMTSV	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,812 (12,813)	15,600 (159.5, 2,263)
XZU412L-TKMTSV3	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,812 (12,813)	15,600 (159.5, 2,263)

BRAKE - LOAD SENSING PROPORTIONING VALVE

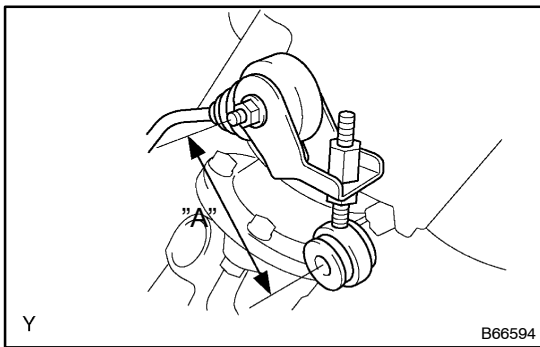
XZU412L-TKMTW3	Drum	1,140 (2,513)	500 (5.1, 73)	2,250 (4,960)	8,100 (82.4, 1,175)	5,772 (12,725)	15,600 (159.5, 2,263)
XZU412R-HKMMW	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412R-HKMMW Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412R-HKMMW3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412R-HKMMW3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412R-HKMQW	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412R-HKMQW Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412R-HKMQW3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412R-HKMQW3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412R-HKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412R-HKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412R-HKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412R-HKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412R-TKMMW	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412R-TKMMW Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412R-TKMMW3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU412R-TKMMW3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU412R-TKMQW	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412R-TKMQW Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412R-TKMQW3	Drum	1,247 (2,750)	500 (5.1, 73)	1,955 (4,309)	6,400 (65.4, 928)	4,107 (9,054)	12,400 (126.2, 1,798)
XZU412R-TKMQW3 Reinforced rear spring	Drum	1,135 (2,503)	500 (5.1, 73)	2,289 (5,046)	8,300 (85, 1,204)	4,107 (9,054)	14,000 (142.5, 2,031)
XZU412R-TKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412R-TKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU412R-TKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,969 (10,955)	16,300 (166, 2,364)
XZU412R-TKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,969 (10,955)	14,600 (149, 2,118)
XZU414L-TKMMW3	Drum	1,067 (2,353)	500 (5.1, 73)	1,866 (4,114)	7,200 (73.2, 1,044)	3,264 (7,196)	11,600 (118.4, 1,682)
XZU414L-TKMMW3 Reinforced rear spring	Drum	955 (2,105)	500 (5.1, 73)	2,200 (4,851)	9,000 (91.3, 1,305)	3,264 (7,196)	13,200 (134.2, 1,915)
XZU414R-HKMMWQ3	Disc	779 (1,717)	500 (5.1, 73)	1,622 (3,576)	7,000 (71.7, 1,015)	3,233 (7,128)	12,200 (124.1, 1,769)
XZU414R-TKMMWQ3	Disc	779 (1,717)	500 (5.1, 73)	1,622 (3,576)	7,000 (71.7, 1,015)	3,233 (7,128)	12,200 (124.1, 1,769)

BRAKE - LOAD SENSING PROPORTIONING VALVE

XZU422L-HKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-HKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-HKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-HKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-HKMRSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-HKMRSV Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-HKMRSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-HKMRSV3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-HKMRW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-HKMRW3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-HKMTRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)
XZU422L-HKMTRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)
XZU422L-HKMTRSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,742 (12,659)	15,900 (161.9, 2,306)
XZU422L-HKMTRSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,742 (12,659)	15,900 (161.9, 2,306)
XZU422L-HKMTW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)
XZU422L-TKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-TKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-TKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-TKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-TKMRSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-TKMRSV Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-TKMRSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-TKMRSV3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-TKMRW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422L-TKMRW3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422L-TKMTSV	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,742 (12,659)	15,900 (161.9, 2,306)
XZU422L-TKMTSV3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,742 (12,659)	15,900 (161.9, 2,306)
XZU422L-TKMTW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)
XZU422R-HKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)

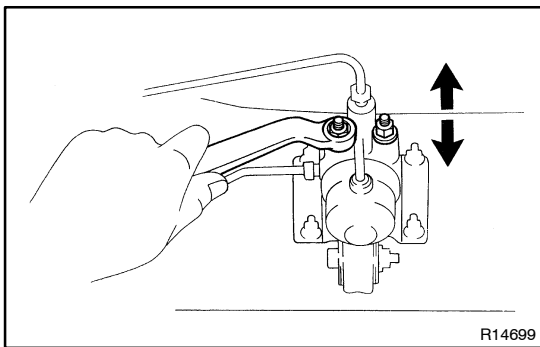
BRAKE - LOAD SENSING PROPORTIONING VALVE

XZU422R-HKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422R-HKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422R-HKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422R-TKMRS	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422R-TKMRS Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU422R-TKMRS3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU422R-TKMRS3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU424L-HKMTW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)
XZU424L-TKMRW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,296 (5,063)	9,000 (91.3, 1,305)	4,905 (10,814)	16,000 (163.7, 2,321)
XZU424L-TKMRW3 Reinforced rear spring	Drum	1,060 (2,336)	500 (5.1, 73)	2,216 (4,885)	8,400 (85.6, 1,218)	4,905 (10,814)	14,400 (146.6, 2,089)
XZU424L-TKMTW3	Drum	1,060 (2,336)	500 (5.1, 73)	2,250 (4,960)	8,600 (88, 1,247)	5,708 (12,584)	15,900 (161.9, 2,306)

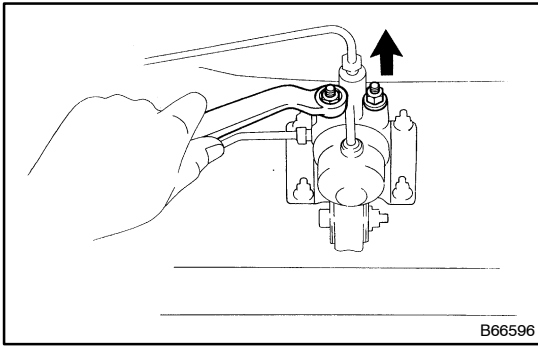


6. IF NECESSARY, ADJUST FLUID PRESSURE

- (a) Adjust the length of the No. 2 shackle.
 Lower pressure - Lengthen "A"
 High pressure - Shorten "A"
Initial set: 78 mm (3.07 in.)
Adjusting: 72 - 84 mm (2.83 - 3.31 in.)



- (b) If the pressure cannot be adjusted by the No. 1 shackle, raise or lower the valve body.
 Lower pressure - Lower
 High pressure - Raise
- (c) Torque the nuts.
Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)
- (d) Adjust the length of the No.2 shackle again.
 If it cannot be adjusted, inspect the valve body.



7. IF NECESSARY, CHECK VALVE BODY

(a) Assemble the valve body in the uppermost position.

HINT:

When the brakes are applied, the piston moves down about 1 mm (0.039 in.). Even at this time, the piston should not make contact with or move the load sensing spring.

(b) In this position, check the brake pressure.

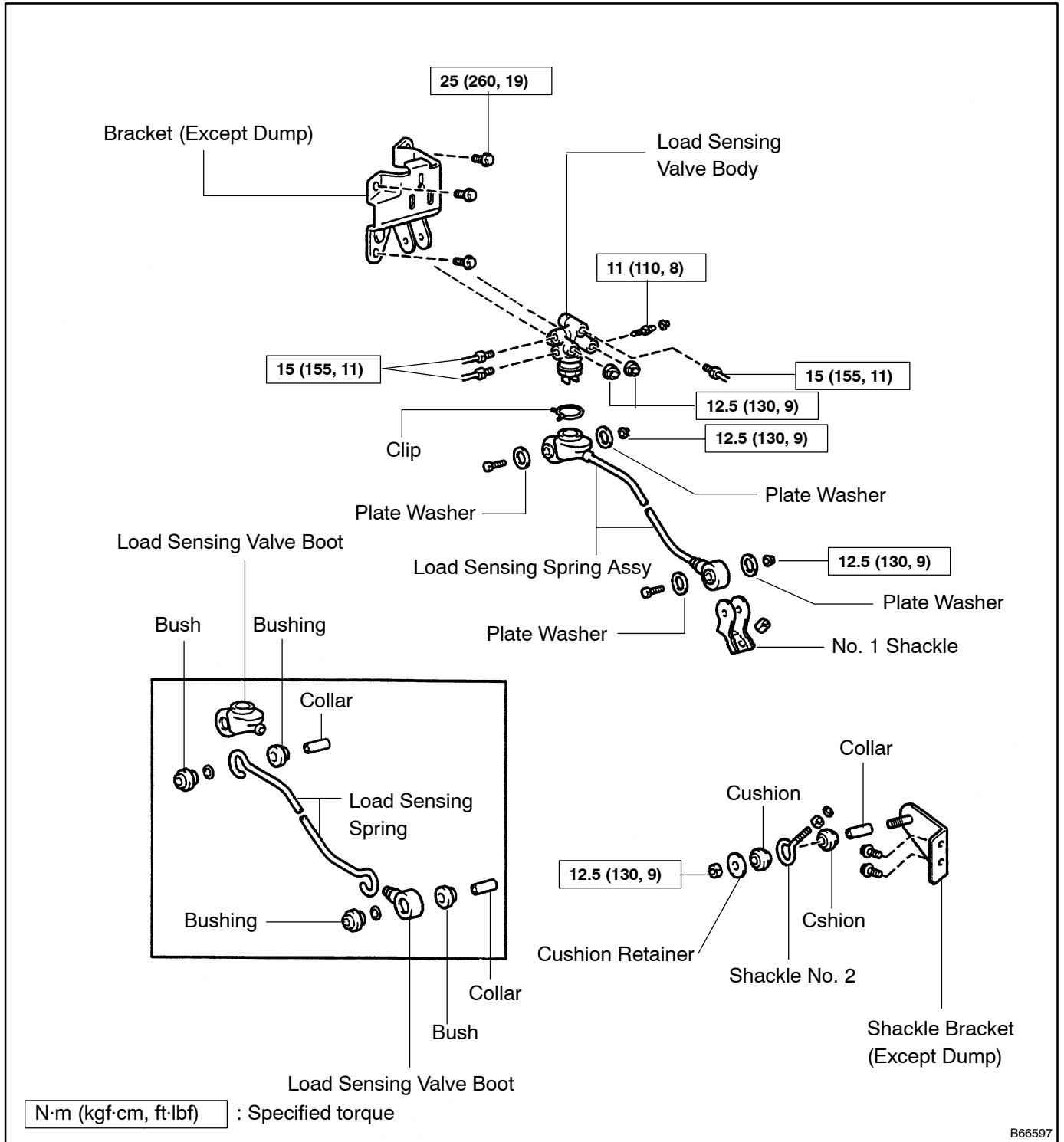
Brake pressure:

Front brake pressure kPa (kgf/cm ² , psi)	Rear brake pressure kPa (kgf/cm ² , psi)
490 (5, 71)	490 (5, 71)
2,452 (25, 356)	1,020 - 1,412 (10.4 - 14.4, 148 - 204)
5,884 (60, 853)	2,148 - 2,834 (21.9 - 28.9, 311 - 411)

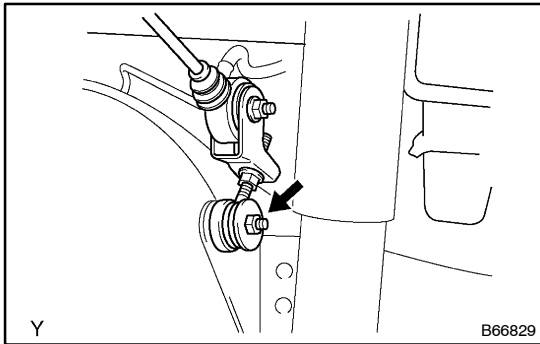
If the measured value is not within the standard, replace the valve body.

8. REMOVE LSPV GAUGE (SST) AND BLEED BRAKE SYSTEM (See page 32-4)

COMPONENTS

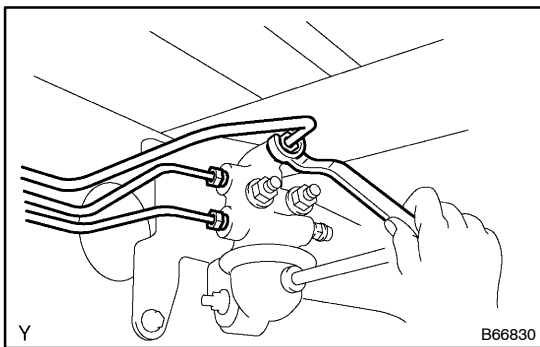


REPLACEMENT



1. DISCONNECT NO.2 SHACKLE

- (a) Remove the nut and cushion retainer from the bracket.
- (b) Disconnect the No. 2 shackle from the bracket.
- (c) Remove the 2 cushions and collar.



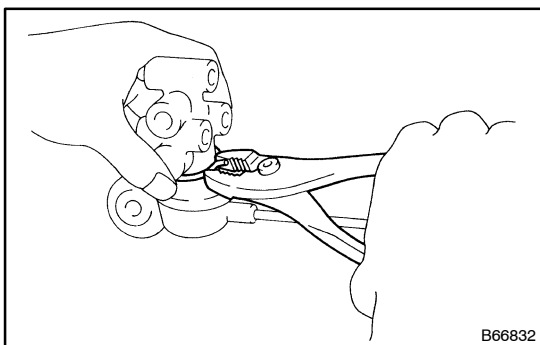
2. REMOVE LOAD SENSING PROPORTIONING VALVE

- (a) Using SST, disconnect the 3 brake lines from the valve body.
SST 09751-36011
- (b) Remove the 3 valve bracket mounting bolts and LSPV.



3. REMOVE VALVE BRACKET

- (a) Remove the bolt, nut and 2 plate washers.
- (b) Remove the 2 nuts and bracket from the valve body.

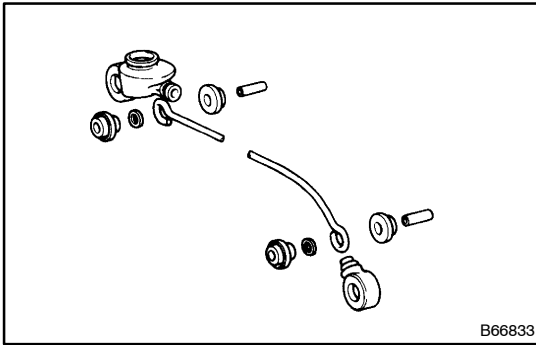


4. REMOVE LOAD SENSING SPRING ASSY

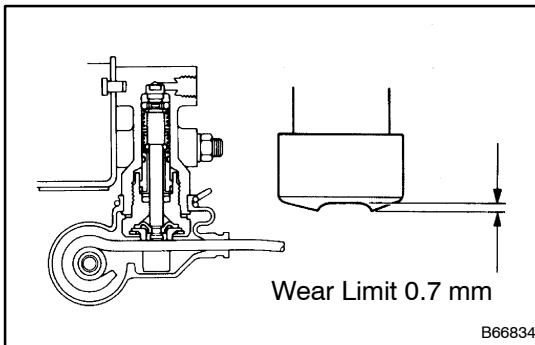
Using pliers, remove the clip and load sensing spring assembly from the valve body.

5. REMOVE NO. 1 AND NO. 2 SHACKLES

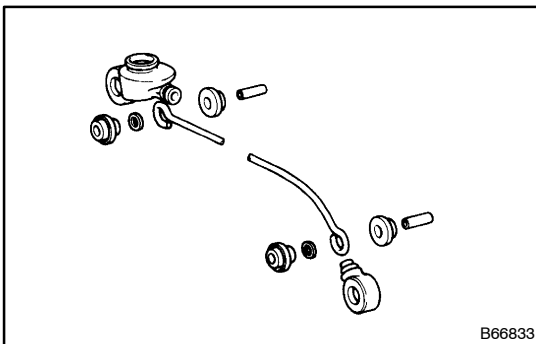
- (a) Remove the bolt, nut, 2 plate washers, No. 1 shackle and No.2 shackle assembly.
- (b) Loosen the lock nut.
- (c) Remove the nut, No. 2 shackle and washer from the No. 1 shackle.
- (d) Remove the lock nut.

**6. REMOVE LOAD SENSING SPRING**

- (a) Remove the 4 bushes, 2 collars and 2 rubber plates from the load sensing spring.
- (b) Remove the load sensing valve boot.
- (c) Remove the load sensing spring boot.

**7. INSPECT VALVE PISTON PIN AND LOAD SENSING SPRING CONTACT SURFACE FOR WEAR**

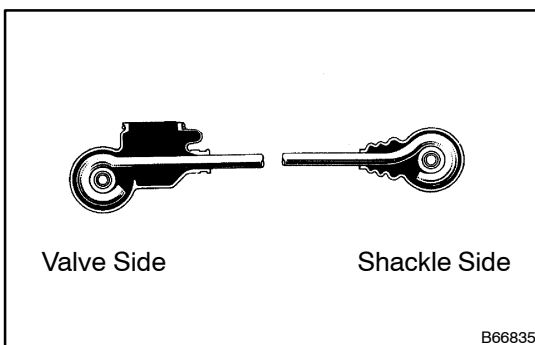
Wear limit: 0.7 mm (0.028 in.)

**8. INSTALL LOAD SENSING SPRING**

- (a) Install the load sensing spring boot.
- (b) Install the load sensing valve boot.
- (c) Install the 2 rubber plates, 2 collars and 4 bushes.

HINT:

- Apply lithium soap-base glycol grease to all rubbing areas.
- Do not mistake the valve side for the shackle side of the load sensing spring.

**9. INSTALL NO. 1 AND NO. 2 SHACKLES**

- (a) Install the lock nut, washer, No. 1 shackle and nut to the No. 2 shackle.
- (b) Install the shackle assembly and 2 plate washers with the bolt and nut.

Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)

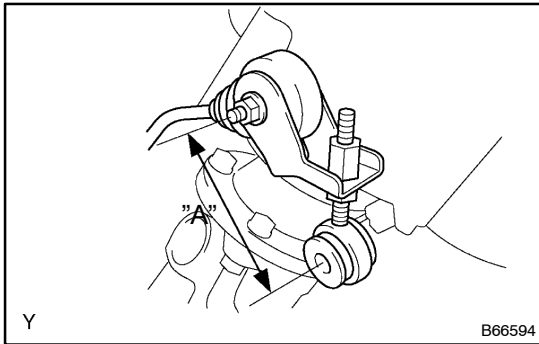
10. INSTALL LOAD SENSING SPRING ASSY

- (a) Install the spring to the load sensing valve with a clip.

11. INSTALL VALVE BRACKET

- (a) Place the valve bracket to the valve assembly, and temporarily install the 2 valve body mounting nuts.
- (b) Install the load sensing spring assembly and 2 plate washers with the bolt and nut.

Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)

**12. INSTALL LOAD SENSING PROPORTIONING VALVE**

- (a) Install the LSPV assembly to the frame with the 3 bolts.

25 N·m (260 kgf·cm, 19 ft·lbf)

13. ADJUST SHACKLE

- (a) Set the dimension "A" by turning the No. 2 shackle.

Initial set: 78 mm (3.07 in.)

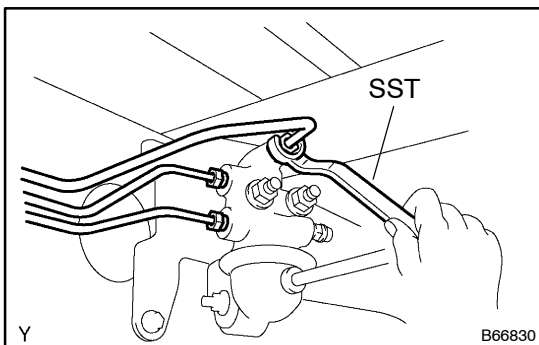
- (b) Tighten the lock nut.

Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)

- (c) Install the 2 cushions and collar to the No. 2 shackle.

- (d) Install the No. 2 shackle to the shackle bracket with the cushion retainer and nut.

Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)

**14. CONNECT BRAKE LINE**

- (a) Using SST, connect the brake lines.

SST 09751-36011

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

15. SET REAR AXLE LOAD**16. SET VALVE BODY**

- (a) When pulling down the load sensing spring, confirm that the valve piston moves down smoothly.
- (b) Position the valve body so that valve piston lightly contacts the load sensing spring.
- (c) Tighten the 2 valve body mounting nuts.

Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)

17. BLEED BRAKE LINE (See page 32-4)**18. CHECK FLUID LEVEL IN RESERVOIR (See page 32-4)****19. INSPECT FOR LEAKS**

SPEED SENSOR FRONT LH

320JA-01

REPLACEMENT

1. **REMOVE FRONT WHEEL**
2. **REMOVE SPEED SENSOR FRONT LH**
 - (a) Disconnect the speed sensor connector.
 - (b) Remove the bolts from the frame, knuckle and upper arm.
 - (c) Remove the bolt and front speed sensor from the axle hub.
3. **INSTALL SPEED SENSOR FRONT LH**
 - (a) Install the front speed sensor to the axle hub with the bolt.
Torque: 8.0 N·m (82 kgf·cm, 71 in·lbf)
 - (b) Install each bolt to the frame, knuckle and upper arm.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)
 - (c) Connect the speed sensor connector.
4. **INSTALL FRONT WHEEL**
5. **CHECK ABS SPEED SENSOR SIGNAL (See page 05-98)**

SPEED SENSOR REAR LH

320UB-01

REPLACEMENT

1. REMOVE REAR TIRE
2. REMOVE REAR DRUM BRAKE (See page 32-53)
3. REMOVE SPEED SENSOR REAR LH
 - (a) Remove each clamp bolt from the differential carrier.
 - (b) Disconnect the sensor connector.
 - (c) Remove the bolt and speed sensor from the axle hub.

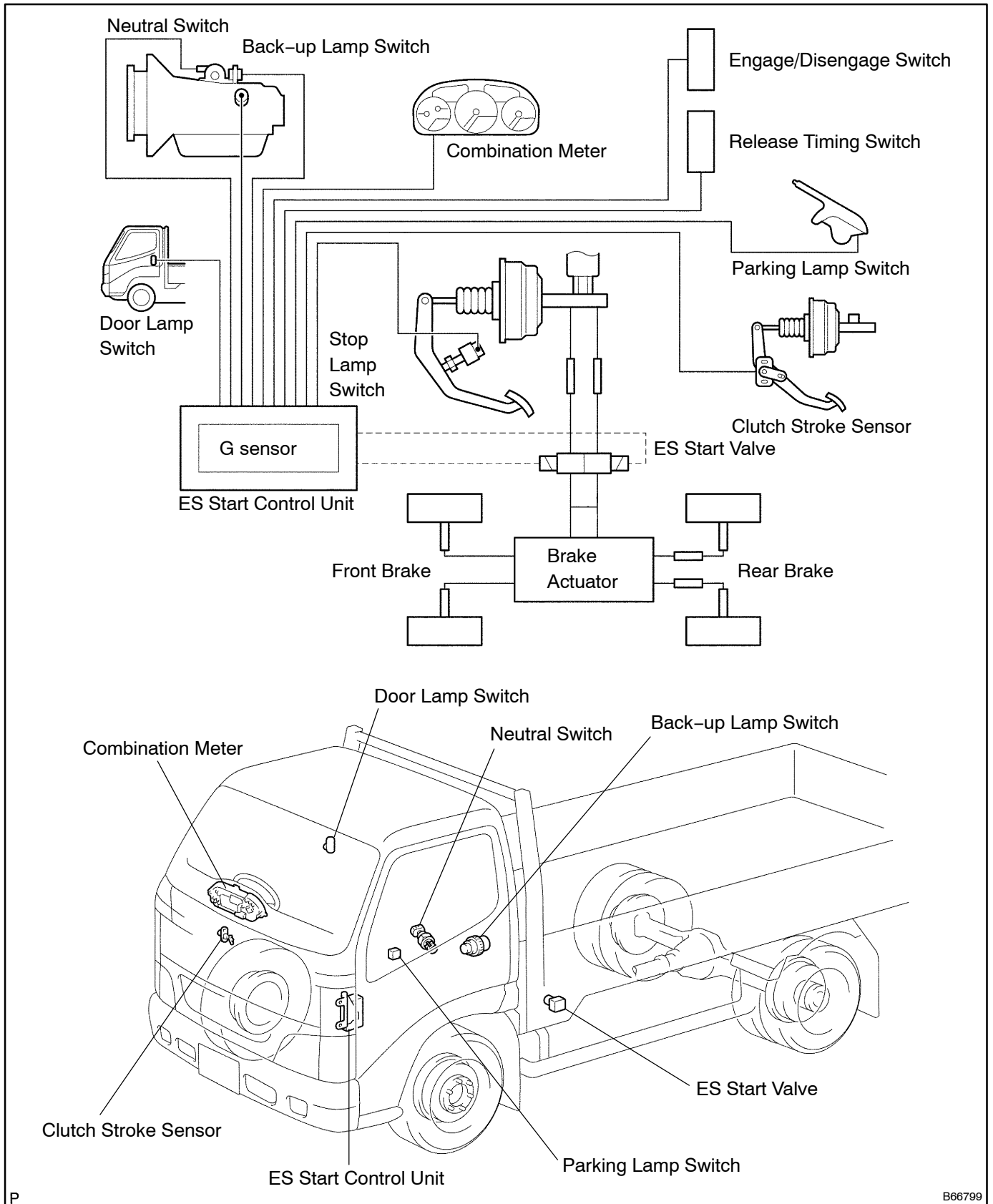
NOTICE:

Be careful that any foreign matter should not stick to the sensor tip.

4. INSTALL SPEED SENSOR REAR LH
 - (a) Install the speed sensor to the axle hub with the bolt.
Torque: 8.0 N·m (82 kgf·cm, 71 in·lbf)
 - (b) Connect the sensor connector.
 - (c) Install each clamp bolt to the differential carrier.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)
5. INSTALL REAR DRUM BRAKE (See page 32-53)
6. INSTALL REAR TIRE
7. CHECK ABS SENSOR SIGNAL (See page 05-98)

EASY & SMOOTH START COMPONENTS

320UD-01



REPLACEMENT

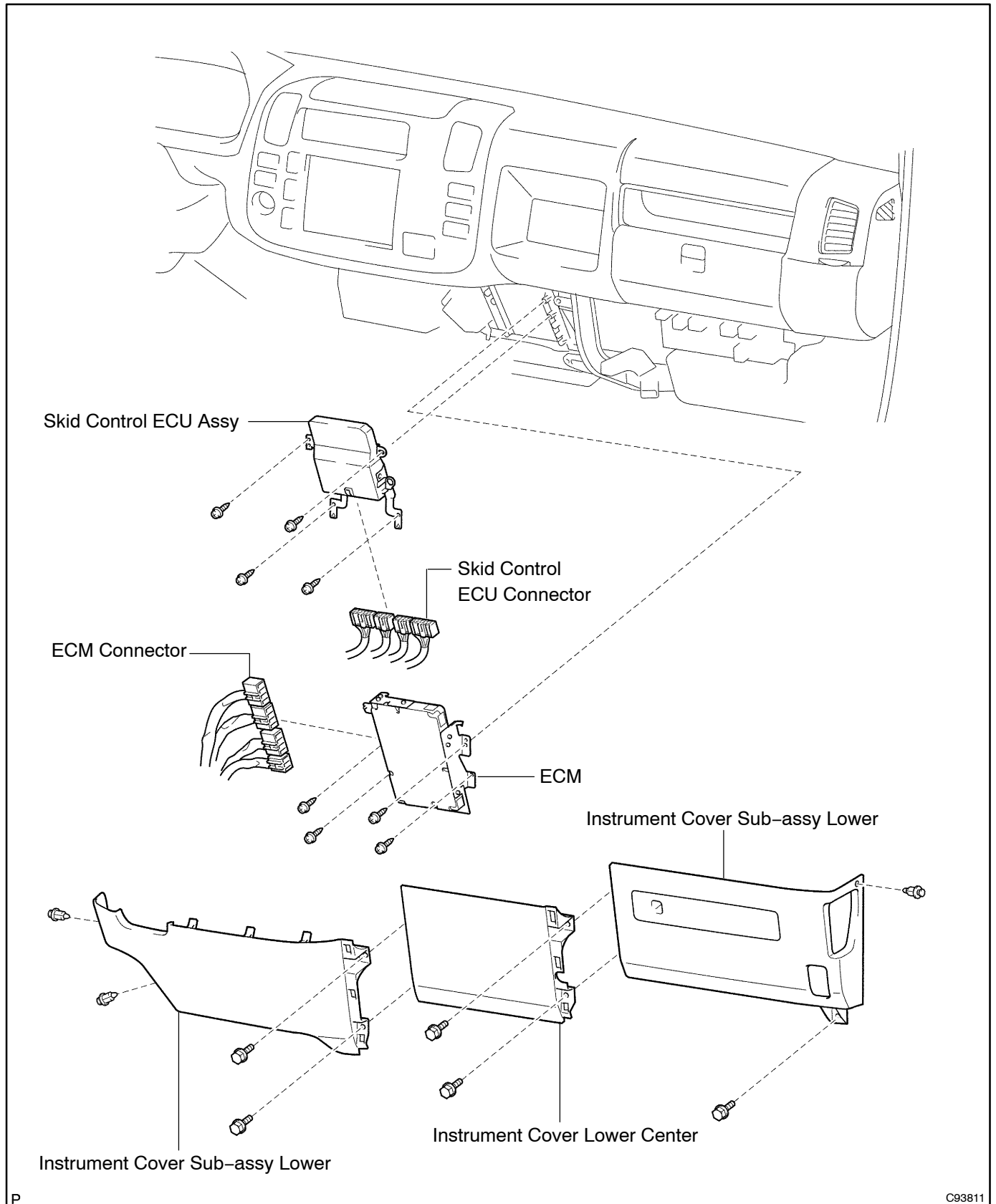
1. **DRAIN BRAKE FLUID**
2. **DISCONNECT BRAKE ACTUATOR ASSY**
 - (a) Using a union nut wrench, disconnect the front brake tube.
3. **REMOVE ES START VALVE ASSY**
 - (a) Disconnect the connector.
 - (b) Remove the 3 bolts and the ES start valve.
4. **INSTALL ES START VALVE ASSY**
 - (a) Install the ES start valve assy with the 3 bolts.
Torque: 12.7 N·m (130 kgf·cm, 9.4 ft·lbf)
 - (b) Connect the connector.
5. **CONNECT BRAKE ACTUATOR ASSY**
 - (a) Using a union nut wrench, install the rear brake tube.
Torque: 15 N·m (155 kgf·cm, 11.2 ft·lbf)

HINT:

After the installation, bleed the system.

SKID CONTROL ECU ASSY COMPONENTS

320UC-01



PARKING BRAKE

PARKING BRAKE SYSTEM	33-1
PROBLEM SYMPTOMS TABLE	33-1
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PARKING BRAKE LEVER ASSY	33-3
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PARKING BRAKE SYSTEM

PROBLEM SYMPTOMS TABLE

330BE-01

Use the table below to help you find a cause of the problem. The numbers indicate the priority of a likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspected Area	See Page
Brake drag	1. Parking brake lever travel (Out of adjustment)	33-2
	2. Parking brake wire (Sticking)	33-3
		33-4
		33-6
	3. Parking brake shoe clearance (Out of adjustment)	33-11
4. Parking brake shoe lining (Cracked or distorted)	33-11	
5. Tension or return spring (Damaged)	33-11	

ADJUSTMENT

1. ADJUST PARKING BRAKE SHOE CLEARANCE (See page 33-11)

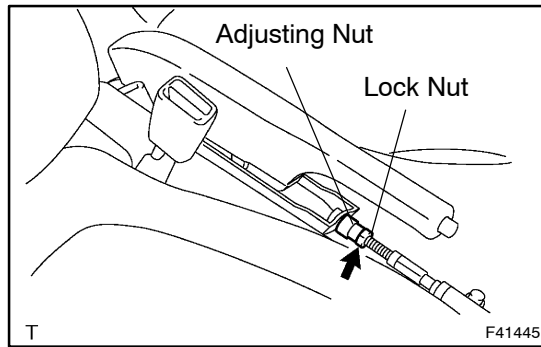
2. INSPECT PARKING BRAKE LEVER TRAVEL

- (a) Pull the parking brake lever all the way up, and count the number of clicks at 250 N (25 kgf, 55 lbf).

Parking brake: 6 - 10 clicks

If incorrect, adjust the parking brake.

3. REMOVE PARKING BRAKE HOLE COVER



4. ADJUST PARKING BRAKE LEVER TRAVEL

- (a) Loosen the lock nut, and turn the adjusting nut until the lever travel becomes correct.

- (b) Fixing the adjusting nut, tighten the lock nut.

Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)

- (c) Check whether the parking brake drags or not.

- (d) When operating the parking brake lever, check that the brake indicator light lights up.

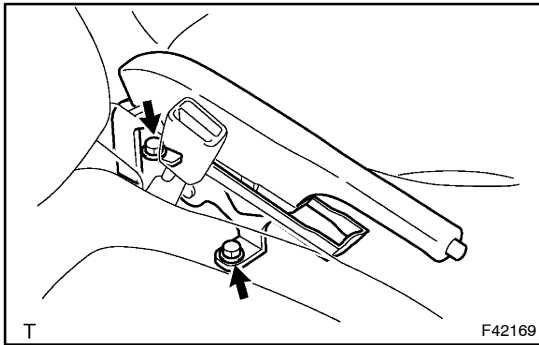
5. INSTALL PARKING BRAKE HOLE COVER

PARKING BRAKE LEVER ASSY

330BG-01

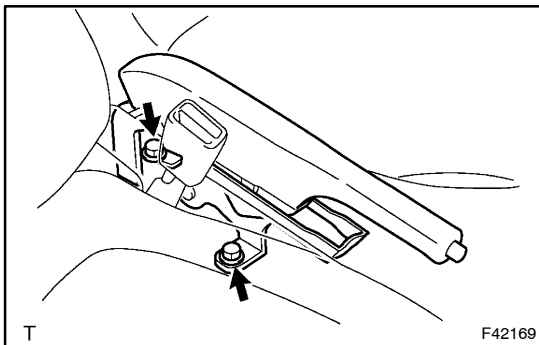
REPLACEMENT

1. REMOVE FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY
2. REMOVE SHIFTING HOLE COVER SUB-ASSY
3. REMOVE SHIFT LEVER HOLE COVER
4. REMOVE PARKING BRAKE HOLE COVER



5. REMOVE PARKING BRAKE LEVER ASSY
 - (a) Disconnect the parking brake switch connector.
 - (b) Fixing the adjusting nut, loosen the lock nut.
 - (c) Remove the 2 bolts.
 - (d) Disconnect the parking brake cable No. 1, and remove the parking brake lever.

6. REMOVE PARKING BRAKE SWITCH ASSY
7. INSTALL PARKING BRAKE SWITCH ASSY



8. INSTALL PARKING BRAKE LEVER ASSY
 - (a) Connect the parking brake cable No. 1 to the parking brake lever.
 - (b) Install the and parking brake lever with the 2 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
 - (c) Connect the parking brake switch connector.

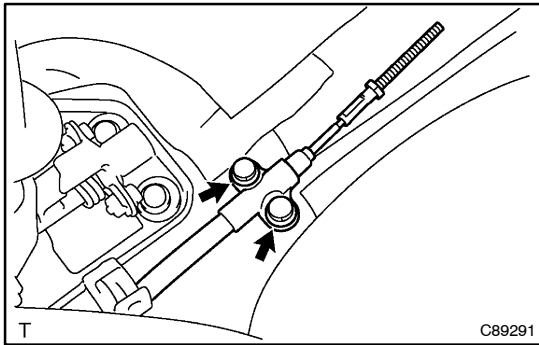
9. ADJUST PARKING BRAKE SHOE CLEARANCE (See page 33-11)
10. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-2)
11. INSTALL PARKING BRAKE HOLE COVER
12. INSTALL SHIFT LEVER HOLE COVER
13. INSTALL SHIFTING HOLE COVER SUB-ASSY
14. INSTALL FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY

PARKING BRAKE CABLE ASSY NO.2

330BH-01

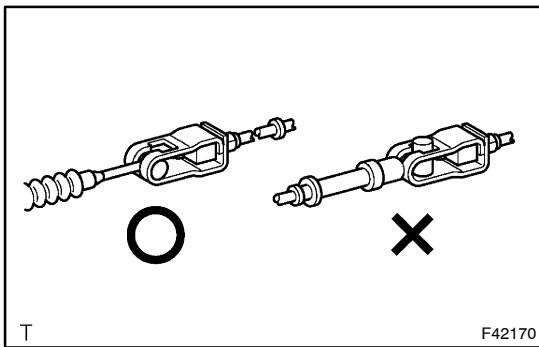
REPLACEMENT

1. REMOVE FLOOR SHIFT SHIFTER LEVER KNOB SUB-ASSY
2. REMOVE SHIFTING HOLE COVER SUB-ASSY
3. REMOVE SHIFT LEVER HOLE COVER
4. REMOVE PARKING BRAKE HOLE COVER
5. REMOVE PARKING BRAKE LEVER ASSY (See page 33-3)
6. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (See page 41-19)



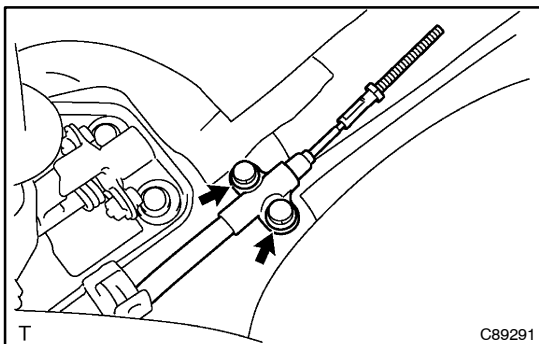
7. REMOVE PARKING BRAKE CABLE ASSY NO.2

- (a) Remove the 2 bolts, and disconnect the parking brake cable No. 2 from the floor panel.
- (b) Disconnect the parking brake cable No. 2 from the No. 3.
- (c) Remove the clamp, clips and parking brake cable No. 2.



8. INSTALL PARKING BRAKE CABLE ASSY NO.2

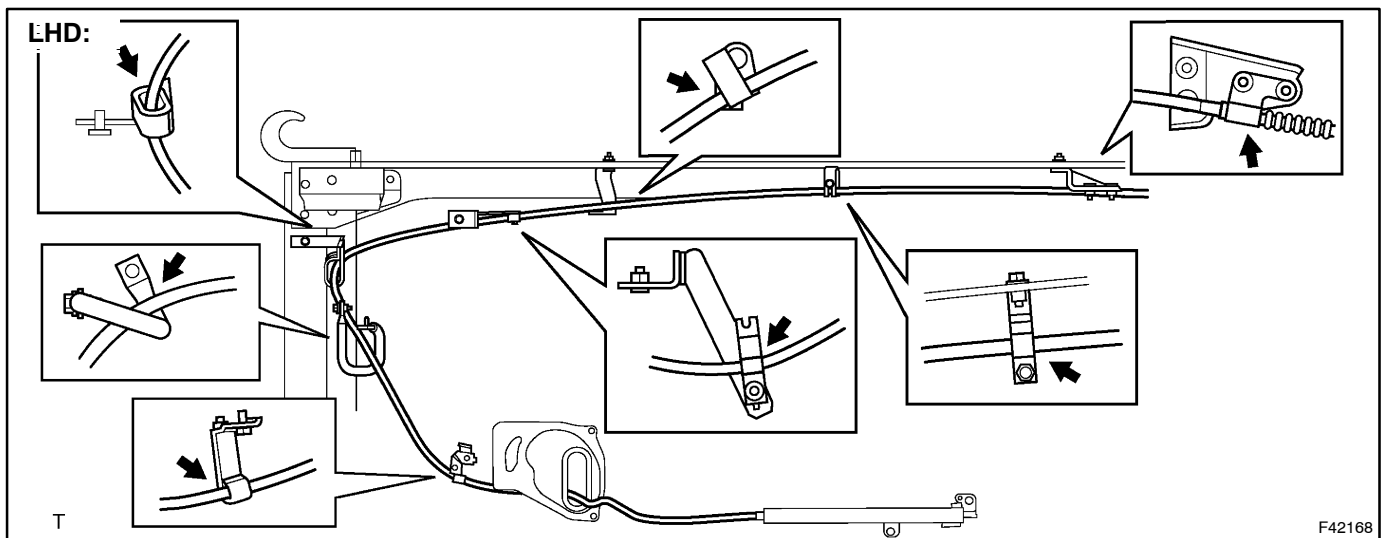
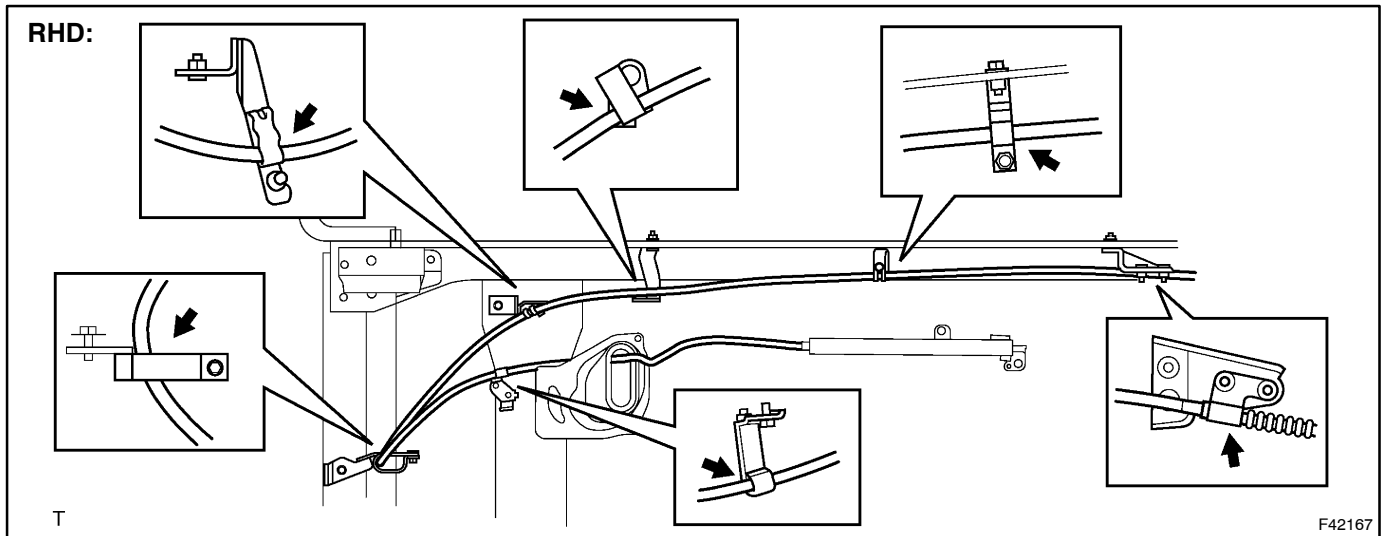
- (a) Connect the parking brake cable No. 2 to the No. 3, as shown in the illustration.



- (b) Connect the parking brake cable No. 2 to the floor panel with the 2 bolts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

- (c) Install the clamp and clips, as shown in the illustration.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



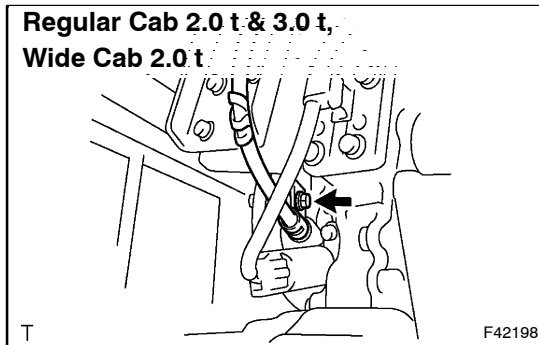
9. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (See page 41-19)
10. INSTALL PARKING BRAKE LEVER ASSY (See page 33-3)
11. ADJUST PARKING BRAKE SHOE CLEARANCE
12. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL
13. INSTALL PARKING BRAKE HOLE COVER
14. INSTALL SHIFT LEVER HOLE COVER
15. INSTALL SHIFTING HOLE COVER SUB-ASSY
16. INSTALL FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY
17. DRIVE TEST

PARKING BRAKE CABLE ASSY NO.3

330BI-01

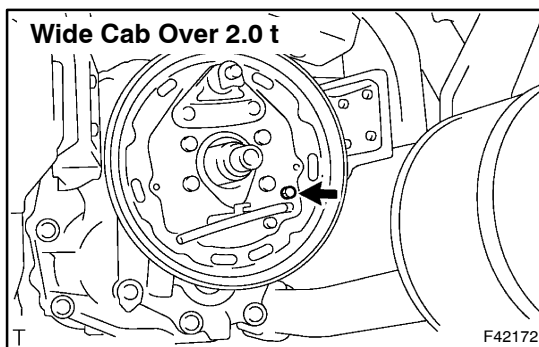
REPLACEMENT

1. REMOVE PROPELLER SHAFT ASSY (See page 30-6, 30-14, 30-22, 30-29)
2. REMOVE PARKING BRAKE DRUM SUB-ASSY (See page 33-11)
3. REMOVE PARKING BRAKE SHOE RETURN TENSION SPRING (See page 33-11)
4. REMOVE PARKING BRAKE SHOE (See page 33-11)

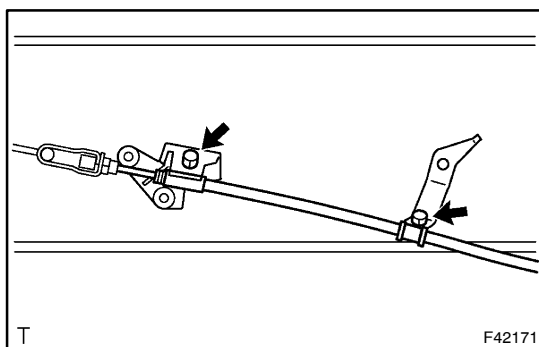


5. REMOVE PARKING BRAKE CABLE ASSY NO.3

- (a) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:
Disconnect the parking brake cable assy No. 3.
 - (1) Remove the bolt and clamp from the parking brake shoe back plate.
 - (2) Disconnect the parking brake cable assy No. 3 from the parking brake shoe back plate.
 - (3) Remove the inner wire spring, E-ring, collar and dust seal from the cable assy No. 3.
- (b) Wide cab over 2.0 t:
Disconnect the parking brake cable assy No. 3.
 - (1) Remove the bolt from the parking brake shoe backing plate.
 - (2) Remove the E-ring, and disconnect the parking brake cable No. 3 from the backing plate.
 - (3) Remove the dust seal and collar from the cable.

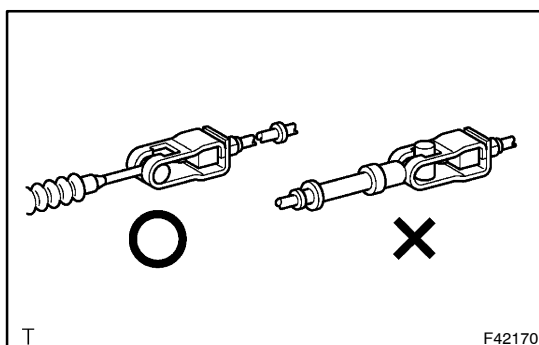


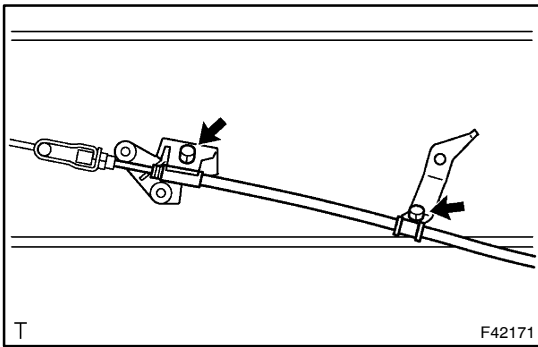
- (c) Remove the 2 bolts, and disconnect the parking brake cable No. 3.
- (d) Remove the parking brake cable No. 3 from the No. 2.



6. INSTALL PARKING BRAKE CABLE ASSY NO.3

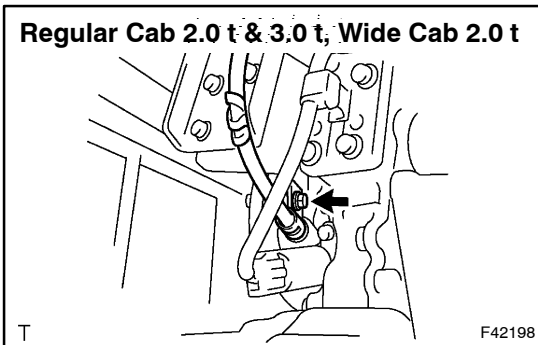
- (a) Connect the parking brake cable No. 3 to the No. 2, as shown in the illustration.





- (b) Attach the parking brake cable No. 3, and then install the 2 bolts, as shown in the illustration.

Torque: 17.5 N·m (175 kgf·cm, 13 ft·lbf)

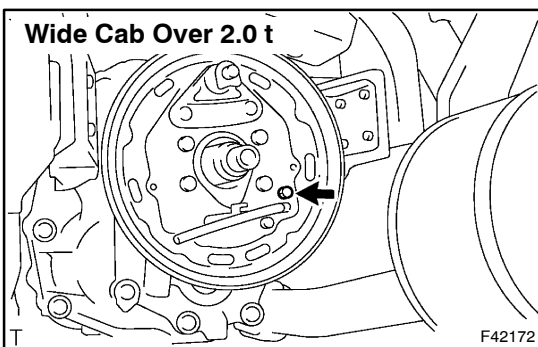


- (c) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:

Connect the parking brake cable assy No. 3.

- (1) Install the inner wire spring, E-ring, collar and dust seal to the cable assy No. 3.
- (2) Connect the parking brake cable assy No. 3.
- (3) Install the bolt and clamp to the parking brake shoe backing plate.

Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)



- (d) Wide cab over 2.0 t:

Connect the parking brake cable assy No. 3.

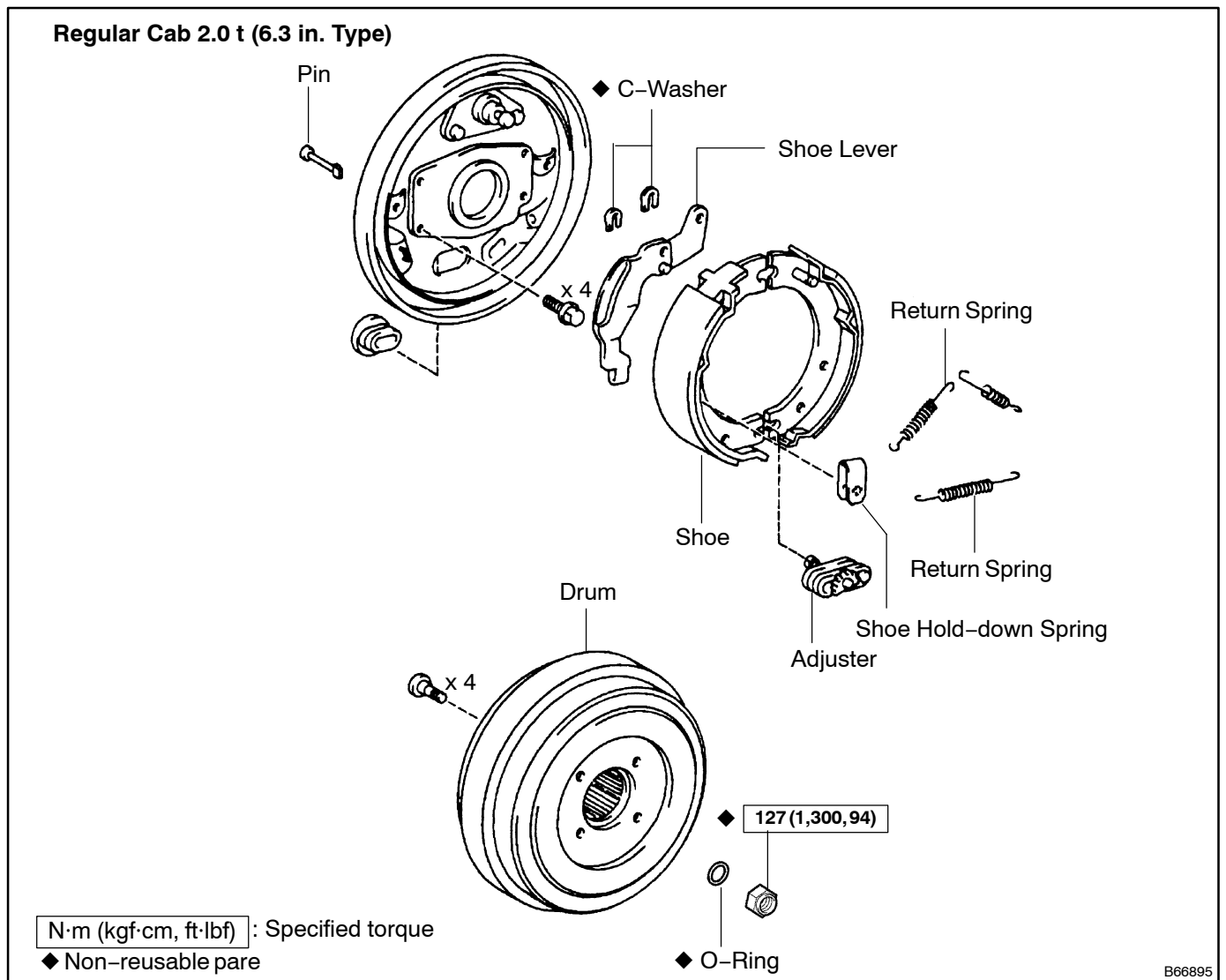
- (1) Connect the cable No. 3 to the parking brake shoe backing plate.
- (2) Install the bolt to the parking brake shoe backing plate.

Torque: 7.8 N·m (80 kgf·cm, 69 ft·lbf)

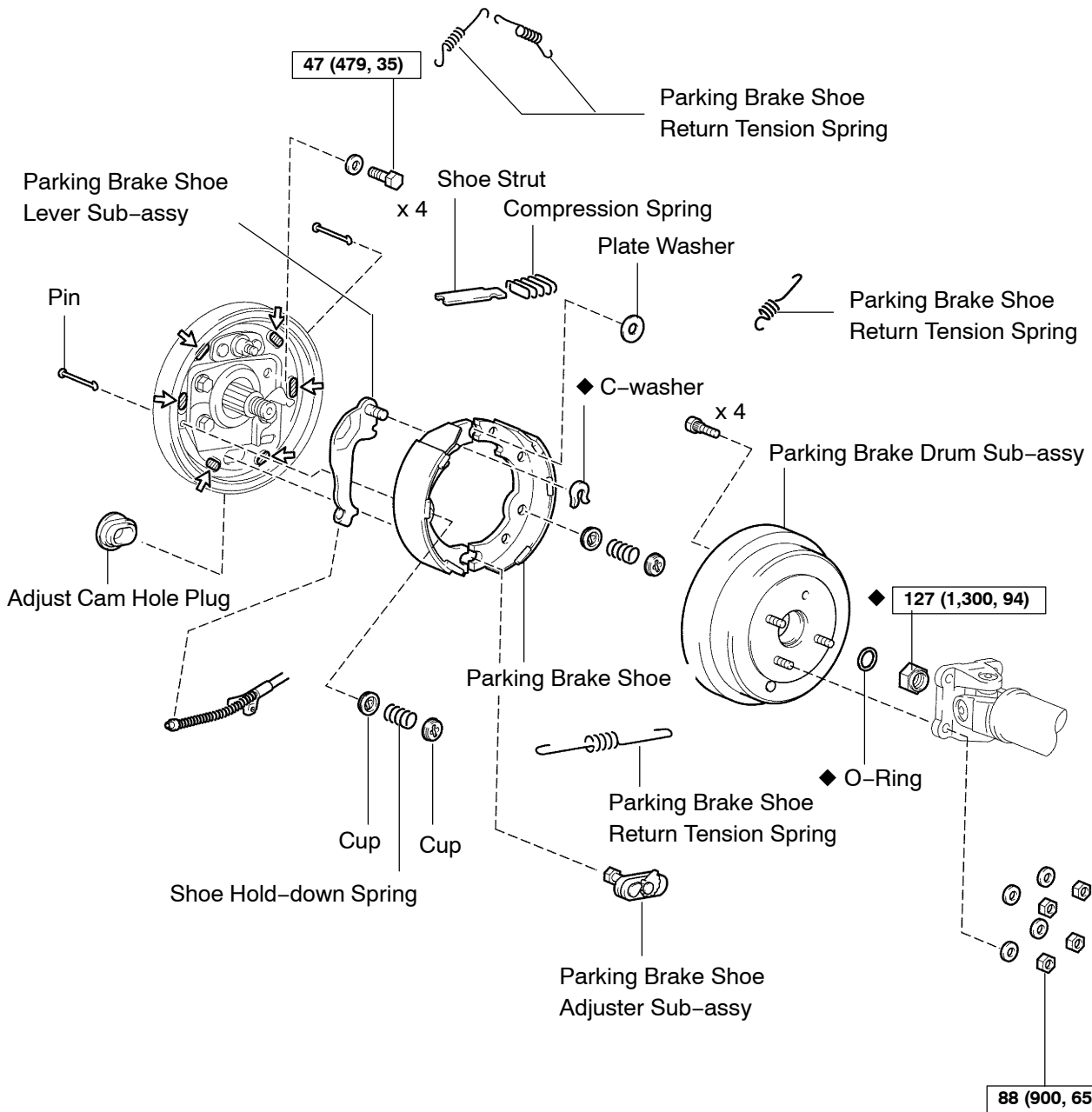
7. **INSTALL PARKING BRAKE SHOE (See page 33-11)**
8. **INSTALL PARKING BRAKE SHOE RETURN TENSION SPRING (See page 33-11)**
9. **CHECK PARKING BRAKE INSTALLATION (See page 33-11)**
10. **INSTALL PARKING BRAKE DRUM SUB-ASSY (See page 33-11)**
11. **ADJUST PARKING BRAKE SHOE CLEARANCE (See page 33-11)**
12. **INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-11)**
13. **TIGHTEN PARKING BRAKE DRUM SET NUT (See page 33-11)**
14. **INSTALL PROPELLER SHAFT ASSY (See page 30-6, 30-14, 30-22, 30-29)**

PARKING BRAKE ASSY

COMPONENTS



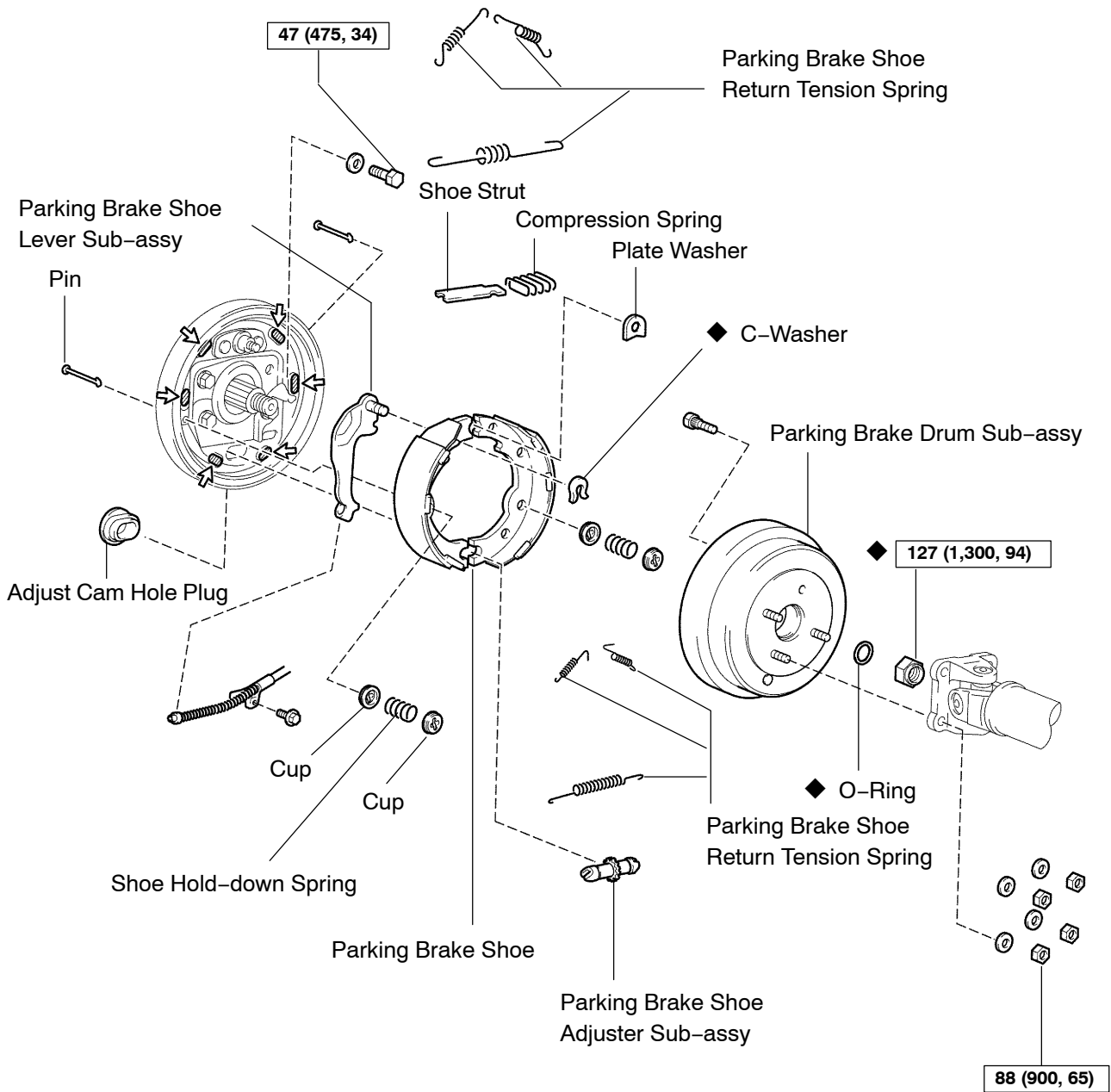
Regular Cab 3.0 t, Wide Cab 2.0 t (7 in. Type)



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

Wide Cab Over 2.0 t (200 mm Type)



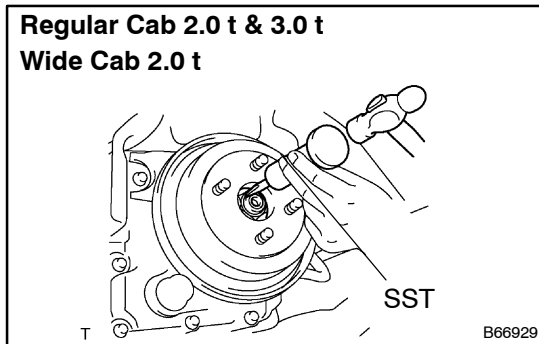
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

P → High temperature grease

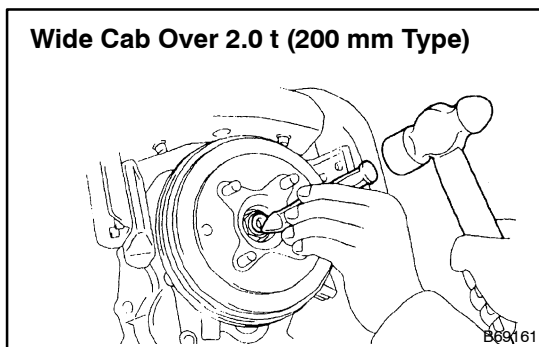
OVERHAUL

1. REMOVE PROPELLER SHAFT ASSY (See pages 30-6, 30-14, 30-22, 30-29)

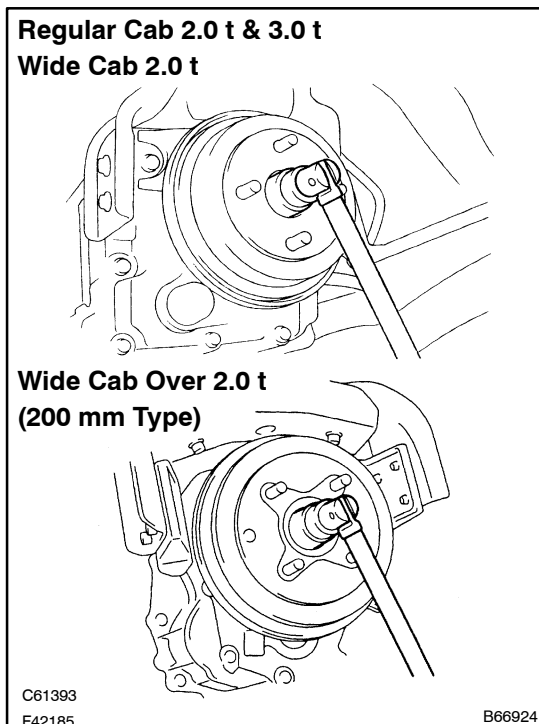


2. REMOVE PARKING BRAKE DRUM SUB-ASSY

- (a) Pull the parking brake lever fully.
- (b) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:
- (1) Using a SST and hammer, loosen the staked part of the nut.
- SST 09930-00010

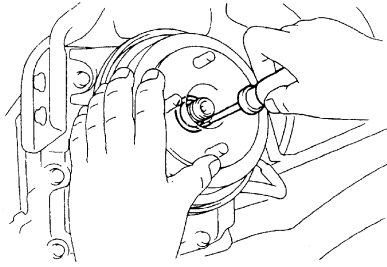


- (c) Wide cab over 2.0 t (200 mm type):
- (1) Using a chisel and hammer, loosen the staked part of the nut.

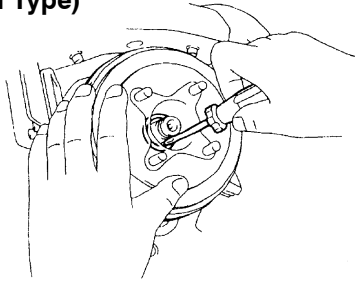


- (d) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:
- (1) Using a socket wrench (32mm), remove the nut.
- (e) Wide cab over 2.0 t (200 mm type):
- (1) Using a socket wrench (32 mm), remove the nut.

**Regular Cab 2.0 t & 3.0 t
Wide Cab 2.0 t**



**Wide Cab Over 2.0 t
(200 mm Type)**

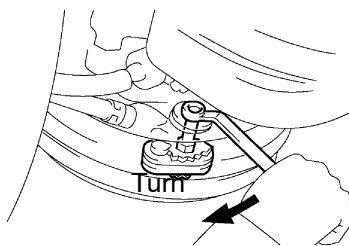


F42542
F42186

B66925

- (f) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:
- (1) Using a screwdriver, remove the O-ring.
 - (2) Release the parking brake lever.
 - (3) Remove the drum.
- (g) Wide cab over 2.0 t (200 mm type):
- (1) Using a screwdriver, remove the O-ring.
 - (2) Release the parking brake lever.
 - (3) Remove the drum.

**Regular Cab 2.0 t & 3.0 t
Wide Cab 2.0 t**



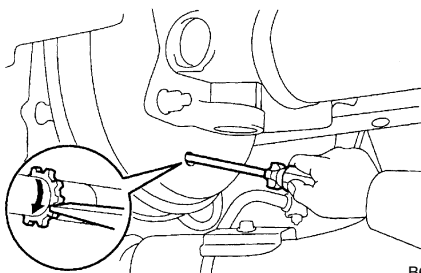
B69162

HINT:

Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:

If the brake drum cannot be removed easily, turn the shoe adjuster clockwise until the drum turns freely.

Wide Cab Over 2.0 t (200 mm Type)



B69163

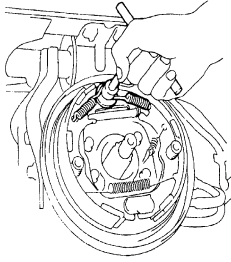
- (h) Wide cab over 2.0 t (200 mm type):

HINT:

If the brake drum cannot be removed easily, remove the rubber plug, and turn the shoe adjuster in the direction of the illustrated arrow mark until the drum turns freely.

**Regular Cab 2.0 t & 3.0 t
Wide Cab 2.0 t**

SST



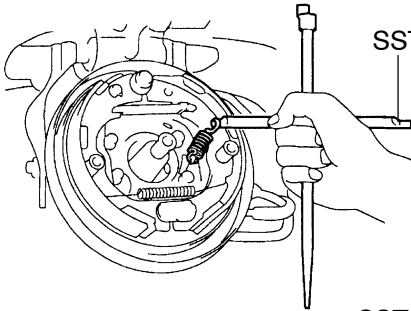
B66930

3. REMOVE PARKING BRAKE SHOE RETURN TENSION SPRING

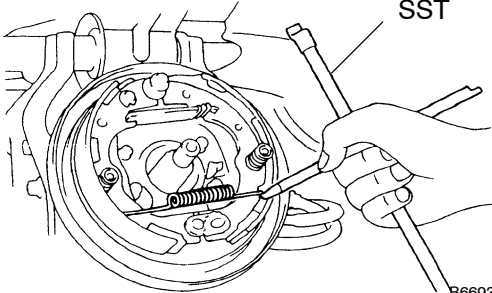
- (a) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:
- (1) Using SST, remove the 2 return springs on the upper side.
- SST 09717-20010
- (2) Remove the plate washer.

**Regular Cab 2.0 t & 3.0 t
Wide Cab 2.0 t**

SST



SST

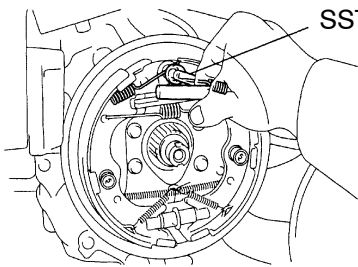


B66931

- (b) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:
- (1) Using SST, remove the 2 return springs on the upper and lower sides.
- SST 09703-30010

Wide Cab Over 2.0 t (200 mm Type)

SST

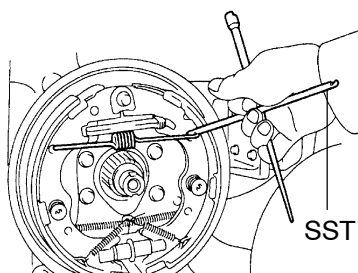


B69164

- (c) Wide cab over 2.0 t (200 mm type):
- (1) Using SST, remove the 2 tension springs.
- SST 09717-20010
- (2) Remove the plate washer.

Wide Cab Over 2.0 t (200 mm Type)

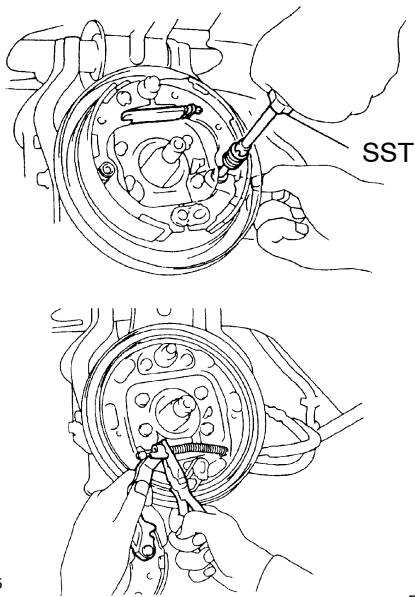
SST



B69165

- (3) Using SST, remove the return spring on the upper side.
- SST 09703-30010
- (4) Remove the 2 return springs on the lower side.

**Regular Cab 2.0 t & 3.0 t
Wide Cab 2.0 t**



F42175
F42176

B66934

4. REMOVE PARKING BRAKE SHOE

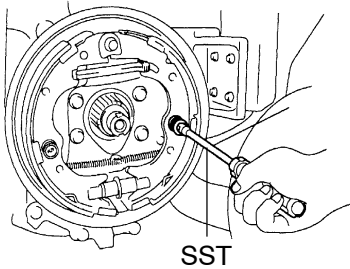
(a) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:

- (1) Remove the parking brake shoe lever strut and the compression spring.
- (2) Using SST, remove the shoe hold-down springs, cups and pins.

SST 09718-00010

- (3) Remove the parking brake shoe.
- (4) Using needle-nose pliers, disconnect the parking brake cable from the shoe lever with the parking brake shoe Assy.

Wide Cab Over 2.0 t (200 mm Type)



SST

B69166

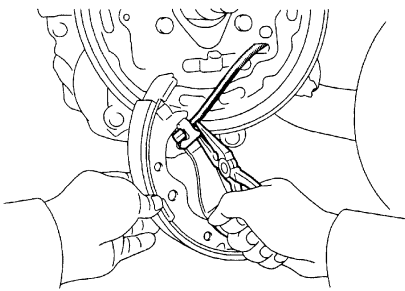
(b) Wide cab over 2.0 t (200 mm type):

- (1) Using SST, remove the shoe hold-down springs, cups and pins.

SST 09718-00010

- (2) Remove the return spring on the lower side.
- (3) Remove the parking brake shoe lever strut and the compression spring.
- (4) Remove the parking brake shoe.

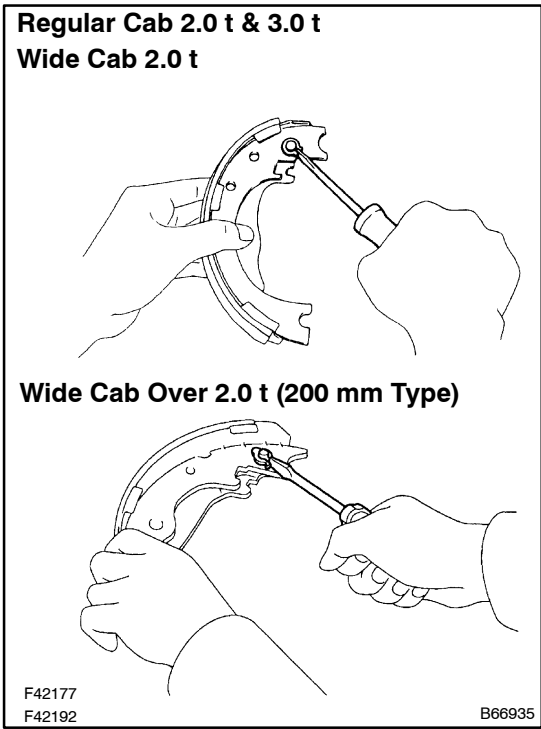
Wide Cab Over 2.0 t (200 mm Type)



B69167

- (5) Using needle-nose pliers, disconnect the parking brake cable from the shoe lever.

5. REMOVE PARKING BRAKE SHOE ADJUSTER SUB-ASSY



- 6. REMOVE PARKING BRAKE SHOE LEVER SUB-ASSY**
- (a) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:
 - (1) Using a screwdriver, remove the C-washer and disassemble the shoe and lever.
 - (b) Wide cab over 2.0 t (200 mm type):
 - (1) Using a screwdriver, remove the C-washer and disassemble the shoe and lever.

7. INSPECT PARKING BRAKE DRUM SUB-ASSY

- (a) Using a brake drum gauge or equivalent, measure the inside diameter of the drum.

Standard inside diameter:

Regular cab 2.0 t	160.0 mm (6.299 in.)
Regular cab 3.0 t, wide cab 2.0 t	177.8 mm (7.000 in.)
Wide cab over 2.0 t	200.0 mm (7.874 in.)

Maximum inside diameter:

Regular cab 2.0 t	161.0 mm (6.339 in.)
Regular cab 3.0 t, wide cab 2.0 t	178.8 mm (7.039 in.)
Wide cab over 2.0 t	201.0 mm (7.913 in.)

If the drum is scored or worn, the brake drum may be lathed to the maximum inside diameter.

8. INSPECT PARKING BRAKE SHOE LINING THICKNESS

- (a) Using vernier calipers, measure the shoe lining thickness.

Standard thickness:

Regular cab 2.0 t	4.0 mm (0.157 in.)
Regular cab 3.0 t, wide cab 2.0 t	3.6 mm (0.142 in.)
Wide cab over 2.0 t	3.8 mm (0.150 in.)

Minimum thickness:

Regular cab 2.0 t	1.5 mm (0.059 in.)
Regular cab 3.0 t, wide cab 2.0 t	1.5 mm (0.059 in.)
Wide cab over 2.0 t	1.0 mm (0.039 in.)

If the shoe lining thickness is less than the minimum or the lining shows signs of uneven wear, replace the brake shoes.

HINT:

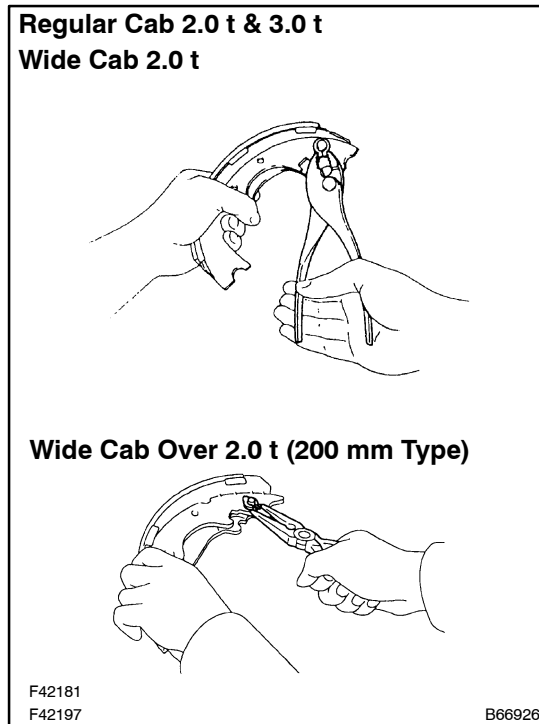
If any of the brake shoes have to be replaced, replace all the parking brake shoes in order to maintain even braking effect.

9. INSPECT BRAKE DRUM AND PARKING BRAKE SHOE LINING FOR PROPER CONTACT

- (a) Apply some chalk to the inside of the brake drum, and rub the drum and the shoe together.

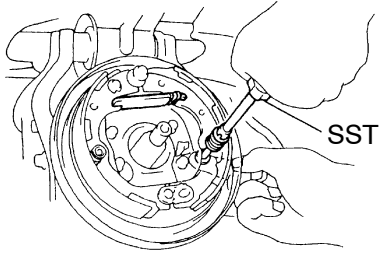
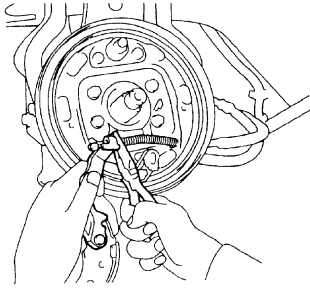
Standard: There should be no defective contact

If the contact condition between the brake lining and drum is improper, repair the drum with a shoe grinder or replace the brake shoe assembly.

10. INSPECT PARKING BRAKE PLATE SUB-ASSY**11. INSTALL PARKING BRAKE SHOE LEVER SUB-ASSY**

- (a) Reassemble the shoe and lever, and then install a new C-washer.

12. INSTALL PARKING BRAKE SHOE ADJUSTER SUB-ASSY

Regular Cab 2.0 t & 3.0 t**Wide Cab 2.0 t**F42176
F42175

B66936

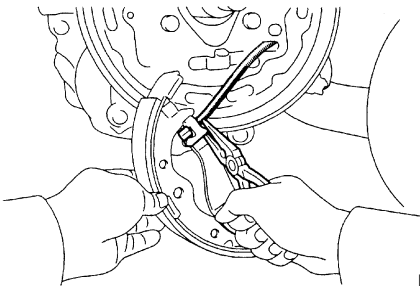
13. INSTALL PARKING BRAKE SHOE

(a) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:

- (1) Using needle-nose pliers, connect the parking brake cable to the shoe lever.
- (2) Install the parking brake shoe.
- (3) Using SST, install the shoe hold-down springs, cups and pins.

SST 09718-00010

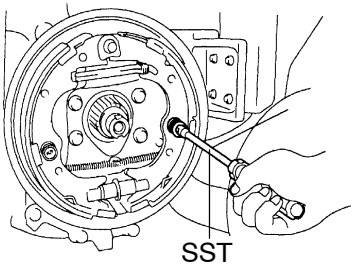
- (4) Install the parking brake shoe lever strut and compression spring.

Wide Cab Over 2.0 t (200 mm Type)

B69167

(b) Wide cab over 2.0 t (200 mm type):

- (1) Using needle-nose pliers, connect the parking brake cable to the shoe lever.
- (2) Install the parking brake shoe.
- (3) Install the parking brake shoe lever strut and compression spring.

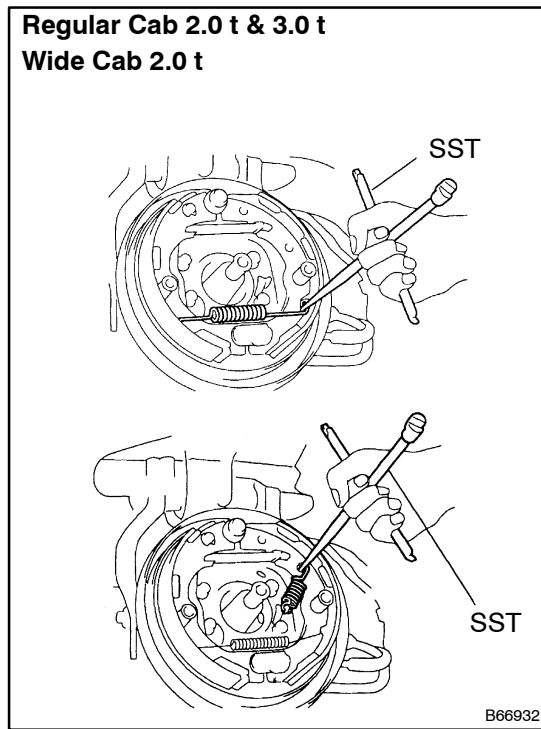
Wide Cab Over 2.0 t (200 mm Type)

B69166

- (4) Using SST, install the shoe hold-down springs, cups and pins.

SST 09718-00010

- (5) Install the 2 return springs on the lower side.

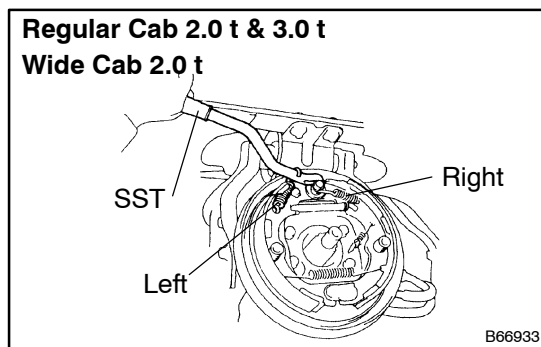


14. INSTALL PARKING BRAKE SHOE RETURN TENSION SPRING

- (a) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:
- (1) Using SST, install the 2 return springs on the upper and lower sides.

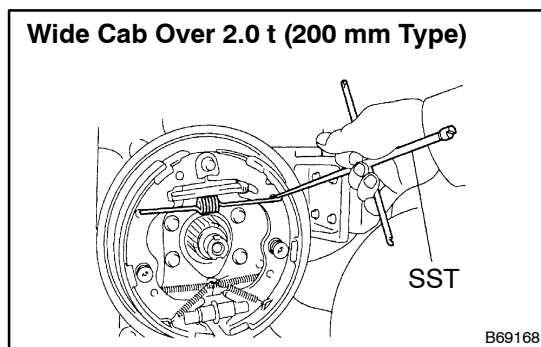
SST 09703-30010

- (2) Install the plate washer.



- (3) Using SST, install the right return spring, and then install the left return spring.

SST 09718-20010

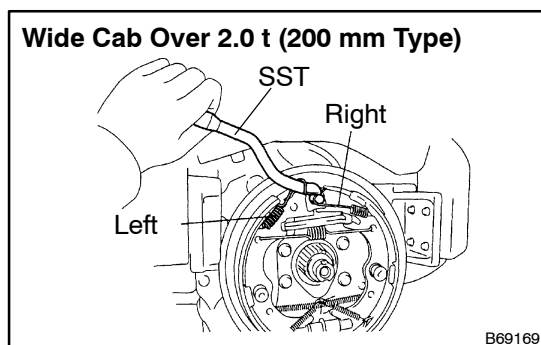


- (b) Wide cab over 2.0 t (200 mm type):

- (1) Using SST, install the return spring on the upper side.

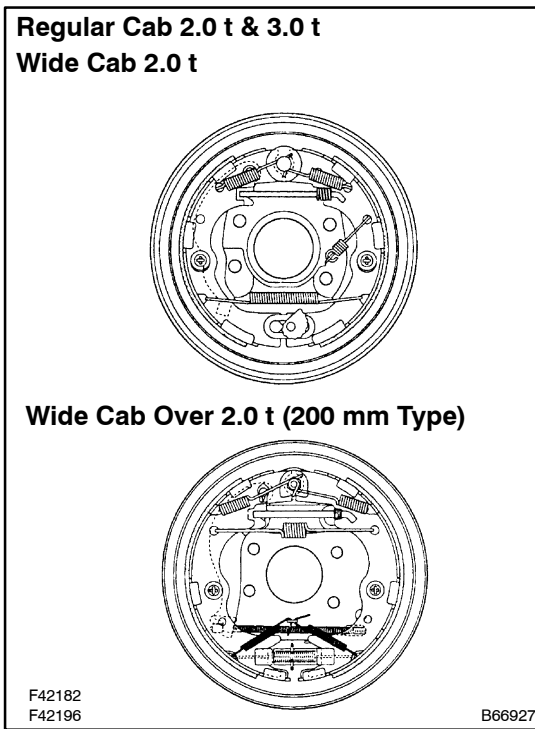
SST 09703-30010

- (2) Install the plate washer.



- (3) Using SST, install the right tension spring, then install the left tension spring.

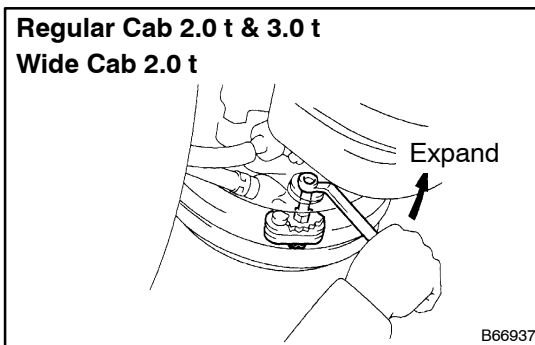
SST 09718-20010

**15. CHECK PARKING BRAKE INSTALLATION**

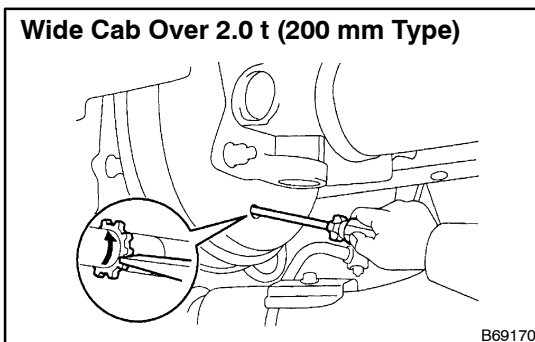
- (a) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:
- (1) Check that all the parts are installed correctly.
- (b) Wide cab over 2.0 t (200 mm type):
- (1) Check that all the parts are installed correctly.

16. INSTALL PARKING BRAKE DRUM SUB-ASSY

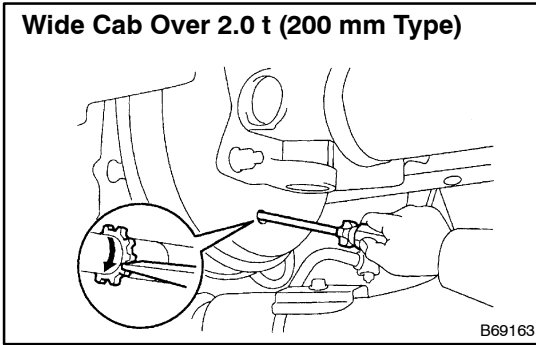
- (a) Install a new O-ring and the drum.
- (b) Temporarily tighten the nut.

**17. ADJUST PARKING BRAKE SHOE CLEARANCE**

- (a) Regular cab 2.0 t & 3.0 t, Wide cab 2.0 t:
- (1) Release the parking brake.
 - (2) Turn the shoe adjuster counterclockwise until the brake shoes are fully expanded.
 - (3) Turn the shoe adjuster clockwise by 1 notch.

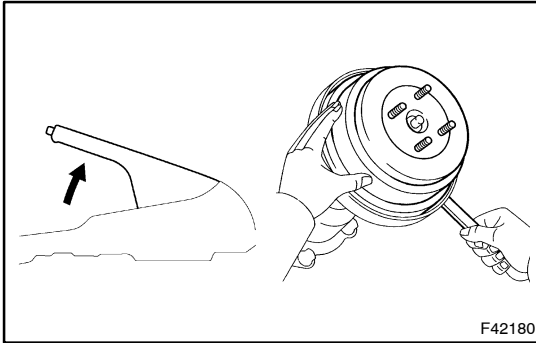


- (b) Wide cab over 2.0 t (200 mm type):
- (1) Release the parking brake.
 - (2) Remove the rubber plug by turning the parking brake drum to match the adjusting hole with the shoe adjuster (vehicle's lower side).
 - (3) Using a screwdriver, turn the shoe adjuster in the direction of the illustrated arrow mark until the brake shoes are fully expanded.

Wide Cab Over 2.0 t (200 mm Type)

B69163

- (4) Return the shoe adjuster by 7 – 10 notches.



F42180

- (c) With the parking brake fully pulled, check that the drum is locked.
- (d) Release the parking brake lever, and check that the parking brake is not dragging. If it is dragging, return the shoe adjuster by 1 notch.
- (e) Install the rubber plug.
- (f) Check that the parking brake lever travel is correct.

18. TIGHTEN FLANGE SET NUT

- (a) Tighten the nut.

Torque: 127 N·m (1,300 kgf·cm, 94 ft·lbf)

- (b) Using a SST, stake the nut.
SST 09930-00010

19. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33-2)**20. INSTALL PROPELLER SHAFT ASSY (See page 30-6, 30-14, 30-22, 30-29)**

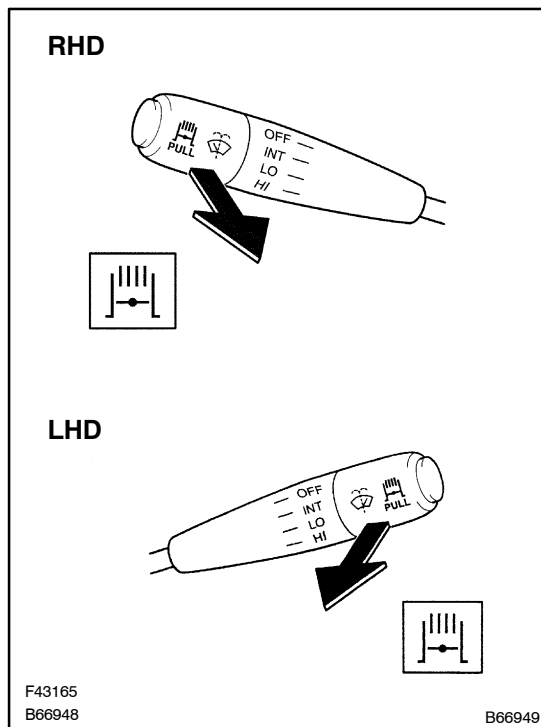
EXHAUST BRAKE

EXHAUST RETARDER ASSY	34-1
ON-VEHICLE INSPECTION	34-1
COMPONENTS	34-4
OVERHAUL	34-5

EXHAUST RETARDER ASSY

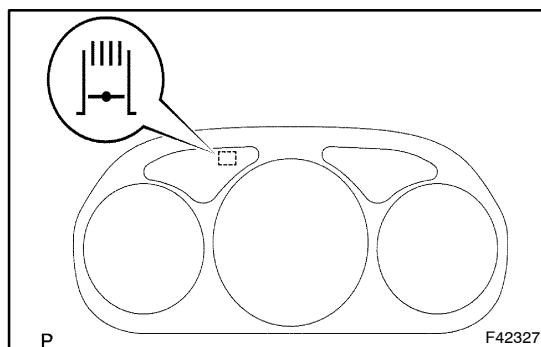
ON-VEHICLE INSPECTION

3400A-01

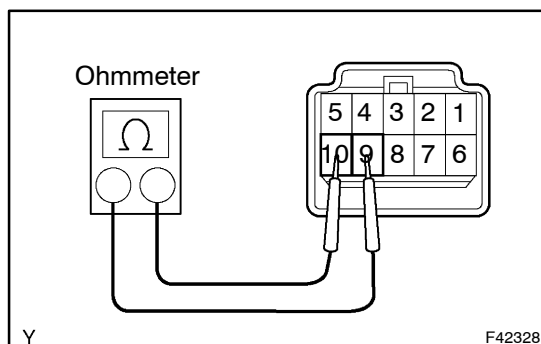


1. INSPECT INDICATOR LIGHT OPERATION

- (a) Turn the ignition switch ON.
- (b) Turn the main switch ON.

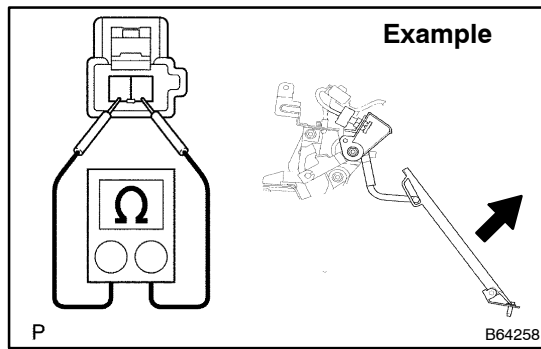


- (c) Check that the warning light comes on.

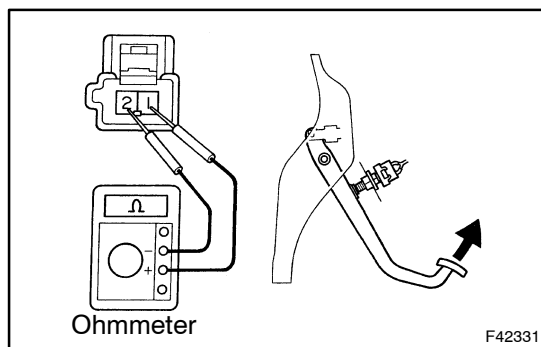
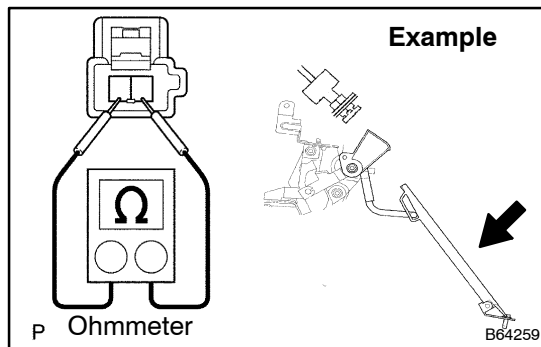


2. INSPECT MAIN SWITCH

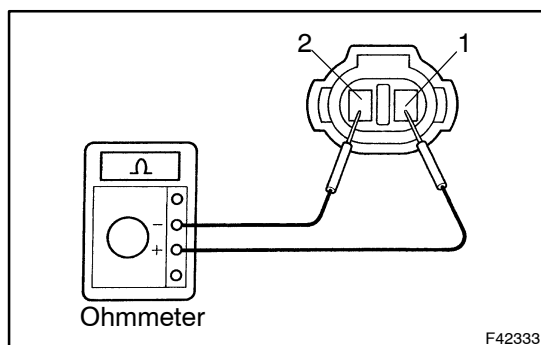
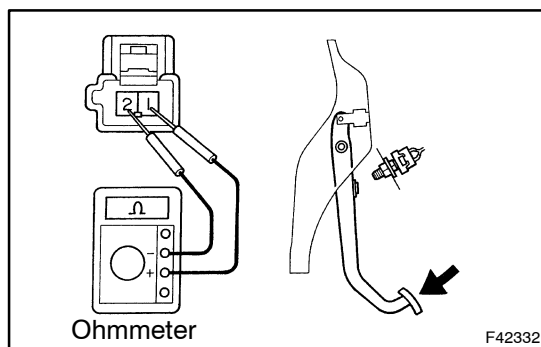
- (a) Disconnect the connector from the steering column.
- (b) Inspect the switch continuity.
 - (1) Check that there is continuity between terminals 9 and 10 with the main switch ON.
 - (2) Check that there is no continuity between terminals 9 and 10 with the main switch OFF.
- (c) Reconnect the connector to the steering column.

**3. INSPECT ACCELERATOR PEDAL SWITCH**

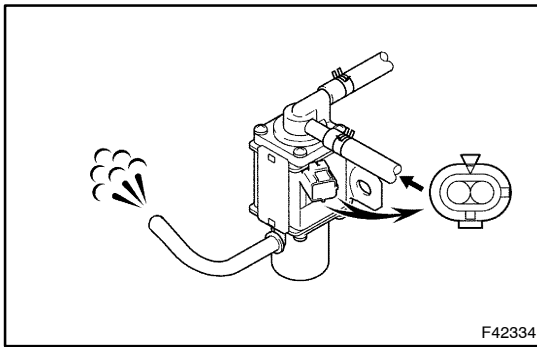
- (a) Disconnect the accelerator pedal switch connector.
- (b) Inspect the switch continuity.
 - (1) Check that there is continuity between terminals 1 and 2 with the pedal released.
 - (2) Check that there is no continuity between terminals 1 and 2 with the pedal depressed.
- (c) Reconnect the accelerator pedal switch connector.

**4. INSPECT CLUTCH PEDAL SWITCH**

- (a) Disconnect the clutch pedal switch connector.
- (b) Inspect the switch continuity.
 - (1) Check that there is continuity between terminals 1 and 2 with the pedal released.
 - (2) Check that there is no continuity between terminals 1 and 2 with the pedal depressed.
- (c) Reconnect the clutch pedal switch connector.

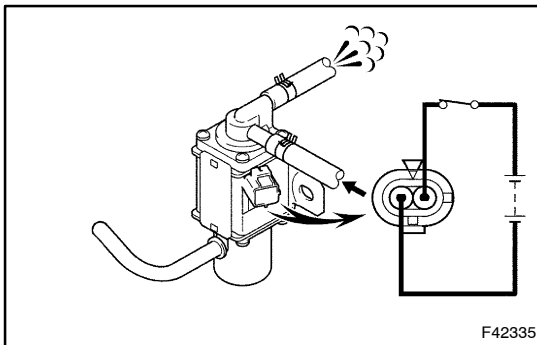
**5. INSPECT NEUTRAL SWITCH**

- (a) Disconnect neutral switch connector.
- (b) Inspect the switch continuity.
 - (1) Check that there is continuity between terminals 1 and 2 with the shift lever in any position other than the neutral position.
 - (2) Check that there is no continuity between terminals 1 and 2 with the shift lever in the neutral position.
- (c) Reconnect the neutral switch connector.



6. INSPECT EXHAUST RETARDER SOLENOID

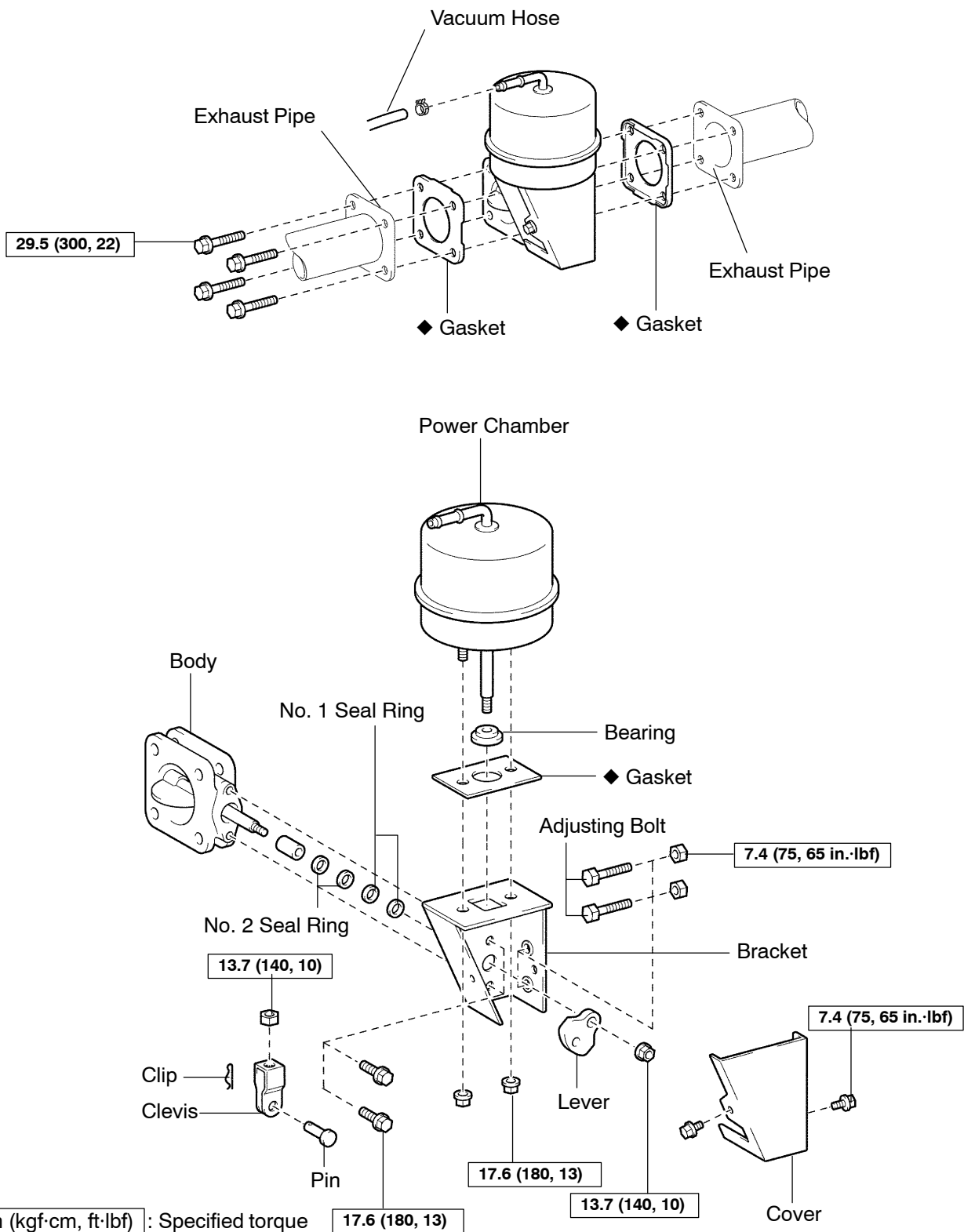
- (a) Remove the exhaust retarder solenoid.
- (b) Check the air travel.
 - (1) When blowing into the exhaust retarder side union, make sure that the air travels to the intake hose.



- (2) Apply battery voltage to the connector.
 - (3) When blowing into the exhaust retarder side union, make sure that air travels to the vacuum tank side union.
- (c) Reinstall the exhaust retarder solenoid.

COMPONENTS

Example

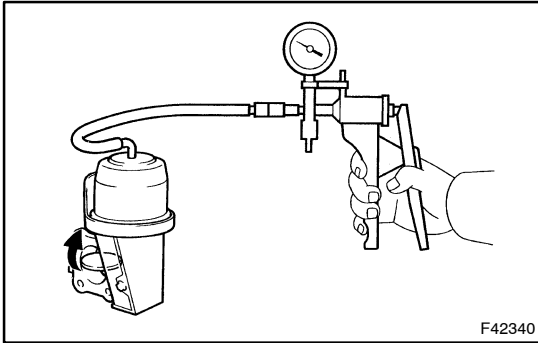


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

OVERHAUL

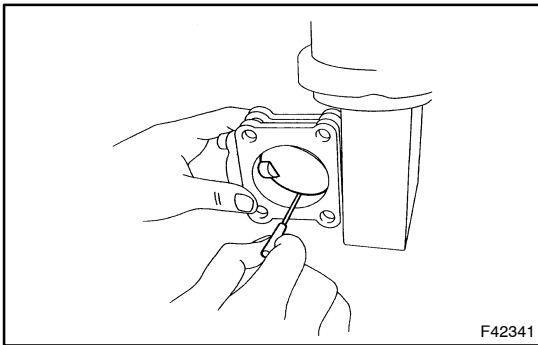
1. REMOVE ENGINE SIDE COVER SUB-ASSY RH
2. DISCONNECT VACUUM HOSE
3. REMOVE EXHAUST RETARDER ASSY
 - (a) Remove the 4 bolts.
 - (b) Pull the exhaust pipe backward, and then remove the exhaust retarder and 2 gaskets.



4. INSPECT EXHAUST RETARDER CHAMBER

- (a) Apply vacuum to the chamber and check for vacuum leakage and smooth movement of the valve.

If a problem is found, replace the exhaust retarder assembly.



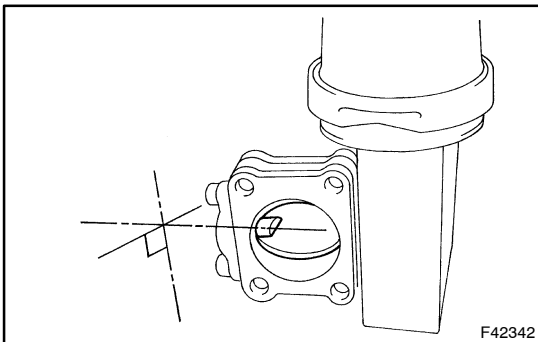
5. INSPECT VALVE BODY CLEARANCE AND OPENING ANGLE

- (a) Using SST, check the valve body clearance with the chamber in vacuum.

SST 09240-00020

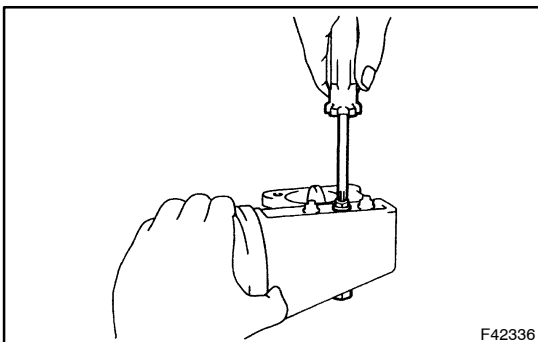
Standard clearance:

S05C-B, TA, TB	0.3 - 0.5 mm (0.012 - 0.019 in.)
14B, W04D-J	0.4 - 0.55 mm (0.016 - 0.021 in.)
S05C-B, TA (with aneroid compensator)	0.2 - 0.4 mm (0.008 - 0.016 in.)



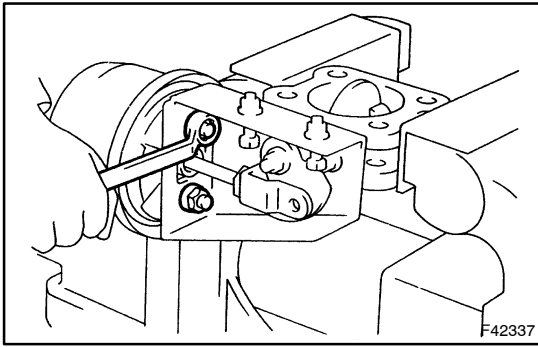
- (b) With the valve fully opened, measure the angle of the valve to the body surface.

Opening angle: 90°

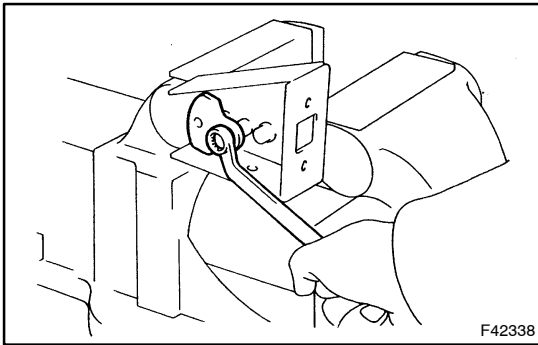


6. REMOVE BRACKET COVER

- (a) Remove the 2 bolts and cover.
- (b) Remove the clip and pin from the clevis.

**7. REMOVE POWER CHAMBER**

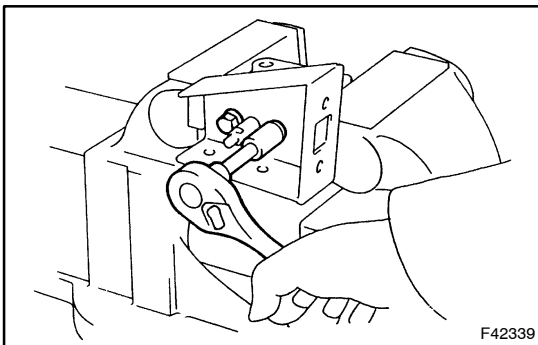
- (a) Remove the 2 nuts and chamber from the bracket.
- (b) Remove the clevis and lock nut.
- (c) Remove the gasket and bearing.

**8. REMOVE EXHAUST BRAKE LEVER**

- (a) Remove the nut and lever.

9. REMOVE ADJUSTING BOLTS

- (a) Loosen the lock nut, and remove the adjusting bolt and lock nut.

**10. REMOVE VALVE BODY**

- (a) Remove the 2 bolts and bracket from the body.
- (b) Remove the 4 seal rings to the body.

11. INSTALL VALVE BODY

- (a) Install 4 new seal rings to the body.
- (b) Install the 2 bolts and bracket to the body.

Torque: 17.6 N·m (180 kgf·cm, 13 ft·lbf)

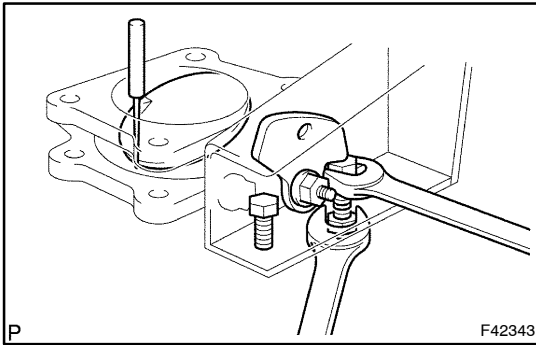
12. INSTALL ADJUSTING BOLTS

- (a) Temporarily tighten the lock nuts and adjusting bolts.

13. INSTALL EXHAUST BRAKE LEVER

- (a) Install the nut and lever.

Torque: 13.7 N·m (140 kgf·cm, 10 ft·lbf)

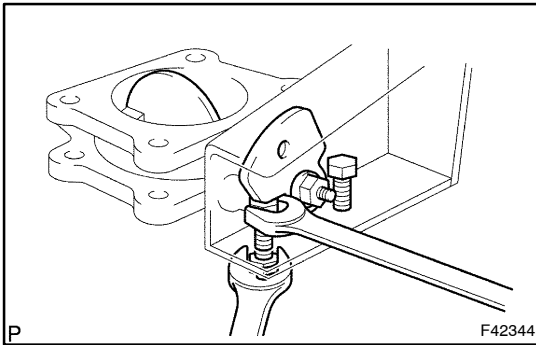


14. ADJUST VALVE BODY CLEARANCE AND OPENING ANGLE

- (a) Adjust the valve body to the standard clearance with the adjusting bolt.

Standard clearance:

S05C-B, TA, TB	0.3 - 0.5 mm (0.012 - 0.019 in.)
14B, W04D-J	0.3 - 0.55 mm (0.016 - 0.021 in.)
S05C-B, TA (with aneroid compensator)	0.2 - 0.4 mm (0.008 - 0.016 in.)



- (b) Release the vacuum from the chamber and fully open the valve.

- (c) Adjust the opening angle to the standard with the adjusting bolt.

Opening angle: 90°

- (d) Tighten the 2 lock nuts.

Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

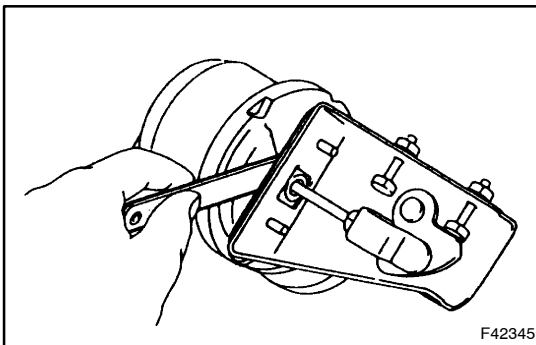
15. TEMPORARILY INSTALL POWER CHAMBER

- (a) Install a new gasket and bearing.

- (b) Install the clevis and lock nut.

Torque: 13.7 N·m (140 kgf·cm, 10 ft·lbf)

- (c) Temporarily install the chamber to the bracket with the 2 nuts.



16. ADJUST ROD LENGTH

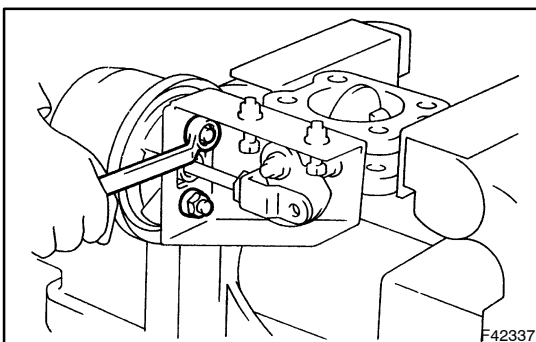
- (a) Measure the clearance between the chamber and gasket.

Standard clearance: 2 - 5 mm (0.08 - 0.20 in.)

HINT:

Check that the valve lever and adjusting bolt are making contact.

- (b) If necessary, Loosen the clevis nut and adjust the clearance by turning the rod.



17. INSTALL POWER CHAMBER

- (a) Tighten the 2 nuts.

Torque: 17.6 N·m (180 kgf·cm, 13 ft·lbf)

18. INSTALL BRACKET COVER

- (a) Install the clip and pin to the clevis.

- (b) Install the cover with the 2 bolts.

19. INSTALL EXHAUST RETARDER ASSY

- (a) Install the 2 new gaskets and exhaust retarder with the 4 bolts.

Torque: 29.5 N·m (300 kgf·cm, 22 ft·lbf)

20. INSTALL VACUUM HOSE**21. INSTALL ENGINE SIDE COVER SUB-ASSY RH**

MANUAL TRANSMISSION/TRANSAXLE

MANUAL TRANSMISSION SYSTEM	41-1
PROBLEM SYMPTOMS TABLE	41-1
MANUAL TRANSMISSION OIL	41-2
REPLACEMENT	41-2
MANUAL TRANSMISSION UNIT ASSY	41-3
REPLACEMENT	41-3
REAR BEARING RETAINER OIL SEAL	41-9
REPLACEMENT	41-9
FLOOR SHIFT ASSY	41-10
ADJUSTMENT	41-10
OVERHAUL	41-11
SHIFT AND SELECT TRANSMISSION	
CONTROL CABLE ASSY	41-19
REPLACEMENT	41-19

MANUAL TRANSMISSION SYSTEM

PROBLEM SYMPTOMS TABLE

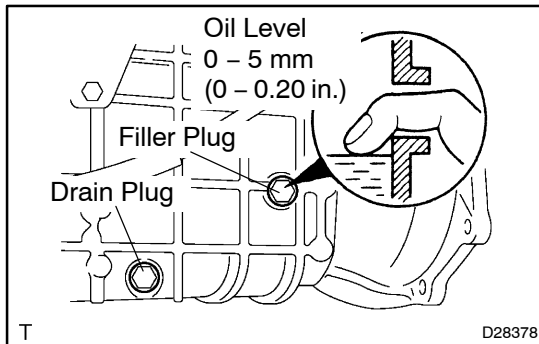
410D4-01

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspected Area	See Page
Noise	6. Oil (Level low)	41-2
	7. Oil (Wrong)	41-2
	8. Gear (Worn or damaged)	*
	9. Bearing (Worn or damaged)	*
Oil leakage	1. Oil (Level too high)	41-2
	2. Gasket (Damaged)	*
	3. Oil seal (Worn or damaged)	41-9
	4. O-Ring (Worn or damaged)	*
Shifting is hard or disabled	1. Synchronizer ring (Worn or damaged)	*
	2. Shift key spring (Damaged)	*
Jumps out of gear	1. Locking ball spring (Damaged)	*
	2. Shift fork (Worn)	*
	3. Gear (Worn or damaged)	*
	4. Bearing (Worn or damaged)	*

MANUAL TRANSMISSION OIL REPLACEMENT

410D5-01



1. REPLACE MANUAL TRANSMISSION OIL

- (a) Loosen the filler plug.
- (b) Remove the drain plug.

HINT:

Use a container to catch the transmission oil.

- (c) Remove the filler plug.
- (d) Reinstall the drain plug.

Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

- (e) Pour fresh transmission oil, as shown in the illustration.

Transmission type	M150/M153	H350/H351/H260
Oil grade	API GL-4 or GL-5	
Viscosity	SAE 75W-90	
Capacity Litter (US.qts, Imp.qts)	3.2 (3.4, 2.8)	4.2 (4.4, 3.7)

- (f) Reinstall the filler plug.

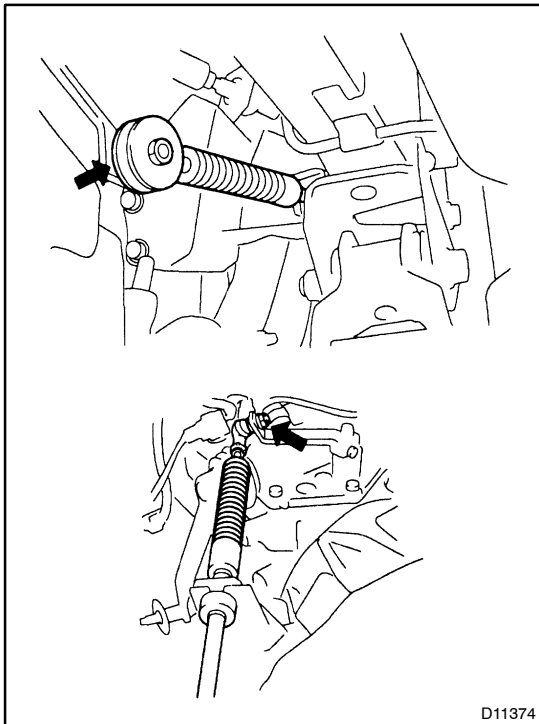
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

MANUAL TRANSMISSION UNIT ASSY

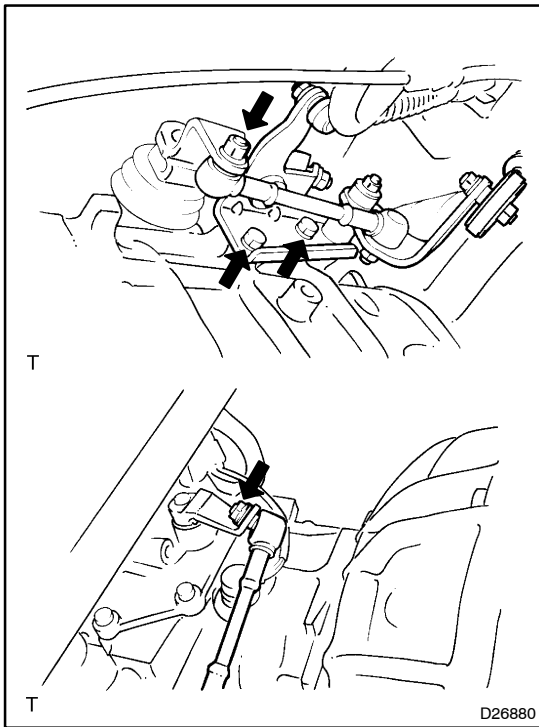
410D6-01

REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN MANUAL TRANSMISSION OIL
3. REMOVE ENGINE SIDE COVER SUB-ASSY LH
4. REMOVE ENGINE SIDE COVER SUB-ASSY RH
5. REMOVE EXHAUST PIPE ASSY CENTER (See page 15-8 or 15-12 or 15-19 or 15-22)
6. REMOVE EXHAUST PIPE ASSY FRONT (See page 15-8 or 15-12 or 15-19 or 15-22)
7. REMOVE PROPELLER SHAFT ASSY
 - B-type Propeller Shaft (See page 30-6 or 30-22)
 - LE-type Propeller Shaft (See page 30-14 or 30-29)
8. REMOVE PARKING BRAKE DRUM SUB-ASSY (See page 33-11)
9. DISCONNECT PARKING BRAKE PLATE SUB-ASSY (See page 33-11)
10. DISCONNECT CABLE AND CONNECTOR
 - (a) Disconnect the speedometer cable.
 - (b) Disconnect the back-up lamp switch connector.
 - (c) Remove the clamp and bands.



11. DISCONNECT SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (14B/W04D-J ENGINE)
 - (a) Remove the 2 nuts and 2 clips, and disconnect the shift and select transmission cable.



12. REMOVE SELECTING BELLCRANK SUPPORT SUB-ASSY

(15B-FTE/S05C-B/S05C-TA/S05C-TB ENGINE)

- (a) Remove the 2 nuts and 2 rods from the transmission.
- (b) Remove the 2 bolts and selecting bellcrank support from the transmission.

13. DISCONNECT CLUTCH RELEASE CYLINDER ASSY

- (a) Remove the 2 bolts and disconnect the clutch release cylinder.

14. REMOVE STARTER ASSY (14B ENGINE TYPE) (See page 19-3)

15. REMOVE STIFFENER PLATE RH (14B ENGINE)

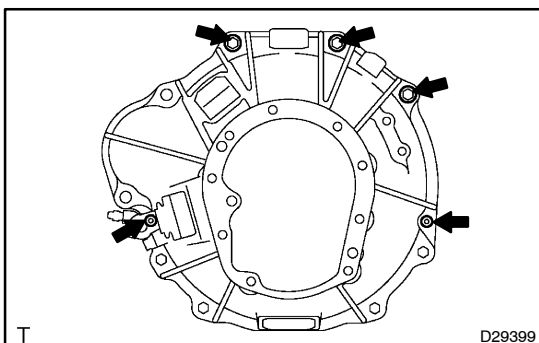
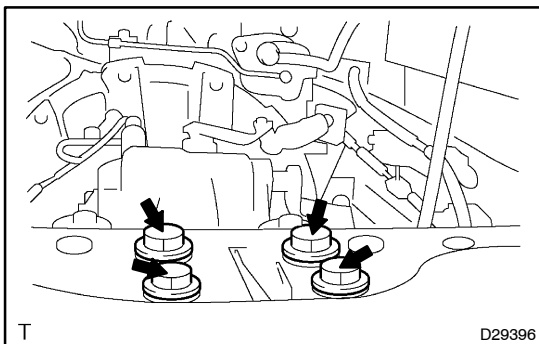
- (a) Remove the 4 bolts and stiffener plate.

16. REMOVE STIFFENER PLATE LH (14B ENGINE)

- (a) Remove the 4 bolts and stiffener plate.

17. REMOVE MANUAL TRANSMISSION UNIT ASSY (14B ENGINE)

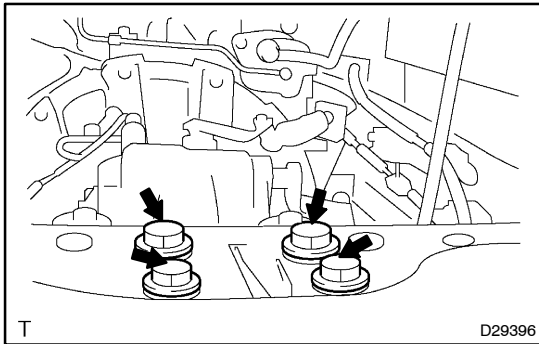
- (a) Using a transmission jack, support the transmission unit.
- (b) Remove the 4 engine rear mounting bolts from the frame.



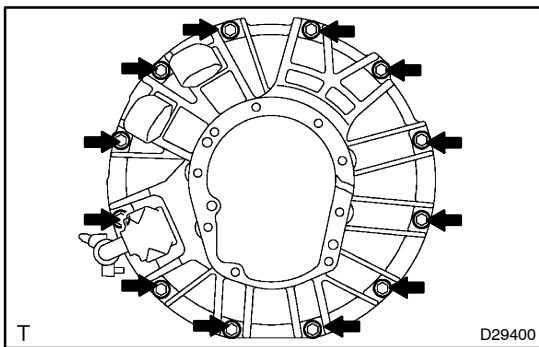
- (c) Remove the 5 transmission mounting bolts from the engine.
- (d) Pull out the transmission.

18. REMOVE MANUAL TRANSMISSION UNIT ASSY (15B-FTE/S05C-B/S05C-TA/S05C-TB/W04D-J ENGINE)

- (a) Using a transmission jack, support the transmission unit.



- (b) Remove the 4 engine rear mounting bolts from the frame.

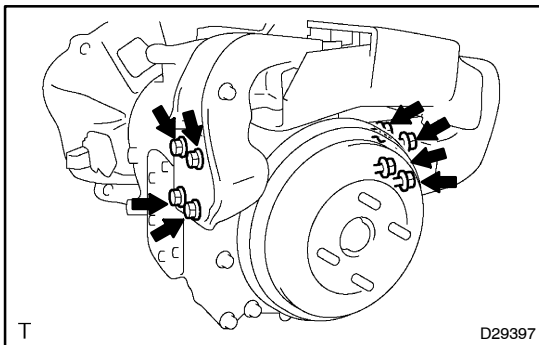


- (c) Remove the transmission mounting bolts from the engine.

10 bolts: 15B-FTE engine

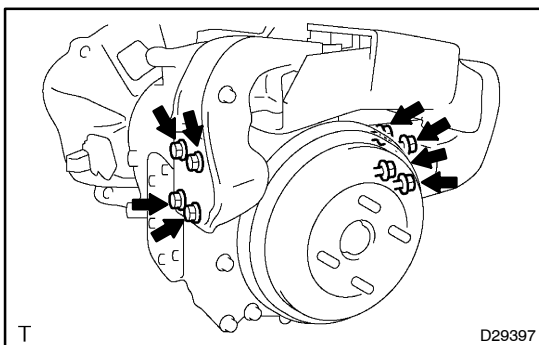
12 bolts: S05C-B/S05C-TA/S05C-TB/W04D-J engine

- (d) Pull out the transmission.



19. REMOVE ENGINE MOUNTING BRACKET SUB-ASSY RR

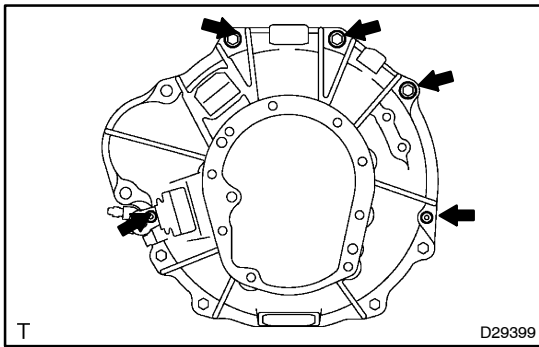
- (a) Remove the 8 bolts and mounting bracket from the transmission.



20. INSTALL ENGINE MOUNTING BRACKET SUB-ASSY RR

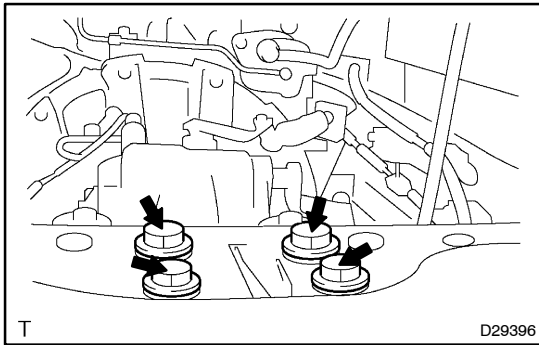
- (a) Install the 8 bolts and mounting bracket to the transmission.

Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

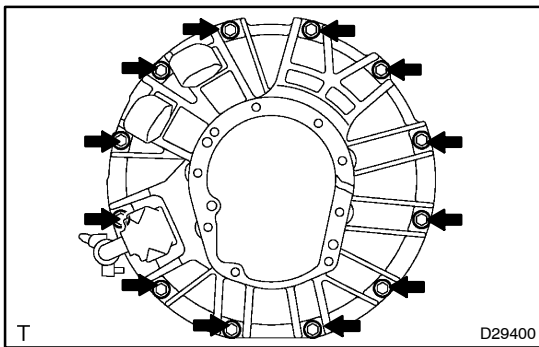


21. INSTALL MANUAL TRANSMISSION UNIT ASSY (14B ENGINE)

- Align the input shaft with the clutch disc and install the transmission unit to the engine.
- Install the 5 transmission mounting bolts.
Torque: 71.5 N·m (729 kgf·cm, 53 ft·lbf)

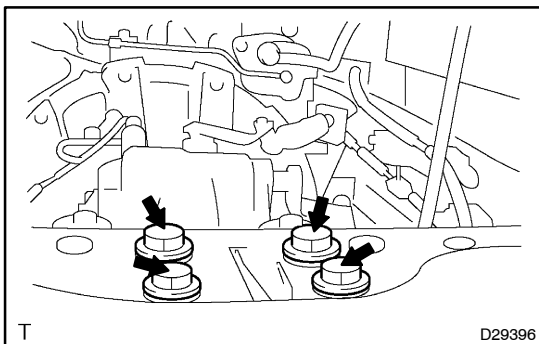


- Install the 4 engine rear mounting bolts to the frame.
Torque: 74 N·m (755 kgf·cm, 55 ft·lbf)



22. INSTALL MANUAL TRANSMISSION UNIT ASSY (15B-FTE/S05C-B/S05C-TA/S05C-TB/W04D-J ENGINE)

- Align the input shaft with the clutch disc and install the transmission unit to the engine.
- Install the transmission mounting bolts.
10 bolts: 15B-FTE engine
12 bolts: S05C-B/S05C-TA/S05C-TB/W04D-J engine
Torque: 43 N·m (439 kgf·cm, 32 ft·lbf)



- Install the 4 engine rear mounting bolts to the frame.
Torque: 74 N·m (755 kgf·cm, 55 ft·lbf)

23. INSTALL STIFFENER PLATE RH (14B ENGINE)

- Install the stiffener plate with the 4 bolts.
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

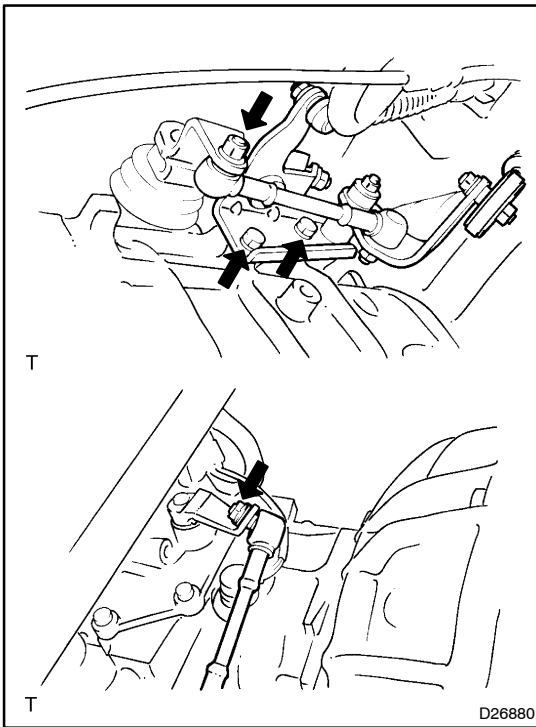
24. INSTALL STIFFENER PLATE LH (14B ENGINE)

- Install the stiffener plate with the 4 bolts.
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

25. INSTALL STARTER ASSY (14B ENGINE) (See page 19-3)

26. INSTALL CLUTCH RELEASE CYLINDER ASSY

- Install the clutch release cylinder assy with the 2 bolts.
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



27. INSTALL SELECTING BELLCRANK SUPPORT SUB-ASSY

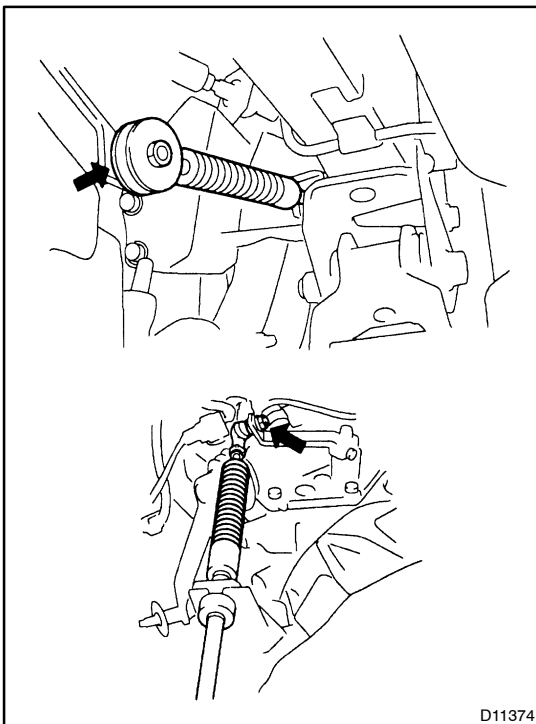
(15B-FTE/S05C-B/S05C-TA/S05C-TB ENGINE)

- (a) Install the selecting bellcrank support to the transmission with the 2 bolts.

Torque: 36 N·m (367 kgf·cm, 27 ft·lbf)

- (b) Install the 2 rods to the transmission with the 2 nuts

Torque: 17.5 N·m (179 kgf·cm, 13 ft·lbf)



28. CONNECT SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (14B/ W04D-J ENGINE TYPE)

- (a) Connect the shift and select cable to the levers with the 2 nuts.

Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)

- (b) Install the shift and select cable to the bracket with the 2 clips.

29. CONNECT CABLE AND CONNECTOR

- (a) Connect the speedometer cable.
 (b) Connect the back-up light switch connector.
 (c) Install the clamp and bands.

30. INSTALL PARKING BRAKE PLATE SUB-ASSY (See page 33-11)

31. INSTALL PARKING BRAKE DRUM SUB-ASSY (See page 33-11)

32. ADJUST PARKING BRAKE SHOE CLEARANCE (See page 33-2)

33. INSTALL PROPELLER SHAFT ASSY

B-type Propeller Shaft (See page 30-6 or 30-22)

LE-type Propeller Shaft (See page 30-14 or 30-29)

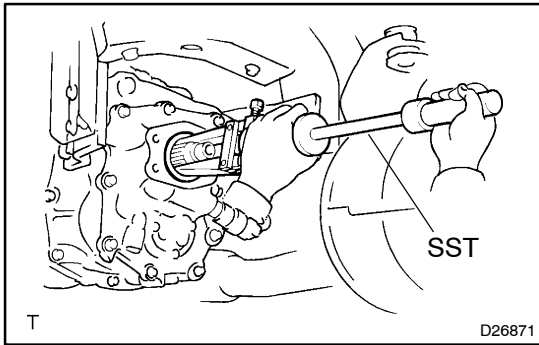
34. **INSTALL EXHAUST PIPE ASSY FRONT (See page 15-8 or 15-12 or 15-19 or 15-22)**
35. **INSTALL EXHAUST PIPE ASSY CENTER (See page 15-8 or 15-12 or 15-19 or 15-22)**
36. **FILL UP MANUAL TRANSMISSION OIL (See page 41-2)**
37. **CONNECT BATTERY NEGATIVE TERMINAL**

REAR BEARING RETAINER OIL SEAL

410D7-01

REPLACEMENT

1. REMOVE PROPELLER SHAFT ASSY
 B-type Propeller Shaft (See page 30-6 or 30-22)
 LE-type Propeller Shaft (See page 30-14 or 30-29)
2. REMOVE PARKING BRAKE DRUM SUB-ASSY (See page 33-11)
3. SEPARATE PARKING BRAKE PLATE SUB-ASSY (See page 33-11)

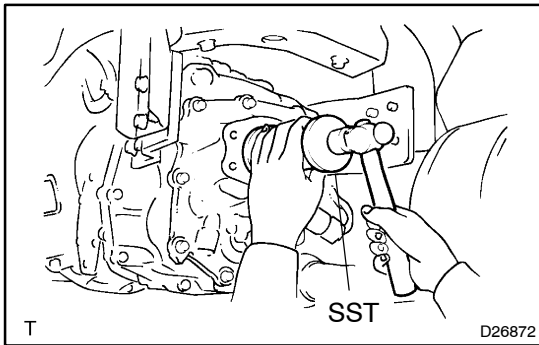


4. REMOVE TRANSMISSION REAR BEARING RETAINER OIL SEAL

- (a) Using SST, drive out the oil seal.
 SST 09308-00010

NOTICE:

Take care not to damage the sealing seat of the rear cover.



5. INSTALL TRANSMISSION REAR BEARING RETAINER OIL SEAL

- (a) Coat the lip of a new oil seal with MP grease.
- (b) Using SST and a hammer, tap in the oil seal.
 SST 09316-60011 (09316-00011, 09316-00041)

NOTICE:

- Uniformly tap the oil seal.
- Do not damage or deform the oil seal.

6. INSTALL PARKING BRAKE PLATE SUB-ASSY (See page 33-11)
7. INSTALL PARKING BRAKE DRUM SUB-ASSY (See page 33-11)
8. ADJUST PARKING BRAKE SHOE CLEARANCE (See page 33-2)
9. INSTALL PROPELLER SHAFT ASSY
 B-type Propeller Shaft (See page 30-6 or 30-22)
 LE-type Propeller Shaft (See page 30-14 or 30-29)
10. INSPECT AND ADJUST MANUAL TRANSMISSION OIL (See page 41-2)

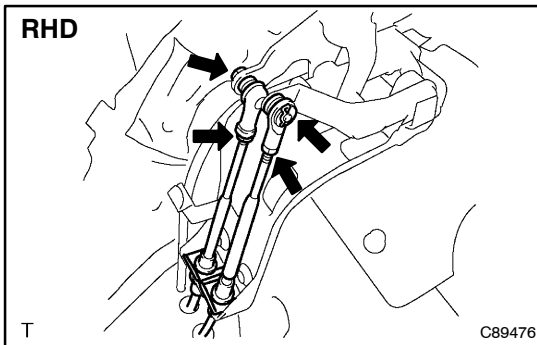
FLOOR SHIFT ASSY ADJUSTMENT

410D8-01

1. INSPECT AND ADJUST SHIFT LEVER POSITION

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.



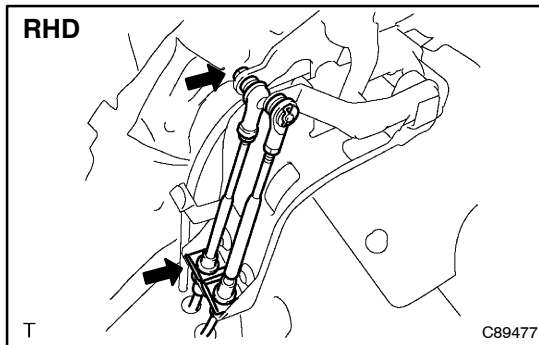
- (a) When the shift lever is in the N position, check that the shift lever is perpendicular to the installation surface for the floor shift assy.
- (b) Remove the nut and disconnect the shift cable from the floor shift assy.
- (c) Remove the clip and disconnect the select cable from the floor shift assy.
- (d) Loosen the lock nut and adjust the shift lever range by turning the ball joint.
- (e) Install the select cable to the floor shift assy with the clip.
- (f) Install the shift cable to the floor shift assy with the nut.
Torque: 11.5 N·m (117 kgf·cm, 8.5 ft·lbf)
- (g) Tighten the lock nut.
Torque: 13 N·m (133 kgf·cm, 9.6 ft·lbf)
- (h) After adjustment, check the following.
 - (1) The shift lever is perpendicular to the installation surface for the floor shift assy.
 - (2) Shifting into each position can be done securely.
 - (3) When selecting or shifting the shift positions, no abnormal force is required.
 - (4) When selecting the shift position, the shift lever should return to the N position smoothly.
 - (5) No abnormal noise is heard during operation.

FLOOR SHIFT ASSY

410D9-01

OVERHAUL

1. REMOVE FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY
2. REMOVE PARKING BRAKE HOLE COVER
 - (a) Remove the 2 screws and parking hole cover.
3. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER
 - (a) Remove the 3 clips and shift lever boot cover.

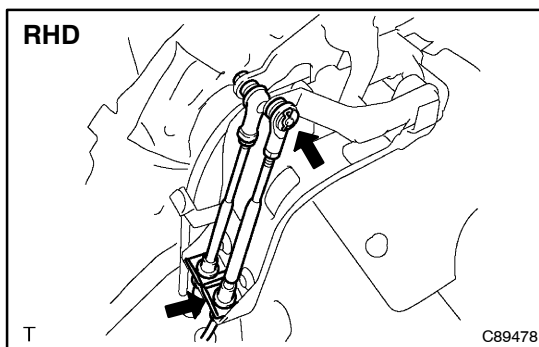


4. SEPARATE FLOOR SHIFT CABLE TRANSMISSION CONTROL SHIFT

- (a) Remove the nut and disconnect the shift cable from the floor shift.
- (b) Remove the clip and disconnect the shift cable from the shift lever retainer.

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

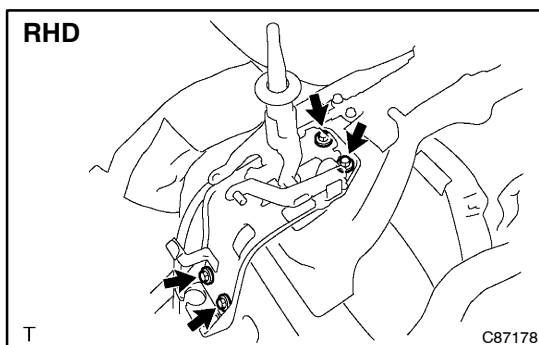


5. SEPARATE FLOOR SHIFT CABLE TRANSMISSION CONTROL SELECT

- (a) Remove the clip and disconnect the select cable from the floor shift.
- (b) Remove the clip and disconnect the select cable from the shift lever retainer.

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

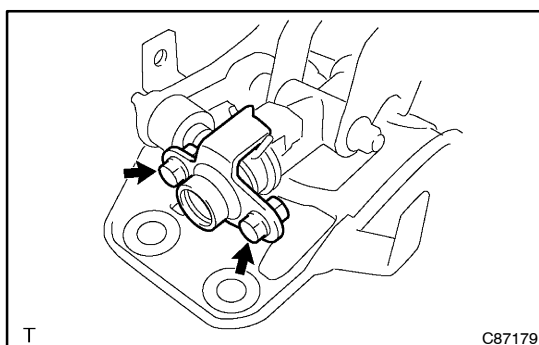


6. REMOVE FLOOR SHIFT ASSY

- (a) Remove the 4 bolts and floor shift.

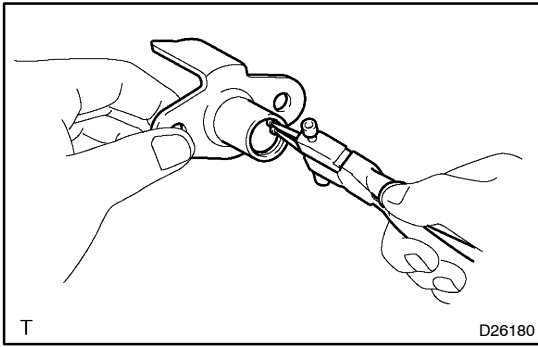
HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

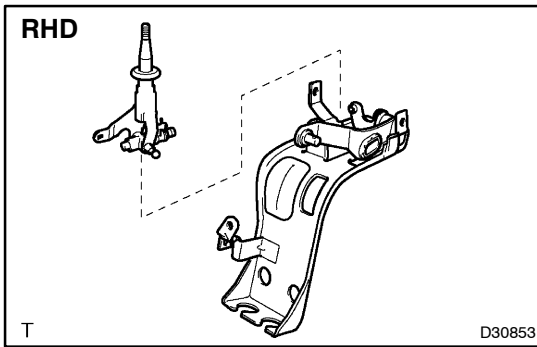


7. REMOVE FLOOR SHIFT CONTROL LEVER STOPPER

- (a) Remove the 2 bolts, control lever stopper and washer.



- (b) Using snap ring pliers, remove the snap ring from the control lever stopper.

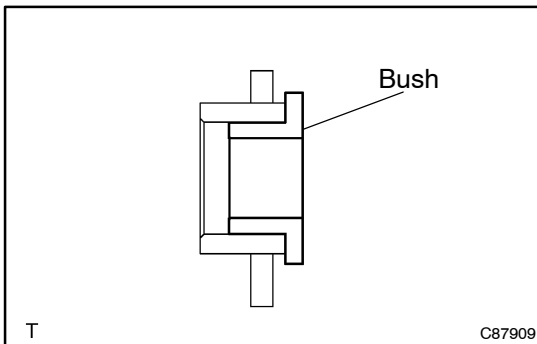


8. REMOVE FLOOR SHIFT CONTROL SHIFT LEVER RETAINER SUB-ASSY

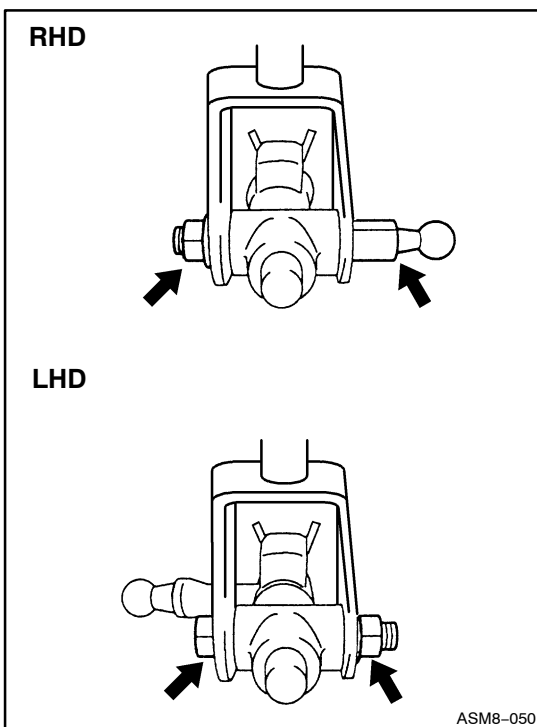
- (a) Remove the shift lever retainer.

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

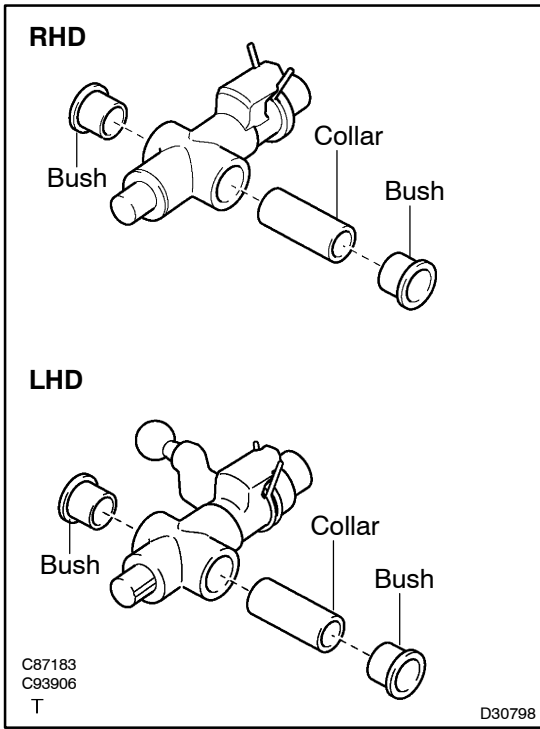


- (b) Remove the bush from the shift lever retainer.



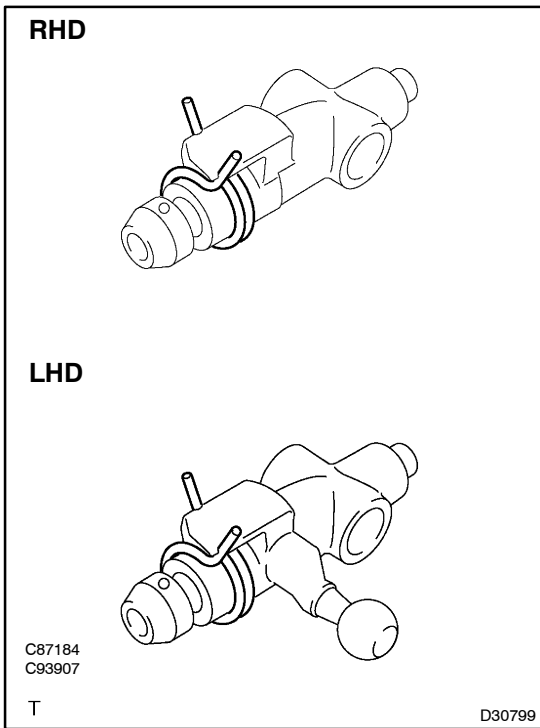
9. REMOVE FLOOR SHIFT SHIFT LEVER SUB-ASSY

- (a) Remove the nut, shift lever bolt and shift lever from the select lever.



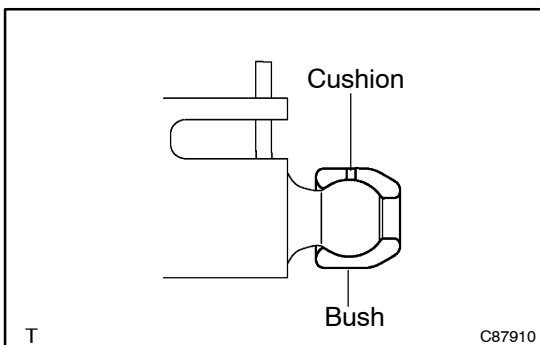
10. REMOVE SELECT LEVER COLLAR

- (a) Remove the 2 bushes and collar from the select lever.



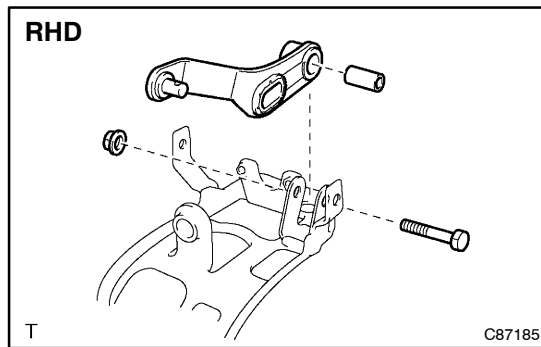
11. REMOVE SELECT LEVER TORSION SPRING

- (a) Remove the torsion spring from the select lever.



12. REMOVE FLOOR SHIFT NO.1 BUSH

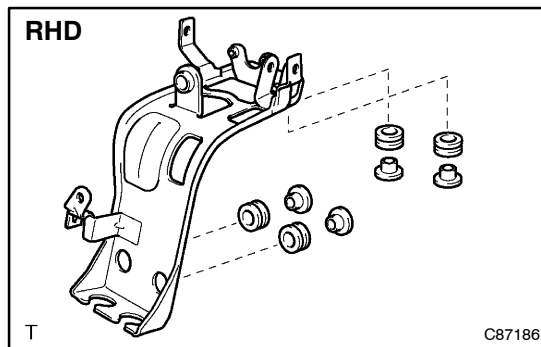
- (a) Remove the bush and cushion from the select lever.

**13. REMOVE SELECTING BELLCRANK**

- (a) Remove the nut, bolt and selecting bellcrank from the shift lever retainer.
- (b) Remove the collar from the selecting bellcrank.

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

**14. REMOVE CONTROL SHIFT LEVER RETAINER NO.1 GROMMET**

- (a) Remove the 4 grommets and bushes from the shift lever retainer.

HINT:

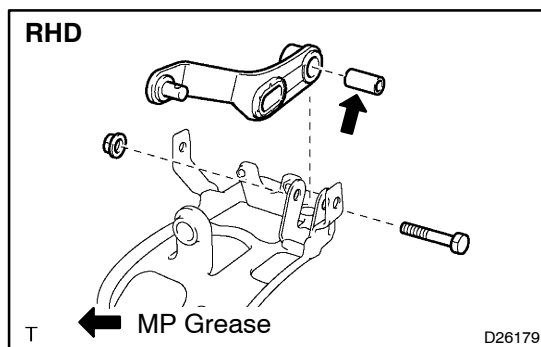
For LHD vehicles, the configuration is opposite to RHD vehicles.

15. INSTALL CONTROL SHIFT LEVER RETAINER NO.1 GROMMET

- (a) Install the 4 bushes and new grommets to the shift lever retainer.

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

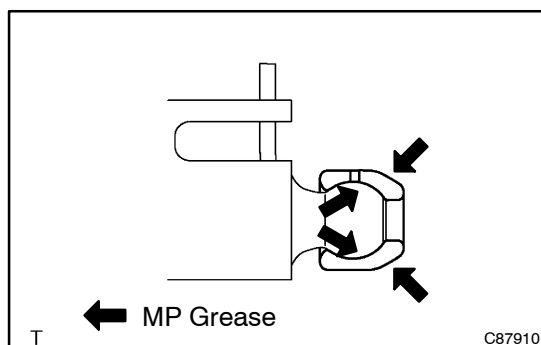
**16. INSTALL SELECTING BELLCRANK**

- (a) Apply MP grease to the outside of the collar
- (b) Install the selecting bellcrank to the shift lever retainer with the bolt and nut.

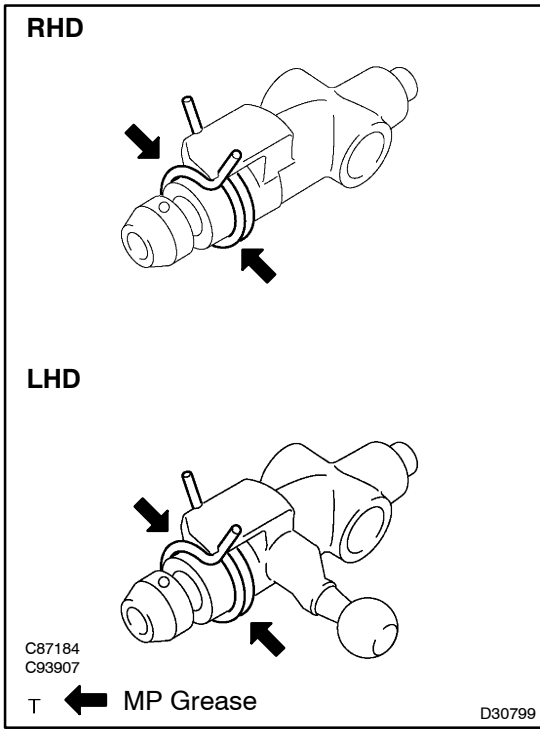
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

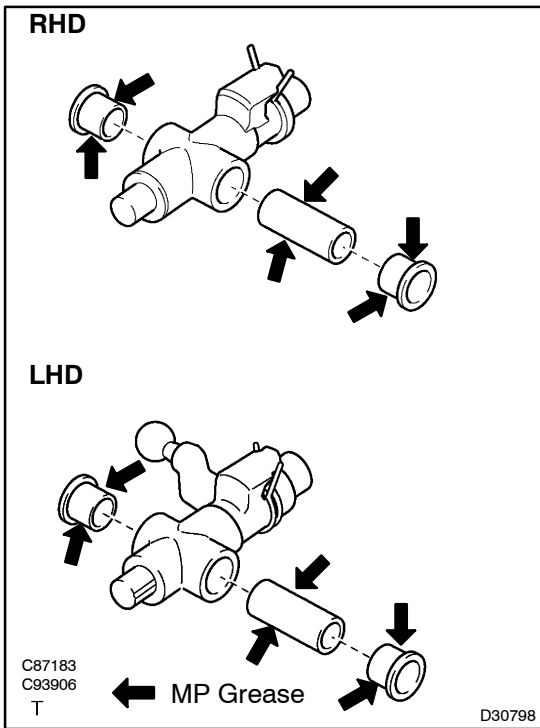
**17. INSTALL SELECT LEVER TORSION SPRING**

- (a) Apply MP grease to the inside and outside of a new bush.
- (b) Install a new cushion and the bush to the select lever.



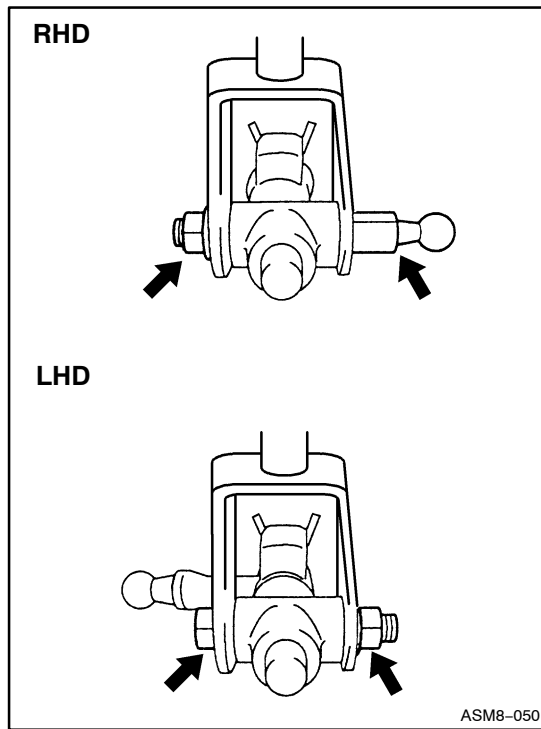
18. INSTALL FLOOR SHIFT NO.1 BUSH

- (a) Apply MP grease to the torsion spring.
- (b) Install the torsion spring to the select lever.

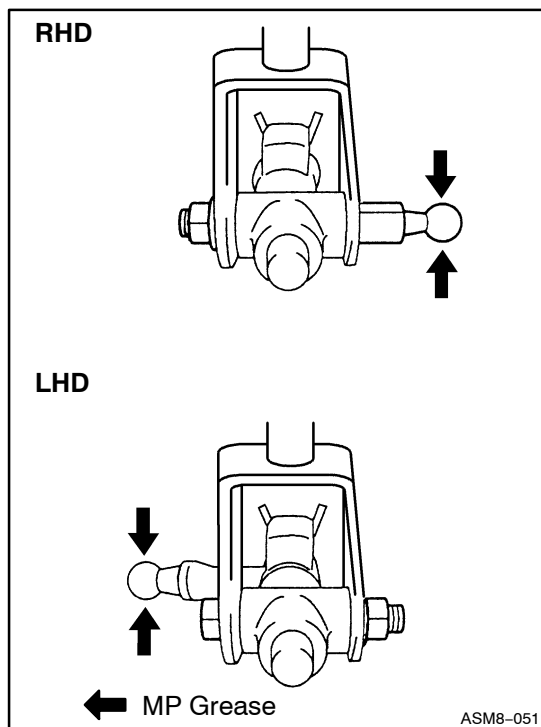


19. INSTALL SELECT LEVER COLLAR

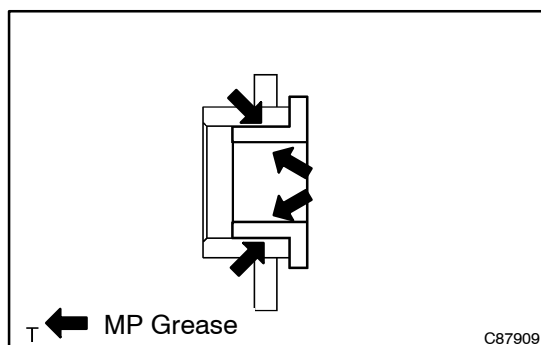
- (a) Apply MP grease to the outside of the collar.
- (b) Apply MP grease to both sides of 2 new bushes.
- (c) Install the collar and 2 bushes to the select lever.



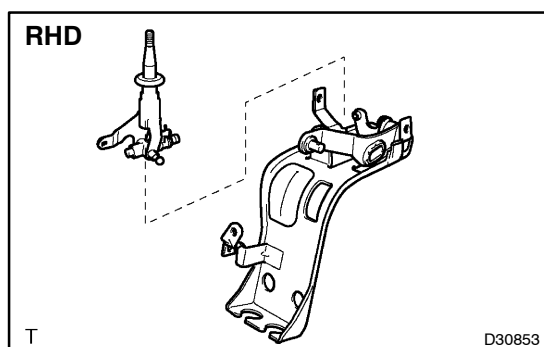
- 20. INSTALL FLOOR SHIFT SHIFTER LEVER SUB-ASSY**
- (a) Install the shift lever to the select lever with the shift lever bolt and nut.
- Torque: 14.5 N·m (145 kgf·cm, 11 ft·lbf)**



- (b) Apply MP grease to the outside of the shift lever bolt.



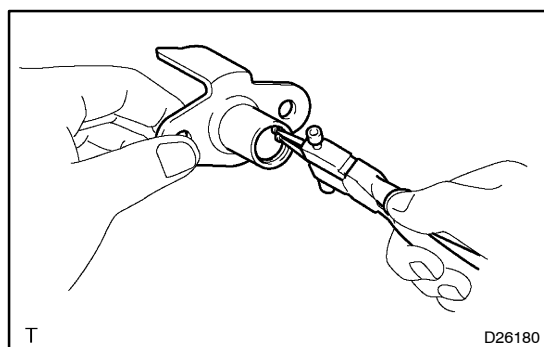
- 21. INSTALL FLOOR SHIFT CONTROL SHIFTER LEVER RETAINER SUB-ASSY**
- (a) Apply MP grease to the inside and outside of a new bush.
- (b) Install the bush to the shift lever retainer.



- (c) Install the shift lever retainer with the shift lever bolt and nut.

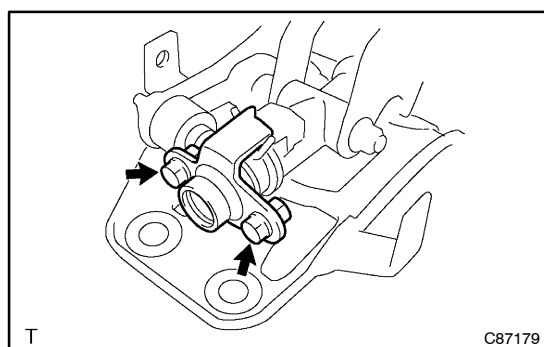
HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

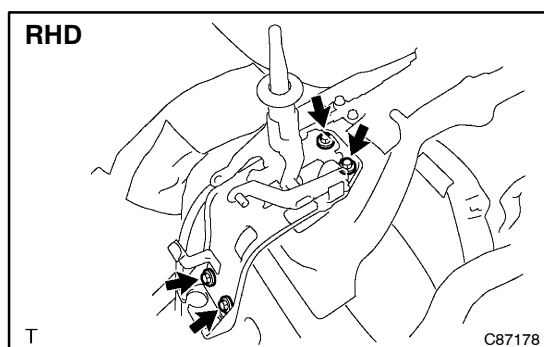


22. INSTALL FLOOR SHIFT CONTROL LEVER STOPPER

- (a) Using snap ring pliers, install the snap ring to the control lever stopper.
- (b) Install the washer to the control lever stopper.



- (c) Install the control lever stopper with the 2 bolts.
Torque: 5.0 N·m (50 kgf·cm, 44 in·lbf)

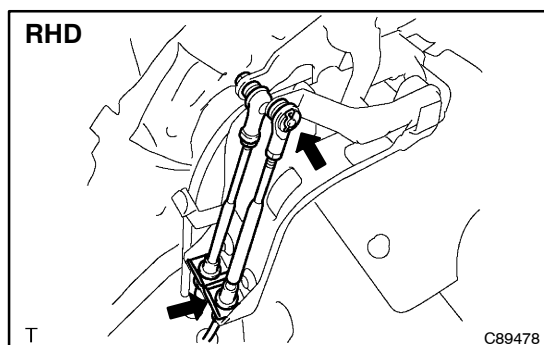


23. INSTALL FLOOR SHIFT ASSY

- (a) Install the floor shift assy to the floor with the 4 bolts.
Torque: 18 N·m (183 kgf·cm, 13 ft·lbf)

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

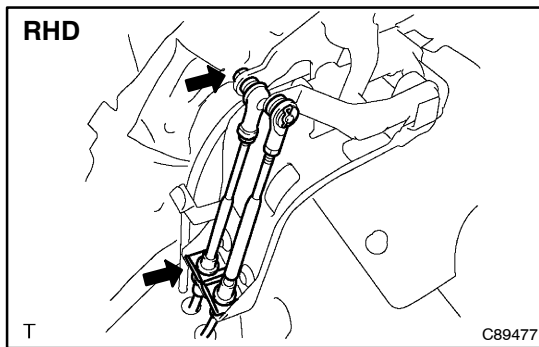


24. INSTALL FLOOR SHIFT CABLE TRANSMISSION CONTROL SHIFT

- (a) Install the select cable to the shift lever retainer with the clip.
- (b) Install the select cable to the floor shift with the clip.

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

**25. INSTALL FLOOR SHIFT CABLE TRANSMISSION CONTROL SELECT**

- (a) Install the shift cable to the shift lever retainer with the clip.
- (b) Temporarily install the shift cable to the floor shift with the nut.

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

26. INSPECT AND ADJUST SHIFT LEVER POSITION (See page 41-10)**27. INSTALL SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER**

- (a) Install the shift lever boot cover with the 3 clips.

28. INSTALL PARKING BRAKE HOLE COVER

- (a) Install the parking hole cover with the 2 screws.

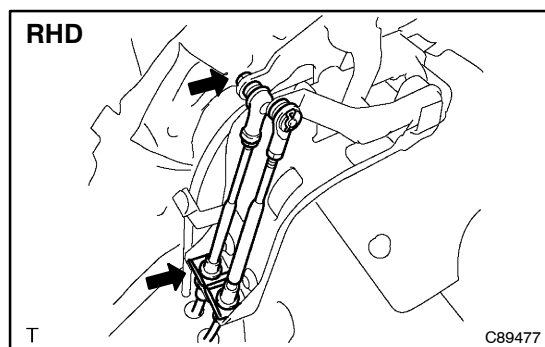
29. INSTALL FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY

SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY

410DA-01

REPLACEMENT

1. REMOVE FLOOR SHIFT SHIFTER LEVER KNOB SUB-ASSY
2. REMOVE PARKING BRAKE HOLE COVER
 - (a) Remove the 2 screws and parking brake hole cover.
3. REMOVE SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER
 - (a) Remove the 3 clips and shift lever boot cover.

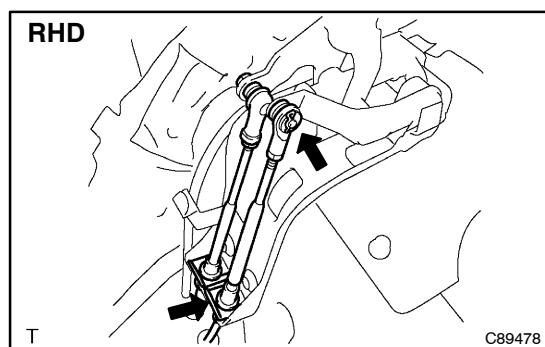


4. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY

- (a) Remove the shift cable from the floor shift (See page 41-11).

HINT:

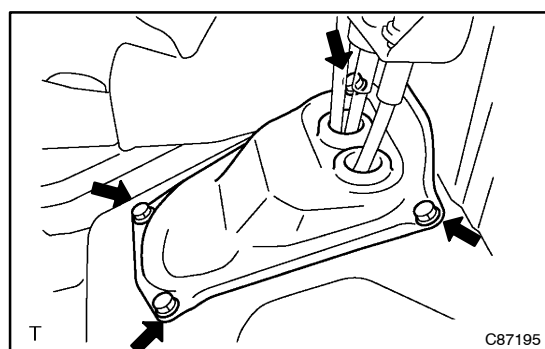
For LHD vehicles, the configuration is opposite to RHD vehicles.



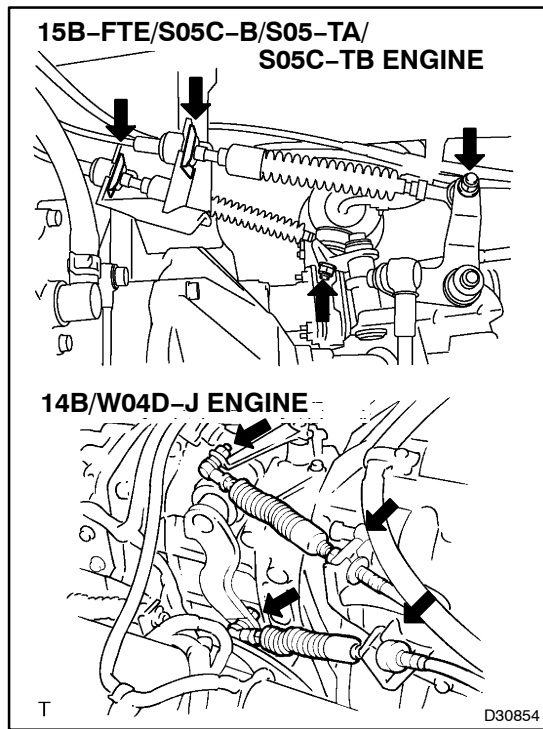
- (b) Remove the select cable from the floor shift (See page 41-11).

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

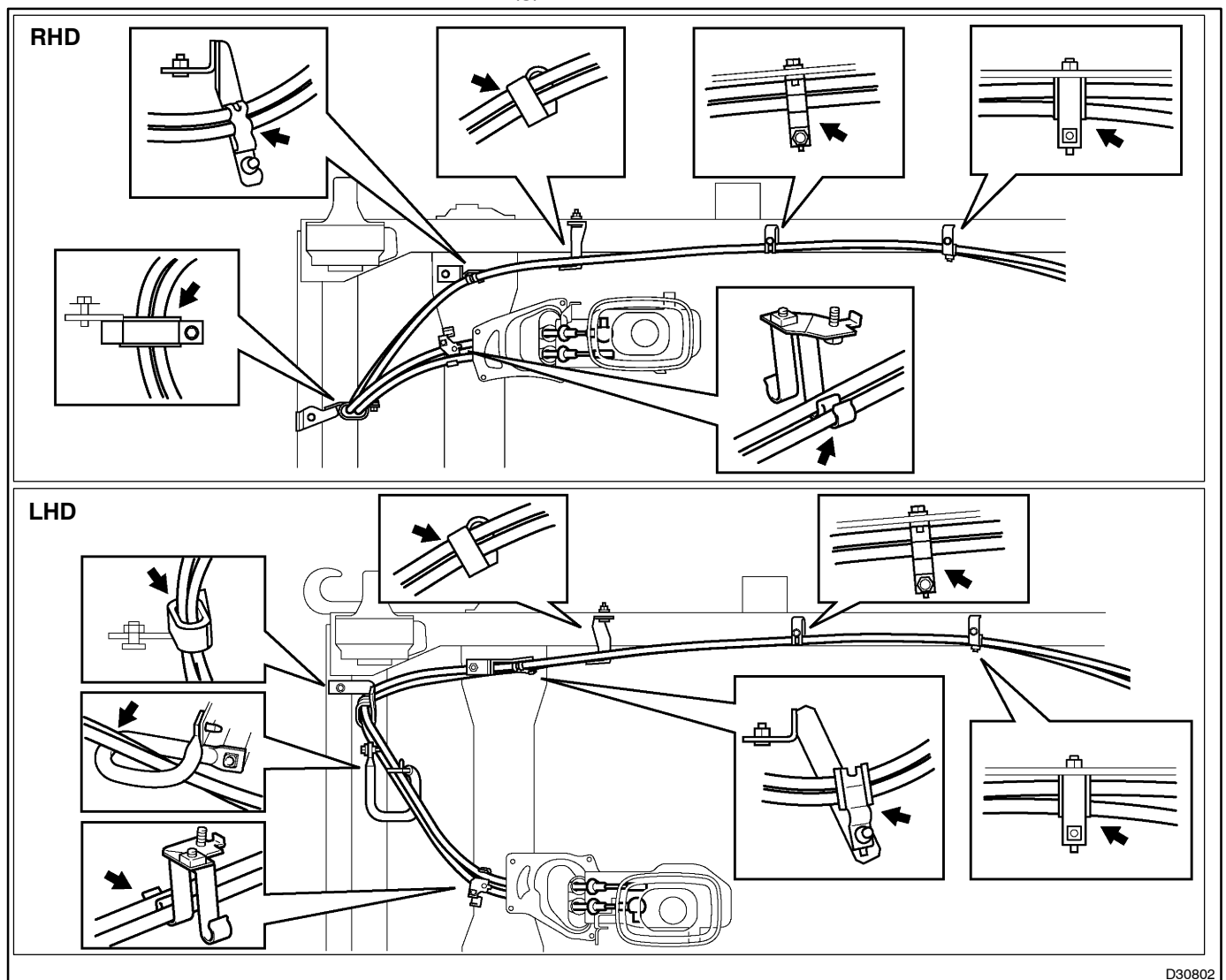


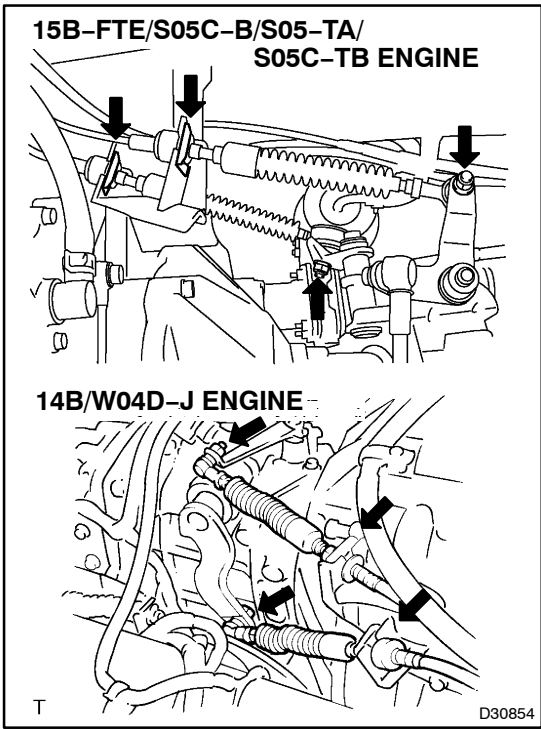
- (c) Remove the 4 bolts, and disconnect the grommet from the floor.
- (d) Disconnect the shift cable from the grommet.



- (e) Remove the nut and clip, and disconnect the shift cable together with the clip and nut.
- (f) Remove the nut and clip, and disconnect the select cable together with the clip and nut.

- (g) Remove the clamps, as shown in illustration.





5. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY

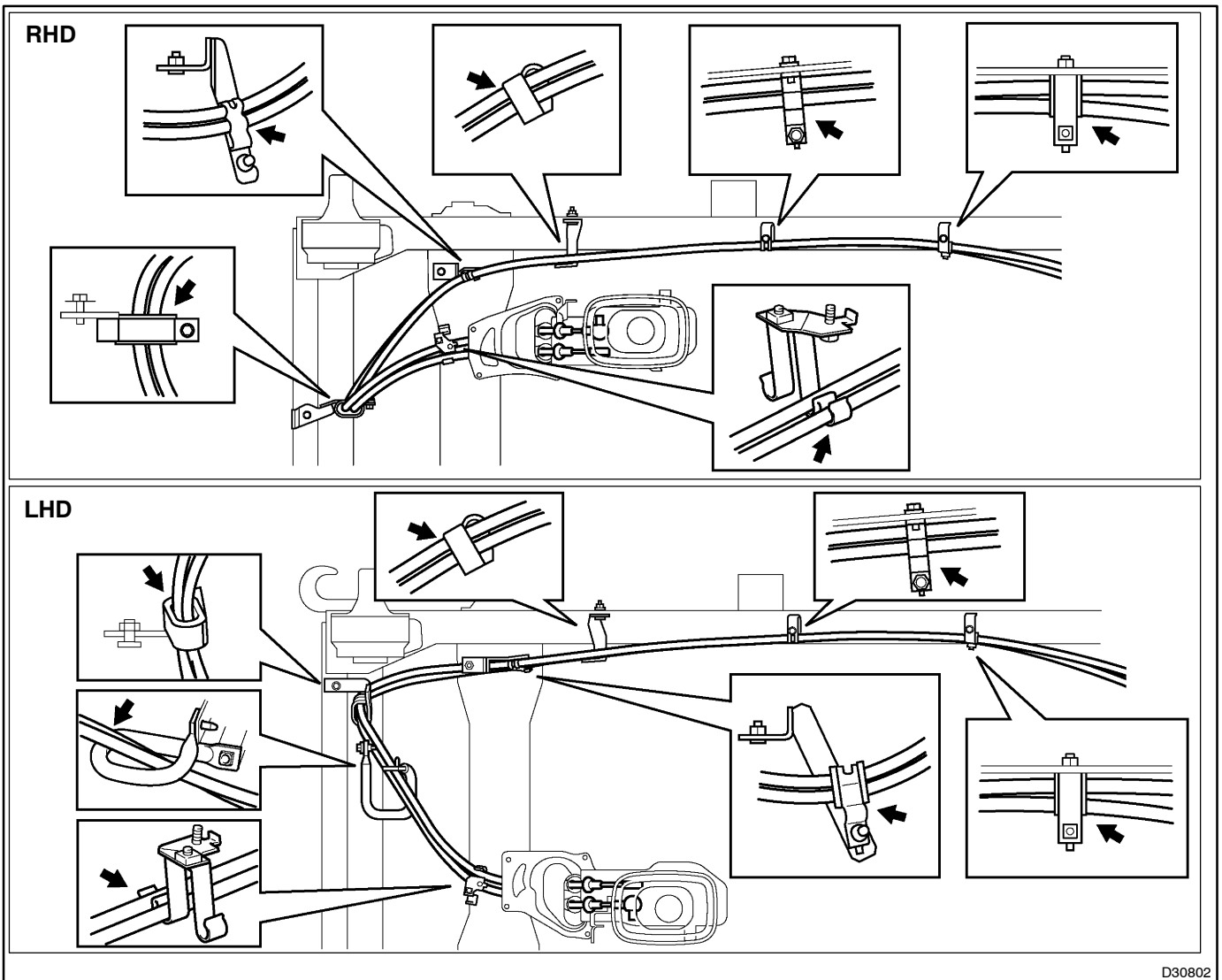
- (a) Pull in the shift cable and select cable to the floor.
- (b) Install the shift cable and select cable to the levers with the nuts.

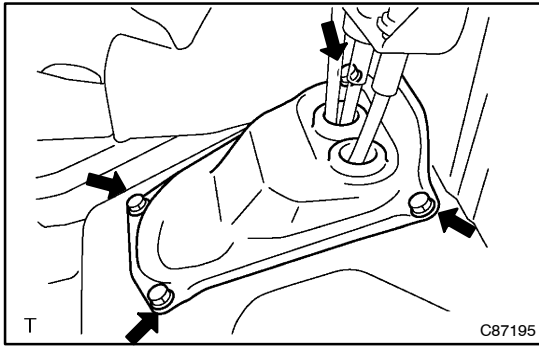
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

- (c) Install the shift cable and select cable to the bracket with the clips.

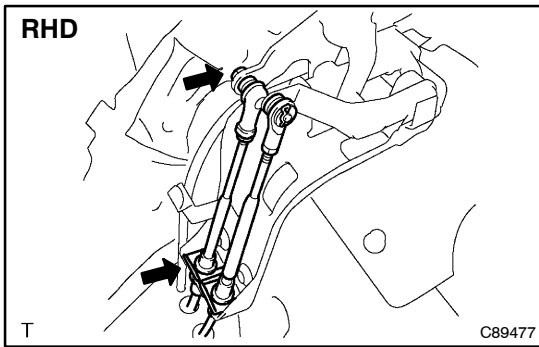
- (d) Install the clamps, as shown in illustration.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)





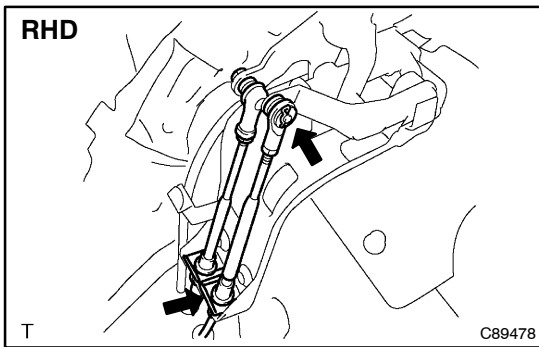
- (e) Install the grommet to the floor with the 4 bolts.
Torque: 7.0 N·m (71 kgf·cm, 62 in·lbf)



- (f) Install the shift cable to the floor shift (See page 41-10).
Torque: 11.5 N·m (117 kgf·cm, 8.5 ft·lbf)

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.



- (g) Install the select cable to the floor shift (See page 41-10).

HINT:

For LHD vehicles, the configuration is opposite to RHD vehicles.

6. INSPECT AND ADJUST SHIFT LEVER POSITION (See page 41-10)

7. INSTALL SHIFTING HOLE COVER SUB-ASSY AND SHIFT LEVER BOOT COVER

- (a) Install the shift lever boot cover with the 3 clips.

8. INSTALL PARKING BRAKE HOLE COVER

- (a) Install the parking hole cover with the 2 screws.

9. INSTALL FLOOR SHIFT SHIFT LEVER KNOB SUB-ASSY

CLUTCH

CLUTCH SYSTEM	42-1
PROBLEM SYMPTOMS TABLE	42-1
BLEEDING	42-2
CLUTCH PEDAL SUB-ASSY	
(W/ BOOSTER)	42-3
ADJUSTMENT	42-3
REPLACEMENT	42-4
CLUTCH PEDAL SUB-ASSY	
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CLUTCH SYSTEM

PROBLEM SYMPTOMS TABLE

4205W-01

(a) Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspected Area	See Page
Clutch grabs/chatters	1. Engine mounting (Loosen)	*
	2. Clutch disc (Excessive runout)	42-24
	3. Clutch disc (Oily)	42-24
	4. Clutch disc (Worn out)	42-24
	5. Clutch disc torsion rubber (Damaged)	42-24
	6. Clutch disc (Glazed)	42-24
	7. Diaphragm spring (Out of tip alignment)	42-24
Clutch pedal spongy	1. Clutch line (Air in line)	42-2
	2. Master cylinder cup (Damaged)	42-14 42-16
	3. Release cylinder cup (Damaged)	42-21
Clutch noisy	1. Release bearing (Worn, dirty, or damaged)	42-24
	2. Input shaft bearing (Worn or damaged)	*
	3. Clutch disc torsion rubber (Damaged)	42-24
Clutch slips	1. Clutch pedal (Freeplay out of adjustment)	42-3 42-7
	2. Clutch disc (Oily)	42-24
	3. Clutch disc (Worn out)	42-24
	4. Diaphragm spring (Damaged)	42-24
	5. Pressure plate (Distortion)	42-24
	6. Flywheel (Distortion)	42-24
Clutch does not disengage	1. Clutch pedal (Freeplay out of adjustment)	42-3 42-7
	2. Clutch line (Air in line)	42-2
	3. Master cylinder cup (Damaged)	42-14 42-16
	4. Release cylinder cup (Damaged)	42-21
	5. Input shaft bearing (Worn or damaged)	*
	6. Clutch disc (Out of true)	42-24
	7. Clutch disc (Excessive runout)	42-24
	8. Clutch disc (Lining broken)	42-24
	9. Clutch disc (Dirty or burned)	42-24
	10. Clutch disc (Oily)	42-24
	11. Clutch disc (Lack of spline grease)	42-24
	12. Diaphragm spring (Damaged)	42-24
	13. Diaphragm spring (Out of tip alignment)	42-24
	14. Pressure plate (Distortion)	42-24

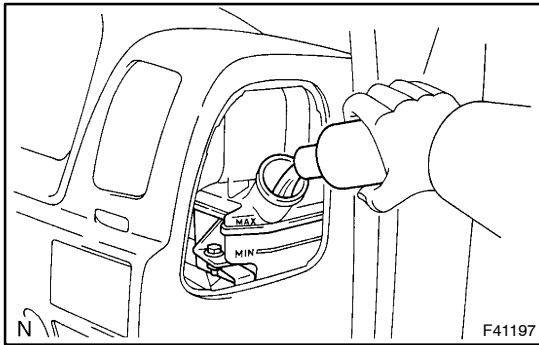
BLEEDING

HINT:

When working on the clutch line, bleed air from the system.

NOTICE:

Wash off any brake fluid that has come into contact with the painted surface.



1. FILL RESERVOIR WITH BRAKE FLUID

- (a) Check the fluid level in the reservoir after bleeding air from the wheels. Add fluid if necessary.

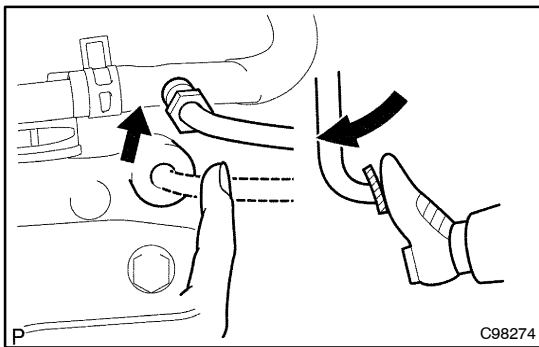
Fluid: SAE J1703 or FMVSS No. 116 DOT3

2. BLEED AIR FROM MASTER CYLINDER

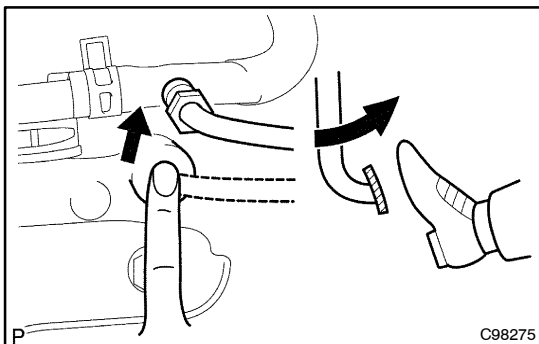
HINT:

If the master cylinder has been disassembled or if the reservoir becomes empty, bleed the air from the master cylinder.

- (a) Disconnect the clutch lines from the master cylinder (See page 42-14 or 42-16).
- (b) Slowly depress the clutch pedal and hold it.



- (c) Block the outer holes with your finger, and release the clutch pedal.
- (d) Repeat steps (b) and (c) 3 or 4 times.
- (e) Connect the clutch lines to the master cylinder (See page 42-14 or 42-16).



3. BLEED AIR FROM CLUTCH LINE

- (a) Connect the vinyl tube to the clutch release cylinder.
- (b) Depress the clutch pedal several times, then loosen the bleeder plug with the pedal depressed.
- (c) At the point when fluid stops coming out, tighten the bleeder plug and then release the clutch pedal.
- (d) Repeat steps (b) and (c) until no air is in the fluid.

Torque: 11 N·m (112 kgf·cm, 8 ft·lbf)

4. CHECK FLUID LEVEL IN RESERVOIR

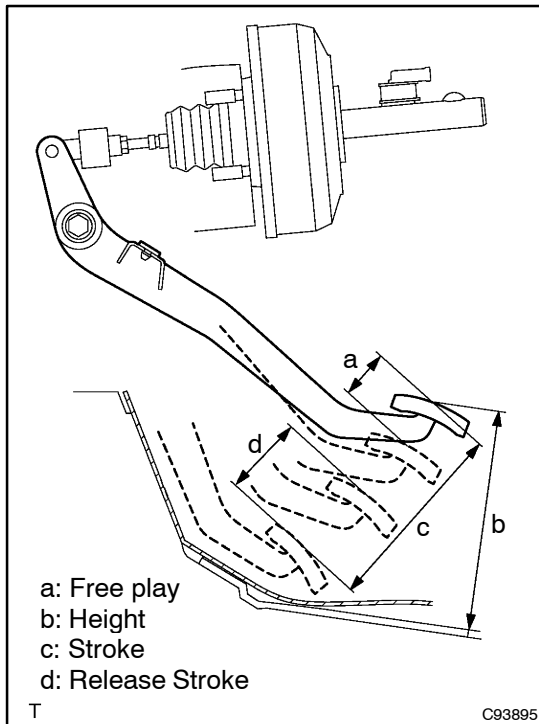
- (a) Check the fluid level and add fluid if necessary.

Fluid: SAE J1703 or FMVSS No. 116 DOT3

CLUTCH PEDAL SUB-ASSY (W/ BOOSTER)

4205Y-01

ADJUSTMENT



1. INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSY

- (a) Check that the pedal height is correct.

Pedal height from asphalt sheet:

LHD	183.0 – 193.0 mm (7.205 – 7.598 in.)
RHD	179.0 – 189.0 mm (7.047 – 7.441 in.)

- (b) Adjust the pedal height.

- (1) Loosen the lock nut and turn the stopper bolt until the height is correct.
- (2) Tighten the lock nut.

- (c) Check that the pedal free play and push rod play are correct.

- (1) Depress the pedal until the clutch resistance begins to be felt.

Pedal free play: 5.0 – 10.0 mm (0.197 – 0.394 in.)

- (2) Gently depress the pedal until the resistance begins to increase a little.

Push rod play at pedal top (Reference valve):

LHD	0.5 – 1.0 mm (0.020 – 0.039 in.)
RHD	0.25 – 0.5 mm (0.010 – 0.020 in.)

- (d) Check the clutch release point.

- (1) Pull the parking brake lever and install wheel stopper
- (2) Start and idle the engine.
- (3) Without depressing the clutch pedal, slowly shift the shift lever into the reverse position until the gears contact each other.
- (4) Gradually depress the clutch pedal and measure the stroke distance from the point that the gear noise stops (release point) up to the full stroke end position.

Standard distance:

(From pedal stroke end position to release point):

LHD	37 mm (1.475 in.) or more
RHD	25 mm (0.985 in.) or more

If the distance is not as specified, perform the following operations.

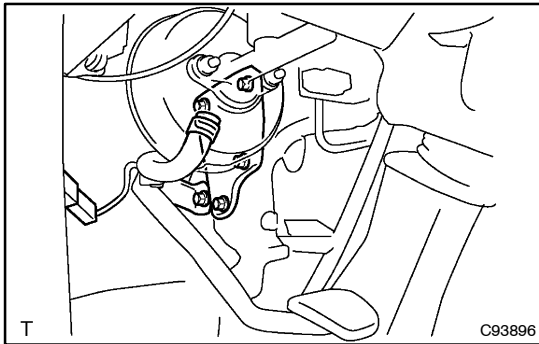
- Check the pedal height.
- Check the push rod play and pedal free play.
- Bleed the clutch line.
- Check the clutch cover and disc.

HINT:

Initialize the cancel position when the parts related with the clutch has been replaced and a free play of the clutch pedal has been adjusted (See page 42-3).

REPLACEMENT

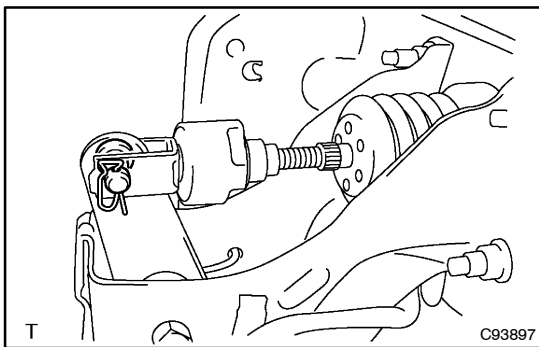
1. DRAIN CLUTCH FLUID
2. DISCONNECT CLUTCH RESERVOIR TUBE (See page 42-14)
3. DISCONNECT CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE (See page 42-14)



4. DISCONNECT CLUTCH BOOSTER VACUUM NO.1 HOSE

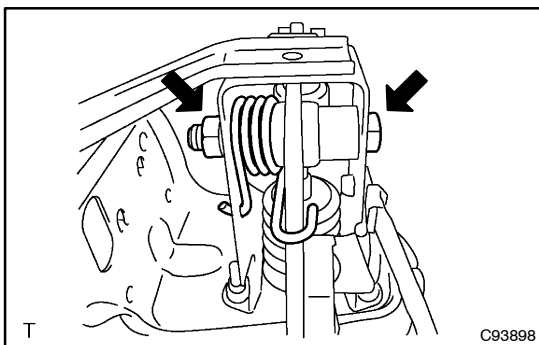
5. REMOVE CLUTCH MASTER CYLINDER SUPPORT

- (a) Disconnect the exhaust brake connector.
- (b) Remove the 5 bolts and clutch master cylinder support.



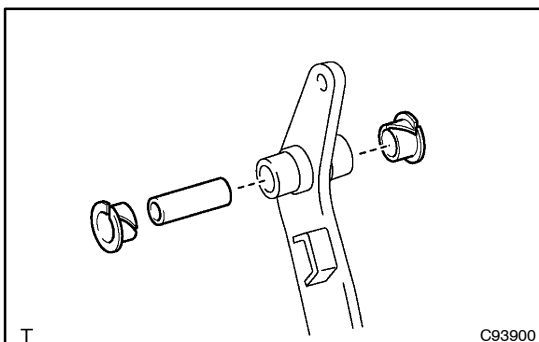
6. REMOVE CLUTCH MASTER CYLINDER PUSH ROD CLEVIS

- (a) Remove the clip and hole pin.
- (b) Disconnect the clevis from the clutch pedal.



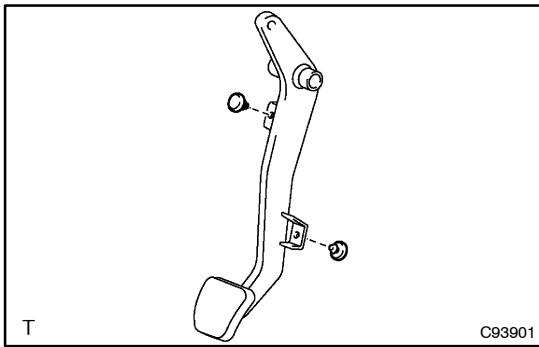
7. REMOVE CLUTCH PEDAL SUB-ASSY

- (a) Mount the clutch pedal in a soft jaw vice.
- (b) Remove the nut, washer and clutch pedal shaft.
- (c) Remove the clutch pedal from the clutch master cylinder support.

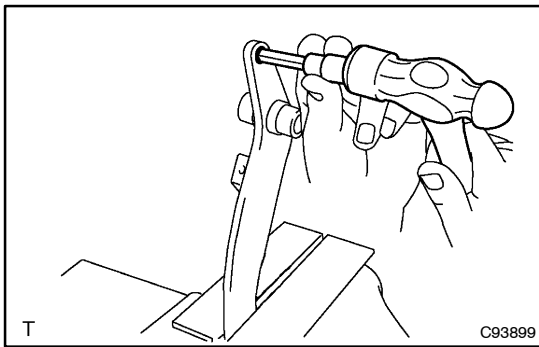


8. REMOVE CLUTCH PEDAL SHAFT COLLAR

- (a) Remove the 2 clutch pedal bushes and clutch pedal shaft collar from the clutch pedal.

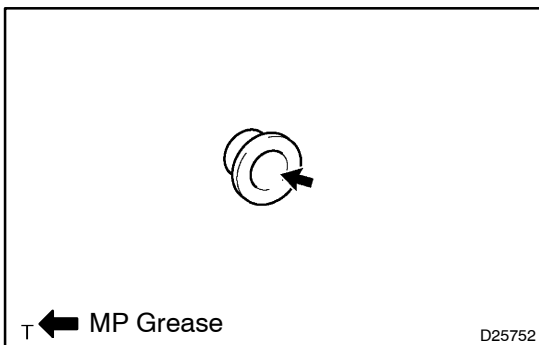
**9. REMOVE CLUTCH PEDAL NO.1 CUSHION**

- (a) Remove the clutch pedal cushion from the clutch pedal.

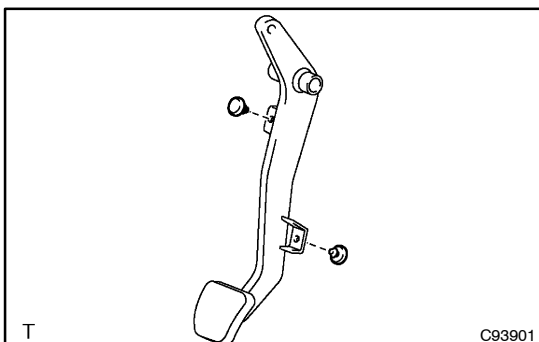
**10. REMOVE CLUTCH MASTER CYLINDER PUSH ROD CLEVIS BUSH**

- (a) Using a 8 mm hexagon wrench and hammer, tap out the clevis bush from the clutch pedal.

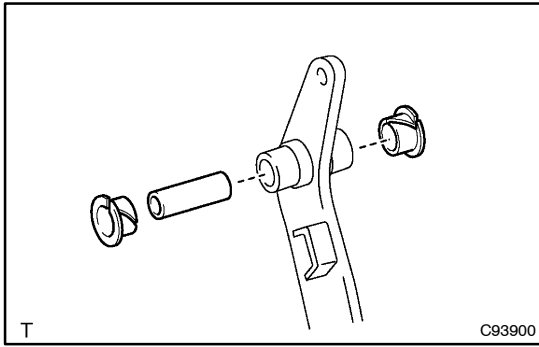
- 11. REMOVE CLUTCH PEDAL PAD**
12. INSTALL CLUTCH PEDAL PAD

**13. INSTALL CLUTCH PEDAL BUSH**

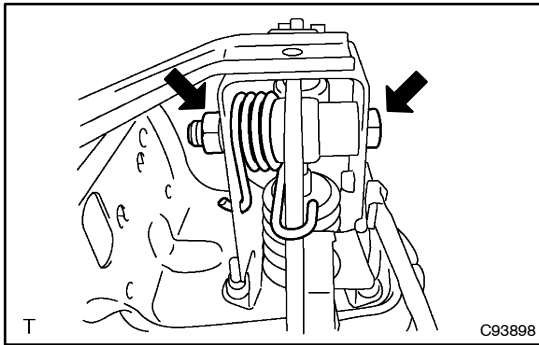
- (a) Apply MP grease to the inside of a new bush.
 (b) Install the bush to the clutch pedal.

**14. INSTALL CLUTCH PEDAL NO.1 CUSHION**

- (a) Install the clutch pedal cushion to the clutch pedal.

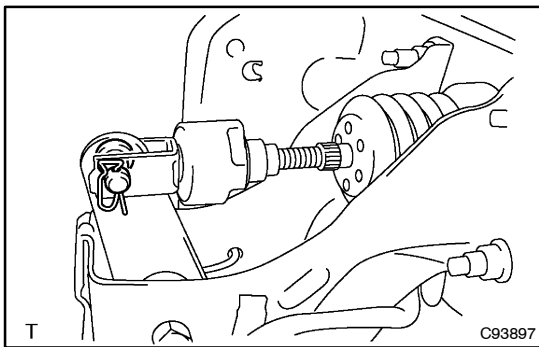
**15. INSTALL CLUTCH PEDAL SHAFT COLLAR**

- (a) Apply MP grease to the inside and outside of a collar.
- (b) Apply MP grease to both sides of 2 new bushes.
- (c) Install the collar and 2 new bushes to the clutch pedal.

**16. INSTALL CLUTCH PEDAL SUB-ASSY**

- (a) Install the clutch pedal to the bracket with the clutch pedal shaft, washer and nut.

Torque: 31 N·m (315 kgf·cm, 23 ft·lbf)

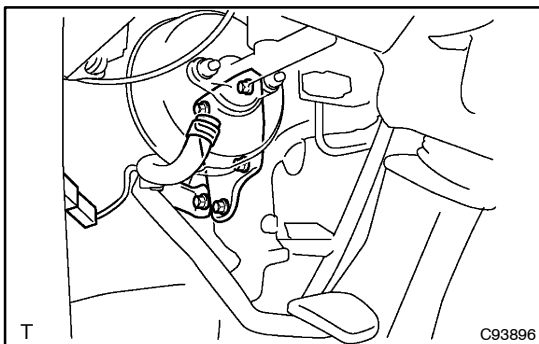
**17. INSTALL CLUTCH MASTER CYLINDER PUSH ROD CLEVIS**

- (a) Apply MP grease to the contact surface of the push rod clevis and bush.
- (b) Connect the clevis to the clutch pedal with the hole pin.

HINT:

Install the hole pin from the right side of the vehicle.

- (c) Install the clip to the hole pin.

**18. INSTALL CLUTCH MASTER CYLINDER SUPPORT**

- (a) Install the clutch master cylinder support to the vehicle with the 5 bolts.

Torque: 19 N·m (185 kgf·cm, 13 ft·lbf)

- (b) Connect the exhaust brake switch connector.

19. INSTALL CLUTCH BOOSTER VACUUM NO.1 HOSE

20. INSTALL CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE (See page 42-14)

21. INSTALL CLUTCH RESERVOIR TUBE (See page 42-14)

22. BLEED CLUTCH PIPE LINE (See page 42-2)

23. CHECK CLUTCH FLUID LEAKAGE

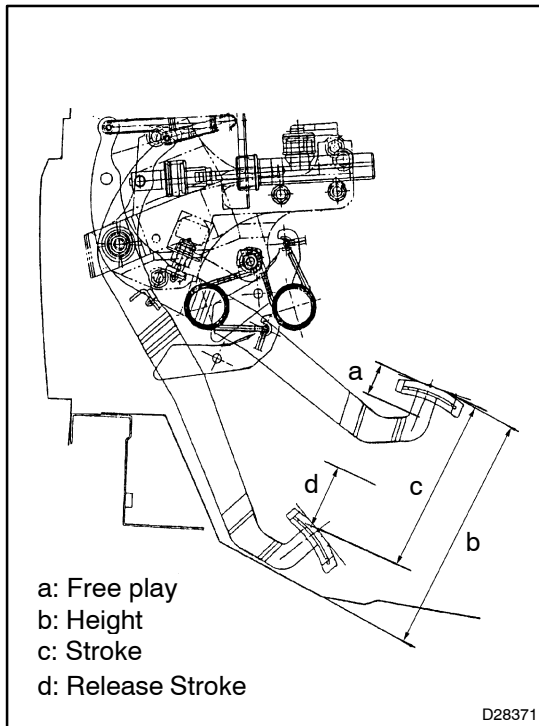
24. INSPECT CHECK FLUID LEVEL IN RESERVOIR

25. INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSY (See page 42-3)

CLUTCH PEDAL SUB-ASSY (W/O BOOSTER)

ADJUSTMENT

42080-01



1. **INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSY**
 - (a) Check that the pedal height is correct.

Pedal height from asphalt sheet:
155.0 – 165.0 mm (6.102 – 6.496 in.)
 - (b) Adjust the pedal height.
 - (1) Loosen the lock nut and turn the stopper bolt until the height becomes correct.
 - (2) Tighten the lock nut.
 - (c) Check that the pedal free play and push rod play are correct.
 - (1) Depress the pedal until the clutch resistance begins to be felt.

Pedal free play: 5.0 – 10.0 mm (0.197 – 0.394 in.)
 - (2) Gently depress the pedal until the resistance begins to increase a little.

Push rod play at pedal top (Reference valve):
0.25 – 0.5 mm (0.010 – 0.020 in.)
 - (d) Check the clutch release point.
 - (1) Pull the parking brake lever and install the wheel stopper
 - (2) Start and idle the engine.
 - (3) Without depressing the clutch pedal, slowly shift the shift lever into the reverse position until the gears contact each other.
 - (4) Gradually depress the clutch pedal and measure the stroke distance from the point that the gear noise stops (release point) to the full stroke end position.

Standard distance:

25 mm (0.985 in.) or more

(From release point to pedal stroke end position)

If the distance is not as specified, perform the following.

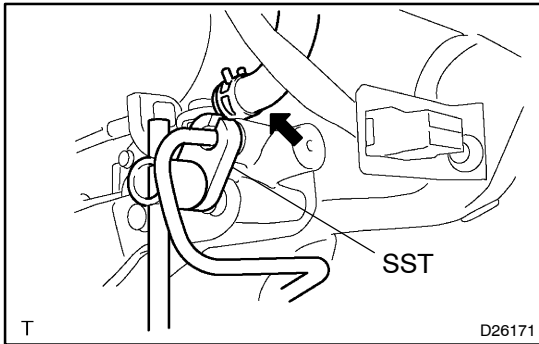
- Check the pedal height.
- Check the push rod play and pedal free play.
- Bleed air from the clutch line.
- Check the clutch cover and disc.

HINT:

Initialize the cancel position when the parts related with the clutch has been replaced and a free play of the clutch pedal has been adjusted (See page 42-7).

REPLACEMENT

1. DRAIN CLUTCH FLUID

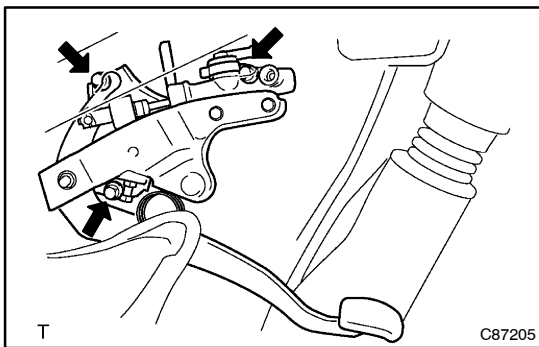


2. DISCONNECT CLUTCH RESERVOIR TUBE 3. DISCONNECT CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE

- (a) Using SST, disconnect the tube.
SST 09023-38200
- (b) Remove the clutch reservoir tube from the clutch master cylinder.

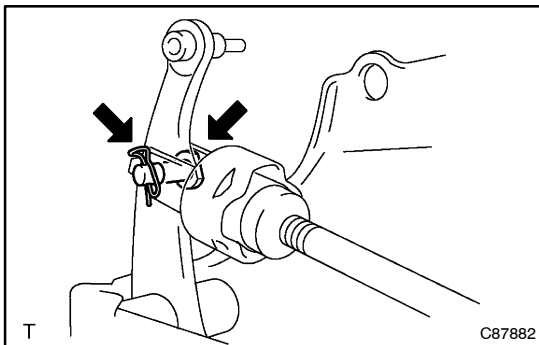
HINT:

Use a container to catch the fluid.



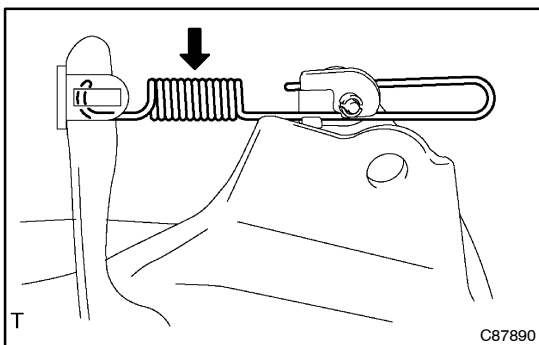
4. REMOVE CLUTCH MASTER CYLINDER SUPPORT

- (a) Remove the 3 bolts.
- (b) Remove the clutch pedal bracket.



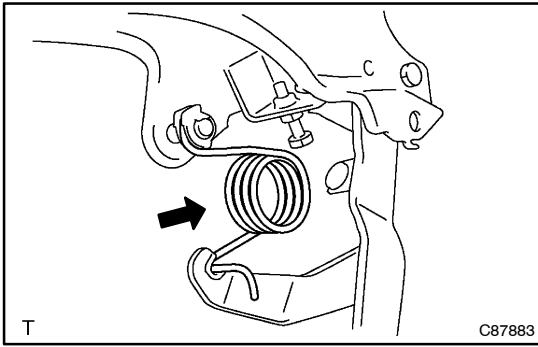
5. REMOVE CLUTCH MASTER CYLINDER PUSH ROD CLEVIS W/HOLE PIN

- (a) Remove the clip and hole pin.
- (b) Disconnect the clevis from the clutch pedal.



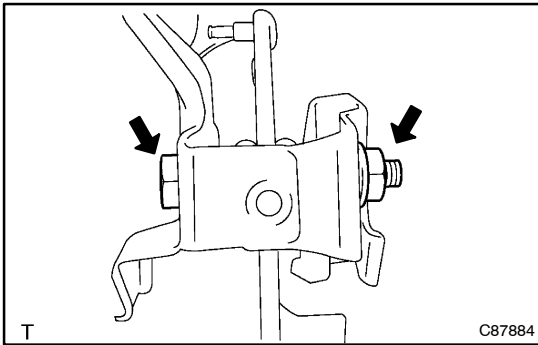
6. REMOVE CLUTCH PEDAL SPRING

- (a) Remove the clutch pedal spring.



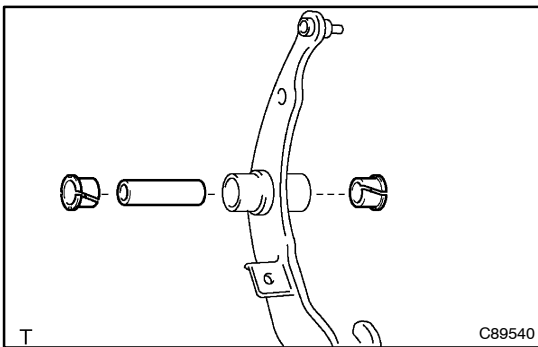
7. REMOVE TURN OVER SPRING SEAT COMPRESSION SPRING

- (a) Remove the turn over spring from the clutch pedal bracket and clutch pedal.



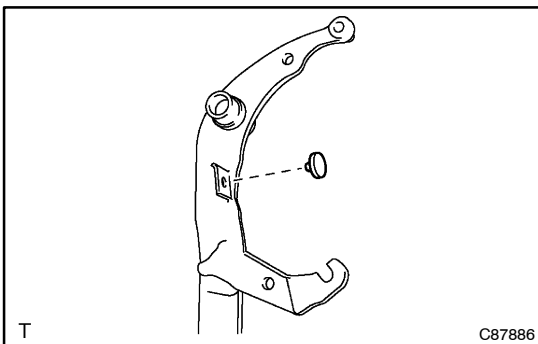
8. REMOVE CLUTCH PEDAL SUB-ASSY

- (a) Mount the clutch pedal in a soft jaw vise.
 (b) Remove the nut, washer and clutch pedal shaft.
 (c) Remove the clutch pedal from the clutch pedal bracket.



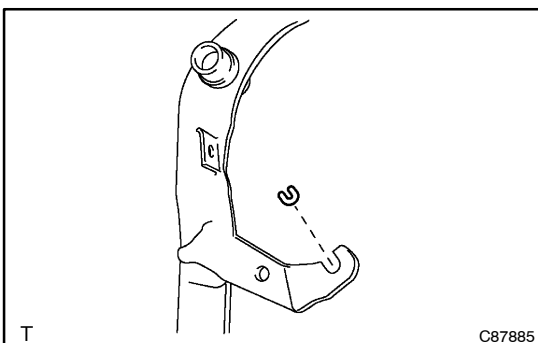
9. REMOVE CLUTCH PEDAL SHAFT COLLAR

- (a) Remove the 2 clutch pedal bushes and clutch pedal shaft collar from the clutch pedal.



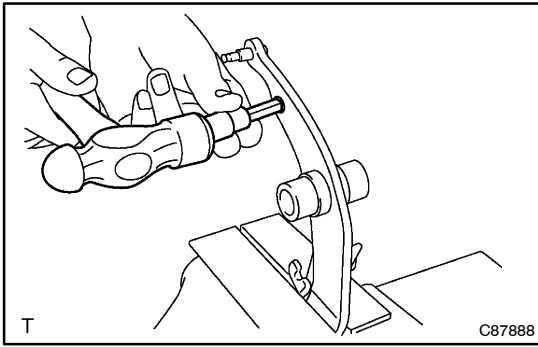
10. REMOVE CLUTCH PEDAL NO.1 CUSHION

- (a) Remove the clutch pedal No. 1 cushion from the clutch pedal.

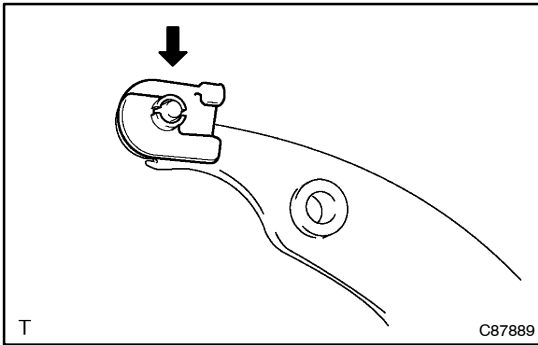


11. REMOVE CLUTCH PEDAL TURN OVER BUSH

- (a) Remove the turn over bush from the clutch pedal.

**12. REMOVE CLUTCH PEDAL BUSH**

- (a) Using a 8 mm hexagon wrench and hammer, remove the clevis bush from the clutch pedal.

**13. REMOVE PEDAL SPRING HOOK**

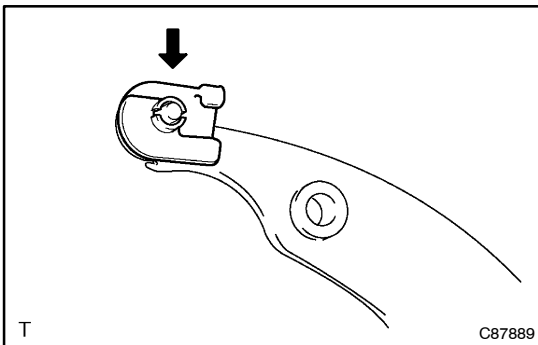
- (a) Remove the spring hook from the clutch pedal.

14. REMOVE CLUTCH PEDAL PAD

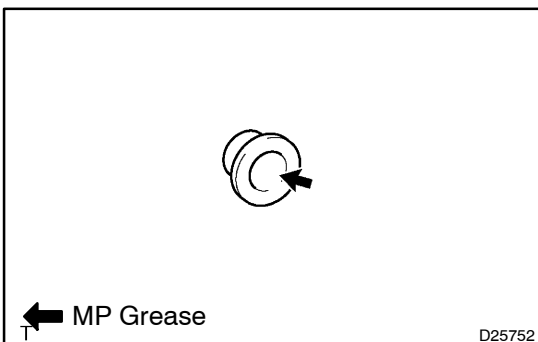
- (a) Remove the clutch pedal pad to the clutch pedal.

15. INSTALL CLUTCH PEDAL PAD

- (a) Install the clutch pedal pad to the clutch pedal.

**16. INSTALL PEDAL SPRING HOOK**

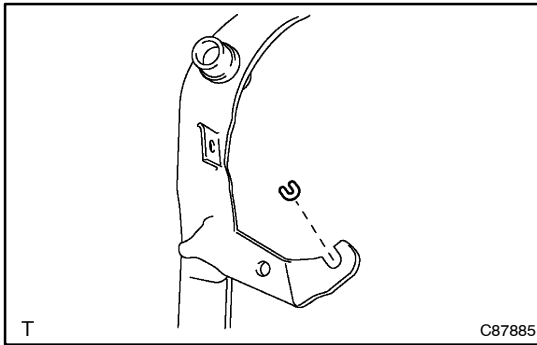
- (a) Install the spring hook to the clutch pedal.

**17. INSTALL CLUTCH PEDAL BUSH**

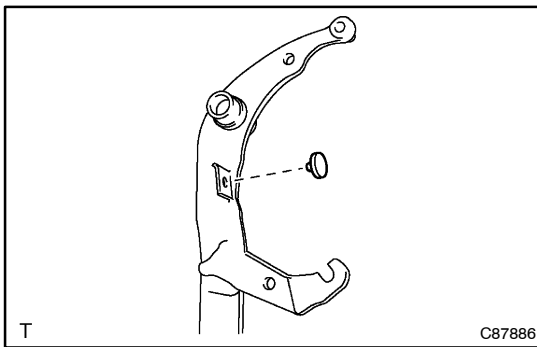
- (a) Apply MP grease to the inside of a new bush.
 (b) Install the bush to the clutch pedal.

**18. INSTALL CLUTCH PEDAL TURN OVER BUSH**

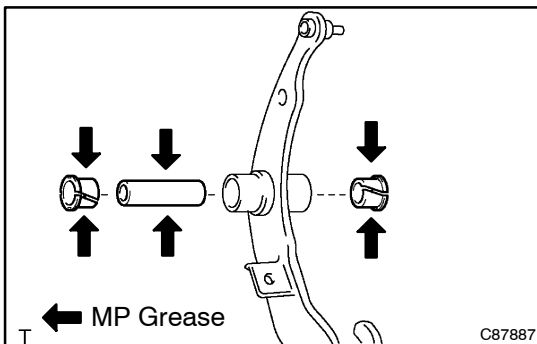
- (a) Apply MP grease to the inside of a new turn over bush.



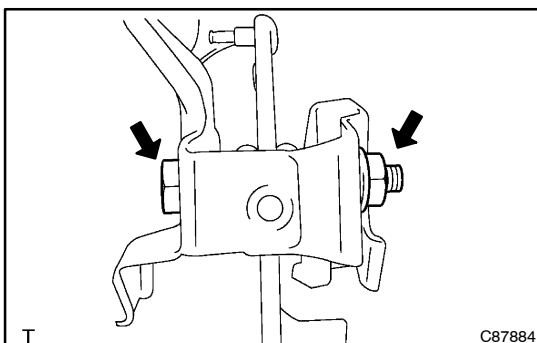
- (b) Install the turn over bush to the clutch pedal.

**19. INSTALL CLUTCH PEDAL NO.1 CUSHION**

- (a) Apply MP grease to the outside of a clutch pedal spring.

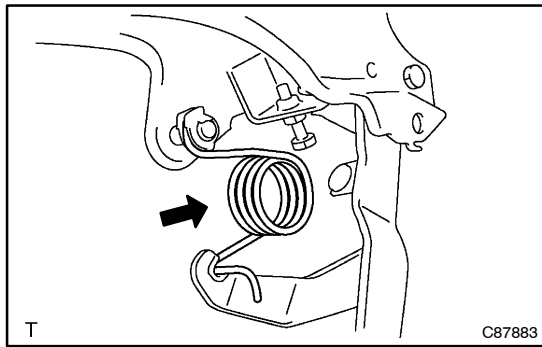
**20. INSTALL CLUTCH PEDAL SHAFT COLLAR**

- (a) Apply MP grease to the inside and the outside of a collar.
 (b) Apply MP grease to both sides of 2 new bushes.
 (c) Install the collar and 2 new bushes to the clutch pedal.

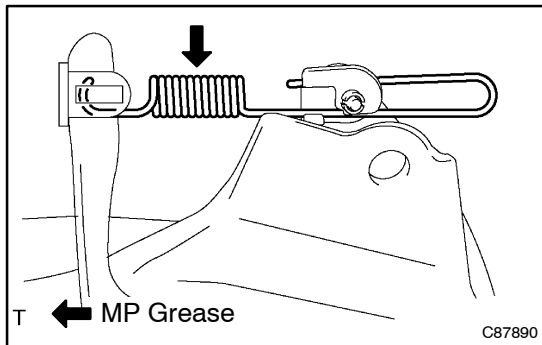
**21. INSTALL CLUTCH PEDAL SUB-ASSY**

- (a) Install the clutch pedal bracket to the vehicle with the 3 bolts.

Torque: 19 N·m (185 kgf·cm, 14 ft·lbf)

**22. INSTALL SELECT LEVER TORSION SPRING**

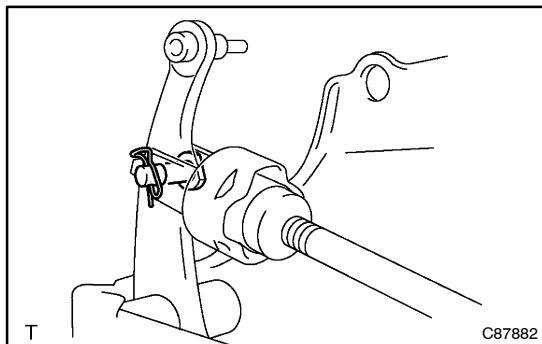
- (a) Install the spring to the clutch pedal and clutch pedal support.

**23. INSTALL PARKING BRAKE SHOE RETURN TENSION SPRING**

- (a) Apply MP grease to the outside of a clutch pedal spring.
(b) Install the clutch pedal spring.

24. INSTALL CLUTCH MASTER CYLINDER PUSH ROD CLEVIS W/HOLE PIN

- (a) Apply MP grease to the contact surface of the push rod clevis and bush.

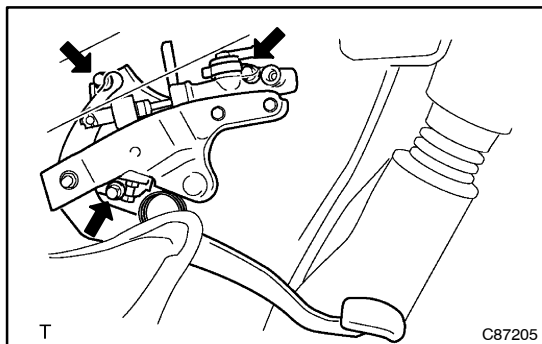


- (b) Connect the clevis to the clutch pedal with the hole pin.

HINT:

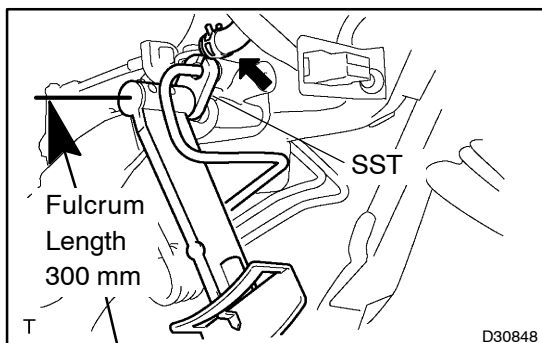
Install the hole pin from the right side of the vehicle.

- (c) Install the clip to the hole pin.

**25. INSTALL CLUTCH MASTER CYLINDER SUPPORT**

- (a) Install the clutch pedal bracket to the vehicle with the 3 bolts.

Torque: 19 N·m (185 kgf·cm, 14 ft·lbf)

**26. INSTALL CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE**

- (a) Using SST, connect the tube to the clutch master cylinder.
SST 09023-38200

Torque:

15.8 N·m (161 kgf·cm, 11 ft·lbf) for use with SST

19.5 N·m (199 kgf·cm, 14 ft·lbf)

HINT:

Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

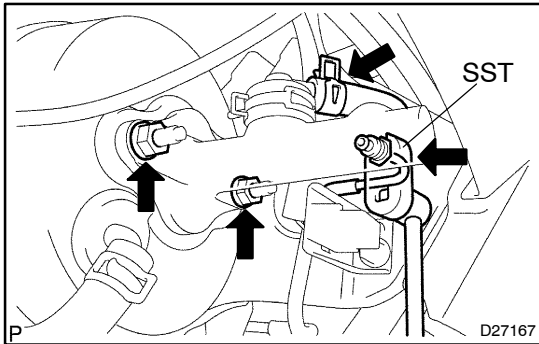
27. **INSTALL CLUTCH RESERVOIR TUBE**
28. **BLEED CLUTCH PIPE LINE (See page 42-2)**
 - (a) Fill the reservoir tank with fluid and bleed air from the clutch system.
Torque: 11 N·m (112 kgf·cm, 8 ft·lbf)
29. **CHECK CLUTCH FLUID LEAKAGE**
30. **INSPECT CHECK FLUID LEVEL IN RESERVOIR**
31. **INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSY (See page 42-7)**

CLUTCH MASTER CYLINDER ASSY (W/ BOOSTER)

42082-01

OVERHAUL

1. DRAIN CLUTCH FLUID



2. DISCONNECT CLUTCH RESERVOIR TUBE
3. DISCONNECT CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE

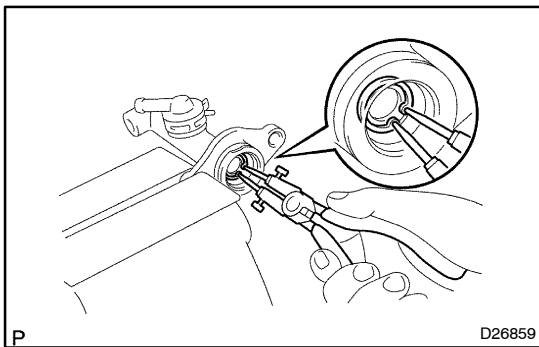
- (a) Using SST, disconnect the hose tube.
SST 09023-38200

HINT:

Use a container to catch the fluid.

4. REMOVE CLUTCH MASTER CYLINDER ASSY

- (a) Remove the 2 nuts and clutch master cylinder assy.

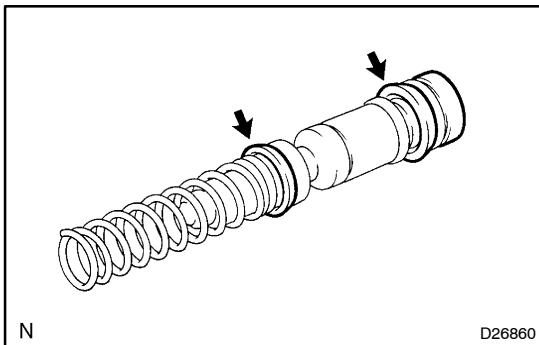


5. REMOVE CLUTCH MASTER CYLINDER KIT

- (a) Using snap ring pliers, remove the snap ring.
- (b) Using pliers, remove the clip together with the elbow and O-ring from the master cylinder body.

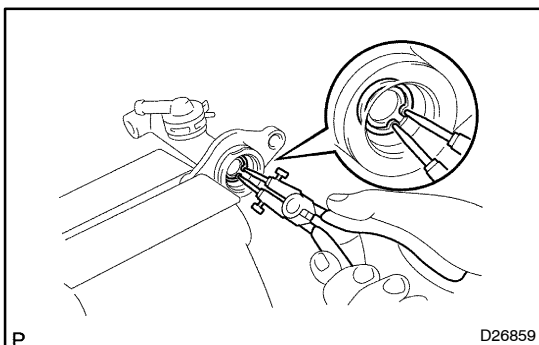
NOTICE:

Be careful not to damage the inside of the cylinder body.



6. INSTALL CLUTCH MASTER CYLINDER KIT

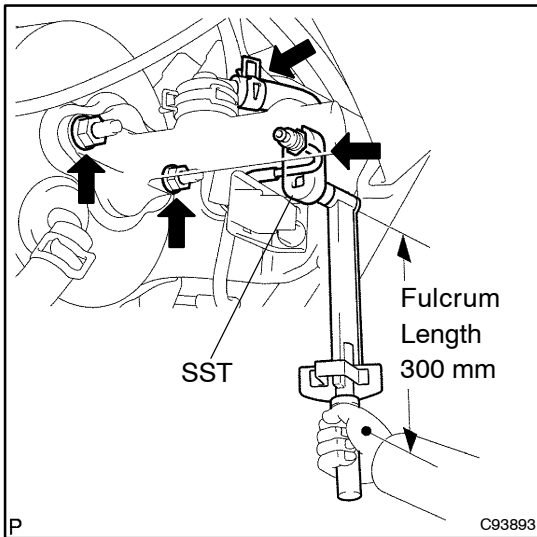
- (a) Coat the parts with lithium soap base glycol grease, as shown in the illustration.



- (b) Install the piston with spring into the cylinder.
- (c) Using snap ring pliers, install the snap ring to the master cylinder body.
- (d) Install the elbow and O-ring to the master cylinder body.

NOTICE:

Be careful not to damage the inside of the cylinder body.

**7. INSTALL CLUTCH MASTER CYLINDER ASSY**

- (a) Install the clutch master cylinder to the clutch booster with the 2 nuts.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

8. INSTALL CLUTCH RESERVOIR TUBE

- (a) Connect the clutch reservoir tube so that it will not be twisted.

9. INSTALL CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE

- (a) Using SST, connect the tube.

SST 09023-38200

Torque:

21.4 N·m (218 kgf·cm, 15.8 ft·lbf) for use with SST

25 N·m (255 kgf·cm, 18 ft·lbf)

HINT:

Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

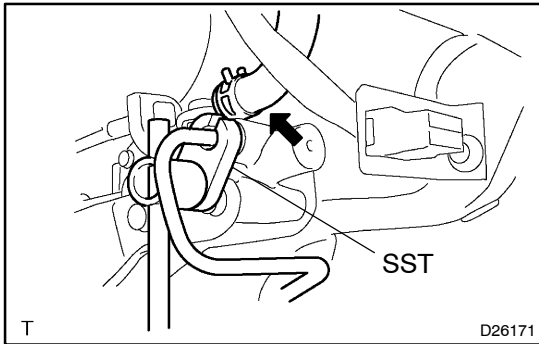
10. **BLEED CLUTCH PIPE LINE (See page 42-2)**
11. **CHECK CLUTCH FLUID LEAKAGE**
12. **CHECK FLUID LEVEL IN RESERVOIR**
13. **INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSY (See page 42-3)**

CLUTCH MASTER CYLINDER ASSY (W/O BOOSTER)

42083-01

OVERHAUL

1. REPLACE CLUTCH FLUID

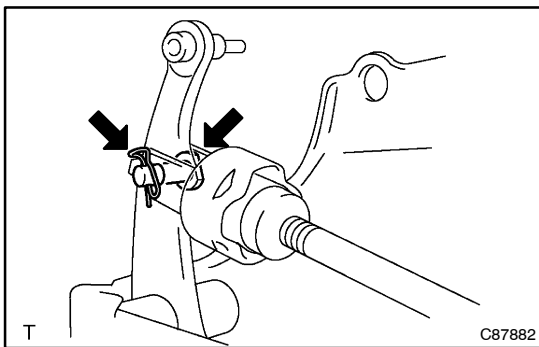


2. DISCONNECT CLUTCH RESERVOIR TUBE
3. DISCONNECT CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE

- (a) Using SST, disconnect the hose tube.
SST 09023-38200

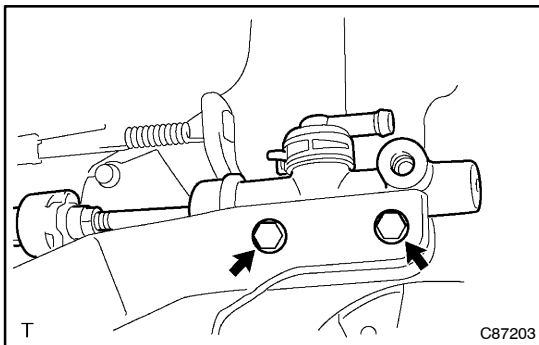
HINT:

Use a container to catch the fluid.



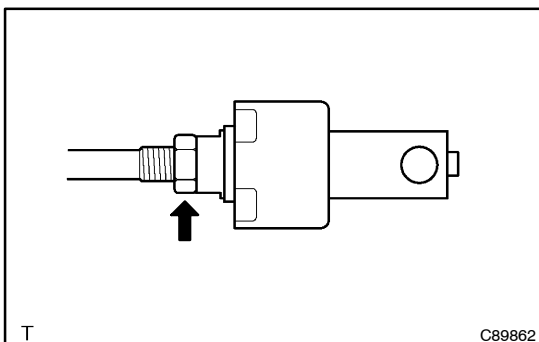
4. REMOVE CLUTCH MASTER CYLINDER PUSH ROD CLEVIS W/HOLE PIN

- (a) Remove the clip and hole pin.
- (b) Disconnect the clevis to the clutch pedal.



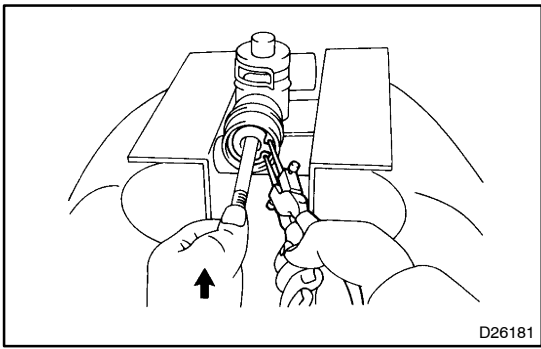
5. REMOVE CLUTCH MASTER CYLINDER ASSY

- (a) Remove the 2 bolts and clutch master cylinder.



6. REMOVE CLUTCH MASTER CYLINDER KIT

- (a) Loosen the lock nut and remove the push rod clevis from the push rod.
- (b) Remove the lock nut from the push rod.
- (c) Remove the boot from the cylinder body.



- (d) While pushing the push rod using snap ring pliers, remove the snap ring.
- (e) Remove the push rod from the cylinder body.

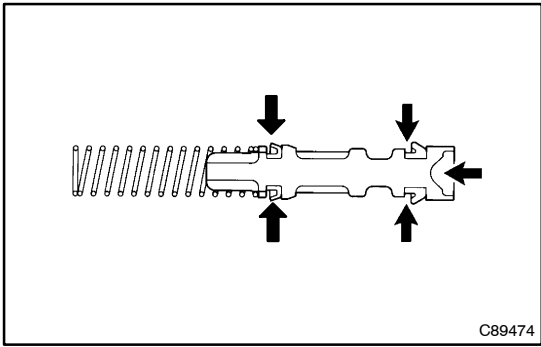
NOTICE:

The piston may pop out from the cylinder body. Therefore, slowly remove the push rod from the cylinder body.

- (f) Remove the stop plate from the push rod.
- (g) Remove the piston from the cylinder.

NOTICE:

Be careful not to damage the inside of the cylinder body.



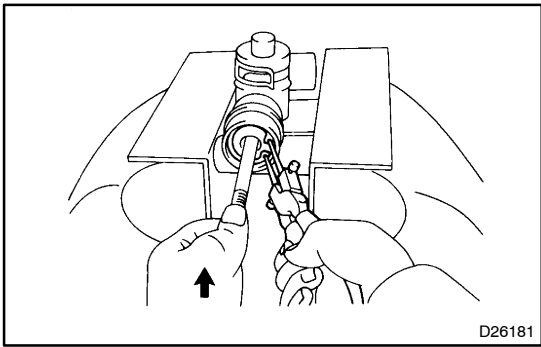
7. INSTALL CLUTCH MASTER CYLINDER KIT

- (a) Coat the parts with lithium soap base glycol grease, as shown in the illustration.
- (b) Install the piston with spring into the cylinder.

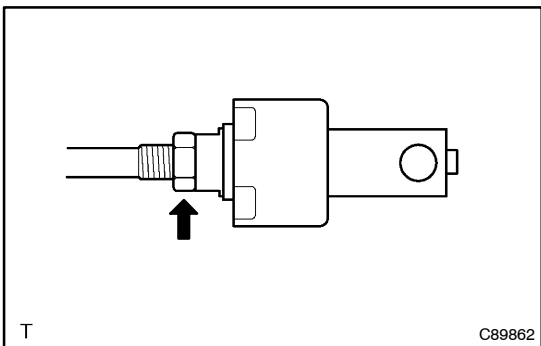
NOTICE:

Be careful not to damage the inside of the cylinder body.

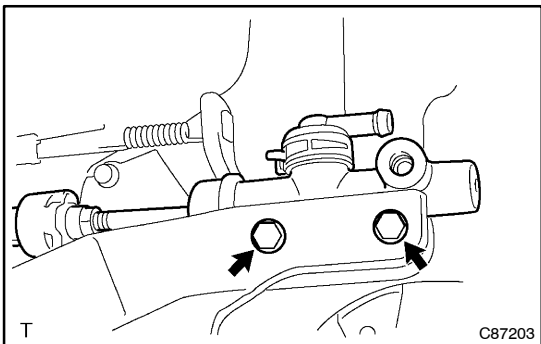
- (c) Install the stop plate to the push rod.
- (d) Install the push rod to the cylinder body.



- (e) While pushing the push rod using snap ring pliers, install the snap ring.
- (f) Install the boot to the cylinder body.
- (g) Install the lock nut to the push rod.



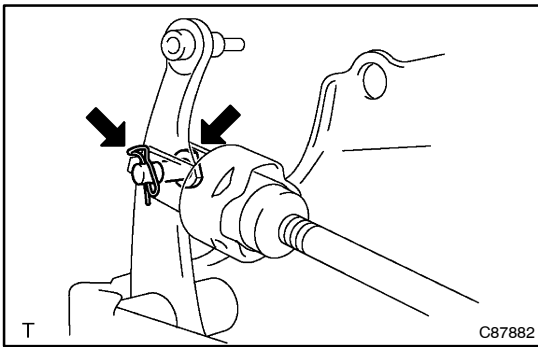
- (h) Install the push rod clevis to the push rod.
Torque: 11.8 N·m (120 kgf·cm, 9 ft·lbf)



8. INSTALL CLUTCH MASTER CYLINDER ASSY

- (a) Install the clutch master cylinder to the clutch pedal bracket with the 2 bolts.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

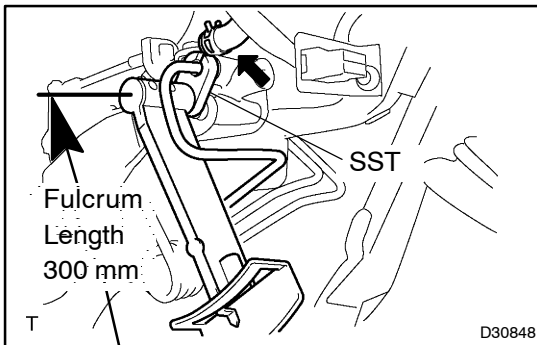


9. INSTALL CLUTCH MASTER CYLINDER PUSH ROD CLEVIS W/HOLE PIN

- (a) Apply MP grease to the contact surface of the hole pin and bush.
- (b) Install the hole pin to the pedal with the clip.

HINT:

Install the hole pin from the right side of the vehicle.



10. INSTALL CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE

- (a) Using SST, connect the tube.

SST 09023-38200

Torque:

15.8 N·m (161 kgf·cm, 11 ft·lbf) for use with SST

19.5 N·m (199 kgf·cm, 14 ft·lbf)

HINT:

Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

11. INSTALL CLUTCH RESERVOIR TUBE

HINT:

Connect the clutch reservoir tube so that it will not be twisted.

12. BLEED AIR FROM CLUTCH LINE (See page 42-2)

- (a) Fill the reservoir tank with fluid and bleed air from the clutch system.

Torque: 10.5 N·m (100 kgf·cm, 8 ft·lbf)

13. CHECK CLUTCH FLUID LEAKAGE

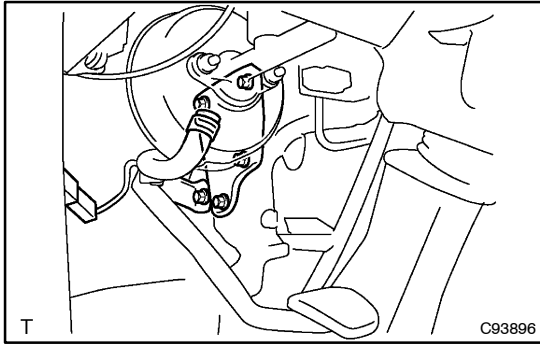
14. CHECK FLUID LEVEL IN RESERVOIR

15. INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSY (See page 42-7)

CLUTCH W/AIR CLEANER BOOSTER ASSY (W/ BOOSTER) REPLACEMENT

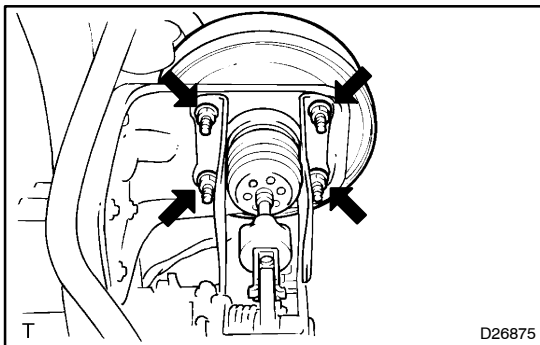
42064-01

1. DISCONNECT CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE (See page 42-14)
2. DISCONNECT CLUTCH RESERVOIR TUBE (See page 42-14)



3. DISCONNECT CLUTCH BOOSTER VACUUM NO.1 HOSE
4. REMOVE CLUTCH MASTER CYLINDER SUPPORT (See page 42-4)

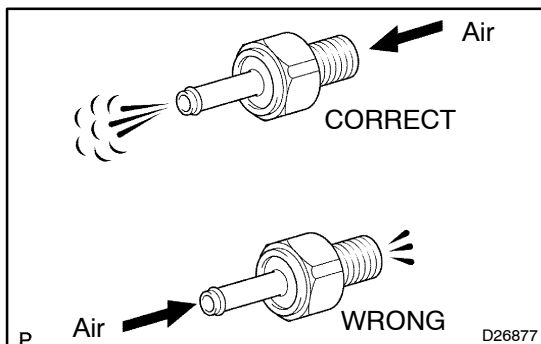
5. REMOVE CLUTCH MASTER CYLINDER ASSY (See page 42-14)
6. REMOVE CLUTCH MASTER CYLINDER PUSH ROD CLEVIS (See page 42-4)



7. REMOVE CLUTCH W/ AIR CLEANER BOOSTER ASSY
 - (a) Remove the 4 nuts and clutch booster.
8. INSTALL CLUTCH W/ AIR CLEANER BOOSTER ASSY
 - (a) Install the clutch booster with the 4 nuts.

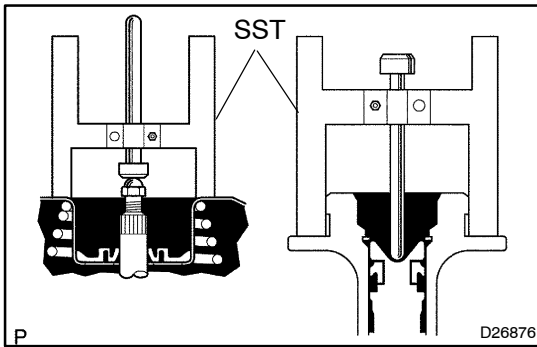
Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

9. INSTALL CLUTCH MASTER CYLINDER PUSH ROD CLEVIS (See page 42-4)



10. INSPECT CHECK VALVE
 - (a) Check that air flows from the vacuum tank side to the vacuum hose side.
 - (b) Check that air does not flow from the vacuum hose side to the vacuum tank side.

If the result is not as specified, replace the check valve.

**11. INSPECT PUSH ROD****NOTICE:**

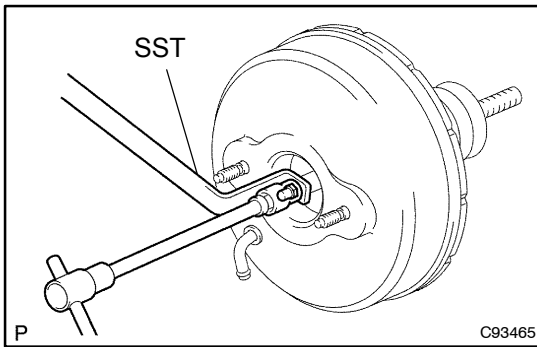
The adjustment should be made with the clutch booster installed on the vehicle.

- (a) Set the SST rod so that it lightly contacts with the piston of the master cylinder.
SST 09737-00012
- (b) Turn the SST and inspect the clearance between the SST rod and the push rod.

Clearance: 0 mm (0 in.)

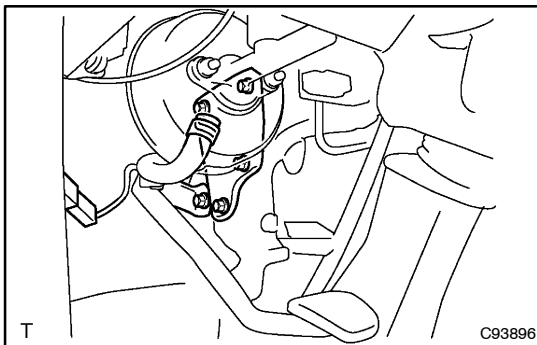
If the clearance is not as specified, adjust the clearance by turning the rod tip with the SST fixed.

SST 09737-00020

**12. INSTALL CLUTCH MASTER CYLINDER ASSY**

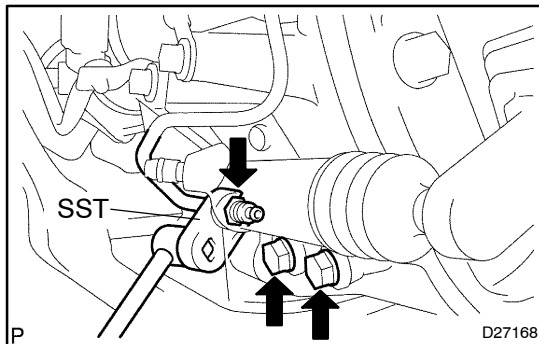
- (a) Install the clutch master cylinder to the clutch booster with the 2 nuts.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

**13. INSTALL CLUTCH MASTER CYLINDER SUPPORT
(See page 42-4)****14. INSTALL CLUTCH BOOSTER VACUUM NO.1 HOSE****15. INSTALL CLUTCH MASTER CYLINDER TO FLEXIBLE HOSE TUBE (See page 42-14)****16. INSTALL CLUTCH RESERVOIR TUBE (See page 42-14)****17. BLEED CLUTCH PIPE LINE (See page 42-2)****18. CHECK CLUTCH FLUID LEAKAGE****19. CHECK FLUID LEVEL IN RESERVOIR****20. INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSY (See page 42-3)**

CLUTCH RELEASE CYLINDER ASSY OVERHAUL

42085-01



1. DISCONNECT CLUTCH RELEASE CYLINDER TO FLEXIBLE HOSE TUBE

- (a) Remove the 2 bolts and clutch release cylinder.
SST 09023-00100

HINT:

Use a container to catch the fluid.

2. REMOVE CLUTCH RELEASE CYLINDER ASSY

- (a) Remove the 2 bolts and clutch release cylinder.

3. REMOVE CLUTCH RELEASE CYLINDER BOOT

- (a) Remove the boot from the release cylinder.

4. REMOVE CLUTCH RELEASE CYLINDER PUSH ROD NO.1

- (a) Remove the push rod from the release cylinder.

5. REMOVE RELEASE CYLINDER BLEEDER PLUG

- (a) Remove the bleeder plug cap and bleeder plug from the cylinder body.

6. REMOVE CLUTCH RELEASE CYLINDER KIT

- (a) Remove the piston from the cylinder body.

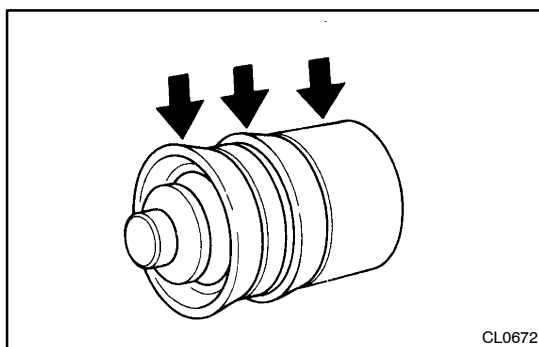
NOTICE:

Be careful not to damage the inside of the cylinder body.

- (b) Remove the spring from the cylinder body.

7. INSTALL CLUTCH RELEASE CYLINDER KIT

- (a) Install a new spring to the cylinder body.



- (b) Coat a new piston with lithium soap base glycol grease, as shown in the illustration.

- (c) Install the piston to the cylinder body.

NOTICE:

Be careful not to damage the inside of the cylinder body.

8. INSTALL RELEASE CYLINDER BLEEDER PLUG

- (a) Install the bleeder plug to the cylinder body.

Torque: 11 N·m (112 kgf·cm, 8 ft·lbf)

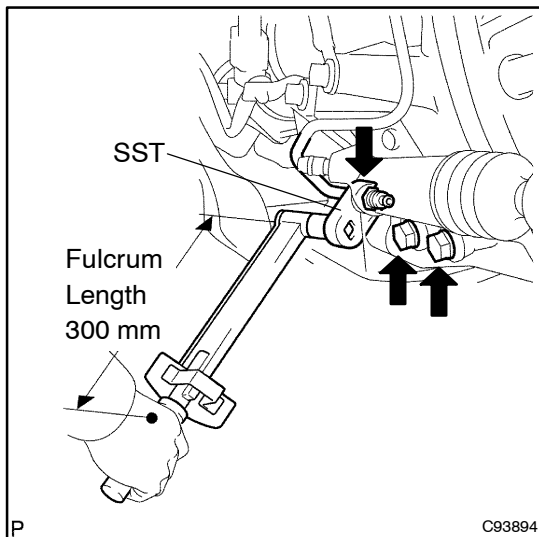
- (b) Install the bleeder plug cap to the bleeder plug.

9. INSTALL CLUTCH RELEASE CYLINDER PUSH ROD NO.1

- (a) Install the push rod to the release cylinder.

10. INSTALL CLUTCH RELEASE CYLINDER BOOT

- (a) Install the boot to the release cylinder.

**11. INSTALL CLUTCH RELEASE CYLINDER ASSY**

- (a) Install the clutch release cylinder with the 2 bolts.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

12. INSTALL CLUTCH RELEASE CYLINDER TO FLEXIBLE HOSE TUBE

- (a) Using SST, install the flexible hose tube.

SST 09023-00100

Torque:

21 N·m (214 kgf·cm, 15 ft·lbf) for use with SST

24 N·m (245 kgf·cm, 18 ft·lbf)

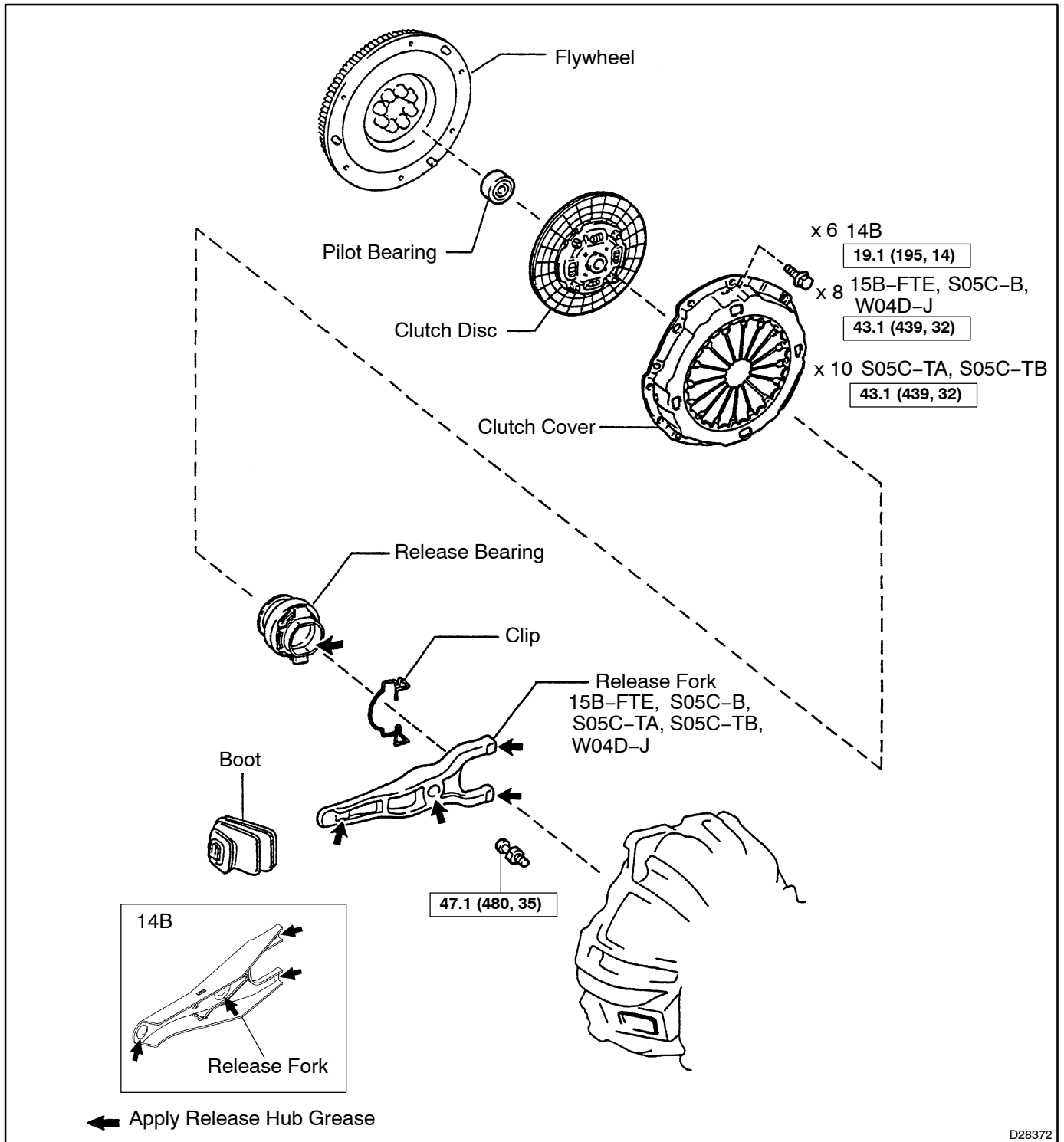
HINT:

Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

13. CHECK CLUTCH FLUID LEAKAGE**14. BLEED CLUTCH PIPE LINE (See page 42-2)****15. INSPECT CHECK FLUID LEVEL IN RESERVOIR**

CLUTCH UNIT COMPONENTS

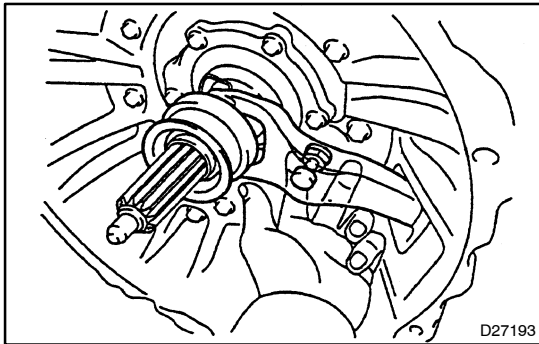
42086-01



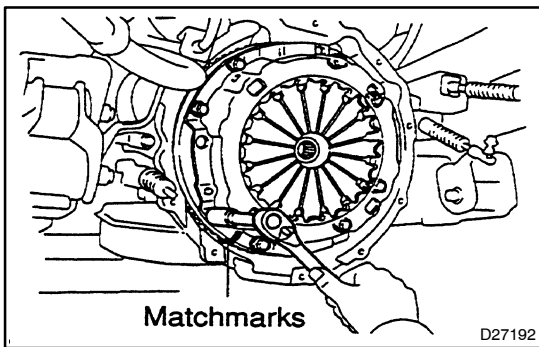
D28372

OVERHAUL

1. REMOVE MANUAL TRANSMISSION UNIT ASSY (See page 41-3)



2. REMOVE CLUTCH RELEASE BEARING ASSY
3. REMOVE CLUTCH RELEASE FORK BOOT
4. REMOVE CLUTCH RELEASE FORK SUB-ASSY



5. REMOVE CLUTCH COVER ASSY
 - (a) Place matchmarks on the clutch cover and flywheel.
 - (b) Loosen each set bolt one turn at a time until the spring tension is released.
 - (c) Remove the set bolts and pull off the clutch cover together with the clutch disc.

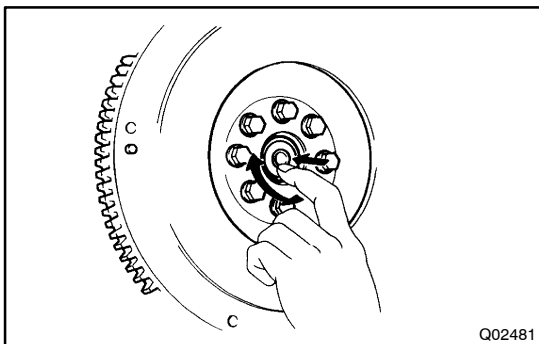
NOTICE:

Do not drop the clutch disc.

6. REMOVE CLUTCH DISC ASSY

NOTICE:

Keep the lining part of the clutch disc assy, the pressure plate and the surface of the flywheel away from oil and foreign objects.



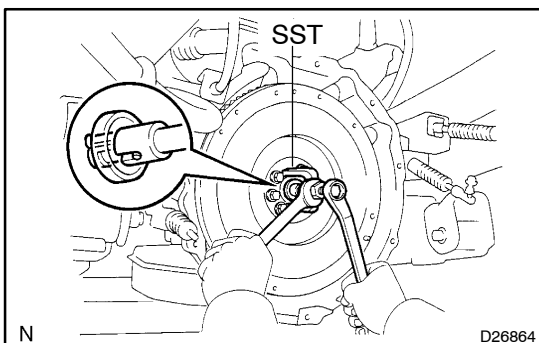
7. INSPECT PILOT BEARING

- (a) Turn the bearing by hand while applying force in the rotation direction.

If the bearing sticks have much resistance, replace the pilot bearing.

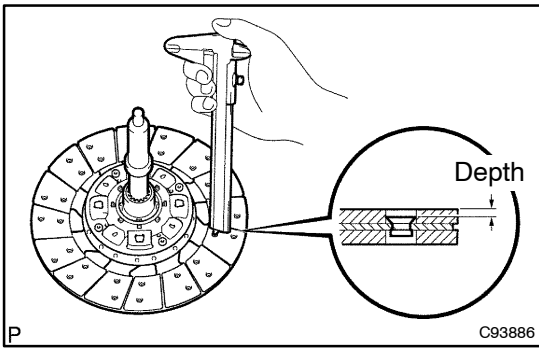
HINT:

The bearing is permanently lubricated and requires no cleaning or lubrication.



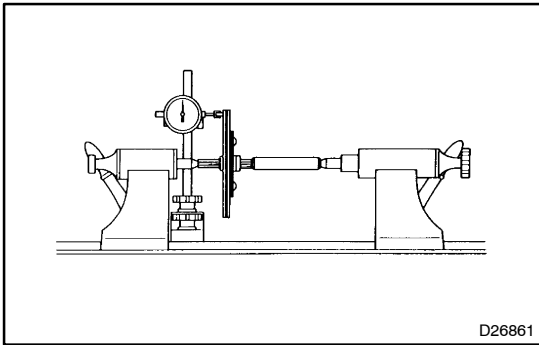
8. REMOVE PILOT BEARING

- (a) Using SST, remove the pilot bearing.
SST 09303-35011

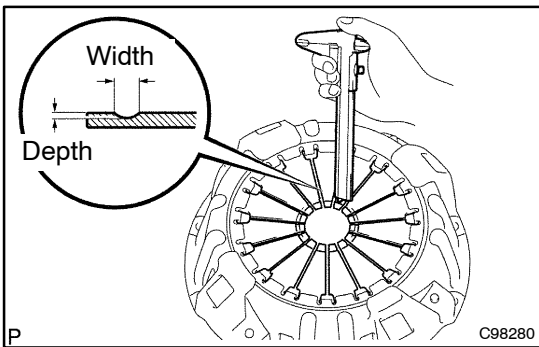


9. INSPECT CLUTCH DISC ASSY

- (a) Using vernier calipers, measure the rivet head depth.
Minimum rivet head depth: 0.3 mm (0.012 in.)
 If necessary, replace the clutch disc.



- (b) Using a dial indicator, measure the disc runout.
Maximum runout: 1.0 mm (0.039 in.)
 If necessary, replace the clutch disc.

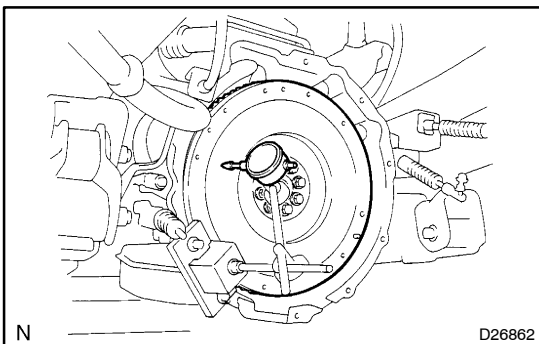


10. INSPECT CLUTCH COVER ASSY

- (a) Using vernier calipers, measure the worn depth and width of the diaphragm spring.

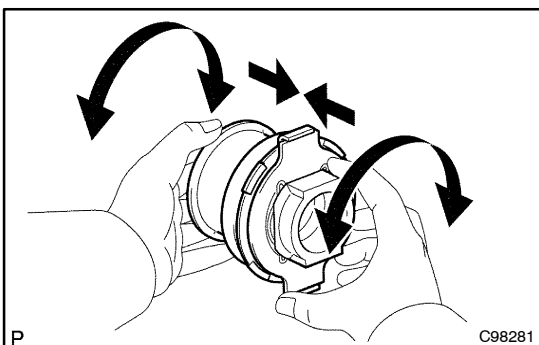
WORN DEPTH	0.6 mm (0.024 in.)
WORN WIDTH	5.0 mm (0.197 in.)

If necessary, replace clutch cover assy.



11. INSPECT FLYWHEEL SUB-ASSY

- (a) Using a dial indicator, measure the flywheel runout.
Maximum runout: 0.1 mm (0.004 in.)
 If necessary, replace the flywheel.



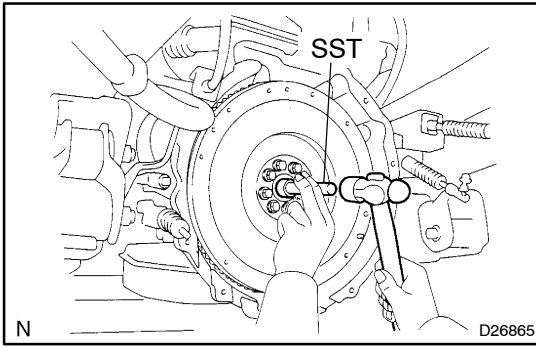
12. INSPECT CLUTCH RELEASE BEARING ASSY

- (a) Turn the bearing by hand while applying force in the axial direction.

HINT:

The bearing is permanently lubricated and requires no cleaning or lubrication.

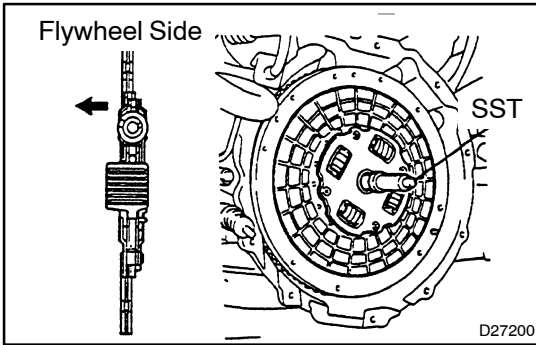
If necessary, replace the release bearing.

**13. INSTALL PILOT BEARING**

- (a) Using SST and a hammer, tap in a new pilot bearing.
SST 09304-12012

HINT:

After assembling the input shaft bearing to the hub, make sure that it rotates smoothly.

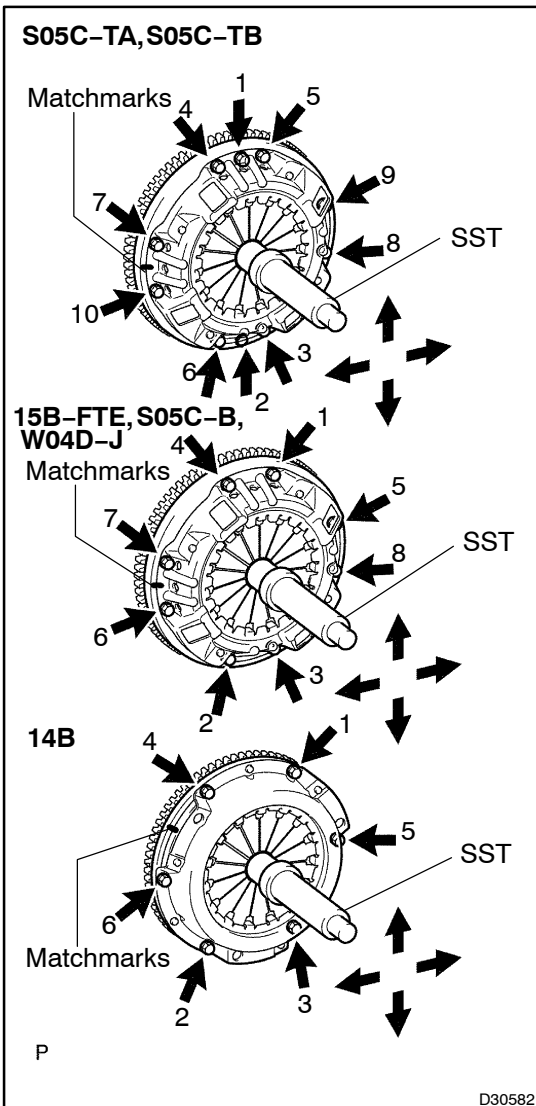
**14. INSTALL CLUTCH DISC ASSY**

- (a) Insert SST into the clutch disc, then insert them into the flywheel.

SST 09301-00110

NOTICE:

Take care not to insert clutch disc in the wrong direction.

**15. INSTALL CLUTCH COVER ASSY**

- (a) Align the matchmarks on the clutch cover and flywheel.
(b) Following the procedures as shown in the illustration, tighten the bolts in the order, starting the bolt locating near the knock pin on the top.

Torque:

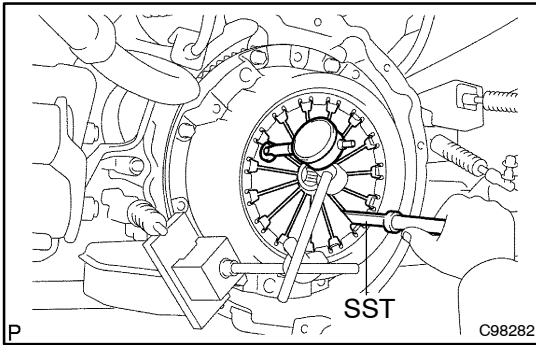
15B-FTE, S05C-B, S05C-TA, S05C-TB, W04D-J:
43.1 N·m (440 kgf·cm, 32 ft·lbf)

14B:

19.1 N·m (195 kgf·cm, 14 ft·lbf)

HINT:

- Following the order in the illustration, tighten the bolts one at a time evenly.
 - Lightly move SST up and down, right and left and tighten the bolts, after checking that the disc is in the center.
- SST 09301-00110

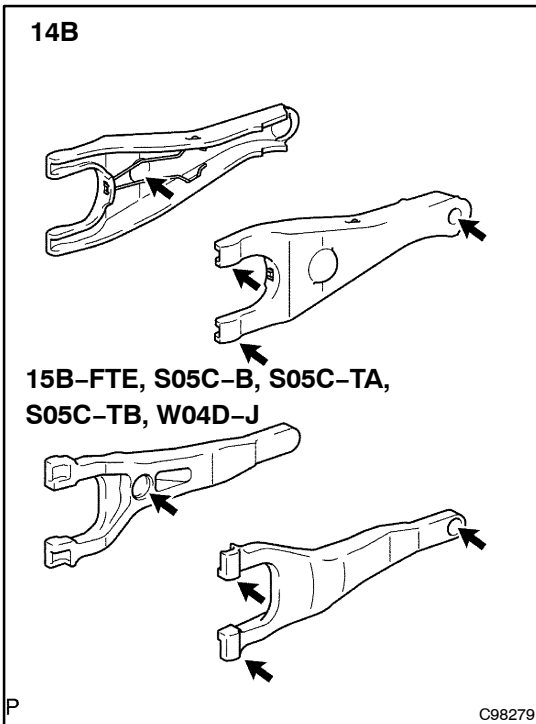
**16. INSPECT AND ADJUST CLUTCH COVER ASSY**

- (a) Using a dial indicator with a roller instrument, check the diaphragm spring tip alignment.

Maximum non-alignment: 0.5 mm (0.020 in.)

If alignment is not as specified, adjust the diaphragm spring tip alignment using SST.

SST 09333-00013

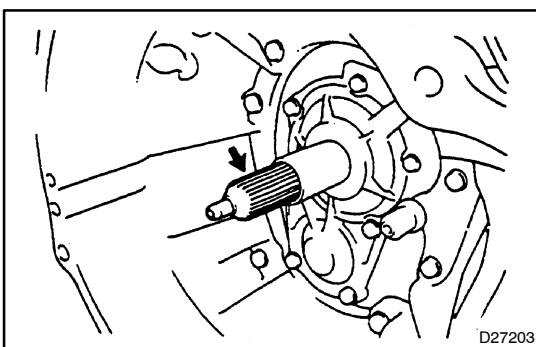
**17. INSTALL CLUTCH RELEASE FORK SUB-ASSY**

- (a) Apply release hub grease to the contact of the release fork and hub, the contact of release fork and push rod and the release fork pivot points.

Grease:

Part No. 08887-01806, RELEASE HUB GREASE or equivalent

- (b) Install the release fork to the hub bearing.

18. INSTALL CLUTCH RELEASE FORK BOOT**19. INSTALL CLUTCH RELEASE BEARING ASSY**

- (a) Apply clutch spline grease to the input shaft spline.

Grease:

Part No. 08887-01706, CLUTCH SPLINE GREASE or equivalent

- (b) Install the bearing to the release fork, and then install them to the transmission assy.

NOTICE:

After the installation, move the fork forward and backward to check that the release bearing slides smoothly.

20. INSTALL MANUAL TRANSMISSION UNIT ASSY (See page 41-3)

STEERING COLUMN

STEERING SYSTEM	50-1
PRECAUTION	50-1
PROBLEM SYMPTOMS TABLE	50-2
ON-VEHICLE INSPECTION	50-3
STEERING COLUMN ASSY	50-4
COMPONENTS	50-4
OVERHAUL	50-8

STEERING SYSTEM

50040-02

PRECAUTION

1. HANDLING PRECAUTIONS OF STEERING SYSTEM

- (a) Care must be taken when replacing parts. Incorrect replacement could affect the performance of the steering system and result in hazard to the driving condition.

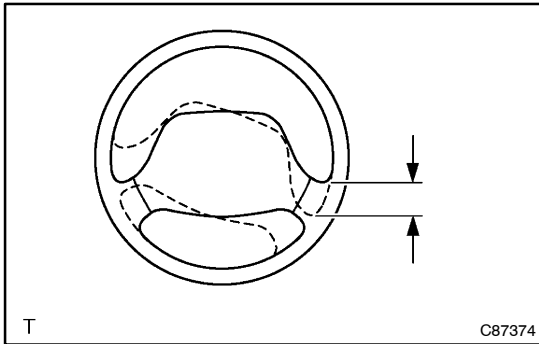
PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help you find the cause of the problem. The numbers indicate the possibility of the problem in descending order. Check each part in the order shown. If necessary, repair or replace these parts.

Symptom	Suspected Area	See Page
Hard steering	1. Tires (Improperly inflated)	28-1
	2. Power steering fluid level (Low)	51-3
	3. Front wheel alignment (Incorrect)	26-2
	4. Steering system joints (Worn)	-
	5. Steering column (Binding)	50-8
	6. Power steering vane pump	14B 51-10
		15B-FTE 51-18
	S05C-B, S05C-TA, S05C-TB 51-27	
	W04D-J 51-37	
	7. Power steering gear	51-47
Poor return	1. Tires (Improperly inflated)	28-1
	2. Front wheel alignment (Incorrect)	26-2
	3. Steering column (Binding)	-
	4. Power steering gear	51-47
Excessive play	1. Steering system joints (Worn)	-
	2. Intermediate shaft, Sliding yoke (Worn)	B-TYPE 30-22
		LE-TYPE 30-29
	3. Front wheel bearing (Worn)	Disc Brake 30-34
		5-Bolts Drum Brake 30-40
	6-Bolts Drum Brake 30-45	
	4. Power steering gear	51-47
Abnormal noise	1. Power steering fluid level (Low)	51-3
	2. Steering system joints (Worn)	-
	3. Power steering vane pump	14B 51-10
		15B-FTE 51-18
		S05C-B, S05C-TA, S05C-TB 51-27
	W04D-J 51-37	
	4. Power steering gear	51-47

ON-VEHICLE INSPECTION



1. CHECK STEERING WHEEL FREE PLAY

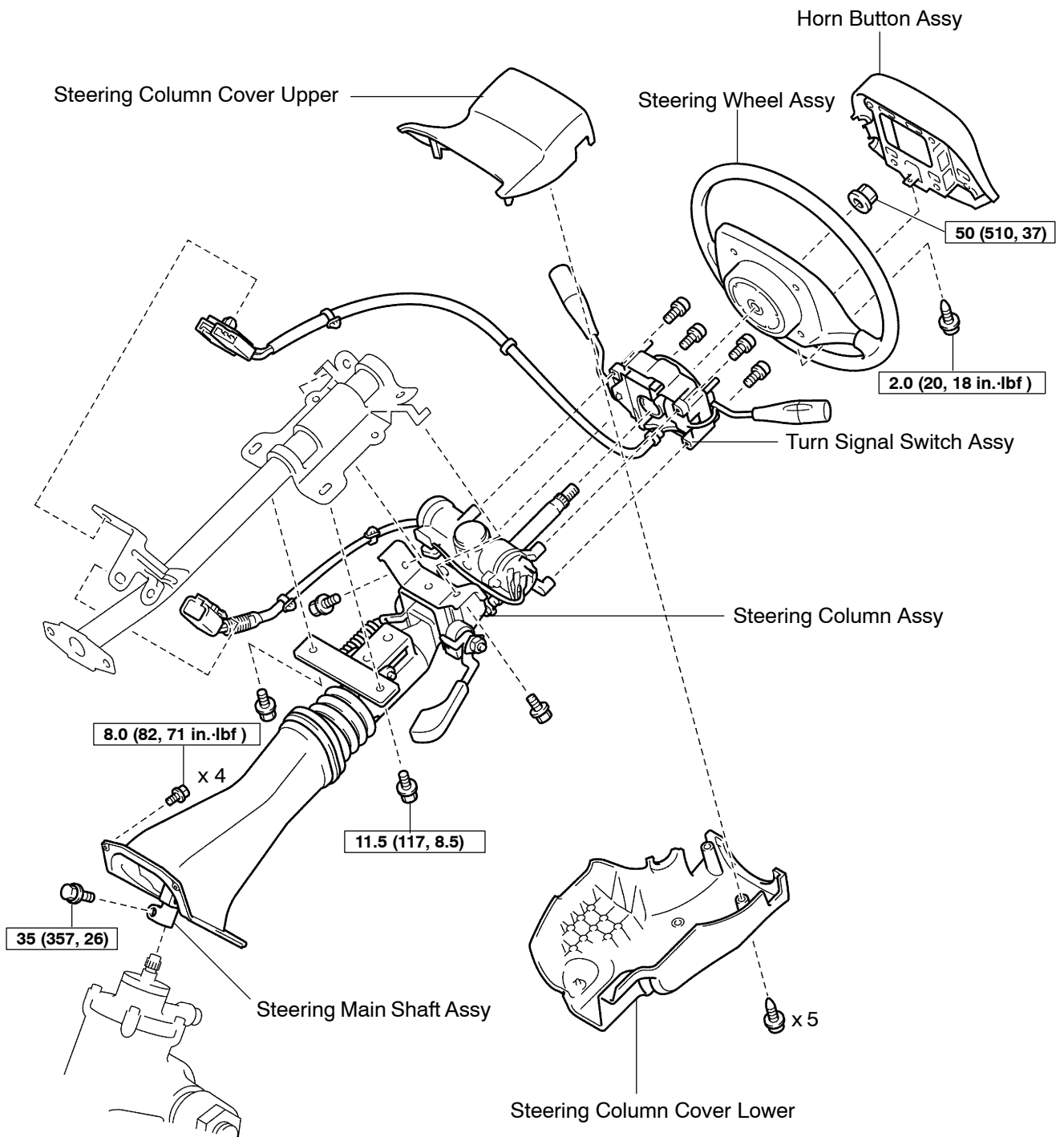
- (a) Stop the vehicle and face the tires straight ahead.
- (b) Gently move the steering wheel up and down with your hand, and check the free play.

Maximum free play: 25 mm (0.98 in.)

STEERING COLUMN ASSY COMPONENTS

5004R-02

Tilt Steering Column

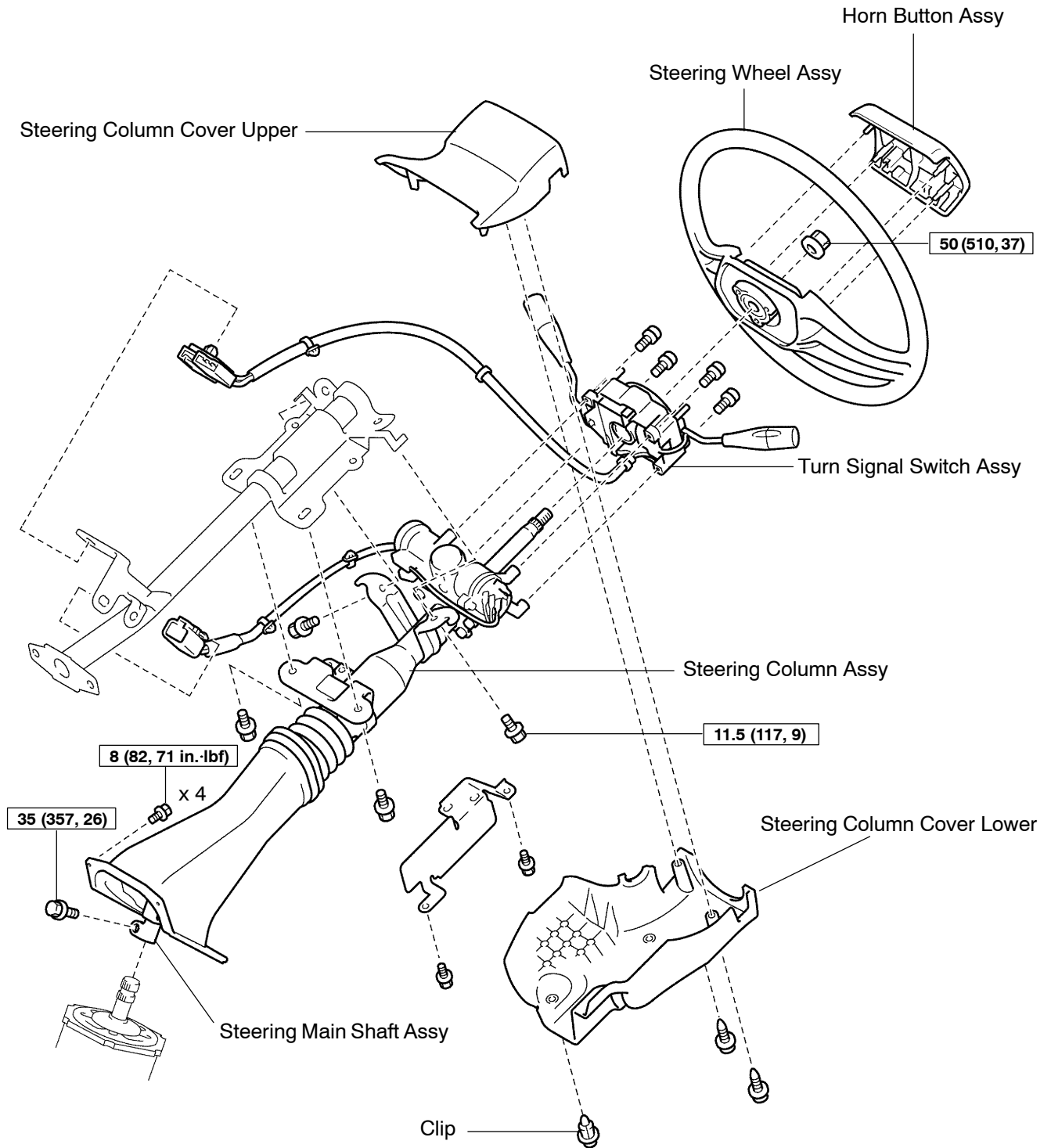


$\text{N}\cdot\text{m} (\text{kgf}\cdot\text{cm}, \text{ft}\cdot\text{lbf})$: Specified torque

P

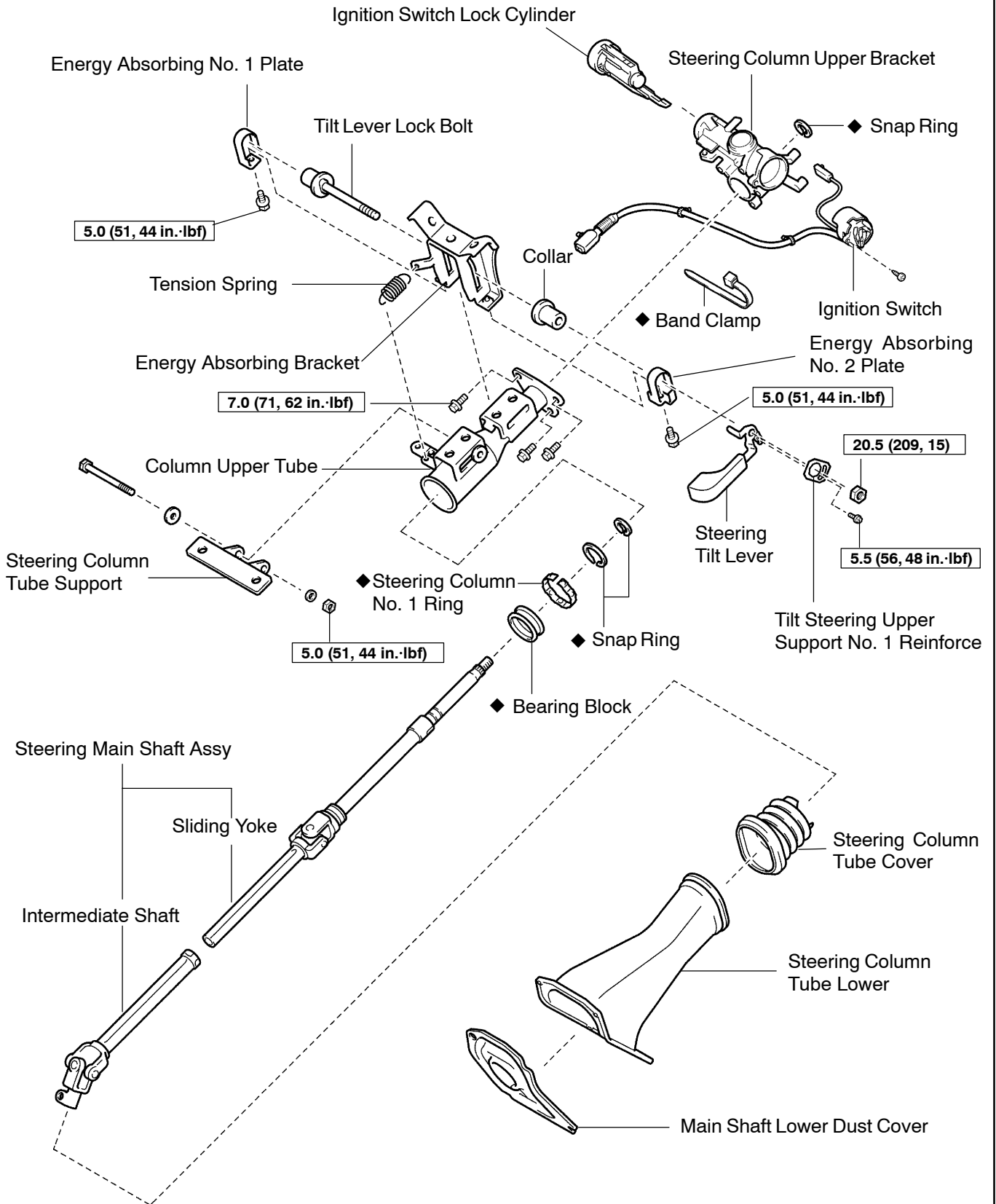
F42201

Non-tilt Steering Column



N·m (kgf·cm, ft·lbf) : Specified torque

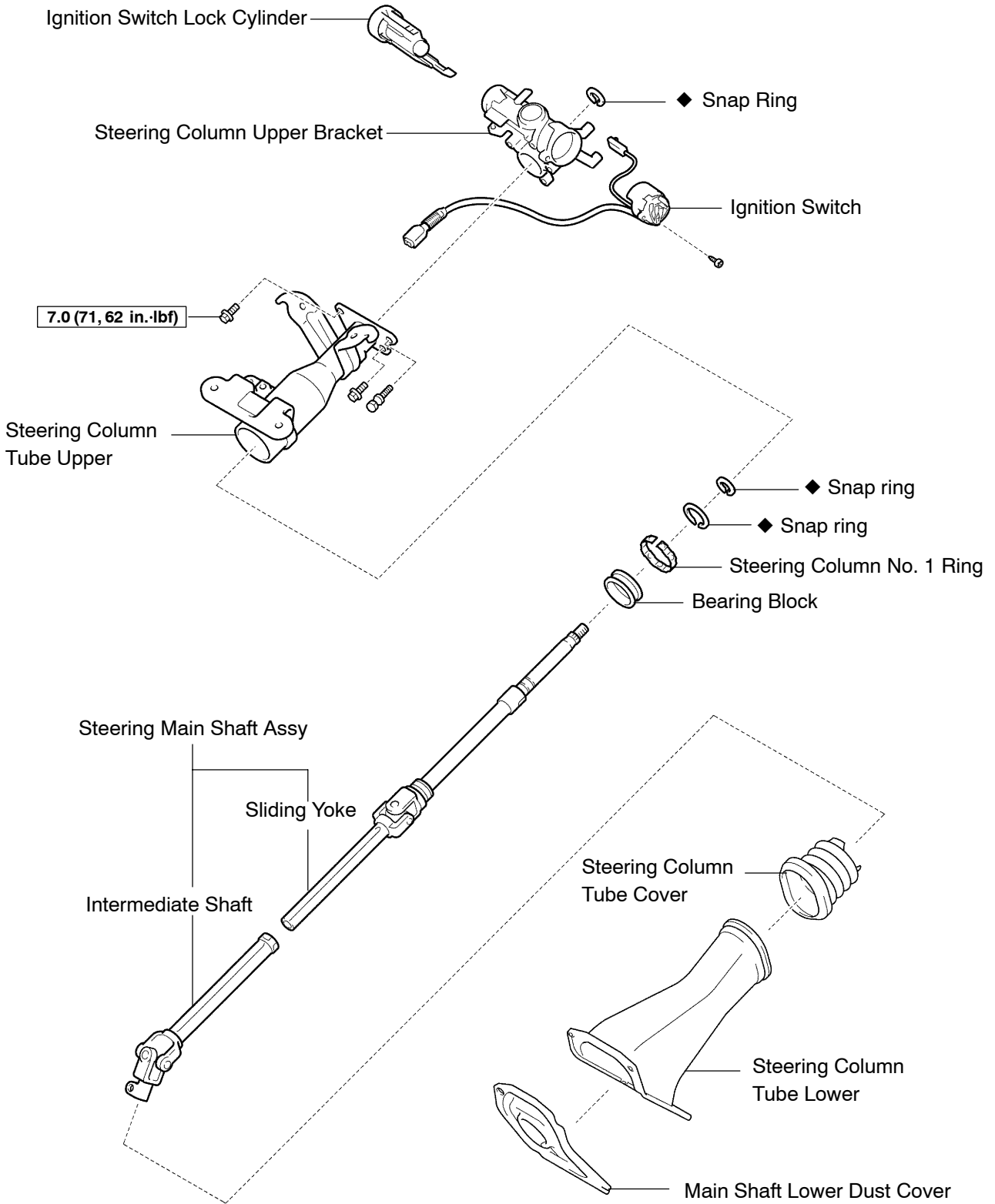
Tilt Steering Column



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

Non-tilt Steering Column

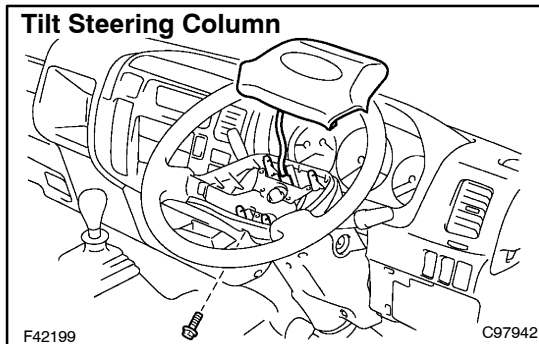


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

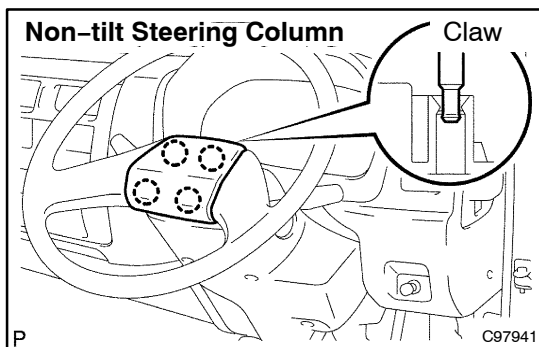
OVERHAUL

1. **PRECAUTION** (See page 50-1)
2. **DISCONNECT BATTERY NEGATIVE TERMINAL**
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**

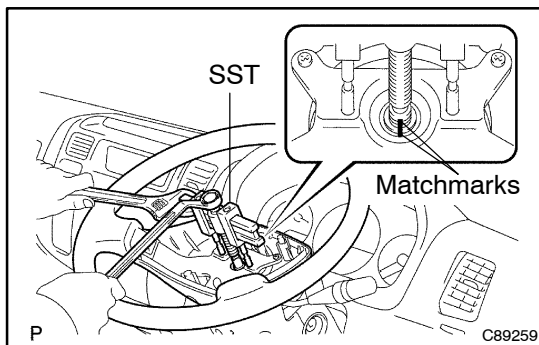


4. REMOVE HORN BUTTON ASSY

- (a) Tilt steering column:
Remove the horn button.
 - (1) Remove the screw.
 - (2) Disconnect the horn button from the steering wheel.
 - (3) Disconnect the horn button connector, and remove the horn button.

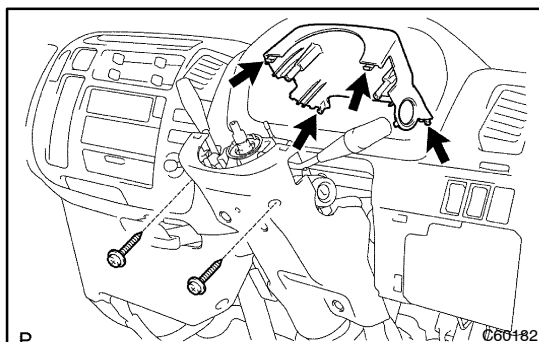


- (b) Non-tilt steering column:
Remove the horn button.
 - (1) Disengage the 4 claws by pulling the horn button, and disconnect the horn button from the steering wheel.
 - (2) Disconnect the horn button connector, and remove the horn button.



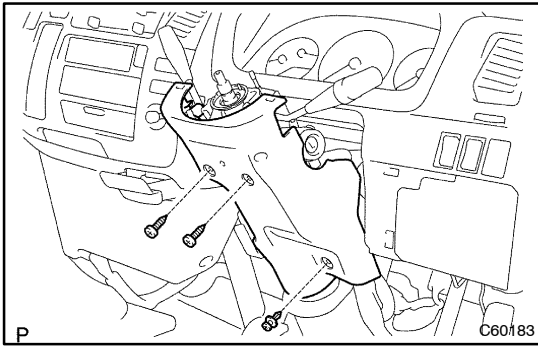
5. REMOVE STEERING WHEEL ASSY

- (a) Remove the steering wheel set nut.
- (b) Place matchmarks on the steering wheel and main shaft.
- (c) Using SST, remove the steering wheel.
SST 09950-50013 (09951-05010, 09952-05010, 09953-05010, 09954-05021)

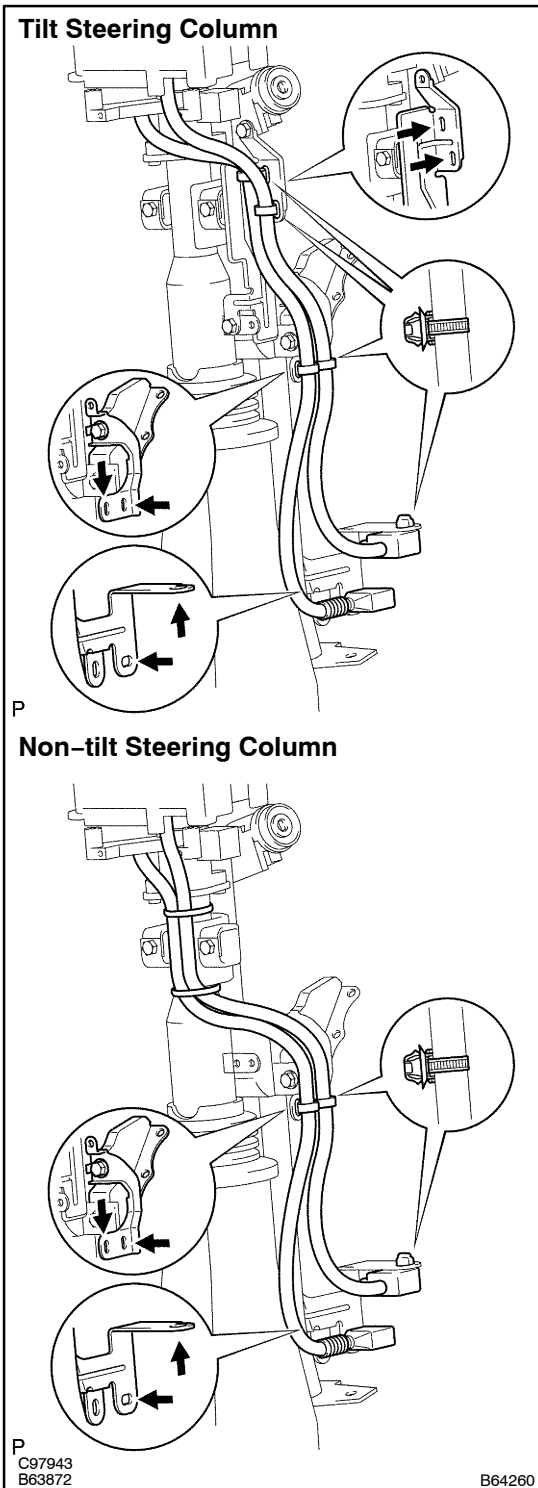


6. REMOVE STEERING COLUMN COVER UPR

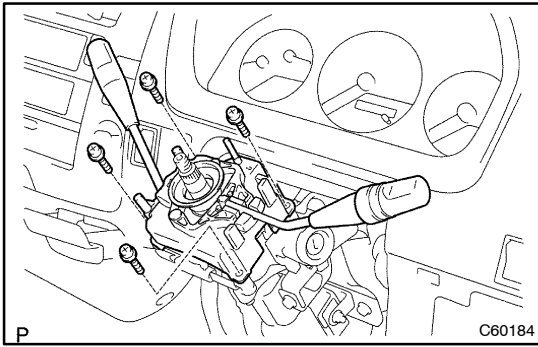
- (a) Remove the 2 screws.
- (b) Disengage the 4 claws from the column cover LWR, and remove the column cover UPR.

**7. REMOVE STEERING COLUMN COVER LWR**

- (a) Remove the clip, 2 screws and column cover.

**8. REMOVE TURN SIGNAL SWITCH ASSY**

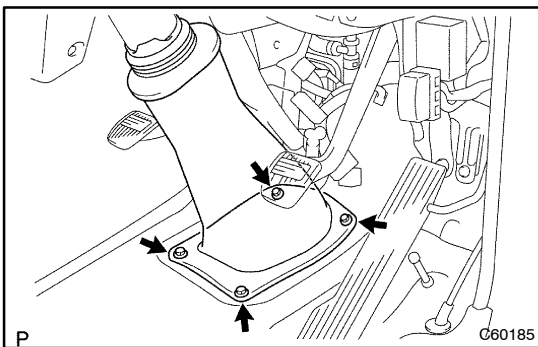
- (a) Disconnect the 2 turn signal switch assy connectors.
 (b) Remove the 2 connector clamps from the brackets.
 (c) Remove the 4 wire harness clamps from the brackets.



- (d) Remove the 4 screws and turn signal switch assy.

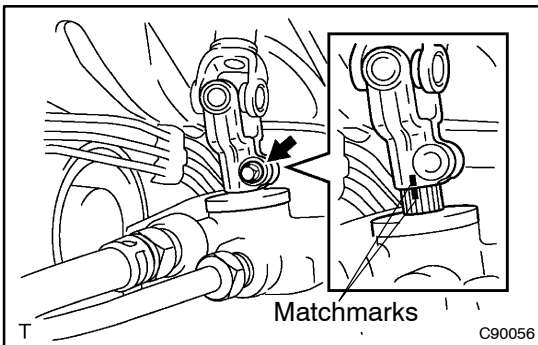
9. REMOVE FRONT DOOR SCUFF PLATE RH

- (a) Remove the 4 screws and scuff plate.

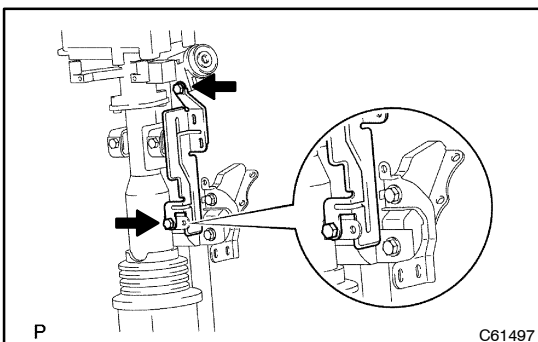


10. DISCONNECT STEERING MAIN SHAFT ASSY

- (a) Remove the 4 bolts.

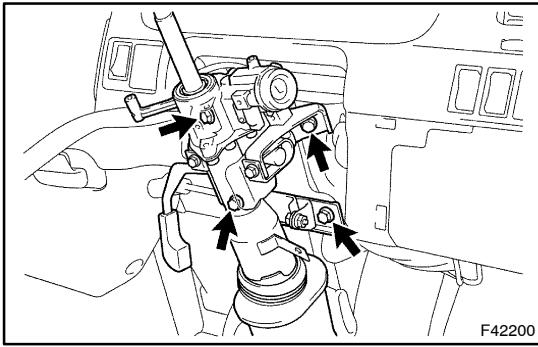


- (b) Place matchmarks on the main shaft and steering gear.
 (c) Disconnect the main shaft by lifting the main shaft from the steering gear.



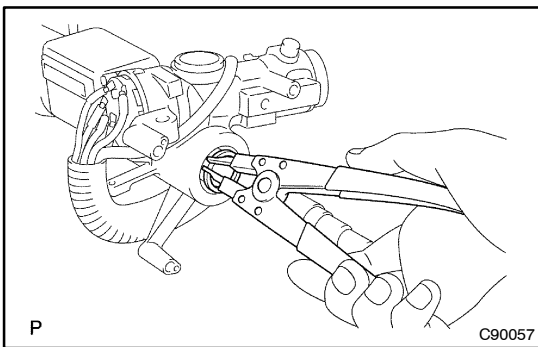
11. REMOVE STEERING COLUMN ASSY

- (a) Remove the 2 bolts and clamp bracket.



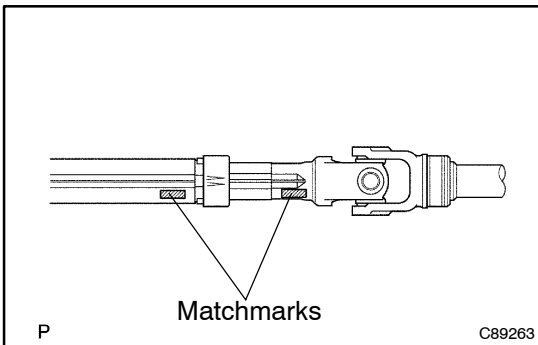
- (b) Remove the 4 set bolts and steering column assy.

12. REMOVE STEERING COLUMN TUBE LOWER
 13. REMOVE STEERING COLUMN TUBE COVER
 14. REMOVE MAIN SHAFT LOWER DUST COVER

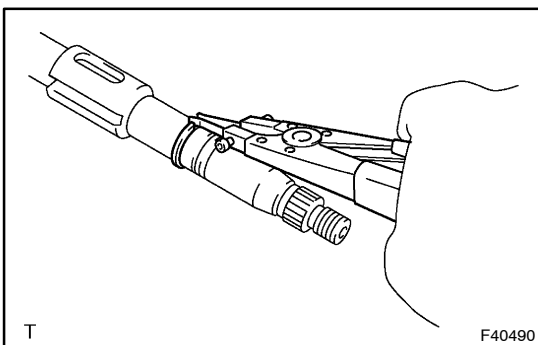


15. REMOVE STEERING MAIN SHAFT ASSY

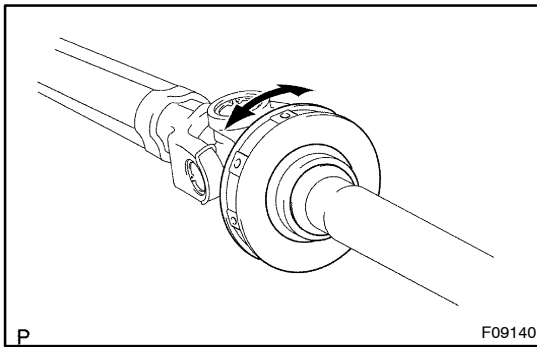
- (a) Using snap ring pliers, remove the sliding yoke snap ring (outer side).
 (b) Pull out the main shaft and intermediate shaft from the column tube upper.



- (c) Place the matchmarks on the intermediate shaft and sliding yoke.



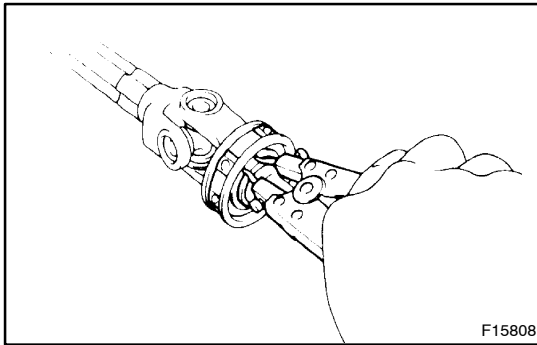
- (d) Using snap ring pliers, remove the sliding yoke snap ring (inner side).
 (e) Remove the intermediate shaft from the sliding yoke.

**16. INSPECT BEARING BLOCK**

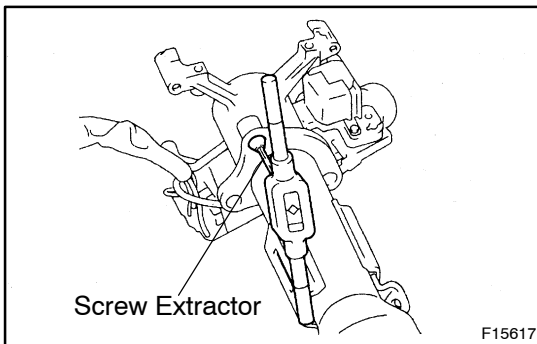
- (a) Check the rotating condition of the bearing block of the intermediate shaft, and check for abnormal noise.

If necessary, replace the bearing block.

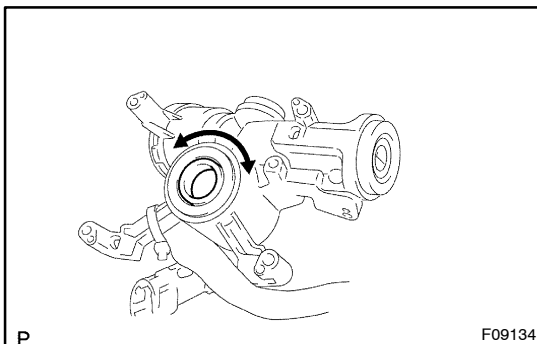
- (b) Coat the bearing with molybdenum disulfide lithium base grease.

**17. REMOVE BEARING BLOCK**

- (a) Remove the steering column No. 1 ring.
- (b) Using snap ring pliers, remove the snap ring from the sliding yoke.
- (c) Remove the bearing block.

**18. REMOVE STEERING COLUMN UPPER BRACKET W/ SWITCH**

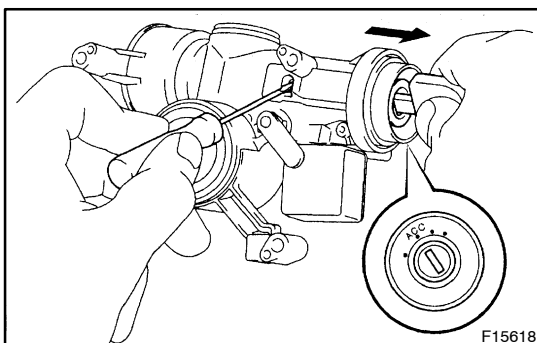
- (a) Using a centering punch, mark the center of the tapered-head bolt.
- (b) Using a 3 – 4 mm (0.12 – 0.16 in.) drill, drill the bolt.
- (c) Using a screw extractor, remove the bolt.
- (d) Remove the 2 bolts and column upper bracket from the column upper tube.

**19. INSPECT STEERING COLUMN UPPER BRACKET W/ SWITCH**

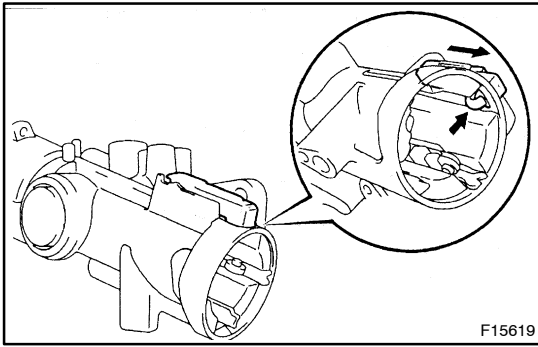
- (a) Check the rotating condition and check of the bearing for abnormal noise.

If the bearing is worn or damaged, replace the column upper bracket.

- (b) Coat the bearing with molybdenum disulfide lithium base grease.

**20. REMOVE IGNITION SWITCH LOCK CYLINDER ASSY**

- (a) Turn the key to the ACC position.
- (b) Using a screwdriver, push down the stop pin of the cylinder, and pull out the lock cylinder.



- 21. REMOVE IGNITION OR STARTER SWITCH ASSY**
- Remove the key unlock warning switch by pushing the claw, as shown in the illustration.
 - Remove the screw and ignition switch.

22. INSTALL IGNITION OR STARTER SWITCH ASSY

- Install the ignition switch with the screw.
- Install the key unlock warning switch.

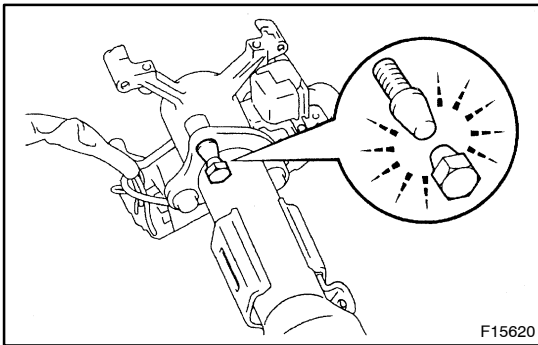
23. INSTALL IGNITION SWITCH LOCK CYLINDER ASSY

HINT:

Make sure that the key is at the ACC position.

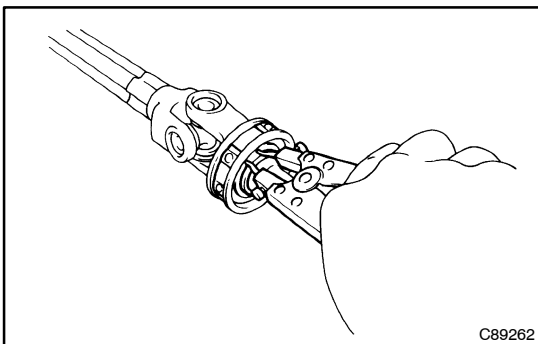
24. INSPECT STEERING LOCK OPERATION

- Check that the steering lock mechanism is activated when removing the key.
- Check that the lock mechanism is deactivated when inserting the key and turning to the ACC position.



25. INSTALL STEERING COLUMN UPPER BRACKET W/ SWITCH

- Install the column upper bracket assy with the 2 bolts.
Torque: 7.0 N·m (71 kgf·cm, 62 in·lbf)
- Install a new tapered-head bolt, and tighten the tapered-head bolt until the bolt head breaks off.

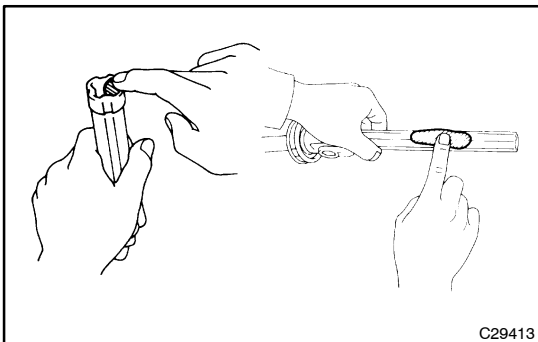


26. INSTALL BEARING BLOCK

- Install the bearing block.
- Using snap ring pliers, install a new shaft ring to the main shaft assy.
- Install the column No. 1 ring to the bearing block.

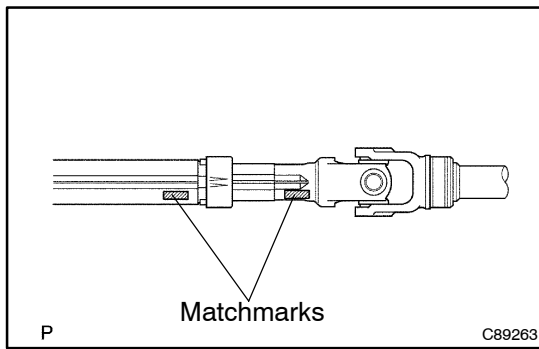
NOTICE:

- Do not expand the shaft ring excessively.
- Position the shaft ring into the groove securely.

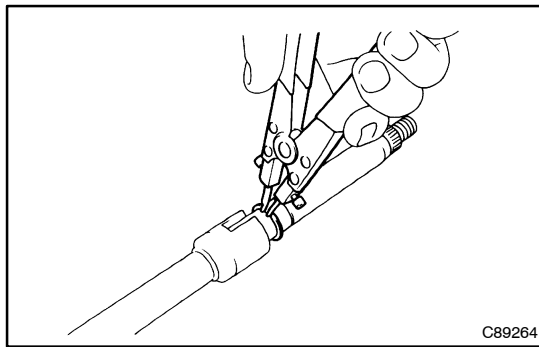


27. INSTALL STEERING MAIN SHAFT ASSY

- Apply chassis grease to the oil seal of the intermediate shaft and spline of the sliding yoke.



- (b) Align the matchmarks on the intermediate shaft and the sliding yoke.
- (c) Check that the intermediate shaft can slide smoothly.



- (d) Using snap ring pliers, install a new sliding yoke shaft snap ring (inner side) to the sliding yoke.

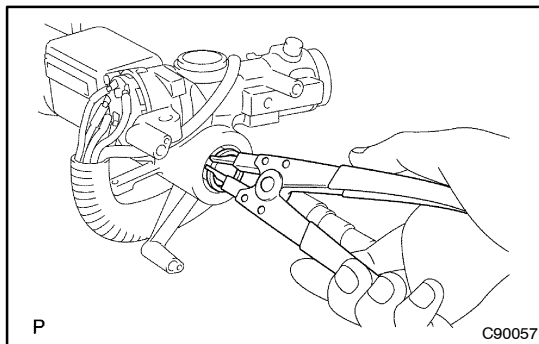
NOTICE:

- Do not damage the sliding yoke.
- Do not expand the snap ring excessively.
- Position the snap ring into the groove securely.

- (e) Install the main shaft assy to the column upper tube.

NOTICE:

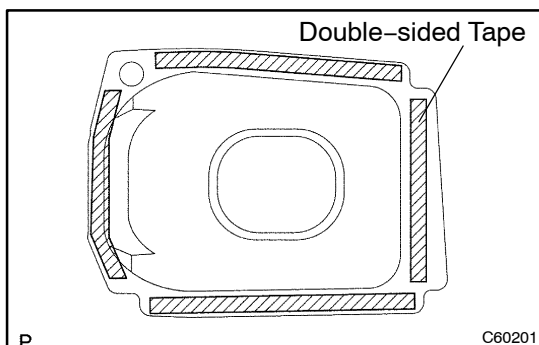
Do not damage the column tube cover.



- (f) Using snap ring pliers, install a new sliding yoke snap ring (outer side) to the sliding yoke.

NOTICE:

- Do not damage the sliding yoke.
- Do not expand the snap ring excessively.
- Position the snap ring into the groove securely.

**28. INSTALL MAIN SHAFT LOWER DUST COVER**

- (a) Apply double-sided tape to dust cover, as shown in the illustration.

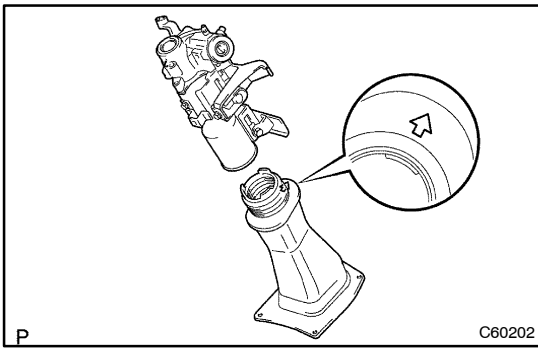
NOTICE:

Be sure that foreign objects do not stick to the contact surface.

- (b) Install the lower dust cover to the column tube lower.

29. INSTALL STEERING COLUMN TUBE LOWER

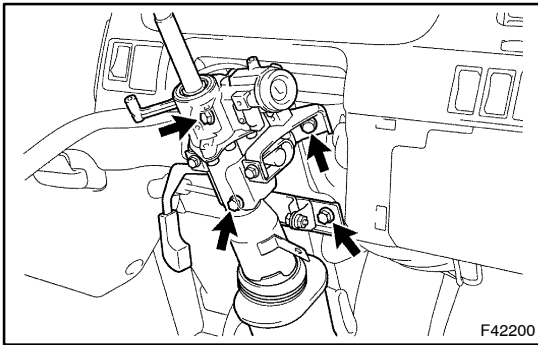
- (a) Install the column tube lower to the column tube cover.

**30. INSTALL STEERING COLUMN TUBE COVER**

- (a) Install the column tube cover.

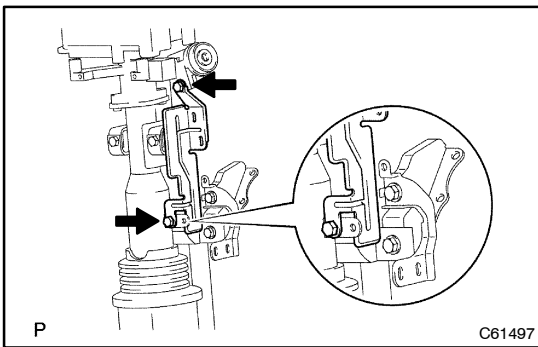
NOTICE:

Place the arrow mark so that it faces the vehicle front side.

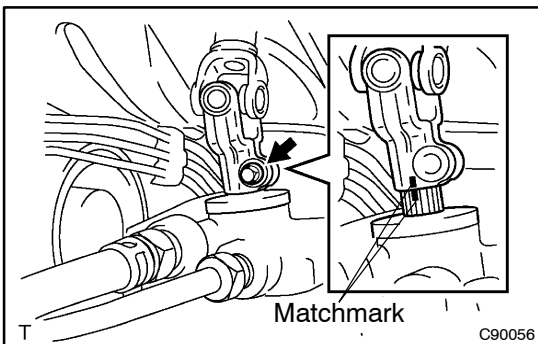
**31. INSTALL STEERING COLUMN ASSY**

- (a) Install the steering column assy with the 4 bolts.

Torque: 11.5 N·m (117 kgf·cm, 9 ft·lbf)

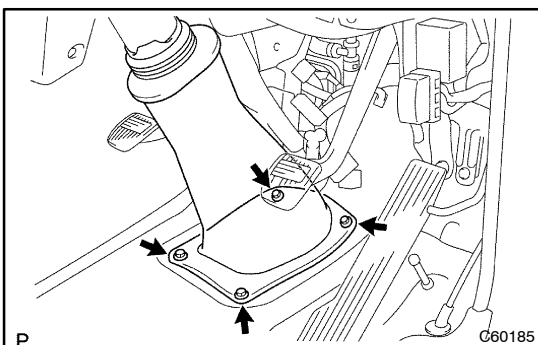


- (b) Install the clamp bracket with the 2 bolts.

**32. CONNECT STEERING MAIN SHAFT ASSY**

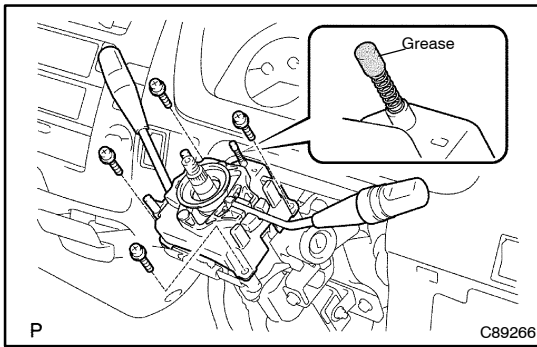
- (a) Align the matchmarks on the intermediate shaft and steering gear.
 (b) Install the bolt.

Torque: 35 N·m (357 kgf·cm, 26 ft·lbf)

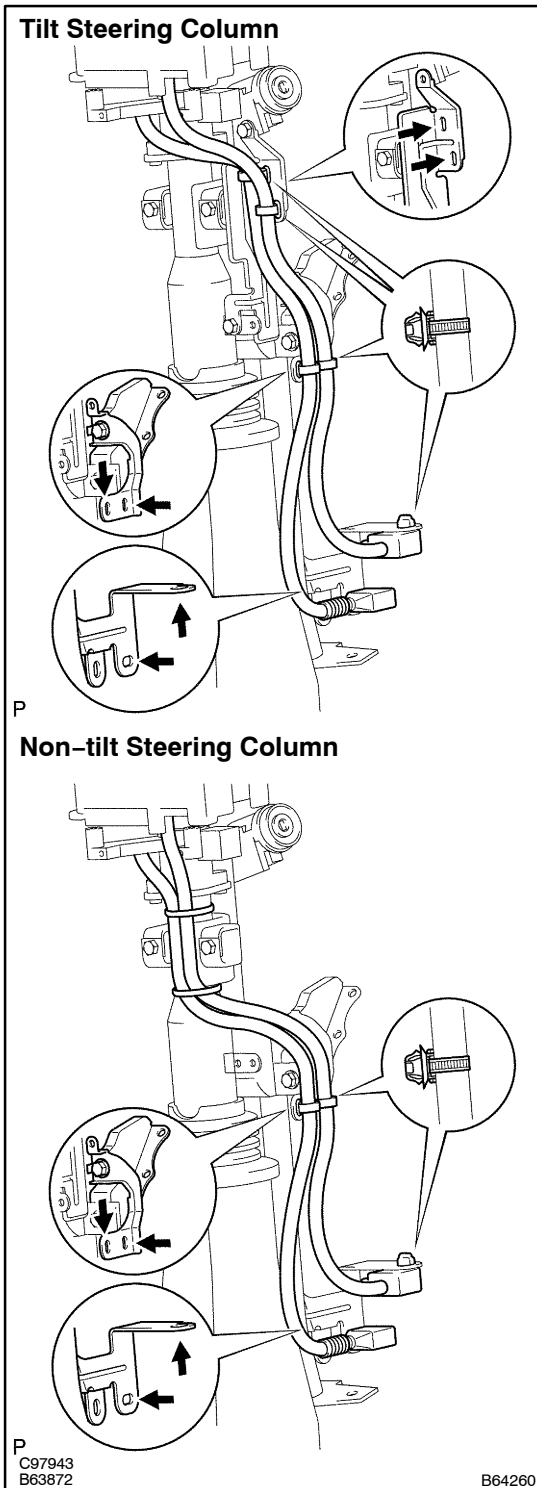


- (c) Install the steering column tube lower with the 4 bolts.

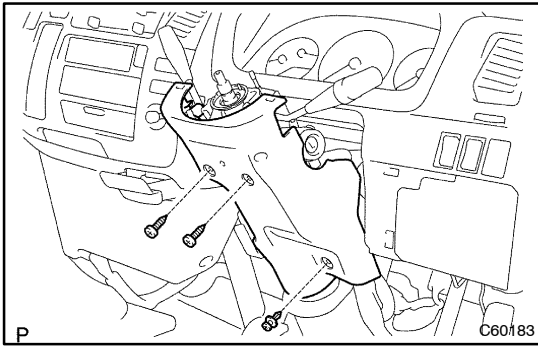
Torque: 8 N·m (82 kgf·cm, 71 in·lbf)

**33. INSTALL TURN SIGNAL SWITCH ASSY**

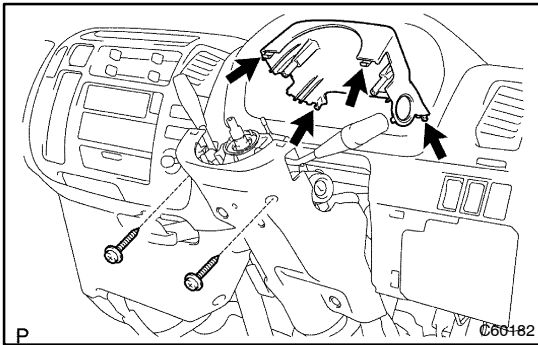
- (a) Install the turn signal switch assy with the 4 screws.
- (b) Apply lithium soap base glycol grease to the horn contact surface.



- (c) Install the 4 wire harness clamps to the brackets.
- (d) Install the 2 connector clamps to the brackets.
- (e) Connect the 2 turn signal switch assy connectors.

**34. INSTALL STEERING COLUMN COVER LWR**

- (a) Install the column cover with the clip and 2 screws.

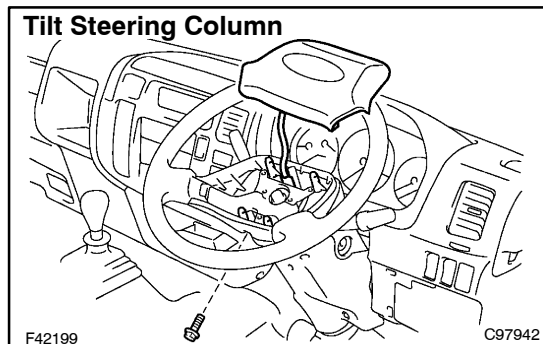
**35. INSTALL STEERING COLUMN COVER UPR**

- (a) Engage the 4 claws to the column cover LWR.
 (b) Install the column cover UPR with the 2 screws.

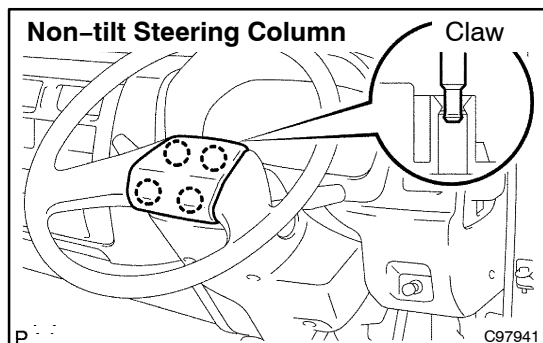
36. PLACE FRONT WHEELS FACING STRAIGHT AHEAD**37. INSTALL STEERING WHEEL ASSY**

- (a) Align the matchmarks on the steering wheel and steering main shaft.
 (b) Install the steering wheel set nut.

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

**38. INSTALL HORN BUTTON ASSY**

- (a) Tilt steering column:
 Install the horn button assy.
 (1) Connect the horn button connector.
 (2) Install the horn button assy with the bolt.
Torque: 2.0 N·m (20 kgf·cm, 18 in·lbf)



- (b) Non-tilt steering column:
 Install the horn button assy.
 (1) Connect the horn button connector.
 (2) Install the horn button.
 Engage the 4 claws by pushing the horn button.

POWER STEERING

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POWER STEERING SYSTEM

51OCT-01

PRECAUTION

1. HANDLING PRECAUTIONS OF STEERING SYSTEM

- (a) Care must be taken when replacing parts. Incorrect replacement could affect the performance of the steering system and result in hazard to the driving condition.

PROBLEM SYMPTOMS TABLE

HINT:

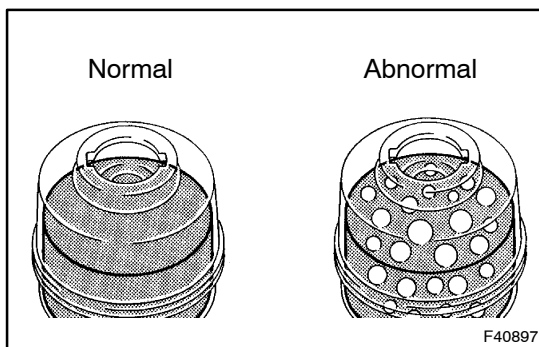
Use the table below to help you find the cause of the problem. The numbers indicate the possibility of the problem in descending order. Check each part in the order shown. If necessary, repair or replace these parts.

Symptom	Suspected Area	See Page
Hard steering	1. Tires (Improperly inflated)	28-1
	2. Power steering fluid level (Low)	51-3
	3. Front wheel alignment (Incorrect)	26-2
	4. Steering system joints (Worn)	-
	5. Steering column (Binding)	50-8
	6. Power steering vane pump	14B 51-10
		15B-FTE 51-18
	S05C-B, S05C-TA, S05C-TB 51-27	
	W04D-J 51-37	
	7. Power steering gear	51-47
Poor return	1. Tires (Improperly inflated)	28-1
	2. Front wheel alignment (Incorrect)	26-2
	3. Steering column (Binding)	-
	4. Power steering gear	51-47
Excessive play	1. Steering system joints (Worn)	-
	2. Intermediate shaft, Sliding yoke (Worn)	B-TYPE 30-22
		LE-TYPE 30-29
	3. Front wheel bearing (Worn)	Disc Brake 30-34
		5-Bolts Drum Brake 30-40
	6-Bolts Drum Brake 30-45	
	4. Power steering gear	51-47
Abnormal noise	1. Power steering fluid level (Low)	51-3
	2. Steering system joints (Worn)	-
	3. Power steering vane pump	14B 51-10
		15B-FTE 51-18
		S05C-B, S05C-TA, S05C-TB 51-27
	W04D-J 51-37	
	4. Power steering gear	51-47

ON-VEHICLE INSPECTION

1. BLEED POWER STEERING SYSTEM

- (a) Check the fluid level.
- (b) Jack up the front of the vehicle and support it with stands.
- (c) Turn the steering wheel.
 - (1) With the engine stopped, turn the wheel slowly from lock to lock several times.
- (d) Lower the vehicle.
- (e) Start the engine.
 - (1) Run the engine at idle for a few minutes.
- (f) Turn the steering wheel.
 - (1) With the engine idling, turn the wheel to the left or right full lock position and keep it there for 2 – 3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2 – 3 seconds.
 - (2) Repeat (1) several times.
- (g) Stop the engine.

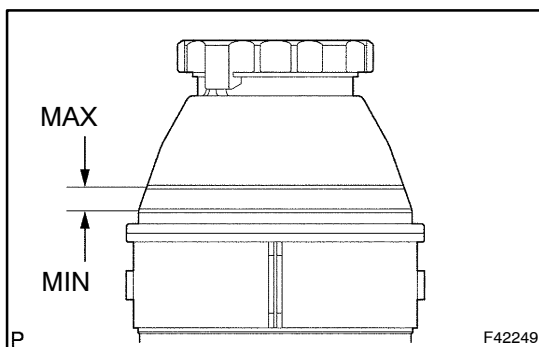


- (h) Check for foaming or emulsification.

NOTICE:

If the system has to be bled twice because of foaming or emulsification, check for fluid leaks in the system.

- (i) Check the fluid level.



2. CHECK FLUID LEVEL

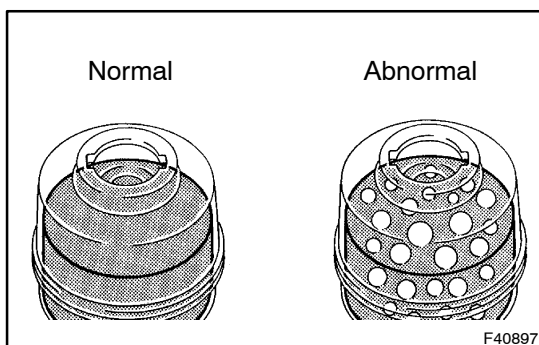
- (a) Put the vehicle in a level place.
- (b) With the engine stopped, check the fluid level in the oil reservoir.

If necessary, add fluid.

Fluid: ATF DEXRON® II or III

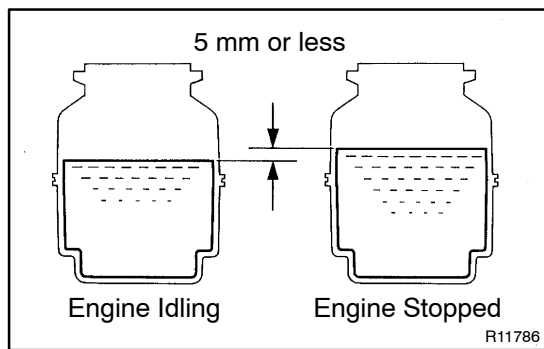
HINT:

Check that the fluid level is within the MAX LEVEL range on the reservoir.



- (c) Check for foaming or emulsification.

If foaming or emulsification is found, bleed the power steering system.



- (d) With the engine idling, measure the fluid level in the oil reservoir.
- (e) Stop the engine.
- (f) Wait a few minutes and measure the fluid level in the oil reservoir again.

Maximum fluid level rise: 5 mm (0.20 in.)

If a problem is found, bleed the power steering system.

- (g) Check the fluid level.

3. CHECK STEERING FLUID PRESSURE

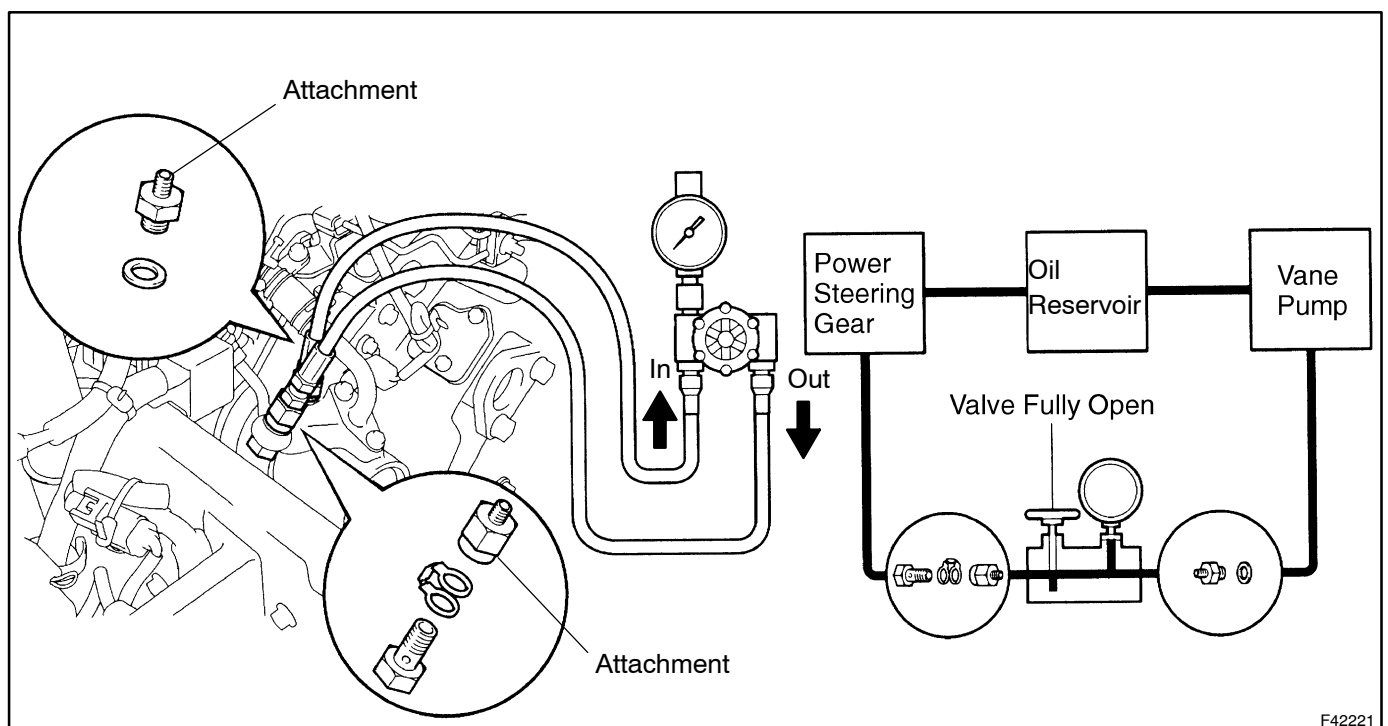
- (a) Disconnect the pressure feed tube from the vane pump (See pages 51-10, 51-18, 51-27 and 51-37).
- (b) Connect SST, as shown in the illustration.
SST 09640-10010 (09641-01010, 09641-01030, 09641-01040)

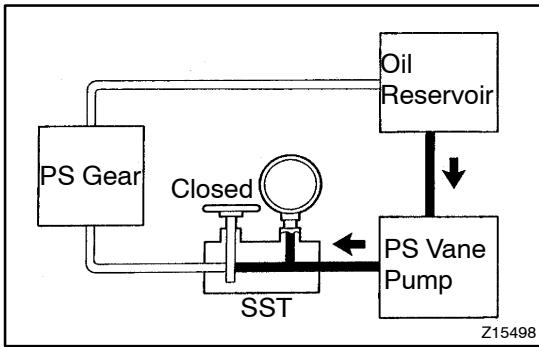
NOTICE:

Check that the valve of the SST is in the open position.

- (c) Bleed the power steering system.
- (d) Start the engine and run it at idle.
- (e) Turn the steering wheel from lock to lock several times to raise fluid temperature.

Fluid temperature: 75 - 80°C (167 - 176°F)





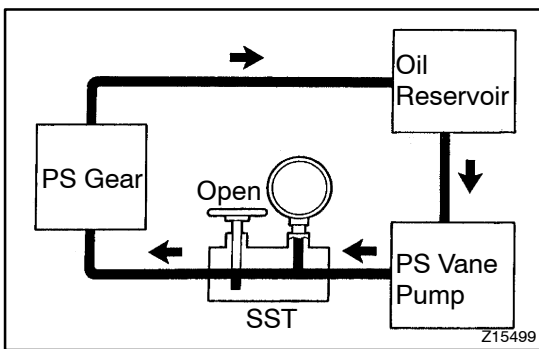
- (f) With the engine idling, close the valve of the SST and observe the reading on the SST.

Minimum fluid pressure:

Model	Fluid pressure
4 ton model (6 Hub bolts)	9,300 kPa (95 kgf/cm ² , 1,351 psi)
2 ton model (5 Hub bolts)	7,400 kPa (75 kgf/cm ² , 1,067 psi)

NOTICE:

- Do not maintain the valve closed for more than 10 seconds.
- Do not allow the fluid temperature to become too high.



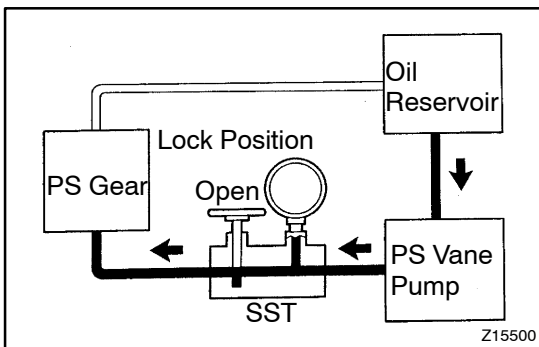
- (g) With the engine idling, open the valve fully.
 (h) Measure the fluid pressure at engine speed of 1,000 rpm and 3,000 rpm.

Difference fluid pressure:

490 kPa (5 kgf/cm², 71 psi) or less

NOTICE:

Do not turn the steering wheel.



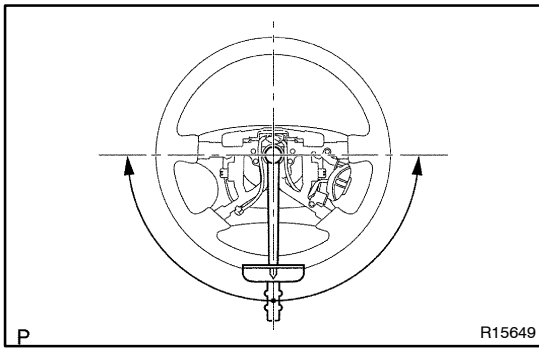
- (i) With the engine idling and valve of SST fully opened, turn the steering wheel to the full lock position and check the reading on SST.

Minimum fluid pressure:

Model	Fluid pressure
4 ton model (6 Hub bolts)	9,300 kPa (95 kgf/cm ² , 1,351 psi)
2 ton model (5 Hub bolts)	7,400 kPa (75 kgf/cm ² , 1,067 psi)

NOTICE:

- Do not maintain the steering wheel at the lock position for more than 10 seconds.
 - Do not allow the fluid temperature to become too high.
- (j) Disconnect the SST.
 SST 09640-10010 (09641-01010, 09641-01030, 09641-01040, 09641-01060)
- (k) Connect the pressure feed tube to the vane pump assy (See pages 51-10, 51-18, 51-27 and 51-37).

**4. CHECK STEERING EFFORT**

- (a) Center the steering wheel.
- (b) Remove the steering wheel pad (See page 50-8).
- (c) Start the engine and run it at idle.
- (d) Measure the steering effort in both directions.

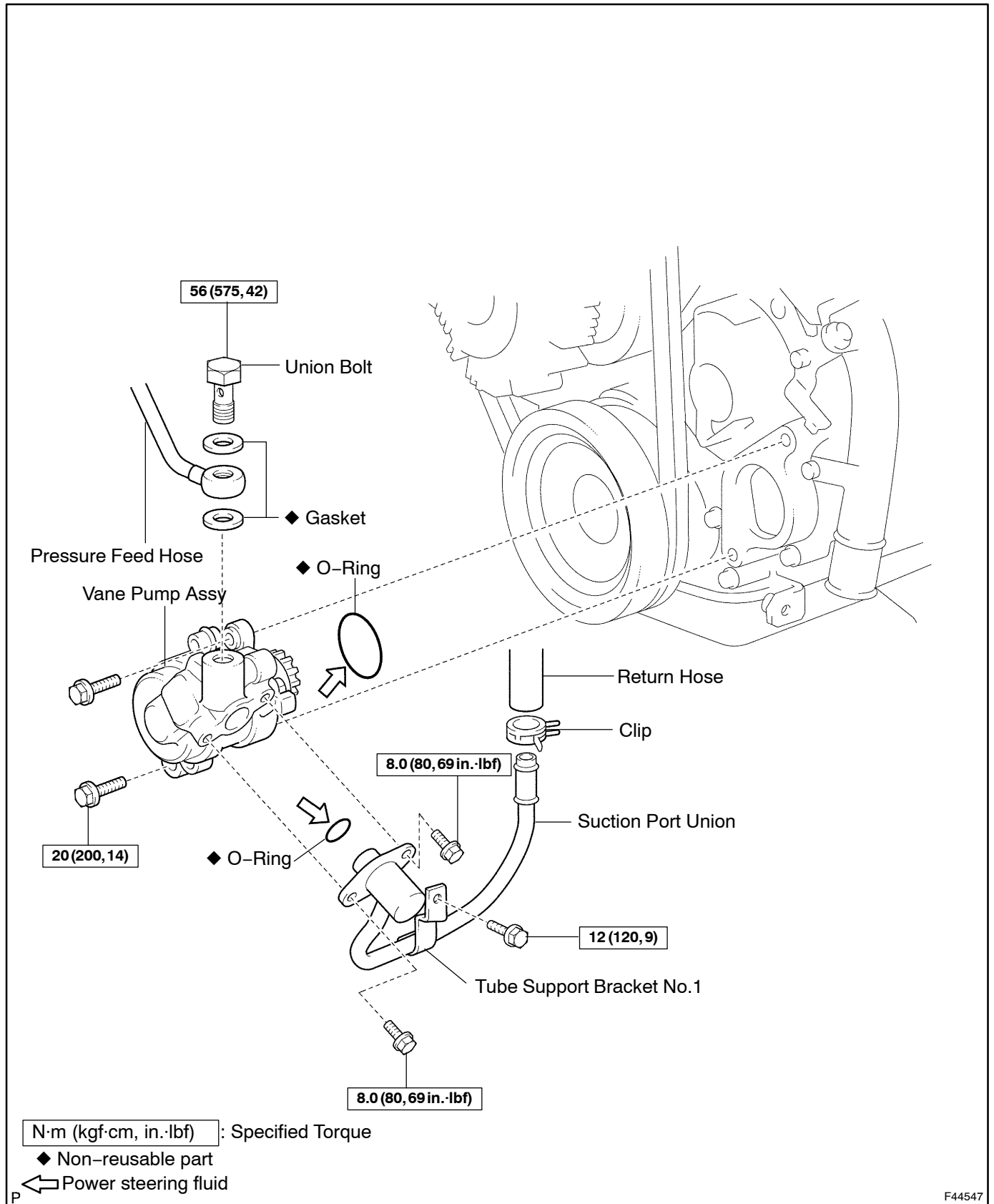
Steering effort (Reference):**6 N·m (60 kgf·cm, 53 in·lbf) or less****HINT:**

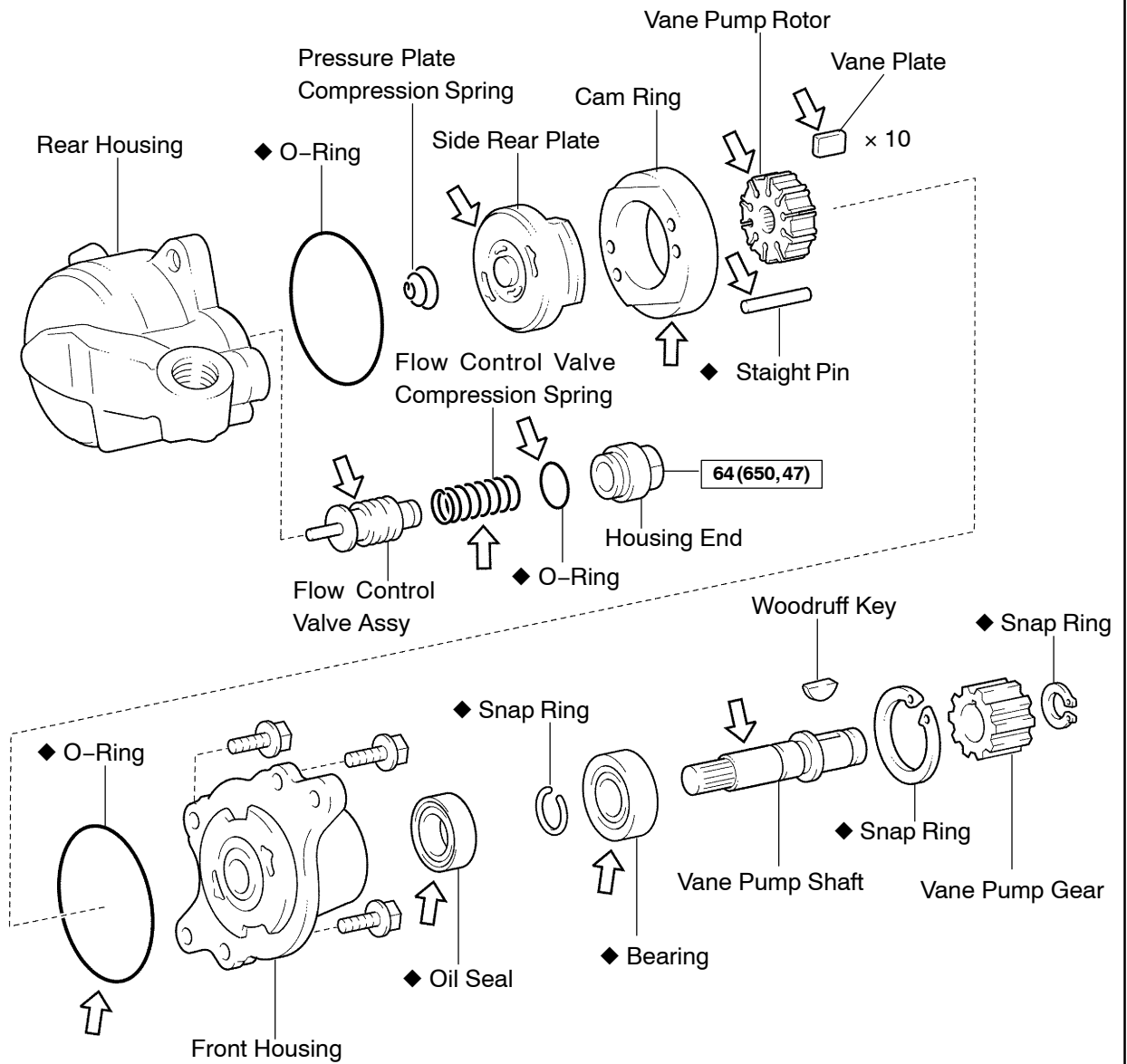
Take the tire type, pressure and contact surface into consideration before making your diagnosis.

- (e) Torque the steering wheel set nut.
Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)
- (f) Install the steering wheel pad (See page 50-8).

VANE PUMP ASSY (14B) COMPONENTS

510CK-01





N·m (kgf·cm, in.·lbf) : Specified Torque

◆ Non-reusable part

← Power steering fluid

P

REPLACEMENT

HINT:

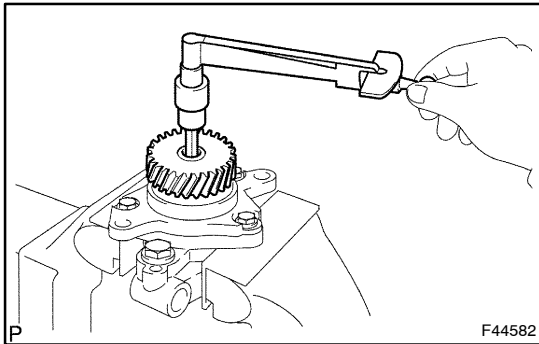
The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

- 1. DRAIN POWER STEERING FLUID**
- 2. DISCONNECT STEERING GEAR OUTLET RETURN TUBE**
- 3. DISCONNECT PRESSURE FEED HOSE**
 - (a) Remove the union bolt and 2 gaskets, and disconnect the pressure feed hose.
- 4. REMOVE POWER STEERING SUCTION PORT UNION**
 - (a) Remove the bolt from the tube support bracket No. 1.
 - (b) Remove the 2 bolts.
 - (c) Remove the O-ring from the suction port union.
- 5. REMOVE VANE PUMP ASSY**
 - (a) Remove the 2 bolts and vane pump.
 - (b) Remove the O-ring from the vane pump.

OVERHAUL

NOTICE:

When using a vise, do not overtighten it.



1. INSPECT VANE PUMP ROTATING TORQUE

- (a) Check that the vane pump smoothly rotates without abnormal noise.
- (b) Using a torque wrench, check the pump rotating torque.

Rotating torque:

0.27 N·m (2.75 kgf·cm, 2.39 in·lbf) or less

2. REMOVE POWER STEERING SUCTION PORT UNION

- (a) Remove the bolt and disconnect the suction port union.
- (b) Remove the O-ring from the suction port union.

3. REMOVE VANE PUMP GEAR

- (a) Using a snap ring expander, remove the snap ring from the vane pump shaft.
- (b) Remove the vane pump gear and woodruff key.

4. REMOVE FLOW CONTROL VALVE

- (a) Remove the housing end.
- (b) Remove the O-ring from the housing end.
- (c) Remove the flow control valve compression spring and flow control valve assy.

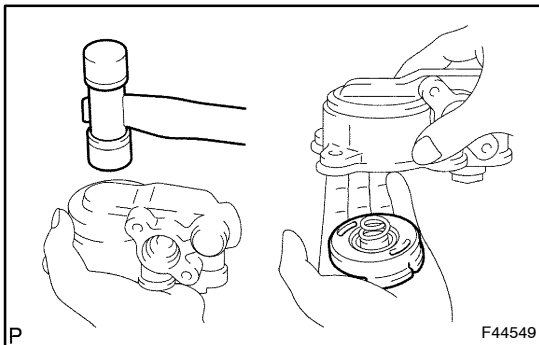
5. REMOVE VANE PUMP HOUSING REAR

- (a) Remove the 3 bolts.

NOTICE:

When removing the rear housing, be careful that the vane plates, rotor and cam ring do not fall out.

- (b) Remove the O-ring from the front housing.



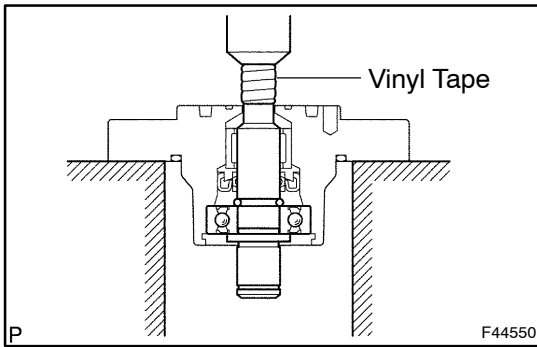
6. REMOVE REAR SIDE PLATE

- (a) Using a plastic hammer, tap out the rear side plate and pressure plate compression spring from the rear housing.
- (b) Remove the O-ring from the front housing.

7. REMOVE VANE PUMP CAM RING

8. REMOVE VANE PUMP ROTOR

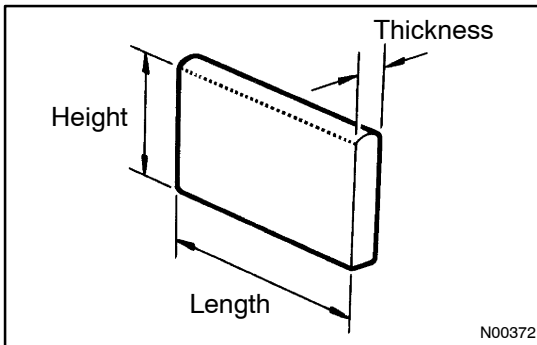
9. REMOVE VANE PLATES

**10. REMOVE STRAIGHT PIN**

- (a) Using pliers, pull out the pin from the front housing.

11. REMOVE VANE PUMP SHAFT WITH BEARING

- (a) Using snap ring pliers, remove the snap ring from the front housing.
- (b) Wind vinyl tape on the serrated part of the vane pump shaft.
- (c) Using a press, press out the shaft together with the bearing.

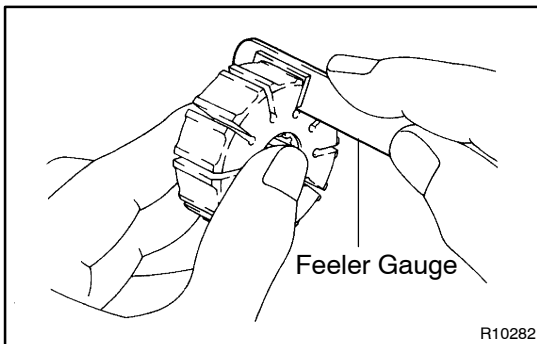
**12. INSPECT VANE PUMP ROTOR AND VANE PLATES**

- (a) Using a micrometer, measure the dimensions.

Minimum dimension:

Height	8.6 mm (0.339 in.)
Thickness	1.397 mm (0.0550 in.)
Length	14.991 mm (0.5902 in.)

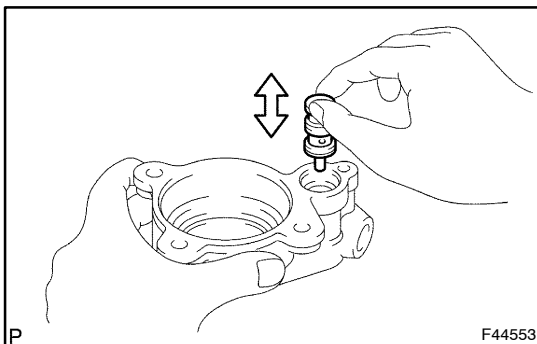
If the result is not as specified, replace the rotor and vane plates with the cam ring.



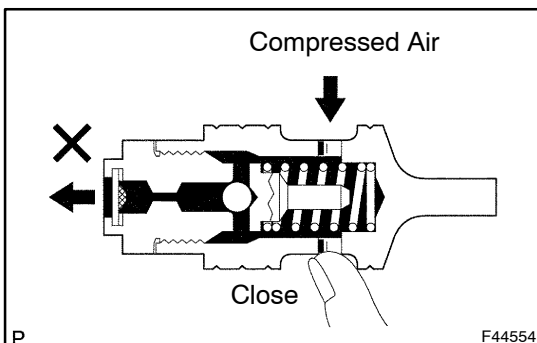
- (b) Using a feeler gauge, measure the clearance between the rotor groove and plate.

Maximum clearance: 0.033 (0.0013 in.)

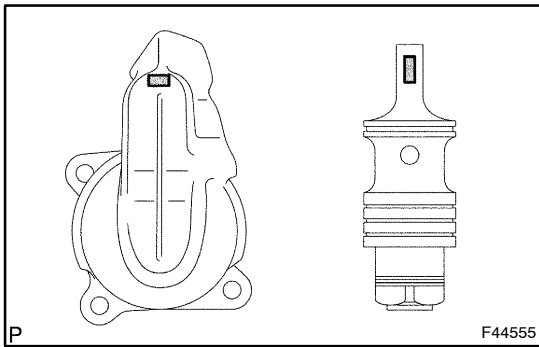
If the result is greater than the maximum, replace the rotor and vane plates together with the cam ring.

**13. INSPECT FLOW CONTROL VALVE**

- (a) Coat the valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.



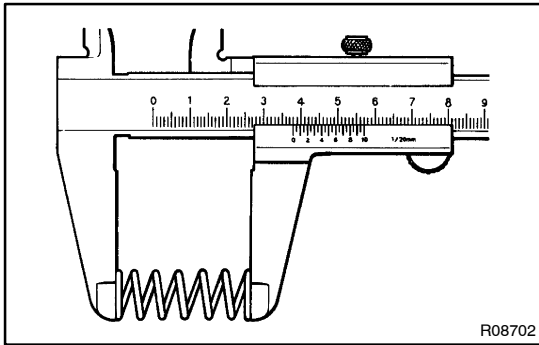
- (b) Check the valve for leakage. Close one of the side holes and apply compressed air 392 – 490 kPa (4 – 5 kgf/cm², 57 – 71 psi) from another side hole, and confirm that no air comes out from the end hole.



- (c) If necessary, replace the valve with one having the same letter as inscribed on the front housing.

Inscribed mark:

Rear housing mark	Flow control valve mark
0	II
1	I
2	None

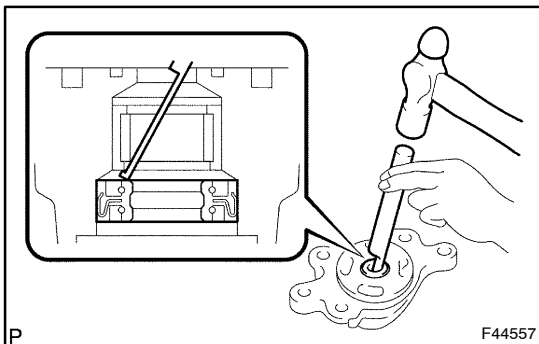


14. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

- (a) Using calipers, measure the free length of the spring.

minimum free length: 50 mm (1.97 in.)

If the result is less than the minimum, replace the spring.



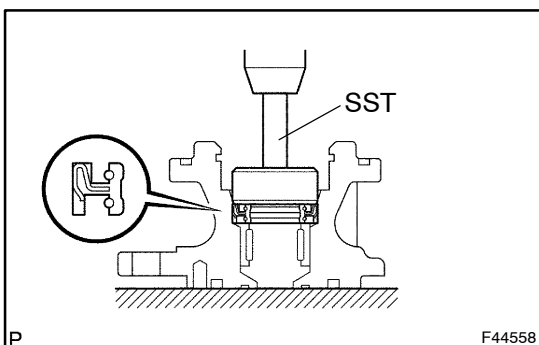
15. REPLACE VANE PUMP HOUSING OIL SEAL

- (a) Using SST and hammer, tap out the oil seal from the front housing.

SST 09631-10030

NOTICE:

Be careful not to damage the front housing.



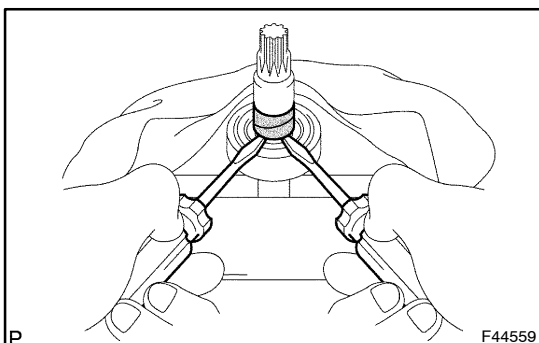
- (b) Coat a new oil seal lip with power steering fluid.

- (c) Using SST and a press, install the oil seal.

SST 09950-60010 (09951-00310), 09950-70010
(09951-07100)

NOTICE:

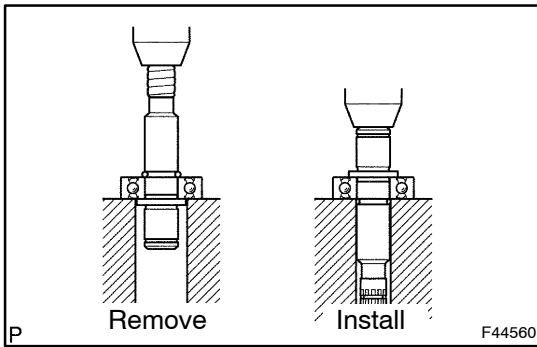
Make sure to install the oil seal so that it faces to the correct direction.



16. REPLACE VANE PUMP SHAFT BEARING

- (a) Wind vinyl tape on the vane pump shaft.

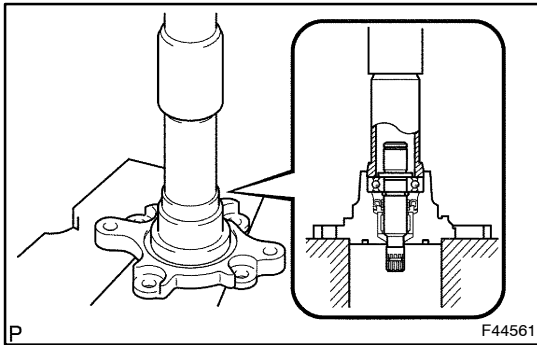
- (b) Using 2 screwdrivers, remove the snap ring from the vane pump shaft.



- (c) Wind vinyl tape on the serrated part of the vane pump shaft.
- (d) Press out the bearing from the vane pump shaft.
- (e) Coat a new bearing with power steering fluid.
- (f) Press in the bearing to the shaft.
- (g) Using snap ring pliers, install a new snap ring to the shaft.

NOTICE:

Be careful not to damage the vane pump shaft.

**17. INSTALL VANE PUMP SHAFT WITH BEARING**

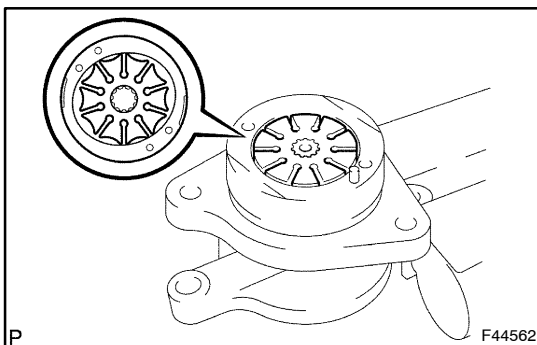
- (a) Using SST, press in the shaft with the bearing to the front housing.
SST 09632-36010
- (b) Using snap ring pliers, install a new snap ring to the front housing.

18. INSTALL STRAIGHT PIN

- (a) Using a plastic hammer, tap in a new pin.

NOTICE:

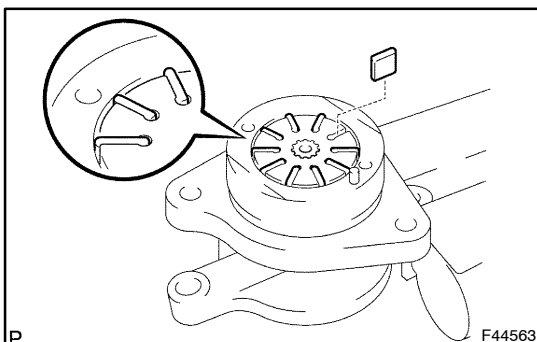
Be careful not to damage the pin.

**19. INSTALL VANE PUMP CAM RING**

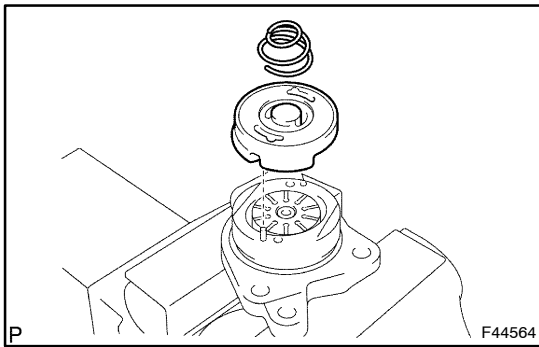
- (a) Install the ring with the inscribed mark facing outward.

20. INSTALL VANE PUMP ROTOR

- (a) Install the rotor with the inscribed mark facing outward.

**21. INSTALL VANE PLATES**

- (a) Install the 10 plates with the round end facing outward.

**22. INSTALL REAR SIDE PLATE**

- (a) Coat a new O-ring with power steering fluid.
- (b) Install the O-ring to the rear housing.
- (c) Install the rear side plate to the cam ring positioning the groove to the straight pin.
- (d) Install the pressure plate compression spring to the rear side plate.

NOTICE:

Make sure to install the pressure plate compression spring, as shown in the illustration.

23. INSTALL VANE PUMP HOUSING REAR

- (a) Coat a new O-ring with power steering fluid.
- (b) Install the O-ring to the front housing.
- (c) Install the 3 bolts.

Torque: 42 N·m (425 kgf·cm, 31 ft·lbf)

24. INSTALL FLOW CONTROL VALVE

- (a) Install the flow control valve assy and flow control valve compression spring.
- (b) Coat a new O-ring with power steering fluid.
- (c) Install the O-ring to the housing end.
- (d) Install the housing end.

Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

25. INSTALL VANE PUMP GEAR

- (a) Install the woodruff key and vane pump gear.
- (b) Using a snap ring expander, install a new snap ring to the vane pump shaft.

26. INSTALL VANE PUMP ASSY

- (a) Coat a new O-ring with power steering fluid.
- (b) Install the O-ring to the vane pump assy.
- (c) Install the 2 bolts.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

27. INSTALL POWER STEERING SUCTION PORT UNION

- (a) Coat a new O-ring to with power steering fluid.
- (b) Install the O-ring to the suction port union.
- (c) Install the suction port union with the 2 bolts.

Torque: 8.0 N·m (80 kgf·cm, 69 ft·lbf)

- (d) Install the tube support bracket No. 1 set bolt.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

28. CONNECT RETURN HOSE**29. CONNECT PRESSURE FEED HOSE**

- (a) Install the union bolt with a new gaskets on each side of the pressure feed hose.

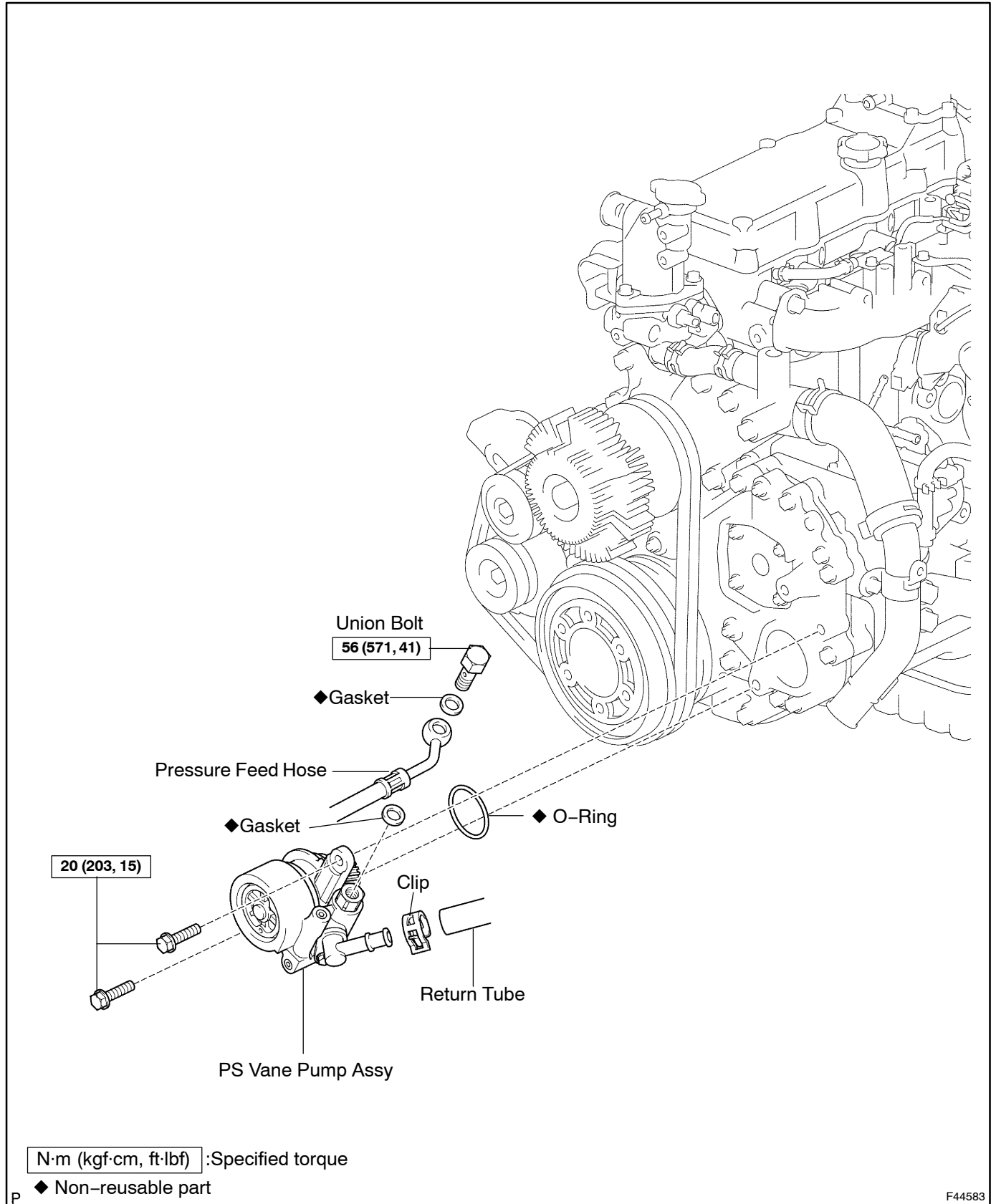
Torque: 56 N·m (575 kgf·cm, 42 ft·lbf)

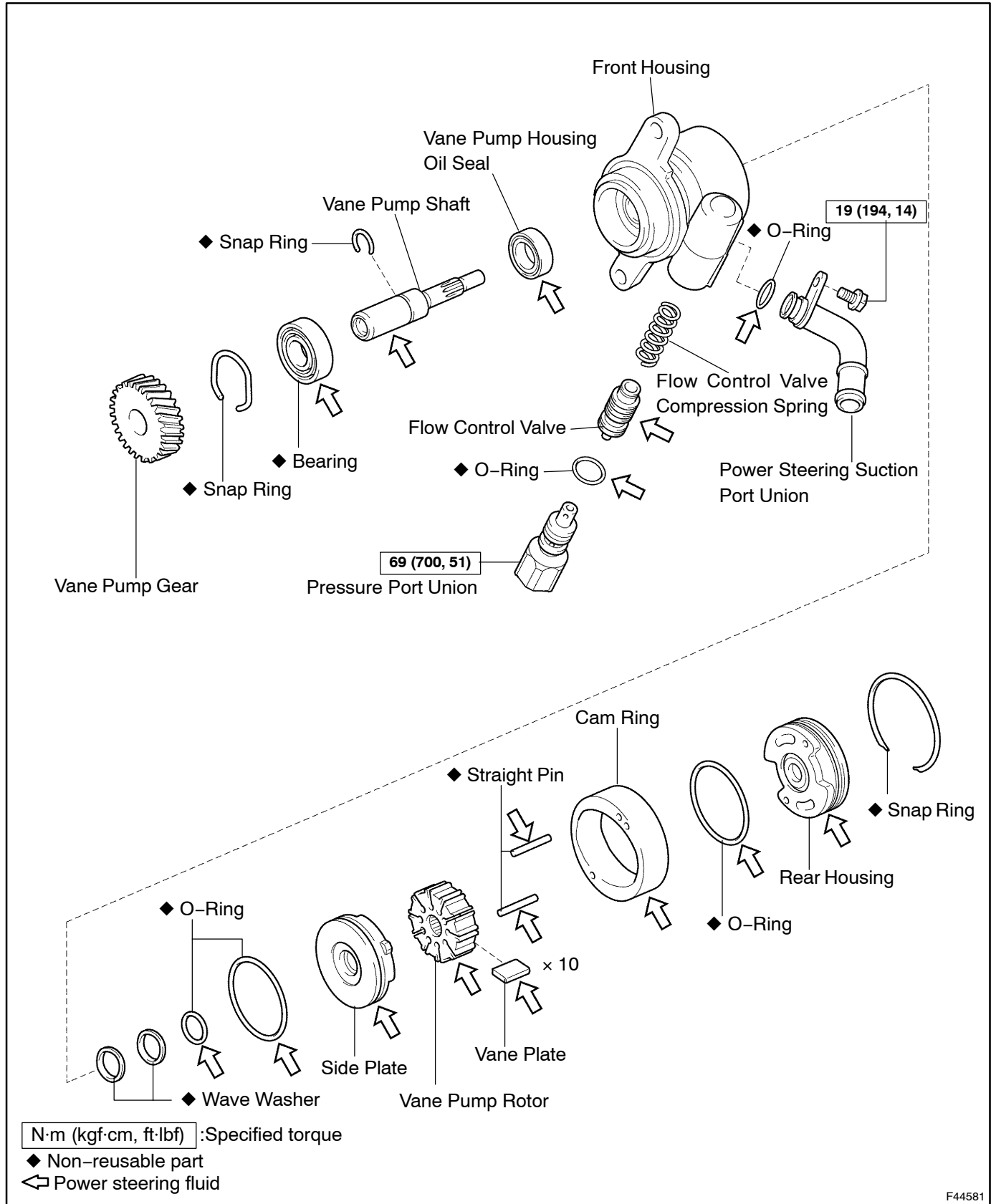
30. ADD POWER STEERING FLUID**31. BLEED POWER STEERING FLUID****32. INSPECT FOR FLUID LEAKS**

VANE PUMP ASSY (15B-FTE)

COMPONENTS

510CH-01



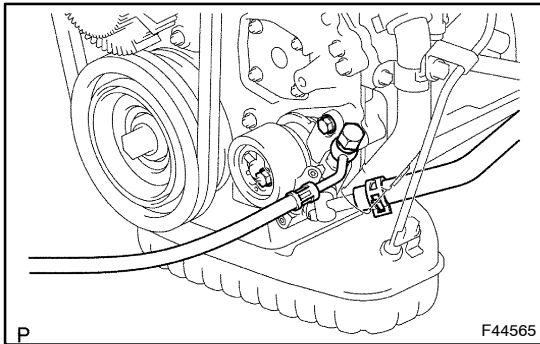


VANE PUMP ASSY (15B-FTE)

REPLACEMENT

510CI-01

1. DRAIN POWER STEERING FLUID



2. DISCONNECT STEERING GEAR OUTLET RETURN TUBE

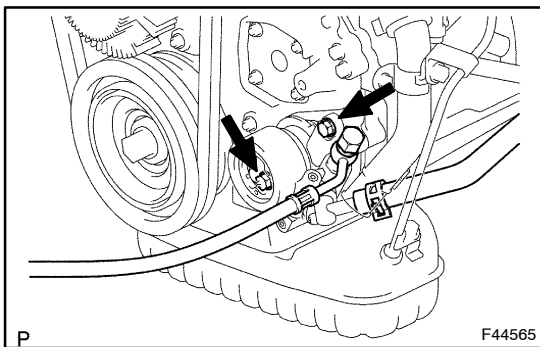
- (a) Remove the clip and disconnect the return tube.

3. DISCONNECT PRESSURE FEED HOSE

- (a) Remove the union bolt, 2 gaskets and pressure feed hose.

4. REMOVE VANE PUMP ASSY

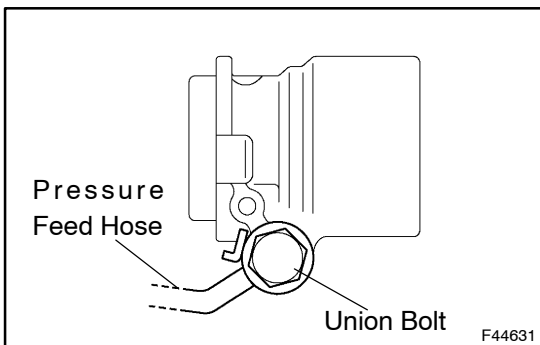
- (a) Remove the vane pump.
(b) Remove the O-ring from the vane pump assy.



5. INSTALL VANE PUMP ASSY

- (a) Coat a new O-ring with power steering fluid and install it to the vane pump.
(b) Install the vane pump assy with the 2 bolts.

Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)



6. INSTALL PRESSURE FEED HOSE

- (a) Install a 2 new gaskets and connect the hose.
(b) Install the union bolt.

Torque: 56 N·m (575 kgf·cm, 42 ft·lbf)

7. INSTALL POWER STEERING SUCTION PORT UNION

- (a) Coat a new O-ring with power steering fluid and install it to suction port union.
(b) Install the suction port union to the vane pump assy with the bolt.

Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

8. ADD POWER STEERING FLUID

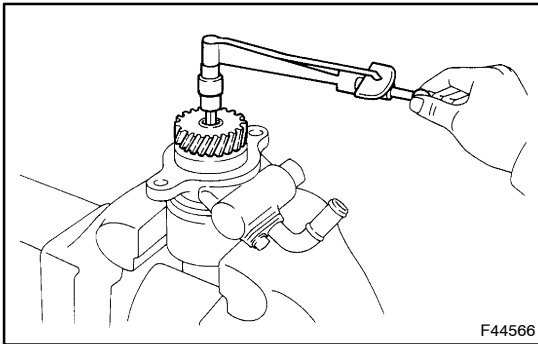
9. BLEED POWER STEERING FLUID

10. INSPECT FOR FLUID LEAKS

VANE PUMP ASSY (15B-FTE)

OVERHAUL

510CJ-01



1. INSPECT VANE PUMP ROTATING TORQUE

- (a) Check that the smoothly vane pump rotates without abnormal noise.
- (b) Using a torque wrench, check the pump rotating torque.

Rotating torque:

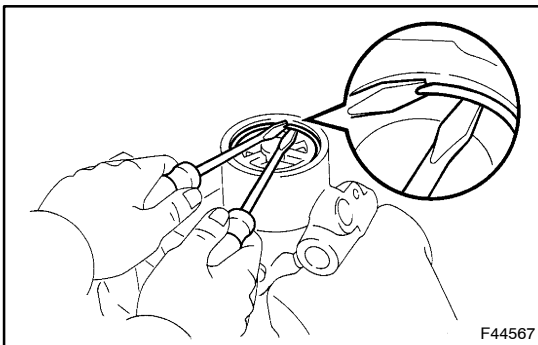
0.27 N·m (2.75 kgf·cm, 2.39 in.·lbf) or less

2. REMOVE POWER STEERING SUCTION PORT UNION

- (a) Remove the bolt and disconnect the suction port union.
- (b) Remove the O-ring from the suction port union.

3. REMOVE FLOW CONTROL VALVE

- (a) Remove the control valve orifice, flow control valve and spring.
- (b) Remove the O-ring from the control valve orifice.

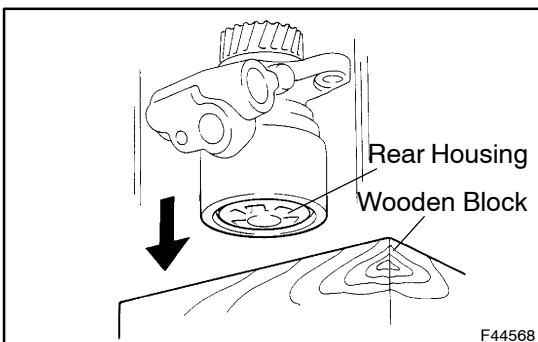


4. REMOVE VANE PUMP HOUSING REAR

- (a) Using 2 screwdrivers, remove the snap ring.

NOTICE:

Take care not to damage the housing.



- (b) Gently tap the PS pump assy on a wood block and remove the rear housing.
- (c) Remove the O-ring from the housing.

5. REMOVE VANE PUMP CAM RING

6. REMOVE VANE PUMP ROTOR

7. REMOVE VANE PLATES

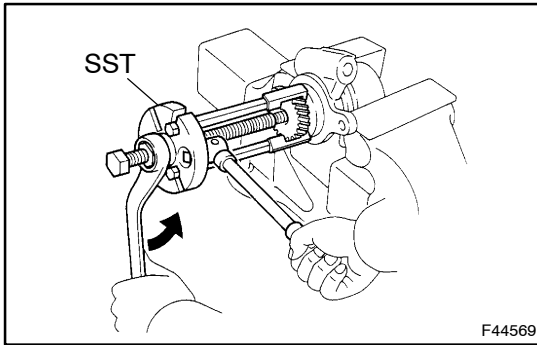
8. REMOVE STRAIGHT PIN

9. REMOVE SIDE PLATE AND WAVE WASHER

- (a) Remove the 2 wave washers.
- (b) Remove the 2 O-rings from the side plate.

NOTICE:

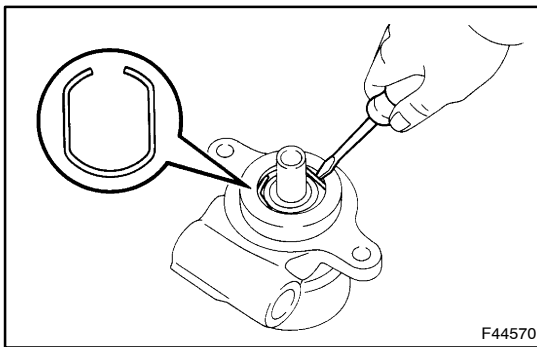
Be careful not to scratch the side plate.

**10. REMOVE VANE PUMP GEAR**

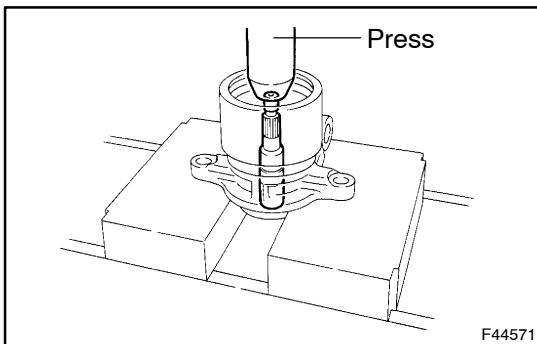
- (a) Using SST, pull out the gear.
SST 09950-30012 (09951-03010, 09953-03010, 09954-03010, 09955-03020)

NOTICE:

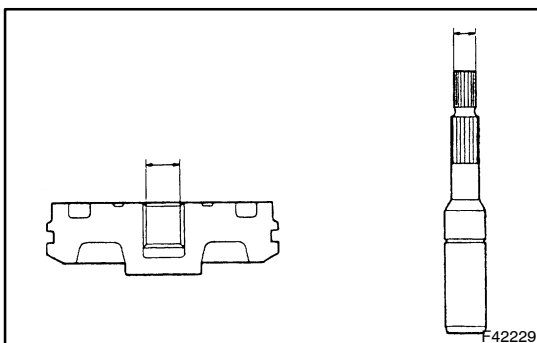
Be careful not to damage the gear.

**11. REMOVE VANE PUMP SHAFT WITH BEARING**

- (a) Using a screwdriver, remove the snap ring.



- (b) Using a press, out the shaft together with the bearing.

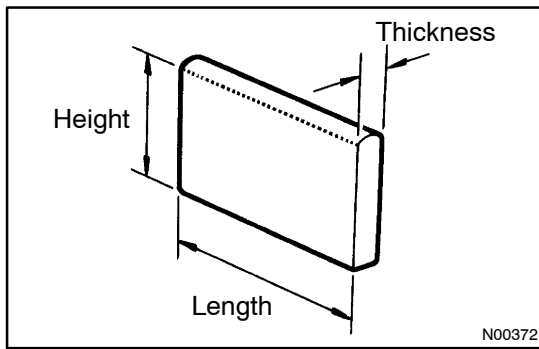
**12. INSPECT OIL CLEARANCE**

- (a) Using a micrometer and caliper gauge, measure the oil clearance.

Oil Clearance:

Standard	0.020 - 0.087 mm (0.00079 - 0.00343 in.)
Maximum	0.087 mm (0.00343 in.)

If the result is greater than the maximum, replace the rear housing and vane pump shaft.

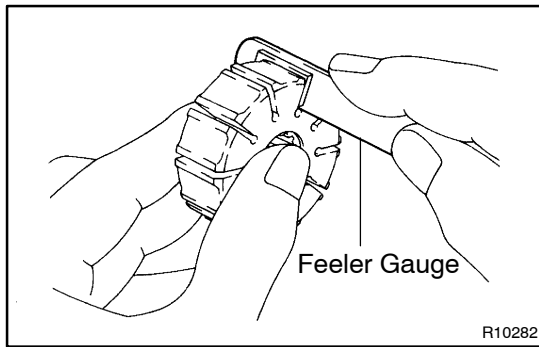
**13. INSPECT VANE PUMP ROTOR AND VANE PLATES**

- (a) Using a micrometer, measure the dimensions of the plates.

Minimum dimension:

Height	8.6 mm (0.339 in.)
Thickness	1.397 mm (0.0550 in.)
Length	14.991 mm (0.5902 in.)

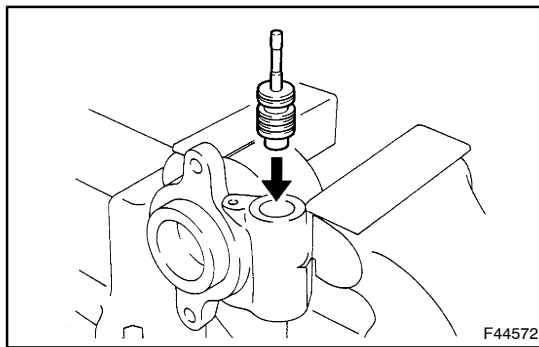
If the result is not as specified, replace the rotor and vane plates together with the cam ring.



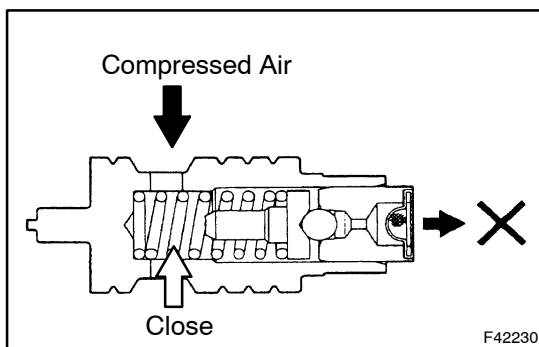
- (b) Using a feeler gauge, measure the clearance between the rotor groove and plate.

Maximum clearance: 0.03 mm (0.0012 in.)

If the result is greater than the maximum, replace the rotor and vane plates together with the cam ring.

**14. INSPECT FLOW CONTROL VALVE**

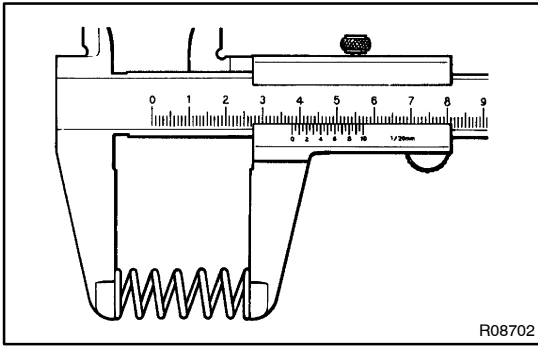
- (a) Coat the valve with power steering fluid and check that it smoothly falls into the valve hole by its own weight.



- (b) Check the valve for leakage. Close one of the side holes and apply compressed air 392 – 490 kPa (4 – 5 kgf/cm², 57 – 71 psi) from another side hole, and confirm that no air comes out from the end hole.

15. INSPECT VANE PUMP CAM RING

- (a) Check that the bearing is not rough or worn. If necessary, replace the bearing.

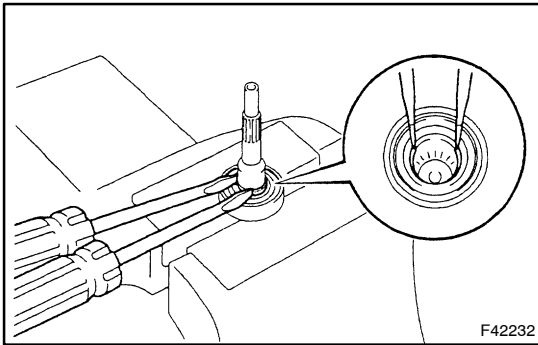


16. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

- (a) Using calipers, measure the free length of the spring.

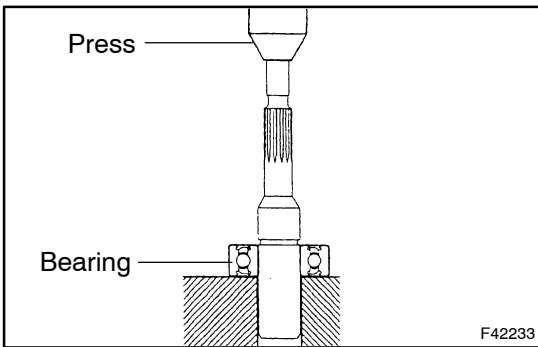
Minimum free length: 33.4 mm (1.315 in.)

If the result is less than the minimum, replace the spring.



17. REPLACE VANE PUMP SHAFT BEARING

- (a) Using 2 screwdrivers, remove the snap ring from the vane pump shaft.

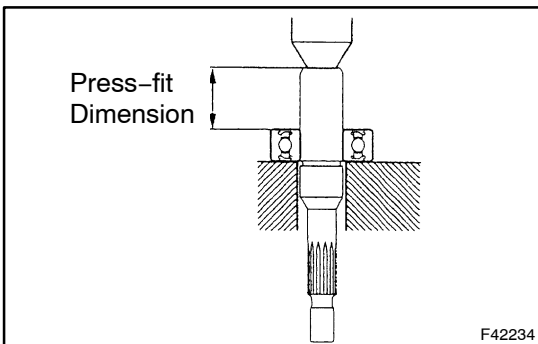


- (b) Using a press, press out the bearing.

NOTICE:

Be careful not to damage the shaft.

- (c) Coat a new bearing with power steering fluid.

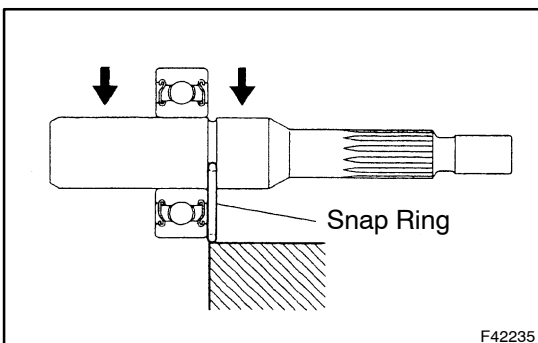


- (d) Using a press, press-fit the bearing with the black side of the oil seal onto the shaft until the specified press-fit dimension is achieved.

Press-fit dimension: 21.4 – 21.7 mm (0.84. – 0.854 in.)

NOTICE:

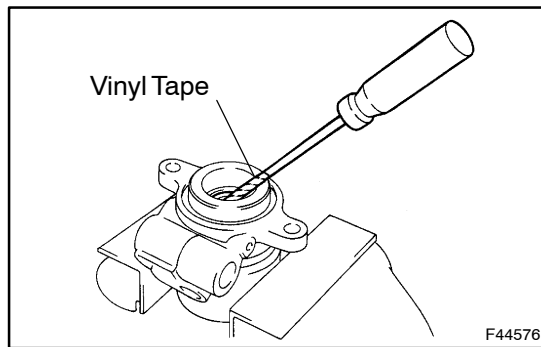
- **Be careful not to damage the shaft.**
- **Apply a work bench to the inner race of the bearing.**



- (e) Install a new snap ring to the shaft.

NOTICE:

Be careful not to damage the shaft.

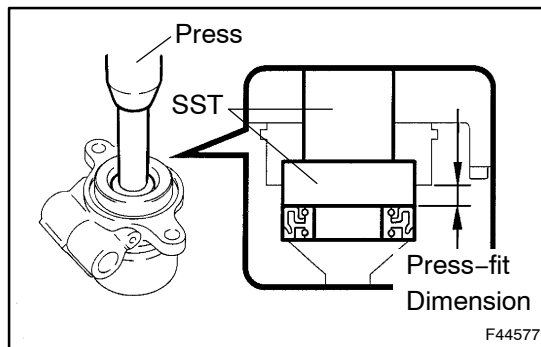
**18. REPLACE VANE PUMP HOUSING OIL SEAL**

- (a) Using a screwdriver with vinyl tape wound around its tip, remove the oil seal from the front housing.

NOTICE:

Be careful not to damage the front housing.

- (b) Coat a new oil seal lip with power steering fluid.



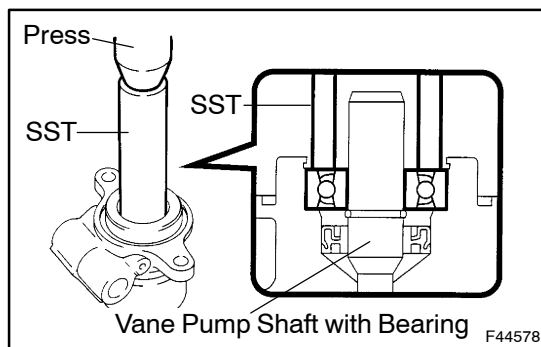
- (c) Using SST, press-fit in the oil seal, as shown in the illustration.

SST 09950-60010 (09951-00300), 09950-70010 (09951-07100)

Press-fit dimension: 3.6 - 3.9 mm (0.142 - 0.154 in.)

NOTICE:

Make sure to install the oil seal so that it faces to the correct direction.

**19. INSTALL VANE PUMP SHAFT WITH BEARING**

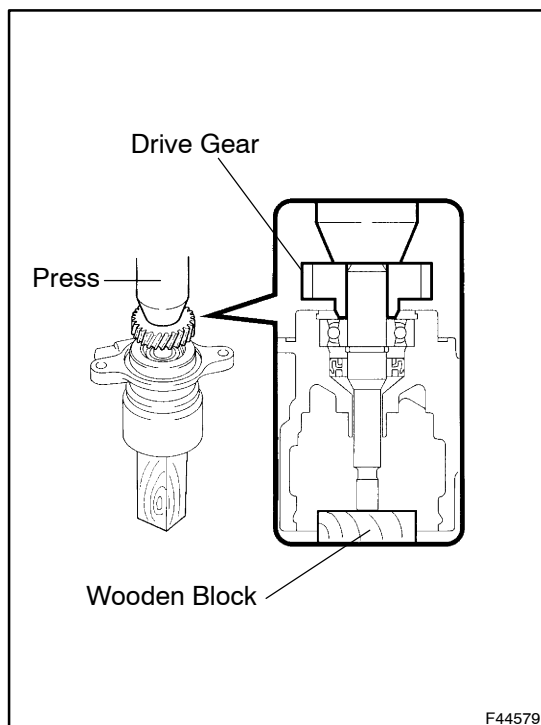
- (a) Using SST and a press, press in the shaft with the bearing.

SST 09612-22011

NOTICE:

Be careful not to damage the oil seal lip.

- (b) Install a new snap ring.

**20. INSTALL VANE PUMP GEAR**

- (a) Supporting the vane pump shaft end with a wood block, press in the drive gear to the shaft, as shown in the illustration.

NOTICE:

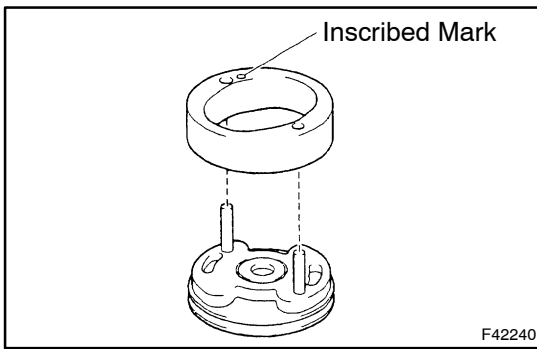
Press in the drive gear until its top surface becomes on a level with the top of the pump shaft.

21. INSTALL SIDE PLATE AND WAVE WASHER

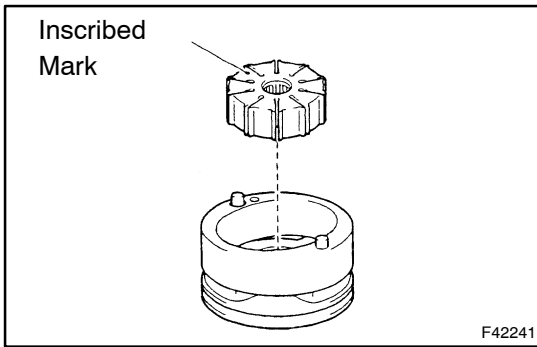
- (a) Coat 2 new O-rings with power steering fluid and install them to the side plate.
- (b) Install 2 new wave washers.

22. INSTALL STRAIGHT PIN

- (a) Install 2 new straight pins to the rear housing.

**23. INSTALL VANE PUMP CAM RING**

- (a) Install the cam ring with the inscribed marks facing upward.

**24. INSTALL VANE PUMP ROTOR**

- (a) Install the vane pump rotor with the inscribed marks facing upward.

25. INSTALL VANE PLATES**26. INSTALL VANE PUMP HOUSING REAR**

- (a) Coat a new O-ring with power steering fluid and install it to the rear housing.
 (b) Install a new snap ring.

27. INSTALL FLOW CONTROL VALVE

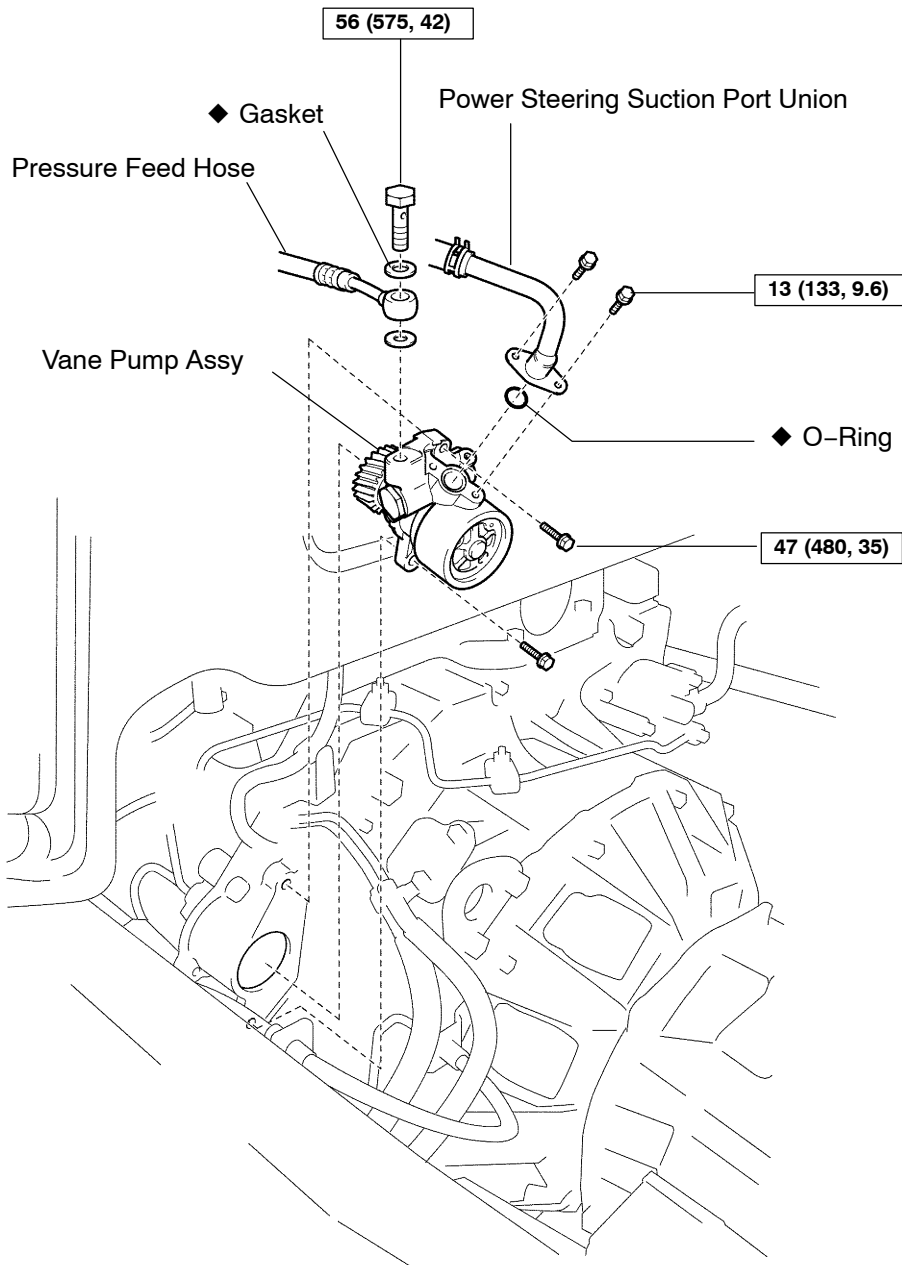
- (a) Install the spring.
 (b) Install the flow control valve so that it faces to the correct direction.
 (c) Coat a new O-ring with power steering fluid and install it to the pressure port union.
 (d) Install the flow control valve orifice.

Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

28. MEASURE PS VANE PUMP ROTATION TORQUE

VANE PUMP ASSY (S05C-B, S05C-TA, S05C-TB) COMPONENTS

510CN-01

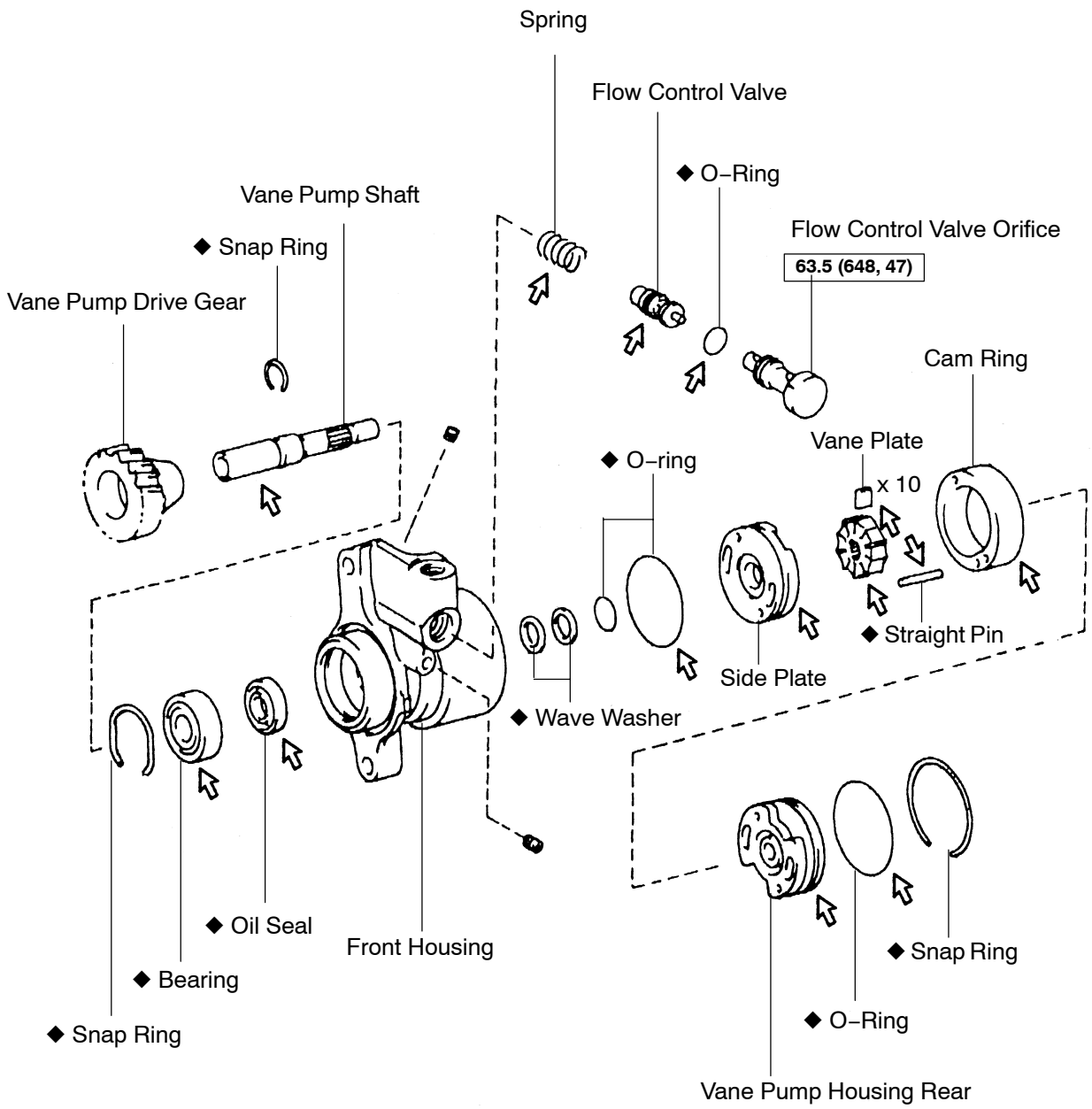


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

P

C93812



N·m (kgf·cm, ft·lbf) : Specified torque

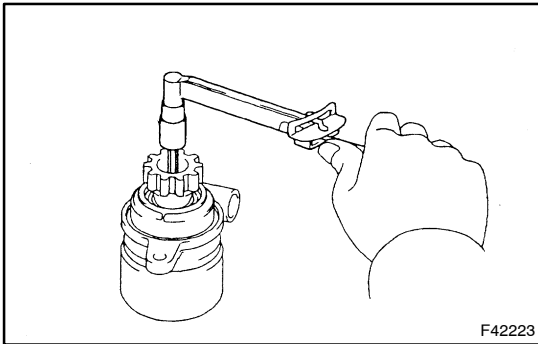
◆ Non-reusable part

↔ Power steering fluid

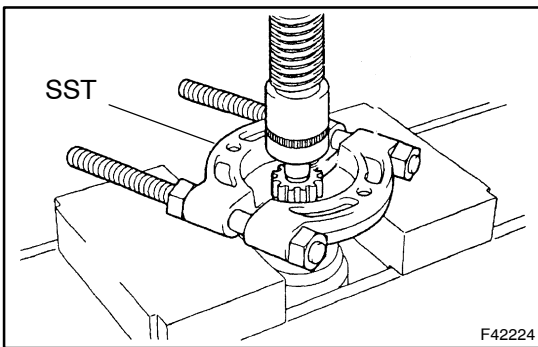
REPLACEMENT

1. **DRAIN POWER STEERING FLUID**
2. **DISCONNECT POWER STEERING SUCTION PORT UNION**
 - (a) Remove the 2 bolts and disconnect the suction port union.
 - (b) Remove the O-ring from the suction port union.
3. **DISCONNECT PRESSURE FEED HOSE**
 - (a) Remove the union bolt and 2 gaskets.
 - (b) Disconnect the pressure feed hose.
4. **REMOVE VANE PUMP ASSY**
 - (a) Remove the 2 bolts and vane pump assy.
 - (b) Remove the O-ring from the vane pump assy.
5. **INSTALL VANE PUMP ASSY**
 - (a) Coat a new O-ring with power steering fluid and install to the vane pump assy.
 - (b) Install the vane pump assy with the 2 bolts.
Torque:47 N·m (480 kgf·cm, 35 ft·lbf)
6. **INSTALL PRESSURE FEED HOSE**
 - (a) Install the 2 new gaskets and hose.
 - (b) Install the union bolt.
Torque:56 N·m (575 kgf·cm, 42 ft·lbf)
7. **INSTALL POWER STEERING SUCTION PORT UNION**
 - (a) Coat a new O-ring with power steering fluid and install it to suction port union.
 - (b) Install the suction port union with the bolt to the vane pump assy.
Torque:13 N·m (133 kgf·cm, 9.6 ft·lbf)
8. **ADD POWER STEERING FLUID**
9. **BLEED POWER STEERING FLUID**
10. **INSPECT FOR FLUID LEAKS**

OVERHAUL



- 1. MEASURE PS VANE PUMP ROTATION TORQUE**
 - (a) Check that the pump rotates smoothly without abnormal noise.
 - (b) Using a torque wrench and a 8 mm hexagon wrench, check the pump rotating torque.
Rotating torque:
0.27 N·m (2.75 kgf·cm, 2.39 in.·lbf) or less



- 2. REMOVE VANE PUMP GEAR**
 - (a) Using SST, a 10 mm deep socket wrench and a press, press out the vane pump gear.
SST 09950-0020

3. REMOVE FLOW CONTROL VALVE

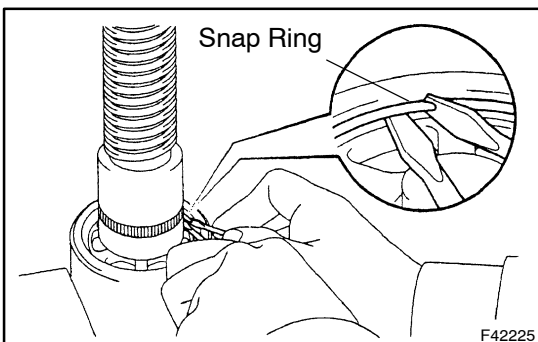
- (a) Remove the control valve orifice, flow control valve and spring.
- (b) Remove the O-ring from the control valve orifice.

4. REMOVE VANE PUMP HOUSING REAR

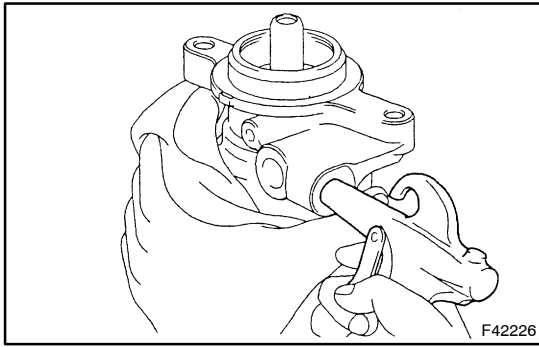
- (a) Using a press, lightly push in the rear housing.

NOTICE:

The push-in amount should be washer, however it should not be more than that.



- (b) Using 2 screwdrivers, pry out the snap ring.
NOTICE:
Take care not to damage the housing.
- (c) Temporarily install the flow control valve orifice.

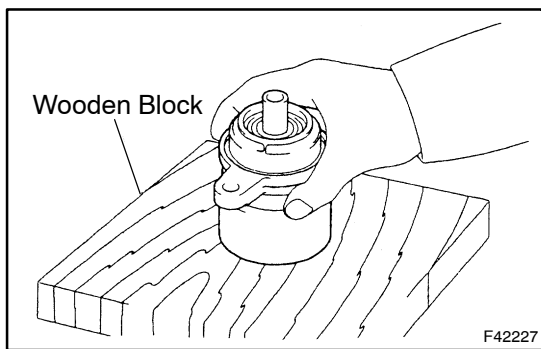


- (d) Close the opening of the suction port union with your finger, use an air gun to apply air pressure from the opening of the pressure feed hose, and remove the rear housing.

NOTICE:

Cover the pump assembly with rags beforehand to prevent oil from flowing out.

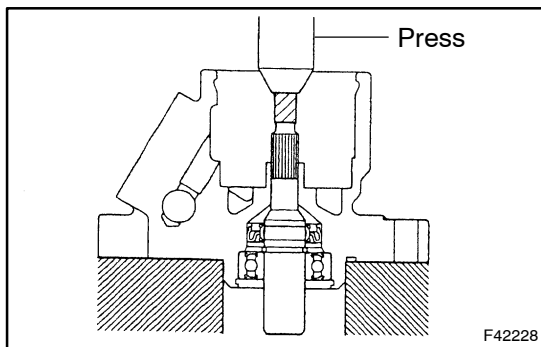
- (e) Remove the O-ring from the housing.

5. REMOVE VANE PUMP CAM RING**6. REMOVE VANE PUMP ROTOR****7. REMOVE VANE PLATES****8. REMOVE STRAIGHT PIN****9. REMOVE SIDE PLATE AND WAVE WASHER**

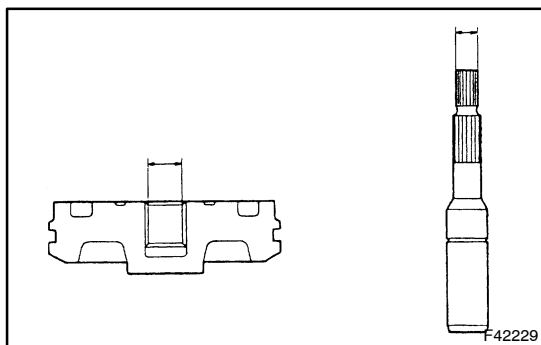
- (a) Gently tap the vane pump assy on a wooden block and remove the side plate.
 (b) Remove the 2 O-rings from the side plate.

10. REMOVE VANE PUMP SHAFT WITH BEARING

- (a) Using a screwdriver, remove the snap ring.



- (b) Using a press, press out the shaft together with the bearing.

**11. INSPECT OIL CLEARANCE**

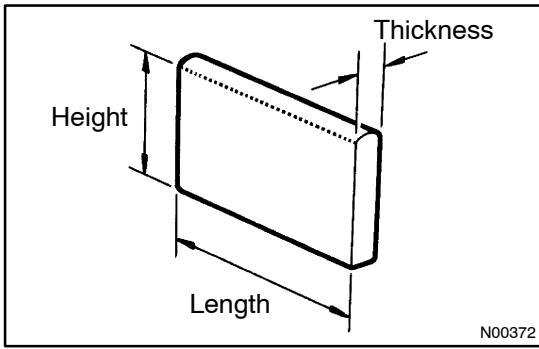
- (a) Using a micrometer and caliper gauge, measure the oil clearance.

Standard clearance:

0.020 - 0.087 mm (0.00079 - 0.00343 in.)

Maximum clearance: 0.087 mm (0.00343 in.)

If the clearance is greater than the maximum, replace the rear housing and vane pump shaft.



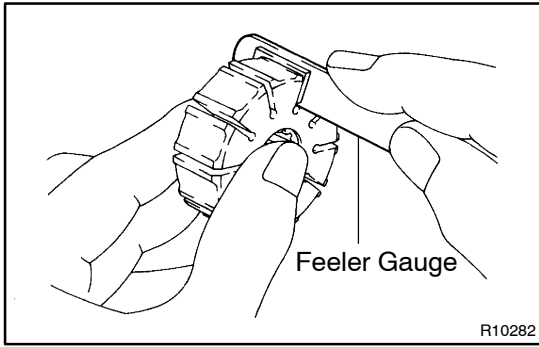
12. INSPECT VANE PUMP ROTOR AND VANE PLATES

(a) Using a micrometer, measure the dimensions.

Minimum dimension:

Height	8.6 mm (0.339 in.)
Thickness	1.397 mm (0.0550 in.)
Length	14.991 mm (0.5902 in.)

If the result is less than the minimum, replace the rotor and vane plates together with the cam ring.



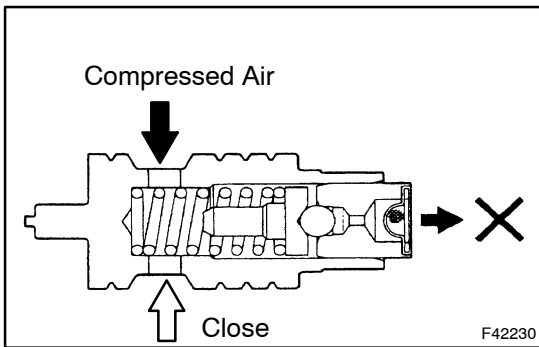
(b) Using a feeler gauge, measure the clearance between the rotor groove and plate.

Maximum clearance: 0.03 mm (0.0012 in.)

If the clearance is greater than the maximum, replace the rotor and vane plates together with the cam ring.

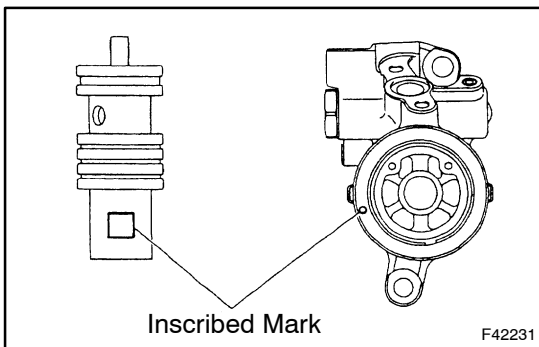
13. INSPECT FLOW CONTROL VALVE

(a) Coat the valve with power steering fluid and check that it smoothly falls into the valve hole by its own weight.



(b) Check the valve for leakage.

- (1) Close one of the side holes and apply compressed air of 392 – 490 kPa (4 – 5 kgf/cm², 57 – 71 psi) from another side hole, and confirm that no air comes out from the end hole.



If necessary, replace the flow control valve with the one having the same letter as inscribed on the rear housing.

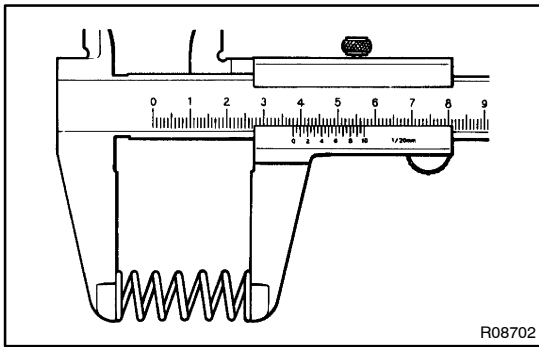
Inscribed mark:

Mark	Part No.
A	40430-37060
B	40420-37060
C	40410-37060
D	44330-37060

14. INSPECT VANE PUMP CAM RING

(a) Check that the bearing is not rough or worn.

If necessary, replace the bearing.

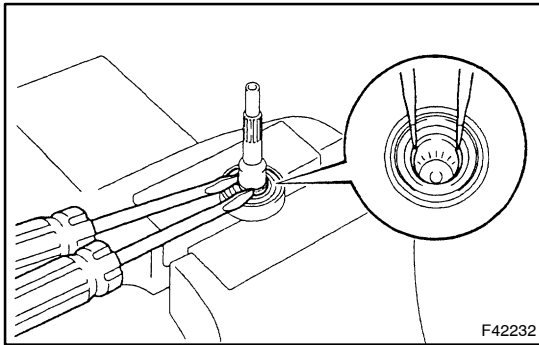


15. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

- (a) Using vernier calipers, measure the free length of the spring.

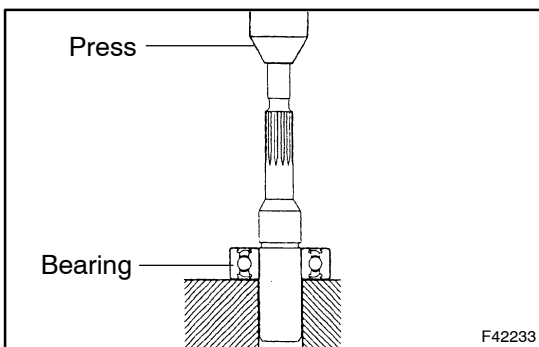
Minimum free length: 33.4 mm (1.315 in.)

If the length is less than the minimum, replace the spring.



16. REPLACE VANE PUMP SHAFT BEARING

- (a) Using 2 screwdrivers, pry out the snap ring from the vane pump shaft.

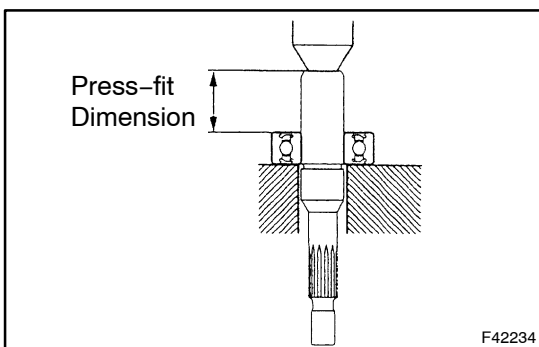


- (b) Using a press, press out the bearing.

NOTICE:

Be careful not to damage the shaft.

- (c) Coat a new bearing with power steering fluid.

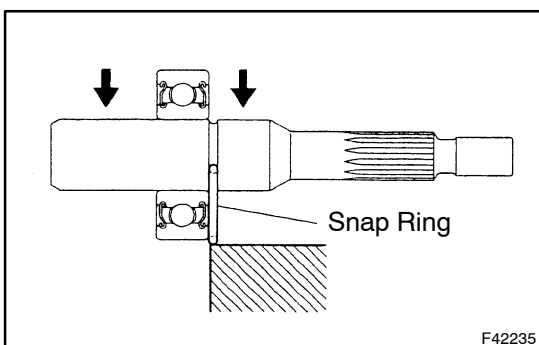


- (d) Using a press, press-fit the bearing with the black side of the oil seal onto the shaft until the specified press-fit dimension is achieved.

Press-fit dimension: 21.4 - 21.7 mm (0.843 - 0.854 in.)

NOTICE:

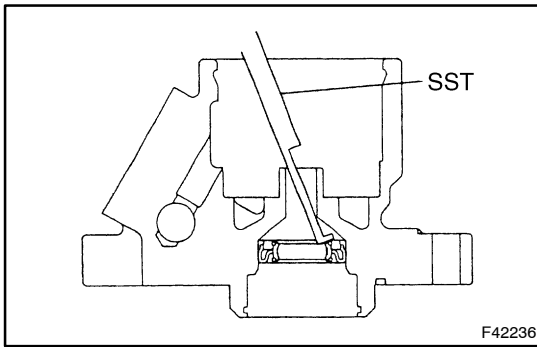
Be careful not to damage the shaft.



- (e) Install a new snap ring to the shaft.

NOTICE:

Be careful not to damage the shaft.



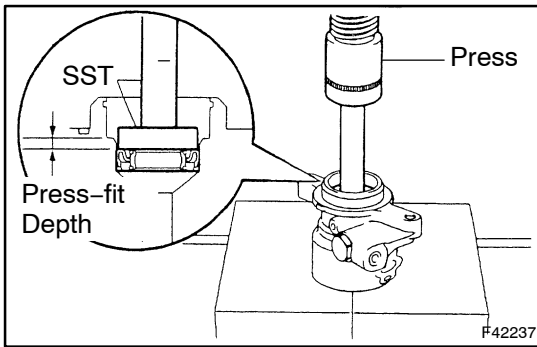
17. REPLACE VANE PUMP HOUSING OIL SEAL

- (a) Using SST and a hammer, tap out the oil seal.
SST 09631-10030

NOTICE:

Be careful not to damage the vane pump housing.

- (b) Coat a new oil seal lip with power steering fluid.



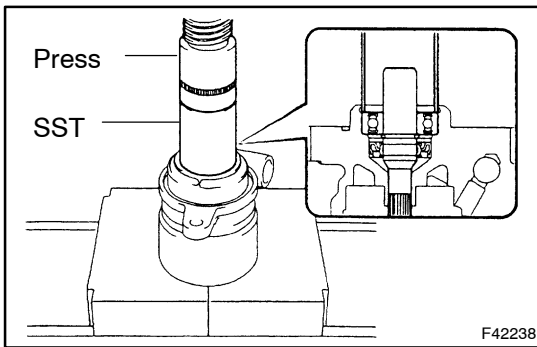
- (c) Using SST and a press, press in a new oil seal to the specified press-fit depth.

SST 09950-60010 (09951-00300), 09950-70010
(09951-07100, 09951-00320)

Press-fit depth: 3.6 - 3.9 mm (0.142 - 0.154 in.)

NOTICE:

Make sure that the oil seal faces to the correct direction.



18. INSTALL VANE PUMP SHAFT WITH BEARING

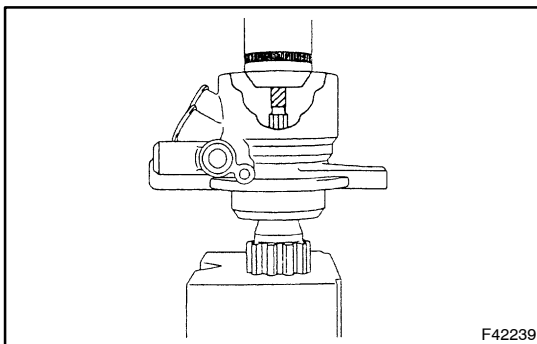
- (a) Using SST and a press, press in the shaft with the bearing.

SST 09632-36010

NOTICE:

Be careful not to damage the oil seal lip.

- (b) Install a new snap ring.



19. INSTALL VANE PUMP GEAR

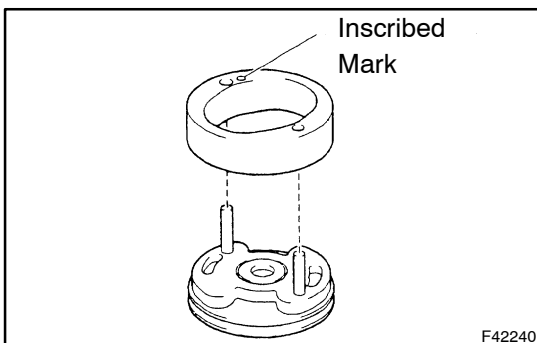
- (a) Using a press, press in the vane pump gear.

NOTICE:

Take care not to incline the shaft.

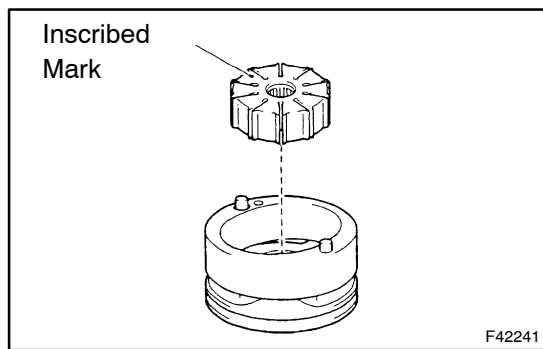
20. INSTALL STRAIGHT PIN

- (a) Install 2 new straight pins to the rear housing.



21. INSTALL VANE PUMP CAM RING

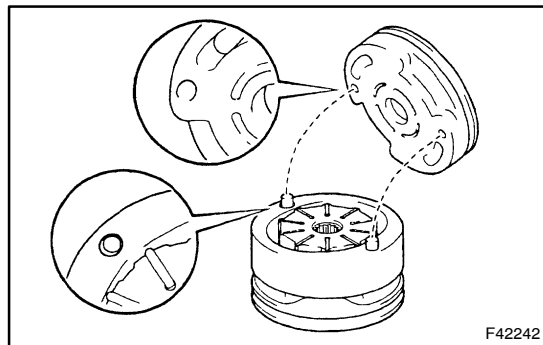
- (a) Install the cam ring with the inscribed marks facing upward.

**22. INSTALL VANE PUMP ROTOR**

- (a) Install the vane pump rotor with the inscribed marks facing upward.

23. INSTALL VANE PLATES

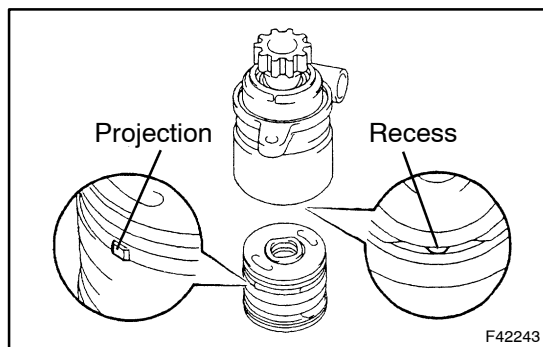
- (a) Apply power steering fluid to the vane plates before installation them.

**24. INSTALL SIDE PLATE AND WAVE WASHER**

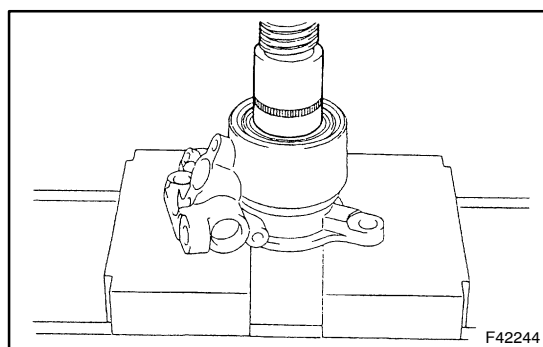
- (a) Coat 2 new O-rings with power steering fluid and install them to the side plate.
 (b) Align the holes of the side plate and 2 straight pins.
 (c) Place the 2 new wave washers onto the recess of in the side plate.

25. INSTALL VANE PUMP HOUSING REAR

- (a) Coat a new O-ring with power steering fluid and install it to the rear housing.
 (b) Align the projection of the side plate with the recess of the pump housing.



- (c) Using a press, press in the rear housing to the pump housing.

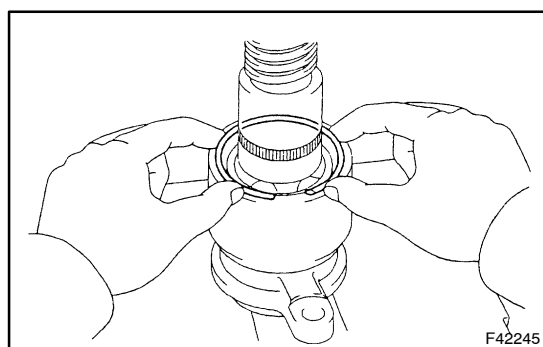


- (d) Using a press, press in the rear housing so that a new snap ring can be installed.

NOTICE:

The push-in amount should be washer, however it should not be more than that.

- (e) Install a new snap ring.



26. INSTALL FLOW CONTROL VALVE

- (a) Install the spring.
- (b) Install the flow control valve so that it faces to the correct direction.
- (c) Coat a new O-ring with power steering fluid and install it to the pressure port union.
- (d) Install the flow control valve orifice.

Torque: 63.5 N·m (648 kgf·cm, 47 ft·lbf)

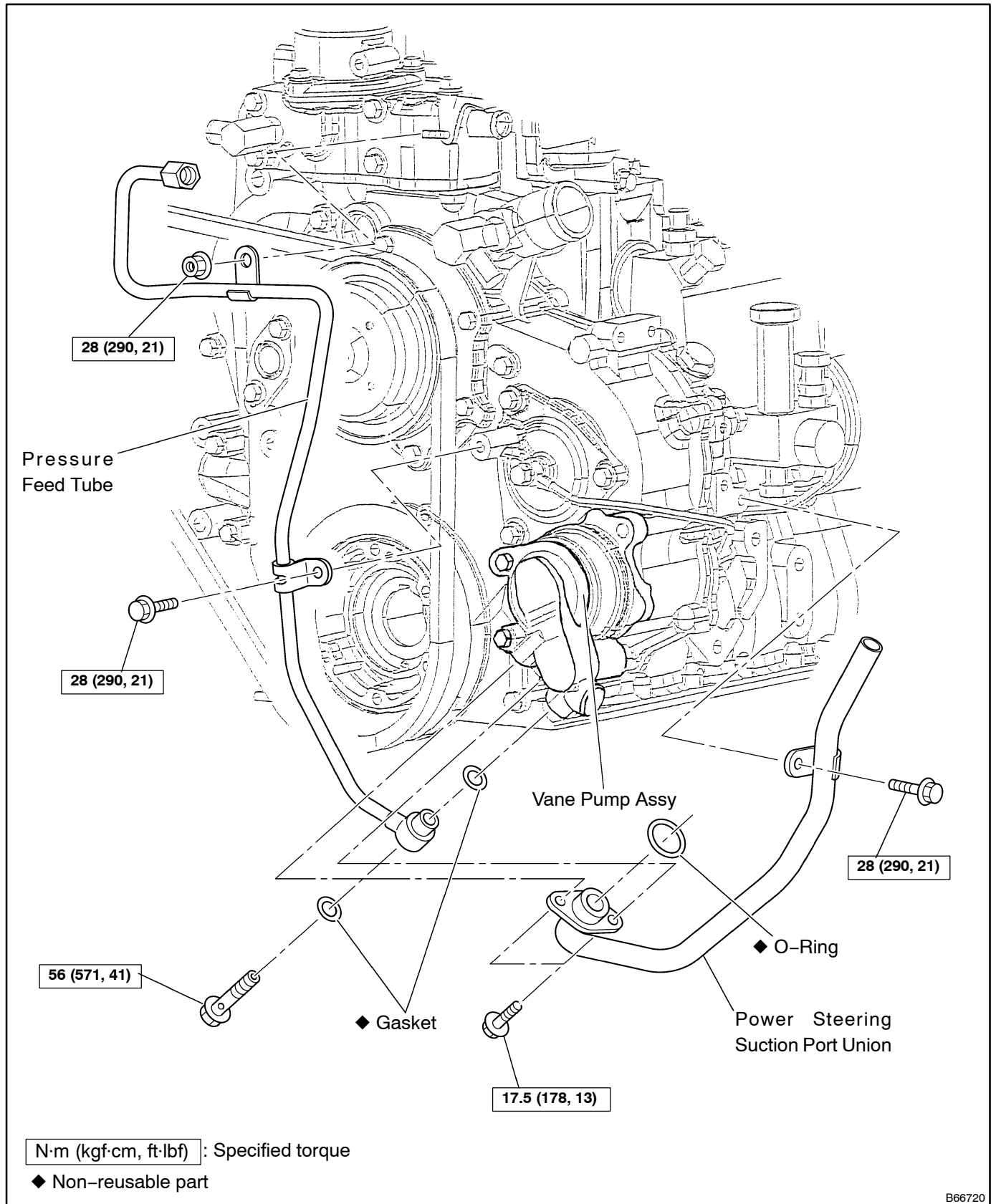
27. MEASURE PS VANE PUMP ROTATION TORQUE (See Step 1.)

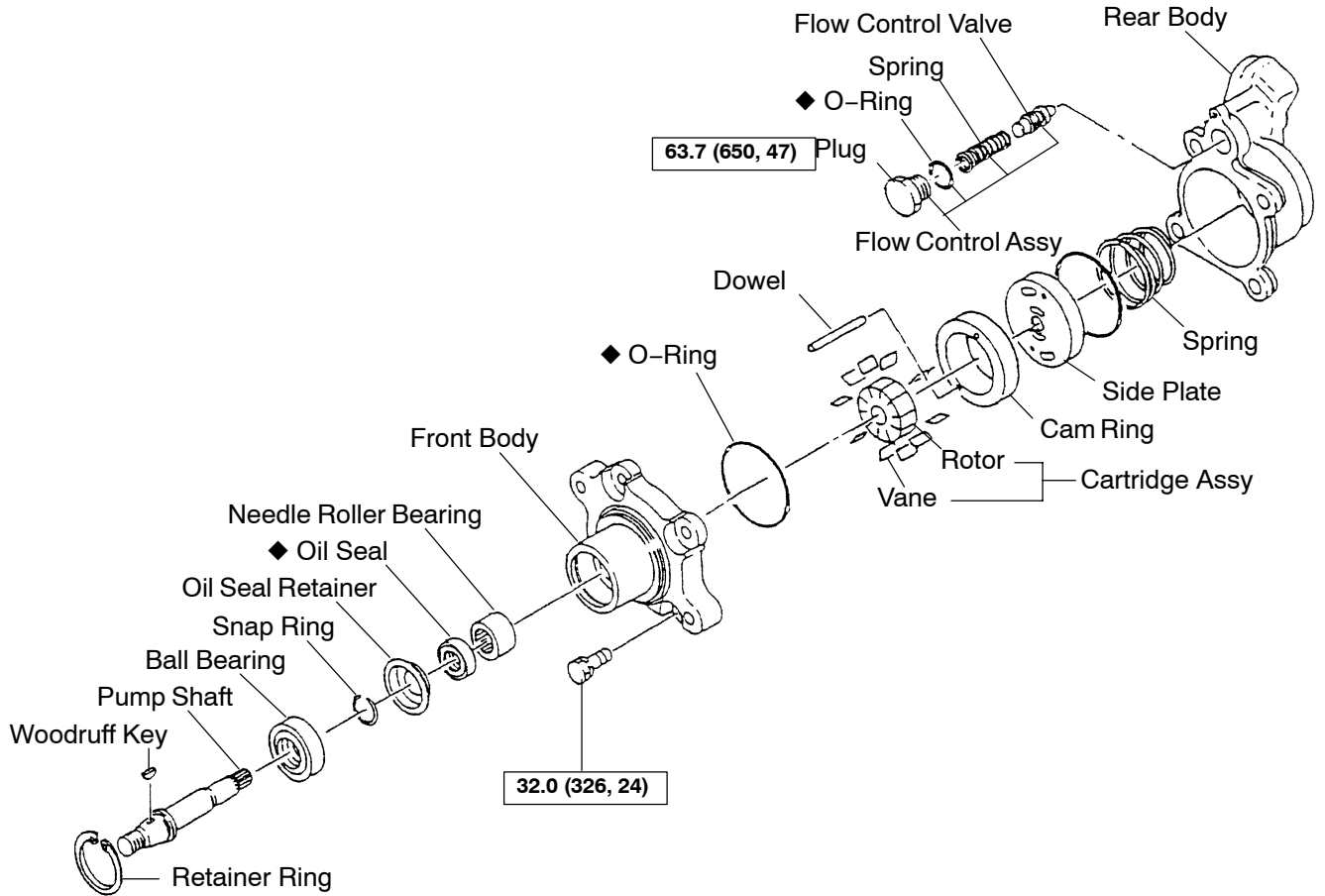
Torque: 0.27 N·m (2.75 kgf·cm, 2.39 in·lbf)

VANE PUMP ASSY (W04D-J)

COMPONENTS

510CQ-01



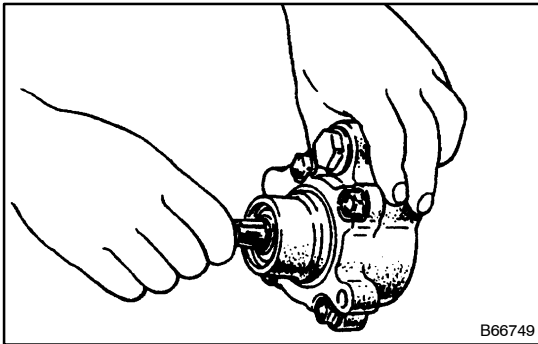


N·m (kgf·cm, ft·lbf) : Specified torque
 ◆ Non-reusable part

REPLACEMENT

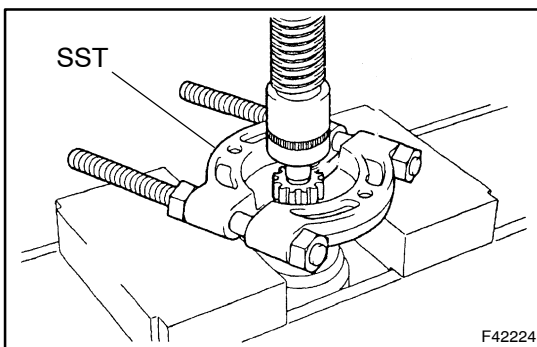
1. **DRAIN POWER STEERING FLUID**
2. **DISCONNECT POWER STEERING SUCTION PORT UNION**
 - (a) Remove the 3 bolts and disconnect the suction port union.
 - (b) Remove the O-ring from the suction port union.
3. **DISCONNECT PRESSURE FEED TUBE**
 - (a) Remove the union bolt and 2 gaskets.
 - (b) Disconnect the pressure feed tube.
4. **REMOVE VANE PUMP ASSY**
 - (a) Remove the 2 bolts and vane pump.
 - (b) Remove the O-ring from the vane pump.
5. **INSTALL VANE PUMP ASSY**
 - (a) Install new O-ring to the vane pump.
 - (b) Install the vane pump with the 2 bolts.
Torque: 32.0 N·m (326 kgf·cm, 24 ft·lbf)
6. **CONNECT POWER STEERING SUCTION PORT UNION**
 - (a) Install the new O-ring to the suction port union.
 - (b) Connect the suction port union with the 3 bolts.
Torque:
17.5 N·m (178 kgf·cm, 13 ft·lbf) for suction port union side
28.0 N·m (290 kgf·cm, 21 ft·lbf) for bracket side
7. **CONNECT PRESSURE FEED TUBE**
 - (a) Connect the pressure feed tube.
 - (b) Connect the feed hose with 2 new gaskets and the union bolt.
Torque: 56.0 N·m (571 kgf·cm, 41 ft·lbf)

OVERHAUL



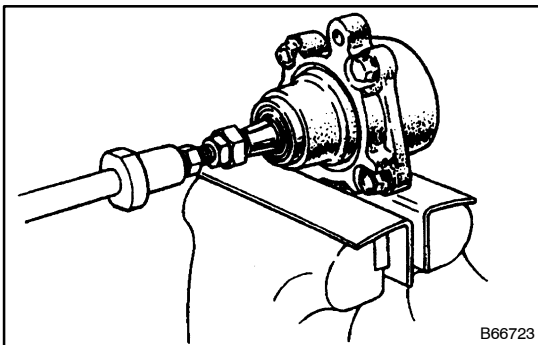
1. INSPECT VANE PUMP ROTATING TORQUE

- (a) Check that the smoothly vane pump rotates without abnormal noise.



2. REMOVE VANE PUMP GEAR

- (a) Using SST, a 10 mm deep socket wrench and a press, press out the drive gear.
SST 09950-0020



3. REMOVE VANE PUMP SHAFT

- (a) Using a snap ring pliers, remove the retainer ring.

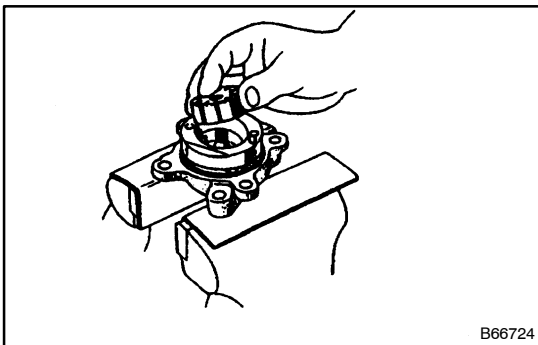
CAUTION:

The retainer ring is made of spring steel and so may pop out from the groove when removing. Wear safety glasses during removal.

- (b) Using a sliding hammer and adapter to remove the pump shaft with bearing.

NOTICE:

Do not tighten the vise too tight when clamping the pump in the vise.

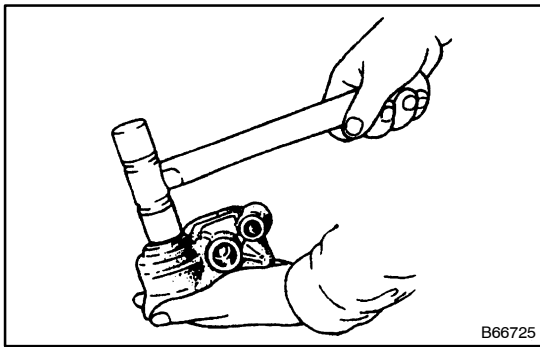


4. REMOVE ROTOR, VANES, CAM RING AND SIDE PLATE

- (a) Remove the front body, rotor and vanes.

NOTICE:

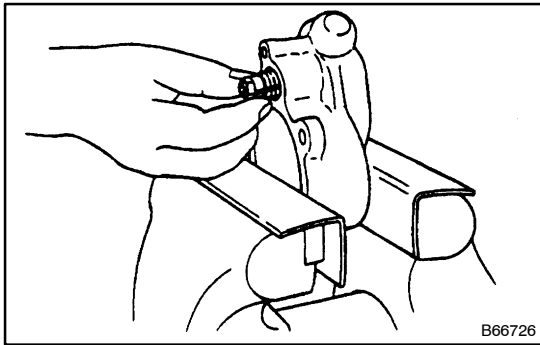
Be careful that the rotor and vanes do not fall out.



- (b) Using a plastic hammer, the rear body and remove the cam ring, side plate and spring.

NOTICE:

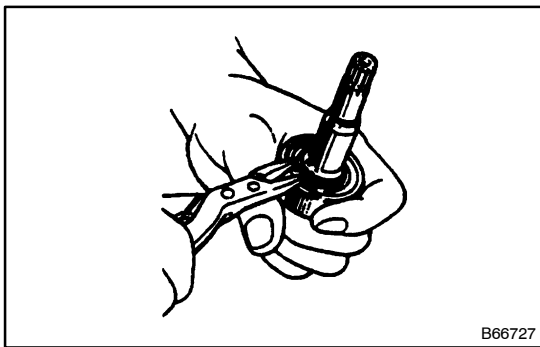
Do not grip the side plate with pliers, because this could damage it.

**5. REMOVE FLOW CONTROL VALVE**

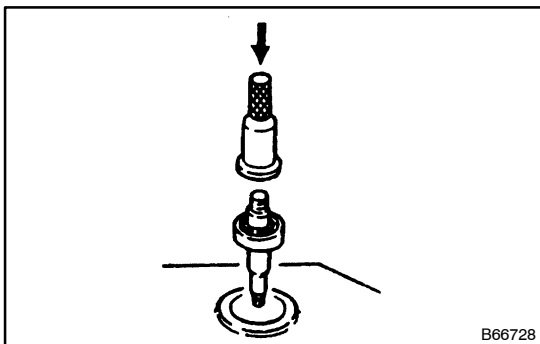
- (a) Remove the plug, spring and flow control valve assy.

NOTICE:

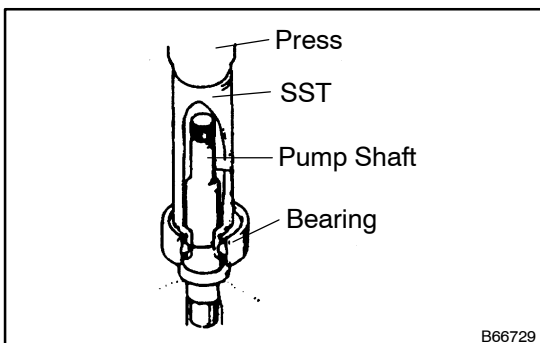
Be careful not to drop, scratch or nick the flow control valve.

**6. REMOVE VANE PUMP SHAFT BEARING**

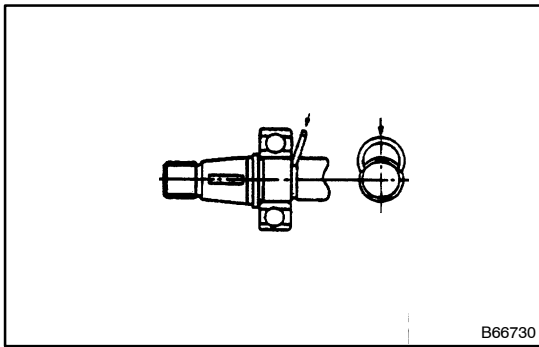
- (a) Using snap ring pliers, remove the snap ring.



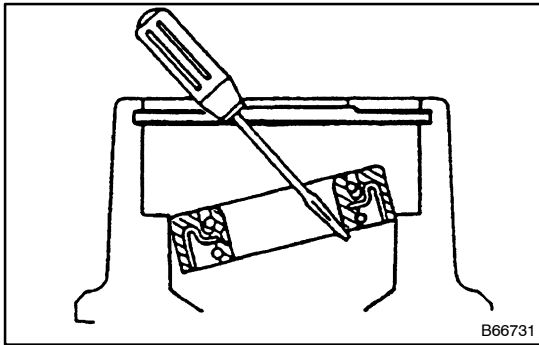
- (b) Using a press and SST, and press out the bearing.
SST 09632-36010 or 09434-1140

**7. INSTALL VANE PUMP SHAFT BEARING**

- (a) Using a press and SST, press in the bearing.
SST 09632-36010 or 09434-1130



- (b) Install the snap ring.



8. REMOVE OIL SEAL AND NEEDLE ROLLER BEARING

- (a) Using a screwdriver, pry out the oil seal.

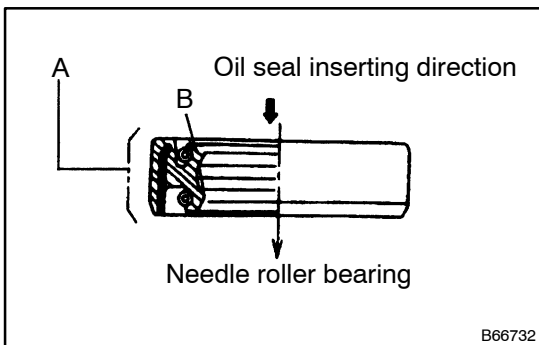
NOTICE:

Do not scrape or damage the inside of the front body.

- (b) Remove the needle roller bearing.

9. INSTALL NEEDLE ROLLER BEARING

- (a) Using a press, press in the needle roller bearing.



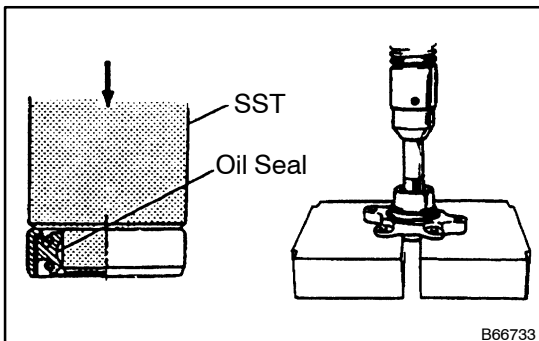
10. INSTALL OIL SEAL

- (a) Oil seal inserting direction.

Insert the oil seal as shown in the illustration.

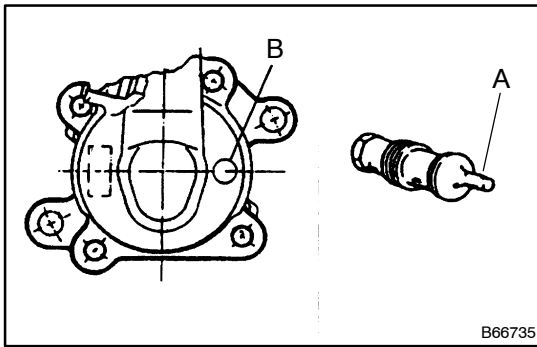
NOTICE:

In order to prevent oil leakage from oil seal due to lip wear, apply lithium base grease to A and B.



- (b) Using SST and a press, press in the oil seal into the front body.

SST 09950-60010, (09951-00320), 09950-70010
(09951-07100) or 09434-1110

**11. INSTALL FLOW CONTROL VALVE**

- (a) Apply fluid to the valve and check to see that it smoothly falls into the valve hole by its own weight.

If the result is not as specified, replace the flow control valve assy.

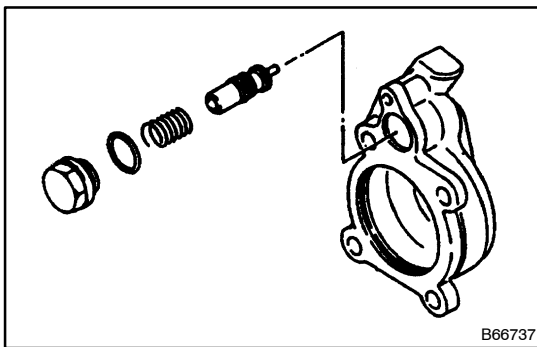
NOTICE:

There are three different valve diameters, therefore be careful that the mark on both valve and the pump body are always matched.

A Valve: Number of lines

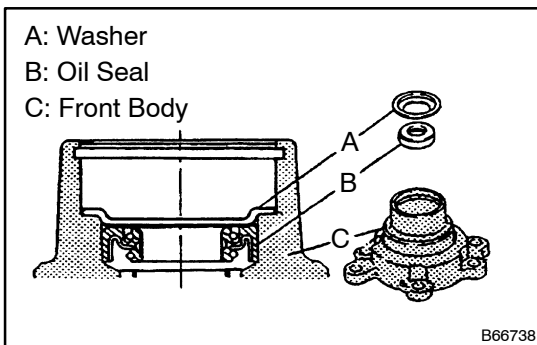
B Body: Numeral

Matchmark	A	II	I	
	B	0	1	2

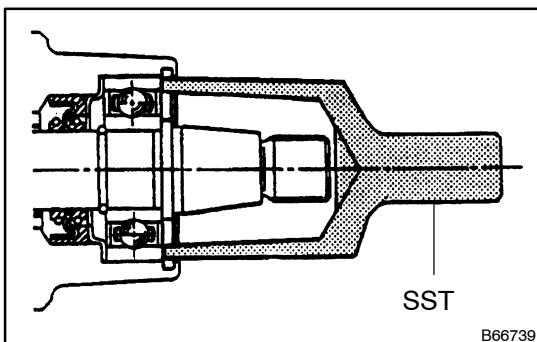


- (b) Install the flow control valve assy and spring, as shown in the illustration, and then tighten the plug.

Torque: 63.7 N·m (650 kgf·cm, 47 ft·lbf)

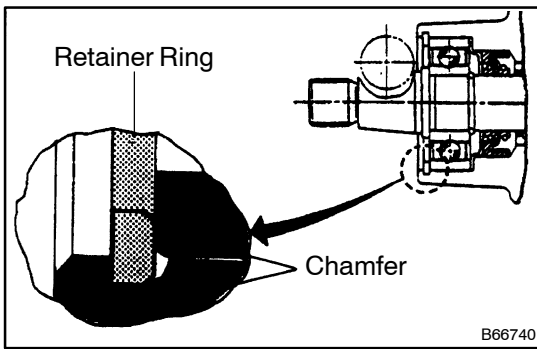
**12. INSTALL PUMP SHAFT INTO THE FRONT BODY**

- (a) Install the washer, as shown in the illustration.



- (b) Using SST, press in the pump shaft with bearing into the front body.

SST 09632-36010 or 09434-1140



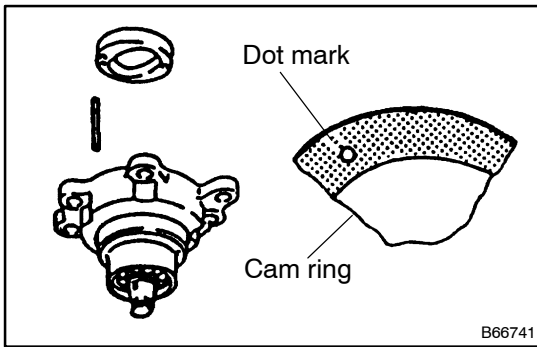
(c) Using a snap ring pliers, install the retainer ring.

NOTICE:

When installing the retainer ring, place the chamfer side face towards the ball bearing, as shown in the illustration.

CAUTION:

The retainer ring is made of spring steel and so may pop out from the groove when installing. Wear safety glasses during installation.



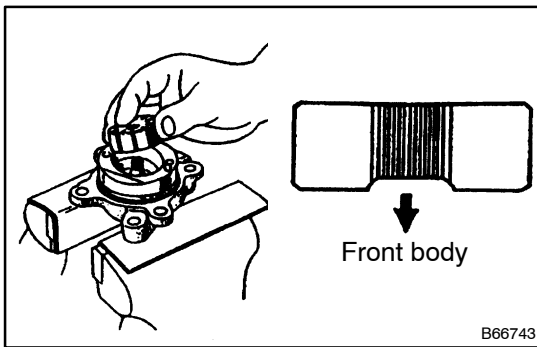
13. INSTALL CAM RING, ROTOR AND VANE.

(a) Install the dowel into the front body.

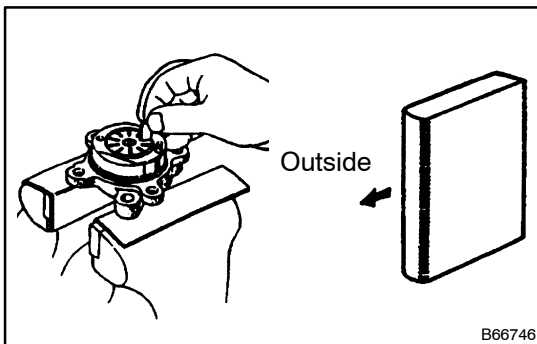
(b) Install the cam ring with the dowel hole aligned with the dowel.

NOTICE:

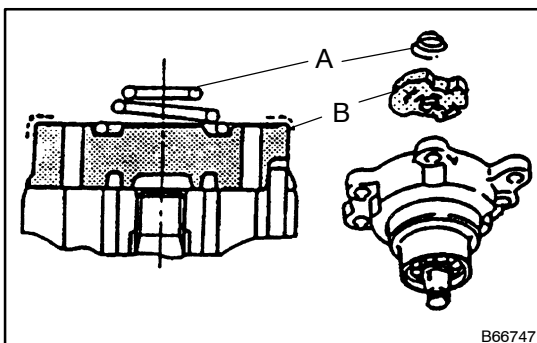
At this time, make sure that the dot mark in the side surface is positioned toward the rear body.



(c) Install the rotor with the cut spline side facing the front body.



(d) Install the vanes with the rounded part facing outward.



14. INSTALL SIDE PLATE AND SPRING

(a) Place the side plate on the cam ring with the dowel hole aligned with the dowel.

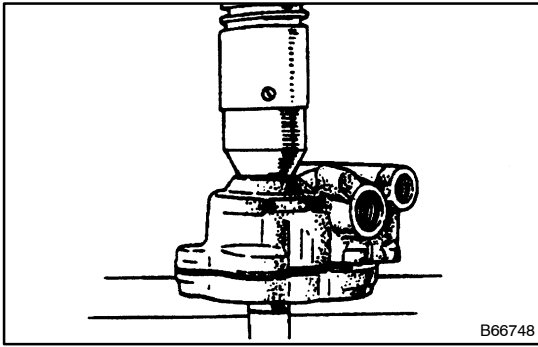
(b) Place the spring on the side plate hole, as shown in the illustration.

A: Spring

B: Side plate

NOTICE:

Apply lithium-base grease to A.

**15. INSTALL VANE PUMP HOUSING REAR**

- (a) Apply lithium-base grease to the O-ring and install the O-ring into the pump housing rear.
- (b) Using a press, press the rear body until it contacts the front body.
- (c) Tighten the bolts to the specified torque.

Torque: 32.0 N·m (326 kgf·cm, 24 ft·lbf)

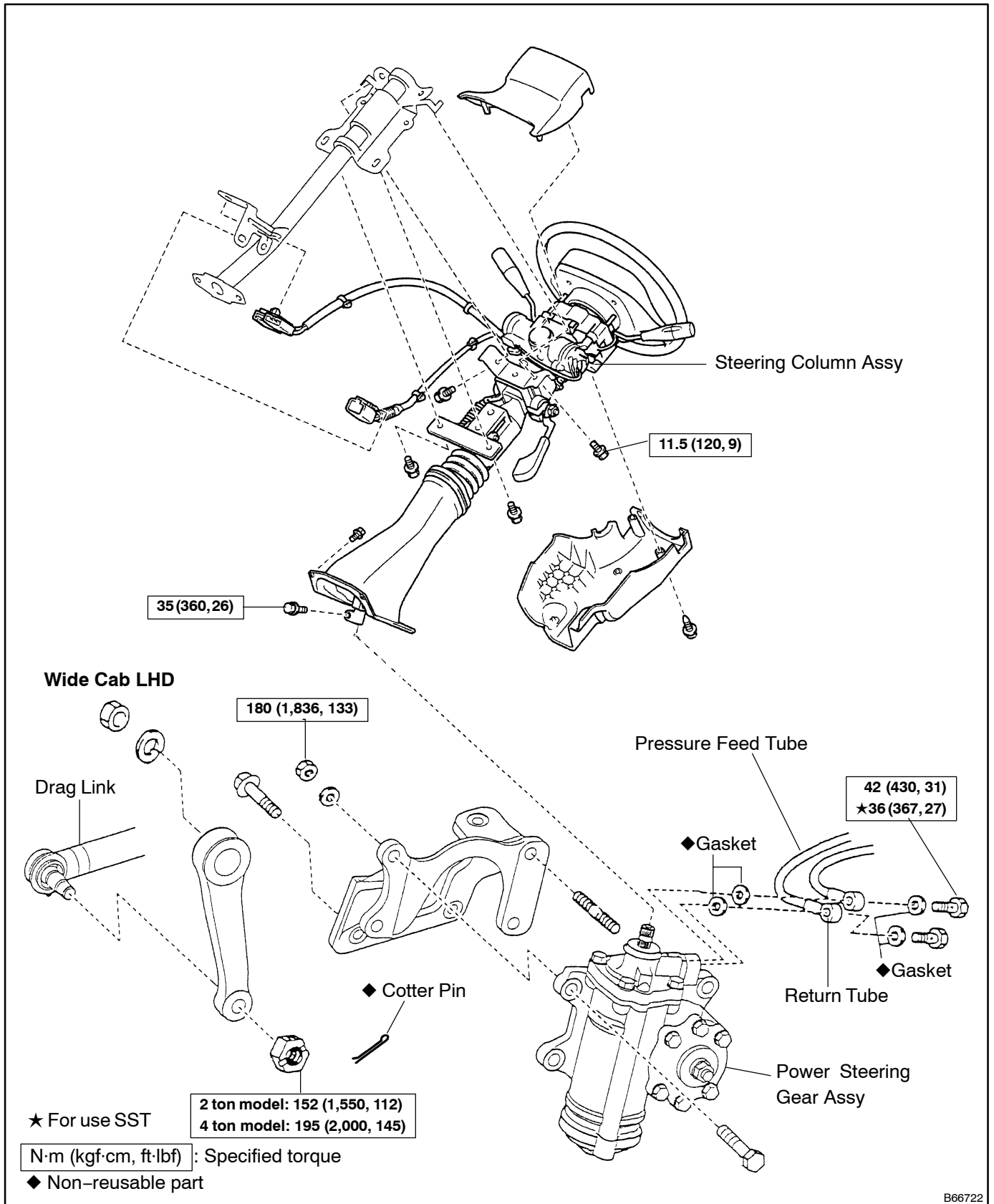
16. INSTALL VANE PUMP GEAR TO THE PUMP SHAFT

- (a) Tighten the lock nut to the specified torque.

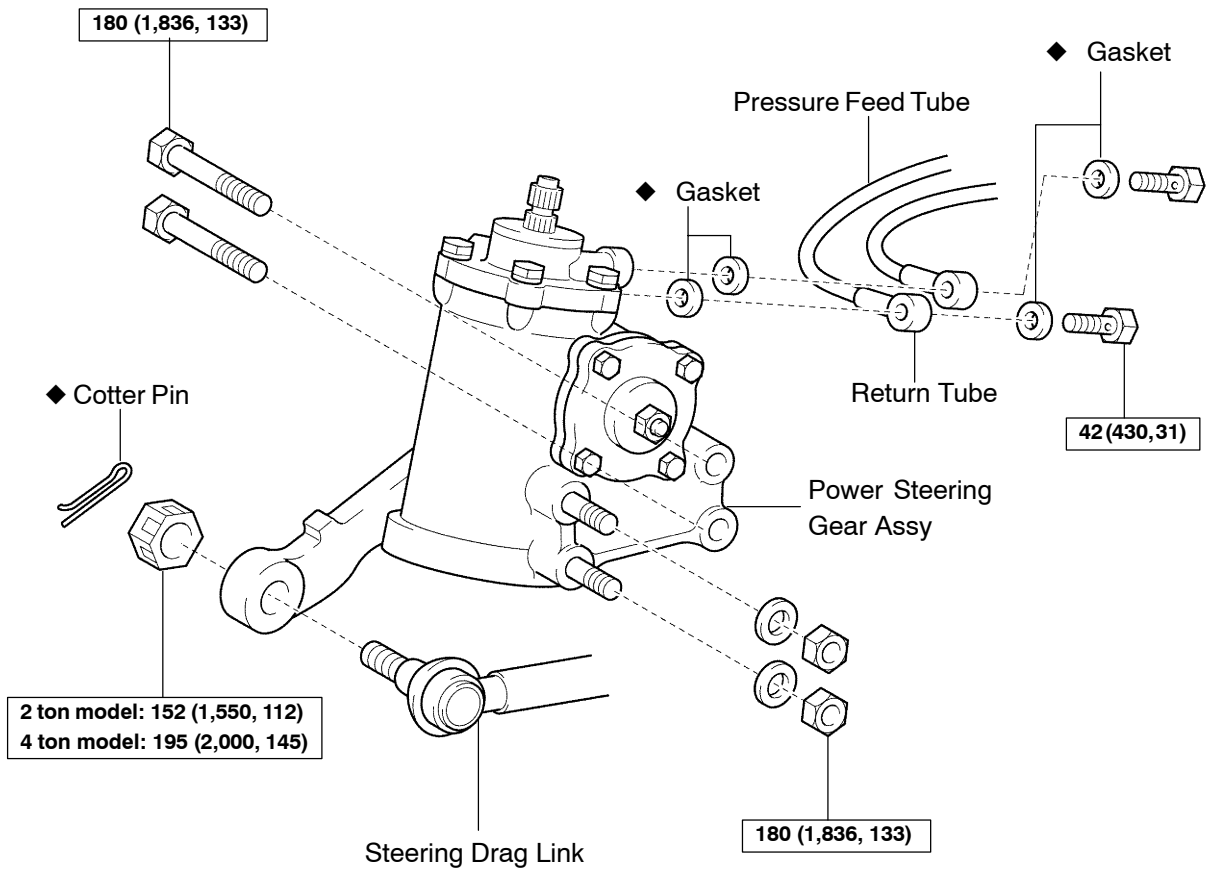
Torque: 73.5 N·m (750 kgf·cm, 54 ft·lbf)

POWER STEERING GEAR ASSY COMPONENTS

510CW-01



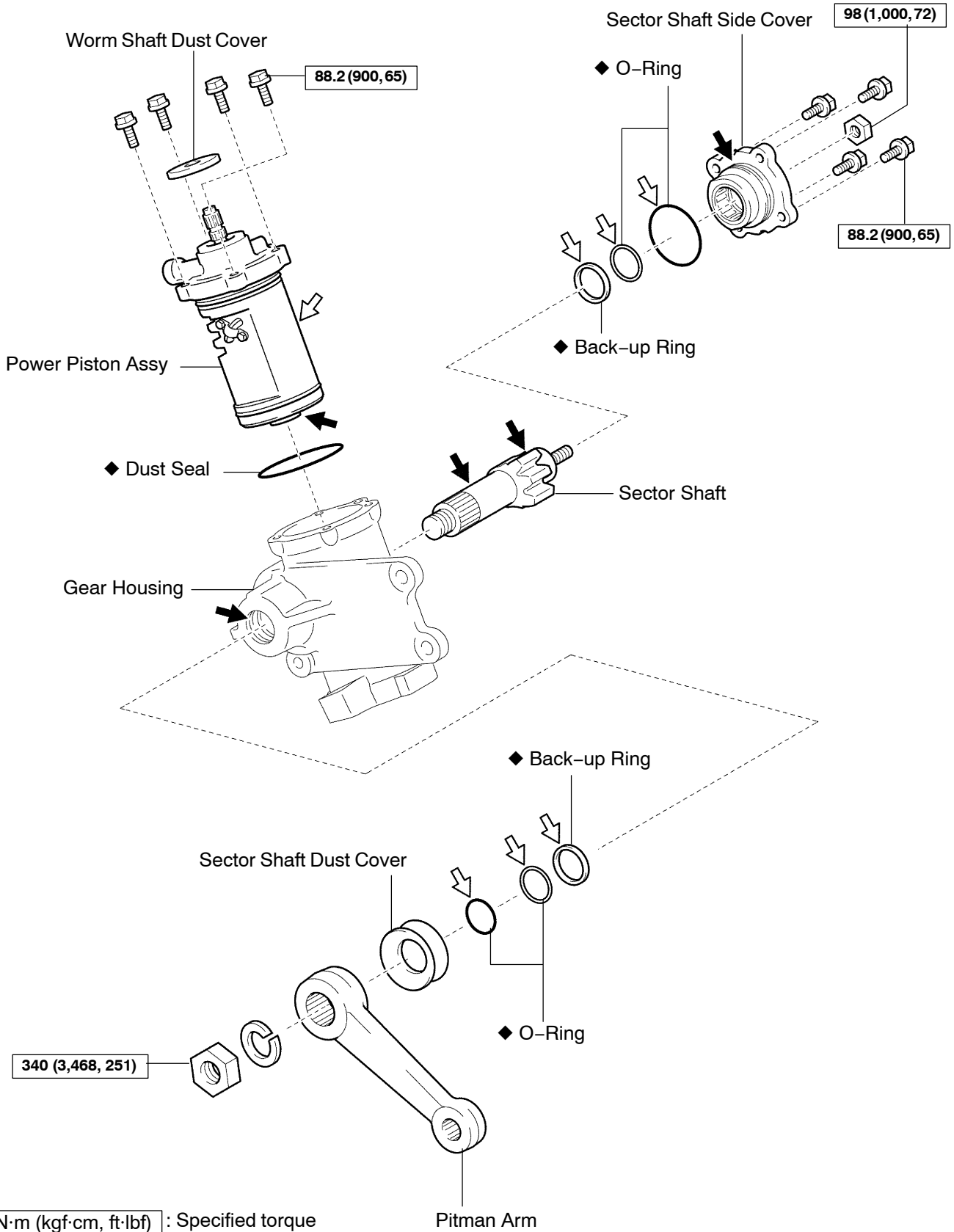
Regular Cab RHD



N·m (kgf·cm, in·lbf) : Specified torque

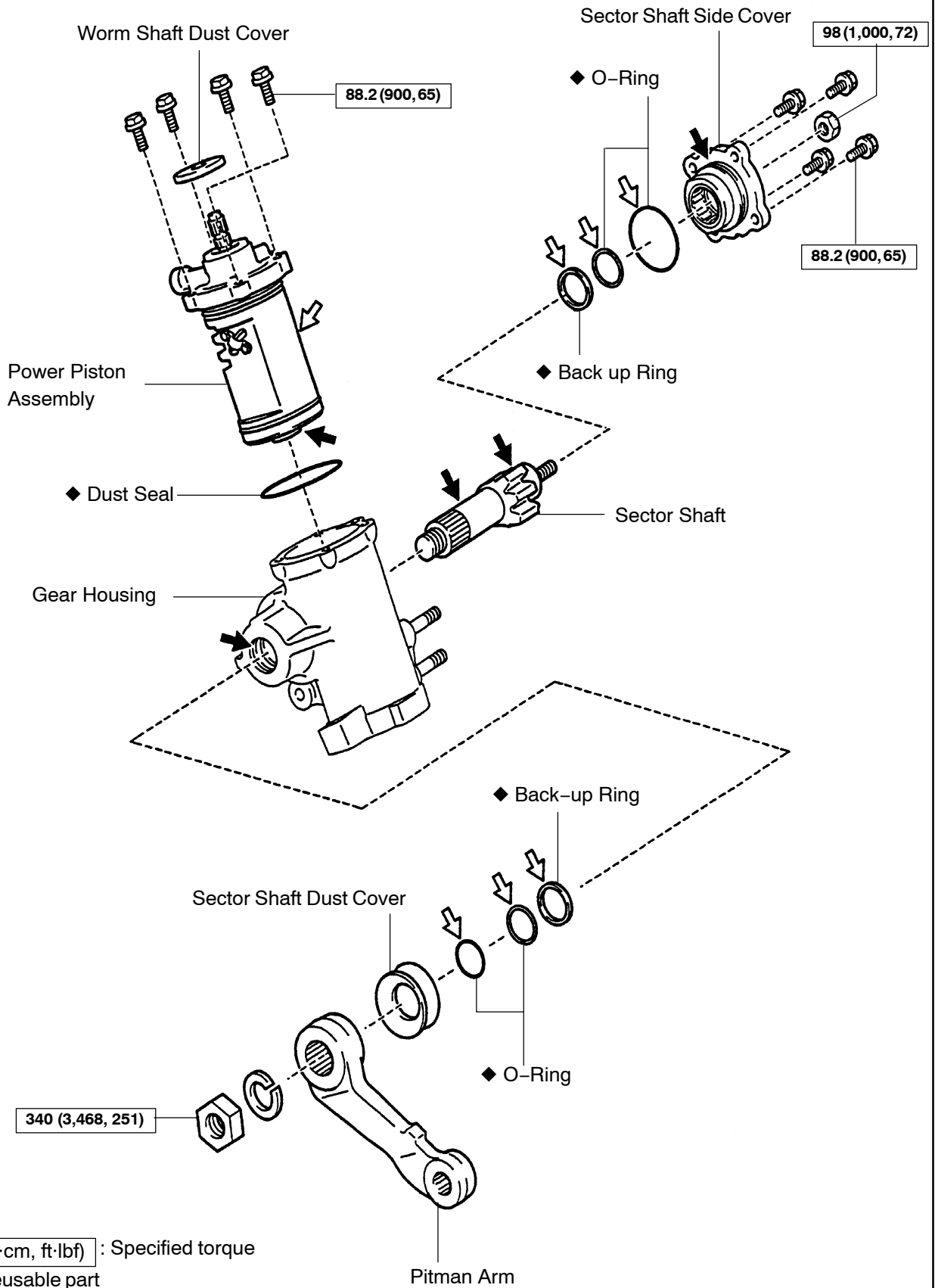
◆ Non-reusable part

Wide Cab LHD



- N·m (kgf·cm, ft·lbf) : Specified torque
- ◆ Non-reusable part
- ➡ Molybdenum disulfide lithium base grease
- ↖ Power steering fluid

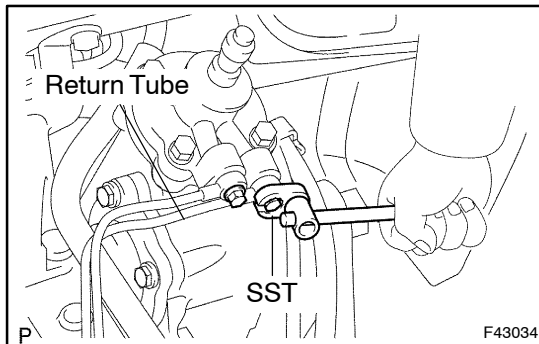
Regular Cab RHD:



- N·m (kgf·cm, ft·lbf) : Specified torque
- ◆ Non-reusable part
- ➡ Molybdenum disulfide lithium base grease
- ↖ Power steering fluid

OVERHAUL

1. TILT UP CAB
2. PLACE FRONT WHEELS FACING STRAIGHT AHEAD
3. REMOVE STEERING COLUMN ASSY



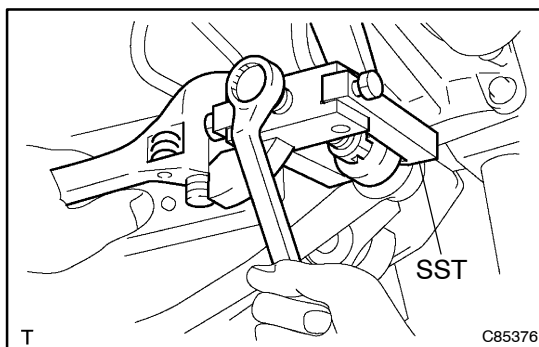
4. DISCONNECT PRESSURE FEED HOSE
 - (a) Using SST, remove the union bolt and 2 gaskets and disconnect the pressure feed hose.

SST 09023-12700

5. DISCONNECT STEERING GEAR OUTLET RETURN TUBE

- (a) Using SST, remove the union bolt and 2 gaskets and disconnect the return tube.

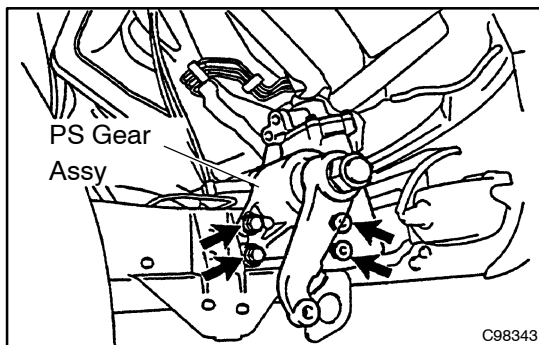
SST 09023-12700



6. DISCONNECT STEERING DRAG LINK ASSY

- (a) Remove the cotter pin and nut.
- (b) Using SST, disconnect the drag link from the pitman arm.
- (c) Remove the nut and spring washer.

SST 09628-62011

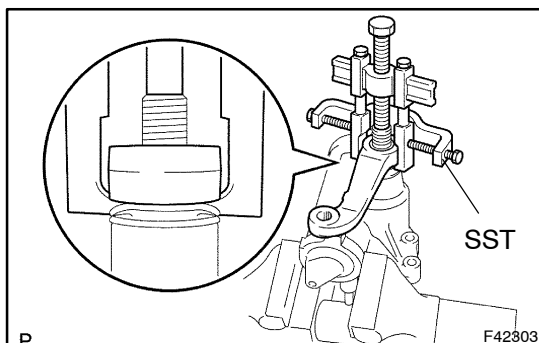


7. REMOVE POWER STEERING GEAR ASSY

- (a) Remove the 2 bolts, 2 nuts, washers and power steering gear assy.

8. FIX POWER STEERING GEAR ASSY

SST 09630-00014 (09631-00142)



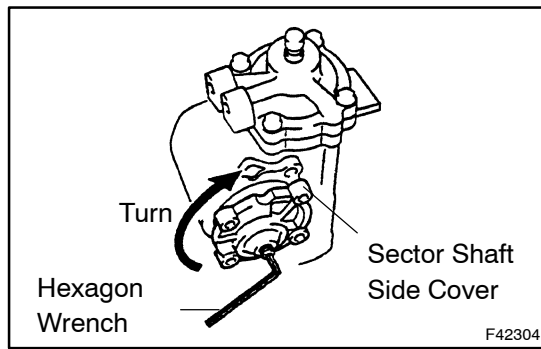
9. REMOVE PITMAN ARM

- (a) Using SST, remove the pitman arm.
- SST 09950-40011 (09951-04020, 09952-04010, 09953-04020, 09954-04010, 09955-04031, 09958-04011)

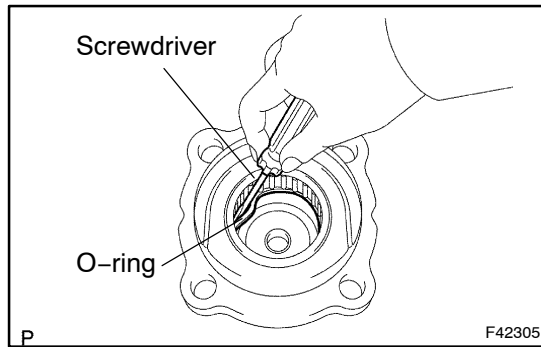
NOTICE:

Be careful not to damage the sector shaft dust cover.

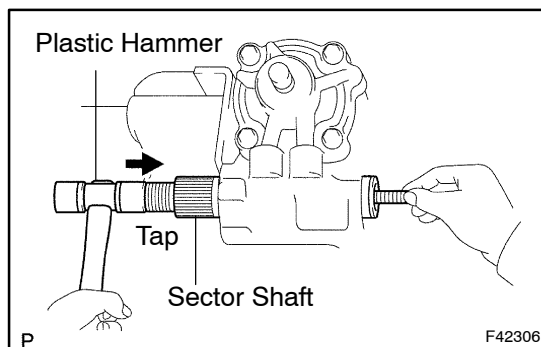
10. REMOVE SECTOR SHAFT DUST COVER

**11. REMOVE SIDE COVER**

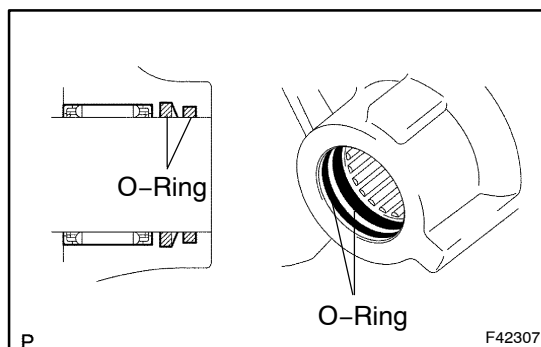
- (a) Remove the sector shaft adjusting screw lock nut.
- (b) Remove the 4 bolts.
- (c) Using a hexagon wrench, turn the sector shaft adjusting screw clockwise until the cover comes off.



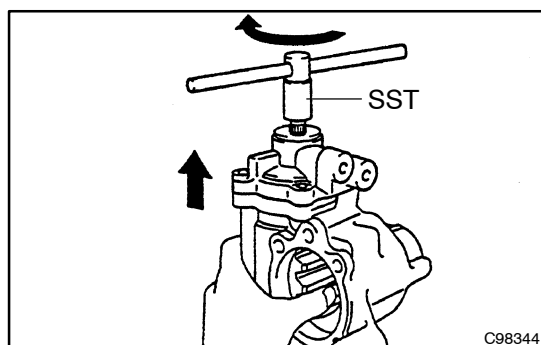
- (d) Using a screwdriver, remove the back-up ring and 2 O-rings from the sector shaft side cover.

**12. REMOVE SECTOR SHAFT**

- (a) Using a plastic hammer, tap on the sector shaft end and pull out the sector shaft, as shown in the illustration.



- (b) Using a screwdriver, remove the back-up ring and 2 O-rings from the gear housing.

13. REMOVE WORM SHAFT DUST COVER**14. REMOVE POWER PISTON ASSY**

- (a) Remove the 4 bolts.
- (b) Using SST, turn the power piston shaft clockwise until the shaft is locked. Then turn the power piston shaft counter-clockwise until the end cover of the power piston assembly is separated from the gear housing while holding the power piston with your hand.

SST 09616-00011

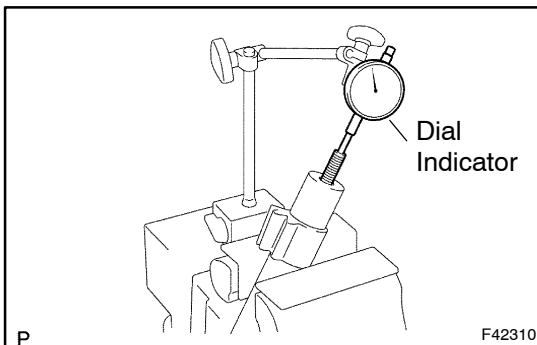
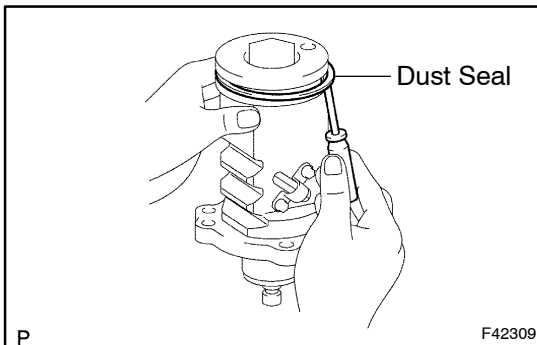
NOTICE:

Do not leave the end cover separate from the gear housing cover more than 60 mm (2.36 in.).

- (c) While holding the power piston, pull out the power piston.
- (d) Using a screwdriver, remove the dust seal from the power piston.

NOTICE:

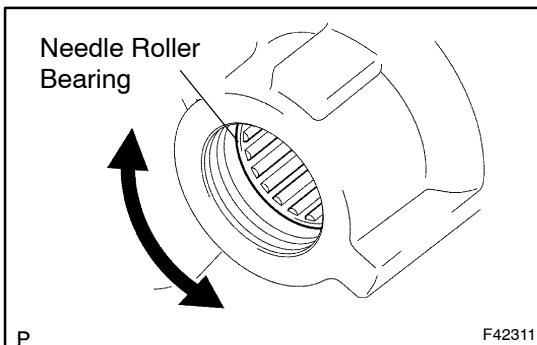
Be careful not to damage the power piston sub-assy.

**15. INSPECT SECTOR SHAFT**

- (a) Using a dial indicator, measure the thrust clearance.

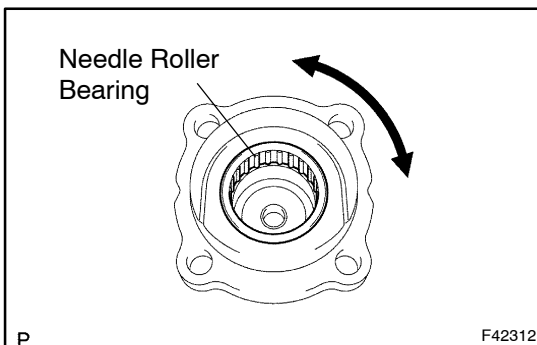
Maximum thrust clearance: 0.15 mm (0.0059 in.)

If the clearance is greater than the maximum, adjust the thrust clearance of the sector shaft.

**16. INSPECT GEAR HOUSING BEARING**

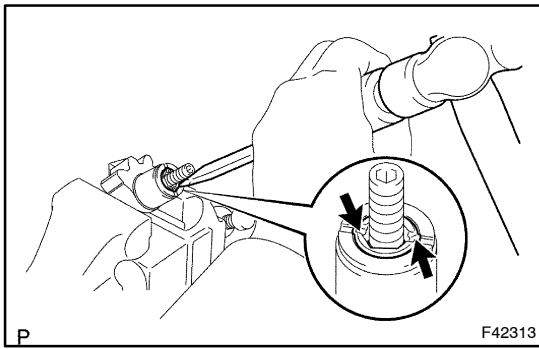
- (a) Check the rotating condition of the needle roller bearing and check for abnormal noise.

If the bearing is worn or damaged, replace the gear housing.

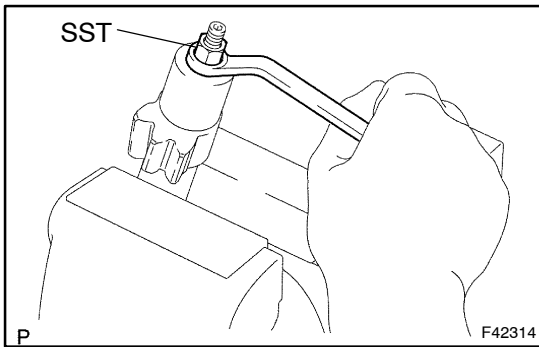
**17. INSPECT SECTOR SHAFT SIDE COVER BEARING**

- (a) Check the rotating condition of the needle roller bearing and check for abnormal noise.

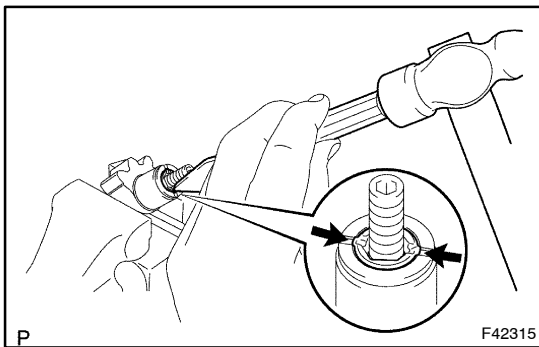
If the bearing is worn or damaged, replace the sector shaft side cover.



- 18. ADJUST SECTOR SHAFT THRUST CLEARANCE**
 (a) Using a chisel and a hammer, unstake the back-up ring.



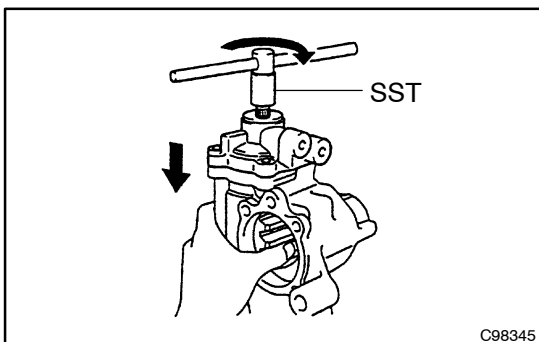
- (b) Using SST, remove the lock nut.
 SST 09630-00014 (09631-00051)
 (c) Using a hexagon wrench, adjust the adjusting screw to the correct thrust clearance.
 (d) Using SST, tighten the lock nut.
 SST 09630-00014 (09631-00051)
 (e) Using a dial indicator, measure the thrust clearance.
Maximum thrust clearance: 0.15 mm (0.0059 in.)
 If the clearance is greater than the maximum, adjust it again.



- (f) Stake the back-up ring.

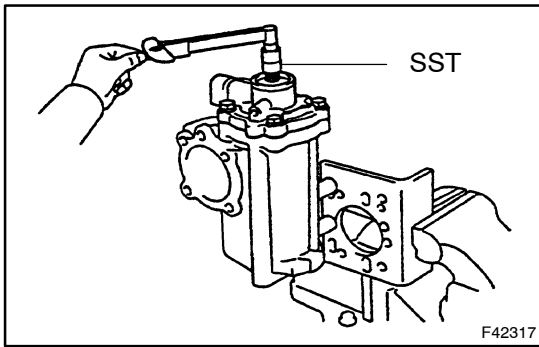
19. INSTALL CONTROL VALVE SUB-ASSY AND BALLS

- (a) Coat the power piston with power steering fluid.
 (b) Snug the dust seal down with the piston ring compressor for 5 - 7 minutes.



20. INSTALL POWER PISTON ASSY

- (a) Mount the gear housing on SST and a clamp vise.
 SST 09630-00014 (09631-00142), 09616-00011
 (b) Install the power piston assembly while holding the power piston with your hand.
 (c) Install the 4 bolts.
Torque: 88.2 N·m (900 kgf·cm, 65 ft·lbf)



- (d) Using SST and a torque wrench, check the power piston rotating torque.

SST 09616-00011

Rotating torque:

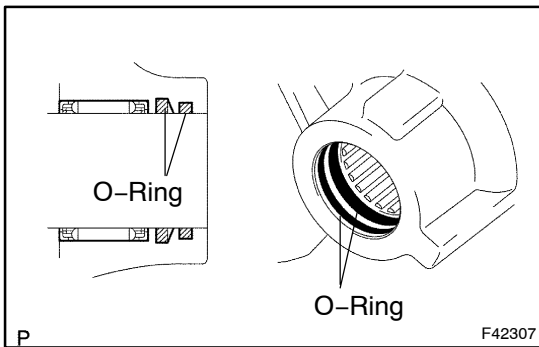
0.35 – 1.0 N·m (3.6 – 10.2 kgf·cm, 3.1 – 8.9 in·lbf)

If the rotating torque is not within the range or the difference between clockwise and counterclockwise rotating torque is over 0.4 N·m (4 kgf·cm, 3.5 in·lbf), replace the power piston assembly.

21. INSTALL WORM SHAFT DUST COVER

22. INSTALL SECTOR SHAFT AND SECTOR SHAFT SIDE COVER

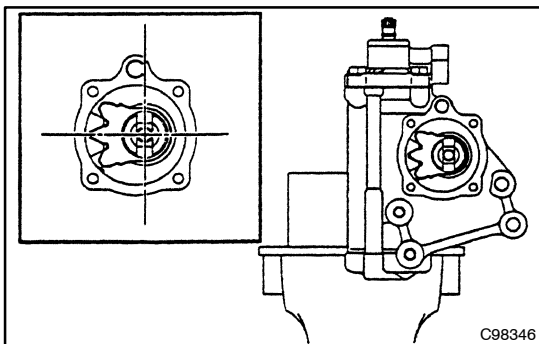
- (a) Coat 4 new O-rings and 2 back-up rings with power steering fluid.
 (b) Install the 2 O-rings and back-up ring to the side cover.
 (c) Coat 2 new O-rings with power steering fluid.



- (d) Install the 2 O-rings to the gear housing, as shown in the illustration.

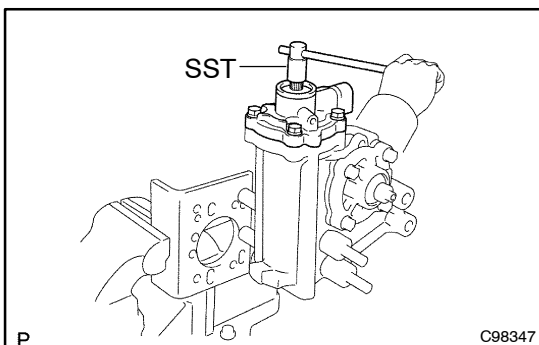
NOTICE:

Make sure that the back-up rings face to the correct direction.



- (e) Set the power piston in the center of the shaft.
 (f) Install and push the sector shaft into the gear housing so that the center teeth mesh each other.
 (g) Install the sector shaft side cover with the 4 bolts.

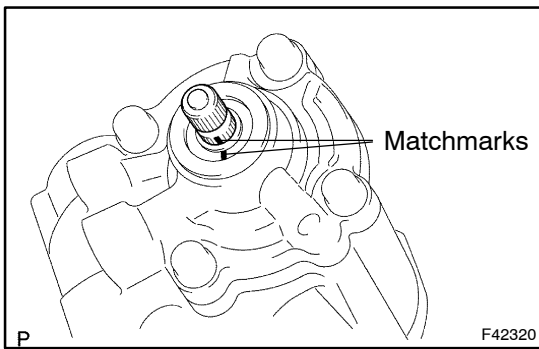
Torque: 88 N·m (898 kgf·cm, 65 ft·lbf)



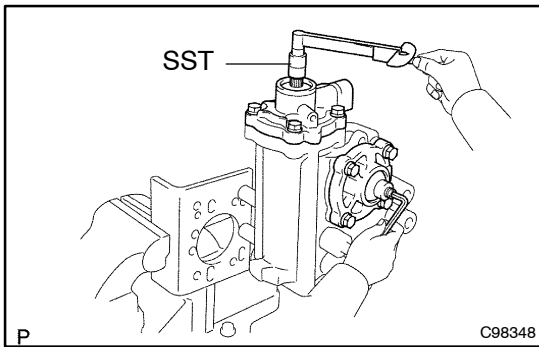
23. DETERMINE CENTER POSITION

- (a) Using SST, turn the power piston shaft to the full lock position in both directions and determine the exact center.

SST 09616-00011



- (b) Align the matchmarks on the power piston shaft and the end cover of the power piston assembly in order to show the neutral position.



24. INSPECT TOTAL PRELOAD

- (a) Using a torque wrench, install SST in the power piston shaft.

SST 09616-00011

- (b) Using a hexagon wrench, turn the sector shaft adjusting screw until the preload becomes within the specified range.

Preload (turning):

0.2 - 0.4 N·m (2 - 4 kgf·cm, 1.7 - 3.5 in.·lbf)

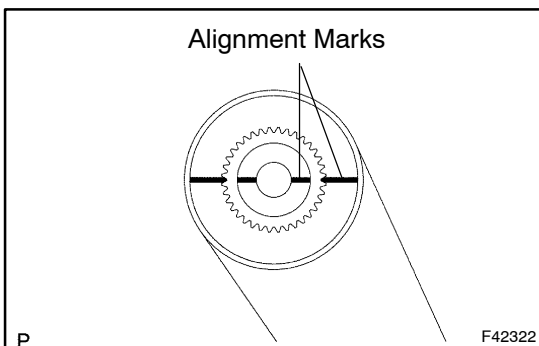
- (c) Using a hexagon wrench, hold the adjusting screw and install the lock nut.

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

- (d) Recheck the total preload.

Preload (turning):

0.2 - 0.4 N·m (2 - 4 kgf·cm, 1.7 - 3.5 in.·lbf)



25. INSTALL PITMAN ARM

- (a) Align the alignment marks on the sector shaft and the pitman arm.

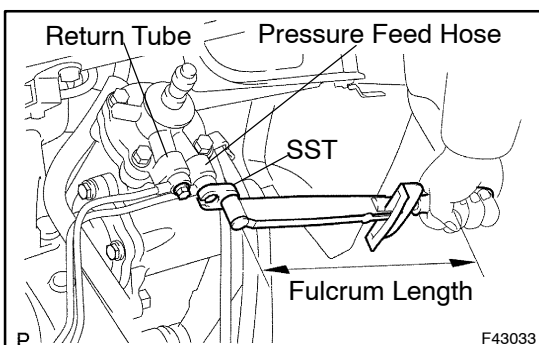
- (b) Install the spring washer and nut.

Torque: 340 N·m (3,468 kgf·cm, 251 ft·lbf)

26. INSTALL POWER STEERING GEAR ASSY

- (a) Install the power steering gear with the 2 bolts, 2 nuts and washers.

Torque: 180 N·m (1,836 kgf·cm, 133 ft·lbf)



27. INSTALL STEERING GEAR OUTLET RETURN TUBE

- (a) Using SST, connect the return tube and install the union bolt with 2 new gaskets.

SST 09023-12700

Torque:

42 N·m (430 kgf·cm, 31 ft·lbf)

36 N·m (367 kgf·cm, 27 ft·lbf) when using with SST

HINT:

- Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- This torque value will be effective if the SST is parallel to a torque wrench.

28. INSTALL PRESSURE FEED HOSE

- (a) Using SST, connect the pressure feed hose and install the union bolt with 2 new gaskets.
SST 09023-12700

Torque:**42 N·m (430 kgf·cm, 31 ft·lbf)****36 N·m (367 kgf·cm, 27 ft·lbf) when using with SST****HINT:**

- Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- This torque value will be effective if that the SST is parallel to a torque wrench.

29. INSTALL STEERING DRAG LINK ASSY

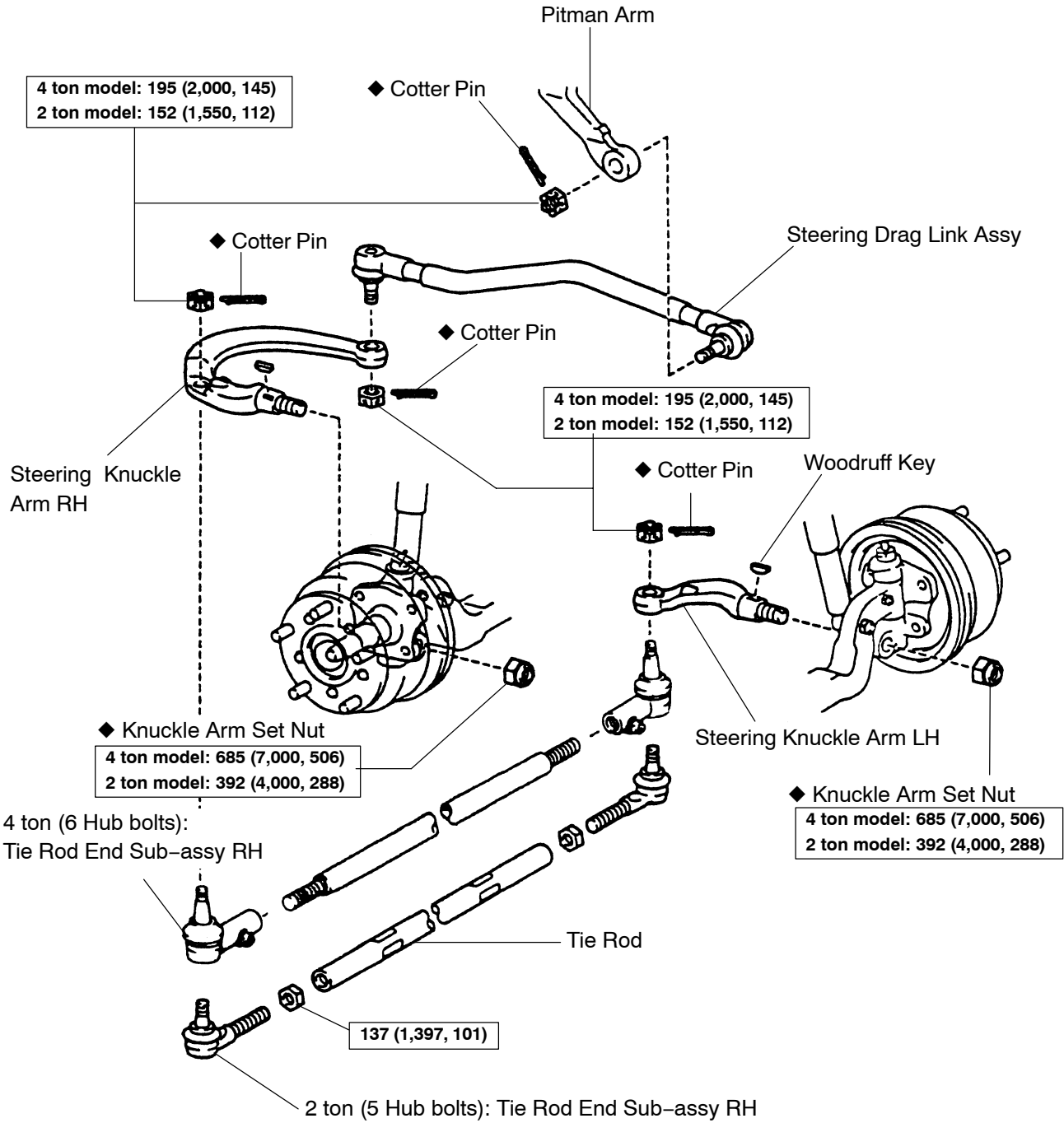
- (a) Connect the drag link to the pitman arm.
(b) Install the nut and a new cotter pin.

Torque:**4 ton (6 hub bolts) model: 195 N·m (2,000 kgf·cm, 145 ft·lbf)****2 ton (5 hub bolts) model: 152 N·m (1,550 kgf·cm, 112 ft·lbf)****30. INSTALL STEERING COLUMN ASSY****31. BLEED POWER STEERING FLUID****32. CHECK POWER STEERING FLUID LEAKAGE****33. TILT DOWN CAB**

STEERING LINKAGE COMPONENTS

510CY-01

This illustration shows in the Right Hand-Drive Vehicle. In case of Left Hand- Drive Vehicle, these parts are symmetrical.

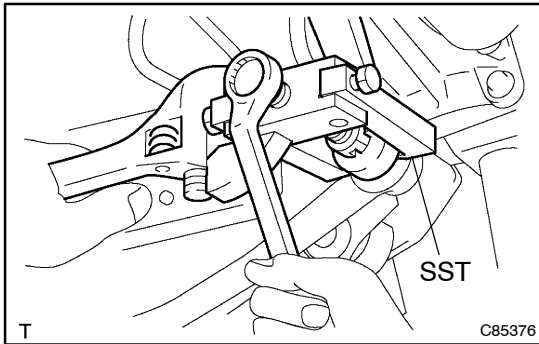


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

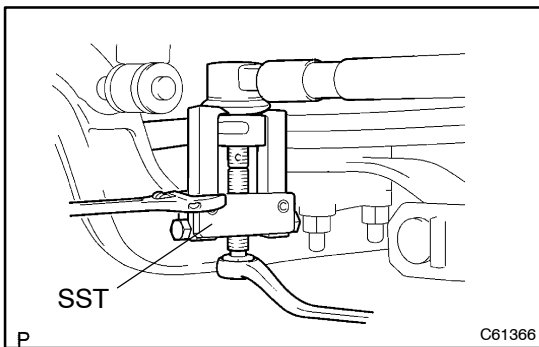
OVERHAUL

1. TILT UP CAB

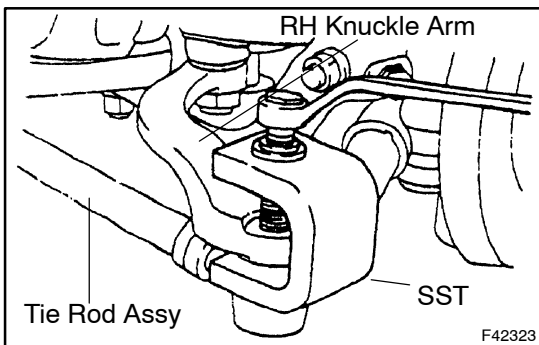


2. REMOVE STEERING DRAG LINK ASSY

- (a) Remove the 2 cotter pins and 2 nuts.
- (b) Using SST, disconnect the drag link from the pitman arm.
SST 09628-62011

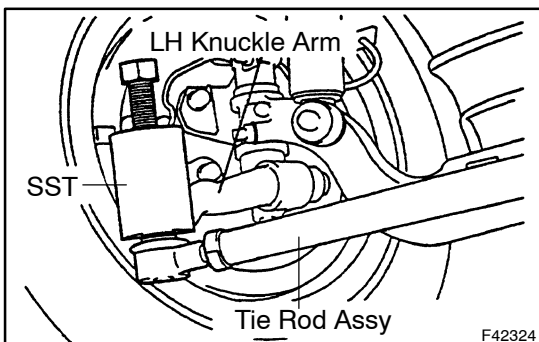


- (c) Using SST, disconnect the drag link from the knuckle arm.
SST 09628-62011



3. REMOVE TIE ROD ASSY

- (a) Remove the 2 cotter pins and 2 nuts.
- (b) Using SST, disconnect the tie rod from the knuckle arm RH.
SST 09628-00011, 09611-36020



- (c) Remove the 2 cotter pins and 2 nuts.
- (d) Using SST, disconnect the tie rod from the knuckle arm LH.
SST 09628-00011, 09611-36020, 09610-20012

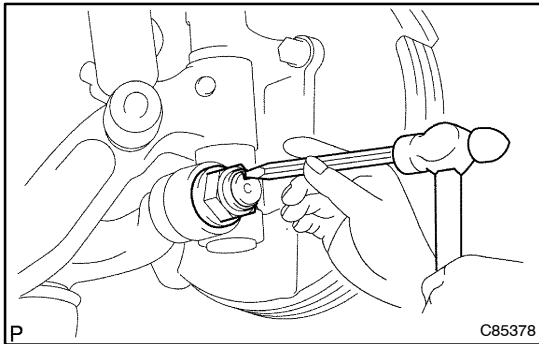
4. REMOVE TIE ROD END SUB-ASSY LH

- (a) Loosen the lock nut.
- (b) Remove the tie rod end and lock nut from the tie rod.

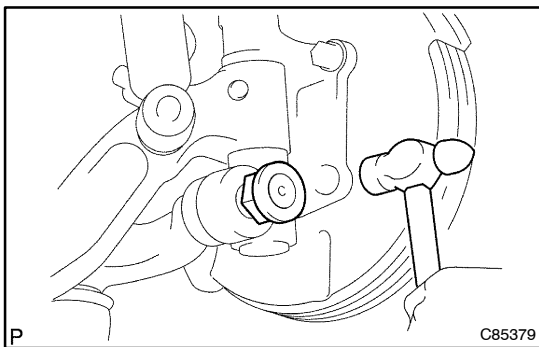
5. REMOVE TIE ROD END SUB-ASSY RH

HINT:

Use same procedures described above for the LH side.

**6. REMOVE STEERING KNUCKLE ARM LH**

- (a) Using a hammer and a chisel, unseat the lock nut.
- (b) Remove the lock nut.

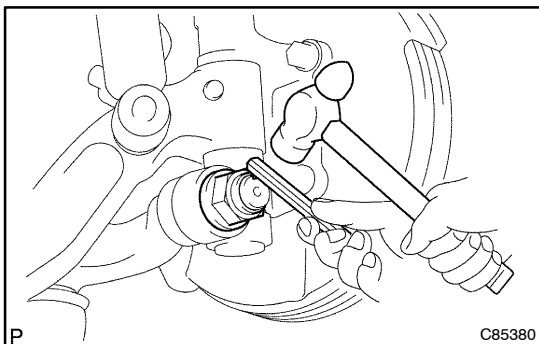


- (c) Using a hammer, tap out the knuckle arm from the steering knuckle.
- (d) Remove the woodruff key from the knuckle arm.

NOTICE:**Be careful not to damage the thread of the knuckle arm.****7. REMOVE STEERING KNUCKLE ARM RH**

HINT:

Use same procedures described above for the LH side.

**8. INSTALL STEERING KNUCKLE ARM LH**

- (a) Install the woodruff key to the knuckle arm.
- (b) Install the knuckle arm to the steering knuckle.
- (c) Tighten the new lock nut.

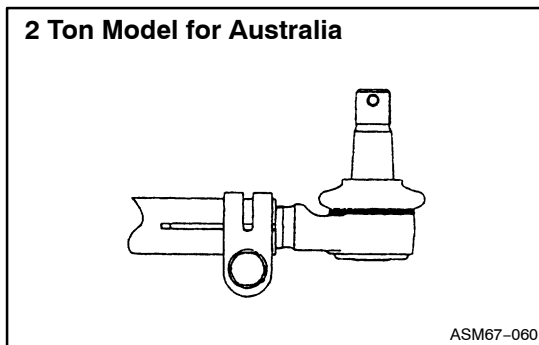
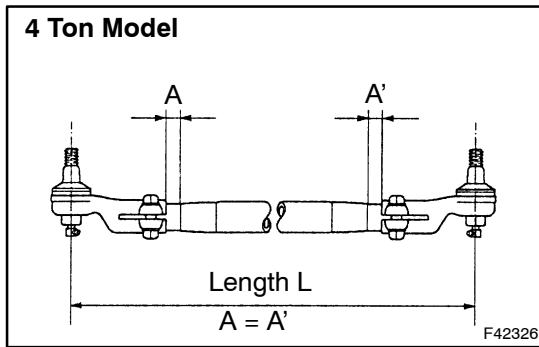
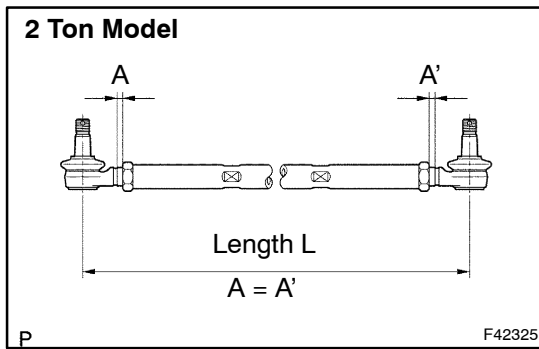
Torque:**4 ton model: 685 N·m (7,000 kgf·cm, 506 ft·lbf)****2 ton model: 392 N·m (4,000 kgf·cm, 288 ft·lbf)**

- (d) Using a hammer and a chisel, stake the lock nut.

9. INSTALL STEERING KNUCKLE ARM RH

HINT:

Use the same procedures described above for the LH side.

**10. INSTALL TIE ROD END SUB-ASSY LH**

- Screw the tie rod ends and lock nuts by an equivalent amount into the both ends of the tie rod.
- Adjust the length of the tie rod assembly.

Length:

	Regular cab	Wide cab
4 ton model	-	1,435 mm (56.50 in.)
2 ton model	1,158 mm (45.64 in.)	1,425 mm (56.10 in.)

- Temporarily tighten the tie rod end lock nuts or clamp bolts.
- After toe-in adjustment, torque the lock nut or clamp bolt.

Torque:

4 ton model (clamp bolt) : 74 N·m (755 kgf·cm, 55 ft·lbf)

2 ton model (lock nut) :

137 N·m (1,398 kgf·cm, 101 ft·lbf)

Clamp bolt for Australia: 37 N·m (378 kgf·cm, 27 ft·lbf)

11. INSTALL TIE ROD END SUB-ASSY RH**HINT:**

Install the RH side by the same procedures with the LH side..

12. INSTALL TIE ROD ASSY

- Install the tie rod to the right and left knuckle arm, then tighten 2 nuts.

Torque:

4 ton model : 195 N·m (2,000 kgf·cm, 145 ft·lbf)

2 ton model : 152 N·m (1,550 kgf·cm, 112 ft·lbf)

- Install the new 2 cotter pins.

13. INSTALL STEERING DRAG LINK ASSY

- Install the drag link to the knuckle arm and steering pitman arm, then tighten the 2 nuts.

Torque:

4 ton model : 195 N·m (2,000 kgf·cm, 145 ft·lbf)

2 ton model : 152 N·m (1,550 kgf·cm, 112 ft·lbf)

- Install the new 2 cotter pins.

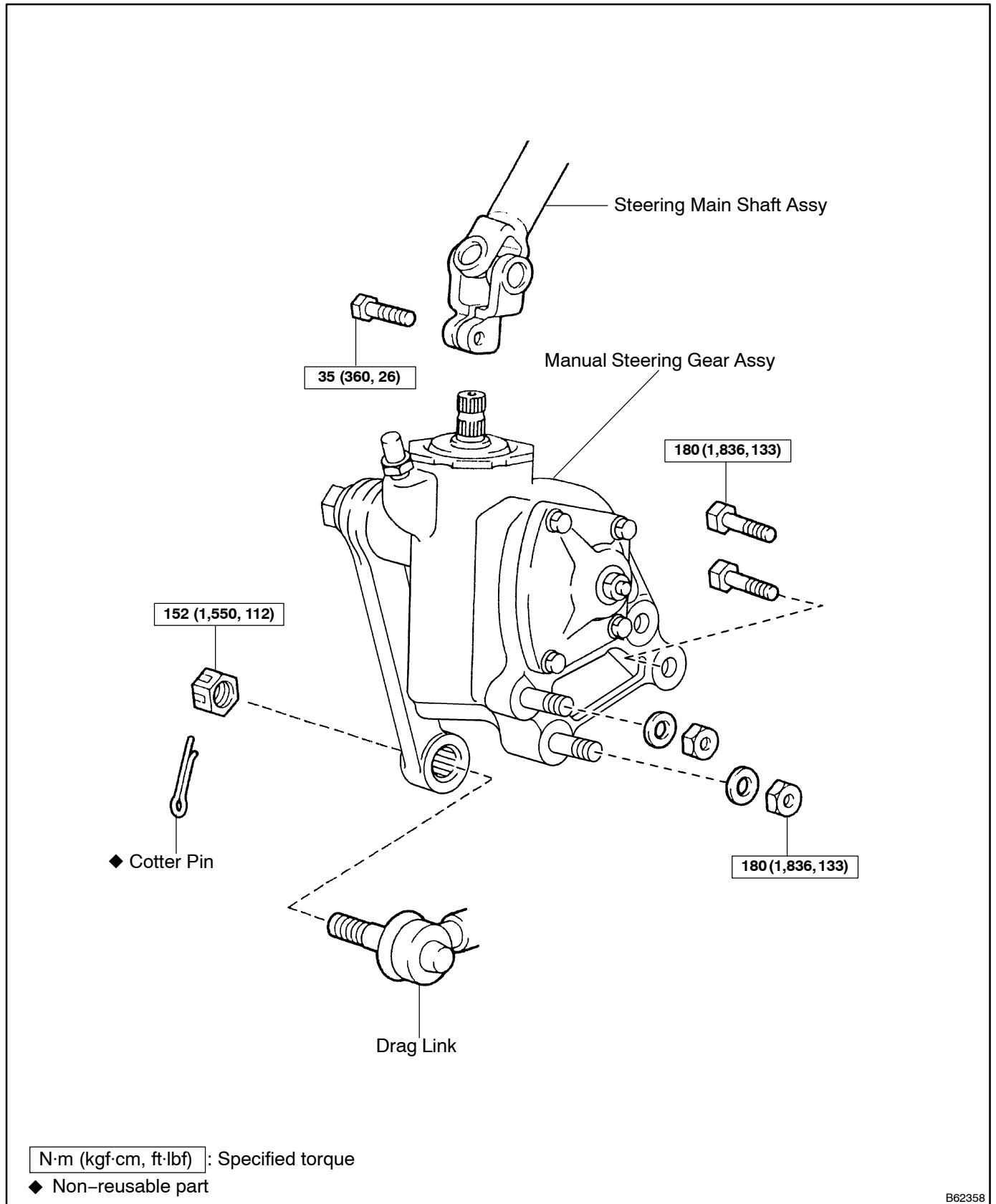
14. INSPECT STEERING WHEEL CENTER POINT**15. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT (See page 26-2)****16. TILT DOWN CAB**

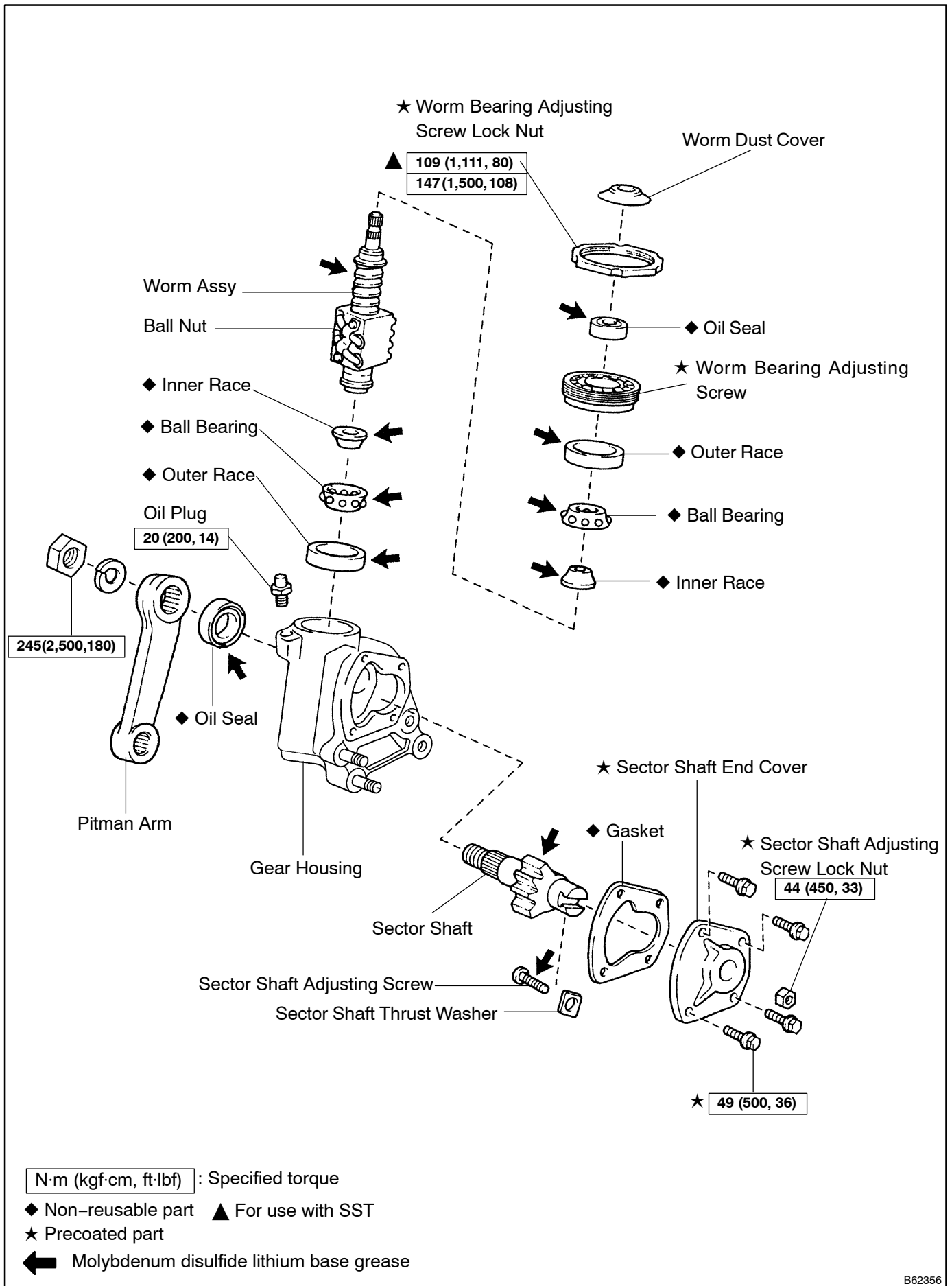
MANUAL STEERING

STEERING GEAR HOUSING ASSY	52-1
COMPONENTS	52-1
OVERHAUL	52-3
STEERING LINKAGE	
(REGULAR CAB MODELS)	52-10
COMPONENTS	52-10
OVERHAUL	52-11

STEERING GEAR HOUSING ASSY COMPONENTS

5200G-01



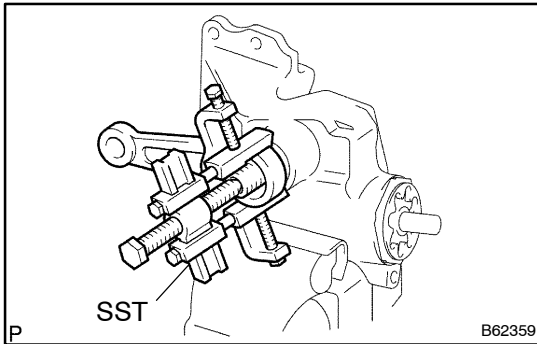


OVERHAUL

NOTICE:

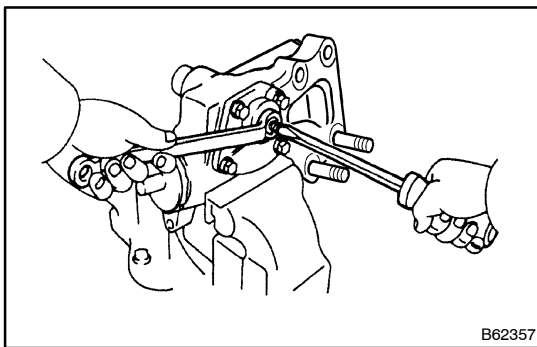
When using a vise, do not overtighten it.

1. DRAIN GEAR OIL



2. REMOVE PITMAN ARM

- (a) Remove the nut and spring washer.
- (b) Using SST, remove the pitman arm.
SST 09950-40011 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04031, 09958-04010)

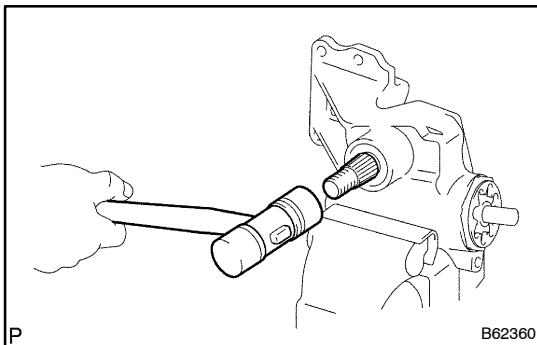


3. REMOVE SECTOR SHAFT END COVER

- (a) Remove the shaft adjusting screw lock nut and 4 bolts.
HINT:
Hold the shaft adjusting screw while removing the sector adjusting screw lock nut.
- (b) Using a screwdriver, turn the sector shaft adjusting screw clockwise and remove the end cover.

4. REMOVE SECTOR SHAFT ADJUSTING SCREW

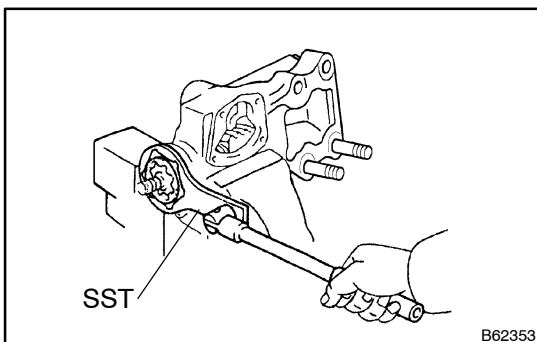
- (a) Remove the sector shaft thrust washer.



5. REMOVE SECTOR SHAFT

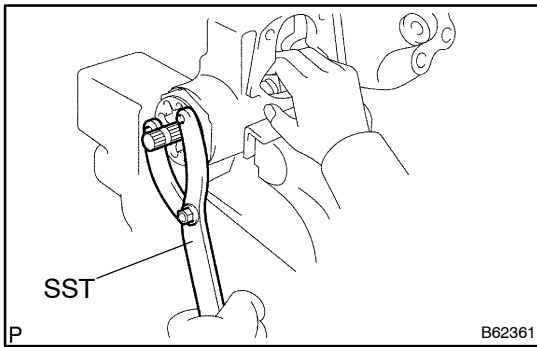
- (a) Using a plastic hammer, tap out the sector shaft as shown in the illustration.

6. REMOVE SECTOR SHAFT DUST COVER



7. REMOVE WORM BEARING ADJUSTING SCREW LOCK NUT

- (a) Using SST, remove the nut.
SST 09617-60010

**8. REMOVE WORM BEARING ADJUSTING SCREW**

- (a) Using SST, remove the adjusting screw.
SST 09960-10010 (09962-01000, 09963-00600)

HINT:

Hold the worm shaft while removing the screw.

9. REMOVE WORM ASSY

- (a) Remove the worm assy together with the the 2 ball bearings from the gear housing.

NOTICE:

Do not remove the ball nut from the worm assy.

10. INSPECT WORM ASSY**NOTICE:**

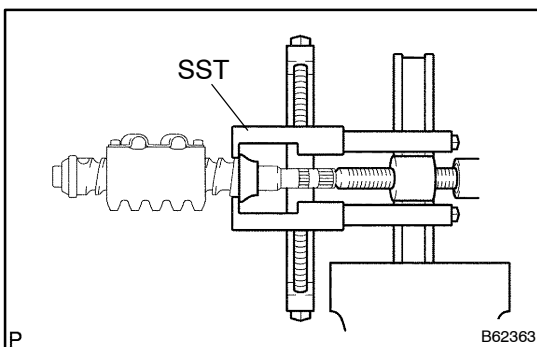
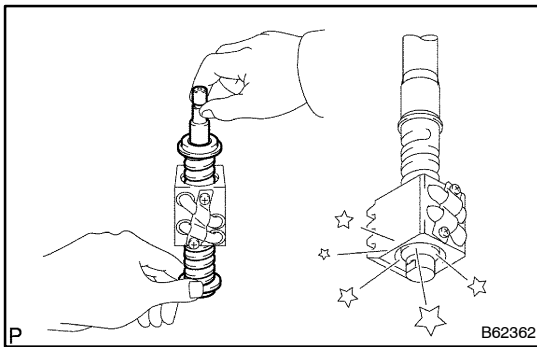
When using a vise, do not overtighten it.

- (a) Check the worm assy and ball nut for wear or damage.
(b) Check that the nut rotates down smoothly the shaft by its own weight.

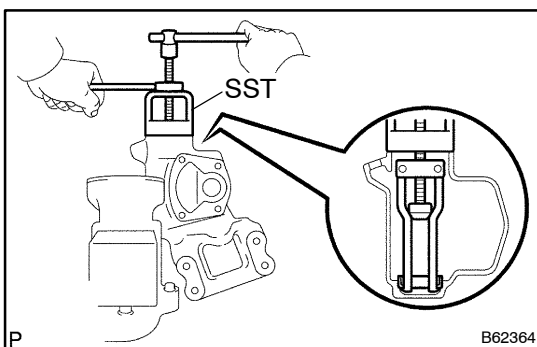
If a problem is found, replace the worm assy.

NOTICE:

Do not allow the ball nut to hit the end of the shaft.

**11. REMOVE WORM BEARING**

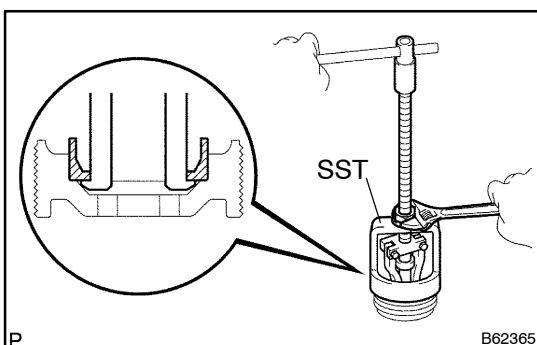
- (a) Using SST, remove the 2 inner races from the worm assy.
SST 09950-40011 (09951-04020, 09952-04010, 09953-04020, 09954-04010, 09955-04051, 09958-04011)



- (b) Using SST, remove the outer race from the gear housing.
SST 09612-65014 (09612-01030)

NOTICE:

Be careful not to damage the gear housing.

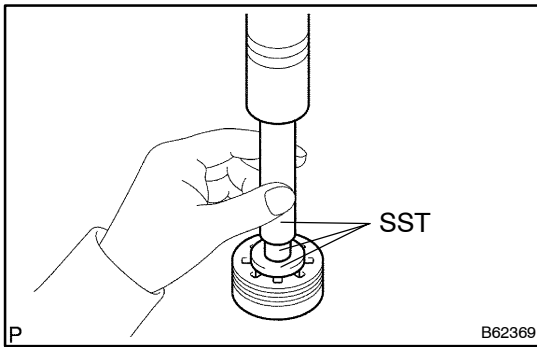


- (c) Using SST, remove the outer race from the worm bearing adjusting screw.

SST 09612-65014 (09612-01040)

NOTICE:

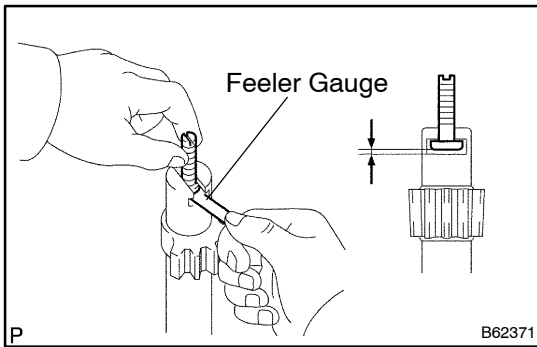
Be careful not to damage the worm bearing adjusting screw.



12. REMOVE WORM BEARING ADJUSTING SCREW OIL SEAL

- (a) Using SST and a press, press out the oil seal from the worm bearing adjusting screw.

SST 09950-60010 (09951-00180, 09951-00310, 09952-06010), 09950-70010 (09951-07100)



13. INSPECT SECTOR SHAFT

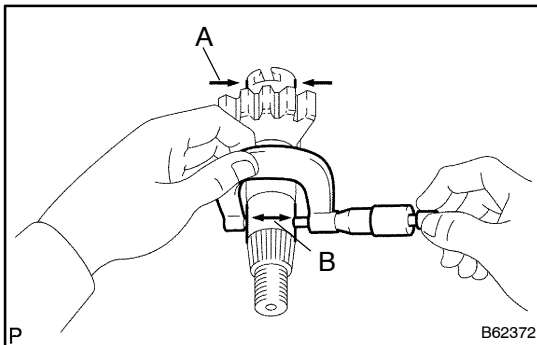
- (a) Using a feeler gauge, measure the thrust clearance with a feeler gauge.

Maximum thrust clearance: 0.10 mm (0.0039 in.)

If necessary, replace the sector shaft thrust washer which will provide the minimum clearance between the sector shaft and the sector shaft adjusting screw.

Thrust washer thickness:

1.95 mm (0.0768 in.)	2.05 mm (0.0807 in.)
2.00 mm (0.0787 in.)	-



- (b) Inspect the sector shaft oil clearance.

- (1) Using a micrometer, measure the sector shaft diameter the A and B.

Standard shaft diameter:

37.966 - 37.991 mm (1.4947 - 1.4957 in.)

Minimum shaft diameter: 37.94 mm (1.4937 in.)

If the shaft diameter is less than the minimum, replace the sector shaft.

- (2) Check the bush of the gear housing for wear or damage.

- (3) Using a caliper gauge, measure the bush inside diameter of the gear housing.

Standard inside diameter:

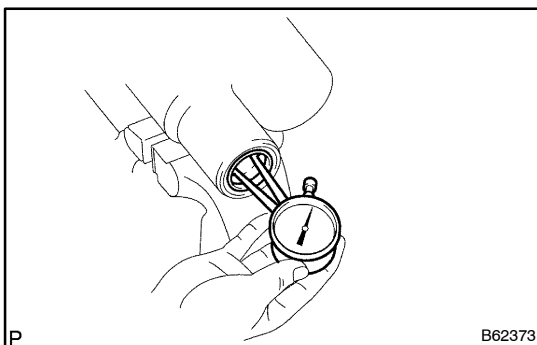
38.000 - 38.025 mm (1.4961 - 1.4970 in.)

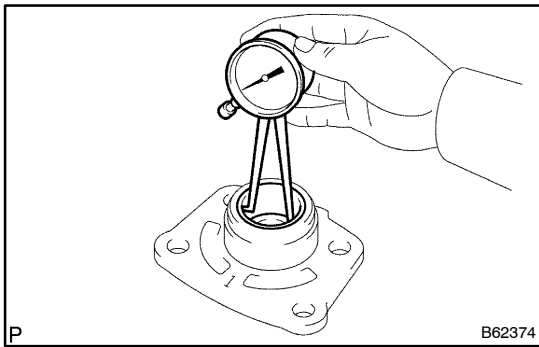
- (4) Calculate the oil clearance between the B and bush.

Maximum oil clearance: 0.20 mm (0.0079 in.)

If the oil clearance is greater than the maximum, replace the sector shaft and/or gear housing.

- (c) Check the bush of the sector shaft end cover for wear or damage.





- (d) Using a caliper gauge, measure the bush inside diameter of the sector shaft end cover.

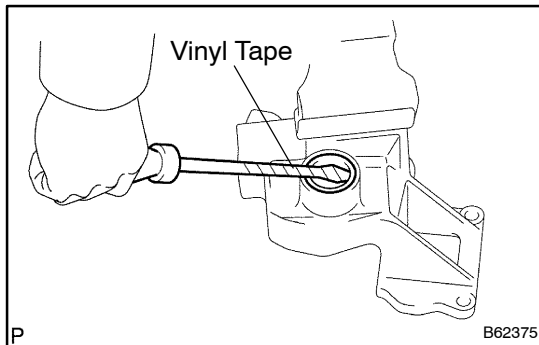
Standard inside diameter:

38.000 – 38.025 mm (1.4961 – 1.4970 in.)

- (e) Calculate the oil clearance between the A and bushing.

Maximum oil clearance: 0.20 mm (0.0079 in.)

If the oil clearance is greater than the maximum, replace the sector shaft and/or sector shaft end cover.



14. REMOVE WORM BEARING ADJUSTING SCREW OIL SEAL

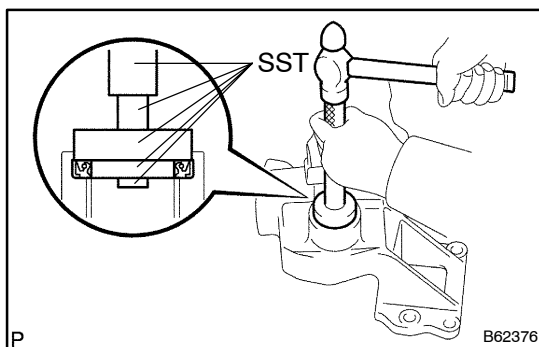
- (a) Using a screwdriver, pry out the oil seal from the gear housing.

HINT:

Tape a screwdriver tip before use.

NOTICE:

Be careful not to damage the gear housing.



15. INSTALL WORM BEARING ADJUSTING SCREW OIL SEAL

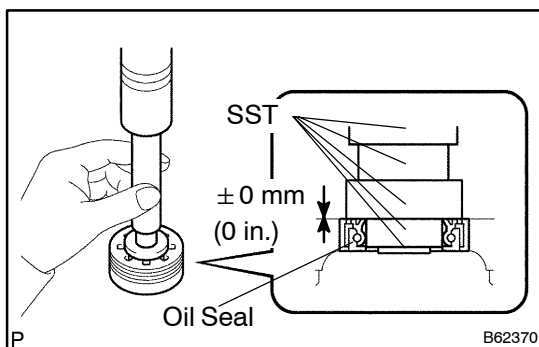
- (a) Coat a new oil seal with molybdenum disulfide lithium base grease.

- (b) Using SST and a hammer, tap in the oil seal to the gear housing.

SST 09950-60010 (09951-00520, 09952-06010),
09950-70010 (09951-07100)

NOTICE:

Make sure that the oil seal faces the correct direction.



16. INSTALL OIL SEAL

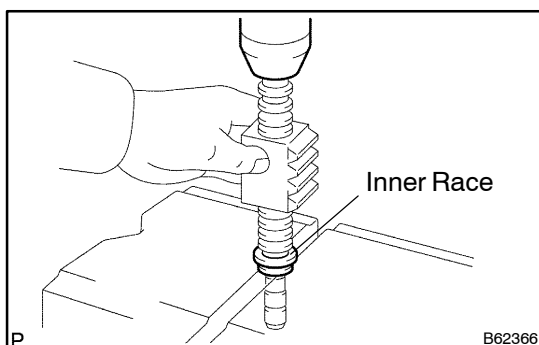
- (a) Coat a new oil seal with molybdenum disulfide lithium base grease.

- (b) Using SST and a press, press in the oil seal until its surface is flush with the worm bearing adjusting screw.

SST 09950-60010 (09951-00180, 09951-00310,
09952-06010), 09950-70010 (09951-07100)

NOTICE:

Make sure that the oil seal faces the correct direction.



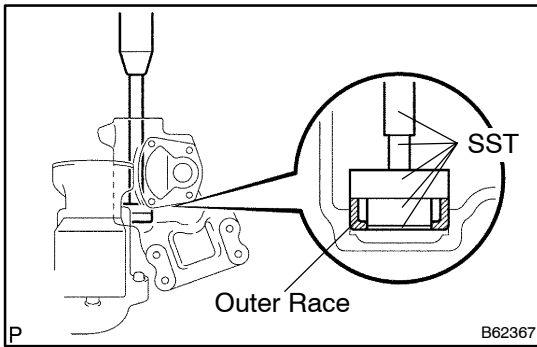
17. INSTALL WORM BEARING

- (a) A press, press in 2 new inner races to the worm assy.

NOTICE:

Be careful not to damage the inner race.

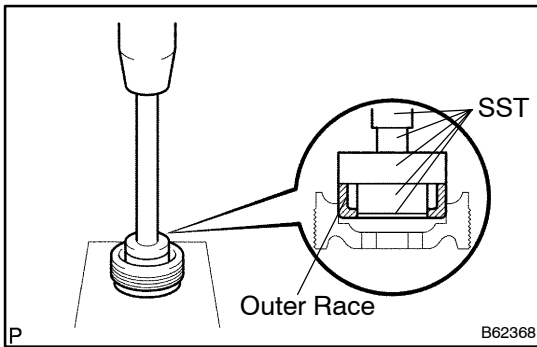
- (b) Coat 2 inner races with molybdenum disulfide lithium base grease.



- (c) Coat a new outer race with molybdenum disulfide lithium base grease.
- (d) Using SST and a press, press in the outer race to the gear housing.

SST 09950-60010 (09951-00520, 09951-00550, 09952-06010), 09950-70010 (09951-07200),

- (e) Coat a new outer race with molybdenum disulfide lithium base grease.

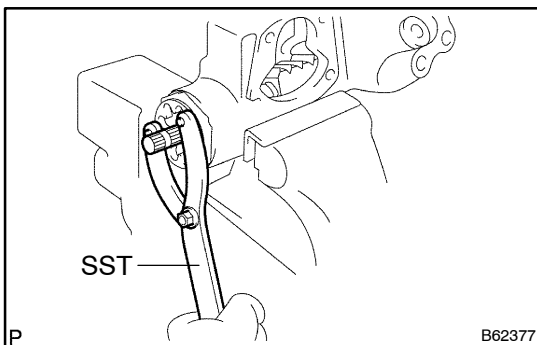


- (f) Using SST and a press, press in the outer race to the worm bearing adjusting screw.

SST 09950-60010 (09951-00520, 09951-00550, 09952-06010), 09950-70010 (09951-07100)

18. INSTALL WORM ASSY

- (a) Coat 2 new ball bearings with molybdenum disulfide lithium base grease.
- (b) Put one ball bearing into the gear housing and place the other ball bearing on the worm assy.
- (c) Install the worm assy into the gear housing.



19. INSTALL WORM BEARING ADJUSTING SCREW

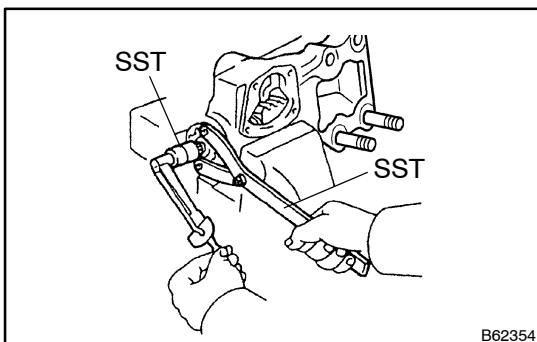
- (a) Apply adhesive to 2 or 3 threads of the screw.

Sealant:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

- (b) Using SST, tighten the screw taking care that worm shaft still moves by hand.

SST 09960-10010 (09962-01000, 09963-01000)

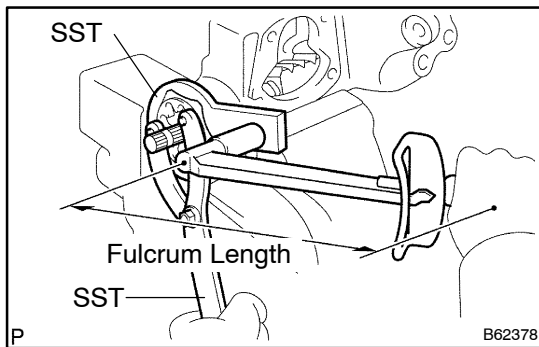


- (c) Using SST and a torque wrench, turn the adjusting screw until the bearing preload is correct.

SST 09616-00011, 09960-10010 (09962-01000, 09963-01000)

Preload (Starting):

0.29 - 0.59N·m (3 - 6 kgf·cm, 2.6 - 5.2 in·lbf)



20. INSTALL WORM BEARING ADJUSTING SCREW LOCK NUT

- (a) Apply adhesive to 2 or 3 threads of the nut.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

- (b) Using SST, hold the adjusting screw in position and torque the nut.

SST 09617-60010, 09960-10010 (09962-01000, 09963-00600)

Torque: 147 N·m (1,500 kgf·cm, 108 ft·lbf)

109 N·m (1,111 kgf·cm, 80 ft·lbf) For use with SST

HINT:

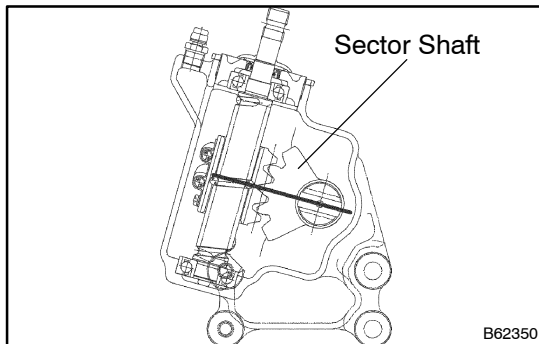
Use a torque wrench with a fulcrum length of 425 mm (16.73 in.)

- (c) Recheck the bearing preload.

Preload (Starting):

0.29 - 0.59 N·m (3 - 6 kgf·cm, 2.6 - 5.2 in.·lbf)

21. INSTALL SECTOR SHAFT DUST COVER



22. INSTALL SECTOR SHAFT

- (a) Install the sector shaft adjusting screw and sector shaft thrust washer to the sector shaft.

- (b) Set the ball nut at the center of the worm assy.

- (c) Install the sector shaft into the gear housing so that the center teeth mesh together.

23. INSTALL SECTOR SHAFT END COVER

- (a) Place a new gasket on the gear housing.

- (b) Using a screwdriver, loosen the sector shaft adjusting screw as far as possible.

- (c) Apply adhesive to the 2 or 3 threads of the 4 bolts and end cover.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

- (d) Install the end cover with the 4 bolts.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

24. ADJUST TOTAL PRELOAD

- (a) Place the worm assy in neutral position.

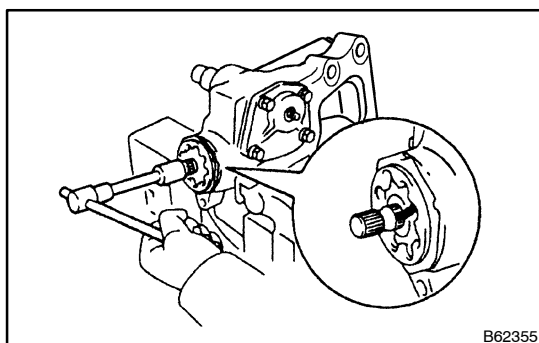
- (1) Using SST, count the total worm shaft rotations and turn the shaft back half of that number.

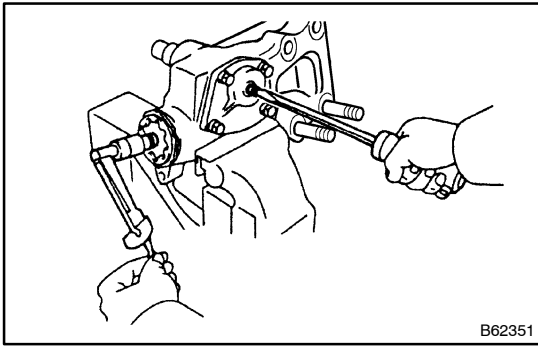
SST 09616-00011

HINT:

Be sure that the worm shaft is in the neutral position.

- (2) Place match marks on the worm shaft and worm bearing adjusting screw to show neutral position.





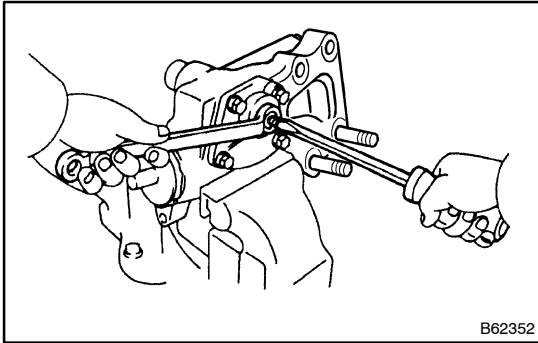
- (b) Using SST, torque wrench and a screwdriver, turn the sector shaft adjusting screw while measuring the preload until the preload is correct.
SST 09616-00011

HINT:

Be sure that the worm assy is in the neutral position.

Preload (Starting):

0.8 - 1.1 N·m (8 - 11 kgf·cm, 6.9 - 9.5 in.·lbf)

**25. INSTALL SECTOR SHAFT ADJUSTING SCREW LOCK NUT**

- (a) Apply adhesive to 2 or 3 threads of the nut.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

- (b) Install the nut.

Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)

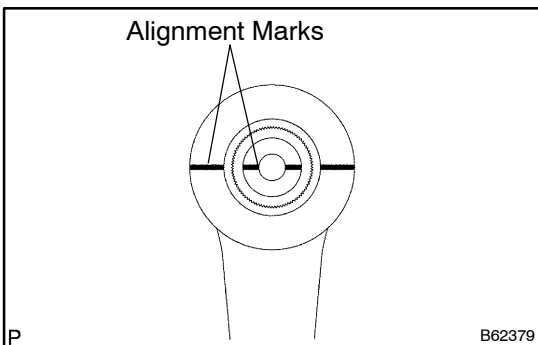
HINT:

Hold the sector shaft adjusting screw while torquing the sector shaft adjusting screw lock nut.

- (c) Recheck the total preload.

Preload (Starting):

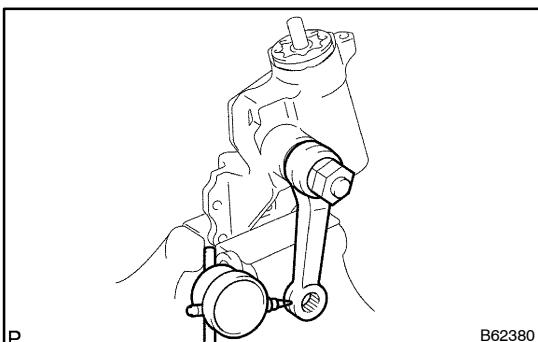
0.8 - 1.1 N·m (8 - 11 kgf·cm, 6.9 - 9.5 in.·lbf)

**26. INSTALL PITMAN ARM**

- (a) Align the alignment marks on the sector shaft and pitman arm.

- (b) Install the spring washer and nut.

Torque: 245 N·m (2,500 kgf·cm, 180 ft·lbf)

**27. INSPECT SECTOR SHAFT BACKLASH**

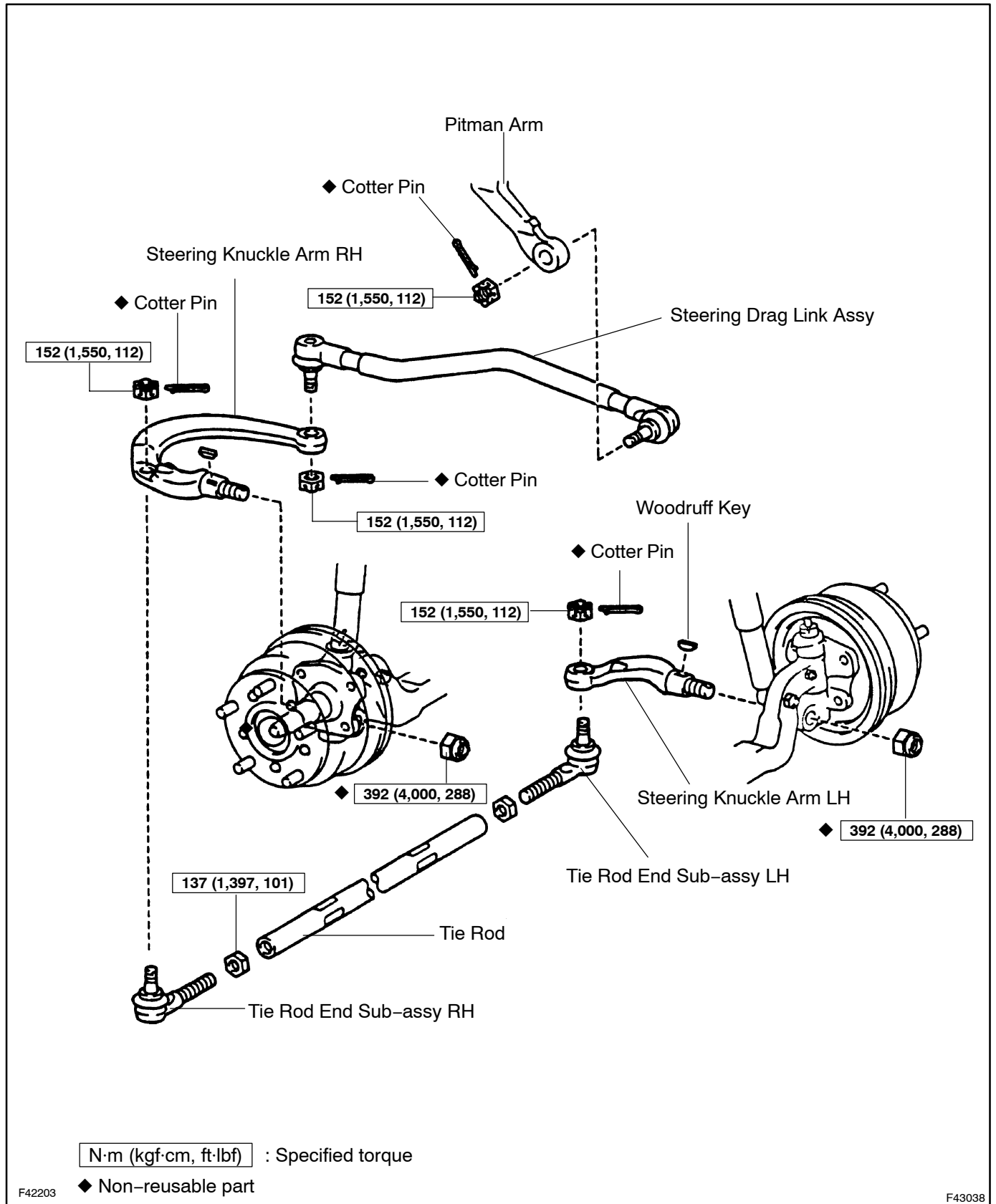
- (a) Set a dial indicator as shown.

- (b) Check that the sector shaft has a backlash of 0 mm (0 in.).

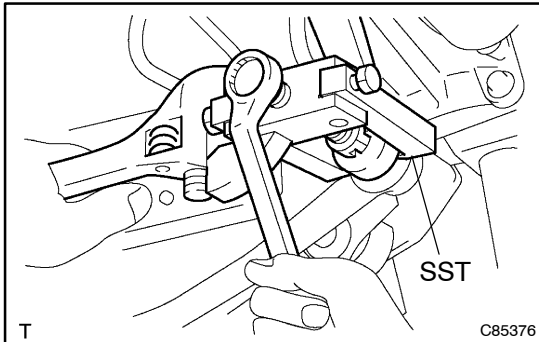
28. INSTALL MANUAL STEERING GEAR

STEERING LINKAGE (REGULAR CAB MODELS) COMPONENTS

52008-03



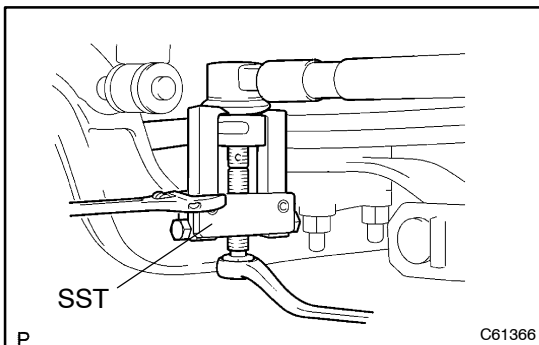
OVERHAUL



1. REMOVE STEERING DRAG LINK ASSY

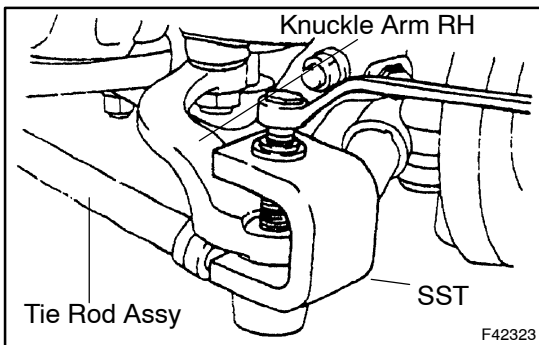
- (a) Remove the 2 cotter pins and 2 nuts.
- (b) Using SST, disconnect the drag link from the pitman arm.

SST 09628-62011



- (c) Using SST, disconnect the drag link from the knuckle arm.

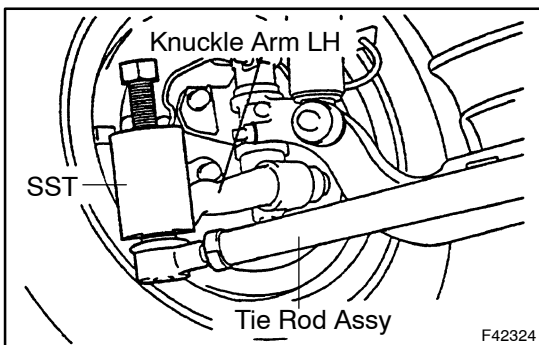
SST 09628-62011



2. REMOVE TIE ROD ASSY

- (a) Remove the 2 cotter pins and 2 nuts.
- (b) Using SST, disconnect the tie rod from the knuckle arm RH.

SST 09628-00011 or 09611-36020



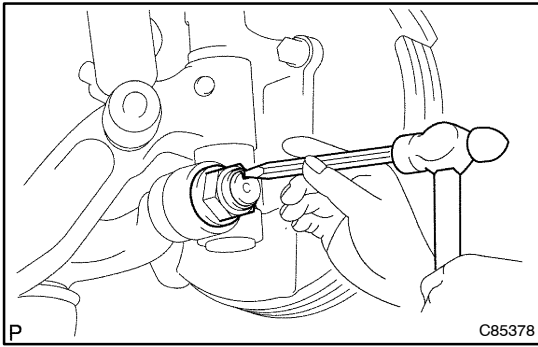
- (c) Remove the 2 cotter pins and 2 nuts.

- (d) Using SST, disconnect the tie rod from the knuckle arm LH.

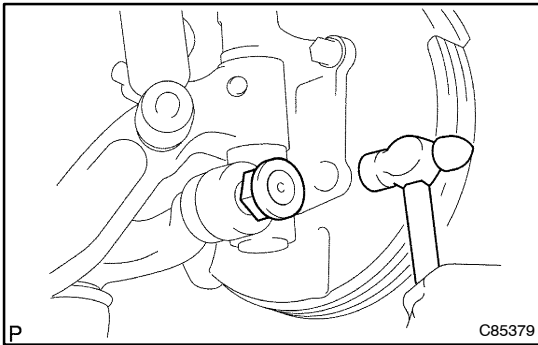
SST 09611-36020 or 09610-20012

3. REMOVE TIE ROD END SUB-ASSY

- (a) Loosen the lock nut.
- (b) Remove the tie rod end and lock nut from the tie rod.

**4. REMOVE STEERING KNUCKLE ARM LH**

- (a) Using a hammer and a chisel, unstake the lock nut.
- (b) Remove the lock nut.



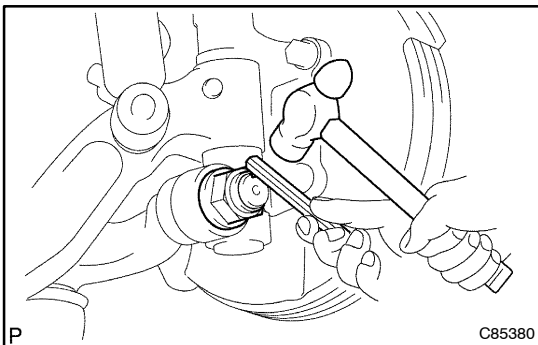
- (c) Using a hammer, tap out the knuckle arm from the steering knuckle.
- (d) Remove the woodruff key from the knuckle arm.

NOTICE:

Be careful not to damage the thread of the knuckle arm.

5. REMOVE STEERING KNUCKLE ARM RH**HINT:**

Use the same procedures described above for the LH side.

**6. INSTALL STEERING KNUCKLE ARM LH**

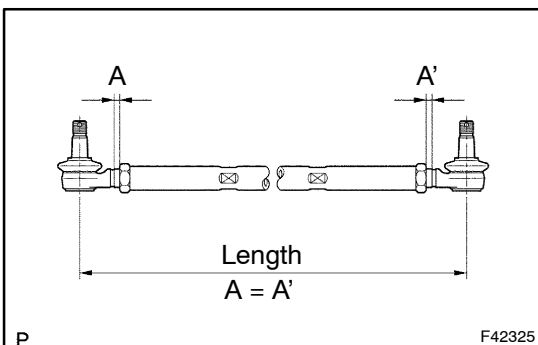
- (a) Install the woodruff key to the knuckle arm.
- (b) Install the knuckle arm to the steering knuckle.
- (c) Tighten a new lock nut.

Torque: 392 N·m (4,000 kgf·cm, 288 ft·lbf)

- (d) Using a hammer and a chisel, stake the lock nut.

7. INSTALL STEERING KNUCKLE ARM RH**HINT:**

Use the same procedures described above for the LH side.

**8. INSTALL TIE ROD END SUB-ASSY**

- (a) Screw the tie rod ends and lock nuts into the both ends of the tie rod by an equivalent amount.
- (b) Adjust the length of the tie rod end sub-assy.

Length: 1,158 mm (45.59 in.)

- (c) Temporarily tighten the lock nuts.
- (d) After toe-in adjustment, tighten the lock nut or clamp bolt.

Torque: 137 N·m (1,397 kgf·cm, 101 ft·lbf)

9. INSTALL TIE ROD ASSY

- (a) Install the tie rod to the right and left knuckle arms, then install the 2 nuts.

Torque: 152 N·m (1,550 kgf·cm, 112 ft·lbf)

10. INSTALL STEERING DRAG LINK ASSY

- (a) Install the drag link to the knuckle arm and steering pitman arm then install the 2 nuts.

Torque: 152 N·m (1,550 kgf·cm, 112 ft·lbf)

- (b) Install 2 new cotter pins.

11. INSPECT STEERING WHEEL CENTER POINT**12. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**

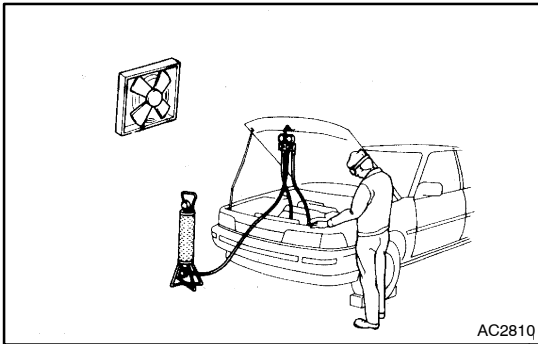
HEATER & AIR CONDITIONER

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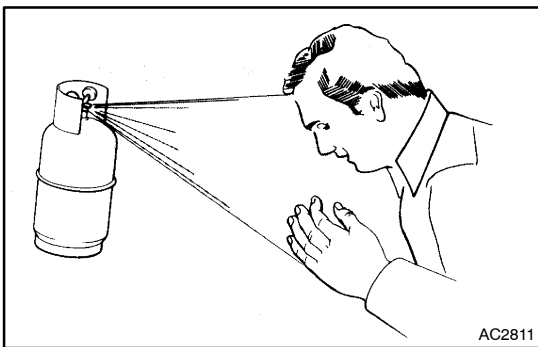
AIR CONDITIONING SYSTEM

PRECAUTION

550WS-01



1. **DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME**
2. **ALWAYS WEAR EYE PROTECTION**



3. **BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN**

If liquid refrigerant gets in your eyes or on your skin.

- (a) Wash the area with lots of cool water.

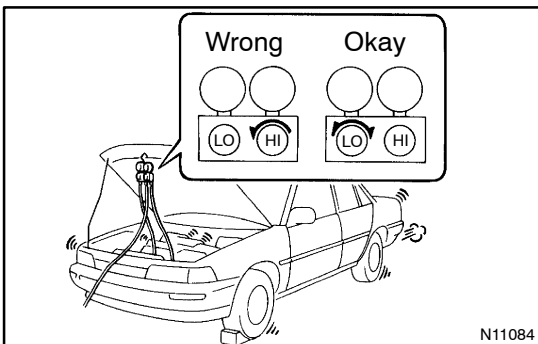
CAUTION:

Do not rub your eyes or skin.

- (b) Apply clean petroleum jelly to the skin.
- (c) Go immediately to a physician or hospital for professional treatment.

4. **NEVER HEAT CONTAINER OR EXPOSE IT TO NAKED FLAME**

5. **BE CAREFUL NOT TO DROP CONTAINER AND NOT TO APPLY PHYSICAL SHOCKS TO IT**



6. **DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERANT SYSTEM**

If there is not enough refrigerant in the refrigerant system, oil lubrication will be insufficient and compressor burnout may occur, so take care to avoid this.

7. **DO NOT OPEN HIGH PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATING**

If the high pressure valve are opened, refrigerant flows in the reverse direction and could cause the charging cylinder to rupture, so open and close only the low pressure valve.

8. **BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT**

If refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy, engine overheating etc.

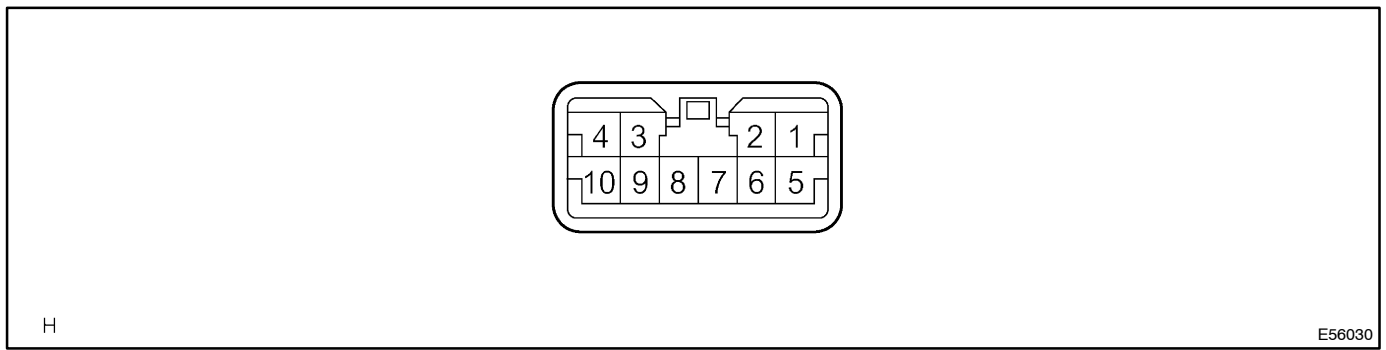
PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspect Area	See Page
Blower fan does not operate.	<ol style="list-style-type: none"> 1. HTR fuse 2. Heater relay 3. Blower motor 4. A/C conditioning amplifier assy 5. Wire harness 	<p>68-1</p> <p>68-1</p> <p>55-5</p> <p>55-3</p> <p>-</p>
Blower fan is not controlled.	<ol style="list-style-type: none"> 1. Blower motor 2. Blower switch 3. Wire harness 	<p>55-5</p> <p>55-5</p> <p>-</p>
Blower air is not warm.	<ol style="list-style-type: none"> 1. Engine coolant volume is little. 2. A/C conditioning amplifier assy 	<p>-</p> <p>55-3</p>
A/C compressor does not operate.	<ol style="list-style-type: none"> 1. Refrigerant volume is little. 2. A/C fuse 3. Magnetic clutch and compressor 4. Pressure switch 5. Heater relay 6. A/C conditioning amplifier assy 7. Thermistor 8. Wire harness 	<p>55-8</p> <p>68-1</p> <p>-</p> <p>55-3</p> <p>55-5</p> <p>55-3</p> <p>55-5</p> <p>-</p>
Blower air is not cool.	<ol style="list-style-type: none"> 1. Refrigerant volume is little. 2. Refrigerant pressure 3. Drive belt is loose. 4. Magnetic clutch and compressor 5. Condenser 6. Expansion valve 7. Pressure switch 8. Thermistor 9. A/C conditioning amplifier assy 10. Wire harness 	<p>55-8</p> <p>55-8</p> <p>55-23</p> <p>55-5</p> <p>55-44</p> <p>55-28</p> <p>55-3</p> <p>55-5</p> <p>55-3</p> <p>-</p>
Engine does not idle-up when A/C system operates.	<ol style="list-style-type: none"> 1. A/C conditioning amplifier assy 2. ECM 3. Idle control system 4. Wire harness 	<p>55-3</p> <p>01-27</p> <p>-</p> <p>-</p>
RECIRC/FRESH control does not operate.	<ol style="list-style-type: none"> 1. A/C conditioning amplifier assy 2. Air inlet control cable 3. Wire harness 	<p>55-3</p> <p>55-24</p> <p>-</p>
Mode control does not operate.	<ol style="list-style-type: none"> 1. A/C conditioning amplifier assy 2. Air outlet control cable 3. Wire harness 	<p>55-3</p> <p>55-24</p> <p>-</p>
A/C indicator is blinking.	<ol style="list-style-type: none"> 1. A/C compressor 2. Drive belt 3. A/C conditioning amplifier assy 	<p>55-5</p> <p>55-23</p> <p>55-3</p>
Illumination of A/C control assembly does not change when light control switch is turned on.	<ol style="list-style-type: none"> 1. Headlight and taillight system 2. A/C conditioning amplifier assy 	<p>-</p> <p>55-3</p>

ON-VEHICLE INSPECTION

1. INSPECT AIR CONDITIONING AMPLIFIER ASSY

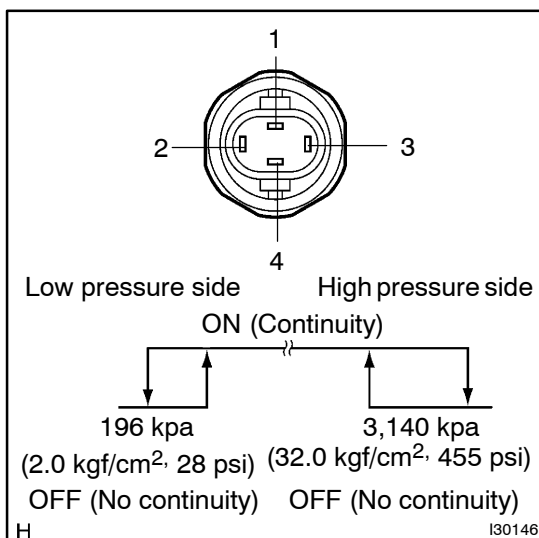


(a) Connect the connector to heater amplifier and inspect wire harness side from the back side, as shown in the chart below.

Standard :

Symbols (Terminal No.)	Condition	Specified Condition
PRS (1) ↔ GND (4)	Start engine Refrigerant pressure: Normally → Less than 0.19 MPa (2.0 kgf/cm ² , 28 psi) or more than 3.14 MPa (32 kgf/cm ² , 455 psi)	20 - 28 → Below 2.0 V
TE (2) ↔ SG (10)	Ignition switch: ON Evaporator temp.: 0°C (32°F) → 15°C (59°F)	0°C: 2.1 - 2.5 V 15°C: 1.2 - 1.6 V
GND (4) ↔ Body ground	Always	Continuity
A/C (5) ↔ GND (4)	Blower switch: ON A/C switch: OFF → ON	Below 2.0 V → 20 - 28 V
B/V (6) ↔ SG (10)	Ignition switch: ON Evaporator temp.: 0°C (32°F) → 15°C (59°F)	0°C: 2.9 - 3.3 V 15°C: 2.1 - 2.5 V
IG (7) ↔ GND (4)	Ignition switch: OFF → ON	Below 2.0 V → 20 - 28 V
MGC (9) ↔ GND (4)	Start engine A/C switch: OFF → ON (Magnetic clutch: OFF → ON)	20 - 28 V → Below 2.0 V
SG (10) ↔ Body ground	Always	Continuity
15B-FTE: ACT (3) ↔ GND (4)	Engine Idling → Rapid Accelate	20 - 28 V → Below 2.0 V

If circuit is as specified, try replacing the amplifier with a new one. If the circuit is not as specified, inspect the circuits connected to other parts.



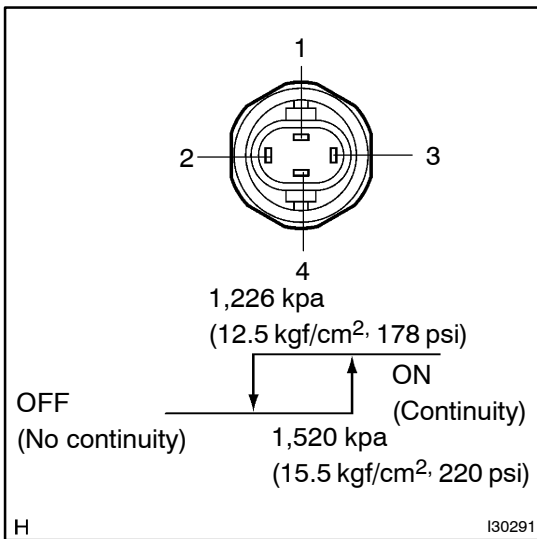
2. CHECK PRESSURE SWITCH NO.1

(a) Magnetic clutch control:

Check pressure switch operation.

- (1) Set on the manifold gauge set.
- (2) Connect the positive (+) lead from the ohmmeter to terminal 4 and the negative (-) lead to terminal 1.
- (3) Check continuity between terminals when refrigerant pressure is changed, as shown in the illustration.

If operation is not as specified, replace the pressure switch.

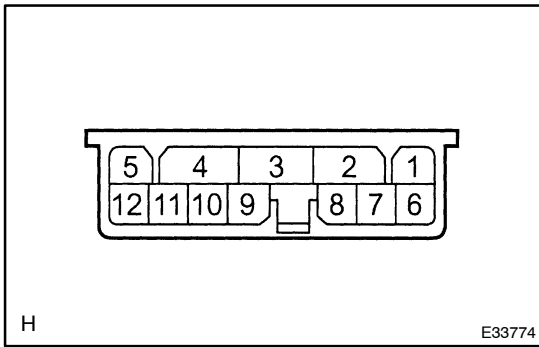


(b) Cooling fan control:

Check pressure switch operation.

- (1) Connect the positive (+) lead from the ohmmeter to terminal 2 and the negative (-) lead to terminal 3.
- (2) Check continuity between terminals when refrigerant pressure is changed, as shown in the illustration.

If operation is not as specified, replace the pressure switch.



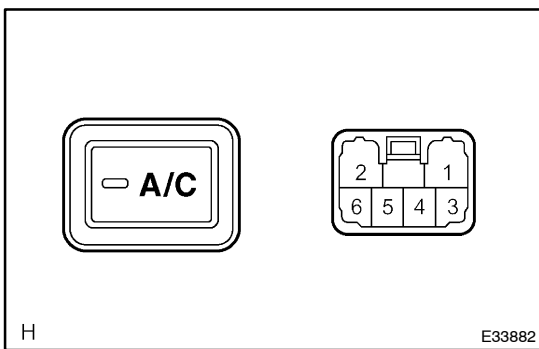
INSPECTION

1. INSPECT HEATER BLOWER SWITCH ASSY

(a) Inspect switch continuity.

Switch position	Tester connection	Specified Condition
OFF	All	No continuity
LO	4 ↔ 1	Continuity
M1	12 ↔ 4 ↔ 1	Continuity
M2	5 ↔ 4 ↔ 1	Continuity
HI	2 ↔ 4 ↔ 1	Continuity

If the result is not as specified, replace the switch assy.

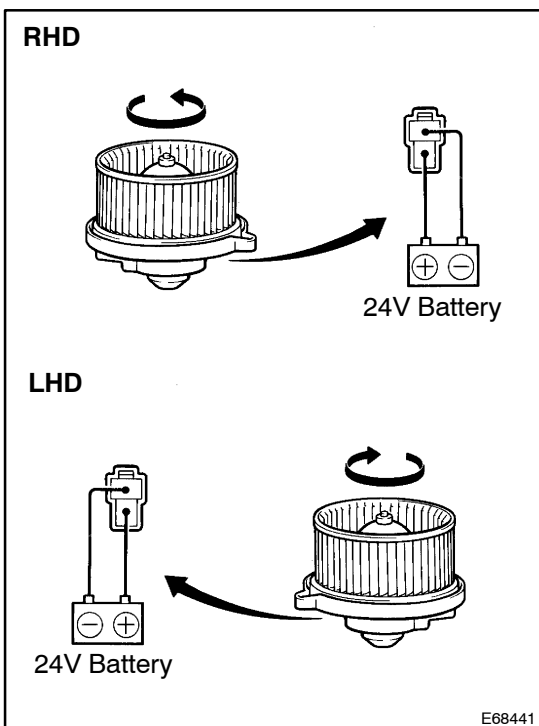


2. INSPECT COOLER SWITCH

(a) Inspect switch continuity.

Switch position	Tester connection	Specified Condition
OFF	5 ↔ 6	No continuity
ON	5 ↔ 6	Continuity

If the result is not as specified, replace the switch.

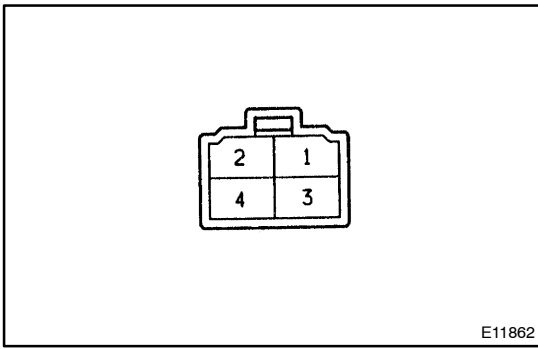


3. INSPECT HEATER BLOWER MOTOR SUB-ASSY

(a) Connect the positive (+) lead from the 24 V battery to terminal 1 and negative (-) to terminal 2.

(b) Check that the motor operates smoothly

If operation is not as specified, replace the blower motor sub-assy.



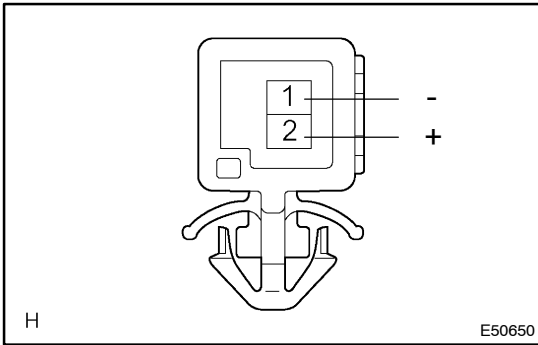
4. INSPECT BLOWER RESISTOR

(a) Measure resistance between terminals, as shown in the chart below.

Standard resistance:

Tester connection	Specified Condition
1 ↔ 3	0.45 ± 0.03 Ω
1 ↔ 2	1.00 ± 0.07 Ω
1 ↔ 4	2.42 ± 0.17 Ω

If the result is not as specified, replace the blower resistor.



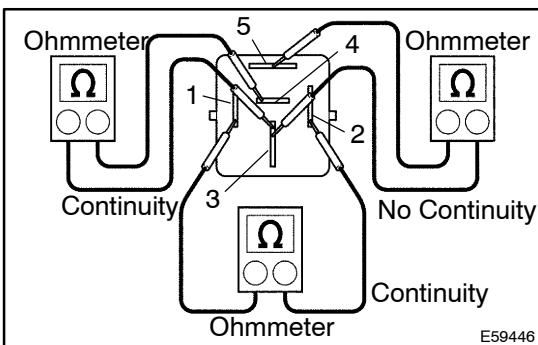
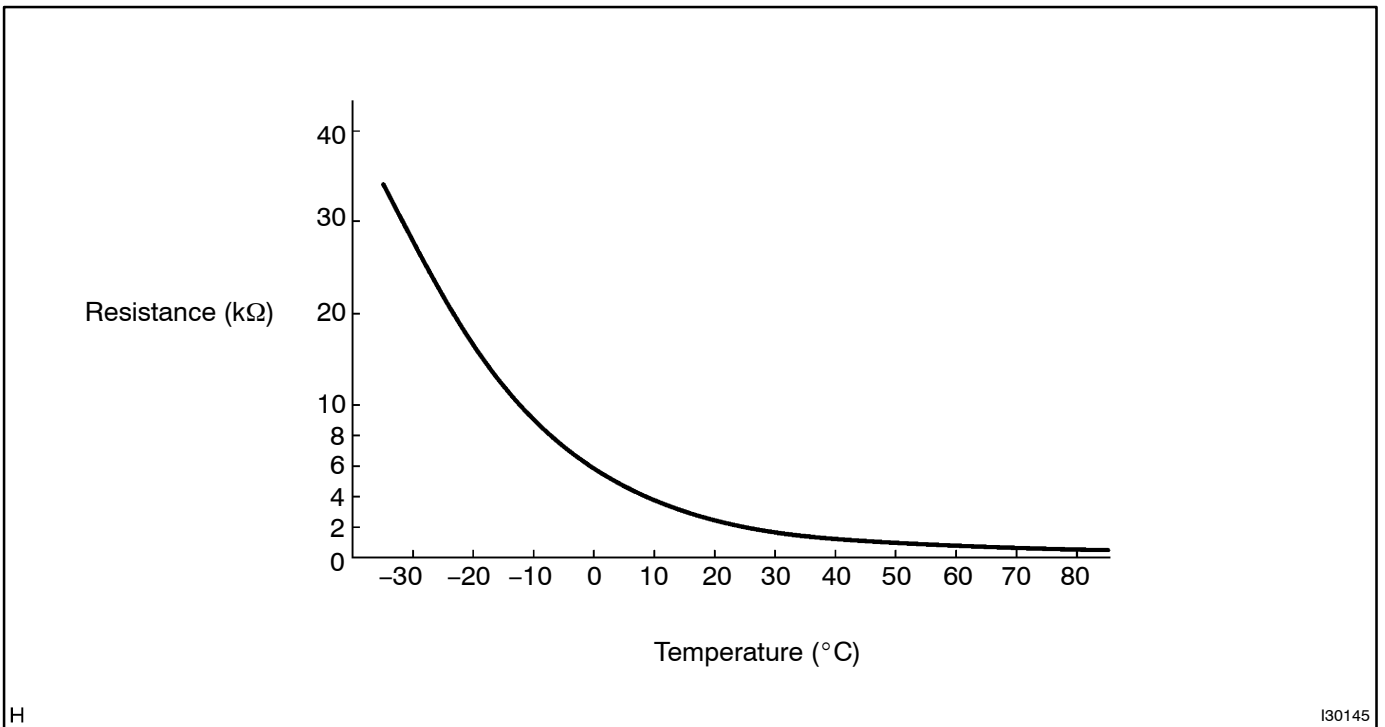
5. INSPECT COOLER THERMISTOR NO.1

(a) Measure the resistance between the connector terminals.

Standard resistance:

Condition	Specified Condition
0°C (32°C)	4.6 - 5.1 kΩ
15°C (59°C)	2.1 - 2.6 kΩ

If the result is not as specified, replace the thermistor.



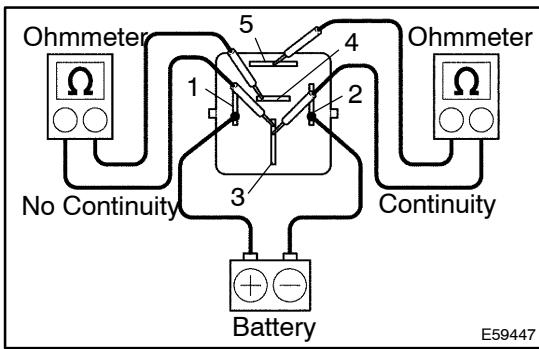
6. INSPECT HEATER BLOWER MOTOR RELAY ASSY

(a) Remove the relay.

(b) Inspect the relay continuity.

Using an ohmmeter, check the continuity between the terminals.

Terminals	Specified Condition
1 - 2	Continuity
3 - 4	Continuity
3 - 5	No Continuity

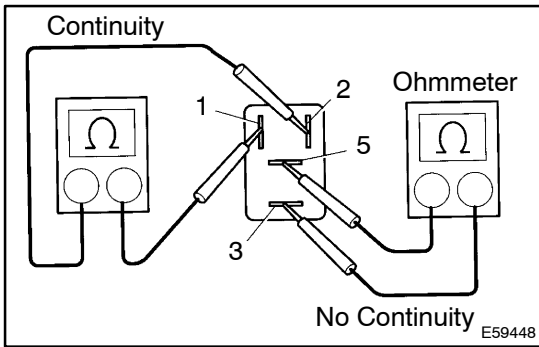


- (c) Inspect the relay operation.
Using an ohmmeter, check the continuity between the terminals when applying battery positive voltage across terminals 1 and 2.

Terminals	Specified Condition
3 - 4	No Continuity
3 - 5	Continuity

If the result is not as specified, replace relay assy.

- (d) Reinstall the relay.

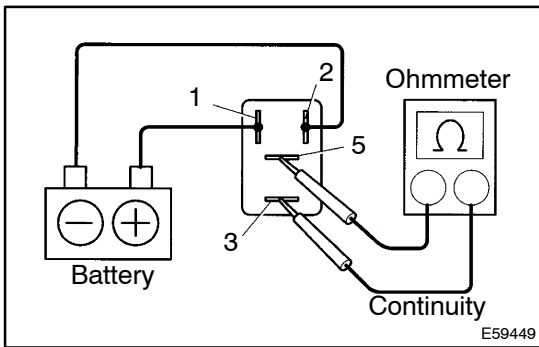


7. INSPECT MAGNETIC CLUTCH RELAY

- (a) Remove the relay.
(b) Inspect the relay continuity.
Using an ohmmeter, check the continuity between the terminals.

Terminals	Specified Condition
1 - 2	Continuity
3 - 5	No Continuity

If the result is not as specified, replace it.



- (c) Inspect the relay operation.
(1) Apply battery positive voltage across terminals 1 and 2.
(2) Using an ohmmeter, check there is continuity between terminal 3 and 5.

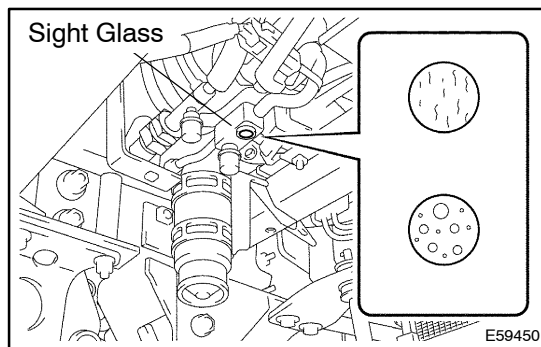
If the result is not as specified, replace relay.

- (d) Reinstall the relay.

REFRIGERANT

ON-VEHICLE INSPECTION

550W9-01



1. CHECK REFRIGERANT VOLUME

(a) Observe the sight glass on the liquid tube.

Test conditions:

- Running engine at 1,500 rpm
- Blower speed control switch at "HI"
- A/C switch ON
- Temperature control dial at "MAX. COOL"
- Fully open the doors

Item	Symptom	Amount of refrigerant	Corrective Actions
1	Bubbles present	Insufficient*	1. Check for gas leakage and repair if necessary 2. Add refrigerant until bubbles disappear
2	No bubbles present	None, insufficient or too much	Refer 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	1. Check for gas leakage with gas leak detector and repair if necessary 2. Add refrigerant until bubbles disappear
4	Considerable temperature difference between compressor inlet and outlet.	Correct or too much	Refer to 5 and 6
5	Immediately after air conditioning is turned off, refrigerant clear	Too much	1. Discharge refrigerant 2. Remove air and supply proper amount or purified refrigerant
6	Immediately after air conditioning is turned off, refrigerant foams and then becomes clear	Correct	-

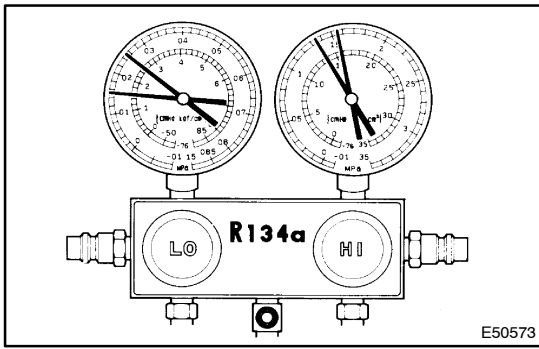
*: Bubbles in the sight glass with ambient temperatures higher than usual can be considered normal if cooling is sufficient.

2. CHECK REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

(a) This is a method in which the trouble is located by using a manifold gauge set. Read the manifold gauge pressure when these conditions are established.

Test conditions:

- Temperature at the air inlet with the switch set at RECIRC is 30 – 35 °C (86 – 95 °F)
- Engine running at 1,500 rpm
- Blower speed control switch at "HI" position
- Temperature control dial at "COOL" position
- A/C switch ON
- Fully open doors



(1) Normally functioning refrigeration system.

Gauge reading:

Low pressure side:

0.15 – 0.25 MPa (1.5 – 2.5 kgf/cm²)

High pressure side:

1.37 – 1.57 MPa (14 – 16 kgf/cm²)

(2) Moisture present in refrigeration system.

Condition : Periodically cools and then fails to cool

I22117

Symptom	Probable cause	Diagnosis	Remedy
During operation, pressure on low pressure side sometimes become a vacuum and sometimes is normal	Moisture in refrigerating system freezes at expansion valve orifice causing a temporary stop of cycle, however, when it melts, normal state is restored.	<ul style="list-style-type: none"> • Drier in oversaturated state • Moisture in refrigerating system freezes at expansion valve orifice and blocks circulation of refrigerant 	<ol style="list-style-type: none"> 1. Replace condenser 2. Remove moisture in cycle by repeatedly evacuating air 3. Supply proper amount of new refrigerant

(3) Insufficient cooling

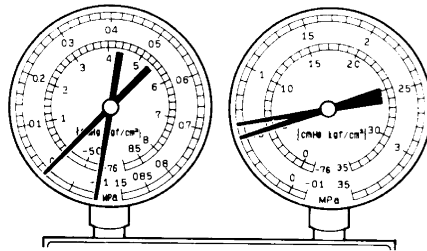
Condition: Cooling system does not function effectively.

I22118

Symptom	Probable cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> • Pressure low on both low and high pressure sides • Bubbles seen through sight glass continuously • Insufficient cooling performance 	Gas leakage in refrigeration system	<ul style="list-style-type: none"> • Insufficient refrigerant • Refrigerant leaking 	<ol style="list-style-type: none"> 1. Check for gas leakage and repair if necessary 2. Supply proper amount of new refrigerant 3. If indicated pressure value is close to 0 when connected to gauge, create the vacuum after inspecting and repairing location of leak

(4) Poor circulation of refrigerant

Condition: Cooling system does not functioning effectively.

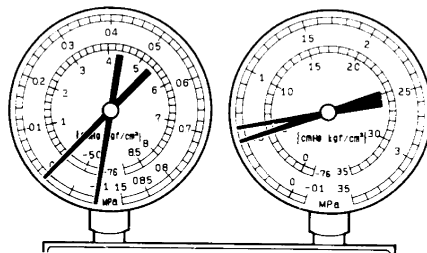


I22119

Symptom	Probable cause	Diagnosis	Corrective Action
<ul style="list-style-type: none"> • Pressure low on both low and high pressure sides • Frost on pipe from condenser to unit 	Refrigerant flow obstructed by dirt in receiver	Receiver clogged	Replace condenser

(5) Refrigerant does not circulate

Condition: Cooling system does not function. (Sometimes it may function)



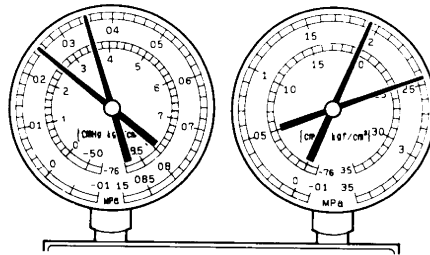
I22120

HEATER & AIR CONDITIONER – REFRIGERANT

Symptom	Probable cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> • Vacuum indicated on low pressure side, very low pressure indicated on high pressure side • Frost or dew seen on piping before and after receiver/ drier or expansion valve 	<ul style="list-style-type: none"> • Refrigerant flow obstructed by moisture or dirt in refrigerating system • Refrigerant flow obstructed by gas leaked from expansion valve 	Refrigerant does not circulate	<ol style="list-style-type: none"> 1. Check expansion valve 2. Clean out dirt in expansion valve by air blowing 3. Replace condenser 4. Evaporate air and supply proper amount of new refrigerant 5. For gas leakage from expansion valve, replace expansion valve

(6) Refrigerant overcharged or insufficient cooling of condenser

Condition: Cooling system does not function effectively.

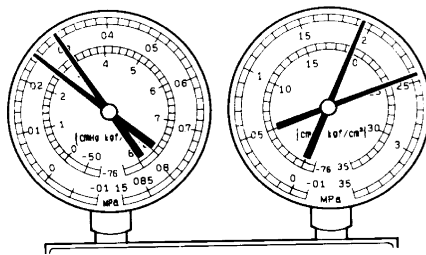


I22121

Symptom	Probable cause	Diagnosis	Remedy
<ul style="list-style-type: none"> • Pressure too high on both low and high pressure sides • No air bubbles seen through the sight glass even when the engine rpm is lowered 	<ul style="list-style-type: none"> • Unable to develop sufficient performance due to excessive use of refrigerating system • Insufficient cooling of condenser 	<ul style="list-style-type: none"> • Excessive refrigerant in cycle → too much refrigerant supplied • Condenser cooling insufficient → condenser fins clogged at cooling fan 	<ol style="list-style-type: none"> 1. Clean condenser 2. Check cooling fan with cooling fan motor operation 3. If (1) and (2) are in normal state, check amount of refrigerant and supply proper amount of refrigerant

(7) Air present in refrigeration system

Condition: Cooling system does not function.



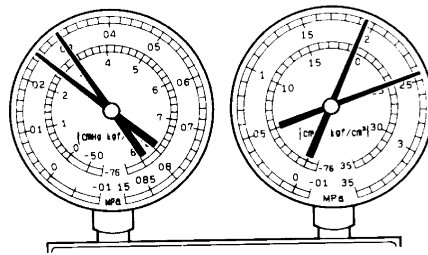
NOTE : These gauge indications are shown when the refrigerating system has been opened and the refrigerant charged without vacuum purging.

I22122

Symptom	Probable cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> • Pressure too high on both low and high pressure sides • The low pressure piping is too hot to touch 	Air entered in refrigerating system	<ul style="list-style-type: none"> • Air present in refrigerating system • Insufficient vacuum purging 	<ol style="list-style-type: none"> 1. Check compressor oil to see if it is dirty or insufficient 2. Evacuate air and supply new refrigerant

(8) Expansion valve functions improperly

Condition: Refrigerant functions insufficiently.

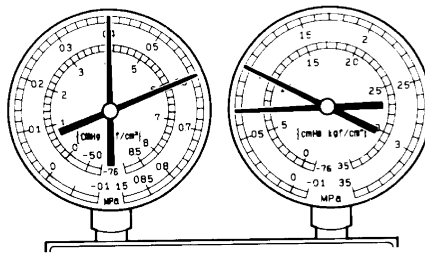


I22123

Symptom	Probable cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> • Pressure too high on both low and high pressure sides • Frost or large amount of dew on piping on low pressure side 	Trouble in expansion valve	<ul style="list-style-type: none"> • Excessive refrigerant in low pressure piping • Expansion valve opened too wide 	Check expansion valve

(9) Defective compression compressor

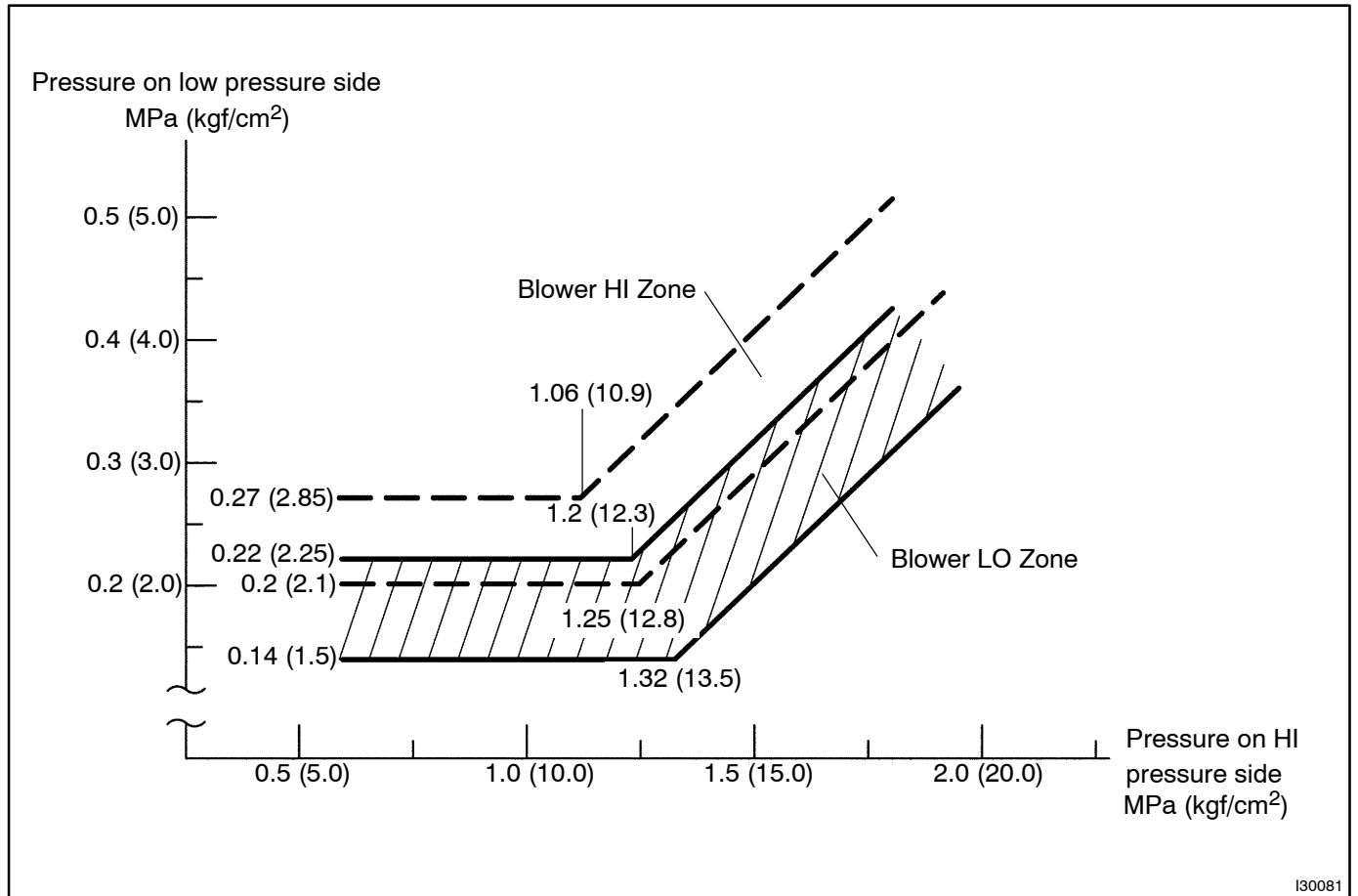
Condition : Refrigerant is not effective.



I22124

Symptom	Probable cause	Diagnosis	Corrective Actions
<ul style="list-style-type: none"> • Pressure too high on low pressure side • Pressure too low on high pressure side 	Internal leak in compressor	<ul style="list-style-type: none"> • Compression failure • Leakage from damaged valve or broken sliding parts 	Repair or replace compressor

Gauge readings (Reference)



REPLACEMENT

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

- Turn the A/C switch ON.
- Operating the cooler compressor at the engine rpm of approx. 1,000 for 5 to 6 min., circulate the refrigerant and collect compressor oil remaining in each component into the cooler compressor as much as possible.
- Stop the engine.
- Let the refrigerant gas out.

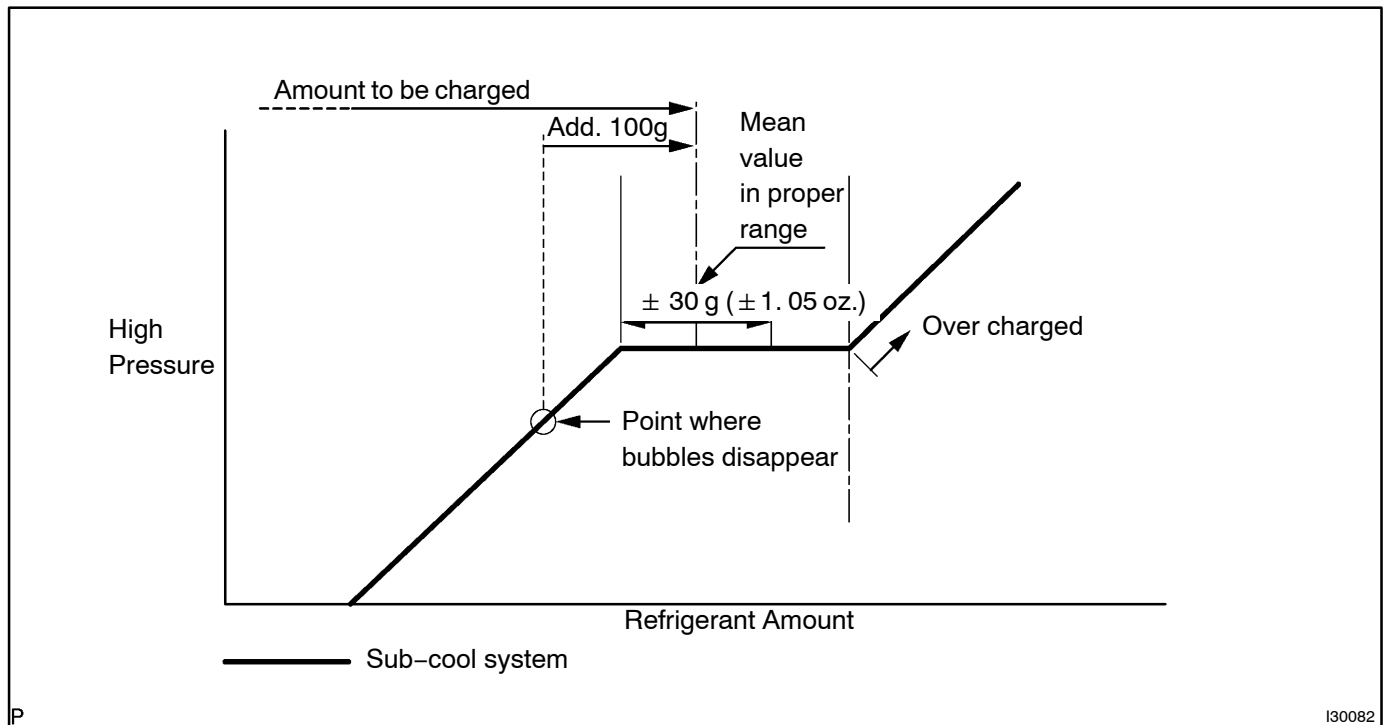
SST 07110-58060 (07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)

2. CHARGE REFRIGERANT

- Using a vacuum pump, perform vacuum pumping.
- Charge refrigerant HFC-134a (R134a).

Standard: A/C: 550 ± 50 g (19.40 ± 1.76 oz.)

SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)



NOTICE:

Do not operate the cooler compressor without refrigerant charged, because the compressor will be burned due to a lack of lubrication.

HINT:

From the point where bubbles disappear, add more refrigerant by 100 g.

3. WARM UP ENGINE

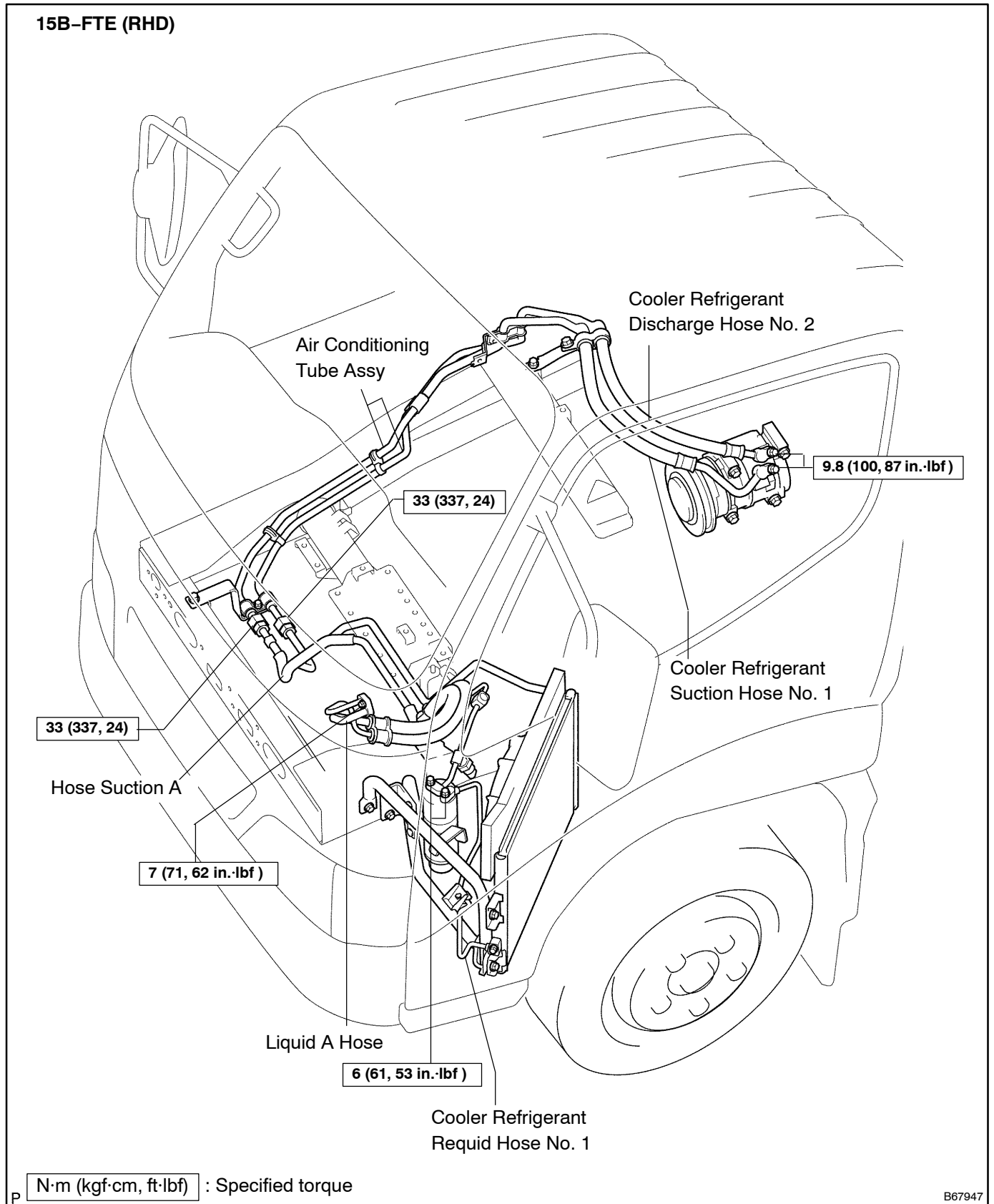
HINT:

Idle the compressor by 2000 rpm or less for 2 minutes or more after charging refrigerant.

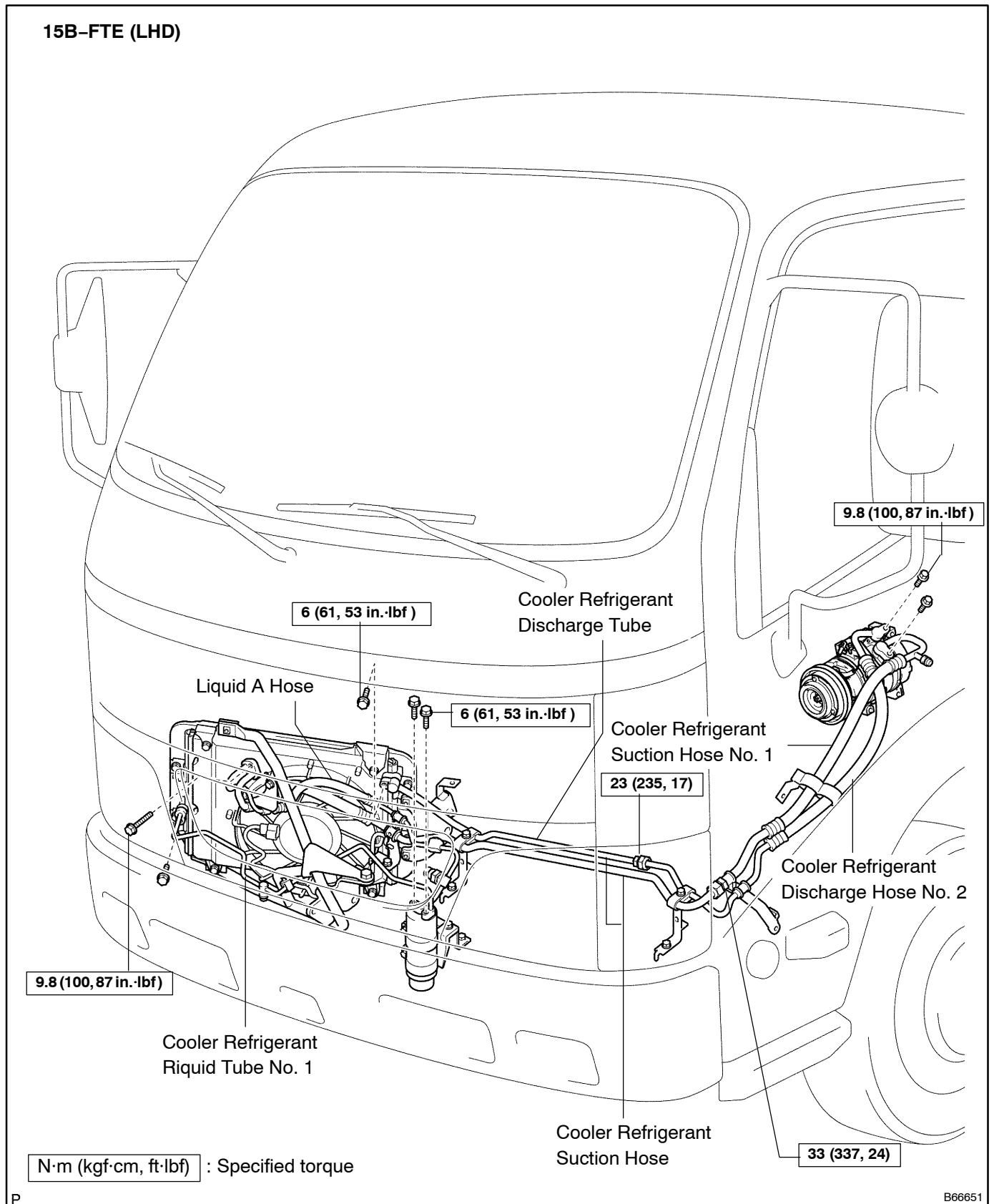
4. INSPECT LEAKAGE OF REFRIGERANT

REFRIGERANT LINE COMPONENTS

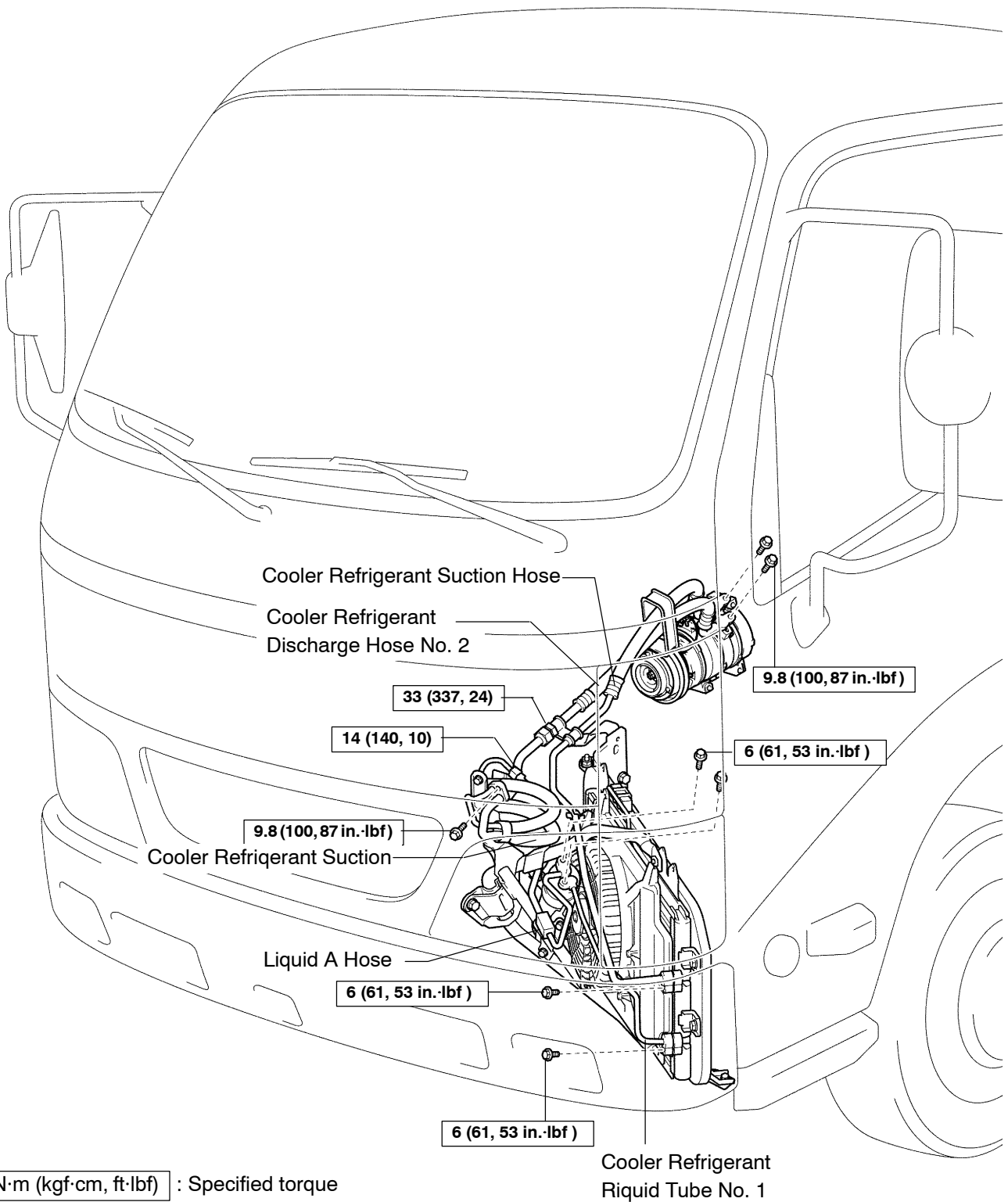
550WB-01



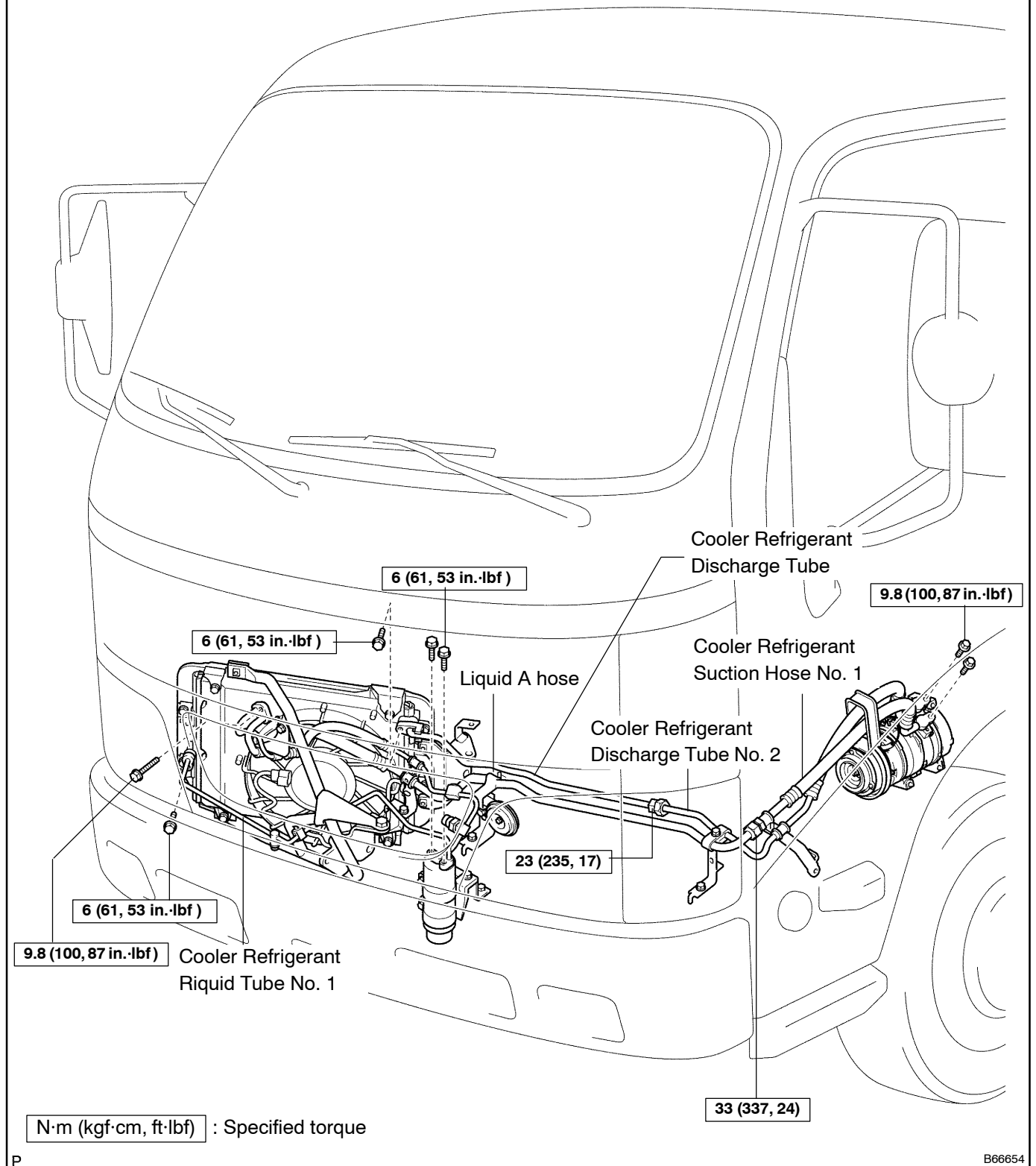
15B-FTE (LHD)



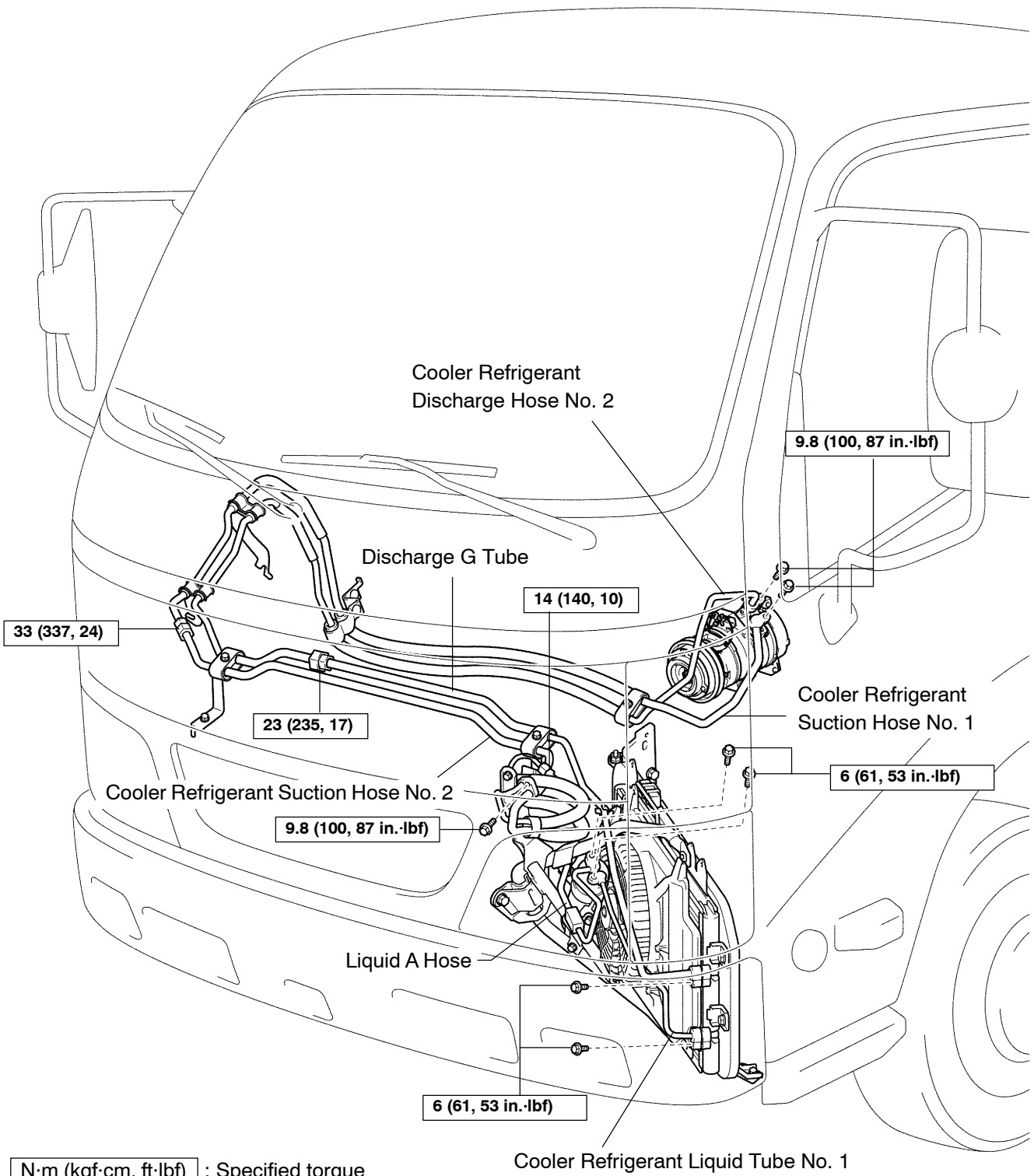
S05C-B (RHD)



S05C-B (LHD)

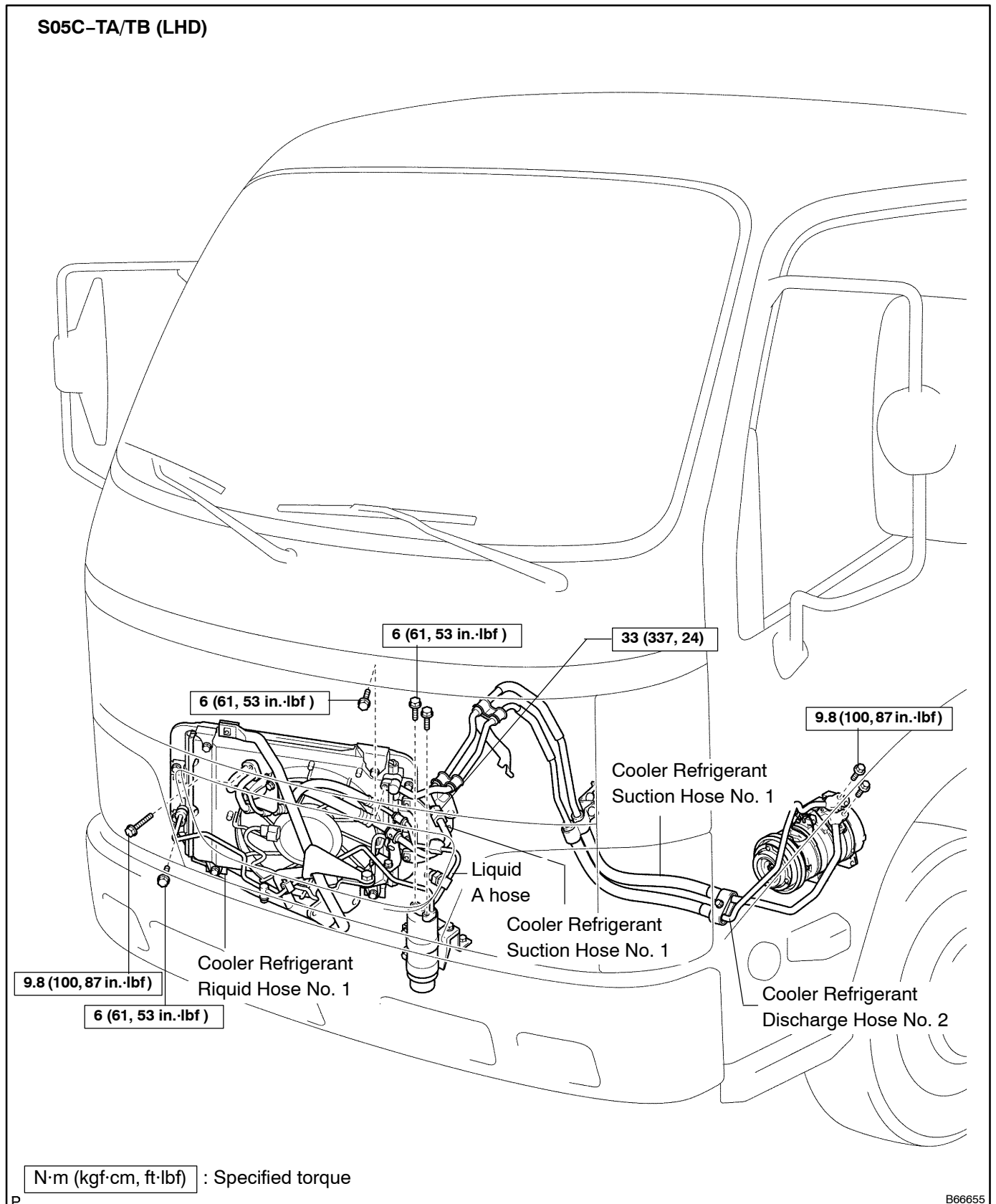


S05C-TA/TB (RHD)

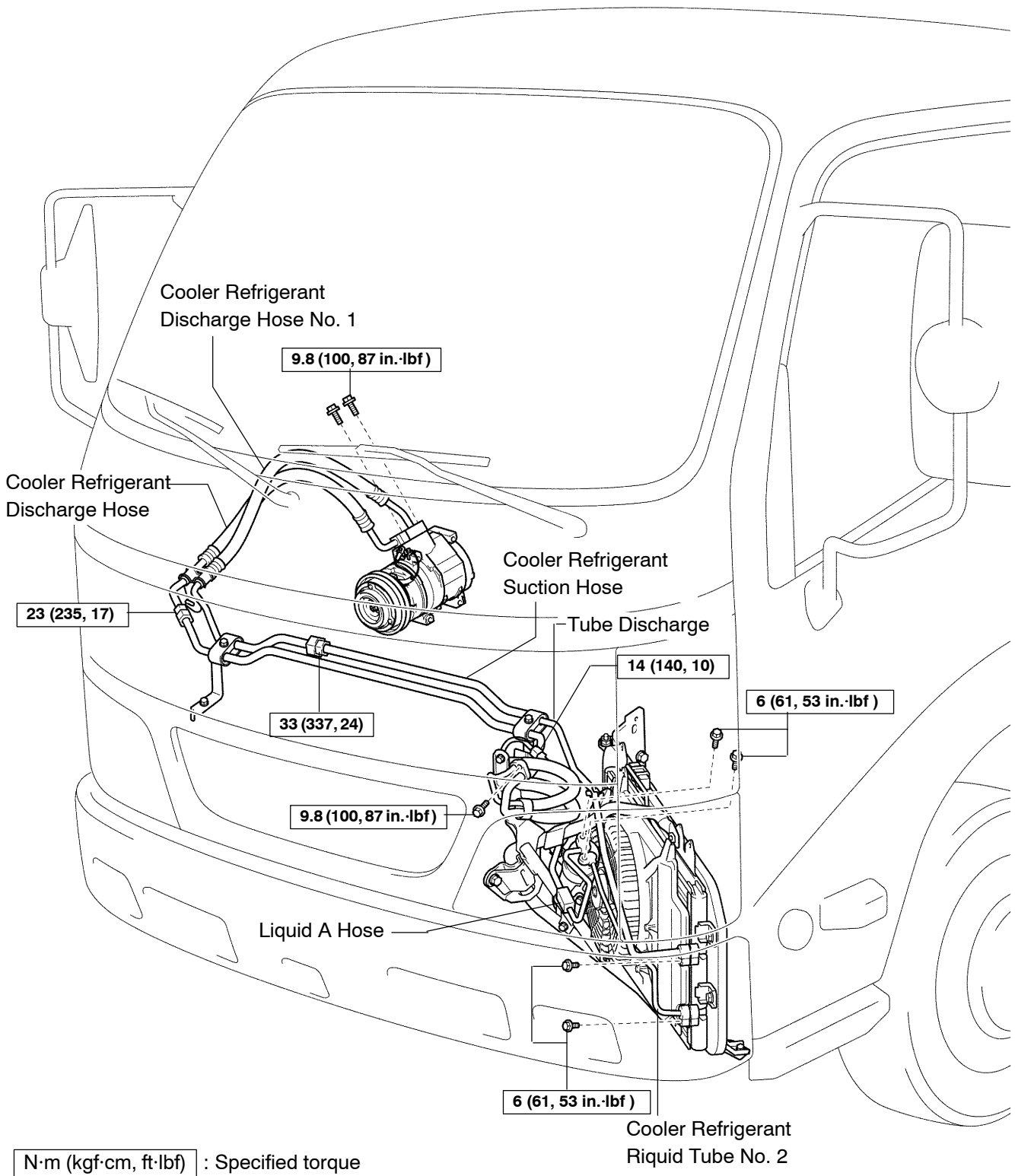


N·m (kgf·cm, ft·lbf) : Specified torque

S05C-TA/TB (LHD)

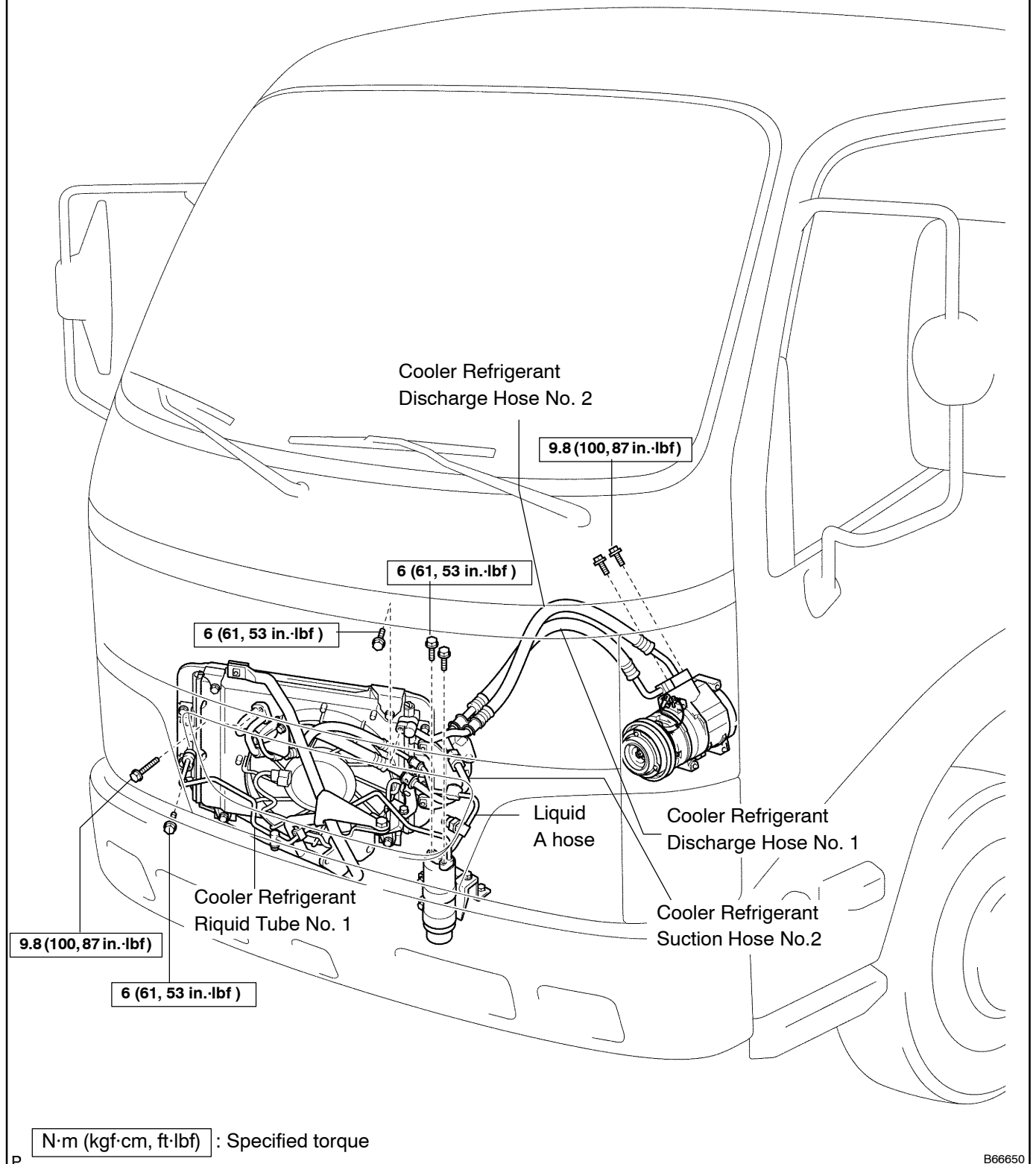


W04D-J (RHD)



P

W04D-J (LHD)



V COOLER BELT REPLACEMENT

550WC-01

1. REPLACE V COOLER BELT

- (a) Loosen the idler pulley bolt.
- (b) Loosen the adjusting bolt and remove the belt.
- (c) Install a new belt and extend the belt by tightening the adjusting bolt.

2. ADJUST V COOLER BELT

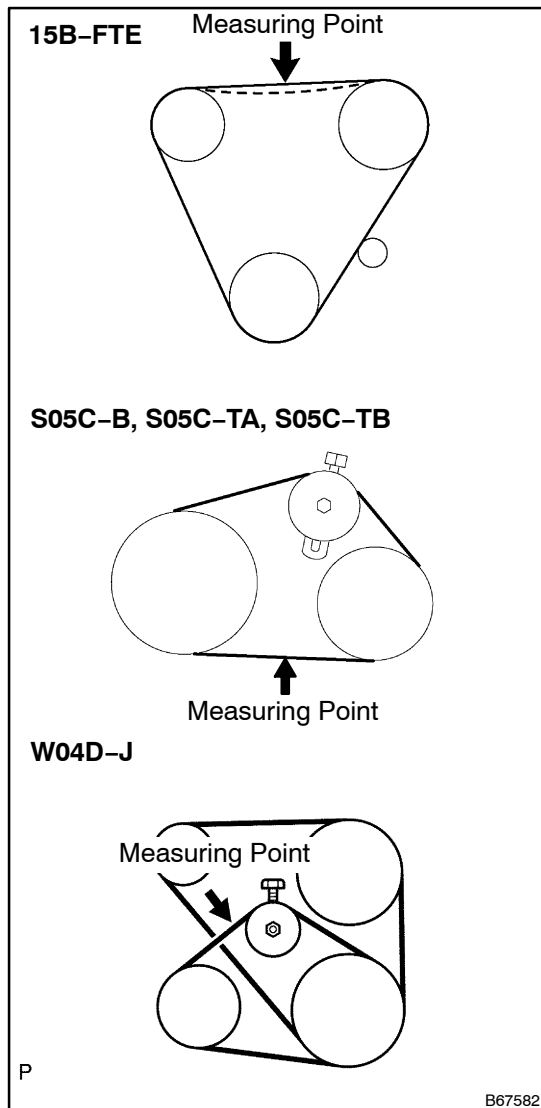
- (a) Check the drive belt deflection by pressing on the belt at the point in the illustration with force of 98 N (10 kgf, 22 lbf).

Drive belt deflection:

Engine	Belt	Deflection
15B-FTE	New	9.0 - 12.0 mm (0.35 - 0.47 in.)
	Used	12.0 - 16.0 mm (0.47 - 0.63 in.)
S05C-#	New	7.0 - 8.5 mm (0.28 - 0.34 in.)
	Used	8.5 - 10.0 mm (0.34 - 0.39 in.)
W04D-J	New	7.0 - 8.5 mm (0.28 - 0.34 in.)
	Used	8.5 - 10.0 mm (0.34 - 0.39 in.)

- (b) Tighten the idler pulley bolt.

Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)



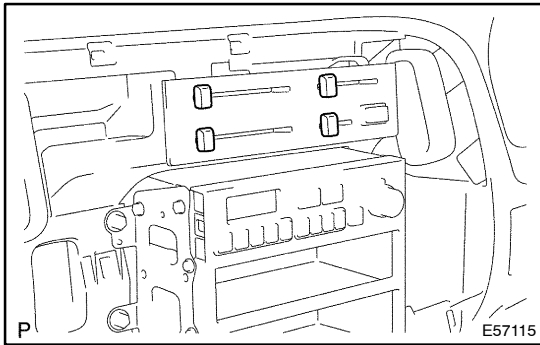
HEATER OR BOOST VENTILATOR CONTROL ASSY OVERHAUL

550WD-01

HINT:

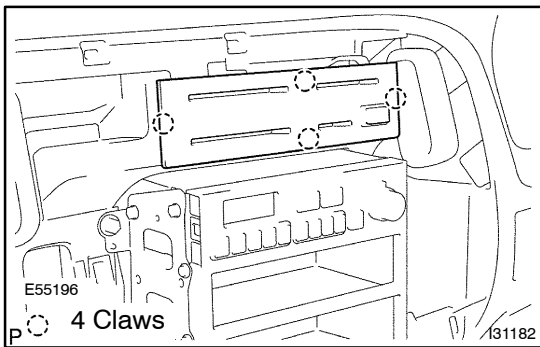
The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSY CENTER (See page 71-11 or 71-17)



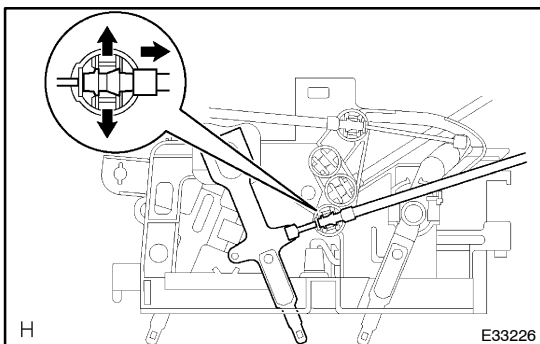
2. REMOVE HEATER CONTROL LEVER KNOB

- (a) w/ Heater:
Remove the 4 heater control lever knobs.
- (b) w/o Heater:
Remove the 3 heater control lever knobs.



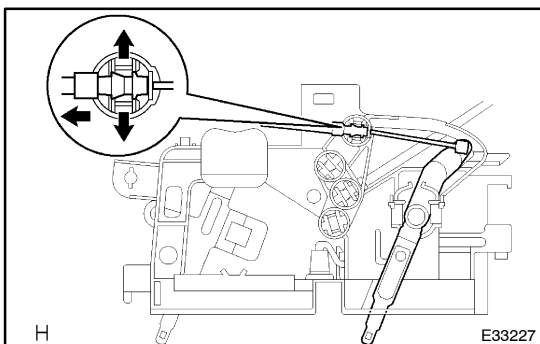
3. REMOVE HEATER CONTROL NAME PLATE

- (a) Release the 4 claw fittings and remove the heater control name plate.

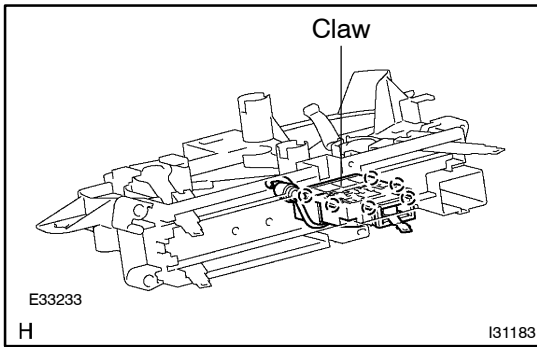


4. REMOVE HEATER OR BOOST VENTILATOR CONTROL ASSY

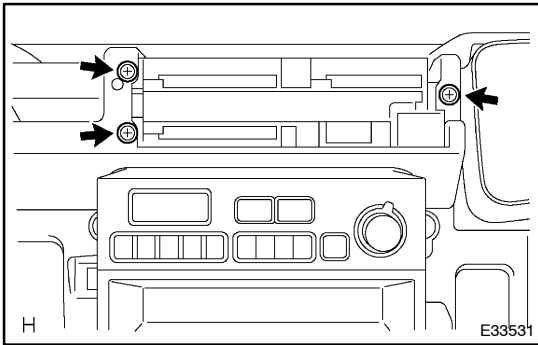
- (a) Spread the clamp's claws of the defroster damper control cable and disconnect the inner cable.



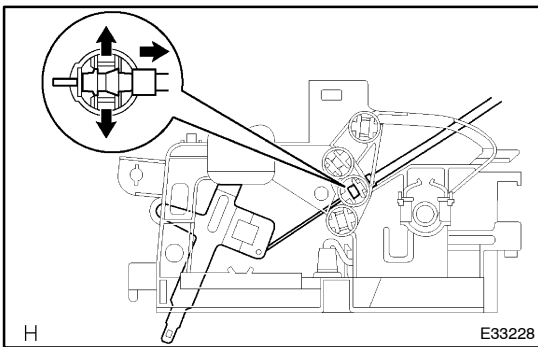
- (b) Spread the clamp's claws of the air inlet damper control cable and disconnect the inner cable.



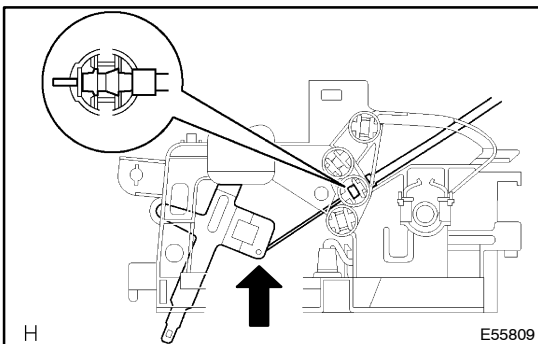
- (c) Release the claw fitting and remove the heater blower switch assy and bulb.



- (d) Remove the 3 screws and heater or boost ventilator control assy.



- (e) Spread the clamp's claws of the air mix damper control cable and disconnect the inner cable.
 (f) Disconnect the connector, remove the heater or boost ventilator control assy.

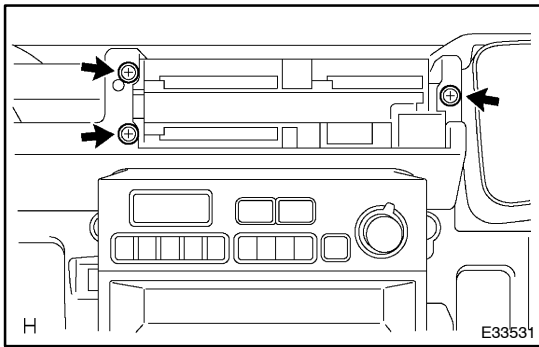


5. INSTALL HEATER OR BOOST VENTILATOR CONTROL ASSY

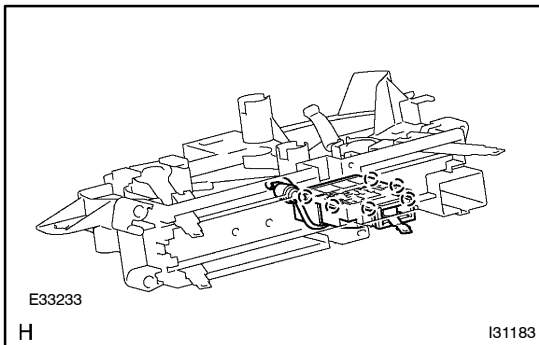
- (a) Install the inner cable end of the air mix damper control cable to the heater control lever.
 (b) Install the outer cable of the air mix damper control cable to the cable clamp.

HINT:

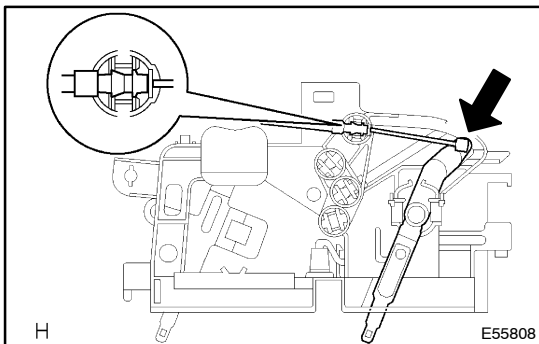
Operating the heater control knob, check that it properly stops at both ends of MAX. COOL and MAX. HOT and no recoil is identified.



- (c) Install the heater or boost ventilator control assy with the 3 screws.



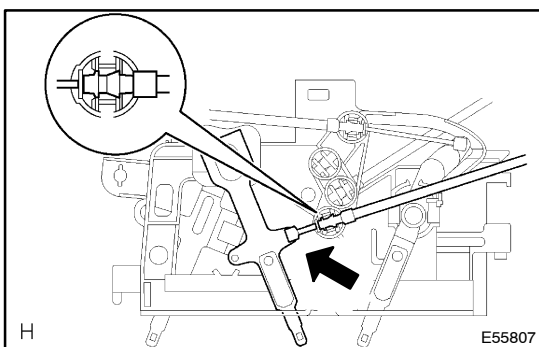
- (d) Install the heater blower switch assy and bulb.



- (e) Install the inner cable end of the air inlet damper control cable to the control lever.
 (f) Install the outer cable of the air inlet damper control cable to the cable clamp.

HINT:

Operating the R/F control knob, check that it properly stops at both ends of RECIRC and FRESH and no recoil is identified.



- (g) Install the inner cable end of the defroster damper control cable to the heater control lever.
 (h) Install the outer cable of the defroster damper control cable to the cable clamp.

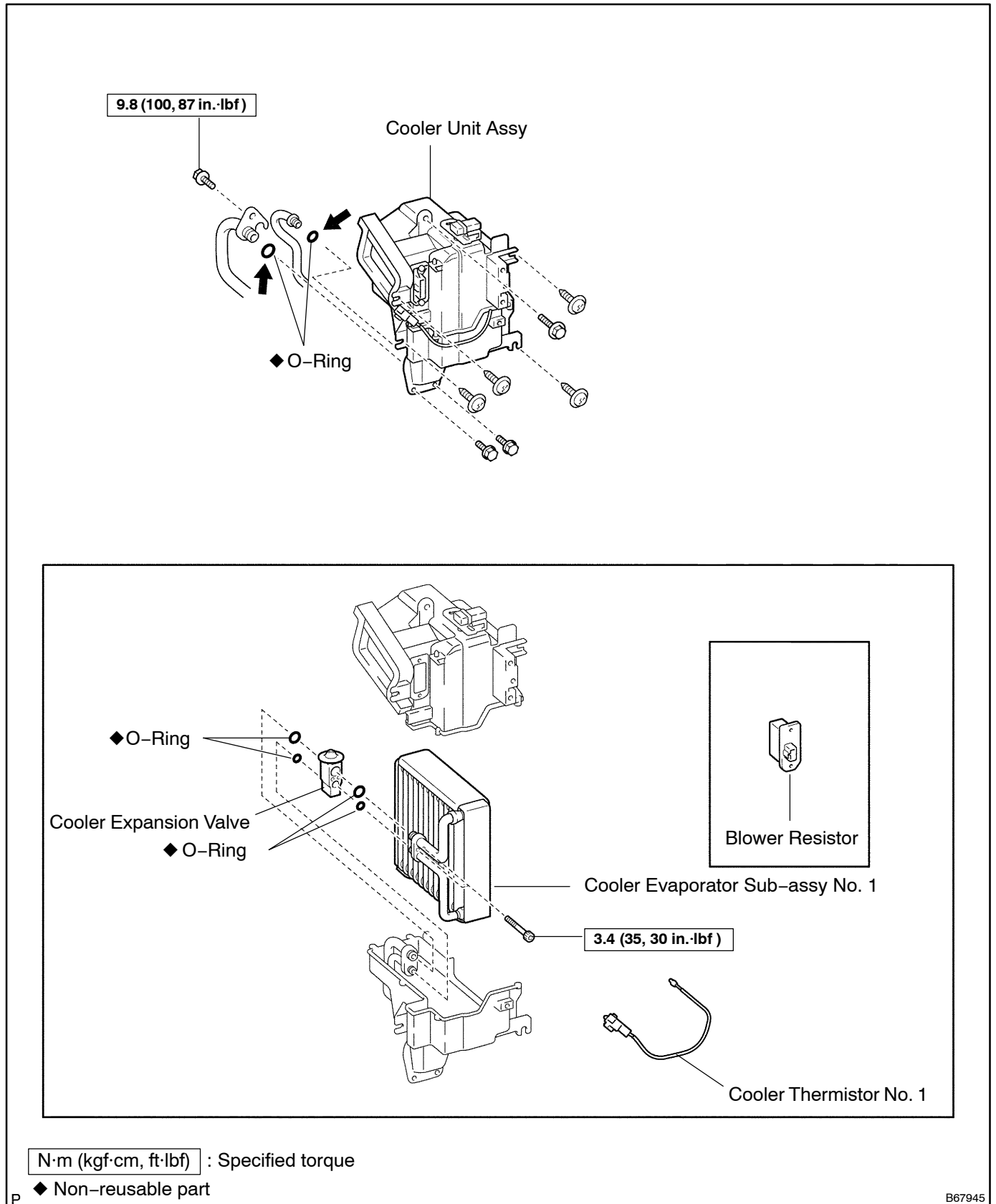
HINT:

Operating the heater control knob, check that it properly stops at both ends of FACE and DEF and no recoil is identified.

6. **INSTALL HEATER CONTROL NAME PLATE**
7. **INSTALL HEATER CONTROL LEVER KNOB**
8. **INSTALL INSTRUMENT CLUSTER FINISH PANEL SUB-ASSY CENTER**
 (See page 71-11 or 71-17)

CONTROL UNIT ASSY COMPONENTS

550WE-01



OVERHAUL

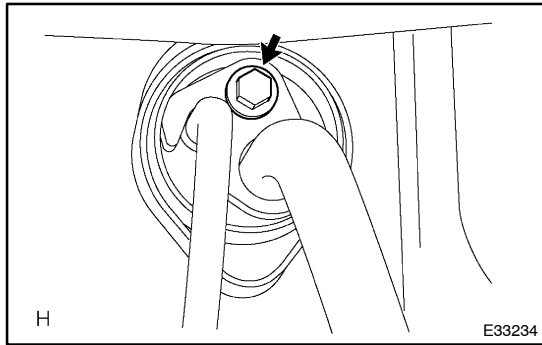
HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. REMOVE RADIATOR GRILLE (See page 76-3)

2. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page 55-14)

SST 07110-58060 (07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)



3. DISCONNECT COOLER REFRIGERANT SUCTION HOSE NO.1

- (a) Remove the bolt and disconnect the connection plate.
- (b) Disconnect the suction hose and remove the 2 O-rings.

NOTICE:

Tape the disconnected parts of hoses, to protect it from dust and water.

4. DISCONNECT LIQUID A HOSE

- (a) Disconnect the liquid hose.
- (b) Remove the O-ring from the liquid hose.

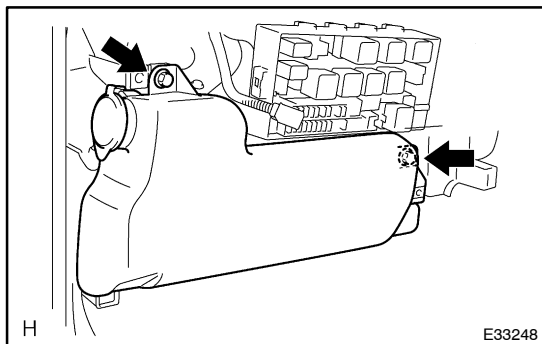
NOTICE:

Tape the disconnected parts of hoses, to protect it from dust and water.

5. REMOVE GLOVE COMPARTMENT DOOR ASSY (See page 71-11 or 71-17)

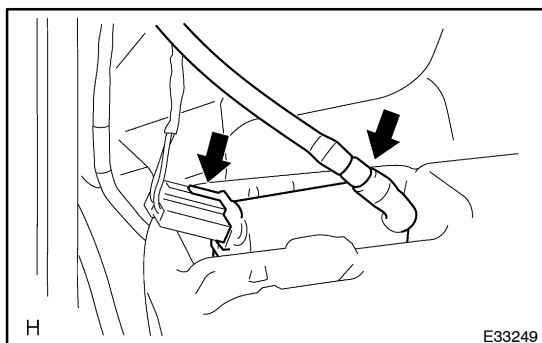
6. REMOVE INSTRUMENT COVER LWR NO.3 (WIDE BODY MODELS) (See page 71-11)

7. REMOVE INSTRUMENT COVER LOWER CENTER (See page 71-11 or 71-17)

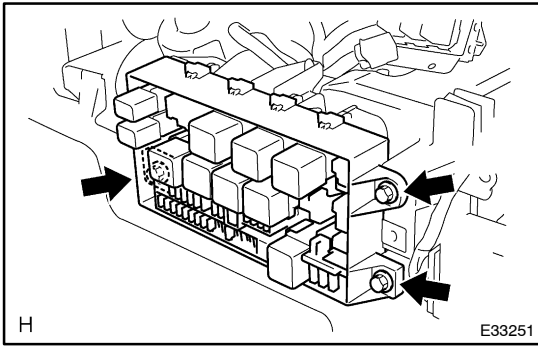


8. REMOVE WINDSHIELD WASHER JAR ASSY

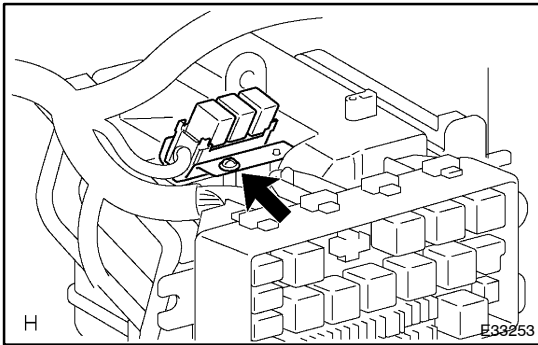
- (a) Remove the 2 bolts and windshield washer jar.



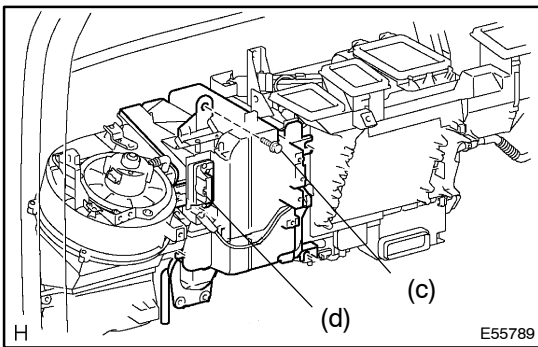
- (b) Disconnect the hose and connector from the washer pump.

**9. REMOVE COOLER UNIT ASSY**

(a) Remove the 3 bolts and disconnect the relay block.



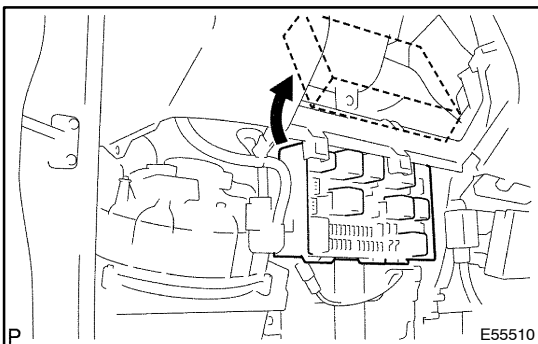
(b) Remove the screw and disconnect the relay block.



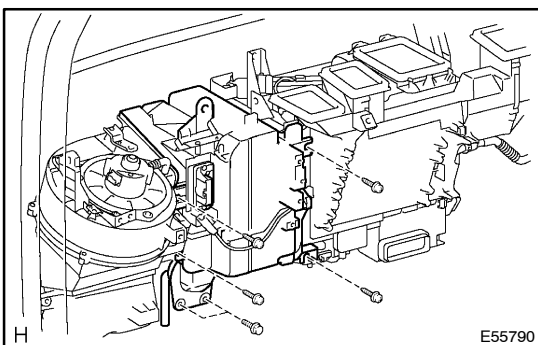
(c) Remove the bolt.

(d) Disconnect the blower resistor connector.

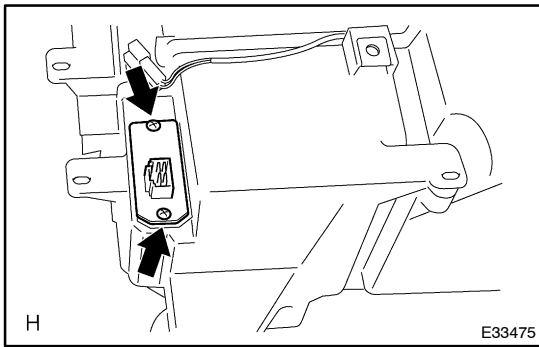
(e) Disconnect the thermistor No. 1 connector.



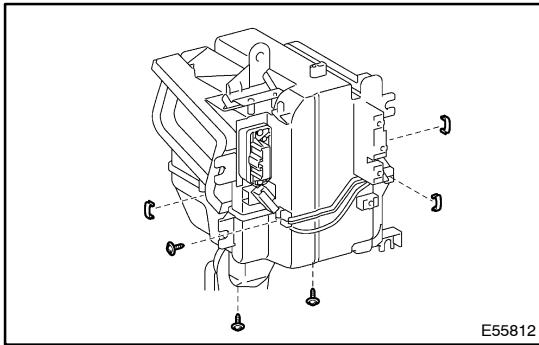
(f) Slide the relay block assy to the upper part of the vehicle.



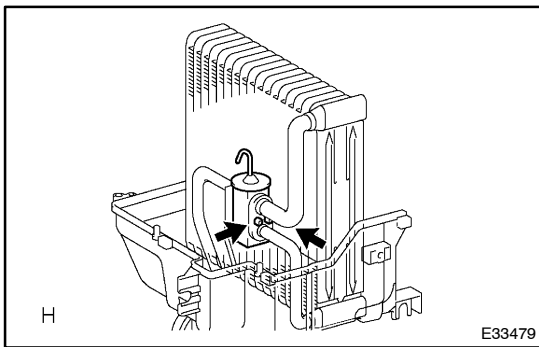
(g) Remove the 2 bolts, 4 screws and cooler unit.

**10. REMOVE BLOWER RESISTOR**

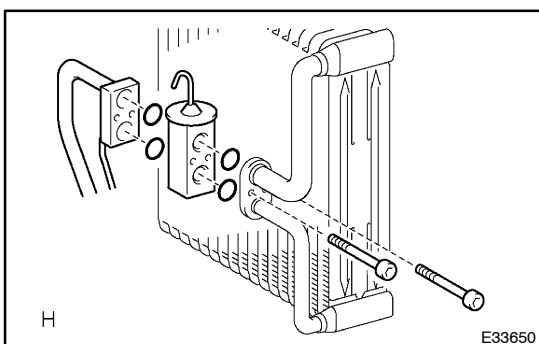
- (a) Remove the 2 screws and blower resistor.

**11. REMOVE COOLER EXPANSION VALVE**

- (a) Remove the 3 screws, 3 holding springs and lower case.



- (b) Using a 5 mm hexagon wrench, remove the 2 hexagon bolts, 4 O-rings and expansion valve No. 1.
- (c) Remove the 2 O-rings from the air conditioner tube.
- (d) Remove the 2 O-rings from the cooler evaporator No. 1.

12. REMOVE COOLER THERMISTOR NO.1**13. REMOVE COOLER EVAPORATOR SUB-ASSY NO.1****14. INSTALL COOLER EVAPORATOR SUB-ASSY NO.1****15. INSTALL COOLER THERMISTOR NO.1****16. INSTALL COOLER EXPANSION VALVE**

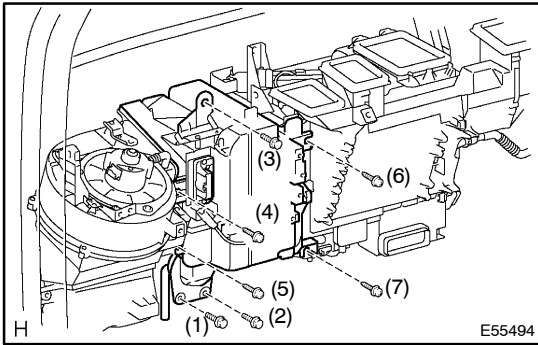
- (a) Coat 4 new O-rings with compressor oil and place it to the expansion valve.

Compressor oil: ND-OIL 8 or equivalent

- (b) Using a 5 mm hexagon wrench, install the expansion valve No. 1 with the 2 hexagon bolts.

3.4 N·m (35 kgf·cm, 30 in·lbf)

17. INSTALL BLOWER RESISTOR

**18. INSTALL COOLER UNIT ASSY**

(a) Install the cooler unit assy with the 3 bolts and 4 screws.

HINT:

The bolts and screws should be installed in the illustrated order.

19. INSTALL WINDSHIELD WASHER JAR ASSY

(a) Connect the hose and connector to washer pump.

(b) Install the windshield washer jar and 2 bolts.

20. INSTALL INSTRUMENT COVER LOWER CENTER (See page 71-11 or 71-17)**21. INSTALL INSTRUMENT COVER LWR NO.3 (WIDE BODY MODELS) (See page 71-11)****22. INSTALL GLOVE COMPARTMENT DOOR ASSY (See page 71-11 or 71-17)****23. INSTALL LIQUID A HOSE**

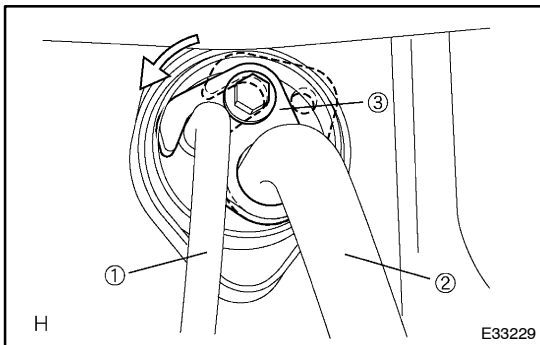
(a) Coat new O-ring with compressor oil and install them to liquid hose.

Compressor oil: ND-OIL 8 or equivalent

(b) Install the O-ring to the hose.

(c) Install the liquid hose.

Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)

**24. INSTALL COOLER REFRIGERANT SUCTION HOSE NO.1**

(a) Coat new O-ring with compressor oil and install them to liquid hose.

Compressor oil: ND-OIL 8 or equivalent

(b) Install the O-ring to the hose.

(c) Install the suction hose.

(d) Install the connection plate and bolt.

Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)

25. CHARGE REFRIGERANT (See page 55-14)

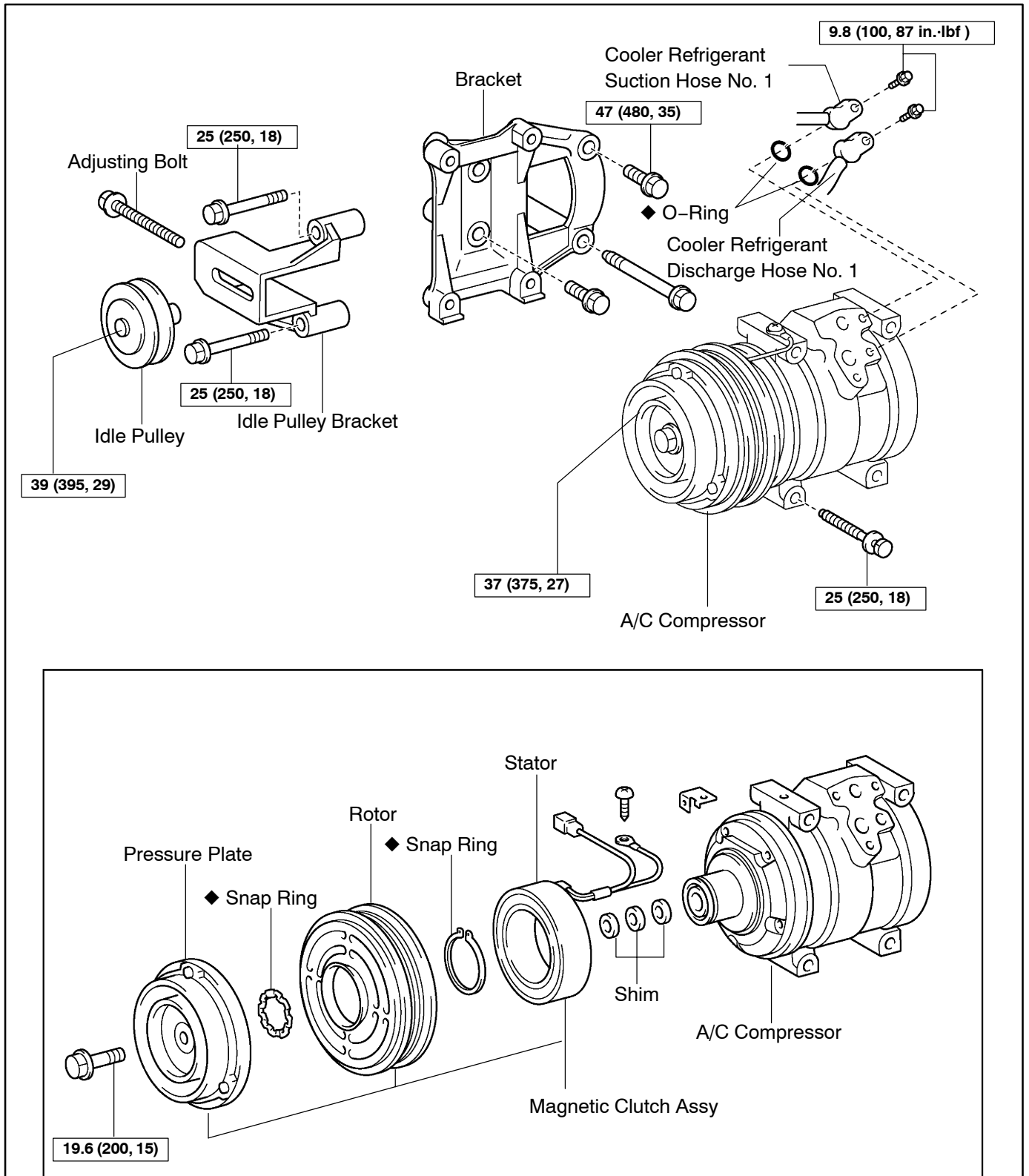
SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080), 07117-48130, 07117-48140

26. WARM UP ENGINE**27. INSPECT LEAKAGE OF REFRIGERANT****28. INSTALL RADIATOR GRILLE (See page 76-3)**

COOLER COMPRESSOR ASSY (15B-FTE)

COMPONENTS

550WM-01



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

T

B67269

REPLACEMENT

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page 55-14)**
SST 07110-58060 (07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)
2. **REMOVE V BELT (See page 55-23)**
3. **DISCONNECT COOLER REFRIGERANT DISCHARGE HOSE NO.2(See page 55-28)**
 - (a) Remove the bolt and disconnect the hose.
 - (b) Remove the O-ring from the discharge hose.

NOTICE:

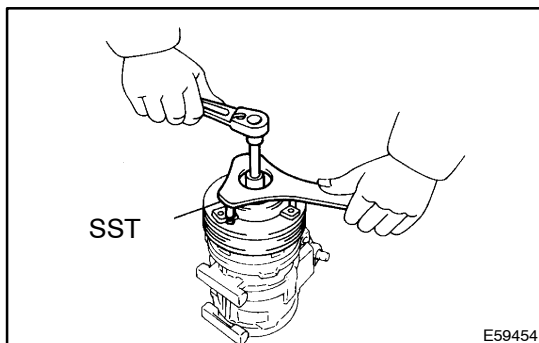
Tape the disconnection parts of hoses and compressor, to protect it from dust and water.

4. **DISCONNECT COOLER REFRIGERANT SUCTION HOSE NO.1 (See page 55-28)**
 - (a) Remove the bolt and disconnect the hose.
 - (b) Remove the O-ring from the suction hose.

NOTICE:

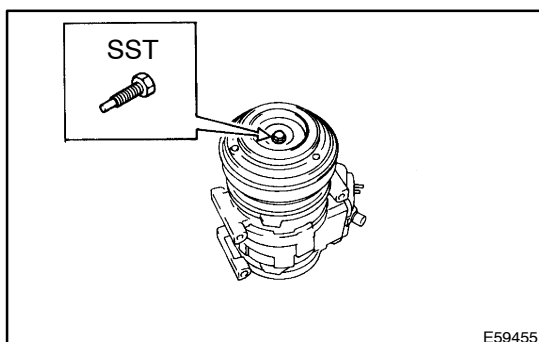
Tape the disconnected parts of hoses and compressor, to protect it from dust and water.

5. **REMOVE COOLER COMPRESSOR ASSY**
 - (a) Remove the 4 bolts and compressor assembly, and disconnect the connector.

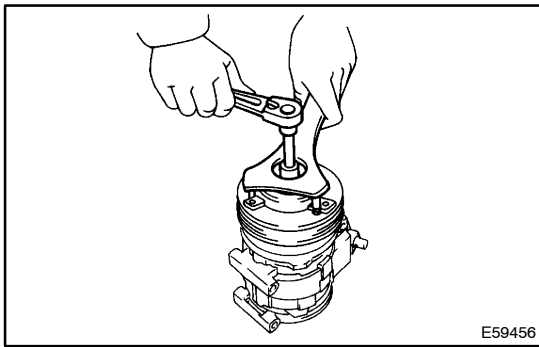


6. REMOVE MAGNET CLUTCH ASSY

- (a) Remove the pressure plate.
 - (1) Using SST and a socket wrench, remove the shaft bolt.
SST 07112-76060



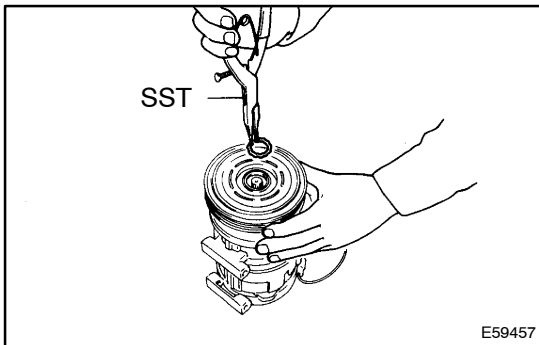
- (2) Install SST.
SST 07112-66040



- (3) Using SST and a socket wrench, remove the pressure plate.

SST 07112-66040, 07112-76060

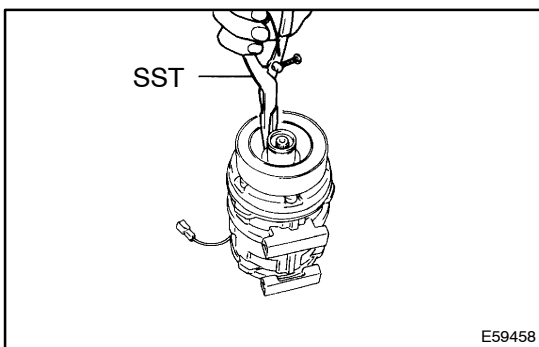
- (4) Remove the shims.



- (b) Remove the rotor.

- (1) Using SST, remove the snap ring.

SST 95994-10020



- (c) Remove the stator.

- (1) Remove the screw and disconnect the stator wire.

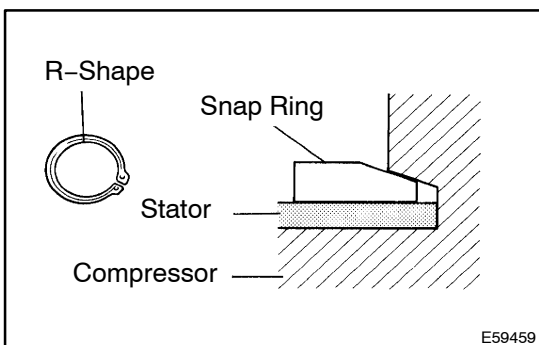
- (2) Using SST, remove the snap ring and stator.

SST 95994-10020

7. INSTALL MAGNET CLUTCH ASSY

- (a) Install the stator.

- (1) Install the stator with the snap ring.



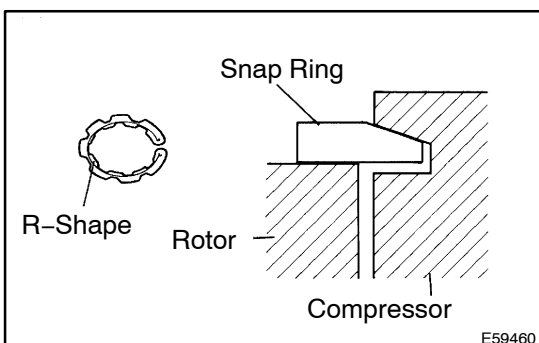
NOTICE:

The snap ring should be installed so that its beveled side faces up.

- (2) Connect the stator wire with the screw.

- (b) Install the rotor.

- (1) Install the rotor with the snap ring.



NOTICE:

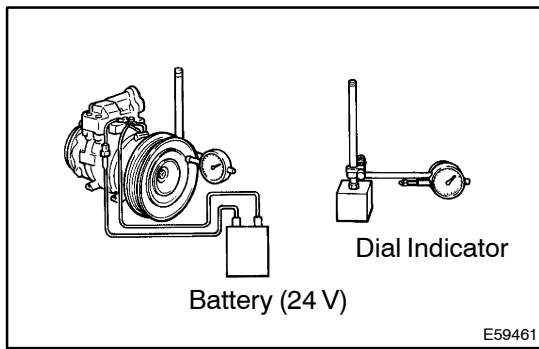
The snap ring should be installed so that its beveled side faces up.

- (c) Install the pressure plate.

- (1) Install the shims.

- (2) Install the pressure plate with the bolt.

Torque: 13.2 N·m (135 kgf·cm, 9 ft·lbf)

**8. INSPECT MAGNETIC CLUTCH CLEARANCE**

- (a) Set the dial indicator to the pressure plate of the magnetic clutch.
- (b) Connect the magnetic clutch lead wire to the positive terminal of the battery.
- (c) Check the clearance between the pressure plate and rotor when connecting the negative terminal to the battery.

Standard clearance value:

0.5 ± 0.15 mm (0.020 ± 0.006 in.)

If the clearance is not within the standard value, adjust it using shims to obtain the standard one.

Shim thickness:

0.1 mm (0.004 in.)

0.3 mm (0.012 in.)

0.5 mm (0.020 in.)

9. INSTALL COOLER COMPRESSOR ASSY

- (a) Replacing a new compressor:
Drain compressor oil from a new compressor.

Draining compressor oil value:

(Oil value of new compressor) - (Oil value of replaced compressor)

- (b) Install the compressor assembly with 4 bolts and connect the connector.
Torque: 29 N·m (295 kgf·cm, 21 ft·lbf)

10. INSTALL COOLER REFRIGERANT SUCTION HOSE NO.1

- (a) Apply a new O-ring with compressor oil and install the suction hose.

Compressor oil: ND-OIL 8 or equivalent

- (b) Connect the suction hose with the bolt.

Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)

11. INSTALL COOLER REFRIGERANT DISCHARGE HOSE NO.2

- (a) Apply a new O-ring with compressor oil and install the discharge hose.

Compressor oil: ND-OIL 8 or equivalent

- (b) Connect the liquid hose with the bolt.

Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)

12. INSTALL V BELT (See page 55-23)**13. ADJUST V BELT (See page 55-23)****14. CHARGE REFRIGERANT (See page 55-14)**

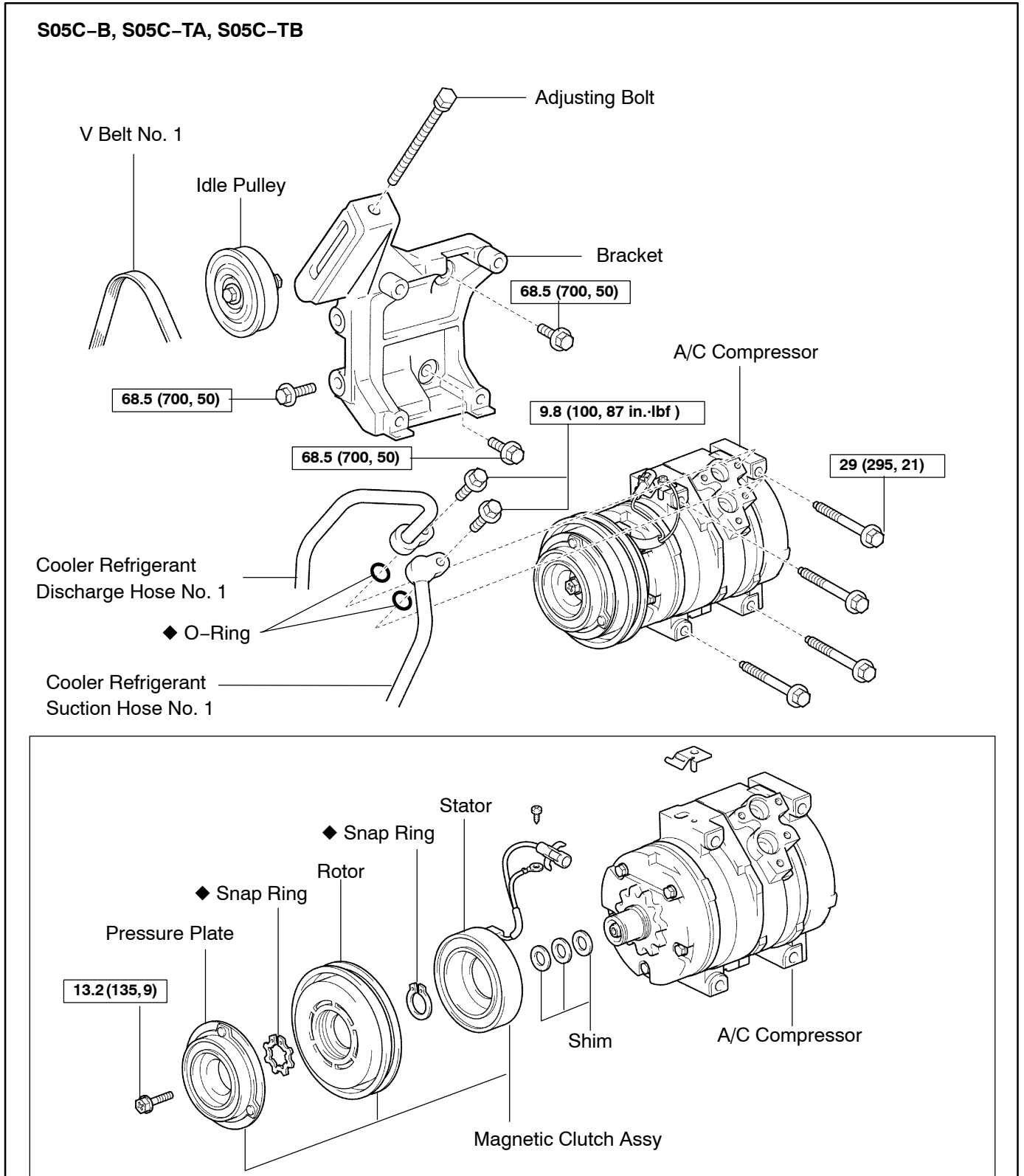
SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)

15. WARM UP ENGINE**16. INSPECT LEAKAGE OF REFRIGERANT**

COOLER COMPRESSOR ASSY (S05C-B, S05C-TA, S05C-TB)

COMPONENTS

550WO-01



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

REPLACEMENT

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page 55-14)**
SST 07110-58060 (07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)
2. **REMOVE V BELT (See page 55-23)**
3. **DISCONNECT COOLER REFRIGERANT DISCHARGE HOSE NO.2 (See page 55-14)**
 - (a) Remove the bolt and disconnect the hose.
 - (b) Remove the O-ring from the discharge hose.

NOTICE:

Tape the disconnection parts of hoses and compressor, to protect it from dust and water.

4. **DISCONNECT COOLER REFRIGERANT SUCTION HOSE NO.1 (See page 55-14)**
 - (a) Remove the bolt and disconnect the hose.
 - (b) Remove the O-ring from the suction hose.

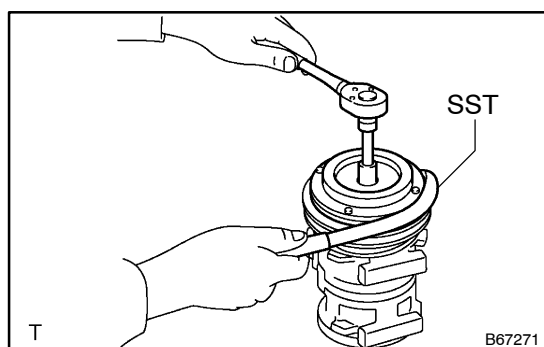
- (a) Remove the bolt and disconnect the hose.
- (b) Remove the O-ring from the suction hose.

NOTICE:

Tape the disconnected parts of hoses and compressor, to protect it from dust and water.

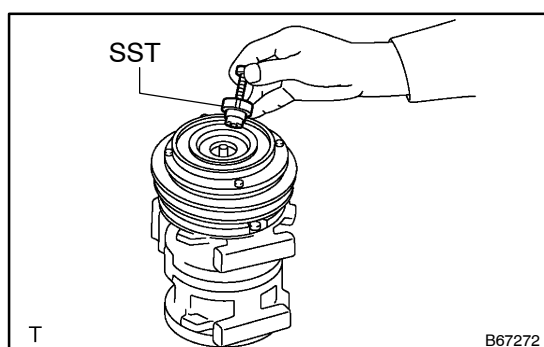
5. **REMOVE COOLER COMPRESSOR ASSY**

- (a) Remove the 4 bolts and compressor assembly, and disconnect the connector.

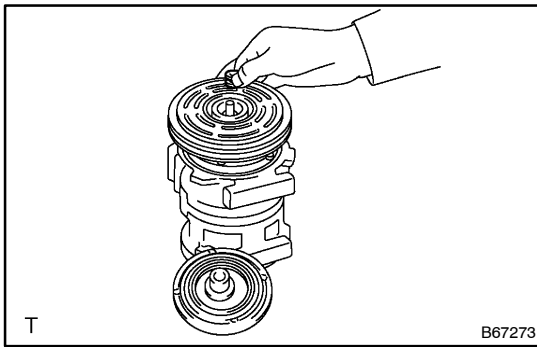


6. **REMOVE MAGNET CLUTCH ASSY**

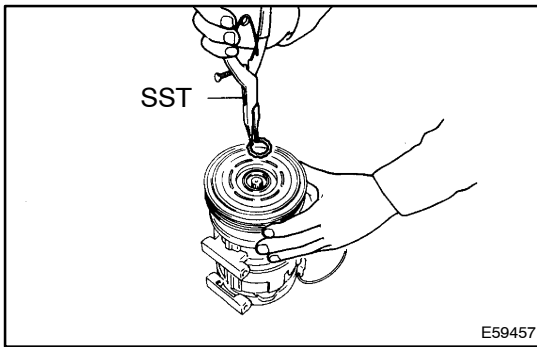
- (a) Remove the pressure plate.
 - (1) Using SST and a socket wrench, remove the shaft bolt.
SST 07112-67010



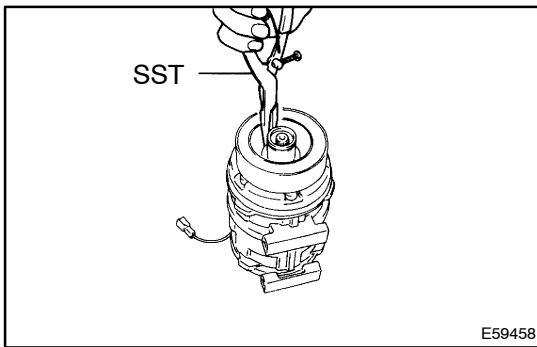
- (2) Install SST.
SST 07112-71010



- (3) Remove the shims from the shaft.



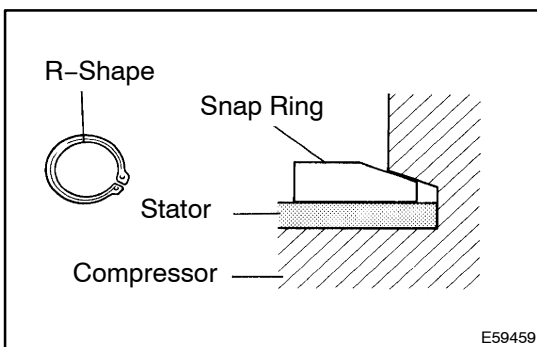
- (b) Remove the rotor.
 (1) Using SST, remove the snap ring.
 SST 95994-10020



- (c) Remove the stator.
 (1) Remove the screw and disconnect the stator wire.
 (2) Using SST, remove the snap ring and stator.
 SST 95994-10020

7. INSTALL MAGNET CLUTCH ASSY

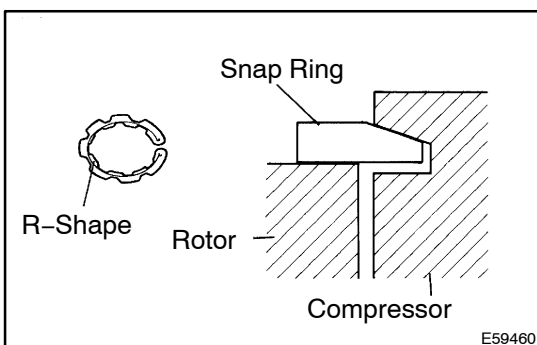
- (a) Install the stator.
 (1) Install the stator with the snap ring.



NOTICE:

The snap ring should be installed so that its beveled side faces up.

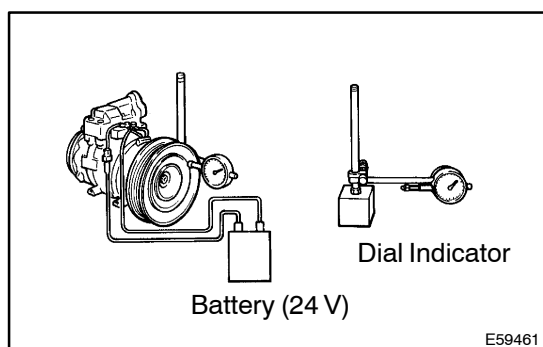
- (2) Connect the stator wire with the screw.
 (b) Install the rotor.
 (1) Install the rotor with the snap ring.



NOTICE:

The snap ring should be installed so that its beveled side faces up.

- (c) Install the pressure plate.
 (1) Install the shims.
 (2) Install the pressure plate with the bolt.
Torque: 19.6 N·m (200 kgf·cm, 15 ft·lbf)

**8. INSPECT MAGNETIC CLUTCH CLEARANCE**

- (a) Set the dial indicator to the pressure plate of the magnetic clutch.
- (b) Connect the magnetic clutch lead wire to the positive terminal of the battery.
- (c) Check the clearance between the pressure plate and rotor when connecting the negative terminal to the battery.

Standard clearance value:

0.5 ± 0.15 mm (0.020 ± 0.006 in.)

If the clearance is not within the standard value, adjust it using shims to obtain the standard one.

Shim thickness:

0.1 mm (0.004 in.)

0.3 mm (0.012 in.)

0.5 mm (0.020 in.)

9. INSTALL COOLER COMPRESSOR ASSY

- (a) Replacing a new compressor:
Drain compressor oil from a new compressor.

Draining compressor oil value:

(Oil value of new compressor) – (Oil value of replaced compressor)

- (b) Install the compressor assembly with 4 bolts and connect the connector.
Torque: 29 N·m (295 kgf·cm, 21 ft·lbf)

10. INSTALL COOLER REFRIGERANT SUCTION HOSE NO.1

- (a) Apply a new O-ring with compressor oil and install the suction hose.
Compressor oil: ND-OIL 8 or equivalent

- (b) Connect the suction hose with the bolt.
Torque: 9.8 N·m (100 kgf·cm, 7 ft·lbf)

11. INSTALL COOLER REFRIGERANT DISCHARGE HOSE NO.2

- (a) Apply a new O-ring with compressor oil and install the discharge hose.
Compressor oil: ND-OIL 8 or equivalent

- (b) Connect the liquid hose with the bolt.
Torque: 9.8 N·m (100 kgf·cm, 7 ft·lbf)

12. INSTALL V BELT (See page 55-23)**13. ADJUST V BELT (See page 55-23)****14. CHARGE REFRIGERANT (See page 55-14)**

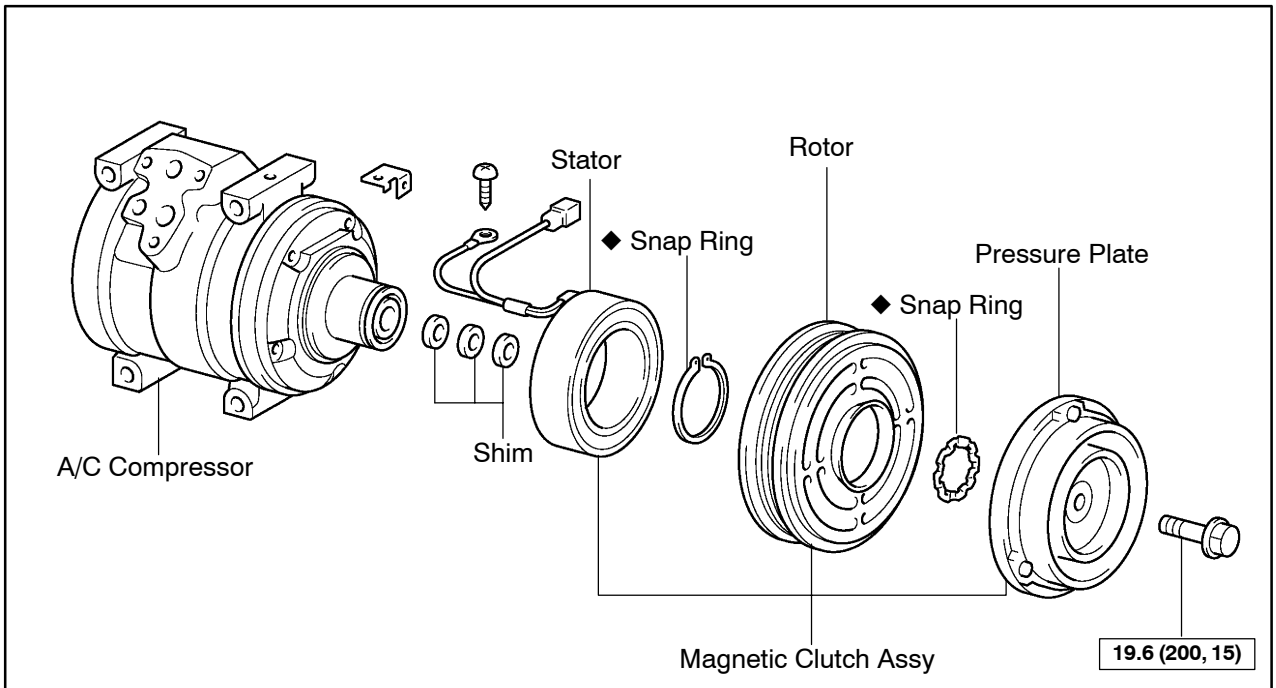
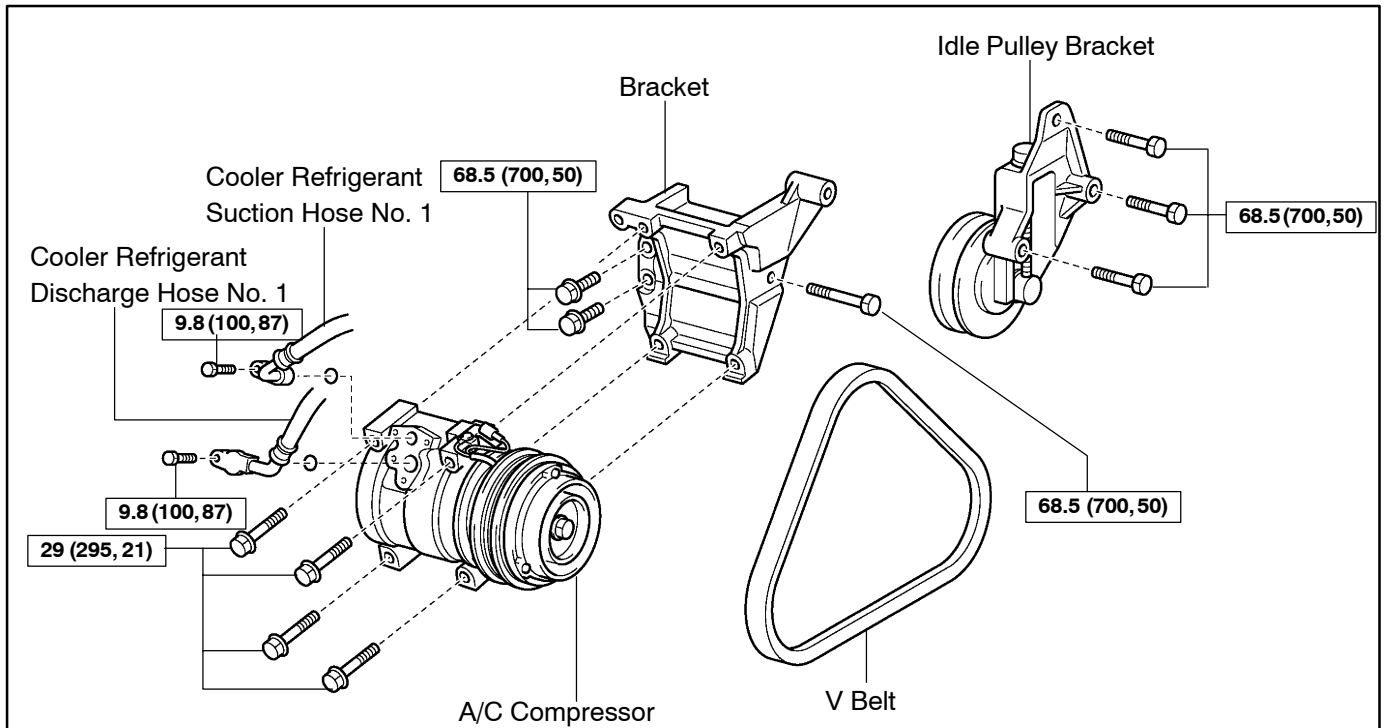
SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)

15. WARM UP ENGINE**16. INSPECT LEAKAGE OF REFRIGERANT**

COOLER COMPRESSOR ASSY (W04D-J)

COMPONENTS

550WK-01



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

T

B67943

REPLACEMENT

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page 55-14)**
SST 07110-58060 (07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)
2. **REMOVE V BELT (See page 55-23)**
3. **DISCONNECT COOLER REFRIGERANT DISCHARGE HOSE NO.2 (See page 55-28)**
 - (a) Remove the bolt and disconnect the hose.
 - (b) Remove the O-ring from the discharge hose.

NOTICE:

Tape the disconnection parts of hoses and compressor, to protect it from dust and water.

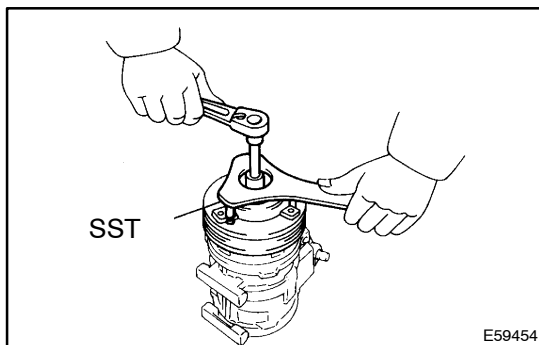
4. **DISCONNECT COOLER REFRIGERANT SUCTION HOSE NO.1 (See page 55-28)**
 - (a) Remove the bolt and disconnect the hose.
 - (b) Remove the O-ring from the suction hose.

NOTICE:

Tape the disconnected parts of hoses and compressor, to protect it from dust and water.

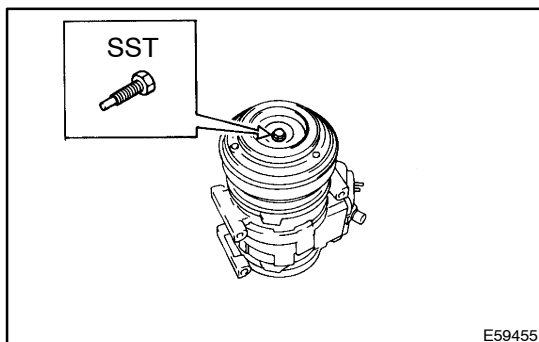
5. **REMOVE COOLER COMPRESSOR ASSY**

- (a) Remove the 4 bolts and compressor and disconnect the connector.

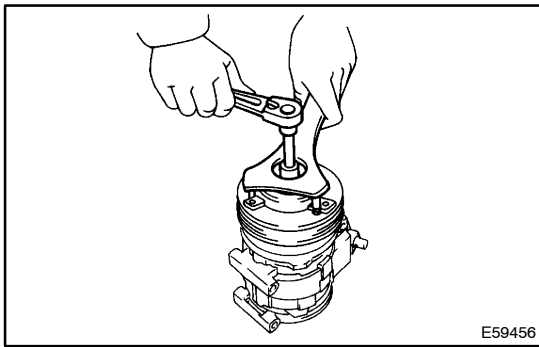


6. **REMOVE MAGNET CLUTCH ASSY**

- (a) Remove the pressure plate.
 - (1) Using SST and a socket wrench, remove the shaft bolt.
- SST 07112-76060



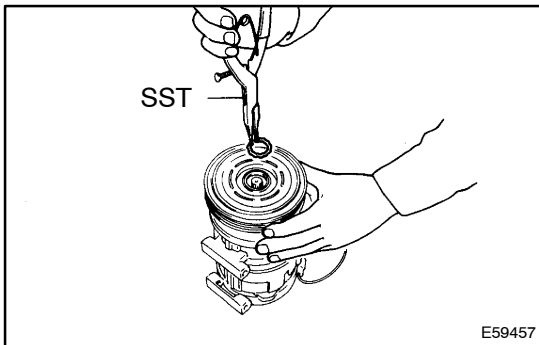
- (2) Install SST.
- SST 07112-66040



- (3) Using SST and a socket wrench, remove the pressure plate.

SST 07112-66040, 07112-76060

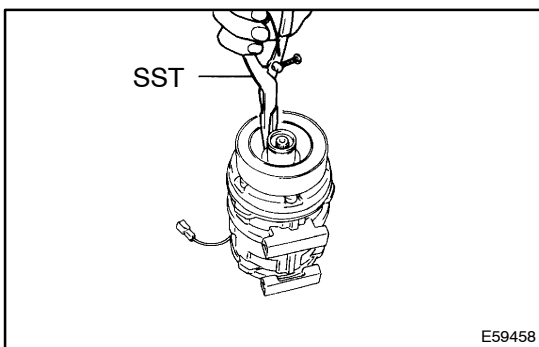
- (4) Remove the shims.



- (b) Remove the rotor.

- (1) Using SST, remove the snap ring.

SST 95994-10020



- (c) Remove the stator.

- (1) Remove the screw and disconnect the stator wire.

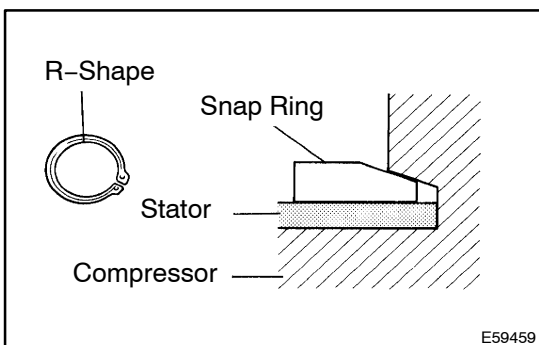
- (2) Using SST, remove the snap ring and stator.

SST 95994-10020

7. INSTALL MAGNET CLUTCH ASSY

- (a) Install the stator.

- (1) Install the stator with the snap ring.



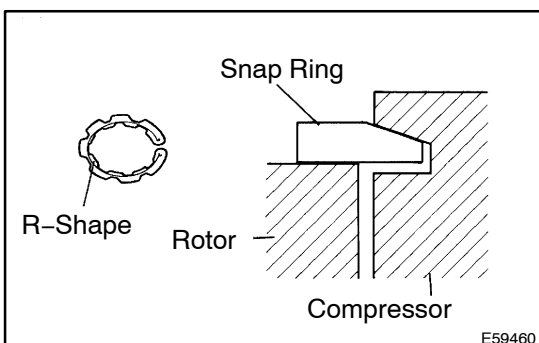
NOTICE:

The snap ring should be installed so that its beveled side faces up.

- (2) Connect the stator wire with the screw.

- (b) Install the rotor.

- (1) Install the rotor with the snap ring.



NOTICE:

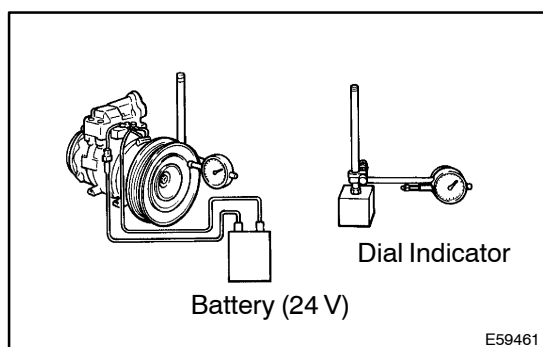
The snap ring should be installed so that its beveled side faces up.

- (c) Install the pressure plate.

- (1) Install the shims.

- (2) Install the pressure plate with the bolt.

Torque: 13.2 N·m (135 kgf·cm, 9 ft·lbf)

**8. INSPECT MAGNETIC CLUTCH CLEARANCE**

- (a) Set the dial indicator to the pressure plate of the magnetic clutch.
- (b) Connect the magnetic clutch lead wire to the positive terminal of the battery.
- (c) Check the clearance between the pressure plate and rotor when connecting the negative terminal to the battery.

Standard clearance value:

0.5 ± 0.15 mm (0.020 ± 0.006 in.)

If the clearance is not within the standard value, adjust it using shims to obtain the standard one.

Shim thickness:

0.1 mm (0.004 in.)

0.3 mm (0.012 in.)

0.5 mm (0.020 in.)

9. INSTALL COOLER COMPRESSOR ASSY

- (a) Replacing a new compressor:
Drain compressor oil from a new compressor.

Draining compressor oil value:

(Oil value of new compressor) - (Oil value of replaced compressor)

- (b) Install the compressor assembly with 4 bolts and connect the connector.
Torque: 29 N·m (295 kgf·cm, 21 ft·lbf)

10. INSTALL COOLER REFRIGERANT SUCTION HOSE NO.1

- (a) Apply a new O-ring with compressor oil and install the suction hose.
Compressor oil: ND-OIL 8 or equivalent

- (b) Connect the suction hose with the bolt.
Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)

11. INSTALL COOLER REFRIGERANT DISCHARGE HOSE NO.2

- (a) Apply a new O-ring with compressor oil and install the discharge hose.
Compressor oil: ND-OIL 8 or equivalent

- (b) Connect the liquid hose with the bolt.
Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)

12. INSTALL V BELT (See page 55-23)**13. ADJUST V BELT (See page 55-23)****14. CHARGE REFRIGERANT (See page 55-14)**

SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)

15. WARM UP ENGINE**16. INSPECT LEAKAGE OF REFRIGERANT**

COOLER CONDENSOR ASSY

550WQ-01

ON-VEHICLE INSPECTION

1. INSPECT COOLER CONDENSER ASSY

- (a) If a fin of the cooler condenser assy is dirty, clean it with water and dry it with compressed air.

NOTICE:

Do not damage the fin of the condenser assy.

- (b) If a fin of the condenser assy is bent, make it straight using a screwdriver or pliers.

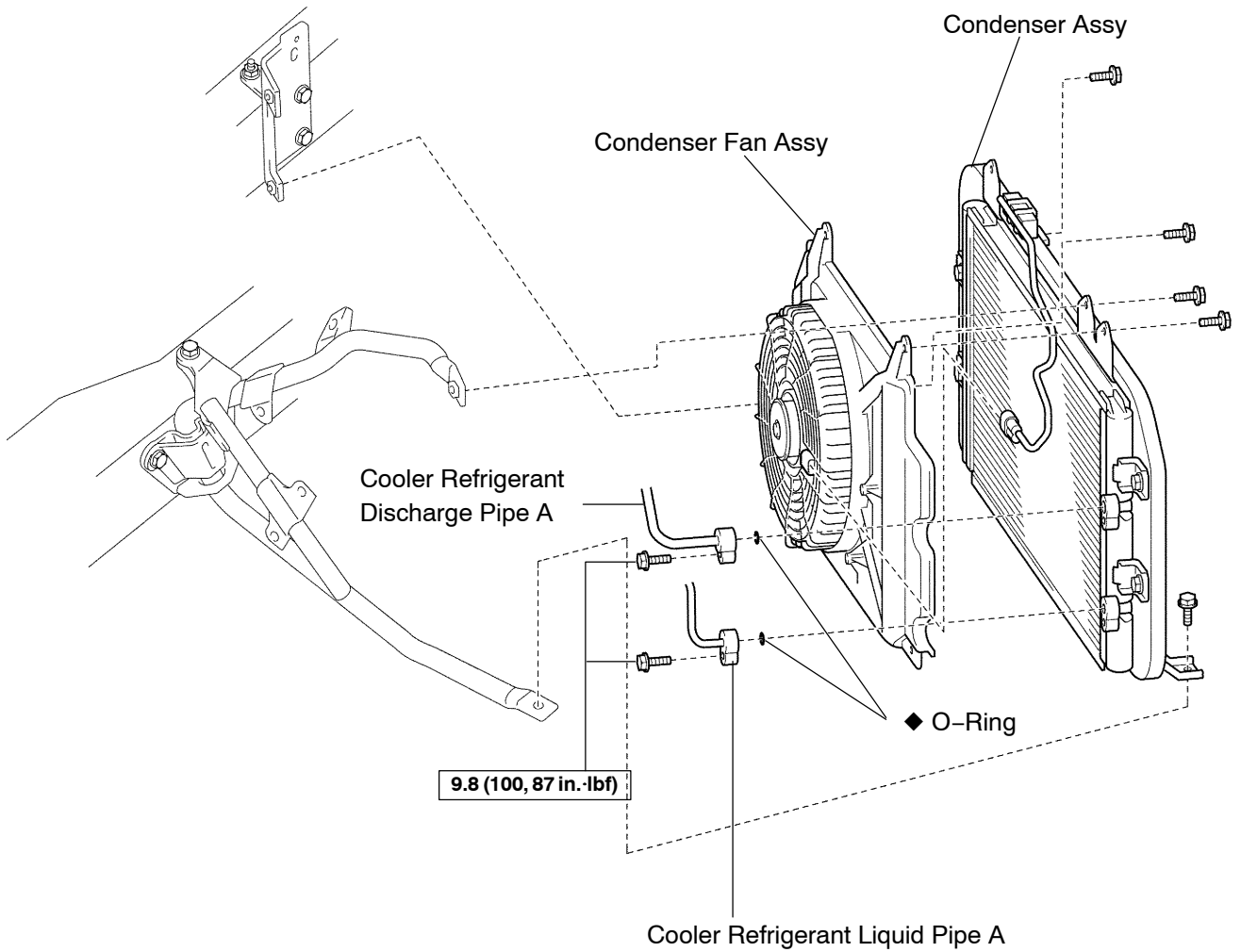
2. INSPECT CONDENSER FOR LEAKAGE OF REFRIGERANT

- (a) Using a halogen leak detector, check pipe joints for gas leakage.

If gas leakage is detected in a joint, check the torque of the joint.

COMPONENTS

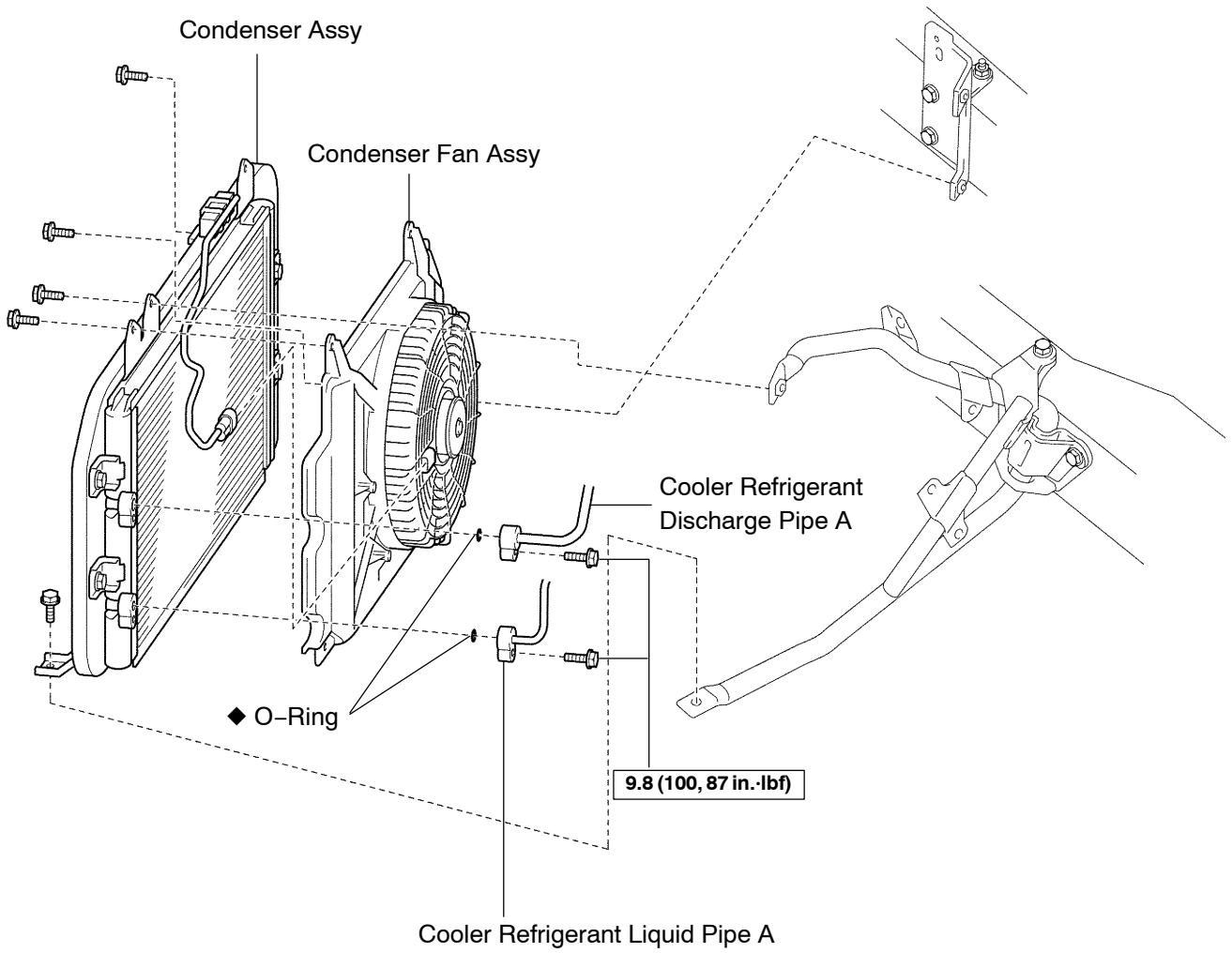
RHD



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

LHD

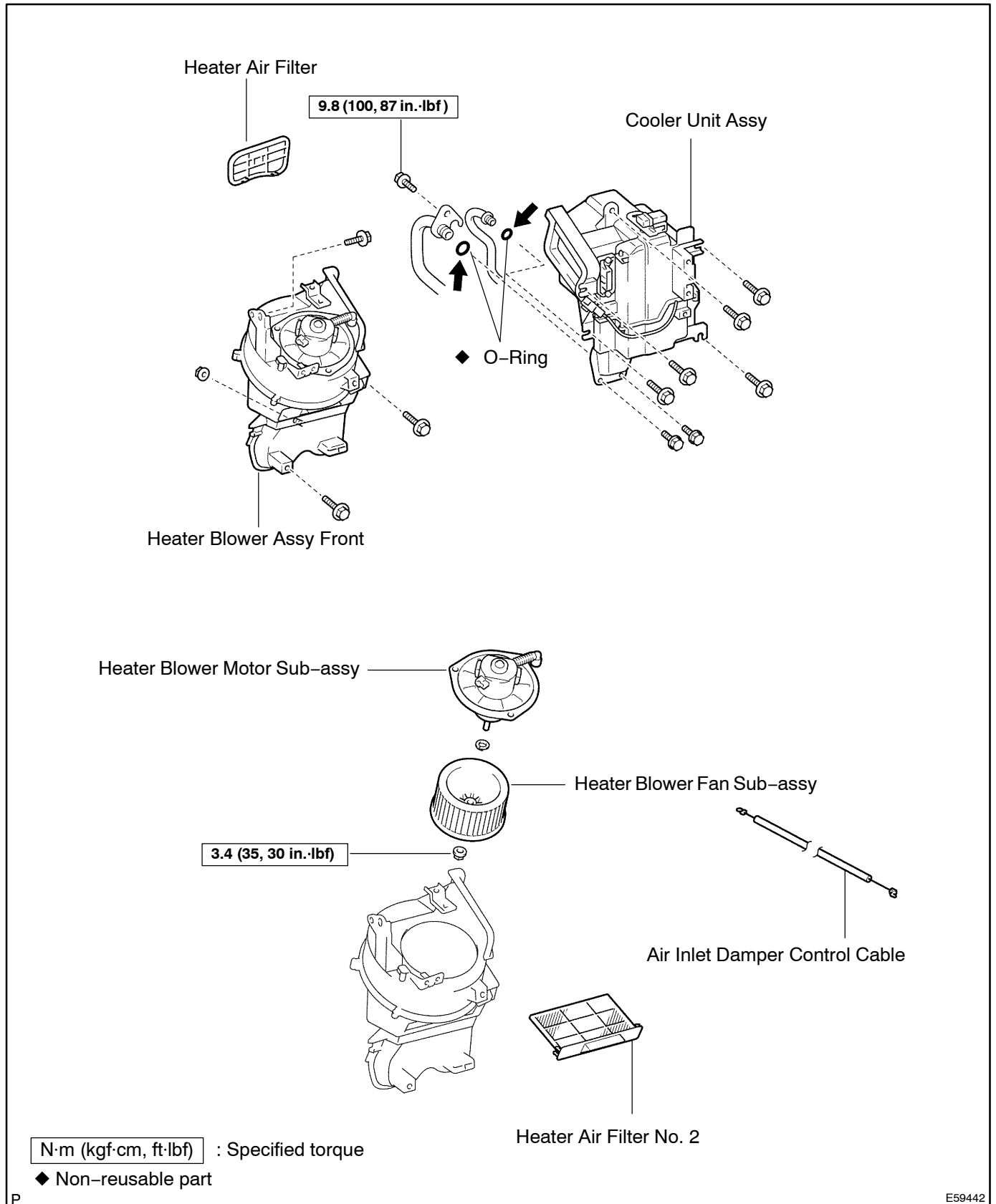


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

HEATER BLOWER ASSY FRONT COMPONENTS

550WG-01

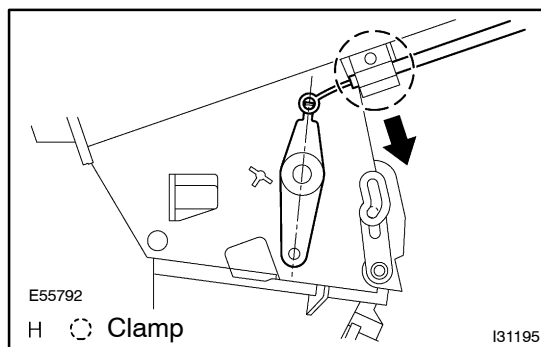


OVERHAUL

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. REMOVE RADIATOR GRILLE (See page 76-3)
2. REMOVE CLEARANCE LAMP LENS & BODY LH (LHD STEERING POSITION TYPE)
(See page 65-25)
3. REMOVE HEADLAMP UNIT LH (See page 65-12 or 65-18)
4. REMOVE HEATER AIR FILTER (See page 55-61)
5. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page 55-14)
6. DISCONNECT COOLER REFRIGERANT SUCTION HOSE NO.1 (See page 55-28)
7. DISCONNECT LIQUID A HOSE (See page 55-28)
8. REMOVE GLOVE COMPARTMENT DOOR ASSY (See page 71-11 or 71-17)
9. REMOVE INSTRUMENT COVER LWR NO.3 (WIDE BODY MODELS) (See page 71-11)
10. REMOVE INSTRUMENT COVER LOWER CENTER (See page 71-11 or 71-17)
11. REMOVE WINDSHIELD WASHER JAR ASSY (See page 55-28)
12. REMOVE COOLER UNIT ASSY (See page 55-28)
13. REMOVE AIR DUCT SUB-ASSY NO.1 (WIDE BODY)

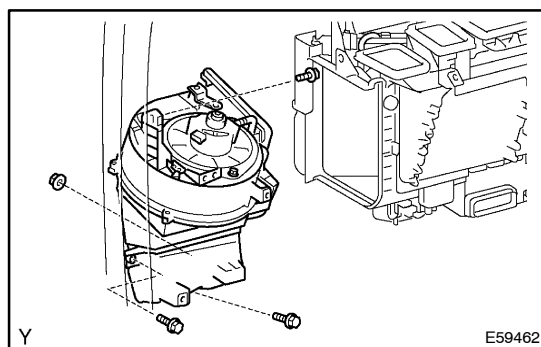


14. DISCONNECT AIR INLET DAMPER CONTROL CABLE SUB-ASSY

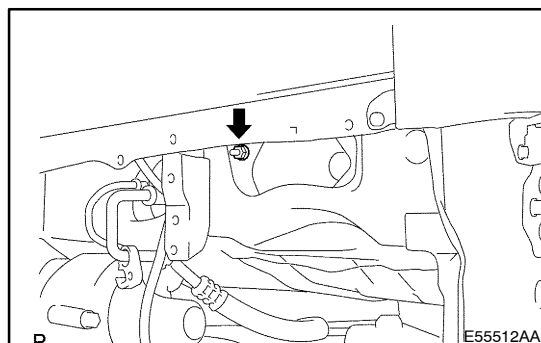
- (a) Disconnect the outer cable from the clamp.
- (b) Remove the inner cable.

15. REMOVE HEATER BLOWER ASSY FRONT

- (a) Disconnect the heater blower motor connector.
- (b) Disconnect the 2 connector holders from the heater blower.

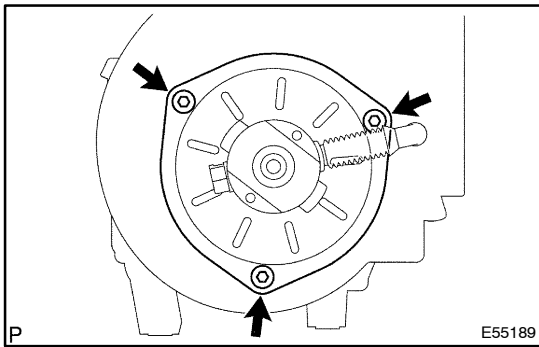


- (c) Remove the 3 bolts, nut and heater blower.

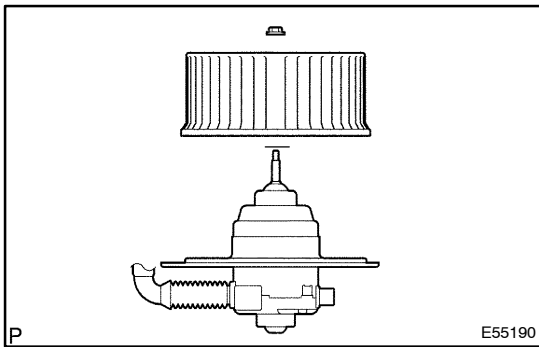


HINT:

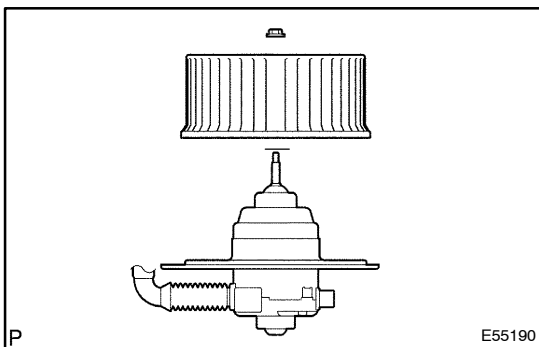
The nut is in the heater air filter.

**16. REMOVE HEATER BLOWER MOTOR SUB-ASSY**

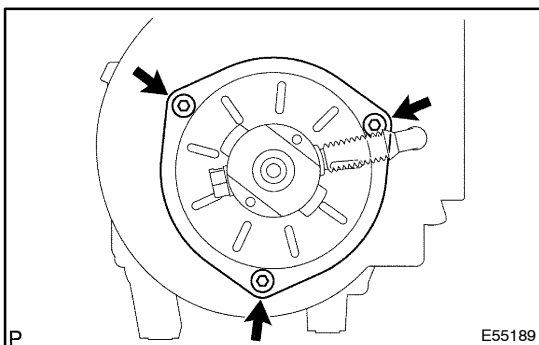
- (a) Remove the 3 screws and heater blower motor.

**17. REMOVE HEATER BLOWER FAN SUB-ASSY**

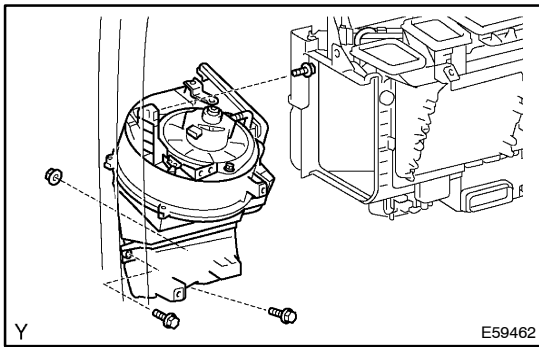
- (a) Remove the nut, washer and heater blower fan from the heater blower motor.

18. REMOVE HEATER AIR FILTER NO.2 (See page 55-60)**19. INSTALL HEATER AIR FILTER NO.2 (See page 55-60)****20. INSTALL HEATER BLOWER FAN SUB-ASSY**

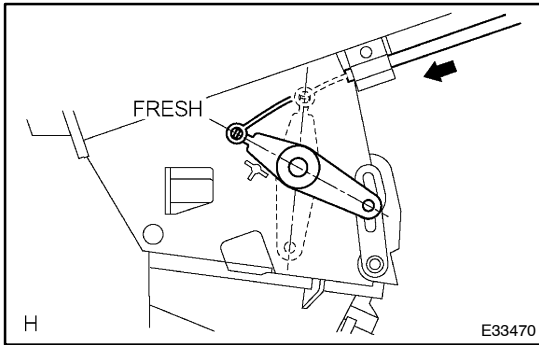
- (a) Install the heater blower fan with the nut and washer.
Torque: 3.4 N·m (35 kgf·cm, 30 in·lbf)

**21. INSTALL HEATER BLOWER MOTOR SUB-ASSY**

- (a) Install the heater blower motor with the 3 screws.

**22. INSTALL HEATER BLOWER ASSY FRONT**

- (a) Install the heater blower with the 3 bolts and nut.
- (b) Connect the heater blower motor connector.

**23. INSTALL AIR INLET DAMPER CONTROL CABLE SUB-ASSY**

- (a) Connect the air inlet damper control cable to the heater control assy, keep the condition of FRESH remaining.
- (b) Install the tip of inner cable to the control lever in FRESH position.
- (c) Install the outer cable to the clamp while slightly pulling it to the direction shown by arrow in the illustration.

NOTICE:

When operating the mode control lever, check that the restraint exists at the both ends of FRESH and RECIRC, and no repulsion occurs.

24. INSTALL AIR DUCT SUB-ASSY NO.1**25. INSTALL COOLER UNIT ASSY (See page 55-28)****26. INSTALL WINDSHIELD WASHER JAR ASSY (See page 55-28)****27. INSTALL GLOVE COMPARTMENT DOOR ASSY (See page 71-11 or 71-17)****28. INSTALL INSTRUMENT COVER LOWER CENTER (See page 71-11 or 71-17)****29. INSTALL INSTRUMENT COVER LWR NO.3 (WIDE BODY MODELS) (See page 71-11)****30. INSTALL LIQUID A HOSE (See page 55-28)****31. INSTALL COOLER REFRIGERANT SUCTION HOSE NO.1 (See page 55-28)****32. INSTALL HEATER AIR FILTER (See page 55-61)****33. CHARGE REFRIGERANT (See page 55-14)**

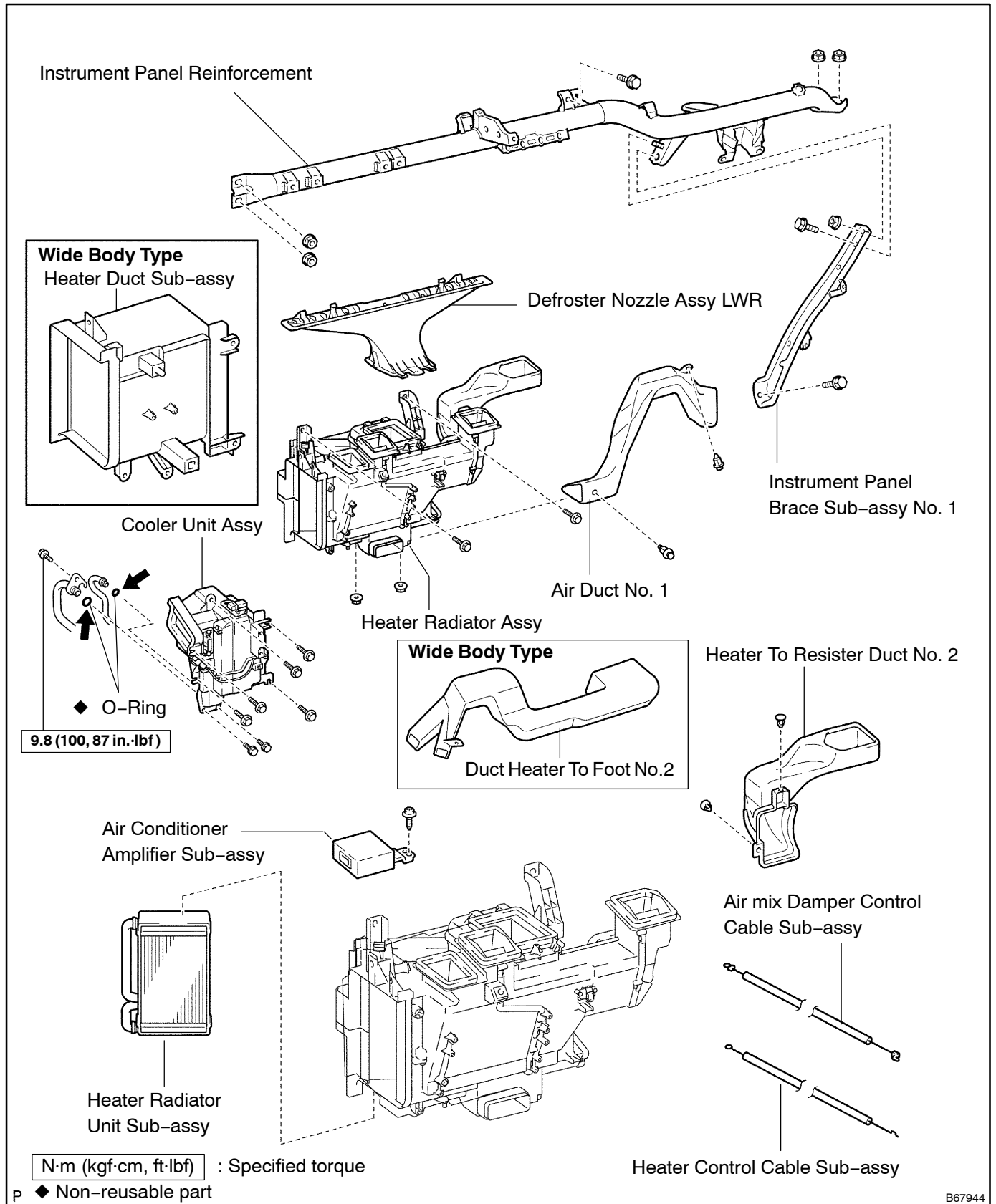
SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080), 07117-48130, 07117-48140

34. WARM UP ENGINE**35. INSPECT LEAKAGE OF REFRIGERANT****36. INSTALL HEADLAMP UNIT LH (See page 65-12 or 65-18)****37. INSTALL CLEARANCE LAMP LENS & BODY LH (LHD STEERING POSITION TYPE) (See page 65-25)****38. INSTALL RADIATOR GRILLE (See page 76-3)**

HEATER RADIATOR ASSY

COMPONENTS

550W-01

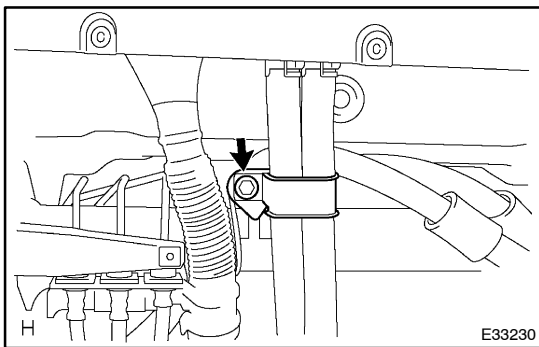


OVERHAUL

HINT:

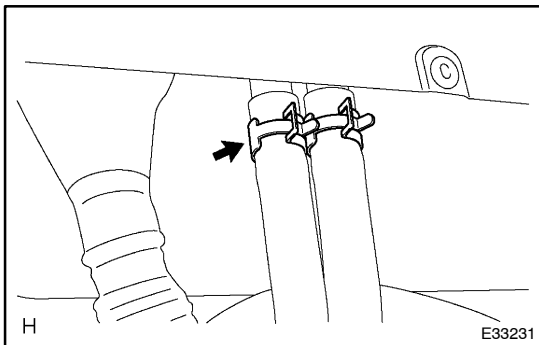
The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. **DRAIN COOLANT**
2. **REMOVE RADIATOR GRILLE (See page 76-3)**
3. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page 55-14)**
SST 07110-58060 (07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)
4. **DISCONNECT COOLER REFRIGERANT SUCTION HOSE NO.1 (See page 55-28)**
5. **DISCONNECT LIQUID A HOSE (See page 55-28)**



6. DISCONNECT HEATER WATER INLET HOSE

- (a) Remove the bolt and heater water bracket.



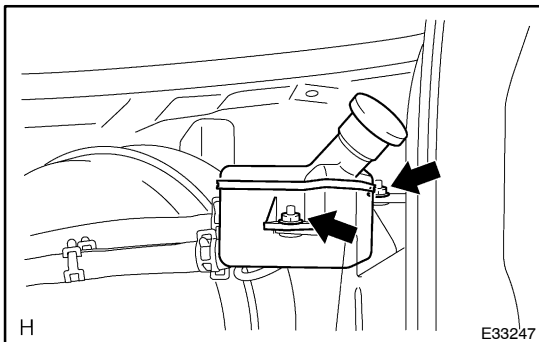
- (b) Slide the clip and disconnect the heater water inlet hose.

7. DISCONNECT HEATER WATER OUTLET HOSE

- (a) Slide the clip and disconnect the heater water outlet hose.

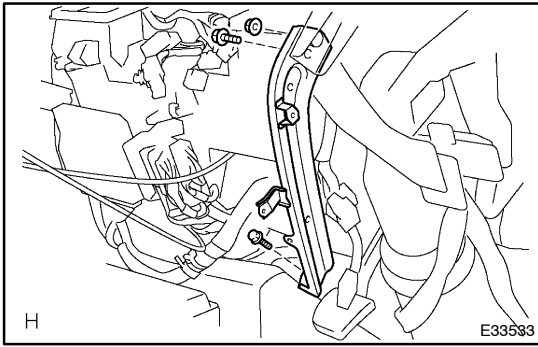
8. REMOVE STEERING COLUMN ASSY (See page 50-8)

9. REMOVE INSTRUMENT PANEL SUB-ASSY (See page 71-11 or 71-17)



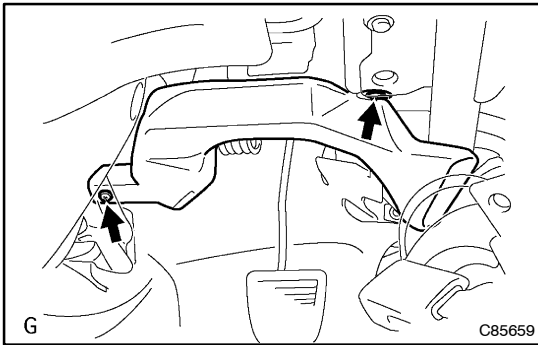
10. REMOVE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSY

- (a) Remove the 2 nuts and disconnect bracket master cylinder reservoir.



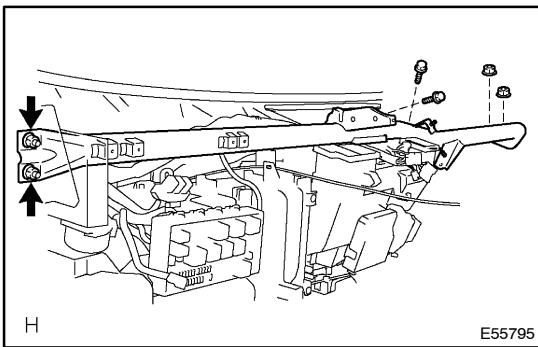
11. REMOVE INSTRUMENT PANEL BRACE SUB-ASSY NO.1

- (a) Remove the 2 bolts, nut and instrument panel brace.



12. REMOVE AIR DUCT NO.1

- (a) Remove the 2 clips and air duct.

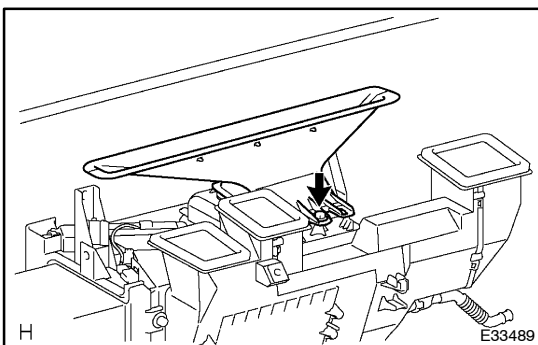


13. REMOVE INSTRUMENT PANEL REINFORCEMENT

- (a) Remove the 2 bolts, 4 nuts and instrument panel reinforcement.

14. REMOVE WINDSHIELD WASHER JAR ASSY (See page 55-28)

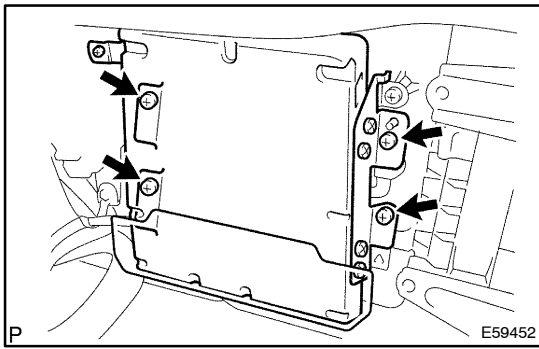
15. REMOVE COOLER UNIT ASSY (See page 55-28)



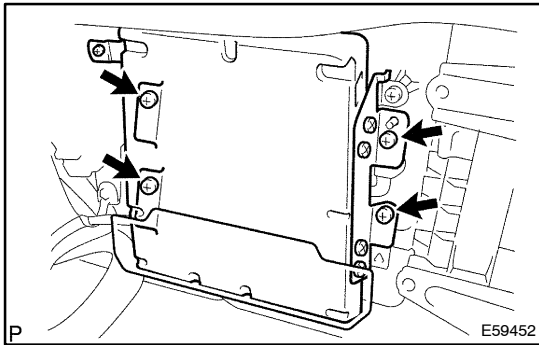
16. REMOVE DEFROSTER NOZZLE ASSY LWR

- (a) Remove the screw and defroster nozzle.

17. REMOVE AIRCONDITIONER AMPLIFIER SUB-ASSY (See page 55-58)

**18. REMOVE ECM**

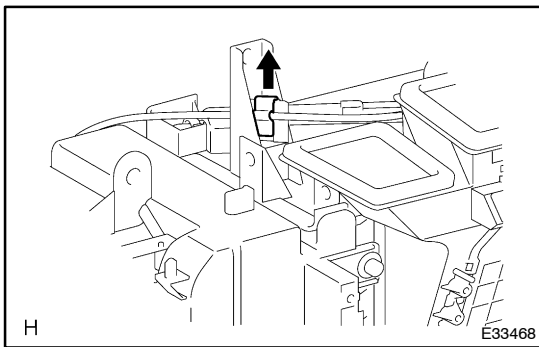
- (a) Remove the 4 screws and ECM.

**19. REMOVE SKID CONTROL ECU ASSY**

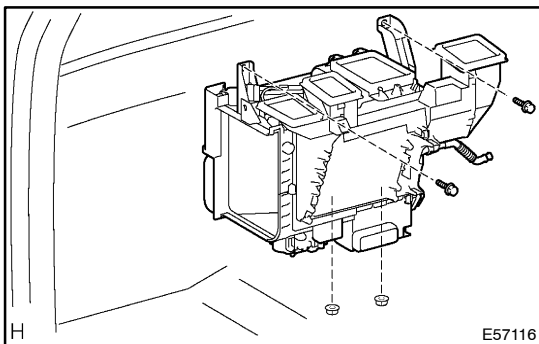
- (a) Remove the 4 screws and skid control ECU.

20. REMOVE HEATER RADIATOR ASSY

- (a) Release the 2 claws and disconnect the connector.



- (b) Disconnect the outer cable from the clamp.



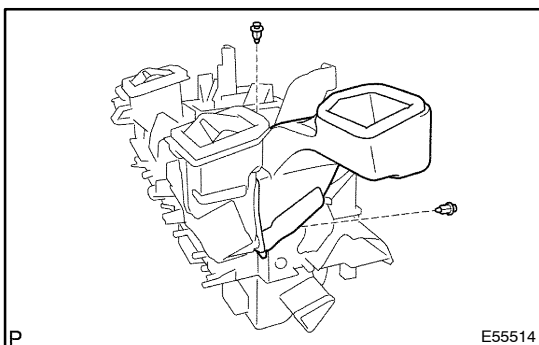
- (c) Wide Body Type:

Remove the screw and

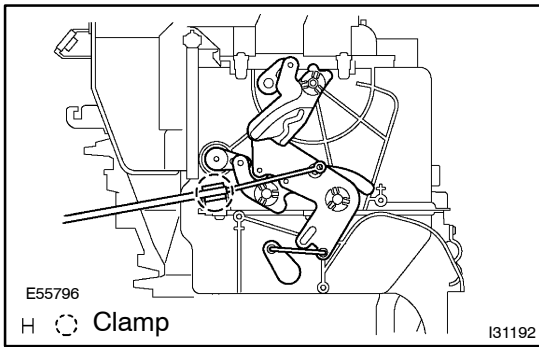
- (d) Remove the 2 bolts, 2 nuts and heater radiator.

- (e) Wide Body Type:

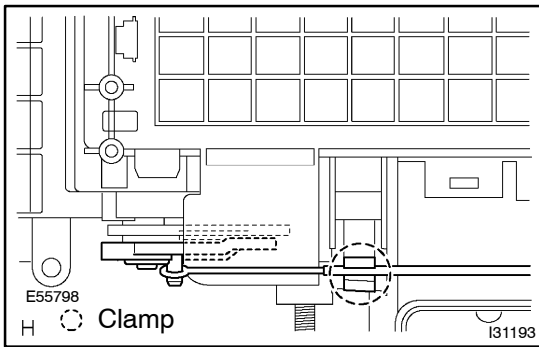
Remove the heater duct sub-assy.

**21. REMOVE HEATER TO REGISTER DUCT NO.2**

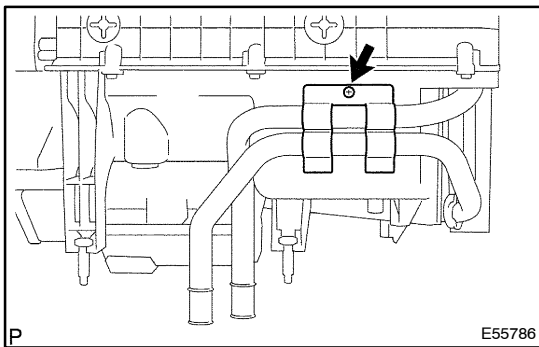
- (a) Remove the 2 clips and duct.

**22. SEPARATE HEATER CONTROL CABLE SUB-ASSY**

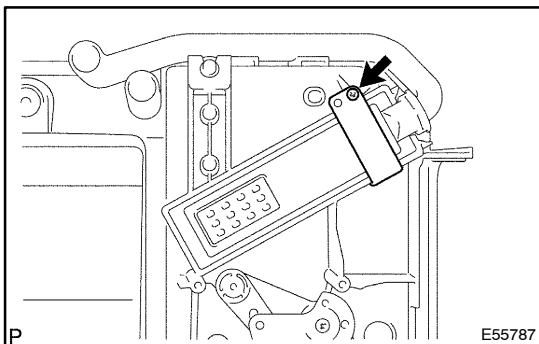
- (a) Disconnect the outer cable from the clamp.
- (b) Remove the inner cable.

**23. REMOVE AIRMIX DAMPER CONTROL CABLE SUB-ASSY**

- (a) Disconnect the outer cable from the clamp.
- (b) Remove the inner cable.

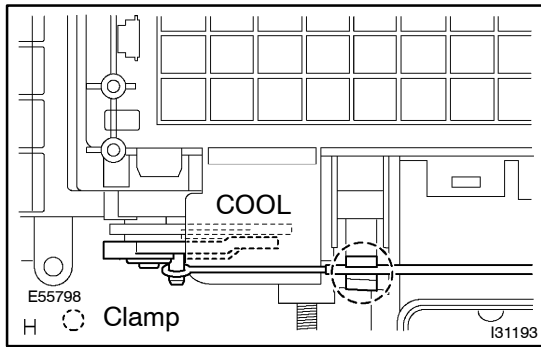
**24. REMOVE HEATER RADIATOR UNIT SUB-ASSY**

- (a) Remove the screw and bracket.



- (b) Remove the screw, bracket and heater radiator unit.

25. INSTALL HEATER RADIATOR UNIT SUB-ASSY

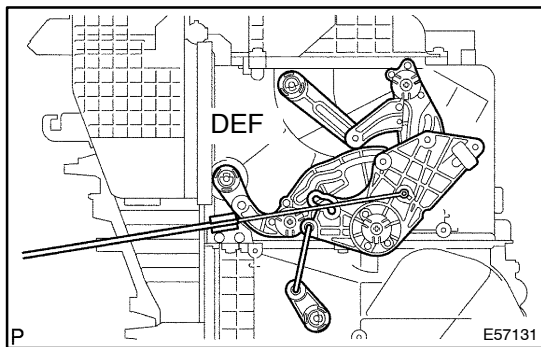


26. INSTALL AIRMIX DAMPER CONTROL CABLE SUB-ASSY

- Connect the heater control cable to the heater control assy, keep the condition of MAX COOL remaining.
- Install the inner cable to the control lever in MAX COOL position.
- Install the outer cable to the clamp while slightly pulling it to the direction shown by arrow in the illustration.

NOTICE:

When operating the mode control lever, check that the restraint exists at both ends of MAX COOL and MAX HOT, and no repulsion occurs.



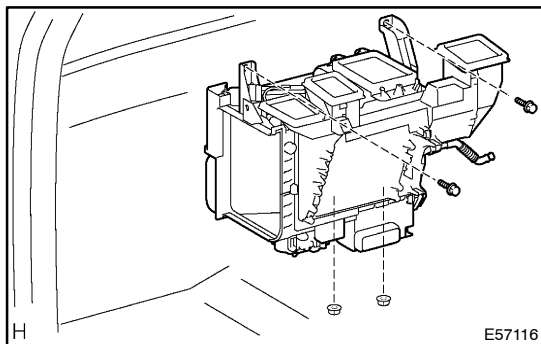
27. INSTALL HEATER CONTROL CABLE SUB-ASSY

- Connect the heater control cable to the heater control assy, keep the condition of DEF remaining.
- Install the inner cable to the control lever in DEF position.
- Install the outer cable to the clamp while slightly pulling it to the direction shown by arrow in the illustration.

NOTICE:

When operating the mode control lever, check that the restraint exists at both ends of FACE and DEF, and no repulsion occurs.

28. INSTALL HEATER TO REGISTER DUCT NO.2



29. INSTALL HEATER RADIATOR ASSY

- Install the heater radiator with the 2 bolts and 2 nuts.

30. INSTALL SKID CONTROL ECU ASSY

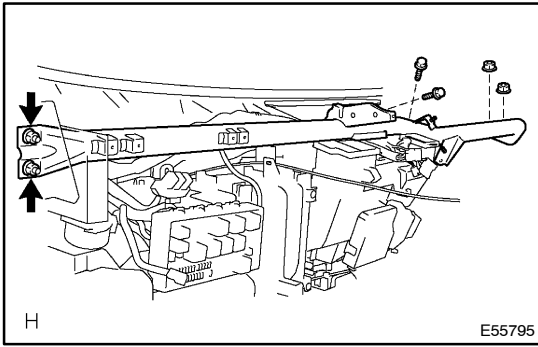
31. INSTALL ECM

32. INSTALL AIRCONDITIONER AMPLIFIER SUB-ASSY (See page 55-58)

33. INSTALL DEFROSTER NOZZLE ASSY LWR

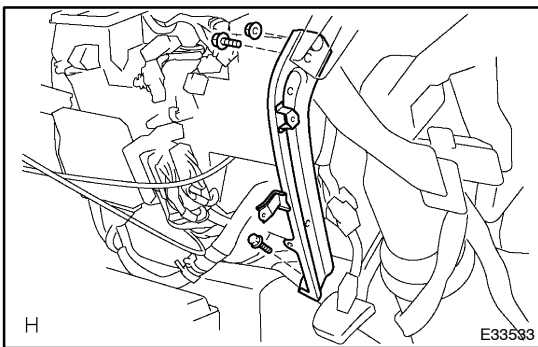
34. INSTALL COOLER UNIT ASSY (See page 55-28)

35. INSTALL WINDSHIELD WASHER JAR ASSY (See page 55-28)



- 36. INSTALL INSTRUMENT PANEL REINFORCEMENT**
 (a) Install the instrument panel reinforcement with the 2 bolts and 4 nuts.

37. INSTALL AIR DUCT NO.1



- 38. INSTALL INSTRUMENT PANEL BRACE SUB-ASSY NO.1**
 (a) Install the instrument panel brace with the 2 bolts and nut.

- 39. INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSY**
40. INSTALL HEATER WATER OUTLET HOSE
41. INSTALL HEATER WATER INLET HOSE
42. INSTALL INSTRUMENT PANEL SUB-ASSY (See page 71-11 or 71-17)
43. INSTALL STEERING COLUMN ASSY (See page 50-8)
44. INSTALL LIQUID A HOSE (See page 55-28)
45. INSTALL COOLER REFRIGERANT SUCTION HOSE NO.1 (See page 55-28)
46. ADD COOLANT (See page 16-3 or 16-23 or 16-38 or 16-53 or 16-68 or 16-83)
47. CHECK FOR ENGINE COOLANT LEAKS (See page 16-1 or 16-21 or 16-36 or 16-52 or 16-66 or 16-81)
48. WARM UP ENGINE
49. CHARGE REFRIGERANT (See page 55-14)
 SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050,
 07117-88060, 07117-88070, 07117-88080)
50. INSPECT LEAKAGE OF REFRIGERANT

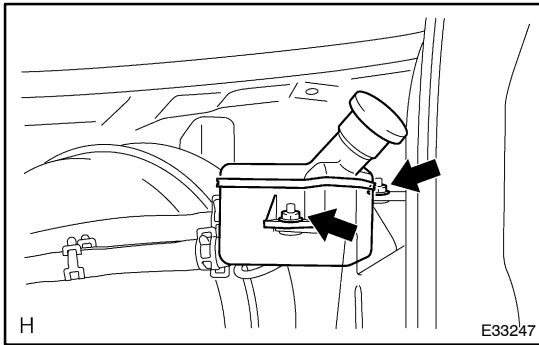
AIR CONDENSOR AMPLIFIER ASSY REPLACEMENT

550WS-01

HINT:

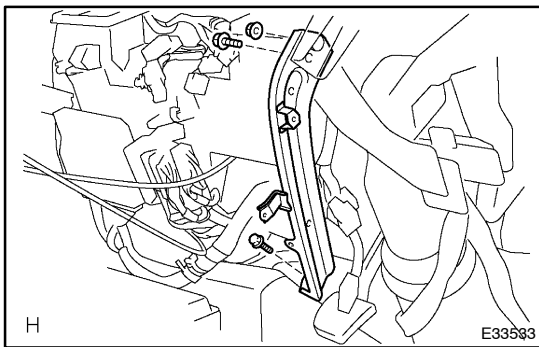
The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. REMOVE STEERING COLUMN ASSY (See page 50-8)
2. REMOVE INSTRUMENT PANEL SUB-ASSY (See page 71-11 or 71-17)



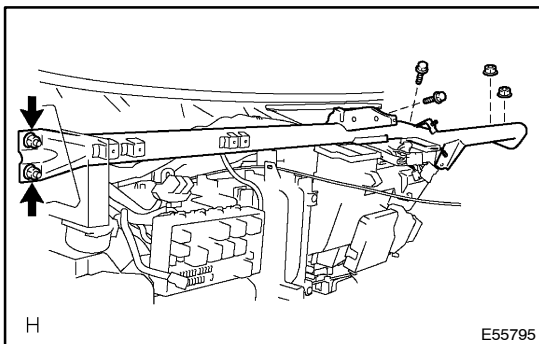
3. REMOVE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSY

- (a) Remove the 2 nuts and disconnect bracket master cylinder reservoir.



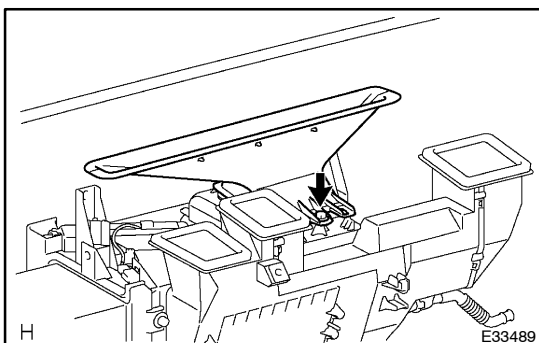
4. REMOVE INSTRUMENT PANEL BRACE SUB-ASSY NO.1

- (a) Remove the 2 bolts, nut and instrument panel brace.



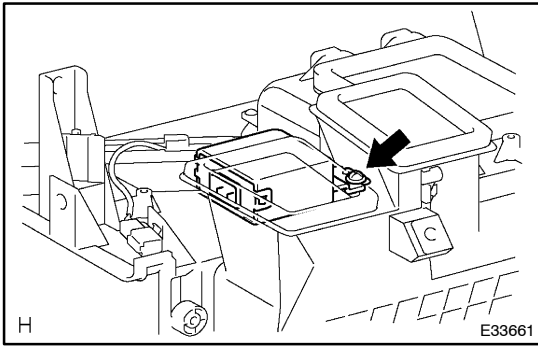
5. REMOVE INSTRUMENT PANEL REINFORCEMENT

- (a) Remove the 2 bolts, 4 nuts and instrument panel reinforcement.



6. REMOVE DEFROSTER NOZZLE ASSY LWR

- (a) Remove the screw and defroster nozzle assy LWR.



- 7. REMOVE AIRCONDITIONER AMPLIFIER SUB-ASSY**
 - (a) Remove the screw and amplifier.
- 8. INSTALL AIRCONDITIONER AMPLIFIER SUB-ASSY**
 - (a) Install the amplifier with the screw.

- 9. INSTALL DEFROSTER NOZZLE ASSY LWR**
- 10. INSTALL INSTRUMENT PANEL REINFORCEMENT**
- 11. INSTALL INSTRUMENT PANEL BRACE SUB-ASSY NO.1**
- 12. INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSY**
- 13. INSTALL INSTRUMENT PANEL SUB-ASSY (See page 71-11 or 71-17)**
- 14. INSTALL STEERING COLUMN ASSY (See page 50-8)**

HEATER AIR FILTER NO.2

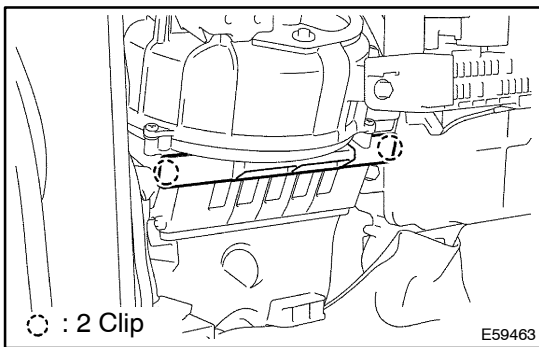
550WT-01

REPLACEMENT

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. REMOVE INSTRUMENT COVER LWR NO.3 (WIDE BODY MODELS) (See page 71-11)
2. REMOVE INSTRUMENT COVER LOWER CENTER (See page 71-11 or 71-17)
3. REMOVE GLOVE COMPARTMENT DOOR ASSY (See page 71-11 or 71-17)
4. REMOVE WINDSHIELD WASHER JAR ASSY (See page 55-28)



5. REMOVE HEATER AIR FILTER NO.2
6. INSTALL HEATER AIR FILTER NO.2

HINT:

When reusing the filter, wash and dry it before installation.

7. INSTALL WINDSHIELD WASHER JAR ASSY (See page 55-28)
8. INSTALL GLOVE COMPARTMENT DOOR ASSY (See page 71-11 or 71-17)
9. INSTALL INSTRUMENT COVER LOWER CENTER (See page 71-11 or 71-17)
10. INSTALL INSTRUMENT COVER LWR NO.3 (WIDE BODY MODELS) (See page 55-28)

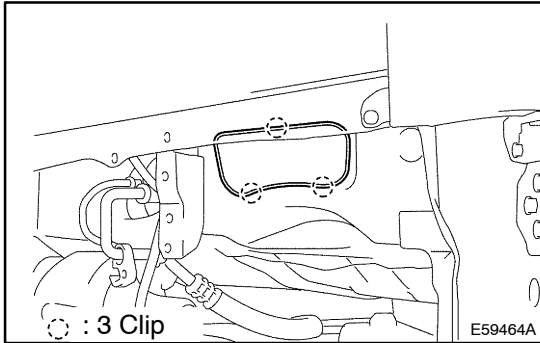
HEATER AIR FILTER REPLACEMENT

550WU-01

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. **REMOVE RADIATOR GRILLE (See page 76-3)**
2. **REMOVE CLEARANCE LAMP LENS & BODY LH (LHD STEERING POSITION TYPE)
(See page 65-25)**
3. **REMOVE HEADLAMP UNIT LH (See page 65-12 or 65-18)**



4. **REMOVE HEATER AIR FILTER**
5. **INSTALL HEATER AIR FILTER**

HINT:

When reusing the filter, wipe dirt off the filter with a soft brush or cloth before installation.

6. **INSTALL HEADLAMP UNIT LH (See page 65-12 or 65-18)**
7. **INSTALL CLEARANCE LAMP LENS & BODY LH (LHD STEERING POSITION TYPE)
(See page 65-25)**
8. **INSTALL RADIATOR GRILLE (See page 76-3)**

SUPPLEMENTAL RESTRAINT SYSTEM

SUPPLEMENTAL RESTRAINT SYSTEM	60-1
PRECAUTION	60-1
ON-VEHICLE INSPECTION	60-3
HORN BUTTON ASSY	60-5
COMPONENTS	60-5
REPLACEMENT	60-6
DISPOSAL	60-7
SPIRAL CABLE	60-14
COMPONENTS	60-14
REPLACEMENT	60-15
AIRBAG ECU ASSY	60-18
COMPONENTS	60-18
REPLACEMENT	60-19
AIRBAG SENSOR ASSY	60-21
COMPONENTS	60-21
REPLACEMENT	60-22

SUPPLEMENTAL RESTRAINT SYSTEM

600IF-01

PRECAUTION

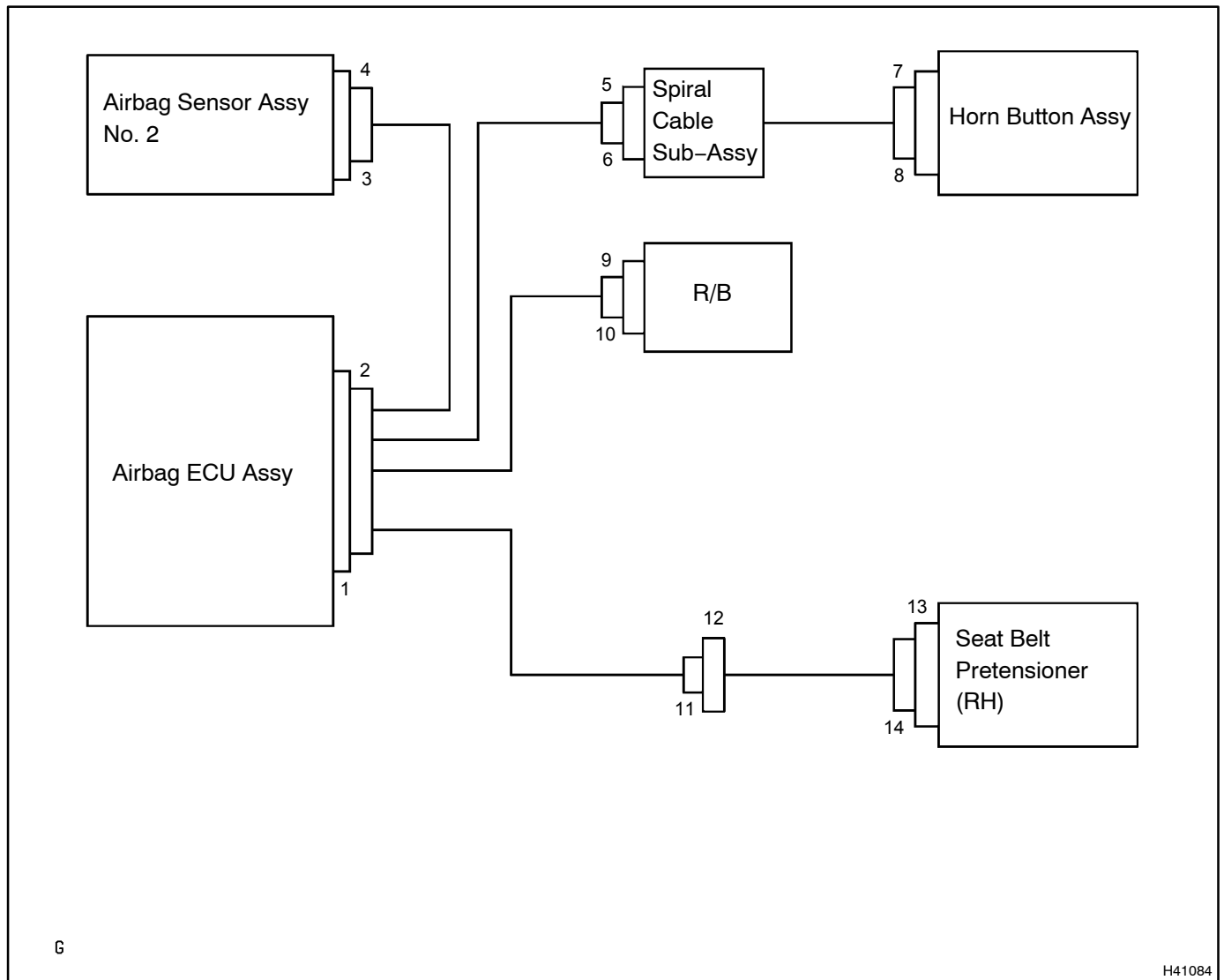
CAUTION:

- The HINO DUTRO is equipped with SRS, which comprises a driver airbag. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Further, if a mistake is made in servicing the SRS, it is possible that the SRS may fail to operate when required. Before performing servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedures described in the repair manual.
- Work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.
(The SRS is equipped with a back-up power source so that if work is started within 90 seconds from disconnecting the negative (-) terminal cable of the battery, the SRS may be deployed.)
- Do not expose the horn button assy, airbag ECU assy or airbag sensor assy No. 2 directly to hot air or flames.

NOTICE:

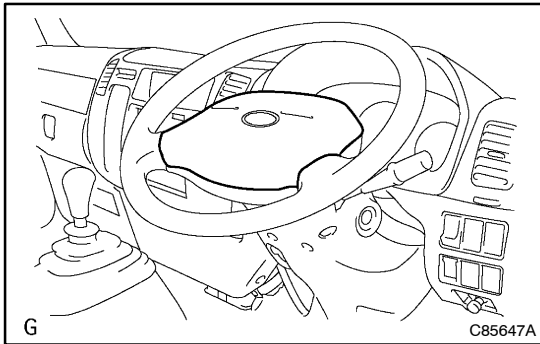
- Malfunction symptoms of the SRS are difficult to confirm, so the DTCs become the most important source of information when troubleshooting. When troubleshooting the SRS, always inspect the DTCs before disconnecting the battery.
- Even in cases of a minor collision where the SRS does not deploy, the horn button assy, airbag ECU assy and airbag sensor assy No. 2 should be inspected (See page 60-3).
- Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.
- Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.
- Never disassemble and repair the horn button assy, airbag ECU assy or airbag sensor assy No. 2 in order to reuse it.
- If the horn button assy, airbag ECU assy or airbag sensor assy No. 2 has been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace it with new one.
- Use a volt/ohmmeter with high impedance (10 k Ω /V minimum) for troubleshooting the system's electrical circuits.
- Information labels are attached to the periphery of the SRS components. Follow the instructions on the notices.
- After work on the SRS is completed, perform the SRS warning light check (See page 05-216).
- When the negative (-) terminal cable is disconnected from the battery, the memory of the clock and audio system will be canceled. So before starting work, make a record of the contents memorized in the audio memory system. When work is finished, reset the audio systems as they were before and adjust the clock. To avoid erasing the memory in each memory system, never use a back-up power supply from outside the vehicle.
- If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.

1. SRS CONNECTORS



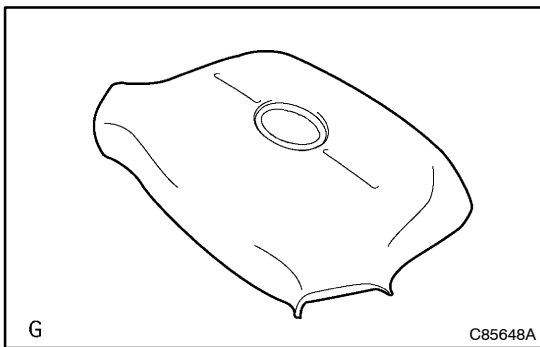
No.	Item	Application
(1)	Terminal Twin-Lock Mechanism	Connectors 2, 4, 5, 6, 7, 8, 10, 11, 12, 14
(2)	Airbag Activation Prevention Mechanism	Connectors 2, 6, 7, 13
(3)	Electrical Connection Check Mechanism	Connectors 1, 2,
(4)	Harf Connection Prevension Mechanism	Connectors 4, 5, 6, 11
(5)	Connector Twin-Lock Mechanism	Connectors 9

ON-VEHICLE INSPECTION



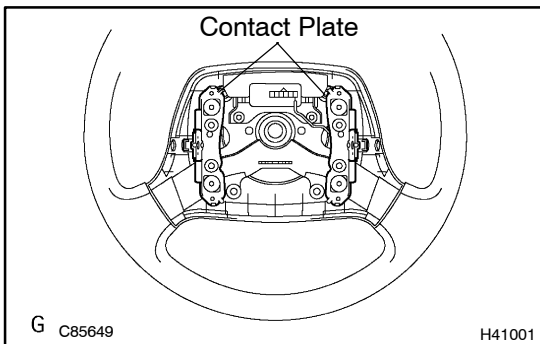
1. CHECK HORN BUTTON ASSY(VEHICLES NOT INVOLVED IN COLLISION)

- (a) Do a diagnostic system check (See page 05-216).
- (b) Do a visual check which includes the following item with the horn button assy (with airbag) installed in the vehicle. Check cuts, minute cracks or marked discoloration on the horn button assy top surface and in the grooved portion.



2. CHECK HORN BUTTON ASSY(VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED)

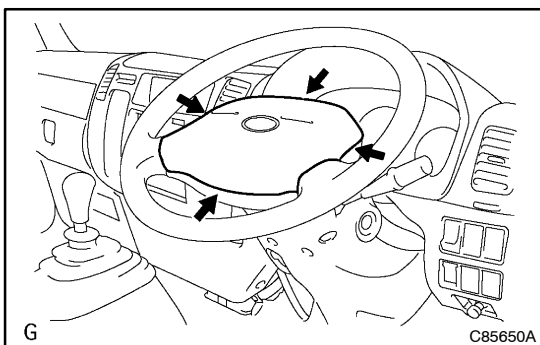
- (a) Do a diagnostic system check (See page 05-216).
- (b) Do a visual check which includes the following items with the horn button assy (with airbag) removed from the vehicle.
 - Check cuts, minute cracks or marked discoloration on the horn button assy top surface and in the grooved portion.
 - Check cuts and cracks in wire harness, and chipping in connectors.
 - Check the deformation on the steering wheel.



- Check the deformation on the horn button contact plate of the steering wheel assy.

HINT:

- If the horn button contact plate of the steering wheel assy is deformed, never repair it. Always replace the steering wheel pad with a new one.



- There should be no interference between the horn button assy and steering wheel assy, and the clearance should be uniform all the way around when the new horn button assy is installed on the steering wheel assy.

CAUTION:

For removal and installation of the horn button assy, see page 60-6, and be sure to follow the correct procedure.

3. CHECK HORN BUTTON ASSY (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED)

- (a) Do a diagnostic system check (See page 05-216).
- (b) Do a visual check which includes the following item with the horn button assy (with airbag) removed from the vehicle.

Check the damage on the spiral cable connector and wire harness.

HINT:

There should be no interference between the horn button assy and steering wheel assy, and the clearance should be uniform all the way around when the new horn button assy is installed on the steering wheel assy.

4. CHECK AIRBAG ECU ASSY (VEHICLE NOT INVOLVED IN COLLISION)

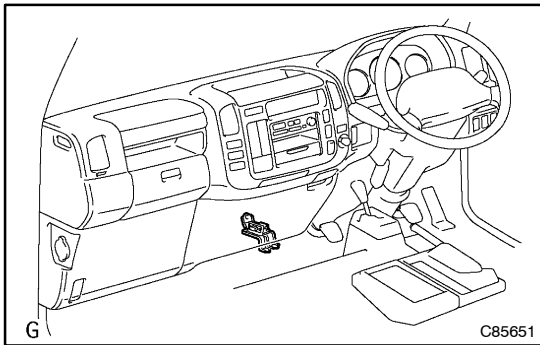
- (a) Do a diagnostic system check (See page 05-216).

5. CHECK AIRBAG ECU ASSY (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED)

- (a) Do a diagnostic system check (See page 05-216).

6. CHECK AIRBAG ECU ASSY (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED)

- (a) Replace the airbag ECU assy (See page 60-19).

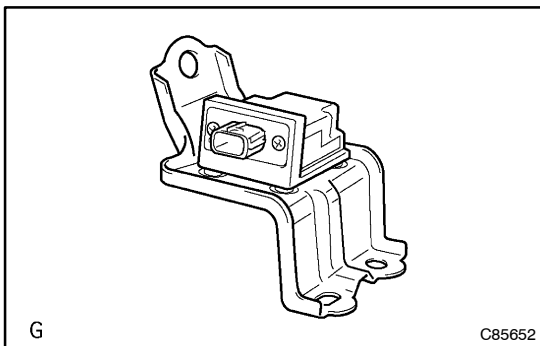
**7. CHECK AIRBAG SENSOR ASSY NO. 2 (VEHICLE NOT INVOLVED IN COLLISION)**

- (a) Do a diagnostic system check (See page 05-216).

8. CHECK AIRBAG SENSOR ASSY NO. 2 (VEHICLE INVOLVED IN COLLISION)

- (a) Do a diagnostic system check (See page 05-216).
- (b) If the front bumper of the vehicle or its periphery is damaged, do a visual check for damage to the airbag sensor assy No. 2, which includes the following items even if the airbag was not deployed:

- Bracket deformation
- Paint peeling off the bracket
- Cracks, dents or chips in the case
- Cracks, dents, chipping and scratches in the connector
- Peeling off of the label or damage to the serial number

**9. CHECK WIRE HARNESS AND CONNECTOR (VEHICLE NOT INVOLVED IN COLLISION)**

- (a) Do a diagnostic system check (See page 05-216).

10. CHECK WIRE HARNESS AND CONNECTOR (VEHICLE INVOLVED IN COLLISION)

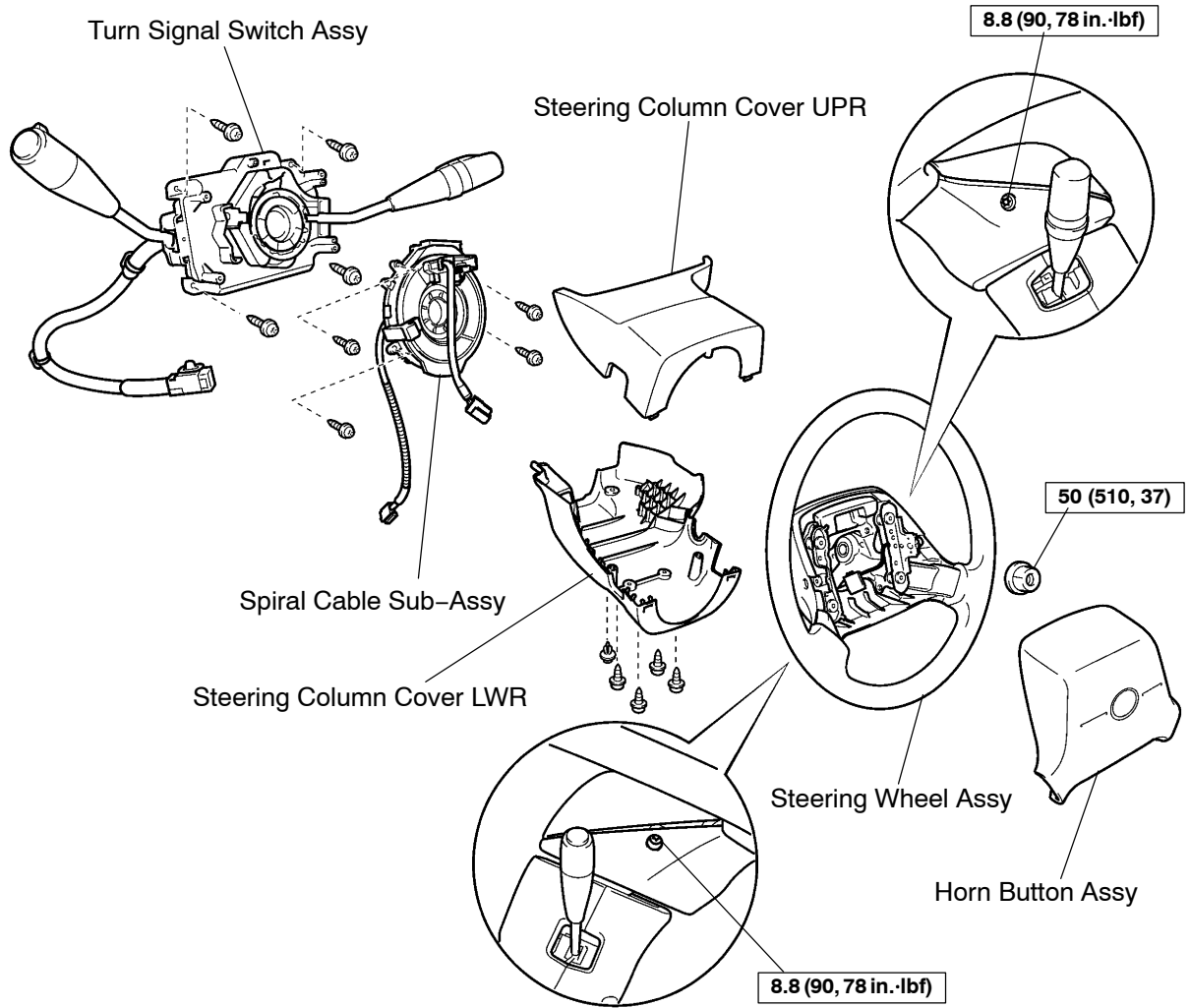
- (a) Do a diagnostic system check (See page 05-216).
- (b) Check breaks in all wires of the SRS wire harness, and exposed conductors.
- (c) Check to see if the SRS wire harness connectors are cracked or chipped.

HINT:

The SRS wire harness is integrated with the instrument panel wire harness assembly. All the connectors in the system are a standard yellow color.

HORN BUTTON ASSY COMPONENTS

600H-01



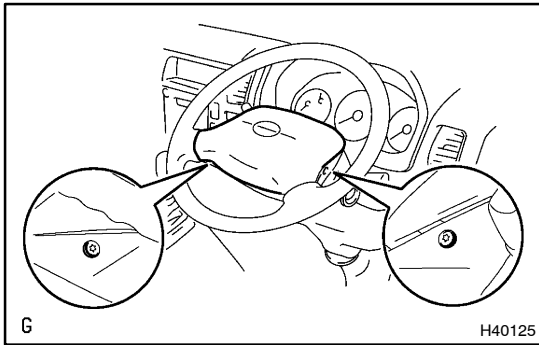
N·m (kgf·cm, ft·lbf) : Specified torque

G

H40159A

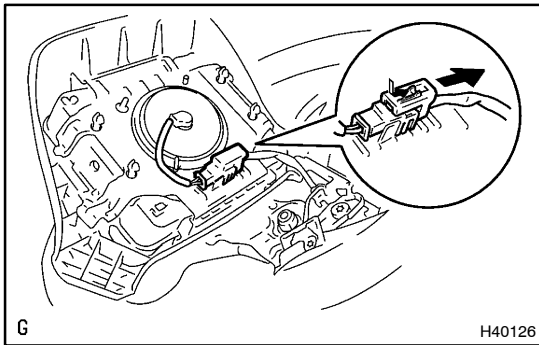
REPLACEMENT

1. **PRECAUTION (See page 60-1)**
2. **SEPARATE BATTERY NEGATIVE TERMINAL**



3. REMOVE HORN BUTTON ASSY

- (a) Place the front wheels facing straight ahead.
- (b) Using a torx socket wrench (T30), loosen the 2 torx screws until the groove along the screw circumference catches on the screw case.



- (c) Pull out the wheel pad from the horn button.
- (d) Disconnect the airbag connector and horn connector and remove the horn button.

4. INSTALL HORN BUTTON ASSY

- (a) Connect the airbag connector and horn connector.
- (b) Install the horn button after confirming that the circumference groove of the torx screws is caught on the screw case.
- (c) Using a torx socket wrench, install the 2 screws.
Torque: 8.8 N·m (90 kgf·cm, 78 in·lbf)

5. INSPECT HORN BUTTON ASSY (See page 60-3)

6. INSPECT SRS WARNING LIGHT (See page 05-216)

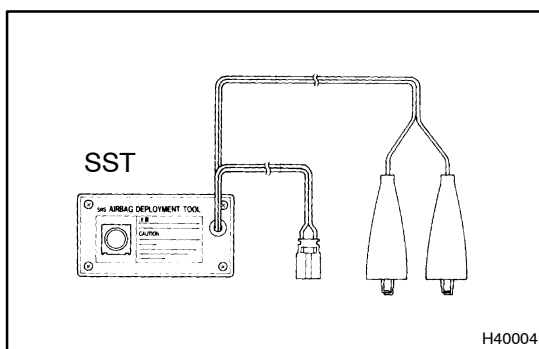
DISPOSAL

HINT:

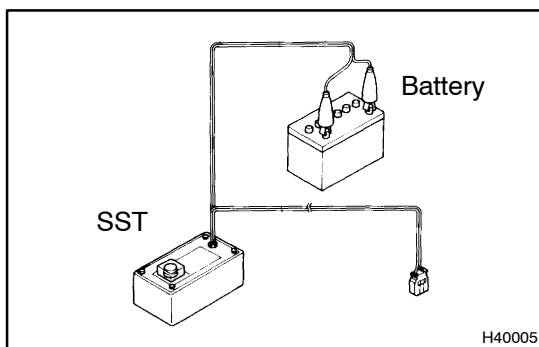
When scrapping vehicle equipped with an SRS or disposing of a horn button assy (with airbag), always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of the DISTRIBUTOR.

CAUTION:

- Never dispose of a horn button assy which has an undeployed airbag.
- The airbag produces a sizeable exploding sound when it deploys, so perform the operation out-of-doors and where it will not create a nuisance to nearby residents.



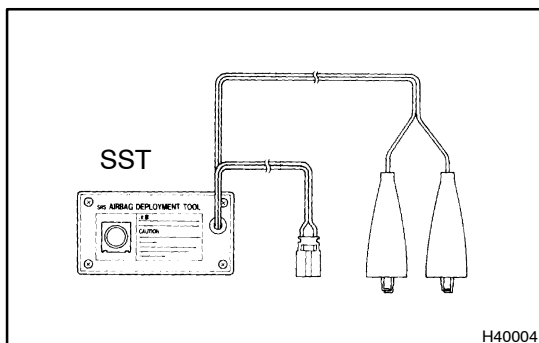
- When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.
- When deploying an airbag, perform the operation at least 10 m (33 ft) away from the horn button assy.
- The horn button assy is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a horn button assy with the deployed airbag.
- Always wash your hands with water after completing the operation.
- Do not apply water, etc. to a horn button assy with the deployed airbag.



1. DISPOSE OF HORN BUTTON ASSY (WHEN SCRAPPING VEHICLE DEPLOYMENT METHOD)

HINT:

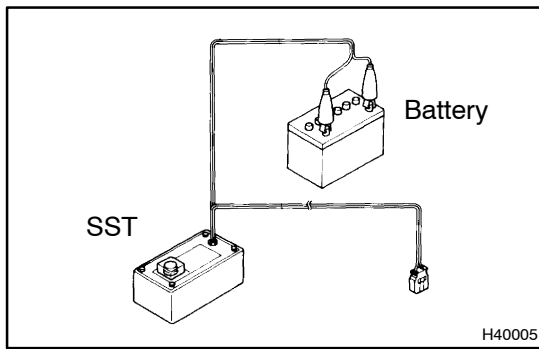
Have a battery ready as the power source to deploy the airbag.



- (a) Check functioning of the SST.
SST 09082-00700

CAUTION:

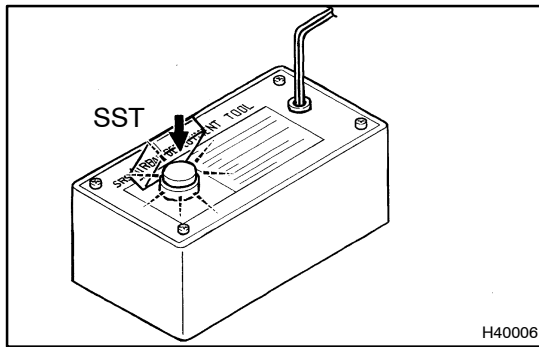
When deploying the airbag, always use the specified SST: SRS Airbag Deployment Tool.



- (1) Connect the SST to the battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.

HINT:

Do not connect the yellow connector which will be connected with the supplemental restraint system.

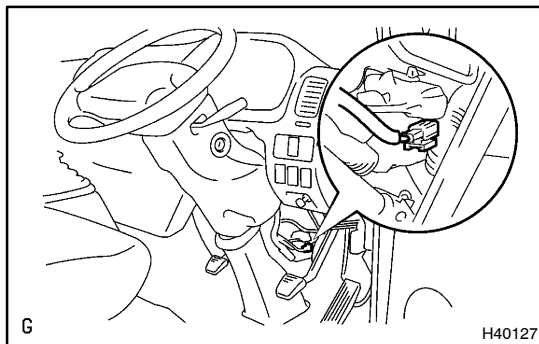


- (2) Check functioning of the SST.
Press the SST activation switch, and check that the LED of the SST activation switch lights up.

CAUTION:

If the LED lights up when the activation switch is not being pressed, SST malfunction is probable, so definitely do not use the SST.

- (3) Disconnect the SST from the battery.



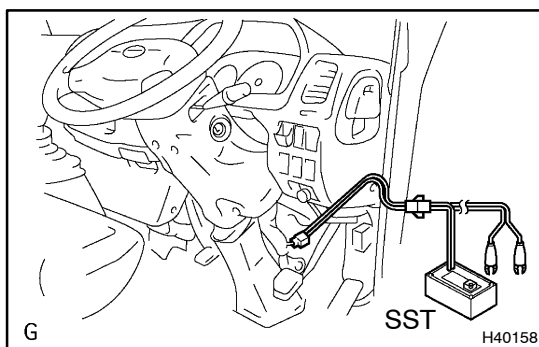
- (b) Install the SST.

SST 09082-00700, 09082-00760

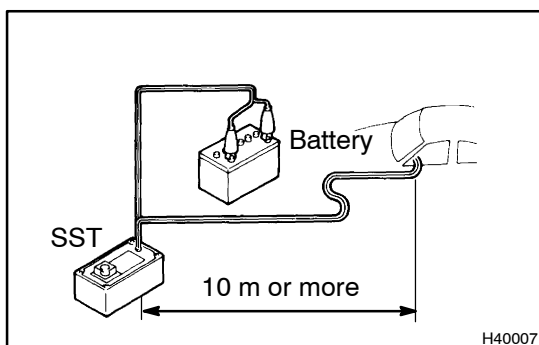
CAUTION:

Check that there is no looseness in the steering wheel and horn button assy.

- (1) Disconnect the airbag connector under the steering column tube LWR.



- (2) Connect the connectors of the SST to the airbag connector of the spiral cable sub-assy side.



- (3) Move the SST at least 10 m (33 ft) away from the front of the vehicle.
- (4) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

- (5) Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the negative (-) terminal.

- (c) Deploy the airbag.
- (1) Confirm that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.
 - (2) Press the SST activation switch and deploy the airbag.

HINT:

The airbag deploys simultaneously as the LED of the SST activation switch lights up.

- (d) Dispose the horn button assy (with airbag).

CAUTION:

- The horn button assy is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.
- When moving a vehicle for scrapping which has a horn button assy with deployed airbag, use gloves and safety glasses.
- Use gloves and safety glasses when handling a horn button assy with the deployed airbag.
- Always wash your hands with water after completing the operation.
- Do not apply water, etc. to a horn button assy with the deployed airbag.

HINT:

When scrapping a vehicle, deploy the airbag and scrap the vehicle with the horn button assy still installed.

2. DISPOSE OF HORN BUTTON ASSY (WHEN DISPOSING OF AIRBAG ASSEMBLY DEPLOYMENT METHOD)

NOTICE:

- When disposing of the horn button assy (with airbag) only, never use the customers vehicle to deploy the airbag.
- Be sure to follow the procedure given below when deploying the airbag.

HINT:

Have a battery ready as the power source to deploy the airbag.

- (a) Remove the horn button assy (See page 60-6).

CAUTION:

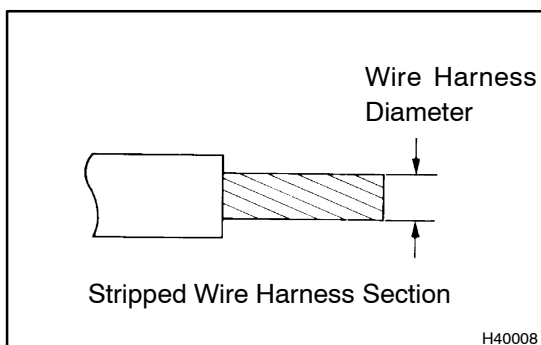
When storing the horn button assy, keep the upper surface of the pad facing upward.

- (b) Using a service-purpose wire harness, tie down the horn button assy to the disc wheel.

**Wire harness: Stripped wire harness section
1.25 mm² or more (0.0019 in². or more)**

CAUTION:

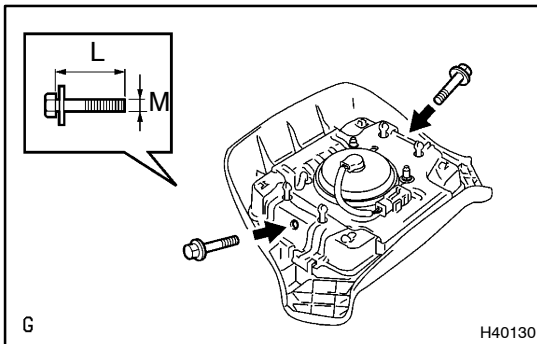
If a wire harness which is too thin or some other thing is used to tie down the horn button assy, it may be snapped by the shock when the airbag is deployed. This is highly dangerous. Always use a wire harness for vehicle use which is at least 1.25 mm² (0.0019 in²).



HINT:

To calculate the square of the stripped wire harness section:

$$\text{Square} = 3.14 \times (\text{Diameter})^2 \text{ divided by } 4$$



- (1) Install the 2 bolts with washers in the 2 bolt holes in the horn button assy.

Bolt:

L: 35.0 mm (1.387 in.)

M: 6.0 mm (0.236 in.)

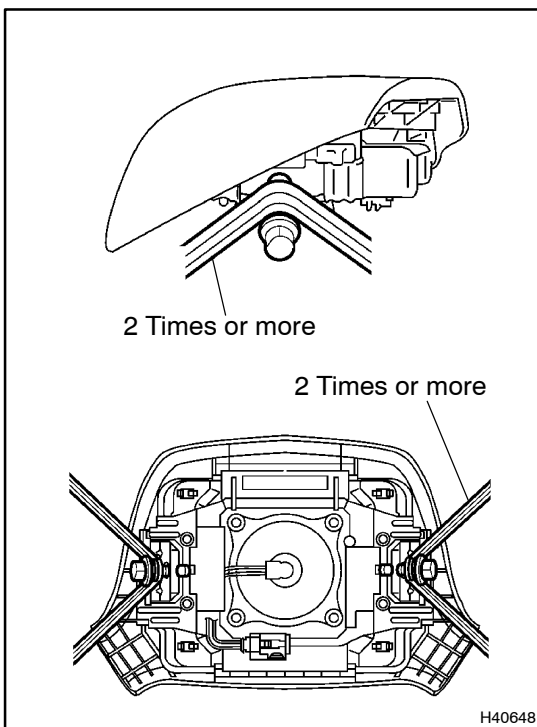
Pitch: 1.0 mm (0.039 in.)

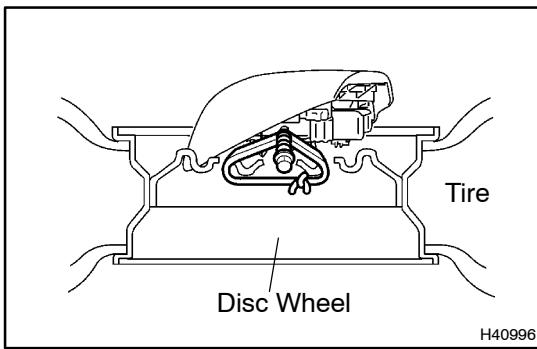
NOTICE:

- **Tighten the bolts by hand until the bolts become difficult to turn.**
 - **Do not tighten the bolts too much.**
- (2) Using 3 wire harness, wind the wire harness at least 2 times each around the bolts installed on the left and right sides of the horn button assy.

CAUTION:

- **Tightly wind the wire harness around the bolts so that there is no slack.**
- **If there is slack in the wire harness, the horn button assy may come loose due to the shock when the air-bag is deployed. This is highly dangerous.**





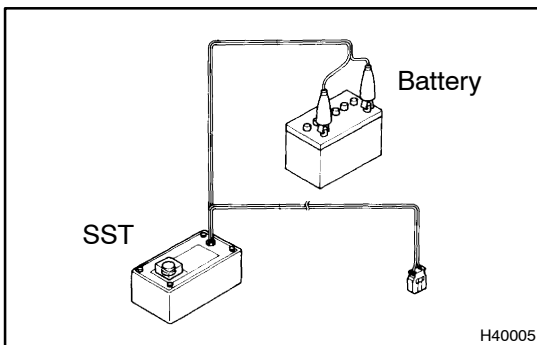
- (3) Face the upper surface of the horn button assy upward. Separately tie the left and right sides of the horn button assy to the disc wheel through the hub nut holes. Position the horn button assy connector so that it hangs downward through a hub hole in the disc wheel.

CAUTION:

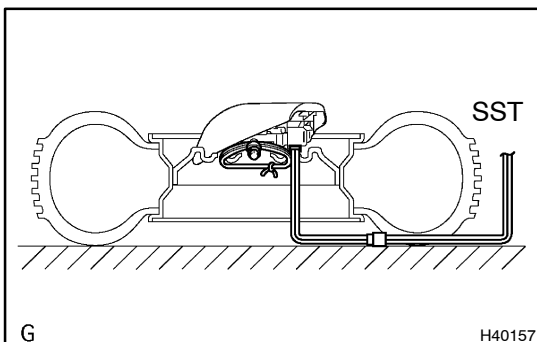
- **Make sure that the wire harness is tight. It is very dangerous when looseness in the wire harness results in the horn button assy coming free through the shock from the airbag deploying.**
- **Always tie down the horn button assy with the pad side facing upward. It is very dangerous if the horn button assy is tied down with the metal surface facing upward as the wire harness will be cut by the shock from the airbag deploying and the horn button assy will be thrown into the air.**

NOTICE:

The disc wheel will be marked by airbag deployment, so when disposing of the airbag use a redundant disc wheel.



- (c) Check functioning of the SST (See step 1-(a)).
SST 09082-00700



- (d) Install the SST.
SST 09082-00700, 09082-00760

CAUTION:

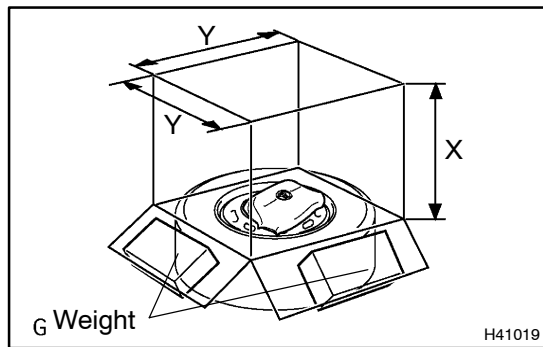
Place the disc wheel on the level ground.

- (1) Connect the connectors of the 2 SST to the horn button assy connector.

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the disc wheel.

- (2) Move the SST to at least 10 m (33 ft) away from the horn button assy tied down on the disc wheel.



- (e) Cover the horn button assy with a cardboard box or tires.
- Covering method using a cardboard box:
Cover the horn button assy with the cardboard box and weight the cardboard box down in 4 places with at least 190 N (20 kg, 44 lb).

Size of cardboard box:

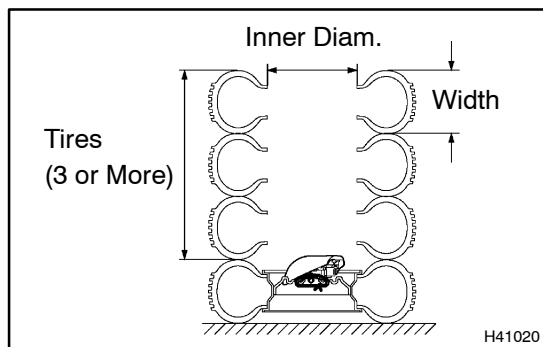
Must exceed the following dimensions:

X = 460 mm (18.11 in.)

Y = 650 mm (25.59 in.)

NOTICE:

- When dimension Y of the cardboard box exceeds the diameter of the disc wheel with tire to which the horn button assy is tied, X should be the following size.
X = 460 mm (18.11 in.) + width of tire
- If a cardboard box smaller than the specified size is used, the cardboard box will be broken by the shock from the airbag deployment.



- Covering method using tires:
Place at least 3 tires without disc wheel on top of the disc wheel with tire to which the horn button assy is tied.

Tire size: Must exceed the following dimensions-

Width: 185 mm (7.28 in.)

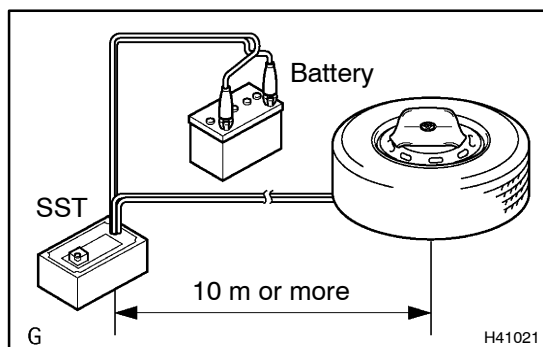
Inner diameter: 360 mm (14.17 in.)

CAUTION:

Do not use tires with disc wheels.

NOTICE:

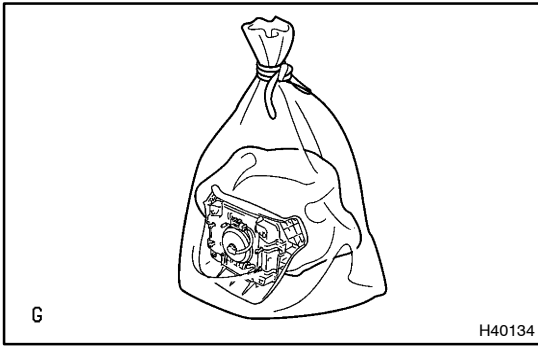
The tires may be marked by the airbag deployment, so use the redundant tires.



- (f) Deploy the airbag.
- Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.
 - Check that no one is within 10 m (33 ft) area around the disc wheel which the horn button assy is tied.
 - Press the SST activation switch and deploy the airbag.

HINT:

The airbag deploys simultaneously as the LED of the SST activation switch lights up.



(g) Dispose the horn button assy (with airbag).

CAUTION:

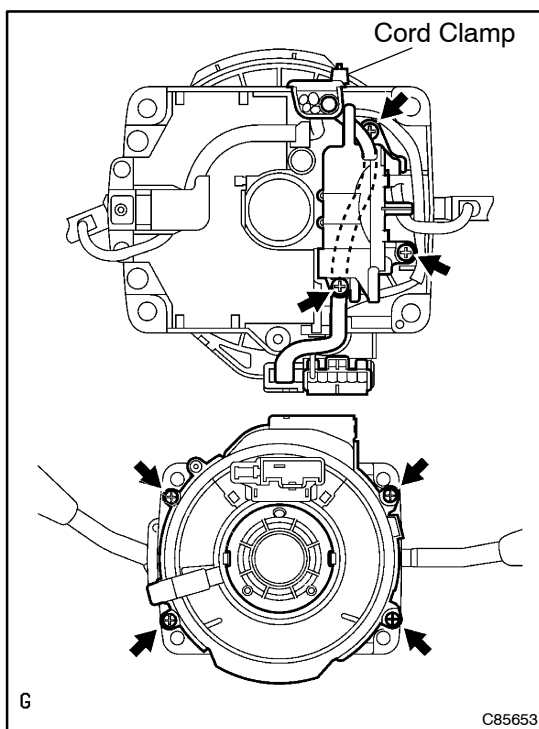
- **The horn button assy is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a horn button assy with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a horn button assy with the deployed airbag.**
 - (1) Remove the horn button assy from the disc wheel.
 - (2) Place the horn button assy in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.

SPIRAL CABLE COMPONENTS

(See page 60-5)

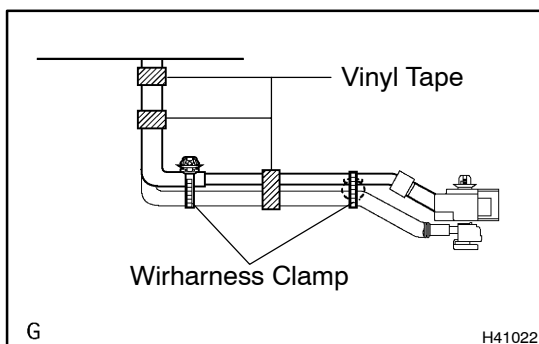
REPLACEMENT

1. **PRECAUTION** (See page 60-1)
2. **SEPARATE BATTERY NEGATIVE TERMINAL** (See page 60-1)
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
4. **REMOVE HORN BUTTON ASSY** (See page 60-6)
5. **REMOVE STEERING WHEEL ASSY** (See page 50-8)
SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)
6. **REMOVE STEERING COLUMN COVER UPR** (See page 50-8)
7. **REMOVE STEERING COLUMN COVER LWR** (See page 50-8)
8. **REMOVE TURN SIGNAL SWITCH ASSY** (See page 50-8)



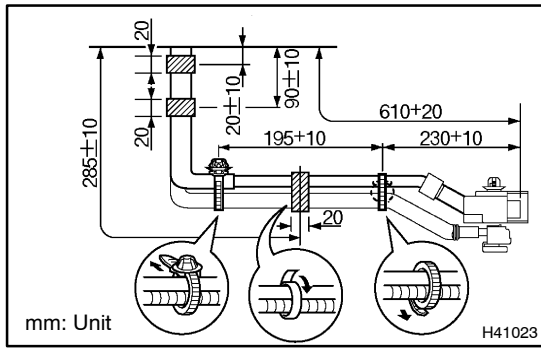
9. REMOVE SPIRAL CABLE

- (a) Remove the 3 screws, separate the headlamp dimmer switch and the turn signal switch.
- (b) Remove the 4 screws, connector and cord clamp, separate the spiral cable and the turn signal switch.

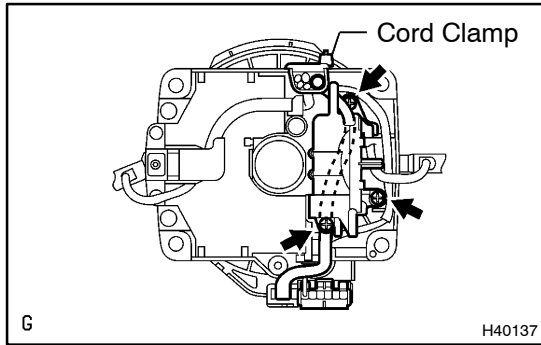


- (c) Remove the 2 wire harness clamps and vinyl tape then remove the spiral cable.

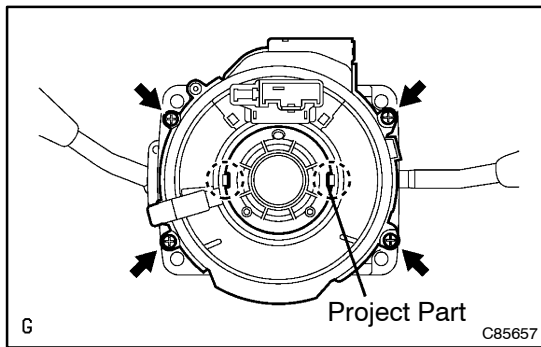
10. **INSPECT SPIRAL CABLE**
11. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
 - (a) Check that the front wheels are facing straight ahead.

**12. INSTALL SPIRAL CABLE**

- (a) As shown in illustration, bind the 2 wire harnesses with the 2 wire harness clamps.
- (b) Put new vinyl tape 2 or 3 times around the place shown in the diagram.



- (c) As shown in illustration, locate the wire harness of spiral cable sub-assy along the back side of the turn signal switch.
- (d) Connect the connector to the spiral cable.
- (e) Install the headlamp dimmer switch to the turn signal switch with the 3 screws.
- (f) Bind wire harness with a new cord clamp.



- (g) Combine the hole part of cancel cam with the project part of spiral cable, then install with the 4 screws.

NOTICE:

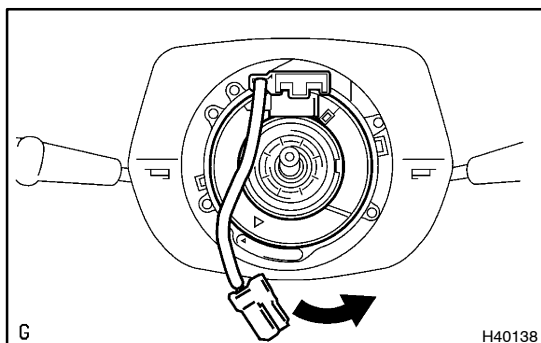
When replacing the spiral cable with new one, remove the lock pin before installing the steering wheel.

13. INSTALL TURN SIGNAL SWITCH ASSY (See page 50-8)**14. CENTER SPIRAL CABLE**

- (a) Check that the ignition switch is OFF.
- (b) Check that the battery negative terminal is disconnected.

NOTICE:

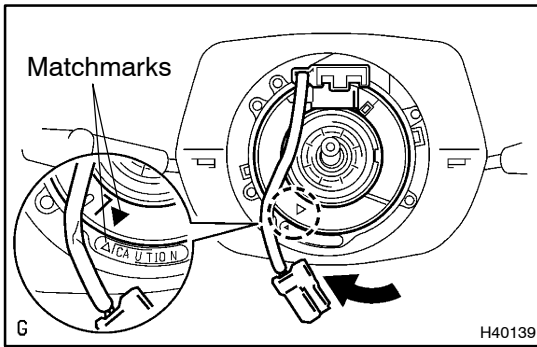
Do not start the operation for 90 seconds after removing the terminal.



- (c) Turn the cable counterclockwise by hand until it becomes harder to turn.

HINT:

The cable will rotate about 3.5 turns to either left or right of the center.

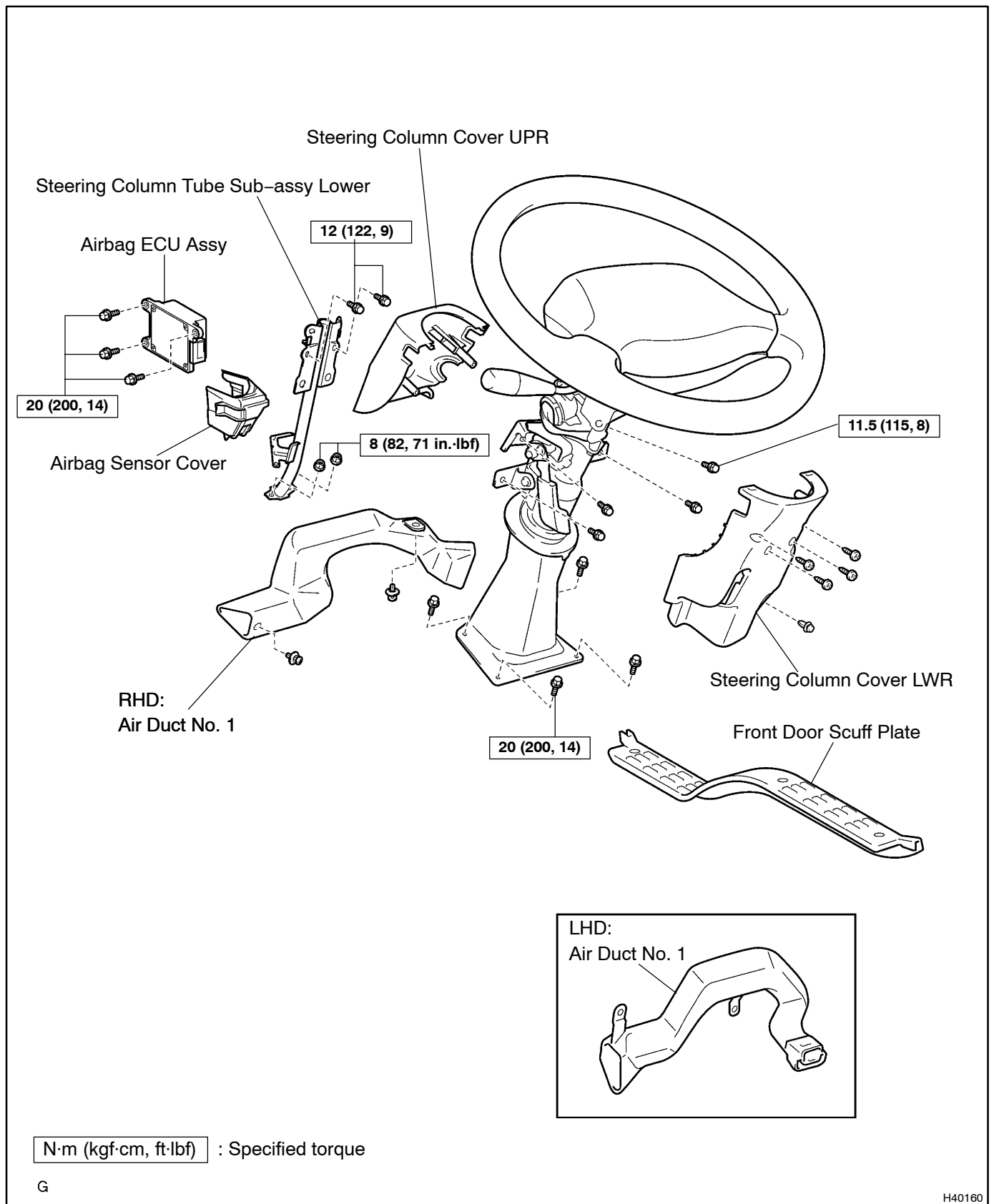


- (d) Then rotate the cable clockwise about 3.5 turns to align the marks.

15. **INSTALL STEERING WHEEL ASSY (See page 50-8)**
Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)
16. **INSPECT STEERING WHEEL CENTER POINT**
17. **INSTALL HORN BUTTON ASSY (See page 60-6)**
18. **INSPECT HORN BUTTON ASSY (See page 60-3)**
19. **INSPECT SRS WARNING LIGHT (See page 05-216)**

AIRBAG ECU ASSY COMPONENTS

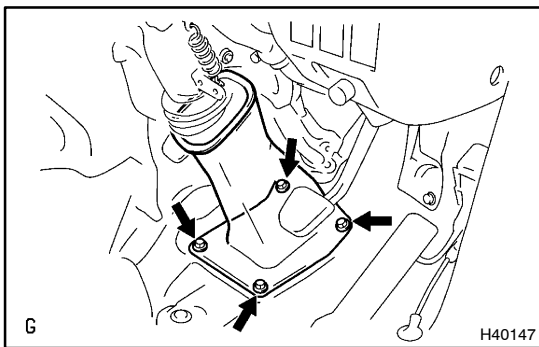
600IM-01



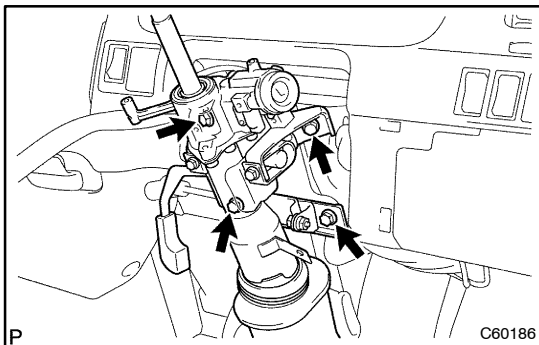
REPLACEMENT

HINT:

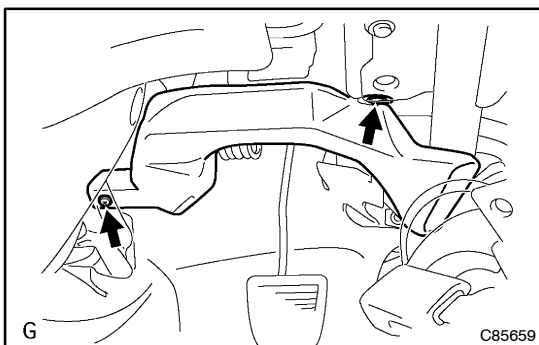
- COMPONENTS: See page 60-18
 - The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
1. **PRECAUTION (See page 60-1)**
 2. **SEPARATE BATTERY NEGATIVE TERMINAL (See page 60-1)**
 3. **REMOVE FRONT DOOR SCUFF PLATE RH (RHD STEERING POSITION TYPE)
(See page 76-5)**
 4. **REMOVE FRONT DOOR SCUFF PLATE LH (LHD STEERING POSITION TYPE)
(See page 76-5)**
 5. **REMOVE STEERING COLUMN COVER UPR (See page 50-8)**
 6. **REMOVE STEERING COLUMN COVER LWR (See page 50-8)**



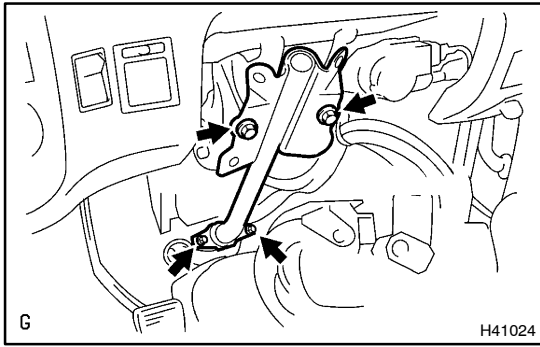
7. **DISCONNECT STEERING COLUMN TUBE LOWER**
 - (a) Turn the floor carpet off until the bolts holding the steering column tube lower can be seen.
 - (b) Remove the 4 bolts, and disconnect the steering column tube lower from the body.



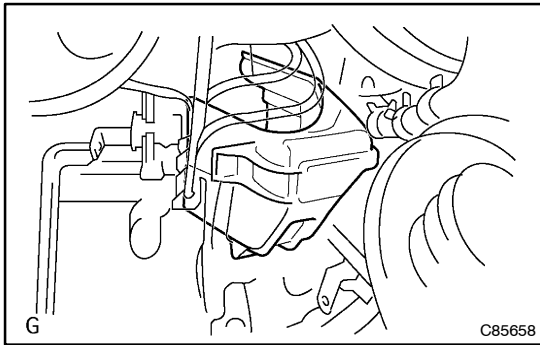
8. **DISCONNECT STEERING COLUMN ASSY**
 - (a) Remove the 4 bolts, and disconnect the steering column from the steering column tube lower, and tilt it to the back side of the vehicle.



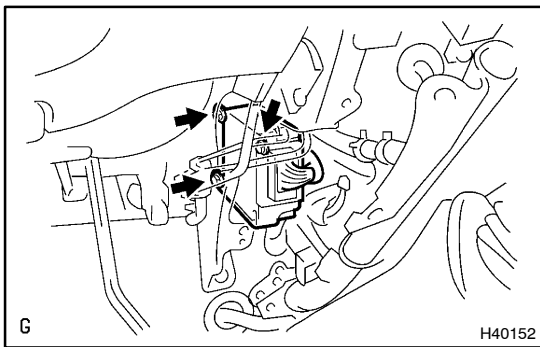
9. **REMOVE AIR DUCT NO.1**
 - (a) Remove the 2 clips and air duct No. 1.

**10. REMOVE STEERING COLUMN TUBE ASSY LOWER**

- (a) Remove the 2 bolts, 2 nuts and steering column tube.

**11. REMOVE AIR BAG SENSOR COVER**

- (a) Remove the 2 claws and airbag sensor cover from the pedal bracket.

**12. REMOVE AIRBAG ECU ASSY**

- (a) Disconnect the connector of the airbag ECU.
 (b) Remove the 3 bolts and airbag ECU from the pedal bracket.

13. INSTALL AIRBAG ECU ASSY

- (a) Check that the ignition switch turn OFF.
 (b) Check that the battery negative terminal is disconnected.

NOTICE:

Do not start the operation for 90 seconds after removing the terminal.

- (c) Temporarily install the airbag ECU with the 3 bolts.
 (d) Tighten the 3 bolts.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

- (e) Connect the connector to the airbag ECU.
 (f) Check that no play is identified.

14. INSPECT AIRBAG ECU ASSY (See page 60-3)**15. INSTALL STEERING COLUMN TUBE ASSY LOWER**

Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)

16. INSTALL STEERING COLUMN ASSY

Torque: 11.5 N·m (115 kgf·cm, 8 ft·lbf)

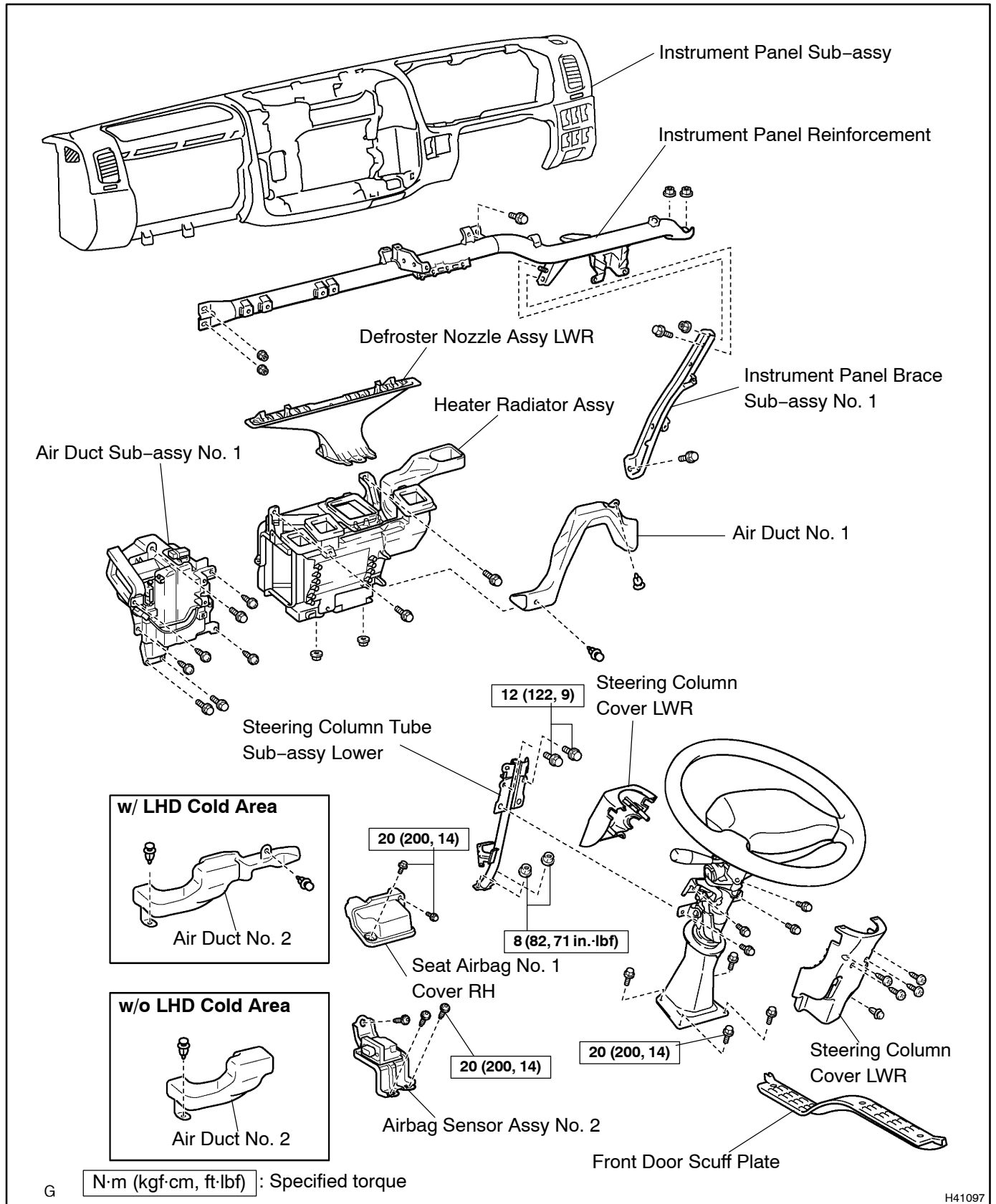
17. INSTALL STEERING COLUMN TUBE LOWER

Torque: 8 N·m (82 kgf·cm, 71 in·lbf)

18. INSPECT SRS WARNING LIGHT (See page 05-216)

AIRBAG SENSOR ASSY COMPONENTS

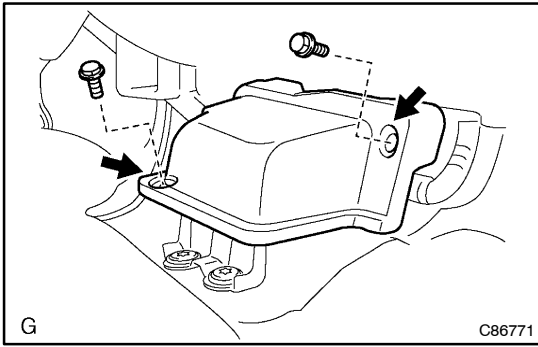
60010-01



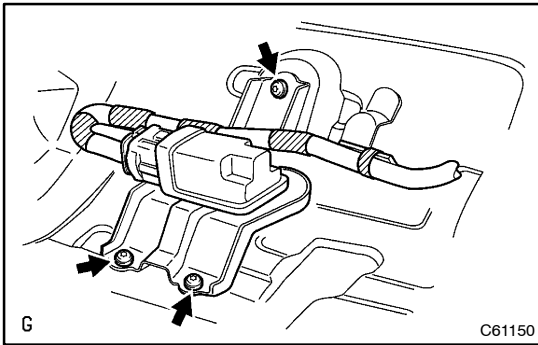
REPLACEMENT

HINT:

- COMPONENTS: See page 60-21
 - The installation is the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
1. **PRECAUTION (See page 60-1)**
 2. **BATTERY NEGATIVE TERMINAL (See page 60-1)**
 3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
 4. **REMOVE HORN BUTTON ASSY (See page 60-6)**
 5. **REMOVE STEERING WHEEL ASSY (See page 50-8)**
SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)
 6. **REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSY CENTER**
(See page 71-11, 71-17)
 7. **REMOVE HEATER CONTROL LEVER KNOB (See page 71-11, 71-17)**
 8. **REMOVE HEATER CONTROL NAME PLATE (See page 71-11, 71-17)**
 9. **REMOVE HEATER OR BOOST VENTIATOR CONTROL ASSY**
(See page 71-11, 71-17)
 10. **REMOVE RADIO BRACKET NO. 1 & NO. 2 (See page 71-11, 71-17)**
 11. **REMOVE GLOVE COMPARTMENT DOOR ASSY (See page 71-11, 71-17)**
 12. **REMOVE INSTRUMENT COVER LWR (See page 71-11, 71-17)**
 13. **REMOVE INSTRUMENT COVER LOWER CENTER (See page 71-11, 71-17)**
 14. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page 71-11, 71-17)**
 15. **REMOVE COMBINATION METER ASSEMBLY (See page 71-11, 71-17)**
 16. **REMOVE OIL RESERVOIR TANK COVER RH (RHD STEERING POSITION TYPE)**
(See page 71-11, 71-17)
 17. **REMOVE OIL RESERVOIR TANK COVER LH (LHD STEERING POSITION TYPE)**
(See page 71-11, 71-17)
 18. **REMOVE INSTRUMENT PANEL SUB-ASSY (See page 71-11, 71-17)**
 19. **REMOVE RADIATOR GRILLE (See page 55-52)**
 20. **SEPARATE HEATER WATER INLET HOSE B (See page 55-52)**
 21. **SEPARATE HEATER WATER OUTLET HOSE B (See page 55-52)**
 22. **SEPARATE DOOR CONTROL RECEIVR (W/ WIRELESS DOOR LOCK) (See page 55-52)**
 23. **SEPARATE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSY (See page 55-52)**
 24. **REMOVE INSTRUMENT PANEL BRACE SUB-ASSY NO.1 (See page 71-11, 71-17)**
 25. **REMOVE FRONT DOOR SCUFF PLATE RH (See page 76-5)**
 26. **REMOVE STEERING COLUMN COVER UPR (See page 50-8)**
 27. **REMOVE STEERING COLUMN COVER LWR (See page 50-8)**
 28. **SEPARATE STEERING COLUMN TUBE LOWER (See page 50-8)**
 29. **SEPARATE STEERING COLUMN ASSY (See page 50-8)**
 30. **REMOVE AIR DUCT NO.2 (LHD STEERING POSITION TYPE) (See page 55-52)**
 31. **REMOVE AIR DUCT NO.1 (See page 55-52)**
 32. **REMOVE STEERING COLUMN TUBE ASSY LOWER (See page 50-8)**
 33. **REMOVE INSTRUMENT PANEL REINFORCEMENT (See page 55-52)**
 34. **REMOVE WINDSHIELD WASHER JAR ASSY (See page 55-52)**
 35. **REMOVE AIR DUCT SUB-ASSY NO.1 (See page 55-52)**
 36. **REMOVE DEFROSTER NOZZLE ASSY LWR (See page 55-52)**
 37. **SEPARATE SKID CONTROL ECU ASSY (See page 55-52)**
 38. **REMOVE ECM (See page 55-52)**
 39. **REMOVE HEATER RADIATOR ASSY (See page 55-52)**

**40. REMOVE SEAT AIR BAG NO.1 COVER RH**

- (a) Remove the 2 bolts and seat airbag cover.

**41. REMOVE AIR BAG SENSOR ASSY NO.2**

- (a) Disconnect the connector of airbag sensor.
 (b) Using a torx socket wrench (T40), remove the 3 torx screws and airbag sensor.

42. INSTALL AIR BAG SENSOR ASSY NO.2

- (a) Check that the ignition switch turn OFF.
 (b) Check that the battery negative terminal is disconnected.

NOTICE:

Do not start the operation for 90 seconds after removing the terminal.

- (c) Install the airbag sensor with the 3 torx screws.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

- (d) Connect the connector to the airbag sensor.
 (e) Check that no play is identified.

43. INSPECT AIR BAG SENSOR ASSY NO.2 (See page 60-3)**44. INSTALL SEAT AIR BAG NO.1 COVER RH**

- (a) Install the 2 bolts and seat airbag cover.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

45. INSTALL HEATER RADIATOR ASSY (See page 55-52)**46. INSTALL AIR DUCT SUB-ASSY NO.1****47. INSTALL INSTRUMENT PANEL REINFORCEMENT (See page 55-52)****48. INSTALL STEERING COLUMN TUBE ASSY LOWER (See page 50-8)****49. INSTALL STEERING COLUMN ASSY (See page 50-8)****50. INSTALL STEERING COLUMN TUBE LOWER (See page 50-8)****51. INSTALL INSTRUMENT PANEL BRACE SUB-ASSY NO.1 (See page 71-11, 71-17)**

Torque: 8 N·m (82 kgf·cm, 71 in·lbf)

52. INSTALL INSTRUMENT PANEL SUB-ASSY (See page 71-11, 71-17)**53. CENTER SPIRAL CABLE****54. INSTALL STEERING WHEEL ASSY (See page 50-8)****55. STEERING WHEEL CENTER POINT**

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

56. INSTALL HORN BUTTON ASSY (See page 60-6)**57. INSPECT HORN BUTTON ASSY (See page 60-3)**

Torque: 8.8 N·m (90 kgf·cm, 78 in·lbf)

58. INSPECT SRS WARNING LIGHT (See page 05-216)

59. **ADD COOLANT (See page 16-3 or 16-23 or 16-38 or 16-53 or 16-68 or 16-83)**
60. **INSPECT CHECK FOR ENGINE COOLANT LEAKS (See page 16-1 or 16-21 or 16-36 or 16-52 or 16-66 or 16-81)**
61. **WARM UP ENGINE (See page 55-52)**

SEAT BELT

FRONT SEAT BELT	61-1
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COMPONENTS	61-2
REPLACEMENT	61-8
DISPOSAL	61-12

FRONT SEAT BELT

PRECAUTION

610D4-01

HINT:

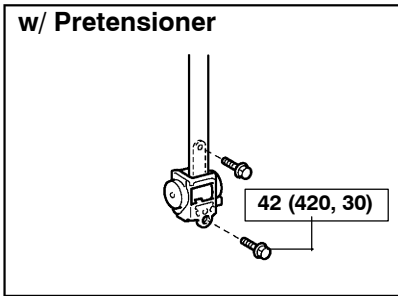
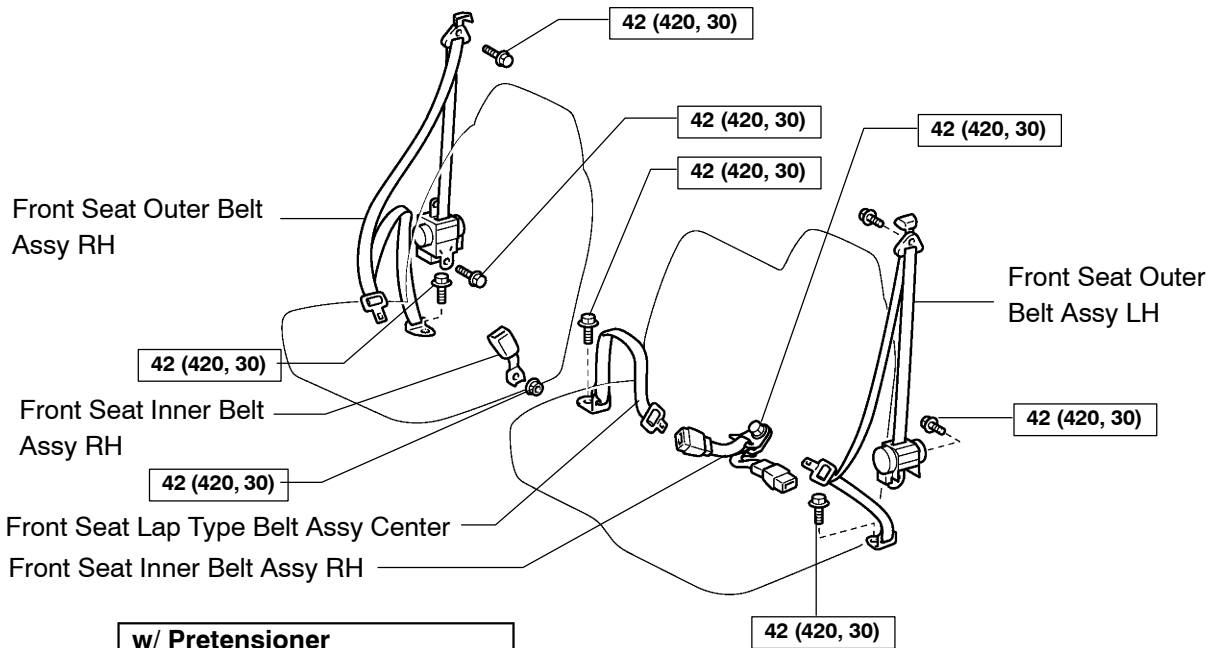
When scrapping vehicles equipped with a seat belt pretensioner or disposing of a front seat outer belt (with seat belt pretensioner), always first activate the seat belt pretensioner in accordance with the procedure described below. If any abnormality occurs in the seat belt pretensioner operation, contact the SERVICE DEPT. of the DISTRIBUTOR. When disposing of a front seat outer belt (with seat belt pretensioner) having been activated in a collision, follow the same procedure given in step 1-(e) in "DISPOSAL".

CAUTION:

- **Never dispose of a front seat outer belt which has an inactivated pretensioner.**
- **Seat belt pretensioner produces a sizeable exploding sound when it is activated, so perform the operation out-of-door and where it will not disturb nearby residents.**
- **When activating the seat belt pretensioner, always use a specified SST (09082-00700, 09082-00740) (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When activating a front seat outer belt (with seat belt pretensioner), perform the operation at least 10 m (33 ft) away from the front seat outer belt.**
- **Use gloves and safety glasses when handling a front seat outer belt with activated pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with activated pretensioner.**
- **The front seat outer belt is very hot when the seat belt pretensioner is activated, so leave it alone for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a front seat outer belt with activated seat belt pretensioner.**

COMPONENTS

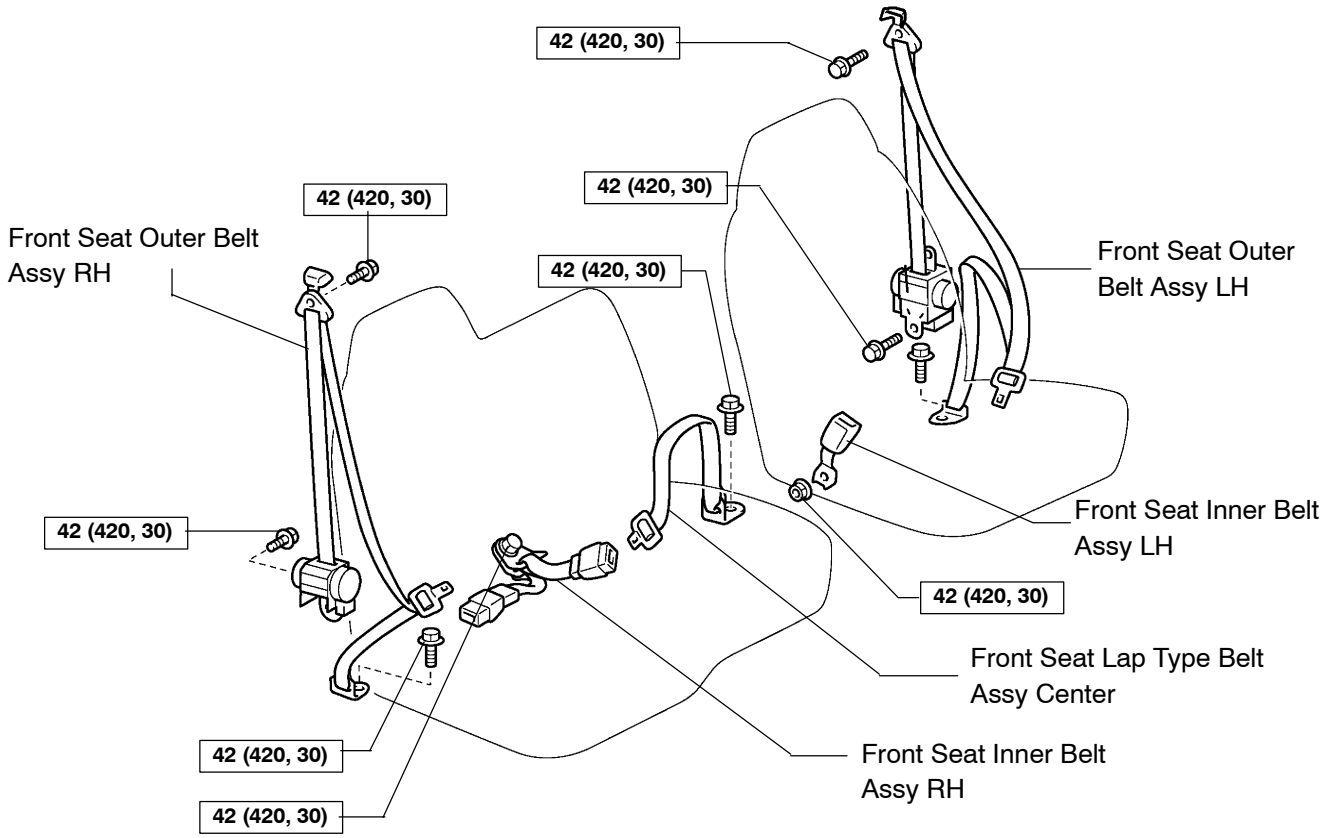
3P ELRx2
2P NRx1
RHD



T N·m (kgf·cm, ft·lbf) : Specified torque

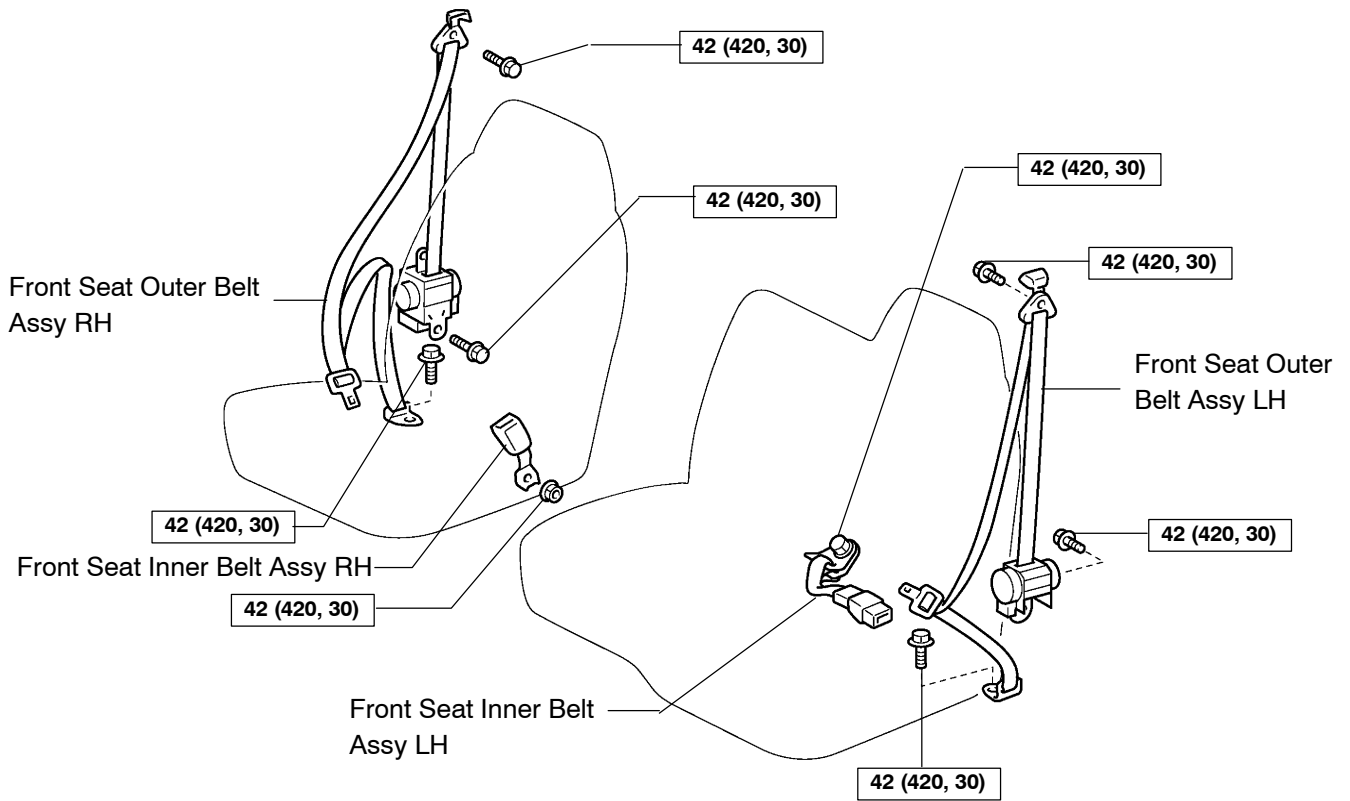
SEAT BELT - FRONT SEAT BELT

3P ELRx2
2P NRx1
LHD



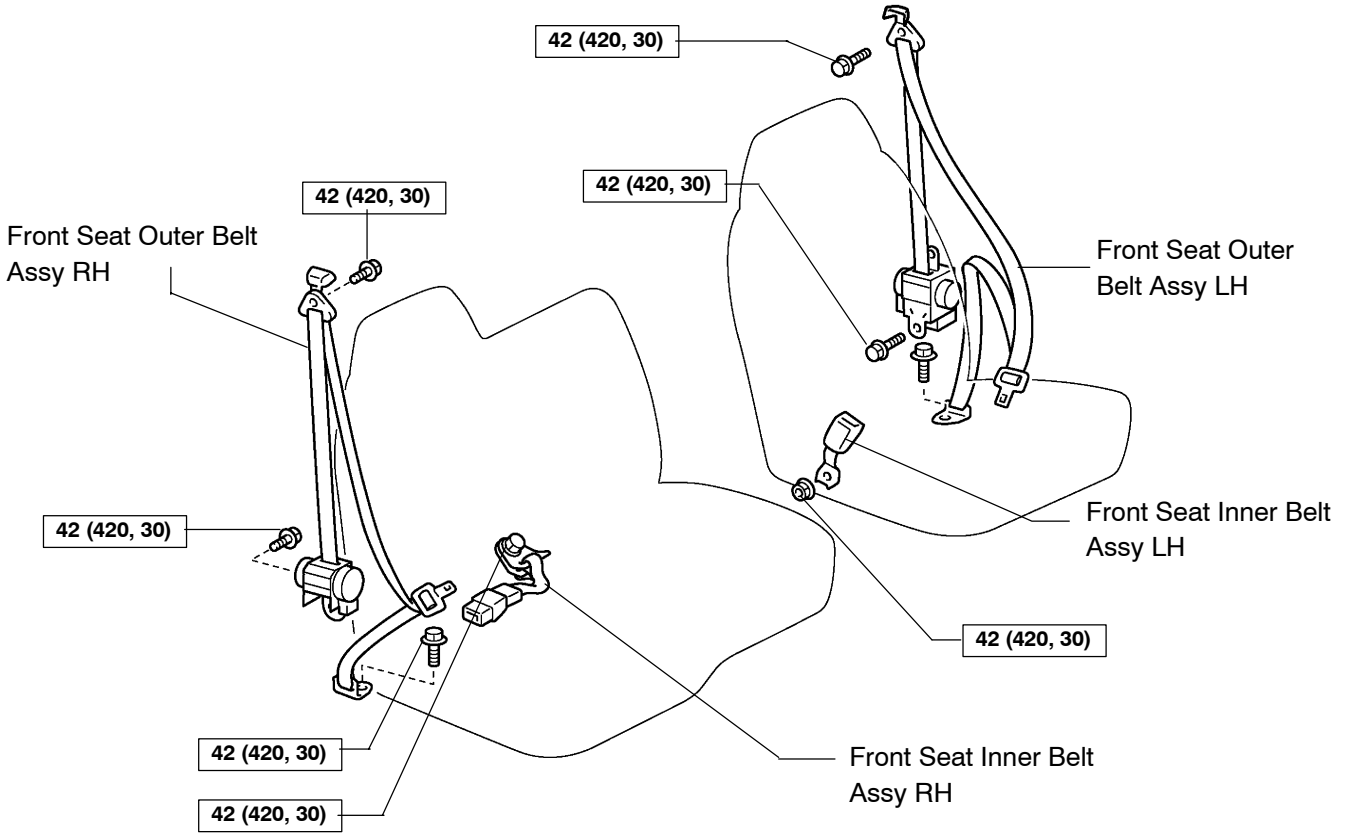
T N·m (kgf·cm, ft·lbf) : Specified torque

3P ELRx2
RHD



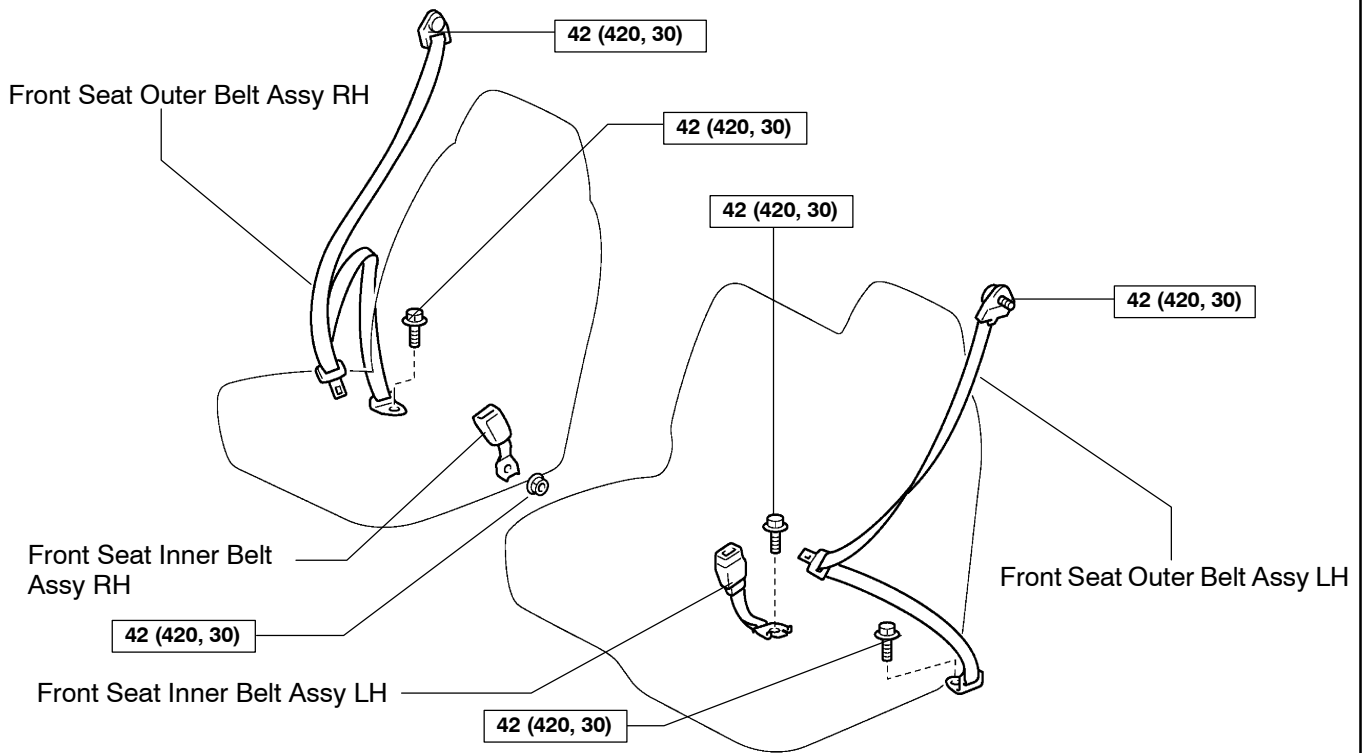
T N·m (kgf·cm, ft·lbf) : Specified torque

3P ELRx2
LHD



T N·m (kgf·cm, ft·lbf) : Specified torque

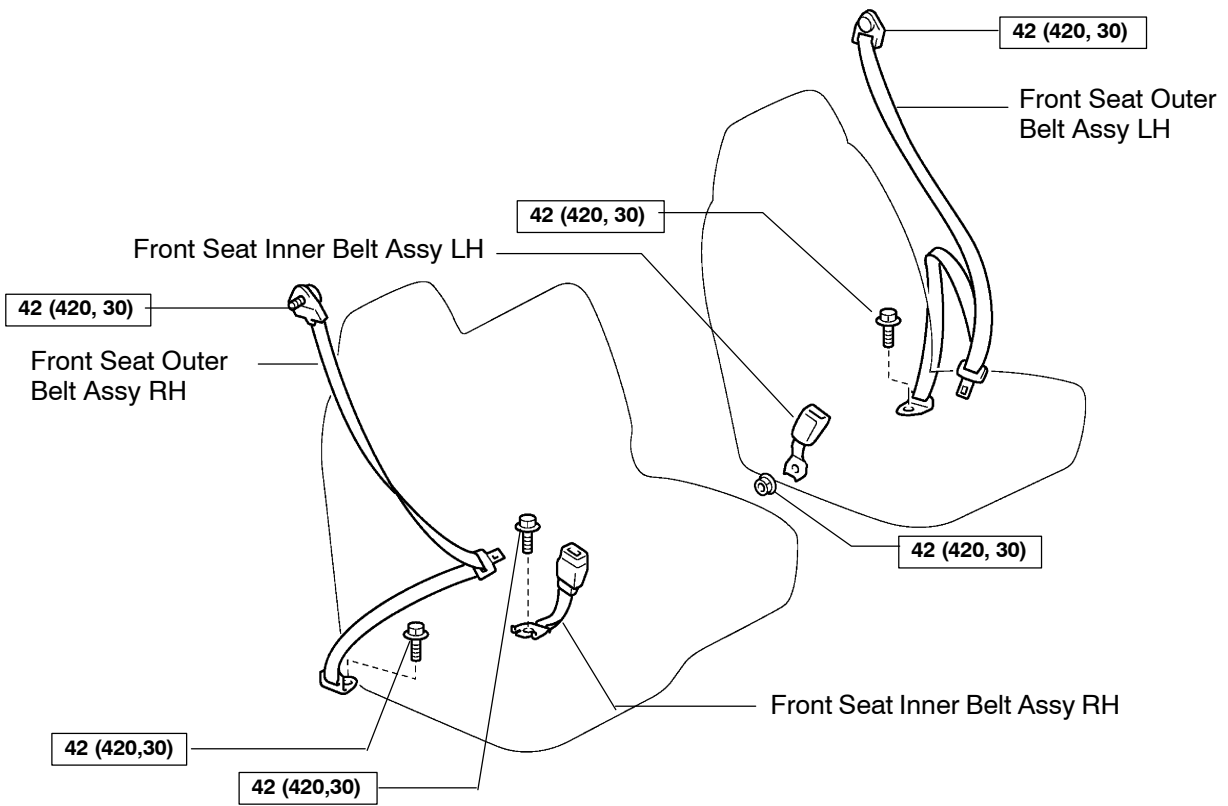
3P NRx2
RHD



T

N·m (kgf·cm, ft·lbf) : Specified torque

3P NRx2
LHD



T

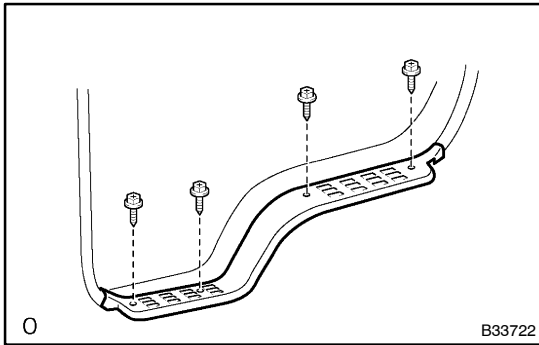
N·m (kgf·cm, ft·lbf) : Specified torque

REPLACEMENT

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. SEPARATE BATTERY NEGATIVE TERMINAL

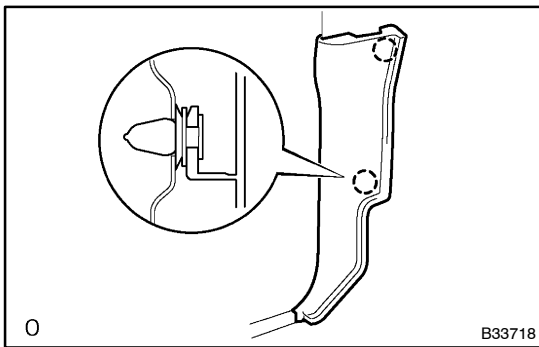


2. REMOVE FRONT DOOR SCUFF PLATE RH

- (a) Remove the 4 screws and scuff plate.

3. REMOVE FRONT DOOR SCUFF PLATE LH

- (a) Remove the 4 screws and scuff plate.

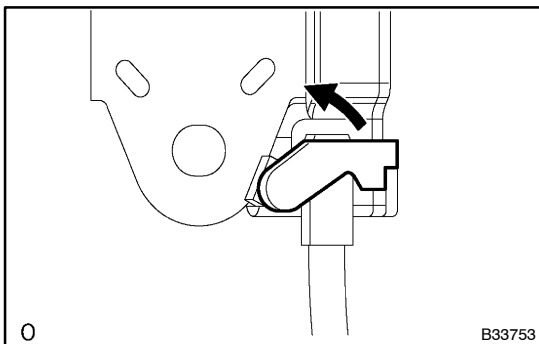


4. REMOVE QUARTER TRIM PANEL LOWER RH

- (a) Disengage the 2 clips and remove the hook of the front side to remove the trim panel.

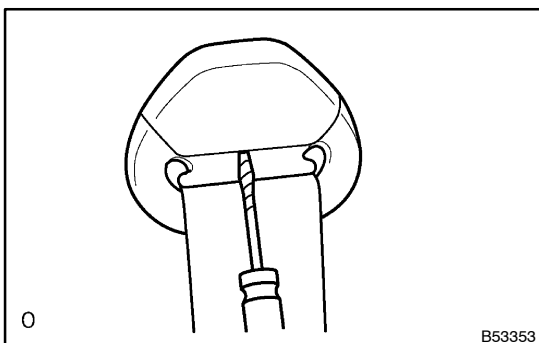
5. REMOVE QUARTER TRIM PANEL LOWER LH

- (a) Disengage the 2 clips and remove the hook of the front side to remove the trim panel.



6. REMOVE FRONT SEAT OUTER BELT ASSY (DRIVER SIDE)

- (a) w/ SRS airbag:
Disconnect the pretensioner connector.
- (b) Remove the bolt and floor anchor.



- (c) Using a screwdriver, remove the shoulder anchor cover.

HINT:

Tape the screwdriver tip before use.

- (d) Remove the shoulder anchor bolt.

- (e) w/o SRS airbag:

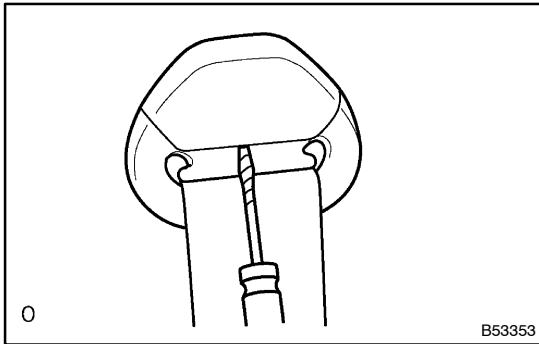
Remove the bolt and seat outer belt.

- (f) w/ SRS airbag:

Remove the 2 bolts and seat outer belt.

7. REMOVE FRONT SEAT OUTER BELT ASSY (PASSENGER SIDE)

- (a) Disconnect the pretensioner connector (w/ SRS airbag).
- (b) Remove the bolt and floor anchor.



- (c) Using a screwdriver, pry out the shoulder anchor cover.

HINT:

Tape the screwdriver tip before use.

- (d) Remove the shoulder anchor bolt.
- (e) Remove the bolt and front seat outer belt.

8. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (See page 72-2)**9. REMOVE FRONT SEAT INNER BELT ASSY RH**

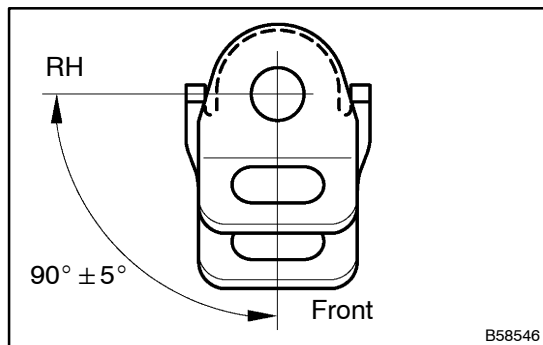
- (a) Remove the nut and seat inner belt.

10. REMOVE FRONT SEAT CUSHION ASSEMBLY (PASSENGER SEAT) (See page 72-8 or 72-12)**11. REMOVE FRONT SEAT INNER BELT ASSY LH**

- (a) Remove the bolt and seat inner belt.

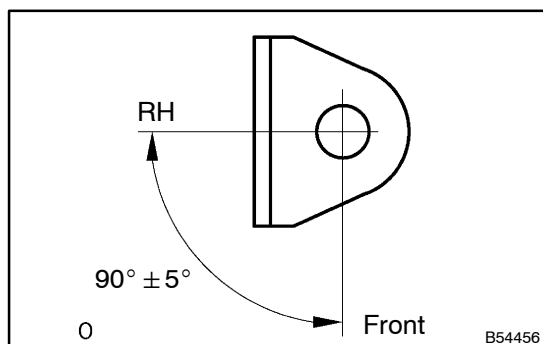
12. REMOVE FRONT SEAT LAP TYPE BELT ASSY CENTER

- (a) Remove the bolt and seat lap type belt.

**13. INSTALL FRONT SEAT INNER BELT ASSY LH**

- (a) Install the seat inner belt with the bolt, as shown in the illustration.

Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)

**14. INSTALL FRONT SEAT LAP TYPE BELT ASSY CENTER**

- (a) Install the seat lap type belt with the bolt, as shown in the illustration.

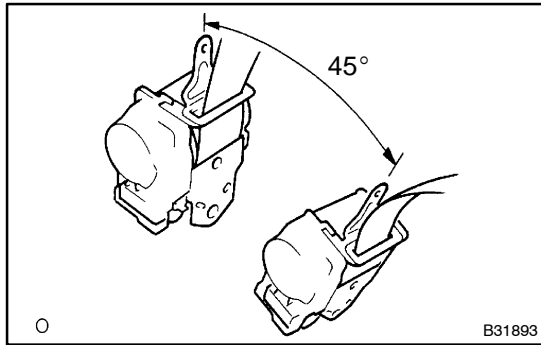
Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)

15. INSTALL FRONT SEAT CUSHION ASSEMBLY (PASSENGER SEAT)

(See page 72-8 or 72-12)

16. INSTALL FRONT SEAT INNER BELT ASSY RH

- (a) Install the seat inner belt with the nut to the seat.

Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)**17. INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (See page 72-2)****18. INSPECT FRONT SEAT BELT**

- (a) Make sure that the bolt can be pulled out at 15 degrees or less of tilt.
- (b) Make sure that the belt can not be pulled out at over 45 degrees of tilt.

19. INSTALL FRONT SEAT OUTER BELT ASSY (DRIVER SIDE)

- (a) w/o SRS airbag:

Install the seat outer belt with the bolt.

Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)

- (b) w/ SRS airbag:

Install the seat outer belt with the 2 bolts.

Torque:**Upper bolt, 8.5 N·m (85 kgf·cm, 74 in·lbf)****Lower bolt, 42 N·m (420 kgf·cm, 30 ft·lbf)**

- (c) Install the shoulder anchor bolt and shoulder anchor cover.

Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)

- (d) Install the floor anchor with the bolt, as shown in the illustration.

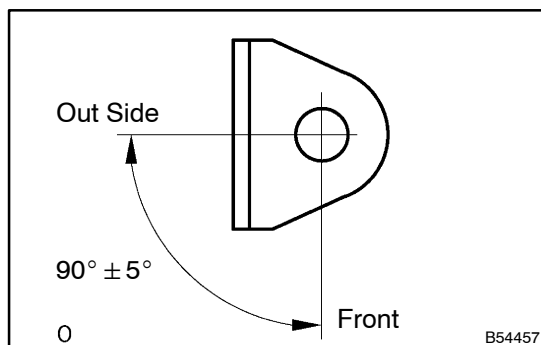
Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)

- (e) w/ SRS airbag:

Connect the pretensioner connector.

- (f) Check the ELR lock.

- (1) Check that the seat belt is locked when the seat belt is pulled out quickly with the seat belt installed with the vehicle.

**20. INSTALL FRONT SEAT OUTER BELT ASSY (PASSENGER SIDE)**

- (a) w/o SRS airbag:

Install the seat outer belt with the bolt.

Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)

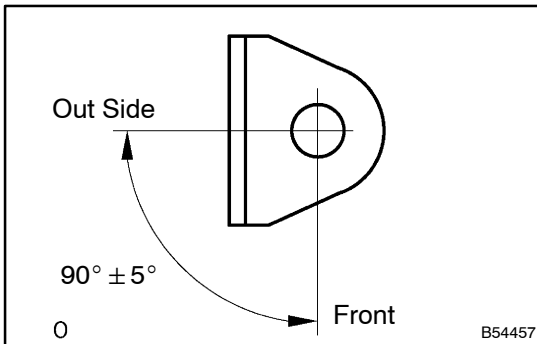
- (b) w/ SRS airbag:

Install the seat outer belt with the 2 bolts.

Torque:**Upper bolt: 8.5 N·m (85 kgf·cm, 74 in·lbf)****Lower bolt: 42 N·m (420 kgf·cm, 30 ft·lbf)**

- (c) Install the shoulder anchor bolt and shoulder anchor cover.

Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)



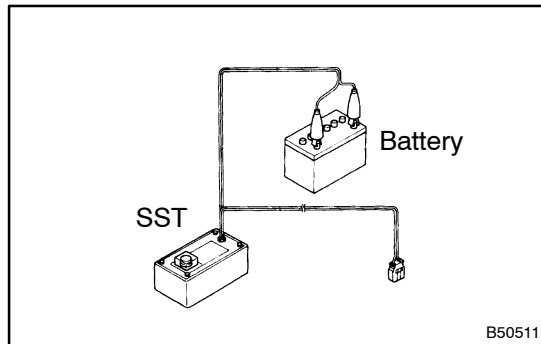
- (d) Install the floor anchor with the bolt, as shown in the illustration.

Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)

- (e) Connect the pretensioner connector (w/ SRS airbag).
 (f) Check the ELR lock.
 (1) Check that the seat belt is locked when the seat belt is pulled out quickly with the seat belt installed with the vehicle.

21. INSPECT SRS WARNING LIGHT (See page 05-216)

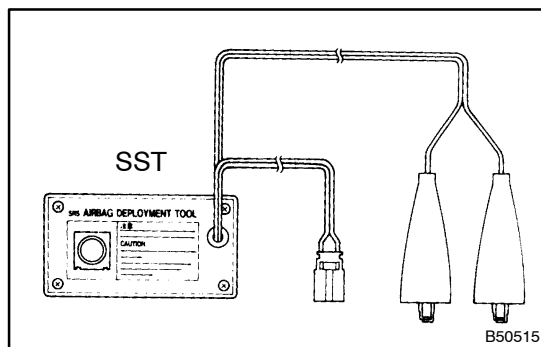
DISPOSAL



1. DISPOSE OF FRONT SEAT BELT (WHEN INSTALLED IN VEHICLE)

HINT:

Check battery voltage is above 24 V.

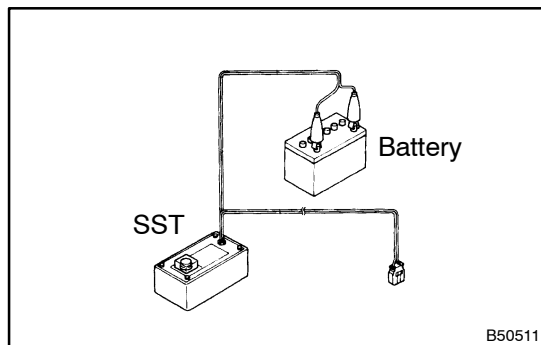


(a) Check functioning of SST.

SST 09082-00700, 09082-00740

CAUTION:

When activating the seat belt pretensioner, always use a specified SST.

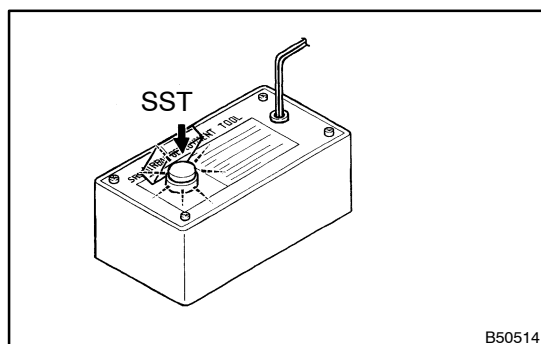


(1) Connect the SST to the battery.

Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.

HINT:

Do not connect the yellow connector which will be connected to the seat belt pretensioner.



(2) Check functioning of SST.

Press the SST activation switch, and check the LED of the SST activation switch lights up.

CAUTION:

If the LED lights up when the activation switch is not pressed, the SST probably malfunctions, so definitely do not use the SST.

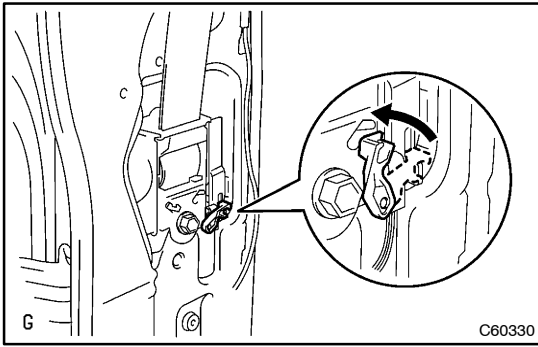
(b) Disconnect the pretensioner connector.

(1) Remove the front door scuff plate.

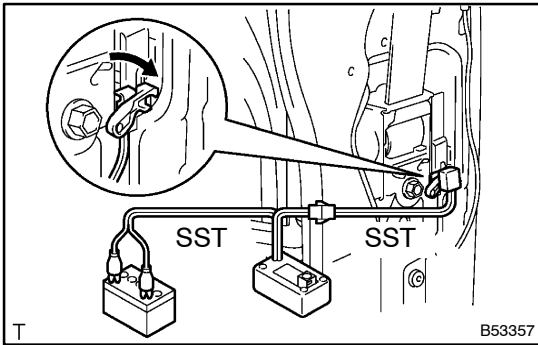
(2) Remove the quarter trim panel.

(See page 61-8)

SEAT BELT - FRONT SEAT BELT



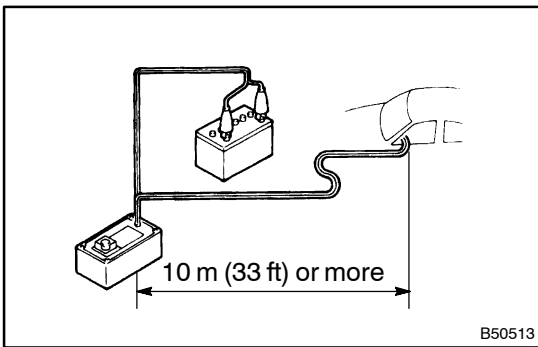
- (3) Disconnect the pretensioner connector as shown in the illustration.
- (c) Install the SST.
SST 09082-00700, 09082-00740
- (1) Install the floor anchor of the seat belt.



- (2) Connect the SST, then connect them to the seat belt pretensioner.

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



- (3) Move the SST to at least 10 m (33 ft) away from the front of the vehicle.
- (4) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

- (5) Connect the SST red clip to the battery positive (+) terminal and the black clip to the negative (-) terminal.
- (d) Activate the seat belt pretensioner.
 - (1) Confirm that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.
 - (2) Press the SST activation switch and activate the seat belt pretensioner.

HINT:

The seat belt pretensioner operates simultaneously with the LED of the SST activation switch lighting up.

- (e) Dispose of the front seat outer belt (with seat belt pretensioner).

HINT:

When scrapping a vehicle, activate the seat belt pretensioner and scrap the vehicle with activated front seat outer belt being installed.

2. DISPOSE OF FRONT SEAT BELT (WHEN NOT INSTALLED IN VEHICLE)

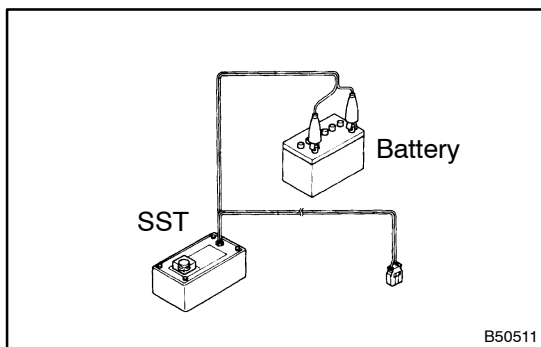
NOTICE:

- When disposing of a front seat outer belt (with seat belt pretensioner) only, never use the customer's vehicle to activate the seat belt pretensioner.
- Be sure to follow the procedure given on the next page when activating the seat belt pretensioner.

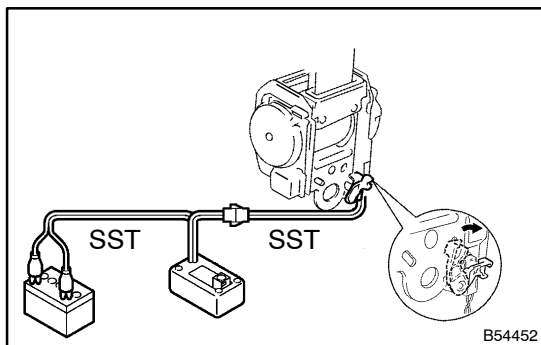
(a) Remove the front seat outer belt (See page 61-8).

HINT:

Cut the belt near the seat belt retractor.



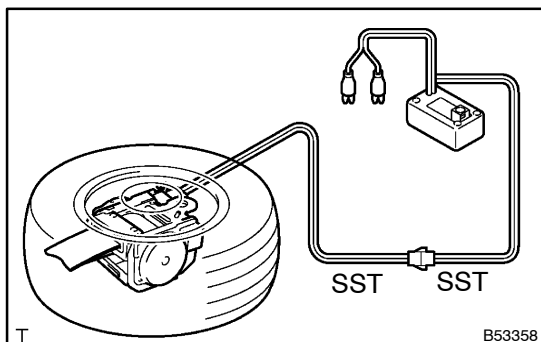
(b) Check functioning of SST (See step 1-(a)).
SST 09082-00700, 09082-00740



(c) Install the SST.
(1) Connect the SST, then connect them to the seat belt pretensioner.
SST 09082-00700, 09082-00740

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(2) Place the front seat outer belt on the ground and cover it with the disc wheel with tire.

NOTICE:

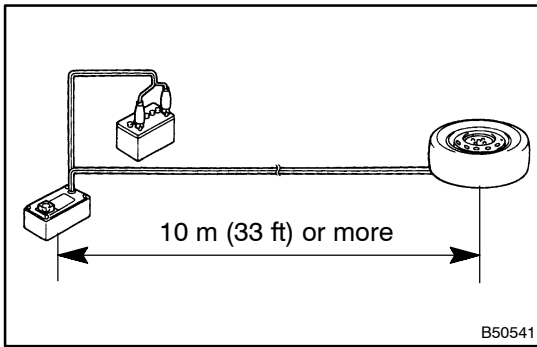
Place the front seat outer belt as shown in the illustration.

(3) Move the SST at least 10 m (33 ft) away from the disc wheel.

NOTICE:

Take care not to damage the SST wire harness.

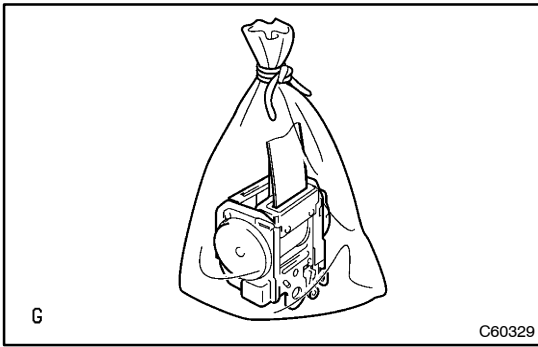
SEAT BELT - FRONT SEAT BELT



- (d) Activate the seat belt pretensioner.
- (1) Connect the SST red clip to the battery positive (+) terminal and black clip to the battery negative (-) terminal.
 - (2) Check that no one is within 10 m (33 ft) area around the disc wheel.
 - (3) Press the SST activation switch and activate the seat belt pretensioner.

HINT:

The seat belt pretensioner operates simultaneously with the LED of the SST activation switch lighting up.



- (e) w/ seat belt pretensioner:
Dispose of the front seat outer belt.
- (1) Remove the disc wheel and SST.
 - (2) Place the front seat outer belt in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts.

LIGHTING

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TURN SIGNAL SWITCH	65-38
REPLACEMENT	65-38

LIGHTING SYSTEM

650ED-03

PRECAUTION

1. PRECAUTION FOR HEADLAMP BULB REPLACEMENT

- (a) If there is oil on a halogen lamp (headlamp) surface, the lamp will become hotter when turned on, thus shortening the lamp service life.
- (b) Since a halogen lamp bulb (headlamp) contains high pressure gas, carefully handle the lamp. Dropping a bulb may cause an explosion and scatter pieces in all directions.
- (c) If a bulb has been removed from the lens for a long time, there may be dirt or moisture on the lens. So, remove the bulb after preparing a new one.
- (d) Always use a bulb having the same watt rating.
- (e) Firmly reinstall the socket cover after bulb replacement. Otherwise, water will penetrate and the lens will be clouded.

PROBLEM SYMPTOMS TABLE

1. HEADLAMP AND TAIL LAMP

Symptom	Suspected Area	See Page
Only one headlamp comes on.	1. Bulb 2. HEAD (LH) fuse HEAD (RH) fuse 3. Wire harness	- - - -
LO-beam does not operate on both sides.	1. Headlamp dimmer switch 2. Headlamp (H-LP) relay 3. Wire harness	65-6 65-6 -
LO-beam does not operate on either side.	1. Bulb 2. Wire harness	- -
HI-beam does not operate on both sides.	1. Headlamp dimmer switch 2. Wire harness	65-6 -
HI-beam does not operate on either side.	1. Bulb 2. Wire harness	- -
Flash does not operate.	1. Headlamp dimmer switch 2. Wire harness	65-6 -
Headlamp is dark.	1. Bulb 2. Wire harness	- -
Only one tail lamp comes on.	1. Bulb 2. Wire harness	- -
Tail lamp does not come on (Headlamp is normal).	1. TAIL fuse 2. Tail lamp (TAIL) relay 3. Light control switch No. 1 4. Parking lamp switch (w / Parking lamp) 5. Wire harness	- 65-6 65-6 65-6 -
Tail lamp does not come on (Headlamp does not light up).	1. Light control switch No. 1 2. Wire harness	65-6 -
Headlamp beam level control system does not operate on both sides.	1. TAIL fuse 2. Tail lamp (TAIL) relay 3. Headlamp leveling switch 4. Headlamp 5. Wire harness	- 65-6 65-6 - -
Headlamp beam level control system does not operate on either side.	1. Headlamp leveling switch 2. Headlamp 3. Wire harness	65-6 - -
Headlamp beam level control system operates abnormally on both sides.	1. Headlamp leveling switch 2. Headlamp 3. Wire harness	65-6 - -
Headlamp beam level control system operates abnormally on either side.	1. Headlamp leveling switch 2. Headlamp 3. Wire harness	65-6 - -

2. FOG LAMP SYSTEM

Symptom	Suspected Area	See Page
Fog lamp does not light up with light control switch in HEAD (Headlamp is normal).	1. FR FOG fuse 2. Fog lamp (FOG) relay 3. Fog lamp switch 4. Wire harness	- 65-6 65-6 -
Only one fog lamp lights up.	1. Bulb 2. Wire harness	- -

3. TURN SIGNAL AND HAZARD WARNING SYSTEM

Symptom	Suspected Area	See Page
Hazard warning lamp and turn signal lamp do not light up.	1. HAZARD fuse 2. Turn signal flasher relay 3. Wire harness	- 65-4 -
Hazard warning lamps do not light up. (Turn signal is normal)	1. Hazard warning signal switch 2. Wire harness	65-6 -
Turn signal lights do not light up (Hazard warning lamp is normal)	1. Turn signal switch 2. Wire harness	65-6 -
Turn signal does not light up on either side.	1. Turn signal switch 2. Wire harness	65-6 -
Only one bulb lights up.	1. Bulb 2. Wire harness	- -

4. STOP LAMP SYSTEM

Symptom	Suspected Area	See Page
Stop lamp does not light up.	1. STOP fuse 2. Stop lamp switch 3. Wire harness	- 65-6 -
Stop lamp remains on.	1. Stop lamp switch 2. Wire harness	65-6 -
Only one bulb lights up.	1. Bulb 2. Wire harness	- -

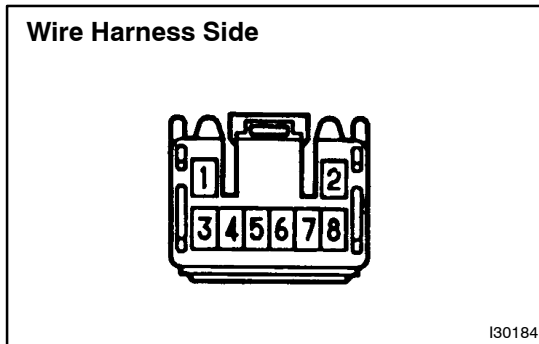
5. BACK-UP LAMP SYSTEM

Symptom	Suspected Area	See Page
Back-up lamp does not light up.	1. ECU-IG fuse 2. Back-up lamp switch 3. Wire harness	- 65-6 -
Back-up lamp remains on.	1. Back-up lamp switch 2. Wire harness	65-6 -
Only one bulb lights up.	1. Bulb 2. Wire harness	- -

6. ROOM LAMP SYSTEM

Symptom	Suspected Area	See Page
Room lamp does not light up.	1. DOME fuse 2. Inner rear view mirror 3. Wire harness	- 65-6 -

ON-VEHICLE INSPECTION



1. **w/ Rear Fog Lamp:**
CHECK REAR FOG LAMP SWITCH
 - (a) Check the rear fog lamp switch circuit.
 - (1) Disconnect the connector from the rear fog lamp switch and inspect the connector on the wire harness side, as shown in the chart.

Standard:

Tester Connection	Condition	Specified Condition
1 ↔ Body ground	Constant	Continuity
2 ↔ Body ground	Light control switch OFF → TAIL or HEAD	0 V → 20 - 28 V
3 ↔ Body ground	Light control switch OFF → TAIL or HEAD	0 V → 20 - 28 V
4 ↔ Body ground	Ignition switch OFF → ON	0 V → 20 - 28 V
5 ↔ Body ground	Light control switch OFF → TAIL or HEAD	No continuity → Continuity
7 ↔ Body ground	Constant	Continuity

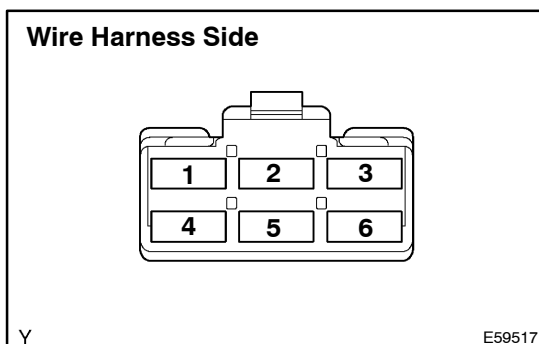
If the result is not as specified, replace the switch.

- (b) Check operation of the rear fog lamp.
 - (1) Turn the ignition switch ON.
 - (2) Check the rear fog lamp condition when each switch is operated, as shown in the chart.

Standard:

Condition	Specified Condition
Light control switch OFF → HEAD or TAIL and rear fog lamp switch ON	Lighting up

If the result is not as specified, replace the switch.



2. **CHECK TURN SIGNAL FLASHER ASSY**
 - (a) Check the turn signal flasher circuit.
 - (1) Disconnect the connector from the turn signal flasher, and check the connector on the wire harness side, as shown in the chart.

Standard:

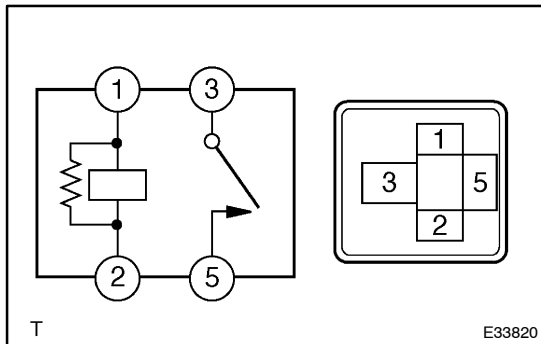
Terminal No.	Condition	Specified Condition
1 ↔ Body ground	Constant	Battery voltage
2 ↔ Body ground	Constant	Continuity
3 ↔ Body ground	Constant	Continuity

LIGHTING - LIGHTING SYSTEM

Terminal No.	Condition	Specified Condition
5 ↔ Body ground	Turn signal switch LEFT or OFF	No continuity
5 ↔ Body ground	Turn signal switch RIGHT	Continuity
5 ↔ Body ground	Hazard warning switch OFF	No continuity
5 ↔ Body ground	Hazard warning switch ON	Continuity
6 ↔ Body ground	Turn signal switch RIGHT or OFF	No continuity
6 ↔ Body ground	Turn signal switch LEFT	Continuity
6 ↔ Body ground	Hazard warning switch OFF	No continuity
6 ↔ Body ground	Hazard warning switch ON	Continuity

If the result is not as specified, replace the flasher assy.

INSPECTION



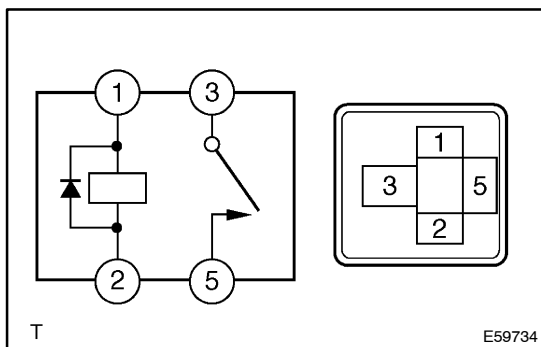
1. INSPECT HEADLAMP RELAY (Marking H-LP)

- (a) Inspect the relay continuity.

Standard:

Terminal No.	Condition	Specified Condition
1 ↔ 2	Constant	Continuity
3 ↔ 5	Apply battery voltage to terminals 1 and 2	Continuity

If the result is not as specified, replace the relay.



2. INSPECT TAIL LAMP RELAY (Marking TAIL)

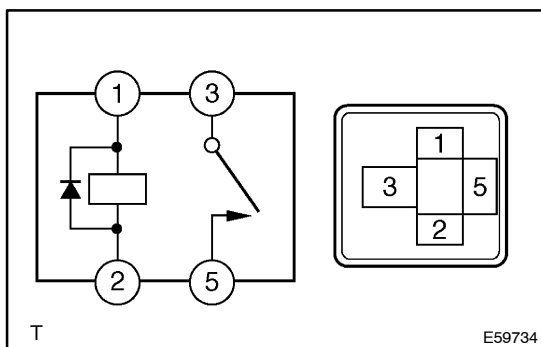
- (a) Inspect the relay continuity.

Standard:

Terminal No.	Condition	Specified Condition
1 ↔ 2	Constant	Continuity
3 ↔ 5	Apply battery voltage to terminals 1 and 2*	Continuity

*: Apply battery positive to terminal 1 and battery negative to terminal 2.

If the result is not as specified, replace the relay.



3. INSPECT FOG LAMP RELAY (Marking FOG)

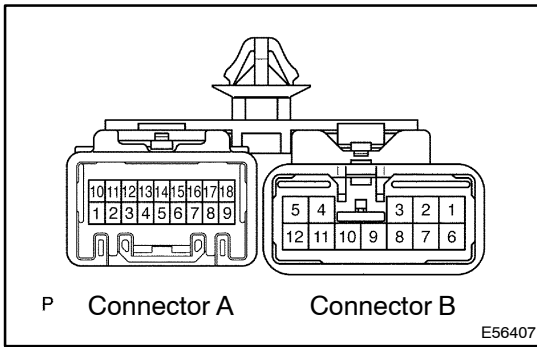
- (a) Inspect the relay continuity.

Standard:

Terminal No.	Condition	Specified Condition
1 ↔ 2	Constant	Continuity
3 ↔ 5	Apply battery voltage to terminals 1 and 2*	Continuity

*: Apply battery positive to terminal 1 and battery negative to terminal 2.

If the result is not as specified, replace the relay.



4. INSPECT TURN SIGNAL SWITCH ASSY

- (a) Inspect the light control switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
-	OFF	No continuity
A9 ↔ A17	TAIL	Continuity
A8 ↔ A9 ↔ A17	HEAD	Continuity

If the result is not as specified, replace the switch assy.

- (b) Inspect the headlamp dimmer switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
A16 ↔ B5 ↔ B12	FLASH	Continuity
B4 ↔ B12	LOW BEAM	Continuity
B5 ↔ B12	HI BEAM	Continuity

If the result is not as specified, replace the switch assy.

- (c) Inspect the turn signal switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
A12 ↔ A15	Right turn	Continuity
-	Original	No continuity
A12 ↔ B2	Left turn	Continuity

If the result is not as specified, replace the switch assy.

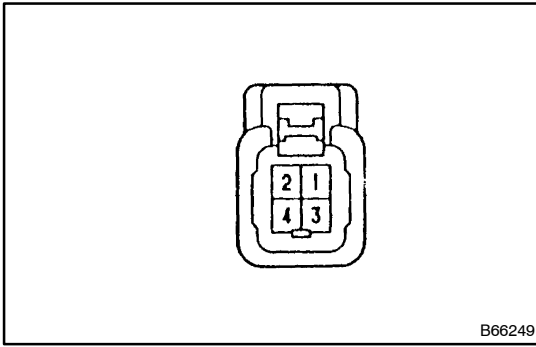
- (d) RHD models (w/ front fog lamp):

Inspect the fog lamp switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
A6 ↔ A18	OFF	No continuity
A6 ↔ A18	ON	Continuity

If the result is not as specified, replace the switch assy.



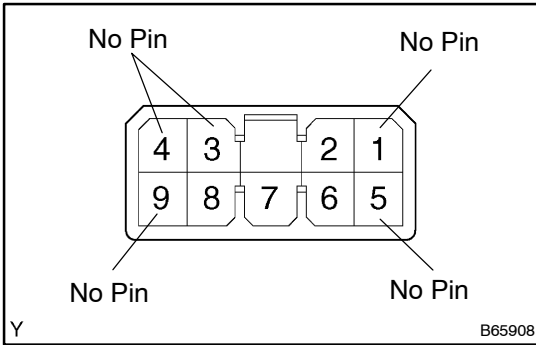
5. LHD Models (w/ Front Fog Lamp): INSPECT FRONT FOG LAMP SWITCH ASSY

- (a) Inspect the fog lamp switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
2 ↔ 4	ON	Continuity
3 ↔ 4	OFF	Continuity

If the result is not as specified, replace the switch assy.



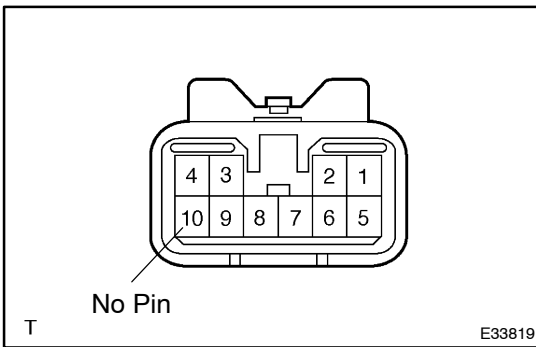
6. w/ Parking Lamp: INSPECT PARKING LAMP SWITCH ASSY

- (a) Inspect the parking lamp switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
6 ↔ 7	OFF	Continuity
2 ↔ 6 ↔ 8	ON	Continuity

If the result is not as specified, replace the switch assy.



7. INSPECT HAZARD WARNING SIGNAL SWITCH ASSY

- (a) Inspect the hazard warning signal switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
-	OFF	No continuity
1 ↔ 2 ↔ 3 ↔ 4	ON	Continuity

If the result is not as specified, replace the switch assy.

8. INSPECT STOP LAMP SWITCH ASSY

- (a) Check the continuity between the terminals when operating the switch.

Standard:

OFF (When shaft is not pressed): No continuity

ON (when shaft is pressed): Continuity

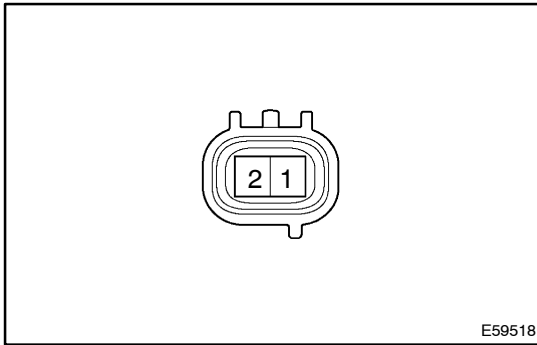
If the result is not as specified, replace the switch assy.

9. INSPECT BACK-UP LAMP SWITCH ASSY

- (a) Check the continuity between the terminals when operating the switch.

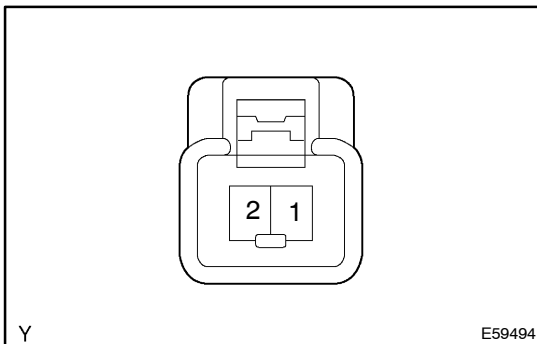
Standard:**OFF (When ball is not pressed): No continuity****ON (when ball is pressed): Continuity**

If the result is not as specified, replace the switch assy.

**10. INSPECT REVERSE WARNING BUZZER ASSY**

- (a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and then check that the buzzer sounds.

If the sound is not heard, replace the warning buzzer assy.

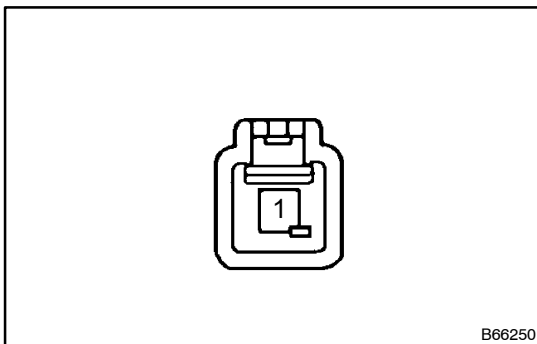
**11. INSPECT INNER REAR VIEW MIRROR ASSY**

- (a) Inspect the rear view mirror continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
1 ↔ 2	DOOR	Continuity
-	OFF	No continuity
2 ↔ Body ground	ON	Continuity

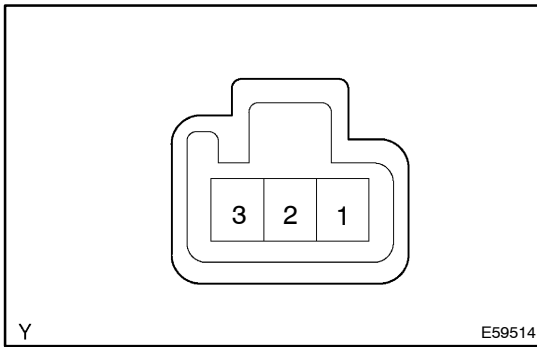
If the result is not as specified, replace the mirror assy.

**12. INSPECT DOOR COURTESY LAMP SWITCH ASSY**

- (a) Check that continuity exists between terminal 1 and the body ground when operating the switch.

Standard:**ON (When shaft is pressed): No continuity****OFF (When shaft is not pressed): Continuity**

If the result is not as specified, replace the switch assy.



13. INSPECT HEADLAMP LEVELING SWITCH

- (a) Check that the resistance between the terminals at each switch position, as shown in the chart.

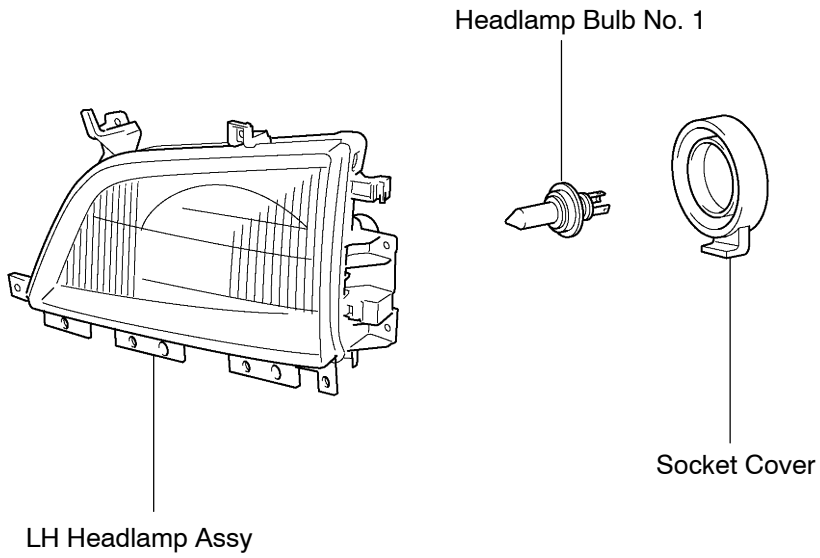
Standard:

Terminal No.	Switch Position	Specified Resistance (kΩ)
1 ↔ 3	0	21.35
1 ↔ 3	1	9.35
1 ↔ 3	2	5.45
1 ↔ 3	3	3.45
1 ↔ 3	4	2.25
1 ↔ 3	5	1.50

If the resistance is not as specified, replace the switch.

HEADLAMP UNIT LH (TYPE A) COMPONENTS

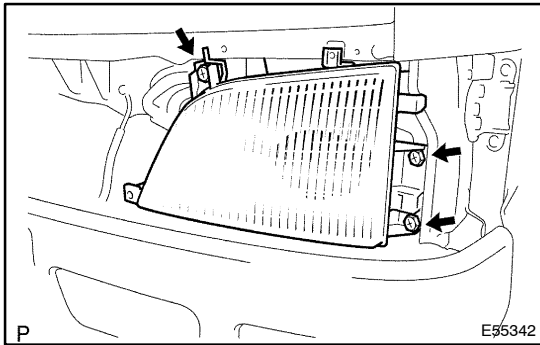
650EG-02



REPLACEMENT

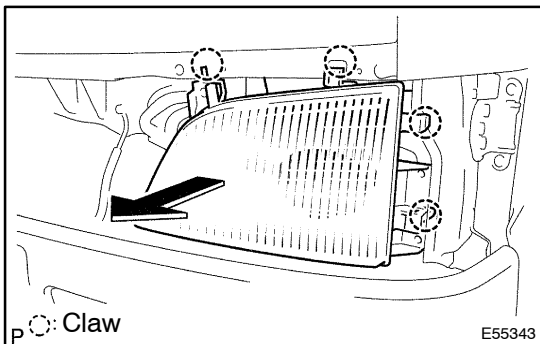
HINT:

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
 - On the RH side, use the same procedures as on the LH side.
1. **REMOVE CLEARANCE LAMP LENS & BODY LH (See page 65-25)**
 2. **REMOVE RADIATOR GRILLE (See page 76-3)**



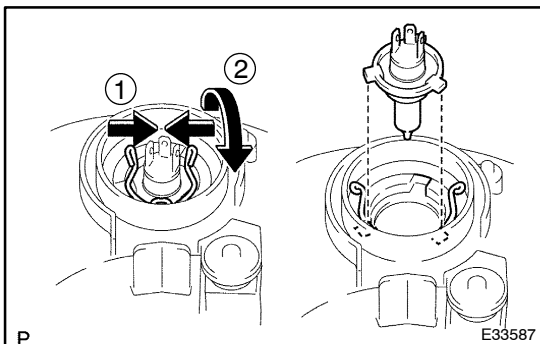
3. REMOVE LH HEADLAMP ASSY

- (a) Remove the 3 bolts.



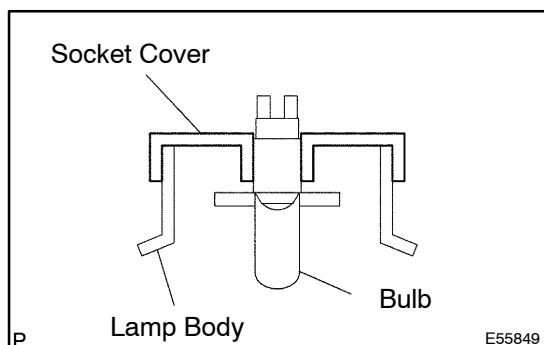
- (b) Release the 4 claws.
- (c) Pull out the headlamp forward while disengaging the 4 claws.
- (d) Disconnect the connectors and wire clamp, and remove the headlamp.

4. REMOVE SOCKET COVER



5. REMOVE HEADLAMP BULB NO.1

- (a) Release the set spring, as shown in the illustration, and remove the headlamp bulb No. 1.



6. INSTALL SOCKET COVER

- (a) Install the socket cover.

NOTICE:

- Push in the socket cover until its outer circumference touches the lamp body.
 - Push in the inside girth of the socket cover (bulb girth) until the whole metal parts of the bulb can be checked.
7. **ADJUST HEADLAMP AIM ONLY (See page 65-13)**

ADJUSTMENT

1. ADJUST HEADLAMP AIM ONLY

- (a) Put the vehicle in the following conditions.
 - The vehicle is parked on a level surface.
 - The tire inflation pressure is at the specified value.
 - A driver is in the driver side seat and the vehicle is ready for driving (with the tank full).
 - The vehicle has been bounced several times.
- (b) Check the headlamp aiming.
 - (1) Prepare a thick white paper.
 - (2) Put the paper perpendicularly on the ground at the position 3 m (9.84 ft) away from the headlamps.
 - (3) Make sure that the center line of the vehicle and the paper face forms a 90-degree angle, as shown in the illustration.
 - (4) Draw a horizontal line (H line) on the paper, showing where the headlamps should strike.
 - (5) Draw a vertical line (V line) on the paper, showing where the center line of the vehicle is to be.
 - (6) Draw 2 vertical lines on the paper, showing where the both headlamps should strike (V RH and V LH lines).
 - (7) Draw a horizontal line (by connecting both low beam center marks) on the paper, showing where the headlamps should strike (H RH and H LH lines).

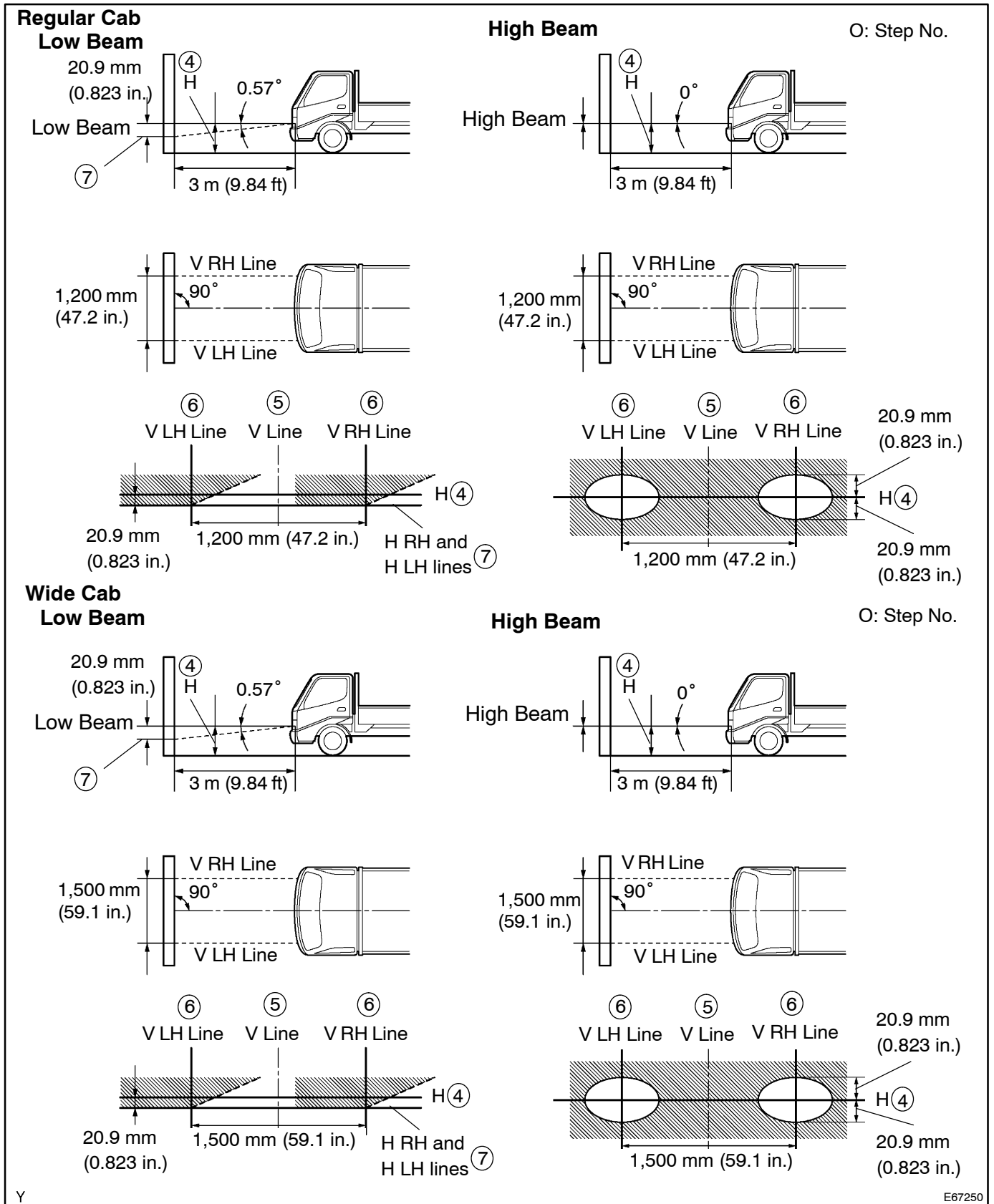
HINT:

The H RH and H LH lines are in 0.57° (w/o Levering) or 0.69° (w/ Levering) below the horizontal line (H line) of the light axis.

- (8) Start the engine.
- (9) Turn on the headlamps.
- (10) Check that the headlamps properly strike the position, as shown in the illustration.

(11) w/o Leveling:

If not, adjust the headlamps in the vertical or horizontal direction.



HINT:

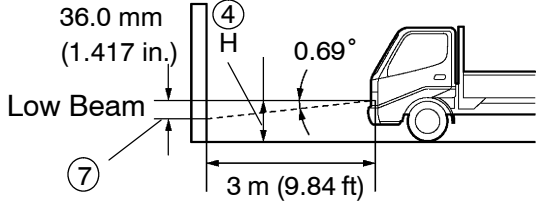
- As shown in the illustration, adjust each aim of the RH and LH lights.
- The value of the "High Beam" aim is a reference value.

(12) w/ Leveling

If not, adjust the headlamps in the vertical or horizontal direction.

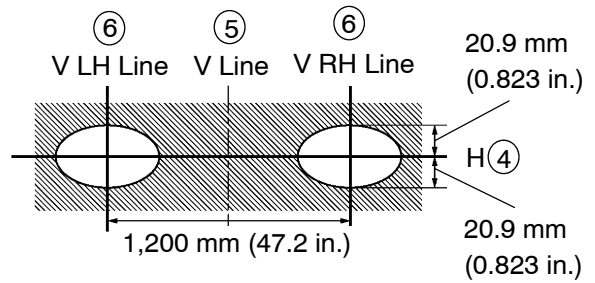
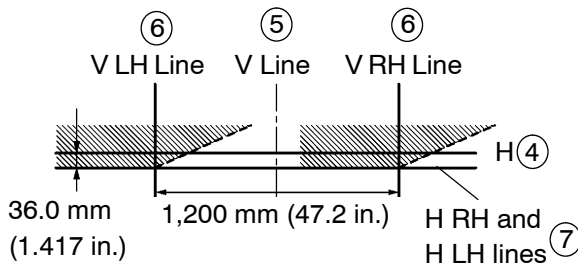
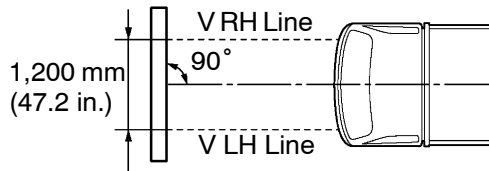
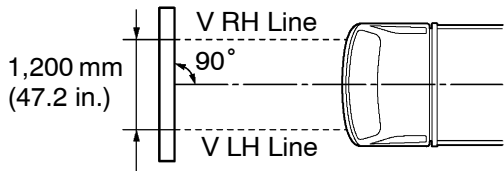
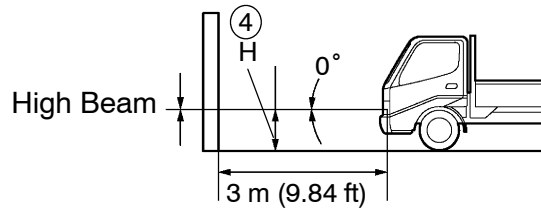
Regular Cab

Low Beam



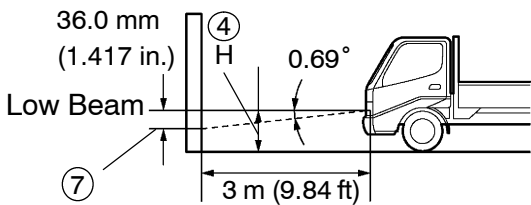
High Beam

O: Step No.



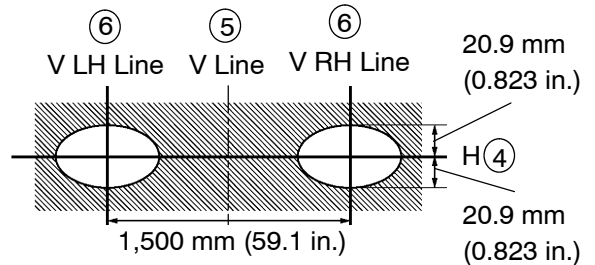
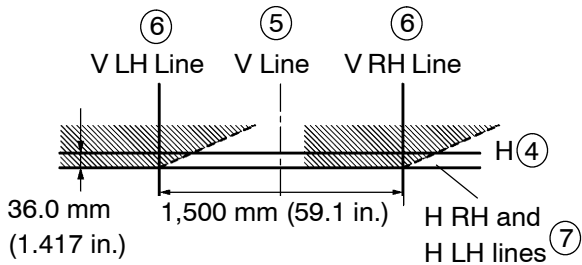
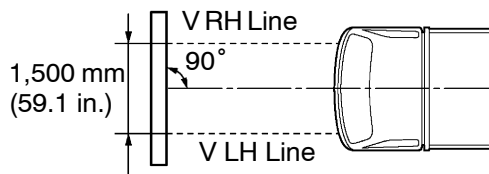
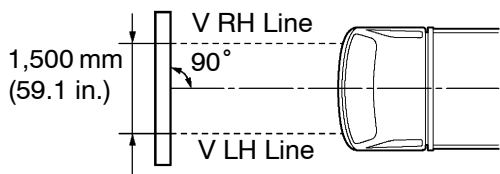
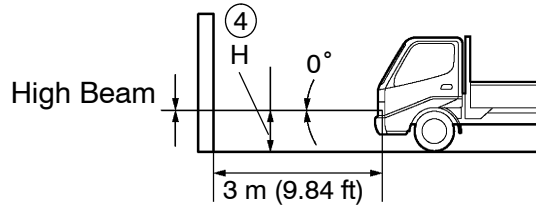
Wide Cab

Low Beam



High Beam

O: Step No.

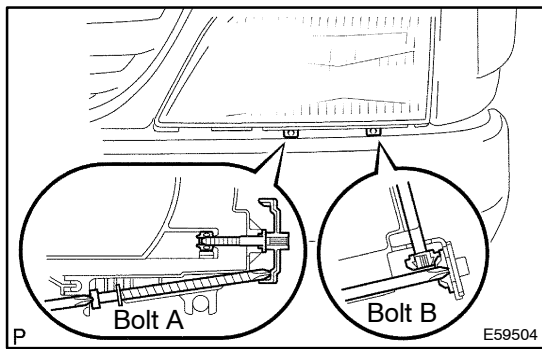


Y

E67250

HINT:

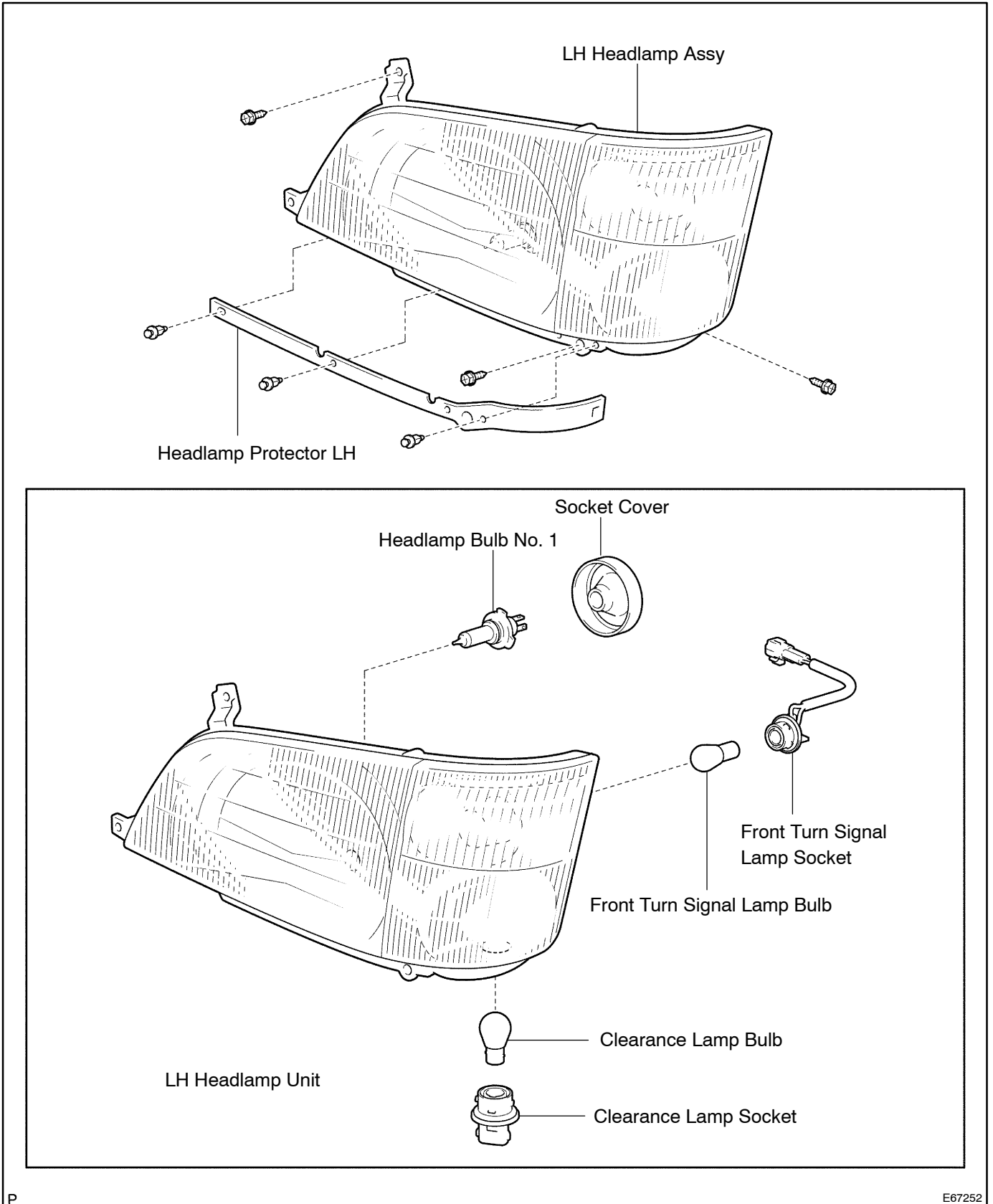
- As shown in the illustration, adjust each aim of the RH and LH lights.
- The value of the "High Beam" aim is a reference value.



- (c) When adjusting the headlamps in the vertical direction:
Using the adjusting bolt A, adjust the headlamp aim within the specified range.
- (d) When adjusting the headlamps in the horizontal direction:
Using the adjusting bolt B, adjust the headlamp aim within the specified range.

HEADLAMP UNIT LH (TYPE B) COMPONENTS

650QE-01

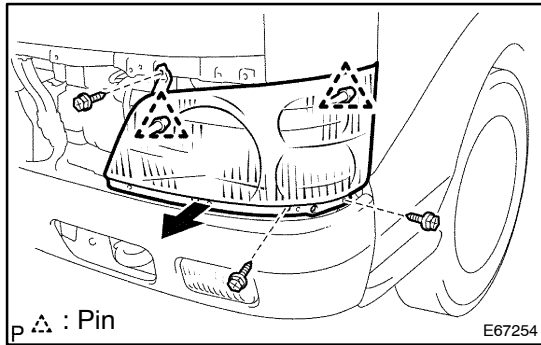


REPLACEMENT

HINT:

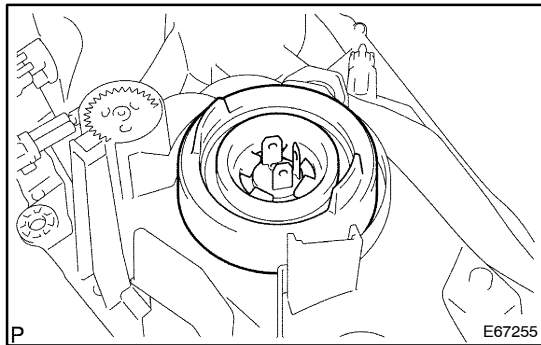
- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- On the RH side, use the same procedures as on the LH side.

1. REMOVE RADIATOR GRILLE (See page 76-3)



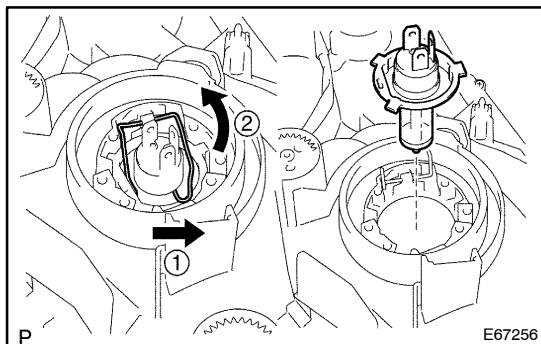
2. REMOVE LH HEADLAMP ASSY

- Remove the 3 bolts.
- Pull out the headlamp forward while disengaging the 2 pins of the headlamp.
- Disconnect the connectors and remove the headlamp.



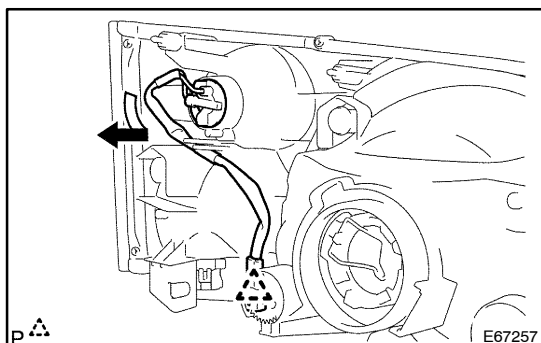
3. REMOVE SOCKET COVER

- Remove the socket cover from the headlamp.



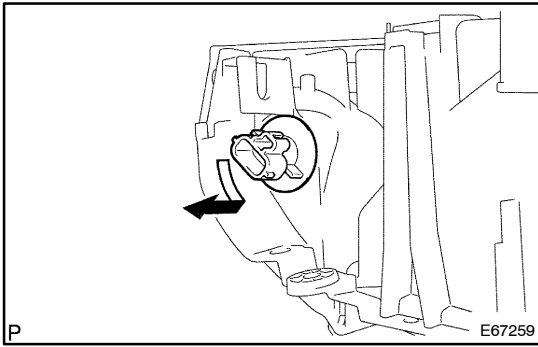
4. REMOVE HEADLAMP BULB NO.1

- Release the set spring, as shown in the illustration, and remove the headlamp bulb No. 1.



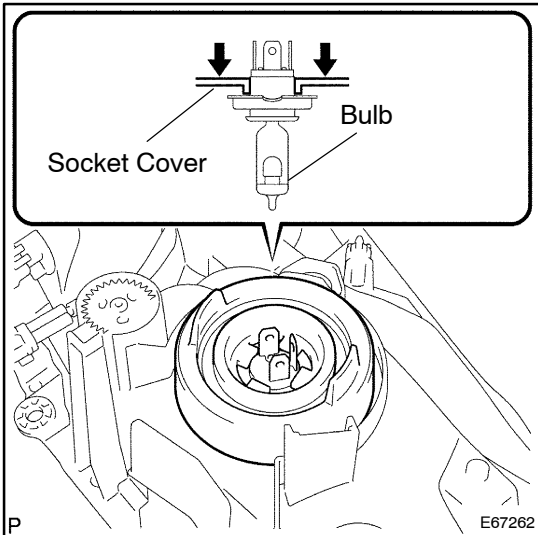
5. REMOVE FRONT TURN SIGNAL LAMP SOCKET

- Disengage the clamp.
- Remove the lamp socket, as shown in the illustration.



6. REMOVE CLEARANCE LAMP SOCKET

- (a) Remove the lamp socket, as shown in the illustration.



7. INSTALL SOCKET COVER

- (a) Install the socket cover.

NOTICE:

- Push in the socket cover until its outer circumference touches the lamp body.
- Push in the inside girth of the socket cover (bulb girth) until the whole metal parts of the bulb can be checked.

8. ADJUST HEADLIGHT AIM ONLY (See page 65-20)

ADJUSTMENT

1. ADJUST HEADLAMP AIM ONLY

- (a) Put the vehicle in the following conditions.
 - The vehicle is parked on a level surface.
 - The tire inflation pressure is at the specified value.
 - A driver is in the driver side seat and the vehicle is ready for driving (with the tank full).
 - The vehicle has been bounced several times.
- (b) Check the headlamp aiming.
 - (1) Prepare a thick white paper.
 - (2) Put the paper perpendicularly on the ground at the position 3 m (9.84 ft) away from the headlamps.
 - (3) Make sure that the center line of the vehicle and the paper face forms a 90-degree angle, as shown in the illustration.
 - (4) Draw a horizontal line (H line) on the paper, showing where the headlamps should strike.
 - (5) Draw a vertical line (V line) on the paper, showing where the center line of the vehicle is to be.
 - (6) Draw 2 vertical lines on the paper, showing where the both headlamps should strike (V RH and V LH lines).
 - (7) Draw a horizontal line (by connecting both low beam center marks) on the paper, showing where the headlamps should strike (H RH and H LH lines).

HINT:

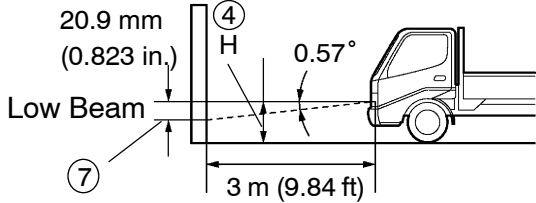
The H RH and H LH lines are in 0.57° below the horizontal line (H line) of the light axis.

- (8) Start the engine.
- (9) Turn on the headlamps.
- (10) Check that the headlamps properly strike the position, as shown in the illustration.

(11) If not, adjust the headlamps in the vertical or horizontal direction.

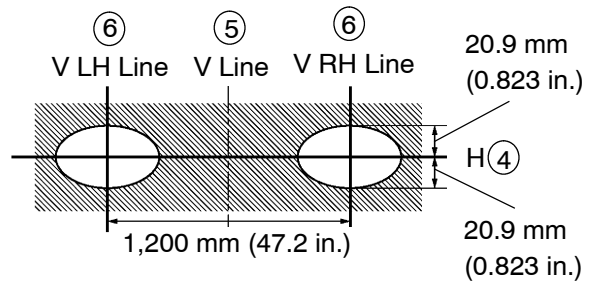
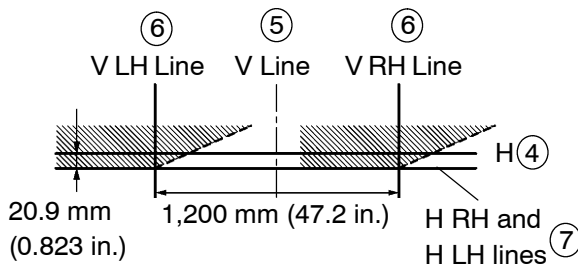
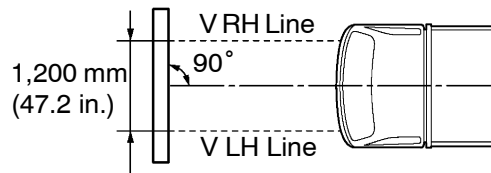
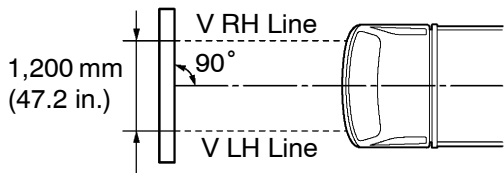
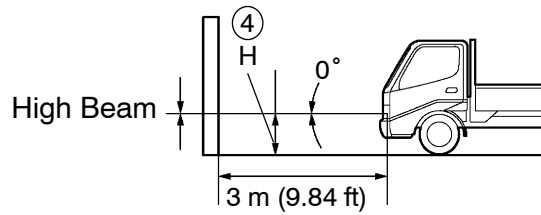
Regular Cab

Low Beam



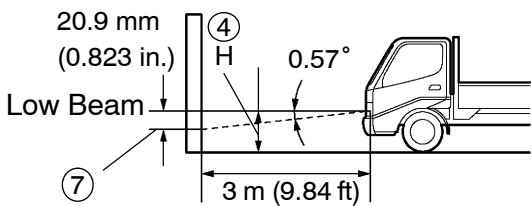
High Beam

O: Step No.



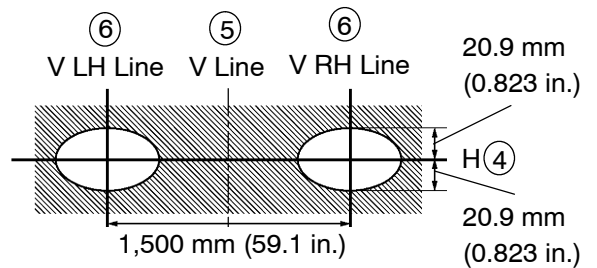
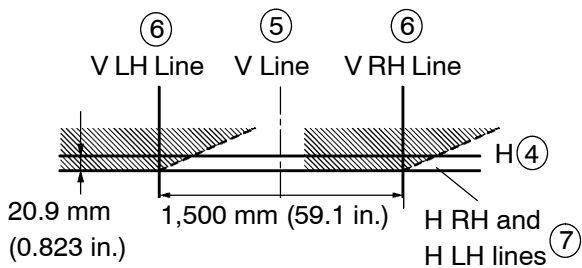
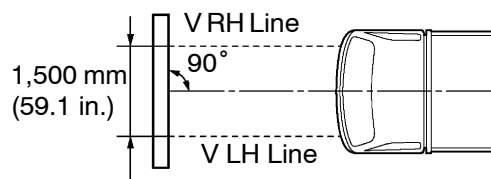
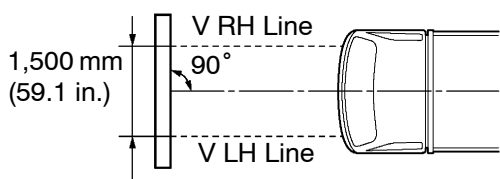
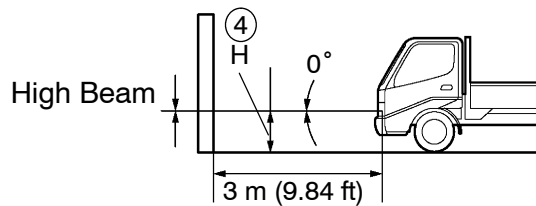
Wide Cab

Low Beam



High Beam

O: Step No.

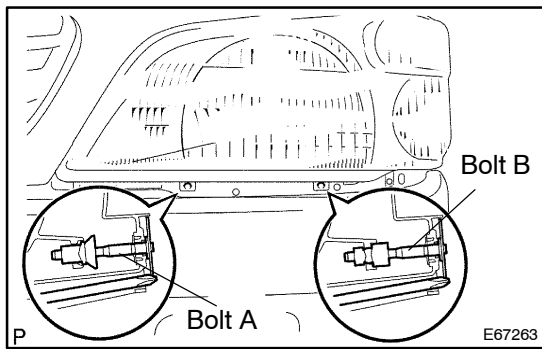


Y

E67250

HINT:

- As shown in the illustration, adjust each aim of the RH and LH lights.
- The value of the "High Beam" aim is a reference value.



- (c) When adjusting the headlamps in the vertical direction:
Using the adjusting bolt A, adjust the headlamp aim within the specified range.
- (d) When adjusting headlamps in the horizontal direction:
Using the adjusting bolt B, adjust the headlamp aim within the specified range.

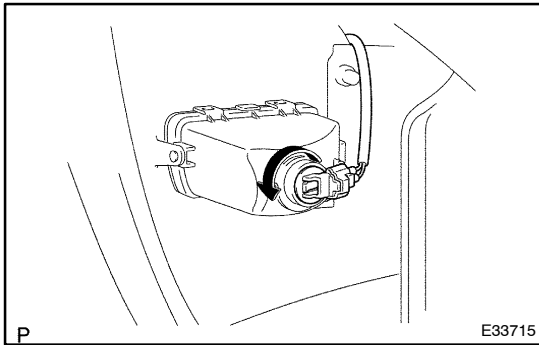
FOG LAMP ASSY LH

REPLACEMENT

650EJ-02

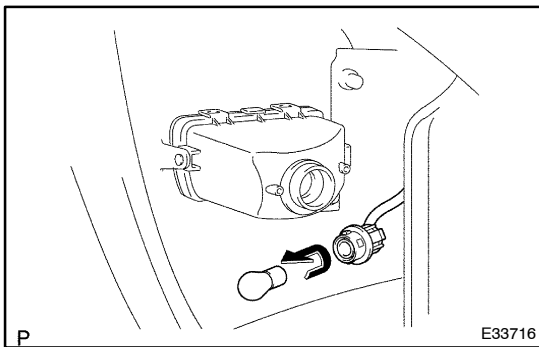
HINT:

- The installation is in the reverse order of the removal.
- On the RH side, use the same procedures as on the LH side.

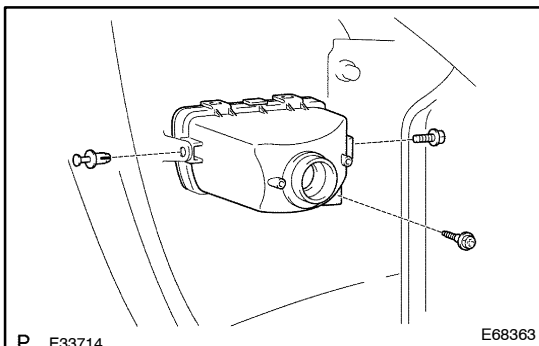


1. REMOVE FOG LAMP BULB

- (a) Disconnect the bulb socket, as shown in the illustration.



- (b) Remove the bulb, as shown in the illustration.

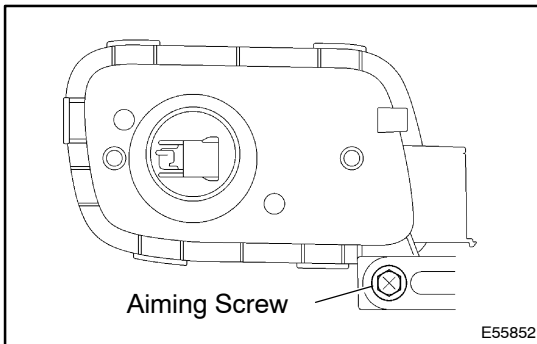


2. REMOVE FOG LAMP ASSY LH

- (a) Remove the 2 screws, washer and clip.
 (b) Remove the fog lamp.

3. ADJUST FOG LAMP AIM ONLY (See page 65-24)

ADJUSTMENT



1. **ADJUST FOG LAMP AIM ONLY**
 - (a) Adjust the fog lamp aim by moving the aiming screw in the vertical direction.

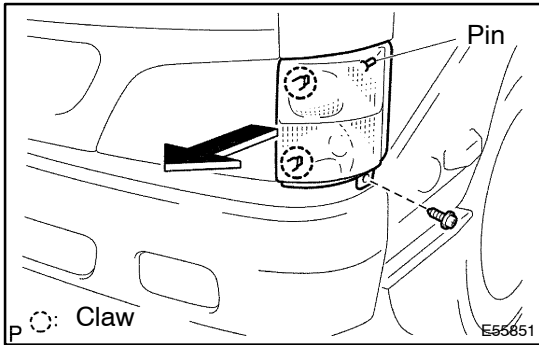
CLEARANCE LAMP ASSY LH

REPLACEMENT

650EL-02

HINT:

- The installation is in the reverse order of the removal.
- On the RH side, use the same procedures as on the LH side.



1. REMOVE CLEARANCE LAMP ASSY LH

- (a) Remove the screw.
- (b) Pull out the clearance lamp forward while disengaging the pin and 2 claws.
- (c) Disconnect the connectors and remove the clearance lamp.

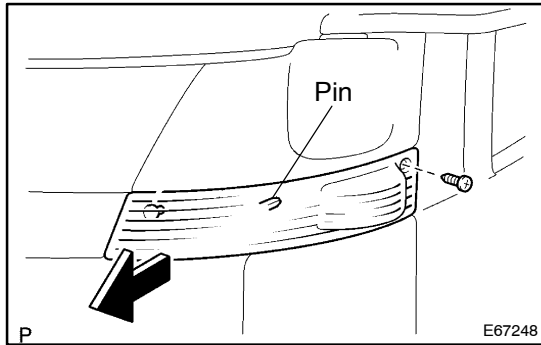
FRONT TURN SIGNAL LAMP ASSY LH (STANDARD BODY FOR TAIWAN)

REPLACEMENT

650QH-01

HINT:

- The installation is in the reverse order of the removal.
- On the RH side, use the same procedures as on the LH side.



1. REMOVE FRONT TURN SIGNAL LAMP LH

- (a) Remove the screw.
- (b) Pull out the turn signal lamp forward while disengaging the pin.
- (c) Disconnect the connector and remove the turn signal lamp.

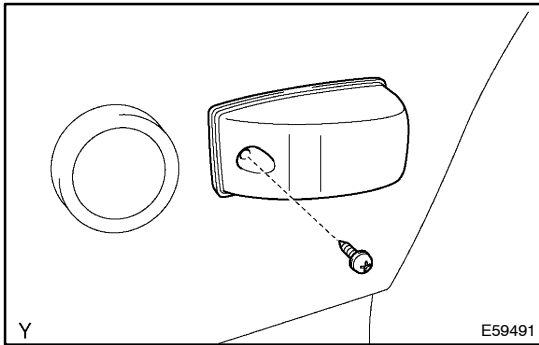
SIDE TURN SIGNAL LAMP ASSY LH (Europe and Australia)

REPLACEMENT

650QI-01

HINT:

- The installation is in the reverse order of the removal.
- On the RH side, use the same procedures as on the LH side.



1. REMOVE SIDE TURN SIGNAL LAMP ASSY LH

- (a) Remove the screw and pull out the side turn signal lamp.
- (b) Disconnect the connector and remove the side turn signal lamp.

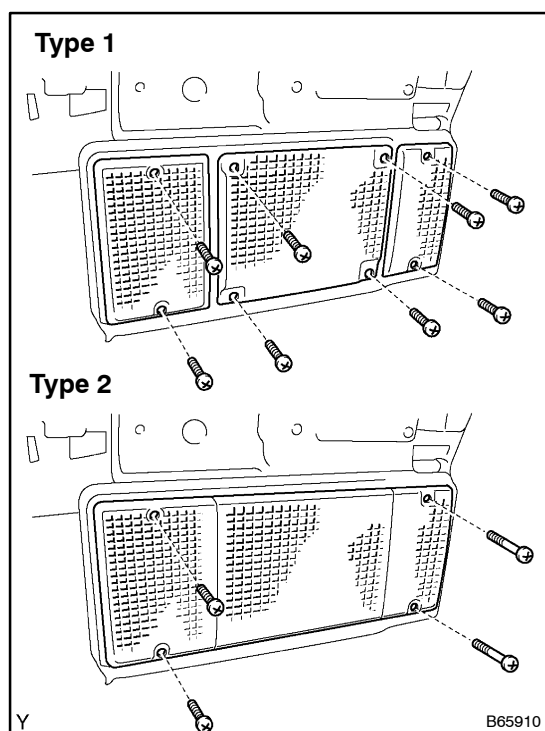
REAR COMBINATION LAMP LENS LH

REPLACEMENT

650QJ-01

HINT:

- The installation is in the reverse order of the removal.
- On the RH side, use the same procedures as on the LH side.



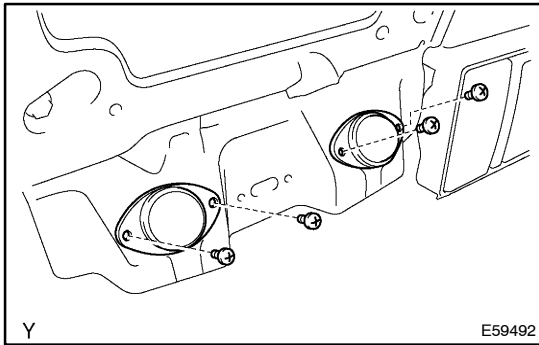
- 1. REMOVE REAR COMBINATION LAMP ASSY LH**
 - (a) Remove the 8 (type 1) or 4 (type 2) screws and rear combination lamp lens LH.**

LICENSE PLATE LAMP LENS REPLACEMENT

650QK-01

HINT:

The installation is in the reverse order of the removal.



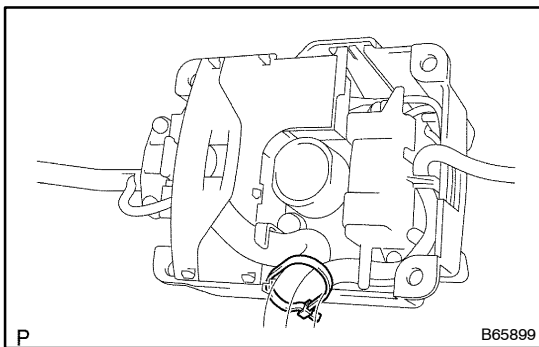
- 1. REMOVE LICENSE PLATE LAMP LENS**
 - (a) Remove the 2 screws, gasket, retainer and lens.

HEADLAMP DIMMER SWITCH ASSY

650QL-01

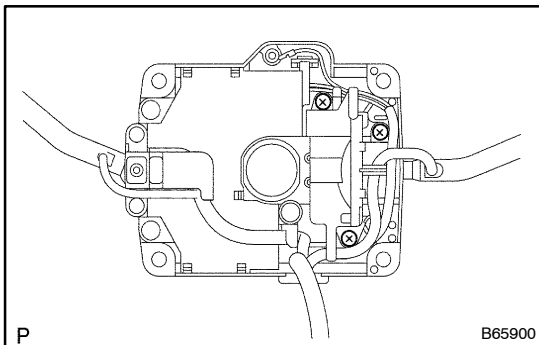
REPLACEMENT

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **REMOVE TURN SIGNAL SWITCH ASSY (See page 50-8)**
 - (a) Place the front wheels facing straight ahead.
 - (b) Remove the horn button assy.
 - (c) Remove the steering wheel assy.
SST 09950-50013 (09951-00510, 09952-05010, 09953-05020, 09954-05021)
 - (d) Remove the steering column cover lower.
 - (e) Remove the steering column cover upper.
 - (f) Remove the turn signal switch assy.

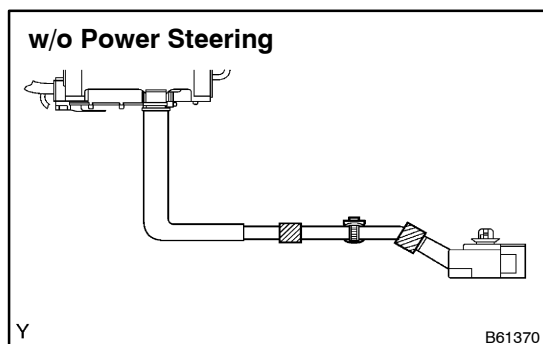


3. REMOVE HEADLAMP DIMMER SWITCH ASSY

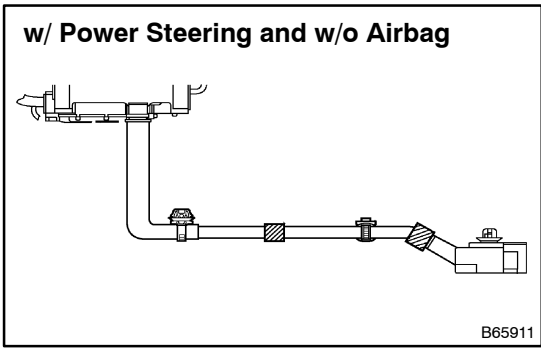
- (a) Remove the cord clamp.



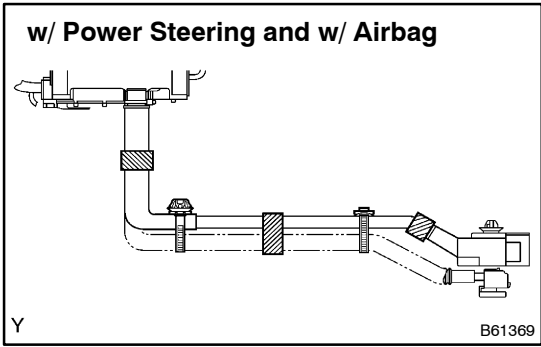
- (b) Remove the 3 screws.



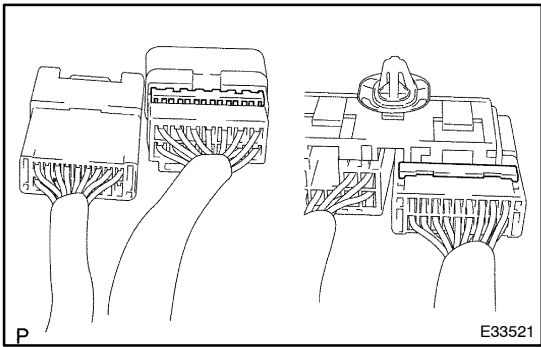
- (c) w/o Power steering:
Remove the wire harness clamp and 2 tapes.



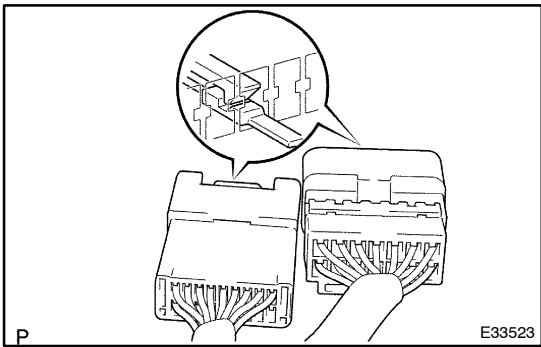
- (d) w/ Power steering and w/o airbag:
Remove the 2 wire harness clamps and 2 tapes.



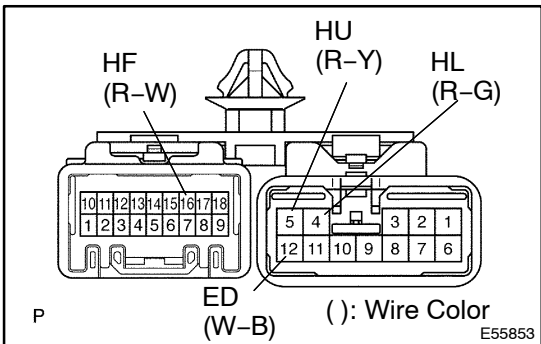
- (e) w/ Power steering and w/ airbag:
Remove the 2 wire harness clamps and 3 tapes.



- (f) Release the lock from the connector.



- (g) Using a precision screwdriver, unlock the connector terminal.
- (h) Pull out the connector terminal pins and remove the headlamp dimmer switch.

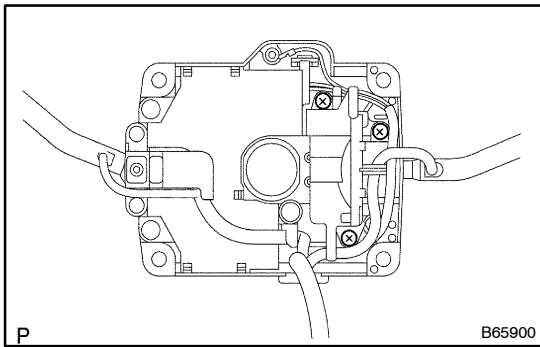


4. INSTALL HEADLAMP DIMMER SWITCH ASSY

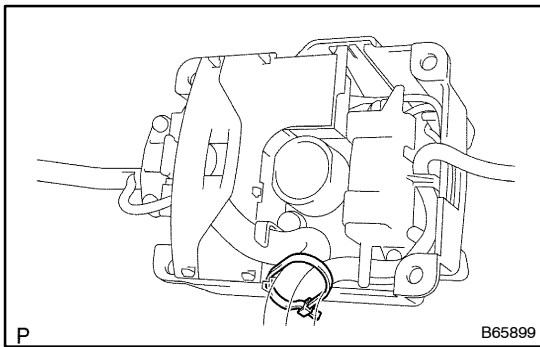
- (a) Install the connector terminal pins for the connector.

NOTICE:

Do not arrange the connector terminal pins wrongly.



- (b) Install the headlamp dimmer switch with the 3 screws.
- (c) Check that the headlamp dimmer switch operates smoothly.



- (d) Install a new cord clamp.
- (e) After installing the cord clamp, cut it off so that the extra length from the binding point will be 1 – 3 mm (0.04 – 0.12 in.).

- (f) Using the wire harness clamps, bind the wire harness, and tape the wire harness.

Standard:

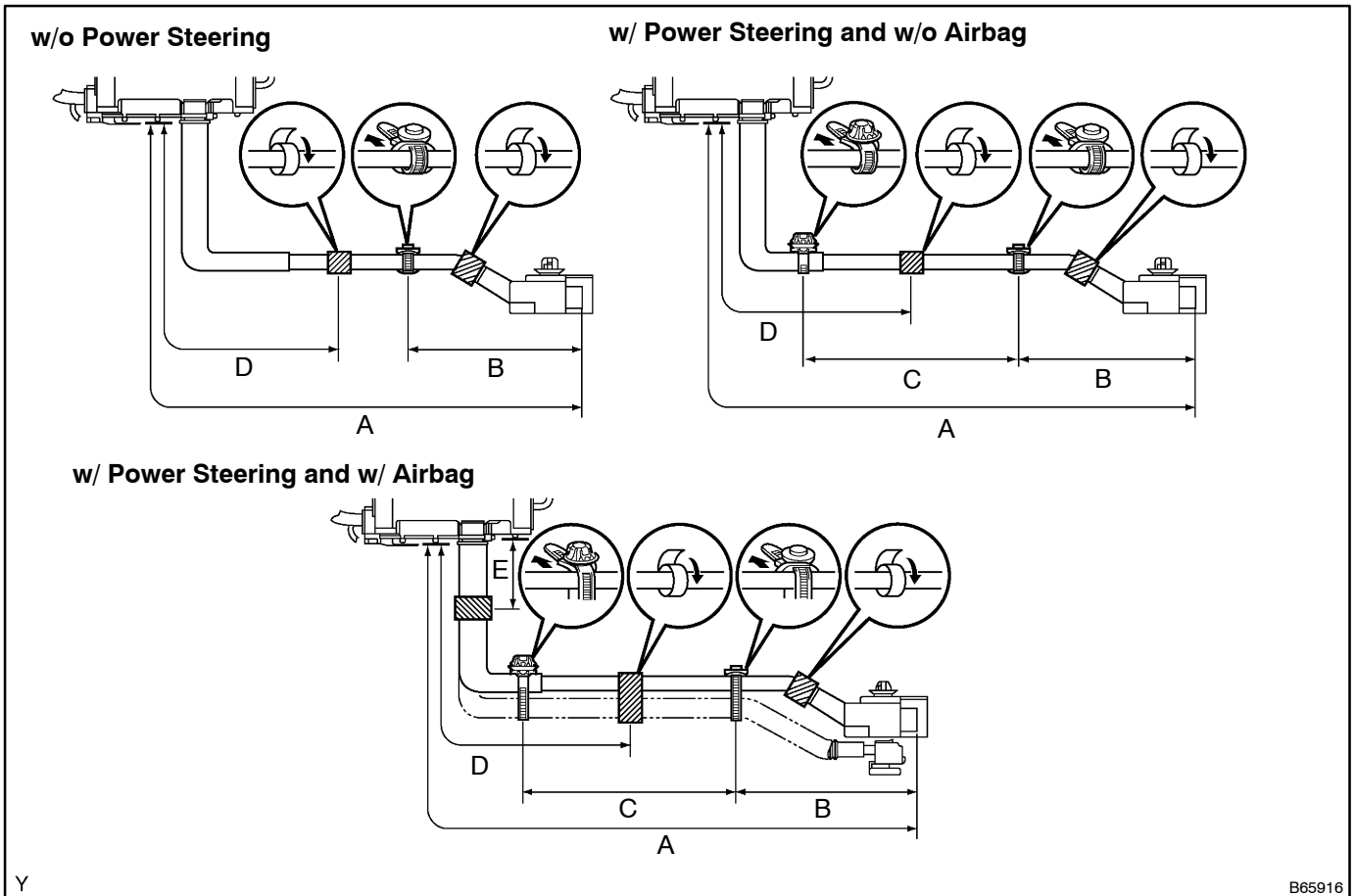
A: 610 – 630 mm (24.02 – 24.80 in.)

B: 230 – 240 mm (9.06 – 9.45 in.)

C: 195 – 205 mm (7.67 – 8.07 in.)

D: 275 – 295 mm (10.83 – 11.61 in.)

E: 80 – 100 mm (3.15 – 3.94 in.)



5. INSTALL TURN SIGNAL SWITCH ASSY (See page 50-8)

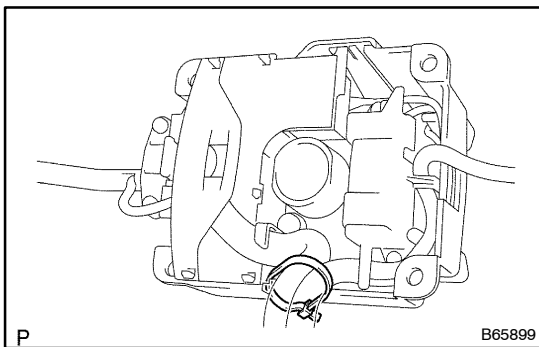
- Install the turn signal switch assy.
- Place the front wheels facing straight ahead.
- Install the steering column cover upper.
- Install the steering column cover lower.
- Install the steering wheel assy.
- Install the horn button assy.

LIGHT CONTROL SWITCH ASSY NO.1

650QM-01

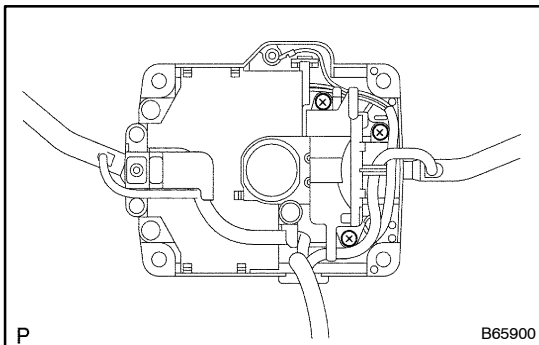
REPLACEMENT

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **REMOVE TURN SIGNAL SWITCH ASSY (See page 50-8)**
 - (a) Place the front wheels facing straight ahead.
 - (b) Remove the horn button assy.
 - (c) Remove the steering wheel assy.
SST 09950-50013 (09951-00510, 09952-05010, 09953-05020, 09954-05021)
 - (d) Remove the steering column cover lower.
 - (e) Remove the steering column cover upper.
 - (f) Remove the turn signal switch assy.

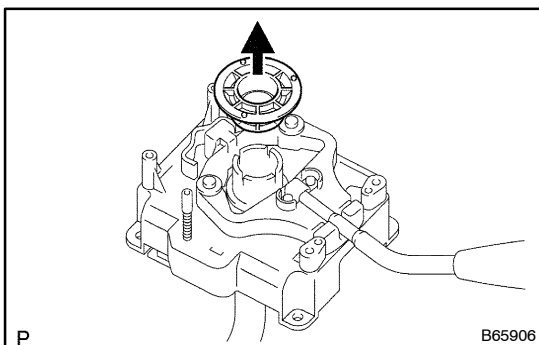


3. REMOVE HEADLAMP DIMMER SWITCH ASSY

- (a) Remove the cord clamp.

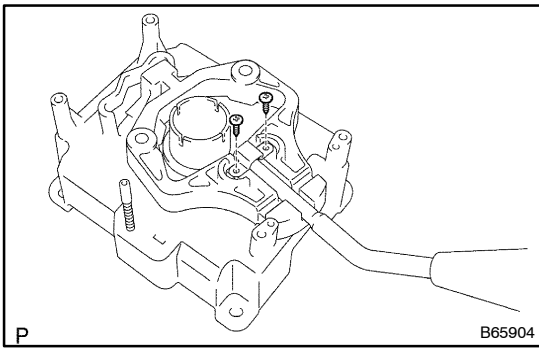


- (b) Remove the 3 screws.
- (c) Disconnect the headlamp dimmer switch from the turn signal switch.

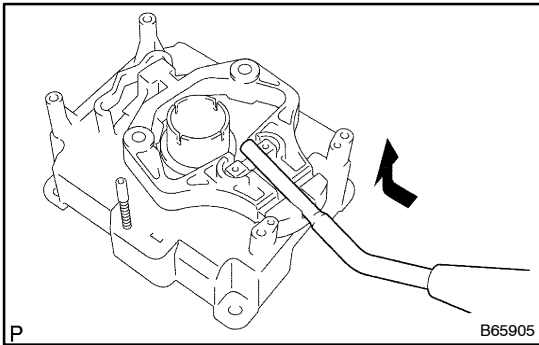


4. REMOVE LIGHT CONTROL SWITCH ASSY NO.1

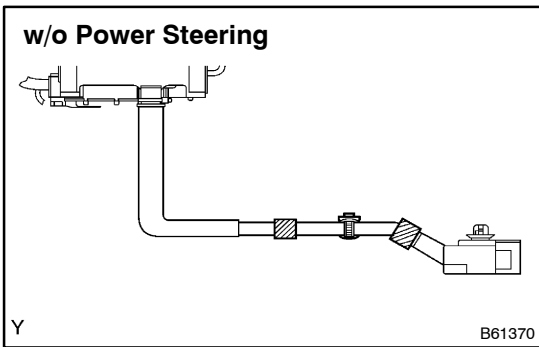
- (a) Remove the cancel cam.



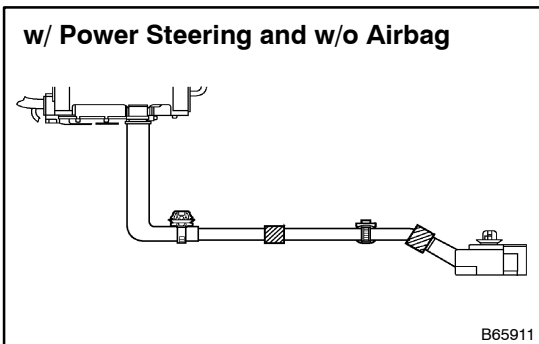
(b) Remove the 2 screws.



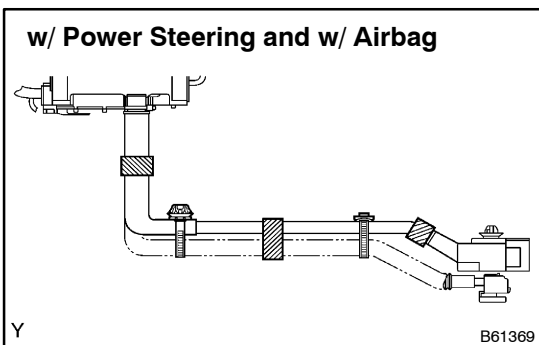
(c) Shift the lever into the "H" position and remove the plate and steel ball.
 (d) Slide the light control switch in the center direction, unlock and remove it.



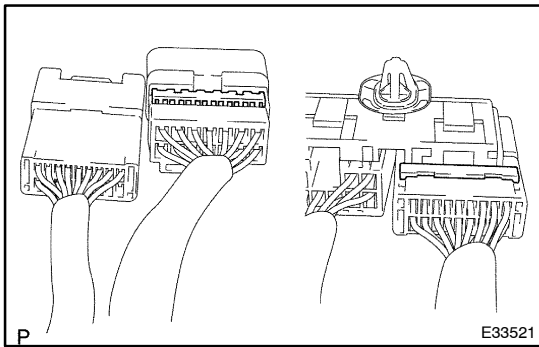
(e) w/o Power steering:
 Remove the wire harness clamp and 2 tapes.



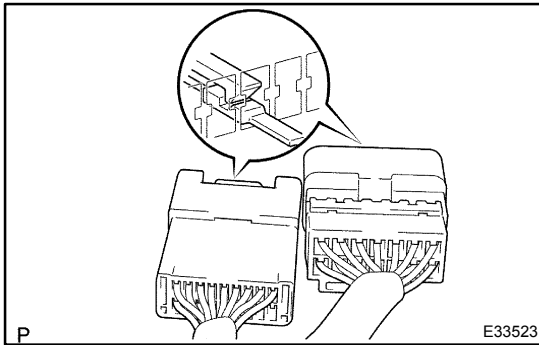
(f) w/ Power steering and w/o airbag:
 Remove the 2 wire harness clamps and 2 tapes.



(g) w/ Power steering and w/ airbag:
 Remove the 2 wire harness clamps and 3 tapes.

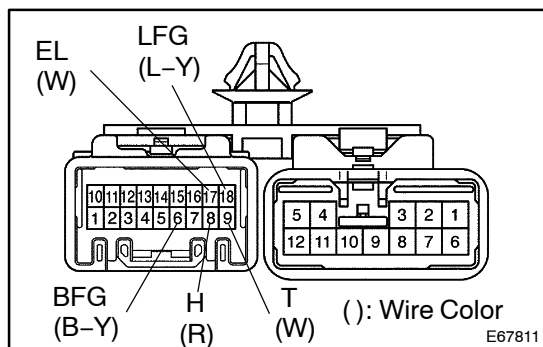


(h) Release the lock from the connector.



(i) Using a precision screwdriver, unlock the connector terminals.

(j) Pull out the connector terminals and remove the light control switch.



5. INSTALL LIGHT CONTROL SWITCH ASSY NO.1

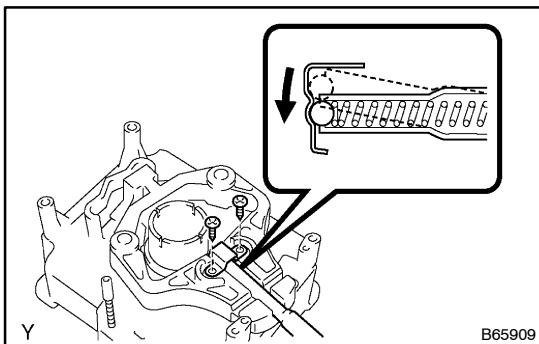
(a) Install the connector terminal pins for the connector.

NOTICE:

Do not arrange the connector terminal pins wrongly.

(b) Engage the light control switch.

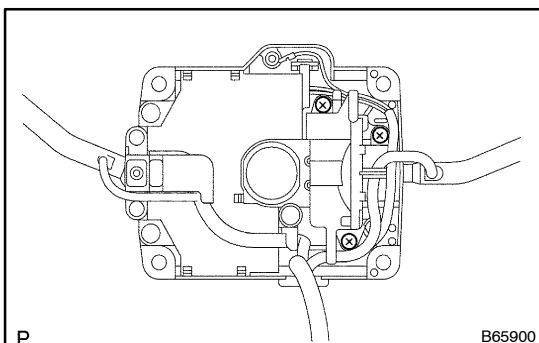
(c) Shift the lever into the HI position and install the steel ball and plate.



(d) Push in the plate while shifting the lever into the LO position, and install the 2 screws.

(e) Check that the light control switch operates smoothly.

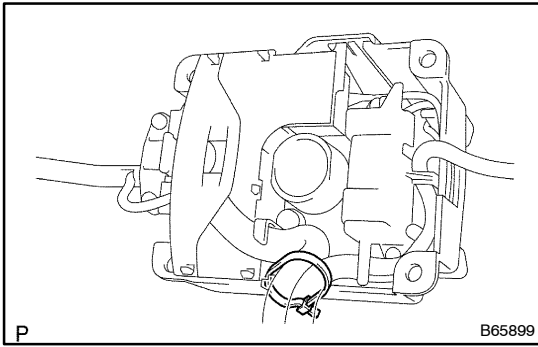
(f) Install the cancel cam.



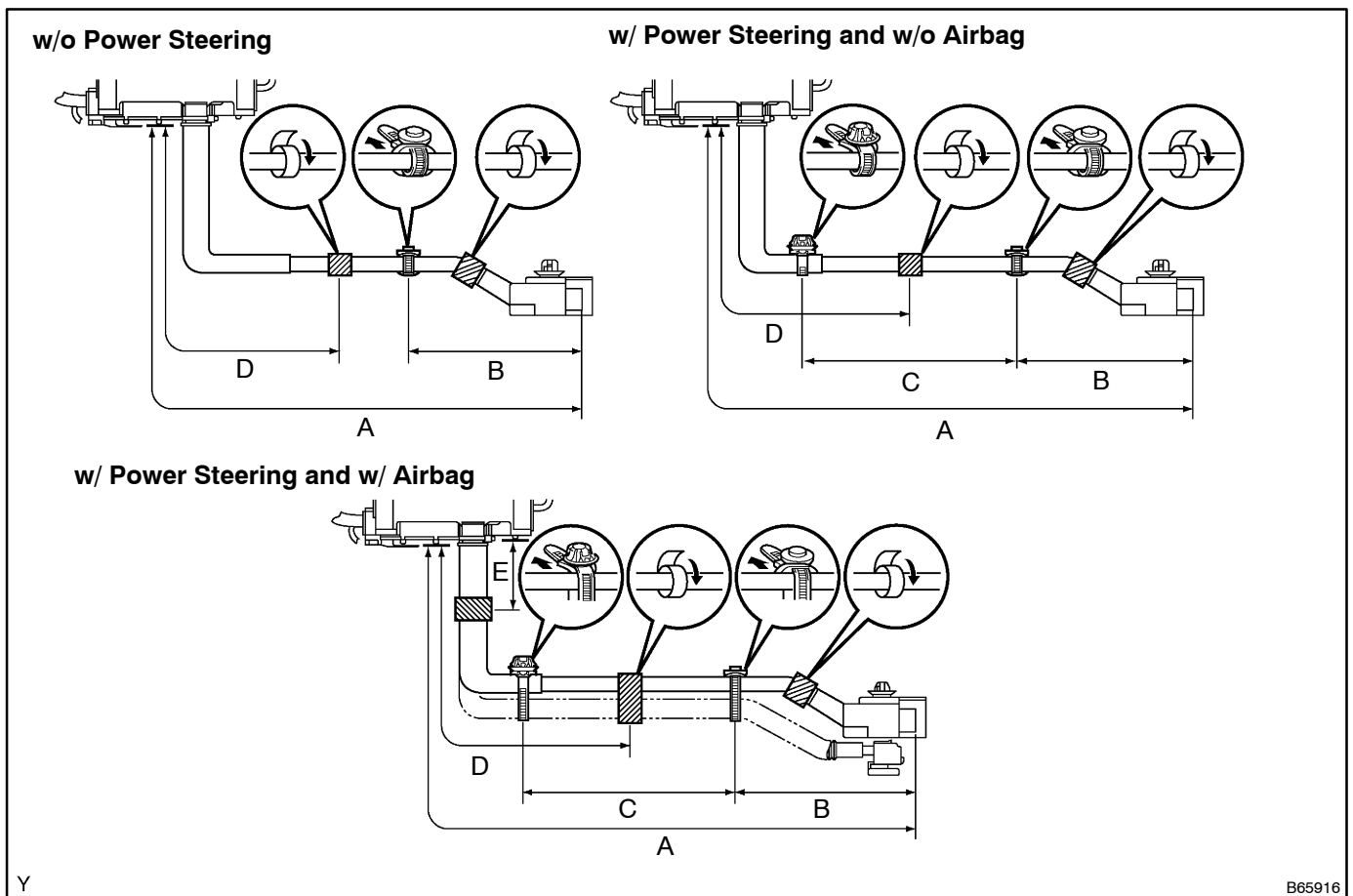
6. REMOVE HEADLAMP DIMMER SWITCH ASSY

(a) Install the headlamp dimmer switch with the 3 screws.

(b) Check that the headlamp dimmer switch operates smoothly.



- (c) Install a new cord clamp.
- (d) After installing the cord clamp, cut it off so that the extra length from the binding point will be 1 – 3 mm (0.04 – 0.12 in.).
- (e) Using the wire harness clamps, bind the wire harness, and tape the wire harness.

Standard:**A: 610 – 630 mm (24.02 – 24.80 in.)****B: 230 – 240 mm (9.06 – 9.45 in.)****C: 195 – 205 mm (7.67 – 8.07 in.)****D: 275 – 295 mm (10.83 – 11.61 in.)****E: 80 – 100 mm (3.15 – 3.94 in.)****7. INSTALL TURN SIGNAL SWITCH ASSY (See page 50-8)**

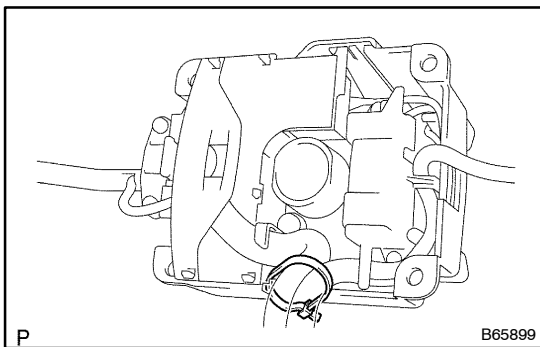
- (a) Install the turn signal switch assy.
- (b) Place the front wheels facing straight ahead.
- (c) Install the steering column cover upper.
- (d) Install the steering column cover lower.
- (e) Install the steering wheel assy.
- (f) Install the horn button assy.

TURN SIGNAL SWITCH

650QN-01

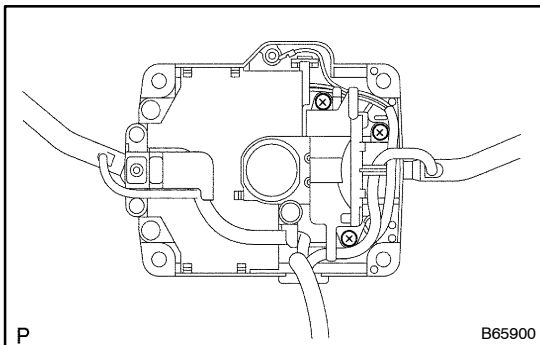
REPLACEMENT

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **REMOVE TURN SIGNAL SWITCH ASSY (See page 50-8)**
 - (a) Place the front wheels facing straight ahead.
 - (b) Remove the horn button assy.
 - (c) Remove the steering wheel assy.
SST (See page 02-39) 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)
 - (d) Remove the steering column cover lower.
 - (e) Remove the steering column cover upper.
 - (f) Remove the turn signal switch assy.



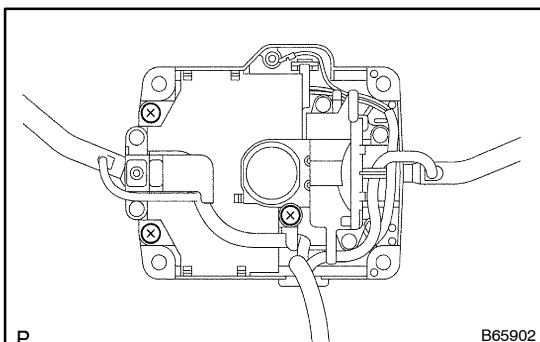
3. REMOVE HEADLAMP DIMMER SWITCH ASSY

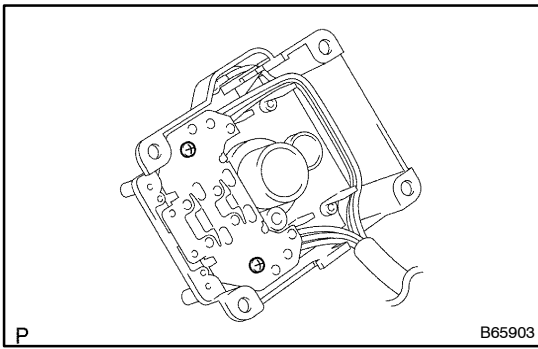
- (a) Remove the cord clamp.
- (b) Remove the 3 screws.
- (c) Disconnect the headlamp dimmer switch from the turn signal switch.



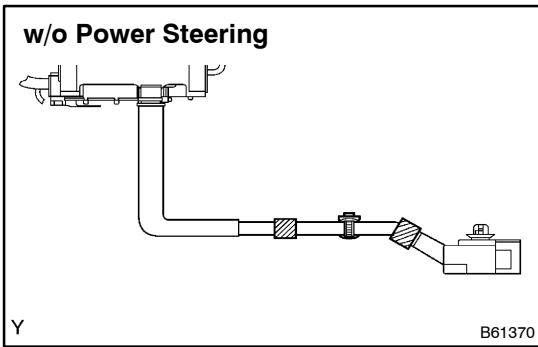
4. REMOVE WINDSHIELD WIPER SWITCH ASSY

- (a) Remove the 3 screws and windshield wiper switch.

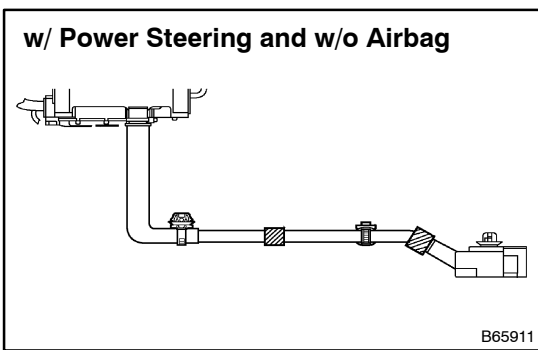


**5. REMOVE TURN SIGNAL SWITCH**

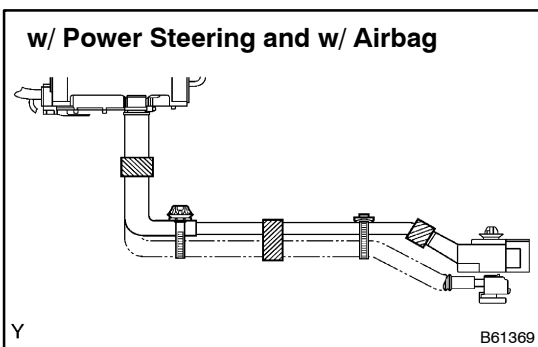
(a) Remove the 2 screws.



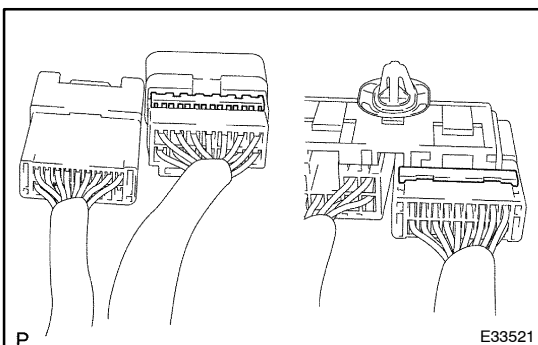
(b) w/o Power steering:
Remove the wire harness clamp and 2 tapes.



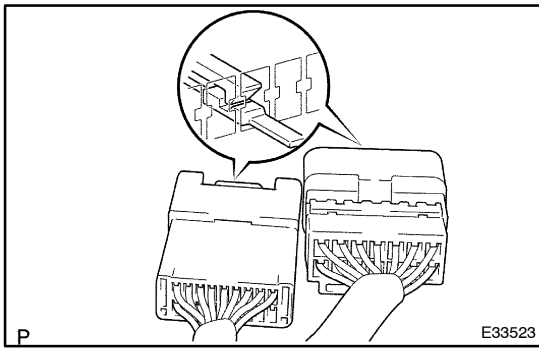
(c) w/ Power steering and w/o airbag:
Remove the 2 wire harness clamps and 2 tapes.



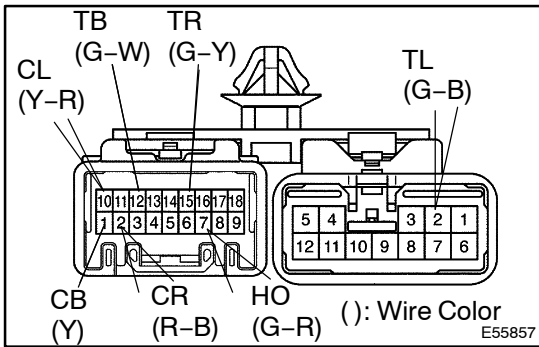
(d) w/ Power steering and w/ airbag:
Remove the 2 wire harness clamps and 3 tapes.



(e) Release the lock from the connector.



- (f) Using a precision screwdriver, unlock the connector terminals.
- (g) Pull out the connector terminal pins and remove the turn signal switch.

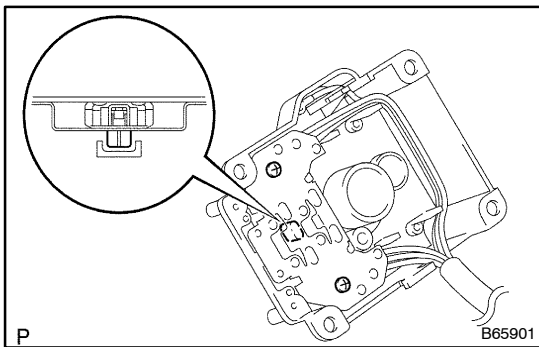


6. INSTALL TURN SIGNAL SWITCH

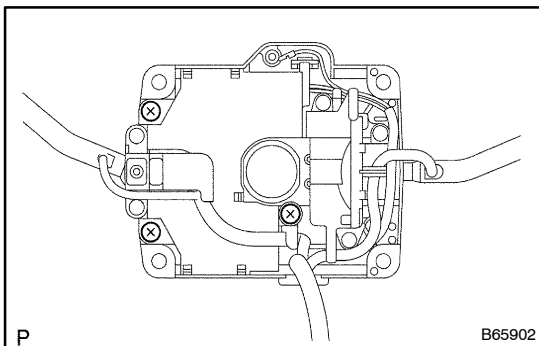
- (a) Install the connector terminal pins for the connector.

NOTICE:

Do not arrange the connector terminal pins wrongly.

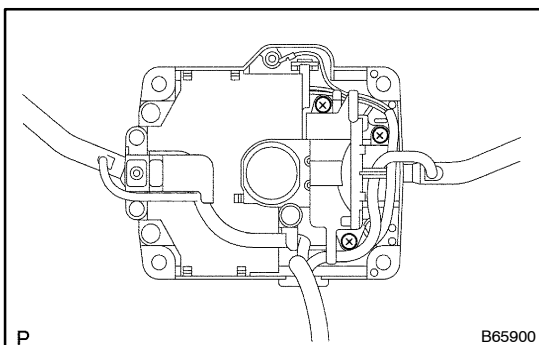


- (b) Engage the turn signal switch and install the switch with the 2 screws.
- (c) Check that the turn signal switch operates smoothly.



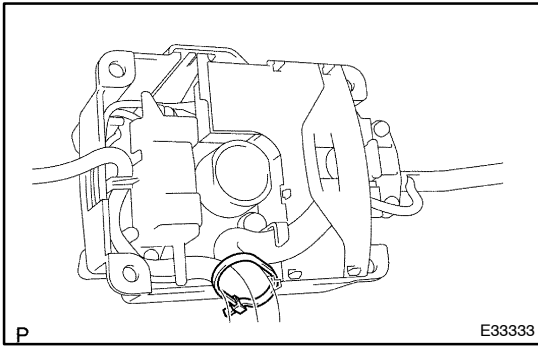
7. INSTALL WINDSHIELD WIPER SWITCH ASSY

- (a) Install the windshield wiper switch assembly with the 3 screws.
- (b) Check that the windshield wiper switch assembly operates smoothly.



8. INSTALL HEADLAMP DIMMER SWITCH ASSY

- (a) Install the headlamp dimmer switch with the 3 screws.
- (b) Check that the headlamp dimmer switch assembly operates smoothly.



- (c) Install a new cord clamp.
- (d) After installing the cord clamp, cut it off so that the extra length from the binding point will be 1 – 3 mm (0.04 – 0.12 in.).
- (e) Using the wire harness clamps, bind the wire harness, and tape the wire harness.

Standard:

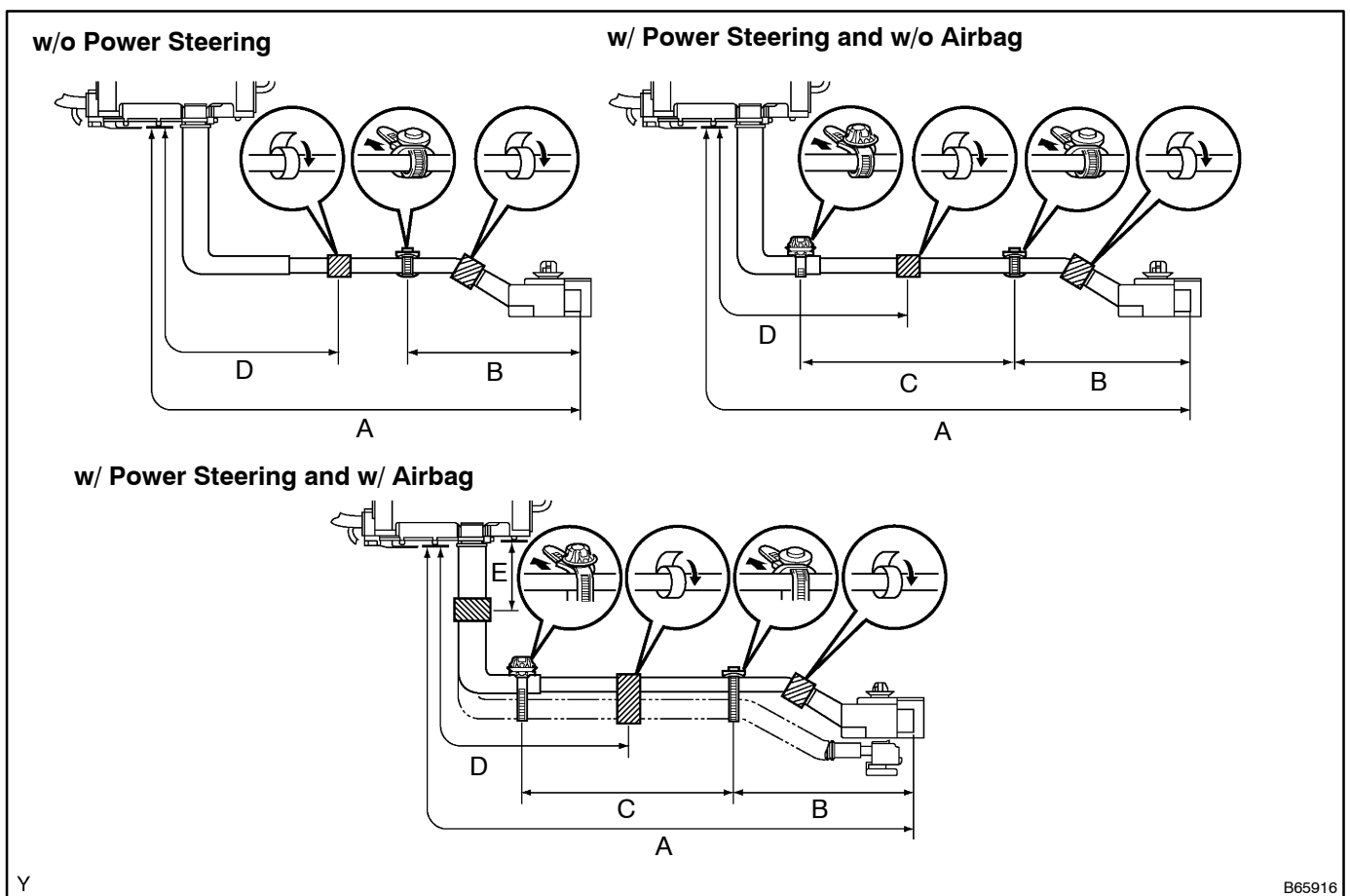
A: 610 – 630 mm (24.02 – 24.80 in.)

B: 230 – 240 mm (9.06 – 9.45 in.)

C: 195 – 205 mm (7.67 – 8.07 in.)

D: 275 – 295 mm (10.83 – 11.61 in.)

E: 80 – 100 mm (3.15 – 3.94 in.)



9. INSTALL TURN SIGNAL SWITCH ASSY (See page 50-8)

- (a) Install the turn signal switch assy.
- (b) Place the front wheels facing straight ahead.
- (c) Install the steering column cover upper.
- (d) Install the steering column cover lower.
- (e) Install the steering wheel assy.
- (f) Install the horn button assy.

WIPER & WASHER

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WIPER AND WASHER SYSTEM

PROBLEM SYMPTOMS TABLE

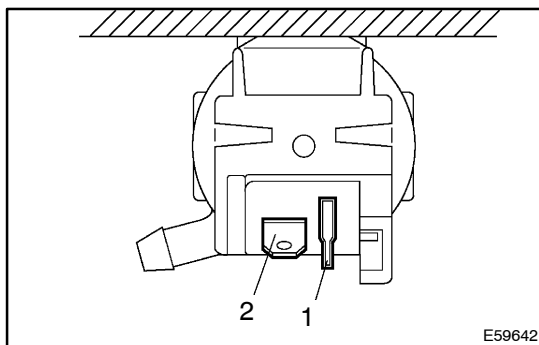
66066-03

1. WIPER AND WASHER SYSTEM

Symptom	Suspected Area	See Page
Front wipers and washers do not operate.	1. WIP fuse	-
	2. Ignition relay No.2 (IG1-2 relay) (15B-FTE and S05C-TB)	66-3
	3. Windshield wiper switch assy	66-3
	4. Wire harness	-
Front wipers do not operate at LO or HI.	1. Windshield wiper switch assy	66-3
	2. Front wiper motor & bracket assy	66-3
	3. Wire harness	-
Front wipers do not operate at INT.	1. Windshield wiper switch assy	66-3
	2. Front wiper motor & bracket assy	66-3
	3. Wire harness	-
Front washer motor does not operate.	1. WIP fuse	-
	2. Windshield wiper switch assy	66-3
	3. Washer motor	66-3
	4. Wire harness	-
Front wipers do not operate when washer switch is ON.	1. Windshield wiper switch assy	66-3
	2. Front wiper motor & bracket assy	66-3
	3. Wire harness	-
When wiper switch is OFF, wiper blade does not retract or retract position is wrong. *	1. Front wiper motor	66-3

*: Inspect the wiper arm and blade set position.

ON-VEHICLE INSPECTION

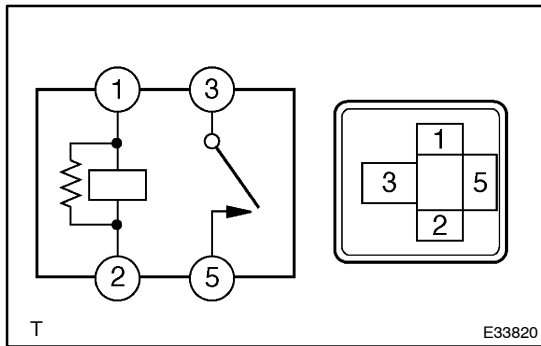


1. CHECK WASHER MOTOR

- (a) Pour the water into the washer jar with the washer motor installed to the washer jar.
- (b) Connect the positive (+) lead from the battery (+) to terminal 2 of the washer motor and the negative (-) lead to terminal 1 of the washer motor. Check that the water comes out from the washer jar.

If the result is not as specified, replace the motor.

INSPECTION



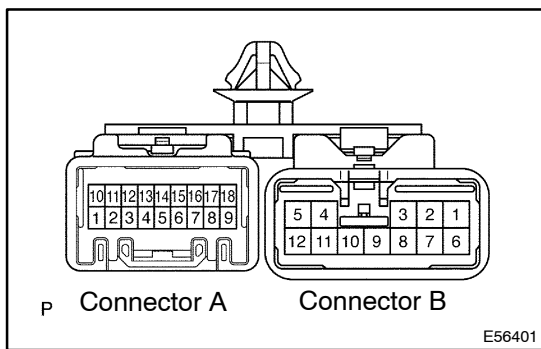
**1. 15B-FTE and S05C-TB:
INSPECT IGNITION RELAY NO.2 (Marking: IG1 - 2)**

(a) Inspect the relay continuity.

Standard:

Terminal No.	Tester Connection	Specified Condition
1 ↔ 2	Constant	Continuity
3 ↔ 5	Apply battery voltage to terminals 1 and 2	Continuity

If the result is not as specified, replace the relay.



2. INSPECT WINDSHIELD WIPER SWITCH ASSY

(a) RHD models (w/ standard body and w/o power steering):
Inspect the wiper switch continuity.

Standard:

Symbols (Terminal No.)	Switch Position	Specified Condition
+1 (B3) ↔ +S (B9)	OFF	Continuity
+1 (B3) ↔ +S (B9)	INT	Continuity
+1 (B3) ↔ +B (B6)	LO	Continuity
+B (B6) ↔ +2 (B8)	HI	Continuity

If the result is not as specified, replace the switch assy.

(b) Inspect the washer switch continuity.

Standard:

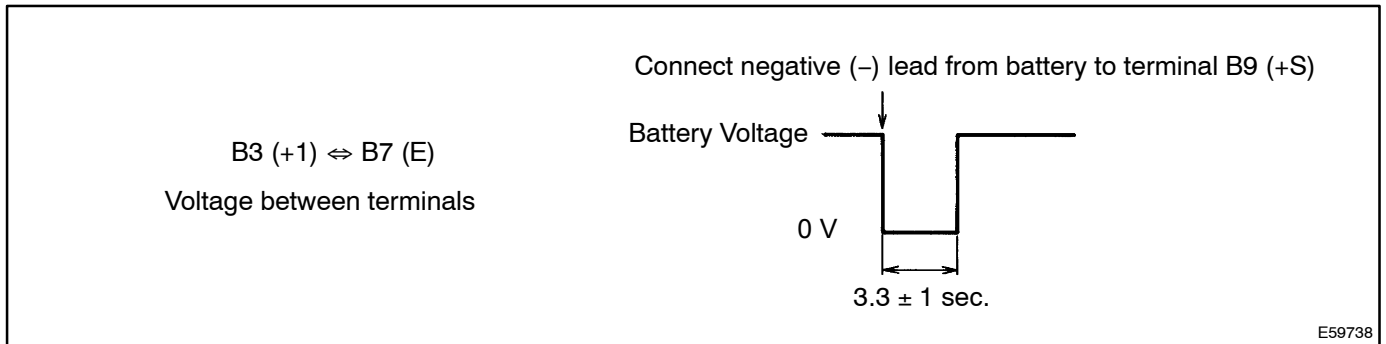
Symbols (Terminal No.)	Switch Position	Specified Condition
-	OFF	No continuity
WF (B1) ↔ E (B7)	ON	Continuity

If the result is not as specified, replace the switch assy.

(c) Inspect the intermittent operation.

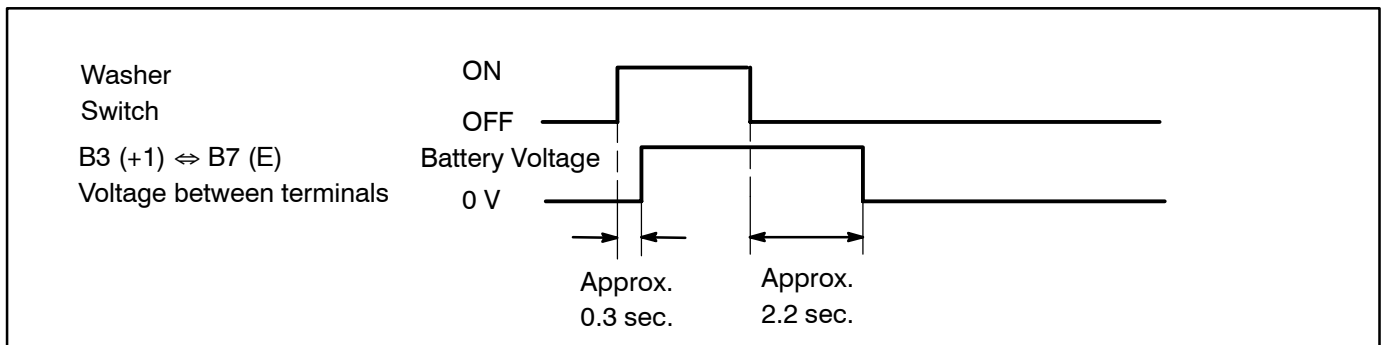
- (1) Connect the voltmeter positive (+) lead to terminal B3 (+1) of the connector and the voltmeter negative (-) lead to terminal B7 (E) of the connector.
- (2) Connect the positive (+) lead from the battery to terminal B6 (+B) of the connector and the negative (-) lead to terminals B7 (E) and B9 (+S) of the connector.
- (3) Turn the wiper switch to INT.
- (4) Connect the positive (+) lead from the battery to terminal B9 (+S) of the connector for 5 seconds.

- (5) Connect the negative (-) lead from the battery to terminal B9 (+S) of the connector, operate the intermittent wiper relay and check the voltage between terminal B3 (+1) and terminal B7 (E).

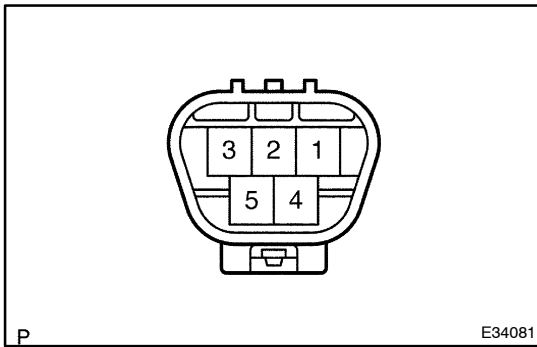


If the result is not as specified, replace the switch assy.

- (d) Inspect operation of the washer.
- (1) Turn the wiper switch OFF.
 - (2) Connect the positive (+) lead from the battery to terminal B6 (+B) of the connector and the negative (-) lead to terminals B9 (+S) and B7 (E) of the connector.
 - (3) Connect the voltmeter positive (+) lead to terminal B3 (+1) of the connector and the voltmeter negative (-) lead to terminal B7 (E) of the connector. Turn the washer switch ON and OFF, and check the voltage between terminal B3 (+1) and terminal B7 (E).



If the result is not as specified, replace the switch assy.



3. Standard Body: INSPECT FRONT WIPER MOTOR & BRACKET ASSY

- (a) Inspect the LO operation.
- (1) Connect the battery (+) to terminal 1 ((5)) of the connector and the battery (-) to terminal 5 ((4)) of the connector, and check that the motor operates with low speed.

(()): RHD models

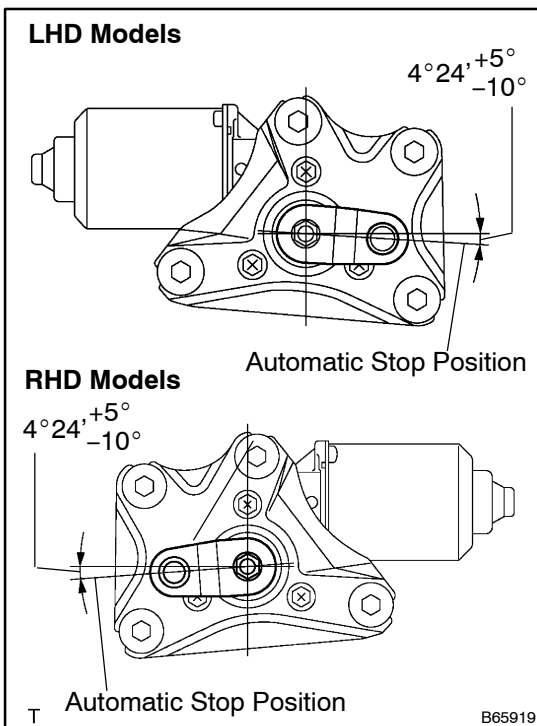
If the result is not as specified, replace the motor.

- (b) Inspect the HI operation.

- (1) Connect the battery (+) to terminal 4 ((3)) of the connector and the battery (-) to terminal 5 ((4)) of the connector, and check that the motor operates with high speed.

(()): RHD models

If the result is not as specified, replace the motor.

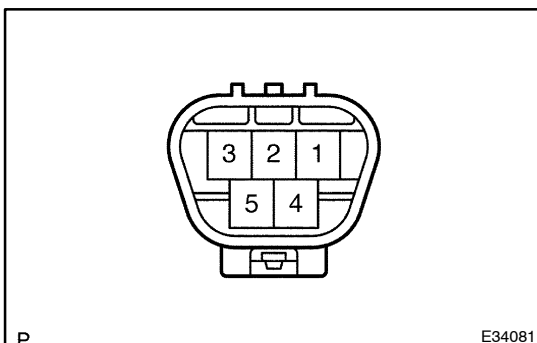


- (c) Inspect the automatic stop operation.

- (1) Connect the battery (+) to terminal 1 ((5)) of the connector and the battery (-) to terminal 5 ((4)) of the connector. While the motor is rotating with low speed, disconnect terminal 1 ((5)) to stop operation of the wiper motor operation at any position except the automatic stop position.
- (2) Connect terminals 1 ((5)) and 3 ((1)).
- (3) Check that the motor starts operating again with low speed and stops at the automatic stop position by connecting the battery (+) to terminal 2 ((2)).

(()): RHD models

If the result is not as specified, replace the motor.



4. Wide Body: INSPECT FRONT WIPER MOTOR & BRACKET ASSY

- (a) Inspect the LO operation.
- (1) Connect the battery (+) to terminal 5 ((1)) of the connector, the battery (-) to terminal 4 ((5)) of the connector, and check that the motor operates with low speed.

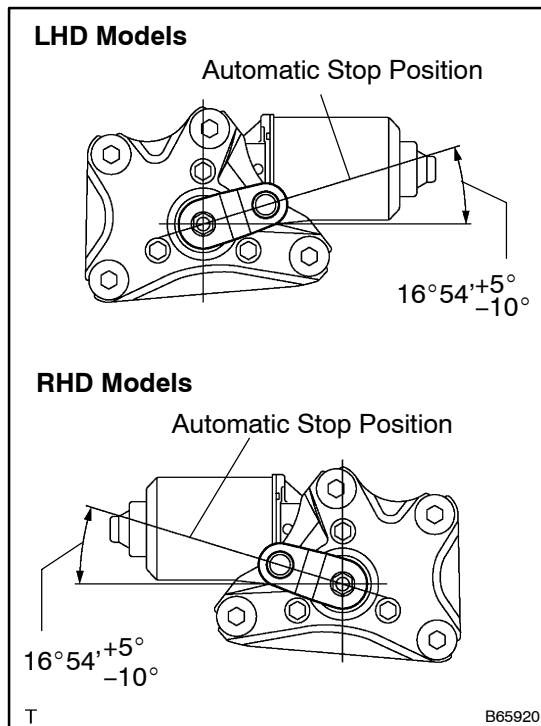
(()): RHD models

If the result is not as specified, replace the motor.

- (b) Inspect the HI operation.
- (1) Connect the battery (+) to terminal 3 ((4)) of the connector and the battery (-) to terminal 4 ((5)) of the connector, and check that the motor operates with high speed.

(()): RHD models

If the result is not as specified, replace the motor.



- (c) Inspect the automatic stop operation.
- (1) Connect the battery (+) to terminal 5 ((1)) of the connector and the battery (-) to terminal 4 ((5)) of the connector. While the motor is rotating with low speed, disconnect terminal 5 ((1)) to stop operation of the wiper motor at any position except the automatic stop position.
 - (2) Connect terminals 5 ((1)) and 1 ((3)).
 - (3) Check that the motor starts operating again with low speed and stops at the automatic stop position by connecting the battery (+) to terminal 2 ((2)).

(()): RHD models

If the result is not as specified, replace the motor.

FRONT WIPER MOTOR & BRACKET ASSY

REPLACEMENT

66062-04

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. Except Australia and Portugal:

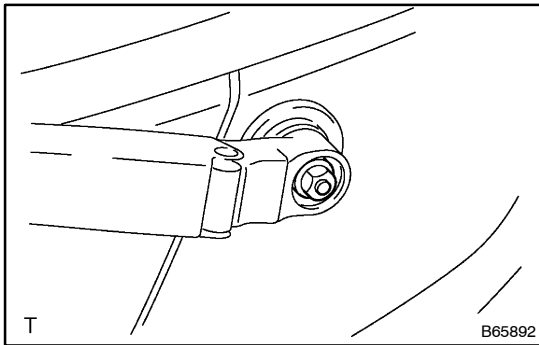
REMOVE OUTER MIRROR COVER LH (See page 70-19)

- (a) Regular cab for Taiwan:
Remove the front turn signal lamp assy LH.
- (b) Except regular cab for Taiwan:
Remove the front valance panel LH.
- (c) Remove the outer mirror grommet.
- (d) Remove the outer mirror bezel.
- (e) Remove the outer mirror cover LH.

2. REMOVE OUTER MIRROR COVER RH

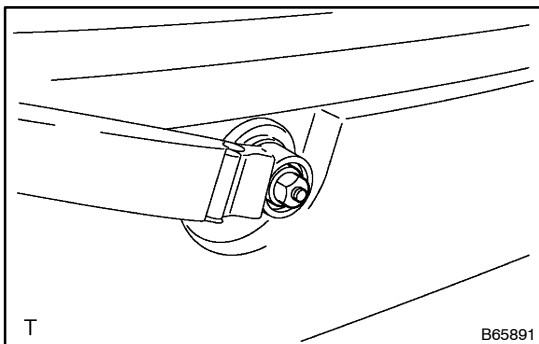
HINT:

Use the same procedures described for LH side.



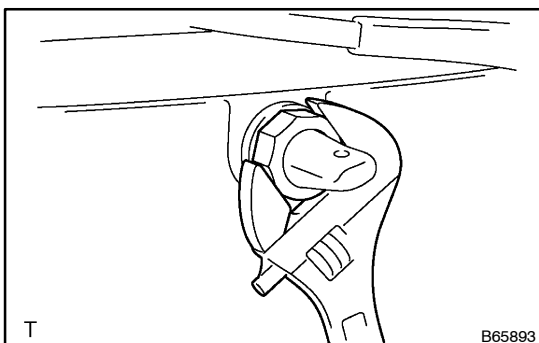
3. REMOVE FR WIPER ARM LH

- (a) Remove the windshield wiper arm cover.
- (b) Remove the nut and wiper arm.
- (c) Remove the wiper shaft packing.



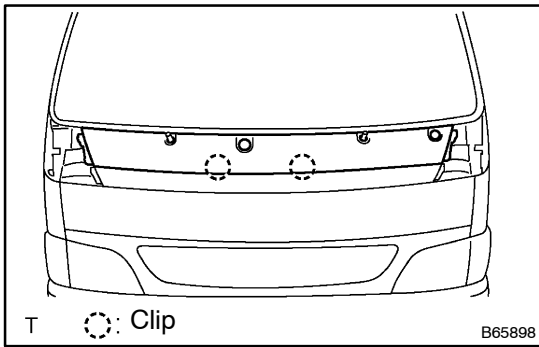
4. REMOVE FR WIPER ARM RH

- (a) Remove the windshield wiper arm cover.
- (b) Remove the nut and wiper arm.
- (c) Remove the wiper shaft packing.

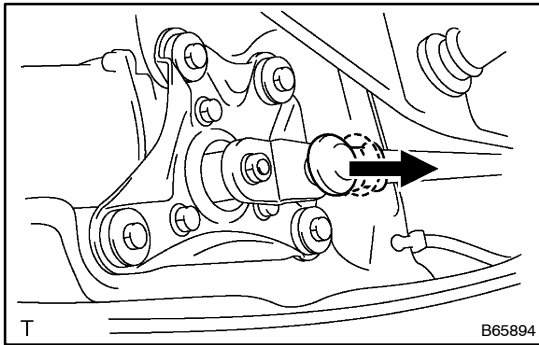


5. REMOVE FRONT WASHER NOZZLE HOLDER

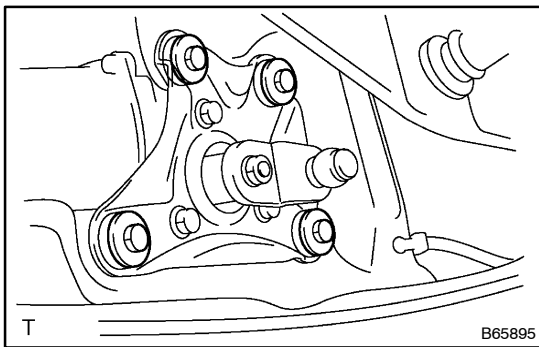
- (a) Remove the 2 nuts and 2 front washer nozzle holders.

**6. REMOVE FRONT PANEL COVER SUB-ASSY**

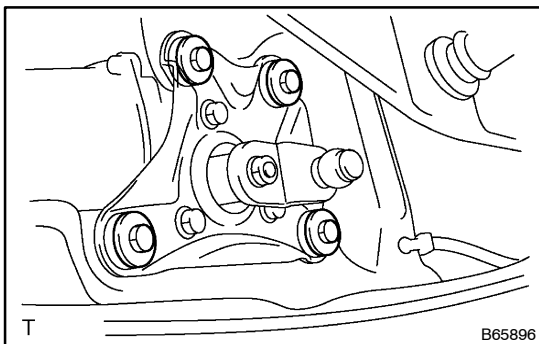
- (a) Remove the 2 clips.
- (b) Pull out the front panel cover.

**7. REMOVE FRONT WIPER MOTOR & BRACKET ASSY**

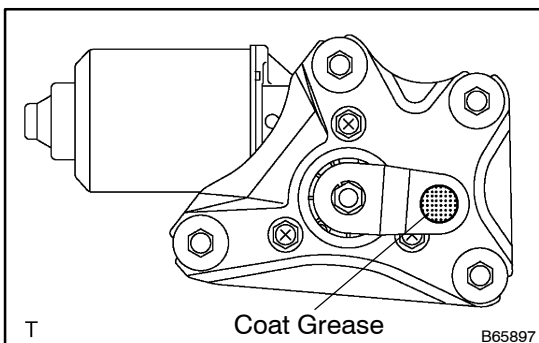
- (a) Turn the boot.
- (b) Disconnect the wiper link from the motor & bracket assembly.
- (c) Disconnect the wiper motor connector.



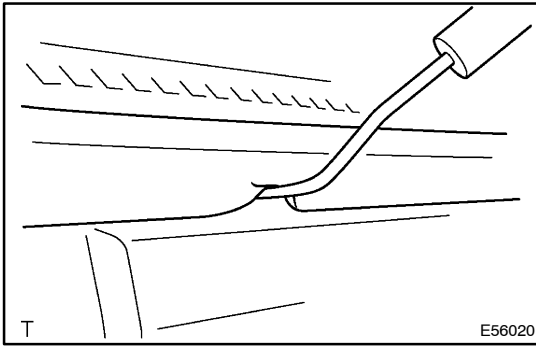
- (d) Remove the 4 bolts and motor & bracket assembly.

**8. INSTALL FRONT WIPER MOTOR & BRACKET ASSY**

- (a) Install the motor & bracket assembly with the 4 bolts.
Torque: 5.5 N·m (56 kgf·cm, 48 in·lbf)
- (b) Connect the wiper motor connector.



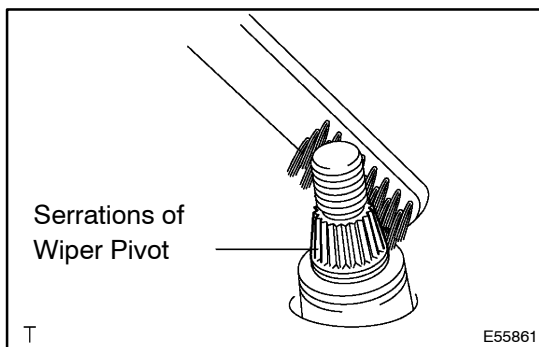
- (c) Coat the crank arm pivot with grease.

**9. INSTALL FRONT PANEL COVER SUB-ASSY**

- (a) Using a clip remover, turn up the windshield weatherstrip.
- (b) Install the panel cover with the 2 screws.

10. INSTALL FRONT WASHER NOZZLE HOLDER

- (a) Install the 2 front washer nozzle holders with the 2 nuts.
Torque: 3.9 N·m (40 kgf·cm, 35 in·lbf)

**11. INSTALL FR WIPER ARM LH**

- (a) Using a wire-brush, clean the serrations of the wiper pivot.

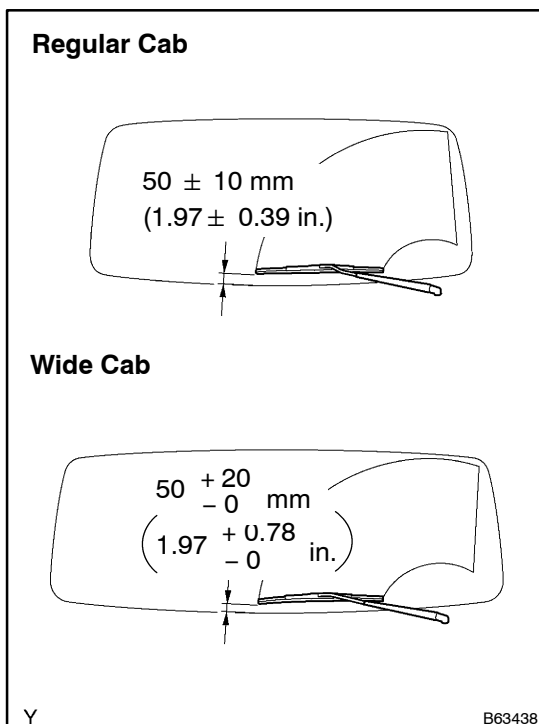
- (b) Install the wiper arm with a nut so that the wiper blade will be in the position as shown in the illustration.

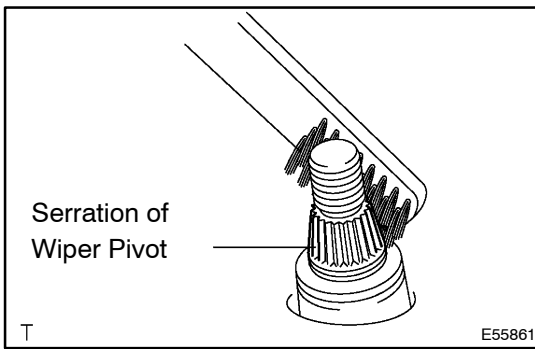
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

NOTICE:

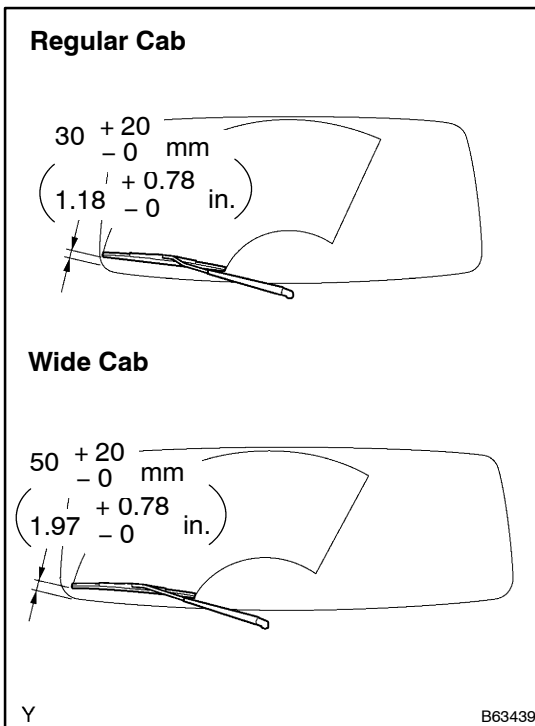
The wiper arm should be installed at the automatic stop position.

- (c) Operate the wiper, and check that the windshield weatherstrip and the wiper blade do not interfere with each other.



**12. INSTALL FR WIPER ARM RH**

- (a) Using a wire-brush, clean the serrations of the wiper pivot.



- (b) Install the wiper arm with a nut so that the wiper blade will be in the position as shown in the illustration.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

NOTICE:

The wiper arm should be installed at the automatic stop position.

- (c) Operate the wiper, and check that the windshield weatherstrip and the wiper blade do not interfere with each other.

WIPER RUBBER LH

REPLACEMENT

66063-03

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- On the RH side, use the same procedures as on the LH side.

1. REMOVE FR WIPER BLADE LH

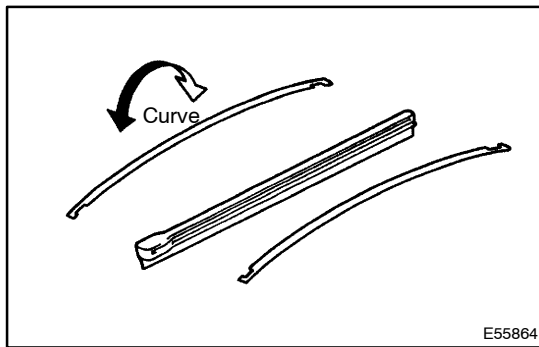
- (a) Remove the wiper blade from the wiper arm.

CAUTION:

Do not operate the wiper arm while removing the wiper blade.

2. REMOVE WIPER RUBBER LH

- (a) Remove the wiper rubber from the wiper blade.

**3. INSTALL WIPER RUBBER LH**

- (a) Install the wiper rubber so that the head of the wiper rubber (outer side of the arc) will face the axis.

NOTICE:

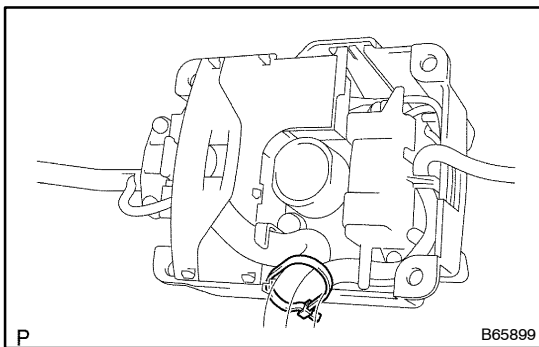
Do not set the packing plate inside out.

WINDSHIELD WIPER SWITCH ASSY

660BL-01

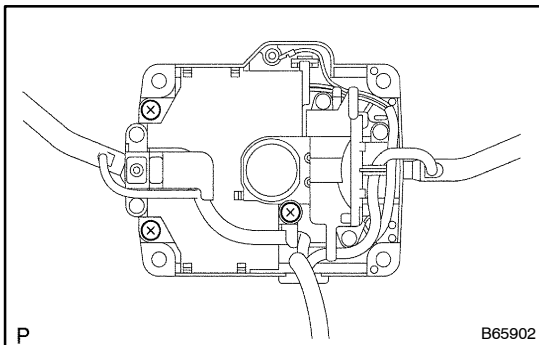
REPLACEMENT

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **REMOVE TURN SIGNAL SWITCH ASSY (See page 50-8)**
 - (a) Place the front wheels facing straight ahead.
 - (b) Remove the horn button assy.
 - (c) Remove the steering wheel assy.
SST 09950-50013 (09951-00510, 09952-05010, 09953-05020, 09954-05021)
 - (d) Remove the steering column cover lower.
 - (e) Remove the steering column cover upper.
 - (f) Remove the turn signal switch assy.

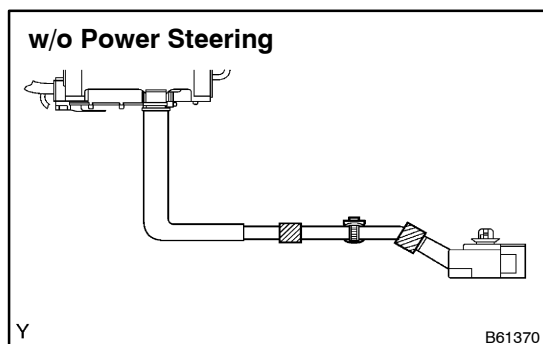


3. REMOVE WINDSHIELD WIPER SWITCH ASSY

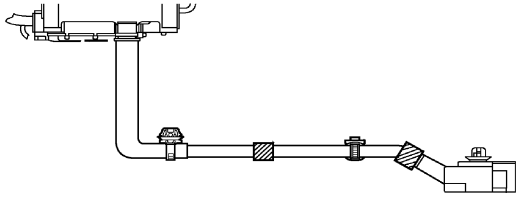
- (a) Remove the cord clamp.



- (b) Remove the 3 screws.

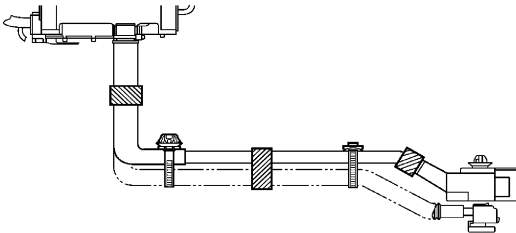


- (c) w/o Power steering:
Remove the wire harness clamp and 2 tapes.

w/ Power Steering and w/o Airbag

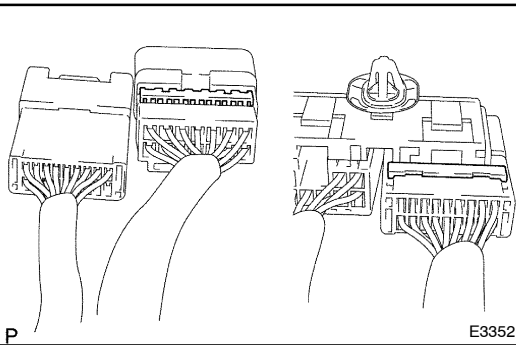
B65911

- (d) w/ Power steering and w/o airbag:
Remove the 2 wire harness clamps and 2 tapes.

w/ Power Steering and w/ Airbag

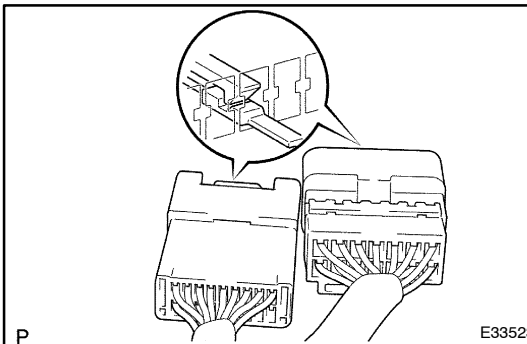
B61369

- (e) w/ Power steering and w/ airbag:
Remove the 2 wire harness clamps and 3 tapes.



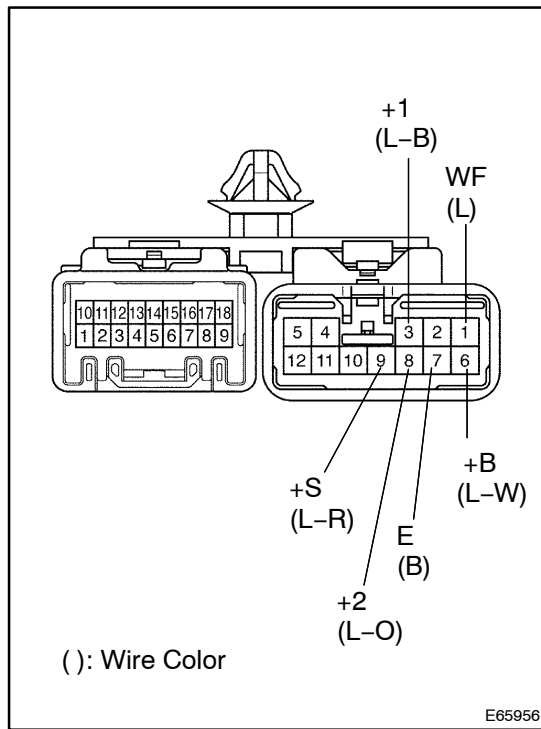
E33521

- (f) Release the lock from the connector.



E33523

- (g) Using a precision screwdriver, unlock the connector terminal.
(h) Pull out the terminal pin and remove the windshield wiper switch.

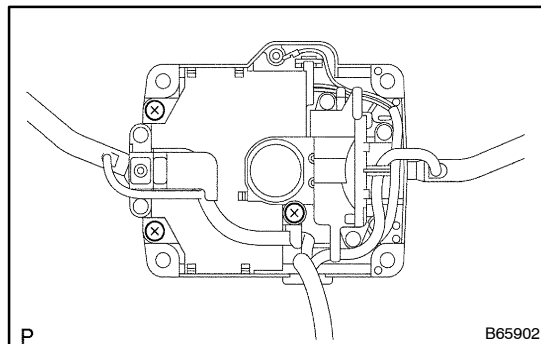


4. INSTALL WINDSHIELD WIPER SWITCH ASSY

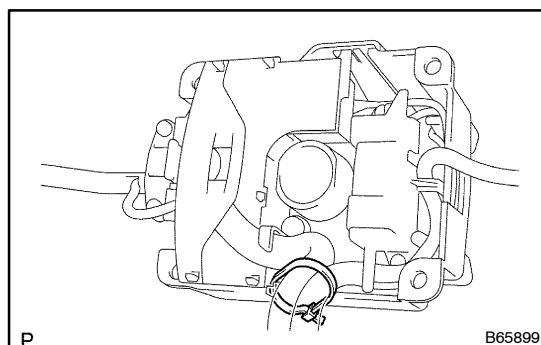
- (a) Install the connector terminal pins for the connector.

NOTICE:

Do not arrange the connector terminal pins wrongly.



- (b) Install the windshield wiper switch with the 3 screws.



- (c) Install a new cord clamp.
- (d) After installing the cord clamp, cut it off so that the extra length from the binding point will be 1 – 3 mm (0.04 – 0.12 in.).

- (e) Using the wire harness clamps, bind the wire harness, and tape the wire harness.

Standard:

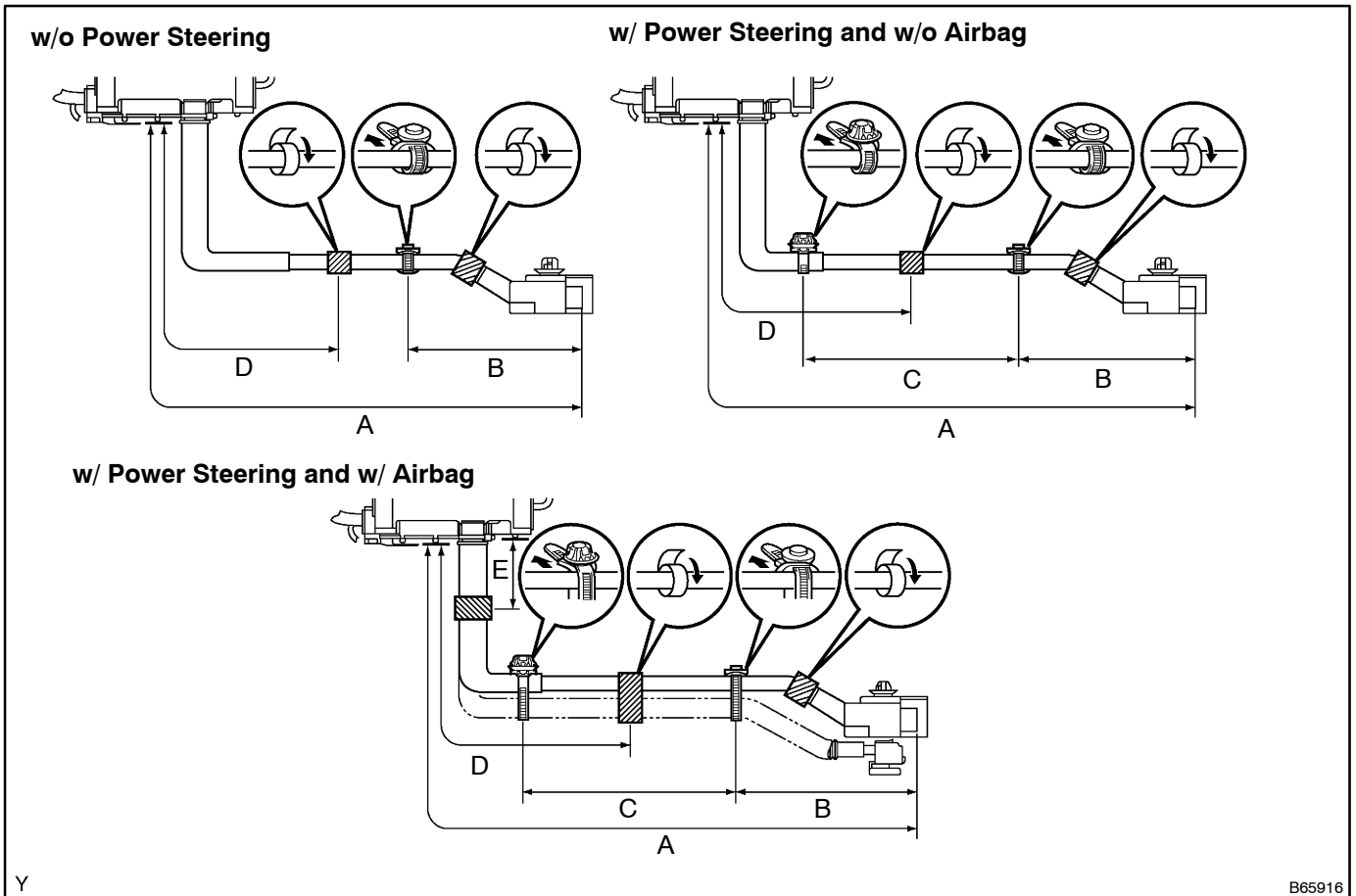
A: 610 – 630 mm (24.02 – 24.80 in.)

B: 230 – 240 mm (9.06 – 9.45 in.)

C: 195 – 205 mm (7.67 – 8.07 in.)

D: 275 – 295 mm (10.83 – 11.61 in.)

E: 80 – 100 mm (3.15 – 3.94 in.)



5. INSTALL TURN SIGNAL SWITCH ASSY (See page 50-8)

- Install the turn signal switch assy.
- Place the front wheels facing straight ahead.
- Install the steering column cover upper.
- Install the steering column cover lower.
- Install the steering wheel assy.
- Install the horn button assy.

WASHER NOZZLE SUB-ASSY

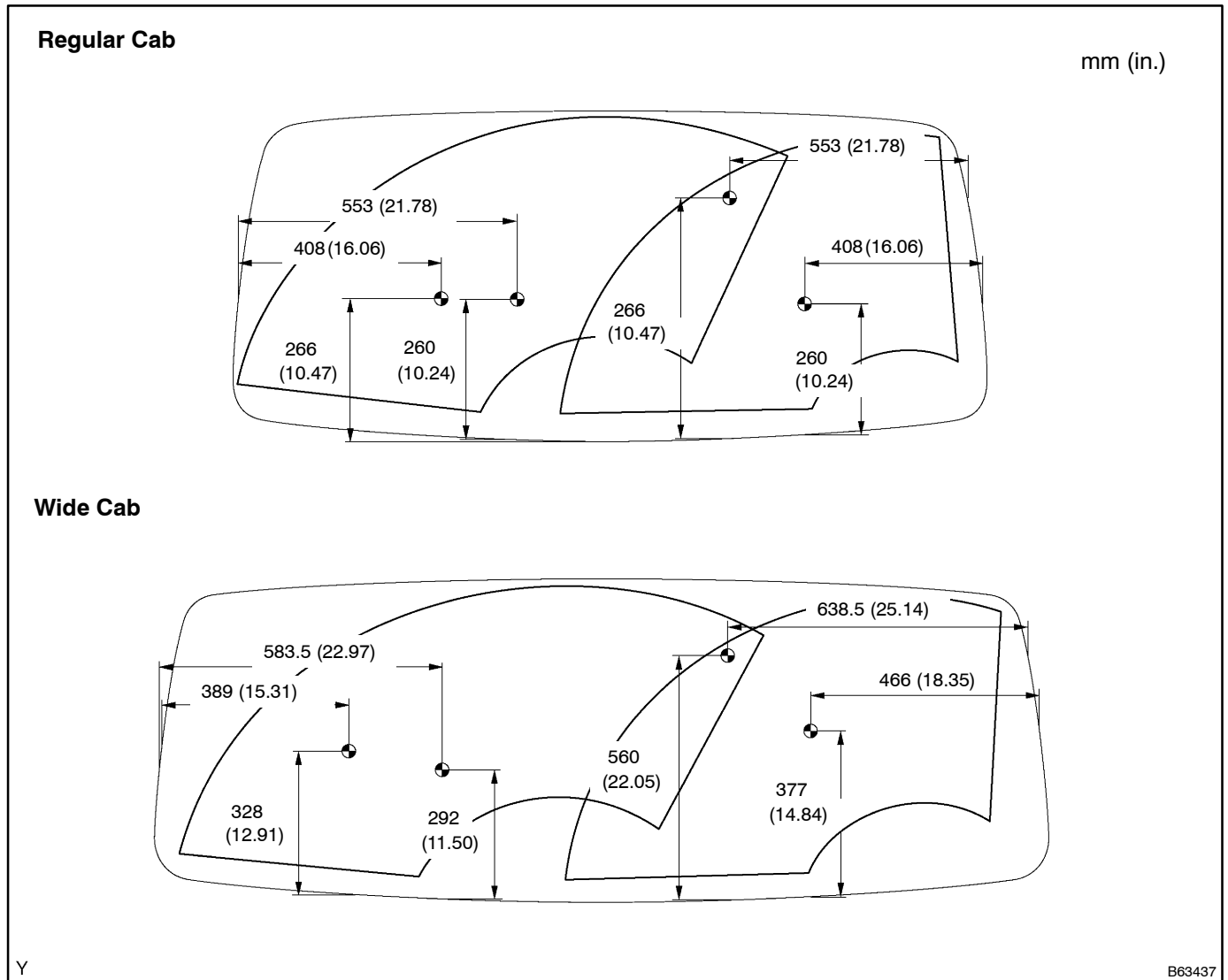
66064-03

ADJUSTMENT

1. ADJUST WASHER NOZZLE SUB-ASSY

- (a) Under the engine start condition, check the point on the windshield where the fluid injected from the washer nozzle hits.

Standard: The point is within the range shown in the illustration.

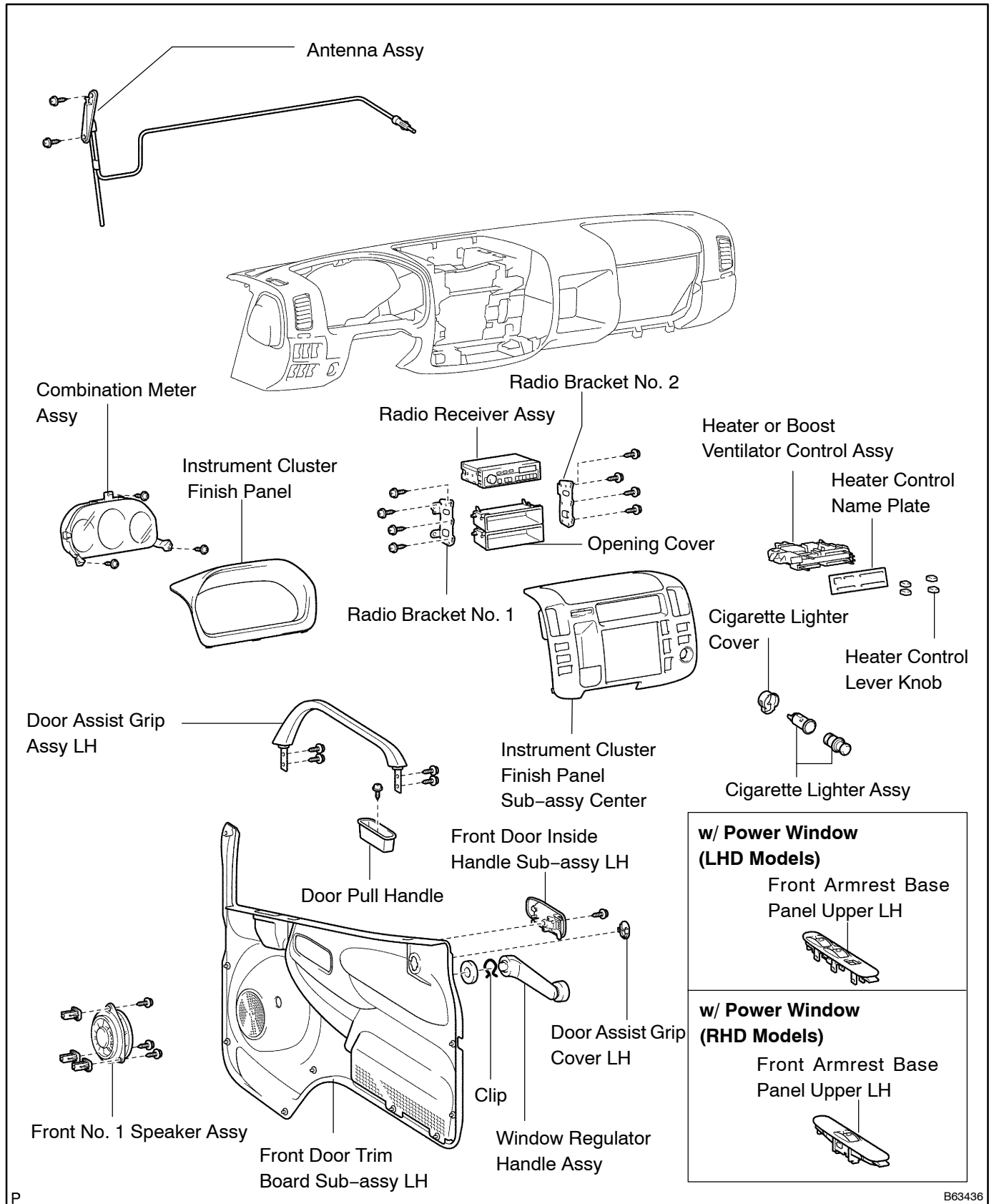


AUDIO & VISUAL SYSTEM

AUDIO & VISUAL SYSTEM	67-1
COMPONENTS	67-1
RADIO RECEIVER ASSY	67-2
REPLACEMENT	67-2
FRONT NO.1 SPEAKER ASSY	67-3
REPLACEMENT	67-3
ANTENNA ASSY	67-4
REPLACEMENT	67-4
CIGARETTE LIGHTER ASSY	67-6
REPLACEMENT	67-6

AUDIO & VISUAL SYSTEM COMPONENTS

6708Q-02



P

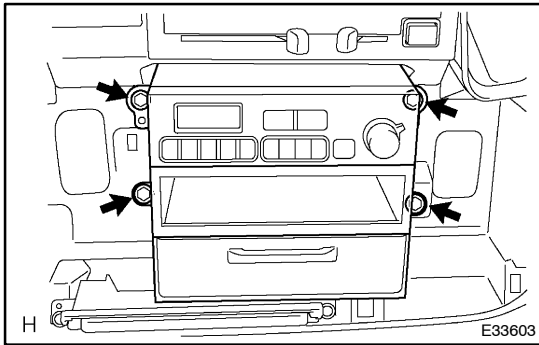
B63436

RADIO RECEIVER ASSY REPLACEMENT

670BR-02

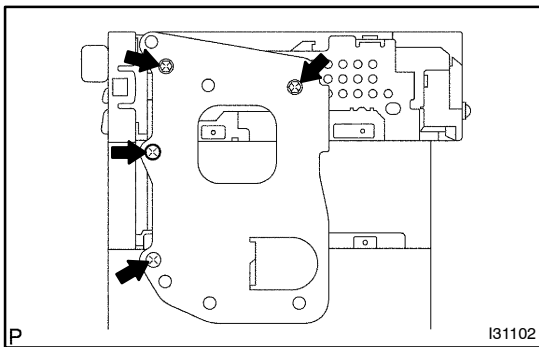
HINT:

- COMPONENTS: See page 67-1
 - The installation is in the reverse order of the removal.
1. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page 71-11 or 71-17)**



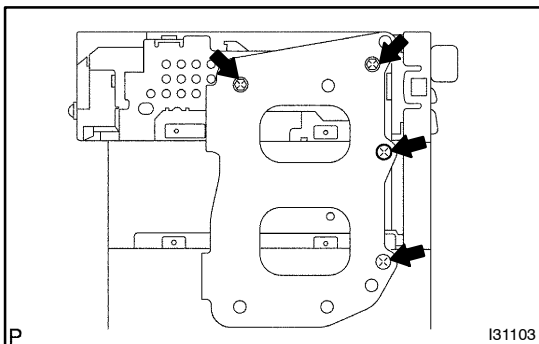
2. REMOVE RADIO RECEIVER ASSY

- (a) Remove the 4 bolts.
- (b) Disconnect the connector and remove the radio receiver.



3. REMOVE RADIO BRACKET NO.1

- (a) Remove the 4 screws and radio bracket No. 1.



4. REMOVE RADIO BRACKET NO.2

- (a) Remove the 4 screws and radio bracket No. 2.

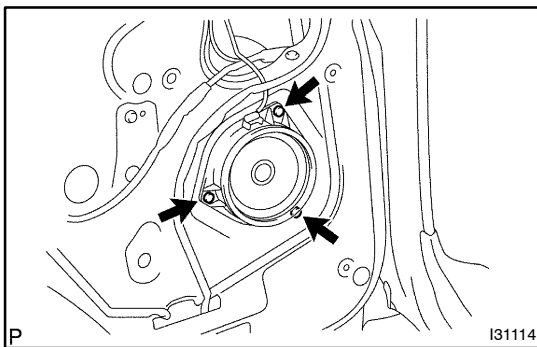
FRONT NO.1 SPEAKER ASSY

REPLACEMENT

670BS-02

HINT:

- COMPONENTS: See page 67-1
 - The installation is in the reverse order of the removal.
- 1. REMOVE FRONT DOOR TRIM BOARD SUB-ASSY LH (See page 75-5)**
 - (a) Remove the door pull handle.
 - (b) Remove the front door inside handle sub-assy LH.
 - (c) Remove the door assist grip cover LH.
 - (d) Remove the door assist grip LH.
 - (e) Remove the front door trim board sub-assy LH.



- 2. REMOVE FRONT NO.1 SPEAKER ASSY**

- (a) Remove the 3 screws.
- (b) Disconnect the connector and remove the front No. 1 speaker.

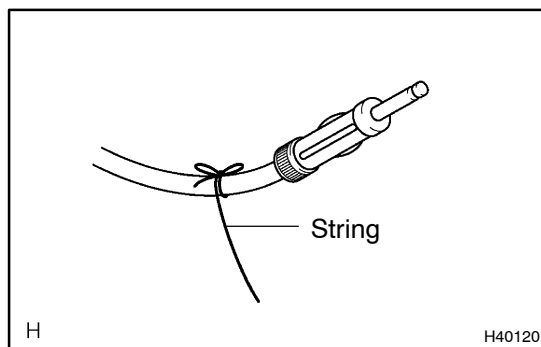
ANTENNA ASSY

REPLACEMENT

670BT-02

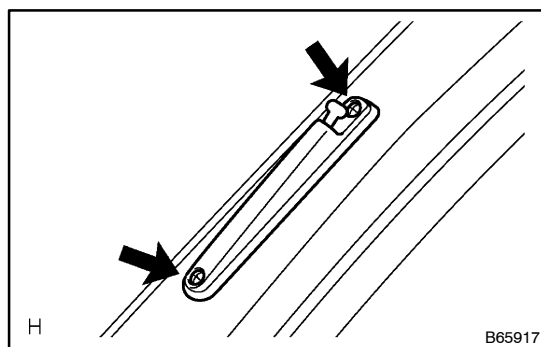
HINT:

- COMPONENTS: See page 67-1
 - The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
1. **REMOVE RADIO RECEIVER ASSY (See page 67-2)**
 - (a) Remove the instrument cluster panel sub-assy center.
 - (b) Remove the radio receiver assy.
 2. **REMOVE HEATER OR BOOST VENTILATOR CONTROL ASSY (W/ HEATER) (See page 71-11 or 71-17)**
 - (a) Remove the heater control lever knob.
 - (b) Remove the heater control name plate.
 - (c) Remove the heater or boost ventilator control assy.
 3. **REMOVE COMBINATION METER ASSY (See page 71-11 or 71-17)**
 - (a) Remove the instrument cluster finish panel.
 - (b) Remove the combination meter assy.



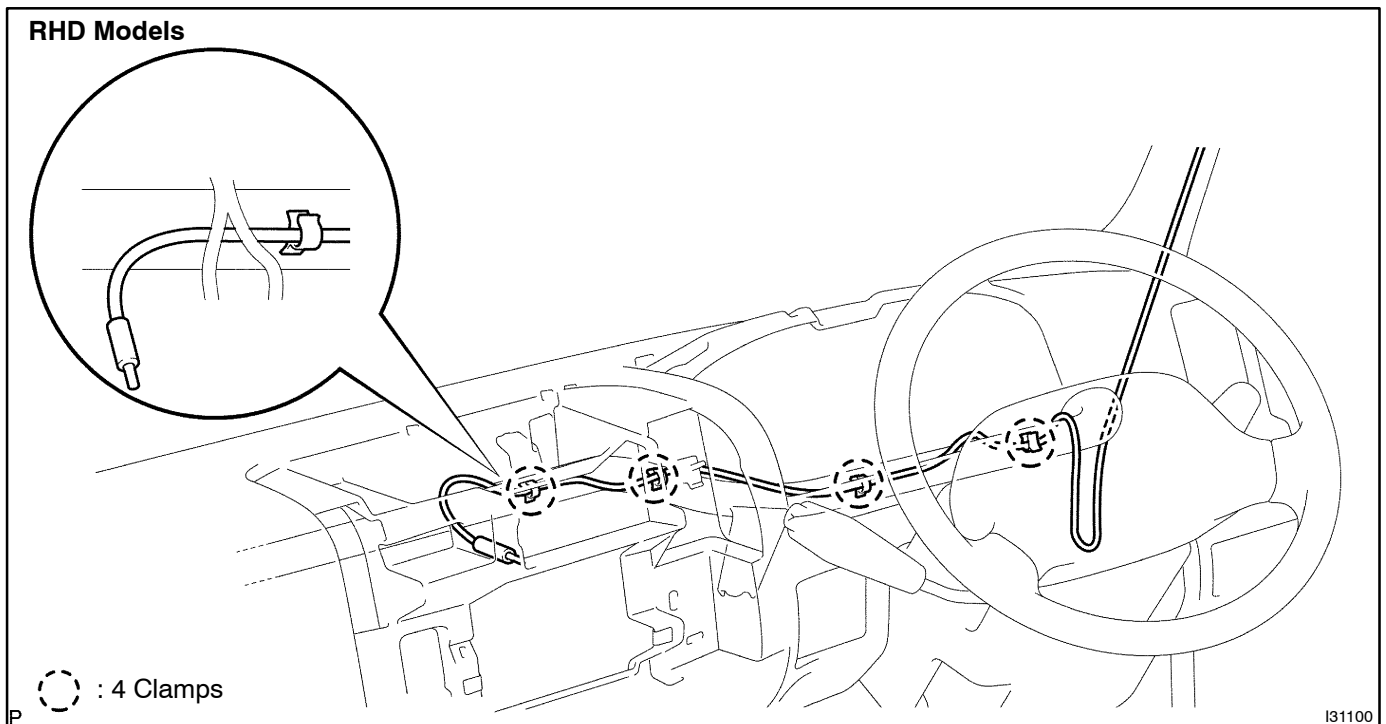
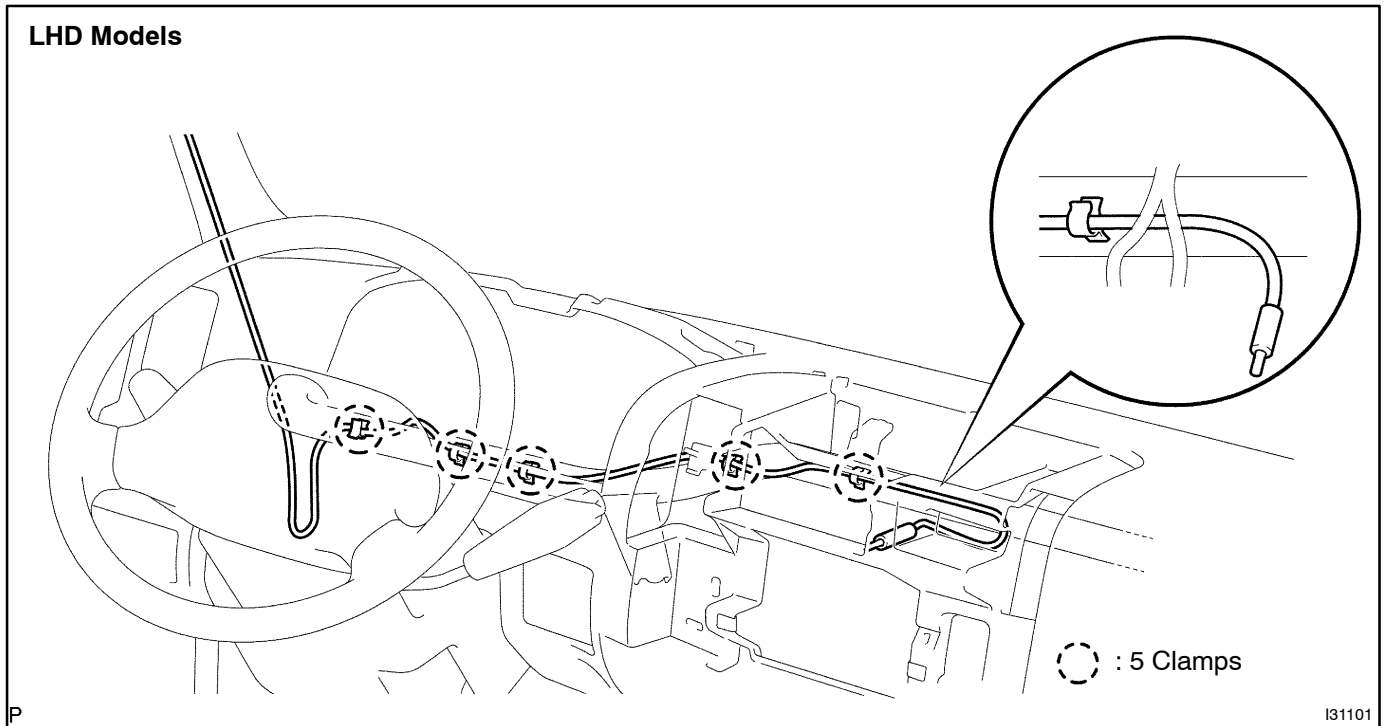
4. REMOVE ANTENNA ASSY

- (a) Tie a string at the tip of the cable of the antenna.



- (b) Remove the 2 screws.

(c) Remove the antenna.



5. INSTALL ANTENNA ASSY

- (a) Use a string to put the cable of the antenna.
- (b) Install the antenna with the 2 screws and engage the clamps.

CIGARETTE LIGHTER ASSY

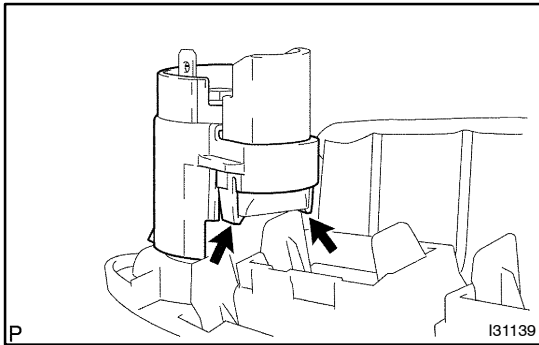
REPLACEMENT

670BU-03

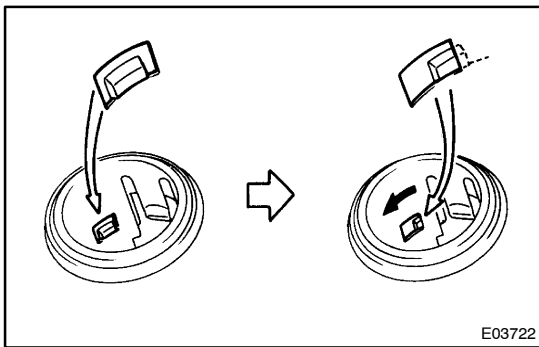
HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. **REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSY CENTER**
(See page 71-11 or 71-17)



2. **REMOVE CIGARETTE LIGHTER COVER**
 - (a) Remove the cover.



3. **REMOVE CIGARETTE LIGHTER ASSY**
 - (a) Turn the socket in the circumference direction as shown in the illustration, and disengage the claw between the socket and cigarette lighter indicator lens. Then, push out the socket to the room side but stop pushing halfway.
 - (b) Turn back the socket and align the socket with the notch on the cigarette lighter indicator lens. Then remove the cigarette lighter.

4. **INSTALL CIGARETTE LIGHTER ASSY**

- (a) Align the socket with the notch on the cigarette lighter indicator lens, push in the cigarette lighter as hard as possible and install it.

WIRING

POWER SOURCE	68-1
LOCATION	68-1

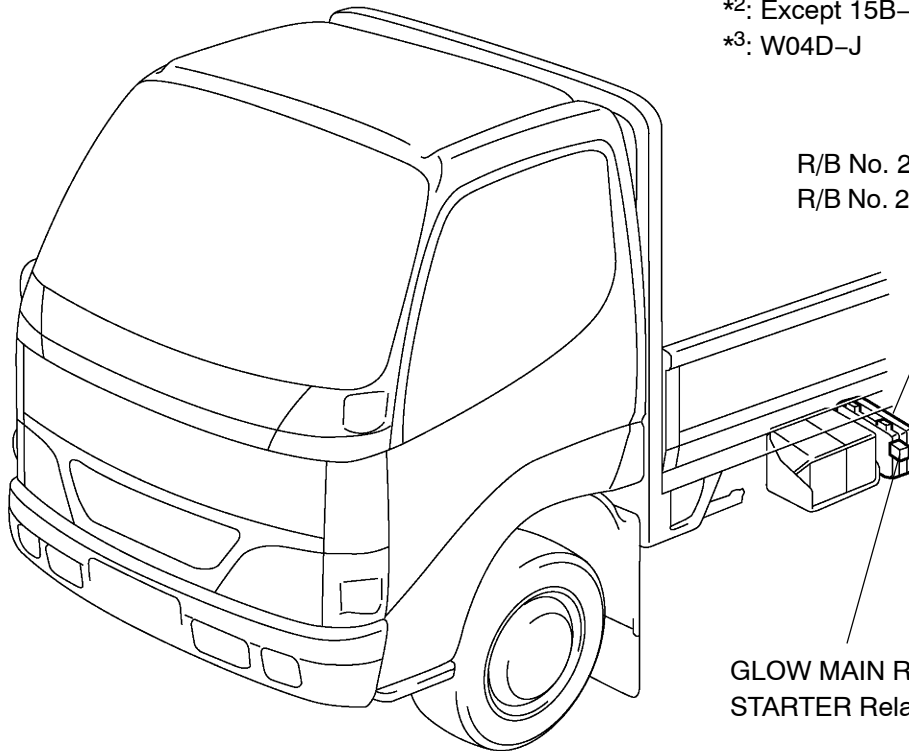


POWER SOURCE LOCATION

6804M-01

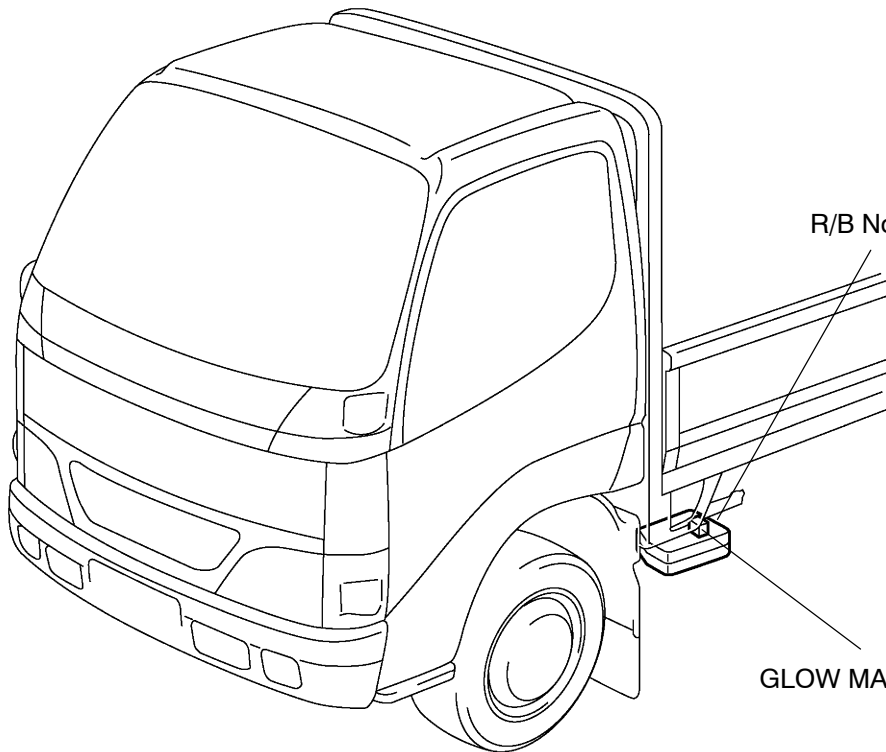
Regular Cab except Standard Roof

- *1: 15B-FTE
- *2: Except 15B-FTE
- *3: W04D-J



GLOW MAIN Relay*1
STARTER Relay*3

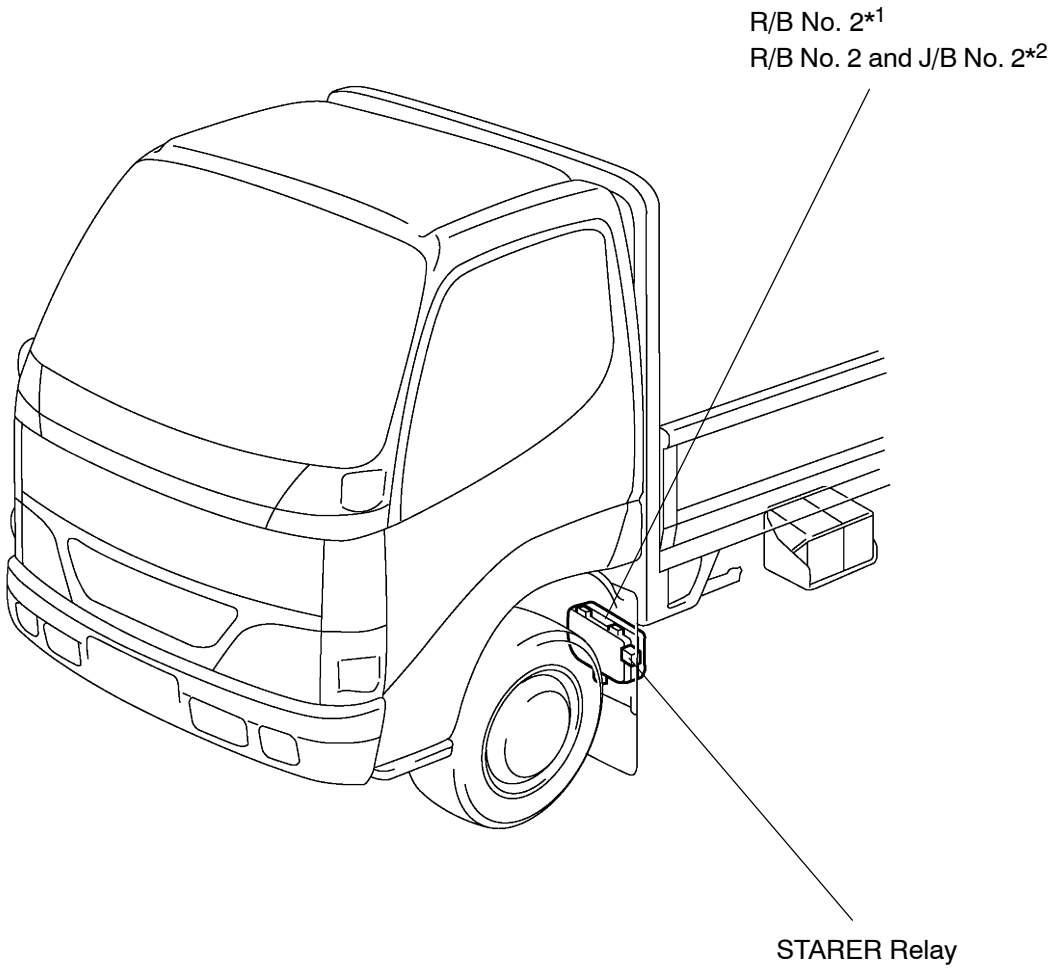
Regular Cab w/ Standard Roof



R/B No. 2
GLOW MAIN Relay

Wide Cab

- *1: S05C-TB
- *2: Except S05C-TB

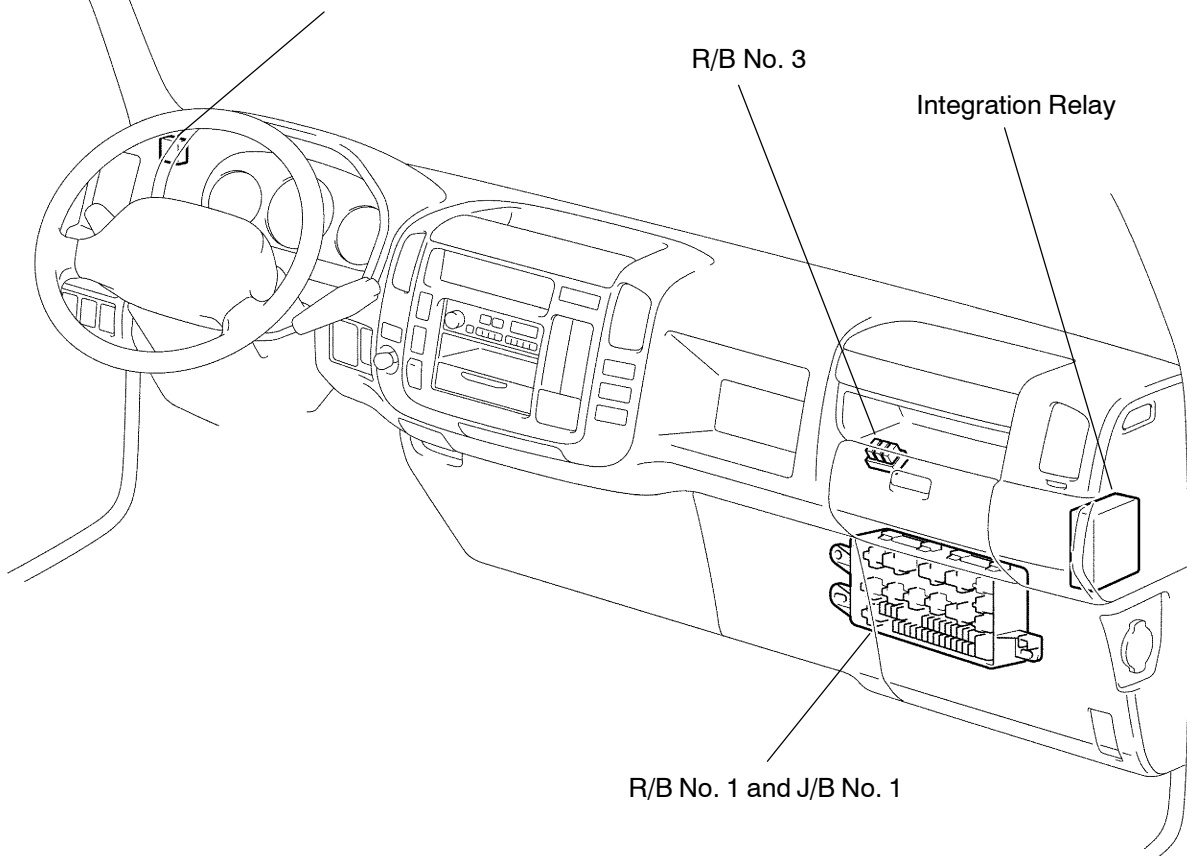


LHD Models

Turn Signal Flasher Assy

R/B No. 3

Integration Relay

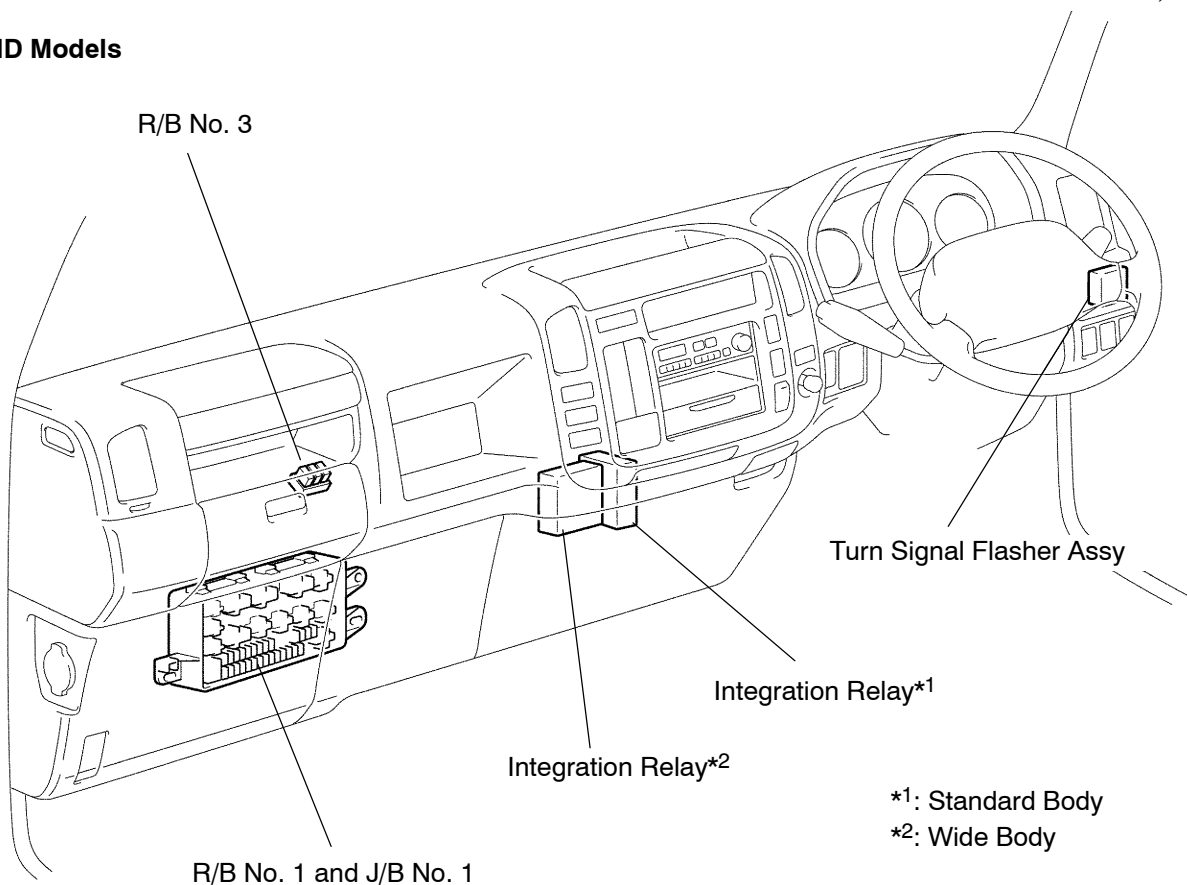


R/B No. 1 and J/B No. 1

RHD Models

R/B No. 3

Turn Signal Flasher Assy



Integration Relay*1

Integration Relay*2

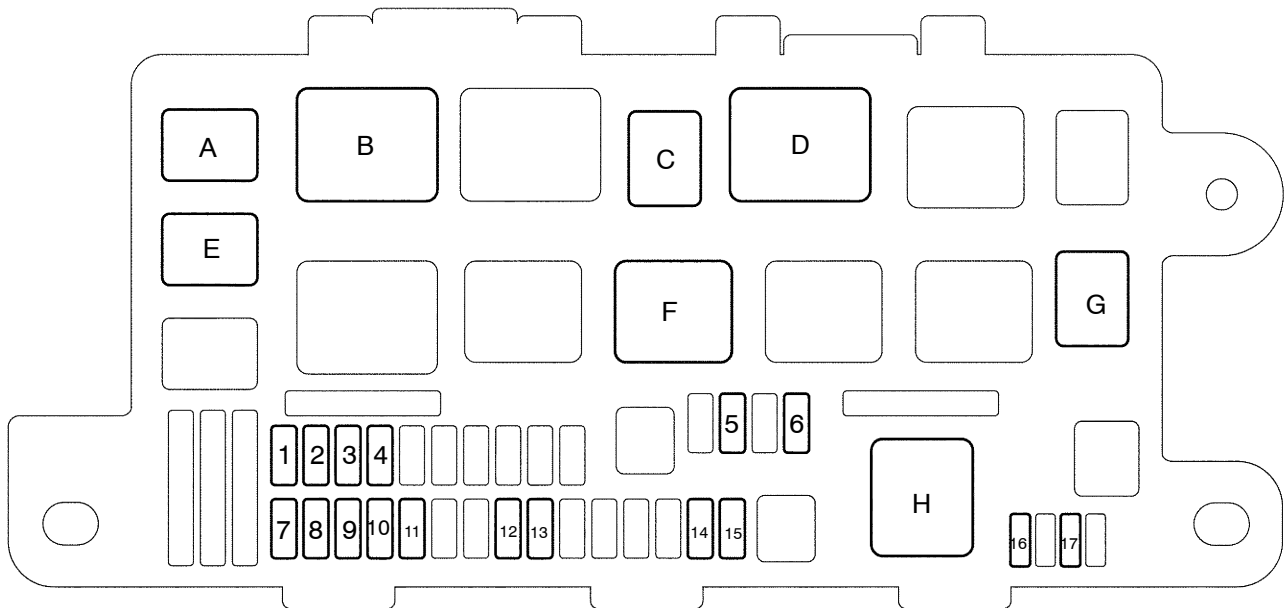
R/B No. 1 and J/B No. 1

*1: Standard Body

*2: Wide Body

R/B No. 1 and J/B No. 1

14B, S05C-B, S05C-TA, W04D-J

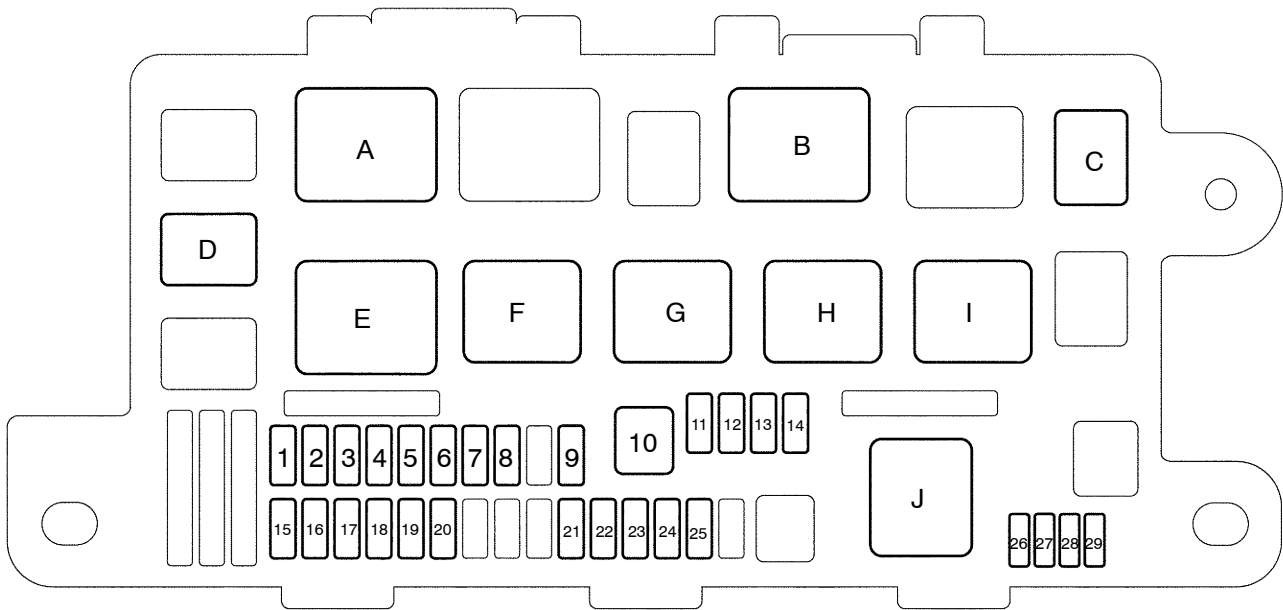
**FUSE**

1	HAZARD	10 A	11	WIP	20 A
2	HORN	10 A	12	HEAD (LH)	10 A
3	STOP	10 A	13	HEAD (RH)	10 A
4	A/C	10 A	14	P.T.O.	10 A
5	FOG	10 A	15	CIG	10 A
6	DOME	10 A	16	SPARE	20 A
7	ST	10 A	17	SPARE	10 A
8	TAIL	10 A			
9	RTD	10 A			
10	GAUGE	10 A			

RELAY

A	GLOW LP
B	HTR
C	PKB
D	H-LP
E	HORN
F	FOG
G	NEUTRAL
H	TAIL

R/B No. 1 and J/B No. 1
15B-FTE, S05C-TB



FUSE

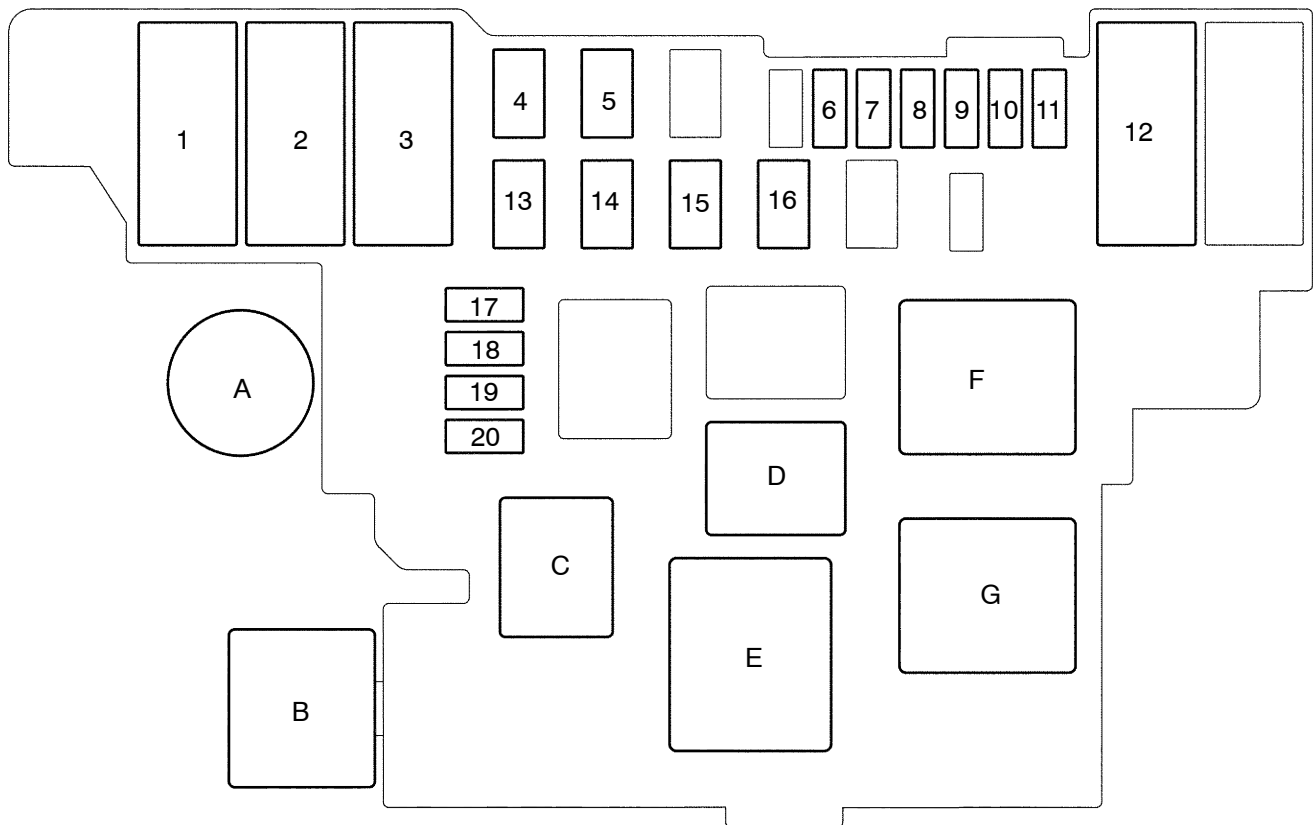
1	CIG	10 A	11	P-BAT	15 A	21	HEAD (LH)	15 A
2	RADIO	7.5 A	12	FOG	15 A	22	HEAD (RH)	15 A
3	P-ACC	15 A	13	ECU+B	7.5 A	23	ECU-IG	10 A
4	AIR BAG	15 A	14	DOME	15 A	24	GAUGE	10 A
5	ECU-IG2	15 A	15	ST	7.5 A	25	P-IGN	15 A
6	WIP	20 A	16	HORN	10 A	26	SPARE	20 A
7	ESSTART	7.5 A	17	P-TAIL	10 A	27	SPARE	15 A
8	RTD	7.5 A	18	ILL	7.5 A	28	SPARE	10 A
9	A/C	10 A	19	TAIL	7.5 A	29	SPARE	7.5 A
10	POWER WINDOW	30 A	20	OBD-2	7.5 A			

RELAY

A	HTR
B	H-LP
C	RR FOG (Europe)
D	HORN
E	IG1 - 2
F	P/W MAIN
G	FOG
H	ACC
I	IG1 - 3
J	TAIL

R/B No. 2

15B-FTE, S05C-TB

**FUSE**

1	MAIN3	60 A	11	IGN	15 A
2	MAIN2	60 A	12	GLOW	120 A*1
3	ALT	80 A			100 A*2
4	AM1	30 A	13	ABS	40 A
5	HEAD	50 A	14	HTR	40 A
6	E/G	15 A	15	E FAN	30 A
7	HAZARD	10 A	16	MAIN4	30 A
8	ALT-S	7.5 A	17	ABS SOL	20 A
9	AM2	20 A	18	PCV1*2	10 A
10	STOP	7.5 A	19	PCV2*2	10 A
			20	E/G SW*2	7.5 A

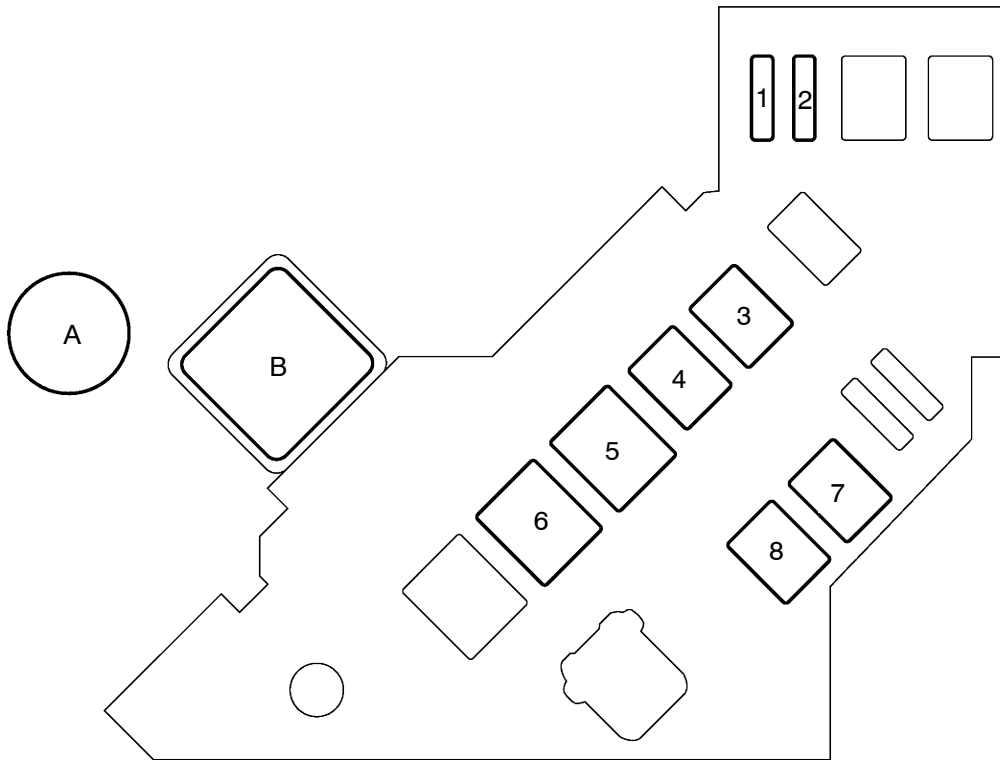
RELAY

A	GLOW MAIN*1 STARTER*2
B	STARTER*1
C	SPL VLV*1 PCV*2
D	MAIN
E	ABS MTR MAIN
F	IG2
G	ABS SOL MAIN

*1: 15B-FTE

*2: S05C-TB

R/B No.2 and J/B No.2
 14B, S05C-B, S05C-TA, W04D-J



FUSE

1	ALT-S	10 A
2	AM2	10 A
3	AM1	30 A
4	HEAD	50 A
5	GLOW	100 A
6	ALT	80 A
7	MAIN	50 A
8	HTR	50 A

RELAY

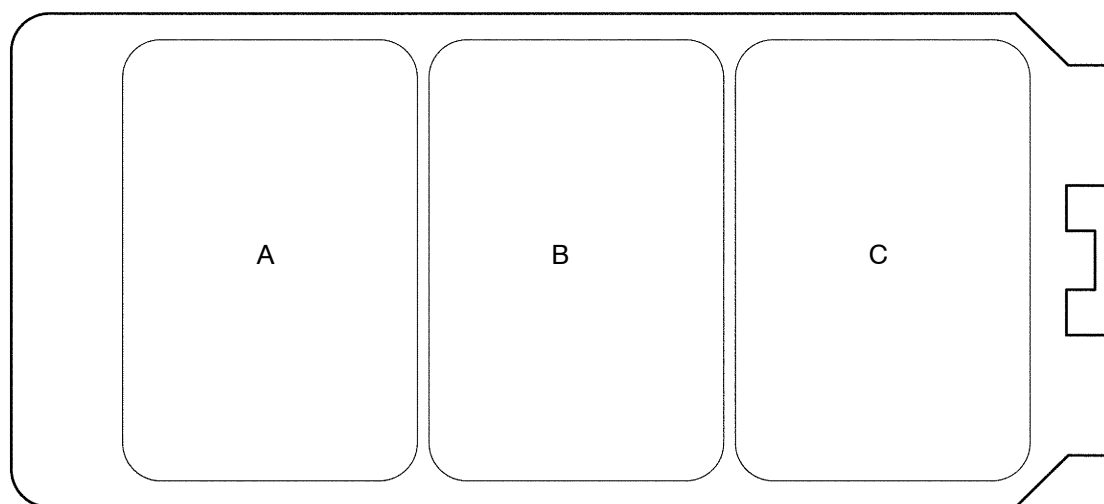
A	STARTER*1
B	STARTER*2
	GLOW MAIN*3

*1: S05C-B, S05C-TA and W04D-J

*2: 14B

*3 S05C-B and W04D-J

R/B No. 3

**RELAY**

- A COMP
- B FAN NO.2
- C FAN NO.1

COMMUNICATION SYSTEM

HORN SYSTEM	69-1
PROBLEM SYMPTOMS TABLE	69-1
INSPECTION	69-2



HORN SYSTEM

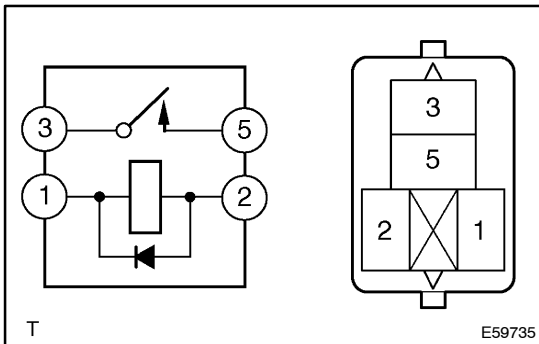
PROBLEM SYMPTOMS TABLE

69073-01

Symptom	Suspected Area	See Page
Horn does not sound.	1. HORN fuse (Fuse holder)	-
	2. HORN relay (R/B No. 1)	-
	3. Horn switch (Combination switch)	-
	4. Horn	69-2
	5. Wire harness	-

HORN SYSTEM INSPECTION

6903N-03



1. INSPECT HORN RELAY ASSY

- (a) Inspect the relay continuity.

Standard:

Terminal No.	Tester Connection	Specified Condition
1 ↔ 2	Constant	Continuity
3 ↔ 5	Apply battery voltage to terminals 1 and 2*	Continuity

*: Apply battery positive to terminal 1 and battery negative to terminal 2.

If the result is not as specified, replace the relay assy.

2. INSPECT HORN

- (a) Connect the positive (+) lead from the battery to the terminal and the negative (-) lead to the horn body, and then check that the horn blows.

If the result is not as specified, replace the horn.

WINDSHIELD/WINDOWGLASS/MIRROR

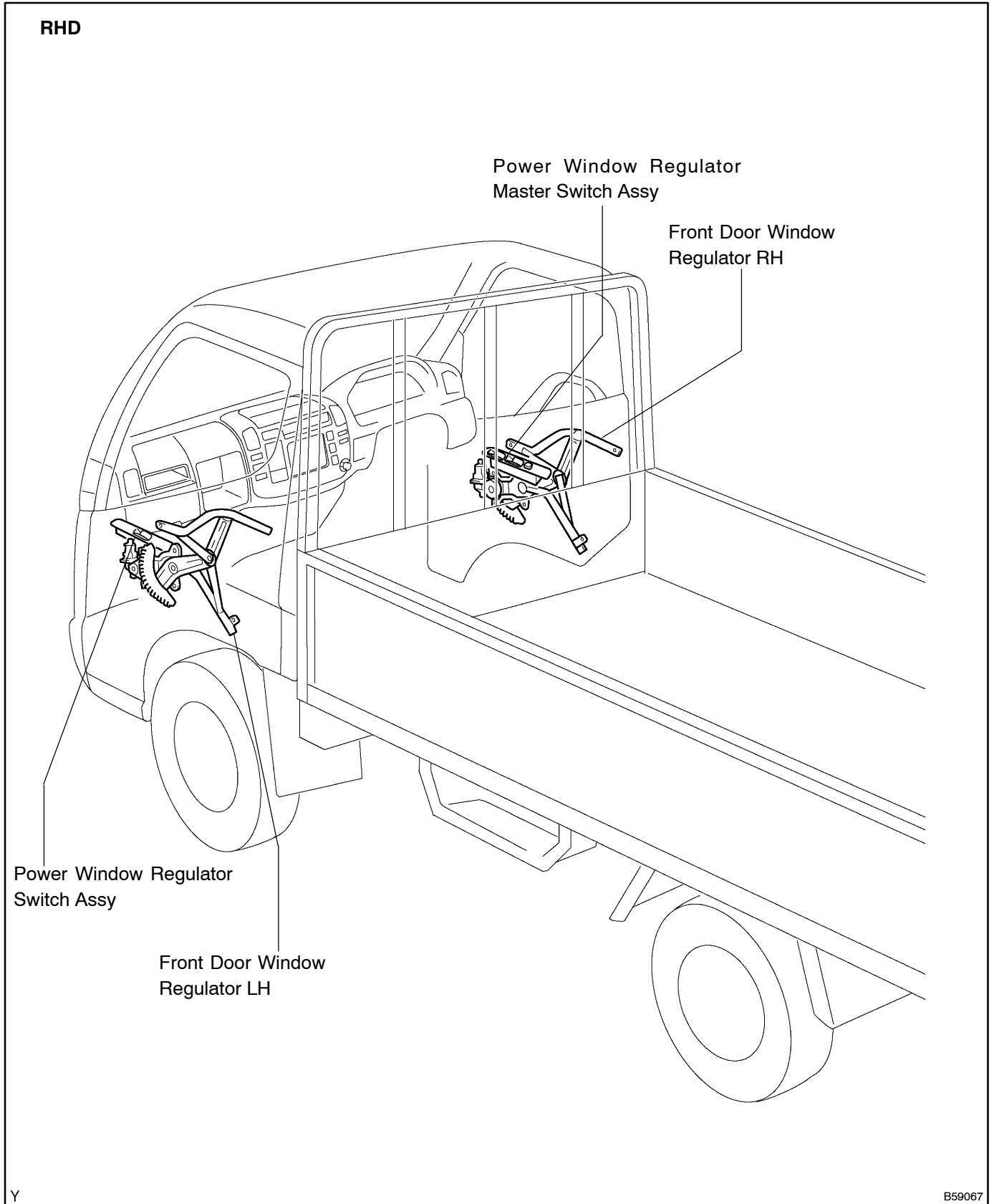
POWER WINDOW CONTROL SYSTEM	70-1
LOCATION	70-1
ON-VEHICLE INSPECTION	70-3
PROBLEM SYMPTOMS TABLE	70-4
INSPECTION	70-5
WINDSHIELD GLASS	70-8
COMPONENTS	70-8
REPLACEMENT	70-9
BACK WINDOW GLASS	70-13
COMPONENTS	70-13
REPLACEMENT	70-14
INNER REAR VIEW MIRROR ASSY	70-17
REPLACEMENT	70-17
OUTER REAR VIEW MIRROR (AUSTRALIA, PORTUGAL)	70-18
REPLACEMENT	70-18
OUTER REAR VIEW MIRROR (EXCEPT OCEANIA)	70-19
REPLACEMENT	70-19

POWER WINDOW CONTROL SYSTEM

700R5-01

LOCATION

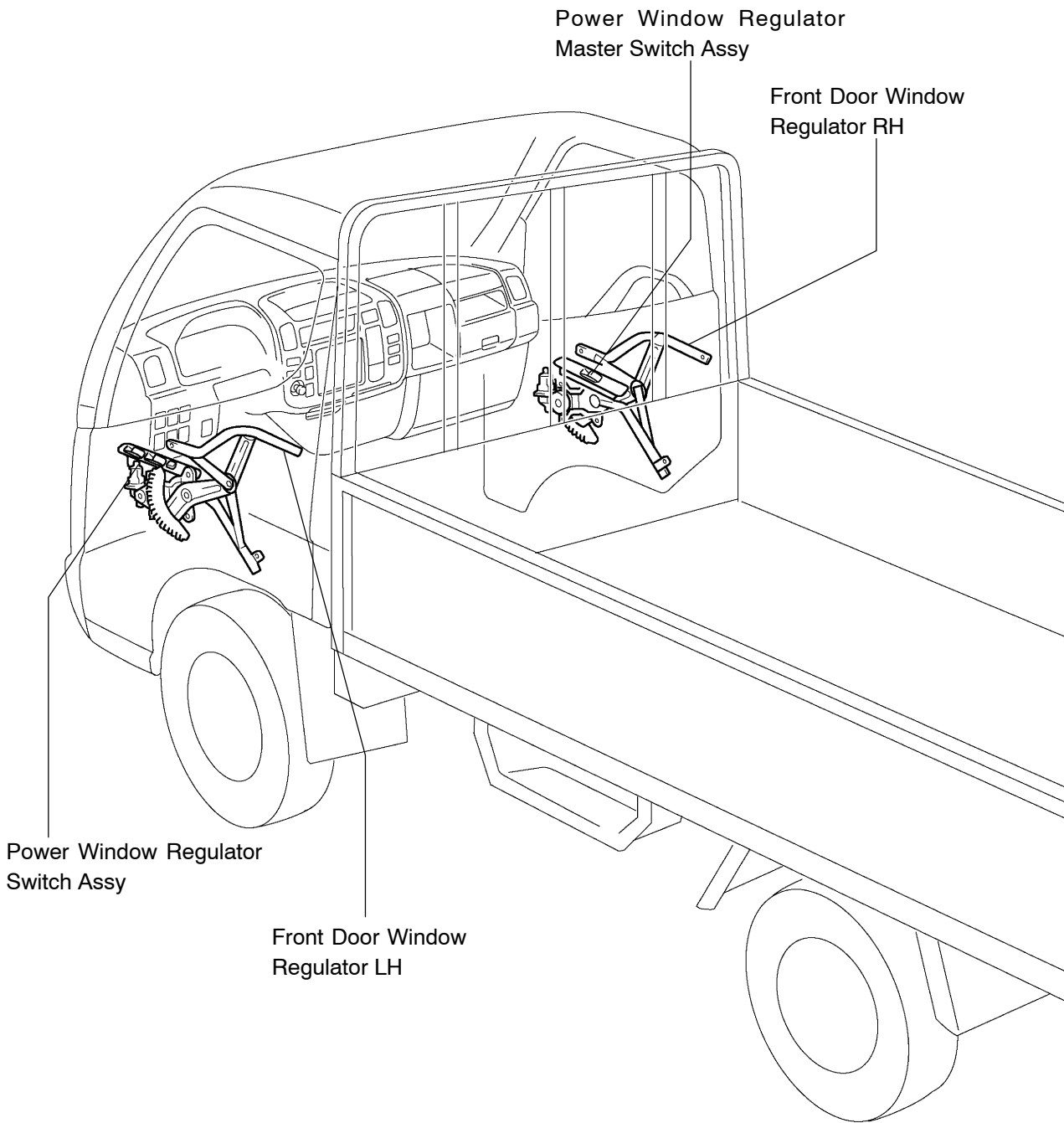
RHD



Y

B59067

LHD



Power Window Regulator
Switch Assy

Front Door Window
Regulator LH

Power Window Regulator
Master Switch Assy

Front Door Window
Regulator RH

Y

ON-VEHICLE INSPECTION

1. INSPECT POWER WINDOW

- (a) Check the basic function (manual operation function).
 - (1) Turn the ignition switch ON.
 - (2) Check that the door glass will rise when operating the power window regulator master switch to UP side, and the door glass will go down when operating it to DOWN side.
 - (3) Check that the door glass will rise when operating the power window regulator switch of each door to UP side, and the door glass will go down when operating it to DOWN side.
 - (4) Check that the door glass other than the driver's seat will not operate when locking the window locking switch.

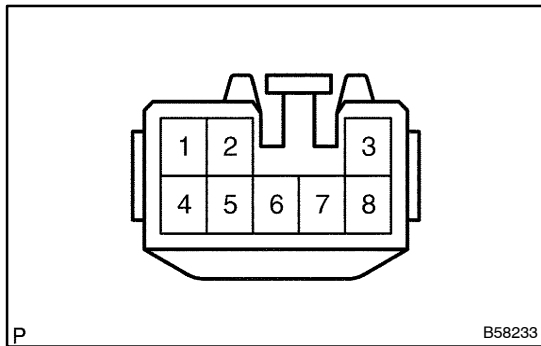
2. CHECK AUTOMATIC OPERATION FUNCTION

- (a) Check the basic function.
 - (1) Turn the ignition switch ON.
 - (2) Check that it operates AUTO DOWN and the door glass will be fully open when operating the master switch of the power window regulator for the driver's seat to DOWN side by double sifting.
 - (3) Check that it operates AUTO UP and the door glass will be fully close when operating the master switch of the power window regulator for the driver's seat to UP side by double sifting.
 - (4) Check that the door glass will stop during the AUTO DOWN operation, when operating the master switch of the power window regulator to UP side.
 - (5) Check that the door glass will stop during the AUTO UP operation, the door glass will stop when operating the power window switch to DOWN side (However, when continuing the UP and DOWN operations, it will transfer to the manual operation).

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See page
"One touch power window system" does not operate	1. Power Window Master Switch	70-5
	2. Power Window Motor (driver's side)	70-5
Power window does not operate (driver's side)	1. DOOR Fuse (instrument panel J/B)	68-1
	2. Power Main Fuse (instrument panel J/B)	68-1
	3. Power Ignition Relay (instrument panel J/B)	68-1
	4. Power Window Master Switch	70-5
	5. Power Window Motor (driver's side)	70-5
	6. Wire Harness	—
Power window does not operate (each seat)	1. DOOR Fuse (instrument panel J/B)	68-1
	2. Power Main Fuse (instrument panel J/B)	68-1
	3. Power Ignition Relay (instrument panel J/B)	68-1
	4. Power Window Switch	70-5
	5. Power Window Motor	70-5
	6. Wire Harness	—
Passenger's window cannot be operated by wireless operation via master switch	1. Power Window Master Switch	70-5
	2. Wire Harness	—

INSPECTION



P

B58233

1. INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSY

- (a) Check the continuity between each terminal of the connector, operating the switch.

Standard:

Driver side

Switch position	Tester connection	Condition
UP AUTO UP	1 ↔ 5	Continuity
	2 ↔ 3	
OFF	1 ↔ 5	Continuity
	2 ↔ 5	
DOWN AUTO DOWN	2 ↔ 5	Continuity
	1 ↔ 3	

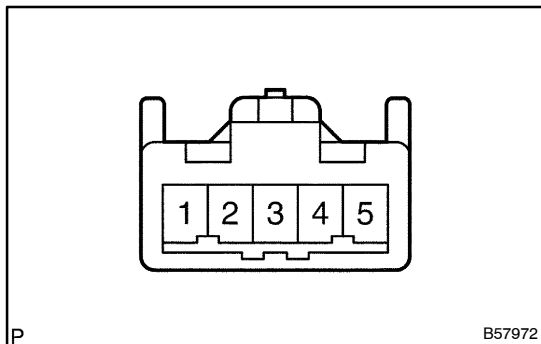
Passenger side (Window lock switch unlock)

Switch position	Tester connection	Condition
UP	1 ↔ 5	Continuity
	2 ↔ 3	
OFF	1 ↔ 5	Continuity
	2 ↔ 5	
DOWN	2 ↔ 5	Continuity
	1 ↔ 3	

Passenger side (Window lock switch lock)

Switch position	Tester connection	Condition
UP	3 ↔ 4	Continuity
OFF	4 ↔ 7	Continuity
DOWN	3 ↔ 7	Continuity

If the result is not as specified, replace the switch.



P

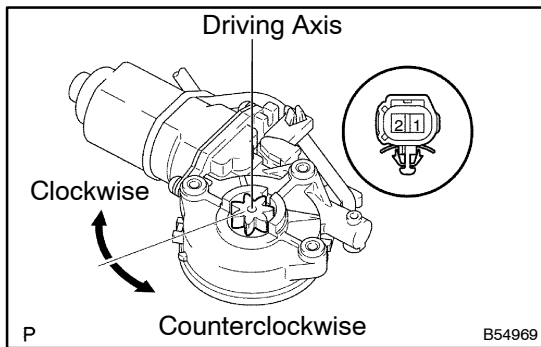
B57972

2. INSPECT POWER WINDOW REGULATOR SWITCH ASSY

- (a) Check the continuity between each terminal of the connector, operating the switch.

Switch position	Tester connection	Condition
UP	1 ↔ 3	Continuity
	4 ↔ 5	
OFF	2 ↔ 3	Continuity
	4 ↔ 5	
DOWN	2 ↔ 3	Continuity
	1 ↔ 5	

If the result is not as specified, replace the switch assy.



3. INSPECT POWER WINDOW REGULATOR MOTOR ASSY RH

- (a) Inspect the operation of the rear RH side power window regulator motor assembly.
- (1) When adding the battery voltage to each connector terminal check that the motor operates smoothly.

Measuring condition	Operational direction
Battery positive → Terminal 2 Battery negative → Terminal 1	Clockwise rotation toward driving axis
Battery positive → Terminal 1 Battery negative → Terminal 2	Counterclockwise wind rotation toward driving axis

- (b) Check the PTC operation inside power window regulator motor.

NOTICE:

Check should be done under the condition that the power window regulator and the door glass are installed.

- (1) Set the DC 400 A probe of electrical tester to terminal 1 or 2 of the wire harness.

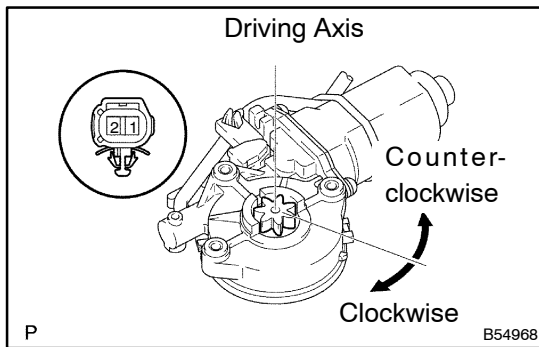
NOTICE:

Match the arrow mark of the probe with the current direction.

- (2) Set the door glass at the fully-closed position.
- (3) When approx. 60 seconds have passed after fully closing it, check the time that the current when pressing the power regulator switch UP again (at initial time) changes from approx. 16 to 34 A to less than 1 A.

Standard: Approx. 4 – 90 seconds

- (4) When approx. 60 seconds have passed after the cutoff checking, check that the door glass will go down when the power regulator switch is pressed DOWN.



4. INSPECT POWER WINDOW REGULATOR MOTOR ASSY LH

- (a) Inspect the operation of the front LH side power window regulator motor assembly.
- (1) When adding the battery voltage to each connector terminal, check that the motor operates smoothly.

Measuring condition	Operational direction
Battery positive → Terminal 1 Battery negative → Terminal 2	Clockwise rotation toward driving axis
Battery positive → Terminal 2 Battery negative → Terminal 1	Counterclockwise wind rotation toward driving axis

- (b) Check the PTC operation inside power window regulator motor.

NOTICE:

Check should be done under the condition that the power window regulator and the door glass are installed.

- (1) Set the DC 400 A probe of electrical tester to terminal 4 or 5 of the wire harness.

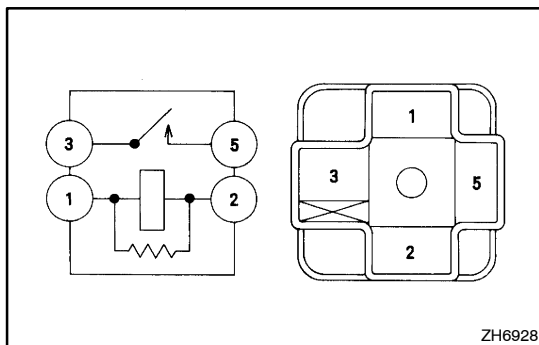
NOTICE:

Match the arrow mark of the probe with the current direction.

- (2) Set the door glass at the fully-closed position.
- (3) When approx. 60 seconds have passed after fully closing it, check the time that the current when pressing the power regulator switch UP again (at initial time) changes from approx. 16 to 34 A to less than 1 A.

Standard: Approx. 4 – 90 seconds

- (4) When approx. 60 seconds after the cutoff checking, check that the door glass will go down when the power regulator switch is pressed DOWN.



5. INSPECT IGNITION RELAY NO.1

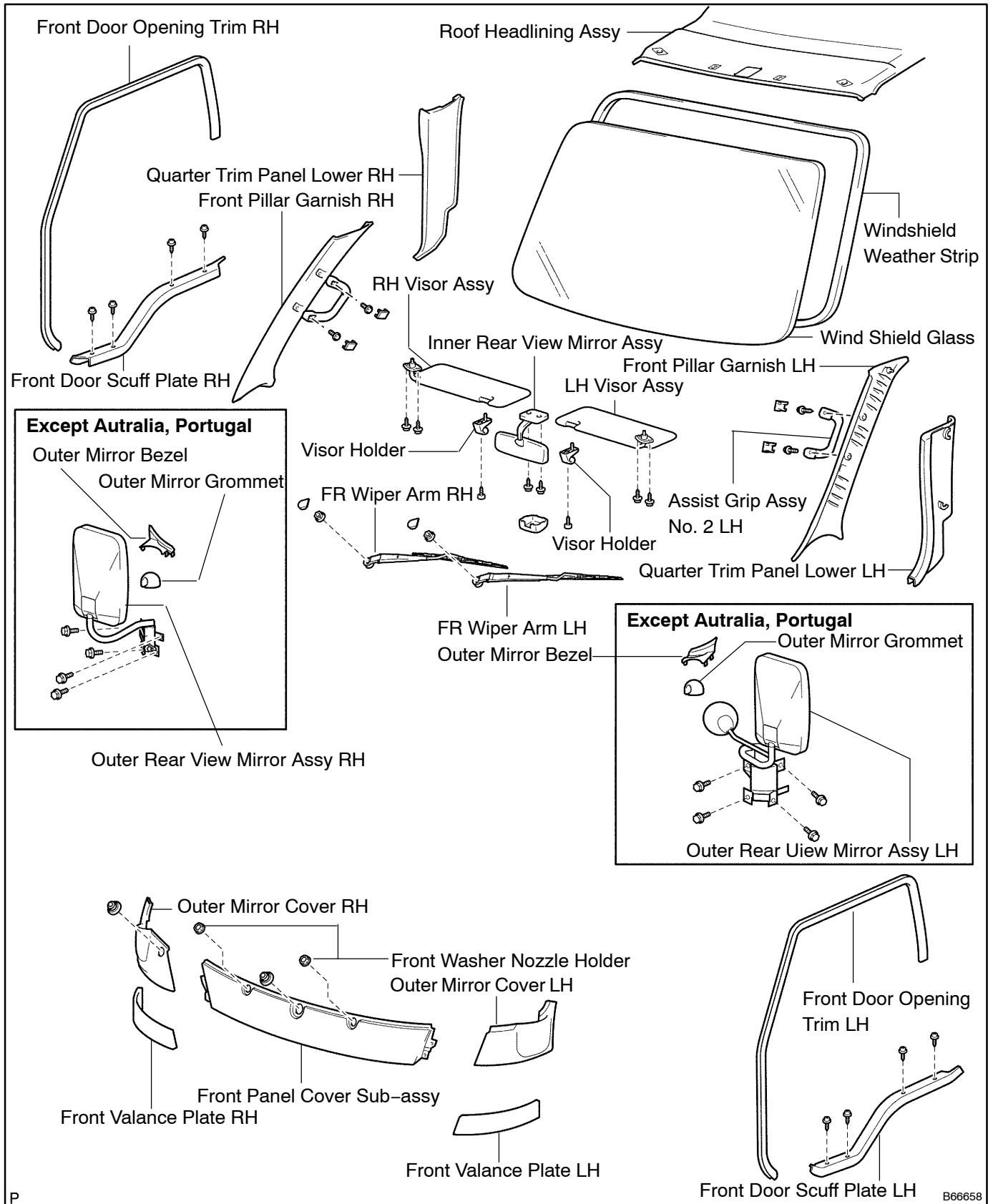
- (a) Remove the relay from the R/B No.1.
- (b) Check the relay continuity.

Condition	Tester connection	Specified Condition
Constant	1 - 2	Continuity
Apply B + between terminals 1 and 2	3 - 5	Continuity

If the result is not as specified, replace the relay.

WINDSHIELD GLASS COMPONENTS

700R9-01

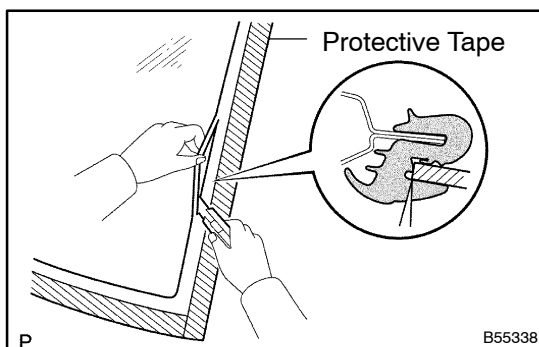


REPLACEMENT

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. REMOVE FRONT DOOR SCUFF PLATE LH (See page 76-5)
2. REMOVE FRONT DOOR SCUFF PLATE RH (See page 76-5)
3. REMOVE ASSIST GRIP PLUG (See page 76-5)
4. REMOVE ASSIST GRIP ASSY NO.2 LH (See page 76-5)
5. REMOVE ASSIST GRIP ASSY NO.2 RH (See page 76-5)
6. REMOVE FRONT PILLAR GARNISH LH (See page 76-5)
7. REMOVE FRONT PILLAR GARNISH RH (See page 76-5)
8. REMOVE FRONT DOOR OPENING TRIM LH (See page 76-5)
9. REMOVE FRONT DOOR OPENING TRIM RH (See page 76-5)
10. REMOVE LH VISOR ASSY (See page 76-5)
11. REMOVE RH VISOR ASSY (See page 76-5)
12. REMOVE VISOR HOLDER (See page 76-5)
13. REMOVE INNER REAR VIEW MIRROR ASSY (See page 76-5)
14. REMOVE ROOF HEADLINING ASSY (See page 76-5)
15. REMOVE WINDSHIELD WIPER ARM COVER (See page 76-5)
16. REMOVE FR WIPER ARM LH (See page 66-7)
17. REMOVE FR WIPER ARM RH (See page 66-7)
18. REMOVE FRONT VALANCE PANEL LH (See page 65-25)
19. REMOVE FRONT VALANCE PANEL RH (See page 65-25)
20. REMOVE OUTER MIRROR GROMMET (EXCEPT OCEANIA) (See page 70-19)
21. REMOVE OUTER MIRROR BEZEL (EXCEPT OCEANIA) (See page 70-19)
22. REMOVE OUTER MIRROR COVER LH (EXCEPT OCEANIA) (See page 70-19)
23. REMOVE OUTER REAR VIEW MIRROR ASSY LH (EXCEPT OCEANIA)(See page 70-19)
24. REMOVE OUTER MIRROR GROMMET (EXCEPT OCEANIA) (See page 70-19)
25. REMOVE OUTER MIRROR BEZEL (EXCEPT OCEANIA) (See page 70-19)
26. REMOVE OUTER MIRROR COVER RH (EXCEPT OCEANIA) (See page 70-19)
27. REMOVE OUTER REAR VIEW MIRROR ASSY RH (EXCEPT OCEANIA) (See page 70-19)
28. REMOVE FRONT WASHER NOZZLE HOLDER (See page 66-7)
29. REMOVE FRONT PANEL COVER SUB-ASSY (See page 66-7)



30. REMOVE WINDSHIELD GLASS

- (a) Using a knife, cut off the weatherstrip as shown in the illustration.

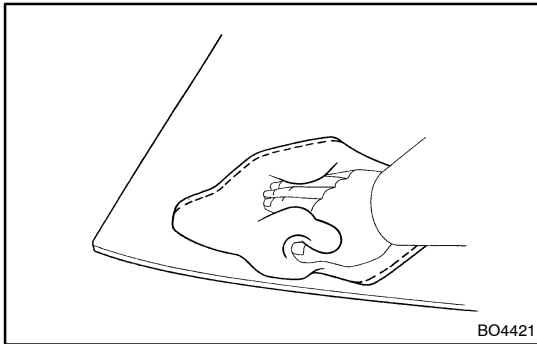
NOTICE:

Do not damage the body with the knife.

- (b) Remove the glass.

31. REMOVE WINDSHIELD WEATHERSTRIP

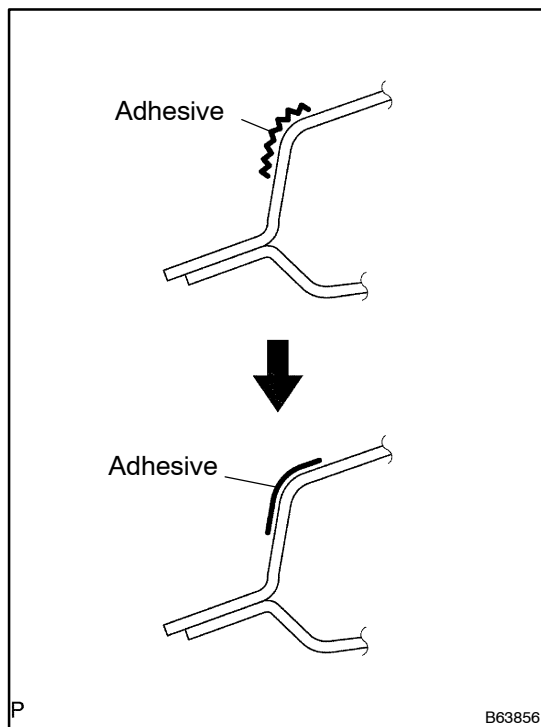
- (a) Remove the windshield weatherstrip from the windshield glass.

**32. CLEAN WINDSHIELD GLASS**

- (a) Using a scraper, remove the adhesive sticking to the glass.
 (b) Clean the outer circumference of the glass with white gasoline.

NOTICE:

- Do not touch the glass surface after cleaning it.
- Be careful not to damage the body.



- (c) Clean and shape the contact surface of the vehicle body.
 (1) Using a knife, cut away any rough adhesive on the contact surface of the body to shape the surface.

HINT:

Leave as much adhesive on the body as possible.

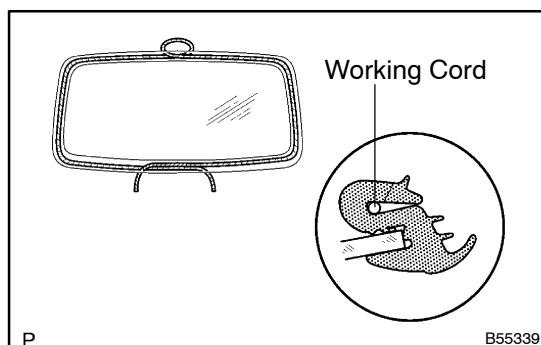
- (2) Clean the contact surface of the body with a piece of shop rag saturated with cleaner.

HINT:

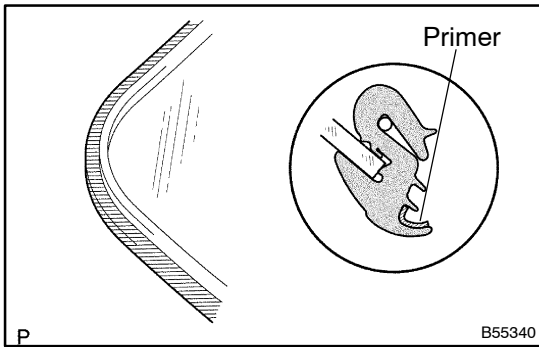
Even if all the adhesive has been removed, clean the body.

33. INSTALL WINDSHIELD WEATHERSTRIP

- (a) Install the windshield weatherstrip to the windshield glass.

**34. INSTALL WINDSHIELD GLASS**

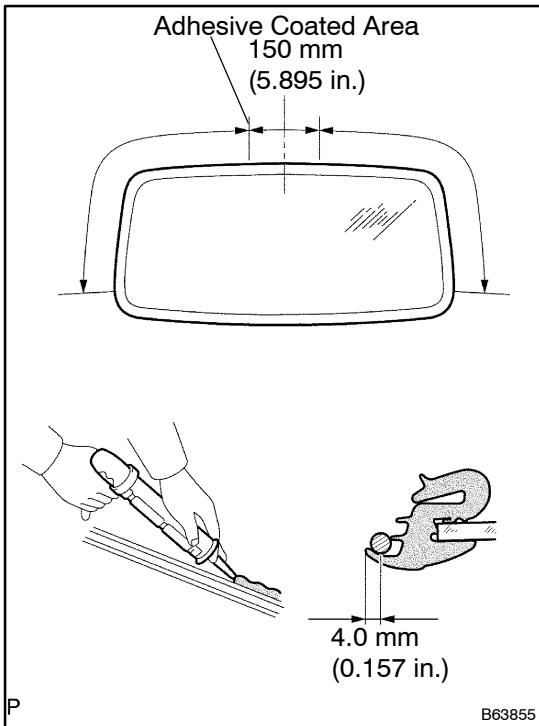
- (a) Apply a working cord along the weatherstrip groove, as shown in the illustration.



- (b) Apply primer to the weatherstrip on the surface with body as shown in the illustration.

NOTICE:

- **Do not apply too much primer.**
- **Dry the primer coating for 3 minutes or more.**



- (c) Cut off the tip of the cartridge nozzle to make a hole 4 mm (0.18 in.) in diameter. Fill the cartridge with adhesive.

Adhesive: Part No. 08850-00801 or equivalent

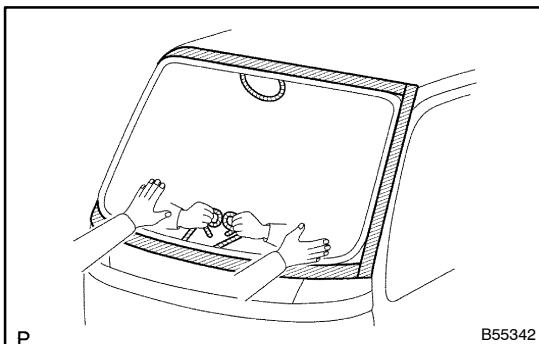
HINT:

After cutting off the tip, use all adhesive within the time described in the table below.

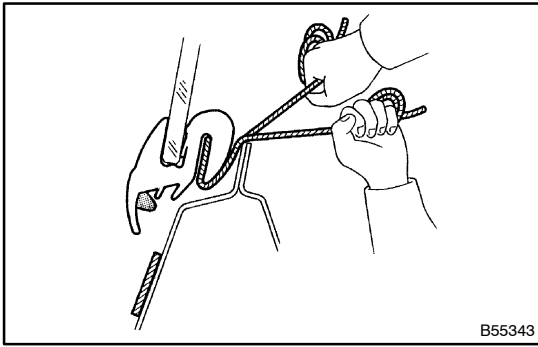
Tackfree time:

Temperature	Tackfree time
35°C (95°F)	15 minutes
20°C (68°F)	100 minutes
5°C (41°F)	8 minutes

- (d) Load the cartridge into the sealer gun.
- (e) Coat the glass with adhesive on all contact surfaces along the ridge.
- Adhesive: Approx. 4.0 mm (0.157 in.)**
- (f) Apply adhesive to the contact area with the weatherstrip by the arrows as shown in the illustration.
- (g) Put masking tape around the weatherstrip to protect the body.



- (h) Begin installation in the middle of the lower part of the glass.
- (i) Hold the glass in position on the body.



- (j) From the inside, pull one cord at an angle so it pulls the lip over the flange. From the outside, press the glass along the weatherstrip until the glass is installed.
- (k) To make the glass fit snugly, tap from the outside with your open hand.

NOTICE:

Take care not to drive the vehicle during the time described in the table below.

Minimum time:

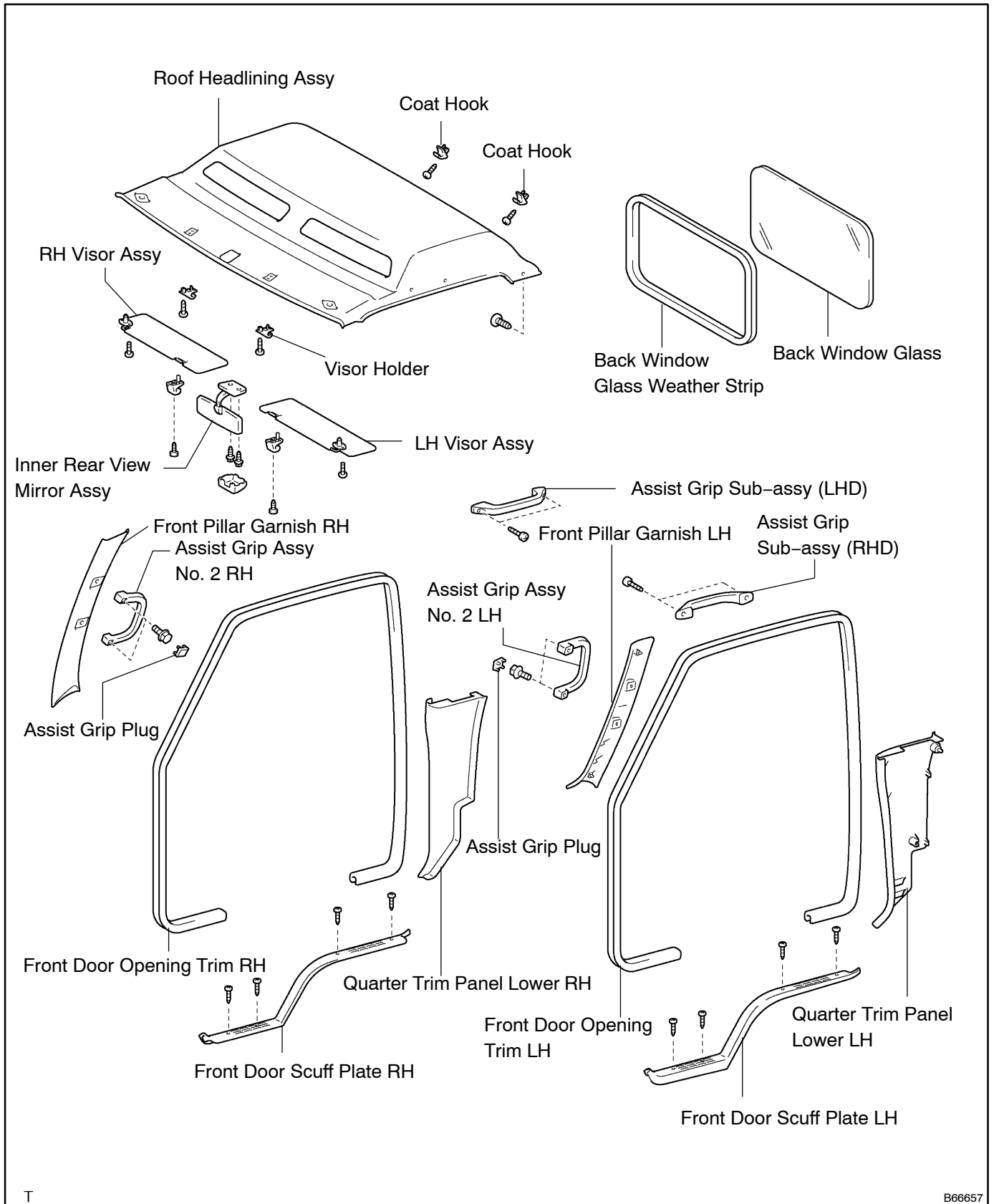
Temperature	Minimum time prior to driving the vehicle
35°C (95°F)	1.5 hours
20°C (68°F)	5 hours
5°C (41°F)	24 hours

35. WATER-LEAK CHECK AND REPAIRMENT

- (a) Conduct a leak test after the adhesive has completely hardened.
- (b) Seal any leaks with auto glass sealer.

BACK WINDOW GLASS COMPONENTS

700RB-01

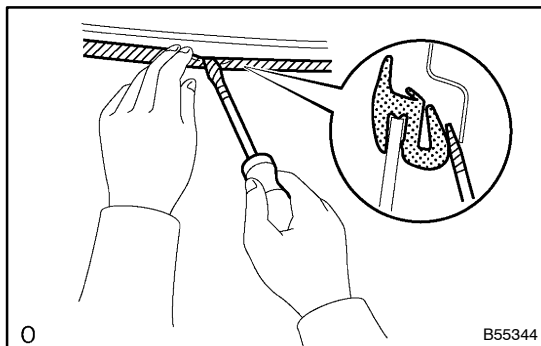


REPLACEMENT

HINT:

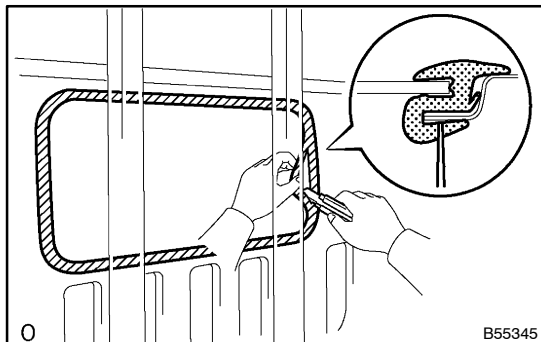
The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. REMOVE FRONT DOOR SCUFF PLATE LH (See page 76-5)
2. REMOVE FRONT DOOR SCUFF PLATE RH (See page 76-5)
3. REMOVE QUARTER TRIM PANEL LOWER LH (See page 76-5)
4. REMOVE QUARTER TRIM PANEL LOWER RH (See page 76-5)
5. REMOVE FRONT SEAT OUTER BELT ASSY LH (See page 61-8)
6. REMOVE FRONT SEAT OUTER BELT ASSY RH (See page 61-8)
7. REMOVE QUARTER INSIDE TRIM BOARD LH (See page 76-5)
8. REMOVE QUARTER INSIDE TRIM BOARD RH (See page 76-5)
9. REMOVE ASSIST GRIP PLUG (See page 76-5)
10. REMOVE ASSIST GRIP ASSY NO.2 LH (See page 76-5)
11. REMOVE ASSIST GRIP ASSY NO.2 RH (See page 76-5)
12. REMOVE FRONT PILLAR GARNISH LH (See page 76-5)
13. REMOVE FRONT PILLAR GARNISH RH (See page 76-5)
14. REMOVE FRONT DOOR OPENING TRIM LH (See page 76-5)
15. REMOVE FRONT DOOR OPENING TRIM RH (See page 76-5)
16. REMOVE COAT HOOK (See page 76-5)
17. REMOVE ROOM LAMP ASSY NO.1 (See page 76-5)
18. REMOVE LH VISOR ASSY (See page 76-5)
19. REMOVE RH VISOR ASSY (See page 76-5)
20. REMOVE VISOR HOLDER (See page 76-5)
21. REMOVE ASSIST GRIP ASSY NO.2 LH (See page 76-5)
22. REMOVE INNER REAR VIEW MIRROR ASSY (See page 70-17)
23. REMOVE ROOF HEADLINING ASSY (See page 76-5)
24. REMOVE BACK PANEL GARNISH UPPER (See page 76-5)



25. REMOVE BACK WINDOW GLASS

- (a) Reusable weatherstrip:
Pry the lip of the weatherstrip outward from the interior part of the body flange.
- (b) Reusable weatherstrip:
Pull the glass outwards, and remove it with the weatherstrip.



- (c) Non reusable weatherstrip:
Using a knife, cut off the weatherstrip as shown in the illustration.

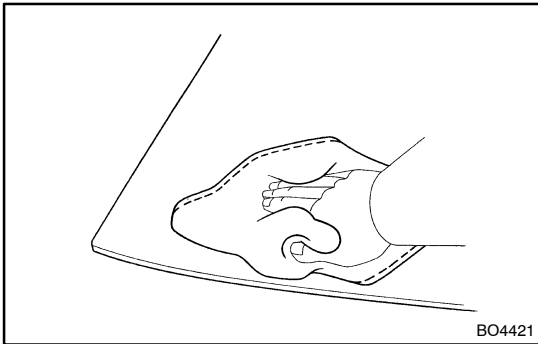
NOTICE:

Do not damage the body with the knife.

- (d) Remove the back window glass.

26. REMOVE BACK WINDOW GLASS WEATHERSTRIP

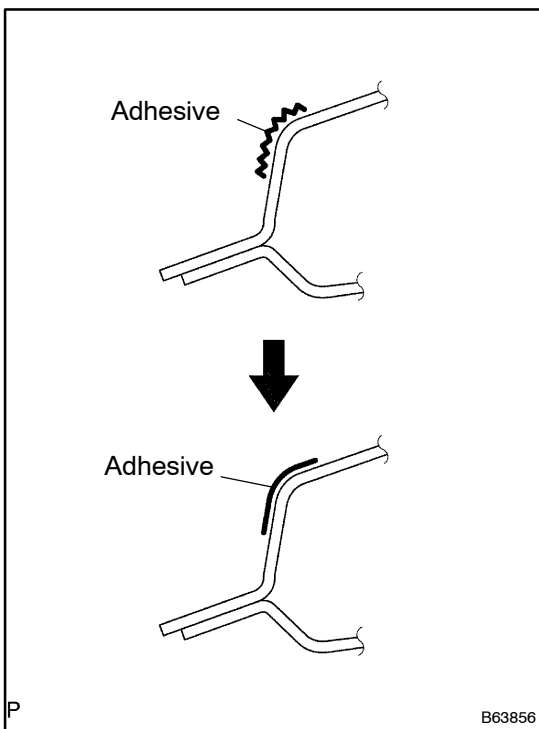
- (a) Remove the back window glass weatherstrip from the back window glass.

**27. CLEAN BACK WINDOW GLASS**

- (a) Using a scraper, remove the adhesive sticking to the glass.
 (b) Clean the outer circumference of the glass with white gasoline.

NOTICE:

- Do not touch the glass surface after cleaning it.
- Be careful not to damage the body.



- (c) Clean and shape the contact surface of the vehicle body.
 (1) Using a knife, cut away any rough adhesive on the contact surface of the body to shape the surface.

HINT:

Leave as much adhesive on the body as possible.

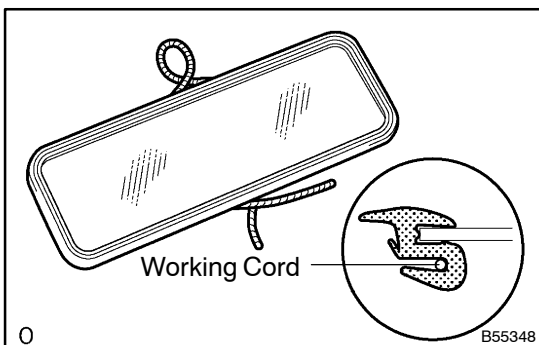
- (2) Clean the contact surface of the body with a piece of shop rag saturated with cleaner.

HINT:

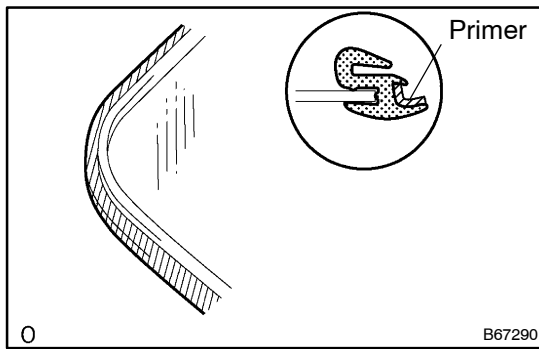
Even if all the adhesive has been removed, clean the body.

28. INSTALL BACK WINDOW GLASS WEATHERSTRIP

- (a) Install the back window glass weatherstrip to the back window glass.

**29. INSTALL BACK WINDOW GLASS**

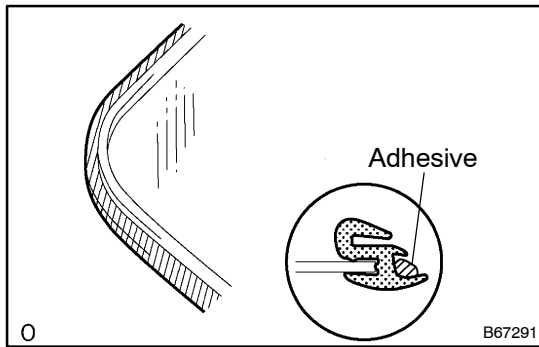
- (a) Apply a working cord along the weatherstrip groove, as shown in the illustration.



- (b) Apply primer and adhesive to the weatherstrip on the surface with body as shown in the illustration.

NOTICE:

- **Do not apply too much primer.**
- **Dry the primer coating for 3 minutes or more.**



- (c) Cut off the tip of the cartridge nozzle to make a hole 4 mm (0.18 in.) in diameter. Fill the cartridge with adhesive.

Adhesive: Part No. 08850-00801 or equivalent

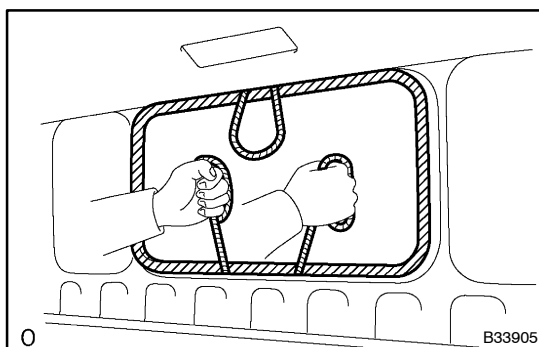
HINT:

After cutting off the tip, use all adhesive within the time described in the table below.

Tackfree time:

Temperature	Tackfree time
35°C (95°F)	15 minutes
20°C (68°F)	100 minutes
5°C (41°F)	8 minutes

- (d) Load the cartridge into the sealer gun.
 (e) Coat the glass with adhesive on all contact surfaces along the ridge.
Adhesive: Approx. 4.0 mm (0.18 in.)
 (f) Apply adhesive to the contact area with the weatherstrip by the arrows as shown in the illustration.
 (g) Put masking tape around the weatherstrip to protect the body.



- (h) Hold the glass in position on the body.
 (i) Install the glass by pulling the cord from the room side, while pushing weatherstrip from the outside with your open hand.
 (j) To mark the glass fit in place, tap from the outside with your open hand.

NOTICE:

Take care not to drive the vehicle during the time described in the table below.

Minimum time:

Temperature	Minimum time prior to driving the vehicle
35°C (95°F)	1.5 hours
20°C (68°F)	5 hours
5°C (41°F)	24 hours

30. WATER-LEAK CHECK AND REPAIRMENT

- (a) Conduct a leak test after the adhesive has completely hardened.
 (b) Seal any leaks with auto glass sealer.

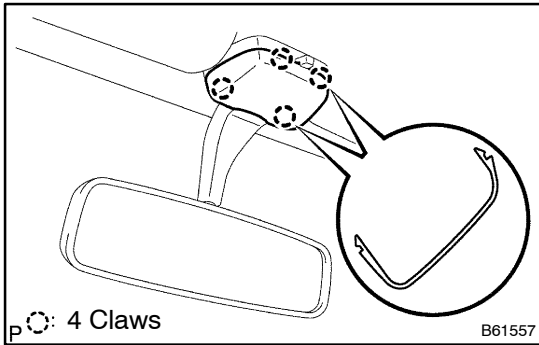
INNER REAR VIEW MIRROR ASSY

REPLACEMENT

700RD-01

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

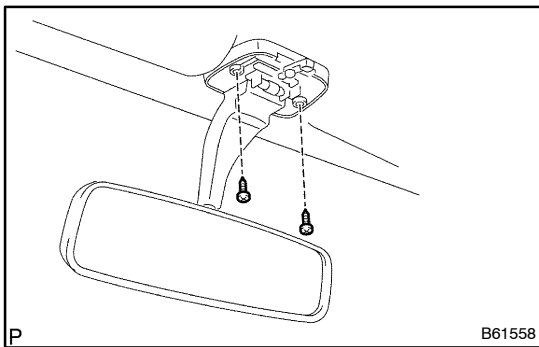


1. REMOVE INNER RR VIEW MIRROR ROOM LAMP LENS

- (a) Using a screwdriver, remove the inner rear view mirror room lamp lens.

HINT:

Tape the screwdriver tip before use.



2. REMOVE INNER REAR VIEW MIRROR ASSY

- (a) Remove the 2 screws and inner rear view mirror assy, then disconnect the connector.

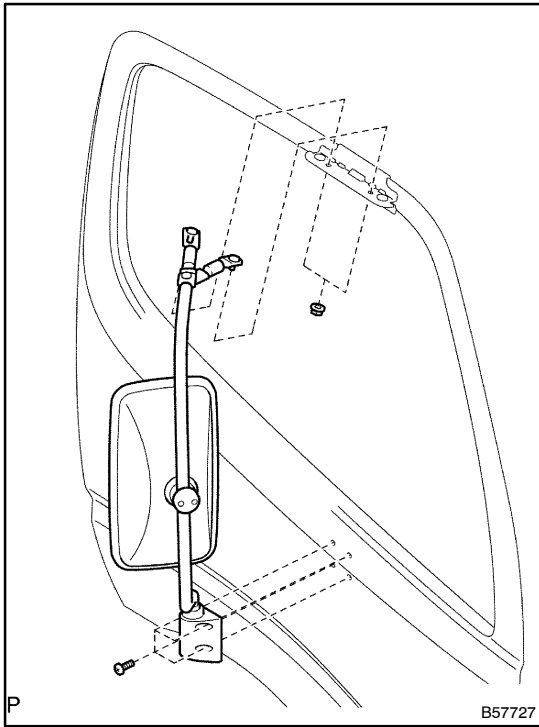
OUTER REAR VIEW MIRROR (OCEANIA)

700RE-01

REPLACEMENT

HINT:

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- On the RH side, use the same procedures as on the LH side.

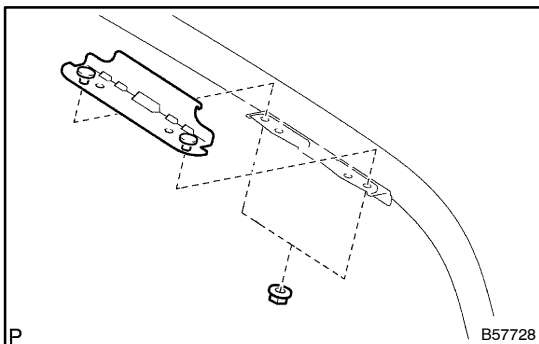


1. REMOVE OUTER REAR VIEW MIRROR ASSY

- Remove the 2 nuts.
- Using a torx driver (T30), remove the 4 screws and outer rear view mirror assy.

2. REMOVE OUTER REAR VIEW MIRROR

- Remove the 2 screws and outer rear view mirror.



3. REMOVE OUTER REAR VIEW MIRROR RETAINER

- Remove the 2 screws and outer rear view mirror.

4. INSTALL OUTER REAR VIEW MIRROR RETAINER

- Install the outer rear view mirror retainer with the 2 nuts.

Torque: 20 N·m (204 kgf·m, 15 ft·lbf)

5. INSTALL OUTER REAR VIEW MIRROR ASSY

- Install the outer rear view mirror assy with the 4 screws and 2 nuts.

Torque:

Bolt: 20 N·m (204 kgf·m, 15 ft·lbf)

Screw: 11 N·m (112 kgf·m, 8 ft·lbf)

6. INSTALL OUTER REAR VIEW MIRROR COVER

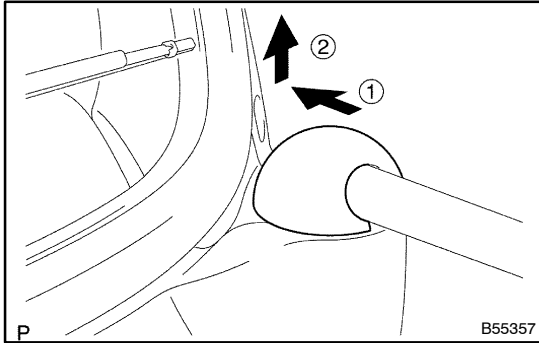
OUTER REAR VIEW MIRROR (EXCEPT OCEANIA)

700RF-01

REPLACEMENT

HINT:

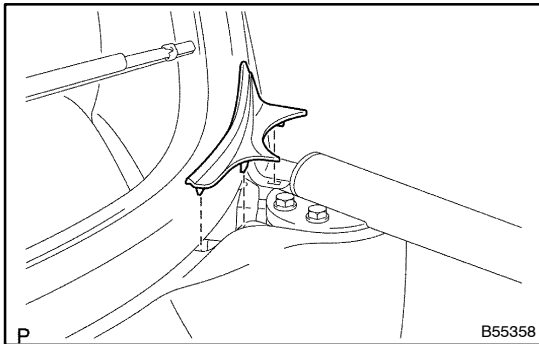
- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- On the RH side, use the same procedures as on the LH side.



1. REMOVE OUTER REAR VIEW MIRROR

(a) Remove the outer rear view mirror assembly LH.

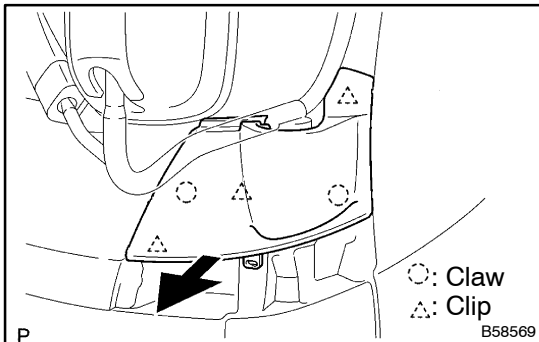
- (1) Remove the clearance lamp lens & body LH (See page 65-25).
- (2) Remove the outer mirror grommet as shown in the illustration.



(3) Using a screwdriver, remove the outer mirror bezel.

HINT:

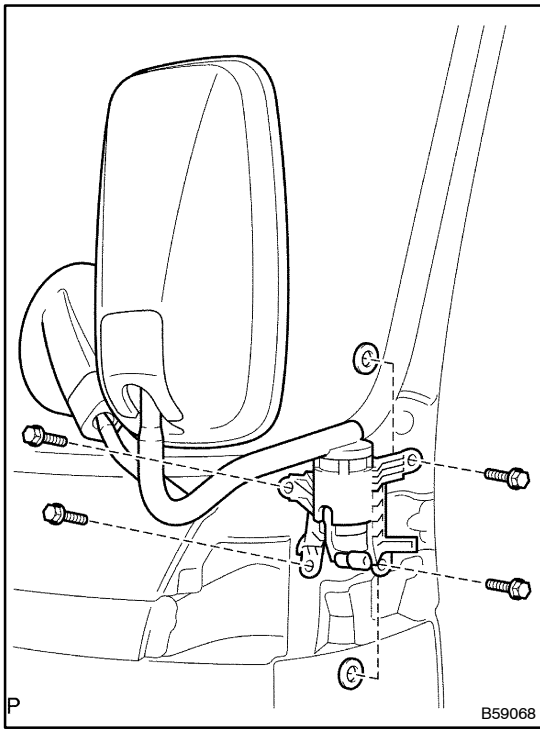
Tape the screwdriver tip before use.



(4) Using a screwdriver, remove the outer mirror cover LH as shown in the illustration.

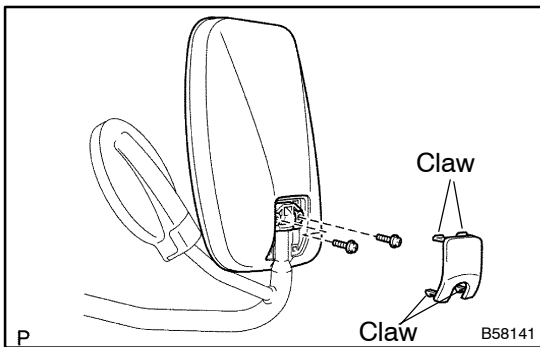
HINT:

Tape the screwdriver tip before use.



- (5) Remove the 4 bolts and outer rear view mirror assy LH.

Torque: 23 N·m (235 kgf·m, 17 ft·lbf)

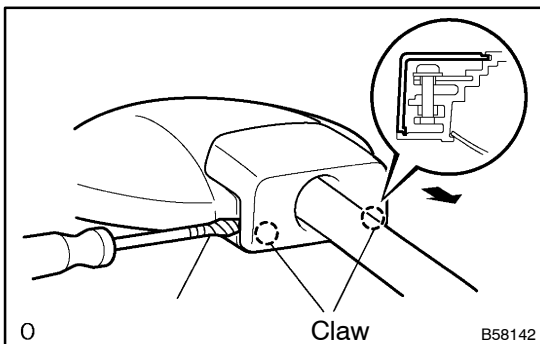


2. REMOVE OUTER REAR VIEW MIRROR ASSY LH

- (a) Using a screwdriver, remove the outer rear view mirror cover.

HINT:

Tape the screwdriver tip before use.



3. REMOVE OUTER UNDER VIEW MIRROR ASSEMBLY

- (a) Using a screwdriver, remove the outer under view mirror cover as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

INSTRUMENT PANEL/METER

COMBINATION METER	71-1
PROBLEM SYMPTOMS TABLE	71-1
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(REGULAR CAB MODELS)	71-15
COMPONENTS	71-15
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COMBINATION METER

PROBLEM SYMPTOMS TABLE

710ES-01

Illumination:

Symptom	Suspected Area	See Page
All illumination lights do not light up	1. Combination meter assy 2. Wire harness or connector	- -
Only one illumination light does not light up	1. Combination meter assy	-

Warning Lights:

Symptom	Suspected Area	See Page
Check Engine warning light does not light up	1. Wire harness or connector 2. ECM 3. Combination meter assy	- - -
Discharge warning light does not light up	1. Wire harness or connector 2. ECM 3. Combination meter assy	- - -
Brake warning light does not light up	1. Wire harness or connector 2. Parking brake switch 3. Brake warning switch 4. Combination meter assy	- 71-5 71-5 -
Fuel Level warning light does not light up	1. Wire harness or connector 2. Fuel level warning switch 3. Combination meter assy	- 71-5 -
Low Oil Pressure warning light does not light up	1. Wire harness or connector 2. Low oil pressure warning switch 3. Combination meter assy	- 71-5 -
Fuel Sediment warning light does not light up	1. Wire harness or connector 2. Level warning switch 3. Combination meter assy	- 71-5 -

Indicator Lights:

Symptom	Suspected Area	See Page
Turn indicator light does not light up	1. Wire harness or connector 2. Turn signal and hazard warning system 3. Combination meter assy	- 65-6 -
High Beam indicator light does not light up	1. Wire harness or connector 2. Headlight dimmer switch 3. Combination meter assy	- 65-6 -

Combination Meter (others):

Symptom	Suspected Area	See Page
Malfunction in ODO/TRIP meter	1. Combination meter assy	-

ON-VEHICLE INSPECTION

1. CHECK SPEEDOMETER

(a) Check the operation.

- (1) Using a speedometer tester, check the speedometer for allowable indication error and check the operation of the odometer.

Reference: km/h (European type)

Standard indication	Allowable range
20 km/h	21 – 25 km/h
40 km/h	41.5 – 46 km/h
60 km/h	62.5 – 67 km/h
80 km/h	83 – 88 km/h
100 km/h	104 – 109 km/h
120 km/h	125 – 130.5 km/h
140 km/h	145.5 – 151.5 km/h

Reference: km/h (General export type)

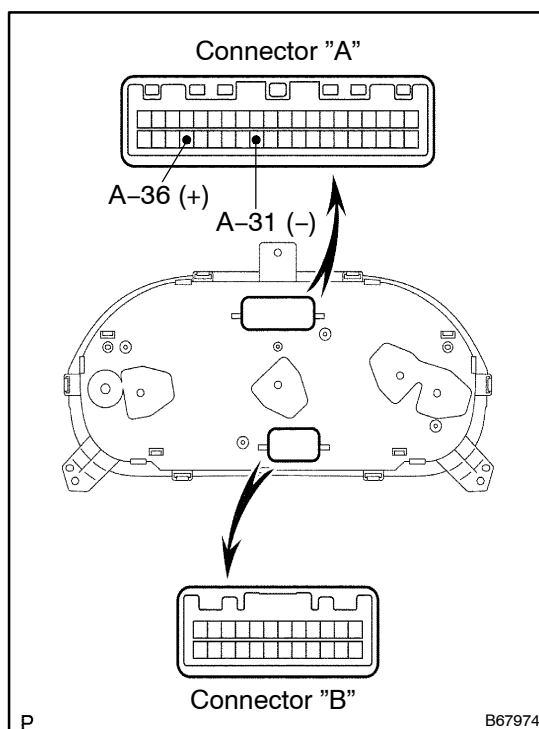
Standard indication	Allowable range
20 km/h	17.5 – 21.5 km/h
40 km/h	38 – 42 km/h
60 km/h	58 – 63 km/h
80 km/h	78 – 84 km/h
100 km/h	99 – 104.5 km/h
120 km/h	119.5 – 125.5 km/h
140 km/h	139.5 – 146.5 km/h

NOTICE:

Tire wear and tire over or under inflation will increase the indication error.

- (2) Check the deflection width of the speed meter indicator.

Reference: Below 0.5 km/h (0.3 mph)



2. CHECK OUTPUT SIGNAL OF VEHICLE SPEED

(a) Check for standard signal.

- (1) While driving the vehicle at the speed of 10 km/h, check the voltage between the terminals A-36 and A-31 of the combination meter assy.

Standard:

Fluctuation between 20 to 28 V or less is repeated 8 times within 1 sec.

NOTICE:

Check it with the ignition switch ON and the connector connected.

3. CHECK TACHOMETER

(a) Check the operation

(1) Connect a tune-up test tachometer, and start the engine.

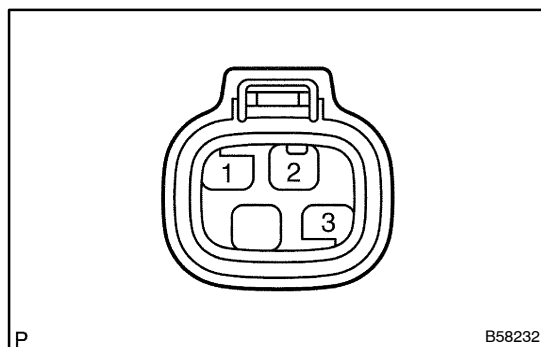
NOTICE:

- Reversing the connection of the tachometer will damage the transistors and diodes inside.
- When removing or installing the tachometer, be careful not to drop or subject it to heavy shocks.

(2) Compare the test and tachometer indications.

Standard: DC 27.0 V, 25°C at (77°F)

Standard indication (rpm)	Allowable range (rpm) Data in () are for reference
700	630 – 770
1,000	(900 – 1,100)
2,000	(1,875 – 2,125)
3,000	2,850 – 3,150



4. CHECK FUEL RECEIVER GAUGE

(a) Check the circuit.

- (1) Disconnect the connector from the sender gauge.
- (2) Turn the ignition switch ON, then check the position of the receiver gauge needle.

Needle position: EMPTY

- (3) Connect terminals 1 and 2 on the wire harness side connector and Turn the ignition switch ON, then check the position of the receiver gauge needle.

Needle position: FULL

5. CHECK FUEL LEVEL WARNING

(a) Inspect the circuit.

- (1) Disconnect the connector from the sender gauge.
- (2) Turn the ignition switch ON, check the fuel level needle indicates EMPTY and fuel level warning lights light on.

6. CHECK WATER TEMPERATURE RECEIVER GAUGE WARNING LIGHT

(a) Inspect the circuit.

- (1) Disconnect the connector from the water temperature sensor sender gauge.
- (2) Turn the ignition switch ON, check the position of the water temperature receiver gauge needle.

Needle position: COOL

- (3) Ground terminal 1 on the wire harness side, then check the position of the water temperature receiver gauge needle.

Needle position: HOT

7. CHECK LOW OIL PRESSURE WARNING LIGHT

- (a) Inspect the circuit.
- (1) Disconnect the connector from the low oil pressure switch.
 - (2) Turn the ignition switch ON.
 - (3) Connect the terminal of wire harness side connector and ground, then check the warning low oil pressure warning light.

Low oil pressure warning light: Light on

8. CHECK BRAKE WARNING LIGHT

- (a) Inspect the parking brake warning light.
- (1) Disconnect the connector from the parking brake switch and ground terminal on the wire harness side connector.
 - (2) Turn the ignition switch ON and check that the warning light lights up.

9. CHECK BRAKE FLUID LEVEL WARNING SWITCH

- (a) Inspect the continuity.
- (1) Remove the reservoir tank cap and strainer.
 - (2) Disconnect the connector.
 - (3) Check that the continuity exists between the terminals.

Float up (switch off): No continuity

- (4) Use syphon, etc., to take fluid out of the reservoir.
- (5) Check that the continuity exists between the terminals.

Float down (switch on): Continuity

- (6) Pour the fluid back in the reservoir.

10. CHECK FUEL SEDIMENTER WARNING LIGHT

- (a) Inspect the fuel sedimenter warning light.
- (1) Disconnect the connector from the level warning switch and connect terminals on the wire harness side connector.
 - (2) Turn the ignition switch ON and check that the warning light lights up.

INSPECTION

1. INSPECT ENGINE OIL PRESSURE SWITCH ASSY

- (a) Check the continuity.
- (1) Disconnect the connector from the low oil pressure switch.
 - (2) Check that continuity exists between terminal and ground.

Engine stopped: continuity

Engine running: no continuity

2. INSPECT ENGINE OIL LEVEL SENSOR

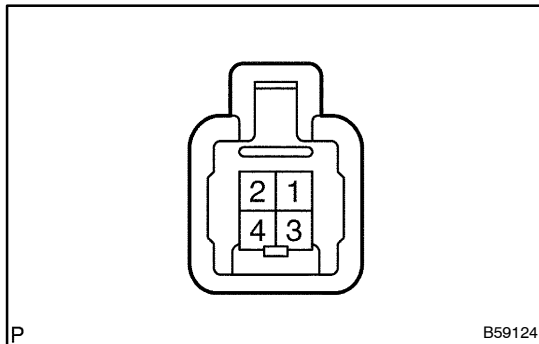
- (a) Check the continuity.
- (1) Heat the switch to above 60°C (140°F) in an oil bath.
 - (2) Check the continuity exists between terminals at each float position.

Float up (switch ON): Continuity

Float down (switch OFF): No continuity

3. INSPECT LEVEL WARNING SWITCH

- (a) Check the continuity.
- (1) Check the continuity exists between terminals at each float position.



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4. INSPECT PARKING BRAKE SWITCH ASSY

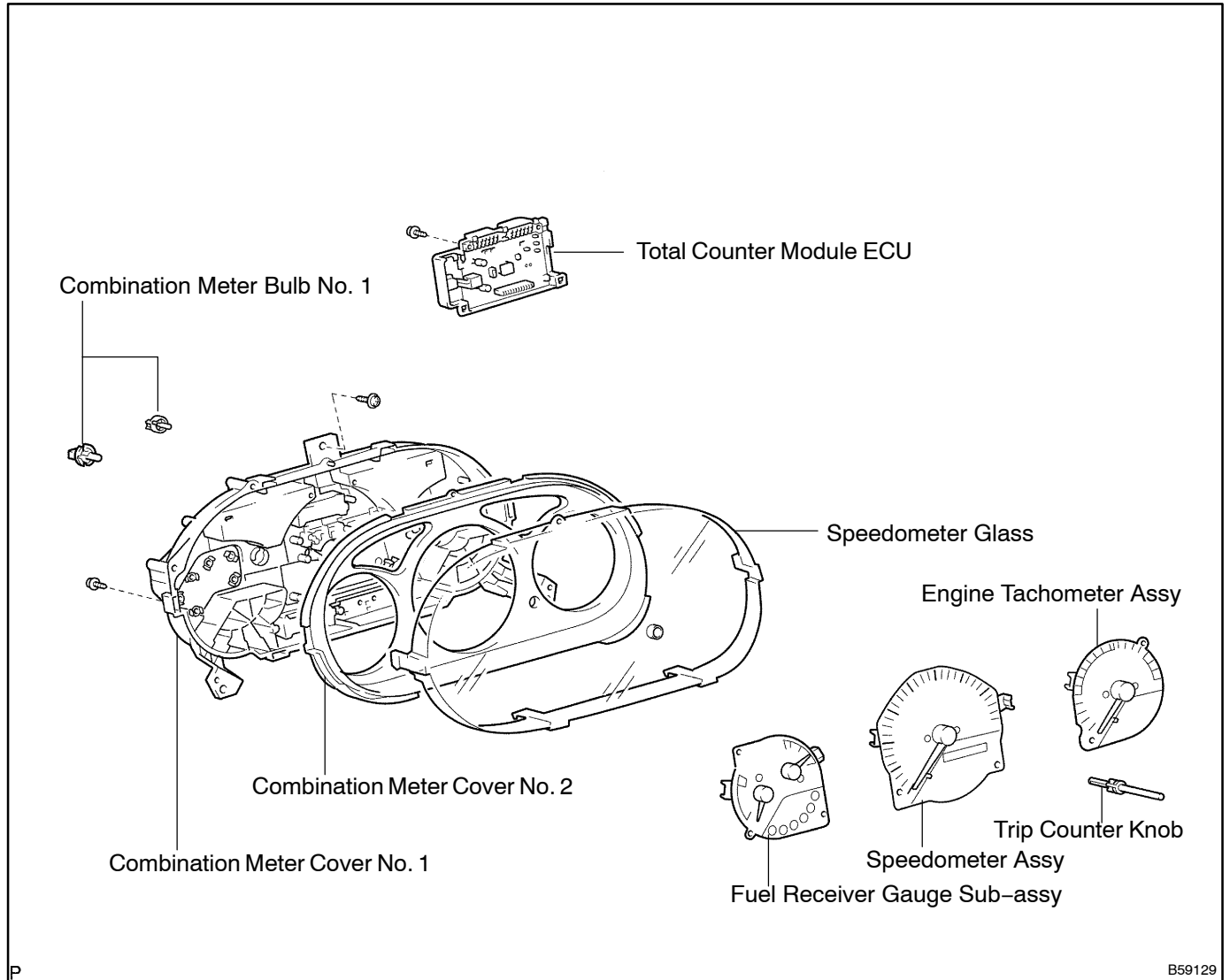
- (a) Inspect parking brake switch assy continuity.
- (1) Check that the continuity exists between terminal 1 and body ground, when switch is operated.

Standard:

Switch Position	Tester Connection	Specified Condition
ON	1 ↔ 4 2 ↔ 3	Continuity
OFF	1 ↔ 4 2 ↔ 3	No continuity

If the result is not as specified, replace the parking brake switch.

COMPONENTS

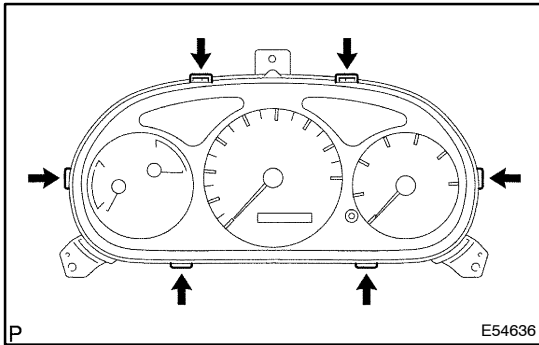


OVERHAUL

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

1. REMOVE INSTRUMENT CLUSTER FINISH PANEL
2. REMOVE COMBINATION METER ASSEMBLY

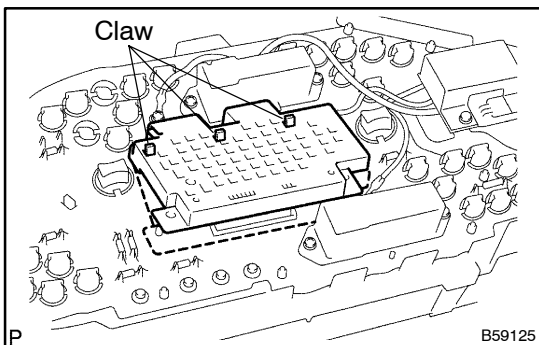


3. REMOVE COMBINATION METER GLASS

- (a) Disengage the 6 claws and remove the meter glass.

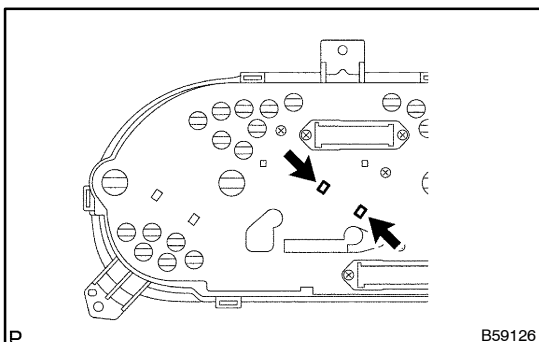
4. REMOVE COMBINATION METER COVER NO.1

- (a) Remove the meter cover.



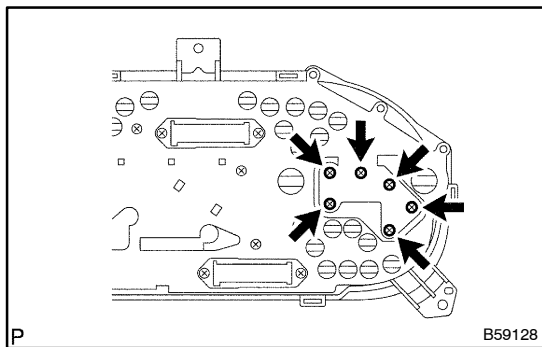
5. TOTAL COUNTER MODULE ECU

- (a) Remove the 6 screws.
- (b) Disengage the 3 claws and remove the ECU.

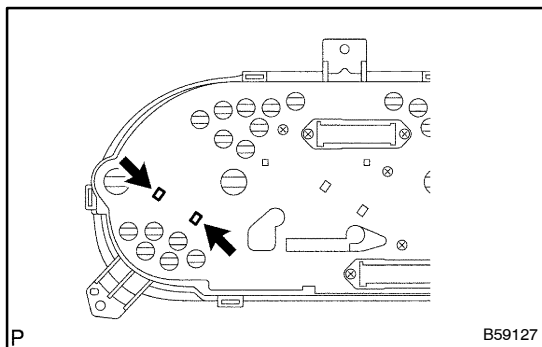


6. REMOVE SPEEDOMETER ASSY

- (a) Disengage the 2 claws and remove the speedometer assy.

**7. REMOVE FUEL RECEIVER GAUGE ASSY**

- (a) Remove the 6 screws and receiver gage.

**8. REMOVE ENGINE TACHOMETER ASSY**

- (a) Disengage the 2 claws and remove the tachometer.

9. REMOVE TRIP COUNTER KNOB

- (a) Disengage the claw and remove the knob.

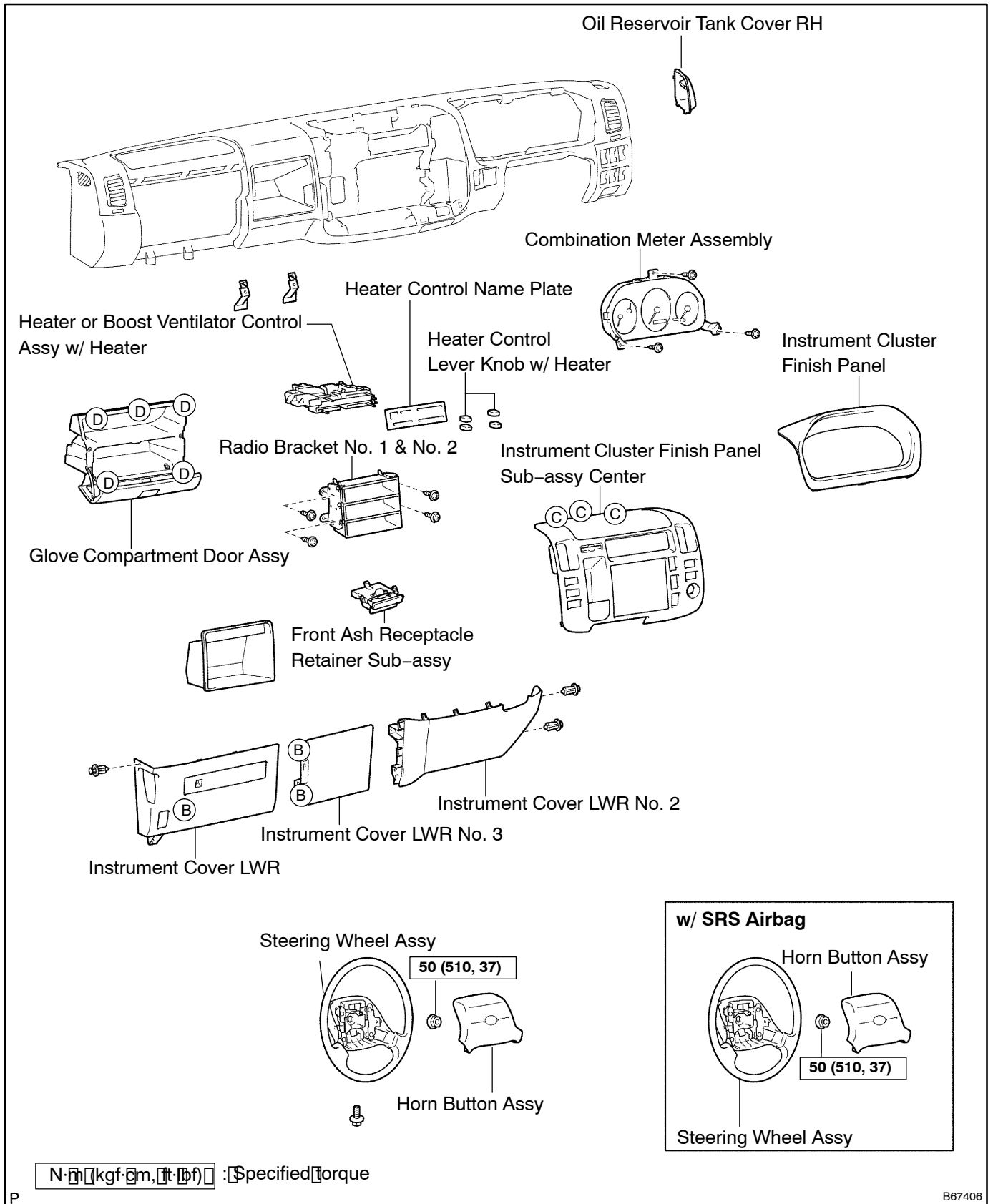
10. REMOVE COMBINATION METER BULB NO.1

- (a) Remove the bulb.

INSTRUMENT PANEL (WIDE CAB MODELS)

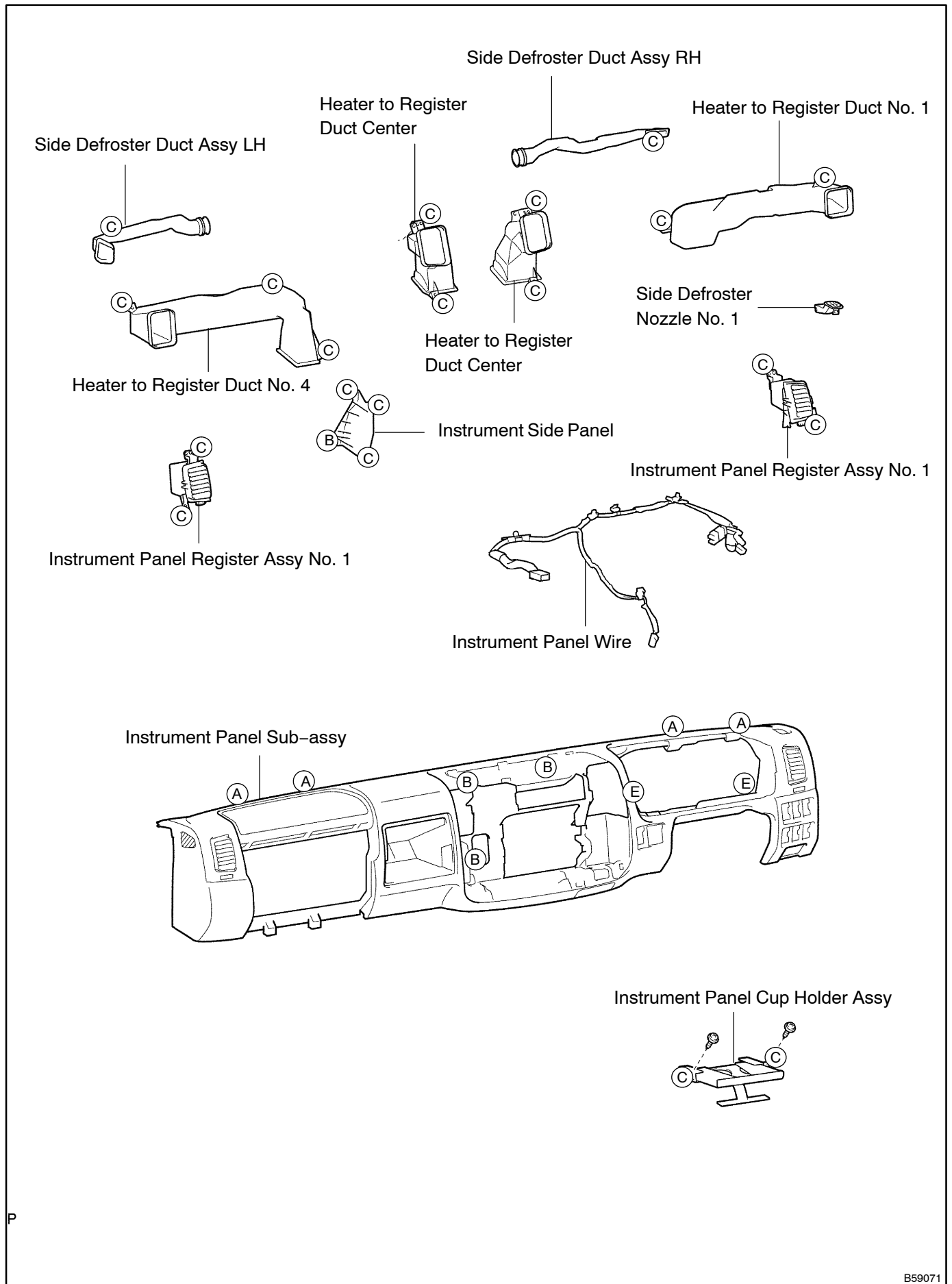
COMPONENTS

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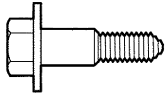
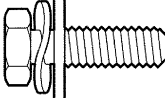
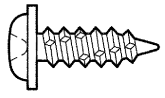
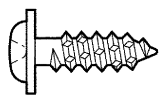

P

REPLACEMENT

1. TABLE OF BOLT, SCREW AND NUT

HINT:

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- Indicate the bolts, screws and nuts, which are necessary for installation and removal of the instrument panel, in the illustration and the text with alphabets.

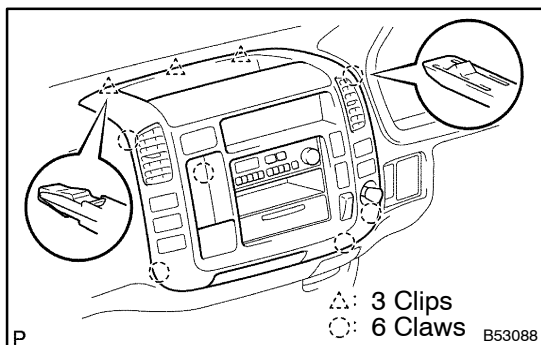
				mm (in.)	
Code	Shape	Code	Shape	Code	Shape
<A>	 <p>$\phi = 17.5$ (0.70) L = 25 (0.99)</p>		 <p>$\phi = 6$ (0.24) L = 22 (0.87)</p>	<C>	 <p>$\phi = 5.22$ (0.21) L = 16 (0.64)</p>
B33595	55394-37010	B33319	90119-06022	B30768	93567-15016
<D>	 <p>$\phi = 5.22$ (0.21) L = 16 (0.64)</p>	<E>	 <p>$\phi = 6$ (0.24)</p>		
B30768	93567-55016	B34041	90179-06009		

P

- DISCONNECT BATTERY NEGATIVE TERMINAL
- INSPECT CENTER FRONT WHEEL (See page 50-8)
- REMOVE HORN BUTTON ASSY (See page 50-8)
- REMOVE STEERING WHEEL ASSY (See page 50-8)

B68571

SST 09950-50012 (09951-05010, 09952-05010, 09953-05020, 09954-05020)

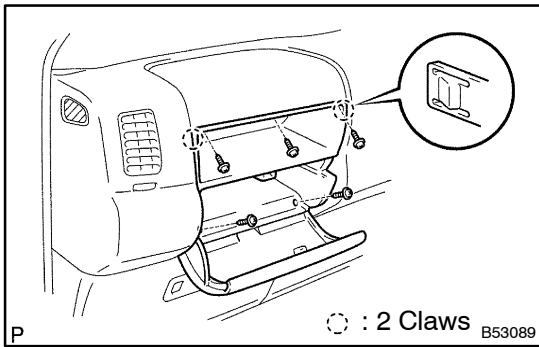


P

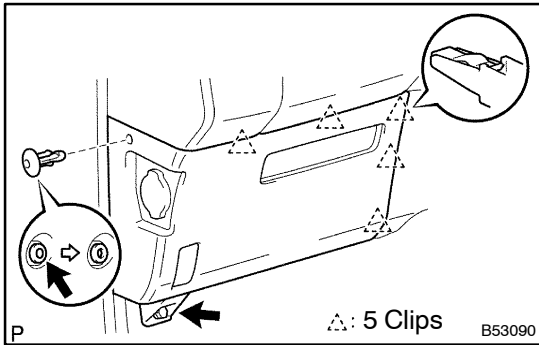
6. REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSY CENTER

- Disengage the 3 clips and 6 claws.
- Disconnect the connectors and remove the instrument cluster finish panel.

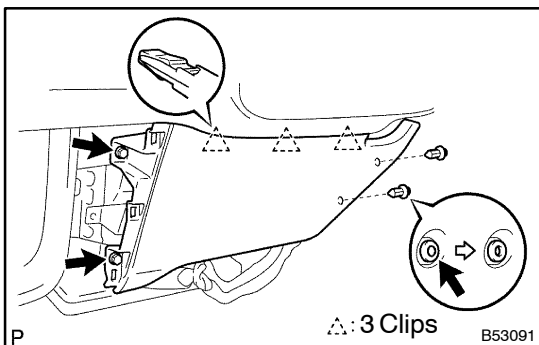
- REMOVE HEATER CONTROL LEVER KNOB
- REMOVE HEATER CONTROL NAME PLATE
- REMOVE HEATER OR BOOST VENTILATOR CONTROL ASSY
- REMOVE RADIO BRACKET NO. 1 & NO. 2

**11. REMOVE GLOVE COMPARTMENT DOOR ASSY**

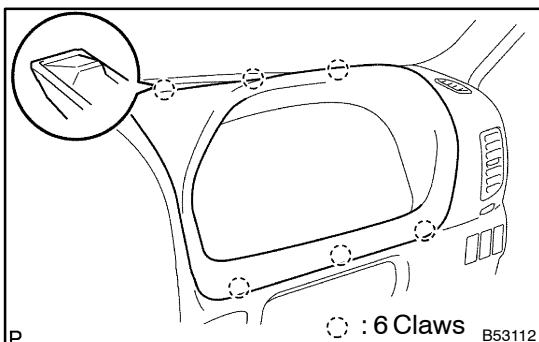
- (a) Remove the 5 screws.
- (b) Disengage the 2 claws and remove the compartment door.

**12. REMOVE INSTRUMENT COVER LWR**

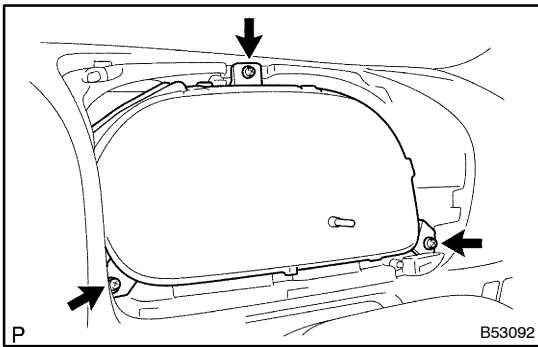
- (a) Remove the clip and bolt.
- (b) Disengage the 5 clips and remove the instrument cover.

13. REMOVE INSTRUMENT COVER LWR NO.3**14. REMOVE INSTRUMENT COVER LWR NO.2**

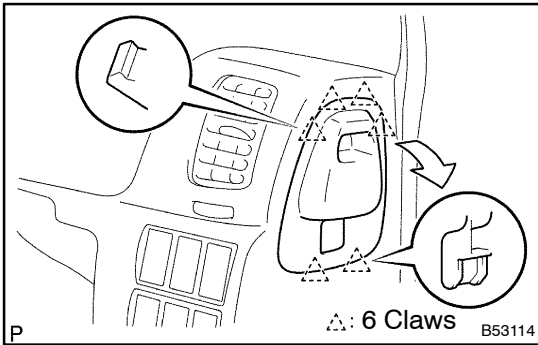
- (a) Remove the 2 clips and 2 bolts.
- (b) Disengage the 3 clips and remove the instrument cover.

**15. REMOVE INSTRUMENT CLUSTER FINISH PANEL**

- (a) Using a moulding remover, disengage the 6 claws and remove the instrument cluster finish panel.

**16. REMOVE COMBINATION METER ASSEMBLY**

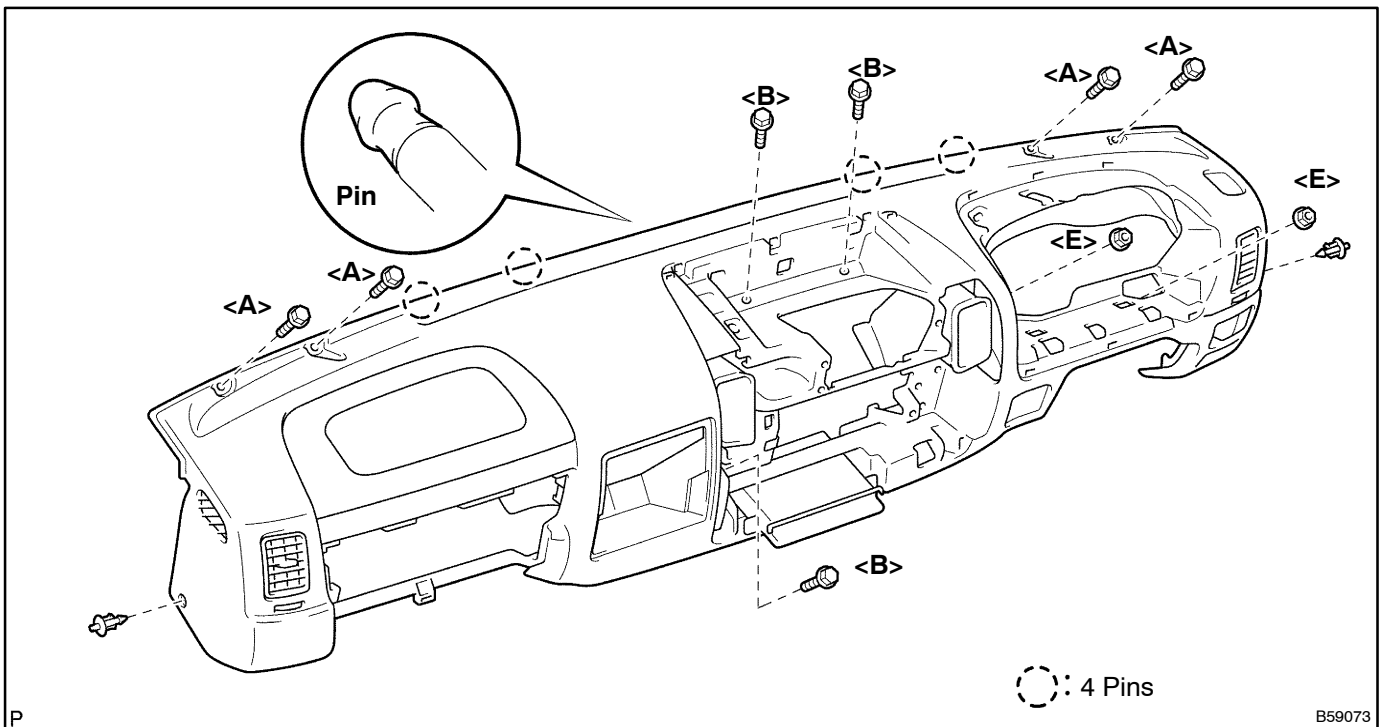
- (a) Remove the 3 screws.
- (b) Disconnect the connectors and remove the combination meter.

**17. REMOVE OIL RESERVOIR TANK COVER RH**

- (a) Disengage the 6 claws and remove the oil reservoir tank cover.

18. REMOVE INSTRUMENT PANEL SUB-ASSY

- (a) Remove the 2 clips.
- (b) Remove the 2 nuts and 7 bolts.
- (c) Disconnect the connectors and remove the instrument panel.

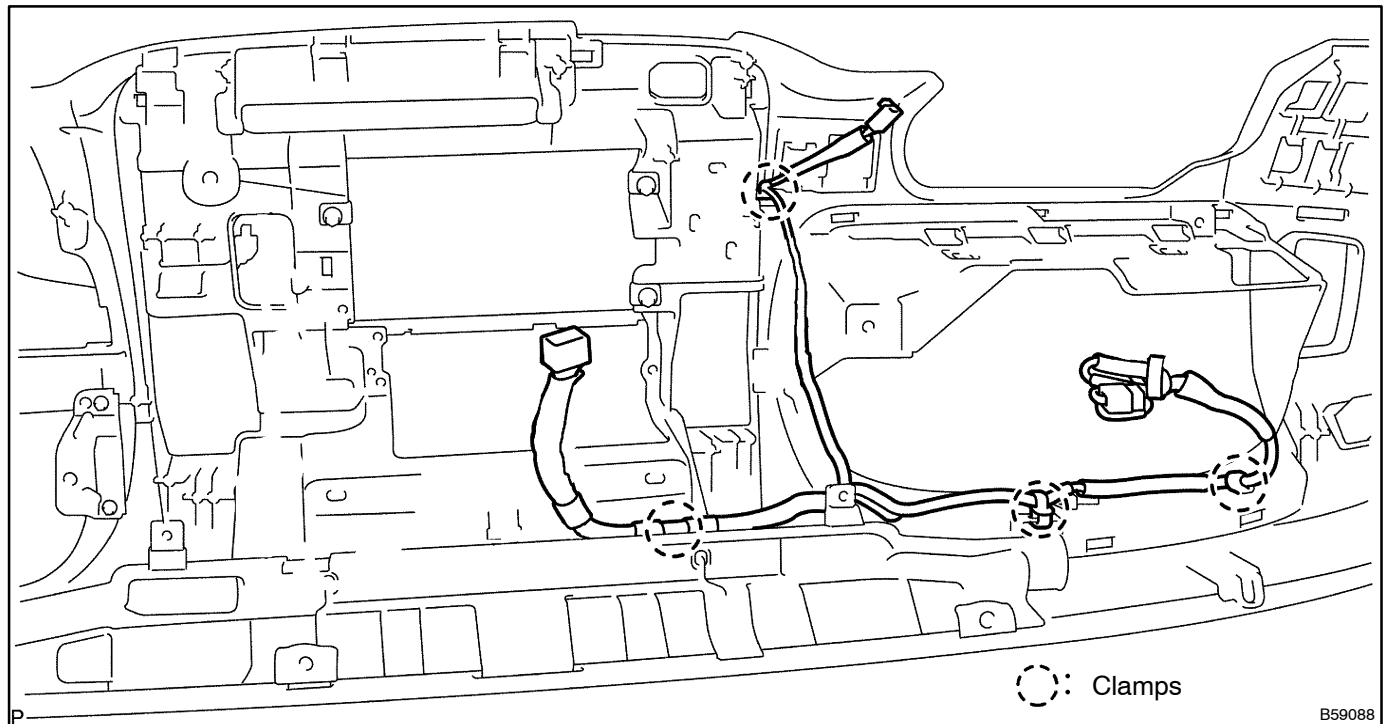
**19. REMOVE INSTRUMENT PANEL CUP HOLDER ASSY**

- (a) Remove the 2 screws and instrument panel cup holder.

20. REMOVE FRONT ASH RECEPTACLE RETAINER SUB-ASSY

- (a) Remove the 3 screws and ash receptacle retainer.

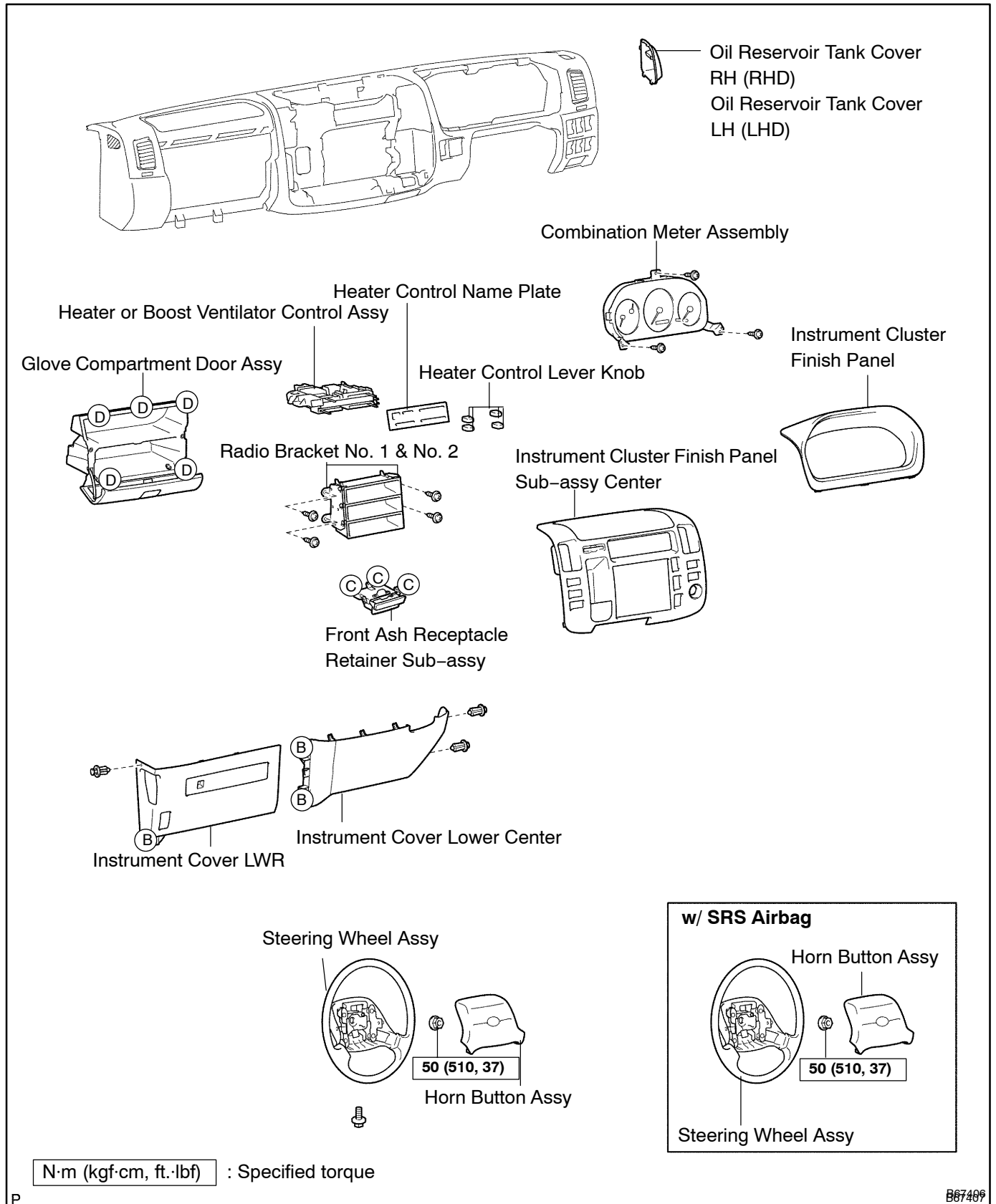
- 21. REMOVE HEATER TO REGISTER DUCT NO.1**
 - (a) Remove the 2 screws and duct.
- 22. REMOVE HEATER TO REGISTER DUCT NO.4**
 - (a) Remove the 3 screws and duct.
- 23. REMOVE HEATER TO REGISTER DUCT CENTER**
 - (a) Remove the 2 screws and duct.
- 24. REMOVE HEATER TO REGISTER DUCT CENTER**
 - (a) Remove the 2 screws and duct.
- 25. REMOVE SIDE DEFROSTER DUCT ASSY RH**
 - (a) Remove the screw and defroster duct.
- 26. REMOVE SIDE DEFROSTER DUCT ASSY LH**
 - (a) Remove the screw and defroster duct.
- 27. REMOVE INSTRUMENT PANEL REGISTER ASSY NO.1**
 - (a) Remove the 2 screws and instrument panel register.
- 28. REMOVE INSTRUMENT PANEL REGISTER ASSY NO.1**
 - (a) Remove the 2 screws and instrument panel register.
- 29. REMOVE INSTRUMENT PANEL WIRE**
 - (a) Disengage the clamps and remove the instrument panel wire.



- 30. REMOVE SIDE DEFROSTER NOZZLE NO.1**
- 31. REMOVE INSTRUMENT SIDE PANEL RH**
 - (a) Remove the 4 screws and instrument side panel.
- 32. INSTALL STEERING WHEEL ASSY**
- 33. INSPECT STEERING WHEEL CENTER POINT**
- 34. INSTALL HORN BUTTON ASSY**

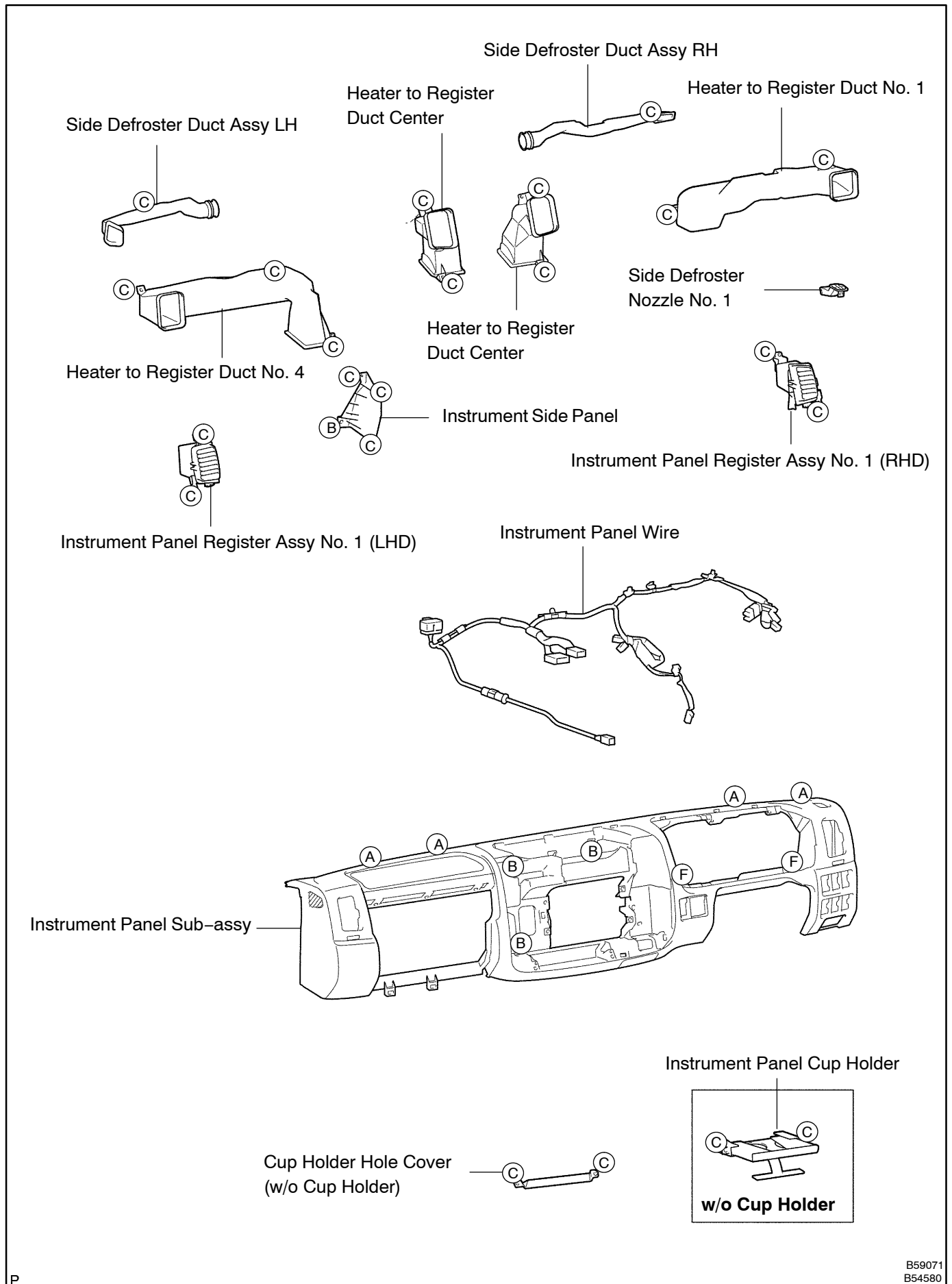
INSTRUMENT PANEL (REGULAR CAB MODELS) COMPONENTS

710EZ-01



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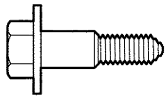
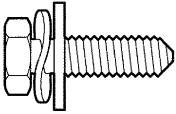
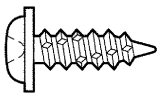
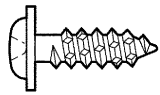
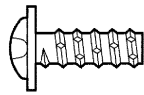
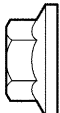
REPLACEMENT

1. TABLE OF BOLT, SCREW AND NUT

HINT:

- Indicate the bolts, screws and nuts, which are necessary for installation and removal of the instrument panel, in the illustration and the text with alphabets.
- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

2. DISCONNECT BATTERY NEGATIVE TERMINAL

mm (in.)					
Code	Shape	Code	Shape	Code	Shape
<A>	 <p>$\phi = 17.5$ (0.6948) $L = 25$ (0.9925)</p>		 <p>$\phi = 6$ (0.2382) $L = 22$ (0.8734)</p>	<C>	 <p>$\phi = 5.22$ (0.2072) $L = 16$ (0.6352)</p>
B33595	55394-37010	B33319	90119-06022	B30768	93567 - 15016
<D>	 <p>$\phi = 5.22$ (0.2072) $L = 16$ (0.6352)</p>	<E>	 <p>$\phi = 8$ (0.3176) $L = 18$ (0.7146)</p>	<F>	 <p>$\phi = 6$ (0.2382)</p>
B30768	93567-55016	E34413	93568 - 15012	B34041	90179 - 06009

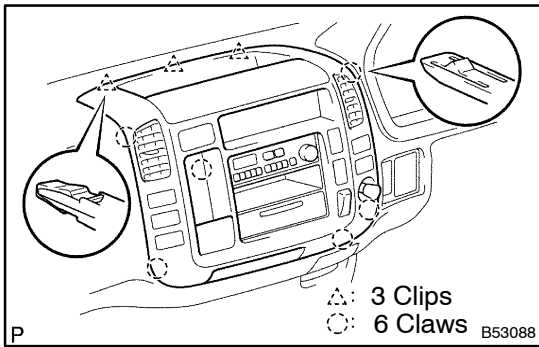
3. INSPECT CENTER FRONT WHEEL

4. REMOVE HORN BUTTON ASSY (W/O SRS AIRBAG) (See page 50-8)

5. REMOVE HORN BUTTON ASSY (W/ SRS AIRBAG) (See page 50-8)

6. REMOVE STEERING WHEEL ASSY (See page 50-8)

SST 09950-50012 (09951-05010, 09952-05010, 09953-05020, 09954-05020)



7. REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSY CENTER

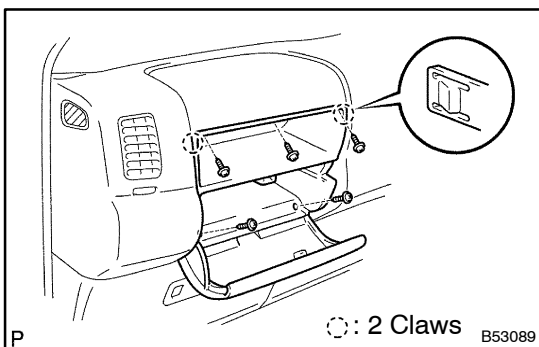
- (a) Disengage the 3 clips and 6 claws.
- (b) Disconnect the connectors and remove the instrument cluster finish panel.

8. REMOVE HEATER CONTROL LEVER KNOB (See page 55-24)

9. REMOVE HEATER CONTROL NAME PLATE (See page 55-24)

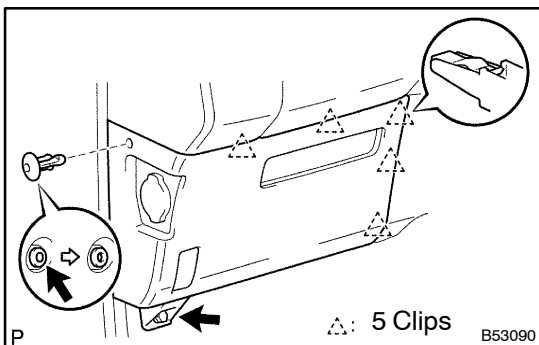
10. REMOVE HEATER OR BOOST VENTILATOR CONTROL ASSY (See page 55-24)

11. REMOVE RADIO BRACKET NO. 1 & NO. 2 (See page 67-2)



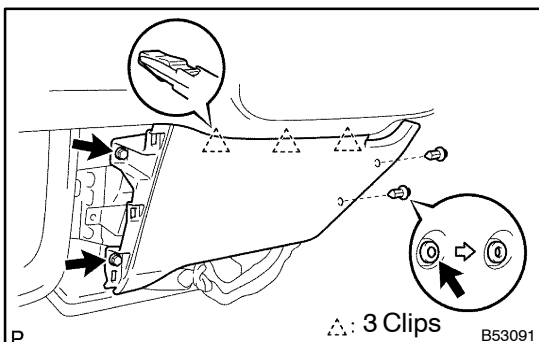
12. REMOVE GLOVE COMPARTMENT DOOR ASSY

- (a) Remove the 5 screws <D>.
- (b) Disengage the 2 claws and remove the glove compartment door.



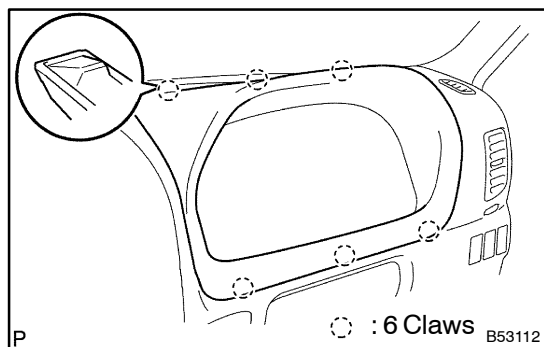
13. REMOVE INSTRUMENT COVER LWR

- (a) Remove the clip and bolt.
- (b) Disengage the 5 clips and remove the instrument cover.

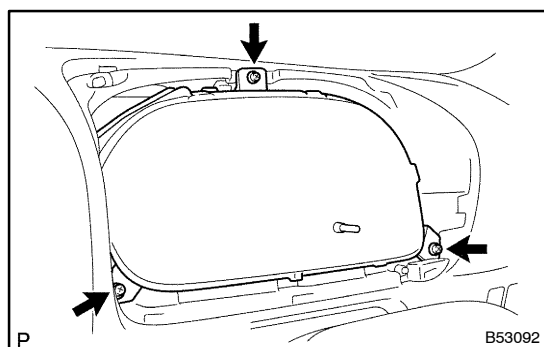


14. REMOVE INSTRUMENT COVER LOWER CENTER

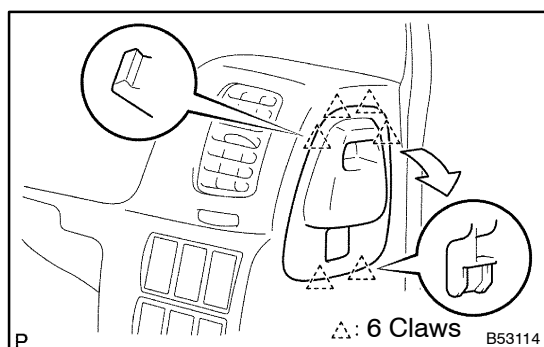
- (a) Remove the 2 clips and 2 bolts.
- (b) Disengage the 3 clips and remove the instrument cover.

**15. REMOVE INSTRUMENT CLUSTER FINISH PANEL**

- (a) Using a moulding remover, disengage the 6 claws and remove the finish panel.

**16. REMOVE COMBINATION METER ASSEMBLY**

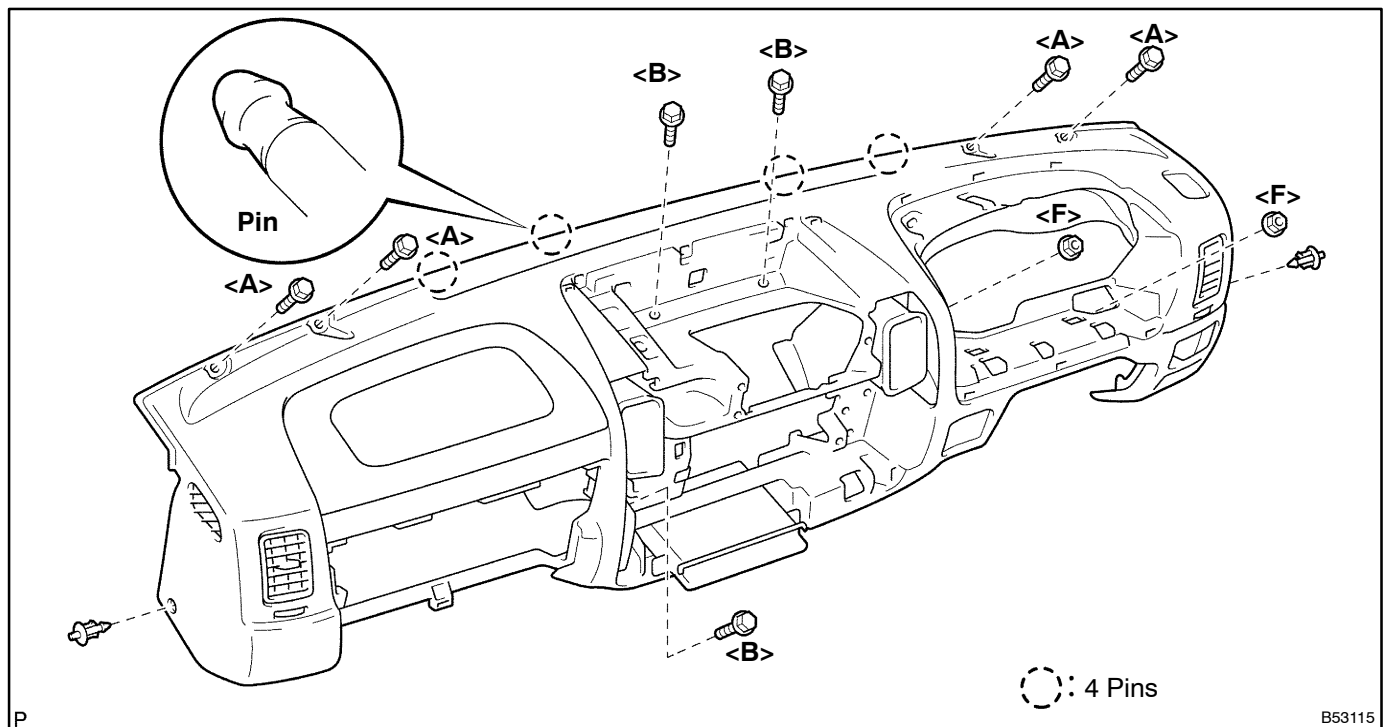
- (a) Remove the 3 screws.
(b) Disconnect the connectors and remove the combination meter.

**17. REMOVE OIL RESERVOIR TANK COVER RH**

- (a) Disengage the 6 claws and remove the reservoir tank cover.

18. REMOVE INSTRUMENT PANEL SUB-ASSY

- (a) Remove the 2 clips.
- (b) Remove the 2 nuts <F> and 7 bolts <A> .
- (c) Disconnect the connectors and remove the instrument panel.

**19. REMOVE INSTRUMENT PANEL CUP HOLDER ASSY**

- (a) Remove the 2 screws <C> and cup holder.

20. REMOVE CUP HOLDER HOLE COVER**21. REMOVE FRONT ASH RECEPTACLE RETAINER SUB-ASSY**

- (a) Remove the 3 screws <C> and ash receptacle retainer.

22. REMOVE HEATER TO REGISTER DUCT NO.1

- (a) Remove the 2 screws <C> and heater to register duct.

23. REMOVE HEATER TO REGISTER DUCT NO.4**24. REMOVE HEATER TO REGISTER DUCT CENTER**

- (a) Remove the 2 screws <C> and heater to register duct center for RH.

25. REMOVE HEATER TO REGISTER DUCT CENTER

- (a) Remove the 2 screws <C> and heater to register duct center for LH.

26. REMOVE SIDE DEFROSTER DUCT ASSY RH

- (a) Remove the screw <C> and defroster duct.

27. REMOVE SIDE DEFROSTER DUCT ASSY LH**28. REMOVE INSTRUMENT PANEL REGISTER ASSY NO.1 (RH)****29. REMOVE INSTRUMENT PANEL REGISTER ASSY NO.1 (LH)****30. REMOVE INSTRUMENT PANEL WIRE****31. REMOVE SIDE DEFROSTER NOZZLE NO.1****32. REMOVE INSTRUMENT SIDE PANEL RH****33. CENTER SPIRAL CABLE (W/ SRS AIRBAG) (See page 50-8)****34. INSTALL STEERING WHEEL ASSY (See page 50-8)****35. INSPECT STEERING WHEEL CENTER POINT (See page 50-8)****36. INSTALL HORN BUTTON ASSY (W/O SRS AIRBAG) (See page 50-8)****37. INSTALL HORN BUTTON ASSY (W/ SRS AIRBAG) (See page 50-8)**

38. **INSPECT HORN BUTTON ASSY (W/ SRS AIRBAG) (See page 50-8)**
39. **INSPECT SRS WARNING LIGHT (W/ SRS AIRBAG) (See page 05-216)**

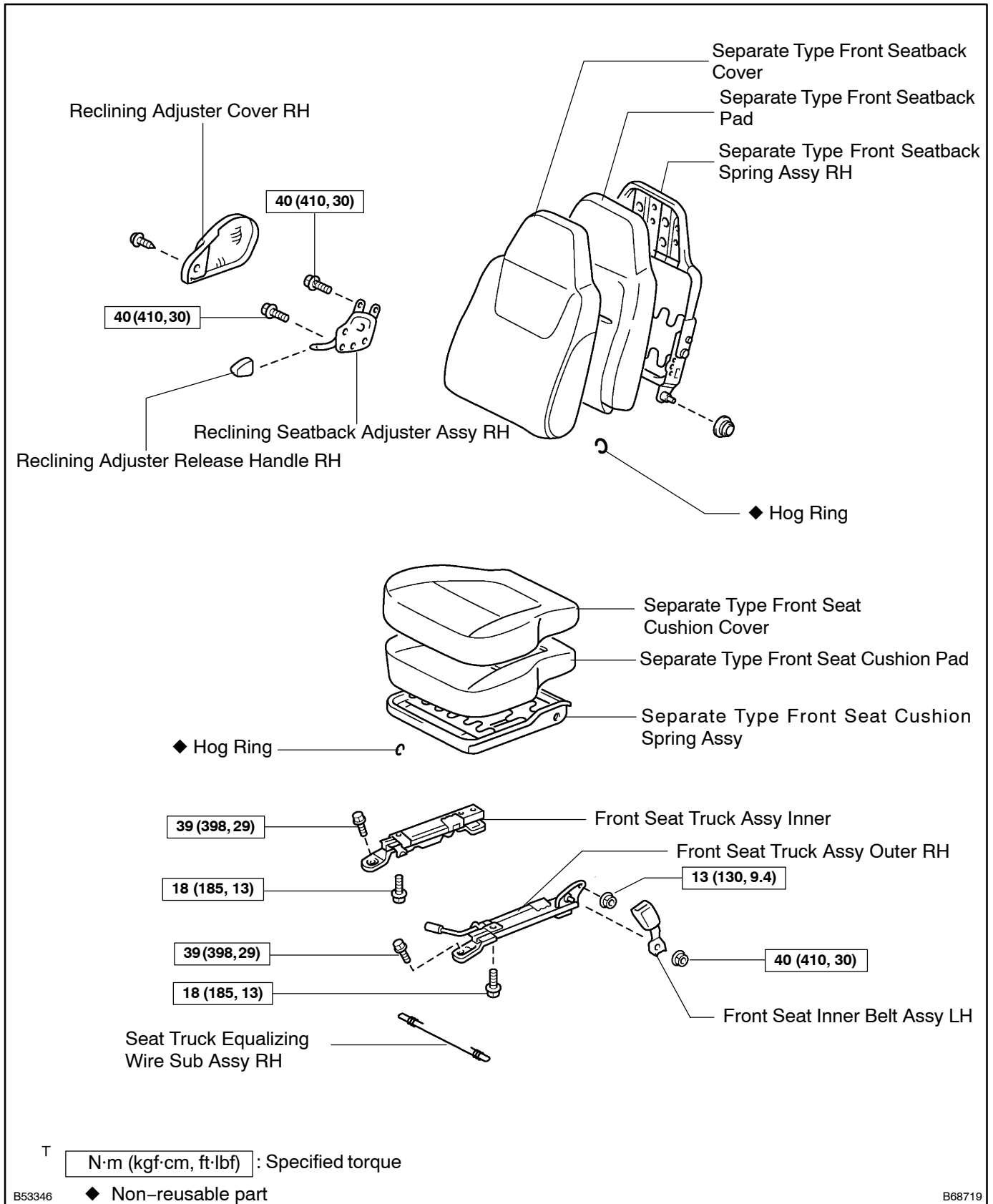
SEAT

FRONT SEAT ASSEMBLY	
(DRIVER SEAT)	72-1
COMPONENTS	72-1
OVERHAUL	72-2
FRONT SEAT ASSEMBLY	
(PASSENGER SEAT)	
(WIDE CAB MODELS)	72-7
COMPONENTS	72-7
OVERHAUL	72-8
FRONT SEAT ASSEMBLY	
(PASSENGER SEAT)	
(REGULAR CAB MODELS)	72-11
COMPONENTS	72-11
REPLACEMENT	72-12

FRONT SEAT ASSEMBLY (DRIVER SEAT)

COMPONENTS

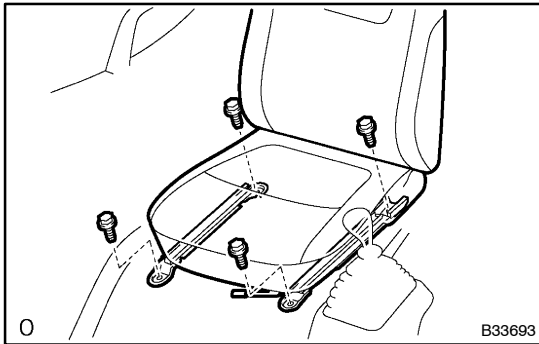
720HF-01



OVERHAUL

HINT:

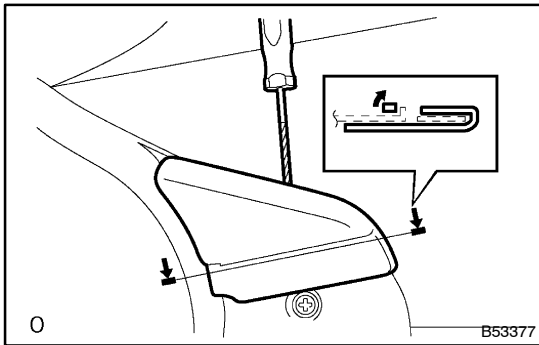
The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.



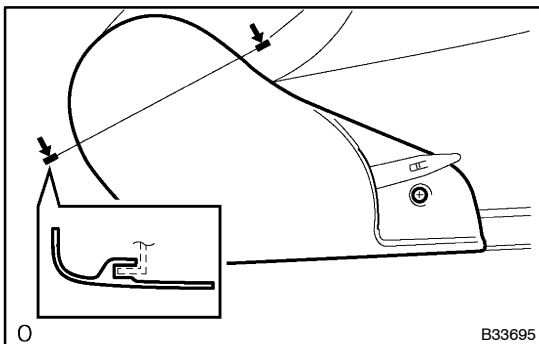
1. REMOVE FRONT SEAT ASSEMBLY RH

- (a) Remove the seat track cover.
- (b) Remove the 4 bolts.
- (c) Remove the front seat.

2. REMOVE FRONT SEAT INNER BELT ASSY RH

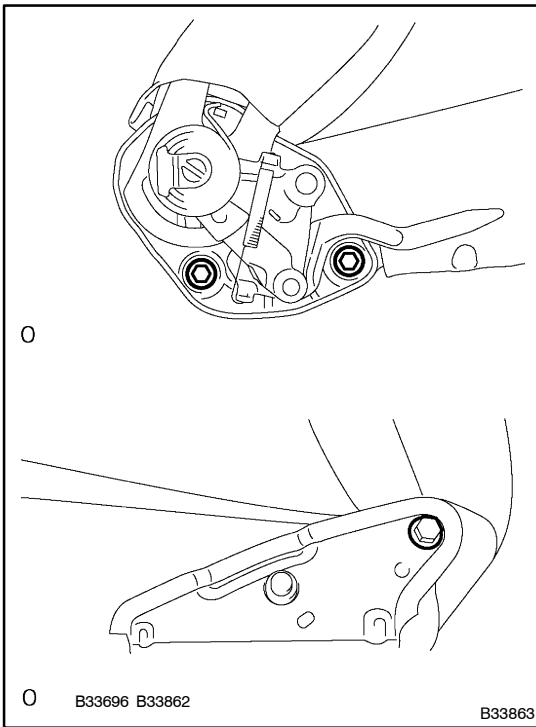


3. REMOVE RECLINING ADJUSTER RELEASE HANDLE RH

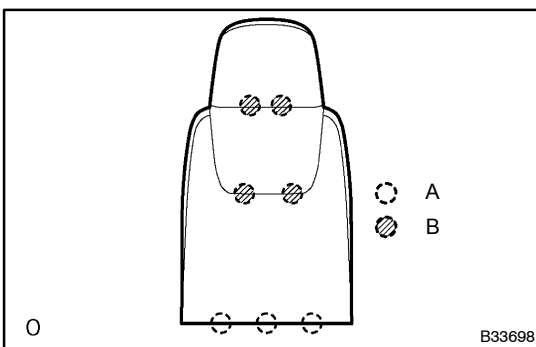


4. REMOVE RECLINING ADJUSTER COVER RH

- (a) Remove the screw and reclining adjuster cover.

**5. REMOVE FRONT SEAT BACK ASSEMBLY RH**

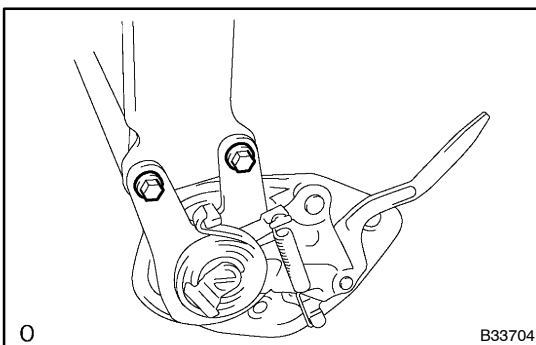
- (a) Remove the 2 bolts, nut and seatback.
- (b) Remove the bush from the seatback.

**6. REMOVE SEPARATE TYPE FRONT SEAT BACK COVER**

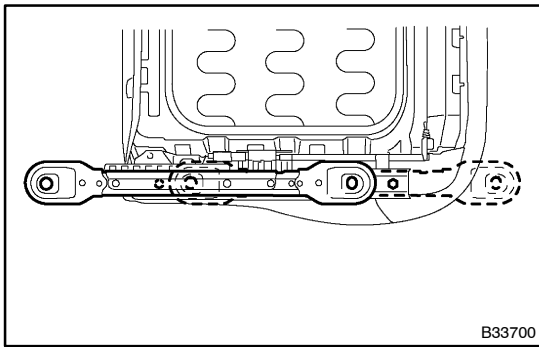
- (a) Remove the 3 hog rings "A", as shown in the illustration.
- (b) Remove the 4 hog rings "B", as shown in the illustration.
- (c) Remove the seatback cover.

7. REMOVE SEPARATE TYPE FRONT SEAT BACK PAD

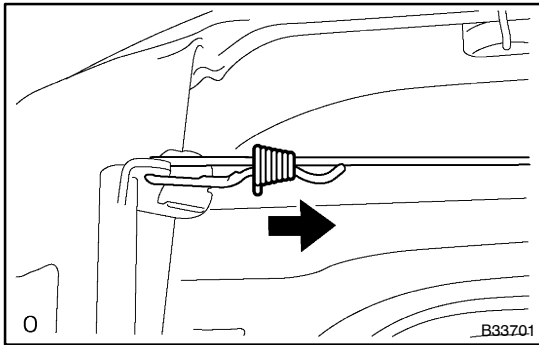
- (a) Remove the seatback pad from the seatback spring.

**8. REMOVE RECLINING SEAT BACK ADJUSTER ASSY RH**

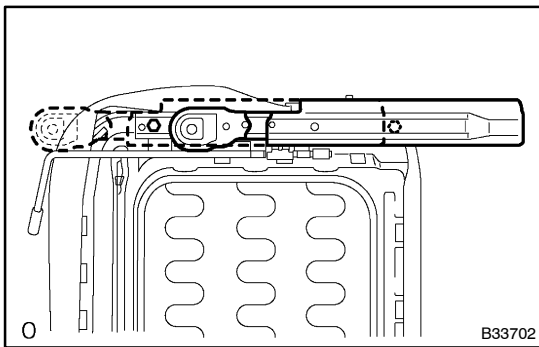
- (a) Remove the 2 bolts and reclining seatback adjuster RH from seatback spring.

**9. REMOVE FRONT SEAT TRACK ASSY OUTER RH**

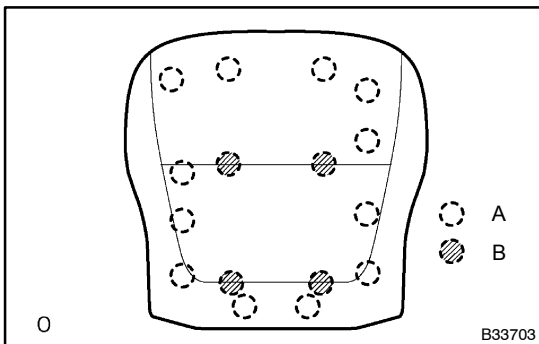
- (a) Remove the front side bolt.
- (b) Remove the rear side bolt and front seat track.

**10. REMOVE SEAT TRACK EQUALIZING WIRE SUB-ASSY RH**

- (a) Remove the seat track equalizing wire.

**11. REMOVE FRONT SEAT TRACK ASSY INNER RH**

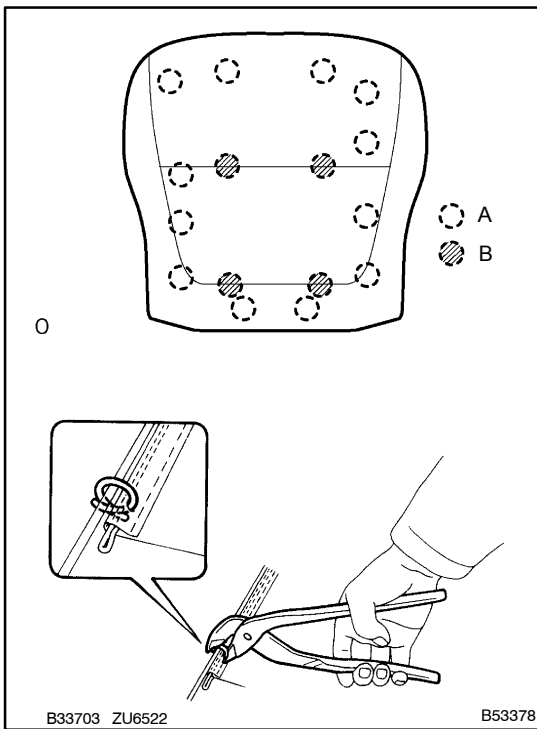
- (a) Remove the front side bolt.
- (b) Remove the rear side bolt and front seat track.

**12. REMOVE SEPARATE TYPE FRONT SEAT CUSHION COVER**

- (a) Remove the 12 hog rings "A", as shown in the illustration.
- (b) Remove the 4 hog rings "B", as shown in the illustration.
- (c) Remove the front seat cushion cover.

13. REMOVE SEPARATE TYPE FRONT SEAT CUSHION PAD

- (a) Remove the seat cushion pad from the seat cushion spring.



14. INSTALL SEPARATE TYPE FRONT SEAT CUSHION COVER

- (a) Install the seat cushion cover to the seat cushion pad.
- (b) Using hog ring pliers, install the seat cushion cover with pad with new hog rings "B", as shown in the illustration.
- (c) Using hog ring pliers, install the seat cushion cover RH with pad with new hog rings "A", as shown in the illustration.

15. INSTALL FRONT SEAT TRACK ASSY INNER RH

- (a) Temporarily install the rear side of the seat track to the seat cushion with the bolt.
- (b) Install the front side bolt.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

- (c) Tighten the rear side bolt.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

16. INSTALL SEAT TRACK EQUALIZING WIRE SUB-ASSY RH

- (a) Install the seat equalizing wire to the seat track.

17. INSTALL FRONT SEAT TRACK ASSY OUTER RH

- (a) Temporarily install the rear side of the seat track to the seat cushion with the bolt.
- (b) Install the front side bolt.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

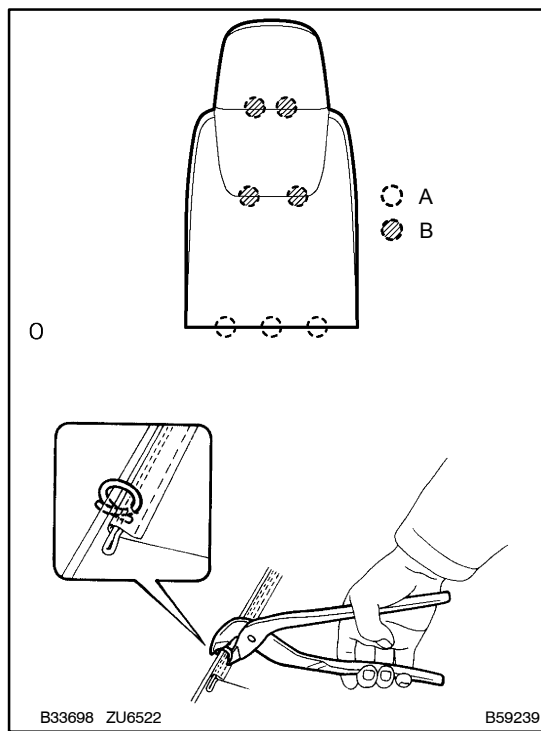
- (c) Tighten the rear side bolt.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

18. INSTALL RECLINING SEAT BACK ADJUSTER ASSY RH

- (a) Install the reclining seatback adjuster to the seatback spring with the 2 bolts.

Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)



19. INSTALL SEPARATE TYPE FRONT SEAT BACK COVER

- (a) Install the seatback cover to the seatback pad.
- (b) Using hog ring pliers, install the seatback cover with pad with new hog rings "B", as shown in the illustration.
- (c) Using hog ring pliers, install the seatback cover with pad with new hog rings "A", as shown in the illustration.

20. INSTALL FRONT SEAT BACK ASSEMBLY RH

- (a) Install the bush to the seat back.
- (b) Install the seat back with the 2 bolts and nut.

Torque:

Bolt: 40 N·m (410 kgf·cm, 30 ft·lbf)

Nut: 13 N·m (130 kgf·cm, 9.4 ft·lbf)

21. INSTALL FRONT SEAT INNER BELT ASSY RH

Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)

22. INSTALL FRONT SEAT ASSEMBLY RH

- (a) Temporarily install the front side of the front seat with the 2 bolts.
- (b) Install the 2 rear side bolts.

Torque: 39.0 N·m (398 kgf·cm, 29 ft·lbf)

- (c) Tighten the 2 front side bolts.

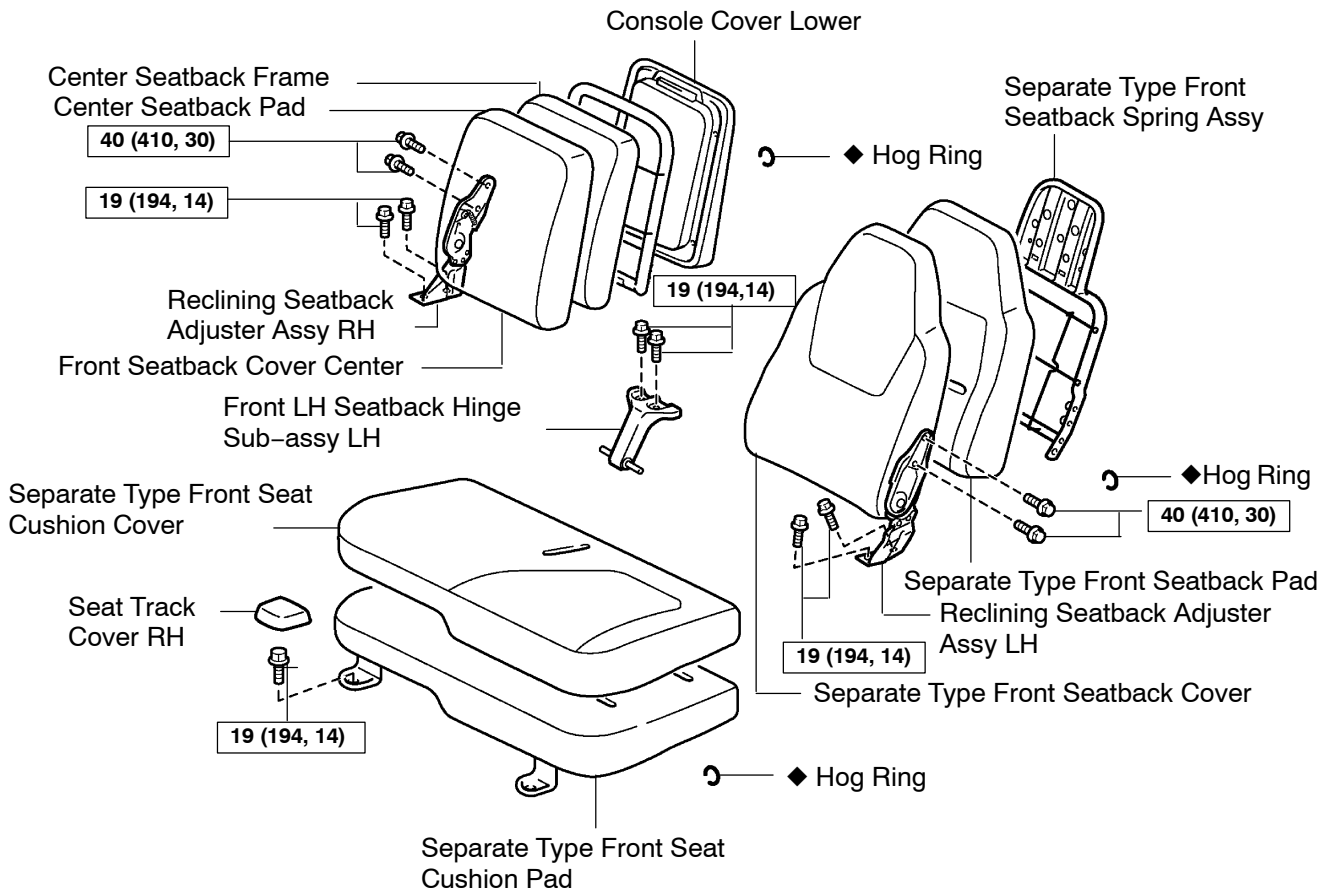
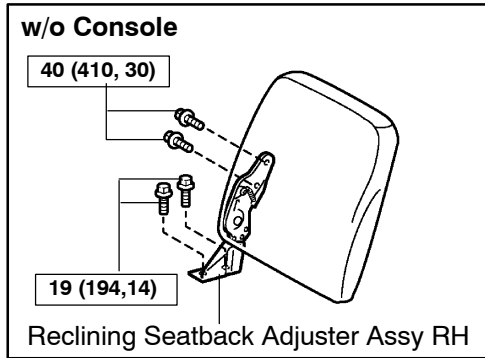
Torque: 39.0 N·m (398 kgf·cm, 29 ft·lbf)

- (d) Install the seat track cover.

FRONT SEAT ASSEMBLY (PASSENGER SEAT) (WIDE CAB MODELS)

COMPONENTS

720HH-01



N·m (kgf·cm, ft·lbf) : Specified torque

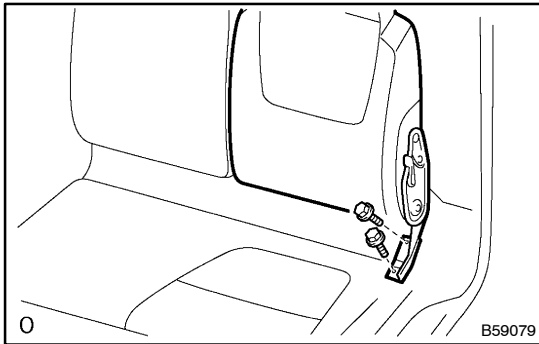
◆ Non-reusable part

B68720

OVERHAUL

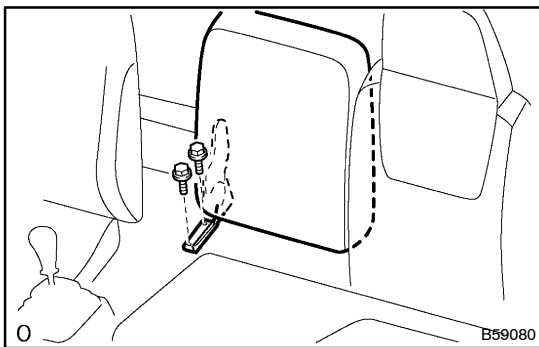
HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.



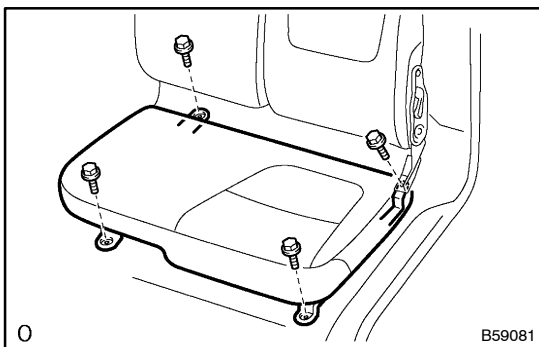
1. REMOVE FRONT SEAT BACK ASSEMBLY LH

- (a) Remove the 2 bolts and front seat back.



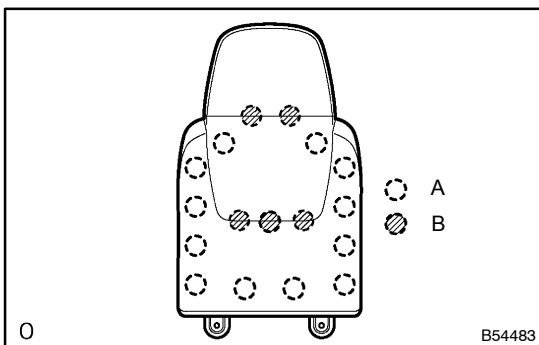
2. REMOVE FRONT SEAT BACK CENTER ASSEMBLY

- (a) Remove the 2 bolts and front seat back.



3. REMOVE FRONT SEAT CUSHION ASSEMBLY LH

- (a) Remove the seat track cover.
(b) Remove the 4 bolts and front seat cushion.



4. REMOVE SEPARATE TYPE FRONT SEAT BACK COVER

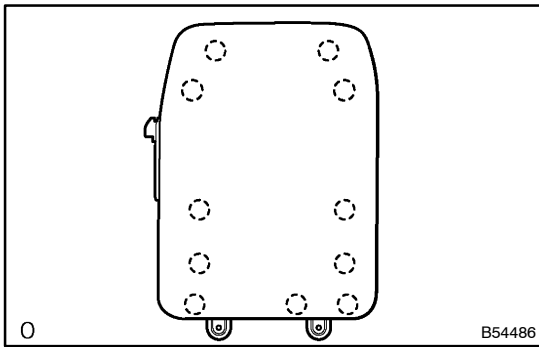
- (a) Remove the 12 hog rings "A", as shown in the illustration.
(b) Remove the 5 hog rings "B", as shown in the illustration.
(c) Remove the front seat back cover.

5. REMOVE SEPARATE TYPE FRONT SEAT BACK PAD

- (a) Remove the seat back pad from the seat back spring.

6. REMOVE CONSOLE COVER LOWER

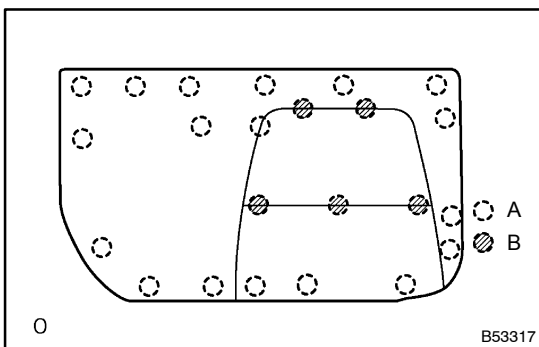
- (a) Remove the screw and reclining remote control lever from the seat back.

**7. REMOVE FRONT SEAT BACK COVER CENTER**

- (a) Remove the 11 hog rings and seat back cover center, as shown in the illustration.

8. REMOVE CENTER SEAT BACK PAD

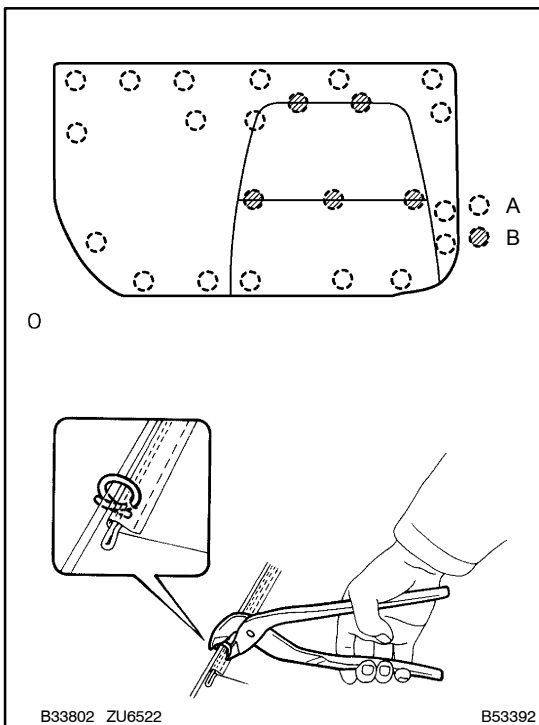
- (a) Remove the center seatback pad from the center seat back frame.

**9. REMOVE SEPARATE TYPE FRONT SEAT CUSHION COVER**

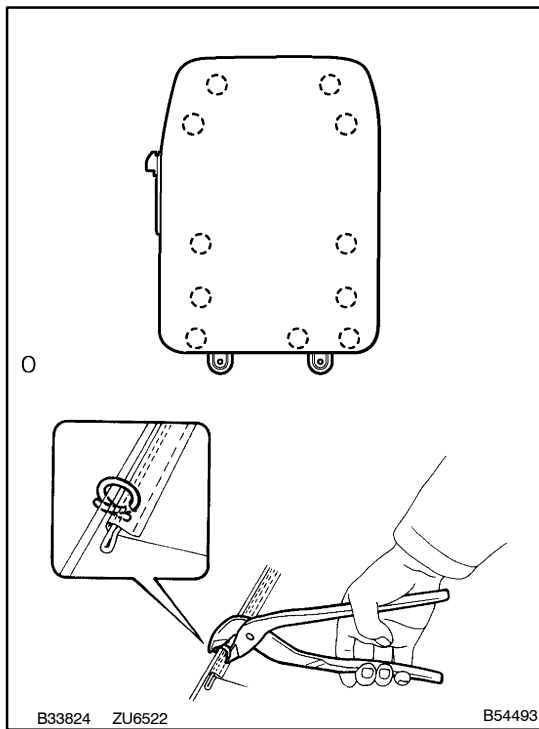
- (a) Remove the 18 hog rings "A", as shown in the illustration.
 (b) Remove the 5 hog rings "B", as shown in the illustration.
 (c) Remove the seat cushion cover.

10. REMOVE SEPARATE TYPE FRONT SEAT CUSHION PAD

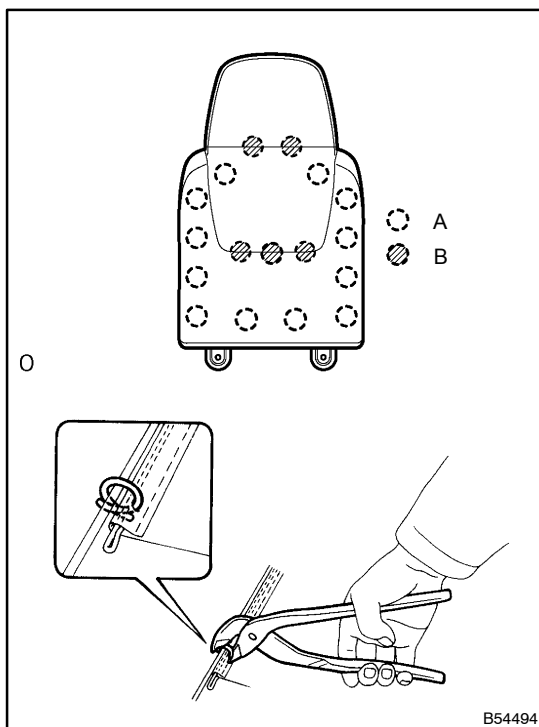
- (a) Remove the seat cushion pad from the cushion frame.

**11. INSTALL SEPARATE TYPE FRONT SEAT CUSHION COVER**

- (a) Install the seat cushion cover to the seat cushion pad.
 (b) Using hog ring pliers, install the seat cushion cover with pad with new hog rings "B", as shown in the illustration.
 (c) Using hog ring pliers, install the seat cushion cover with pad with new hog rings "A", as shown in the illustration.

**12. INSTALL FRONT SEAT BACK COVER CENTER**

- (a) Install the seatback cover to the center seat back pad.
- (b) Using hog ring pliers, install the seatback cover center with pad with new hog rings, as shown in the illustration.

**13. INSTALL SEPARATE TYPE FRONT SEAT BACK COVER**

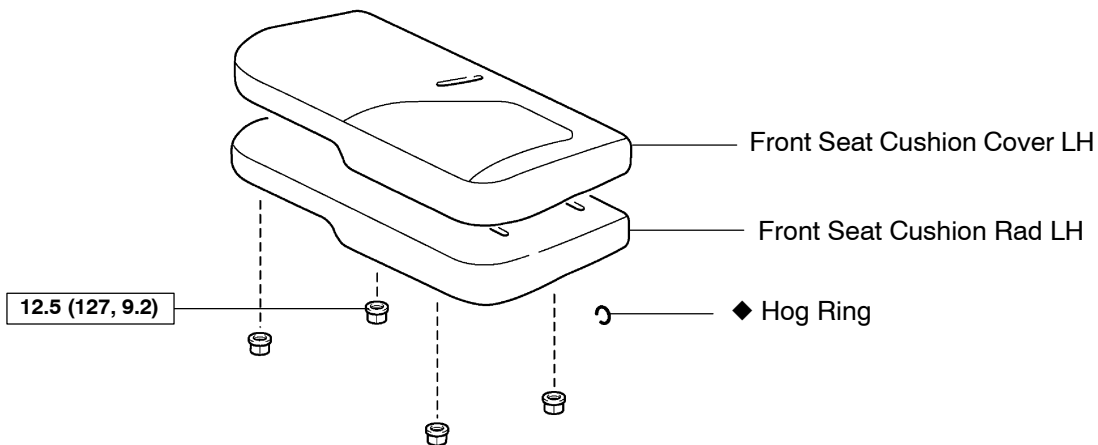
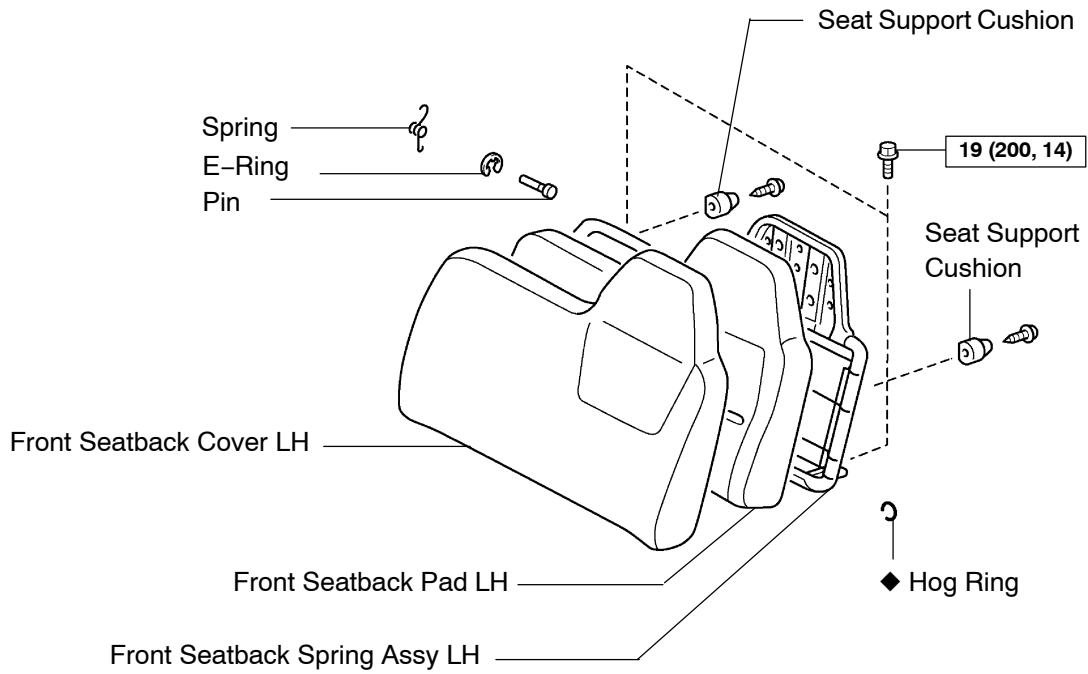
- (a) Install the seatback cover LH to the seatback pad.
- (b) Using hog ring pliers, install the seatback cover with pad with new hog rings "B", as shown in the illustration.
- (c) Using hog ring pliers, install the seatback cover with pad with new hog rings "A", as shown in the illustration.
- (d) Install the seat support cushion to seat back assy with the screw.
- (e) Fix the pin and spring to seat back assy LH with the E-ring.

14. INSTALL FRONT SEAT CUSHION ASSEMBLY LH
15. INSTALL FRONT SEAT BACK CENTER ASSEMBLY
16. INSTALL FRONT SEAT BACK ASSEMBLY LH

FRONT SEAT ASSEMBLY (PASSENGER SEAT) (REGULAR CAB MODELS)

COMPONENTS

720HJ-01



T

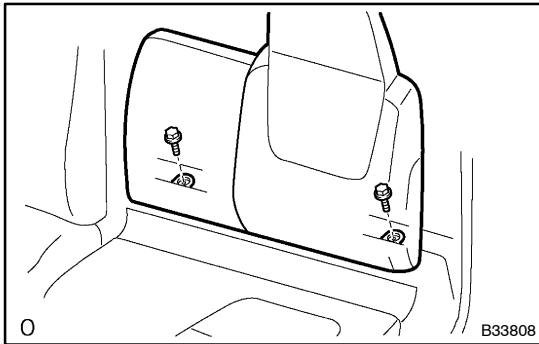
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

REPLACEMENT

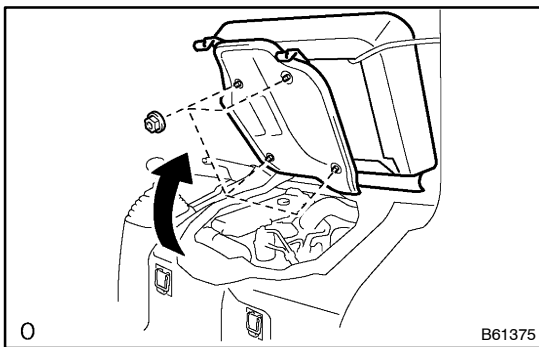
HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.



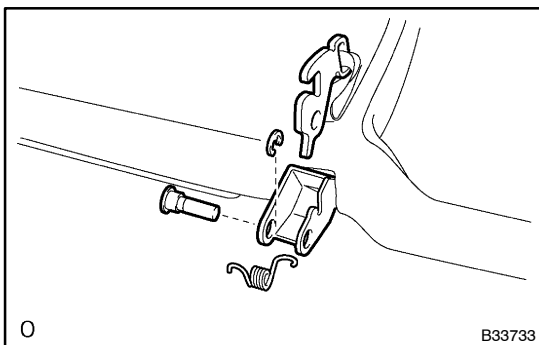
1. REMOVE FRONT SEATBACK ASSY LH

- (a) Remove the 2 bolts and front seatback.



2. REMOVE FRONT SEAT CUSHION ASSY LH

- (a) Remove the 4 nuts and front seat cushion.

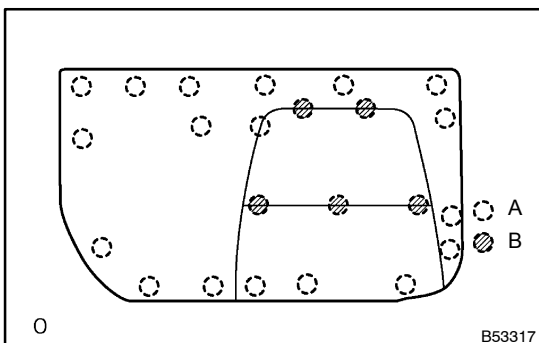


3. REMOVE FRONT SEATBACK COVER LH

- (a) Remove the E-ring, pin and spring from seatback.
 (b) Remove the 2 screws and 2 seat support cushions from the seatback.

4. REMOVE FRONT SEATBACK PAD LH

- (a) Remove the seatback pad from the seatback spring.

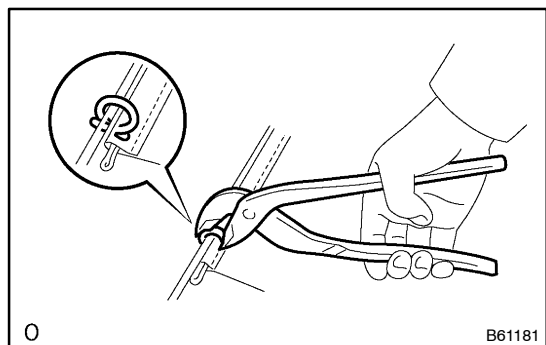


5. REMOVE FRONT SEAT CUSHION COVER LH

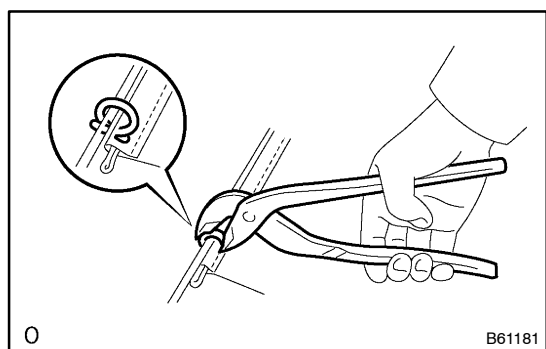
- (a) Remove the 18 hog rings "A", as shown in the illustration.
 (b) Remove the seat cushion cover.

6. REMOVE FRONT SEAT CUSHION PAD LH

- (a) Remove the seat cushion pad from the cushion frame.

**7. INSTALL FRONT SEAT CUSHION COVER LH**

- (a) Install the seat cushion cover to the seat cushion pad.
(b) Using hog ring pliers, install the seat cushion cover to the pad with new hog rings.

**8. INSTALL FRONT SEATBACK COVER LH**

- (a) Install the seatback cover to the seatback pad.
(b) Using hog ring pliers, install the seatback cover to the pad with new hog rings.
(c) Install the 2 seat support cushions to the seatback with the 2 screws.
(d) Fix the pin and spring to the seatback with the E-ring.

9. INSTALL FRONT SEAT CUSHION ASSY LH**10. INSTALL FRONT SEATBACK ASSY LH**

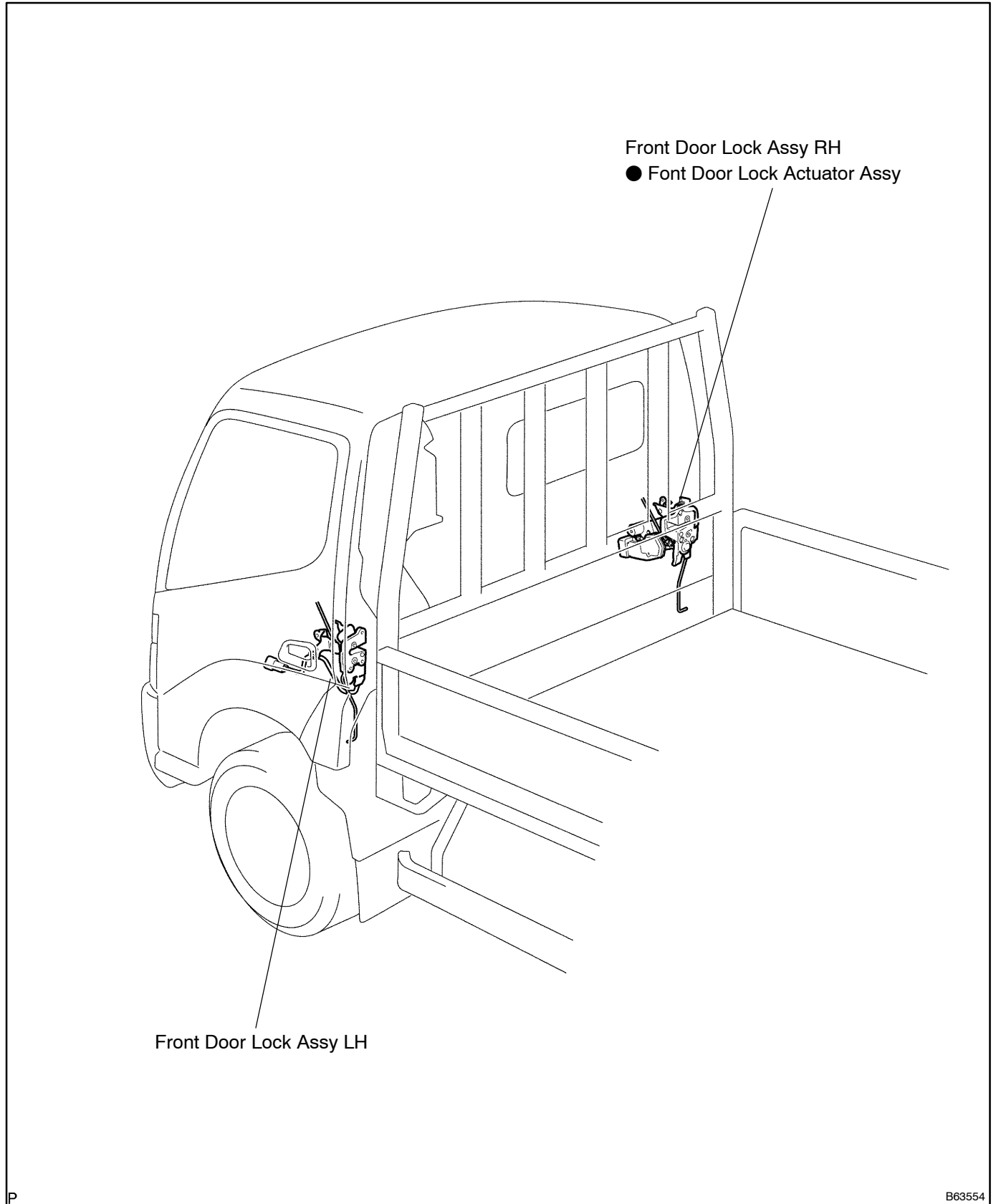
THEFT DETERRENT & DOOR LOCK

POWER DOOR LOCK	
CONTROL SYSTEM	73-1
LOCATION	73-1
ON-VEHICLE INSPECTION	73-3
PROBLEM SYMPTOMS TABLE	73-4
INSPECTION	73-5

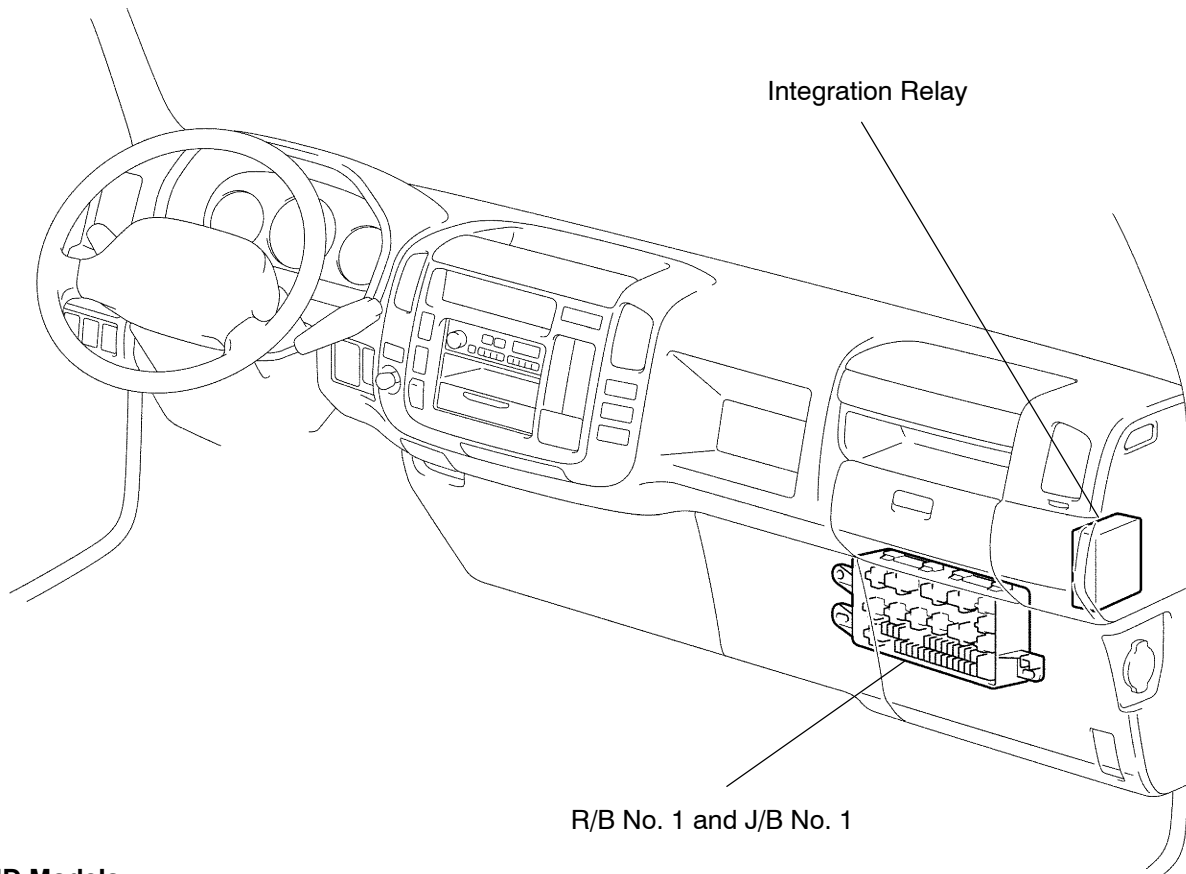
POWER DOOR LOCK CONTROL SYSTEM

LOCATION

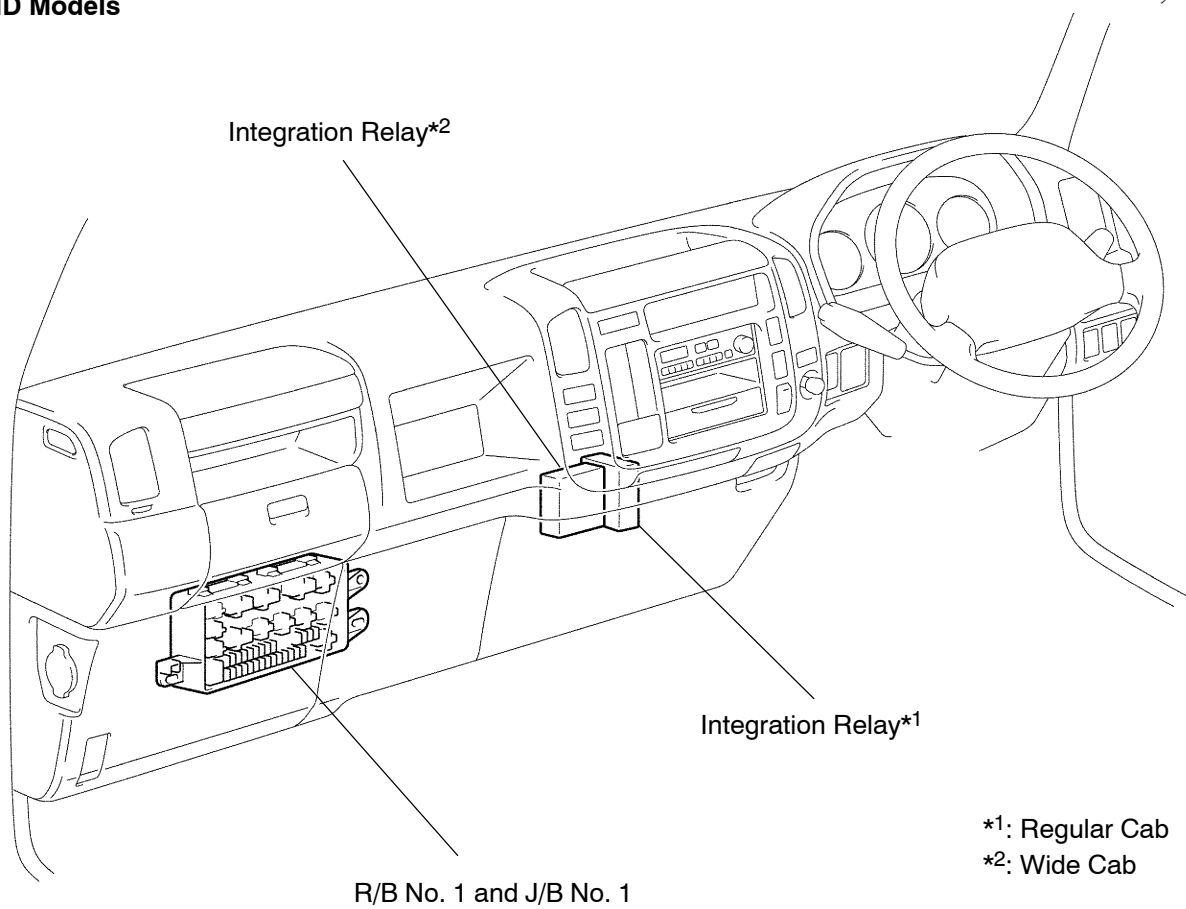
730A8-02



LHD Models



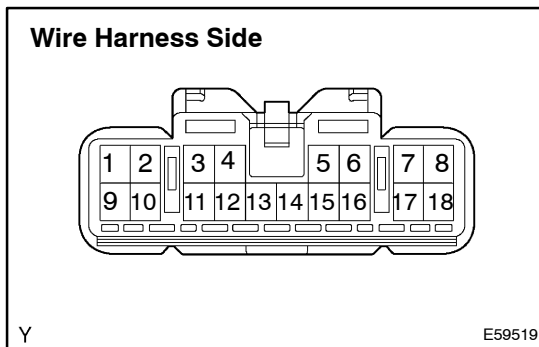
RHD Models



ON-VEHICLE INSPECTION

1. BASIC INSPECTION FOR POWER DOOR LOCK

- Check that all the doors are locked when the door lock knob is pushed in the lock side and that all the doors are unlocked when the door lock knob is pulled out to the unlock side.
- Check that all the doors are locked when the driver side door is locked by a key operation from the outside of the vehicle and that all the doors are unlocked when the driver side door is unlocked by a key operation from the outside of the vehicle.



2. CHECK INTEGRATION RELAY

- Disconnect the integration relay connector.
- Check the connector on the wire harness side, as shown in the chart.

Standard:

Tester Connection	Condition	Specified Condition
7 ↔ Ground	Constant	Battery voltage
8 ↔ 18	Constant	Continuity
11 ↔ Ground	Door lock control switch LOCK	No continuity
11 ↔ Ground	Door lock control switch UNLOCK	Continuity
12 ↔ Ground	Door lock control switch LOCK	Continuity
12 ↔ Ground	Door lock control switch UNLOCK	No continuity
14 ↔ Ground	Constant	Continuity

If the result is not as specified, there may be a malfunction on the wire harness side.

- Reconnect the integration relay connector and check the voltage of each terminal of the connector.

Standard:

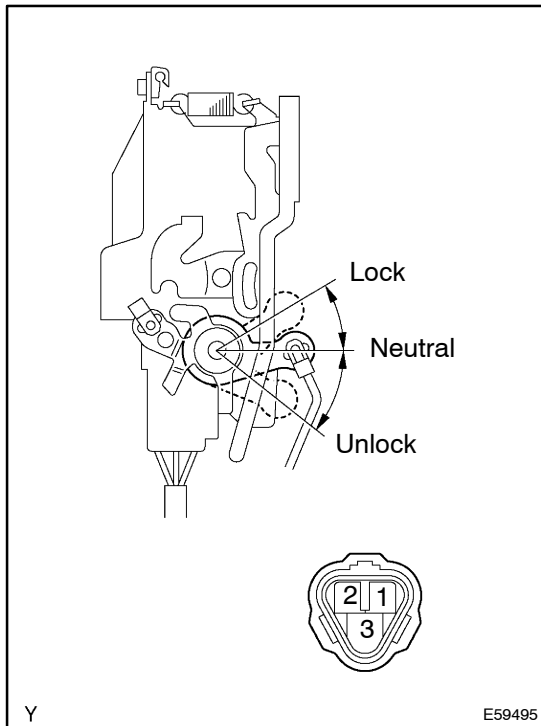
Tester Connection	Condition	Specified Condition
8 ↔ Ground	Door lock control switch UNLOCK	0 V
8 ↔ Ground	Door lock control switch LOCK	20 - 28 V → 0 V
18 ↔ Ground	Door lock control switch UNLOCK	20 - 28 V → 0 V
18 ↔ Ground	Door lock control switch LOCK	0 V

If the result is not as specified, the integration relay may malfunction.

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See Page
Door lock control system does not operate.	1. POWER WINDOW fuse	-
	2. Door lock assy (Door lock control switch) (Driver side)	73-5
	3. Integration relay	73-3
	4. Door lock actuator	73-5
	5. Wire harness	-

INSPECTION



1. LHD Models:

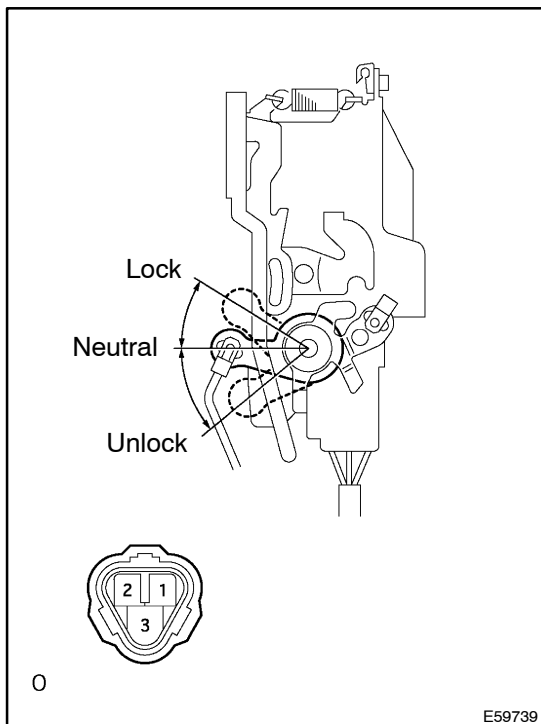
INSPECT FRONT DOOR LOCK ASSY LH

- (a) Inspect the door lock control switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
1 ↔ 2	Lock	Continuity
-	Neutral	—
2 ↔ 3	Unlock	Continuity

If the result is not as specified, replace the front door lock assy.



2. RHD Models:

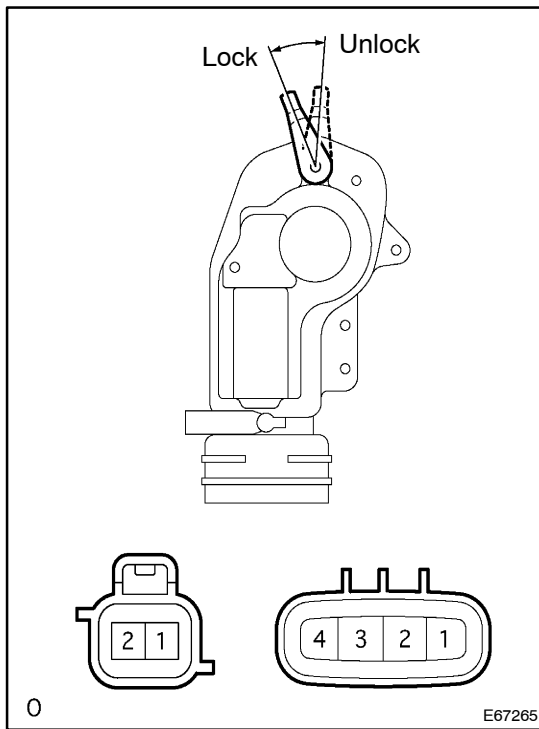
INSPECT FRONT DOOR LOCK ASSY RH

- (a) Inspect the door lock control switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
1 ↔ 2	Lock	Continuity
-	Neutral	—
2 ↔ 3	Unlock	Continuity

If the result is not as specified, replace the front door lock assy.

**3. LHD Models:****INSPECT FRONT DOOR LOCK ACTUATOR ASSY LH**

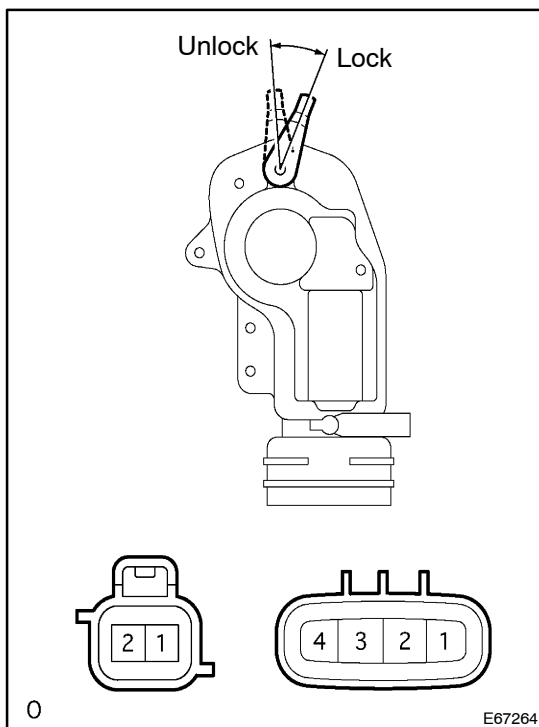
- (a) Inspect operation of the door lock actuator.
- (1) Check operation of the door lock actuator when the battery voltage is applied between the terminals of the actuator inside the door lock.

Standard:

Terminal No.	Operation
Battery positive → 1 (2) Battery negative → 2 (3)	Lock
Battery positive → 2 (3) Battery negative → 1 (2)	Unlock

(): 4 pin type

If the result is not as specified, replace the front door lock actuator assy.

**4. RHD Models:****INSPECT FRONT DOOR LOCK ACTUATOR ASSY RH**

- (a) Inspect operation of the door lock actuator.
- (1) Check operation of the door lock actuator when the battery voltage is applied between the terminals of the actuator inside the door lock.

Standard:

Terminal No.	Operation
Battery positive → 1 (2) Battery negative → 2 (3)	Lock
Battery positive → 2 (3) Battery negative → 1 (2)	Unlock

(): 4 pin type

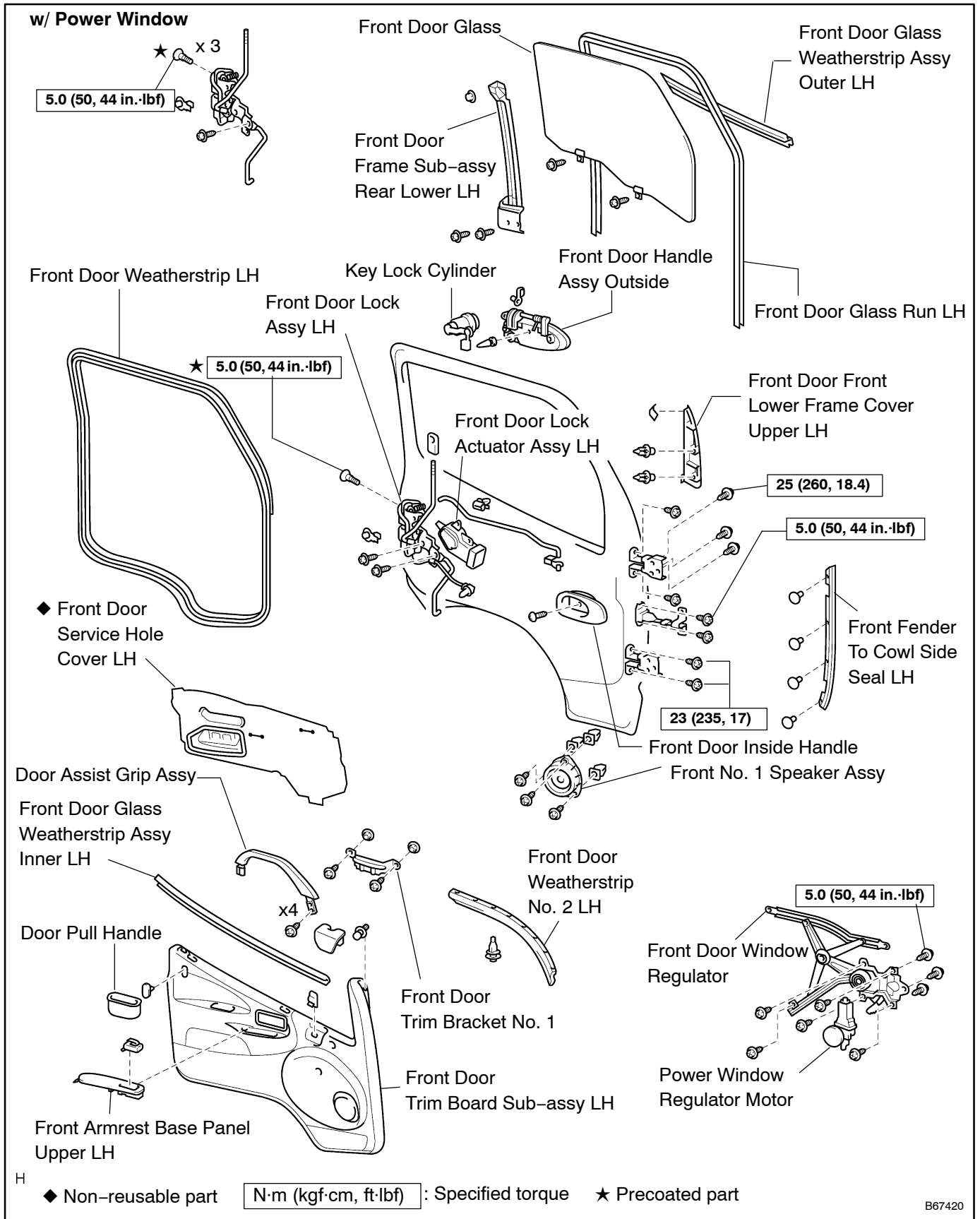
If the result is not as specified, replace the front door lock actuator assy.

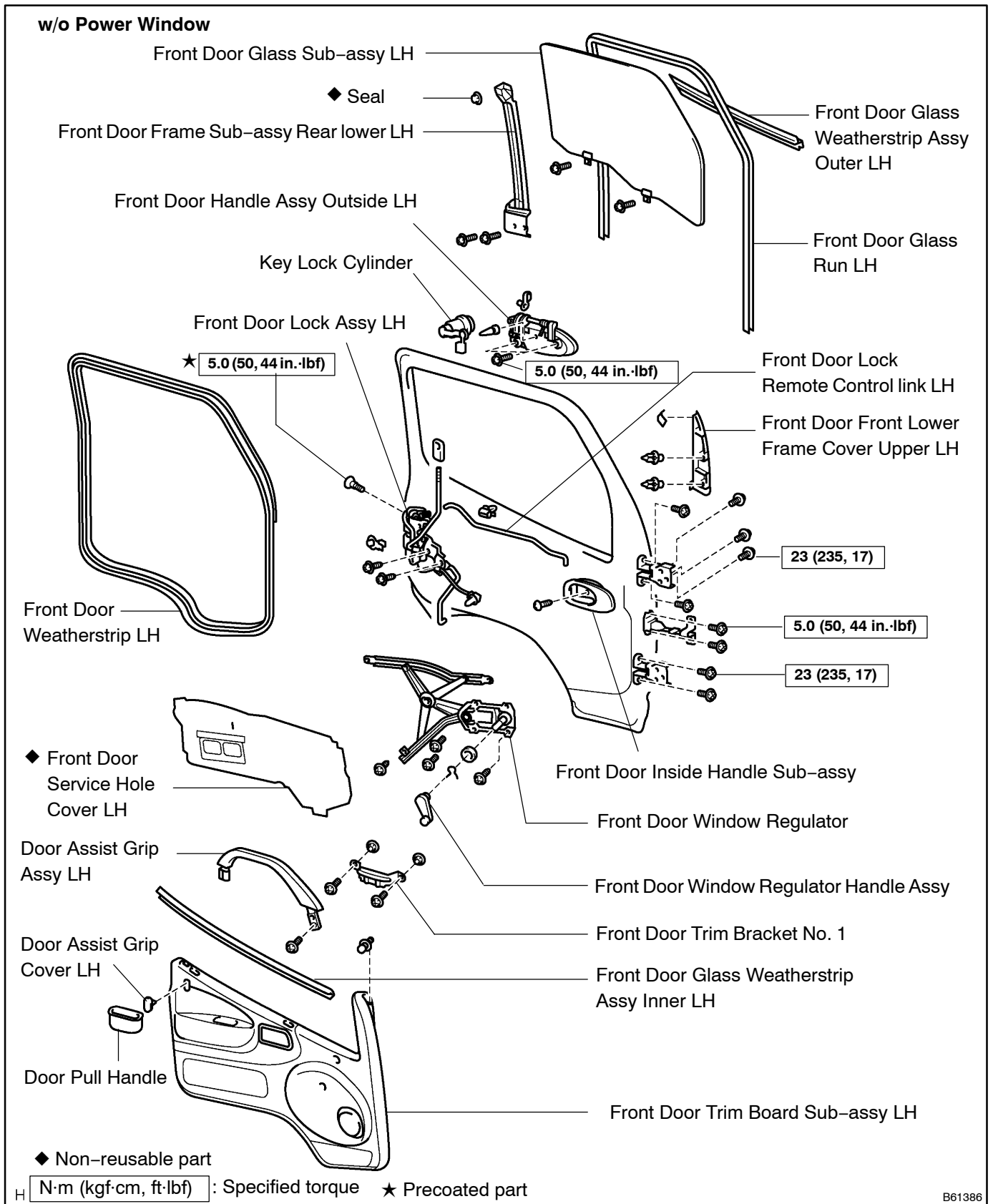
ENGINE HOOD/DOOR

FRONT DOOR	75-1
COMPONENTS	75-1
ADJUSTMENT	75-3
OVERHAUL	75-5
TILT CAB TUBE SUB-ASSY NO.1	75-10
COMPONENTS	75-10
REPLACEMENT	75-11
CAB MOUNTING CUSHION	
SUB-ASSY NO.2	75-16
COMPONENTS	75-16
REPLACEMENT	75-17
TILT CAB MOUNTING LOCK ASSY	75-18
COMPONENTS	75-18
REPLACEMENT	75-19
TILT CAB STAY ASSY	75-21
COMPONENTS	75-21
REPLACEMENT	75-22

FRONT DOOR COMPONENTS

750L3-01





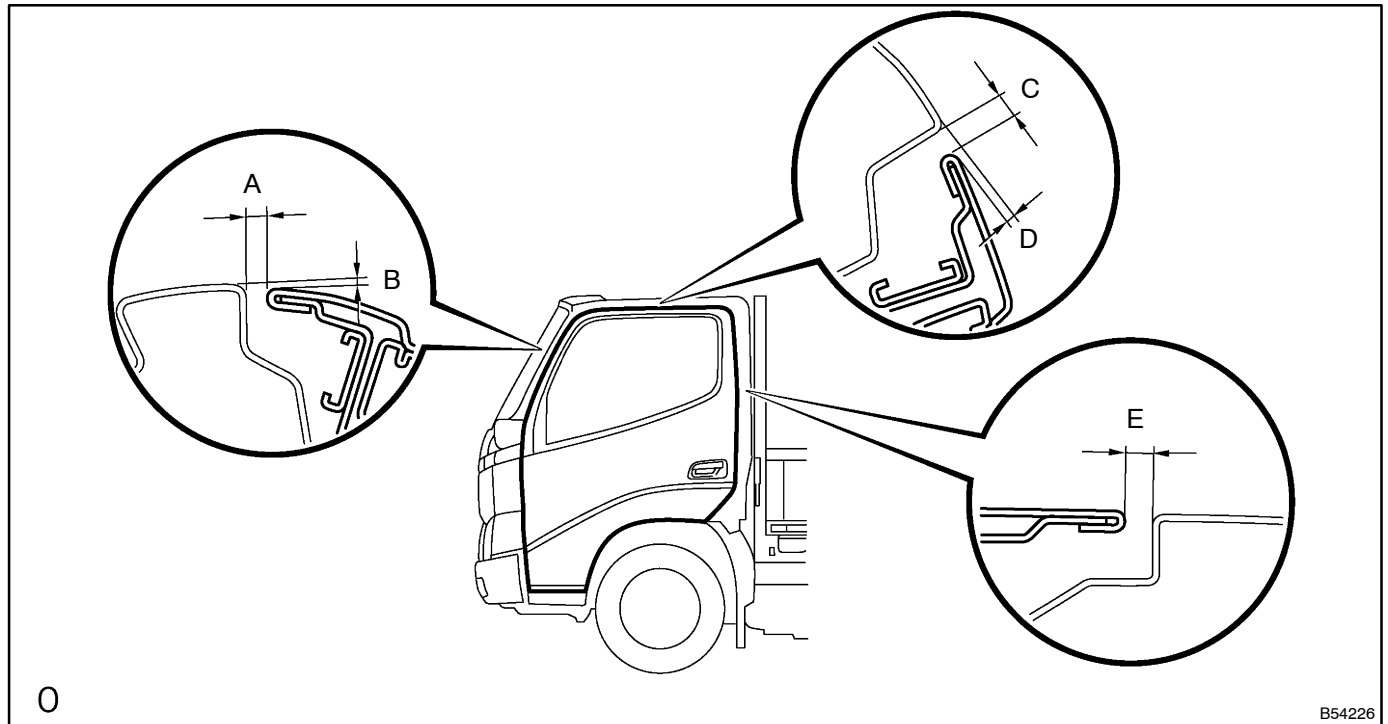
ADJUSTMENT

HINT:

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- On the RH side, use the same procedures as on the LH side.

1. INSPECT FRONT DOOR PANEL SUB-ASSY LH

- (a) Check that the clearance is within the standard range.

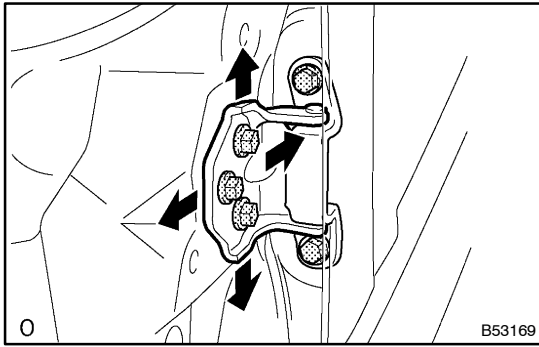


B54226

Dimension:

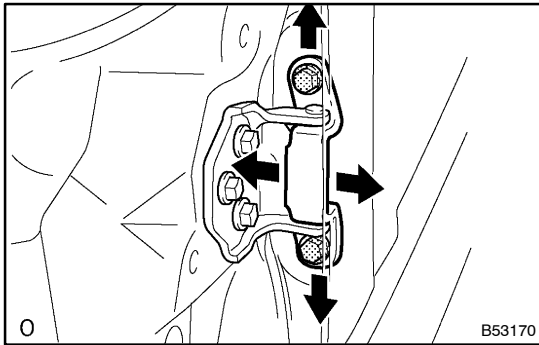
A	4.1 – 7.1 mm (0.161 – 0.279 in.)
B	0.3 – 3.3 mm (0.011 – 0.129 in.)
C	4.1 – 6.9 mm (0.161 – 0.271 in.)
D	0 – 3 mm (0 – 0.118 in.)
E	4.1 – 7.1 mm (0.161 – 0.279 in.)

2. REMOVE RADIATOR GRILLE (See page 76-3)
3. REMOVE FRONT VALANCE PANEL LH (See page 76-8)
4. REMOVE CLEARANCE LAMP LENS & BODY LH (See page 76-8)
5. REMOVE FRONT SIDE PANEL SUB-ASSY LH (See page 76-8)
6. REMOVE OUTER MIRROR GROMMET (See page 70-19)
7. REMOVE OUTER MIRROR BEZEL (See page 70-19)
8. REMOVE OUTER MIRROR COVER LH (See page 70-18 or 70-19)
9. REMOVE OUTER REAR VIEW MIRROR ASSY LH (See page 70-18 or 70-19)

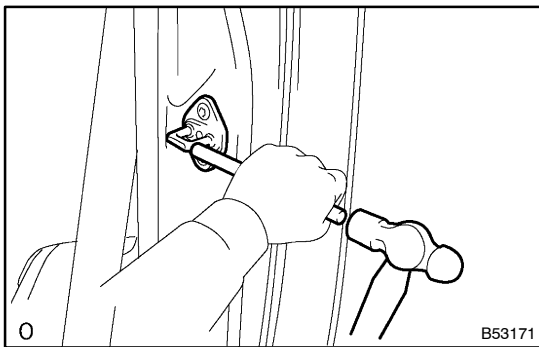


10. ADJUST FRONT DOOR PANEL SUB-ASSY LH

- (a) Adjust the door by loosening the body side hinge bolts.
Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)



- (b) Adjust the door by loosening the door side hinge bolts.
Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

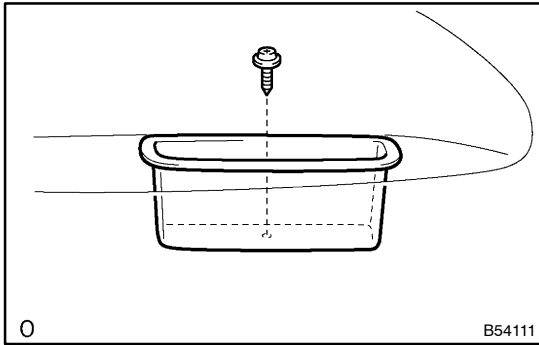


- (c) Adjust the striker position by slightly loosening the striker mounting screws, and hitting the striker with a plastic hammer.
- (d) Tighten the striker mounting screws again.
Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

OVERHAUL

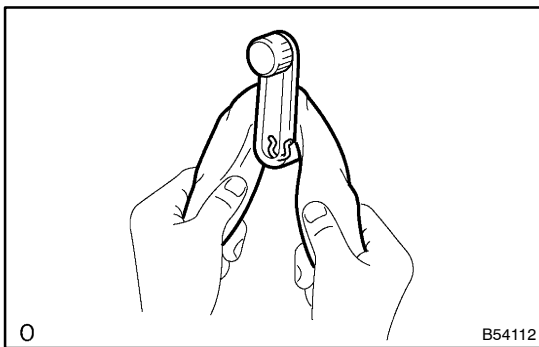
HINT:

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- On the RH side, use the same procedures as on the LH side.



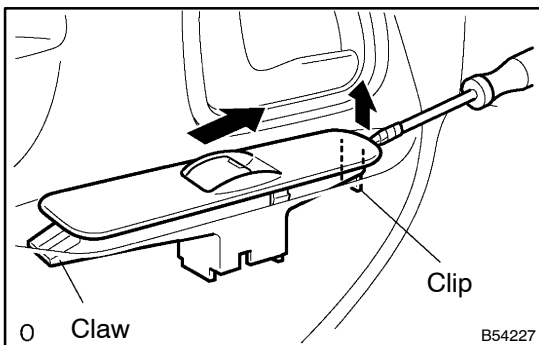
1. REMOVE DOOR PULL HANDLE

- (a) Remove the screw and door pull handle.



2. REMOVE FRONT DOOR WINDOW REGULATOR HANDLE ASSY (W/O POWER WINDOW)

- (a) Pull off the snap ring with a shop rag and remove the regulator handle and plate.



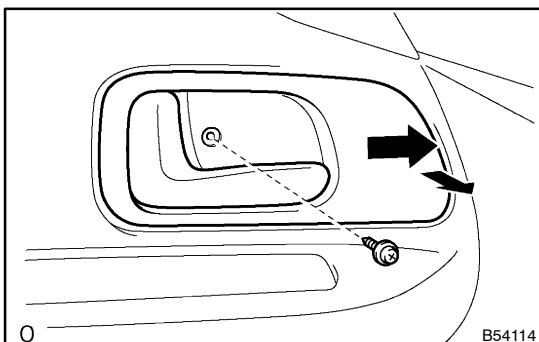
3. REMOVE FRONT ARMREST BASE PANEL UPPER LH (W/ POWER WINDOW)

- (a) Using a screwdriver, remove the panel.

HINT:

Tape the screwdriver tip before use.

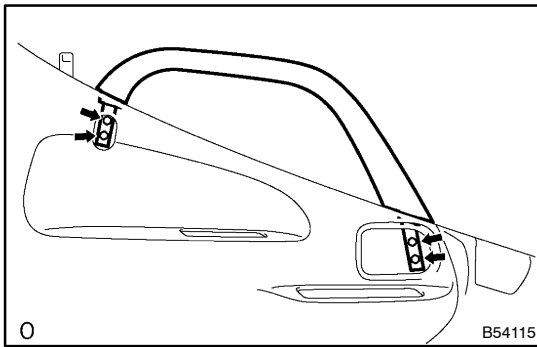
- (b) Disconnect the connector.



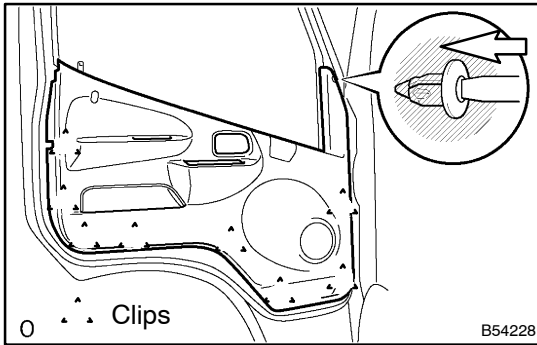
4. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSY LH

- (a) Remove the screw, and slide the bezel forward.
- (b) Disconnect the handle from the 2 links, and remove the inside handle.

5. REMOVE DOOR ASSIST GRIP COVER LH

**6. REMOVE DOOR ASSIST GRIP ASSY LH**

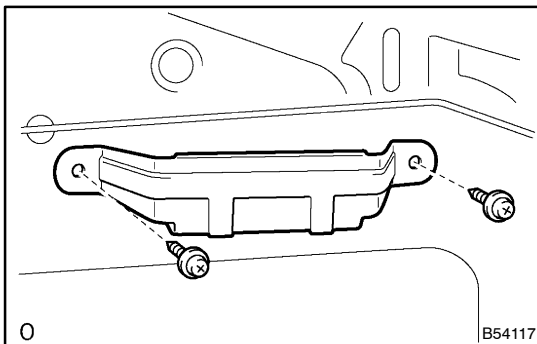
- (a) Remove 4 bolts and door assist grip.

**7. REMOVE FRONT DOOR TRIM BOARD SUB-ASSY LH**

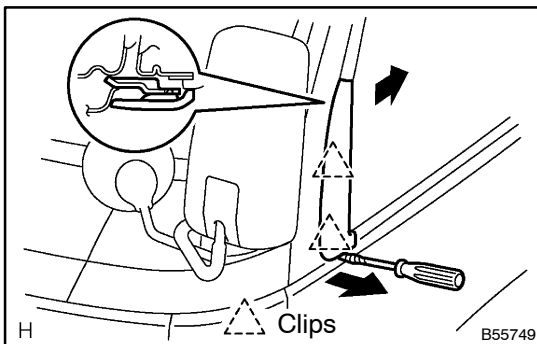
- (a) Remove the clip as shown in the illustration.
 (b) Using a screwdriver, remove the door trim board and disconnect the connector.

HINT:

Tape the screwdriver tip before use.

8. REMOVE FRONT DOOR GLASS WEATHERSTRIP INNER LH**9. REMOVE FRONT DOOR TRIM BRACKET NO.1**

- (a) Remove 2 screws and door trim bracket.

**10. REMOVE FRONT DOOR FRONT LOWER FRAME COVER UPPER LH**

- (a) Using a screwdriver, remove the door lower frame cover.

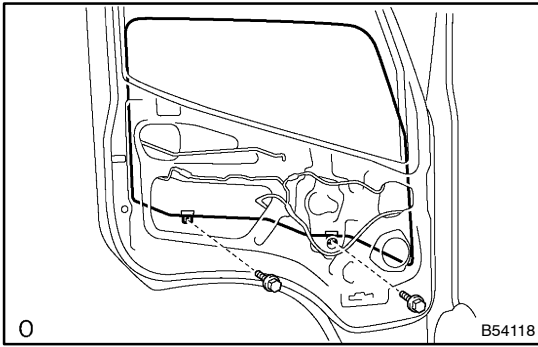
HINT:

Tape the screwdriver tip before use.

11. REMOVE FRONT DOOR SERVICE HOLE COVER LH**12. REMOVE FRONT NO.1 SPEAKER ASSY (W/ SPEAKER)**

- (a) Disconnect the connector.
 (b) Remove the 3 bolts and speaker.

13. REMOVE FRONT DOOR GLASS WEATHERSTRIP ASSY OUTER LH



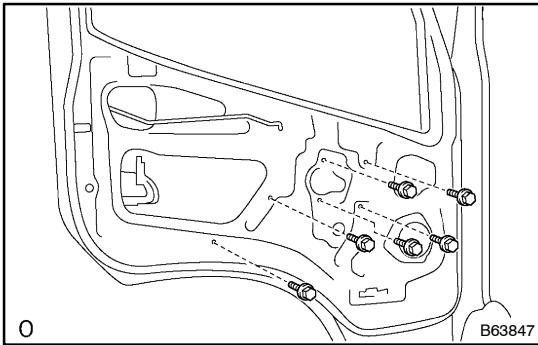
14. REMOVE FRONT DOOR GLASS SUB-ASSY LH

HINT:

Insert a shop rag inside the door panel to prevent scratching the glass.

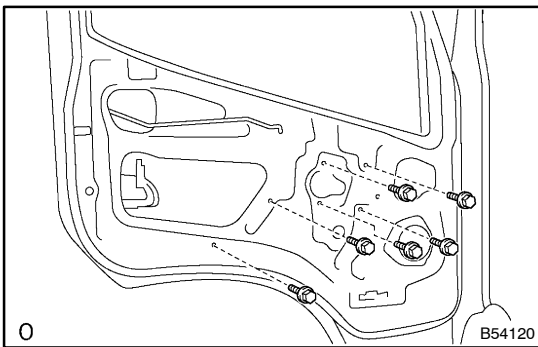
- (a) Open the door glass.
- (b) Remove the 2 bolts and door glass.

15. REMOVE FRONT DOOR GLASS RUN LH



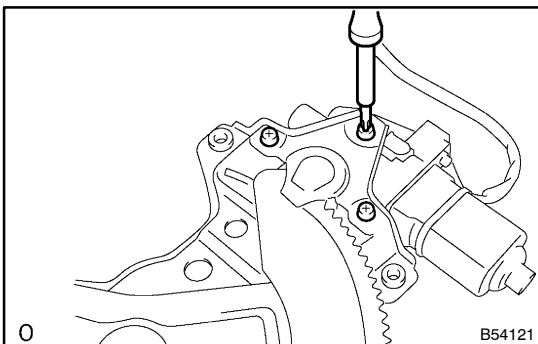
16. REMOVE FRONT DOOR WINDOW REGULATOR SUB-ASSY LH (W/O POWER WINDOW)

- (a) Remove the 6 bolts and regulator.



17. REMOVE FRONT DOOR WINDOW REGULATOR SUB-ASSY LH (W/ POWER WINDOW)

- (a) Disconnect the connector.
- (b) Remove the 6 bolts and window regulator.

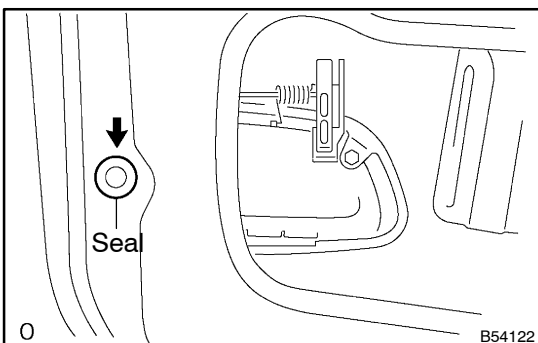


18. REMOVE POWER WINDOW REGULATOR MOTOR ASSY LH (W/ POWER WINDOW)

- (a) Remove the 3 screws and motor.

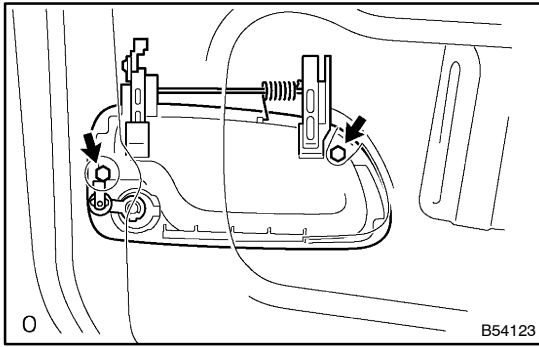
19. APPLICATION BODY GREASE

- (a) Apply MP grease to the sliding and rotating parts of the regulator.

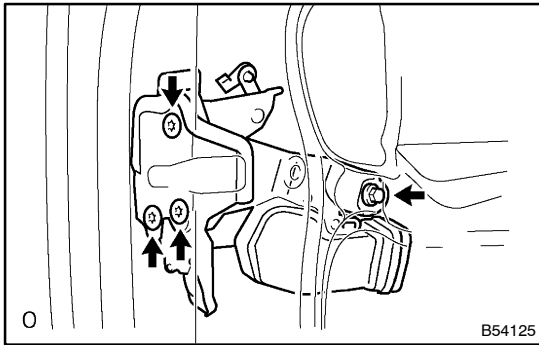


20. REMOVE FRONT DOOR HANDLE ASSY OUTSIDE LH

- (a) Remove the seal.

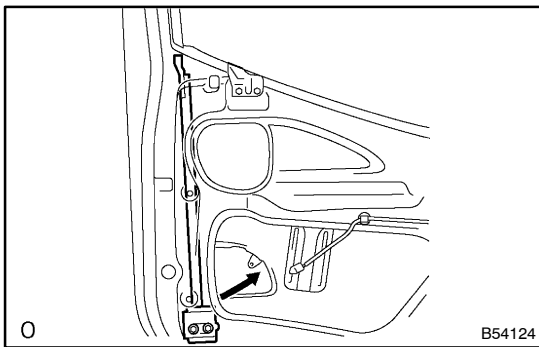


- (b) Remove 2 bolts.
- (c) Disconnect the handle from the 2 links, and remove the front door handle.



21. REMOVE FRONT DOOR LOCK ASSY LH

- (a) Remove the 3 screws and bolt.
- (b) w/ Power door lock and wireless door lock: Disconnect the connector.
- (c) Remove the door lock control knob.
- (d) Disconnect the door lock link, and remove the door lock.



22. REMOVE FRONT DOOR FRAME SUB-ASSY REAR LOWER LH

- (a) Remove 2 bolts and door frame.

23. REMOVE FRONT DOOR LOCK ACTUATOR ASSY LH (W/ POWER DOOR LOCK)

- (a) Remove the 2 screws and door lock actuator.

24. INSTALL FRONT DOOR LOCK ACTUATOR ASSY LH (W/ POWER DOOR LOCK)

- (a) Remove 2 bolts and door lock actuator.

Torque: 5.0 N·m (50 kgf·cm, 44 in·lbf)

25. INSTALL FRONT DOOR LOCK ASSY LH

- (a) Apply MP grease to the sliding and rotating parts of the door lock.

- (b) Apply adhesive to the 3 screws.

Part No.08833-00070, THREE BOND 1324 or equivalent

- (c) Install the door lock with 3 screws.

Torque: 5.0 N·m (50 kgf·cm, 44 in·lbf)

- (d) Connect the link and connector.

- (e) Install the door lock control knob.

26. INSTALL FRONT DOOR HANDLE ASSY OUTSIDE LH

- (a) Install the door handle with 2 bolts.

Torque: 5.0 N·m (50 kgf·cm, 44 in·lbf)

- (b) Connect the 2 links.

- (c) Install a new seal to the panel.

27. INSTALL POWER WINDOW REGULATOR MOTOR ASSY LH (W/ POWER WINDOW)

- (a) Install the regulator motor with 3 screws.

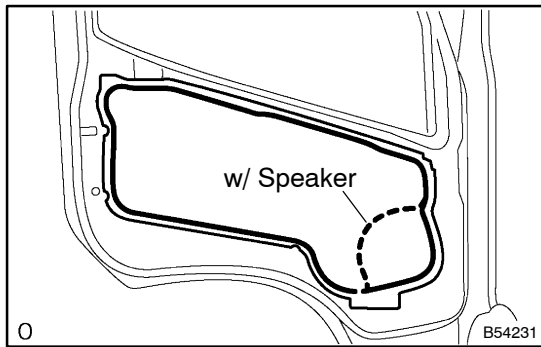
28. INSPECT FUNCTION OF POWER WINDOW (W/ POWER WINDOW)

(a) Inspect operation of the power window.

HINT:

When the installation point of the door glass does not match, adjust the regulator position in manual operation.

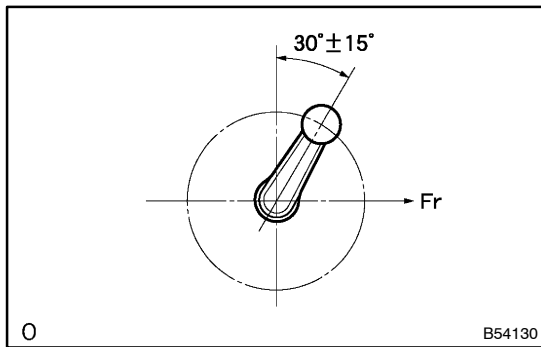
- (1) Connect the power window switch to the wire harness and turn the ignition switch ON.
- (2) Repeat UP and DOWN operation several times in manual operation.

29. INSTALL FRONT DOOR GLASS SUB-ASSY LH**30. INSTALL FRONT DOOR SERVICE HOLE COVER LH**

(a) Install a new service hole cover to the door panel.

HINT:

- When installing the service hole cover, pull out the links and connectors through the service hole cover.
- There should be no wrinkles or folds after attaching the service hole cover.
- After attaching the service hole cover, sealing condition should be confirmed.

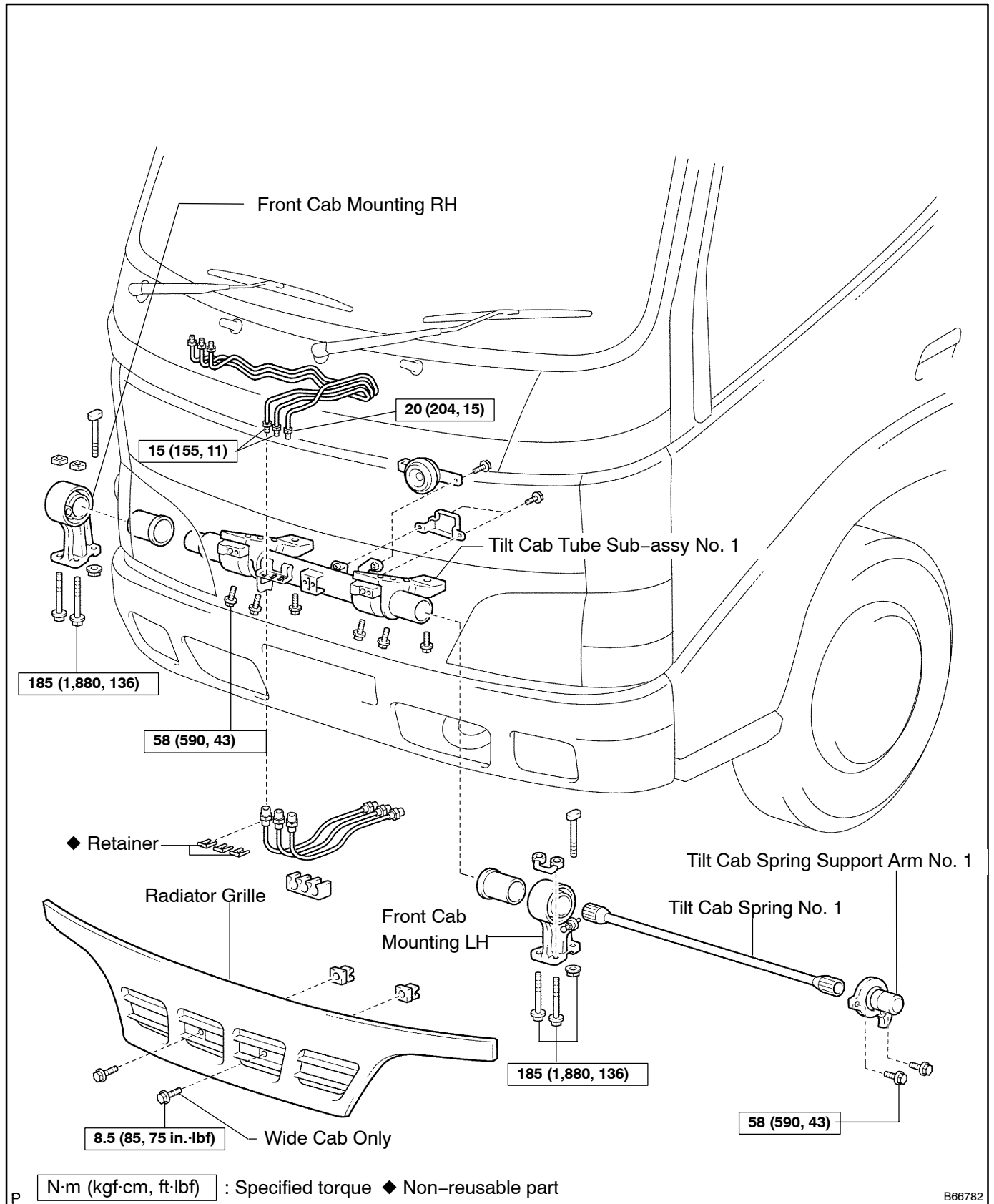
**31. INSTALL FRONT DOOR WINDOW REGULATOR HANDLE ASSY (W/O POWER WINDOW)**

(a) With the door window fully closed, install the plate and regulator handle with a snap ring as shown in the illustration.

TILT CAB TUBE SUB-ASSY NO.1

COMPONENTS

750L6-01

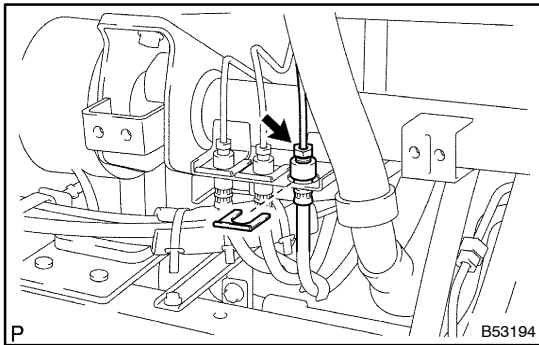


REPLACEMENT

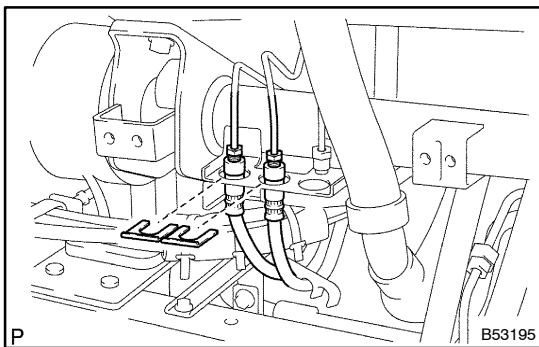
HINT:

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
 - On the No. 2 side, use the same procedures as on the No.1 side.
1. **PRECAUTION (See page 50-1)**
 2. **SEPARATE BATTERY NEGATIVE TERMINAL**
 3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD (See page 50-8)**
 4. **REMOVE HORN BUTTON ASSY (See page 50-8)**
 5. **REMOVE STEERING WHEEL ASSY (See page 50-8)**
SST 09951-05010, 09952-05010, 09953-05010), 09950-50013 (09954-05021)
 6. **REMOVE STEERING COLUMN COVER UPR (See page 50-8)**
 7. **REMOVE STEERING COLUMN COVER LWR (See page 50-8)**
 8. **REMOVE TURN SIGNAL SWITCH ASSY (See page 50-8)**
 9. **REMOVE STEERING MAIN SHAFT ASSY (RIGID FRONT SUSPENSION) (See page 50-8)**
 10. **REMOVE STEERING COLUMN ASSY (See page 50-8)**
 11. **REMOVE INSTRUMENT CLUSTER FINISH PANEL SUB-ASSY CENTER (See page 71-11 or 71-17)**
 12. **REMOVE HEATER CONTROL LEVER KNOB (See page 71-11 or 71-17)**
 13. **REMOVE HEATER CONTROL NAME PLATE (See page 71-11 or 71-17)**
 14. **REMOVE HEATER OR BOOST VENTILATOR CONTROL ASSY (See page 71-11 or 71-17)**
 15. **REMOVE RADIO BRACKET NO. 1 & NO. 2 (See page 71-11 or 71-17)**
 16. **REMOVE GLOVE COMPARTMENT DOOR ASSY (See page 71-11 or 71-17)**
 17. **REMOVE INSTRUMENT COVER LWR (See page 71-11 or 71-17)**
 18. **REMOVE INSTRUMENT COVER LWR NO.3 (See page 71-11 or 71-17)**
 19. **REMOVE INSTRUMENT COVER LWR NO.2 (See page 71-11 or 71-17)**
 20. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page 71-11 or 71-17)**
 21. **REMOVE COMBINATION METER ASSEMBLY (See page 71-11 or 71-17)**
 22. **REMOVE OIL RESERVOIR TANK COVER RH (RHD STEERING POSITION TYPE) (See page 71-11 or 71-17)**
 23. **REMOVE INSTRUMENT PANEL SUB-ASSY (See page 71-11 or 71-17)**
 24. **REMOVE RADIATOR GRILLE (See page 76-3)**
 25. **REMOVE HEATER WATER INLET HOSE B (See page 55-52)**
 26. **REMOVE HEATER WATER OUTLET HOSE A(FROM HEATER UNIT) (See page 55-52)**
 27. **REMOVE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSY (See page 32-10)**
 28. **REMOVE INSTRUMENT PANEL BRACE SUB-ASSY NO.1 (See page 55-52)**
 29. **REMOVE FRONT DOOR SCUFF PLATE RH (See page 76-5)**
 30. **REMOVE AIR DUCT NO.2 (LHD STEERING POSITION TYPE) (See page 55-52)**
 31. **REMOVE HEATER TO FOOT DUCT NO.1 (See page 55-52)**
 32. **REMOVE INSTRUMENT PANEL REINFORCEMENT (See page 55-52)**
 33. **REMOVE WINDSHIELD WASHER JAR ASSY (See page 55-28)**
 34. **REMOVE AIR DUCT SUB-ASSY NO.1 (See page 55-52)**
 35. **REMOVE DEFROSTER NOZZLE ASSY LWR (See page 55-52)**
 36. **REMOVE SKID CONTROL ECU ASSY (See page 55-52)**
 37. **REMOVE PRE-HEATING TIMER (See page 55-52)**
 38. **REMOVE ECM**
 39. **REMOVE HEATER RADIATOR ASSY (See page 55-52)**
 40. **REMOVE HEATER TO REGISTER DUCT NO.2 (See page 55-52)**
 41. **REMOVE HEATER CONTROL CABLE SUB-ASSY (See page 55-24)**

42. REMOVE AIRMIX DAMPER CONTROL CABLE SUB-ASSY (See page 55-52)
43. REMOVE HEATER RADIATOR UNIT SUB-ASSY (See page 55-52)
44. REMOVE FRONT BUMPER BAR (See page 76-2)
45. REMOVE CLEARANCE LAMP LENS & BODY LH (See page 76-8)
46. REMOVE CLEARANCE LAMP LENS & BODY RH (See page 76-8)
47. REMOVE HEADLAMP UNIT LH (See page 76-8)
48. REMOVE HEADLAMP UNIT RH (See page 76-8)
49. REMOVE RADIATOR GRILLE BRACKET (See page 76-8)
 - (a) Remove the bolt and radiator grille bracket.



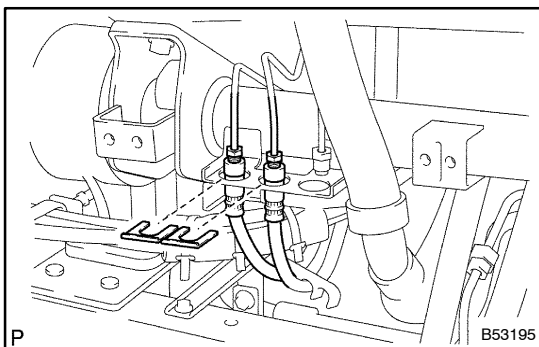
50. REMOVE TUBE CONNECTOR TO FLEXIBLE HOSE TUBE
 - (a) Using SST, disconnect the hose tube.
SST 09023-00100
 - (b) Remove the retainer.



51. REMOVE FRONT BRAKE TUBE FRAME NO.1
 - (a) Using SST, disconnect the front brake.
SST 09023-00100
 - (b) Remove the retainer.

NOTICE:

Check the hose installation condition (When installing a hose, never mistake the hose to be installed).

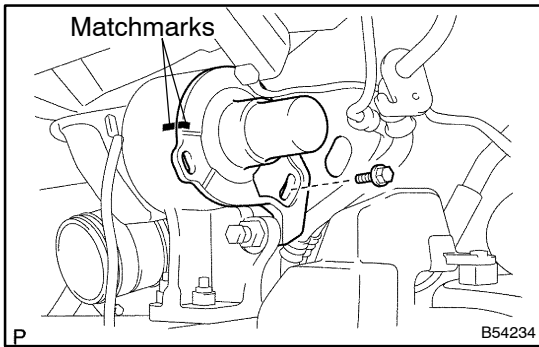


52. REMOVE REAR BRAKE TUBE FRAME NO.1
 - (a) Using SST, disconnect the front brake tube.
SST 09023-00100
 - (b) Remove the retainer.

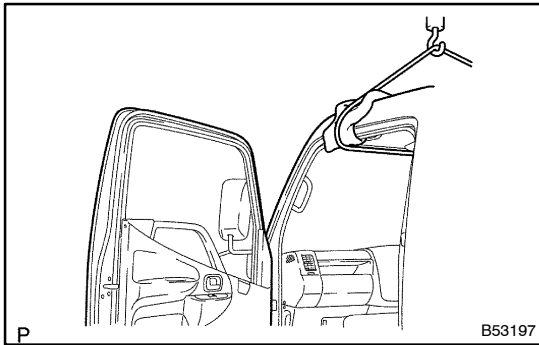
NOTICE:

Check the hose installation condition (When installing a hose, never mistake the hose to be installed).

53. REMOVE ENGINE ROOM MAIN WIRE
54. TILT UP CAB



- 55. REMOVE TILT CAB SPRING SUPPORT ARM NO.1**
 (a) Place matchmarks on support arm and cab mounting.
 (b) Remove the bolt and support arm and cab mounting.
- 56. TILT DOWN CAB**



57. CAB HOLD

- (a) Put the wire on the roof panel of the cab.

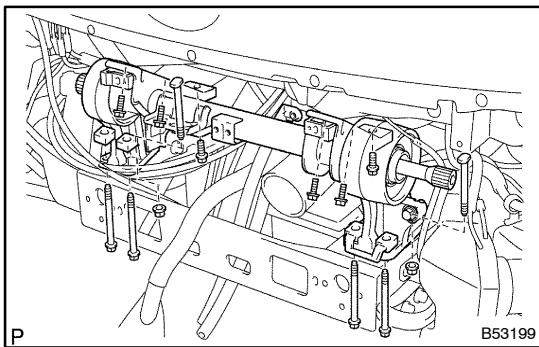
NOTICE:

Place the rag on the point contacting the cab in order not to avoid damage.

- (b) Tense the wire with the degree of force which does not pull the cab up.

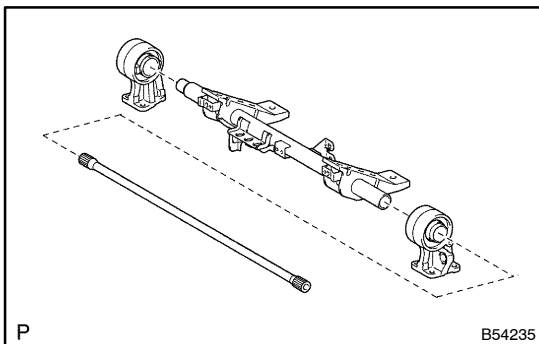
NOTICE:

Do not pull cab up.

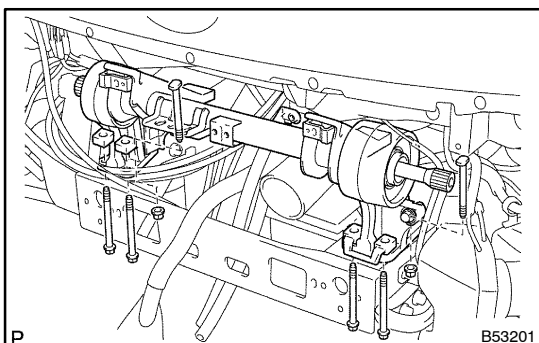


58. REMOVE TILT CAB TUBE SUB-ASSY NO.1

- (a) Remove the 12 bolts, 6 nuts and tilt cab tube.

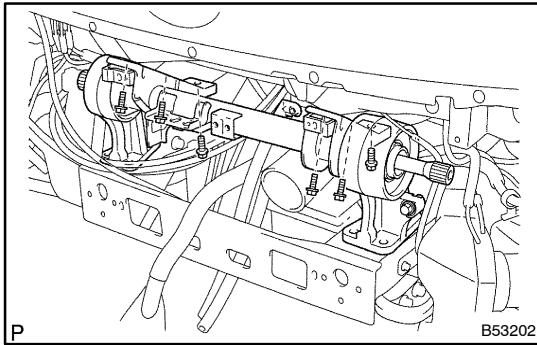


- (b) Remove the cab mounting LH and cab mounting RH.



59. INSTALL TILT CAB TUBE SUB-ASSY NO.1

- (a) Install the tilt cab tube with the 6 bolts and 6 nuts.
Torque: 185 N·m (1,880 kgf·cm, 136 ft·lbf)



- (b) Install the 6 bolts.
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

60. TILT UP CAB

61. INSTALL TILT CAB SPRING SUPPORT ARM NO.1

- (a) Align the matchmarks on the support arm and cab mounting.
 (b) Install the support arm with bolt.

Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

62. INSTALL REAR BRAKE TUBE FRAME NO.1

- (a) Install the retainer.
 (b) Using SST, install the rear brake tube No. 1.

SST 09023-00100

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

63. INSTALL FRONT BRAKE TUBE FRAME NO.1

- (a) Install the retainer.
 (b) Using SST, install the front brake tube No. 1.

SST 09023-00100

Torque: 15 N·m (155 kgf·cm, 11.2 ft·lbf)

64. INSTALL TUBE CONNECTOR TO FLEXIBLE HOSE TUBE

- (a) Install the retainer.
 (b) Using SST, install the tube connector to flexible hose tube.

SST 09023-00100

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

65. INSTALL RADIATOR GRILLE BRACKET

- (a) Install the radiator grille bracket with the bolt.

Torque: 8.5 N·m (85 kgf·cm, 75 in·lbf)

66. INSTALL STEERING MAIN SHAFT ASSY (See page 50-8)

67. INSTALL FRONT BUMPER BAR (See page 76-2)

68. INSTALL AIRMIX DAMPER CONTROL CABLE SUB-ASSY (See page 55-52)

69. INSTALL HEATER CONTROL CABLE SUB-ASSY (See page 55-24)

70. INSTALL HEATER RADIATOR ASSY (See page 55-52)

71. INSTALL AIR DUCT SUB-ASSY NO.1 (See page 55-52)

72. INSTALL INSTRUMENT PANEL REINFORCEMENT (See page 55-52)

73. INSTALL STEERING COLUMN TUBE ASSY LOWER (See page 50-8)

74. INSPECT INSTRUMENT PANEL PASSENGER AIRBAG ASSY (See page 71-11 or 71-17)

75. INSTALL INSTRUMENT PANEL (See page 71-11 or 71-17)

76. INSTALL COMBINATION METER ASSEMBLY (See page 71-11 or 71-17)

77. INSTALL STEERING COLUMN ASSY (See page 50-8)

78. INSTALL STEERING COLUMN COVER LWR (See page 50-8)

79. INSTALL STEERING COLUMN COVER UPR (See page 50-8)

80. INSTALL INSTRUMENT PANEL BRACE SUB-ASSY NO.1 (See page 55-52)

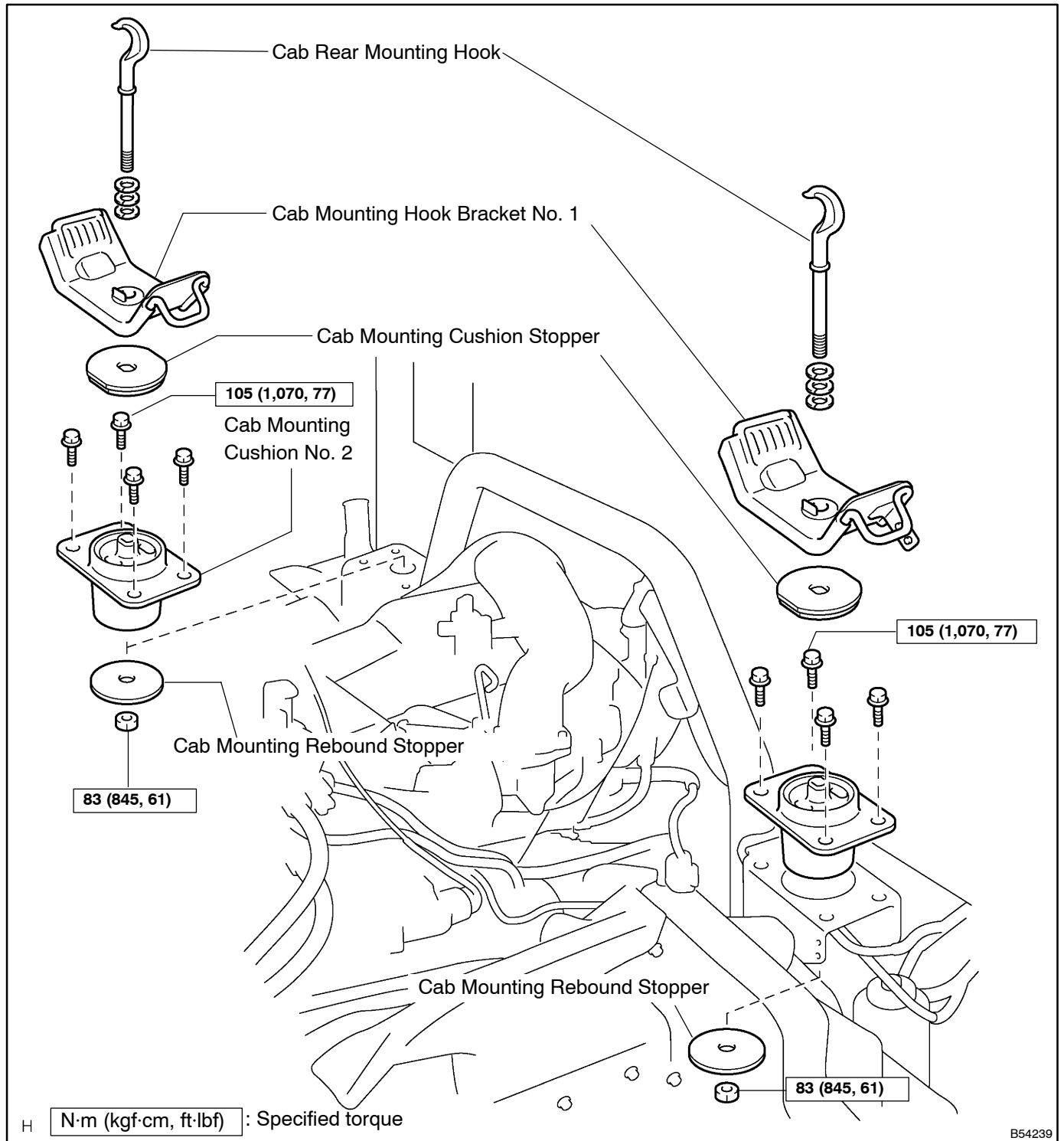
81. INSTALL INSTRUMENT PANEL SUB-ASSY (See page 71-11 or 71-17)

82. INSTALL COOLANT (See page 16-3)

83. CHECK FOR ENGINE COOLANT LEAKS (See page 16-2)
84. WARM UP ENGINE
85. INSTALL TURN SIGNAL SWITCH ASSY (See page 50-8)
86. PLACE FRONT WHEELS FACING STRAIGHT AHEAD (See page 50-8)
87. INSPECT HORN BUTTON ASSY (See page 50-8)
88. CENTER SPIRAL CABLE (See page 50-8)
89. INSTALL STEERING WHEEL ASSY (See page 50-8)
90. INSTALL HORN BUTTON ASSY (See page 50-8)
91. INSTALL BLEED BRAKE LINE (See page 32-4)
92. CHECK BRAKE FLUID LEAKAGE (See page 32-4)
93. CHECK FLUID LEVEL IN RESERVOIR (See page 32-4)
94. BLEED CLUTCH PIPE LINE (See page 42-2)
95. CHECK CLUTCH FLUID LEAKAGE (See page 42-2)
96. INSPECT SRS WARNING LIGHT
97. HEADLIGHT AIM ONLY

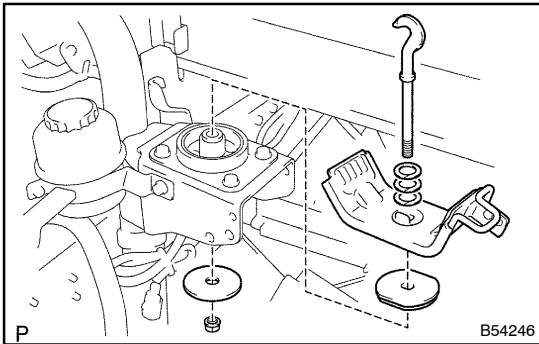
CAB MOUNTING CUSHION SUB-ASSY NO.2 COMPONENTS

750L8-01



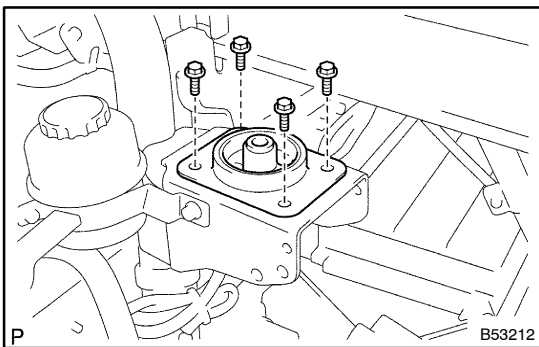
REPLACEMENT

1. TILT UP CAB



2. REMOVE CAB MOUNTING HOOK BRACKET SUB-ASSY NO.1

- (a) Disconnect the connector.
- (b) Remove the nut and cab mounting hook bracket.

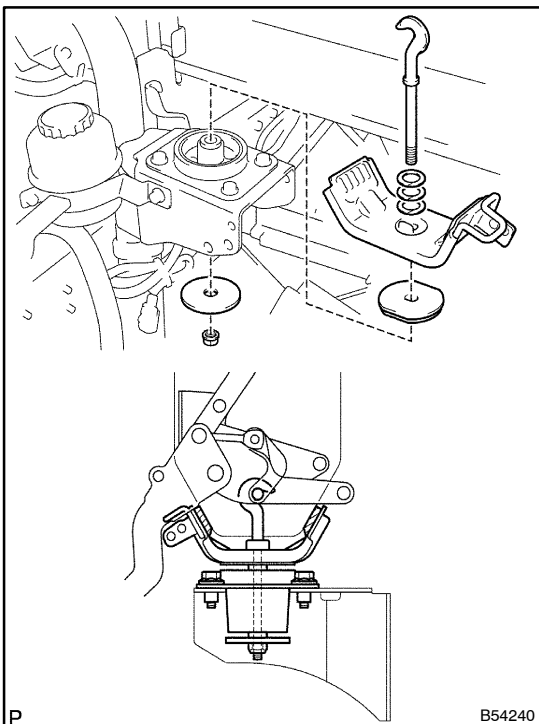


3. REMOVE CAB MOUNTING CUSHION SUB-ASSY NO.2

- (a) Remove the 4 bolts and cab mounting cushion.

4. INSTALL CAB MOUNTING CUSHION SUB-ASSY NO.2

- (a) Install the mounting cushion with 4 bolts.
Torque: 105 N·m (1,070 kgf·cm, 77 ft·lbf)



5. INSTALL CAB MOUNTING HOOK BRACKET SUB-ASSY NO.1

- (a) Temporarily install the cab rear mounting hook, the cab mounting rebound stopper, the plate washer and the cab mounting cushion stopper together with the cab mounting hook bracket with nut.

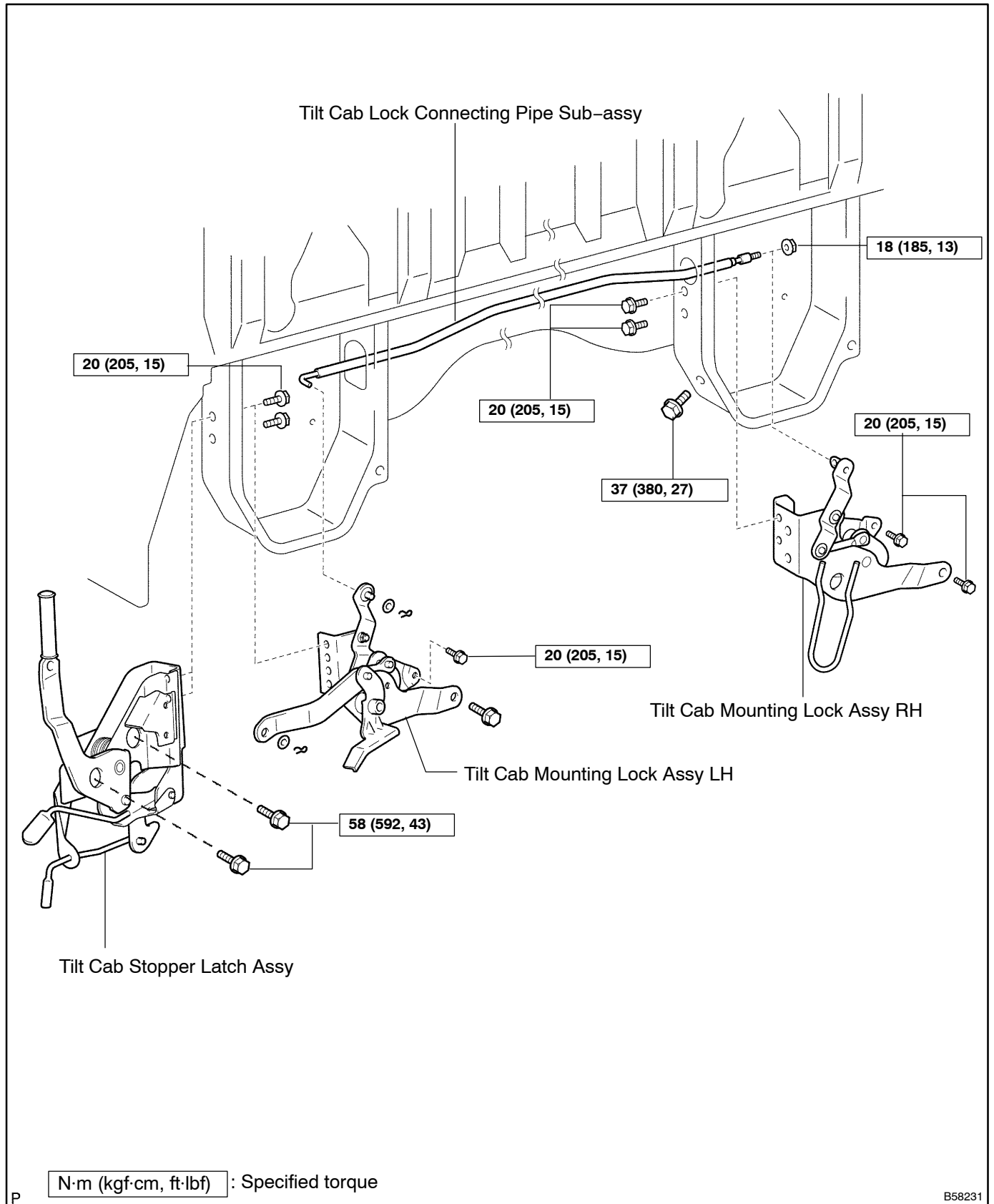
NOTICE:

- Assemble the plate washers as many as those were removed. (sometime no plate washer is used)
- Temporarily tighten so that the cab mounting hook bracket can move.
- (b) Make the cab tilt down (should not be locked), after checking that the cab and cab mounting hook bracket evenly hit, tighten the nut.

Torque: 83 N·m (845 kgf·cm, 61 ft·lbf)

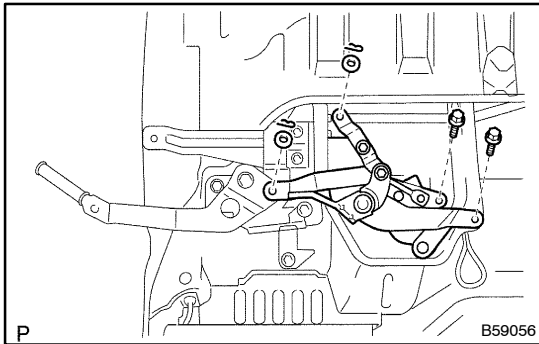
TILT CAB MOUNTING LOCK ASSY COMPONENTS

750LA-01

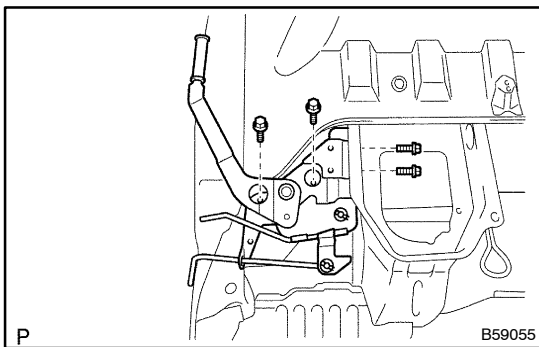


REPLACEMENT

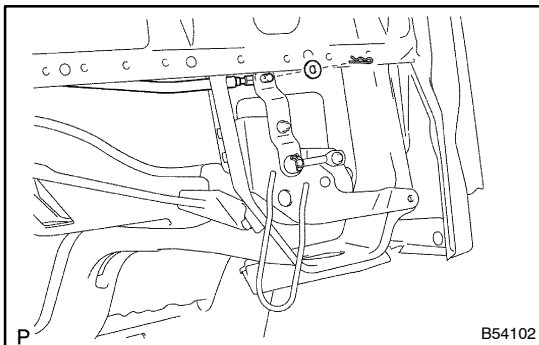
1. TILT UP CAB



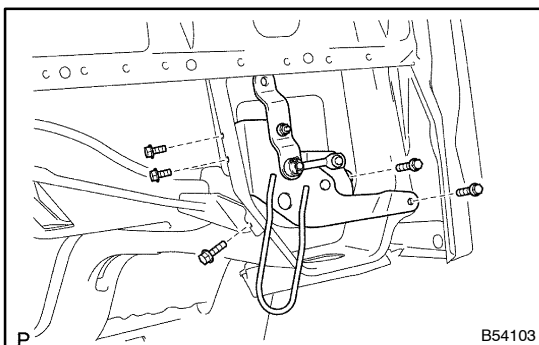
2. **REMOVE TILT CAB MOUNTING LOCK ASSY LH**
 - (a) Remove the clip, plate washer and tilt cab connecting pipe from the tilt cab mounting lock.
 - (b) Remove the 2 clip and 2 plate washer from the tilt cab stopper assembly.
 - (c) Remove the 2 bolts and tilt cab mounting lock.



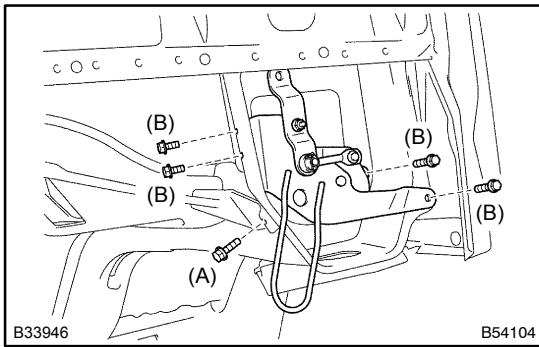
3. **REMOVE TILT CAB STOPPER LATCH ASSY**
 - (a) Remove the 4 bolts and tilt cab stopper latch.



4. **REMOVE TILT CAB LOCK CONNECTING PIPE SUB-ASSY**
 - (a) Remove the clip, plate washer and tilt cab lock connecting pipe.



5. **REMOVE TILT CAB MOUNTING LOCK ASSY RH**
 - (a) Remove the 5 bolts and tilt cab mounting lock.



6. INSTALL TILT CAB MOUNTING LOCK ASSY RH

- (a) Install the tilt cab mounting lock with 5 bolts.

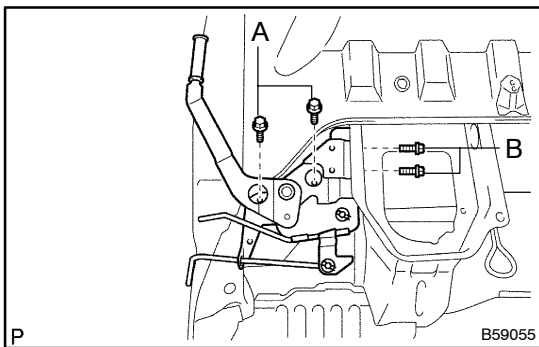
Torque:

37 N·m (380 kgf·cm, 27 ft·lbf) for A bolt

20 N·m (205 kgf·cm, 15 ft·lbf) for B bolt

7. INSTALL TILT CAB LOCK CONNECTING PIPE SUB-ASSY

- (a) Install the tilt cab lock connecting pipe with the clip and plate washer.



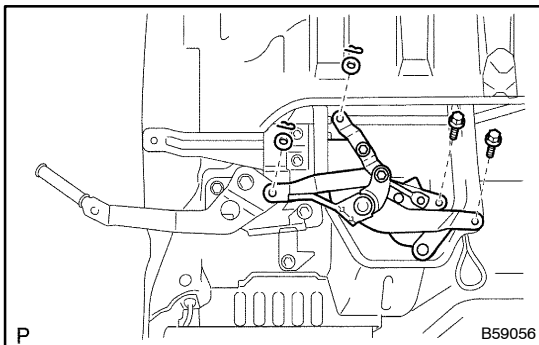
8. INSTALL TILT CAB STOPPER LATCH ASSY

- (a) Install the tilt cab stopper latch with the 4 bolts.

Torque:

58 N·m (592 kgf·cm, 43 ft·lbf) for A bolt

20 N·m (205 kgf·cm, 15 ft·lbf) for B bolt

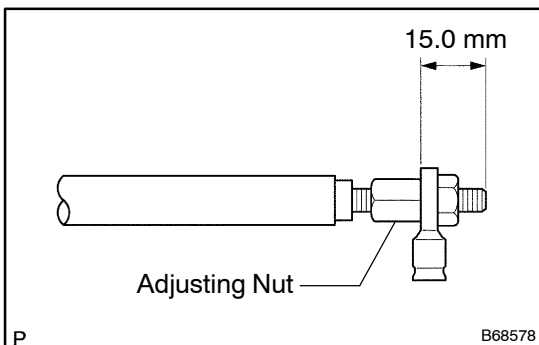


9. INSTALL TILT CAB MOUNTING LOCK ASSY LH

- (a) Install the tilt cab mounting lock with the 2 bolts.

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

- (b) Install the 2 clips and 2 plate washers.



10. ADJUST TILT CAB LOCK CONNECTING PIPE SUB-ASSY

- (a) Remove the nut and pipe joint.
 (b) Turn the adjusting nut and adjust the protrusion width of the bolt.

Standard: 15.0 mm (0.590 in.)

- (c) Install the pipe joint with the nut.

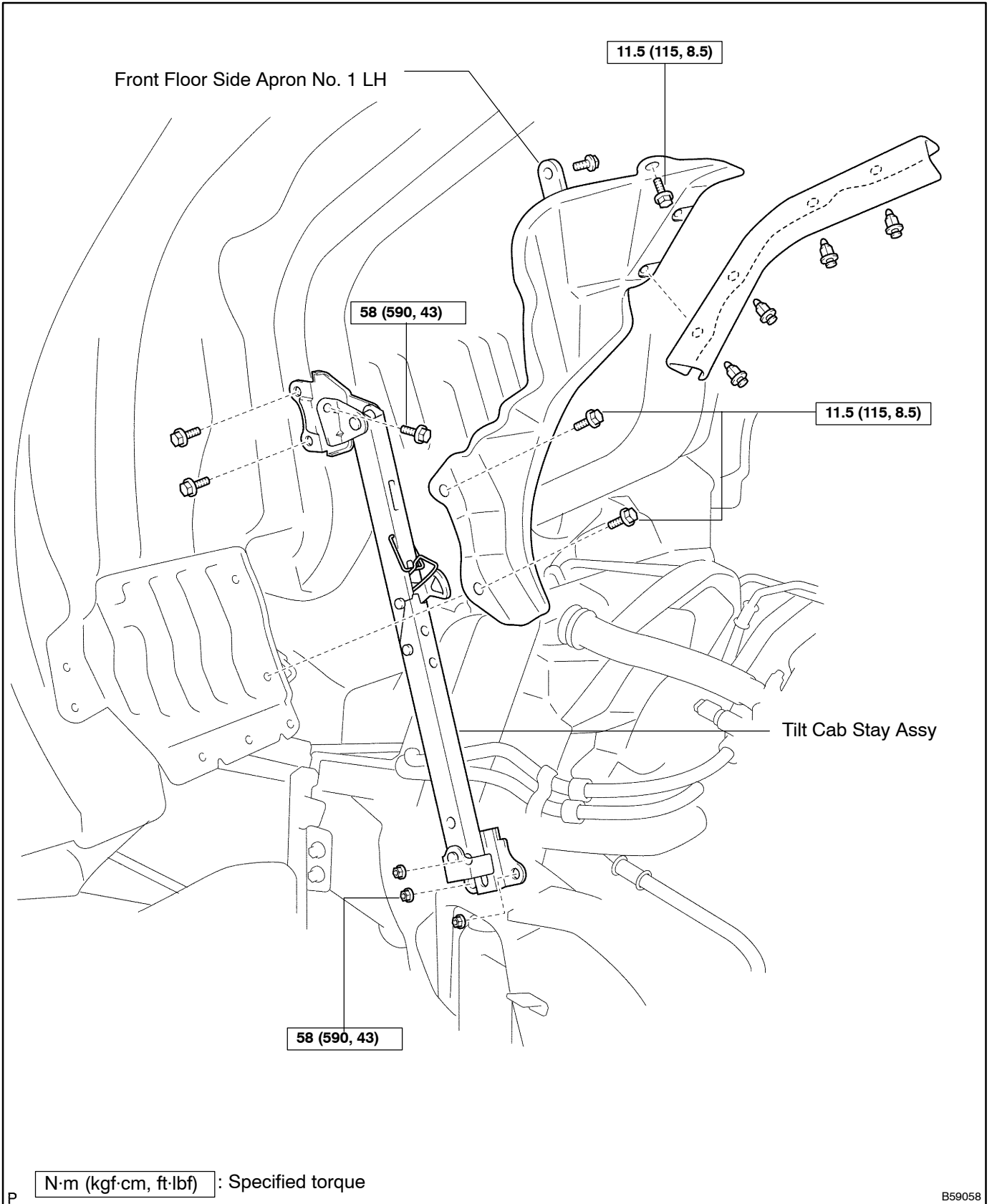
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

HINT:

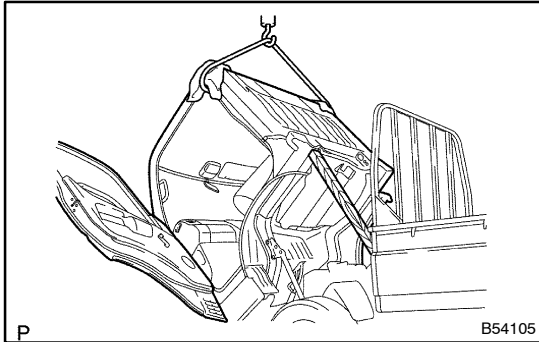
After installing the tilt carburetor lock connecting pipe, release the carburetor stopper clutch. When the steering wheel jumps up, adjust the adjusting nut in the direction that the protrusion width of bolt becomes smaller.

TILT CAB STAY ASSY COMPONENTS

750LC-01



REPLACEMENT



1. CAB HOLD

- (a) After tilting the cab up, put the wire on the roof panel of cab.

NOTICE:

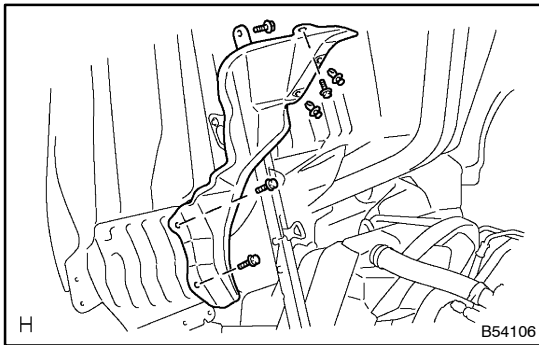
Place the rag on the point contacting the cab in order not to damage.

- (b) Tense the wire with the degree of force which does not pull the cab up.

NOTICE:

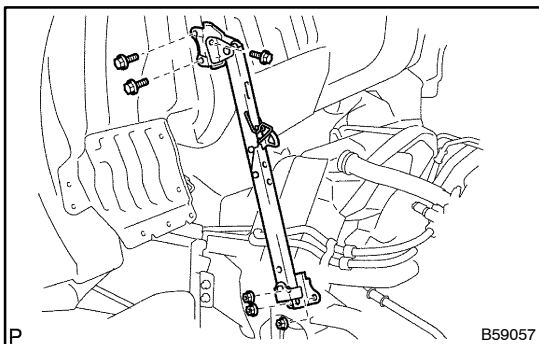
Do not pull the cab up.

- (c) Using wood, etc., support the cab.



2. REMOVE FRONT FLOOR SIDE APRON NO.1 LH

- (a) Remove the 4 bolts, 2 clips and side apron.



3. REMOVE TILT CAB STAY ASSY

- (a) Remove the 3 bolts, 3 nuts and tilt cab stay.

4. INSTALL TILT CAB STAY ASSY

- (a) Install the tilt cab stay with the 3 bolts and 3 nuts.

Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

5. INSTALL FRONT FLOOR SIDE APRON NO.1 LH

- (a) Install the side apron with the 4 bolts and 2 clips.

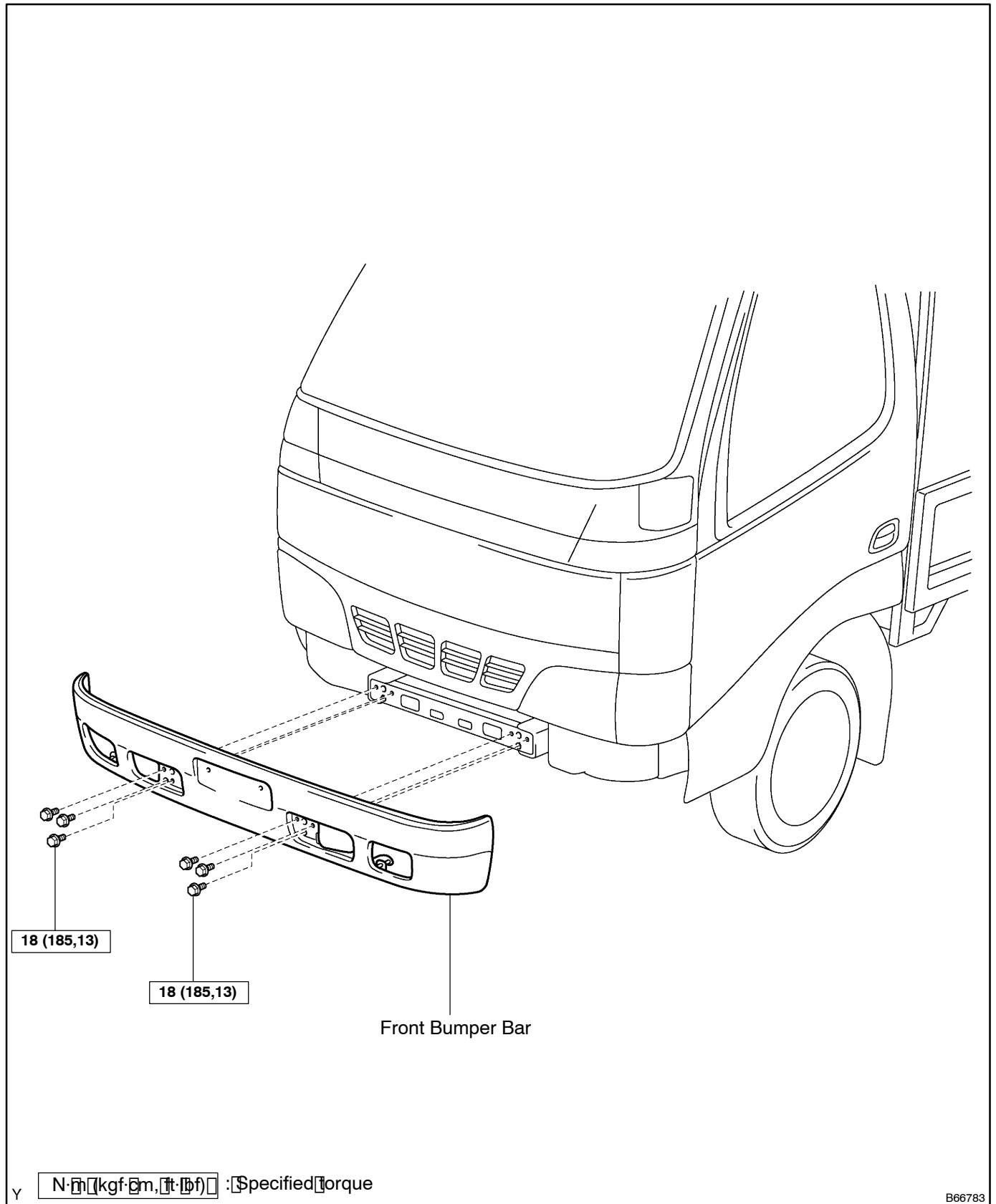
Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)

EXTERIOR/INTERIOR TRIM

FRONT BUMPER BAR	76-1
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RADIATOR GRILLE	76-3
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OUTER MIRROR COVER LH	76-9
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FRONT BUMPER BAR COMPONENTS

760TX-01



REPLACEMENT

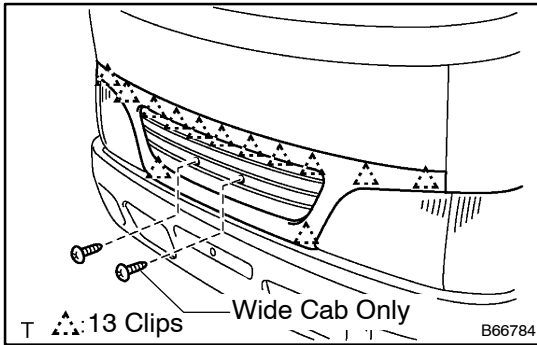
1. **REMOVE FRONT BUMPER BAR**
 - (a) Disconnect the fog light connectors.
 - (b) Remove the 6 bolts and bumper bar.
2. **INSTALL FRONT BUMPER BAR**
 - (a) Install the bumper bar with the 6 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
 - (b) Connect the fog light connectors.

RADIATOR GRILLE REPLACEMENT

760TZ-01

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.

**1. REMOVE RADIATOR GRILLE**

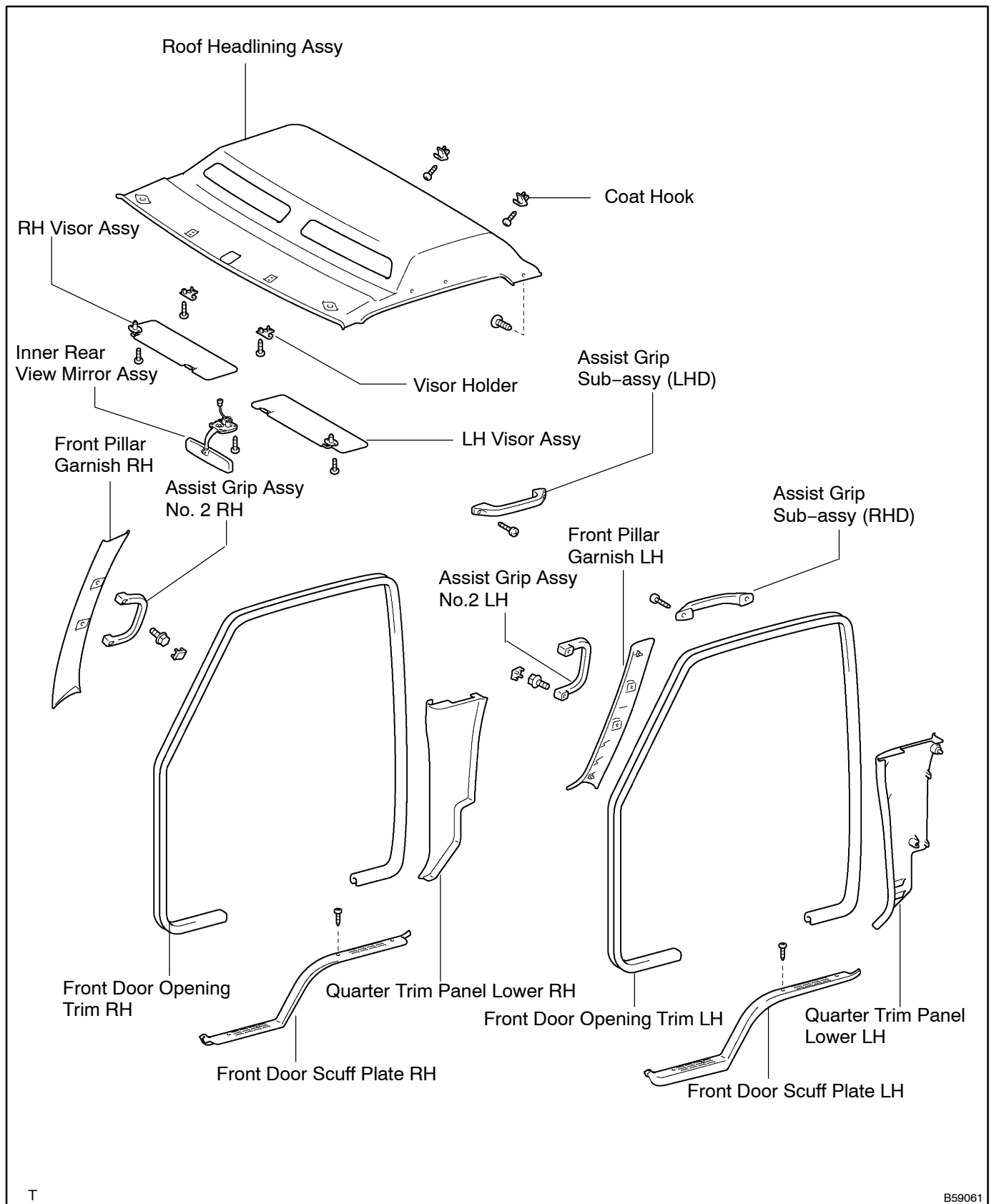
- (a) Wide body:
Remove the 2 screws.
- (b) Regular Cab:
Remove the screw.
- (c) Using a screwdriver, disengage the the clips and remove the radiator grille.

HINT:

Tape the screwdriver tip before use.

ROOF HEADLINING ASSY COMPONENTS

76UJ-01



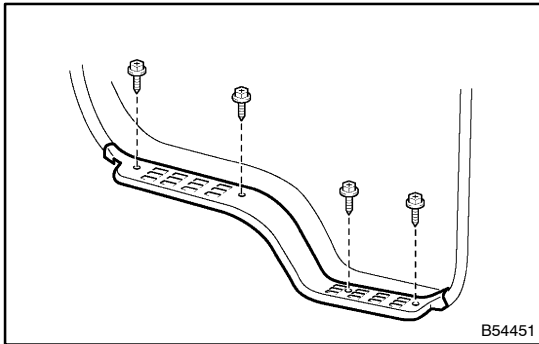
T

B59061

REPLACEMENT

HINT:

The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.



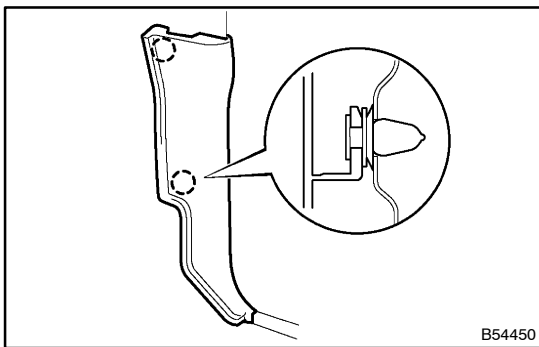
1. REMOVE FRONT DOOR SCUFF PLATE LH

- (a) Remove the 4 screws and scuff plate.

2. REMOVE FRONT DOOR SCUFF PLATE RH

HINT:

Use the same procedures described above for the LH side.



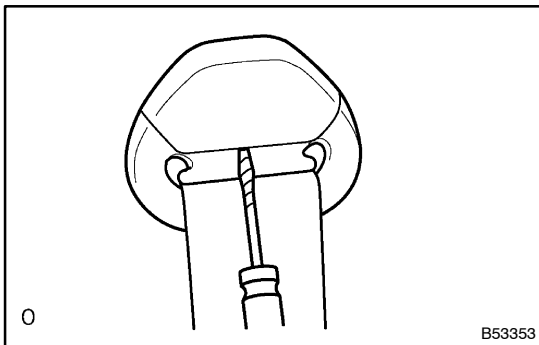
3. REMOVE QUARTER TRIM PANEL LOWER LH

- (a) Disengage the 2 clips and remove the quarter trim panel.

4. REMOVE QUARTER TRIM PANEL LOWER RH

HINT:

Use the same procedures described above for the LH side.



5. REMOVE FRONT SEAT OUTER BELT ASSY LH

- (a) Using a screwdriver, pry the seat belt anchor cover cap.

HINT:

Tape the screwdriver tip before use.

- (b) Remove the bolt and shoulder anchor LH.

6. REMOVE FRONT SEAT OUTER BELT ASSY RH

HINT:

Use the same procedures described above for the LH side.

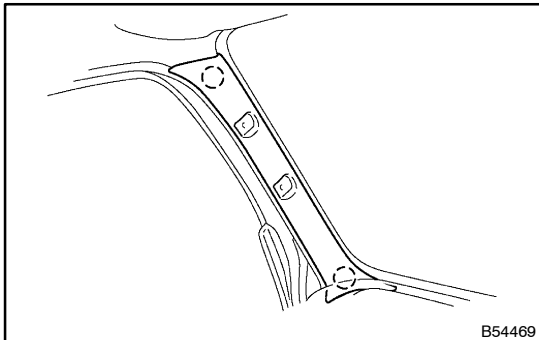
7. REMOVE ASSIST GRIP PLUG

8. REMOVE ASSIST GRIP ASSY NO.2 LH

- (a) Remove the 2 screws and assist grip.

9. REMOVE ASSIST GRIP ASSY NO.2 RH

- (a) Remove the 2 screws and assist grip.



10. REMOVE FRONT PILLAR GARNISH LH

- (a) Using a screwdriver, remove the pillar garnish.

HINT:

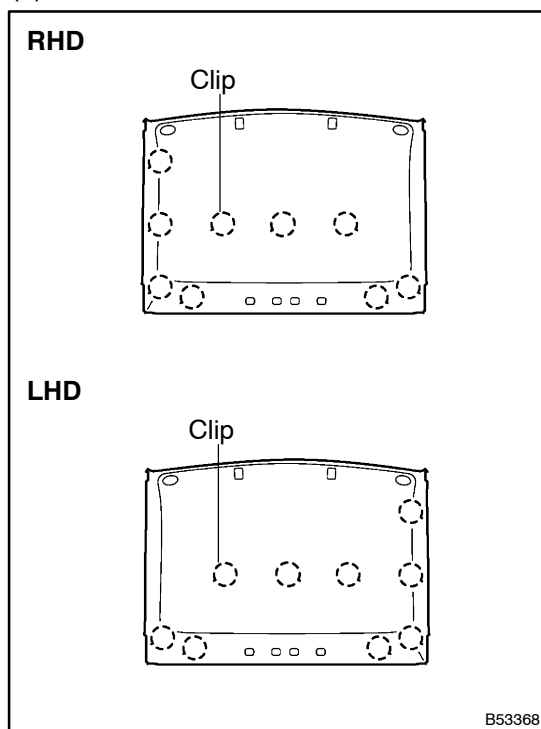
Tape the screwdriver tip before use.

11. REMOVE FRONT PILLAR GARNISH RH

HINT:

Use the same procedures described above for the LH side.

12. REMOVE FRONT DOOR OPENING TRIM LH
13. REMOVE FRONT DOOR OPENING TRIM RH
14. REMOVE COAT HOOK
 - (a) Remove the 2 screws.
 - (b) Using a roof moulding remover, remove the 2 coat hooks.
15. REMOVE LH VISOR ASSY
 - (a) Remove the 2 screws and visor.
16. REMOVE RH VISOR ASSY
 - (a) Remove the 2 screws and visor.
17. REMOVE VISOR HOLDER
18. REMOVE ASSIST GRIP SUB-ASSY
 - (a) Remove the 2 screws and remove the assist grip.
19. REMOVE INNER REAR VIEW MIRROR ASSY
 - (a) Remove the claw and cover.
 - (b) Remove the 2 screws and view mirror.



20. REMOVE ROOF HEADLINING ASSY
 - (a) Using a clip remover, remove the 9 clips and roof headlining.

21. INSTALL FRONT SEAT OUTER BELT ASSY LH
22. INSTALL FRONT SEAT OUTER BELT ASSY RH

RADIATOR GRILLE ORNAMENT

760U2-01

REPLACEMENT

1. REMOVE RADIATOR GRILLE ORNAMENT

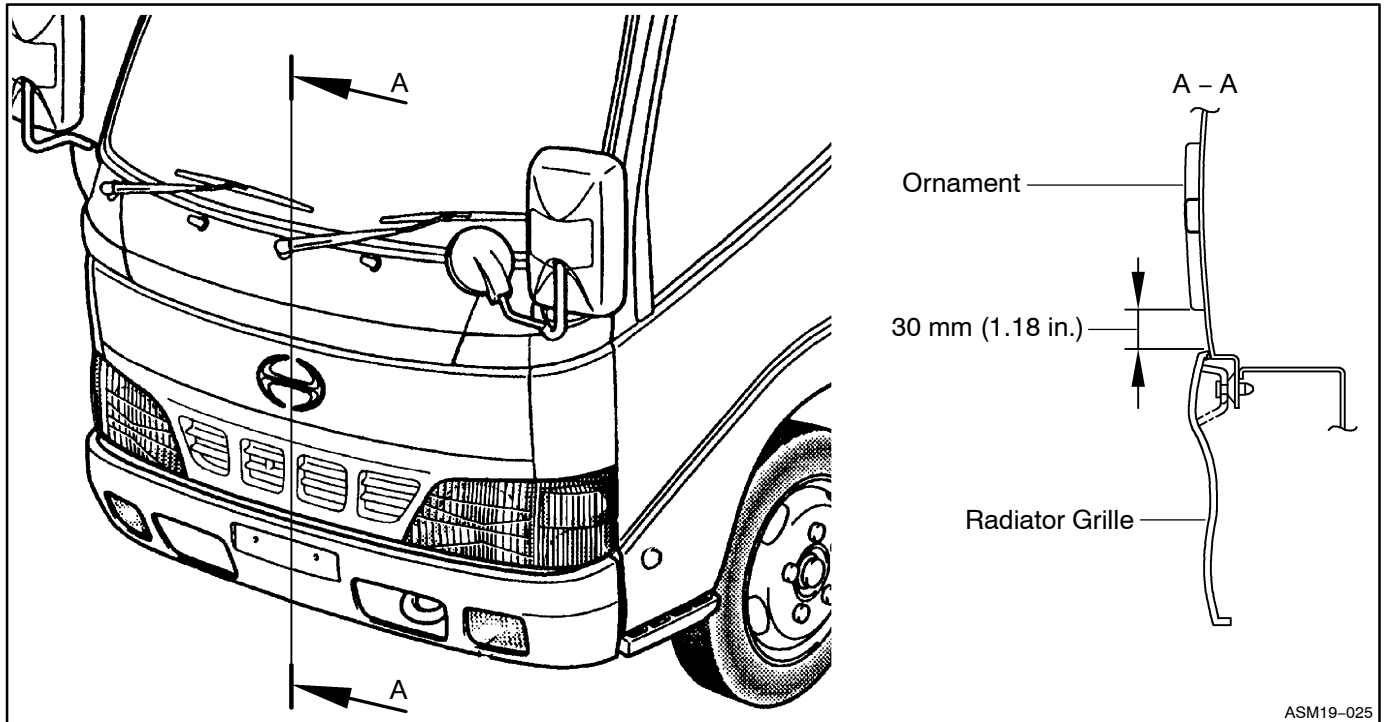
- (a) Put protective tape to the body around the ornament.
- (b) Using a heat light, heat the ornament to 40 – 60°C (104 – 140°F).
- (c) Using a scraper, remove the ornament.

2. INSTALL RADIATOR GRILLE ORNAMENT

- (a) Wipe off the stains with cleaner.
- (b) Install the ornament, as shown in the illustration.

HINT:

If the temperature is under 20°C (68°F), heat the body and the ornament to 20 – 30°C (68 – 86°F) by using a heat light.



ASM19-025

FRONT SIDE PANEL SUB-ASSY LH

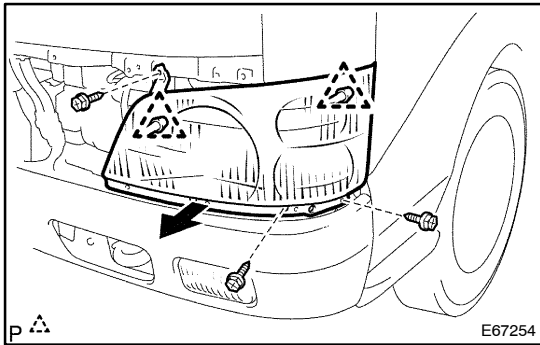
REPLACEMENT

760U3-01

HINT:

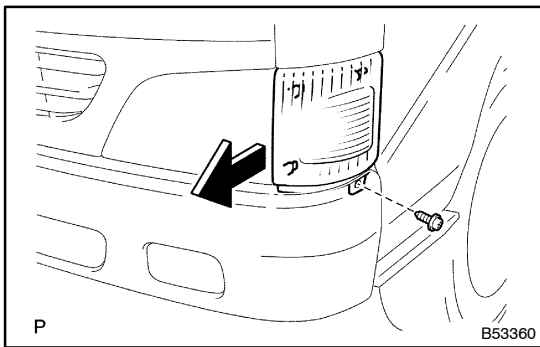
- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- On the RH side, use the same procedures as on the LH side.

- 1. REMOVE FRONT BUMPER BAR (See page 76-2)**
- 2. REMOVE RADIATOR GRILLE (See page 76-3)**



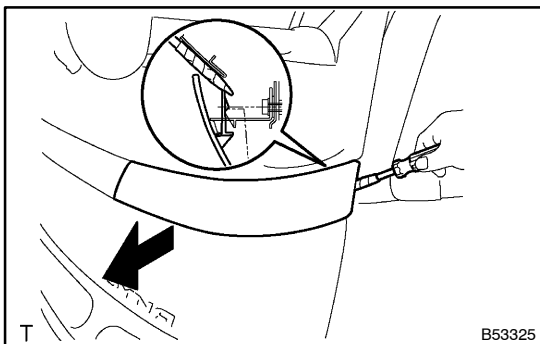
3. REMOVE HEADLAMP UNIT LH (RHD STEERING POSITION TYPE)

- Remove the 3 bolts.
- Pull out the headlamp forward while disengaging the 2 pins of the headlamp.
- Disconnect the connectors and remove the headlamp.



4. REMOVE CLEARANCE LAMP ASSY LH (LHD STEERING POSITION TYPE)

- Remove the screw and clearance lamp.



5. REMOVE FRONT VALANCE PANEL LH

- Using a screwdriver, remove the valance panel.

HINT:

Tape the screwdriver tip before use.

6. REMOVE FRONT SIDE PANEL SUB-ASSY LH

- Remove the 2 bolts, screw and side panel.

7. INSTALL FRONT SIDE PANEL SUB-ASSY LH

- Install the side panel with the 2 bolts and screw.

Torque: 8.5 N·m (85 kgf·cm, 74 in·lbf)

8. INSTALL FRONT BUMPER BAR (See page 76-2)

OUTER MIRROR COVER LH

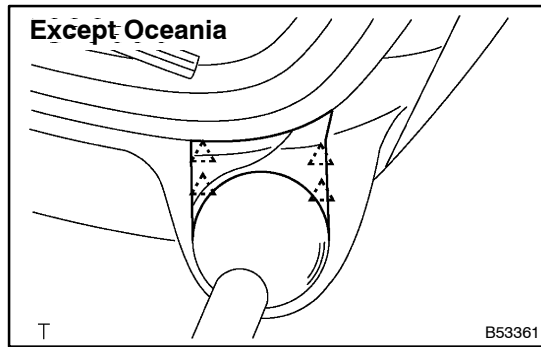
REPLACEMENT

780U4-01

HINT:

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- On the RH side, use the same procedures as on the LH side.

1. REMOVE FRONT VALANCE PANEL LH
2. REMOVE OUTER MIRROR GROMMET

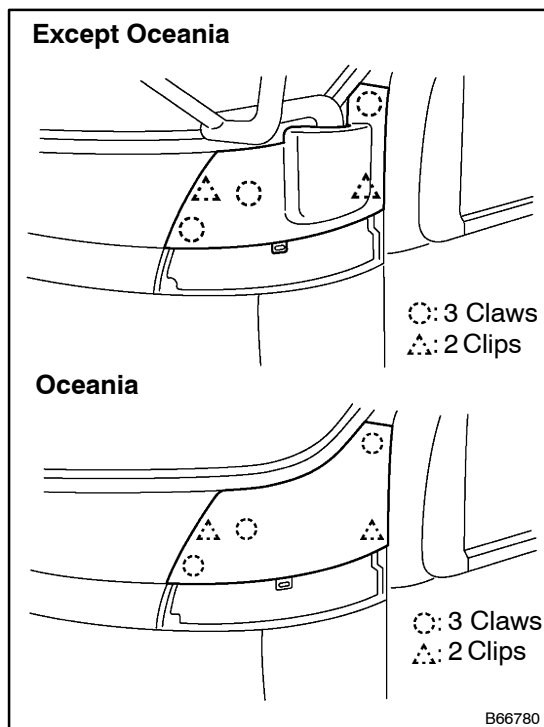


3. REMOVE OUTER MIRROR BEZEL (EXCEPT OCEANIA)

- (a) Using a screwdriver, remove the outer mirror bezel.

HINT:

Tape the screwdriver, tip before use.



4. REMOVE OUTER MIRROR COVER LH

- (a) Disengage the clips and remove the outer mirror cover.

OUTER MIRROR COVER RH

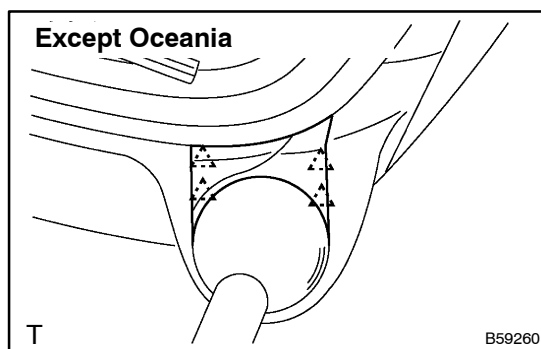
780U5-01

REPLACEMENT

HINT:

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- On the RH side, use the same procedures as on the LH side.

1. REMOVE FRONT VALANCE PANEL RH
2. REMOVE WINDSHIELD WIPER ARM COVER
3. REMOVE FR WIPER ARM RH
4. REMOVE OUTER MIRROR GROMMET

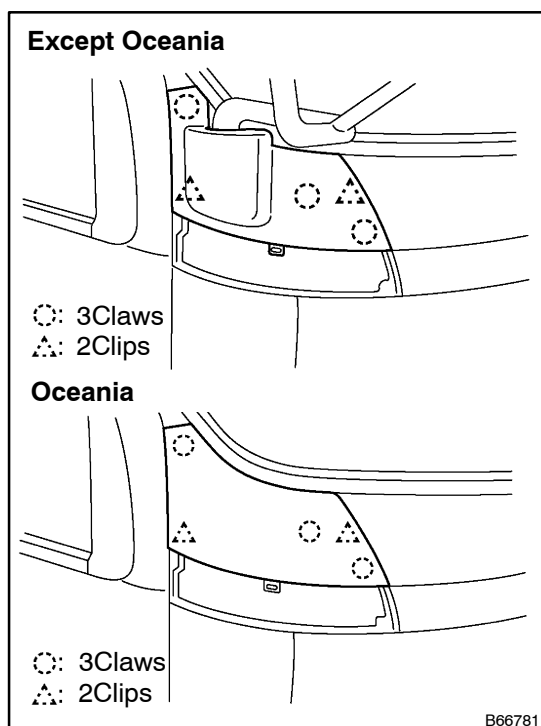


5. REMOVE OUTER MIRROR BEZEL (EXCEPT OCEANIA)

- (a) Using a screwdriver, disengage the 4 clips and remove the outer mirror bezel.

HINT:

Tape the screwdriver, tip before use.



6. REMOVE OUTER MIRROR COVER RH

- (a) Disengage the clips and remove the outer mirror cover.

VEHICLE CONTROL SYSTEM

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INSPECTION	80-2
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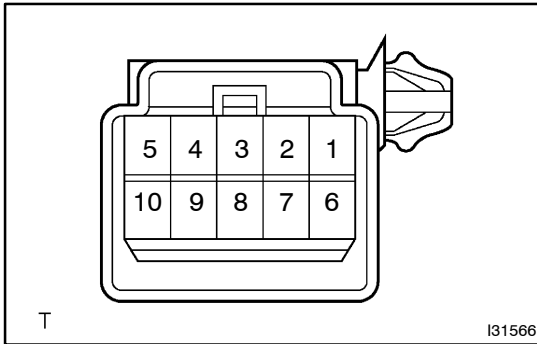
IGNITION SYSTEM

PROBLEM SYMPTOMS TABLE

8002F-03

Symptom	Suspected Area	See Page
Ignition or starter switch can not be set to each position.	<ol style="list-style-type: none">1. AM1 fuse2. AM2 fuse3. Ignition or starter switch4. Power source circuit	<p>-</p> <p>-</p> <p>80-2</p> <p>-</p>

INSPECTION



1. INSPECT IGNITION OR STARTER SWITCH ASSY

(a) Inspect the switch continuity.

Standard:

Terminal No.	Switch Position	Specified Condition
-	LOCK	No continuity
4 ↔ 9	ACC	Continuity
4 ↔ 9 ↔ 10 5 ↔ 8	ON	Continuity
3 ↔ 9 ↔ 10 5 ↔ 8	START	Continuity

If the result is not as specified, replace the switch assy.

REPLACEMENT

HINT:

The installation is in the reverse order of the removal.

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
2. **REMOVE STEERING COLUMN COVER LWR (See page 50-8)**
3. **REMOVE STEERING COLUMN COVER UPR (See page 50-8)**

HINT:

The tilt steering column is in the lowest position when removing the steering column cover.

4. **REMOVE IGNITION OR STARTER SWITCH ASSY**
 - (a) Disconnect the connector.
 - (b) Remove the screw and switch.

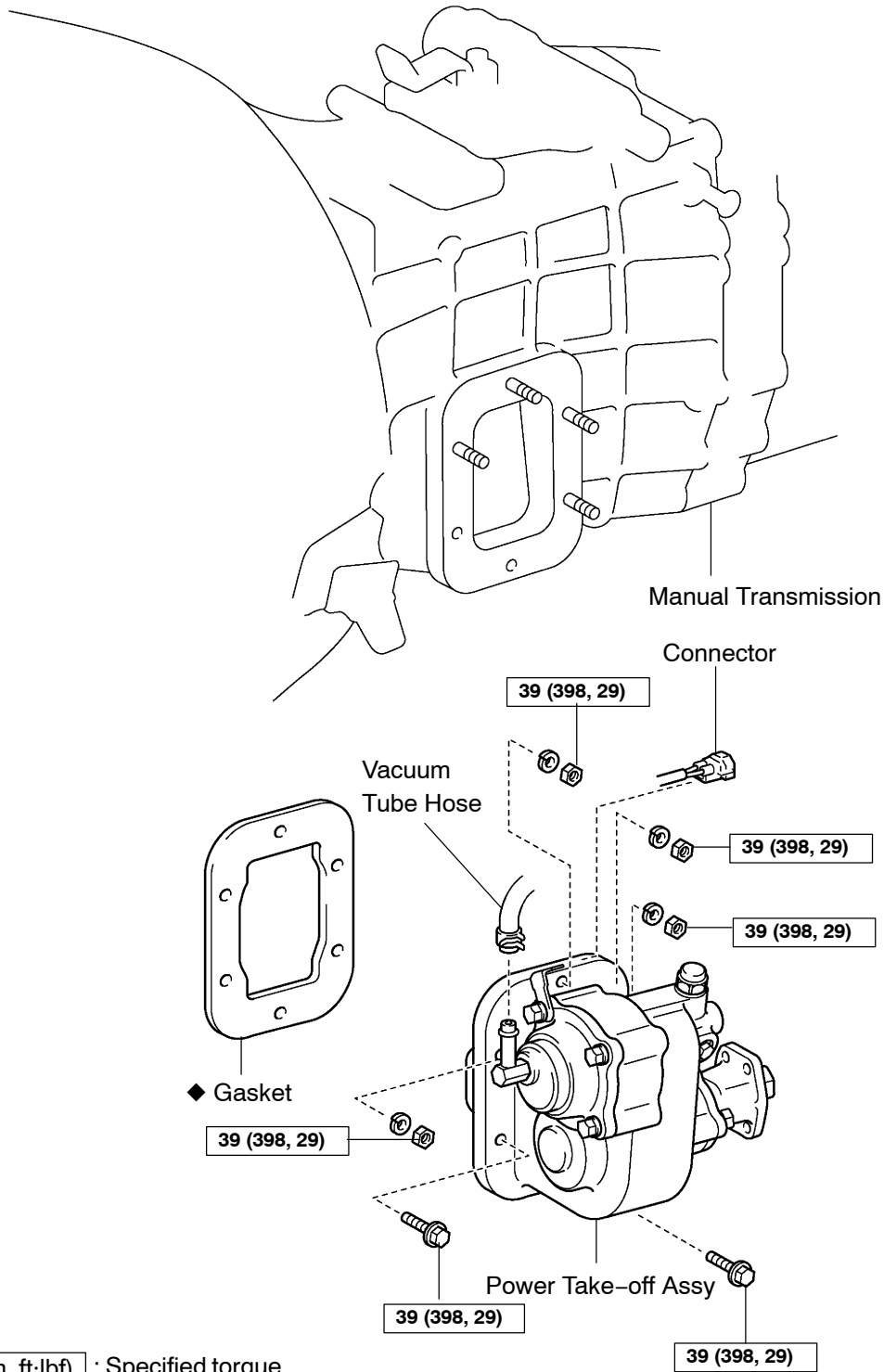
POWER TAKE-OFF

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POWER TAKE-OFF ASSY COMPONENTS

8700M-01

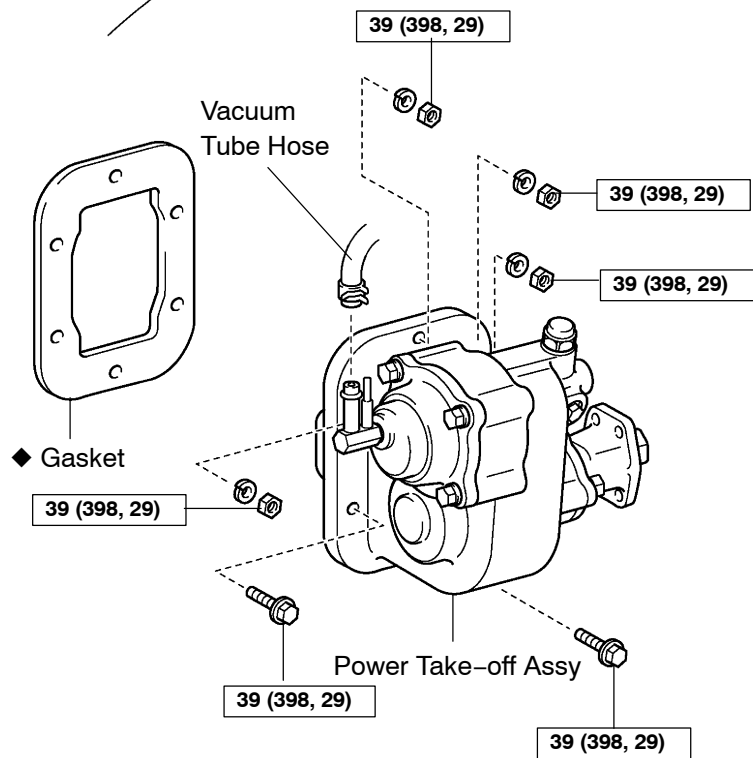
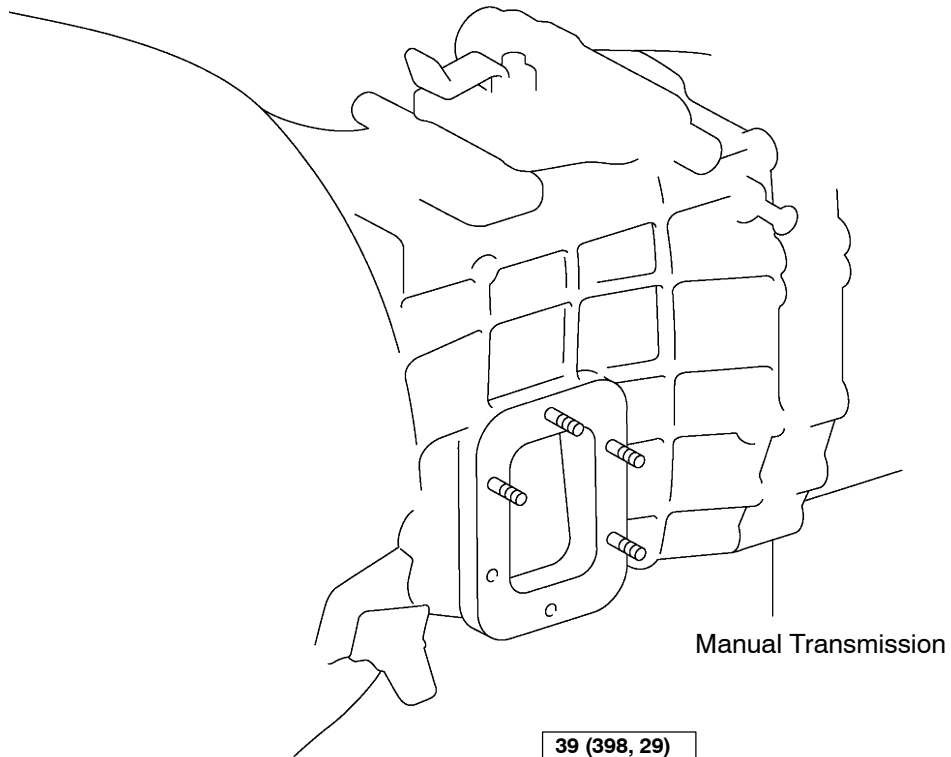
M150



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

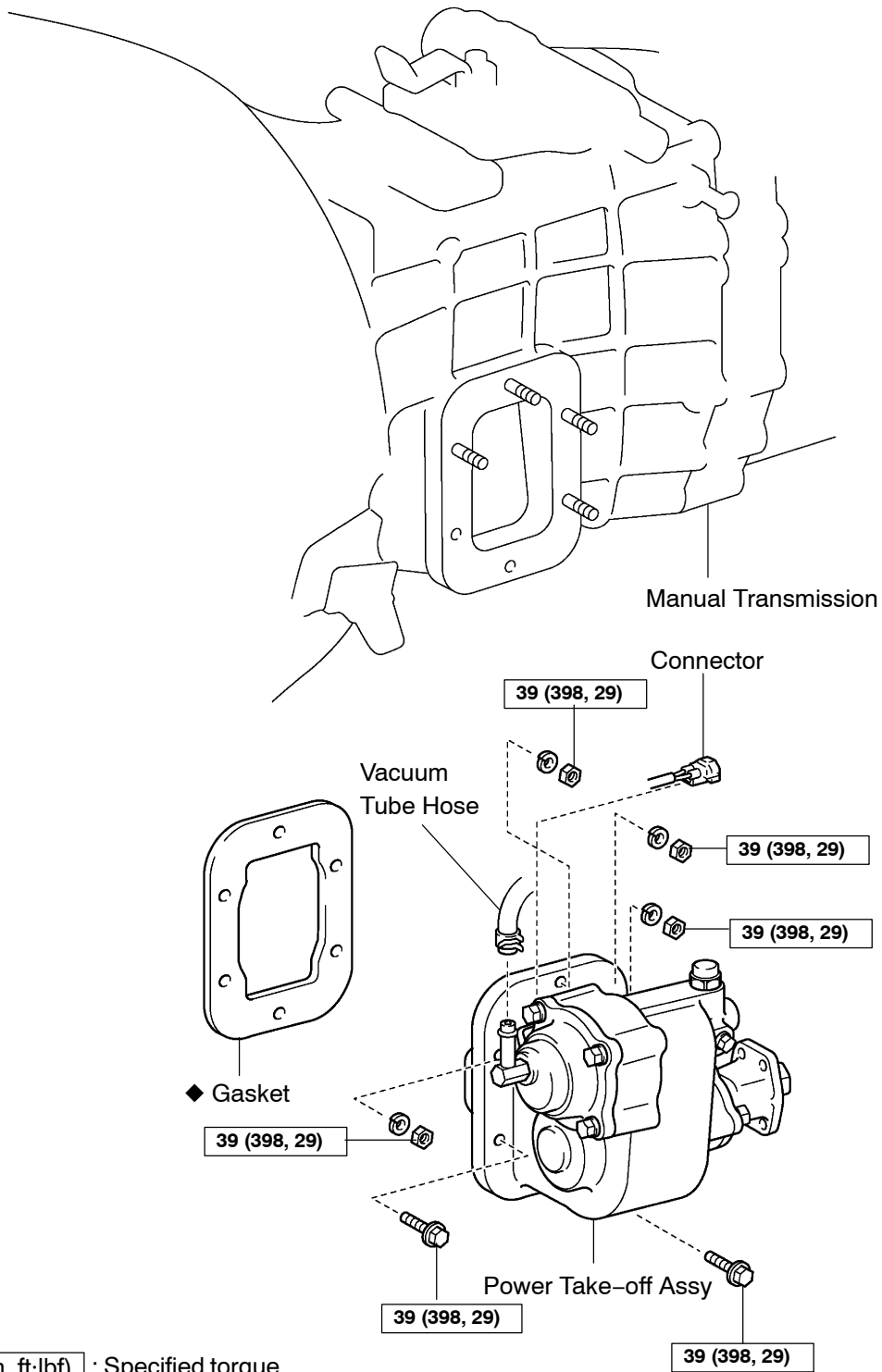
M153



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

H260

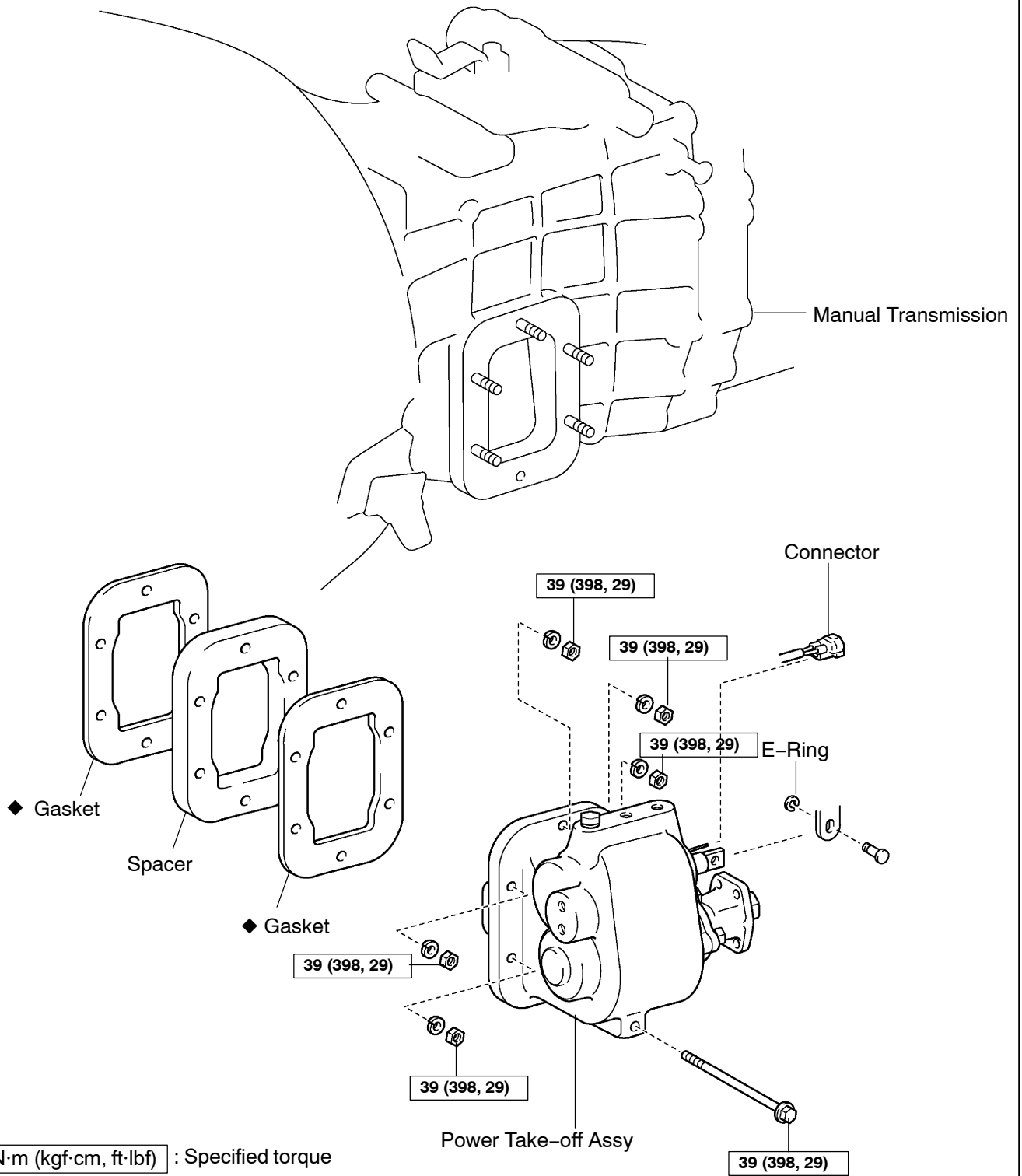


N·m (kgf·cm, ft·lbf) : Specified torque

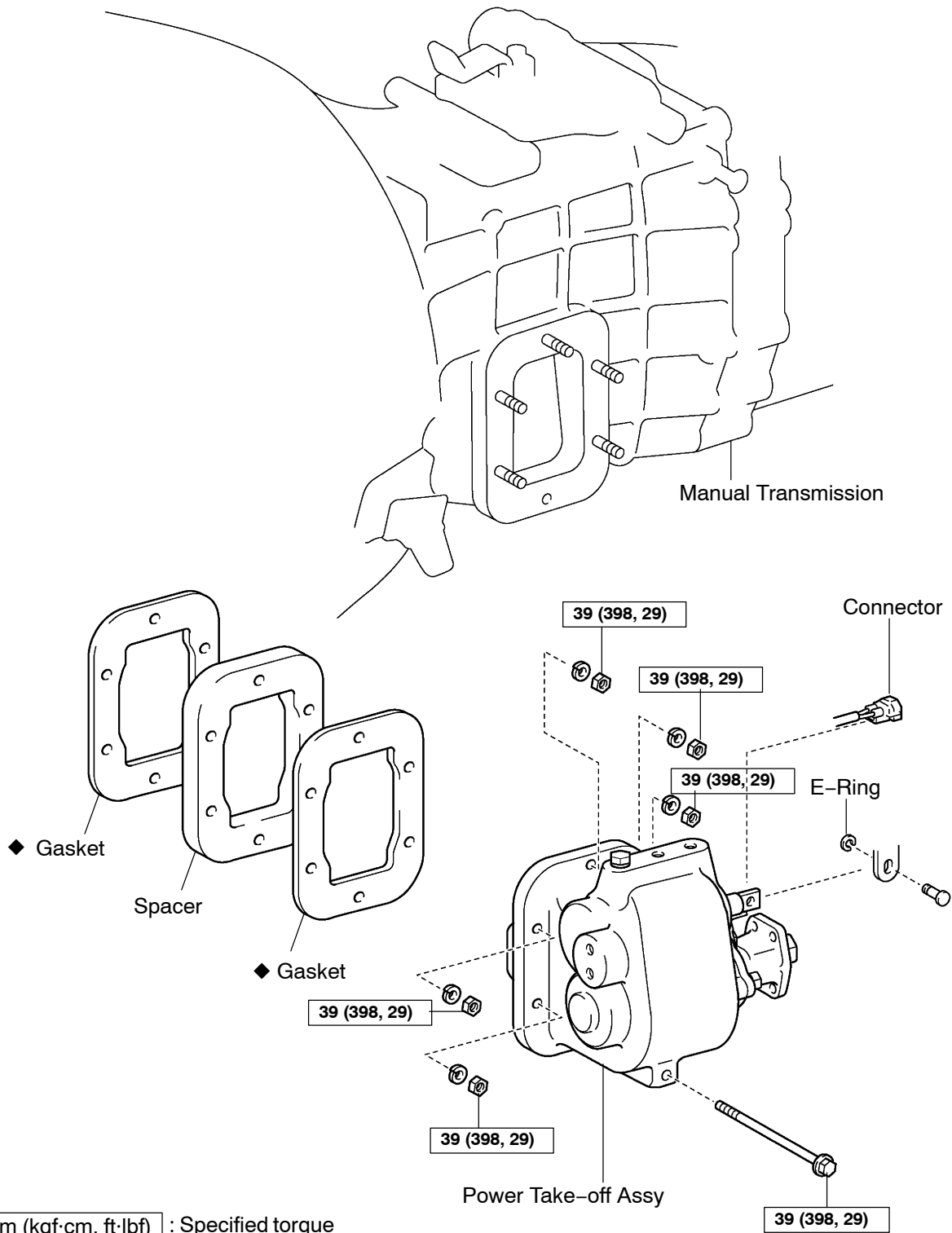
◆ Non-reusable part

T

H350



H351



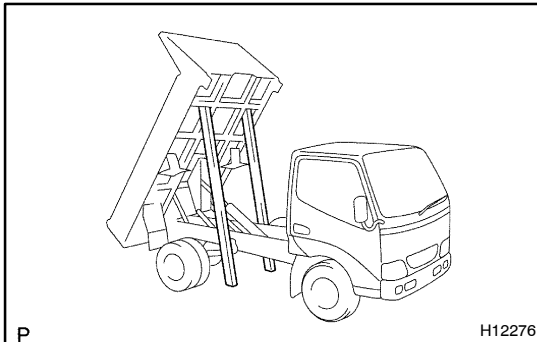
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

REPLACEMENT

HINT:

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.



1. RAISE REAR DECK

2. DRAIN TRANSAXLE OIL

3. REMOVE BATTERY

4. REMOVE BATTERY BRACKET

5. REMOVE PTO DRIVE SHAFT ASSEMBLY

6. REMOVE POWER TAKE-OFF ASSY

- Disconnect the connector.
- M150, M153, H260:
Disconnect the vacuum tube hose.
- H350, H351:
Remove the E-ring.
- Remove the 2 bolts, 4 nuts, spring washers and power take-off.
- M150, M153, H260:
Remove the spacer.
- H350, H351:
Remove the 2 gaskets and spacer.

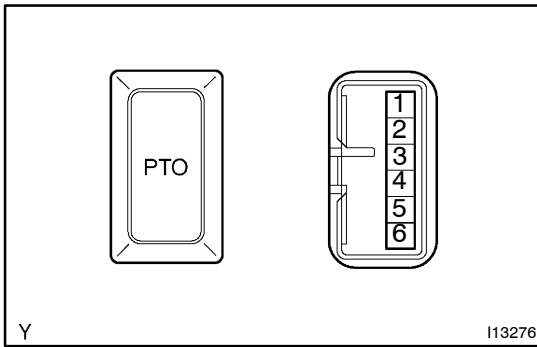
7. INSTALL POWER TAKE-OFF ASSY

- Using a scraper, clean the installation surfaces of the transmission and power take-off.
- M150, M153, H260:
Install a new spacer.
- H350, H351:
Install a new gasket and the spacer.
- Install the power take off with the 2 bolts and 4 nuts.
Torque: 39.2 N·m (400 kgf·cm 29 ft·lbf)
- H350, H351:
Install the E-ring.
- M150, M153, H260:
Connect the vacuum tube hose.
- Connect the connector.

8. INSTALL PTO DRIVE SHAFT ASSEMBLY

9. INSTALL BATTERY BRACKET

10. INSTALL BATTERY



INSPECTION

1. INSPECT POWER TAKE-OFF SWITCH

(a) Inspect the power take-off switch continuity.

Switch position	Tester connector	Specified condition
OFF	-	No continuity
ON	3 ↔ 4	Continuity

If the result is not as specified, replace the switch.

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