TOYOTA

REPAIR MANUAL SUPPLEMENT FOR CHASSIS & BODY

YARiS/ECHO

SCP10 series
NCP1_ series
NLP10 series

Sep., 2001

Pub. No. RM910E

FOREWORD

This supplement has been prepared to provide information covering general service repairs for the chassis and body of the TOYOTA YARIS/ECHO which underwent changes in September, 2001.

Applicable models: SCP10 series
NCP10, 11, 12, 13 series
NLP10 series

For the service specifications and repair procedures of the above model other than those listed in this supplement, refer to the following manuals.

Manual Name	Pub. No.
• YARIS/ECHO Chassis and Body Repair Manual	RM685E
• YARIS/ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
• YARIS/ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E
• 1SZ–FE Engine Repair Manual	RM686E
• 1SZ–FE Engine Repair Manual Supplement	RM839E
• 1NZ–FE, 2NZ–FE Engine Repair Manual	RM749E
• 1ND–TV Engine Repair Manual	RM920E
• U340E, U341E Automatic Transaxle Repair Manual (Aug., 1999)	RM735U
• U440E, U441E Automatic Transaxle Repair Manual (Jan., 1999)	RM689E

All information in this manual is based on the latest product information at the time of publication. However, specifications and procedures are subject to change without notice.

TOYOTA MOTOR CORPORATION

First Printing: Aug. 1, 2001 01-010801-00
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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.

INTRODUCTION

HOW TO USE THIS MANUAL

GENERAL INFORMATION

IN00U-31

1. INDEX

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

2. GENERAL DESCRIPTION

At the beginning of each section, a General Description is given that pertains to all repair operations contained in that section.
Read these precautions before starting any repair task.

3. TROUBLESHOOTING

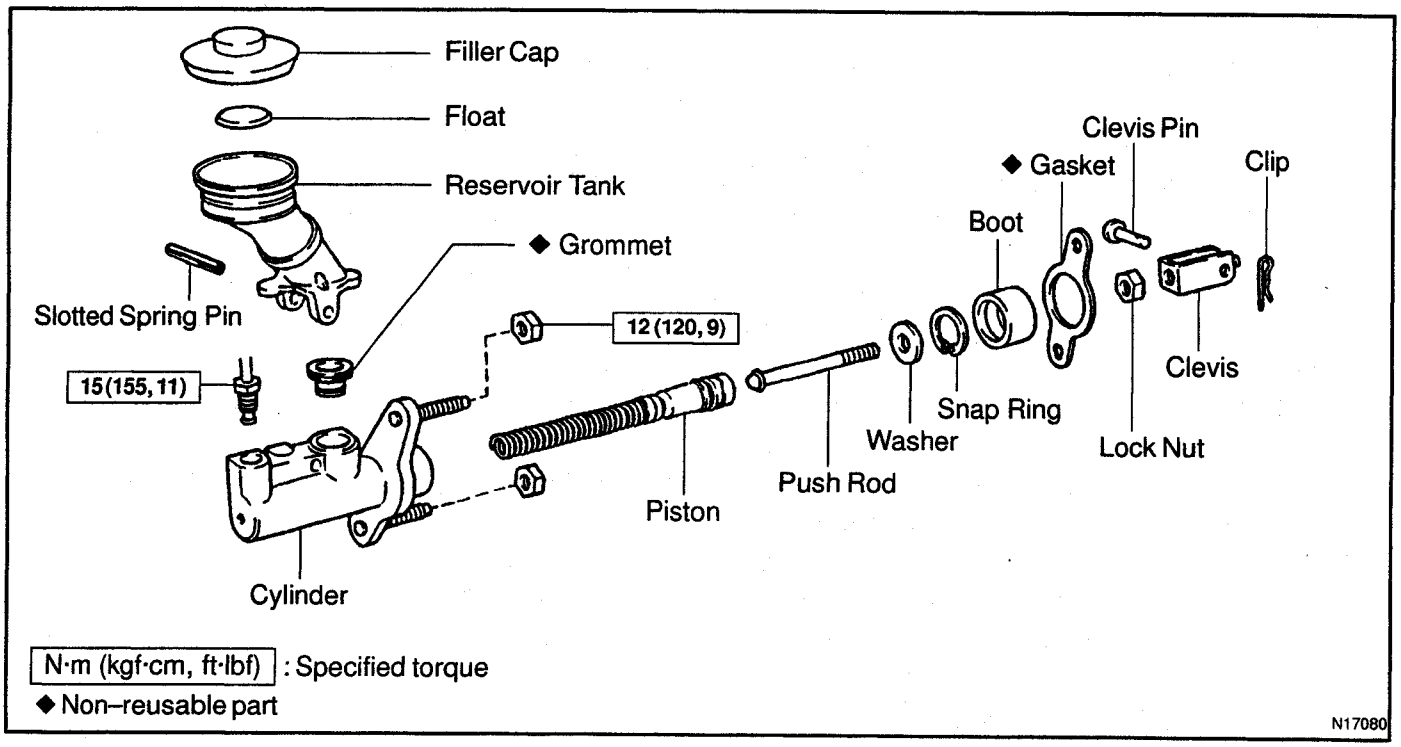
TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The fundamentals of how to proceed with troubleshooting are described on page IN–22.
Be sure to read this before performing troubleshooting.

4. PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

5. REPAIR PROCEDURES

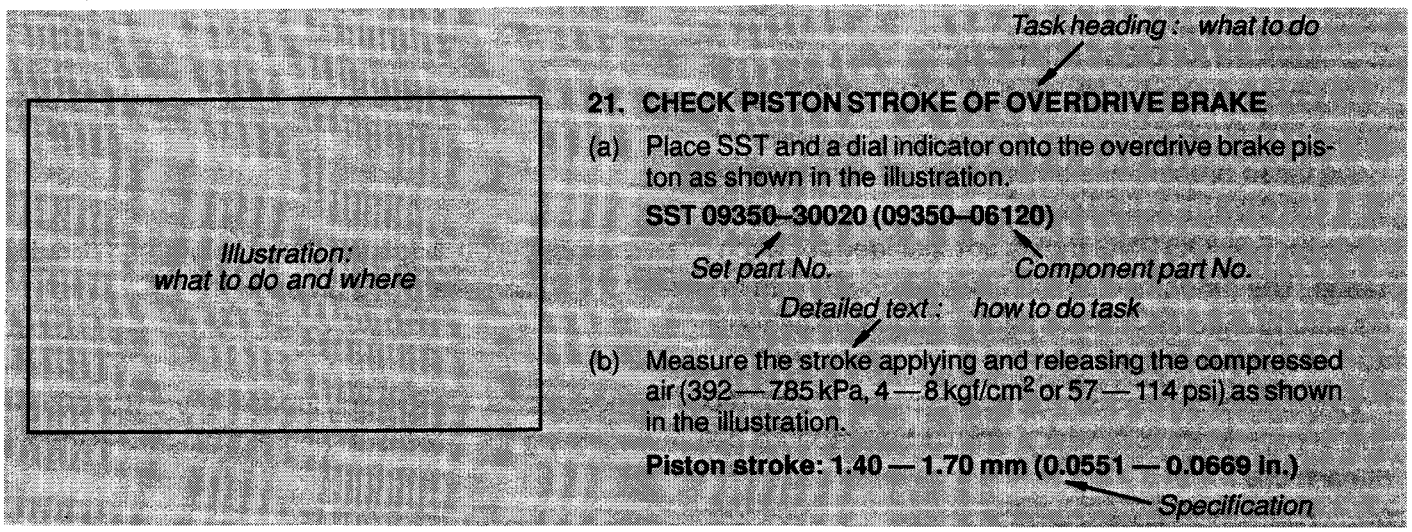
Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.
Example:



The procedures are presented in a step–by–step format:

- The illustration shows what to do and where to do it.
- The task heading tells what to do.
- The detailed text tells how to perform the task and gives other information such as specifications and warnings.

Example:



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

6. REFERENCES

References have been kept to a minimum. However, when they are required you are given the page to refer to.

7. SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found in Service Specifications section for quick reference.

8. CAUTIONS, NOTICES, HINTS:

- CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide additional information to help you perform the repair efficiently.

9. SI UNIT

The UNITS given in this manual are primarily expressed according to the SI UNIT (International System of Unit), 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

IN04P–21

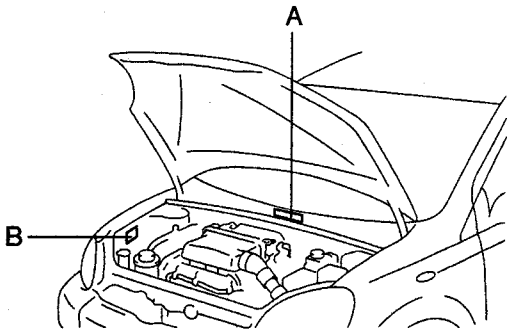
VEHICLE IDENTIFICATION AND ENGINE SERIAL NUMBER

1. VEHICLE IDENTIFICATION NUMBER

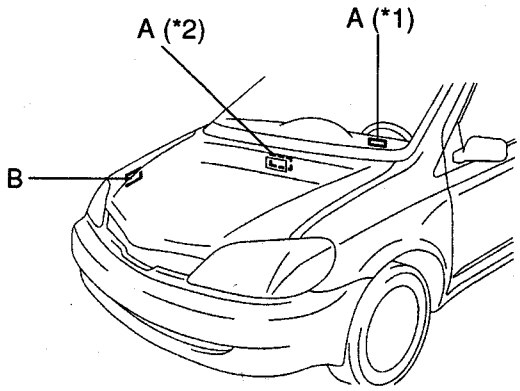
The vehicle identification number is stamped in the engine compartment as shown in the illustration. This number has also been stamped on the manufacturer's plate, as shown in the illustration.

A: Vehicle Identification Number
B: Manufacturer's Plate

TMC made:



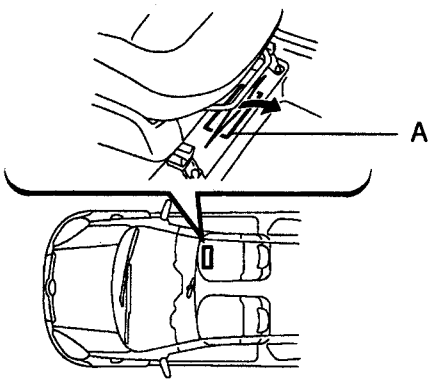
Hatchback model:

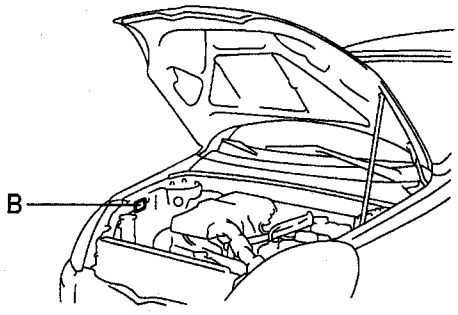


Sedan model:

*1: G.C.C. countries
*2: General

TMMF made:





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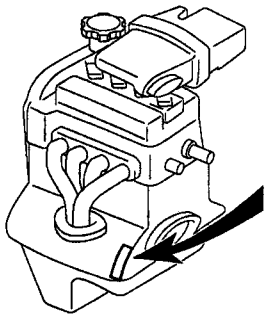
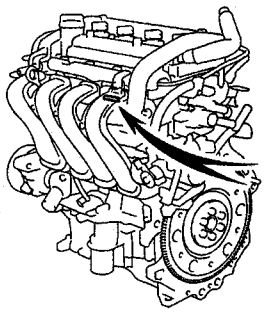
2. ENGINE SERIAL NUMBER

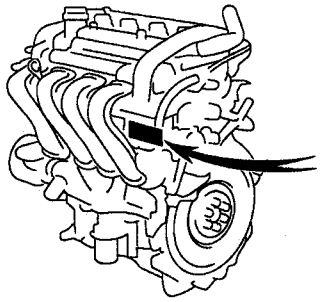
The engine serial number is stamped on the engine block, as shown in the illustration.



1SZ–FE:



1NZ–FE, 2NZ–FE:



1ND–TV:

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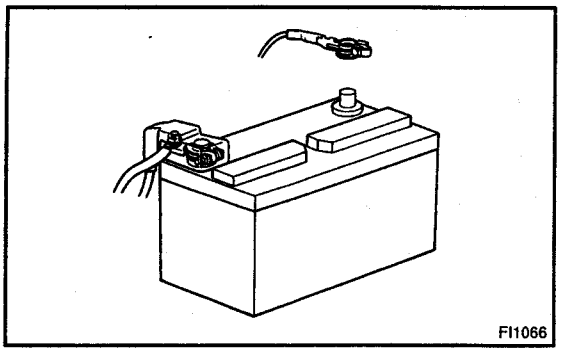
B15758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REPAIR INSTRUCTIONS

GENERAL INFORMATION

IN0DC–03

BASIC REPAIR HINT

(a) Use fender, seat and floor covers to keep the vehicle clean and prevent damage.

(b) During disassembly, keep parts in the appropriate order to facilitate reassembly.

(c) Installation and removal of battery terminal:

(1) Before performing electrical work, disconnect the negative (–) terminal cable from the battery.

(2) If it is necessary to disconnect the battery for inspection or repair, first disconnect the negative (–) terminal cable.

(3) When disconnecting the terminal cable, to prevent damage to the battery terminal, loosen the cable nut and raise the cable straight up without twisting or prying it.

(4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.

(5) Install the cable ends to the battery terminals after loosening the nut, and tighten the nut after installation. Do not use a hammer to tap the cable ends onto the terminals.

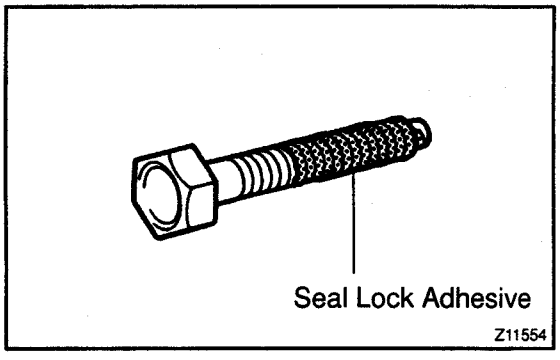
(6) Be sure the cover for the positive (+) terminal is properly in place.

(d) Check hose and wiring connectors to make sure that they are connected securely and correctly.

(e) Non–reusable parts

(1) Always replace cotter pins, gaskets, O–rings, oil seals, etc. with new ones.

(2) Non–reusable parts are indicated in the component illustrations by the "◆" symbol.



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(f) Precoated parts

Precoated parts are bolts, nuts, etc. that are coated with a seal lock adhesive at the factory.

(1) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.

(2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.

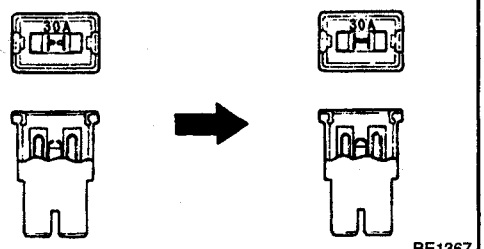
(3) Precoated parts are indicated in the component illustrations by the "★" symbol.

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

(h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.

(i) Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found in Preparation section in this manual.

Medium Current Fuse and High Current Fuse Equal Amperage Rating



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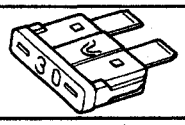
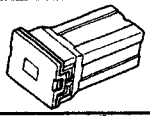
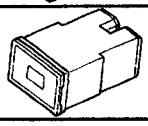
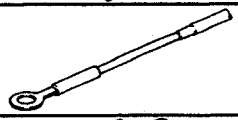
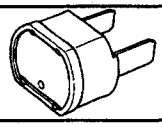
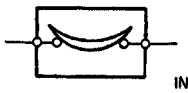
(j) When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.

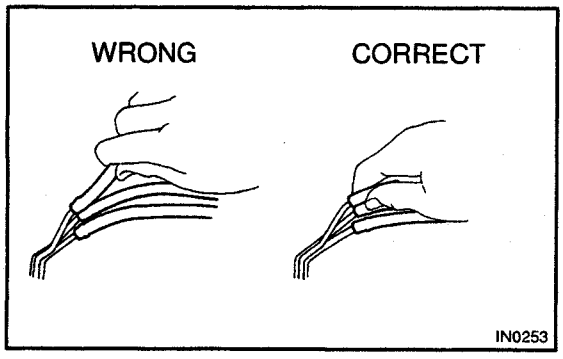
Illustration	Symbol	Part Name	Abbreviation
 BE5594	 IN0365	FUSE	FUSE
 BE5595	 IN0366	MEDIUM CURRENT FUSE	M–FUSE
 BE5596	 IN0367	HIGH CURRENT FUSE	H–FUSE
 BE5597	 IN0367	FUSIBLE LINK	FL
 BE5598	 IN0368	CIRCUIT BREAKER	CB

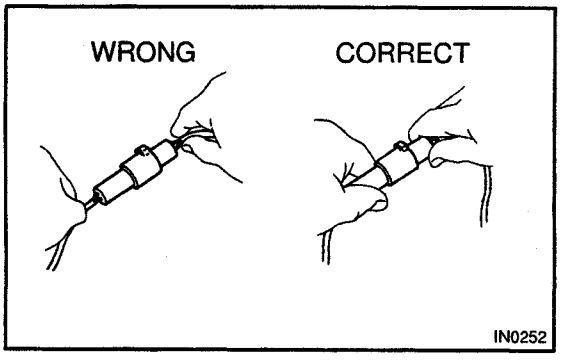
V00076

(k) 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 IN–9).
- Cancel the parking brake on the level place and shift the transmission in Neutral (or N range).
- 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 before the front wheels.
- When either the front or rear wheels only should be jacked up, set rigid racks 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 rigid racks. It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.

(l) Observe the following precautions to avoid damage to the following 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 destroyed by static electricity.)





(2) To disconnect vacuum hoses, pull off the end, not the middle of the hose.

(3) To pull apart electrical connectors, pull on the connector itself, not the wires.

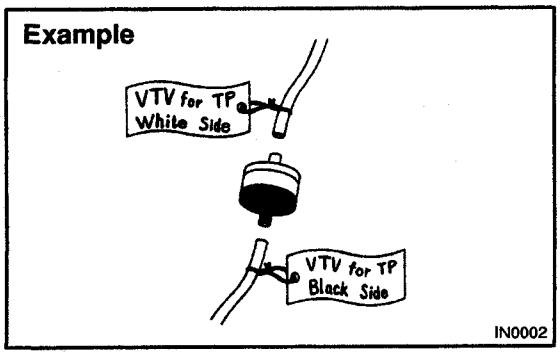
(4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.

(5) When steam cleaning an engine, protect the electronic components, air filter and emission–related components from water.

(6) Never use an impact wrench to remove or install temperature switches or temperature sensors.

(7) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.

(8) 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.



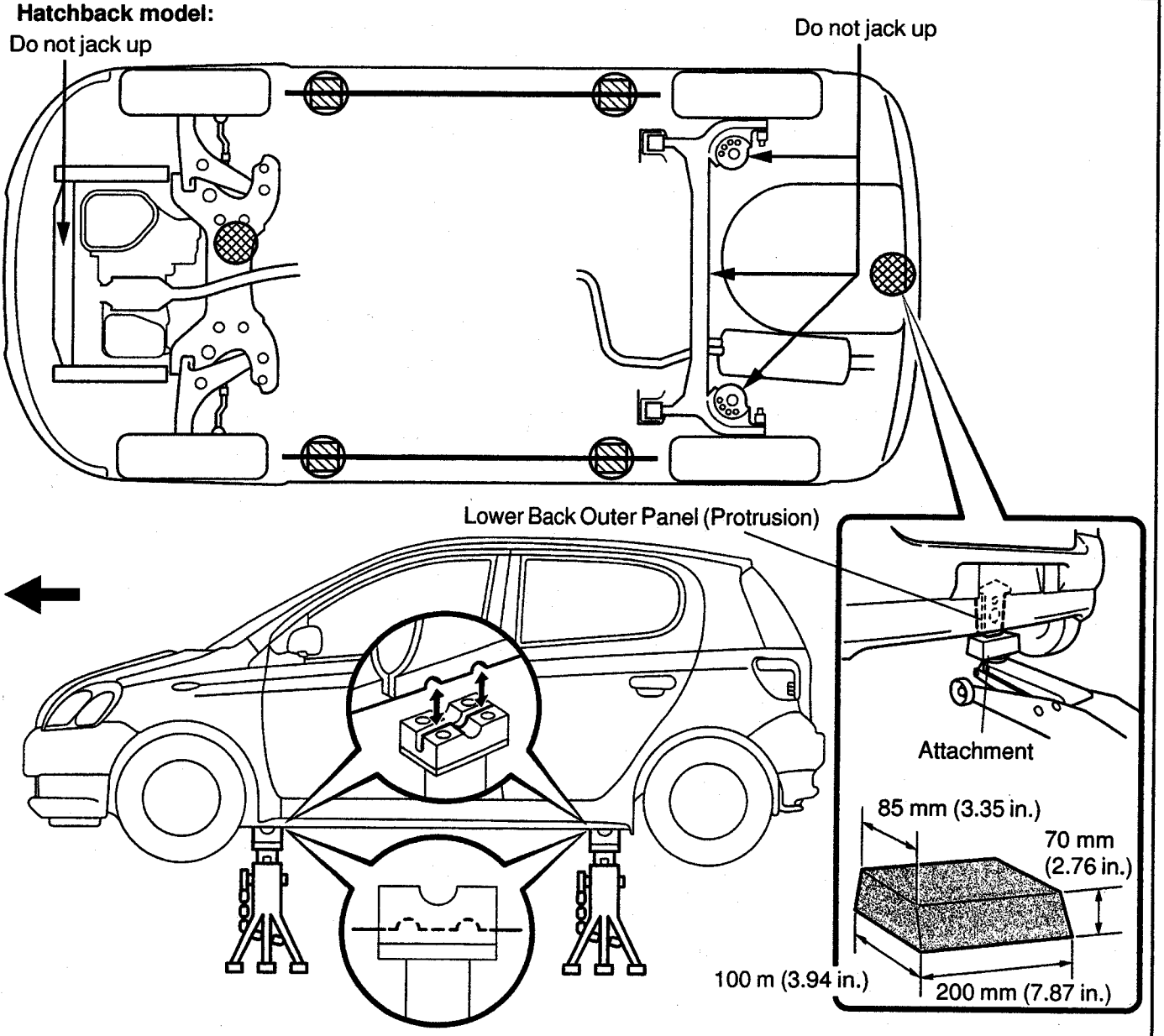
(m) Installation and removal of vacuum hose:
  (1) When disconnecting vacuum hoses, use tags to identify where they should be reconnected to.
  (2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

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

IN0FP–01

VEHICLE LIFT AND SUPPORT LOCATIONS

Hatchback model:



JACK POSITION

Front - - - - - - - - - Front suspension member
Rear - - - - - - - - - Lower Back Outer Panel (Protrusion)

CAUTION : When jacking–up the front and rear, make sure the vehicle is not carrying any extra weight.

PANTOGRAPH JACK POSITION

SUPPORT POSITION

Safety stand and swing arm type lift - - - - - - - - - - - - - - - - - -

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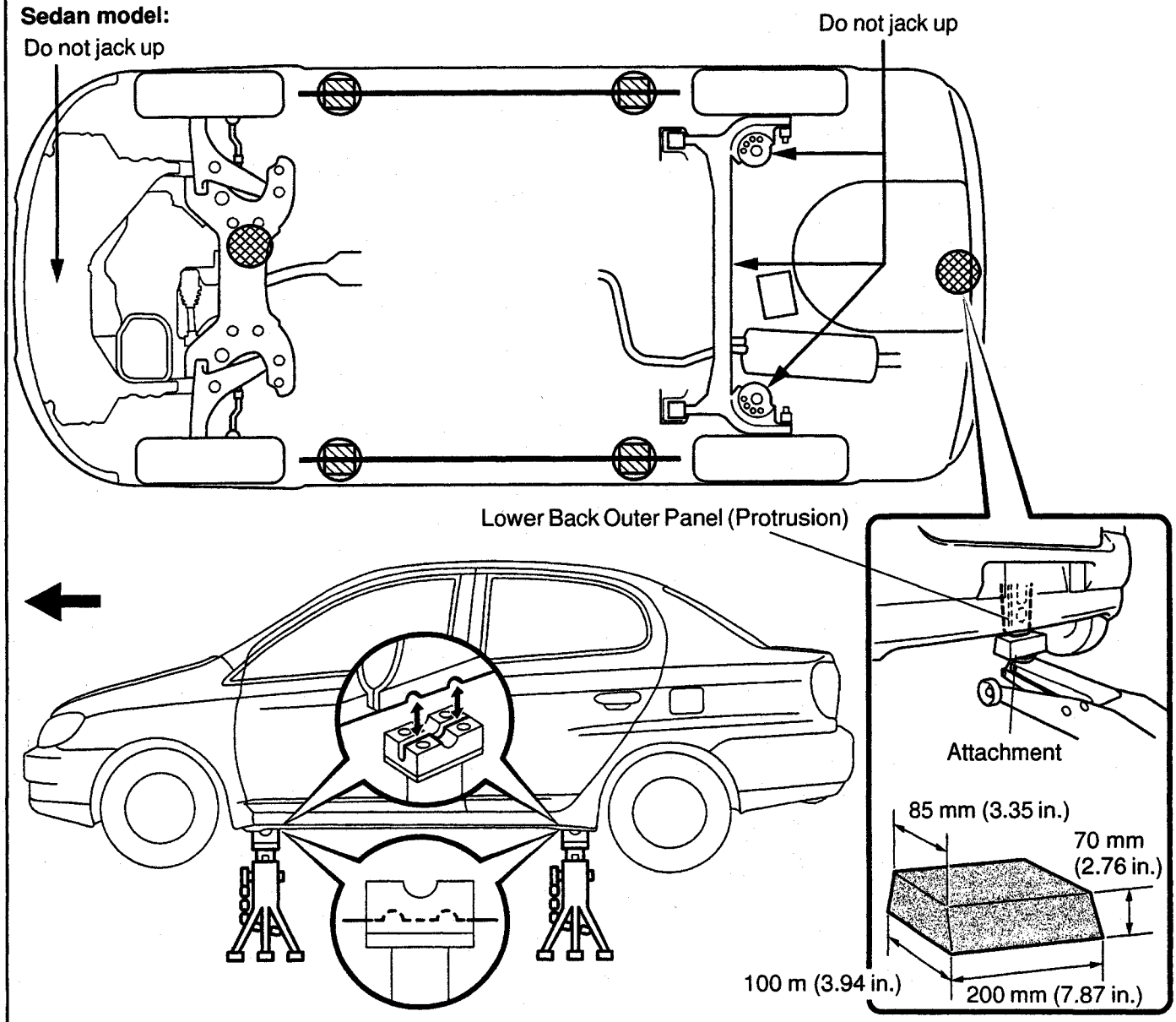
Sedan model:



JACK POSITION

Front - - - - - - - - - Front suspension member
Rear - - - - - - - - - Lower Back Outer Panel (Protrusion)

CAUTION : When jacking–up the front and rear, make sure the vehicle is not carrying any extra weight.

PANTOGRAPH JACK POSITION

SUPPORT POSITION

Safety stand and swing arm type lift - - - - - - - - - - - - - - - - - - -

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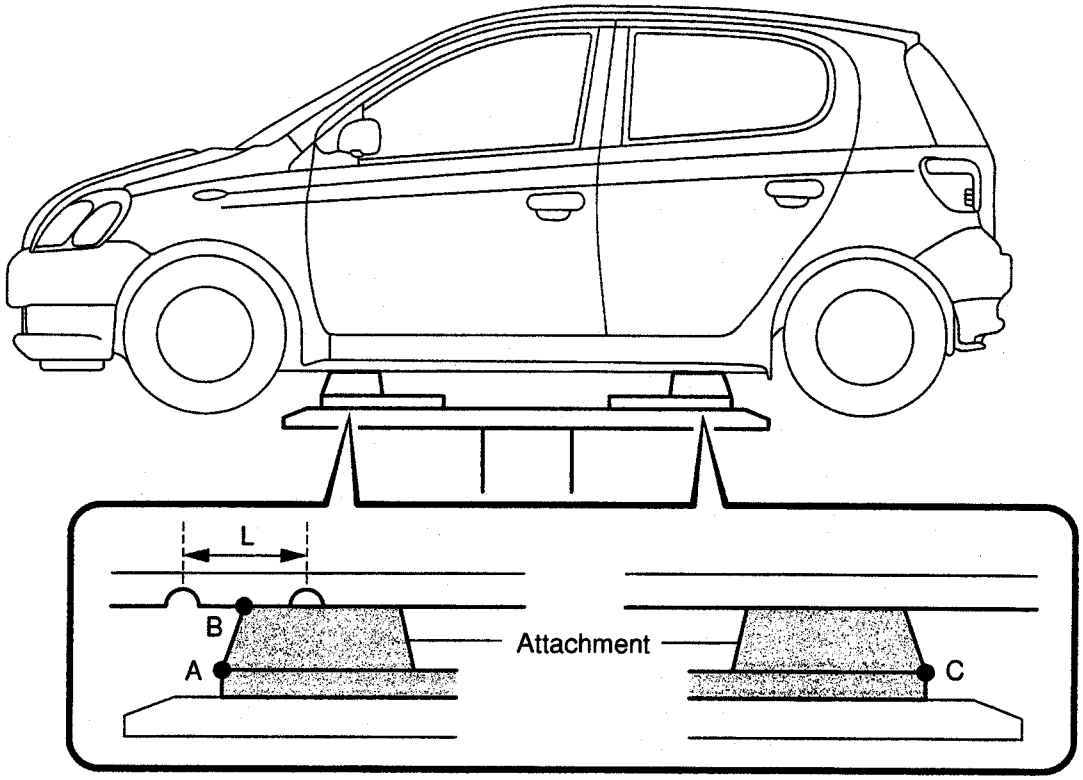
Hatchback model:

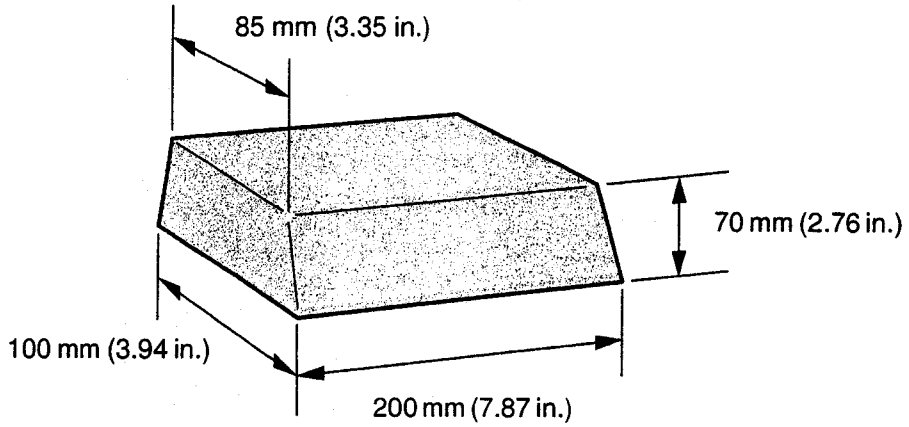
Plate type lift



HINT:

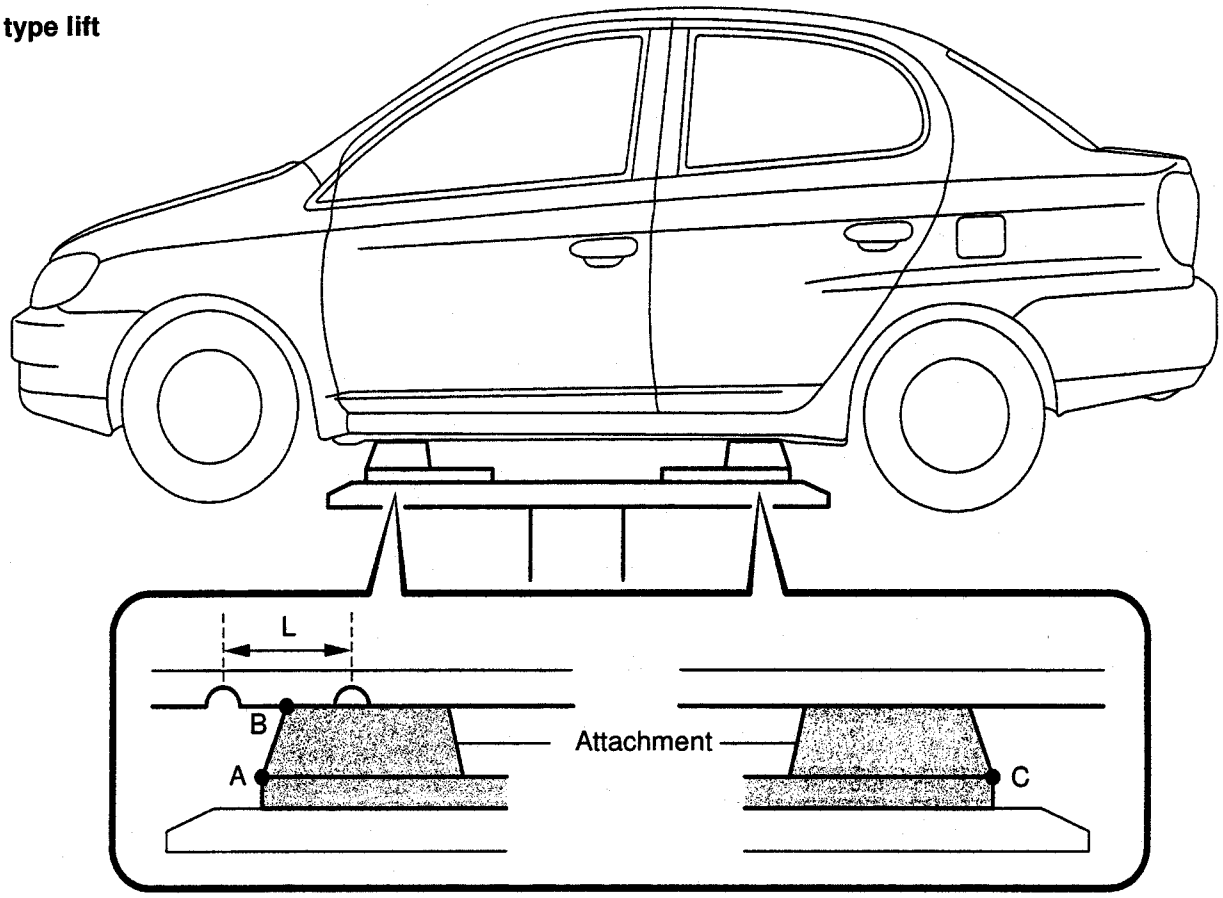
Right and left set position	Place the vehicle over the center of the lift.
Front and rear set position	• When using attachments, place the one for front side vertically and the one for rear side horizontally to the vehicle. • Align the cushion gum ends of the plate with the attachment lower ends (A, C). • Align the attachment upper end (B) with the rocker flange rear side notch.

Attachment dimensions



Sedan model:

Plate type lift



HINT:

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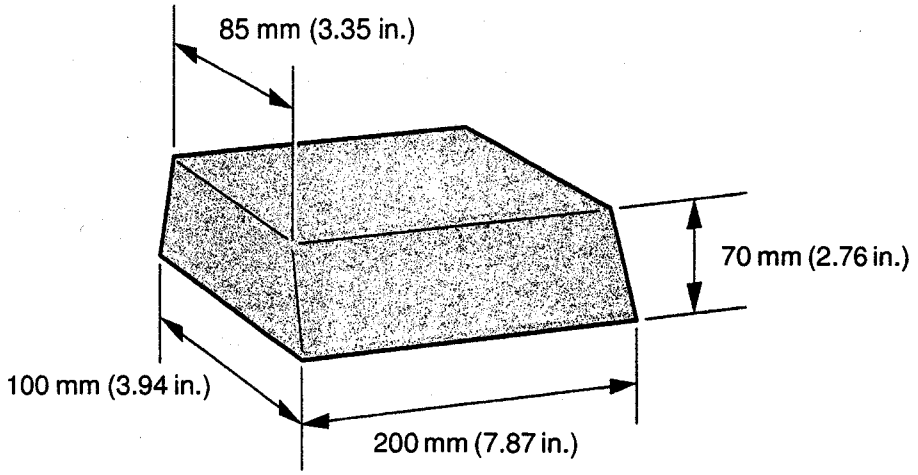

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FOR ALL OF VEHICLES

PRECAUTION

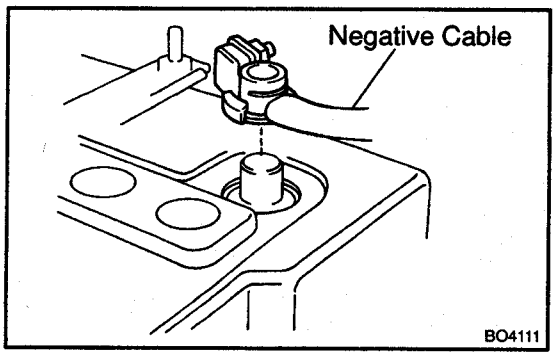
IN0FQ–03

1. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER (See Pub. No. RM685E on page RS–1)

(a) The YARIS/ECHO is equipped with an SRS (Supplemental Restraint System), such as the driver airbag, front passenger airbag assembly, side airbag assembly and seat belt pretensioners.

Failure to carry out service operations in the correct sequence could cause the supplemental restraint system to unexpectedly deploy during servicing, possibly leading to a serious accident.

Further, if a mistake is made in servicing the supplemental restraint system, it is possible the SRS may 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 procedure described in this manual.



(b) 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 inspect the diagnostic trouble codes before disconnecting the battery (See Pub. No. RM838E on page DI–159).

(2) Work must be started after 90 seconds from the time 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 that if work is started within 90 seconds of 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 will be cancelled. So before starting work, make a record of the contents memorized by the each memory system. Then when work is finished, reset the clock and audio systems as before.

To avoid erasing the memory of each memory system, never use a back–up power supply from another battery.

(3) Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad, front passenger airbag assembly, side airbag assembly, airbag sensor assembly, front airbag sensor, side airbag sensor assembly and seat belt pretensioner should be inspected.

(4) Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.

(5) Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.

(6) Never disassemble and repair the airbag sensor assembly, steering wheel pad, front passenger airbag assembly, side airbag assembly, airbag sensor assembly, front airbag sensor, side airbag sensor assembly or seat belt pretensioner.

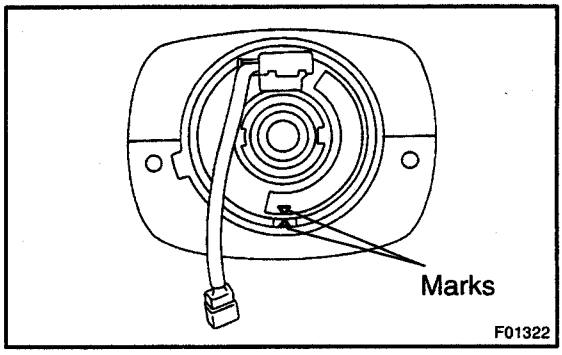
(7) If the airbag sensor assembly, steering wheel pad, front passenger airbag assembly, side airbag assembly, airbag sensor assembly, front airbag sensor, side airbag sensor assembly or seat belt pretensioner has been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.

(8) Do not directly expose the airbag sensor assembly, steering wheel pad, front passenger airbag assembly, side airbag assembly, airbag sensor assembly, front airbag sensor, side airbag sensor assembly or seat belt pretensioner to hot air or flames.

(9) Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting of the electrical circuit.

(10) Information labels are attached to the periphery of 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 Pub. No. RM838E on page DI–159).



(c) SPIRAL CABLE (in Combination Switch)
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 result. Refer to See Pub. No. RM838E on page SR–9 of this manual concerning correct steering wheel installation.

(d) STEERING WHEEL PAD (with Airbag)

(1) When removing the steering wheel pad or handling a new steering wheel pad, it should be placed with the pad top surface facing up.
Storing the pad with its metallic surface facing upward may lead to a serious accident if the airbag deploys for some reason. In addition do not store a steering wheel pad on top of another one.

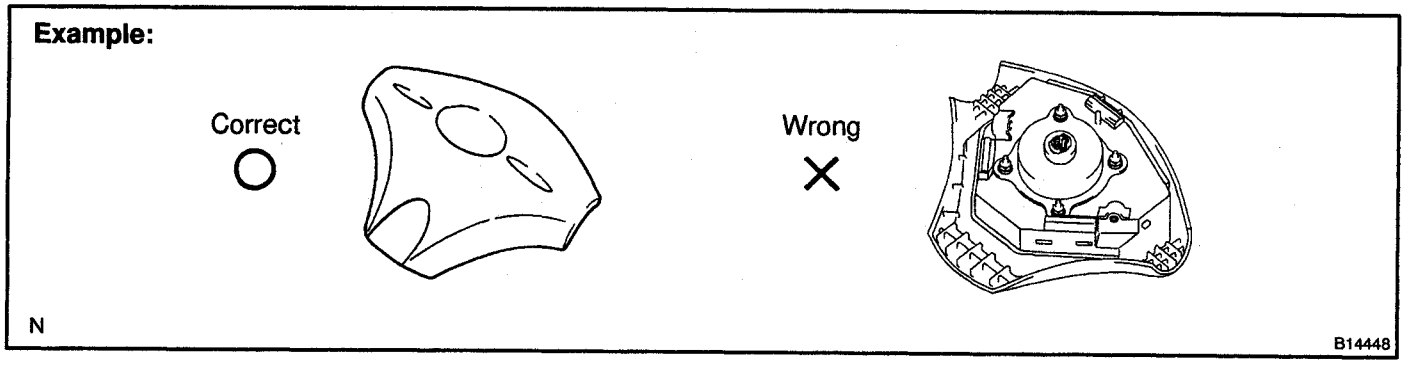
(2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)

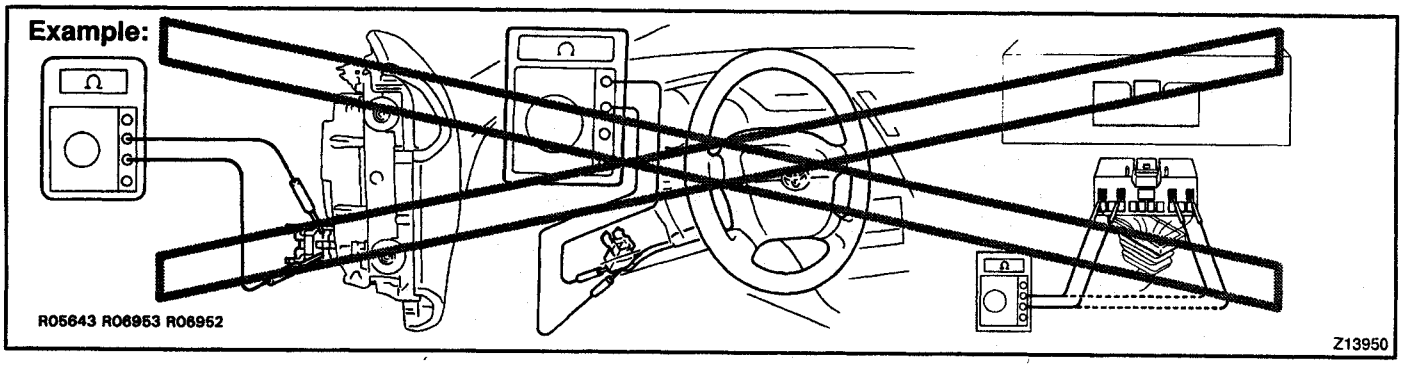
(3) Grease should not be applied to the steering wheel pad and the pad should not be cleaned with detergents of any kind.

(4) Store the steering wheel pad where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) under the steering column near the combination switch connector before starting work.

(6) When disposing of a vehicle or the steering wheel pad alone, the airbag should be deployed using an SST before disposal (See Pub. No. RM685E on page RS–14).
Carry out the operation in a safe place away from electrical noise.





(e) FRONT PASSENGER AIRBAG ASSEMBLY

(1) Always store a removed or new front passenger airbag assembly with the airbag deployment direction facing up.
Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag deploys.

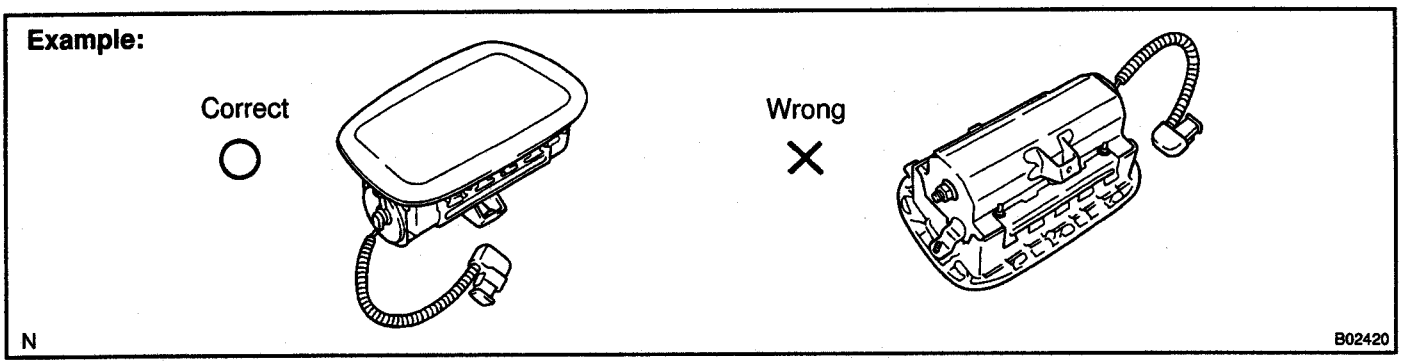
(2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)

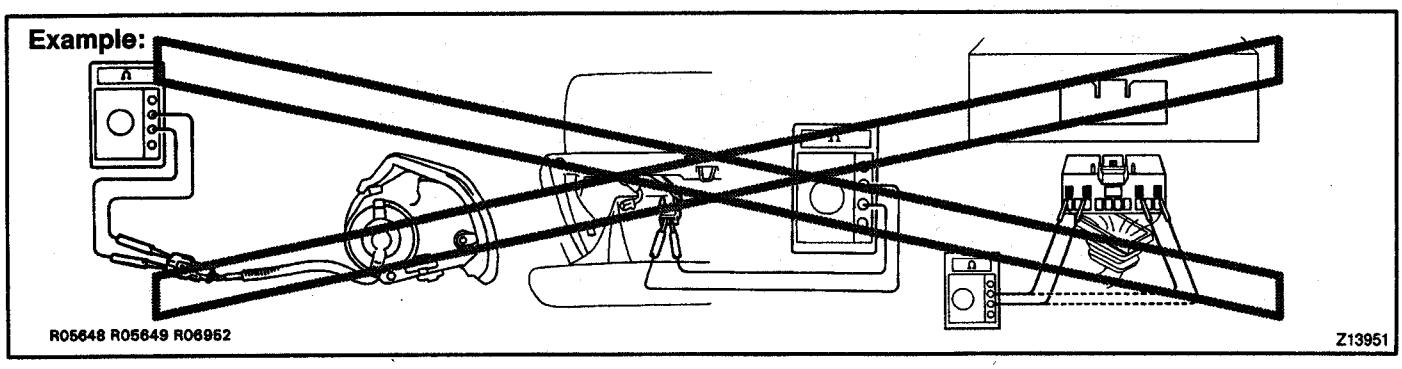
(3) Grease should not be applied to the front passenger airbag assembly and the airbag door should not be cleaned with detergents of any kind.

(4) Store the airbag assembly where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) installed on the assembly before starting work.

(6) When disposing of a vehicle or the front passenger airbag assembly alone, the airbag should be deployed using an SST before disposal (See Pub. No. RM685E on page RS–27).
Perform the operation in a safe place away from electrical noise.





(f) SIDE AIRBAG ASSEMBLY

(1) Always store a removed or new side airbag assembly with the airbag deployment direction facing up. Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag deploys.

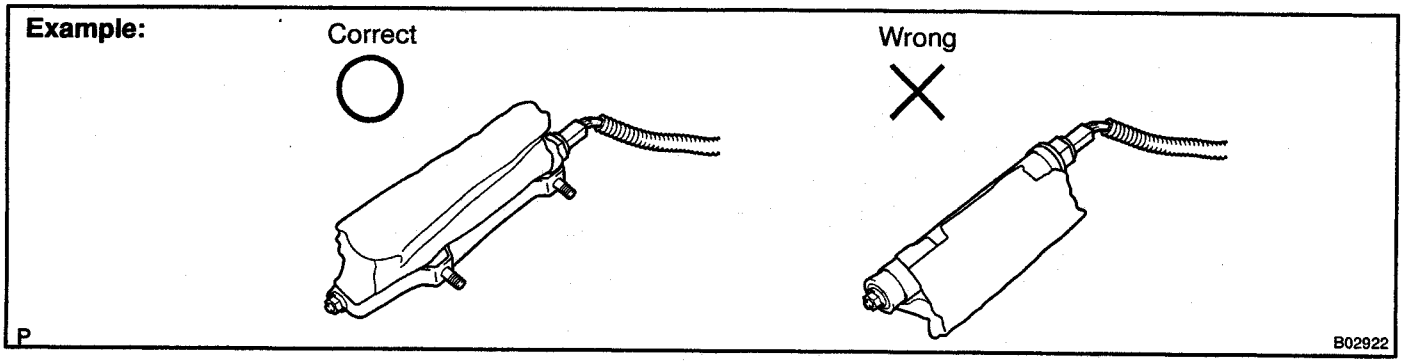
(2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)

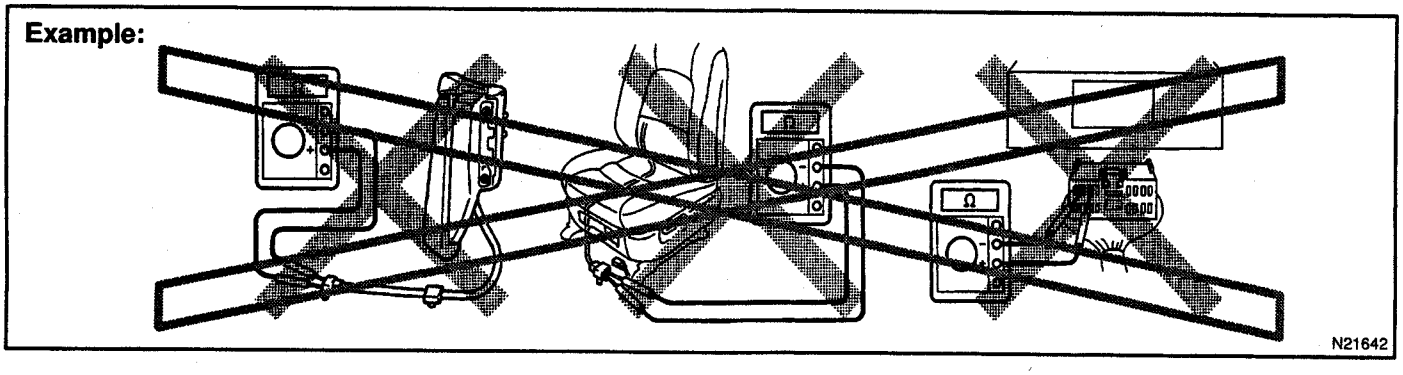
(3) Grease should not be applied to the side airbag assembly and the surface should not be cleaned with detergents of any kind.

(4) Store the airbag assembly where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) under the seat before starting work.

(6) When disposing of a vehicle or the side airbag assembly alone, the airbag should be deployed using an SST before disposal (See Pub. No. RM737E RS–17).
Perform the operation in a safe place away from electrical noise.





(g) 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 in another vehicle.

(4) Store the seat belt pretensioner where the ambient temperature remains below 80°C (176°F) and away from electrical noise without high humidity.

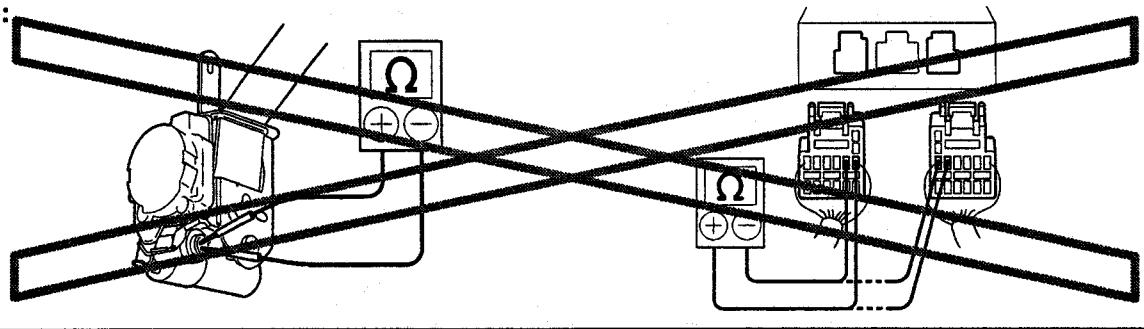
(5) When using electric welding, first disconnect the connector (yellow color and 2 pins) before starting work.

(6) When disposing of a vehicle or the seat belt pretensioner alone, the seat belt pretensioner should be activated before disposal (See Pub. No. RM685E on page BO–130 and See Pub. No. RM737E on page BO–65).
Perform the operation in a safe place away from electrical noise.

(7) The seat belt pretensioner is hot after activation, so let it cool down sufficiently before the disposal. However never apply water to 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:



(h) AIRBAG SENSOR ASSEMBLY

(1) Never reuse the airbag sensor assembly involved in a collision when 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 undesired ignition of the supplemental restraint system.

(3) Work must be started after 90 seconds from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery, even if only loosing the set bolts of the airbag sensor assembly.

(i) WIRE HARNESS AND CONNECTOR

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 as shown on page (See Pub. No. RM737E on page RS–47).

2. FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

CAUTION:

If large amount of unburned gasoline flows into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.

(a) Use only unleaded gasoline.

(b) Avoid prolonged idling.
Avoid running the engine at idle speed for more than 20 minutes.

(c) Avoid spark jump test.

(1) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.

(2) While testing, never race the engine.

(d) Avoid prolonged engine compression measurement.
Engine compression tests must be done as rapidly as possible.

(e) Do not run engine when fuel tank is nearly empty.
This may cause the engine to misfire and create an extra load on the converter.

(f) Avoid coasting with ignition turned off.

(g) Do not dispose of used catalyst along with parts contaminated with gasoline or oil.

3. IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

For vehicles with mobile communication systems such as two–way radios and cellular telephones, observe the following precautions.

(1) Install the antenna as far as possible away from the ECU and sensors of the vehicle's electronic system.

(2) Install the antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle's electronic systems. For details about ECU and sensors locations, refer to the section on the applicable component.

(3) Avoid winding the antenna feeder together with other wiring as much as possible, and also avoid running the antenna feeder parallel with other wire harnesses.

(4) Check that the antenna and feeder are correctly adjusted.

(5) Do not install powerful mobile communications system.

4. FOR USING HAND–HELD TESTER

CAUTION:

Observe the following items for safety reasons:

- **Before using the hand–held tester, the hand–held tester's operator manual should be read thoroughly.**
- **Be sure to route all cables securely when driving with the hand–held tester connected to the vehicle. (i.e. Keep cables away from feet, pedals, steering wheel and shift lever.)**
- **Two persons are required when test driving with the hand–held tester, one person to drive the vehicle and the other person to operate the hand–held tester.**

5. FOR VEHICLES EQUIPPED WITH TOYOTA FREE–TRONIC

CAUTION:

Do not operate the throttle link when the shift lever is in any position other than neutral while the engine is rotating. The vehicle might start suddenly.

6. FOR VEHICLES EQUIPPED WITH TOYOTA STOP AND GO SYSTEM

NOTICE:

When disconnecting the negative (–) terminal cable from the battery, after completing work, repeat depressing and releasing the clutch pedal in a full degree 10 times or more.

HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

GENERAL INFORMATION

IN04S–35

A large number of ECU controlled systems are used in the YARIS/ECHO. In general, the ECU controlled system is considered to be a very intricate system requiring a high level of technical knowledge and expert skill to troubleshoot. However, the fact is that if you proceed to inspect the circuits one by one, troubleshooting of these systems is not complex. If you have adequate understanding of the system and a basic knowledge of electricity, accurate diagnosis and necessary repair can be performed to locate and fix the problem. This manual is designed through emphasis of the above standpoint to help service technicians perform accurate and effective troubleshooting, and is compiled for the following major ECU controlled systems: The troubleshooting procedure and how to make use of it are described on the following pages.

System	Page
1. Anti–Lock Brake System with Electronic Brake Force Distribution (EBD) (1ND–TV)	DI–1
2. Engine Immobiliser System	DI–15

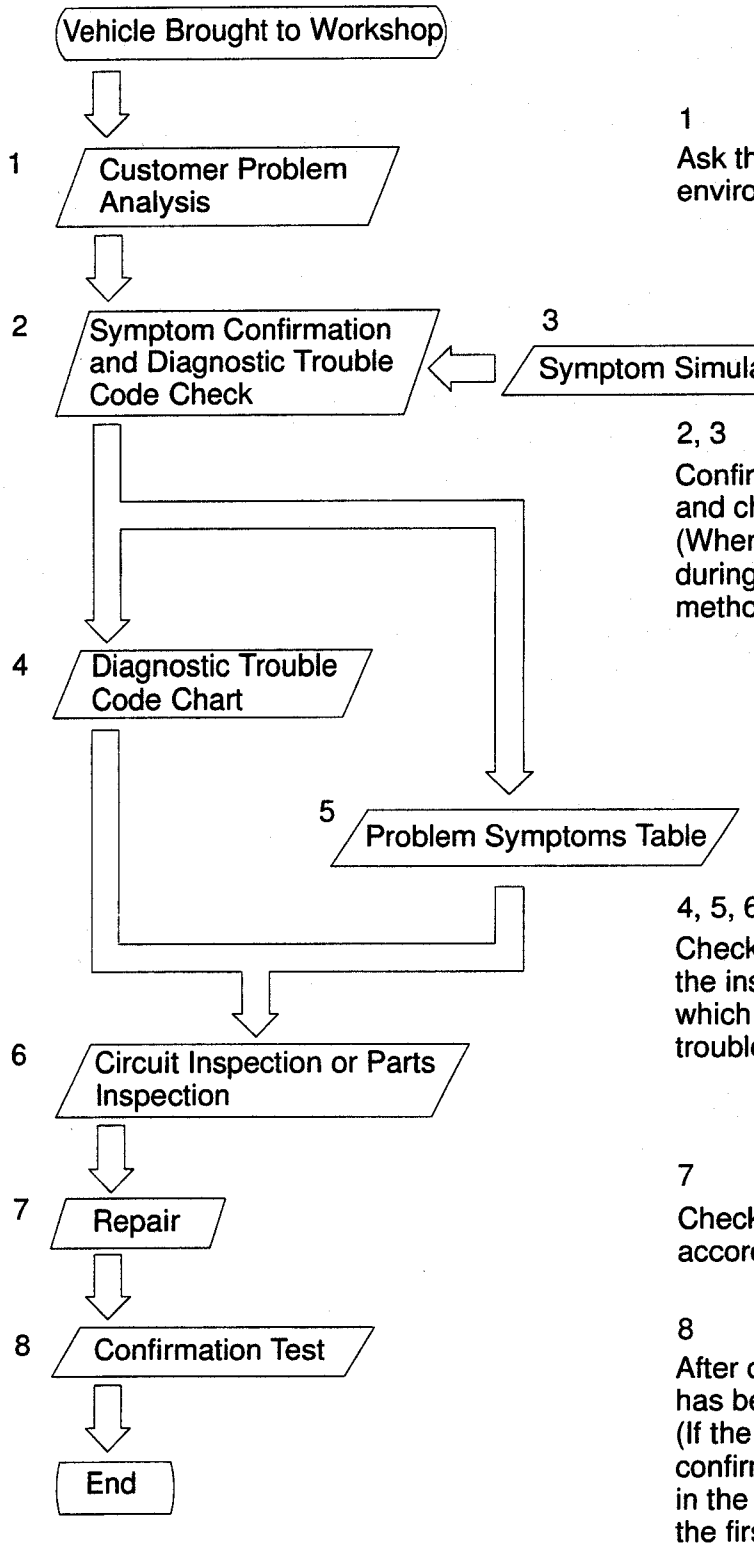
FOR USING HAND–HELD TESTER

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

INOJ3-01

HOW TO PROCEED WITH TROUBLESHOOTING

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



1

Ask the customer about the conditions and the environment when the problem occurred.

2, 3

Confirm the symptoms and the problem conditions, and check the diagnostic trouble codes.
(When the problem symptoms do not appear during confirmation, use the symptom simulation method described later on.)

4, 5, 6

Check the results obtained in Step 2, then confirm the inspection procedure for the system or the part which should be checked using the diagnostic trouble code chart or the problem symptoms table.

7

Check and repair the affected system or part in accordance with the instructions in Step 6.

8

After completing repairs, confirm that the problem has been eliminated.
(If the problem is not reproduced, perform the confirmation test under the same conditions and in the same environment as when it occurred for the first time.)

1. CUSTOMER PROBLEM ANALYSIS

In troubleshooting, the problem symptoms must be confirmed accurately and all preconceptions must be cleared away in order to give an accurate judgment. To ascertain just what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time it occurred.

Important Point in the Problem Analysis:

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 its relationship with the problem symptoms should be correctly ascertained for reference in troubleshooting. A customer problem analysis table is provided in Diagnostics section for each system for your use.

Important Points in the 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	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other
Temperature	Approx.

Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]

2. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE CHECK

The diagnostic system in the YARIS/ECHO fulfills various functions. The first function is the Diagnostic Trouble Code Check in which a malfunction in the signal circuits to the ECU is stored in code in the ECU memory at the time of occurrence, to be output by the technician during troubleshooting. 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, the problem areas can be narrowed down quickly and troubleshooting can be performed effectively. Diagnostic functions are incorporated in the following systems in the YARIS/ECHO.

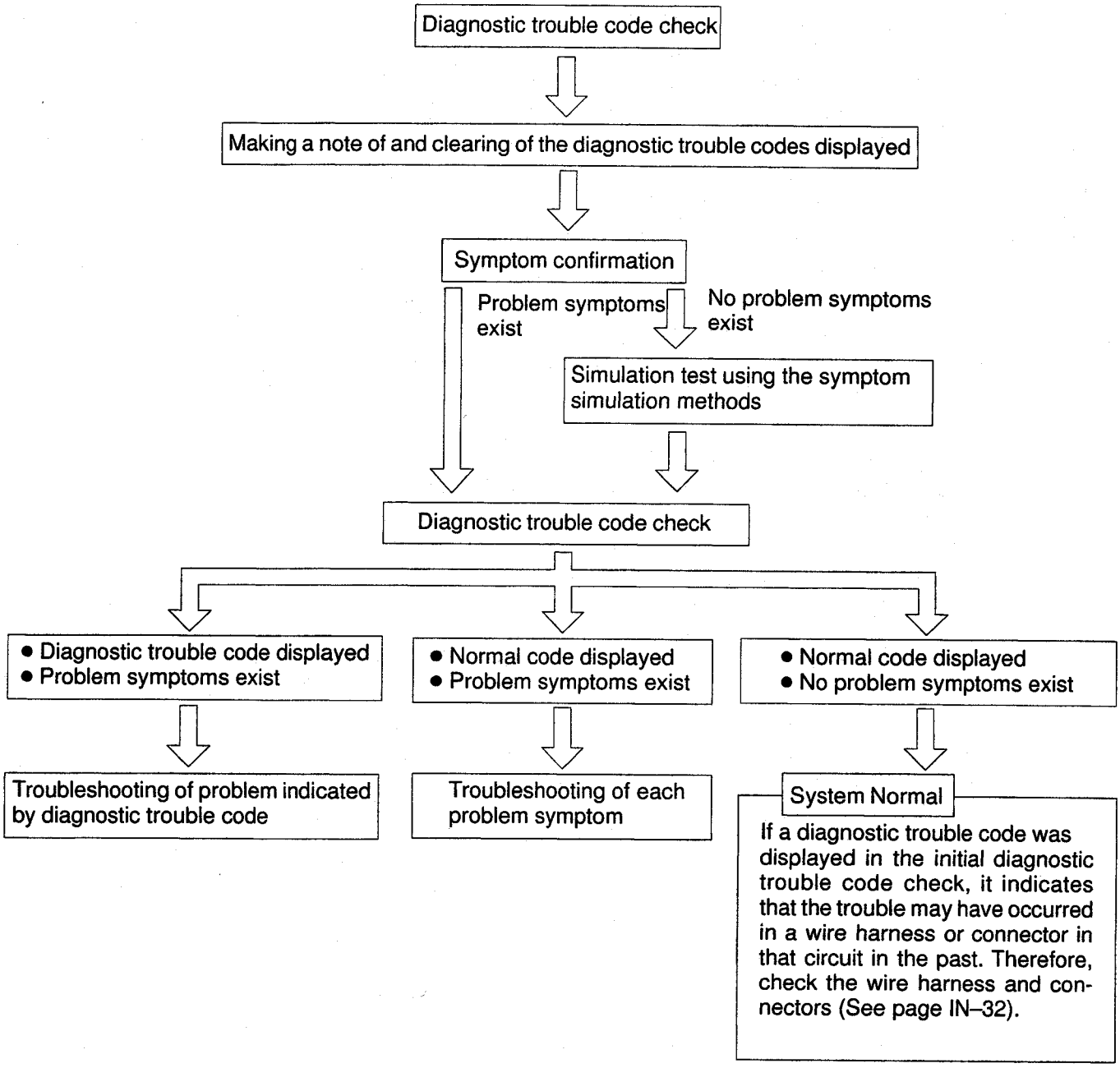
System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Diagnostic Test Mode (Active Test)
Anti–Lock Brake System with Electronic Brake Force Distribution (EBD) (1ND–TV)	○	○	○
Engine Immobiliser System	○		

In diagnostic trouble code check, it is very important to determine whether the problem indicated by the diagnostic trouble code is still occurring or occurred in the past but returned to normal at present. In addition, it must be checked in the problem symptom check whether the malfunction indicated by the diagnostic trouble code is directly related to the problem symptom or not. For this reason, the diagnostic trouble codes should be checked before and after the symptom confirmation to determine the current conditions, as shown in the table below. If this is not done, it may, depending on the case, result in unnecessary troubleshooting for normally operating systems, thus making it more difficult to locate the problem, or in repairs not pertinent to the problem. Therefore, always follow the procedure in correct order and perform the diagnostic trouble code check.

DIAGNOSTIC TROUBLE CODE CHECK PROCEDURE

Diagnostic Trouble Code Check (Make a note of and then clear)	**Confirmation of Symptoms**	**Diagnostic Trouble Code Check**	**Problem Condition**
Diagnostic Trouble Code Display	Problem symptoms exist	Same diagnostic trouble code is displayed	Problem is still occurring in the diagnostic circuit
		Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit (The diagnostic trouble code displayed first is either for a past problem or it is a secondary problem)
	No problem symptoms exist		The problem occurred in the diagnostic circuit in the past
Normal Code Display	Problem symptoms exist	Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit
	No problem symptoms exist	Normal code is displayed	The problem occurred in a place other than in the diagnostic circuit in the past

Taking into account the points on the previous page, a flow chart showing how to proceed with troubleshooting using the diagnostic trouble code check is shown below. This flow chart shows how to utilize the diagnostic trouble code check effectively, then by carefully checking the results, indicates how to proceed either to diagnostic trouble code troubleshooting or to troubleshooting of problem symptoms table.

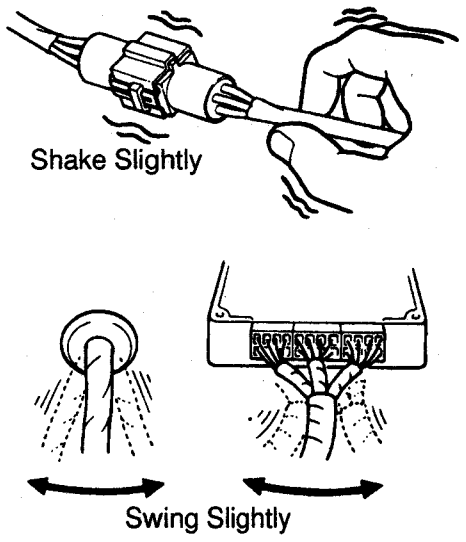
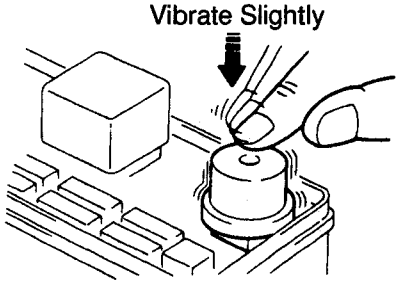


3. SYMPTOM SIMULATION

The most difficult case in troubleshooting is when there are no problem symptoms occurring. 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 so long as the symptoms are confirmed with the engine hot condition or the vehicle at a standstill. Since vibration, heat or water penetration (moisture) is likely cause for problem which is difficult to reproduce, the symptom simulation tests introduced here are effective measures in that the external causes are applied to the vehicle in a stopped condition.

Important Points in the Symptom Simulation Test:

In the symptom simulation test, the problem symptoms should of course be confirmed, but the problem area or parts must also be found out. To do this, narrow down the possible problem circuits according to the symptoms before starting this test and connect a tester 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 for each system to narrow down the possible causes of the symptom.

1	**VIBRATION METHOD: When vibration seems to be the major cause.**
CONNECTORS Slightly shake the connector vertically and horizontally. **WIRE HARNESS** Slightly shake the wire harness vertically and horizontally. The connector joint, fulcrum of the vibration, and body through portion are the major areas to be checked thoroughly.	 FI2331 FI2332
PARTS AND SENSOR Apply slight vibration with a 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.	 FI2330

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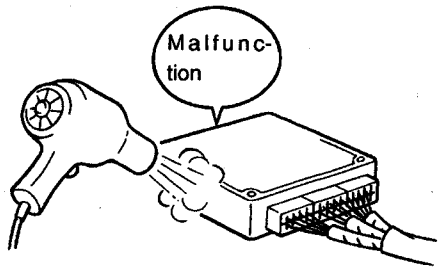
2	**HEAT METHOD: When the problem seems to occur when the suspect area is heated.**

Heat the component that is the likely cause of the malfunction with a hair dryer or similar object. Check to see if the malfunction occurs.

NOTICE:

(1) Do not heat to more than 60 °C (140 °F). (Temperature is limited not to damage the components.)

(2) Do not apply heat directly to parts in the ECU.



FI2334

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

Sprinkle water onto the vehicle and check to see if the malfunction occurs.

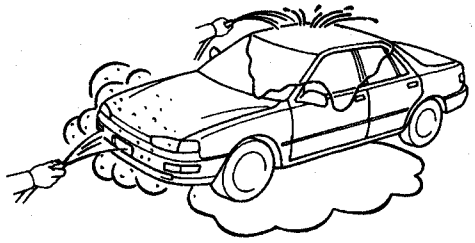
NOTICE:

(1) Never sprinkle water directly into the engine compartment, but indirectly change the temperature and humidity by applying water spray onto the radiator front surface.

(2) Never apply water directly onto the electronic components.

HINT:

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



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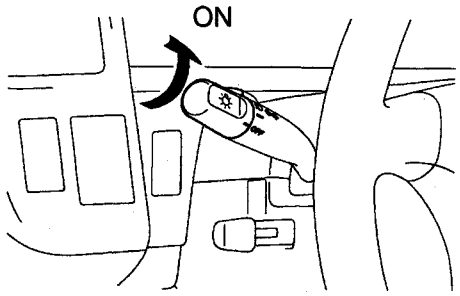
4	**OTHER: When a malfunction seems to occur when electrical load is excessive.**

Turn on all electrical loads including the heater blower, head lights, rear window defogger, etc. and check to see if the malfunction occurs.



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4. DIAGNOSTIC TROUBLE CODE CHART

The inspection procedure is shown in the table below. This table permits efficient and accurate troubleshooting using the diagnostic trouble codes displayed in the diagnostic trouble code check. Proceed with troubleshooting in accordance with the inspection procedure given in the diagnostic chart corresponding to the diagnostic trouble codes displayed. The engine diagnostic trouble code chart is shown below as an example.

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

- Trouble Area
  Indicates the suspect area of the problem.

- Detection Item
  Indicates the system of the problem or contents 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).

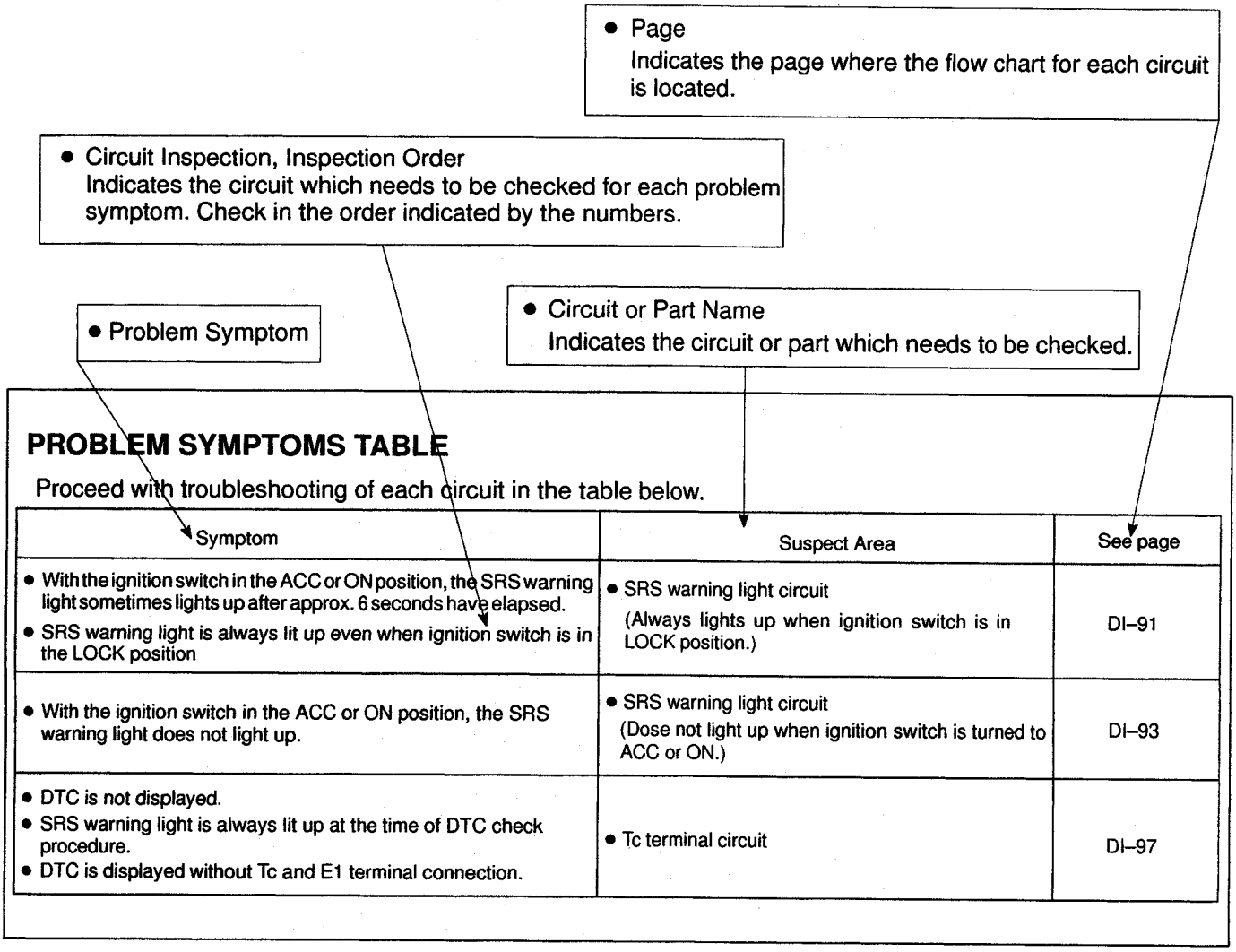
DTC No. (See page)	Detection Item	Trouble Area	SRS Warming Light
11 (DI–14)	• Short in D squib circuit (to ground)	• Steering wheel pad (squib) • Spiral cable • Airbag sensor assembly • Wire harness	ON
12 (DI–19)	• Short in D squib circuit (to B+)	• Steering wheel pad (squib) • Spiral cable • Airbag sensor assembly • Wire harness	ON
13 (DI–23)	• Short in D squib circuit	• Steering wheel pad (squib) • Spiral cable • Airbag sensor assembly • Wire harness	ON
14 (DI–27)	• Open in D squib circuit	• Steering wheel pad (squib) • Spiral cable • Airbag sensor assembly • Wire harness	ON
15 (DI–27)	• Front airbag sensor assembly (RH) malfunction	• Front airbag sensor assembly (RH) • Wire harness	ON
	• Front airbag sensor assembly malfunction	• Front airbag sensor assembly (LH) • Wire harness	
	ssembly malfunction	• Airbag sensor assembly	

5. 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 check but the problem is still occurring. Numbers in the table indicate the inspection 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 is considered that the problem is occurring outside the detection range of the diagnostic system, or that the problem is occurring in a system other than the diagnostic system.



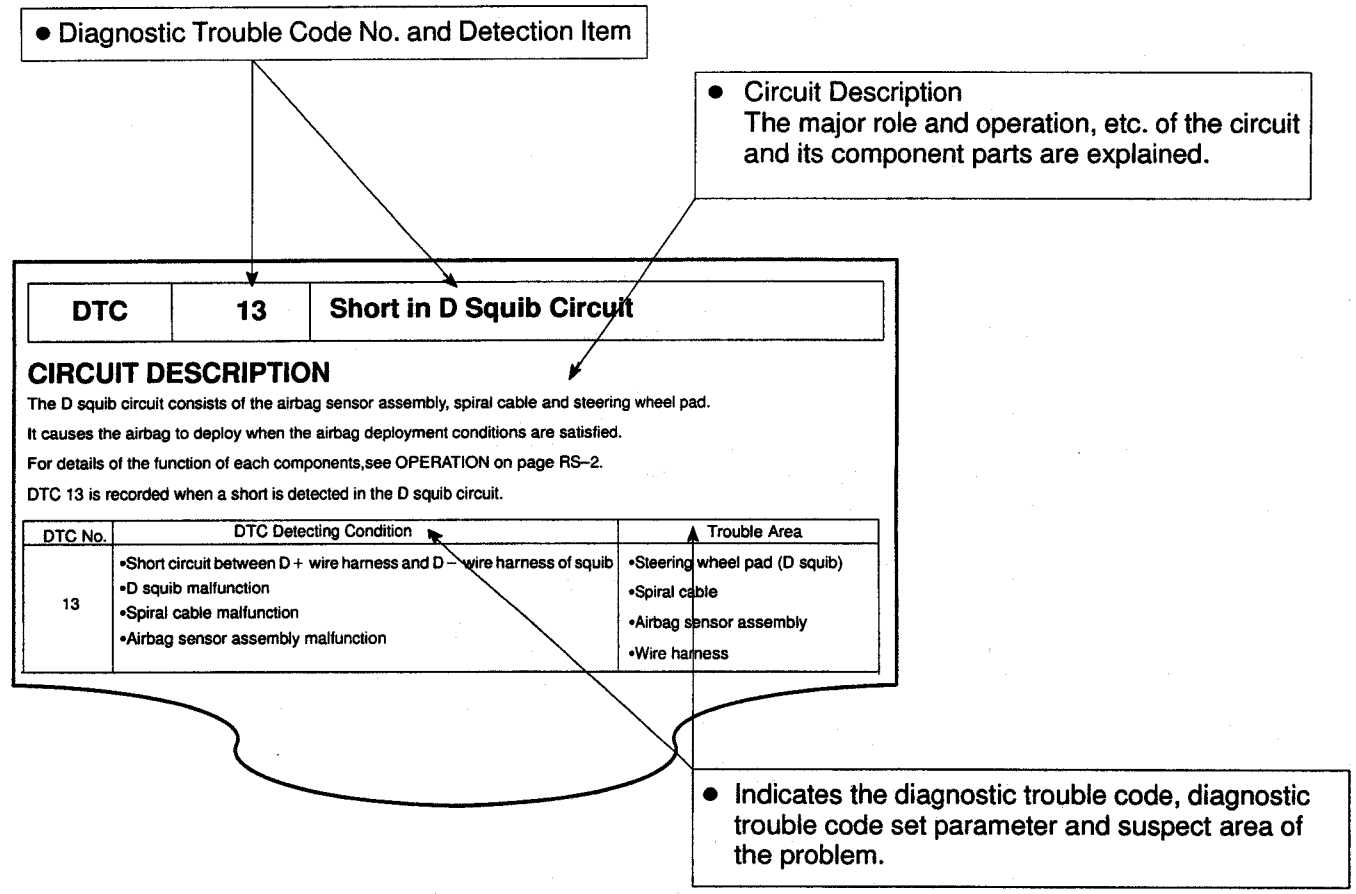
PROBLEM SYMPTOMS TABLE

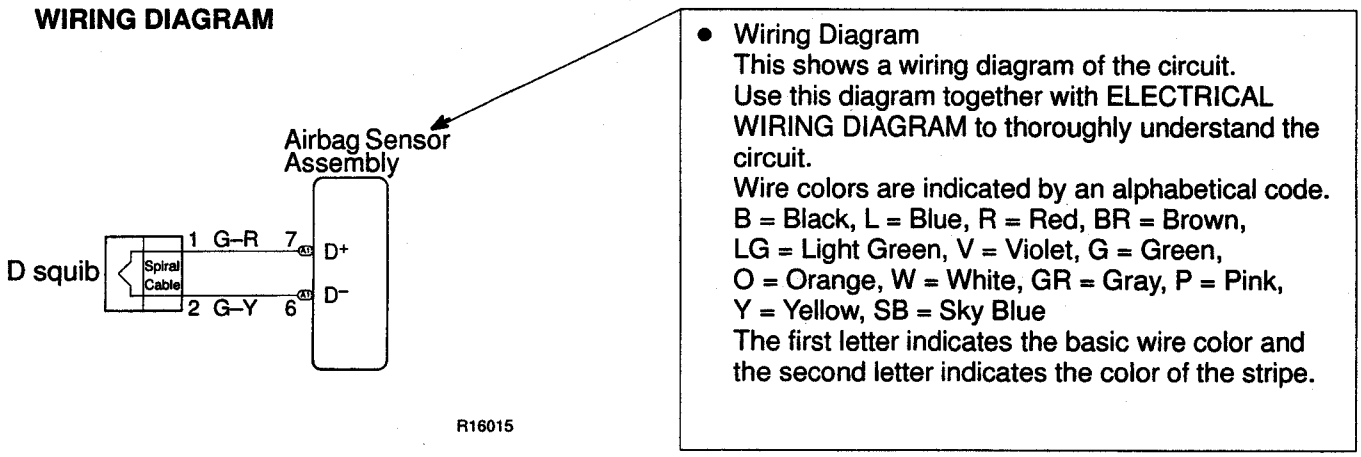
Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspect Area	See page
• With the ignition switch in the ACC or ON position, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed. • SRS warning light is always lit up even when ignition switch is in the LOCK position	• SRS warning light circuit (Always lights up when ignition switch is in LOCK position.)	DI–91
• With the ignition switch in the ACC or ON position, the SRS warning light does not light up.	• SRS warning light circuit (Dose not light up when ignition switch is turned to ACC or ON.)	DI–93
• DTC is not displayed. • SRS warning light is always lit up at the time of DTC check procedure. • DTC is displayed without Tc and E1 terminal connection.	• Tc terminal circuit	DI–97

6. CIRCUIT INSPECTION

How to read and use each page is shown below.





- Indicates the position of the ignition switch during the check.

LOCK
Ignition Switch LOCK (OFF)

ON
Ignition Switch ON

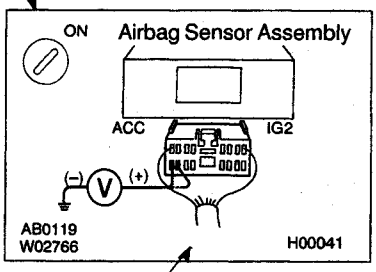
START
Ignition Switch START

ACC
Ignition Switch ACC

- Inspection Procedure
Use the inspection procedure to determine if the circuit is normal or abnormal, and if it is abnormal, use it to determine whether the problem is located in the sensors, actuators, wire harness or ECU.

INSPECTION PROCEDURE

2 Check voltage at IG2 and ACC of airbag sensor assembly.



PREPARATION:
Turn ignition switch ON.

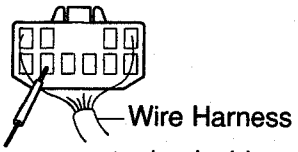
CHECK:
Measure voltage between terminals IG2 and ACC of airbag sensor assembly and body ground.

OK:
Voltage: Below 16 V

NG → **Check battery and charging system. (See charging system section)**

OK

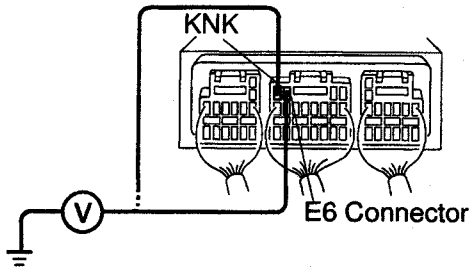
- Indicates the place to check the voltage or resistance.
- Indicates the connector position to be checked, from the front or back side.



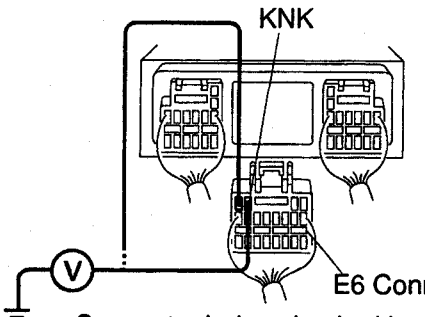
Check from the connector back side. (with harness)

Check from the connector front side. (without harness)
In this case, care must be taken not to bend the terminals.

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



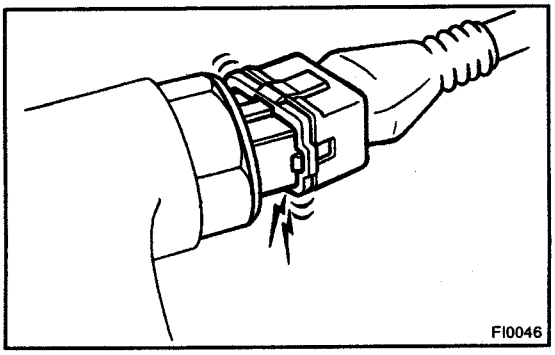
Connector being checked is connected.

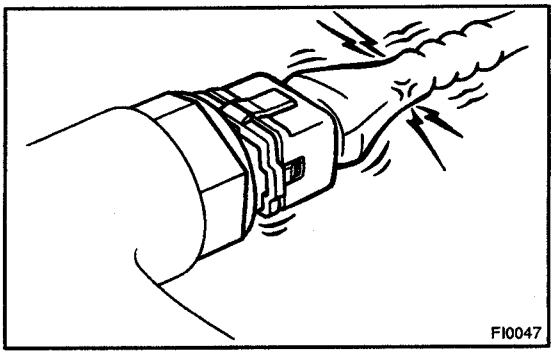


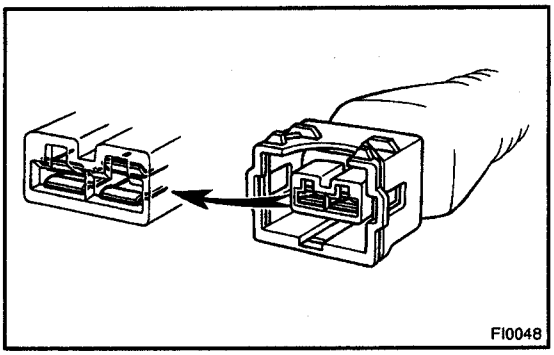
Connector being checked is disconnected.

B00691

B00972


FI0046


FI0047


FI0048

IN011-22

HOW TO USE THE DIAGNOSTIC CHART AND INSPECTION PROCEDURE

1. CONNECTOR CONNECTION AND TERMINAL INSPECTION

- For troubleshooting, diagnostic trouble code charts or problem symptom table are provided for each circuit with detailed inspection procedures on the following pages.
- When all the component parts, wire harnesses and connectors of each circuit except the ECU are found to be normal in troubleshooting, then it is determined that the problem is in the ECU. Accordingly, if diagnosis is performed without the problem symptoms occurring, refer to step 8 to replace the ECU. So always confirm that the problem symptoms are occurring, or proceed with inspection while using the symptom simulation method.
- The instructions "Check wire harness and connector" and "Check and replace ECU" which appear in the inspection procedure, are common and applicable to all diagnostic trouble codes. Follow the procedure outlined below whenever these instructions appear.

OPEN CIRCUIT:

This could be due to a disconnected wire harness, faulty contact in the connector, and a connector terminal pulled out, etc.

HINT:

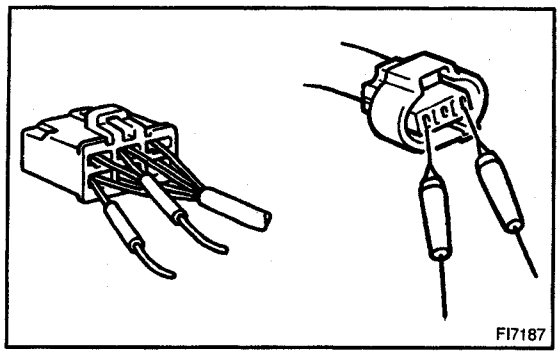
- It is rarely the case that a wire is broken in the middle of it. Most cases occur at the connector. In particular, carefully check the connectors of sensors and actuators
- Faulty contact could be due to rusting of the connector terminals, to foreign materials entering terminals or a deformation of connector terminals. Simply disconnecting and reconnecting the connectors once changes the condition of the connection and may result in a return to normal operation. Therefore, in troubleshooting, if no abnormality is found in the wire harness and connector check, but the problem disappears after the check, then the cause is considered to be in the wire harness or connectors.

SHORT CIRCUIT:

This could be due to a contact between wire harness and the body ground or to a short circuit occurred inside the switch, etc.

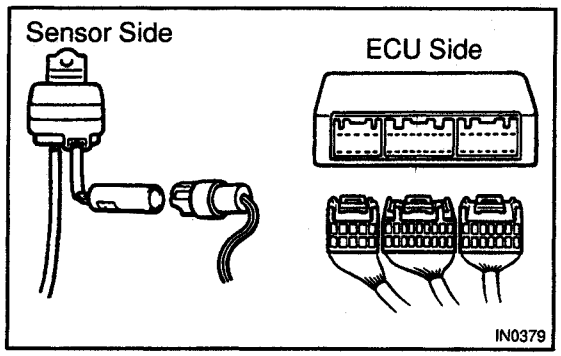
HINT:

When there is a short circuit between the wire harness and body ground, check thoroughly whether the wire harness is caught in the body or is clamped properly.



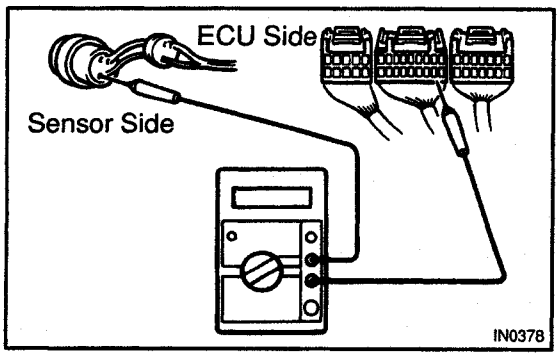
2. CONNECTOR HANDLING

When inserting tester probes into a connector, insert them from the rear of the connector. When necessary, use mini test leads. For water resistant connectors which cannot be accessed from behind, take good care not to deform the connector terminals.



3. CONTINUITY CHECK (OPEN CIRCUIT CHECK)

(a) Disconnect the connectors at both ECU and sensor sides.

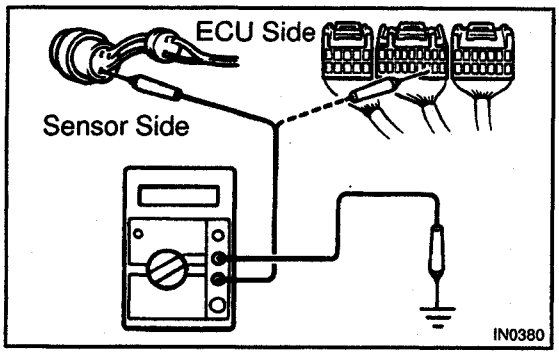


(b) Measure the resistance between the applicable terminals of the connectors.

Resistance: 1 Ω or less

HINT:

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



4. RESISTANCE CHECK (SHORT CIRCUIT CHECK)

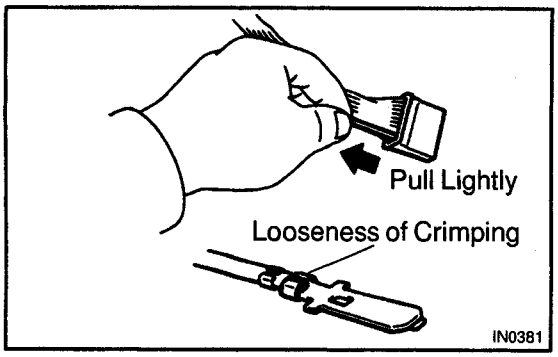
(a) Disconnect the connectors on both ends.

(b) Measure the resistance between the applicable terminals of the connectors and body ground. Be sure to carry out this check on the connectors on both ends.

Resistance: 1 MΩ or higher

HINT:

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



5. VISUAL CHECK AND CONTACT PRESSURE CHECK

(a) Disconnect the connectors at both ends.

(b) Check for rust or foreign material, etc. in the terminals of the connectors.

(c) Check crimped portions for looseness or damage and check that the terminals are secured in lock portion.

HINT:

The terminals should not come out when pulled lightly from the back.

(d) Prepare a test male terminal and insert it in the female terminal, then pull it out.

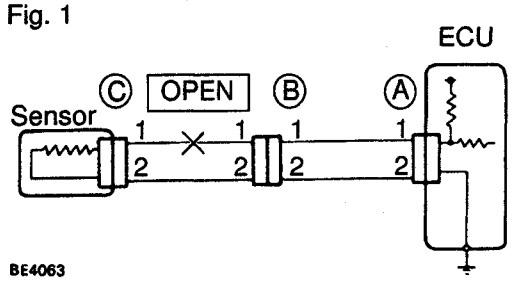
NOTICE:

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

HINT:

When the test terminal is pulled out more easily than others, there may be poor contact in that section.

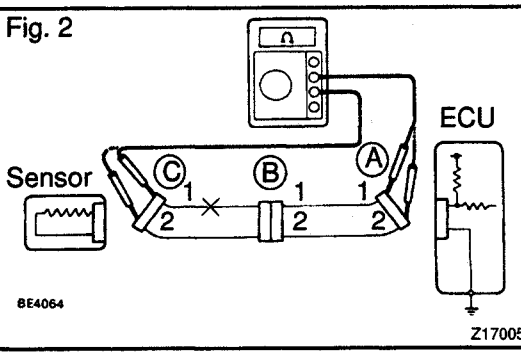
Fig. 1



6. CHECK OPEN CIRCUIT

For the open circuit in the wire harness in Fig. 1, perform "(a) Continuity Check" or "(b) Voltage Check" to locate the section.

Fig. 2



(a) Check the continuity.

(1) Disconnect connectors "A" and "C" and measure the resistance between them.

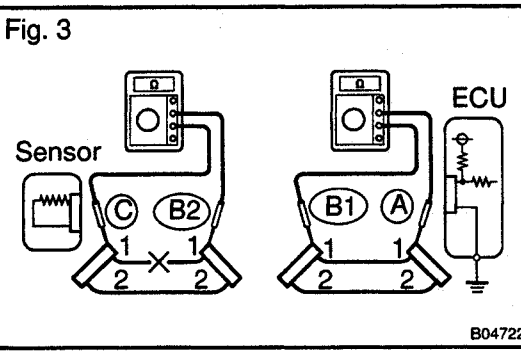
In the case of Fig. 2,

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, it is found out that there is an open circuit between terminal 1 of connector "A" and terminal 1 of connector "C".

Fig. 3



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

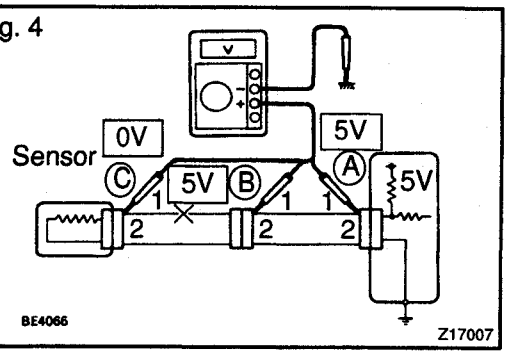
In the case of Fig. 3,

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, it is found out that there is an open circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

Fig. 4



(b) Check the voltage.

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

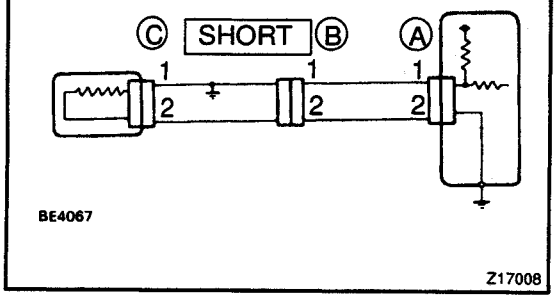
As shown in Fig. 4, with each connector still connected, measure the voltage between body ground and terminal 1 of connector "A" at the ECU 5V output terminal, terminal 1 of connector "B", and terminal 1 of connector "C", in that order.

If the results are:

5V: Between Terminal 1 of connector "A" and Body Ground
5V: Between Terminal 1 of connector "B" and Body Ground
0V: Between Terminal 1 of connector "C" and Body Ground

Then it is found out that there is an open circuit in the wire harness between terminal 1 of "B" and terminal 1 of "C".

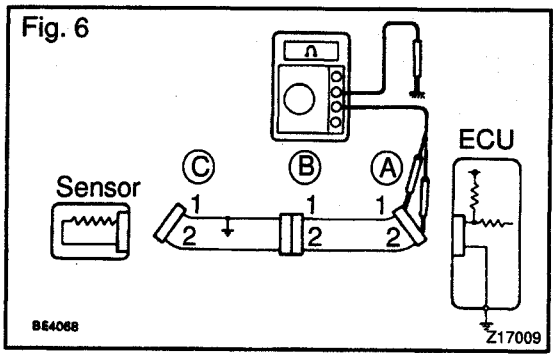
Fig. 5



7. CHECK SHORT CIRCUIT

If the wire harness is ground shorted as in Fig. 5, locate the section by conducting a "continuity check with ground".

Fig. 6



Check the continuity with ground.

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

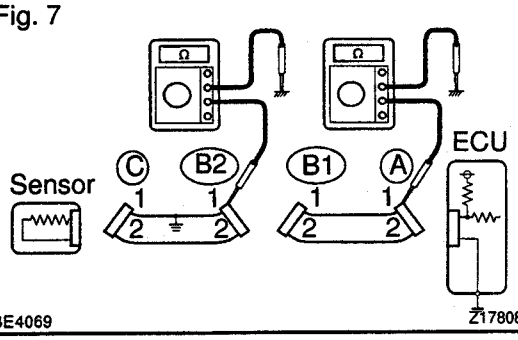
In the case of Fig. 6

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

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

Therefore, it is found out that there is a short circuit between terminal 1 of connector "A" and terminal 1 of connector "C".

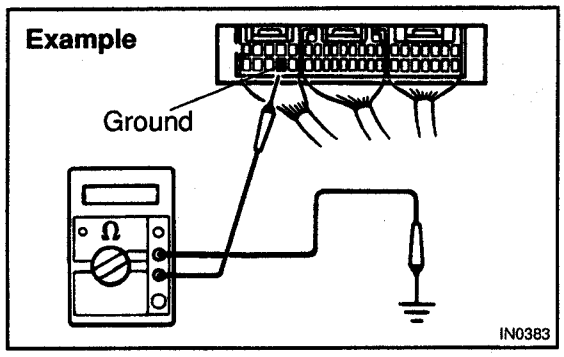
Fig. 7



(2) Disconnect connector "B" and measure the resistance between terminal 1 of connector "A" and body ground, and terminal 1 of connector "B2" and body ground.
Between terminal 1 of connector "A" and body ground → No continuity
Between terminal 1 of connector "B2" and body ground → Continuity (short)
Therefore, it is found out that there is a short circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

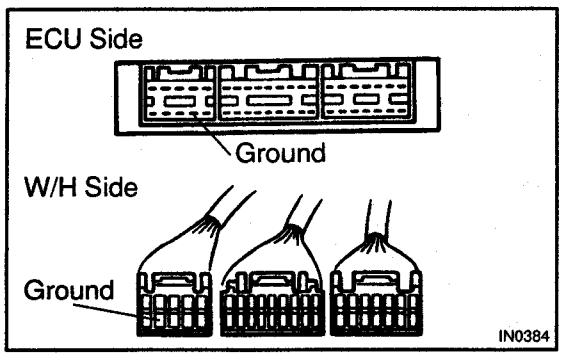
8. CHECK AND REPLACE ECU

First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty, so replace the ECU with a normal functioning one and check that the symptoms appear.



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

Resistance: 1 Ω or less



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

TERMS

ABBREVIATIONS USED IN THIS MANUAL

IN012–20

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
AHC	Active Height Control Suspension
ALR	Automatic Locking Retractor
ALT	Alternator
AMP	Amplifier
ANT	Antenna
APPROX.	Approximately
A/T	Automatic Transmission (Transaxle)
ATF	Automatic Transmission Fluid
AUTO	Automatic
BA	Brake Assist
BACS	Boost Altitude Compensation System
BAT	Battery
B/L	Bi–Level
BVSV	Bimetallic Vacuum Switching Valve
CB	Circuit Breaker
CD	Compact Disc
CH	Channel
CKD	Complete Knock Down
COMB.	Combination
CPE	Coupe
CRS	Child Restraint System
CTR	Center
DC	Direct Current
DIFF.	Differential
DIFF. LOCK	Differential Lock
DLC	Data Link Connector
DSP	Digital Signal Processor
DTC	Diagnostic Trouble Code
EBD	Electronic Brake Force Distribution
ECT	Electronic Control Transmission
ECU	Electronic Control Unit
EDU	Electronic Driving Unit
EFI	Electronic Fuel Injection
E/G	Engine
ELR	Emergency Locking Retractor

FF	Front–Engine Front–Wheel–Drive
FIPG	Formed In Place Gasket
FL	Fusible Link
Fr	Front
FR	Front–Engine Rear–Wheel–Drive
FWD	Front–Wheel–Drive
GND	Ground
H/B	Hatchback
HI	High
HID	High Intensity Discharge (Head Lamp)
HT	Hard Top
HWS	Heated Windshield System
IAC	Idle Air Control
IFS	Independent Front Suspension
IG	Ignition
INT	Intermittent
I/P	Instrument Panel
IRS	Independent Rear Suspension
J/B	Junction Block
J/C	Junction Connector
LAN	Local Area Network
LB	Liftback
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left–Hand
LHD	Left–Hand Drive
LO	Low
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
MP	Multipurpose
MPI	Multipoint Electronic Fuel Injection
MPX	Multiplex Communication System
M/T	Manual Transmission
N	Neutral
No.	Number
O2S	Oxygen Sensor
O/D	Overdrive
OPT	Option
P & BV	Proportioning And Bypass Valve
PCS	Power Control System

PKB	Parking Brake
PPS	Progressive Power Steering
PS	Power Steering
PTO	Power Take–Off
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
RR	Rear–Engine Rear–Wheel Drive
RRS	Rigid Rear Suspension
RWD	Rear–Wheel Drive
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SPEC	Specification
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
SW	Switch
SYS	System
T/A	Transaxle
TACH	Tachometer
TDC	Top Dead Center
TEMP.	Temperature
TEMS	TOYOTA Electronic Modulated Suspension
TFT	Toyota Free–Tronic
T/M	Transmission
TMC	TOYOTA Motor Corporation
TRC	Traction Control System
U/D	Underdrive
VENT	Ventilator
VIN	Vehicle Identification Number
VSC	Vehicle Stability Control
w/	With
WGN	Wagon
W/H	Wire Harness
w/o	Without
1st	First
2nd	Second

2WD	Two Wheel Drive Vehicle (4x2)
4WD	Four Wheel Drive Vehicle (4x4)

PREPARATION

REFER TO FOLLOWING REPAIR MANUALS:

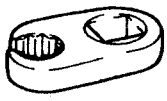
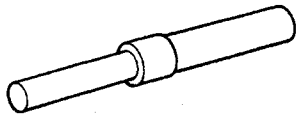
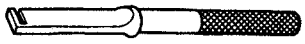
Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

NOTE: The above pages contain only the points which differ from the above listed manuals.

CLUTCH

SST (Special Service Tools)

PP3TW-01

	09023–00100	Union Nut Wrench 10 mm	Clutch line
	09301–00210	Clutch Guide Tool	
	09333–00013	Clutch Diaphragm Spring Aligner	

PP0HE–05

EQUIPMENT

Vernier calipers	
Dial indicator with magnetic base	
Torque wrench	

LUBRICANT

PP0CK-06

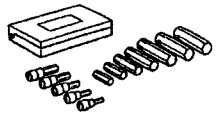
Item	Capacity	Classification
Brake fluid	–	SAE J1703 or FMVSS No. 116 DOT3

MANUAL TRANSAXLE (C153)

RECOMMENDED TOOLS

PP3U6-01

PP

	09040–00011	Hexagon Wrench Set .	
	09090–04020	Engine Sling Device	

EQUIPMENT

PP04Q–06

Torque wrench	
Wooden block or similar object	

PP04S-07

LUBRICANT

Item	Capacity	Classification
Manual transaxle oil (w/ Differential oil)	1.9 liters (2.0 US qts, 1.7 Imp. qts)	API GL–4 or GL–5 SAE 75W–90

SUSPENSION AND AXLE

EQUIPMENT

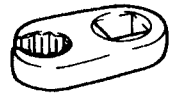
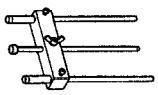
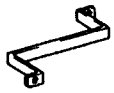
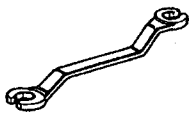
PP0AM–07

Dial indicator with magnetic base	
Torque wrench	

BRAKE

SST (Special Service Tools)

PP3U1–01

	09023–00100	Union Nut Wrench 10 mm	
	09737–00012	Brake Booster Push Rod Gauge	
	09737–00020	Brake Booster Push Rod Wrench	
	09751–36011	Brake Line Union Nut 10 x 12 mm Wrench	
	09709–29018	LSPV Gauge Set	

EQUIPMENT

PP17U-08

Torque wrench	
Vacuum gauge	Vacuum pump
Hexagon Wrench (4 mm)	Vacuum pump
Vernier calipers	Vacuum pump

PP17V–05

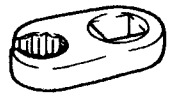
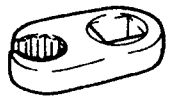
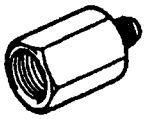
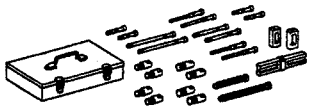
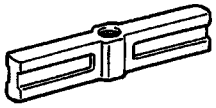
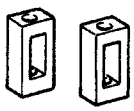
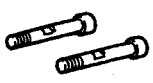
LUBRICANT

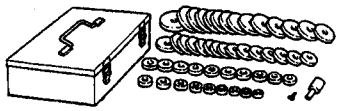
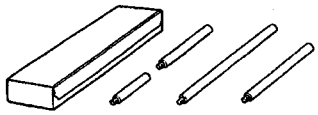
Item	Capacity	Classification
Brake fluid	–	SAEJ1703 or FMVSS No.116 DOT 3

STEERING

SST (Special Service Tools)

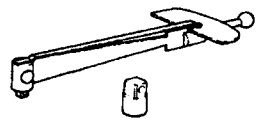
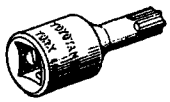
PP2GJ–02

	09023–12700	Union Nut Wrench 17mm	PS vane pump (1ND–TV) PS gear (1ND–TV)
	09023–12900	Union Nut Wrench 19mm	PS gear (1ND–TV)
	09640–10010	Power Steering Pressure Gauge Set	Power steering fluid (1ND–TV)
	(09641–01010)	Gauge Assy	
	(09641–01030)	Attachment B	
	(09641–01060)	Attachment E	
	09670–00010	Front Crossmember Guide Tool	Manual steering gear (1ND–TV) PS gear (1ND–TV)
	09950–50013	Puller C Set	Tilt steering column (1ND–TV)
	(09951–05010)	Hanger 150	
	(09952–05010)	Slide Arm	
	(09953–05020)	Center Bolt 150	
	(09954–05021)	Claw No.2	

	09950–60010	Replacer Set	PS vane pump (1ND–TV)
	(09951–00280)	Replacer 28	
	09950–70010	Handle Set	PS vane pump (1ND–TV)
	(09951–07100)	Handle 100	

RECOMMENDED TOOLS

PP2GK-02

	09025–00010	Small Torque Wrench (30 kgf–cm)	PS vane pump (1ND–TV)
	09042–00010	Torx Socket T30 .	Tilt steering column (1ND–TV)

PP18L–11

EQUIPMENT

Caliper gauge	PS vane pump (1ND–TV)
Vernier calipers	PS vane pump (1ND–TV)
Feeler gauge	PS vane pump (1ND–TV)
Micrometer	PS vane pump (1ND–TV)
Torque wrench	

BODY ELECTRICAL

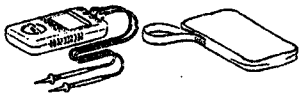
SST (Special Service Tools)

PP26C–01

	09843–18040 Diagnosis Check Wire No.2	

PP3U0-01

RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	

EQUIPMENT

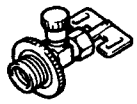
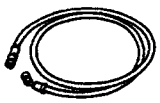
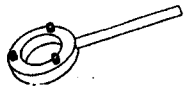
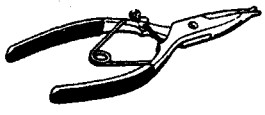
PP26E-05

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	

AIR CONDITIONING

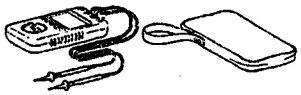
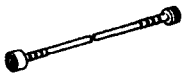
SST (Special Service Tools)

PP3U3–01

	07110–58060	Air Conditioner Service Tool Set	
	(07117–58060)	Refrigerant Drain Service Valve	
	(07117–58070)	T–Joint	
	(07117–58080)	Quick Disconnect Adapter	
	(07117–58090)	Quick Disconnect Adapter	
	(07117–88060)	Refrigerant Charging Hose	
	(07117–88070)	Refrigerant Charging Hose	
	(07117–88080)	Refrigerant Charging Hose	
	07112–66040	Magnetic Clutch Remover	
	07112–76050	Magnetic Clutch Stopper	
	95994–10020	Snap Ring Pliers (DENSO Part No.)	

RECOMMENDED TOOLS

PP3U4-01

	09082–00040	TOYOTA Electrical Tester.	
	09216–00021	Belt Tension Gauge .	
	09216–00030	Belt Tension Gauge Cable .	

EQUIPMENT

PP0E4-04

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Thermistor
Torque wrench	
Dial indicator	Magnetic clutch
Plastic hammer	Magnetic clutch

LUBRICANT

PP0ES-08

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

SERVICE SPECIFICATIONS

REFER TO FOLLOWING REPAIR MANUALS:

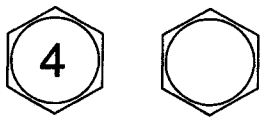
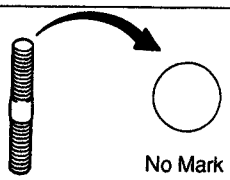
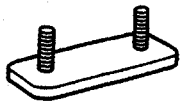
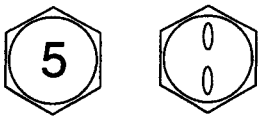
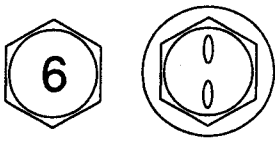
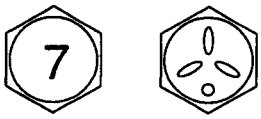
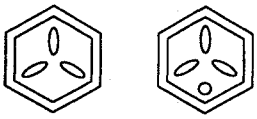
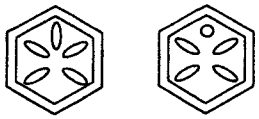
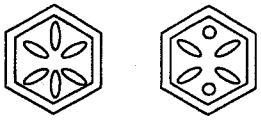
Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

NOTE: The above pages contain only the points which differ from the above listed manuals.

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

SS0ZS-01

Bolt Type				Class
Hexagon Head Bolt		Stud Bolt	Weld Bolt	
Normal Recess Bolt	Deep Recess Bolt			
				4T
				5T
				6T
				7T
				8T
				9T
				10T
				11T

B06431

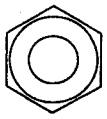
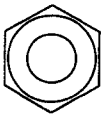
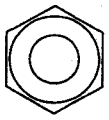
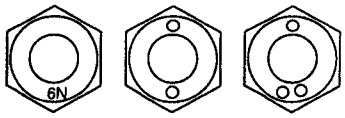
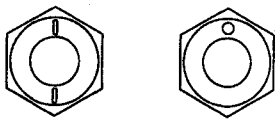
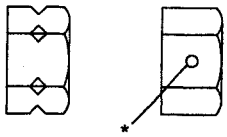
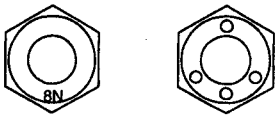
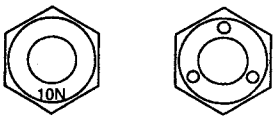
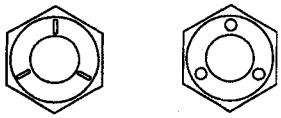
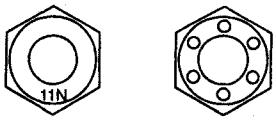
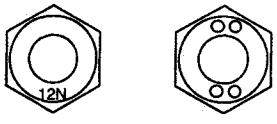
SS0ZT–01

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

SS0ZU-01

Nut Type			Class
Present Standard Hexagon Nut	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			6N
		 *	7N (5T)
 8N			8N
 10N		 No Mark	10N (7T)
 11N			11N
 12N			12N

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

B06432

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

CLUTCH

SERVICE DATA

SS09Q–10

Pedal height from floor panel	LHD RHD	150.7 – 160.7 mm (5.933 – 6.327 in.) 155.5 – 165.5 mm (6.122 – 6.516 in.)
Pedal free play		5.0 – 15.0 mm (0.197 – 0.591 in.)
Push rod play at pedal top		1.0 – 5.0 mm (0.039 – 0.197 in.)
Clutch release point from pedal full stroke end position		25 mm (0.98 in.) or more
Disc rivet head depth	Minimum	0.3 mm (0.012 in.)
Disc runout	Maximum	0.8 mm (0.031 in.)
Flywheel runout	Maximum	0.1 mm (0.004 in.)
Diaphragm spring finger wear	Maximum depth	0.6 mm (0.024 in.)
Diaphragm spring finger wear	Maximum width	5.0 mm (0.197 in.)
Diaphragm spring tip non–alignment	Maximum	0.5 mm (0.020 in.)

TORQUE SPECIFICATION

SS09R-09

Part tightened	N·m	kgf·cm	ft·lbf
Clutch line	15.2	155	11
Release cylinder installation bolt	11.8	120	9
Union bolt	24.5	250	18
Bleeder plug	8.4	84	73 in.·lbf
Clutch accumulator x Glow relay with bracket	5.0	51	44 in.·lbf
Clutch accumulator x Body	5.0	51	44 in.·lbf
Release fork support	36.8	375	27
Clutch cover x Flywheel	19.1	195	14

MANUAL TRANSAXLE (C153)

TORQUE SPECIFICATION

SS02O-13

Part tightened	N·m	kgf·cm	ft·lbf
Hood set bolt	13	130	9
Wiper arm x Wiper link assembly	21	214	15
Wiper link assembly x Outer front cowl top panel	5.5	56	49 in.·lbf
Outer front cowl top panel x Body	7.8	80	69 in.·lbf
Air cleaner case assembly x Air cleaner bracket	7.5	76	66 in.·lbf
Air cleaner bracket x Transaxle	19	195	14
Transaxle x Engine	33	340	25
Transaxle x Starter (from transaxle to starter)	39	400	29
Transaxle x Starter (from starter to transaxle)	37	370	27
Starter wire x Starter	9.8	100	87 in.·lbf
No. 1 engine hangers set bolt	40	400	29
Engine LH mounting bracket x Engine LH mounting insulator	49	500	36
Engine LH mounting bracket x Transaxle	64	653	48
Clutch release cylinder x Transaxle	11.8	120	9
Clutch release cylinder tube x Transaxle	19	195	14
Engine rear mounting bracket x Transaxle	49	500	36
Engine rear mounting insulator x Engine rear mounting bracket	64	650	47
Front suspension member reinforcement	47	480	35
Pressure feed and return tube x Suspension member	7.8	80	69 in.·lbf
Pressure feed and return tube (LHD) x Power steering gear assembly	25 (*23)	250 (*235)	24 (*22)
Pressure feed and return tube (RHD) x Power steering gear assembly	44.1 (*41.1)	450 (*420)	33 (*31)
Power steering gear assembly x No. 3 intermediate shaft assembly	28	290	21
Suspension member (front) x Body	70	715	52
Suspension member (rear) x Body	116	1,185	86
Engine rear mounting insulator x Suspension member	80	820	59
Front suspension lower arm x Steering knuckle	98	1,000	72
Tie rod end x Steering knuckle	49	500	36
Front drive shaft x Steering knuckle	216	2,200	159

* For use with SST

SUSPENSION AND AXLE

SERVICE DATA

SS13W–09

Cold tire inflation pressure (Europe, diesel)	Vehicle load up to 2 passengers	Front	230 kPa (2.3 kgf/cm², 33 psi)
		Rear	210 kPa (2.1 kgf/cm², 30 psi)
	Vehicle load up to 5 passengers		
	155/ 80R 13	Front	230 kPa (2.3 kgf/cm², 33 psi)
		Rear*1	210 kPa (2.1 kgf/cm², 30 psi)
		Rear*2	230 kPa (2.3 kgf/cm², 33 psi)
	175/ 65R 14	Front	230 kPa (2.3 kgf/cm², 33 psi)
		Rear*1	210 kPa (2.1 kgf/cm², 30 psi)
		Rear*2	220 kPa (2.2 kgf/cm², 32 psi)
Front wheel alignment (Europe, diesel)	Vehicle height		
		Front: B*4 – A*3	85 mm (3.35 in.)
		Rear: C*5 – D*6	9 mm (0.35 in.)
	Camber		–0°35' ± 45' (–0.58° ± 0.75°)
		Right–left error	45' (0.75°) or less
	Caster		
		Manual steering	0°34' ± 45' (0.57° ± 0.75°)
		Power steering	1°33' ± 45' (1.55° ± 0.75°)
		Right–left error	45' (0.75°) or less
	Steering axis inclination		10°04' ± 45' (10.07° ± 0.75°)
		Right–left error	45' (0.75°) or less
	Toe–in (total)		0° ± 12' (0° ± 0.2°, 0 ± 2 mm, 0 ± 0.08 in.)
		Rack end length difference	1.5 mm (0.059 in.) or less
	Wheel angle		
	Manual steering	Inside wheel	36°59' ± 2° (36.98° ± 2°)
		Outside wheel: Reference	32°10' (32.17°)
	Power steering	Inside wheel	36°59' ± 2° (36.98° ± 2°)
		Outside wheel: Reference	32°20' (32.28°)
Rear wheel alignment (Europe, diesel)	Camber		–0°56' ± 25' (–0.93° ± 0.42°)
		Right–left error	30' (0.5°) or less
	Toe–in (total)		0°19' ± 15' (0.32° ± 0.25°, 2.9 ± 2.3 mm, 0.11 ± 0.09 in.)

*1: For driving under 160 km/h (100 mph)
*2: For driving at 160 km/h (100 mph) or over
*3:Ground clearance of the front lower suspension arm mounting bolt center.
*4:Ground clearance of the front wheel center.
*5:Ground clearance of the rear axle beam mounting bolt center.
*6:Ground clearance of the rear wheel center.

SS13X-08

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
FRONT WHEEL ALIGNMENT			
Tie rod end lock nut	47	480	35
Steering knuckle x Shock absorber	132	1,350	97

BRAKE

SERVICE DATA

SS0M2–13

Brake booster push rod to piston clearance (W/SST)		0 mm (0 in.)
Vacuum pump blade thickness	STD	4.9 mm (0.193 in.)
Vacuum pump blade thickness	Minimum	4.5 mm (0.177 in.)

SS0M3-12

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Brake booster x Installation nut		12.7	130	9
Brake booster clevis lock nut		26	265	19
Brake line union nut		15.2	155	11
Vacuum pump end cover x Casing		6	61	53 in.·lbf
Vacuum pump x Cam position sensor		9	92	80 in.·lbf
Vacuum pump installation flange bolt		21	214	15
ABS actuator x Actuator No. 1 bracket		4.7	48	42 in.·lbf
ABS actuator assembly x Body		19	194	14
Front speed sensor installation bolt		8.0	82	71 in.·lbf
Front speed sensor wire harness clamp installation bolt	Bolt A	8.0	82	71 in.·lbf
	Bolt B	29.4	300	22

SS

STEERING

SERVICE DATA

SS0MY–19

DRIVE BELT (1ND–TV)		
Drive belt deflection	New belt	8 – 10 mm (0.315 – 0.394 in.)
	Used belt	11 – 13 mm (0.433 – 0.512 in.)
*Drive belt tension	New belt	440 – 540 N (45 – 55 kgf)
	Used belt	240 – 340 N (25 – 35 kgf)
POWER STEERING FLUID (1ND–TV)		
Fluid level rise	Maximum	5 mm (0.20 in.)
Fluid pressure at idle speed with valve closed	Minimum	5,400 kPa (55 kgf/cm^2, 781 psi)
POWER STEERING VANE PUMP (1ND–TV)		
Vane pump rotating torque		0.27 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less
Vane pump shaft and front housing bushing oil clearance	STD	0.021 – 0.043 mm (0.0008 – 0.0017 in.)
	Maximum	0.07 mm (0.0028 in.)
Vane plate height	Minimum	7.6 mm (0.299 in.)
Vane plate thickness	Minimum	1.405 mm (0.0553 in.)
Vane plate length	Minimum	11.993 mm (0.4722 in.)
Vane plate and vane pump rotor groove clearance	Maximum	0.03 mm (0.0012 in.)
Vane plate length	Pump rotor and cam ring mark	
	0	12.001 – 12.003 mm (0.47248 – 0.47256 in.)
	1	11.999 – 12.001 mm (0.47240 – 0.47248 in.)
	2	11.997 – 11.999 mm (0.47232 – 0.47240 in.)
	3	11.995 – 11.997 mm (0.47224 – 0.47232 in.)
	4	11.993 – 11.995 mm (0.47216 – 0.47224 in.)
Spring free length	Minimum	35.8 mm (1.409 in.)

* For use with belt tension gauge

SS141–09

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
TILT STEERING COLUMN (1ND–TV)				
No. 2 intermediate shaft assembly x Main shaft assembly		28	290	21
Column assembly set bolt		21	210	15
Sliding yoke x No. 3 intermediate shaft assembly		28	290	21
No. 2 intermediate shaft assembly x Sliding yoke		28	290	21
Steering wheel set nut		50	510	37
Steering wheel pad set screw (Torx screw)		8.8	90	78 in.·lbf
POWER STEERING VANE PUMP (1ND–TV)				
Rear housing x Front housing		22	220	16
Oil pressure sensor		21	210	15
Pressure port union		69	700	51
Front and rear bracket x Pump housing		44	440	32
Heat insulator and rear stay x Rear housing		44	440	32
Oil reservoir x Pump housing		9.0	90	78 in.·lbf
Pump assembly set bolt	Bolt A	44	440	32
	Bolt B	44	440	32
	Bolt C	44	440	32
Pressure feed tube x Pump assembly		41 (44)	415 (450)	30 (33)
MANUAL STEERING GEAR (1ND–TV)				
Engine hanger set bolt		20	204	15
Engine rear mount bracket set bolt		49	500	36
Engine rear mount bracket x Engine rear mount insulator		64	650	47
No. 3 intermediate shaft assembly x Steering pinion		28	290	21
Manual steering gear assembly set bolt		74	750	54
Steering gear heat insulator set bolt		7.4	75	65 in.·lbf
Front suspension member x Frame	Bolt A	116	1,185	86
	Bolt B	70	715	52
Engine rear mount insulator x Front suspension member		80	810	59
Front suspension member reinforcement set bolt		47	480	35
Lower suspension arm x Steering knuckle		98	1,000	72
Engine hood x Hinge		11	115	8
Tie rod end x Steering knuckle		49	500	36
POWER STEERING GEAR (1ND–TV)				
Engine hanger set bolt		20	204	15
Engine rear mount bracket set bolt		49	500	36
Engine rear mount bracket x Engine rear mount insulator		64	650	47
No. 3 intermediate shaft assembly x Control valve shaft		28	290	21
PS gear assembly set bolt		74	750	54
Rack housing heat insulator set bolt (RHD)		7.4	75	65 in.·lbf
Dynamic damper (with rack housing heat insulator) set bolt (LHD)		18	180	13
Rack housing heat insulator set bolt		35	360	26
Front suspension member x Frame	Bolt A	116	1,185	86
	Bolt B	70	715	52
Engine rear mount insulator x Front suspension member		80	810	59

Part tightened		N·m	kgf·cm	ft·lbf
Front suspension member reinforcement set bolt		47	480	35
Lower suspension arm x Steering knuckle		98	1,000	72
Engine hood x Hinge		11	115	8
Tube clamp		7.8	80	69 in.·lbf
Pressure feed and return tube	LHD	27 (25)	280 (250)	20 (18)
	RHD	41 (44)	415 (450)	30 (33)

( ): For use without SST

BODY ELECTRICAL

SERVICE DATA

SS02V-07

SPEEDOMETER (ON–VEHICLE)	
Digital meter:	
Standard indication (mph)	Allowable range (mph)
20	20 – 23
40	41 – 44
60	63 – 67
80	84 – 88
100	105 – 109
120	126 – 130
Standard indication (km/h)	Allowable range (km/h)
20	20 – 24
40	41 – 45
60	62 – 66
80	84 – 88
100	105 – 111
120	126 – 132
140	148 – 154
160	169 – 175
Except australia analog meter:	
Standard indication (mph)	Allowable range (mph)
20	21 – 23.5
40	41.5 – 44
60	62.5 – 66
80	83 – 87
100	104 – 108.5
Standard indication (km/h)	Allowable range (km/h)
20	21 – 25
40	41.5 – 46
60	62.5 – 67
80	83 – 88
100	104 – 109
120	125 – 130.5
140	145.5 – 151.5
160	166 – 173
180	188.5 – 194.5
Australia analog meter:	
Standard indication (km/h)	Allowable range (km/h)
20	17.5 – 21.5
40	38 – 42
60	58 – 63
80	78 – 84
100	99 – 104.5
120	119.5 – 125.5

140	139.5 – 146.5
160	159.5 – 167.5
180	179.5 – 188.5

AIR CONDITIONING

SERVICE DATA

SS072-06

Refrigerant charge volume	430 ± 30 g (15.17 ± 1.06 oz.)
Drive belt tension (Apply load of 98 N)	–
New belt	7.0 – 8.5 mm (0.28 – 0.33 in.)
Used belt	11.0 – 13.0 mm (0.43 – 0.51 in.)
Drive belt tension	–
New belt	540 – 640 N (55 – 65 kgf)
Used belt	250 – 390 N (25 – 40 kgf)

TORQUE SPECIFICATION

SS073-06

Part tightened	N·m	kgf·cm	ft·lbf
Drive belt			
Pivot bolts	54	540	39
Refrigerant line			
A/C unit x Liquid and Suction hose	5.4	55	48 in.·lbf
Expansion valve x Evaporator	3.4	35	30 in.·lbf
Condenser x Liquid tube	5.4	55	48 in.·lbf
Condenser x Discharge hose	5.4	55	48 in.·lbf
Pressure switch x Liquied tube	10	100	7
Compressor and magnetic clutch			
Compressor x Engine	25	250	18
Pressure plate x Compressor	13.2	135	9

DIAGNOSTICS

DI

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

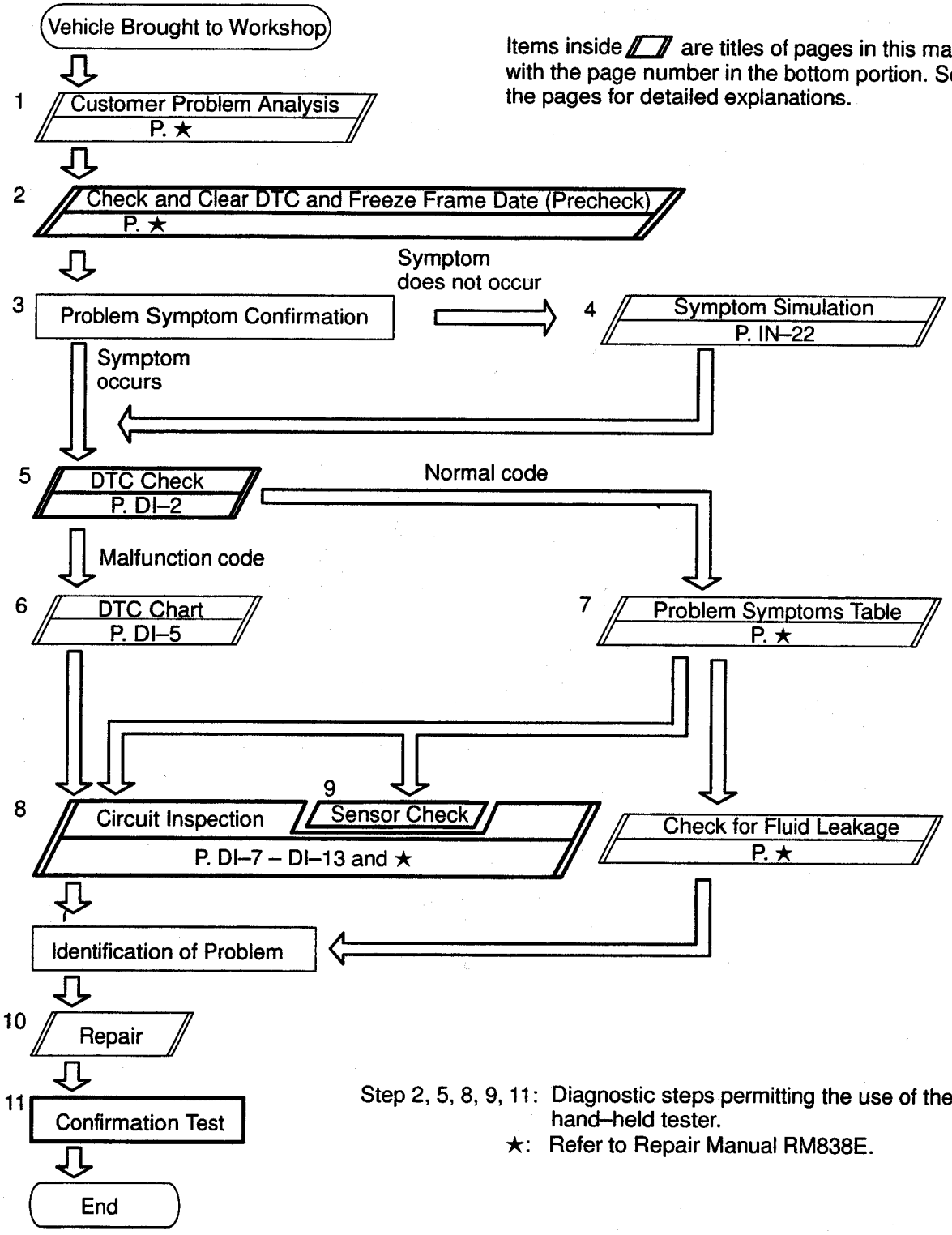
NOTE: The above pages contain only the points which differ from the above listed manuals.

ANTI–LOCK BRAKE SYSTEM WITH ELECTRONIC BRAKE FORCE DISTRIBUTION (EBD) (1ND–TV)

HOW TO PROCEED WITH TROUBLESHOOTING

DI9AP–02

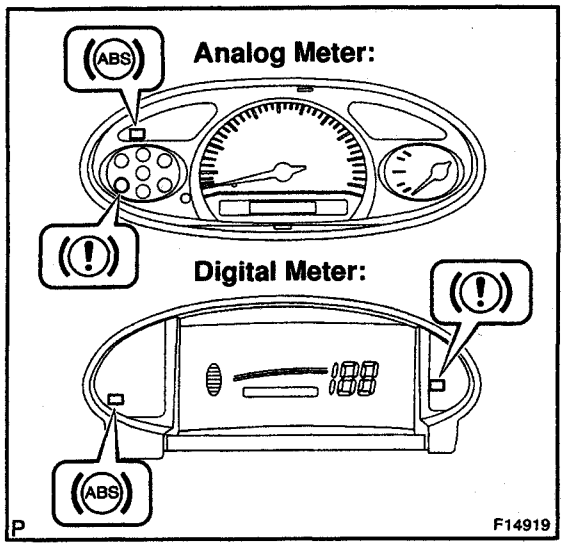
Troubleshoot in accordance with the procedure on the following pages.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5, 8, 9, 11: Diagnostic steps permitting the use of the hand–held tester.
★: Refer to Repair Manual RM838E.

Fail safe function:
When a failure occurs in the ABS system, the ABS warning light is lit and the ABS operation is prohibited. In addition to this, when the failure which disables the EBD operation occurs, the brake warning light is lit as well and the EBD operation is prohibited.



DI8AR-02

PRE–CHECK

1. DIAGNOSIS SYSTEM

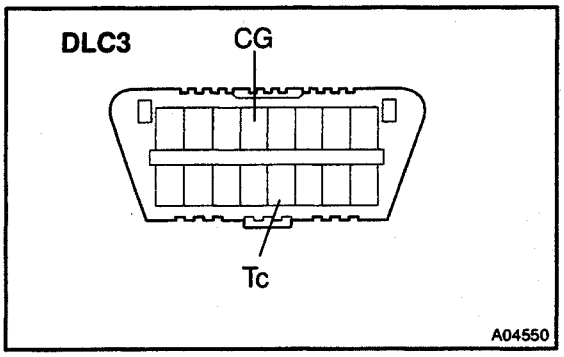
(a) Release the parking brake lever.

(b) Check the warning light.

When the ignition switch is turned ON, check that the ABS warning light and brake warning light goes on for 3 seconds.

HINT:

- When the parking brake is applied or the level of the brake fluid is low, the brake warning light is lit.
- If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit or brake warning light circuit (See page DI–7 or DI–13).



(c) In case of not using hand–held tester:

Check the DTC.

(1) Using SST, connect terminals Tc and CG of DLC3.

SST 09843–18040

(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light on the combination meter.

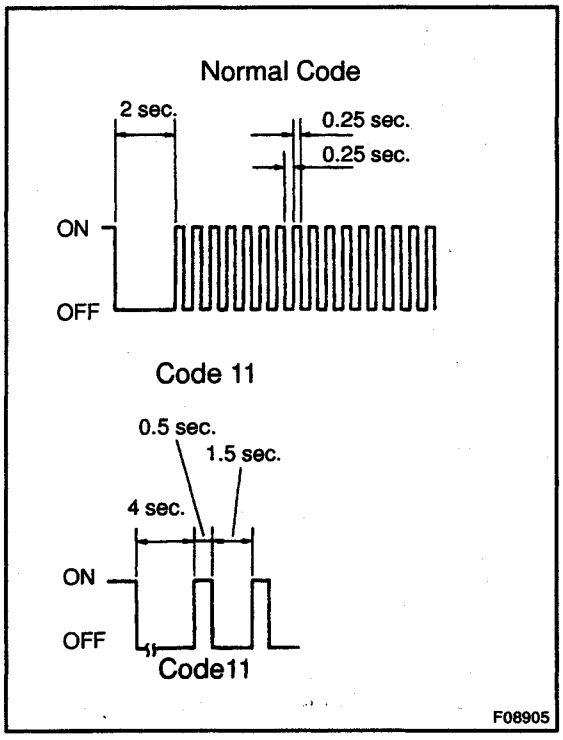
HINT:

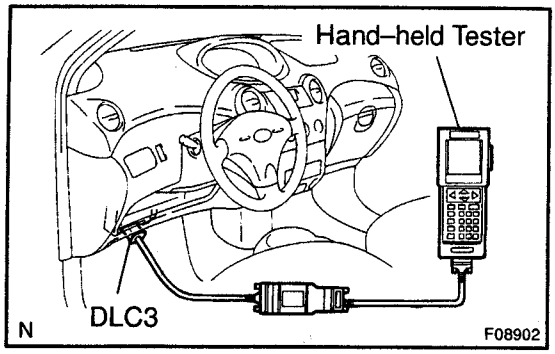
- If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page DI–7 or DI–13).
- As an example, the blinking patterns for normal code and codes 11 are shown on the left.

(4) Codes are explained in the code table on page DI–5.

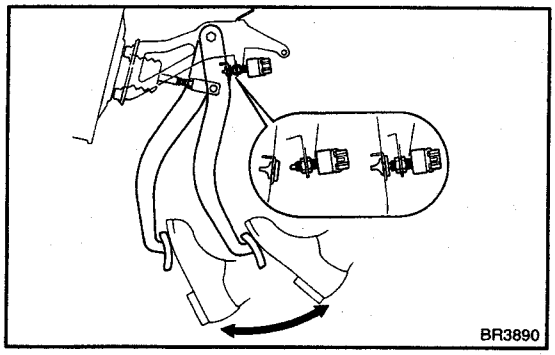
(5) After completing the check, disconnect terminals Tc and CG, and turn off the ignition switch.

Even if 2 or more malfunctions are detected, the lowest numbered DTC will be displayed.



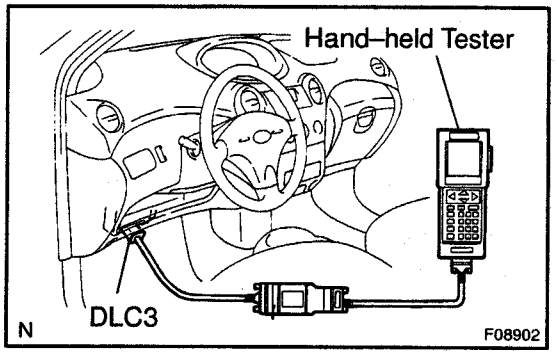


(d) In case of using hand–held tester:
Check the DTC.
(1) Hook up the hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Read the DTC by following the prompts on the tester screen.
Please refer to the hand–held tester operator's manual for further details.



(e) In case of not using hand–held tester:
Clear the DTC.
(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 5 seconds.
(4) Check that the warning light shows the normal code.
(5) Remove the SST from the terminals of DLC3.
SST 09843–18040

DI



(f) In case of using hand–held tester:
Clear the DTC.
(1) Hook up the hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the hand–held tester to erase code.
(See hand–held tester operator's manual.)

2. FREEZE FRAME DATA

(a) The vehicle (sensor) status at the occurrence of abnormality of the diagnosis code and during the ABS operating can be memorized and displayed using the hand–held tester.

(b) Only one record of freeze frame data is stored, however, freeze frame data during the ABS operating is always up–dated. After the storage of freeze frame data, up to 31 ignition "ON " operations are stored and displayed.

HINT:

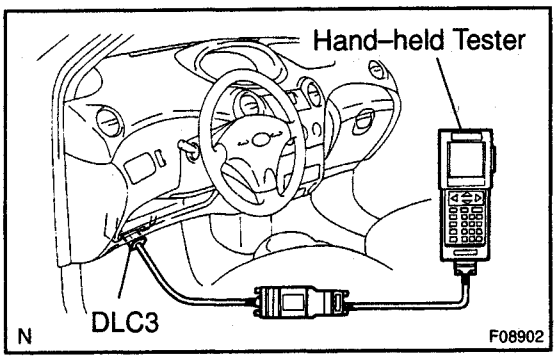
- If the ignition switch "ON" operation exceeds 31 times, "31" appears on the display.
- The ignition switch operation only does not count up. (Driving the vehicle is necessary for the count.)

(c) If the diagnosis code abnormality occurs, the freeze frame data at the occurrence of the abnormality is stored but the ABS actuation data is deleted.

Hand–held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Vehicle speed	Speed indication of a meter
SPD GRADE	Vehicle speed gradient	–1.5 – 1.5
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Numbers of operations of ignition switch ON after memorizing freeze frame data	0 – 31

*: If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

DI



3. In case of using hand–held tester:
SPEED SENSOR SIGNAL CHECK (TEST MODE)

(a) Hook up the hand–held tester to the DLC3.
(b) Start the engine.
(c) Select the ACTIVE TEST mode on the hand–held tester.
(d) Drive vehicle faster than 45 km/h (28 mph) for several seconds.

HINT:
There is a case that the sensor check is not completed if the vehicle has its wheels spined or its steering wheel steered during this check.

(e) Read the DTC, from the hand–held tester screen.

HINT:
- See the list of DTC shown at the bottom of this page.
- Please refer to the hand–held tester operator's manual for further details.

DTC of speed sensor check function:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output voltage of right front speed sensor	• Right front speed sensor • Right front speed sensor rotor • Sensor installation
C1272/72	Low output voltage of left front speed sensor	• Left front speed sensor • Left front speed sensor rotor • Sensor installation
C1273/73	Low output voltage of right rear speed sensor	• Right rear speed sensor • Right rear speed sensor rotor • Sensor installation
C1274/74	Low output voltage of left rear speed sensor	• Left rear speed sensor • Left rear speed sensor rotor • Sensor installation
C1275/75	Abnormal change in output voltage of right front speed sensor	Right front speed sensor rotor
C1276/76	Abnormal change in output voltage of left front speed sensor	Left front speed sensor rotor
C1277/77	Abnormal change in output voltage of right rear speed sensor	Right rear speed sensor rotor
C1278/78	Abnormal change in output voltage of left rear speed sensor	Left rear speed sensor rotor

DIAGNOSTIC TROUBLE CODE CHART

DI9AS–02

NOTICE:

When removing the part, turn the ignition switch OFF.

HINT:

- Using SST 09843–18040, connect the terminals Tc and CG of DLC3.
- If any abnormality is found when inspecting 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, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area
C0200/31* (★)	Right front wheel speed sensor signal malfunction	• Right front, left front, right rear and left rear speed sensor • Each speed sensor circuit • Sensor installation
C0205/32* (★)	Left front wheel speed sensor signal malfunction	
C0210/33* (★)	Right rear wheel speed sensor signal malfunction	
C0215/34* (★)	Left rear wheel speed sensor signal malfunction	
C0226/21 (★)	Right front solenoid valves faulty	ABS actuator (right front inlet or outlet solenoid valve)
C0236/22 (★)	Left front solenoid valves faulty	ABS actuator (left front inlet or outlet solenoid valve)
C0246/23 (★)	Right rear solenoid valves faulty	ABS actuator (right rear inlet or outlet solenoid valve)
C0256/24 (★)	Left rear solenoid valves faulty	ABS actuator (left rear inlet or outlet solenoid valve)
C0273/13 (★)	ABS pump motor faulty	• ABS motor relay • Pump motor voltage • Pump motor lead disconnected
C0278/11 (★)	ABS solenoid valve relay faulty	• ABS solenoid valve relay • Valve supply voltage
C1237/37 (★)	Speed sensor rotor is wrong number of teeth on one of the 4 wheels	• Speed sensor • Sensor rotor
C1241/41 (★)	Low battery voltage	• Battery • IC regulator • Power source circuit
C1249/58 (★)	Open circuit in stop light switch circuit	• Stop light switch • Stop light switch circuit
C1300/62 (★)	Malfunction in skid control ECU	• Battery • Skid control ECU
C1330/35* (★)	Open circuit in right front wheel speed sensor circuit	• Right front, left front speed sensor • Each speed sensor circuit
C1331/36* (★)	Open circuit in left front wheel speed sensor circuit	

DI

C1332/38* (★)	Open circuit in right rear wheel speed sensor circuit	• Right rear, left rear speed sensor • Each speed sensor circuit
C1333/39* (★)	Open circuit in left rear wheel speed sensor circuit	
Always ON (★)	Malfunction in skid control ECU	• Charging system • ABS warning light circuit

*: As the DTC cannot only be erased by replacing parts, do either of the following operations.
(1) Clear DTC (See page DI–2).
(2) At a vehicle speed of 20 km/h (12 mph), drive the vehicle for 30 sec. or more.
★: Refer to Repair Manual RM838E.

CIRCUIT INSPECTION

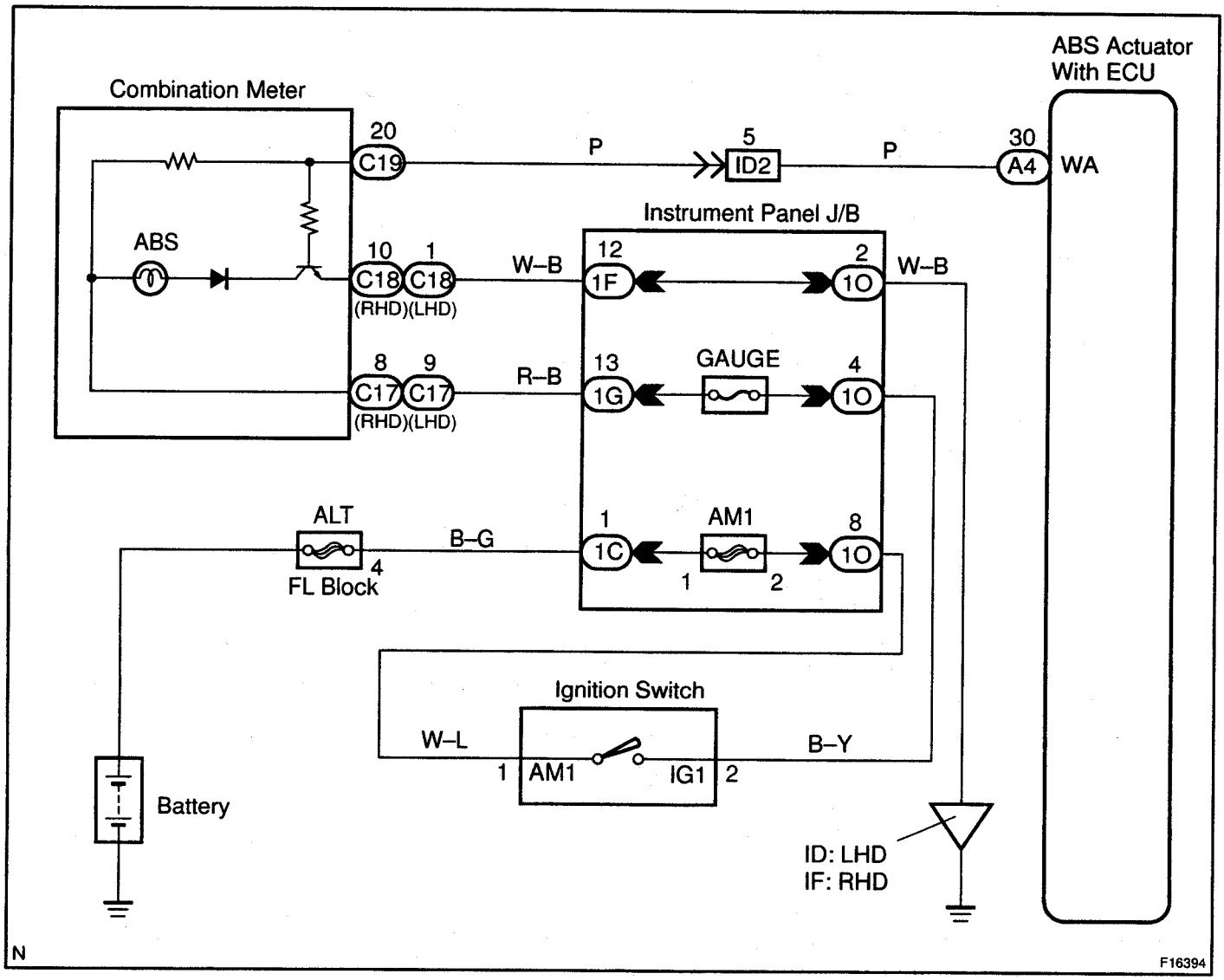
DI9QO-01

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.
Connecting terminals Tc and CG of the DLC3 makes the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

Troubleshoot in accordance with the table below for each trouble symptom.

ABS warning light does not light up	*1
ABS warning light remains on	*2

*1: Start the inspection from step 1 in case of using the hand–held tester and start from step 2 in case of not using hand–held tester.

*2: After inspection with step 3, start the inspection from step 4 in case of using the hand–held tester and start from step 5 in case of not using hand–held tester.

DI

1	**Check operation of the ABS warning light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester.

CHECK:

Check that "ON" and "OFF" of the ABS warning light can be shown on the combination meter by the hand–held tester.

OK → **Check and replace ABS actuator assembly (See page IN–32).**

NG

2	**Check ABS warning light.**

See combination meter troubleshooting on page BE–4.

NG → **Replace bulb or combination meter assembly.**

OK

Check for open circuit in harness and connector between GAUGE fuse and ABS warning light (See page IN–32).

3	**Check that the ECU connectors are securely connected to the ECU.**

NO → **Connect the connector to the ECU.**

YES

4	**Check operation of the ABS warning light (See step 1).**

OK → **Check and replace ABS actuator assembly (See page IN–32).**

NG

5	**Is DTC output?**

Check DTC on page DI–2.

YES → **Repair circuit indicated by the code output.**

NO

Check for short circuit in harness and connector between ABS warning light, DLC3 and skid control ECU (See page IN–32).

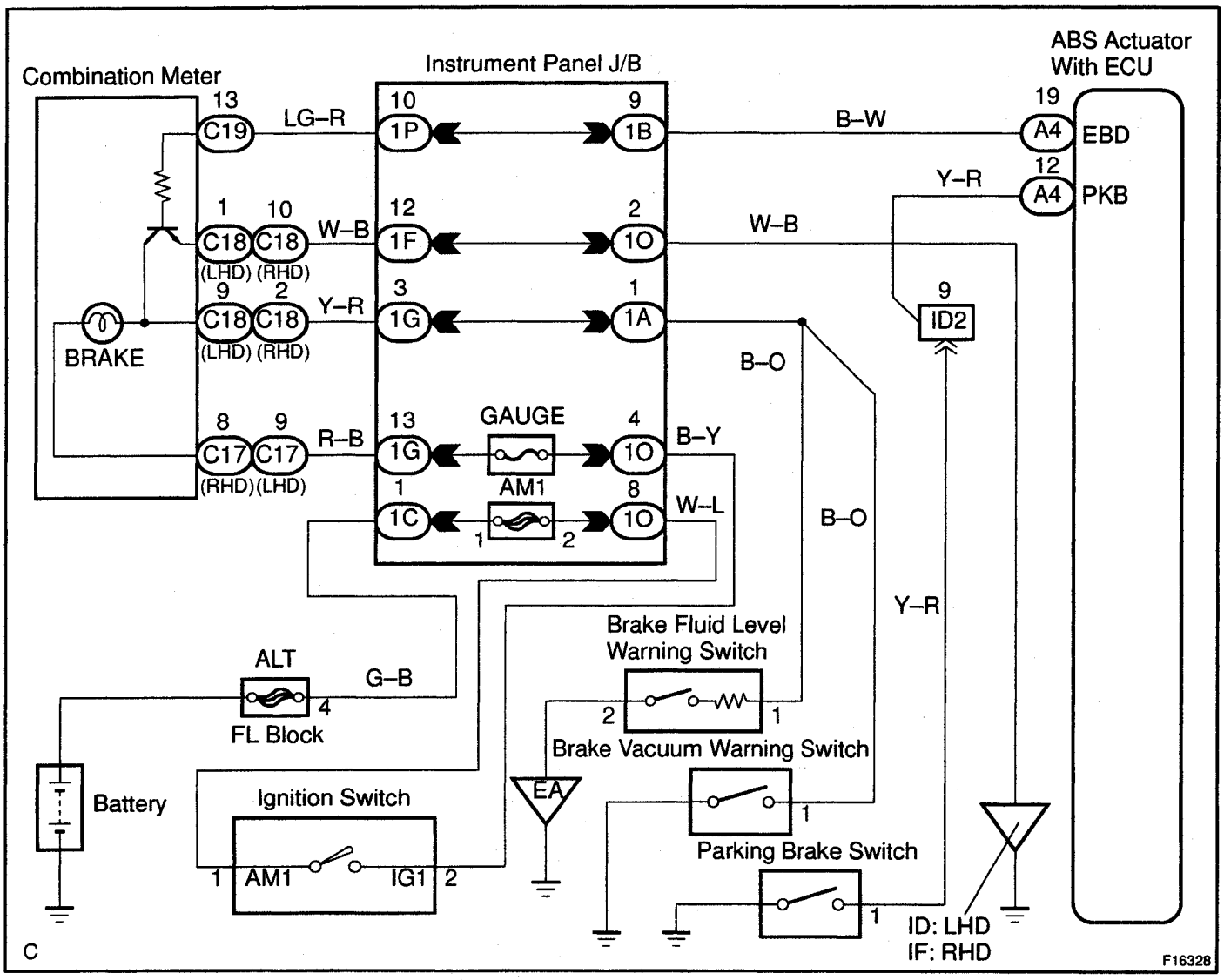
DI9QP-01

Brake Warning Light Circuit

CIRCUIT DESCRIPTION

The brake warning light lights up when the brake fluid is insufficient, parking brake is applied or the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check parking brake switch circuit (See Pub. No. RM685E on page BE–78).**

NG → **Repair or replace parking brake switch circuit.**

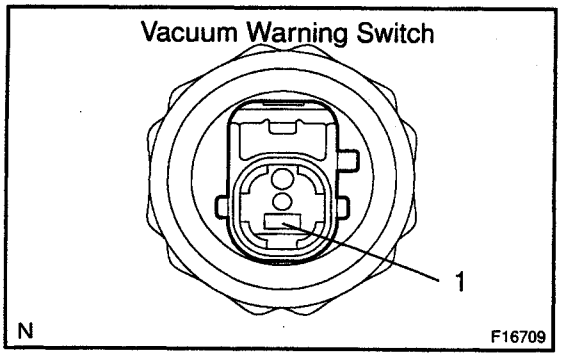
OK

2	**Check brake fluid level warning switch circuit (See Pub. No. RM685E on page BE–77).**

NG → **Repair or replace brake fluid level warning switch circuit.**

OK

3	**Check vacuum warning switch circuit.**



PREPARATION:

Disconnect the vacuum warning switch connector from the vacuum tank.

CHECK:

Check continuity terminal 1 of the vacuum warning switch and body ground.

OK:

Vacuum Tank	Condition
Fill vacuum	Open
No vacuum	Continuity

NG → **Replace vacuum warning switch assembly.**

OK

4	**Is DTC output for ABS ?**

Yes → **Repair circuit indicated by the output code.**

No

5	**Check brake warning light.**

See combination meter troubleshooting (See page BE–4).

NG → **Repair or replace combination meter.**

OK

6	**Check for open or short circuit in harness and connector (See page IN–32).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS actuator assembly (See page IN–32).

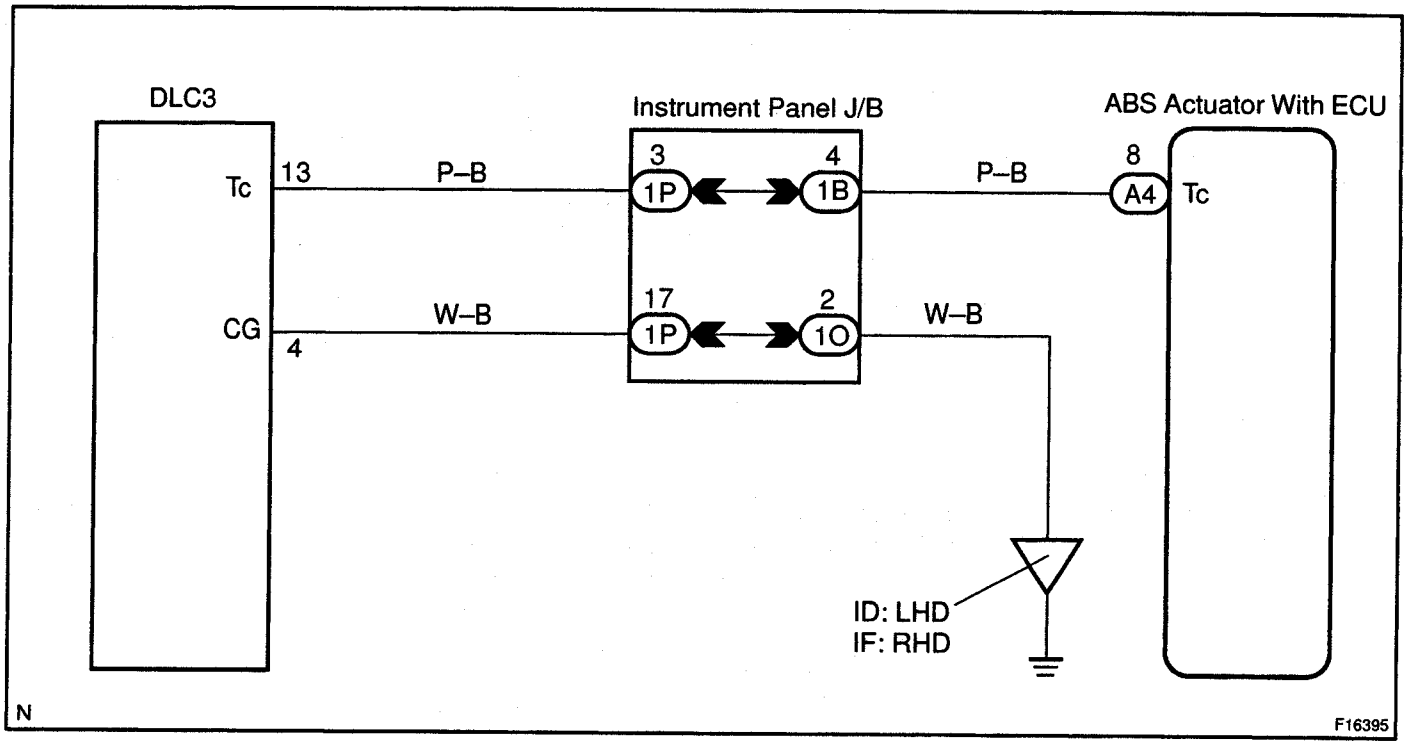
DI5QQ–01

Tc Terminal Circuit

CIRCUIT DESCRIPTION

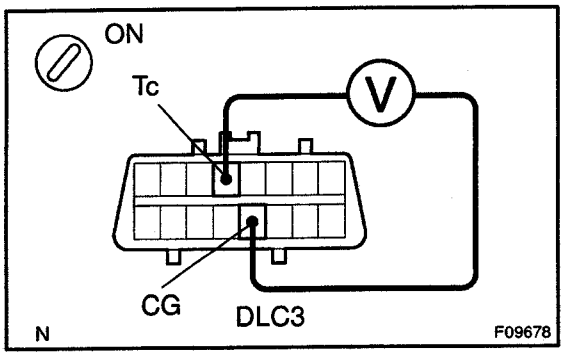
Connecting between terminals Tc and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Tc and CG of DLC3.

OK:

Voltage: 5.7 – 8.1 V

OK → **If ABS warning light does not blink even after Tc and CG are connected, the ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between skid control ECU and DLC3, DLC3 and body ground (See page IN–32).**

NG → **Repair or replace harness or connector.**

OK

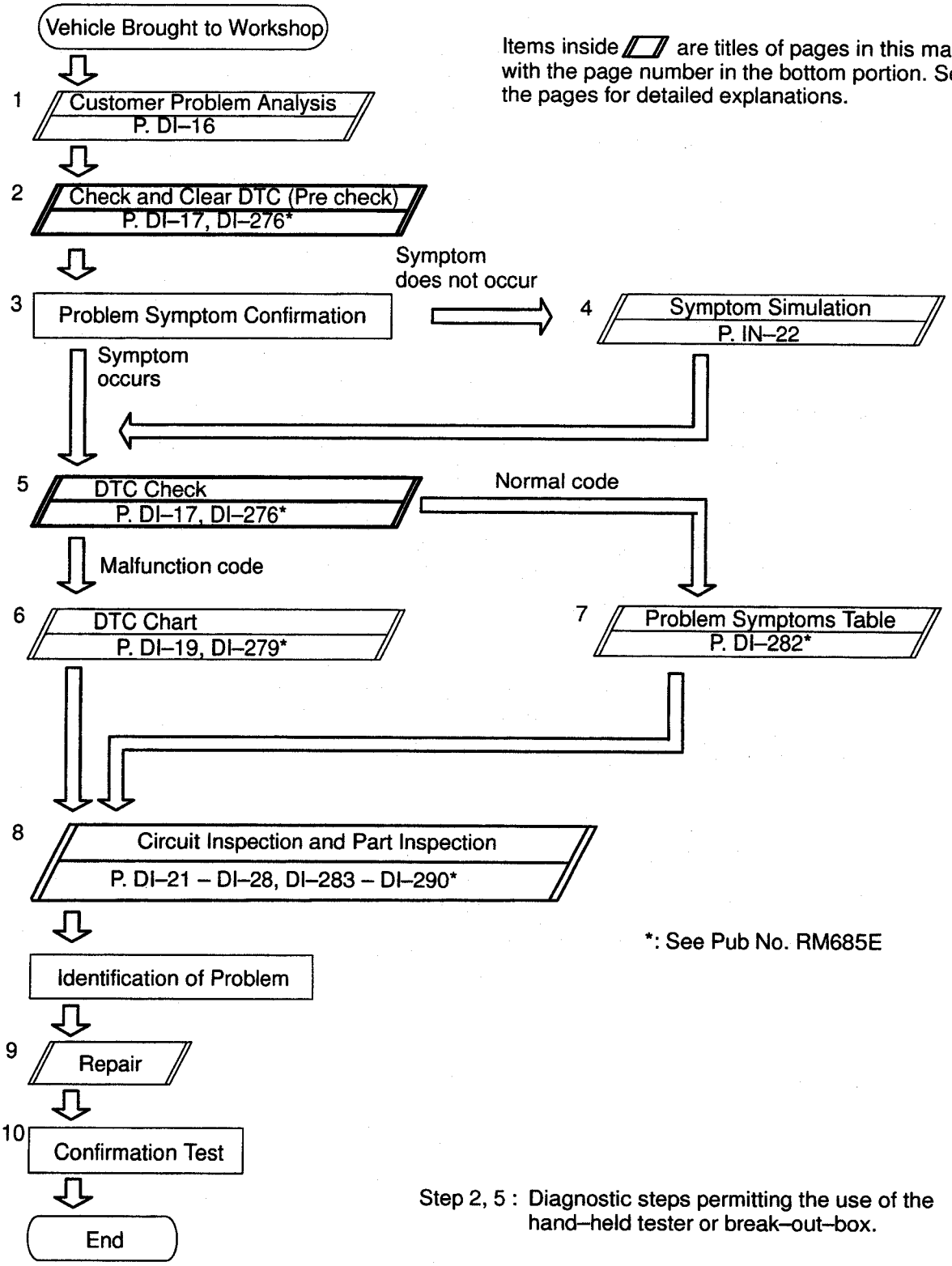
Check and replace ABS actuator assembly (See page IN–32).

ENGINE IMMOBILISER SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI67Z–04

Troubleshoot in accordance with the procedure on the following pages.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

*: See Pub No. RM685E

Step 2, 5 : Diagnostic steps permitting the use of the hand–held tester or break–out–box.

DI680-02

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILISER Check Sheet

Inspector's Name :

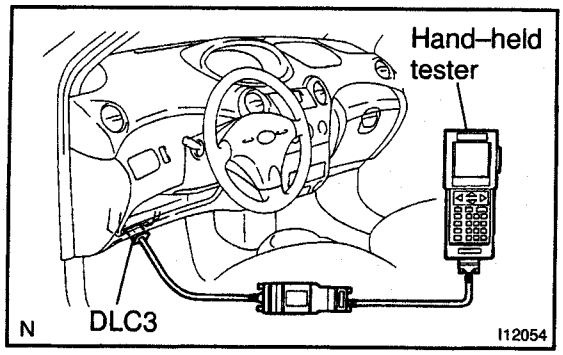
Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Immobiliser is not set. (Engine starts with key codes other than the registered key code.)
	☐ Engine does not start.

Check Item	**Malfunction Indicator Lamp**	☐ Normal ☐ Remains ON ☐ Does not Light Up

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)



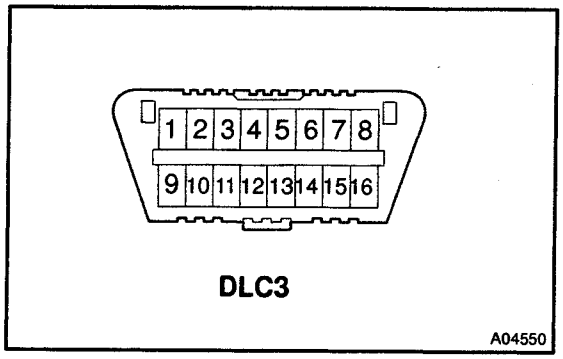
PRE–CHECK

DI9R0–01

1. 1ND–TV:
DIAGNOSIS SYSTEM

(a) Description

ECU controls the function of immobiliser on this vehicle. Data of the immobiliser or DTC can be read form DLC3 of the vehicle. When a trouble occurs on immobiliser, MIL does not light up but DTC inspection is performed. Therefore when there seems to be a trouble on immobiliser, use hand–held tester or SST to check and troubleshoot it.



(b) Check the DLC3.

The vehicle's engine ECU uses ISO 14230 for communication. The terminal arrangement of 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 your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of the hand–held tester to 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 DLC3 on the original vehicle.
- If communication is still not possible 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. 1ND–TV:

INSPECT DIAGNOSIS (Normal Mode)

Check the DTC using hand–held tester.

NOTICE:

Hand–held tester only: When the diagnosis system is switched from normal mode to check mode, it erases all DTCs and freezed frame data recorded in normal mode. So before switching modes, always check the DTCs and freezed frame data, and note them down.

(1) Prepare the hand–held tester.
(2) Connect the hand–held tester to DLC3.
(3) Turn the ignition switch ON and push the hand–held tester main switch ON.
(4) Use the hand–held tester to check the DTCs and freezed frame data, note them down. (For operating instructions, see the hand–held tester instruction book.)
(5) See page DI–19 to confirm the details of the DTCs.

DI682-03

DIAGNOSTIC TROUBLE CODE CHART

1ND–TV:

DTC No. (See Page)	Detection Item	Trouble Area
B2795 (DI–21)	Unmatched key code	• Key • Unregistered key inserted before
B2796 (DI–22)	No communication in immobiliser system	• Key • Transponder key amplifier • Wire harness • Engine ECU
B2797 (DI–24)	Communication malfunction No. 1	• Communication contents
B2798 (DI–26)	Communication malfunction No. 2	• Key • Transponder key amplifier • Wire harness • Engine ECU

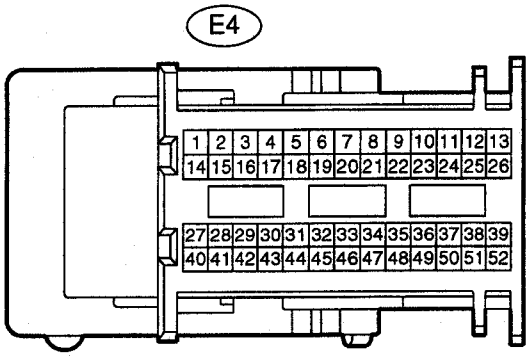
HINT:

To reduce the unnecessary exchange of engine ECU, check that a trouble occurs with the original engine ECU at the time of excanging engine ECU and the trouble will disappear with a new engine ECU.

DI584-03

TERMINALS OF ECU

1ND–TV:



C

I23732

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
TXCT – EOM (E4 – 25 ↔ E4 – 4)	L–B ↔ W–B	Ignition Switch ON	4.5 – 5.5
CODE – EOM (E4 – 26 ↔ E4 – 4)	Y–R ↔ W–B	Ignition Switch ON	10 – 14
RXCK – EOM (E4 – 18 ↔ E4 – 4)	Y–B ↔ W–B	Ignition Switch ON	10 – 14

DI686-03

CIRCUIT INSPECTION

DTC	B2795	Unmatched Key Code (1ND–TV)

CIRCUIT DESCRIPTION

This DTC is output when an unregistered key is inserted. When this DTC is output, delete DTC and insert the key that a customer keeps to check that B2795 is output.
When a key that outputs B2795 is found, register this key. when B2795 is not output, there is a possibility that the unregistered key has been inserted before. (Engine ECU is normal.)
Inquire a customer the condition of using the system to find the cause of the trouble.
(Example: Another key has been inserted, etc..)

DTC No.	DTC Detecting Condition	Trouble Area
B2795/99	No communication	• Key

INSPECTION PROCEDURE

1	**Delete DTC and insert all the presently available keys to check whether the engine starts or not.**

HINT:
When inserting the key that does not start the engine, DTC (B 2795) is stored in memory.

RESULT:

OK	All keys starts the engine.
NG	A specific key does not start the engine.

OK → **No problem.**

HINT:
If the result is "OK", please confirm whether or not customers have ever inserted the unregistered key or the immobiliser key (with transponder chip) of other vehicle in the ignition key cylinder, and find out the cause of detecting DTC.

NG

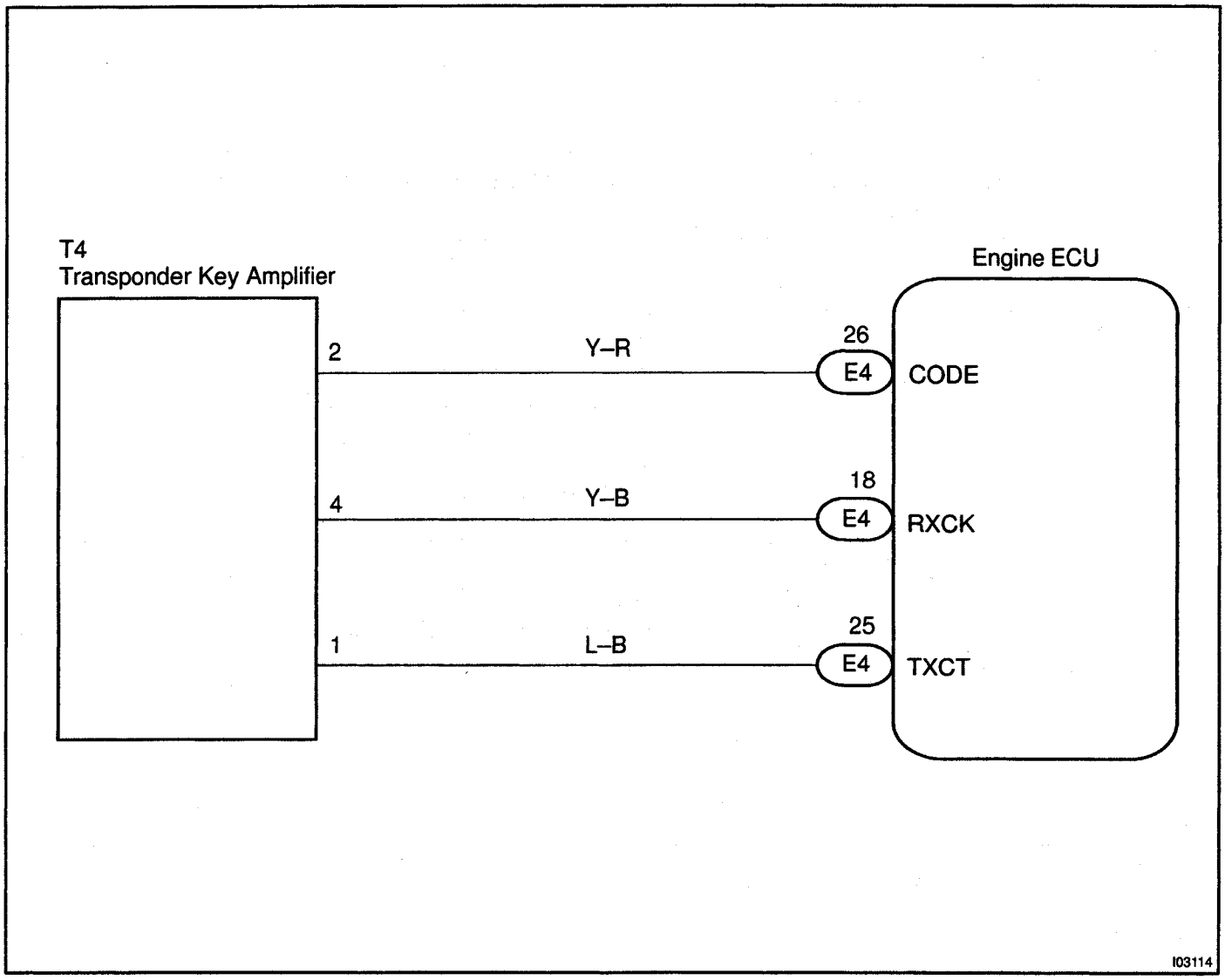
Register the key that does not start the engine.

DTC	B2796	No Communication in Immobiliser system (1ND–TV)

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2796	No communication	• Key • Transponder Key Amplifier • Wire Harness • Engine ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Delete DTC and insert all the presently available keys to check whether the engine starts or not.**

RESULT:

A	All keys start the engine.
B	A specific key does not start the engine. In this case, DTC (B 2796) is stored in memory.
C	All keys do not start the engine. In this case, DTC (B 2796) is stored in memory.

A → **No problem at this time.**

HINT:
If the result is "A", please confirm whether or not customers have ever inserted the key (without transponder chip) of other vehicle in the ignition key cylinder, and find out the cause of detecting DTC.

B → **The transponder chip of a specific key is defective. Replace the key.**

C

2	**Check harness and connector between transponder key amplifier and Engine ECU.**

NG → **Repair or replace harness and connector.**

OK

3	**Does it operate normally after replacement of transponder key amplifier?**

Yes → **Replace transponder key amplifier.**

No

Replace Engine ECU.

DI688-05

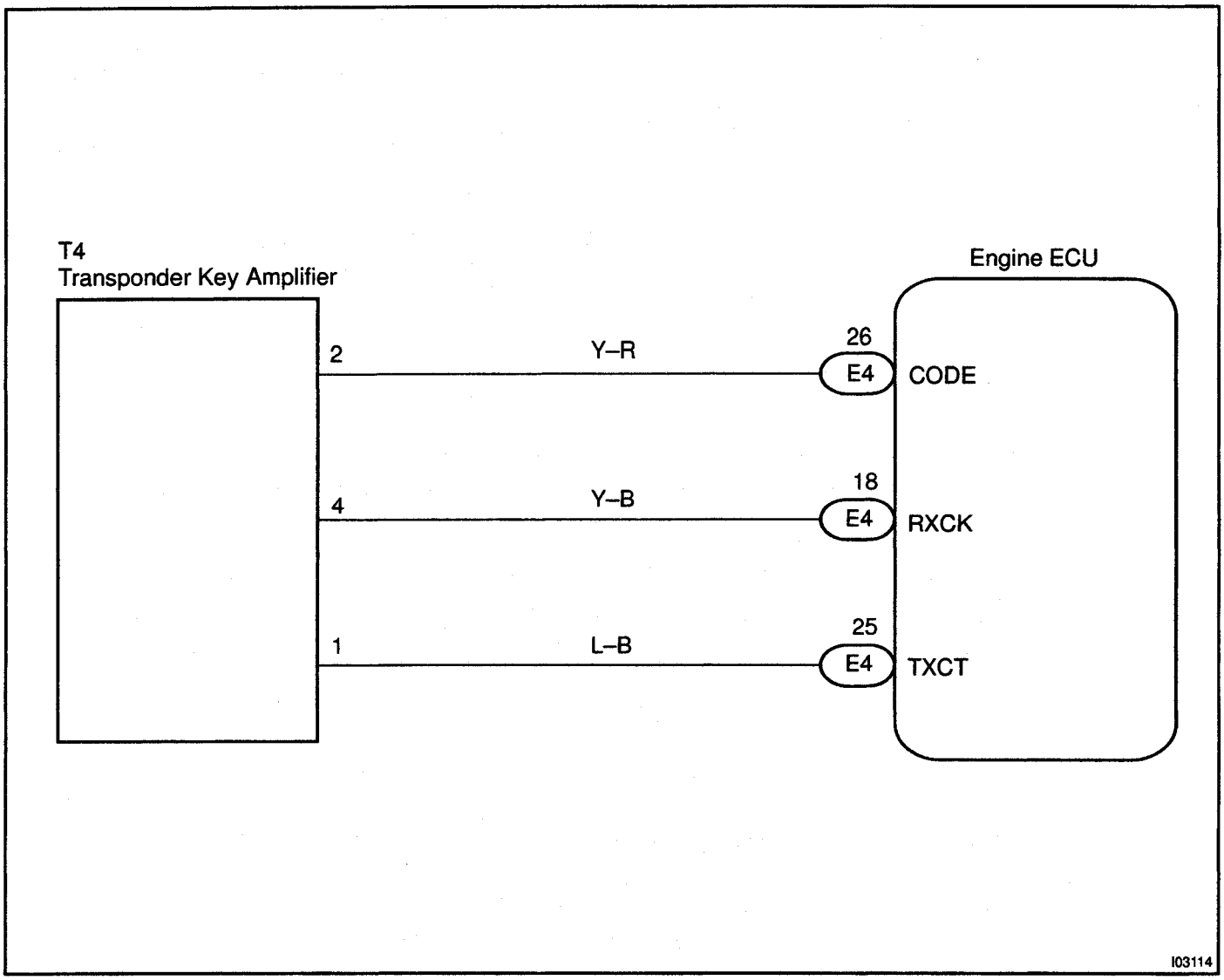
DTC	B2797	Communication Malfunction No. 1 (1ND–TV)

CIRCUIT DESCRIPTION

This code is detected when although the communication has been performed normally, an error occurs. (Example. Some noise is included in communication line.)

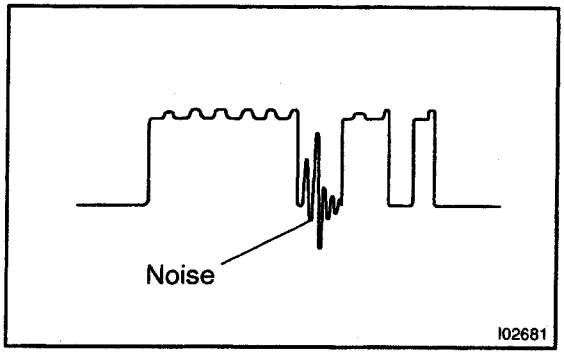
DTC No.	DTC Detecting Condition	Trouble Area
B2797	Communication error	• Wire Harness • Transponder Key Amplifier • Engine ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Noise check



PREPARATION:
Insert the already registered master key in the key cylinder.
CHECK:
Using an oscilloscope or hand–held tester, check that noise is included in the signals sent to the CODE terminal of Engine ECU.
OK:
No noise is detected.

NG → **Try to find the cause of the noise and remove it.**

OK ↓

2	Does the system operate normally after replacement of transponder key amplifier?

Yes → **Replace transponder key amplifier.**

No ↓

Replace Engine ECU.

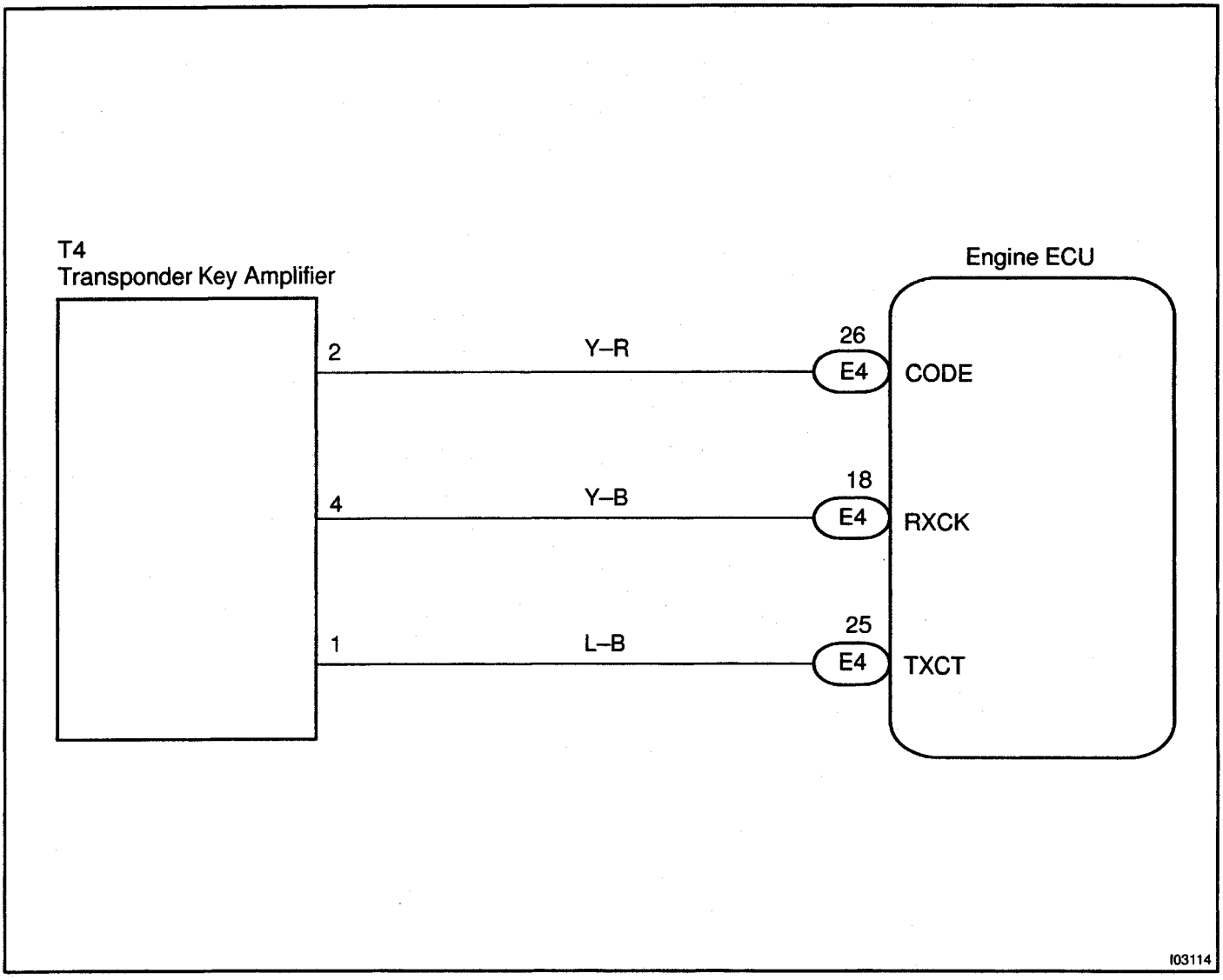
DI689–05

DTC	B2798	Communication malfunction No. 2 (1ND–TV)

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2798	Communication error	• Key • Transponder Key Amplifier • Wire harness • Engine ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check harness and connector between transponder key amplifier and Engine ECU.

NG → Repair or replace harness and connector

OK ↓

2	Does it operate normally after replacement of transponder key amplifier?

Yes → Replace transponder key amplifier.

No ↓

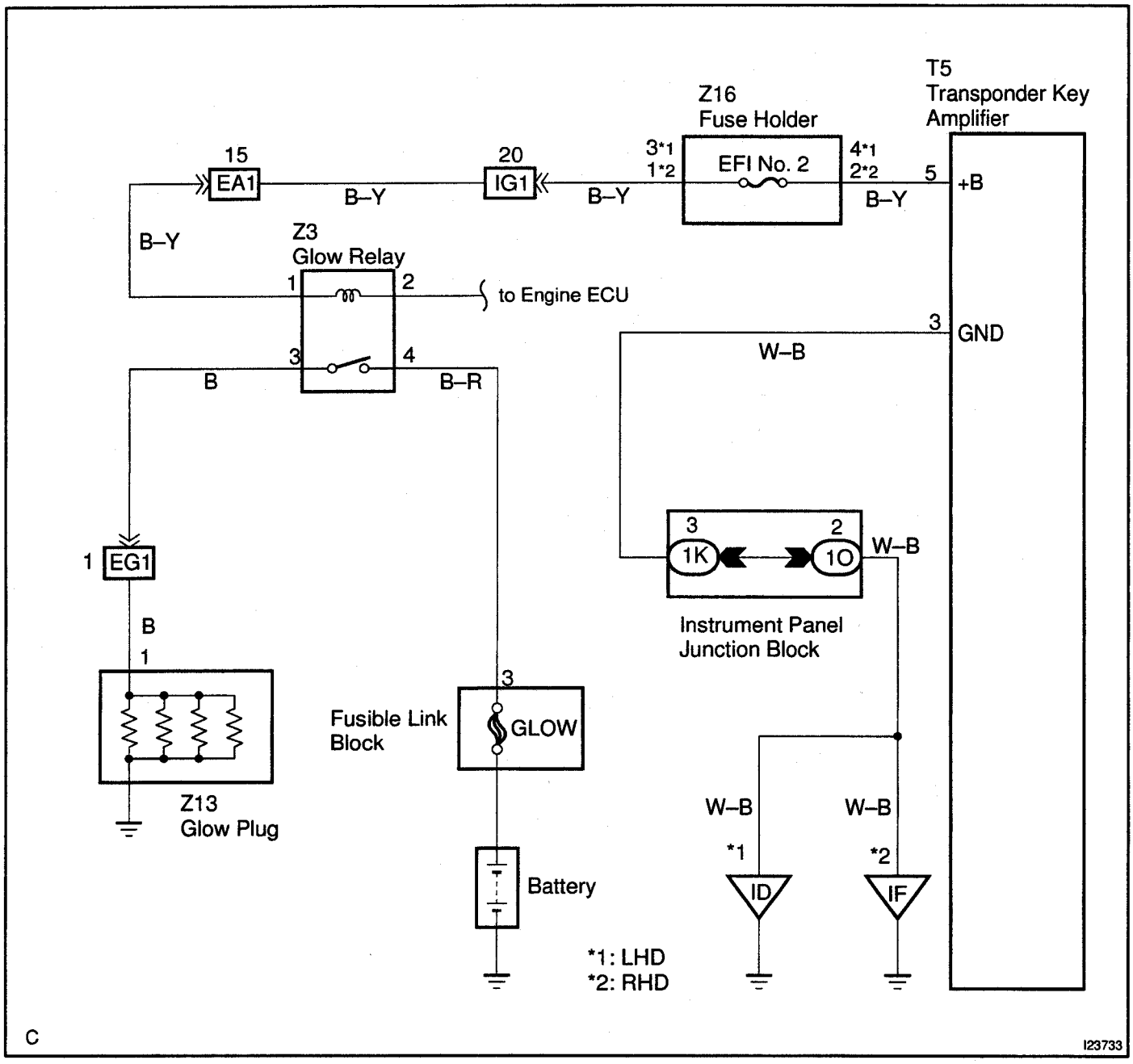
Replace Engine ECU.

Power source circuit (1ND–TV)

CIRCUIT DESCRIPTION

This circuit provides power to operate the Transponder Key Amplifier.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check EFI No. 2 fuse.**

CHECK:
Check continuity of EFI No. 2 fuse.
OK:
Continuity

NG → **Replace the failure fuse.**

OK

2	**Check voltage between terminals +B and GND of Transponder Key Amplifier connector.**

PREPARATION:
(a) Turn ignition switch OFF.
(b) Disconnect the Transponder Key Amplifier connector.
CHECK:
Measure voltage between terminals +B and GND.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table. (See Pub No. RM685E on page DI–282)**

NG

3	**Check wire harness and connector between Transponder Key Amplifier and body ground.**

NG → **Repair or replace wire harness or connector.**

OK

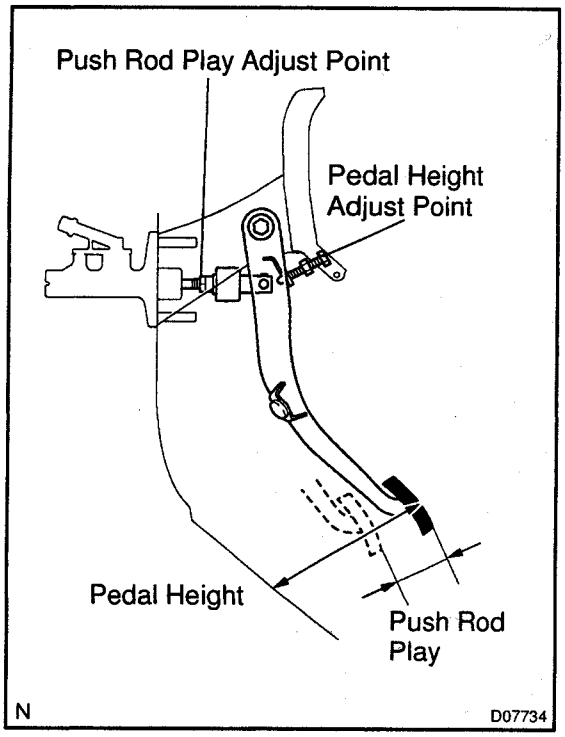
Check and repair wire harness and connector between Transponder Key Amplifier and Battery.

CLUTCH

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

NOTE: The above pages contain only the points which differ from the above listed manuals.



CLUTCH PEDAL (1ND–TV)

INSPECTION

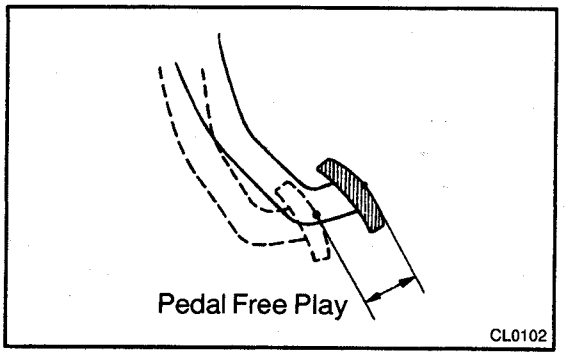
CL0E5-01

1. CHECK THAT PEDAL HEIGHT IS CORRECT

Pedal height from dash panel:
LHD: 150.7 – 160.7 mm (5.933 – 6.327 in.)
RHD: 155.5 – 165.5 mm (6.122 – 6.516 in.)

2. IF NECESSARY, ADJUST PEDAL HEIGHT

Loosen the lock nut and turn the stopper bolt until the height is correct. Tighten the lock nut.



3. CHECK THAT PEDAL FREE PLAY AND PUSH ROD PLAY ARE CORRECT

(a) Push in on the pedal until the beginning of clutch resistance is felt.

Pedal free play: 5.0 – 15.0 mm (0.197 – 0.591 in.)

(b) Gently push on the pedal until the resistance begins to increase a little.

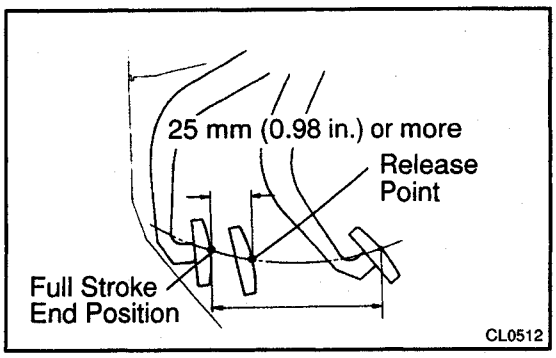
Push rod play at pedal top:
1.0 – 5.0 mm (0.039 – 0.197 in.)

4. IF NECESSARY, ADJUST PEDAL FREE PLAY AND PUSH ROD PLAY

(a) Loosen the lock nut and turn the push rod until the free play and push rod play are correct.
(b) Tighten the lock nut.
(c) After adjusting the pedal free play, check the pedal height.

5. CHECK CLUTCH RELEASE POINT

(a) Pull the parking brake lever and install wheel stopper.
(b) Start the engine and idle the engine.
(c) Without depressing the clutch pedal, slowly shift the shift lever into reverse position until the gears contact.



(d) Gradually depress the clutch pedal and measure the stroke distance from where the gear noise stops (release point) up to the full stroke end position.

Standard distance:
25 mm (0.98 in.) or more
(From pedal stroke end position to release point)

If the distance is not as specified, perform the following operation.

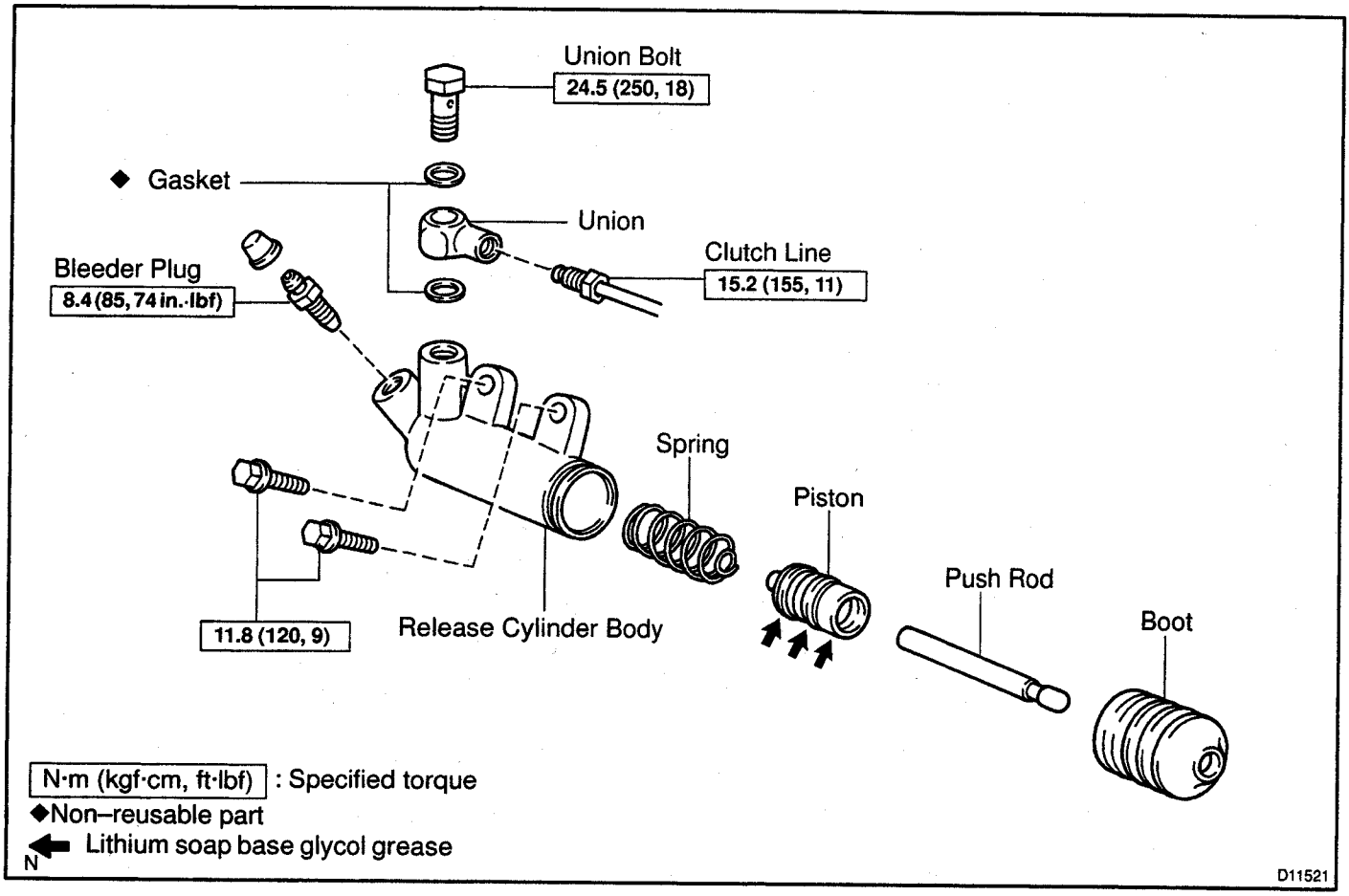
- Check pedal height.
- Check push rod play and pedal free play.
- Bleed clutch line.
- Check clutch cover and disc.

CL

CLUTCH RELEASE CYLINDER (1ND–TV)

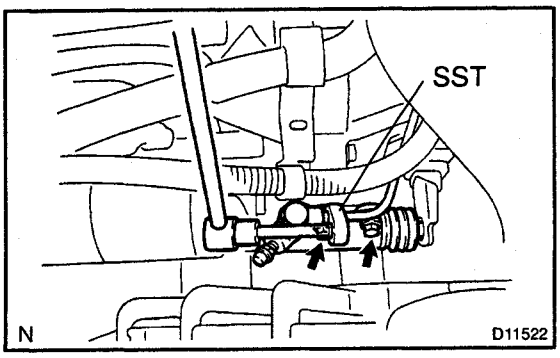
COMPONENTS

CL0DT-01



CL

CL0DU–01



REMOVAL

1. DISCONNECT CLUTCH LINE

Using SST, disconnect the clutch line. Use a container to catch the fluid.

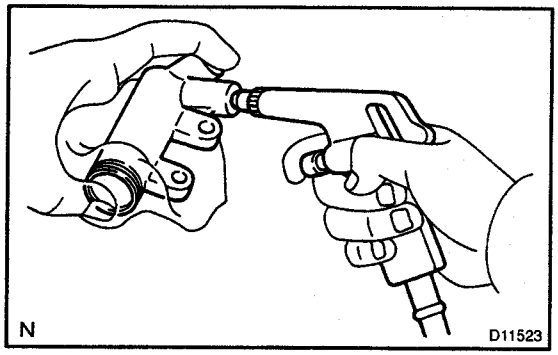
SST 09023–00100

2. REMOVE 2 BOLTS AND PULL OUT RELEASE CYLINDER

CL0DV-01

DISASSEMBLY

1. **REMOVE BLEEDER PLUG**
2. **REMOVE UNION BOLT, 2 GASKETS AND UNION**
3. **PULL OUT BOOT WITH PUSH ROD**



4. **REMOVE PISTON WITH SPRING**

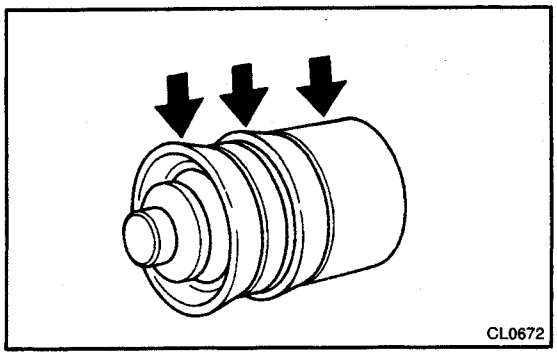
Using compressed air, remove the piston with the spring from the cylinder.

NOTICE:

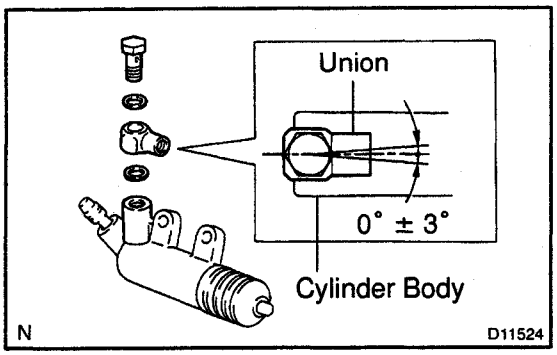
- **Blowing off the air may cause the piston's jump–out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash brake fluid when air–blowing.**

CL0DW–01

REASSEMBLY



1. **COAT PISTON WITH LITHIUM SOAP BASE GLYCOL GREASE, AS SHOWN**
2. **INSTALL PISTON WITH SPRING INTO CYLINDER**
3. **INSTALL BOOT WITH PUSH ROD TO CYLINDER**



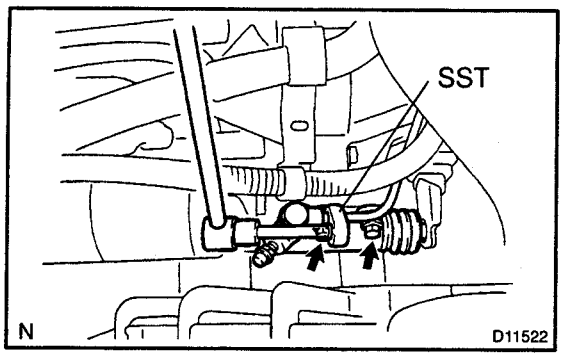
4. **INSTALL UNION AND 2 NEW GASKETS WITH UNION BOLT**
   Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

HINT:

Install the union in the direction 0 ± 3° to the cylinder body, as shown in the illustration.

5. **INSTALL BLEEDER PLUG**
   Torque: 8.4 N·m (85 kgf·cm, 74 in.·lbf)

CL



INSTALLATION

CL0DX–01

1. **INSTALL RELEASE CYLINDER WITH 2 BOLTS**
   Torque: 11.8 N·m (120 kgf·cm, 9 ft·lbf)
2. **CONNECT CLUTCH LINE**

Using SST, connect the clutch line.

SST 09023–00100

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)

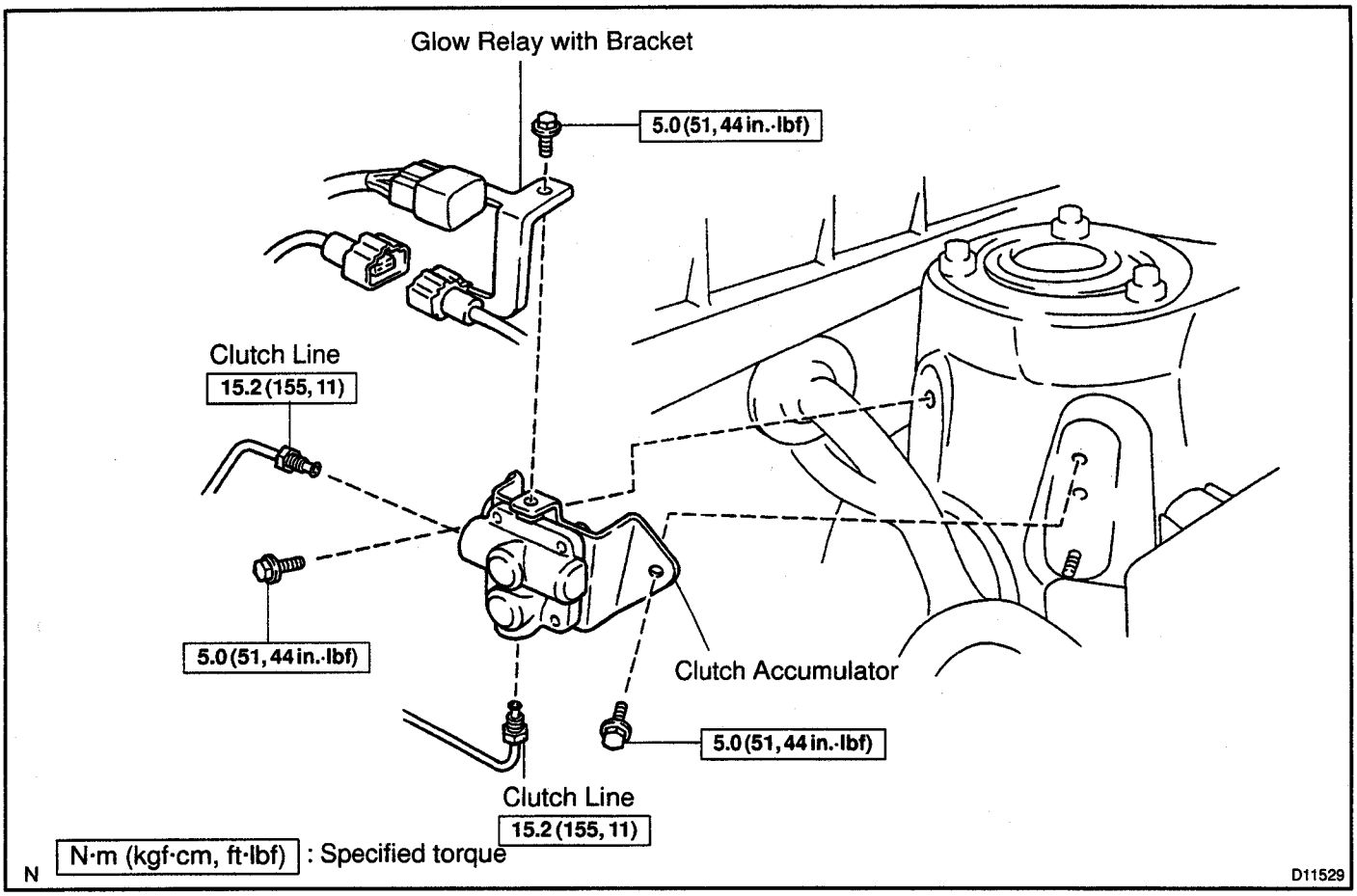
3. **FILL CLUTCH RESERVOIR WITH BRAKE FLUID AND BLEED CLUTCH SYSTEM**
4. **CHECK FOR LEAKS**

C

CLUTCH ACCUMULATOR (1ND–TV)

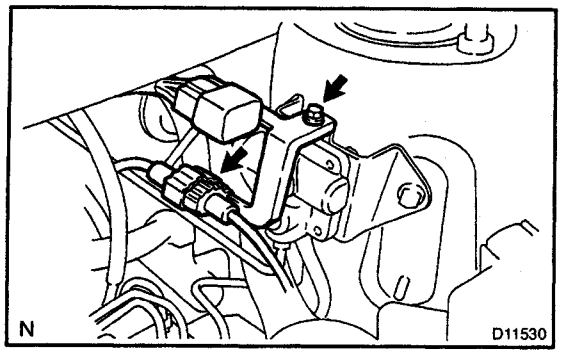
COMPONENTS

CL0DY–01



CL0DZ–01

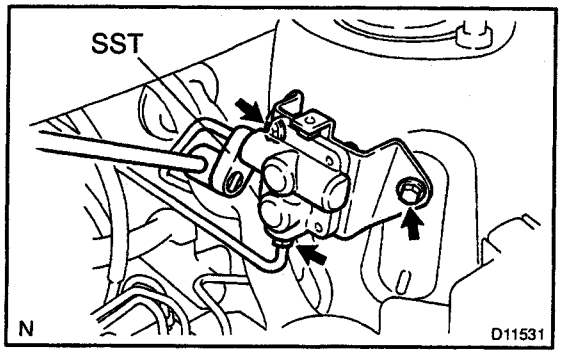
REMOVAL



1. REMOVE GLOW RELAY WITH BRACKET

(a) Disconnect the connector.

(b) Remove the bolt and glow relay with the bracket.



2. DISCONNECT CLUTCH LINE

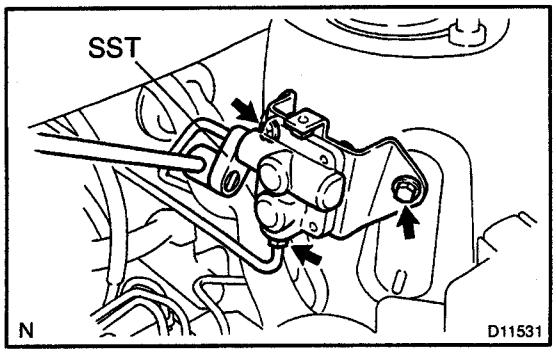
Using SST, disconnect the 2 clutch lines. Use a container to catch the fluid.

SST 09023–00100

3. REMOVE 2 BOLTS AND CLUTCH ACCUMULATOR

CL0E0–01

INSTALLATION



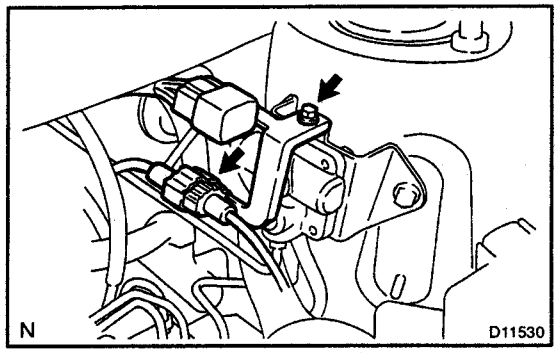
1. INSTALL CLUTCH ACCUMULATOR WITH 2 BOLTS
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

2. CONNECT CLUTCH LINE

Using SST, connect the 2 clutch lines to the clutch accumulator.

SST 09023–00100

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)



3. INSTALL GLOW RELAY WITH BRACKET

(a) Install the glow relay with the bracket and bolt.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(b) Connect the connector.

4. FILL CLUTCH RESERVOIR WITH BRAKE FLUID AND BLEED CLUTCH SYSTEM

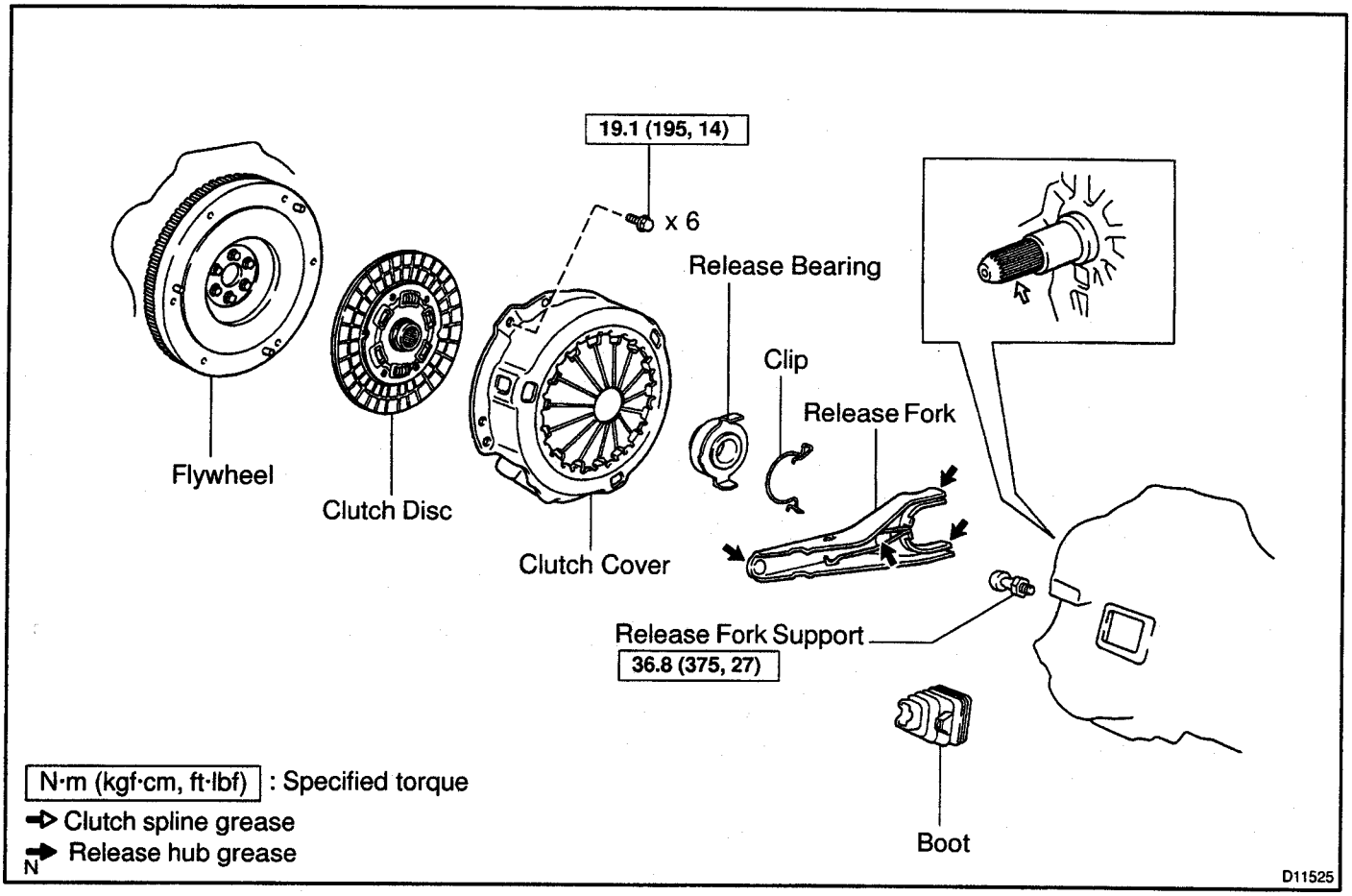
5. CHECK FOR LEAKS

CL

CLUTCH UNIT (1ND–TV)

COMPONENTS

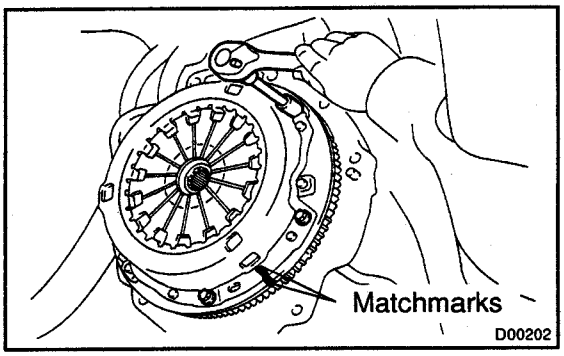
CL0E1–01



CL0E2–01

REMOVAL

1. REMOVE TRANSAXLE FROM ENGINE
(See page MX–4)



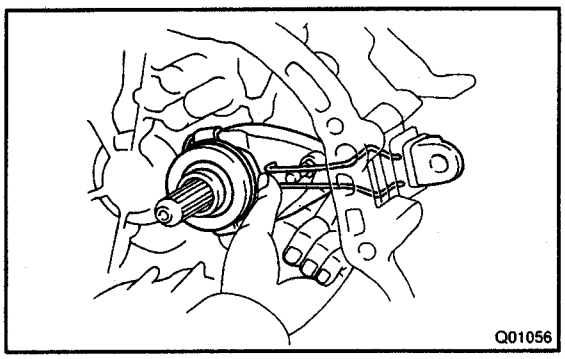
2. REMOVE CLUTCH COVER AND DISC

(a) Align the matchmark on the clutch cover with the one on the flywheel.

(b) Loosen each set bolt one turn at a time until spring tension is released.

(c) Remove the set bolts, and pull off the clutch cover with the clutch disc.

NOTICE:
Do not drop the clutch disc.



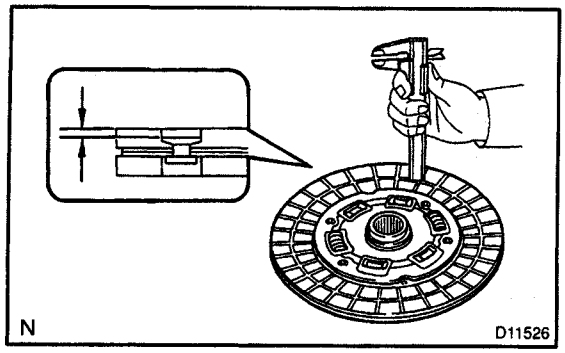
3. REMOVE RELEASE BEARING AND FORK FROM TRANSAXLE

Remove the release bearing with the fork together and then separate them.

4. REMOVE RELEASE FORK SUPPORT AND BOOT

CL0E3-01

INSPECTION

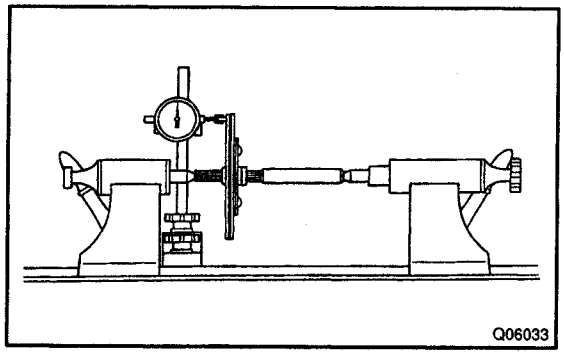


1. INSPECT CLUTCH DISC FOR WEAR OR DAMAGE

Using vernier calipers, measure the rivet head depth.

Minimum rivet depth: 0.3 mm (0.012 in.)

If necessary, replace the clutch disc.

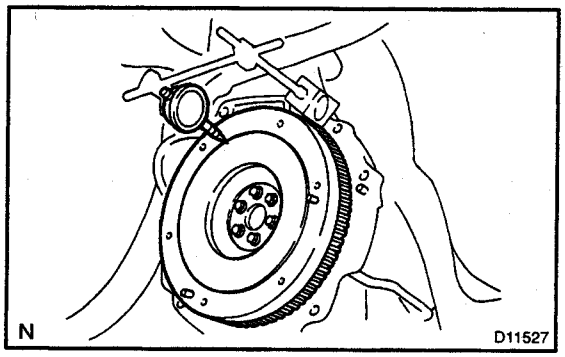


2. INSPECT CLUTCH DISC RUNOUT

Using a dial indicator, check the disc runout.

Maximum runout: 0.8 mm (0.031 in.)

If necessary, replace the clutch disc runout.

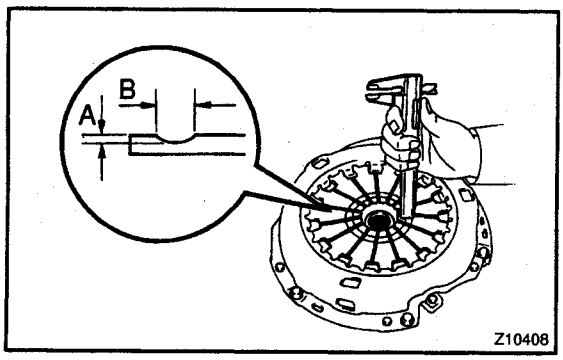


3. INSPECT FLYWHEEL RUNOUT

Using a dial indicator, check the flywheel runout.

Maximum runout: 0.1 mm (0.004 in.)

If necessary, replace the flywheel.



4. INSPECT DIAPHRAGM SPRING FOR WEAR

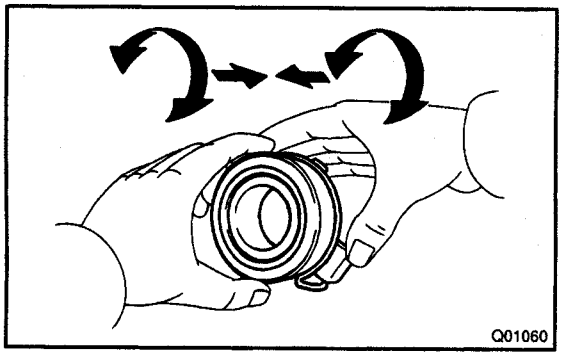
Using vernier calipers, measure the diaphragm spring for depth and width of wear.

Maximum:

A (Depth): 0.6 mm (0.024 in.)

B (Width): 5.0 mm (0.297 in.)

If necessary, replace the clutch cover.



5. INSPECT RELEASE BEARING

Turn the bearing by hand while applying force in the axial direction.

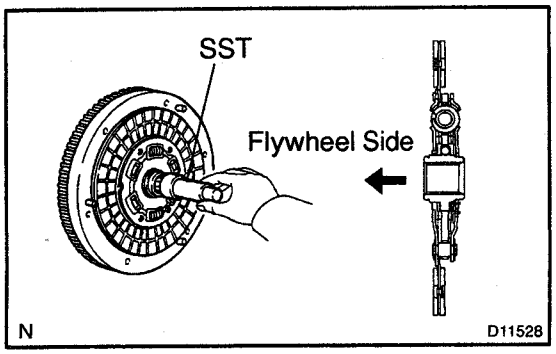
HINT:

The bearing is permanently lubricated and requires no cleaning or lubrication.

If necessary, replace the release bearing.

CL0E4-01

INSTALLATION



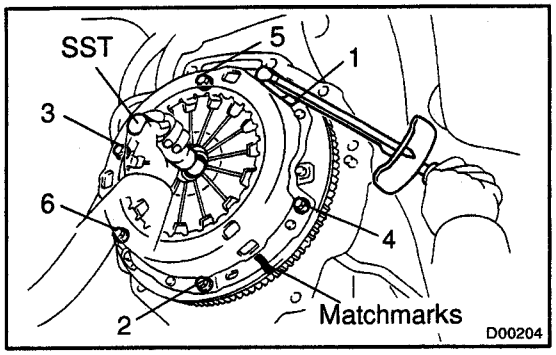
1. INSTALL CLUTCH DISC AND CLUTCH COVER ON FLYWHEEL

(a) Insert SST in the clutch disc, then insert them in the flywheel.

SST 09301–00210

HINT:

Take care not to insert clutch disc in the wrong direction.



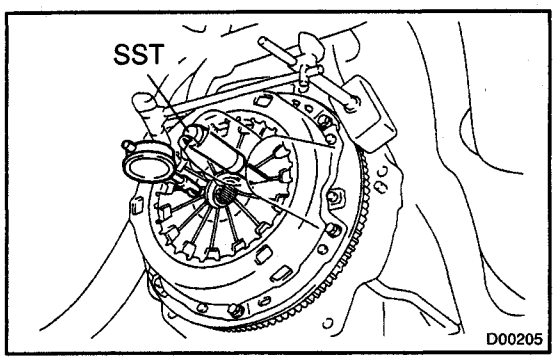
(b) Align the matchmarks on the clutch cover and flywheel.

(c) Following the procedures shown in the illustration, tighten the 6 bolts in the order starting the bolt locating near the knock pin on the top.

Torque: 19.1 N·m (195 kgf·cm, 14 ft·lbf)

HINT:

- Following the order in the illustration, tighten the bolts at a time evenly.
- Move SST up and down, right and left lightly, after checking that the disc is in the center, tighten the bolts.



2. CHECK DIAPHRAGM SPRING TIP ALIGNMENT

Using a dial indicator with roller instrument, check the diaphragm spring tip alignment.

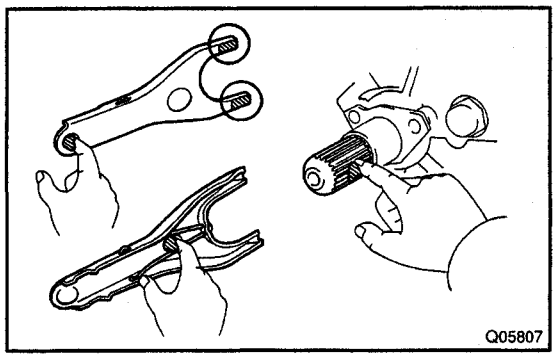
Maximum non–alignment: 0.5 mm (0.020 in.)

If alignment is not as specified, using SST, adjust the diaphragm spring tip alignment.

SST 09333–00013

3. INSTALL BOOT AND RELEASE FORK SUPPORT TO TRANSAXLE

Torque: 36.8 N·m (375 kgf·cm, 27 ft·lbf)



4. APPLY RELEASE HUB GREASE

Apply release hub grease to the release fork and hub contact, release fork and push rod contact and release fork pivot points.

Sealant:

Part No. 08887–01806, RELEASE HUB GREASE or equivalent

5. APPLY CLUTCH SPRING GREASE

Apply clutch spline grease to the input shaft spline.

Sealant:

Part No. 08887–01706, CLUTCH SPLINE GREASE or equivalent

6. INSTALL RELEASE BEARING AND FORK TO TRANSAXLE

Install the bearing to the release fork, and then install them to the transaxle.

7. INSTALL TRANSAXLE TO ENGINE

(See page MX–8)

MANUAL TRANSAXLE (C153)

REFER TO FOLLOWING REPAIR MANUALS:

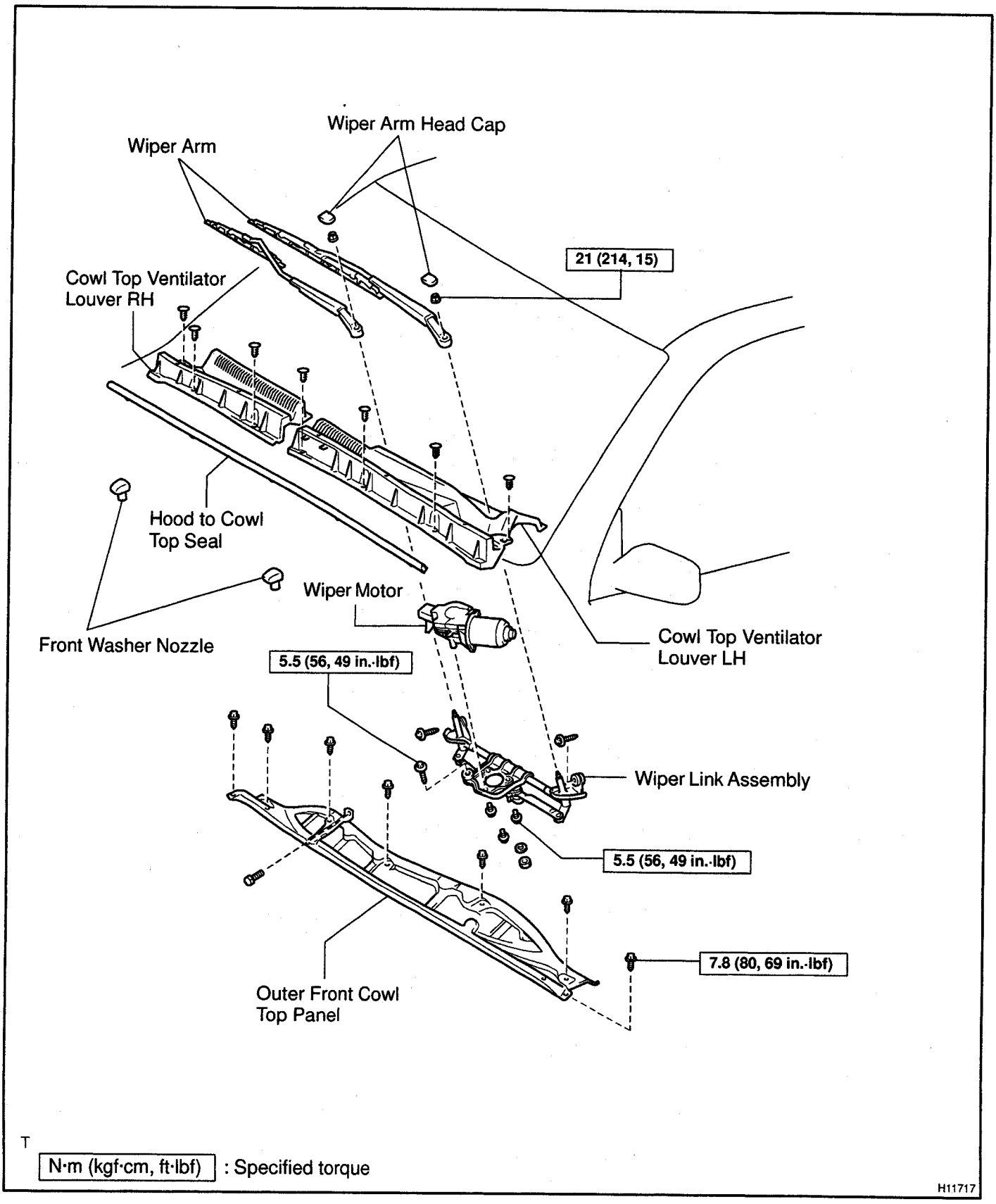
Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E

NOTE: The above pages contain only the points which differ from the above listed manuals.

MANUAL TRANSAXLE UNIT

COMPONENTS

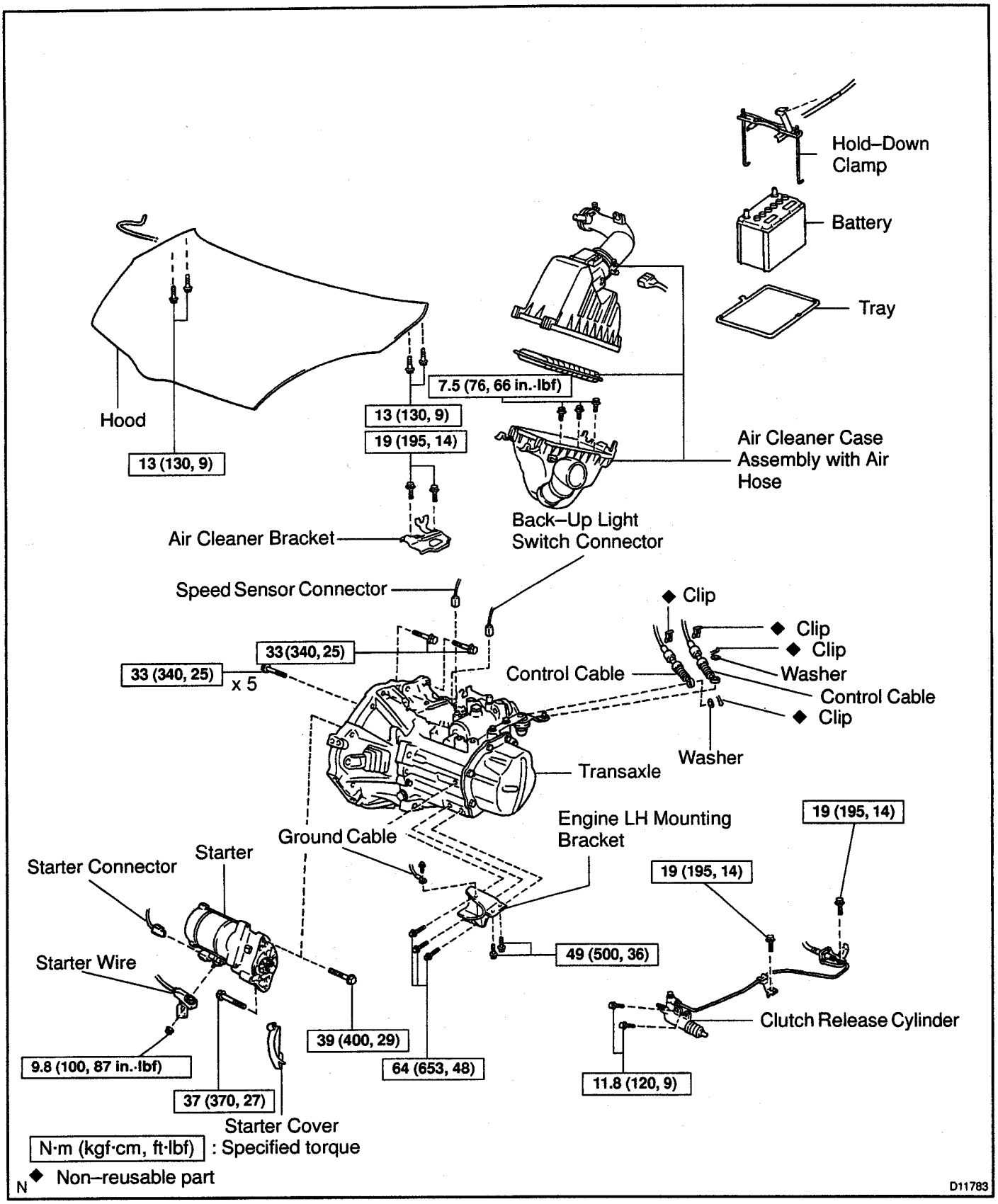
MX0E7-02

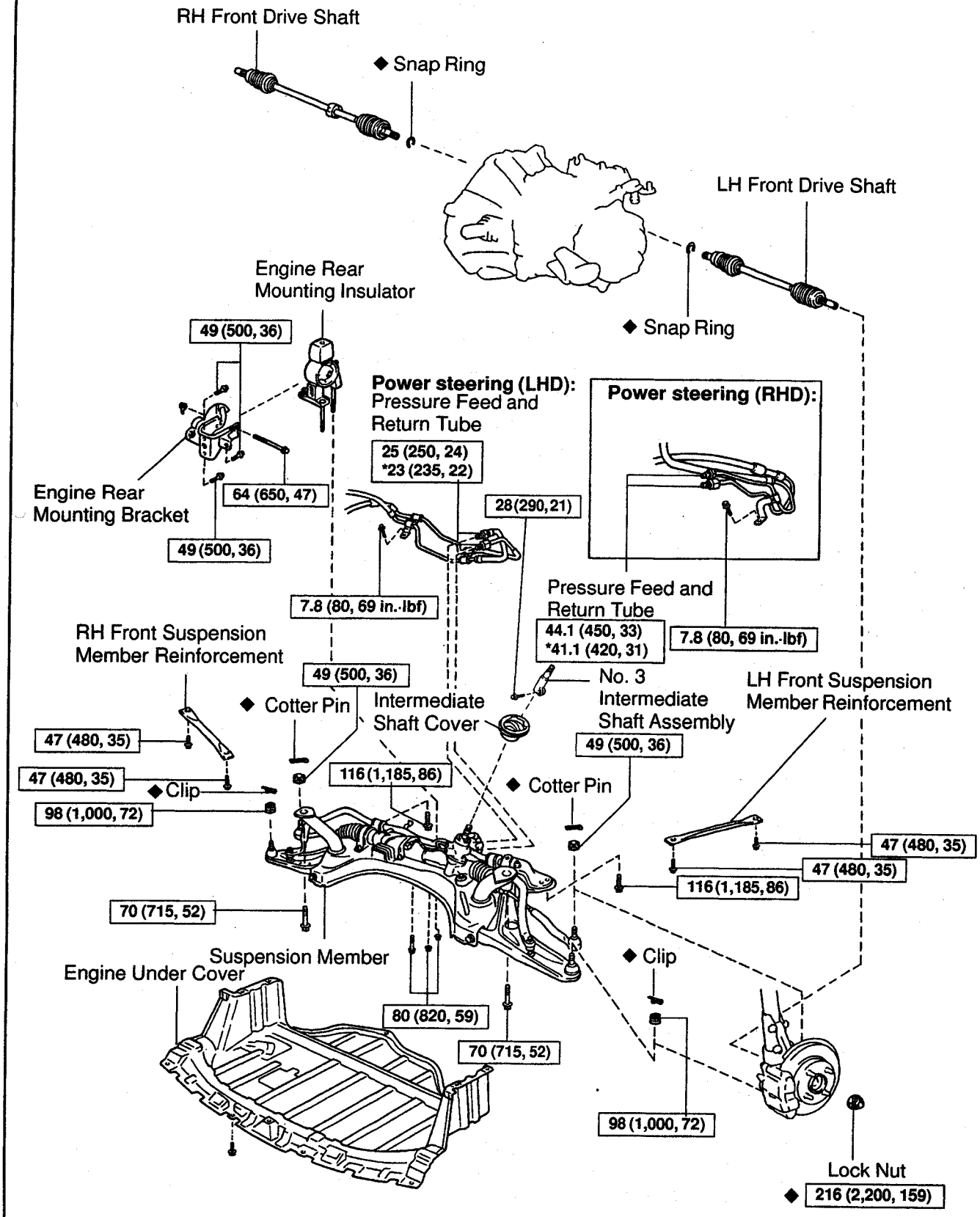


T

N·m (kgf·cm, ft·lbf) : Specified torque

H11717


Hold–Down Clamp
Battery
Tray
Hood
13 (130, 9)
7.5 (76, 66 in.-lbf)
13 (130, 9)
19 (195, 14)
Air Cleaner Case Assembly with Air Hose
Air Cleaner Bracket
Back–Up Light Switch Connector
Speed Sensor Connector
◆ Clip
◆ Clip
◆ Clip
Washer
Control Cable
Control Cable
◆ Clip
33 (340, 25)
33 (340, 25)
x 5
Transaxle
Washer
Engine LH Mounting Bracket
19 (195, 14)
Ground Cable
Starter
Starter Connector
19 (195, 14)
49 (500, 36)
Starter Wire
Clutch Release Cylinder
39 (400, 29)
9.8 (100, 87 in.-lbf)
64 (653, 48)
11.8 (120, 9)
37 (370, 27)
Starter Cover
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
D11783



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
* For use with SST

D11784

MX0ES-01

REMOVAL

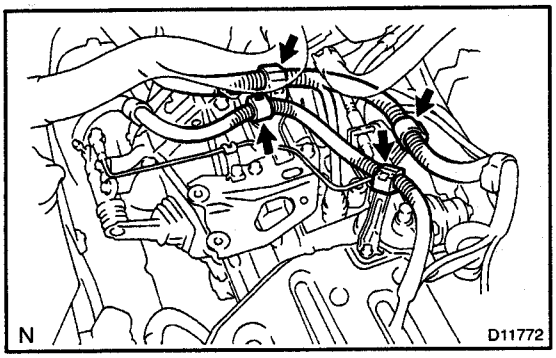
1. **REMOVE HOOD**
   Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

HINT:
At the time of installation, please refer to the following item.
Adjust the hood (See Pub. No. RM685E on page BO–16).

2. **REMOVE RH AND LH WIPER ARMS**
   (See Pub. No. RM685E on page BO–41)

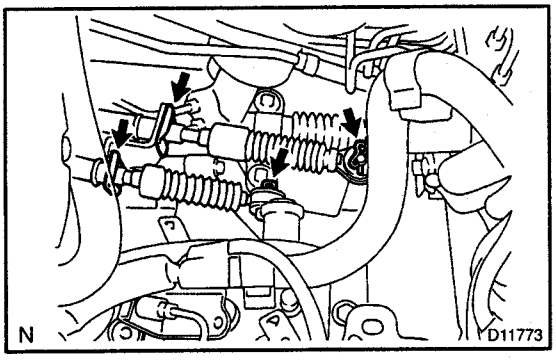
HINT:
At the time of installation, please refer to the following item.
Adjust the installation position of the wiper arms (See Pub. No. RM685E on page BO–44).

3. **REMOVE RH AND LH COWL TOP VENTILATOR LOUVERS AND OUTER FRONT COWL TOP PANEL**
   (See Pub. No. RM685E on page BO–41)
4. **REMOVE BATTERY AND AIR CLEANER CASE ASSEMBLY WITH AIR HOSE**
   Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)
5. **REMOVE ENGINE UNDER COVER**



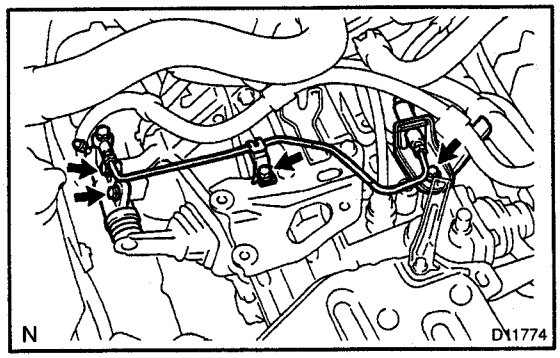
6. **DISCONNECT WIRE HARNESS FROM TRANSAXLE**

Disconnect the 4 wire harness clamps.



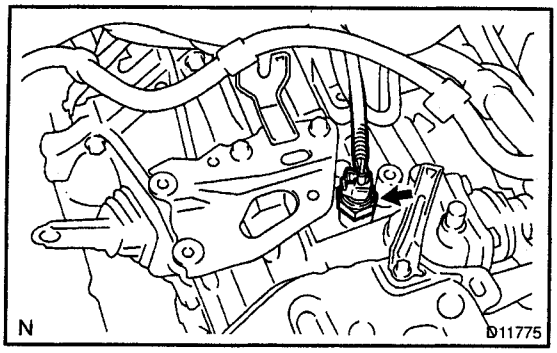
7. **DISCONNECT CONTROL CABLE**

(a) Remove the 2 clips and washers.
(b) Remove the 2 clips and disconnect the control cables from the transaxle.



8. **DISCONNECT CLUTCH RELEASE CYLINDER**

(a) Remove the 2 set bolts and disconnect the clutch line.
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)
(b) Remove the 2 set bolts and disconnect the clutch release cylinder.
Torque: 11.8 N·m (120 kgf·cm, 9 ft·lbf)



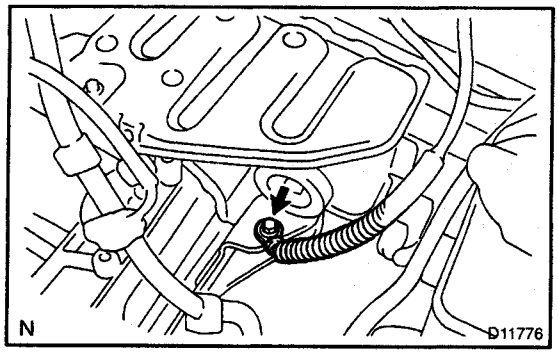
9. DISCONNECT BACK–UP LIGHT SWITCH CONNECTOR

10. DISCONNECT SPEED SENSOR CONNECTOR

11. REMOVE AIR CLEANER BRACKET

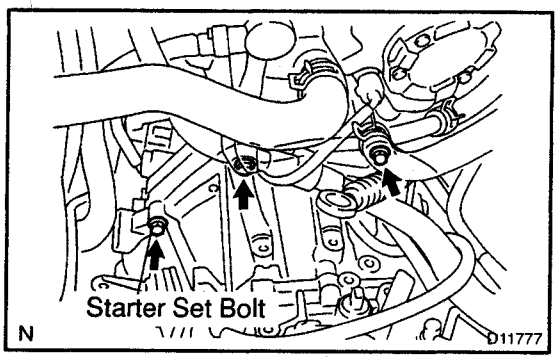
Remove the 2 bolts and remove the air cleaner bracket.

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)



12. DISCONNECT GROUND CABLE

Remove the set bolt and disconnect the ground cable from the engine LH mounting bracket.

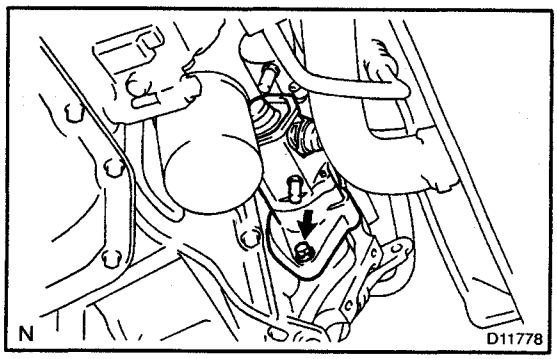


13. REMOVE 2 TRANSAXLE UPPER SIDE MOUNTING BOLTS

Torque: 33 N·m (340 kgf·cm, 25 ft·lbf)

14. REMOVE STARTER SET BOLT

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)



15. REMOVE STARTER

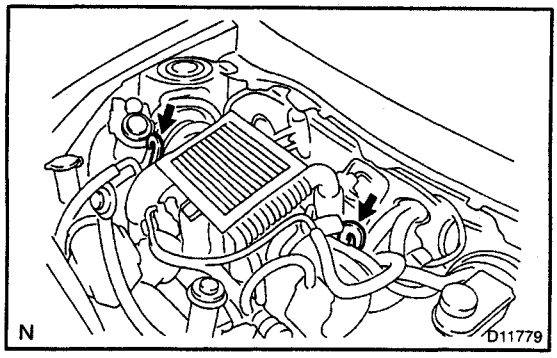
(a) Disconnect the starter connector.

(b) Remove the nut and starter wire.

Torque: 9.8 N·m (100 kgf·cm, 87 in.·lbf)

(c) Remove the bolt, starter cover and starter.

Torque: 37 N·m (370 kgf·cm, 27 ft·lbf)



16. ATTACH ENGINE SLING DEVICE TO ENGINE HANGER

(a) Install the 2 No. 1 engine hangers with the bolts in the correct direction.

Parts No.:

No. 1 engine hanger: 12281–21010

Bolt: 91642–81025

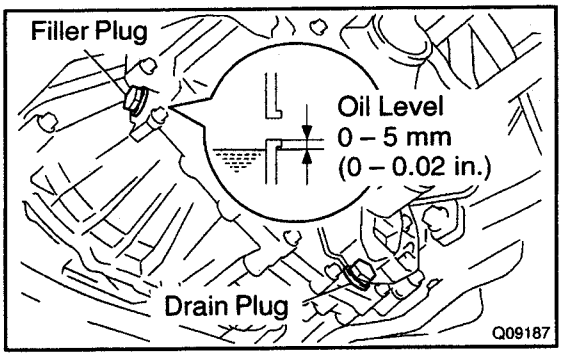
Torque: 40 N·m (408 kgf·cm, 29 ft·lbf)

(b) Attach the engine chain hoist to the engine hangers.

CAUTION:
Do not attempt to hang the engine by hooking the chain to any other part.

17. RAISE VEHICLE

CAUTION:
Make sure that the vehicle is securely supported.



18. DRAIN TRANSAXLE OIL
Oil grade: API GL–4 or GL–5
Viscosity: SAE 75 W–90
Capacity: 1.9 liters (2.0 US qts, 1.7 Imp. qts)
Torque: 39.2 N·m (400 kgf·cm, 29 ft·lbf)

19. REMOVE RH AND LH FRONT DRIVE SHAFTS
(See Pub. No. RM737E on page SA–8)

20. REMOVE SUSPENSION MEMBER

(a) Remove the 2 set nuts and bolt of the engine rear mounting insulator from the suspension member (See Pub. No. RM737E on page SA–17).

(b) Disconnect the sliding yoke (See Pub. No. RM737E on page SR–7).

(c) Power steering:
Disconnect the pressure feed and return tubes (See Pub. No. RM737E on page SR–31).

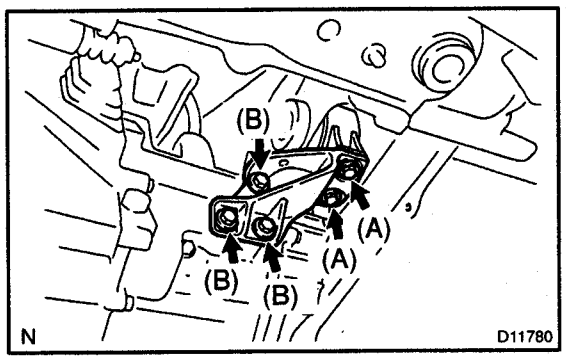
(d) Power steering:
Disconnect the tube clamp (See Pub. No. RM737E on page SR–31).

(e) Remove the 4 bolts, RH and LH front suspension member reinforcements.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

(f) Remove the suspension member (See Pub. No. RM737E on page SR–31).

21. JACK UP TRANSAXLE SLIGHTLY

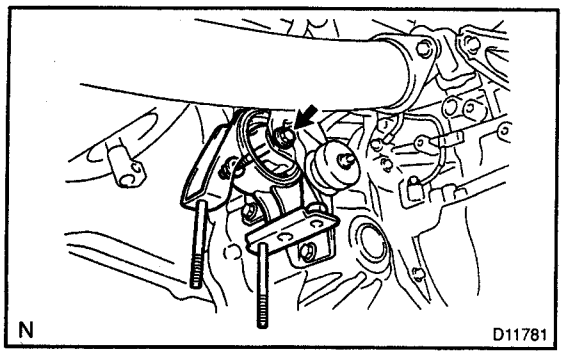
Using a transmission jack, support the transaxle.



22. DISCONNECT ENGINE LH MOUNTING BRACKET FROM ENGINE LH MOUNTING INSULATOR

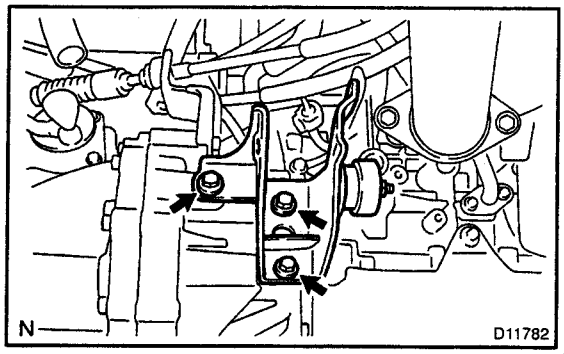
Remove the 5 bolts and enjgin LH mounting bracket from the LH mounting insulater.

Torque:
Bolt(A):49 N·m (500 kgf·cm, 36 ft·lbf)
Bolt(B):64 N·m (653 kgf·cm, 48 ft·lbf)

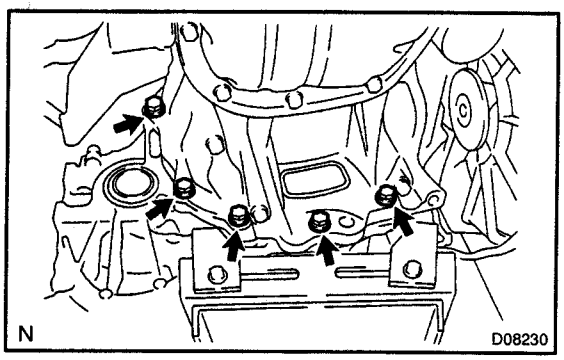


23. REMOVE ENGINE REAR MOUNTING INSULATOR AND BRACKET

(a) Remove the bolt, nut and engine rear mounting insulator.
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)



(b) Remove the 3 bolts and engine rear mounting bracket.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



24. REMOVE 5 TRANSAXLE LOWER SIDE MOUNTING BOLTS
Torque: 33 N·m (340 kgf·cm, 25 ft·lbf)

25. REMOVE TRANSAXLE

Lower the engine left side and remove the transaxle from the engine.

HINT:

At the time of installation, please refer to the following items.

- Align the input shaft with the clutch disc and install the transaxle to the engine.
- Temporarily tighten the transaxle mounting bolts.

M

MX09H–06

INSTALLATION

Installation is in the reverse order of removal (See page MX–4).

HINT:

After installation, check and inspect items as follows.

- Front wheel alignment.
- Do the road test.

SUSPENSION AND AXLE

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

NOTE: The above pages contain only the points which differ from the above listed manuals.

TIRE AND WHEEL

INSPECTION

SA0CC-15

1. INSPECT TIRE

(a) Check the tires for wear and proper inflation pressure.

Cold tire inflation pressure
(EUROPE DIESEL):
Vehicle load up to 2 passengers

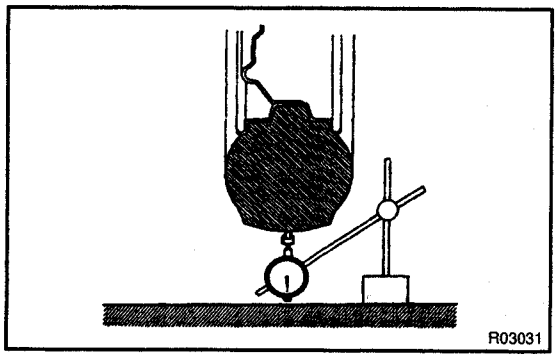
Vehicle speed	Front kPa (kgf/cm², psi)	Rear kPa (kgf/cm², psi)
Vehicle speed is not concerned	230 (2.3, 33)	210 (2.1, 30)

Vehicle load up to 5 passengers
155/ 80R 13:

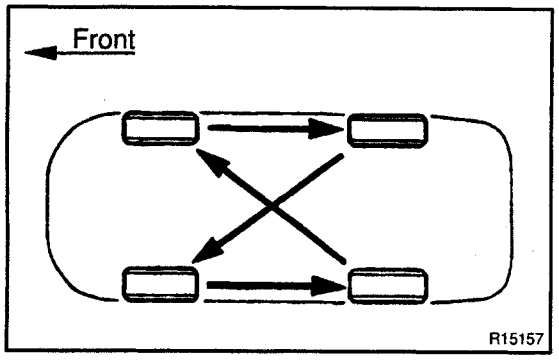
Vehicle speed	Front kPa (kgf/cm², psi)	Rear kPa (kgf/cm², psi)
Under 160 km/h (100 mph)	230 (2.3, 33)	210 (2.1, 30)
160 km/h (100 mph) or over	230 (2.3, 33)	230 (2.3, 33)

175/ 65R 14:

Vehicle speed	Front kPa (kgf/cm², psi)	Rear kPa (kgf/cm², psi)
Under 160 km/h (100 mph)	230 (2.3, 33)	210 (2.1, 30)
160 km/h (100 mph) or over	230 (2.3, 33)	220 (2.2, 32)

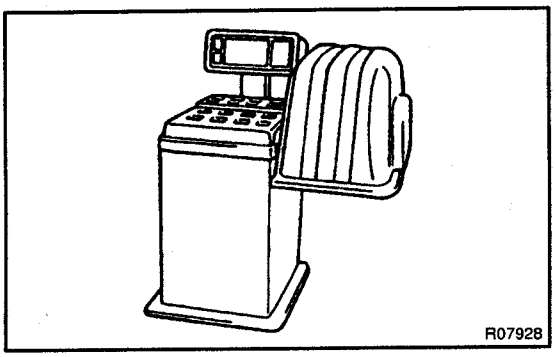


(b) Using a dial indicator, check the tire runout.
Tire runout: 1.0 mm (0.039 in.) or less



2. ROTATING TIRES

HINT:
See the illustration for where to rotate each tire.

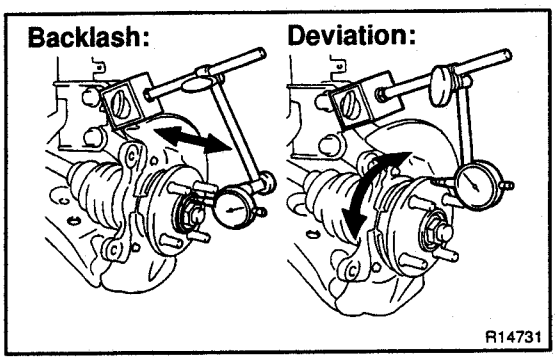


3. INSPECT WHEEL BALANCE

(a) Check and adjust the Off–the–car balance.

(b) If necessary, check and adjust the On–the–car balance.

Imbalance after adjustment: 8.0 g (0.018 lb) or less



4. CHECK WHEEL BEARING LOOSENESS

(a) Using a dial indicator, check the backlash near the center of the axle hub.

Maximum: 0.05 mm (0.0020 in.)

If the backlash exceeds the maximum, replace the bearing.

(b) Using a dial indicator, check the deviation at the surface of the axle hub outside the hub bolt.

Maximum: 0.07 mm (0.0028 in.)

If the deviation exceeds the maximum, replace the axle hub.

5. CHECK FRONT SUSPENSION FOR LOOSENESS

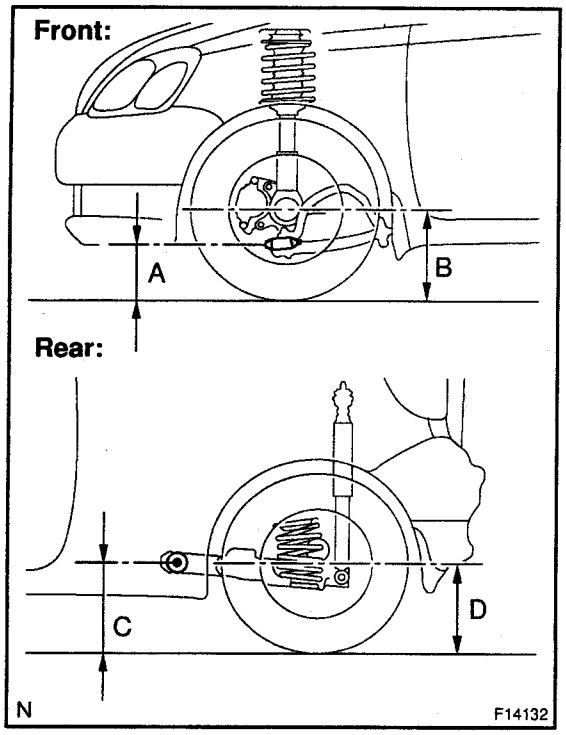
6. CHECK STEERING LINKAGE FOR LOOSENESS

7. CHECK BALL JOINT FOR LOOSENESS

8. CHECK SHOCK ABSORBER WORKS PROPERLY

- Check if oil leaks
- Check mounting bushings for wear
- Bounce front and rear of the vehicle

SA



FRONT WHEEL ALIGNMENT

SA1CK–15

INSPECTION

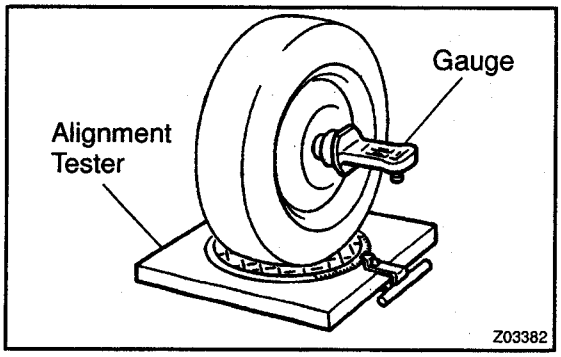
1. MEASURE VEHICLE HEIGHT

Vehicle height:
(EUROPE DIESEL):

Front vehicle height	Rear vehicle height
85 mm (3.35 in.)	9 mm (0.35 in.)

Measuring points:
A: Ground clearance of the front lower suspension arm mounting bolt center.
B: Ground clearance of the front wheel center
C: Ground clearance of the rear axle beam mounting bolt center
D: Ground clearance of the rear wheel center
Vehicle height:
Front: B – A
Rear: D – C

NOTICE:
Before inspecting the wheel alignment, adjust the vehicle height to the specified value.
If the vehicle height is not the specified value, try to adjust it by pushing down on or lifting the body.



2. INSTALL CAMBER–CASTER–KINGPIN GAUGE OR POSITION VEHICLE ON WHEEL ALIGNMENT TESTER

Follow the specific instructions of the equipment manufacturer.

3. INSPECT CAMBER, CASTER AND STEERING AXIS INCLINATION

Camber, caster and steering axis inclination:
(EUROPE DIESEL):

Camber		–0°35' ± 45' (–0.58° ± 0.75°)
	Right–left error	45' (0.75°) or less
Caster		
	Manual steering	0°34' ± 45' (0.57° ± 0.75°)
	Power steering	1°33' ± 45' (1.55° ± 0.75°)
	Right–left error	45' (0.75°) or less
Steering axis inclination		10°04' ± 45' (10.07° ± 0.75°)
	Right–left error	45' (0.75°) or less

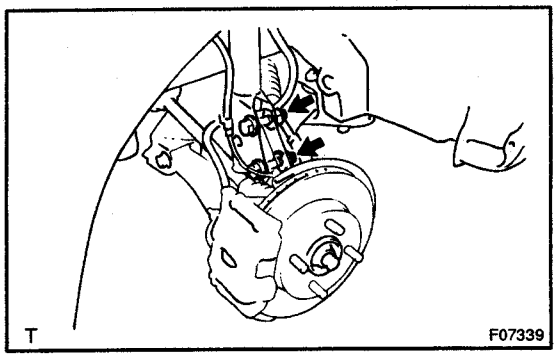
If the caster and steering axis inclination are not within the specified values, after the camber has been correctly adjusted, recheck the suspension parts for damaged and/or worn out parts.

4. ADJUST CAMBER

NOTICE:

After the camber has been adjusted, inspect the toe–in.

(a) Remove the front wheel.

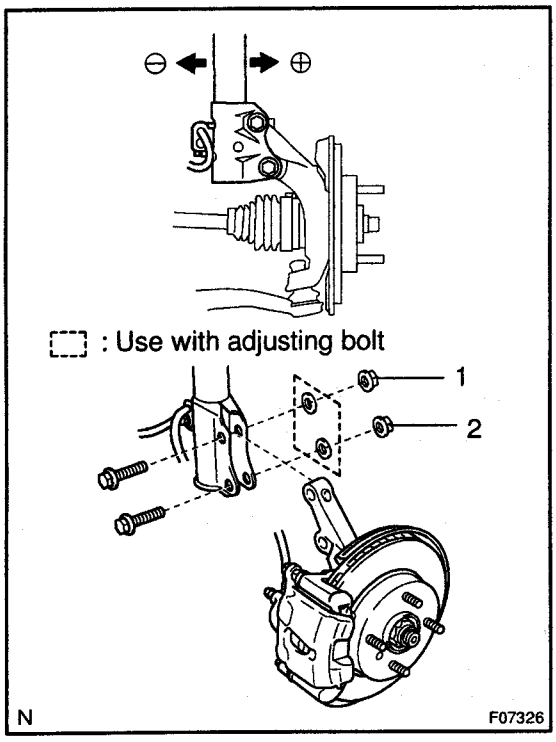


(b) Remove the 2 nuts on the lower side of the shock absorber.

If reusing the bolts and/or nuts, coat the threads of nuts with engine oil.

(c) Clean the installation surfaces of the shock absorber and the steering knuckle.

(d) Temporarily install the 2 nuts.



(e) Adjust the camber by pushing or pulling the lower side of the shock absorber in the direction in which the camber adjustment is required.

(f) Tighten the nuts.

Torque: 132 N·m (1,350 kgf·cm, 97 ft·lbf)

(g) Install the front wheel.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

(h) Check the camber.

HINT:

- Try to adjust the camber to the center of the specified value.
- Adjusting value for the set bolts is 6' – 30' (0.1° – 0.5°).

If the camber is not within the specified value, using the following table, estimate how much additional camber adjustment will be required, and select the camber adjusting bolt.

NOTICE:

Tighten the adjusting bolt with a washer and a new nut.

Bolt / Adjusting Value	Set Bolt		Adjusting Bolt			
	90105–14140		90105–14146		90105–14147	
			1 Dot 		2 Dots 	
	1	2	1	2	1	2
15'	●			●		
30'	●					●
45'			●			●
1°00'			●		●	●

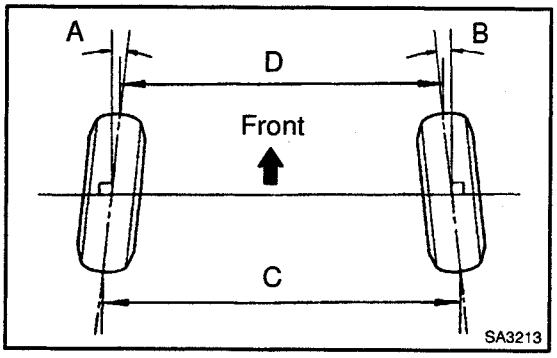
N

F07372

(i) Do the steps mentioned above again. At step (b), replace 1 or 2 selected bolts.

HINT:

When replacing the 2 bolts, replace 1 bolt for each time.



5. INSPECT TOE–IN

Toe–in:

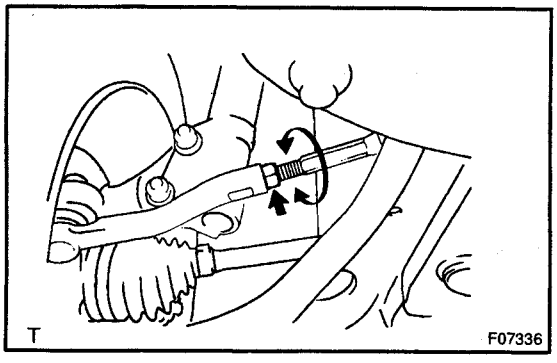
(EUROPE DIESEL):

Toe–in (total)	A + B: 0° ± 12' (0° ± 0.2°) C – D: 0 ± 2 mm (0 ± 0.08 in.)

If the toe–in is not within the specified value, adjust it at the rack ends.

6. ADJUST TOE–IN

(a) Remove the rack boot set clips.

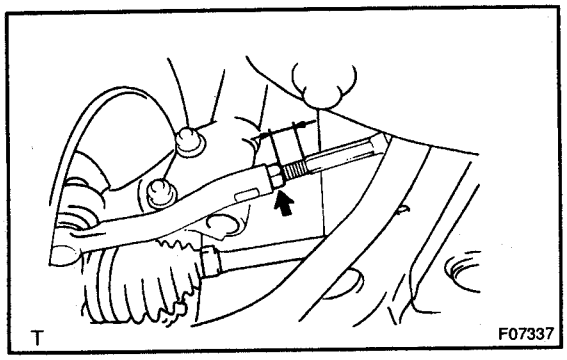


(b) Loosen the tie rod end lock nuts.

(c) Turn the right and left rack ends by an equal amount to adjust the toe–in.

HINT:

Try to adjust the toe–in to the center of the specified value.

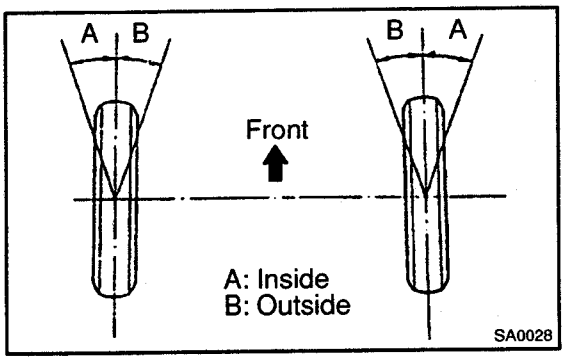


(d) Make sure that the lengths of the right and left rack ends are the same.
Rack end length difference: 1.5 mm (0.059 in.) or less

(e) Torque the tie rod end lock nuts.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

(f) Place the boots on the seats and install the clips.

HINT:
Make sure that the boots are not twisted.



7. INSPECT WHEEL ANGLE

Turn the steering wheel fully and measure the turning angle.

Wheel turning angle:
(EUROPE DIESEL):

	Manual steering	Power steering
Inside wheel	36°59' ± 2° (36.98° ± 2°)	36°59' ± 2° (36.98° ± 2°)
Outside wheel: Reference	32°10' (32.17°)	32°20' (32.28°)

If the right and left inside wheel angles differ from the specified value, check the right and left rack end lengths.

SA

REAR WHEEL ALIGNMENT

SA0OR-09

INSPECTION

1. MEASURE VEHICLE HEIGHT (See page SA–3)

NOTICE:

Before inspecting the wheel alignment, adjust the vehicle height to the specified value.

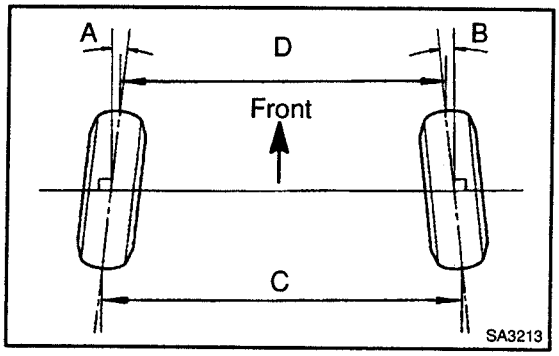
2. INSPECT CAMBER

Camber:

(EUROPE DIESEL):

Camber	–0°56' ± 25' (–0.93° ± 0.42°)
Right–left error	30' (0.5°) or less

If the measured value is not within the specified value, inspect the suspension parts for damage and/or wear and replace them if necessary because camber is not adjustable.



3. INSPECT TOE–IN

Toe–in:

(EUROPE DIESEL):

Toe–in (total)	A + B: 0°19' ± 15' (0.32° ± 0.25°) C – D: 2.9 ± 2.3 mm (0.11 ± 0.09 in.)

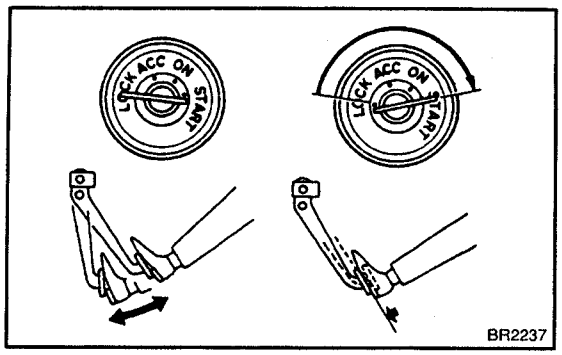
If the toe–in is not within the specified value, inspect and replace the suspension parts as necessary.

BRAKE

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

NOTE: The above pages contain only the points which differ from the above listed manuals.



BRAKE BOOSTER ASSEMBLY (1ND–TV)

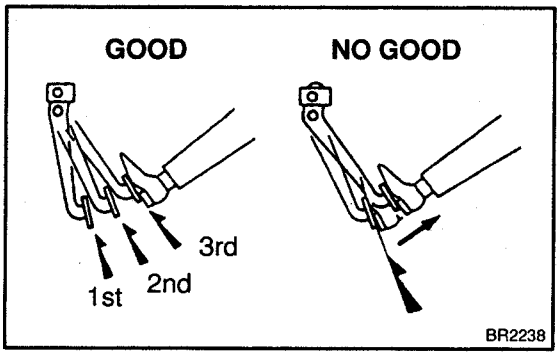
ON–VEHICLE INSPECTION

BR1RL-01

1. OPERATING CHECK

(a) Depress the brake pedal several times with the engine off and check that there is no change in the pedal reserve distance.

(b) Depress the brake pedal and start the engine. If the pedal goes down slightly, operation is normal.



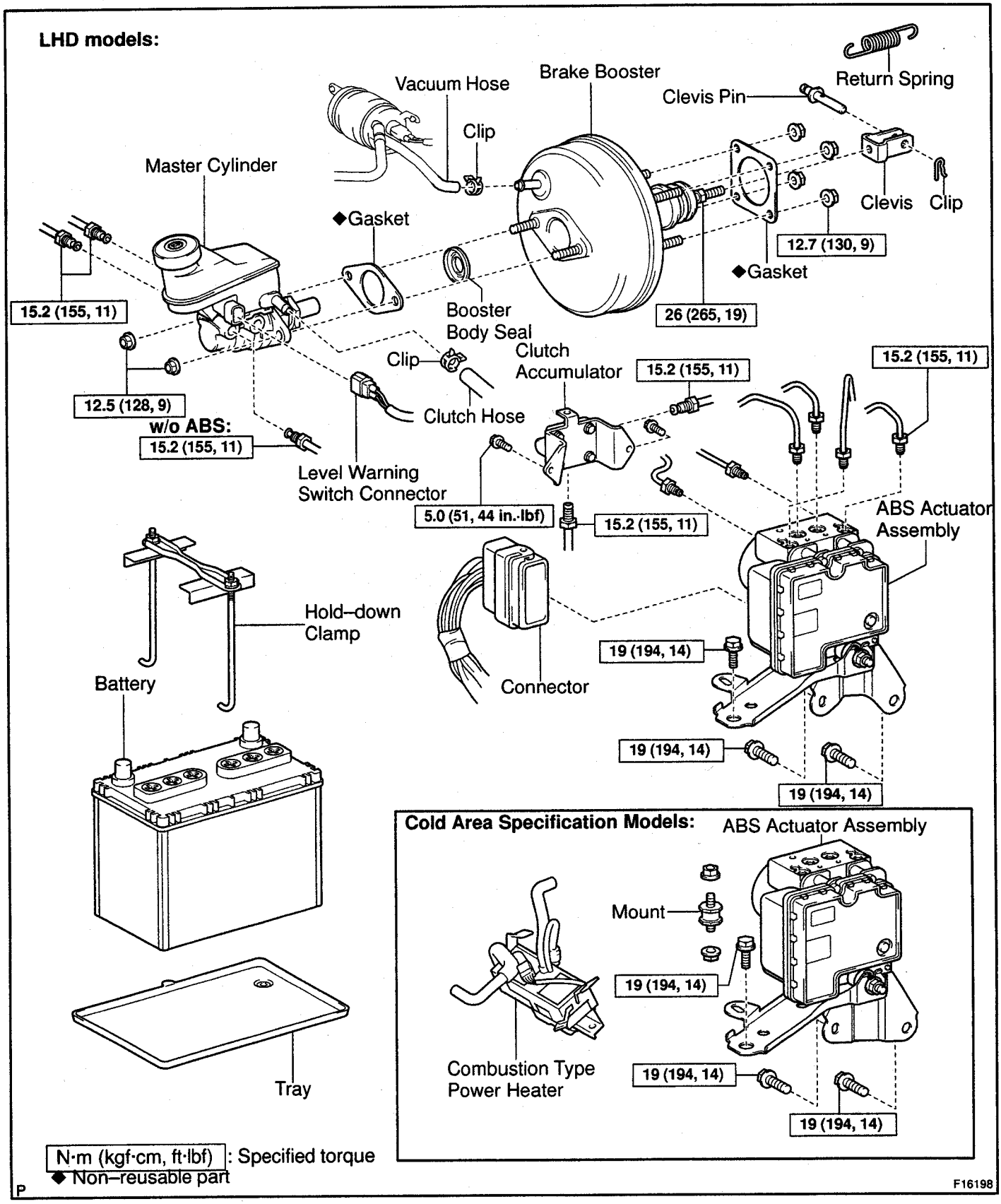
2. AIR TIGHTNESS CHECK

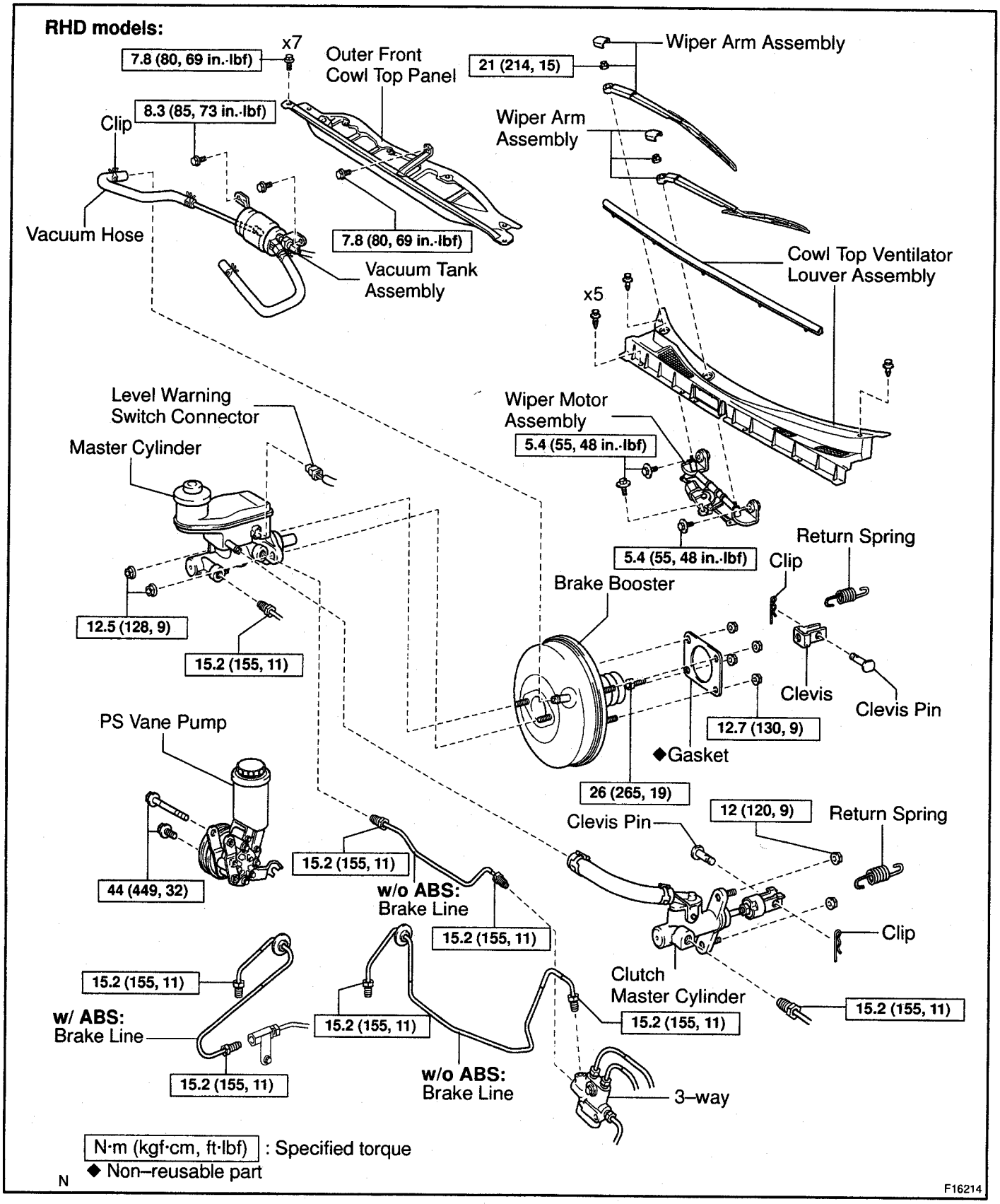
(a) Start the engine and stop it after 1 or 2 minutes. Depress the brake pedal several times slowly.

If the pedal goes down farthest the 1st time, but gradually rises after the 2nd or 3rd time, the booster is air tight.

(b) Depress the brake pedal while the engine is running, and stop the engine with the pedal depressed. If there is no change in the pedal reserve travel after holding the pedal for 30 seconds, the booster is air tight.

COMPONENTS


LHD models:
Vacuum Hose
Brake Booster
Return Spring
Clevis Pin
Clip
Master Cylinder
Clevis
Clip
◆Gasket
12.7 (130, 9)
◆Gasket
15.2 (155, 11)
Booster Body Seal
26 (265, 19)
Clip
Clutch Accumulator
15.2 (155, 11)
15.2 (155, 11)
12.5 (128, 9)
Clutch Hose
w/o ABS:
15.2 (155, 11)
Level Warning Switch Connector
5.0 (51, 44 in.-lbf)
15.2 (155, 11)
ABS Actuator Assembly
Hold–down Clamp
Battery
19 (194, 14)
Connector
19 (194, 14)
19 (194, 14)
Cold Area Specification Models:
ABS Actuator Assembly
Mount
19 (194, 14)
Combustion Type Power Heater
19 (194, 14)
19 (194, 14)
Tray
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non–reusable part
P
F16198


RHD models:
7.8 (80, 69 in.·lbf)
x7
Outer Front Cowl Top Panel
21 (214, 15)
Wiper Arm Assembly
Clip
8.3 (85, 73 in.·lbf)
Wiper Arm Assembly
Vacuum Hose
7.8 (80, 69 in.·lbf)
Vacuum Tank Assembly
Cowl Top Ventilator Louver Assembly
x5
Level Warning Switch Connector
Master Cylinder
Wiper Motor Assembly
5.4 (55, 48 in.·lbf)
5.4 (55, 48 in.·lbf)
Return Spring
Clip
Brake Booster
12.5 (128, 9)
15.2 (155, 11)
Clevis
Clevis Pin
12.7 (130, 9)
◆Gasket
PS Vane Pump
26 (265, 19)
12 (120, 9)
Return Spring
Clevis Pin
15.2 (155, 11)
44 (449, 32)
w/o ABS:
Brake Line
15.2 (155, 11)
Clip
Clutch Master Cylinder
15.2 (155, 11)
15.2 (155, 11)
w/ ABS:
Brake Line
15.2 (155, 11)
15.2 (155, 11)
w/o ABS:
Brake Line
3–way
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
N
F16214

BR1RN-01

REMOVAL

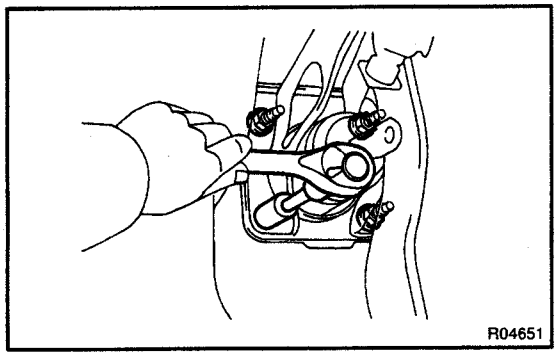
1. **REMOVE MASTER CYLINDER (See Pub. No. RM685E on page BR-11, BR-15)**
2. **LHD:**
   REMOVE BRAKE BOOSTER

(a) Cold Area Specification models:
Remove the combustion type power heater (See page AC-15).

(b) Remove the ABS actuator assembly (See page BR-24).

(c) Disconnect the vacuum hose from the brake booster.

(d) Remove the booster body seal from the brake booster.



(e) Remove the brake booster.
   (1) Remove the return spring.
   (2) Remove the clip and clevis pin.
   (3) Remove the 4 installation nuts and clevis.
   (4) Pull out the brake booster and remove the gasket.

3. **RHD:**
   REMOVE BRAKE BOOSTER

(a) Remove 2 bolts and the vacuum tank assembly.

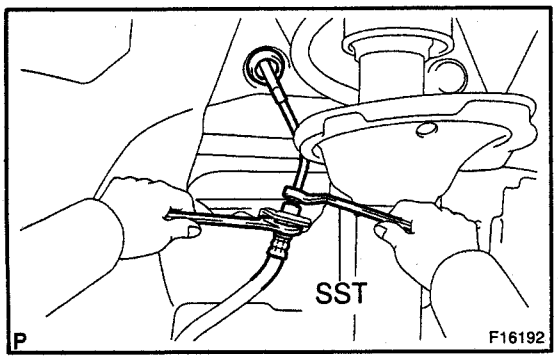
(b) Remove the wiper arm assembly (See Pub. No. RM685E on page BO-41).

(c) Remove the cowl top ventilator louver assembly (See Pub. No. RM685E on page BO-41).

(d) Remove the wiper motor assembly (See Pub. No. RM685E on page BO-41).

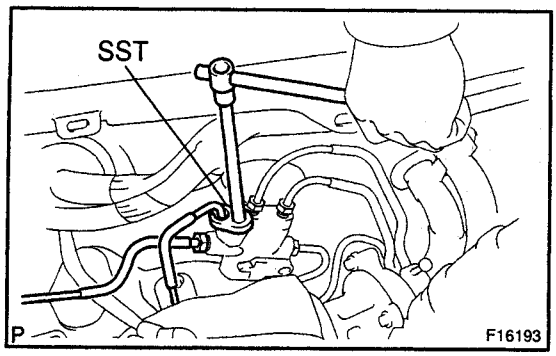
(e) Remove the outer front cowl top panel (See Pub. No. RM685E on page BO-41).

(f) Remove the 2 bolts of PS vane pump, and move PS vane pump aside (See page SR-15).

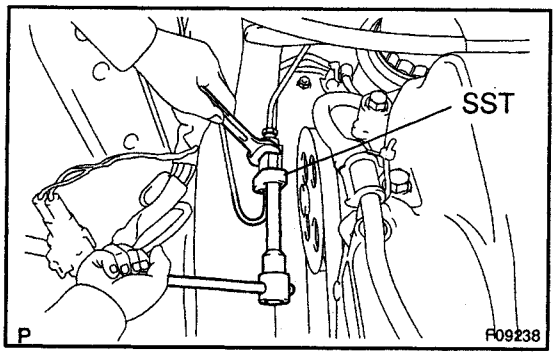


(g) Remove the brake line.
   (1) Using a SST and spanner, disconnect the brake line from the flexible hose.

SST 09751-36011



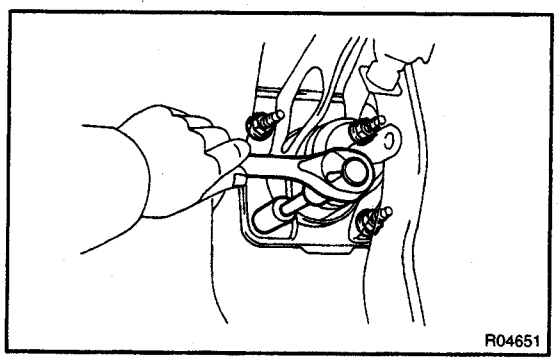
(2) w/o ABS:
Using a SST, remove the 2 brake lines from the 3–way.
SST 09023–00100



(3) w/ ABS:
Using a SST and spanner, remove the brake line.
SST 09023–00100

(h) Remove the clutch master cylinder (See Pub. No. RM685E on page CL–5).

(i) Disconnect the vacuum hose from the brake booster.



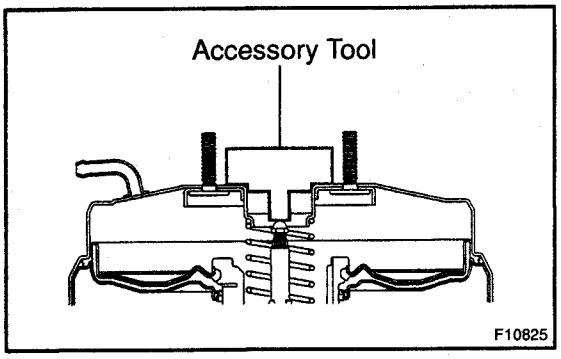
(j) Remove the brake booster.
(1) Remove the return spring.
(2) Remove the clip and clevis pin.
(3) Remove the 4 installation nuts and clevis
(4) Pull out the brake booster and remove the gasket.

BR1RO-01

INSTALLATION

1. **LHD:**
   INSTALL BRAKE BOOSTER

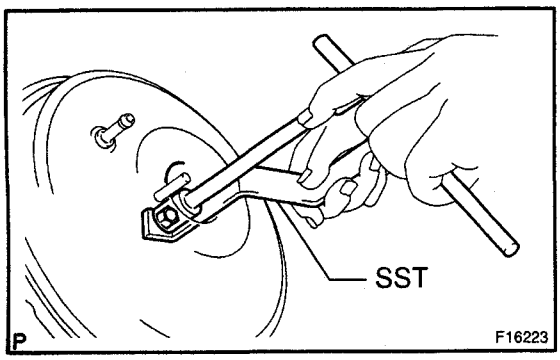
(a) Install the brake booster.
   (1) Install the booster and a new gasket.
   (2) Install and torque the 4 installation nuts.
   Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)
   (3) Install the clevis, and torque the lock nut.
   Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)
   (4) Insert the clevis pin into the clevis and brake pedal, and install the clip to the clevis pin and install the return spring.



(b) When replacing the brake master cylinder only:
Adjust the length of brake booster push rod.
   (1) Apply chalk to the tip of an accessory tool.

HINT:
An accessory tool is enclosed with new master cylinder.
   (2) Place the accessory tool to the brake booster.
   (3) Measure the clearance between the brake booster push rod and accessory tool.
   Clearance: 0 mm (0 in.)

HINT:
Adjust the clearance in following cases:
- If there is a clearance between the accessory tool and the shell of the booster (floating accessory tool), the clearance is small.
- If the chalk does not stick on the tip of the push rod, the clearance is large.



   (4) If the clearance is out of the specified range, fix the push rod using SST and adjust the length of the protruding adjusting bolt.
   SST 09737–00020

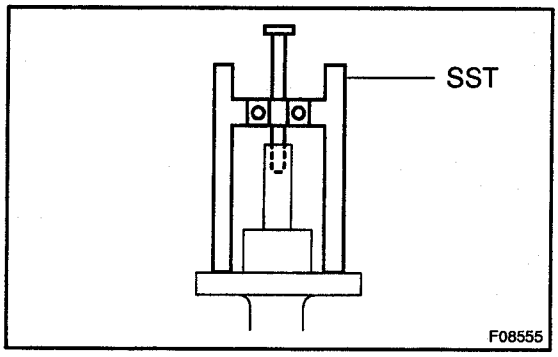
HINT:
When adjusting the push rod, depress the brake pedal sufficiently so that the push rod sticks out.

(c) Connect the vacuum hose to the brake booster.
(d) Install the ABS actuator assembly (See page BR–25).
(e) Cold Area specification models:
Install the combustion type power heater (See page AC–24).

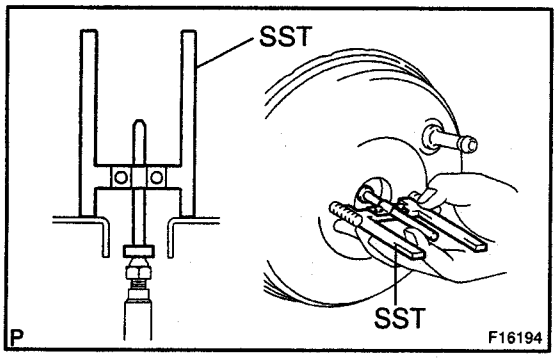
2. RHD:

INSTALL BRAKE BOOSTER

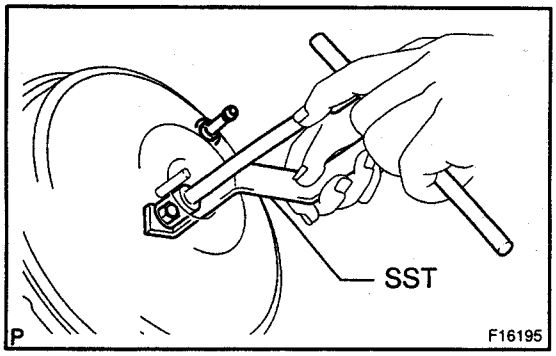
(a) Install the brake booster.
(1) Install the booster and a new gasket.
(2) Install and torque the 4 installation nuts.
Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)
(3) Install the clevis, and torque the lock nut.
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)
(4) Insert the clevis pin into the clevis and brake pedal, and install the clip to the clevis pin and install the return spring.



(b) Adjust the length of brake booster push rod.
(1) Set the SST on the master cylinder, and lower the pin until its tip slightly touches the piston.
SST 09737–00012



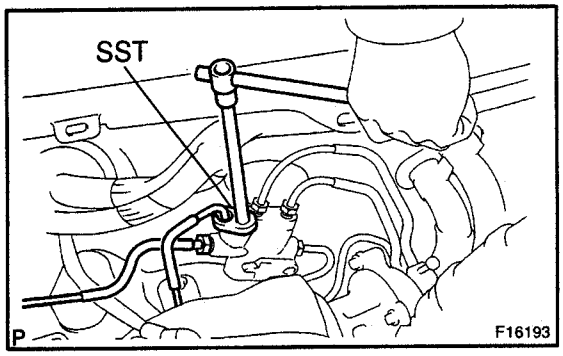
(2) Turn the SST upside down, and set it on the booster.
SST 09737–00012
(3) Measure the clearance between the brake booster push rod and pin head.
Clearance: 0 mm (0 in.)



(4) If the clearance is out of the specified range, fix the push rod using SST and adjust the length of the protruding adjusting bolt.
SST 09737–00020

HINT:
When adjusting the push rod, depress the brake pedal sufficiently so that the push rod sticks out.

(c) Connect the vacuum hose to the brake booster.
(d) Install the clutch master cylinder (See Pub. No. RM685E on page CL–8).



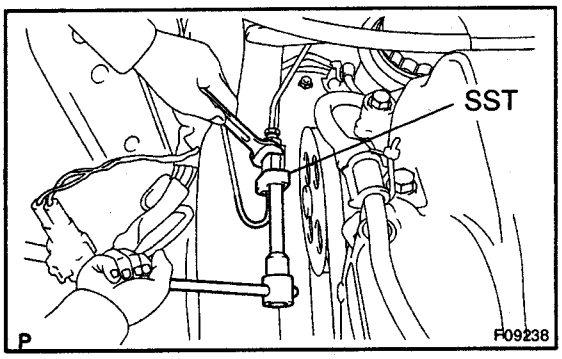
(e) Install the brake line.

(1) w/o ABS:

Using a SST, connect the 2 brake lines to the 3–way.

SST 09023–00100

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)

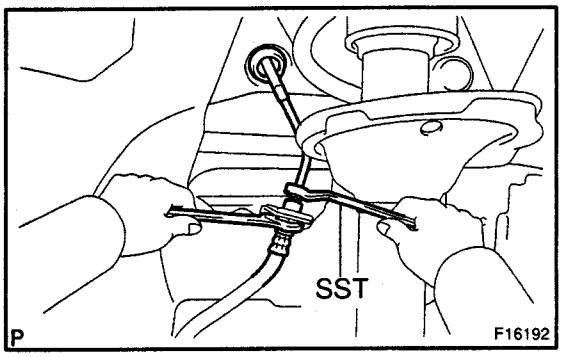


(2) w/ ABS:

Using a SST and spanner, connect the brake line.

SST 09023–00100

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)



(3) Using a SST and spanner, install the brake line to the flexible hose.

SST 09751–36011

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)

(f) Install the PS vane pump (See page SR–23).

(g) Install the outer front cowl top panel (See Pub. No. RM685E on page BO–44).

(h) Install the wiper motor assembly (See Pub. No. RM685E on page BO–44).

(i) Install the cowl top ventilator louver assembly (See Pub. No. RM685E on page BO–44).

(j) Install the wiper arm assembly (See Pub. No. RM685E on page BO–44).

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

(k) Install the vacuum tank assembly.

Torque: 8.3 N·m (85 kgf·cm, 73 in.·lbf)

3. INSTALL MASTER CYLINDER (See Pub. No. RM685E on page BR–12, BR–20)

(a) LHD:

Install the 2 nuts and brake master cylinder.

HINT:

When installing the master cylinder, insert the booster body seal into the master cylinder piston, and install the master cylinder to the brake booster.

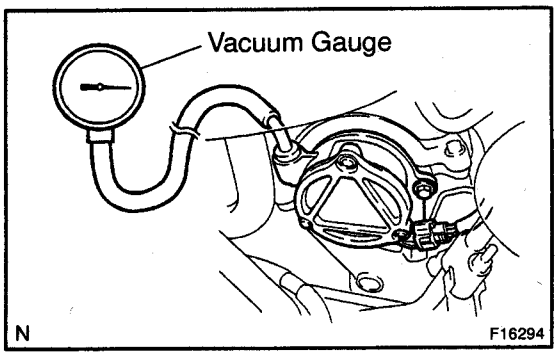
(b) RHD:

Install the 2 nuts and brake master cylinder.

4. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM (See Pub. No. RM685E on page BR–4)

BR

5. RHD:
   BLEED CLUTCH SYSTEM
6. CHECK FOR LEAKS
7. CHECK AND ADJUST BRAKE PEDAL (See Pub. No. RM685E on page BR–6)
8. RHD:
   CHECK AND ADJUST CLUTCH PEDAL (See page CL–1)
9. PERFORM OPERATIONAL CHECK (See page BR–1)



VACUUM PUMP

BR1RP-01

ON–VEHICLE INSPECTION

OPERATIONING CHECK

(a) Disconnect the vacuum hose and connect the vacuum gauge to the vacuum pump.
(b) Start the engine.
(c) Measure the vacuum with the engine at idle.
Vacuum at standard (sea–level) atmospheric pressure (1,013 mbar) when 2 minutes or more has elapsed after engine is started:
More than 86 kpa (650 mmHg)

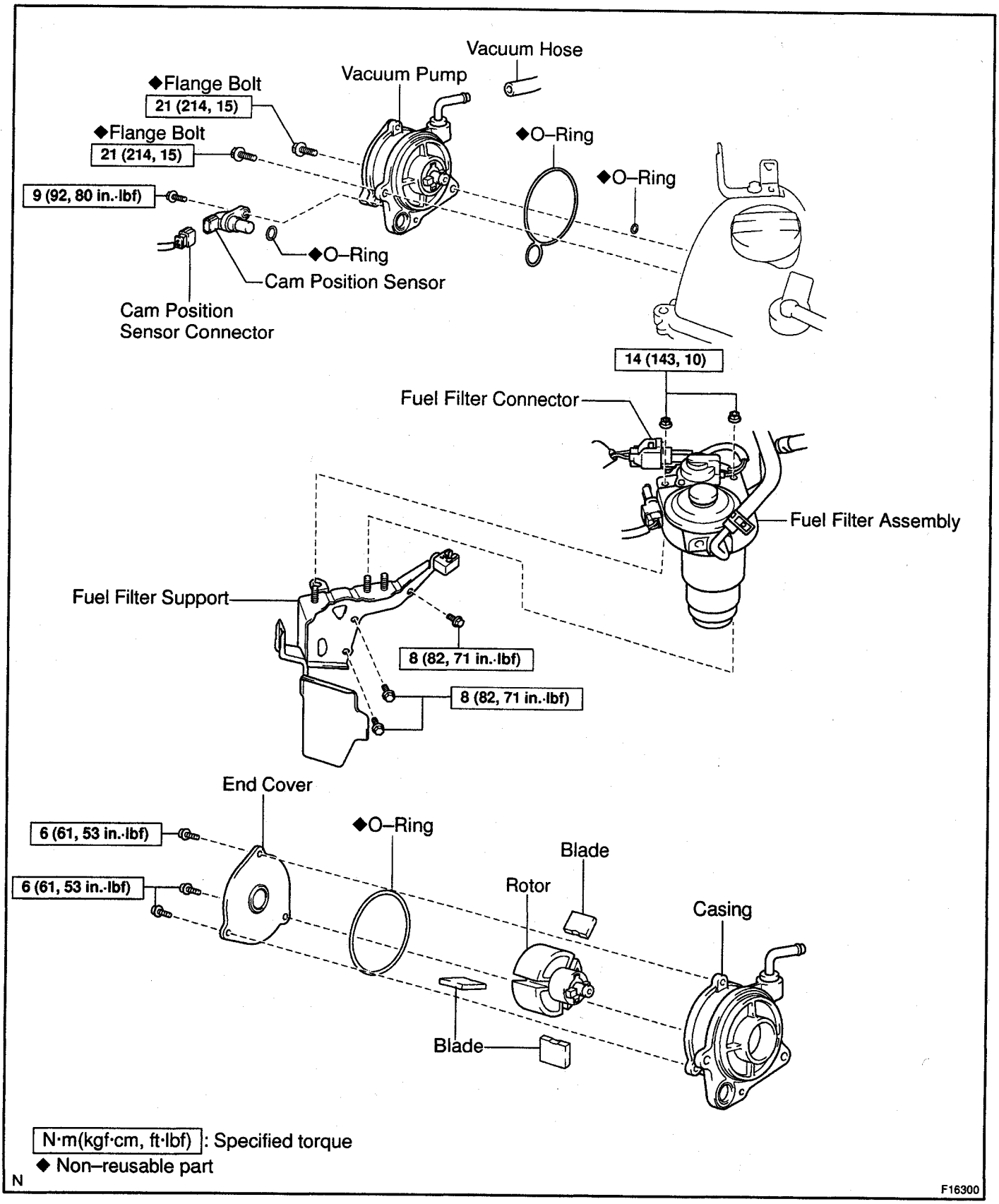
If necessary, replace the vacuum pump assembly.

HINT:

For maintenance (every 200,000 km (124,000 miles) or 10 years), make sure to inspect the rotor, blades, casing and end cover even if the vacuum is more than 86 kpa (650 mmHg).

COMPONENTS

BR1RQ-01



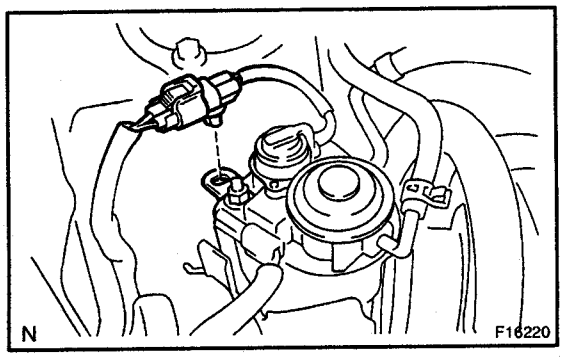
N·m(kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

N

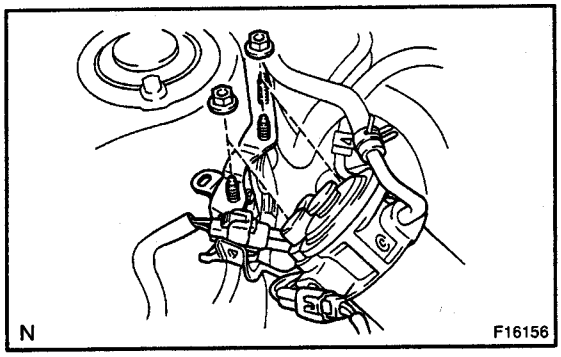
F16300

BR1RR–01

REMOVAL



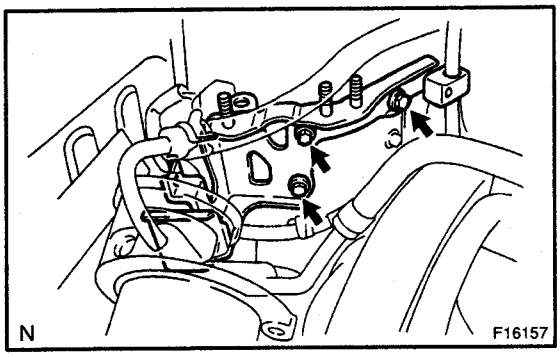
1. DISCONNECT FUEL FILTER CONNECTOR FROM BRACKET



2. REMOVE FUEL FILTER ASSEMBLY

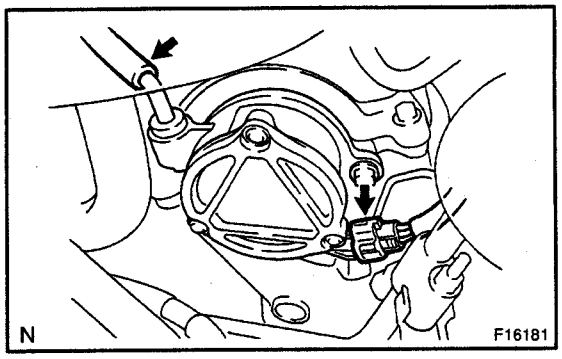
(a) Remove the 2 nuts.

(b) Raise the fuel filter assembly and slide it.



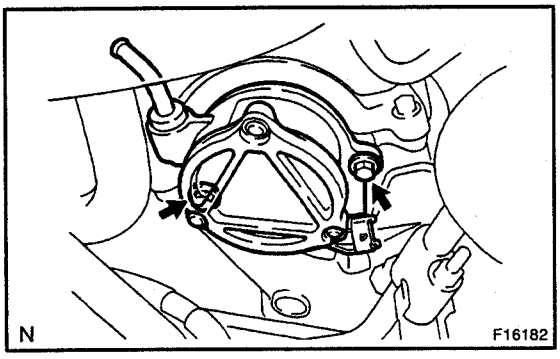
3. REMOVE FUEL FILTER SUPPORT

Remove the 3 bolts and fuel filter support.



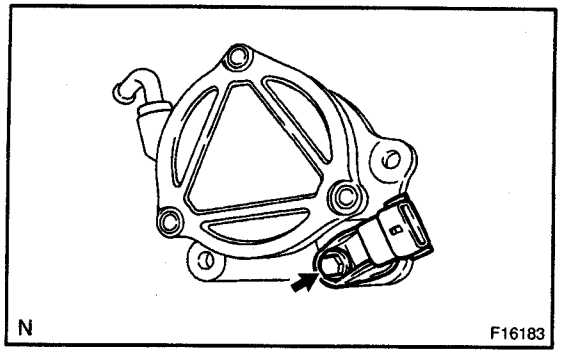
4. REMOVE VACUUM PUMP ASSEMBLY

(a) Disconnect the vacuum hose and cam position sensor connector.



(b) Remove the 2 bolts and vacuum pump.

(c) Remove the 2 O–rings from the vacuum pump.

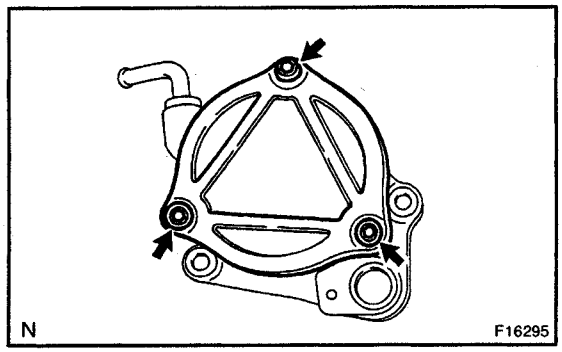


5. REMOVE CAM POSITION SENSOR

Remove a bolt, cam position sensor and O–ring from the vacuum pump.

BR1RS-01

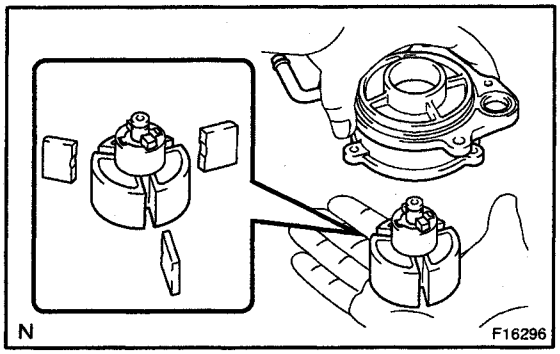
DISASSEMBLY



1. REMOVE END COVER

(a) Using a hexagon wrench (4 mm), remove the 3 screws and end cover.

(b) Using a screw driver, remove the O–ring from the casing.



2. REMOVE ROTOR AND 3 BLADES

NOTICE:

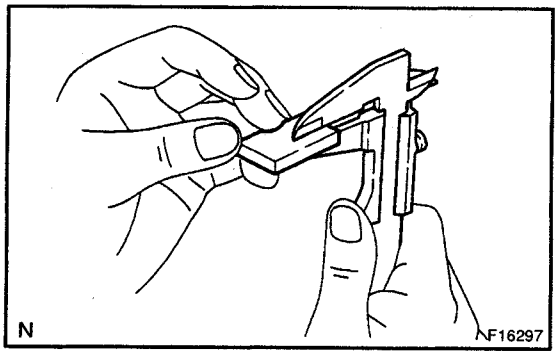
Be careful not to drop the blades.

BR1RT-01

INSPECTION

1. INSPECT ROTOR

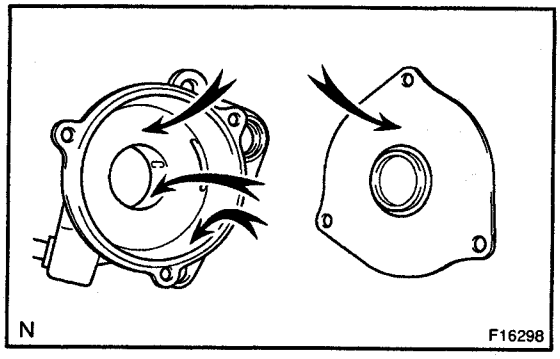
Inspect the rotor for wear or damage.
If necessary, replace the vacuum pump.



2. INSPECT BLADE

(a) Inspect the blades for wear or damage.
(b) Using vernier calipers, measure the most thin point of the blades.
Standard thickness: 4.9 mm (0.193 in.)
Minimum thickness: 4.5 mm (0.177 in.)

If necessary, replace the blade.



3. INSPECT CASING AND END COVER

(a) Inspect the inside surface on the casing of for scoring.
(b) Inspect the under side surface on the end cover of for scoring.

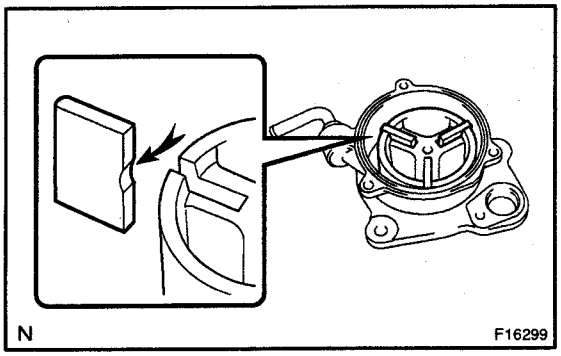
If necessary, replace the vacuum pump assembly.

BR1RU-01

REASSEMBLY

1. INSTALL ROTOR

Coat the rotor with engine oil, and install into the casing.

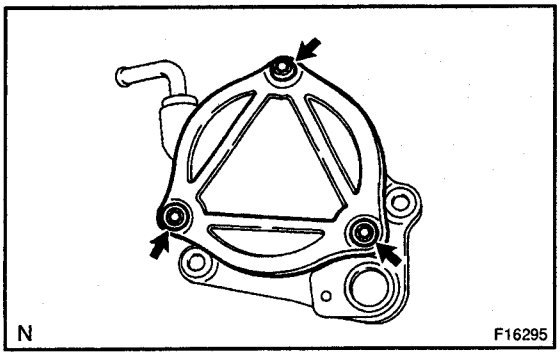


2. INSTALL 3 BLADES

Coat the 3 blades with engine oil, and install into the rotor.

HINT:

When installing the blade to the rotor, insert it with the hollow side facing inside.



3. INSTALL END COVER

(a) Coat the new O–ring with engine oil, and place them to the casing.

(b) Install the end cover to the casing.

(c) Using a hexagon wrench (4 mm), install and torque the 3 screws to the casing.

Torque: 6 N·m (61 kgf·cm, 53 in.·lbf)

BR1RV-01

INSTALLATION

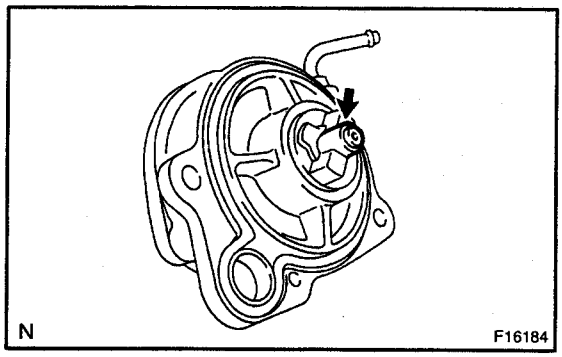
1. INSTALL CAM POSITION SENSOR

(a) Install a new O–ring to the cam position sensor.

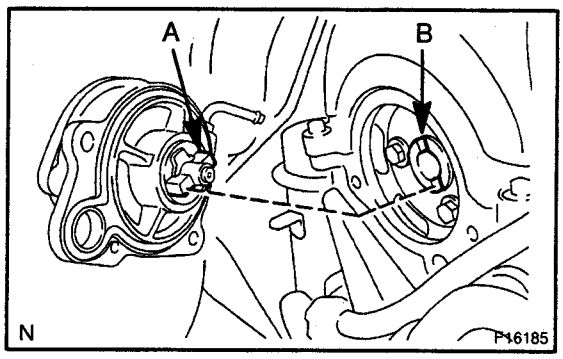
(b) Install the cam position sensor to the vacuum pump.
Torque: 9 N·m (92 kgf·cm, 80 in.·lbf)

2. INSTALL VACUUM PUMP ASSEMBLY

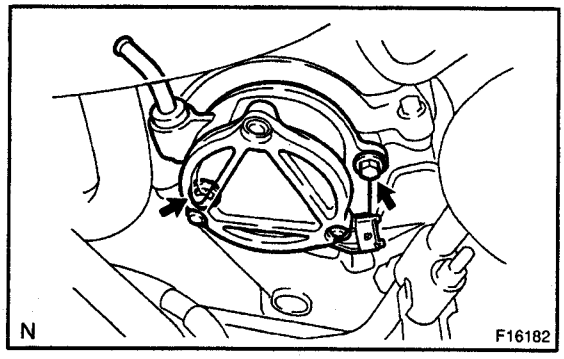
(a) Coat the 2 new O–rings with engine oil, and place them to the vacuum pump assembly.



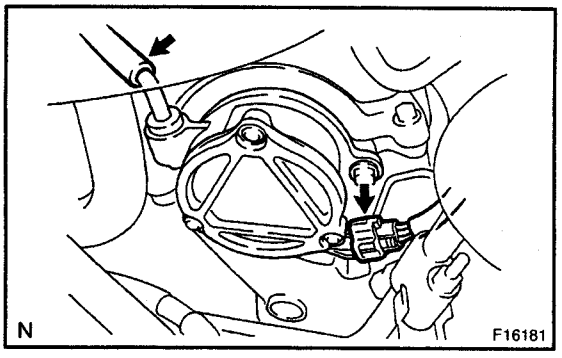
(b) Apply engine oil to the oil pipe at the tip of vacuum pump assembly.



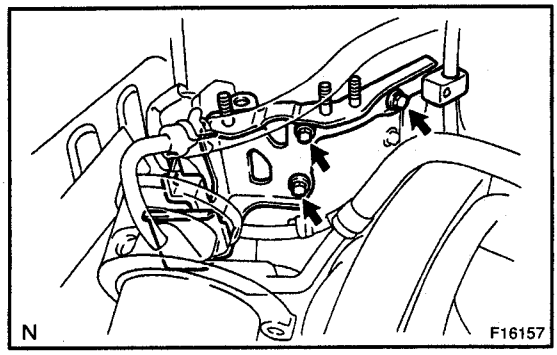
(c) Install the vacuum pump assembly so that the coupling teeth "A" at the side of vacuum pump assembly and the tip groove of camshaft "B" can engage.



(d) Install and torque the 2 new flange bolts.
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)



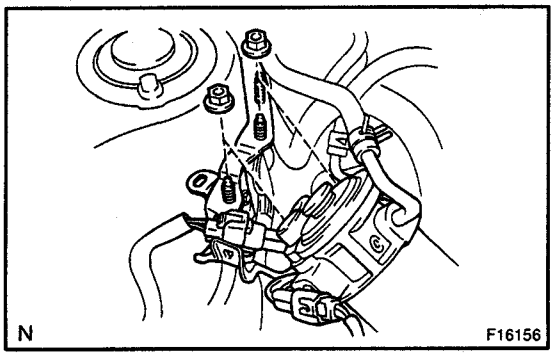
(e) Connect vacuum hose and cam position sensor connector.



3. INSTALL FUEL FILTER SUPPORT

Install the fuel filter support and 3 bolts.

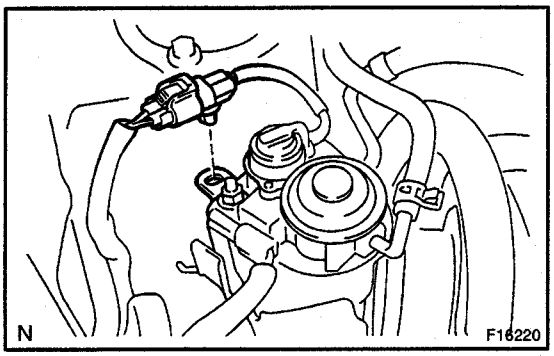
Torque: 8 N·m (82 kgf·cm, 71 in.·lbf)



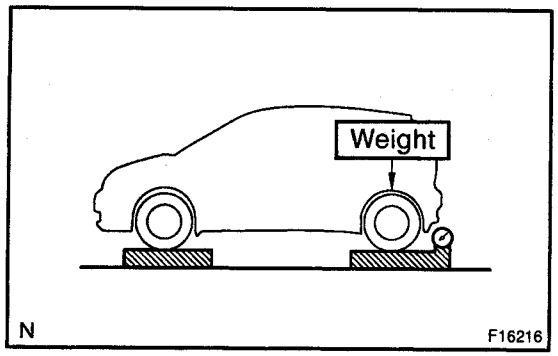
4. INSTALL FUEL FILTER ASSEMBLY

Install the fuel filter assembly and 2 nuts.

Torque: 14 N·m (143 kgf·cm, 10 ft·lbf)



5. CONNECT FUEL FILTER CONNECTOR TO BRACKET



LOAD SENSING PROPORTIONING VALVE (LSPV)

ON–VEHICLE INSPECTION

BR186-02

1. SET REAR AXLE LOAD

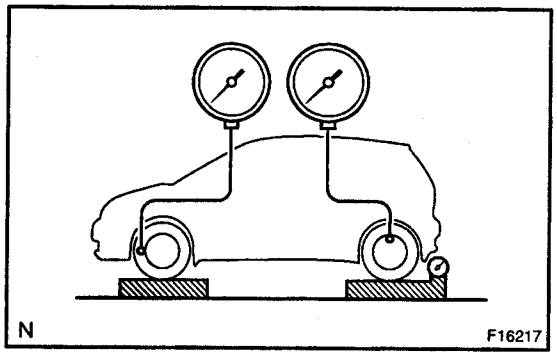
(a) Set the vehicle to its curb weight.

(b) Measure the rear axle load and note the value.

(c) Set the rear axle load.

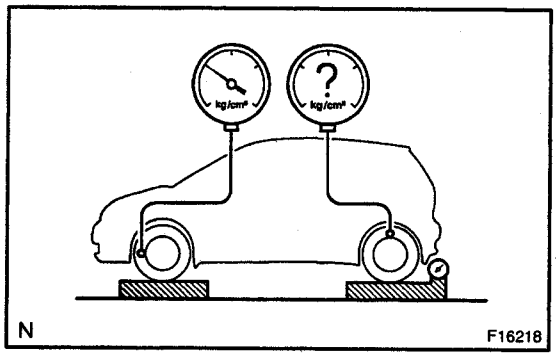
Rear axle load:

Rear axle curb weight + 41 kgf (90 lb)



2. INSTALL LSPV GAUGE (SST) AND BLEED BRAKE SYSTEM

SST 09709–29018



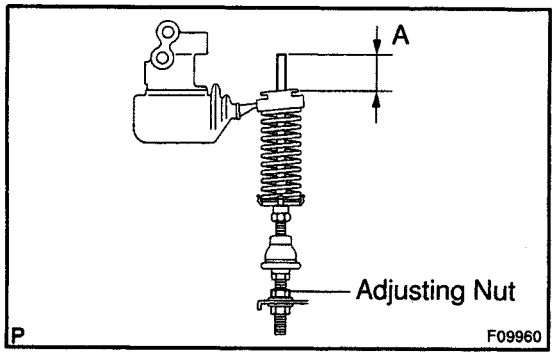
3. RAISE FRONT BRAKE FLUID PRESSURE TO 9,800 kpa (100 kgf/cm², 1,421 psi) AND CHECK REAR BRAKE FLUID PRESSURE

Rear brake pressure:

3700 ± 600 kpa (38 ± 6 kgf/cm², 537 ± 87 psi)

HINT:

The brake pedal should not be depressed twice and/or returned while setting to the specified pressure. Read the value of rear pressure after holding the specified fluid pressure for 2 seconds after adjusting the specified fluid pressure.



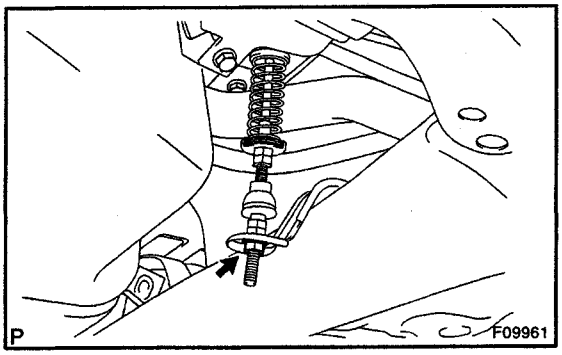
4. IF NECESSARY, ADJUST FLUID PRESSURE

(a) Set the shaft length A to initial set length and tighten the adjusting bolt lock nut.

Initial set length: 9.7 mm (0.381 in.)

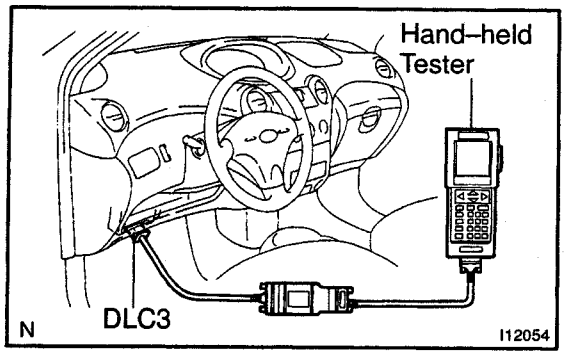
(b) Check the rear brake pressure.

(c) If the pressure is not within the specification, adjust the fluid pressure by changing the shaft length.
To increase rear brake pressure – Shorten A
To decrease rear brake pressure – Lengthen A



(d) Torque the lock nut.
Torque: 12.5 N·m (127 kgf·cm, 9 ft·lbf)

If it cannot be adjusted, replace the valve body.



ABS ACTUATOR (1ND–TV)

ON–VEHICLE INSPECTION

BR1RW-01

1. CONNECT HAND–HELD TESTER

(a) Connect the hand–held tester to the DLC3.

(b) Start the engine and run it at idle.

(c) Select the ACTIVE TEST mode on the hand–held tester.

HINT:

Please refer to the hand–held tester operator's manual for further details.

2. INSPECT ABS ACTUATOR MOTOR OPERATION

(a) Check that the operation sound of the ABS actuator motor can be heard when the motor relay is turned ON by the hand–held tester.

NOTICE:

Do not keep motor relay ON for more than 5 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

If the operation sound can not be heard, replace the ABS actuator because the motor operation is in failure.

(b) Turn the motor relay OFF.

3. INSPECT RIGHT FRONT WHEEL SOLENOID

(a) Depress the brake pedal and hold it for about 15 seconds, and check that the brake pedal does not go down further.

If the brake pedal goes down, replace the ABS actuator because the sealing condition of the reduction solenoid valve is abnormal.

(b) Check that the brake pedal does not pulsate when the motor relay is turned ON by the hand–held tester.

NOTICE:

Do not keep motor relay ON for more than 5 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

If there is a pulsation in the brake pedal, replace the ABS actuator because the sealing condition of the reduction solenoid valve is abnormal.

(c) Turn the motor relay to OFF.

(d) Depress the brake pedal and hold it until the step (g) is completed.

(e) Check that the brake pedal does is fully depressed when the SFRH and SFRR solenoids are turned ON by the hand–held tester.

NOTICE:

Do not keep solenoid ON for more than 2 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

If the brake pedal goes down, replace the ABS actuator because the holding solenoid valve operation is abnormal.

HINT:

To prevent the solenoids from damaging, the hand–held tester turns OFF automatically 2 secs. after it has been turned ON.

(f) Check that the brake pedal can be depressed down further when the solenoids are turned OFF.

If the brake pedal does not go down, replace the ABS actuator because the reduction solenoid valve operation is abnormal.

(g) Check that the brake pedal returns when the motor relay is turned ON by the hand–held tester.

NOTICE:

Do not keep motor relay ON for more than 5 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

If the brake pedal does not return, replace the ABS actuator because the motor operation is in failure.

(h) Turn the motor relay to OFF and release the brake pedal.

4. INSPECT OTHER WHEEL SOLENOIDS OPERATION

Check the solenoids of the other wheels with the same inspection procedure as the right front wheel solenoids.

HINT:

Left front wheel: SFLH and SFLR
Right rear wheel: SRRH and SRRR
Left rear wheel: SRLH and SRLR

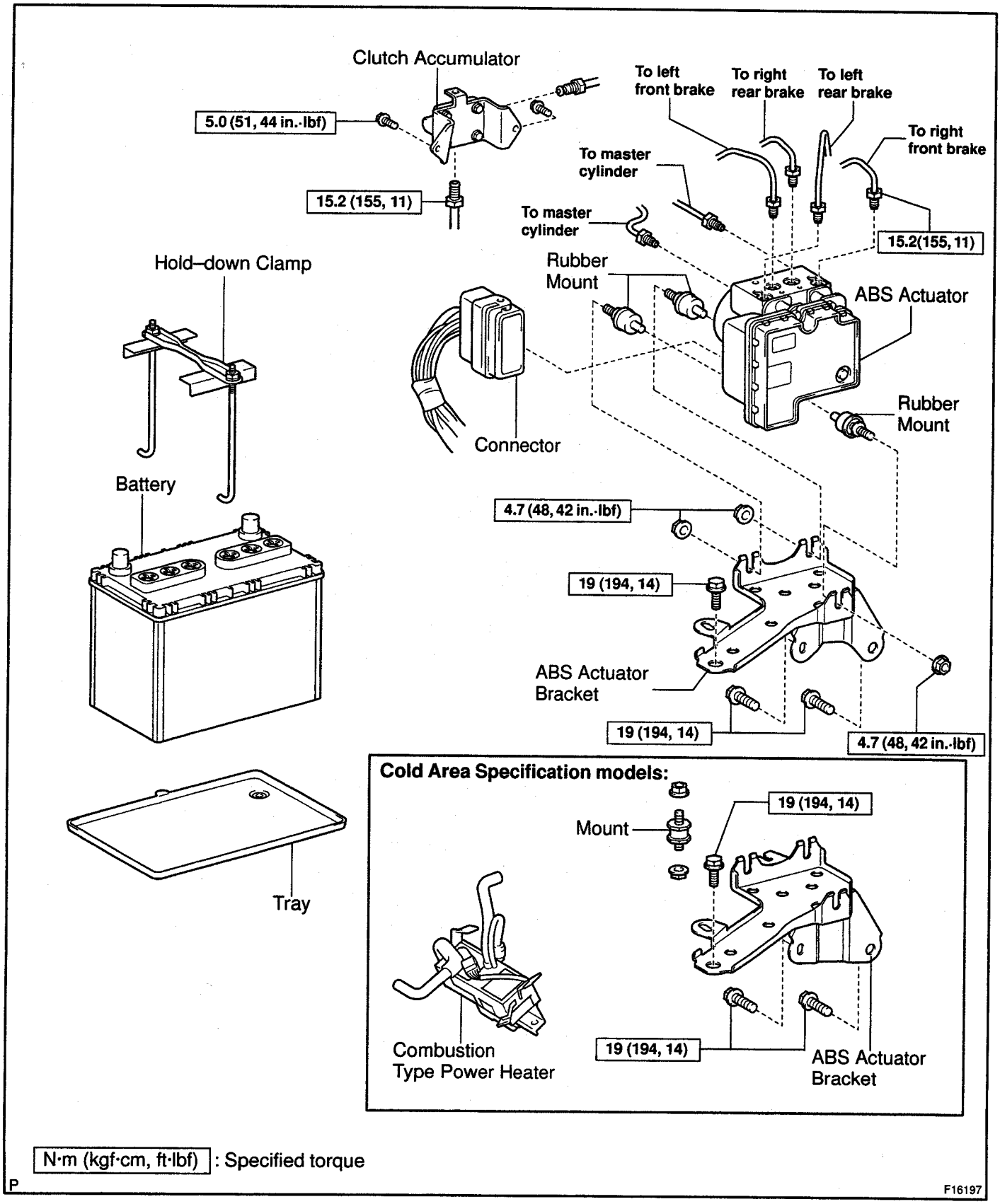
NOTICE:

Never depress the brake pedal under the condition that the reduction solenoid alone is turned ON as ABS ECU is reset.

5. CLEAR DTC (See page DI–2)

COMPONENTS

BR1RX–01



N·m (kgf·cm, ft·lbf) : Specified torque

P

F16197

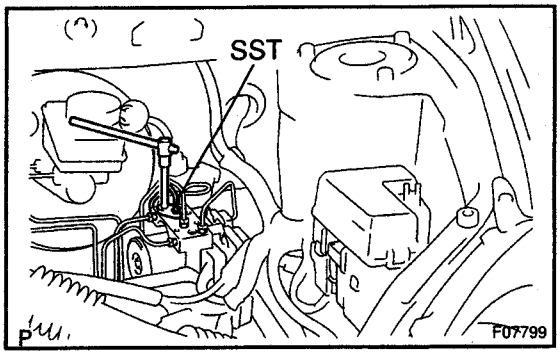
BR1RY-01

REMOVAL

1. REMOVE BATTERY ASSEMBLY

Remove the hold–down clamp, then remove the battery and tray from the engine room.

2. REMOVE CLUTCH ACCUMULATOR (See page CL–9)



3. DISCONNECT BRAKE LINE

Using a SST, disconnect the 6 brake lines from the ABS actuator assembly.

SST 09023–00100

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)

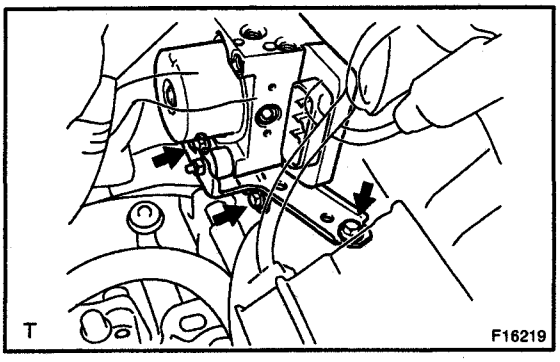
HINT:

- When disconnecting the brake lines, use tags or make a memo to identify the place to reconnect.
- At the time of installation, connect each brake line to the correct position (See page BR–23).

4. DISCONNECT CONNECTOR FROM ABS ACTUATOR ASSEMBLY

5. REMOVE ABS ACTUATOR ASSEMBLY

(a) LHD Cold Area Specification models:
Remove the 2 nuts and mount from the ABS actuator bracket and combustion type power heater (See page AC–15).



(b) Remove the 3 bolts and ABS actuator assembly.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

6. REMOVE ABS ACTUATOR

(a) Remove the 3 nuts and ABS actuator from the bracket.
Torque: 4.7 N·m (48 kgf·cm, 42 in.·lbf)

(b) Remove the 3 rubber mounts from the ABS actuator.

BR1RZ-01

INSTALLATION

Installation is in the reverse order of removal (See page BR–24).

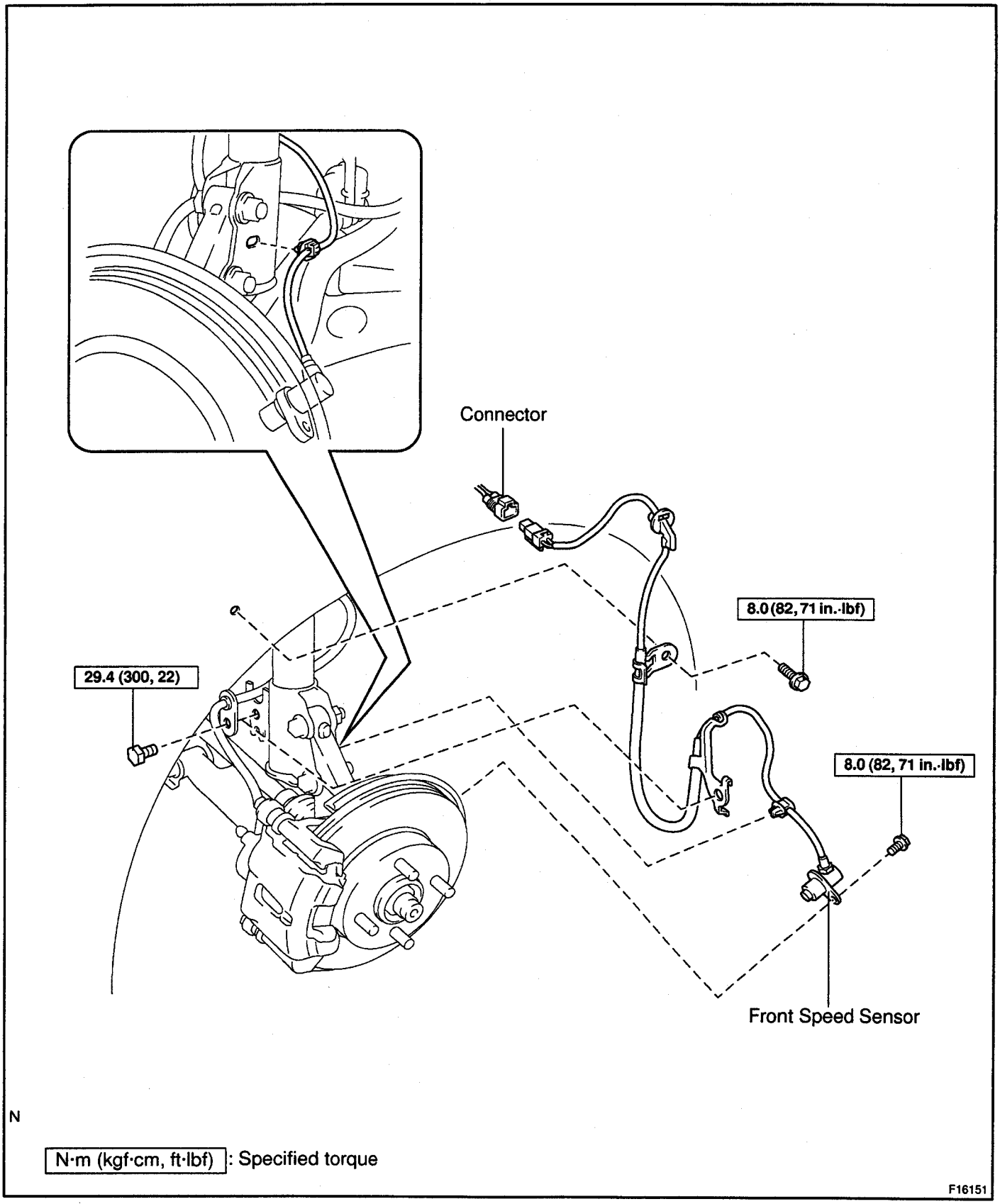
HINT:

- After installation, fill the brake reservoir with brake fluid and bleed brake system (See Pub. No. RM685E on page BR–4).
- Check for leaks.

FRONT SPEED SENSOR

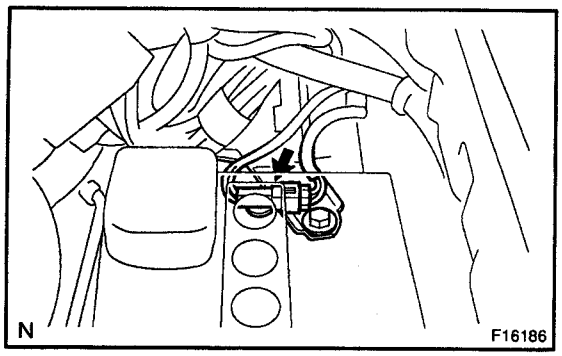
COMPONENTS

BR1S0-01



BR1S1-01

REMOVAL

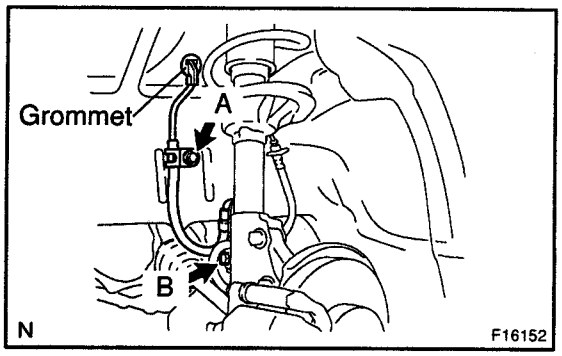


1. DISCONNECT SPEED SENSOR CONNECTOR

Disconnect the speed sensor connector.

2. REMOVE FRONT WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)



3. REMOVE SPEED SENSOR

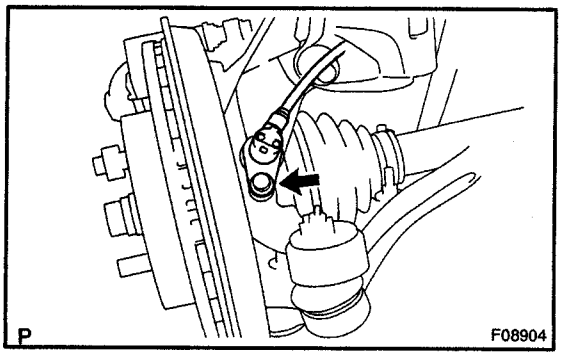
(a) Remove the grommet and the 2 clamp bolts from the body and shock absorber.

Torque:

Bolt: A 8.0 N·m (82 kgf·cm, 71 in.·lbf)

Bolt: B 29.4 N·m (300 kgf·cm, 22 ft·lbf)

(b) Using a clip remover, remove the clip from the absorber bracket.



(c) Remove the bolt and speed sensor from the steering knuckle.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

BR1S2-01

INSTALLATION

Installation is in the reverse order of removal (See page BR–27).

HINT:

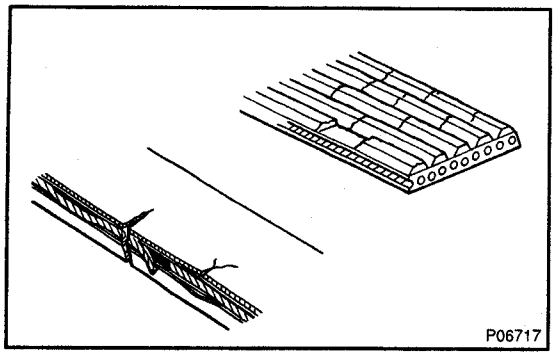
After installation, check the speed sensor signal (See page DI–2).

STEERING

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

NOTE: The above pages contain only the points which differ from the above listed manuals.



DRIVE BELT (1ND–TV)

INSPECTION

SR101–03

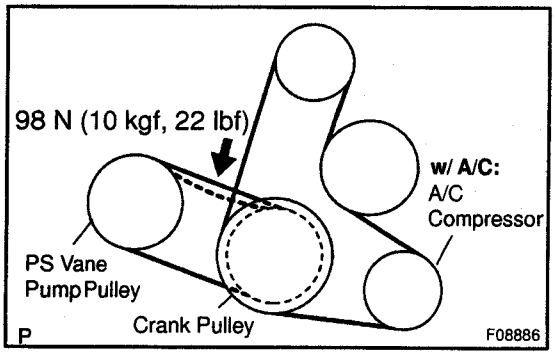
INSPECT DRIVE BELT

(a) Visually check the belt for excessive wear, frayed cords, etc.

If any defect has been found, replace the drive belt.

HINT:

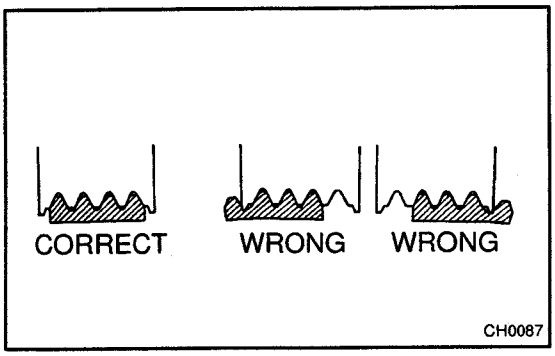
Cracks on the rib side of a belt are considered acceptable. If the missing chunks from the ribs are found on the belt, it should be replaced.



(b) Measure the drive belt deflection.

Drive belt tension: at 98 N (10 kgf, 22 lbf)
New belt: 8 – 10 mm (0.315 – 0.394 in.)
Used belt: 11 – 13 mm (0.433 – 0.512 in.)

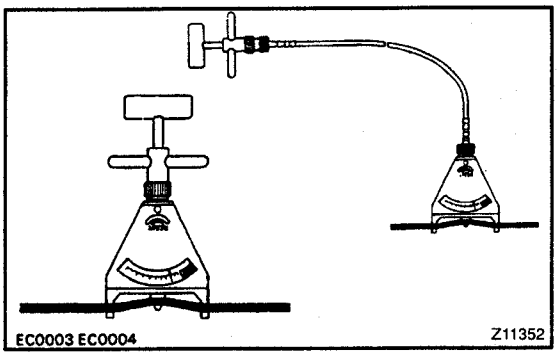
If the belt deflection is not as specified, adjust it.



HINT:

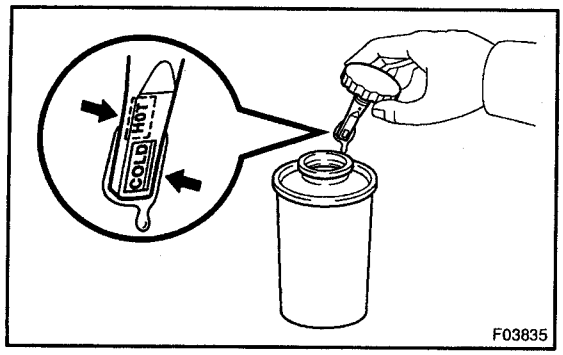
- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a belt, check that it fits properly in the ribbed grooves.
- Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.

SR



- Reference:
  Using a belt tension gauge, measure the drive belt tension.
  Drive belt tension:
  New belt: 440 – 540 N (45 – 55 kgf)
  Used belt: 240 – 340 N (25 – 35 kgf)

If the belt tension is not as specified, adjust it.



POWER STEERING FLUID (1ND–TV)

INSPECTION

SR102–02

1. CHECK FLUID LEVEL

(a) Keep the vehicle level.

(b) With the engine stopped, check the fluid level in the oil reservoir.

If necessary, add fluid.

Fluid: ATF DEXRON® II or III

HINT:

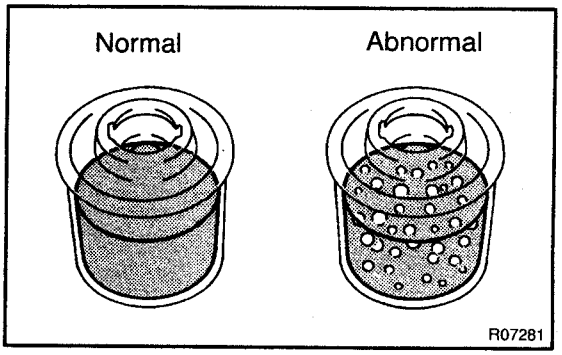
Check that the fluid level is within the HOT LEVEL range on the reservoir cap dipstick. If the fluid is cold, check that it is within the COLD LEVEL range.

(c) Start the engine and run it at idle.

(d) Turn the steering wheel from lock to lock several times to boost fluid temperature.

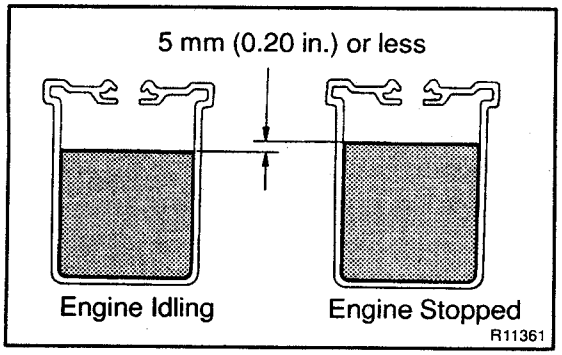
Fluid temperature: 80°C (176°F)

SF



(e) Check for foaming or emulsification.

If there is foaming or emulsification, bleed power steering system (See Pub. No. RM685E on page SR–7).



(f) With the engine idling, measure the fluid level in the oil reservoir.

(g) Stop the engine.

(h) Wait a few minutes and remeasure the fluid level in the oil reservoir.

Maximum fluid level rise: 5 mm (0.20 in.)

If a problem is found, bleed power steering system (See Pub. No. RM685E on page SR–7).

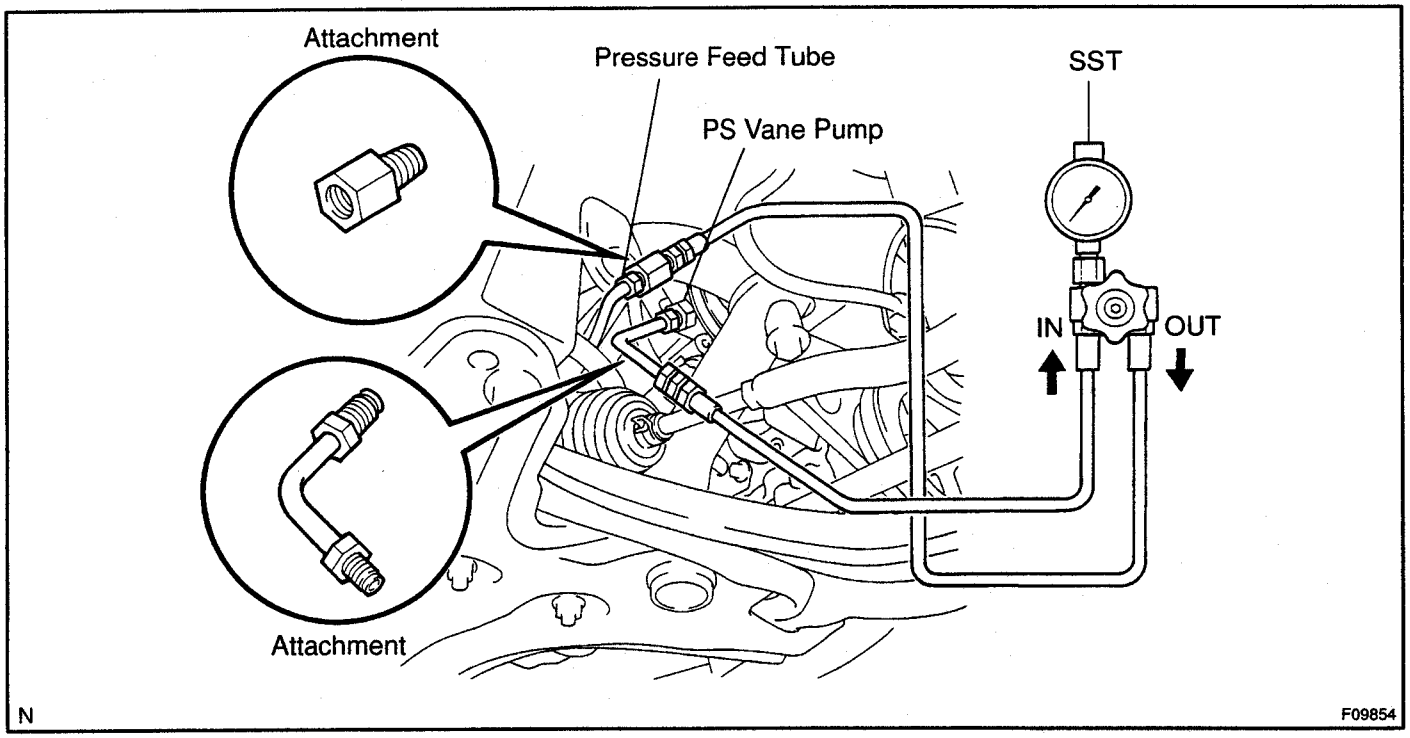
(i) Check the fluid level.

2. CHECK STEERING FLUID PRESSURE

(a) Disconnect the pressure feed tube from the PS vane pump (See page SR–15).

(b) Connect SST, as shown in the illustration below.
SST 09640–10010 (09641–01010, 09641–01030, 09641–01060)

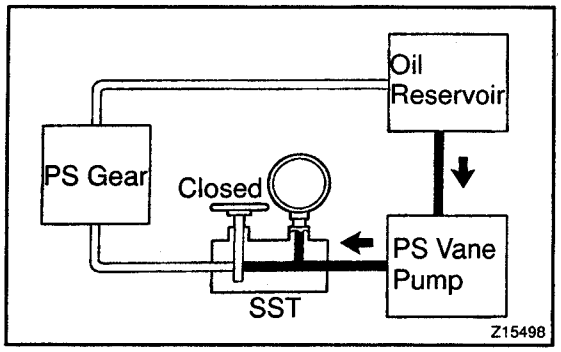
NOTICE:
Check that the valve of the SST is in the open position.



(c) Bleed the power steering system (See Pub. No. RM685E on page SR–7).

(d) Start the engine and run it at idle.

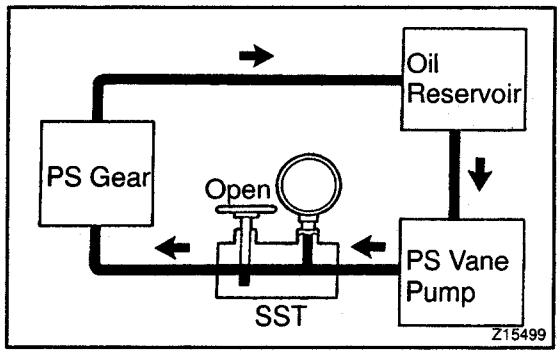
(e) Turn the steering wheel from lock to lock several times to boost fluid temperature.
Fluid temperature: 80 °C (176 °F)



(f) With the engine idling, close the valve of the SST and observe the reading on the SST.
Minimum fluid pressure:
5,400 kPa (55 kgf/cm², 781 psi)

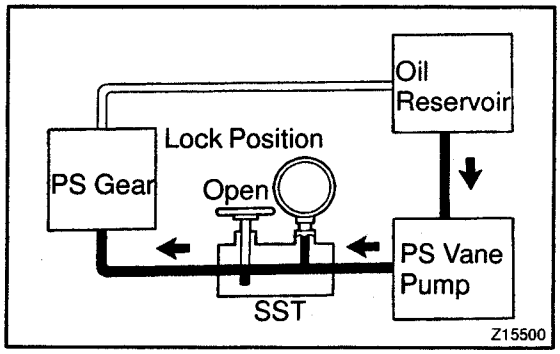
NOTICE:

- **Do not keep the valve closed for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**



(g) With the engine idling, open the valve fully.
(h) Measure the fluid pressure at engine speeds 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 fully opened, turn the steering wheel to full lock position.
Minimum fluid pressure:
5,400 kPa (55 kgf/cm², 781 psi)

NOTICE:

- **Do not maintain lock position for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**

(j) Disconnect the SST.
SST 09640–10010 (09641–01010, 09641–01030, 09641–01060)

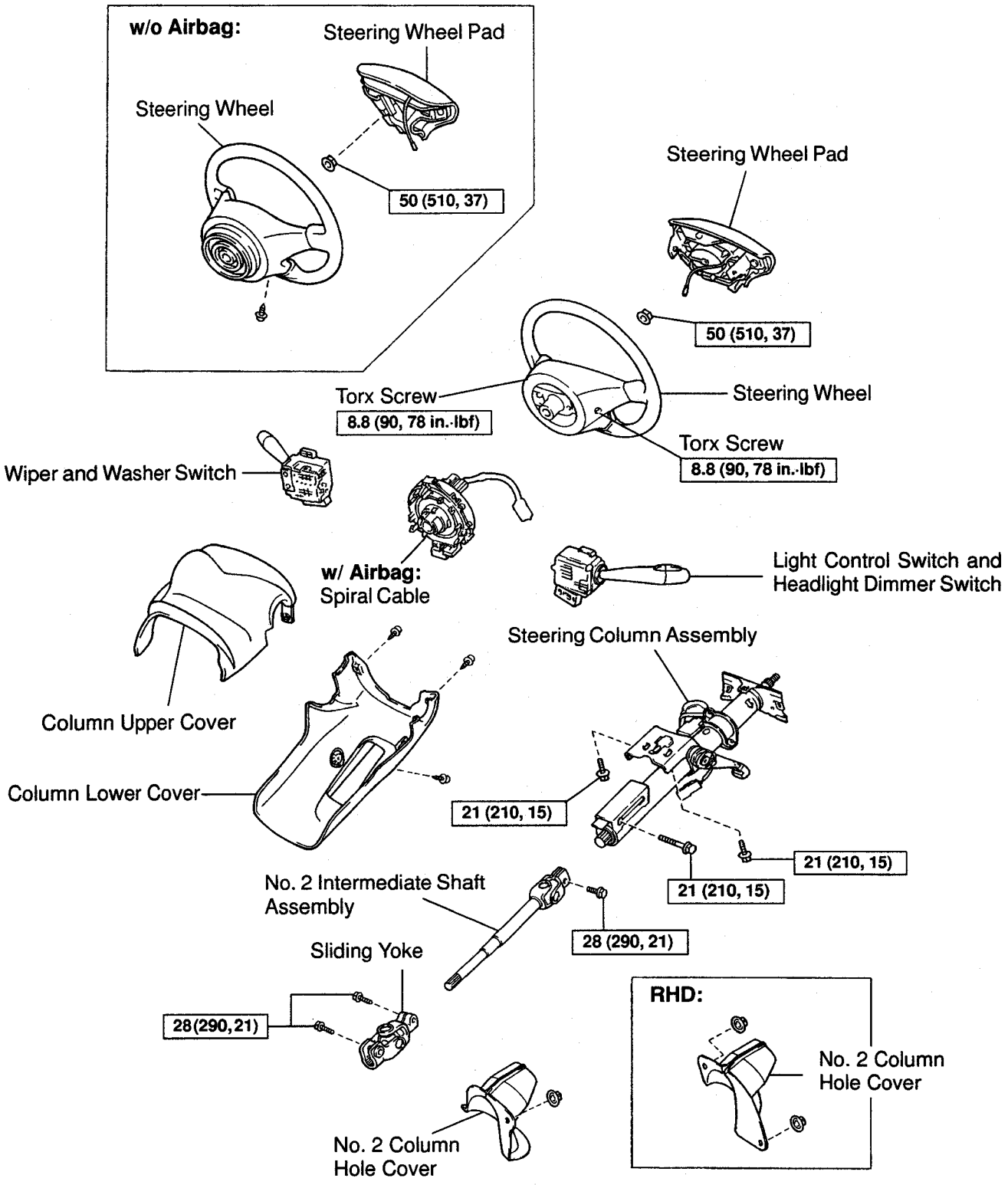
(k) Connect the pressure feed tube to the PS vane pump (See page SR–23).

(l) Bleed the power steering system (See Pub. No. RM685E on page SR–7).

TILT STEERING COLUMN (1ND–TV)

SR10P–02

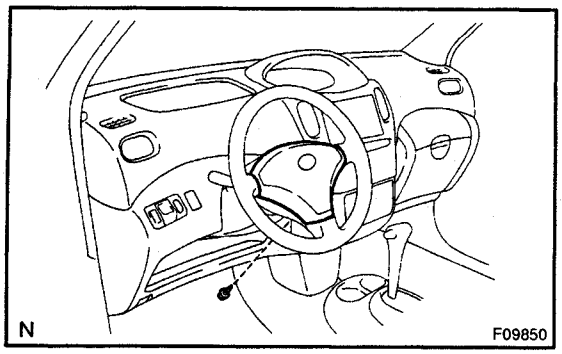
COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

N

F09851



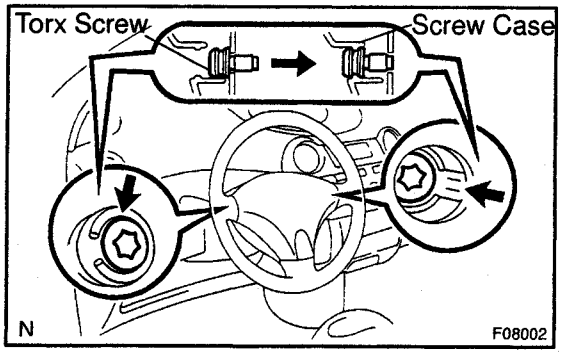
REMOVAL

1. w/o Airbag

REMOVE STEERING WHEEL PAD

(a) Remove the screw.

(b) Disconnect the terminal and remove the steering wheel pad.



2. w/ Airbag:

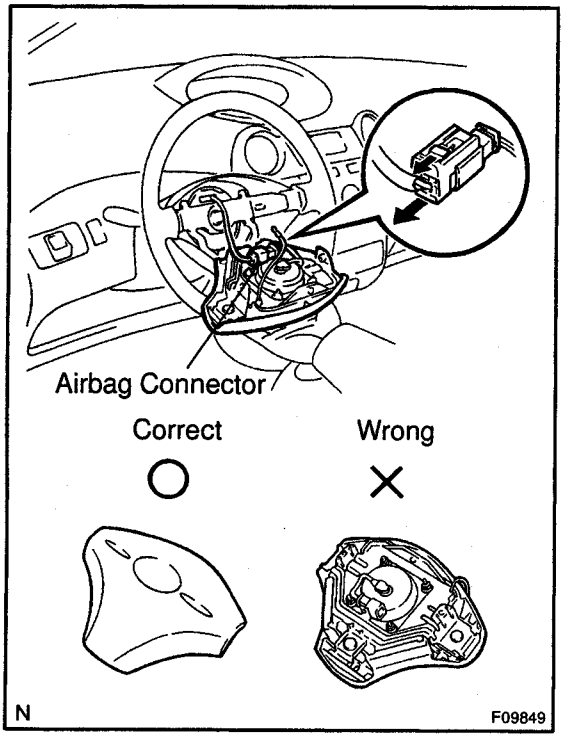
REMOVE STEERING WHEEL PAD

NOTICE:

If the airbag connector is disconnected with the ignition switch at ON, DTCs will be recorded.

(a) Place the front wheels facing straight ahead.

(b) Using a torx socket wrench, 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 steering wheel and disconnect the airbag connector.

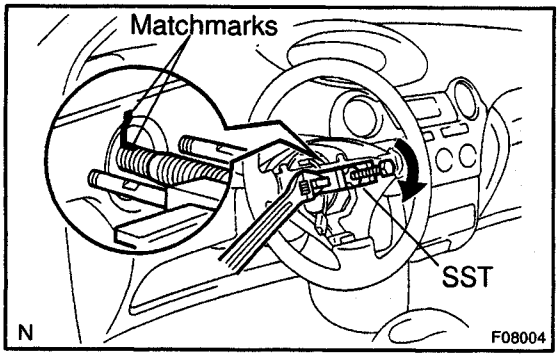
(d) Except sports type steering wheel:
Disconnect the connector.

CAUTION:

- **When storing the wheel pad, keep the upper surface of the pad facing upward.**
- **Never disassemble the wheel pad.**

NOTICE:

When removing the wheel pad, take care not to pull the airbag wire harness.



3. REMOVE STEERING WHEEL

(a) Sports type steering wheel:
Disconnect the connector.

(b) Remove the steering wheel set nut.

(c) Place matchmarks on the steering wheel and main shaft assembly.

(d) Using SST, remove the steering wheel.

SST 09950–50013 (09951–05010, 09952–05010, 09953–05020, 09954–05021)

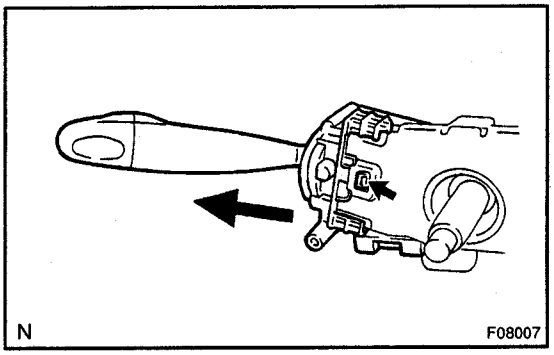
4. REMOVE COLUMN LOWER COVER

Remove the 3 screws and column lower cover.

5. w/o Airbag:

REMOVE LIGHT CONTROL SWITCH AND HEADLIGHT DIMMER SWITCH, WIPER AND WASHER SWITCH AND COLUMN UPPER COVER

(a) Disconnect the 2 connectors from the light control switch and headlight dimmer switch and wiper and washer switch.



(b) Push the claw and pull out the light control switch and headlight dimmer switch.

(c) Employ the same manner described above to the wiper and washer switch.

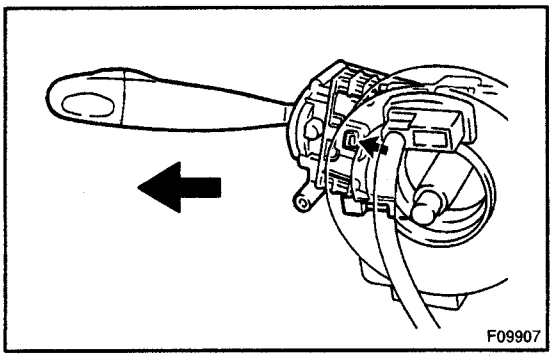
(d) Remove the column upper cover.

6. w/ Airbag:

REMOVE SPIRAL CABLE, LIGHT CONTROL SWITCH AND HEADLIGHT DIMMER SWITCH, WIPER AND WASHER SWITCH AND COLUMN UPPER COVER

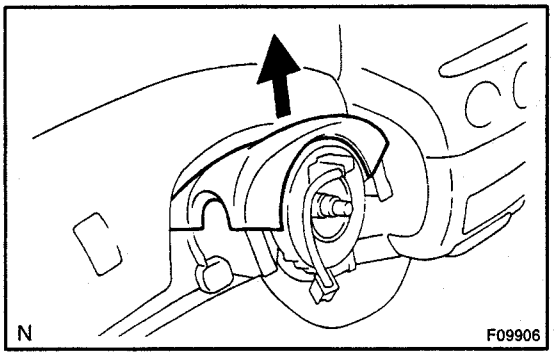
(a) Disconnect the 3 connectors from the spiral cable, light control switch and headlight dimmer switch and wiper and washer switch.

(b) Disconnect the airbag connector from the spiral cable.



(c) Push the claw and pull out the light control switch and headlight dimmer switch.

(d) Employ the same manner described above to the wiper and washer switch.



(e) Slide the column upper cover and remove the spiral cable.

NOTICE:

Do not disassemble the spiral cable or apply oil to it.

(f) Remove the column upper cover.

7. A/T:

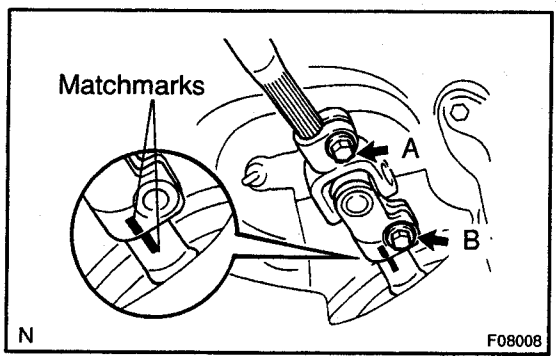
REMOVE KEY INTERLOCK CABLE

(See Pub. No. RM737E on page AX–18 and AX–11)

SR

8. REMOVE NO. 2 COLUMN HOLE COVER

- LHD:
  Remove the clip and No. 2 column hole cover.
- RHD:
  Remove the 2 clips and No. 2 column hole cover.



9. DISCONNECT SLIDING YOKE

(a) Place matchmarks on the sliding yoke and No. 3 intermediate shaft assembly.

(b) Loosen the bolt A and remove the bolt B, then disconnect the sliding yoke.

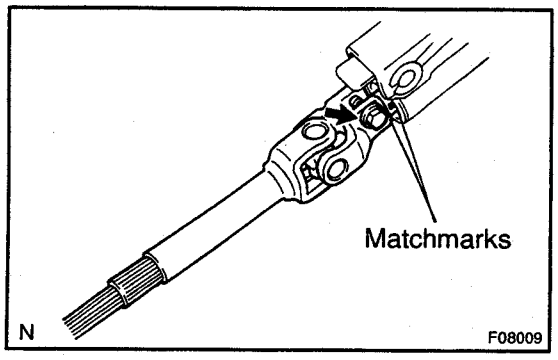
10. REMOVE STEERING COLUMN ASSEMBLY

(a) Disconnect the connectors.

(b) Remove the lower mount bolt, 2 upper mount bolts and steering column assembly.

11. REMOVE SLIDING YOKE

Remove the bolt A and sliding yoke.

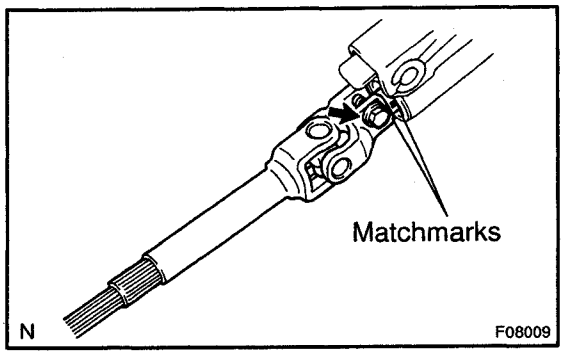


12. REMOVE NO. 2 INTERMEDIATE SHAFT ASSEMBLY

(a) Place matchmarks on the No. 2 intermediate shaft assembly and main shaft assembly.

(b) Remove the bolt and No. 2 intermediate shaft assembly.

SR105-02



INSTALLATION

1. INSTALL NO. 2 INTERMEDIATE SHAFT ASSEMBLY

(a) Align the matchmarks on the No. 2 intermediate shaft assembly and main shaft assembly.

(b) Install the No. 2 intermediate shaft assembly with the bolt.
Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

2. INSTALL SLIDING YOKE

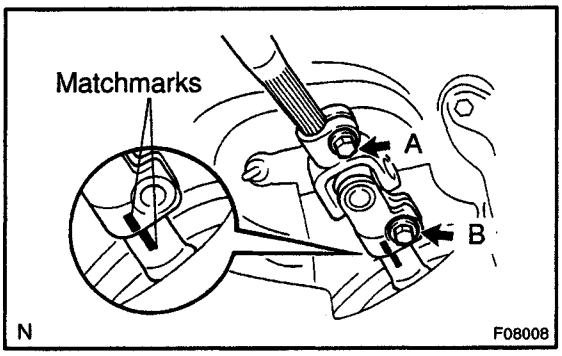
Temporarily install the sliding yoke to the No. 2 intermediate shaft assembly with the bolt A.

3. INSTALL STEERING COLUMN ASSEMBLY

(a) Install the steering column assembly with the lower mount bolt and 2 upper mount bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(b) Connect the connectors.

SR



4. CONNECT SLIDING YOKE

(a) Align the matchmarks on the sliding yoke and No. 3 intermediate shaft assembly.

(b) Install the bolt B.
Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

(c) Torque the bolt A.
Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

5. INSTALL NO. 2 COLUMN HOLE COVER

- LHD:
  Install the No. 2 column hole cover with the clip.
- RHD:
  Install the No. 2 column hole cover with the 2 clips.

6. A/T:
INSTALL KEY INTERLOCK CABLE
(See Pub. No. RM737E on page AX–24 and AX–17)

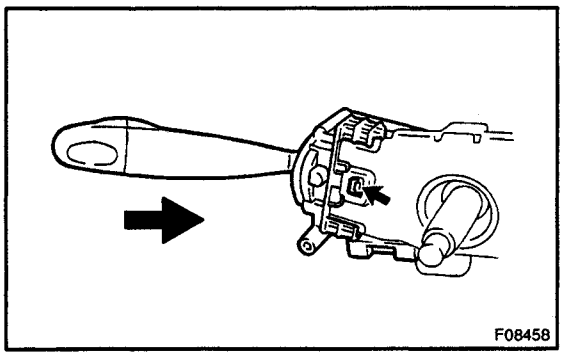
7. w/o Airbag:
INSTALL COLUMN UPPER COVER, LIGHT CONTROL SWITCH AND HEADLIGHT DIMMER SWITCH AND WIPER AND WASHER SWITCH

(a) Install the column upper cover.

(b) Push into the light control switch and headlight dimmer switch until the claw is latched.

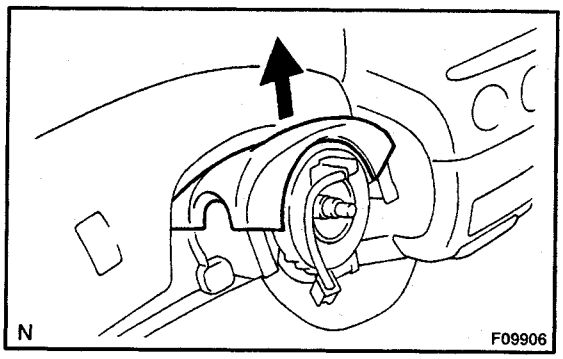
(c) Employ the same manner described above to the wiper and washer switch.

(d) Connect the 2 connectors to the light control switch and headlight dimmer switch and wiper and washer switch.

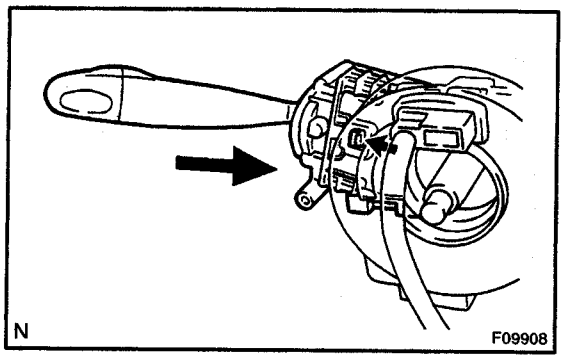


8. w/ Airbag:
INSTALL COLUMN UPPER COVER, LIGHT CONTROL SWITCH AND HEADLIGHT DIMMER SWITCH, WIPER AND WASHER SWITCH AND SPIRAL CABLE

(a) Install the column upper cover.



(b) Slide the column upper cover and install the spiral cable.



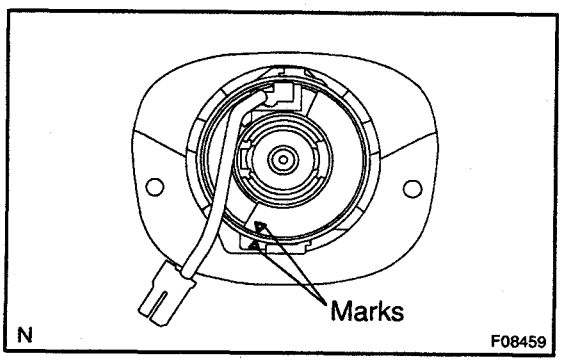
(c) Push into the light control switch and headlight dimmer switch until the claw is latched.
(d) Employ the same manner described above to the wiper and washer switch.
(e) Connect the airbag connector to the spiral cable.
(f) Connect the 3 connectors to the spiral cable, light control switch and headlight dimmer switch and wiper and washer switch.

9. INSTALL COLUMN LOWER COVER

Install the column lower cover with the 3 screws.

10. w/ Airbag:
CENTER SPIRAL CABLE

(a) Check that the front wheels are facing straight ahead.
(b) Turn the cable counterclockwise by hand until it becomes harder to turn.
(c) Then rotate the cable clockwise about 2.5 turns to align the marks.



HINT:
The cable will rotate about 2.5 turns to either left or right of the center.

11. INSTALL STEERING WHEEL

(a) Align the matchmarks on the steering wheel and main shaft assembly.
(b) Install the steering wheel set nut.
Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)
(c) Sports type steering wheel:
Connect the connector.

12. **w/o Airbag:**
INSTALL STEERING WHEEL PAD

(a) Connect the terminal and install the steering wheel pad.

(b) Install the screw.

13. **w/ Airbag:**
INSTALL STEERING WHEEL PAD

NOTICE:

- **Never use airbag parts from another vehicle. When replacing parts, replace with new ones.**
- **Make sure the wheel pad is installed with the specified torque.**
- **If the wheel pad has been dropped, or there are cracks, dents or other defects in the case or connector, replace the wheel pad with a new one.**
- **When installing the wheel pad, take care that the wirings do not interfere with other parts and that they are not pinched between other parts.**

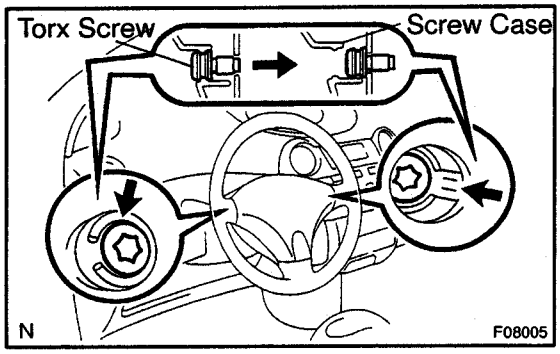
(a) Except sports type steering wheel:
Connect the connector.

(b) Connect the airbag connector.

(c) Install the steering wheel pad after confirming that the circumference groove of the torx screws is caught on the screw case.

(d) Using a torx socket wrench, torque the 2 screws.
Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)

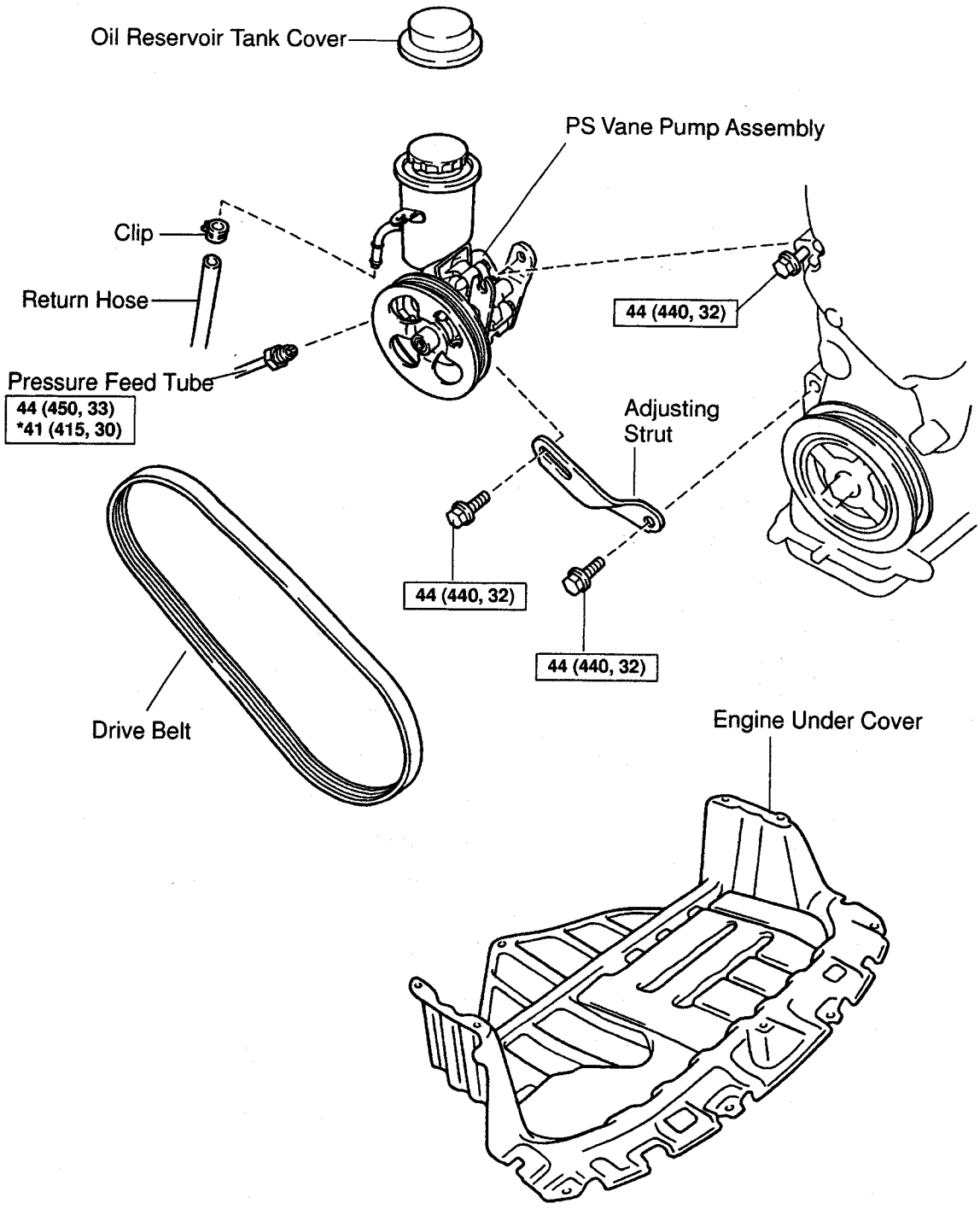
14. **CHECK STEERING WHEEL CENTER POINT**



POWER STEERING VANE PUMP (1ND–TV)

COMPONENTS

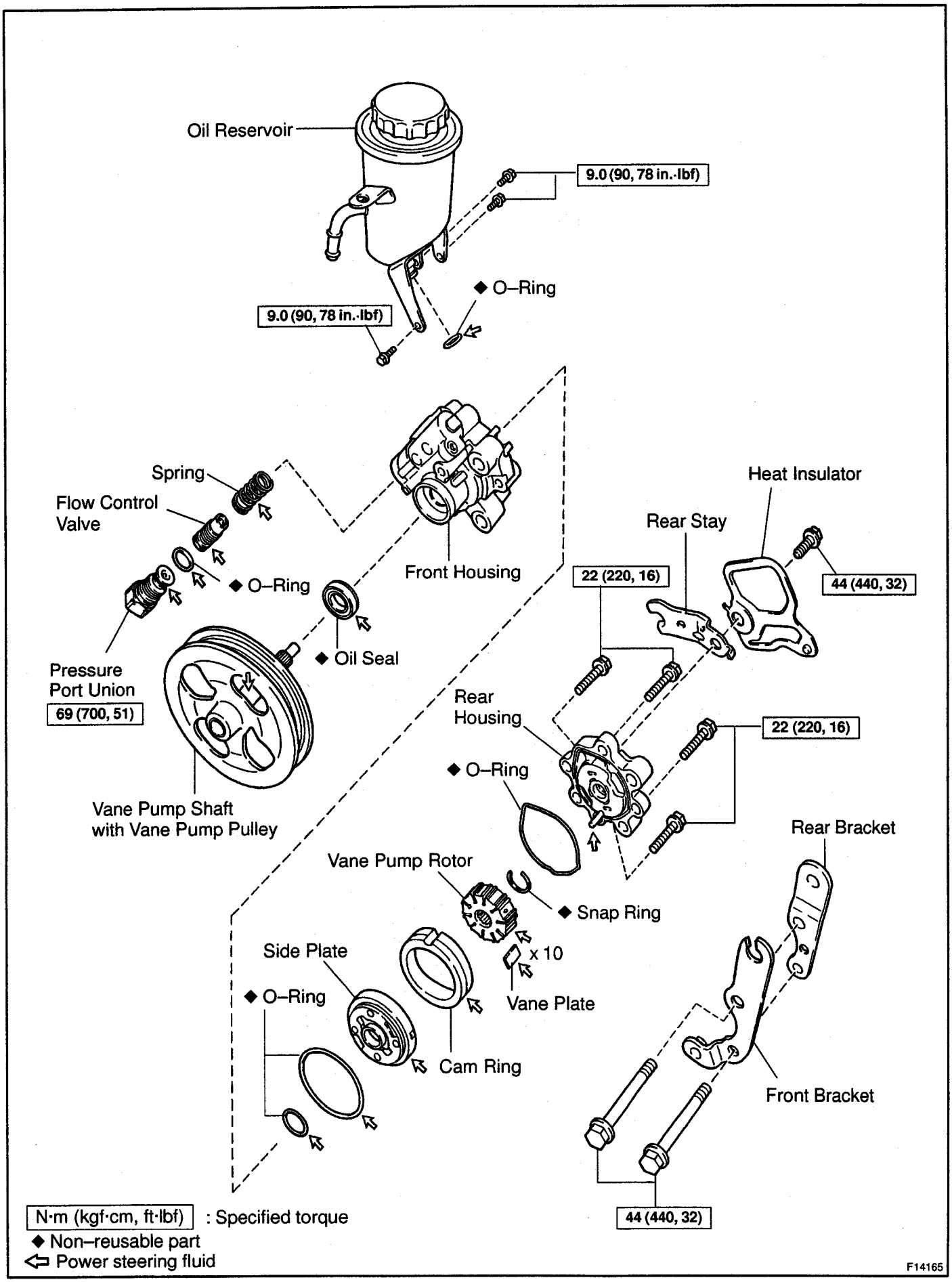
SR106–02



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
* For use with SST

N

F14164


Oil Reservoir
9.0 (90, 78 in.·lbf)
◆ O–Ring
9.0 (90, 78 in.·lbf)
Spring
Flow Control Valve
◆ O–Ring
Front Housing
Heat Insulator
Rear Stay
22 (220, 16)
44 (440, 32)
Pressure Port Union
69 (700, 51)
◆ Oil Seal
Rear Housing
◆ O–Ring
22 (220, 16)
Vane Pump Shaft with Vane Pump Pulley
Rear Bracket
Vane Pump Rotor
◆ Snap Ring
x 10
Side Plate
◆ O–Ring
Vane Plate
Cam Ring
Front Bracket
44 (440, 32)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
⇦ Power steering fluid
F14165

SR107-02

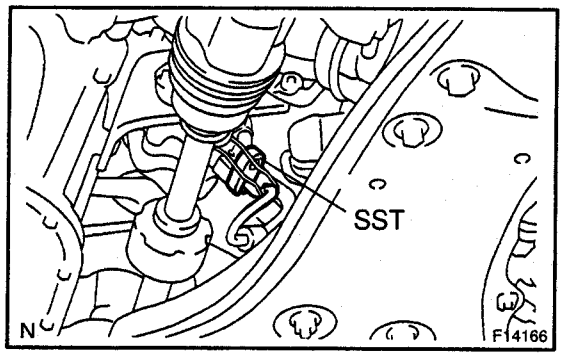
REMOVAL

1. **REMOVE ENGINE UNDER COVER**
2. **REMOVE OIL RESERVOIR TANK COVER**
3. **DISCONNECT RETURN HOSE**

Remove the clip, and disconnect the return hose.

NOTICE:

Take care not to spill fluid on the drive belt.

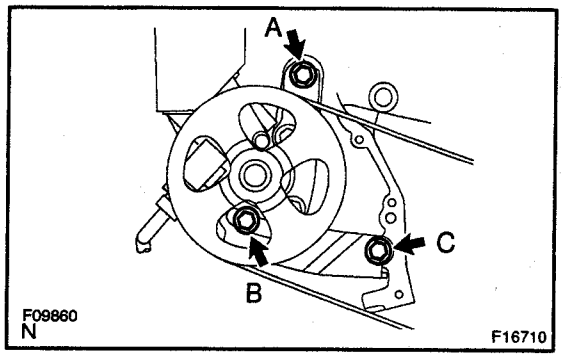


4. **DISCONNECT PRESSURE FEED TUBE**

Using SST, disconnect the pressure feed tube.

SST 09023–12700

5. **DISCONNECT OIL PRESSURE SENSOR CONNECTOR**



6. **REMOVE DRIVE BELT**

Loosen the bolt A and B, and remove the drive belt.

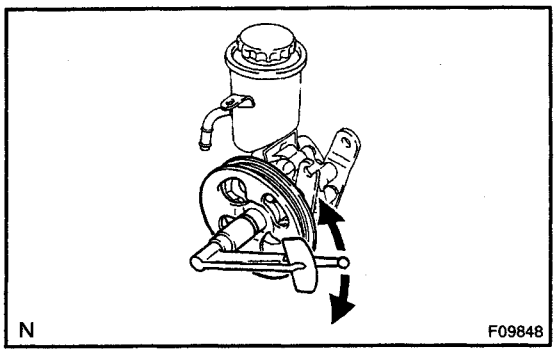
7. **REMOVE PS VANE PUMP ASSEMBLY**

(a) Remove the bolt B, bolt C and adjusting strut.

(b) Loosen the bolt A sufficiently so that PS vane pump assembly can be removed.

HINT:

Bolt A cannot be removed.



SR108-02

DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. MEASURE PS VANE PUMP ROTATING TORQUE

(a) Check that the pump rotates smoothly without abnormal noise.

(b) Using a torque wrench, check the pump rotating torque.

Rotating torque:

0.27 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less

2. REMOVE OIL RESERVOIR

(a) Remove the 3 bolts and oil reservoir.

(b) Remove the O–ring from the oil reservoir.

3. REMOVE HEAT INSULATOR AND REAR STAY

Remove the bolt, heat insulator and rear stay.

4. REMOVE FRONT AND REAR BRACKETS

Remove the 2 bolts, front and rear brackets.

5. REMOVE PRESSURE PORT UNION, FLOW CONTROL VALVE AND SPRING

(a) Remove the pressure port union, flow control valve and spring.

(b) Remove the O–ring from the pressure port union.

6. REMOVE REAR HOUSING

(a) Remove the 4 bolts and rear housing.

(b) Remove the O–ring from the rear housing.

7. REMOVE CAM RING, 10 VANE PLATES, VANE PUMP ROTOR AND SIDE PLATE

(a) Remove the cam ring and 10 vane plates.

NOTICE:

Take care not to drop the vane plate.

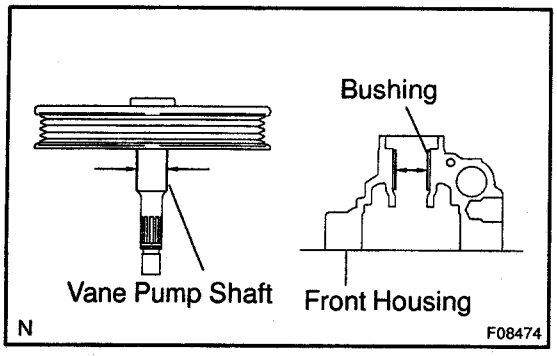
(b) Using a screwdriver, remove the snap ring, vane pump rotor and side plate.

(c) Remove the 2 O–rings from the side plate.

8. REMOVE VANE PUMP SHAFT WITH VANE PUMP PULLEY

SR109-01

INSPECTION

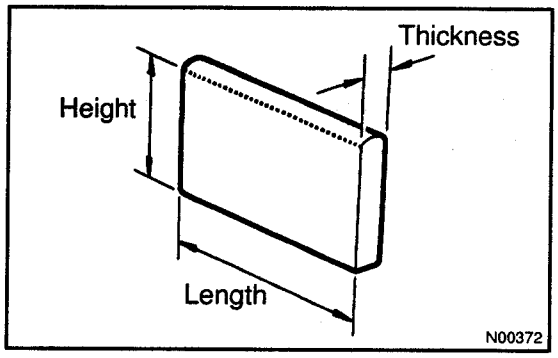


1. MEASURE OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND BUSHING

Using a micrometer and a caliper gauge, measure the oil clearance.

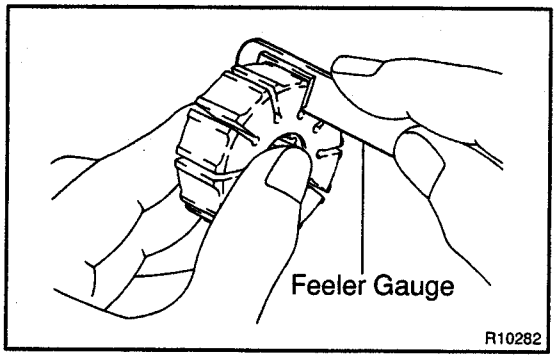
Standard clearance:
0.021 – 0.043 mm (0.0008 – 0.0017 in.)
Maximum clearance: 0.07 mm (0.0028 in.)

If it is more than the maximum, replace the front housing and vane pump shaft.

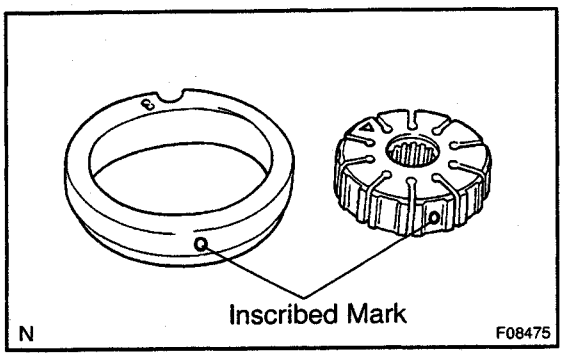


2. INSPECT VANE PUMP ROTOR AND VANE PLATES

(a) Using a micrometer, measure the height, thickness and length of the 10 vane plates.
Minimum height: 7.6 mm (0.299 in.)
Minimum thickness: 1.405 mm (0.0553 in.)
Minimum length: 11.993 mm (0.4722 in.)



(b) Using a feeler gauge, measure the clearance between the vane pump rotor groove and vane plate.
Maximum clearance: 0.03 mm (0.0012 in.)



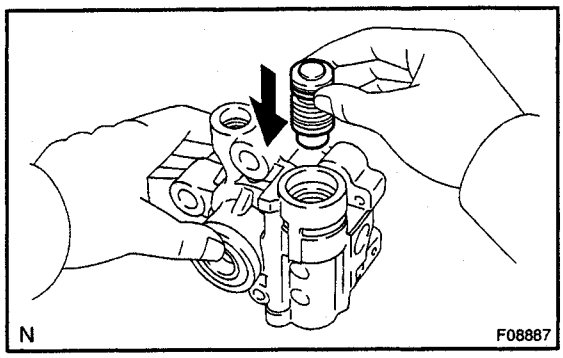
If it is more than the maximum, replace the vane plate and/or vane pump rotor with the one having the same mark stamped on the cam ring.

Inscribed mark: 0, 1, 2, 3, or 4

HINT:

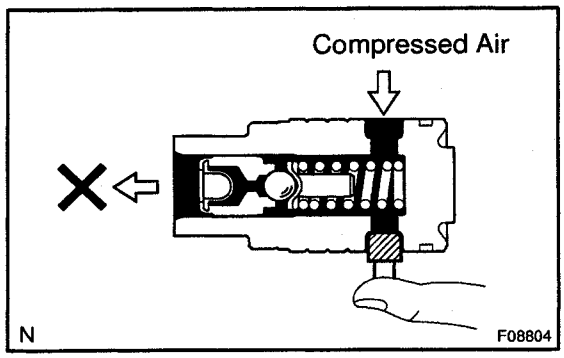
There are 5 vane plate lengths corresponding to the following vane pump rotor and cam ring marks:

Vane pump rotor and cam ring mark	Vane plate part number	Vane plate length mm (in.)
0	44345 – 32100	12.001 – 12.003 (0.47248 – 0.47256)
1	44345 – 32110	11.999 – 12.001 (0.47240 – 0.47248)
2	44345 – 32120	11.997 – 11.999 (0.47232 – 0.47240)
3	44345 – 32130	11.995 – 11.997 (0.47224 – 0.47232)
4	44345 – 32140	11.993 – 11.995 (0.47216 – 0.47224)

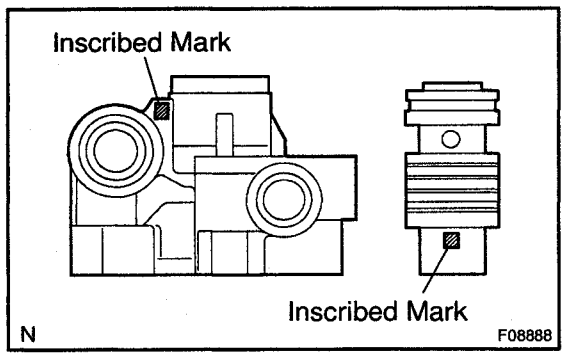


3. INSPECT FLOW CONTROL VALVE

(a) Coat the flow control valve with power steering fluid and check that it falls smoothly into the valve hole of the front housing by its own weight.

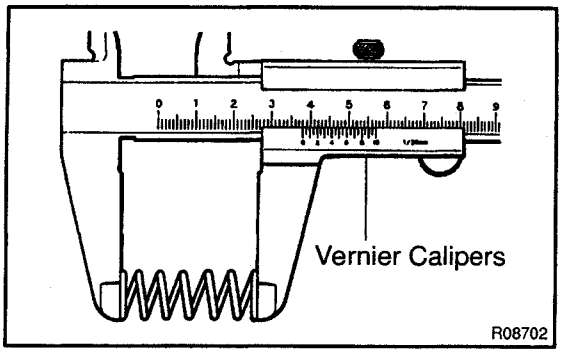


(b) Check the flow control valve for leakage. Close one of the holes and apply compressed air of 392 – 490 kPa (4 – 5 kgf/cm^2, 57 – 71 psi) into the opposite side hole, and confirm that air does not come out from the end hole.



If necessary, replace the flow control valve with the one having the same letter as inscribed on the front housing.

Inscribed mark: A, B, C, D, E or F



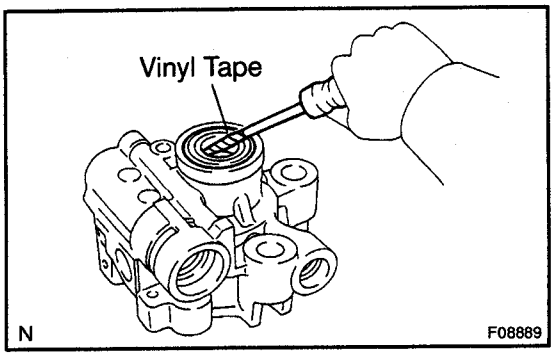
4. INSPECT SPRING

Using vernier calipers, measure the free length of the spring.

Minimum free length: 35.8 mm (1.409 in.)

If it is not within the specification, replace the spring.

SR10A–01



REPLACEMENT

NOTICE:

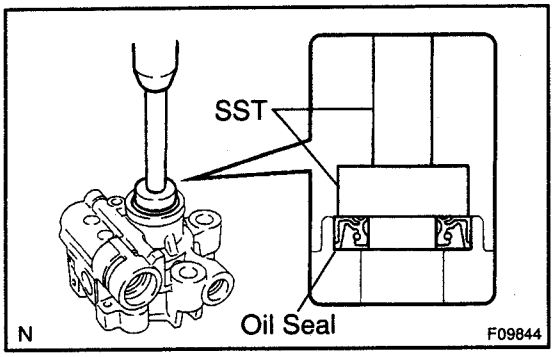
When using a vise, do not overtighten it.

IF NECESSARY, REPLACE OIL SEAL

(a) Using a screwdriver with vinyl tape wound around its tip, remove the oil seal.

NOTICE:

Be careful not to damage the bushing of the front housing.



(b) Coat a new oil seal lip with power steering fluid.

(c) Using SST, press in the oil seal.

SST 09950–60010 (09951–00280),
09950–70010 (09951–07100)

NOTICE:

Make sure that the oil seal is installed facing in the correct direction.

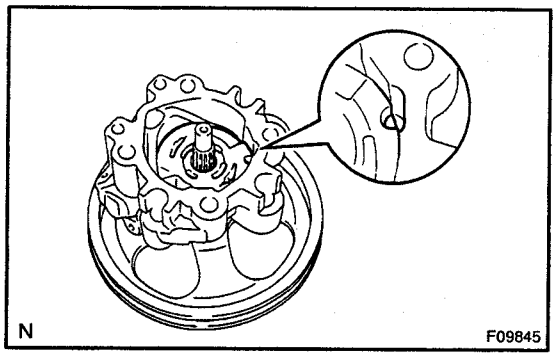
SR10B–02

REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. **COAT PARTS INDICATED BY ARROWS WITH POWER STEERING FLUID (See page SR–13)**
2. **INSTALL VANE PUMP SHAFT WITH VANE PUMP PULLEY**



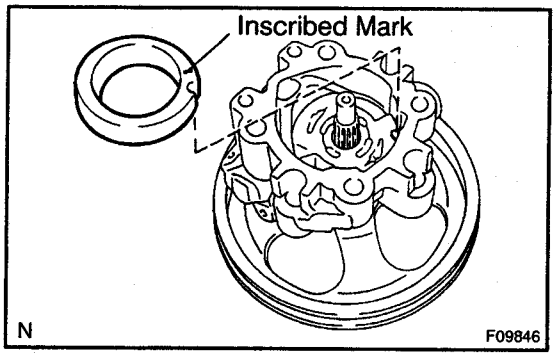
3. **INSTALL SIDE PLATE**

(a) Coat 2 new O–rings with power steering fluid, and install them to the side plate.

(b) Align the dent of the side plate with the dent of the front housing, and install the side plate.

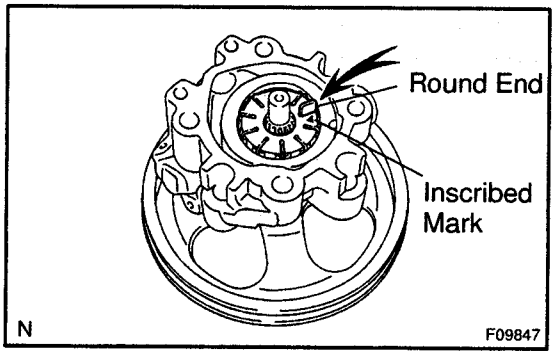
NOTICE:

Make sure that the side plate is installed facing in the correct direction.



4. **INSTALL CAM RING**

Align the dent of the cam ring with the dent of the side plate, and install the cam ring with the inscribed mark facing outward.



5. **INSTALL VANE PUMP ROTOR**

(a) Install the vane pump rotor with the inscribed mark facing outward.

(b) Install a new snap ring to the vane pump shaft.

6. **INSTALL 10 VANE PLATES**

Install the 10 vane plates with the round end facing outward.

7. **INSTALL REAR HOUSING**

(a) Coat a new O–ring with power steering fluid, and install it to the rear housing.

(b) Align the straight pin of the rear housing with the dents of the cam ring, side plate and front housing, and install the rear housing with the 4 bolts.

Torque: 22 N·m (220 kgf·cm, 16 ft·lbf)

8. **INSTALL OIL PRESSURE SENSOR**

(a) Coat a new O–ring with power steering fluid, and install it to the oil pressure sensor.

(b) Install the oil pressure sensor.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

9. INSTALL SPRING, FLOW CONTROL VALVE AND PRESSURE PORT UNION

(a) Install the spring.

(b) Install the flow control valve facing in the correct direction (See page SR–13).

(c) Coat a new O–ring with power steering fluid, and install it to the pressure port union.

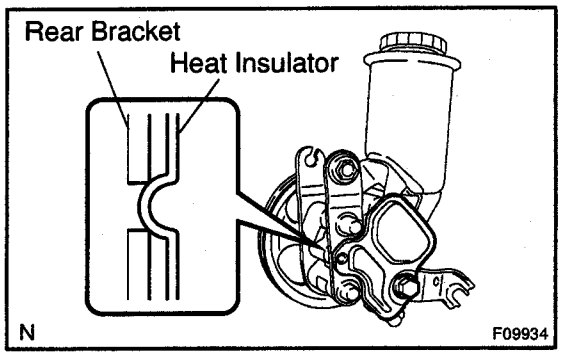
(d) Install the pressure port union.

Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

10. INSTALL FRONT AND REAR BRACKETS

Install the front and rear brackets with the 2 bolts.

Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)



11. INSTALL HEAT INSULATOR AND REAR STAY

Install the heat insulator and rear stay with the bolt.

Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)

NOTICE:

Install the heat insulator, pressing its projection into a hole in the rear bracket, as shown in the illustration.

12. INSTALL OIL RESERVOIR

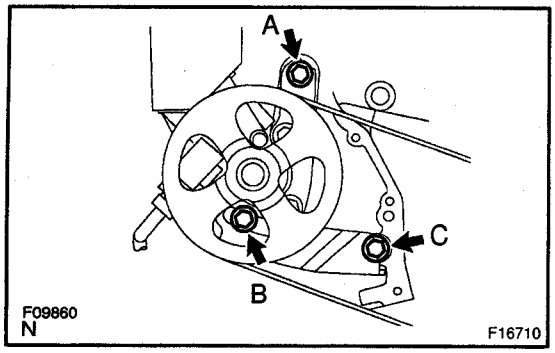
(a) Coat a new O–ring with power steering fluid, and install it to the oil reservoir.

(b) Install the oil reservoir with the 3 bolts.

Torque: 9.0 N·m (90 kgf·cm, 78 in.·lbf)

13. MEASURE PS VANE PUMP ROTATING TORQUE (See page SR–13)

SR10C–02



INSTALLATION

1. INSTALL PS VANE PUMP ASSEMBLY

(a) Temporarily install the PS vane pump assembly with the bolt A.

(b) Install the adjusting strut with the bolt C.
Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)

(c) Temporarily install the bolt B.

2. INSTALL DRIVE BELT

(a) Install the drive belt and adjust the drive belt tension (See page SR–1).

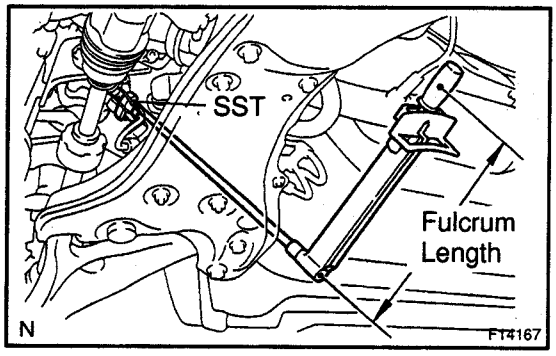
(b) Torque the bolt A.
Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)

(c) Torque the bolt B.
Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)

3. CONNECT OIL PRESSURE SENSOR CONNECTOR

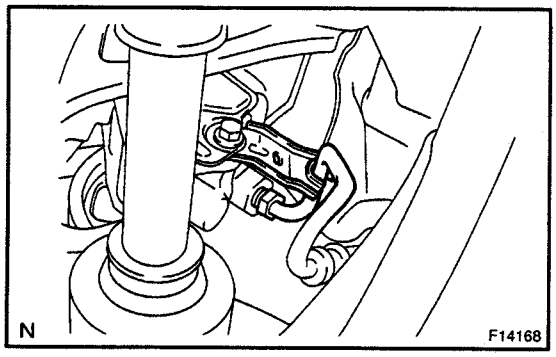
NOTICE:

Be careful to prevent oil from being attached to the connector.



4. CONNECT PRESSURE FEED TUBE

Using SST, connect the pressure feed tube.
SST 09023–12700
Torque: 41 N·m (415 kgf·cm, 30 ft·lbf)



NOTICE:

Check that the pressure feed tube is properly installed to the rear stay.

HINT:

- Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).
- This torque value is effective in case that SST is parallel to a torque wrench.

5. CONNECT RETURN HOSE

Connect the return hose with the clip.

6. INSTALL ENGINE UNDER COVER

7. BLEED POWER STEERING SYSTEM
(See Pub. No. RM685E on page SR–7)

8. INSTALL OIL RESERVOIR TANK COVER

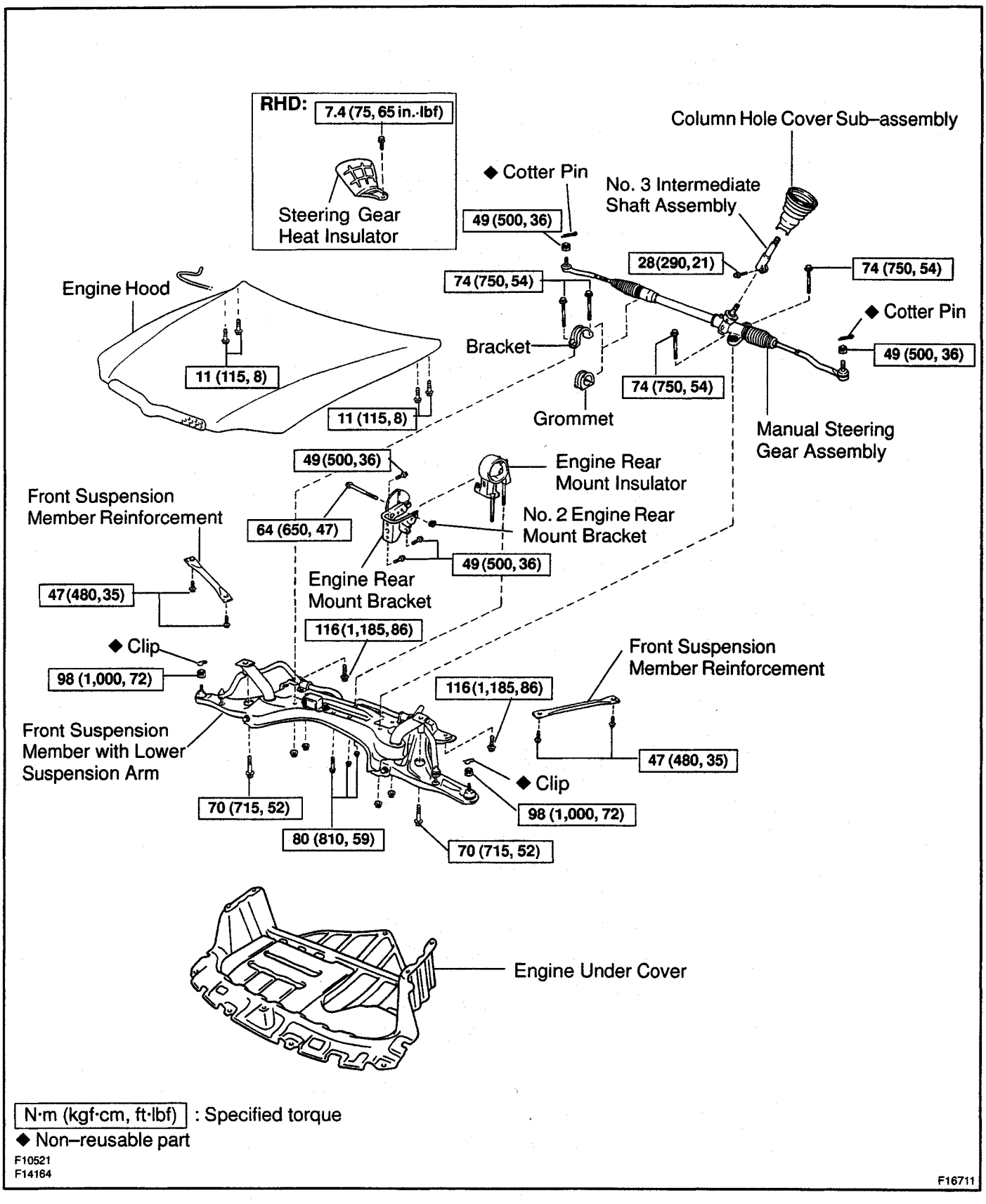
NOTICE:

Push the oil reservoir tank cover completely.

MANUAL STEERING GEAR (1ND–TV)

COMPONENTS

SR10D–02



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

F10521
F14164

F16711

SR10E–02

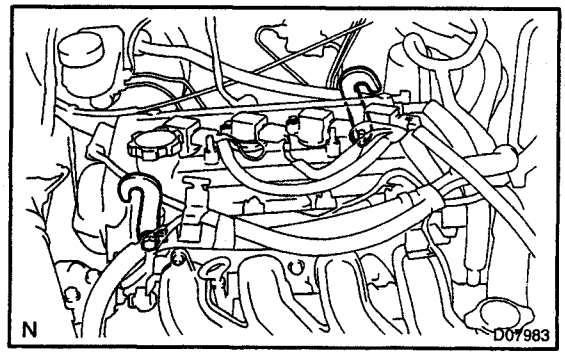
REMOVAL

NOTICE:

w/ Airbag:

Remove the steering wheel assembly before the steering gear removal, because there is possibility of breaking of the spiral cable.

1. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
2. **w/ Airbag:**
   REMOVE STEERING WHEEL PAD (See page SR–7)
3. **w/ Airbag:**
   REMOVE STEERING WHEEL (See page SR–7)
4. **REMOVE ENGINE UNDER COVER**
5. **DISCONNECT RH AND LH TIE ROD ENDS**
   (See Pub. No. RM685E on page SA–10)
6. **REMOVE NO. 2 COLUMN HOLE COVER**
   (See page SR–7)
7. **DISCONNECT SLIDING YOKE (See page SR–7)**
8. **REMOVE ENGINE HOOD**
   (See Pub. No. RM685E on page BO–16)



9. **ATTACH ENGINE SLING DEVICE TO ENGINE HANGERS**

(a) Install the 2 No. 1 engine hangers with the bolt in the correct direction.

Parts No.:
No. 1 engine hanger: 12281–21010
Bolt: 91511–60818
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(b) Attach the engine chain hoist to the engine hangers.

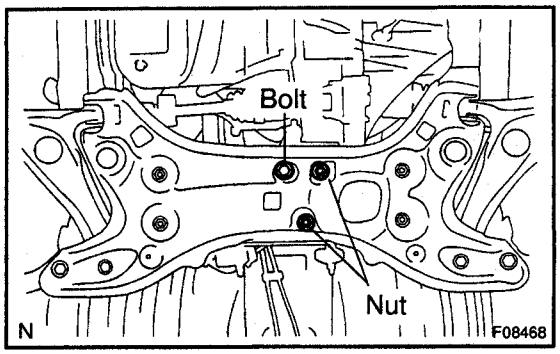
CAUTION:

Do not attempt to hang the engine by hooking the chain to any other part.

10. **DISCONNECT LOWER SUSPENSION ARM FROM STEERING KNUCKLE (See Pub. No. RM737E on page SA–17)**
11. **REMOVE RH AND LH FRONT SUSPENSION MEMBER REINFORCEMENT**

(a) Remove the 2 bolts and front suspension member reinforcement.

(b) Employ the same manner described above to the other side.

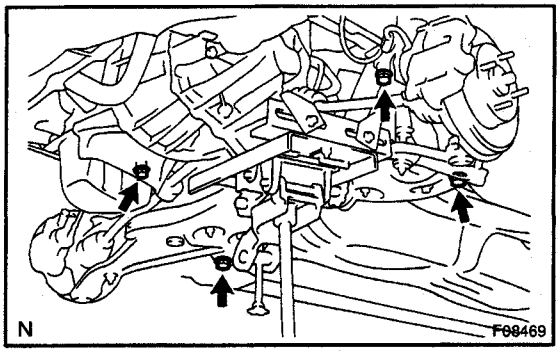


12. DISCONNECT ENGINE REAR MOUNT INSULATOR AND FRONT SUSPENSION MEMBER

Remove the bolt and 2 nuts, and disconnect the engine rear mount insulator and front suspension member.

13. SUPPORT FRONT SUSPENSION MEMBER WITH LOWER SUSPENSION ARM

Using a transmission jack, support the front suspension member with lower suspension arm.



14. REMOVE FRONT SUSPENSION MEMBER WITH LOWER SUSPENSION ARM AND MANUAL STEERING GEAR ASSEMBLY

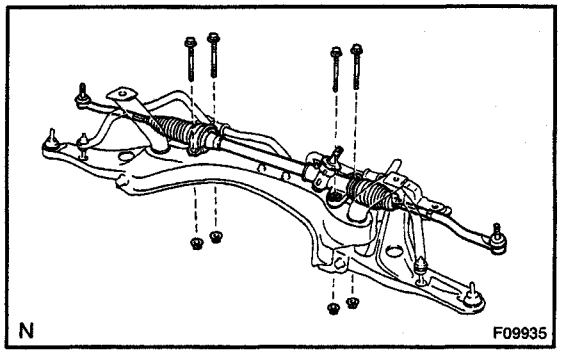
(a) Disconnect the column hole cover sub–assembly.

(b) Remove the 4 bolts and front suspension member with lower suspension arm and manual steering gear assembly.

15. REMOVE MANUAL STEERING GEAR ASSEMBLY

(a) RHD:
Remove the bolt and steering gear heat insulator.

(b) Remove the column hole cover sub–assembly.

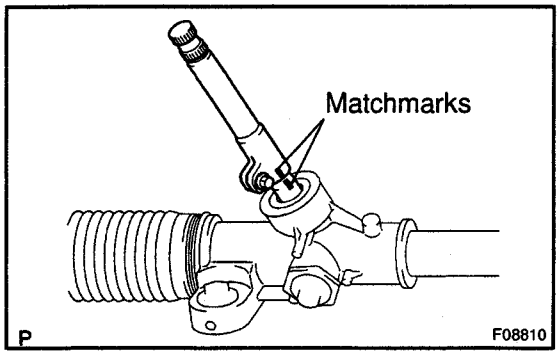


(c) Remove the 4 bolts, nuts and manual steering gear assembly from the front suspension member.

NOTICE:

Because the nut has its own stopper, do not turn the nut and torque the bolt with the nut fixed.

(d) Remove the bracket and grommet from the manual steering gear assembly.



(e) Place matchmarks on the No. 3 intermediate shaft assembly and steering pinion.

(f) Remove the bolt and No. 3 intermediate shaft assembly.

16. REMOVE ENGINE REAR MOUNT INSULATOR AND ENGINE REAR MOUNT BRACKET

(a) Remove the through bolt, No. 2 engine rear mount bracket and engine rear mount insulator.

(b) Remove the 3 bolts and engine rear mount bracket.

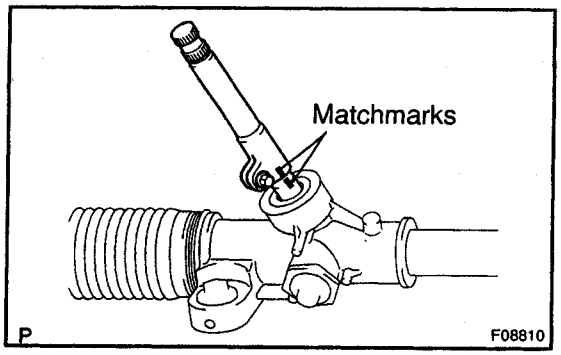
SR10F–02

INSTALLATION

1. INSTALL ENGINE REAR MOUNT INSULATOR AND ENGINE REAR MOUNT BRACKET

(a) Install the engine rear mount bracket with the 3 bolts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

(b) Install the engine rear mount insulator with the through bolt and No. 2 engine rear mount bracket.
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

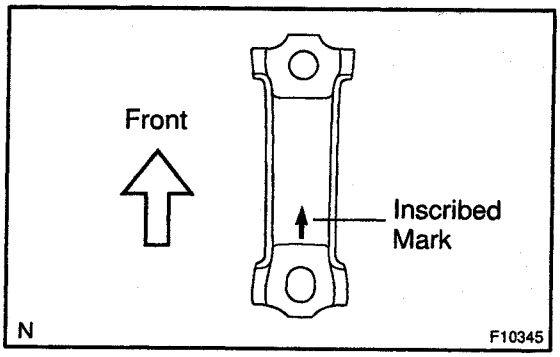


2. INSTALL MANUAL STEERING GEAR ASSEMBLY

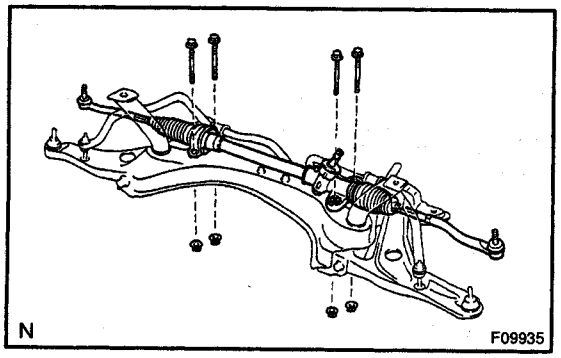
(a) Align the matchmarks on the No. 3 intermediate shaft assembly and steering pinion.

(b) Install the No. 3 intermediate shaft assembly with the bolt.
Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

(c) Install the grommet and bracket to the manual steering gear assembly.



HINT:
Install the bracket with the inscribed mark facing to the front of the vehicle.



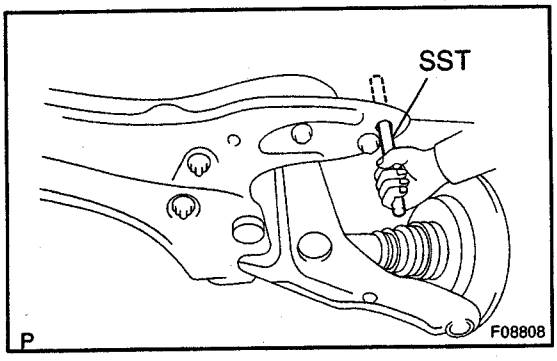
(d) Install the manual steering gear assembly with the 4 bolts and nuts to the front suspension member.
Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)

NOTICE:
Because the nut has its own stopper, do not turn the nut and torque the bolt with the nut fixed.

(e) Install the column hole cover sub–assembly.

(f) RHD:
Install the steering gear heat insulator with the bolt.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

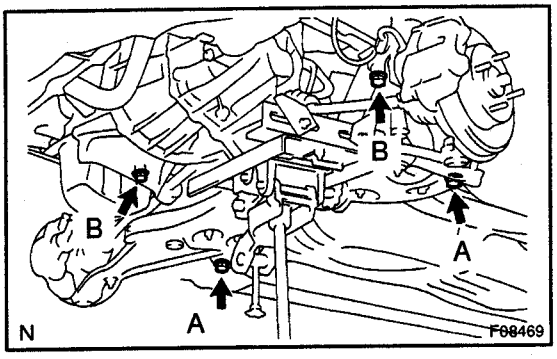
HINT:
When assembling the steering gear heat insulator, set a projection of the column hole cover sub–assembly to the interlocking port of the steering gear heat insulator.



3. INSTALL FRONT SUSPENSION MEMBER WITH LOWER SUSPENSION ARM AND MANUAL STEERING GEAR ASSEMBLY

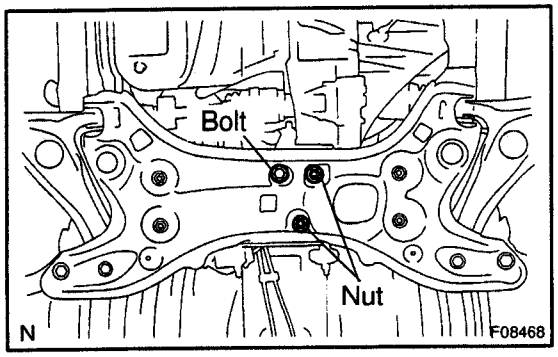
(a) Using SST, align the holes of the front suspension member and body.
SST 09670–00010

(b) Employ the same manner described above to the other side.



(c) Install the front suspension member with lower suspension arm and manual steering gear assembly with the 4 bolts.
Torque:
Bolt A: 116 N·m (1,185 kgf·cm, 86 ft·lbf)
Bolt B: 70 N·m (715 kgf·cm, 52 ft·lbf)

(d) Connect the column hole cover sub–assembly.



4. CONNECT ENGINE REAR MOUNT INSULATOR AND FRONT SUSPENSION MEMBER

Connect the engine rear mount insulator and front suspension member with the bolt and 2 nuts.
Torque: 80 N·m (810 kgf·cm, 59 ft·lbf)

5. INSTALL RH AND LH FRONT SUSPENSION MEMBER REINFORCEMENT

(a) Install the front suspension member reinforcement with the 2 bolts.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

(b) Employ the same manner described above to the other side.

6. CONNECT LOWER SUSPENSION ARM TO STEERING KNUCKLE (See Pub. No. RM737E on page SA–18)

7. DISENGAGE ENGINE SLING DEVICE FROM ENGINE HANGERS

(a) Disengage the engine chain hoist from the engine hangers.

(b) Remove the 2 No. 1 engine hangers.

8. INSTALL ENGINE HOOD
(See Pub. No. RM685E on page BO–16)

9. CONNECT SLIDING YOKE (See page SR–10)

10. INSTALL NO. 2 COLUMN HOLE COVER
(See page SR–10)

11. CONNECT RH AND LH TIE ROD ENDS
(See Pub. No. RM685E on page SA–14)

12. INSTALL ENGINE UNDER COVER

13. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

HINT:

Do it with the front of the vehicle jacked up.

14. w/ Airbag:
CENTER SPIRAL CABLE (See page SR–10)

15. w/ Airbag:
INSTALL STEERING WHEEL

(a) Align the matchmarks on the steering wheel and steering column main shaft.

(b) Temporarily tighten the steering wheel set nut.

16. w/ Airbag:
CHECK STEERING WHEEL CENTER POINT

17. w/ Airbag:
TORQUE STEERING WHEEL SET NUT
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

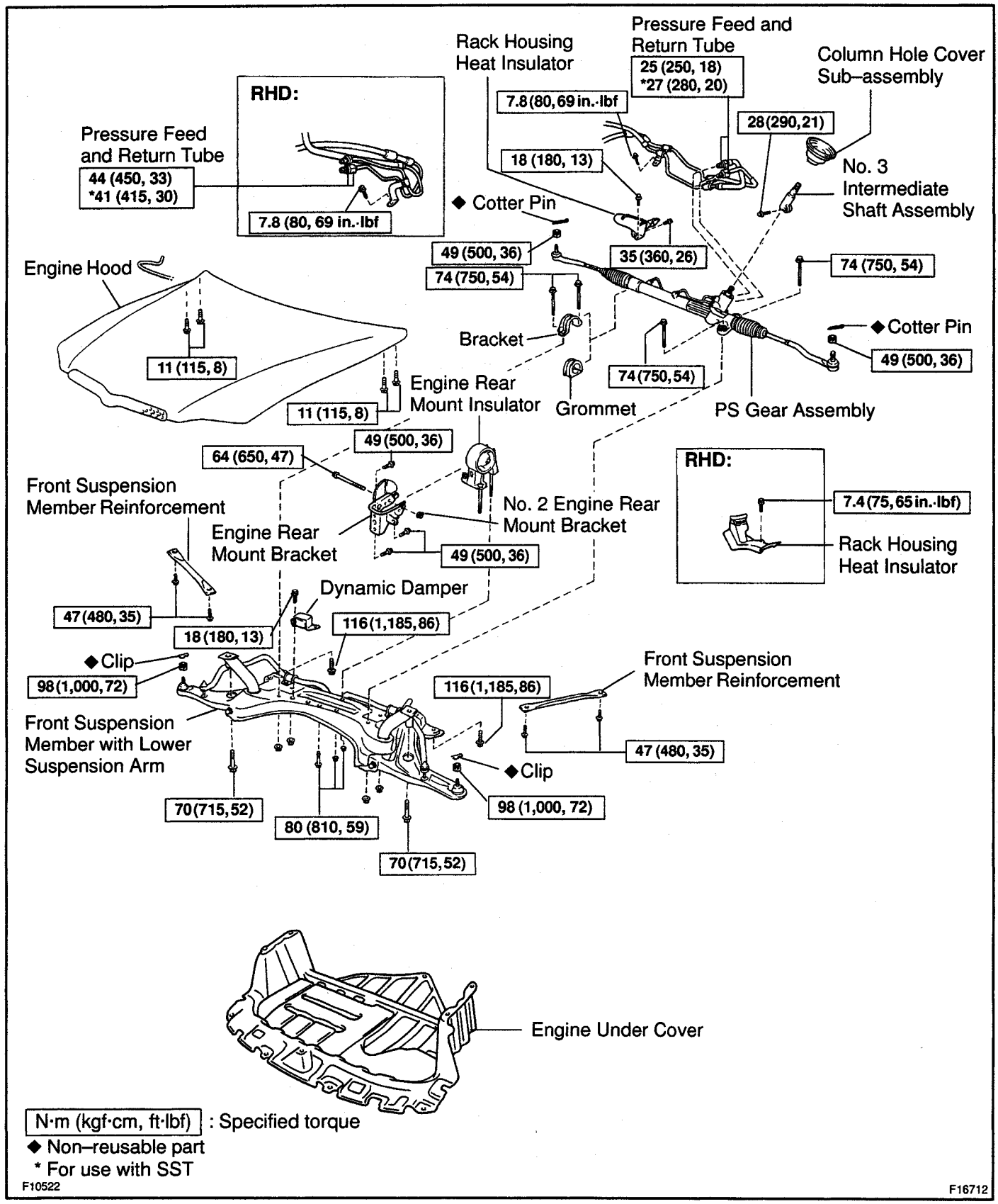
18. w/ Airbag:
INSTALL STEERING WHEEL PAD (See page SR–10)

19. CHECK FRONT WHEEL ALIGNMENT
(See page SA–3)

POWER STEERING GEAR (1ND–TV)

COMPONENTS

SR10G–02



SR10H–02

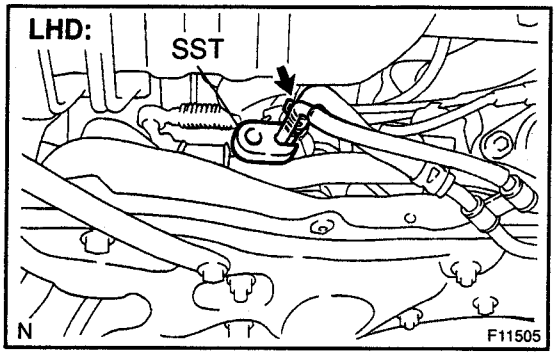
REMOVAL

NOTICE:

w/ Airbag:

Remove the steering wheel assembly before the steering gear removal, because there is possibility of breaking of the spiral cable.

1. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
2. **w/ Airbag:**
   REMOVE STEERING WHEEL PAD (See page SR–7)
3. **w/ Airbag:**
   REMOVE STEERING WHEEL (See page SR–7)
4. **REMOVE RH AND LH ENGINE UNDER COVERS**
5. **DISCONNECT RH AND LH TIE ROD ENDS**
   (See Pub. No. RM685E on page SA–10)
6. **REMOVE NO. 2 COLUMN HOLE COVER**
   (See page SR–7)
7. **DISCONNECT SLIDING YOKE (See page SR–7)**

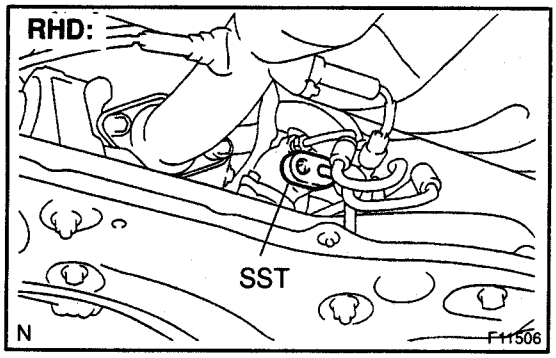


8. **DISCONNECT PRESSURE FEED AND RETURN TUBES**

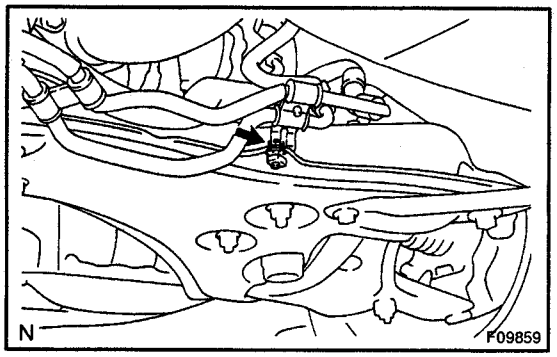
(a) Disconnect the column hole cover sub–assembly.

(b) LHD:
Remove the clip and disconnect the return hose.

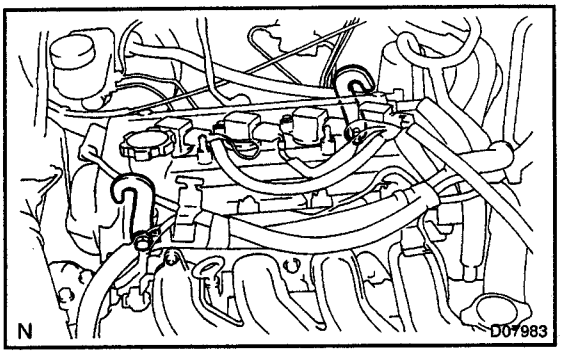
(c) LHD:
Using SST, disconnect the pressure feed and return tubes.
SST 09023–12900



(d) RHD:
Using SST, disconnect the pressure feed and return tubes.
SST 09023–12700



9. **DISCONNECT TUBE CLAMP**
Remove the bolt and disconnect the tube clamp.
10. **REMOVE ENGINE HOOD**
(See Pub. No. RM685E on page BO–16)



11. ATTACH ENGINE SLING DEVICE TO ENGINE HANGERS

(a) Install the 2 No. 1 engine hangers with the bolt in the correct direction.

Parts No.:
No. 1 engine hanger: 12281–21010
Bolt: 91511–60818
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(b) Attach the engine chain hoist to the engine hangers.

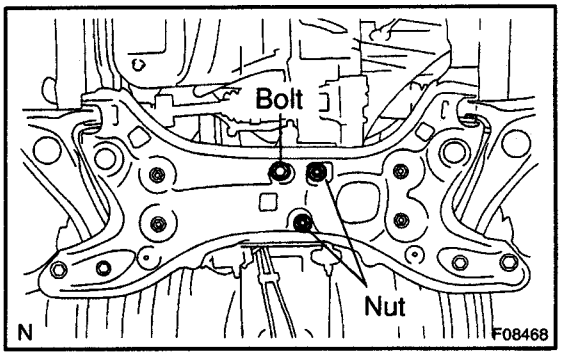
CAUTION:
Do not attempt to hang the engine by hooking the chain to any other part.

12. DISCONNECT LOWER SUSPENSION ARM FROM STEERING KNUCKLE (See Pub. No. RM737E on page SA–17)

13. REMOVE RH AND LH FRONT SUSPENSION MEMBER REINFORCEMENT

(a) Remove the 2 bolts and front suspension member reinforcement.

(b) Employ the same manner described above to the other side.

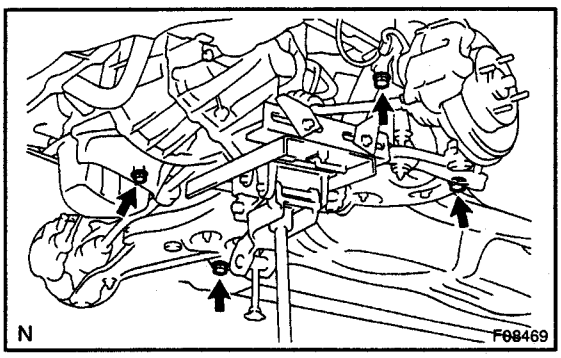


14. DISCONNECT ENGINE REAR MOUNT INSULATOR AND FRONT SUSPENSION MEMBER

Remove the bolt and 2 nuts, and disconnect the engine rear mount insulator and front suspension member.

15. SUPPORT FRONT SUSPENSION MEMBER WITH LOWER SUSPENSION ARM

Using a transmission jack, support the front suspension member with lower suspension arm.



16. REMOVE FRONT SUSPENSION MEMBER WITH LOWER SUSPENSION ARM AND PS GEAR ASSEMBLY

Remove the 4 bolts and front suspension member with lower suspension arm and PS gear assembly.

17. REMOVE PS GEAR ASSEMBLY

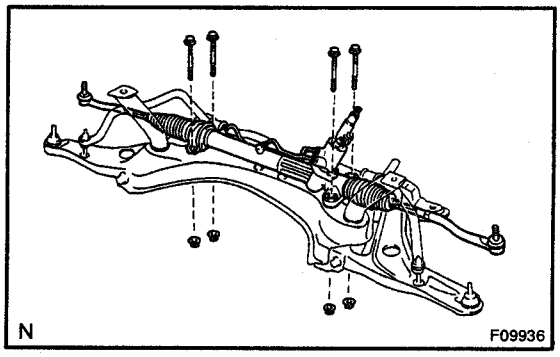
(a) RHD:
Remove the bolt and rack housing heat insulator.

(b) LHD:
Remove the stabilizer bar (See Pub. No. RM737E on page SA–20).

(c) LHD:
Remove the bolt of the rack housing heat insulator.

(d) LHD:
Remove the 2 bolts, rack housing heat insulator and dynamic damper.

(e) Remove the column hole cover sub–assembly.

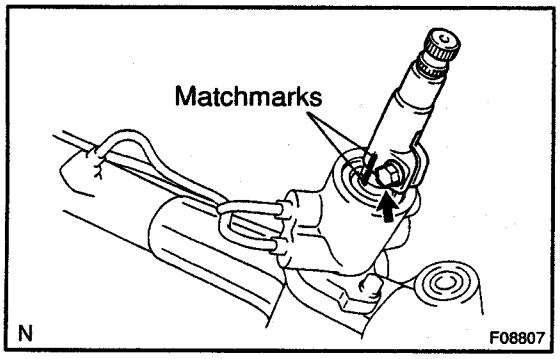


(f) Remove the 4 bolts, nuts and PS gear assembly from the front suspension member.

NOTICE:

Because the nut has its own stopper, do not turn the nut and torque the bolt with the nut fixed.

(g) Remove the bracket and grommet from the PS gear assembly.



(h) Place matchmarks on the No. 3 intermediate shaft assembly and control valve shaft.

(i) Remove the bolt and No. 3 intermediate shaft assembly.

18. REMOVE ENGINE REAR MOUNT INSULATOR AND ENGINE REAR MOUNT BRACKET

(a) Remove the through bolt, No. 2 engine rear mount bracket and engine rear mount insulator.

(b) Remove the 3 bolts and engine rear mount bracket.

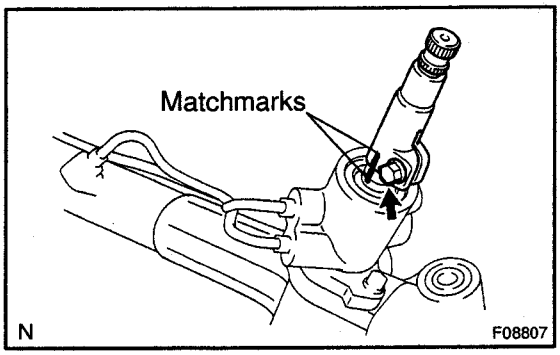
SR10I–02

INSTALLATION

1. INSTALL ENGINE REAR MOUNT INSULATOR AND ENGINE REAR MOUNT BRACKET

(a) Install the engine rear mount bracket with the 3 bolts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

(b) Install the engine rear mount insulator with the through bolt and No. 2 engine rear mount bracket.
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

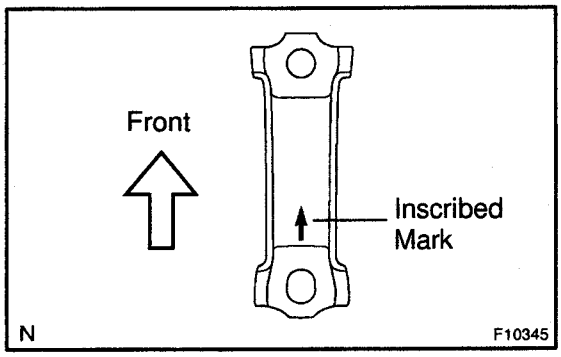


2. INSTALL PS GEAR ASSEMBLY

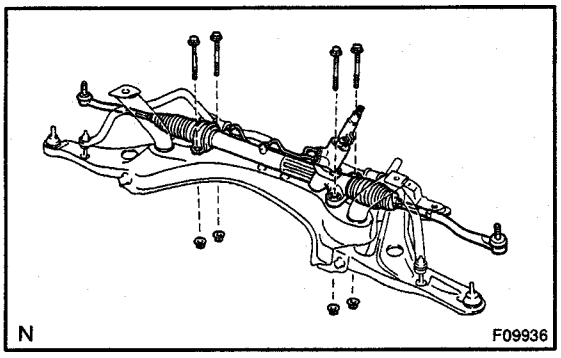
(a) Align the matchmarks on the No. 3 intermediate shaft assembly and control valve shaft.

(b) Install the No. 3 intermediate shaft assembly with the bolt.
Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

(c) Install the grommet and bracket to the PS gear assembly.



HINT:
Install the bracket with the inscribed mark facing to the front of the vehicle.



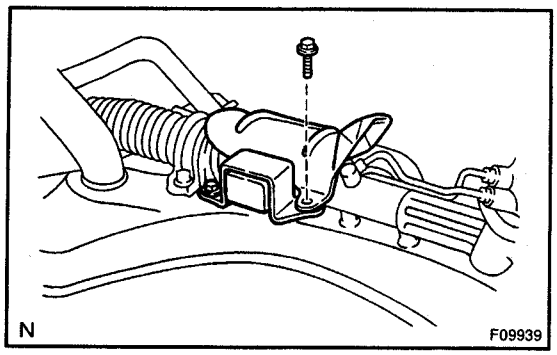
(d) Install the PS gear assembly with the 4 bolts and nuts to the front suspension member.
Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)

NOTICE:
Because the nut has its own stopper, do not turn the nut and torque the bolt with the nut fixed.

(e) Install the column hole cover sub–assembly.

(f) RHD:
Install the rack housing heat insulator with the bolt.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

HINT:
When assembling the steering gear heat insulator, set a projection of the column hole cover sub–assembly to the interlocking port of the steering gear heat insulator.



(g) LHD:
Install the dynamic damper and rack housing heat insulator with the 2 bolts as sown in the illustration.
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

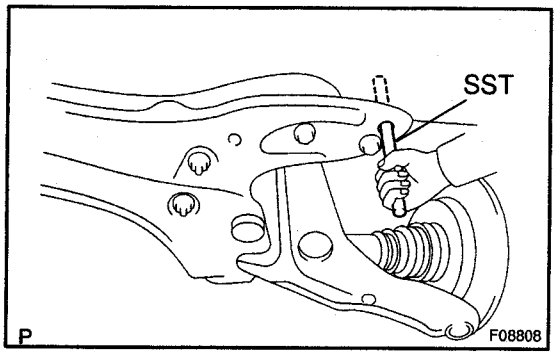
(h) LHD:
Install the bolt of the rack housing heat insulator.
Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

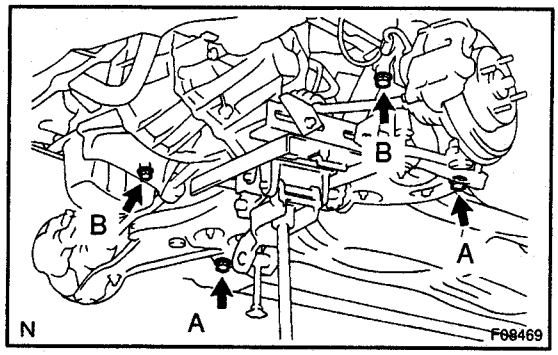
(i) LHD:
Install the stabilizer bar (See Pub. No. RM737E on page SA–22).

3. INSTALL FRONT SUSPENSION MEMBER WITH LOWER SUSPENSION ARM AND PS GEAR ASSEMBLY

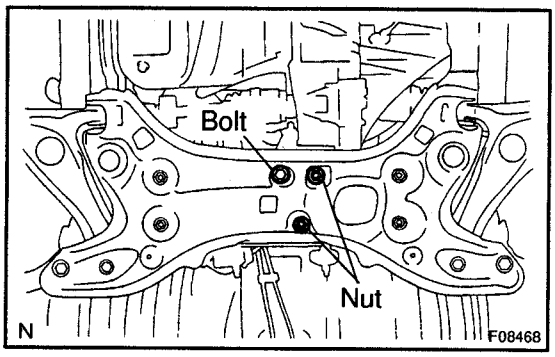
(a) Using SST, align the holes of the front suspension member and body.
SST 09670–00010

(b) Employ the same manner described above to the other side.





(c) Install the front suspension member with lower suspension arm and PS gear assembly with the 4 bolts.
Torque:
Bolt A: 116 N·m (1,185 kgf·cm, 86 ft·lbf)
Bolt B: 70 N·m (715 kgf·cm, 52 ft·lbf)



4. CONNECT ENGINE REAR MOUNT INSULATOR AND FRONT SUSPENSION MEMBER

Connect the engine rear mount insulator and front suspension member with the bolt and 2 nuts.
Torque: 80 N·m (810 kgf·cm, 59 ft·lbf)

5. INSTALL RH AND LH FRONT SUSPENSION MEMBER REINFORCEMENT

(a) Install the front suspension member reinforcement with the 2 bolts.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

(b) Employ the same manner described above to the other side.

6. CONNECT LOWER SUSPENSION ARM TO STEERING KNUCKLE (See Pub. No. RM737E on page SA–18)

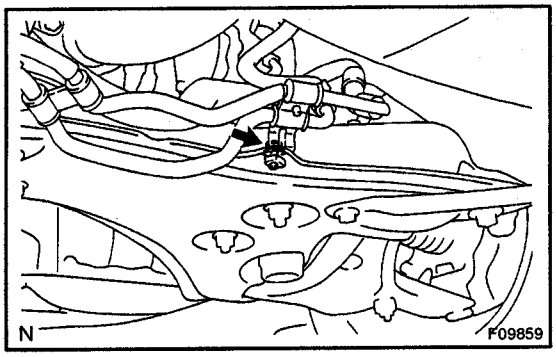
7. DISENGAGE ENGINE SLING DEVICE FROM ENGINE HANGERS

(a) Disengage the engine chain hoist from the engine hangers.

(b) Remove the 2 No. 1 engine hangers.

8. INSTALL ENGINE HOOD

(See Pub. No. RM685E on page BO–16)

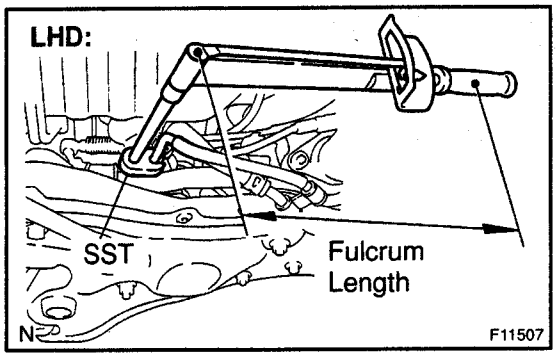


9. CONNECT TUBE CLAMP

(a) Temporarily connect the pressure feed and return tubes.

(b) Connect the tube clamp with the bolt.

Torque: 7.8 N·m (80 kgf·cm, 69 in.·lbf)



10. CONNECT PRESSURE FEED AND RETURN TUBES

(a) LHD:

Using SST, connect the pressure feed and return tubes.

SST 09023–12900

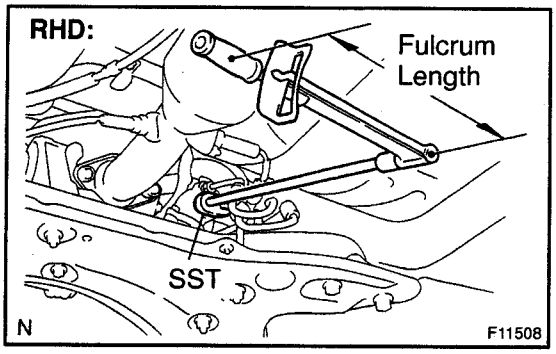
Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)

HINT:

- Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- This torque value is effective in case that SST is parallel to a torque wrench.

(b) LHD:

Connect the return hose with the clip.



(c) RHD:
Using SST, connect the pressure feed and return tubes.
SST 09023–12700
Torque: 41 N·m (415 kgf·cm, 30 ft·lbf)

HINT:

- Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).
- This torque value is effective in case that SST is parallel to a torque wrench.

(d) Connect the column hole cover sub–assembly.

11. CONNECT SLIDING YOKE (See page SR–10)
12. INSTALL NO. 2 COLUMN HOLE COVER (See page SR–10)
13. CONNECT RH AND LH TIE ROD ENDS (See Pub. No. RM685E on page SA–14)
14. INSTALL RH AND LH ENGINE UNDER COVERS
15. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

HINT:
Do it with the front of the vehicle jacked up.

16. w/ Airbag:
CENTER SPIRAL CABLE (See page SR–10)
17. w/ Airbag:
INSTALL STEERING WHEEL

(a) Align the matchmarks on the steering wheel and steering column main shaft.
(b) Temporarily tighten the steering wheel set nut.

18. BLEED POWER STEERING SYSTEM (See Pub. No. RM685E on page SR–7)
19. w/ Airbag:
CHECK STEERING WHEEL CENTER POINT
20. w/ Airbag:
TORQUE STEERING WHEEL SET NUT
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)
21. w/ Airbag:
INSTALL STEERING WHEEL PAD (See page SR–10)
22. CHECK FRONT WHEEL ALIGNMENT (See page SA–3)

BODY ELECTRICAL

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

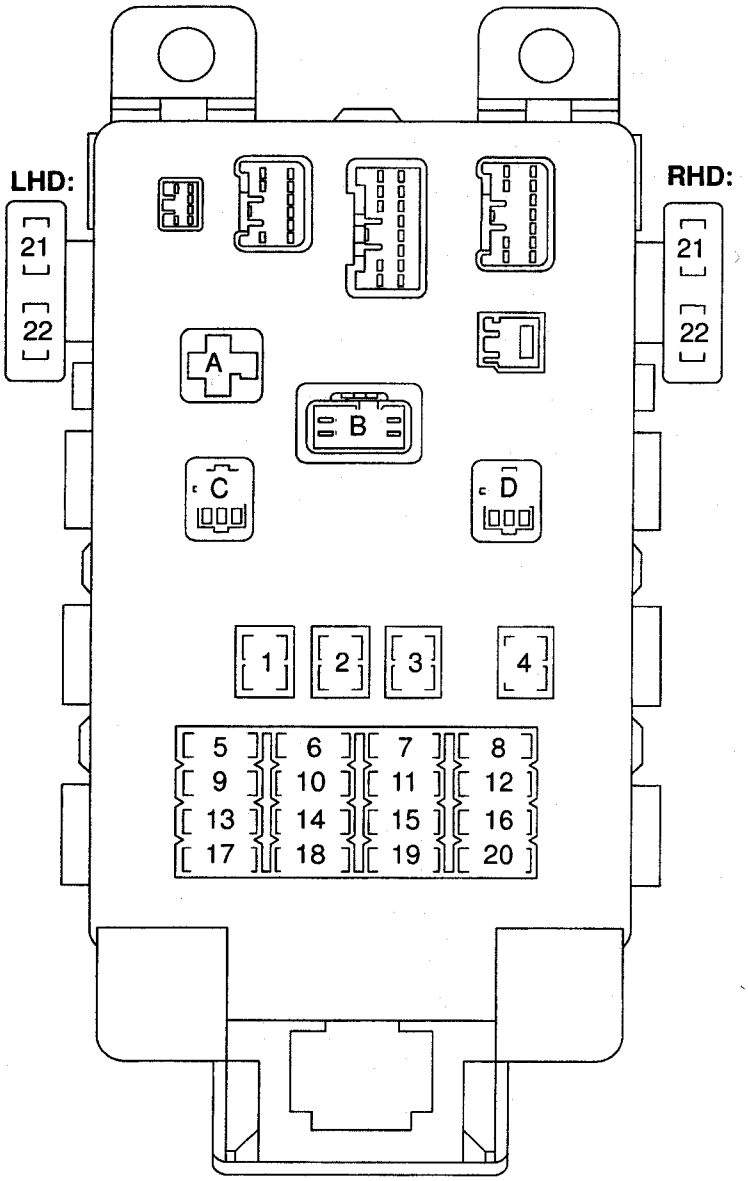
NOTE: The above pages contain only the points which differ from the above listed manuals.

POWER SOURCE

LOCATION

BE2BH-01

Instrument panel junction block (1ND–TV):



Fuses

1. AM1 Fuse
2. POWER Fuse
3. HTR Fuse
4. –
5. GAUGE Fuse
6. DEF Fuse
7. D/L Fuse
8. TAIL Fuse
9. –
10. WIPER Fuse
11. ECU–B Fuse
12. –
13. ACC Fuse
14. ECU–IG Fuse
15. OBD Fuse
16. HAZ Fuse
17. A/C Fuse
18. S–HTR Fuse
19. –
20. STOP Fuse
21. I/UP Fuse
22. EFI No. 2 Fuse

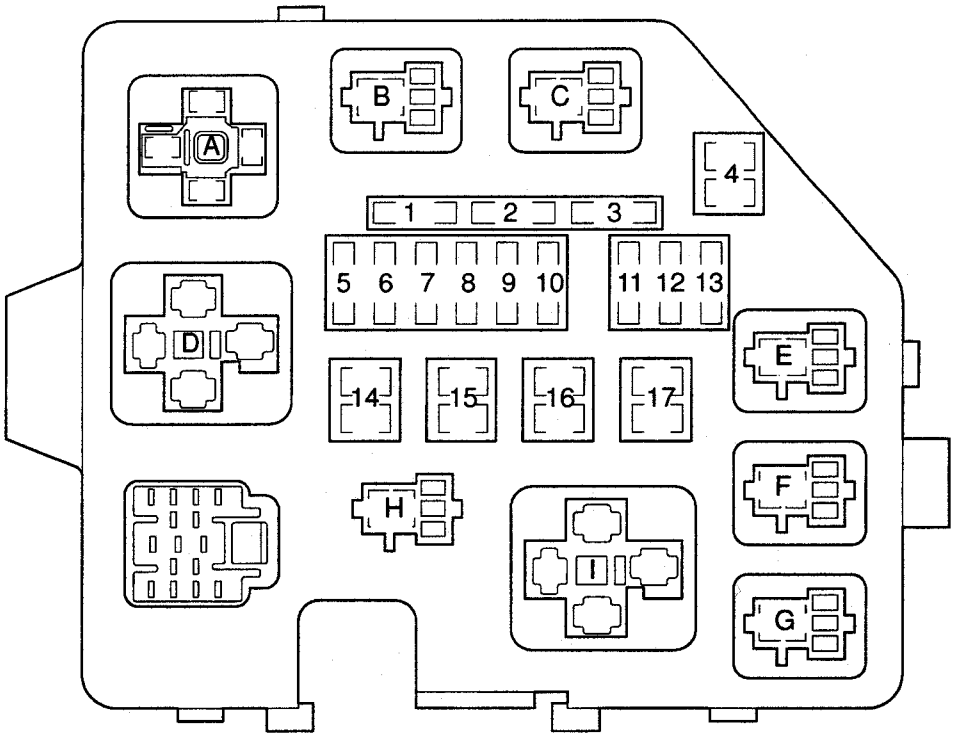
Relays

A. Heater Relay
B. FLASHER Relay
C. Power Main Relay
D. C/OPN Relay

C

I23708

Engine room relay block No. 1 (1ND–TV):



Fuses

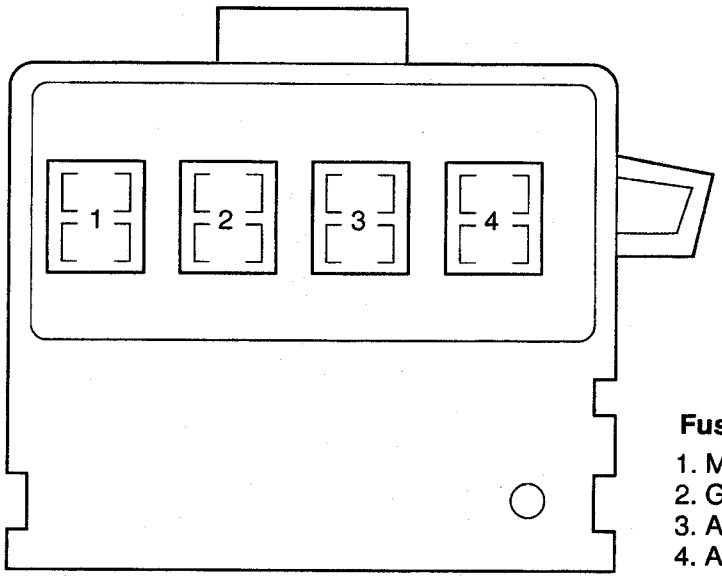
1. SPARE Fuse
2. SPARE Fuse
3. –
4. –
5. DOME Fuse
6. ECD Fuse
7. HORN Fuse
8. AM2 Fuse
9. ST Fuse
10. FUEL HTR Fuse
11. H–LP LH Fuse
12. H–LP RH Fuse
13. ECD2 Fuse
14. –
15. RDI Fuse
16. HTR SUB1 Fuse
17. HTR SUB2 Fuse

15. RDI Fuse
16. HTR SUB1 Fuse
17. HTR SUB2 Fuse

Relays

A. ST Relay
B. FAN NO. 2 Relay
C. FAN NO. 1 Relay
D. HTR SUB2 Relay
E. EFI Relay
F. A/C MG Relay
G. HORN Relay
H. FUEL HTR Relay
I. HTR SUB Relay

Fusible link block (1ND–TV):



Fuses
1. MAIN Fuse
2. GLOW Fuse
3. ALT Fuse
4. ABS Fuse

Y

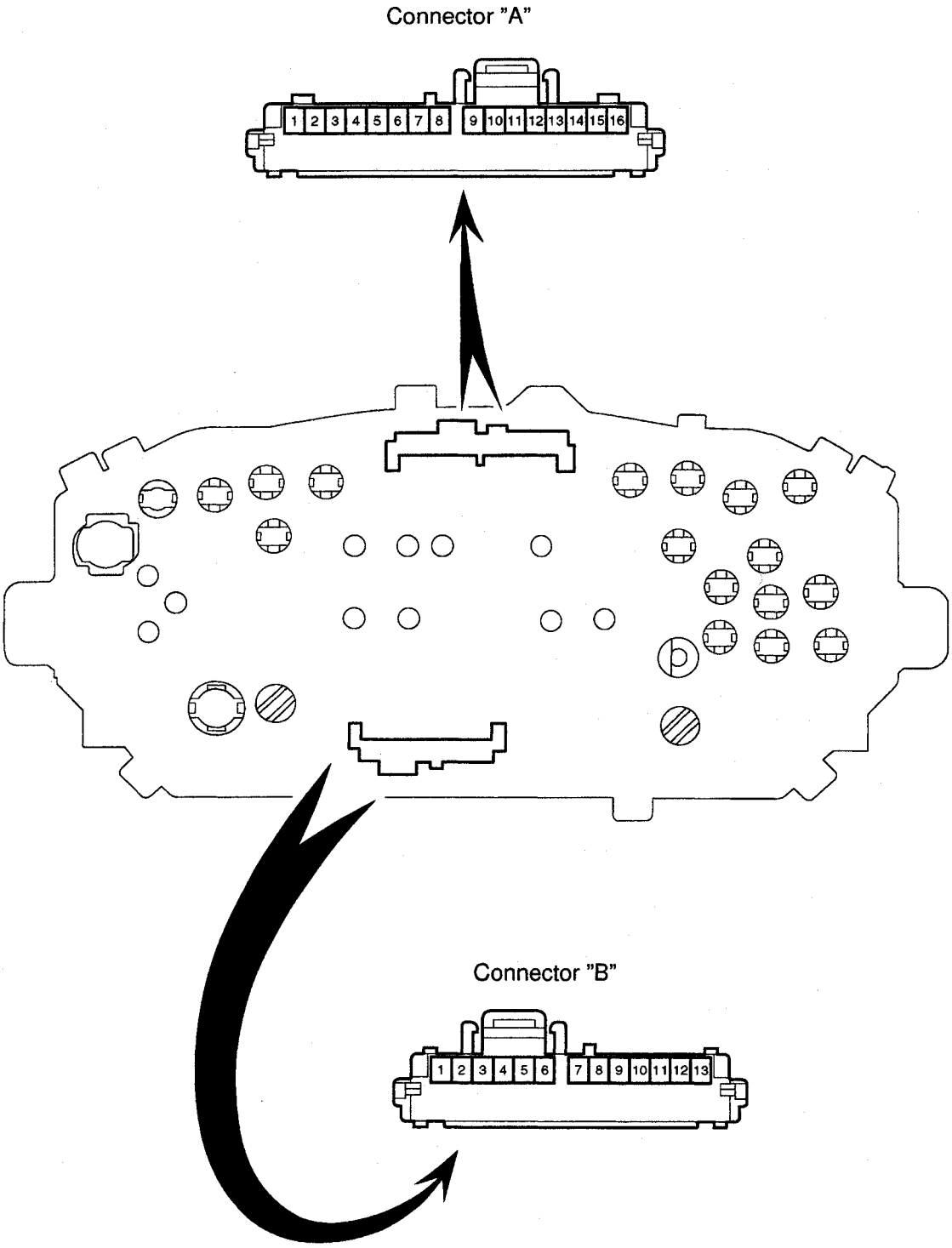
I12358

COMBINATION METER

BE2BI-01

CIRCUIT

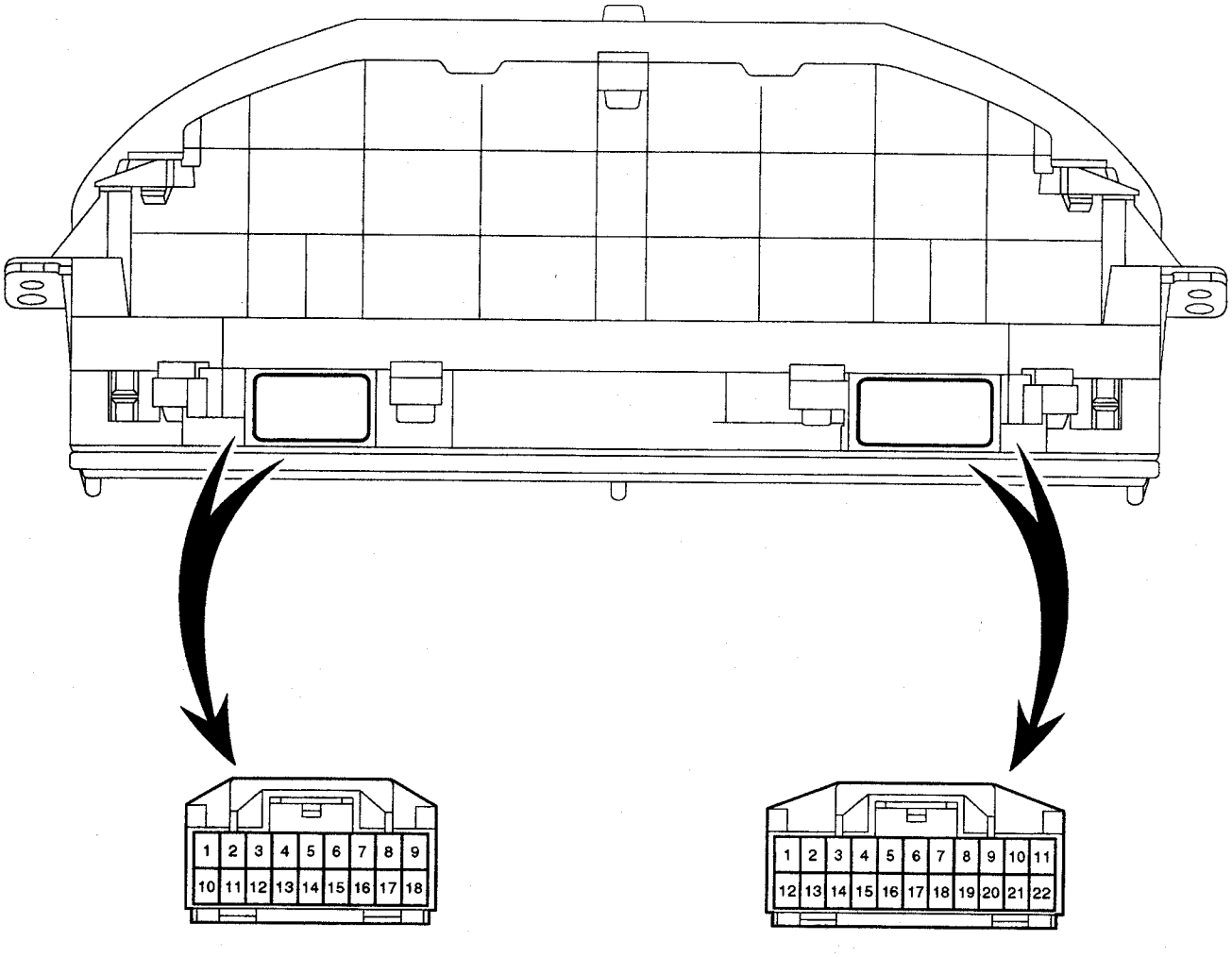
Except Middle East models:
Analog meter



N

I12356

Middle East models:
Analog meter



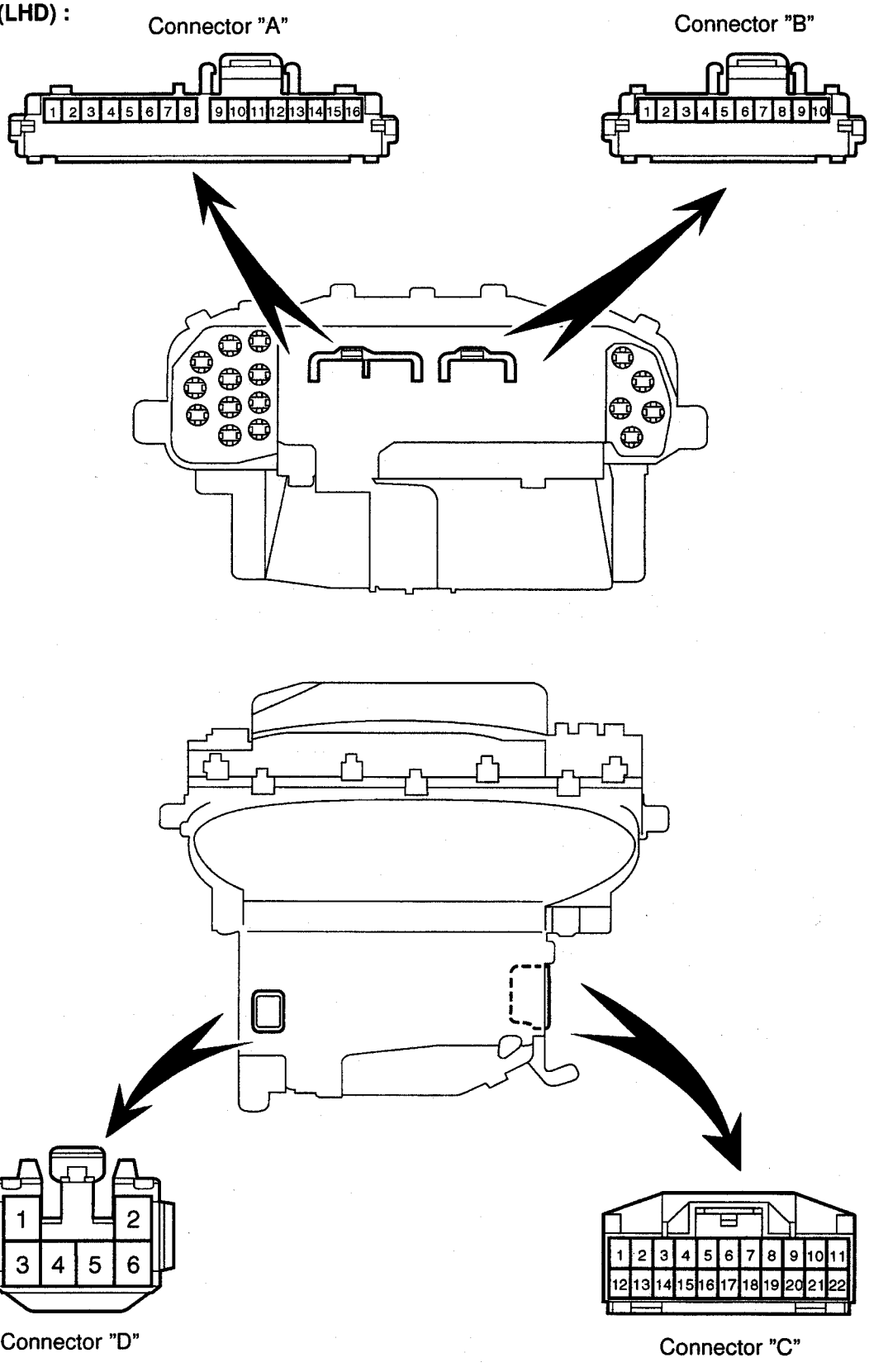
Connector "B"

Connector "A"

N

I12359

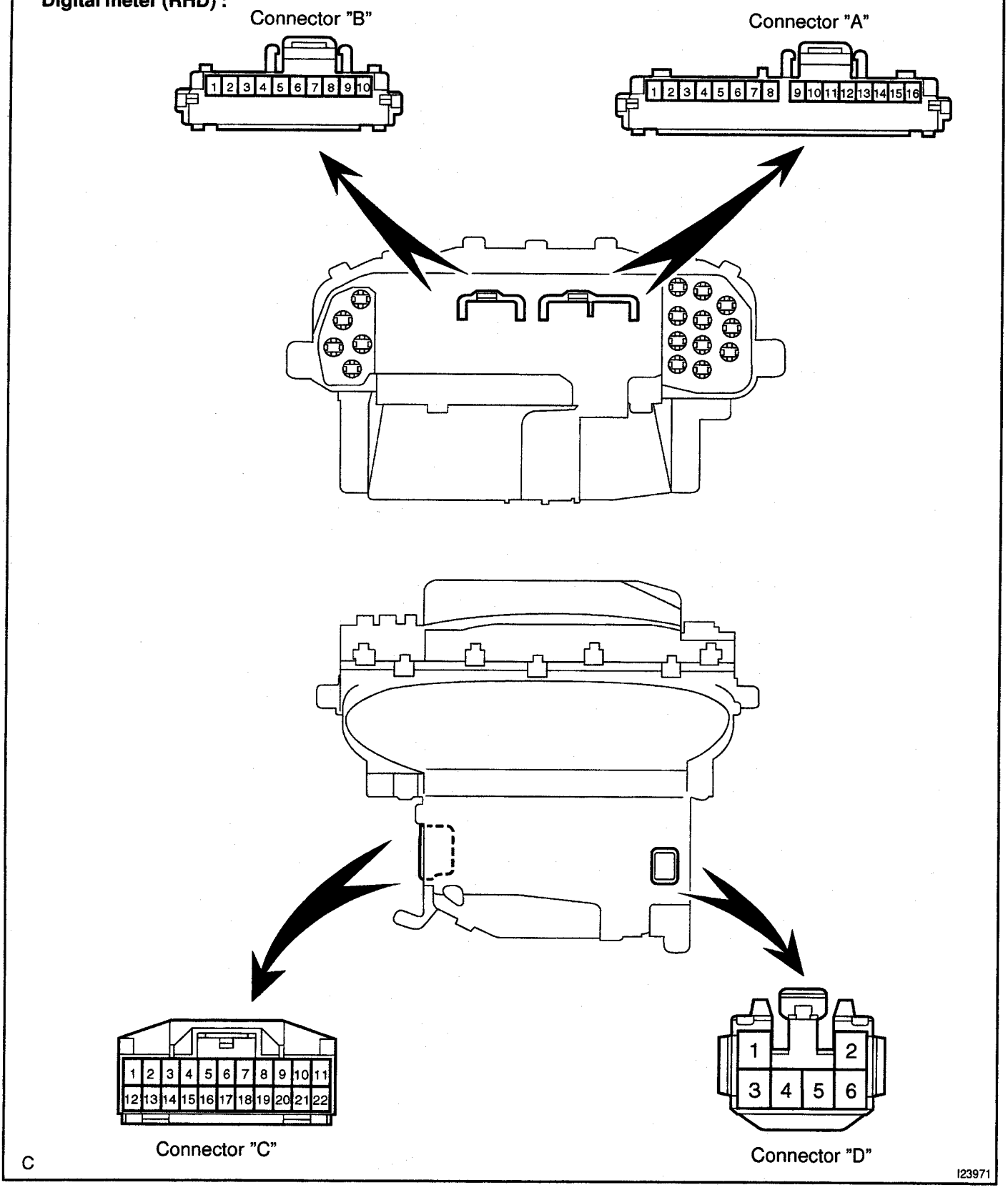
Digital meter (LHD) :



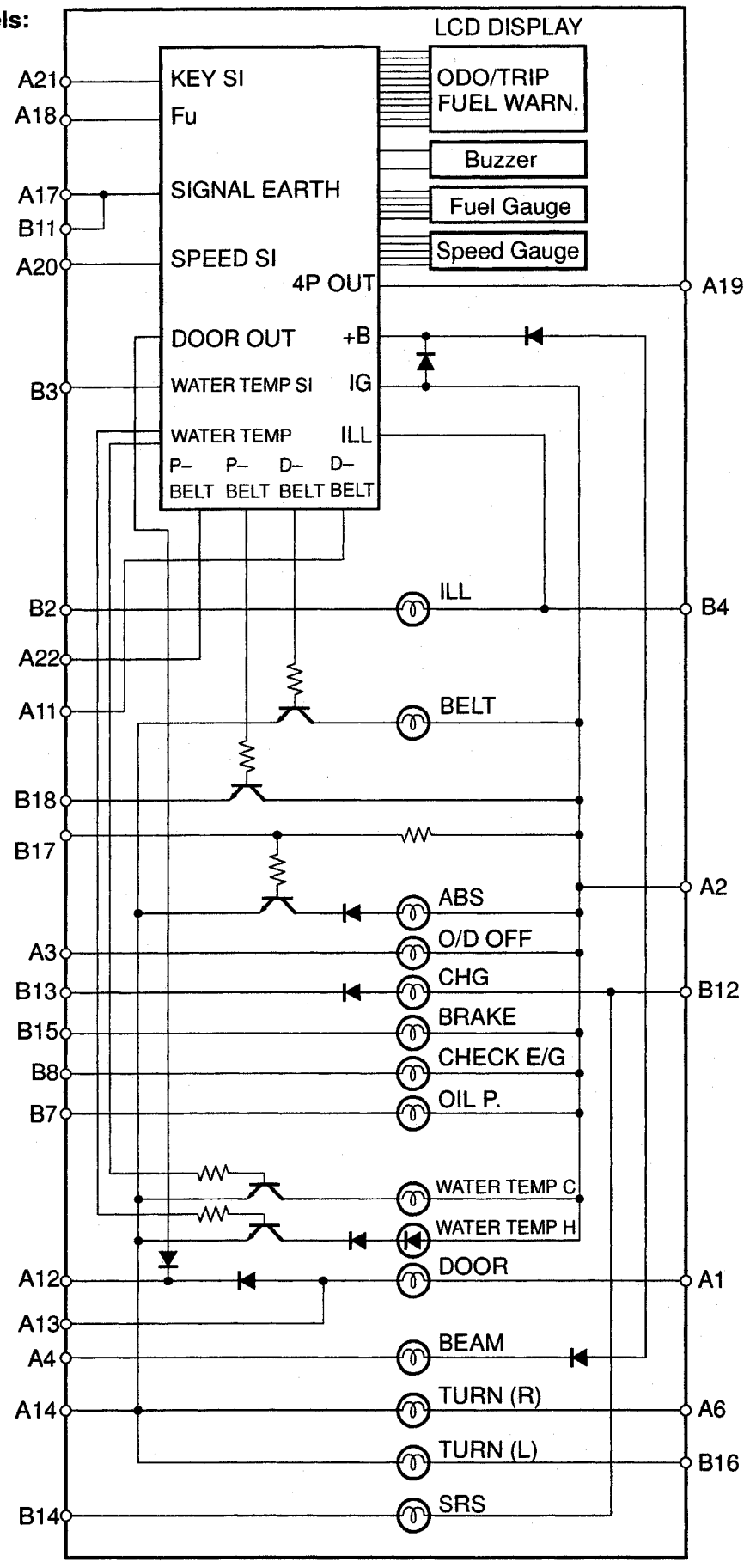
C

123970

Digital meter (RHD) :



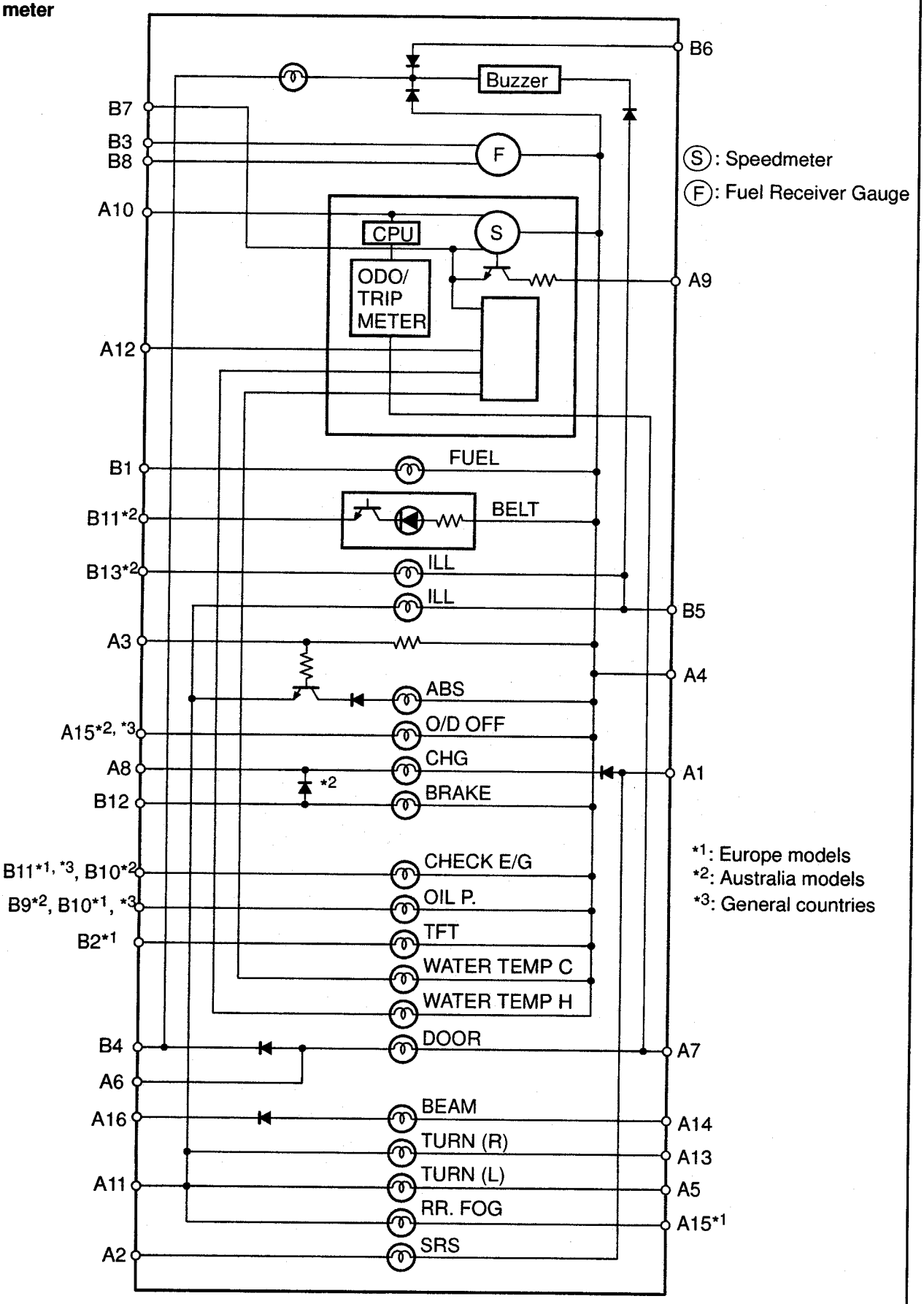
Middle East models:
Analog meter



C

I23710

Except Middle East models:
Analog meter

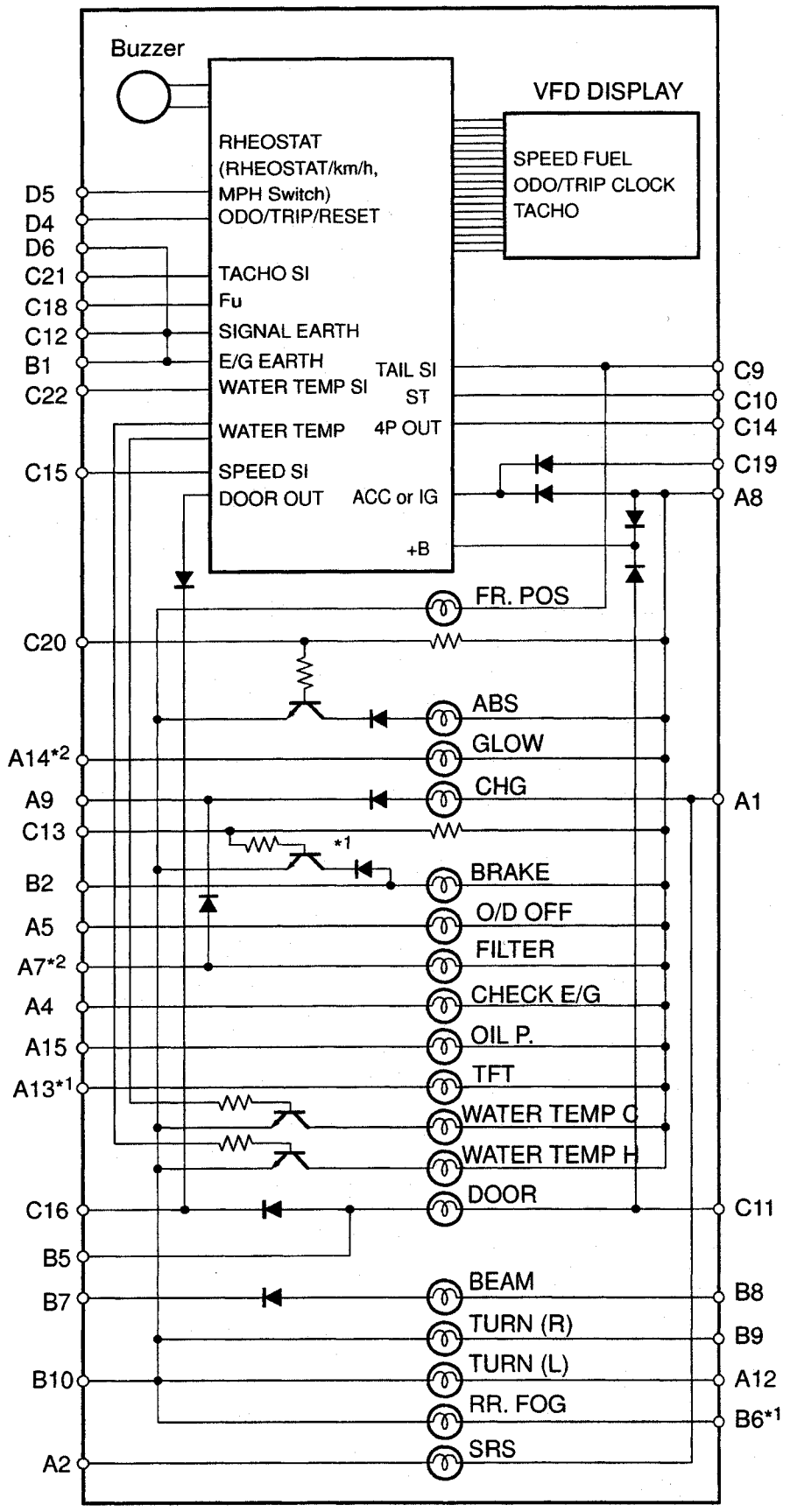


P

I14616

BE

Europe and General Country models (RHD):
Digital meter

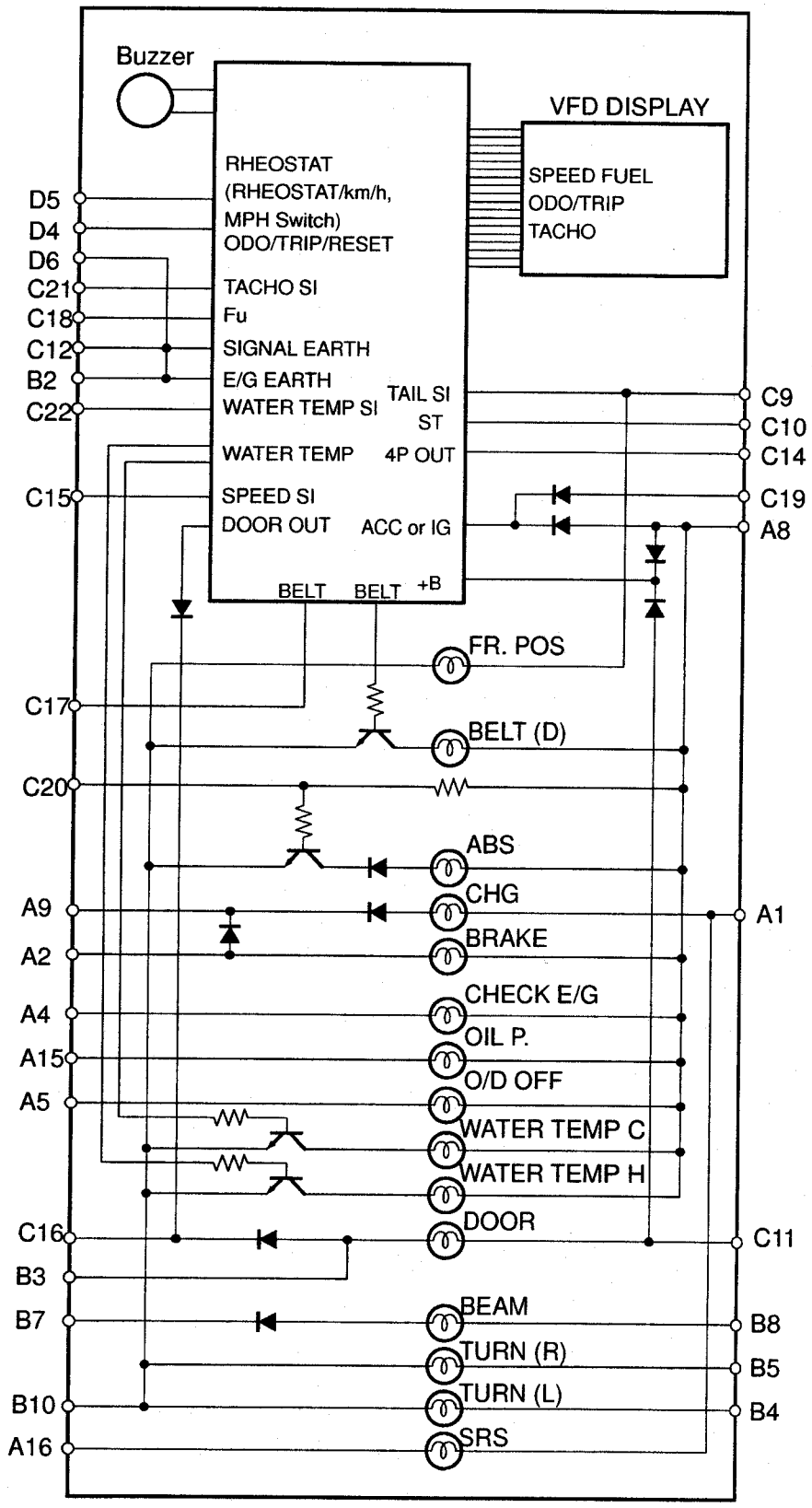


*1: Europe models
*2: Diesel engine

C

I23711

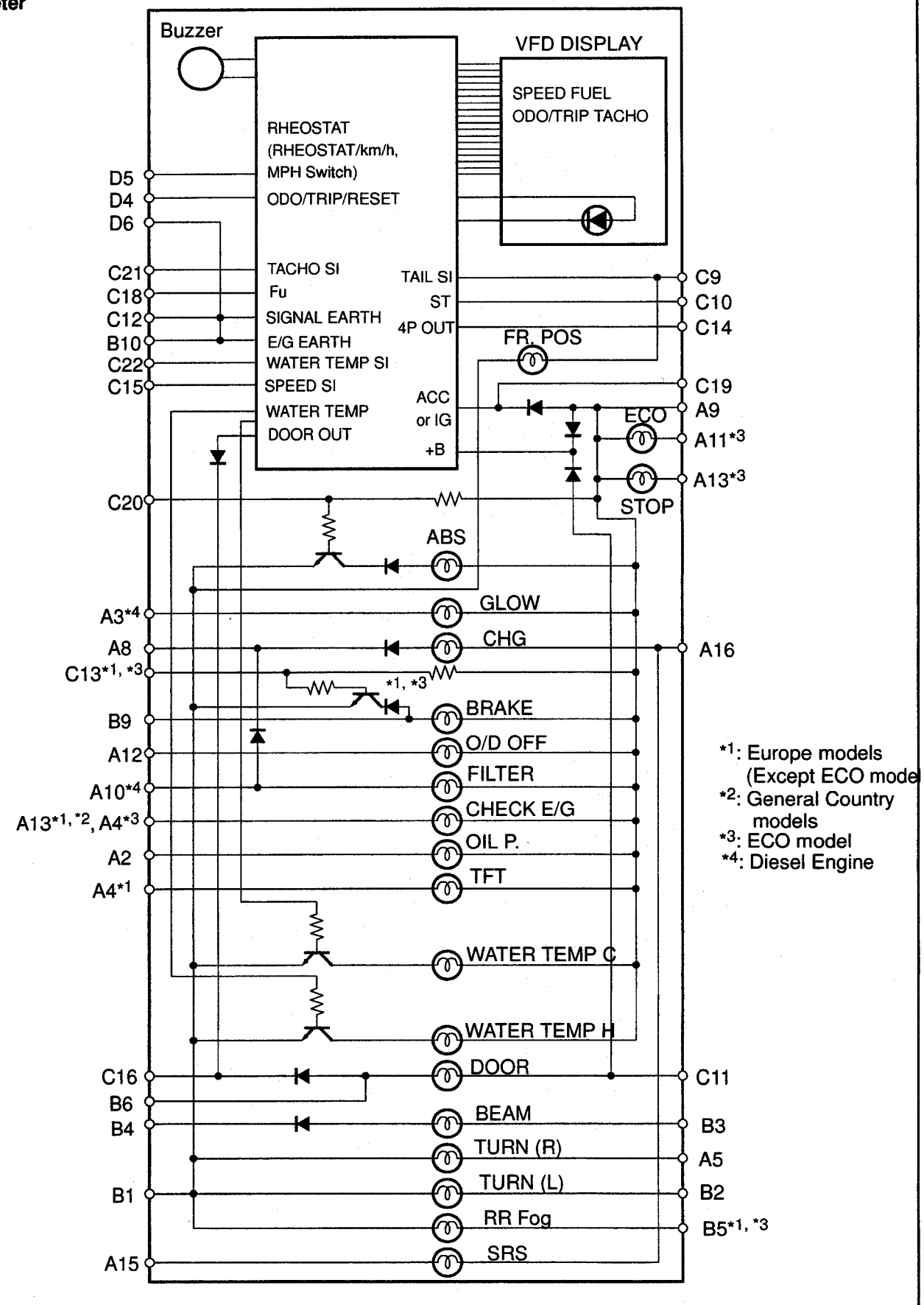
Australia models:
Digital meter



C

I23712

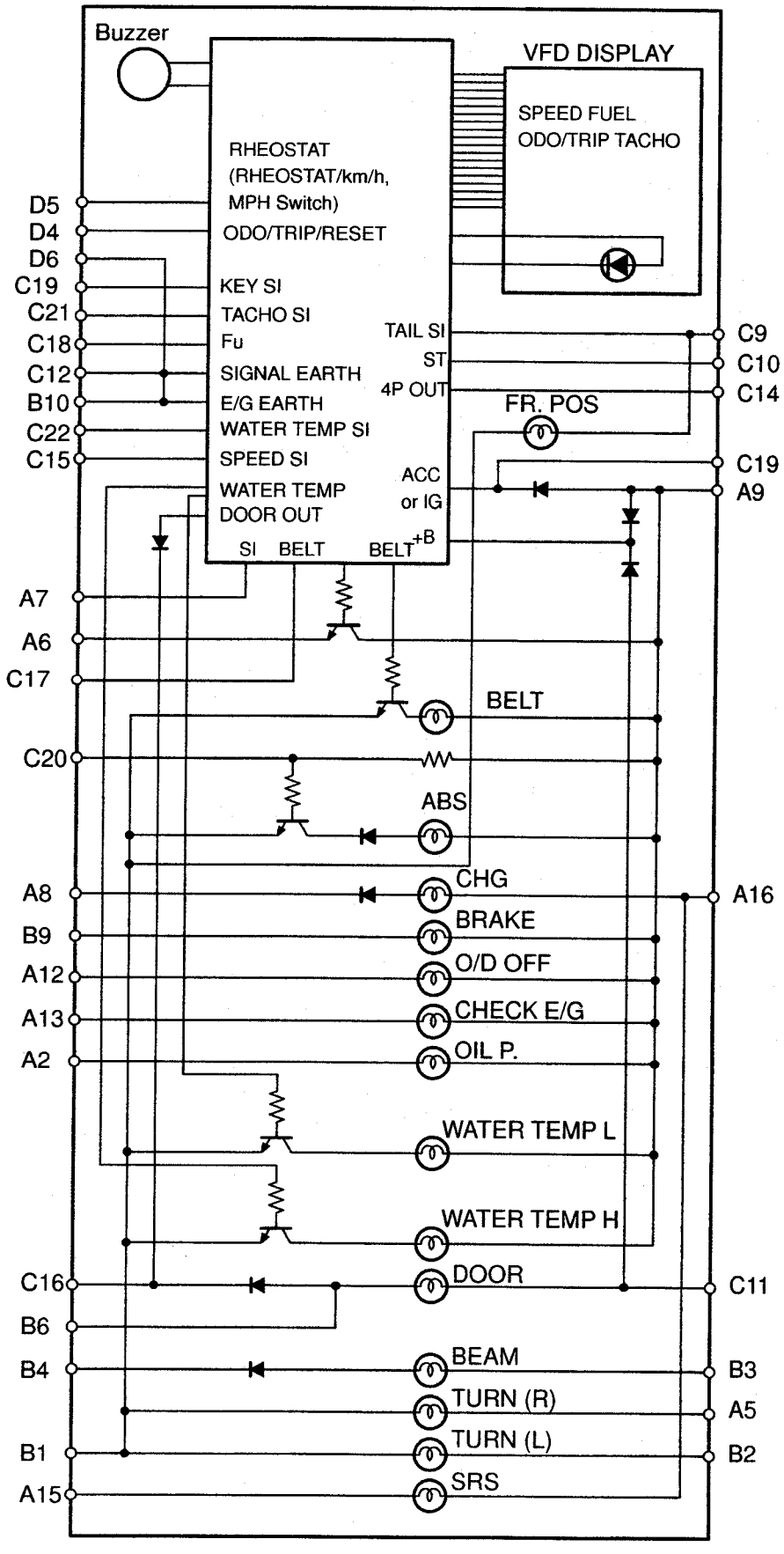
Europe and General Country models (LHD):
Digital meter



C

I23714

Middle East:
Digital meter



Middle East models:
Analog meter

No.		Wire Harness Side
A	1	DOME Fuse
	2	GAUGE Fuse
	3	O/D Off Switch
	4	Headlight Dimmer Switch
	6	Turn Signal Switch (Right)
	11	Driver's Buckle Switch
	12	Driver Door Courtesy Switch
	13	Except Driver Door Courtesy Switch
	14	Ground
	17	Ground
	18	Fuel Sender Gauge
	19	Speed Control Unit
	20	Vehicle Speed Sensor (SI terminal)
	21	Key Unlock Warning Switch
	22	Passenger's Buckle Switch
B	2	Light Control Rheostat Volume
	3	Water Temperature Sender Gauge
	4	Light Control Switch
	7	Low Oil Pressure Warning Switch
	8	Engine & ECT ECU
	11	Ground
	12	Ignition Switch
	13	Generator
	14	Airbag Sensor Assembly
	15	Brake Fluid Level Warning Switch
	16	Turn Signal Switch (Left)
	17	ABS ECU
	18	Passenger's Seat Belt Warning

Except Middle East models:
Analog meter

No.		Wire Harness Side
A	1	IGN Fuse
	2	Airbag Sensor Assembly
	3	ABS ECU
	4	GAUGE Fuse
	5	Turn Signal Switch (Left)
	6	Except Driver Door Courtesy Switch
	7	DOME Fuse
	8	Alternator
	9	Speed Control Unit
	10	Vehicle Speed Sensor (SI terminal)
	11	Ground
	12	Water Temperature Sender Gauge
	13	Turn Signal Switch (Right)
	14	DOME Fuse (w/o D. R. L.)
		Daytime Running Light Relay (w/ D. R. L.)
	15	Rear Fog Light Switch *1
		Over Drive off Switch *2, *3
	16	Headlight Dimmer Switch (w/o D. R. L.)
		Ground (w/ D. R. L.)
B	1	Fuel Lever Warning Switch
	2	TFT ECU *1
	3	Fuel Sender Gauge
	4	Driver Door Courtesy Switch
	5	Light Control Switch
	6	ACC Fuse
	7	Ground
	8	Ground
	9	Low Oil Pressure Warning Switch *2
	10	Low Oil Pressure Warning Switch *1, *3
	11	Engine and ECT ECU *1, *3
		Driver Seat Belt Buckle Switch *2
	12	Brake Fluid Level Warning Switch
	13	Light Control Switch *2

*1, Europe models
*2, Australia models
*3, General countries

D. R. L. : Daytime Running Light

Europe and General Country models (RHD):
Digital meter

No.		Wire Harness Side
A	1	IGN Fuse
	2	Airbag Sensor Assembly
	4	Engine and ECT ECU
	5	O/D Main Switch
	7	Sedimenter Switch *2
	8	GAUGE Fuse
	9	Alternator
	12	Turn Signal Switch (Left)
	13	TFT ECU *1
	14	Low Oil Pressure Switch *2
B	1	Ground
	2	Brake Fluid Level Warning switch
	5	Except Driver Door Courtesy Switch
	6	Rear Fog Light Switch *1
	7	Headlight Dimmer Switch (w/o D. R. L.) Ground (w/ D. R. L.)
	8	DOME Fuse (w/o D. R. L.) Daytime Running Light Relay (w/ D. R. L.)
	9	Turn Signal Switch (Right)
	10	Ground
C	9	Light Control Switch
	10	Ignition Switch (ST terminal)
	11	DOME Fuse
	12	Ground
	13	ABS ECU
	14	Speed Control Unit
	15	Vehicle Speed Sensor (SI terminal)
	16	Driver Door Courtesy Switch
	18	Fuel Sender Gauge
	19	ACC Fuse
	20	ABS ECU
	21	Engine and ECT ECU
	22	Water Temperature Sender Gauge
D	4	Trip Switch (ODO/TRIP/RESET)
	5	Trip Switch (RHEOSTAT) (Trip Switch (RHOSTAT/ km/h, MPH Switch))
	6	Ground

*1, Europe models
*2, Diesel Engine
D. R. L. : Daytime Running Light

Australia models:
Digital meter

No.		Wire Harness Side
A	1	IGN Fuse
	2	Brake Fluid Level Warning switch
	4	Engine and ECT ECU
	5	O/D Main Switch
	8	GAUGE Fuse
	9	Alternator
	15	Low Oil Pressure Switch
	16	Airbag Sensor Assembly
B	2	Ground
	3	Except Driver Door Courtesy Switch
	4	Turn Signal Switch (Left)
	5	Turn Signal Switch (Right)
	7	Headlight Dimmer Switch (w/o D. R. L.) Ground (w/ D. R. L.)
	8	DOME Fuse (w/o D. R. L.)
	10	Ground
C	9	Light Control Switch
	10	Ignition Switch (ST terminal)
	11	DOME Fuse
	12	Ground
	14	Speed Control Unit
	15	Vehicle Speed Sensor (SI terminal)
	16	Driver Door Courtesy Switch
	17	Driver Seat Belt Buckle Switch
	18	Fuel Sender Gauge
	19	ACC Fuse
	20	ABS ECU
	21	Engine and ECT ECU
	22	Water Temperature Sender Gauge
D	4	Trip Switch (ODO/TRIP/RESET)
	5	Trip Switch (RHEOSTAT) (Trip Switch (RHOSTAT/ km/h, MPH Switch))
	6	Ground

D. R. L. : Daytime Running Light

Europe and General Country models (LHD):
Digital meter

No.		Wire Harness Side
A	2	Low Oil Pressure Switch
	3	Engine & ECT ECU*4
	4	TFT ECU *1
		Engine & ECT ECU*3
	5	Turn Signal Switch (Right)
	8	Alternator
	9	GAUGE Fuse
	10	Sedimenter Switch *4
	11	ECO RUN ECU *3
	12	O/D Main Switch
	13	Engine and ECT ECU *1, *2
		ECO RUN ECU *3
	15	Airbag Sensor Assembly
	16	IGN Fuse
B	1	Ground
	2	Turn Signal Switch (Left)
	3	DOME Fuse (w/ D. R. L.)
	4	Headlight Dimmer Switch (w/o D. R. L.)
		Ground (w/ D. R. L.)
	5	Rear Fog Light Switch
	6	Except Driver Door Courtesy Switch
	9	Brake Fluid Level Warning Switch
	10	Ground
C	9	Light Control Switch
	10	Ignition Switch (ST terminal)
	11	DOME Fuse
	12	Ground
	13	ABS ECU
	14	Speed Control Unit
	15	Vehicle Speed Sensor (SI terminal)
	16	Driver Door Courtesy Switch
	18	Fuel Sender Gauge
	19	ACC Fuse
	20	ABS ECU
	21	Engine and ECT ECU
	22	Water Temperature Sender Gauge
D	4	Trip Switch (ODO/TRIP/RESET)
	5	Trip Switch (RHEOSTAT)
	6	Ground

*1: Europe models (Except ECO model)
*2: General Country models
*3: ECO model
*4: Diesel Engine
D. R. L. : Daytime Running Light

Middle East:
Digital meter

No.		Wire Harness Side
A	2	Low Oil Pressure Switch
	5	Turn Signal Switch (Right)
	6	Passenger Seat Belt Warning Light
	7	Passenger Seat Belt Buckle Switch
	8	Alternator
	9	GAUGE Fuse
	12	O/D Main Switch
	13	Engine and ECT ECU
	15	Airbag Sensor Assembly
	16	IGN Fuse
B	1	Ground
	2	Turn Signal Switch (Left)
	3	DOME Fuse (w/ D. R. L.)
	4	Headlight Dimmer Switch (w/o D. R. L.) Ground (w/ D. R. L.)
	6	Except Driver Door Courtesy Switch
	9	Brake Fluid Level Warning Switch
	10	Ground
C	9	Light Control Switch
	10	Ignition Switch (ST terminal)
	11	DOME Fuse
	12	Ground
	14	Speed Control Unit
	15	Vehicle Speed Sensor (SI terminal)
	16	Driver Door Courtesy Switch
	17	Driver Seat Belt Buckle Switch
	18	Fuel Sender Gauge
	19	Ignition Switch
	20	ABS ECU
	21	Engine and ECT ECU
	22	Water Temperature Sender Gauge
D	4	Trip Switch (ODO/TRIP/RESET)
	5	Trip Switch (RHEOSTAT)
	6	Ground

D. R. L. : Daytime Running Light

BE2BJ-01

INSPECTION

INSPECT SPEEDOMETER ON–VEHICLE

Using a speedometer tester, inspect the speedometer for allowable indication error and check the operation of the odometer.

HINT:

Tire wear and tire over or under inflation will increase the indication error.

Digital meter

(mph)		(km/h)	
Standard indication	Allowable range	Standard indication	Allowable range
20	20 – 23	20	20 – 24
40	41 – 44	40	41 – 45
60	63 – 67	60	62 – 66
80	84 – 88	80	84 – 88
100	105 – 109	100	105 – 111
120	126 – 130	120	126 – 132
		140	148 – 154
		160	169 – 175

Except australia analog meter

(mph)		(km/h)	
Standard indication	Allowable range	Standard indication	Allowable range
20	21 – 23.5	20	21 – 25
40	41.5 – 44	40	41.5 – 46
60	62.5 – 66	60	62.5 – 67
80	83 – 87	80	83 – 88
100	104 – 108.5	100	104 – 109
		120	125 – 130.5
		140	145.5 – 151..5
		160	166 – 173
		180	188.5 – 194.5

Australia analog meter

(mph)		(km/h)	
Standard indication	Allowable range	Standard indication	Allowable range
		20	17.5 – 21.5
		40	38 – 42
		60	58 – 63
		80	78 – 84
		100	99 – 104.5
		120	119.5 – 125.5
		140	139.5 – 146.5
		160	159.5 – 167.5
		180	179.5 – 188.5

If error is excessive, replace the speedometer.

AIR CONDITIONING

REFER TO FOLLOWING REPAIR MANUALS:

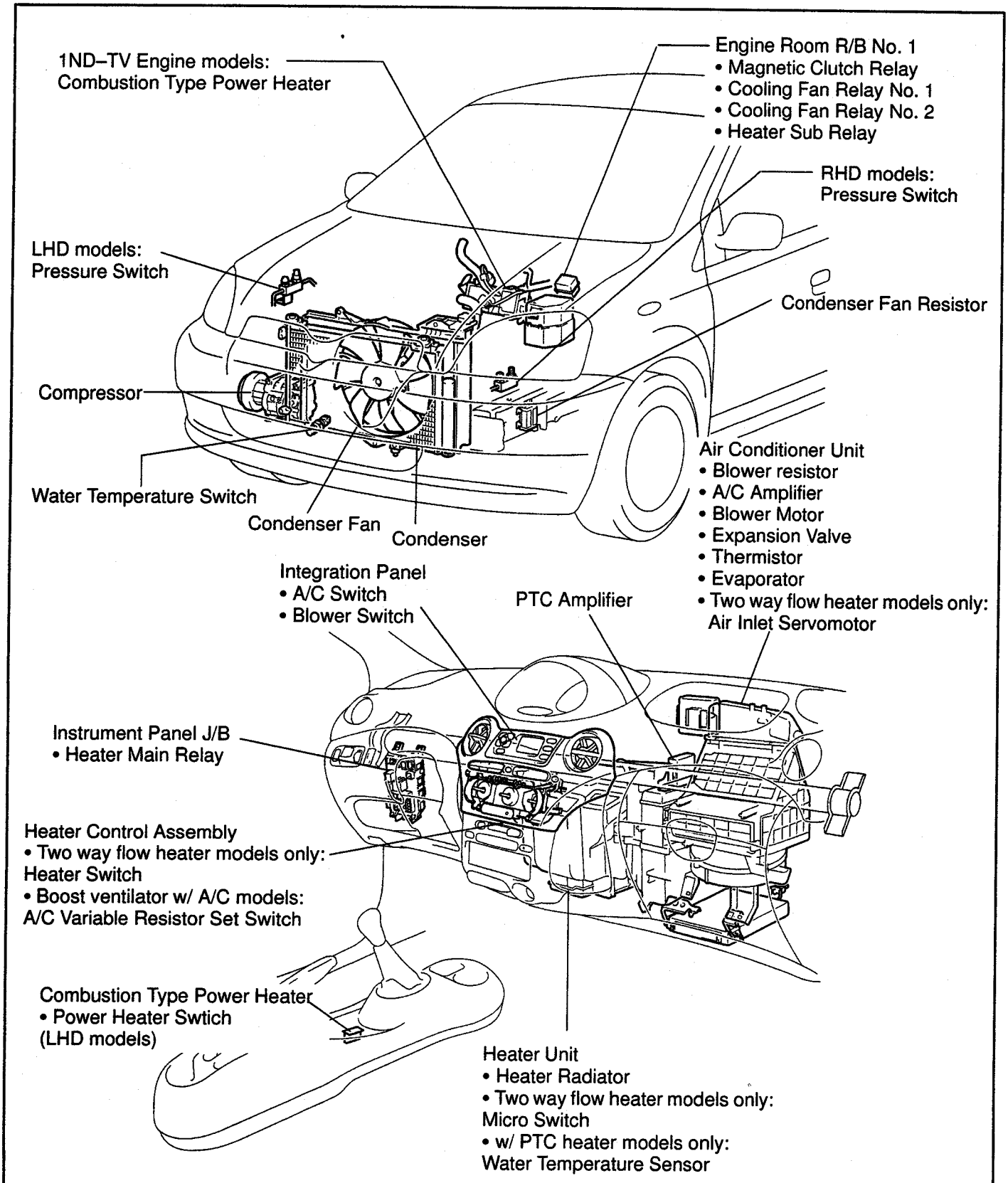
Manual Name	Pub. No.
YARIS / ECHO Chassis and Body Repair Manual	RM685E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Aug., 1999)	RM737E
YARIS / ECHO Chassis and Body Repair Manual Supplement (Jan., 2001)	RM838E

NOTE: The above pages contain only the points which differ from the above listed manuals.

AIR CONDITIONING SYSTEM

LOCATION

AC0C6–13



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AC

TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

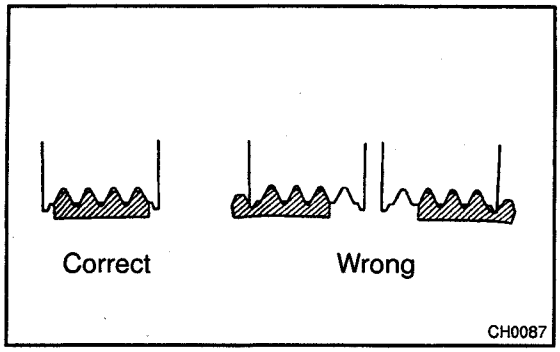
AC27Y-04

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.

Standard:

Combustion type power heater:

Symptom	Suspect Area	See page
Combusion type power heater does not function.	Combustion power heater	AC–10



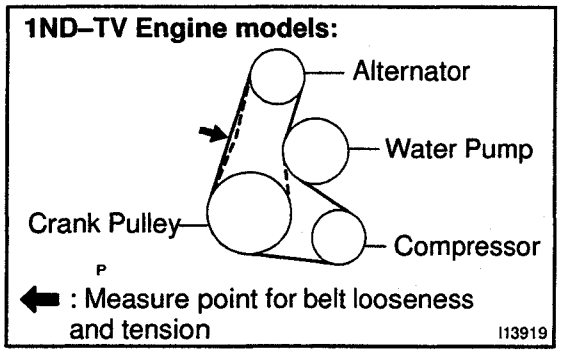
DRIVE BELT

ON–VEHICLE INSPECTION

AC3N2–01

1. INSPECT DRIVE BELT'S INSTALLATION CONDITION

Check that the drive belt fits properly in the ribbed grooves.



2. INSPECT DRIVE BELT DEFLECTION

(a) Using a belt tension gauge, apply load of 98 N (10 kgf, 22 lbf).

(b) Measure drive belt deflection.

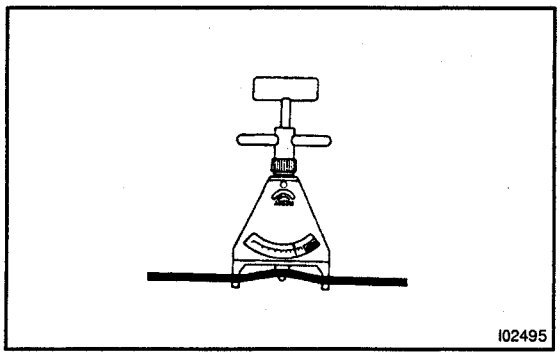
Drive belt deflection:

New belt: 7.0 – 8.5 mm (0.28 – 0.33 in.)

Used belt: 11.0 – 13.0 mm (0.43 – 0.51 in.)

HINT:

- "New belt" refers to a belt which has been used 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 the drive belt, check that it fits properly in the ribbed grooves.



3. INSPECT DRIVE BELT TENSION (Reference)

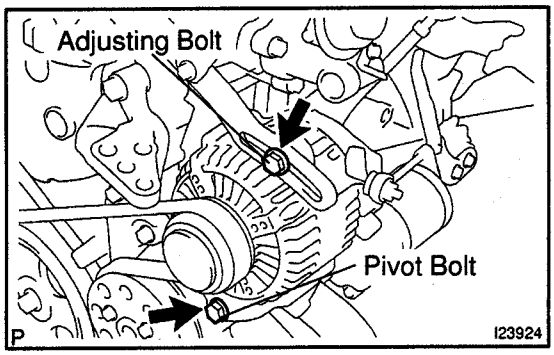
Using a belt tension gauge, check the drive belt tension.

Drive belt tension:

New belt: 882 – 1078 N (90 – 100 kgf)

Used belt: 392 – 588 N (40 – 60 kgf)

AC3N3–01



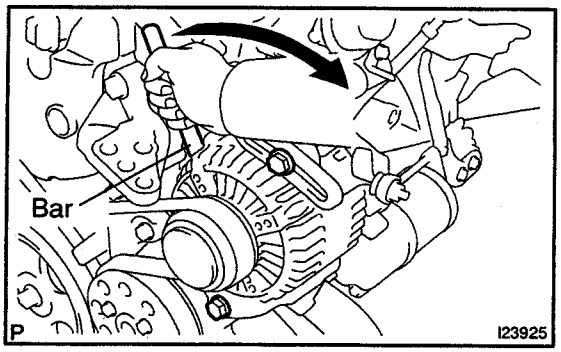
REMOVAL

REMOVE DRIVE BELT

(a) Loosen the pivot bolt.

(b) Loosen the drive belt tension by turning adjusting bolt and remove the drive belt.

AC3N4-01

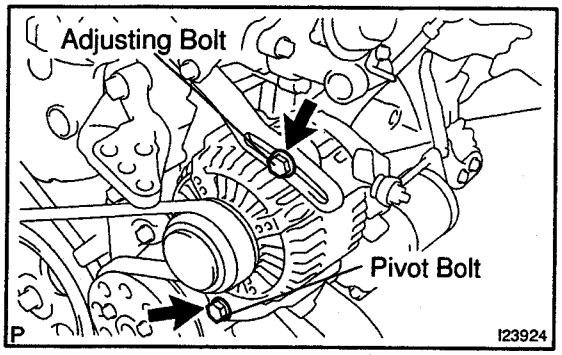


INSTALLATION

INSTALL DRIVE BELT

(a) Install the drive belt.

(b) Apply drive belt tension.
Insert the bar between the engine RH mount bracket and the alternator, and pull it forward to make the adjust.
Drive belt deflection:
New belt: 7.0 – 8.5 (0.28 – 0.33 in.)
Used belt: 11.0 – 13.0 (0.43 – 0.51 in.)

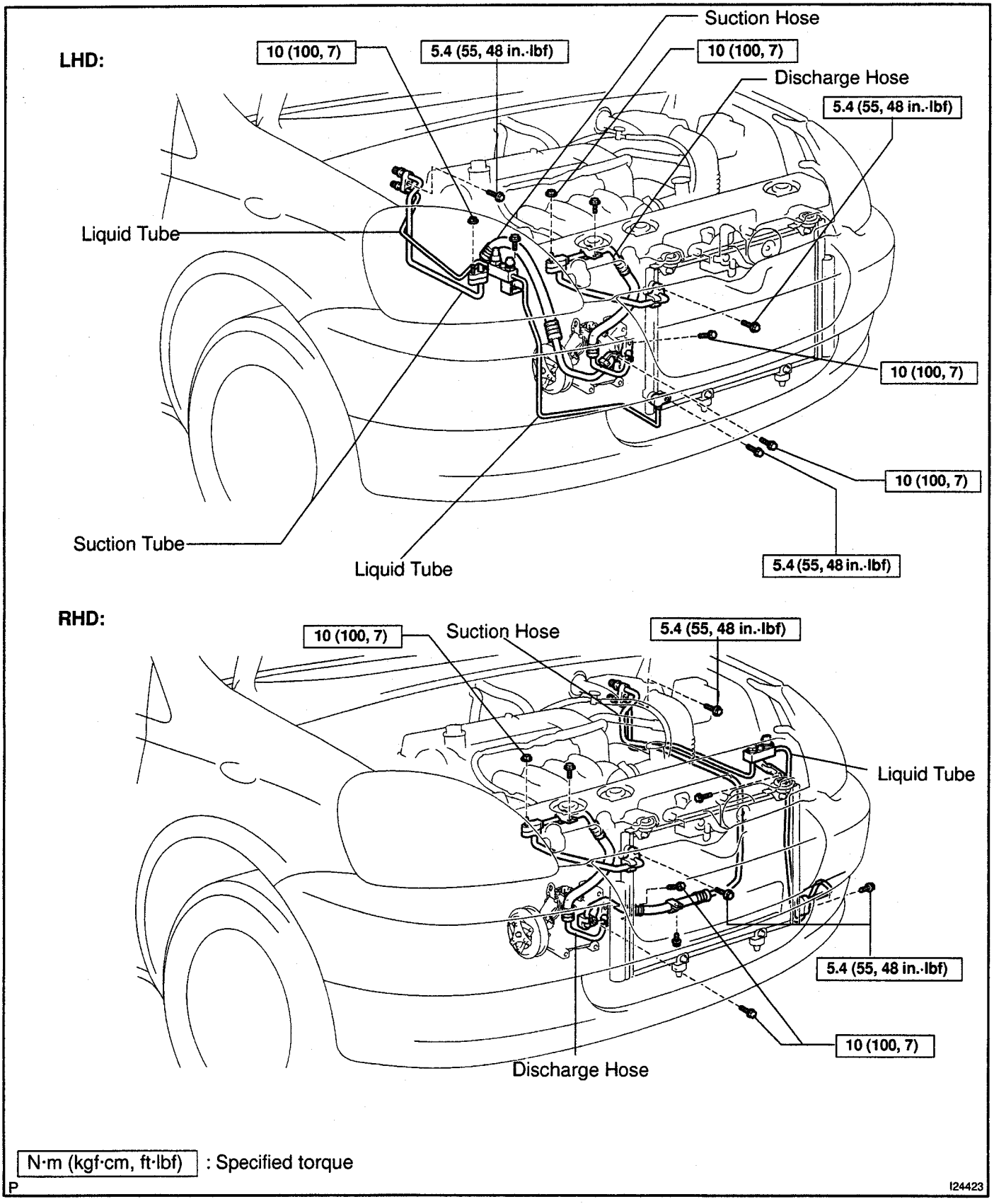


(c) Tighten the pivot bolts.
Torque: 54 N·m (540 kgf·cm, 39 ft·lbf)

REFRIGERANT LINE

COMPONENTS

AC282-05



AC

N·m (kgf·cm, ft·lbf) : Specified torque

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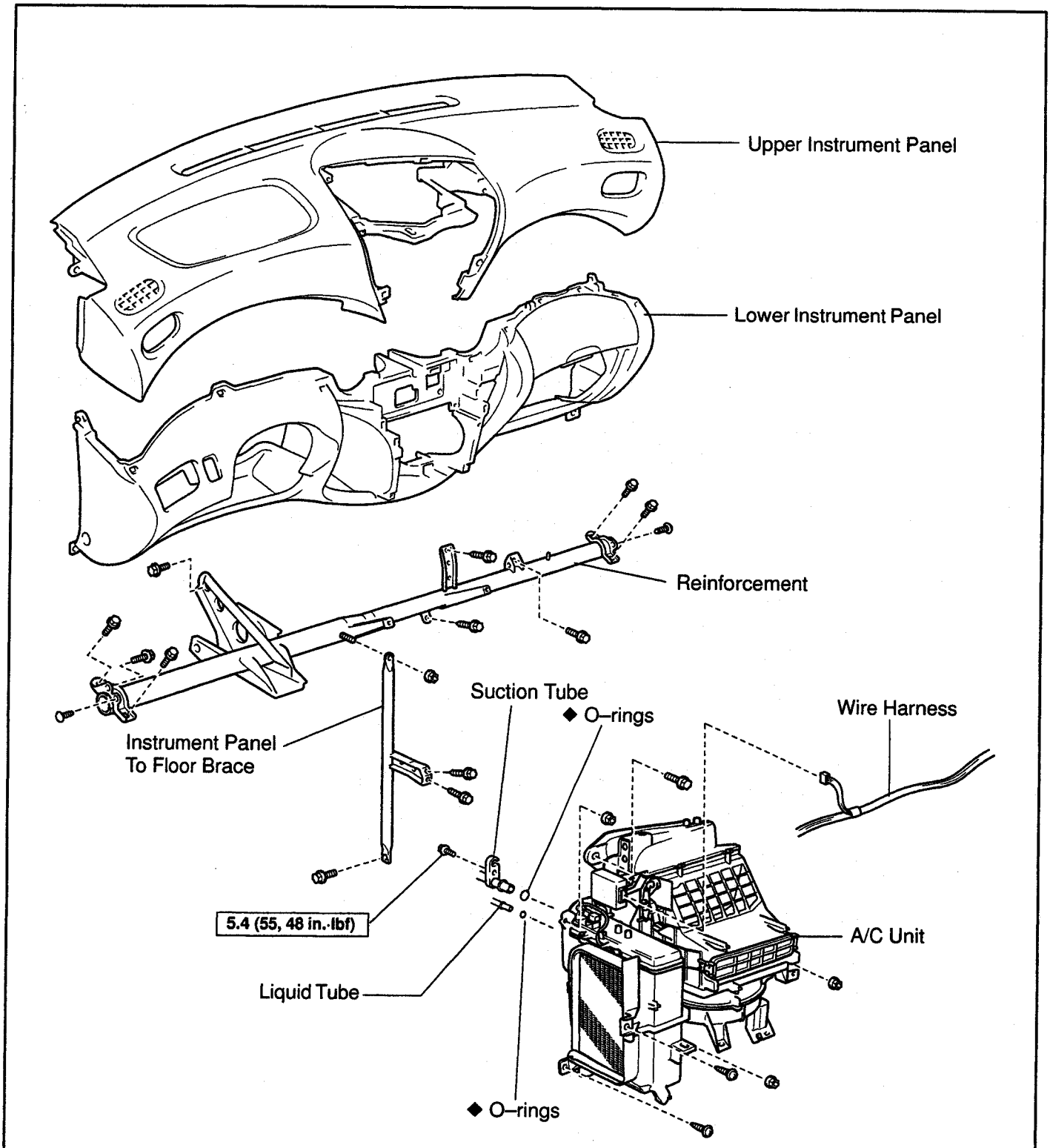
AIR CONDITIONER UNIT

COMPONENTS

AC3N5-01



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

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AC

AC3N6-01

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

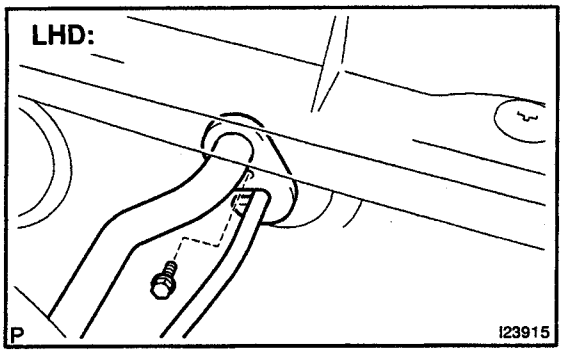
HINT:

At the time of installation, please refer to the following item.

Evacuate air from refrigeration system.

Charge system with refrigerant and inspect for leakage of refrigerant.

Specified amount: 430 ± 30 g (15.17 ± 1.06 oz.)



2. DISCONNECT LIQUID AND SUCTION TUBES

(a) Remove the grommet.

(b) Remove the bolt and slide the plate, then disconnect the both tubes.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

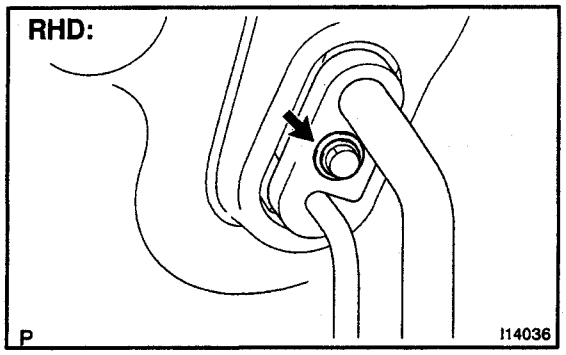
NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

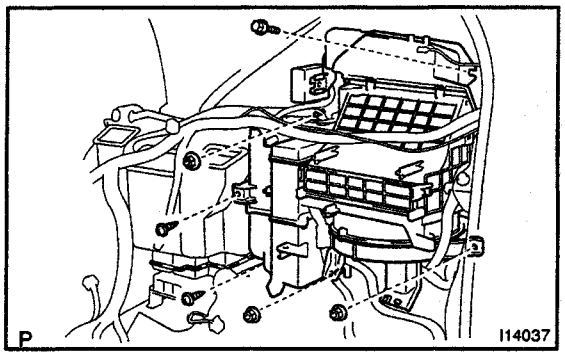
HINT:

At the time of installation, please refer to the following item.

Lubricate 2 new O–rings with compressor oil and install them to the tube.



3. REMOVE INSTRUMENT PANEL AND REINFORCEMENT



4. REMOVE A/C UNIT

(a) Disconnect the connectors.

(b) Disconnect the wire harness clamps.

(c) Remove the 2 bolts, nut, rivet and A/C unit.

HINT:

At the time of installation, please refer to the following item.

Do not reuse the rivet.

AC

AC289-03

INSTALLATION

Installation is in the reverse order of removal (See page AC–8).

COMBUSTION TYPE POWER HEATER

AC29V–04

ON–VEHICLE INSPECTION

NOTICE:

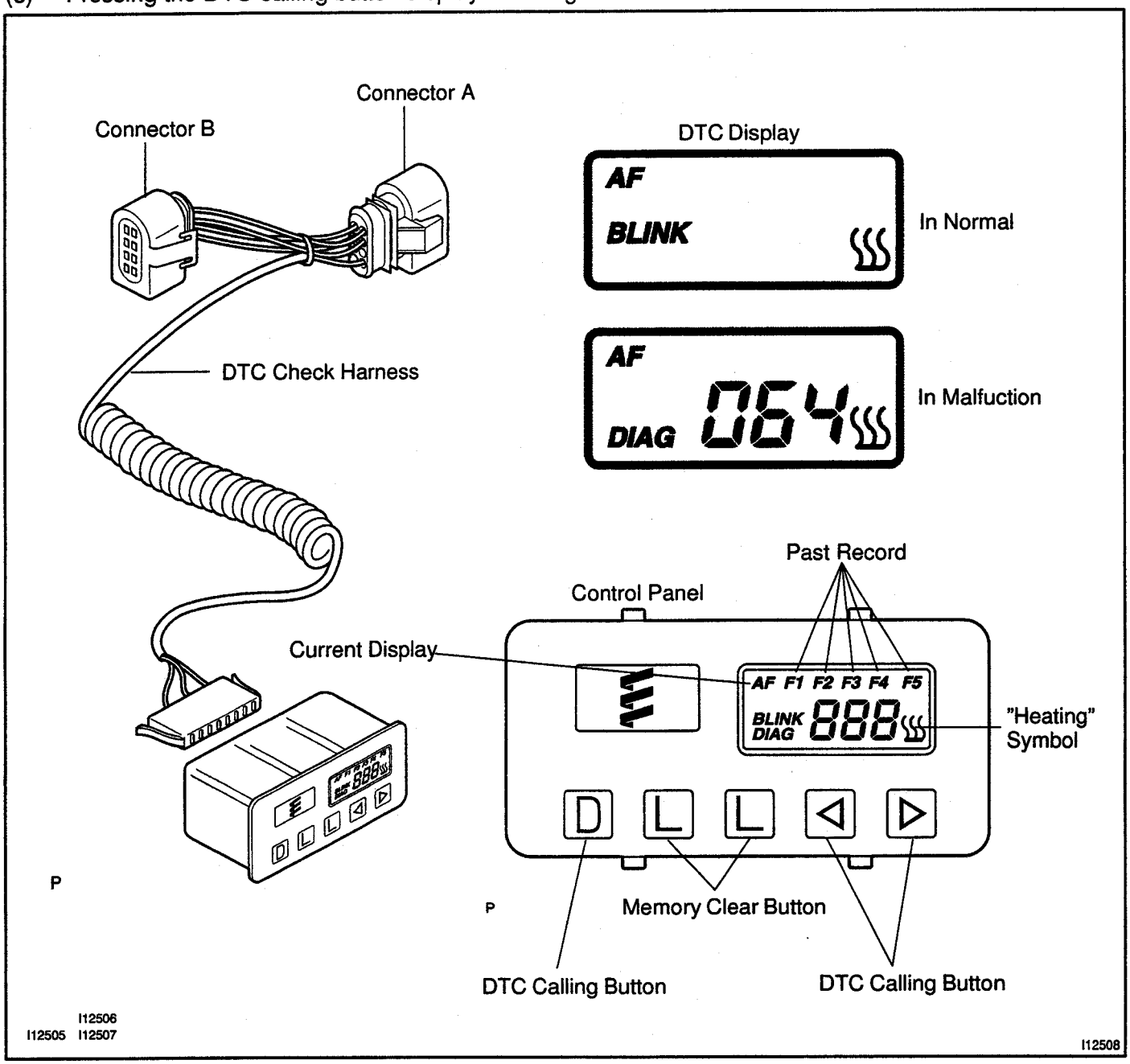
- **If the glow plug breaks, the ECU detects the breakage and stops the automatic operation, so the burner heater does not activate. (For other failures, similarly activated.)**
- **The cause of failures (such as voltage malfunction, overheating malfunction, short–circuit or breakage of functional componects, etc.) and how to remedy are shown by connecting the DTC tester and reading the DTC.**

1. DIAGNOSTICS FUNCTION

(a) Connect the DTC tester between the connector A (Vehicle harness) of DTC check harness and connector B (Power heater harness).

(b) Start the engine.

(c) Pressing the DTC calling button displays a 3–digit number DTC.



2. DESCRIPTION OF DISPLAY AND BUTTONS

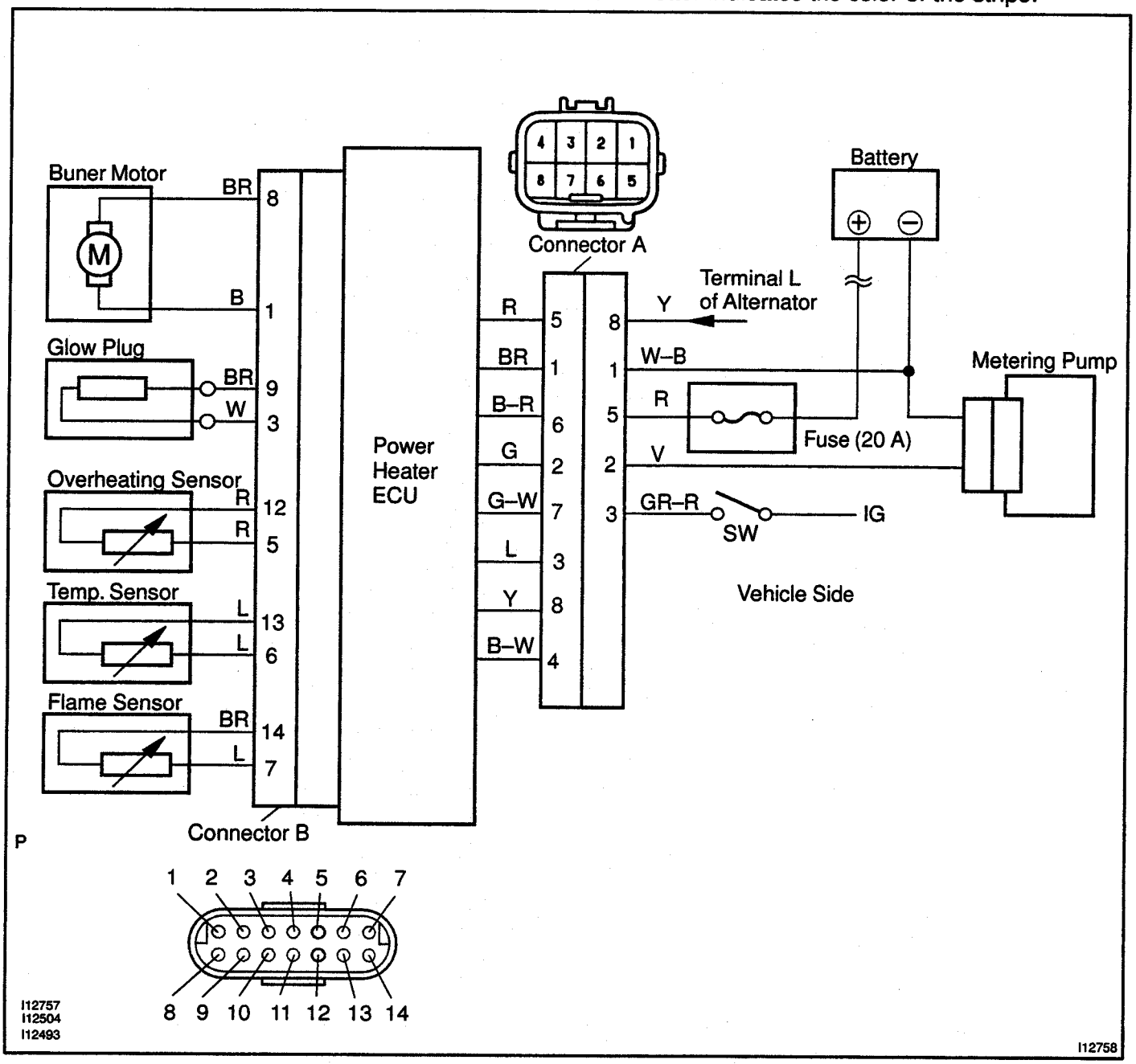
AF: Current Value Malfunction (Blinking at current failure)
Diag: DTC (Example: 064 Flame sensor break)
Mamory Clear button: Deletion of faulty memory (Press both buttons together for longer than 2 sec.)
> Button: Scroll up of faulty memory (The past 5 codes can be stored.)
< Button: Scroll down of faulty memory (The past 5 codes can be stored.)

3. FAULTY MEMORY

The ECU is able to store up to 5 pieces of faulty memory. If it is full, the new data is written over F5.

4. WIRING DIAGRAM

Wire colors are indicated by an alphabetical code.
B=Black W=White BR=Brown L=Blue R=Red G=Green Y=Yellow
The first letter insicates the basic wire color and the seconk letter indicates the color of the stripe.



5. DIAGNOSTIC TROUBLE CODE CHART

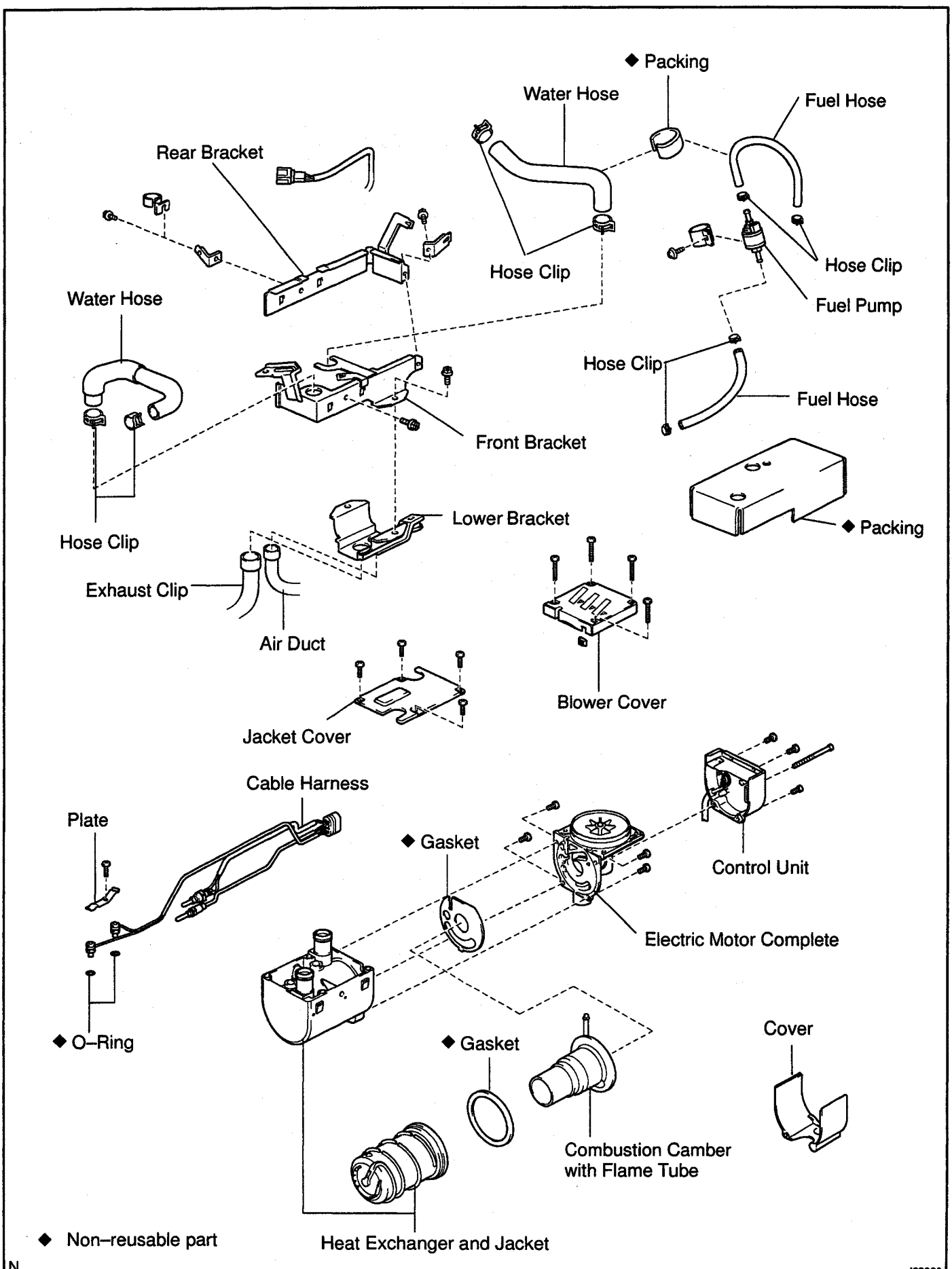
If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the appropriate page.

DTC No.	Description of fault	Comment / Remedy
000	No malfunction	–
010 011	Overvoltage shutoff Undervoltage shutoff	Voltage between 1 and 5 at connector A > 16 V Voltage between 1 and 5 at connector A < 10.2 V (Voltage values must be present > 20 seconds) Check battery, regulator and electrical leads.
012	Overheating	Check temperature at temperature or overheating sensor > 125°C. Check water circuit.
014	Possible overheating detected (Hardware threshold value)	Difference of measured values at temperature sensor > 15°C (min. 70°C water temperature and metering pump in operation); Check temperature sensor and overheating sensor, replace if necessary.
017	Overheating delected (Hardware threshold value)	Temperature at temperature or overheating sensor > 130°C, emergency OFF if DTC No. 012 or 014 not applicable; Check water circuit, check temperature sensor and overheating sensor, replace if necessary.
020	Glow plug break	Check glow plug, replace if necessary.
021	Glow plug output overload	Check glow plug, replace if necessary.
030	Combustion air blower motor EMF outside perm. range.	Blower impeller or burner motor fammed (frozen solid, dirty, etc.) Remedy jam, replace burner motor if necessary.
031	Combustion air blower motor break	Check lead to combustion air motor (burner motor) for continuity, replace if necessary.
032	Combustion air blower motor short–circuit	Check combustion air blower motor (burner motor), replace if necessary. Check supply lead (chafed, etc.).
047	Metering pump short–circuit	Check supply lead to metering pump for short–circuit, check metering pump, replace if necessary.
048	Metering pump break	Check supply lead to metering pump for continuity, remedy break, replace metering pump if necessary.
051	Cold blow time exceeded	At start, if flame sensor above 70°C > 240 sec.; Check exhaust gas combustion air supply, check flame sensor, replace if necessary.
052	Safety time exceeded	When all perm. start attempts used up; Check fuel delivery and fuel supply. Check exhaust gas and combustion air ducts.
054	Flame cutout, HIGH setting	Check fuel delivery and fuel supply. Check exhaust gas and combustion air ducts. If combustion OK → Check flame sensor, replace if necessary.
056	Flame cutout, LOW setting	
060	Temperature sensor break	Check connecting leads. Resistance value between 6 and 13 at connector B > 2 MΩ If break)
061	Temperature sensor short–circuit	Check connecting leads. Resistance value between 6 and 13 at connector B < 2 MΩ (If short–circuit)

DTC No.	Description of fault	Comment / Remedy
064	Flame sensor break	Check connecting leads. Resistance value between 7 and 14 at connector B > 3,040 Ω (If break)
065	Flame sensor short–circuit	Check connecting leads. Resistance value between 7 and 14 at connector B > 780 Ω (If short–circuit)
071	Overheating sensor break	Check connecting leads. Resistance value between 5 and 12 at connector B > 2MΩ (If break)
072	Overheating sensor short–circuit	Check connecting leads. Resistance value between 5 and 12 at connector B < 50 Ω (If short–circuit)
090 092 093	Control unit detectice (Intermal fault / Reset) Control unit detective (ROM error) Control unit detective (RAM error)	Control unit malfunction due to interference voltage from vehicle electrical system; Possible causes low batteries, chargers, other sources of interlerence; eliminale interference voltages. Internal faults detected in microprocessor / memory detected. Replace control unit.
097	Internal control unit faults	Other faults which cannot lead to DTC No.90, 92 and 93, replace control unit.

AC3N7–01

COMPONENTS



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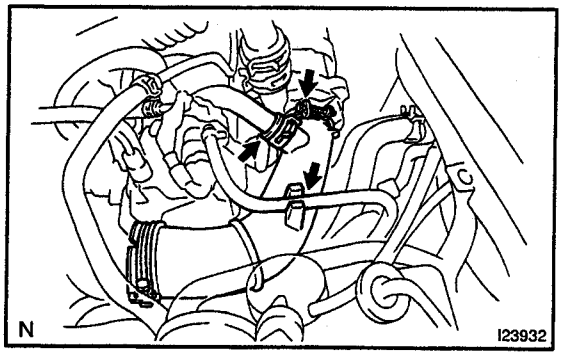
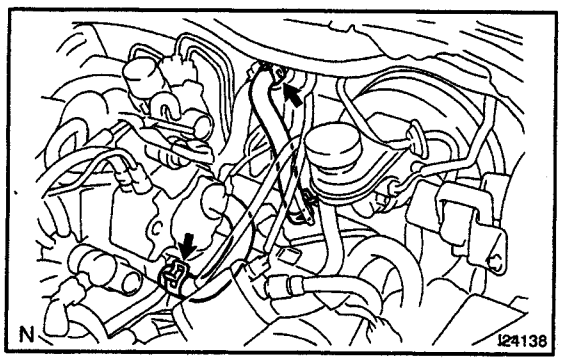
AC3N8-01

REMOVAL

1. DRAIN ENGINE COOLANT
2. REMOVE HOOD
3. REMOVE WIPER ARM
4. REMOVE COWL TOP VENTILATOR LOUVER
5. REMOVE WIPER MOTOR ASSEMBLY
6. REMOVE OUTER FRONT COWL TOP PANEL
7. REMOVE AIR CLEANER CASE ASSEMBLY WITH AIR HOSE
8. REMOVE BATTERY
9. REMOVE ENGINE UNDER COVER

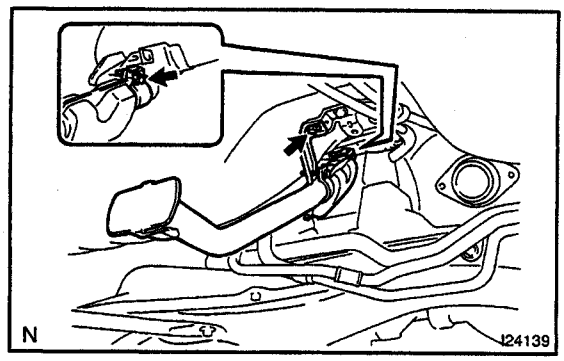


10. REMOVE AIR HOSE



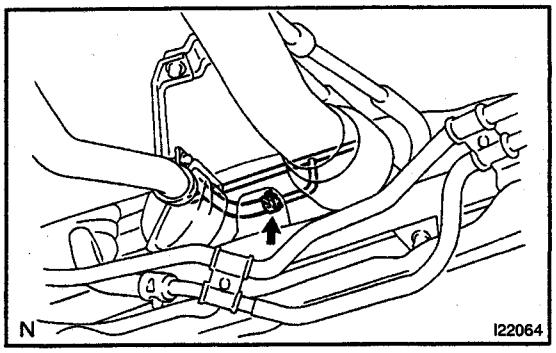
11. DISCONNECT WATER HOSES

(a) Using pliers, grip the claws of hose clip and slide the hose clip along the hose.
(b) Disconnect the water hose from heater radiator.
(c) Disconnect the water hose from cylinder head.



12. REMOVE EXHAUST PIPE

Remove the 2 bolts and exhaust pipe.

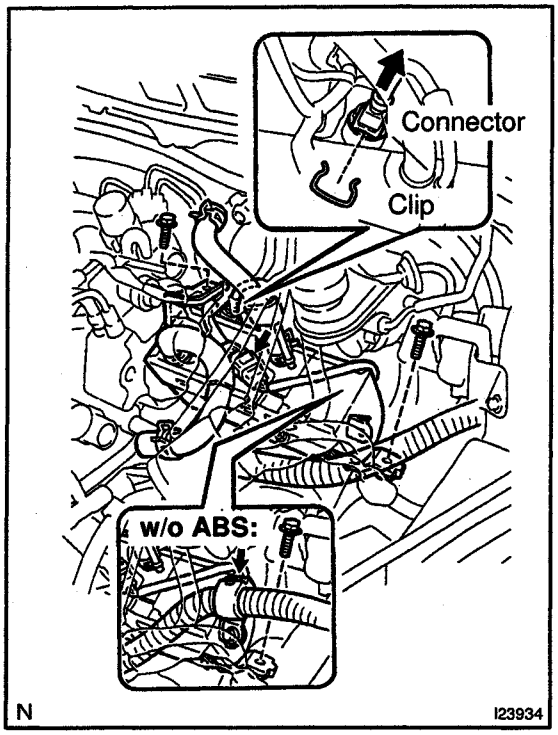


13. DISCONNECT FUEL HOSES

(a) Using pliers, grip the claws of hose clip and slide the hose clip along the hose.

(b) Disconnect the fuel hose.

14. DISCONNECT INTAKE HOSE



15. REMOVE COMBUSTION TYPE POWER HEATER

(a) Disconnect the wire harness clamp.

(b) Disconnect the connectors.

(c) Disconnect the air duct

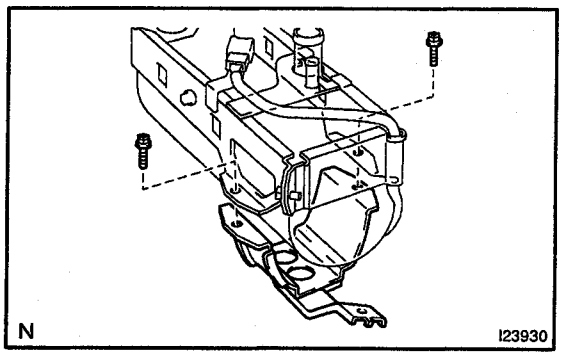
(d) Remove the 2 nuts and combustion type power heater.

AC3N9–01

DISASSEMBLY

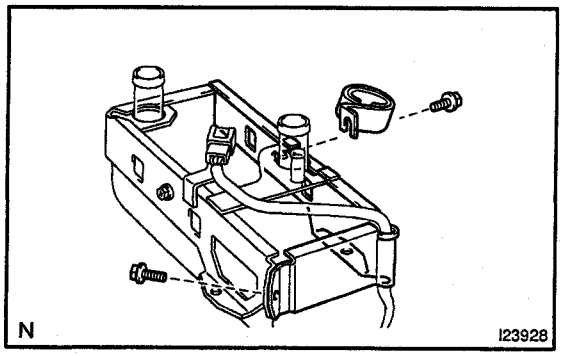
1. REMOVE WATER HOSES

(a) Remove the packing.
(b) Using pliers, grip the claws of the hose cip and slide the hose clip along the hose.
(c) Pull out the water hoses.



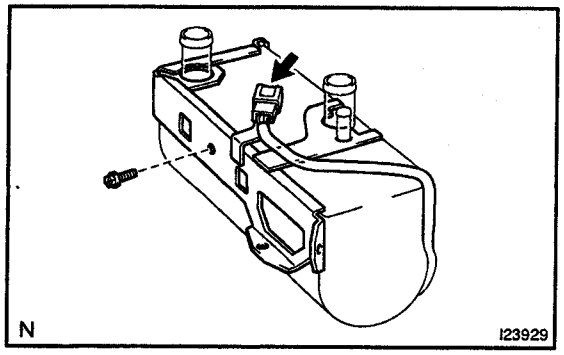
2. REMOVE LOWER BRACKET

Remove the 2 bolts and lower bracket.



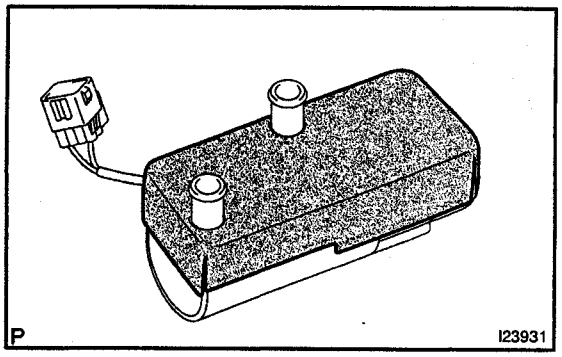
3. REMOVE REAR BRACKET

Remove the 2 bolts and rear bracket.

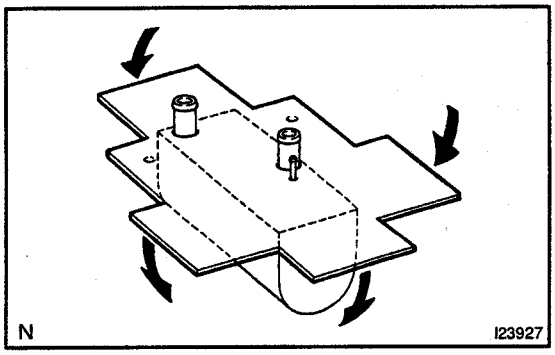


4. REMOVE FRONT BRACKET

(a) Disconnect the connector clamp.
(b) Remove the 2 bolts and front bracket.



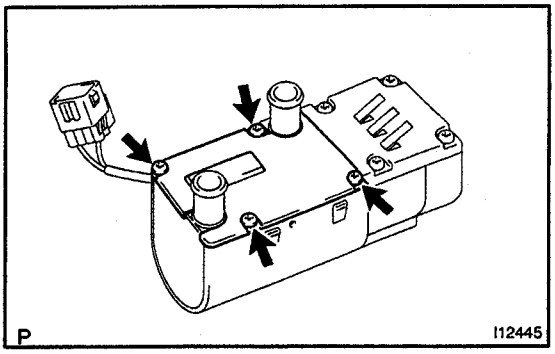
5. REMOVE PACKING



HINT:

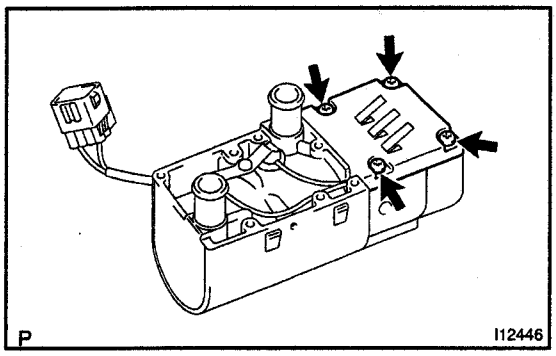
At the time of reassembly, please refer to the following items.

- Clean the face of combustion type power heater.
- Install a new packing on combustion type power heater upper face.
- Following the procedures shown in the illustration, apply the packing to side face of combustion type power heater.



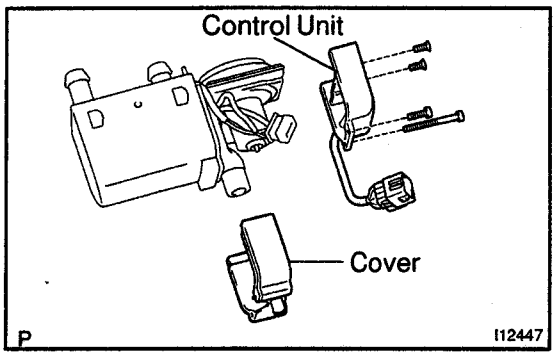
6. REMOVE JACKET COVER

Remove the 4 screws and jacket cover.



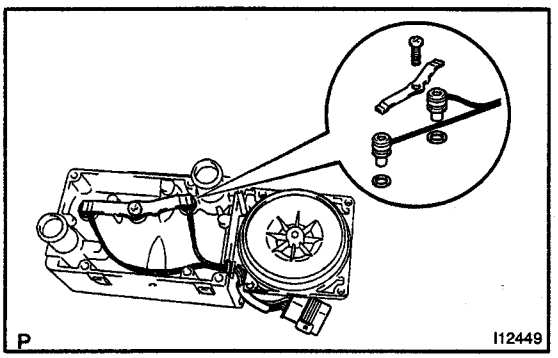
7. REMOVE BLOWER COVER

Remove the 4 screws and blower cover.



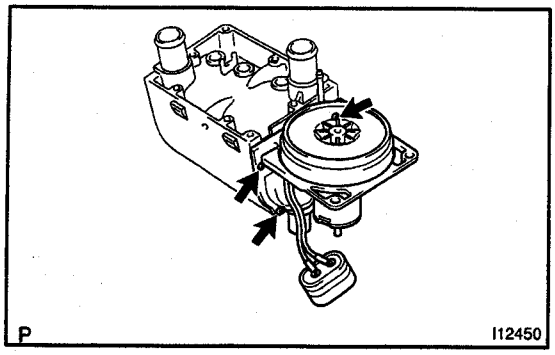
8. REMOVE CONTROL UNIT AND COVER

(a) Remove the 2 screws.
(b) Remove the 2 hexagon screws.
(c) Remove the control unit and cover.



9. REMOVE CABLE HARNESS

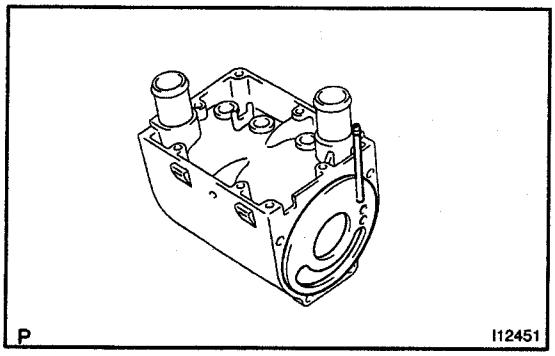
(a) Remove the screw and plate.
(b) Remove the water temperature sensor and overheat sensor.



10. REMOVE ELECTRIC MOTOR

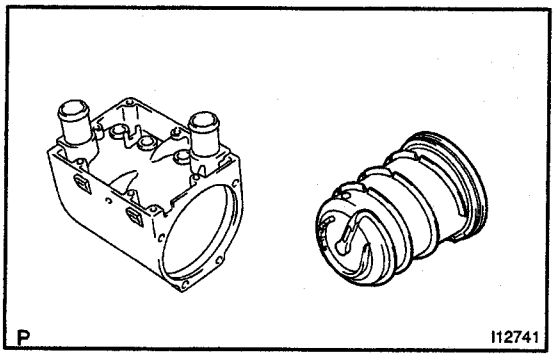
(a) Remove the 3 screws and the electric motor.

(b) Remove the gasket.



11. REMOVE COMBUSTION CHAMBER WITH FLAME TUBE

Remove the combustion chamber and gasket.



12. REMOVE HEAT EXCHAMBER

AC3NA-01

INSPECTION

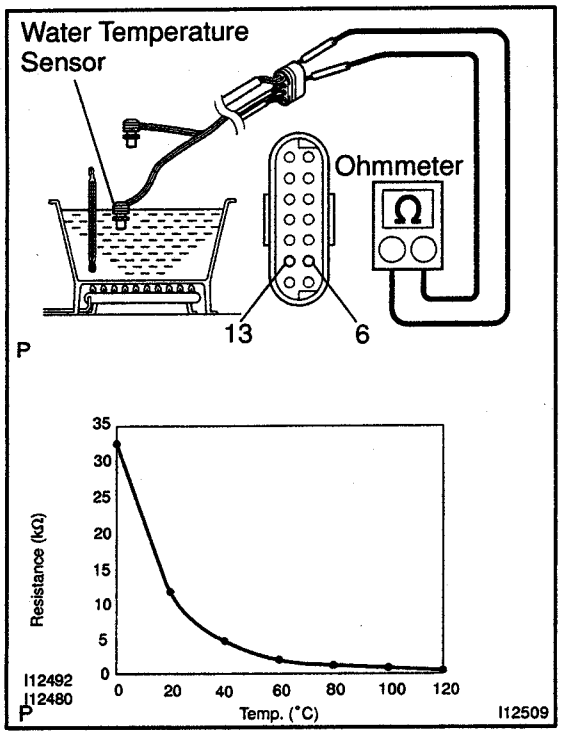
1. INSPECT WATER TEMPERATURE SENSOR

Measure the resistance between the terminals 6, 13.

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the graph

If the resistance is not as specified, replace the water temperature sensor.



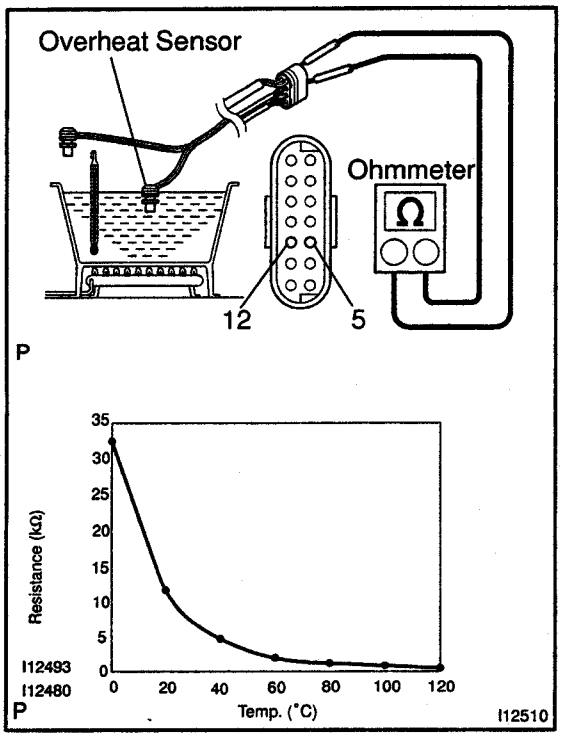
2. INSPECT OVERHEAT SENSOR

Measur the resistance between the terminal 5, 12.

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the graph

If the resistance is not as specified, replace the over heat sensor.

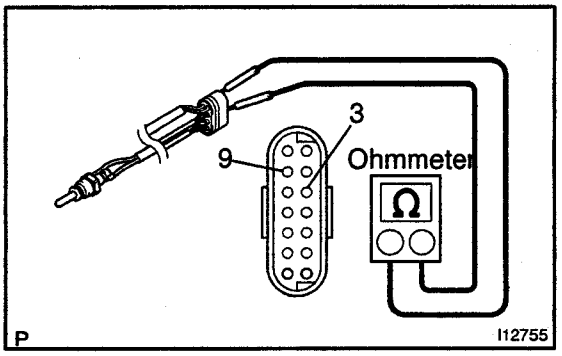


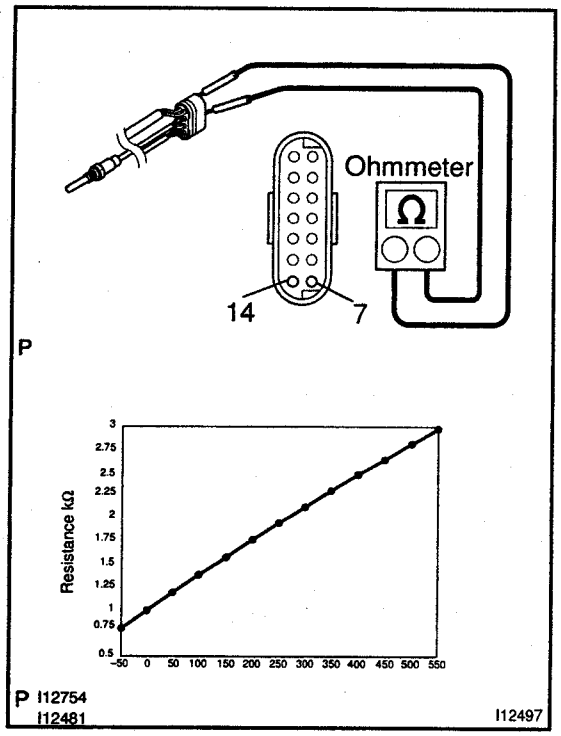
3. INSPECT GLOW PLUG

Using an ohmmeter, check that there is continuity, between the glow plug terminal 3, 9.

Standard resistance: about 0.5 Ω (20°C, reference valve)

If resistance is over 1Ω, replace the glow plug.



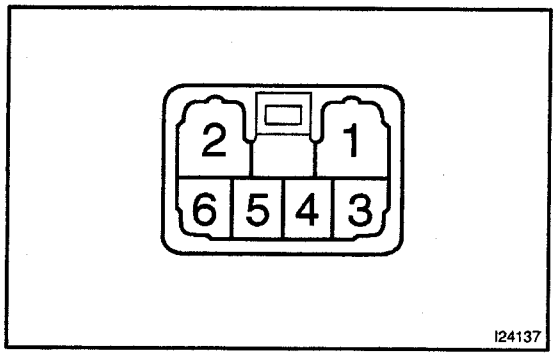


4. INSPECT FLAME SENSOR

Measur the resistance between the terminal 7, 14.

Resistance: Refer to the graph

If the resistance is not as specified, replace the water temperature sensor.

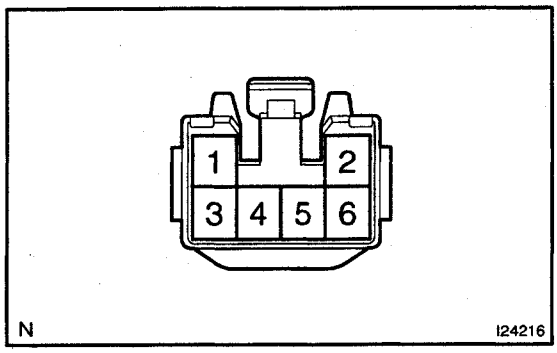


5. INSPECT POWER HEATER SWITCH CIRCUIT

(a) Disconnect the connector from the power heater switch and inspect the connector on the wire harness side, as shown in the chart.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
4 – Ground	Constant	Continuity
1 – Ground	Turn ignition switch ON	Battery voltage
1 – Ground	Turn ignition switch OFF	No voltage
3 – Ground	Turn light control switch TAIL or HEAD	Battery voltage
3 – Ground	Turn light control switch OFF	No voltage

If the circuit is as specified, replace the power heater switch.
If the circuit is not as specified, inspect the circuits connected to other parts.



(b) Connect the connector to the power heater switch and inspect the connector from the back side, as shown in the chart.

Tester connection	Condition	Specified condition
6 – Ground	Turn ignition switch ON and power heater switch ON	Battery voltage
6 – Ground	Turn ignition switch ON and power heater switch ON	No voltage

If the circuit is not as specified, replace the power heater switch.

AC3NB–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–17).

AC3NC–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–15).

COMPRESSOR AND MAGNETIC CLUTCH

ON–VEHICLE INSPECTION

AC3ND-01

1. INSPECT COMPRESSOR FOR METALLIC SOUND

Check there is abnormal metallic sound from the compressor when the A/C switch is ON.

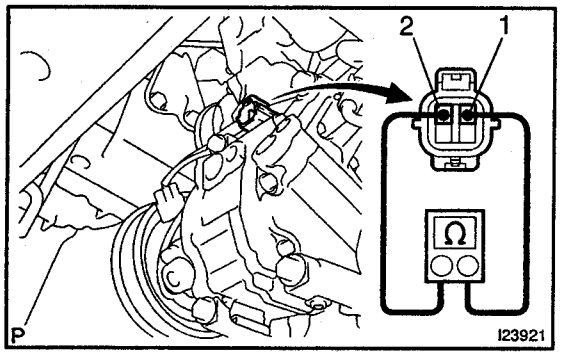
If abnormal metallic sound is heard, replace the compressor assembly.

2. INSPECT REFRIGERANT PRESSURE
(See Pub. No. RM RM685E on page AC–3)

3. INSPECT VISUALLY FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant.

If there is any leakage, replace the compressor assembly.



4. INSPECT COMPRESSOR LOCK SENSOR RESISTANCE

(a) Disconnect the connector.

(b) Measure resistance between terminals 1 and 2.

Standard resistance: 65 – 125 Ω at 20 °C (68 °F)

If resistance is not as specified, replace the sensor.

5. CHECK FOR LEAKAGE OF GREASE FROM CLUTCH BEARING

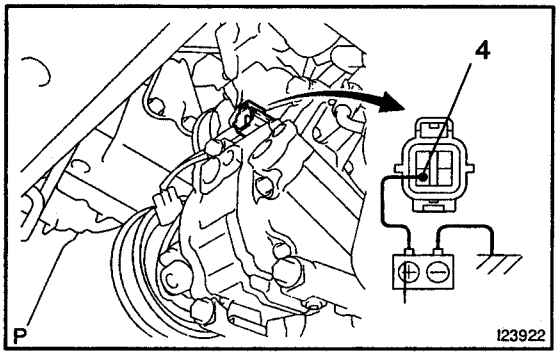
6. CHECK FOR SIGNS OF OIL ON PRESSURE PLATE OR ROTOR

7. INSPECT MAGNETIC CLUTCH BEARING FOR NOISE

(a) Start engine.

(b) Check for abnormal noise from the compressor when the A/C switch is OFF.

If abnormal noise is being emitted, replace the magnetic clutch.



8. INSPECT MAGNETIC CLUTCH OPERATION

(a) Disconnect the connector.

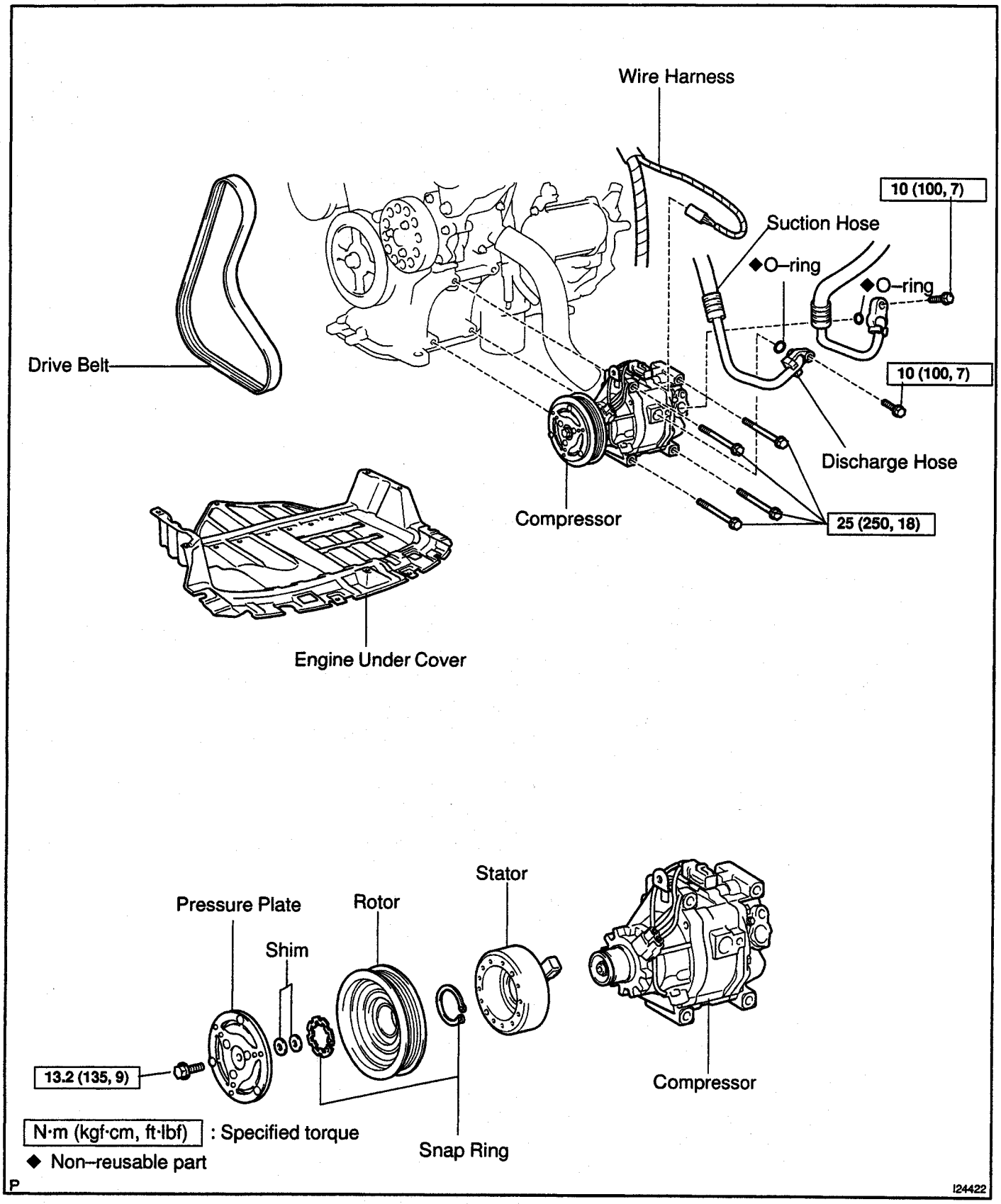
(b) Connect the positive (+) lead from the battery to terminal 4 and the negative (–) lead to the body ground.

(c) Check that the magnetic clutch energized.

If operation is not as specified, replace the magnetic clutch.

AC28E-04

COMPONENTS



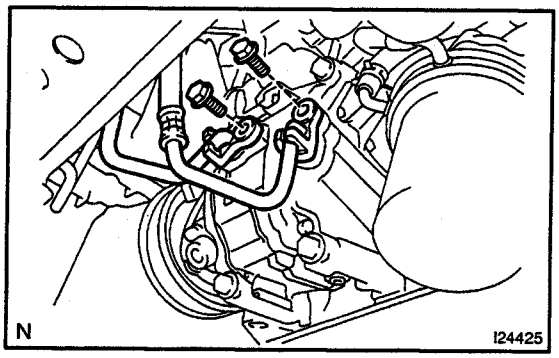
P

I24422

AC3NE-01

REMOVAL

1. **RUN ENGINE AT IDLE SPEED WITH A/C ON FOR APPROX. 10 MINUTES**
2. **STOP ENGINE**
3. **DISCONNECT NEGATIVE (–) TERMINAL CABLE FROM BATTERY**
4. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM**
5. **REMOVE ENGINE UNDER COVER**
6. **DISCONNECT DRIVE BELT (See page AC–4)**

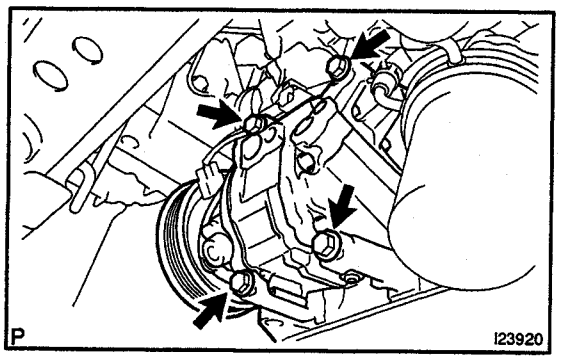


7. **DISCONNECT DISCHARGE AND SUCTION HOSES FROM COMPRESSOR**

Remove the 2 bolts and disconnect the both hoses.

NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

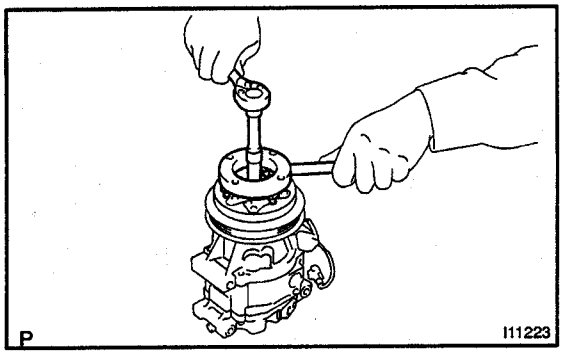


8. **REMOVE COMPRESSOR**

(a) Disconnect the connector.
(b) Disconnect the wire harness clamp.
(c) Remove the 4 bolts and compressor.

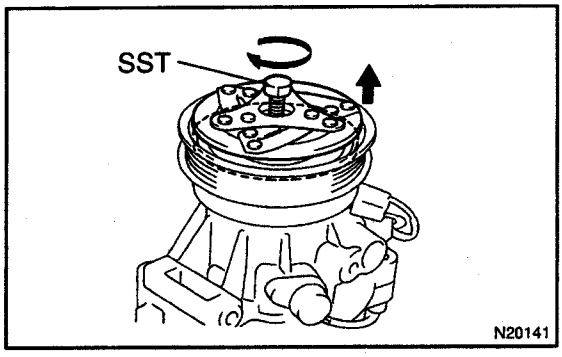
AC3NF–01

DISASSEMBLY



1. REMOVE PRESSURE PLATE

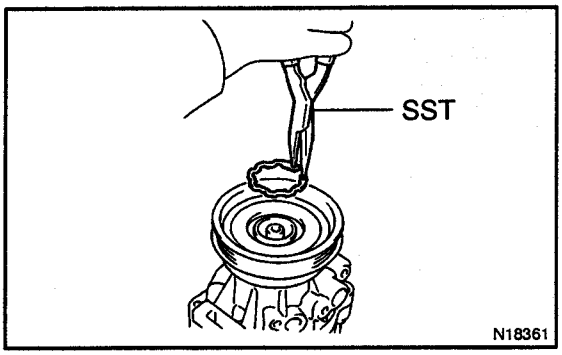
(a) Using SST and a socket wrench, remove the shaft bolt.
SST 07112–76050
Torque: 13.2 N·m (135 kgf·cm, 9 ft·lbf)



(b) Install SST to the pressure plate.
SST 07112–66040

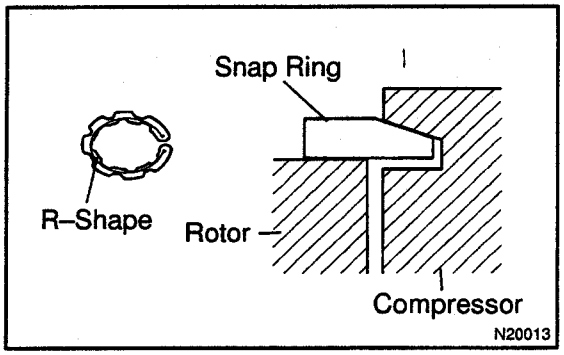
(c) Using SST and a socket wrench, remove the pressure plate.
SST 07112–76050, 07112–66040

(d) Remove the shims from the shaft.

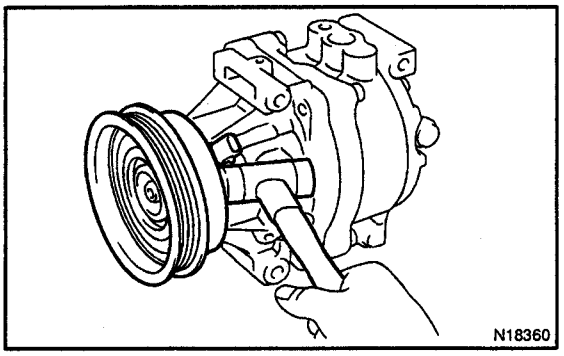


2. REMOVE ROTOR

(a) Using SST, remove the snap ring.
SST 95994–10020

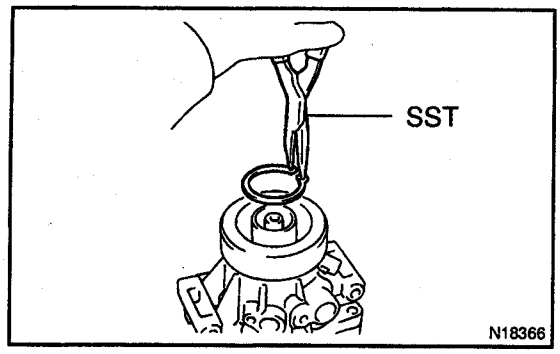


NOTICE:
At the time of reassembly, please refer to the following item.
The snap ring should be installed so that its beveled side faces up.



(b) Using a plastic hammer, tap the rotor off the shaft.

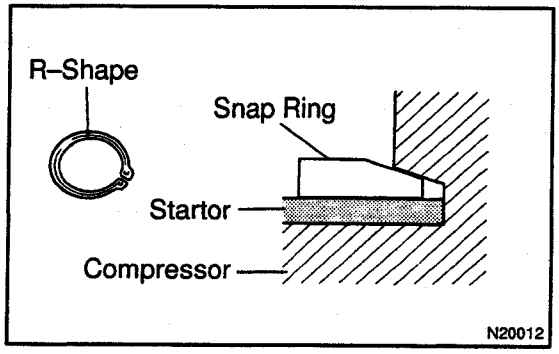
NOTICE:
Be careful not to damage the pulley when tapping on the rotor.



3. REMOVE STATOR

(a) Disconnect the connector from the stator.

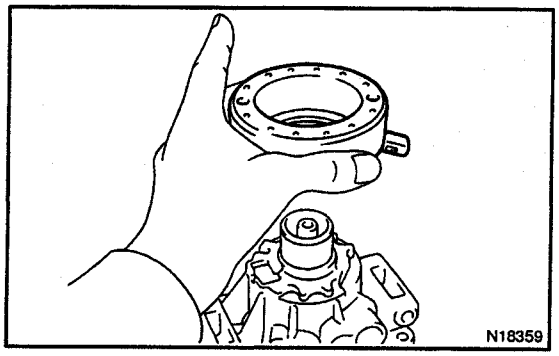
(b) Using SST, remove the snap ring.
SST 95994–10020



NOTICE:

At the time of reassembly, please refer to the following item.

The snap ring should be installed so that its beveled side faces up.

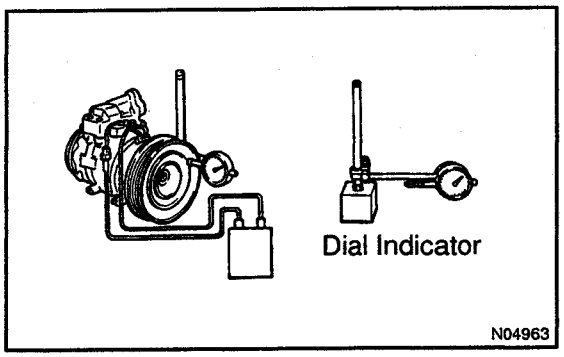


(c) Remove the stator.

AC0D3-07

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–28).



CHECK CLEARANCE OF MAGNETIC CLUTCH

HINT:

After reassembly, check the 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:

0.5 ± 0.15 mm (0.020 ± 0.0059 in.)

If the clearance is not within the standard clearance, adjust the clearance using shims to obtain the standard clearance.

Shim thickness:

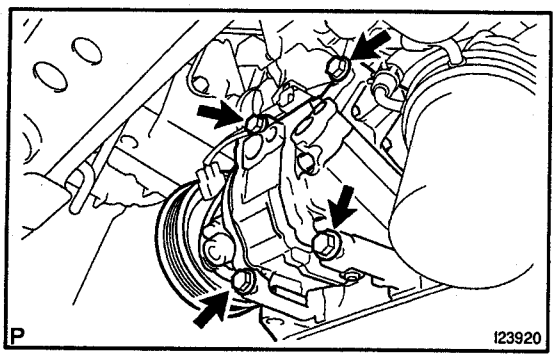
0.1 mm (0.004 in.)

0.3 mm (0.012 in.)

0.5 mm (0.020 in.)

AC3NG-01

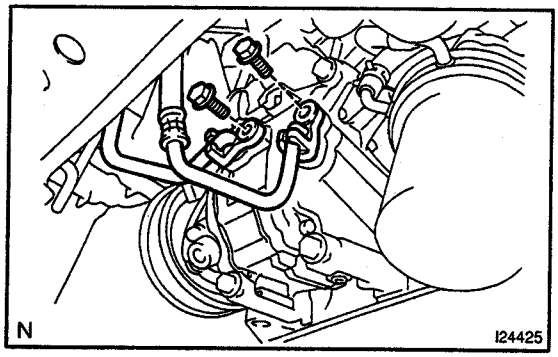
INSTALLATION



1. INSTALL COMPRESSOR

(a) Install the compressor with 4 bolts.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

(b) Connect the connector.



2. CONNECT DISCHARGE AND SUCTION HOSES FROM COMPRESSOR

(a) Lubricate 2 new O–rings with compressor oil and install them to the both hoses.

(b) Connect the both hoses with 2 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

NOTICE:
Hoses should be connected immediately after the caps have been removed.

3. CONNECT DRIVE BELT (See page AC–5)

4. INSTALL ENGINE UNDER COVER

5. CHARGE SYSTEM WITH REFRIGERANT

(a) Evacuate air from refrigeration system.

(b) Charge system with refrigerant and inspect for leakage of refrigerant.
Specified amount: 430 ± 30 g (15.17 ± 1.06 oz.)

6. INSPECT FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant.
If there is leakage, check the tightening torque at the joints.

7. INSPECT A/C OPERATION

ALPHABETICAL INDEX

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B

C

D

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R

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TOYOTA MOTOR CORPORATION

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