FOREWORD

TOYOTA MOTOR CORPORATION

This supplement has been prepared to provide information covering general service repairs for COROLLA which underwent changes in August or October, 2002.

Applicable models: ZZE120, 121, 122, 123 series

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

Manual Name	Pub. No.
• COROLLA Repair Manual	RM821E
• COROLLA Repair Manual Supplement	RM926E
• 1ZZ-FE, 3ZZ-FE Engine Repair Manual	RM823E
• 2ZZ-GE Engine Repair Manual	RM929E
• 3ZZ-FE, 4ZZ-FE Engine Repair Manual	RM928E
• C51, C52 Manual Transaxle Repair Manual	RM826E
• C64 Manual Transaxle Repair Manual	RM930E
• C150 Manual Transaxle Repair Manual	RM927E
• A245E, A246E Automatic Transaxle Repair Manual	RM847E
• COROLLA Electrical Wiring Diagram (Draft)	DR067W

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.

CAUTION

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

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

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COROLLA ENGINE SUPPLEMENT DR 105E

Which underwent changes in August & October, 2002.

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HOW TO USE THIS MANUAL

010B2-04

GENERAL INFORMATION

1. GENERAL DESCRIPTION

(a) This manual is made in accordance with SAE J2008.

(b) Generally, repair operations can be separated in the following 3 main processes:
1. Diagnosis
2. Removing and Installing, Replacing, Disassembling, Installing and Checking, Adjusting
3. Final Inspection

(c) This manual explains the 1st process of ”Diagnosis” (placed in the ”Diagnostics” section), the 2nd process of ”Removing and Installing, Replacing, Disassembling, Installing and Checking, Adjusting”, but the 3rd process of ”Final Inspection” is omitted.

(d) The following essential operations are not written in this manual. However, these operations must be done in the practical situation.
(1) Operation with a jack or lift
(2) Cleaning of a removed part when necessary
(3) Visual check

2. INDEX

(a) An alphabetical INDEX is provided as a section on the end of the book to guide you to the item to be repaired.

3. PREPARATION

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

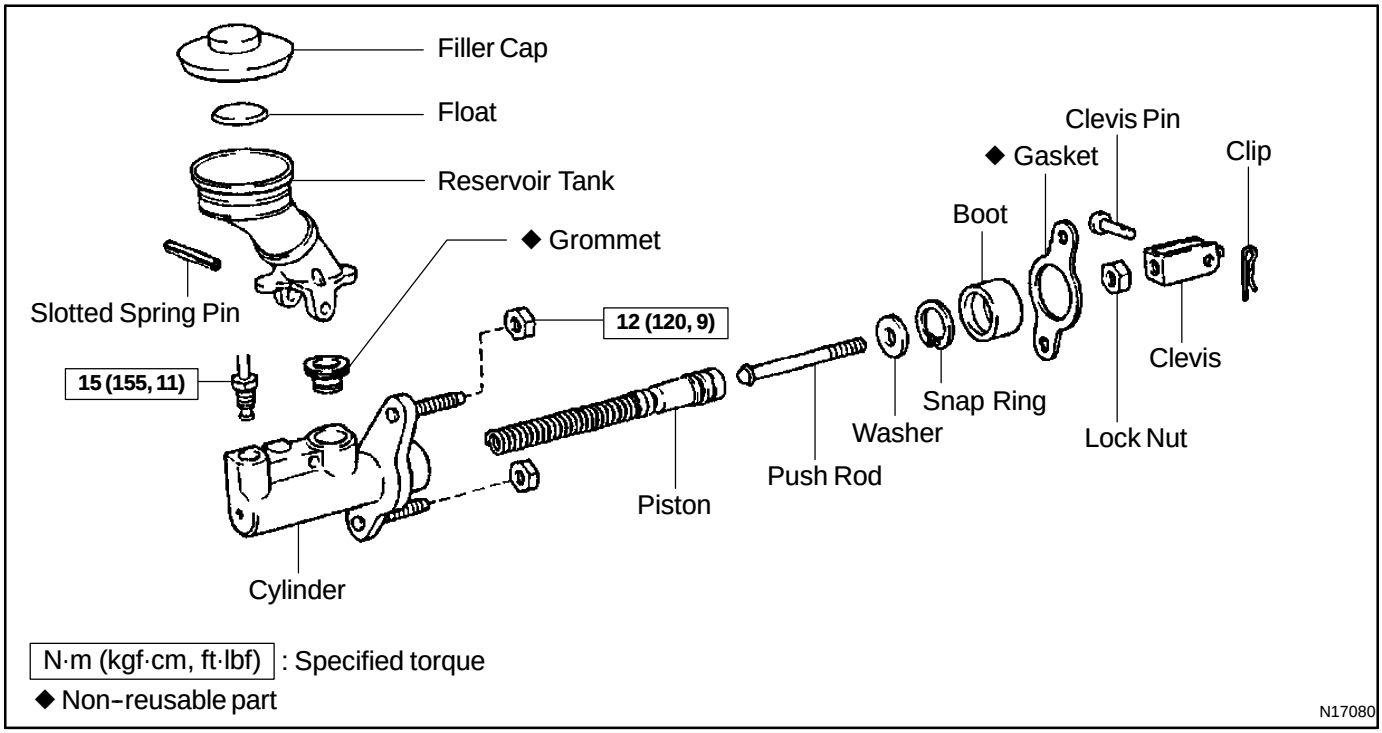
4. REPAIR PROCEDURES

(a) Component drawing is placed under the title when necessary.

(b) Illustrations are placed as ”disassembled parts drawing” so that it enables you to understand the fitting condition of the components.

(c) Non–reusable parts, grease applied parts, precoated parts and tightening torque are specified in the components drawing.

Example:



CONTINUED

(d) Tightening torque, oil applying position, and non–reusable parts are described as important points in the procedure.

NOTICE:

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

(e) Installing procedure of operation items is performed in the reverse order of the removal, and only the important points are described.

(f) Only items with points are described in the procedure, and the operational portion and content are placed using an illustration. In the explanations, details of the operational method, standard value and notice are placed.

(g) There may be a case where the illustrations of the similar models are used. In that case the details may be different from the actual vehicle.

(h) The procedures are presented in a step–by–step format:

(1) The illustration shows what to do and where to do it.

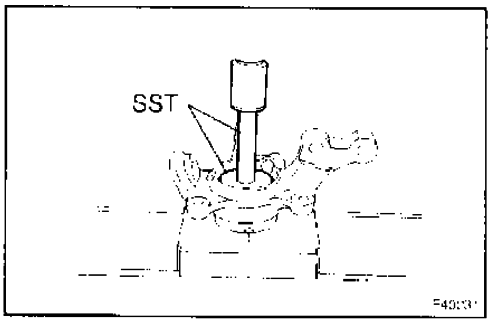
(2) The task heading tells what to do.

(3) The detailed text tells how to perform the task and gives other information such as specifications and warnings.

Example:

Illustration:

what to do and where



Task heading: what to do

14. INSTALL FRONT AXLE HUB LH BEARING

(a) Using SST and a press, install a new bearing to the steering knuckle. ← *Detailed test: how to perform task*

SST 09950–60020 (09951–00720), 09950–70010 (09951–07100)

Set part No.

Component part No.

D26745

HINT:

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

5. SERVICE SPECIFICATIONS

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

6. TERMS DEFINITION

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

CONTINUED

7. SI UNIT

(a) 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:

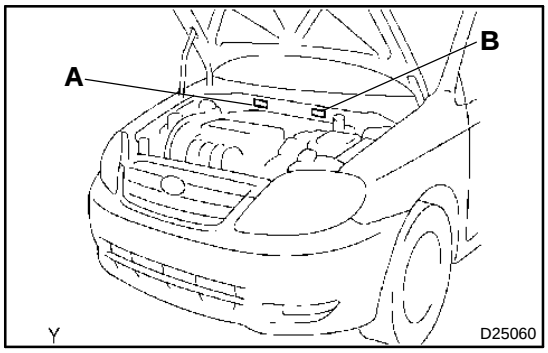
Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

CONTINUED

IDENTIFICATION INFORMATION

VEHICLE IDENTIFICATION AND SERIAL NUMBERS

010E1-03

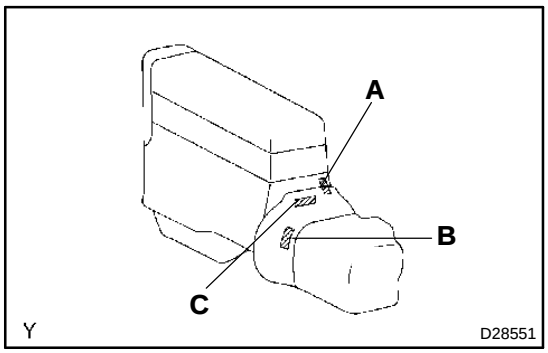


1. VEHICLE IDENTIFICATION NUMBER

(a) 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.

A: Vehicle Identification Number

B: Manufacturer's Plate



2. ENGINE SERIAL NUMBER AND TRANSAXLE SERIAL NUMBER

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

A: 1ZZ-FE, 2ZZ-GE,3ZZ-FE, 4ZZ-FE

B: C50, C52, C64, A245E, A246E

C: C150

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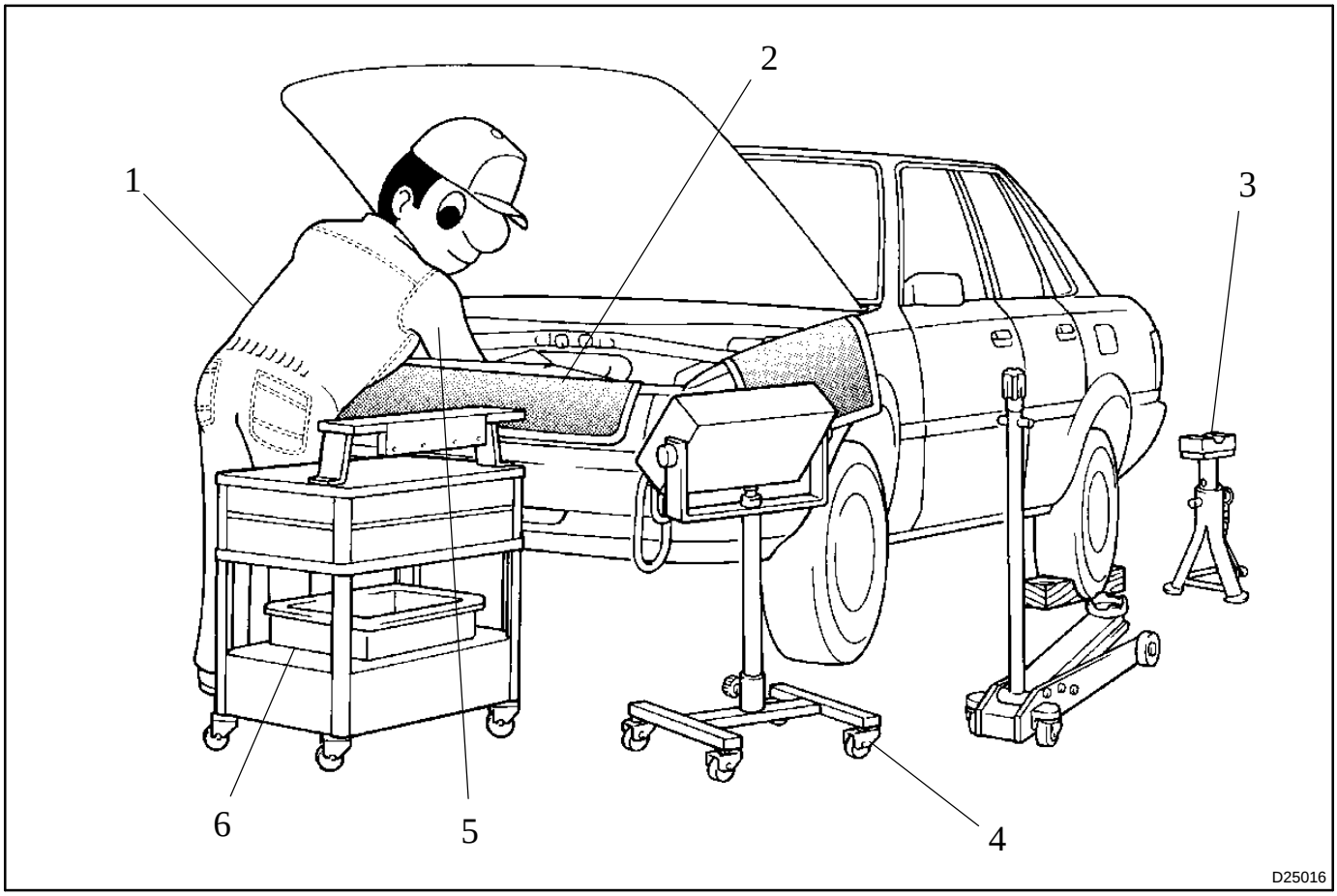
REPAIR INSTRUCTION

PRECAUTION

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1. BASIC REPAIR HINT

(a) HINTS ON OPERATIONS

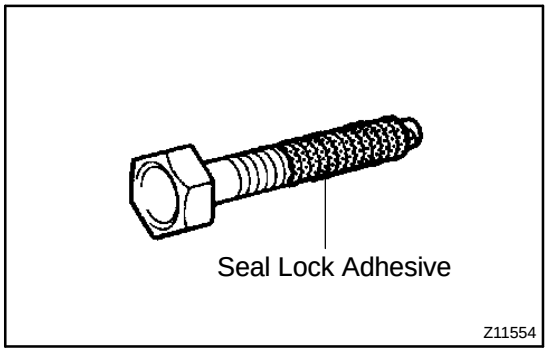


1	Looks	• Always wear a clean uniform. • Hat and safety shoes must be worn.
2	Vehicle protection	• Set a grill cover, fender cover, seat cover and floor mat before starting the operation.
3	Safe operation	• In case of working with 2 or more persons, be sure to check safety of one another. • When working with the engine running, pay attention to the ventilation of the workshop. • In case of operating on a high-temperature parts, rotating, moving and vibrating parts, pay attention to not burn or injure yourself. • When jacking up the vehicle, be sure to support the specified location with a safety stand. • When lifting up the vehicle, apply a safety equipment.
4	Preparation of tools and measuring gauge	• Before starting operation, prepare a tool stand, SST, gauge, oil, shop rag and parts for replacement.
5	Removal and installation, disassembly and assembly operations	• Diagnose with a thorough understanding of the trouble phenomenon and perform effective operations. • Before removing the parts, check the assembly for general condition, deformation and damage. • When the structure is complicated, take a note or put matchmakers so as not to make mistakes that affect the function of the parts. • Clean and wash the removed parts if necessary, and assemble them after a thorough check.
6	Removed parts	• Place the removed parts in the correct order to avoid mixing up or making them dirty. • As for non-reusable parts such as gasket, O-ring, and self lock nut, change them to new ones following the instruction of this manual. • Sort out the parts for replacement in a box and show them to the customer.

(b) JACKING UP AND SUPPORTING VEHICLE

(1) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page 01-15).

CONTINUED



(c) PRECOATED PARTS

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

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

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

NOTICE:

Perform the torque checking with the lower limit value of the torque tolerance.

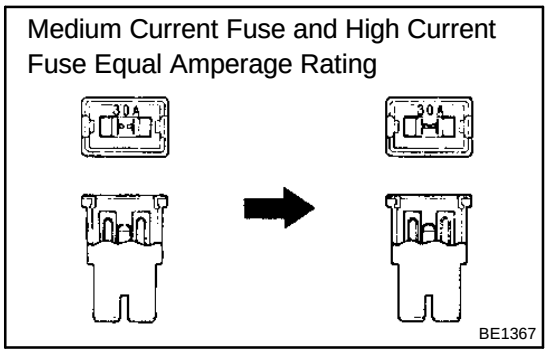
(4) Depending on the seal lock agent to apply, there may be a case where it is necessary to leave it for a specified time until it hardens.

(d) GASKETS

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

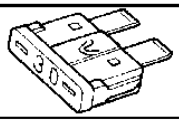
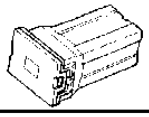
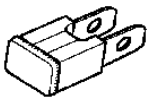
(e) BOLTS, NUTS AND SCREWS

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



(f) FUSES

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

Illustration	Symbol	Part Name	Abbreviation
 BE5594	 IN0365	FUSE	FUSE
 BE5595	 IN0366	MEDIUM CURRENT FUSE	M-FUSE
 D27353	 IN0367	HIGH CURRENT FUSE	H-FUSE

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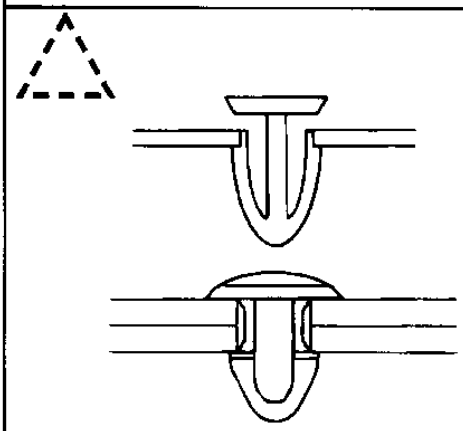
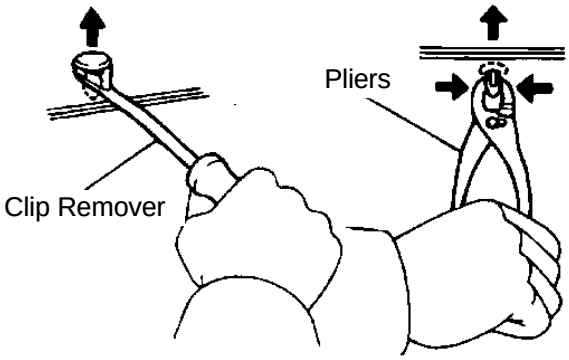
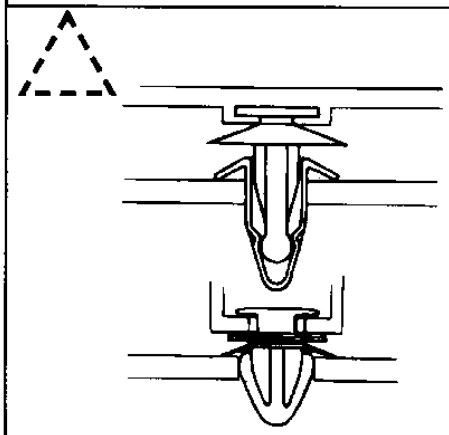
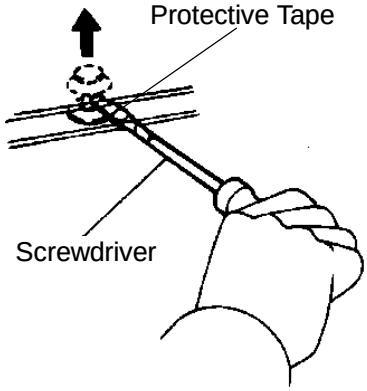
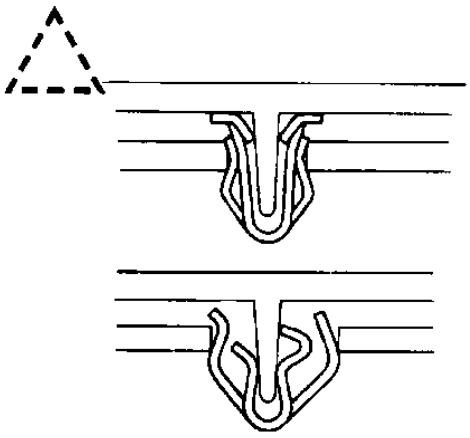
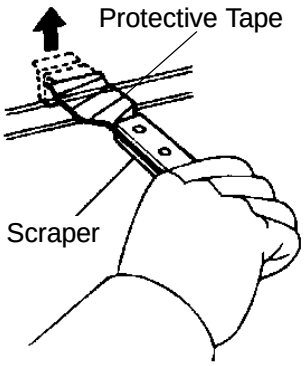
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(g) CLIPS

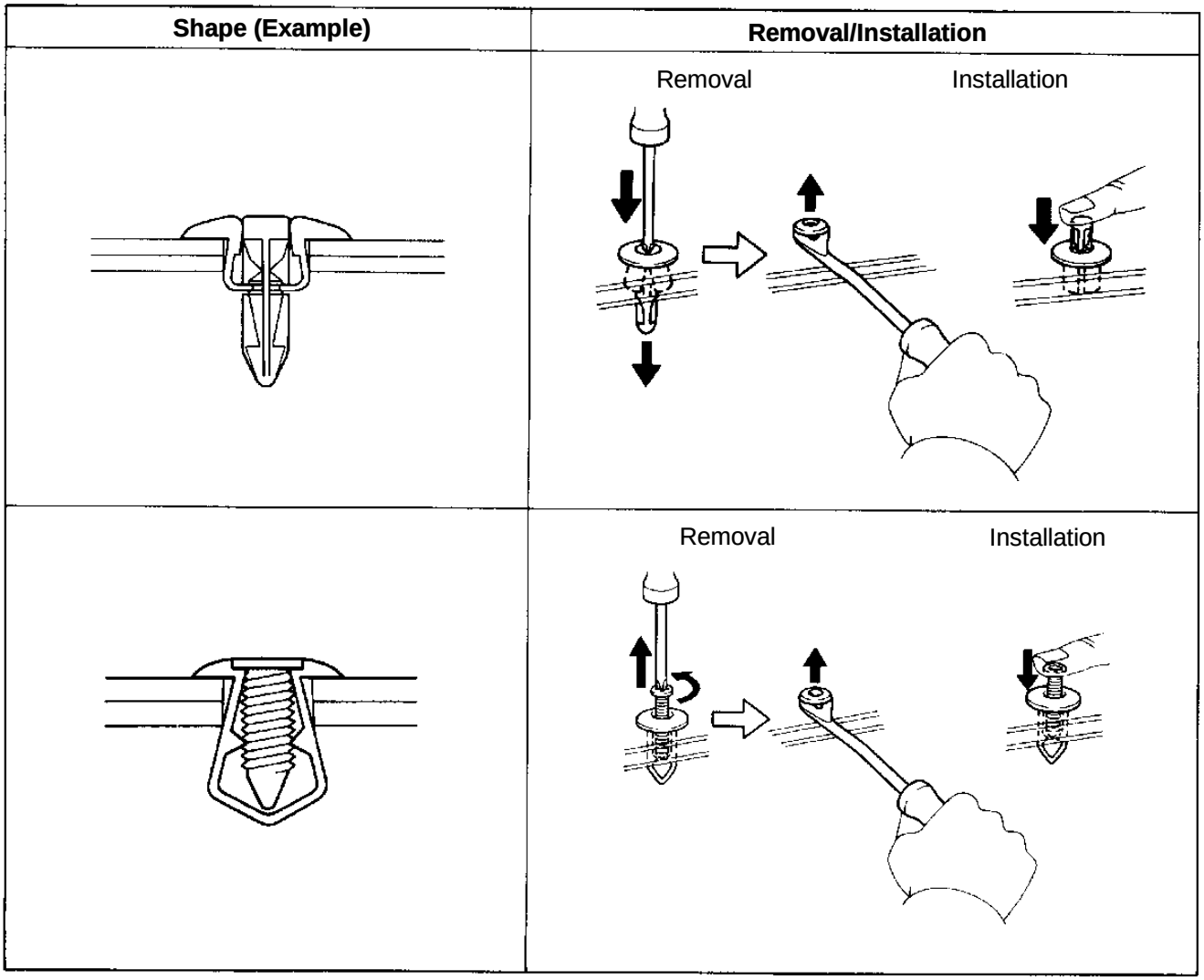
(1) The removal and installation methods of typical clips used in body parts are shown in the table below.

HINT:

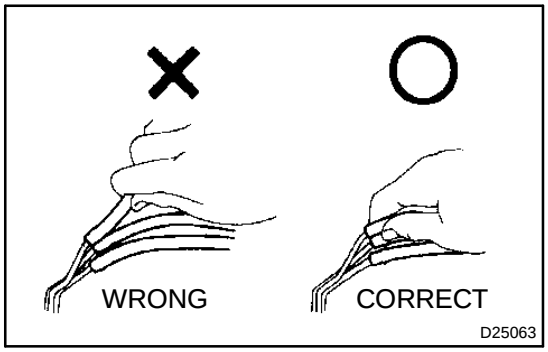
If the clip is damaged during the operation, always replace it with a new clip.

Shape (Example)	Removal/Installation
	
	
	

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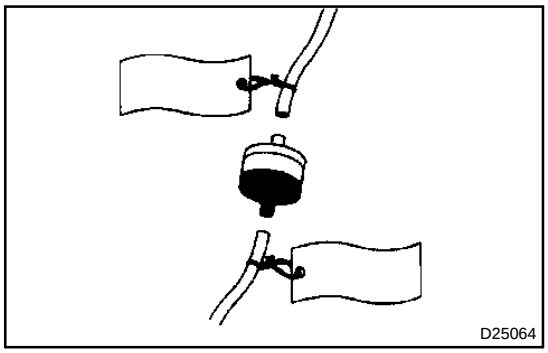


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(h) REMOVAL AND INSTALLATION OF VACUUM HOSES

(1) To disconnect vacuum hoses, pull them by holding the end, not the middle of the hose.

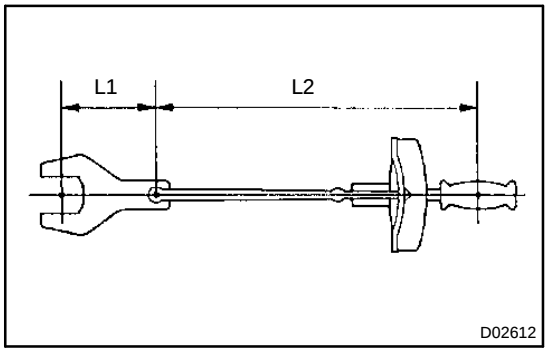


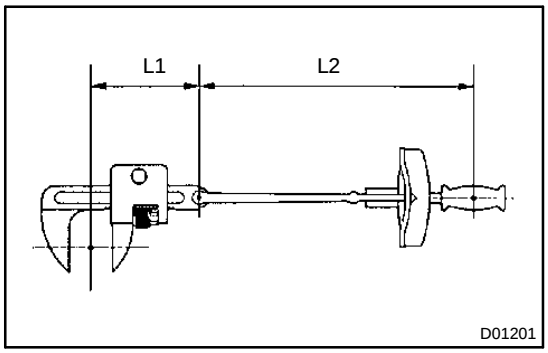
(2) When disconnecting vacuum hoses, use tags to identify where they should be reconnected.

(3) After completing the job, make a double check whether the vacuum hoses are properly connected. A label under the hood shows the proper layout.

(4) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step–down adapter for adjustment. Once the hose has been stretched, it may leak air.

CONTINUED





(i) TORQUE WHEN USING TORQUE WRENCH WITH EXTENSION TOOL

(1) When a SST or extension tool is combined with the torque wrench to extend its entire length, if you tighten until the reading of the torque wrench reaches the specified torque value, the actual torque becomes excessive.

(2) In this manual, only the specified torque is described. In case of using SST or extension tool, calculate the reading of the torque wrench by the following formula.

(3) Formula T'=T x L2/(L1 + L2)

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

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

HINT:

The vehicle is equipped with an SRS (Supplemental Restraint System), such as the horn button assembly, instrument panel passenger airbag assembly, front airbag sensor and seat belt pretensioner.

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

Furthermore, 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.

(a) GENERAL NOTICE

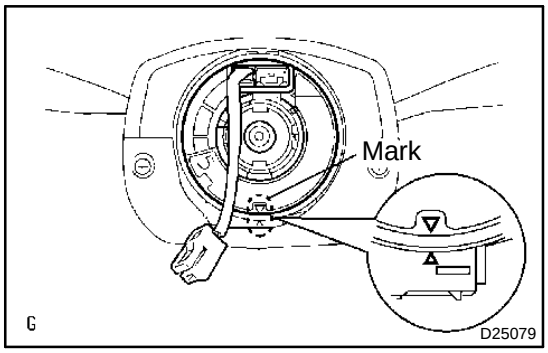
(1) Malfunction symptoms of the supplemental restraint system are difficult to confirm, so the diagnostic trouble codes become the most important source of information when troubleshooting. When troubleshooting the supplemental restraint system, always inspect the diagnostic trouble codes before disconnecting the battery (Refer to Pub. No. RM926E on page 05–59).

(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 if work is started within 90 seconds after disconnecting the negative (–) terminal cable from the battery, the SRS may deploy.)
When the negative (–) terminal cable is disconnected from the battery, memory of the clock and audio systems will be cancelled. So before starting work, make a record of the memorized contents in each memory system. Then, when work is finished, reset the clock and audio systems as before. To avoid erasing the memory in each memory system, never use a back–up power supply from another battery.

(3) Even in case of a minor collision where the SRS does not deploy, the horn button assembly, instrument panel passenger airbag assembly and seat belt pretensioner should be should be inspected.

CONTINUED

(4) Never use SRS relating 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, horn button assembly, instrument panel passenger airbag assembly or seat belt pretensioner.
(7) If the airbag sensor assembly, horn button assembly, instrument panel passenger airbag assembly or seat belt pretensioner have been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.
(8) Do not directly expose the airbag sensor assembly, horn button assembly, instrument panel passenger airbag assembly, front seat airbag assembly or seat belt pretensioner to hot air or flames.
(9) Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting an electrical circuit.
(10) Information labels are attached to the SRS components. Follow the instructions on the notices.
(11) After work on the supplemental restraint system is completed, check the SRS warning light
(Refer to Pub. No. RM926E on page 05–59).

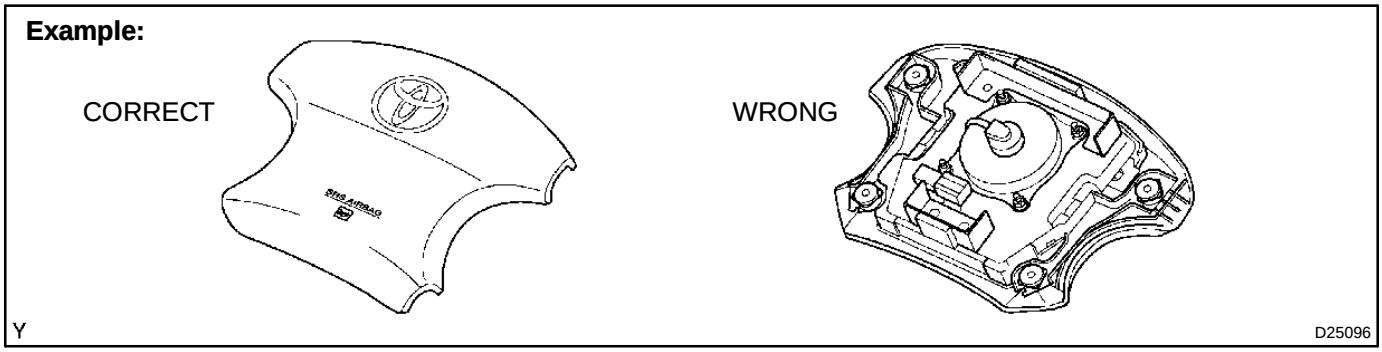


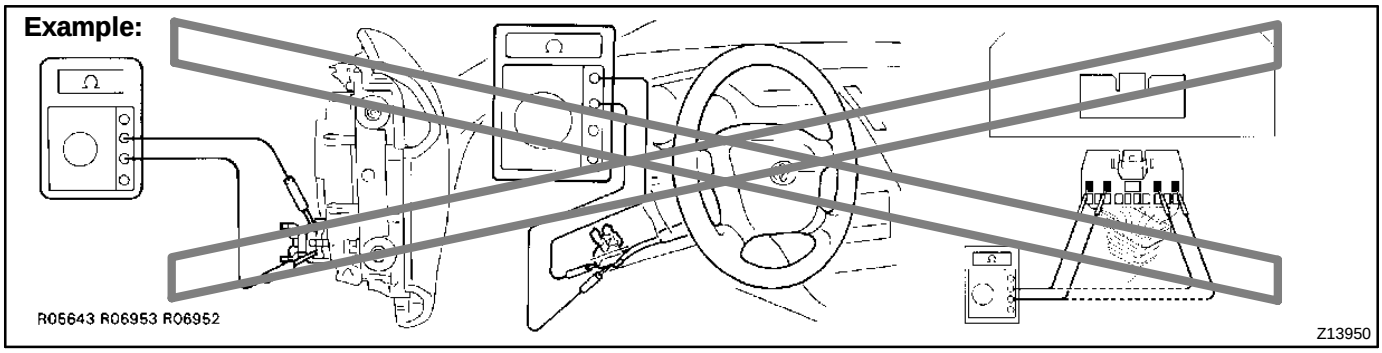
(b) SPIRAL CABLE (in Combination Switch)
(1) The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may occur.
Refer to Pub No. RM821E on page 50–5 concerning the correct installation of steering wheel.

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

CONTINUED

(6) When disposing the vehicle or the horn button assembly alone, the airbag should be inflated using an SST before disposal (Refer to Pub. No. RM821E on page 60–15).
Perform the operation in a safe place away from electrical noise.





(d) INSTRUMENT PANEL PASSENGER AIRBAG ASSEMBLY

(1) Always store a removed or new instrument panel passenger airbag assembly with the airbag inflating direction facing upward.
Placing the airbag assembly with the airbag inflation direction facing downward could cause a serious accident if the airbag inflates.

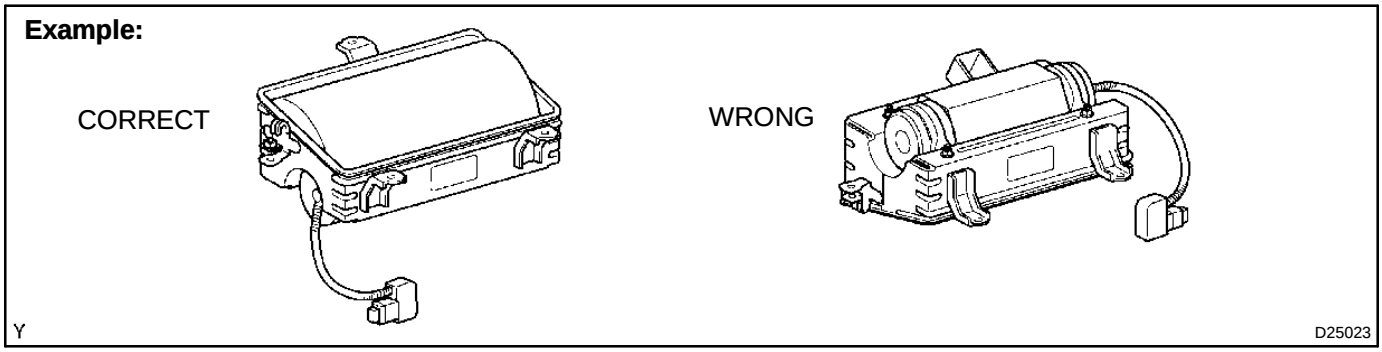
(2) Never measure the resistance of the airbag squib (This may cause the airbag to inflate, which is very dangerous.).

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

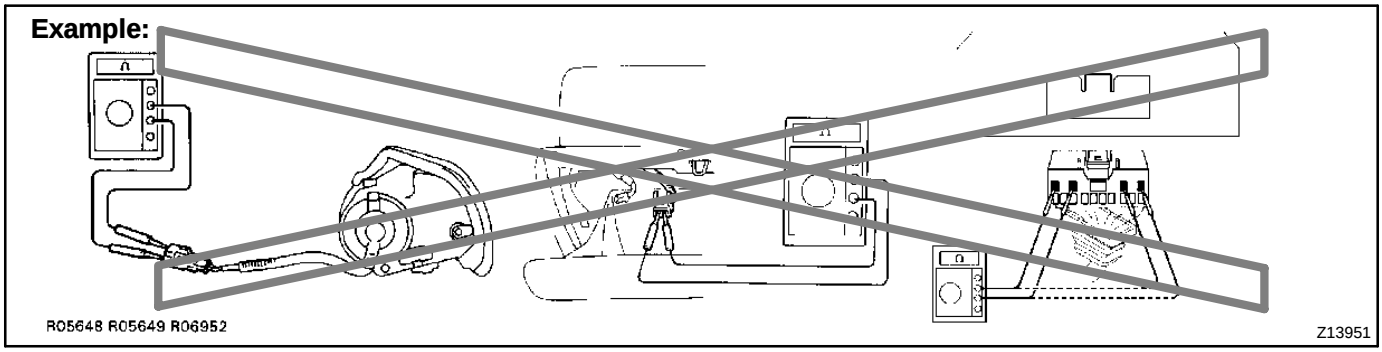
(4) Store the airbag assembly where the ambient temperature remains below 93°C (200°F), without high humidity and away from electrical noise.

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

(6) When disposing of a vehicle or the airbag assembly alone, the airbag should be inflated using an SST before disposal (Refer to Pub. No. RM821E on page 60–26).
Perform the operation in a safe place away from electrical noise.



CONTINUED



(e) 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.

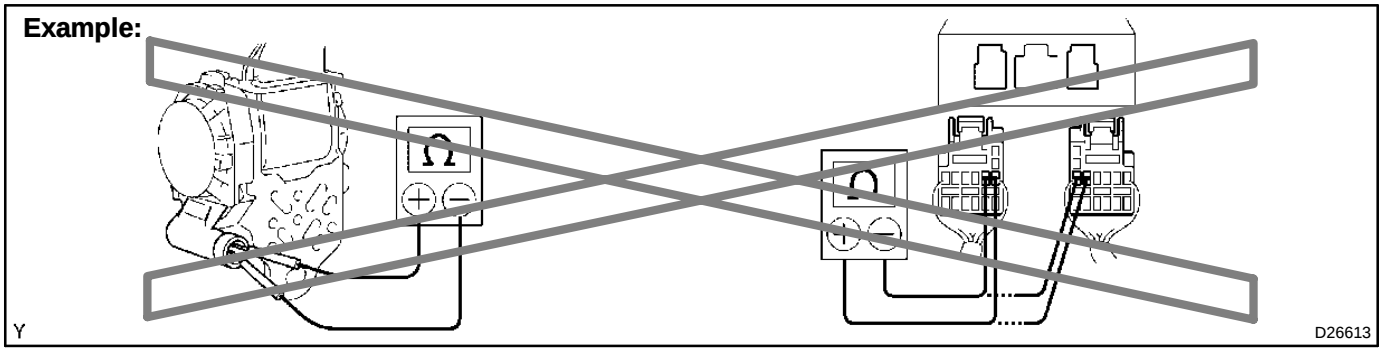
(4) Store the seat belt pretensioner where the ambient temperature remains below 80˚C (176˚F) without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the connector (2 yellow 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 (Refer to Pub. No. RM821E on page 61–4). 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 disposal. Never apply water to cool down the seat belt pretensioner.

(8) Oil or water should not be put on the front seat outer belt and the front seat outer belt should be cleaned with the appropriate detergents.



(f) AIRBAG SENSOR ASSEMBLY

(1) Never reuse the airbag sensor assembly involved in a collision where the SRS has deployed.

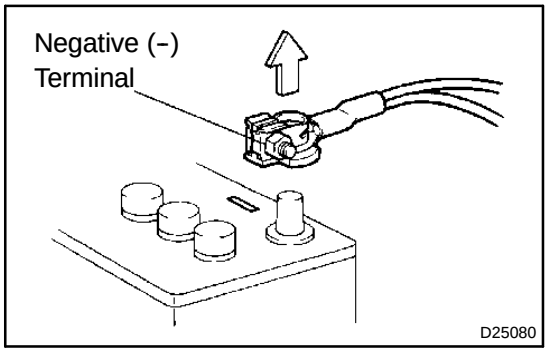
(2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor mounted on the floor. If the connectors are connected or disconnected while the airbag sensor assembly is not mounted to the floor, it could cause an undesired ignition of the supplemental restraint system.

(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 loosening the set bolts of the airbag sensor assembly.

(g) WIRE HARNESS AND CONNECTOR

(1) The SRS wire harness is integrated with the instrument panel wire harness assembly. All 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.

CONTINUED



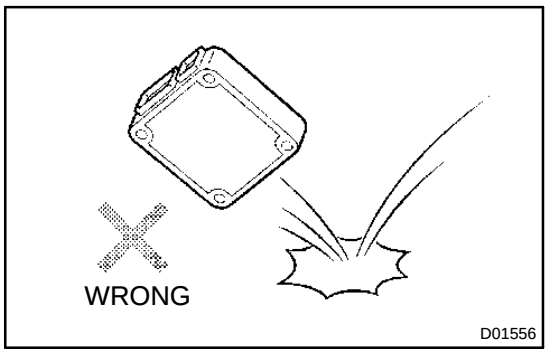
3. ELECTRONIC CONTROL

(a) REMOVAL AND INSTALLATION OF BATTERY TERMINAL

(1) Before performing electrical work, disconnect the battery negative (–) terminal cable beforehand so as to prevent burnt–out damage by short.

(2) When disconnecting and installing the terminal cable, turn the ignition switch and lighting switch OFF, and loosen the terminal nut completely. Perform these operations without twisting or prying the terminal.

(3) When the battery terminal is removed, all the memories of the clock, radio, DTCs, etc. will be erased. So before removing it, check them and note them down.



(b) HANDLING OF ELECTRONIC PARTS

(1) Do not open the cover or case of the ECU unless absolutely necessary (If the IC terminals are touched, the IC may be destroyed by static electricity).

(2) To disconnect electronic connectors, pull the connector itself, not the wires.

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

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

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

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

4. REMOVAL AND INSTALLATION OF FUEL CONTROL PARTS

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

(1) Work in a place with good air ventilation and without anything flammable such as welder, grinder, drill, electric motor or stove in the surroundings.

(2) Never work in a place such as a pit or nearby a pit, as there is a possibility that vaporized fuel is filled in those places.

(b) REMOVING AND INSTALLING OF FUEL SYSTEM PARTS

(1) Prepare a fire extinguisher before starting the operation.

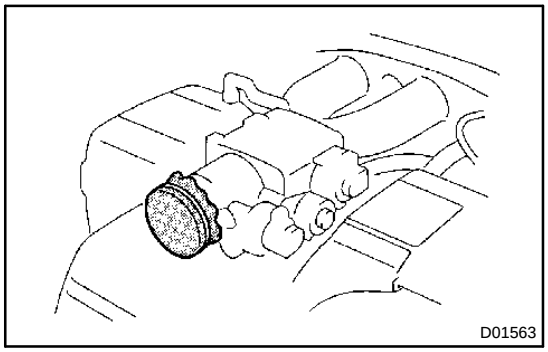
(2) For prevention of the static electricity, install a ground on the fuel changer, vehicle and fuel tank, and do not spray much water so as to prevent slipping.

(3) Never use any electric equipment like an electric motor or a working light, as they may cause sparks or high temperature.

(4) Never use an iron hammer, as it may cause sparks.

(5) Dispose of the shop rag separately from any fuel deposit.

CONTINUED

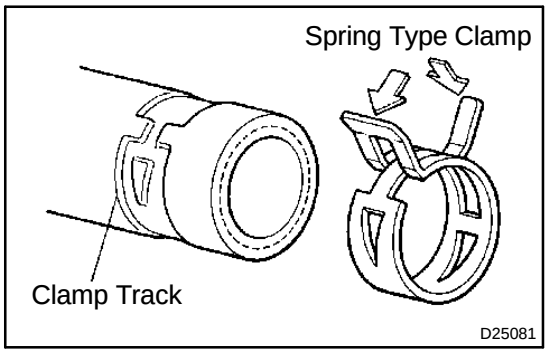


5. REMOVAL AND INSTALLATION OF ENGINE INTAKE PARTS

(a) If any metal tip is mixed in the inlet pass, that may give a bad effect to the engine and turbocharger.

(b) When removing and installing the inlet system parts, close the opening of the removed inlet system parts and the engine with a clean shop rag or gummed tape.

(c) When installing the inlet system parts, check that there is no mixing of a metal tip.



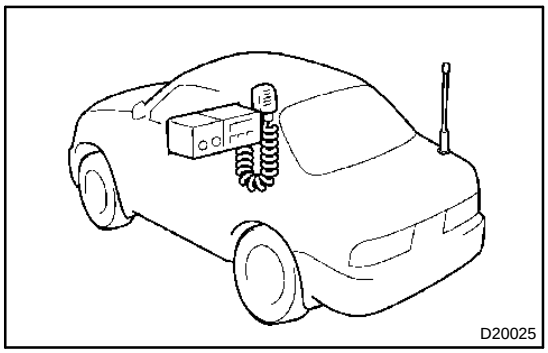
6. HANDLING OF HOSE CLAMPS

(a) Before removing the hose, check the clamp position to restore it securely.

(b) Change a deformed or dented clamp into a new one.

(c) In case of reusing the hose, install the clamp on the hose where it has a clamp track.

(d) For a spring type clamp, make adjustment by adding force to the arrow mark direction after the installation.



7. FOR VEHICLES EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

(a) Install an antenna as far as possible away from the ECU and sensors of the vehicle's electronic systems.

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

(c) Prevent the antenna feeder from getting entangled with the other wirings, and keep the antenna feeder separately from the other wirings as much as possible.

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

(e) Do not install any powerful mobile communication system.

8. FOR VEHICLES EQUIPPED WITH CATALYTIC CONVERTER

CAUTION:

If large amount of unburned gasoline flows into the converter, it may cause overheating and a fire hazard. To prevent this, observe the following precautions.

(a) Use only unleaded gasoline.

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

(c) Avoid a spark jump test.
  (1) Perform a spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
  (2) While testing, never race the engine.

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

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

CONTINUED

010B5-06

VEHICLE LIFT AND SUPPORT LOCATIONS

1. NOTICE ABOUT VEHICLE CONDITION WHEN JACKING UP

(a) As a rule, the vehicle must be unloaded when jacking up. Never jack up or lift up the vehicle loaded with things of heavy weight.

(b) When removing any parts of heavy weight like the engine and transmission, the center of gravity of the vehicle moves. Place a balance weight so as to keep it from rolling, or hold the jacking support location using the mission jack.

2. NOTICE FOR USING 4 POST LIFT

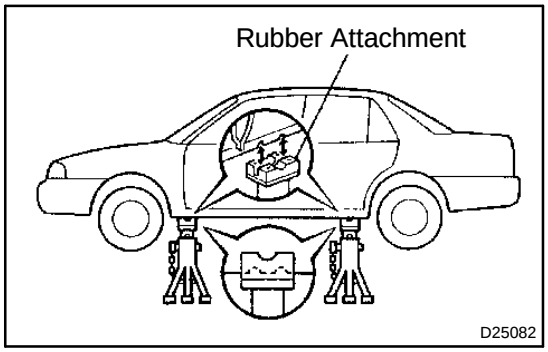
(a) Follow the instruction manual for a safety operation.

(b) Do not damage tires or wheels with a free wheel beam.

(c) Using a wheel stopper, fix the vehicle.

3. NOTICE FOR USING JACK AND SAFETY STAND

(a) Work in the flat place using a wheel stopper at all times.



(b) Use a safety stand with a rubber attachment, as shown in the illustration.

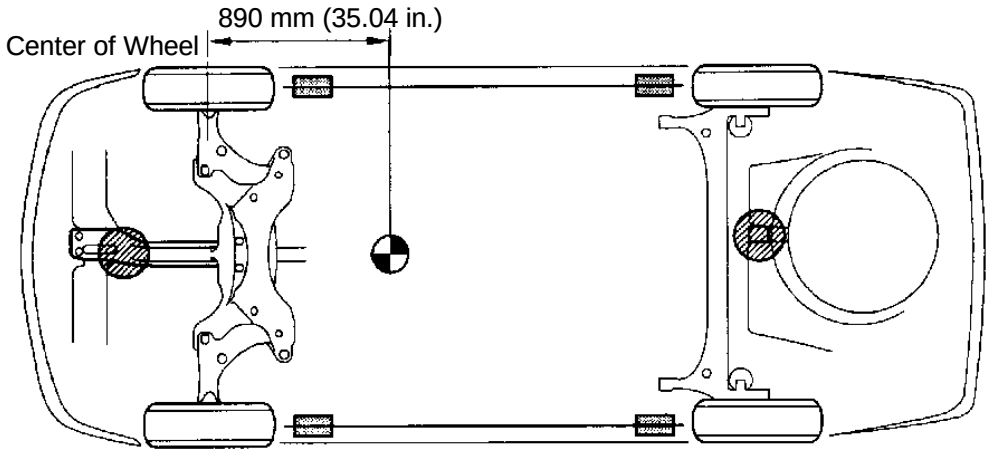
(c) Support the specified location with a jack and safety stand accurately.

(d) When jacking up the front wheels, release the parking brake and place wheel stoppers only behind the rear wheels. When jacking up the rear wheels, place wheel stoppers only in front of the front wheels.

(e) Do not work or leave the vehicle supported only by a jack. Be sure to support the vehicle with a safety stand.

(f) When jacking up only the front wheels or only the rear wheels, place wheel stoppers to both sides of the wheels that contact ground.

(g) When jacking down the vehicle with its front wheels jacked up, release the parking brake and place wheel stoppers only in front of the rear wheels. When jacking down the vehicle with its rear wheels jacked up, place wheel stoppers only behind the front wheels.



: JACK POSITION

: SUPPORT POSITION, PANTOGRAPH JACK POSITION

: CENTER OF VEHICLE GRAVITY (unload condition)

D25024

4. NOTICE FOR USING SWING ARM TYPE LIFT

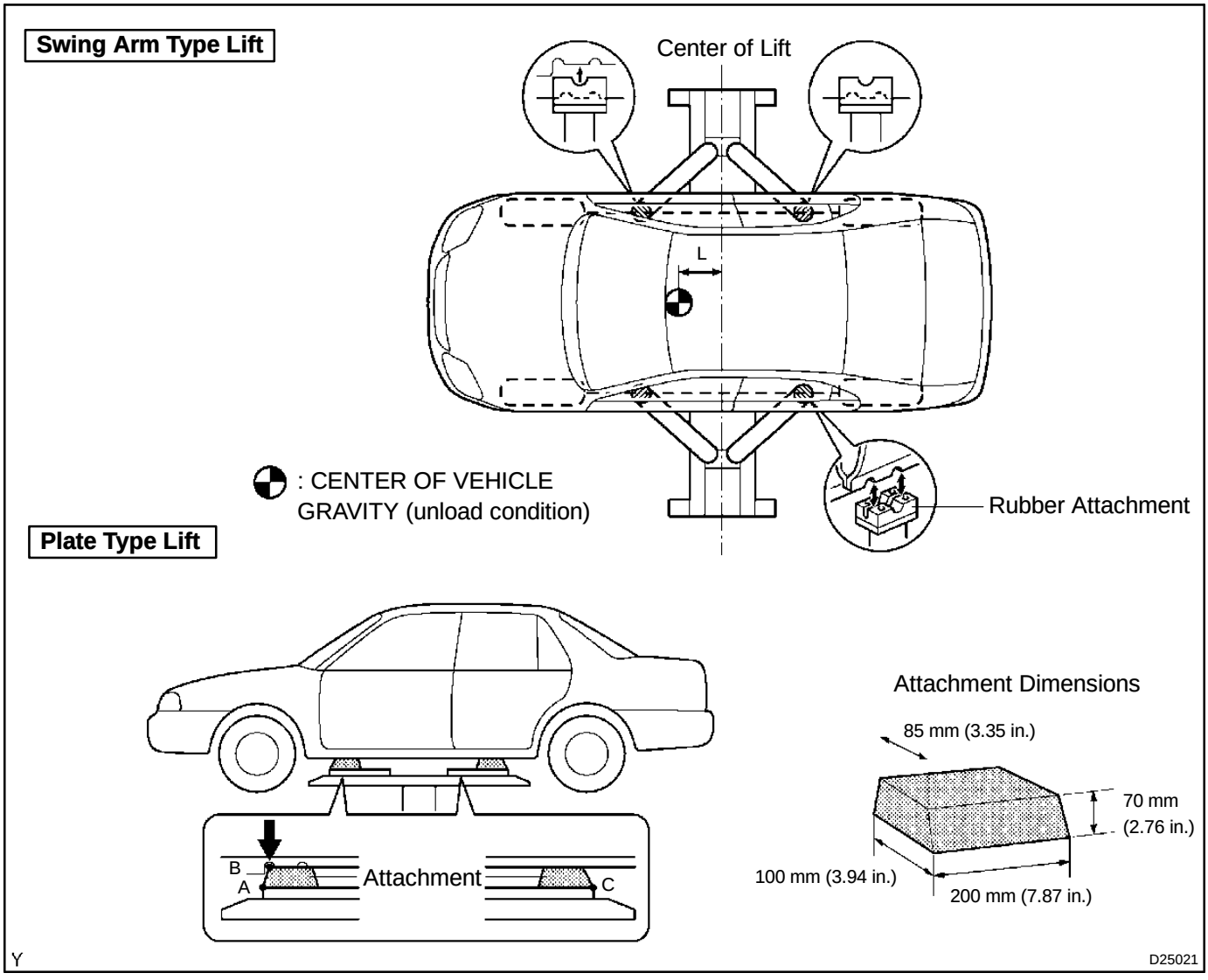
(a) Follow the instruction manual of the lift for a safe operation.
(b) Use a cradle with a rubber attachment, as shown in the illustration.
(c) Set in the vehicle so as to make its center of gravity as close as possible to the center of the lift. (”L” becomes short.)
(d) Place the vehicle horizontally by adjusting the height of the cradle, and match the groove of the cradle and the safety stand support location accurately.
(e) Be sure to lock the swing arm during the operation.
(f) Lift the vehicle up until the tires float, and shake the vehicle to make sure that the vehicle is stable.

5. NOTICE FOR USING PLATE TYPE LIFT

(a) Follow the instruction manual of the lift for a safe operation.
(b) Use a plate lift attachment.
(c) Be sure to set the vehicle to the specified position.

Right and left set position	• Place the vehicle over the center of the lift.
Front and rear set position	• Align the cushion gum ends of the plate with the attachment lower ends (A and C). • Align the attachment upper end (B) with the rocker flange front side notch.

(d) Lift the vehicle up until the tires float a bit, and shake the vehicle to make sure that the vehicle is stable.



CONTINUED

HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

010B6-06

GENERAL INFORMATION

A large number of ECU controlled systems are used in COROLLA. In general, the ECU controlled system is considered to be a very intricate system requiring high level of technical knowledge and expert skill to troubleshoot. The fact is, however, 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 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 an 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. EFI System (2ZZ-GE)	05–1
2. EFI System (4ZZ-FE)	05–112
3. Combination Meter	05–208

FOR USING HAND-HELD TESTER

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

CONTINUED

010B7-06

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

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

1	Vehicle brought to workshop

2	Customer problem analysis

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

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

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

OK	Go to step 5

NG

4	DTC chart

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

	Go to step 6

5	Problem symptoms chart

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

6	Circuit inspection or parts inspection

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

7	Repair

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

CONTINUED

8	Confirmation test

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

END

CONTINUED

CUSTOMER PROBLEM ANALYSIS

HINT:

- In troubleshooting, the problem symptoms must be confirmed accurately and all preconceptions must be cleared in order to give an accurate judgment. To ascertain what the problem symptoms are, it is extremely important to ask the customer about the problem and conditions when it occurred.
- The following 5 items are important points in the problem analysis. Past problems which are thought to be unrelated and the repair history, etc. may also help in some cases. So as much information as possible should be gathered and its relationship with the problem symptoms should be correctly ascertained for a 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]

CONTINUED

SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE

HINT:

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

System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Diagnostic Test Mode (Active Test)
EFI System	○ (with Check Mode)	○	○

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

1 DTC check

2 Making a note and clearing of the DTCs displayed

3 Symptom confirmation

a	Problem symptoms exist
b	No problem symptoms exist

a → Go to step 5

b

4 Simulation test using the symptom simulation methods

5 DTC check

a	DTC displayed
b	Normal code displayed

CONTINUED

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

b

6 Symptom confirmation

a	No problem symptoms exist
b	Problem symptoms exist

If a DTC is displayed in the initial DTC check, it indicates that a trouble may have occurred in a wire harness or connector in that circuit in the past, therefore check the wire harness and connectors (See page 01–28).

a → **System normal**

b

Troubleshooting of each problem symptom

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

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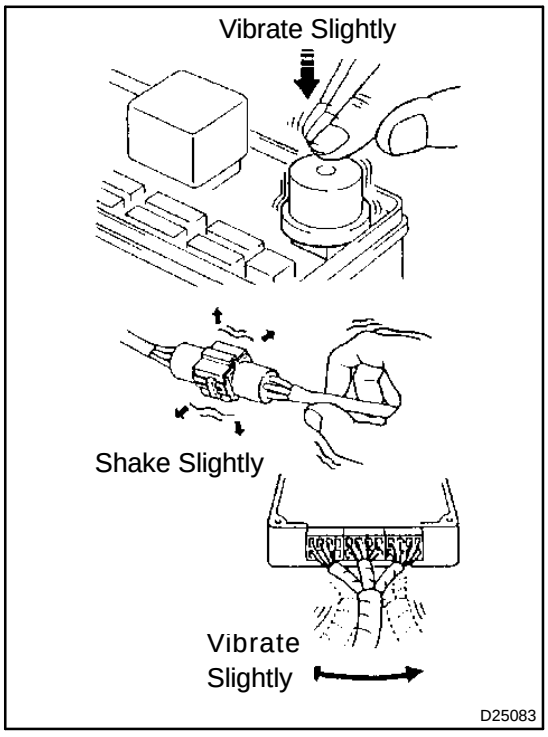
SYMPTOM SIMULATION

HINT:

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

Important points in the symptom simulation test:

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



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

(a) PART AND SENSOR

(1) Apply slight vibration with 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.

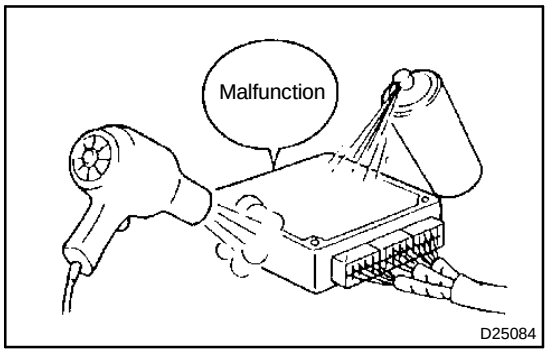
(b) CONNECTORS

(1) Slightly shake the connector vertically and horizontally.

(c) WIRE HARNESS

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

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



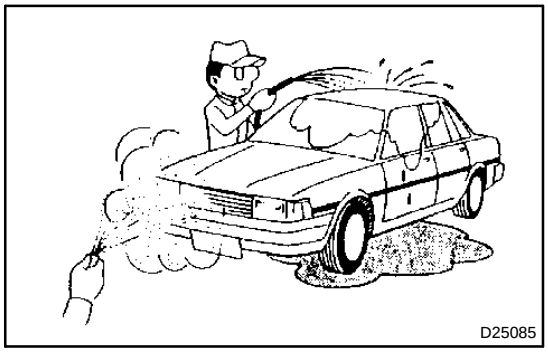
2. HEAT METHOD: When the problem seems to occur when the suspect area is heated.

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

NOTICE:

- **Do not heat to more than 60°C (140°F) (Temperature is limited so as not to damage the components).**
- **Do not apply heat directly to the parts in the ECU.**

CONTINUED



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

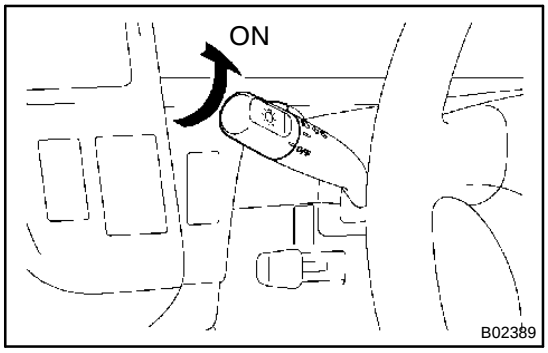
(a) Sprinkle water onto the vehicle and check if the malfunction occurs.

NOTICE:

- **Never sprinkle water directly onto the engine compartment, but indirectly change the temperature and humidity by applying water spray onto the radiator front surface.**
- **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.



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

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

CONTINUED

DIAGNOSTIC TROUBLE CODE CHART

The inspection procedure is shown in the table below. This table permits an efficient and accurate trouble-shooting 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 Supplemental Restraint System 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
B0100/13 (05-119)	● Short in D squib circuit	● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
B0101/14 (05-124)	● Open in D squib circuit	● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
B0102/11 (05-128)	● Short in D squib circuit (to ground)	● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
B0103/12 (05-132)	● Short in D squib circuit (to B+)	● Steering wheel pad (squib) ● Spiral cable ● Airbag sensor assembly ● Wire harness	ON
B0105/53 (05-136)	● Short in P squib circuit	● Front passenger airbag assembly (squib) ● Airbag sensor assembly ● Wire harness	ON
B0106/54	● Open in P squib circuit	● Front passenger airbag assembly (squib) ● Airbag sensor assembly ● Wire harness	
	circuit (to Ground)	● Front passenger airbag assembly (squib) ● Airbag sensor assembly ● Wire harness	

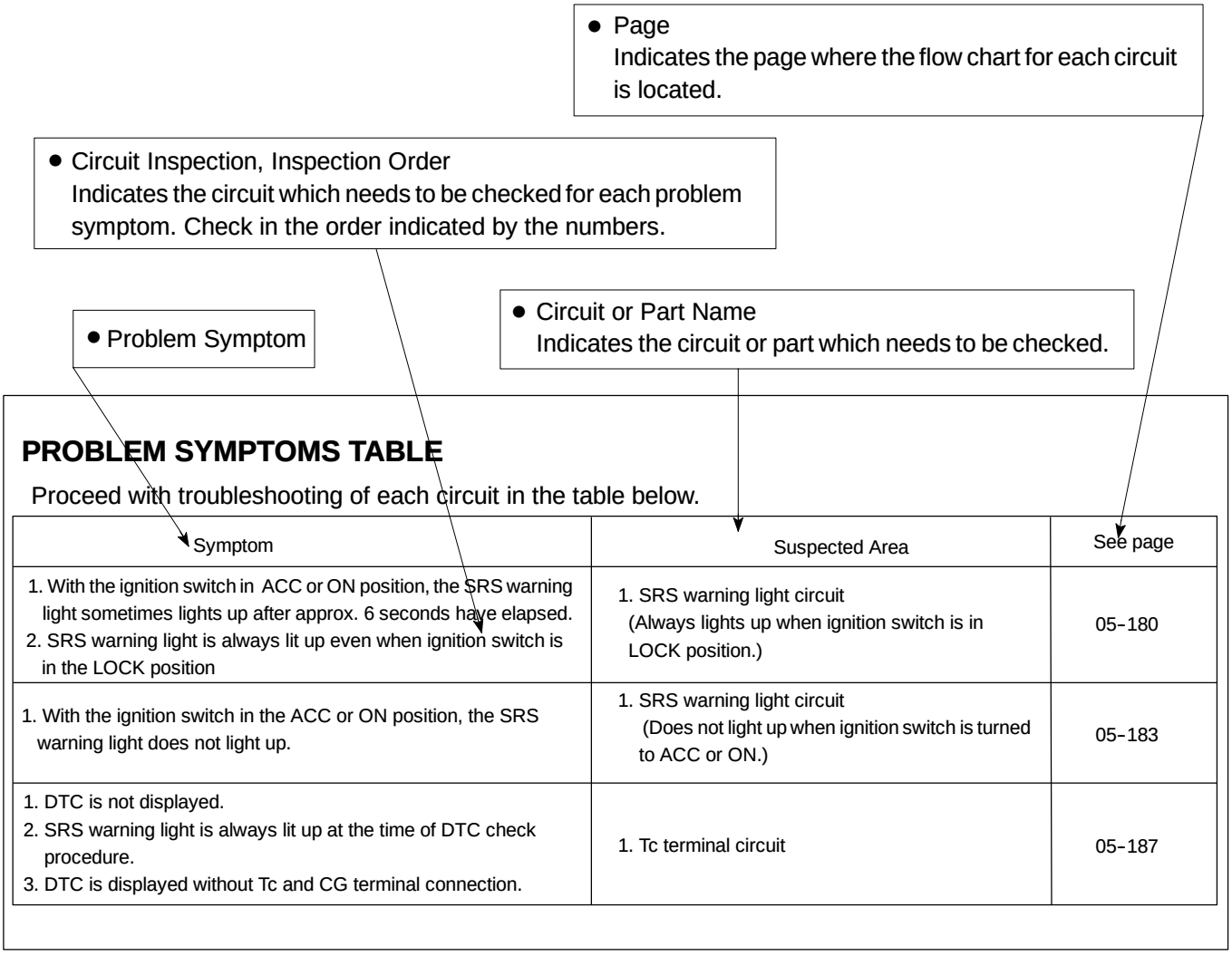
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PROBLEM SYMPTOMS TABLE

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

CONTINUED

CIRCUIT INSPECTION

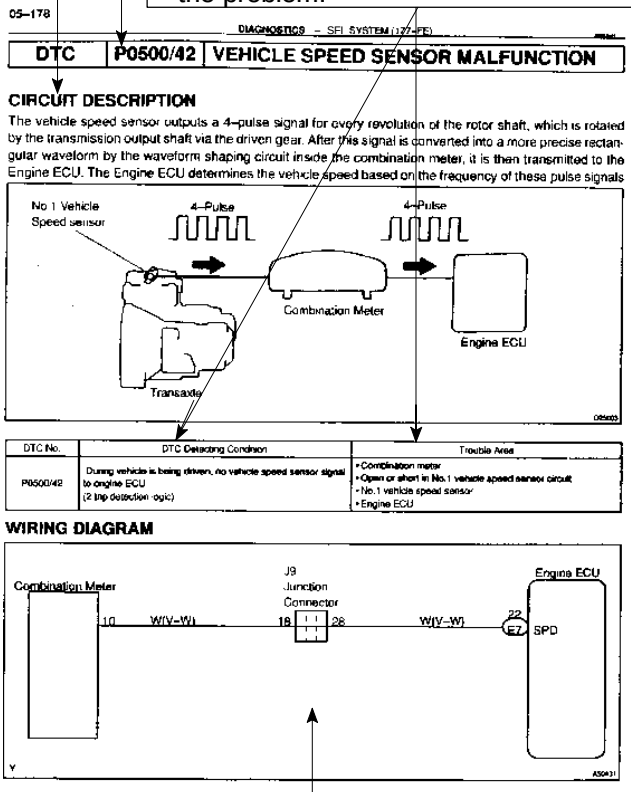
How to read and use each page is shown below.

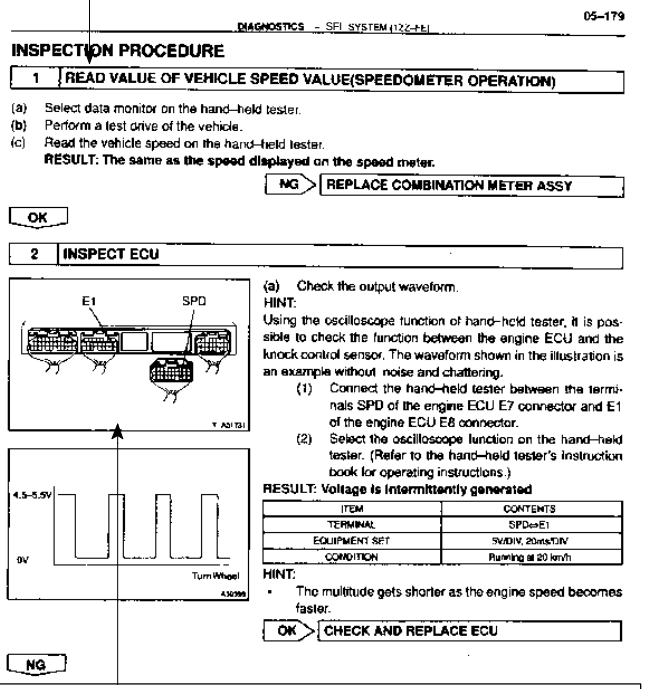
● Circuit Description
The major role and operation, etc. of the circuit and its component parts are explained.

● Diagnostic Trouble Code No. and Detection Item

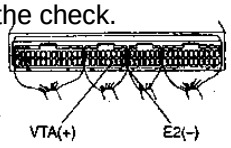
● Indicates the diagnostic trouble code, diagnostic trouble code set parameter and suspect area of the problem.

● 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.



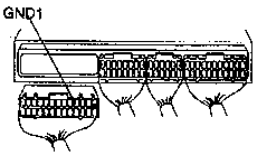


● Indicates the condition of the connector of ECU during the check.



Connector being checked is connected.

Connections of tester are indicated by (+), (–) after terminals name.



Connector being checked is disconnected.

On inspection with body ground side is not specified.

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

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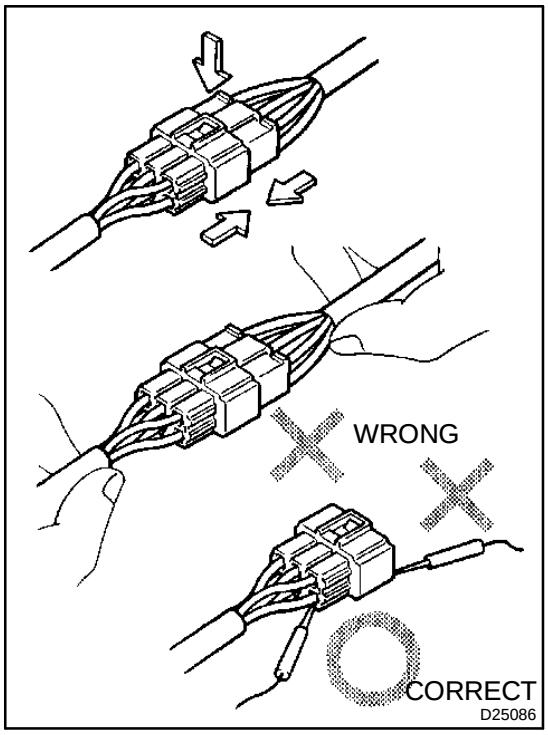
010B8-03

ELECTRONIC CIRCUIT INSPECTION PROCEDURE

1. BASIC INSPECTION

(a) RESISTANCE MEASURING CONDITION OF ELECTRONIC PARTS

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



(b) HANDLING OF CONNECTOR

(1) When removing the connector with a lock, press the connector toward the engagement and remove the lock by making the lock claw movable easily.

(2) When removing the connector, do not hold the harness, but hold the connector.

(3) Before connecting the connector, check that there are no deformation, damage and missing of the terminals.

(4) Connection of the connector with a lock should be securely done until it makes a click sound.

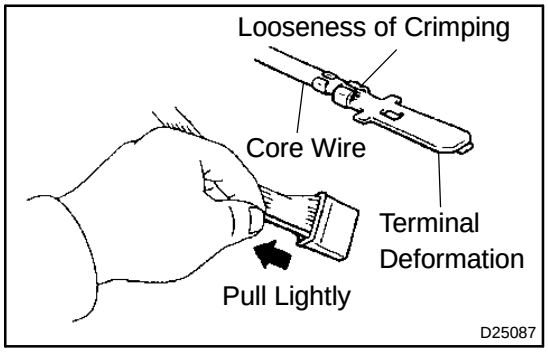
(5) In case of checking the connector with a Toyota electrical tester, perform it at the back side (harness side) of the connector using a mini test lead.

NOTICE:

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

(c) CONNECTOR CHECKING POINTS

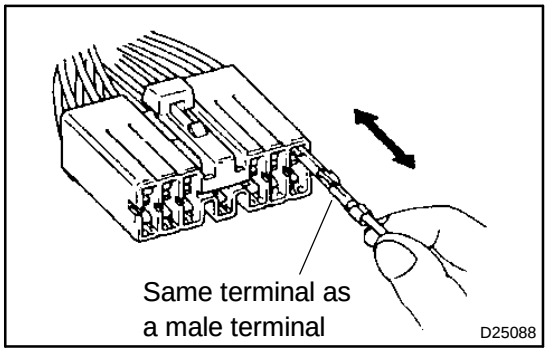
(1) Checking when the connector is connected:
By holding the connector, check the inserted condition and locking efficiency (engaged condition).



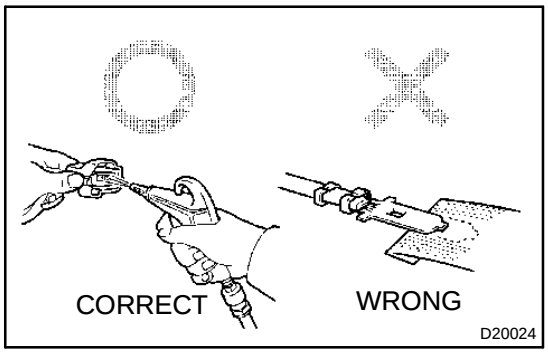
(2) Checking when the connector is removed:
Check the wire harness by pulling lightly (missing terminal, terminal crimping condition, core wire break).
Check visually if there is any rust, metal tip, water and bend of terminal (rust, mixing of foreign object, terminal deformation).

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

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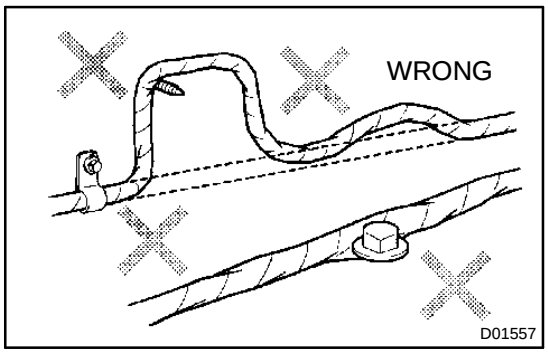
(3) Checking of the contact pressure of the terminal:
Prepare the same terminal as a male terminal.
By inserting it to a female terminal, check the engaged condition and sliding load.



(d) REPAIR METHOD OF CONNECTOR TERMINAL

(1) In case that there is any soil at the contact point, clean the contact point using an air gun or shop rag. At this time, never polish the contact point using a sand paper as the platings may come off.

(2) In case of abnormal contact pressure, replace the female terminal. At this time, if a male terminal is gold–plated (gold color), use gold–plated female terminals and if it is silver–plated (silver color), use silver–plated female terminals.



(e) HANDLING OF WIRE HARNESS

(1) In case of removing the wire harness, check the wiring and clamping condition before the work so as to restore it correctly.

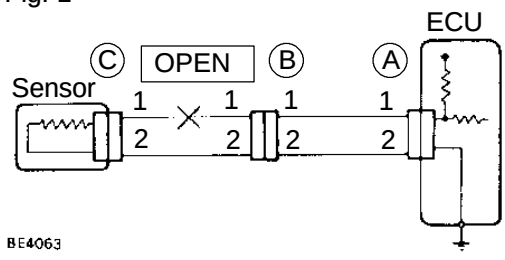
(2) Never twist, pull or slack off the wire harness more than necessary.

(3) Never make the wire harness come into contact with a high–temperature part, rotating, moving, vibrating or acute–angled part (edge of the panel, tip of the screw, etc.).

(4) When installing parts, never sandwich the wire harness between them.

(5) Never cut or break the cover of the wire harness. If it is cut or broken, replace it or securely repair it with a vinyl tape.

Fig. 1

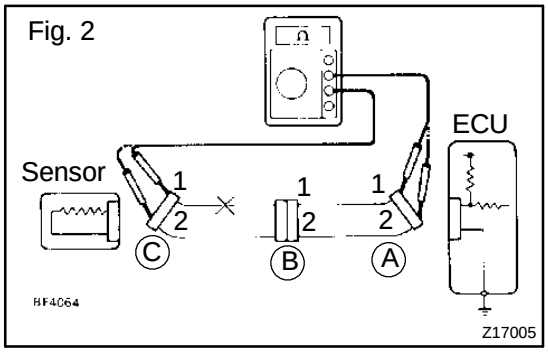


2. CHECK OPEN CIRCUIT

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

CONTINUED

Fig. 2



(b) Check the continuity.

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

Resistance: 1 Ω or less

HINT:

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

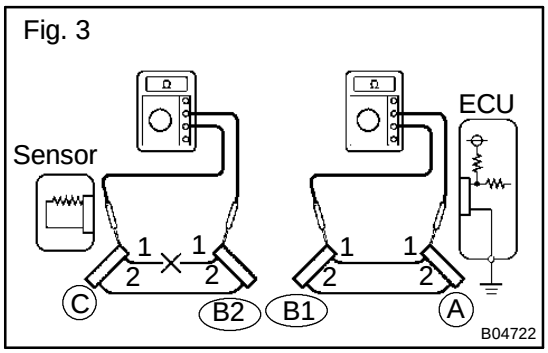
In the case of Fig. 2:

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

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

Therefore, 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.

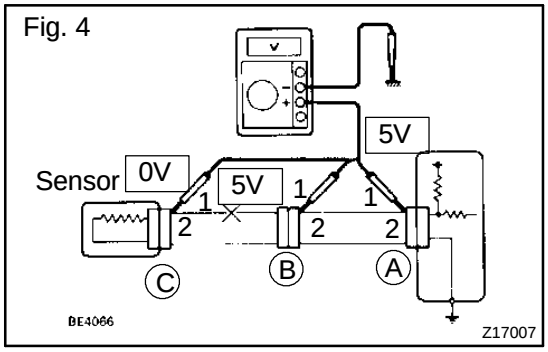
In the case of Fig. 3:

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



(c) Check the voltage.

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

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

(2) If the results are:

5 V: Between terminal 1 of connector "A" and body ground

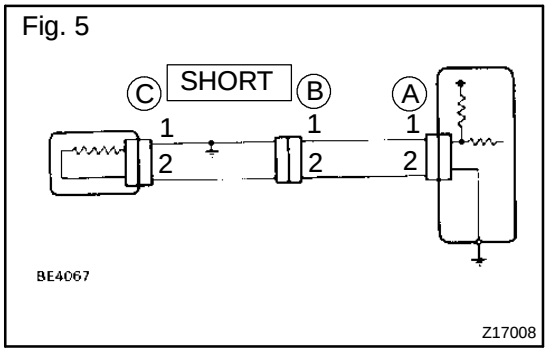
5 V: Between terminal 1 of connector "B" and body ground

0 V: Between terminal 1 of connector "C" and body ground

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".

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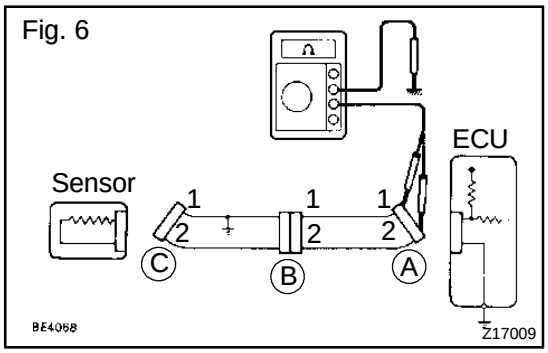
Fig. 5



3. CHECK SHORT CIRCUIT

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

Fig. 6



(b) Check continuity with the body ground.

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

Resistance: 1 MΩ or higher

HINT:

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

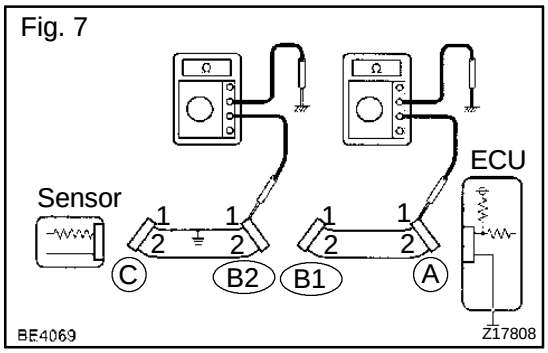
In the case of Fig. 6:

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

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

Therefore, 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 the body ground, and terminal 1 of connector "B2" and the body ground.

In the case of Fig. 7:

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

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

Therefore, it is found out that there is a short circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

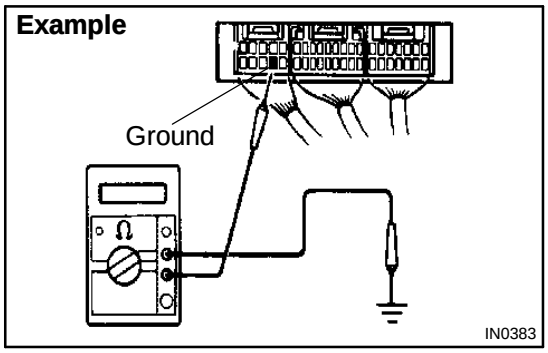
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4. CHECK AND REPLACE ECU

NOTICE:

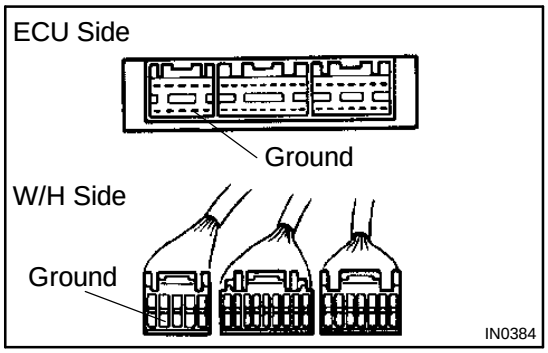
- **Start an inspection of the connector from the back-side of the connector at the wire harness side with the connector connected to the ECU.**
- **When no measuring condition is specified, perform the inspection with the engine stopped and also the ignition switched ON.**

(a) 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 if the symptoms appear.



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

Resistance: 1 Ω or less



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

CONTINUED

TERMS

ABBREVIATIONS USED IN THIS MANUAL

010B9-05

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

CONTINUED

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

CONTINUED

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

CONTINUED

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

CONTINUED

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

CONTINUED

010BA-07

GLOSSARY OF SAE AND TOYOTA TERMS

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

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

CONTINUED

HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO_2S)
IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	–
IFI	Indirect Fuel Injection	Indirect Injection (IDL)
IFS	Inertia Fuel–Shutoff	–
ISC	Idle Speed Control	–
KS	Knock Sensor	Knock Sensor
MAF	Mass Air Flow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	–
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Lamp	Check Engine Lamp
MST	Manifold Surface Temperature	–
MVZ	Manifold Vacuum Zone	–
NVRAM	Non–Volatile Random Access Memory	–
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On–Board Diagnostic	On–Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalyst Convert (OC), CCo
OP	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	–
PNP	Park/Neutral Position	–
PROM	Programmable Read Only Memory	–
PSP	Power Steering Pressure	–
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	–
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	E–ABV
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	–
SRI	Service Reminder Indicator	–
SRT	System Readiness Test	–
ST	Scan Tool	–
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter

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

CONTINUED

PREPARATION

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REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E

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

CONTINUED

DIAGNOSTICS

PREPARATION

021PL-01

SST

	09843-18040	Diagnosis Check Wire No.2	EFI SYSTEM(2ZZ-GE) EFI SYSTEM(4ZZ-FE)

Recomended Tools

	09082-00040	TOYOTA Electrical Tester	EFI SYSTEM(2ZZ-GE) EFI SYSTEM(4ZZ-FE) COMBINATION METER(SOUTH AFRICA)
	(09083-00150)	Test Lead Set	EFI SYSTEM(2ZZ-GE) EFI SYSTEM(4ZZ-FE)

CONTINUED

ENGINE CONTROL SYSTEM

021PC-01

PREPARATION

Recomended Tools

	09082-00040	TOYOTA Electrical Tester	EFI SYSTEM(2ZZ-GE) EFI SYSTEM(4ZZ-FE)
	(09083-00150)	Test Lead Set	EFI SYSTEM(2ZZ-GE) EFI SYSTEM(4ZZ-FE)

Equipment

Torque wrench	
Radiator cap tester	

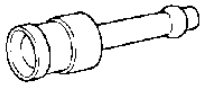
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FUEL

PREPARATION

021PD-01

SST

	09268-21010	Fuel Hose Puller	FUEL INJECTOR ASSY(2ZZ-GE) FUEL INJECTOR ASSY(4ZZ-FE)
	09268-41047	Injection Measuring Tool Set	FUEL SYSTEM(2ZZ-GE) FUEL SYSTEM(4ZZ-FE)
	(09268-41110)	Adaptor	FUEL SYSTEM(2ZZ-GE) FUEL SYSTEM(4ZZ-FE)
	(09268-41300)	Clamp	FUEL SYSTEM(2ZZ-GE) FUEL SYSTEM(4ZZ-FE)
	(95336-08070)	Hose	FUEL SYSTEM(2ZZ-GE) FUEL SYSTEM(4ZZ-FE)
	09842-30055	Wire "G" EFI Inspection	FUEL SYSTEM(4ZZ-FE)
	09842-30080	Wire "H" EFI Inspection	FUEL SYSTEM(2ZZ-GE)

Recomended Tools

	09082-00040	TOYOTA Electrical Tester	FUEL SYSTEM(2ZZ-GE) FUEL SYSTEM(4ZZ-FE)
	(09083-00150)	Test Lead Set	FUEL SYSTEM(2ZZ-GE) FUEL SYSTEM(4ZZ-FE)
	(09083-00150)	Test Lead Set	FUEL SYSTEM(2ZZ-GE) FUEL SYSTEM(4ZZ-FE)

SSM

	08850-00065	Butyl Tape Set	FUEL PUMP ASSY(2ZZ-GE) FUEL TANK ASSY(2ZZ-GE) FUEL PUMP ASSY(4ZZ-FE) FUEL TANK ASSY(4ZZ-FE)

CONTINUED

Equipment

Torque wrench	
Clip	
Service Wire Harness	
Stopwatch	
Measuring Flask	
Vernier calipers	

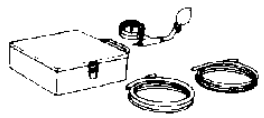
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EMISSION CONTROL

PREPARATION

021PE-01

SST

	09992-00242	Turbocharger Pressure Gauge	EMISSION CONTROL SYSTEM(2ZZ-GE)

Recomended Tools

	09082-00040	TOYOTA Electrical Tester	EMISSION CONTROL SYSTEM(2ZZ-GE) EMISSION CONTROL SYSTEM(4ZZ-FE)
	(09083-00150)	Test Lead Set	EMISSION CONTROL SYSTEM(2ZZ-GE) EMISSION CONTROL SYSTEM(4ZZ-FE)

Equipment

Torque wrench	
Hand-held vacuum pump	

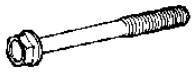
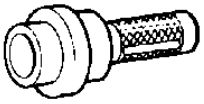
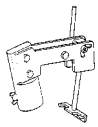
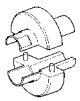
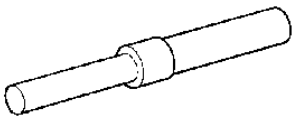
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ENGINE MECHANICAL

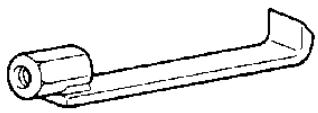
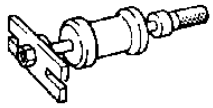
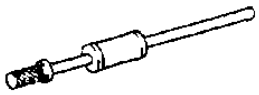
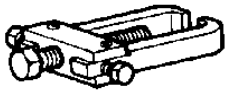
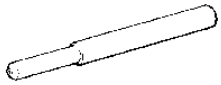
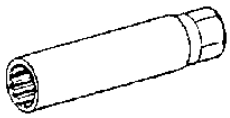
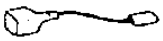
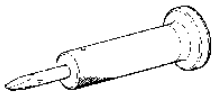
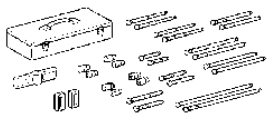
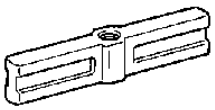
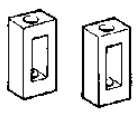
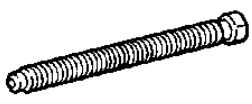
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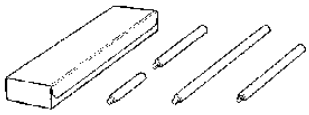
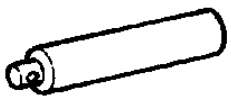
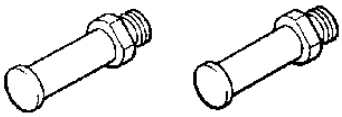
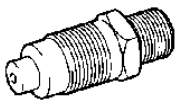
SST

	09213-70011	Crankshaft Pully Holding Tool	PARTIAL ENGINE ASSY(2ZZ-GE) CHAIN SUB-ASSY(2ZZ-GE) TIMING GEAR COVER OIL SEAL(2ZZ-GE) ENGINE REAR OIL SEAL(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE)
	(09213-70020)	Bolt	PARTIAL ENGINE ASSY(2ZZ-GE) CHAIN SUB-ASSY(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE)
	09223-15020	Oil Seal & Bearing Replacer	ENGINE REAR OIL SEAL(2ZZ-GE) ENGINE REAR OIL SEAL(4ZZ-FE)
	09223-15030	Oil Seal & Bearing Replacer	ENGINE REAR OIL SEAL(2ZZ-GE) ENGINE REAR OIL SEAL(4ZZ-FE)
	09223-22010	Crankshaft Front Oil Seal Replacer	CHAIN SUB-ASSY(2ZZ-GE) TIMING GEAR COVER OIL SEAL(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE) CHAIN SUB-ASSY(4ZZ-FE) CYLINDER HEAD GASKET(4ZZ-FE) TIMING GEAR COVER OIL SEAL(4ZZ-FE)
	09248-77010	Valve Clearance Adjusting Compressor Set	VALVE CLEARANCE(2ZZ-GE)
	(09248-07010)	Valve Clearance Adjusting Compressor	VALVE CLEARANCE(2ZZ-GE)
	09268-21010	Fuel Hose Puller	CYLINDER HEAD GASKET(4ZZ-FE)
	09268-46021	Nozzle Holder Retaining Nut Wrench	PARTIAL ENGINE ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE)
	09301-00210	Clutch Guide Tool	PARTIAL ENGINE ASSY(2ZZ-GE) ENGINE REAR OIL SEAL(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE) ENGINE REAR OIL SEAL(4ZZ-FE)
	09330-00021	Companion Flange Holding Tool	PARTIAL ENGINE ASSY(2ZZ-GE) CHAIN SUB-ASSY(2ZZ-GE) TIMING GEAR COVER OIL SEAL(2ZZ-GE) ENGINE REAR OIL SEAL(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE)

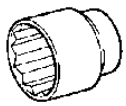
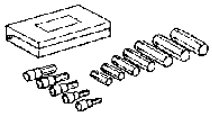
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	09520-01010	Drive Shaft Remover Attachment	ENGINE REAR OIL SEAL(4ZZ-FE)
	09520-24010	Differential Side Gear Shaft Puller	ENGINE REAR OIL SEAL(4ZZ-FE)
	(09520-32040)	Shocker Set	ENGINE REAR OIL SEAL(4ZZ-FE)
	09628-62011	Boll Joint Puller	PARTIAL ENGINE ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE) ENGINE REAR OIL SEAL(4ZZ-FE)
	09670-00010	Front Crossmember Guide Tool	PARTIAL ENGINE ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE)
	09817-33190	Sensor Socket Wrench	PARTIAL ENGINE ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE)
	09843-18030	Tacho-pulse Pickup Wire No.2	ENGINE ASSEMBLY(2ZZ-GE) PARTIAL ENGINE ASSY(2ZZ-GE) ENGINE ASSEMBLY(4ZZ-FE) PARTIAL ENGINE ASSY(4ZZ-FE) CYLINDER HEAD GASKET(4ZZ-FE)
	09843-18040	Diagnosis Check Wire No.2	ENGINE ASSEMBLY(2ZZ-GE) PARTIAL ENGINE ASSY(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE) ENGINE ASSEMBLY(4ZZ-FE) PARTIAL ENGINE ASSY(4ZZ-FE) CYLINDER HEAD GASKET(4ZZ-FE)
	09930-00010	Drive Shaft Nut Chisel	PARTIAL ENGINE ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE) ENGINE REAR OIL SEAL(4ZZ-FE)
	09950-50013	Puller C Set	CHAIN SUB-ASSY(2ZZ-GE) TIMING GEAR COVER OIL SEAL(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE)
	(09951-05010)	Hanger 150	CHAIN SUB-ASSY(2ZZ-GE) TIMING GEAR COVER OIL SEAL(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE)
	(09952-05010)	Slide Arm	CHAIN SUB-ASSY(2ZZ-GE) TIMING GEAR COVER OIL SEAL(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE)
	(09953-05020)	Center Bolt 150	CHAIN SUB-ASSY(2ZZ-GE) TIMING GEAR COVER OIL SEAL(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE)

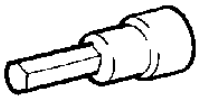
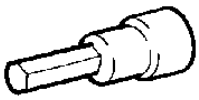
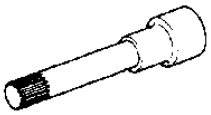
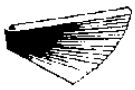
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	(09954-05021)	Claw No.2	CHAIN SUB-ASSY(2ZZ-GE) TIMING GEAR COVER OIL SEAL(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE)
	(09957-04010)	Attachment	CHAIN SUB-ASSY(2ZZ-GE) TIMING GEAR COVER OIL SEAL(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE)
	09950-70010	Handle Set	ENGINE REAR OIL SEAL(2ZZ-GE) ENGINE REAR OIL SEAL(4ZZ-FE)
	(09951-07100)	Handle 100	ENGINE REAR OIL SEAL(2ZZ-GE) ENGINE REAR OIL SEAL(4ZZ-FE)
	09960-10010	Variable Pin Wrench Set	CHAIN SUB-ASSY(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE) CHAIN SUB-ASSY(4ZZ-FE) CYLINDER HEAD GASKET(4ZZ-FE) TIMING GEAR COVER OIL SEAL(4ZZ-FE) ENGINE REAR OIL SEAL(4ZZ-FE)
	(09962-01000)	Variable Pin Wrench Arm Assy	CHAIN SUB-ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE) CHAIN SUB-ASSY(4ZZ-FE) CYLINDER HEAD GASKET(4ZZ-FE) TIMING GEAR COVER OIL SEAL(4ZZ-FE) ENGINE REAR OIL SEAL(4ZZ-FE)
	(09963-00600)	Pin 6	CHAIN SUB-ASSY(2ZZ-GE)
	(09963-01000)	Pin 10	PARTIAL ENGINE ASSY(4ZZ-FE) CHAIN SUB-ASSY(4ZZ-FE) CYLINDER HEAD GASKET(4ZZ-FE) TIMING GEAR COVER OIL SEAL(4ZZ-FE) ENGINE REAR OIL SEAL(4ZZ-FE)
	09992-00500	Compression Gauge Attachment	ENGINE ASSEMBLY(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE) ENGINE ASSEMBLY(4ZZ-FE) CYLINDER HEAD GASKET(4ZZ-FE)

Recomended Tools

	09011-12301	Socket Wrench 30 mm	PARTIAL ENGINE ASSY(2ZZ-GE) ENGINE REAR OIL SEAL(4ZZ-FE)
	09040-00011	Hexagon Wrench Set	PARTIAL ENGINE ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE)

CONTINUED

	(09043-20050)	Socket Hexagon Wrench 5	PARTIAL ENGINE ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE)
	(09043-20050)	Socket Hexagon Wrench 5	PARTIAL ENGINE ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE)
	09043-50100	Bi-hexagon Wrench 10 mm	CYLINDER HEAD GASKET(2ZZ-GE)
	09090-04020	Engine Sling Device	PARTIAL ENGINE ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE)
	(09203-00010)	Thickness Gauge	CAMSHAFT(2ZZ-GE)

SSM

	08826-00080	Seal Packing Black or equivalent (FIPG)	CHAIN SUB-ASSY(2ZZ-GE) CAMSHAFT(2ZZ-GE) CYLINDER HEAD GASKET(2ZZ-GE) VALVE CLEARANCE(2ZZ-GE) VALVE CLEARANCE(4ZZ-FE) CHAIN SUB-ASSY(4ZZ-FE) CAMSHAFT(4ZZ-FE) CYLINDER HEAD GASKET(4ZZ-FE)
	08826-00100	"Seal Packing 1282B," THREE BOND 1282B or equivalent (FIPG)	CYLINDER HEAD GASKET(2ZZ-GE)
	08833-00070	"Adhesive 1324," THREE BOND 1324 or equivalent	PARTIAL ENGINE ASSY(2ZZ-GE) PARTIAL ENGINE ASSY(4ZZ-FE)

CONTINUED

Equipment

Torque wrench	
Slide calipers	
Sandpaper(#400)	
Wooden Block	
Abgle gauge	
Universal engine lifter	
Feeler gauge	
CO/HC meter	
Dial indicator	
Dial indicator or diali indicator with magnetic base	
Radiator cap tester	
Straight edge	
Tachometer	
Vernier calipers	
Tire pressure gauge	
Alignment tester	
Toe-in gauge	

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EXHAUST

PREPARATION

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Equipment

Torque wrench	
Slide calipers	

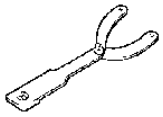
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COOLING

PREPARATION

021PH-01

SST

	09960-10010	Variable Pin Wrench Set	WATER PUMP ASSY(2ZZ-GE)
	(09962-01000)	Variable Pin Wrench Arm Assy	WATER PUMP ASSY(2ZZ-GE)
	(09963-00600)	Pin 6	WATER PUMP ASSY(2ZZ-GE)

Recomended Tools

	09082-00040	TOYOTA Electrical Tester	COOLING FAN SYSTEM(2ZZ-GE) COOLING FAN SYSTEM(4ZZ-FE)
	(09083-00150)	Test Lead Set	COOLING FAN SYSTEM(2ZZ-GE) COOLING FAN SYSTEM(4ZZ-FE)

Equipment

Torque wrench	
Slide calipers	
Heater	
Radiator cap tester	
Thermometer	

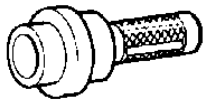
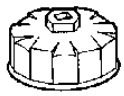
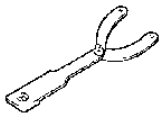
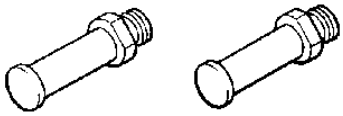
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LUBRICATION

PREPARATION

021PI-01

SST

	09223-22010	Crankshaft Front Oil Seal Replacer	OIL PUMP ASSY(4ZZ-FE)
	09228-06501	Oil Filter Wrench	OIL COOLER ASSY(2ZZ-GE) OIL FILTER SUB-ASSY(2ZZ-GE) OIL FILTER SUB-ASSY(4ZZ-FE)
	09960-10010	Variable Pin Wrench Set	OIL PUMP ASSY(4ZZ-FE)
	(09962-01000)	Variable Pin Wrench Arm Assy	OIL PUMP ASSY(4ZZ-FE)
	(09963-01000)	Pin 10	OIL PUMP ASSY(4ZZ-FE)

SSM

	08826-00080	Seal Packing Black or equivalent (FIPG)	OIL PUMP ASSY(4ZZ-FE)

Equipment

Torque wrench	
Wooden block	
Ammeter	

CONTINUED

IGNITION

PREPARATION

021PJ-01

Recomended Tools

	09082-00040	TOYOTA Electrical Tester	IGNITION SYSTEM(2ZZ-GE) IGNITION SYSTEM(4ZZ-FE)
	(09083-00150)	Test Lead Set	IGNITION SYSTEM(2ZZ-GE) IGNITION SYSTEM(4ZZ-FE)

Equipment

Torque wrench	
Ohmmeter	

CONTINUED

STARTING & CHARGING

021PK-01

PREPARATION

Recomended Tools

	09082–00040	TOYOTA Electrical Tester	STARTING SYSTEM(2ZZ–GE) STARTING SYSTEM(4ZZ–FE)
	(09083–00150)	Test Lead Set	STARTING SYSTEM(2ZZ–GE) STARTING SYSTEM(4ZZ–FE)

Equipment

Torque wrench	
Slide calipers	
Service wire harness	

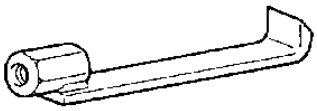
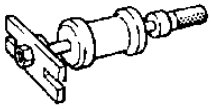
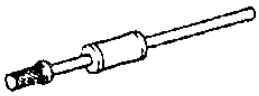
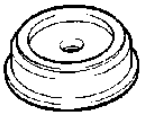
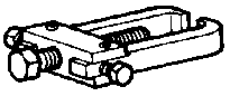
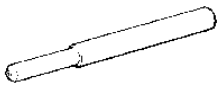
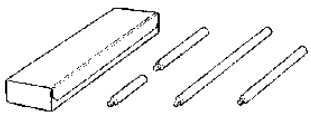
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MANUAL TRANSMISSION/TRANSAXLE

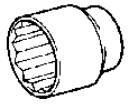
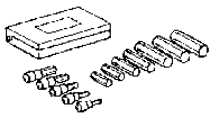
PREPARATION

021PM-01

SST

	09308-00010	Oil Seal Puller	FRONT DIFFERENTIAL OIL SEAL(C50/C64/C150)
	09520-01010	Drive Shaft Remover Attachment	MANUAL TRANSAXLE ASSY(C50/C64/C150) FRONT DIFFERENTIAL OIL SEAL(C50/C64/C150)
	09520-24010	Differential Side Gear Shaft Puller	MANUAL TRANSAXLE ASSY(C50/C64/C150) FRONT DIFFERENTIAL OIL SEAL(C50/C64/C150)
	(09520-32040)	Shocker Set	MANUAL TRANSAXLE ASSY(C50/C64/C150) FRONT DIFFERENTIAL OIL SEAL(C50/C64/C150)
	09554-14010	Differential Oil Seal Replacer	FRONT DIFFERENTIAL OIL SEAL(C50/C64/C150)
	09628-62011	Boll Joint Puller	MANUAL TRANSAXLE ASSY(C50/C64/C150) FRONT DIFFERENTIAL OIL SEAL(C50/C64/C150)
	09670-00010	Front Crossmember Guide Tool	MANUAL TRANSAXLE ASSY(C50/C64/C150)
	09930-00010	Drive Shaft Nut Chisel	MANUAL TRANSAXLE ASSY(C50/C64/C150) FRONT DIFFERENTIAL OIL SEAL(C50/C64/C150)
	09950-70010	Handle Set	FRONT DIFFERENTIAL OIL SEAL(C50/C64/C150)
	(09951-07200)	Handle 200	FRONT DIFFERENTIAL OIL SEAL(C50/C64/C150)

Recomended Tools

	09011-12301	Socket Wrench 30 mm	MANUAL TRANSAXLE ASSY(C50/C64/C150) FRONT DIFFERENTIAL OIL SEAL(C50/C64/C150)
	09040-00011	Hexagon Wrench Set	MANUAL TRANSAXLE ASSY(C50/C64/C150)

CONTINUED

Equipment

Torque wrench	

Lubricant

Item	Capacity	Classification
C50, C150 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
C64 Manual transaxle oil (w/ Differential oil)	2.3 liters (2.4 US qts, 2.0 Imp. qts)	API GL–4 or GL–5 SAE 75W–90

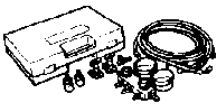
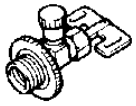
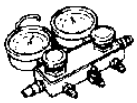
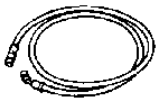
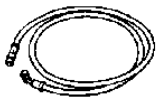
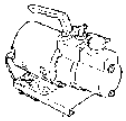
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HEATER & AIR CONDITIONER

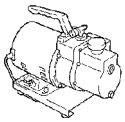
PREPARATION

021PB-01

SST

	07110-58060	Air Conditioner Service Tool Set	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	(07117-58060)	Refrigerant Drain Service Valve	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	(07117-58070)	T-Joint	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	(07117-58080)	Quick Disconnect Adapter	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	(07117-58090)	Quick Disconnect Adapter	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	(07117-78050)	Refrigerant Charging Gauge	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	(07117-88060)	Refrigerant Charging Hose	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	(07117-88070)	Refrigerant Charging Hose	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	(07117-88080)	Refrigerant Charging Hose	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	07117-48130	Vacuum Pump (220 V)	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)

CONTINUED

	07117-48140	Vacuum Pump (240 V)	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)

Recomended Tools

	09904-00010	Expander Set	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	(09904-00050)	No. 4 Claw	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)
	95416-00140	Gas Leak Detector (Halogen Leak Detector) (DENSO Part No.)	COOLER COMPRESSOR ASSY(2ZZ-GE FOR SOUTH AFRICA) COOLER COMPRESSOR ASSY(4ZZ-FE FOR SOUTH AFRICA)

Equipment

Vinyl tape	
Vise pliers	
Gas leak detector	
Belt tension gauge	
Dial indicator	
Torque wrench	

Lubricant

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

CONTINUED

EXTERIOR/INTERIOR TRIM

021PO-01

PREPARATION

Equipment

Tape	To avoid surface damage.
Torque wrench	

CONTINUED

SERVICE SPECIFICATIONS

STANDARD BOLT 03–1
HOW TO DETERMINE BOLT STRENGTH 03–1
SPECIFIED TORQUE FOR STANDARD BOLTS 03–2
HOW TO DETERMINE NUT STRENGTH 03–3
ENGINE CONTROL SYSTEM 03–4
SERVICE DATA 03–4
TORQUE SPECIFICATION 03–5
FUEL 03–6
SERVICE DATA 03–6
TORQUE SPECIFICATION 03–7
EMISSION CONTROL 03–8
SERVICE DATA 03–8
ENGINE MECHANICAL 03–9
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TORQUE SPECIFICATION 03–10/12
EXHAUST 03–13
SERVICE DATA 03–13
TORQUE SPECIFICATION 03–14
COOLING 03–15
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LUBRICATION 03–17
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SERVICE DATA 03–25
TORQUE SPECIFICATION 03–26
EXTERIOR/INTERIOR TRIM 03–27
TORQUE SPECIFICATION 03–27

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E

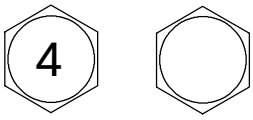
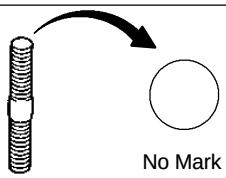
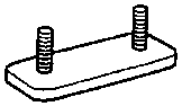
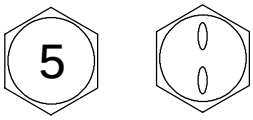
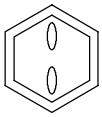
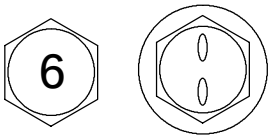
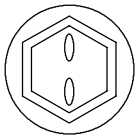
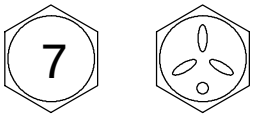
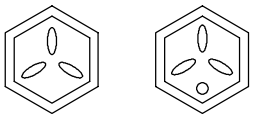
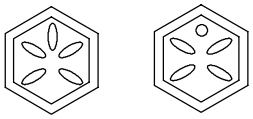
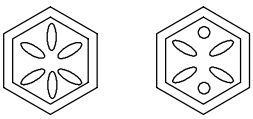
NOTE: The above pages contain only the points which differ from the above listed manuals.

CONTINUED

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

0301Z-04

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

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0301Y-04

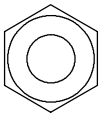
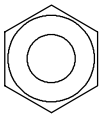
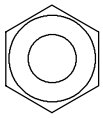
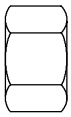
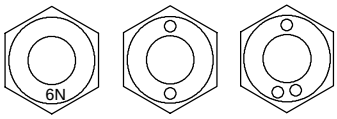
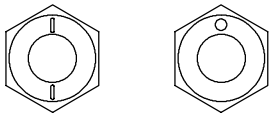
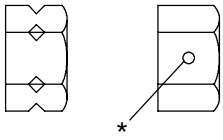
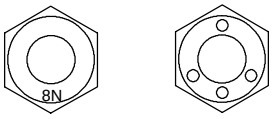
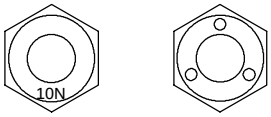
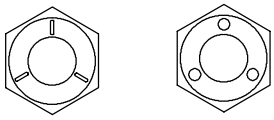
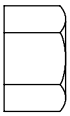
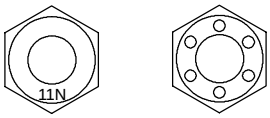
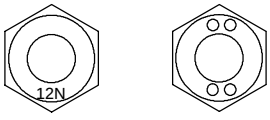
SPECIFIED TORQUE FOR STANDARD BOLTS

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

CONTINUED

03020-04

HOW TO DETERMINE NUT STRENGTH

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

CONTINUED

ENGINE CONTROL SYSTEM

SERVICE DATA

0300M-03

Throttle idle speed control valve assy	2ZZ-GE	
Movement	Ignition switch ON	Half open → fully close → fully open → half open
Throttle idle speed control valve assy	4ZZ-FE	
Movement		Half open
Idle speed	w/ connect terminal TC and CG of DLC 3	600 - 700 rpm
Intake air flow meter sub-assy		
Resistance	THA - E2	
	at -20°C (-4°F)	13.6 - 18.4 kΩ
	at 20°C (68°F)	2.21 - 2.69 kΩ
	at 60°C (140°F)	0.49 - 0.67 kΩ
Camshaft timing oil control valve assy		
Resistance	at 20°C (68°F)	6.9 - 7.9 Ω
E.F.I Throttle position sensor		
Resistance	VC - E2	2.5 - 6.0 kΩ
E.F.I. Engine coolant temperature sensor		
Resistance	Approx. 20°C (68°F)	2.32 - 2.59 kΩ
	Approx. 80°C (176°F)	0.310 - 0.326 kΩ
Knock control sensor		
Resistance	(2ZZ-GE) Approx. 20°C (68°F)	120 - 280 kΩ
	(4ZZ-FE)	1MΩ or more

CONTINUED

0300N-03

TORQUE SPECIFICATION

2ZZ-GE/4ZZ-FE:

Part Tightened		N·m	kgf·cm	ft·lbf
Throttle body idle speed control valve assy x Throttle body assy		3.7	38	33 in.·lbf
E.F.I. Throttle position sensor x Throttle body assy		2.0	20	18 in.·lbf
Throttle body assy x Intake manifold	2ZZ-GE	22	224	16
Throttle body assy x Intake manifold	4ZZ-FE	30	306	22
Cylinder head cover No. 2 x Cylinder head cover sub-assy		7.0	71	62 in.·lbf

CONTINUED

FUEL

SERVICE DATA

0300S-04

Fuel pressure Standard pressure		304 – 347 kPa (3.1 – 3.5 kgf·cm^2, 44 – 50 psi)
Fuel pressure Standard pressure		147 kPa (1.5 kgf·cm^2, 2.21 psi) or more
Fuel injector assy Resistance	at 20°C (68°F)	13.4 – 14.2 Ω
Fuel injector assy Injection volume	2ZZ-GE	77 – 93 cm^3 (4.7 – 5.7 cu in.) per 15 seconds
Fuel injector assy Injection volume	4ZZ-FE	39 – 53 cm^3 (2.4 – 3.2 cu in.) per 15 seconds
Fuel injector assy	2ZZ-GE Difference between each injector	16 cm^3 (1.0 cu in.) or less
Fuel injector assy	4ZZ-FE Difference between each injector	14 cm^3 (0.9 cu in.) or less
Fuel injector assy Fuel drop	2ZZ-GE	1 drop or less per 12 minutes
Fuel injector assy Fuel drop	4ZZ-FE	1 drop or less per 5 minutes
Fuel pump assy Resistance	at 20°C (68°F)	0.2 – 3.0 Ω

CONTINUED

0300T-06

TORQUE SPECIFICATION

Part Tightened		N·m	kgf·cm	ft·lbf
Fuel delivery pipe sub-assy x Cylinder head sub-assy	2ZZ-GE	29	296	21
Fuel delivery pipe sub-assy x Cylinder head sub-assy	4ZZ-FE	19	194	14
Fuel delivery pipe sub-assy (Clamp side) x Cylinder head sub-assy		9.0	92	80 in.·lbf
Fuel pipe clamp x Cylinder head sub-assy	2ZZ-GE	9.0	92	80 in.·lbf
Engine wire x Cylinder head	2ZZ-GE	10	102	7
Cylinder head cover No. 2 x Cylinder head cover sub-assy		7.0	71	62 in.·lbf
Fuel tank vent tube set plate x Fuel tank assy		5.9	60	52 in.·lbf
Fuel tank band sub-assy x Body		39	400	29
Parking brake cable assy x Body		5.4	55	48 in.·lbf
Fuel tank protector No. 1 x Body		5.4	55	48 in.·lbf

CONTINUED

EMISSION CONTROL

0300F–03

SERVICE DATA

2ZZ–GE/3ZZ–FE/4ZZ–FE:

Oxyzen sensor	2ZZ–FE	
Resistance	HT – +B	11 – 16 Ω
Oxyzen sensor	4ZZ–FE	
Resistance	HT – +B	5 – 30 Ω
Vacuum switching valve		
Resistance	at 20°C (68°F)	30 – 34 Ω
Operation	air flows port E to port F	Air flows from the port F

CONTINUED

ENGINE MECHANICAL

03000-11

SERVICE DATA

2ZZ-GE:

Ignition timing		
w/ Terminal T and CG of DLC3 connected		8 - 12°BTDC
w/ Terminal TC and CG of DLC3 disconnected		4 - 12°BTDC
Idle speed		750 - 850 rpm
Compression		
Compression pressure		1,400 kPa (14.3kgf/cm^2 203 psi)
Minimum pressure		1,000 kPa (10.2 kgf/cm^2 145 psi)
Difference between each cylinder		110 kPa (1.1kgf/cm^2 16 psi)
Cylinder head set bolt		
Length	Standard	146.0 - 148.2 mm (5.780 - 5.835 in.)
	Maximum	148.5 mm (5.846 in.)
Valve clearance (cold)	Intake	0.08 - 0.18 mm (0.003 - 0.007 in.)
	Exhaust	0.22 - 0.32 mm (0.009 - 0.013in.)

4ZZ-FE:

Ignition timing		
w/ Terminals TC and CG of DLC3 connected		8 - 12°BTDC
w/ Terminals TC and CG of DLC3 disconnected		3 - 13°BTDC
Idle speed		600 - 700 rpm
Compression		
Compression pressure		1,300 kPa (13.3kgf/cm^2 189 psi)
Minimum pressure		1,000 kPa (10.2 kgf/cm^2 145 psi)
Difference between each cylinder		100 kPa (1.0kgf/cm^2 14 psi)
Cylinder head set bolt		
Length	Standard	156.0 - 159.0 mm (6.142 - 6.260 in.)
	Maximum	159.5 mm (6.280 in.)
Valve clearance (cold)	Intake	0.15 - 0.25 mm (0.006 - 0.010 in.)
	Exhaust	0.25 - 0.35 mm (0.010 - 0.014in.)

CONTINUED

0300P-11

TORQUE SPECIFICATION

2ZZ-GE:

Part Tightened		N·m	kgf·cm	ft·lbf
Camshaft bearing cap No.1 x Cylinder head		19	189	14
Camshaft x Camshaft timing gear		54	551	40
Chain tensioner x Cylinder block		9.0	92	80 in·lbf
Cylinder head cover x Cylinder head		10	102	7 in·lbf
V-ribbed belt tensioner x Cylinder block	Nut	29	296	21
	Bolt	100	1,016	74
Engine hanger x Engine		38	385	28
E. F. I. water tempeerature x Cylinder head		20	208	15
Knock control sensor x Cylinder block		20	204	15
Crank position sensor x Timing chain cover		9.0	92	80 in.·lbf
Engine oil pressure switch x Cylinder block		15	153	11
Water by-pass pipe No.1 x Cylinder block	M6	8.5	87	75 in.·lbf
	M8	21	214	15
	Nut	10	102	7
Ignition coil assy x Cylinder head cover		9.0	92	80 in.·lbf
Fuel delivery pipe sub assy x Cylinder head		29	296	21
Fuel delivery pipe clamp x Cylinder head		9.0	92	80 in.·lbf
Exhaust manifold x Cylinder head	Bolt A	50	510	37
	Bolt B	21	214	16
Exhaust manifold insulator x Exhaust manifold		20	204	15
Intake manifold x Cylinder head	Bolt A	34	347	25
	Bolt B	46	469	34
Surge tank stay No.1		24	245	18
Flywheel x Crankshaft				
	1st	49	500	36
	2nd	Turn90°	Turn90°	Turn90°
Clutch cover x Flywheel		19	195	14
Starter assy x engine (See page14-21)	Bolt	37	377	27
	Wiring	9.8	100	7
Engine mounting insulator FR x Engine mounting bracket		52	530	38
Engine mounting insulator RR x Engine mounting bracket		87	887	64
Vane pump assembly x Engine		37	377	27
Engine mounting insulator LH x Engine mounting bracket		80	816	59
Transeverse Engine Engine Mounting Bracket x Engine		49	500	36
Engine mounting insulator RH x Body		52	530	38
Crossmember x Body (See page14-21)	Front	113	1,152	83
Center member x Body (See page14-21)	Rear	157	1,601	116
Suspension nember brace x Crossmember (See page14-21)		133	1,357	98
Suspension nember brace x Body (See page14-21)		80	816	59
Tie rod end x Steering knuckle		49	500	36
Battery carrier x Body		13	131	9
Generator x Engine	6 M	25	255	18
	8 M	58	591	43
Floor panel brace x Body		30	302	22
Chain vibration damper x Cylinder block		21	214	16
Chain tensioner slipper x Cylinder block		21	214	16
Timing chain cover x Cylinder block	6 M	11	112	8
	8 M	21	214	16
Chain tensioner x Timing chain cover		9.0	92	80 in.·lbf
Crankshaft pulley x Crankshaft		118	1,204	87
Engine mounting bracket x Timing chain cover		49	500	36

CONTINUED

Part Tightened		N·m	kgf·cm	ft·lbf
Water pump x Timing chain cover		9.0	92	80 in.·lbf
Water pump pulley x Water pump		15	153	11
Cylinder head x Cylinder block	1st	35	357	26
	2nd	Turn 90°	Turn 90°	Turn 90°
Commpressor x Cylinder block		29	295	21

4ZZ-FE:

Part Tightened		N·m	kgf·cm	ft·lbf
Cylinder head cover No. 2 x Cylinder head cover sub-assy		7.0	71	62 in.·lbf
Camshaft bearing cap No. 3 x Cylinder head sub-assy		13	133	10
Camshaft bearing cap No. 1 x Cylinder head sub-assy		23	235	17
Camshaft timing gear or sprocket x Camshaft No. 2		54	551	40
Chain tensioner assy No. 1 x Timing chain or belt cover sub-assy		9.0	92	80 in.·lbf
V-ribbed belt tensioner assy x Cylinder block sub-assy		69	704	51
V-ribbed belt tensioner assy x Cylinder head sub-assy		29	296	21
Engine mounting insulator RH x Body		52	530	38
Engine mounting insulator RH x Transverse engine engine mounting bracket		52	530	38
Cylinder head cover sub-assy x Cylinder head sub-assy	w/o washer	11	112	8
	w/ washer	9.0	92	80 in.·lbf
Cylinder head cover sub-assy x Timing chain or belt cover sub-assy		11	112	8
Engine wire x Cylinder head cover sub-assy		9.0	92	80 in.·lbf
Ignition coil assy x Cylinder head cover sub-assy		9.0	92	80 in.·lbf
Engine hanger x Cylinder head cover sub-assy		38	387	28
E.F.I. Engine coolant temperature sensor x Cylinder head sub-assy		20	204	15
Exhaust manifold x Cylinder head sub-assy		37	377	27
Exhaust manifold heat insulator No. 1 x Exhaust manifold		18	184	13
Manifold stay x Exhaust manifold		49	500	36
Manifold stay x Cylinder block sub-assy		49	500	36
Transverse engine engine mounting bracket x Timing chain or belt cover sub-assy		47	479	35
Knock control sensor x Cylinder block sub-assy		20	204	15
Crank position sensor No. 1 x Cylinder head sub-assy		9.0	92	80 in.·lbf
Engine oil pressure switch assy x Cylinder block sub-assy		15	153	11
Water inlet x Cylinder block sub-assy		11	112	8
Water by-pass pipe No. 1 x Cylinder block sub-assy		9.0	92	80 in.·lbf
Water by-pass pipe No. 1 x Cylinder head sub-assy		9.0	92	80 in.·lbf
Oil level gage guide x Water by-pass pipe No. 1		13	133	10
Intake manifold x Cylinder head sub-assy		30	306	22
Flywheel sub-assy x Crankshaft	1st	49	500	36
	2nd	Turn 90°	Turn 90°	Turn 90°
Transverse engine engine mounting bracket front x Transverse engine engine mounting insulator front		52	530	38
Transverse engine engine mounting bracket rear x Transverse engine engine mounting insulator rear		87	887	64
Transverse engine engine mounting bracket LH x Transverse engine engine mounting insulator LH		80	816	59
Transverse engine engine mounting bracket RH x Transverse engine engine mounting insulator RH		52	530	38
Front suspension crossmember sub-assy x Body	Front	113	1,152	83
	Rear	157	1,601	116
Engine mounting member sub-assy center x Body		39	398	29
Floor panel brace front x Body		30	306	22
Air cleaner case x Body		7.0	71	62 in.·lbf

CONTINUED

SERVICE SPECIFICATIONS – ENGINE MECHANICAL

Part Tightened		N·m	kgf·cm	ft·lbf
Air cleaner case x Transverse engine engine mounting bracket LH		7.0	71	62 in.·lbf
Battery carrier x Body		13	133	10
Battery clamp sub-assy x Body		5.0	51	44 in.·lbf
Battery clamp sub-assy x Battery clamp bolt		30 – 4.0	31 – 41	27 – 35 in.·lbf
Radiator support upper x Body		19	194	14
Front wheel RH & LH x Front axle hub sub-assy RH & LH		103	1,050	76
Chain tensioner slipper x Cylinder block sub-assy		19	194	14
Timing chain or belt cover sub-assy x Cylinder head sub-assy		13	133	10
Timing chain or belt cover sub-assy x Cylinder block sub-assy	M6 M8	13 19	133 194	10 14
Water pump assy x Cylinder block sub-assy		11	112	8
Water pump assy x Timing chain or belt cover sub-assy		9.0	92	80 in.·lbf
Crankshaft pulley x Crankshaft		138	1,407	102
Cylinder head sub-assy x Cylinder block sub-assy	1st 2nd	49 Turn 90°	500 Turn 90°	36 Turn 90°
Camshaft timing oil control valve assy x Cylinder head sub-assy		9.0	92	80 in.·lbf
Chain vibration damper No. 1 x Cylinder head sub-assy		9.0	92	80 in.·lbf
Chain vibration damper No. 1 x Cylinder block sub-assy		9.0	92	80 in.·lbf

CONTINUED

EXHAUST

SERVICE DATA

0300V-02

Compression spring Free length	Exhaust pipe assy front x Exhaust manifold	44 mm (1.7322 in.)
Compression spring Free length	Exhaust pipe assy front x Tail pipe assy	40 mm (1.5748 in.)

CONTINUED

0300U–03

TORQUE SPECIFICATION

Part Tightened		N·m	kgf·cm	ft·lbf
Exhaust pipe assy front x Exhaust manifold		43	440	32
Exhaust pipe assy front x Tail pipe assy		43	440	32
Floor panel brace front x Body		30	302	22
Oxygen sensor x Exhaust pipe assy front	2ZZ–GE	44	450	33

CONTINUED

COOLING

SERVICE DATA

0300G–03

Thermostat		
Valve opening temperature		80 – 84°C (176 – 183°F)
Valve lift	at 90°C (194°F)	10 mm (0.39 in.) or more
Radiator cap sub–assy		
Standard opening pressure		74 – 103 kPa (0.75 – 1.05 kgf/cm2, 10.7 – 14.9 psi)
Minimum opening pressure		59 kPa (0.6 kgf/cm2, 8.5 psi)
Cooling fan		
Standard amperage	at 20°C (68°F)	8 – 12 A
Cooling fan		
Resistarce	at 20°C (68°F)	1.17 – 1.43 Ω

CONTINUED

0300H–03

TORQUE SPECIFICATION

Part Tightened		N·m	kgf·cm	ft·lbf
Water pump x Cylinder block	2ZZ–GE	9.0	92	80 in.lbf
Water pump x Cylinder block	4ZZ–FE Bolt A Bolt B	 9.0 11	 92 113	 80 in.lbf 8
Generator assy	12 mm head	25	250	18
Generator assy	2ZZ–GE 14 mm head	58	519	43
Generator assy	4ZZ–FE 14 mm head	54	550	39
Generator bracket x Generator assy	2ZZ–GE	29	296	21
Generator bracket x Intake air surge tank	2ZZ–GE	29	296	21
Cylinder head cover No. 2 x Cylinder head cover		7.0	71	62 in.lbf

CONTINUED

LUBRICATION

SERVICE DATA

0300L-07

Oil pressure	2ZZ-GE	
	at idle speed	39 kPa (0.4 kgf·cm^2, 5.7 psi) or more
	at 3,000 rpm	294 –539 kPa (3.0 – 5.5 kgf·cm^2, 43 – 78 psi) or more
Oil pressure	4ZZ-FE	
	at idle speed	29 kPa (0.3 kgf·cm^2, 4.3 psi) or more
	at 3,000 rpm	294 –539 kPa (3.0 – 5.5 kgf·cm^2, 43 – 78 psi) or more

CONTINUED

0300K–05

TORQUE SPECIFICATION

Part Tightened		N·m	kgf·cm	ft·lbf
Oil pressure switch x Cylinder head	2ZZ–GE	13	130	9
Oil pressure switch x Cylinder head	4ZZ–FE	15	153	11
Oil pan drain plug x Oil pan		37	378	27
Oil pump x Cylinder block		9.0	92	80 in.·lbf
Oil cooler x cylinder block		79	806	58
Oil filter x Oil cooler		37	378	27

CONTINUED

IGNITION

SERVICE DATA

0300I–02

Spark plug	2ZZ–GE	
Recommended spark plug	DENSO made	SK20R11
	NGK made	IFR6A11
Electrode gap		1.0 – 1.3 mm (0.039 – 0.051 in.)
Spark plug	4ZZ–FE	
Recommended spark plug	DENSO made	K16R–U11
	NGK made	BKR5EYA–11
Electrode gap		1.1 mm (0.043 in.)
Cam position sensor	2ZZ–GE	
Resistance	at cold	835 – 1,400Ω
	at hot	1,060 – 1,645Ω
Crank position sensor	2ZZ–GE	
Resistance	at cold	1,630 – 2,740Ω
	at hot	2,065 – 3,225Ω
Crank position sensor No. 1	4ZZ–FE	
Resistance	at cold	1,630 – 2,740Ω
	at hot	2,065 – 3,225Ω

CONTINUED

0300J-02

TORQUE SPECIFICATION

Part Tightened		N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head				
	2ZZ-GE	18	184	13
	4ZZ-FE	25	255	18
Ignition coil x Cylinder head cover				
	2ZZ-GE	9.0	91	80 in.·lbf
	4ZZ-FE	9.0	92	80 in.·lbf

CONTINUED

STARTING & CHARGING

0300Q-06

SERVICE DATA

Starter assy		
Specified current	2ZZ-GE	90 A or less at 11.5 V
	4ZZ-FE	160 A or less at 10.5 V
Generator	2ZZ-GE	
Rated output		12V 70A, 12V 80A
standerd amperage	Idle to 2000 rpm	10A or less
standerd voltage	Idle to 2000 rpm	13.2 - 14.6 V
Generator	4ZZ-FE	
Rated output		12V 80A
standerd amperage	Idle to 2000 rpm	5A or less
standerd voltage	Idle to 2000 rpm	13.2 - 14.6V
Battery		
Voltage	at 20°C (68°F)	12.5 - 12.9 V
Specific gravity	at 20°C (68°F)	1.25 - 1.29

CONTINUED

0300R–07

TORQUE SPECIFICATION

Part Tightened		N·m	kgf·cm	ft·lbf
Lead wire x Terminal C of starter		9.8	100	7.2
Starter x Transaxle	Bolt	37	378	28
	Terminal 30	9.8	100	7
Generator assy x Engine	2ZZ–GE			
	M14	25	250	18
	M12	58	591	43
Generator assy x Engine	4ZZ–FE			
	M12	25	250	18
	M14	54	550	39

CONTINUED

MANUAL TRANSMISSION / TRANSAXLE

03010-12

SERVICE DATA

C50, C150	
Transmission case oil seal drive in depth	2.4 ± 0.3 mm (0.094 ± 0.012 in.)
Transaxle case oil seal drive in depth	1.9 ± 0.3 mm (0.075 ± 0.012 in.)
C64	
Transmission case oil seal drive in drive in depth	9.9 ± 0.3 mm (0.390 ± 0.012 in.)
Transaxle case oil seal drive in depth	1.9 ± 0.3 mm (0.075 ± 0.012 in.)

CONTINUED

0300Z-12

TORQUE SPECIFICATION

Part Tightened		N·m	kgf·cm	ft·lbf
C50/ C64/ C150				
Filler and drain plugs		39.2	400	29
Engine hanger set bolt	4ZZ-FE, 3ZZ-FE:	30	306	22
	2ZZ-GE:	38	387	28
Engine mounting bracket RR x Transaxle		64	653	47
Engine mounting bracket RR x Engine mounting insulator RR		87	888	64
Engine mounting bracket FR x Transaxle		64	653	47
Engine mounting bracket FR x Engine mounting insulator FR		52	530	38
Manual transaxle assy x Engine	Bolt A:	64	650	47
	Bolt B:	47	480	35
	Bolt C:	23	230	17
Transverse engine engine mounting bracket LH x Transaxle		52	530	38
Engine mounting bracket LH x Engine mounting insulator LH	Bolt A:	52	530	38
	Nut B:	80	816	59
Starter assy x Manual transaxle assy		37	378	27
Starter wire set nut		12.8	131	9
Clutch release cylinder assy x Transaxle	Bolt A:	25	250	19
	Bolt B:	11.8	120	9
	Bolt C:	5.0	21	44 in.·lbf
Manual transaxle assy x Wire harness clmap	Bolt A:	25.5	260	19
	Bolt B:	12.8	131	9
Manual transaxle assy x Ground cable		13	133	10
Battery carrier x Body		13	133	10
Battery clamp sub-assy x Body	Bolt:	5.0	51	44 in.·lbf
	Nut:	3.5	36	31 in.·lbf
Air cleaner assy x Body		7.0	71	62 in.·lbf
Cylinder head cover No.2 x Engine		7.0	71	62 in.·lbf
Hood set bolt		13	133	10

CONTINUED

HEATER & AIR CONDITIONER

030QY-02

SERVICE DATA

Refrigerant charge volume	Standard:	490 ± 30 g (17.28 ± 1.06 oz.)
Magnetic clutch clearance	(2ZZ–GE)	0.20 – 0.45 mm (0.008 – 0.018 in.)
Magnetic clutch clearance	(4ZZ–FE)	0.20 – 0.45 mm (0.008 – 0.018 in.)

CONTINUED

030QZ-02

TORQUE SPECIFICATION

Part Tightened	N·m	kgf·cm	ft·lbf
COOLER COMPRESSOR ASSY (2ZZ–GE)			
Magnet clutch hub x Cooler compressor assy	18	184	13
W/pulley ompressor assy x Engine	25	250	18
Cooler refrigerant discharge hose No.1 x W/pulley ompressor assy	9.8	100	87 in.·lbf
Cooler refrigerant suction hose No.1 x W/pulley ompressor assy	9.8	100	87 in.·lbf
COOLER COMPRESSOR ASSY (4ZZ–FE)			
Magnet clutch hub x Cooler compressor assy	18	184	13
W/pulley ompressor assy x Engine	25	250	18
Cooler refrigerant discharge hose No.1 x W/pulley ompressor assy	9.8	100	87 in.·lbf
Cooler refrigerant suction hose No.1 x W/pulley ompressor assy	9.8	100	87 in.·lbf

CONTINUED

EXTERIOR/INTERIOR TRIM

TORQUE SPECIFICATION

030XR-01

Part Tightened	N·m	kgf·cm	ft·lbf
Front bumper reinfocement × Body	13.0	133	9

CONTINUED

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REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E

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

CONTINUED

EFI SYSTEM (2ZZ-GE)

0504C-08

HOW TO PROCEED WITH TROUBLESHOOTING

When using hand-held tester, troubleshoot in accordance with the procedure shown below.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (See page 05-6)

3	CONNECT THE HAND-HELD TESTER TO DLC3

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

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

HINT:
Record or print DTC and Freezed Frame Data, if needed.

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

6	VISUAL INSPECTION

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

8	PROBLEM SYMPTOM CONFIRMATION

HINT:
If the engine does not start, perform step 10 and 12 first.

A	Malfunction does not occur
B	Malfunction occurs

B → GO TO STEP 10

A

CONTINUED

9	SYMPTOM SIMULATION

10	DTC CHECK (See page 05-7)

A	Malfunction code
B	No code

B → GO TO STEP 12

A

11	DTC CHART (See page 05-14)

GO TO STEP 14

12	BASIC INSPECTION (See page 05-7)

A	Not confirm wrong parts
B	Confirm wrong parts

B → GO TO STEP 17

A

13	PROBLEM SYMPTOMS TABLE (See page 05-19)

A	Confirm wrong circuit
B	Confirm wrong Parts

B → GO TO STEP 17

A

14	CHECK ECM POWER SOURCE CIRCUIT (See page 05-98)

15	CIRCUIT INSPECTION

A	Not confirm malfunction
B	Confirm malfunction

B → GO TO STEP 18

A

CONTINUED

16	CHECK FOR INTERMITTENT PROBLEMS (See page 05–7)

GO TO STEP 18

17	PARTS INSPECTION

18	IDENTIFICATION OF PROBLEM

19	ADJUSTMENT, REPAIR

20	CONFIRMATION TEST

END

CONTINUED

When not using hand-held tester, troubleshoot in accordance with the procedure shown below.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (See page 05-6)

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

4	PROBLEM SYMPTOM CONFIRMATION

A	Malfunction occurs
B	Malfunction does not occur

B → SYMPTOM SIMULATION (See page 05-19)

5	DTC CHECK (See page 05-7)

A	Malfunction code
B	No code

B → GO TO STEP 7

A

6	DTC CHART (See page 05-14)

GO TO STEP 9

7	BASIC INSPECTION (See page 05-7)

A	Not confirm wrong parts
B	Confirm wrong parts

B → GO TO STEP 12

A

CONTINUED

8	PROBLEM SYMPTOMS TABLE (See page 05-19)

A	Confirm wrong circuit
B	Confirm wrong Parts

B → GO TO STEP 12

A

9	CHECK ECM POWER SOURCE CIRCUIT (See page 05-98)

10	CIRCUIT INSPECTION

A	Not confirm malfunction
B	Confirm malfunction

B → GO TO STEP 13

A

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

GO TO STEP 13

12	PARTS INSPECTION

13	IDENTIFICATION OF PROBLEM

14	ADJUSTMENT, REPAIR

15	CONFIRMATION TEST

END

CONTINUED

0504B-08

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name

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

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

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

Condition of check engine warning light (CHK ENG)		☐ Remains on ☐ Sometimes light up ☐ Does not light up
DTC Inspection	Normal mode (Precheck)	☐ Normal ☐ Malfunction code(s) (code) ☐ Freezed frame data ( )
	Check Mode	☐ Normal ☐ Malfunction code(s) (code) ☐ Freezed frame data ( )

CONTINUED

0573E–02

PRE–CHECK

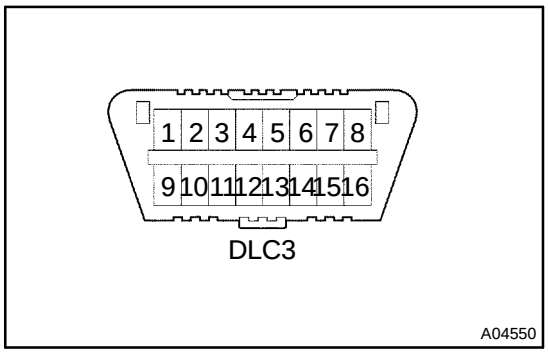
1. DIAGNOSIS SYSTEM

(a) Description for M–OBD

- When troubleshoot Multiplex OBD (M–OBD) vehicles, the only difference from the usual troubleshooting procedure is that you connect the hand–held tester to the vehicle, and read off various data output from the vehicle's ECM.
- The vehicle's on–board computer indicates the check engine warning light (CHK ENG) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components. In addition to an indication of the CHK ENG when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) are recorded in the ECM memory (See page 05–14). When the malfunction does not reoccur, the CHK ENG is indicated until the ignition switch is turned off, and then the CHK ENG is not indicated when the ignition switch is turned on but the DTCs remain recorded in the ECM memory.
- To check the DTCs, connect the hand–held tester to Data Link Connector 3 (DLC3) on the vehicle. or read the number of blinks of the check engine warning light when TC and CG terminals on the DLC3 are connected. The hand–held tester also enables you to erase the DTCs and activate the several actuators and check freezed frame data and various forms of engine data. (For operating instructions, see the hand–held tester instruction book.)
- The diagnosis system operates in the normal mode during normal vehicle use. It also has a check (test) mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and ensure thorough malfunction detection. By switching the ECM to the check (test) mode using hand–held tester when troubleshooting, the technician can cause the CHK ENG on the light up for a malfunction that is only detected once or momentarily (Hand–held tester only) (See step 3).

CONTINUED

- * 2 trip detection logic
  When a logic malfunction is first detected, the malfunction is temporally stored in the ECM memory. If the same malfunction is detected again during the second drive test, this second detection cases the CHK ENG to light up.
  The 2 trip repeats the same mode for 2 times (However, the ignition switch must be turned OFF between the 1st trip and 2nd trip).
- Freeze frame data:
  Freeze frame data records the engine condition when malfunction is detected.
  Because freeze frame data records the engine conditions (fuel system, calculator load, water temperature, fuel trim, engine speed, vehicle speed, etc.) when the malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.



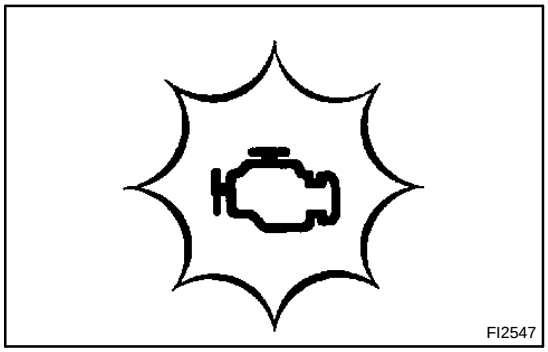
(b) Check the DLC3.
The vehicle's ECM uses the ISO 14230(M-OBD) communication protocol. The terminal arrangement of DLC3 complies with ISO 15031-03 and matches the ISO 14230 format.

Terminal No.	Connection / Voltage or Residence	Condition
7	Bus + Line / Pulse generation+	During transmission
4	Chassis Ground ↔ Body Ground / 1 Ω or less	Always
16	Battery Positive ↔ Body Ground / 9 - 14 V	Always

HINT:
If the display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of the hand-held tester to 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 is when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Debarment listed in the tool,s instruction manual.

CONTINUED


FI2547

2. INSPECT DIAGNOSIS (Normal Mode)

(a) Check the check engine warning light.

(1) The check engine warning (CHK ENG) comes on when the ignition switch is turned ON and the engine is not running.

HINT:

If the check engine warning (CHK ENG) does not light up, troubleshoot the combination meter.

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

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

NOTICE:

Hand-held tester only:

When the diagnosis system is switched from normal mode to check (test) 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 switch 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's instruction book.)

(5) See page 05-14 to confirm the details of the DTCs.

NOTICE:

- **When simulating symptoms without a hand-held tester to check the DTCs, use normal mode. For codes on the DTCs, chart subject to "2 trip detection logic", turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again. When the problem has been simulated twice, the check engine warning light lights up and the DTCs, are recorded in the ECM.**
- **Check the 1st trip DTC using Mode7 for ISO 15031. (Continuous Test Results of Euro-OBD function in hand-held tester)**

3. INSPECT DIAGNOSIS (Check (Test) Mode)

HINT:

Hand-held tester only:

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

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

CONTINUED

(a) Check the DTC.

(1) Initial conditions

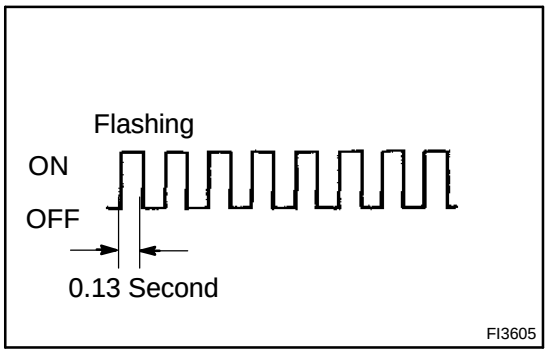
- Battery positive voltage 11V or more.
- Throttle valve fully closed.
- Air conditioning switched OFF.

(2) Turn ignition switch OFF.

(3) Prepare the hand–held tester.

(4) Connect the hand–held tester to DLC3 on the at the lower right of the instrument panel.

(5) Turn the ignition switch ON and switch the push the hand–held tester ON.



(6) Switch the hand–held tester normal mode to check (test) mode. (Check that the check engine warning light (CHK ENG) flashes.)

(7) Start the engine. (The check engine warning (CHK ENG) light goes out after the engine start.)

(8) Simulate the conditions of the malfunction described by the customer.

NOTICE:

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

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

HINT:

Be careful not to turn the ignition switch OFF. When turning the ignition switch OFF, the diagnosis system converts from check (test) mode to normal mode. All DTCs, etc. are erased at this condition.

(10) After checking the DTCs, inspect the applicable circuit.

(b) Clear the DTC.

The following actions will erase the DTCs and freezed frame data.

- Operating the hand–held tester to erase the codes. (See the hand–held tester's instruction book for operating instructions.)
- Disconnecting the battery terminals or EFI fuse more than 30 second.

NOTICE:

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

CONTINUED

4. FAIL-SAFE CHART

If any of the following codes is recorded, the ECM enters fail-safe mode.

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0100/31	Ignition timing is fixed at 5° BTDC	Returned to normal condition
P0110/24	Intake air temperature is fixed at 20°C (68°F)	Returned to normal condition
P0115/22	Water temperature is fixed at 80°C (176°F)	Returned to normal condition
P0120/41	VTA is fixed at 0°	The following condition must be repeated at least 2 times consecutively when closed throttle position switch is OFF: VTA ≧ 0.1 V and ≦ 0.95 V
P0135/21	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0325/55	Max. timing retardation	Ignition switch OFF
P1300/14 P1305/15 P1310/14 P1315/15	Fuel cut	Returned to normal condition
P1656/39	It cut electrically the circuit in which an abnormality is detected	Returned to normal condition

5. CHECK FOR INTERMITTENT PROBLEMS

HINT:

Hand-held tester only:

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

(a) Clear the DTC (See step 3).

(b) Set the check mode (See step 3).

(c) Perform a simulation test (See page 01-18).

(d) Check the connector and terminal (See page 01-28).

(e) Handle the connector (See page 01-28).

6. ENGINE OPERATING CONDITION

NOTICE:

The values given below for "Normal Condition" are representative values, so a vehicle may still be normal even if its value from those listed here. So do not decide whether a part is faulty or not solely according to the "Normal Condition" here.

Hand-held tester display	Measurement Item	Normal Condition*1
FUEL SYS #1	Fuel System Bank 1 OPEN: Air-fuel ratio feedback stopped CLOSED: Air-fuel ratio feedback operating	Idling after warming up: CLOSED
CALC LOAD	Calculator Load: Current intake air volume as a proportion of max. intake air volume	Idling: 27.5 - 46.4 % Racing without load (2,500r/min): 19.7 - 40.5 %
COOLANT TEMP./WATER TEMP.	Water Temp. Sensor Value	After warming up: 80 - 95°C (176 - 203°F)
SHORT FT #1	Short-term Fuel Trim Bank 1	0 ± 20%
LONG FT #1	Long-term Fuel Trim Bank 1	0 ± 20%
ENGINE SPD	Engine Speed	Idling: 750 - 850 r/min.
VEHICLE SPD	Vehicle Speed	Vehicle Stopped: 0 km/h (0 mph)
IGN ADVANCE	Ignition Advance: Ignition Timing of Cylinder No. 1	Idling: BTDC 8 - 12°
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to Ambient Temp.
THROTTLE POS	Voltage Output of Throttle Position Sensor Calculated as a percentage: 0 V → 0%, 5 V → 100%	Throttle Fully Closed: 8 - 20 % Throttle Fully Open: 64 - 96 %

CONTINUED

O2S B1, S1	Voltage Output of Oxygen Sensor Bank 1, Sensor 1	Idling: 0.1 - 0.9 V
O2FT B1, S1	Oxygen Sensor Fuel Trim Bank 1, Sensor 1 (Same as SHORT FT #1)	0 ± 20 %
INJECTOR	Fuel injection time for cylinder No.1	Idling: 1.92 - 3.37 ms
STARTER SIG	Starter Signal	Cranking: ON
CTP SW	Closed Throttle Position Switch Signal	Throttle Fully Closed: ON
A/C SIG	A/C Switch Signal	A/C ON: ON
STOP LIGHT SW	Stop Light Switch Signal	Stop light switch ON: ON
FC IDL	Fuel Cut Idle: Fuel cut when throttle valve fully closed, during deceleration	Fuel cut operating: ON
FC TAU	Fuel Cut TAU: Fuel cut during very light load	Fuel cut operating: ON
CYL#1, CYL#2, CYL#3, CYL#4	Abnormal revolution variation for each cylinder	0 %
A/C CUT SIG	A/C Cut Signal	A/C S/W OFF: ON
FUEL PUMP	Fuel Pump Signal	Idling: ON
EVAP (PURGE) VSV	EVAP VSV Signal	VSV operating: ON
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.5 - 1.4

*1: If no conditions are specifically stated for "Idling",the A/C switch is OFF and all accessory switches are OFF.

BASIC INSPECTION

When the malfunction code is not confirmed in the DTC check, troubleshooting should be carried out in the order for all possible circuits to be considered as causes of the problems. In many cases, by carrying out the basic engine check shown in the following flow chart, the location causing the problem can be found quickly and efficiently. Therefore, using of this check is essential in engine troubleshooting.

1 CHECK BATTERY POSITIVE VOLTAGE

NOTICE:
Carry out this check under the engine stoppage condition.

	OK	NG
voltage	11 V or more	Less than 11 V

NG → **CHARGE OR REPLACE BATTERY**

OK

2 CHECK IF ENGINE IS CRANKED

NG → **PROCEED TO PROBLEM TABLE**
(See page 05-19)

OK

3 CHECK IF ENGINE STARTS

NG → **GO TO STEP 7**

OK

CONTINUED

4	CHECK AIR FILER

(a) Visually check that the air filter is not excessively dirty or oily.

HINT:

If necessary, clean the filter with compressed air. First blow from inside thoroughly, then blow from outside of filter.

NG → CLEAN OR REPLACE

OK

5	CHECK IDLE SPEED (See page 14-1)

NG → PROCEED TO PROBLEM SYMPTOMS TABLE (See page 05-19)

OK

6	CHECK IGNITION TIMING (See page 14-1)

NG → PROCEED TO PAGE 14-1 AND CONTINUE TO TROUBLESHOOT

OK

7	CHECK FUEL PRESSURE (See page 11-5)

NG → PROCEED TO PAGE 11-5 AND CONTINUE TO TROUBLESHOOT

OK

8	CHECK FOR SPARK(See page 18-1)

NG → PROCEED TO PAGE 18-1 AND CONTINUE TO TROUBLESHOOT

OK

PROCEED TO PROBLEM SYMPTOMS TABLE (See page 05-19)

CONTINUED

05046-08

DIAGNOSTIC TROUBLE CODE CHART

HINT:

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

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

DTC No. (See page)	Detection Item	Trouble Area	*1 CHK ENG (MIL)	Memory
P0100/31 (05-21)	Mass Air Flow Circuit Malfunction	• Open or short in air flow meter circuit • Intake air flow meter • ECM	○	○
P0110/24 (05-28)	Intake Air Temperature Circuit Malfunction	• Open or short in intake air temp. sensor circuit • Intake air temp. sensor (inside intake air flow meter) • ECM	○	○
P0115/22 (05-32)	Engine Coolant Temperature Circuit Malfunction	• Open or short in water temp. sensor circuit • E.F.I. engine coolant temp. sensor • ECM	○	○
P0120/41 (05-36)	Throttle Pedal Position Sensor/ Switch "A" Circuit Malfunction	• Open or short in throttle position sensor circuit • E.F.I. throttle position sensor • ECM	○	○
P0130/21 (05-42)	O2 Sensor Circuit Malfunction (Bank 1 Sensor 1)	• Open or short in oxygen sensor circuit • Oxygen sensor • Fuel pressure • Injector • ECM	○	○
P0131/21 (05-42)	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	• Open or short in oxygen sensor circuit • Oxygen sensor • Fuel pressure • Injector • ECM	○	○
P0135/21 (05-48)	O2 Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)	• Open or short in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • ECM	○	○
P0325/55 (05-50)	Knock Sensor 1 Circuit Malfunction	• Open or short in knock control sensor circuit • Knock control sensor (looseness) • ECM	○	○
P0335/12 (05-53)	Crankshaft Position Sensor "A"Circuit Malfunction	• Open or short in crankshaft position sensor circuit • Crank position sensor • Crank angle sensor plate • ECM	○	○
P0335/13 (05-53)	Crankshaft Position Sensor "A"Circuit Malfunction	• Open or short in crankshaft position sensor circuit • Crank position sensor • Crank angle sensor plate • ECM	○	○
P0340/12 (05-57)	Camshaft Position Sensor Circuit Malfunction	• Open or short in camshaft position sensor circuit • Cam position sensor • Intake camshaft • ECM	○	○

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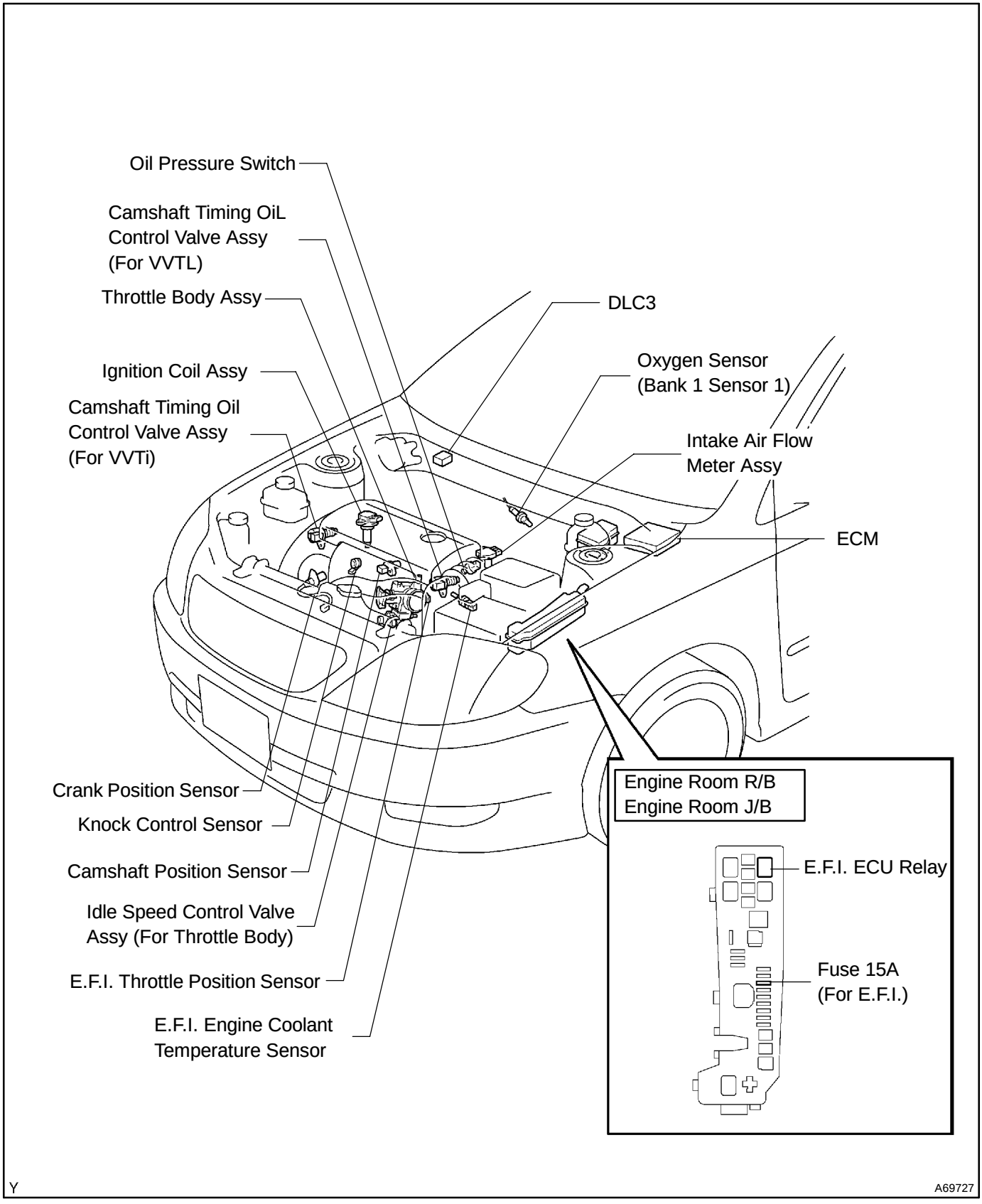
P0500/42 (05-59)	Vehicle Speed Sensor Malfunction	• Combination meter • Open or short in No.1 vehicle speed sensor circuit • No.1 Vehicle speed sensor • ECM	-	○
P0505/33 (05-61)	Idle Control System Malfunction	• Open or short in ISC valve circuit • ISC valve is stick or closed • Open or short in A/C switch circuit • ECM • Air Induction System	○	○
P1300/14 (05-69)	Igniter Circuit Malfunction	• Ignition system • Open or short in IGF or IGT1 circuit from No. 1 ignition coil • No. 1 ignition coil • ECM	○	○
P1305/15 (05-69)	Igniter Circuit Malfunction	• Ignition system • Open or short in IGF or IGT2 circuit from No. 2 ignition coil • No. 2 ignition coil • ECM	○	○
P1310/14 (05-69)	Igniter Circuit Malfunction	• Ignition system • Open or short in IGF or IGT3 circuit from No. 3 ignition coil • No. 3 ignition coil • ECM	○	○
P1315/15 (05-69)	Igniter Circuit Malfunction	• Ignition system • Open or short in IGF or IGT4 circuit from No. 4 ignition coil • No. 4 ignition coil • ECM	○	○
P1335/13 (05-53)	Crankshaft Position Sensor Circuit Malfunction (During engine running)	• Open or short in crank position sensor circuit • Crank position sensor • Crank angle sensor plate • ECM	-	○
P1346/18 (05-75)	VVT Sensor/Camshaft Position Sensor Circuit Range/Performance Problem (Bank 1)	• Mechanical system malfunction (skipping teeth of timing chain, chain stretched) • ECM	-	○
P1349/59 (05-76)	VVT System Malfunction (Bank 1)	• Valve timing • OCV • VVT controller assembly • ECM	-	○
P1656/39 (05-82)	OCV Circuit Malfunction (Bank 1)	• Open or short in OCV circuit • OCV • ECM	○	○
P1690/39 (05-85)	OCV For VVTL Circuit Malfunction (Bank 1)	• Open or short in OCV circuit • OCV for VVTL • ECM	○	○
P1692/59 (05-89)	OCV For VVTL Open Malfunction (Bank 1)	• Open or short in OCV circuit • OCV for VVTL • Oil pressure switch for VVTL • ECM	-	○
P1693/59 (05-89)	OCV For VVTL Close Malfunction (Bank 1)	• Open or short in OCV circuit • OCV for VVTL • Oil pressure switch for VVTL • ECM	-	○

*1: ○ ... CHK ENG (MIL) lights up. - ... CHK ENG (MIL) does not light up.

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05047-08

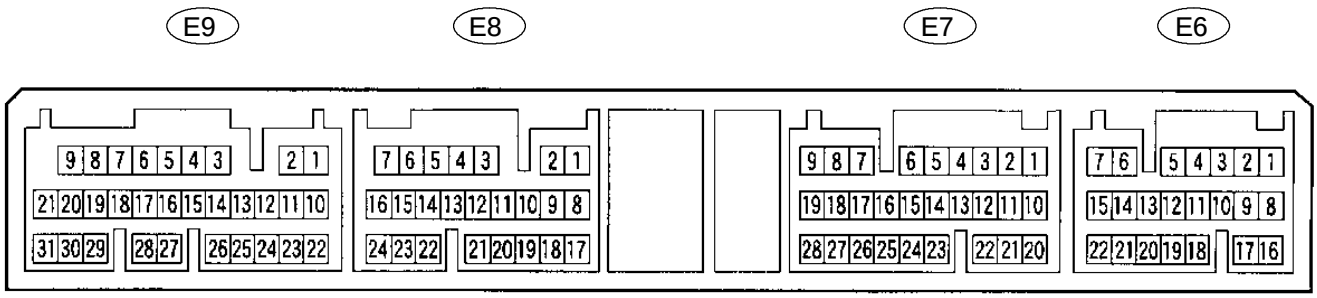
LOCATION



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05048–07

TERMINALS OF ECM



A63335

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E6 – 1) – E1 (E8 – 17)	R–W ↔ BR	Always	8 – 14
FC (E6 – 3) – E1 (E8 – 17)	G–R ↔ BR	IG switch ON	8 – 14
FC (E6 – 3) – E1 (E8 – 17)	G–R ↔ BR	Idling	Below 1.5
IGSW (E6 – 8) – E1 (E8 – 17)	B–O ↔ BR	IG switch ON	8 – 14
W (E6 – 15) – E1 (E8 – 17)	R–Y ↔ BR	Idling	8 – 14
W (E6 – 15) – E1 (E8 – 17)	R–Y ↔ BR	IG switch ON	Below 3.5
+B (E6 – 16) – E1 (E8 – 17)	B ↔ BR	IG switch ON	8 – 14
STP (E7 – 6) – E1 (E8 – 17)	G–W ↔ BR	IG switch ON, brake pedal depressed	8 – 14
STP (E7 – 6) – E1 (E8 – 17)	G–W ↔ BR	IG switch ON, brake pedal released	Below 1.5
F/PS (E7 – 8) – E1 (E8 – 17)	Y ↔ BR	IG switch ON	Pulse generation
STA (E7 – 11) – E1 (E8 – 17)	B ↔ BR	Cranking	5.5 or more
PS (E7 – 14) – E1 (E8 – 17)	L–R ↔ BR	IG switch ON	8 – 14
MREL (E7 – 21) – E1 (E8 – 17)	B–W ↔ BR	IG switch ON	8 – 14
SPD (E7 – 22) – E1 (E8 – 17)	V–W ↔ BR	IG switch ON, rotate driving wheel slowly	Pulse generation
TACH (E7 – 27) – E1 (E8 – 17)	B ↔ BR	Idling	Pulse generation
VC (E8 – 2) – E2 (E8 – 18)	Y ↔ BR	IG switch ON	4.5 – 5.5
HT (E8 – 3) – E01 (E9 – 21)	P ↔ BR	Idling	Below 3.0
HT (E8 – 3) – E01 (E9 – 21)	P ↔ BR	IG switch ON	9 – 14
EVP1 (E8 – 4) – E01 (E9 – 21)	L–B ↔ W–B	IG switch ON	8 – 14
OVL+ (E8 – 7) – OVL– (E8 – 6)	B ↔ L–Y	Engine speed at 6,000 rpm or more	9 – 14
VG (E8 – 11) – EVG (E8 – 1)	G ↔ L–W	Idling, A/C switch OFF	1.1 – 1.5
OX (E8 – 12) – E2 (E8 – 18)	R ↔ BR	Maintain engine speed at 2,500 rpm after warming up	Pulse generation
THW (E8 – 14) – E2 (E8 – 18)	W ↔ BR	Idling, Engine coolant temp. at 80 °C (176 °F)	0.2 – 1.0
G2 (E8 – 15) – NE– (E8 – 24)	B ↔ W	Idling	Pulse generation (See page 05–53)
NE+ (E8 – 16) – NE– (E8 – 24)	B ↔ W	Idling	Pulse generation (See page 05–53)
THA (E8 – 22) – E2 (E8 – 18)	Y–B ↔ BR	Idling, intake air temp. 20 °C (68 °F)	0.5 – 3.4
VTA (E8 – 23) – E2 (E8 – 18)	LG ↔ BR	IG switch ON, throttle valve fully closed	0.3 – 1.0
VTA (E8 – 23) – E2 (E8 – 18)	LG ↔ BR	IG switch ON, throttle valve fully open	3.2 – 4.9
#10 (E9 – 1) – E01 (E9 – 21)	Y ↔ W–B	IG switch ON	8 – 14
#20 (E9 – 2) – E01 (E9 – 21)	B ↔ W–B	IG switch ON	8 – 14
#30 (E9 – 3) – E01 (E9 – 21)	W ↔ W–B	IG switch ON	8 – 14
#40 (E9 – 4) – E01 (E9 – 21)	L ↔ W–B	IG switch ON	8 – 14

CONTINUED

IGT1 (E9 - 10) - E1 (E8 - 17)	R-L ↔ BR	Idling	Pulse generation (See page 05-69)
IGT2 (E9 - 11) - E1 (E8 - 17)	Y-G ↔ BR	Idling	Pulse generation (See page 05-69)
IGT3 (E9 - 12) - E1 (E8 - 17)	GR ↔ BR	Idling	Pulse generation (See page 05-69)
IGT4 (E9 - 13) - E1 (E8 - 17)	W ↔ BR	Idling	Pulse generation (See page 05-69)
RSO (E9 - 18) - E1 (E8 - 17)	B-L ↔ W-B	IG switch ON	9 - 14
OCV+ (E9 - 24) - OCV- (E9 - 23)	Y ↔ B-Y	IG switch ON	Pulse generation (See page 05-76)
IGF (E9 - 25) - E1 (E8 - 17)	L-Y ↔ BR	IG switch ON	4.5 - 5.5
IGF (E9 - 25) - E1 (E8 - 17)	L-Y ↔ BR	Idling	Pulse generation (See page 05-69)
KNK1 (E9 - 27) - EKNK (E9 - 26)	B ↔ W	Idling	Pulse generation (See page 05-50)

CONTINUED

05049-08

PROBLEM SYMPTOMS TABLE

When the malfunction code is not confirmed in the diagnostic trouble code check and the problem still can not be confirmed in the basic inspection, proceed to this problem symptoms tables and troubleshoot according to the numbered order given below.

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	19-1
No initial combustion (Does not start)	1. ECM power source circuit 2. Ignition coil circuit 3. Fuel pump control circuit 4. Injector	05-98 05-69 05-105 11-7
No complete combustion (Does not start)	1. Fuel pump control circuit 2. Ignition coil circuit 3. Injector	05-105 05-69 11-7
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. ISC valve circuit 3. Fuel pump control circuit 4. Ignition coil 5. Spark plug 6. Compression 7. Injector	05-93 05-59 05-105 05-69 18-2 14-1 11-7
Cold engine (Difficult to start)	1. Starter signal circuit 2. ISC valve circuit 3. Fuel pump control circuit 4. Injector 5. Ignition coil 6. Spark plug	05-93 05-59 05-105 11-7 05-69 18-2
Hot engine (Difficult to start)	1. Starter signal circuit 2. ISC valve circuit 3. Fuel pump control circuit 4. Injector 5. Ignition coil 6. Spark plug	05-93 05-59 05-105 11-7 05-69 18-2
Incorrect first idle (Poor idling)	1. ISC valve circuit	05-59
High engine idle speed (Poor idling)	1. ISC valve circuit 2. ECM power source circuit 3. Back up power source circuit	05-59 05-98 05-96
Low engine idle speed (Poor idling)	1. ISC valve circuit 2. Fuel pump control circuit 3. Injector 4. Back up power source circuit	05-59 05-105 11-7 05-96
Rough idling (Poor idling)	1. ISC valve circuit 2. Injector 3. Ignition coil circuit 4. Compression 5. Fuel pump control circuit 6. Back up power source circuit	05-59 11-7 05-69 14-1 05-105 05-96
Hunting (Poor idling)	1. ISC valve circuit 2. ECM power source circuit 3. Fuel pump control circuit	05-59 05-98 05-105
Hesitation/Poor acceleration (Poor drivability)	1. Injector 2. Fuel pump control circuit 3. Ignition coil circuit	11-7 05-105 05-69
Muffler explosion, after fire (Poor drivability)	1. Ignition coil 2. Spark plug 3. Injector	05-69 18-2 11-7

CONTINUED

Surging (Poor drivability)	1. Fuel pump control circuit 2. Spark plug 3. Injector	05–105 18–2 11–7
Engine stall (Soon after starting)	1. Fuel pump control circuit 2. ISC valve circuit	05–105 05–59
Engine stall (After accelerator pedal released)	1. Injector 2. ISC valve circuit 3. ECM	11–7 05–59 01–28

CONTINUED

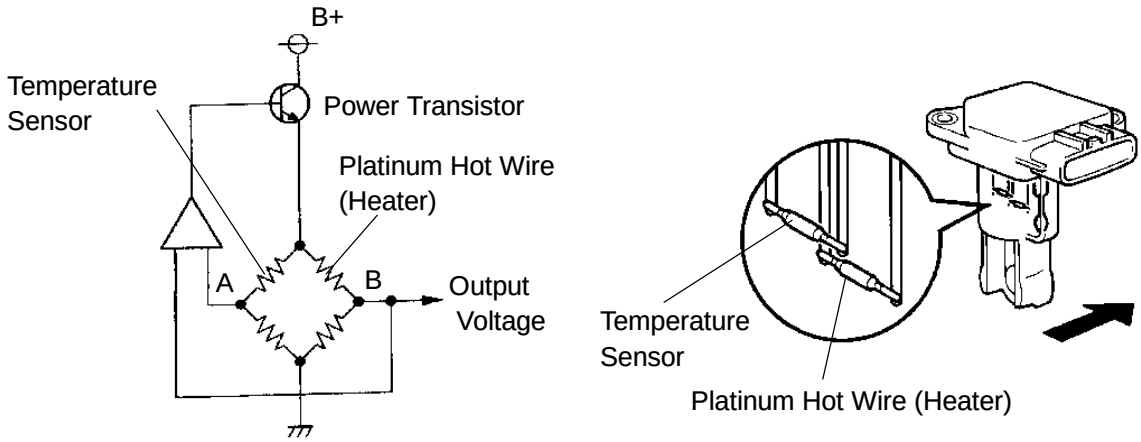
DTC P0100/31 MASS AIR FLOW CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

The air flow meter uses a platinum hot wire. The hot wire air flow meter consists of a platinum hot wire, temperature sensor and a control circuit installed in a plastic housing. The hot wire air flow meter works on the principle that the hot wire and temperature sensor located in the intake air bypass of the housing detect any changes in the intake air temperature.

The hot wire is maintained at the set temperature by controlling the current flow through the hot wire. This current flow is then measured as the output voltage of the air flow meter.

The circuit is constructed so that the platinum hot wire and temperature sensor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



DTC No.	DTC Detecting Condition	Trouble Area
P0100/31	Open or short in air flow meter circuit with more than 3 sec. engine speed less than 4,000 rpm	• Open or short in air flow meter circuit • Intake air flow meter • ECM

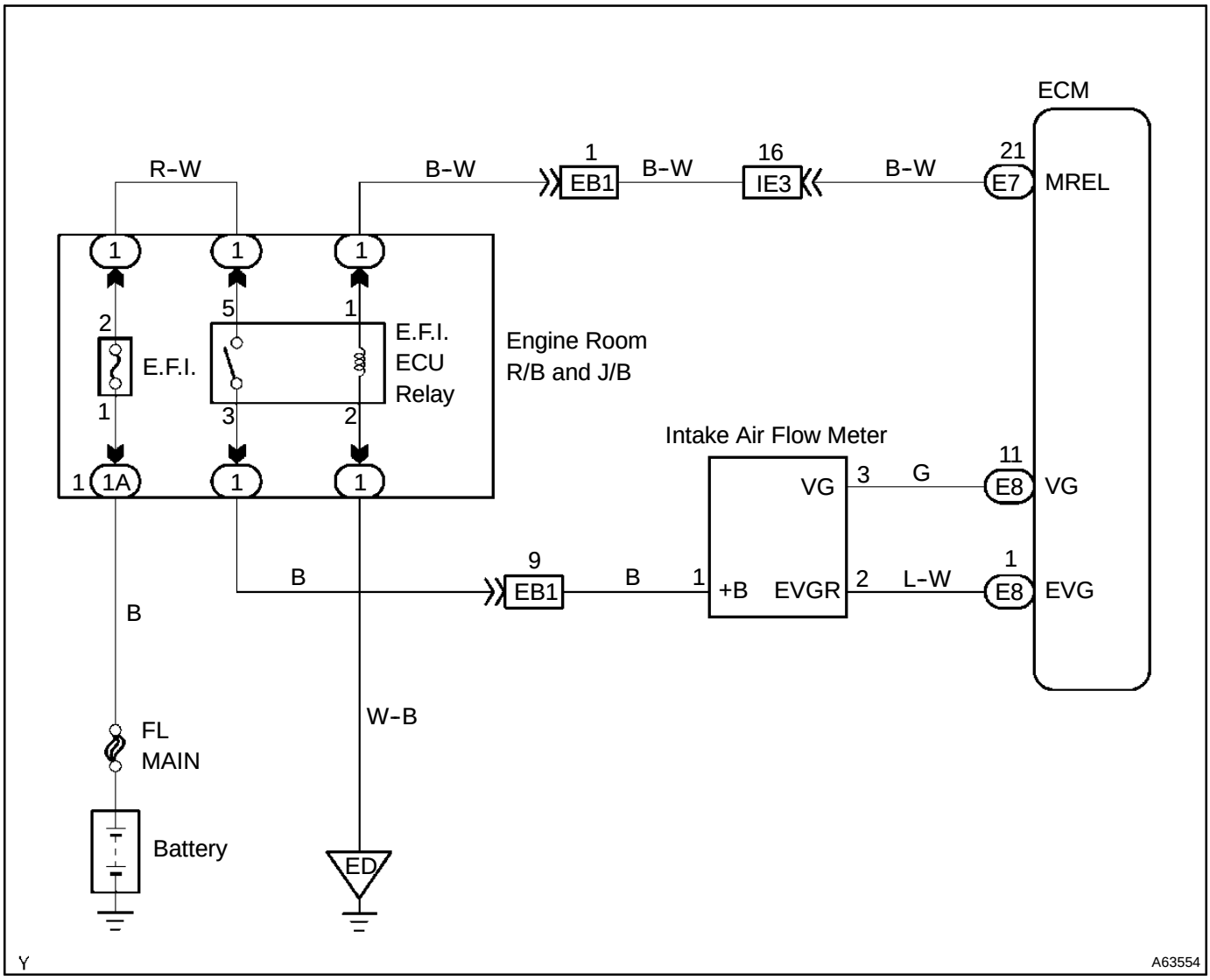
HINT:

After confirming DTC P0100/31, use the hand-held tester to confirm the air flow ratio from CURRENT DATA.

Air Flow Value (g/s)	Malfunction
Approx. 0.0	• Air flow meter power source circuit open • VG circuit open or short
160.0 or more	• EVG circuit open

CONTINUED

WIRING DIAGRAM



CONTINUED

INSPECTION PROCEDURE

HINT:

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

When using hand-held tester:

1	READ VALUE OF HAND-HELD TESTER(MAF)

(a) Read air flow rate on the hand-held tester.

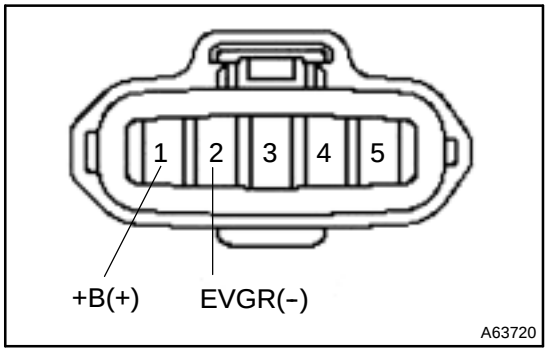
Result:

	A	B
Air flow rate (g/s)	0.0	160.0 or more

B → Go to step 6

A

2	INSPECT INTAKE AIR FLOW METER SUB-ASSY(POWER SOURCE VOLTAGE)

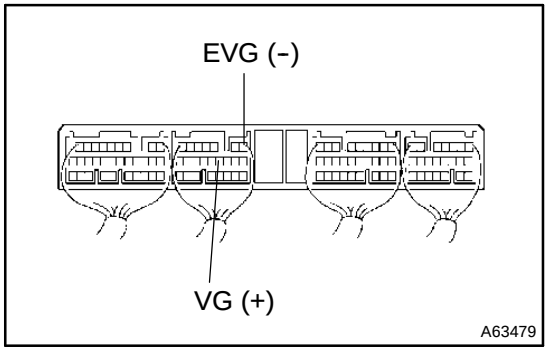


(a) Disconnect the intake air flow meter connector.
(b) Turn the ignition switch ON.
(c) Measure voltage between the terminals +B and EVGR of the intake air flow meter connector.
Voltage: 9 - 14 V

NG → Go to step 5

OK

3	INSPECT ECM(VG VOLTAGE)



(a) Start the engine.
(b) Measure voltage between the terminals VG and EVG of the ECM connector while the engine is idling.
Voltage: 1.1 - 1.5 V

HINT:

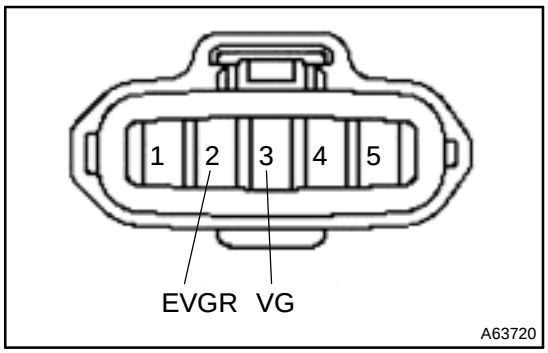
The A/C switch should be turned OFF.

OK → CHECK AND REPLACE ECM

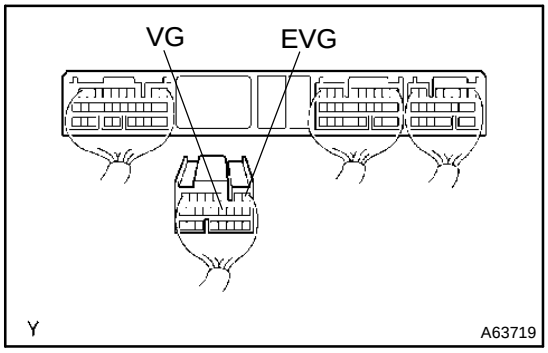
CONTINUED

NG

4	CHECK HARNESS AND CONNECTOR(ECM - INTAKE AIR FLOW METER)



(a) Disconnect the intake air flow meter connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals VG of the intake air flow meter harness connector and VG of the ECM connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals VG and EVG of the ECM connector.
Resistance: 1 MΩ or more

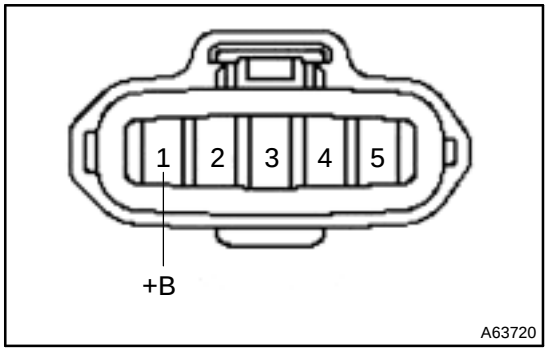


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

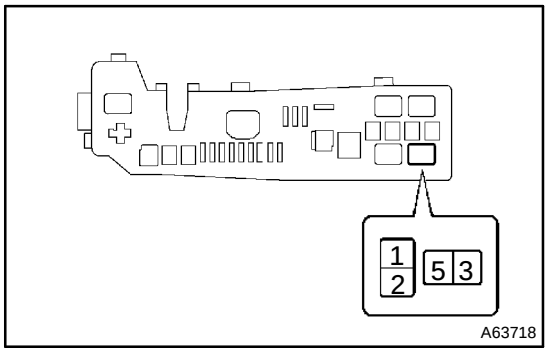
OK

REPLACE INTAKE AIR FLOW METER SUB-ASSY

5	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - INTAKE AIR FLOW METER)



(a) Disconnect the intake air flow meter connector.
(b) Remove the E.F.I. ECU relay.
(c) Check for open between the terminals +B of the intake air flow meter connector and 3 of the E.F.I. ECU relay side connector.
Resistance: 1 Ω or less



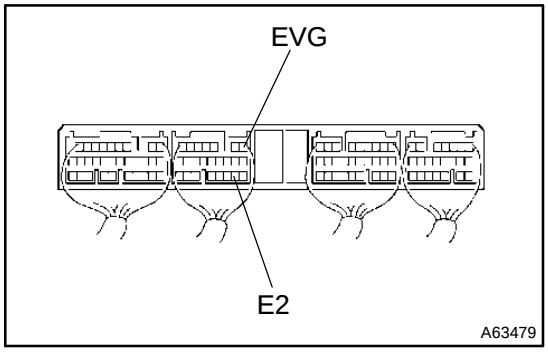
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

CONTINUED

OK

CHECK FOR ECM POWER SOURCE CIRCUIT

6 INSPECT ECM

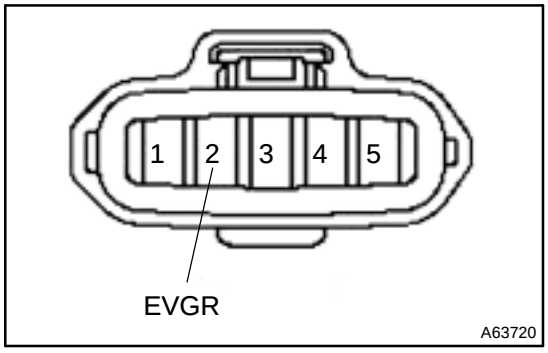


(a) Check for open between the terminals EVG and E2 of the ECM connector.
Resistance: 1 Ω or less

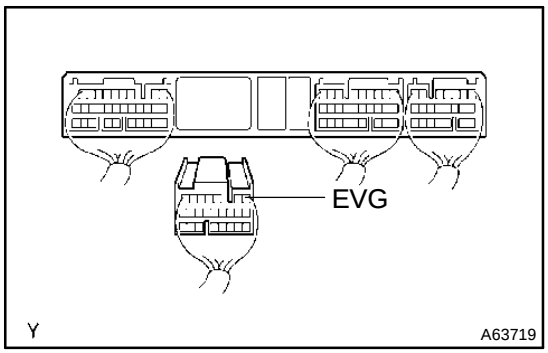
NG → **CHECK AND REPLACE ECM**

OK

7 CHECK HARNESS AND CONNECTOR(ECM - INTAKE AIR FLOW METER)



(a) Disconnect the intake air flow meter connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals EVGR of the inatke air flow meter harness connector and EVG of the ECM connector.
Resistance: 1 Ω or less



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

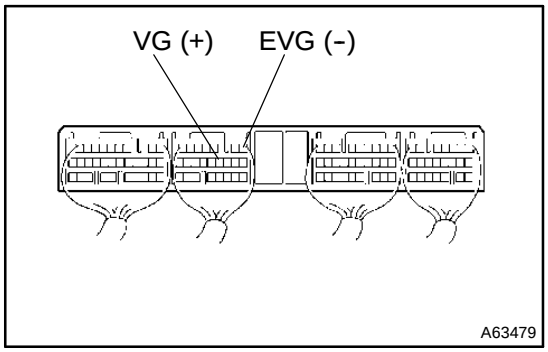
OK

CHECK AND REPLACE ECM

CONTINUED

When not using hand-held tester:

1	INSPECT ECM(VG VOLTAGE)



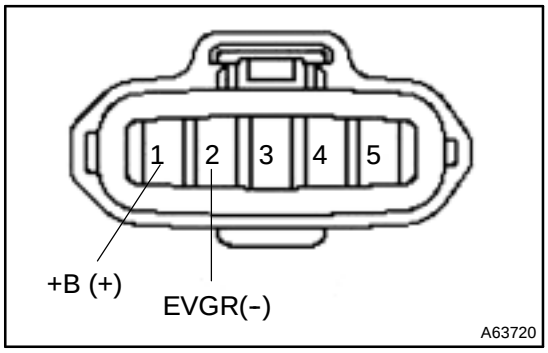
(a) Start the engine.
(b) Measure voltage between the terminals VG and EVG of the ECM connector while the engine is idling.
Voltage: 1.1 - 1.5 V

HINT:
The A/C switch should be turned off.

NG → **CHECK AND REPLACE ECM**

OK

2	INSPECT INTAKE AIR FLOW METER SUB-ASSY(POWER SOURCE VOLTAGE)

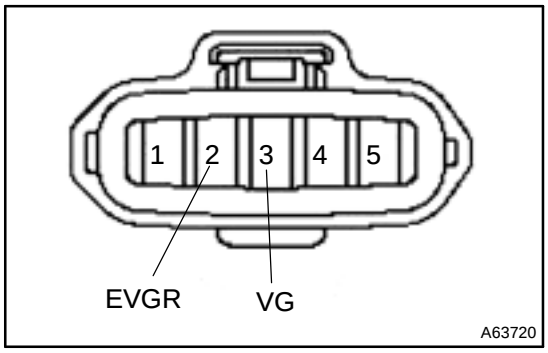


(a) Disconnect the intake air flow meter connector.
(b) Turn the ignition switch ON.
(c) Measure voltage between the terminals +B and EVGR of the intake air flow meter connector.
Voltage: 9 - 14 V

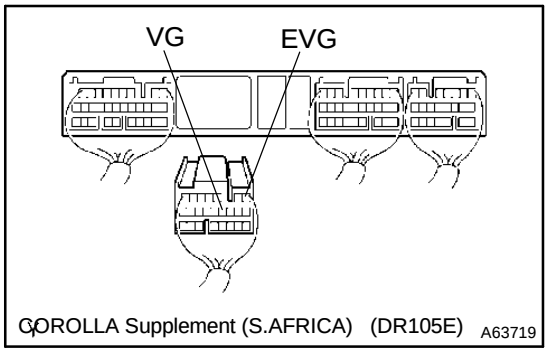
NG → **Go to step 4**

OK

3	CHECK HARNESS AND CONNECTOR(ECM - INTAKE AIR FLOW METER)



(a) Disconnect the intake air flow meter connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals VG of the intake air flow meter connector and VG of the ECM connector.
Resistance: 1 Ω or less
(d) Check for open between the terminals EVGR of the intake air flow meter connector and EVG of the ECM connector.
Resistance: 1 Ω or less
(e) Check for short between the terminals VG and EVG of the ECM connector.
Resistance: 1 MΩ or more



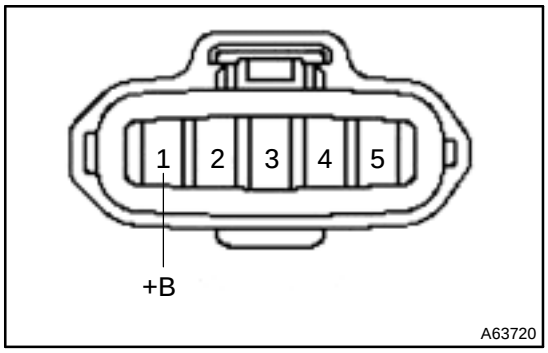
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NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

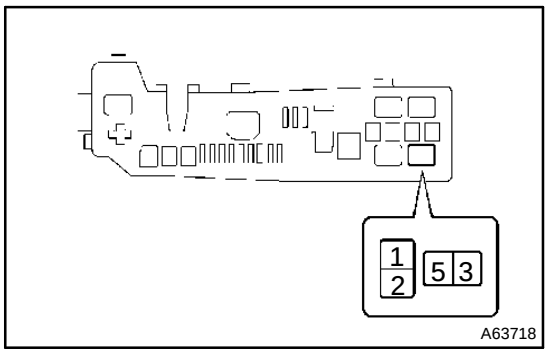
OK

REPLACE INTAKE AIR FLOW METER SUB-ASSY

4	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - INTAKE AIR FLOW METER)



(a) Disconnect the intake air flow meter connector.
(b) Remove the E.F.I. ECU relay.
(c) Check for open between the terminals +B of the intake air flow meter connector and 3 of the E.F.I. ECU relay side connector.
Resistance: 1 Ω or less



NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

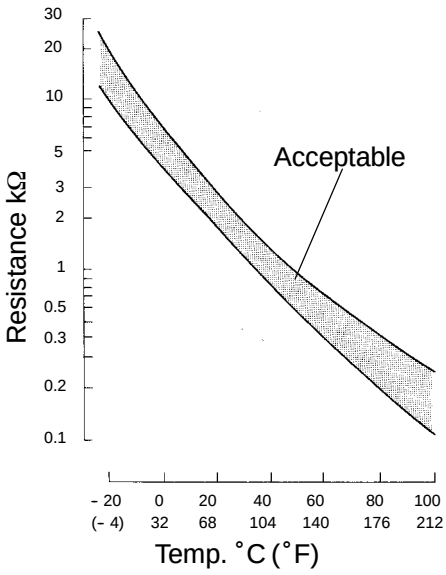
CHECK FOR ECM POWER SOURCE CIRCUIT

CONTINUED

DTC	P0110/24	INTAKE AIR TEMPERATURE CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

(fig. 1)

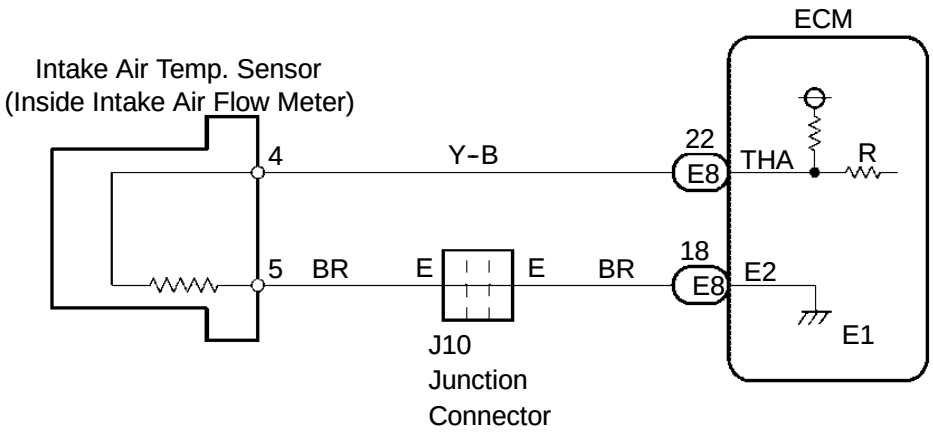


FI4741

The intake air temp. sensor is built into the intake air flow meter and senses the intake air temperature.
A thermistor built in the sensor changes the resistance value according to the intake air temperature.
The lower the intake air temperature, the greater the thermistor resistance value, and the higher the intake air temperature, the lower the thermistor resistance value (See fig. 1).
The intake air temp. sensor is connected to the ECM (See below). The 5 V power source voltage in the ECM is applied to the intake air temp. sensor from the terminal THA (THAR) via resistor R.
That is, the resistor R and the intake air temp. sensor are connected in series. When the resistance value of the intake air temp. sensor changes in accordance with changes in the intake air temperature, the potential at terminal THA (THAR) also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during cold engine operation.

DTC No.	DTC Detecting Condition	Trouble Area
P0110/24	Open or short in intake air temp. sensor circuit	• Open or short in intake air temp. sensor circuit • Intake air temp. sensor (inside intake air flow meter) • ECM

WIRING DIAGRAM



Y

A69720

CONTINUED

INSPECTION PROCEDURE

HINT:

- If DTCs P0110/24 (Intake Air Temperature Circuit Malfunction), P0115/22 (Engine Coolant Temperature Circuit Malfunction), and P0120/41 (Throttle Pedal Position Sensor/Switch "A" Circuit Malfunction) are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using the hand-held tester, as freeze frame records the engine conditions when a malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, etc. at the time of the malfunction.

When using hand-held tester:

1	READ VALUE OF HAND-HELD TESTER(INTAKE AIR TEMPERATURE)

(a) Read temperature value on the hand-held tester.
Temperature: The same as actual intake air temperature

Result:

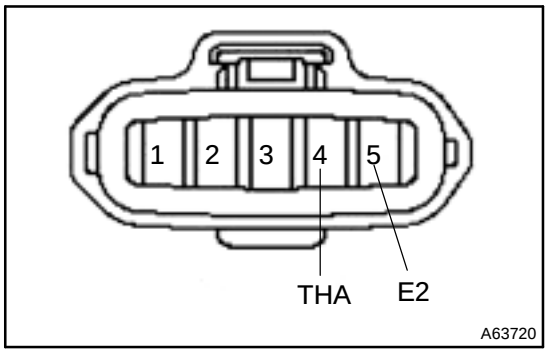
A	B	C
-40°C (-40°F)	140°C (284°F) or more	OK

B → **Go to step 4**

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

A

2	READ VALUE OF HAND-HELD TESTER(CHECK FOR OPEN IN HARNESS)



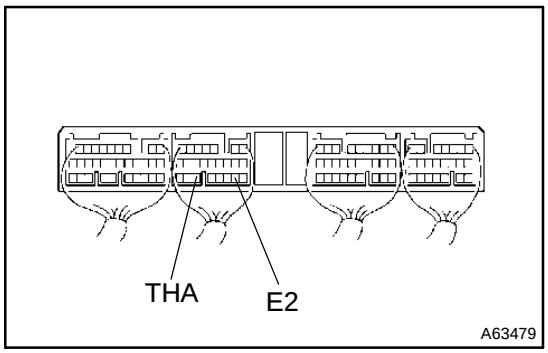
(a) Disconnect the intake air flow mater connector.
(b) Connect the terminal THA with E2.
(c) Turn the ignition switch ON.
(d) Read temperature value on the hand-held tester.
Temperature: 140°C (284°F) or more

OK → **REPLACE INTAKE AIR FLOW METER SUB-ASSY**

CONTINUED

NG

3	READ VALUE OF HAND-HELD TESTER(CHECK FOR OPEN IN ECM)



(a) Connect the terminals THA with E2 of the ECM connector.

HINT:

Before checking, do a visual check and connector connection and terminal inspection of the ECM.

(b) Read temperature value on the hand-held tester.
Temperature: 140°C (284°F) or more

NG → **CHECK AND REPLACE ECM**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

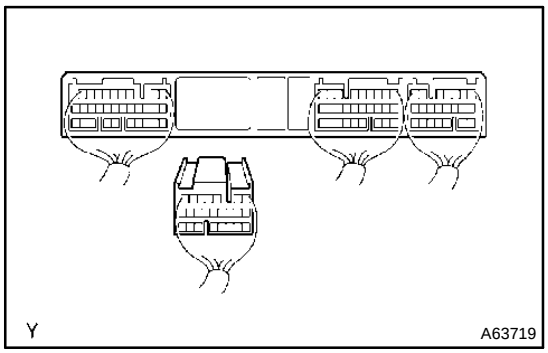
4	READ VALUE OF HAND-HELD TESTER(CHECK FOR SHORT IN HARNESS)

(a) Disconnect the intake air flow meter connector.
(b) Turn the ignition switch ON.
(c) Read temperature value on the hand-held tester.
Temperature: -40°C (-40°F)

OK → **REPLACE INTAKE AIR FLOW METER SUB-ASSY**

NG

5	READ VALUE OF HAND-HELD TESTER(CHECK FOR SHORT IN ECM)



(a) Disconnect the the ECM E8 connector.
(b) Turn the ignition switch ON.
(c) Read temperature value on the hand-held tester.
Temperature: -40°C (-40°F)

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

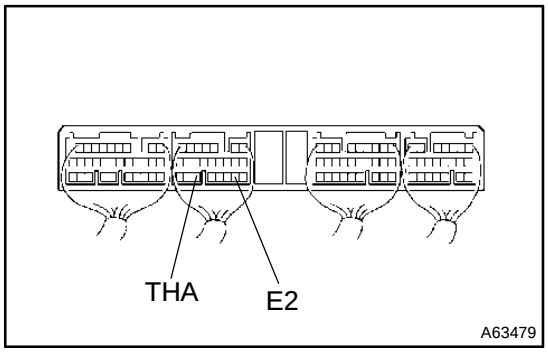
NG

CHECK AND REPLACE ECM

CONTINUED

When not using hand-held tester:

1	INSPECT ECM(CHECK VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure voltage between the terminals THA and E2 of ECM connector.

Voltage:

Intake air temp. ˚C (˚F)	Voltage V
20 (68)	0.5 - 3.4
60 (140)	0.2 - 1.0

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

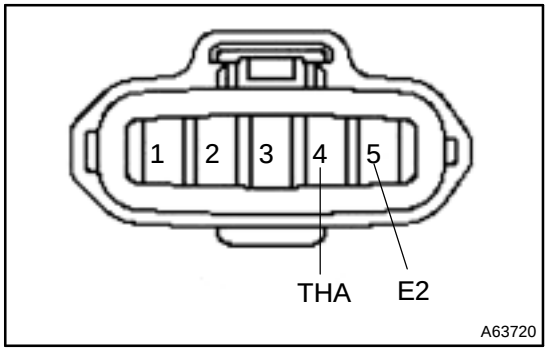
NG

2	CHECK INTAKE AIR FLOW METER SUB-ASSY (See page 10-2)

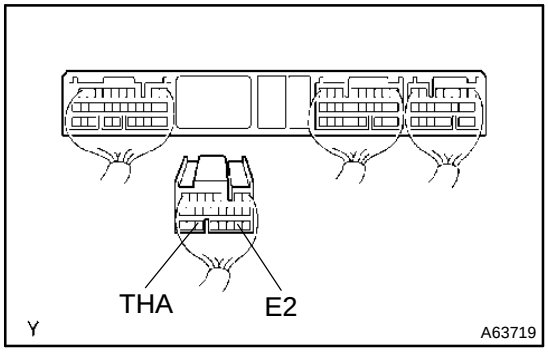
NG → **REPLACE INTAKE AIR FLOW METER SUB-ASSY**

OK

3	CHECK HARNESS AND CONNECTOR(ECM - INTAKE AIR TEMPERATURE SENSOR)



(a) Disconnect the intake air flow meter connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals THA of the intake air flow meter connector and THA of the ECM connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals THA and E2 of the ECM connector.
Resistance: 1 MΩ or more



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

OK

CHECK AND REPLACE ECM

CONTINUED

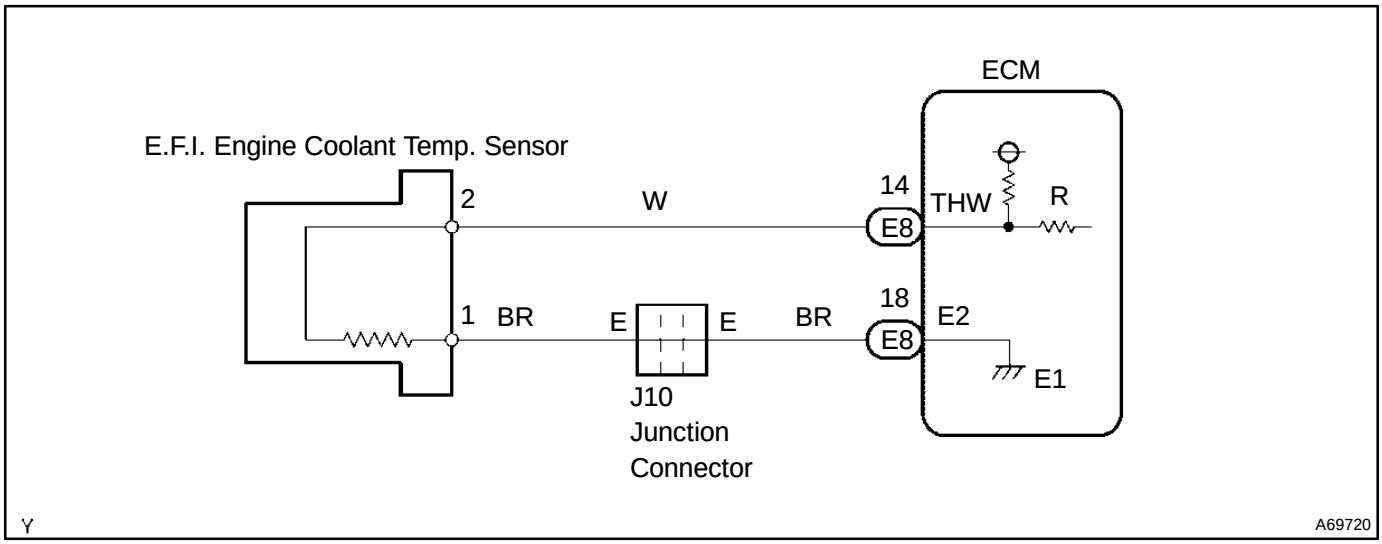
DTC	P0115/22	ENGINE COOLANT TEMPERATURE CIRCUIT MULFUNCTION

CIRCUIT DESCRIPTION

A thermistor built into the E.F.I. engine coolant temp. sensor changes the resistance value according to the engine coolant temperature.
The structure of the sensor and connection to the ECM is the same as the ones of the air temperature sensor.

DTC No.	DTC Detecting Condition	Trouble Area
P0115/22	Open or short in E.F.I. engine coolant temp. sensor circuit	• Open or short in E.F.I. engine coolant temp. sensor circuit • E.F.I. engine coolant temp. sensor • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0110/24 (Intake Air Temperature Circuit Malfunction), P0115/22 (Engine Coolant Temperature Circuit Malfunction) and P0120/41 (Throttle Position Sensor/ Switch "A" Circuit Malfunction) are output simultaneously, E1, E2 etc. (sensor ground) may be open.
- Read freeze frame data using the hand-held tester, as freeze frame records the engine conditions when a malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, etc. at the time of the malfunction.

CONTINUED

When using hand-held tester:

1	READ VALUE OF HAND-HELD TESTER(ENGINE COOLANT TEMPERATURE)

(a) Read temperature value on the hand-held tester.
Temperature: Same as actual engine coolant temperature

Result:

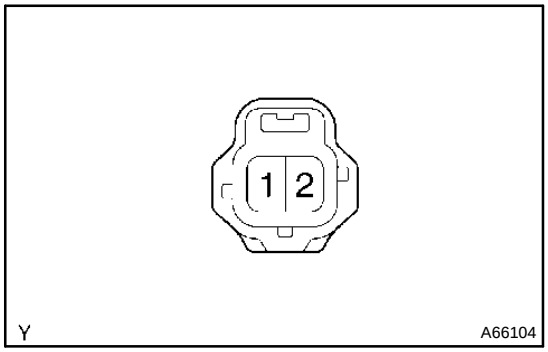
A	B	C
-40°C (-40°F)	140°C (284°F)	OK

B → **Go to step 4**

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

A

2	READ VALUE OF HAND-HELD TESTER(CHECK FOR OPEN IN HARNESS)

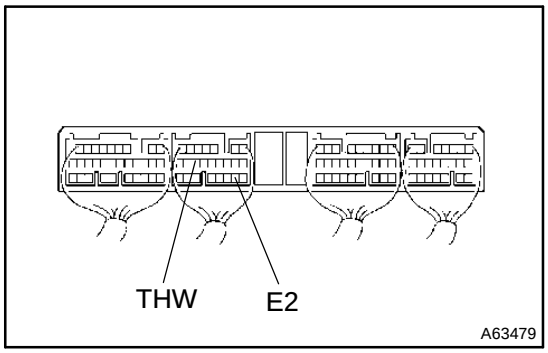


(a) Disconnect the E.F.I. engine coolant temp. sensor connector.
(b) Connect the terminals 1 with 2 of the E.F.I. engine coolant temp. sensor connector.
(c) Turn the ignition switch ON.
(d) Read temperature value on the hand-held tester.
Temperature: 140°C (284°F) or more

OK → **REPLACE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR**

NG

3	READ VALUE OF HAND-HELD TESTER(CHECK FOR OPEN IN ECM)



(a) Connect the terminals THW with E2 of the ECM connector.
(b) Turn the ignition switch ON.
(c) Read temperature value on the hand-held tester.
Temperature: 140°C (284°F) or more

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

CHECK AND REPLACE ECM

CONTINUED

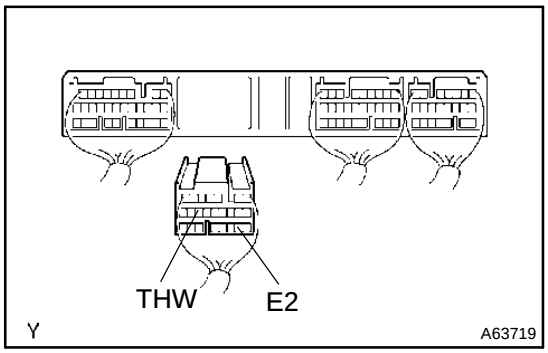
4	READ VALUE OF HAND-HELD TESTER(CHECK FOR SHORT IN HARNESS)

(a) Disconnect the E.F.I. engine coolant temp. sensor connector.
(b) Turn the ignition switch ON.
(c) Read temperature value on the hand-held tester.
Temperature: -40°C (-40°F)

OK → **REPLACE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR**

NG

5	READ VALUE OF HAND-HELD TESTER(CHECK FOR SHORT IN ECM)



(a) Disconnect the ECM E8 connector.
(b) Turn the ignition switch ON.
(c) Read temperature value on the hand-held tester.
Temperature: -40°C (-40°F)

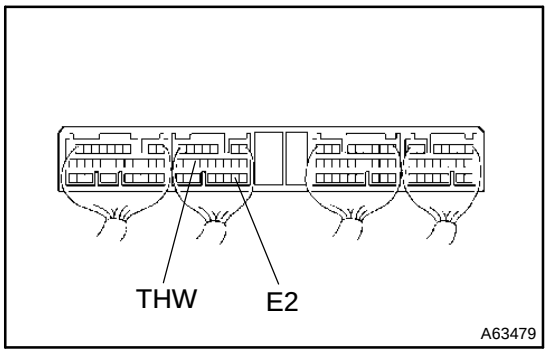
OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

CHECK AND REPLACE ECM

When not using hand-held tester:

1	INSPECT ECM(CHECK VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure voltage between the terminals THW and E2 of the ECM connector.

Voltage:

Water temp. °C (°F)	Voltage V
20 (68)	0.5 - 3.4
80 (176)	0.2 - 1.0

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

NG

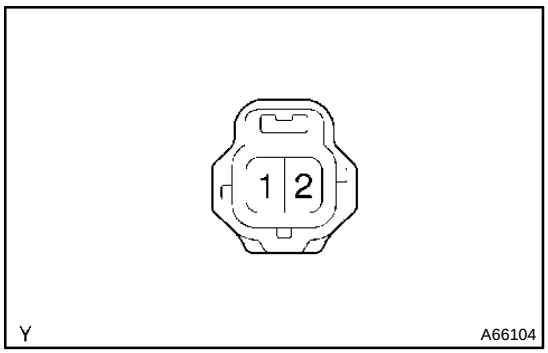
CONTINUED

2	CHECK E.F.I. ENGINE COOLANT TEMPERATURE SENSOR (See page 10-2)

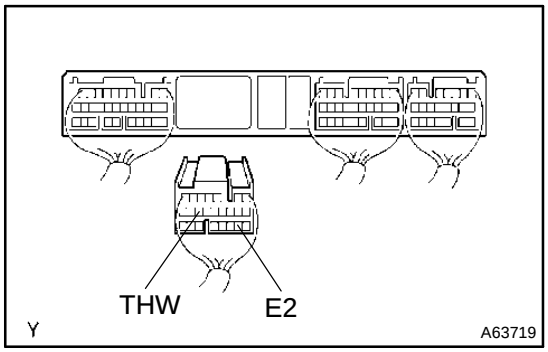
NG → REPLACE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

OK

3	CHECK HARNESS AND CONNECTOR(ECM - E.F.I. ENGINE COOLANT TEMPERATURE SENSOR)



(a) Disconnect the E.F.I. engine coolant temp. sensor connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals 2 of the E.F.I. engine coolant temp. sensor connector and THW of the ECM connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals THW and E2 of the ECM connector.
Resistance: 1 MΩ or more



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

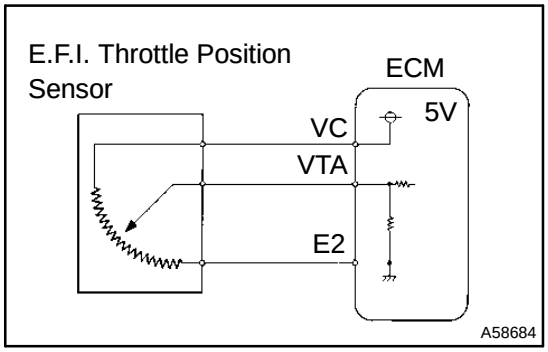
OK

CHECK AND REPLACE ECM

CONTINUED

DTC	P0120/41	THROTTLE PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



The E.F.I. throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle.
When the throttle valve is fully closed, a voltage of approximately 0.7 V is applied to terminal VTA of the ECM. The voltage applied to the terminals VTA of the ECM increases in proportion to the opening angle of the throttle valve and becomes approximately 3.5 – 5.0 V when the throttle valve is fully opened. The ECM judges the vehicle driving conditions from these signals input from terminal VTA, uses them as one of the conditions for deciding the air–fuel ratio correction, power increase correction and fuel–cut control etc.

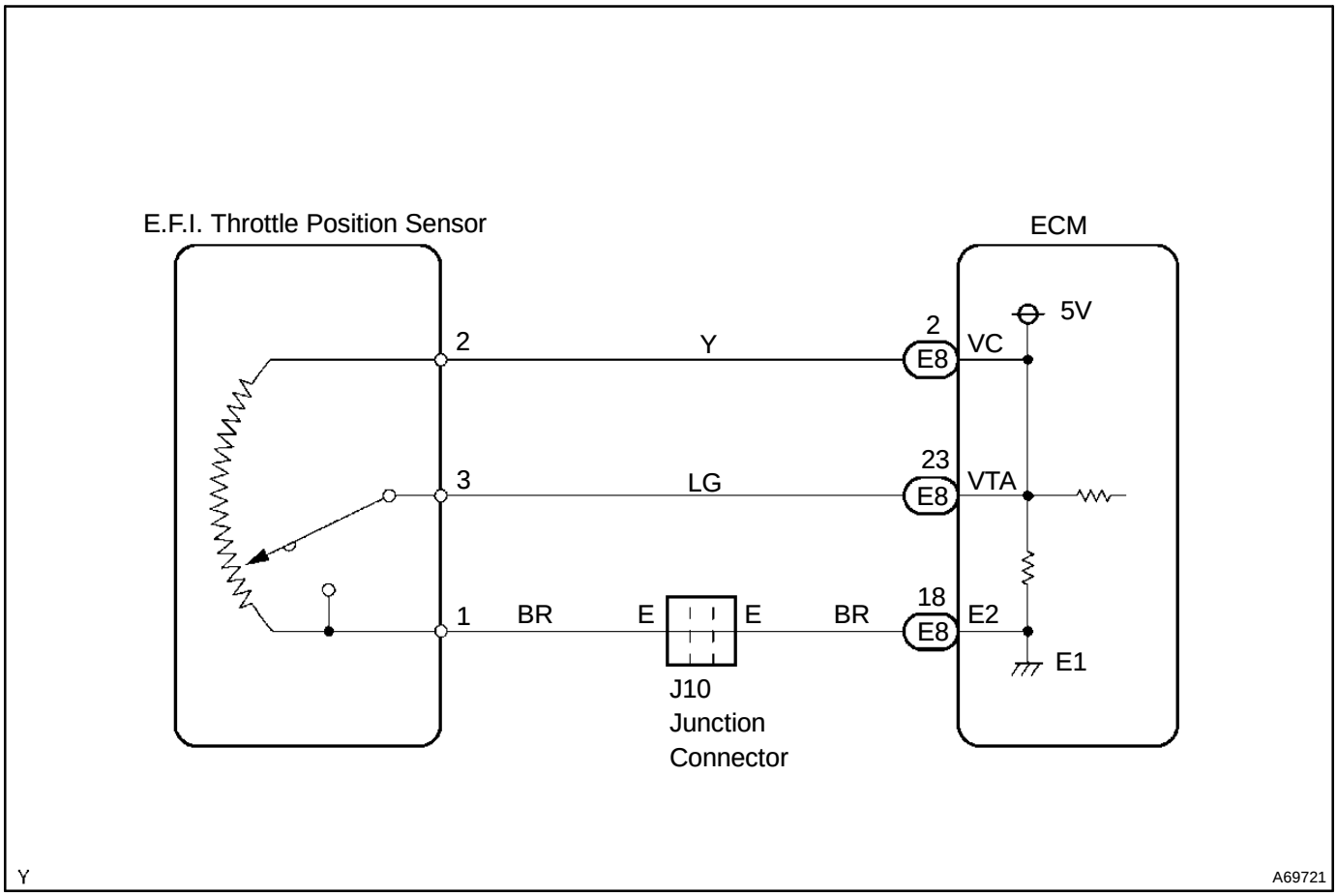
DTC No.	DTC Detecting Condition	Trouble Area
P0120/41	Condition (1) or (2) continues with more than 5 sec.: 1. VTA < 0.1 V 2. VTA > 4.9 V	• Open or short in E.F.I. throttle position sensor circuit • E.F.I. throttle position senor • ECM

HINT:
After confirming DTC P0120/41, use the hand–held tester to confirm the throttle valve opening percentage.

Throttle valve opening position expressed as percentage		Trouble Area
Throttle valve fully closed	Throttle valve fully open	
0 %	0 %	VC circuit open VTA circuit open or short
Approx. 100 %	Approx. 100 %	E2 circuit open

CONTINUED

WIRING DIAGRAM



INSPECTION PROCEDURE

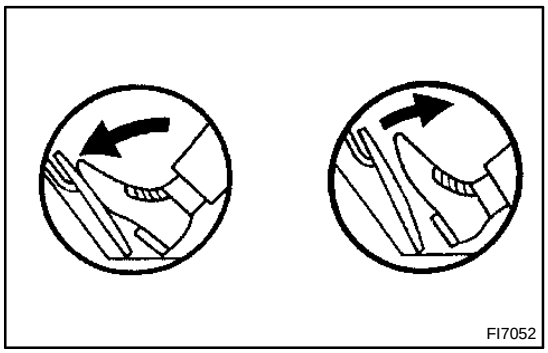
HINT:

- If DTC P0110/24 (Intake Air Temperature Circuit Malfunction), P0115/22 (Engine Coolant Temperature Circuit Malfunction) and P0120/41 (Throttle Pedal Position Sensor/Switch ”A” Circuit Malfunction) are output simultaneously, E1, E2 (sensor ground) may be open.
- Read freeze frame data using the hand–held tester, as freeze frame records the engine conditions when a malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, etc. at the time of the malfunction.

CONTINUED

When using hand-held tester:

1	READ VALUE OF HAND-HELD TESTER(THROTTLE VALVE OPENING PERCENTAGE)



(a) Read the throttle valve opening percentage.

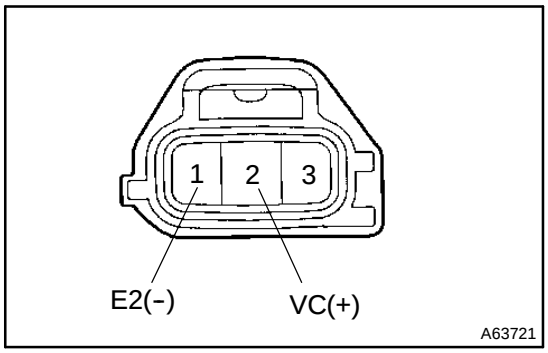
Result:

Throttle valve	Throttle valve opening position expressed as percentage
Fully open	Approx. 75 %
Fully closed	Approx. 10 %

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

NG

2	CHECK HARNESS AND CONNECTOR(CHECK VOLTAGE)



(a) Disconnect the E.F.I. throttle position sensor connector.
(b) Turn the ignition switch ON.
(c) Measure voltage between terminals VC and E2 of the throttle position sensor connector.
Voltage: 4.5 - 5.5 V

NG → **Go to step 6**

OK

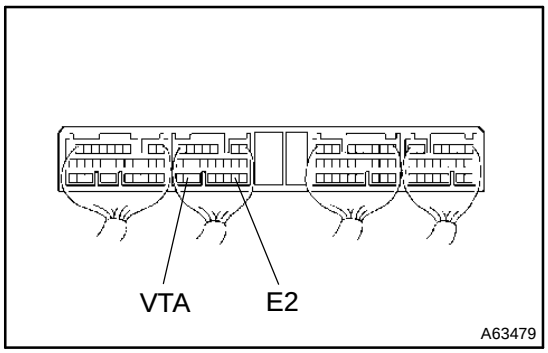
3	INSPECT E.F.I. THROTTLE POSITION SENSOR **(See page 10-2)**

NG → **REPLACE E.F.I. THROTTLE POSITION SENSOR**

OK

CONTINUED

4	INSPECT ECM(CHECK VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure voltage between the terminals VTA and E2 of the ECM connector.

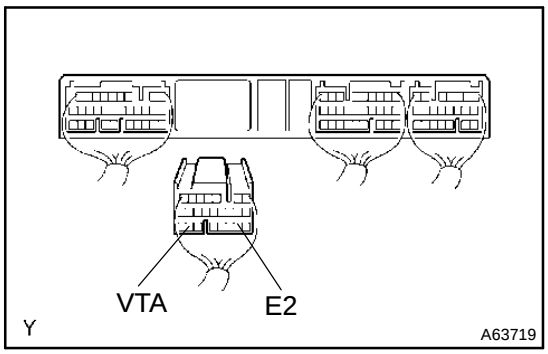
Voltage:

Throttle valve	Voltage V
Fully closed	0.3 - 1.0
Fully open	3.2 - 4.9

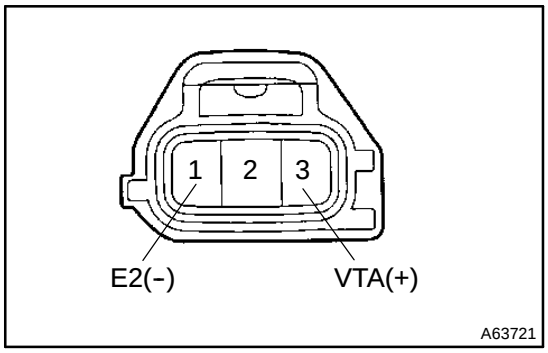
OK → **CHECK AND REPLACE ECM**

NG

5	CHECK HARNESS AND CONNECTOR(ECM - E.F.I. THROTTLE POSITION SENSOR)



(a) Disconnect the E.F.I. throttle position sensor connector.
(b) Disconnect the ECM E8 connector.
(c) Check continuity between the terminals VTA of the ECM connector and VTA of the E.F.I. throttle position sensor connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals VTA and E2 of the ECM connector.
Resistance: 1 MΩ or more



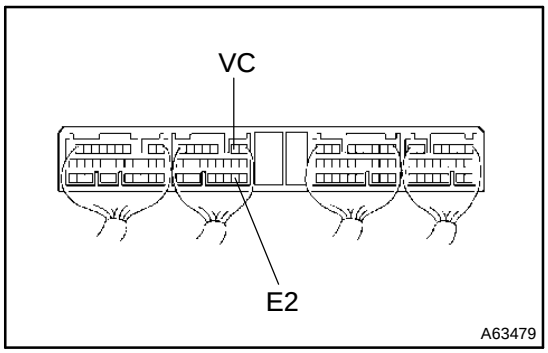
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPLACE ECM

CONTINUED

6	INSPECT ECM(CHECK VOLTAGE)

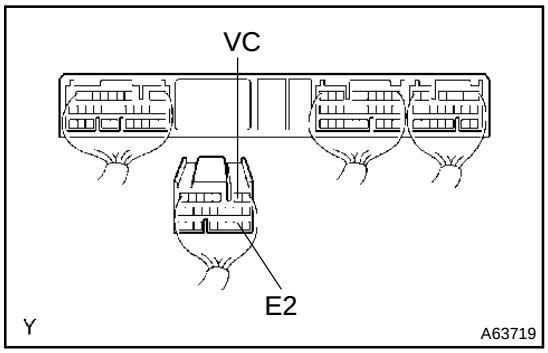


(a) Turn the ignition switch ON.
(b) Measure voltage between the terminals VC and E2 of ECM connector.
Voltage: 4.5 - 5.5 V

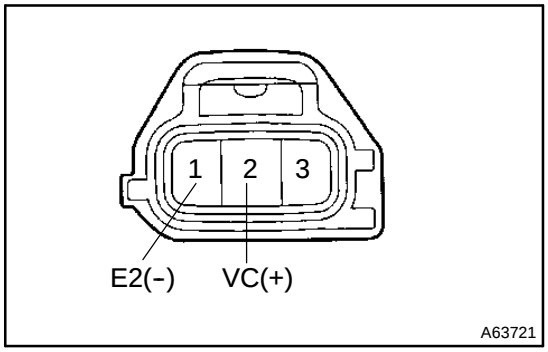
OK → **CHECK AND REPLACE ECM**

NG

7	CHECK HARNESS AND CONNECTOR(ECM - E.F.I. THROTTLE POSITION SENSOR)



(a) Disconnect the E.F.I. throttle position sensor connector.
(b) Disconnect the ECM E8 connector.
(c) Check continuity between the terminals VC of the ECM connector and VC of the E.F.I. throttle position sensor connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals VC and E2 of the ECM connector.
Resistance: 1 MΩ or more



OK → **CHECK AND REPLACE ECM**

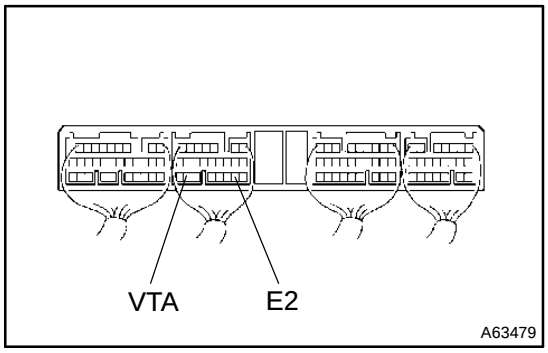
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

CONTINUED

When not using hand-held tester:

1	INSPECT ECM(CHECK VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure voltage between the terminals VTA and E2 of the ECM connector.

Voltage:

Throttle valve	Voltage V
Fully closed	0.3 - 1.0
Fully open	3.2 - 4.9

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

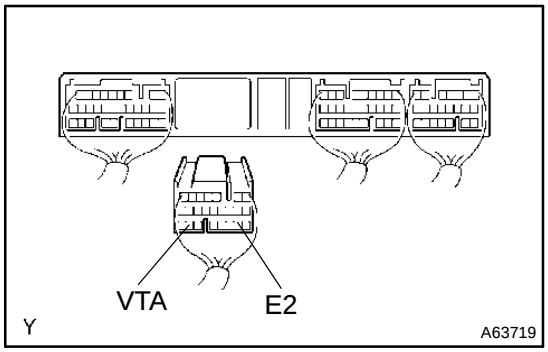
NG

2	CHECK E.F.I. THROTTLE POSITION SENSOR (See page 10-2)

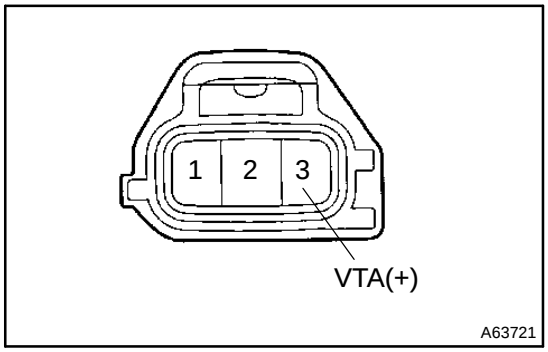
NG → **REPLACE E.F.I. THROTTLE POSITION SENSOR**

OK

3	CHECK HARNESS AND CONNECTOR(ECM - E.F.I. THROTTLE POSITION SENSOR)



(a) Disconnect the E.F.I. throttle position sensor connector.
(b) Disconnect the ECM E8 connector.
(c) Check continuity between the terminals VTA of the ECM connector and VTA of the E.F.I. throttle position sensor connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals VTA and E2 of the ECM connector.
Resistance: 1 MΩ or more



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

OK

CHECK AND REPLACE ECM

CONTINUED

DTC	P0130/21	O2 SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 1)

DTC	P0131/21	O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

CIRCUIT DESCRIPTION

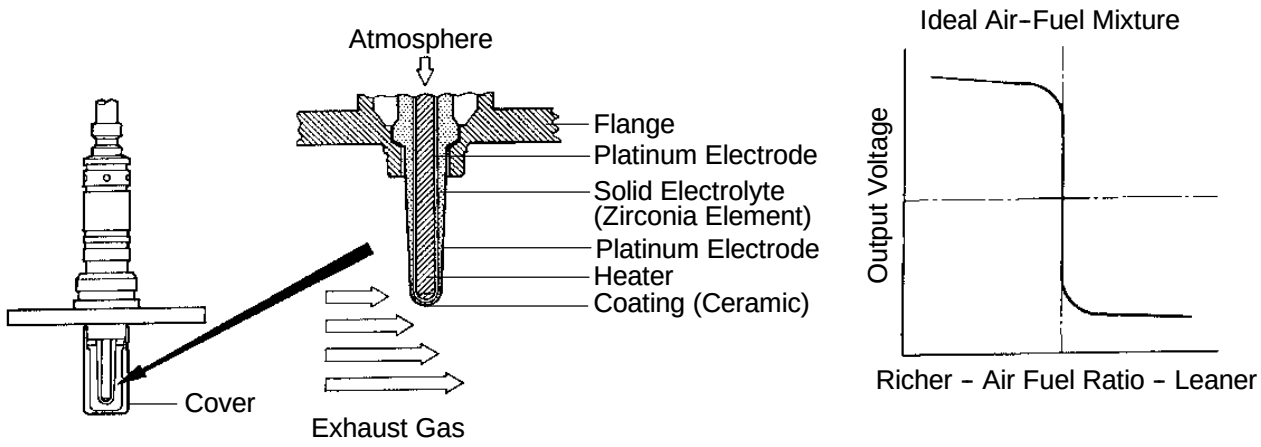
To obtain a high purification rate of the CO, HC and NOx components of the exhaust gas, a three-way catalytic converter is used. For the most efficient use of the three-way catalytic converter, the air-fuel ratio must be precisely controlled so that it is always close to the stoichiometric air-fuel ratio.

The oxygen sensor has the characteristic that it provides output voltage* being approximately proportional to the existing air-fuel ratio. The oxygen sensor output voltage* is used to provide feedback for the ECM to control the air-fuel ratio.

By the oxygen sensor output, the ECM can determine the deviation amount from the stoichiometric air-fuel ratio and control the proper injection time immediately. If the oxygen sensor is out of order, ECM is unable to perform the accurate air-fuel ratio control.

The oxygen sensor is equipped with a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low), the current flows to the heater to heat the sensor for the accurate oxygen concentration detection.

*: The voltage value changes at the inside of the ECM only.



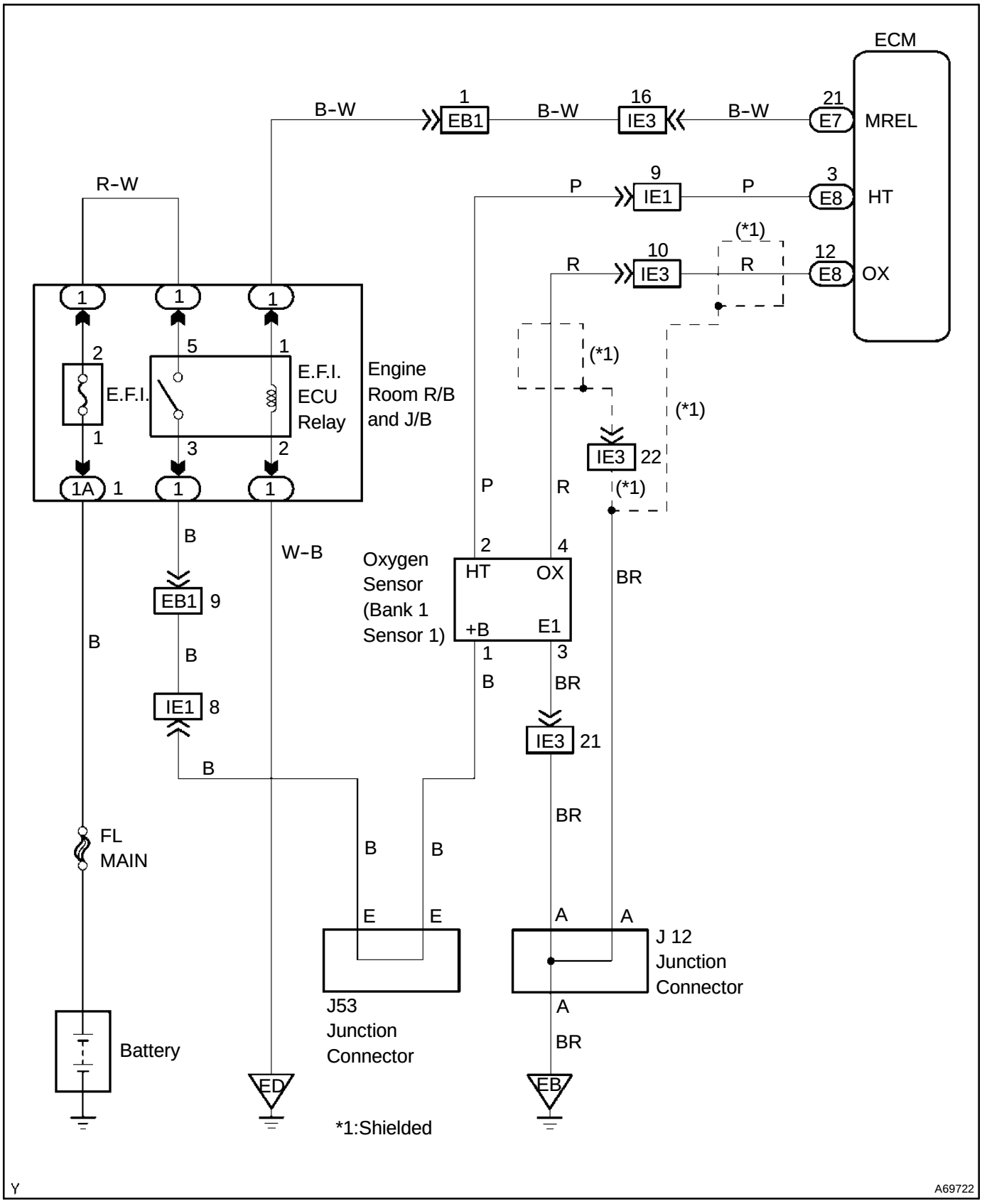
DTC No.	DTC Detecting Condition	Trouble Area
P0130/21 P0131/21	Voltage output of oxygen sensor remains at 0.4 V or more, or 0.55 V or less, during idling after engine is warmed up (2 trip detection logic)	• Open or short in oxygen sensor circuit • Oxygen sensor • Air induction system • Fuel pressure • Injector • ECM

HINT:

- Sensor 1 refers to the sensor closer to the engine body.
- The oxygen sensor's output voltage and the short-term fuel trim value can be read using the hand-held tester.

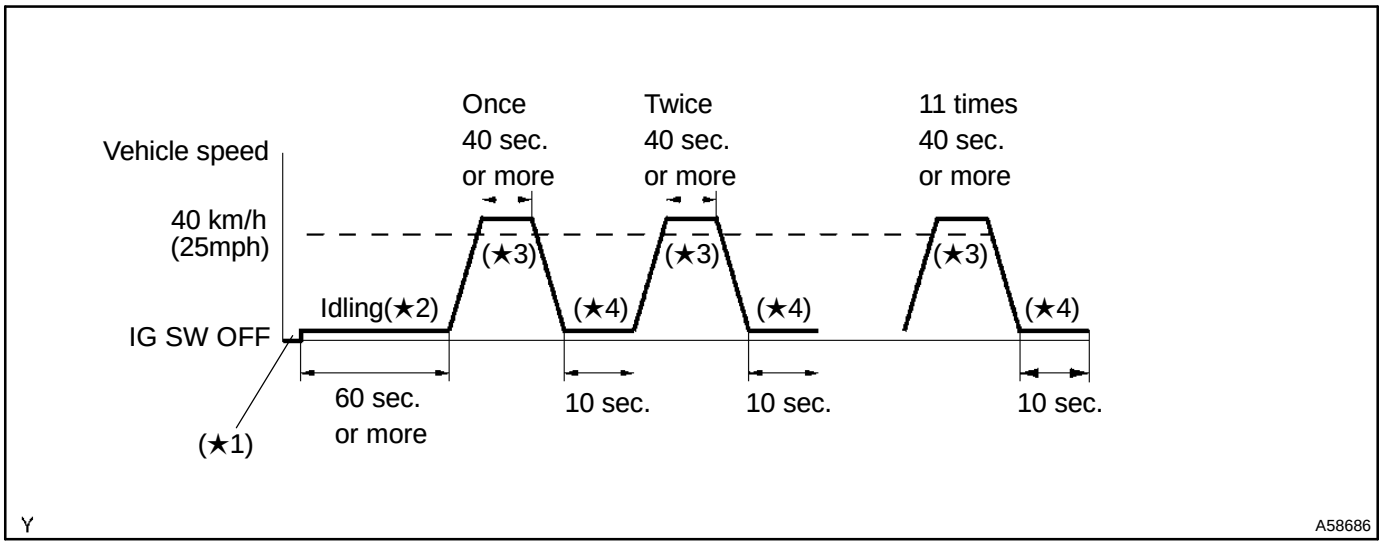
CONTINUED

WIRING DIAGRAM



CONTINUED

CONFIRMATION DRIVING PATTERN



1. **Connect the hand-held tester to the DLC3. (★1)**
2. **Switch the hand-held tester from the normal mode to the check (test) mode (See page 05-7). (★1)**
3. **Start the engine and let the engine idle for 60 seconds or more. (★2)**
4. **Drive the vehicle at 40 km/h (25 mph) and more for 40 seconds or more. (★3)**
5. **Let the engine idle for 10 seconds or more. (★4)**
6. **Perform steps (★3) to (★4) 11 times. (★5)**

HINT:

If a malfunction exists, the CHK ENG (MIL) will light up on the multi information display during step (★5).

NOTICE:

If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

If you do not have a hand-held tester, turn the ignition switch OFF after performing steps from (★2) to (★5), then perform steps from (★2) to (★5) again.

CONTINUED

INSPECTION PROCEDURE

HINT:

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

1	READ OUTPUT DTC(BESIDES P0130/21 OR P0131/21) (See page 05-7)

Result:

	A	B
RESULT	P0130/21 and/or P0131/21 are output.	P0130/21 and/or P0131/21 other codes are output.

B → **GO TO RELEVANT DTC CHART (See page 05-14)**

A

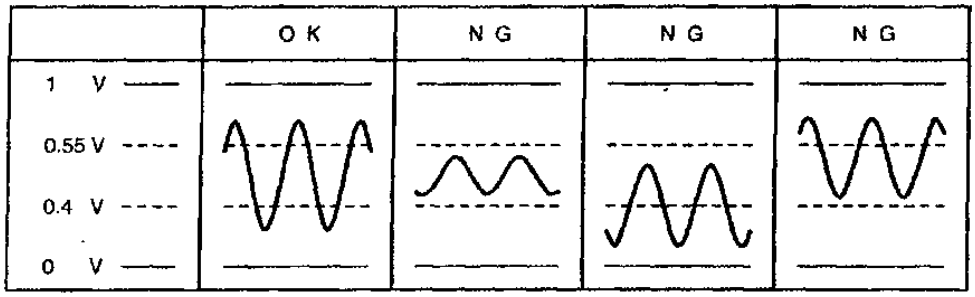
2	READ VALUE OF HAND-HELD TESTER(OUTPUT VOLTAGE OXYGEN SENSOR)

(a) Warm up the oxygen sensor with the engine speed at 2,500 rpm for approx. 90 sec.

(b) Use the hand-held tester to read the output voltage of the oxygen sensor during idling.

Oxygen sensor output voltage:

Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table)



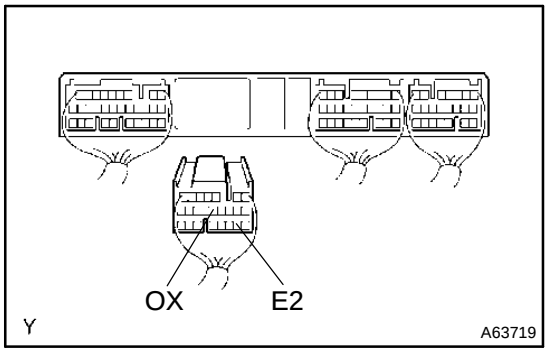
P18349

OK → **Go to step 9**

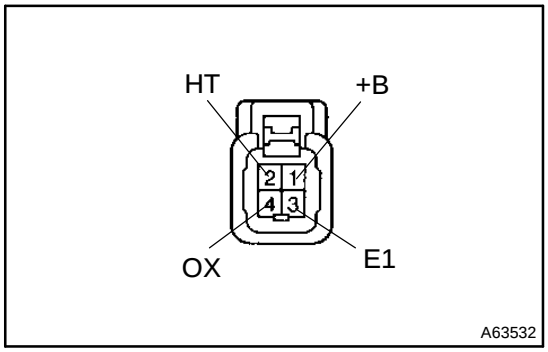
NG

CONTINUED

3	CHECK HARNESS AND CONNECTOR(ECM - OXYGEN SENSOR)



(a) Disconnect the oxygen sensor connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals OX of the ECM connector and OX of the oxygen sensor connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals OX and E2 of the ECM connector.
Resistance: 1 MΩ or more
(e) Check for open between the terminals E1 of the oxygen sensor connector and body ground.
Resistance: 1 Ω or less



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

OK ↓

4	CHECK WHETHER MISFIRE IS OCCURRED OR NOT BY MONITORING DTC AND DATA LIST (See page 18-1)

NG → **CHECK FOR SPARK AND IGNITION (See page 18-1)**

OK ↓

5	INSPECT AIR INDUCTION SYSTEM

(a) Visually inspect the hoses, connections and gaskets (See page 12-1).

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK ↓

6	CHECK FUEL PRESSURE (See page 11-5)

NG → **REPAIR OR REPLACE FUEL SYSTEM (See page 11-7)**

OK ↓

CONTINUED

7	CHECK FUEL INJECTOR ASSY (See page 11-7)

NG → REPLACE FUEL INJECTOR ASSY (See page 11-10)

OK

8	CHECK EXHAUST GAS LEAK

NG → REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT

OK

REPLACE OXYGEN SENSOR

9	PERFORM CONFIRMATION DRIVING PATTERN

(a) Clear the DTC.
(b) Warm up the oxygen sensor by a driving test to check the system.

HINT:
Refer to CONFIRMATION DRIVING PATTERN.

GO

10	READ OUTPUT DTC(P0130/21 AND/OR P0131/21 ARE OUTPUT AGAIN) (See page 05-7)

Result:

	A	B
RESULT	P0130/21 and/or P0131/21 are not output again.	P0130/21 and/or P0131/21 are output again.

B → CHECK AND REPLACE ECM

A

11	CONFIRM VEHICLE RUNS OUT OF FUEL IN PAST

(a) Confirm if the vehicle ran out of fuel or not in the past.

HINT:
There is no problem, if DTC P0130/21 and P0131/21 is not output after the CONFIRMATION DRIVING PATTERN. This means that the ECM records DTC P0130/21 and P0131/21 because of the running out of fuel in the past.

NO → CHECK FOR INTERMITTENT PROBLEMS (See page 05-7)

YES

DTC IS CAUSED RUNNING OUT OF FUEL

CONTINUED

DTC	P0135/21	O2 SENSOR HEATER CIRCUIT MALFUNCTION (BANK 1 SENSOR 1)

CIRCUIT DESCRIPTION

Refer to DTC P0130/21 on page 05-42.

DTC No.	DTC Detecting Condition	Trouble Area
P0135/21	When heater operates, heater current exceeds 2 A (2 trip detection logic)	• Open or short in heater circuit of heated oxygen sensor • Oxygen sensor heater • ECM
	Heater current of 0.2 A or less when heater operates (2 trip detection logic)	

HINT:

- Bank 1 refers to the bank that includes cylinder No. 1.
- Sensor 2 refers to the sensor being farther from the engine body.

WIRING DIAGRAM

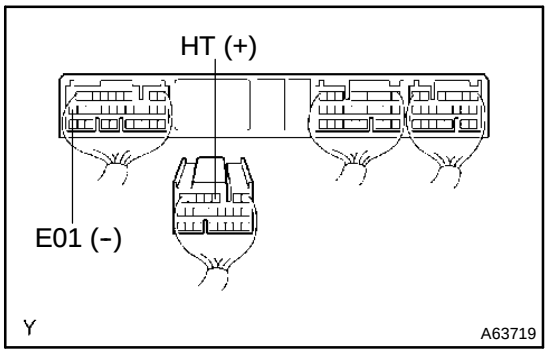
Refer to DTC P0130/21 on page 05-42.

INSPECTION PROCEDURE

HINT:

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

1	INSPECT ECM(CHECK VOLTAGE)

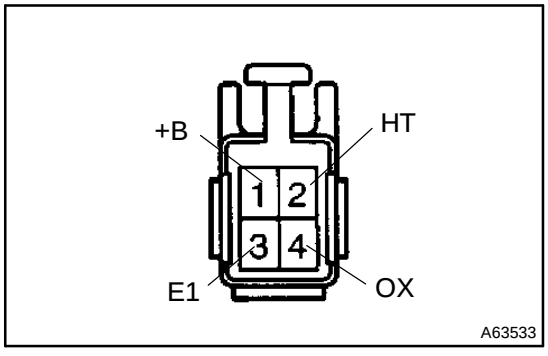


(a) Disconnect the ECM E8 connector.
(b) Turn the ignition switch ON.
(c) Measure voltage between the terminals HT and E01 of the ECM connectors.
Voltage: 9 - 14 V

OK → **CHECK AND REPLACE ECM**

NG

2	INSPECT OXYGEN SENSOR(OXYGEN SENSOR HEATER)



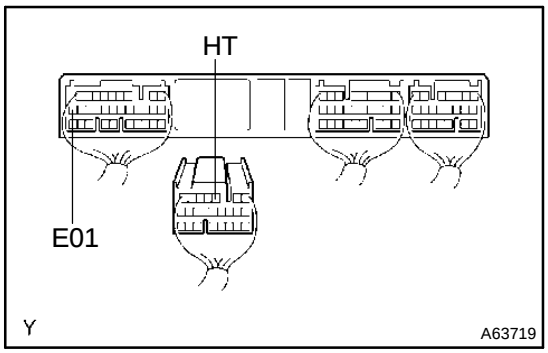
(a) Disconnect the oxygen sensor connector.
(b) Measure resistance between the terminals HT and +B of the oxygen sensor.
Resistance: 11 - 16 Ω at 20°C (68°F)

NG → **REPLACE OXYGEN SENSOR**

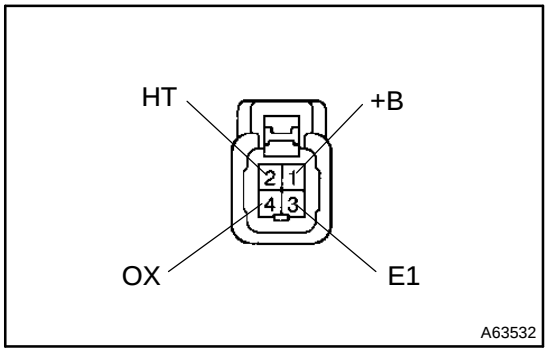
OK

CONTINUED

3	CHECK HARNESS AND CONNECTOR(ECM - OXYGEN SENSOR)



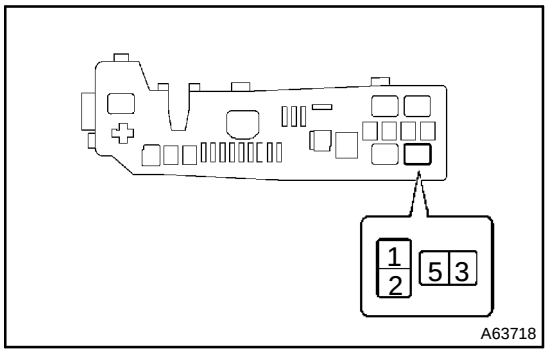
(a) Disconnect the oxygen sensor connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals HT of the oxygen sensor and HT of the ECM connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals HT and E01 of the ECM connectors.
Resistance: 1 MΩ or more



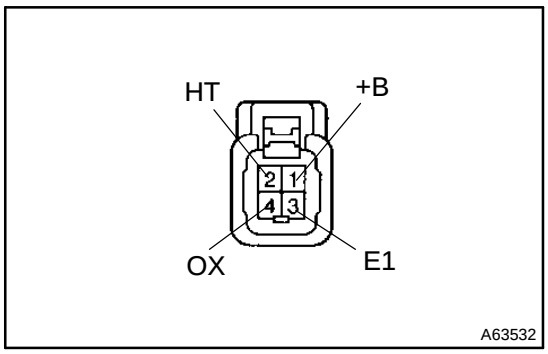
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - OXYGEN SENSOR)



(a) Remove the E.F.I. ECU relay.
(b) Disconnect the oxygen sensor connector.
(c) Check for open between the terminals 3 of the E.F.I. ECU relay side connector and +B of the oxygen sensor connector.
Resistance: 1 Ω or less



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

OK

CHECK FOR ECM POWER SOURCE CIRCUIT **(See page 05-98)**

DTC P0325/55 KNOCK SENSOR 1 CIRCUIT MALFUNCTION

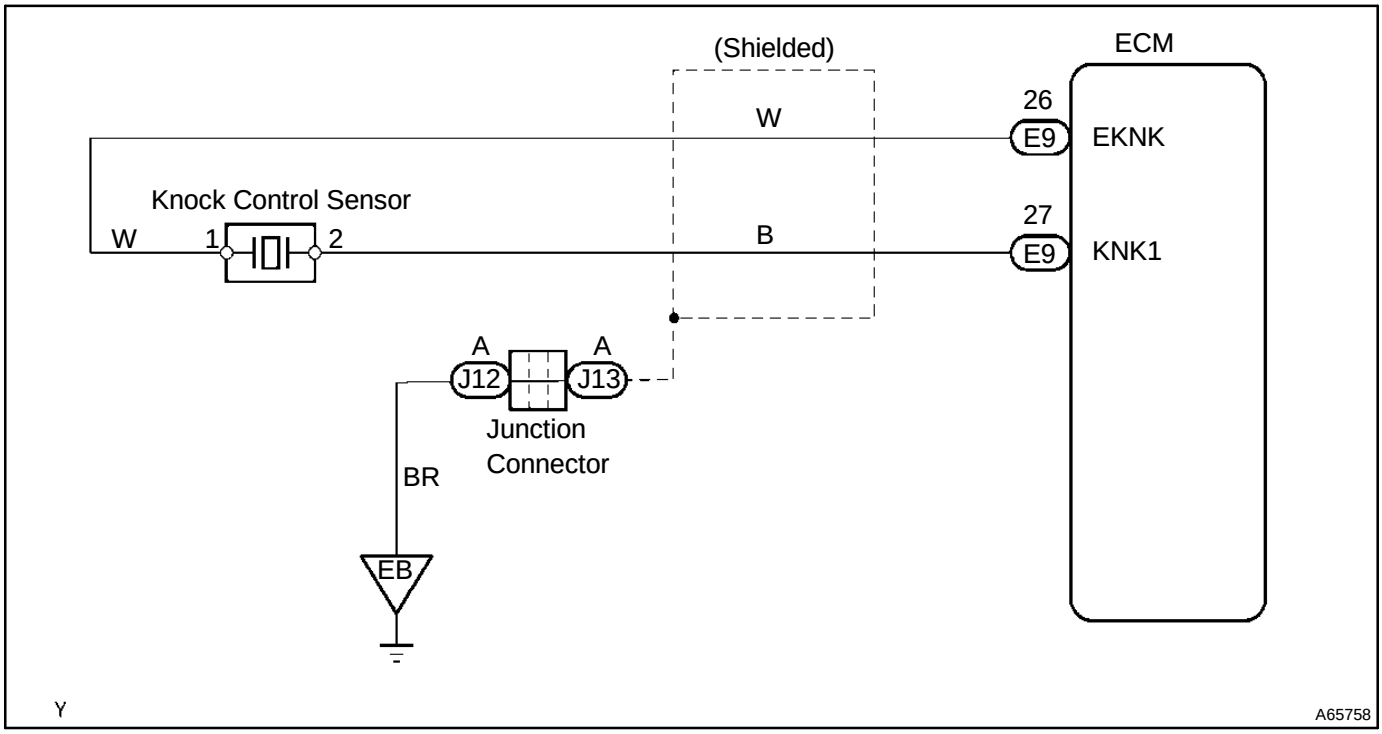
CIRCUIT DESCRIPTION

The knock sensor is fitted to the cylinder block to detect the engine knocking. This sensor contains a piezo-electric element which generates a voltage when it becomes deformed. This occurs when the cylinder block vibrates due to knocking. If the engine knocking occurs, the ignition timing is delayed to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325/55	No knock sensor signal to ECM with engine speed, 2,000 rpm or more	• Open or short in knock sensor circuit • Knock sensor (looseness) • ECM

HINT:
If the ECM detects above diagnosis conditions, it operates the fail safe function in which the corrective retard angle value is set to the maximum value.

WIRING DIAGRAM

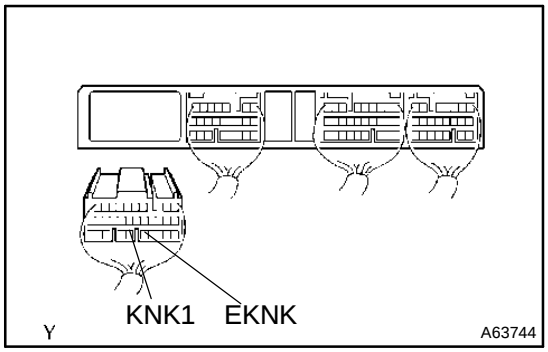


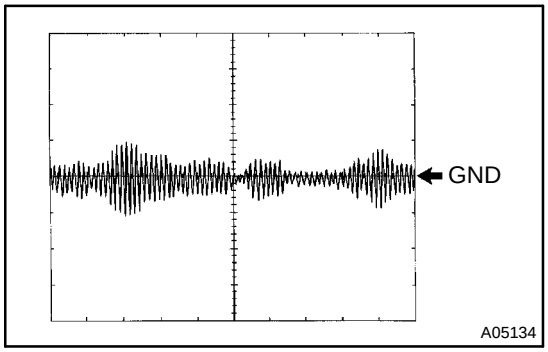
INSPECTION PROCEDURE

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

CONTINUED

1	CHECK HARNESS AND CONNECTOR





(a) Check for short on the wire harness between the ECM and the knock control sensor.
(1) Disconnect the ECM E8 connector.
(2) Check for short between the terminals KNK1 of ECM connector and EKNK of ECM connector.
Resistance: 1 MΩ or more

(b) Reference:
Inspection using the oscilloscope.
(1) With the engine racing at 4,000 rpm, check the waveform between the terminal KNK1 of the ECM connector and the body ground.

HINT:
The correct waveforms are as shown in the left.
(2) Spread the time on the horizontal axis, and confirm that period of the wave is 80 μ seconds (Normal mode vibration frequency of knock sensor: 11.7 kHz).

OK → **Go to step 3**

NG

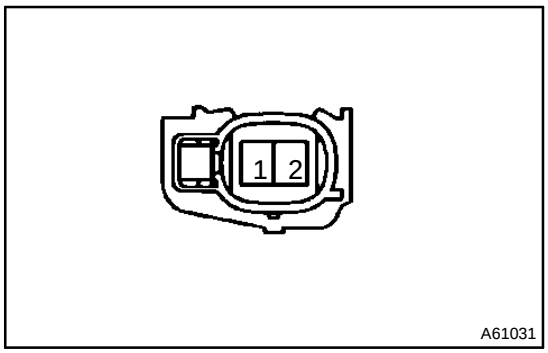
2	INSPECT KNOCK CONTROL SENSOR (See page 10-2)

NG → **REPLACE KNOCK CONTROL SENSOR**

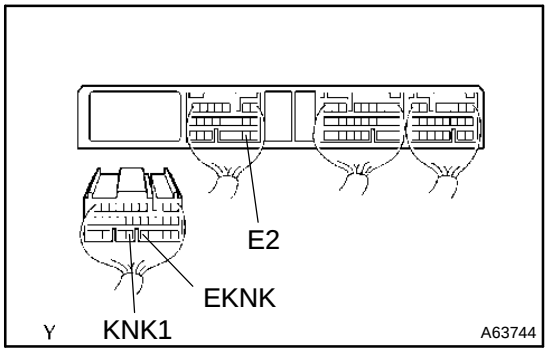
OK

CONTINUED

3	CHECK HARNESS AND CONNECTOR(ECM - KNOCK CONTROL SENSOR)



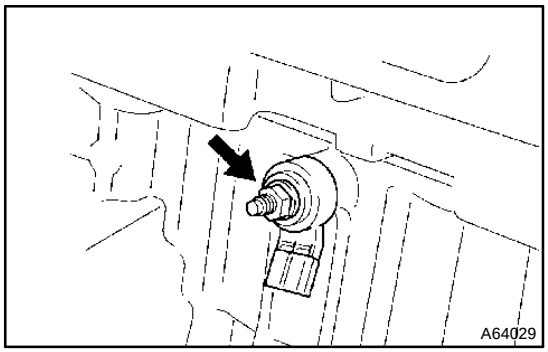
(a) Disconnect the knock control sensor connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals EKNK of the ECM connector and 1 of the knock control sensor.
Resistance: 1 Ω or less
(d) Check for open between the terminals KNK1 of the ECM connector and 2 of the knock control sensor.
Resistance: 1 Ω or less
(e) Check for short between the terminals KNK1 and E2 of the ECM connector.
Resistance: 1 MΩ or more
(f) Check for short between the terminals EKNK and E2 of the ECM connector.
Resistance: 1 MΩ or more



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

OK

4	CONFIRM THE MALFUNCTION DISAPPEAR WHEN A GOOD KNOCK SENSOR IS INSTALLED



(a) Change the knock control sensor to a new one.
(1) Remove the knock control sensor.
(2) Install the knock control sensor.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)
(b) Perform the driving test.
(c) Read DTC.

Result:

	A	B
RESULT	P0325/55 is output	P0325/55 is not output

B → **REPLACE KNOCK CONTROL SENSOR**

A

CHECK AND REPLACE ECM

CONTINUED

DTC	P0335/12	CRANKSHAFT POSITION SENSOR "A" CIRCUIT MALFUNCTION

DTC	P0335/13	CRANKSHAFT POSITION SENSOR "A" CIRCUIT MALFUNCTION

DTC	P1335/13	CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION (DURING ENGINE RUNNING)

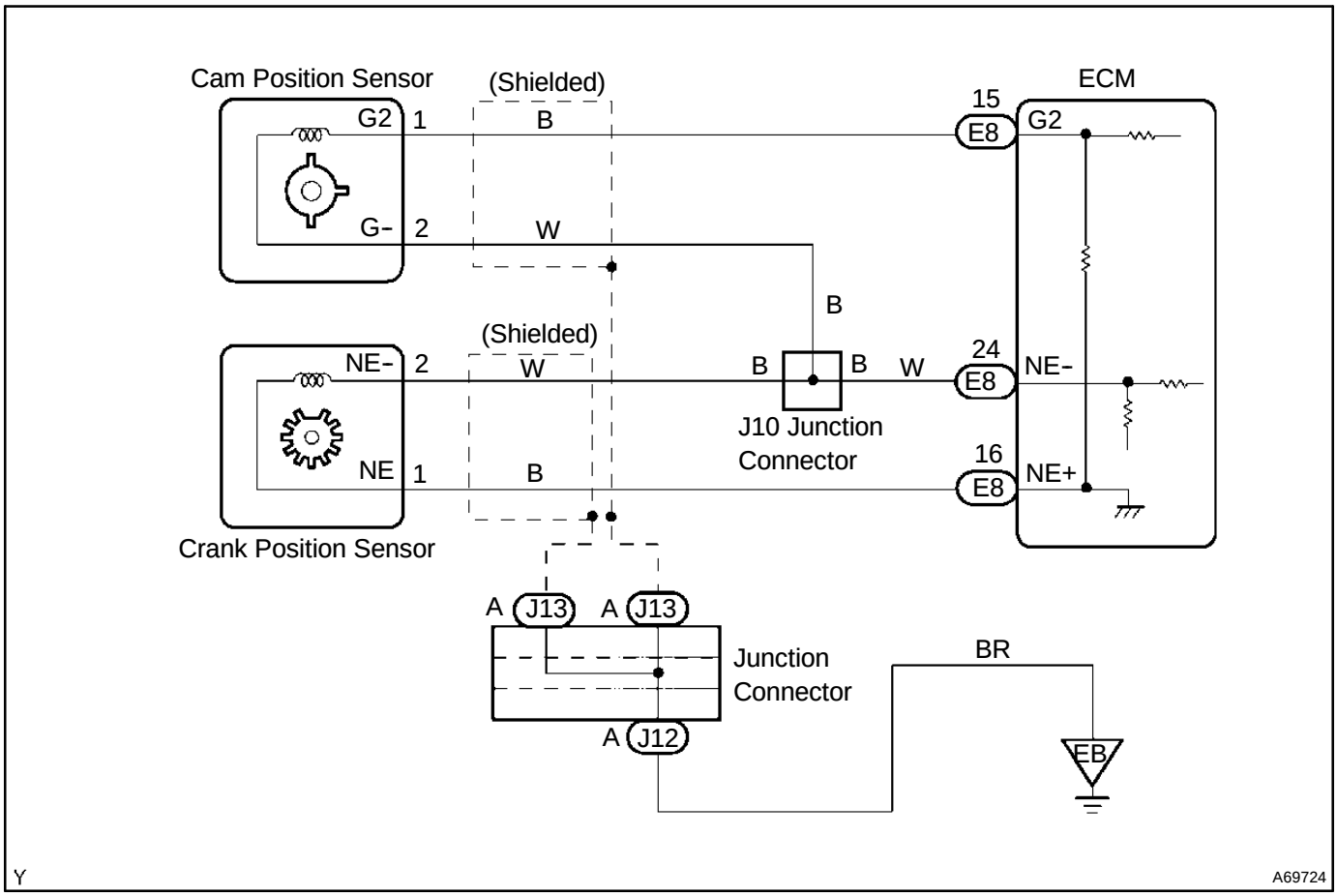
CIRCUIT DESCRIPTION

Crank position sensor (NE signal) consists of a magnet, iron core and pick up coil.
The NE signal plate (crankshaft position sensor plate No.1) has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the crankshaft angle and the engine revolution based on the NE signal, and distinction of the cylinder and phase of the VVT based on the combination of the G and NE signal.

DTC No.	DTC Detecting Condition	Trouble Area
P0335/12 P0335/13	No crank position sensor signal to ECM during cranking (2 trip detection logic)	• Open or short in crank position sensor circuit • Crank position sensor • Crankshaft position sensor plate No. 1 • ECM
	No crank position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	
P1335/13	If conditions (a) through (c) are met: (a) NE ≧ 1,000 rpm (b) NE signal is not detected for over 50 msec. (c) Not during cranking	• Open or short in crank position sensor circuit • Crank position sensor • Crankshaft position sensor plate No. 1 • ECM

CONTINUED

WIRING DIAGRAM



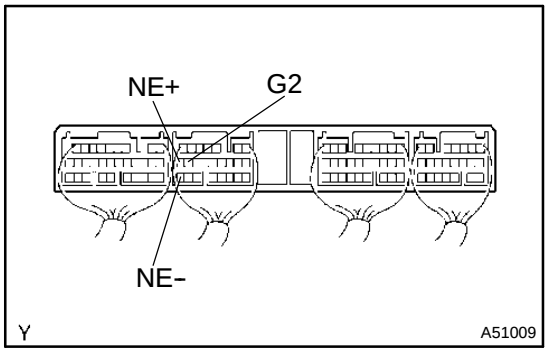
INSPECTION PROCEDURE

HINT:

- Perform troubleshooting of DTC P0335/12 (Crankshaft Position Sensor "A" Circuit Malfunction), P0335/13 (Crankshaft Position Sensor "A" Circuit Malfunction) and P1335/13 (Crankshaft Position Sensor Circuit Malfunction (During Engine running)) first. If no trouble is found, troubleshoot the following mechanical system.
- Read freed frame data using the hand-held tester, as freeze frame records the engine conditions when a malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, etc. at the time of the malfunction.

CONTINUED

1 INSPECT CRANKSHAFT POSITION SENSOR

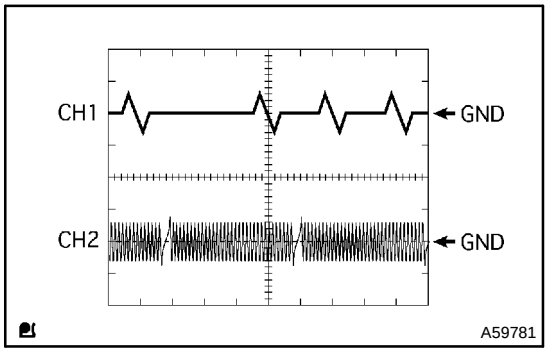


(a) Check the crank position sensor for resistance.
(See page 18-2)

(b) Check the output waveform.

Item	Contents
Terminal	CH1: G2+⇔NE- CH2: NE+⇔NE-
Equipment Set	2V/DIV, 20ms/DIV
Condition	During Cranking or idling

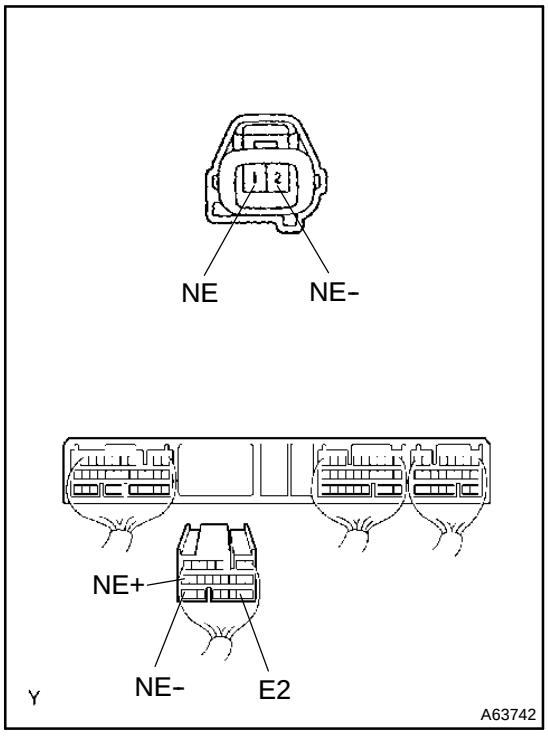
HINT:
The correct waveforms are as shown in the left.



NG → **REPLACE CRANKSHAFT POSITION SENSOR**

OK

2 CHECK HARNESS AND CONNECTOR(ECM - CRANKSHAFT POSITION SENSOR)



(a) Disconnect the crank position sensor connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals NE of the crank position sensor connector and NE+ of the ECM connector.
Resistance: 1 Ω or less
(d) Check for open between the terminals NE- of the crank position sensor connector and NE- of the ECM connector.
Resistance: 1 Ω or less
(e) Check for short between the terminals NE+ and E2 of the ECM connector.
Resistance: 1 MΩ or more
(f) Check for short between the terminals NE- and E2 of the ECM connector.
Resistance: 1 MΩ or more

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

OK

CONTINUED

3	CHECK SENSOR INSTALLATION

(a) Check the crank position sensor installation.

NG → TIGHTEN SENSOR

OK

4	INSPECT CRANKSHAFT POSITION SENSOR PLATE NO.1(TEETH OF SIGNAL PLATE)

(a) Remove the crankshaft position sensor plate No.1.(See page 14–39)
(b) Check the teeth of the signal plate.

NG → REPAIR OR REPLACE CRANKSHAFT POSITION SENSOR PLATE NO.1

OK

CHECK AND REPLACE ECM

CONTINUED

DTC	P0340/12	CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

Camshaft position sensor (G signal) consists of a magnet, iron core and pickup coil.
The G signal rotor has 3 teeth on the outside and is mounted on the intake camshaft.
When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil changes, causing fluctuations in the magnetic field and generating an electromotive force in the pickup coil.
The NE signal plate (crackshaft position sensor plate No.1) has 34 teeth and is installed in the crankshaft.
The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the crankshaft angle and the engine revolution based on the NE signal, and distinetion of the cylinder and phase of the VVT based on the combination of the G and NE signal.

DTC No.	DTC Detecting Condition	Trouble Area
P0340/12	No cam position sensor signal to ECM during cranking (2 trip detection logic)	• Open or short in camshaft position sensor circuit • Cam position sensor • Intake camshaft • ECM
	No cam position sensor signal to ECM with engine speed 600 rpm or more	

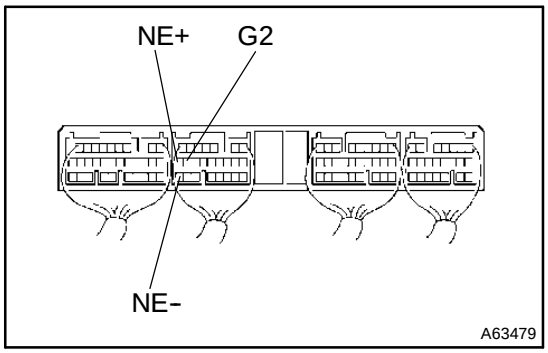
WIRING DIAGRAM

Refer to DTC P0335/12 on page 05–53.

INSPECTION PROCEDURE

HINT:
Read freed frame data using the hand–held tester, as freeze frame records the engine conditions when a malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, etc. at the time of the malfunction.

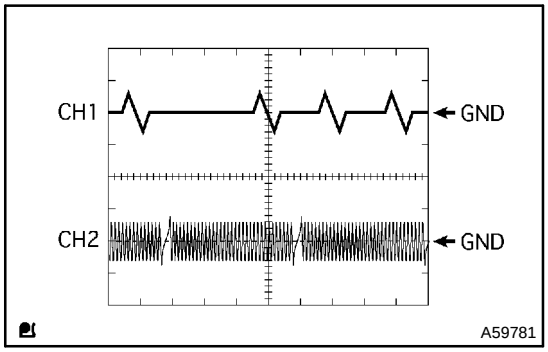
1	INSPECT CAM POSITION SENSOR(CHECK RESISTANCE)



(a) Check the cam position sensor for resistance.
(See page 18–2)
(b) Check the output waveform.

Item	Contents
Terminal	CH1: G2+⇔NE– CH2: NE+⇔NE–
Equipment Set	2V/DIV, 20ms/DIV
Condition	During Cranking or idling

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

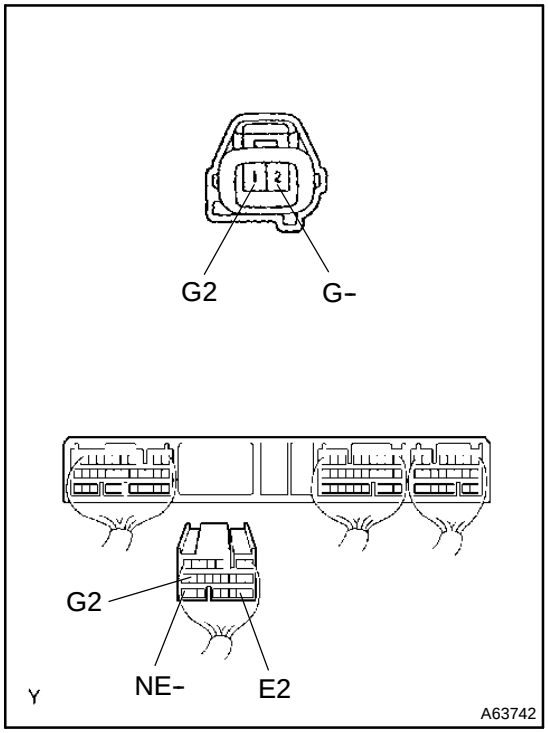


CONTINUED

NG → REPLACE CAM POSITION SENSOR

OK

2	CHECK HARNESS AND CONNECTOR(ECM - CAM POSITION SENSOR)



(a) Disconnect the cam position sensor connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals G2 of the cam position sensor connector and G2 of the the ECM connector.
Resistance: 1 Ω or less
(d) Check for open between the terminals G- of the cam position sensor connector and the NE- of the the ECM connector.
Resistance: 1 Ω or less
(e) Check for short between the terminals G2 of the cam position sensor connector and E2 of the the ECM connector.
Resistance: 1 MΩ or more
(f) Check for short between the terminals NE- and E2 of the the ECM connector.
Resistance: 1 MΩ or more

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	CHECK SENSOR INSTALLATION

(a) Check the cam position sensor installation.

NG → TIGHTEN SENSOR

OK

4	INSPECT CAMSHAFT (See Page 14-54)

NG → REPLACE CAMSHAFT

OK

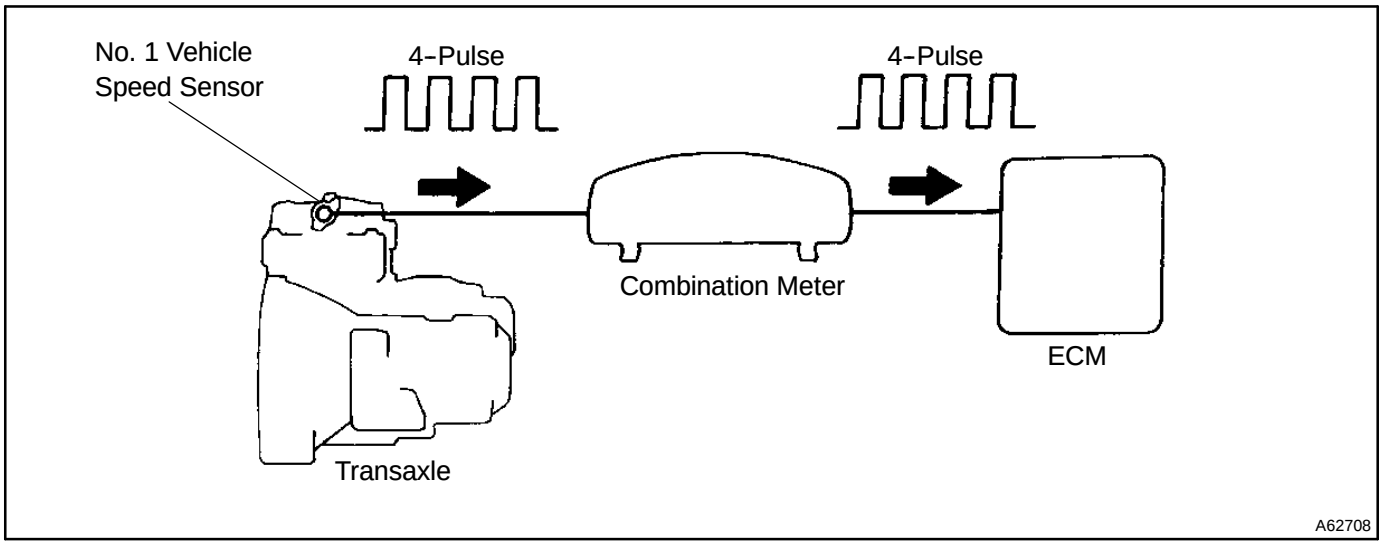
CHECK AND REPLACE ECM

CONTINUED

DTC P0500/42 VEHICLE SPEED SENSOR MALFUNCTION

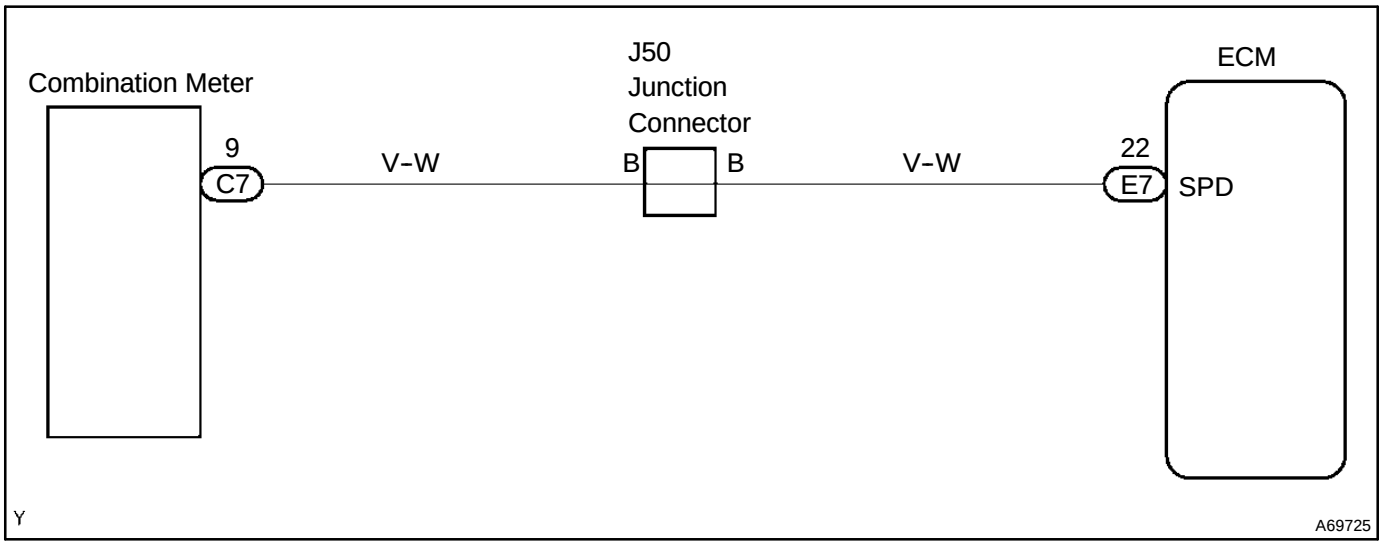
CIRCUIT DESCRIPTION

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



DTC No.	DTC Detecting Condition	Trouble Area
P0500	During vehicle is being driven, no vehicle speed sensor signal to ECM (2 trip detection logic)	• Combination meter • Open or short in No.1 vehicle speed sensor circuit • No.1 vehicle speed sensor • ECM

WIRING DIAGRAM



CONTINUED

INSPECTION PROCEDURE

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

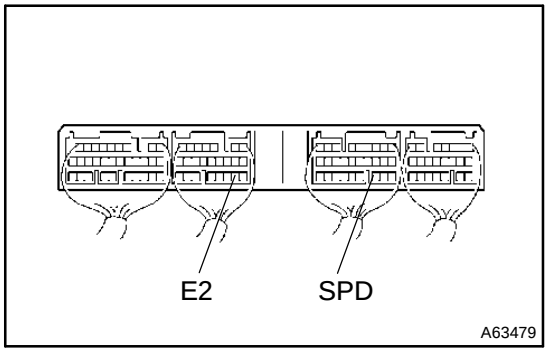
1	CHECK OPERATION OF SPEEDOMETER(SPEEDOMETER OPERATION)

(a) Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed sensor is operating normally if the speedometer display is normal.

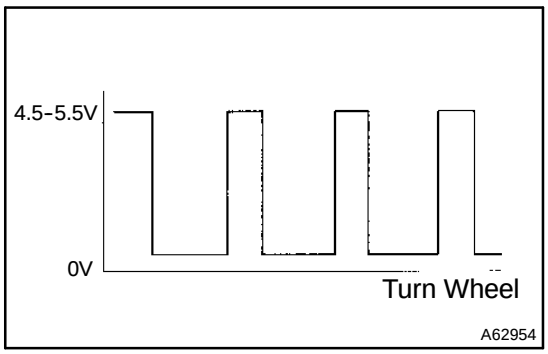
NG → CHECK SPEEDOMETER CIRCUIT

OK

2	INSPECT ECM(CHECK VOLTAGE)



(a) Shift the lever to the neutral position.
(b) Jack up the vehicle.
(c) Turn the ignition switch ON.
(d) Measure the voltage between the terminal SPD of the ECM connector and E2 of the ECM connector with turning the wheel slowly.
Voltage: Generated intermittently



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

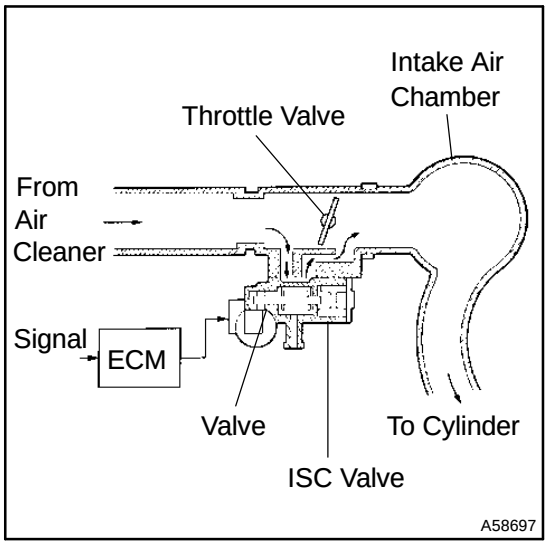
OK

CHECK AND REPLACE ECM

CONTINUED

DTC P0505/33 IDLE CONTROL SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

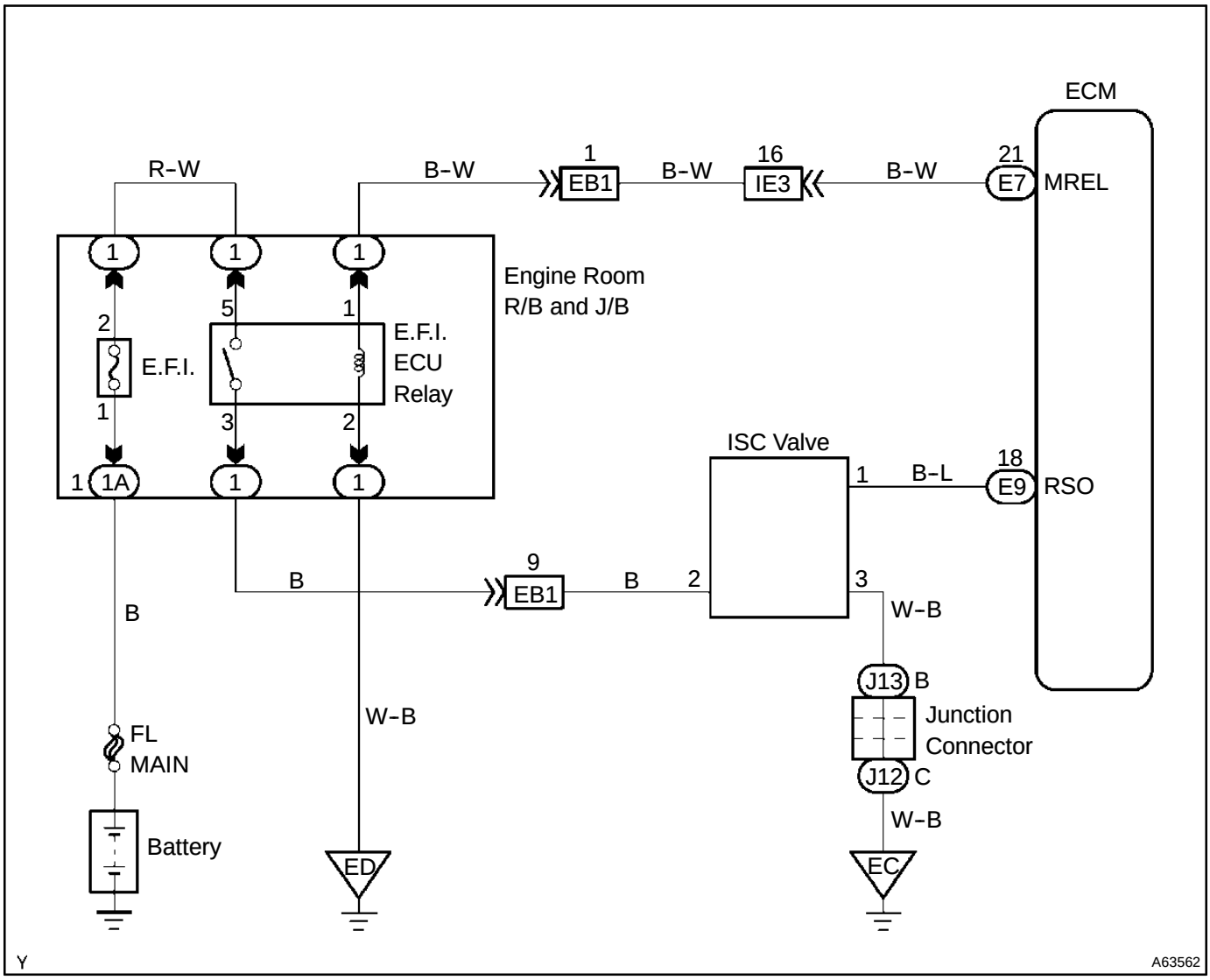


The rotary solenoid type ISC valve is located under the throttle body and intake air bypassing the throttle valve is directed to the ISC valve through the passage.
In this way the intake air volume bypassing the throttle valve is regulated, controlling the engine speed.
The ECM operates the ISC valve only to perform idle-up and provide feedback for the target idling speed.

DTC No.	DTC Detecting Condition	Trouble Area
P0505/33	Idle speed continues to be apart greatly from target speed	• Open or short in ISC valve circuit • ISC valve is stuck or closed • Open or short in A/C switch circuit • Air induction system • ECM

CONTINUED

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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

CONTINUED

When using hand-held tester:

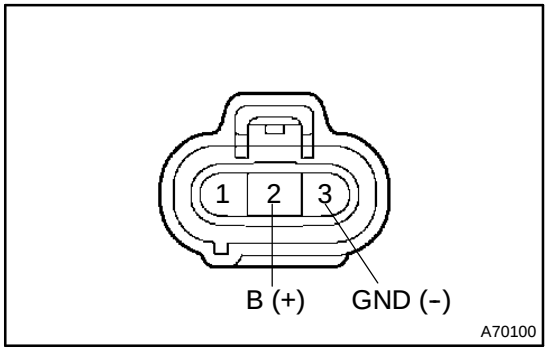
1	PERFORM ACTIVE TEST BY HAND-HELD TESTER(CHECK OPERATION OF THE ISC VALVE)

(a) Warm up the engine to the normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Shift the lever into the neutral position.
(e) Connect the hand-held tester to the DLC3 on the vehicle.
(f) Check the engine speed when the ISC valve is operated by the hand-held tester.
Engine speed:
Engine speed is increased and decreased in response to change of ISC duty ratio

OK → **Go to step 6**

NG

2	CHECK HARNESS AND CONNECTOR



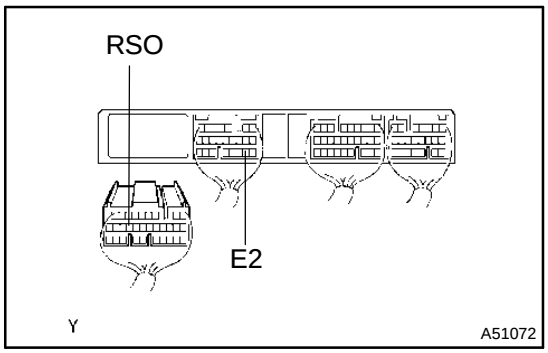
(a) Disconnect the ISC valve connector.
(b) Turn the ignition switch ON.
(c) Measure voltage between terminals B and GND of the ISC valve connector.
Voltage: 9 - 14 V

NG → **Go to step 8**

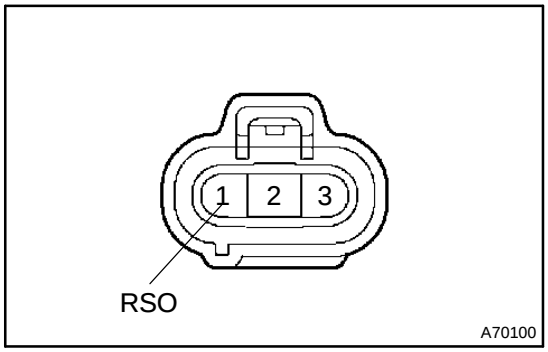
OK

CONTINUED

3	CHECK HARNESS AND CONNECTOR(ECM - ISC VALVE)



(a) Disconnect the ECM E9 connector.
(b) Disconnect the ISC valve connector.
(c) Check for open between the terminals RSO of the ECM connector and RSO of the ISC valve connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals RSO and E2 of the ECM connectors.
Resistance: 1 MΩ or more



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

OK

4	CHECK THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY (See page 10-1)

NG → **REPLACE THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY**

OK

5	CHECK BLOCKAGE OF ISC VALVE AND PASSAGE TO BYPASS THROTTLE VALVE

NG → **REPAIR OR REPLACE THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY**

OK

CHECK AND REPLACE ECM

6	CHECK AIR INDUCTION SYSTEM

(a) Visually inspect the hoses, connections and gaskets (See page 12-1).

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

CONTINUED

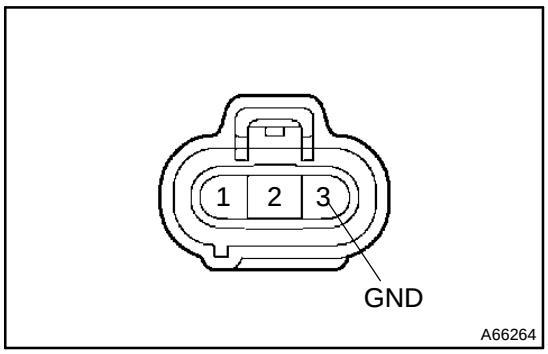
7	CHECK FOR A/C SIGNAL CIRCUIT

NG → REPAIR OR REPLACE

OK

CHECK FOR INTERMITTENT PROBLEMS

8	CHECK HARNESS AND CONNECTOR(ISC VALVE - BODY GROUND)

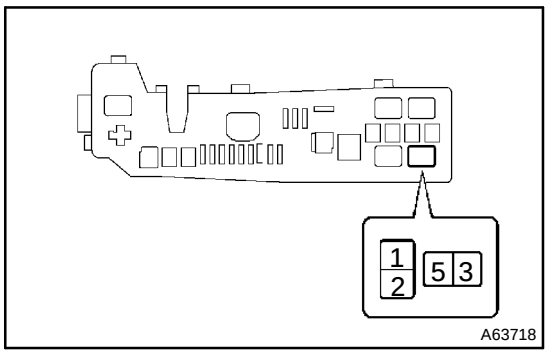


(a) Disconnect the ISC valve connector.
(b) Check for open between the terminal GND of the ISC valve connector and the body ground.
Resistance: 1 Ω or less

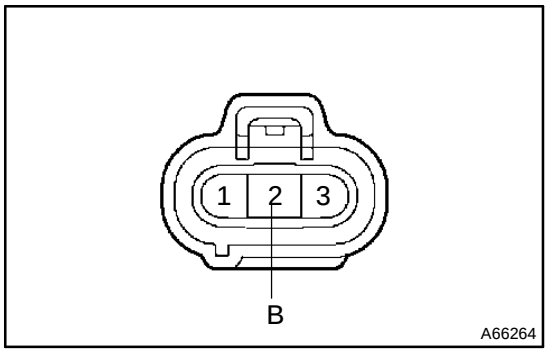
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

9	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - ISC VALVE)



(a) Remove the E.F.I. ECU relay.
(b) Disconnect the ISC valve connector.
(c) Check for open between the terminals 3 of the E.F.I. ECU relay side connector and B of the ISC valve connector.
Resistance: 1 Ω or less



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK FOR ECM POWER SOURCE CIRCUIT (See page 05-98)

CONTINUED

When not using hand-held tester:

1	CHECK AIR INDUCTION SYSTEM

(a) Visually inspect the hoses, connections and gaskets (See page 12-1).

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

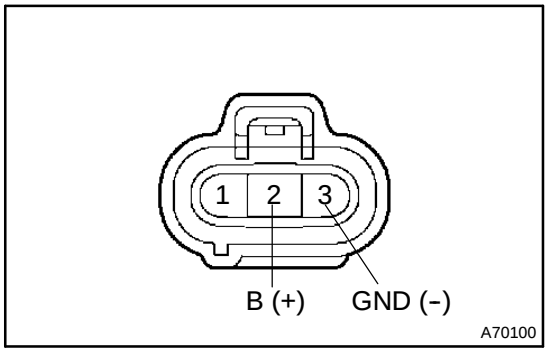
OK

2	CHECK FOR A/C SIGNAL CIRCUIT

NG → REPAIR OR REPLACE

OK

3	CHECK HARNESS AND CONNECTOR

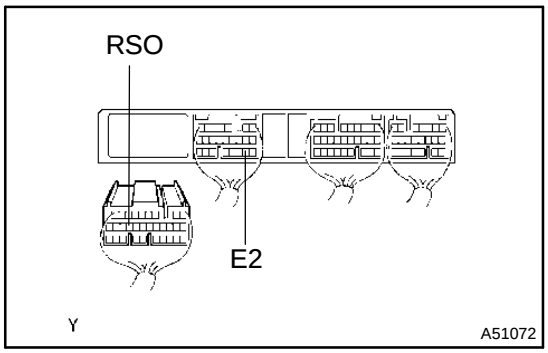


(a) Disconnect the ISC valve connector.
(b) Turn the ignition switch ON.
(c) Measure voltage between terminals B and GND of the ISC valve connector.
Voltage: 9 - 14 V

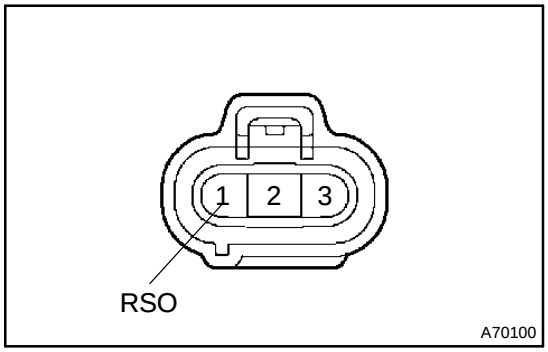
NG → Go to step 7

OK

4	CHECK HARNESS AND CONNECTOR(ECM - ISC VALVE)



(a) Disconnect the ECM E9 connector.
(b) Disconnect the ISC valve connector.
(c) Check for open between the terminals RSO of the ECM connector and RSO of the ISC valve connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals RSO and E2 of the ECM connectors.
Resistance: 1 MΩ or more



CONTINUED

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5	CHECK THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY (See page 10-1)

NG → REPLACE THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY

OK

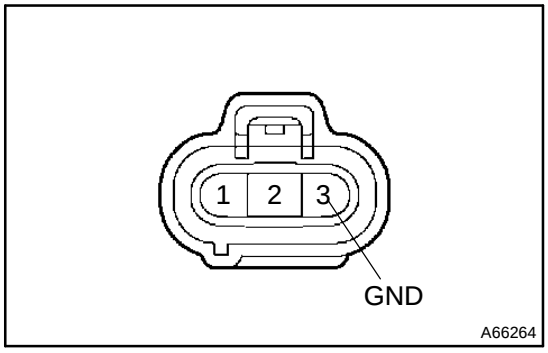
6	CHECK BLOCKAGE OF ISC VALVE AND PASSAGE TO BYPASS THROTTLE VALVE

NG → REPAIR OR REPLACE THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY

OK

CHECK AND REPLACE ECM

7	CHECK HARNESS AND CONNECTOR(ISC VALVE - BODY GROUND)



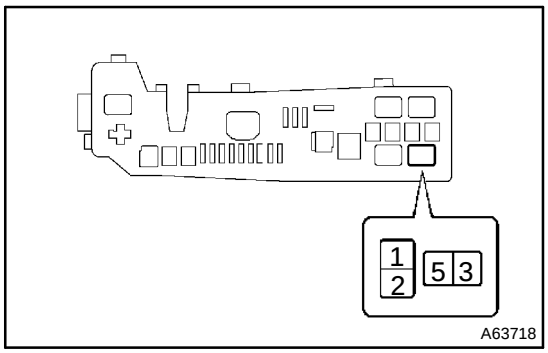
(a) Disconnect the ISC valve connector.
(b) Check for open between the terminal GND of the ISC valve connector and the body ground.
Resistance: 1 Ω or less

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

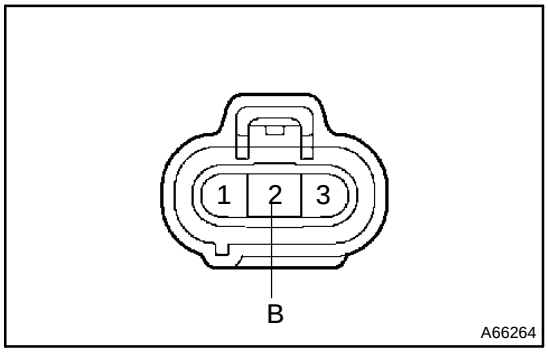
OK

CONTINUED

8	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - ISC VALVE)



(a) Remove the E.F.I. ECU relay.
(b) Disconnect the ISC valve connector.
(c) Check for open between the terminals 3 of the E.F.I. ECU relay side connector and B of the ISC valve connector.
Resistance: 1 Ω or less



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

OK

CHECK FOR ECM POWER SOURCE CIRCUIT **(See page 05-98)**

CONTINUED

DTC	P1300/14	IGNITER CIRCUIT MALFUNCTION

DTC	P1305/15	IGNITER CIRCUIT MALFUNCTION

DTC	P1310/14	IGNITER CIRCUIT MALFUNCTION

DTC	P1315/15	IGNITER CIRCUIT MALFUNCTION

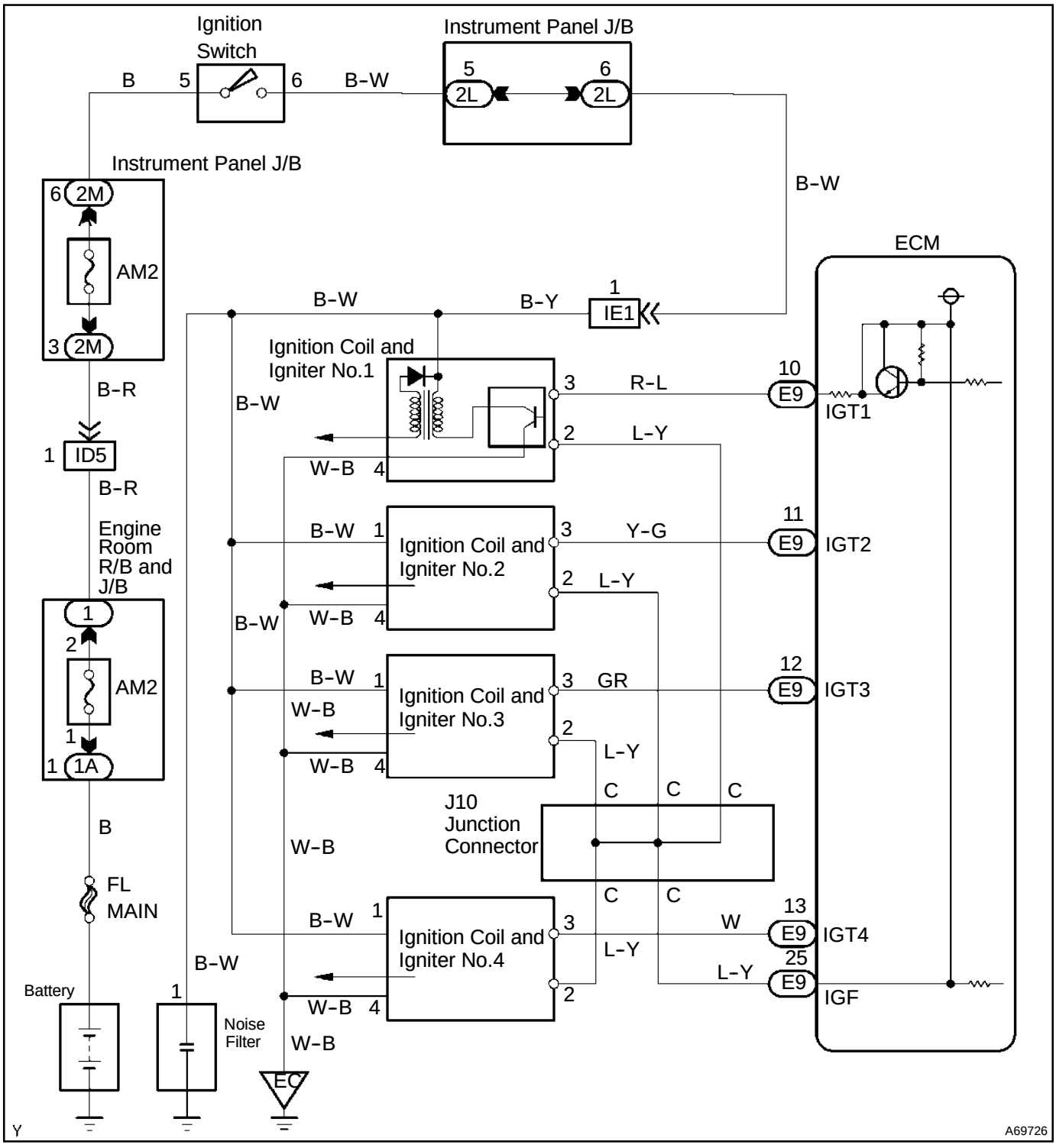
CIRCUIT DESCRIPTION

A Direct Ignition System (DIS) has been adopted. The DIS improves the ignition timing accuracy, reduces the high-voltage loss, and enhances overall reliability of the ignition system by eliminating the distributor. The DIS is a 1-cylinder ignition system which ignites one cylinder with one ignition coil. In the 1-cylinder ignition system, the spark plug is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plug. The spark of the spark plug passes through from the center electrode to the ground electrode.
The ECM determines ignition timing and outputs the ignition signals (IGT) of each cylinder. Based on IGT signals, the power transistors cut off the current to the primary coil in the ignition coil. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail-safe measurement to the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P1300/14 P1305/15 P1310/14 P1315/15	No IGF signal to ECM while engine is running	• Ignition system • Open or short in IGF and IGT circuit from ignition coil • Ignition coil • ECM

CONTINUED

WIRING DIAGRAM



CONTINUED

INSPECTION PROCEDURE

HINT:

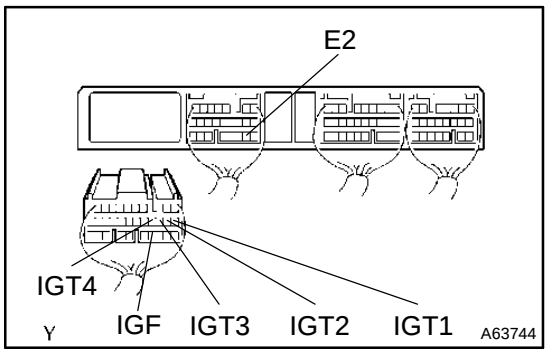
- If DTC P1300/14 is displayed, check No.1 ignition coil circuit.
- If DTC P1305/15 is displayed, check No.2 ignition coil circuit.
- If DTC P1310/14 is displayed, check No.3 ignition coil circuit.
- If DTC P1315/15 is displayed, check No.4 ignition coil circuit.
- Read freeze frame data using the hand–held tester, as freeze frame records the engine conditions when a malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, etc. at the time of the malfunction.

1	CHECK SPARK PLUG AND SPARK (See page 18–1)

NG → Go to step 4

OK

2	CHECK HARNESS AND CONNECTOR(ECM – IGNITION COIL)



HINT:

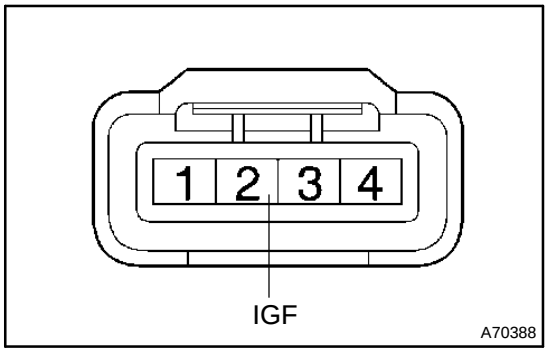
The procedure below is for NO.1 cylinder. If a malfunction is found on the other cylinders, check the circuit for the cylinder with referring to this procedure.

(a) Disconnect the ignition coil connector.

(b) Disconnect the ECM E9 connector.

(c) Check for open between the terminals IGF of the ECM connector and IGF of the ignition coil connector.
Resistance: 1 Ω or less

(d) Check for short between the terminals IGF of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more

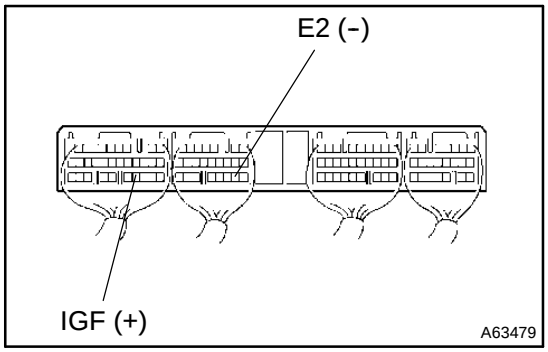


NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CONTINUED

3	INSPECT ECM(CHECK VOLTAGE)



(a) Disconnect the ignition coil connector.
(b) Turn the ignition switch ON.
(c) Measure voltage between the terminals IGF of the ECM connector and E2 of the ECM connector.
Voltage: 4.5 - 5.5 V

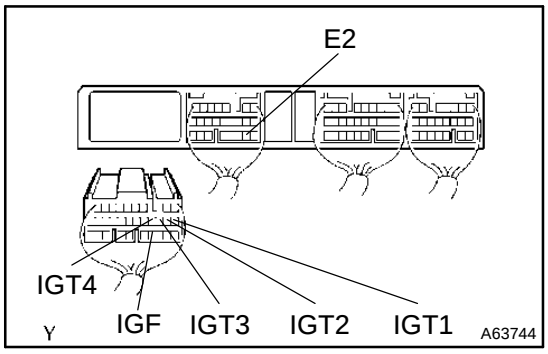
OK → **REPLACE IGNITION COIL ASSY**

NG

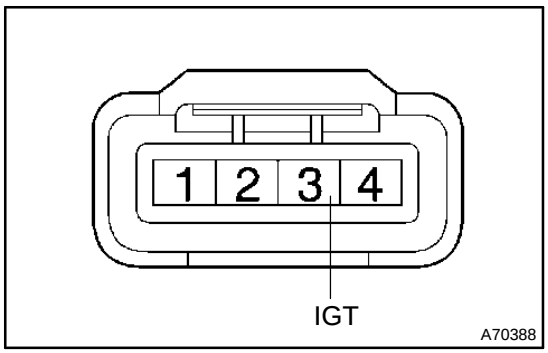
CHECK AND REPLACE ECM

4	CHECK HARNESS AND CONNECTOR(ECM - IGNITION COIL)

HINT:
The procedure below is for NO.1 cylinder. If a malfunction is found on the other cylinders, check the circuit for the cylinder with referring to this procedure.



(a) Disconnect the ignition coil connector.
(b) Disconnect the ECM E9 connector.
(c) Check for open between the terminals IGT1 of the ECM connector and IGT of the ignition coil connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals IGT1 of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more

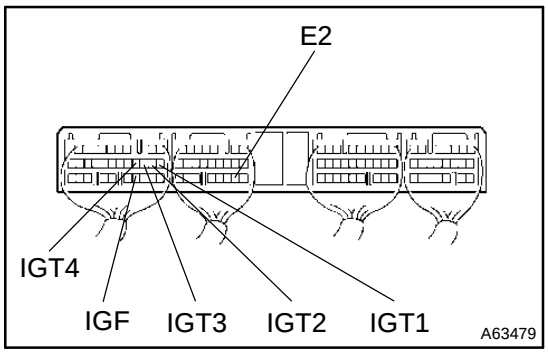


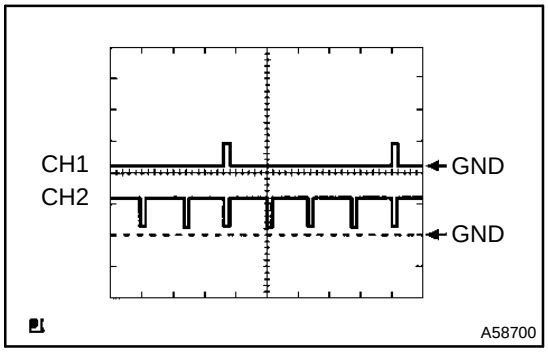
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CONTINUED

5 INSPECT ECM(CHECK VOLTAGE)





(a) Turn the ignition switch ON.
(b) Measure the voltage between the terminals IGT1 – IGT4 of the ECM connector and E2 of the ECM connector when the engine is cranked.
Voltage: More than 0.1 V and less than 4.5 V

HINT:
During cranking or idling, check the waveform between terminals IGT1 – IGT4 and E2 of the ECM connector.

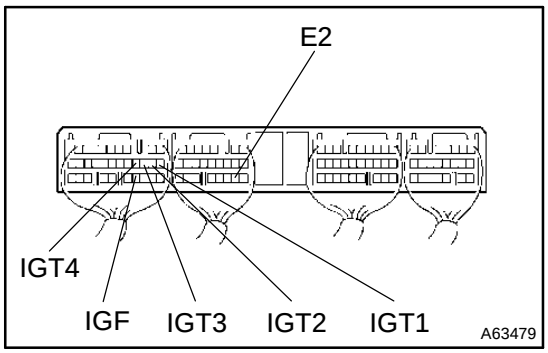
Item	Contents
Terminal	CH1: IGT1, IGT2, IGT3, IGT4 – E2 CH2: IGF – E2
Equipment Set	5 V/DIV, 20 ms/DIV
Condition	While the engine is cranking or idling

HINT:
Correct waveform appears as shown, with rectangle waves.

NG → **CHECK AND REPLACE ECM**

OK

6 INSPECT ECM(CHECK VOLTAGE)



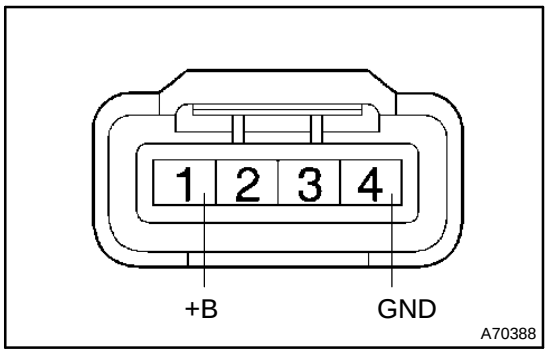
(a) Disconnect the ignition coil connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the terminals IGT1 – IGT4 of the ECM connector and E2 of the ECM connector when the engine is cranked.
Voltage: More than 0.1 V and less than 4.5 V

NG → **CHECK AND REPLACE ECM**

OK

CONTINUED

7	CHECK IGNITION COIL ASSY(POWER SOURCE)

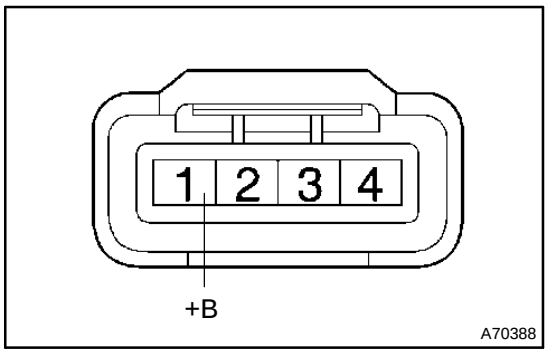


(a) Disconnect the ignition coil connector.
(b) Turn the ignition switch ON.
(c) Measure voltage between the terminals +B and GND of the ignition coil connector.
Voltage: 9 - 14 V

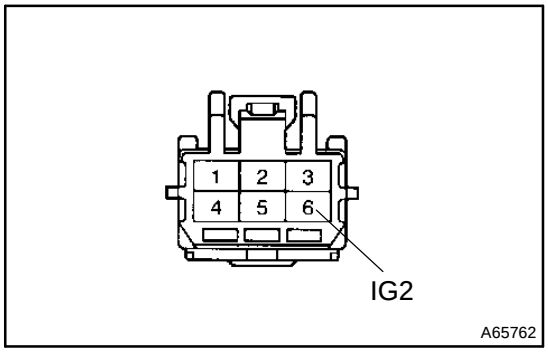
OK → **REPLACE IGNITION COIL ASSY**

NG

8	CHECK HARNESS AND CONNECTOR(IGNITION SWITCH - IGNITION COIL)



(a) Disconnect the ignition coil connector.
(b) Disconnect the ignition switch connector.
(c) Check for open between the terminals +B of the ignition coil connector and IG2 of the ignition switch.
Resistance: 1 Ω or less



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

OK

REPAIR OR REPLACE POWER SOURCE

CONTINUED

DTC	P1346/18	VVT SENSOR/CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (BANK 1)

CIRCUIT DESCRIPTION

Refer to DTC P0335/12 on page 05–53.

DTC No.	Detection Item	Trouble Area
P1346/18	Deviation in crankshaft position sensor signal and VVT sensor signal (2 trip detection logic)	• Mechanical system malfunction (skipping teeth of timing chain, chain stretched) • ECM

WIRING DIAGRAM

Refer to DTC P0335/12 on page 05–53.

INSPECTION PROCEDURE

HINT:

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

1	CHECK VALVE TIMING (See page 14–39)

NG → ADJUST VALVE TIMING

OK ↓

CHECK AND REPLACE ECM

CONTINUED

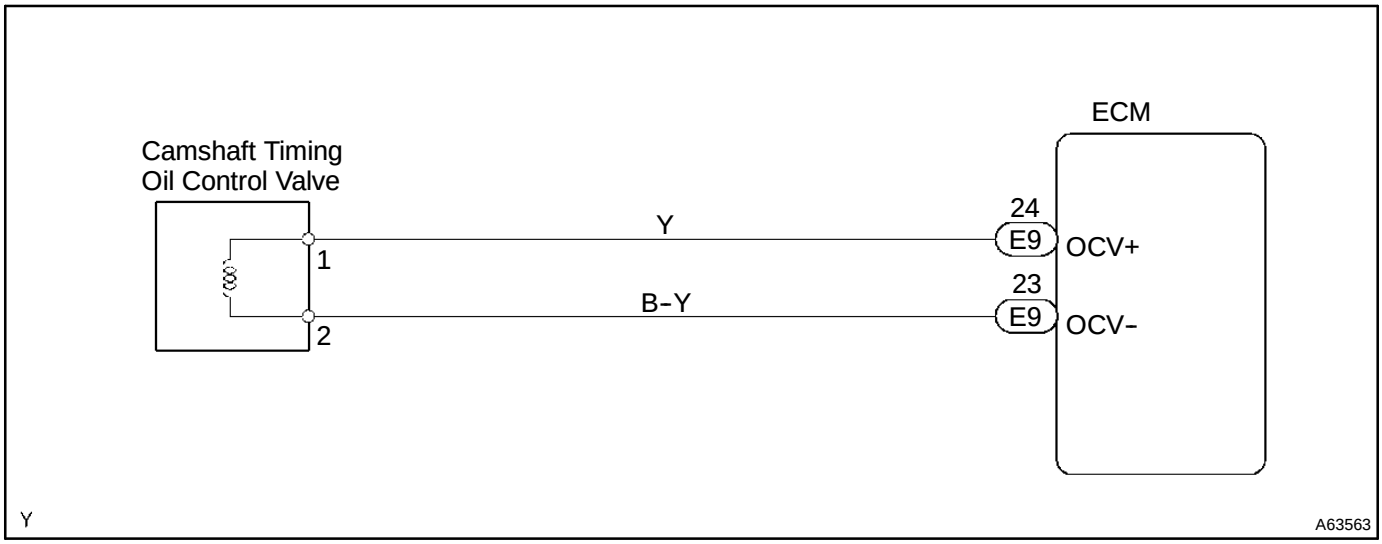
DTC P1349/59 VVT SYSTEM MALFUNCTION (BANK 1)

CIRCUIT DESCRIPTION

VVT system controls the intake valve timing to proper timing in response to driving condition.
ECM controls OCV (Oil Control Valve) to make the intake valve timing properly, and, oil pressure controlled with OCV is supplied to the VVT controller, and then, VVT controller changes relative position between the camshaft and the crankshaft.

DTC No.	DTC Detecting Condition	Trouble Area
P1349/59	Condition (a) or (b) continues for after the engine is warmed up and engine speed at 400 - 4,000 rpm: (a) Valve timing does not change from of current valve timing (b) Current valve timing is fixed	• Valve timing • OCV • VVT controller assembly • ECM

WIRING DIAGRAM



CONTINUED

INSPECTION PROCEDURE

HINT:

- If DTC P1349/59 is displayed, check VVT system circuit.
- Read freeze frame data using the hand–held tester, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, etc. at the time of the malfunction.

When using hand–held tester:

1	CHECK VALVE TIMING(See page 14–39)

NG → ADJUST VALVE TIMING (See page 14–39)

OK

2	PERFORM ACTIVE TEST BY HAND–HELD TESTER(OPERATION OF OCV)

(a) Start the engine and warm it up.
(b) Connect the hand–held tester and select VVT on the ACTIVE TEST menu.
(c) Check the engine speed when operating the OCV by the hand–held tester.
OCV is OFF: Normal engine speed
OCV is ON: Rough idle or engine stall

HINT:

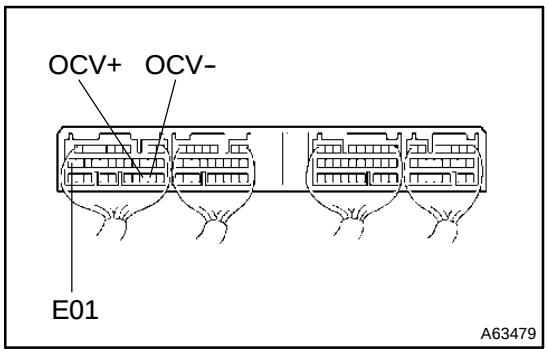
*: DTC P1349/59 is also output when a foreign object is detected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign object, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

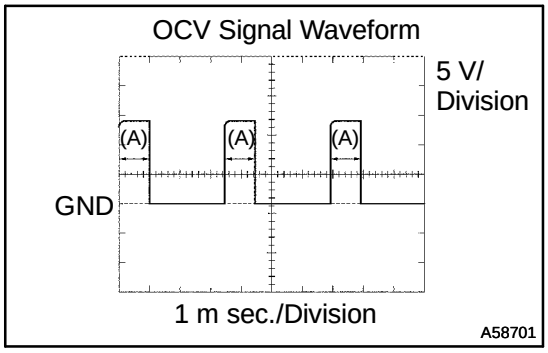
OK → VVT SYSTEM OK

CONTINUED

NG

3	INSPECT ECM(CHECK VOLTAGE)





(a) Turn the ignition switch ON.
(b) Check the waveform between terminals OCV+ and OCV- of the ECM connector.

HINT:

- The correct waveform is as shown in the left.
- The waveform frequency (A) becomes longer as the engine speed becomes higher.
- DTC P1349/59 is also output when a foreign object is detected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign object, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

NG → CHECK AND REPLACE ECM

OK

4	INSPECT CAMSHAFT TIMING GEAR ASSY (See page 14-54)

NG → REPLACE VVT CONTROLLER ASSEMBLY, AND THEN GO TO NEXT STEP

OK

5	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See page 10-2)

NG → REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY, AND THEN GO TO NEXT STEP

OK

6	CHECK BLOCKAGE(OCV AND OIL HOLE)

NG → REPAIR OR REPLACE

OK

CONTINUED

7	PERFORM SIMULATION TEST(CHECK DTC)

(a) Clear the DTC (See page 05-7).
(b) Perform the simulation test.
(c) Check whether or not DTC P1349/59 is stored (See page 05-7).
Result:

	A	B
RESULT	P1349/59 is output.	P1349/59 is not output.

HINT:
DTC P1349/59 is also output when a foreign object is detected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign object, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

B → **VVT SYSTEM OK**

A

CHECK AND REPLACE ECM

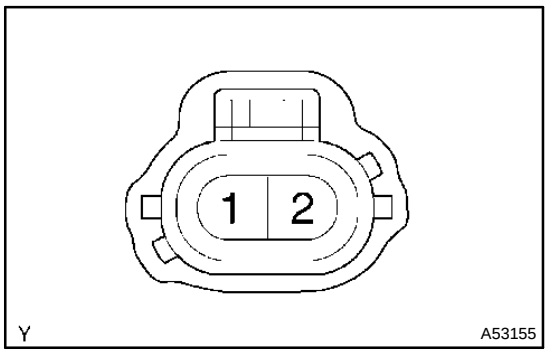
When not using hand held tester:

1	CHECK VALVE TIMING (See page 14-39)

NG → **ADJUST VALVE TIMING (See page 14-39)**

OK

2	CHECK OPERATION OF OCV



(a) Start the engine.
(b) Check the engine speed when disconnecting the OCV connector.
(c) Check the engine speed when applying battery positive voltage to the terminals of the OCV.
Result:

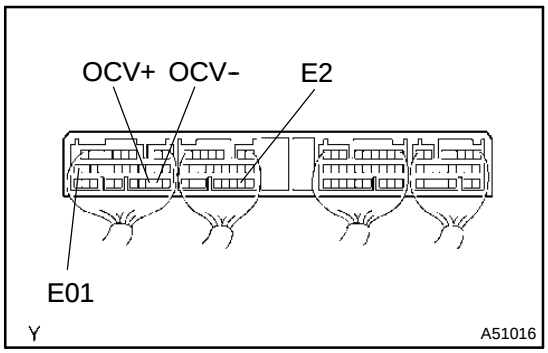
Result	Check (b)	Check (c)
A	Normal engine speed	Rough idle or engine stall
B	Except 1	

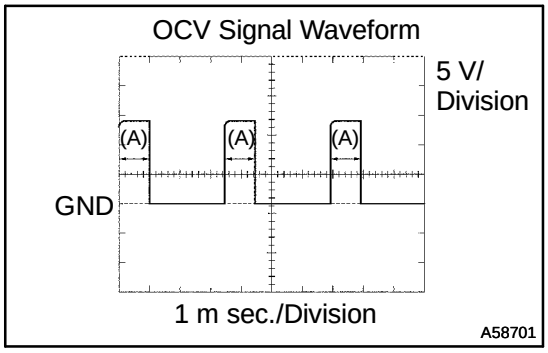
B → **Go to step 4**

A

CONTINUED

3	INSPECT ECM(CHECK VOLTAGE)





(a) Turn the ignition switch ON.
(b) Check the waveform between terminals OCV+ and OCV- of the ECM connector.

HINT:

- The correct waveform is as shown in the left.
- The waveform frequency (A) becomes longer as the engine speed becomes higher.
- DTC P1349/59 is also output when a foreign object is detected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign object, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

OK → VVT SYSTEM OK

NG

CHECK AND REPLACE ECM

4	INSPECT CAMSHAFT TIMING GEAR ASSY (See page 14-54)

NG → REPLACE VVT CONTROLLER ASSEMBLY, AND THEN GO TO NEXT STEP

OK

5	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See page 10-2)

NG → REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY, AND THEN GO TO NEXT STEP

OK

6	CHECK BLOCKAGE(OCV AND OIL HOLE)

NG → REPAIR OR REPLACE

OK

CONTINUED

7	PERFORM SIMULATION TEST(DTC CHECK)

(a) Clear the DTC (See page 05–7).
(b) Perform the simulation test.
(c) Check whether or not DTC P1349/59 is stored (See page 05–7).
Result:

	A	B
RESULT	P1349/59 is output.	P1349/59 is not output.

HINT:
DTC P1349/59 is also output when a foreign object is detected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign object, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

B → **VVT SYSTEM OK**

A

CHECK AND REPLACE ECM

CONTINUED

DTC	P1656/39	OCV CIRCUIT MALFUNCTION (BANK 1)

CIRCUIT DESCRIPTION

Refer to DTC P1349/59 on page 05-76.

DTC No.	DTC Detecting Condition	Trouble Area
P1656/39	Open or short in OCV circuit	• Open or short in OCV circuit • OCV • ECM

WIRING DIAGRAM

Refer to DTC P1349/59 on page 05-76.

INSPECTION PROCEDURE

HINT:

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

When using hand-held tester:

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER(OCV OPERATION)

(a) Start the engine and warm it up.
(b) Connect the hand-held tester and select the VVT on the ACTIVE TEST menu.
(c) Check the engine speed when operating the OCV by using the hand-held tester.

Result:

VVT system is OFF (OCV is OFF): Normal engine speed
VVT system is ON (OCV is ON): Rough idle or engine stalled

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

NG

2	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See page 10-2)

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

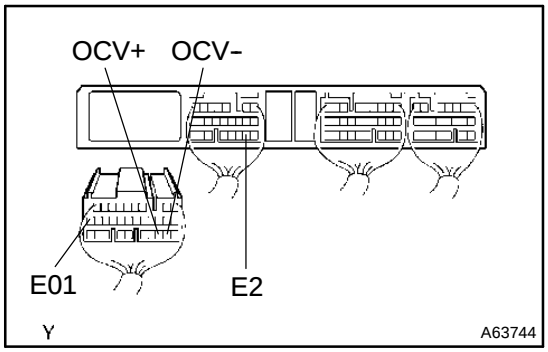
3	INSPECT ECM(CHECK VOLTAGE) (See page 05-76)

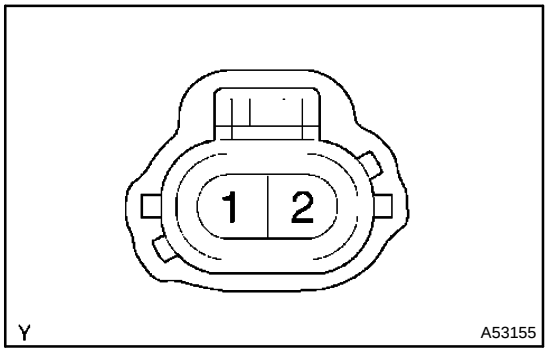
NG → **CHECK AND REPLACE ECM**

OK

CONTINUED

4	CHECK HARNESS AND CONNECTOR(ECM - OCV)





(a) Disconnect the ECM E9 connector.
(b) Disconnect the camshaft timing oil control valve connector.
(c) Check for open between the terminals OCV+ of the ECM connector and 1 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals OCV+ of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more
(e) Check for open between the terminals OCV- of the ECM connector and 2 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(f) Check for short between the terminals OCV- of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more

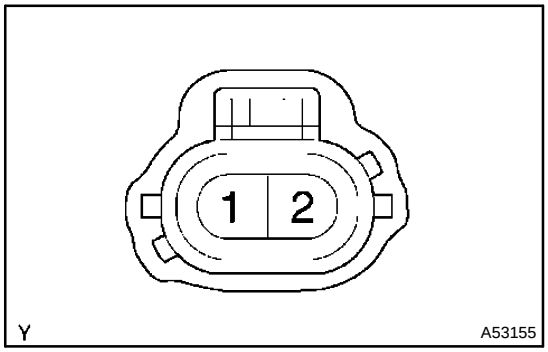
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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

When not using hand-held tester:

1	CHECK OPERATION OF OCV



(a) Start the engine and warm it up.
(b) Apply battery positive voltage to the terminals of the OCV.
(c) Check the engine speed.
Result: Rough idle or engine stalled

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

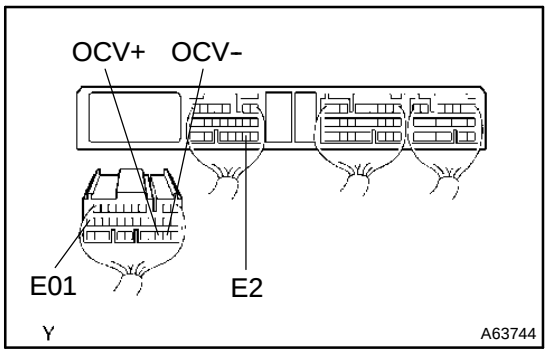
CONTINUED

2	INSPECT ECM(CHECK VOLTAGE)(See Page 05-76)

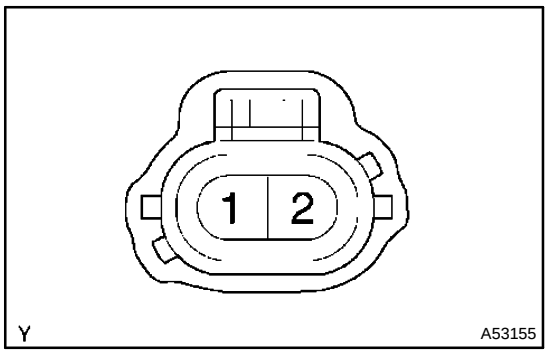
NG → CHECK AND REPLACE ECM

OK

3	CHECK HARNESS AND CONNECTOR(ECM - OCV)



(a) Disconnect the ECM E9 connector.
(b) Disconnect the camshaft timing oil control valve connector.
(c) Check for open between the terminals OCV+ of the ECM connector and 1 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals OCV+ of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more



(e) Check for open between the terminals OCV- of the ECM connector and 2 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(f) Check for short between the terminals OCV- of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05-7)

CONTINUED

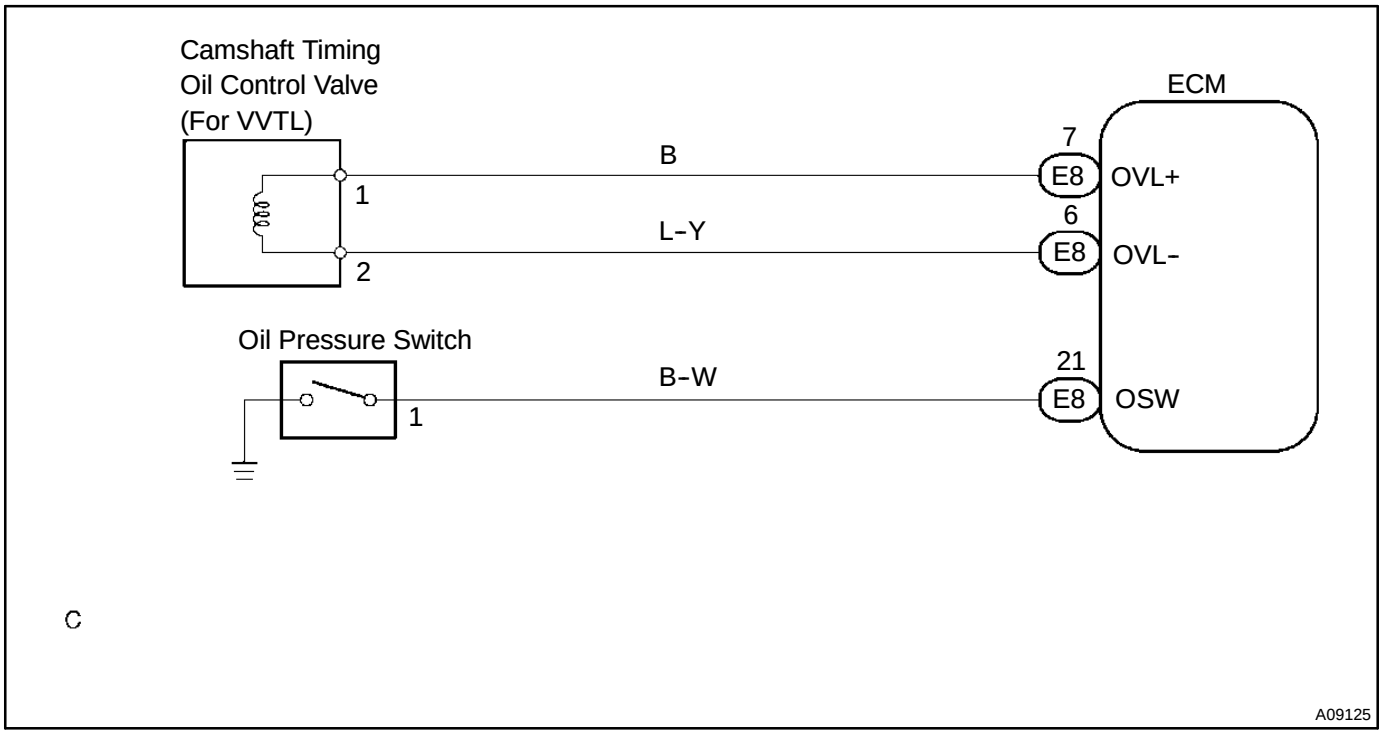
DTC	P1690/39	OCV FOR VVTL CIRCUIT MALFUNCTION (BANK 1)

CIRCUIT DESCRIPTION

When the engine speed reaches 6,000 rpm, the VVTL system switches the locker arm from low speed to high speed. The ECM control the OCV to apply hydraulic pressure to the piston in the locker arm and switch the locker arm by locking the slipper for high speed.

DTC No.	DTC Detecting Condition	Trouble Area
P1690/39	Open or short in OCV (for VVTL) circuit	• Open or short in OCV circuit • OCV for VVTL • ECM

WIRING DIAGRAM



CONTINUED

INSPECTION PROCEDURE

HINT:

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

When using hand-held tester:

1	**PERFORM ACTIVE TEST BY CAMSHAFT TIMING OIL CONTROL VALVE ASSY(FOR VVTL)**

(a) Start the engine and warmed it up.
(b) Connect the hand-held tester and select VVTL from ACTIVE TEST menu.
(c) Maintain engine speed at 1,500 - 2,500 rpm.
(d) Check the engine speed when operate the OCV for VVTL by the hand-held tester.

Result:

VVTL system is OFF (OCV is OFF): Normal engine speed
VVTL system is ON (OCV is ON): Rough engine speed or engine stalled

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

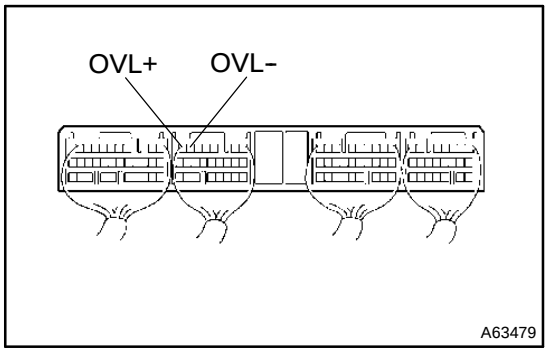
NG

2	**INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY(FOR VVTL)** **(See page 10-2)**

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

3	**CHECK ECM(OVL+ - OVL-)**



(a) Turn the ignition switch ON.
(b) Measure voltage between the terminals OVL+ and OVL- of the ECM connector.

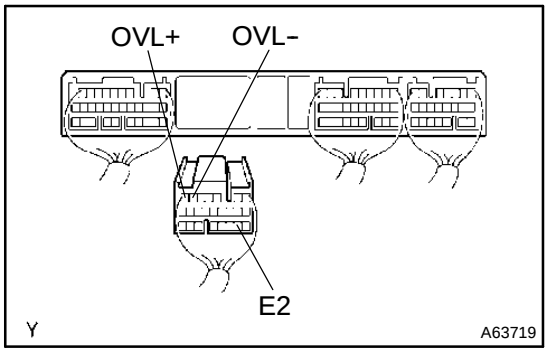
Voltage: 9 - 14 V

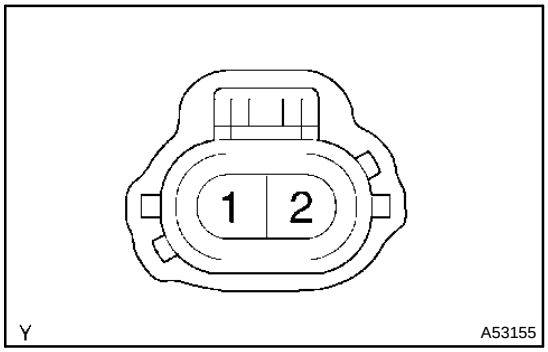
NG → **CHECK AND REPLACE ECM**

CONTINUED

OK

4	CHECK HARNESS AND CONNECTOR(ECM - OCV FOR VVTL)





(a) Disconnect the ECM E8 connector.
(b) Disconnect the camshaft timing oil control valve connector.
(c) Check for open between the terminals OVL+ of the ECM connector and 1 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals OVL+ of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more
(e) Check for open between the terminals OVL- of the ECM connector and 2 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(f) Check for short between the terminals OVL- of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more

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

OK

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

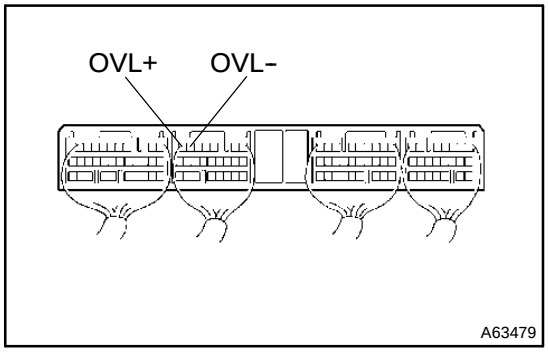
When not using hand-held tester:

1	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY(FOR VVTL) (See page 10-2)

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

2	CHECK ECM(OVL+ - OVL-)



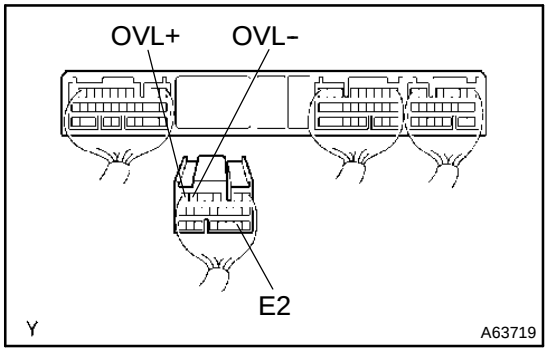
(a) Turn the ignition switch ON.
(b) Measure voltage between the terminals OVL+ and OVL- of the ECM connector.
Voltage: 9 - 14 V

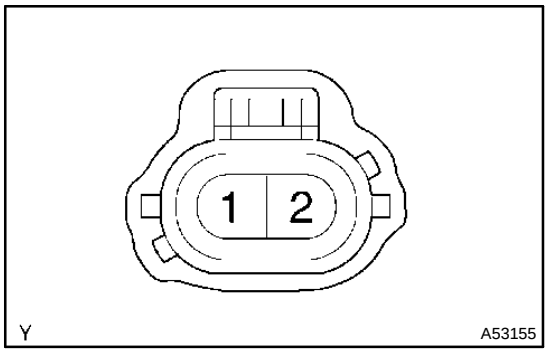
CONTINUED

NG → CHECK AND REPLACE ECM

OK

3	CHECK HARNESS AND CONNECTOR(ECM - OCV FOR VVTL)





(a) Disconnect the ECM E8 connector.
(b) Disconnect the camshaft timing oil control valve connector.
(c) Check for open between the terminals OVL+ of the ECM connector and 1 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals OVL+ of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more
(e) Check for open between the terminals OVL- of the ECM connector and 2 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(f) Check for short between the terminals OVL- of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05-7)

CONTINUED

DTC	P1692/59	OCV FOR VVTL OPEN MALFUNCTION (BANK 1)

DTC	P1693/59	OCV FOR VVTL CLOSE MALFUNCTION (BANK 1)

CIRCUIT DESCRIPTION

Refer to DTC P1690/39 on page 05-85.

DTC No.	DTC Detecting Condition	Trouble Area
P1692/59	In the condition that the engine speed is 6,000 rpm or less and the oil pressure switch on for 5 sec. or more	• Open or short in OCV circuit • OCV for VVTL • Oil pressure switch for VVTL • ECM
P1693/59	In the condition that the water temperature is 60°C or more, the engine speed is 6,000 rpm or more, and the oil pressure switch OFF for 1 sec. or more	

WIRING DIAGRAM

Refer to DTC P1690/39 on page 05-85.

When using hand-held tester:

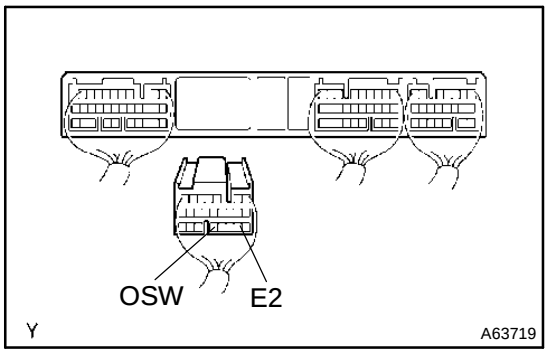
1	PERFORM ACTIVE TEST BY OIL PRESSURE SWITCH ASSY(FOR VVTL)

(a) Start the engine and warmed it up.
(b) Connect the hand-held tester and select VVTL from ACTIVE TEST menu.
(c) Disconnect the oil pressure switch for VVTL connector.
(d) Maintain engine speed at 6,500 rpm.
(e) Measure continuity between the oil pressure switch and body ground when operate the OCV by the hand-held tester.
Result:
VVTL system is OFF (OCV is OFF): No continuity
VVTL system is ON (OCV is ON): Continuity

NG → **REPLACE OIL PRESSURE SWITCH ASSY**

OK

2	CHECK HARNESS AND CONNECTOR(OIL PRESSURE SWITCH FOR VVTL - ECM)



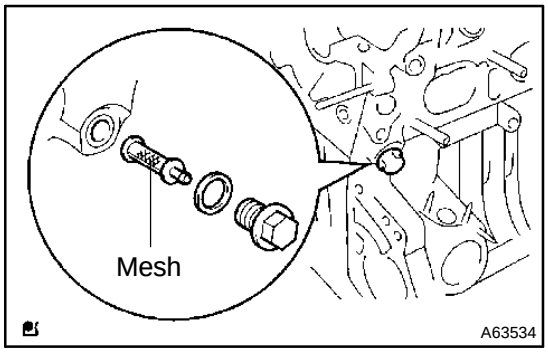
(a) Disconnect the oil pressure switch connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals OSW of the ECM connector and oil pressure switch connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals OSW and E2 of the ECM connector.
Resistance: 1 MΩ or more

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

CONTINUED

OK

3 CHECK OIL CONTROL VALVE FILTER

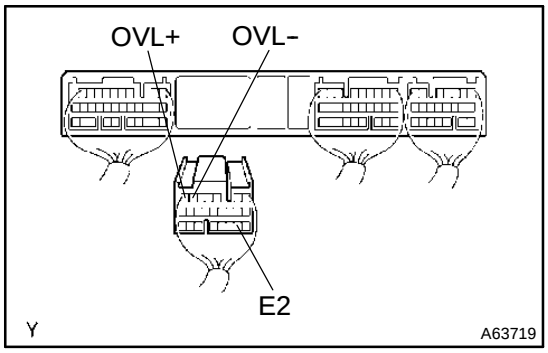


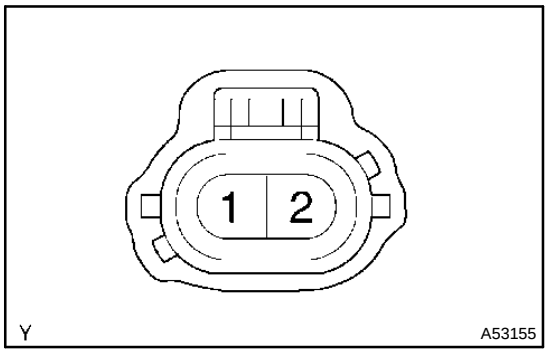
(a) Remove the generator. (See page 19-8)
(b) Remove the oil control valve filter.
(c) Check the oil control valve filter.
  (1) Confirm that the filter is clear.
(d) Place a new gasket on the bolt and install the filter.
  Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

NG → **REPLACE OIL CONTROL VALVE FILTER**

OK

4 CHECK HARNESS AND CONNECTOR(OCV FOR VVTL - ECM)





(a) Disconnect the ECM E8 connector.
(b) Disconnect the camshaft timing oil control valve connector.
(c) Check for open between the terminals OVL+ of the ECM connector and 1 of the camshaft timing oil control valve connector.
  Resistance: 1 Ω or less
(d) Check for short between the terminals OVL+ of the ECM connector and E2 of the ECM connector.
  Resistance: 1 MΩ or more
(e) Check for open between the terminals OVL- of the ECM connector and 2 of the camshaft timing oil control valve connector.
  Resistance: 1 Ω or less
(f) Check for short between the terminals OVL- of the ECM connector and E2 of the ECM connector.
  Resistance: 1 MΩ or more

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

OK

CHECK AND REPLACE ECM

CONTINUED

When not using hand-held tester:

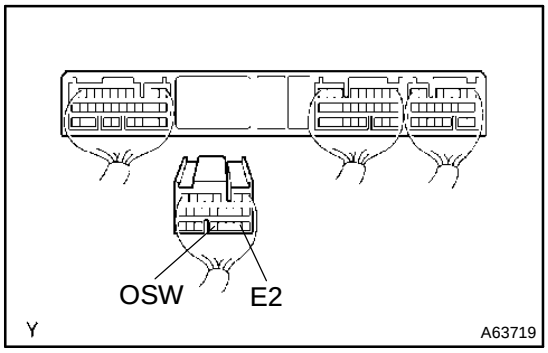
1	CHECK OIL PRESSURE SWITCH ASSY(FOR VVTL)

(a) Disconnect the oil pressure switch for VVTL connector.
(b) Ignition switch OFF.
(c) Measure continuity between the oil pressure switch and body ground.
Resistance: No continuity

NG → **REPLACE OIL PRESSURE SWITCH ASSY**

OK

2	CHECK HARNESS AND CONNECTOR(OIL PRESSURE SWITCH FOR VVTL - ECM)

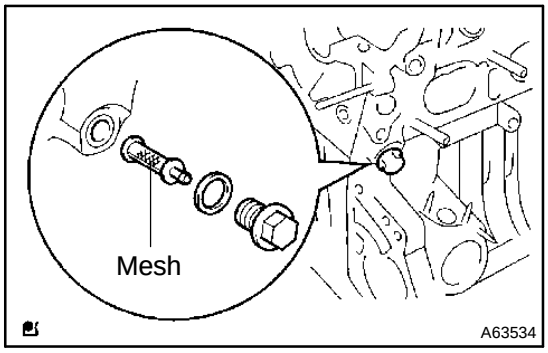


(a) Disconnect the oil pressure switch connector.
(b) Disconnect the ECM E8 connector.
(c) Check for open between the terminals OSW of the ECM connector and oil pressure switch connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals OSW and E2 of the ECM connector.
Resistance: 1 MΩ or more

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

OK

3	CHECK OIL CONTROL VALVE FILTER



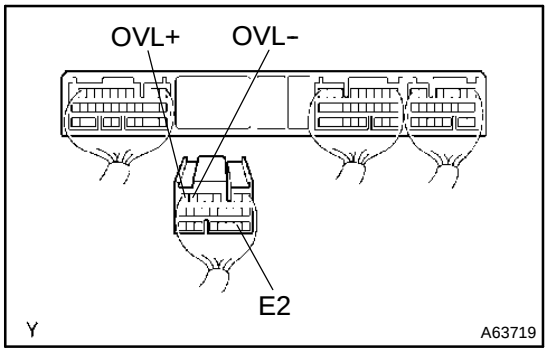
(a) Remove the generator. (See page 19-8)
(b) Remove the oil control valve filter.
(c) Check the oil control valve filter.
(1) Confirm that the filter is clear.
(d) Place a new gasket on the bolt and install the filter.
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

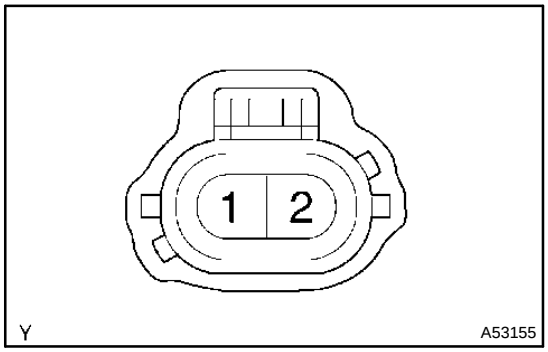
NG → **REPLACE OIL CONTROL VALVE FILTER**

OK

CONTINUED

4	CHECK HARNESS AND CONNECTOR(OCV FOR VVTL - ECM)





(a) Disconnect the ECM E8 connector.
(b) Disconnect the camshaft timing oil control valve connector.
(c) Check for open between the terminals OVL+ of the ECM connector and 1 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals OVL+ of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more
(e) Check for open between the terminals OVL- of the ECM connector and 2 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(f) Check for short between the terminals OVL- of the ECM connector and E2 of the ECM connector.
Resistance: 1 MΩ or more

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

OK

CHECK AND REPLACE ECM

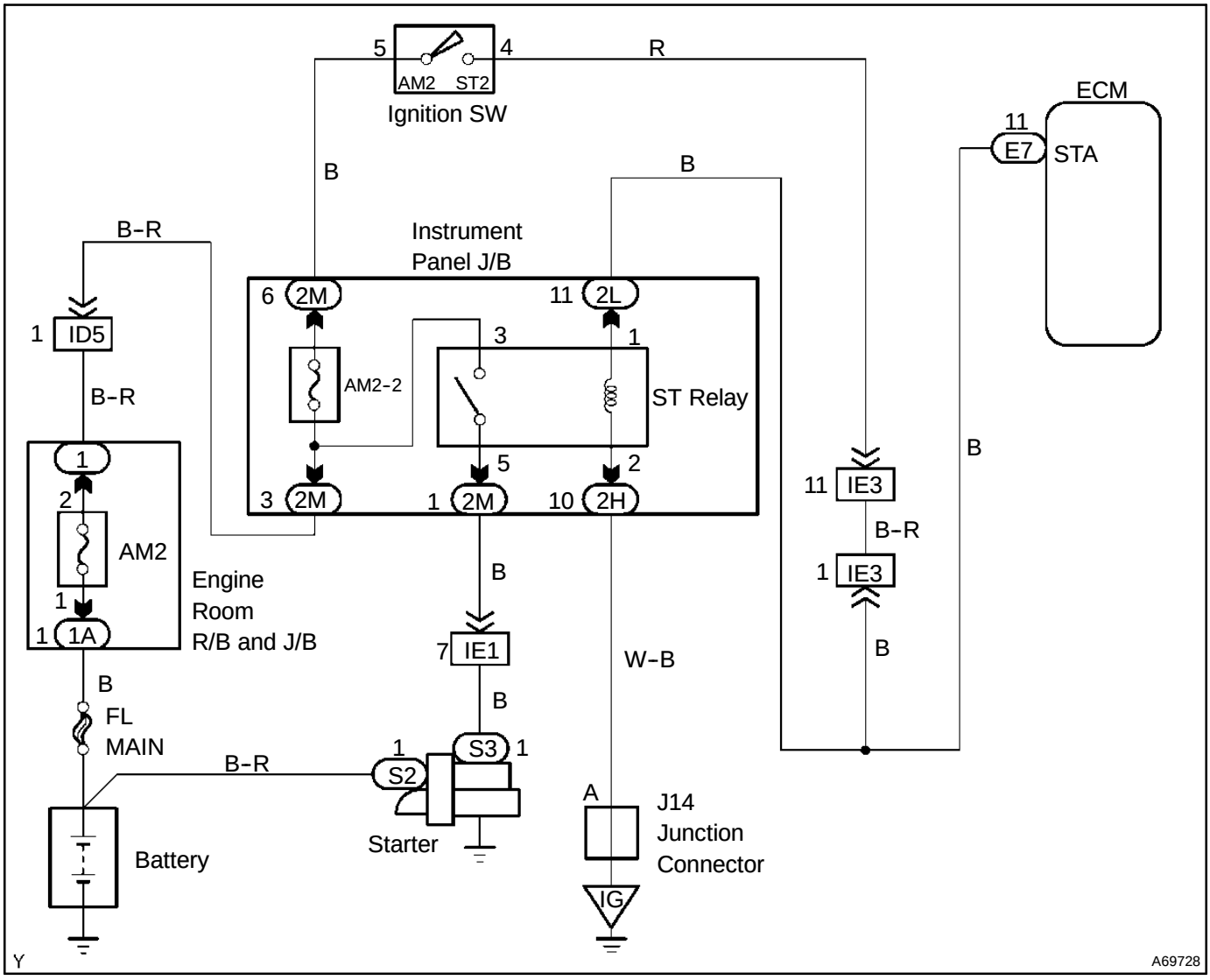
CONTINUED

STARTER SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

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

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

This diagnostic chart is based on the premise that the engine is being cranked under normal conditions. If the engine does not crank, proceed to the problem symptoms table on page 05-19.

CONTINUED

When using hand-held tester:

1	READ VALUE OF HAND-HELD TESTER(STARTER SIGNAL)

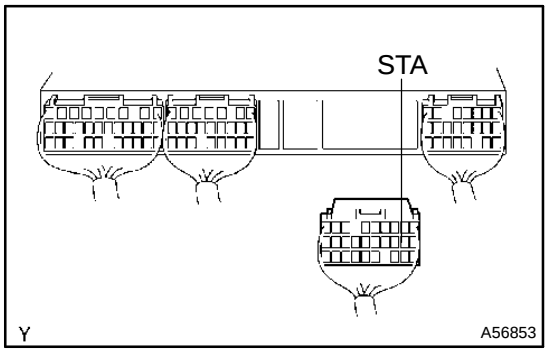
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Read the STA signal on the hand-held tester while the starter is operating.
Result:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

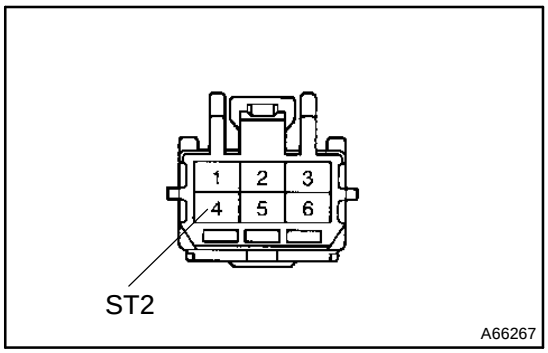
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE**

NG

2	CHECK HARNESS AND CONNECTOR(ECM - IGNITION SWITCH)



(a) Disconnect the ECM E7 connector.
(b) Disconnect the ignition switch connector.
(c) Check for open between the terminals STA of the ECM connector and ST2 of the ignition switch connector.
Resistance: 1 Ω or less
(d) Check for short between the terminal STA of the ECM connector and body ground.
Resistance: 1 MΩ or more



OK → **CHECK AND REPLACE ECM**

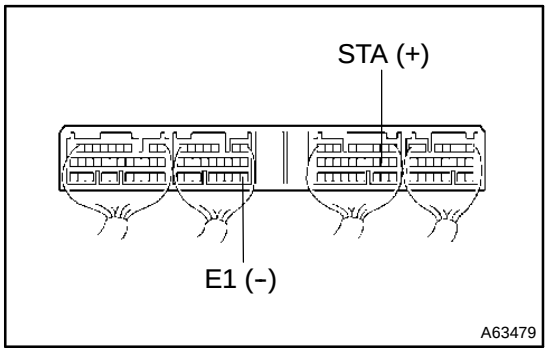
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

CONTINUED

When not using hand-held tester:

1	INSPECT ECM(CHECK VOLTAGE)

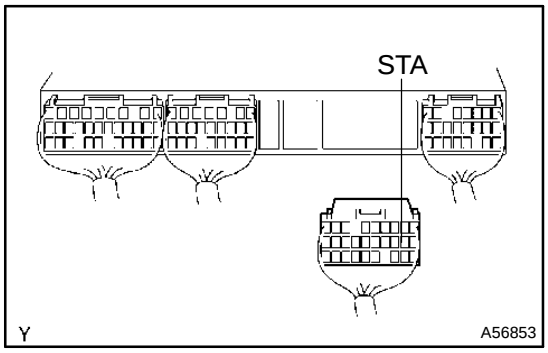


(a) Turn the ignition switch ON.
(b) Measure the voltage between the terminals STA and E1 of the ECM connectors, during the engine cranking.
Voltage: 6 V or more

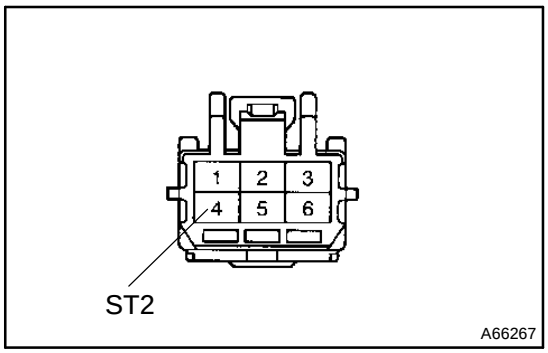
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE**

NG

2	CHECK HARNESS AND CONNECTOR(ECM - IGNITION SWITCH)



(a) Disconnect the ECM E7 connector.
(b) Disconnect the ignition switch connector.
(c) Check for open between the terminals STA of the ECM connector and ST2 of the ignition switch connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals STA of the ECM connector and body ground.
Resistance: 1 MΩ or more



OK → **CHECK AND REPLACE ECM**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

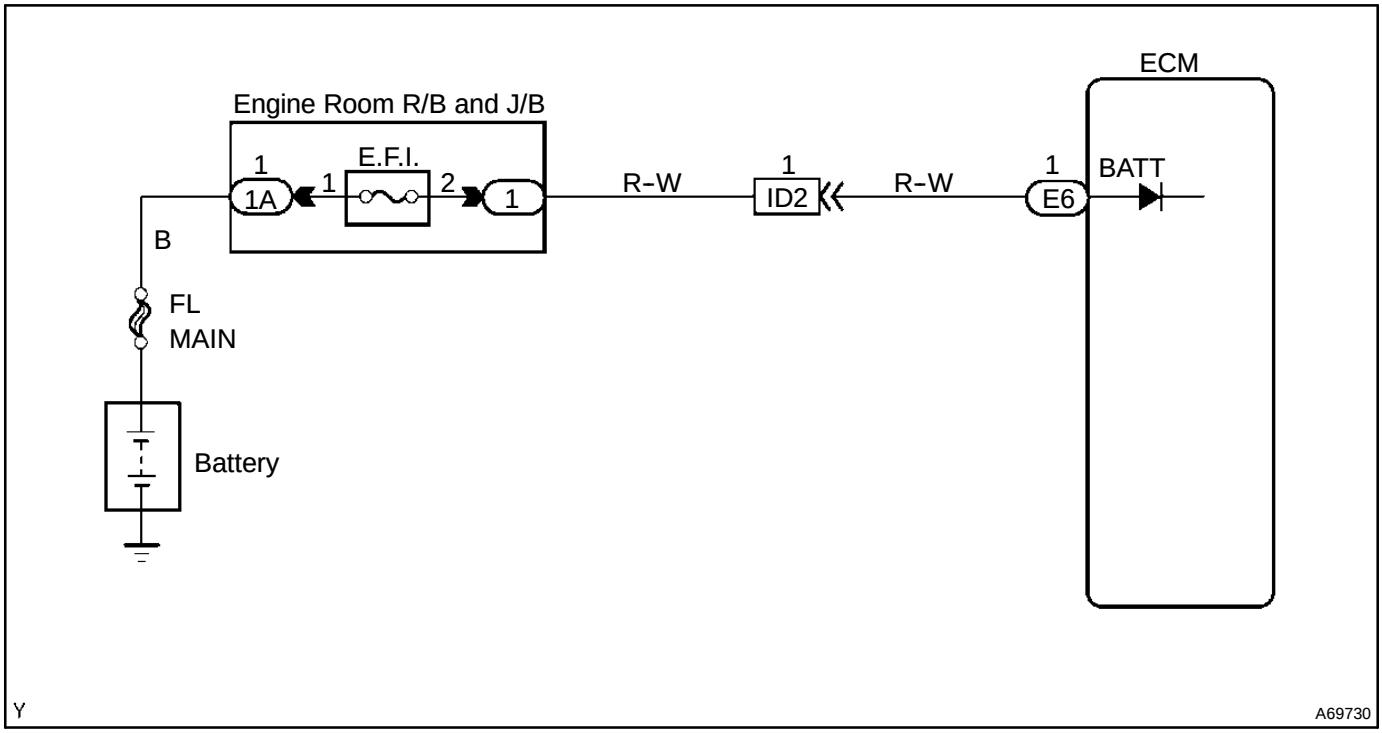
CONTINUED

ECM BACK-UP POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

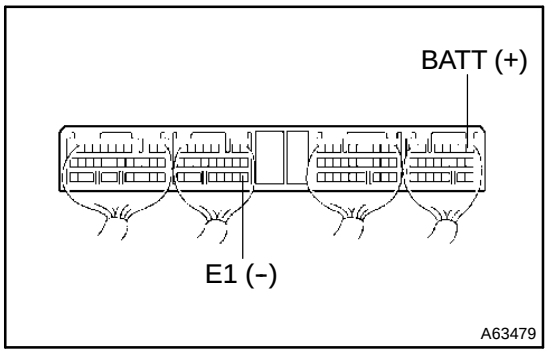
Battery positive voltage is supplied to terminal BATT of the ECM even when the ignition switch is OFF for use by the DTC memory and air-fuel ratio adaptive control value memory, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ECM(CHECK VOLTAGE)



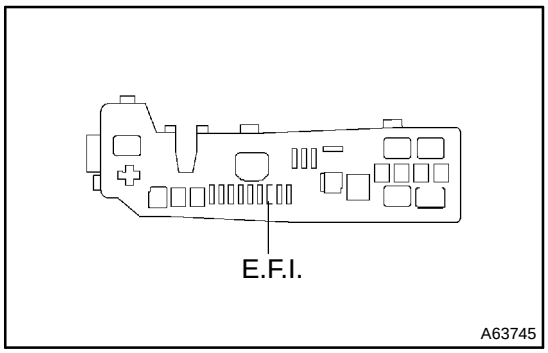
(a) Measure the voltage between terminals BATT and E1 of the ECM connectors.
Voltage: 9 - 14 V

OK	PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE

NG

CONTINUED

2	CHECK FUSE(E.F.I. FUSE)



(a) Measure the resistance of E.F.I. fuse.
Resistance: 1 Ω or less

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - BATTERY)**

NG

CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED E.F.I. FUSE

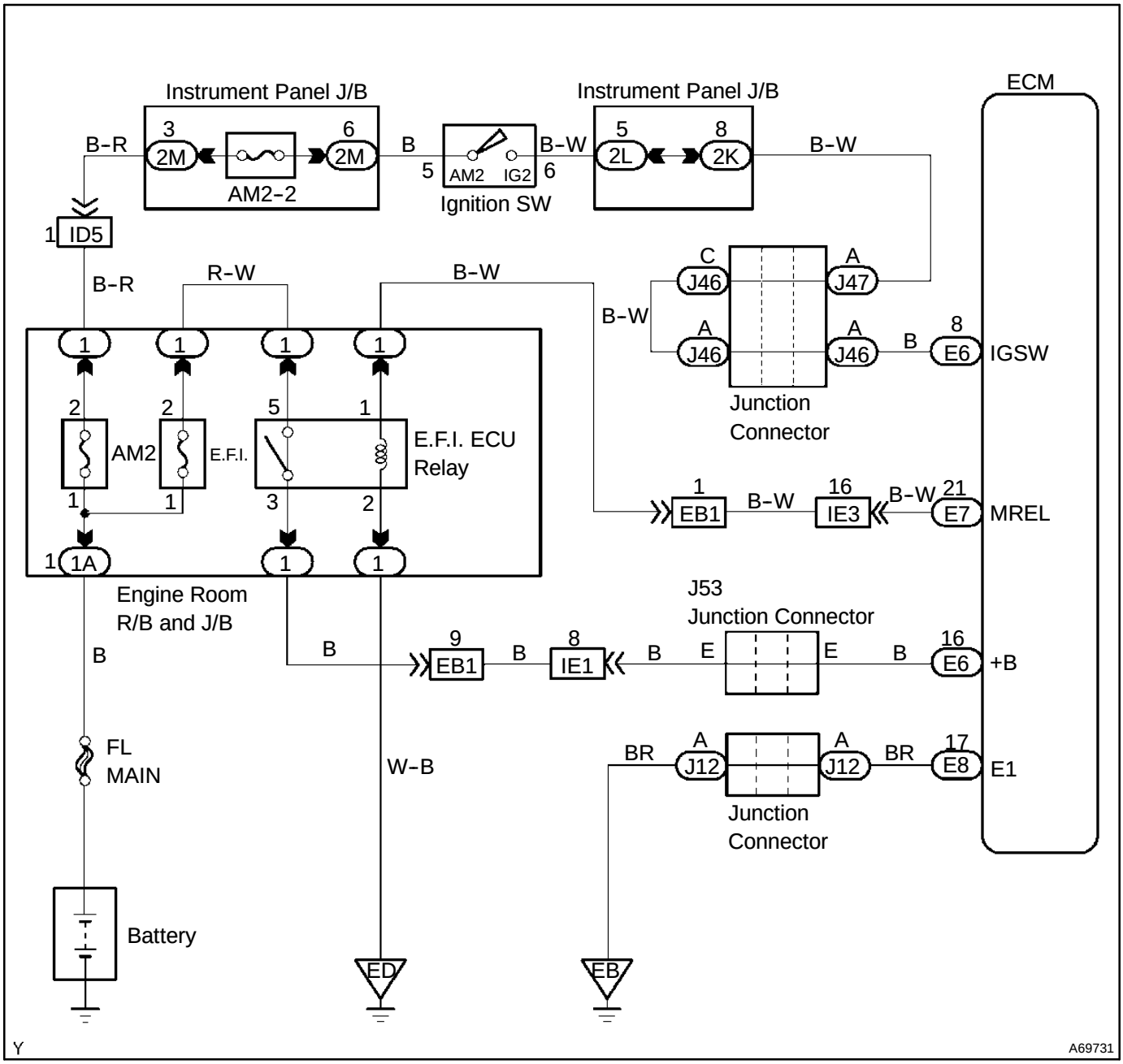
CONTINUED

ECM POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

When the ignition switch is turned ON, battery positive voltage is applied to terminal IGSW of the ECM and the E.F.I. ECU relay control circuit in the ECM sends a signal to the terminal MREL of the ECM switching on the E.F.I. ECU relay.
This signal causes current to flow to the coil, closing the contacts of the E.F.I. ECU relay and supplying power to terminal +B of the ECM.

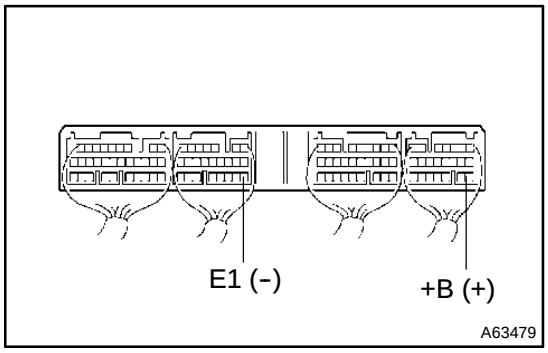
WIRING DIAGRAM



CONTINUED

INSPECTION PROCEDURE

1	INSPECT ECM(CHECK VOLTAGE)

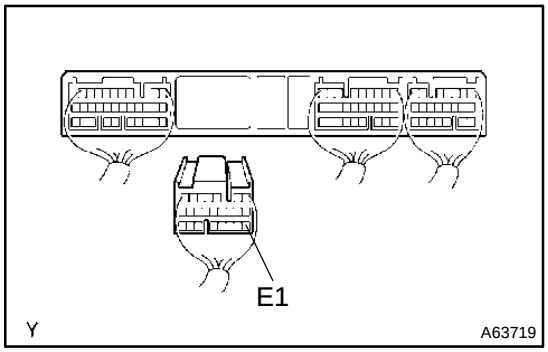


(a) Turn the ignition switch ON.
(b) Measure the voltage between the terminals +B and E1 of the ECM connectors.
Voltage: 9 - 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE**

NG

2	CHECK HARNESS AND CONNECTOR(ECM GROUND)



(a) Disconnect the ECM E8 connector.
(b) Check for open between the terminal E1 of the ECM connector and body ground.
Resistance: 1 Ω or less

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

OK

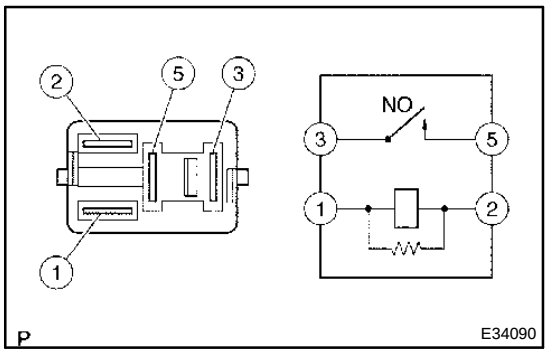
3	CHECK FUSE(E.F.I. FUSE) (See page 05-96)

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED E.F.I. FUSE**

OK

CONTINUED

4 INSPECT E.F.I ECU RELAY



(a) Measure the resistance between the terminals shown below.

Resistance:

Terminal No.	Resistance
1 - 2	1 Ω or less
3 - 5	1 MΩ or more

(b) Measure the resistance between the terminals 3 and 5 of the connector when the battery voltage is applied to the terminals between 1 and 2.

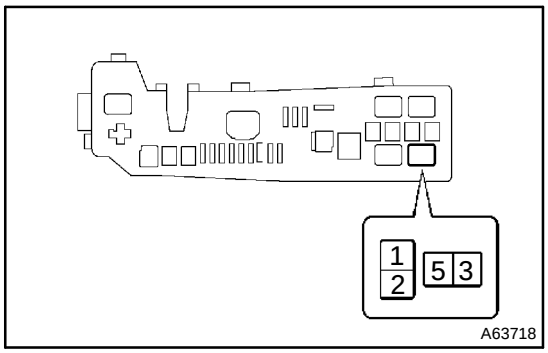
Resistance:

Terminal No.	Resistance
3 - 5	1 Ω or less

NG → **REPLACE E.F.I ECU RELAY**

OK

5 CHECK RELAY OPERATION(E.F.I. ECU RELAY)



(a) Confirm that the E.F.I. ECU relay operates normally when turning the ignition switch ON.

Result:

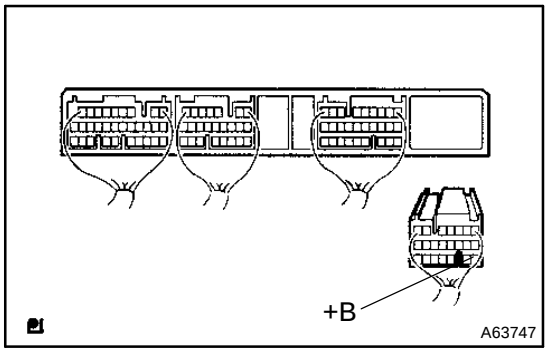
E.F.I. ECU relay operation sound is heard successively when turning the ignition switch ON.

NG → **Go to step 7**

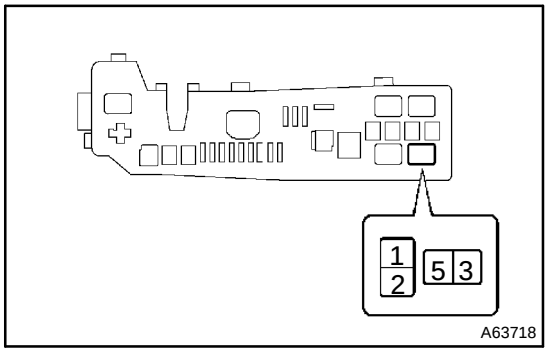
OK

CONTINUED

6	CHECK HARNESS AND CONNECTOR(ECM - E.F.I. ECU RELAY)



(a) Disconnect the ECM E6 connector.
(b) Remove the E.F.I. ECU relay.
(c) Check for open between the terminals +B of the ECM connector and 3 of the E.F.I. ECU relay side connector.
Resistance: 1 Ω or less
(d) Check for short between the terminal +B of the ECM connector and body ground.
Resistance: 1 MΩ or more

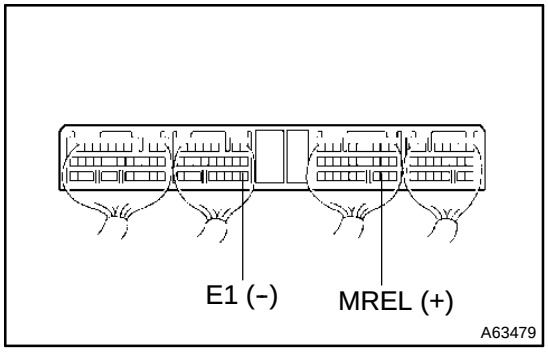


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR(E.F.I. ECU RELAY - BATTERY)

7	INSPECT ECM(CHECK VOLTAGE)



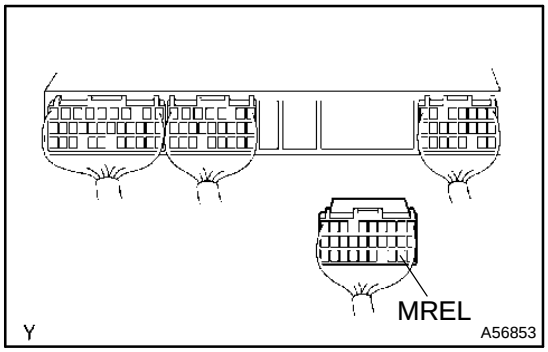
(a) Turn the ignition switch ON.
(b) Measure the voltage between the terminals MREL and E1 of the ECM connectors.
Voltage: 9 - 14 V

NG → **Go to step 9**

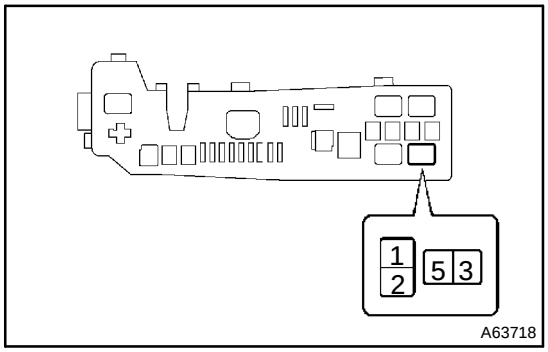
OK

CONTINUED

8	CHECK HARNESS AND CONNECTOR(ECM - E.F.I. ECU RELAY)



(a) Disconnect the ECM E7 connector.
(b) Remove the E.F.I. ECU relay.
(c) Check for open between the terminals MREL of the ECM connector and 1 of the E.F.I. ECU relay side connector.
Resistance: 1 Ω or less
(d) Check for short between the terminal MREL of the ECM connector and body ground.
Resistance: 1 MΩ or more

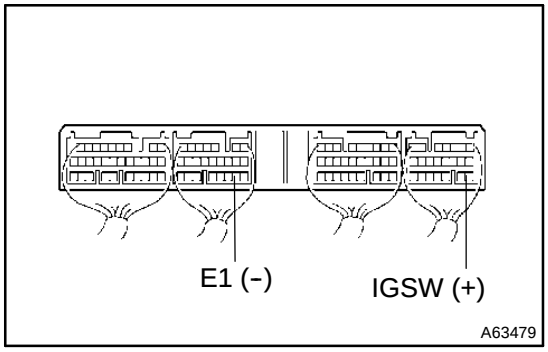


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (E.F.I. ECU RELAY - BODY GROUND)

9	INSPECT ECM(CHECK VOLTAGE)



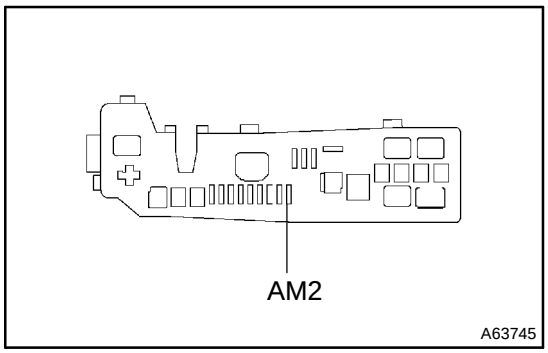
(a) Turn the ignition switch ON.
(b) Measure the voltage between the terminals IGSW and E1 of the ECM connectors.
Voltage: 9 - 14 V

OK → **CHECK AND REPLACE ECM**

NG

CONTINUED

10	CHECK FUSE(AM2 FUSE)

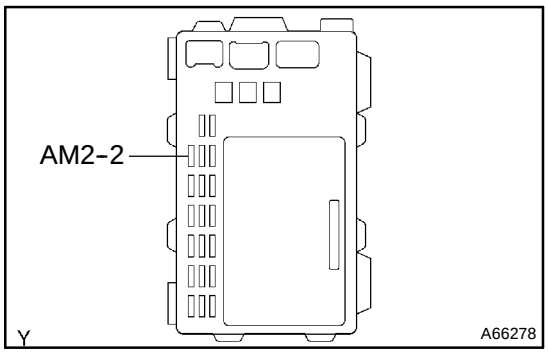


(a) Measure the resistance of AM2 fuse.
Resistance: 1 Ω or less

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED AM2 FUSE**

OK

11	CHECK FUSE(AM2-2 FUSE)

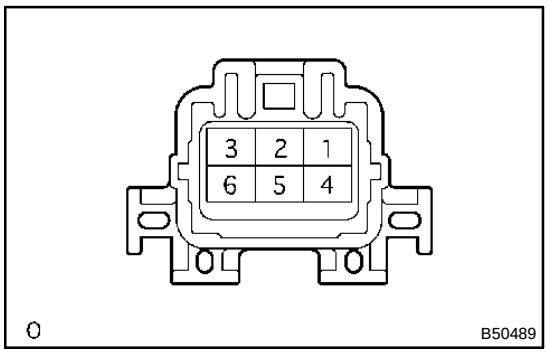


(a) Measure the resistance of AM2-2 fuse.
Resistance: 1 Ω or less

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED AM2-2 FUSE**

OK

12	INSPECT IGNITION OR STARTER SWITCH ASSY



(a) Measure the resistance between the connector terminals shown in the chart below.

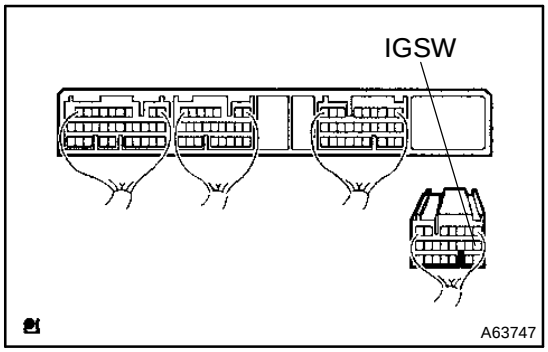
Switch	Terminal No.	Resistance
LOCK	All Terminals	1 MΩ or more
ACC	1-3	1 Ω or less
ON	1-2-3 5-6	1 Ω or less
START	4-5-6 1-2	1 Ω or less

NG → **REPLACE IGNITION OR STARTER SWITCH ASSY**

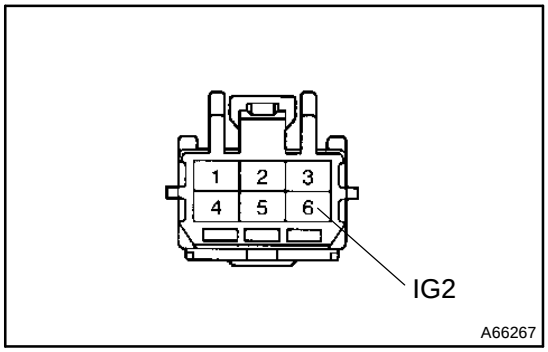
CONTINUED

OK

13	CHECK HARNESS AND CONNECTOR(IGNITION SWITCH – ECM)



(a) Disconnect the ECM E6 connector.
(b) Disconnect the ignition switch connector.
(c) Check for open between the terminals IGSW of the ECM connector and IG2 of the ignition switch connector.
Resistance: 1 Ω or less
(d) Check for short between the terminal IGSW of the ECM connector and body ground.
Resistance: 1 MΩ or more



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

OK

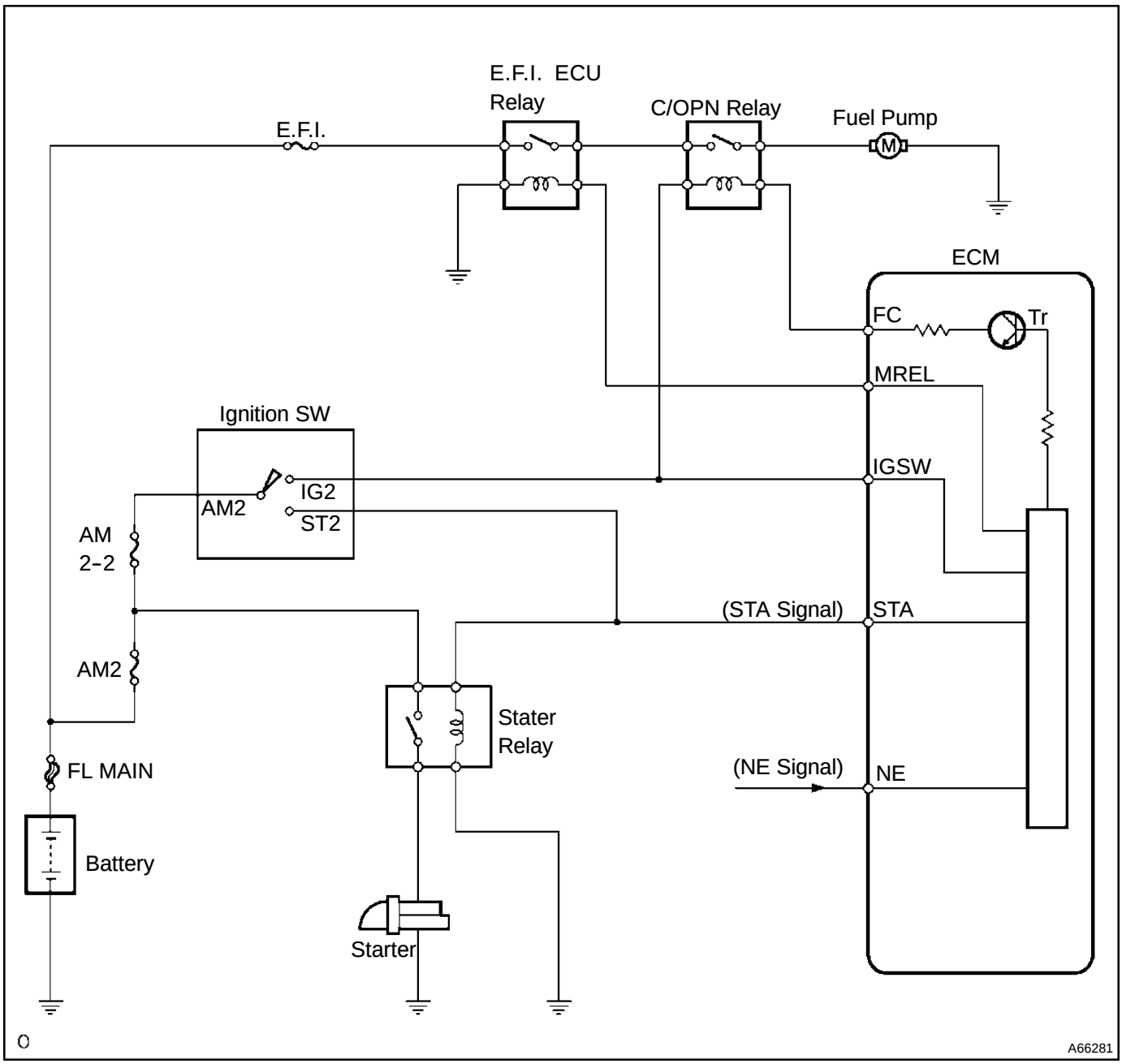
REPAIR OR REPLACE HARNESS OR CONNECTOR (IGNITION SWITCH – BATTERY)

CONTINUED

FUEL PUMP CONTROL CIRCUIT

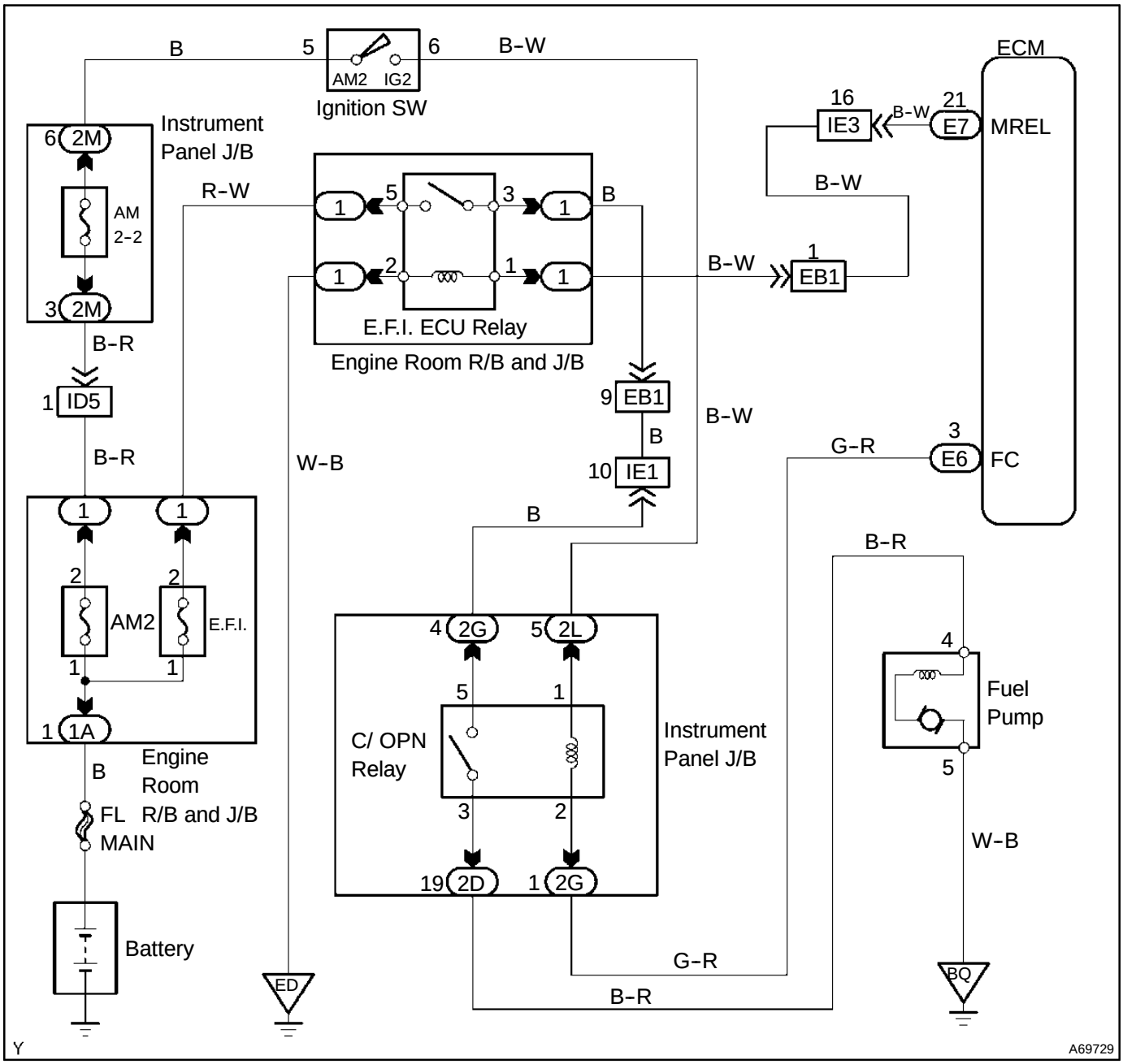
CIRCUIT DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal ST2 of the ignition switch to the starter relay coil and also current flows to terminal STA of ECM (STA signal).
When the STA signal and NE signal are input to the ECM, Tr is turned ON, current flows to the coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump and the fuel pump operates. While the NE signal is generated (engine running), the ECM keeps Tr ON (circuit opening relay ON) and the fuel pump also keeps operating.



CONTINUED

WIRING DIAGRAM



INSPECTION PROCEDURE

When using hand-held tester:

1	**PERFORM ACTIVE TEST BY HAND-HELD TESTER(OPERATION OF CIRCUIT OPENING RELAY)**

(a) Select the ACTIVE TEST mode on the hand-held tester.
(b) Turn the ignition switch ON, and perform the active test at the engine stop.
Result: The circuit opening relay operates.

OK → **Go to step 5**

NG

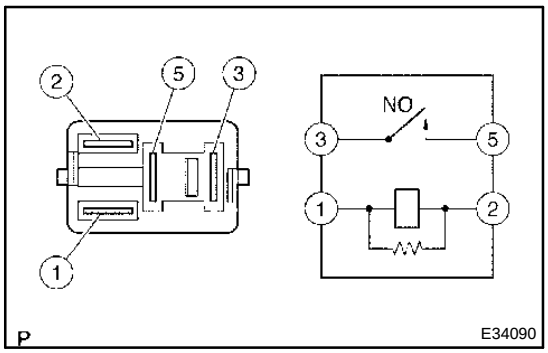
CONTINUED

2	CHECK FOR ECM POWER SOURCE CIRCUIT (See page 05-98)

NG → REPAIR OR REPLACE

OK

3	INSPECT E.F.I. CIRCUIT OPENING RELAY ASSY



(a) Measure the resistance between the terminals shown below.

Resistance:

Terminal No.	Resistance
1 - 2	1 Ω or less
3 - 5	1 MΩ or more

(b) Measure the resistance between the terminals 3 and 5 of the connector when the battery voltage is applied to the terminals between 1 and 2.

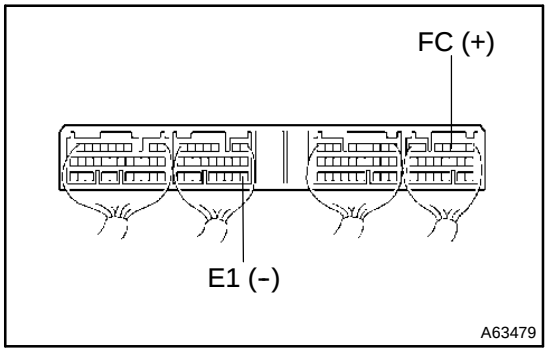
Resistance:

Terminal No.	Resistance
3 - 5	1 Ω or less

NG → REPLACE E.F.I. CIRCUIT OPENING RELAY ASSY

OK

4	INSPECT ECM(CHECK VOLTAGE)



(a) Turn the ignition switch ON.

(b) Measure the voltage between the terminal FC and E1 of the ECM connectors.

Voltage: 9 - 14 V

OK → CHECK AND REPLACE ECM

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (E.F.I. CIRCUIT OPENING RELAY - ECM)

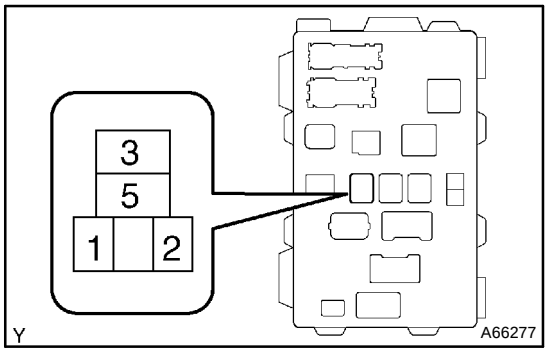
5	INSPECT FUEL PUMP ASSY (See page 11-7)

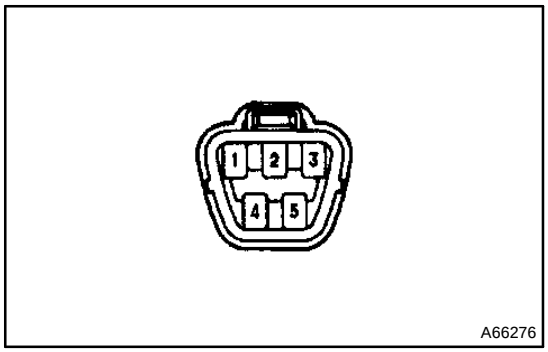
NG → REPLACE FUEL PUMP ASSY

CONTINUED

OK

6	CHECK HARNESS AND CONNECTOR(E.F.I. CIRCUIT OPENING RELAY - FUEL PUMP, FUEL PUMP - BODY GROUND)



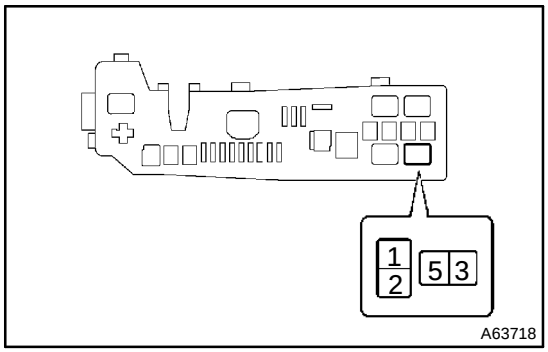


(a) Remove the E.F.I. circuit opening relay.
(b) Disconnect the fuel pump connector.
(c) Check for open between the terminals 3 of the E.F.I. circuit opening relay side connector and 4 of the fuel pump connector.
Resistance: 1 Ω or less
(d) Check for short between the terminal 4 of the fuel pump connector and body ground.
Resistance: 1 MΩ or more
(e) Check for open between the terminal 5 of the fuel pump connector and body ground.
Resistance: 1 Ω or less

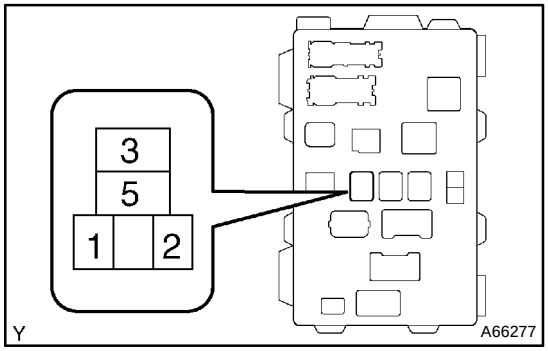
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - E.F.I. CIRCUIT OPENING RELAY)



(a) Remove the E.F.I. ECU relay.
(b) Remove the E.F.I. circuit opening relay.
(c) Check for open between the terminals 3 of the E.F.I. ECU relay side connector and 5 of the E.F.I. circuit opening relay side connector.
Resistance: 1 Ω or less
(d) Check for short between the terminal 3 of the E.F.I. ECU relay side connector and body ground.
Resistance: 1 MΩ or more



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

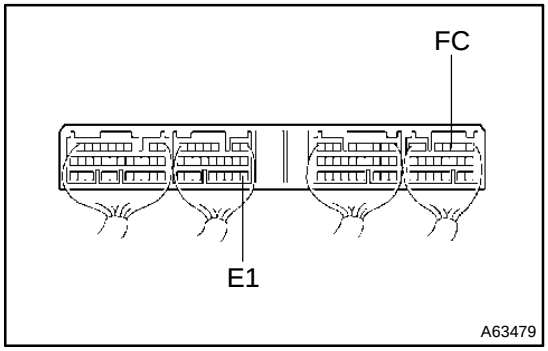
OK

CONTINUED

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE

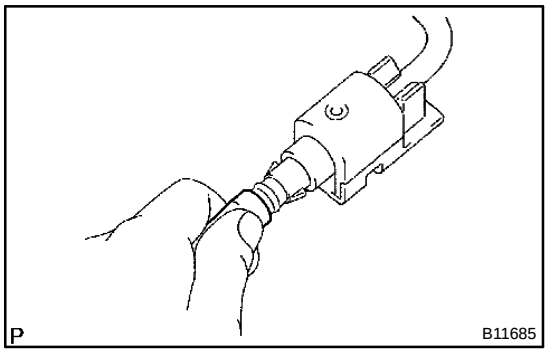
When not using hand-held tester:

1 CHECK OPERATION OF FUEL PUMP



(a) Turn the ignition switch ON.
(b) Connect between the terminals FC and E1 of the ECM connectors.
(c) Check for fuel pressure in the fuel inlet hose when it is pinched off.
Result: There is pressure in fuel inlet hose.

HINT:
At this time, you will hear the fuel return flowing noise.



OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE**

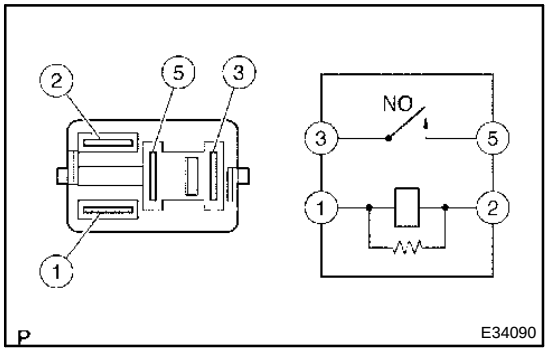
NG

2 CHECK FOR ECM POWER SOURCE CIRCUIT (See page 05-98)

NG → **REPAIR OR REPLACE**

OK

3 INSPECT E.F.I. CIRCUIT OPENING RELAY ASSY



(a) Measure the resistance between the terminals shown below.
Resistance:

Terminal No.	Resistance
1 - 2	1 Ω or less
3 - 5	1 MΩ or more

(b) Measure the resistance between the terminals 3 and 5 of the connector when the battery voltage is applied to the terminals between 1 and 2.
Resistance:

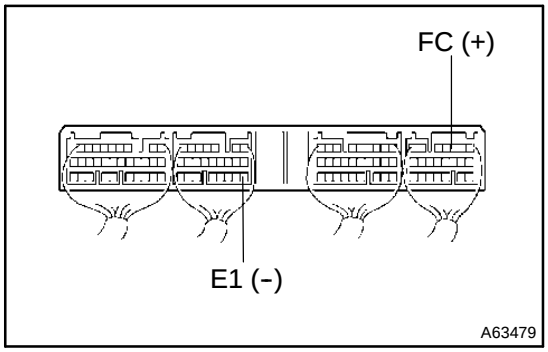
Terminal No.	Resistance
3 - 5	1 Ω or less

CONTINUED

NG → REPLACE E.F.I. CIRCUIT OPENING RELAY ASSY

OK

4	INSPECT ECM(CHECK VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure the voltage between the terminals FC and E1 of the ECM connectors.
Voltage: 9 - 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

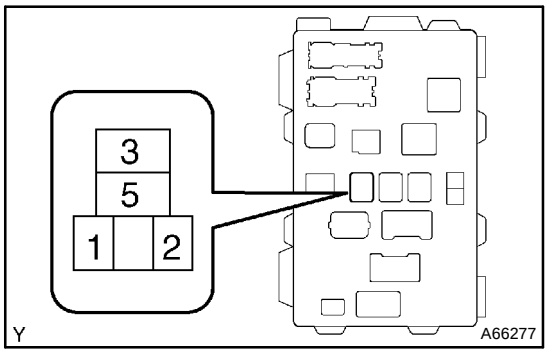
OK

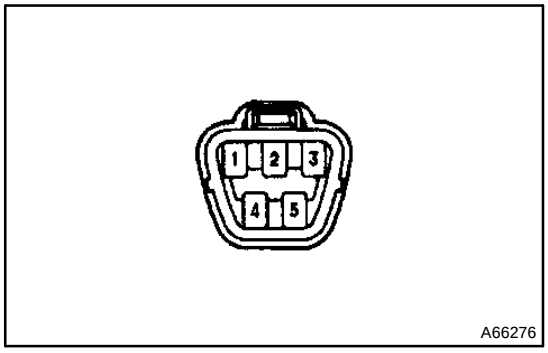
5	INSPECT FUEL PUMP ASSY (See page 11-7)

NG → REPLACE FUEL PUMP ASSY

OK

6	CHECK HARNESS AND CONNECTOR(E.F.I. CIRCUIT OPENING RELAY - FUEL PUMP, FUEL PUMP - BODY GROUND)





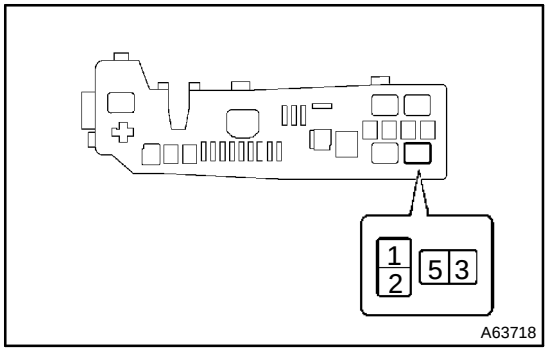
(a) Remove the E.F.I. circuit opening relay.
(b) Disconnect the fuel pump connector.
(c) Check for open between the terminals 3 of the E.F.I. circuit opening relay side connector and 4 of the fuel pump connector.
Resistance: 1 Ω or less
(d) Check for short between the terminal 4 of the fuel pump connector and body ground.
Resistance: 1 MΩ or more
(e) Check for open between the terminal 5 of the fuel pump connector and body ground.
Resistance: 1 Ω or less

CONTINUED

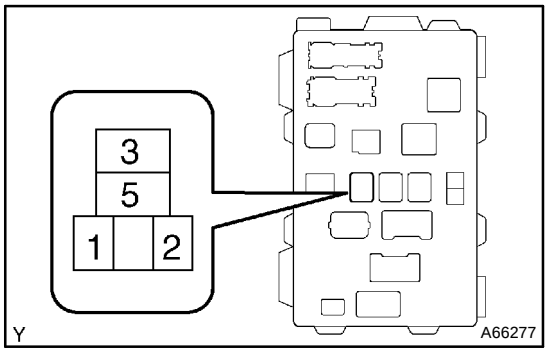
NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

7	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - E.F.I. CIRCUIT OPENING RELAY)



(a) Remove the E.F.I. ECU relay.
(b) Remove the E.F.I. circuit opening relay.
(c) Check for open between the terminals 3 of the E.F.I. ECU relay side connector and 5 of the E.F.I. circuit opening relay side connector.
Resistance: 1 Ω or less
(d) Check for short between the terminal 3 of the E.F.I. ECU relay side connector and body ground.
Resistance: 1 MΩ or more



NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK AND REPLACE ECM

CONTINUED

EFI SYSTEM (4ZZ-FE)

HOW TO PROCEED WITH TROUBLESHOOTING

0504C-07

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (See page 05-115)

3	CONNECT THE HAND-HELD TESTER TO DLC3

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

4	CHECK DTC AND FREEZED FRAME DATA (See page 05-116)

HINT:
Record or print DTC and Freezed Frame Data, if needed.

5	CLEAR DTC AND FREEZED FRAME DATA (See page 05-116)

6	VISUAL INSPECTION

7	PROBLEM SYMPTOM CONFIRMATION

HINT:
If the engine does not start, perform step 9 and 11 first.

A	Malfunction does not occur
B	Malfunction occurs

B → GO TO STEP 9

A

8	SYMPTOM SIMULATION

CONTINUED

9	DTC CHECK (See page 05-116)

A	Malfunction code
B	No code

B → GO TO STEP 11

A

10	DTC CHART (See page 05-122)

GO TO STEP 13

11	BASIC INSPECTION (See page 05-116)

A	Not confirm wrong parts
B	Confirm wrong parts

B → GO TO STEP 16

A

12	PROBLEM SYMPTOMS TABLE (See page 05-128)

A	Confirm wrong circuit
B	Confirm wrong Parts

B → GO TO STEP 16

A

13	CHECK ECM POWER SOURCE CIRCUIT (See page 05-197)

14	CIRCUIT INSPECTION

A	Not confirm malfunction
B	Confirm malfunction

B → GO TO STEP 17

A

CONTINUED

15	CHECK FOR INTERMITTENT PROBLEMS

GO TO STEP 17

16	PARTS INSPECTION

17	IDENTIFICATION OF PROBLEM

18	ADJUSTMENT, REPAIR

19	CONFIRMATION TEST

END

CONTINUED

0504B–07

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name _____

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

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

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

Condition of check engine warning light (CHK ENG)		☐ Remains on ☐ Sometimes light up ☐ Does not light up
DTC Inspection	Normal mode (Precheck)	☐ Normal ☐ Malfunction code(s) (code) ☐ Freezed frame data ( )
	Check Mode	☐ Normal ☐ Malfunction code(s) (code) ☐ Freezed frame data ( )

CONTINUED

058ZB–01

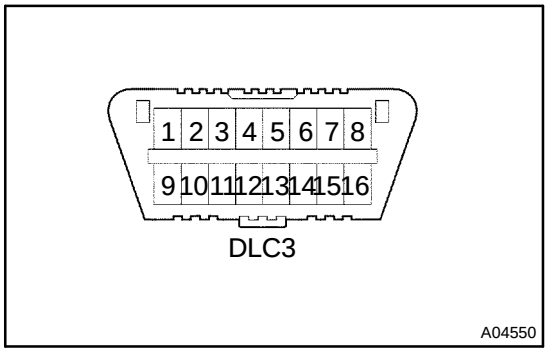
PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description for M–OBD

- When troubleshoot Multiplex OBD (M–OBD) vehicles, the only difference from the usual troubleshooting procedure is that you connect the hand–held tester to the vehicle, and read off various data output from the vehicle's ECM.
- The vehicle's on–board computer indicates the check engine warning light (CHK ENG) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components. In addition to an indication of the CHK ENG when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) are recorded in the ECM memory (See page 05–122). When the malfunction does not reoccur, the CHK ENG is indicated until the ignition switch is turned off, and then the CHK ENG is not indicated when the ignition switch is turned on but the DTCs remain recorded in the ECM memory.
- To check the DTCs, connect the hand–held tester to Data Link Connector 3 (DLC3) on the vehicle. The hand–held tester also enables you to erase the DTCs and check freezed frame data and various forms of engine data. (For operating instructions, see the instruction book.)
- The diagnosis system operates in the normal mode during normal vehicle use. Most DTCs use 3 trip detection logic* to prevent erroneous detection, and ensure thorough malfunction detection.
- * 3 trip detection logic
  When a logic malfunction is first detected, the malfunction is temporally stored in the ECM memory. If the same malfunction is detected again during the second and third drive test, this third detection cases the CHK ENG to light up.
  The 3 trip repeats the same mode for 3 times (However, the ignition switch must be turned OFF between the 1st trip and 2nd and 3rd trip).
- Freeze frame data:
  Freeze frame data records the engine conditions (fuel system, calculator load, water temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

CONTINUED

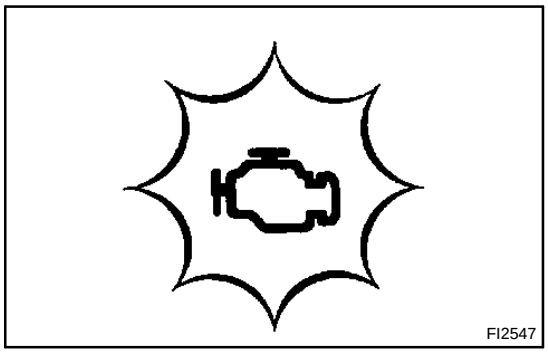


(b) Check the DLC3.
The vehicle's ECM uses the ISO 14230(M–OBD) communication protocol. The terminal arrangement of DLC3 complies with ISO 15031–03 and matches the ISO 14230 format.

Terminal No.	Connection / Voltage or Residence	Condition
7	Bus + Line / Pulse generation+	During transmission
4	Chassis Ground ↔ Body Ground / 1 Ω or less	Always
16	Battery Positive ↔ Body Ground / 9 – 14 V	Always

HINT:
If the display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of the hand–held tester to 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 is when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Debarment listed in the tool,s instruction manual.



2. INSPECT DIAGNOSIS (Normal Mode)

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

HINT:
If the check engine warning (CHK ENG) does not light up, troubleshoot the combination meter.

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

(b) Check the DTC, using hand–held tester.
(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.

CONTINUED

(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's instruction book.)

(5) See page 05-122 to confirm the details of the DTCs.

NOTICE:

- **When simulating symptoms without a hand-held tester to check the DTCs, use normal mode. For codes on the DTCs, chart subject to "3 trip detection logic", turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again. When the problem has been simulated three times, the check engine warning light lights up and the DTCs, are recorded in the ECM.**
- **Check the 1st trip DTC using Mode7 for ISO 15031. (Continuous Test Results of Euro-OBD function in hand-held tester)**

(c) Clear the DTC.

The following actions will erase the DTCs and freezed frame data.

- Operating the hand-held tester to erase the codes. (See the hand-held tester's instruction book for operating instructions.)
- Disconnecting the battery terminals or E.F.I. fuse more than 5 minutes.

3. FAIL-SAFE CHART

If any of the following codes is recorded, the ECM enters fail-safe mode.

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0102 P0103	Vary with engine speed and VTA	Returned to normal condition
P0112 P0113	Intake air temp. is fixed at 20°C (68°F)	Returned to normal condition
P0117 P0118	Water temp. is estimated from intake air temp. and intake air flow	Returned to normal condition
P0122 P0123	VTA is calculated from engine speed	The following condition must be repeated at least 2 times consecutively When closed throttle position switch is ON: VTA ≧ 0.1 V and ≦ 0.95 V
P0135	Fuel adaptation control is stopped and the heater is turned off in case the heater circuit is shorted	IG switch OFF
P0327	Max. timing retardation	IG switch OFF

CONTINUED

4. ENGINE OPERATING CONDITION

NOTICE:

The values given below for ”Normal Condition” are representative values, so a vehicle may still be normal even if its value from those listed here. So do not decide whether a part is faulty or not solely according to the ”Normal Condition” here.

Hand–held tester display	Measurement Item	Normal Condition*1
FUEL SYS #1	Fuel System Bank 1 OPEN: Air–fuel ratio feedback stopped CLOSED: Air–fuel ratio feedback operating	Idling after warming up: CLOSED
CALC LOAD	Calculator Load: Current intake air volume as a proportion of max. intake air volume	Idling: 0 – 20 % Racing without load (2,500rpm): 0 – 20 %
COOLANT TEMP./WATER TEMP.	Engine Coolant Temp. Sensor Value	After warming up: 80 – 95°C (176 – 203°F)
SHORT FT #1	Short–term Fuel Trim Bank 1	0 ± 20%
LONG FT #1	Long–term Fuel Trim Bank 1	0 ± 20%
ENGINE SPD	Engine Speed	Idling: 600 – 700 rpm
VEHICLE SPD	Vehicle Speed	Vehicle Stopped: 0 km/h (0 mph)
IGN ADVANCE	Ignition Advance: Ignition Timing of Cylinder No. 1	Idling: BTDC 3 – 13°
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to Ambient Temp.
THROTTLE POS	Voltage Output of Throttle Position Sensor Calculated as a percentage	Throttle Fully Closed: 0 – 0.8 % Throttle Fully Open: 68 – 88 %
O2S B1, S1	Voltage Output of Oxygen Sensor Bank 1, Sensor 1	Idling: 0.1 – 0.9 V
O2FT B1, S1	Oxygen Sensor Fuel Trim Bank 1, Sensor 1 (Same as SHORT FT #1)	0 ± 20 %
MIL ON RUN DIST	Distance since activation of check engine warning light	When there is no DTC: 0 km (0 mph)
INJECTOR	Fuel injection time for cylinder No.1	Idling: 1.92 – 3.37 ms
MISFIRE RPM	Engine RPM for first misfire range	Misfire 0: 0 rpm
MISFIRE LOAD	Engine LOAD for first misfire range	Misfire 0: 0 g/r
STARTER SIG	Starter Signal	Cranking: ON
A/C SIG	A/C Switch Signal	A/C ON: ON
ELECTRCL LOAD SIG	Electrical Load Signal	Defogger switch ON: ON
CTP SW	Closed Throttle Position Switch Signal	Throttle Fully Closed: ON
STOP LIGHT SW	Stop Light Switch Signal	Stop light switch ON: ON
PS OIL PRESS SW	Power Steering Oil Pressure Switch Signal	Turn steering wheel: ON
FC IDL	Fuel Cut Idle: Fuel cut when throttle valve fully closed, during deceleration	Fuel cut operating: ON
FC TAU	Fuel Cut TAU: Fuel cut during very light load	Fuel cut operating: ON
CYL#1, CYL#2, CYL#3, CYL#4	Abnormal revolution variation for each cylinder	0 %
IGNITION	Total number of ignition for every 1,000 revolutions	0 – 300
INTAKE CTRL VSV	Intake Air Control Valve VSV Signal	VSV operating: ON
A/C CUT SIG	A/C Cut Signal	A/C S/W OFF: ON
FUEL PUMP	Fuel Pump Signal	Idling: ON
EVAP (PURGE) VSV	EVAP VSV Signal	VSV operating: ON
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.5 – 1.4

CONTINUED

O2 LR B1 S1	Oxygen Sensor Lean Rich Bank 1 Sensor 1: Response time for oxygen sensor output to switch from lean to rich	Idling after warming up: 0 - 1,000 msec.
O2 RL B1 S1	Oxygen Sensor Rich Lean Bank 1 Sensor 1: Response time for oxygen sensor output to switch from rich to lean	Idling after warming up: 0 - 1,000 msec.

*1: If no conditions are specifically stated for "Idling", it means the A/C switch is OFF and all accessory switches are OFF.

BASIC INSPECTION

When the malfunction code is not confirmed in the DTC check, troubleshooting should be carried out in the order for all possible circuits to be considered as the causes of the problems. In many cases, by carrying out the basic engine check shown in the following flow chart, the location causing the problem can be found quickly and efficiently. Therefore, use of this check is essential in engine troubleshooting.

1	CHECK BATTERY VOLTAGE

NOTICE:
Carry out this check in engine stoppage condition.

Reference:

	OK	NG
Voltage	11 V or more	less than 11 V

NG → **CHARGE OR REPLACE BATTERY**

OK

2	CHECK IF ENGINE IS CRANKED

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE** **(See page 05-128)**

OK

3	CHECK IF ENGINE STARTS

NG → **GO TO STEP 7**

OK

4	CHECK AIR FILER

(a) Visually check that the air filter is not excessively dirty or oily.

HINT:

If necessary, clean the filter with compressed air. First blow from inside thoroughly, then blow from outside of filter.

NG → **REPAIR OR REPLACE**

CONTINUED

OK

5	CHECK IDLE SPEED (See page 14-93)

NG → PROCEED TO PROBLEM SYMPTOMS TABLE (See page 05-128)

OK

6	CHECK IGNITION TIMING (See page 14-93)

NG → PROCEED TO PAGE 18-4 AND CONTINUE TO TROUBLESHOOT

OK

7	CHECK FUEL PRESSURE (See page 11-34)

NG → PROCEED TO PAGE 11-34 AND CONTINUE TO TROUBLESHOOT

OK

8	CHECK FOR SPARK (See page 18-4)

NG → PROCEED TO PAGE 18-4 AND CONTINUE TO TROUBLESHOOT

OK

PROCEED TO PROBLEM SYMPTOMS TABLE (See page 05-128)

CONTINUED

05046-07

DIAGNOSTIC TROUBLE CODE CHART

HINT:

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

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

DTC No. (See page)	Detection Item	Trouble Area	*1 CHK ENG (MIL)	Memory
P0102 (05-130)	Mass or Volume Air Flow Circuit Low Input	• Open or short in intake air flow meter circuit • Intake air flow meter • ECM	○	○
P0103 (05-130)	Mass or Volume Air Flow Circuit High Input		○	○
P0112 (05-135)	Intake Air Temperature Circuit High Input	• Open or short in intake air temp. sensor circuit • Intake air temp. sensor (built into intake air flow meter) • ECM	○	○
P0113 (05-135)	Intake Air Temperature Circuit Low Input		○	○
P0117 (05-139)	Engine Coolant Temperature Circuit High Input	• Open or short in engine coolant temperature sensor circuit • E.F.I. engine coolant temperature sensor • ECM	○	○
P0118 (05-139)	Engine Coolant Temperature Circuit Low Input		○	○
P0122 (05-142)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Low Input	• Open or short in throttle position sensor circuit • E.F.I. throttle position sensor • ECM	○	○
P0123 (05-142)	Throttle/Pedal Position Sensor/ Switch "A" Circuit High Input		○	○
P0125 (05-146)	Insufficient Coolant Temperature for Closed Loop Fuel Control	• Cooling system • E.F.I. engine coolant temperature sensor • Thermostat	○	○
P0130 (05-147)	Oxygen Sensor Circuit (Bank 1 Sensor 1)	• Open or short in oxygen sensor circuit • Oxygen sensor • Air induction system • Fuel pressure • Fuel injector • ECM	○	○
P0132 (05-147)	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 1)		○	○
P0134 (05-147)	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)		○	○
P0135 (05-154)	Oxygen Sensor Heater Circuit (Bank 1 Sensor 1)	• Open or short in heater circuit of oxygen sensor • Oxygen sensor heater • ECM	○	○

CONTINUED

P0261 (05-157)	Cylinder 1 Injector Circuit Low	• Open or short in fuel injector circuit • Open in fuel injector power source circuit • Fuel injector • ECM	○	○
P0262 (05-157)	Cylinder 1 Injector Circuit High		○	○
P0264 (05-157)	Cylinder 2 Injector Circuit Low		○	○
P0265 (05-157)	Cylinder 2 Injector Circuit High		○	○
P0267 (05-157)	Cylinder 3 Injector Circuit Low		○	○
P0268 (05-157)	Cylinder 3 Injector Circuit High		○	○
P0270 (05-157)	Cylinder 4 Injector Circuit Low		○	○
P0271 (05-157)	Cylinder 4 Injector Circuit High		○	○
P0327 (05-161)	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	• Open or short in knock control sensor circuit • Knock control sensor (looseness) • ECM	○	○
P0335 (05-164)	Crankshaft Position Sensor "A" Circuit	• Open or short in crank position sensor circuit • Crank position sensor • Crankshaft position sensor plate No.1 • ECM	○	○
P0336 (05-164)	Crankshaft Position Sensor "A" Circuit Range/Performance		○	○
P0340 (05-168)	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	• Mechanical system malfunction (skipping teeth of timing chain, chain stretched) • ECM	○	○
P0341 (05-168)	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 or Single Sensor)		○	○
P0342 (05-169)	Camshaft Position Sensor "A" Circuit Low Input (Bank 1 or Single Sensor)	• Open or short in crank position sensor No.1 circuit • Crank position sensor No.1 • Intake camshaft • ECM	○	○
P0343 (05-169)	Camshaft Position Sensor "A" Circuit High Input (Bank 1 or Single Sensor)		○	○
P0351 (05-172)	Ignition Coil "A" Primary/Secondary Circuit	• Ignition system • Open or short in ignition coil circuit • Ignition coil • ECM	○	○
P0352 (05-172)	Ignition Coil "B" Primary/Secondary Circuit		○	○
P0353 (05-172)	Ignition Coil "C" Primary/Secondary Circuit		○	○
P0354 (05-172)	Ignition Coil "D" Primary/Secondary Circuit		○	○
P0443 (05-176)	Evaporative Emission Control System Purge Control Vent Circuit	• Open or short in VSV circuit for EVAP • VSV for EVAP • ECM	○	○
P0501 (05-179)	Vehicle Speed Sensor "A" Range/Performance	• Combination meter • Open or short in No.1 vehicle speed sensor circuit • No.1 vehicle speed sensor • ECM	○	○

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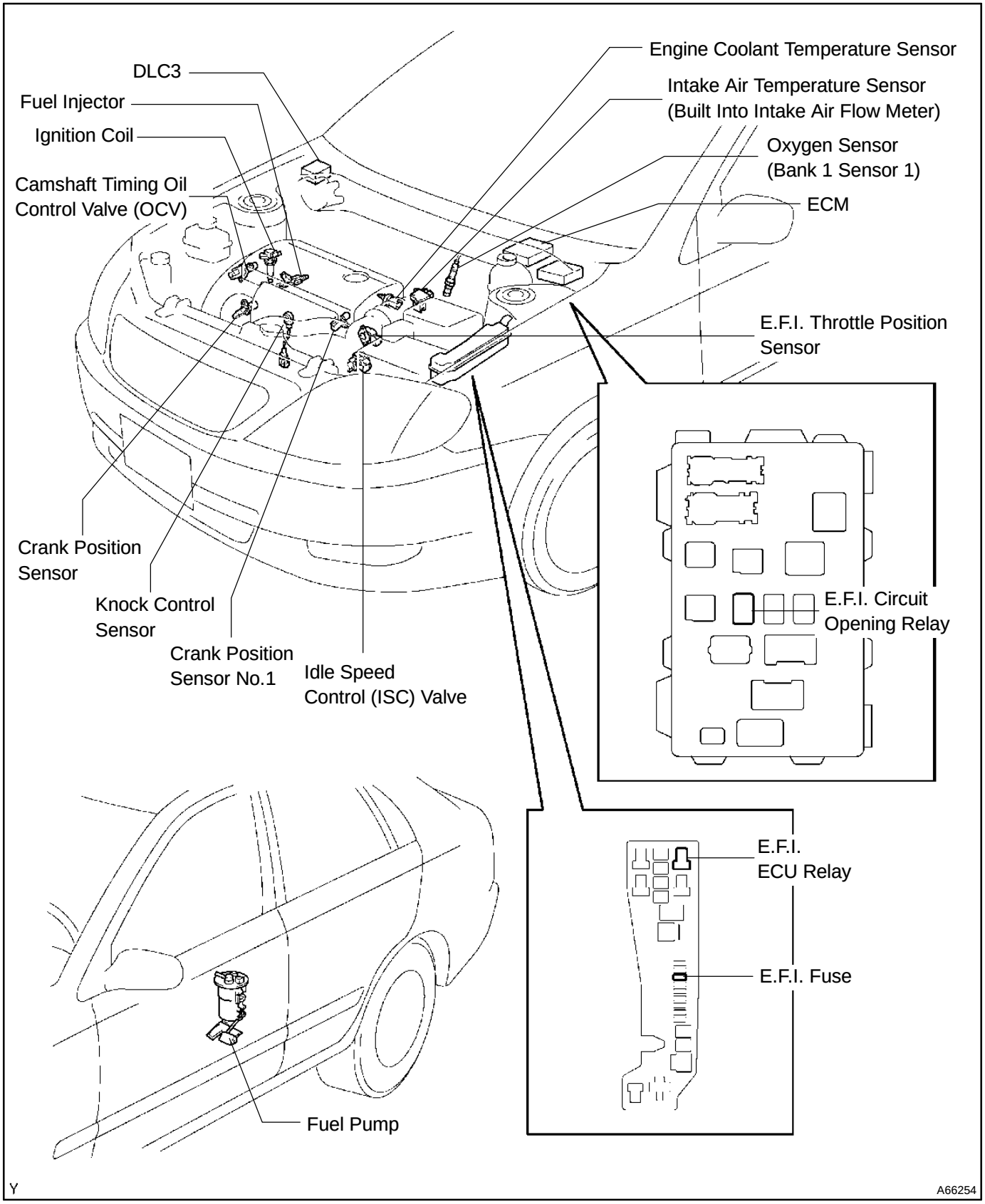
P0505 (05–181)	Idle Air Control System	• Open or short in ISC valve circuit • ISC valve is stuck or closed • Open or short in A/C switch circuit • Air induction system • ECM	○	○
P0561 (05–186)	System Voltage Unstable	• Open or short in back up power source circuit • ECM	○	○
P0562 (05–188)	System Voltage Low	• Open or short in back up power source circuit • Tired battery • Electrical over work • Generator • 24 V battery • ECM	○	○
P0563 (05–188)	System Voltage High		○	○
P0601	Internal Control Module Memory Check Sum Error	• ECM	○	○
P1340 (05–168)	Camshaft Position Sensor "A" (Bank 1 Sensor 2)	• Mechanical system malfunction (skipping teeth of timing chain, chain stretched) • ECM	○	○
P1345 (05–190)	VVT System Stick Detected	• Valve timing • Camshaft timing oil control valve • Camshaft timing gear assy • ECM	○	○
P1346 (05–193)	VVT Sensor/Camshaft Position Sensor Circuit Range/Perfor-mance Problem (Bank1)	• Open or short in camshaft timing oil control valve circuit • Camshaft timing oil control valve • ECM	○	○
P1605 (05–161)	Knock Control CPU Malfunction	• Open or short in knock control sensor circuit • Knock control sensor (looseness) • ECM	○	○

*1: ○ ... CHK ENG (MIL) lights up. - ... CHK ENG (MIL) does not light up.

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05047-07

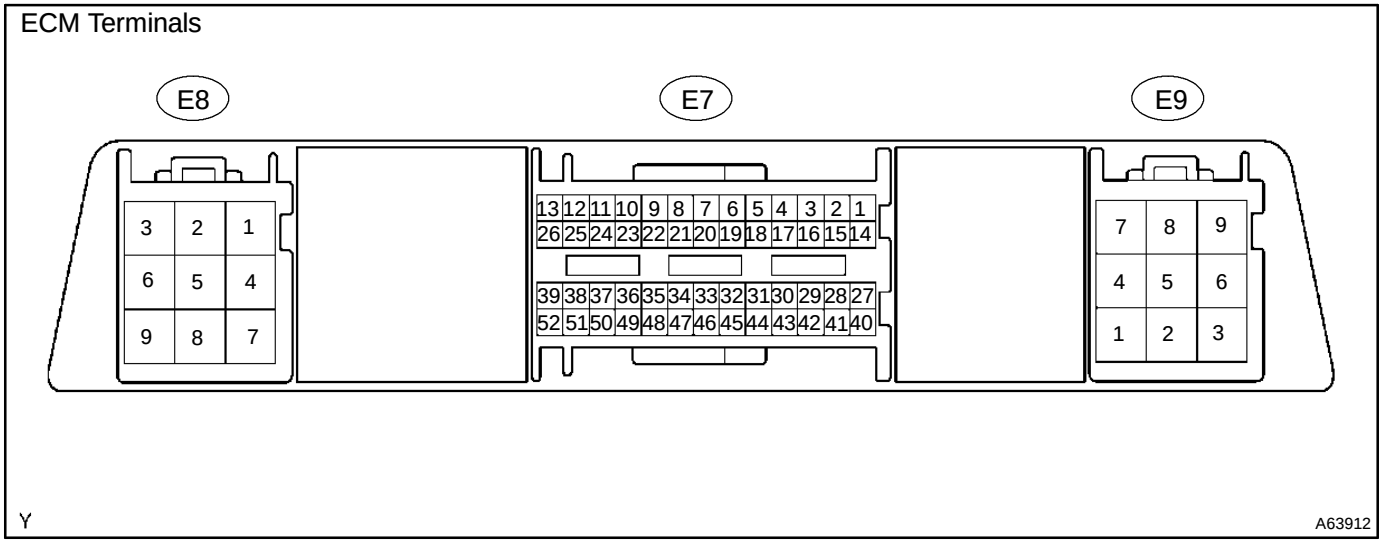
LOCATION



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05048-06

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E8 - 1) - E1 (E8 - 7)	R-W ↔ W-B	Always	9 - 14
IGSW (E7 - 39) - E1 (E8 - 7)	B-W ↔ W-B	IG switch ON	9 - 14
+B (E8 - 4) - E1 (E8 - 7)	B ↔ W-B	IG switch ON	9 - 14
VC (E7 - 52) - E2 (E7 - 20)	Y ↔ BR	IG switch ON	4.5 - 5.5
VTA (E7 - 21) - E2 (E7 - 20)	LG ↔ BR	IG switch ON, throttle valve fully closed	0.4 - 1.0
		IG switch ON, throttle valve fully open	3.2 - 4.8
THA (E7 - 7) - E2 (E7 - 20)	Y-B ↔ BR	Idling, intake air temp. 20°C (68°F)	0.5 - 3.4
THW (E7 - 8) - E2 (E7 - 20)	W ↔ BR	Idling, engine coolant temp. at 80°C (176°F)	0.2 - 1.0
#1 (E8 - 9) - E01 (E9 - 1)	Y ↔ W-B	IG switch ON	9 - 14
#2 (E8 - 6) - E01 (E9 - 1)	B ↔ W-B		
#3 (E8 - 8) - E01 (E9 - 1)	W ↔ W-B		
#4 (E8 - 5) - E01 (E9 - 1)	L ↔ W-B		
IGT1 (E9 - 6) - E02 (E9 - 2)	R-L ↔ W-B	Idling	9 - 14
IGT2 (E9 - 8) - E02 (E9 - 2)	Y-G ↔ W-B		
IGT3 (E9 - 5) - E02 (E9 - 2)	GR ↔ W-B		
IGT4 (E9 - 9) - E02 (E9 - 2)	W ↔ W-B		
MREL (E7 - 49) - E1 (E8 - 7)	B-W ↔ W-B	IG switch ON	9 - 14
FC (E7 - 47) - E1 (E8 - 7)	G-R ↔ W-B	IG switch ON	9 - 14
STP (E7 - 3) - E1 (E8 - 7)	G-W ↔ W-B	Brake pedal depressed	9 - 14
		Brake pedal released	Below 1.5
OX (E7 - 11) - E11 (E7 - 24)	W ↔ B	IG switch ON	9 - 14
HT (E8 - 3) - E11 (E7- 24)	P ↔ B	IG switch ON	9 - 14
TC (E7 - 10) - E1 (E8 - 7)	P-B ↔ W-B	IG switch ON	9 - 14
W (E7 - 48) - E1 (E8 - 7)	R-Y ↔ W-B	IG switch ON	Below 3.0
OCV + (E9 - 4) - OCV - (E9 - 3)	Y ↔ B-Y	IG switch ON	Pulse generation
G1 (E7 - 29) - E1 (E8 - 7)	W ↔ W-B	Idling	Pulse generation (See page 05-164)
NE+ (E7 - 14) - NE- (E7 - 15)	B ↔ W	Idling	Pulse generation (See page 05-164)
VG (E7 - 6) - EVG (E7 - 19)	G ↔ L-W	Idling, A/C switch OFF	1.1 - 1.5
KNK1 (E7 - 5) - KNK2 (E7 - 4)	B ↔ W	Maintain engine speed at 4,000 rpm after warming up	Pulse generation
EVP1 (E7 - 51) - E1 (E8 - 7)	L-B ↔ W-B	IG switch ON	9 - 14
RSO (E7 - 46) - E1 (E8 - 7)	B-L ↔ W-B	Idling	Pulse generation
STA (E7 - 33) - E1 (E8 - 7)	B ↔ W-B	Cranking	5.5 or more

CONTINUED

FAN (E9 – 7) – E1 (E8 – 7)	LG–B ↔ W–B	Idling, engine coolant temp. at 83˚C (181˚F) or less	9 – 14
		Idling, engine coolant temp. at 93˚C (199˚F) or more	Below 1.5
SPD (E7 – 30) – E1 (E8 – 7)	V–W ↔ W–B	IG switch ON, rotate driving wheel slowly	Pulse generation
TACH (E7 – 50) – E1 (E8 – 7)	B ↔ W–B	Idling	Pulse generation
THWO (E7 – 40) – E1 (E8 – 7)	Y–R ↔ W–B	IG switch ON	Pulse generation
PSW (E7 – 31) – E1 (E8 – 7)	L–R ↔ W–B	Idling, steering wheel is center position	9 – 14
		Idling, turn steering wheel	Below 1.5
ELS (E7 – 41) – E1 (E8 – 7)	G ↔ W–B	IG switch ON, rear defogger switch ON	9 – 14
		IG switch ON, rear defogger switch OFF	Below 1.5
ELS2 (E7 – 32) – E1 (E8 – 7)	W–R ↔ W–B	IG switch ON, tail light switch ON	9 – 14
		IG switch ON, tail light switch OFF	Below 1.5
ACT (E7 – 35) – E1 (E8 – 7)	R–L ↔ W–B	Start engine and A/C switch ON, Magnetic clutch is engaged	Below 1.0
		Start engine and A/C switch ON, Magnetic clutch is not engaged	No voltage
AC1 (E7 – 26) – E1 (E8 – 7)	Y–R ↔ W–B	Start engine and A/C switch ON. Engine speed: Idle speed	No voltage
		Start engine and A/C switch ON. Engine speed: Idle–up speed	Below 1
PR2 (E7 – 9) – E1 (E8 – 7)	LG–R ↔ W–B	IG switch ON	9 – 14
F/PS (E7 – 36) – E1 (E8 – 7)	Y ↔ W–B	IG switch ON	Pulse generation

CONTINUED

05049-07

PROBLEM SYMPTOMS TABLE

When the malfunction code is not confirmed in the diagnostic trouble code check and the problem still can not be confirmed in the basic inspection, proceed to this problem symptoms tables and troubleshoot according to the numbered order given below.

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	19-9
No initial combustion (Does not start)	1. ECM power source circuit 2. Ignition coil circuit 3. Fuel pump control circuit 4. Fuel injector circuit	05-197 05-172 05-203 05-157
No complete combustion (Does not start)	1. Fuel pump control circuit 2. Ignition coil circuit 3. Fuel injector circuit	05-203 05-172 05-157
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. ISC valve circuit 3. Fuel pump control circuit 4. Ignition coil circuit 5. Spark plug 6. Compression 7. Fuel injector circuit	05-195 05-181 05-203 05-172 18-6 14-93 05-157
Cold engine (Difficult to start)	1. Starter signal circuit 2. ISC valve circuit 3. Fuel pump control circuit 4. Fuel injector circuit 5. Ignition coil circuit 6. Spark plug	05-195 05-181 05-203 05-157 05-172 18-6
Hot engine (Difficult to start)	1. Starter signal circuit 2. ISC valve circuit 3. Fuel pump control circuit 4. Fuel injector circuit 5. Ignition coil circuit 6. Spark plug	05-195 05-181 05-203 05-157 05-172 18-6
Incorrect first idle (Poor idling)	1. ISC valve circuit	05-181
High engine idle speed (Poor idling)	1. ISC valve circuit 2. ECM power source circuit 3. Back up power source circuit	05-181 05-197 05-186
Low engine idle speed (Poor idling)	1. ISC valve circuit 2. Fuel pump control circuit 3. Fuel injector circuit 4. Back up power source circuit	05-181 05-203 05-157 05-186
Rough idling (Poor idling)	1. ISC valve circuit 2. Fuel injector circuit 3. Ignition coil circuit 4. Compression 5. Fuel pump control circuit 6. Back up power source circuit	05-181 05-157 05-172 14-93 05-203 05-186
Hunting (Poor idling)	1. ISC valve circuit 2. ECM power source circuit 3. Fuel pump control circuit	05-181 05-197 05-203
Hesitation/Poor acceleration (Poor drivability)	1. Fuel injector circuit 2. Fuel pump control circuit 3. Ignition coil circuit	05-157 05-203 05-172
Muffler explosion, after fire (Poor drivability)	1. Ignition coil circuit 2. Spark plug 3. Fuel injector circuit	05-172 18-6 05-157

CONTINUED

Surging (Poor drivability)	1. Fuel pump control circuit 2. Spark plug 3. Fuel injector circuit	05–203 18–6 05–157
Engine stall (Soon after starting)	1. Fuel pump control circuit 2. ISC valve circuit	05–203 05–181
Engine stall (After accelerator pedal released)	1. Fuel injector circuit 2. ISC valve circuit 3. ECM	05–157 05–181 01–28

CONTINUED

DTC	P0102	MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

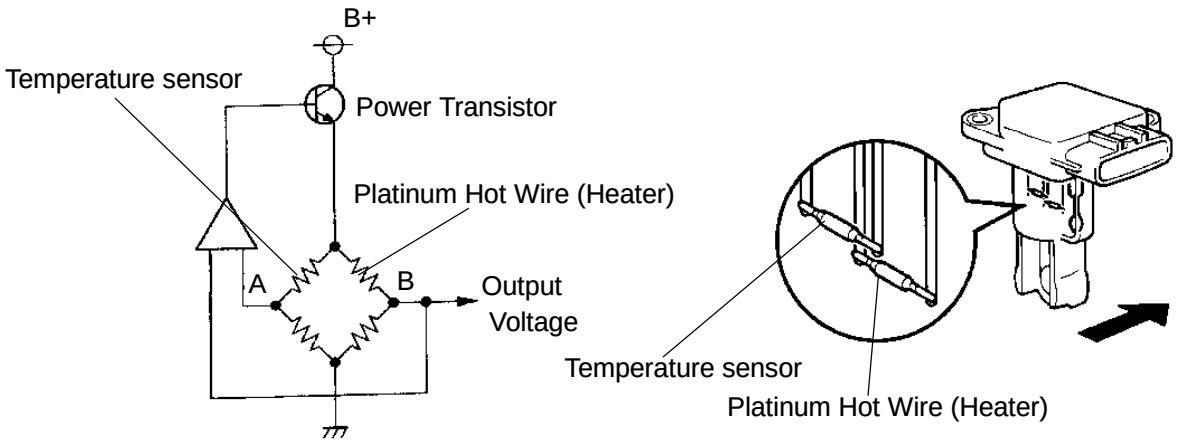
DTC	P0103	MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

The intake air flow meter uses a platinum hot wire. The hot wire air flow meter consists of a platinum hot wire, temperature sensor and a control circuit installed in a plastic housing. The hot wire air flow meter works on the principle that the hot wire and temperature sensor located in the intake air bypass of the housing detect any changes in the intake air temperature.

The hot wire is maintained at the set temperature by controlling the current flow through the hot wire. This current flow is then measured as the output voltage of the intake air flow meter.

The circuit is constructed so that the platinum hot wire and temperature sensor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



FI6929
A09074

A66259

DTC No.	DTC Detecting Condition	Trouble Area
P0102	Open or short in intake air flow meter circuit (3 trip detection logic)	• Open or short in intake air flow meter circuit • Intake air flow meter • ECM
P0103	• Open in intake air flow meter circuit • Short in back up power source circuit (3 trip detection logic)	

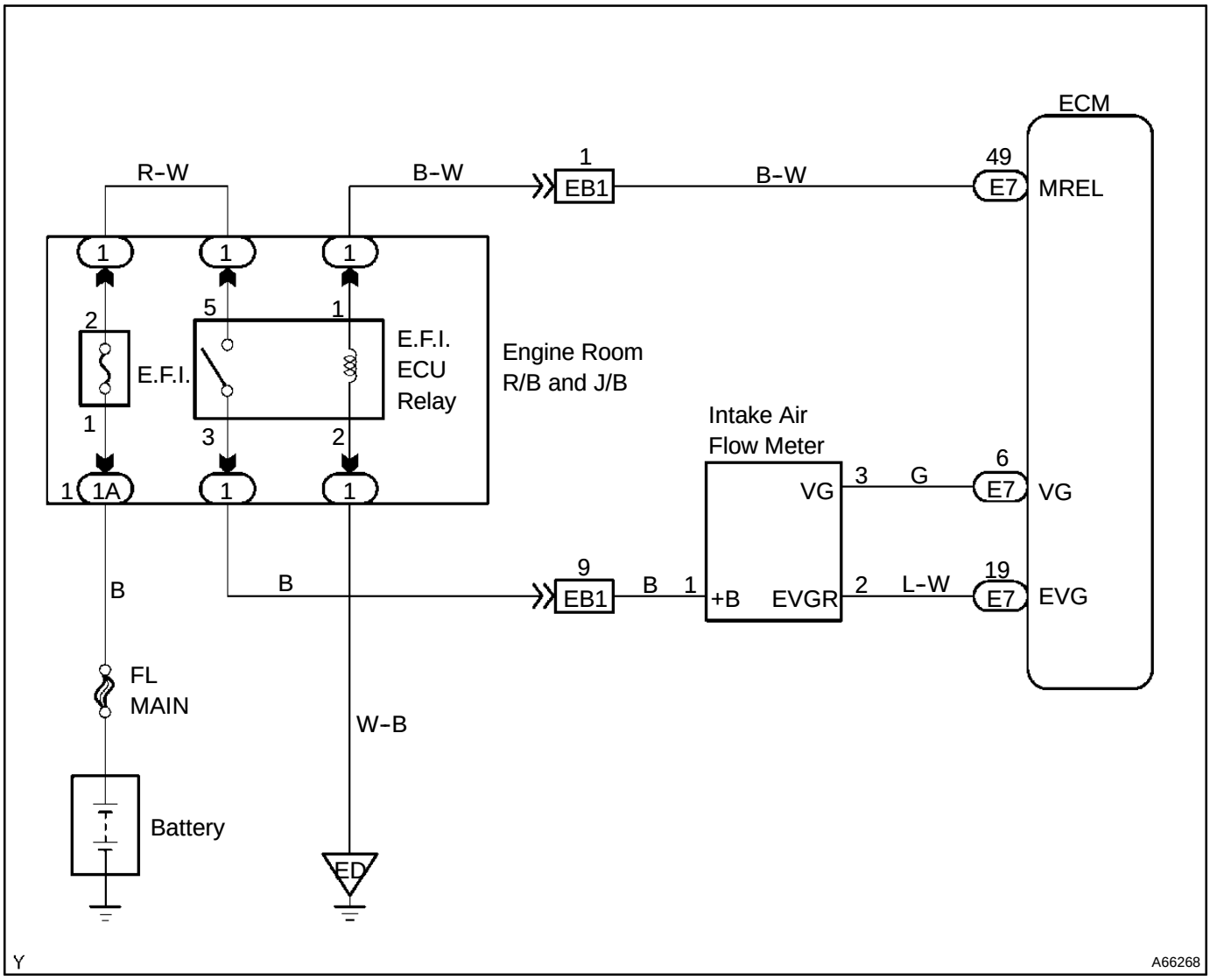
HINT:

After confirming DTC P0102 or P0103, use the hand–held tester to confirm the air flow ratio from CURRENT DATA.

Air Flow Value (g/s)	Malfunction
Approx. 0.0	• Intake air flow meter power source circuit open • VG circuit open or short
271.0 or more	• EVG circuit open

CONTINUED

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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

1	**READ OUTPUT DTC**

Result:

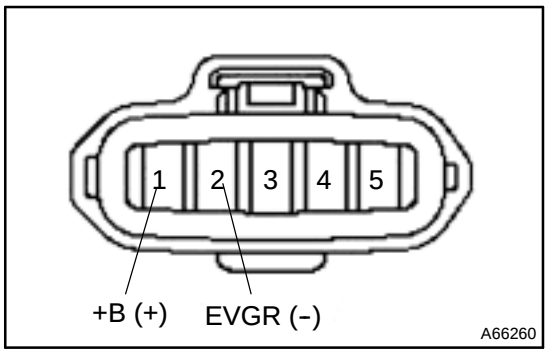
DTC	Check
P0102 is output	to A
P0103 is output	to B

B → **Go to step 6**

A

CONTINUED

2 INSPECT INTAKE AIR FLOW METER SUB-ASSY(POWER SOURCE)

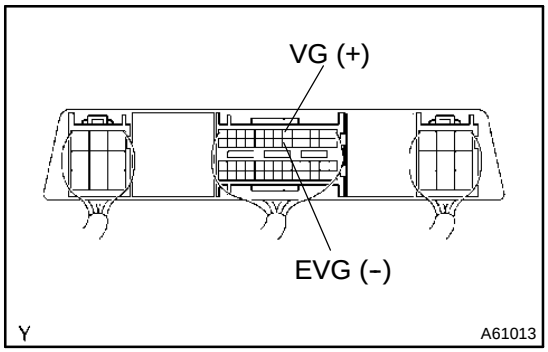


(a) Disconnect the intake air flow meter connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between terminals +B and EVGR of the intake air flow meter connector.
Voltage: 9 - 14 V

NG → **Go to step 5**

OK

3 INSPECT ECM(CHECK VOLTAGE)



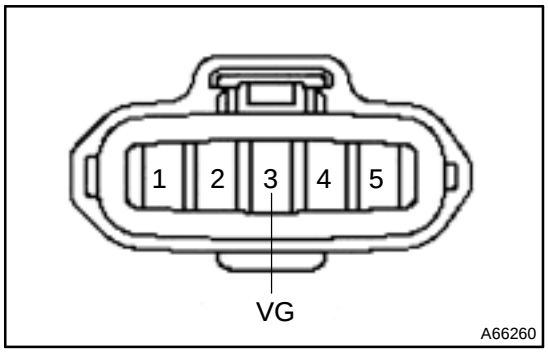
(a) Start the engine.
(b) Measure the voltage between terminals VG and EVG of the ECM connector while the engine is idling.
Voltage: 1.1 - 1.5 V

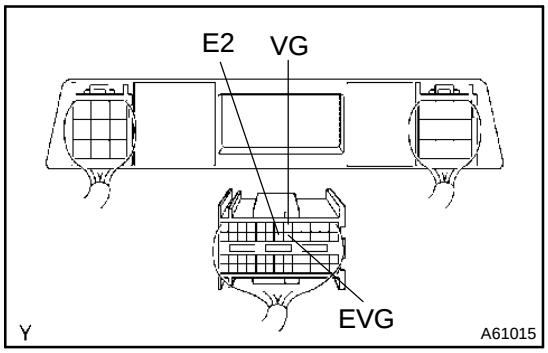
HINT:
A/C switch should be turned OFF.

OK → **CHECK AND REPLACE ECM**

NG

4 CHECK HARNESS AND CONNECTOR(ECM - INTAKE AIR FLOW METER)





(a) Disconnect the intake air flow meter connector.
(b) Disconnect the ECM E7 connector.
(c) Measure the resistance between terminals VG of the intake air flow meter connector and VG of the ECM connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminals VG and EVG of the ECM connector.
Resistance: 1 MΩ or more
(e) Measure the resistance between terminals VG and E2 of the ECM connector.
Resistance: 1 MΩ or more
(f) Measure the resistance between terminal VG of the ECM connector and body ground.
Resistance: 1 MΩ or more

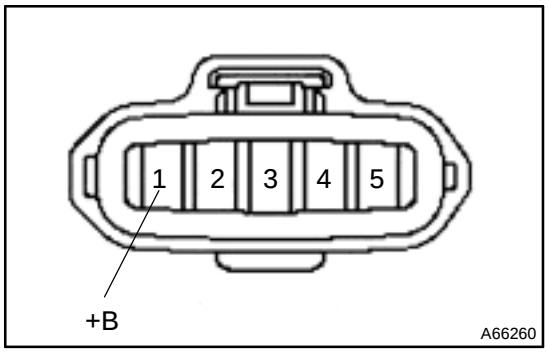
CONTINUED

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

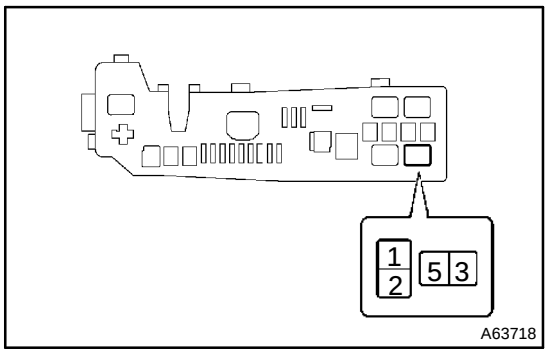
OK

REPLACE INTAKE AIR FLOW METER SUB-ASSY

5	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - INTAKE AIR FLOW METER)



(a) Disconnect the intake air flow meter connector.
(b) Remove the E.F.I. ECU relay.
(c) Measure the resistance between terminals +B of the intake air flow meter connector and 3 of the E.F.I. ECU relay side connector.
Resistance: 1 Ω or less

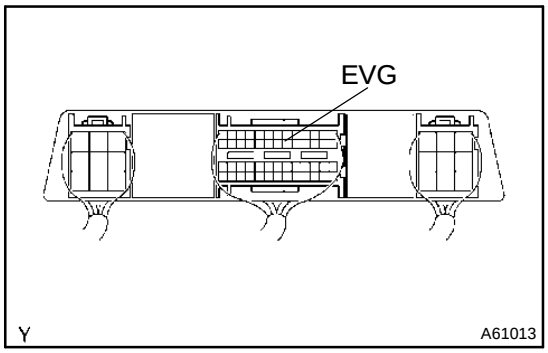


NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK FOR ECM POWER SOURCE CIRCUIT **(See page 05-197)**

6	INSPECT ECM



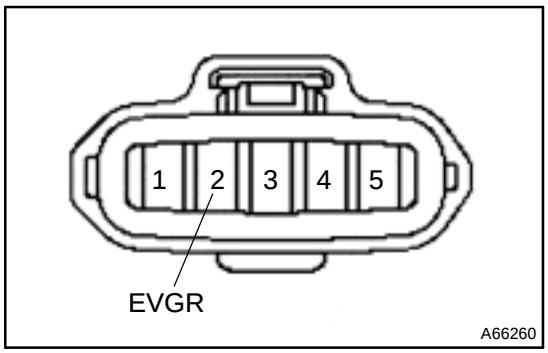
(a) Measure the resistance between terminal EVG of the ECM connector and body ground.
Resistance: 1 Ω or less

NG	CHECK AND REPLACE ECM

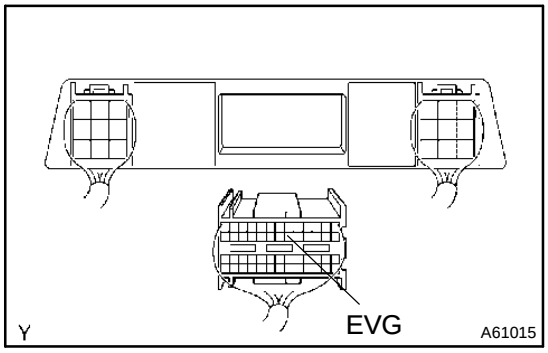
OK

CONTINUED

7	CHECK HARNESS AND CONNECTOR(ECM - INTAKE AIR FLOW METER)



(a) Disconnect the intake air flow meter connector.
(b) Disconnect the ECM E7 connector.
(c) Measure the resistance between terminals EVGR of the intake air flow meter connector and EVG of the ECM connector.
Resistance: 1 Ω or less



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

OK →

REPLACE INTAKE AIR FLOW METER SUB-ASSY

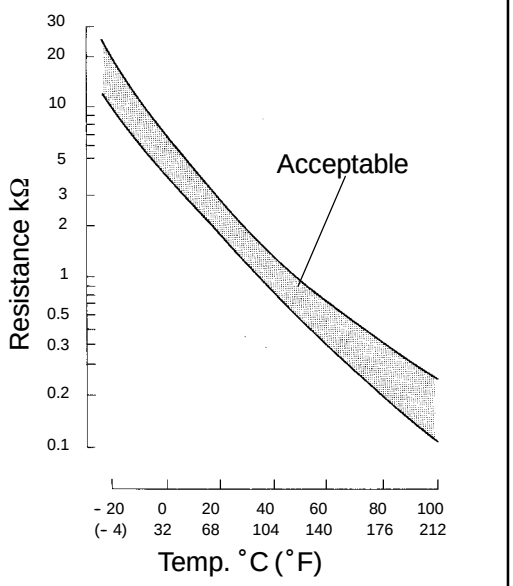
CONTINUED

DTC	P0112	INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT

DTC	P0113	INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT

CIRCUIT DESCRIPTION

(fig. 1)



The intake air temp. sensor is built into the intake air flow meter and senses the intake air temperature.
A thermistor built in the sensor changes the resistance value according to the intake air temperature.
The lower the intake air temperature, the greater the thermistor resistance value, and the higher the intake air temperature, the lower the thermistor resistance value (See fig. 1).
The intake air temp. sensor is connected to the ECM (See below). The 5 V power source voltage in the ECM is applied to the intake air temp. sensor from the terminal THA (THAR) via resistor R.
That is, the resistor R and the intake air temp. sensor are connected in series. When the resistance value of the intake air temp. sensor changes in accordance with changes in the intake air temperature, the potential at terminal THA (THAR) also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during cold engine operation.

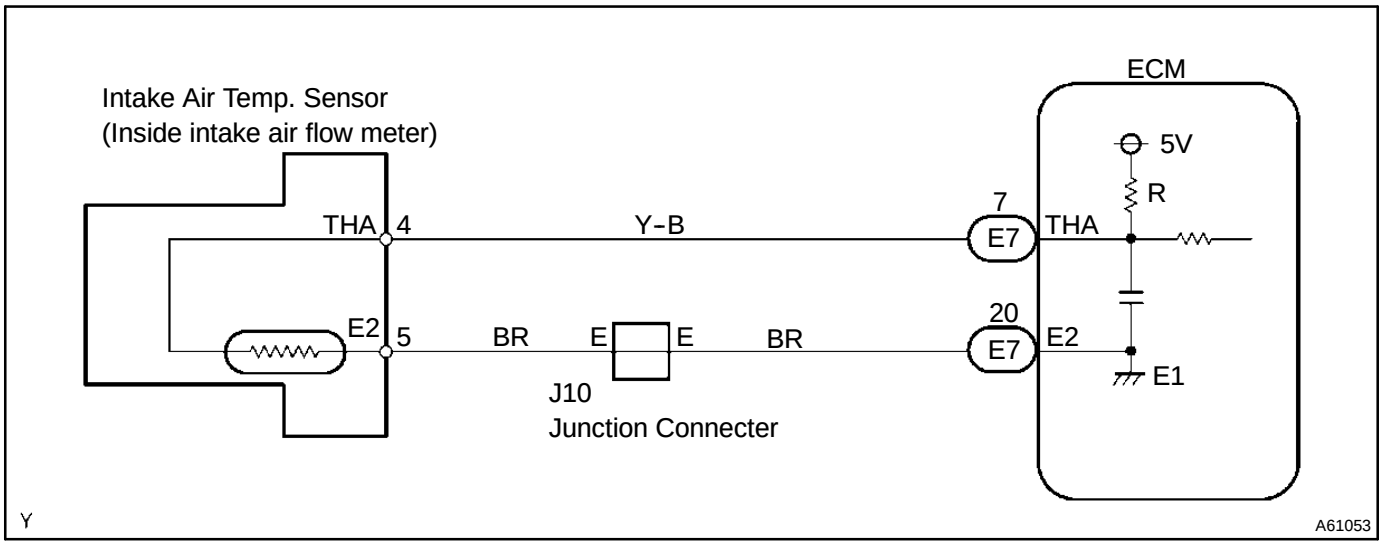
DTC No.	DTC Detecting Condition	Trouble Area
P0112	• Open in intake air temp. sensor circuit (3 trip detection logic) • Short in back up power source circuit (3 trip detection logic)	• Open or short in intake air temp. sensor circuit • Intake air temp. sensor (built into intake air flow meter) • ECM
P0113	Short in intake air temp. sensor circuit (3 trip detection logic)	

HINT:
After confirming DTC P0112 or P0113, use the hand-held tester to confirm the intake air temperature from the CURRENT DATA.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
140°C (284°F) or more	Short circuit

CONTINUED

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs "P0112" (Intake Air Temperature Circuit High Input), "P0117" (Engine Coolant Temperature Circuit High Input), "P0122" (Throttle/Pedal Position Sensor/Switch "A" Circuit Low Input) and "P0125" (Insufficient Coolant Temperature for Closed Loop Fuel Control) are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using the hand-held tester. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

1	READ VALUE OF HAND-HELD TESTER(INTAKE AIR TEMPERATURE)

(a) Read temperature value on the hand-held tester.
Temperature: Same as actual intake air temperature

Result:

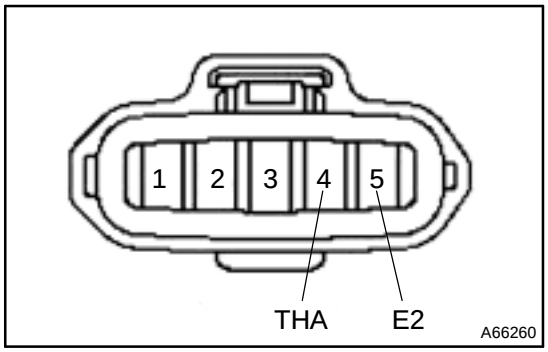
Display	Check
-40°C (-40°F)	to A
140°C (284°F) or more	to B
OK	to C

B	Go to step 4
C	CHECK FOR INTERMITTENT PROBLEMS

A

CONTINUED

2	READ VALUE OF HAND-HELD TESTER(CHECK FOR OPEN IN HARNESS)

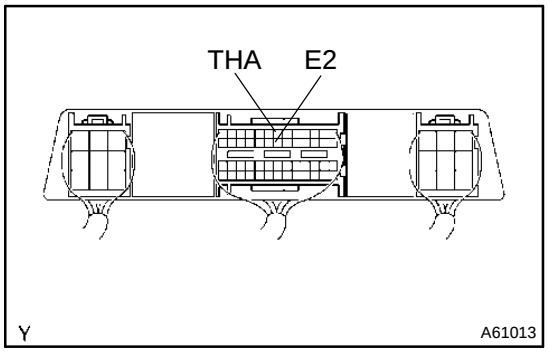


(a) Disconnect the intake air flow meter connector.
(b) Connect the terminals THA and E2 of the intake air flow meter connector.
(c) Turn the ignition switch ON.
(d) Read temperature value on the hand-held tester.
Temperature: 140°C (284°F) or more

OK	REPLACE INTAKE AIR FLOW METER SUB-ASSY

NG

3	READ VALUE OF HAND-HELD TESTER(CHECK FOR OPEN IN ECM)



(a) Connect the terminals THA and E2 of the ECM connector.
(b) Read temperature value on the hand-held tester.
Temperature: 140°C (284°F) or more

OK	REPAIR OR REPLACE HARNESS OR CONNECTOR

NG

CHECK AND REPLACE ECM

4	READ VALUE OF HAND-HELD TESTER(CHECK FOR SHORT IN HARNESS)

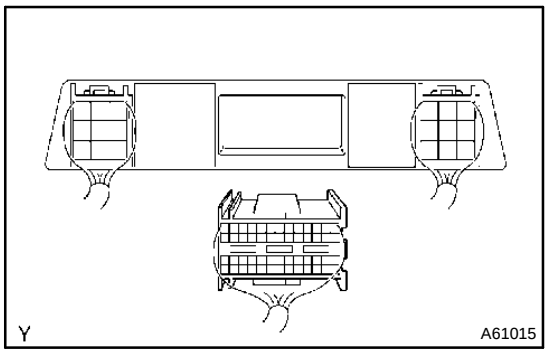
(a) Disconnect the intake air flow meter connector.
(b) Turn the ignition switch ON.
(c) Read temperature value on the hand-held tester.
Temperature: -40°C (-40°F)

OK	REPLACE INTAKE AIR FLOW METER SUB-ASSY

NG

CONTINUED

5	READ VALUE OF HAND-HELD TESTER(CHECK FOR SHORT IN ECM)



(a) Disconnect the ECM E7 connector.
(b) Turn the ignition switch ON.
(c) Read temperature value on the hand-held tester.
Temperature: -40°C (-40°F)

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

CHECK AND REPLACE ECM

CONTINUED

DTC	P0117	ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

DTC	P0118	ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

CIRCUIT DESCRIPTION

A thermistor built into the E.F.I. engine coolant temp. sensor changes the resistance value according to the engine coolant temperature.

The structure of the sensor and connection to the ECM is the same as the ones of the intake air temperature sensor.

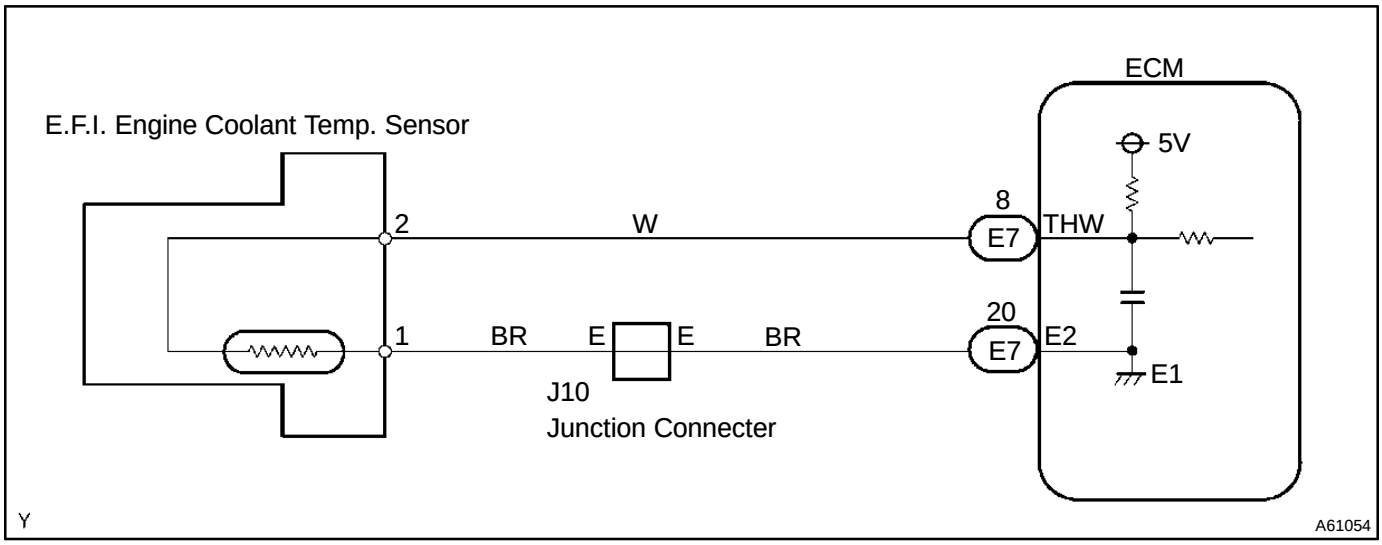
DTC No.	DTC Detecting Condition	Trouble Area
P0117	• Open in E.F.I. engine coolant temp. sensor circuit (3 trip detection logic) • Short in back up power source circuit (3 trip detection logic)	• Open or short in E.F.I. engine coolant temperature sensor circuit • E.F.I. engine coolant temperature sensor • ECM
P0118	Short in E.F.I. engine coolant temp. sensor circuit (3 trip detection logic)	

HINT:

After confirming DTC P0117 or P0118, use the hand-held tester to confirm the engine coolant temperature from the CURRENT DATA.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
140°C (284°F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs "P0112" (Intake Air Temperature Circuit High Input), "P0117" (Engine Coolant Temperature Circuit High Input), "P0122" (Throttle/Pedal Position Sensor/Switch "A" Circuit Low Input) and "P0125" (Insufficient Coolant Temperature for Closed Loop Fuel Control) are output simultaneously, E2 (sensor ground) may be open.

CONTINUED

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

1	READ VALUE OF HAND-HELD TESTER(ENGINE COOLANT TEMPERATURE)

(a) Read temperature value on the hand-held tester.
Temperature: Same as actual engine coolant temperature

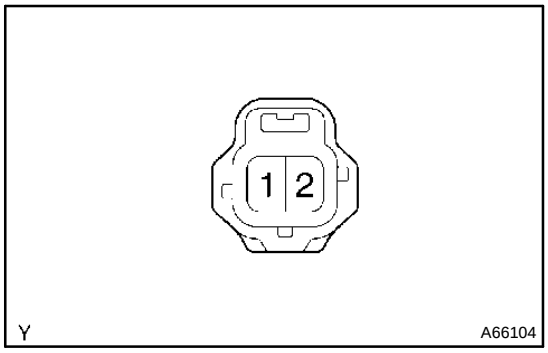
Result:

Display	Check
-40°C (-40°F)	to A
140°C (284°F) or more	to B
OK	to C

B	Go to step 4
C	CHECK FOR INTERMITTENT PROBLEMS

A

2	READ VALUE OF HAND-HELD TESTER(CHECK FOR OPEN IN HARNESS)

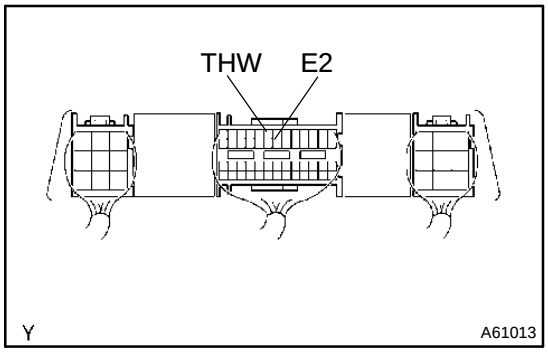


(a) Disconnect the E.F.I. engine coolant temperature sensor connector.
(b) Connect the terminals 1 and 2 of the E.F.I. engine coolant temperature sensor connector.
(c) Turn the ignition switch ON.
(d) Read temperature value on the hand-held tester.
Temperature: 140°C (284°F) or more

OK	REPLACE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

NG

3	READ VALUE OF HAND-HELD TESTER(CHECK FOR OPEN IN ECM)



(a) Connect the terminals THW and E2 of the ECM connector.
(b) Turn the ignition switch ON.
(c) Read temperature value on the hand-held tester.
Temperature: 140°C (284°F) or more

OK	REPAIR OR REPLACE HARNESS OR CONNECTOR

NG

CHECK AND REPLACE ECM

CONTINUED

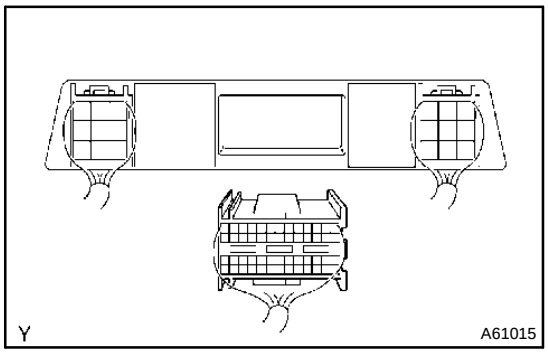
4	READ VALUE OF HAND–HELD TESTER(CHECK FOR SHORT IN HARNESS)

(a) Disconnect the E.F.I. engine coolant temperature sensor connector.
(b) Turn the ignition switch ON.
(c) Read temperature value on the hand–held tester.
Temperature: –40°C (–40°F)

OK → **REPLACE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR**

NG

5	READ VALUE OF HAND–HELD TESTER(CHECK FOR SHORT IN ECM)



(a) Disconnect the ECM E7 connector.
(b) Turn the ignition switch ON.
(c) Read temperature value on the hand–held tester.
Temperature: –40°C (–40°F)

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

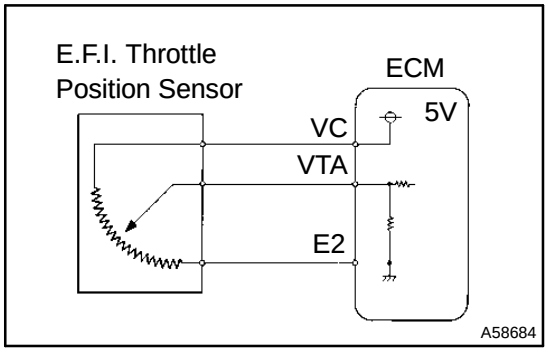
CHECK AND REPLACE ECM

CONTINUED

DTC	P0122	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW INPUT

DTC	P0123	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION



The E.F.I. throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle.
When the throttle valve is fully closed, a voltage of approximately 0.7 V is applied to terminal VTA of the ECM. The voltage applied to the terminal VTA of the ECM increases in proportion to the opening angle of the throttle valve and becomes approximately 3.5 – 5.0 V when the throttle valve is fully opened. The ECM judges the vehicle driving conditions from these signals input from terminal VTA, uses them as one of the conditions for deciding the air–fuel ratio correction, power increase correction and fuel–cut control etc.

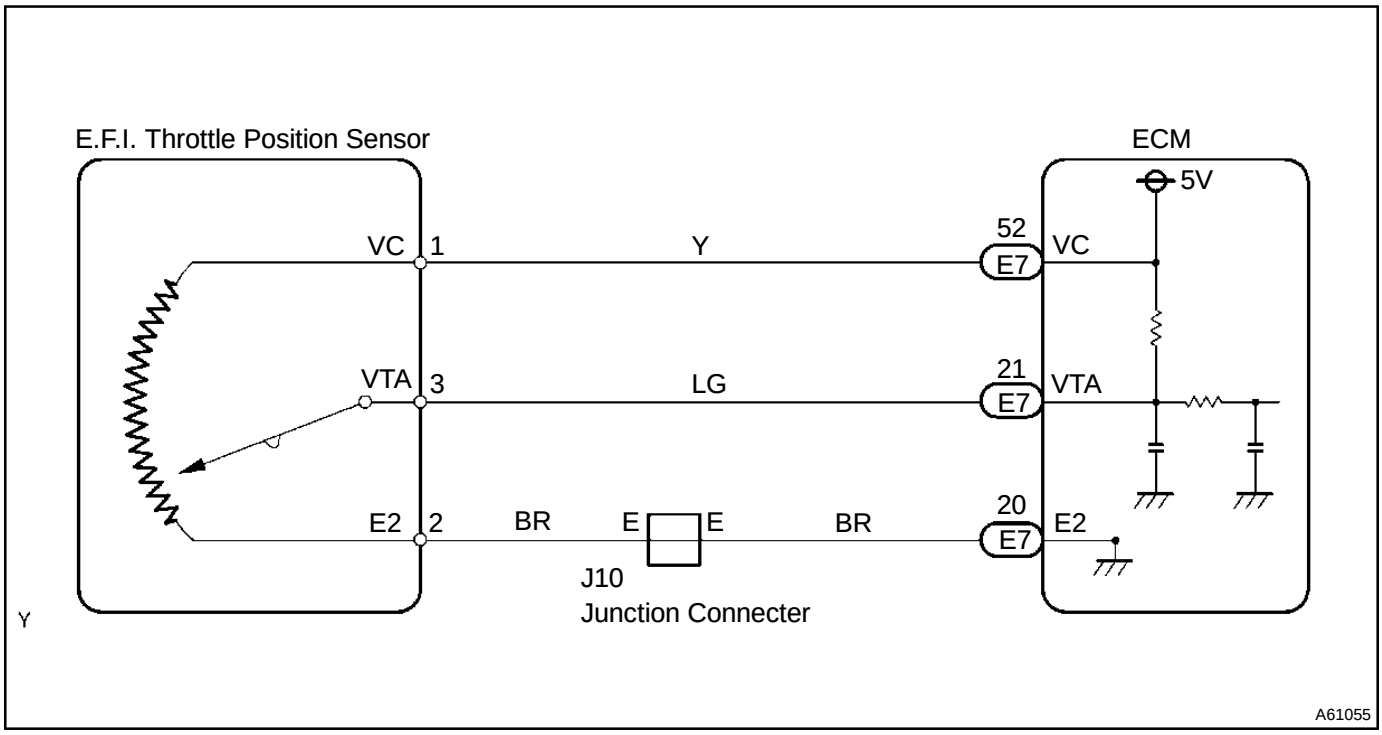
DTC No.	DTC Detecting Condition	Trouble Area
P0122	Condition (1) continues for 5 sec. or more: (3 trip detection logic) 1. VTA < 0.1 V	• Open or short in throttle position sensor circuit • E.F.I. throttle position sensor • ECM
P0123	Condition (1) continues for 5 sec. or more: (3 trip detection logic) 1. VTA > 4.9 V	

HINT:
After confirming DTC P0122 or P0123, use the hand–held tester to confirm the throttle valve opening percentage and closed throttle position switch condition.

Throttle valve opening position expressed as percentage		Trouble Area
Throttle valve fully closed	Throttle valve fully open	
0 %		VC circuit open or short VTA circuit open or short
Approx. 100 %		E2 circuit open

CONTINUED

WIRING DIAGRAM

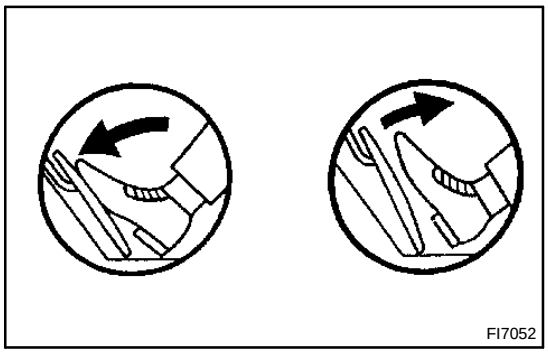


INSPECTION PROCEDURE

HINT:

- If DTCs "P0112" (Intake Air Temperature Circuit High Input), "P0117" (Engine Coolant Temperature Circuit High Input), "P0122" (Throttle/Pedal Position Sensor/Switch "A" Circuit Low Input) and "P0125" (Insufficient Coolant Temperature for Closed Loop Fuel Control) are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using the hand-held tester. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

1	READ VALUE OF HAND-HELD TESTER(THROTTLE VALVE OPENING PERCENTAGE)



(a) Read the throttle valve opening percentage.

Result:

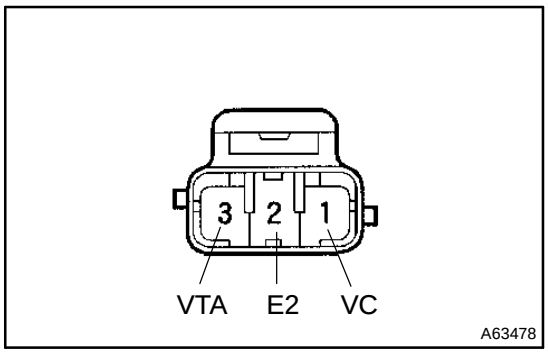
Accelerator pedal	Throttle valve opening position expressed as percentage	Check
Released→Depressed	0 %	to A
	Approx. 10 %→ Approx. 75 %	to B
	Approx. 100 %	to C

B	CHECK FOR INTERMITTENT PROBLEMS
C	Go to step 4

A

CONTINUED

2	INSPECT E.F.I. THROTTLE POSITION SENSOR



(a) Disconnect the E.F.I. throttle position sensor connector.
(b) Measure the resistance between terminals VC and E2 of the E.F.I. throttle position sensor.
(c) Measure the resistance between terminals VTA and E2 of the E.F.I. throttle position sensor.

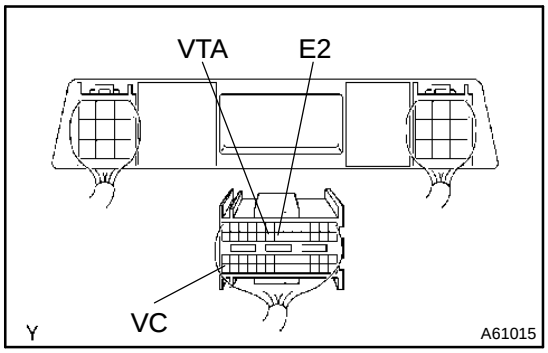
Resistance:

Terminals	Throttle valve	Resistance kΩ
VC - E2	—	2.5 - 5.9
VTA - E2	Fully closed	0.2 - 5.7
	Fully open	2.0 - 10.2

NG → **REPLACE E.F.I. THROTTLE POSITION SENSOR**

OK

3	CHECK HARNESS AND CONNECTOR(ECM - E.F.I. THROTTLE POSITION SENSOR)



(a) Disconnect the ECM E7 connector.
(b) Measure the resistance between terminals VC and E2 of the ECM connector.
(c) Measure the resistance between terminals VTA and E2 of the ECM connector.

Resistance:

Terminals	Throttle valve	Resistance kΩ
VC - E2	—	2.5 - 5.9
VTA - E2	Fully closed	0.2 - 5.7
	Fully open	2.0 - 10.2

(d) Measure the resistance between terminal VC of the ECM connector and body ground.

Resistance: 1 MΩ or more

(e) Measure the resistance between terminal VTA of the ECM connector and body ground.

Resistance: 1 MΩ or more

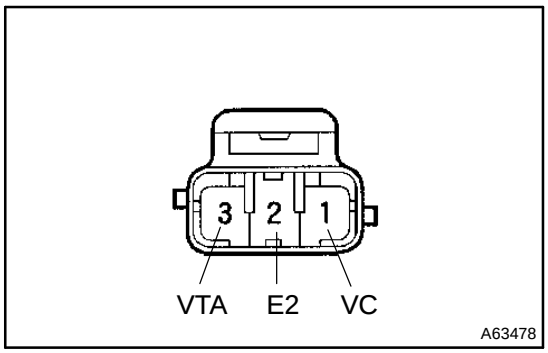
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPLACE ECM

CONTINUED

4	INSPECT E.F.I. THROTTLE POSITION SENSOR



(a) Disconnect the E.F.I. throttle position sensor connector.
(b) Measure the resistance between terminals VC and E2 of the E.F.I. throttle position sensor.
(c) Measure the resistance between terminals VTA and E2 of the E.F.I. throttle position sensor.

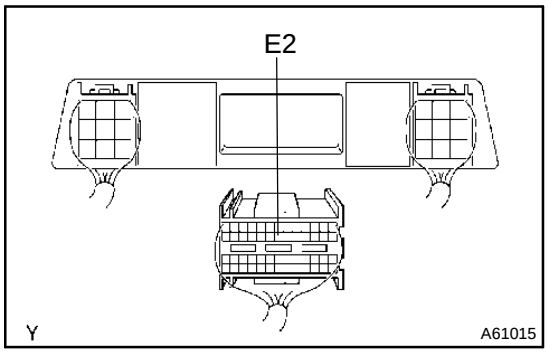
Resistance:

Terminals	Throttle valve	Resistance kΩ
VC - E2	—	2.5 - 5.9
VTA - E2	Fully closed	0.2 - 5.7
	Fully open	2.0 - 10.2

NG → **REPLACE E.F.I. THROTTLE POSITION SENSOR**

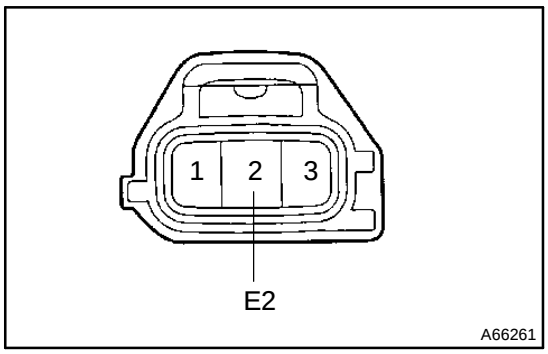
OK

5	CHECK HARNESS AND CONNECTOR(ECM - E.F.I. THROTTLE POSITION SENSOR)



(a) Disconnect the ECM E7 connector.
(b) Disconnect the E.F.I. throttle position sensor connector.
(c) Measure the resistance between terminals E2 of the ECM connector and E2 of the E.F.I. throttle position sensor connector.

Resistance: 1 Ω or less



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

OK

CHECK AND REPLACE ECM

CONTINUED

DTC	P0125	INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

CIRCUIT DESCRIPTION

Refer to DTCs P0117 and P0118 on page 05-139.

DTC No.	DTC Detecting Condition	Trouble Area
P0125	When engine starts, engine coolant temp. is -7°C (20°F) or less. And, 20 min. or more after engine starts, E.F.I. engine coolant temp. sensor value is 20°C (68°F) or less (3 trip detection logic)	• Cooling system • E.F.I. engine coolant temperature sensor • Thermostat
	When engine starts, engine coolant temp. is between -7°C (20°F) and 10°C (50°F). And, 5 min. or more after engine starts, E.F.I. engine coolant temp. sensor value is 20°C (68°F) or less (3 trip detection logic)	

WIRING DIAGRAM

Refer to DTCs P0117 and P0118 on page 05-139.

INSPECTION PROCEDURE

HINT:

- If DTCs "P0112" (Intake Air Temperature Circuit High Input), "P0117" (Engine Coolant Temperature Circuit High Input), "P0122" (Throttle/Pedal Position Sensor/Switch "A" Circuit Low Input) and "P0125" (Insufficient Coolant Temperature for Closed Loop Fuel Control) are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using the hand-held tester. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

1 READ OUTPUT DTC(BESIDES P0125)

Result:

DTC	Check
Only P0125 is output	to A
P0125 and other codes are output	to B

B → GO TO RELEVANT DTC CHART

A

2 INSPECT THERMOSTAT (See page 16-14)

NG → REPLACE THERMOSTAT

OK

REPLACE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

CONTINUED

DTC	P0130	OXYGEN SENSOR CIRCUIT (BANK 1 SENSOR 1)

DTC	P0132	OXYGEN SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

DTC	P0134	OXYGEN SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

CIRCUIT DESCRIPTION

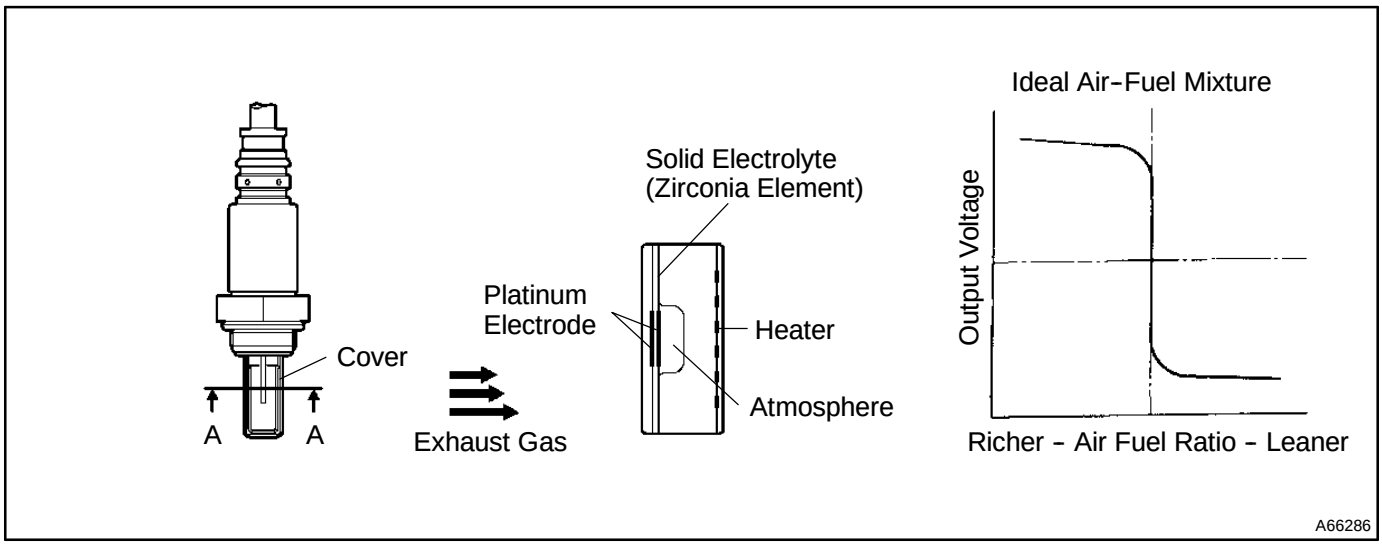
To obtain a high purification rate of the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used. For the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.

The oxygen sensor (bank1, sensor1) has the characteristic that it provides output voltage* being approximately proportional to the existing air–fuel ratio. The oxygen sensor output voltage* is used to provide feedback for the ECM to control the air–fuel ratio.

By the oxygen sensor output, the ECM can determine the deviation amount from the stoichiometric air–fuel ratio and control the proper injection time immediately. If the oxygen sensor is out of order, ECM is unable to perform the accurate air–fuel ratio control.

The oxygen sensor is equipped with a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low), the current flows to the heater to heat the sensor for the accurate oxygen concentration detection.

*: The voltage value changes at the inside of the ECM only.



CONTINUED

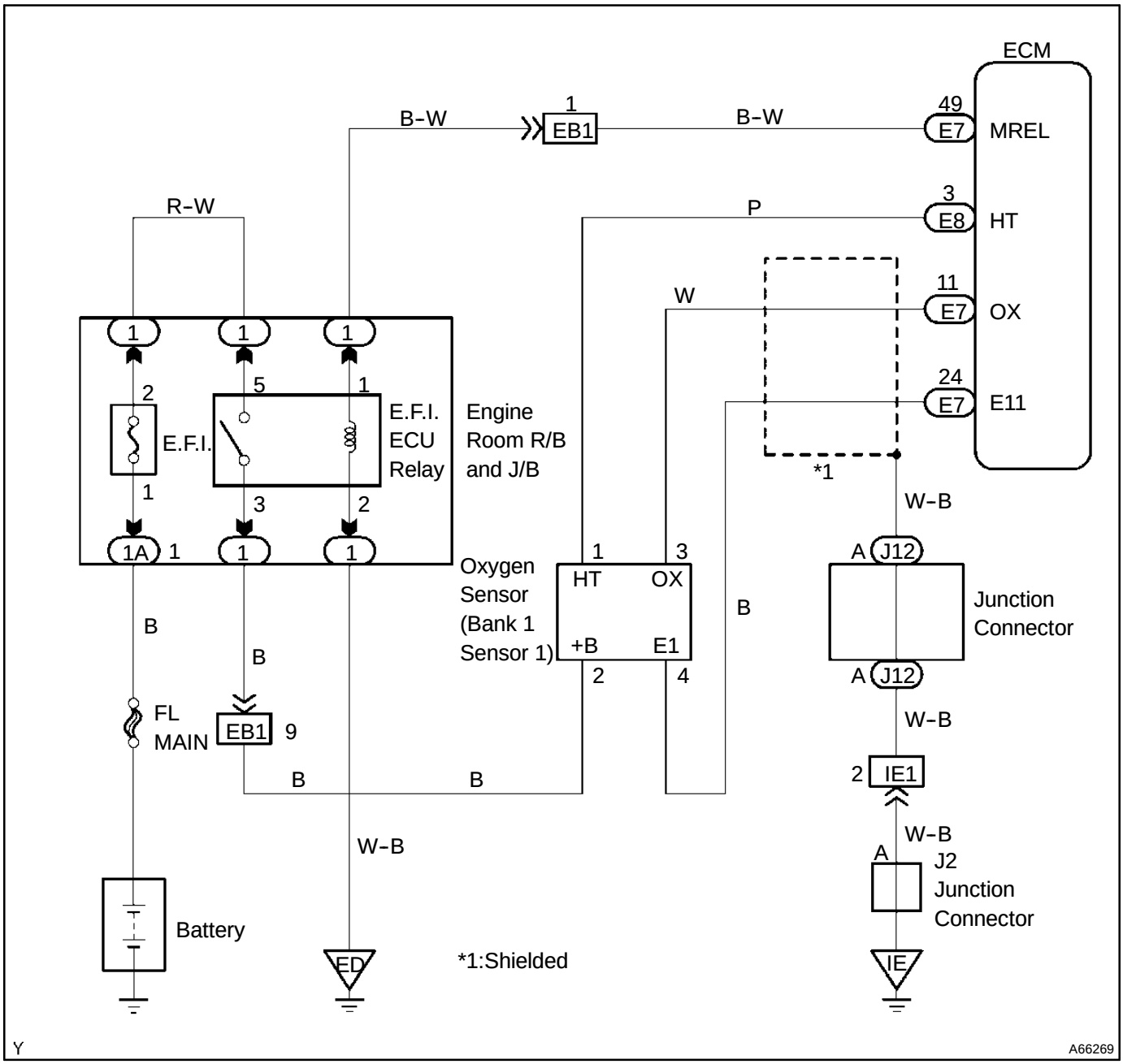
DTC No.	DTC Detecting Condition	Trouble Area
P0130	• GND short in oxygen sensor upstream circuit (3 trip detection logic) • Voltage output of oxygen sensor upstream remains below 0.06 V at cold start. • Detection is only at cold start, but error code entry is made after the time oxygen sensor is ready to operate theoretically. • 'Cold start' means coolant temp. at start is below 42 °C, and it is necessary the coolant temp. at stop on last trip had been above 60 °C	• Open or short in oxygen sensor circuit • Oxygen sensor • Air induction system • Fuel pressure • Fuel injector • ECM
P0132	• Battery short in oxygen sensor upstream circuit (3 trip detection logic) • Voltage output of oxygen sensor upstream remains above 1.5 V during the sensor is ready to operate theoretically.	
P0134	• Open circuit or defective oxygen sensor upstream (3 trip detection logic) • Voltage output of oxygen sensor upstream remains within 0.4 V to 0.5 V during the sensor is ready to operate theoretically.	

HINT:

- Bank 1 refers to bank that includes cylinder No. 1.
- Sensor 1 refers to the sensor closer to the engine body.

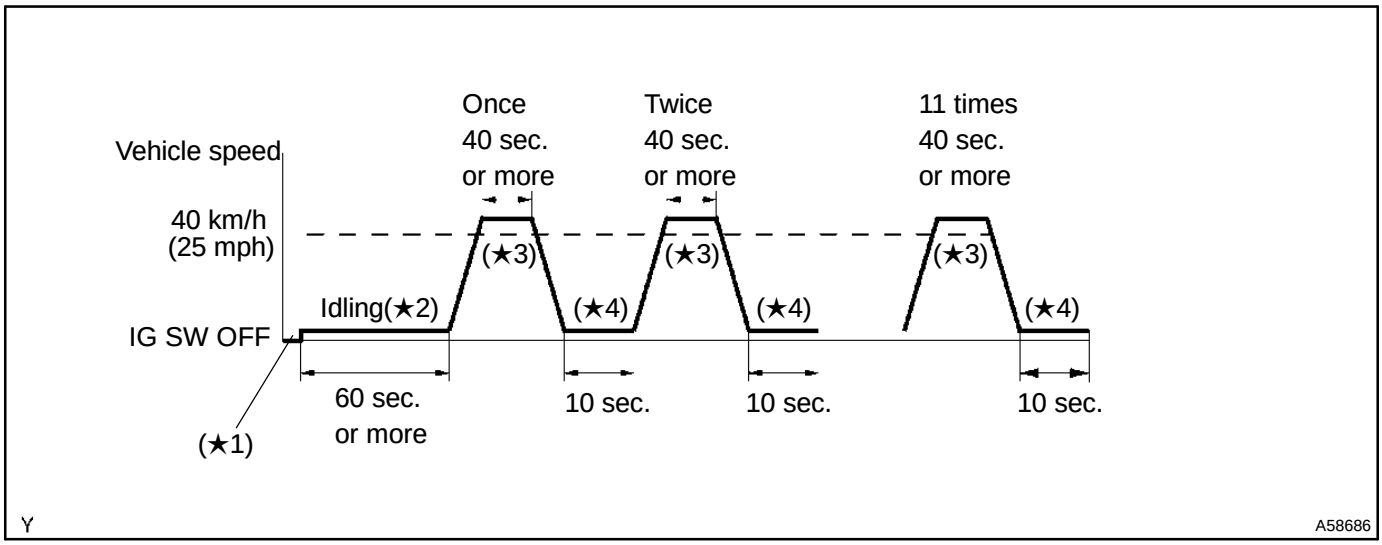
CONTINUED

WIRING DIAGRAM



CONTINUED

CONFIRMATION DRIVING PATTERN



1. **Connect the hand-held tester to the DLC3. (★1)**
2. **Switch the hand-held tester from the normal mode to the check (test) mode (See page 05-116). (★1)**
3. **Start the engine and let the engine idle for 60 seconds or more. (★2)**
4. **Drive the vehicle at 40 km/h (25 mph) or more for 40 seconds or more. (★3)**
5. **Let the engine idle for 10 seconds or more. (★4)**
6. **Perform steps (★3) to (★4) 11 times. (★5)**

HINT:

If a malfunction exists, the CHK ENG (MIL) will light up on the multi information display during step (★5).

NOTICE:

If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.

If you do not have a hand-held tester, turn the ignition switch OFF after performing steps from (★2) to (★5), then perform steps from (★2) to (★5) again.

INSPECTION PROCEDURE

HINT:

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

1	**CHECK OTHER DTC OUTPUT(BESIDES DTC P0130, P0132 AND P0134)**

Result:

DTC	Check
P0130, P0132 or P0134 is output	to A
Other codes are output besides P0130, P0132 and P0134	to B

B → **GO TO RELEVANT DTC CHART (See page 05-122)**

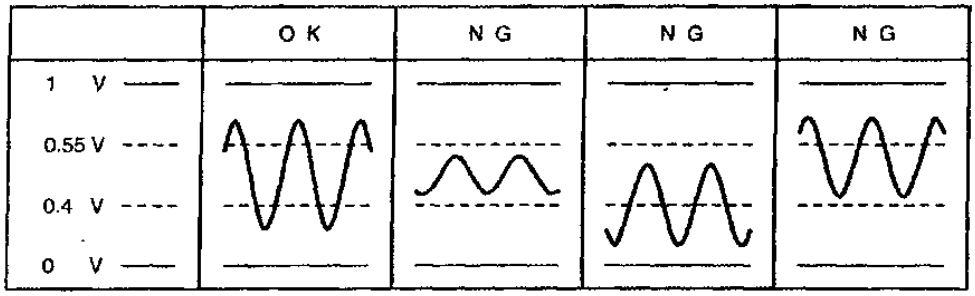
A

CONTINUED

2 READ VALUE OF HAND-HELD TESTER(OUTPUT VOLTAGE OXYGEN SENSOR)

(a) Warm up the oxygen sensor with the engine speed at 2,500 rpm for approx. 90 sec.
(b) Use the hand-held tester to read the output voltage of the oxygen sensor during idling.

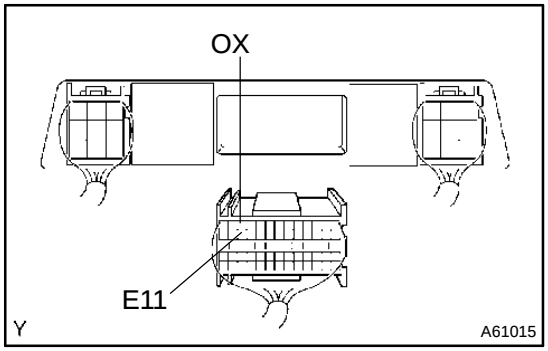
Oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table)

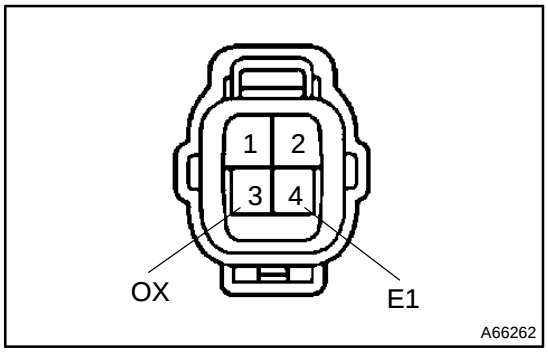


OK → **Go to step 9**

NG

3 CHECK HARNESS AND CONNECTOR(ECM - OXYGEN SENSOR)





(a) Disconnect the ECM E7 connector.
(b) Disconnect the oxygen sensor connector.
(c) Measure the resistance between terminals OX of the ECM connector and OX of the oxygen sensor connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminals E11 of the ECM connector and E1 of the oxygen sensor connector.
Resistance: 1 Ω or less
(e) Measure the resistance between terminals OX and E11 of the ECM connector.
Resistance: 1 MΩ or more
(f) Measure the resistance between terminal OX of the ECM connector and body ground.
Resistance: 1 MΩ or more

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

OK

CONTINUED

4	CHECK WHETHER MISFIRE IS OCCURRED OR NOT BY MONITORING DTC AND DATA LIST (See page 05-116)

NG → CHECK FOR SPARK AND IGNITION

OK

5	CHECK AIR INDUCTION SYSTEM

(a) Visually inspect the hoses, connections and gaskets (See page 12-5).

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

6	CHECK FUEL PRESSURE (See page 11-34)

NG → REPAIR OR REPLACE FUEL SYSTEM

OK

7	INSPECT FUEL INJECTOR ASSY (See page 11-36)

NG → REPLACE FUEL INJECTOR ASSY

OK

8	CHECK EXHAUST GAS LEAK

NG → REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT

OK

REPLACE OXYGEN SENSOR

9	PERFORM CONFIRMATION DRIVING PATTERN

(a) Clear the DTC (See page 05-116).
(b) Warm up the oxygen sensor by a driving test to check the system.

HINT:
Refer to CONFIRMATION DRIVING PATTERN.

CONTINUED

GO

10	READ OUTPUT DTC(DTC P0130, P0132 OR P0134 IS OUTPUT AGAIN)

Result:

DTC	Check
P0130, P0132 or P0134 is not output again	to A
P0130, P0132 or P0134 is output again	to B

B → CHECK AND REPLACE ECM

A

11	CONFIRM VEHICLE RUNS OUT OF FUEL IN PAST

(a) Confirm if the vehicle ran out of fuel or not in the past.

HINT:

There is no problem, if DTC P0130, P0132 or P0134 is not output after the CONFIRMATION DRIVING PATTERN. This means that the ECM records DTC P0130, P0132 or P0134 because of the running out of fuel in the past.

NO → CHECK FOR INTERMITTENT PROBLEMS

YES

DTC P0130, P0132 OR P0134 IS CAUSED BY RUNNING OUT OF FUEL

CONTINUED

DTC	P0135	OXYGEN SENSOR HEATER CIRCUIT (BANK 1 SENSOR 1)

CIRCUIT DESCRIPTION

Refer to DTCs P0130, P0132 and P0134 on page 05-147.

DTC No.	DTC Detecting Condition	Trouble Area
P0135	When heater operates, heater current exceeds 2 A (3 trip detection logic)	• Open or short in heater circuit of oxygen sensor • Oxygen sensor heater • ECM
	Heater current of 0.2 A or less when heater operates (3 trip detection logic)	

HINT:

- Bank 1 refers to bank that includes cylinder No. 1.
- Sensor 1 refers to the sensor closer to the engine body.

WIRING DIAGRAM

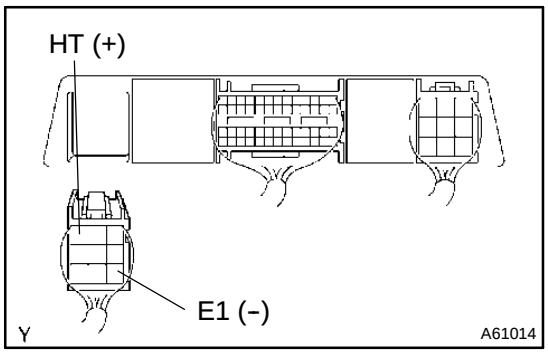
Refer to DTCs P0130, P0132 and P0134 on page 05-147.

INSPECTION PROCEDURE

HINT:

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

1	INSPECT ECM(CHECK VOLTAGE)

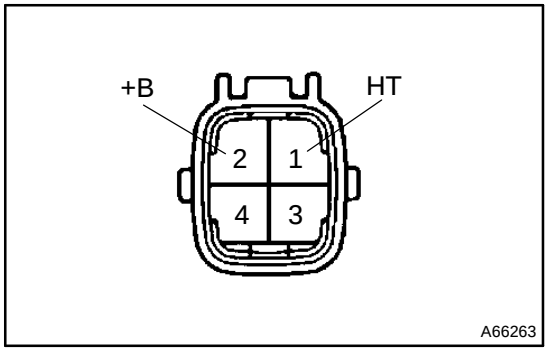


(a) Disconnect the ECM E8 connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between terminals HT and E1 of the ECM connector.
Voltage: 9 - 14 V

OK → **CHECK AND REPLACE ECM**

NG

2	INSPECT OXYGEN SENSOR(OXYGEN SENSOR HEATER)



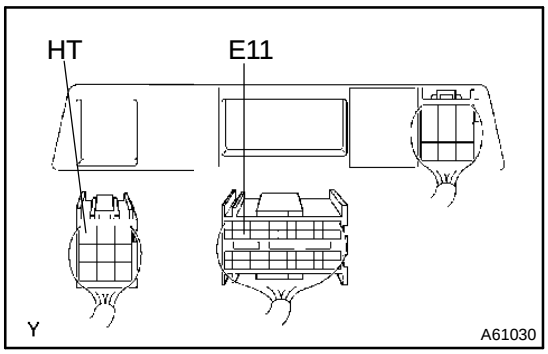
(a) Disconnect the oxygen sensor connector.
(b) Measure the resistance between terminals HT and +B of the oxygen sensor connector.
Resistance: 5 - 30 Ω at 20°C (68 °F)

CONTINUED

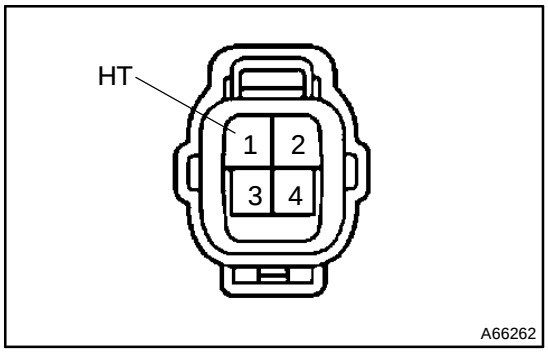
NG → REPLACE OXYGEN SENSOR

OK

3 CHECK HARNESS AND CONNECTOR(ECM - OXYGEN SENSOR)



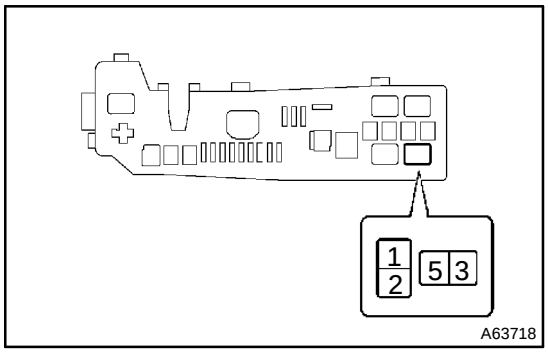
(a) Disconnect the ECM E7 and E8 connectors.
(b) Disconnect the oxygen sensor connector.
(c) Measure the resistance between terminals HT of the ECM connector and HT of the oxygen sensor connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminals HT and E11 of the ECM connectors.
Resistance: 1 MΩ or more
(e) Measure the resistance between terminal HT of the ECM connector and body ground.
Resistance: 1 MΩ or more



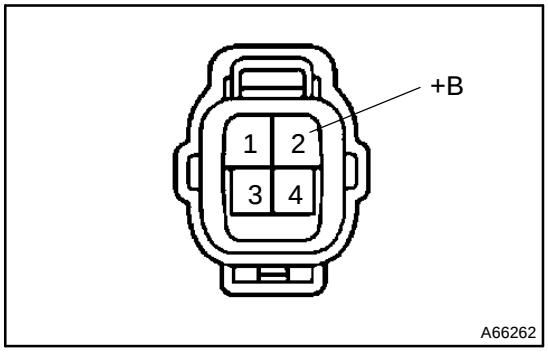
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4 CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - OXYGEN SENSOR)



(a) Remove the E.F.I. ECU relay.
(b) Disconnect the oxygen sensor connector.
(c) Measure the resistance between terminals 3 of the E.F.I. ECU relay side connector and +B of the oxygen sensor connector.
Resistance: 1 Ω or less



CONTINUED

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK FOR ECM POWER SOURCE CIRCUIT (See page 05–197)

CONTINUED

DTC	P0261	CYLINDER 1 INJECTOR CIRCUIT LOW

DTC	P0262	CYLINDER 1 INJECTOR CIRCUIT HIGH

DTC	P0264	CYLINDER 2 INJECTOR CIRCUIT LOW

DTC	P0265	CYLINDER 2 INJECTOR CIRCUIT HIGH

DTC	P0267	CYLINDER 3 INJECTOR CIRCUIT LOW

DTC	P0268	CYLINDER 3 INJECTOR CIRCUIT HIGH

DTC	P0270	CYLINDER 4 INJECTOR CIRCUIT LOW

DTC	P0271	CYLINDER 4 INJECTOR CIRCUIT HIGH

CIRCUIT DESCRIPTION

The fuel injectors are situated in the intake manifold.
They inject fuel into the cylinders based on the signals from the ECM.

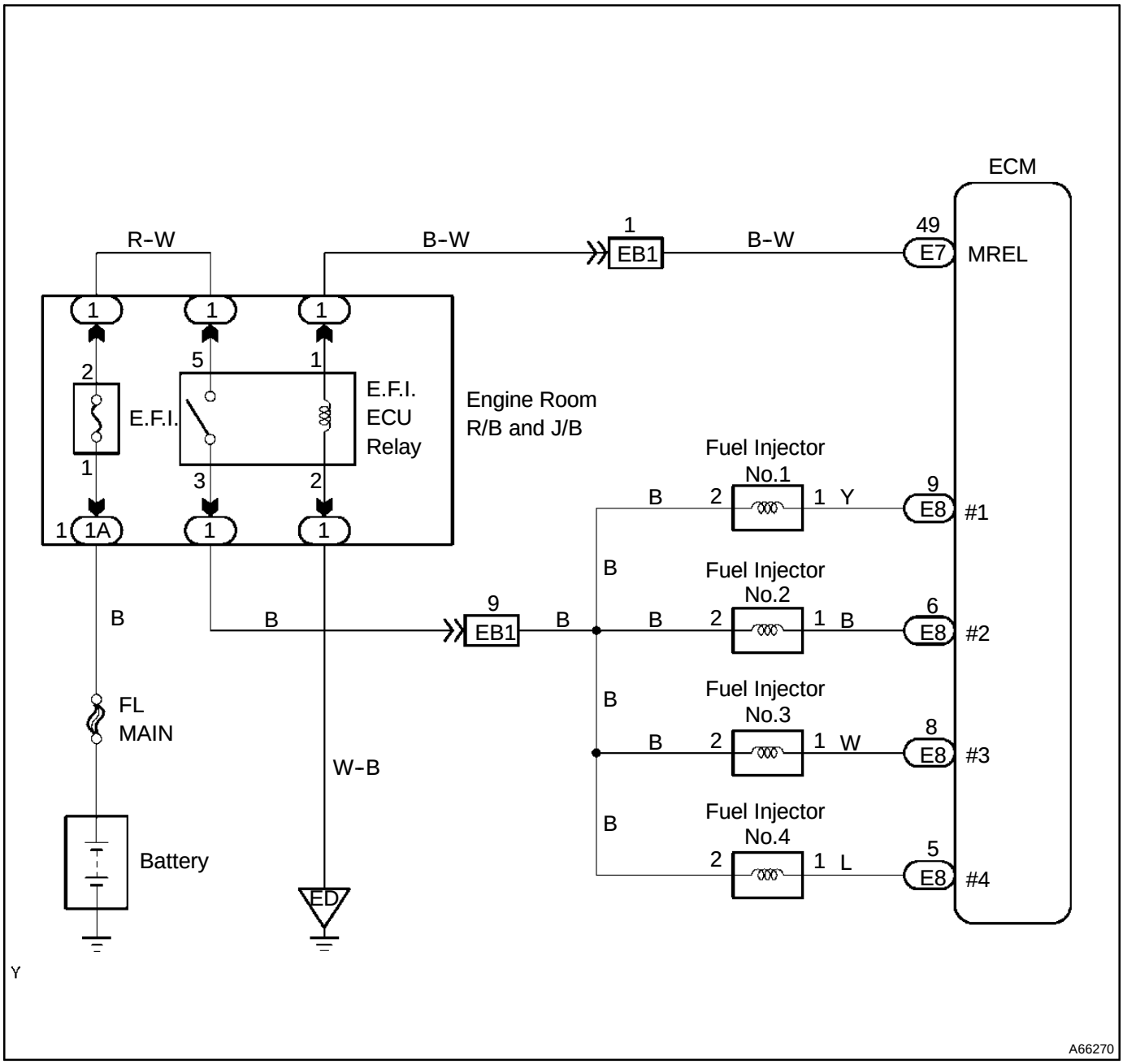
DTC No.	DTC Detecting Condition	Trouble Area
P0261 P0264 P0267 P0270	Open or short in fuel injector circuit (3 trip detection logic)	• Open or short in fuel injector circuit • Open in fuel injector power source circuit • Fuel injector • ECM
P0262 P0265 P0258 P0271	Short in back up power source circuit (3 trip detection logic)	

HINT:

- If DTC P0261 or P0262 is displayed, check No.1 fuel injector circuit.
- If DTC P0264 or P0265 is displayed, check No.2 fuel injector circuit.
- If DTC P0267 or P0268 is displayed, check No.3 fuel injector circuit.
- If DTC P0270 or P0271 is displayed, check No.4 fuel injector circuit.

CONTINUED

WIRING DIAGRAM



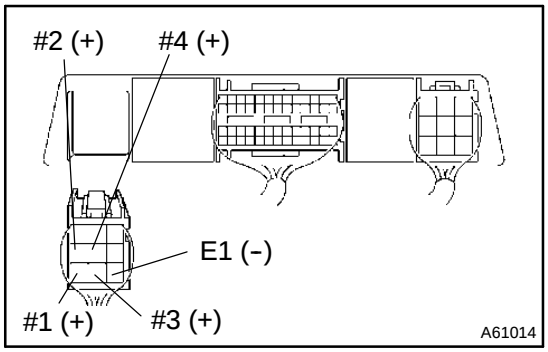
INSPECTION PROCEDURE

HINT:

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

CONTINUED

1	INSPECT ECM(CHECK VOLTAGE)



(a) Disconnect the ECM E8 connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between applicable terminal and E1 of the ECM connector.
Voltage: 9 - 14 V

OK → **CHECK AND REPLACE ECM**

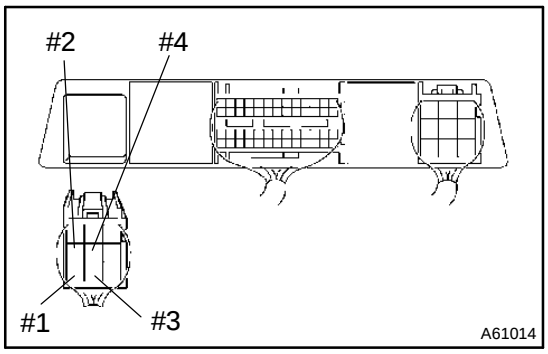
NG

2	INSPECT FUEL INJECTOR ASSY (See page 11-36)

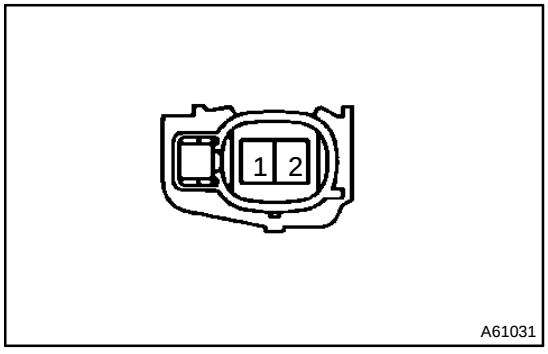
NG → **REPLACE FUEL INJECTOR ASSY**

OK

3	CHECK HARNESS AND CONNECTOR(ECM - FUEL INJECTOR)



(a) Disconnect the ECM E8 connector.
(b) Disconnect the fuel injector connector.
(c) Measure the resistance between applicable terminal of the ECM connector and 1 of the fuel injector connector.
Resistance: 1 Ω or less
(d) Measure the resistance between applicable terminal of the ECM connector and body ground.
Resistance: 1 MΩ or more

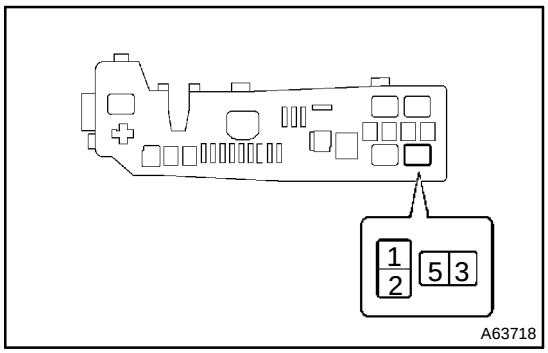


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

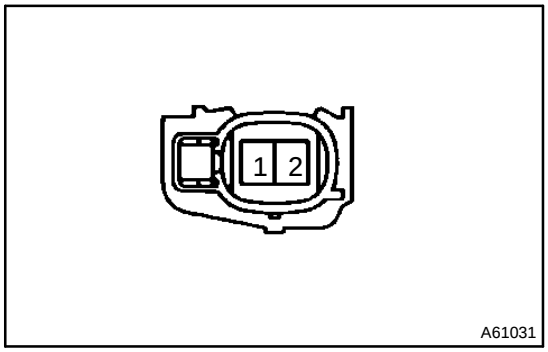
OK

CONTINUED

4	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - FUEL INJECTOR)



(a) Remove the E.F.I. ECU relay.
(b) Disconnect the fuel injector connector.
(c) Measure the resistance between terminals 3 of the E.F.I. ECU relay side connector and 2 of the fuel injector connector.
Resistance: 1 Ω or less



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

OK

CHECK FOR ECM POWER SOURCE CIRCUIT **(See page 05-197)**

CONTINUED

DTC	P0327	KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

DTC	P1605	KNOCK CONTROL CPU MALFUNCTION

CIRCUIT DESCRIPTION

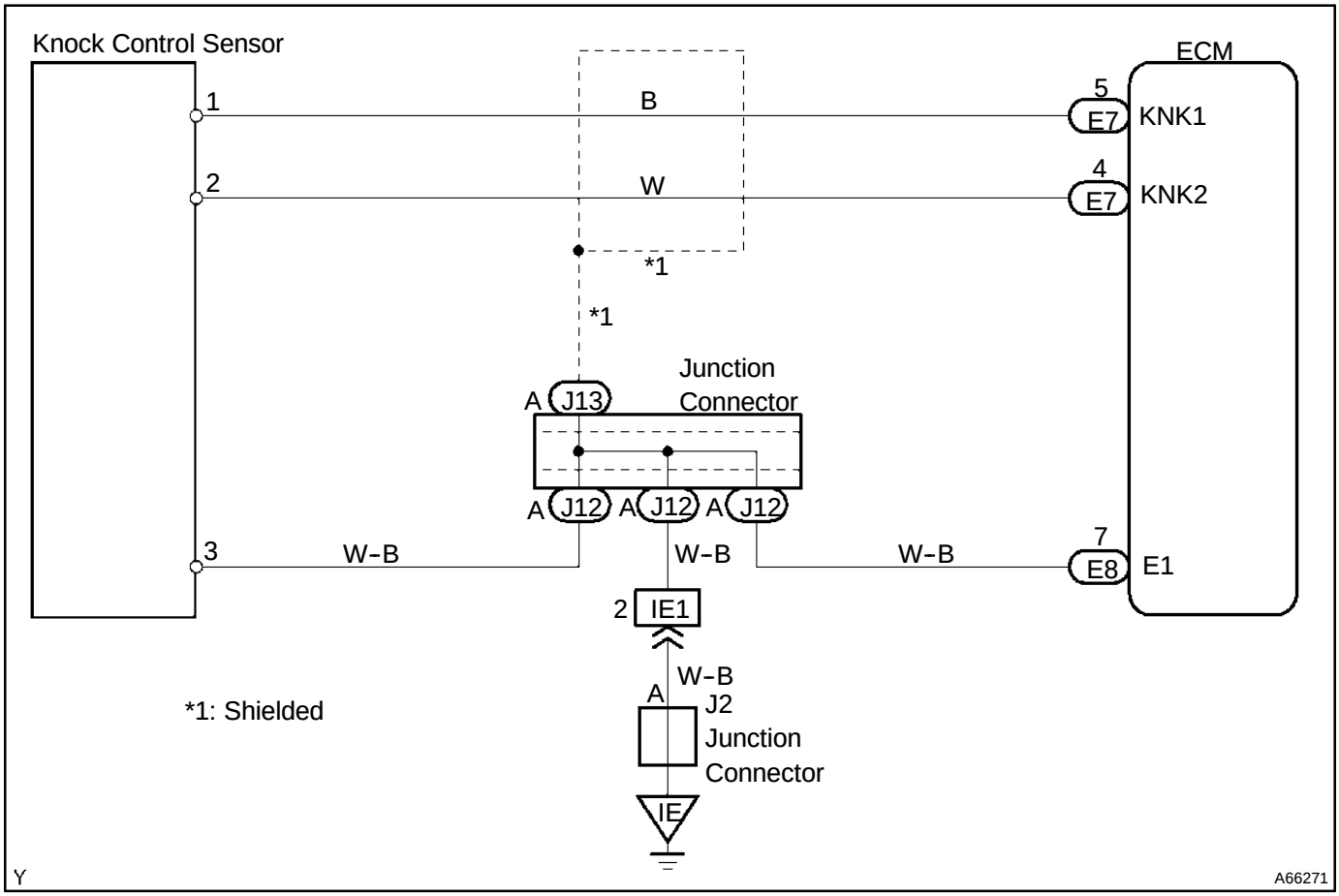
The knock control sensor is fitted to the cylinder block to detect the engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed. This occurs when the cylinder block vibrates due to knocking. If the engine knocking occurs, the ignition timing is delayed to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0327 P1605	Open or short in knock control sensor circuit (3 trip detection logic)	• Open or short in knock control sensor circuit • Knock control sensor (looseness) • ECM

HINT:

If the ECM detects above diagnosis conditions, it operates the fail safe function in which the corrective retard angle value is set to the maximum value.

WIRING DIAGRAM



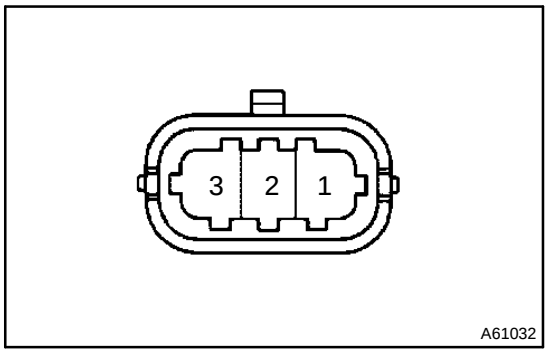
CONTINUED

INSPECTION PROCEDURE

HINT:

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

1	INSPECT KNOCK CONTROL SENSOR

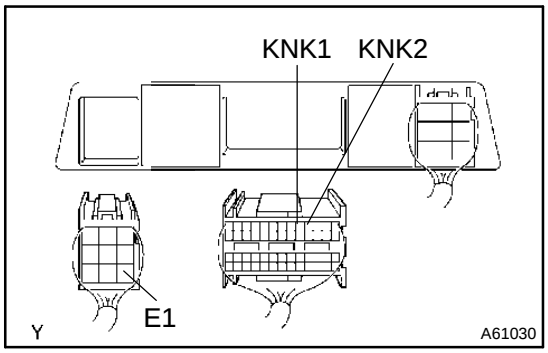


(a) Measure the resistance between terminals 1 and 2 of the knock control sensor.
Resistance: 1 MΩ or more

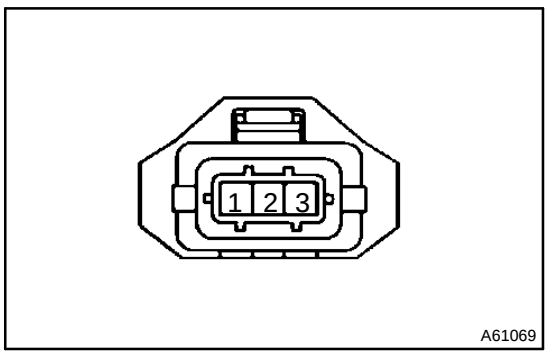
NG → **REPLACE KNOCK CONTROL SENSOR**

OK

2	CHECK HARNESS AND CONNECTOR(ECM - KNOCK CONTROL SENSOR)



(a) Disconnect the ECM E7 and E8 connectors.
(b) Disconnect the knock control sensor connector.
(c) Measure the resistance between terminals KNK1 of the ECM connector and 1 of the knock control sensor connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminals KNK2 of the ECM connector and 2 of the knock control sensor connector.
Resistance: 1 Ω or less



(e) Measure the resistance between terminals E1 of the ECM connector and 3 of the knock control sensor connector.
Resistance: 1 Ω or less
(f) Measure the resistance between terminals KNK1 and KNK2 of the ECM connector.
Resistance: 1 MΩ or more
(g) Measure the resistance between terminal KNK1 of the ECM connector and body ground.
Resistance: 1 MΩ or more
(h) Measure the resistance between terminal KNK2 of the ECM connector and body ground.
Resistance: 1 MΩ or more

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

OK

CONTINUED

3	CONFIRM THE MALFUNCTION DISAPPEAR WHEN A GOOD KNOCK SENSOR IS INSTALLED

(a) Exchange the knock control sensor to a new one.
  (1) Remove the knock control sensor (See page 14–116).
  (2) Install a new knock control sensor (See page 14–116).
(b) Perform the driving test.
(c) Read the DTC (See page 05–116).
  Result:

DTC	Check
DTC P0327 or P1605 is output	to A
DTC P0327 or P1605 is not output	to B

B → REPLACE KNOCK CONTROL SENSOR

A

CHECK AND REPLACE ECM

CONTINUED

DTC	P0335	CRANKSHAFT POSITION SENSOR "A" CIRCUIT

DTC	P0336	CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE

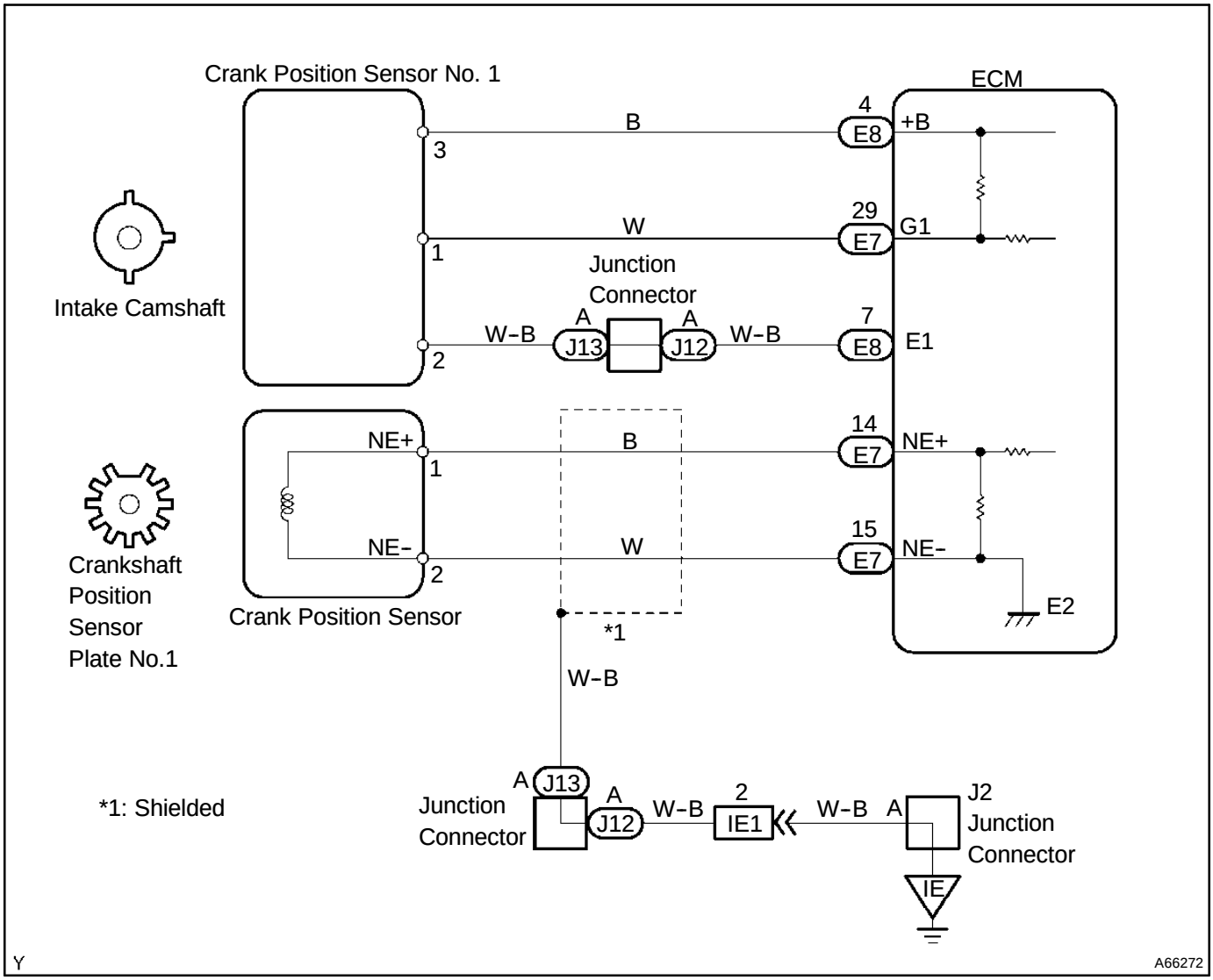
CIRCUIT DESCRIPTION

Crank position sensor No.1 (G signal) and crank position sensor (NE signal) consist of a magnet, iron core and pickup coil.
The G signal rotor has 3 teeth on the outside and is mounted on the intake camshaft.
When the camshafts rotate, the magnetic field on hall element inside of the sensor is changed by changing the air gap between the signal plate and the sensor.
That cause hall effects, and that hall effects cause electromotive force.
The circuit inside of the sensor catch the electromotive force and process it as on/off signal.
The NE signal plate (crankshaft position sensor plate No.1) has 34 teeth and is installed in the crankshaft.
The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the crankshaft angle and the engine revolution based on the NE signal, and distinction of the cylinder and phase of the VVT based on the combination of the G and NE signal.

DTC No.	DTC Detecting Condition	Trouble Area
P0335	No crank position sensor signal to ECM during cranking (1 trip detection logic)	• Open or short in crank position sensor circuit • Crank position sensor • Crankshaft position sensor plate No.1 • ECM
P0336	No crank position sensor signal to ECM with engine speed 600 rpm or more (3 trip detection logic)	

CONTINUED

WIRING DIAGRAM



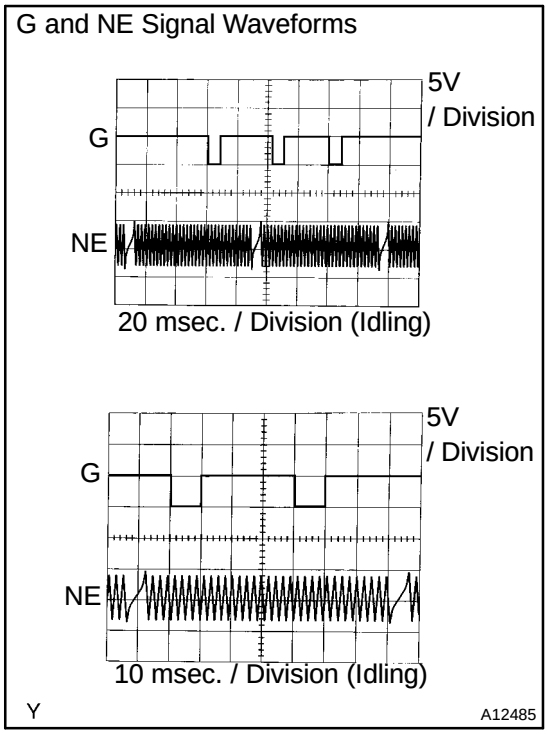
INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the hand-held tester. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.
- Perform troubleshooting of DTCs P0335 and P0336 first. If no trouble is found, troubleshoot the following mechanical systems.

CONTINUED

1	INSPECT CRANK POSITION SENSOR(CHECK RESISTANCE)



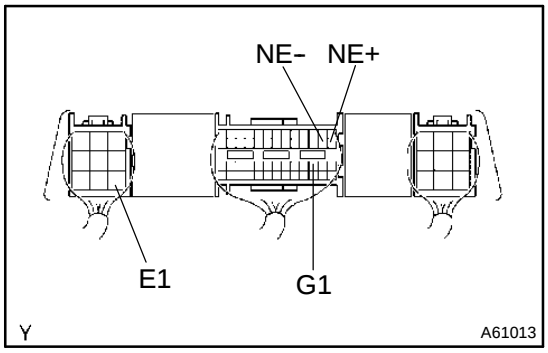
(a) Check the crank position sensor for resistance (See page 18–6).

Resistance:
1,630 – 2,740 Ω (Cold)
2,065 – 3,225 Ω (Hot)

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

(b) Reference:
Inspection using the oscilloscope.
(1) During cranking or idling, check the waveforms between terminals G1 and E1, and NE+ and NE– of the ECM connectors.

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

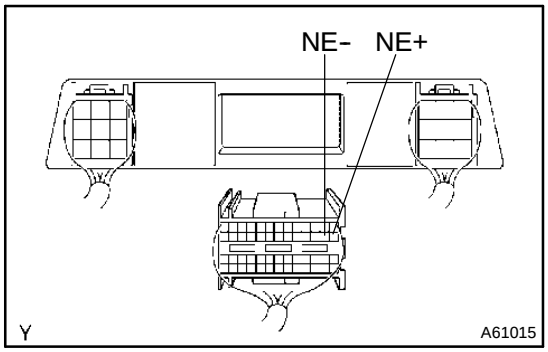


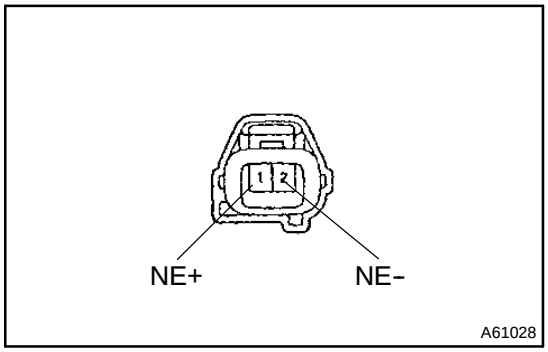
NG → **REPLACE CRANK POSITION SENSOR**

OK

CONTINUED

2	CHECK HARNESS AND CONNECTOR(ECM – CRANK POSITION SENSOR)





(a) Disconnect the ECM E7 connector.
(b) Disconnect the crank position sensor connector.
(c) Measure the resistance between terminals NE+ of the ECM connector and NE+ of the crank position sensor connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminals NE– of the ECM connector and NE– of the crank position sensor connector.
Resistance: 1 Ω or less
(e) Measure the resistance between terminals NE+ and NE– of the ECM connector.
Resistance: 1 MΩ or more
(f) Measure the resistance between terminal NE+ of the ECM connector and body ground.
Resistance: 1 MΩ or more
(g) Measure the resistance between terminal NE– of the ECM connector and body ground.
Resistance: 1 MΩ or more

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

OK

3	CHECK SENSOR INSTALLATION

(a) Check the crank position sensor installation.

NG → **TIGHTEN SENSOR**

OK

4	INSPECT CRANKSHAFT POSITION SENSOR PLATE NO.1(TEETH OF SIGNAL PLATE)

(a) Remove the crankshaft position sensor plate No.1 (See page 14–129).
(b) Check the teeth of the signal plate.

NG → **REPAIR OR REPLACE CRANKSHAFT POSITION SENSOR PLATE NO.1**

OK

CHECK AND REPLACE ECM

CONTINUED

DTC	P0340	CAMSHAFT POSITION SENSOR ”A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC	P0341	CAMSHAFT POSITION SENSOR ”A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

DTC	P1340	CAMSHAFT POSITION SENSOR ”A” (BANK 1 SENSOR 2)

CIRCUIT DESCRIPTION

Refer to DTCs P0335 and P0336 on page 05–164.

DTC No.	DTC Detecting Condition	Trouble Area
P0340 P0341 P1340	Deviation in crank position sensor signal and crank position sensor No.1 signal (3 trip detection logic)	• Mechanical system malfunction (skipping teeth of timing chain, chain stretched) • ECM

WIRING DIAGRAM

Refer to DTCs P0335 and P0336 on page 05–164.

INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the hand–held tester. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- Perform troubleshooting of DTCs P0342 and P0343 first. If no trouble is found, troubleshoot the following mechanical systems.

1	CHECK VALVE TIMING (See page 14–129)

NG → ADJUST VALVE TIMING

OK

CHECK AND REPLACE ECM

CONTINUED

DTC	P0342	CAMSHAFT POSITION SENSOR ”A” CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

DTC	P0343	CAMSHAFT POSITION SENSOR ”A” CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

CIRCUIT DESCRIPTION

Refer to DTCs P0335 and P0336 on page 05–164.

DTC No.	DTC Detecting Condition	Trouble Area
P0342 P0343	No crank position sensor No.1 signal to ECM during cranking (3 trip detection logic)	• Open or short in crank position sensor No.1 circuit • Crank position sensor No.1 • Intake camshaft • ECM
	No crank position sensor No.1 signal to ECM with engine speed 600 rpm or more (3 trip detection logic)	

WIRING DIAGRAM

Refer to DTCs P0335 and P0336 on page 05–164.

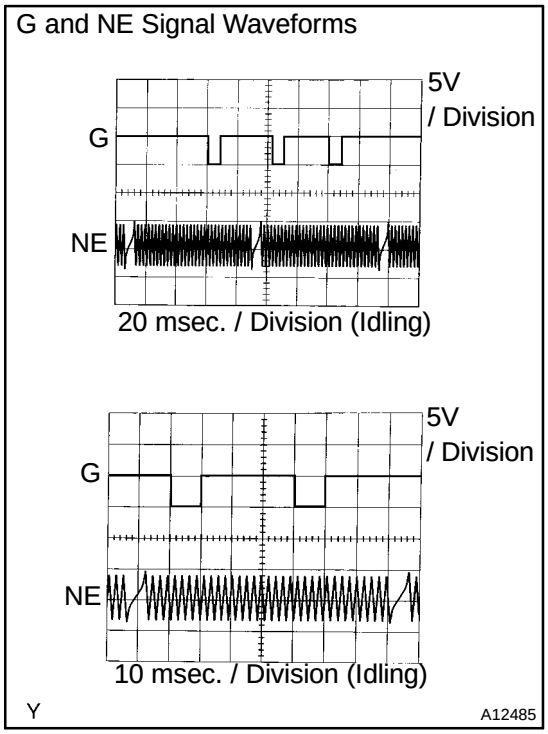
INSPECTION PROCEDURE

HINT:

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

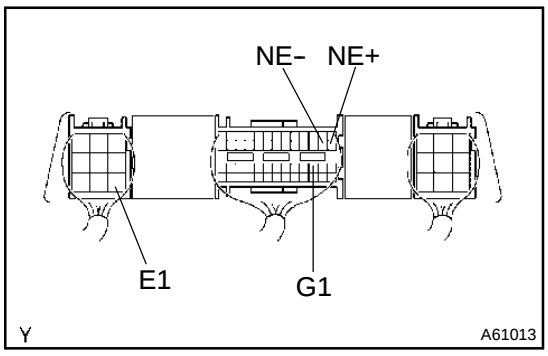
CONTINUED

1	INSPECT CRANK POSITION SENSOR NO.1



(a) Reference:
Inspection using the oscilloscope.
(1) During cranking or idling, check the waveforms between terminals G1 and E1, and NE+ and NE– of the ECM connectors.

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

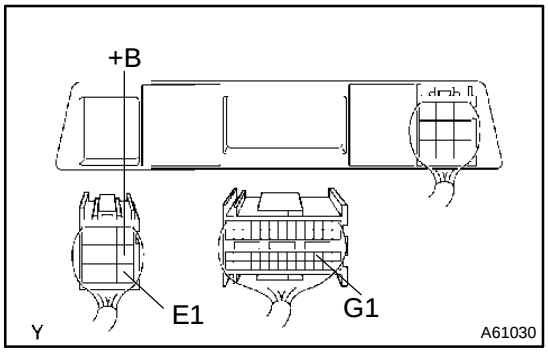


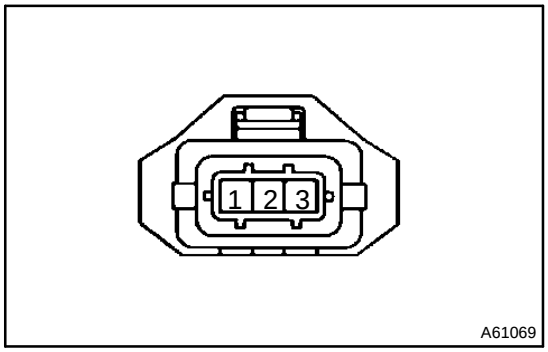
NG → **REPLACE CRANK POSITION SENSOR NO.1**

OK

CONTINUED

2	CHECK HARNESS AND CONNECTOR(ECM - CRANK POSITION SENSOR NO.1)





(a) Disconnect the ECM E7 and E8 connectors.
(b) Disconnect the crank position sensor No.1 connector.
(c) Measure the resistance between terminals G1 of the the ECM connector and 1 of the crank position sensor No.1 connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminals E1 of the the ECM connector and 2 of the crank position sensor No.1 connector.
Resistance: 1 Ω or less
(e) Measure the resistance between terminals +B of the the ECM connector and 3 of the crank position sensor No.1 connector.
Resistance: 1 Ω or less
(f) Measure the resistance between terminals G1 and +B of the ECM connectors.
Resistance: 1 MΩ or more
(g) Measure the resistance between terminal G1 of the ECM connector and body ground.
Resistance: 1 MΩ or more
(h) Measure the resistance between terminal +B of the ECM connector and body ground.
Resistance: 1 MΩ or more

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

OK

3	CHECK SENSOR INSTALLATION

(a) Check the crank position sensor No.1 installation.

NG → **TIGHTEN SENSOR**

OK

4	INSPECT CAMSHAFT

(a) Remove the camshaft (See page 14–141).
(b) Check the camshaft lobes.

NG → **REPAIR OR REPLACE CAMSHAFT**

OK

CHECK AND REPLACE ECM

CONTINUED

DTC	P0351	IGNITION COIL ”A” PRIMARY/SECONDARY CIRCUIT

DTC	P0352	IGNITION COIL ”B” PRIMARY/SECONDARY CIRCUIT

DTC	P0353	IGNITION COIL ”C” PRIMARY/SECONDARY CIRCUIT

DTC	P0354	IGNITION COIL ”D” PRIMARY/SECONDARY CIRCUIT

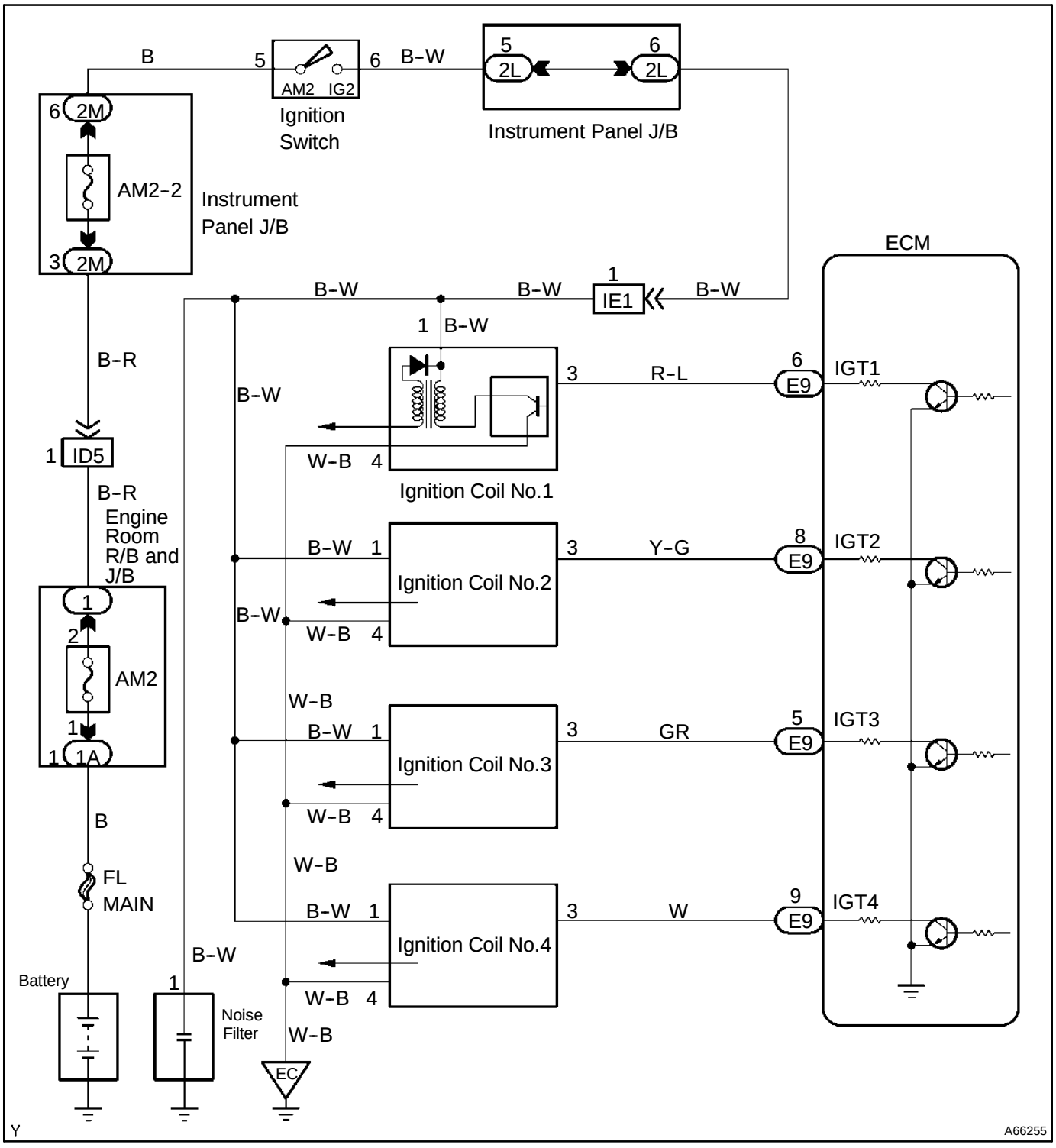
CIRCUIT DESCRIPTION

A Direct Ignition System (DIS) has been adopted. The DIS improves the ignition timing accuracy, reduces the high–voltage loss, and enhances overall reliability of the ignition system by eliminating the distributor. The DIS is a 1–cylinder ignition system which ignites one cylinder with one ignition coil. In the 1–cylinder ignition system, the spark plug is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plug. The spark of the spark plug passes through from the center electrode to the ground electrode.
The ECM determines ignition timing and outputs the ignition signals (IGT) of each cylinder. Based on IGT signals, the power transistors cut off the current to the primary coil in the ignition coil.

DTC No.	DTC Detecting Condition	Trouble Area
P0351 P0352 P0353 P0354	Open or short in ignition coil circuit (3 trip detection logic)	• Ignition system • Open or short in ignition coil circuit • Ignition coil • ECM

CONTINUED

WIRING DIAGRAM



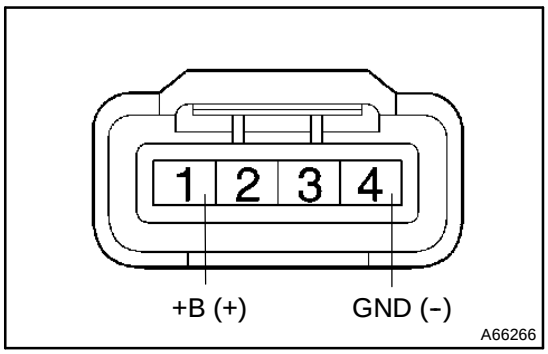
CONTINUED

INSPECTION PROCEDURE

HINT:

- If DTC P0351 is displayed, check No.1 ignition coil circuit.
- If DTC P0352 is displayed, check No.2 ignition coil circuit.
- If DTC P0353 is displayed, check No.3 ignition coil circuit.
- If DTC P0354 is displayed, check No.4 ignition coil circuit.
- Read freeze frame data using the hand-held tester. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

1 INSPECT IGNITION COIL ASSY(POWER SOURCE)

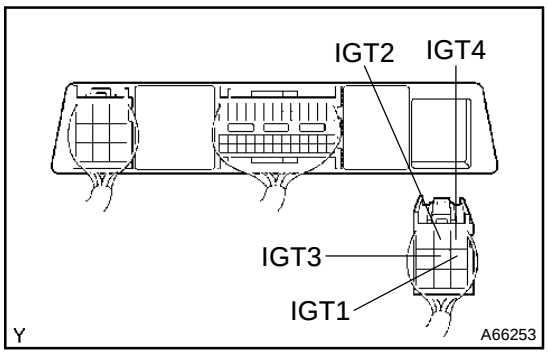


(a) Disconnect the ignition coil connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between terminals +B and GND of the ignition coil connector.
Voltage: 9 - 14 V

NG → **Go to step 4**

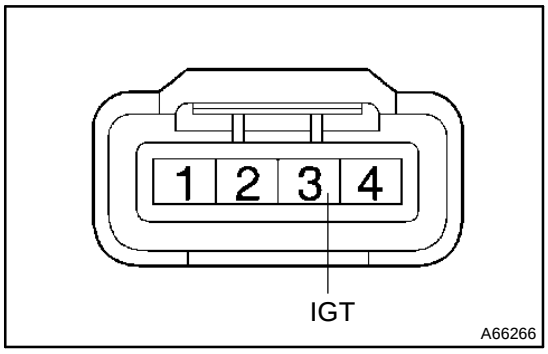
OK

2 CHECK HARNESS AND CONNECTOR(ECM - IGNITION COIL)



(a) Disconnect the ECM E9 connector.
(b) Disconnect the ignition coil connector.
(c) Measure the resistance between terminals IGT1 of the ECM connector and IGT of the ignition coil connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminal IGT1 of the ECM connector and body ground.
Resistance: 1 MΩ or more

HINT:
The procedure above is for No.1 cylinder. If a malfunction is found on the other cylinders, check the circuit for the cylinder with referring to this procedure.



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

OK

CONTINUED

3	PERFORM SIMULATION TEST(CHECK DTC)

(a) Clear the DTC (See page 05-116).
(b) Exchange the ignition coil for the others.

NOTICE:

Do not exchange the ignition coil connector for the others.

(c) Perform the simulation test.
(d) Check the DTC (See page 05-116).

Result:

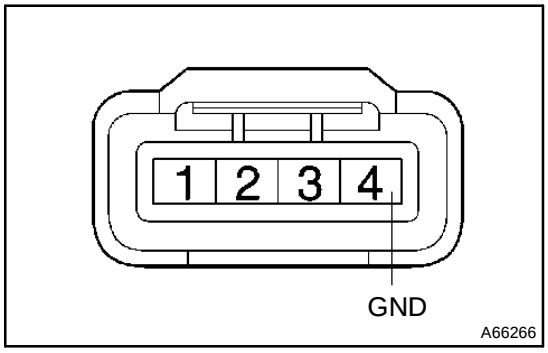
DTC	Check
The same code is output again	to A
The other code is output	to B

B → **REPLACE IGNITION COIL ASSY**

A

CHECK AND REPLACE ECM

4	CHECK HARNESS AND CONNECTOR(IGNITION COIL - BODY GROUND)



(a) Disconnect the ignition coil connector.
(b) Measure the resistance between terminal GND of the ignition coil connector and body ground.
Resistance: 1 Ω or less

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

OK

REPAIR OR REPLACE POWER SOURCE

CONTINUED

DTC	P0443	EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT

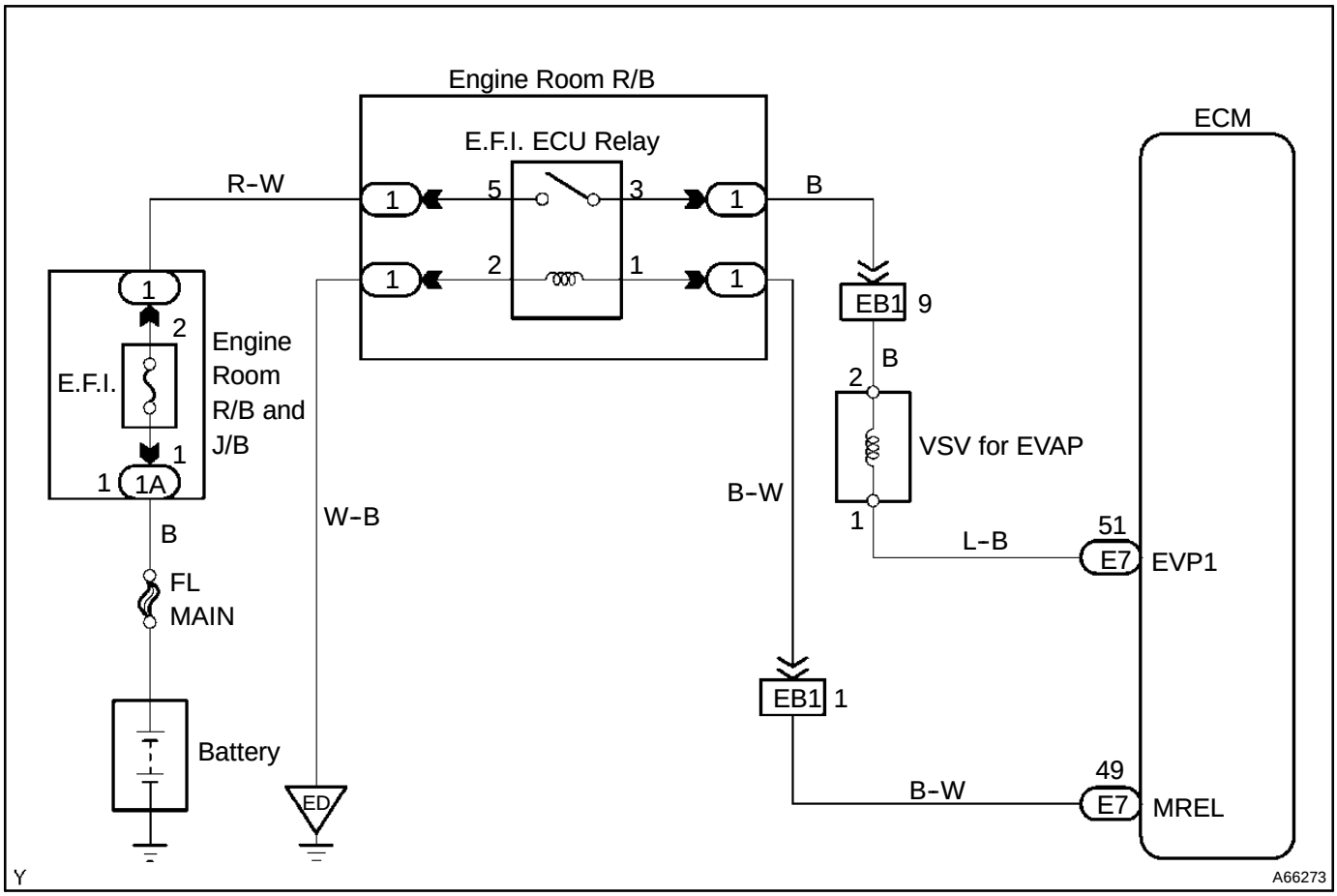
CIRCUIT DESCRIPTION

To reduce HC emissions, evaporated fuel from the fuel tank is routed through the charcoal canister to the intake manifold for combustion in the cylinders.

The ECM changes the duty signal to the VSV for the EVAP so that the intake quantity of HC emissions is appropriate for the driving conditions (engine load, engine speed, vehicle speed, etc.) after the engine is warmed up.

DTC No.	DTC Detecting Condition	Trouble Area
P0443	Proper response to ECM command does not occur (3 trip detection logic)	• Open or short in VSV circuit for EVAP • VSV for EVAP • ECM

WIRING DIAGRAM



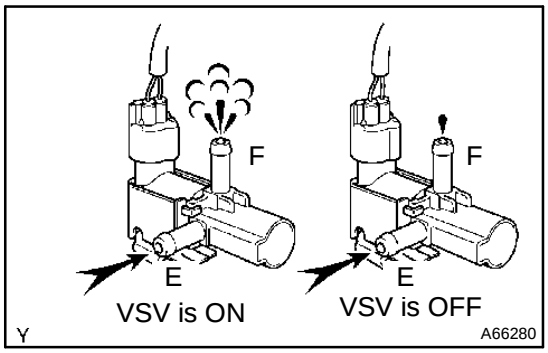
CONTINUED

INSPECTION PROCEDURE

HINT:

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

1	PERFORM ACTIVE TEST BY HAND–HELD TESTER(VSV FOR EVAP)

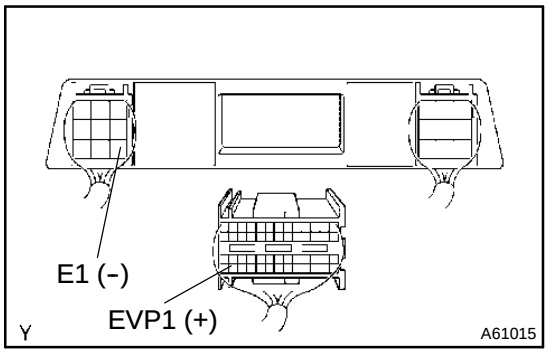


(a) Select the ACTIVE TEST mode on the hand–held tester.
(b) Disconnect the vacuum hose from the VSV.
(c) Check the operation of the VSV when the VSV is operated by the hand–held tester.
VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air from port E flows out with hardly through port F.

OK → **CHECK FOR INTERMITTENT PROBLEMS**

NG

2	INSPECT ECM(CHECK VOLTAGE)



(a) Disconnect the ECM E7 connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between terminals EVP1 and E1 of the ECM connector.
Voltage: 9 – 14 V

OK → **CHECK AND REPLACE ECM**

NG

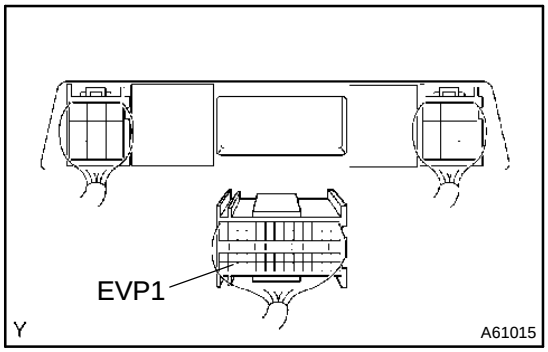
3	INSPECT VACUUM SWITCHING VALVE NO.1 (See page 12–7)

NG → **REPLACE VACUUM SWITCHING VALVE NO.1**

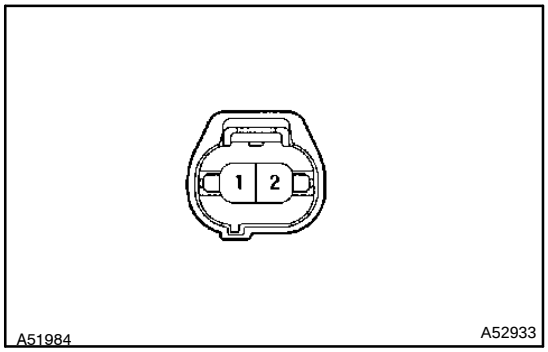
OK

CONTINUED

4	CHECK HARNESS AND CONNECTOR(ECM - VSV FOR EVAP)



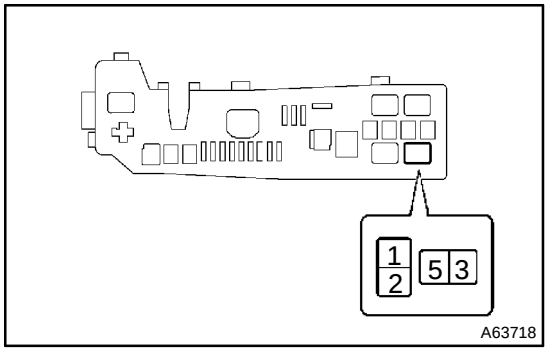
(a) Disconnect the ECM E7 connector.
(b) Disconnect the VSV connector.
(c) Measure the resistance between terminals EVP1 of the ECM connector and 1 of the VSV connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminal EVP1 of the ECM connector and body ground.
Resistance: 1 MΩ or more



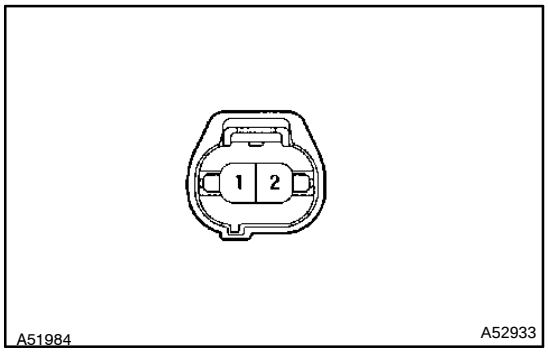
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - VSV FOR EVAP)



(a) Remove the E.F.I. ECU relay.
(b) Disconnect the VSV connector.
(c) Measure the resistance between terminals 3 of the E.F.I. ECU relay side connector and 2 of the VSV connector.
Resistance: 1 Ω or less



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

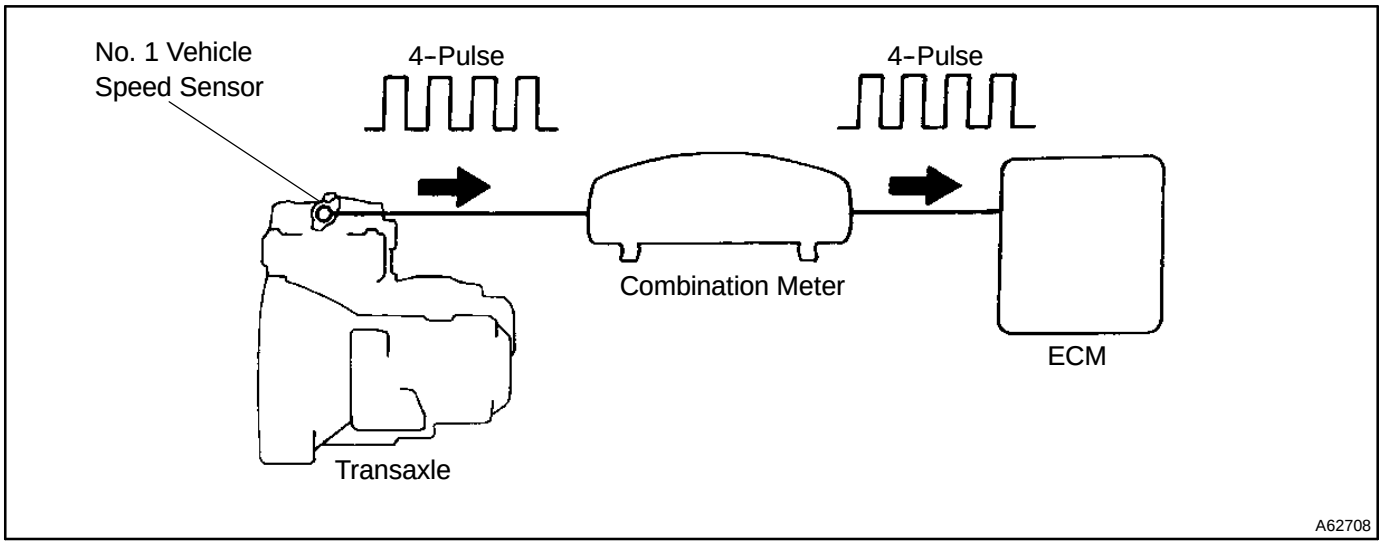
OK

CHECK FOR ECM POWER SOURCE CIRCUIT **(See page 05-197)**

DTC	P0501	VEHICLE SPEED SENSOR "A" RANGE/PERFORMANCE

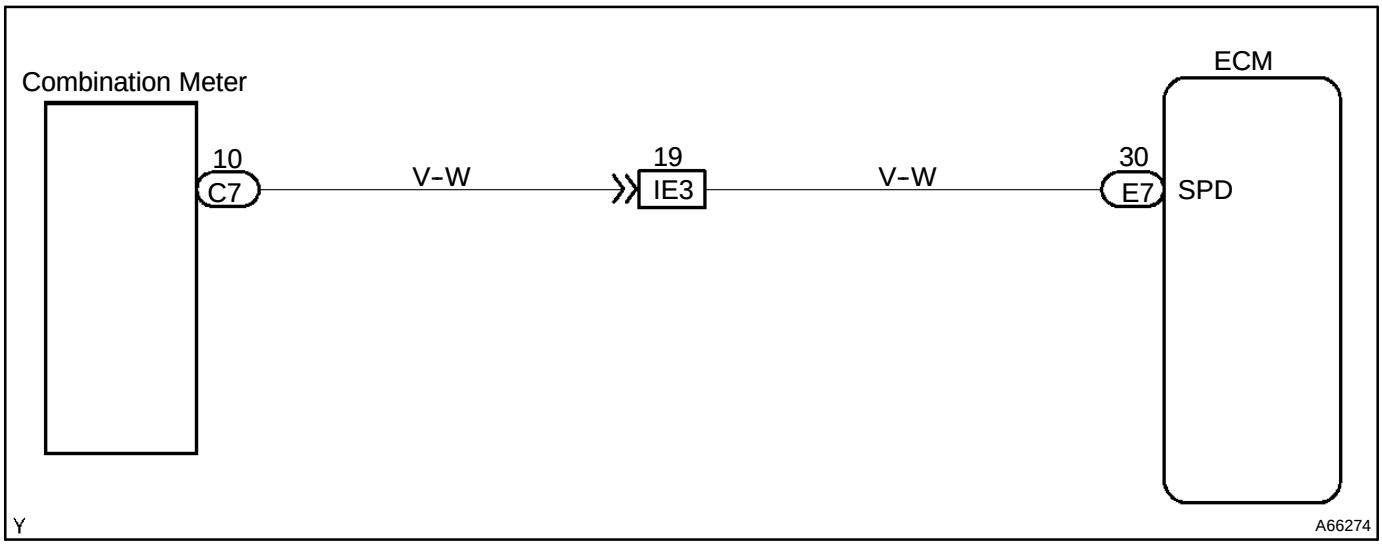
CIRCUIT DESCRIPTION

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



DTC No.	DTC Detecting Condition	Trouble Area
P0501	During vehicle is being driven, no vehicle speed sensor signal to ECM (3 trip detection logic)	• Combination meter • Open or short in No.1 vehicle speed sensor circuit • No.1 vehicle speed sensor • ECM

WIRING DIAGRAM



CONTINUED

INSPECTION PROCEDURE

HINT:

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

1	CHECK OPERATION OF SPEEDOMETER(SPEEDOMETER OPERATION)

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

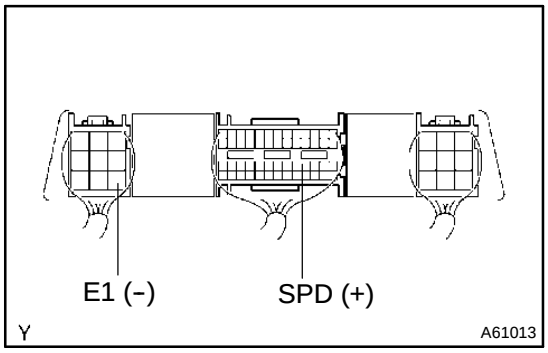
HINT:

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

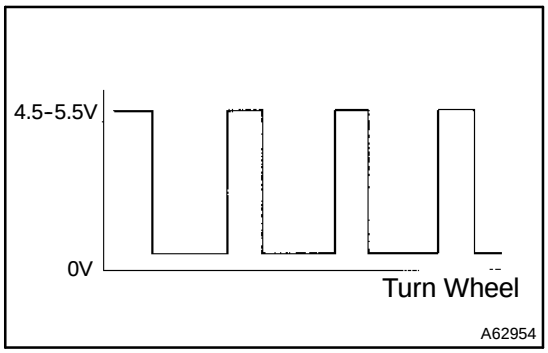
NG → CHECK SPEEDOMETER CIRCUIT

OK

2	INSPECT ECM(CHECK VOLTAGE)



(a) Jack up the vehicle.
(b) Turn the ignition switch ON.
(c) Measure the voltage between terminals SPD and E1 of the ECM connectors with turning the wheel slowly.
Voltage: Generated intermittently



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

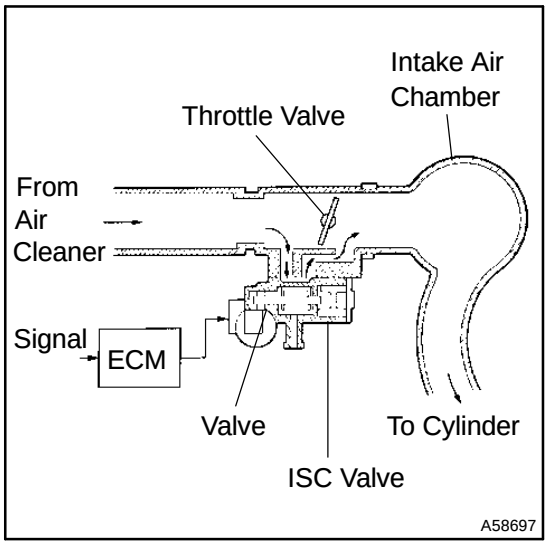
OK

CHECK AND REPLACE ECM

CONTINUED

DTC P0505 IDLE AIR CONTROL SYSTEM

CIRCUIT DESCRIPTION

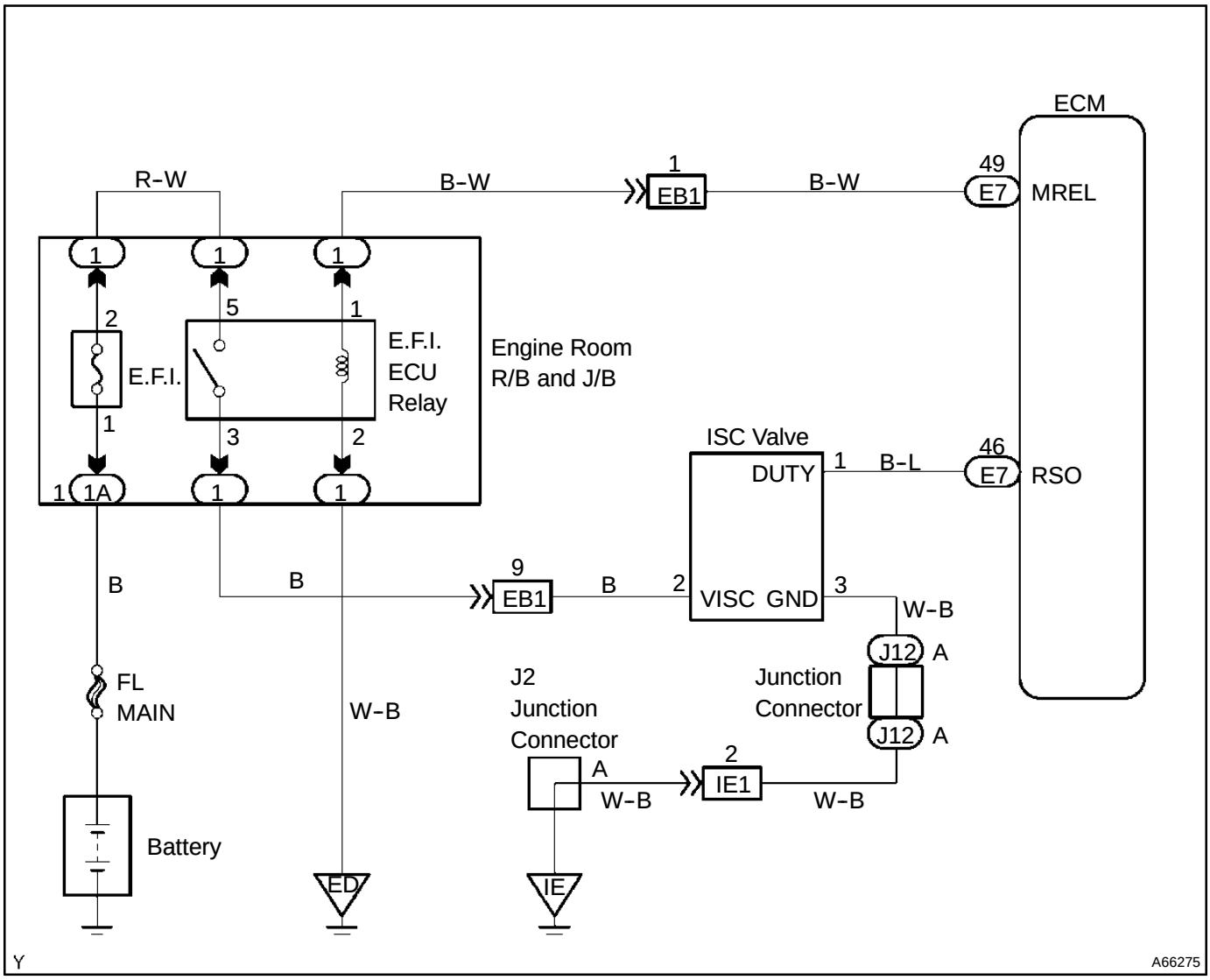


The rotary solenoid type ISC valve is located under the throttle body and intake air bypassing the throttle valve is directed to the ISC valve through the passage.
In this way the intake air volume bypassing the throttle valve is regulated, controlling the engine speed.
The ECM operates the ISC valve only to perform idle-up and provide feedback for the target idling speed.

DTC No.	DTC Detecting Condition	Trouble Area
P0505	Idle speed continues to be apart greatly from target speed (3 trip detection logic)	• Open or short in ISC valve circuit • ISC valve is stuck or closed • Open or short in A/C switch circuit • Air induction system • ECM

CONTINUED

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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

1	**PERFORM ACTIVE TEST BY HAND-HELD TESTER(CHECK OPERATION OF THE ISC VALVE)**

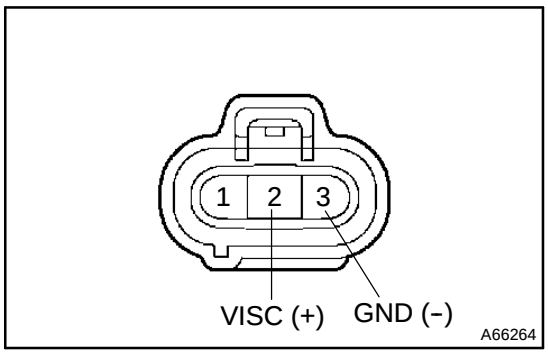
(a) Warm up the engine to the normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Connect the hand-held tester and select the ACTIVE TEST mode on the hand-held tester.
(e) Check the engine speed when the ISC valve is operated by the hand-held tester.
ENGINE SPEED:
Engine speed is increased and decreased in response to change of ISC duty ratio

CONTINUED

OK	Go to step 6

NG

2	CHECK HARNESS AND CONNECTOR

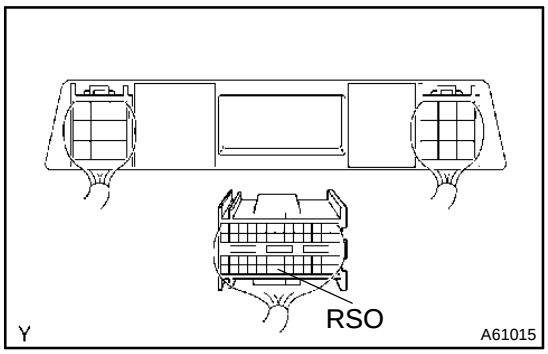


(a) Disconnect the ISC valve connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between terminals VISC and GND of the ISC valve connector.
Voltage: 9 - 14 V

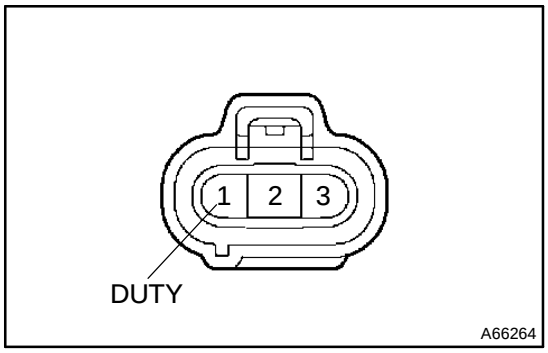
NG	Go to step 8

OK

3	CHECK HARNESS AND CONNECTOR(ECM - ISC VALVE)



(a) Disconnect the ECM E7 connector.
(b) Disconnect the ISC valve connector.
(c) Measure the resistance between terminals RSO of the ECM connector and DUTY of the ISC valve connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminal RSO of the ECM connector and body ground.
Resistance: 1 MΩ or more



NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	CHECK THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY (See page 10-10)

NG	REPLACE THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY

OK

CONTINUED

5	CHECK BLOCKAGE OF ISC VALVE AND PASSAGE TO BYPASS THROTTLE VALVE

NG → REPAIR OR REPLACE THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY

OK

CHECK AND REPLACE ECM

6	CHECK AIR INDUCTION SYSTEM

(a) Visually inspect the hoses, connections and gaskets (See page 12–5).

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

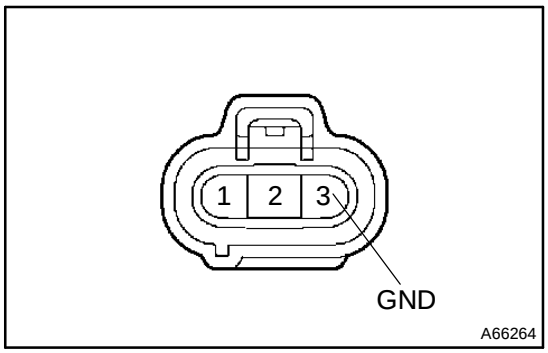
7	CHECK FOR A/C SIGNAL CIRCUIT

NG → REPAIR OR REPLACE

OK

CHECK FOR INTERMITTENT PROBLEMS

8	CHECK HARNESS AND CONNECTOR(ISC VALVE - BODY GROUND)



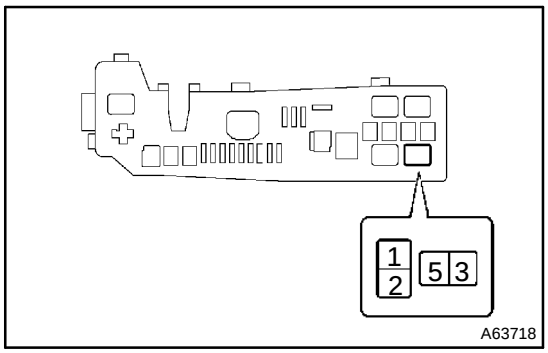
(a) Disconnect the ISC valve connector.
(b) Measure the resistance between terminal GND of the ISC valve connector and body ground.
Resistance: 1 Ω or less

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

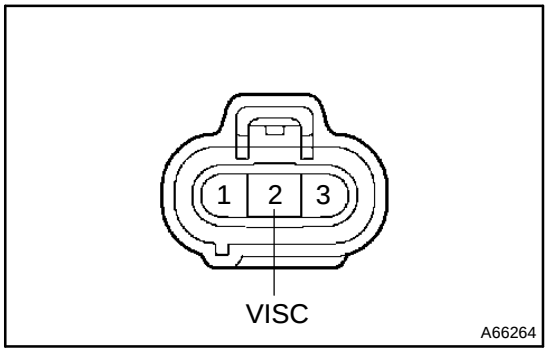
OK

CONTINUED

9	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - ISC VALVE)



(a) Remove the E.F.I. ECU relay.
(b) Disconnect the ISC valve connector.
(c) Measure the resistance between terminals 3 of the E.F.I. ECU relay side connector and VISC of the ISC valve connector.
Resistance: 1 Ω or less



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

OK

CHECK FOR ECM POWER SOURCE CIRCUIT **(See page 05-197)**

CONTINUED

DTC	P0561	SYSTEM VOLTAGE UNSTABLE

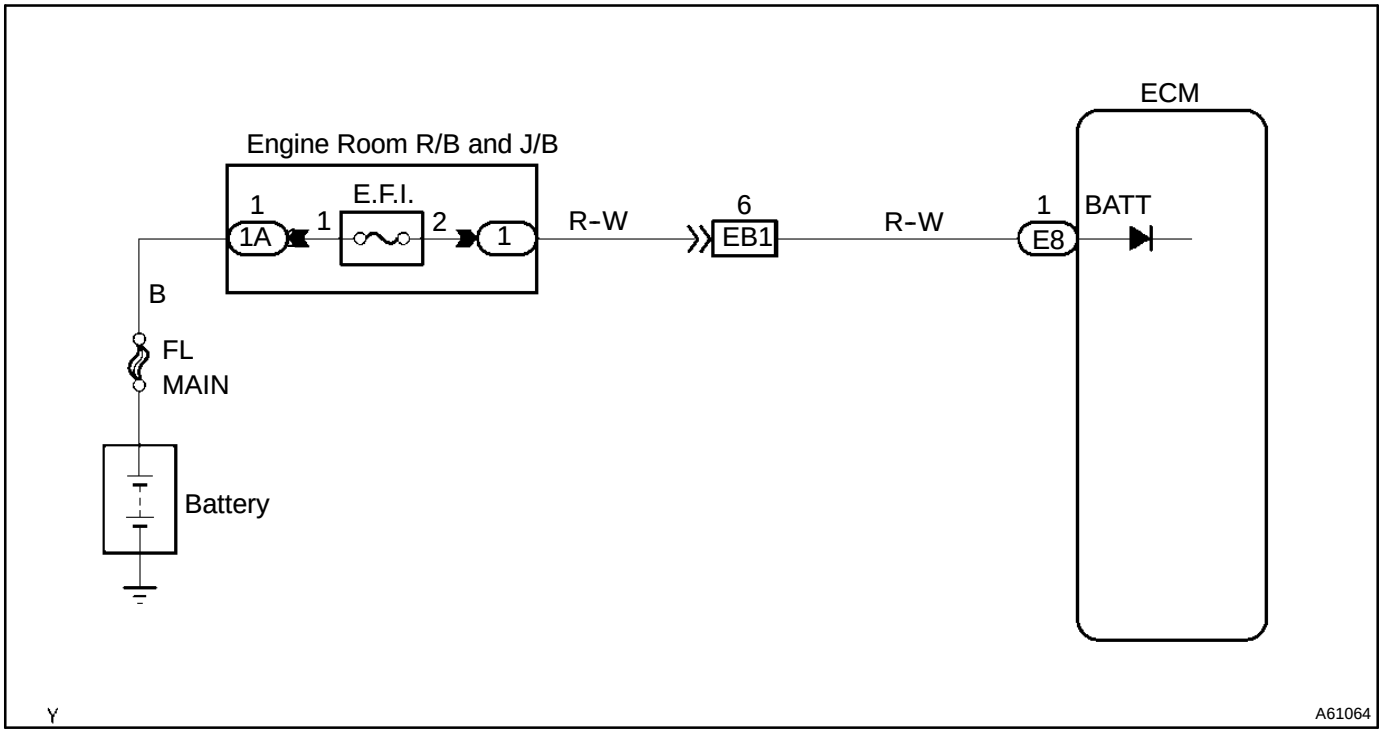
CIRCUIT DESCRIPTION

Battery positive voltage is supplied to terminal BATT of the ECM even when the ignition switch is OFF for use by the DTC memory and air–fuel ratio adaptive control valve memory, etc.

DTC No.	DTC Detecting Condition	Trouble Area
P0561	Open or short in back up power source circuit (3 trip detection logic)	• Open or short in back up power source circuit • ECM

HINT:
If DTC P0561 appear, the ECM dose not store another DTC.

WIRING DIAGRAM

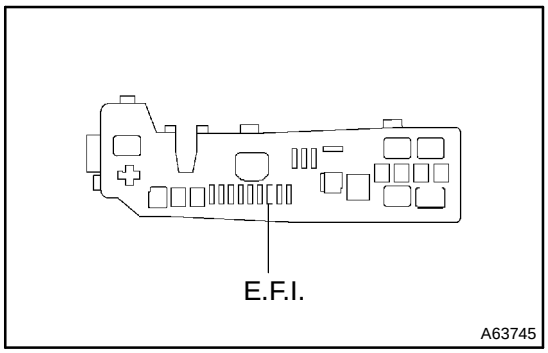


INSPECTION PROCEDURE

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

CONTINUED

1	CHECK FUSE(E.F.I. FUSE)

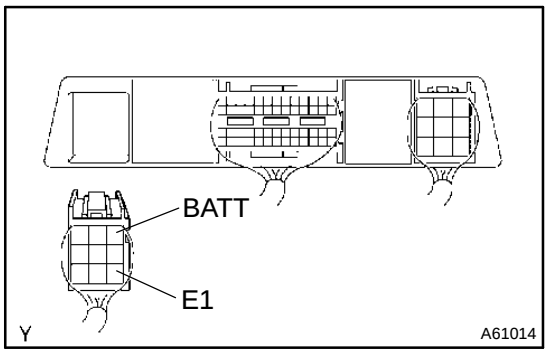


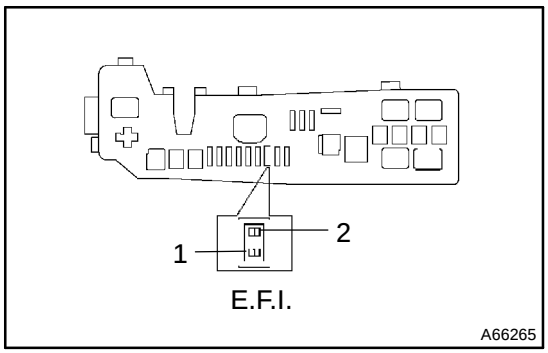
(a) Measure the resistance of E.F.I. fuse.
Resistance: 1 Ω or less

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED E.F.I. FUSE**

OK

2	CHECK HARNESS AND CONNECTOR(ECM - E.F.I. FUSE, E.F.I. FUSE - BATTERY)





(a) Disconnect the battery negative (-) terminal.
(b) Disconnect the ECM E8 connector.
(c) Remove the E.F.I. fuse.
(d) Measure the resistance between terminals BATT of the ECM connector and 2 of the E.F.I. fuse holder.
Resistance: 1 Ω or less
(e) Measure the resistance between terminals BATT and E1 of the ECM connector.
Resistance: 1 MΩ or more
(f) Measure the resistance between terminals 1 of the E.F.I. fuse holder and negative (-) of the battery.
Resistance: 1 Ω or less
(g) Measure the resistance between terminal 1 of the E.F.I. fuse holder and body ground.
Resistance: 1 MΩ or more

NOTICE:
Do not insert the tester leads hard in the procedure (d), (f) and (g), or the holder may be damaged.

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

OK

CHECK AND REPLACE ECM

CONTINUED

DTC	P0562	SYSTEM VOLTAGE LOW

DTC	P0563	SYSTEM VOLTAGE HIGH

CIRCUIT DESCRIPTION

Battery positive voltage is supplied to terminal BATT of the ECM even when the ignition switch is OFF for use by the DTC memory and air-fuel ratio adaptive control valve memory, etc.

DTC No.	DTC Detecting Condition	Trouble Area
P0562 P0563	Open or short in back up power source circuit (3 trip detection logic)	• Open or short in back up power source circuit • Tired battery • Electrical over work • Generator • 24 V battery • ECM

HINT:

- If DTC P0562 appear, the voltage of ECM is 6 V or less.
- If DTC P0563 appear, the voltage of ECM is 16 V or more.

WIRING DIAGRAM

Refer to DTC P0561 on page 05-186.

INSPECTION PROCEDURE

HINT:

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

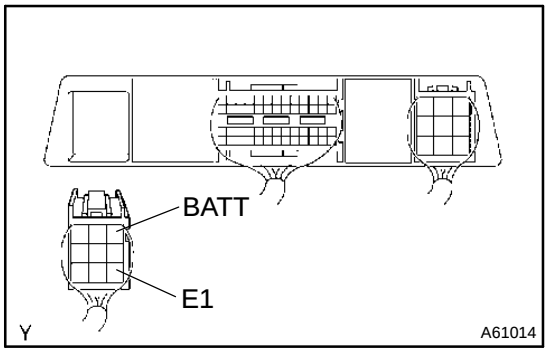
1	CHECK FUSE(E.F.I. FUSE) (See page 05-186)

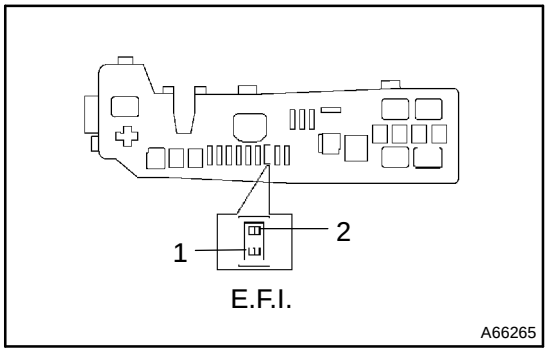
NG → CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED E.F.I. FUSE

OK

CONTINUED

2	CHECK HARNESS AND CONNECTOR(ECM - E.F.I. FUSE, E.F.I. FUSE - BATTERY)





(a) Disconnect the battery negative (-) terminal.
(b) Disconnect the ECM E8 connector.
(c) Remove the E.F.I. fuse.
(d) Measure the resistance between terminals BATT of the ECM connector and 2 of the E.F.I. fuse holder.
Resistance: 1 Ω or less
(e) Measure the resistance between terminals BATT and E1 of the ECM connector.
Resistance: 1 MΩ or more
(f) Measure the resistance between terminals 1 of the E.F.I. fuse holder and negative (-) of the battery.
Resistance: 1 Ω or less
(g) Measure the resistance between terminal 1 of the E.F.I. fuse holder and body ground.
Resistance: 1 MΩ or more

NOTICE:
Do not insert the tester leads hard in the procedure (d), (f) and (g), or the holder may be damaged.

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

OK

3	INSPECT GENERATOR ASSY (See page 19-13)

NG → **REPAIR OR REPLACE**

OK

4	CHECK BATTERY(VOLTAGE) (See page 05-116)

NG → **CHARGE OR REPLACE**

OK

CHECK AND REPLACE ECM

CONTINUED

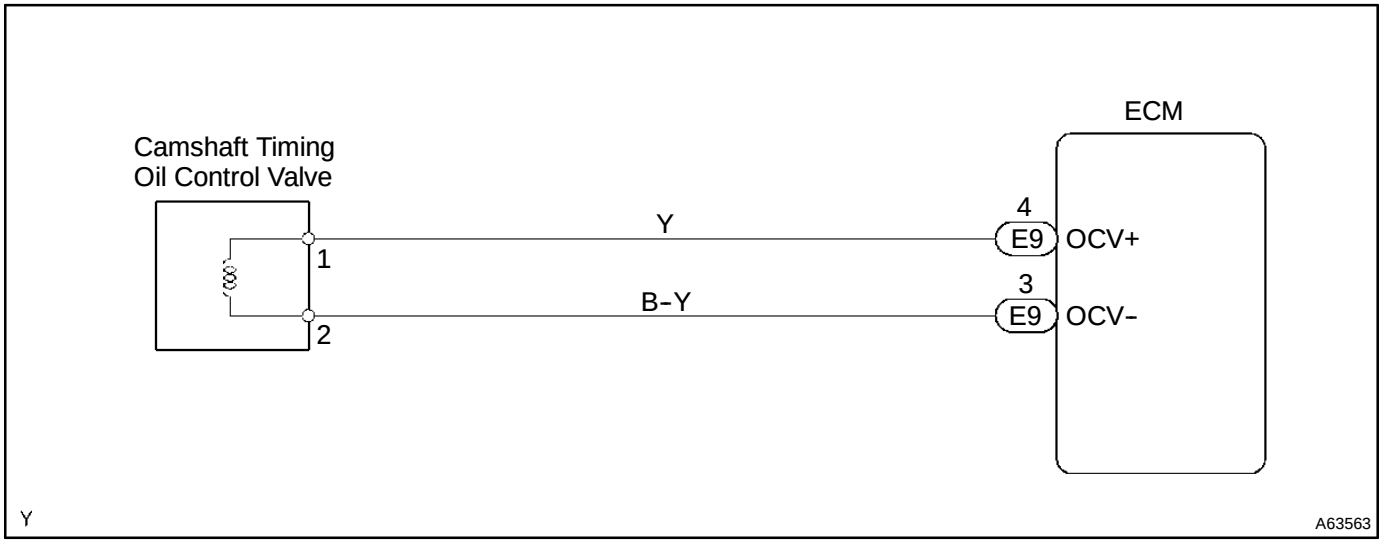
DTC	P1345	VVT SYSTEM STICK DETECTED

CIRCUIT DESCRIPTION

VVT system controls the intake valve timing to proper timing in response to driving condition.
ECM controls OCV (Oil Control Valve) to make the intake valve timing properly, and, oil pressure controlled with OCV is supplied to the camshaft timing gear assy, and then, camshaft timing gear assy changes relative position between the camshaft and the crankshaft.

DTC No.	DTC Detecting Condition	Trouble Area
P1345	Condition (a) or (b) continues for after the engine is warmed up and engine speed at 400 - 4,000 rpm (1 trip detection logic): (a) Valve timing does not change from of current valve timing (b) Current valve timing is fixed	• Valve timing • Camshaft timing oil control valve • Camshaft timing gear assy • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P1345 is displayed, check VVT system circuit.
- Read freeze frame data using the hand-held tester. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

1	CHECK VALVE TIMING (See page 14-129)

NG → ADJUST VALVE TIMING

OK

CONTINUED

2	PERFORM ACTIVE TEST BY HAND–HELD TESTER(OPERATION OF OCV)

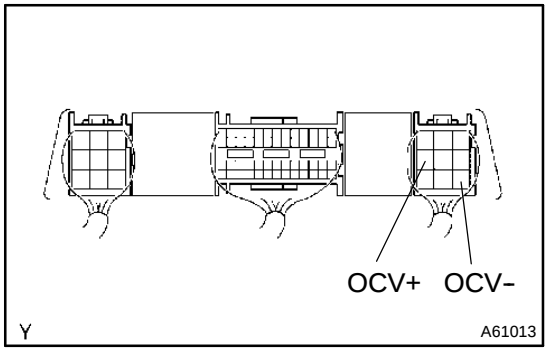
(a) Start the engine and warm it up.
(b) Connect the hand–held tester and select the ACTIVE TEST mode.
(c) Check the engine speed when operating the OCV by the hand–held tester.
VVT system is OFF (OCV is OFF): Normal engine speed
VVT system is ON (OCV is ON): Rough idle or engine stall

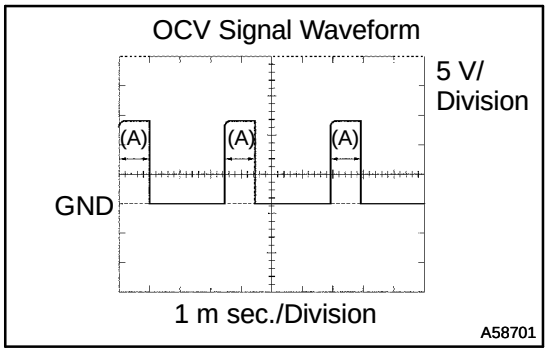
HINT:
*: DTC P1345 is also output when a foreign object is detected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign object, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

OK → **VVT SYSTEM OK**

NG

3	INSPECT ECM(CHECK VOLTAGE)





(a) Turn the ignition switch ON.
(b) Check the waveform between terminals OCV+ and OCV– of the ECM connector.

HINT:
- The correct waveform is as shown in the left.
- The waveform frequency (A) becomes longer as the engine speed becomes higher.
- DTC P1345 is also output when a foreign object is detected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign object, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

NG → **CHECK AND REPLACE ECM**

OK

4	INSPECT CAMSHAFT TIMING GEAR ASSY (See page 14–141)

NG → **REPLACE CAMSHAFT TIMING GEAR ASSY, AND THEN GO TO NEXT STEP**

OK

CONTINUED

5	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See page 10–10)

NG → REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY, AND THEN GO TO NEXT STEP

OK

6	CHECK BLOCKAGE(OCV AND OIL HOLE)

NG → REPAIR OR REPLACE

OK

7	PERFORM SIMULATION TEST(CHECK DTC)

(a) Clear the DTC (See page 05–116).
(b) Perform the simulation test.
(c) Check whether or not DTC P1345 is stored (See page 05–116).

Result:

DTC	Check
P1345 is output	to A
P1345 is not output	to B

HINT:
DTC P1345 is also output when a foreign object is detected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign object, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

B → VVT SYSTEM OK

A

CHECK AND REPLACE ECM

CONTINUED

DTC	P1346	VVT SENSOR/CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM (BANK 1)

CIRCUIT DESCRIPTION

Refer to DTC P1345 on page 05–190.

DTC No.	DTC Detecting Condition	Trouble Area
P1346	Open or short in camshaft timing oil control valve circuit (3 trip detection logic)	• Open or short in camshaft timing oil control valve circuit • Camshaft timing oil control valve • ECM

WIRING DIAGRAM

Refer to DTC P1345 on page 05–190.

INSPECTION PROCEDURE

HINT:

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

1	PERFORM ACTIVE TEST BY HAND–HELD TESTER(OCV OPERATION)

(a) Start the engine and warm it up.
(b) Connect the hand–held tester and select the ACTIVE TEST mode.
(c) Check the engine speed when operating the OCV by the hand–held tester.
VVT system is OFF (OCV is OFF): Normal engine speed
VVT system is ON (OCV is ON): Rough idle or engine stall

OK → **CHECK FOR INTERMITTENT PROBLEMS**

NG

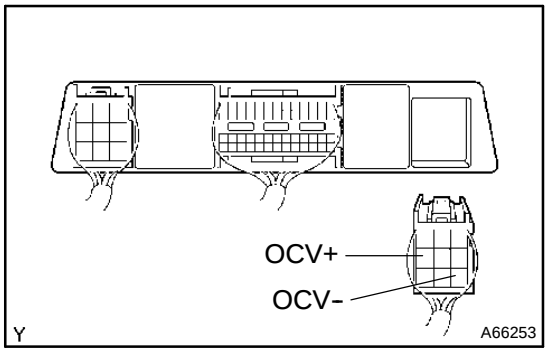
2	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See page 10–10)

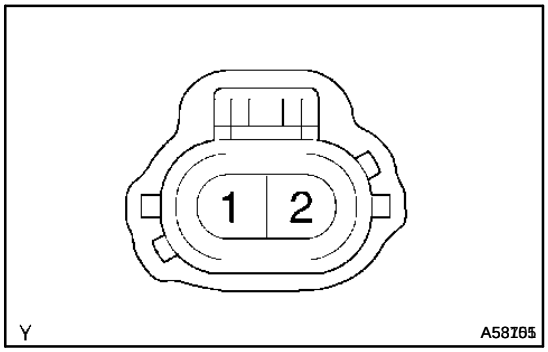
NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

CONTINUED

3	CHECK HARNESS AND CONNECTOR(ECM – OCV)





(a) Disconnect the ECM E9 connector.
(b) Disconnect the camshaft timing oil control valve connector.
(c) Measure the resistance between terminals OCV+ of the ECM connector and 1 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminals OCV– of the ECM connector and 2 of the camshaft timing oil control valve connector.
Resistance: 1 Ω or less
(e) Measure the resistance between terminal OCV+ of the ECM connector and body ground.
Resistance: 1 MΩ or more
(f) Measure the resistance between terminal OCV– of the ECM connector and body ground.
Resistance: 1 MΩ or more

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

OK

CHECK AND REPLACE ECM

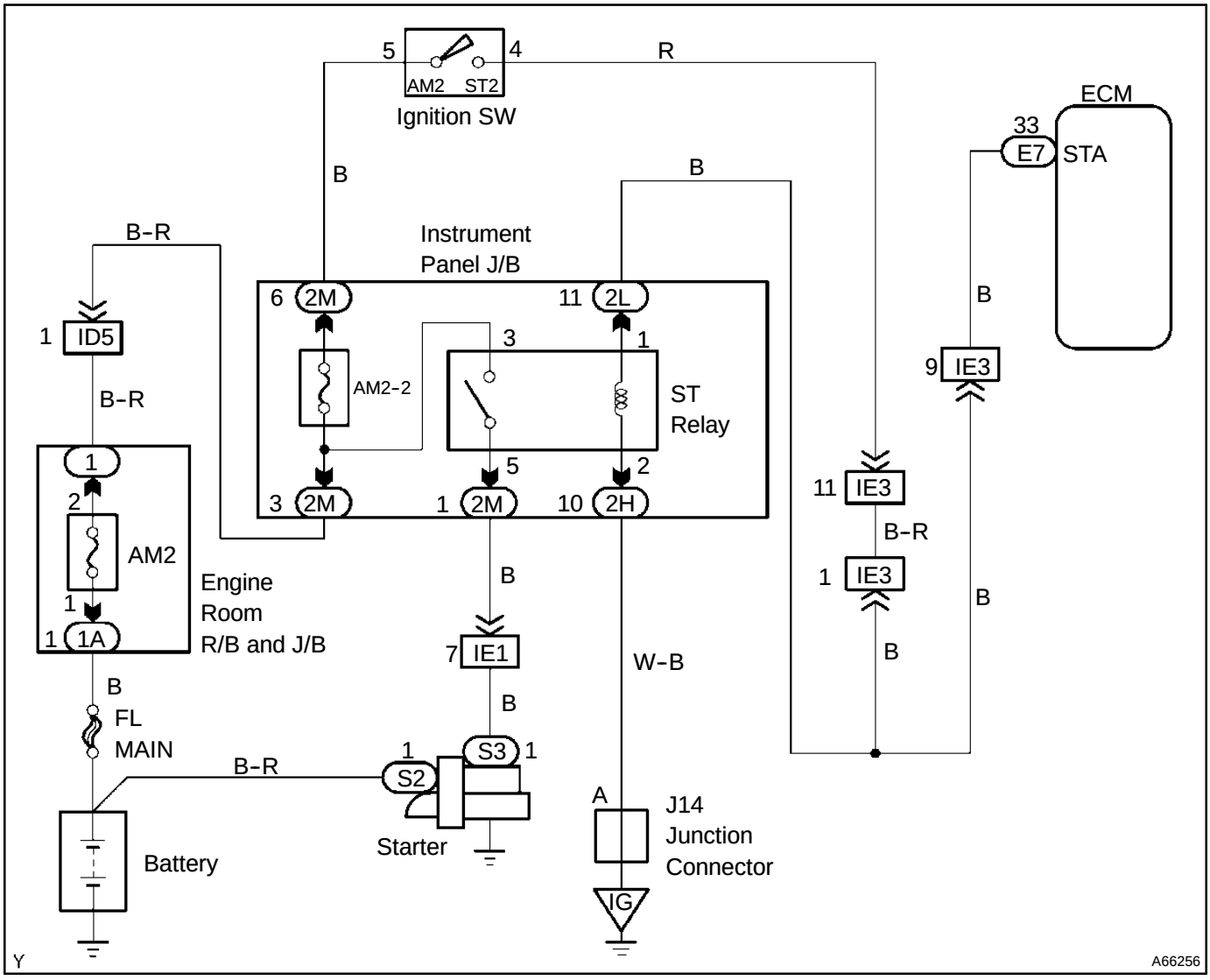
CONTINUED

STARTER SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

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

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

This diagnostic chart is based on the premise that the engine is being cranked under normal conditions. If the engine does not crank, proceed to the problem symptoms table on page 05-128.

CONTINUED

1 READ VALUE OF HAND-HELD TESTER(STARTER SIGNAL)

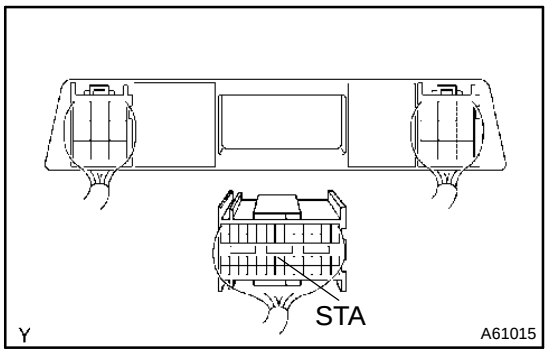
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Read the STA signal on the hand-held tester while the starter is operating.
Result:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

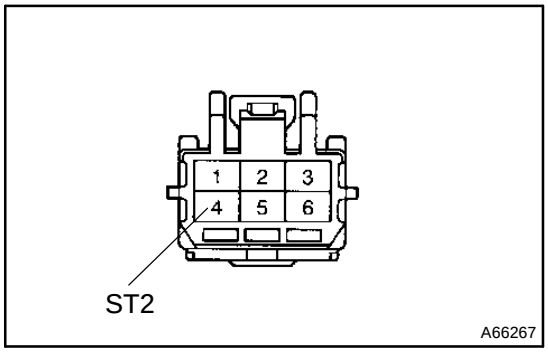
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE**

NG

2 CHECK HARNESS AND CONNECTOR(ECM - IGNITION SWITCH)



(a) Disconnect the ECM E7 connector.
(b) Disconnect the ignition switch connector.
(c) Measure the resistance between terminals STA of the ECM connector and ST2 of the ignition switch connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminal STA of the ECM connector and body ground.
Resistance: 1 MΩ or more



OK → **CHECK AND REPLACE ECM**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

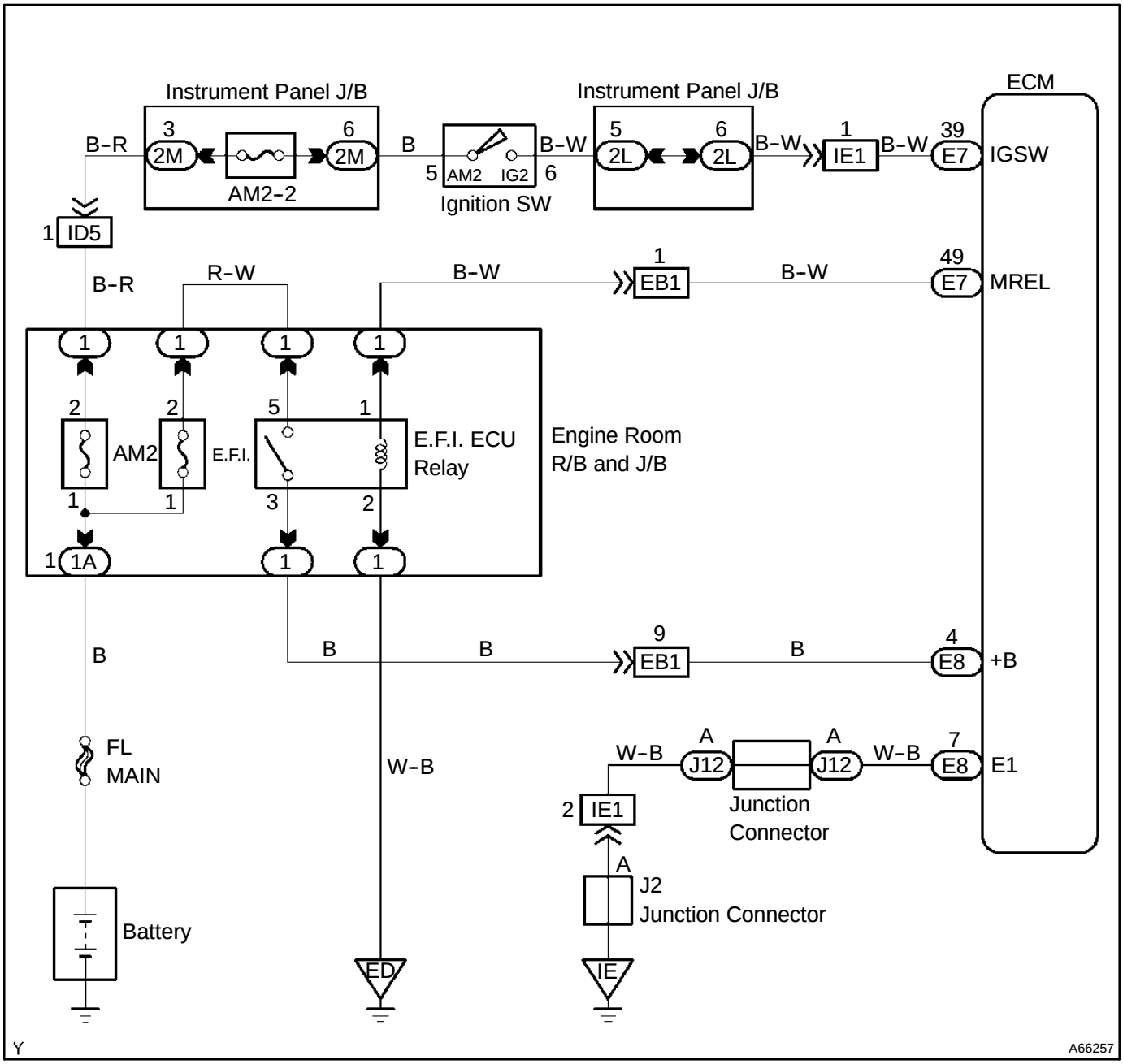
CONTINUED

ECM POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

When the ignition switch is turned ON, battery positive voltage is applied to terminal IGSW of the ECM and the E.F.I. ECU relay control circuit in the ECM sends a signal to the terminal MREL of the ECM switching on the E.F.I. ECU relay.
This signal causes current to flow to the coil, closing the contacts of the E.F.I. ECU relay and supplying power to terminal +B of the ECM.

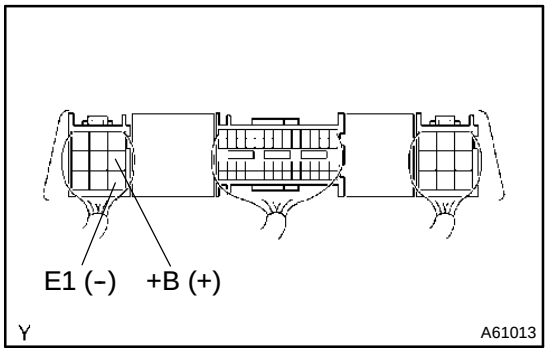
WIRING DIAGRAM



CONTINUED

INSPECTION PROCEDURE

1 INSPECT ECM(CHECK VOLTAGE)

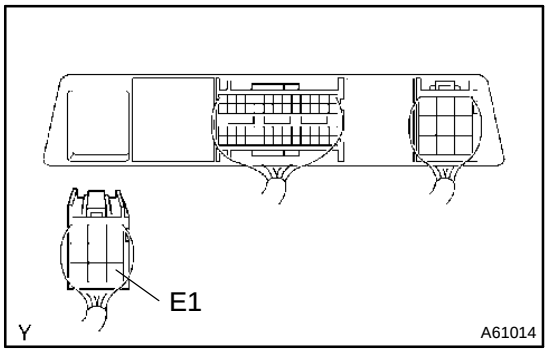


(a) Turn the ignition switch ON.
(b) Measure the voltage between terminals +B and E1 of the ECM connector.
Voltage: 9 - 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE**

NG

2 CHECK HARNESS AND CONNECTOR(ECM GROUND)



(a) Disconnect the ECM E8 connector.
(b) Measure the resistance between terminal E1 of the ECM connector and body ground.
Resistance: 1 Ω or less

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

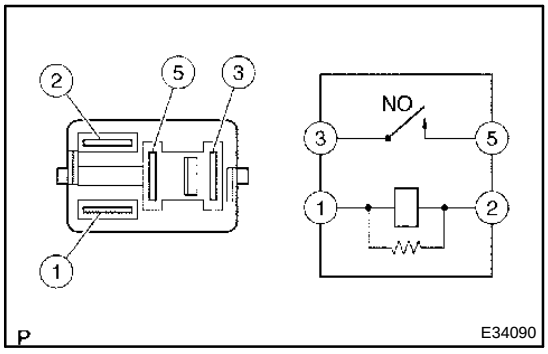
OK

3 CHECK FUSE(E.F.I. FUSE) (See page 05-186)

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED E.F.I. FUSE**

OK

4 INSPECT E.F.I ECU RELAY



(a) Measure the resistance between terminals shown below.
Resistance:

Terminal No.	Resistance
1 - 2	1 Ω or less
3 - 5	1 MΩ or more

(b) Measure the resistance between terminals 3 and 5 of the connector when the battery voltage is applied to the terminals between 1 and 2.

CONTINUED

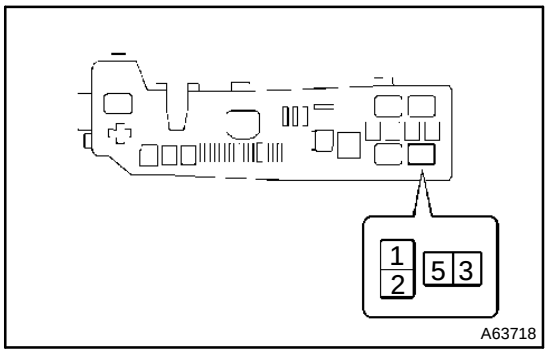
Resistance:

Terminal No.	Resistance
3 - 5	1 Ω or less

NG → **REPLACE E.F.I ECU RELAY**

OK

5 CHECK RELAY OPERATION(E.F.I. ECU RELAY)

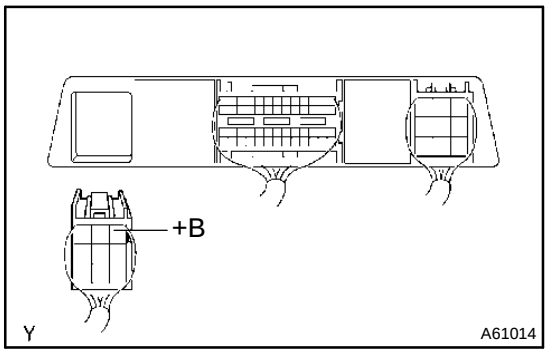


(a) Confirm that the E.F.I. ECU relay operates normally when turning the ignition switch ON.
Result:
E.F.I. ECU relay operation sound is heard successively when turning the ignition switch ON.

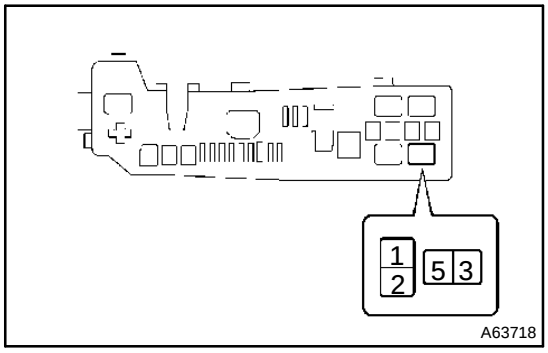
NG → **Go to step 7**

OK

6 CHECK HARNESS AND CONNECTOR(ECM - E.F.I. ECU RELAY)



(a) Disconnect the ECM E8 connector.
(b) Remove the E.F.I. ECU relay.
(c) Measure the resistance between terminals +B of the ECM connector and 3 of the E.F.I. ECU relay side connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminal +B of the ECM connector and body ground.
Resistance: 1 MΩ or more



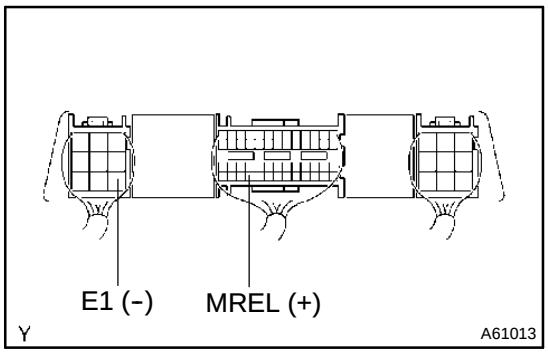
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (E.F.I. ECU RELAY - BATTERY)

CONTINUED

7 INSPECT ECM(CHECK VOLTAGE)

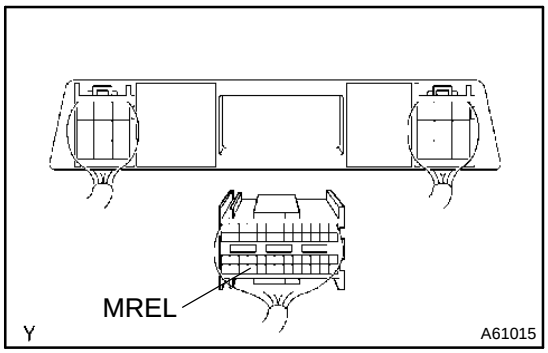


(a) Turn the ignition switch ON.
(b) Measure the voltage between terminals MREL and E1 of the ECM connectors.
Voltage: 9 - 14 V

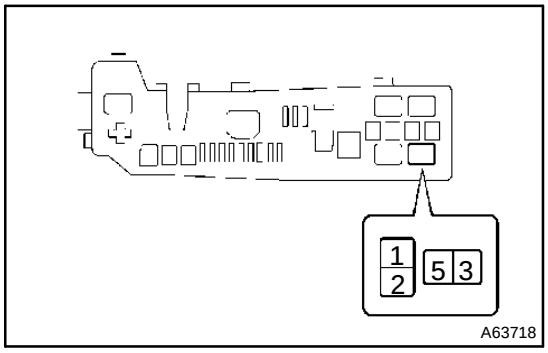
NG → **Go to step 9**

OK

8 CHECK HARNESS AND CONNECTOR(ECM - E.F.I. ECU RELAY)



(a) Disconnect the ECM E7 connector.
(b) Remove the E.F.I. ECU relay.
(c) Measure the resistance between terminals MREL of the ECM connector and 1 of the E.F.I. ECU relay side connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminal MREL of the ECM connector and body ground.
Resistance: 1 MΩ or more



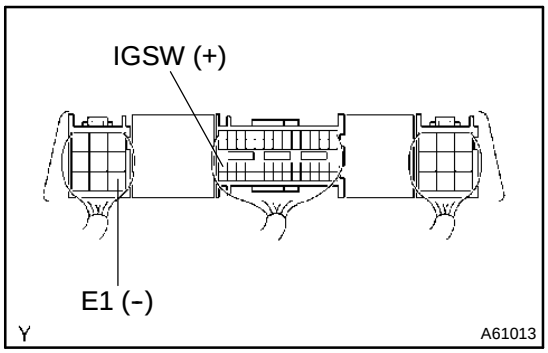
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (E.F.I. ECU RELAY - BODY GROUND)

CONTINUED

9	INSPECT ECM(CHECK VOLTAGE)

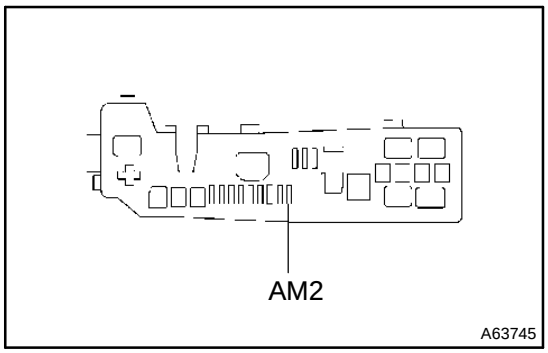


(a) Turn the ignition switch ON.
(b) Measure the voltage between terminals IGSW and E1 of the ECM connectors.
Voltage: 9 - 14 V

OK → **CHECK AND REPLACE ECM**

NG

10	CHECK FUSE(AM2 FUSE)

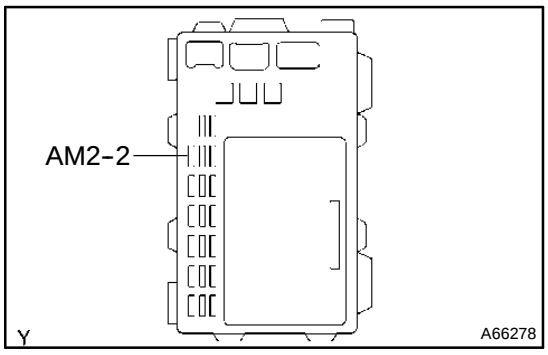


(a) Measure the resistance of AM2 fuse.
Resistance: 1 Ω or less

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED AM2 FUSE**

OK

11	CHECK FUSE(AM2-2 FUSE)



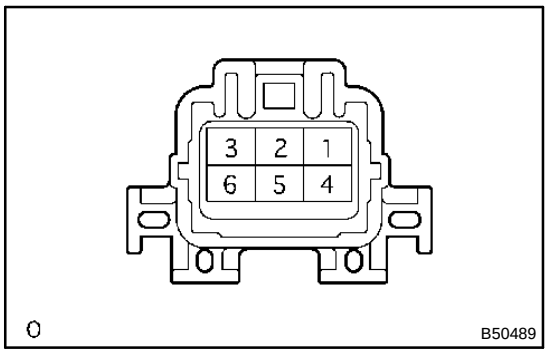
(a) Measure the resistance of AM2-2 fuse.
Resistance: 1 Ω or less

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED AM2-2 FUSE**

OK

CONTINUED

12 INSPECT IGNITION OR STARTER SWITCH ASSY



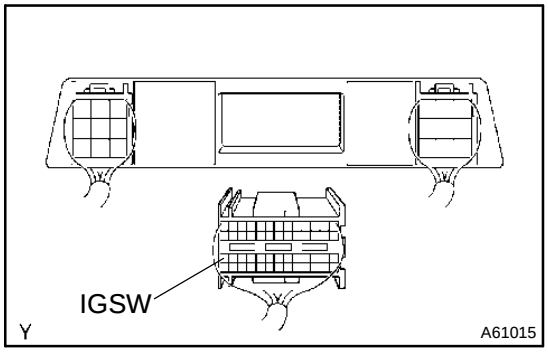
(a) Measure the resistance between the connector terminals shown in the chart below.

Switch	Terminal No.	Resistance
LOCK	All Terminals	1 MΩ or more
ACC	1-3	1 Ω or less
ON	1-2-3 5-6	1 Ω or less
START	4-5-6 1-2	1 Ω or less

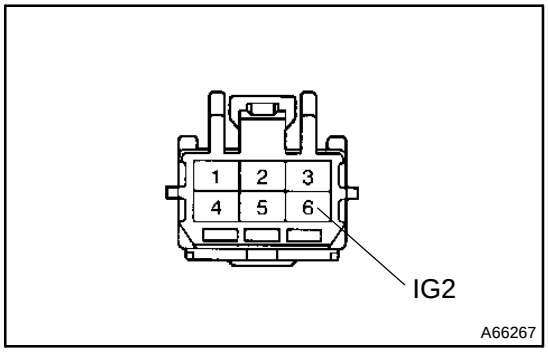
NG → **REPLACE IGNITION OR STARTER SWITCH ASSY**

OK

13 CHECK HARNESS AND CONNECTOR(IGNITION SWITCH - ECM)



(a) Disconnect the ECM E7 connector.
(b) Disconnect the ignition switch connector.
(c) Measure the resistance between terminals IGSW of the ECM connector and IG2 of the ignition switch connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminal IGSW of the ECM connector and body ground.
Resistance: 1 MΩ or more



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

OK

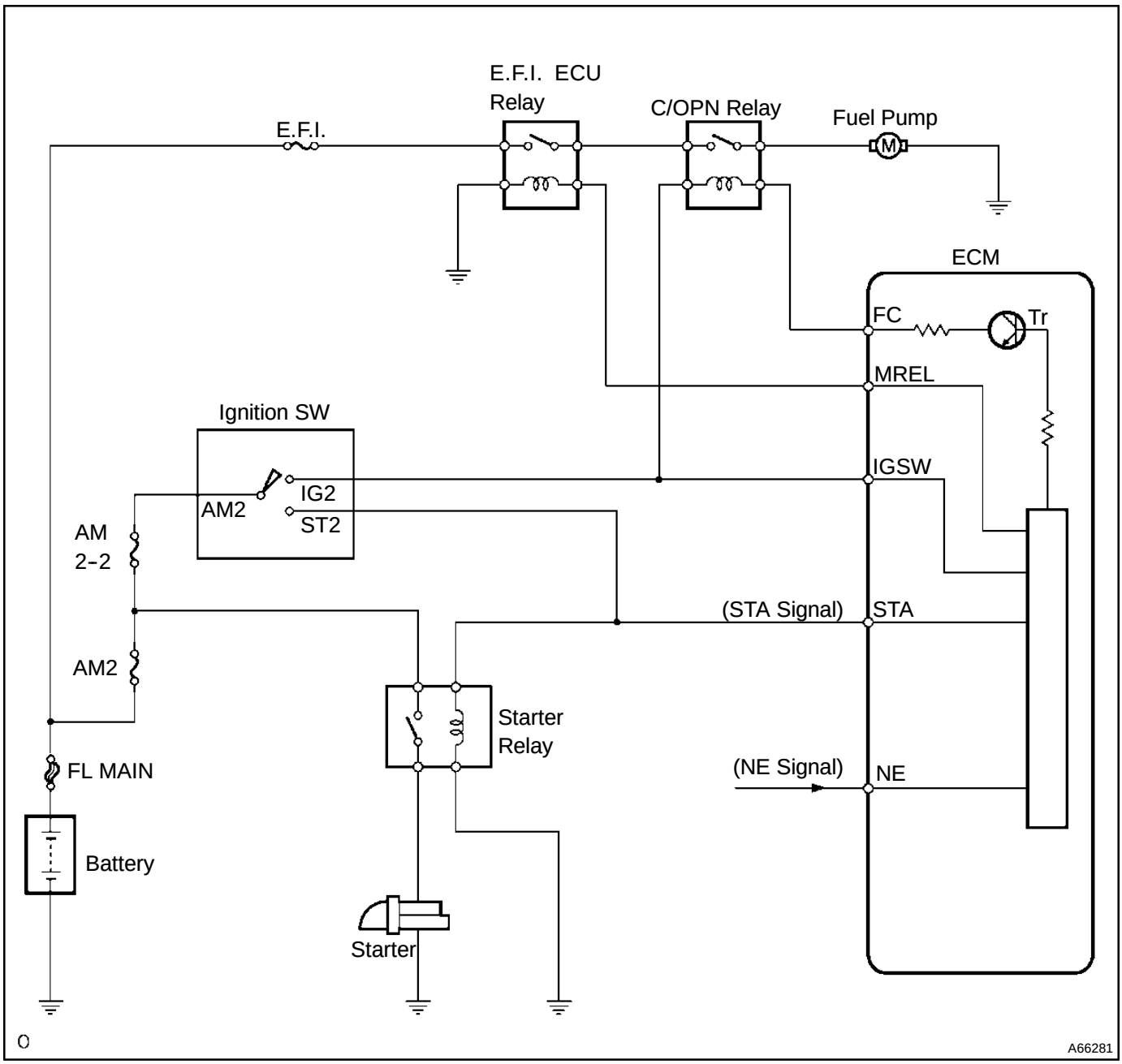
REPAIR OR REPLACE HARNESS OR CONNECTOR (IGNITION SWITCH - BATTERY)

CONTINUED

FUEL PUMP CONTROL CIRCUIT

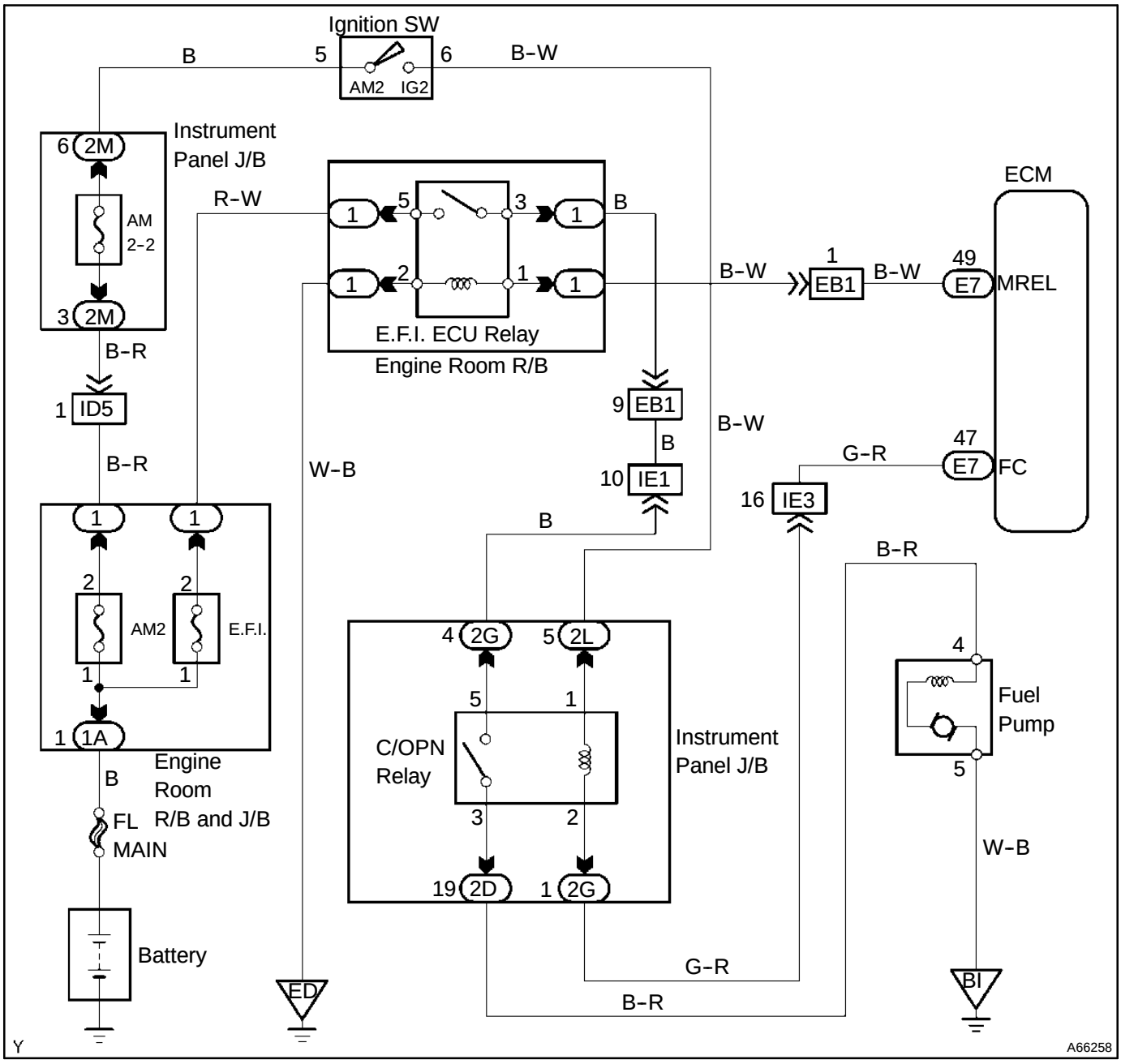
CIRCUIT DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal ST2 of the ignition switch to the starter relay coil and also current flows to terminal STA of ECM (STA signal).
When the STA signal and NE signal are input to the ECM, Tr is turned ON, current flows to the coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump and the fuel pump operates.
While the NE signal is generated (engine running), the ECM keeps Tr ON (circuit opening relay ON) and the fuel pump also keeps operating.



CONTINUED

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**PERFORM ACTIVE TEST BY HAND-HELD TESTER(OPERATION OF CIRCUIT OPENING RELAY)**

(a) Select the ACTIVE TEST mode on the hand-held tester.
(b) Turn the ignition switch ON, and perform the active test at the engine stop.
Result: The circuit opening relay operates.

OK → **Go to step 5**

NG

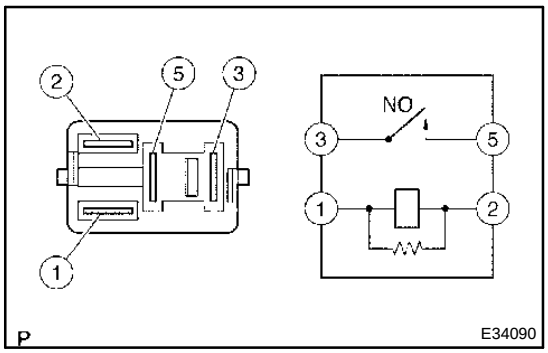
CONTINUED

2	CHECK FOR ECM POWER SOURCE CIRCUIT (See page 05-197)

NG → REPAIR OR REPLACE

OK

3	INSPECT E.F.I. CIRCUIT OPENING RELAY ASSY



(a) Measure the resistance between terminals shown below.
Resistance:

Terminal No.	Resistance
1 - 2	1 Ω or less
3 - 5	1 MΩ or more

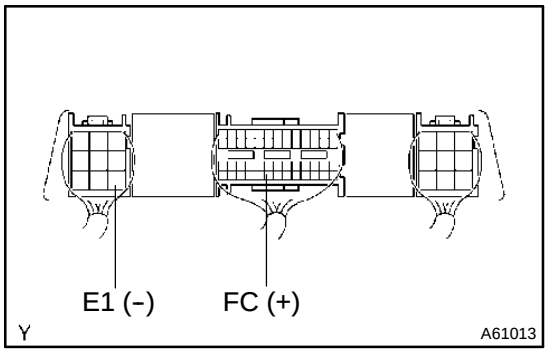
(b) Measure the resistance between terminals 3 and 5 of the connector when the battery voltage is applied to the terminals between 1 and 2.
Resistance:

Terminal No.	Resistance
3 - 5	1 Ω or less

NG → REPLACE E.F.I. CIRCUIT OPENING RELAY ASSY

OK

4	INSPECT ECM(CHECK VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure the voltage between terminals FC and E1 of the ECM connectors.
Voltage: 9 - 14 V

OK → CHECK AND REPLACE ECM

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (E.F.I. CIRCUIT OPENING RELAY - ECM)

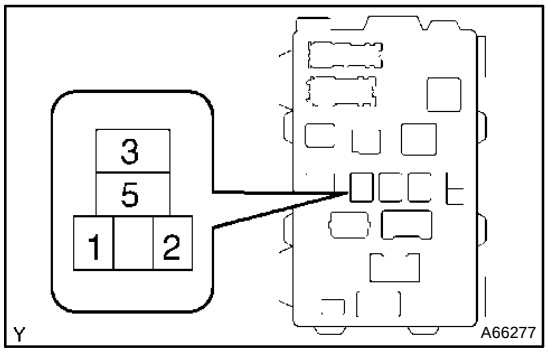
5	INSPECT FUEL PUMP ASSY (See page 11-36)

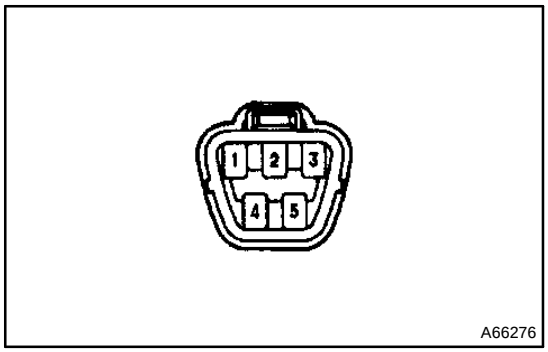
NG → REPLACE FUEL PUMP ASSY

OK

CONTINUED

6	CHECK HARNESS AND CONNECTOR(E.F.I. CIRCUIT OPENING RELAY - FUEL PUMP, FUEL PUMP - BODY GROUND)



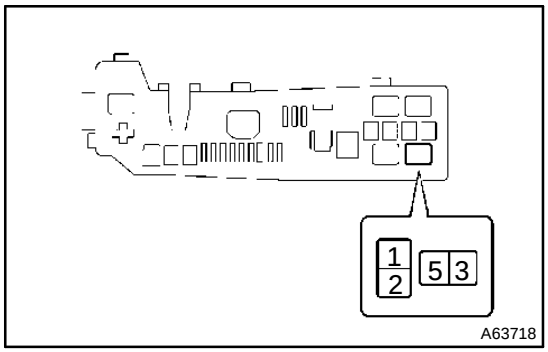


(a) Remove the E.F.I. circuit opening relay.
(b) Disconnect the fuel pump connector.
(c) Measure the resistance between terminals 3 of the E.F.I. circuit opening relay side connector and 4 of the fuel pump connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminal 4 of the fuel pump connector and body ground.
Resistance: 1 MΩ or more
(e) Measure the resistance between terminal 5 of the fuel pump connector and body ground.
Resistance: 1 Ω or less

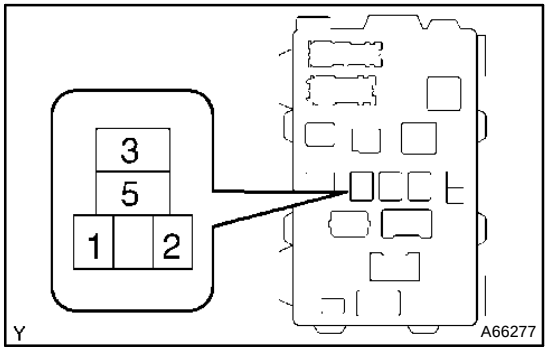
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7	CHECK HARNESS AND CONNECTOR(E.F.I. ECU RELAY - E.F.I. CIRCUIT OPENING RELAY)



(a) Remove the E.F.I. ECU relay.
(b) Remove the E.F.I. circuit opening relay.
(c) Measure the resistance between terminals 3 of the E.F.I. ECU relay side connector and 5 of the E.F.I. circuit opening relay side connector.
Resistance: 1 Ω or less
(d) Measure the resistance between terminal 3 of the E.F.I. ECU relay side connector and body ground.
Resistance: 1 MΩ or more



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

OK

CONTINUED

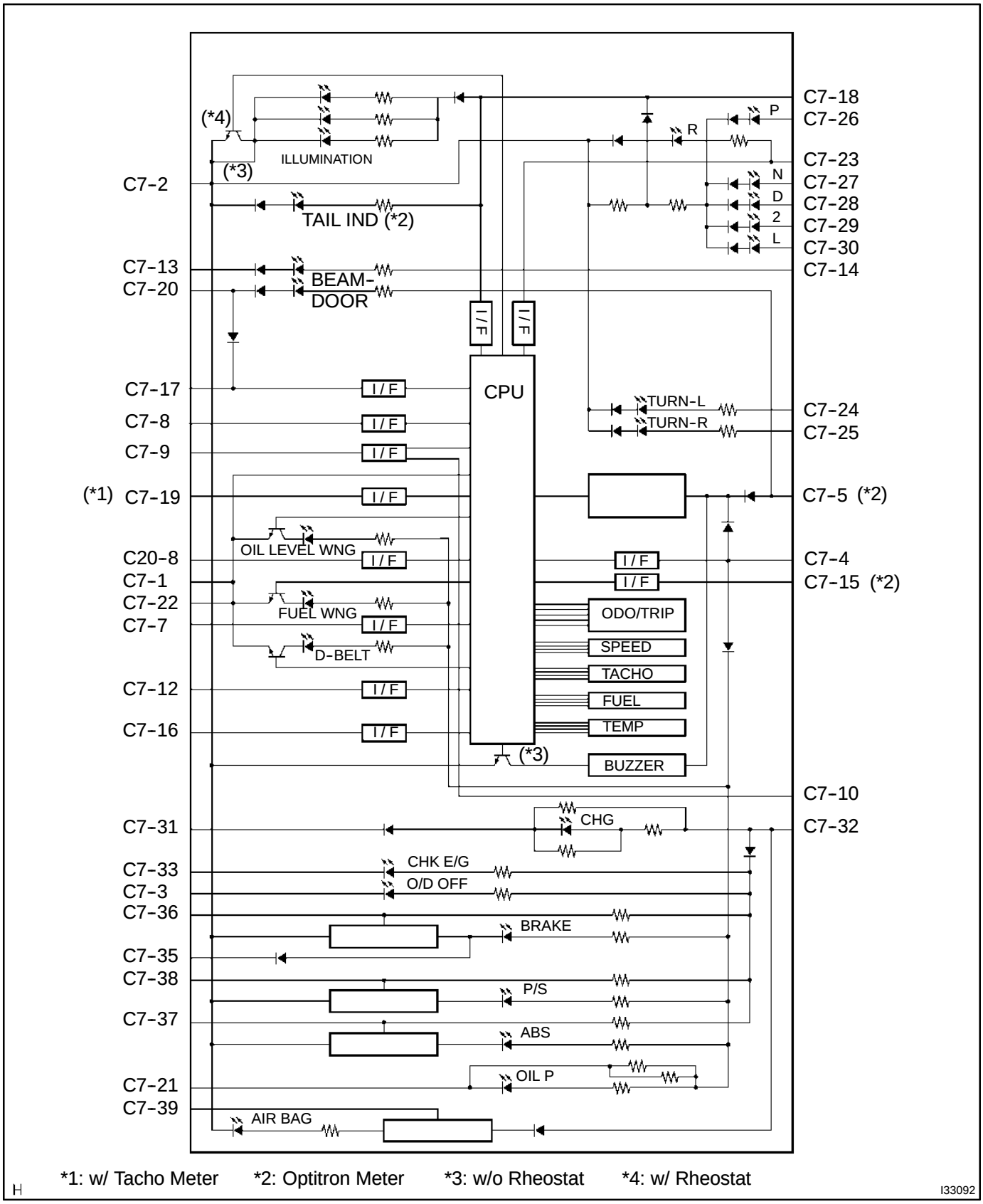
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE

CONTINUED

COMBINATION METER (SOUTH AFRICA)

LOCATION

057GA-02

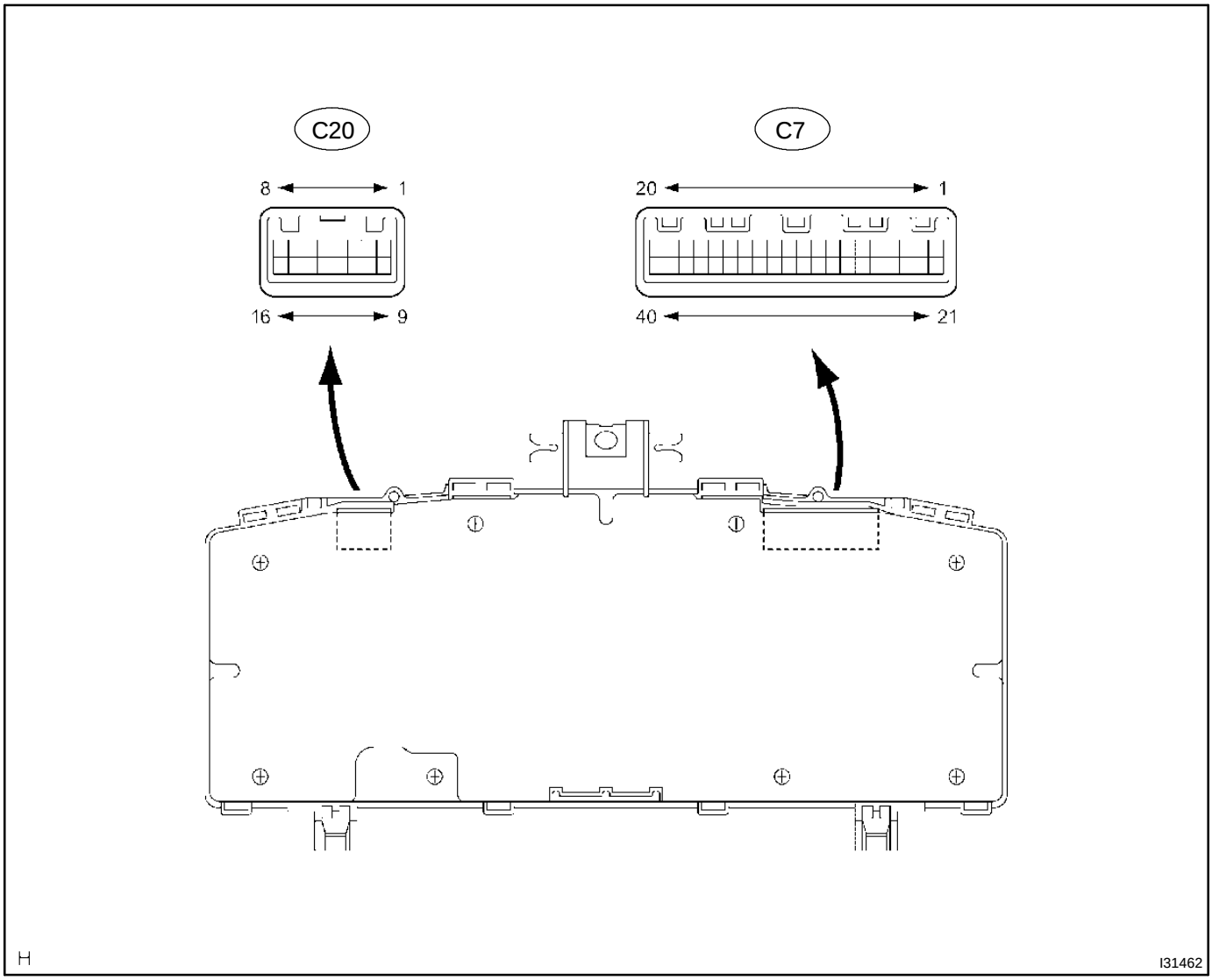


*1: w/ Tacho Meter *2: Optitron Meter *3: w/o Rheostat *4: w/ Rheostat

H

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CONTINUED

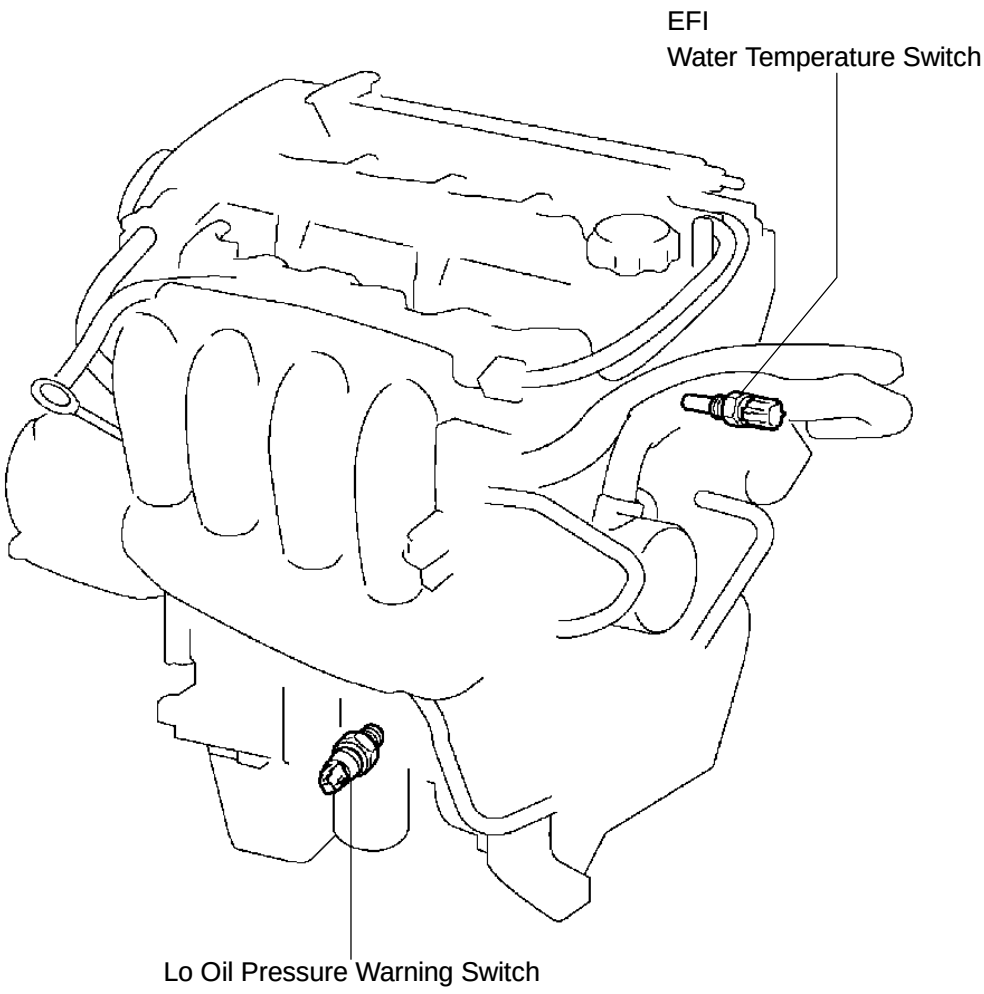


CONTINUED

Terminal No.		Wire harness side
C7	1	Ground (Signal Ground)
	2	Ground (Power Ground)
	3	Engine and ECT ECU (A/T)
	4	GAUGE Fuse
	5	DOME Fuse
	7	Fuel Sender Gauge
	8	Engine ECU (M/T), Engine and ECT ECU (A/T)
	9	Speed Sensor (w/o ABS), ABS Actuator ECU (w/ ABS)
	10	Multi Display, A/C Amplifer, Engine ECU (M/T), Engine and ECT ECU (A/T)
	12	Driver Side Seat Belt Buckle Switch
	13	Dimmer Switch
	14	Engine Room R/B
	15	Ignition Switch
	16	Engine ECU (M/T), Engine and ECT ECU (A/T)
	17	Driver Side Courtesy Switch
	18	Light Control Switch
	19	Engine ECU (M/T), Engine and ECT ECU (A/T)
	20	Except Driver Side Courtesy Switch
	21	Engine Oil Pressure Switch
	22	Fuel Sender Gauge
	23	A/T Indicator Light Switch (R)
	24	Turn Signal Flasher
	25	Turn Signal Flasher
	26	A/T Indicator Light Switch (P)
	27	A/T Indicator Light Switch (N)
	28	A/T Indicator Light Switch (D)
	29	A/T Indicator Light Switch (2)
	30	A/T Indicator Light Switch (L)
	31	Alternator
	32	IG2 Fuse
	33	Engine ECU (M/T), Engine and ECT ECU (A/T)
	35	Brake Fluid Level Warning Switch
	36	Ground (w/o ABS), ABS Actuator ECU (w/ ABS)
	37	Ground (w/o ABS), ABS Actuator ECU (w/ ABS)
	38	Ground
	39	IG2 Fuse (w/o SRS), Airbag Sensor Assembly (w/ SRS)
C20	8	Engine Oli Level Sensor

CONTINUED

1ZZ–FE, 2ZZ–GE, 3ZZ–FE, 4ZZ–FE:

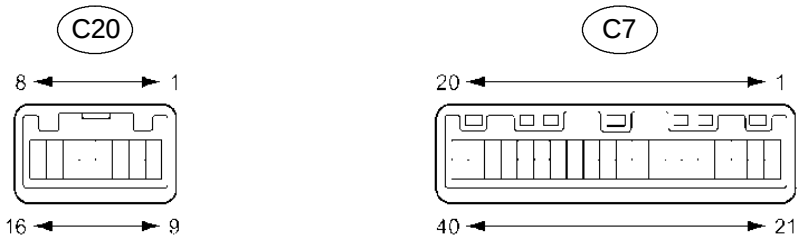


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057GB-02

TERMINALS OF ECU

1. COMBINATION METER ASSY

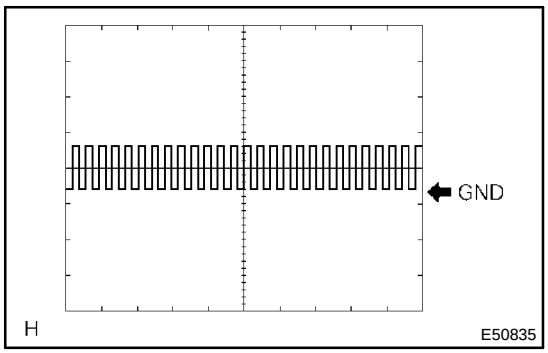


I31463

Terminals No. (Symbols)	Wiring Color	Condition	STD Voltage (V)
C7-1 ↔ Body ground	BR	Any conditions	Continuity
C7-2 ↔ Body ground	W-B	Any conditions	Continuity
C7-3 ↔ Body ground	LG	O/D off indicator light ON → OFF	Below 1 V → 10 - 14 V
C7-4 ↔ Body ground	R-L	Ignition switch OFF or ACC → ON	Below 1 V → 10 - 14 V
C7-5 ↔ Body ground	L-Y	Any conditions	10 - 14 V
C7-7 ↔ Body ground	Y-B	Fuel level is full → empty	Below 1 V → 4 - 7 V
C7-8 ↔ Body ground	Y-G (*2) Y-R (*3)	Ignition switch ON	Pulse generation (*1)
C7-9 ↔ Body ground	V-W	Ignition switch ON and slowly turn drive wheel	Below 1 V ↔ 10 - 14 V
C7-10 ↔ Body ground	V-W	Ignition switch ON and slowly turn drive wheel	Below 1 V ↔ 10 - 14 V
C7-12 ↔ Body ground	R	Ignition switch ON and driver side seat belt buckle switch is fasten.	Below 1 V → 10 - 14 V
C7-13 ↔ Body ground	R-Y	Hi beam indicator light ON → OFF	Below 1 V → 10 - 14 V
C7-14 ↔ Body ground	L-Y	Any conditions	10 - 14 V
C7-15 ↔ Body ground	R (*4)	Ignition switch OFF or ACC or ON	Below 1 V
		Engine start	10 - 14 V
C7-16 ↔ Body ground	L-B	Ignition key inserted	Below 1 V
		No ignition key inserted	10 - 14 V
C7-17 ↔ Body ground	R-G	Driver door opened → closed	Below 1 V → 10 - 14 V
C7-18 ↔ Body ground	G	Tail light switch OFF → ON	Below 1 V → 10 - 14 V
C7-19 ↔ Body ground	B (*5)	Engine running	Pulse generation (*1)
C7-20 ↔ Body ground	R-W	Passenger door opened → closed	Below 1 V → 10 - 14 V
C7-21 ↔ Body ground	W	Oil pressure warning light ON → OFF	Below 1 V → 10 - 14 V
C7-22 ↔ Body ground	BR	Any conditions	Continuity
C7-23 ↔ Body ground	R-B	Ignition switch ON A/T R indicator light OFF → ON	Below 1 V → 10 - 14 V
C7-24 ↔ Body ground	G-B	Left turn indicator light OFF → ON	Below 1 V → 10 - 14 V
C7-25 ↔ Body ground	G-Y	Right turn indicator light OFF → ON	Below 1 V → 10 - 14 V
C7-26 ↔ Body ground	L-R	Ignition switch ON A/T P indicator light OFF → ON	Below 1 V → 10 - 14 V
C7-27 ↔ Body ground	L-W	Ignition switch ON A/T N indicator light OFF → ON	Below 1 V → 10 - 14 V
C7-28 ↔ Body ground	L-B	Ignition switch ON A/T D indicator light OFF → ON	Below 1 V → 10 - 14 V
C7-29 ↔ Body ground	LG-R	Ignition switch ON A/T 2 indicator light OFF → ON	Below 1 V → 10 - 14 V
C7-30 ↔ Body ground	LG-B	Ignition switch ON A/T L indicator light OFF → ON	Below 1 V → 10 - 14 V
C7-31 ↔ Body ground	Y	Discharge indicator light ON → OFF	Below 1 V → 10 - 14 V
C7-32 ↔ Body ground	B-O	Ignition switch OFF → ON	Below 1 V → 10 - 14 V

CONTINUED

C7-33 ↔ Body ground	R-Y	Malfunction indicator light ON → OFF	Below 1 V → 10 - 14 V
C7-35 ↔ Body ground	R-Y	Ignition switch ON and brake fluid level warning light ON → OFF	Below 1 V → 10 - 14 V
C7-36 ↔ Body ground	W-B (*6) R-W (*7)	Brake warning light ON → OFF	4 - 8 V → Below 1 V
C7-37 ↔ Body ground	W-B (*6) W-R (*7)	ABS warning light ON → OFF	4 - 8 V → Below 1 V
C7-38 ↔ Body ground	W-B	Any conditions	Continuity
C7-39 ↔ Body ground	B-O (*8) B-Y (*9)	A/B warning light ON → OFF	Below 1 V → 6 - 11 V
C20-8 ↔ Body ground	LG	OIL indicator light ON → OFF	Below 1 V → 10 - 14 V



(*1): Reference: Using oscilloscope:

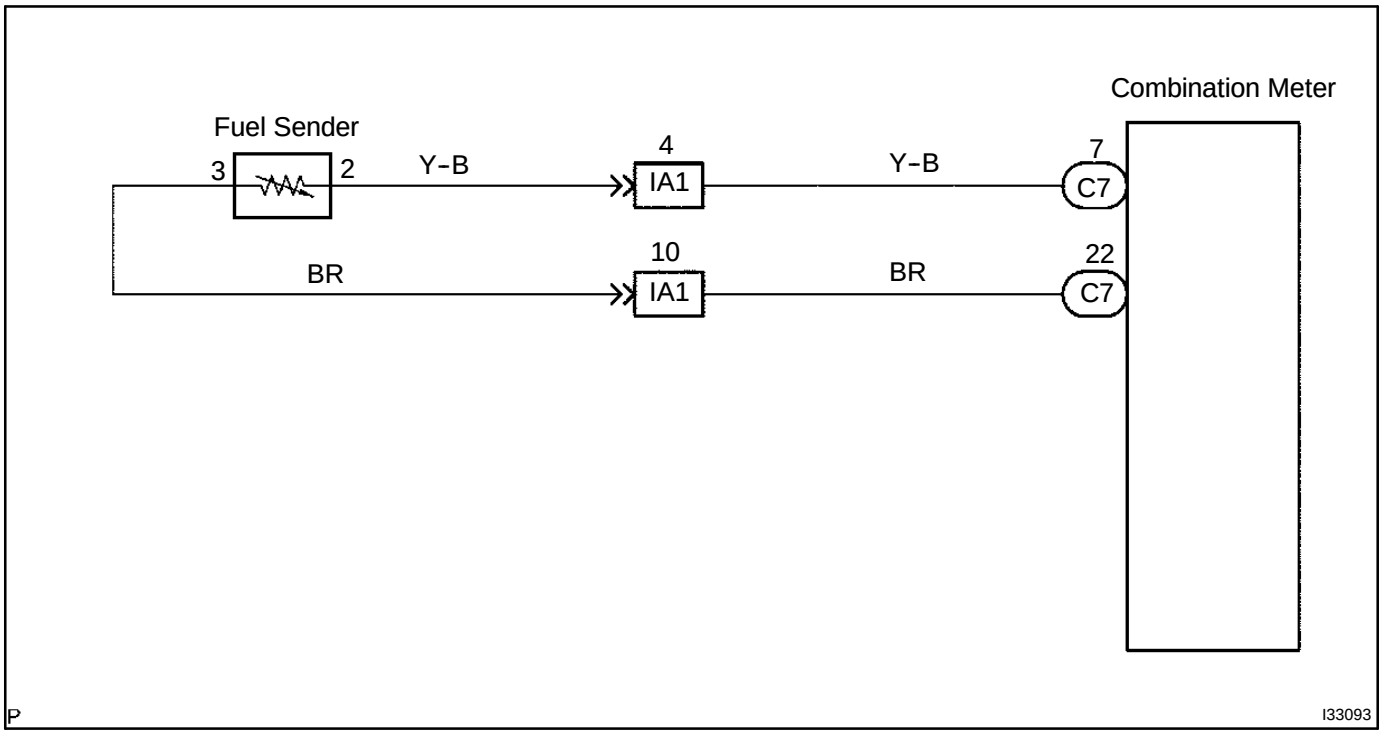
Item	Contents
Tool setting	10 V/ DIV, 20 ms/ DV
Vehicle condition	Engine idle speed

(*2): 1ZZ-FE, 3ZZ-FE Engine
(*3): 2ZZ-GE, 4ZZ-FE Engine
(*4): Optitron Meter
(*5): w/ Tacho Meter
(*6): w/o ABS
(*7): w/ ABS
(*8): w/o SRS
(*9): w/ SRS

CONTINUED

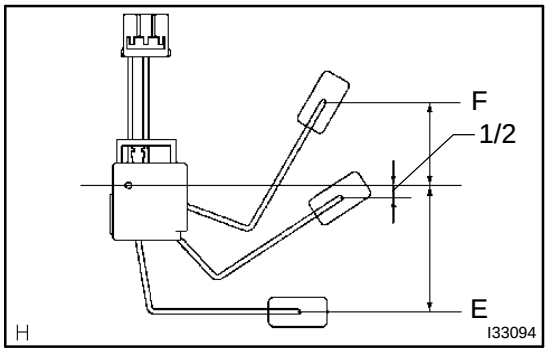
MALFUNCTION IN FUEL RECEIVER GAUGE

WIRING DIAGRAM



CONTINUED

1	INSPECT FUEL SENDER GAGE ASSY



(a) Disconnect the connector fuel sender gauge.
(b) Check the float position is between E and F and measure the resistance between terminals 2 and 3 of the connector. Check that the resistance value changes continuously.

Standard:

Float level	Float position mm (in.)	Resistance (Ω)
F	54.3 (2.14) ± 2 (0.08)	4.0 ± 0.6
1/2	6.1 (0.24) ± 2 (0.08)	50.5 ± 5
E	78.1 (3.07) ± 2 (0.08)	110.0 ± 2.5

NG → **REPLACE FUEL SENDER GAGE ASSY**

OK

2	CHECK HARNESS AND CONNECTOR(BETWEEN COMBINATION METER AND FUEL SENDER GAUGE ASSY)

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

OK

REPLACE COMBINATION METER ASSY

CONTINUED

ENGINE CONTROL SYSTEM

EFI SYSTEM (2ZZ-GE) 10-1
ON-VEHICLE INSPECTION 10-1
INSPECTION 10-2/4
THROTTLE BODY ASSY (2ZZ-GE) 10-5
COMPONENTS 10-5
Removal & Installation and
Disassembly & Reassembly 10-6/9
EFI SYSTEM (4ZZ-FE) 10-10
ON-VEHICLE INSPECTION 10-10
INSPECTION 10-11/13
THROTTLE BODY ASSY (4ZZ-FE) 10-14
COMPONENTS 10-14
Removal & Installation and
Disassembly & Reassembly 10-15

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement	RM926E

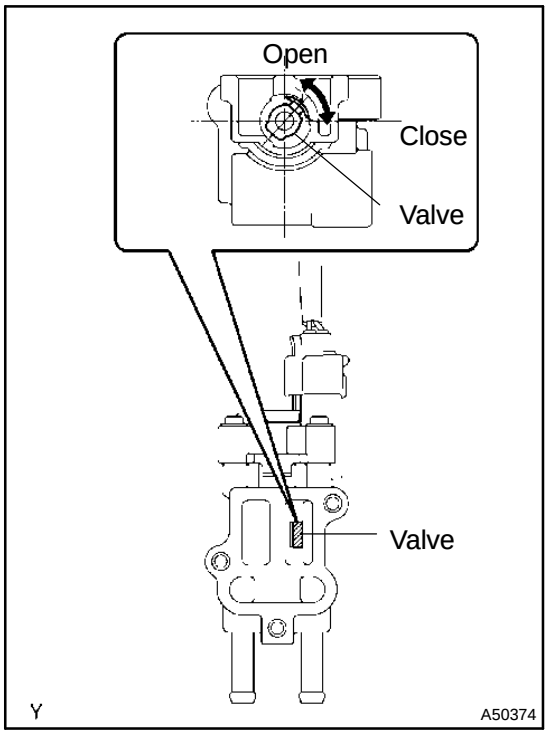
NOTE: The above pages contain only the points which differ from the above listed manual.

CONTINUED

EFI SYSTEM (2ZZ-GE)

ON-VEHICLE INSPECTION

1007E-02



1. INSPECT THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY

NOTICE:

- **It is impossible to check the resister value and the operation of ISCV by itself, because the ISCV has an IC circuit inside it, which transforms the duty signal from the ECM to the derive signal.**
- **After checking, erase the DTC.**
- **Clear the DTC after inspection.**

HINT:

When the ISCV system has malfunctions except for its adherence, DTC P0505 is detected.

(a) Operation inspection.

(1) Connect the ISC connector to the ISCV.

(2) Check the ISCV movement when the ignition switch is turned ON.

Movement:

Half open → fully close → fully open → half open

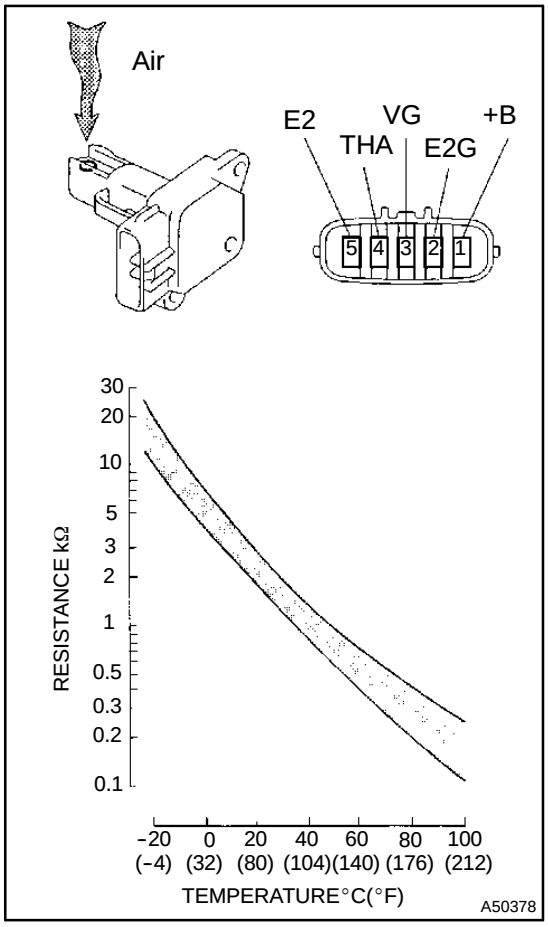
HINT:

ISCV moves within 0.5 second.

CONTINUED

1007F-02

INSPECTION



1. INTAKE AIR FLOW METER SUB-ASSY

(a) Output voltage inspection.

(1) Apply battery voltage across terminals 1 (+B) and 2 (E2G).

(2) Using a voltmeter, connect the positive (+) tester probe to terminal VG, and negative (-) tester probe to terminal E2G.

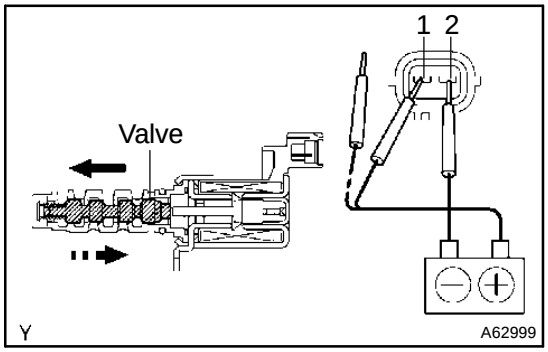
(3) Blow air into the intake air flow meter, and check that the voltage fluctuates.

(b) Resistance inspection.

(1) Using an ohmmeter, measure the resistance between terminals 4 (THA) and 5 (E2).

Resistance:

Terminals	Resistance	Temperature
THA - E2	13.6 - 18.4 kΩ	-20 °C (-4 °F)
THA - E2	2.21 - 2.69 kΩ	20 °C (68 °F)
THA - E2	0.49 - 0.67 kΩ	60 °C (140 °F)



2. CAMSHAFT TIMING OIL CONTROL VALVE ASSY

(a) Resistance inspection.

(1) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 6.9 - 7.9 Ω at 20 °C (68 °F)

(b) Movement inspection.

(1) Connect the positive (+) lead from the battery to terminal 1 and negative (-) lead to terminal 2, and check the movement of the valve.

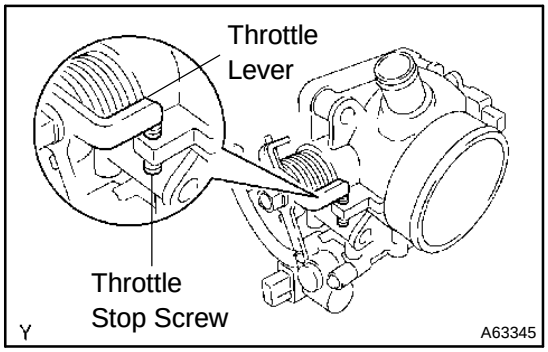
NOTICE:

Confirm the valve does not adhere.

HINT:

Bad returning of the valve by entrance of foreign objects causes subtle pressure leak to the advanced direction. Then, DTC can be detected.

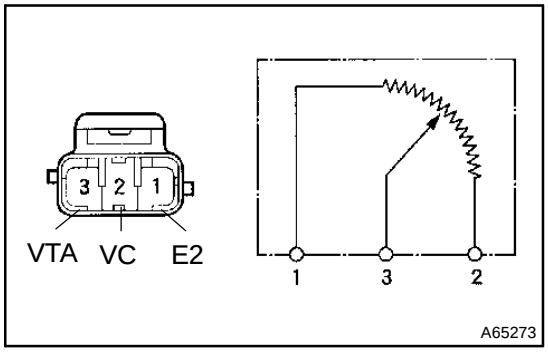
CONTINUED



3. THROTTLE BODY ASSY

(a) Check throttle body.
  (1) Check that throttle valve shaft is not rickety.
  (2) Check that each port is not stopped up.
  (3) Check that throttle valve opens and closes smoothly.
  (4) Check that there is no clearance between the throttle stop screw and throttle lever at the throttle closed position.

NOTICE:
Do not adjust the throttle stop screw.



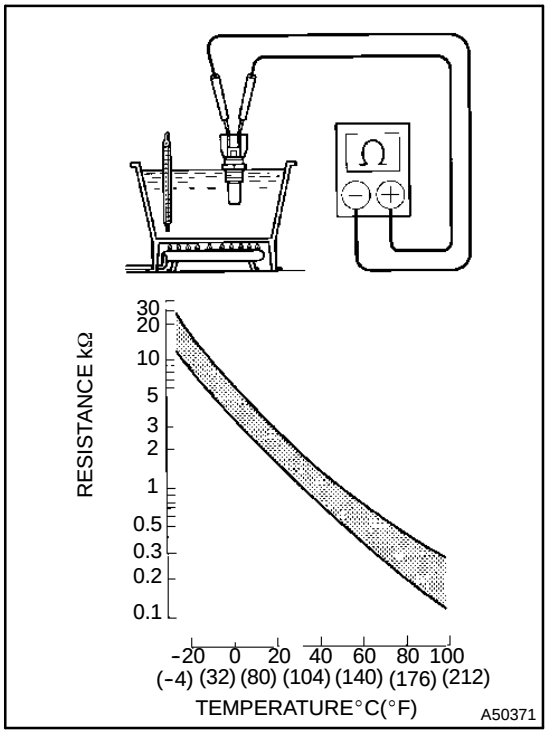
4. E.F.I. THROTTLE POSITION SENSOR

(a) Resistance inspection.
  (1) Disconnect the E. F. I. throttle position sensor connector.
  (2) Using an ohmmeter, measure the resistance between terminals VC and E2.
  Resistance: 2.5 - 6.0 kΩ
  (3) Check the change of resistance between terminals VTA and E2.
  Change of resistance:
  The resistance value increases in proportion to the throttle lever opening value.

HINT:

Throttle valve	Resistance
Fully open	0.2 – 5.7 kΩ
Fully close	2.0 – 10.2 kΩ

CONTINUED



5. E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

(a) Resistance inspection.

(1) Using an ohmmeter, measure the resistance between each terminal.

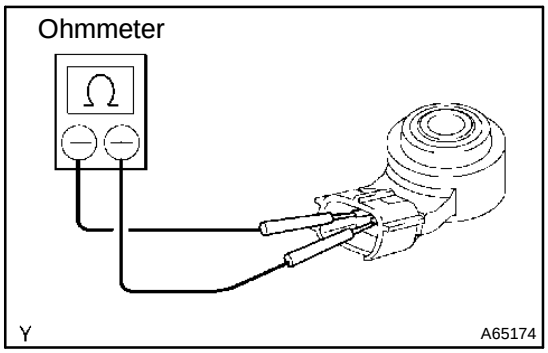
Resistance:

Approx. 20°C (68°F) 2.32 - 2.59 kΩ

Approx. 80°C (176°F) 0.310 - 0.326 kΩ

NOTICE:

In case of checking the water temperature sensor in the water, be careful not to allow water to go into the terminals, and after checking, wipe out the sensor.

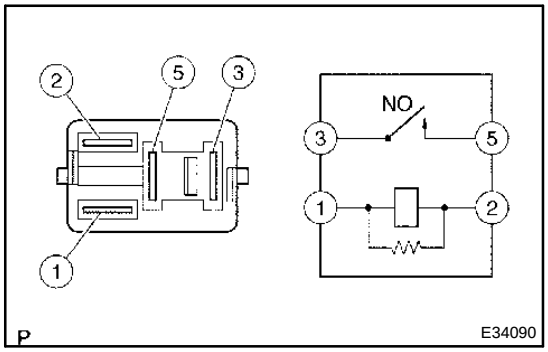


6. KNOCK CONTROL SENSOR

(a) Using an ohmmeter, check that no continuity exists between the terminal and body.

Resistance:120 - 280 kΩ at 20 °C (68 °F)

If the resistance is not specified, replace the knock control sensor.



7. E.F.I. CIRCUIT OPENING RELAY ASSY

(a) Inspect the E. F. I. circuit opening Relay.

(1) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity replace the relay.

(2) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.

(3) Apply battery voltage across terminals 1 and 2.

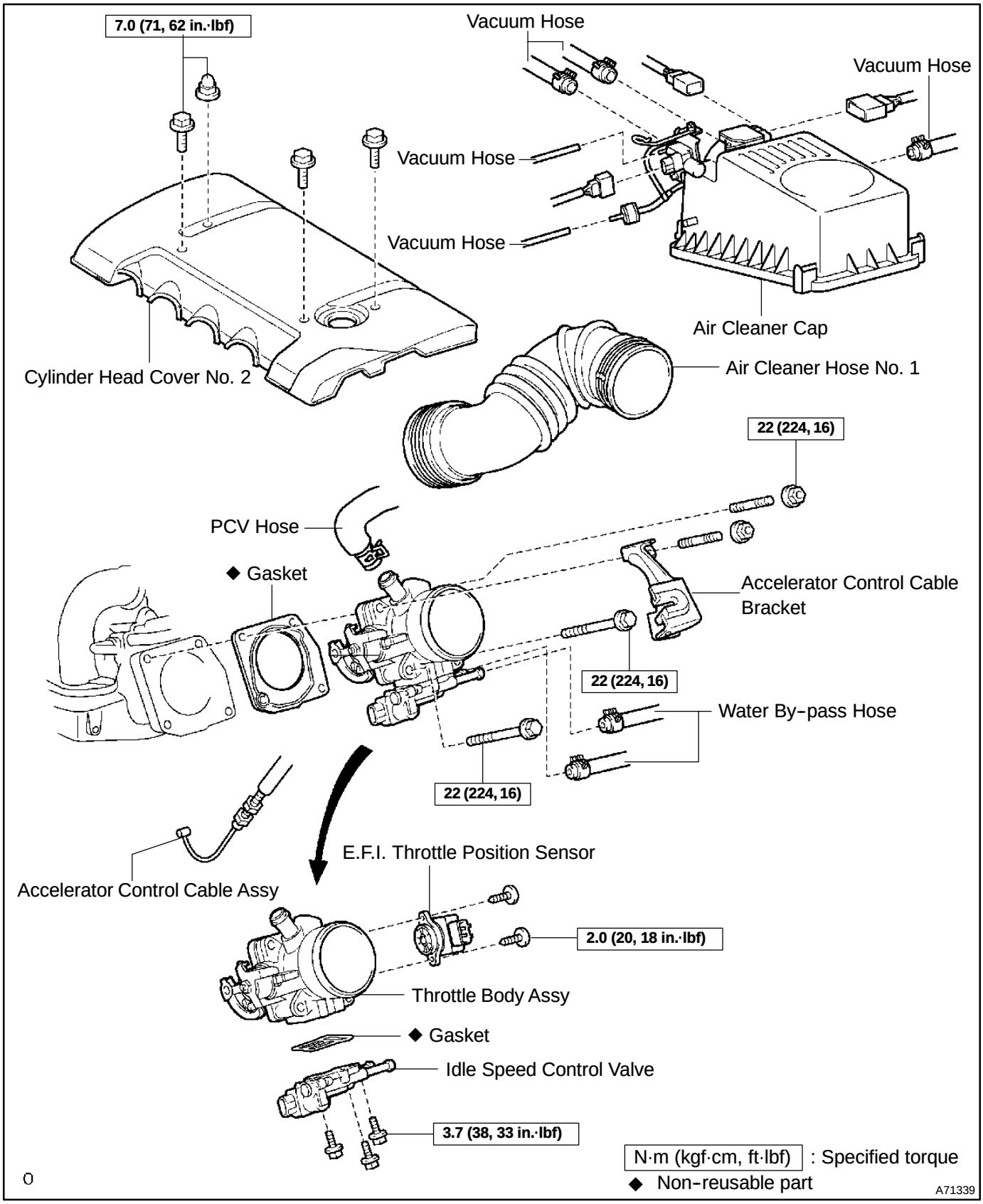
(4) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

CONTINUED

THROTTLE BODY ASSY (2ZZ-GE)

COMPONENTS

1007I-02



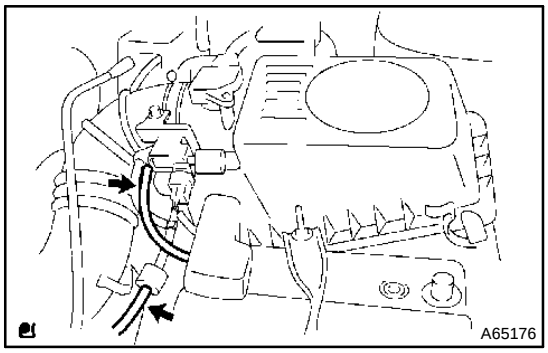
CONTINUED

100A8-01

Removal & Installation and Disassembly & Reassembly

1. REMOVE ENGINE UNDER COVER LH

2. DRAIN COOLANT **(See page 16-6)**

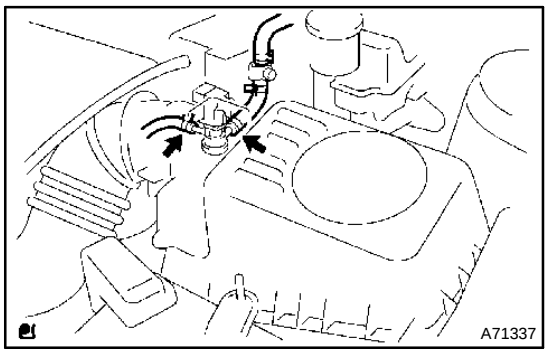


3. REMOVE AIR CLEANER CAP SUB-ASSY

(a) Disconnect 2 vacuum hoses as shown in the illustration.

(b) Disconnect the MAF connector.

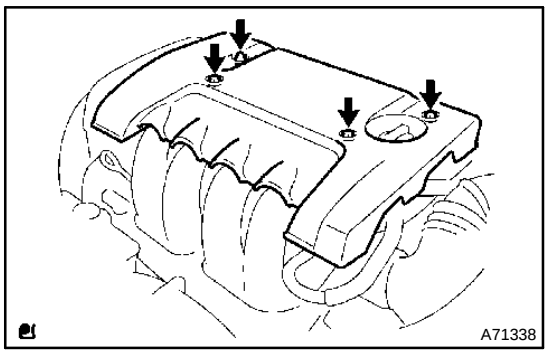
(c) Disconnect 2 VSV connectors.



(d) Disconnect 2 vacuum hoses, as shown in the illustration.

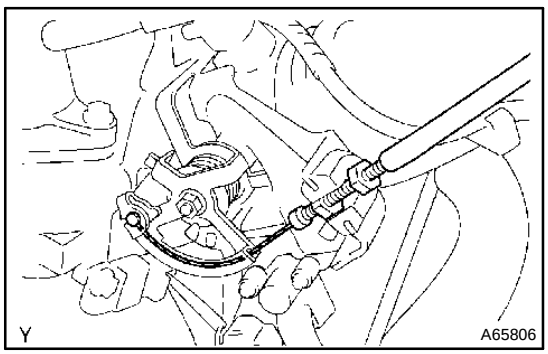
(e) Loosen an air cleaner hose clamp and disconnect an air cleaner hose No. 1.

(f) Remove the air cleaner cap.



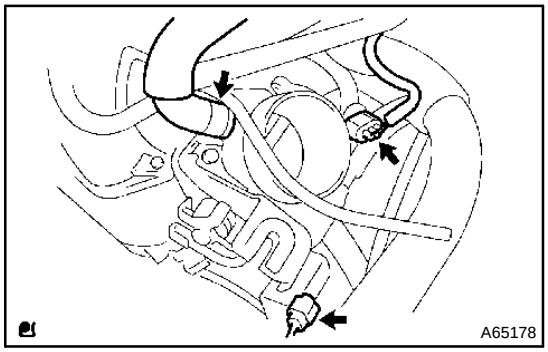
4. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove 3 bolts, nut and cylinder head cover No.2.



5. SEPARATE ACCELERATOR CONTROL CABLE ASSY

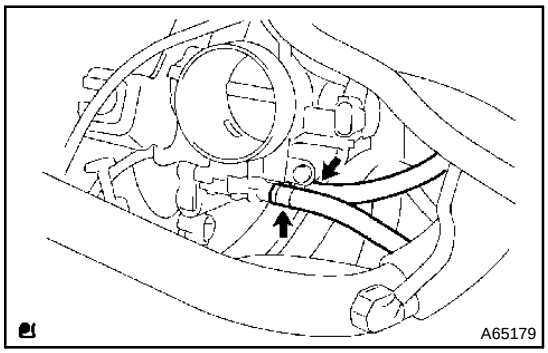
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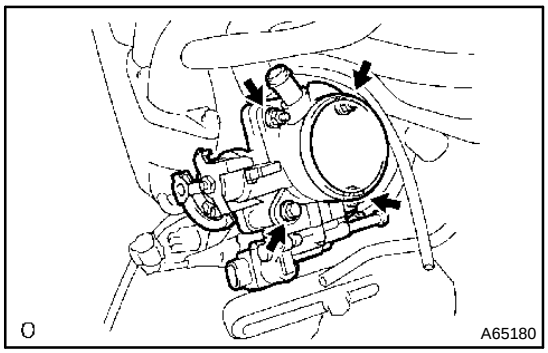
6. REMOVE THROTTLE BODY ASSY

(a) Disconnect the throttle position sensor connector and ISCV connector.

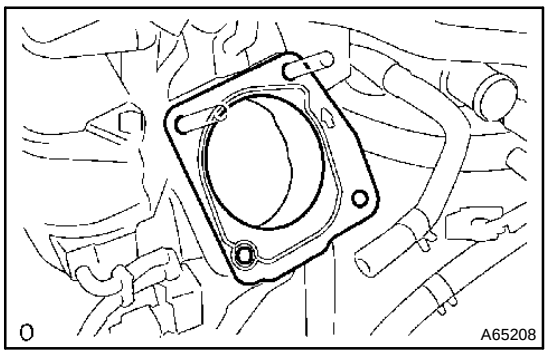
(b) Disconnect the PCV hose.



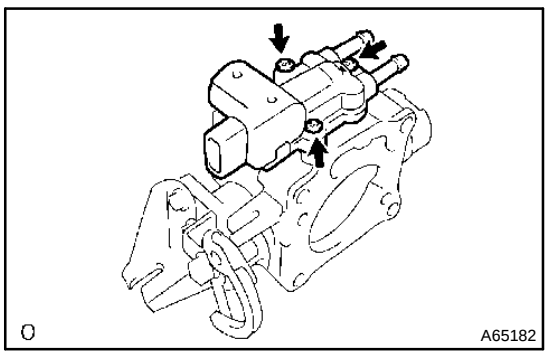
(c) Disconnect 2 water bypass hose.



(d) Remove 2 bolts, 2 nuts and throttle body from the intake manifold.



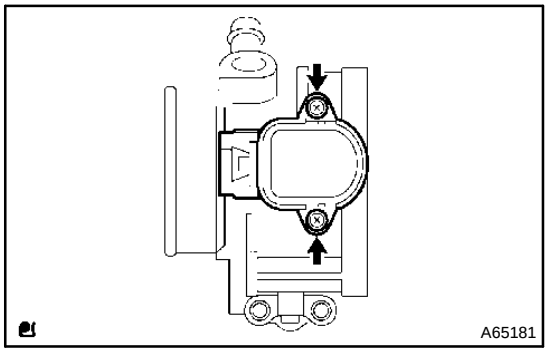
(e) Remove the gasket from the intake manifold.



7. REMOVE THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY

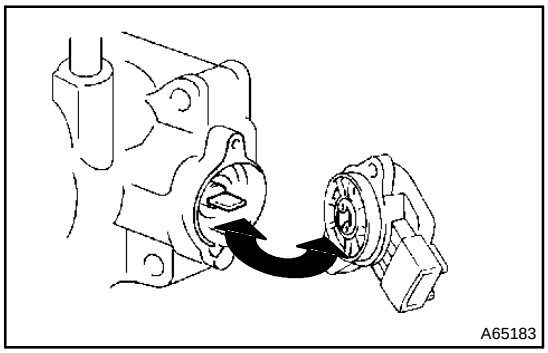
(a) Remove the 3 screws and idle speed control valve.

CONTINUED



8. REMOVE E.F.I. THROTTLE POSITION SENSOR

(a) Remove the 2 screws and throttle position sensor.



9. INSTALL E.F.I. THROTTLE POSITION SENSOR

(a) Check that the throttle valve is fully close.

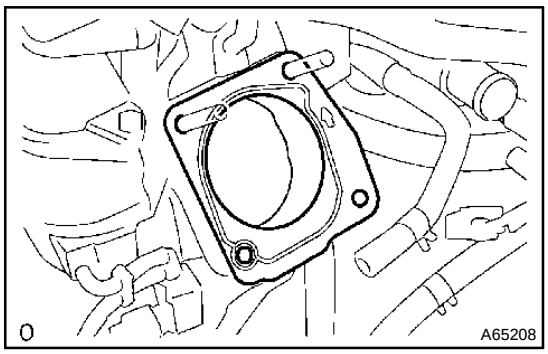
(b) Insert the E. F. I. throttle position sensor to the throttle body with it turned clockwise by 30° to 90° against the fully close valve position.

(c) By turning the E. F. I. throttle position sensor clockeise, tighten 2 screws.

Torque: 2.0N·m (20 kgf·cm, 18 in.·lbf)

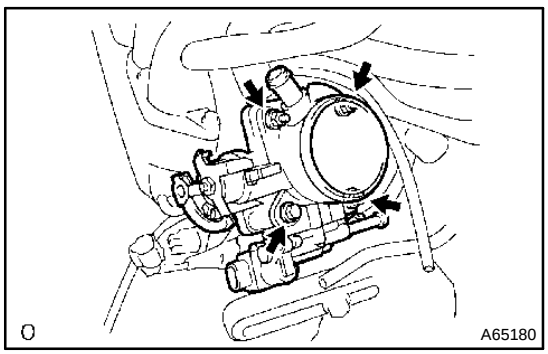
10. INSTALL THLOTTLE BODY IDLE SPEED CONTROL VALVE ASSY

(a) Install the idle speed control valve with a new gasket.



11. INSTALL THROTTLE BODY ASSY

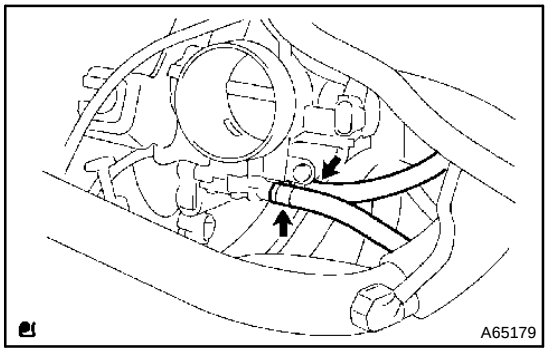
(a) Install a new gasket on the intake manifold, as shown in the illustration.



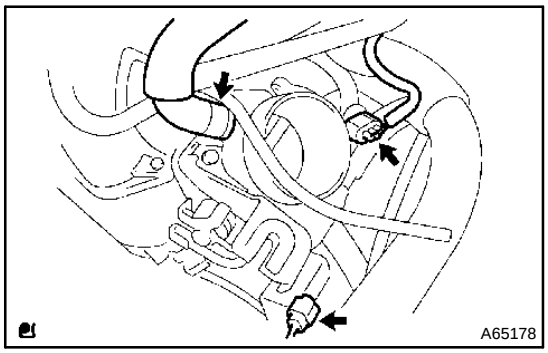
(b) Install the throttle body and accelerator control cable bracket with 2 bolts and 2 nuts.

Torque: 22 N·m (224 kgf·cm, 16 ft·lbf)

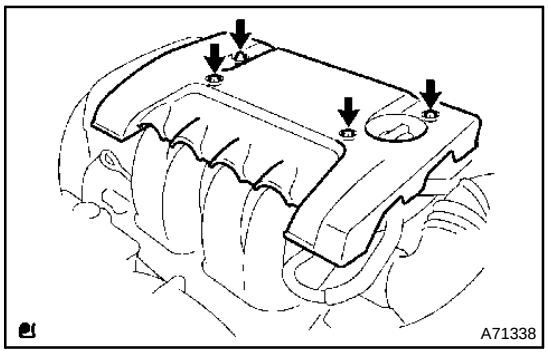
CONTINUED



(c) Connect 2 water by-pass hoese to the throttle body.



(d) Connect the PCV hose to the throttle body.
(e) Connect the throttle body idle speed control valve assy connector to the throttle body.
(f) Connect the E. F. I. throttle position sensor connector to the throttle body.



12. INSTALL CYLINDER HEAD COVER NO.2

(a) Install the cylinder head cover No.2 with 3 bolts and a nut.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

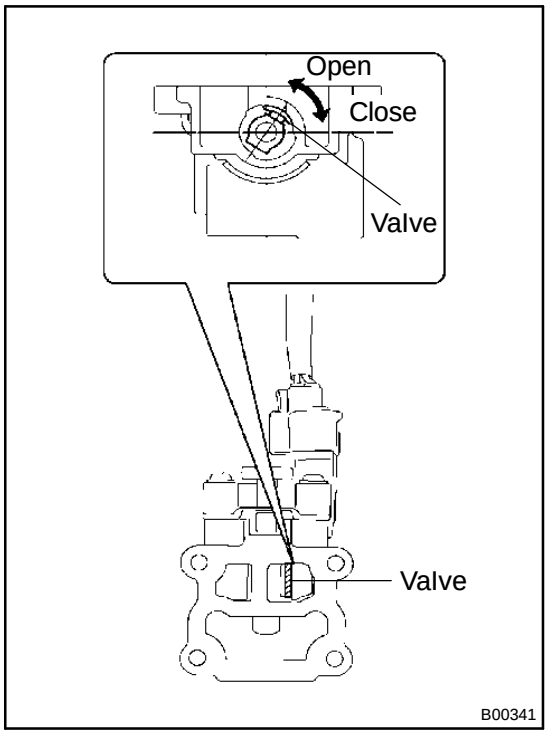
13. ADD COOLANT **(See page 16-6)**
14. INSPECT CHECK FOR ENGINE COOLANT LEAKS **(See page 16-1)**
15. WARMING UP

CONTINUED

EFI SYSTEM (4ZZ–FE)

ON–VEHICLE INSPECTION

100A9–01



1. INSPECTION THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY

NOTICE:

- **It is impossible to check the resister value and the operation of ISCV by itself, because the ISCV has an IC circuit inside it, which transforms the duty signal from the ECU to the derive signal.**
- **After checking, erase the DTC.**
- **Clear the DTC after inspection.**

HINT:

When the ISCV system has malfunctions except for its adherence, DTC P0505 is detected.

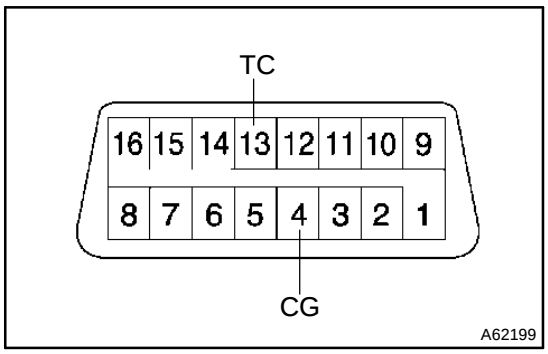
(a) Operation inspection.

(1) Connect the ISC connector to the ISC valve.

(2) Check the ISC valve movement when the ignition switch is turned ON.

Movement:

Half open



(b) Operation inspection.

(1) Using SST, connect terminal 13 (TC) and 4 (CG) of the DLC3.

SST 09843–18030

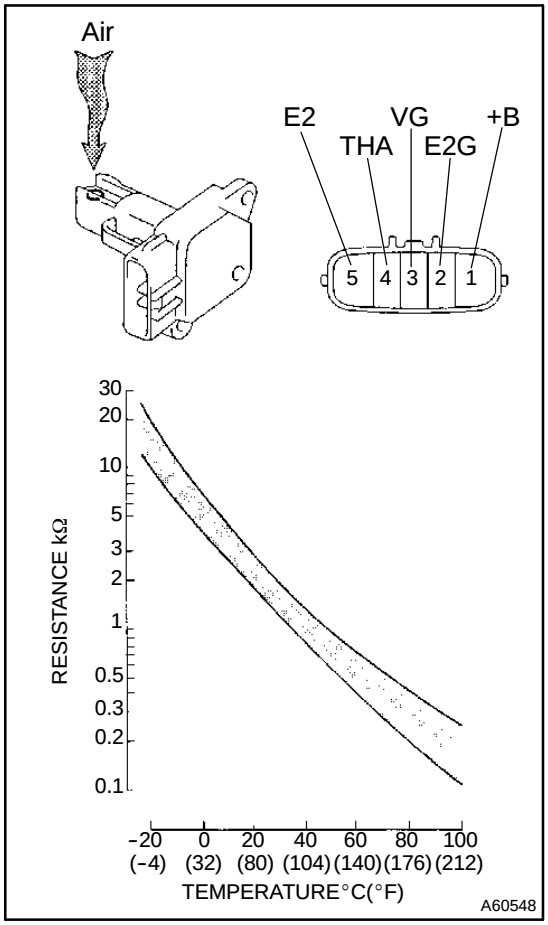
(2) After engine r/min is kept at 1,000 – 1,500 rpm for 5 seconds, check that it returns idle speed.

Idle speed:

600 – 700 rpm

CONTINUED

INSPECTION



1. INTAKE AIR FLOW METER SUB–ASSY

(a) Output voltage inspection.

(1) Apply battery voltage across terminals 1 (+B) and 2 (E2G).

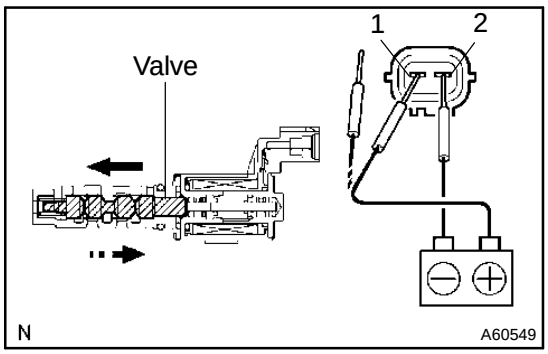
(2) Using a voltmeter, connect the positive (+) tester probe to terminal 3 (VG), and negative (–) tester probe to terminal 2 (E2G).

(3) Blow air into the intake air flow meter, and check that the voltage fluctuates.

(b) Resistance inspection.

(1) Using an ohmmeter, measure the resistance between terminals 4 (THA) and 5 (E2).

Resistance:
Approx. –20 °C (–4 °F) 13.6 – 18.4 kΩ
Approx. 20 °C (68 °F) 2.21 – 2.69 kΩ
Approx. 60 °C (140 °F) 0.49 – 0.67 kΩ



2. CAMSHAFT TIMING OIL CONTROL VALVE ASSY

(a) Resistance inspection.

(1) Using an ohmmeter, measure the resistance between terminals.

Resistance: 6.9 – 7.9 Ω at 20 °C (68 °F)

(b) Movement inspection.

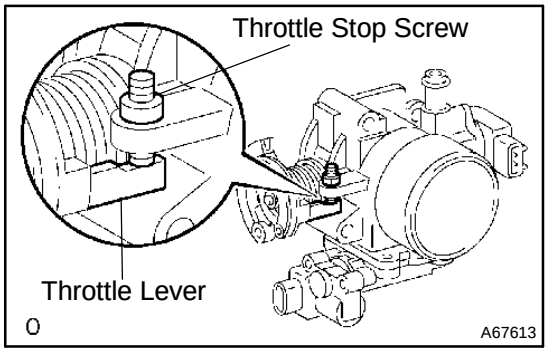
(1) Connect the positive (+) lead from the battery to terminal 1 and negative (–) lead to terminal 2, and check the movement of the valve.

NOTICE:
Confirm the valve does not adhere.

HINT:

Bad returning of the valve by entrance of foreign objects causes subtle pressure leak to the advanced direction. Then, DTC can be detected.

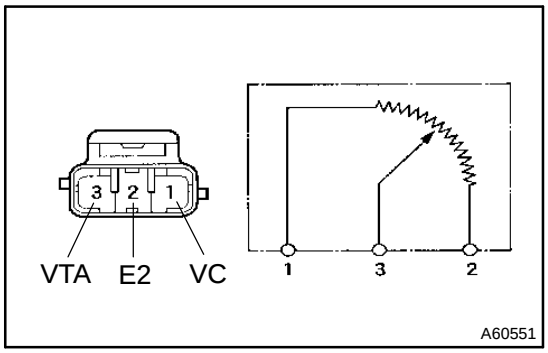
CONTINUED



3. THROTTLE BODY ASSY

(a) Check throttle body.
  (1) Check that throttle valve shaft is not rickety.
  (2) Check that each port is not stopped up.
  (3) Check that throttle valve opens and closes smoothly.
  (4) Check that there is no clearance between the throttle stop screw and throttle lever at the throttle closed position.

NOTICE:
Do not adjust the throttle stop screw.



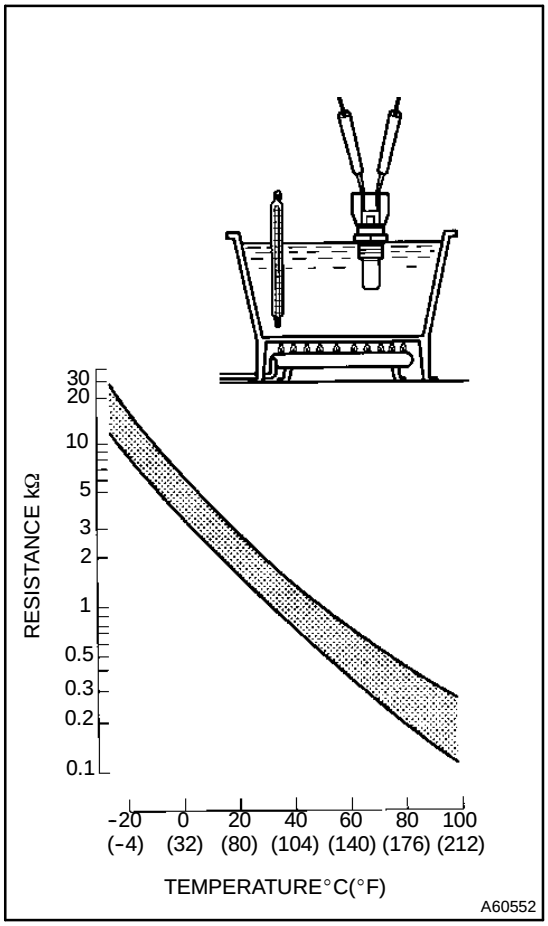
4. E.F.I. THROTTLE POSITION SENSOR

(a) Resistance inspection.
  (1) Disconnect the E.F.I. throttle position sensor connector.
  (2) Using an ohmmeter, measure the resistance between terminals 1 (VC) and 2 (E2).
  Resistance: 2.5 - 6.0 kΩ
  (3) Check the change of resistance between terminals 3 (VTA) and 2 (E2).
  Change of resistance:
  The resistance value increases in proportion to the throttle lever opening value.

HINT:

Throttle valve	Resistance
Fully open	0.2 – 5.7 kΩ
Fully close	2.0 – 10.2 kΩ

CONTINUED



5. E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

(a) Resistance inspection.

(1) Using an ohmmeter, measure the resistance between terminals.

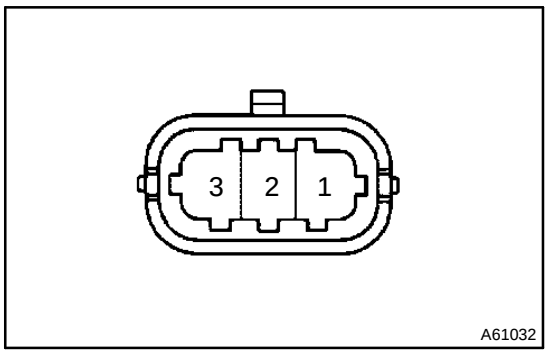
Resistance:

Approx. 20 °C (68 °F) 2.32 - 2.59 kΩ

Approx. 80 °C (176 °F) 0.310 - 0.326 kΩ

NOTICE:

In case of checking the water temperature sensor in the water, be careful not to allow water to go into the terminals, and after checking, wipe out the sensor.

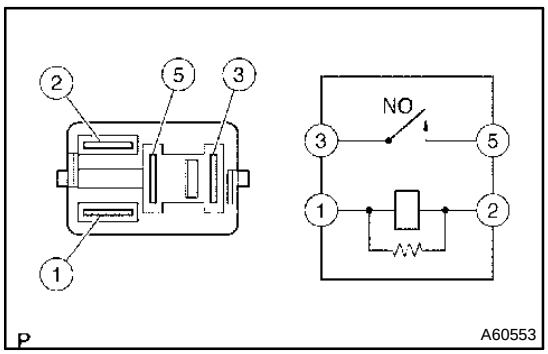


6. KNOCK CONTROL SENSOR

(a) Resistance inspection:

(1) Using an ohmmeter, measure the resistance between terminals 1 and 2.

Resistance: 1 MΩ or more



7. E.F.I. CIRCUIT OPENING RELAY ASSY

(a) Continuity inspection.

(1) Using an ohmmeter, check that there is continuity between each terminal.

Specified condition:

Between terminals	Specified condition
1 - 2	Continuity
3 - 5	No continuity

(2) Using an ohmmeter, check that there is continuity between terminals 3 and 5 when the battery voltage is applied across terminals 1 and 2.

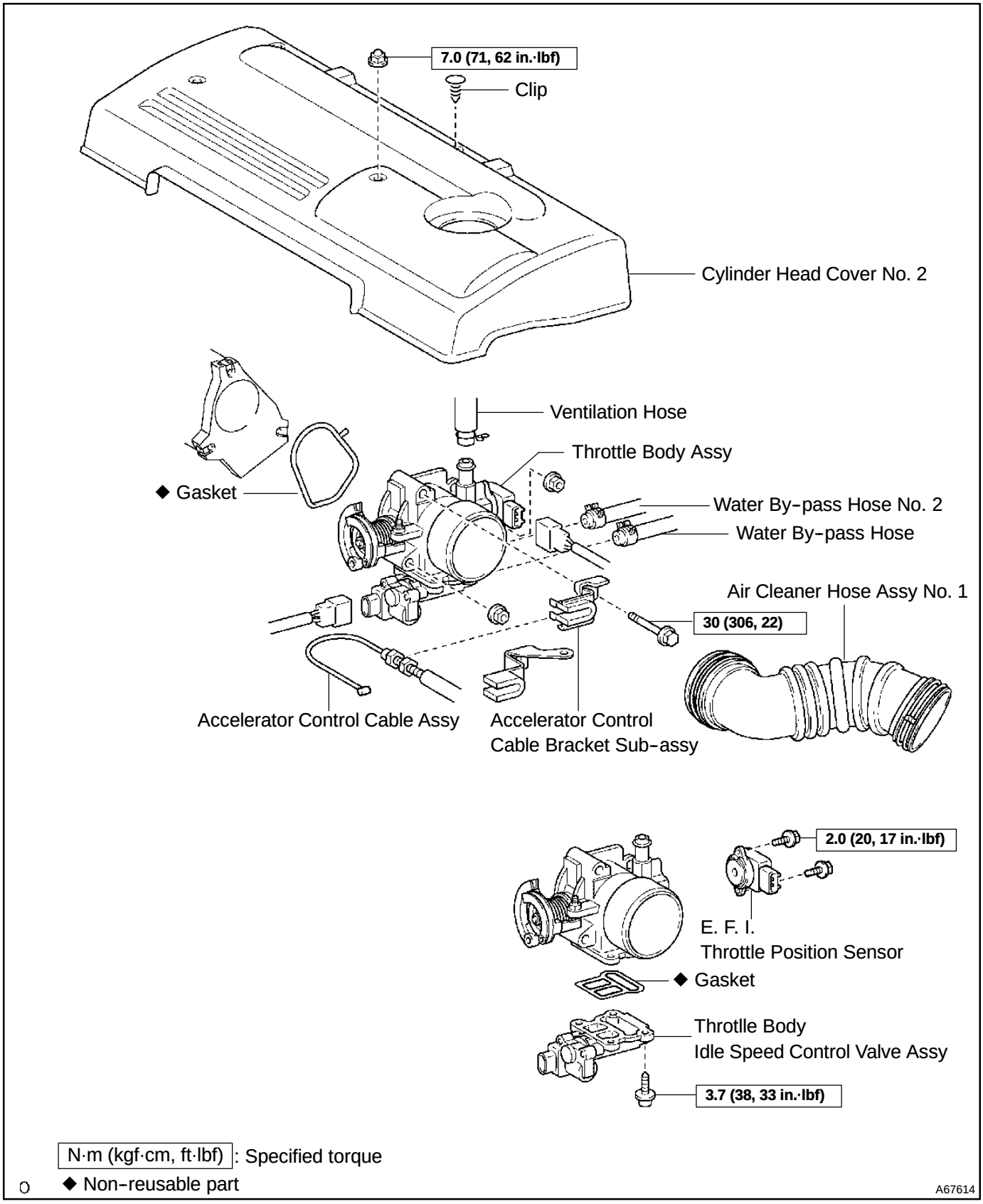
Specified condition: Continuity

CONTINUED

THROTTLE BODY ASSY (4ZZ–FE)

COMPONENTS

1007K–02



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

◆ Non–reusable part

A67614

CONTINUED

1007L-02

Removal & Installation and Disassembly & Reassembly

1. REMOVE ENGINE UNDER COVER LH

2. DRAIN COOLANT**(See page 16-18)**

3. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove the 2 nuts, 2 clips and cylinder head cover.

4. REMOVE AIR CLEANER HOSE NO.1

(a) Loosen the 2 air cleaner hose clamp bolts, and remove the air cleaner hose.

5. SEPARATE ACCELERATOR CONTROL CABLE ASSY

(a) Loosen the nut, and accelerator control cable.

6. DISCONNECT VENTILATION HOSE

(a) Disconnect the ventilation hose from throttle body.

7. DISCONNECT WATER BY-PASS HOSE

(a) Disconnect the water by-pass hose from throttle body.

8. DISCONNECT WATER BY-PASS HOSE NO.2

(a) Disconnect the water by-pass hose from throttle body.

9. REMOVE THROTTLE BODY ASSY

(a) Disconnect the 2 connectors.

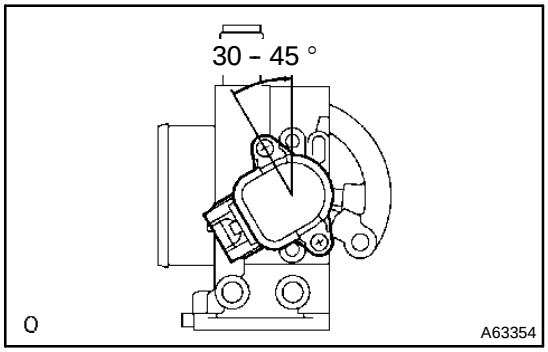
(b) Remove the bolt, 2 nuts, accelerator control cable bracket, throttle body and gasket.

10. REMOVE THLOTTLE BODY IDLE SPEED CONTROL VALVE ASSY

(a) Remove the 4 screws, idle speed control valve and gasket.

11. REMOVE E.F.I. THROTTLE POSITION SENSOR

(a) Remove the 2 screws and E.F.I. throttle position sensor.



12. INSTALL E.F.I. THROTTLE POSITION SENSOR

(a) Confirm the throttle valve is fully closed.

(b) Revolve the E.F.I. throttle position sensor 30 – 45° in the left direction to the throttle valve fully closed position, and insert the E.F.I. throttle position sensor to the throttle body.

(c) Revolve the E.F.I. throttle position sensor 30 – 45° in the right direction, and install it with 2 screws.
Torque: 2.0 N·m (20 kgf·cm, 17 in.·lbf)

13. INSTALL THLOTTLE BODY IDLE SPEED CONTROL VALVE ASSY

(a) Install a new gasket to the idle speed control valve.

(b) Install the idle speed control valve with the 3 screws.
Torque: 3.7 N·m (38 kgf·cm, 33 ft·lbf)

14. INSTALL THROTTLE BODY ASSY

(a) Install a new gasket to the intake manifold.

(b) Install the throttle body and accelerator control cable bracket with the bolt and 2 nuts.
Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)

15. INSTALL CYLINDER HEAD COVER NO.2

(a) Install the cylinder head cover with the 2 nuts and clips.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

16. ADD COOLANT**(See page 16-18)**

17. CHECK FOR ENGINE COOLANT LEAKS**(See page 16-13)**

CONTINUED

FUEL

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ON-VEHICLE INSPECTION 11-5/6
INSPECTION 11-7/8
FUEL INJECTOR ASSY (2ZZ-GE) 11-9
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FUEL PUMP ASSY (2ZZ-GE) 11-14
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Disassembly & Reassembly 11-49/51

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement	RM926E

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

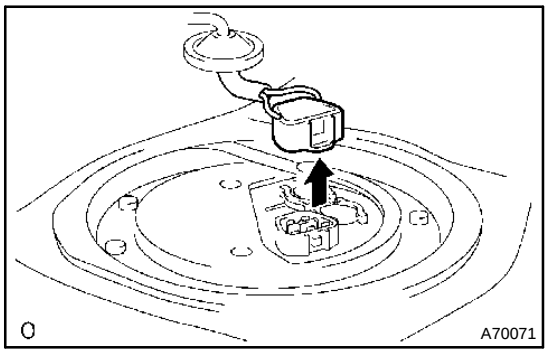
CONTINUED

FUEL SYSTEM (2ZZ-GE)

110HM-01

PRECAUTION

1. **BEFORE WORKING ON FUEL SYSTEM, DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY**
2. **DO NOT SMOKE OR WORK NEAR AN OPEN FLAME WHEN WORKING ON FUEL SYSTEM**
3. **KEEP GASOLINE AWAY FROM RUBBER OR LEATHER PARTS**

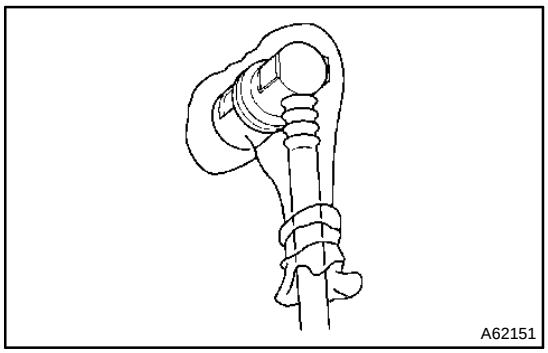


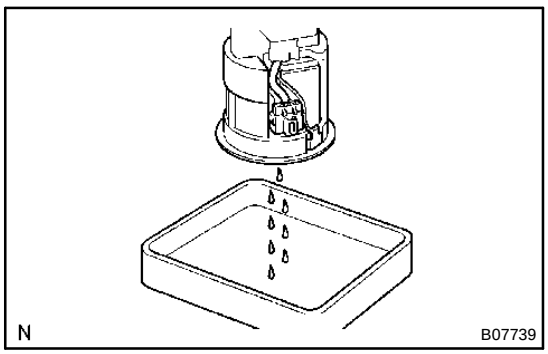
4. WORK FOR PREVENT GASOLINE FROM SPILLING OUT

(a) Disconnect the fuel pump connector.
(b) Start the engine. After the engine has stopped on its own, turn the ignition switch to lock.
(c) Disconnect negative (–) terminal cable from battery.
(d) Connect the fuel pump connector.

5. FUEL SYSTEM

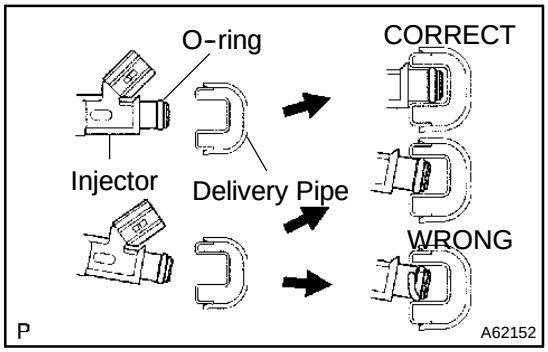
(a) When disconnecting the high fuel pressure line, a large amount of gasoline will spill out, so observe these procedures.
  (1) Work for prevent gasoline from spilling out.
  (2) Disconnect the fuel tube.
  (3) Drain the fuel remained inside the fuel tube.
  (4) Protect the disconnected fuel tube from damage and foreign material by covering it with vinyl bag.





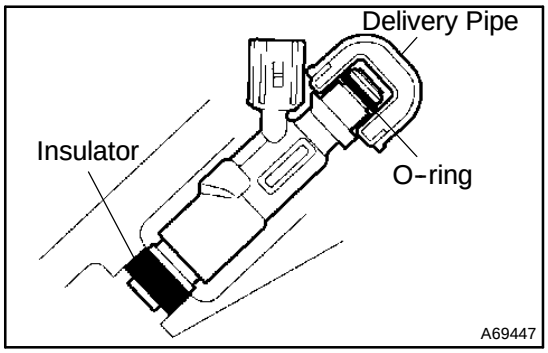
  (5) Put a container under the connection.

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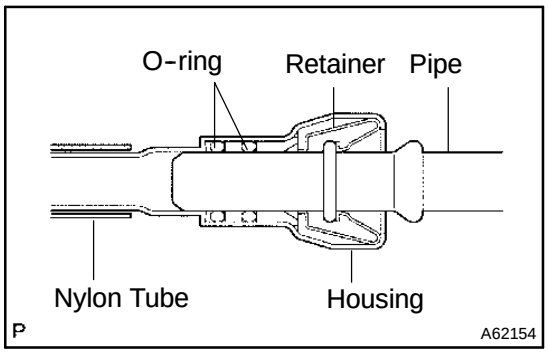


(b) Observe these precautions when removing and installing the injector.
(1) Never reuse the O-ring.
(2) When placing a new O-ring on the injector, take care not to damage it in any way.
(3) Coat a new O-ring with spindle oil or gasoline before installing.

NOTICE:
Never use the engine, gear or brake oil.

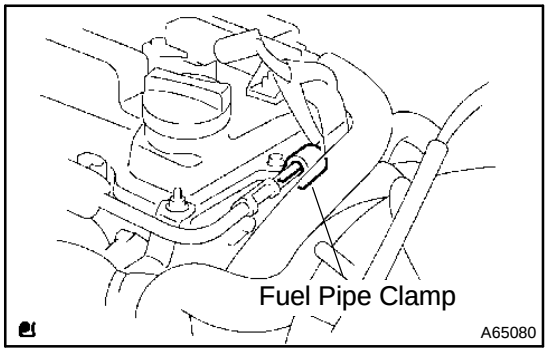


(c) Install the injector to the delivery pipe and cylinder head, as shown in the illustration. Before installing the injector, be sure to apply spindle oil or gasoline on the place where the delivery pipe touches O-ring of the injector.

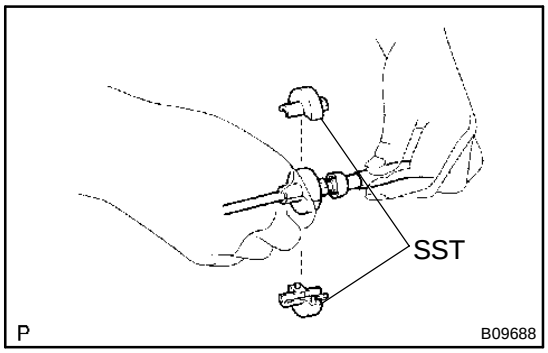


(d) Observe these precautions when disconnecting the fuel delivery pipe.

HINT:
The structure of the metallic connector is shown as left.

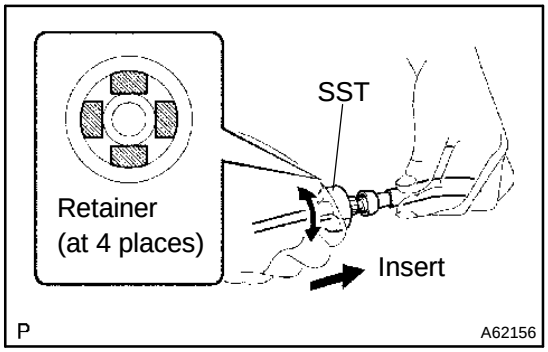


(1) Remove the fuel pipe clamp.

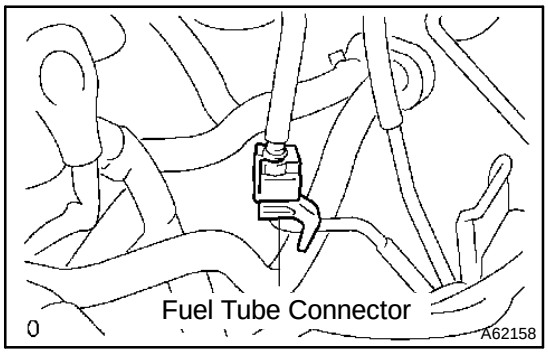


(2) Get the metallic connector of the fuel tube assembly, pull it out towards the rear and hold it as it is.
(3) Assemble SST to the connection as shown.
SST 09268-21010

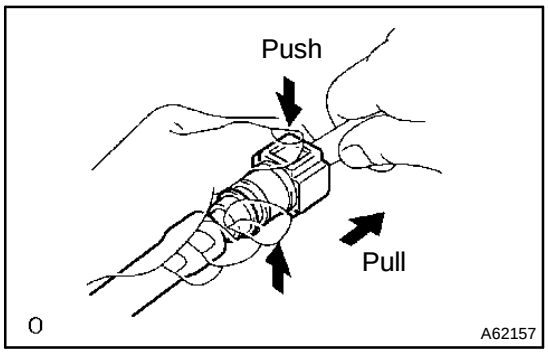
CONTINUED



(4) Turn SST, align the retainers inside the connector with SST chamfered parts and insert SST into the connector.
(5) Slide SST and the connector together towards the fuel tube assembly.



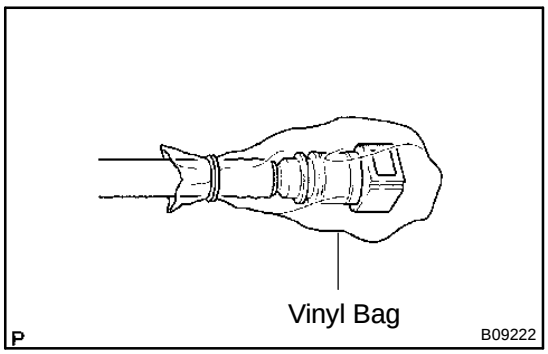
(e) Observe these precautions when disconnecting the fuel tube connector (quick type).
(1) Remove the fuel pipe clamp.
(2) Check if there is any dirt like mud on the pipe and around the connector before disconnecting them and clean the dirt away.



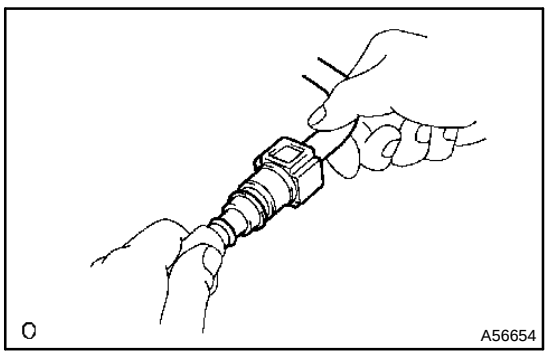
(3) Be sure to disconnect with hands.
(4) When the connector and the pipe are stuck, pinch the retainer between the hands, push and pull the connector to free to disconnect and pull it out.

NOTICE:
Do not use any tool at this time.

(5) Inspect if there is any dirt or the likes on the seal surface of the disconnected pipe and clean it away.



(6) Prevent the disconnected pipe and connector from damaging and mixing foreign objects by covering them with a vinyl bag.



(f) Observe these precautions when connecting the fuel tube connector (quick type).
(1) Match the axis of the connector with axis of the pipe, and push in the connector until retainer makes a ”click” sound. In case that the connections is tight, apply little amount of new engine oil on the tip of the pipe.
(2) After having finished the connection, check if the pipe and the connector are securely connected by pulling them.

CONTINUED

6. CHECK FUEL LEAK

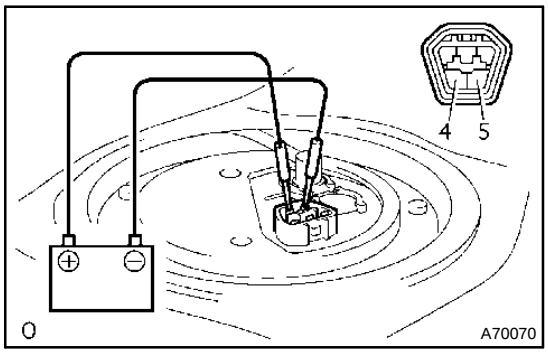
(a) Check that there are no fuel leaks after doing maintenance anywhere on the fuel system.

(1) Connect the hand-held tester to the DLC3.

(2) Turn the ignition switch ON and hand-held tester main switch ON.

(3) Select the active test mode on the hand-held tester.

(4) Please refer to the hand-held tester operator's manual for further details.



(5) If you have no hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector.

(6) Check that there are no leaks from any part of the fuel system.

(7) Turn the ignition switch to LOCK.

(8) Disconnect the hand-held tester from the DLC3.

CONTINUED

ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

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

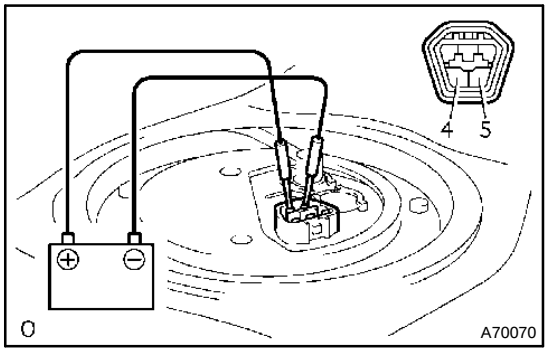
(b) Turn the ignition switch ON and the hand-held tester main switch ON.

NOTICE:

Do not start the engine.

(c) Select the active test mode on the hand-held tester.

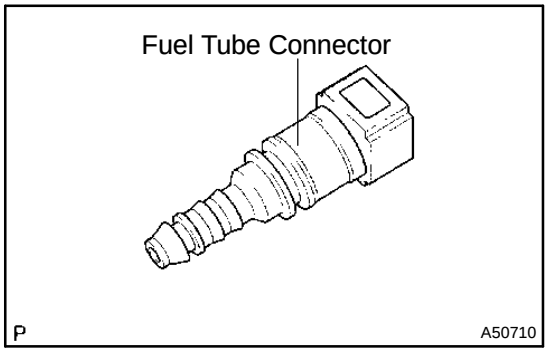
(d) Please refer to the hand-held tester operator's manual for further details.



(e) If you have no hand-held tester, connect the positive (+) lead form the battery to terminal 5 of the connecter, and the negative (-) lead to terminal 4.

NOTICE:

- **These tests must be done quiekly (within 10 seconds) to prevent the coil burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always do the switching at the battery side.**



2. CHECK FUEL PRESSURE

(a) Prepare for inspection.

(1) Purchase the new fuel tube and take out the fuel tube connector from its pipe.

HINT:

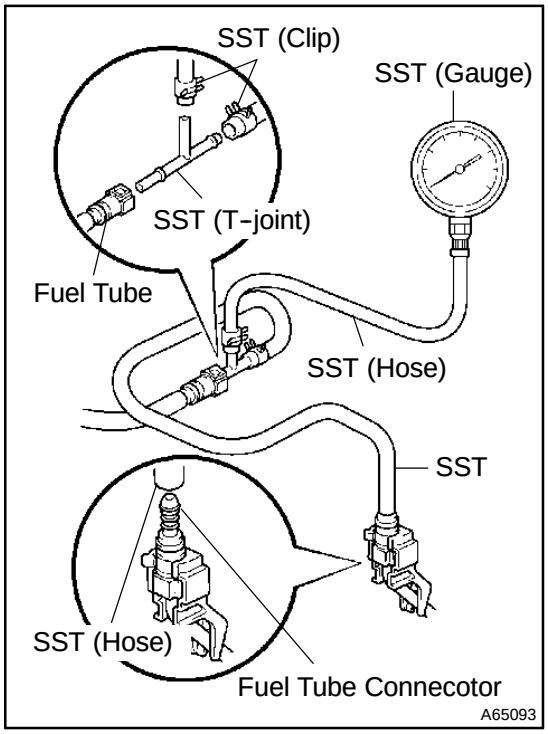
Part No.: 23271 - 88601

(b) Work for prevent gasoline from spilling out. (See page 11-1)

(c) Disconnect the fuel tube clamp from the fuel tube connector. (See page 11-1)

(d) Disconnect the fuel tube (fuel tube connector) from the fuel pipe. (See page 11-1)

CONTINUED



(e) Install SST (pressure gauge) as shown in the illustration by using SST and fuel tube connector.

SST 09268-41047 (90467-13001, 95336-08070), 09268-45014 (09268-41250)

(f) Wipe off any splattered gasoline.
(g) Start the engine.
(h) Measure the fuel pressure at idle.

Fuel pressure:
304 - 347 kPa (3.1 - 3.5 kgf·cm^2, 44 - 50 psi)

(i) Stop the engine.
(j) Check that the fuel pressure remains as specified for 5 minutes after the engine has stopped.

Fuel pressure:
147 kPa (1.5 kgf·cm^2, 21 psi) or more

If pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.

(k) After checking fuel pressure, disconnect the negative (-) terminal cable from the battery and carefully, remove the SST and fuel tube connector to prevent gasoline from the splashing.
(l) Reconnect the fuel tube (fuel tube connector).
(m) Install the fuel tube clamp to the fuel tube connector.
(n) Check fuel leak. (See page 11-5)

CONTINUED

INSPECTION

1. FUEL INJECTOR ASSY

(a) Inspect injector resistance

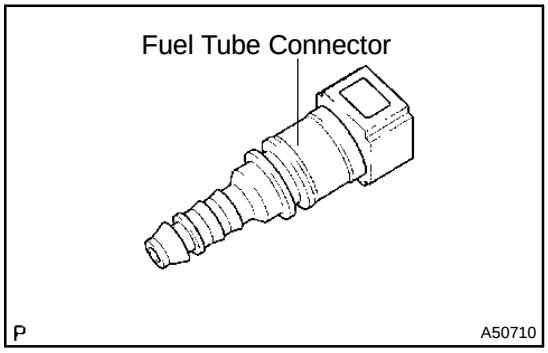
SST 09268-41047 (09268-41110, 09268-41300, 95336-08070), 09842-30080

(1) Using an ohmmeter,measure the resistance between the terminals.

Resistance: 13.4 - 14.2 Ω at 20°C (68°F)

HINT:

If the resistance is not as specified,replace the injector.

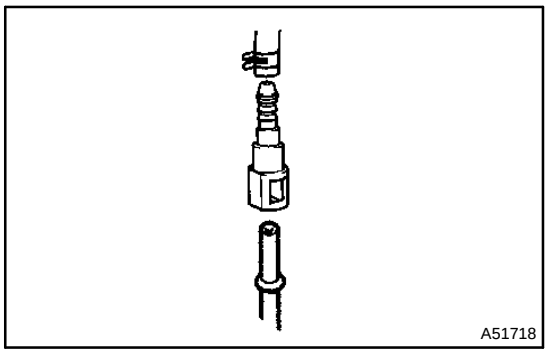


(b) Inspect injector inspection

CAUTION:

Keep injector clear of sparks during the test.

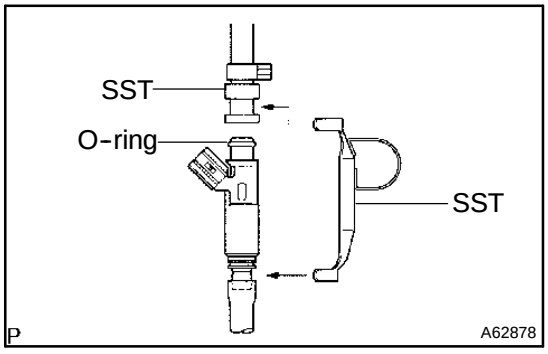
(1) Purchase the new fuel tube and take out the fuel tube connector (Part No. 23271-88601) from its pipe.



(2) Connect SST and fuel tube connector to the fuel pipe.

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after observing the precautions.



(3) Install the O-ring to the injector.

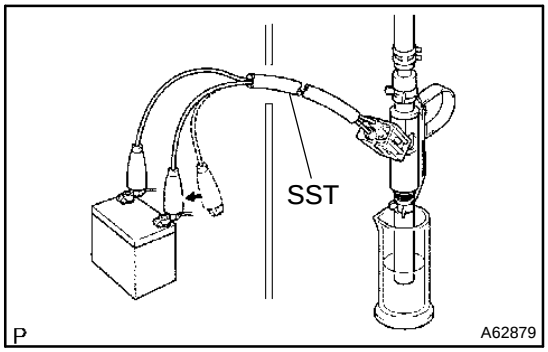
(4) Connect SST (union and hose) to the injector, and hold the injector to prevent gasoline from splashing out.

(5) Put the injector into a graduated cylinder.

HINT:

Install a suitable vinyl tube onto the injector to prevent gasoline from splashing out.

CONTINUED



(6) Connect SST to the connector of injector.

(7) Connect SST to the battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 time.

SST 09842-30080

Volume: 77 - 93 cm^3 (4.7 - 5.7 cu in.) per 15 sec.
Difference between each injector:
16 cm^3 (1.0 cu in.) or less.

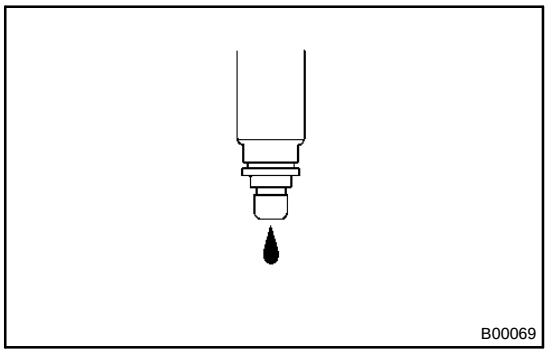
HINT:

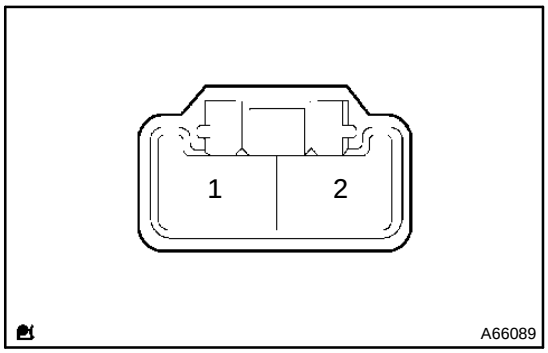
If the injection volume is not as specified,replace the injector.

(c) Inspect leakage

(1) In the condition above, disconnect the test probes of SST from the battery and check the fuel leakage from the injector.

Fuel drop: 1 drop or less per 12 minutes





2. FUEL PUMP ASSY

(a) Insect fuel pump resistance.

(1) Using an ohmmeter, measure the resistance between terminals 1 and 2.

Resistance: 0.2 - 3.0 Ω at 20°C (68°F)

(b) Inspect fuel pump operation

(1) Apply battery voltage to both terminals. Check that the pump operates.

NOTICE:

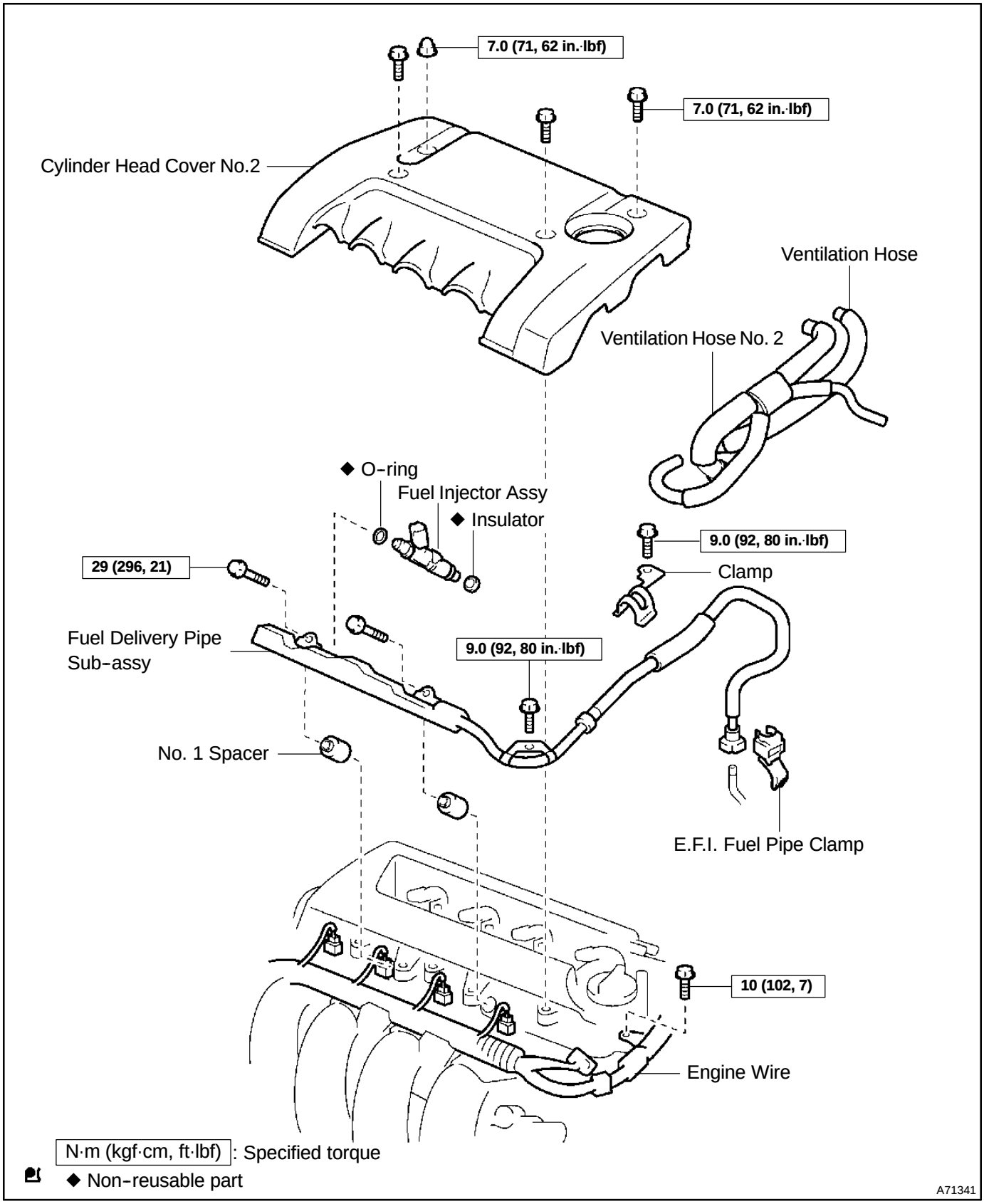
- **These tests must be done quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep fuel pump as far away from the battery as possible.**
- **Always do the switching at the battery side.**

CONTINUED

FUEL INJECTOR ASSY (2ZZ-GE)

COMPONENTS

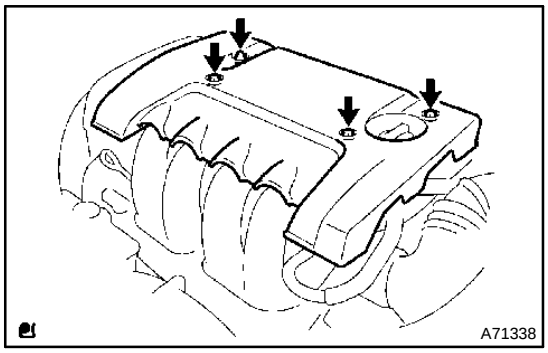
110CG-02



CONTINUED

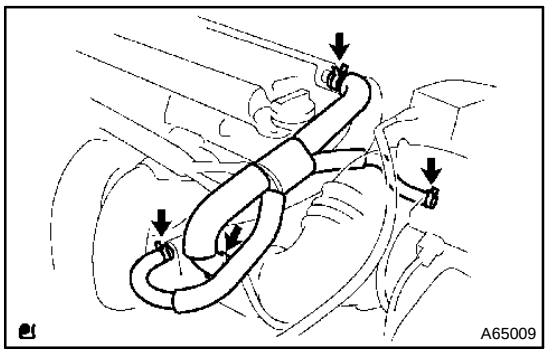
REPLACEMENT

1. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT (See page 11-1)



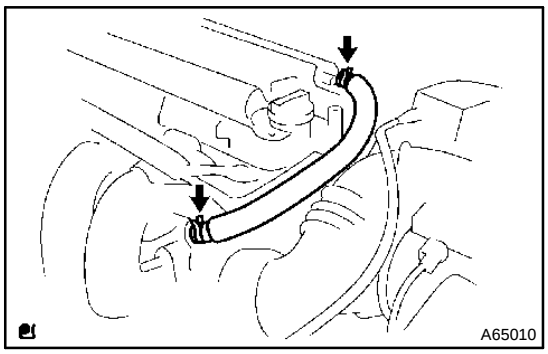
2. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove 3 bolts, nut and the cylinder head cover.



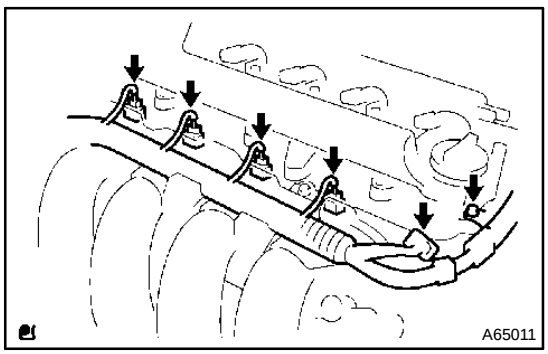
3. REMOVE VENTILATION HOSE NO.2

(a) Remove the ventilation hose No. 2.



4. REMOVE VENTILATION HOSE

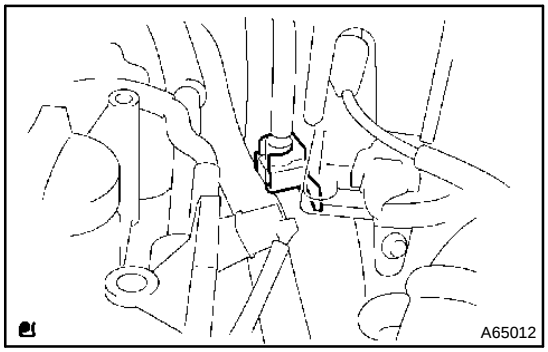
(a) Remove the ventilation hose.



5. DISCONNECT ENGINE WIRE

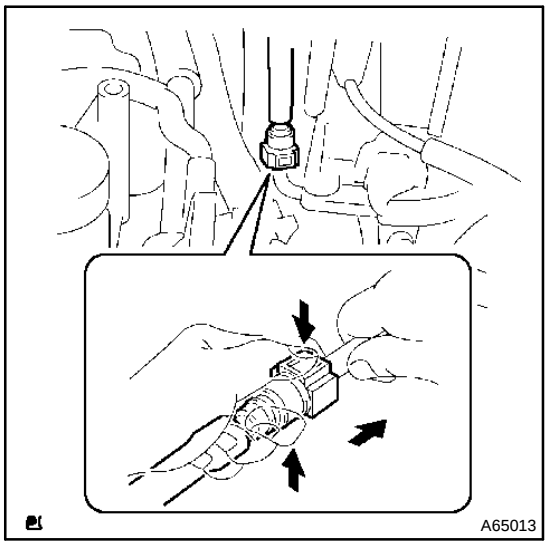
(a) Remove a bolt.
(b) Disconnect 4 fuel injector connectors.
(c) Disconnect the cam position sensor connector.

CONTINUED



6. REMOVE EFI FUEL PIPE CLAMP

(a) Remove the E. F. I. fuel pipe clamp.

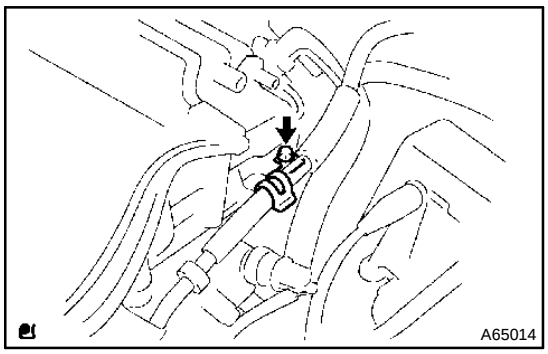


7. REMOVE FUEL TUBE SUB-ASSY

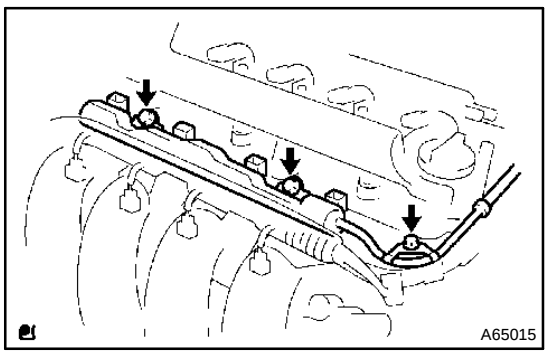
(a) Disconnect the fuel tube (fuel tube connector) from the fuel pipe.

CAUTION:

- **Perform disconnecting operations of the fuel tube connector (quick type) after observing the precautions.**
- **As there is retained pressure in the fuel pipe line, prevent it from splashing inside the engine compartment.**



(b) Remove a bolt and clamp.



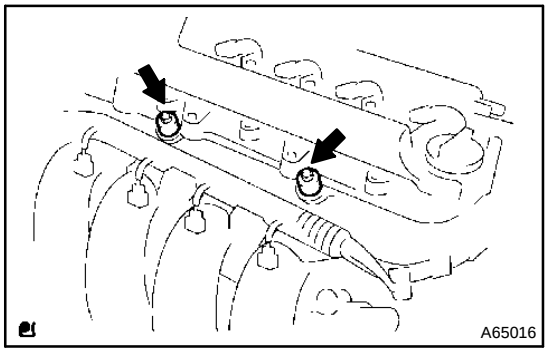
8. REMOVE FUEL DELIVERY PIPE SUB-ASSY

(a) Remove 3 bolts and fuel delivery pipe together with 4 fuel injectors and fuel tube.

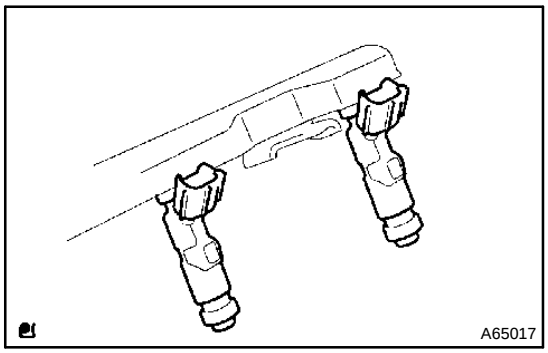
NOTICE:

Be careful not to drop the fuel injectors when removing the fuel delivery pipe.

CONTINUED

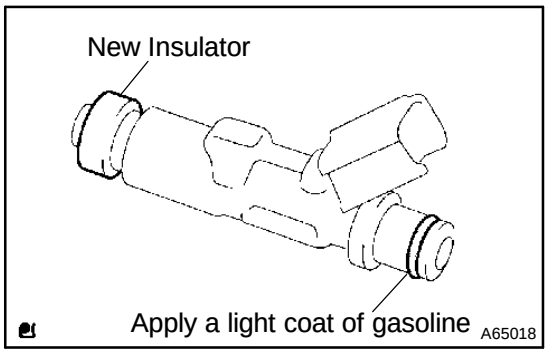


(b) Remove 2 spacers from the cylinder head.



9. REMOVE FUEL INJECTOR ASSY

(a) Pull out 4 fuel injectors from the fuel delivery pipe.



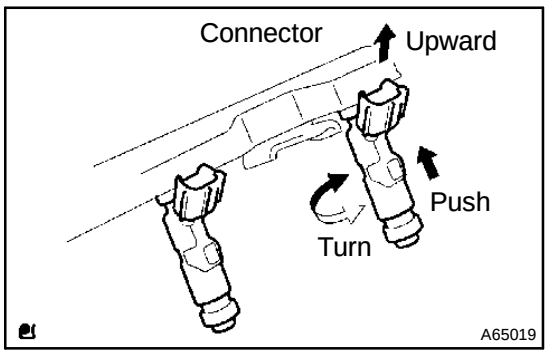
10. INSTALL FUEL INJECTOR ASSY

(a) Install a new insulator to the each fuel injector.

(b) Apply a light coat of spindle oil or gasoline to a new O-ring, and install it to the each fuel injector.

NOTICE:

Never use the engine oil, gear oil or brake oil.



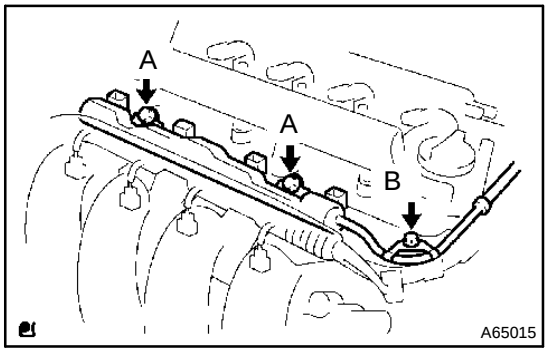
(c) Apply a light coat of spindle oil or gasoline on the place where the fuel delivery pipe touches on the O-ring.

(d) While turning the fuel injector clockwise and counter-clockwise, and push it to the fuel delivery pipe.

NOTICE:

- **Be careful not twist the O-ring.**
- **After installing the fuel injectors, check that they turns smoothly. If the fuel injector does not, reinstall it with a new O-ring.**

CONTINUED



11. INSTALL FUEL DELIVERY PIPE SUB–ASSY

(a) Install 2 spacers to the cylinder head.

(b) Install the fuel delivery pipe together with 4 fuel injectors and fuel tube with 3 bolts.

Torque:
Bolt A 29 N·m (296 kgf·cm, 21 ft·lbf)
Bolt B 9.0 N·m (92 kgf·cm, 80 in.·lbf)

NOTICE:

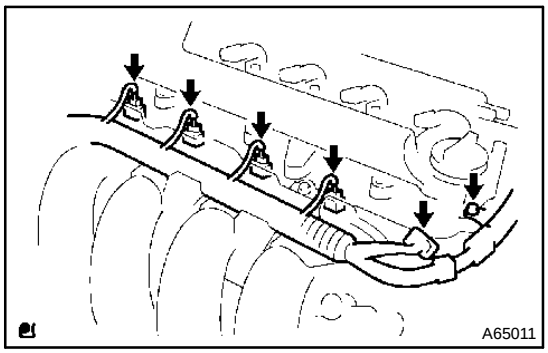
- **Be careful not drop the fuel injectors when installing the fuel delivery pipe.**
- **Check that the fuel injectors ratate smoothly after installing the fuel delivery pipe.**

(c) Install the clamp with a bolt.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

(d) Connect the fuel tube (fuel tube connector) to the fuel pipe.

CAUTION:
Perform connecting operations of the connector (quick type) after observing the precautions.



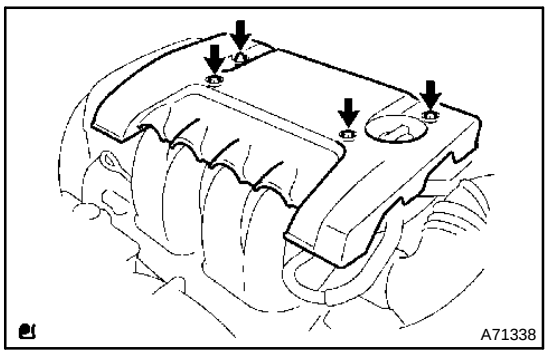
12. INSTALL ENGINE WIRE

(a) Connect the composition sensor connector.

(b) Connect 4 fuel injector connectors.

(c) Install a bolt.

Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)



13. INSTALL CYLINDER HEAD COVER NO.2

(a) Install the cylinder head cover with 3 bolts and a nut.

Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

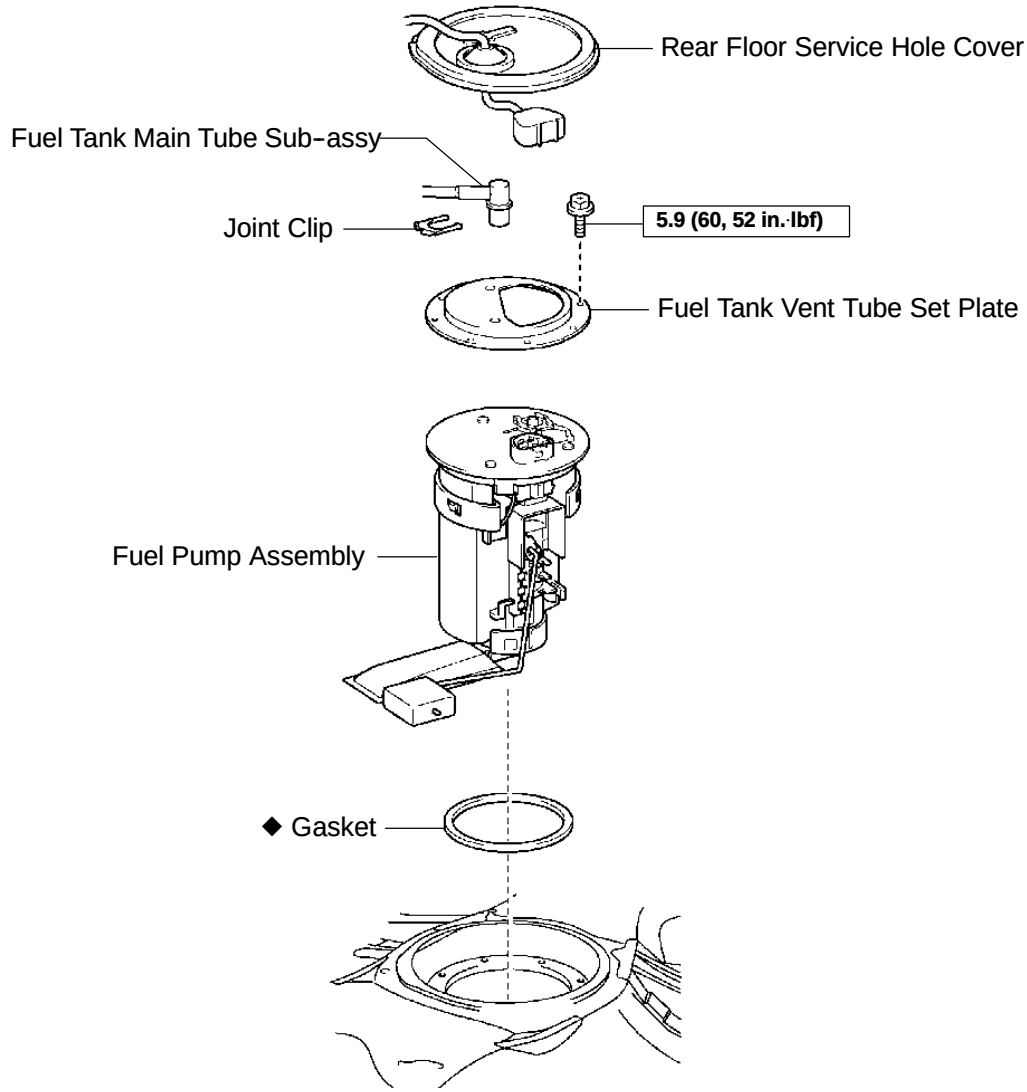
14. INSPECT FUEL PUMP OPERATION AND CHECK FOR FUEL LEAKS **(See page 11–1)**

CONTINUED

FUEL PUMP ASSY (2ZZ-GE)

COMPONENTS

110HP-01

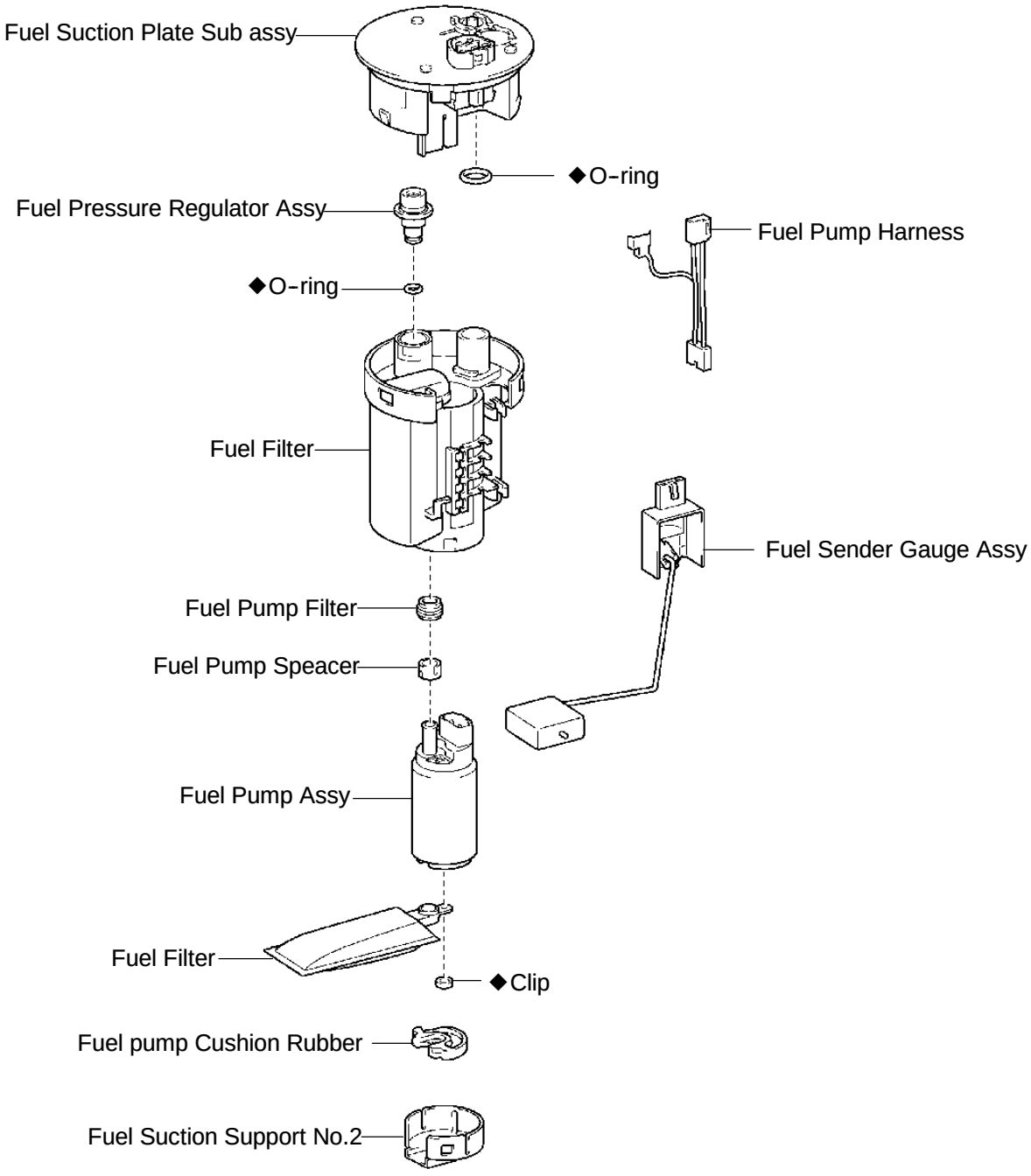


N·m (kgf·cm, ft·lbf) : Specified torque

O ◆ Non-reusable part

A69994

CONTINUED



O ◆ Non-reusable part

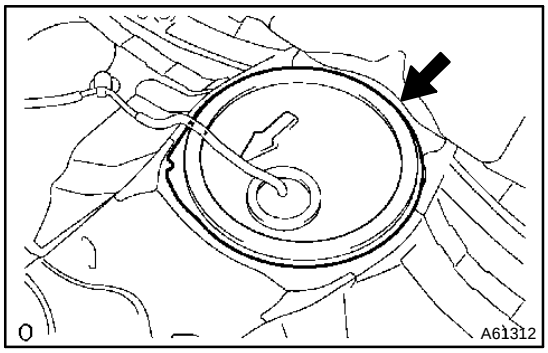
A70080

110HQ-01

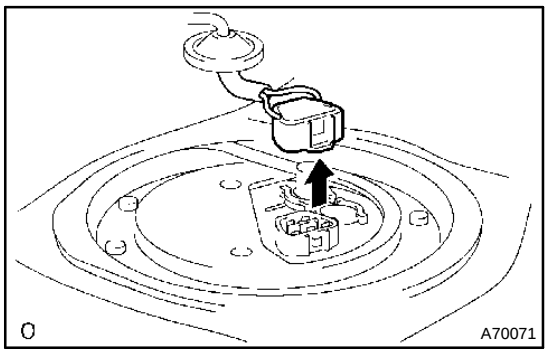
Removal & Installation and Disassembly & Reassembly

1. REMOVE SEPARATE TYPE REAR SEAT CUSHION ASSY

(a) Rempve the rear floor service hole cover.



2. REMOVE REAR FLOOR SERVICE HOLE COVER

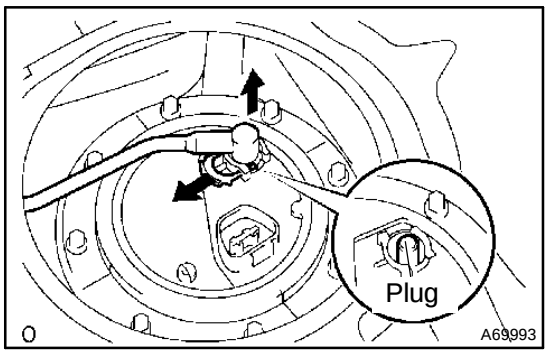


3. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT

(a) Disconnect the fuel pump connector.

(b) Start the engine.

(c) After the engine has stopped on the its own, turn the ignition switch to lock.

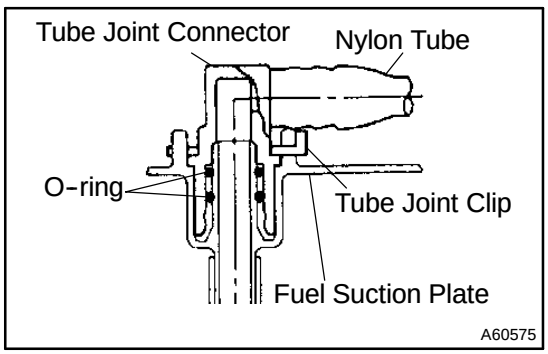


4. DISCONNECT FUEL TANK MAIN TUBE SUB-ASSY

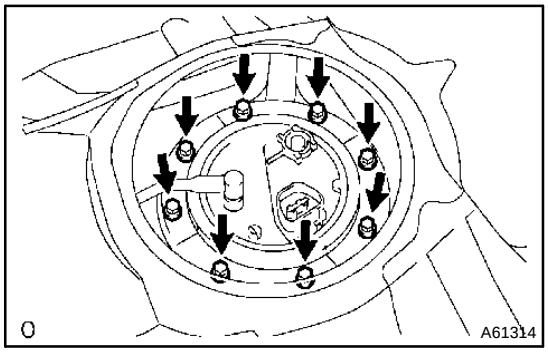
(a) Remove the tube joint clip, and pull out the fuel tank main tube.

NOTICE:

- **Check if there is any dirt like mud around the connector before this work and clean dirt away.**
- **Be careful of dirt like mud because the quickconnector has an O-ring to seal the pipe and the connector.**
- **Do not use any tool in this work.**
- **Do not bend or twist the nylon tube by force.**
- **Keep off the plug from foreign subjects.**
- **To protect the tube, cover it with a vinyl bag after checking.**



CONTINUED



5. REMOVE FUEL TANK VENT TUBE SET PLATE

(a) Remove 8 bolts and fuel tank vent tube set plate.

6. REMOVE FUEL PUMP ASSEMBLY

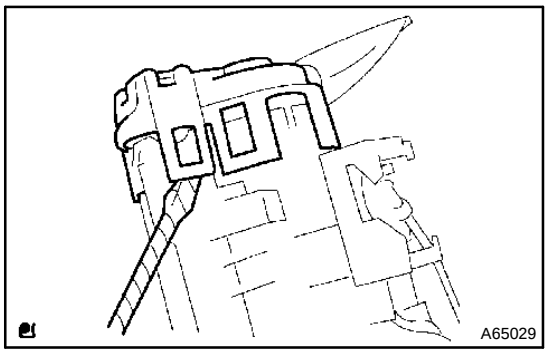
(a) Pull out the fuel pump assembly.

NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge should not bent.**

7. REMOVE FUEL SUCTION TUBE SET GASKET

(a) Remove the gasket from the fuel pump assembly.



8. REMOVE FUEL SUCTION SUPPORT NO.2

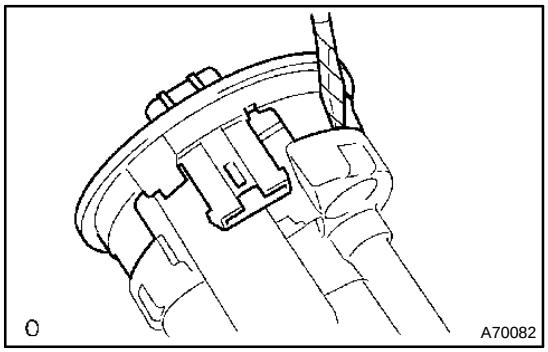
(a) Using a screwdriver, disconnect 4 snap claws from the claw holes, and remove the fuel suction support.

NOTICE:

Be careful not to damge the fuel suction support.

9. REMOVE FUEL PUMP CUSHION RUBBER

10. REMOVE FUEL SENDER GAGE ASSY



11. REMOVE FUEL SUCTION PLATE SUB-ASSY

(a) Disconnect 2 connectors.

(b) Using 2 screwdrivers, disconnect 4 snap claws from the claw holes, and remove the fuel suction plate.

NOTICE:

Be careful not to damage the fuel suction plate.

CONTINUED

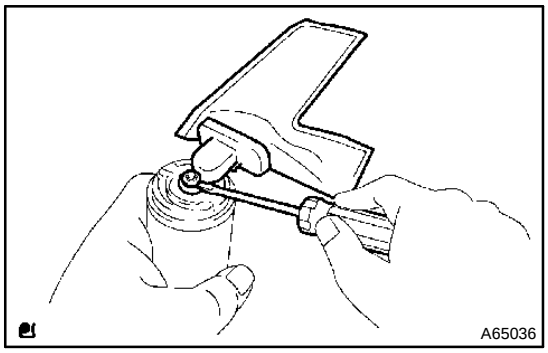
12. REMOVE FUEL PUMP HARNESS

13. REMOVE FUEL PRESSURE REGULATOR ASSY

(a) Pull out the fuel pressure regulator from the filter.

14. REMOVE FUEL PUMP ASSY

(a) Pull out the fuel pump from the filter.



15. REMOVE FUEL PUMP FILTER

(a) Using a small screwdriver, pry out the clip.

(b) Pull out the fuel pump filter from the fuel pump.

16. REMOVE FUEL PUMP SPACER

17. REMOVE FUEL PUMP FILTER SEAL

18. INSTALL FUEL PUMP FILTER

(a) Install the fuel pump filter with a new clip.

19. INSTALL FUEL PUMP ASSY

(a) Apply gasoline to the fuel pump filter seal.

(b) Install the fuel pump to the filter.

20. INSTALL FUEL PRESSURE REGULATOR ASSY

(a) Apply gasoline to a new O-ring, and install it to the fuel pressure reulator.

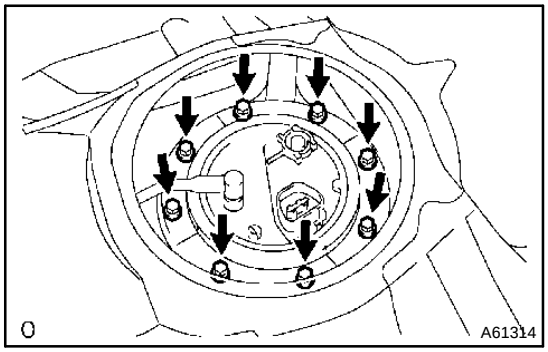
(b) Install the fuel pressure regulator to the filter.

21. INSTALL FUEL SUCTION TUBE SET GASKET

22. INSTALL FUEL PUMP ASSEMBLY

(a) Install a new gasket to the fuel pump assmbly.

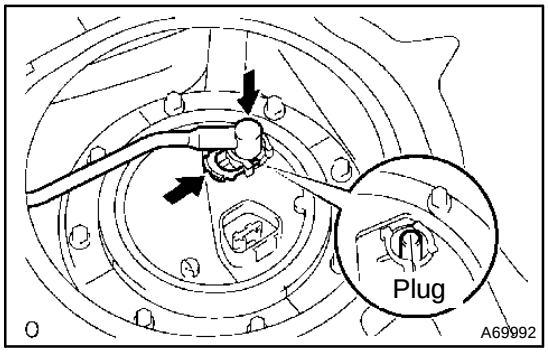
(b) Install the fuel pump assembly to the fuel tank.



23. INSTALL FUEL TANK VENT TUBE SET PLATE

(a) Install the fuel tank vent tube set plate with 8 bolts.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)

CONTINUED



24. CONNECT FUEL TANK MAIN TUBE SUB–ASSY

(a) Connect the fuel tank main tube with the tube joint clip.

NOTICE:

- **Check that there is no scratch or foreign objects on the connecting parts.**
- **Check that the connector is inserted fully and securely.**
- **Check that the clip of the tube joint is on the collor of the connector.**
- **After installing the tube joint clip, check that the connector is not pulled off.**

25. CHECK FUEL LEAK

26. INSTALL REAR FLOOR SERVICE HOLE COVER

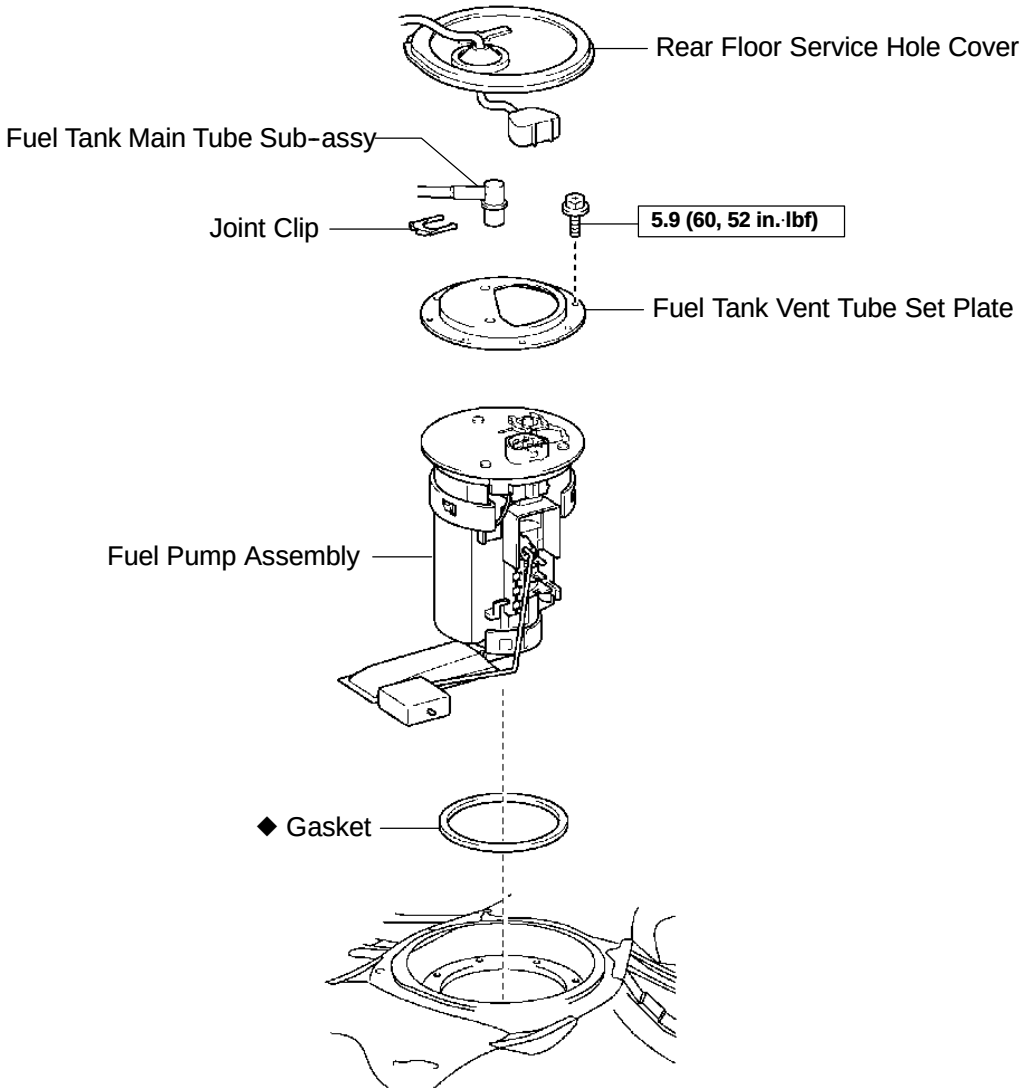
(a) Using butyl tape, install the rear floor service hole cover.

CONTINUED

FUEL TANK ASSY (2ZZ-GE)

COMPONENTS

110HR-01

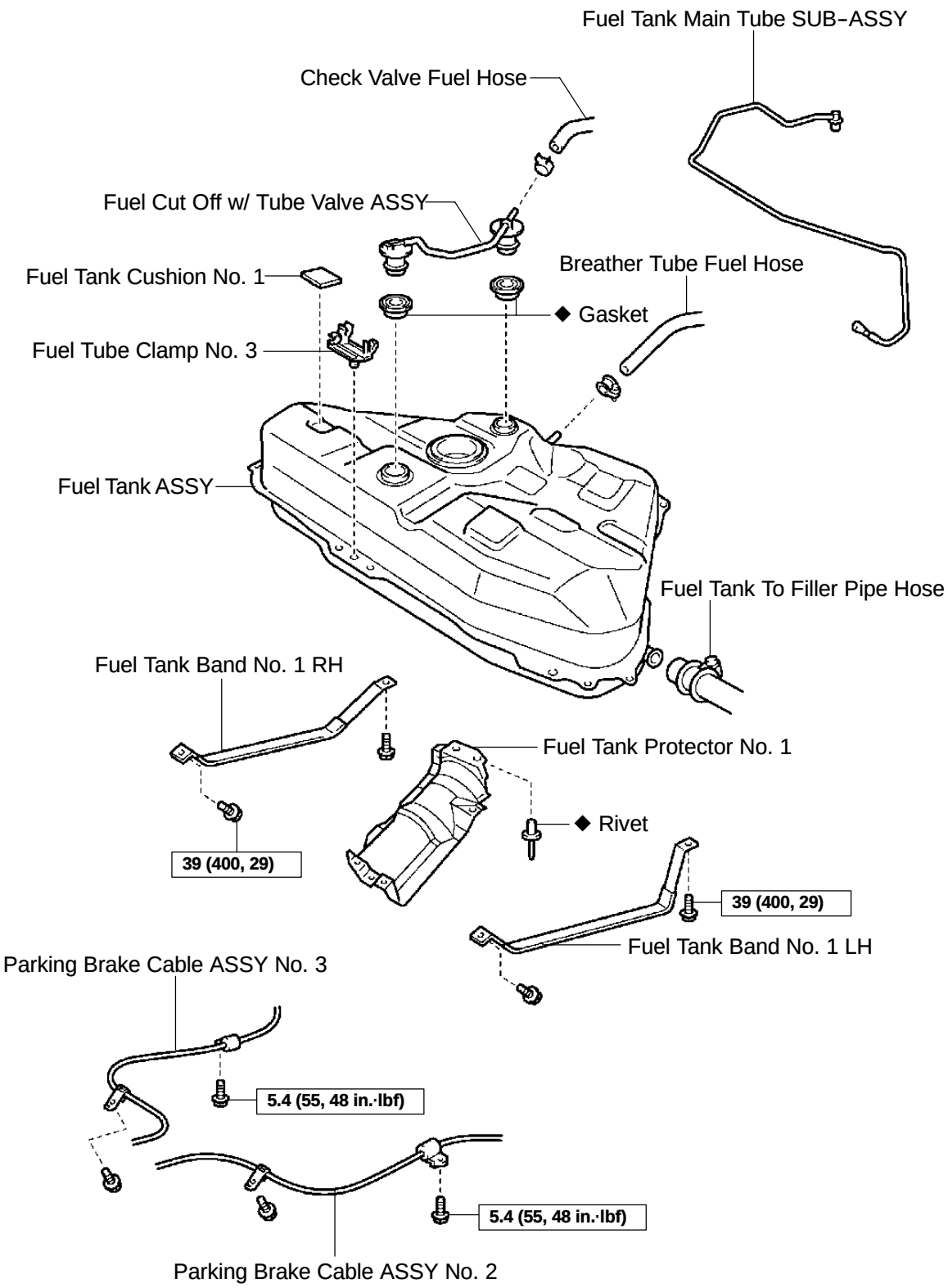


N·m (kgf·cm, ft·lbf) : Specified torque

O ◆ Non-reusable part

A69994

CONTINUED

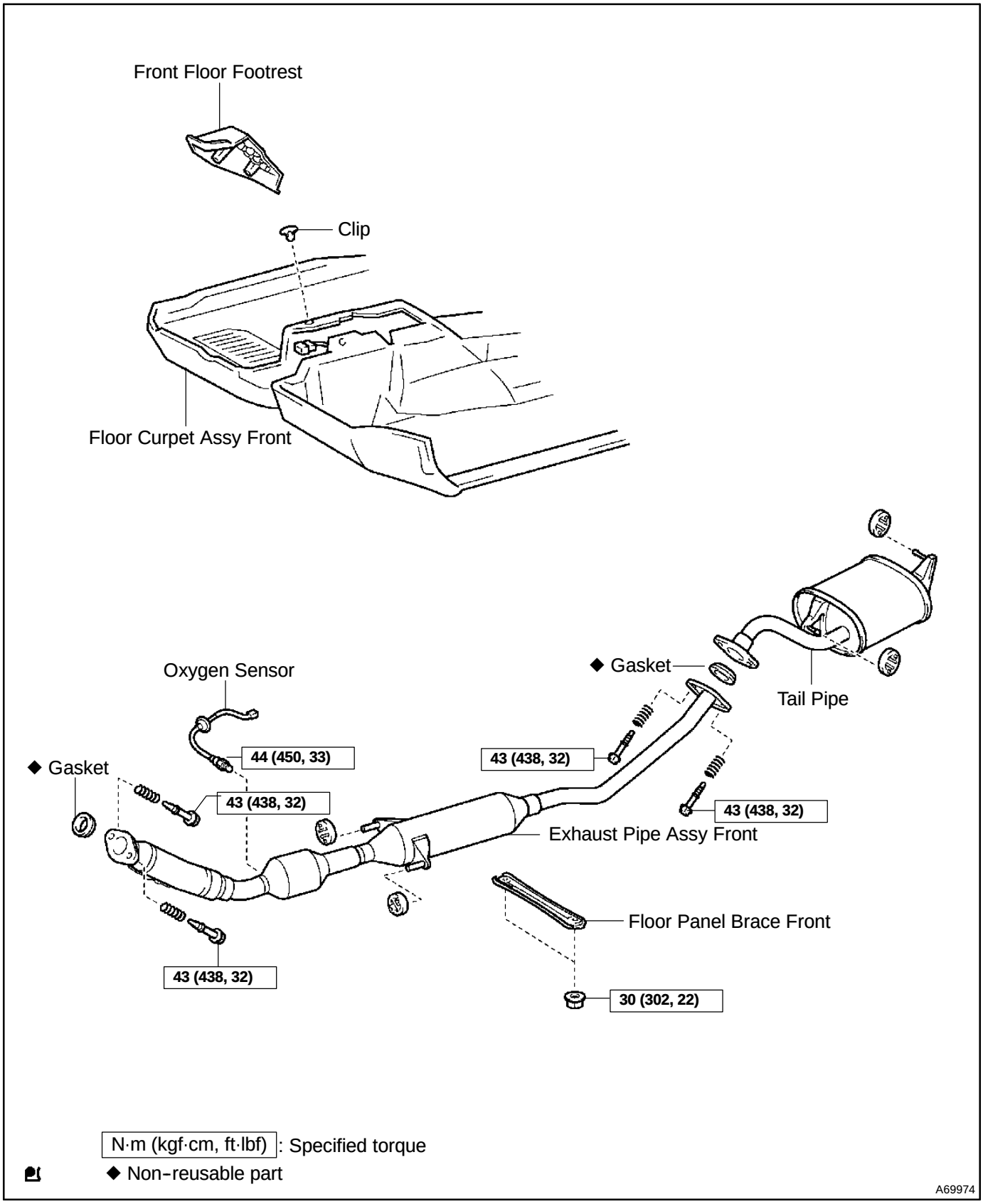


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

A69973

CONTINUED

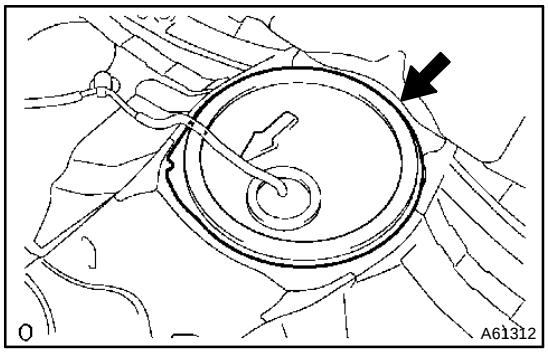

Front Floor Footrest
Clip
Floor Curpet Assy Front
Oxygen Sensor
◆ Gasket
Tail Pipe
44 (450, 33)
43 (438, 32)
◆ Gasket
43 (438, 32)
43 (438, 32)
Exhaust Pipe Assy Front
Floor Panel Brace Front
43 (438, 32)
30 (302, 22)
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A69974

CONTINUED

110HS-01

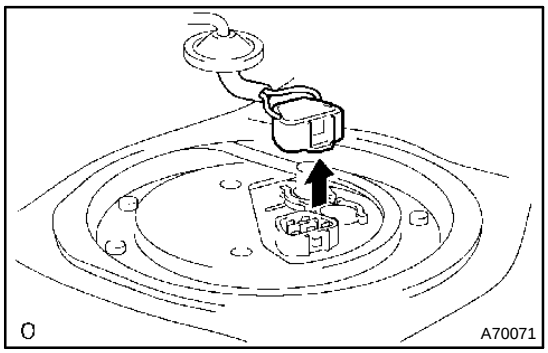
Removal & Installation and Disassembly & Reassembly

1. REMOVE REAR SEAT CUSHION ASSEMBLY



2. REMOVE REAR FLOOR SERVICE HOLE COVER

(a) Remove the rear service hole cover.

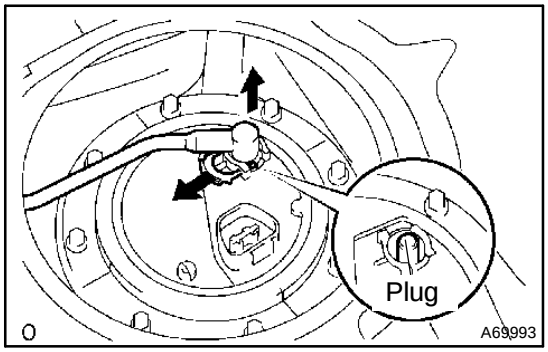


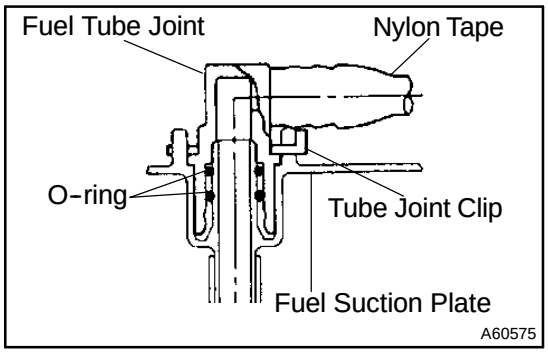
(b) Disconnect the fuel pump cpnnector.

3. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT

(a) Start the engine.

(b) After the engine has stopped on the its own, turn the ignition switch to lock.





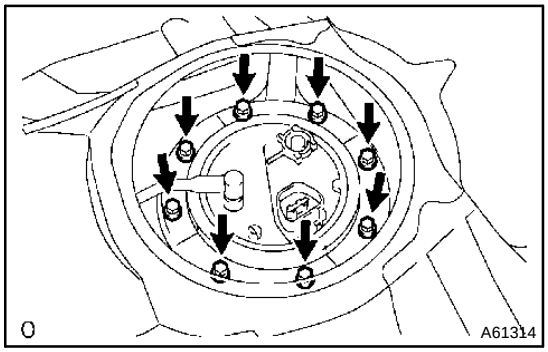
4. DISCONNECT FUEL TANK MAIN TUBE SUB-ASSY

(a) Remove the tube joint clip, and put out the fuel tank main tube.

NOTICE:

- **Check if there is any dirt like mud around the fuel tube joint before this work and clean dirt away.**
- **Be careful joint has the O-ring to seal the fuel tube connector and fuel suction plate.**
- **Do not use any tool in this work.**
- **Do not bend or twist the nylon tube by force.**
- **After disconnecting, cover the fuel tube joint with a vinyl bag.**
- **When the fuel tube joint and fuel suctin plate are stuck, pinch the fuel tank main tube between fingers, and turn it carefully to free and then disconnect the fuel tank main tube.**

CONTINUED



5. REMOVE FUEL TANK VENT TUBE SET PLATE

(a) Remove 8 bolts and the fuel tank vent tube set plate.

6. REMOVE FUEL PUMP ASSEMBLY

(a) Pull out the fuel pump assembly.

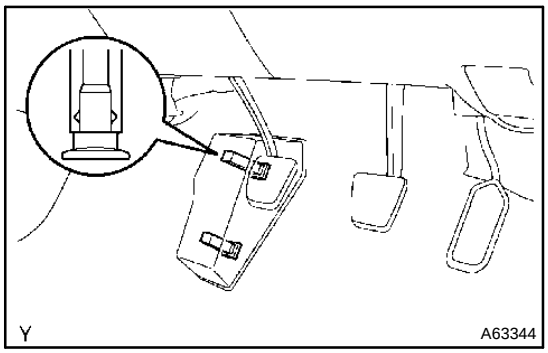
NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the fuel sendergauge should not bent.**

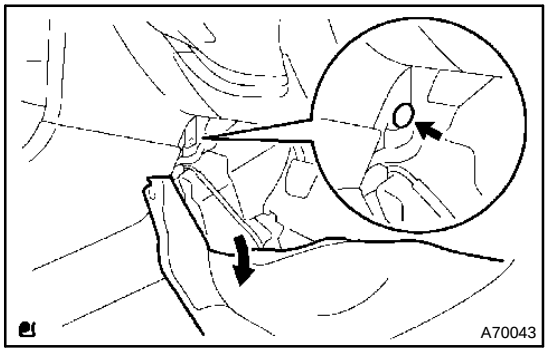
7. REMOVE FUEL SUCTION TUBE SET GASKET

(a) Remove the gasket from the fuel pump assembly.

8. DRAIN FUEL



9. REMOVE FRONT FLOOR FOOTREST



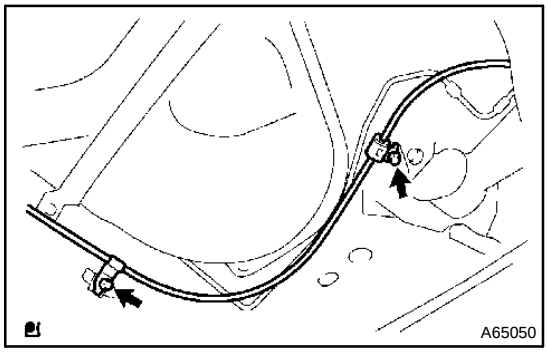
10. DISCONNECT OXYGEN SENSOR

(a) Disconnect the oxygen sensor connector as shown in the illustration.

11. REMOVE FLOOR PANEL BRACE FRONT **(See page 15-2)**

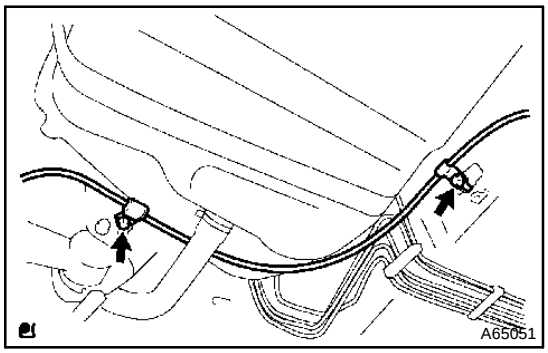
12. REMOVE EXHAUST PIPE ASSY **(See page 15-2)**

CONTINUED



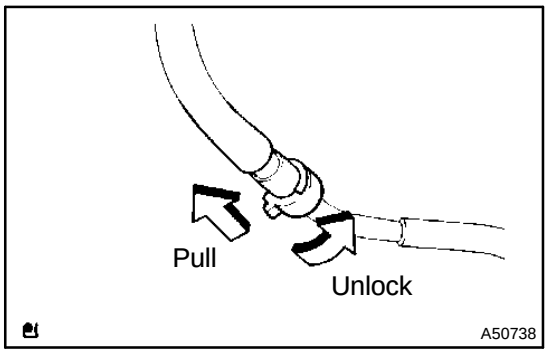
13. SEPARATE PARKING BRAKE CABLE ASSY NO.2

(a) Remove 2 installing bolts of the parking brake cable.



14. SEPARATE PARKING BRAKE CABLE ASSY NO.3

(a) Remove 2 installing bolts of the parking brake cable.

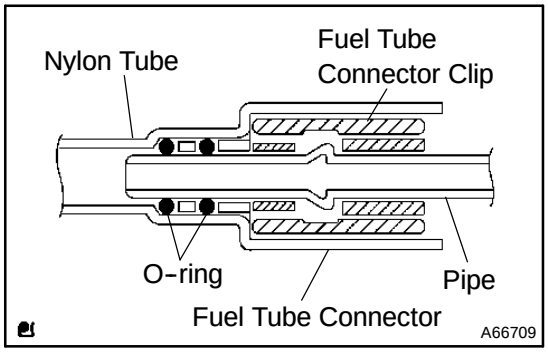


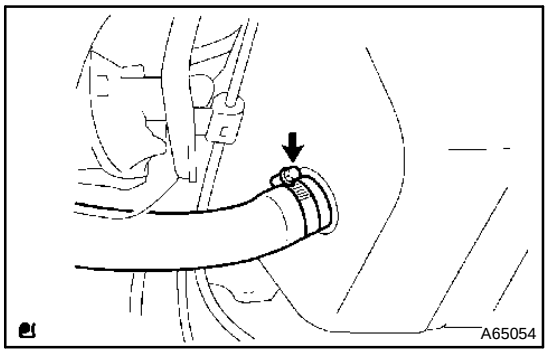
15. DISCONNECT FUEL TANK MAIN TUBE SUB-ASSY

(a) Pinch the pojections of the retainer to remove the lock claws, and pull out it as shown in the illustration.

NOTICE:

- **Check if there is any dirt like mud around the connector before this work and clean the dirt away.**
- **Be careful of dirt like mud because the quick connector has an O-ring to seal the pipe and the connector.**
- **Do not use any tool in this work.**
- **Do not bend or twist the nylon tube by force.**
- **After disconnecting the tube, cover the connector with a vinyl bag.**
- **When the connector and the pipe are stuck, pinch the tube between fingers, and turn it carefully to free and then disconnect the tube.**

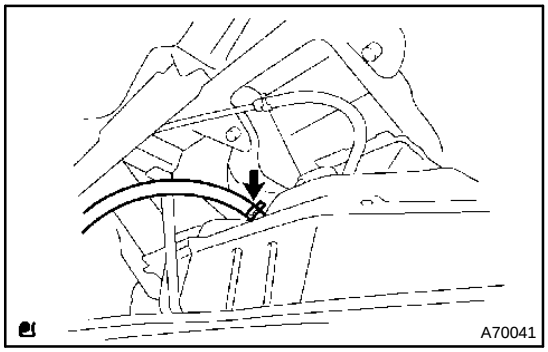




16. DISCONNECT FUEL TANK TO FILLER PIPE HOSE

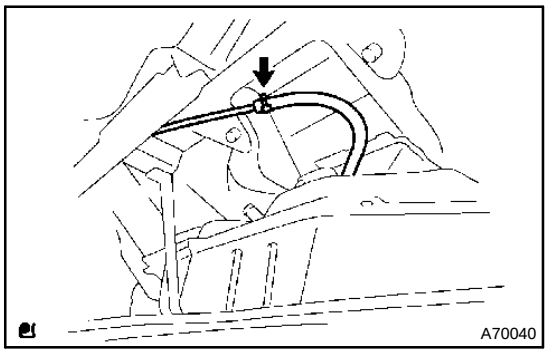
(a) Disconnect the fuel tank inlet filter pipe hose from the fuel tank.

CONTINUED



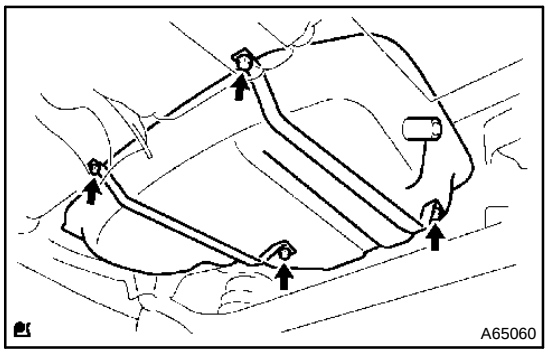
17. DISCONNECT BREATHER TUBE FUEL HOSE

(a) Disconnect the breather tube fuel hose from the fuel tank.



18. DISCONNECT CHECK VALVE FUEL HOSE

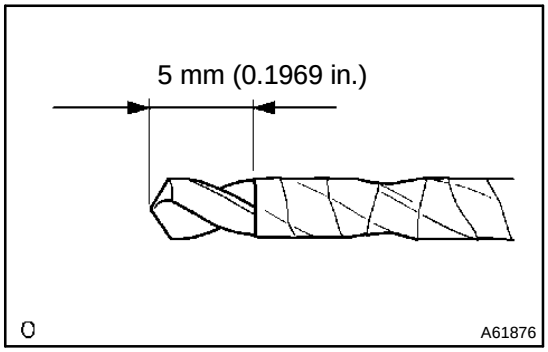
(a) Disconnect the check valve fuel hose from the fuel cut off w/tube valve.



19. REMOVE FUEL TANK ASSY

(a) Set a mission jack to the fuel tank.

(b) Remove 4 bolts, 2 fuel tank bands and fuel tank.



20. REMOVE FUEL TANK PROTECTOR NO.1

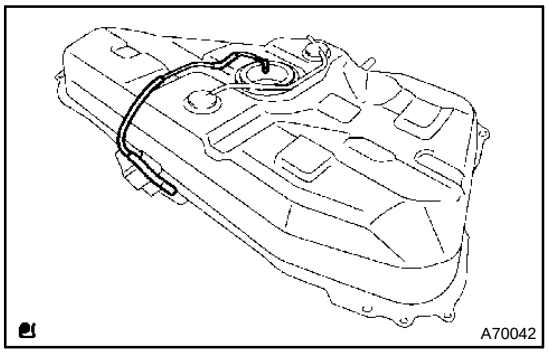
(a) Wind a strip of tape to the 5 mm (0.16969 in.) drill blade as shown in the illustration.

(b) Press the 5 mm (0.16969 in.) drill blade lightly to the rivet, and drill the flange part.

(c) Remove the rivet and the fuel tank protector.

NOTICE:

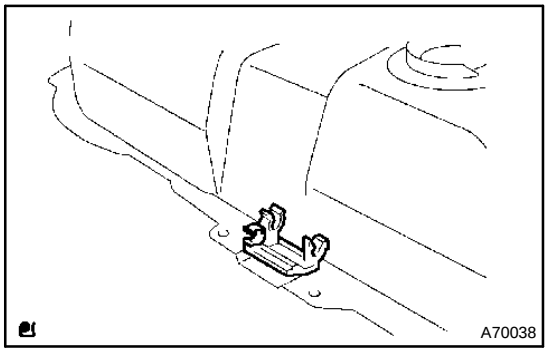
- **Do not press the drill blade strongly, the rivet rotates together.**
- **Be careful of touching the rivet. It is hot by drilling.**



21. REMOVE FUEL TANK MAIN TUBE SUB-ASSY

(a) Remove the fuel tank main tube from the fuel tube clamp and bracket.

CONTINUED

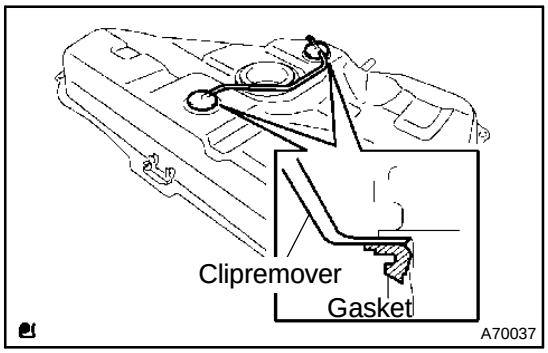


22. REMOVE FUEL TUBE CLAMP NO.3

(a) Using a screwdriver, remove the fuel tube clamp No. 3 from the fuel tank.

HINT:

Tape the screwdriver tip before use.



23. REMOVE FUEL CUT OFF W/TUBE VALVE ASSY

(a) Insert a clip remover between the fuel cut off valve and gasket.

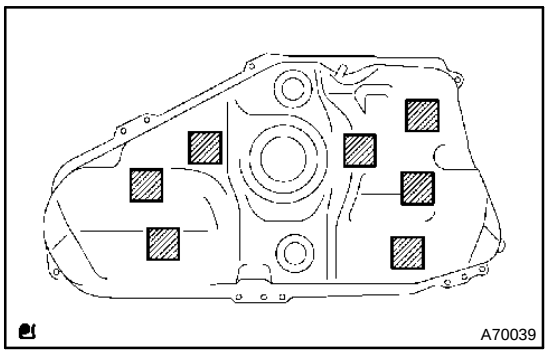
(b) Remove the fuel cut off valve by gradually pushing it up toward.

NOTICE:

- **Work accurately to maintain the sealing performance of the fuel cut off valve, since it is made from resin. It is easy to damage by removing and installing forcibly.**
- **Be sure to install the new fuel cut off valve and gasket.**

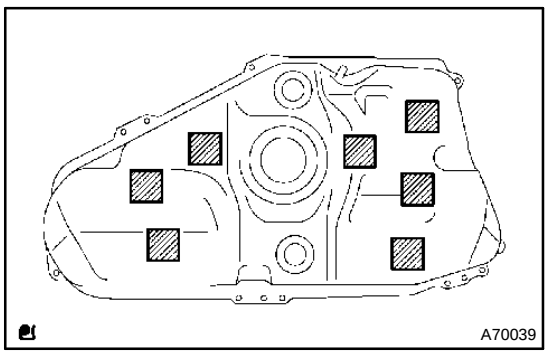
(c) Remove the fuel cut off valve w/tube.

(d) Remove 2 gaskets from the fuel tank.



24. REMOVE FUEL TANK CUSHION NO.1

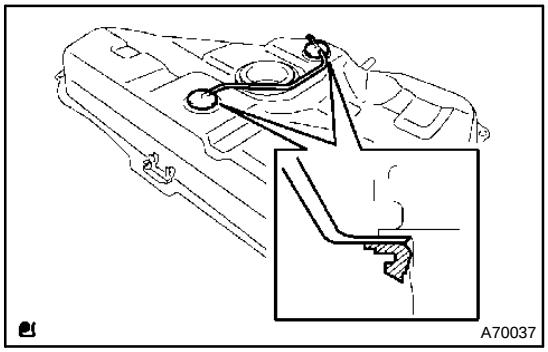
(a) Remove 7 fuel tank cushion No.1 from the fuel tank.



25. INSTALL FUEL TANK CUSHION NO.1

(a) Install 7 new fuel tank cushion No.1 as shown in the illustration.

CONTINUED



26. INSTALL FUEL CUT OFF W/TUBE VALVE ASSY

(a) Install a new gasket to the fuel tank.

(b) Apply light coat of oil around the fuel cut off valve as shown in the illustration, and inspect it into the fuel tank without force.

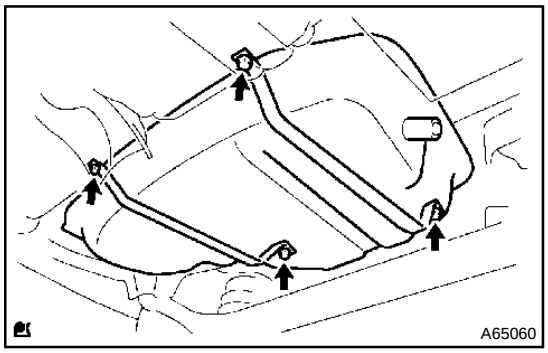
NOTICE:

Be careful not to drop the gasket into the fuel tank.

(c) Check that the fuel cut off valve is fully inserted.

27. INSTALL FUEL TANK PROTECTOR NO.1

(a) Install the fuel tank protector with the new rivets and the fuel tank band No.1.



28. INSTALL FUEL TANK ASSY

(a) Set a mission jack to the fuel tank.

(b) Install the fuel tank and 2 fuel tank bands with 4 bolts.

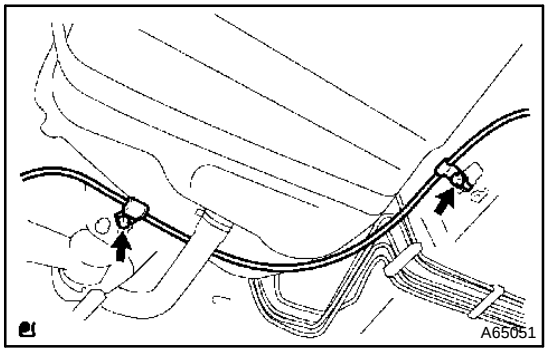
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

29. INSTALL FUEL TANK MAIN TUBE SUB-ASSY

(a) Push in the tube connector to the pipe until and install the retainer.

NOTICE:

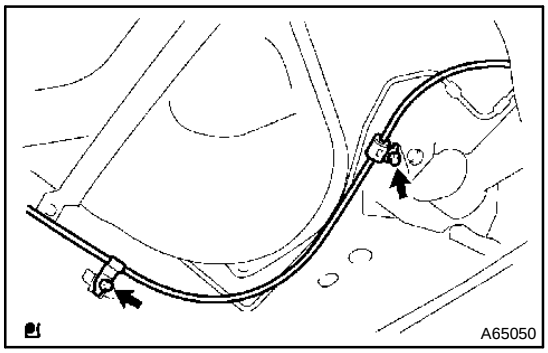
- **Check if there is any damage or foreign objects on the connected part of the pipe.**
- **After connecting, check if the pipe and the connector are securely connected by pulling them.**



30. INSTALL PARKING BRAKE CABLE ASSY NO.3

(a) Install the parking brake cable with 2 bolts.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



31. INSTALL PARKING BRAKE CABLE ASSY NO.2

(a) Install the parking brake cable with 2 bolts.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

CONTINUED

32. INSTALL EXHAUST PIPE ASSY **(See page 15-2)**

33. INSTALL FLOOR PANEL BRACE FRONT **(See page 15-2)**

34. INSTALL FUEL SUCTION TUBE SET GASKET

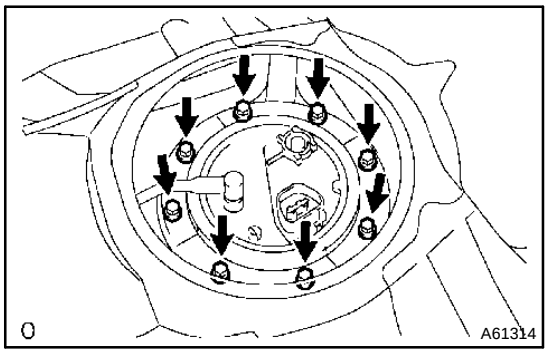
(a) Install a new gasket to the fuel pump.

35. INSTALL FUEL PUMP ASSEMBLY

(a) Install the fuel pump to the fuel tank.

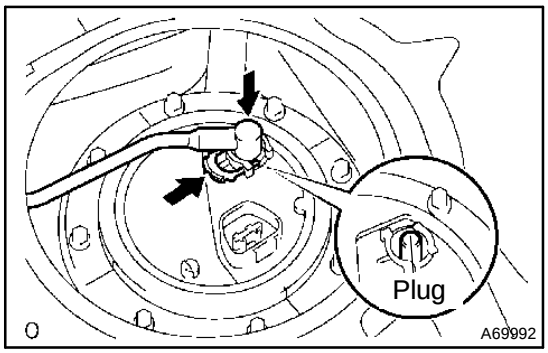
NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the fuel sendergauge should not part.**



36. INSTALL FUEL TANK VENT TUBE SET PLATE

(a) Install the fuel tank vent tube set plate with 8 bolts.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)



37. INSTALL FUEL TANK MAIN TUBE SUB-ASSY

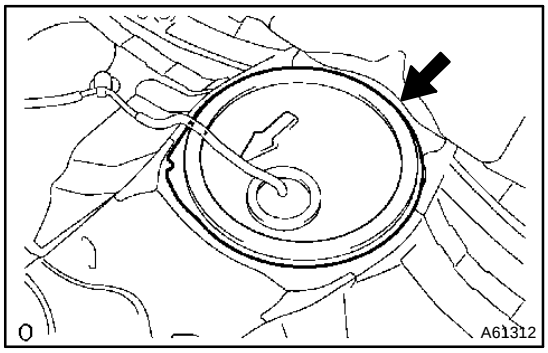
(a) Connect the fuel tank main tube with the tube joint clip.

NOTICE:

- **Check that there is no scratch of foreign objects on the connecting parts.**
- **Check that the fuel tube joint is inserted fully and securely.**
- **Check that the fuel tube joint clip is on the collar of the fuel tube joint.**
- **After installing the tube joint clip, check that the fuel tube joint is not pulled off.**

38. CHECK FUEL LEAK **(See page 11-1)**

39. CHECK EXHAUST GAS LEAK



40. INSTALL REAR FLOOR SERVICE HOLE COVER

(a) Using the butyltape, install the rear floor service hole cover.

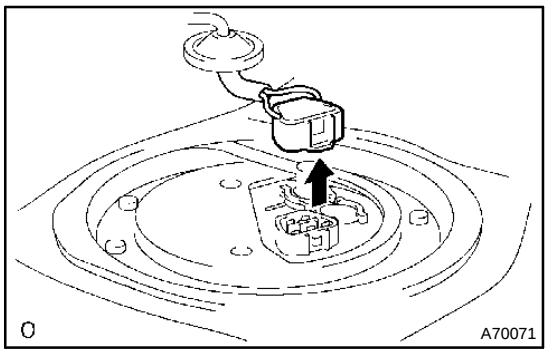
CONTINUED

FUEL SYSTEM (4ZZ-FE)

110CM-02

PRECAUTION

1. **BEFORE WORKING ON FUEL SYSTEM, DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY**
2. **DO NOT SMOKE OR WORK NEAR AN OPEN FLAME WHEN WORKING ON FUEL SYSTEM**
3. **KEEP GASOLINE AWAY FROM RUBBER OR LEATHER PARTS**



4. WORK FOR PREVENT GASOLINE FROM SPILLING OUT

(a) Disconnect the fuel pump connector.

(b) Start the engine. After the engine has stopped on its own, turn the ignition switch to lock.

(c) Disconnect negative (–) terminal cable from battery.

(d) Connect the fuel pump connector.

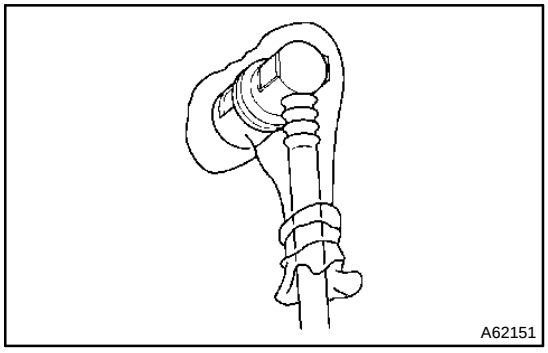
5. FUEL SYSTEM

(a) When disconnecting the high fuel pressure line, a large amount of gasoline will spill out, so observe these procedures.

(1) Work for prevent gasoline from spilling out.

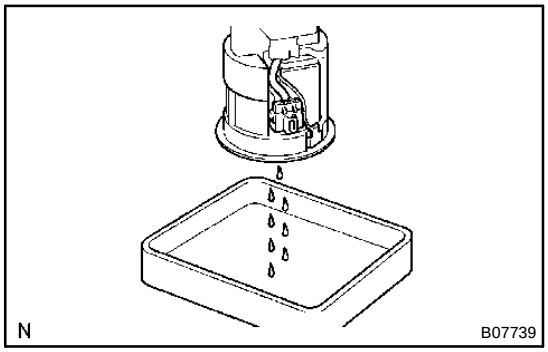
(2) Disconnect the fuel tube.

(3) Drain the fuel remained inside the fuel tube.

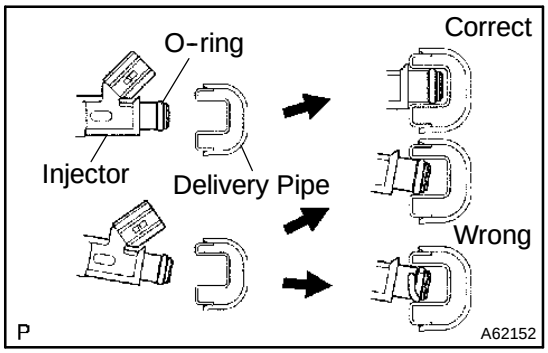


(4) Protect the disconnected fuel tube from damage and foreign material by covering it with a plastic bag.

CONTINUED



(5) Put a container under the connection.

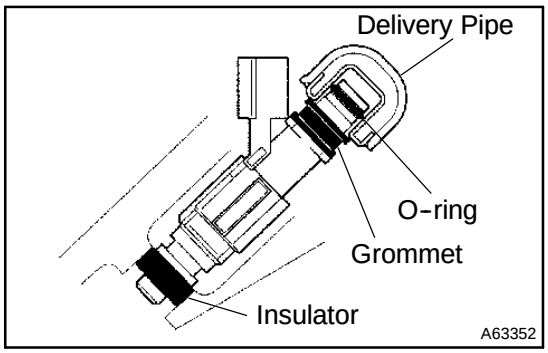


(b) Observe these precautions when removing and installing the injector.

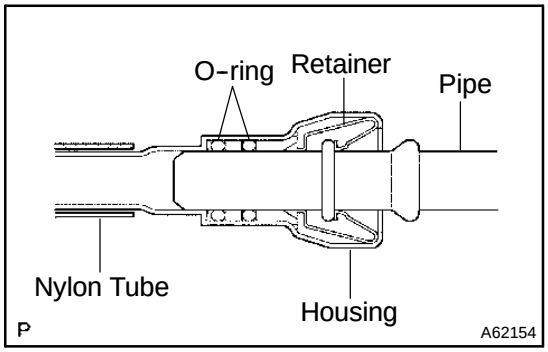
(1) Never reuse the O-ring.

(2) When placing a new O-ring on the injector, take care not to damage it in any way.

(3) Coat a new O-ring with spindle oil or gasoline before installing. Never use engine, gear or brake oil.



(c) Install the injector to the delivery pipe and cylinder head, as shown in the illustration. Before installing the injector, be sure to apply spindle oil or gasoline on the place where the delivery pipe touches O-ring of the injector.



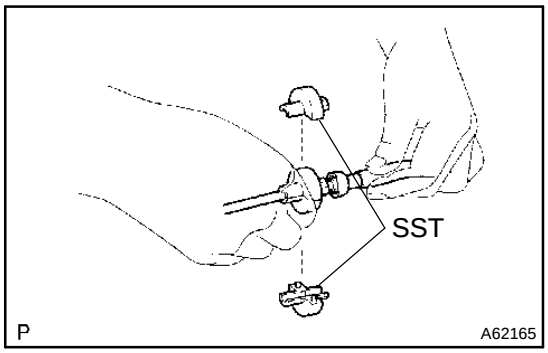
(d) Observe these precautions when disconnecting the fuel delivery pipe.

HINT:

The structure of the metallic connector is shown as left.

(1) Remove the fuel pipe clamp.

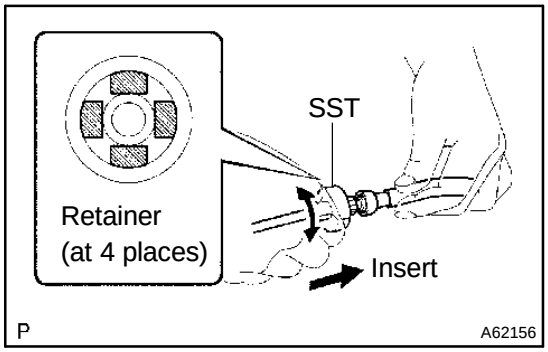
(2) Get the metallic connector of the fuel tube assembly, pull it out towards the rear and hold it as it is.



(3) Assemble SST to the connection as shown.

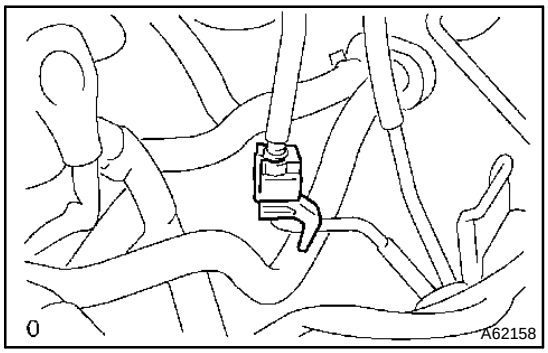
SST 09268-21010

CONTINUED



(4) Turn SST, align the retainers inside the connector with SST chamfered parts and insert SST into the connector.

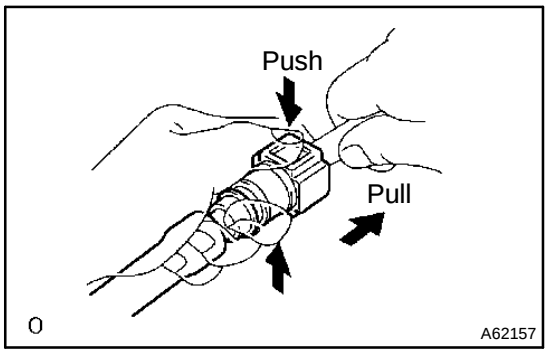
(5) Slide SST and the connector together towards the fuel tube assembly.



(e) Observe these precautions when disconnecting the fuel tube connector (quick type).

(1) Remove the fuel pipe clamp.

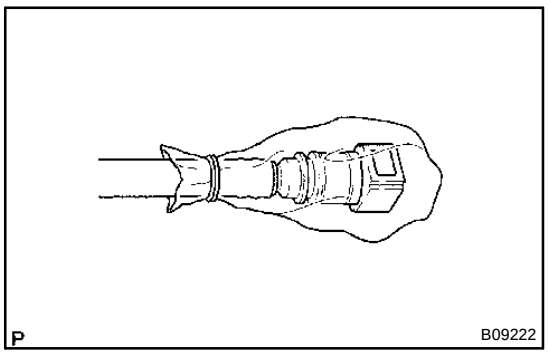
(2) Check if there is any dirt like mud on the pipe and around the connector before disconnecting them and clean the dirt away.



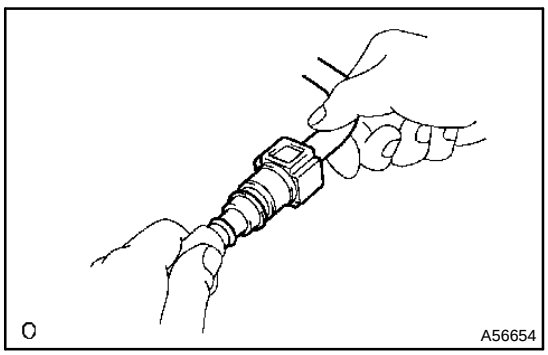
(3) Be sure to disconnect with hands.

(4) When the connector and the pipe are stuck, pinch the retainer between the hands, push and pull the connector to free to disconnect and pull it out. Do not use any tool at this time.

(5) Inspect if there is any dirt or the likes on the seal surface of the disconnected pipe and clean it away.



(6) Prevent the disconnected pipe and connector from damaging and mixing foreign objects by covering them with a vinyl bag.



(f) Observe these precautions when connecting the fuel tube connector (quick type).

(1) Match the axis of the connector with axis of the pipe, and push in the connector until retainer makes a ”click” sound. In case that the connections is tight, apply little amount of new engine oil on the tip of the pipe.

(2) After having finished the connection, check if the pipe and the connector are securely connected by pulling them.

CONTINUED

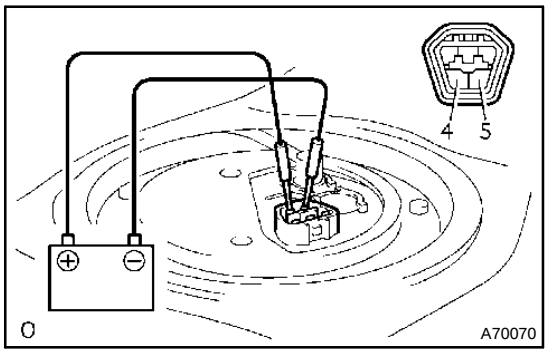
6. CHECK FUEL LEAK

(a) Check that there are no fuel leaks after doing maintenance anywhere on the fuel system.

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

(2) Turn the ignition switch ON and hand–held tester main switch ON.

(3) Select the active test mode on the hand–held tester.



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

(5) If you have no hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector.

(6) Check that there are no leaks from any part of the fuel system.

(7) Turn the ignition switch to LOCK.

(8) Disconnect the hand–held tester from the DLC3.

CONTINUED

1100G-06

ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

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

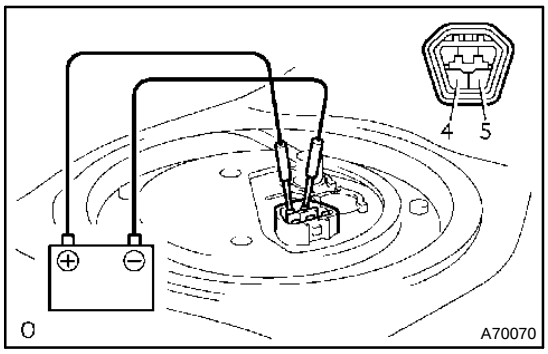
(b) Turn the ignition switch ON and hand-held tester main switch ON.

NOTICE:

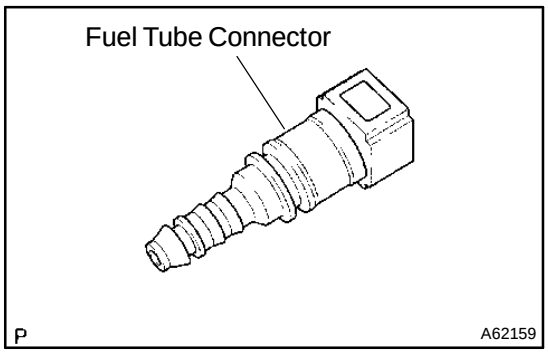
Do not start the engine.

(c) Select the active test mode on the hand-held tester.

(d) Please refer to the hand-held tester operator's manual for further details.



(e) If you have no hand-held tester, connect the positive (+) lead form the battery to terminal 4 of the connecter, and the negative (-) lead to terminal 5.



2. CHECK FUEL PRESSURE

(a) Prepare for inspection.

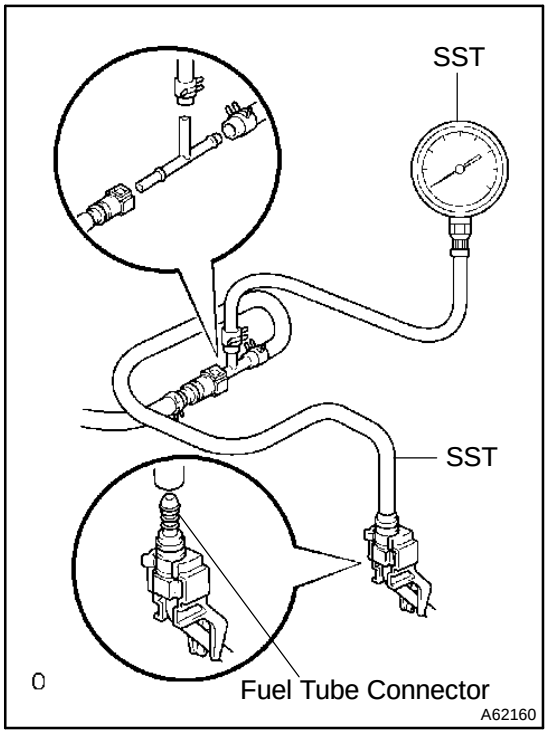
(1) Purchase the new fuel tube and take out the fuel tube connector (Part No. 23901-22140) from its pipe.

(b) Work for prevent gasoline from spilling out.

(c) Disconnect the fuel tube clamp from the fuel tube connector.

(d) Disconnect the fuel tube (fuel tube connector) from the fuel pipe.

CONTINUED



(e) Install SST (pressure gauge) as shown in the illustration by using SST and fuel tube connector.

SST 09268–41047 (90467–13001, 95336–08070), 09268–45014 (09268–41250)

(f) Wipe off any splattered gasoline.
(g) Start the engine.
(h) Measure the fuel pressure at idle.

Fuel pressure:
304 – 343 kPa (3.1 – 3.5 kgf·cm^2, 44 – 50 psi)

(i) Stop the engine.
(j) Check that the fuel pressure remains as specified for 5 minutes after the engine has stopped.

Fuel pressure:
147 kPa (1.5 kgf·cm^2, 21 psi) or more

If pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.

(k) After checking fuel pressure, disconnect the negative (–) terminal cable from the battery and carefully, remove the SST and fuel tube connector to prevent gasoline from the splashing.
(l) Reconnect the fuel tube (fuel tube connector).
(m) Install the fuel tube clamp to the fuel tube connector.
(n) Check fuel leak.

CONTINUED

INSPECTION

1. FUEL INJECTOR ASSY

SST 09268-41047 (09268-41110, 09268-41100, 95336-08070), 09842-30055

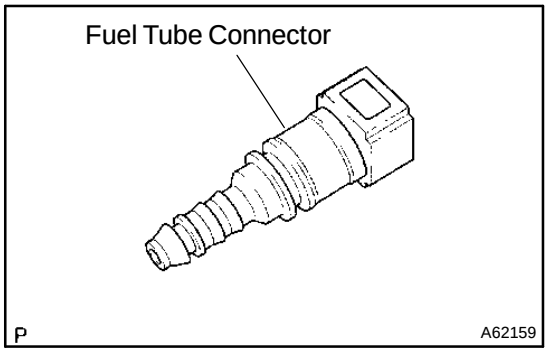
(a) Inspect injector resistance.

(1) Using an ohmmeter,measure the resistance between the terminals.

Resistance: 1.3 - 14.2 Ω at 20°C (68°F)

HINT:

If the resistance is not as specified, replace the injector.

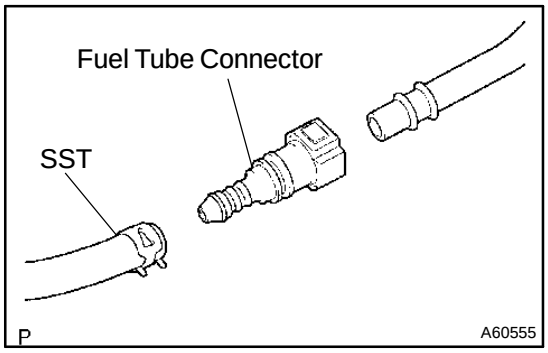


(b) Inspect injector inspection

CAUTION:

Keep injector clear of sparks during the test.

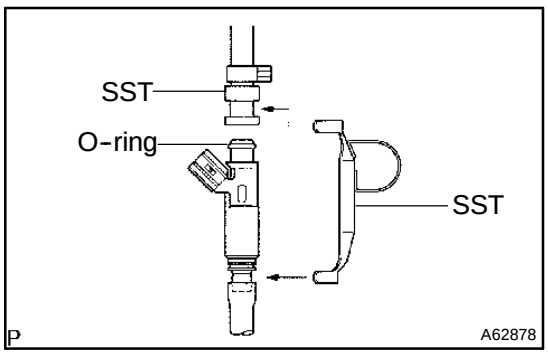
(1) Purchase the new fuel tube and take out the fuel tube connector (Part No. 23901 - 22140) from its pipe.



(2) Connect SST and fuel tube connector to the fuel pipe.

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after observing the precautions.



(3) Install the O-ring to the injector.

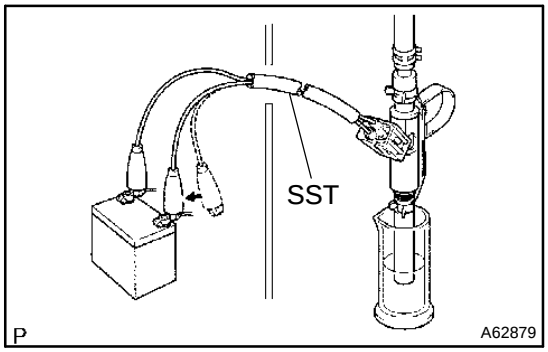
(4) Connect SST (union and hose) to the injector, and hold the injector to prevent gasoline from splashing out.

(5) Put the injector into a graduated cylinder.

HINT:

Install a suitable vinyl tube onto the injector to prevent gasoline from splashing out.

CONTINUED



(6) Connect SST to the connector of injector.

(7) Connect SST to the battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 time.

Injection volume:
39 – 53 cm^3 (2.4 – 3.2 cu in.) per 15 seconds
Difference between each injector:
14 cm^3 (0.9 cu in.) or less

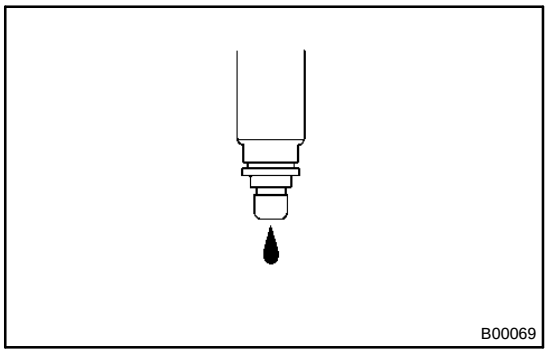
HINT:

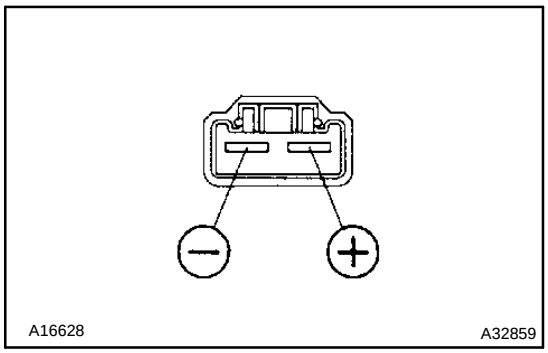
If the injection volume is not as specified, replace the injector.

(c) Inspect leakage

(1) In the condition above, disconnect the test probes of SST from the battery and check the fuel leakage from the injector.

Fuel drop: 1 drop or less per 5 minutes





2. FUEL PUMP ASSY

(a) Insect fuel pump resistance.

(1) Using an ohmmeter, measure the resistance between terminals.

Resistance: 0.2 – 3.0 Ω at 20°C (68°F)

(b) Inspect fuel pump operation

(1) Apply battery voltage to both terminals. Check that the pump operates.

NOTICE:

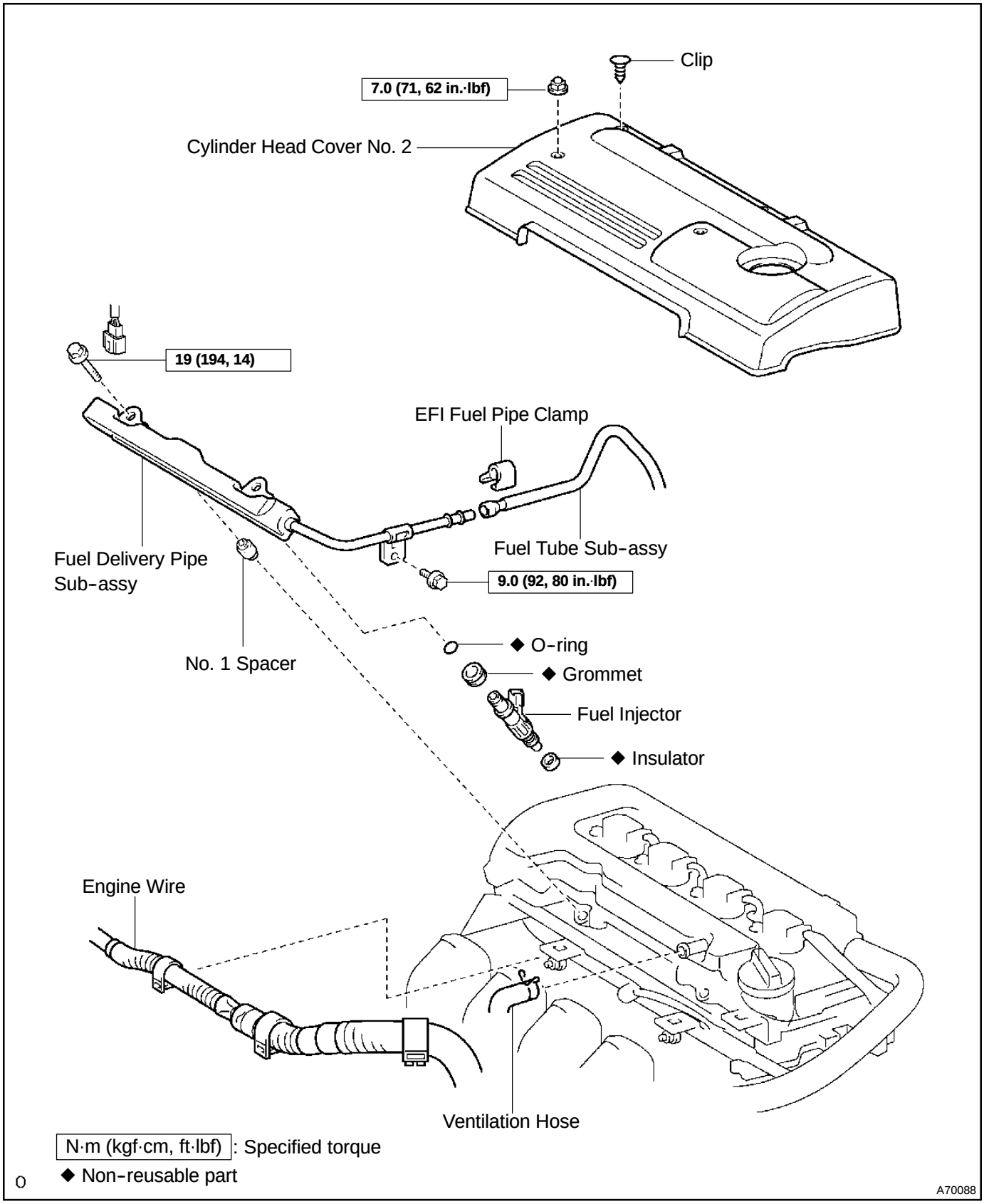
- **These tests must be done quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep fuel pump as far away from the battery as possible.**
- **Always do the switching at the battery side.**

CONTINUED

FUEL INJECTOR ASSY (4ZZ-FE)

COMPONENTS

110CN-02



CONTINUED

REPLACEMENT

1. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT**(See page 11-30)**

2. REMOVE CYLINDER HEAD COVER NO.2

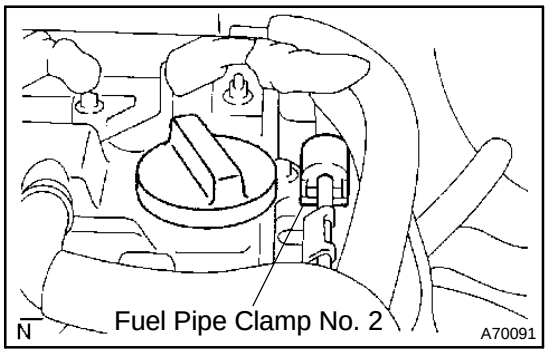
(a) Remove the 2 nuts, 2 clips and cylinder head cover.

3. DISCONNECT VENTILATION HOSE

(a) Disconnect the ventilation hose from the cylinder head cover.

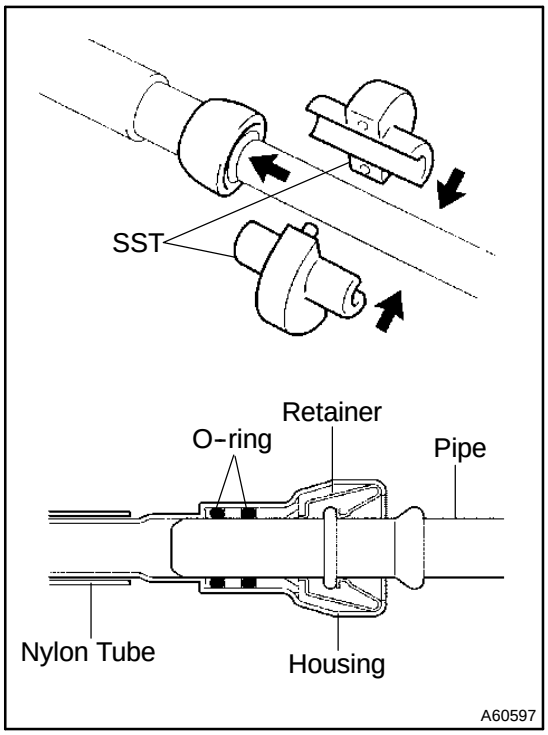
4. DISCONNECT ENGINE WIRE

(a) Remove the 3 wire harness clamps from the clamp brackets.



5. REMOVE EFI FUEL PIPE CLAMP

(a) Remove the fuel pipe clamp No. 2.



6. DISCONNECT FUEL TUBE SUB-ASSY

(a) Using the SST, separate the fuel tube.

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NOTICE:

- **Check if there is any dirt mud on the pipe and around the connector before disconnecting them and clean the dirt away.**
- **Do not bent, fold and rotate the nylon tube.**
- **When the connector and the pipe are stuck, push and pull the connector to free to disconnect and pull it out.**
- **Prevent the disconnected pipe and connector from damaging and mixing foreign objects by covering them with a vinyl bag.**

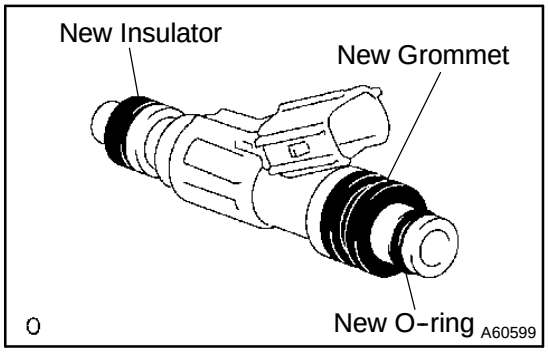
7. REMOVE FUEL DELIVERY PIPE SUB-ASSY

(a) Remove the 3 bolts and fuel delivery pipe with injector.

8. REMOVE FUEL INJECTOR ASSY

(a) Pull out the 4 fuel injectors from the fuel delivery pipe.

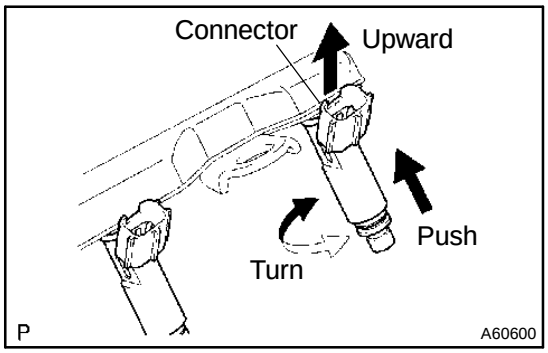
CONTINUED



9. INSTALL FUEL INJECTOR ASSY

(a) Install the new insulator and grommet to each injector.

(b) Apply a light coat of gasoline to the new O-ring and install it to each injector.

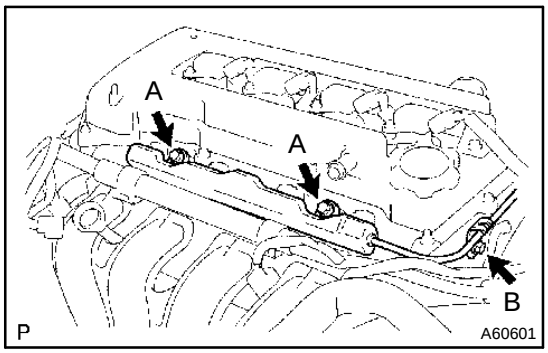


(c) Apply a light coat of gasoline on the place where the fuel delivery pipe touches on O-ring.

(d) While turning the injector clockwise and counterclockwise, push it to the fuel delivery pipe.

NOTICE:

- **Be careful not twist the O-ring.**
- **After installing the fuel injectors,Check that they turns smoothly. If a fuel injector does not, reinstall it with a new O-ring.**



10. INSTALL FUEL DELIVERY PIPE SUB-ASSY

(a) Install the 2 spacers to the cylinder head.

(b) Install the fuel delivery pipe with the fuel injector.

Torque:
Bolt A 19 N·m (194kgf·cm, 14 ft·lbf)
Bolt B 9.0 N·m (92 kgf·cm, 80 in.·lbf)

NOTICE:

- **Be careful not drop the fuel injectors when installing the fuel delivery pipe.**
- **Check that the fuel injectors rotate smoothly after installing the fuel delivery pipe.**

11. INSTALL CYLINDER HEAD COVER NO.2

(a) Install the cylinder head cover with the 2 nuts and 2 clips.
Torque: 7.0 N·m (71kgf·cm, 62 in.·lbf)

12. CHECK FUEL LEAK**(See page 11-30)**

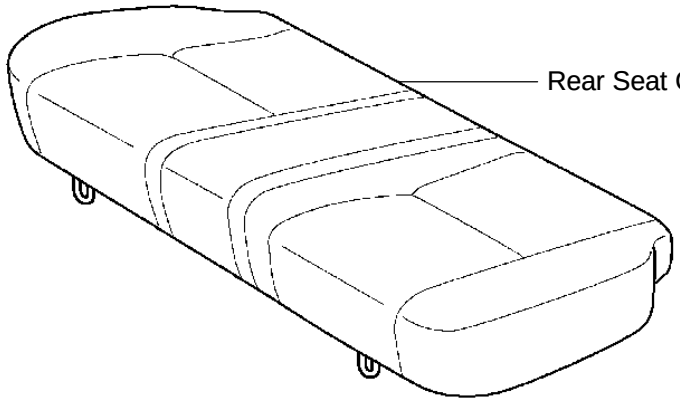
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FUEL PUMP ASSY (4ZZ-FE)

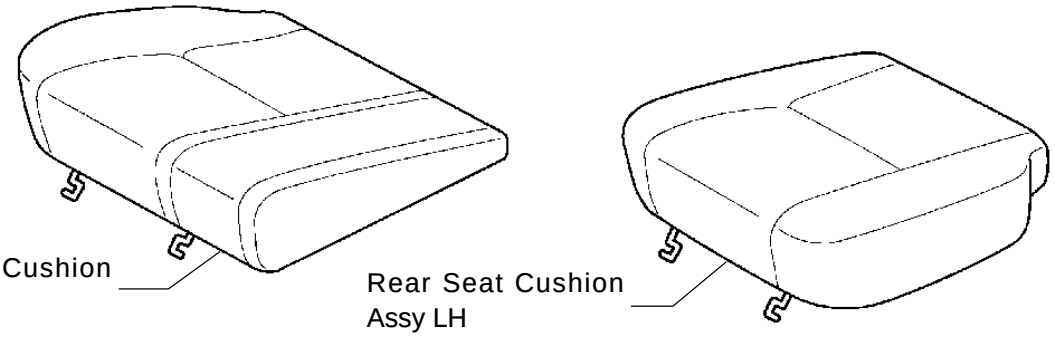
COMPONENTS

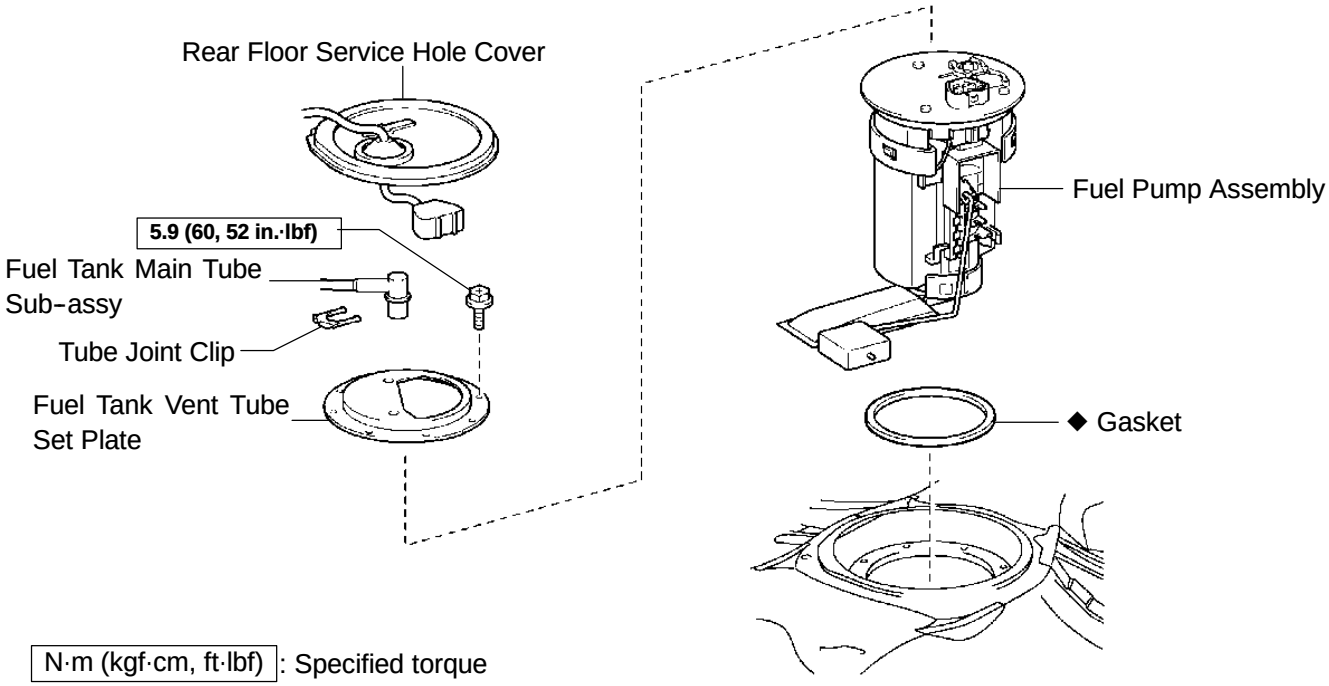
110HT-01

SEDAN :



HATCH BACK :



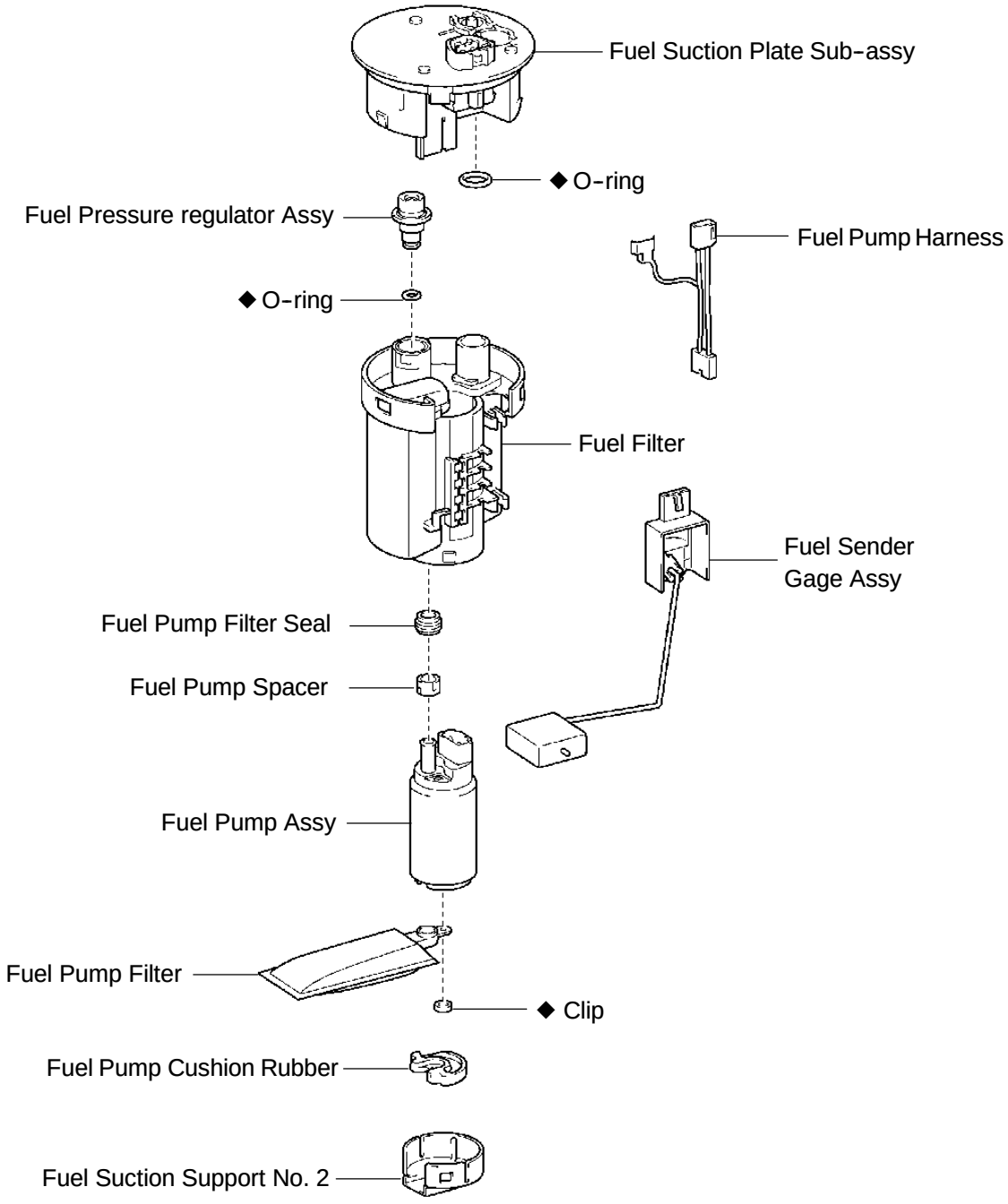


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

A70072

CONTINUED



◆ Non-reusable part

A70080

CONTINUED

110HU-01

Removal & Installation and Disassembly & Reassembly

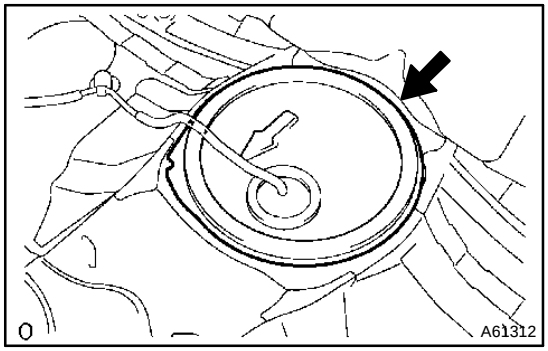
1. REMOVE REAR SEAT CUSHION ASSEMBLY (SEDAN BODY TYPE)

2. REMOVE REAR SEAT CUSHION ASSY LH (5 DOOR HATCH BACK BODY TYPE)

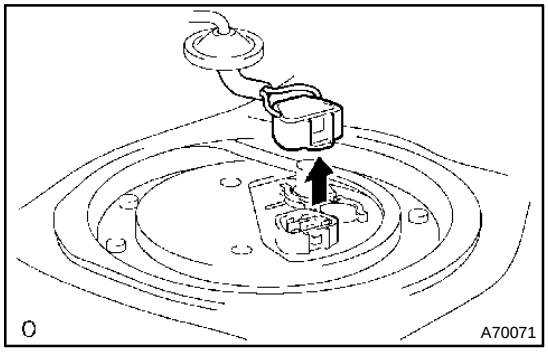
3. REMOVE REAR SEAT CUSHION ASSY RH (5 DOOR HATCH BACK BODY TYPE)

4. REMOVE FLOOR CARPET ASSY FRONT

(a) Using a clip remover, remove the clip and front floor carpet.



5. REMOVE REAR FLOOR SERVICE HOLE COVER

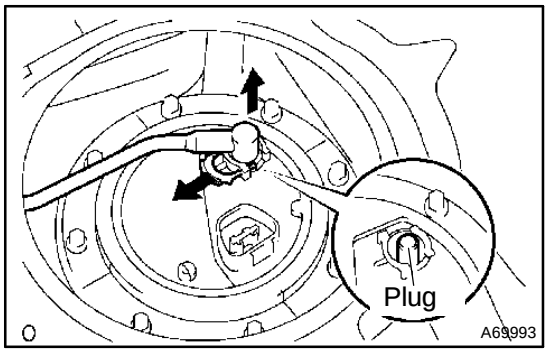


6. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT

(a) Disconnect the fuel pump connector.

(b) Start the engine.

(c) After the engine has stopped on the its own, turn the ignition switch to lock.

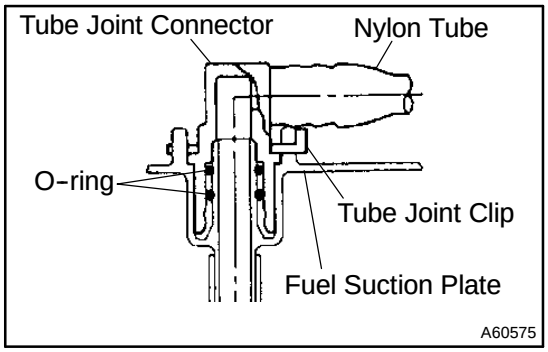


7. DISCONNECT FUEL TANK MAIN TUBE SUB-ASSY

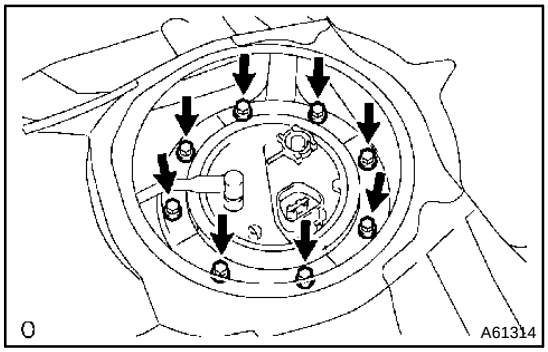
(a) Remove the tube joint clip, and pull out the fuel tank main tube.

NOTICE:

- **Check if there is any dirt like mud around the connector before this work and clean dirt away.**
- **Be careful of dirt like mud because the quick connector has an O-ring to seal the pipe and the connector.**
- **Do not use any tool in this work.**
- **Do not bend or twist the nylon tube by force.**
- **Keep off plug from foreign subjects.**
- **To protect the tube, cover it with a vinyl bag after checking.**



CONTINUED



8. REMOVE FUEL TANK VENT TUBE SET PLATE

(a) Remove the 8 bolts and fuel tank vent tube set plate.

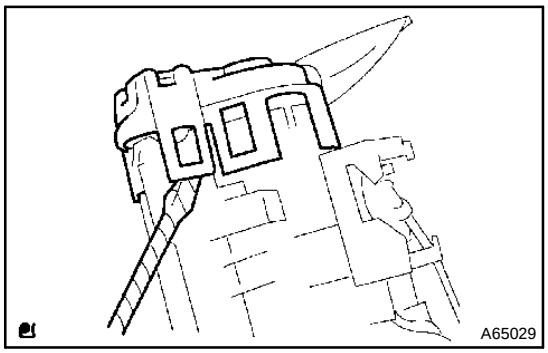
9. REMOVE FUEL PUMP ASSEMBLY

(a) Pull out the fuel pump assembly.

NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge should not bent.**

(b) Remove the gasket from the pump assembly.



10. REMOVE FUEL SUCTION SUPPORT NO.2

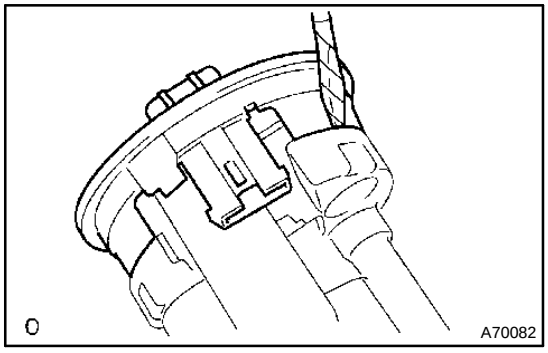
(a) Using a screwdriver, disconnect the 4 snap claws from the claw holes, and remove the fuel suction support.

NOTICE:

Be careful not to damage the fuel suction support.

11. REMOVE FUEL PUMP CUSHION RUBBER

12. REMOVE FUEL SENDER GAGE ASSY



13. REMOVE FUEL SUCTION PLATE SUB-ASSY

(a) Disconnect the 2 connectors.

(b) Using 2 screwdrivers, disconnect the 4 snap claws from the claw holes, and remove the fuel suction plate.

NOTICE:

Be careful not to damage the fuel suction plate.

14. REMOVE FUEL PUMP HARNESS

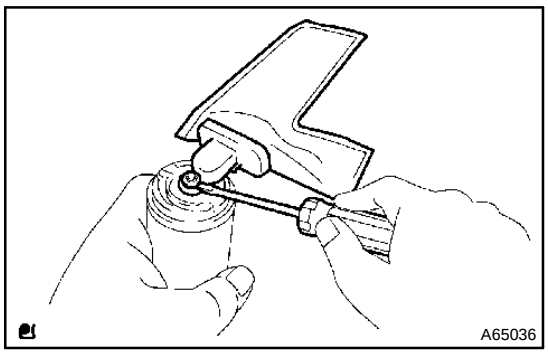
15. REMOVE FUEL PRESSURE REGULATOR ASSY

(a) Pull out the fuel pressure regulator from the filter.

CONTINUED

16. REMOVE FUEL PUMP ASSY

(a) Pull out the fuel pump from the filter.



17. REMOVE FUEL PUMP FILTER

(a) Using a small screwdriver, pry out the clip.

(b) Pull out the fuel pump filter from the fuel pump.

18. REMOVE FUEL PUMP SPACER

19. REMOVE FUEL PUMP FILTER SEAL

20. INSTALL FUEL PUMP FILTER

(a) Install the fuel pump filter with a new clip.

21. INSTALL FUEL PUMP ASSY

(a) Apply gasoline to the fuel pump filter seal.

(b) Install the fuel pump to the filter.

22. INSTALL FUEL PRESSURE REGULATOR ASSY

(a) Apply gasoline to a new O–ring, and install it to the fuel pressure regulator.

(b) Install the fuel pressure regulator to the filter.

23. INSTALL FUEL PUMP ASSEMBLY

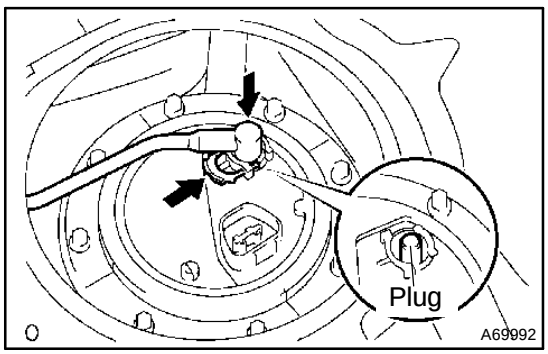
(a) Install a new gasket to the fuel pump assembly.

(b) Install the fuel pump assembly to the fuel tank.

24. INSTALL FUEL TANK VENT TUBE SET PLATE

(a) Install the fuel tank vent tube set plate with the 8 bolts.

Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)



25. CONNECT FUEL TANK MAIN TUBE SUB–ASSY

(a) Connect the fuel tank main tube with the tube joint clip.

NOTICE:

- **Check that there is no scratch or foreign objects on the connecting parts.**
- **Check that the connector is inserted fully and securely.**
- **Check that the clip of the tube joint is on the collar of the connector.**
- **After installing the tube joint clip, check that the connector is not pulled off.**

26. CHECK FUEL LEAK **(See page 11–30)**

27. INSTALL REAR FLOOR SERVICE HOLE COVER

(a) Using butyl tape, install the rear floor service hole cover.

28. INSTALL FLOOR CARPET ASSY FRONT

CONTINUED

29. INSTALL REAR SEAT CUSHION ASSY RH (5 DOOR HATCH BACK BODY TYPE)

30. INSTALL REAR SEAT CUSHION ASSY LH (5 DOOR HATCH BACK BODY TYPE)

31. INSTALL REAR SEAT CUSHION ASSEMBLY (SEDAN BODY TYPE)

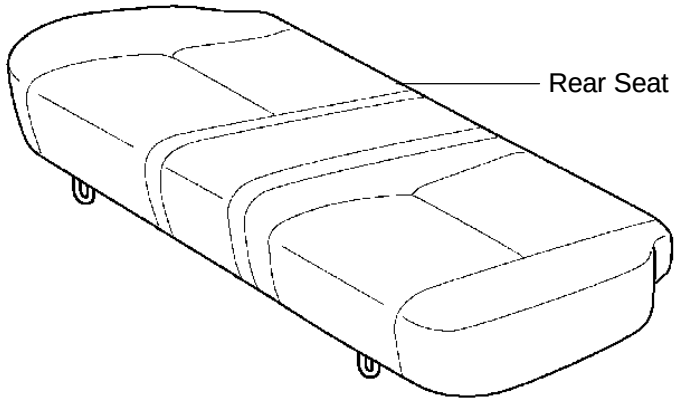
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FUEL TANK ASSY (4ZZ-FE)

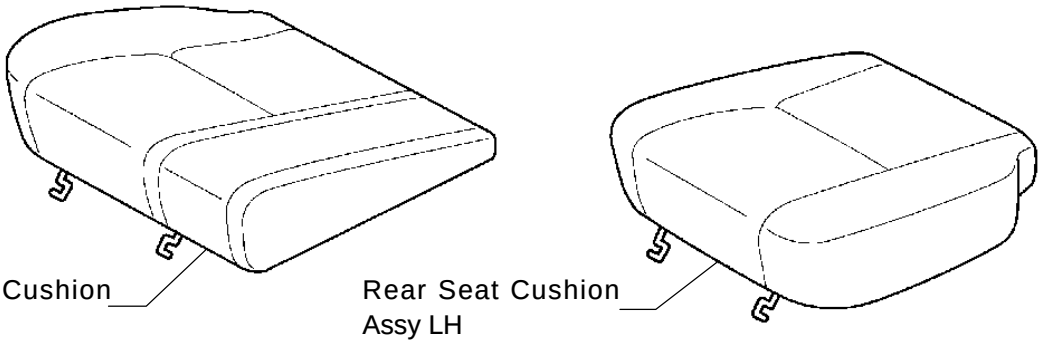
COMPONENTS

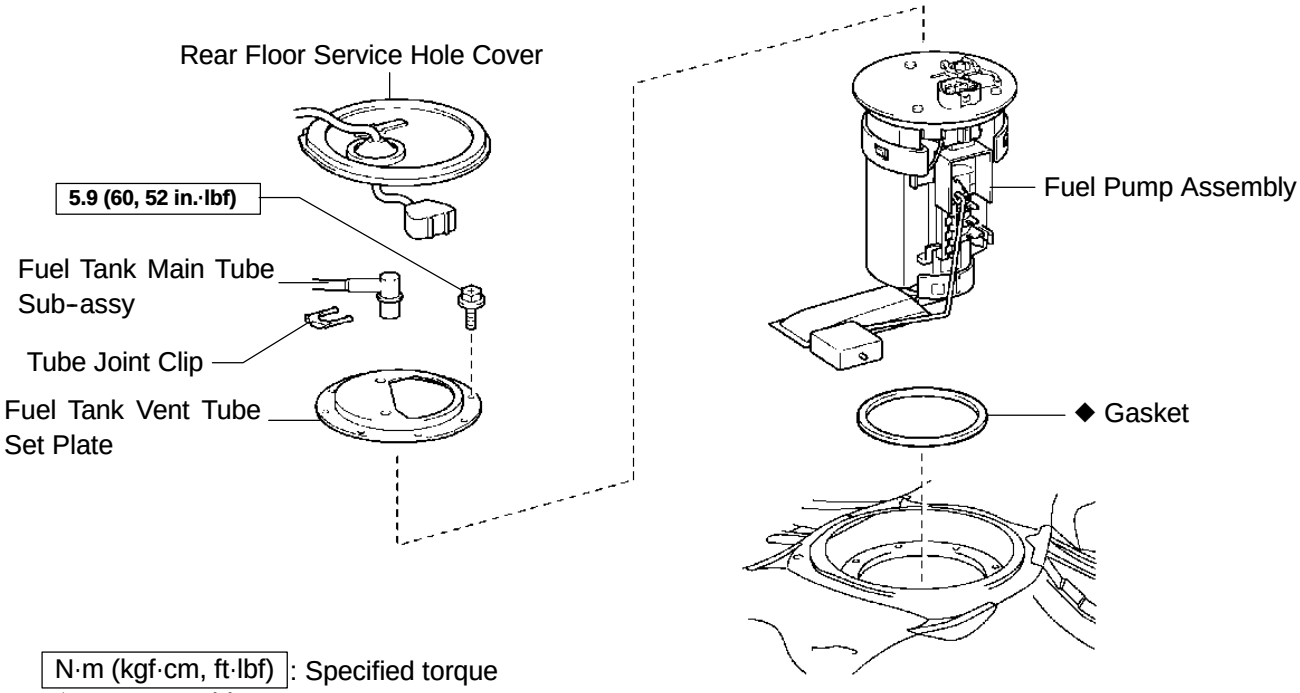
110HV-01

SEDAN :



HATCH BACK :

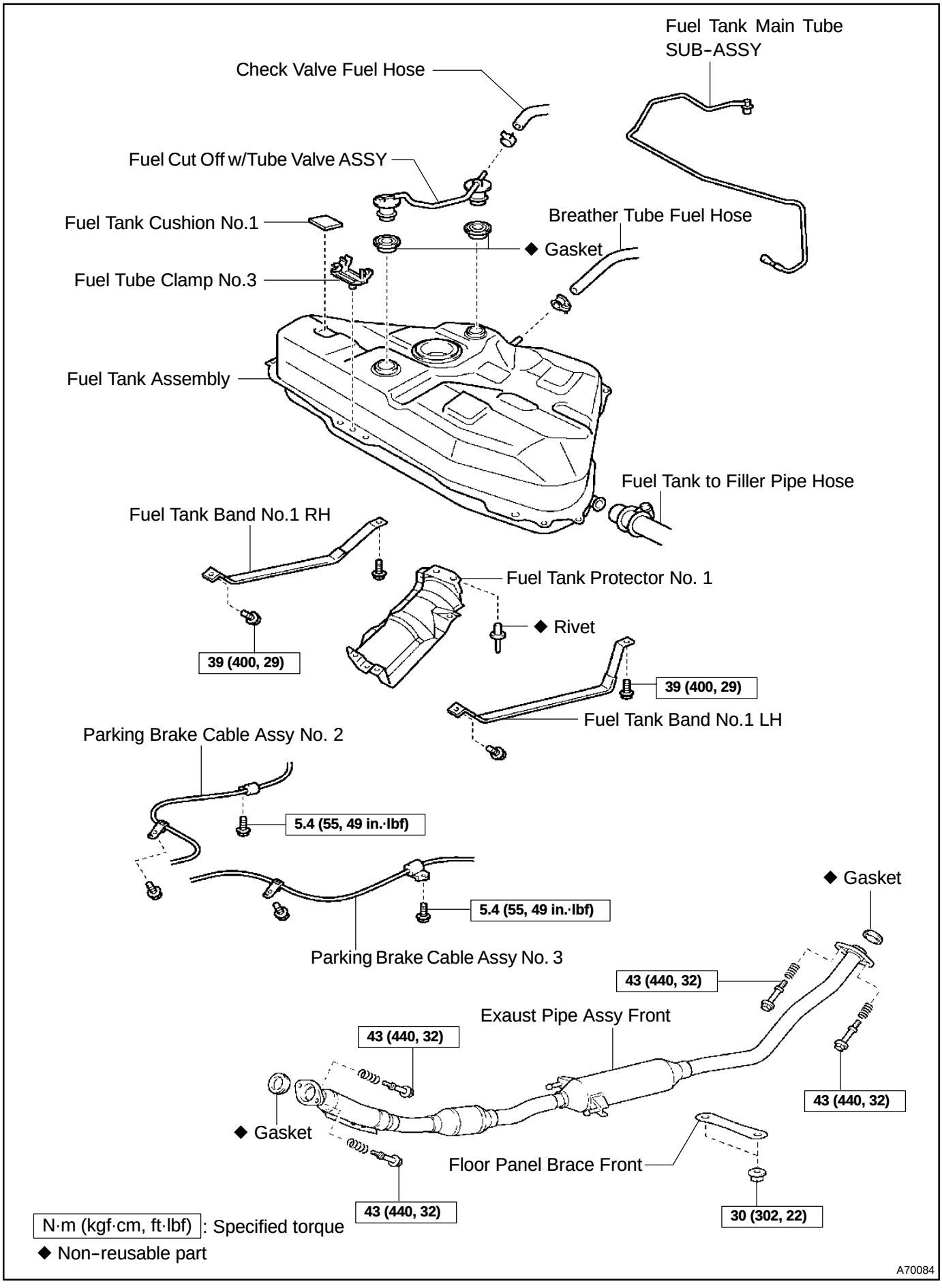




N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

A70072

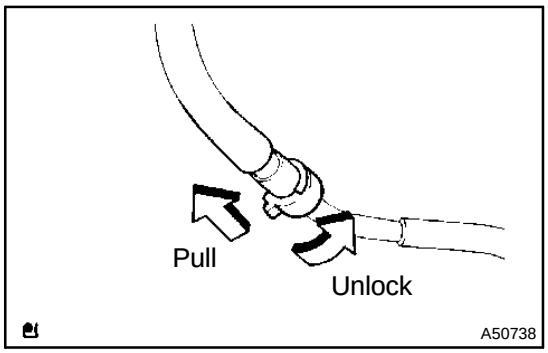
CONTINUED


Fuel Tank Main Tube SUB-ASSY
Check Valve Fuel Hose
Fuel Cut Off w/Tube Valve ASSY
Fuel Tank Cushion No.1
Breather Tube Fuel Hose
◆ Gasket
Fuel Tube Clamp No.3
Fuel Tank Assembly
Fuel Tank to Filler Pipe Hose
Fuel Tank Band No.1 RH
Fuel Tank Protector No. 1
◆ Rivet
39 (400, 29)
39 (400, 29)
Fuel Tank Band No.1 LH
Parking Brake Cable Assy No. 2
5.4 (55, 49 in.·lbf)
5.4 (55, 49 in.·lbf)
◆ Gasket
Parking Brake Cable Assy No. 3
43 (440, 32)
Exaust Pipe Assy Front
43 (440, 32)
43 (440, 32)
◆ Gasket
Floor Panel Brace Front
43 (440, 32)
30 (302, 22)
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A70084

110HW-01

Removal & Installation and Disassembly & Reassembly

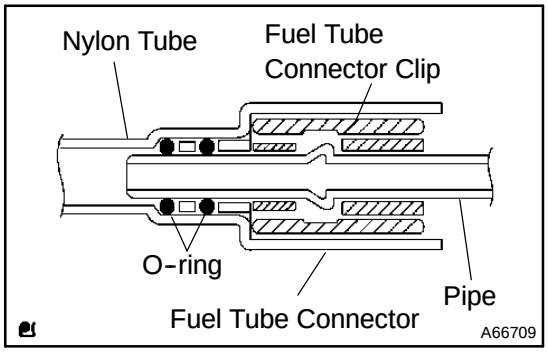
1. REMOVE REAR SEAT ASSEMBLY (SEDAN BODY TYPE)
2. REMOVE REAR SEAT CUSHION ASSY LH (5 DOOR HATCH BACK BODY TYPE)
3. REMOVE REAR SEAT CUSHION ASSY RH (5 DOOR HATCH BACK BODY TYPE)
4. REMOVE FLOOR CARPET ASSY FRONT
5. REMOVE REAR FLOOR SERVICE HOLE COVER
6. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT **(See page 11-30)**
7. DISCONNECT FUEL TANK MAIN TUBE SUB-ASSY **(See page 11-43)**
8. REMOVE FUEL TANK VENT TUBE SET PLATE **(See page 11-43)**
9. REMOVE FUEL PUMP ASSEMBLY **(See page 11-43)**
10. DRAIN FUEL
11. REMOVE FLOOR PANEL BRACE FRONT
12. REMOVE EXHAUST PIPE ASSY FRONT
(a) Remove the 4 bolts, 4 compression spring and exhaust pipe.
13. DISCONNECT BREATHER TUBE FUEL HOSE
(a) Disconnect the breather tube fuel hose from the fuel tank.
14. DISCONNECT FUEL TANK TO FILLER PIPE HOSE
(a) Disconnect the fuel tank to filler pipe hose from the fuel tank.

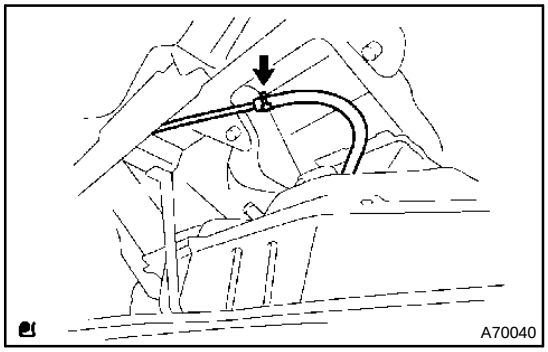


15. DISCONNECT FUEL TANK MAIN TUBE SUB-ASSY
(a) Pinch the projections of the retainer to remove the lock claws and pull out the fuel tank main tube.

NOTICE:

- **Check if there is any dirt like mud around the connector before this work and clean the dirt away.**
- **Be careful of dirt like mud because the quick connector has an O-ring to seal the pipe and the connector.**
- **Do not use any tool in this work.**
- **Do not bend or twist the nylon tube by force.**
- **Keep off plug from foreign subjects.**
- **To protect the tube, cover it with a vinyl bag after checking.**
- **When connector and the pipe are stuck, pinch the tube between fingers, and turn it carefully to free and then disconnect the tube.**





16. DISCONNECT CHECK VALVE FUEL HOSE
(a) Disconnect the check valve fuel hose from the fuel cut off w/tube valve.

CONTINUED

17. REMOVE FUEL TANK ASSY

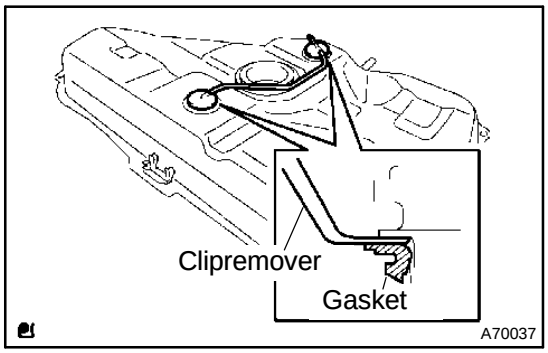
(a) Remove the 4 installing bolts of the parking brake cable clamp, and separate the parking brake cable.

(b) Set a mission jack to the fuel tank.

(c) Remove the 4 bolts, 2 fuel tank bands and fuel tank.

18. REMOVE FUEL TANK MAIN TUBE SUB-ASSY

(a) Remove fuel tank main tube from the fuel tube clamp.



19. REMOVE FUEL CUT OFF W/TUBE VALVE ASSY

(a) Using a screwdriver, unlock the claw and remove the protector by turning it counter clockwise.

(b) Insert a clip remover between the check valve and the gasket, remove the valve by gradually pushing it upward.

NOTICE:

- **Work accurately to maintain the sealing performance of the check valve, since it is made from resin. It is easy to damage by removing and installing forcibly.**
- **Be sure to install new check valve and gasket.**

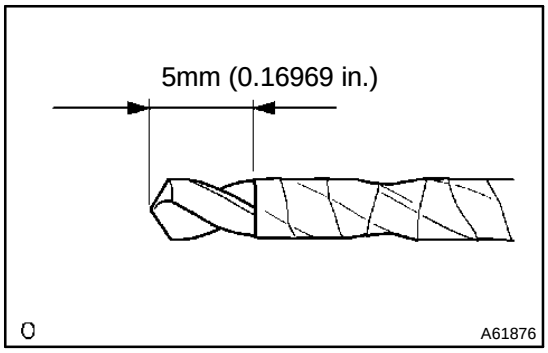
(c) Remove fuel evaporation tube from the fuel tube clamp.

20. REMOVE FUEL TUBE CLAMP NO.3

(a) Remove the fuel tube clamp from the fuel tank.

21. REMOVE FUEL TANK CUSHION NO.1

(a) Remove the 7 fuel tank cushion from the fuel tank.



22. REMOVE FUEL TANK PROTECTOR NO.1

(a) Wind a strip of tape to the 5 mm (0.16969 in.) drill blade as shown in the illustration.

(b) Press the 5 mm (0.16969 in.) drill blade lightly to the rivet, and drill the flange part.

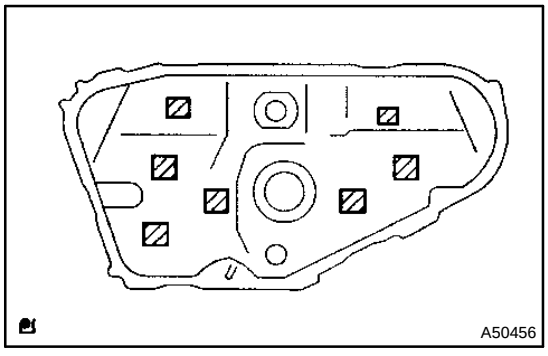
(c) Remove the rivet and the fuel tank protector.

NOTICE:

- **Do not press the drill blade strongly, the rivet rotates together.**
- **Be careful of touching the rivet. It is hot by drilling.**

23. INSTALL FUEL TANK PROTECTOR NO.1

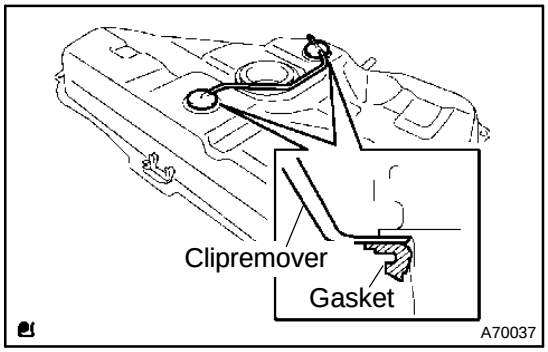
(a) Install the fuel tank protector with the new rivets and the fuel tank band No.1.



24. INSTALL FUEL TANK CUSHION NO.1

(a) Install a new fuel tank cushion as shown in the illustration.

CONTINUED



25. INSTALL FUEL CUT OFF W/TUBE VALVE ASSY

(a) Install a new gasket to the fuel tank.

(b) Apply light oil around the new fuel cut off valve as shown in the illustration, and inspect it into the tank without force. Be careful not to drop the gasket into the tank.

(c) Check that the fuel cut off valve is fully inserted.

26. INSTALL FUEL TANK ASSY

Torque:

Fuel tank band 39 N·m (400 kgf·cm, 29 ft·lbf)

Parking brake cable 5.4 N·m (55 kgf·cm, 48 in.·lbf)

27. CONNECT FUEL TANK MAIN TUBE SUB-ASSY

(a) Push in the tube connector to the pipe until and install the retainer.

NOTICE:

- **Check if there is any damage or foreign objects on the connected part of the pipe.**
- **After connecting, check if the pipe and the connector are securely connected by pulling them.**

28. CONNECT CHECK VALVE FUEL HOSE

29. INSTALL EXHAUST PIPE ASSY FRONT

(See page 15-5)

30. INSTALL FLOOR PANEL BRACE FRONT (See page 15-5)

31. INSTALL FUEL PUMP ASSEMBLY (See page 11-43)

32. INSTALL FUEL TANK VENT TUBE SET PLATE (See page 11-43)

33. CONNECT FUEL TANK MAIN TUBE SUB-ASSY (See page 11-43)

34. CHECK FUEL LEAK(See page 11-30)

35. INSTALL REAR FLOOR SERVICE HOLE COVER

(a) Using butyl tape, install the rear floor service hole cover.

36. INSTALL FLOOR CARPET ASSY FRONT

37. INSTALL REAR SEAT CUSHION ASSY RH (5 DOOR HATCH BACK BODY TYPE)

38. INSTALL REAR SEAT CUSHION ASSY LH (5 DOOR HATCH BACK BODY TYPE)

39. INSTALL REAR SEAT ASSEMBLY (SEDAN BODY TYPE)

40. INSTALL CHECK EXHAUST GAS LEAK

CONTINUED

EMISSION CONTROL

EMISSION CONTROL SYSTEM
(2ZZ-GE) 12-1
ON-VEHICLE INSPECTION 12-1/2
INSPECTION 12-3/4
EMISSION CONTROL SYSTEM
(4ZZ-FE) 12-5
ON-VEHICLE INSPECTION 12-5/6
INSPECTION 12-7

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement	RM926E

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

CONTINUED

EMISSION CONTROL SYSTEM (2ZZ-GE)

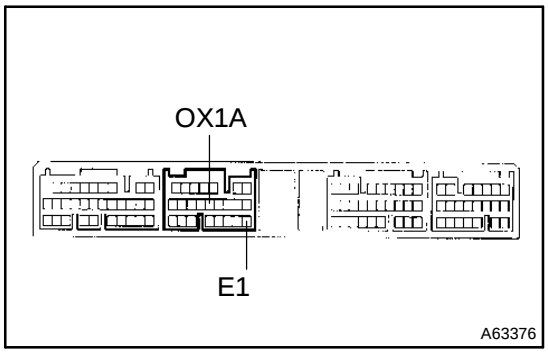
ON-VEHICLE INSPECTION

1205S-01

1. INSPECT AIR-FUEL RATIO COMPENSATION SYSTEM

HINT:

You can also check the system by choosing "DATA MONITOR", then "O_2 SENSOR OUTPUT VOLTAGE" on the monitor of the hand-held tester.



(a) Connect the hand-held tester to the terminals OX1A and E1 of the ECM.

CAUTION:

Connect test leads from the back side of the connector with the ECM connected.

(b) Warm up the oxygen sensor with the engine speed at 2,500 rpm for approx. 2 minutes.

(c) Confirm that the voltage changes between 0 V to 1 V with the engine speed at 2,500 rpm.

OK:

The voltage changes more than 8 times in 10 seconds.

CAUTION:

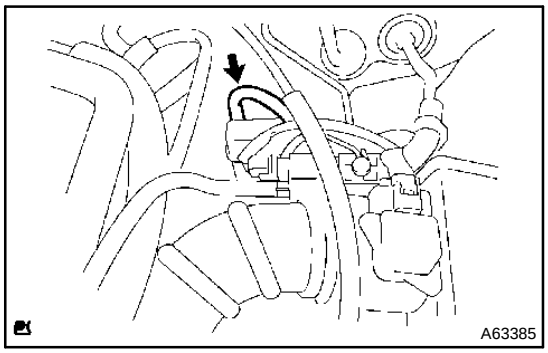
- **Perform the check immediately after the end of the warming up.**
- **If not confirming the change of voltage, warming up the oxygen sensor again.**

2. INSPECT FUEL CUT OFF RPM

(a) Increase the engine speed to at least 3,500 rpm.

(b) Use a sound scope to check for injector operating noise.

(c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.



3. INSPECT EVAPORATIVE EMISSION CONTROL SYSTEM

(a) After starting the engine, disconnect the vacuum hose shown in the illustration.

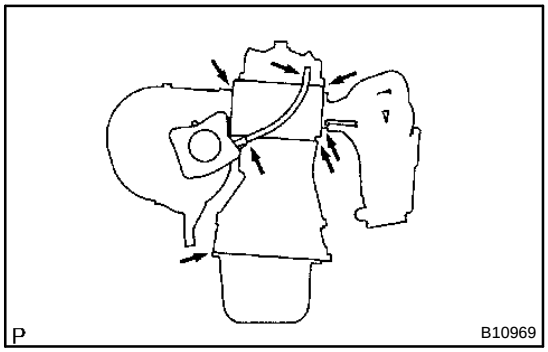
(b) Confirm vacuum occurs at the vsv port, when choosing "ACTIVE TEST" and "PURGE VSV" according to the display on hand-held tester.

(c) Finish "ACTIVE TEST", then connect the vacuum hose again.

(d) After going to "ECU DATA MONITOR" on the hand-held tester, choose "PURGE VSV" to check the operation of the purge vsv.

(e) After warm up the engine and drive the vehicle, confirm the vsv turns on from off.

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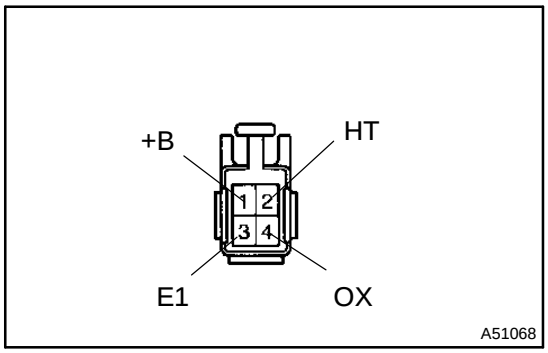


4. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

(a) Check for cracks, leaks or damage.

HINT:

Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to run out of turn. Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause the engine to run out of turn.

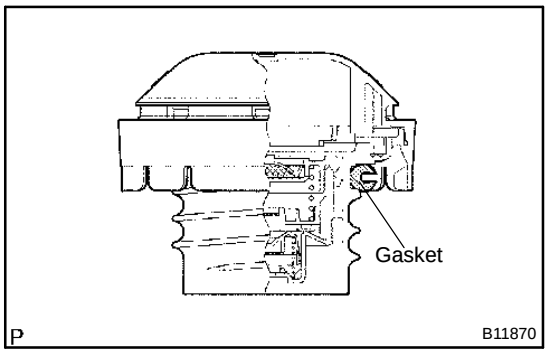


5. INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSOR

(a) Disconnect the oxygen sensor connector.

(b) Using an ohmmeter, measure the resistance between the terminals HT and +B.

Resistance:11 - 16 Ω at 20 °C (68 °F)

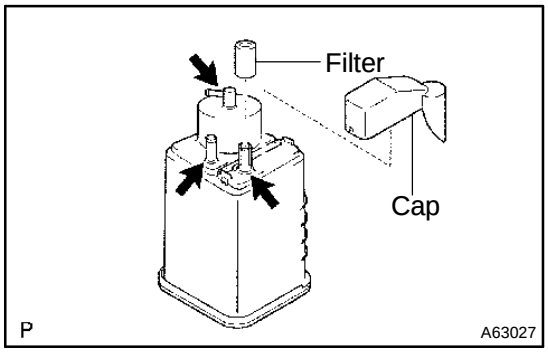


6. INSPECT FUEL TANK CAP

(a) Visually check if the cap and/or gasket are deformed or damaged.

CONTINUED

INSPECTION



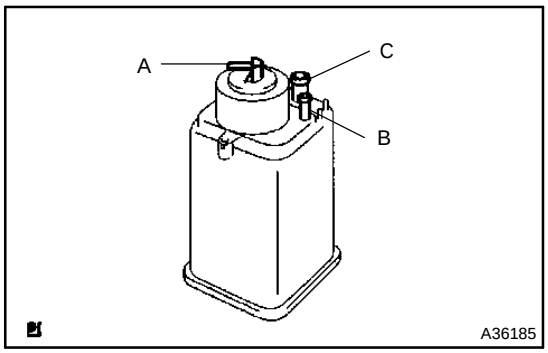
1. CHARCOAL CANISTER ASSY

(a) Remove the charcoal canister cap.

(b) Using a small screwdriver, remove the charcoal canister cap and filter.

(c) Visually check the charcoal canister for cracks or damage.

If necessary, repair the charcoal canister.



(d) Inspect vsv for open circuit

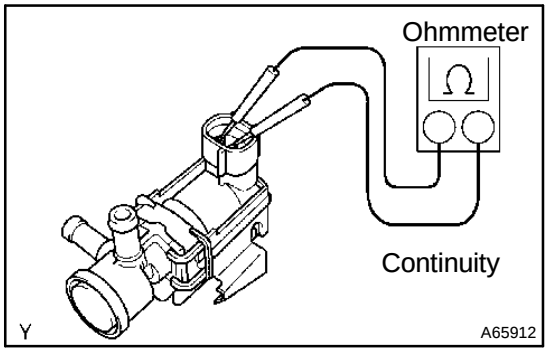
(1) Using an ohmmeter, check that there is no continuity between the terminals.

SST 09992-00242

Operation:

Checking way	Criterion
Close the port B and C, then apply vacuum to port A	No leak
Close the port C, then apply vacuum to port A	Air flows from the port B
Close the port C, then blow air into the port A	Air flows from the port B
Blow air into the port A	Air flows from both the port B and C

If operation is not as specified, replace the charcoal canister.



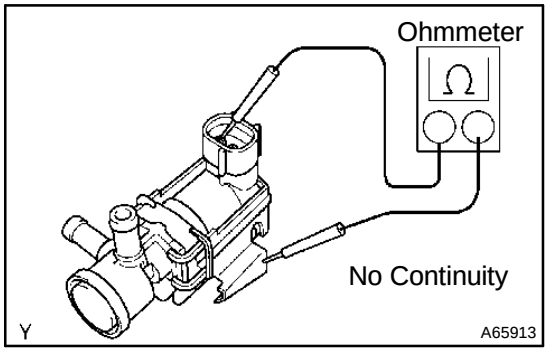
2. VACUUM SWITCHING VALVE NO.1

(a) Inspect VSV for open circuit.

(1) Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 30 - 34 Ω at 20°C (68°F)

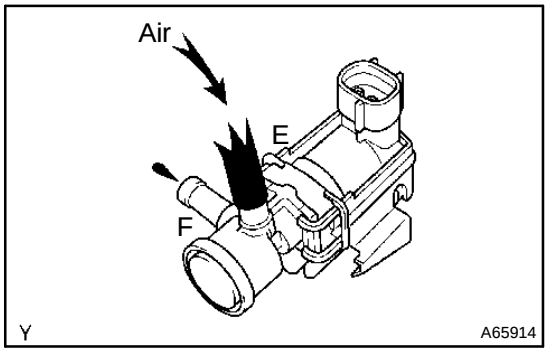
If there is no continuity, replace the VSV.



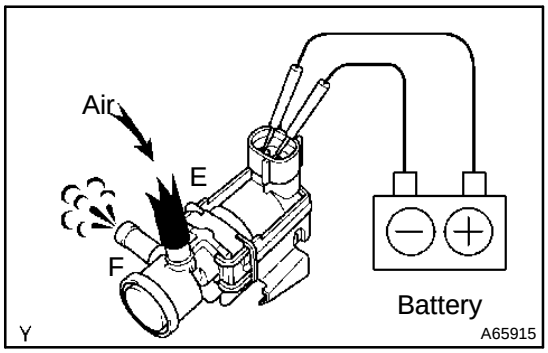
(2) Using an ohmmeter, check that there is no continuity between each terminal and the VSV body.

If there is continuity, replace the VSV.

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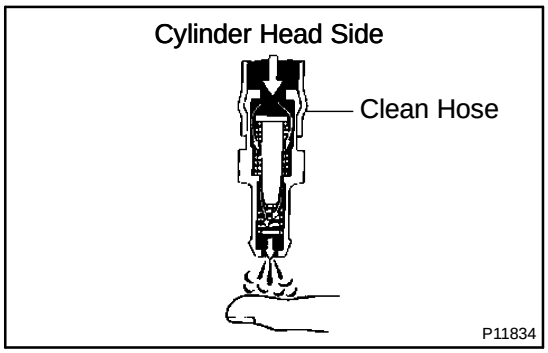


(3) Check that air flows from ports E to F.



(4) Apply battery positive voltage across the terminals.
(5) Check that air does not flow ports E to F.

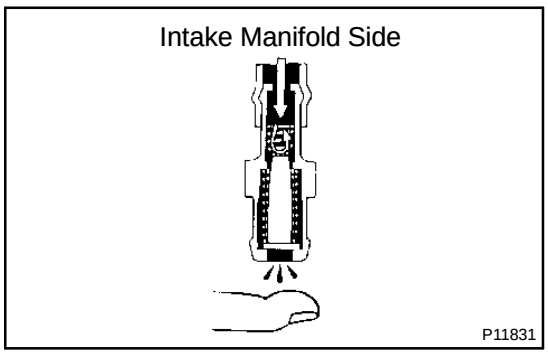
If operation is not as specified, replace the VSV.



3. VENTILATION VALVE SUB-ASSY

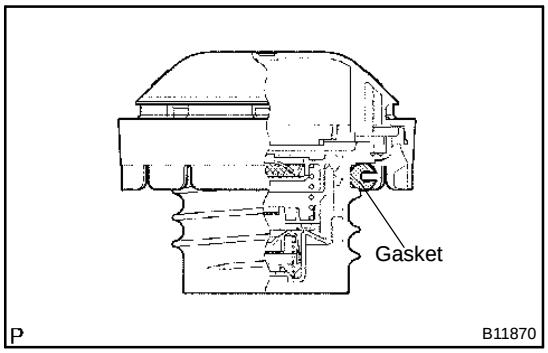
(a) Install clean hose to the PCV valve.
(b) Inspect the PCV valve operation.
(1) Blow air into the cylinder head side, and check that air passes through easily.

CAUTION:
Do not suck air through the value. Petroleum substances inside the valve air harmful.



(2) Blow air into the intake manifold side, and check that air passes through with difficulty.

If operation is not as specified, replace the PCV valve.
(c) Remove clean hose from the PCV valve.



4. FUEL TANK CAP ASSY

(a) Visually check if cap and/or gasket are deformed or damaged.

If necessary, repair or replace the cap.

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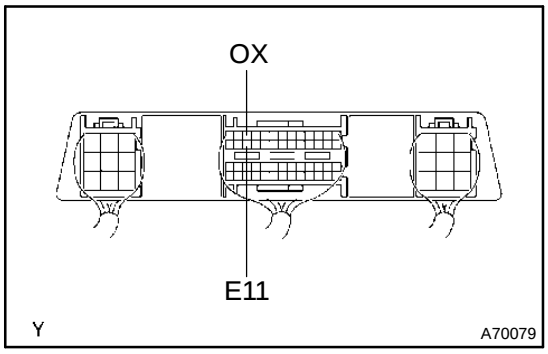
EMISSION CONTROL SYSTEM (4ZZ-FE)

ON-VEHICLE INSPECTION

1205T-01

1. INSPECT AIR-FUEL RATIO COMPENSATION SYSTEM

HINT:
You can also check the system by choosing "DATA MONITOR", then "O_2 SENSOR OUTPUT VOLTAGE" on the monitor of the hand-held tester.



(a) Connect the hand-held tester to the terminals OX and E11 of the ECM.

CAUTION:
Connect test leads from the back side of the connector with the ECM connected.

(b) Warm up the oxygen sensor with the engine speed at 2,500 rpm for approx. 2 minutes.

(c) Confirm that the voltage changes between 0 V to 1 V with the engine speed at 2,500 rpm.

OK:
The voltage changes more than 7 times in 10 seconds.

CAUTION:

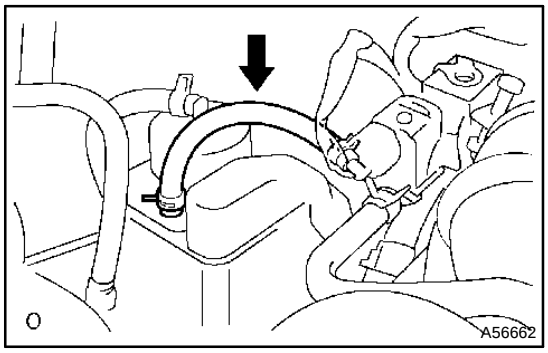
- **Perform the check immediately after the end of the warming up.**
- **If not confirming the change of voltage, warming up the oxygen sensor again.**

2. INSPECT FUEL CUT OFF R/MIN

(a) Increase the engine speed to at least 3,500 rpm.

(b) Use a sound scope to check for injector operating noise.

(c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.



3. INSPECT EVAPORATIVE EMISSION CONTROL SYSTEM

(a) After starting the engine, disconnect the vacuum hose shown in the illustration.

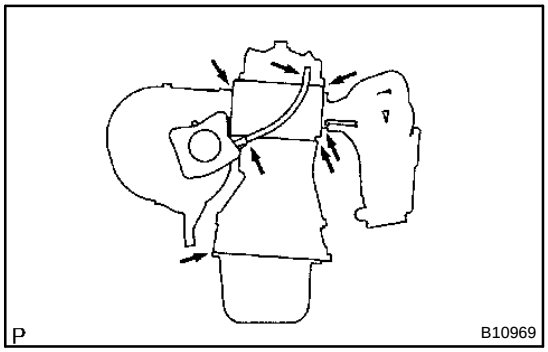
(b) Confirm vacuum occurs at the vsv port, when choosing "ACTIVE TEST" and "PURGE VSV" according to the display on hand-held tester.

(c) Finish "ACTIVE TEST", then connect the vacuum hose again.

(d) After going to "ECU DATA MONITOR" on the hand-held tester, choose "PURGE VSV" to check the operation of the purge vsv.

(e) After warm up the engine and drive the vehicle, confirm the vsv turns on from off.

CONTINUED

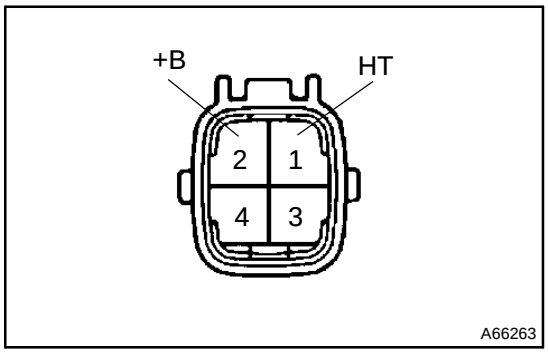


4. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

(a) Check for cracks, leaks or damage.

HINT:

Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to run out of turn. Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause the engine to run out of turn.

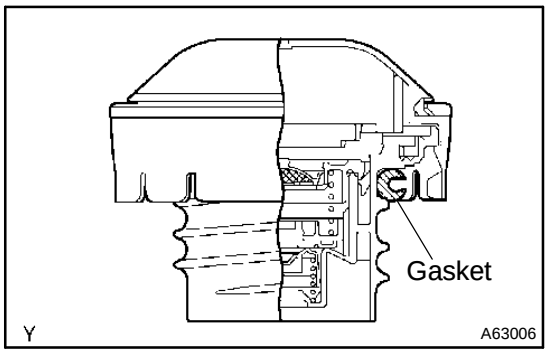


5. INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSOR

(a) Disconnect the oxygen sensor connector.

(b) Using an ohmmeter, measure the resistance between the terminals 2 (+B) and 1 (HT).

Resistance: 5 - 30 Ω at 20 °C (68 °F)



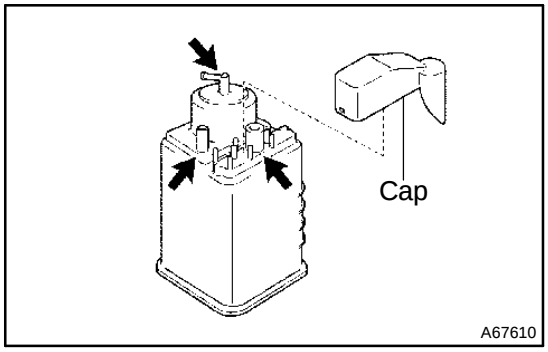
6. INSPECT FUEL TANK CAP

(a) Visually check if the cap and/or gasket are deformed or damaged.

CONTINUED

1200D-04

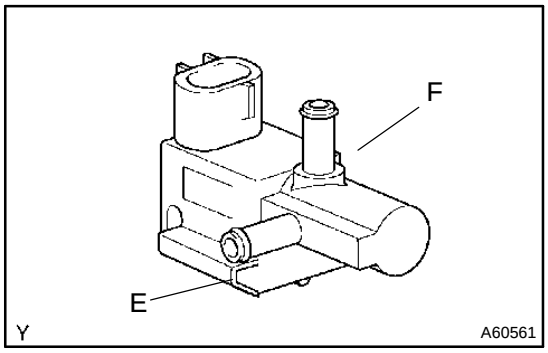
INSPECTION



1. CHARCOAL CANISTER ASSY

(a) Remove the charcoal canister cap.
  (1) Using a small screwdriver, remove the charcoal canister cap.

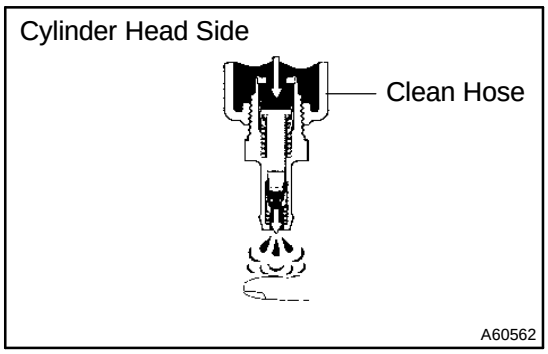
(b) Visually check the charcoal canister for cracks or damage.



2. VACUUM SWITCHING VALVE NO.1

(a) Inspect VSV for open circuit
  (1) Using an ohmmeter, measure the resistance between each terminal.
  Resistance: 30 - 34 Ω at 20 °C (68 °F)

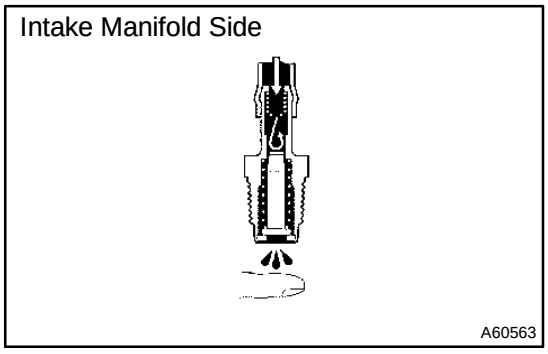
(b) Inspect VSV operation
  (1) Apply battery voltage across the terminals.
  (2) Check that air flows from port E to port F.
  Operation: Air flows from the port F



3. VENTILATION VALVE SUB-ASSY

(a) Blow air into the cylinder head side, and check that air passes through easily.

CAUTION:
Do not suck air through the value. Petroleum substances inside the valve air harmful.



(b) Blow air into the intake manifold side, and check that air passes through with difficulty.

HINT:
If operation is not as specified, replace the PCV valve.

CONTINUED

ENGINE MECHANICAL

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REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement	RM926E

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

CONTINUED

ENGINE ASSEMBLY (2ZZ-GE)

140V2-01

INSPECTION

1. INSPECT COOLANT (See page 16-1)
2. INSPECT ENGINE OIL (See page 17-1)
3. INSPECT BATTERY (See page 19-5)
4. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY
5. INSPECT SPARK PLUG (See page 18-2)
6. INSPECT IGNITION TIMING

(a) Warm up the engine.

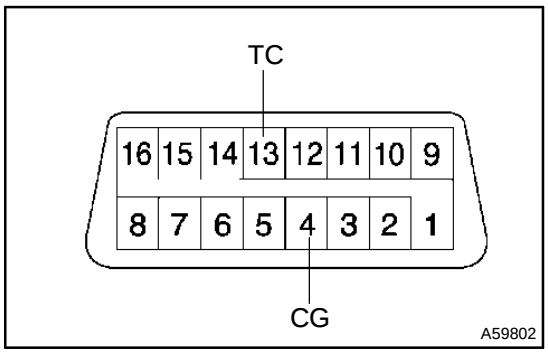
(b) When using the hand-held tester.

(1) Connect the hand-held tester to the DLC3.

HINT:

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

(c) When not using the hand-held tester.

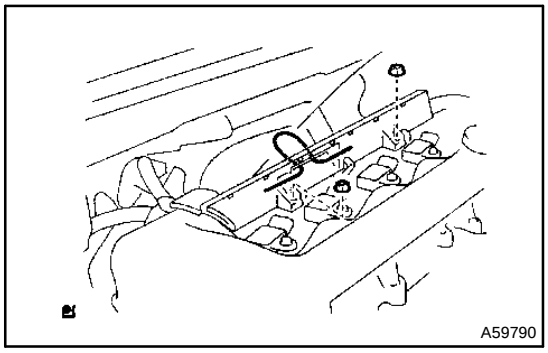


(1) Using SST,connect the terminals 13 (TC) and 4 (CG) of the DLC3.

SST 09843-18040

NOTICE:

- **Be sure not to connect incorrectly.It causes breakage of the engine.**
- **Turn OFF all electrical systems.**
- **Operate the inspection when the cooling fan motor is turned OFF.**



(2) Remove 3 bolts, a nut and the cylinder head cover No. 2.

(3) Pull out the wire harness as shown in the illustration.

(4) Connect the timing light to the engine.

NOTICE:

- **Use a timing light which can detect the first signal.**
- **After checking, be sure to tape the wire harness.**

(5) Inspect the ignition timing at idle.

Ignition timing: 8 - 12°BTDC

NOTICE:

When checking the ignition timing, the transmission is at neutral position.

HINT:

After the engine rpm is kept at 1,000 - 1,300 rpm for 5 seconds, check that it returns idle speed.

(6) Disconnect the terminal 13 (TC) and 4 (CG) of the DLC3.

CONTINUED

(7) Inspect the ignition timing at idle.
Ignition timing: 4 - 12° BTDC
(8) Confirm that the ignition timing moves to advanced angle side when the engine rpm is increased.
(9) Remove the timing light from the engine.
(10) Install the cylinder head cover No. 2 with the 3 bolts a the nut.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

7. INSPECT ENGINE IDLE SPEED

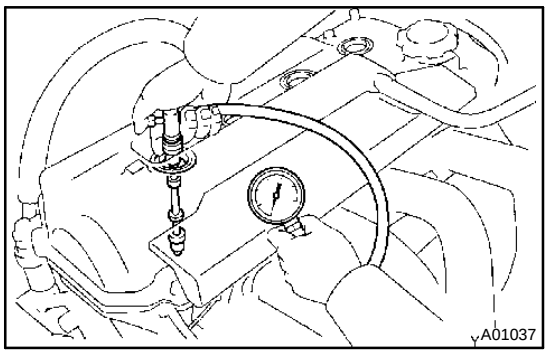
(a) Warm up the engine.
(b) When using the hand-held tester.
(1) Connect the hand-held tester to the DLC3.

HINT:
Please refer to the hand - held tester operator's manual for further details.

(c) When not using the hand - held tester.
(1) Using SST, connect the tachometer test prove to the terminal 9 (TAC) of the DLC3.
SST 09843-18040
(d) Check the idle speed.
Idle speed:750 - 850 rpm

NOTICE:
- **Check idle speed with cooling fan OFF.**
- **Switch off all accessories and air conditioning.**

SST 09843-18040



8. INSPECT COMPRESSION

(a) Warm up and stop engine.
(b) Remove ignition coil.
(c) Remove spark plugs.
(d) Inspect cylinder compression pressure.
SST 09992-00500
(1) Insert a compression gauge into the spark plug hole.
(2) Fully open the throttle.
(3) While cranking the engine, measure the compression pressure.

NOTICE:
- **Always use a fully charged battery to obtain engine speed of 250 rpm or more.**
- **Check other cylinder's compression pressure in the same way.**
- **This measurement must be done in as short a time as possible.**

Compression pressure:
1,400 kpa (14.3 kgf/cm^2, 203 psi)
Minimum pressure:
1,000 kpa (10.3 kgf/cm^2, 145 psi)
Difference between each cylinder:
110 kpa (1.1 kgf/cm^2, 16 psi)

CONTINUED

(4) If the cylinder compression in one more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (1) through (3) for cylinders with low compression.
- If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged.
- If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.

9. INSPECT CO/HC

(a) Start the engine.
(b) Race the engine at 2,500 rpm for approx. 180 seconds.
(c) Insert the CO/HC meter testing probe at least 40 cm (1.3 ft) into tailpipe during idling.
(d) Immediately the check CO/HC concentration at idle and/or 2,500 rpm.

HINT:
- Complete the measuring within 3 minutes.
- When doing the 2 mode (idle and 2,500 rpm) test, these measuring orders are prescribed by the applicable local regulations.

(e) If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.
(1) Check heated oxygen sensor operation.

CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignitions: • Incorrect timing • Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leaky intake and exhaust valves 4. Leaky cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: • PCV hoses • Intake manifold • Throttle body • ISC valve • Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke form exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty EFI systems: • Faulty pressure regulator • Defective water temperature sensor • DEFECTIVE Air–flow meter • Faulty ECM • Faulty injectors • Faulty throttle position sensor

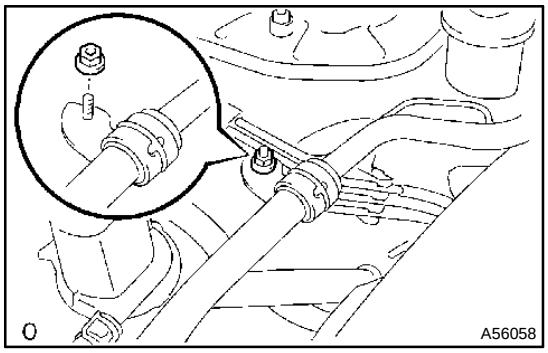
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FAN AND GENERATOR V BELT (2ZZ-GE)

140V3-01

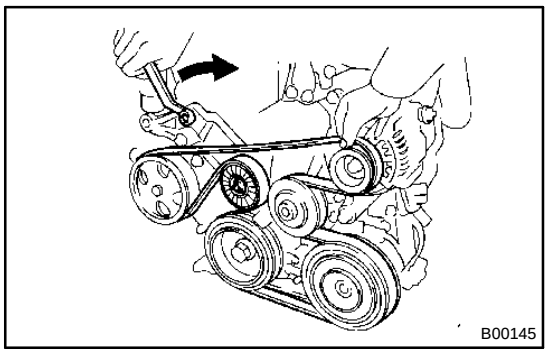
REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH



2. REMOVE COOLER REFRIGERANT SUCTION HOSE NO.1

(a) Remove a nut and seprate the cooler refrigerant suction hose.



3. REMOVE FAN AND GENERATOR V BELT

(a) Turn the drive belt tensioner slowly clockwise and loosen it. Then, remove the drive belt and put back the drive belt tensioner little by little and fix it quietly.

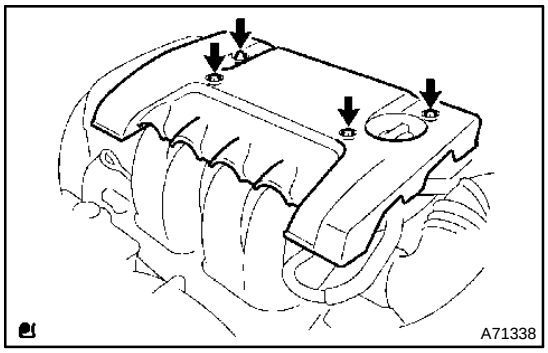
CONTINUED

VALVE CLEARANCE (2ZZ-GE)

140V6-01

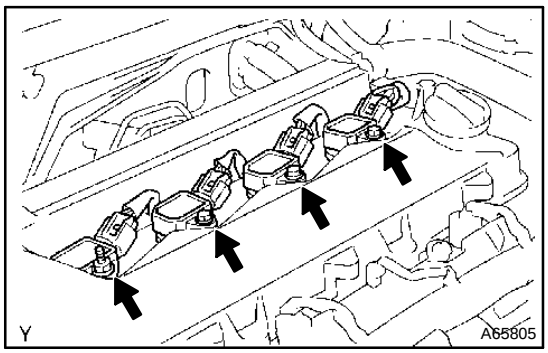
ADJUSTMENT

1. REMOVE ENGINE UNDER COVER RH



2. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove 3 bolts, a nut and the cylinder head cover No. 2.

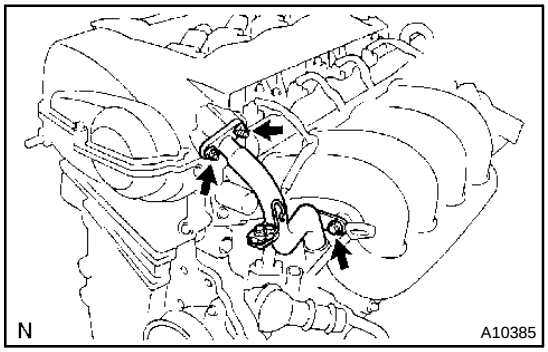


3. REMOVE IGNITION COIL ASSY

(a) Remove 4 bolts and disconnect 4 connectors, and remove 4 ignition coils.

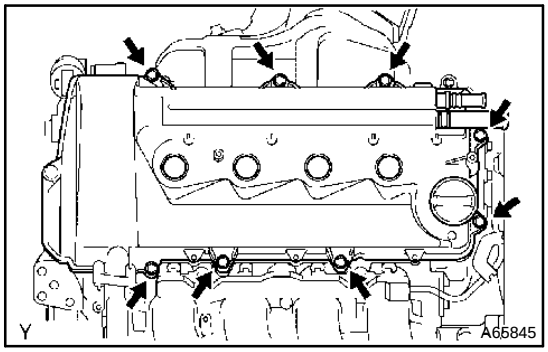
4. REMOVE CYLINDER HEAD COVER SUB-ASSY

(a) Disconnect the fuel hose clamp and 2 PCV hoses from the cylinder head cover.



(b) Remove 2 nuts, a bolt and disconnect the No. 3 ventilation hose from the No. 1 ventilation pipe.

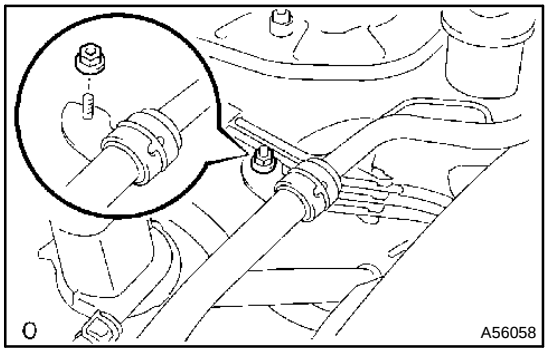
(c) Disconnect the ventilation No. 1 tube and gasket.



(d) Remove 8 bolts, wire harness protector, cylinder head cover and gasket.

(e) Remove the O-ring from the cylinder head cover.

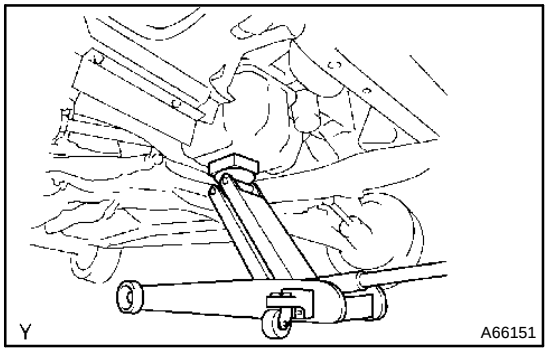
CONTINUED



5. REMOVE COOLER REFRIGERANT SUCTION HOSE NO.1

(a) Remove a nut and seprate the cooler refrigerant suction hose.

6. REMOVE FAN AND GENERATOR V BELT **(See page 14-4)**

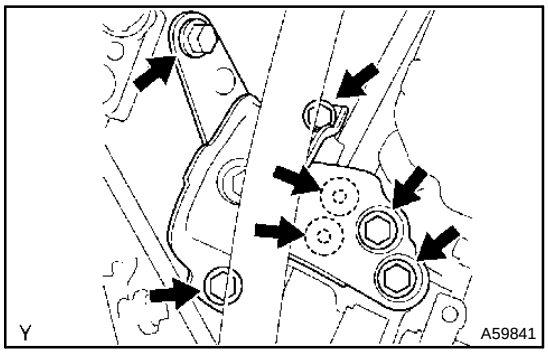


7. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSY RH

(a) Set the jack to the engine.

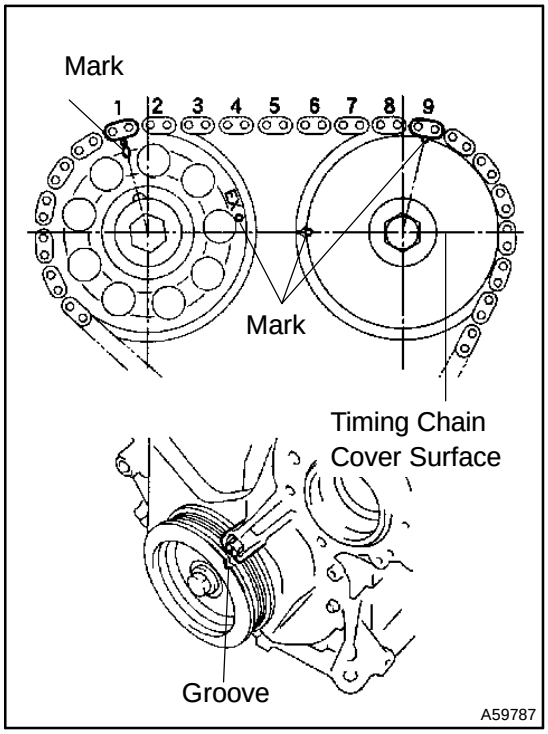
HINT:

Place a wooden block between the jack and engine.



(b) Remove 5 bolts, 2 nuts and engine mounting insulator sub-assy RH.

CONTINUED



8. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley,and align its groove with timing mark ”0” of the timing chain cover.

(b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

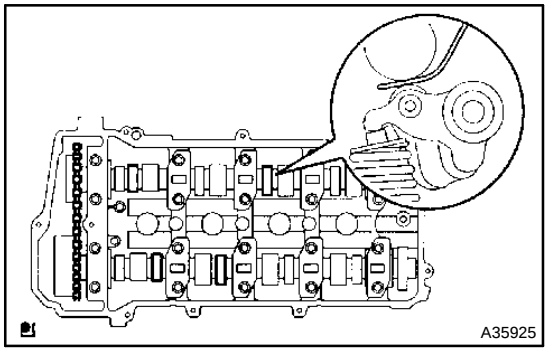
HINT:

If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

9. REMOVE V–RIBBED BELT TENSIONER ASSY

HINT:

Handle a jack up and down to remove the bolt.



10. INSPECT VALVE CLEARANCE

(a) Check only the valves indicated.

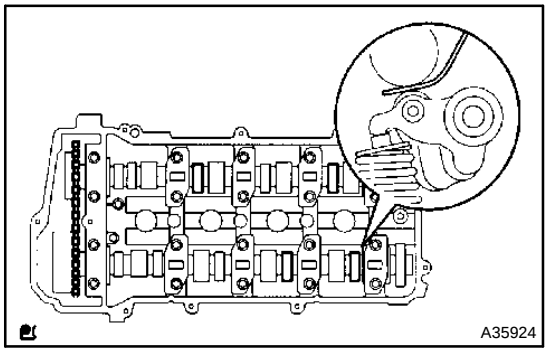
(1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

(2) Record the out–of specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

Valve clearance (Cold)

Intake	0.08 – 0.18 mm (0.003 – 0.007 in.)
Exhaust	0.22 – 0.32 mm (0.009 – 0.013 in.)

(b) Turn the crankshaft 1 revolution (360 °) and set No. 4 cylinder to TDC/compression.



(c) Check only the valves indicated.

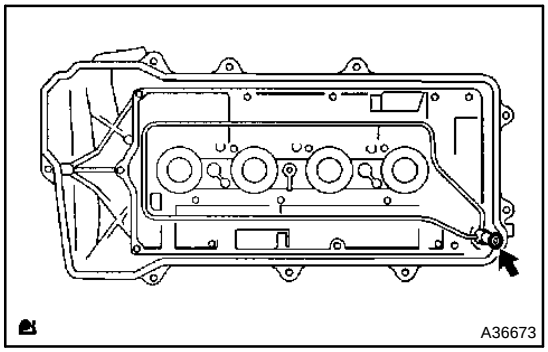
(1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

(2) Record the out–of specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

Valve clearance (Cold)

Intake	0.08 – 0.18 mm (0.003 – 0.007 in.)
Exhaust	0.22 – 0.32 mm (0.009 – 0.013 in.)

CONTINUED



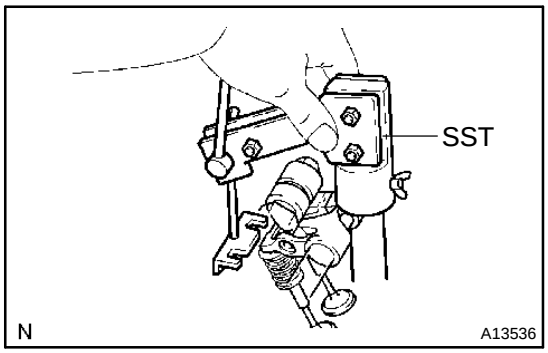
11. ADJUST VALVE CLEARANCE

(a) Set SST.

(1) Turn the crankshaft so that the related rocker arm,where the valve clearance is adjusted, is fully pushed down.

NOTICE:

Remove the spark plug and take off the compression.

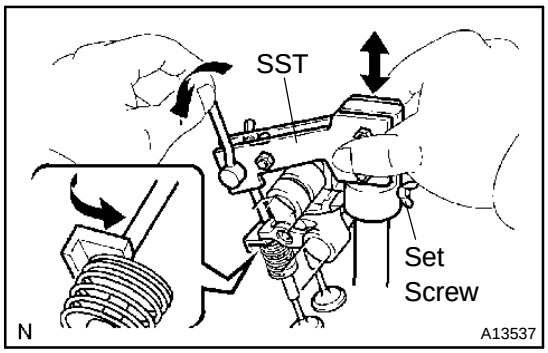


(2) Insert SST into the plug tube.

SST 09248-77010 (09248-07010)

NOTICE:

- **SST cannot be insreted unles the set screw is loosened.**
- **Make sure that the camshaft is in the same condition as step (1).**



(3) Operate the lever so that SST's seat surfase comes to contact with the valve retainer and lock them with the set screw.

NOTICE:

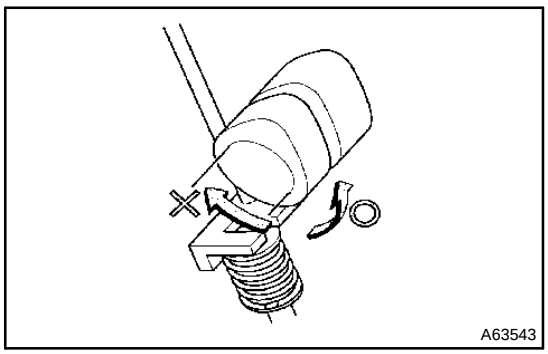
- **Clearance between the valve retainer and SST's seat surface is not allowed.**
- **Care should be taken not to make clearance when inserting SST, since a presence of clearance may unlock the keeper.**

(4) lock the set screw on the plug tube side of SST.

(5) Rotate the crankshaft so that the camshaft is positioned as shown in the illustration.

NOTICE:

- **Pay attention to the direction of the rotation to prevent the nose of the camshaft from interfering with the SST's shaft.**
- **Do not rotate the crankshaft excessively.**



(b) Remove the adjusting shim.

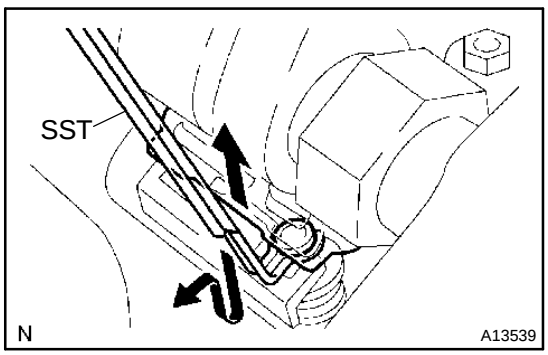
(1) Lift the rocker arm to make a room and remove the adjusting shim using SST.

NOTICE:

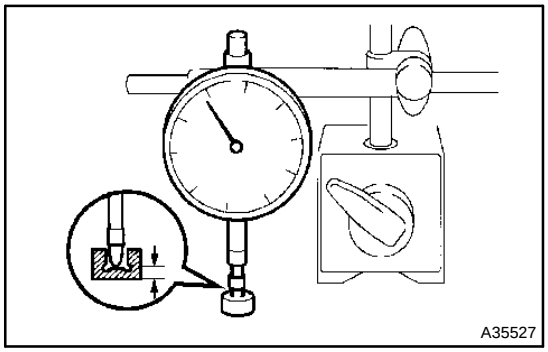
Do not remove SST in the condition that adjusting shim is removed.

HINT:

- Setting SST from the right above makes the removal easy.
- If there is not enough room, reset SST.



CONTINUED



(2) Lift the rocker arm to make a room and remove the adjusting shim using SST.

- Using a dial indicator, measure the thickness of the removed shim.
- Calculate the thickness of a new shim so that the valve clearance comes within the specified value.

A	Thickness of new shim
B	Thickness of used shim
C	Measured valve clearance

Intake: A = B + (C - 0.13 mm (0.005 in.)) × 1.5

Exhaust: A = B + (C - 0.27 mm (0.011 in.)) × 1.5

HINT:

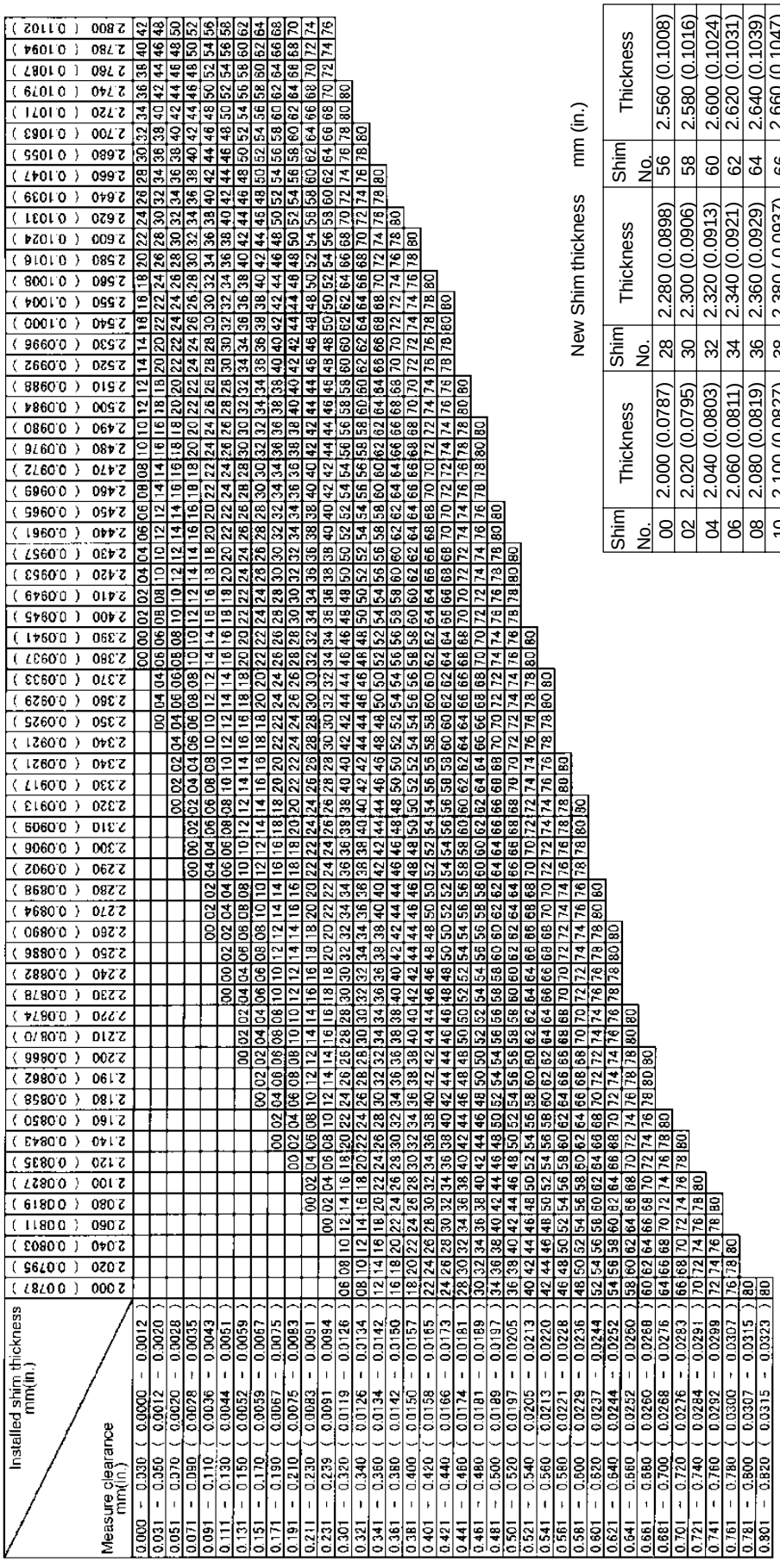
Shim are available in 41 sizes in increments of 0.020 mm (0.0008 in.), from 2.000 mm (0.0787 in.) to 2.800 mm (0.1102 in.).

CONTINUED

2ZZ-GE: Valve Shim Selection Chart (Intake)

| Measure clearance mm(in.) \ Installed shim thickness mm(in.) | 2.000 (0.0787) | 2.020 (0.0795) | 2.040 (0.0803) | 2.060 (0.0811) | 2.080 (0.0819) | 2.100 (0.0827) | 2.120 (0.0835) | 2.140 (0.0843) | 2.160 (0.0850) | 2.180 (0.0858) | 2.190 (0.0862) | 2.200 (0.0866) | 2.210 (0.0870) | 2.220 (0.0874) | 2.230 (0.0878) | 2.240 (0.0882) | 2.250 (0.0886) | 2.260 (0.0890) | 2.270 (0.0894) | 2.280 (0.0898) | 2.290 (0.0902) | 2.300 (0.0906) | 2.310 (0.0909) | 2.320 (0.0913) | 2.330 (0.0917) | 2.340 (0.0921) | 2.350 (0.0925) | 2.360 (0.0929) | 2.370 (0.0933) | 2.380 (0.0937) | 2.390 (0.0941) | 2.400 (0.0945) | 2.410 (0.0949) | 2.420 (0.0953) | 2.430 (0.0957) | 2.440 (0.0961) | 2.450 (0.0965) | 2.460 (0.0969) | 2.470 (0.0972) | 2.480 (0.0976) | 2.490 (0.0980) | 2.500 (0.0984) | 2.510 (0.0988) | 2.520 (0.0992) | 2.530 (0.0996) | 2.540 (0.1000) | 2.560 (0.1008) | 2.580 (0.1016) | 2.600 (0.1024) | 2.620 (0.1031) | 2.640 (0.1039) | 2.660 (0.1047) | 2.680 (0.1055) | 2.700 (0.1063) | 2.720 (0.1071) | 2.740 (0.1079) | 2.760 (0.1087) | 2.780 (0.1094) | 2.800 (0.1102) |
|---|---|---

2ZZ-GE: Valve Shim Selection Chart (Exhaust)



New Shim thickness mm (in.)

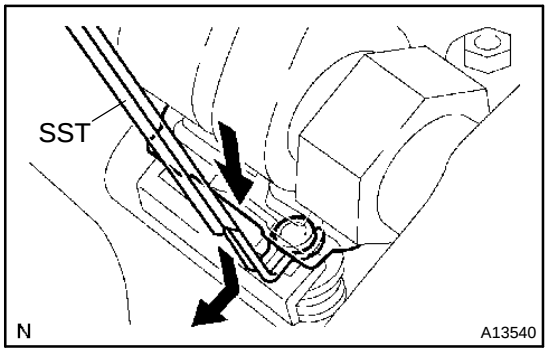
Shim No.	Thickness	Shim No.	Thickness	Shim No.	Thickness
00	2.000 (0.0787)	28	2.280 (0.0898)	56	2.560 (0.1008)
02	2.020 (0.0795)	30	2.300 (0.0906)	58	2.580 (0.1016)
04	2.040 (0.0803)	32	2.320 (0.0913)	60	2.600 (0.1024)
06	2.060 (0.0811)	34	2.340 (0.0921)	62	2.620 (0.1031)
08	2.080 (0.0819)	36	2.360 (0.0929)	64	2.640 (0.1039)
10	2.100 (0.0827)	38	2.380 (.0.0937)	66	2.660 (0.1047)
12	2.120 (0.0835)	40	2.400 (0.0945)	68	2.680 (0.1055)
14	2.140 (0.0843)	42	2.420 (0.0953)	70	2.700 (0.1063)
16	2.160 (0.0850)	44	2.440 (0.0961)	72	2.720 (0.1071)
18	2.180 (0.0858)	46	2.460 (0.0969)	74	2.740 (0.1079)
20	2.200 (0.0866)	48	2.480 (0.0976)	76	2.760 (0.1087)
22	2.220 (0.0874)	50	2.500 (0.0984)	78	2.780 (0.1094)
24	2.240 (0.0882)	52	2.520 (0.0992)	80	2.800 (0.1102)
26	2.260 (0.0890)	54	2.540 (0.1000)		

Exhaust valve clearance (Cold):
0.22 - 0.32 mm (0.0087 - 0.0126 in.)
EXAMPLE: The 2.200 mm (0.0862 in.) shim is installed, and the measured clearance is 0.500 mm (0.0197 in.).
Replace the 2.540 mm (0.1000 in.) shim with a new No. 54 shim.

P

A10467

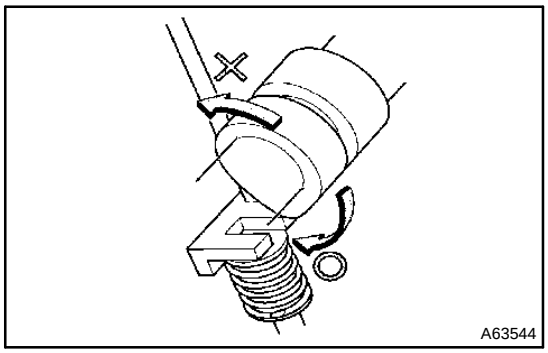
CONTINUED



(c) Apply seal packing to 2 locations as shown in the illustration.

HINT:

- Setting SST from the right above makes the removel easy.
- To remove SST from the adjusting shim, it is advisable to push down the rocker arm.



(d) Turn the crankshaft so that the related rocker arm, where the valve clearance is adjusted, is fully pushed down.

NOTICE:

- **Pay attention to the direction of the rotation to prevent the nose of the camshaft from interfering eith the SST's shaft.**
- **Do not ratate the crankshaft excessively.**

(e) After loosening 2 set screws of SST, remove SST itself.
SST 09248-77010 (09248-07010)

12. INSTALL V-RIBBED BELT TENSIONER ASSY
Torque:
Nut : 29 N·m (296 kgf·cm, 21 ft·lbf)
Bolt : 100 N·m (1,020 kgf·cm, 74 ft·lbf)

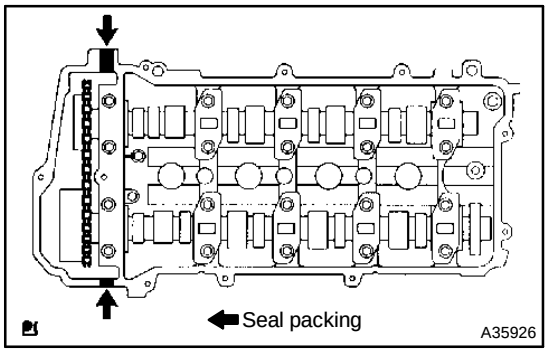
13. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSY RH

(a) Install the engine mounting insulator sub - assy RH with 5 bolts and 2 nuts.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

14. INSTALL CYLINDER HEAD COVER SUB-ASSY

(a) Remove anyold packing (FIPG) material.

HINT:
When FIPG on the head cover gasket side cannot be eliminated completely, replace, the gasket.

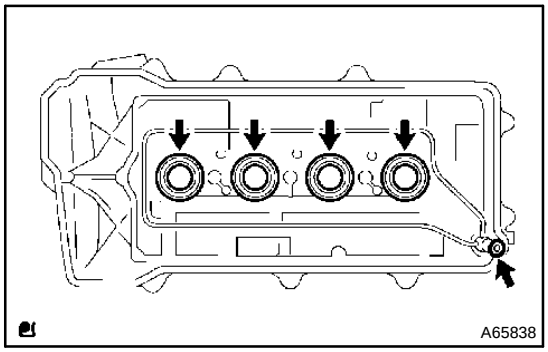


(b) Apply seal packing to 2 locations as shown in the illustration.
Seal packing : Part No. 08826 - 00080 or equivalent.

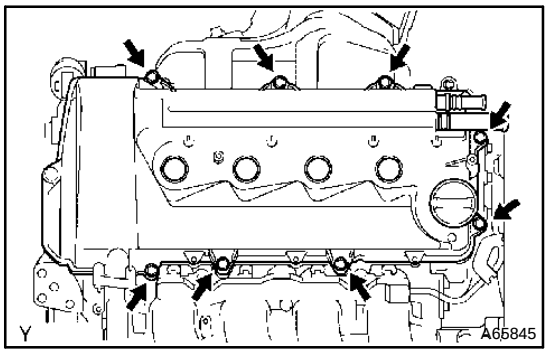
(c) Install the cylinder head cover gasket to the cylinder head cover.

HINT:
Part must be assembled within 3 minutes of application. Other wise the material must be remove and reapplied.

CONTINUED

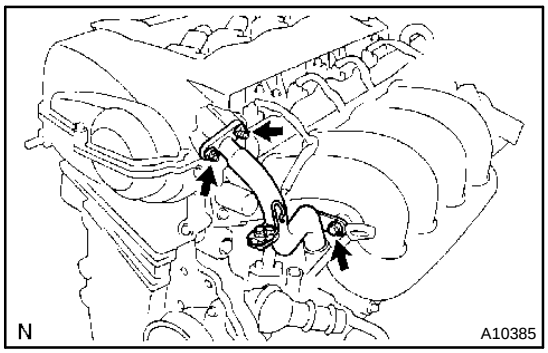


(d) Install the new spark plug tube gasket and a new O–ring to the cylinder head cover.



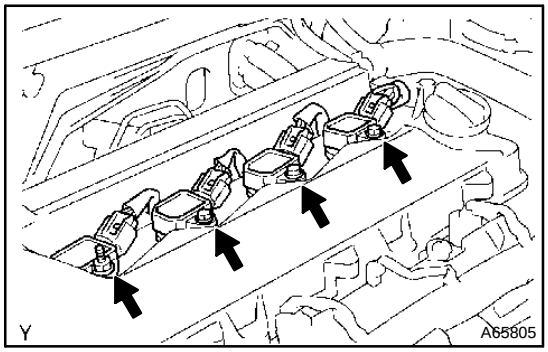
(e) Install the cylinder head cover and wire harness protector with 8 bolts.
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)

(f) Connect the PCV hoses to the cylinder head cover.



(g) Install a new gasket and No. 1 ventilation pipe with 2 nuts and a bolt.
Torque:
Nut : 10 N·m (102 kgf·cm, 7 ft·lbf)
Bolt : 24 N·m (245 kgf·cm, 18 ft·lbf)

(h) Connect the No. 3 ventilation hose to the No. 1 ventilation pipe.



15. INSTALL IGNITION COIL ASSY

(a) Install 4 ignition coils with 4 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

16. INSTALL CYLINDER HEAD COVER NO.2

(a) Install cylinder head cover No. 2 with 3 bolts and a nut.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

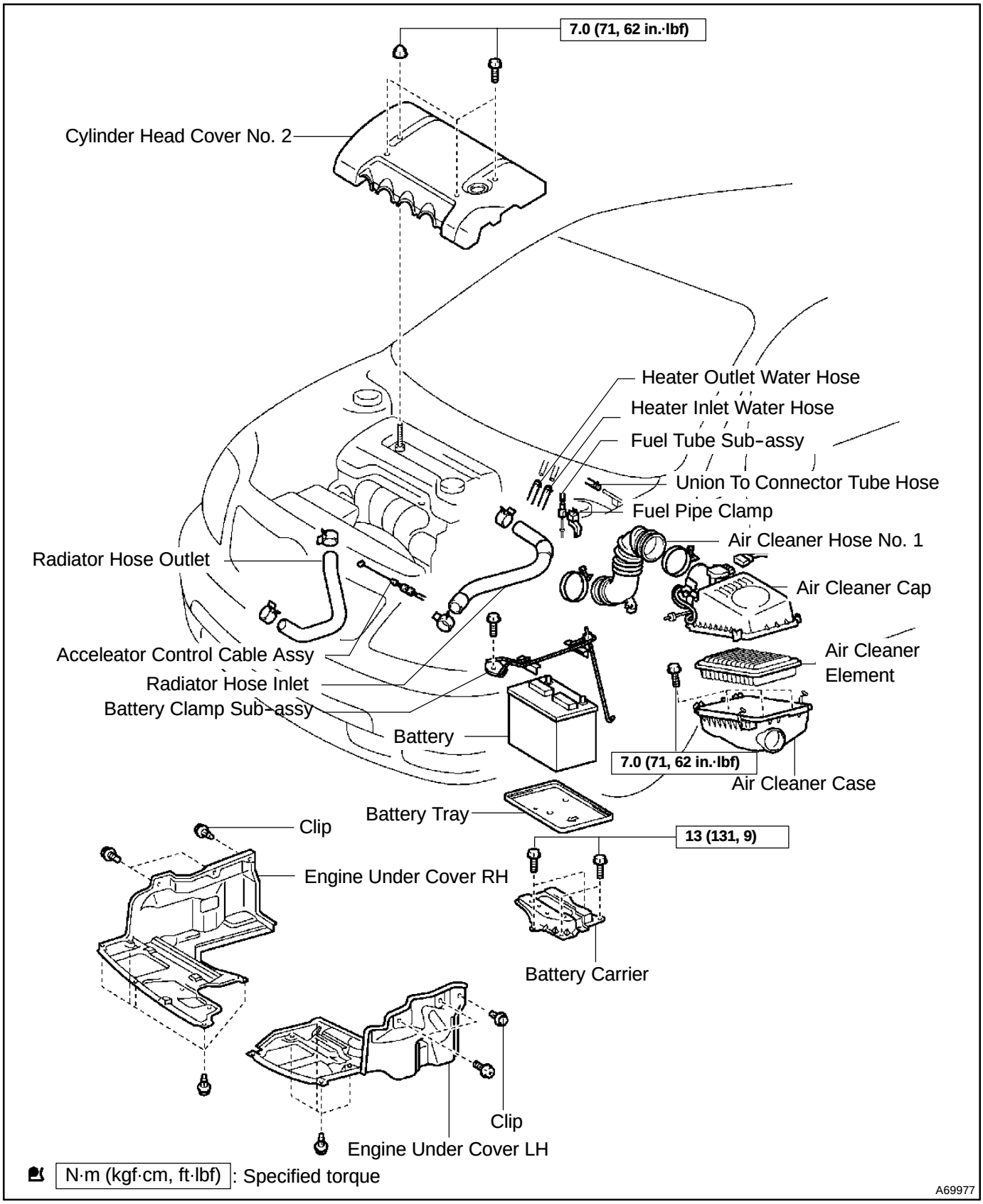
17. INSPECT OIL LEAK

CONTINUED

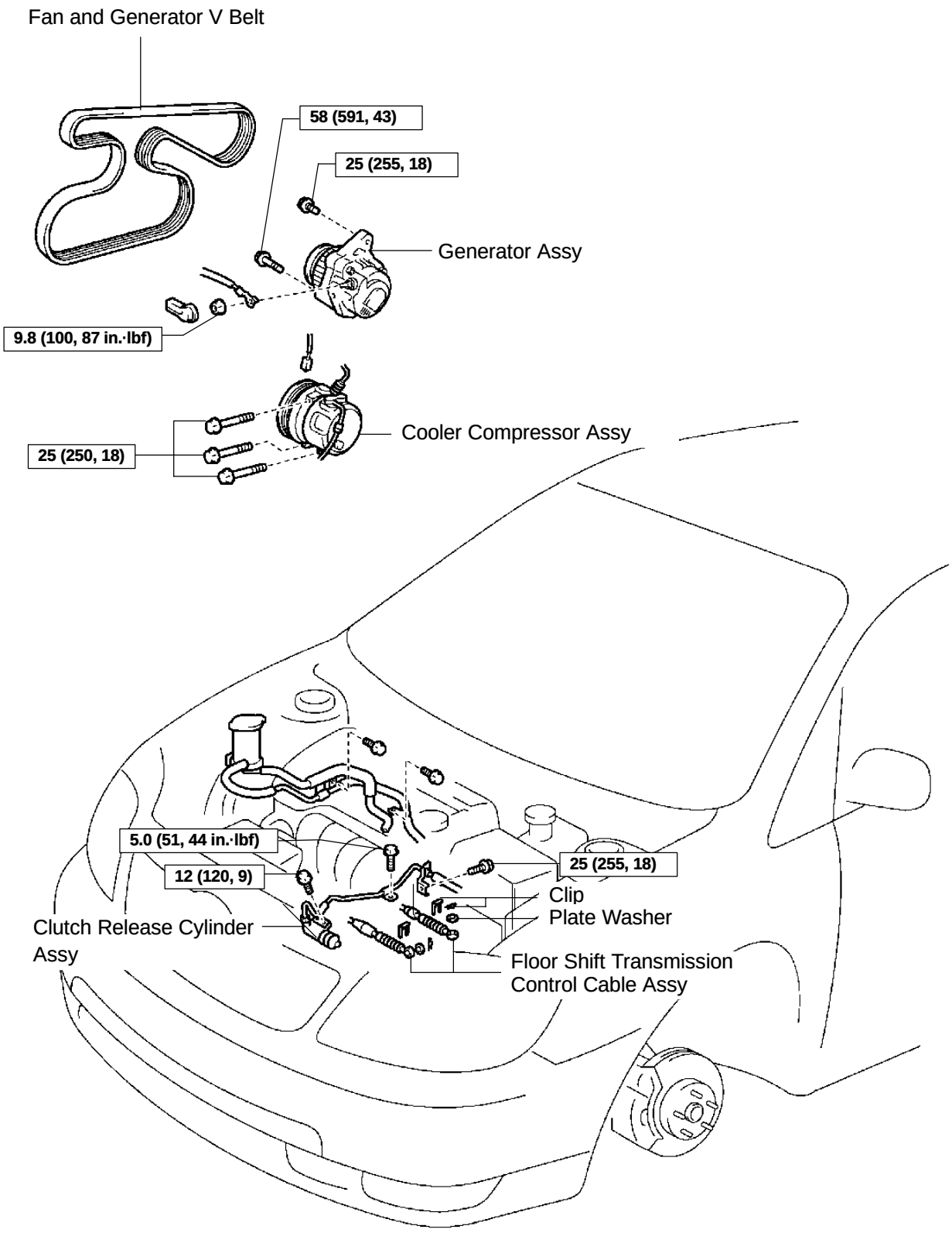
PARTIAL ENGINE ASSY (2ZZ-GE)

COMPONENTS

140V0-01



CONTINUED

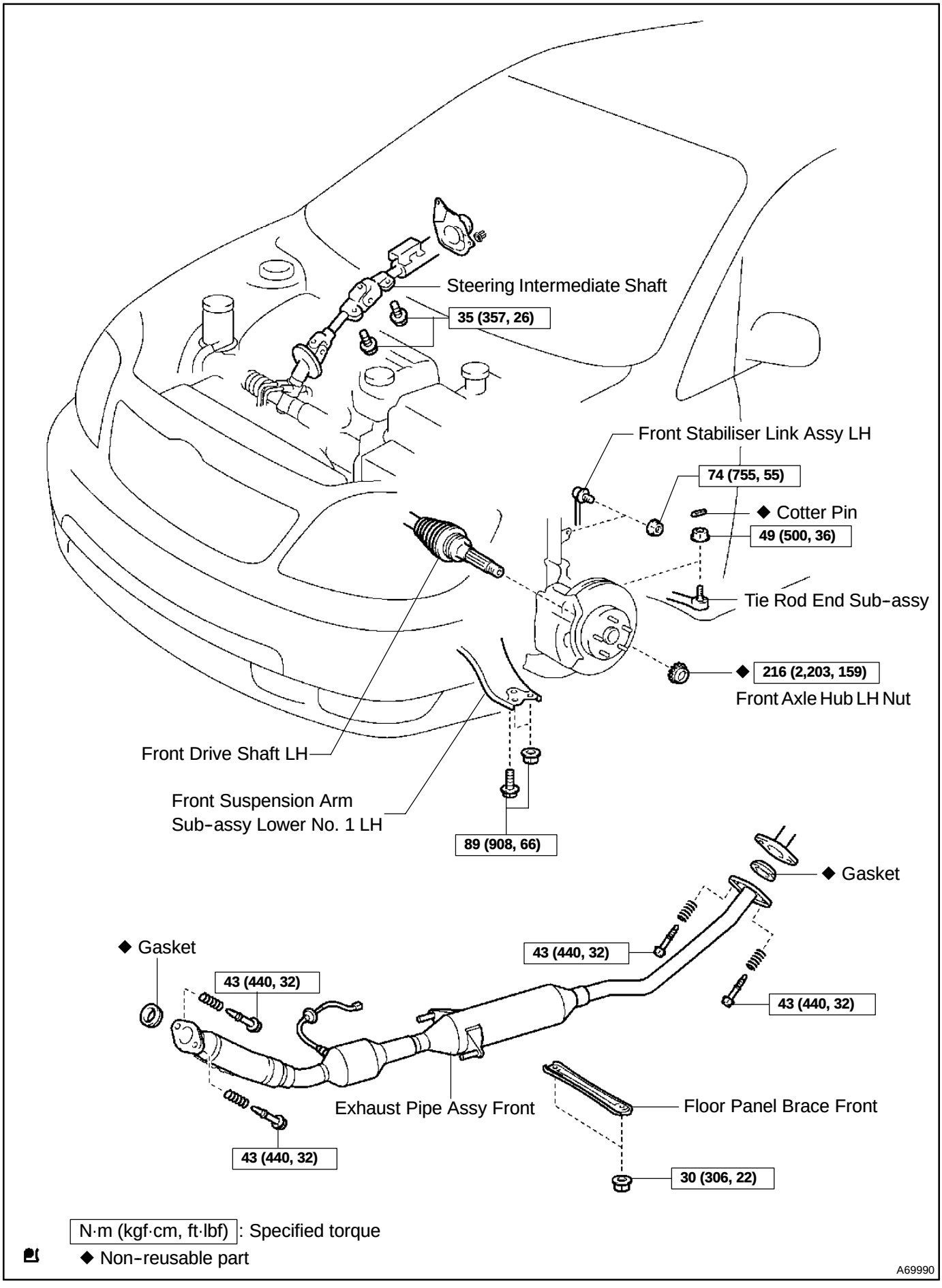


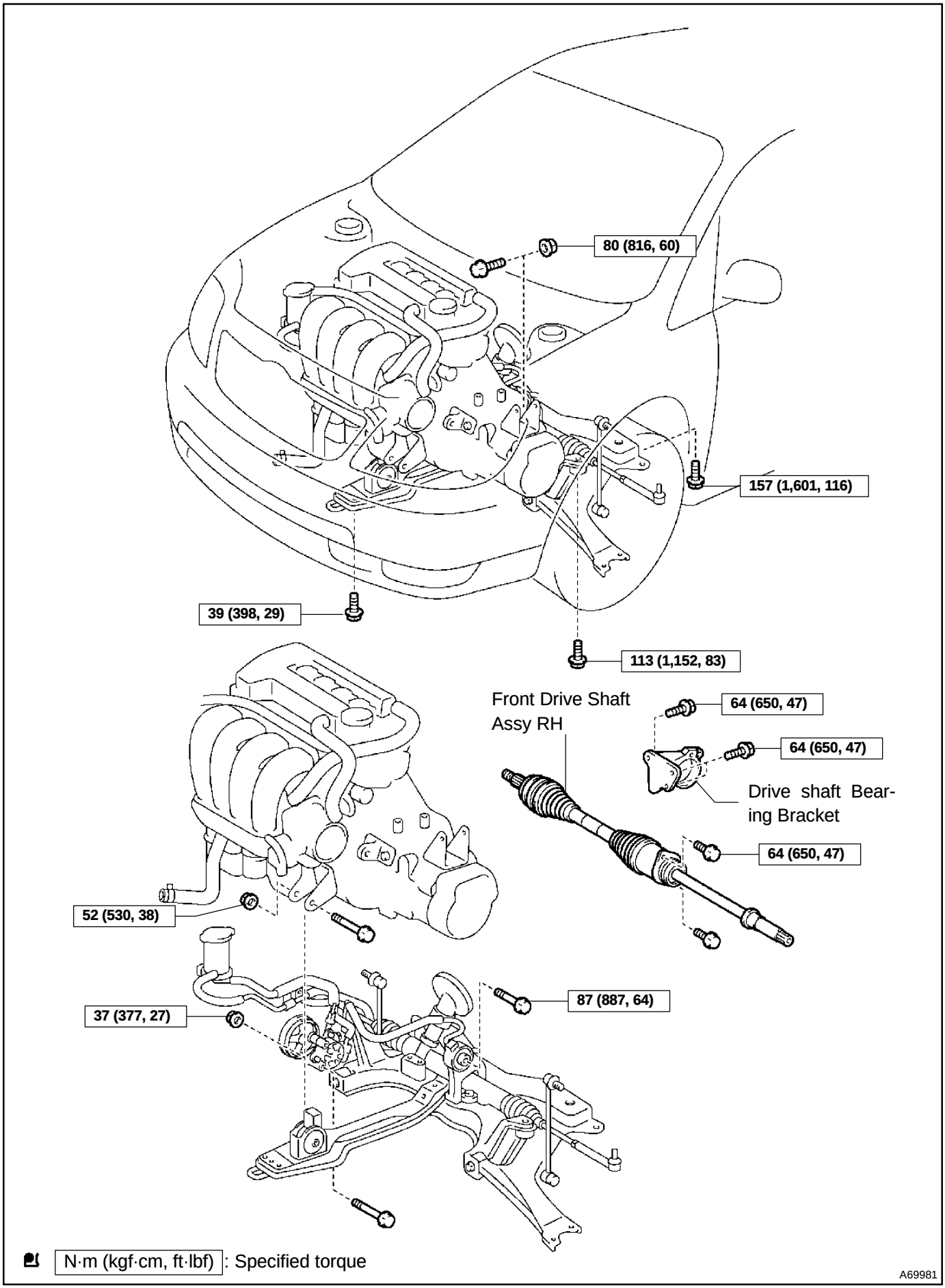
N·m (kgf·cm, ft·lbf): Specified torque

A69979

14-16

ENGINE MECHANICAL - PARTIAL ENGINE ASSY (2ZZ-GE)

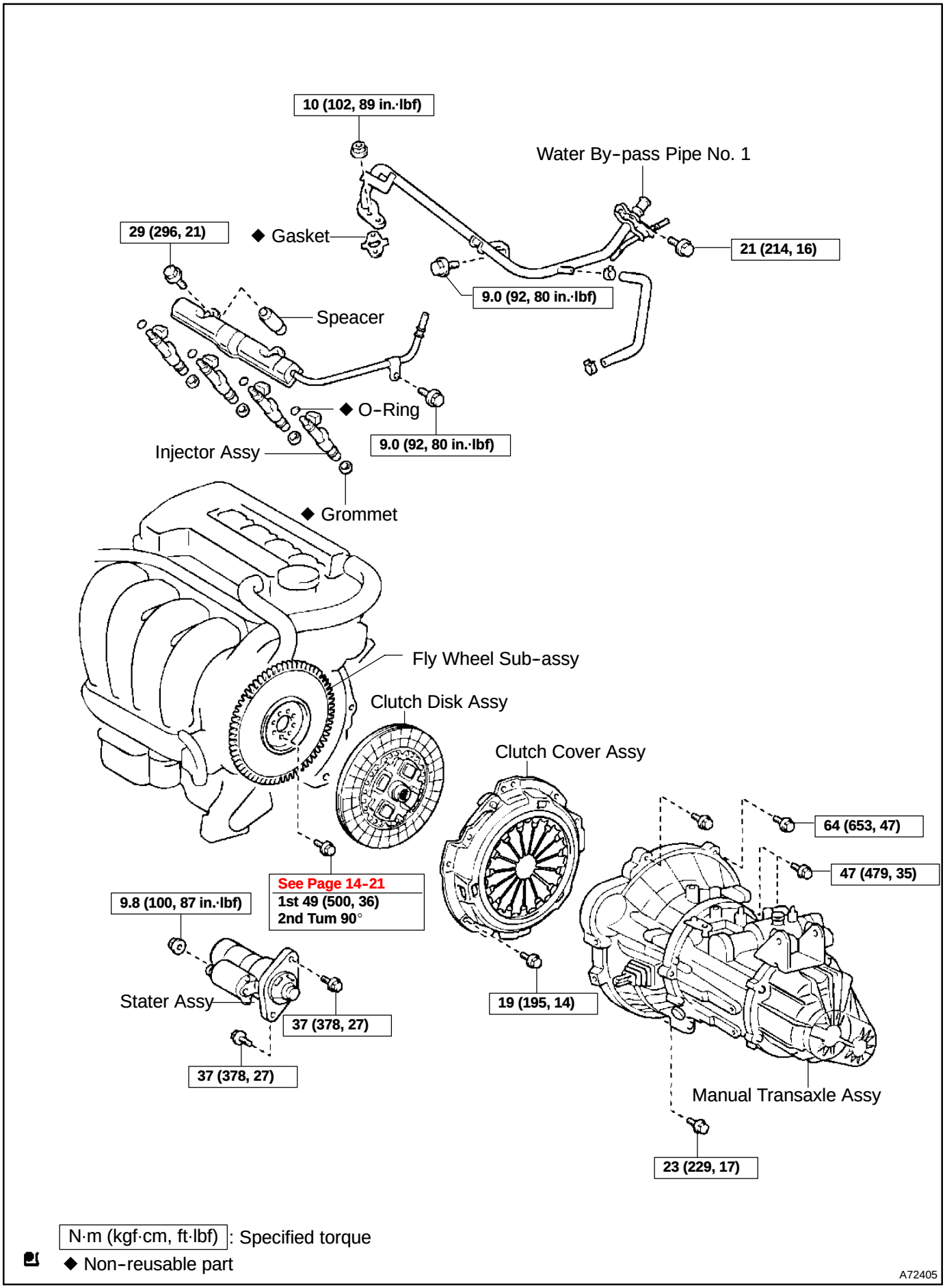



80 (816, 60)
157 (1,601, 116)
39 (398, 29)
113 (1,152, 83)
Front Drive Shaft Assy RH
64 (650, 47)
64 (650, 47)
Drive shaft Bearing Bracket
64 (650, 47)
52 (530, 38)
37 (377, 27)
87 (887, 64)
N·m (kgf·cm, ft·lbf): Specified torque
A69981

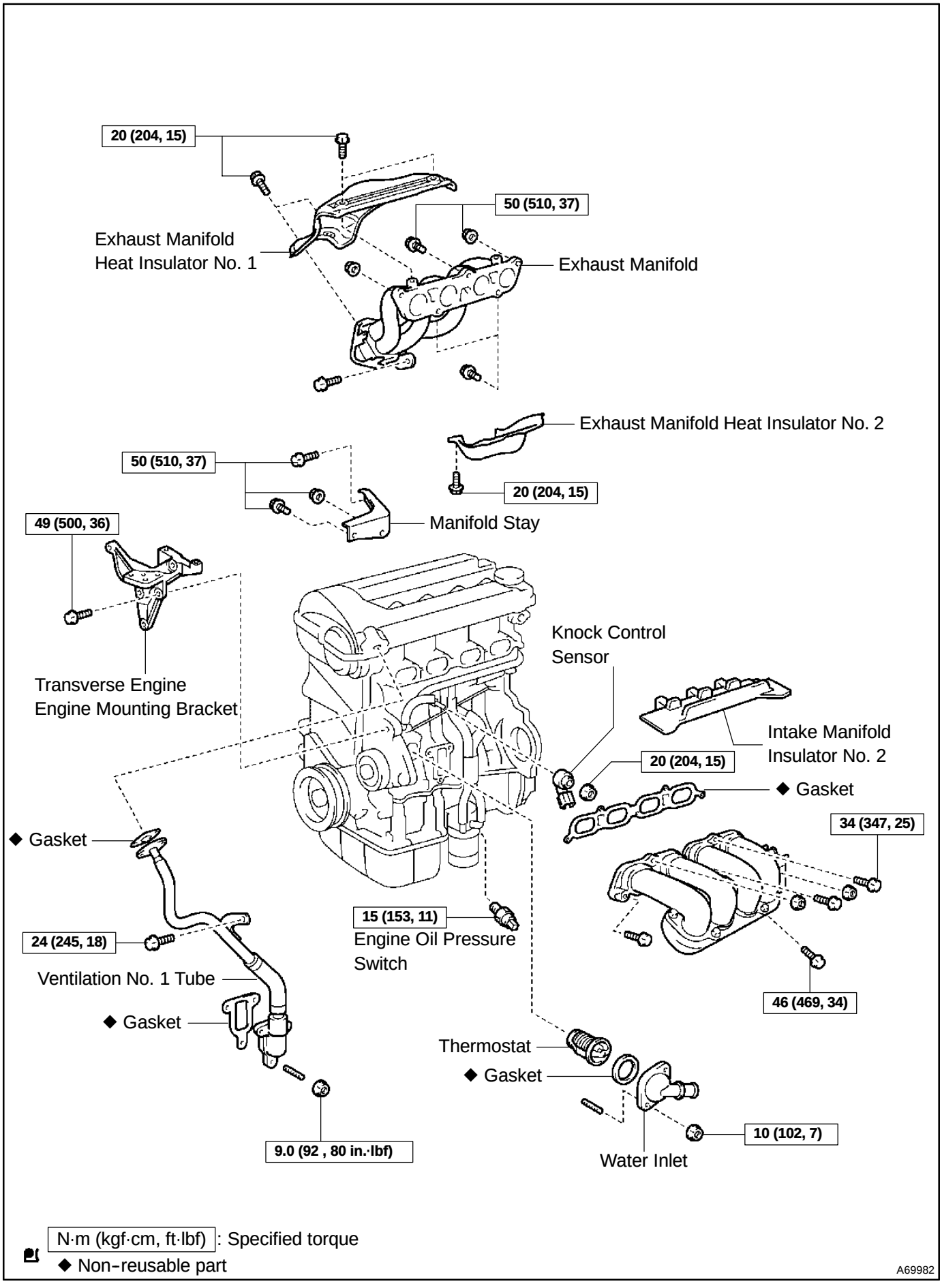
CONTINUED

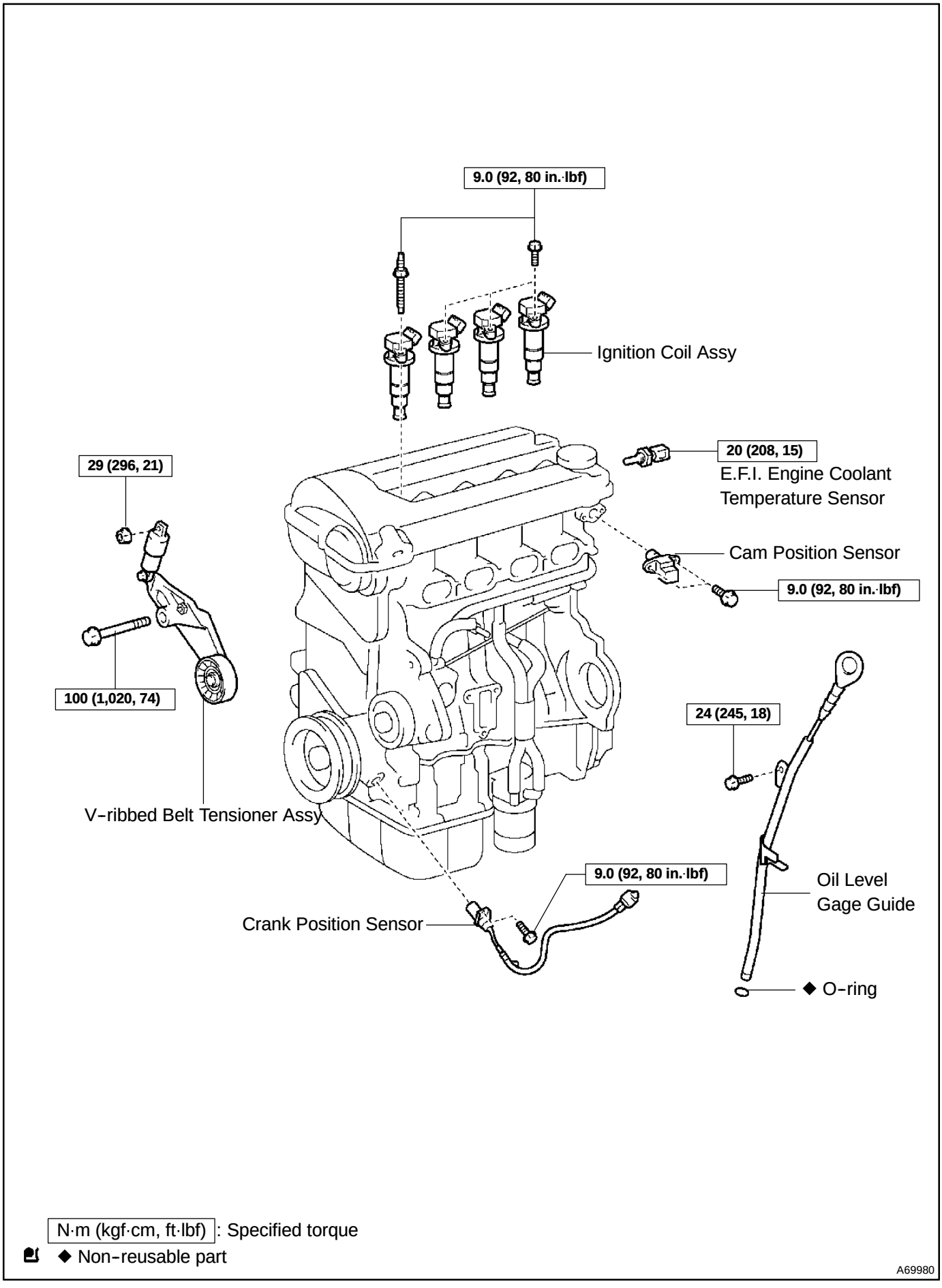
14-18

ENGINE MECHANICAL - PARTIAL ENGINE ASSY (2ZZ-GE)



CONTINUED

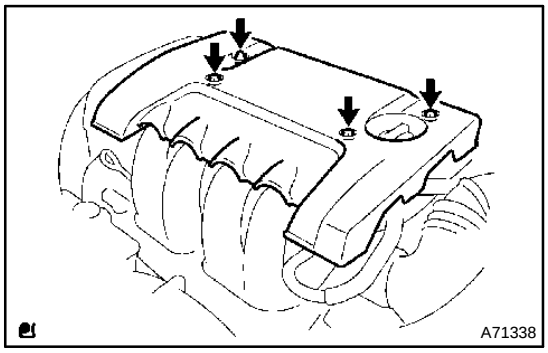

20 (204, 15)
50 (510, 37)
Exhaust Manifold
Heat Insulator No. 1
Exhaust Manifold
Exhaust Manifold Heat Insulator No. 2
50 (510, 37)
20 (204, 15)
Manifold Stay
49 (500, 36)
Transverse Engine
Engine Mounting Bracket
Knock Control
Sensor
Intake Manifold
Insulator No. 2
20 (204, 15)
◆ Gasket
34 (347, 25)
◆ Gasket
15 (153, 11)
Engine Oil Pressure
Switch
24 (245, 18)
Ventilation No. 1 Tube
◆ Gasket
46 (469, 34)
Thermostat
◆ Gasket
10 (102, 7)
9.0 (92 , 80 in.·lbf)
Water Inlet
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A69982


9.0 (92, 80 in.·lbf)
Ignition Coil Assy
29 (296, 21)
20 (208, 15)
E.F.I. Engine Coolant Temperature Sensor
Cam Position Sensor
9.0 (92, 80 in.·lbf)
100 (1,020, 74)
24 (245, 18)
V-ribbed Belt Tensioner Assy
9.0 (92, 80 in.·lbf)
Oil Level Gage Guide
Crank Position Sensor
◆ O-ring
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A69980

CONTINUED

REPLACEMENT

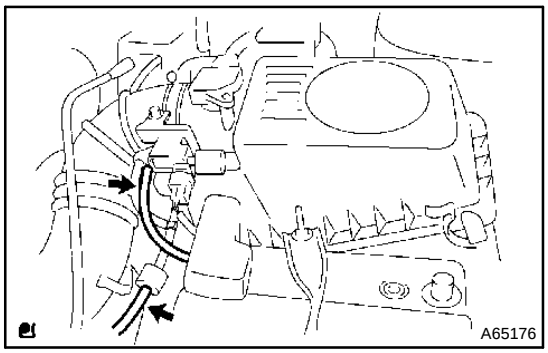
1. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT (See page 11-1)
2. REMOVE FRONT WHEELS
3. REMOVE ENGINE UNDER COVER RH
4. REMOVE ENGINE UNDER COVER LH
5. DRAIN COOLANT (See page 16-6)
6. DRAIN MANUAL TRANSAXLE OIL



7. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove 3 bolts, a nut and the cylinder head cover No. 2.

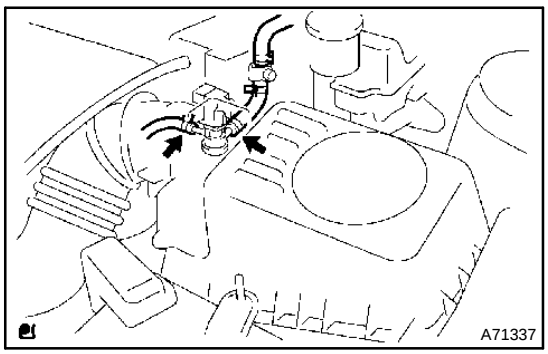
8. REMOVE INTAKE MANIFOLD INSULATOR NO.2
9. REMOVE BATTERY



10. REMOVE AIR CLEANER ASSEMBLY WITH HOSE

(a) Place match marks on the vacuum hoses.

(b) Disconnect 2 vacuum hoses from the air cleaner cap.

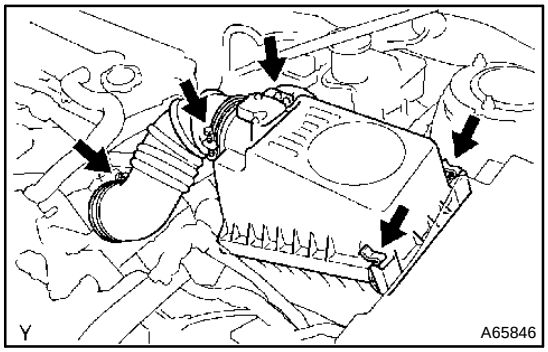


(c) Disconnect 2 vacuum hoses, as shown in the illustration.

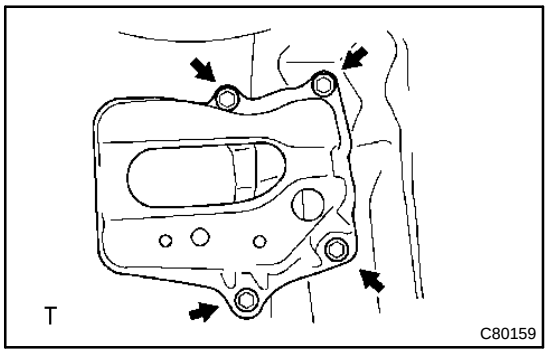
(d) Disconnect the intale air flow meter connector.

(e) Disconnect 2 VSV connectors.

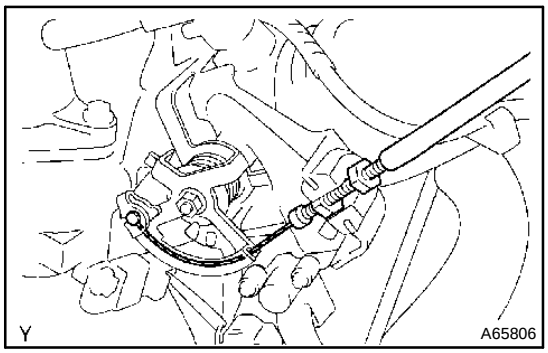
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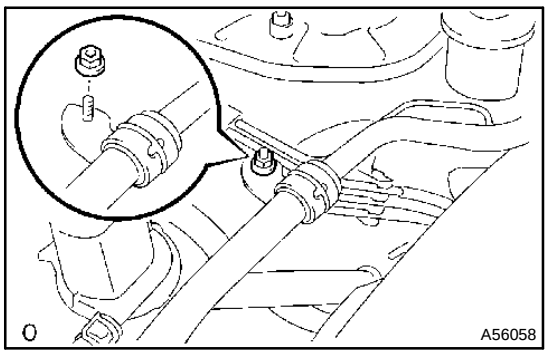
(f) Disconnect 2 clamps, and disconnect the air cleaner cap from the air cleaner case.
(g) Loosen the hose clamp bolt, and disconnect the air cleaner hose from the throttle body.
(h) Remove the air cleaner cap with hose.
(i) Remove the air filter.
(j) Disconnect the wire harness clamp.
(k) Remove 3 bolts and the air cleaner case.



11. REMOVE BATTERY CARRIER
(a) Remove 4 bolts and the battery carrier.



12. SEPARATE ACCELERATOR CONTROL CABLE ASSY



13. REMOVE COOLER REFRIGERANT SUCTION HOSE NO.1
(a) Remove a nut and separate the cooler refrigerant suction hose.

14. REMOVE FAN AND GENERATOR V BELT **(See page 14-4)**
15. REMOVE EFI FUEL PIPE CLAMP **(See page 11-1)**
16. DISCONNECT FUEL TUBE SUB-ASSY **(See page 11-1)**
17. DISCONNECT RADIATOR HOSE INLET
(a) Disconnect the radiator hose inlet from the radiator.
18. DISCONNECT RADIATOR HOSE OUTLET
(a) Disconnect the radiator hose outlet from the radiator.
19. DISCONNECT FLOOR SHIFT CABLE TRANSMISSION CONTROL SHIFT **(See page 41-3)**
20. DISCONNECT FLOOR SHIFT CABLE TRANSMISSION CONTROL SELECT **(See page 41-3)**

CONTINUED

21. DISCONNECT HEATER INLET WATER HOSE

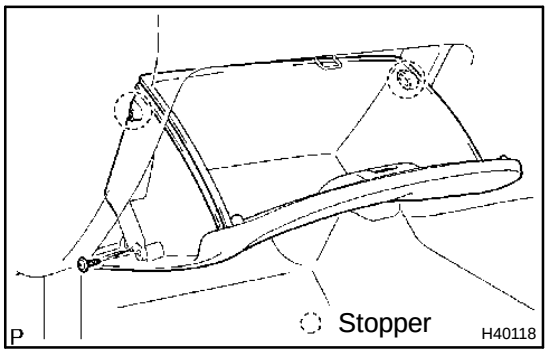
(a) Disconnect the heater inlet water hose from the air conditioner tube.

22. DISCONNECT HEATER OUTLET WATER HOSE

(a) Disconnect the heater outlet water hose from the air conditioner tube.

23. DISCONNECT UNION TO CONNECTOR TUBE HOSE

(a) Disconnect the union to check valve hose from the brake booster.



24. REMOVE GLOVE COMPARTMENT DOOR ASSY

(a) Remove a screw and the glove compartment door stopper from the glove compartment.

(b) Deform the upper part of the glove compertment door to release the stoppers.

(c) Pull the glove compertment door upward to remove it.

25. DISCONNECT ENGINE WIRE

(a) Remove the engine room relay block cover.

(b) Disconnect 3 connectors from the engine room relay block.

(c) Disconnect 2 wireharness clamps.

(d) Disconnect 2 ground cables from the vehicle.

(e) Disconnect 2 ECM connectors.

(f) Disconnect 3 cowl wire connectors from connectors on bracket.

(g) Pull out the engine wire from the cabin.

26. DISCONNECT CLUTCH RELEASE CYLINDER ASSY **(See page 41-3)**

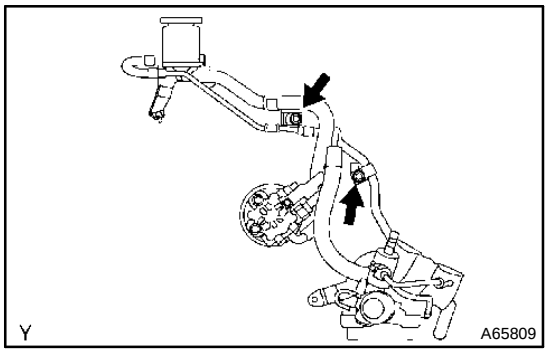
27. REMOVE COMPRESSOR AND MAGNETIC CLUTCH

(a) Disconnect the connector.

(b) Remove 3 bolts and the compressor.

HINT:

Hung up the hoses instead of detaching.



28. SEPARATE RETURN TUBE SUB-ASSY

(a) Remove 2 clamp bolts and separate the return tube sub-assy.

29. SEPARATE VANE PUMP OIL RESERVOIR ASSY

(a) Remove 2 bolts and the oil reservoir assy.

30. REMOVE VANE PUMP ASSY

(a) Disconnect a connector.

(b) Remove a bolt, nut and the vane pump.

CONTINUED

31. REMOVE FLOOR PANEL BRACE FRONT **(See page 15-2)**

32. REMOVE EXHAUST PIPE ASSY FRONT **(See page 15-2)**

33. REMOVE STEERING INTERMEDIATE SHAFT **(See Pub. RM821E on page 51 - 17)**

34. REMOVE FRONT AXLE HUB LH NUT **(See Pub. RM821E on page 30 - 05)**

SST 09930-00010

35. REMOVE FRONT AXLE HUB RH NUT

SST 09930-00010

HINT:

Perform the same procedure as above on the opposite side.

36. SEPARATE TIE ROD END SUB-ASSY LH **(See Pub. RM821E on page 30 - 05)**

SST 09628-62011

37. SEPARATE TIE ROD END SUB-ASSY RH

SST 09628-62011

HINT:

Perform the same procedure as above on the opposite side.

38. SEPARATE FRONT STABILIZER LINK ASSY LH **(See Pub. RM821E on page 26 - 14)**

39. SEPARATE FRONT STABILIZER LINK ASSY RH

HINT:

Perform the same procedure as above on the opposite side.

40. SEPARATE FRONT SUSPENSION ARM SUB-ASSY LOWER NO.1 LH
(See Pub. RM821E on page 26 - 07)

41. SEPARATE FRONT SUSPENSION ARM SUB-ASSY LOWER NO.1 RH

HINT:

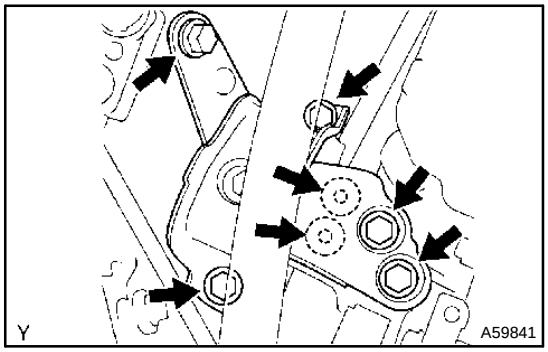
Perform the same procedure as above on the opposite side.

42. SEPARATE FRONT AXLE ASSY LH **(See Pub. RM821E on page 30 - 05)**

43. SEPARATE FRONT AXLE ASSY RH

HINT:

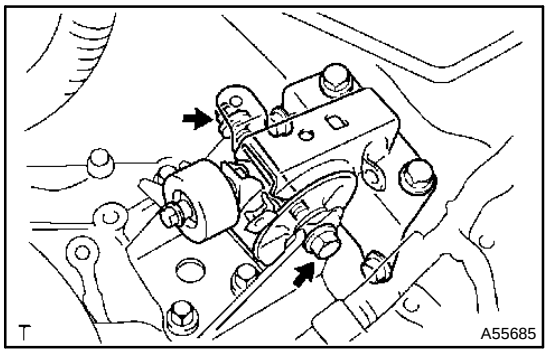
Perform the same procedure as above on the opposite side.



44. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

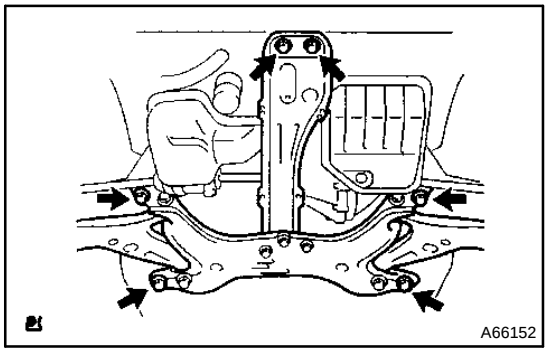
(a) Set the engine lifter.

(b) Remove 5 bolts, 2 nuts and the engine mounting insulator RH.

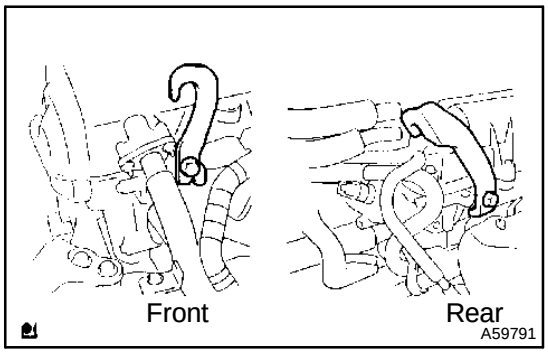


(c) Remove a through bolt and nut, detach the engine mounting insulator LH from the vehicle.

CONTINUED



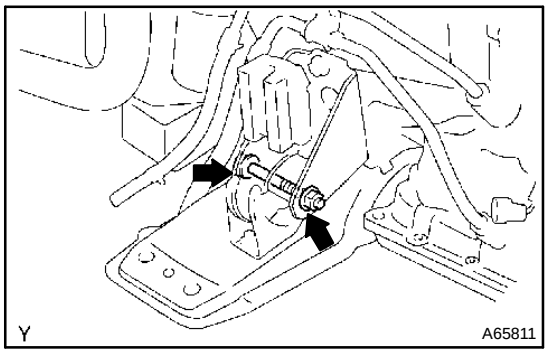
(d) Remove 6 bolts, as shown in the illustration.
(e) Carefully, remove the engine assembly from the vehicle.



(f) Install 2 engine hangers as shown in the illustration.
Parts No.:
No. 1 engine hanger 12281-88600
No. 2 engine hanger 12282-88600
Bolt: 91512-61020
Torque: 38 N·m (387 kgf·cm, 28 ft·lbf)

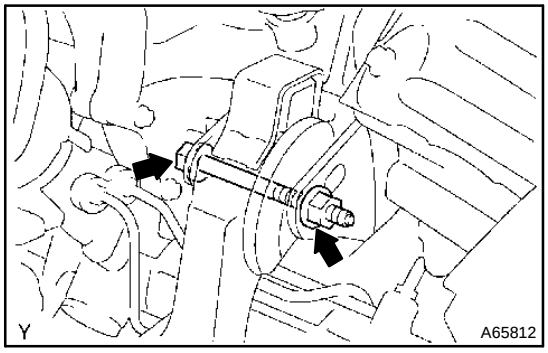
HINT:
Be sure to install engine hanger (12281–88600) to the front side of the engine, and engine hanger (12282–88600) to the rear side.

(g) Using the chain block and the engine sling device, hang the engine assembly.



45. REMOVE FRONT SUSPENSION CROSSMEMBER W/CENTER MEMBER

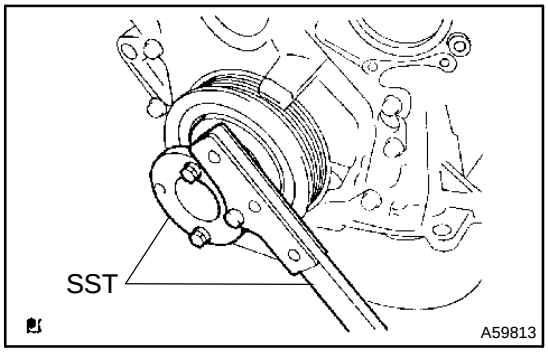
(a) Remove the through bolt and a nut, detach the engine mounting insulator FR from the engine mounting bracket.



(b) Remove the through bolt, detach the engine mounting insulator RR from the suspension crossmember.
(c) Separate the engine and transaxle assembly from the front suspension crossmember w/center member.

46. REMOVE STARTER ASSY **(See page 19-3)**
47. REMOVE FRONT DRIVE SHAFT ASSY RH **(See Pub. RM821E on page 30 - 05)**
48. SEPARATE MANUAL TRANSAXLE ASSY **(See page 41-3)**
49. REMOVE CLUTCH COVER ASSY **(See Pub. RM821E on page 42 - 12)**
50. REMOVE CLUTCH DISC ASSY **(See Pub. RM821E on page 42 - 12)**

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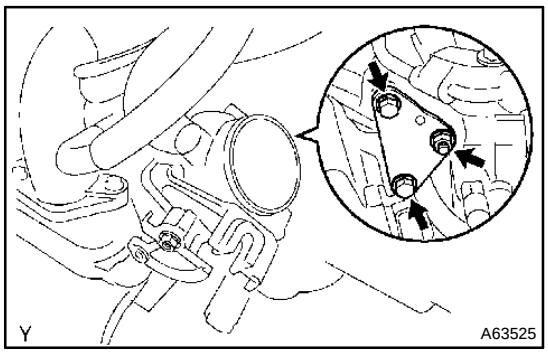
51. REMOVE FLYWHEEL SUB-ASSY

(a) Fix the crankshaft with SST, then remove the flywheel.
SST 09213-70011 (09213-70020), 09330-00021

52. INSTALL ENGINE STAND

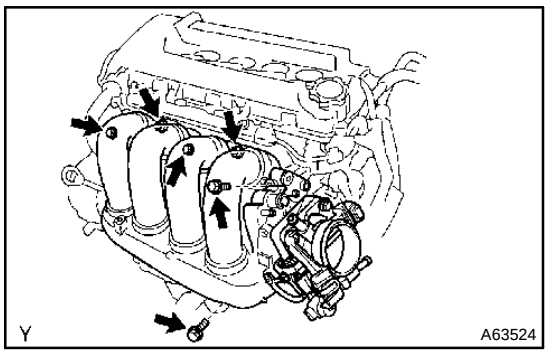
53. REMOVE OIL LEVEL GAGE SUB-ASSY

54. REMOVE OIL LEVEL GAGE GUIDE



55. REMOVE SURGE TANK STAY NO.1

(a) Remove 2 bolts, a nut and the surge tank stay.

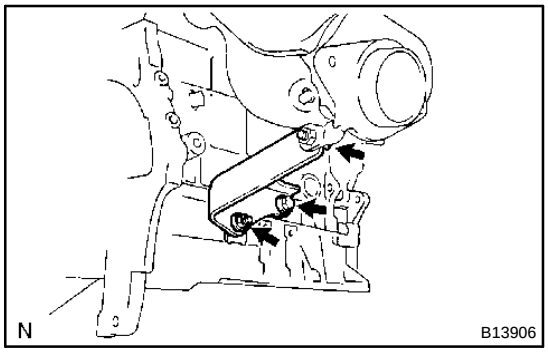


56. REMOVE INTAKE MANIFOLD

(a) Remove 4 bolts, 2 nuts, the intake manifold and the gasket.

57. REMOVE V-RIBBED BELT TENSIONER ASSY

(a) Remove a bolt, a nut and the v-ribbed belt tensioner assy.



58. REMOVE MANIFOLD STAY

(a) Remove 2 bolts, a nut and the exhaust manifold stay.

CONTINUED

59. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.1

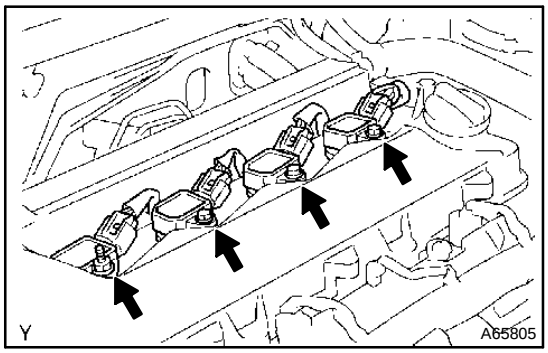
60. REMOVE EXHAUST MANIFOLD

(a) Remove 3 bolts, 2 nuts, the exhaust manifold and the gasket.

61. REMOVE GENERATOR BRACKET NO.1 **(See page 19–8)**

62. REMOVE GENERATOR ASSY**(See page 19–8)**

63. REMOVE FUEL DELIVERY PIPE SUB–ASSY**(See page 11–10)**



64. REMOVE IGNITION COIL ASSY

(a) Disconnect 4 ignition coil connectors.

(b) Remove 4 bolts and 4 ignition coils.

65. REMOVE THERMOSTAT**(See page 16–10)**

66. REMOVE WATER BY–PASS PIPE NO.1

(a) Remove 2 bolts, 2 nuts, the water by–pass pipe No. 1 and the gasket.

67. REMOVE ENGINE OIL PRESSURE SWITCH ASSY

(a) Using the SST, remove the oil pressure switch.

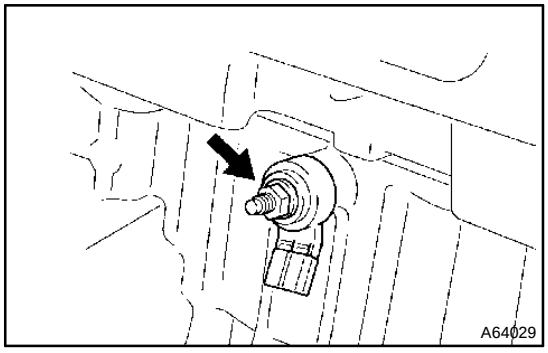
SST 09268–46021

68. REMOVE UNION TO CONNECTOR TUBE HOSE

(a) Remove the clamp and tube.

69. REMOVE CRANK POSITION SENSOR

70. REMOVE CAM POSITION SENSOR



71. REMOVE KNOCK CONTROL SENSOR

(a) Remove a nut and the knock control sensor.

72. REMOVE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

(a) Using SST, remove the water temperature sensor.

SST 09817–33190

73. REPLACE PARTIAL ENGINE ASSY

74. INSTALL E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

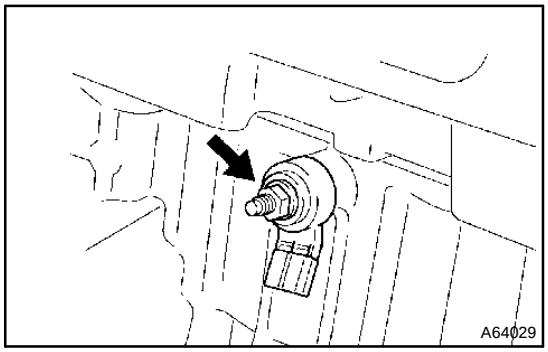
(a) Install a new gasket to the water temperature sensor.

(b) Using SST, install the water temperature sensor.

SST 09817–33190

Torque: 20 N·m (208 kgf·cm, 15 ft·lbf)

CONTINUED



75. INSTALL KNOCK CONTROL SENSOR

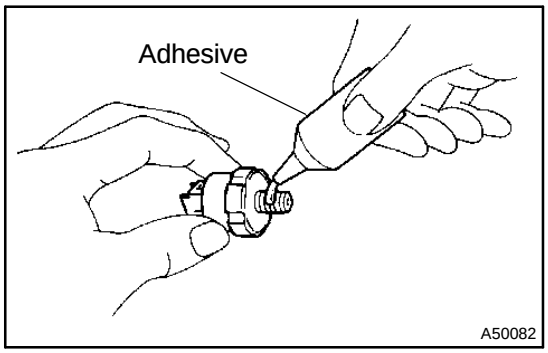
(a) install a nut and the knock control sensor.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

76. INSTALL CAM POSITION SENSOR
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

77. INSTALL CRANK POSITION SENSOR

(a) Install the crank position sensor and cord wiring clamp.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

78. INSTALL UNION TO CONNECTOR TUBE HOSE
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)



79. INSTALL ENGINE OIL PRESSURE SWITCH ASSY

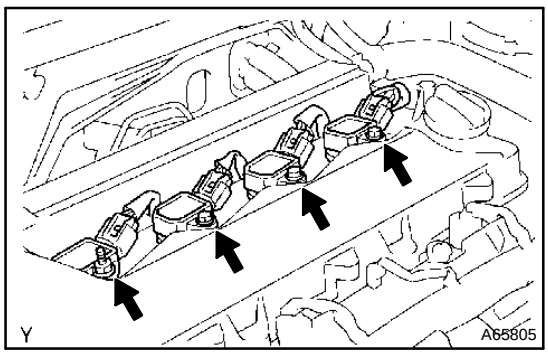
(a) Clean the threads of the oil pressure switch, apply adhesive there.
Adhesive:
Part No. 08833-00080, THREE BOND 1344, LOCTITLE 242 or equivalent.

(b) Using a SST, install the oil pressure switch.
SST 09268-46021
Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)

80. INSTALL WATER BY-PASS PIPE NO.1

(a) Install 2 bolts, 2 nuts, the water by-pass pipe and the new gasket.
Torque:
8.5 N·m (87 kgf·cm, 75 in.·lbf) for M6
21 N·m (214 kgf·cm, 15 ft·lbf) for M8
10 N·m (102 kgf·cm, 7 ft·lbf) for Nut

81. INSTALL THERMOSTAT **(See page 16-10)**



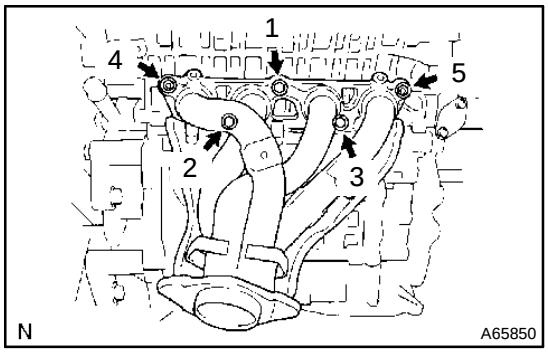
82. INSTALL IGNITION COIL ASSY

(a) Install 3 bolts, a nut and 4 ignition coils.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

(b) Connect 4 ignition coil connectors.

CONTINUED

83. INSTALL FUEL DELIVERY PIPE SUB–ASSY **(See page 11–10)**



84. INSTALL EXHAUST MANIFOLD

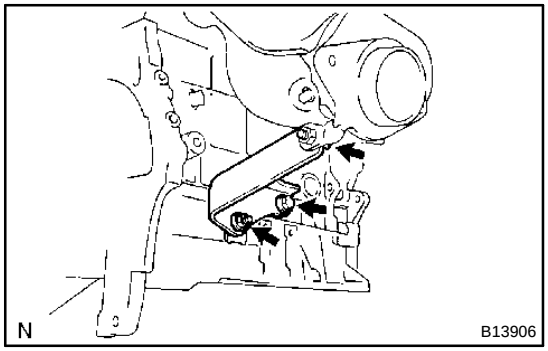
(a) Install a new gasket.

(b) Install and uniformly tighten 3 bolts and 2 nuts in several passes and in the sequence shown.

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

85. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.1

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



86. INSTALL MANIFOLD STAY

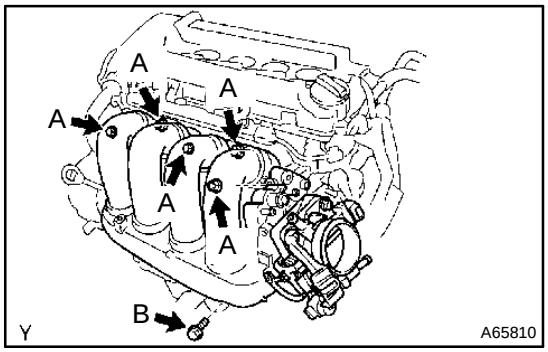
(a) Install the manifold stay with 2 bolts and a nut.

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

87. INSTALL V–RIBBED BELT TENSIONER ASSY

(a) Install bolt, a nut and the V–ribbed belt tensioner assy.

Torque:
Nut: 29 N·m (296 kgf·cm, 21 ft·lbf)
Bolt: 100 N·m (1,020 kgf·cm, 74 ft·lbf)

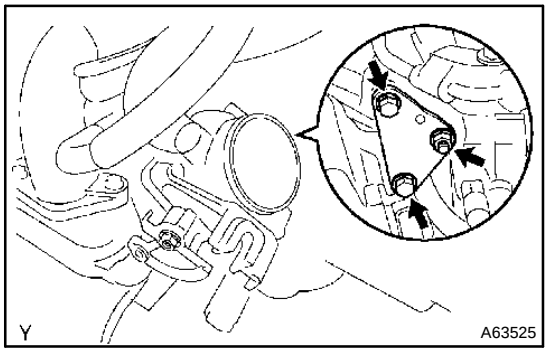


88. INSTALL INTAKE MANIFOLD

(a) Install the new gasket and the intake manifold with 4 bolts and 2 nuts.

Torque:
A: 34 N·m (347 kgf·cm, 25 ft·lbf)
B: 46 N·m (469 kgf·cm, 34 ft·lbf)

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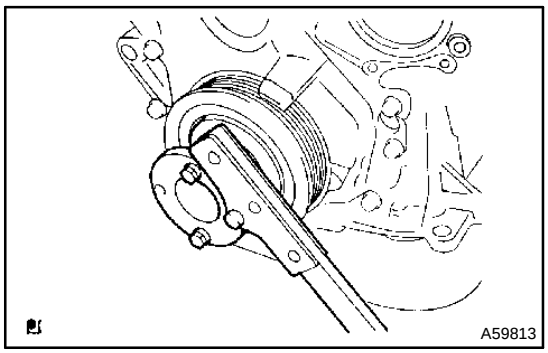


89. INSTALL SURGE TANK STAY NO.1

(a) Install the surge tank stay with 2 bolts and a nut.
Torque:24 N·m (245 kgf·cm, 18 ft·lbf)

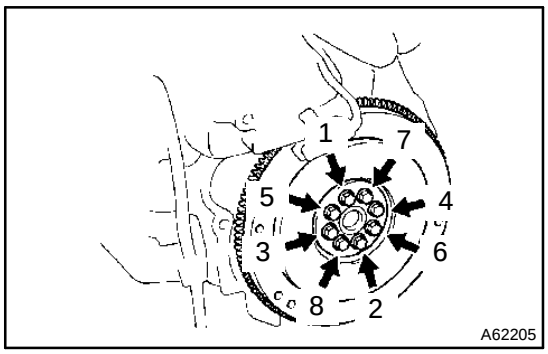
90. INSTALL OIL LEVEL GAGE GUIDE

(a) Apply a light coat of the engine oil to a new O-ring, install it to the oil level gage guide.
(b) Install the oil level gage and guide with a bolt.
Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)

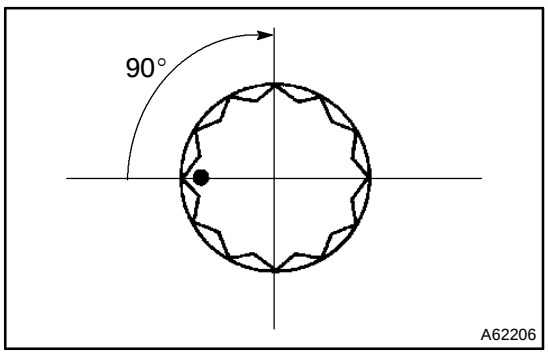


91. INSTALL FLYWHEEL SUB-ASSY

(a) Fix the crankshaft with SST.
SST 09213-70011 (09213-70020), 09330-00021



(b) Clean the bolts and bolt holes.
(c) Apply adhesive to the bolts.
Adhesive:
Part No. 09330-00070, THREE BOND or equivalent.
(d) Install and uniformly tighten the 8 bolts, in several passes, in the sequence shown.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



(e) Mark the bolts with paint.
(f) Retighten the bolts by an additional 90°.
(g) Check that the point marked bolts are moved at 90° angle.

92. INSTALL CLUTCH DISC ASSY (See Pub. RM821E on page 42 - 12)
SST 09301-00210

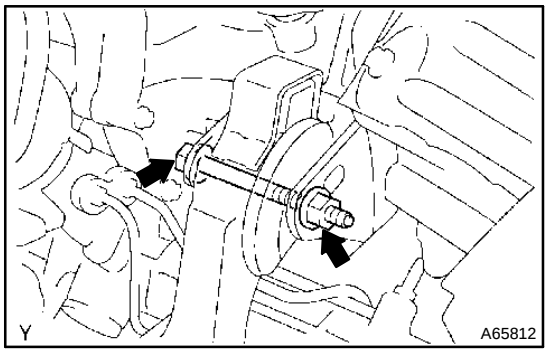
93. INSTALL CLUTCH COVER ASSY(See Pub. RM821E on page 42 - 12)
SST 09301-00210

94. INSTALL FRONT DRIVE SHAFT ASSY RH (See Pub. RM821E on page 30 - 05)

CONTINUED

95. INSTALL MANUAL TRANSAXLE ASSY **(See page 41-3)**

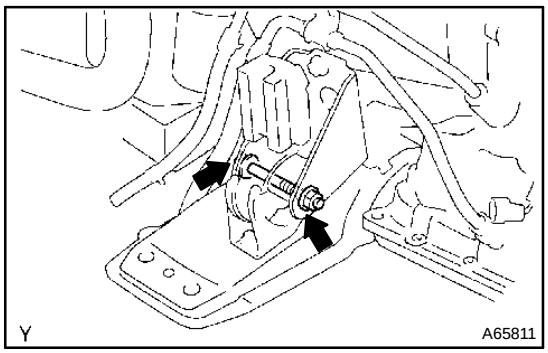
96. INSTALL STARTER ASSY **(See page 19-3)**



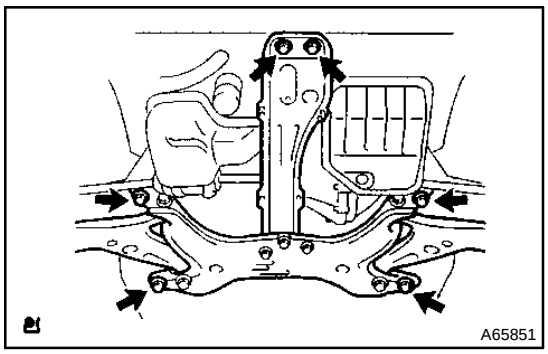
97. INSTALL FRONT SUSPENSION CROSSMEMBER W/CENTER MEMBER

(a) Attach the engine and transaxle assembly to the suspension crossmember w/center member.

(b) Install the bolt holding the rear engine mounting bracket to the mounting insulator RR.
Torque: 87 N·m (887 kgf·cm, 64 ft·lbf)



(c) Install the bolt holding the front engine mounting bracket to the mounting insulator FR.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

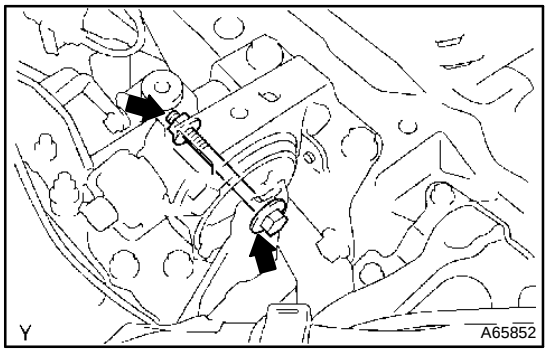


98. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine assembly with transaxle on the engine lifter.

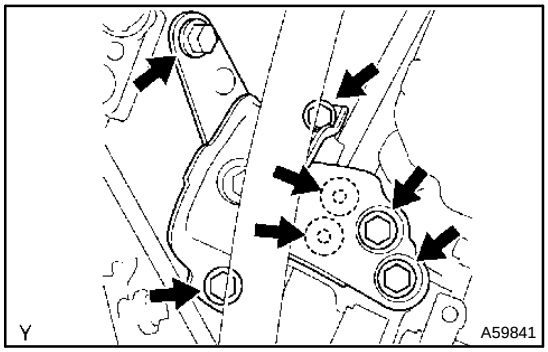
(b) Install the engine assembly to the vehicle.

(c) Temporarily, install the suspension crossmember and 6 bolts.

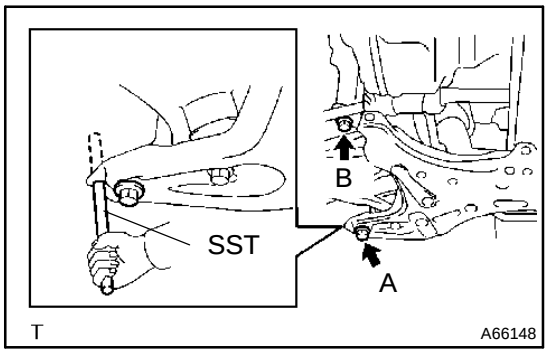


(d) Install the engine mounting insulator LH.
Torque: 80 N·m (816 kgf·cm, 60 ft·lbf)

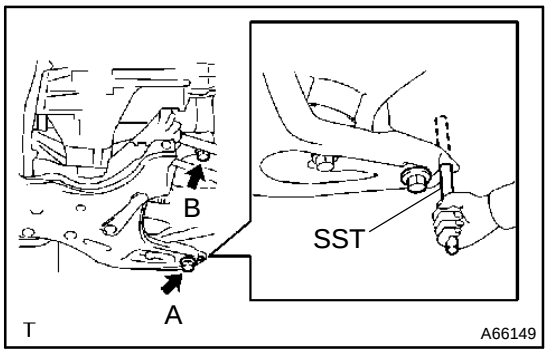
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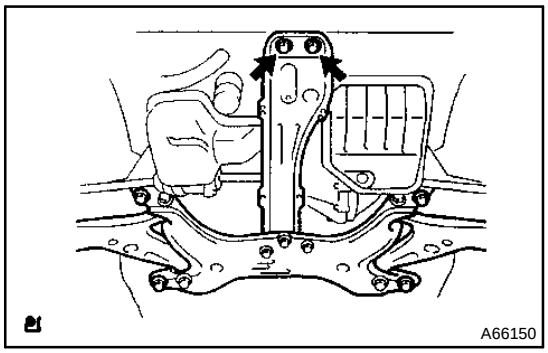
(e) Install the engine mounting insulator RH.
Torque: 52 N·m (531 kgf·cm, 38 ft·lbf)



(f) Insert SST to the positioning holes on the right handle crossmember and on the right–handle of the vehicle.
SST 09670–00010
(g) Temporarily tighten the bolt A first, then bolt B.



(h) Insert SST to the positioning holes on the left–handle crossmember and on the left–handle of the vehicle.
SST 09670–00010
(i) Temporarily tighten the bolt A first, then bolt B.
(j) Insert SST to the positioning holes on the right–handle crossmember and the right–handle of the vehicle, then the bolts with a specified torque.
SST 09670–00010
Torque:
Bolt A: 157 N·m (1,601 kgf·cm, 116 ft·lbf)
Bolt B: 113 N·m (1,152 kgf·cm, 83 ft·lbf)
(k) Insert SST to the positioning holes on the left–handle crossmember and the left–handle of the vehicle, then tighten the bolts with a specified torque.
SST 09670–00010
Torque:
Bolt A: 157 N·m (1,601 kgf·cm, 116 ft·lbf)
Bolt B: 113 N·m (1,152 kgf·cm, 83 ft·lbf)



(1) Tighten 2 bolts as shown in the illustration.
Torque: 39 N·m (398 kgf·cm, 29 ft·lbf)

NOTICE:
After installing the crossmember, check that the positioning holes on the crossmember and the vehicle are aligned with each other.

CONTINUED

99. INSTALL FRONT AXLE ASSY LH **(See Pub. RM821E on page 30 – 05)**

100. INSTALL FRONT AXLE ASSY RH

HINT:

Perform the same procedure as above on the opposite side.

101. INSTALL FRONT SUSPENSION ARM SUB–ASSY LOWER NO.1 LH **(See Pub. RM821E on page 26 – 07)**

102. INSTALL FRONT SUSPENSION ARM SUB–ASSY LOWER NO.1 RH

HINT:

Perform the same procedure as above on the opposite side.

103. INSTALL FRONT STABILIZER LINK ASSY LH **(See Pub. RM821E on page 26 – 14)**

104. INSTALL FRONT STABILIZER LINK ASSY RH

HINT:

Perform the same procedure as above on the opposite side.

105. INSTALL TIE ROD END SUB–ASSY LH **(See Pub. RM821E on page 30 – 05)**

106. INSTALL TIE ROD END SUB–ASSY RH

HINT:

Perform the same procedure as above on the opposite side.

107. INSTALL FRONT AXLE HUB LH NUT **(See Pub. RM821E on page 30 – 05)**

108. INSTALL FRONT AXLE HUB RH NUT

HINT:

Perform the same procedure as above on the opposite side.

109. INSTALL STEERING INTERMEDIATE SHAFT **(See Pub. RM821E on page 51 – 17)**

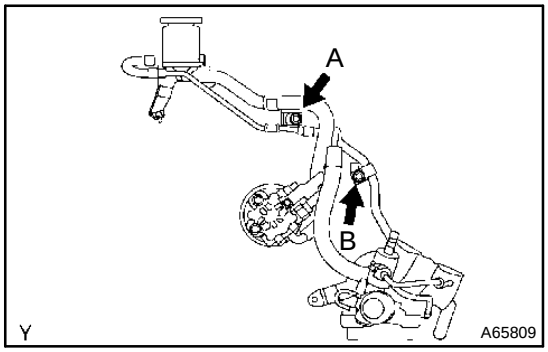
110. INSTALL EXHAUST PIPE ASSY FRONT **(See page 15–2)**

111. INSTALL FLOOR PANEL BRACE FRONT **(See page 15–2)**

112. INSTALL VANE PUMP ASSY

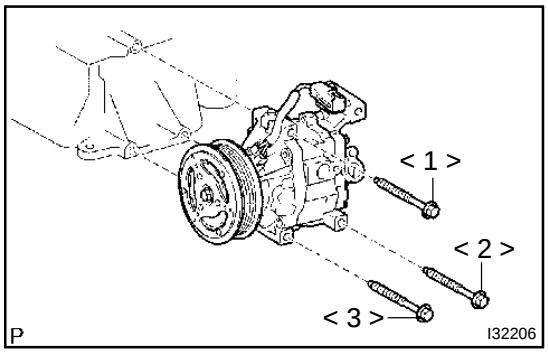
(a) Install the vane pump with a bolt and nut.
Torque: 37 N·m (378 kgf·cm, 27 ft·lbf)

(b) Connect the connector.



113. INSTALL RETURN TUBE SUB–ASSY

(a) Install the return tube with 2 bolts.
Torque:
Bolt A: 5.0 N·m (51 kgf·cm, 44 in.·lbf)
Bolt B: 7.8 N·m (80 kgf·cm, 69 in.·lbf)



114. INSTALL COMPRESSOR AND MAGNETIC CLUTCH

(a) Install the comressor and magnetic clutch with the 3 bolts.
Torque: 29 N·m (295 kgf·cm, 21 ft·lbf)

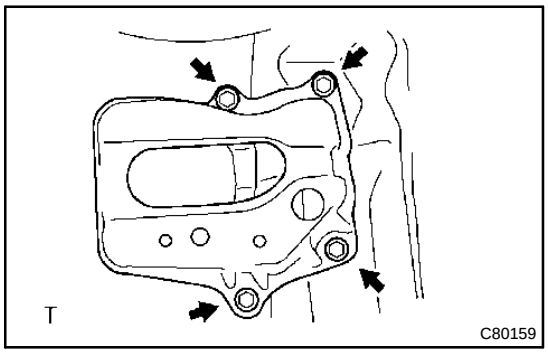
NOTICE:

Tighten the bolts in following order shown in the illustration to install the compresor and magnetic clutch.

(b) Connect the connector.

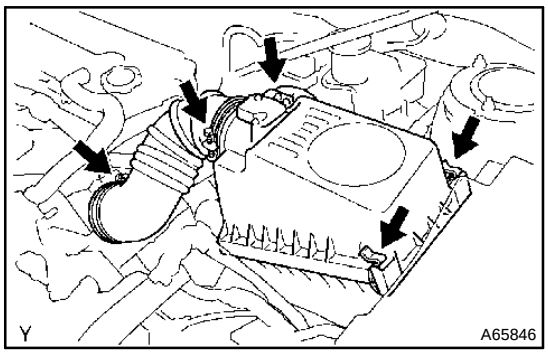
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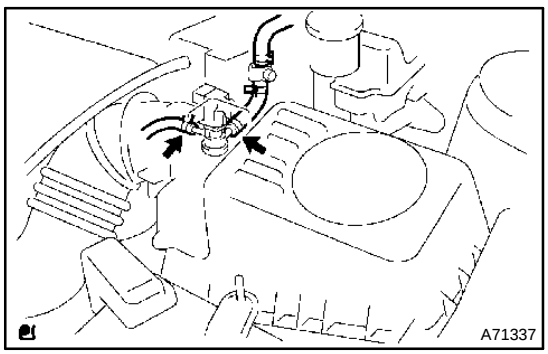
115. INSTALL CLUTCH RELEASE CYLINDER ASSY **(See page 41-3)**
116. INSTALL GENERATOR ASSY **(See page 19-8)**
117. INSTALL GENERATOR BRACKET NO.1 **(See page 19-8)**
118. INSTALL GLOVE COMPARTMENT DOOR ASSY
119. INSTALL FLOOR SHIFT CABLE TRANSMISSION CONTROL SHIFT **(See page 41-3)**
120. INSTALL FLOOR SHIFT CABLE TRANSMISSION CONTROL SELECT **(See page 41-3)**
121. CONNECT FUEL TUBE SUB-ASSY **(See page 11-1)**
122. INSTALL EFI FUEL PIPE CLAMP **(See page 11-1)**



123. INSTALL BATTERY CARRIER
(a) Install the battery carrier with 4 bolts.
Torque: 13 N·m (132 kgf·cm, 10 ft·lbf)

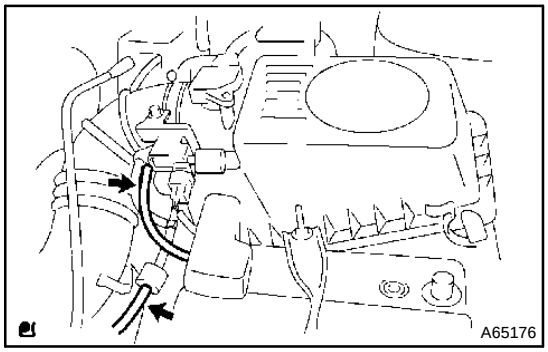
124. INSTALL AIR CLEANER ASSEMBLY WITH HOSE
(a) Install the air cleaner case with 3 bolts.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)
(b) Connect the wireharness clamp, connector and hose.
(c) Install the air filter.
(d) Connect the air cleaner hose to the throttle body.
(e) Attach the air cleaner cap to the air cleaner case, and install 2 clamps.
(f) Tighten the air cleaner hose clamp.
(g) Connect 2 VSV connectors.
(h) Connect the intake air flow-meter connector.



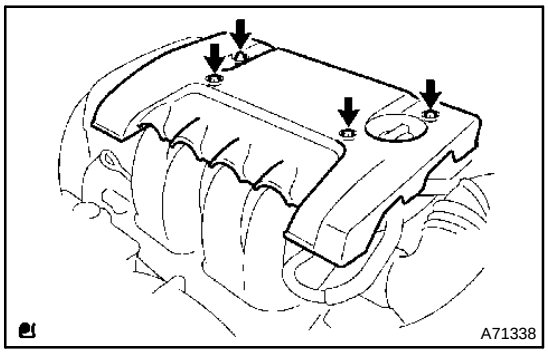


(i) Connect 2 vacuum hoses.

CONTINUED



(j) Connect 2 vacuum hoses.



125. INSTALL CYLINDER HEAD COVER NO.2
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

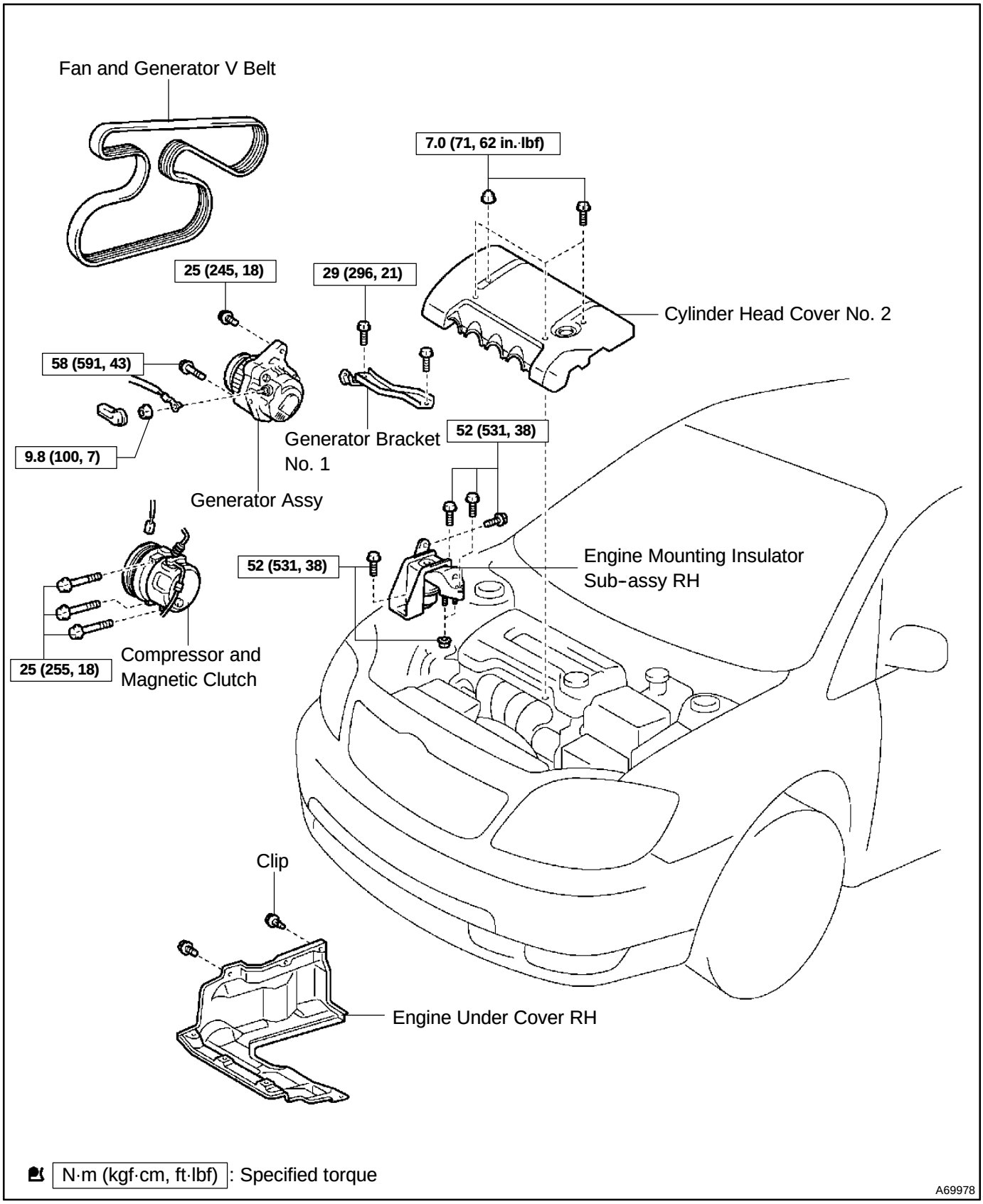
126. ADD MANUAL TRANSAXLE OIL **(See Pub. RM821E on page 41 – 02)**
127. ADD ENGINE OIL
128. ADD COOLANT **(See page 16–6)**
129. CHECK ENGINE OIL LEAK
130. CHECK FOR ENGINE COOLANT LEAKS **(See page 16–1)**
131. CHECK FUEL LEAK
132. INSTALL FRONT WHEELS
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)
133. CHECK EXHAUST GAS LEAK
134. INSPECT CHECK IDLE SPEED AND IGNITION TIMING **(See page 14–1)**
SST 09843–18030, 09843–18040
135. INSPECT CO/HC **(See page 14–1)**
136. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT **(See Pub. RM821E on page 26 – 02)**
137. CHECK ABS SPEED SENSOR SIGNAL

CONTINUED

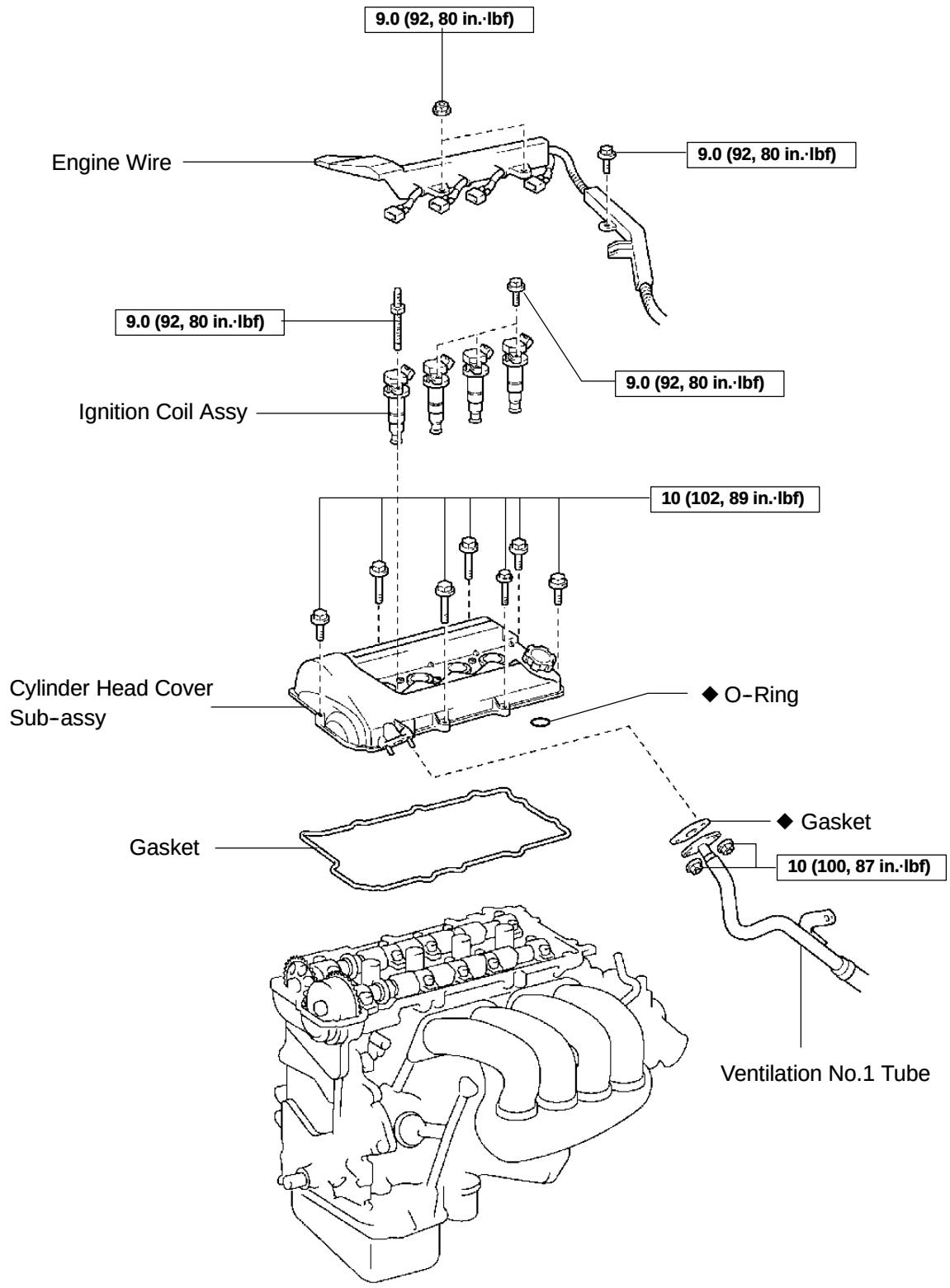
CHAIN SUB-ASSY (2ZZ-GE)

COMPONENTS

140M3-02



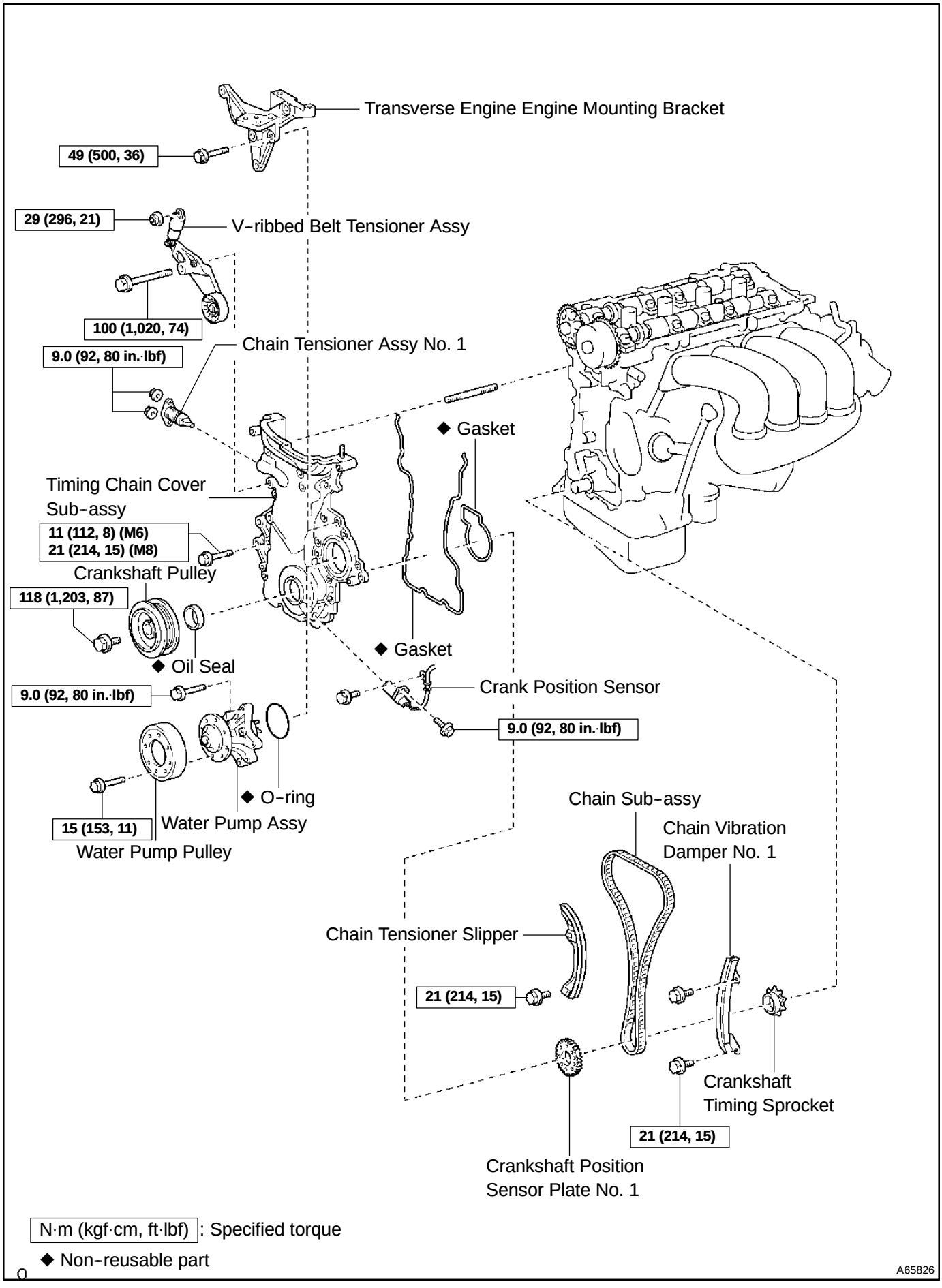
CONTINUED



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

A59854

CONTINUED

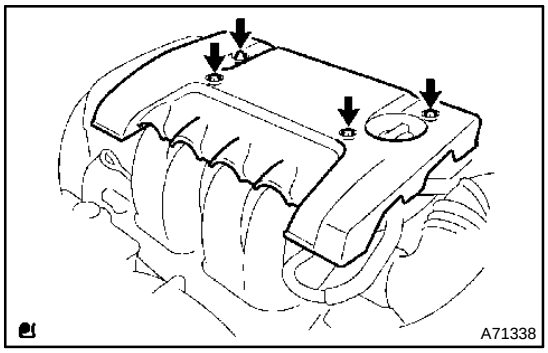

Transverse Engine Engine Mounting Bracket
49 (500, 36)
29 (296, 21)
V-ribbed Belt Tensioner Assy
100 (1,020, 74)
9.0 (92, 80 in.·lbf)
Chain Tensioner Assy No. 1
◆ Gasket
Timing Chain Cover Sub-assy
11 (112, 8) (M6)
21 (214, 15) (M8)
Crankshaft Pulley
118 (1,203, 87)
◆ Oil Seal
◆ Gasket
9.0 (92, 80 in.·lbf)
Crank Position Sensor
9.0 (92, 80 in.·lbf)
◆ O-ring
15 (153, 11)
Water Pump Assy
Water Pump Pulley
Chain Sub-assy
Chain Vibration Damper No. 1
Chain Tensioner Slipper
21 (214, 15)
Crankshaft Timing Sprocket
21 (214, 15)
Crankshaft Position Sensor Plate No. 1
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A65826

CONTINUED

REPLACEMENT

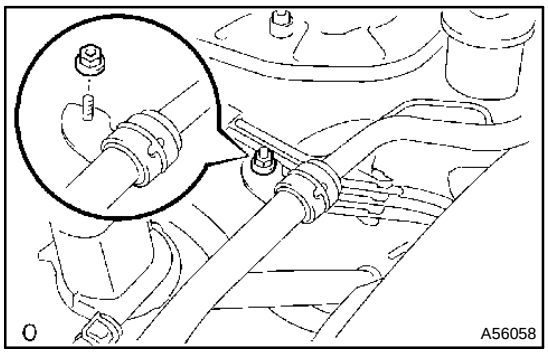
1. REMOVE ENGINE UNDER COVER RH

2. DRAIN COOLANT**(See page 16–6)**



3. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove 3 bolts, a nut and the cylinder head cover No.2.



4. REMOVE COOLER REFRIGERANT SUCTION HOSE NO.1

(a) Remove a nut and seprate the cooler refrigerant suction hose.

5. REMOVE FAN AND GENERATOR V BELT**(See page 14–4)**

6. REMOVE INTAKE MANIFOLD INSULATOR NO.2

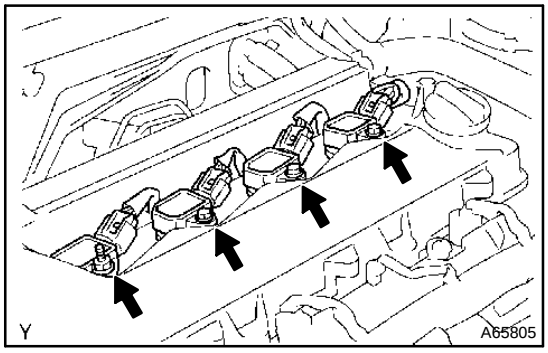
7. REMOVE GENERATOR BRACKET NO.1**(See page 19–8)**

8. REMOVE GENERATOR ASSY**(See page 19–8)**

9. DISCONNECT ENGINE WIRE

(a) Disconnect the ignition coil connectors, the oil control valve connector and the crankshaft connector.

(b) Remove a bolt and a nut for the earth, and put the engine wiring aside.



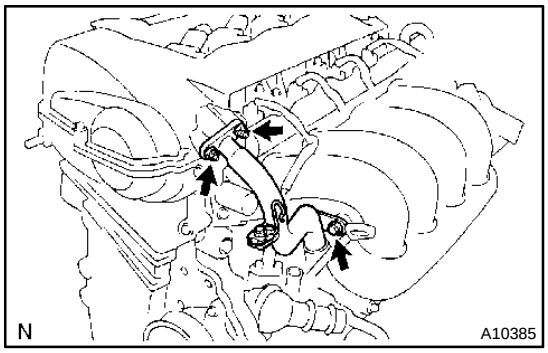
10. REMOVE IGNITION COIL ASSY

(a) Remove 4 bolts and the ignition coils.

CONTINUED

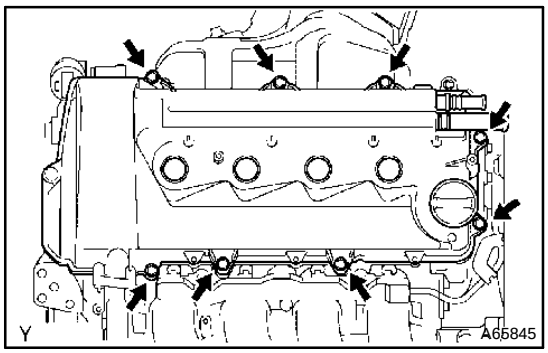
11. REMOVE CYLINDER HEAD COVER SUB-ASSY

(a) Disconnect the fuel hose clamp and 2 PCV hoses from the cylinder head cover.



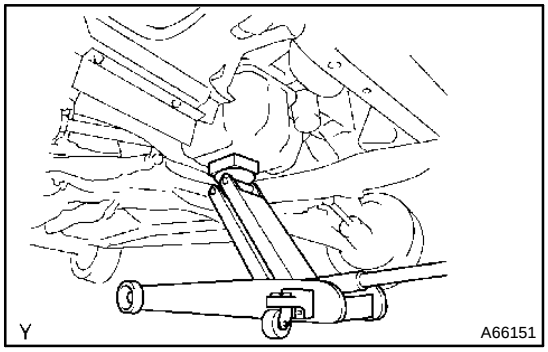
(b) Reomove 2 nuts, bolt and disconnect the No.3 ventilation hose.

(c) Disconnect the ventilation No.1 tube and gasket.



(d) Remove the 8 bolts, wire herness protector, cylinder head cover and gasket.

(e) Remove a O-ring from the cylinder head cover.

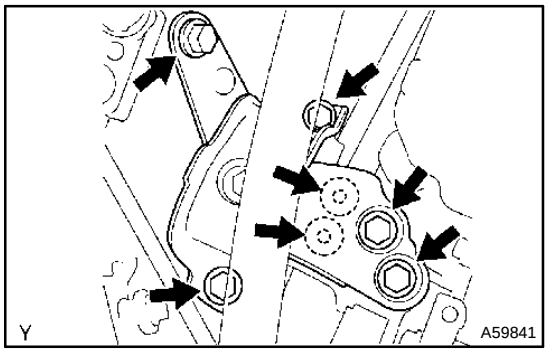


12. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSY RH

(a) Set the jack to the engine.

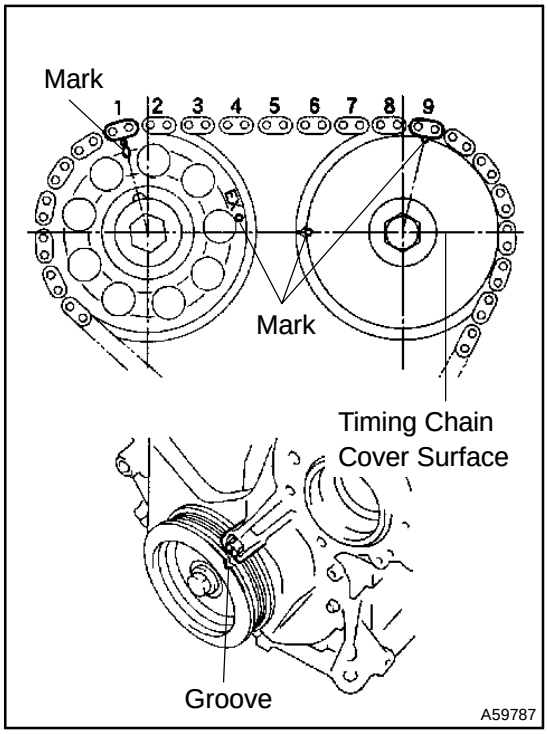
HINT:

Place a wooden block between the jack and the engine.



(b) Remove 5 bolts, 2 nuts and engine mounting insulator sub-assy RH.

CONTINUED



13. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark ”0” of the timing chain cover.

(b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

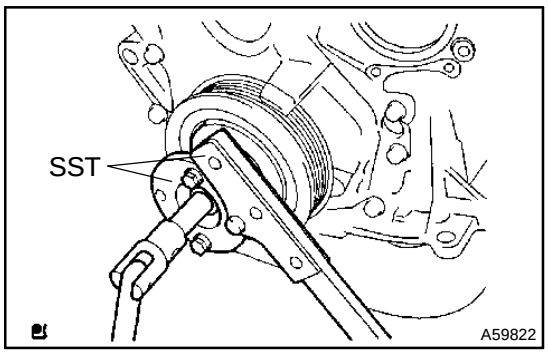
HINT:

If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

14. REMOVE V–RIBBED BELT TENSIONER ASSY

HINT:

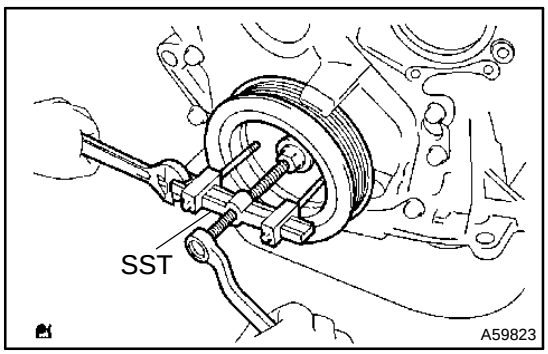
Handle a jack up and down to remove the bolt.



15. REMOVE CRANKSHAFT PULLEY

(a) Using SST, remove the pulley bolt.

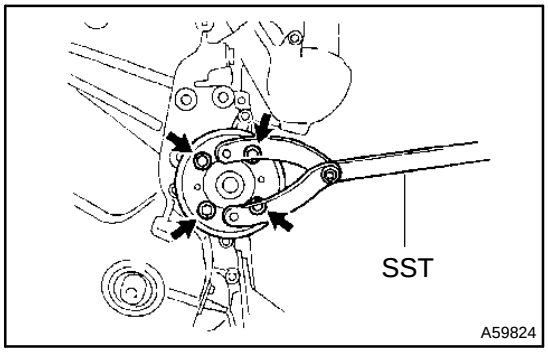
SST 09213–70011 (09213–70020), 09330–00021



(b) Using SST, remove the crankshaft pulley.

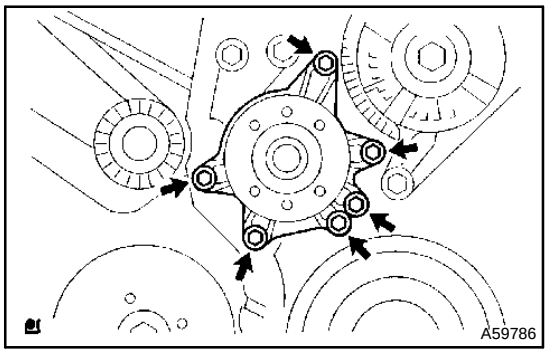
SST 09950–50013 (09951–05010, 09952–05010, 09953–05020, 09954–05021, 09957–04010)

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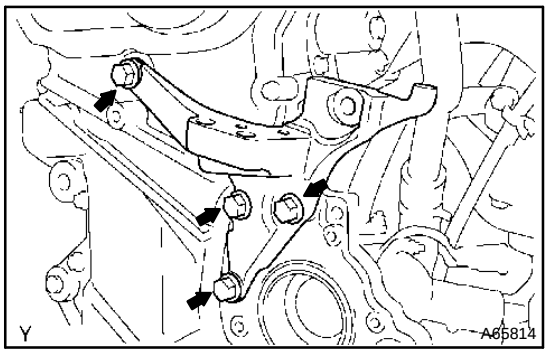
16. REMOVE WATER PUMP PULLEY

(a) Using SST, remove the water pump pulley.
SST 09960-10010



17. REMOVE WATER PUMP ASSY

(a) Remove 6 bolts and the water pump.



18. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

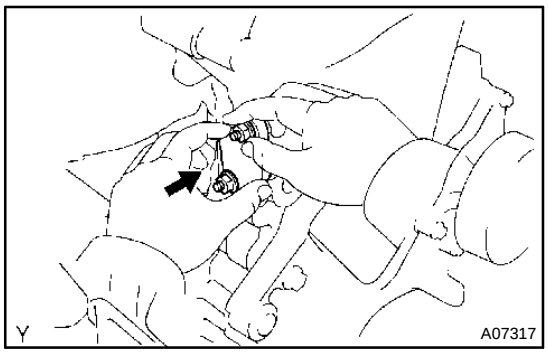
(a) Remove 4 bolts and the engine mounting bracket.

19. REMOVE COMPRESSOR

(a) Disconnect the connector.
(b) Remove 3 bolts and the compresor.

HINT:
Hung up the instead of detaching.

20. REMOVE CRANK POSITION SENSOR

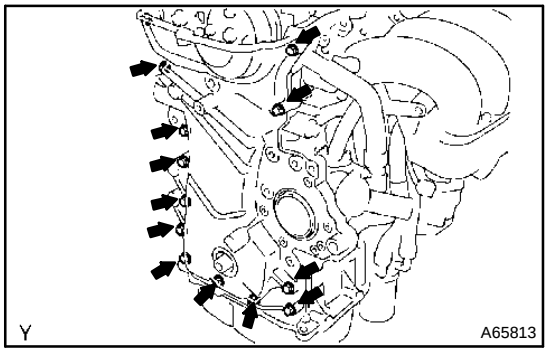


21. REMOVE CHAIN TENSIONER ASSY NO.1

(a) Remove 2 nuts and the chain tensioner assy No.1.

NOTICE:
Be sure not to revolve the crankshaft without the chain tensioner.

CONTINUED

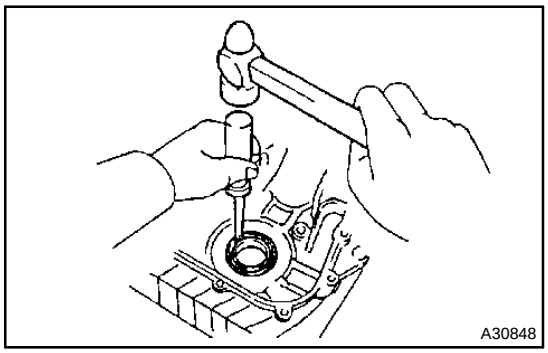


22. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSY

(a) Remove12 bolts.
(b) Using a torx wrench socket (E8), remove the stud bolt.
(c) Remove the timing chain cover and 2 gaskets.

NOTICE:

Be careful no tot damage the contact surfaces of the timing chain cover, cylinder head and cylinder block.



23. REMOVE TIMING GEAR COVER OIL SEAL

(a) Using a screwdriver, remove the timing gear cover oil seal.

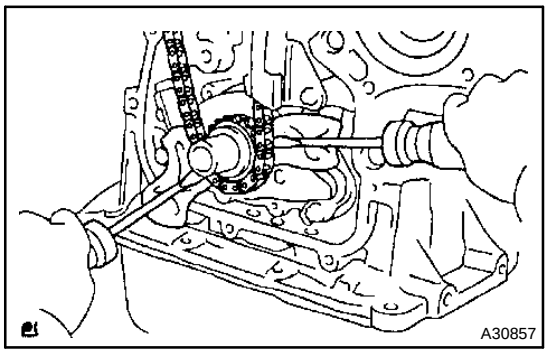
24. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

25. REMOVE CHAIN TENSIONER SLIPPER

(a) Remove a bolt and the chain tensioner slipper.

26. REMOVE CHAIN VIBRATION DAMPER NO.1

(a) Remove 2 bolts and the chain vibration damper No.1.

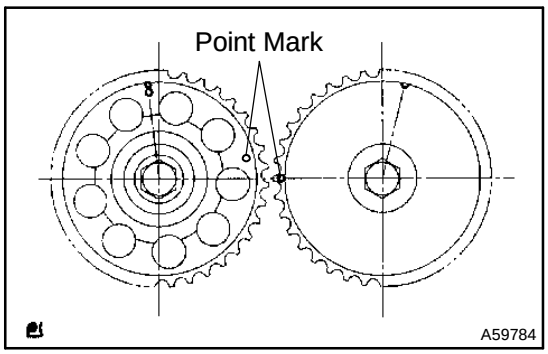


27. REMOVE CHAIN SUB-ASSY

(a) Remove the timing chain with the crankshaft timing gear plying screwdrivers as shown in the illustration.

NOTICE:

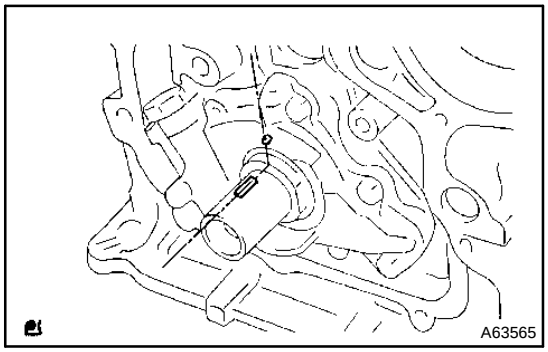
- **Put shop rag to protect the engine.**
- **In case of revolving the camshafts with the chain off the sprockets, turn the crankshaft 1/4 revolution for valves not to touch the pistons.**



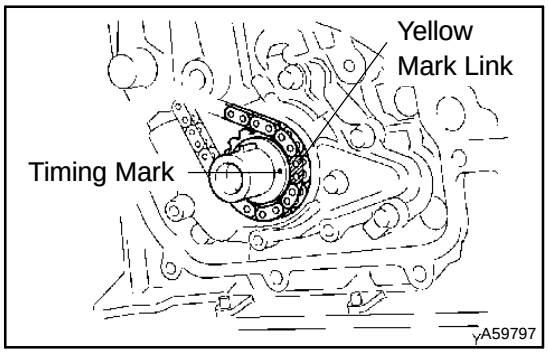
28. INSTALL CHAIN SUB-ASSY

(a) Set No. 1 cylinder to TDC/compression.
  (1) Turn the hexagonal wrench head portion of the camshafts, and align the point marks of the camshaft timing sprockets.

CONTINUED

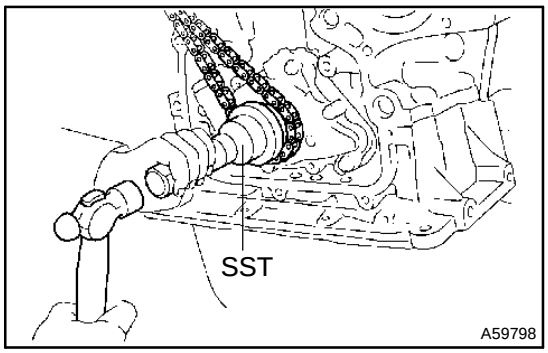


(2) Turn the crankshaft and set the set key on the crankshaft upward.

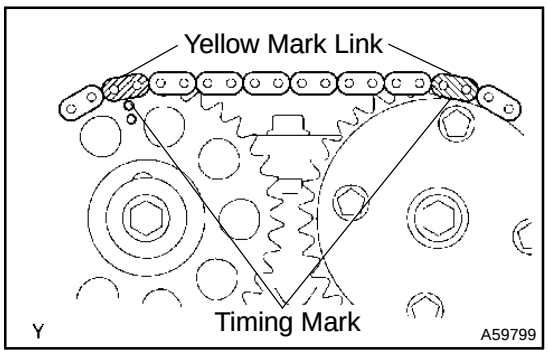


(b) Install the timing chain on the crankshaft timing sprocket with the yellow color link aligned with the timing mark on the crankshaft timing sprocket.

HINT:
Three yellow color links are on the chain.



(c) Using SST, install the sprocket.
SST 09223-22010

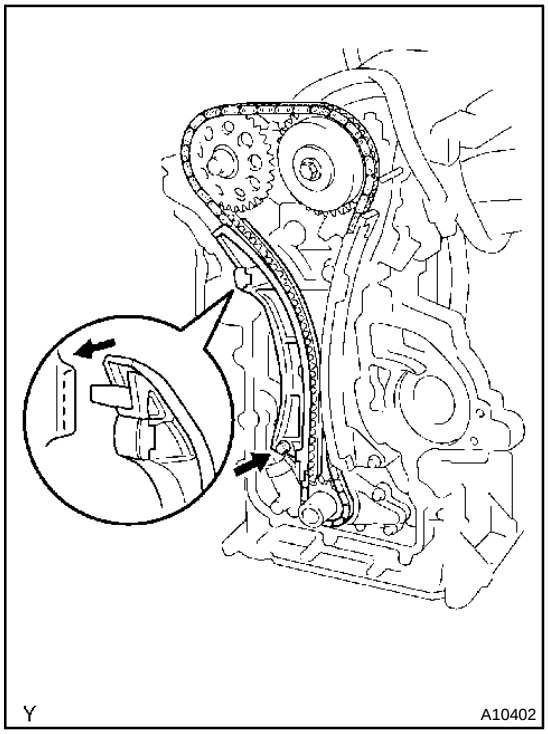


(d) Install the timing chain on the camshaft timing sprockets with the yellow color links aligned with the timing marks on the camshaft timing sprockets.

29. INSTALL CHAIN VIBRATION DAMPER NO.1

(a) Install the chain vibration damper No. 1 with the 2 bolts.
Torque: 21 N·m (214 kgf·cm, 16 ft·lbf)

CONTINUED

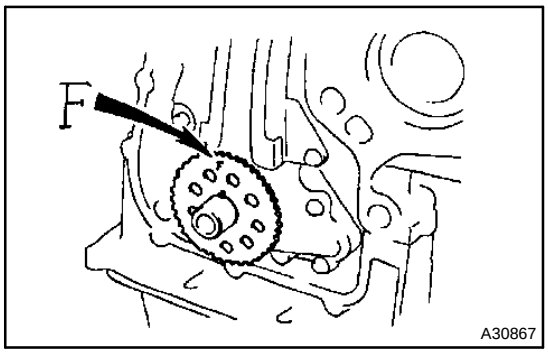


30. INSTALL CHAIN TENSIONER SLIPPER

(a) Install the chain tensioner slipper with a bolt.
Torque: 21 N·m (214 kgf·cm, 16 ft·lbf)

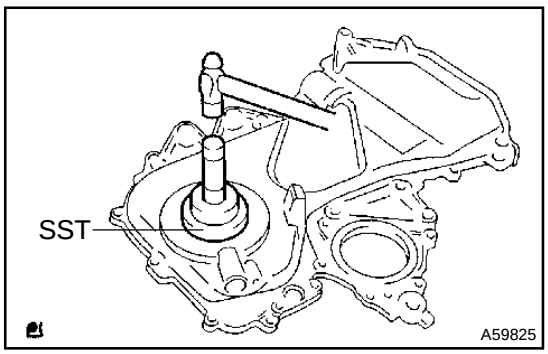
(b) Check that the chain tenioner slipper moves is caught on the cylider head stopper.

NOTICE:
Do not turn the crankshaft.



31. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

(a) Install the crankshaft position semsor plate with the ”F” mark facing forward.



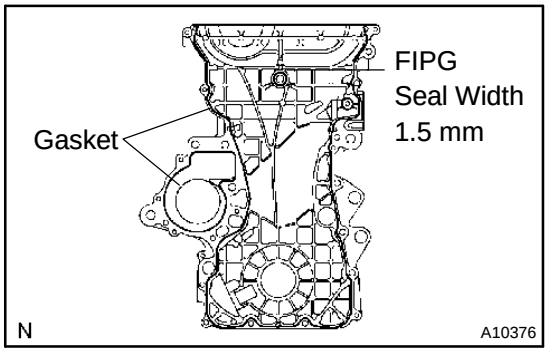
32. INSTALL TIMING GEAR COVER OIL SEAL

(a) Apply MP grease to the oil seal lip.

(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the timing chain cover edge.
SST 09223–22010

NOTICE:
Keep the lip off foreign materials.

CONTINUED



33. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSY

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface of the timing chain cover, cylinder head and cylinder block.

- Using a razor blade and a gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material.
- Using a non-residue solvent, clean both sealing surfaces.

(b) Apply seal packing to the timing chain cover an shown in the illustration.

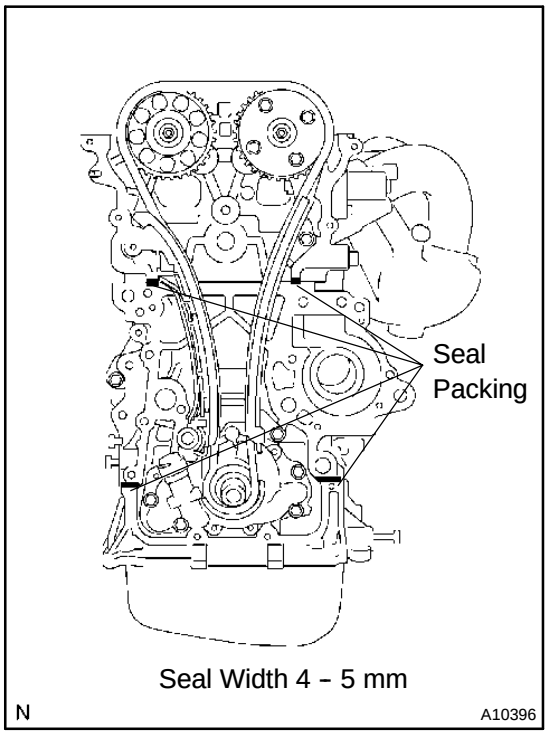
Seal packing:
Part No. 08826-00100 or equivalent

- Install a nozzle that has been cut to a 1.5 mm opening.

HINT:
Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install 2 gaskets to the timing chain cover an shown in the illustration.



(d) Apply seal packing to 4 locations an shown in the illustration.

Seal packing:
Part No. 08826-00080 or equivalent

- Install a nozzle that has been cut to a 4 - 5 mm (0.16 - 0.20 in.)opening.

HINT:
Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove the nozzle from the tube and reinstall cap.

NOTICE:

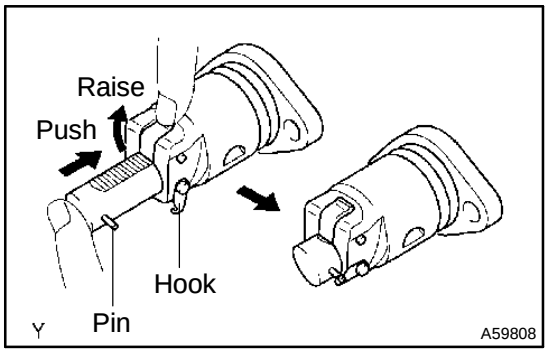
- **Do not put into the engine oil within 2 hours after installing.**

(e) Install the timing chain cover, with 12 bolts and a nut.

Torque:
21 N·m (214 kgf·cm, 16 ft·lbf) (M8)
11 N·m (112 kgf·cm, 8 ft·lbf) (M6)

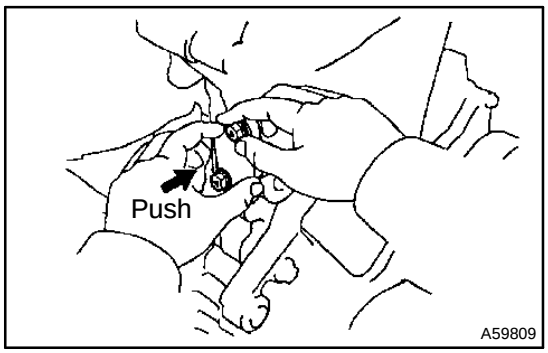
CONTINUED

(f) Install the stud bolt.



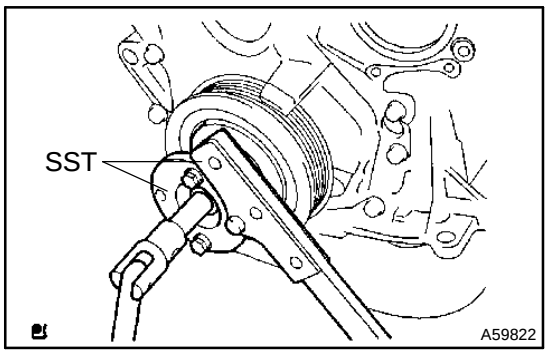
34. INSTALL CHAIN TENSIONER ASSY NO.1

(a) Check the O–ring is clean, and set the hook as shown in the illustration.



(b) Apply the engine oil to the chain tensioner and install it.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

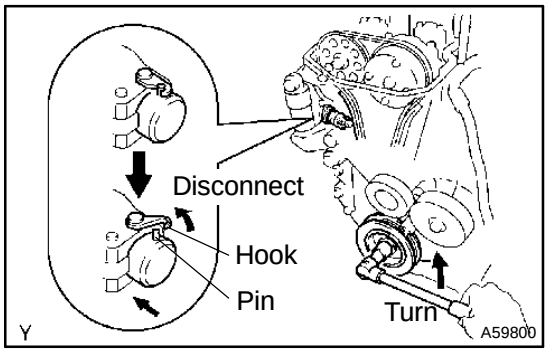
NOTICE:
When installing the tensioner, set the hook again if the hook release the plunger.



35. INSTALL CRANKSHAFT PULLEY

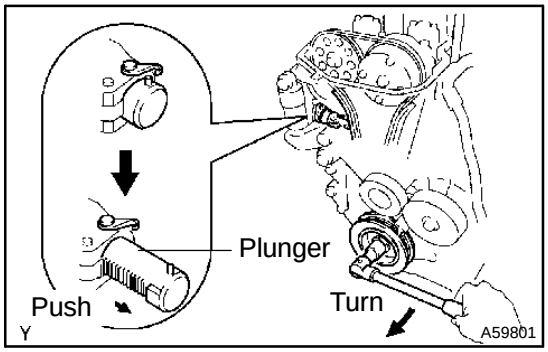
(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

(b) Using SST, install the pulley bolt.
Torque: 118 N·m (1,204 kgf·cm, 87 ft·lbf)



(c) Turn the crankshaft counterclockwise, and disconnect the plunger knock pin form the hook.

CONTINUED



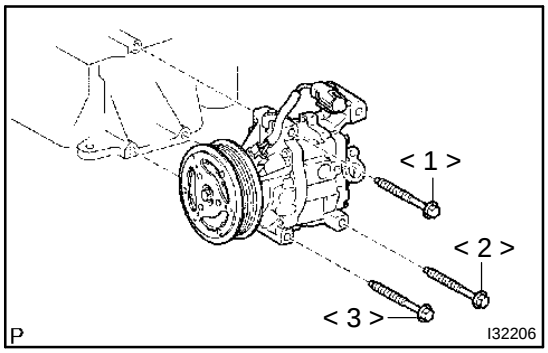
(d) Turn the crankshaft clockwise, and check that the slipper is pushed by the plunger.

HINT:

If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver or your finger so that the hook is released from the knock pin and the plunger springs out.

SST 09213-70011 (09213-70020), 09330-00021

36. INSTALL CRANK POSITION SENSOR
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

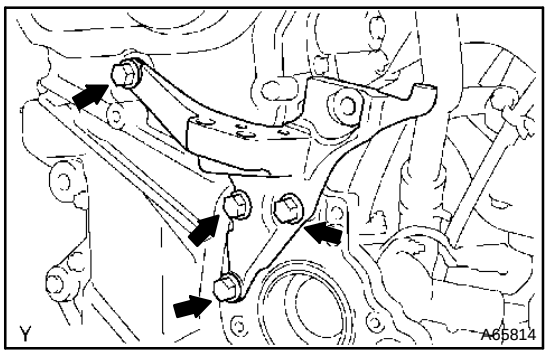


37. INSTALL COMPRESSOR

(a) Install the compressor and magnetic clutch with the 3 bolts.
Torque: 29 N·m (295 kgf·cm, 21 ft·lbf)

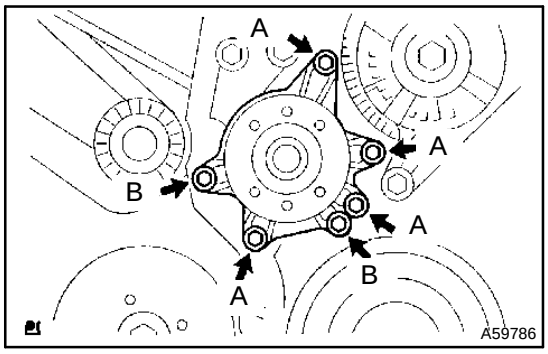
NOTICE:
Tighten the bolts in following order showm in the illustratin to install the compressor and magnetic clutch.

(b) Connect the connector.



38. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Install the engine mounting bracket with 4 bolts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



39. INSTALL WATER PUMP ASSY

(a) Place a new O-ring on the timing chain cover.

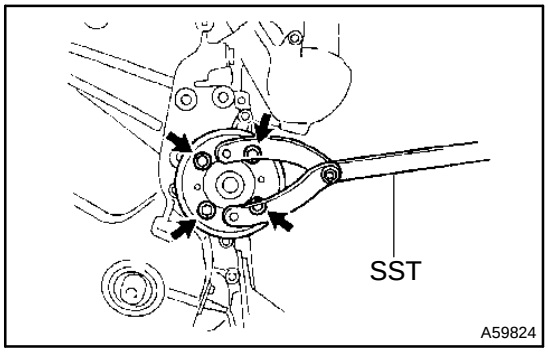
(b) Install the water pump with the 6 bolts.
Torque:9.0 N·m (92 kgf·cm, 80 in.·lbf)

HINT:

Each bolt length is indicated in the illustration.

Bolt A	35 mm (1.38 in.)
Bolt B	28 mm (1.10 in.)

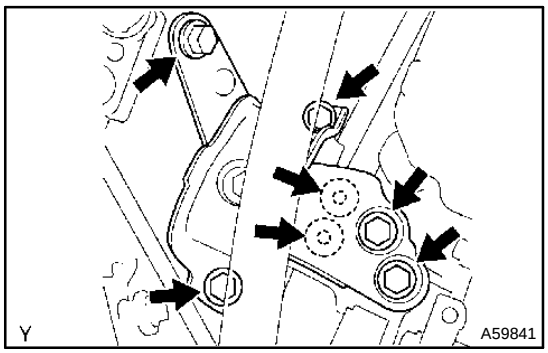
CONTINUED



40. IINSTALL WATER PUMP PULLEY

(a) Using SST the water pump pulley.
Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)
SST 09960–10010 (09962–01000, 09963–00600)

41. INSTALL V–RIBBED BELT TENSIONER ASSY
Torque:
Nut 29 N·m (296 kgf·cm, 21 ft·lbf)
Bolt 100 N·m (1,016 kgf·cm, 74 ft·lbf)



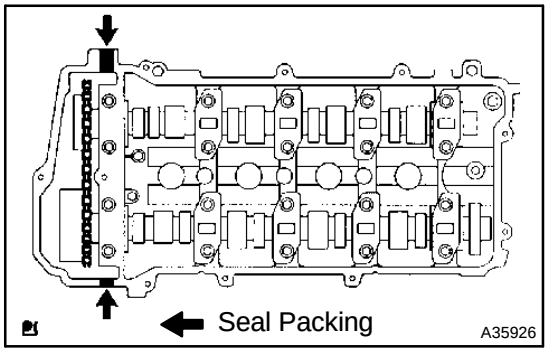
42. INSTALL ENGINE MOUNTING INSULATOR SUB–ASSY RH

(a) Install the engine mounting insulator sub – assy RH with 5 bolts and 2 nuts.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

43. INSTALL CYLINDER HEAD COVER SUB–ASSY

(a) Remove any old packing (FIPG) material.

HINT:
When FIPG on the head cover gasket side cannot be eliminated completely, replace the gasket.



(b) Apply seal packing to 2 locations as shown in the illustration.
Seal packing: Part No. 08826–00080 or equivalent

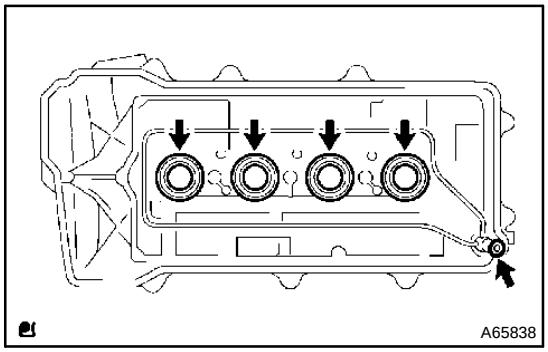
NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes after applying seal packing.**
- **Do not put into engine oil 2 hours after installing.**

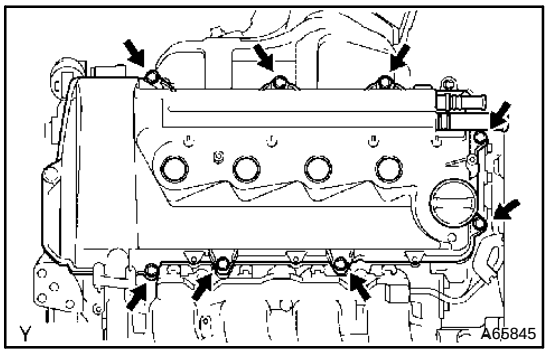
(c) Install the cylinder head cover and cable bracket with 10 bolts.

HINT:
Part must be assembled within 3 minutes of application.Otherwise the material must be remove and reapplied.

CONTINUED

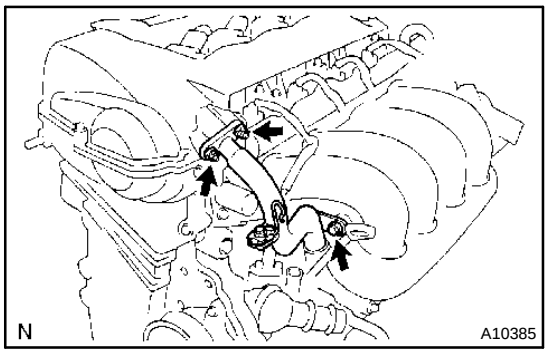


(d) Install the new spark plug tube gasket and a new O - ring to the cylinder head cover.



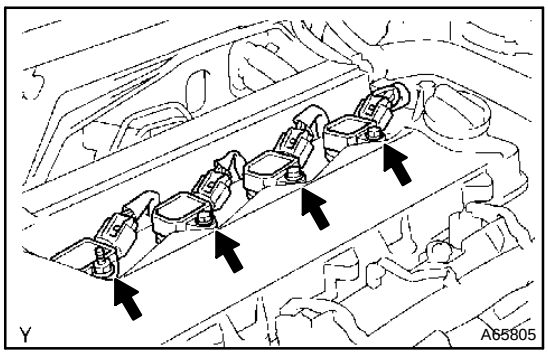
(e) Install the cylinder head cover and wire harness protector with 9 bolts.
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)

(f) Connect 2 PCV hoses to the cylinder head cover.



(g) Install a new gasket and No. 1 ventiration pipe with 2 nuts and a bolt.
Torque:
Nut 10 N·m (102 kgf·cm, 7 ft·lbf)
Bolt 24 N·m (245 kgf·cm, 18 ft·lbf)

(h) Connect the No. 3 ventiration hose to the No. 1 ventiration pipe.



44. INSTALL IGNITION COIL ASSY

(a) Install 4 ignition coils with 4 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

(b) Connect 4 ignition coil connectors.

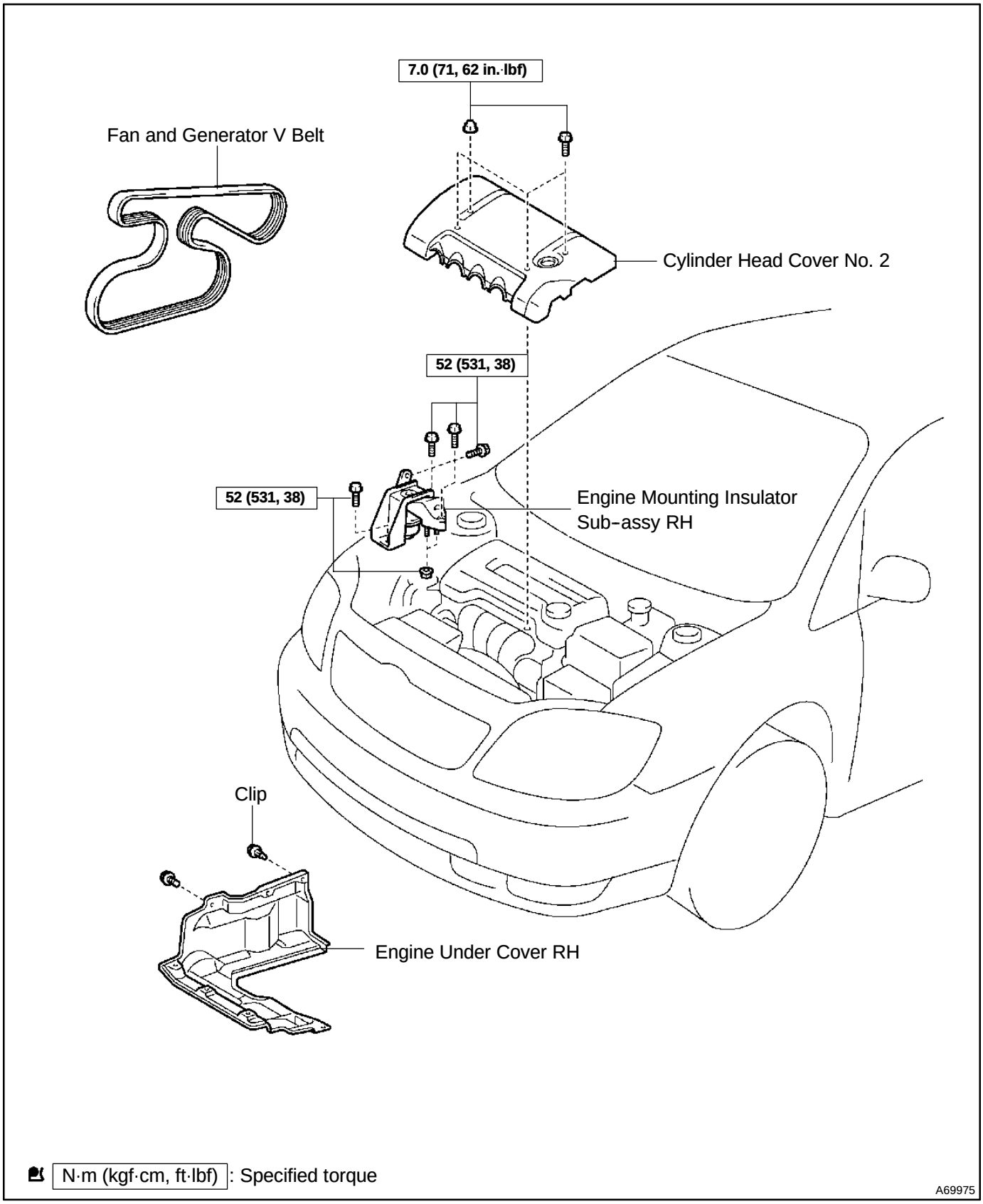
45. INSTALL GENERATOR ASSY**(See page19-8)**
46. INSTALL GENERATOR BRACKET NO.1**(See page19-8)**
47. ADD COOLANT**(See page 16-6)**
Torque: 29 N·m (296 kgf·cm, 21 ft·lbf)
48. INSPECT CHECK FOR ENGINE COOLANT LEAKS**(See page 16-1)**
49. INSPECT OIL LEAK

CONTINUED

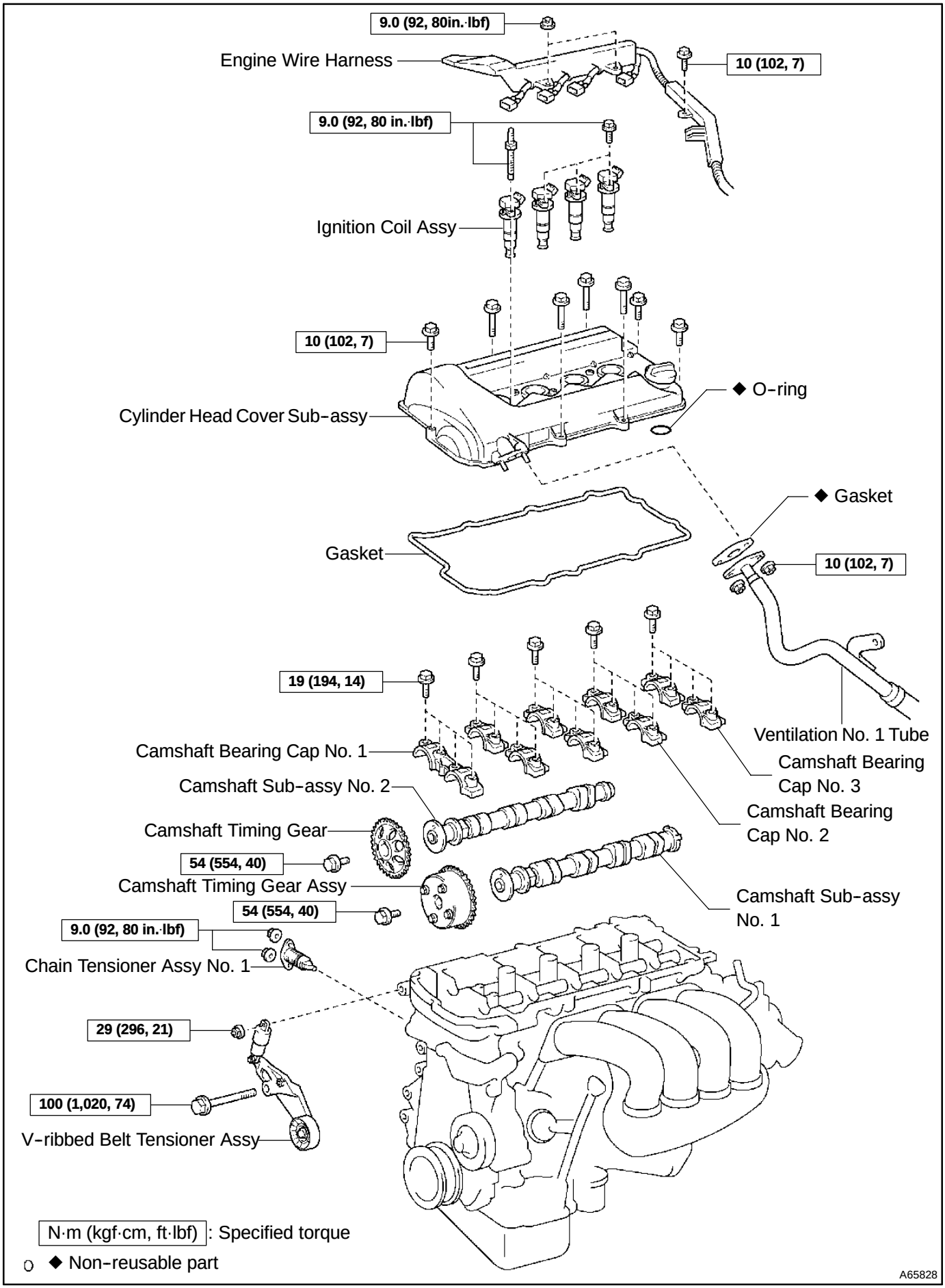
CAMSHAFT (2ZZ–GE)

COMPONENTS

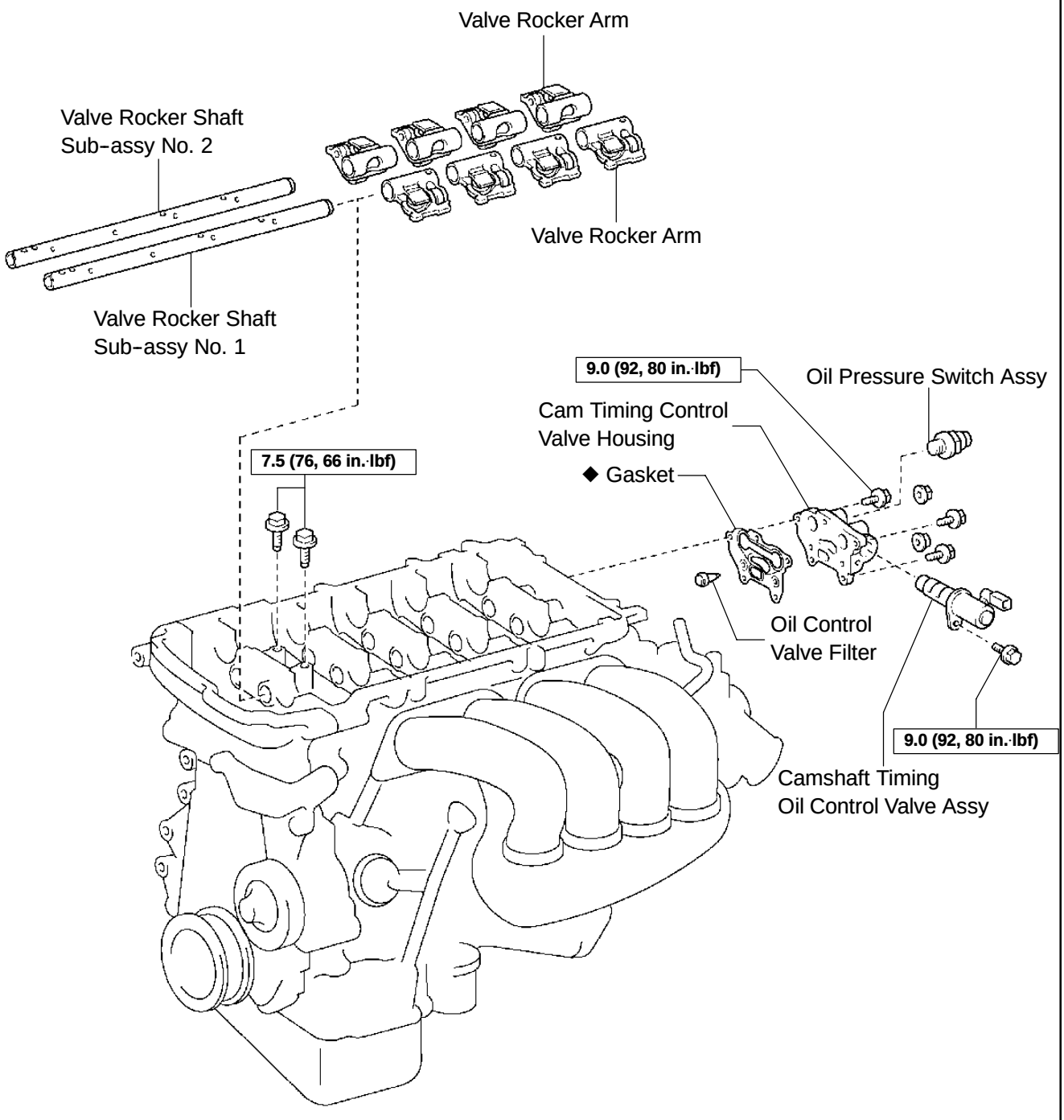
140MN-02



CONTINUED


9.0 (92, 80in.·lbf)
Engine Wire Harness
10 (102, 7)
9.0 (92, 80 in.·lbf)
Ignition Coil Assy
10 (102, 7)
◆ O-ring
Cylinder Head Cover Sub-assy
◆ Gasket
Gasket
10 (102, 7)
19 (194, 14)
Ventilation No. 1 Tube
Camshaft Bearing Cap No. 1
Camshaft Bearing Cap No. 3
Camshaft Sub-assy No. 2
Camshaft Bearing Cap No. 2
Camshaft Timing Gear
54 (554, 40)
Camshaft Timing Gear Assy
Camshaft Sub-assy No. 1
54 (554, 40)
9.0 (92, 80 in.·lbf)
Chain Tensioner Assy No. 1
29 (296, 21)
100 (1,020, 74)
V-ribbed Belt Tensioner Assy
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A65828

CONTINUED



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

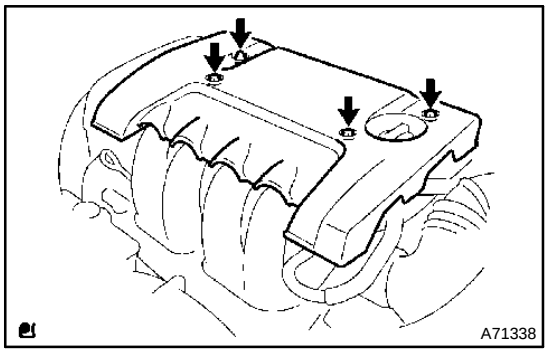
◆ Non–reusable part

A65829

140V5-01

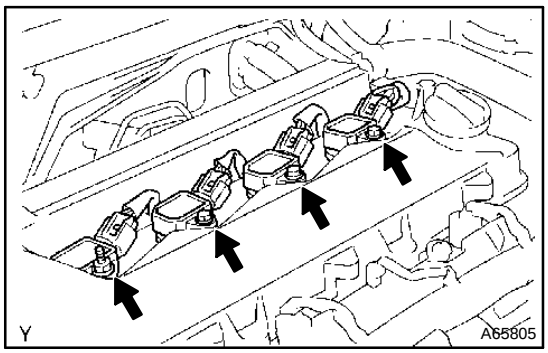
REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH



2. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove 3 bolts, a nut and the cylinder head cover No. 2.

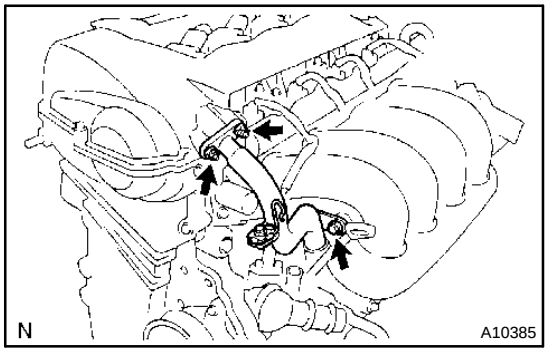


3. REMOVE IGNITION COIL ASSY

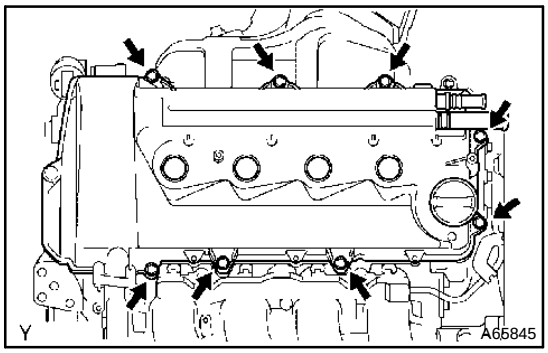
(a) Remove 4 bolts and disconnect 4 connectors.
(b) Rremove 4 ignution coils.

4. REMOVE CYLINDER HEAD COVER SUB-ASSY

(a) Disconnect the fuel hose clamp and 2 PCV hoses from the cylinder head cover.

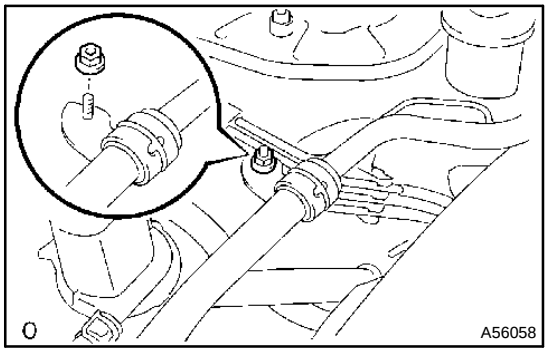


(b) Remove 2 nuts and a bolt, and disconnect the No. 3 ventilation hose from the No. 1 ventilation pipe.
(c) Disconnect the ventilation No. 1 tube and gasket.



(d) Remove 8 bolts, wire harness protector, cylinder head cover and gasket.
(e) Remove the O-ring from the cylinder head cover.

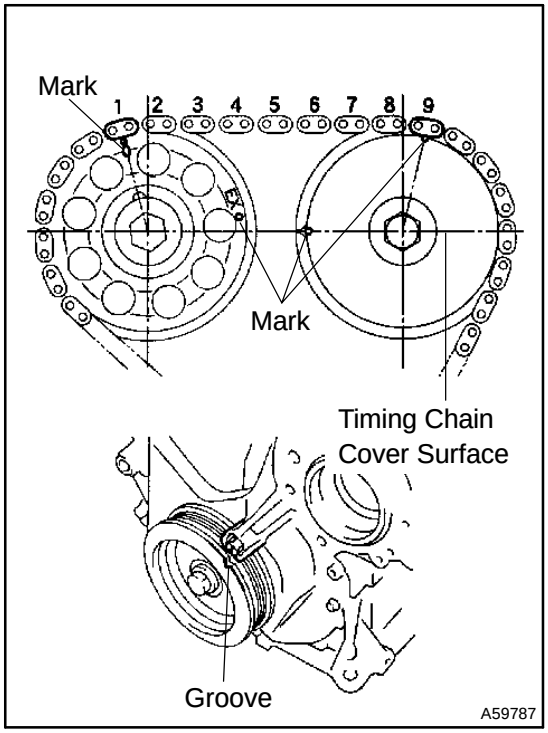
CONTINUED



5. REMOVE COOLER REFRIGERANT SUCTION HOSE NO.1

(a) Remove a nut and seprate the cooler refrigerant suction hose.

6. REMOVE FAN AND GENERATOR V BELT (See page 14–4)



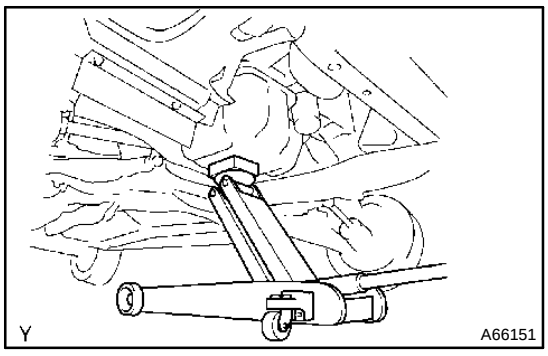
7. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark ”0” of the timing chain cover.

(b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

HINT:

If not, turn the crankshaft 1 revolution (360°) and aligin the marks as above.



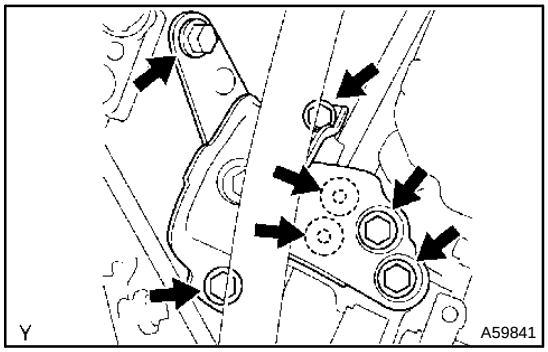
8. REMOVE ENGINE MOUNTING INSULATOR SUB–ASSY RH

(a) Set the jack to the engine.

HINT:

Place a wooden block between the jack and engine.

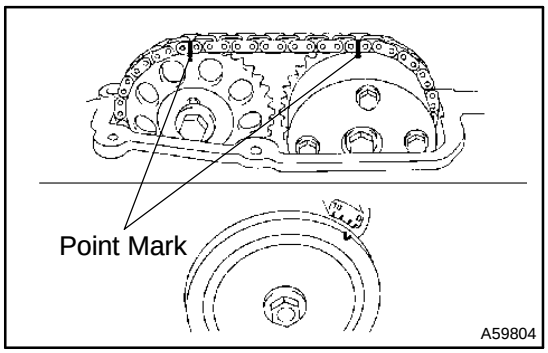
CONTINUED



(b) Remove 5 bolts, 2 nuts and the engine mounting insulator sub-assy RH.

9. REMOVE V-RIBBED BELT TENSIONER ASSY

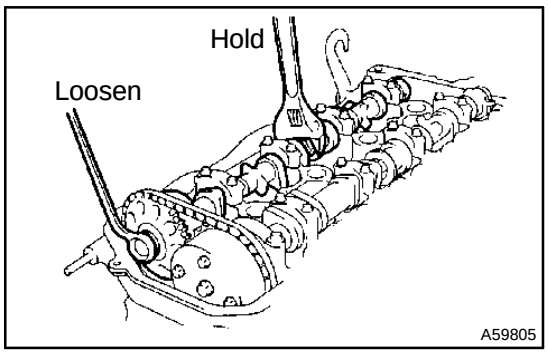
HINT:
Handle a jack up and down to remove the belt.



10. REMOVE CAMSHAFT

NOTICE:
Be sure not to revolve the crankshaft without the chain tensioner.

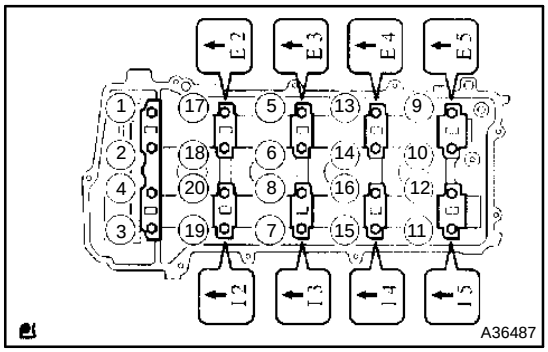
(a) Set the No. 1 cylinder to the TDC/compression.
(b) Place match marks on the timing chain and camshaft timing sprockets.
(c) Remove 2 nuts and the chain tensioner.



(d) Hold the hexagan wrench head portion of the camshaft and remove the camshaft timing gear set bolt.

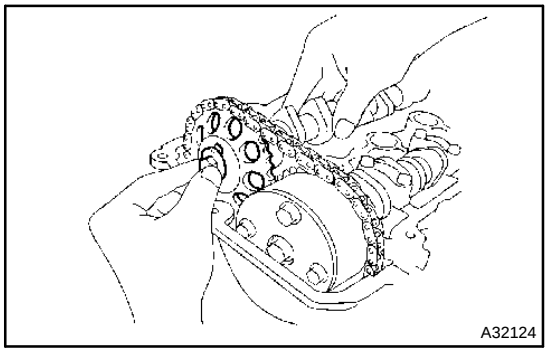
NOTICE:
Be careful not to damage the valve lifter.

(e) Remove the camshaft timing gear and set key from the camshaft.

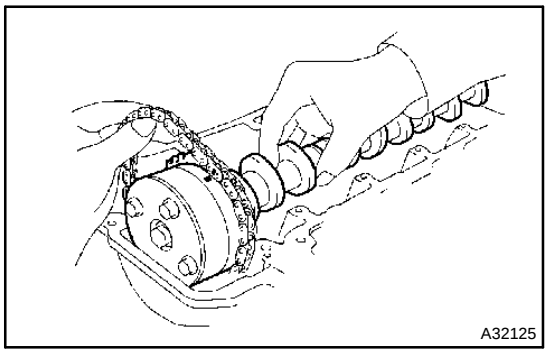


(f) Loosen the camshaft bearing cap bolts on No. 2 camshaft in the order as shown in the illustration in several passes, and remove the caps.

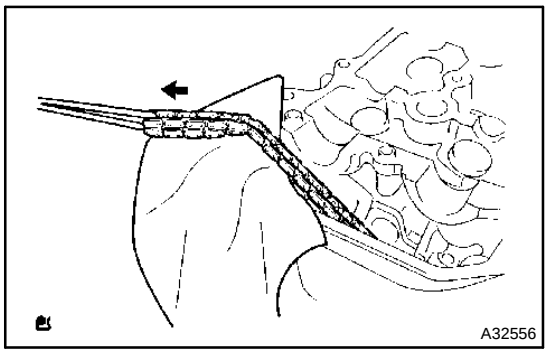
CONTINUED



(g) Remove the camshaft timing gear as shown in the illustration.



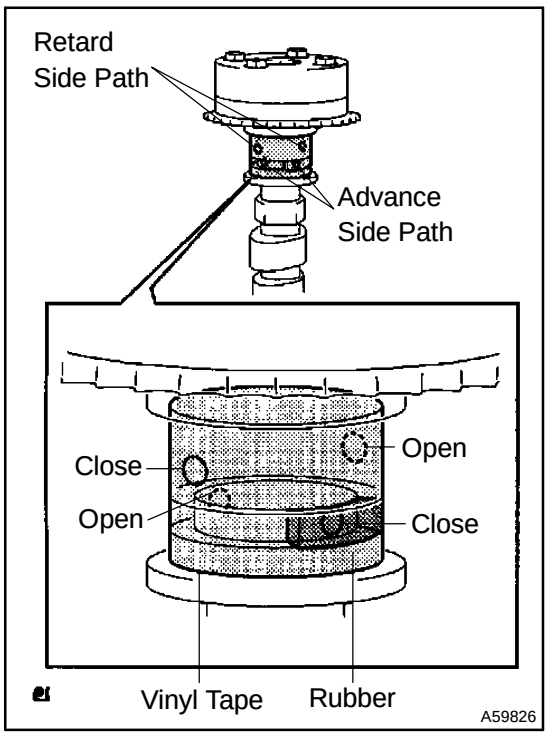
(h) Remove the camshaft with holding the timing chain.



(i) Tie the timing chain with a string as shown in the illustration.

NOTICE:

Be careful not to drop anything inside the timing chain cover.



11. INSPECT CAMSHAFT TIMING GEAR ASSY

(a) Check the lock of camshaft timing gear .

(1) Grip the camshaft with a vice, and confirm the camshaft timing gear is locked.

NOTICE:

Be careful not to damage the camshaft.

(b) Release lock pin.

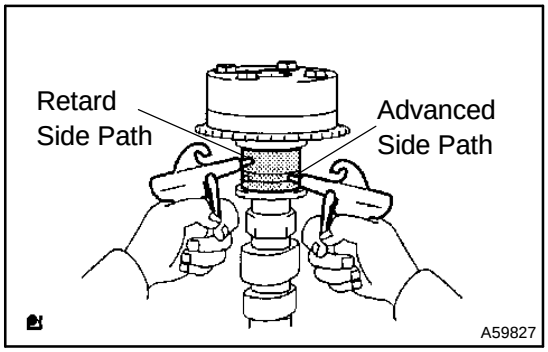
(1) Cover 4 oil paths of cam journal with vinyl tape as shown in the illustration.

HINT:

Two advance side paths are proveided in the groove of the camshaft. Plug one of the path with a rubber piece.

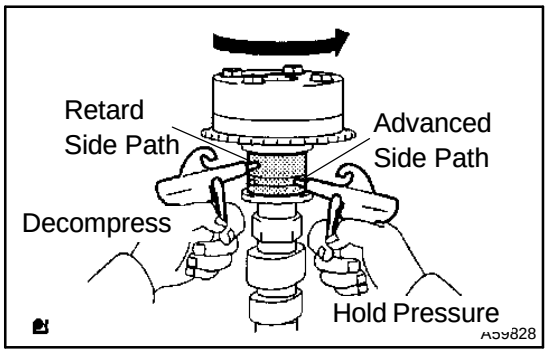
(2) Break throuth the tapes of the advance side path and the retard side path on the opposite on the groove.

CONTINUED



(3) Put air pressure into two broken paths (the advance side path and the retard side path) with about 150 kPa {1.5 kgf/cm^2}

CAUTION:
Cover the paths with shop rag to avoid oil splashing.



(4) Confirm if the camshaft timing gear assembly revolves in the timing advance direction when weakening the air pressure of the timing retard path.

HINT:
The lock pin is released, and camshaft timing gear, revolves in the advance direction.

(5) When the camshaft timing gear comes to the most advanced position, take out the air pressure of the timing retard side path, and then, take out that of timing advance side path.

CAUTION:
Camshaft timing assembly gear occasionally shifts to the retard side abruptly, if the air compression of the advanced side path is released before retard side path. It often causes the breakage of the lock pin.

(c) Check smooth revolution.

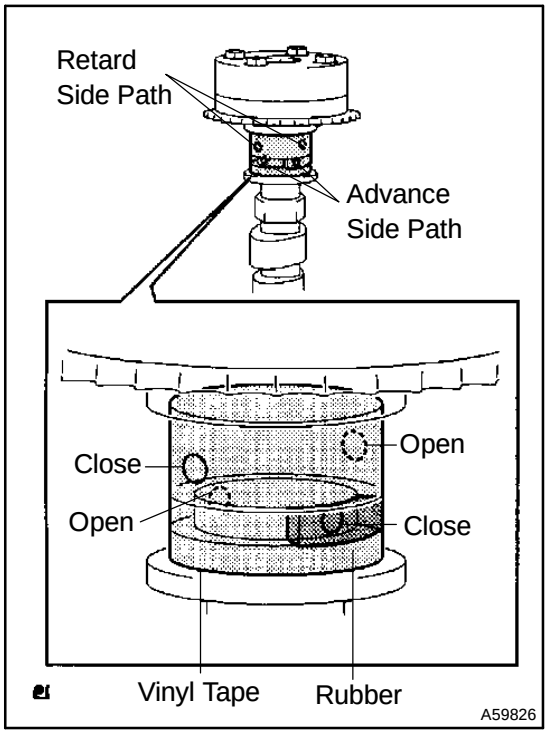
(1) Revolve the camshaft timing gear assembly within the movable range except for the most retarded position several times, and check the smooth revolution.

CAUTION:
Be sure to perform this check by hand, instead of air pressure.

(d) Check the lock in the most retarded position.

(1) Confirm that the camsaft timing gear assembly is locked at the most retarded position.

CONTINUED



12. REMOVE CAMSHAFT TIMING GEAR ASSY

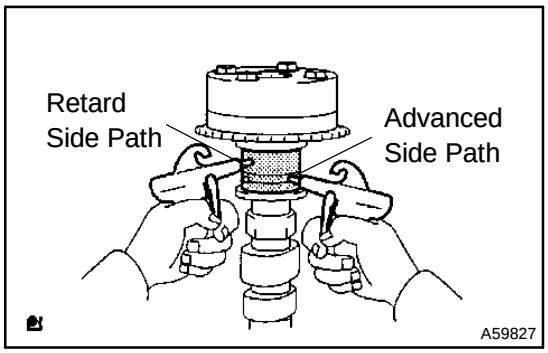
(a) Grip the camshaft with a voice, and confirm that the gear is locked.

CAUTION:
Be careful not to damage the camshaft.

(b) Cover 4 oil paths of cam journal with vinyl tape as camshaft. plug one of the path with a rubber piece.

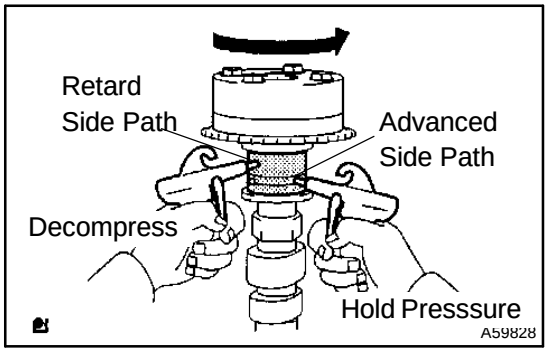
HINT:
Two advance side paths are proveided in the groove of the camshaft. Plug one of the path with a rubber piece.

(c) Break through the tapes of the advance side path and the retard side path on the opposite side of the groove.



(d) Put air pressure into two broken paths (the advance side path and the retard side path) with about 150 kPa {1.5 kgf/cm^2}.

CAUTION:
Cover the paths with shop rag to avoid oil splashing.



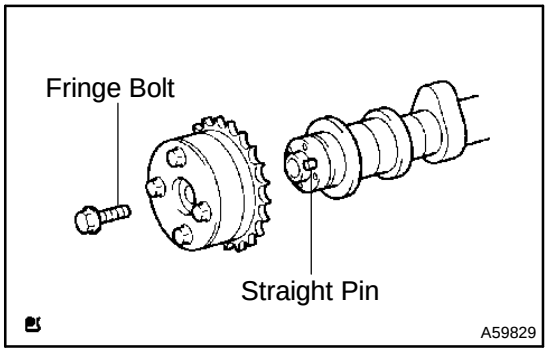
(e) Confirm if the camshaft timing gear assembly revolves in the timing advance direction when weakening the air pressure of the timing retard path.

HINT:
The lock pin is released, and camshaft timing gear revolves in the advance direction.

(f) When the camshaft timing gear comes to the most advanced position, take out the air pressure of the timing retard side path, and then, takeout that of timing advance side path.

CAUTION:
Camshaft timing gear assembly occasionally shifts to the retard side abruptly, if the air compression of the advanced side path is released before retard side paths. It often causes the breakage of the lock pin.

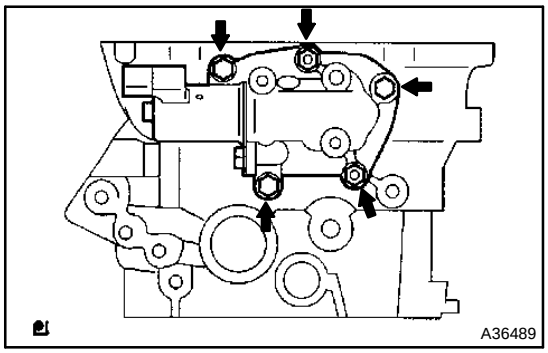
CONTINUED



(g) Remove the fringe bolt of camshaft timing gear assembly.

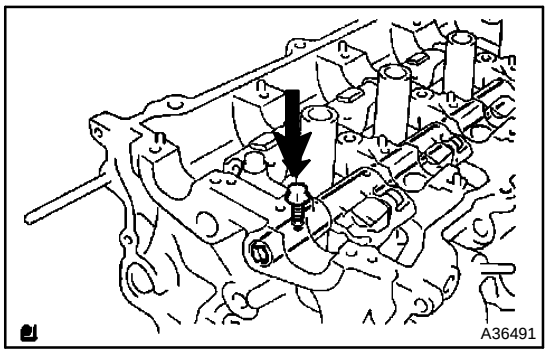
NOTICE:

Be sure not to remove the other 4 bolts.



13. REMOVE CAM TIMING CONTROL VALVE HOUSING

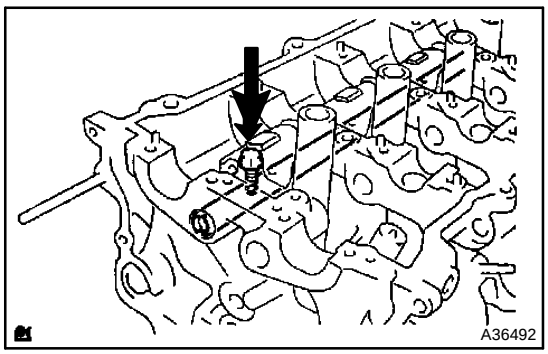
(a) Remove 3 bolts, 2 nuts and the cam timing oil control valve housing.



14. REMOVE VALVE ROCKER SHAFT SUB-ASSY NO.1

(a) Remove a bolt and the rocker shaft No. 1.

(b) Remove the valve rocker arm.

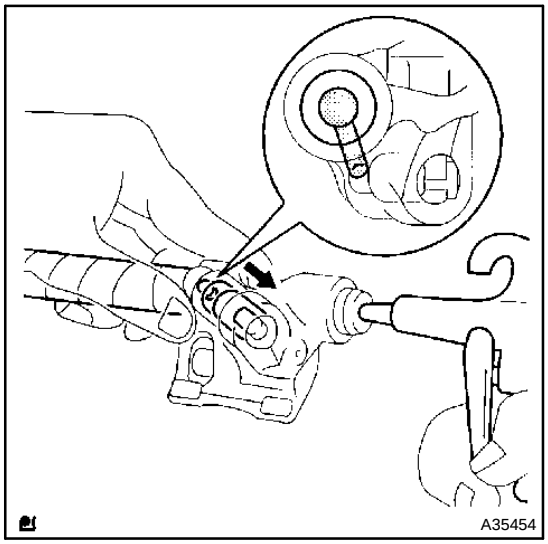


15. REMOVE VALVE ROCKER SHAFT SUB-ASSY NO.2

(a) Remove a bolt and the rocker shaft No. 2.

(b) Remove the valve rocker arm.

CONTINUED

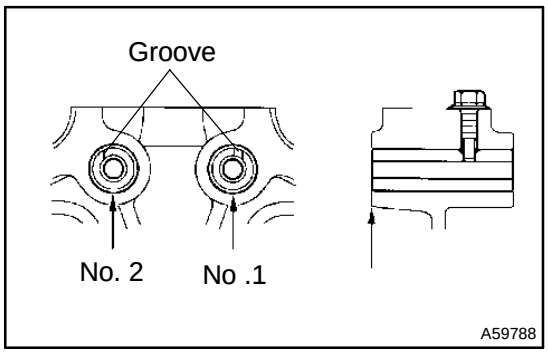


16. INSPECT VALVE ROCKER ARM

(a) Cover oil paths of the rocker arm shaft except 2 paths with vinyl type.

(b) Align the oil path of the rocker arm shaft to the oil path of the rocker arm.

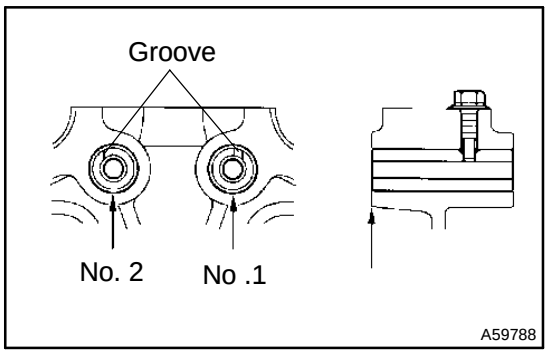
(c) Check that the piston inside of the rocker arm moves when air pressure 150 kpa {1.5kgf/cm^2 } is put to the oil paths.



17. INSTALL VALVE ROCKER SHAFT SUB–ASSY NO.2

(a) Put the valve rocker shaft through the cylinder head and the hole of the valve rocker arm, and check the direction of the groove.

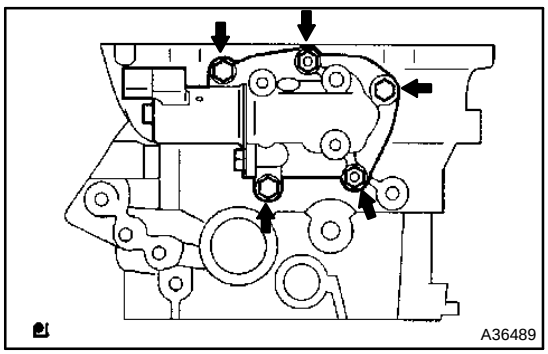
(b) Install a bolt to fix the rocker shaft No.2.
Torque: 7.5 N·m (77 kgf·cm 67 in·lbf)



18. INSTALL VALVE ROCKER SHAFT SUB–ASSY NO.1

(a) Put the valve rocker shaft through the cylinder head and the hole of the valve rocker arm, and check the direction of the groove.

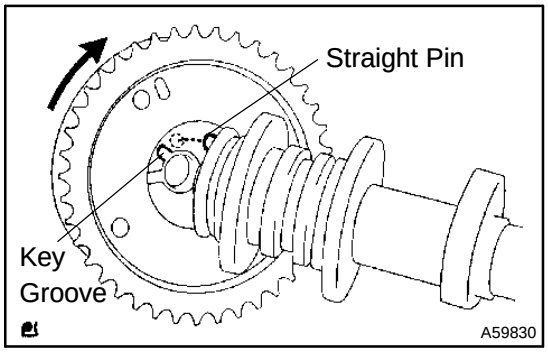
(b) Install a bolt to fix the rocker shaft No.1.
Torque: 7.5 N·m (77 kgf·cm 67 in·lbf)



19. INSTALL CAM TIMING CONTROL VALVE HOUSING

(a) Install the new gasket and the oil control valve housing with 3 bolts and 2 nuts.
Torque: 9.0 N·m (92 kgf·cm 80 in·lbf)

CONTINUED



20. INSTALL CAMSHAFT TIMING GEAR ASSY

(a) Put the camshaft timing gear and the camshaft together with the straight pin off the key groove.

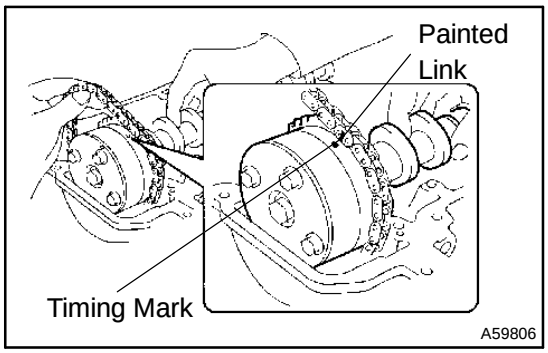
(b) Turn the camshaft timing gear to the left direction (as shown in the illustration) with pushing it lightly against the camshaft. Push further at the position where the pin gets into the groove.

CAUTION:
Be sure not to turn the camshaft timing gear to the retard angle side (to the right angle).

(c) Check that there is no clearance between the gear's fringe and the camshaft.

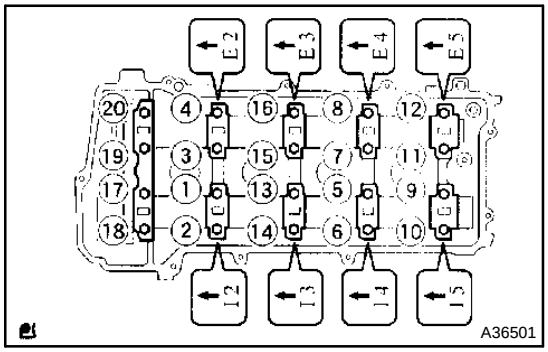
(d) Tighten the fringe bolt with the camshaft timing gear fixed.
Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)

(e) Check that the camshaft timing gear can move to the retard angle side (the right angle), and is locked at the most retarded position.

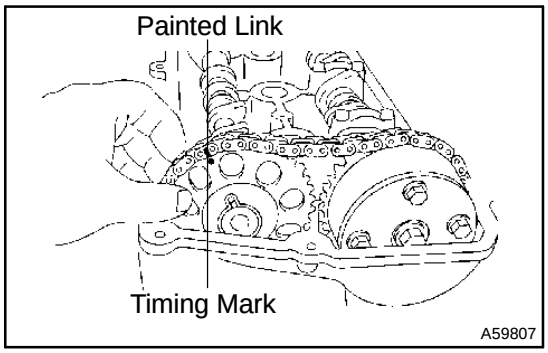


21. INSTALL CAMSHAFT

(a) As shown in the illustration, install the timing chain on the camshaft timing gear, with the painted links aligned with the timing marks on the camshaft timing sprokets.

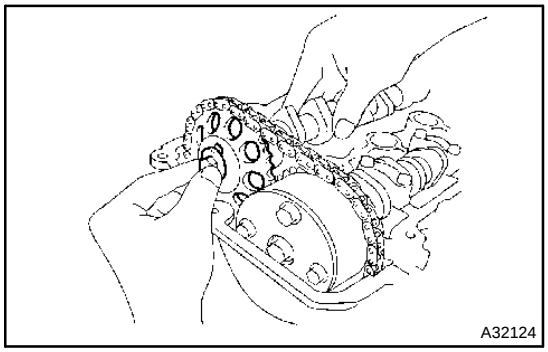


(b) Exxamine the front marks and numbers and tighten the bolts in the order shown in the illustratin.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

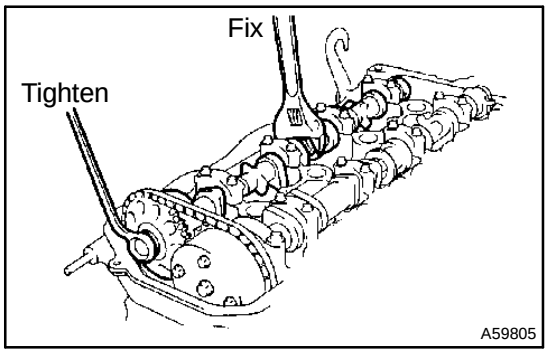


(c) Put the camshaft No. 2 on the cylinder head with the painted links of the chain aligned with the timing mark on the camshaft timing sprockets.

CONTINUED

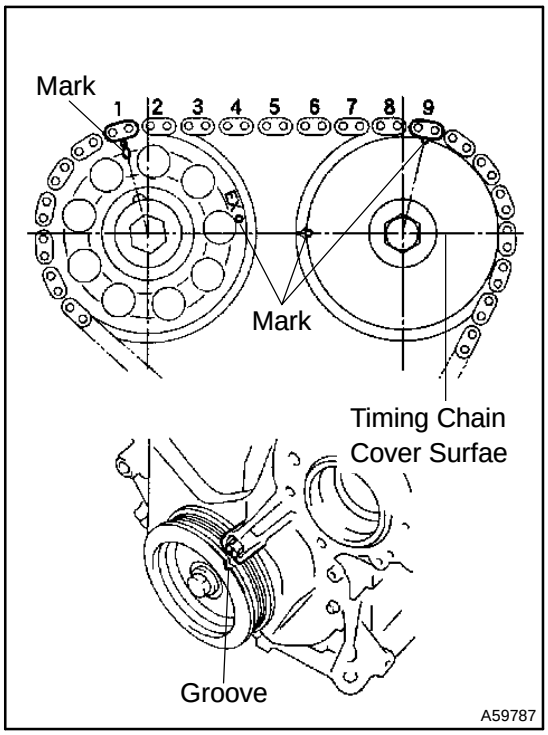


(d) Tighten the set bolt temporarily.

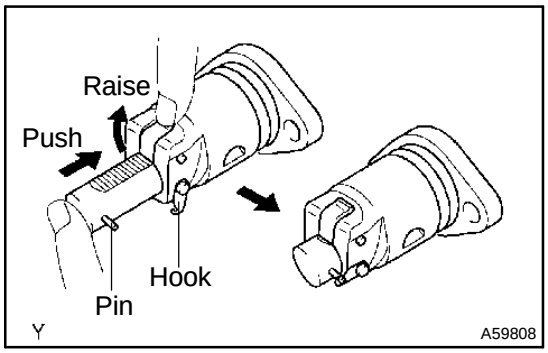


(e) Hold the hexagon wrench head position of the camshaft and remove the camshaft timing gear set bolt.
Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)

NOTICE:
Be careful not damage the valve lifter.

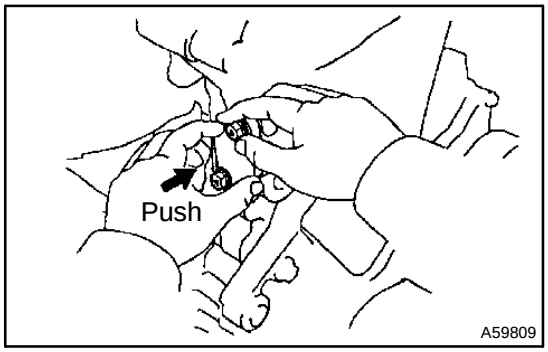


(f) Check the match marks on the timing chain and camshaft timing sprockets, and then the alignment of the pully groove with timing mark of the chain cover as shown in the illustration.



(g) Install chain tensioner.
(1) Check the O–ring is clean, and set the hook as shown in the illustration.

CONTINUED

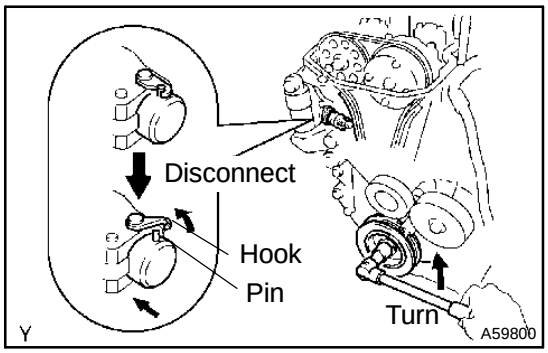


(2) Apply the engine oil to the chain tensioner and install it.

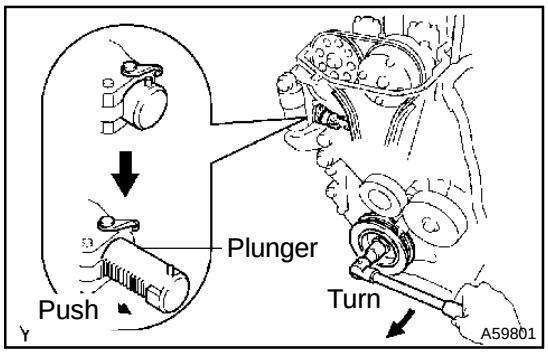
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

NOTICE:

When installing the tensioner, set the hook again if the hook release the plunger.



(3) Turn the crankshaft counterclockwize, and disconnect the plunger knock pin from the hook.



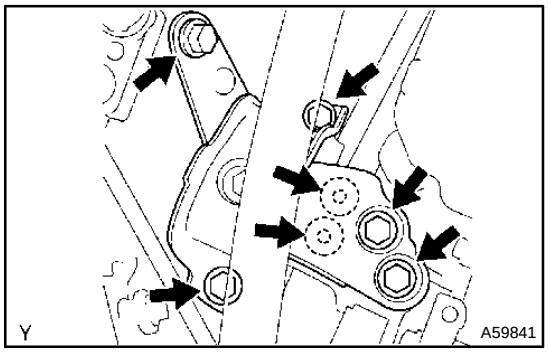
(4) Turn the crankshaft clockwize, and check that the slipper is pushed by the plunger.

HINT:

If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver or your finger so that the hook is released from the knock pin and the plunger spring out.

22. INSTALL V-RIBBED BELT TENSIONER ASSY

Torque:
Nut : 29 N·m (296 kgf·cm, 21 ft·lbf)
Bolt : 100 N·m (1,020 kgf·cm, 74 ft·lbf)



23. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSY RH

(a) Install the engine mounting insulator sub-assy RH with 5 bolts and 2 nuts.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

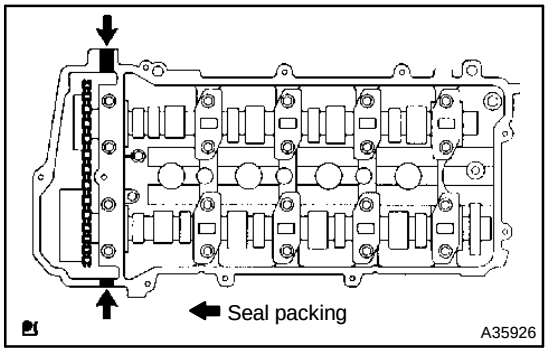
24. INSTALL CYLINDER HEAD COVER SUB-ASSY

(a) Remove any old packing (FIPG) materials.

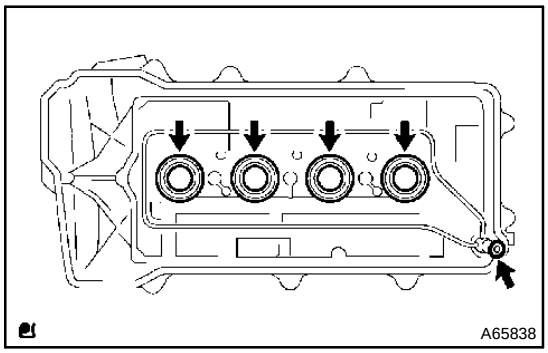
HINT:

When FIPG on the head cover gasket side cannot be eliminated completely, replace the gasket.

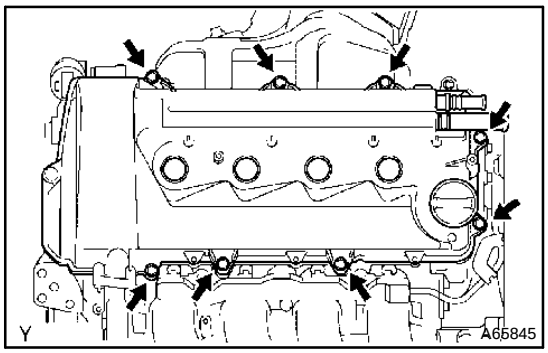
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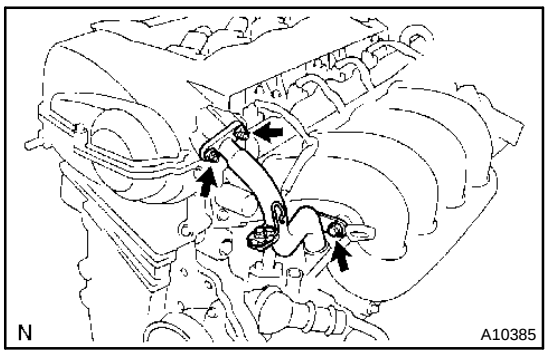
(b) Apply seal packing to 2 locations as shown in the illustration.
Seal packing:
Part No. 08826 – 00080 or equivalent
(c) Install the cylinder head gasket to the cylinder head cover.
HINT:
Part must be assembled within 3 minutes of application. Otherwise the material must be remove and reapplied.



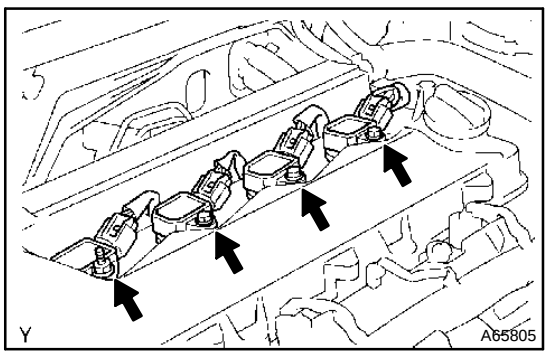
(d) Install the spark plug tube gasket and a new O–ring to the cylinder head cover.



(e) Install the cylinder head cover and wire harness protector with 8 bolts. Uniformly tighten 8 bolts.
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)
(f) Connect 2 PCV hoses to the cylinder head cover.



(g) Install a new gasket and No. 1 ventilation pipe with 2 nuts and a bolt.
Torque:
Nut : 10 N·m (102 kgf·cm, 7 ft·lbf)
Bolt : 24 N·m (245 kgf·cm, 18 ft·lbf)
(h) Connect the No. 3 ventilation hose to the No. 1 ventilation pipe.



25. INSTALL IGNITION COIL ASSY
(a) Install 4 ignition coils with 4 bolts.
Torque: 9.0 N·m (92 kgf·cm 80 in·lbf)

CONTINUED

26. INSTALL CYLINDER HEAD COVER NO.2

(a) Install the cylinder head cover No. 2 with 3 bolts and a nut.
Torque: 7.0 N·m (71 kgf·cm 62 in·lbf)

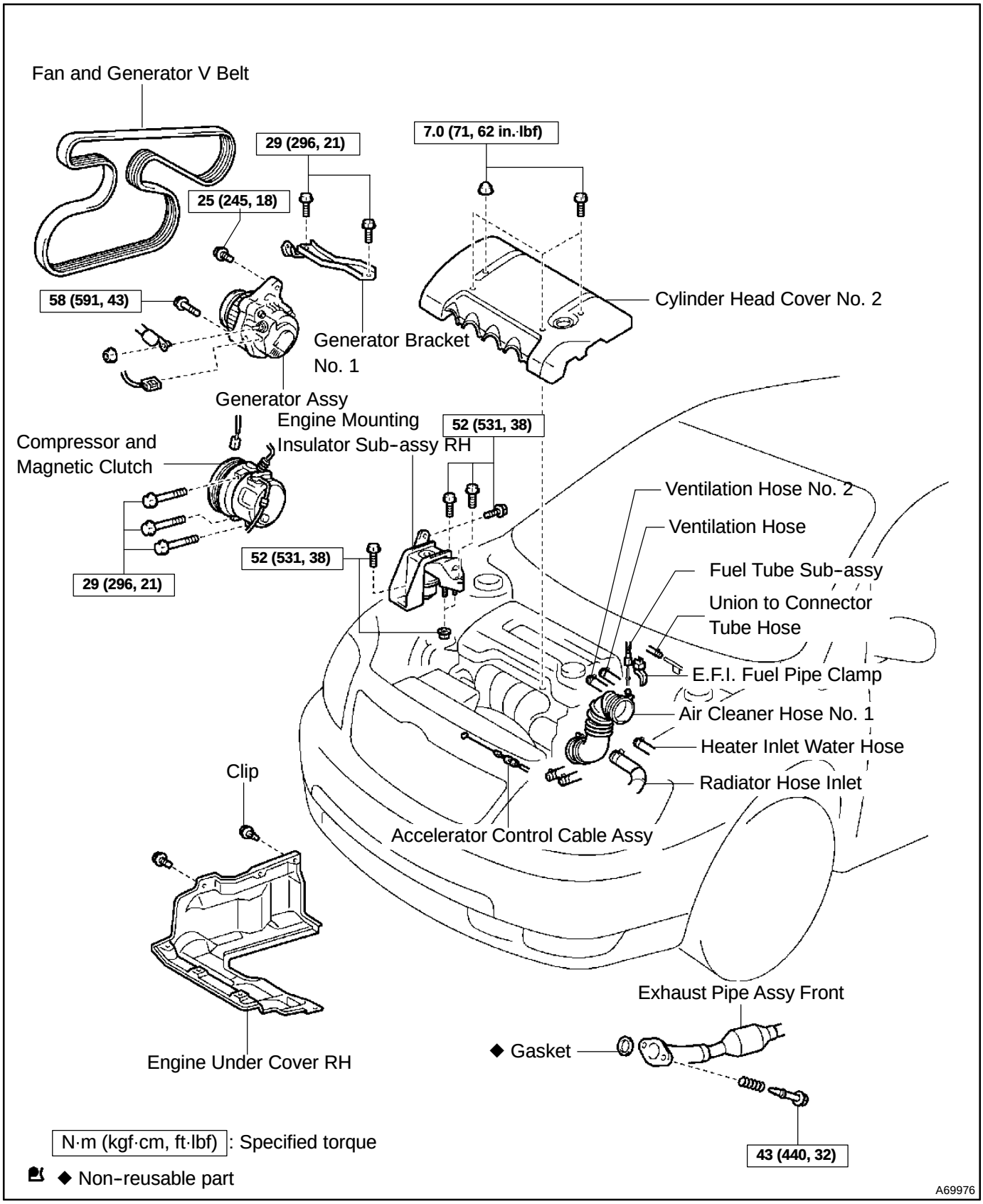
27. CHECK ENGINE OIL LEAK

CONTINUED

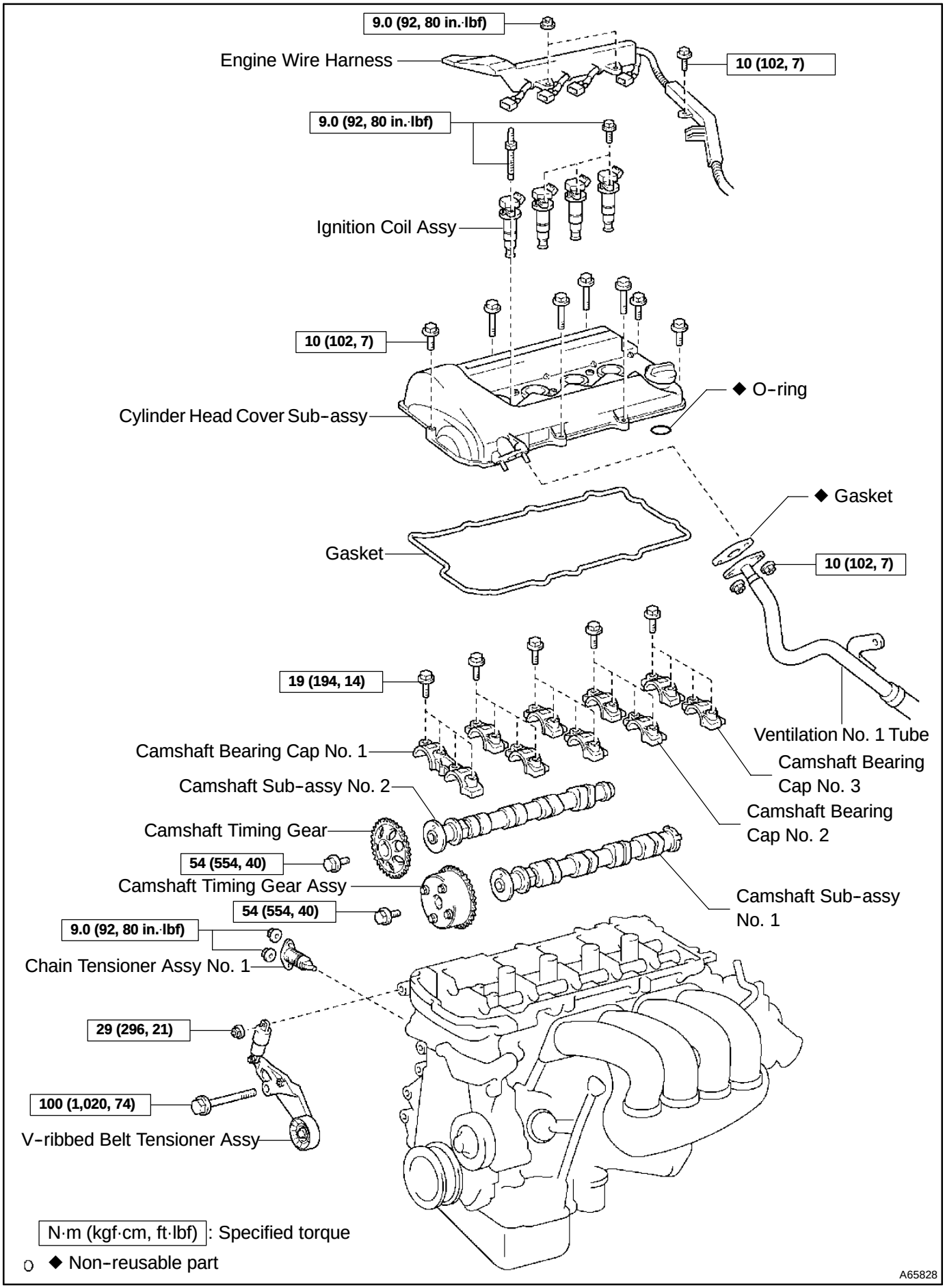
CYLINDER HEAD GASKET (2ZZ-GE)

COMPONENTS

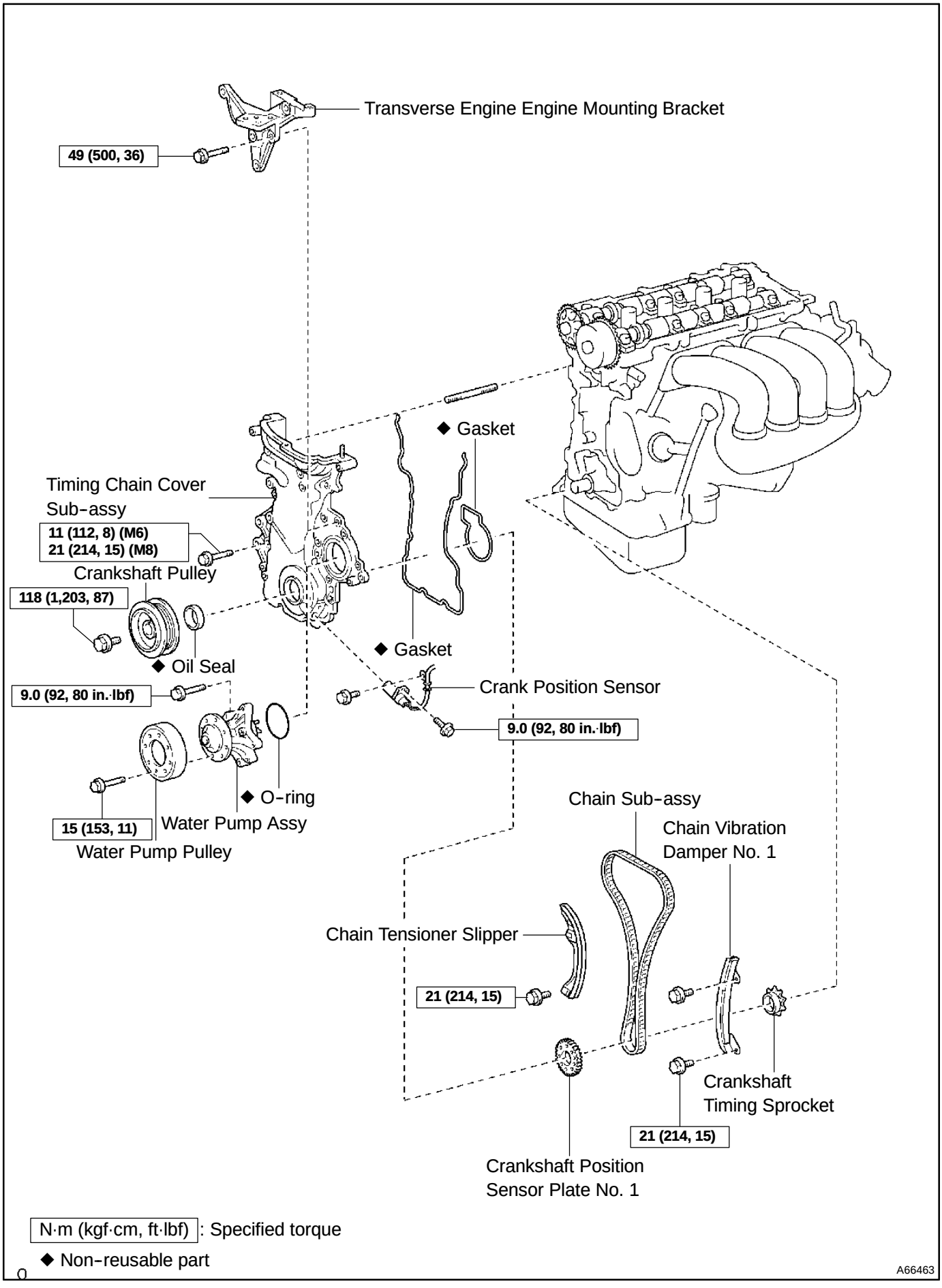
140MY-02

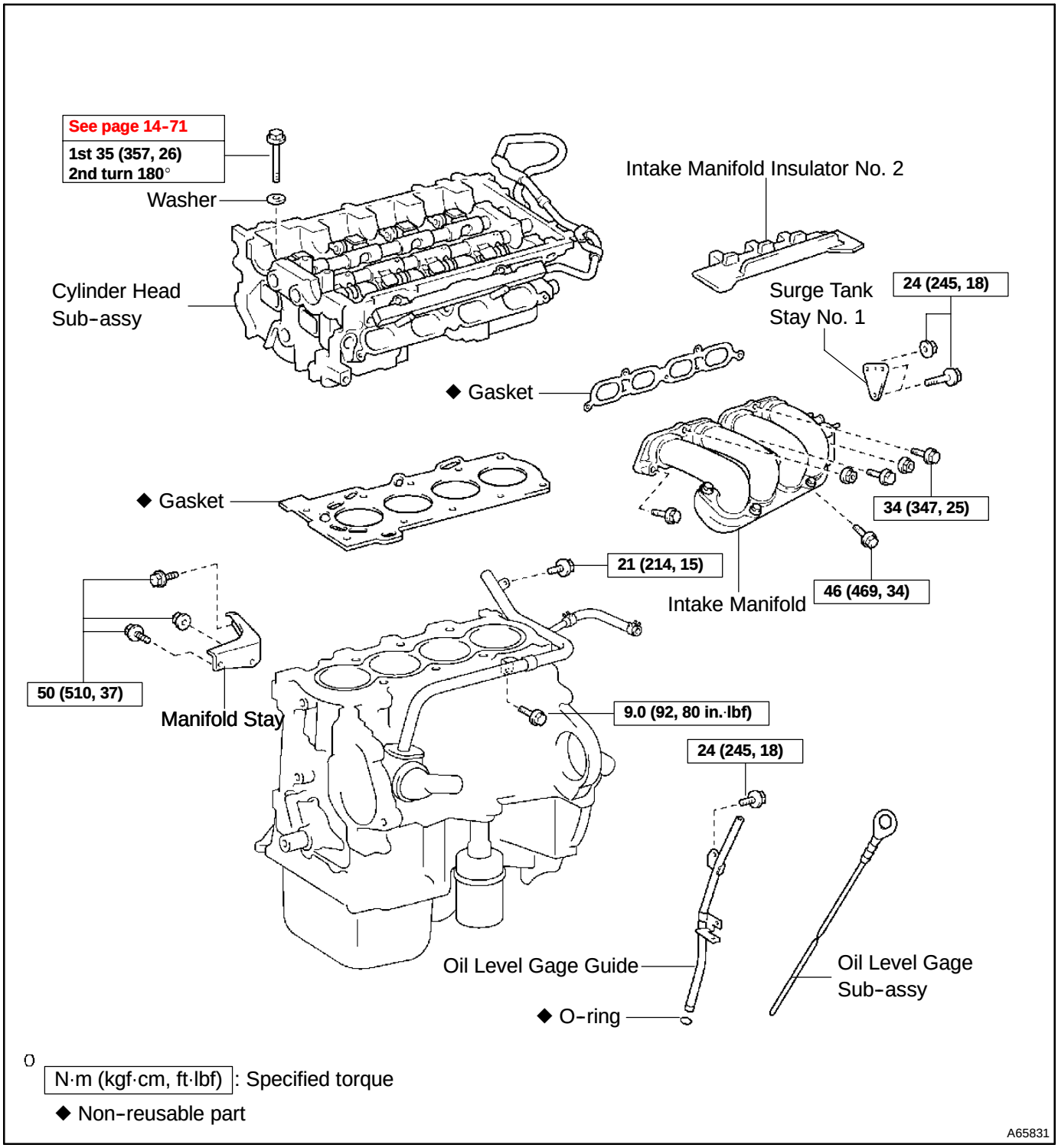


CONTINUED


9.0 (92, 80 in.·lbf)
Engine Wire Harness
10 (102, 7)
9.0 (92, 80 in.·lbf)
Ignition Coil Assy
10 (102, 7)
◆ O-ring
Cylinder Head Cover Sub-assy
◆ Gasket
Gasket
10 (102, 7)
19 (194, 14)
Ventilation No. 1 Tube
Camshaft Bearing Cap No. 1
Camshaft Bearing Cap No. 3
Camshaft Sub-assy No. 2
Camshaft Bearing Cap No. 2
Camshaft Timing Gear
54 (554, 40)
Camshaft Timing Gear Assy
Camshaft Sub-assy No. 1
54 (554, 40)
9.0 (92, 80 in.·lbf)
Chain Tensioner Assy No. 1
29 (296, 21)
100 (1,020, 74)
V-ribbed Belt Tensioner Assy
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A65828

CONTINUED

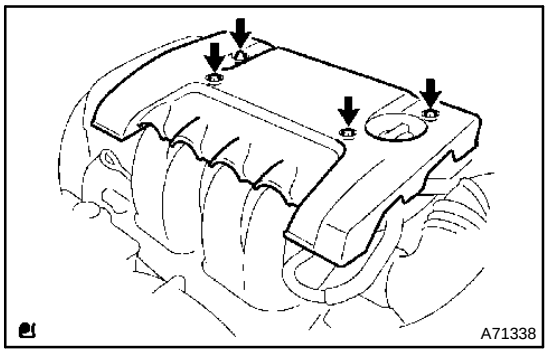

Transverse Engine Engine Mounting Bracket
49 (500, 36)
◆ Gasket
Timing Chain Cover
Sub-assy
11 (112, 8) (M6)
21 (214, 15) (M8)
Crankshaft Pulley
118 (1,203, 87)
◆ Oil Seal
◆ Gasket
9.0 (92, 80 in.·lbf)
Crank Position Sensor
9.0 (92, 80 in.·lbf)
◆ O-ring
15 (153, 11)
Water Pump Assy
Water Pump Pulley
Chain Sub-assy
Chain Vibration
Damper No. 1
Chain Tensioner Slipper
21 (214, 15)
Crankshaft
Timing Sprocket
21 (214, 15)
Crankshaft Position
Sensor Plate No. 1
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A66463


See page 14-71
1st 35 (357, 26)
2nd turn 180°
Washer
Cylinder Head Sub-assy
Intake Manifold Insulator No. 2
Surge Tank Stay No. 1
24 (245, 18)
◆ Gasket
◆ Gasket
34 (347, 25)
21 (214, 15)
46 (469, 34)
Intake Manifold
50 (510, 37)
Manifold Stay
9.0 (92, 80 in.·lbf)
24 (245, 18)
Oil Level Gage Guide
◆ O-ring
Oil Level Gage Sub-assy
O N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A65831

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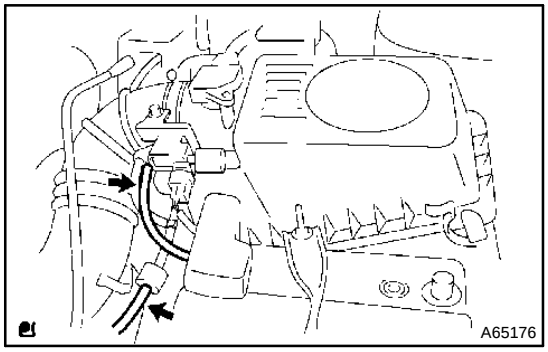
REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT** **(See page 11–5)**
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **DRAIN COOLANT** **(See page 16–6)**



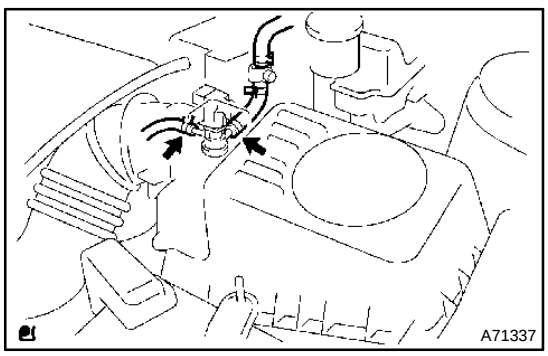
5. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove 3 bolts, a nut and the cylinder hrad cover No. 2.

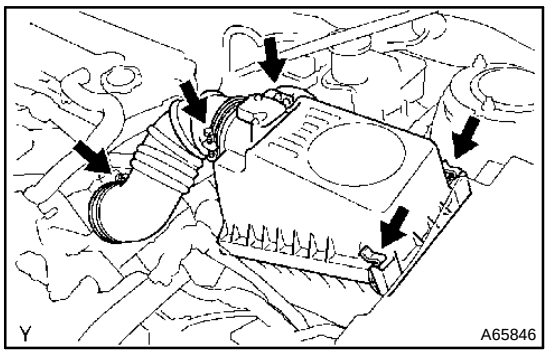


6. REMOVE AIR CLEANER ASSEMBLY WITH HOSE

(a) Place match marks on the vacuum hoses.
(b) Disconnect 2 vacuum hoses as shown in the illustration.
(c) Disconnect the intake air flow–meter connector.
(d) Disconnect 2 VSV connector.

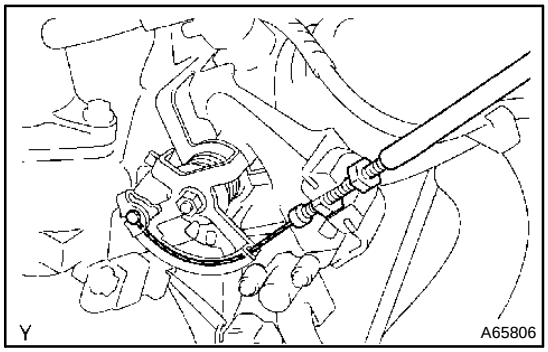


(e) Disconnect 2 vacuum hoses, as shown in the illustration.

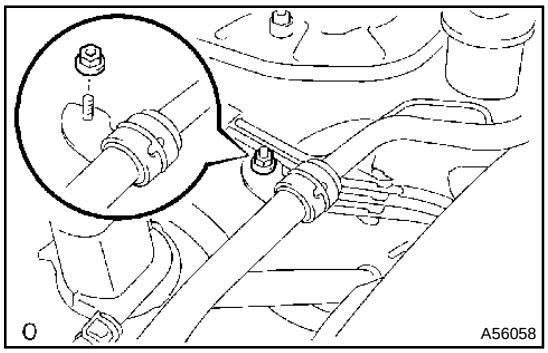


(f) Disconnect 2 clamps, and disconnect the air cleaner cap from the air cleaner case.
(g) Losen the hose from the throttle body.
(h) Remove the air cleanerassembly with hose.

CONTINUED



7. DISCONNECT ACCELERATOR CONTROL CABLE ASSY



8. REMOVE COOLER REFRIGERANT SUCTION HOSE NO.1

(a) Remove a nut and seprate the cooler refrigerant suction hose.

9. REMOVE FAN AND GENERATOR V BELT **(See page 14-4)**

10. REMOVE EFI FUEL PIPE CLAMP**(See page 11-1)**

11. DISCONNECT FUEL TUBE SUB-ASSY**(See page 11-1)**

12. SEPARATE RADIATOR HOSE INLET

(a) Disconnect the radiator hose inlet fron the radiator.

13. DISCONNECT HEATER INLET WATER HOSE

(a) Disconnect the heater inlet water hose from the air conditioner tube.

14. DISCONNECT WATER BY-PASS HOSE NO.2

(a) Disconnect the water by-pass hose No. 2 fron the throttle body.

15. DISCONNECT WATER BY-PASS HOSE NO.3

(a) Disconnect the water by-pass hose No.3 from the throttle body.

16. DISCONNECT UNION TO CONNECTOR TUBE HOSE

(a) Disconnect the union to check valve hose from the brake booster.

17. REMOVE INTAKE MANIFOLD INSULATOR NO.2

18. REMOVE GENERATOR BRACKET NO.1**(See page 19-8)**

19. REMOVE GENERATOR ASSY**(See page 19-8)**

20. SEPARATE COMPRESSOR AND MAGNETIC CLUTCH

(a) Disconnect the connector.

(b) Remove 3 bolts and the compressor.

HINT:

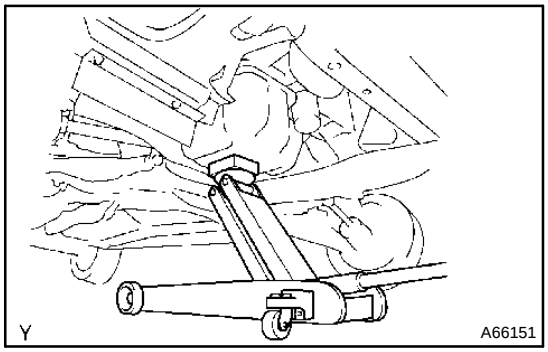
Hung up the hoses instead of deteaching.

21. DISCONNECT EXHAUST PIPE ASSY FRONT

(a) Remove 2 bolts and 2 nuts compression springs installing the front side of exhaust pipe.

(b) Remove the gasket.

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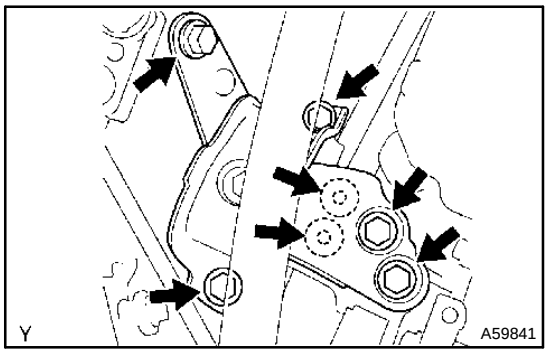


22. REMOVE ENGINE MOUNTING INSULATOR SUB–ASSY RH

(a) Set the jack to the engine.

HINT:

Place a wooden block between the jack and engine.

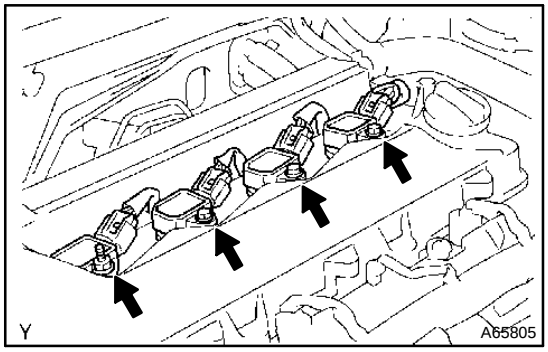


(b) Remove 5 bolts, 2 nuts and the engine mounting insulator sub – assy RH.

23. DISCONNECT ENGINE WIRE

(a) Disconnect the ignition coil connectors, oilcontrol velve connector and crankshaft position sensor connector.

(b) Remove a bolt and a nut for the earth and put the engine wiring side.



24. REMOVE IGNITION COIL ASSY

(a) Disconnect 4 ignition coil connectors.

(b) Remove 4 bolts and 4 ignition coils.

25. DISCONNECT VENTILATION HOSE

(a) Disconnect the ventilation hose from the cylinder head cover.

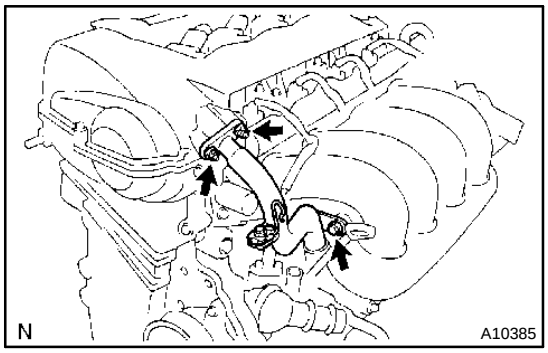
26. DISCONNECT VENTILATION HOSE NO.2

(a) Disconnect the ventilation hose from the cylinder head cover.

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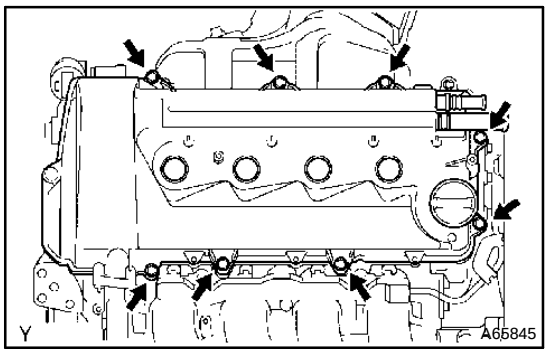
27. REMOVE CYLINDER HEAD COVER SUB-ASSY

(a) Disconect the fuel hose clamp and 2 PCV hoses from the cylinder head cover.



(b) Remove 2 nuts and a bolt, and disconnect the No. 3 ventilation hose from the No. 1 ventilation pipe.

(c) Disconnect the ventilation No. 1 tube and gasket.



(d) Remove 8 bolts, wire harness protector, cylinder head cover and gasket.

(e) Remove the O-ring from the cylinder head cover.

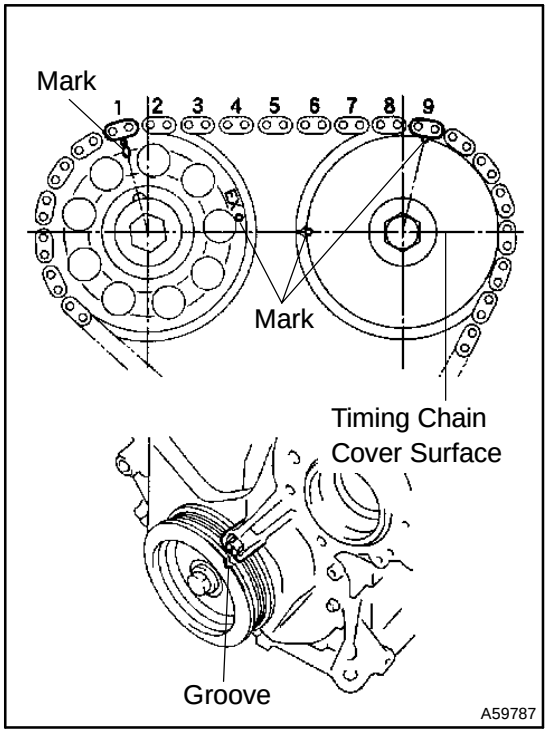
28. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the srankshaft pully, and align its groove with timing mark "0" of the timing chain cover.

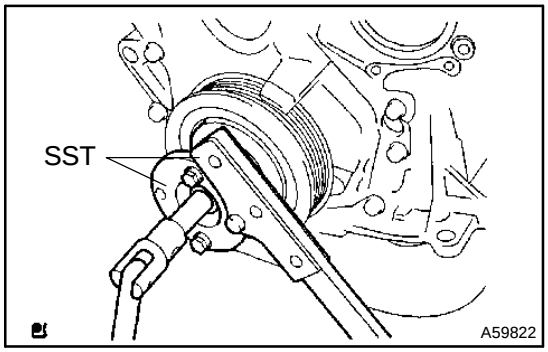
(b) Check that the point marks of the camshaft timing sproket and VVT timing sproket are in straight line on the timing chain cover surface as shown in the illustlation.

HINT:

If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

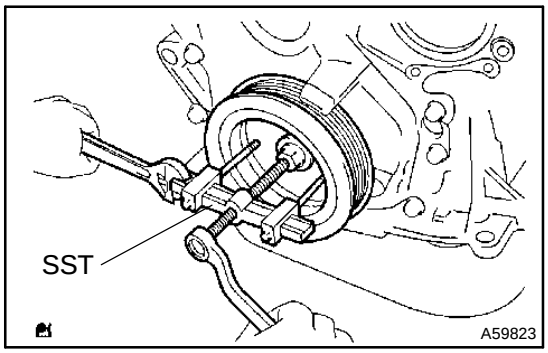


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29. REMOVE CRANKSHAFT PULLEY

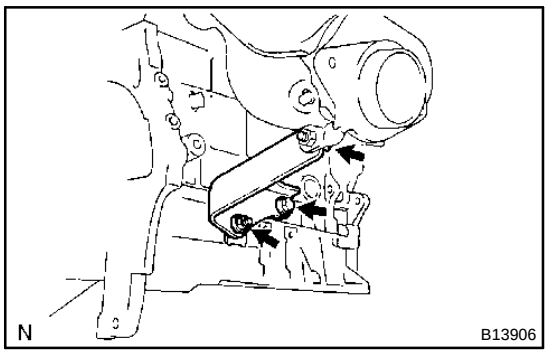
(a) Using SST, remove the crankshaft pulley.
SST 09213–70011 (09213–70020), 09330–00021,



(b) Using SST, remove the crankshaft pulley.
SST 09950–50013 (09951–05010, 09952–05010, 09953–05020, 09954–05021, 09957–04010)

30. REMOVE V–RIBBED BELT TENSIONER ASSY

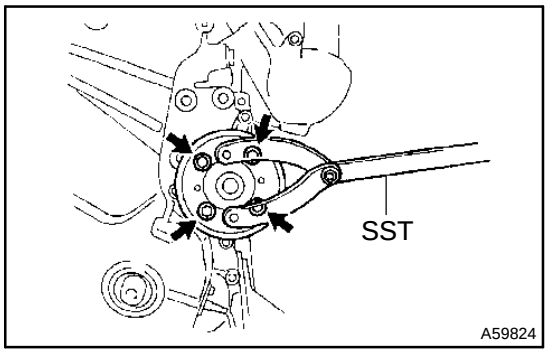
HINT:
Handle a jack up and down to remove the bolt.



31. REMOVE MANIFOLD STAY

(a) Remove 2 bolts, a nut and the exhaust manifold stay.

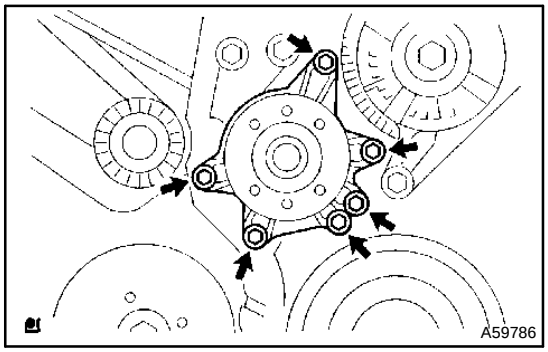
32. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.1



33. REMOVE WATER PUMP PULLEY

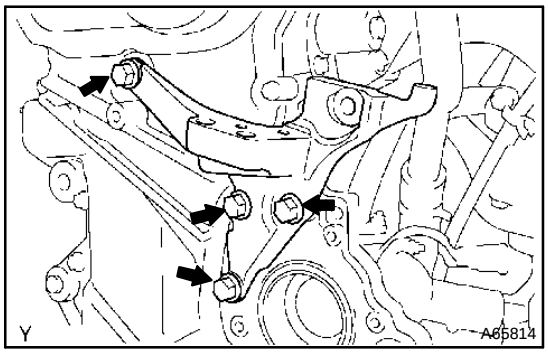
(a) Using SST, remove the water pump pulley.
SST 09960–10010

CONTINUED



34. REMOVE WATER PUMP ASSY

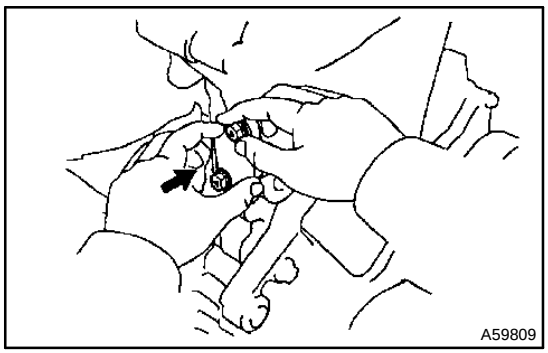
(a) Remove 6 bolts and the water pump.



35. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Remove 4 bolts and the engine mounting bracket.

36. REMOVE CRANK POSITION SENSOR

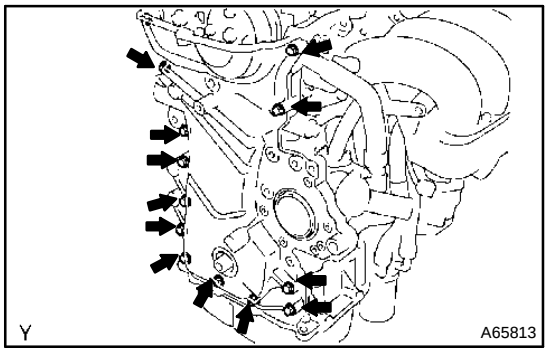


37. REMOVE CHAIN TENSIONER ASSY NO.1

(a) Remove 2 nuts and the chain tensioner assy No. 1.

NOTICE:

Be sure not to revolve the crankshaft without the chain tesioner.



38. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSY

(a) Remove 12 bolts.

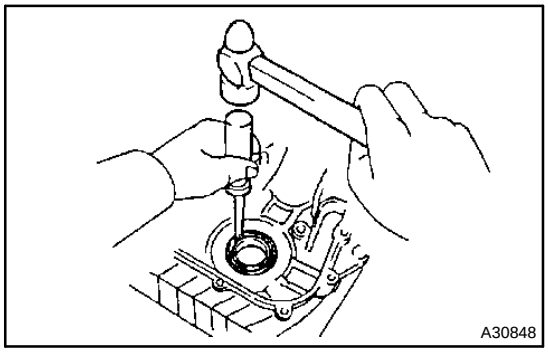
(b) Using a torx wrench soket (E8), remove the stud bolt.

(c) Remove the timing chain cover and 2 gaskets.

NOTICE:

Be careful not to damage the cantact surfaces of the timing chain cover, cylinder head and cylinder block.

CONTINUED



39. REMOVE TIMING GEAR COVER OIL SEAL

(a) Using a screwdriver, remove the timing gear cover oil seal.

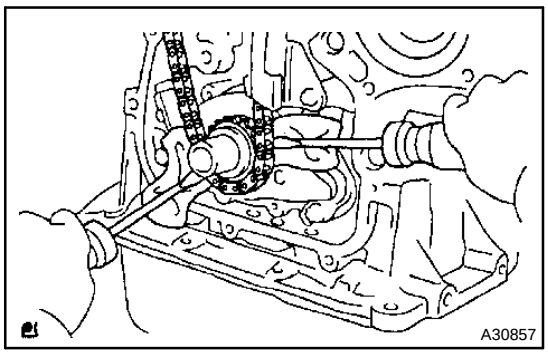
40. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

41. REMOVE CHAIN TENSIONER SLIPPER

(a) Remove a bolt and the chain tesioner slipper.

42. REMOVE CHAIN VIBRATION DAMPER NO.1

(a) Remove 2 bolts and chain vibration damper No. 1.

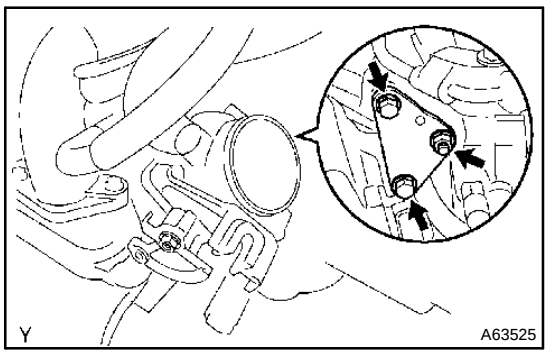


43. REMOVE CHAIN SUB–ASSY

(a) Remove the timing chain withthe crankshaft timing gear plying screwdriver as shown in the illustration.

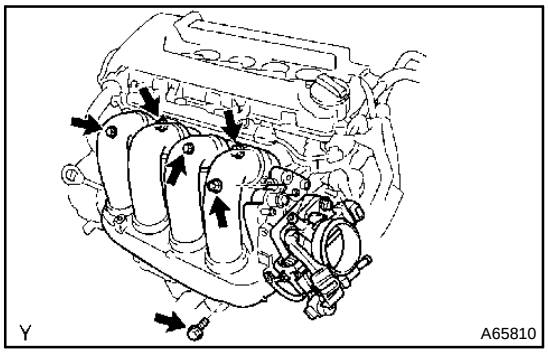
NOTICE:

- **Put shop rag to protect the engine.**
- **In case of revolving the camshafts with the chain off the sprockets, turn the crankshaft 1/4 revolution for valves not to touch the pistons.**



44. REMOVE SURGE TANK STAY NO.1

(a) Remove 2 bolts, a nut and surge tank stay No. 1.



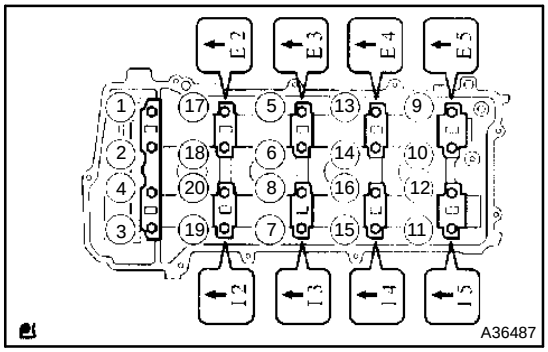
45. REMOVE INTAKE MANIFOLD

(a) Remove 4 bolts, 2 nuts, the intake manifold and the gasket.

46. REMOVE OIL LEVEL GAGE GUIDE

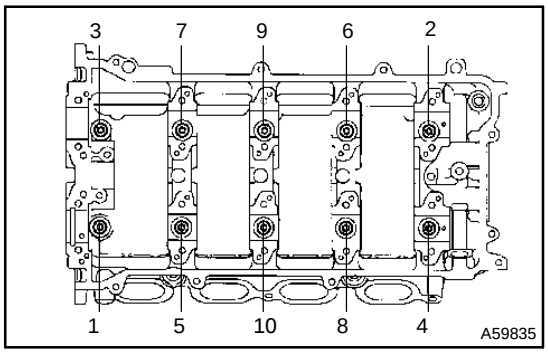
47. REMOVE OIL LEVEL GAGE SUB–ASSY

CONTINUED



48. REMOVE CAMSHAFT

(a) Uniformly loosen and remove 20 bearing cap bolts, in several passes, in the sequence shown, and remove the 9 bearing caps of the intake and exhaustcamshafts.



49. REMOVE CYLINDER HEAD SUB-ASSY

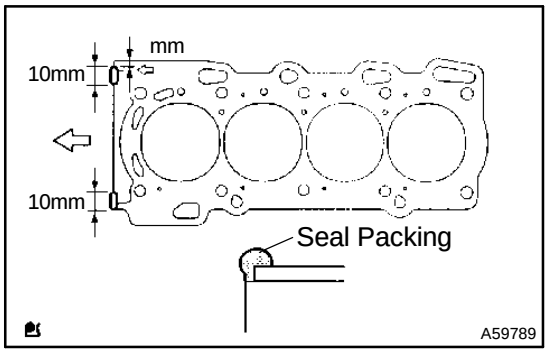
(a) Detach the water by-pass pipe from the cylinder head.

(b) Using a 10 mm bi-hexagon wrench, uniformly loosen and remove 10 cylinder head bolts, in several passes, in the sequence shown. Remove 10 cylinder head bolts and plate washers.

NOTICE:

- **Be careful not to drop washers into the cylinder head.**
- **Head warpage or cracking could result from removeing bolts in and incorrect order.**

50. REMOVE CYLINDER HEAD GASKET



51. INSTALL CYLINDER HEAD GASKET

(a) Place a new cylinder head gasket on the cylinder block.

NOTICE:

- **Pay attention to the installation direction.**
- **Place the cylinder head quietly in order not to damage the gasket with the bottom part of the head.**

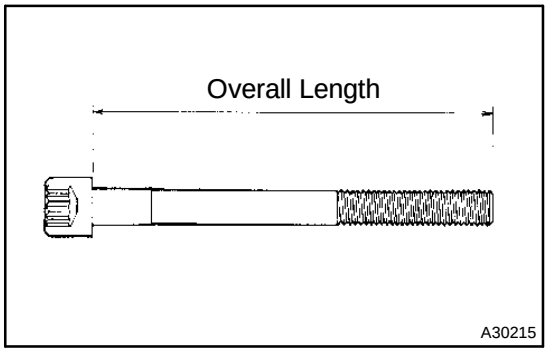
(b) Apply seal packing to the cylinder head gasket as shown in the illustration.

Seal packing :
Part No. 08826 - 00080 or equivalent

HINT:
Avoid applying an excessive amount to the surface.

NOTICE:
Parts must be assembled with in 3 minutes of application. Otherwise the material must be removed and repplied.
Immediately remove nozzle from the tube and reinstall cap.

CONTINUED

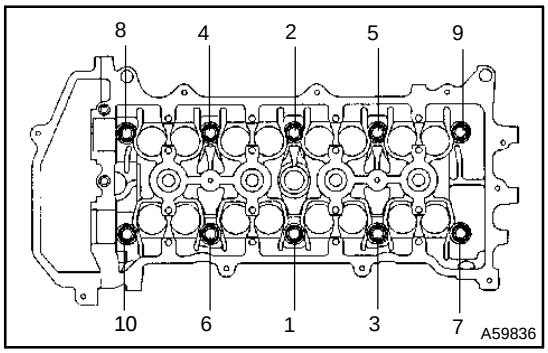


52. INSPECT CYLINDER HEAD SET BOLT

(a) Using vernier calipers, measure the length of head bolts from the seat to the end.

Standard bolt length :
146.0 – 148.2 mm (5.780 – 5.835 in.)
Maximum bolt length : 148.5 mm (5.846 in.)

If the length surpasses the maximum, replace the cylinder head bolt.



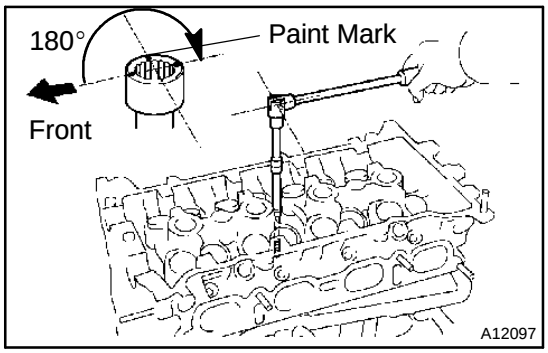
53. INSTALL CYLINDER HEAD SUB–ASSY

HINT:
The cylinder head bolts are tightened in 2 progressive steps.

(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Using a 10 mm bi – hexagon wrench, uniformlytighten and install 10 cylinder head bolts and plate washers, in several passes, in the sequence shown.

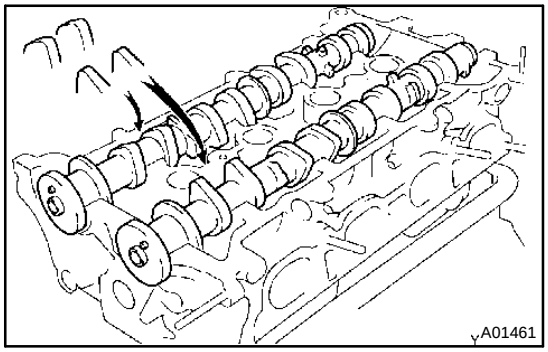
Torque: 35 N·m (357 kgf·cm, 26 ft·lbf)



(c) Make the front of the cylider head bolt with paint.

(d) Retighten the cylinder head bolts 180° in the numerical order shown.

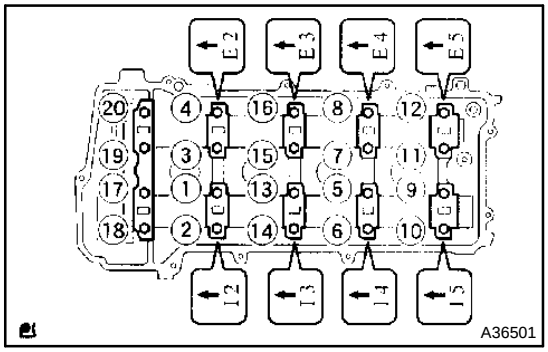
(e) Check that the point marked bolts are moved at 90° angle.



54. INSTALL CAMSHAFT

(a) Applylight coat of engine oil on the camshaft journals.

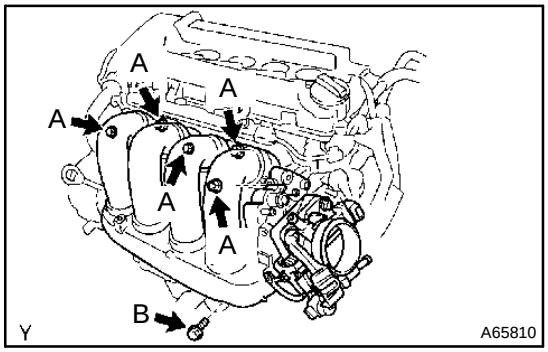
(b) Place 2 camshafts on the cylinder head with the No. 1 cam bolts facing as shown the illustration.



(c) Examine the front marks and numbers and tighten the bolts in the order shown in the illustration.

Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

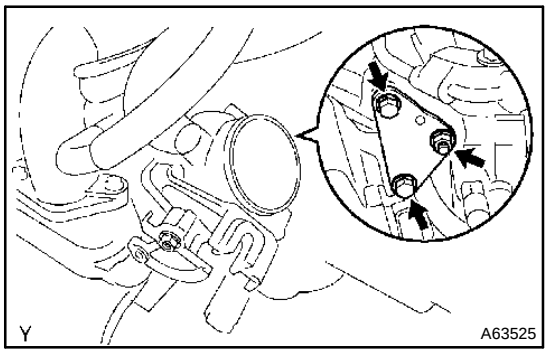
CONTINUED



55. INSTALL INTAKE MANIFOLD

(a) Install a new gasket and the intake manifold with 4 bolts and 2 nuts.

Torque:
A : 34 N·m (347 kgf·cm, 25 ft·lbf)
B : 46 N·m (469 kgf·cm, 34 ft·lbf)



56. INSTALL SURGE TANK STAY NO.1

(a) Install the surge tank stay with 2 bolts and a nut.

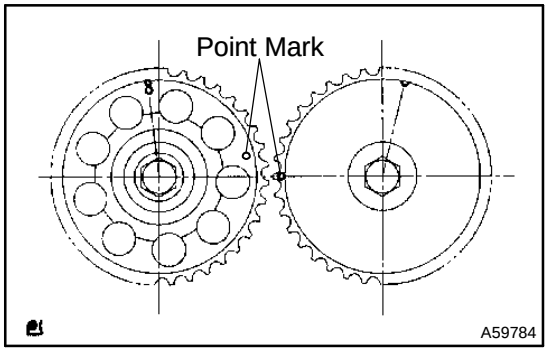
Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)

57. INSTALL OIL LEVEL GAGE GUIDE

(a) Apply a light coat of engine oil to the new O–ring, install it to the oil level gage guide.

(b) Install the oil level gage and guide with a bolt.

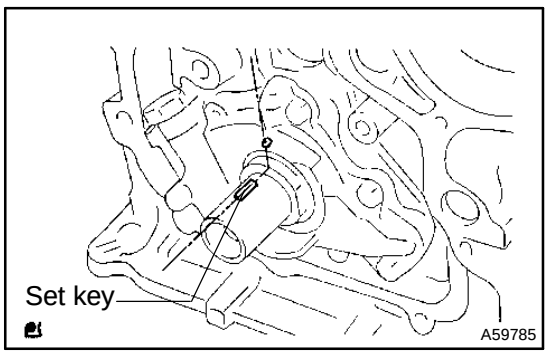
Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)



58. INSTALL CHAIN SUB–ASSY

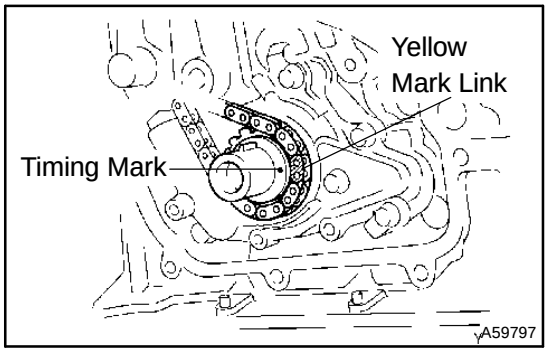
(a) Set No. 1 cylinder to TDC/compression.

(1) Turn the hexagonal wrench head portion of the camshafts, and align the point marks of the camshaft timing sprockets.



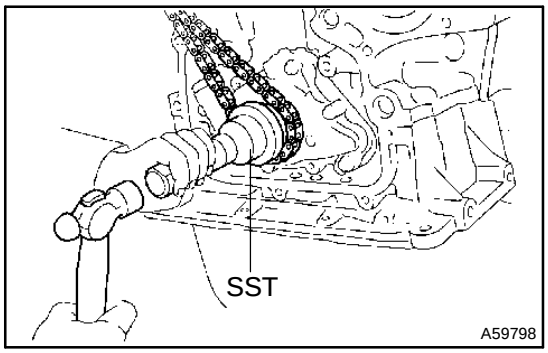
(2) Turn the crankshaft and the set key on the crankshaft upward.

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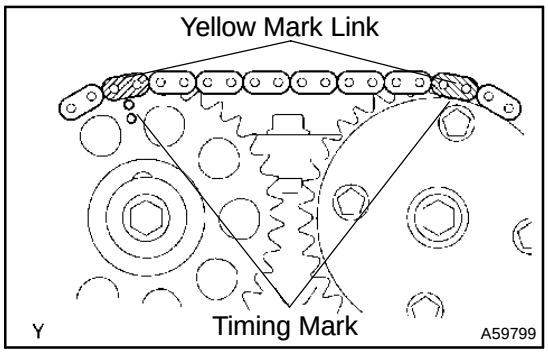


(b) Install the timing chain on the crankshaft timing sprocket with the yellow mark link aligned with the timing mark on the crankshaft timing sprocket.

HINT:
Three yellow color links are on the chain.



(c) Using SST, install the sprocket.
SST 09223–22010

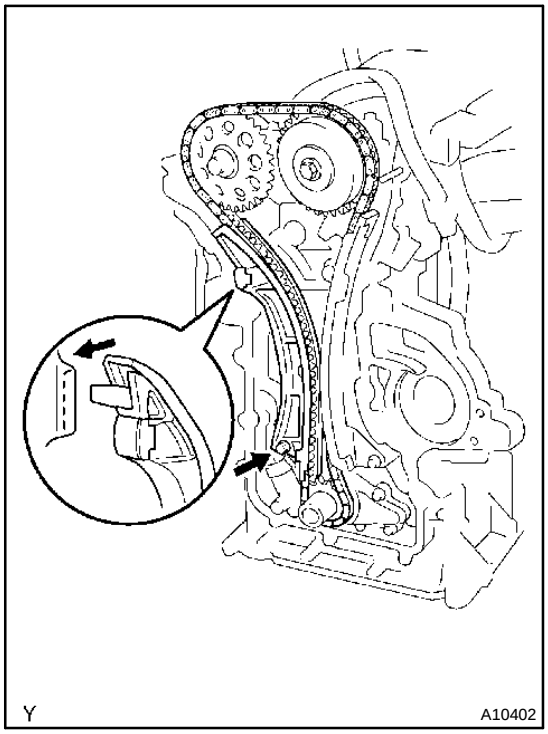


(d) Iastall the timing chain on the camshaft timing sprockets with the yellow mark links aligned with the timing marks on the camshaft timing sprockets.

59. INSTALL CHAIN VIBRATION DAMPER NO.1

(a) Install the chain vibration damper No. 1 with 2 bolts.
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

CONTINUED

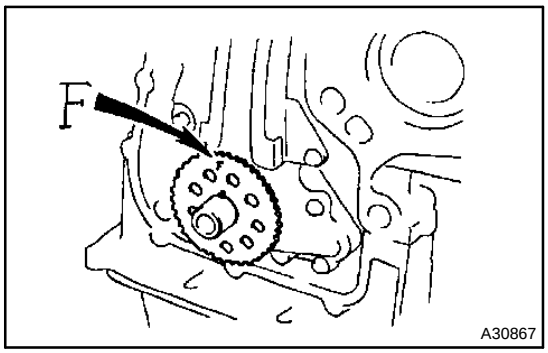


60. INSTALL CHAIN TENSIONER SLIPPER

(a) Install the chain tensioner slipper with the bolt.
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

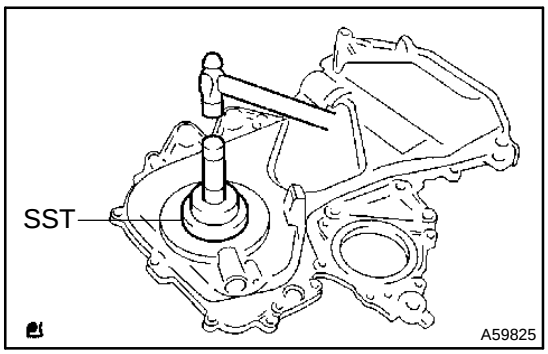
(b) Check that the chain tensioner slipper moves is caught on the cylinder head stopper.

NOTICE:
Do not turn the crankshaft.



61. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

(a) Install the plate with the ”F” mark facking forward.



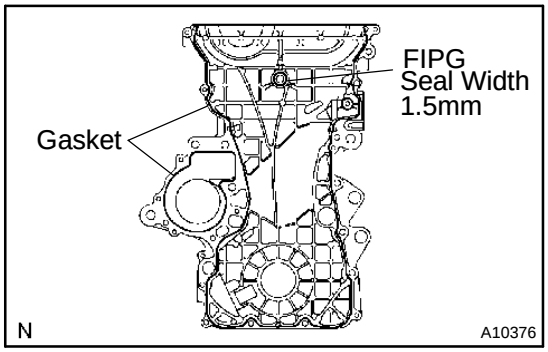
62. INSTALL TIMING GEAR COVER OIL SEAL

(a) Apply MP gease to the oil seal lip.

(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the timing chain cover edge.
SST 09223-22010

NOTICE:
Keep the lip off foreign materials.

CONTINUED



63. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSY

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface of the timing chain cover. cylinder head and cylinder block.

- Using a razor blade and a gasket scraper, remve all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material .
- Using a non–residue solvent, clean both sealing surfaces.

(b) Apply seal pacing to the timing chain cover an shown in the illustratin.

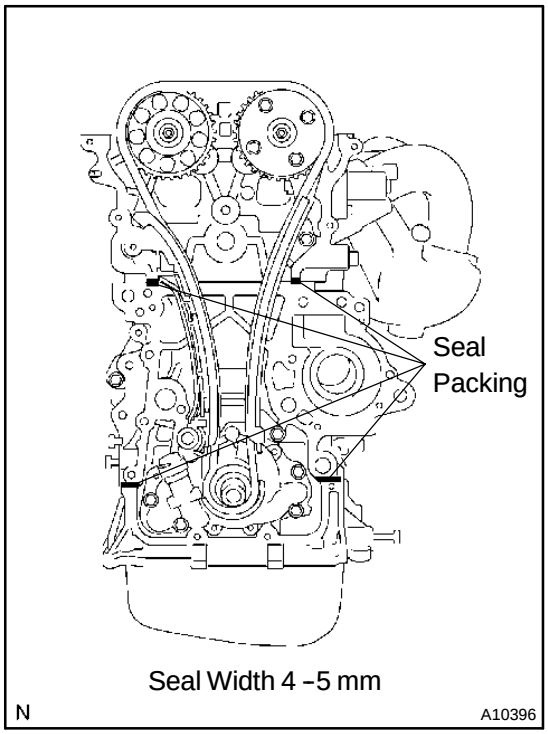
Seal packing :
part No. 08826 - 00100 or equivalent

- Install a nozzle that has been cut to a 1.5 mm opening.

HINT:
Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removes and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Iastall 2 gaskets to the timing chain cover an shown in the illustration.



(d) Apply seal packing to 4 locations an shown in the illustration .

Seal packing :
Part No. 08826 - 00080 or equivalent

- Install a nozzle that has been cut to a 4 – 5 mm (0.16 – 0.20 in.)opening.

HINT:
Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

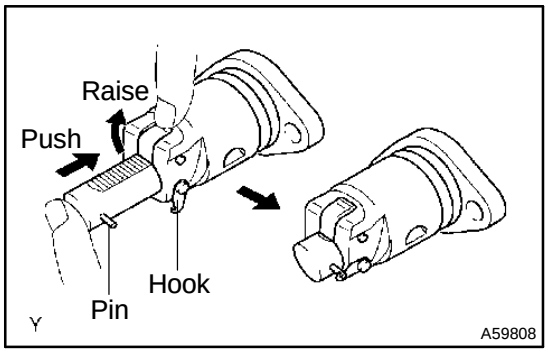
NOTICE:
Do not put into engine oil within 2 hours after installing.

(e) Install the timing chain cover, with 12 bolts and nut.

Torque:
21 N·m (214 kgf·cm, 15 ft·lbf) (M8)
11 N·m (112 kgf·cm, 8 ft·lbf) (M6)

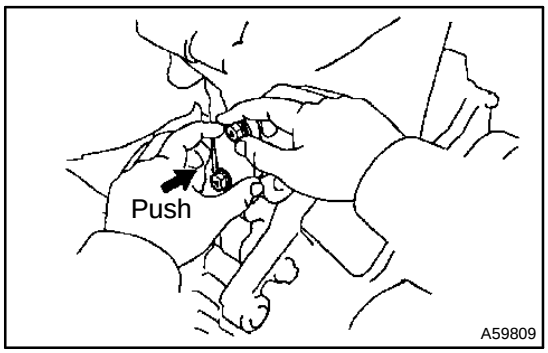
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(f) Install the stud bolt.
Torque: 9.5 N·m (97 kgf·cm, 84 in.·lbf)



64. INSTALL CHAIN TENSIONER ASSY NO.1

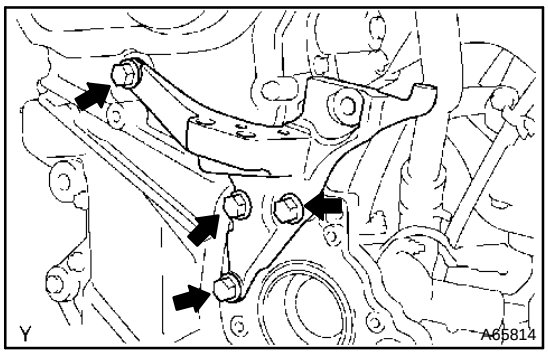
(a) Check the O-ring is clean, and set the hook as shown in the illustration.



(b) Apply the engine oil to the chain tensioner and install it.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

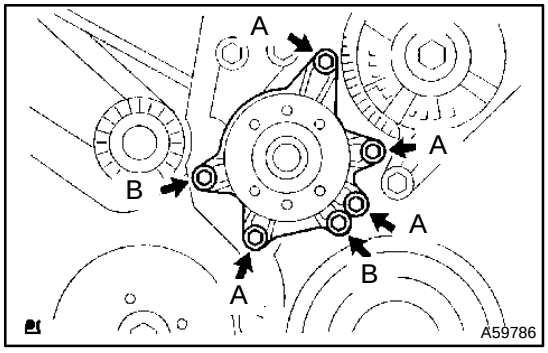
NOTICE:
When installing the tensioner, set the hook again if the hook release the plunger.

65. INSTALL CRANK POSITION SENSOR
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)



66. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Install the engine mounting bracket with 4 bolts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



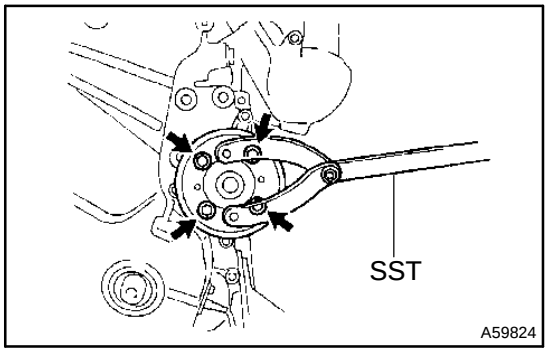
67. INSTALL WATER PUMP ASSY

(a) Place a new O-ring on the timing chain cover.
(b) Install the water pump with 6 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

HINT:

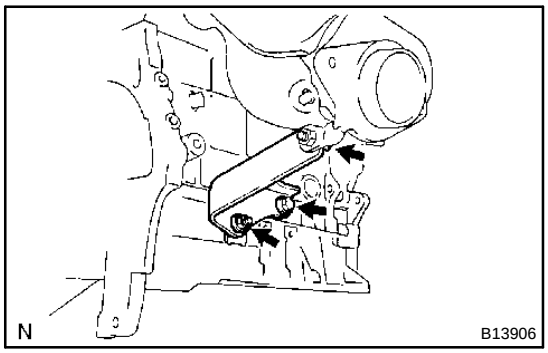
Bolt A	35 mm (1.38 in.)
Bolt B	28 mm (1.10 in.)

CONTINUED



68. INSTALL WATER PUMP PULLEY

(a) Using SST, install the water pump pulley.
Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)
SST 09960–10010



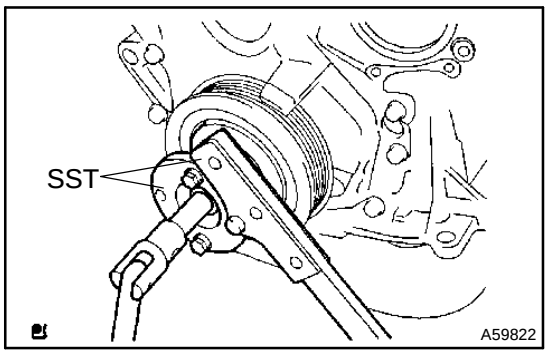
69. INSTALL MANIFOLD STAY

(a) Install the exhaust manifold stay with 2 bolts and a nut
Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

70. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.1
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

71. INSTALL V–RIBBED BELT TENSIONER ASSY

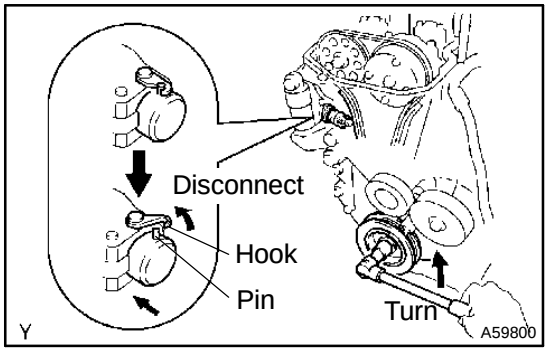
(a) Install bolt, nut and the v–ribbed belt tensioner assy.
Torque:
Nut 29 N·m (296 kgf·cm, 21 ft·lbf)
Bolt 100 N·m (1,020 kgf·cm, 74 ft·lbf)



72. INSTALL CRANKSHAFT PULLEY

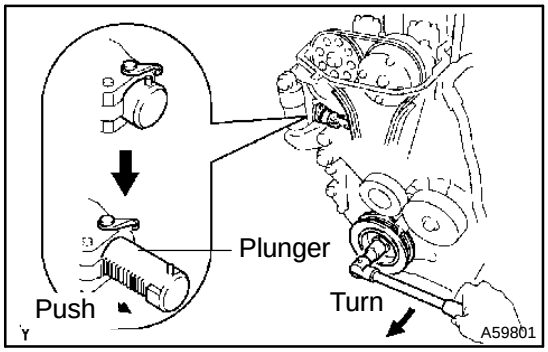
(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

(b) Using SST, install the pulley bolt.
SST 09213–70011 (09213–70020), 09330–00021
Torque: 118 N·m (1,203 kgf·cm, 87 ft·lbf)



(c) Turn the crankshaft counterclockwise, and disconnect the plunger knock pin form the hook.

CONTINUED



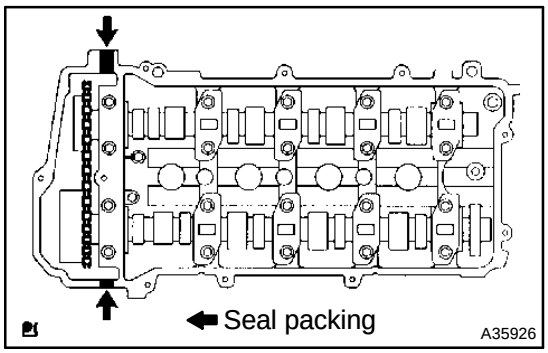
(d) Turn the crankshaft clockwise, and check that the slipper is pushed by the plunger.

73. INSTALL CYLINDER HEAD COVER SUB-ASSY

(a) Remove any old packing (FIPG) material.

HINT:

When FIPG on the head cover gasket side cannot be eliminated completely, replace the gasket.



(b) Apply seal packing to 2 locations as shown in the illustration.

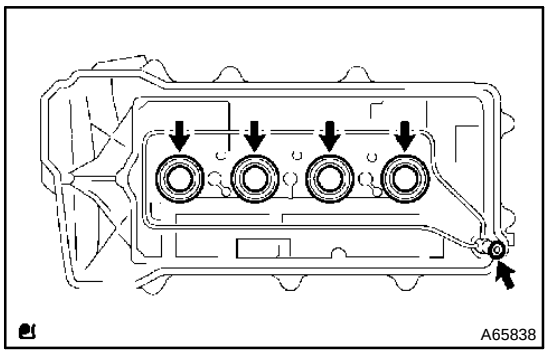
Seal packing:

Part No. 08826-00080 or equivalent

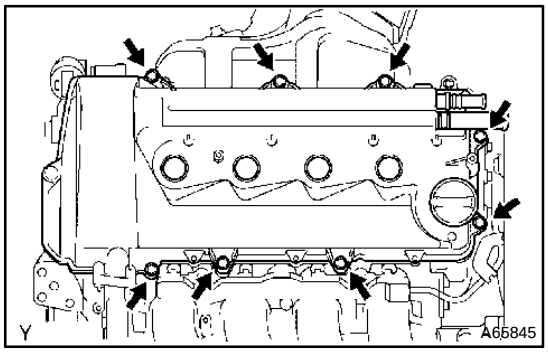
(c) Install the cylinder head cover gasket to the cylinder head cover.

HINT:

Part must be assembled within 3 minutes of application. Otherwise the material must be remove and reapplied.



(d) Install the spark plug tube gasket and a new O-ring to the cylinder head cover.

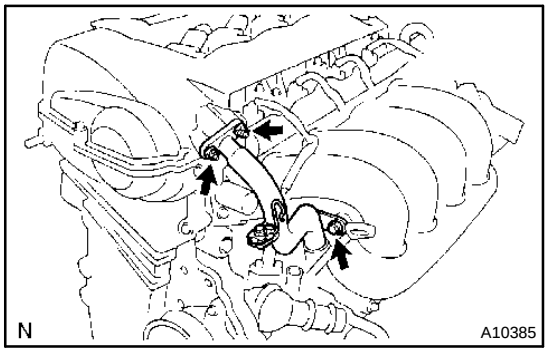


(e) Install the cylinder head cover and wire harness protector with 8 bolts.

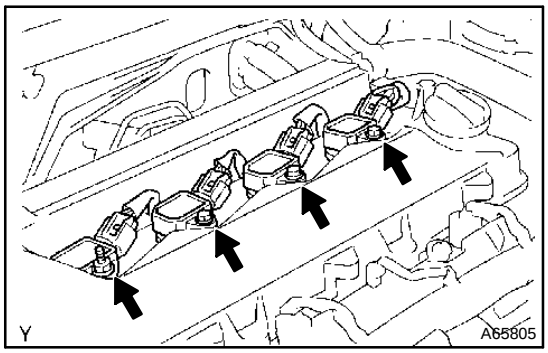
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)

(f) Connect 2 PCV hoses to the cylinder head cover.

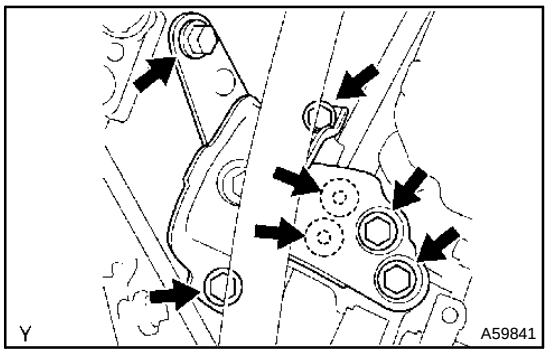
CONTINUED



(g) Install a new gasket and No. 1 ventilation pipe with 2 nuts and bolt.
Torque:
Nut 10 N·m (102 kgf·cm, 7 ft·lbf)
Bolt 24 N·m (245 kgf·cm, 18 ft·lbf)
(h) Connect the No. 3 ventilation hose to the No. 1 ventilation pipe.

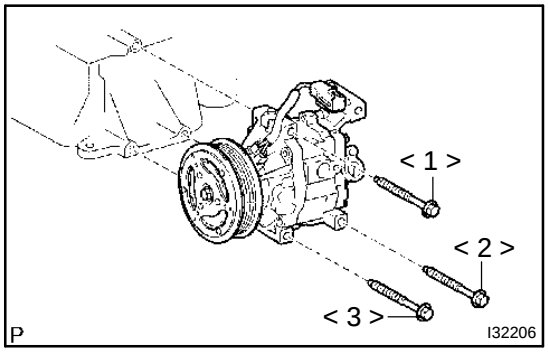


74. INSTALL IGNITION COIL ASSY
(a) Install 4 ignition coils with 4 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)
(b) Connect 4 ignition coil connectors.



75. INSTALL ENGINE MOUNTING INSULATOR SUB–ASSY RH
(a) Install the engine mounting insulator sub–assy RH with 5 bolts and 2 nuts.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

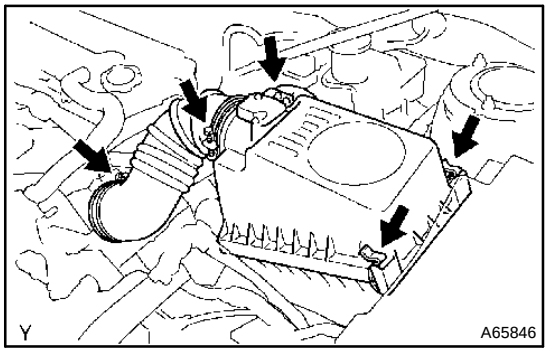
76. INSTALL EXHAUST PIPE ASSY FRONT**(See page 15–2)**



77. INSTALL COMPRESSOR AND MAGNETIC CLUTCH
(a) Install the compressor and magnetic clutch with the 3 bolts.
Torque: 29 N·m (295 kgf·cm, 21 ft·lbf)
NOTICE:
Tighten the bolts in following order shown in the illustration to install the compressor and magnetic clutch.
(b) Connect the connector.

78. INSTALL GENERATOR ASSY**(See page 19–8)**
79. INSTALL GENERATOR BRACKET NO.1**(See page 19–8)**

CONTINUED

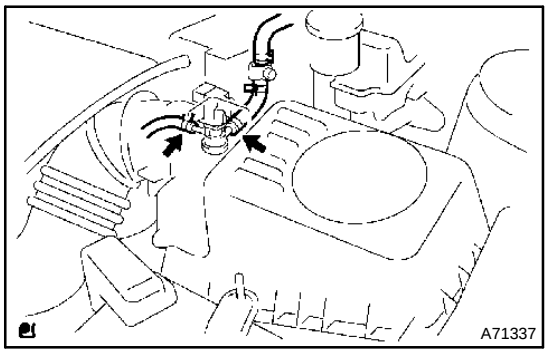


80. INSTALL AIR CLEANER ASSEMBLY WITH HOSE

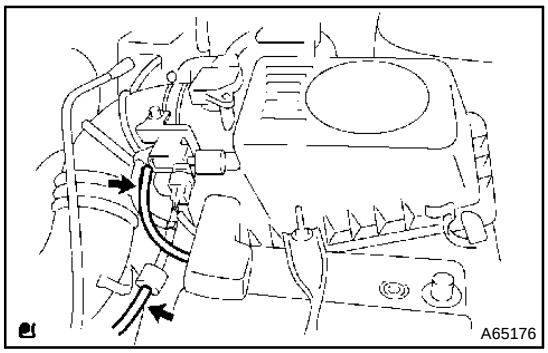
(a) Connect the air cleaner hose to the throttle body.

(b) Attach the air cleaner cap to the air cleaner case, and install 2 clamps.

(c) Tighten the air cleaner hose clamp.



(d) Connect 2 vacuum hoses, as shown in the illustration.



(e) Connect 2 vacuum hoses for the air cleaner cap.

(f) Connect the intake air flow-meter connector.

(g) Connect 2 VSV connector.

81. INSTALL CYLINDER HEAD COVER NO.2
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

82. INSTALL FRONT WHEEL RH
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

83. ADD COOLANT**(See page 16-6)**

84. CHECK FOR ENGINE COOLANT LEAKS**(See page 16-1)**

85. CHECK ENGINE OIL LEAK

86. CHECK IDLE SPEED AND IGNITION TIMING**(See page 14-1)**
SST 09843-18040

87. INSPECT COMPRESSION**(See page 14-1)**
SST 09992-00500

88. INSPECT CO/HC**(See page 14-1)**

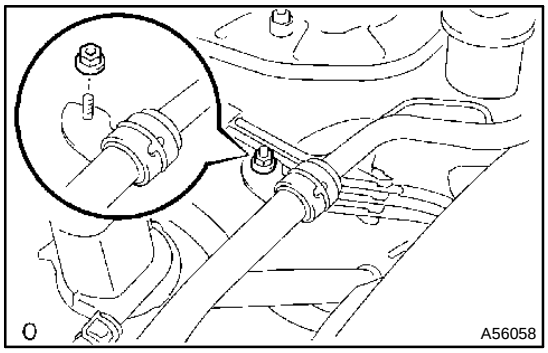
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TIMING GEAR COVER OIL SEAL (2ZZ–GE)

140V8-01

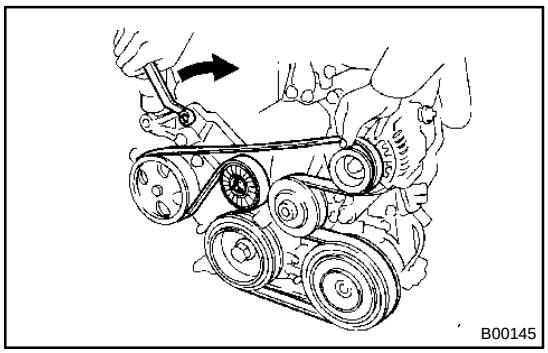
REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH



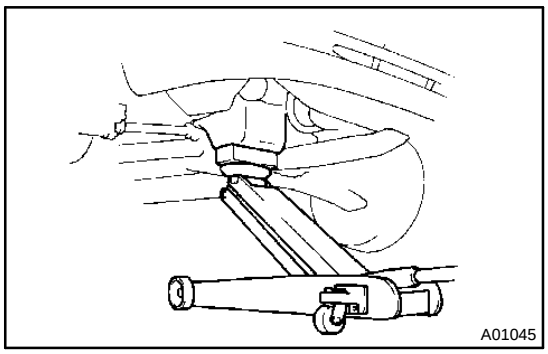
2. REMOVE COOLER REFRIGERANT SUCTION HOSE NO.1

(a) Remove a nut and seprate the cooler refrigerant suction hose.



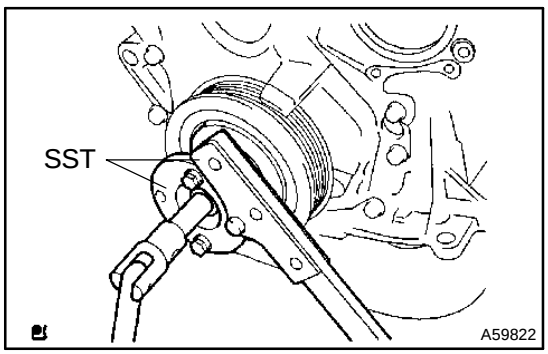
3. REMOVE FAN AND GENERATOR V BELT

(a) Turn the drive belt tensioner slowly clockwise and loosen it. Then, remove the drive belt and put back the drive belt tensioner little by little and fix it quietly.



4. REMOVE ENGINE MOUNTING INSULATOR SUB–ASSY RH

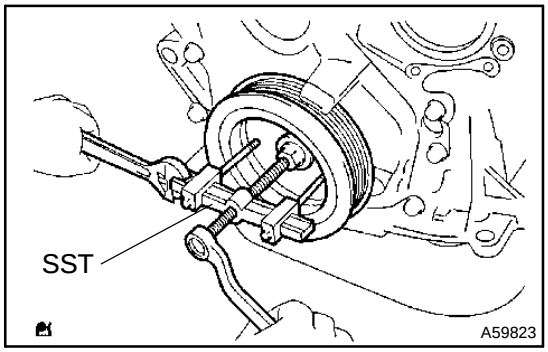
(a) Place a wooden block between the jack and the engine, and set the jack, then remove the engine mounting insulator.



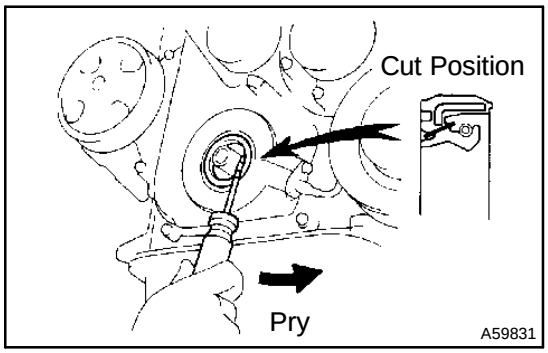
5. REMOVE CRANKSHAFT PULLEY

(a) Using SST, remove the pulley bolt.
SST 09213–70011, 09330–00021

CONTINUED



(b) Using SST, remove the crankshaft pulley.
SST 09950-50013 (09951-05010, 09952-05010, 09954-05021, 09953-05020, 09957-04010)



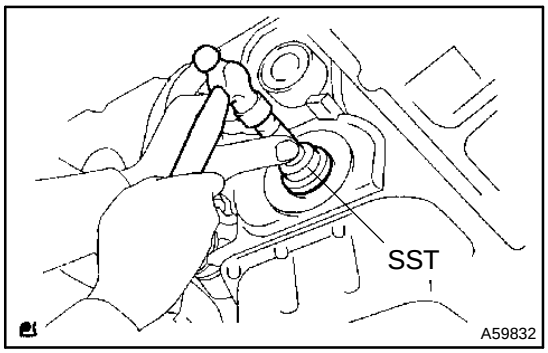
6. REMOVE TIMING GEAR COVER OIL SEAL

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver with taping its tip, pry out the oil seal.

NOTICE:

After the removal, check if the crankshaft is not damaged. If there is, mend it with a sandpaper (#400).



7. INSTALL TIMING GEAR COVER OIL SEAL

(a) Apply MP grease to a new oil seal lip.

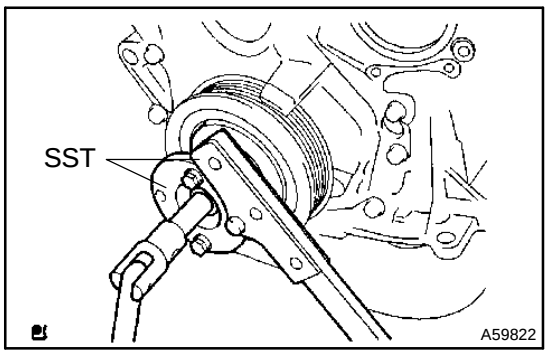
NOTICE:

Keep the lip off foreign materials.

(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-22010

NOTICE:

Wipe off extra grease on the crank shaft.



8. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

(b) Using SST, install the pulley bolt.
Torque: 118 N·m (1,203 kgf·cm, 87 ft·lbf)
SST 09213-70011, 09330-00021

9. INSTALL INSULATOR SUB-ASSY, ENGINE MOUNTING, RH
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

10. INSPECT OIL LEAK

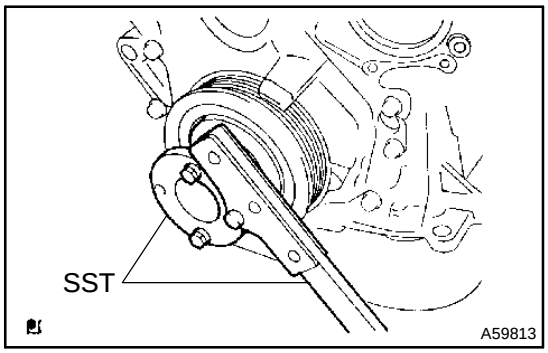
CONTINUED

ENGINE REAR OIL SEAL (2ZZ-GE)

140MW-02

REPLACEMENT

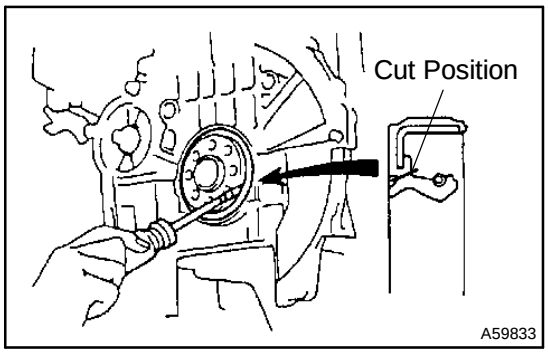
1. **REMOVE MANUAL TRANSAXLE ASSY** **(See page 41-3)**
2. **REMOVE CLUTCH COVER ASSY** **(See Pub.RM821E on page 42 - 12)**
3. **REMOVE CLUTCH DISC ASSY** **(See Pub.RM821E on page 42 - 12)**



4. REMOVE FLYWHEEL ASSY

(a) Fix the crank shaft with SST, then remove the flywheel or the ring gear.

SST 09213-70011, 09330-00021



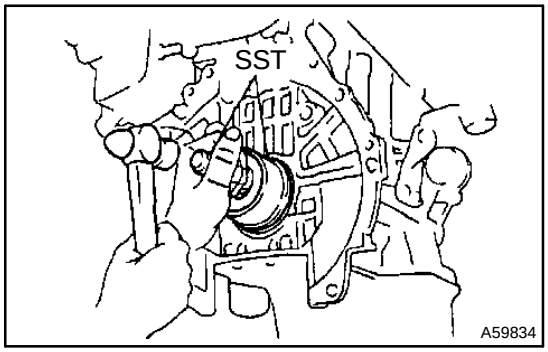
5. REMOVE ENGINE REAR OIL SEAL

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver with taping its tip, pry out the oil seal.

NOTICE:

After the removal, check if the crankshaft is not damaged. If there is, mend it with a sandpaper (#400).



6. INSTALL ENGINE REAR OIL SEAL

(a) Apply MP grease to a new oil seal lip.

NOTICE:

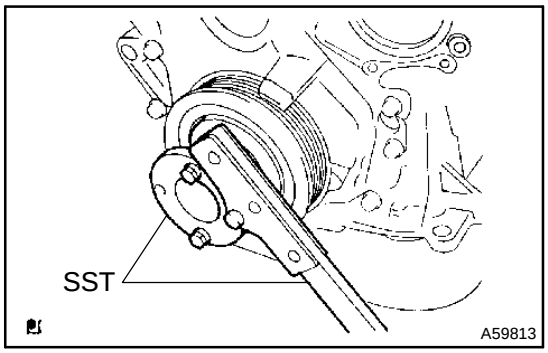
Keep the lip off foreign materials.

(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

SST 09223-15020, 09950-70010 (09951-07100)

NOTICE:

Wipe off extra grease on the crank shaft.



7. INSTALL FLYWHEEL ASSY

(a) Fix the crankshaft with SST.

SST 09213-70011, 09330-00021

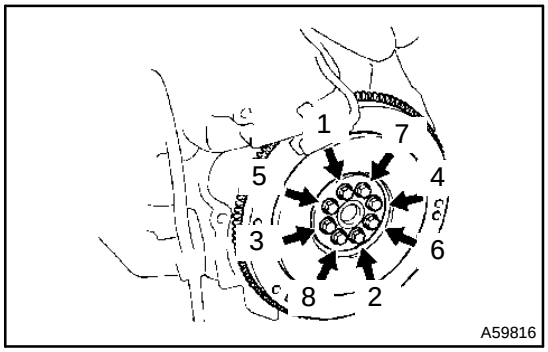
(b) Clean the bolt and the bolt hole.

(c) Apply Adhesive to the bolts.

Adhesive:

Part No. 0933-00070, THREE BOND or equivalent.

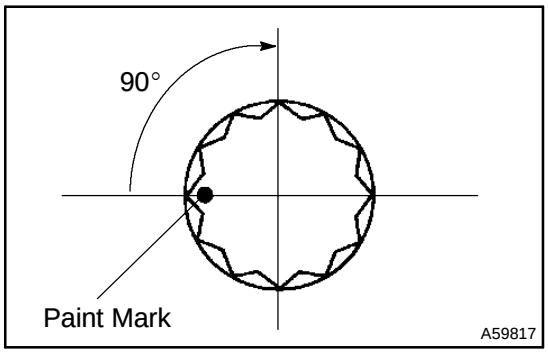
CONTINUED



(d) Install the flywheel.

(1) Install and uniformly tighten the 8 bolts, in several passes, in the sequence shown.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



(2) Mark the flywheel bolt with Paint mark.

(3) Retighten the flywheel bolts by an additional 90°.

(4) Check that the paint marked bolts are moved at 90° angle.

8. INSTALL CLUTCH DISC ASSY **(See Pub. RM821E page on 42 - 12)**

SST 09301-00210

9. INSTALL CLUTCH COVER ASSY **(See Pub. RM821E page on 42 - 12)**

10. INSTALL MANUAL TRANSAXLE ASSY **(See page 41-3)**

CONTINUED

ENGINE ASSEMBLY (4ZZ–FE)

140M7–02

INSPECTION

1. **INSPECT COOLANT** **(See page 16–13)**
2. **INSPECT ENGINE OIL** **(See page 17–6)**
3. **INSPECT BATTERY** **(See page 19–13)**
4. **INSPECT AIR CLEANER FILTER ELEMENT SUB–ASSY**
5. **INSPECT SPARK PLUG** **(See page 18–6)**
6. **INSPECT FAN AND GENERATOR V BELT**

HINT:

You don’t need to check the belt deflection because auto tensioner is adopted.

7. **INSPECT IGNITION TIMING**

(a) Warm up engine.

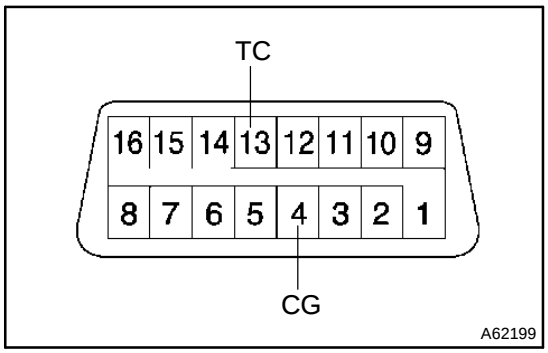
(b) When using hand–held tester.

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

Ignition timing : 8 – 12 °BTDC

HINT:

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



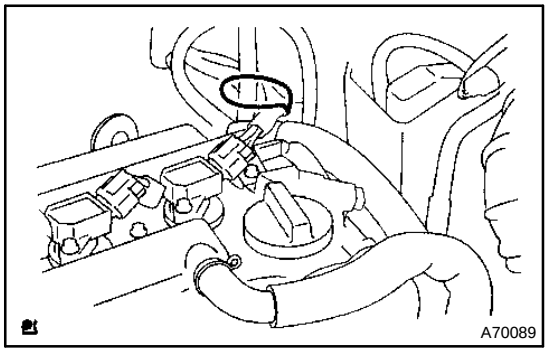
(c) When not using hand–held tester.

(1) Using SST, connect terminal 13 (TC) and 4 (CG) of the DLC3.

SST 09843–18030

NOTICE:

- **Be sure not to connect incorrectly. It causes breakage of the engine.**
- **Turn OFF all electrical systems.**
- **Operate the inspection when the cooling fan motor is turned OFF**



(2) Remove the 2 nuts, 2 clips and cylinder head cover.

(3) Pull out the wire harness as shown in the illustration.

(4) Connect the clip of the timing light to the engine.

NOTICE:

- **Use a timing light which can detect the first signal.**
- **After checking, be sure to tape the wire harness.**

CONTINUED

(5) Inspect ignition timing at idle.

Ignition timing : 8 – 12 °BTDC

NOTICE:

When checking the ignition timing, the transmission is at neutral position.

HINT:

After engine r/min is kept at 1,000 – 1,500 rpm for 5 seconds, check that it returns idle speed.

(6) Disconnect the terminal 13 (TC) and 4 (CG) of the DLC3.

(7) Inspect ignition timing at idle.

Ignition timing :

3 – 13 °BTDC

(8) Confirm that ignition timing moves to advanced angle side when the engine r/min is increased.

(9) Remove the timing light.

(10) Install cylinder head cover with the 2 nuts and 2 clips.

Torque: 7 N·m (71 kgf·cm, 62 in.·lbf)

8. INSPECT ENGINE IDLE SPEED

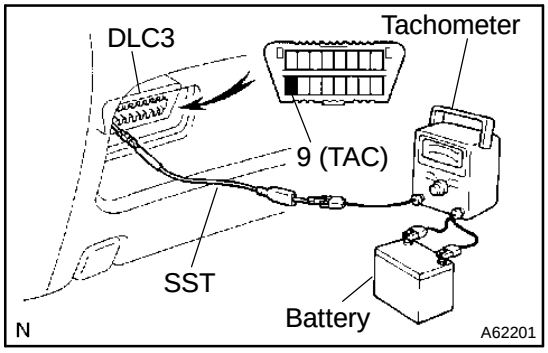
(a) Warm up engine.

(b) When using hand–held tester.

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

HINT:

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



(c) When not using hand–held tester.

(1) Using SST, connect tachometer test prove to terminal 9 (TAC) of DLC3.

SST 09843–18040

(d) Check the idle speed.

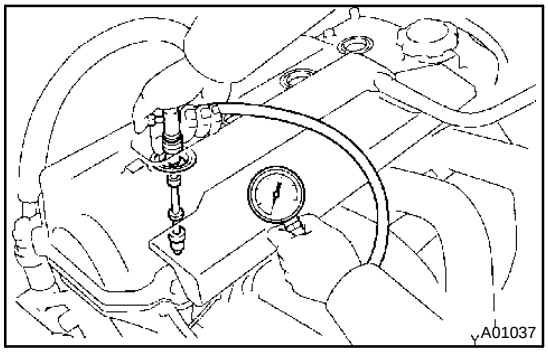
Idle speed:

600 – 700 rpm

NOTICE:

- **Check idle speed with cooling fan OFF.**
- **Switch off all accessories and air conditioning.**

CONTINUED



9. INSPECT COMPRESSION

(a) Warm up and stop engine.

(b) Remove ignition coil.

(c) Remove spark plugs.

(d) Inspect cylinder compression pressure.

SST 09992–00500

(1) Insert a compression gauge into the spark plug hole.

(2) Fully open the throttle.

(3) While cranking the engine, measure the compression pressure.

Compression pressure:
1,300 kPa (13.3 kgf·cm^2, 189 psi)
Minimum pressure: 1,000 kPa (10.2 kgf·cm^2, 145 psi)
Difference between each cylinder:
100 kPa (1.0 kgf·cm^2, 15 psi)

NOTICE:

- **Always use a fully charged battery to obtain engine speed of 250 rpm or more.**
- **Check other cylinder's compression pressure in the same way.**
- **This measurement must be done in as short a time as possible.**

(4) If the cylinder compression in one more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (1) through (3) for cylinders with low compression.

HINT:

- If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged.
- If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.

CONTINUED

10. INSPECT CO/HC

(a) Start the engine.
(b) Race engine at 2,500 rpm for approx. 180 seconds.
(c) Insert CO/HC meter testing probe at least 40 cm (1.3 ft) into tailpipe during idling.
(d) Immediately check CO/HC concentration at idle and/or 2,500 rpm.

HINT:

- Complete the measuring within 3 minutes.
- When doing the 2 mode (idle and 2,500 rpm) test, these measuring orders are prescribed by the applicable local regulations.

(e) If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.
  (1) Check heated oxygen sensor operation. (See page 05-147)
  (2) See the table below for possible causes, and then inspect and correct the applicable causes if necessary.

CO	HC	Problems	Causes
Normal	High	Rough idle	4. Faulty ignitions: • Incorrect timing • Fouled, shorted or improperly gapped plugs 5. Incorrect valve clearance 6. Leaky intake and exhaust valves 7. Leaky cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: • PCV hoses • Intake manifold • Throttle body • ISC valve • Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke form exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty EFI systems: • Faulty pressure regulator • Defective water temperature sensor • DEFECTIVE Air-flow meter • Faulty ECU • Faulty injectors • Faulty throttle position sensor

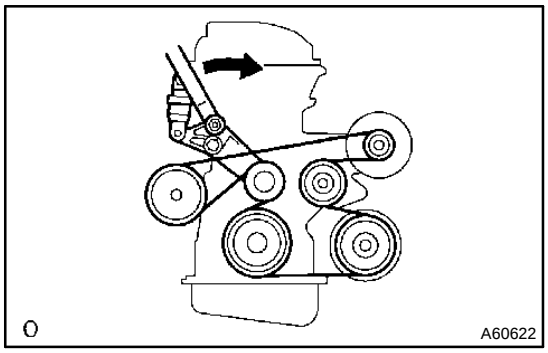
CONTINUED

FAN AND GENERATOR V BELT (4ZZ–FE)

140M8–02

REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH



2. REMOVE FAN AND GENERATOR V BELT

(a) Turn the V–ribbed belt tensioner slowly clockwise and loosen it. Then, remove the fan and generator belt and put back the V–ribbed belt tensioner little by little and fix it quietly.

CONTINUED

VALVE CLEARANCE (4ZZ-FE)

140V9-01

ADJUSTMENT

1. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove the 2 nuts, 2 clips and cylinder head cover.

2. REMOVE IGNITION COIL ASSY

(a) Disconnect the 4 connectors.

(b) Remove the 4 bolts and 4 ignition coils.

3. DISCONNECT ENGINE WIRE

(a) Disconnect the connectors.

(b) Remove the 3 clamps from the 3 clamp brackets.

(c) Remove the bolt and nut installing the engine wire.

4. DISCONNECT VENTILATION HOSE

(a) Disconnect the ventilation hose from the cylinder head cover.

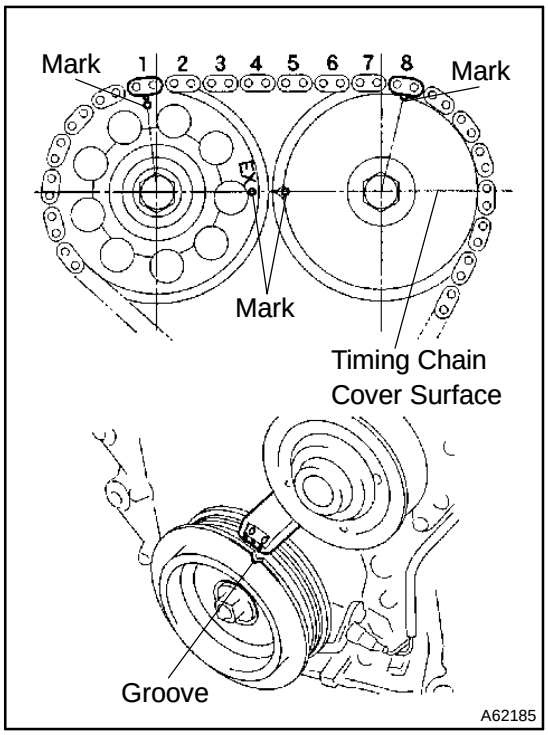
5. DISCONNECT VENTILATION HOSE NO.2

(a) Disconnect the ventilation hose from the cylinder head cover.

6. REMOVE CYLINDER HEAD COVER SUB-ASSY

(a) Remove the 9 bolts, 2 seal washers, 2 nuts, 3 clamp brackets and cylinder head cover.

7. REMOVE ENGINE UNDER COVER RH



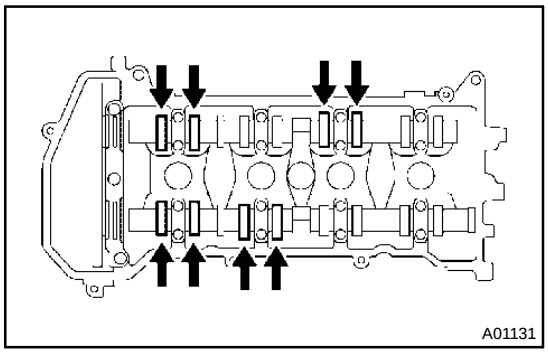
8. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the timing chain cover.

(b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

HINT:

If not, turn the crankshaft 1 revolution (360°) and align the marks as above.



9. INSPECT VALVE CLEARANCE

(a) Check only the valves indicated.

(1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

(2) Record the out-of specification valve clearance measurements. They will be used later to determine the required replacement valve lefter.

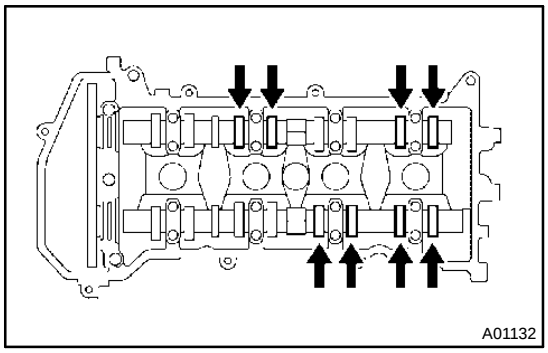
Valve clearance (Cold):

Intake 0.15 - 0.25 mm (0.006 - 0.010 in.)

Exhaust 0.25 - 0.35 mm (0.010 - 0.014 in.)

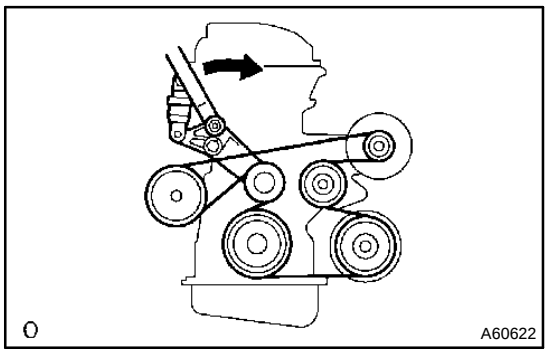
CONTINUED

(b) Turn the crankshaft 1 revolution (360 °) and set No. 4 cylinder to TDC/compression.



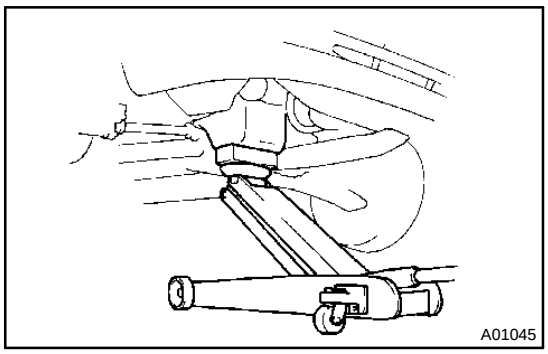
(c) Check only the valves indicated.
(1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
(2) Record the out–of specification valve clearance measurements. They will be used later to determine the required replacement valve lefter.

Valve clearance (Cold):
Intake 0.15 – 0.25 mm (0.006 – 0.010 in.)
Exhaust 0.25 – 0.35 mm (0.010 – 0.014 in.)



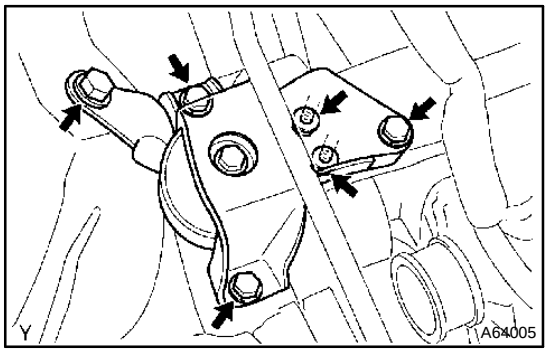
10. REMOVE FAN AND GENERATOR V BELT

(a) Turn the V–ribbed belt tensioner slowly clockwise and loosen it. Then, remove the fan and generator belt and put back the V–ribbed belt tensioner little by little and fix it quietly.



11. REMOVE ENGINE MOUNTING INSULATOR SUB–ASSY RH

(a) Place a wooden block between the jack and engine, and set the jack, then remove the 4 bolts, 2nuts and engine mounting insulator RH.

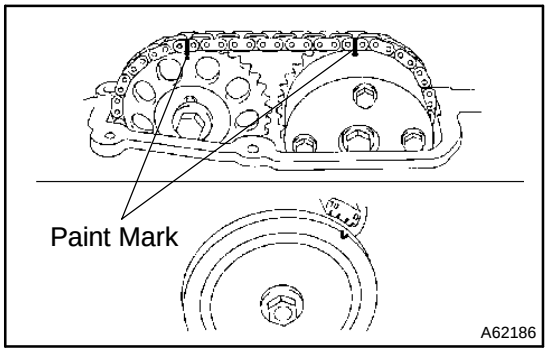


12. REMOVE V–RIBBED BELT TENSIONER ASSY

(a) Remove the bolt, nut and V–ribbed belt tensioner.

HINT:
Handle a jack up and down to remove the bolt.

CONTINUED

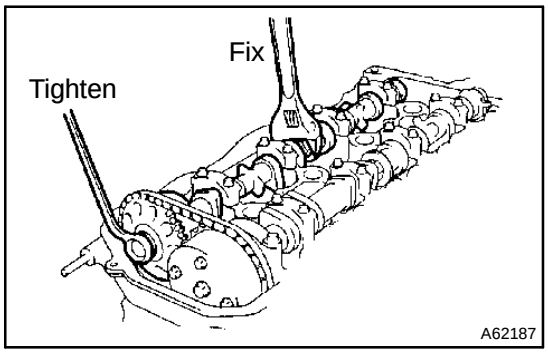


13. ADJUST VALVE CLEARANCE

NOTICE:

Be sure not to revolve the crankshaft without the chain tensioner.

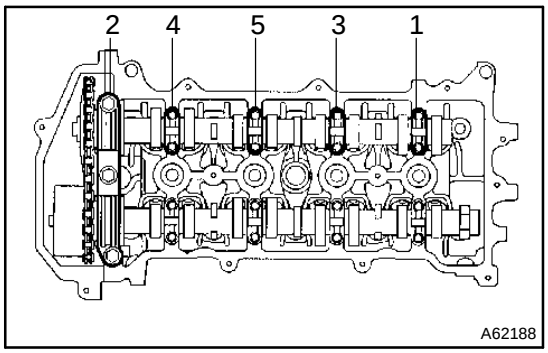
(a) Set the No. 1 cylinder to the TDC/compression.
(b) Place match marks on the timing chain and camshaft timing sprockets.
(c) Remove the 2 nuts and chain tensioner.



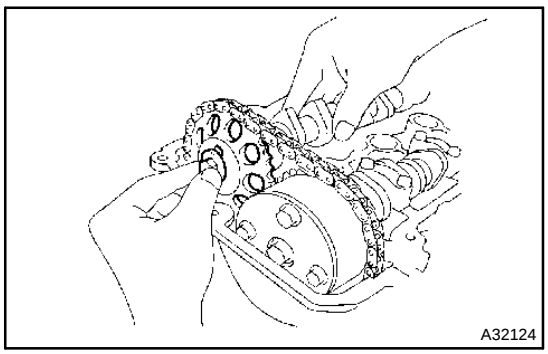
(d) Fix the camshaft with a spanner and so on, then loosen the camshaft timing gear set bolt.

NOTICE:

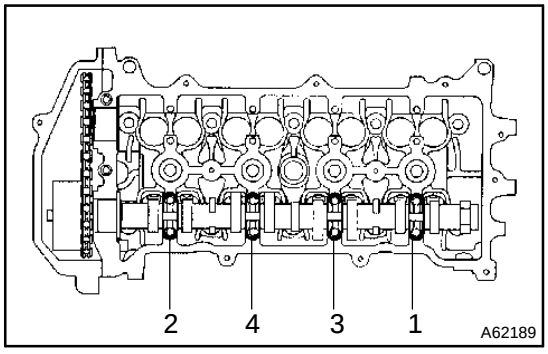
Be careful not to damage the valve lifter.



(e) Loosen the camshaft bearing capbolts on No. 2 camshaft in the order as shown in the illustration in several passes,and remove the caps.

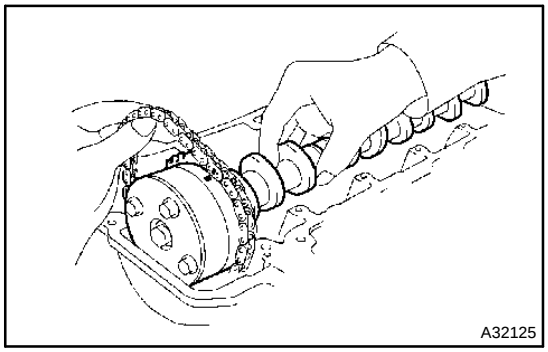


(f) Remove the camshaft timing gear as shown in the illustration.

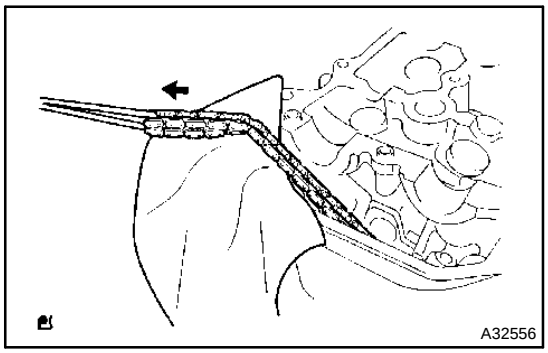


(g) Loosen the camshaft bearing capbolts on camshaft in the order as shown in the illustration in several passes,and remove the caps.

CONTINUED


A32125

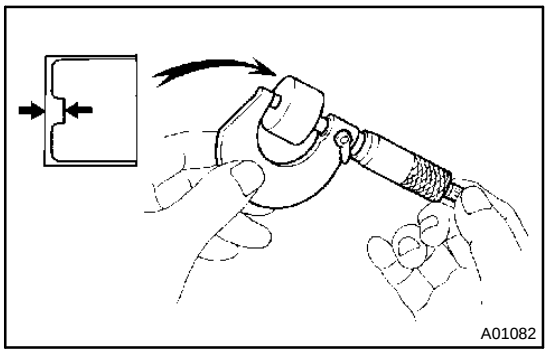
(h) Remove the camshaft with holding the timing chain.


A32556

(i) Tie the timing chain with a string as shown in the illustration.

NOTICE:

Be careful not to drop anything inside the timing chain cover.


A01082

(j) Remove the valve lifters.

(k) Using a micrometer, measure the thickness of the removed lifter.

(l) Calculate the thickness of a new lifter so that the valve clearance comes within the specified value.

A	Thickness of new lifter
B	Thickness of used lifter
C	Measured valve clearance

Valve clearance:

Intake A = B + (C – 0.20 mm (0.008 in.))

Exhaust A = B + (C – 0.30 mm (0.012 in.))

HINT:

- Select a new lifter with a thickness as close as possible to the calculated values.
- Lifter are available in 35 sizes in increments of 0.020 mm (0.0008 in.), from 5.060 mm (0.1992 in.) to 5.740 mm (0.2260 in.).

CONTINUED

Valve Lifter Selection Chart (Intake)

Measured clearance mm (in.) \ Installed lifter thickness mm (in.)	5.060 (0.1992)	5.080 (0.2000)	5.100 (0.2008)	5.120 (0.2016)	5.140 (0.2024)	5.160 (0.2031)	5.180 (0.2039)	5.200 (0.0247)	5.210 (0.2051)	5.220 (0.2055)	5.230 (0.2059)	5.240 (0.2063)	5.250 (0.2067)	5.260 (0.2071)	5.270 (0.2075)	5.280 (0.2079)	5.290 (0.2083)	5.300 (0.2087)	5.310 (0.2091)	5.320 (0.2094)	5.330 (0.2098)	5.340 (0.2102)	5.350 (0.2106)	5.360 (0.2110)	5.370 (0.2114)	5.380 (0.2118)	5.390 (0.2122)	5.400 (0.2126)	5.410 (0.2130)	5.420 (0.2134)	5.430 (0.2138)	5.440 (0.2142)	5.450 (0.2146)	5.460 (0.2150)	5.470 (0.2154)	5.480 (0.2157)	5.490 (0.2161)	5.500 (0.2165)	5.510 (0.2169)	5.520 (0.2173)	5.530 (0.2177)	5.540 (0.2181)	5.550 (0.2185)	5.560 (0.2189)	5.570 (0.2193)	5.580 (0.2197)	5.590 (0.2201)	5.600 (0.2205)	5.620 (0.2213)	5.640 (0.2220)	5.660 (0.2228)	5.680 (0.2236)	5.700 (0.2244)	5.720 (0.2252)	5.740 (0.2260)
0.000 - 0.030 (0.0000 - 0.0012)																																																								
0.031 - 0.050 (0.0012 - 0.0020)																																																								
0.051 - 0.070 (0.0020 - 0.0028)																																																							
0.007 - 0.090 (0.0028 - 0.0035)																																																							
0.091 - 0.110 (0.0036 - 0.0043)																																																							
0.111 - 0.130 (0.0044 - 0.0051)																																																							
0.131 - 0.149 (0.0052 - 0.0059)																																																							
0.150 - 0.250 (0.0059 - 0.0098)																																																							
0.251 - 0.270 (0.0099 - 0.0106)	12	14	16	18	20	22	24	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	
0.271 - 0.290 (0.0107 - 0.0114)	14	16	18	20	22	24	26	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74			
0.291 - 0.310 (0.0115 - 0.0122)	16	18	20	22	24	26	28	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74					
0.311 - 0.330 (0.0122 - 0.0130)	18	20	22	24	26	28	30	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74							
0.331 - 0.350 (0.0130 - 0.0138)	20	22	24	26	28	30	32	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74									
0.351 - 0.370 (0.0138 - 0.0146)	22	24	26	28	30	32	34	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74											
0.371 - 0.390 (0.0146 - 0.0154)	24	26	28	30	32	34	36	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74													
0.391 - 0.410 (0.0154 - 0.0161)	26	28	30	32	34	36	38	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74															
0.411 - 0.430 (0.0162 - 0.0169)	28	30	32	34	36	38	40	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74																	
0.431 - 0.450 (0.0170 - 0.0177)	30	32	34	36	38	40	42	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74																		
0.451 - 0.470 (0.0178 - 0.0185)	32	34	36	38	40	42	44	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74																			
0.471 - 0.490 (0.0185 - 0.0193)	34	36	38	40	42	44	46	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74																				
0.491 - 0.510 (0.0193 - 0.0201)	36	38	40	42	44	46	48	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74																					
0.511 - 0.530 (0.0201 - 0.0209)	38	40	42	44	46	48	50	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74																						
0.531 - 0.550 (0.0209 - 0.0217)	40	42	44	46	48	50	52	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74																							
0.551 - 0.570 (0.0217 - 0.0224)	42	44	46	48	50	52	54	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74																								
0.571 - 0.590 (0.0225 - 0.0232)	44	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74																									
0.591 - 0.610 (0.0233 - 0.0240)	46	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74																										
0.611 - 0.630 (0.0241 - 0.0248)	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74	74	74																											
0.631 - 0.650 (0.0248 - 0.0256)	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74	74	74																											
0.651 - 0.670 (0.0256 - 0.0264)	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74	74	74																											
0.671 - 0.690 (0.0264 - 0.0272)	54	56	58	60	62	64	66	68	70	70	72	72	74	74	74																											
0.691 - 0.710 (0.0272 - 0.0280)	56	58	60	62	64	66	68	70	72	72	74	74	74	74																											
0.711 - 0.730 (0.0280 - 0.0287)	58	60	62	64	66	68	70	72	74	74	74	74	74																											
0.731 - 0.750 (0.0288 - 0.0295)	60	62	64	66	68	70	72	74	74	74	74	74																											
0.751 - 0.770 (0.0296 - 0.0303)	62	64	66	68	70	72	74	74	74	74	74																											
0.771 - 0.790 (0.0304 - 0.0311)	64	66	68	70	72	74	74	74	74	74																											
0.791 - 0.810 (0.0311 - 0.0319)	66	68	70	72	74	74	74	74	74																												
0.811 - 0.830 (0.0319 - 0.0327)	68	70	72	74	74	74	74	74																													
0.631 - 0.850 (0.0327 - 0.0335)	70	72	74	74	74	74	74																														
0.851 - 0.870 (0.0335 - 0.0343)	72	74	74	74	74	74																															
0.871 - 0.890 (0.0343 - 0.0350)	74	74	74	74	74																																
0.891 - 0.910 (0.0351 - 0.0358)	74	74	74	74																																	
0.911 - 0.930 (0.0359 - 0.0366)	74																																				

New lifter thickness mm (in.)

Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)		

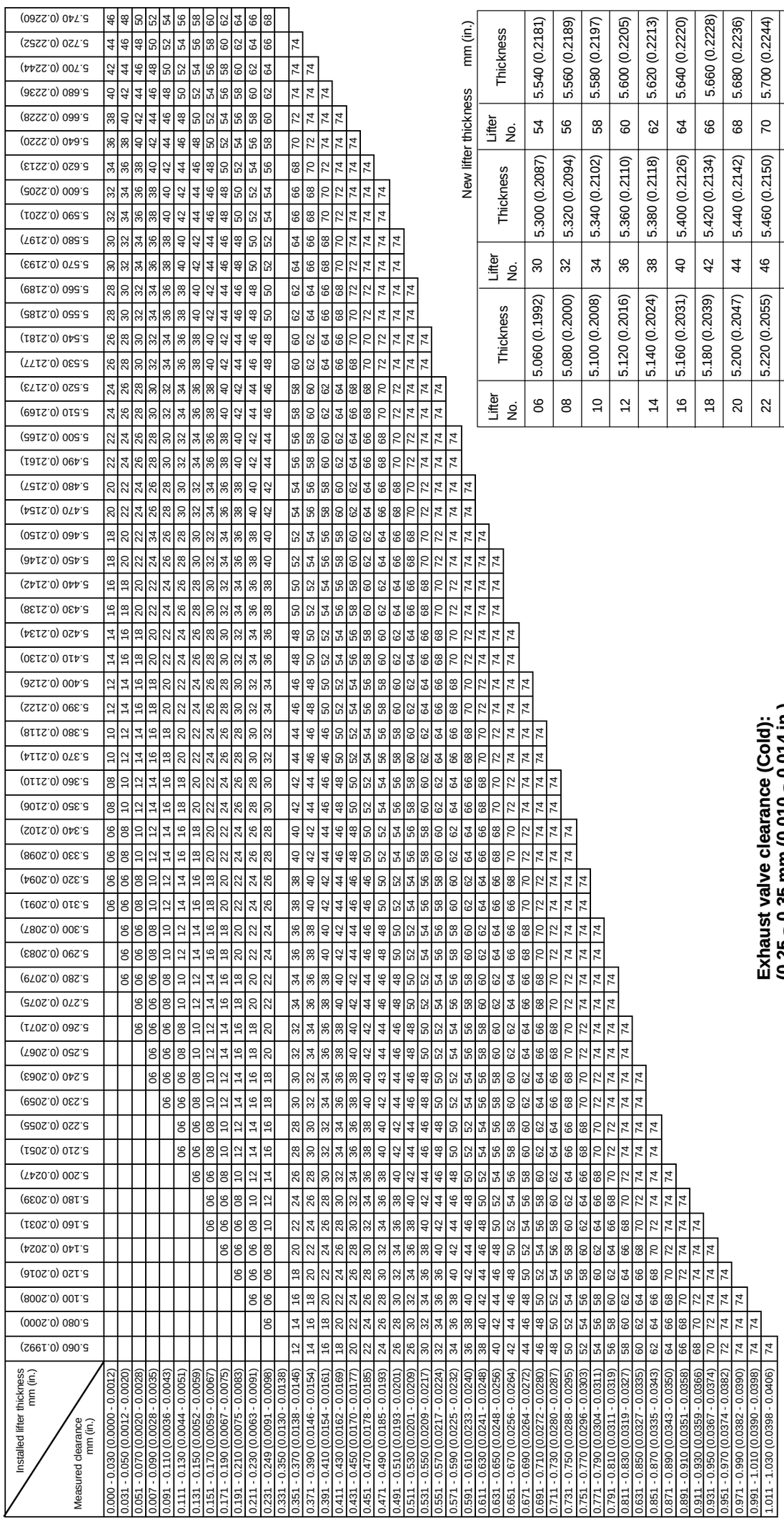
Intake valve clearance (Cold):
(0.15 – 0.25 mm (0.006 – 0.010 in.)

EXAMPLE: The 5.250 mm (0.2067 in.) lifter is installed, and the measured clearance is 0.400 mm (0.0157 in.).
Replace the 5.460 mm (0.2150 in.) lifter with a new No. 46 lifter

A70085

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Valve Lifter Selection Chart (Exhaust)



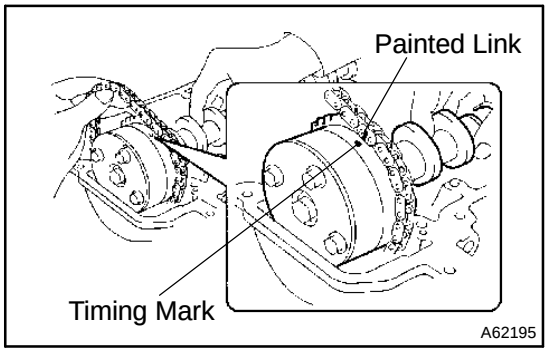
New lifter thickness mm (in.)

Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)		

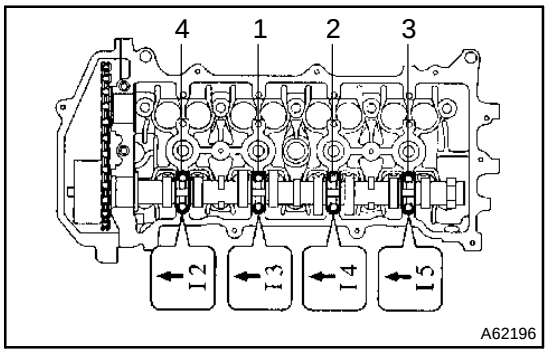
Exhaust valve clearance (Cold):
(0.25 – 0.35 mm (0.010 – 0.014 in.)
EXAMPLE: The 5.340 mm (0.2102 in.) lifter is installed, and the measured clearance is 0.440 mm (0.0173 in.).
Replace the 5.480 mm (0.2157 in.) lifter with a new No. 48 lifter.

A70086

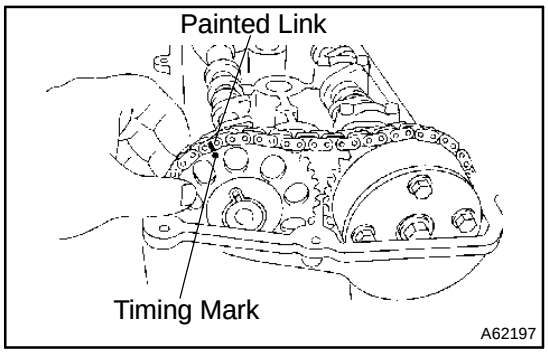
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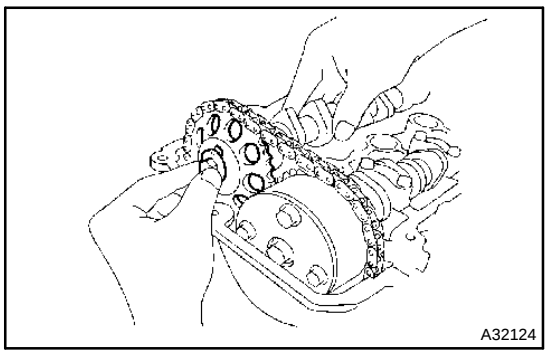
(m) As shown in the illustration, install the timing chain on the camshaft timing gear, with the painted links aligned with the timing marks on the camshaft timing sprocket.



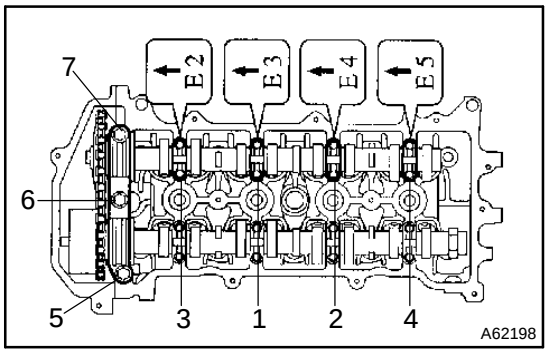
(n) Examine the front marks and numbers and tighten the bolts in the order shown in the illustration.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)



(o) Put the camshaft No.2 on the cylinder head with the painted links of the chain aligned with the timing mark on the camshaft timing sprocket.



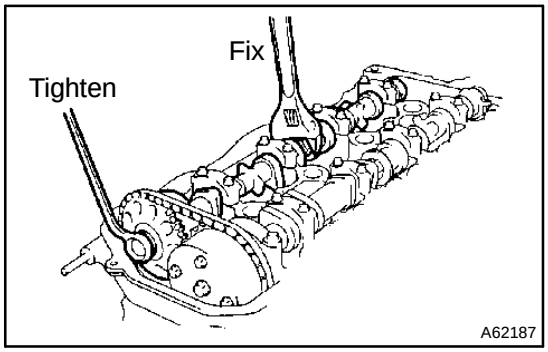
(p) Tighten the camshaft timing gear set bolt temporarily.



(q) Examine the front marks and numbers and tighten the bolts in the order shown in the illustration.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

(r) Install the bearing cap No. 1.
Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

CONTINUED

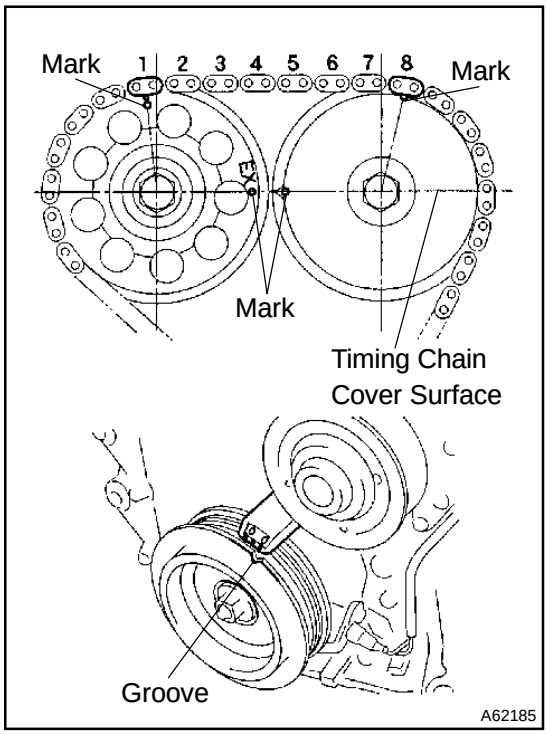


(s) Fix the camshaft with a spanner and so on, then tighten the camshaft timing gear set bolt.

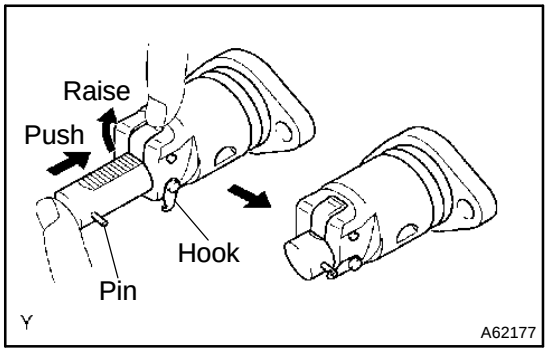
Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)

NOTICE:

Be careful not damage the valve lifter.

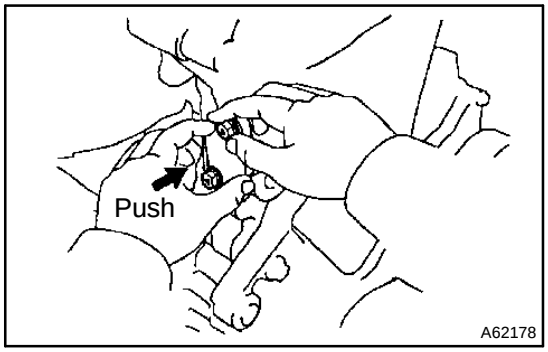


(t) Check the match marks on the timing chain and camshaft timing sprockets, and then the alignment of the pully groove with timing mark of the chain cover as shown in the illustration.



(u) Install chain tensioner.

(1) Check the O–ring is clean, and set the hook as shown in the illustration.



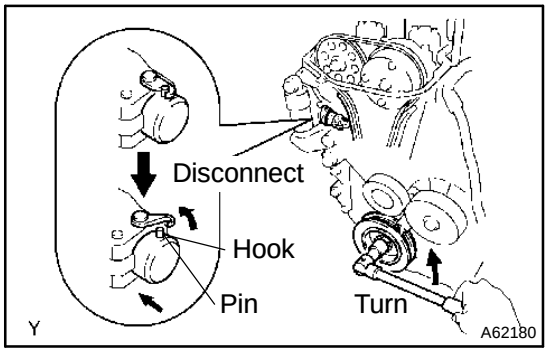
(2) Apply engine oil to the chain tensioner and install it with the 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

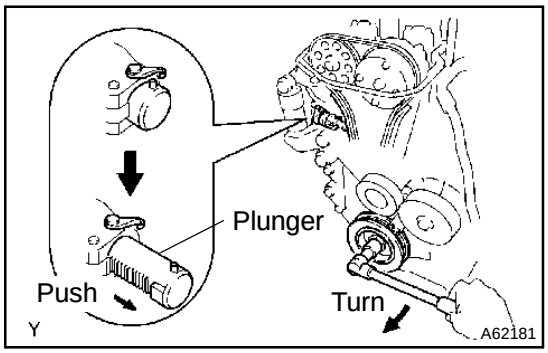
NOTICE:

When installing the tensioner, set the hook again if the hook release the plunger.

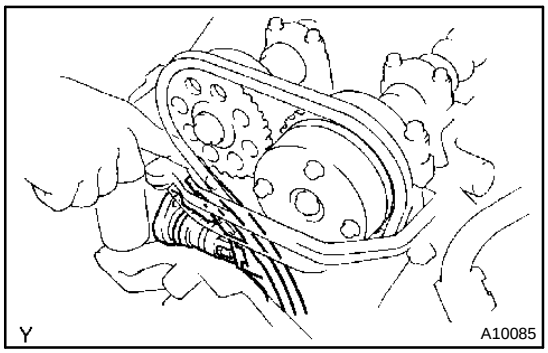
CONTINUED



(3) Turn the crankshaft counterclockwise, and disconnect the plunger knock pin from the hook.



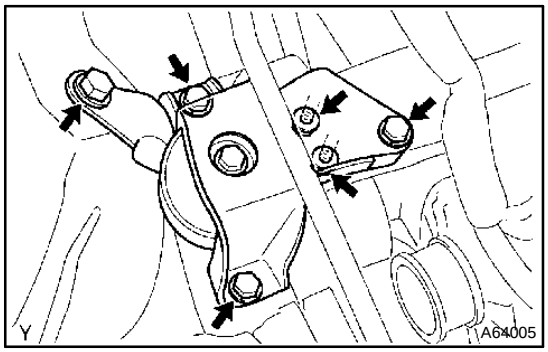
(4) Turn the crankshaft clockwise, and check that the slipper is pushed by the plunger.



HINT:
If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver or your finger so that the hook is released from the knock pin and the plunger springs out.

14. INSTALL V-RIBBED BELT TENSIONER ASSY

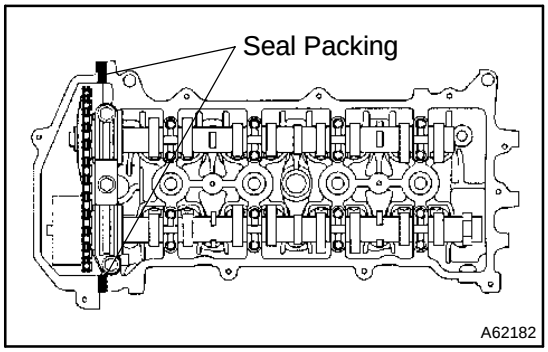
(a) Install the V-ribbed belt tensioner with the nut and bolt.
Torque:
29 N·m (296 kgf·cm, 21 ft·lbf) for Nut
69 N·m (704 kgf·cm, 51 ft·lbf) for Bolt



15. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSY RH

(a) Install engine mounting insulator RH with the 4 bolts and 2 nuts.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

CONTINUED



16. INSTALL CYLINDER HEAD COVER SUB–ASSY

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to 2 locations as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes after applying seal packing.**
- **Do not put into engine oil 2 hours after installing.**

(c) Install the cylinder head cover and cable bracket with the 9 bolts, 2 seal washers and 2 nuts. Uniformly tighten the bolts and nuts, in the several passes.

Torque:
11 N·m (112 kgf·cm, 8 ft·lbf) for w/o washer
9.0 N·m (92 kgf·cm, 80 in.·lbf) for w/ washer

17. INSTALL ENGINE WIRE

(a) Install the engine wire with the bolt and nut.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

18. INSTALL IGNITION COIL ASSY

(a) Install the 4 ignition coils with the 4 bolts.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

19. INSTALL CYLINDER HEAD COVER NO.2

(a) Install the cylinder head cover with the 2 nuts and 2 clips.

Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

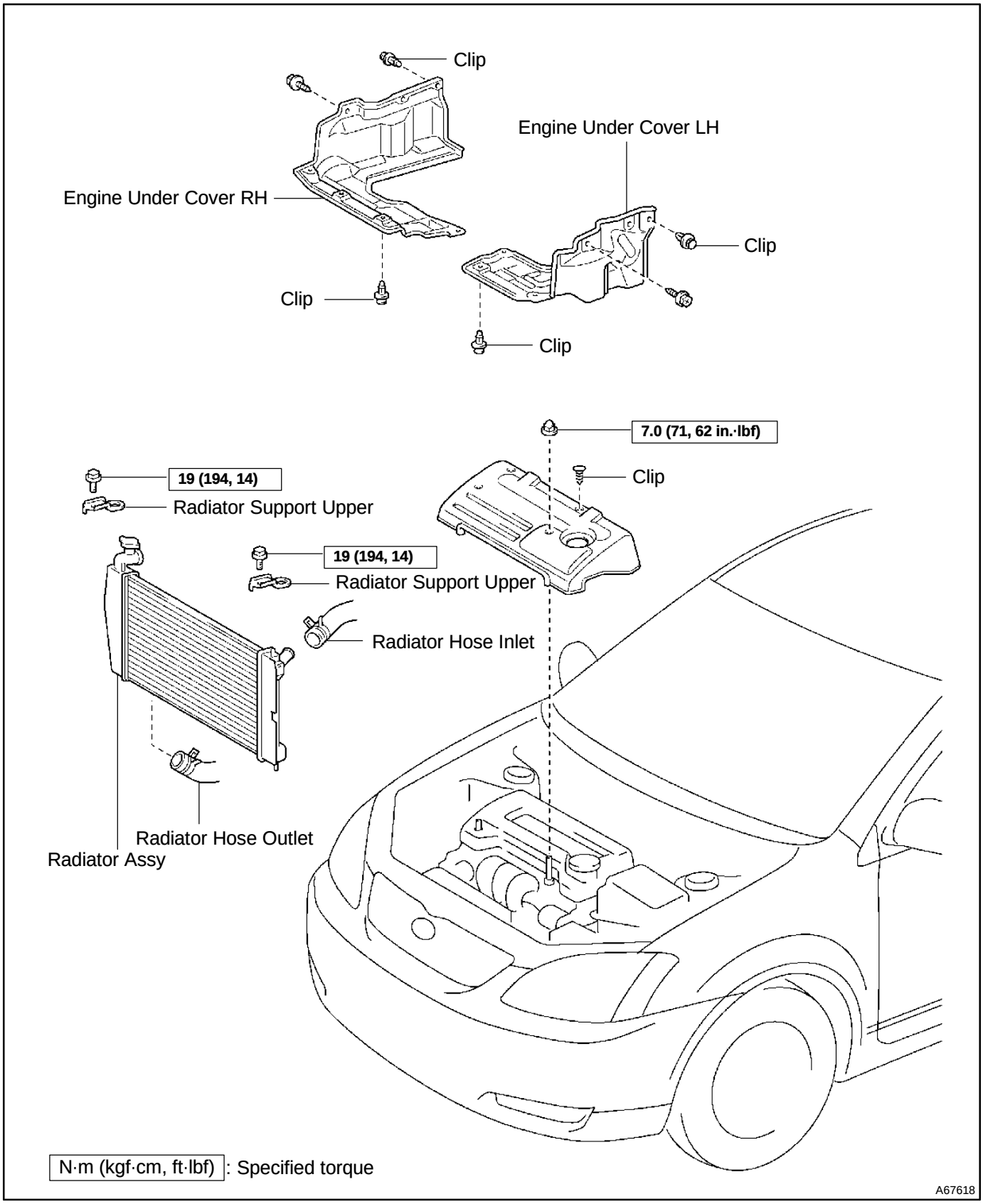
20. CHECK ENGINE OIL LEAK

CONTINUED

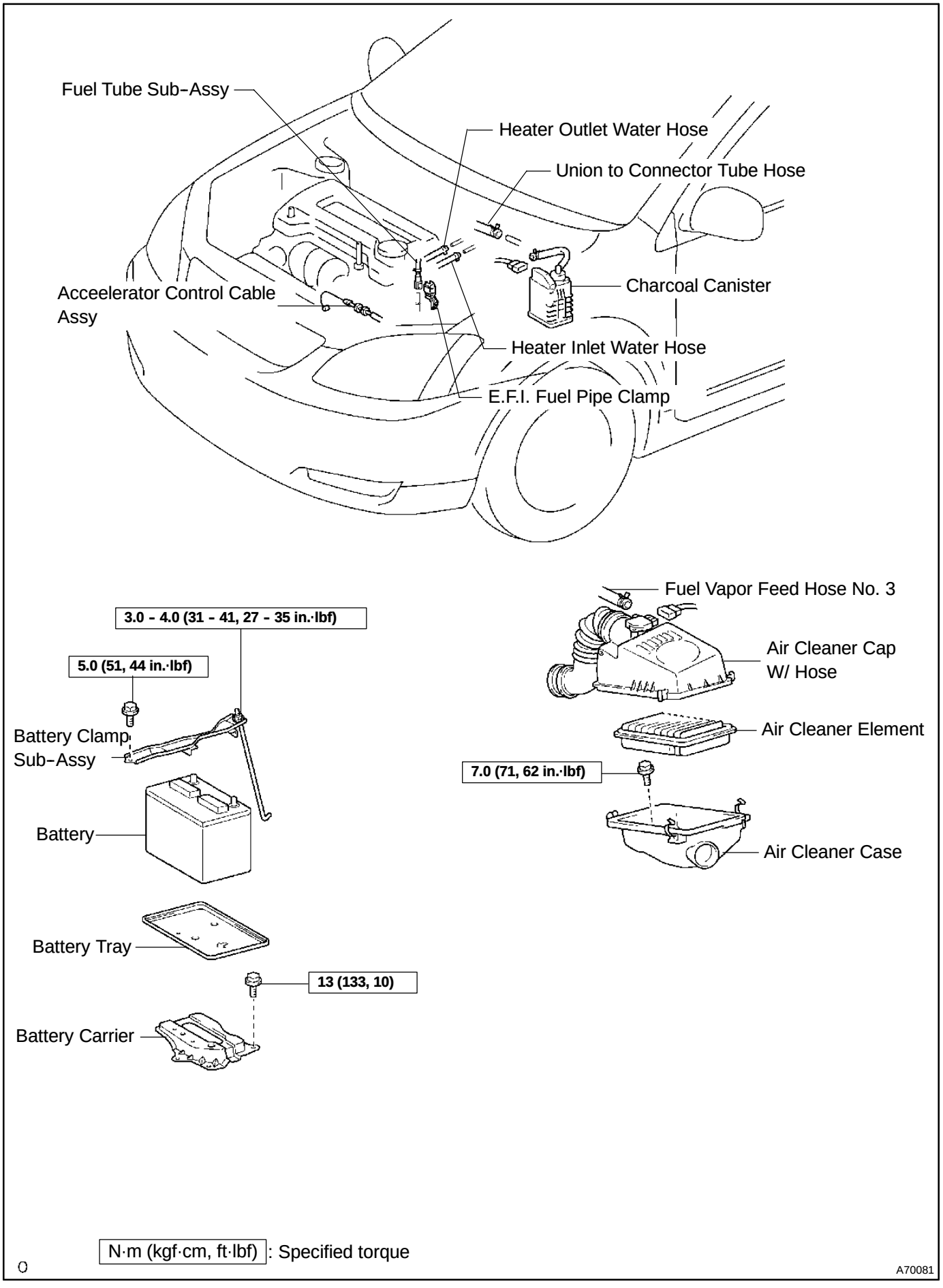
PARTIAL ENGINE ASSY (4ZZ-FE)

COMPONENTS

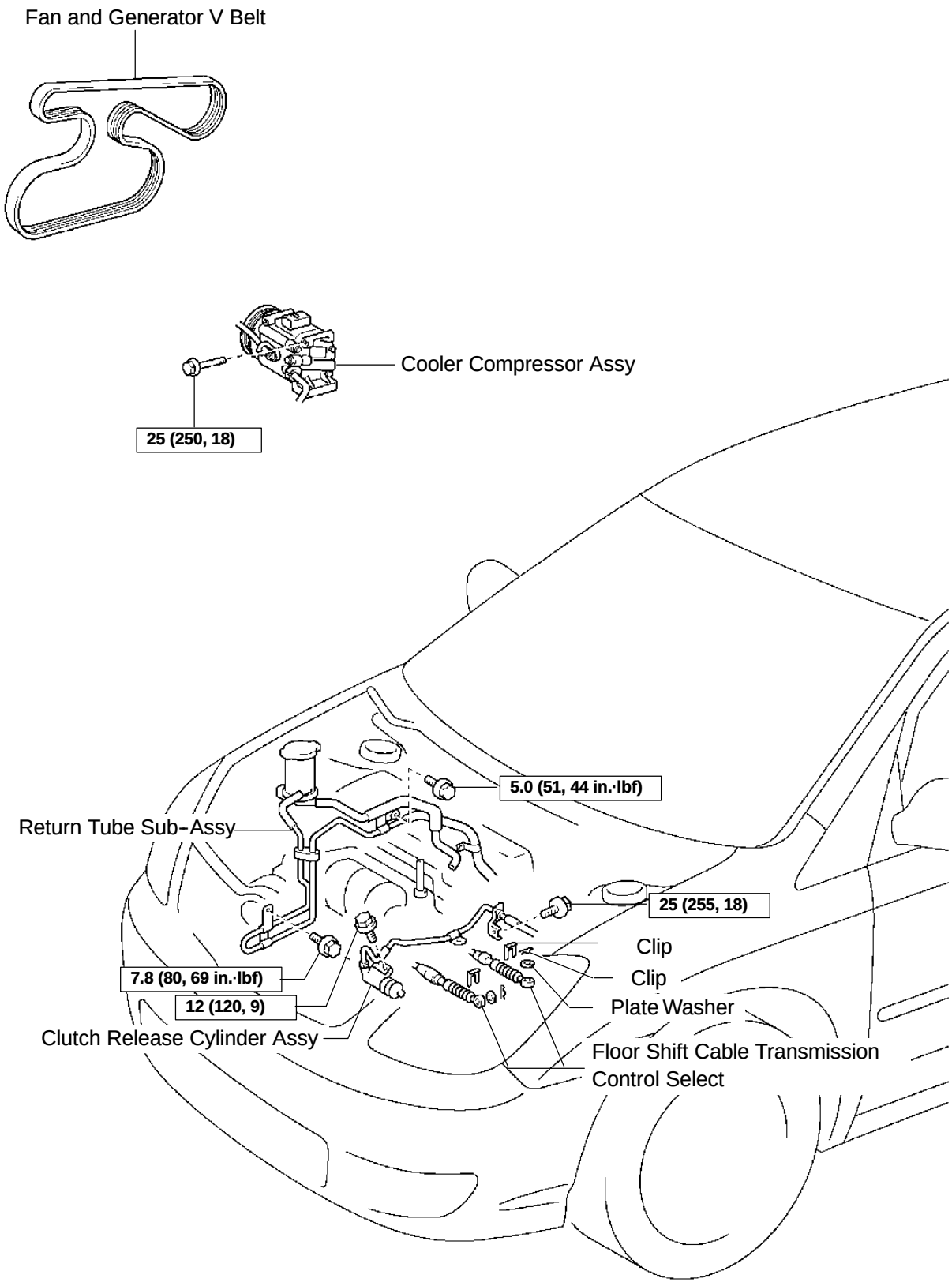
140VA-01



CONTINUED


Fuel Tube Sub–Assy
Heater Outlet Water Hose
Union to Connector Tube Hose
Charcoal Canister
Acceelerator Control Cable Assy
Heater Inlet Water Hose
E.F.I. Fuel Pipe Clamp
Fuel Vapor Feed Hose No. 3
3.0 – 4.0 (31 – 41, 27 – 35 in.·lbf)
5.0 (51, 44 in.·lbf)
Air Cleaner Cap W/ Hose
Air Cleaner Element
Battery Clamp Sub–Assy
7.0 (71, 62 in.·lbf)
Battery
Air Cleaner Case
Battery Tray
13 (133, 10)
Battery Carrier
N·m (kgf·cm, ft·lbf): Specified torque
A70081

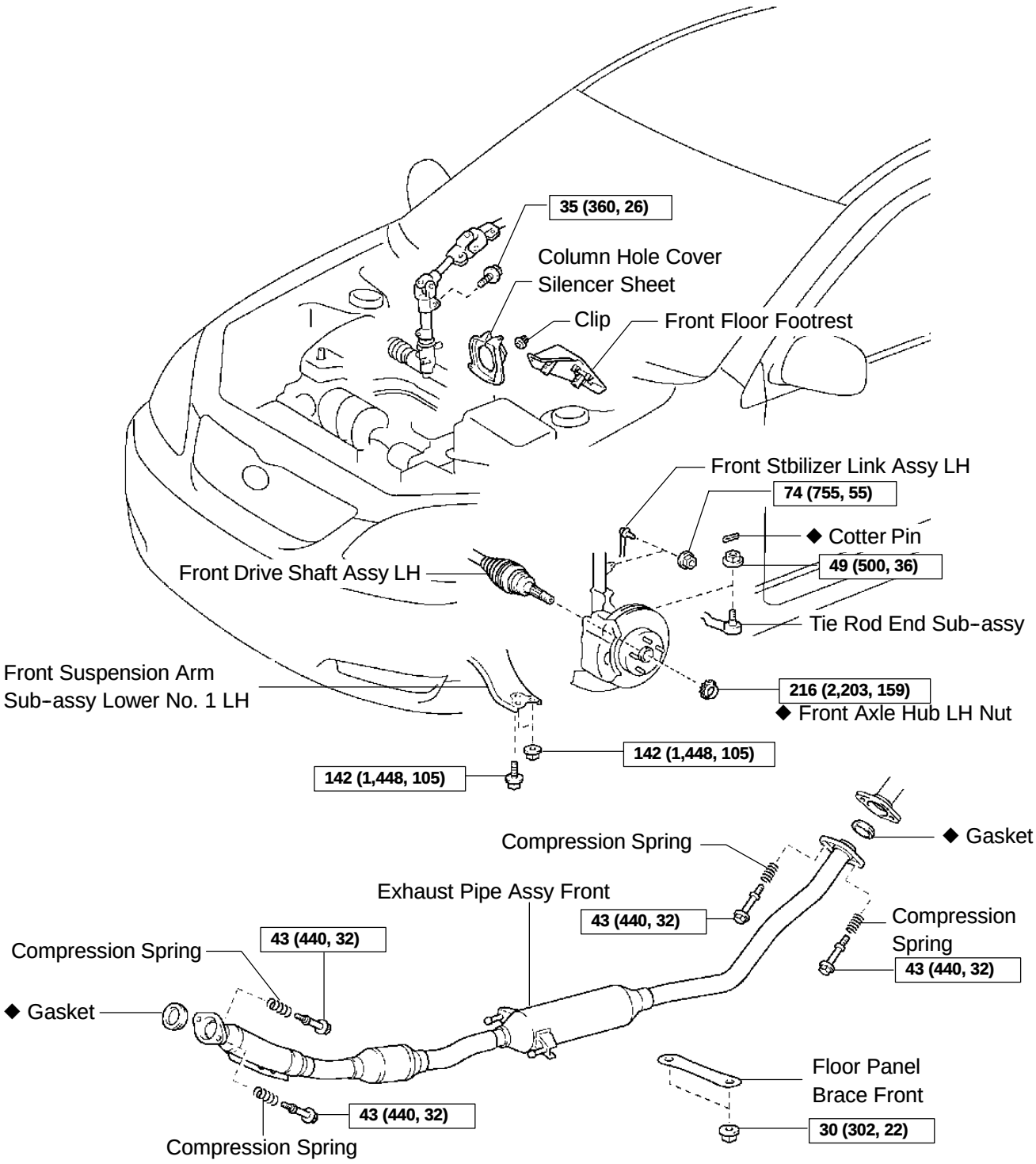
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N·m (kgf·cm, ft·lbf): Specified torque

A70083

CONTINUED



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

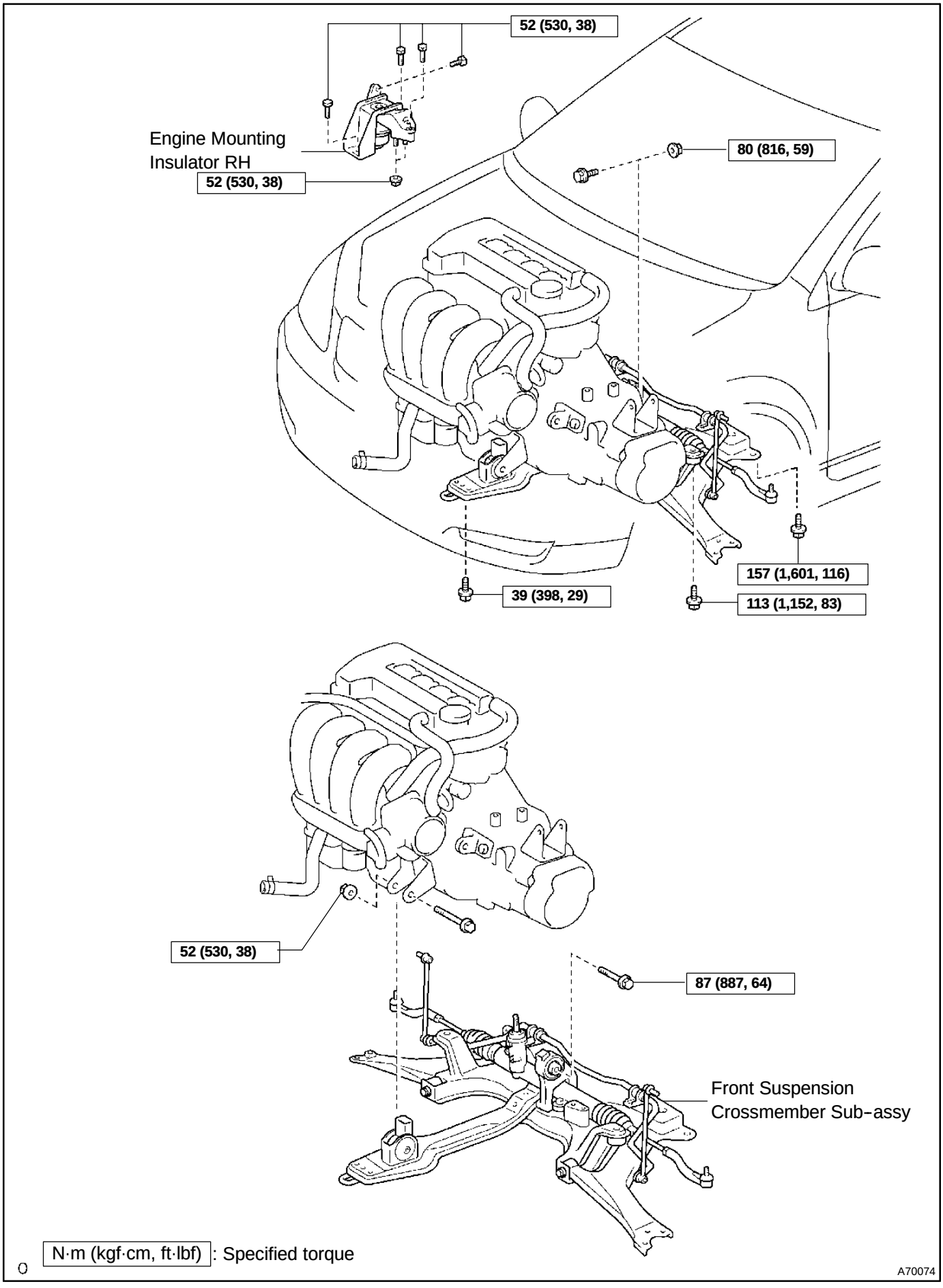
◆ Non-reusable part

A70073

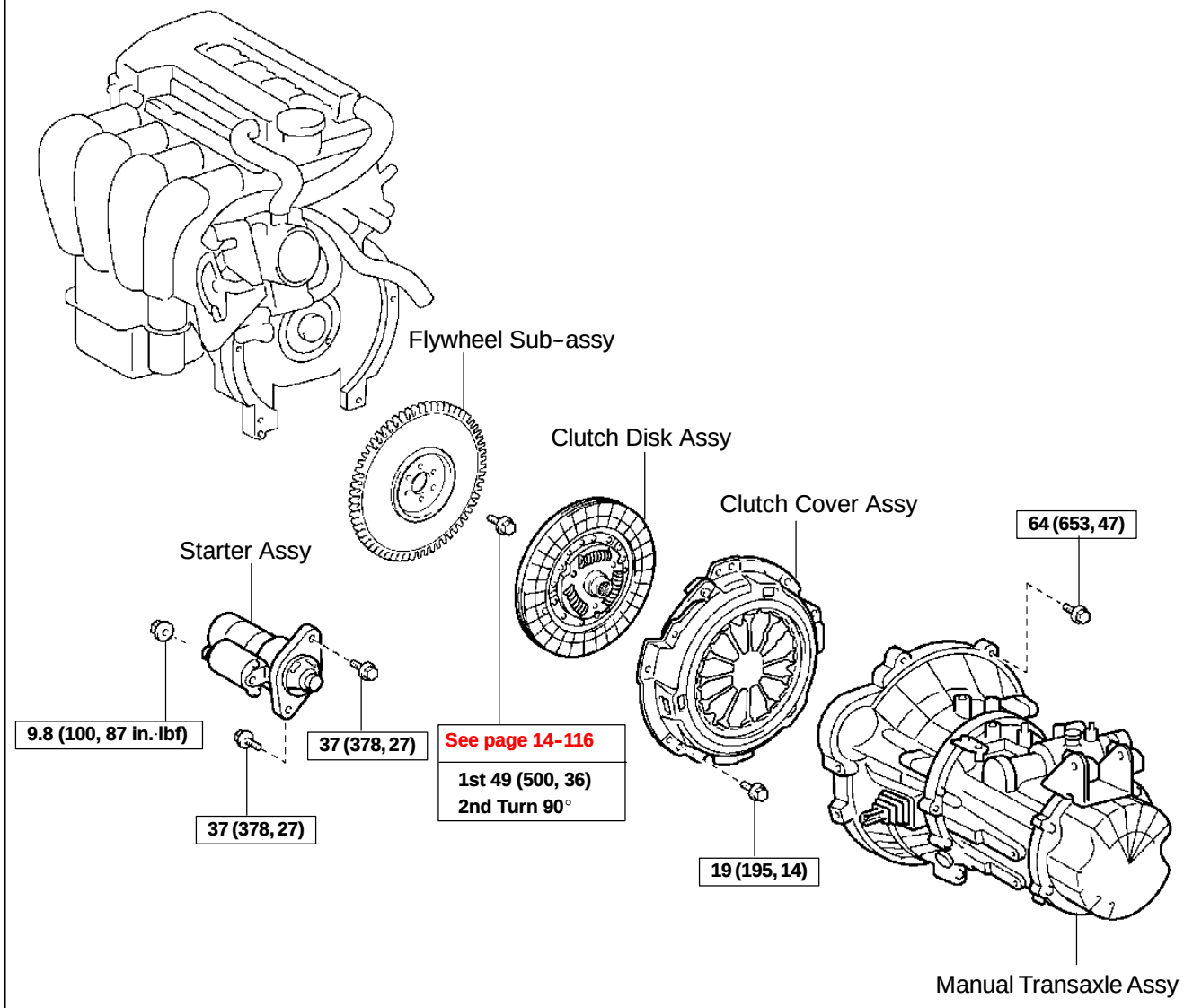
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14-112

ENGINE MECHANICAL - PARTIAL ENGINE ASSY (4ZZ-FE)



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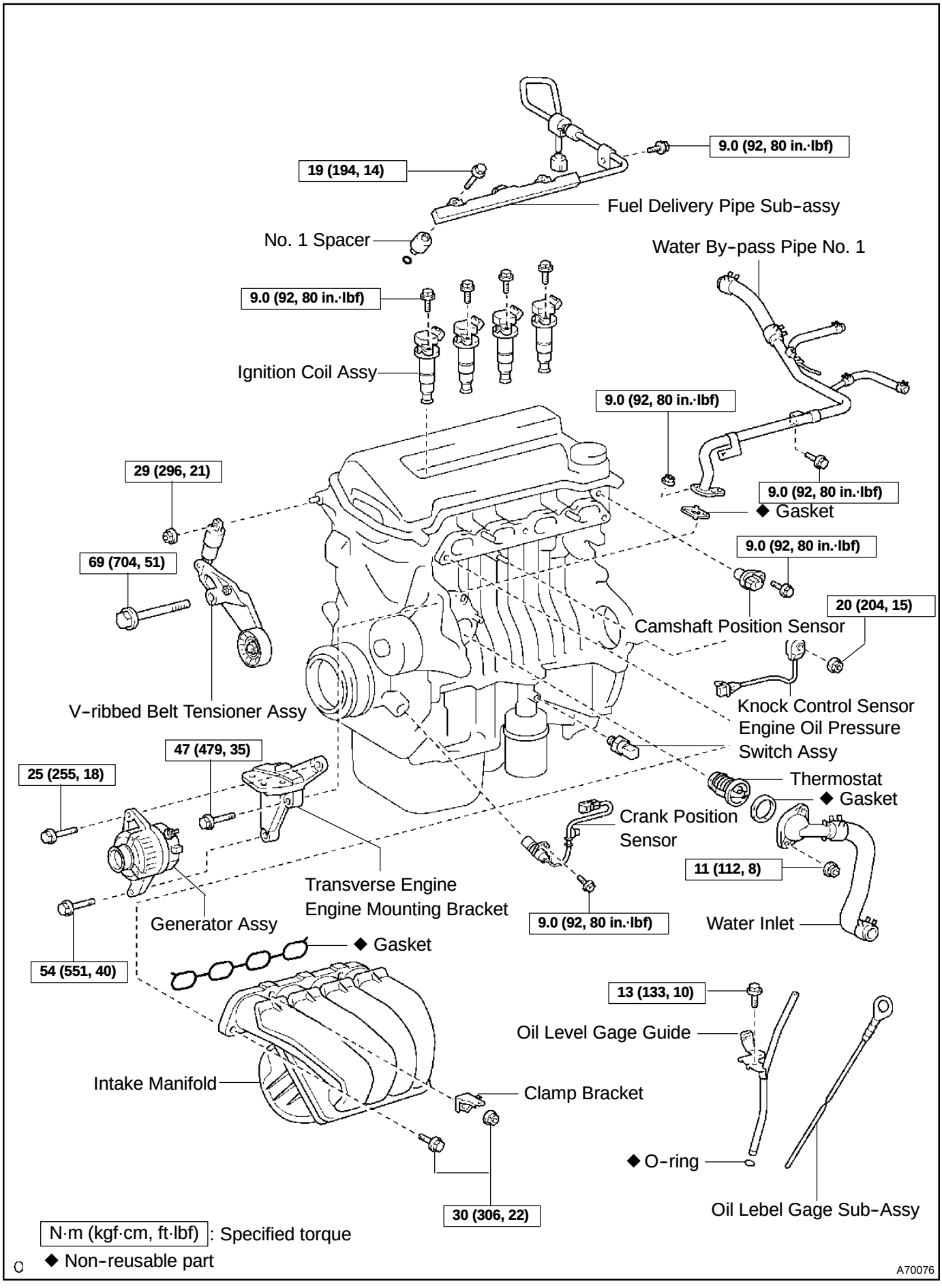


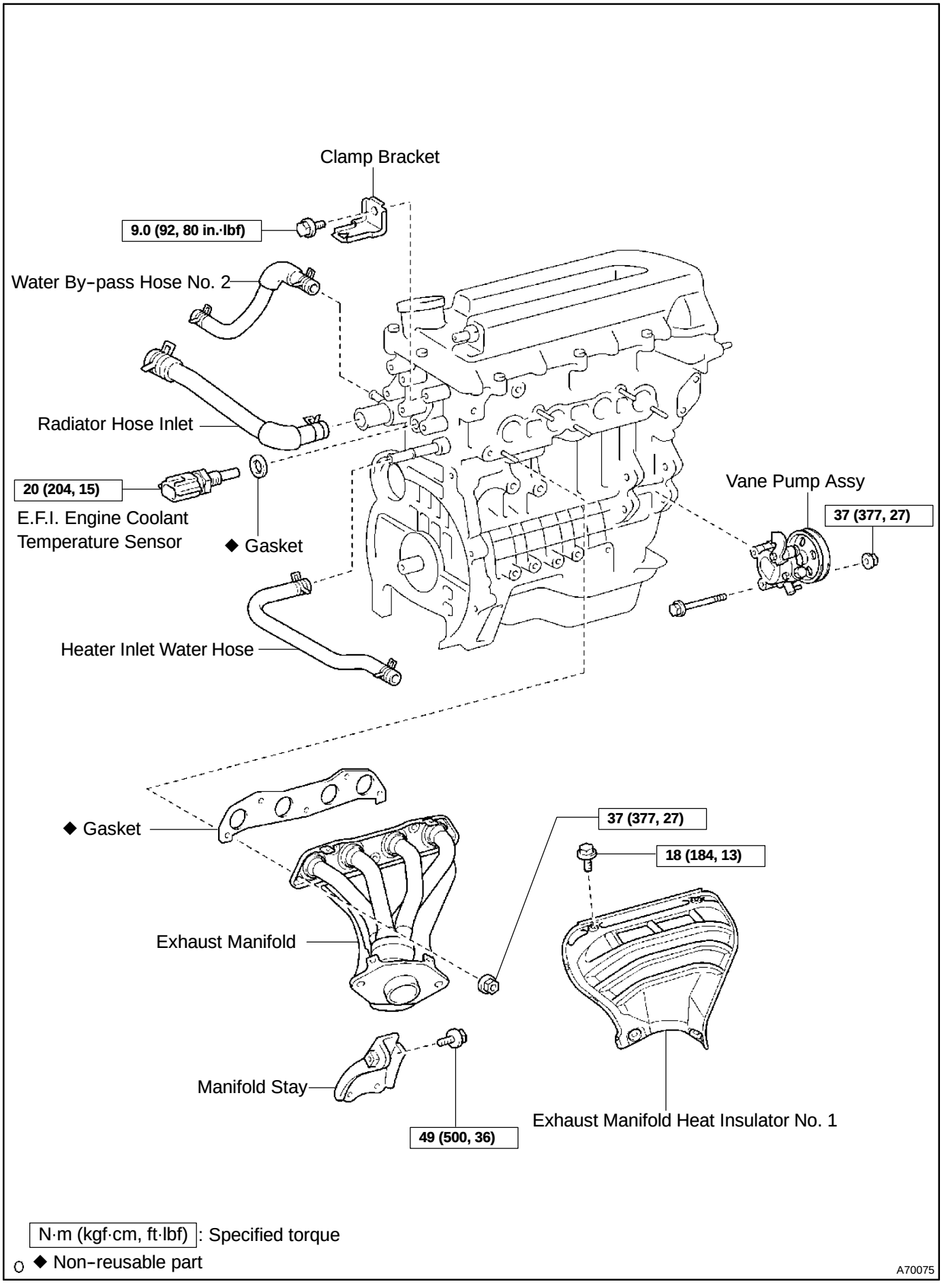
N·m (kgf·cm, ft·lbf): Specified torque

A67616

14-114

ENGINE MECHANICAL - PARTIAL ENGINE ASSY (4ZZ-FE)



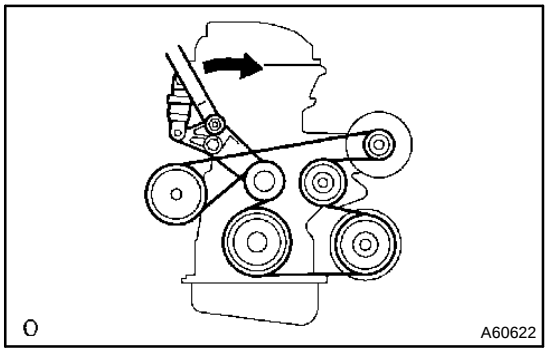

Clamp Bracket
9.0 (92, 80 in.·lbf)
Water By-pass Hose No. 2
Radiator Hose Inlet
20 (204, 15)
E.F.I. Engine Coolant Temperature Sensor
◆ Gasket
Vane Pump Assy
37 (377, 27)
Heater Inlet Water Hose
◆ Gasket
37 (377, 27)
18 (184, 13)
Exhaust Manifold
Manifold Stay
49 (500, 36)
Exhaust Manifold Heat Insulator No. 1
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A70075

140VB-01

REPLACEMENT

1. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT **(See page 11-30)**
2. REMOVE FRONT WHEELS
3. REMOVE ENGINE UNDER COVER RH
4. REMOVE ENGINE UNDER COVER LH
5. DRAIN COOLANT **(See page 16-18)**
6. REMOVE CYLINDER HEAD COVER NO.2
7. DISCONNECT RADIATOR HOSE INLET
(a) Disconnect the radiator hose inlet from the radiator.
8. SEPARATE RADIATOR HOSE OUTLET
(a) Disconnect the radiator hose outlet from the radiator.
9. REMOVE RADIATOR SUPPORT UPPER
(a) Remove the 2 bolts and 2 radiator support upper.
10. REMOVE RADIATOR ASSY
11. REMOVE BATTERY
12. REMOVE BATTERY CARRIER
(a) Remove the 4 bolts and battery carrier.
13. DISCONNECT FUEL VAPOR FEED HOSE NO.3
(a) Disconnect the fuel vapor feed hose from the air cleaner cap.
14. REMOVE AIR CLEANER ASSY
(a) Loosen the air cleaner hose clamp.
(b) Disconnect the connector, vacuum hose and air cleaner cap with hose.
(c) Remove the air cleaner element.
(d) Remove the 3 bolts and air cleaner case.
15. REMOVE EFI FUEL PIPE CLAMP **(See page 11-34)**
16. DISCONNECT FUEL TUBE SUB-ASSY **(See page 11-34)**
17. DISCONNECT HOSE, UNION TO 3 WAY
(a) Disconnect the union to connector tube hose from the hose to hose tube.
18. DISCONNECT HEATER INLET WATER HOSE
(a) Disconnect the heater inlet water hose from the air conditioner tube.
19. DISCONNECT HEATER OUTLET WATER HOSE
(a) Disconnect the heater outlet water hose from the air conditioner tube.
20. REMOVE CHARCOAL CANISTER ASSY
(a) Disconnect the connector and vacuum hose, and remove the charcoal canister.
21. DISCONNECT ACCELERATOR CONTROL CABLE ASSY
(a) Loosen the nut, and remove the accelerator control cable.
22. DISCONNECT TRANSMISSION CONTROL CABLE ASSY **(See page 41-3)**
23. DISCONNECT CLUTCH RELEASE CYLINDER ASSY **(See page 41-3)**
24. REMOVE GLOVE COMPARTMENT DOOR ASSY
25. DISCONNECT ENGINE WIRE
(a) Disconnect the engine wire from the ECM and junction block.
(b) Pull out the engine wire.
(c) Disconnect the engine wire from the engine room junction block.

CONTINUED



26. REMOVE FAN AND GENERATOR V BELT

(a) Turn the V–ribbed belt tensioner slowly clockwise and loosen it. Then, remove the fan and generator belt and put back the V–ribbed belt tensioner little by little and fix it quietly.

27. DISCONNECT COOLER COMPRESSOR ASSY (W/ AIR CONDITIONER)

(a) Disconnect the connector.

(b) Remove the 3 bolts installing the cooler compressor.

28. REMOVE RETURN TUBE SUB–ASSY

(a) Disconnect the vane pump oil reservoir from the oil reservoir bracket.

(b) Remove the 3 bolts installing the return tube.

29. REMOVE FRONT FLOOR FOOTREST

30. REMOVE COLUMN HOLE COVER SILENCER SHEET

(a) Remove the 2 clips and column hole cover silencer sheet.

31. DISCONNECT STEERING INTERMEDIATE SHAFT ASSY NO.2
(See Pub. No. RM821E on page 51–26)

32. REMOVE FLOOR PANEL BRACE FRONT

(a) Remove the 2 nuts and floor panel brace front.

33. REMOVE EXHAUST PIPE ASSY FRONT (See page 15–5)

34. REMOVE FRONT AXLE HUB LH NUT (See Pub. No. RM821E on page 30–4)

SST 09930–00010

HINT:

Perform the same procedure as above on the opposite side.

35. DISCONNECT TIE ROD END SUB–ASSY LH (See Pub. No. RM821E on page 30–4)

SST 09628–62011

HINT:

Perform the same procedure as above on the opposite side.

36. DISCONNECT FRONT STABILIZER LINK ASSY LH (See Pub. No. RM821E on page 26–14)

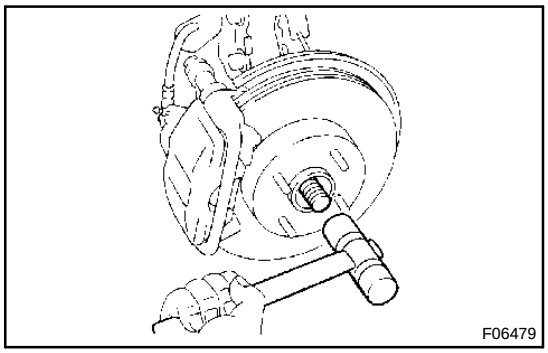
HINT:

Perform the same procedure as above on the opposite side.

37. DISCONNECT FRONT SUSPENSION ARM SUB–ASSY LOWER NO.1 LH
(See Pub. No. RM821E on page 30–4)

HINT:

Perform the same procedure as above on the opposite side.



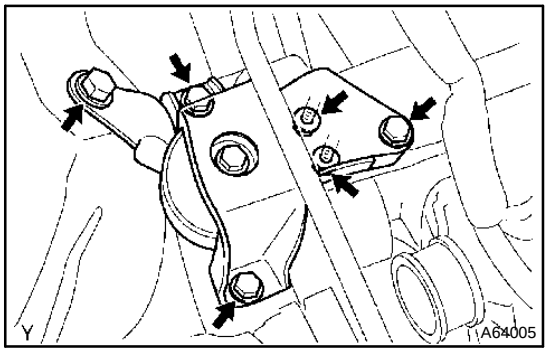
38. DISCONNECT FRONT DRIVE SHAFT ASSY LH

(a) Using a platic hammer, disconnect the front drive shaft from the axle hab.

HINT:

Perform the same procedure as above on the opposite side.

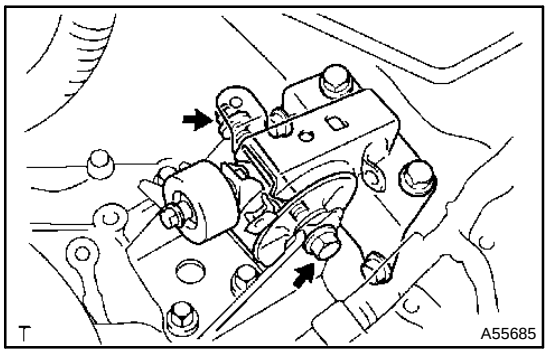
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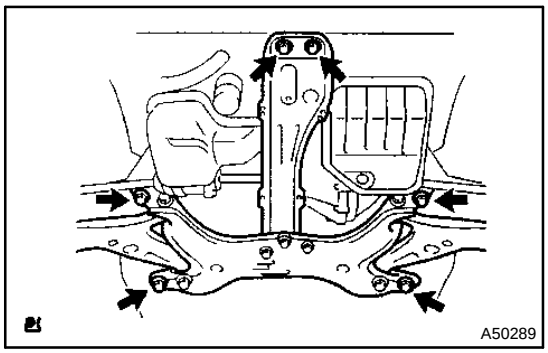
39. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine lifter.

(b) Remove the 4 bolts, 2 nuts and engine mounting insulator.



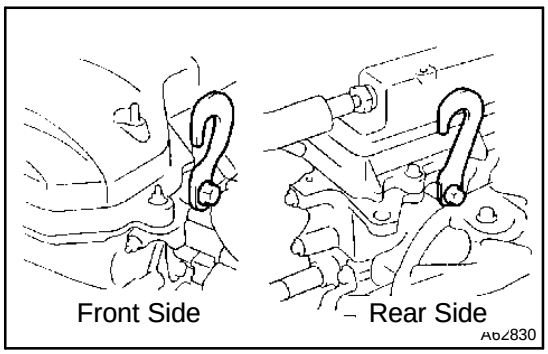
(c) Remove the through bolt and nut, detach the engine mounting insulator from the vehicle.



(d) Remove the engine with transaxle.

(1) Remove the 6 bolts, as shown in the illustration.

(2) Carefully, remove the engine with transaxle from the vehicle.



(e) Install the 2 engine hangers with the 2 bolts.

Part No.:
No. 1 engine hanger 12281-15040
No. 2 engine hanger 12281-22021
Bolt 91512-B1016
Torque: 38 N·m (387 kgf·cm, 28 ft·lbf)

HINT:

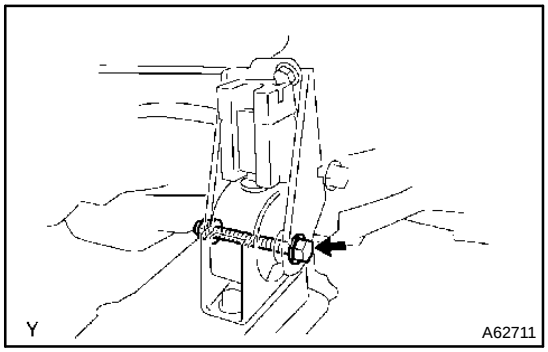
Be sure to install engine hanger (12281-22021) to the front side of the engine and engine hanger (12281-15040) to the rear side.

(f) Using the chain block and engine sling device, hang the engine assembly.

40. REMOVE VANE PUMP ASSY

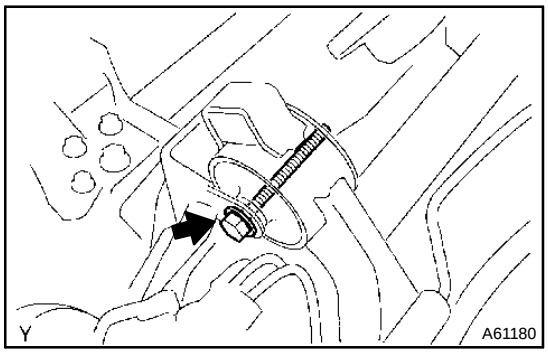
(a) Remove the 2 through bolts and 2 nuts installing the vane pump.

CONTINUED



41. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSY

(a) Remove the through bolt and a nut, detach the engine mounting insulator FR from the engine mounting bracket.



(b) Remove the through bolt, detach the engine mounting insulator RR from the suspension crossmember.

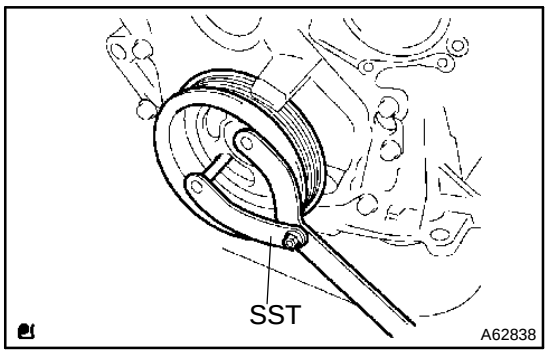
(c) Separate the engine and transaxle assembly from the suspension crossmember and engine mounting member.

42. REMOVE STARTER ASSY **(See page 19-11)**

43. REMOVE MANUAL TRANSAXLE ASSY **(See page 41-3)**

44. REMOVE CLUTCH COVER ASSY **(See Pub. No. RM821E on page 42-12)**

45. REMOVE CLUTCH DISC ASSY **(See Pub. No. RM821E on page 42-12)**



46. REMOVE FLYWHEEL SUB-ASSY

(a) Fix the crankshaft with SST, then remove the 8 bolts and flywheel.

SST 09960-10010 (09962-01000, 09963-01000)

47. REMOVE IGNITION COIL ASSY

(a) Remove the 4 bolts and 4 ignition coils.

48. REMOVE FUEL DELIVERY PIPE SUB-ASSY

(a) Remove the 3 bolts and fuel delivery pipe with fuel injectors.

49. REMOVE GENERATOR ASSY **(See page 19-16)**

50. REMOVE INTAKE MANIFOLD

(a) Remove the 4 bolts, 2 nuts, 2 clamp brackets and intake manifold.

51. REMOVE OIL LEVEL GAGE SUB-ASSY

(a) Remove the oil level gage guide from the oil level gage guide.

52. REMOVE OIL LEVEL GAGE GUIDE

(a) Remove the bolt and oil level gage guide.

53. REMOVE WATER BY-PASS PIPE NO.1

(a) Remove the 2 bolts, 2 nuts, water by-pass pipe and gasket.

CONTINUED

54. REMOVE WATER INLET

(a) Remove the 2 nuts and water inlet.

55. REMOVE THERMOSTAT

56. REMOVE ENGINE OIL PRESSURE SWITCH ASSY

(a) Using SST, remove the engine oil pressure switch.

SST 09268–46021

57. REMOVE CAMSHAFT POSITION SENSOR

(a) Remove the bolt and camshaft position sensor.

58. REMOVE CRANK POSITION SENSOR

(a) Remove the 2 bolts and crank position sensor.

59. REMOVE KNOCK CONTROL SENSOR

(a) Remove the nut and knock control sensor.

60. REMOVE V–RIBBED BELT TENSIONER ASSY

(a) Remove the bolt, nut and V–ribbed belt tensioner.

61. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Remove the 3 bolts and transverse engine engine mounting bracket.

62. REMOVE MANIFOLD STAY

(a) Remove the 3 bolts and manifold stay.

63. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.1

(a) Remove the 4 bolts and exhaust manifold heat insulator.

64. REMOVE EXHAUST MANIFOLD

(a) Remove the 5 nuts, exhaust manifold and gasuket.

65. REMOVE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

(a) Using SST, remove the E.F.I. engine coolant temperature sensor.

SST 09817–33190

66. REMOVE WATER BY–PASS HOSE NO.2

67. REMOVE RADIATOR HOSE INLET

68. REMOVE HEATER OUTLET WATER HOSE

69. REPLACE PARTIAL ENGINE ASSY

70. INSTALL E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

(a) Install a new gasket to the E.F.I. engine coolant temperature sensor.

(b) Using SST, install the E.F.I. engine coolant temperature sensor.

SST 09817–33190

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

71. INSTALL EXHAUST MANIFOLD

(a) Install a new gasket and the exhaust manifold with the 5 nuts.

Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

72. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.1

(a) Install the exhaust manifold heat insulator with the 4 bolts.

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

73. INSTALL MANIFOLD STAY

(a) Install the manifold stay with 3 bolts.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

74. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Install the transverse engine engine mounting bracket with the 3 bolts.

Torque: 47 N·m (479 kgf·cm, 35 ft·lbf)

CONTINUED

75. INSTALL V–RIBBED BELT TENSIONER ASSY

(a) Install the V–ribbed belt tensioner with the bolt and nut.

Torque:
Nut 29 N·m (296 kgf·cm, 21 ft·lbf)
Bolt 69 N·m (704 kgf·cm, 51 ft·lbf)

76. INSTALL KNOCK CONTROL SENSOR

(a) Install the knock control sensor with the nut.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

77. INSTALL CRANK POSITION SENSOR

(a) Apply engine oil on a new O–ring, install the it to the crank position sensor.

(b) Install the crank position sensor with the 2 bolts.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

78. INSTALL CAMSHAFT POSITION SENSOR

(a) Apply engine oil on a new O–ring, install the it to the camshaft position sensor.

(b) Install the camshaft position sensor with the bolt.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

79. INSTALL ENGINE OIL PRESSURE SWITCH ASSY

(a) Clean the threads of the engine oil pressure switch, and apply adhesive there.

Adhesive: Prat No. 08833–00080, THREE BOND 1344

(b) Using SST, install the engine oil pressure switch.

SST 09268–46021

Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)

80. INSTALL THERMOSTAT (See page 16–22)

81. INSTALL WATER INLET

(a) Install the water inlet with the 2 nuts.

Torque: 11 N·m (112 kgf·cm, 8 ft·lbf)

82. INSTALL WATER BY–PASS PIPE NO.1

(a) Install a new gaseket and water by–pass pipe with the 2 nuts and 2 bolts.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

83. INSTALL OIL LEVEL GAGE GUIDE

(a) Apply a light coat of a new O–ring and install it to the oil level gage guide.

(b) Install the oil level gage guide with the bolt.

Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

84. INSTALL INTAKE MANIFOLD

(a) Install a new gasket to the intake manifold.

(b) Install the intake manifold and 2 clamp brackets with the 2 nuts and 4 bolts,

Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)

85. INSTALL GENERATOR ASSY (See page 19–16)

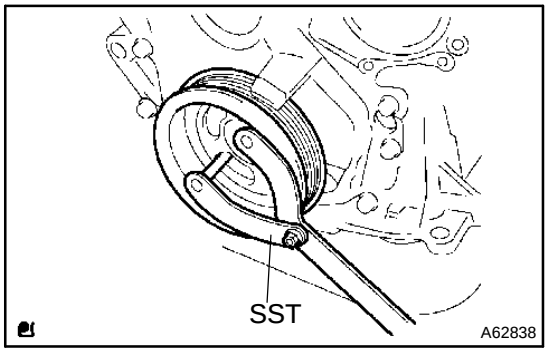
86. INSTALL FUEL DELIVERY PIPE SUB–ASSY (See page 11–39)

87. INSTALL IGNITION COIL ASSY

(a) Install the 4 ignition coils with the 4 bolts.

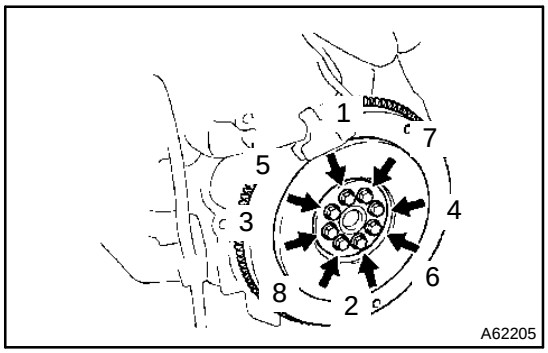
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

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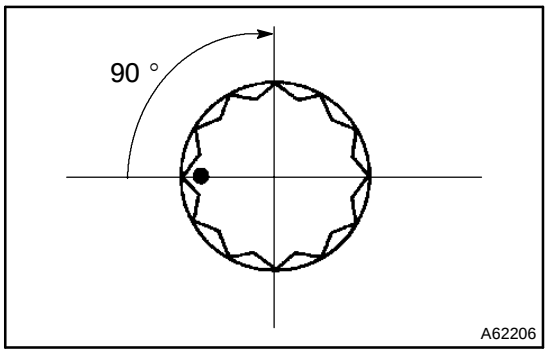


88. INSTALL FLYWHEEL SUB-ASSY

(a) Fix the crankshaft with SST.
SST 09960-10010 (09962-01000, 09963-01000)



(b) Clean the bolt and bolt hole.
(c) Apply adhesive to the bolts.
Adhesive:
Part No. 09330-00070, THREE BOND or equivalent.
(d) Install and uniformly tighten the 8 bolts, in several passes, in the sequence shown.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



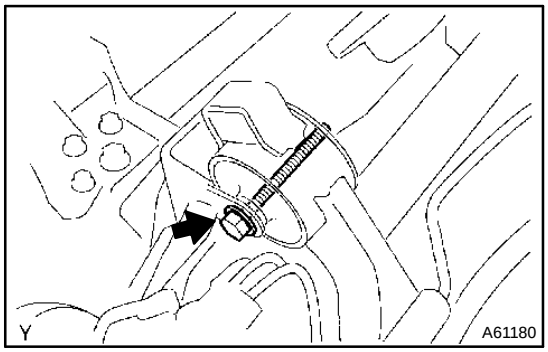
(e) Mark the bolts with paint.
(f) Retighten the bolts by an additional 90 °.
(g) Check that the point marked bolts are moved at 90 ° angle.

89. INSTALL CLUTCH DISC ASSY **(See Pub. No. RM821E on page 42-12)**
SST 09301-00210

90. INSTALL CLUTCH COVER ASSY **(See Pub. No. RM821E on page 42-12)**
SST 09301-00210

91. INSTALL MANUAL TRANSAXLE ASSY **(See page 41-3)**

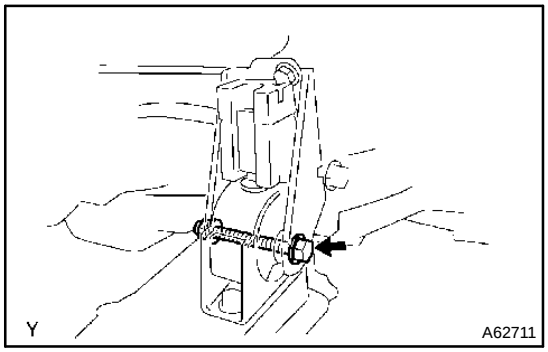
92. INSTALL STARTER ASSY **(See page 19-11)**



93. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSY

(a) Attach the engine and transaxle assembly to the suspension crossmember and engine mounting member.
(b) Install the bolt holding the rear engine mounting bracket to the mounting insulator.
Torque: 87 N·m (887 kgf·cm, 64 ft·lbf)

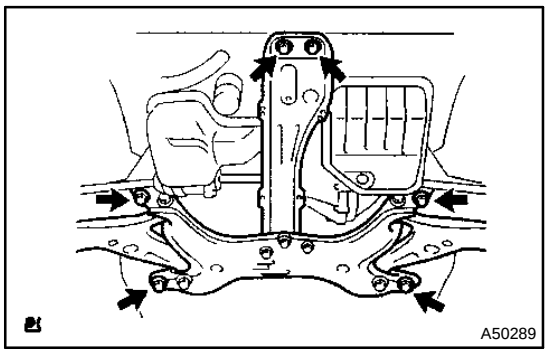
CONTINUED



(c) Install the bolt holding the front engine mounting bracket to the mounting insulator.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

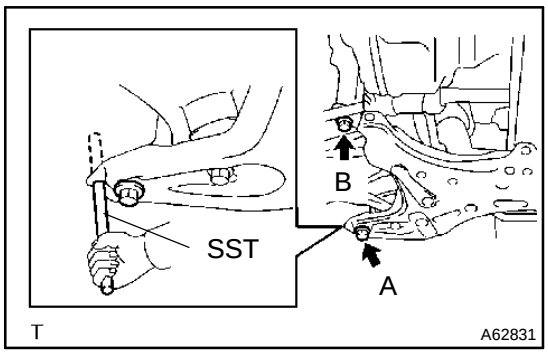
94. INSTALL VANE PUMP ASSY

(a) Install the vane pump with the 2 through bolts and 2 nuts.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

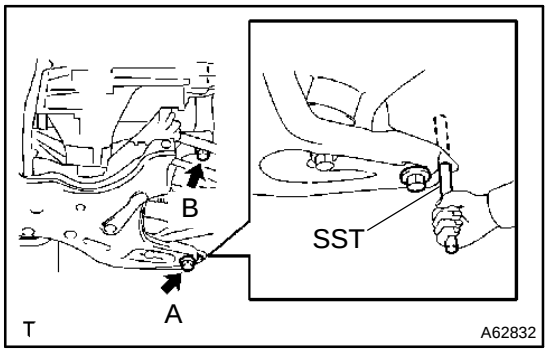


95. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine with transaxle on the engine lifter.
(b) Install the engine with transaxle to the vhicle.
(c) Temporarily, install the suspension crossmember and 6 bolts.
(d) Install the engine mounting insulator LH.
Torque: 80 N·m (816 kgf·cm, 59 ft·lbf)
(e) Install the engine mounting insulator RH.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)



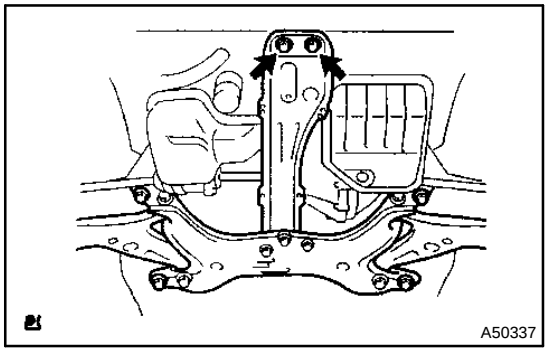
(f) Insert SST to the positioning holes on the right handle crossmember and on the right–handle of the vehicle.
SST 09670–00010
(g) Temporarily tighten the bolt A first, then Bolt B.



(h) Insert SST to the positioning holes on the left handle crossmember and on the left–handle of the vehicle.
SST 09670–00010
(i) Temporarily tighten the bolt A first, then Bolt B.
(j) Insert SST to the positioning holes on the right–handle crossmember and right–handleof the vhicle, then tighten the bolts with a specified torque.

CONTINUED

(k) Insert SST to the positioning holes on the right-handle crossmember and left-handleof the vhicle, then tighten the bolts with a specified torque.
SST 09670-00010
Torque:
Bolt A 157 N·m (1,601 kgf·cm, 116 ft·lbf)
Bolt B 113 N·m (1,152 kgf·cm, 83 ft·lbf)



(l) Tighten the 2 bolts, as shown in the illustration.
Torque: 39 N·m (398 kgf·cm, 29 ft·lbf)

NOTICE:
After installing the crossmember, check that the positioning holes on the crossmember and vhicle are alligned with each other.

96. INSTALL FRONT SUSPENSION ARM SUB-ASSY LOWER NO.1 LH
(See Pub. No. RM821E on page 30-4)

HINT:
Perform the same procedure as above on the opposite side.

97. INSTALL FRONT STABILIZER LINK ASSY LH (See Pub. No. RM821E on page 26-14)

HINT:
Perform the same procedure as above on the opposite side.

98. INSTALL TIE ROD END SUB-ASSY LH (See Pub. No. RM821E on page 30-4)

HINT:
Perform the same procedure as above on the opposite side.

99. INSTALL FRONT AXLE HUB LH NUT (See Pub. No. RM821E on page 30-4)

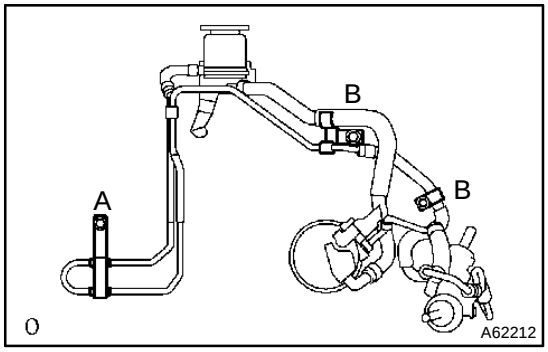
HINT:
Perform the same procedure as above on the opposite side.

100. INSTALL EXHAUST PIPE ASSY FRONT (See page 15-5)

101. INSTALL FLOOR PANEL BRACE FRONT

(a) Install front floor panel brace with the 2 nuts.
Torque: 30 N·m (302 kgf·cm, 22 ft·lbf)

102. INSTALL STEERING INTERMEDIATE SHAFT ASSY NO.2 (See Pub. No. RM821E on page 51-26)



103. INSTALL RETURN TUBE SUB-ASSY

(a) Install the return tube with the 3 bolts.
Torque:
Bolt A 7.8 N·m (80 kgf·cm, 69 in.·lbf)
Bolt B 5.0 N·m (51 kgf·cm, 44 in.·lbf)

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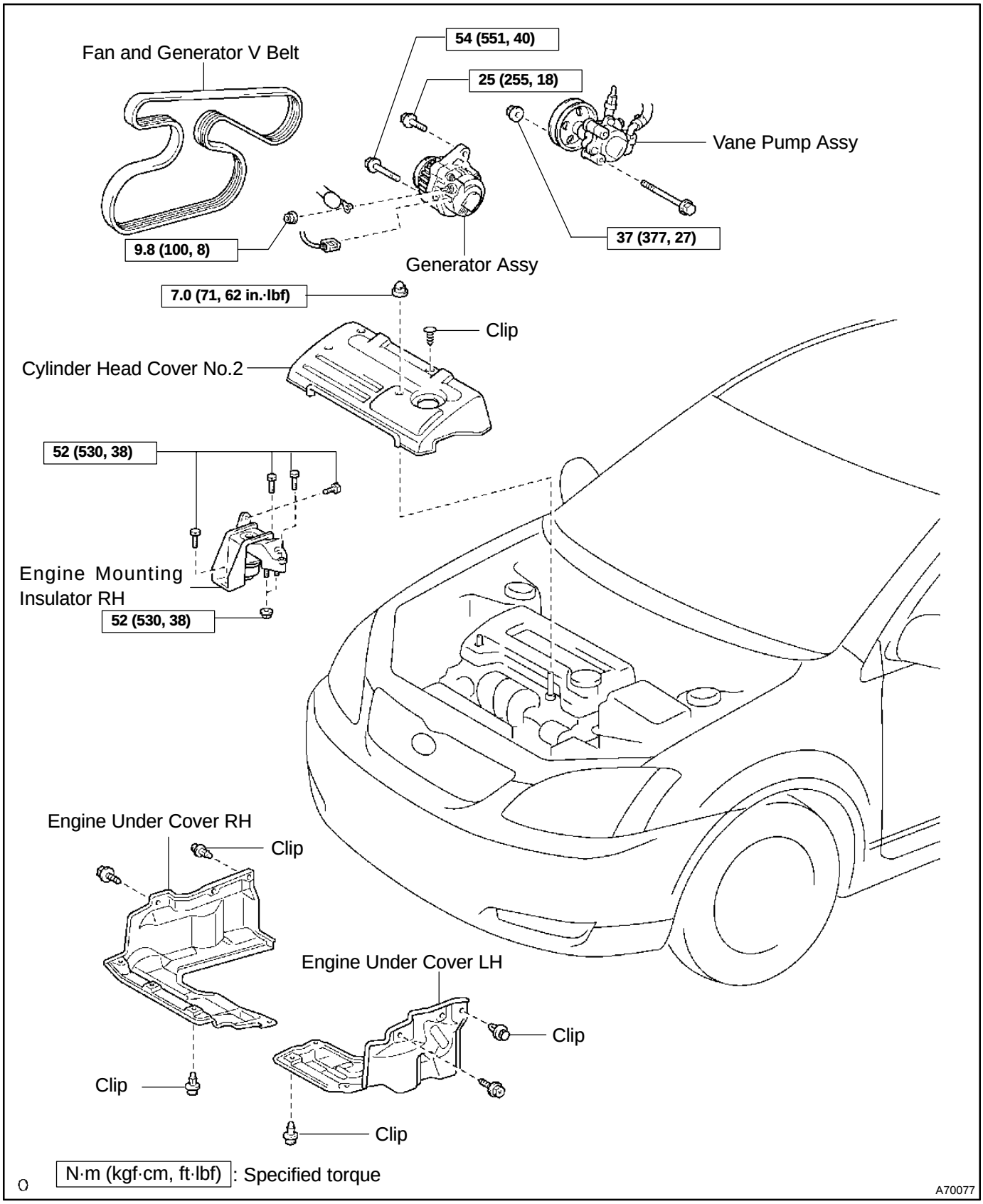
104. INSTALL COOLER COMPRESSOR ASSY (W/ AIR CONDITIONER)
(See Pub. No. RM821E on page 55–48)
105. INSTALL CLUTCH RELEASE CYLINDER ASSY (See page 41–3)
106. INSTALL AIR CLEANER ASSY
(a) Install air cleaner case with 3 bolts.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)
107. INSTALL BATTERY CARRIER
(a) Install battery carrier with the 4 bolts.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)
108. INSTALL BATTERY
Torque:
Bolt 5.0 N·m (51 kgf·cm, 44 in.·lbf)
Nut 3.0 – 4.0 N·m (31 – 41 kgf·cm, 27 – 35 in.·lbf)
109. INSTALL RADIATOR ASSY
110. INSTALL RADIATOR SUPPORT UPPER
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)
111. INSTALL CYLINDER HEAD COVER NO.2
(a) Install the cylinder head cover with the 2 nuts and 2 clips.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)
112. INSTALL FRONT WHEELS
Torque: 103 N·m (1050 kgf·cm, 76 ft·lbf)
113. ADD ENGINE OIL
114. ADD COOLANT (See page 16–18)
115. CHECK ENGINE OIL LEAK
116. CHECK FOR ENGINE COOLANT LEAKS (See page 16–18)
117. CHECK FUEL LEAK
118. CHECK EXHAUST GAS LEAK
119. INSPECT CHECK IDLE SPEED AND IGNITION TIMING (See page 14–93)
SST 09843–18030, 09843–18040
120. INSPECT CO/HC (See page 14–93)
121. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT
122. CHECK ABS SPEED SENSOR SIGNAL

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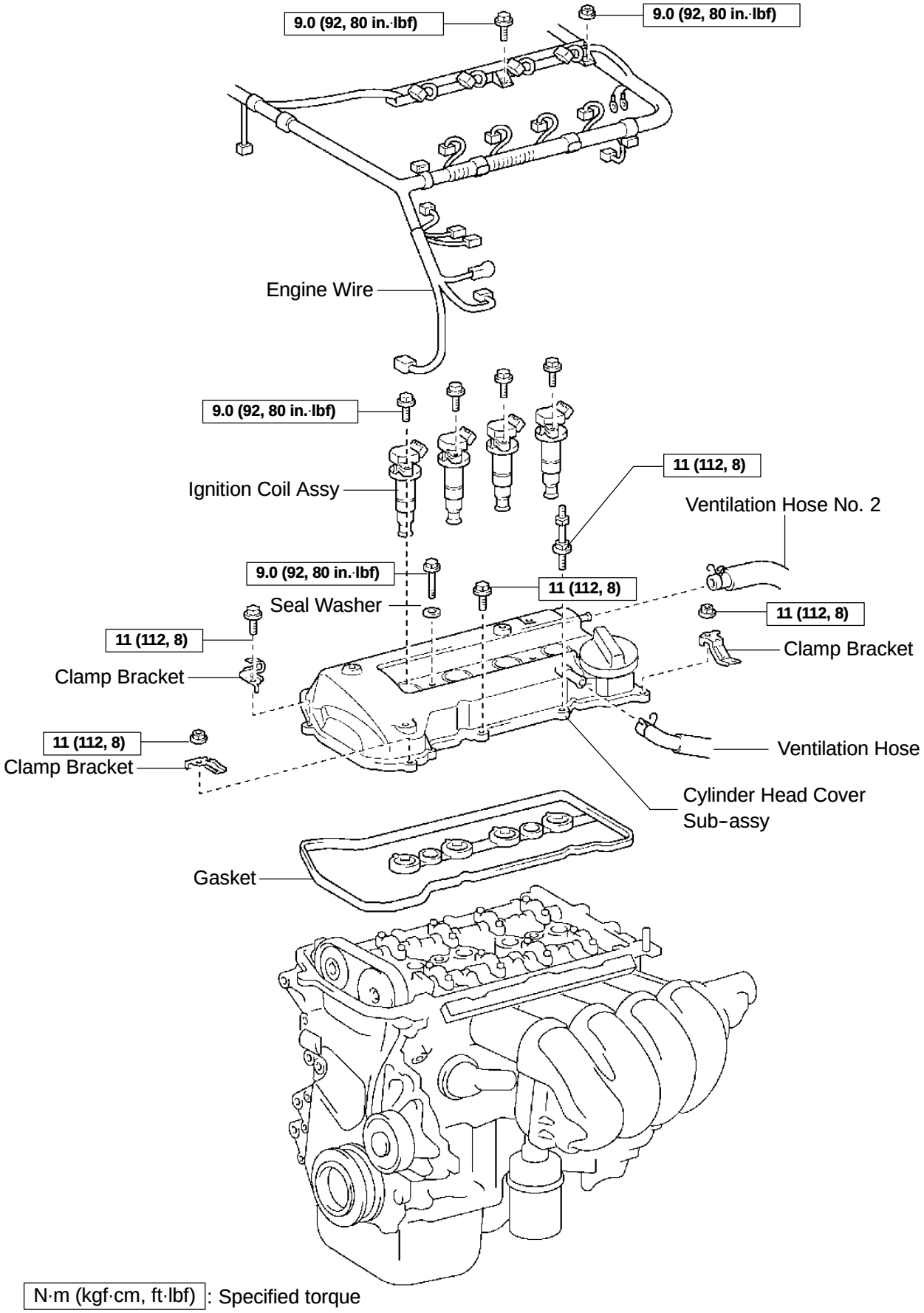
CHAIN SUB-ASSY (4ZZ-FE)

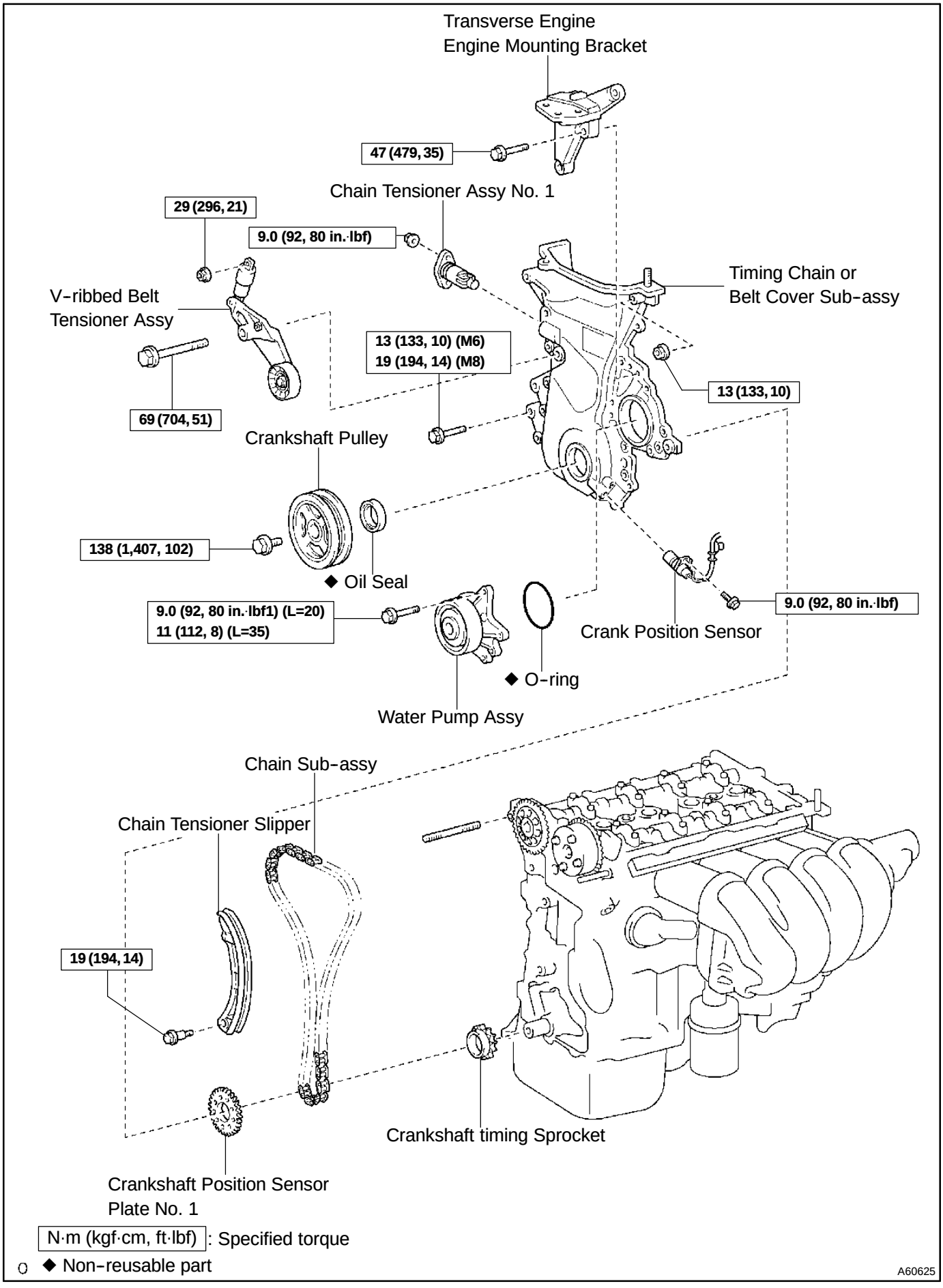
COMPONENTS

140VC-01



CONTINUED


9.0 (92, 80 in.·lbf)
9.0 (92, 80 in.·lbf)
Engine Wire
9.0 (92, 80 in.·lbf)
Ignition Coil Assy
11 (112, 8)
Ventilation Hose No. 2
9.0 (92, 80 in.·lbf)
Seal Washer
11 (112, 8)
11 (112, 8)
11 (112, 8)
Clamp Bracket
Clamp Bracket
11 (112, 8)
Clamp Bracket
Ventilation Hose
Cylinder Head Cover Sub–assy
Gasket
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non–reusable part
A70090


Transverse Engine
Engine Mounting Bracket
47 (479, 35)
Chain Tensioner Assy No. 1
29 (296, 21)
9.0 (92, 80 in.·lbf)
V-ribbed Belt
Tensioner Assy
Timing Chain or
Belt Cover Sub-assy
13 (133, 10) (M6)
19 (194, 14) (M8)
13 (133, 10)
69 (704, 51)
Crankshaft Pulley
138 (1,407, 102)
◆ Oil Seal
9.0 (92, 80 in.·lbf1) (L=20)
11 (112, 8) (L=35)
9.0 (92, 80 in.·lbf)
Crank Position Sensor
◆ O-ring
Water Pump Assy
Chain Sub-assy
Chain Tensioner Slipper
19 (194, 14)
Crankshaft timing Sprocket
Crankshaft Position Sensor
Plate No. 1
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A60625

CONTINUED

REPLACEMENT

1. REMOVE ENGINE UNDER COVER LH

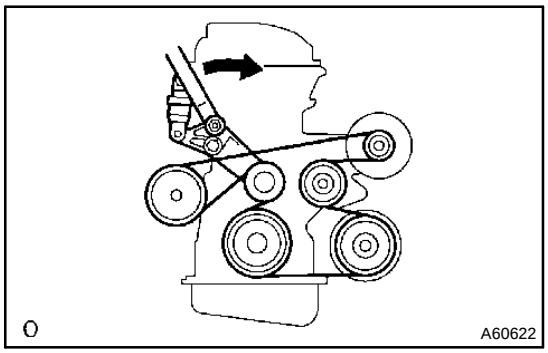
2. REMOVE ENGINE UNDER COVER RH

3. DRAIN COOLANT **(See page 16–18)**

4. REMOVE FRONT WHEEL RH

5. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove the 2 nuts, 2 clips and cylinder head cover.



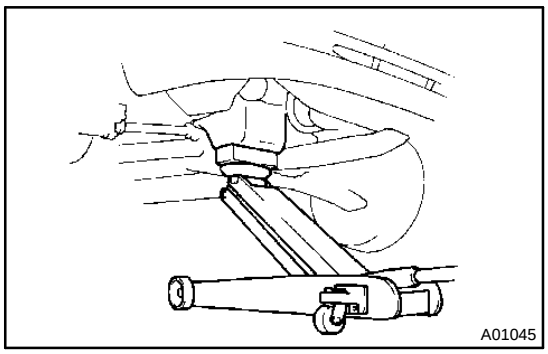
6. REMOVE FAN AND GENERATOR V BELT

(a) Turn the V–ribbed belt tensioner slowly clockwise and loosen it. Then, remove the fan and generator belt and put back the V–ribbed belt tensioner little by little and fix it quietly.

7. REMOVE VANE PUMP ASSY

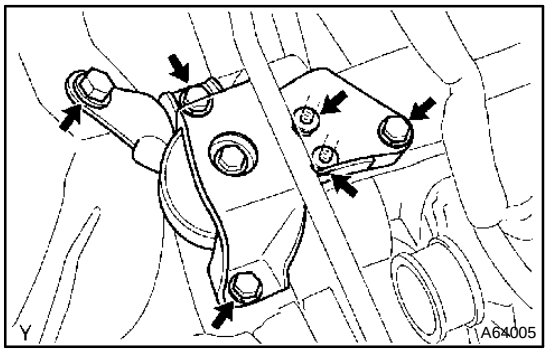
(a) Remove the 2 through bolts and 2 nuts installing the vane pump.

8. REMOVE GENERATOR ASSY **(See page 19–16)**



9. REMOVE ENGINE MOUNTING INSULATOR SUB–ASSY RH

(a) Place a wooden block between the jack and engine, and set the jack, then remove the 4 bolts, 2nuts and engine mounting insulator RH.



CONTINUED

10. REMOVE IGNITION COIL ASSY

(a) Disconnect the 4 connectors.

(b) Remove 4 bolts and 4 ignition coils.

11. DISCONNECT ENGINE WIRE

(a) Disconnect the connectors.

(b) Remove the 3 clamps from the 3 clamp brackets.

(c) Remove the bolt and nut installing the engine wire.

12. DISCONNECT VENTILATION HOSE

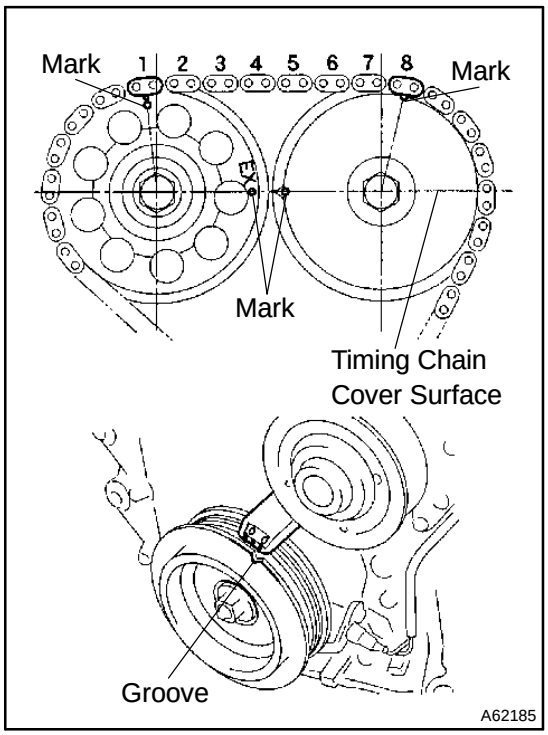
(a) Disconnect the ventilation hose from the cylinder head cover.

13. DISCONNECT VENTILATION HOSE NO.2

(a) Disconnect the ventilation hose from the cylinder head cover.

14. REMOVE CYLINDER HEAD COVER SUB-ASSY

(a) Remove the 9 bolts, 2 seal washers, 2 nuts, 3 clamp brackets and cylinder head cover.



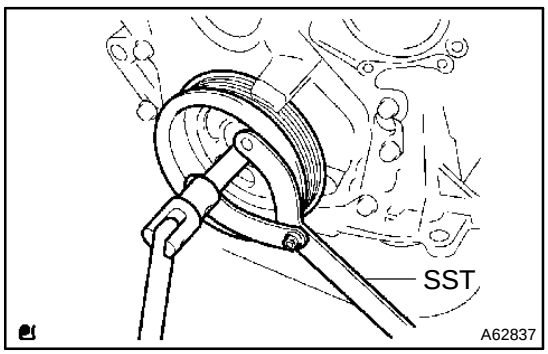
15. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the timing chain cover.

(b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

HINT:

If not, turn the crankshaft 1 revolution (360°) and align the marks as above.



16. REMOVE CRANKSHAFT PULLEY

(a) Using SST, remove the pulley bolt.

SST 09960-10010 (09962-01000, 09963-01000)

(b) Remove the crankshaft pulley from the crankshaft.

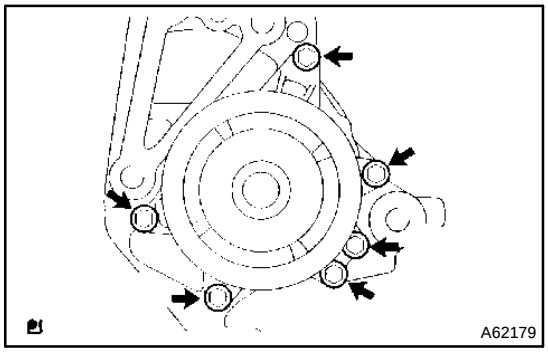
17. REMOVE V-RIBBED BELT TENSIONER ASSY

(a) Remove the bolt, nut and V-ribbed belt tensioner.

HINT:

Handle a jack up and down to remove the bolt.

CONTINUED



18. REMOVE WATER PUMP ASSY

(a) Remove the 6 bolts, water pump and O–ring.

19. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Remove the 3 bolts and transverse engine engine mounting bracket.

20. REMOVE CRANK POSITION SENSOR

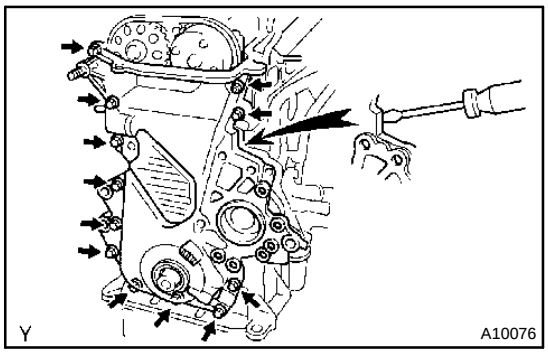
(a) Remove the 2 bolts installing the crank position sensor.

21. REMOVE CHAIN TENSIONER ASSY NO.1

(a) Remove the 2 nuts and chain tensioner.

NOTICE:

Be sure not to revolve the crankshaft without the chain tensioner.



22. REMOVE TIMING CHAIN OR BELT COVER SUB–ASSY

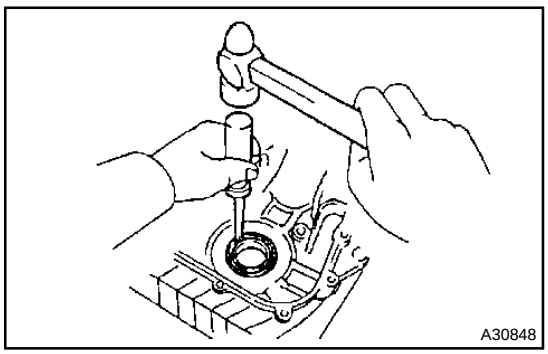
(a) Remove the 11 bolts and nuts.

(b) Using a torx wrench socket (E8), remove the stud bolt.

(c) Remove the timing chain cover by prying the portions between the cylinder head and cylinder block with a screwdriver.

NOTICE:

Be careful no tot damage the contact surfaces of the timing chain cover, cylinder head and cylinder block.



23. REMOVE TIMING GEAR COVER OIL SEAL

(a) Using a screwdriver, remove the oil seal.

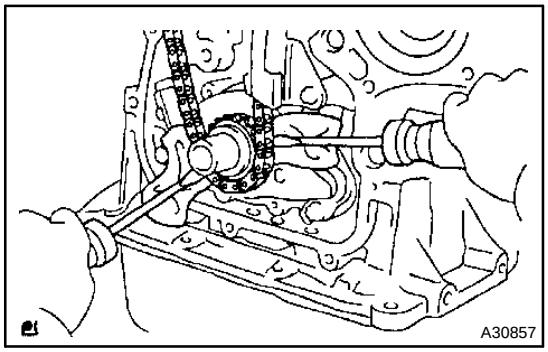
24. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

(a) Remove the crankshaft position sensor plate from the crankshaft.

25. REMOVE CHAIN TENSIONER SLIPPER

(a) Remove the bolt and chain tensioner slipper.

CONTINUED

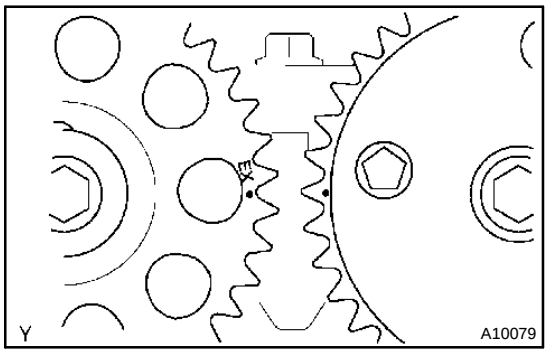


26. REMOVE CHAIN SUB-ASSY

(a) Remove the timing chain with the crankshaft timing gear plying screwdrivers as shown in the illustration.

NOTICE:

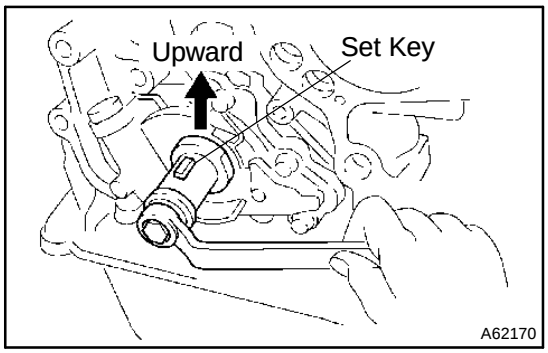
- **Put shop rag to protect the engine.**
- **In case of revolving the camshafts with the chain off the sprockets, turn the crankshaft 1/4 revolution for valves not to touch the pistons.**



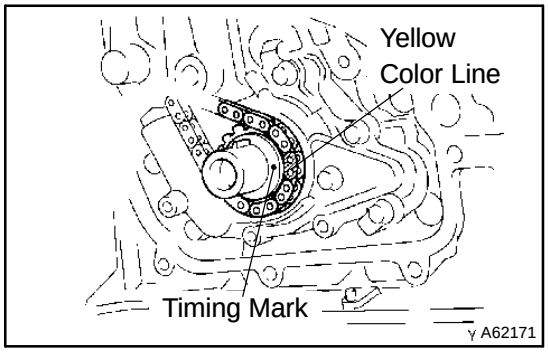
27. INSTALL CHAIN SUB-ASSY

(a) Set No. 1 cylinder to TDC/compression.

(1) Turn the hexagonal wrench head portion of the camshafts, and align the point marks of the camshaft timing sprockets.



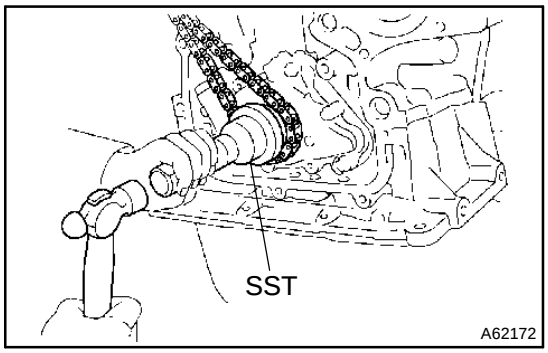
(2) Using a crankshaft pulley bolt, turn the crankshaft and set the set key on the crankshaft upward.



(b) Install the timing chain on the crankshaft timing sprocket with the yellow color link aligned with the timing mark on the crankshaft timing sprocket.

HINT:

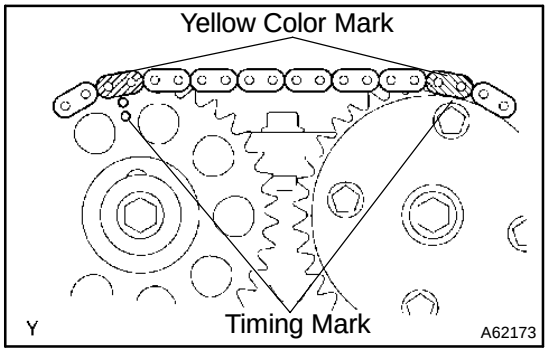
Three yellow color links are on the chain.



(c) Using SST, install the crankshaft timing sprocket.

SST 09223-22010

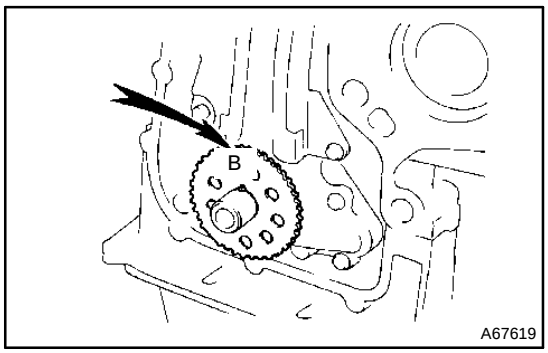
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(d) Install the timing chain on the camshaft timing sprockets with the yellow color links aligned with the timing marks on the camshaft timing sprockets.

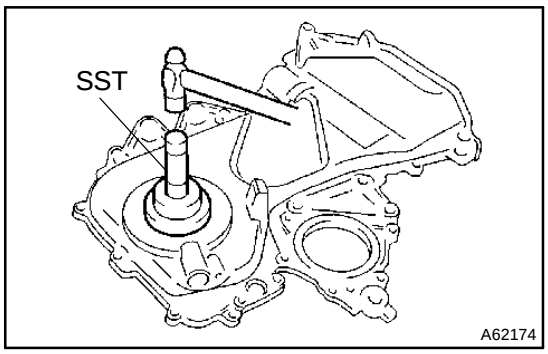
28. INSTALL CHAIN TENSIONER SLIPPER

(a) Install the chain tensioner slipper with the bolt.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)



29. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

(a) Install the plate with the ”B” mark facing forward.



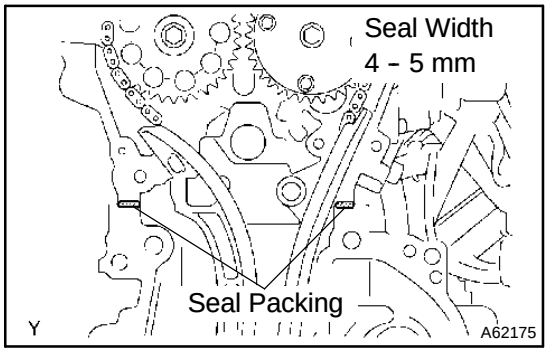
30. INSTALL TIMING GEAR COVER OIL SEAL

(a) Apply MP grease to a new oil seal lip.

(b) Using SST, tap in the oil seal until its surface is flush with the timing chain cover edge.
SST 09223–22010

NOTICE:
Keep the lip off foreign materials.

CONTINUED



31. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSY

(a) Remove any old packing material from the contact surface.

(b) Apply seal packing in the shape of bead (Diameter 3.5 mm - 4.5 mm (0.1379 - 0.177 in.)) consequently as shown in the illustration.

Seal packing:

Water pump part part No. 08826-00100 or equivalent

Other part part No. 08826-00080 or equivalent.

(c) Install the timing chain cover with the 11 bolts and nut.

Torque:

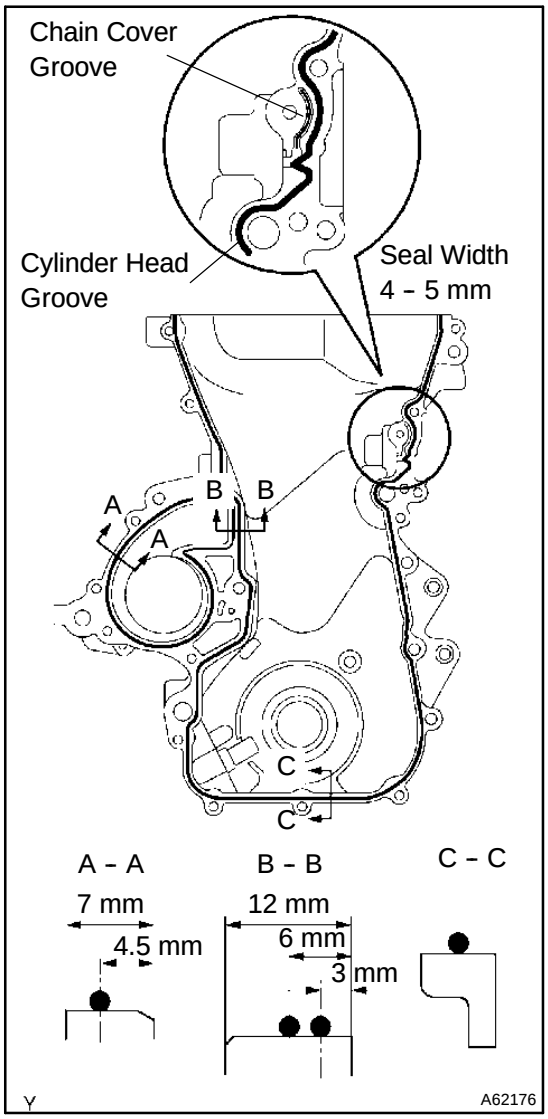
13 N·m (133 kgf·cm, 10 ft·lbf) (M6)

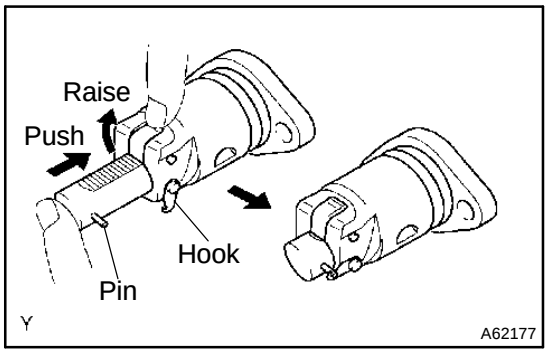
19 N·m (194 kgf·cm, 14 ft·lbf) (M8)

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the oil pan within 3 minutes after applying seal packing.**
- **Do not put into engine oil within 2 hours after installing.**

(d) Using a torx wrench socket (E8), install the stud bolt.

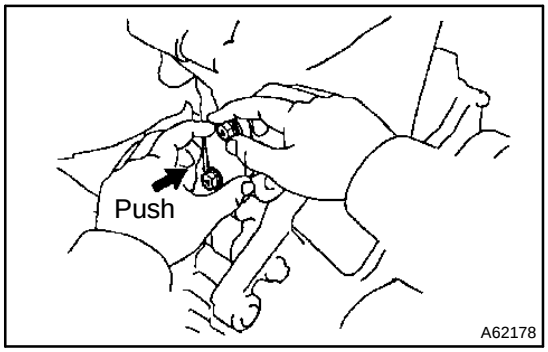




32. INSTALL CHAIN TENSIONER ASSY NO.1

(a) Check the O-ring is clean, and set the hook as shown in the illustration.

CONTINUED



(b) Apply engine oil to the chain tensioner and install it withe 2 nuts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

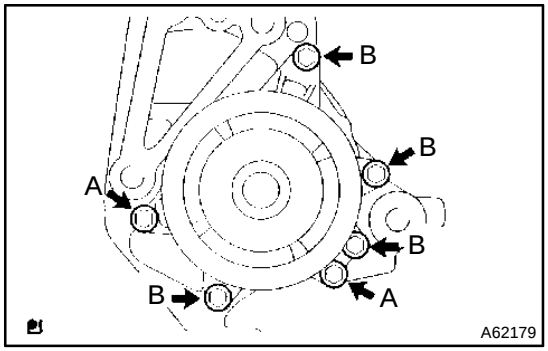
NOTICE:
When installing the tensioner, set the hook again if the hook release the plunger.

33. INSTALL CRANK POSITION SENSOR

(a) Apply a coat of the engine oil to the O–ring of the crank position sensor.
(b) Install the crank position sensor with the 2 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

34. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Install the transverse engine engine mounting bracket with the 3 bolts.
Torque: 47 N·m (479 kgf·cm, 35 ft·lbf)

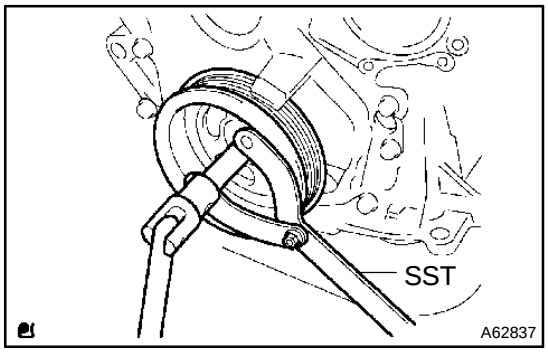


35. INSTALL WATER PUMP ASSY

(a) Place a new O–ring on the timing chain cover.
(b) Install the water pump with the 6 bolts.
Torque:
9.0 N·m (92 kgf·cm, 80 in.·lbf) for Bolt A
11 N·m (112 kgf·cm, 8 ft·lbf) for Bolt B

36. INSTALL V–RIBBED BELT TENSIONER ASSY

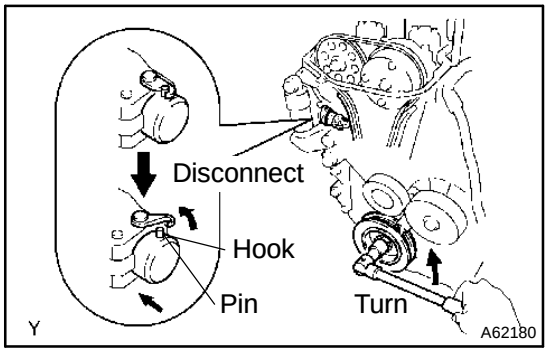
(a) Install the V–ribbed belt tensioner with the nut and bolt.
Torque:
29 N·m (296 kgf·cm, 21 ft·lbf) for Nut
69 N·m (704 kgf·cm, 51 ft·lbf) for Bolt



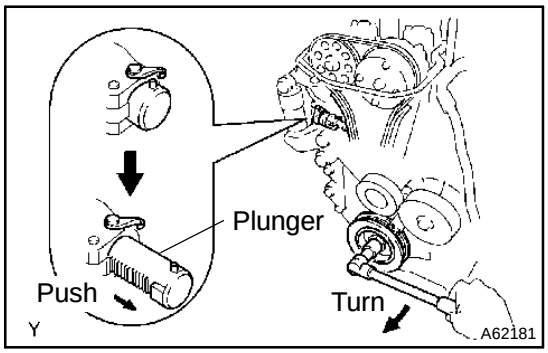
37. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.
(b) Using SST, install the crankshaft pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000)
Torque: 138 N·m (1,407 kgf·cm, 102 ft·lbf)

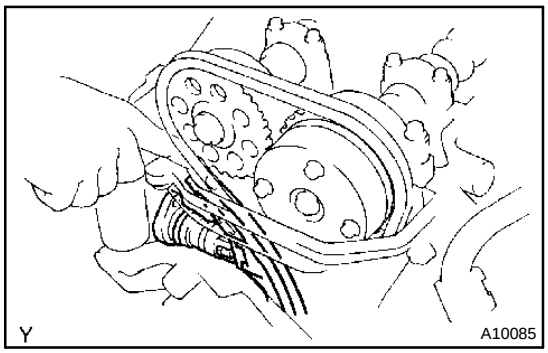
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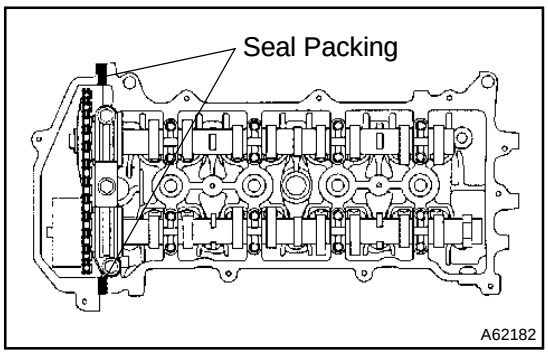
(c) Turn the crankshaft counterclockwise, and disconnect the plunger knock pin form the hook.



(d) Turn the crankshaft clockwise, and check that the slipper is pushed by the plunger.



HINT:
If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver or your finger so that the hook is released from the knock pin and the plunger springs out.



38. INSTALL CYLINDER HEAD COVER SUB-ASSY

(a) Remove any old pacing (FIPG) material.

(b) Apply seal packing to 2 locations as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes after applying seal packing.**
- **Do not put into engine oil 2 hours after installing.**

(c) Install the cylinder head cover and 3 cable brackets with the 9 bolts, 2 seal washers and 2 nuts. Uniformly tighten the bolts and nuts, in the several passes.

Torque:
11 N·m (112 kgf·cm, 8 ft·lbf) for w/o washer
9.0 N·m (92 kgf·cm, 80 in.·lbf) for w/ washer

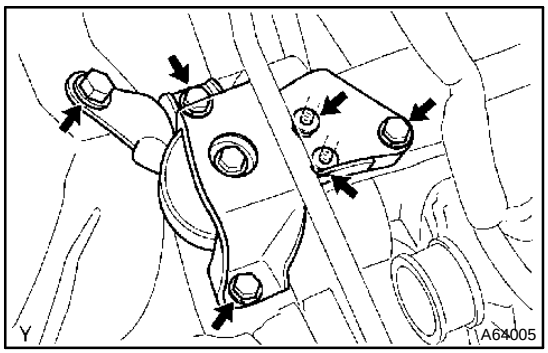
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39. INSTALL IGNITION COIL ASSY

(a) Install the 4 ignition coils with the 4 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

40. INSTALL ENGINE WIRE

(a) Install the engine wire with the bolt and nut.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)



41. INSTALL ENGINE MOUNTING INSULATOR SUB–ASSY RH

(a) Install engine mounting insulator RH with the 4 bolts and 2 nuts.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

42. INSTALL GENERATOR ASSY **(See page 19–16)**

43. INSTALL VANE PUMP ASSY

(a) Install the vane pump with the 2 through bolts and 2 nuts.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

44. INSTALL CYLINDER HEAD COVER NO.2

(a) Install the cylinder head cover with the 2 nuts and 2 clips.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

45. INSTALL FRONT WHEEL RH
Torque: 103 N·m (1050 kgf·cm, 76 ft·lbf)

46. ADD COOLANT **(See page 16–18)**

47. CHECK FOR ENGINE COOLANT LEAKS **(See page 16–13)**

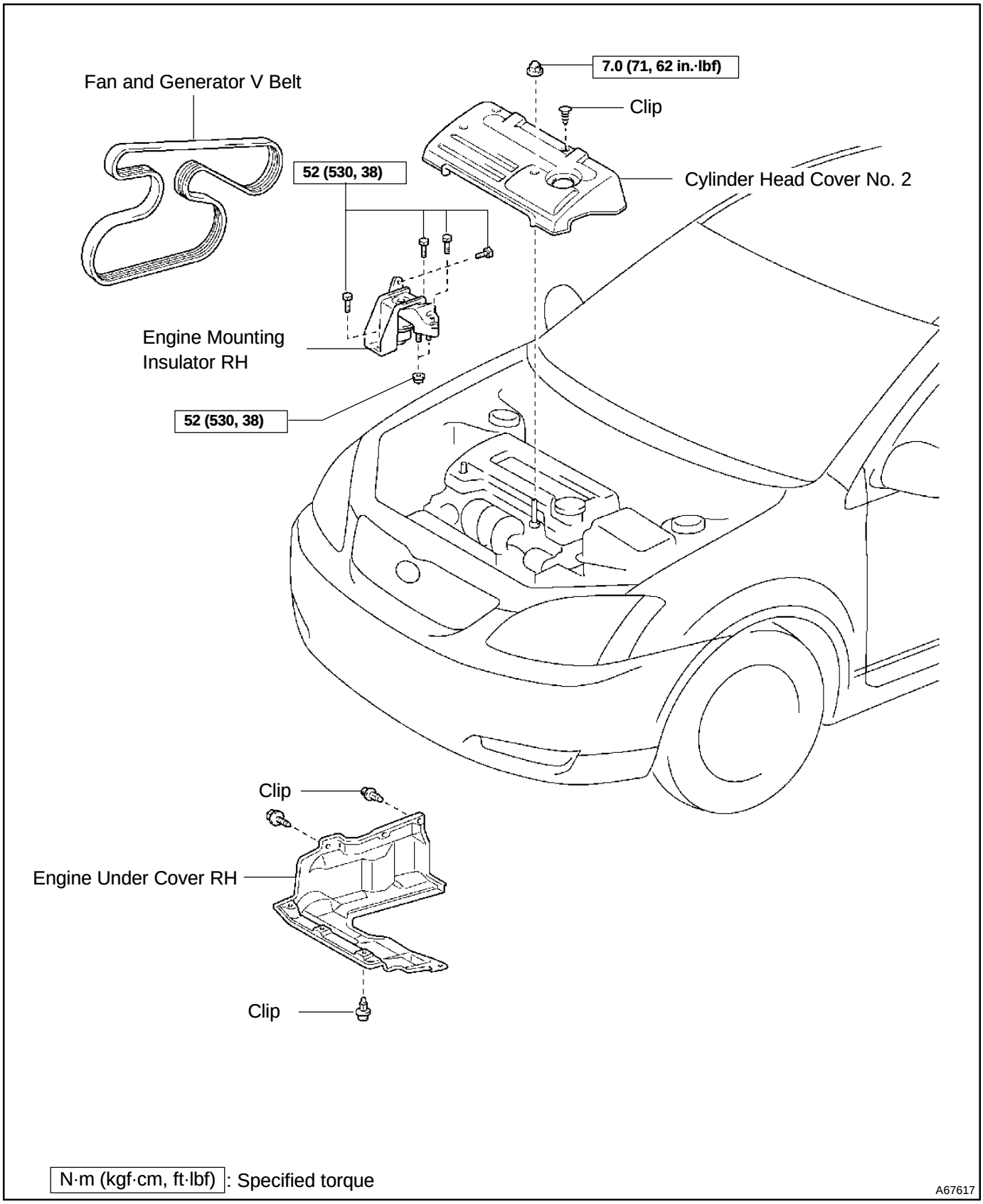
48. CHECK ENGINE OIL LEAK

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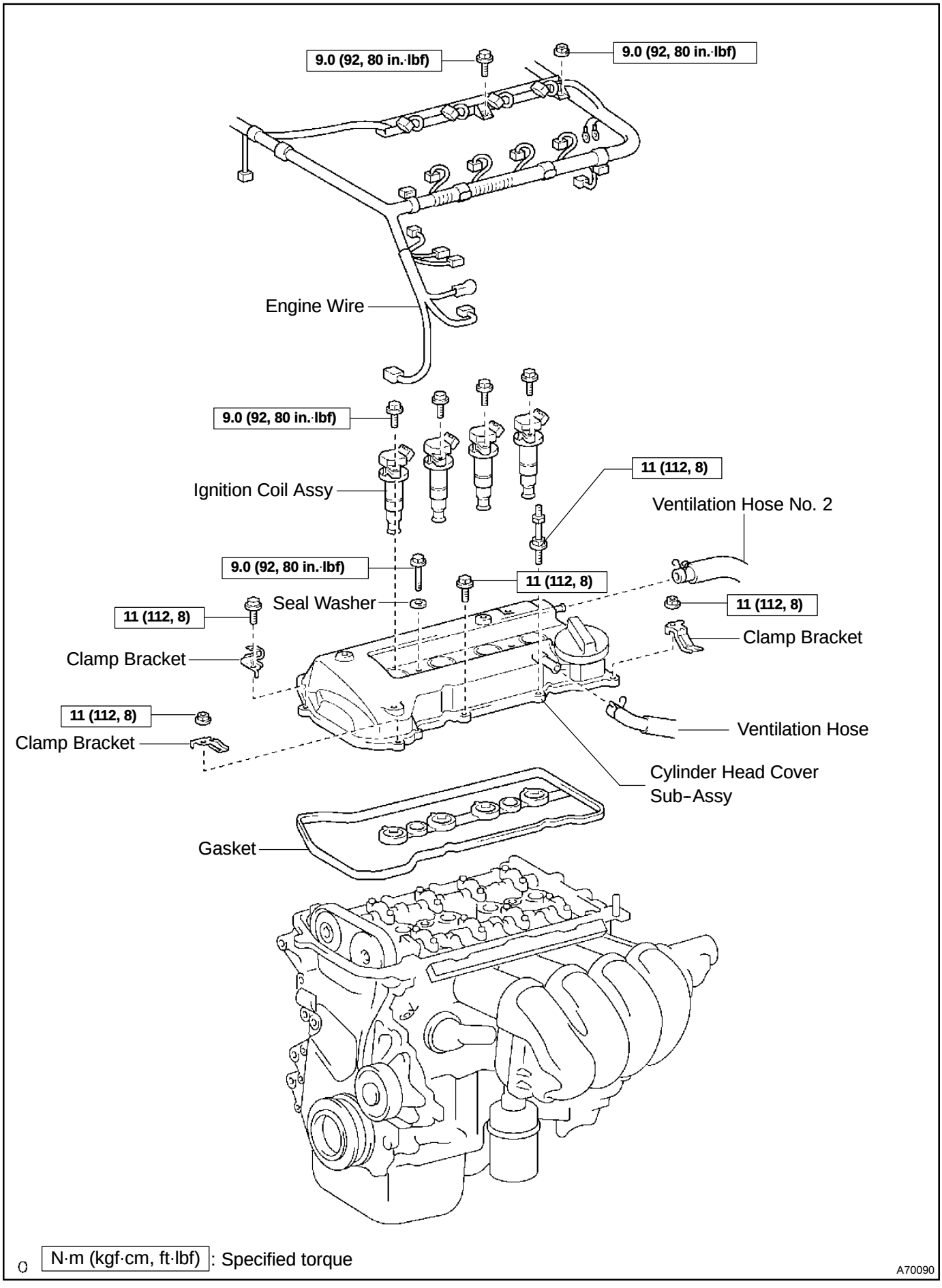
CAMSHAFT (4ZZ-FE)

COMPONENTS

140ME-02



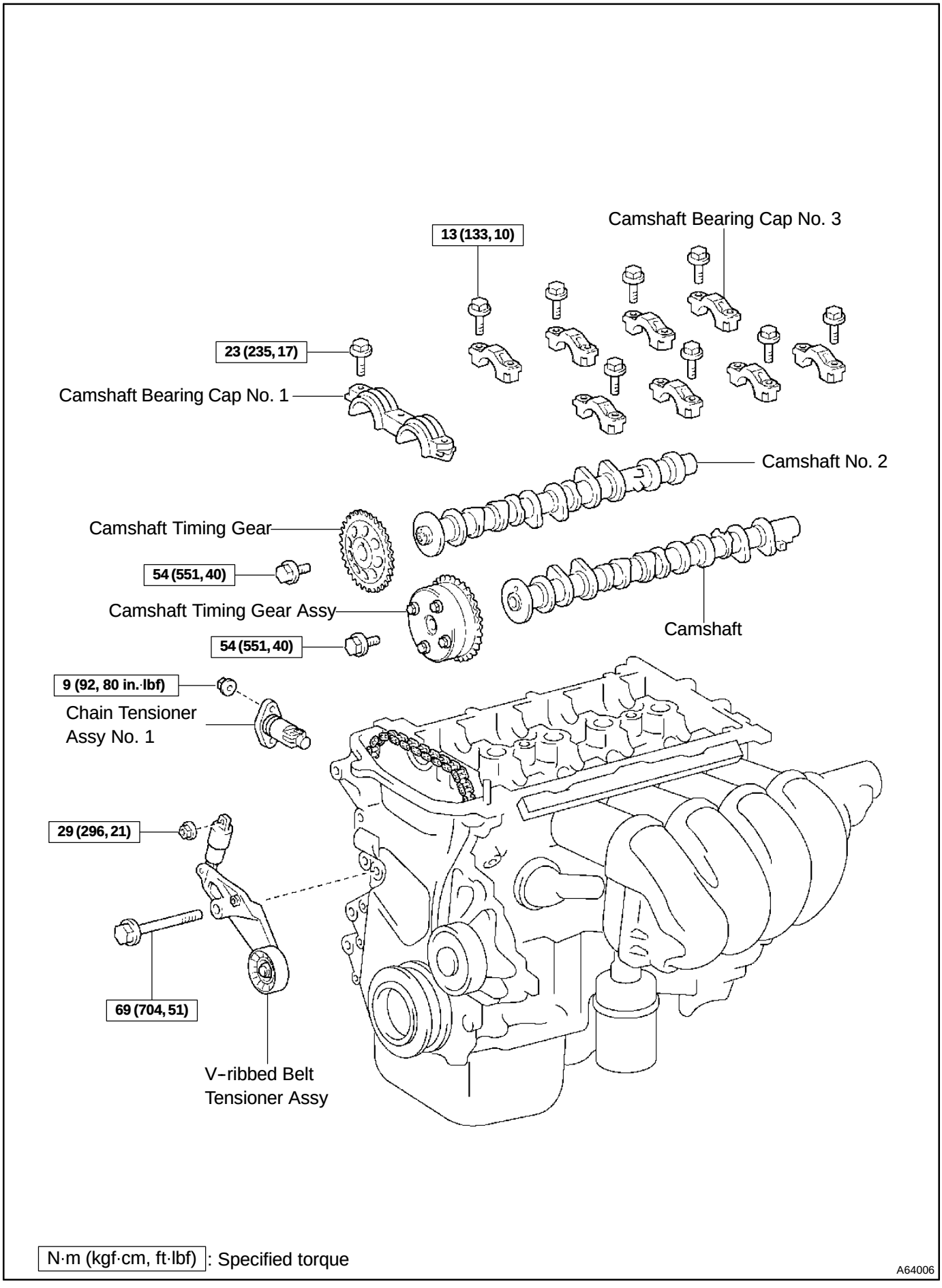
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○ N·m (kgf·cm, ft·lbf): Specified torque

A70090

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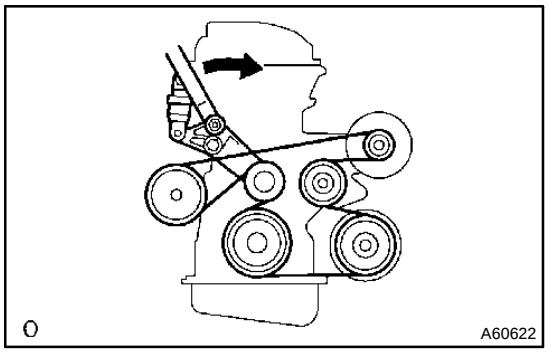

Camshaft Bearing Cap No. 3
13 (133, 10)
23 (235, 17)
Camshaft Bearing Cap No. 1
Camshaft No. 2
Camshaft Timing Gear
54 (551, 40)
Camshaft Timing Gear Assy
54 (551, 40)
Camshaft
9 (92, 80 in.·lbf)
Chain Tensioner
Assy No. 1
29 (296, 21)
69 (704, 51)
V-ribbed Belt
Tensioner Assy
N·m (kgf·cm, ft·lbf): Specified torque
A64006

CONTINUED

REPLACEMENT

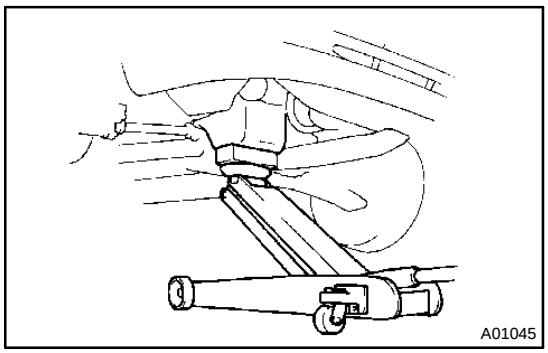
1. REMOVE ENGINE UNDER COVER RH

2. REMOVE CYLINDER HEAD COVER NO.2



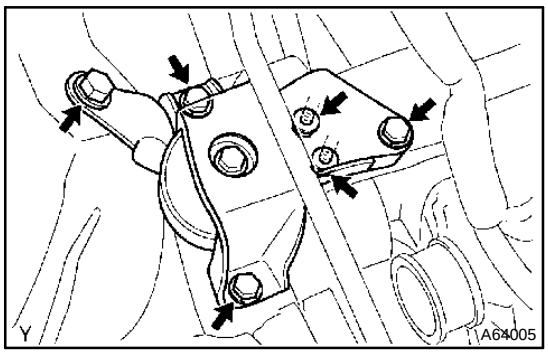
3. REMOVE FAN AND GENERATOR V BELT

(a) Turn the V–ribbed belt tensioner slowly clockwise and loosen it. Then, remove the fan and generator belt and put back the V–ribbed belt tensioner little by little and fix it quietly.



4. REMOVE ENGINE MOUNTING INSULATOR SUB–ASSY RH

(a) Place a wooden block between the jack and engine, and set the jack, then remove the 4 bolts, 2nuts and engine mounting insulator RH.



5. REMOVE IGNITION COIL ASSY

(a) Disconnect the 4 connectors.

(b) Remove the 4 bolts and 4 ignition coils.

6. DISCONNECT ENGINE WIRE

(a) Disconnect the connectors.

(b) Remove the 3 clamps from the 3 clamp brackets.

(c) Remove the bolt and nut installing the engine wire.

7. DISCONNECT VENTILATION HOSE

(a) Disconnect the ventilation hose from the cylinder head cover.

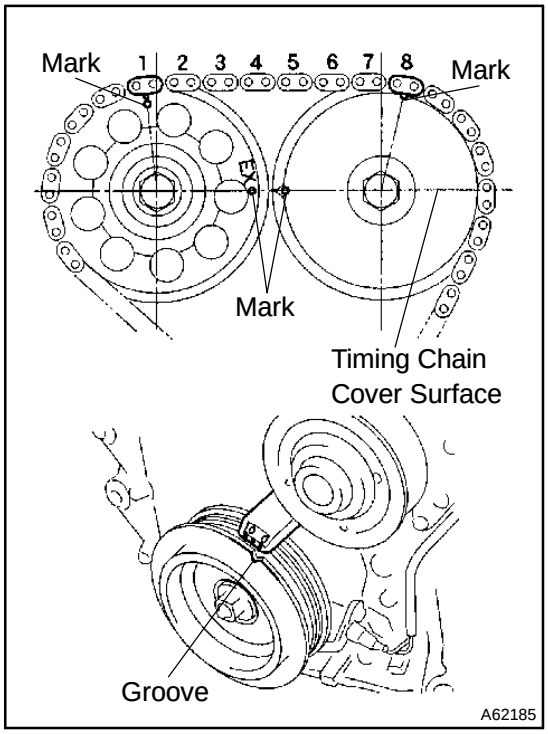
8. DISCONNECT VENTILATION HOSE NO.2

(a) Disconnect the ventilation hose from the cylinder head cover.

9. REMOVE CYLINDER HEAD COVER SUB–ASSY

(a) Remove the 9 bolts, 2 seal washers, 2 nuts, 3 clamp brackets and cylinder head cover.

CONTINUED



10. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the timing chain cover.

(b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

HINT:

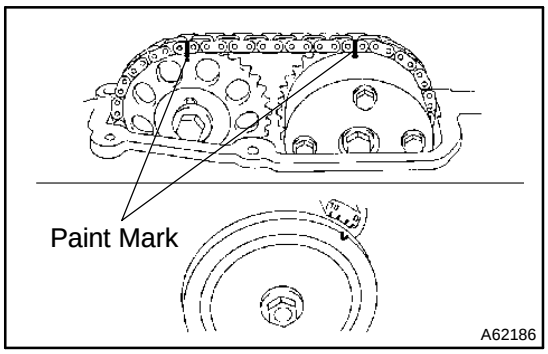
If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

11. REMOVE V-RIBBED BELT TENSIONER ASSY

(a) Remove the bolt, nut and V-ribbed belt tensioner.

HINT:

Handle a jack up and down to remove the bolt.



12. REMOVE CAMSHAFT

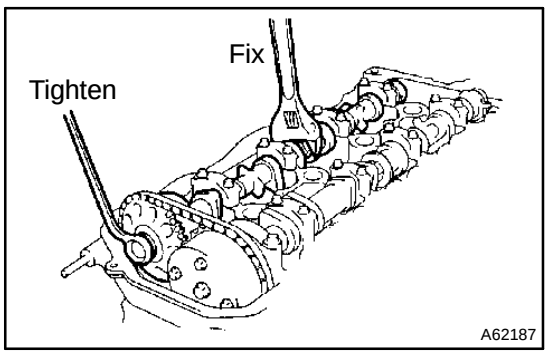
NOTICE:

Be sure not to revolve the crankshaft without the chain tensioner.

(a) Set the No. 1 cylinder to the TDC/compression.

(b) Place match marks on the timing chain and camshaft timing sprockets.

(c) Remove the 2 nuts and chain tensioner.

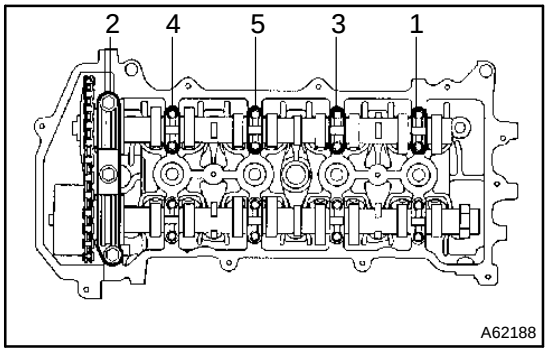


(d) Fix the camshaft with a wrench and so on, then loosen the camshaft timing gear set bolt.

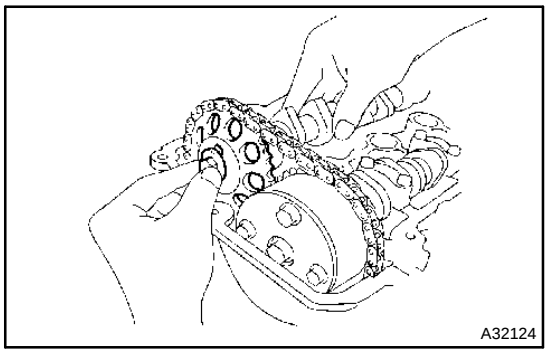
NOTICE:

Be careful not to damage the valve lifter.

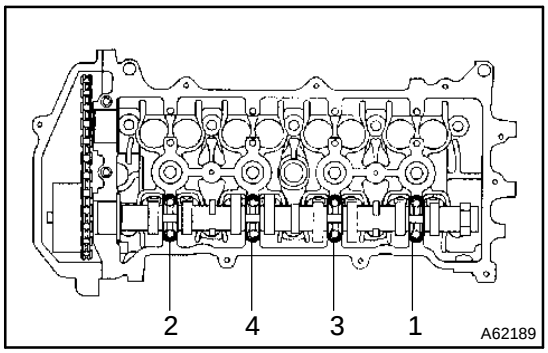
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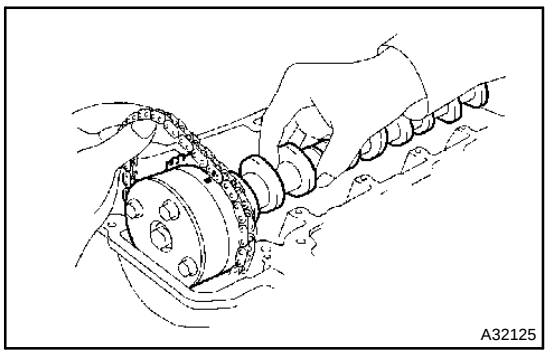
(e) Loosen the camshaft bearing cap bolts on No.2 camshaft in the order as shown in the illustration in several passes, and remove the caps.



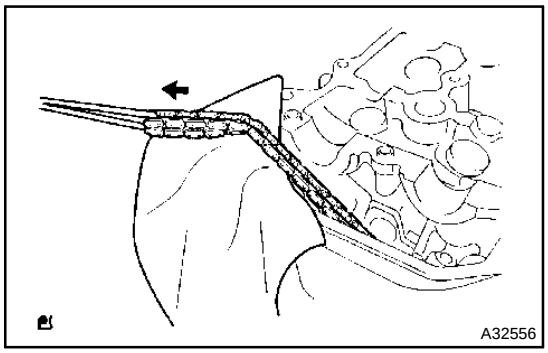
(f) Remove the camshaft timing gear as shown in the illustration.



(g) Loosen the camshaft bearing cap bolts on camshaft in the order as shown in the illustration in several passes,and remove the caps.



(h) Remove the camshaft with holding the timing chain.

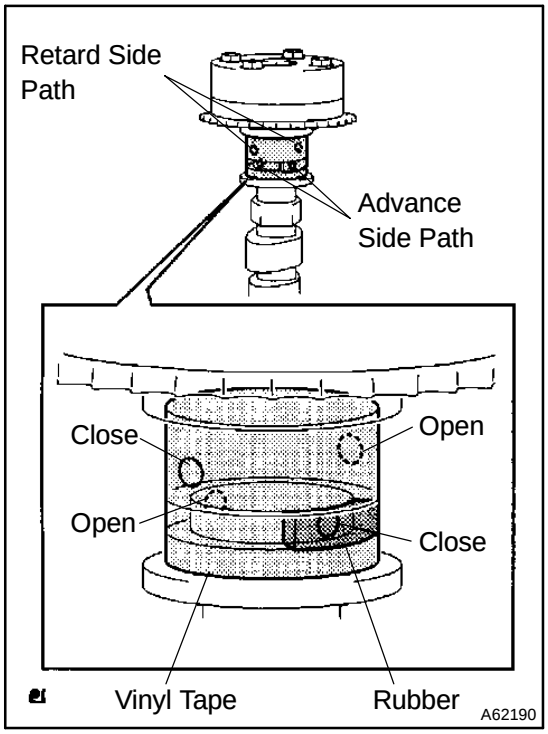


(i) Tie the timing chain with a string as shown in the illustration.

NOTICE:

Be careful not to drop anything inside the timing chain cover.

CONTINUED



13. INSPECT CAMSHAFT TIMING GEAR ASSY (W/ VVT-i)

(a) Check the lock of camshaft timing gear.

(1) Grip the camshaft with a vice, and confirm the camshaft timing gear is locked.

NOTICE:

Be careful not to damage the camshaft.

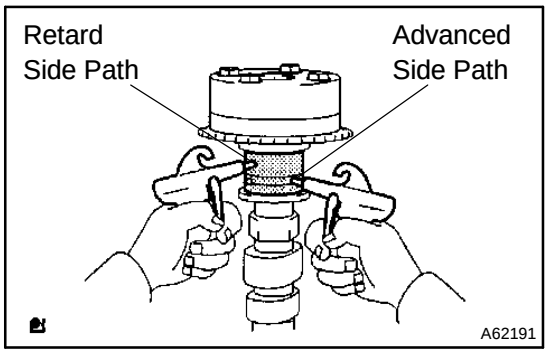
(b) Release lock pin.

(1) Cover 4 oil paths of cam journal with vinyl tape as shown in the illustration.

HINT:

Two advance side paths are provided in the groove of the camshaft. Plug one of the path with a rubber piece.

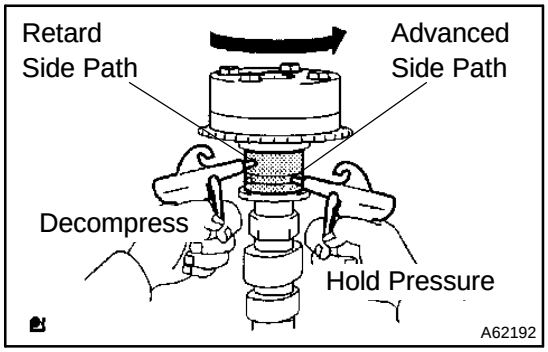
(2) Break through the tapes of the advance side path and the retard side path on the opposite side of the groove.



(3) Put air pressure into two broken paths (the advance side path and the retard side path) with about 150 kPa {1.5 kgf·cm}.

CAUTION:

Cover the pathes with shop rag to avoid oil splashing.



(4) Confirm if the camshaft timing gear assembly revolves in the timing advance direction when weakening the air pressure of the timing retard path.

HINT:

The lock pin is released, and camshaft timing gear, revolves in the advance direction.

(5) When the camshaft timing gear comes to the most advanced position, take out the air pressure of the timing retard side path, and then, take out that of timing advance side path.

CAUTION:

Camshaft timing assembly gear occasionally shifts to the retard side abruptly, if the air compression of the advanced side path is released before retard side path. It often causes the breakage of the lock pin.

CONTINUED

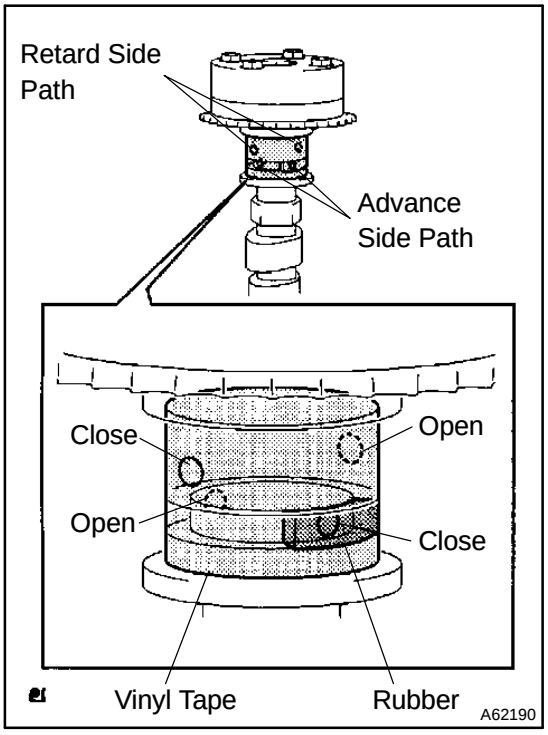
(c) Check smooth revolution

(1) Revolve the camshaft timing gear assembly within the movable range except for the most retarded position several times, and check the smooth revolution.

CAUTION:
Be sure to perform this check by hand, instead of air pressure.

(d) Check the lock in the most retarded position.

(1) Confirm that the camshaft timing gear assembly is locked at the most retarded position.



14. REMOVE CAMSHAFT TIMING GEAR ASSY (W/ VVT–i)

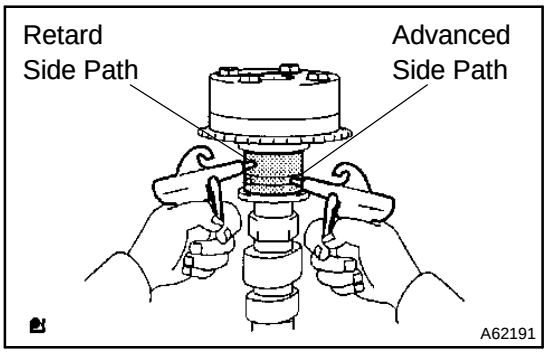
(a) Grip the camshaft with a vice, and confirm that it the gear locked.

CAUTION:
Be careful not to damage the camshaft.

(b) Cover 4 oil paths of cam journal with vinyl tape as shown in the illustration.

HINT:
Two advance side paths are provided in the groove of the camshaft. Plug one of the path with a rubber piece.

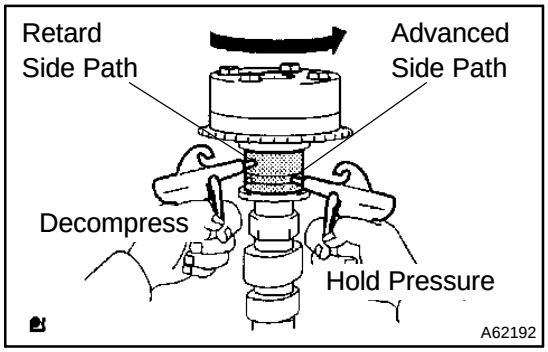
(c) Break through the tapes of the advance side path and the retard side path on the opposite side of the groove.



(d) Put air pressure into two broken paths (the advance side path and the retard side path) with about 150 kPa {1.5 kgf·cm}.

CAUTION:
Cover the pathes with shop rag to avoid oil splashing.

CONTINUED



(e) Confirm if the camshaft timing gear assembly revolves in the timing advance direction when weakening the air pressure of the timing retard path.

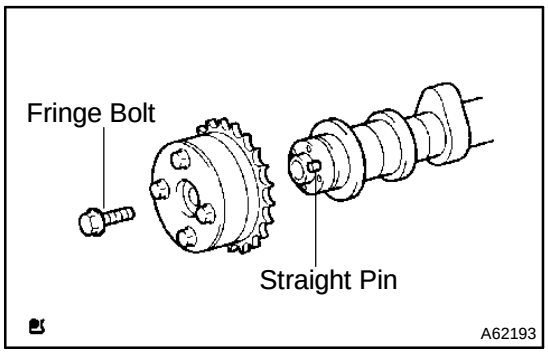
HINT:

The lock pin is released, and camshaft timing gear revolves in the advance direction.

(f) When the camshaft timing gear comes to the most advanced position, take out the air pressure of the timing retard side path, and then, takeout that of timing advance side path.

CAUTION:

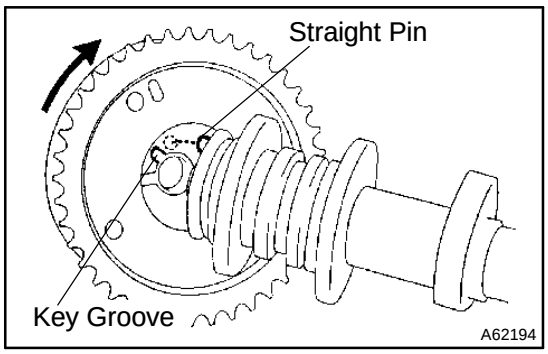
Camshaft timing gear assembly occasionally shifts to the retard side abruptly, if the air compression of the advanced side path is released before retard side paths. It often causes the breakage of the lock pin.



(g) Remove the fringe bolt of camshaft timing gear assembly.

NOTICE:

- **Be sure not to remove the other 4 bolts.**
- **In case of reusing the camshaft timing gear, release the strait pin locking first, and then install the gear.**



15. INSTALL CAMSHAFT TIMING GEAR ASSY (W/ VVT-i)

(a) Put the camshaft timing gear assembly and the camshaft together with the straight pin off the key groove.

(b) Turn the camshaft timing gear assembly to the left direction (as shown in the illustration) with pushing it lightly against the camshaft. Push further at the position where the pin gets into the groove.

CAUTION:

Be sure not to turn the camshaft timing gear to the retard angle side (to the right angle).

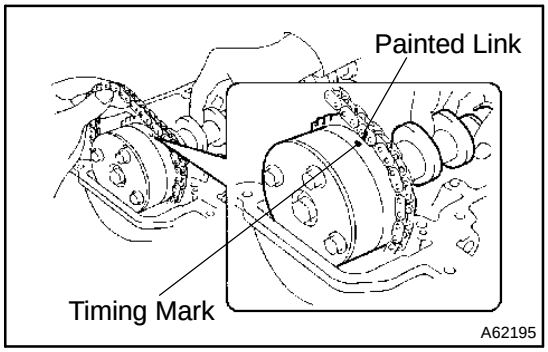
(c) Check that there is no clearance between the gear's fringe and the camshaft.

(d) Tighten the fringe bolt with the camshaft timing gear fixed.

Torque: 54 N·m (551 kgf·cm 40 ft·lbf)

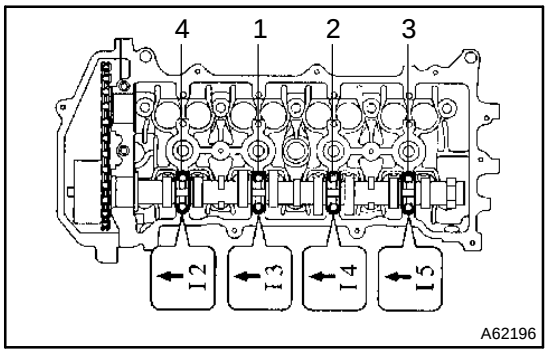
(e) Check that the camshaft timing gear assembly can move to the retard angle side (the right angle), and is locked at the most retarded position.

CONTINUED

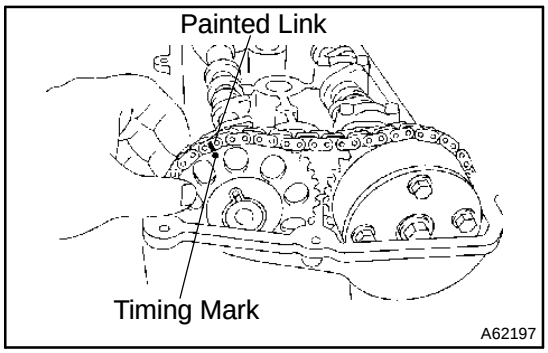


16. INSTALL CAMSHAFT

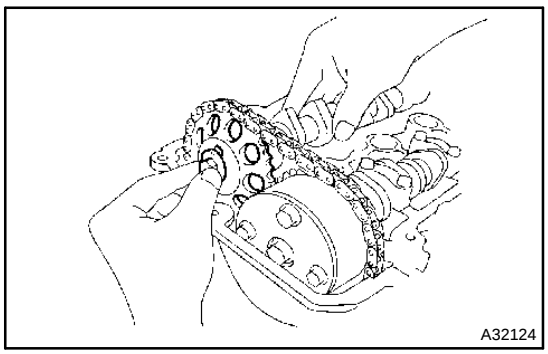
(a) As shown in the illustration, install the timing chain on the camshaft timing gear, with the painted links aligned with the timing marks on the camshaft timing gear.



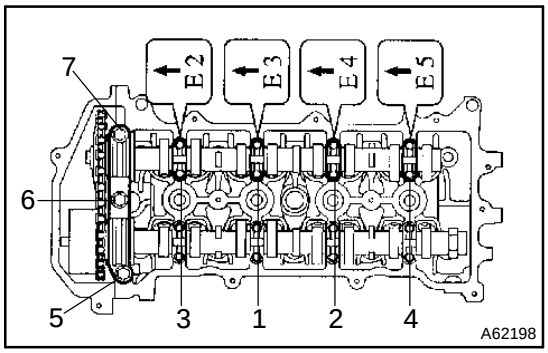
(b) Examine the front marks and numbers and tighten the bolts in the order shown in the illustration.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)



(c) Put the camshaft No.2 on the cylinder head with the painted links of the chain aligned with the timing mark on the camshaft timing gear.



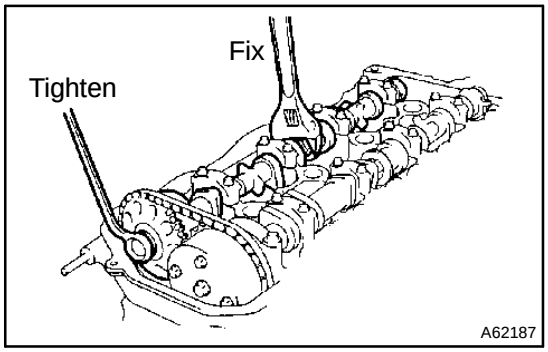
(d) Tighten the camshaft timing gear set bolt temporarily.



(e) Examine the front marks and numbers and tighten the bolts in the order shown in the illustration.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

(f) Install the bearing cap No. 1.
Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

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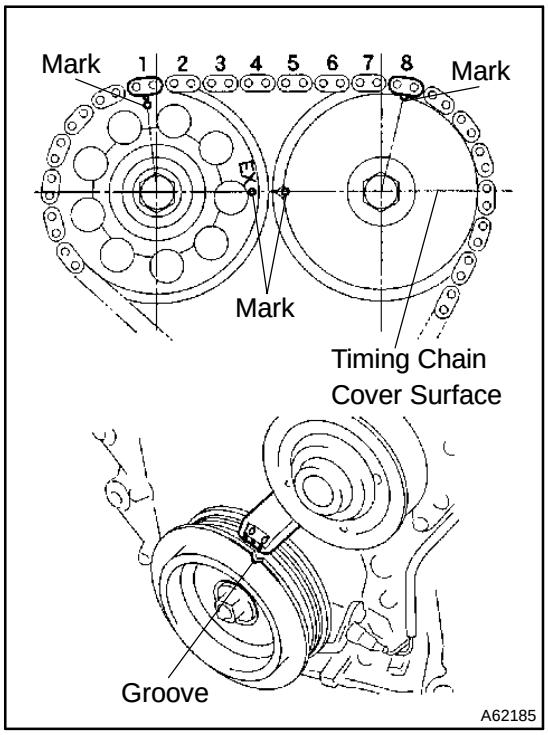


(g) Fix the camshaft with a wrench and so on, then tighten the camshaft timing gear set bolt.

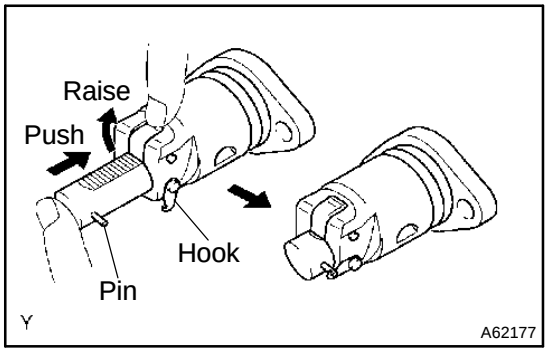
Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)

NOTICE:

Be careful not damage the valve lifter.

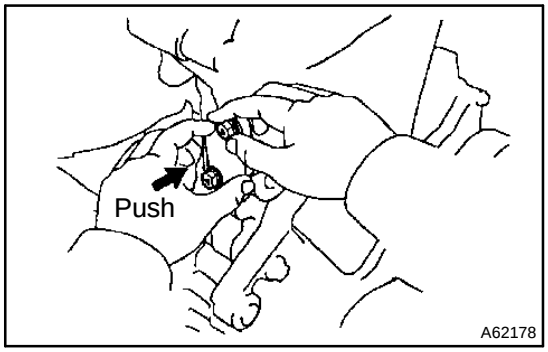


(h) Check the match marks on the timing chain and camshaft timing sprockets, and then the alignment of the pulley groove with timing mark of the chain cover as shown in the illustration.



(i) Install chain tensioner.

(1) Check the O-ring is clean, and set the hook as shown in the illustration.



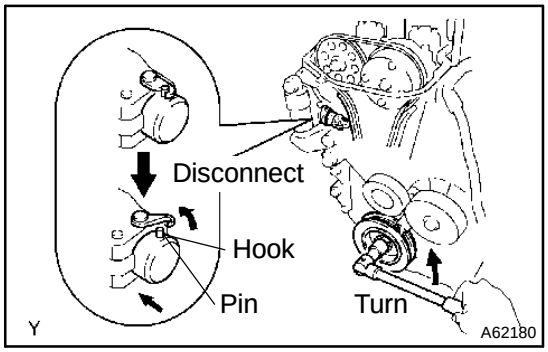
(2) Apply engine oil to the chain tensioner and install it with the 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

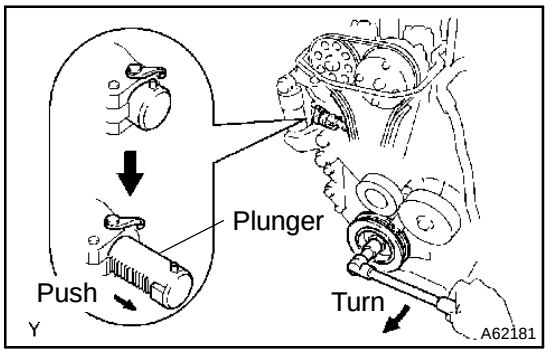
NOTICE:

When installing the tensioner, set the hook again if the hook release the plunger.

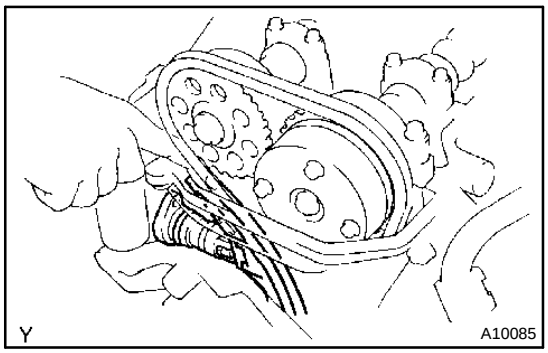
CONTINUED



(3) Turn the crankshaft counterclockwise, and disconnect the plunger knock pin from the hook.



(4) Turn the crankshaft clockwise, and check that the slipper is pushed by the plunger.



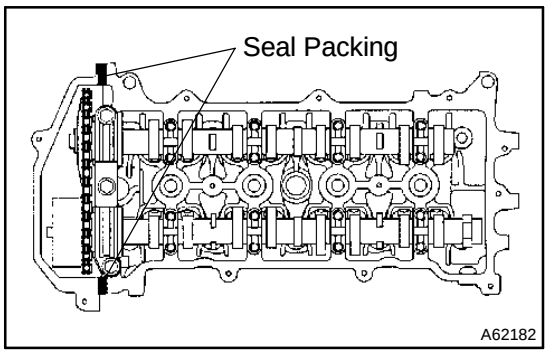
HINT:
If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver or your finger so that the hook is released from the knock pin and the plunger springs out.

17. ADJUST VALVE CLEARANCE **(See page 14–98)**

18. INSTALL V–RIBBED BELT TENSIONER ASSY

(a) Install the V–ribbed belt tensioner with the nut and bolt.

Torque:
29 N·m (296 kgf·cm, 21 ft·lbf) for Nut
69 N·m (704 kgf·cm, 51 ft·lbf) for Bolt



19. INSTALL CYLINDER HEAD COVER SUB–ASSY

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to 2 locations as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes after applying seal packing.**
- **Do not put into engine oil 2 hours after installing.**

CONTINUED

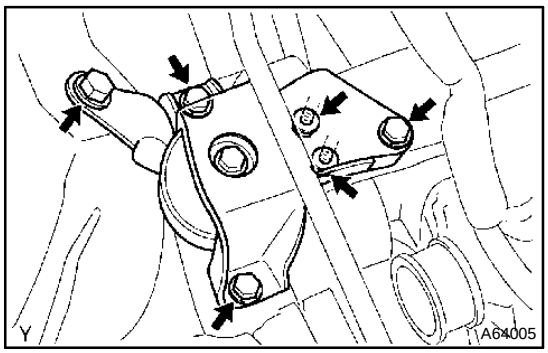
(c) Install the cylinder head cover and 3 cable brackets with the 9 bolts, 2 seal washers and 2 nuts. Uniformly tighten the bolts and nuts, in the several passes.
Torque:
11 N·m (112 kgf·cm, 8 ft·lbf) for w/o washer
9.0 N·m (92 kgf·cm, 80 in·lbf) for w/ washer

20. INSTALL ENGINE WIRE

(a) Install the engine wire with the bolt and nut.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

21. INSTALL IGNITION COIL ASSY

(a) Install the 4 ignition coils with the 4 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)



22. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSY RH

(a) Install engine mounting insulator RH with the 4 bolts and 2 nuts.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

23. INSTALL CYLINDER HEAD COVER NO.2

(a) Install the cylinder head cover with the 2 nuts and 2 clips.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

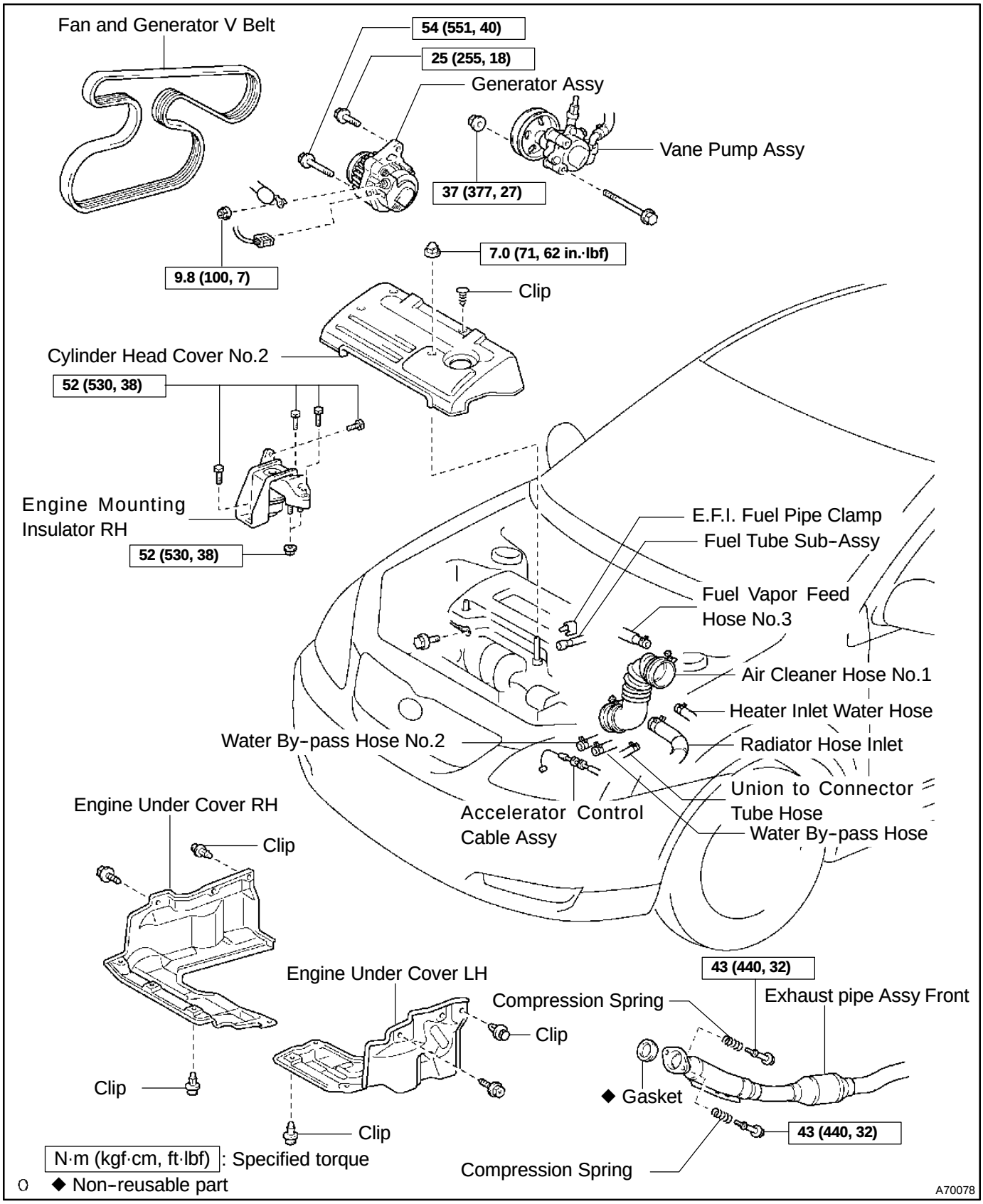
24. CHECK ENGINE OIL LEAK

CONTINUED

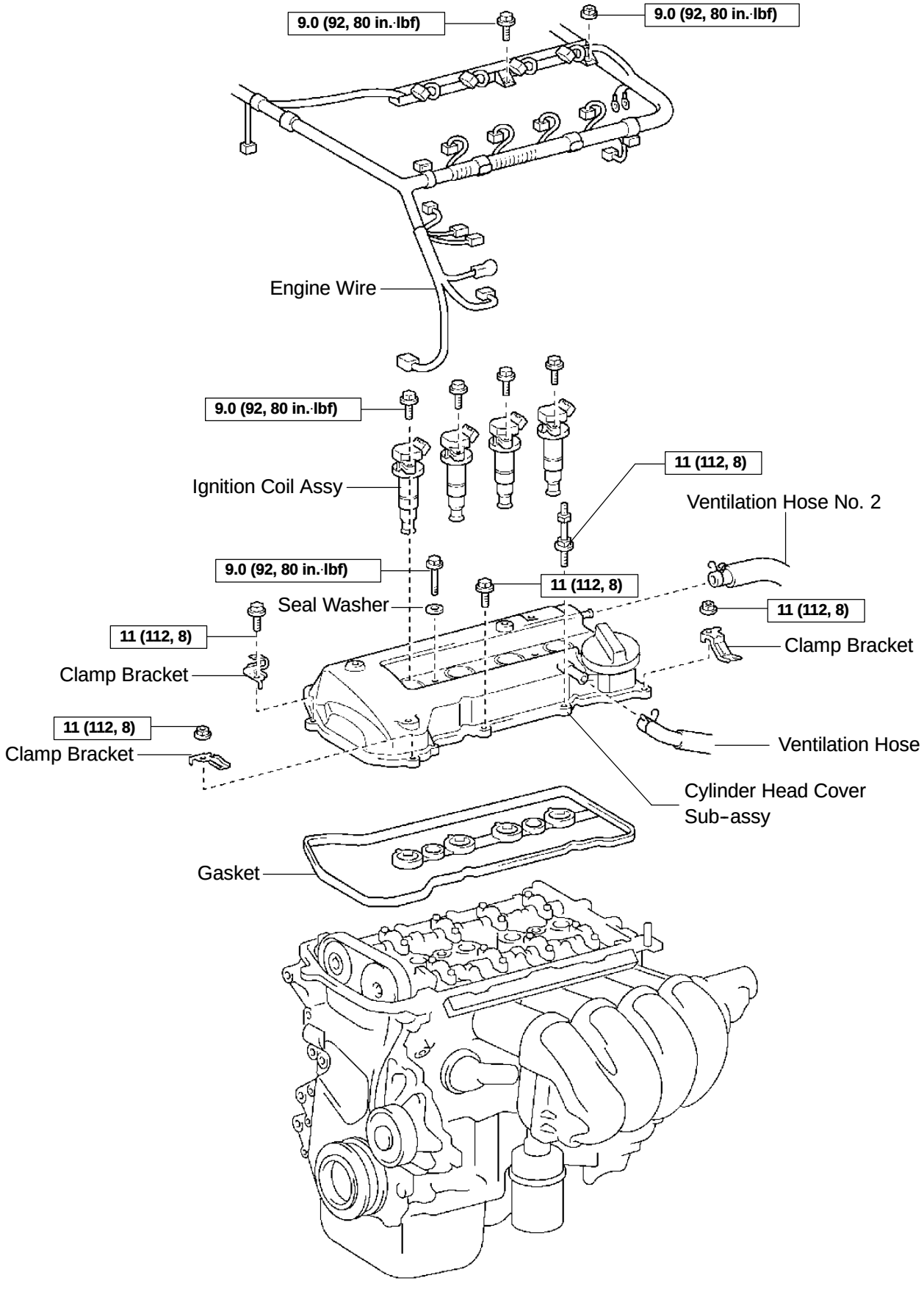
CYLINDER HEAD GASKET (4ZZ–FE)

COMPONENTS

140VD–01



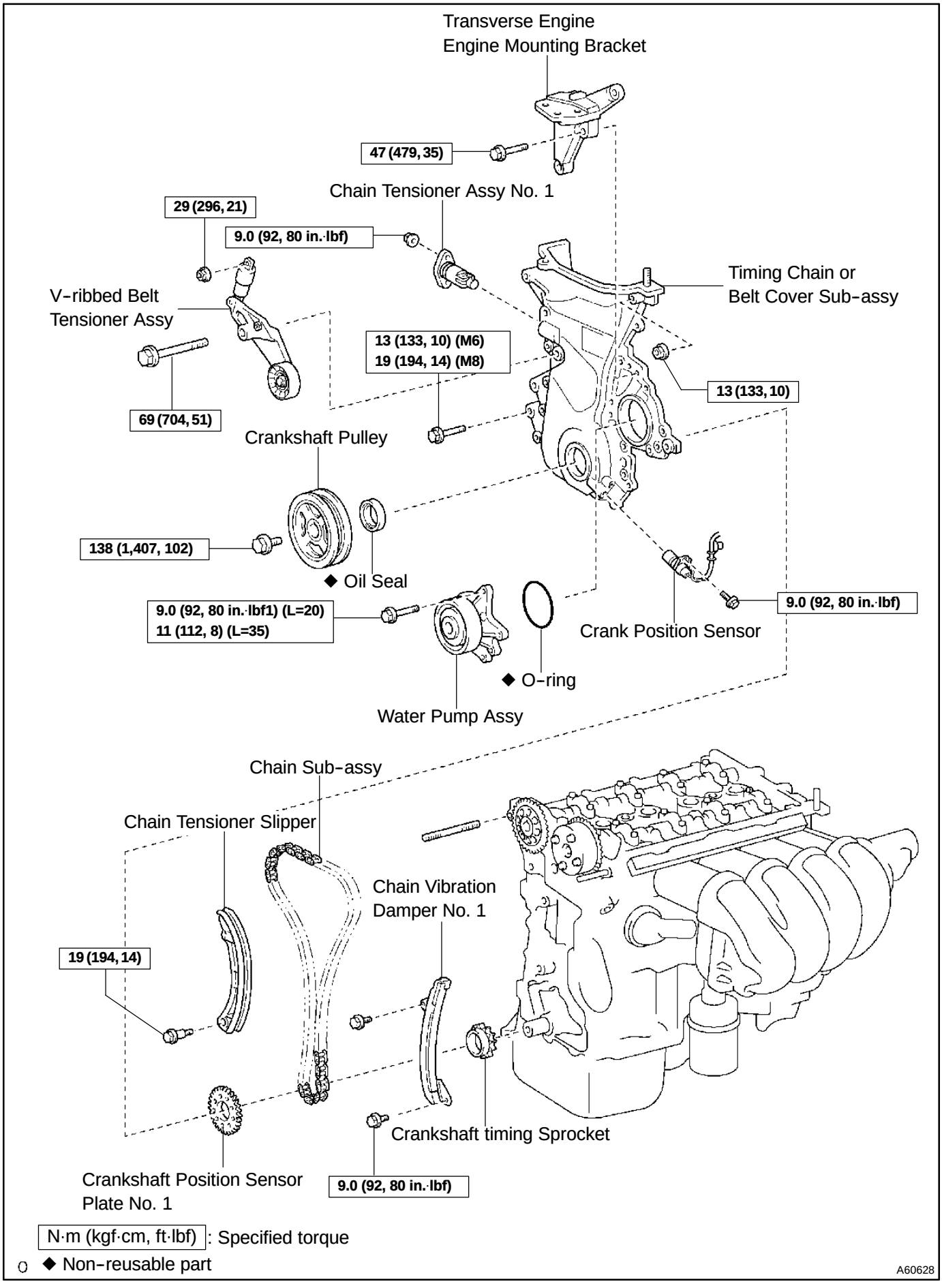
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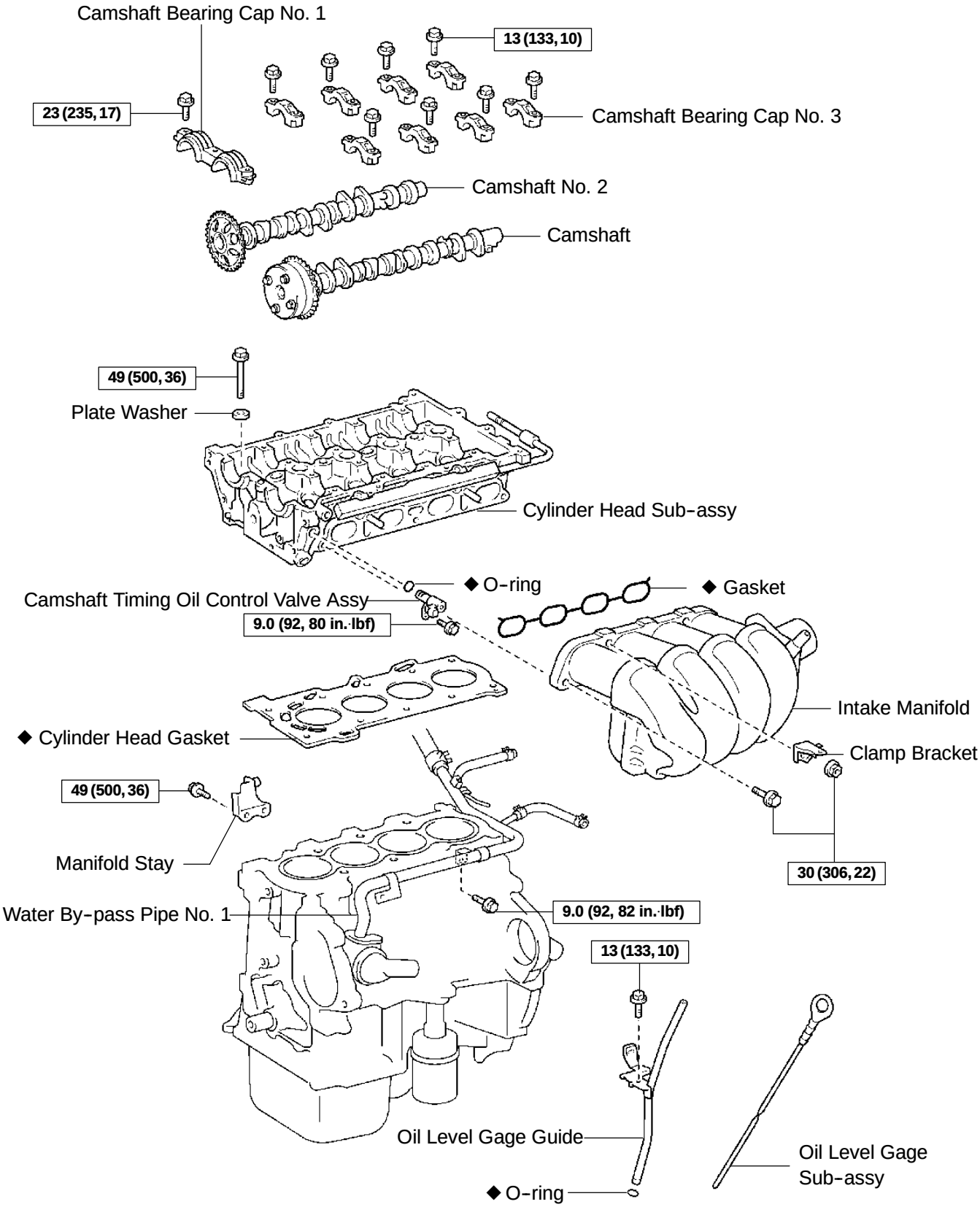


○ N·m (kgf·cm, ft·lbf): Specified torque

A70090

CONTINUED


Transverse Engine
Engine Mounting Bracket
47 (479, 35)
Chain Tensioner Assy No. 1
29 (296, 21)
9.0 (92, 80 in.·lbf)
V-ribbed Belt
Tensioner Assy
Timing Chain or
Belt Cover Sub-assy
13 (133, 10) (M6)
19 (194, 14) (M8)
13 (133, 10)
69 (704, 51)
Crankshaft Pulley
138 (1,407, 102)
◆ Oil Seal
9.0 (92, 80 in.·lbf1) (L=20)
11 (112, 8) (L=35)
9.0 (92, 80 in.·lbf)
Crank Position Sensor
◆ O-ring
Water Pump Assy
Chain Sub-assy
Chain Tensioner Slipper
Chain Vibration
Damper No. 1
19 (194, 14)
Crankshaft timing Sprocket
Crankshaft Position Sensor
Plate No. 1
9.0 (92, 80 in.·lbf)
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part
A60628



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

◆ Non-reusable part

A60627

CONTINUED

140MH–02

REPLACEMENT

1. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT **(See page 11–30)**

2. REMOVE ENGINE UNDER COVER LH

3. REMOVE ENGINE UNDER COVER RH

4. DRAIN COOLANT **(See page 16–18)**

5. REMOVE FRONT WHEEL RH

6. REMOVE CYLINDER HEAD COVER NO.2

(a) Remove the 2 nuts, 2 clips and cylinder head cover.

7. REMOVE AIR CLEANER HOSE NO.1

(a) Loosen the 2 air cleaner hose clamp bolts, and remove the air cleaner hose.

8. DISCONNECT ACCELERATOR CONTROL CABLE ASSY

(a) Loosen the nut, and remove the accelerator control cable from the accelerator control cable bracket.

9. DISCONNECT WATER BY–PASS HOSE

(a) Disconnect the water by–pass hose from the throttle body.

10. DISCONNECT WATER BY–PASS HOSE NO.2

(a) Disconnect the water by–pass hose from the throttle body.

11. DISCONNECT FUEL VAPOR FEED HOSE NO.3

(a) Disconnect the fuel vapor feed hose from the air cleaner cap.

12. REMOVE EFI FUEL PIPE CLAMP **(See page 11–39)**

13. DISCONNECT FUEL TUBE SUB–ASSY **(See page 11–39)**

SST 09268–21010

14. DISCONNECT UNION TO CONNECTOR TUBE HOSE

(a) RHD

(1) Disconnect the union to connector tube hose from the brake booster.

(b) LHD

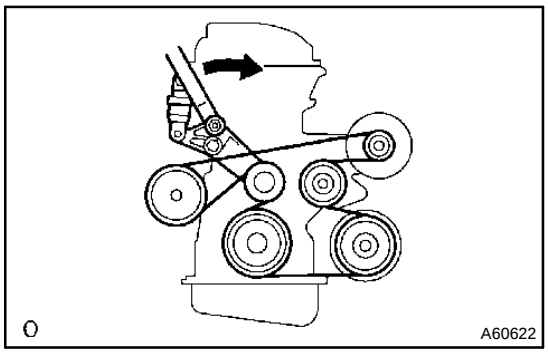
(1) Disconnect the union to connector tube hose from the hose to hose tube.

15. DISCONNECT RADIATOR HOSE INLET

(a) Disconnect radiator hose inlet from the cylinder head.

16. DISCONNECT HEATER INLET WATER HOSE

(a) Disconnect the heater inlet water hose from the cylinder head.



17. REMOVE FAN AND GENERATOR V BELT

(a) Turn the V–ribbed belt tensioner slowly clockwise and loosen it. Then, remove the fan and generator belt and put back the V–ribbed belt tensioner little by little and fix it quietly.

18. REMOVE VANE PUMP ASSY

(a) Remove the 2 through bolts and 2 nuts installing the vane pump.

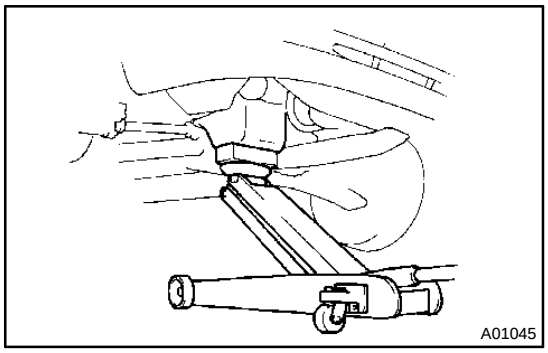
19. REMOVE GENERATOR ASSY **(See page 19–16)**

CONTINUED

20. DISCONNECT EXHAUST PIPE ASSY FRONT

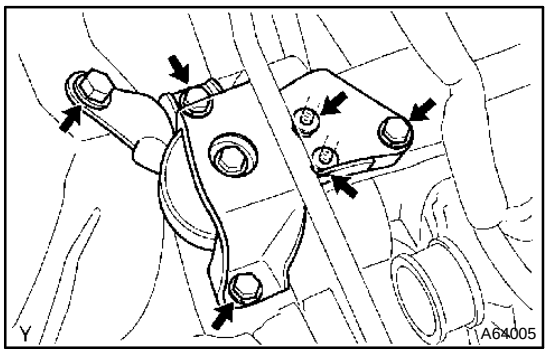
(a) Remove the 2 bolts, 2 compression spring installing the front side of exhaust pipe.

(b) Remove the gasket.



21. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSY RH

(a) Place a wooden block between the jack and engine, and set the jack, then remove the 4 bolts, 2nuts and engine mounting insulator RH.



22. REMOVE IGNITION COIL ASSY

(a) Disconnect the 4 connectors.

(b) Remove 4 bolts and 4 ignition coils.

23. DISCONNECT ENGINE WIRE

(a) Disconnect the connectors.

(b) Remove the 3 clamps from the 3 clamp brackets.

(c) Remove the bolt and nut installing the engine wire.

24. DISCONNECT VENTILATION HOSE

(a) Disconnect the ventilation hose from the cylinder head cover.

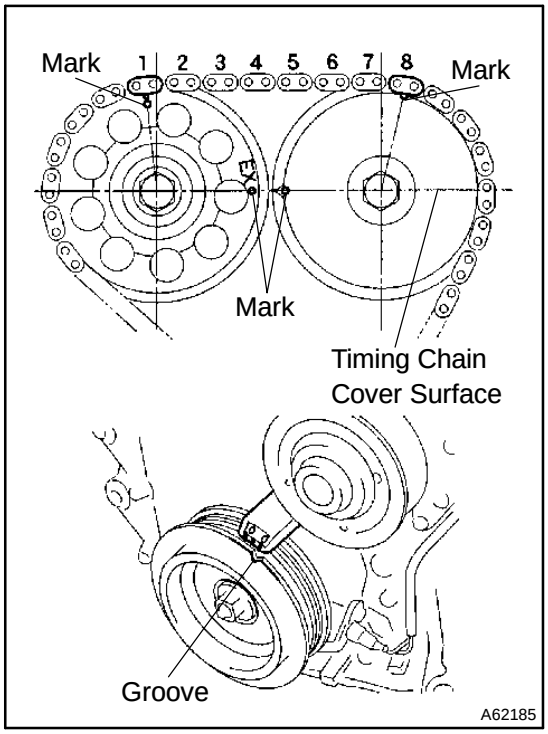
25. DISCONNECT VENTILATION HOSE NO.2

(a) Disconnect the ventilation hose from the cylinder head cover.

26. REMOVE CYLINDER HEAD COVER SUB-ASSY

(a) Remove the 9 bolts, 2 seal washers, 2 nuts, 3 clamp brackets and cylinder head cover.

CONTINUED



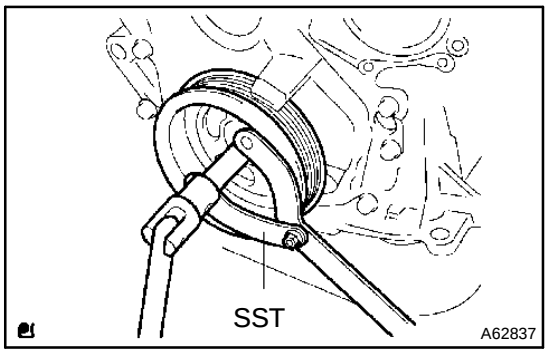
27. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark ”0” of the timing chain cover.

(b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

HINT:

If not, turn the crankshaft 1 revolution (360°) and align the marks as above.



28. REMOVE CRANKSHAFT PULLEY

(a) Using SST, remove the pulley bolt.

SST 09960–10010 (09962–01000, 09963–01000)

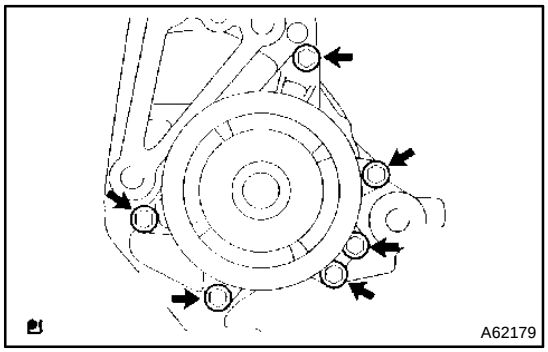
(b) Remove the crankshaft pulley from the crankshaft.

29. REMOVE V–RIBBED BELT TENSIONER ASSY

(a) Remove the bolt, nut and V–ribbed belt tensioner.

HINT:

Handle a jack up and down to remove the bolt.



30. REMOVE WATER PUMP ASSY

(a) Remove the 6 bolts, water pump and O–ring.

31. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Remove the 3 bolts and transverse engine engine mounting bracket.

CONTINUED

32. REMOVE CRANK POSITION SENSOR

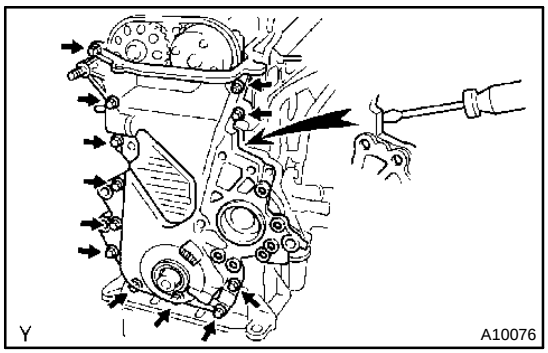
(a) Remove the 2 bolts installing the crank position sensor.

33. REMOVE CHAIN TENSIONER ASSY NO.1

(a) Remove the 2 nuts and chain tensioner.

NOTICE:

Be sure not to revolve the crankshaft without the chain tensioner.



34. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSY

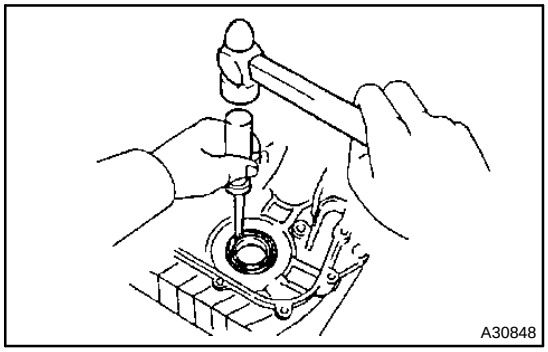
(a) Remove the 11 bolts and nuts.

(b) Using a torx wrench socket (E8), remove the stud bolt.

(c) Remove the timing chain cover by prying the portions between the cylinder head and cylinder block with a screwdriver.

NOTICE:

Be careful no tot damage the contact surfaces of the timing chain cover, cylinder head and cylinder block.



35. REMOVE TIMING GEAR COVER OIL SEAL

(a) Using a screwdriver, remove the oil seal.

36. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

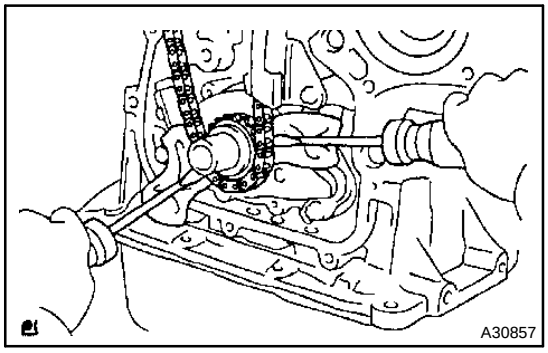
(a) Remove the crankshaft position sensor plate from the crankshaft.

37. REMOVE CHAIN TENSIONER SLIPPER

(a) Remove the bolt and chain tensioner slipper.

38. REMOVE CHAIN VIBRATION DAMPER NO.1

(a) Remove the 2 bolt and chain vibration damper.



39. REMOVE CHAIN SUB-ASSY

(a) Remove the timing chain with the crankshaft timing gear plying screwdrivers as shown in the illustration.

NOTICE:

- **Put shop rag to protect the engine.**
- **In case of revolving the camshafts with the chain off the sprockets, turn the crankshaft 1/4 revolution for valves not to touch the pistons.**

CONTINUED

40. REMOVE INTAKE MANIFOLD

(a) Remove the 4 bolts, 2 nuts, 2 clamp brackets and intake manifold.

41. REMOVE OIL LEVEL GAGE SUB–ASSY

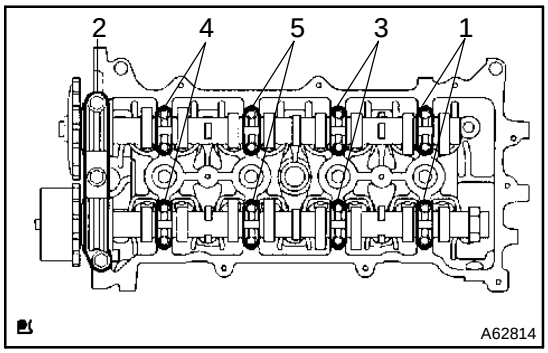
(a) Remove the oil level gage from the oil level gage guide.

42. REMOVE OIL LEVEL GAGE GUIDE

(a) Remove the bolt and oil level gage guide.

43. DISCONNECT WATER BY–PASS PIPE NO.1

(a) Remove the 2 bolts installing the water by–pass pipe.



44. REMOVE CAMSHAFT

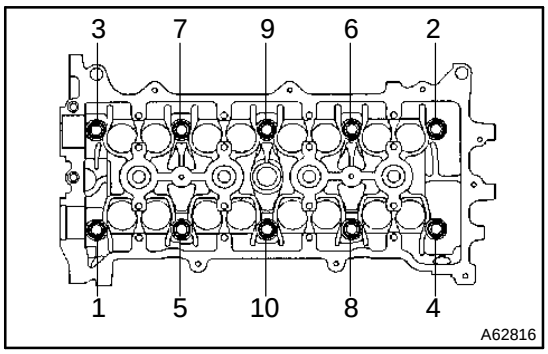
(a) Uniformly loosen and remove the 19 bearing cap bolts, in several passes, in the sequence shown, and remove the 9 bearing caps, intake and exhaust camshafts.

45. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSY

(a) Remove the bolt and camshaft timing oil control valve.

46. REMOVE MANIFOLD STAY

(a) Remove the 3 bolts and manifold stay.

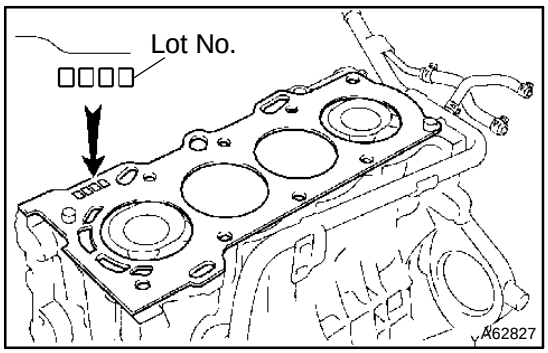


47. REMOVE CYLINDER HEAD SUB–ASSY

(a) Using a 10 mm bi–hexagon wrench, uniformly loosen and remove the 10 cylinder head bolts, in several passes, in the sequence shown, and remove the 10 cylinder head bolts and 10 plate washers.

(b) Remove the cylinder head.

48. REMOVE CYLINDER HEAD GASKET



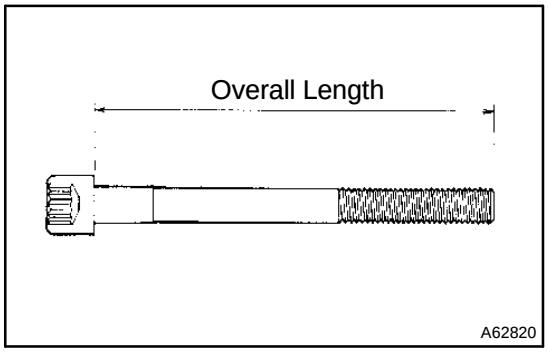
49. INSTALL CYLINDER HEAD GASKET

(a) Place a new cylinder head gasket on the cylinder block surface with the Lot No. stamp upward.

NOTICE:

- **Pay attention to the installation direction.**
- **Place the cylinder head quietly in order not to damage the gasket with the bottom part of the head.**

CONTINUED



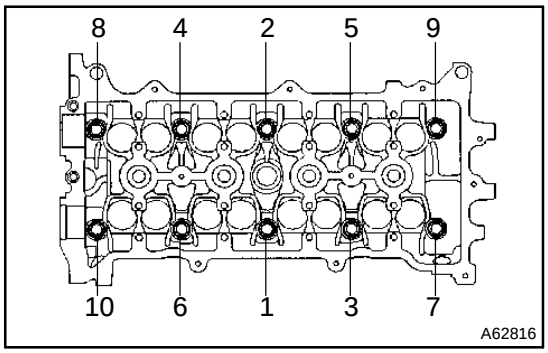
50. INSPECT CYLINDER HEAD SET BOLT

(a) Using a vernier calipers, measure the length of cylinder head bolt from the seat to the end.

Standard length: 156.0 – 159.0 mm (6.142 – 6.260 in.)

Maximum length: 159.5 mm (6.280 in.)

If the length surpasses the maximum, replace the bolt.



51. INSTALL CYLINDER HEAD SUB–ASSY

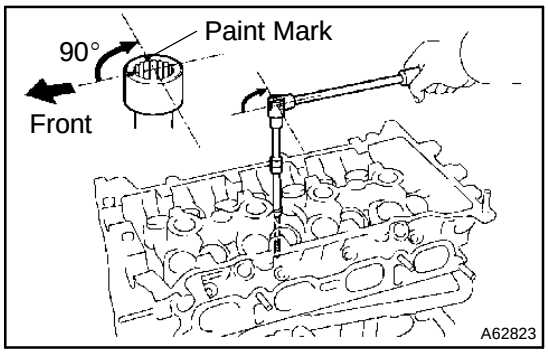
HINT:

The cylinder head bolts are tightened in 2 progressive steps.

(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Using a 10 mm bi–hexagon wrench, install and uniformly tighten the 10 cylinder head bolts and plate washers, in several passes, in the sequence shown.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



(c) Make the front of the cylinder head bolt with paint.

(d) Retighten the cylinder head bolts 90 ° in the numerical order shown.

(e) Check that the point marked bolts are moved at 90 ° angle.

52. INSTALL MANIFOLD STAY

(a) Install the manifold stay with 3 bolts.

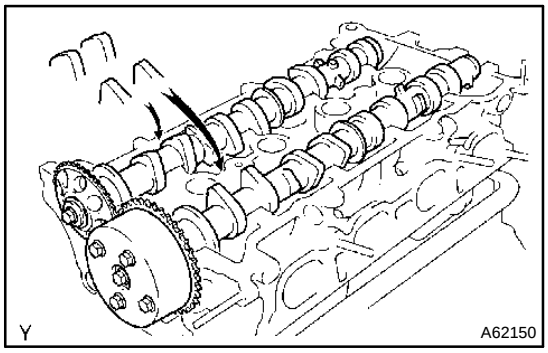
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

53. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY

(a) Apply a light coat of engine oil on a new O–ring, and install it to the camshaft timing oil control valve.

(b) Install the camshaft timing oil control valve with the bolt.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

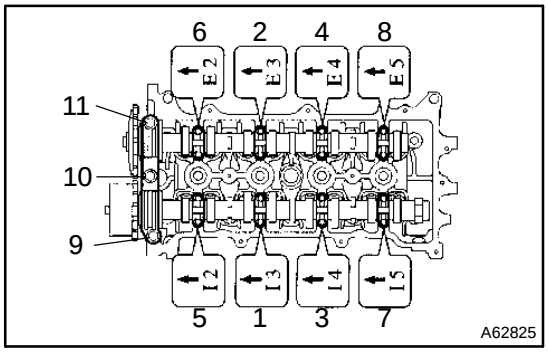


54. INSTALL CAMSHAFT

(a) Apply a light coat of engine oil on the camshaft journals.

(b) Place the 2 camshafts on the cylinder head with the No. 1 cam lobes facing as shown the illustration.

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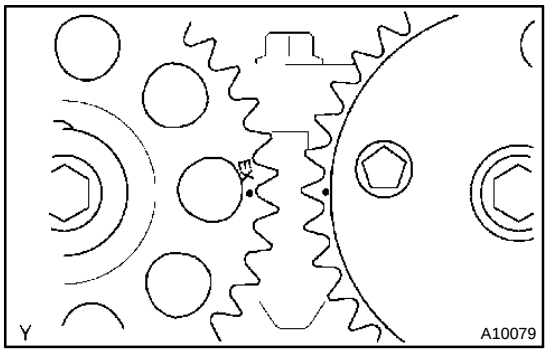


(c) Examine the front marks and numbers and tighten the bolts in the order shown in the illustration.
Torque:
Bearing cap No. 1 23 N·m (235 kgf·cm, 17 ft·lbf)
Bearing cap No. 3 13 N·m (133 kgf·cm, 10 ft·lbf)

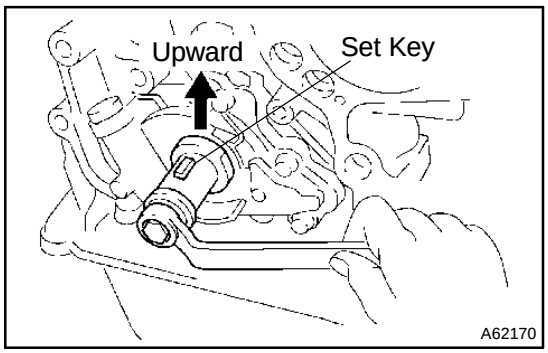
55. INSTALL WATER BY–PASS PIPE NO.1
(a) Install the water by–pass pipe with the 2 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

56. INSTALL OIL LEVEL GAGE GUIDE
(a) Apply a light coat of engine oil on a new O–ring, and install it to the oil level gage guide.
(b) Install the oil level gage guide with the bolt.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

57. INSTALL INTAKE MANIFOLD
(a) Install a new gasket to the intake manifold.
(b) Install the intake manifold and 2 clamp brackets with the 4 bolts and 2 nuts.
Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)

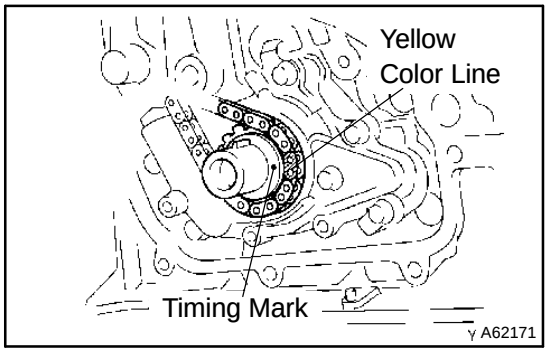


58. INSTALL CHAIN SUB–ASSY
(a) Set No. 1 cylinder to TDC/compression.
(1) Turn the hexagonal wrench head portion of the camshafts, and align the point marks of the camshaft timing sprockets.



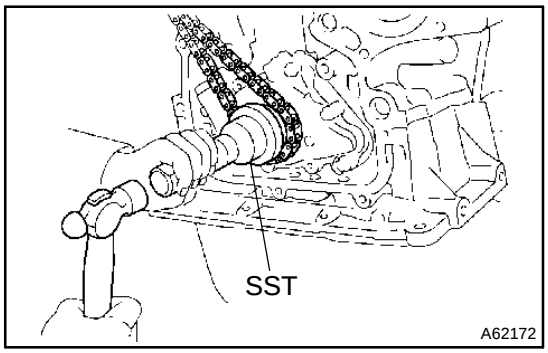
(2) Using a crankshaft pulley bolt, turn the crankshaft and set the set key on the crankshaft upward.

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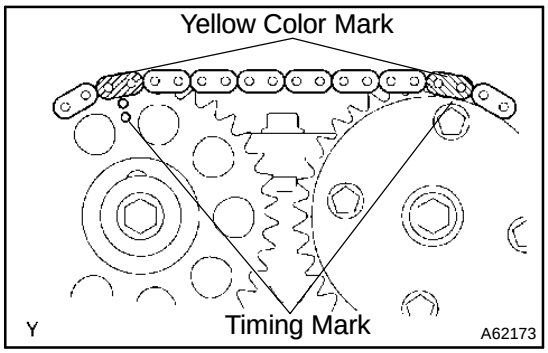


(b) Install the timing chain on the crankshaft timing sprocket with the yellow color link aligned with the timing mark on the crankshaft timing sprocket.

HINT:
Three yellow color links are on the chain.



(c) Using SST, install the crankshaft timing sprocket.
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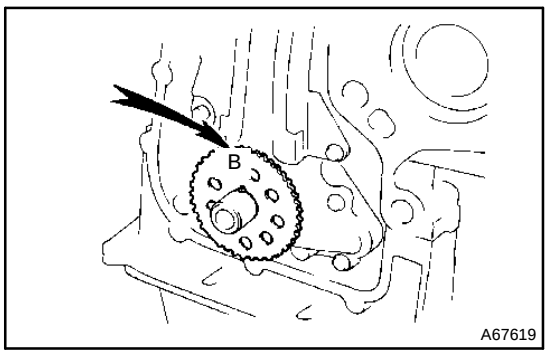
(d) Install the timing chain on the camshaft timing sprockets with the yellow color links aligned with the timing marks on the camshaft timing sprockets.

59. INSTALL CHAIN VIBRATION DAMPER NO.1

(a) Install chain vibration damper with the 2 bolts.
Torque: 19 N·m (189 kgf·cm, 14 ft·lbf)

60. INSTALL CHAIN TENSIONER SLIPPER

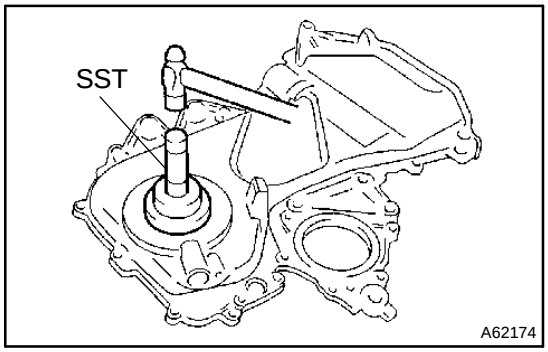
(a) Install the chain tensioner slipper with the bolt.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)



61. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

(a) Install the plate with the "B" mark facing forward.

CONTINUED



62. INSTALL TIMING GEAR COVER OIL SEAL

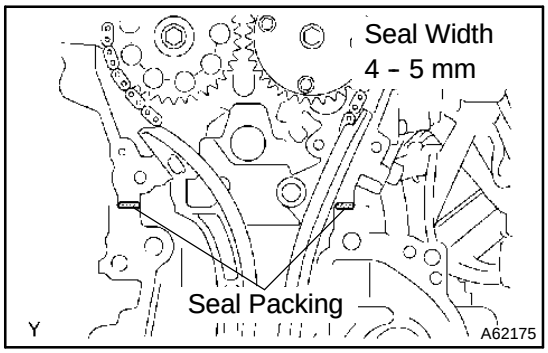
(a) Apply MP grease to a new oil seal lip.

(b) Using SST, tap in the oil seal until its surface is flush with the timing chain cover edge.

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NOTICE:

Keep the lip off foreign materials.



63. INSTALL TIMING CHAIN OR BELT COVER SUB–ASSY

(a) Remove any old packing material from the contact surface.

(b) Apply seal packing in the shape of bead (Diameter 3.5 mm – 4.5 mm (0.1379 – 0.177 in.)) consequently as shown in the illustration.

Seal packing:

Water pump part part No. 08826–00100 or equivalent

Other part part No. 08826–00080 or equivalent.

(c) Install the timing chain cover with the 11 bolts and nut.

Torque:

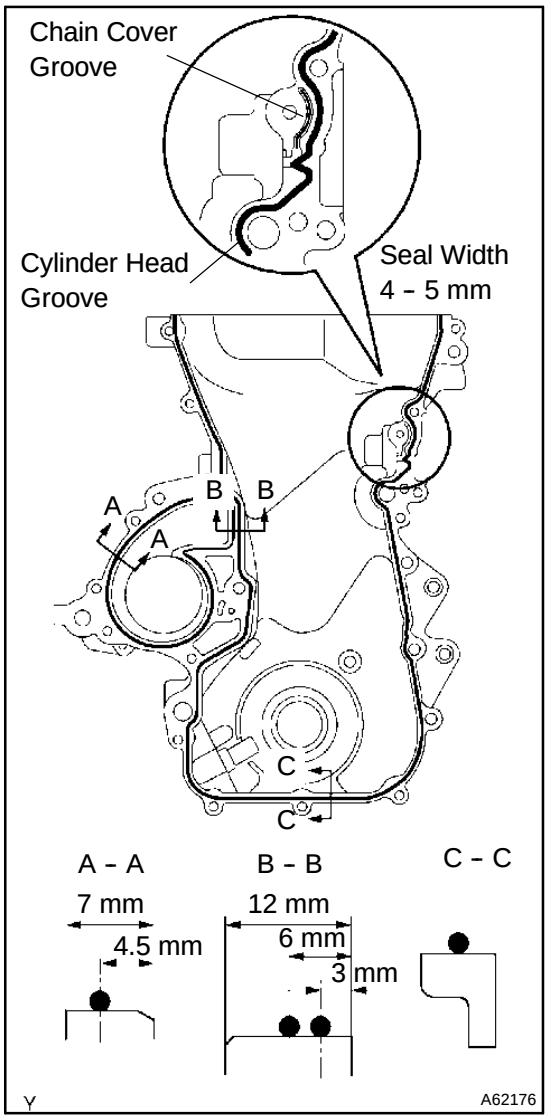
M6 13 N·m (133 kgf·cm, 10 ft·lbf)

M8 19 N·m (194 kgf·cm, 14 ft·lbf)

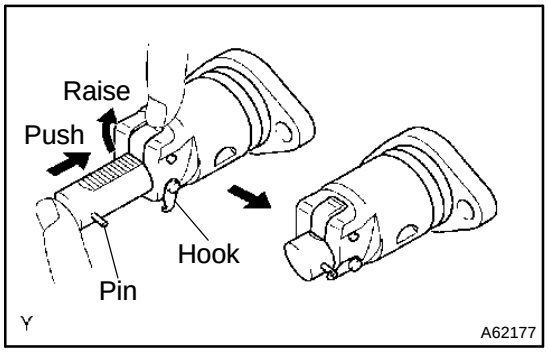
NOTICE:

- **Remove any oil from the contact surface.**
- **Install the oil pan within 3 minutes after applying seal packing.**
- **Do not put into engine oil within 2 hours after installing.**

(d) Using a torx wrench socket (E8), install the stud bolt.

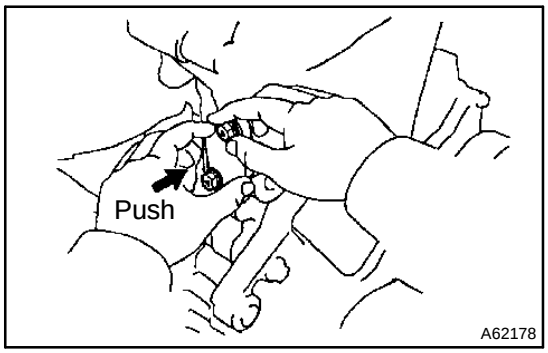


CONTINUED



64. INSTALL CHAIN TENSIONER ASSY NO.1

(a) Check the O-ring is clean, and set the hook as shown in the illustration.



(b) Apply engine oil to the chain tensioner and install it withe 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

NOTICE:

When installing the tensioner, set the hook again if the hook release the plunger.

65. INSTALL CRANK POSITION SENSOR

(a) Apply a coat of the engine oil to the O-ring of the crank position sensor.

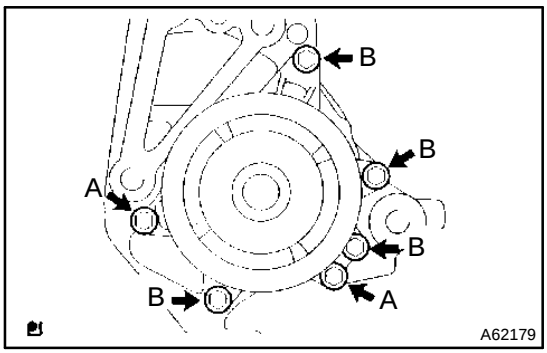
(b) Install the crank position sensor with the 2 bolts.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

66. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Install the transverse engine engine mounting bracket with the 3 bolts.

Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)



67. INSTALL WATER PUMP ASSY

(a) Place a new O-ring on the timing chain cover.

(b) Install the water pump with the 6 bolts.

Torque:

9.0 N·m (92 kgf·cm, 80 in.·lbf) for Bolt A

11 N·m (112 kgf·cm, 8 ft·lbf) for Bolt B

68. INSTALL V-RIBBED BELT TENSIONER ASSY

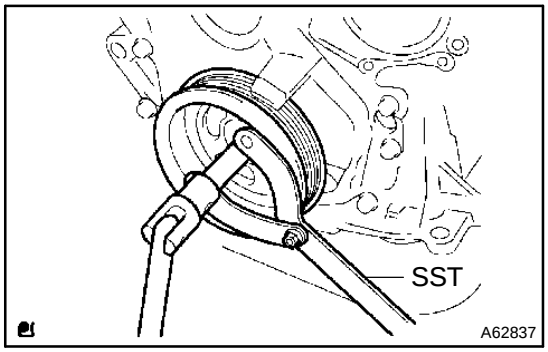
(a) Install the V-ribbed belt tensioner with the nut and bolt.

Torque:

29 N·m (296 kgf·cm, 21 ft·lbf) for Nut

69 N·m (704 kgf·cm, 51 ft·lbf) for Bolt

CONTINUED



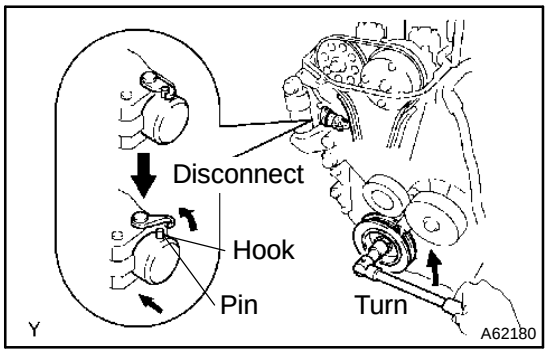
69. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

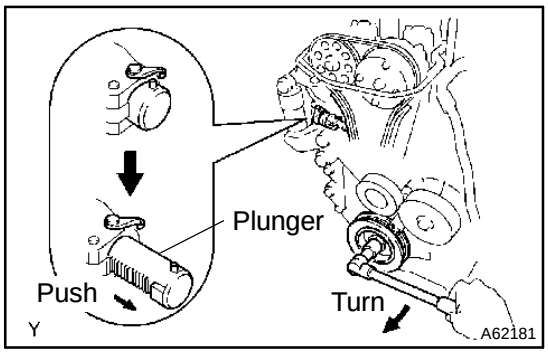
(b) Using SST, install the crankshaft pulley bolt.

SST 09960–10010 (09962–01000, 09963–01000)

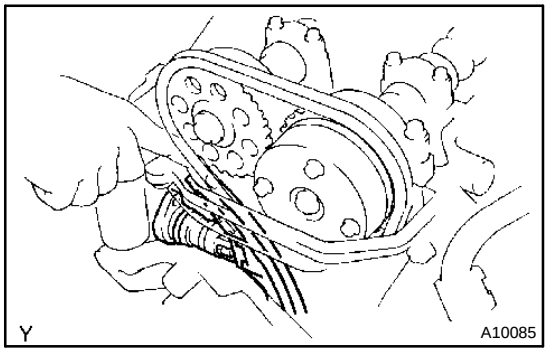
Torque: 138 N·m (1,407 kgf·cm, 102 ft·lbf)



(c) Turn the crankshaft counter clockwise, and disconnect the plunger knock pin form the hook.

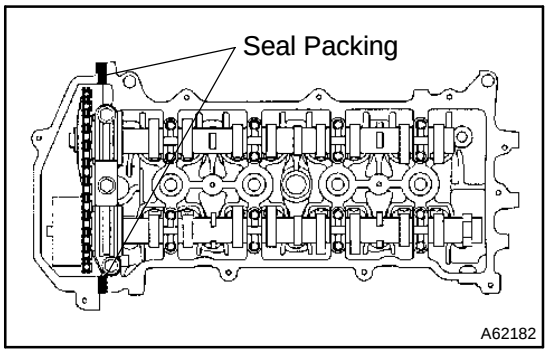


(d) Turn the crankshaft clockwise, and check that the slipper is pushed by the plunger.



HINT:

If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver or your finger so that the hook is released from the knock pin and the plunger springs out.



70. INSTALL CYLINDER HEAD COVER SUB–ASSY

(a) Remove any old pacing (FIPG) material.

(b) Apply seal packing to 2 locations as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes after applying seal packing.**
- **Do not put into engine oil 2 hours after installing.**

CONTINUED

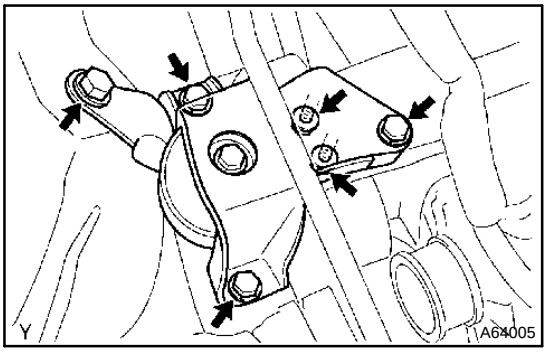
(c) Install the cylinder head cover and 3 cable brackets with the 9 bolts, 2 seal washers and 2 nuts. Uniformly tighten the bolts and nuts, in the several passes.
Torque:
11 N·m (112 kgf·cm, 8 ft·lbf) for w/o washer
9.0 N·m (92 kgf·cm, 80 in.·lbf) for w/ washer

71. INSTALL IGNITION COIL ASSY

(a) Install the 4 ignition coils with the 4 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

72. INSTALL ENGINE WIRE

(a) Install the engine wire with the bolt and nut.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)



73. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSY RH

(a) Install engine mounting insulator RH with the 4 bolts and 2 nuts.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

74. INSTALL EXHAUST PIPE ASSY FRONT **(See page 15-5)**

75. INSTALL VANE PUMP ASSY

(a) Install the vane pump with the 2 through bolts and 2 nuts.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

76. INSTALL GENERATOR ASSY **(See page 19-16)**

77. INSTALL CYLINDER HEAD COVER NO.2

(a) Install the cylinder head cover with the 2 nuts and 2 clips.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

78. INSTALL FRONT WHEEL RH
Torque: 103 N·m (1050 kgf·cm, 76 ft·lbf)

79. ADD COOLANT **(See page 16-18)**

80. INSPECT COMPRESSION
SST 09992-00500

81. INSPECT CO/HC

82. INSPECT IGNITION TIMING
SST 09843-18030, 09843-18040

83. CHECK FOR ENGINE COOLANT LEAKS **(See page 16-13)**

84. CHECK ENGINE OIL LEAK

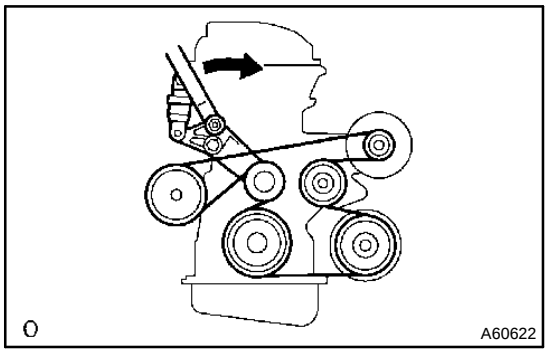
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TIMING GEAR COVER OIL SEAL (4ZZ–FE)

140MI–02

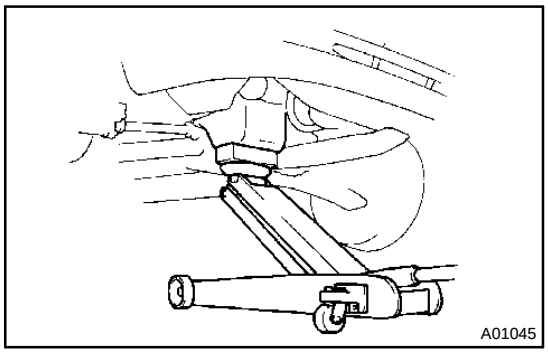
REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH
2. REMOVE FRONT WHEEL RH



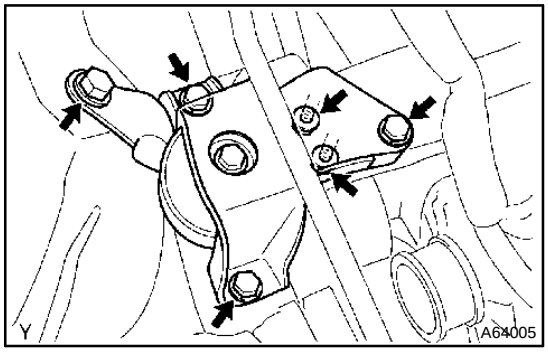
3. REMOVE FAN AND GENERATOR V BELT

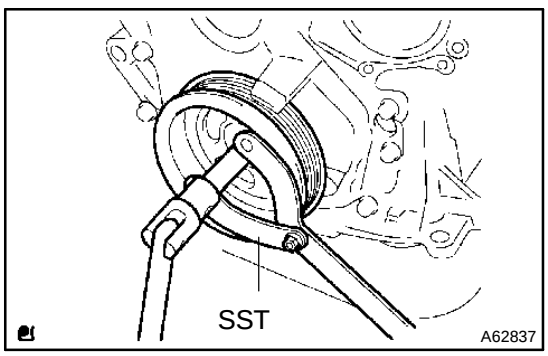
(a) Turn the V–ribbed belt tensioner slowly clockwise and loosen it. Then, remove the fan and generator belt and put back the V–ribbed belt tensioner little by little and fix it quietly.



4. REMOVE ENGINE MOUNTING INSULATOR SUB–ASSY RH

(a) Place a wooden block between the jack and engine, and set the jack. Then, remove the 4 bolts, 2nuts and engine mounting insulator RH.





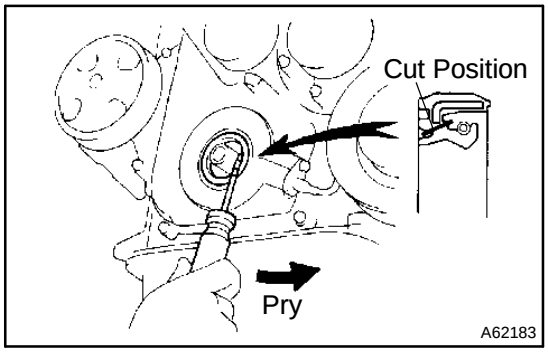
5. REMOVE CRANKSHAFT PULLEY

(a) Using SST, remove the crankshaft pulley bolt.

SST 09960–10010 (09962–01000, 09963–01000)

(b) Remove the crankshaft pulley from the crankshaft.

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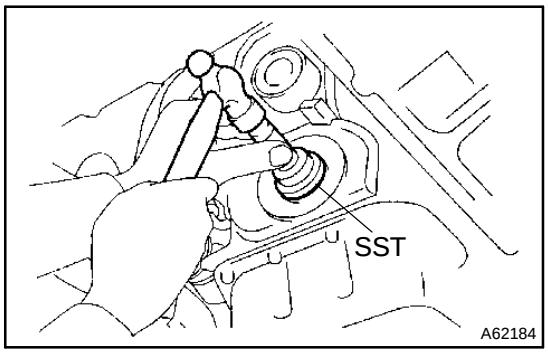
6. REMOVE TIMING GEAR COVER OIL SEAL

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver with taping its tip, pry out the oil seal.

NOTICE:

After the removal, check if the crankshaft is not damaged. If there is, mend it with a sandpaper (#400).



7. INSTALL TIMING GEAR COVER OIL SEAL

(a) Apply MP grease to a new oil seal lip.

NOTICE:

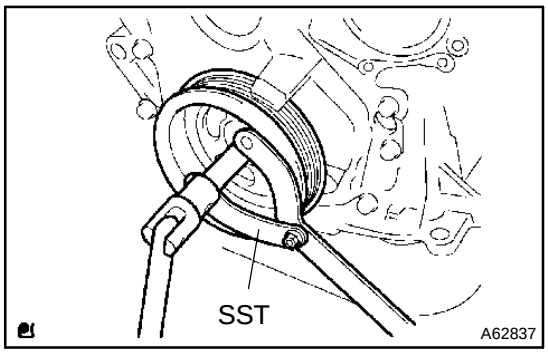
Keep the lip off foreign materials.

(b) Using SST, tap in the oil seal until its surface is flush with the timing chain cover edge.

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NOTICE:

Wipe off extra grease on the crankshaft.



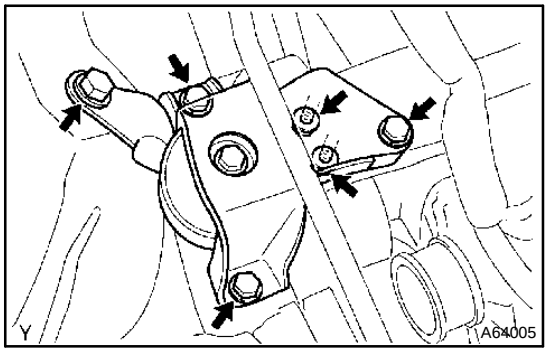
8. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

(b) Using SST, install the crankshaft pulley bolt.

SST 09960-10010 (09962-01000, 09963-01000)

Torque: 138 N·m (1,407 kgf·cm, 102 ft·lbf)



9. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSY RH

(a) Install the engine mounting insulator RH with the 4 bolts and 2 nuts.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

10. INSTALL FRONT WHEEL RH

Torque: 103 N·m (1050 kgf·cm, 76 ft·lbf)

11. CHECK ENGINE OIL LEAK

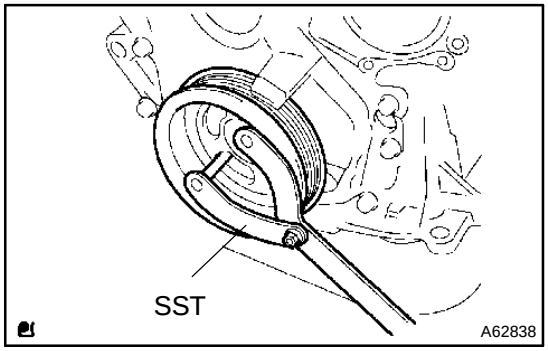
CONTINUED

ENGINE REAR OIL SEAL (4ZZ–FE)

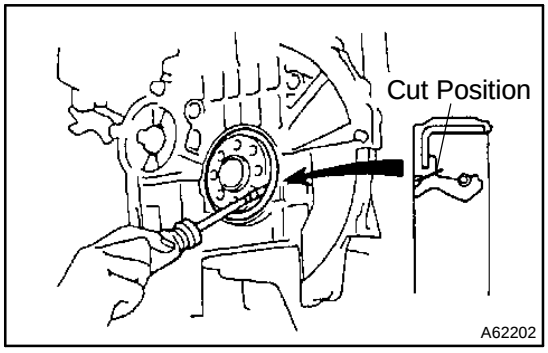
140VE–01

REPLACEMENT

1. **REMOVE MANUAL TRANSAXLE ASSY** **(See page 41–3)**
   SST 09930–00010, 09628–62011, 09520–01010, 09520–24010 (09520–32040)
2. **REMOVE CLUTCH COVER ASSY** **(See Pub. No. RM821E on page 42–12)**
3. **REMOVE CLUTCH DISC ASSY** **(See Pub. No. RM821E on page 42–12)**

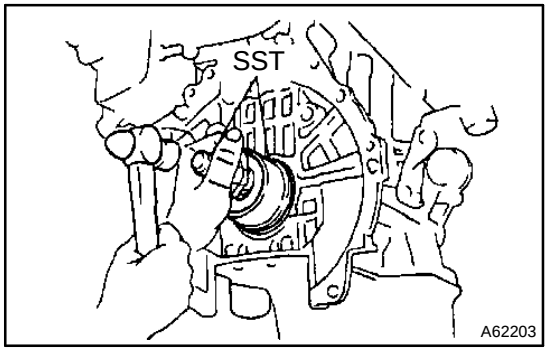


4. **REMOVE FLYWHEEL SUB–ASSY**
(a) Fix the crankshaft with SST, then remove the 8 bolts and flywheel.
SST 09960–10010 (09962–01000, 09963–01000)



5. **REMOVE ENGINE REAR OIL SEAL**
(a) Using a knife, cut off the oil seal lip.
(b) Using a screwdriver with taping its tip, pry out the oil seal.

NOTICE:
After the removal, check if the crankshaft is not damaged. If there is, mend it with a sandpaper (#400).

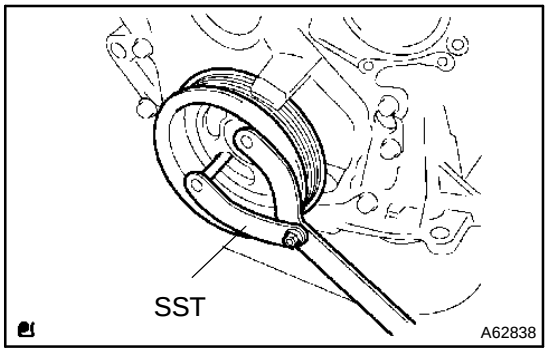


6. **INSTALL ENGINE REAR OIL SEAL**
(a) Apply MP grease to a new oil seal lip.

NOTICE:
Keep the lip off foreign materials.

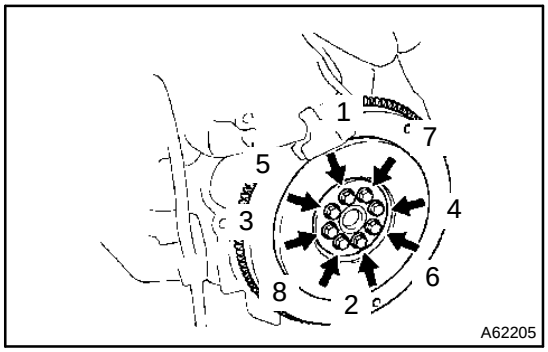
(b) Using SST, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–15020, 09950–70010 (09951–07100), 09223–15030

NOTICE:
Wipe off extra grease on the crankshaft.

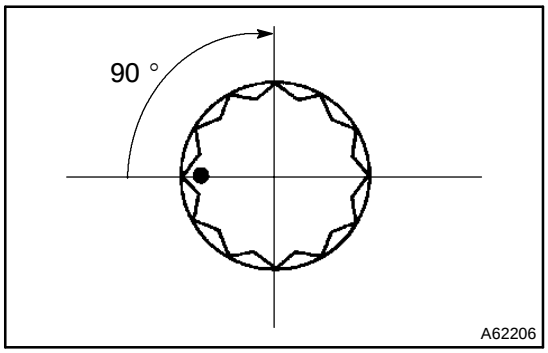


7. **INSTALL FLYWHEEL SUB–ASSY**
(a) Fix the crankshaft with SST.
SST 09960–10010 (09962–01000, 09963–01000)

CONTINUED



(b) Clean the bolt and bolt hole.
(c) Apply adhesive to the bolts.
Adhesive:
Part No. 09330-00070, THREE BOND or equivalent.
(d) Install and uniformly tighten the 8 bolts, in several passes, in the sequence shown.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



(e) Mark the bolts with paint.
(f) Retighten the bolts by an additional 90 °.
(g) Check that the point marked bolts are moved at 90 ° angle.

8. INSTALL CLUTCH DISC ASSY **(See Pub. No. RM821E on page 42-12)**
SST 09301-00210
9. INSTALL CLUTCH COVER ASSY **(See Pub. No. RM821E on page 42-12)**
10. INSTALL MANUAL TRANSAXLE ASSY **(See page 41-3)**

CONTINUED

EXHAUST

EXHAUST PIPE (2ZZ-GE) 15-1
COMPONENTS 15-1
Removal & Installation and
Disassembly & Reassembly 15-2/3
EXHAUST PIPE (4ZZ-FE) 15-4
COMPONENTS 15-4
Removal & Installation and
Disassembly & Reassembly 15-5/6

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement	RM926E

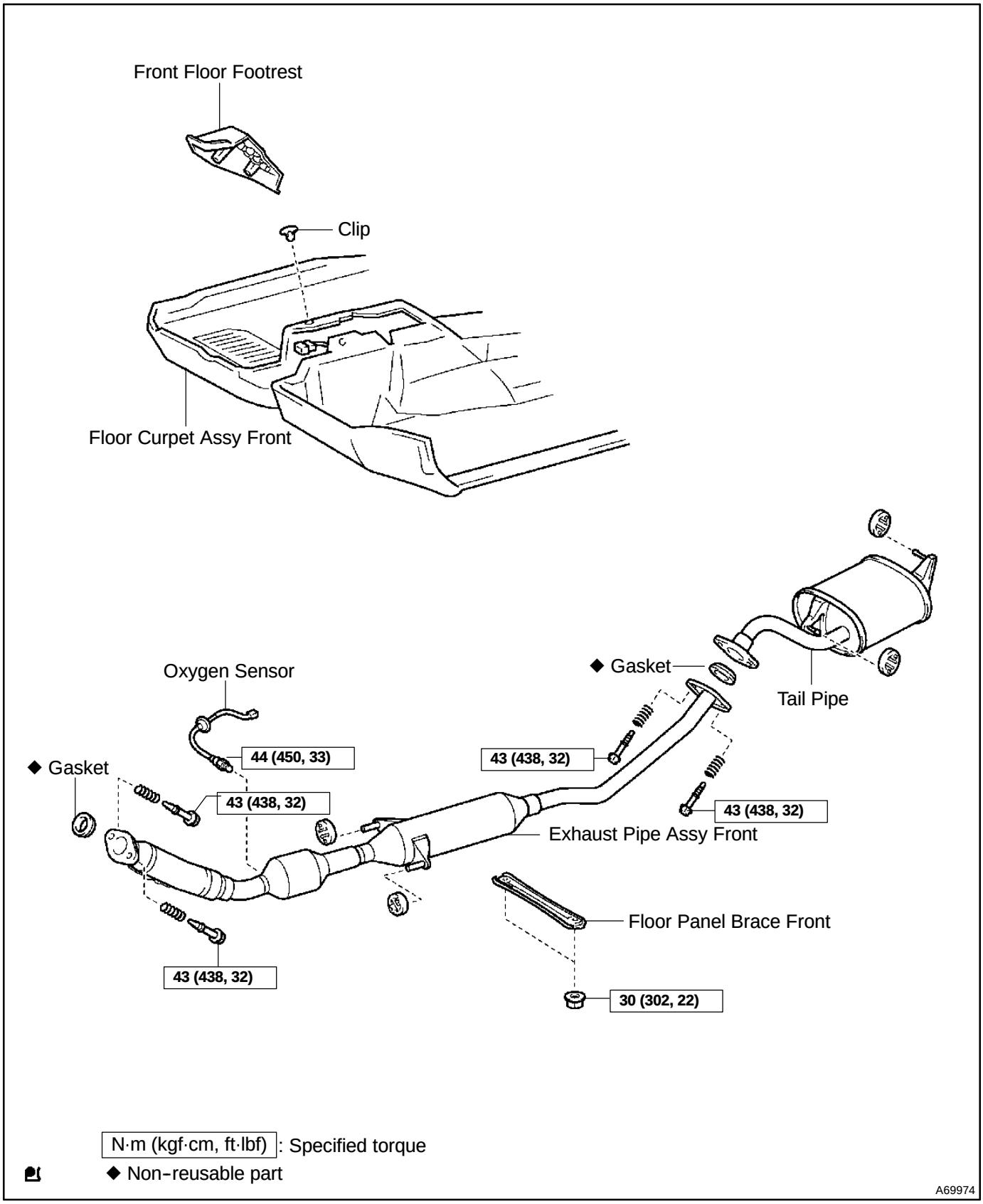
NOTE: The above pages contain only the points which differ from the above listed manual.

CONTINUED

EXHAUST PIPE (2ZZ-GE)

COMPONENTS

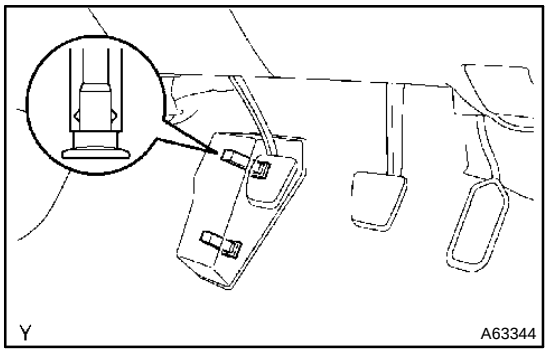
1503T-02



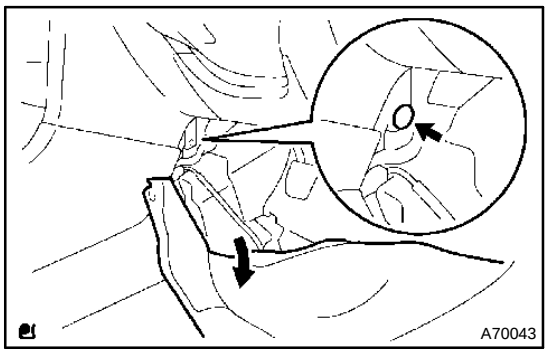
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CONTINUED

Removal & Installation and Disassembly & Reassembly



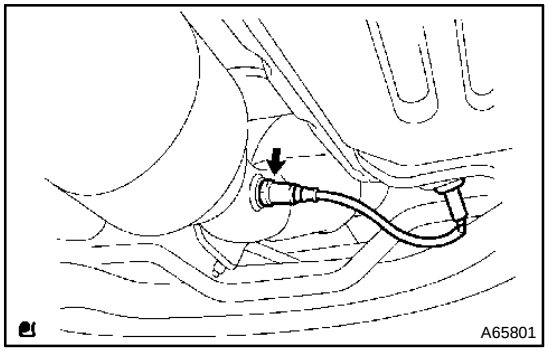
1. REMOVE FRONT FLOOR FOOTREST



2. REMOVE OXYGEN SENSOR

(a) Remove a clip and tear off the floor mat.

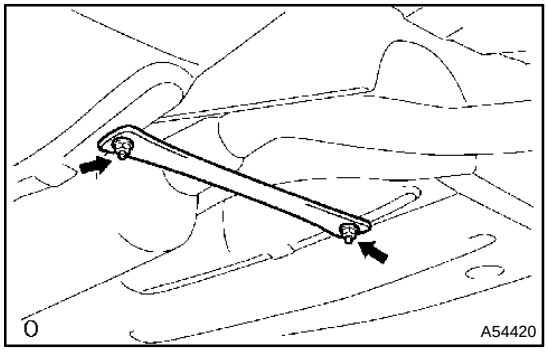
(b) Disconnect the oxygen sensor connector.



(c) Remove the oxygen sensor.

3. REMOVE TAIL PIPE ASSY

(a) Remove 2 bolts, 2 springs and the tail pipe.



4. REMOVE FLOOR PANEL BRACE FRONT

(a) Remove 2 nuts and the floor panel brace front.

CONTINUED

5. REMOVE EXHAUST PIPE ASSY FRONT

(a) Remove 4 bolts, 4 springs and the exhaust pipe front.

6. INSTALL EXHAUST PIPE ASSY FRONT

(a) Using a vernier calipers, measure the free length of the compression spring.
Free length :44 mm (1.732 in)

HINT:
If the length is not as specified, replace the compression spring.

(b) Install a new gasket on the exhaust manifold.

(c) Install the exhaust front pipe with 2 bolts and 2 springs.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

7. INSTALL FLOOR PANEL BRACE FRONT

(a) Install the front floor panel brace with 2 nuts.
Torque: 30 N·m (302 kgf·cm, 22 ft·lbf)

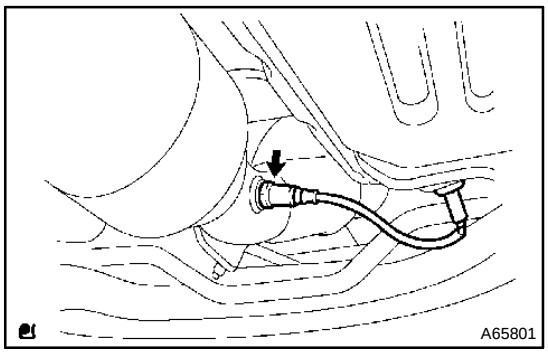
8. INSTALL TAIL PIPE ASSY

(a) Using a vernier calipers, measure the free length of the compression spring.
Free length :40 mm (1.575 in)

HINT:
If the free length is not as specified, replace the compression spring.

(b) Install a new gasket on the exhaust pipe front.

(c) Install the exhaust tail pipe with 2 bolts and 2 springs.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)



9. INSTALL OXYGEN SENSOR

(a) Install the oxygen sensor to the exhaust pipe front.
Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)

(b) Connect the oxygen sensor connector.

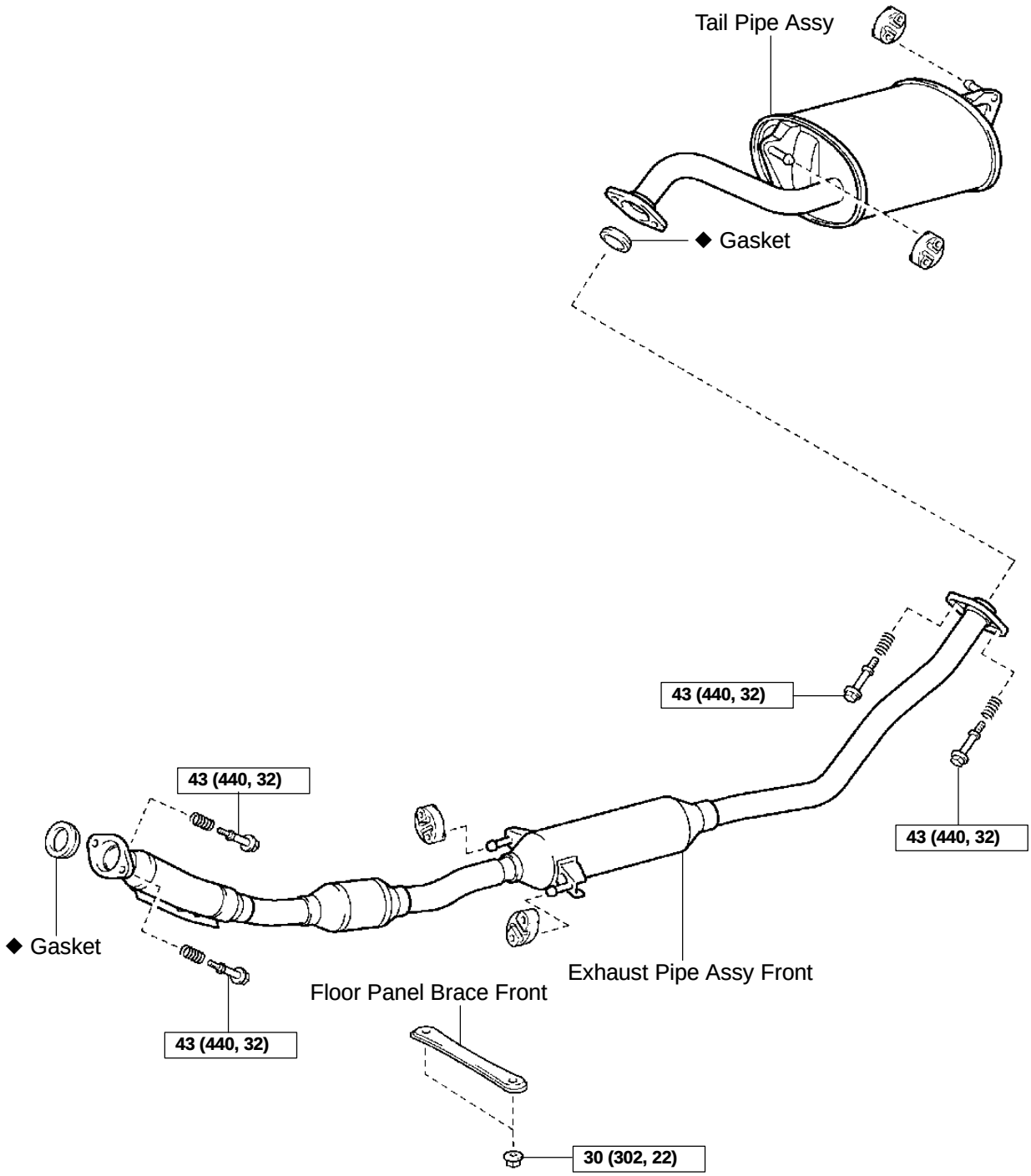
10. CHECK EXHAUST GAS LEAK

CONTINUED

EXHAUST PIPE (4ZZ-FE)

COMPONENTS

1503U-02

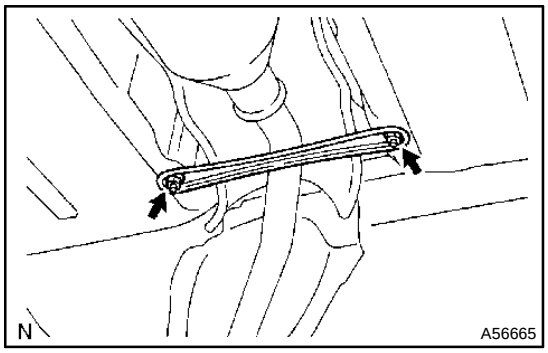


N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part

A70087

CONTINUED

Removal & Installation and Disassembly & Reassembly



1. REMOVE FLOOR PANEL BRACE FRONT

(a) Remove the 2 bolts and the floor panel brace front.

2. REMOVE TAIL PIPE ASSY

(a) Remove the 2 bolts, 2 compression springs and tail pipe assy.

3. REMOVE EXHAUST PIPE ASSY FRONT

(a) Remove the 2 bolts, 2 compression springs and exhaust pipe assy front.

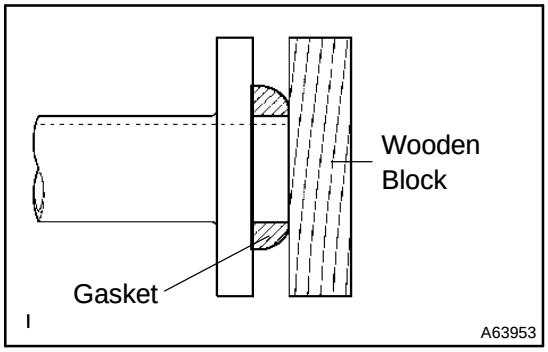
4. INSTALL EXHAUST PIPE ASSY FRONT

(a) Using vernier calipers, measure the free length of the compression spring.

Free length: 44 mm (1.7322 in.)

HINT:

If the free length is not as specified, replace the compression spring.



(b) Using a hammer and a wooden block, tap in a new gasket until its surface is flush with the exhaust manifold.

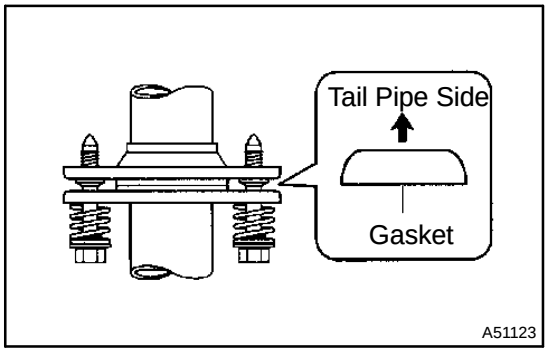
NOTICE:

- **Tap in the gasket in the correct direction.**
- **Do not reuse the removed gasket.**
- **Be sure not to push in the gasket by installing the exhaust pipe.**

(c) Install the front exhaust pipe assy front.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

CONTINUED



5. INSTALL TAIL PIPE ASSY

(a) Using vernier calipers, measure the free length of the compression spring.
Free length: 40 mm (1.5748 in.)

HINT:
If the free length is not as specified, replace the compression spring.

(b) Using a new gasket, install tail pipe to front pipe.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

6. INSTALL FLOOR PANEL BRACE FRONT
Torque: 30 N·m (302 kgf·cm, 22 ft·lbf)

7. CHECK EXHAUST GAS LEAK

CONTINUED

COOLING

COOLING SYSTEM (2ZZ-GE) 16-1
ON-VEHICLE INSPECTION 16-1
INSPECTION 16-2/3
COOLING FAN SYSTEM (2ZZ-GE) 16-4
ON-VEHICLE INSPECTION 16-4
INSPECTION 16-5
COOLANT (2ZZ-GE) 16-6
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REPLACEMENT 16-8/9
THERMOSTAT (2ZZ-GE) 16-10
REPLACEMENT 16-10/11
RADIATOR ASSY (2ZZ-GE) 16-12
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INSPECTION 16-17
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REPLACEMENT 16-24

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement	RM926E

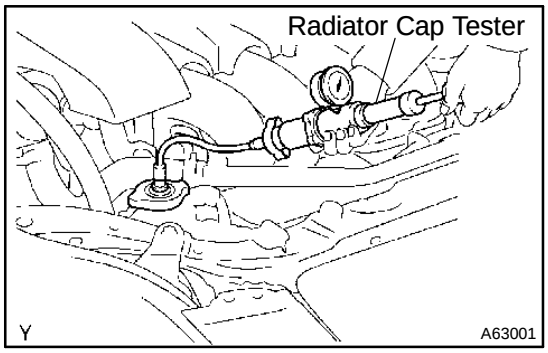
NOTE: The above pages contain only the points which differ from the above listed manual.

CONTINUED

COOLING SYSTEM (2ZZ-GE)

ON-VEHICLE INSPECTION

1600T-07



1. INSPECT COOLING SYSTEM FOR LEAKS

CAUTION:

To avoid the danger of being burned, do no remove the reservoir cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Warm up the engine.

(c) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi), and check that the pressure does not drop.

HINT:

If the pressure drops, check to hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

2. CHECK ENGINE COOLANT LEVEL AT RESERVOIR

(a) The engine coolant level should be between the "LOW" and "FULL" line.

HINT:

If low, check for leaks and add "Toyota Long Life Coolant" or equivalent up to the "FULL" line.

3. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(b) Check if there is any excessive deposits of rust or scale around the radiator cap and radiator filler hole; the coolant should be free from oil.

HINT:

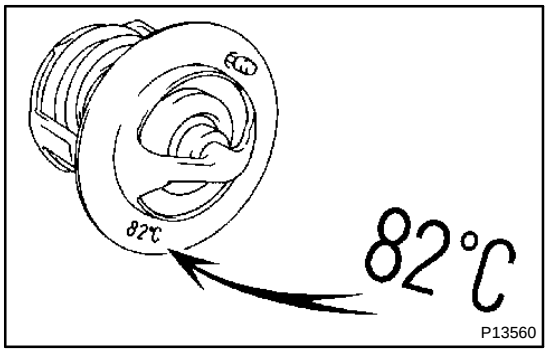
If excessively dirty, replace the coolant.

(c) Reinstall the radiator cap.

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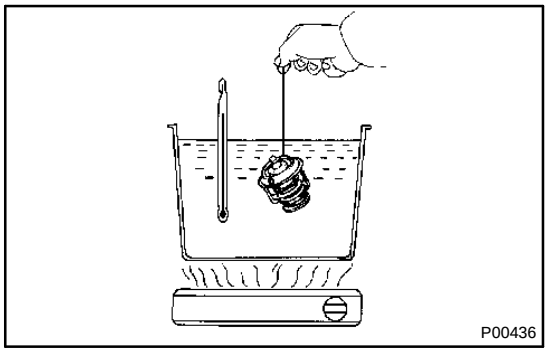
1600U-07

INSPECTION



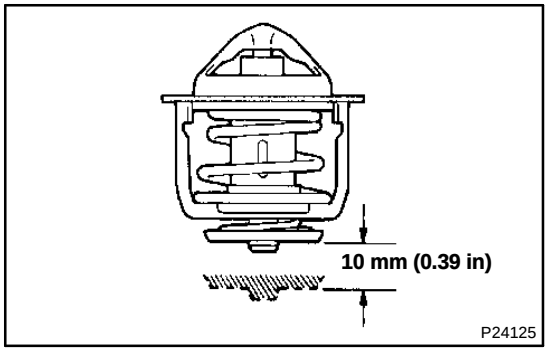
1. THERMOSTAT

HINT:
The thermostat is numbered with the valve opening temperature.



(a) Immerse the thermostat in water an gradually heat the water.
(b) Check the valve opening temperature.
Valve opening temperature: 80 - 84°C (176 - 183°F)

If the valve opening temperature is not as specified, replace the thermostat.

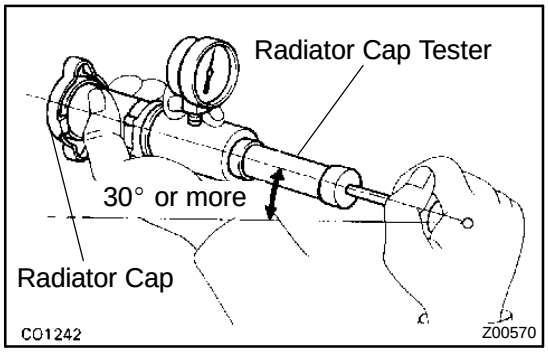


(c) Check the valve lift.
Valve lift: 10 mm (0.39 in) or more at 90°C (194°F)

If the valve lift is not as specified, replace the thermostat.
(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 77°C (171°F)).

If not closed, replace the thermostat.

CONTINUED



2. RADIATOR CAP SUB-ASSY

NOTICE:

- **If the radiator cap has contaminations, always rinse it with water.**
- **Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.**
- **When performing step (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.**

(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push / (3 seconds or more)

NOTICE:

Push the pump at a constant speed.

HINT:

Pump speed : 1 push / (3 seconds or more)

If air is not coming from the vacuum valve, replace the radiator cap.

(b) Pump the tester and measure the relief valve opening pressure.

Standard opening pressure:

74 - 103 kPa (0.75 - 1.05 kgf/cm^2, 10.7 - 14.9 psi)

Minimum opening pressure:

59 kPa (0.6 kgf/cm^2, 8.5 psi)

NOTICE:

This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.

HINT:

- Pump speed: 1 push within 1 second
- Use the tester's maximum reading as the opening pressure.

If the opening pressure is less than minimum, replace the radiator cap.

CONTINUED

COOLING FAN SYSTEM (2ZZ–GE)

1600R–07

ON–VEHICLE INSPECTION

1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 83°C (181°F))

(a) Turn the ignition switch ON.

(b) Check that the cooling fan stops.

HINT:

If not, check the cooling fan relay and water temperature sensor, and check for separated connector or severed wire between the cooling fan relay and water temperature sensor.

(c) Disconnect the water temperature sensor connector.

(d) Check that the cooling fan rotates.

If not, check the fuses, cooling fan relay, ECM and cooling fan, and check for a short circuit between the cooling fan relay and water temperature sensor.

(e) Reconnect the water temperature sensor connector.

2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 93°C (199°F))

(a) Start the engine, and raise coolant temperature to above 93°C (199°F).

HINT:

Coolant temperature is the detected value by the water temperature sensor on the water outlet.

(b) Check that the cooling fan rotates.

If not, replace the water temperature sensor.

3. INSPECT COOLING FAN

(a) Disconnect the cooling fan connector.

(b) Connect battery and ammeter to the connector.

(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

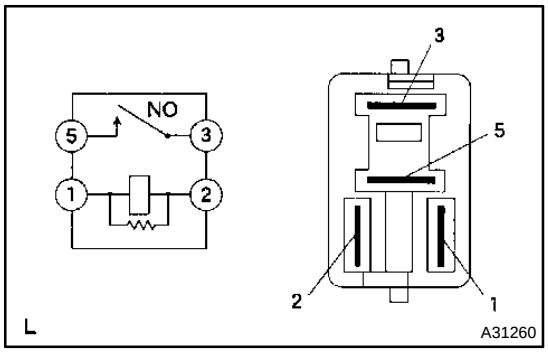
Standard amperage: 8 – 12A at 20°C° (68 °F)

(d) Reconnect the cooling fan connector.

CONTINUED

1600S-06

INSPECTION



1. COOLING FAN RELAY

(a) Inspect the cooling fan relay continuity.

(1) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

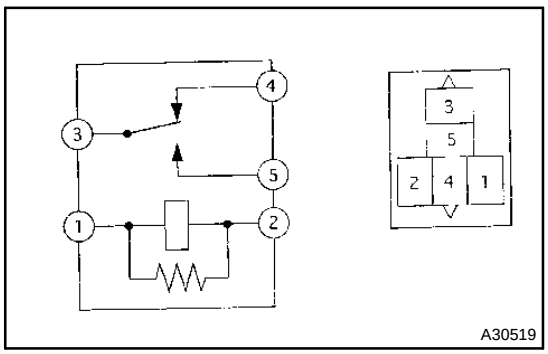
(2) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.

(3) Apply battery voltage across terminals 1 and 2.

(4) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.



2. COOLING FAN RELAY NO.2

(a) Inspect the cooling fan relay continuity.

(1) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

(2) Using an ohmmeter, check that there is continuity between terminals 3 and 4.

If there is continuity, replace the relay.

(3) Check that there is no continuity between terminals 3 and 5.

(4) Apply battery voltage across terminals 1 and 2.

(5) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

3. COOLING FAN RESISTOR

(a) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 1.17 - 1.43 Ω at 20 °C (68 °F)

CONTINUED

COOLANT (2ZZ-GE)

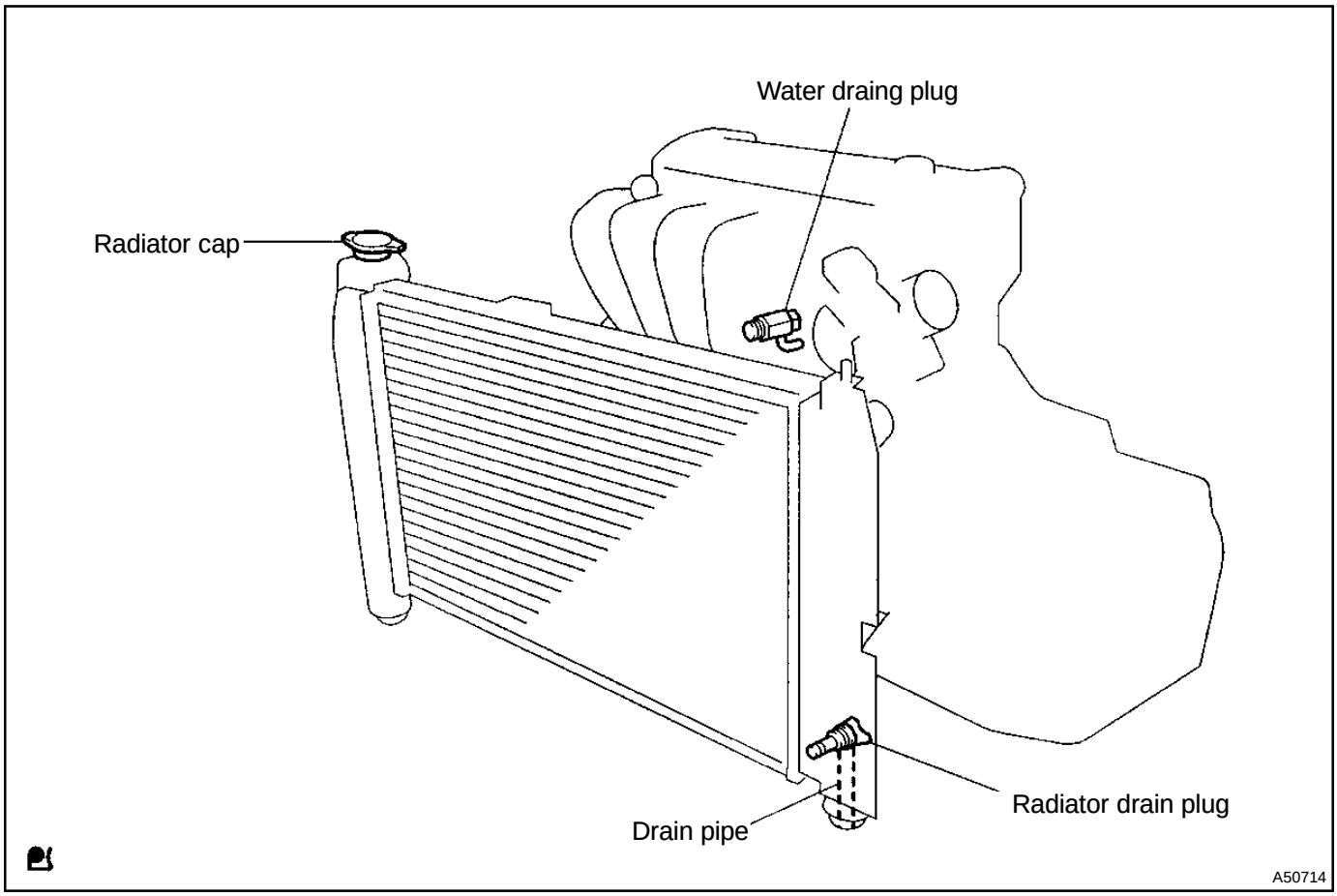
REPLACEMENT

1600V-08

1. DRAIN COOLANT

CAUTION:
To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(a) Remove radiator support opening cover.
(b) Remove the radiator cap.
(c) Loosen the radiator and engine drain plug and drain the coolant.



2. ADD COOLANT

(a) Tighten the radiator and engine drain plug, and pour coolant into radiator until it overflows.
Capacity: 6.7 liters (7.1 US qts, 5.9 lmp. qts)

HINT:

- Press the radiator inlet and outlet hose several times with hard.
- If the coolant level gets lower, pour coolant.

(b) Tighten the radiator cap.
(c) Pour engine coolant into the reservoir tank until it reaches full line.

CONTINUED

(d) Warm up the engine until the thermostat valve begins to open.

HINT:

Press the radiator inlet and outlet hose several times with hard during the warming up.

(e) Stop the engine and wait until the coolant temp. gets cold. Then remove the radiator cap to check the coolant level.

(f) If the level gets lower, perform the procedures above again.

(g) If the level does not gets lower, adjust the reservoir tank coolant level.

3. INSPECT CHECK ENGINE COOLANT LEAK

(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi) and check leakage.

CONTINUED

WATER PUMP ASSY (2ZZ-GE)

160EJ-01

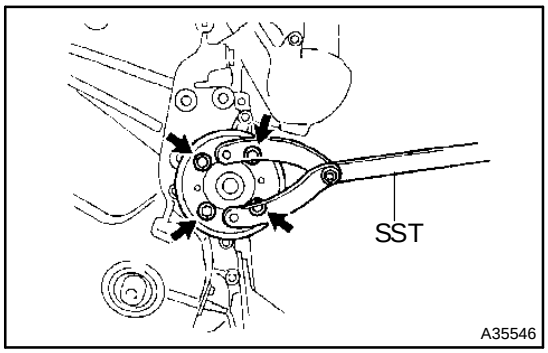
REPLACEMENT

1. **REMOVE ENGINE UNDER COVER RH**
2. **DRAIN COOLANT****(See page 16-6)**
3. **REMOVE COOLER REFRIGERANT SUCTION HOSE NO.1****(See page 14-4)**
4. **REMOVE FAN AND GENERATOR V BELT****(See page 14-4)**
5. **REMOVE INTAKE MANIFOLD INSULATOR NO.2**
6. **REMOVE GENERATOR BRACKET NO.1**

(a) Disconnect the wire clamp from the generator bracket No.1.

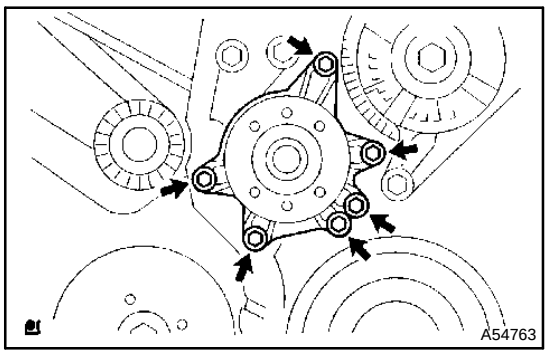
(b) Remove 2 nuts and the generator bracket No.1.

7. **REMOVE GENERATOR ASSY****(See page 19-8)**

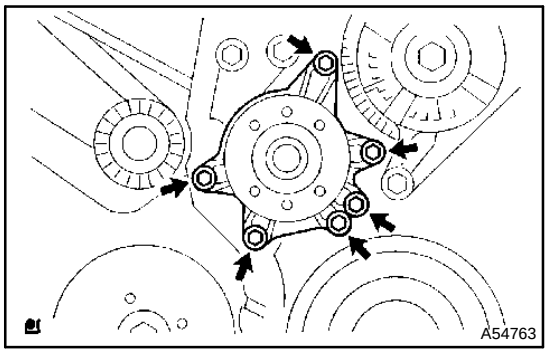


8. **REMOVE WATER PUMP ASSY**

(a) Using SST, remove 4 bolts and the water pump pulley.
SST 09960-10010 (09962-01000, 09963-00600)



(b) Remove 6 bolts, water pump and O-ring.

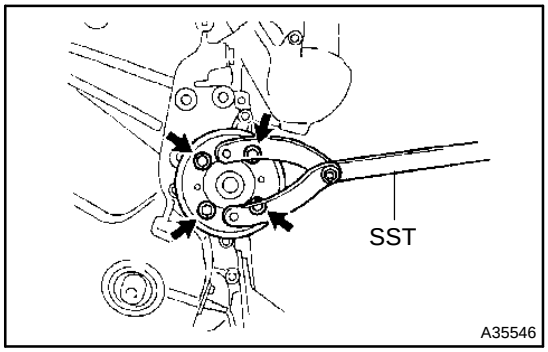


9. **INSTALL WATER PUMP ASSY**

(a) Place a new O-ring on the timing chain cover.

(b) Install the water pump with 6 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

CONTINUED



(c) Using SST, install the water pump pulley.
SST 09960-10010 (09962-01000, 09963-00600)
Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)

10. INSTALL GENERATOR ASSY(See page 19-8)
11. INSTALL GENERATOR BRACKET NO.1 (See page 19-8)
12. ADD COOLANT(See page 16-6)
13. INSPECT CHECK FOR ENGINE COOLANT LEAKS(See page 16-1)

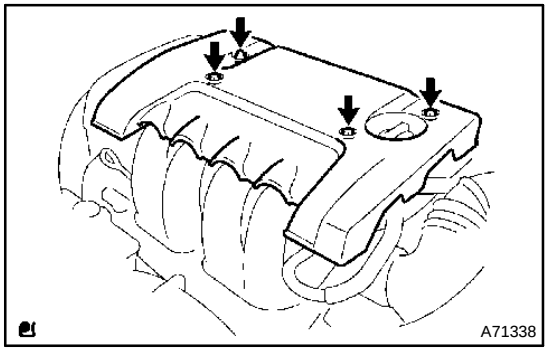
CONTINUED

THERMOSTAT (2ZZ-GE)

160EK-01

REPLACEMENT

1. **REMOVE ENGINE UNDER COVER RH**
2. **DRAIN COOLANT****(See page 16-6)**



3. **REMOVE CYLINDER HEAD COVER NO.2**

(a) Remove 3 bolts, nut and the cylinder head cover.

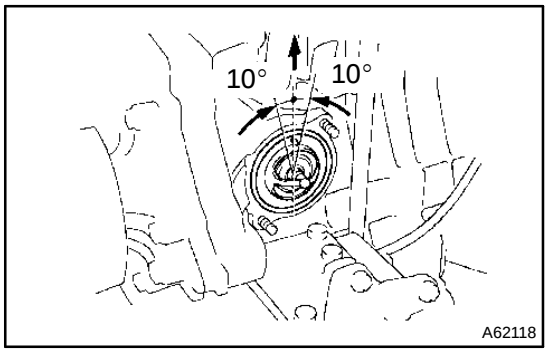
4. **REMOVE COOLER REFRIGERANT SUCTION HOSE NO.1****(See page 14-4)**
5. **REMOVE FAN AND GENERATOR V BELT****(See page 14-4)**
6. **REMOVE INTAKE MANIFOLD INSULATOR NO.2**
7. **REMOVE GENERATOR BRACKET NO.1**

(a) Disconnect the wire clamp from the generator bracket No.1.
(b) Remove 2 bolts and the generator bracket No.1.

8. **REMOVE GENERATOR ASSY****(See page 19-8)**
9. **REMOVE WATER INLET**

(a) Remove a bolt 2, nuts and the water inlet.

10. **REMOVE THERMOSTAT**



11. **INSTALL THERMOSTAT**

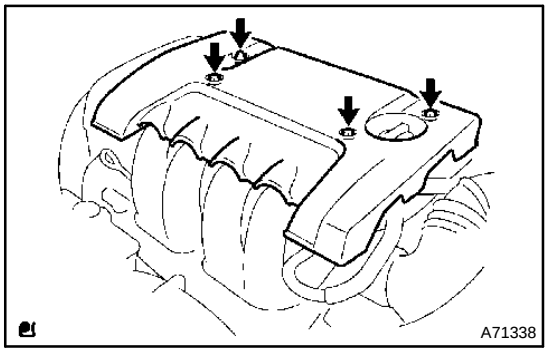
(a) Install a new gasket to the thermostat.
(b) Install the thermostat with the jiggle valve upward as shown in the illustration.

12. **INSTALL WATER INLET**

(a) Install a bolt, 2 nuts and the water inlet.

13. **INSTALL GENERATOR ASSY****(See page 19-8)**
14. **INSTALL GENERATOR BRACKET NO.1****(See page 19-8)**

CONTINUED



15. INSTALL CYLINDER HEAD COVER NO.2

(a) Install the cylinder ead cover with 3 bolts and nut.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

16. ADD COOLANT**(See page 16-6)**

17. INSPECT CHECK FOR ENGINE COOLANT LEAKS**(See page 16-1)**

CONTINUED

RADIATOR ASSY (2ZZ-GE)

1600W-05

REPLACEMENT

1. **DRAIN COOLANT****(See page 16-6)**
2. **SEPARATE RADIATOR HOSE INLET**
3. **SEPARATE RADIATOR HOSE OUTLET**
4. **REMOVE RADIATOR SUPPORT UPPER**
5. **REMOVE RADIATOR ASSY**

(a) Disconnect the fan motor connector.
(b) Disconnect 2 clamps for wire-harness from fan shroud.
(c) Remove 2 fan mount bolts.
(d) Remove the fan w/motor.

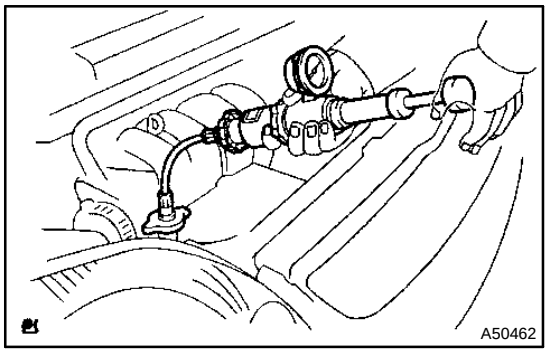
6. **INSTALL RADIATOR ASSY**
7. **ADD COOLANT****(See page 16-6)**
8. **CHECK FOR ENGINE COOLANT LEAKS****(See page 16-1)**

CONTINUED

COOLING SYSTEM (4ZZ-FE)

ON-VEHICLE INSPECTION

1600T-08



1. INSPECT COOLING SYSTEM FOR LEAKS

CAUTION:

To avoid the danger of being burned, do no remove the reservoir cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Warm up the engine.

(c) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi), and check that the pressure does not drop.

HINT:

If the pressure drops, check to hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

2. CHECK ENGINE COOLANT LEVEL AT RESERVOIR

(a) The engine coolant level should be between the "LOW" and "FULL" line.

HINT:

If low, check for leaks and add "Toyota Long Life Coolant" or equivalent up to the "FULL" line.

3. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(b) Check if there is any excessive deposits of rust or scale around the radiator cap and radiator filler hole; the coolant should be free from oil.

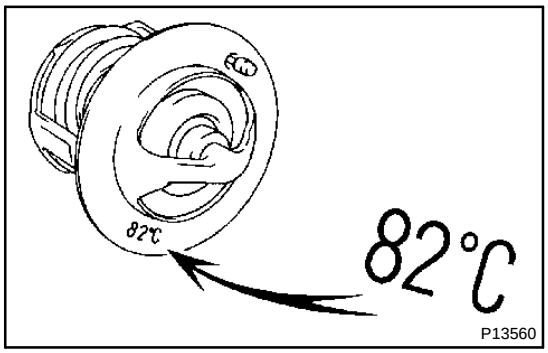
HINT:

If excessively dirty, replace the coolant.

(c) Reinstall the radiator cap.

CONTINUED

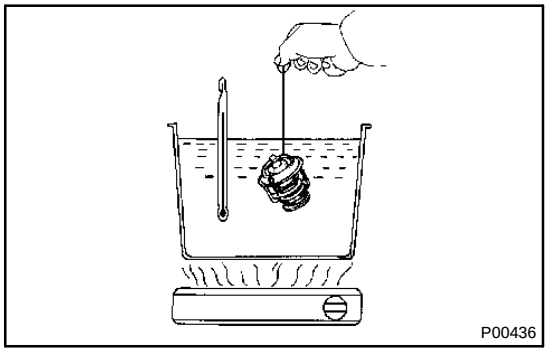
INSPECTION



P13560

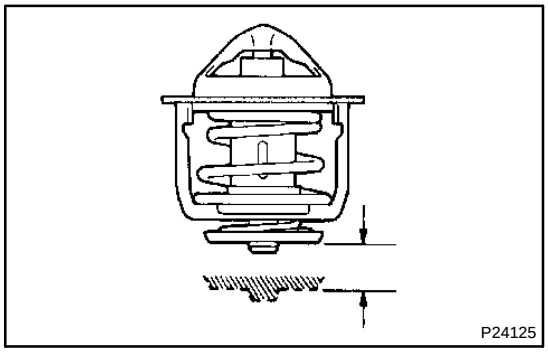
1. THERMOSTAT

HINT:
The thermostat is numbered with the valve opening temperature.


P00436

(a) Immerse the thermostat in water an gradually heat the water.
(b) Check the valve opening temperature.
Valve opening temperature:
80 - 84°C (176 - 183°F)

HINT:
If the valve opening temperature is not as specified, replace the thermostat.


P24125

(c) Check the valve lift.
Valve lift: 10 mm (0.394 in.) or more at 95°C (203°F)

HINT:
If the valve lift is not as specified, replace the thermostat.
(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 77°C (171°F)).

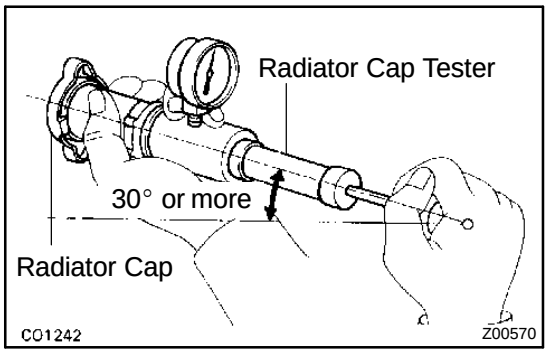
HINT:
If not closed, replace the thermostat.

CONTINUED

2. RADIATOR CAP SUB-ASSY

NOTICE:

- **If the radiator cap has contaminations, always rinse it with water.**
- **Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.**
- **When performing step (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.**



(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.
Pump speed: 1 push / (3 seconds or more)

NOTICE:

Push the pump at a constant speed.

HINT:

- Pump speed: 1 push / (3 seconds or more)
- If air is not coming from the vacuum valve, replace the reservoir cap.

(b) Pump the tester and measure the relief valve opening pressure.
Standard opening pressure:
74 - 103 kPa (0.75 - 1.05 kgf/cm^2, 10.7 - 14.9 psi)
Minimum opening pressure:
59 kPa (0.6 kgf/cm^2, 8.5 psi)

NOTICE:

This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.

HINT:

- Pump speed: 1 push within 1 second
- Use the tester's maximum reading as the opening pressure.
- If the opening pressure is less than minimum, replace the reservoir cap.

CONTINUED

COOLING FAN SYSTEM (4ZZ-FE)

1600R-08

ON-VEHICLE INSPECTION

1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 83°C (181°F))

(a) Turn the ignition switch ON.

(b) Check that the cooling fan stops.

HINT:

If not, check the cooling fan relay and water temperature sensor, and check for separated connector or severed wire between the cooling fan relay and water temperature sensor.

(c) Disconnect the water temperature sensor connector.

(d) Check that the cooling fan rotates.

If not, check the fuses, cooling fan relay, ECM and cooling fan, and check for a short circuit between the cooling fan relay and water temperature sensor.

(e) Reconnect the water temperature sensor connector.

2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 93°C (199°F))

(a) Start the engine, and raise coolant temperature to above 93°C (199°F).

HINT:

Coolant temperature is the detected value by the water temperature sensor on the water outlet.

(b) Check that the cooling fan rotates.

HINT:

If not, replace the water temperature sensor.

3. INSPECT COOLING FAN

(a) Disconnect the cooling fan connector.

(b) Connect battery and ammeter to the connector.

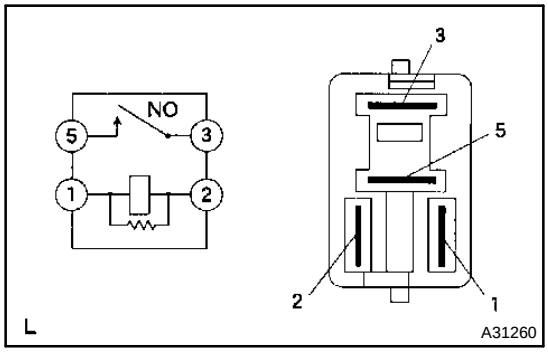
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage: Approx. 8 - 12 A at 20°C (68°F)

(d) Reconnect the cooling fan connector.

CONTINUED

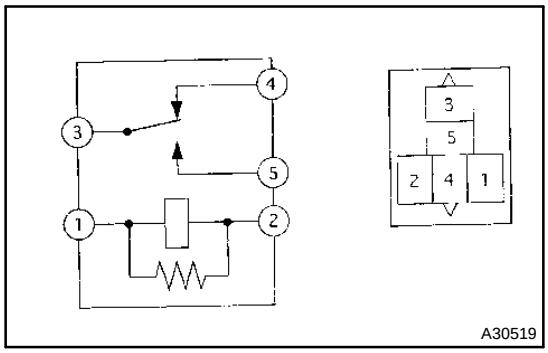
INSPECTION



1. COOLING FAN RELAY

Specified condition:

Condition	Tester connection	Specified condition
Constant	1 – 2	Continuity
Apply B+ between terminals 1 and 2	3 – 5	Continuity



2. COOLING FAN RELAY NO.2

Specified condition:

Condition	Tester connection	Specified condition
Constant	1 – 2 3 – 4	Continuity
Apply B+ between terminals 1 and 2	3 – 5	Continuity

3. COOLING FAN RESISTOR (W/ AIR CONDITIONER)

(a) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 1.17 – 1.43 Ω at 20 °C (68 °F)

CONTINUED

COOLANT (4ZZ-FE)

REPLACEMENT

1600V-09

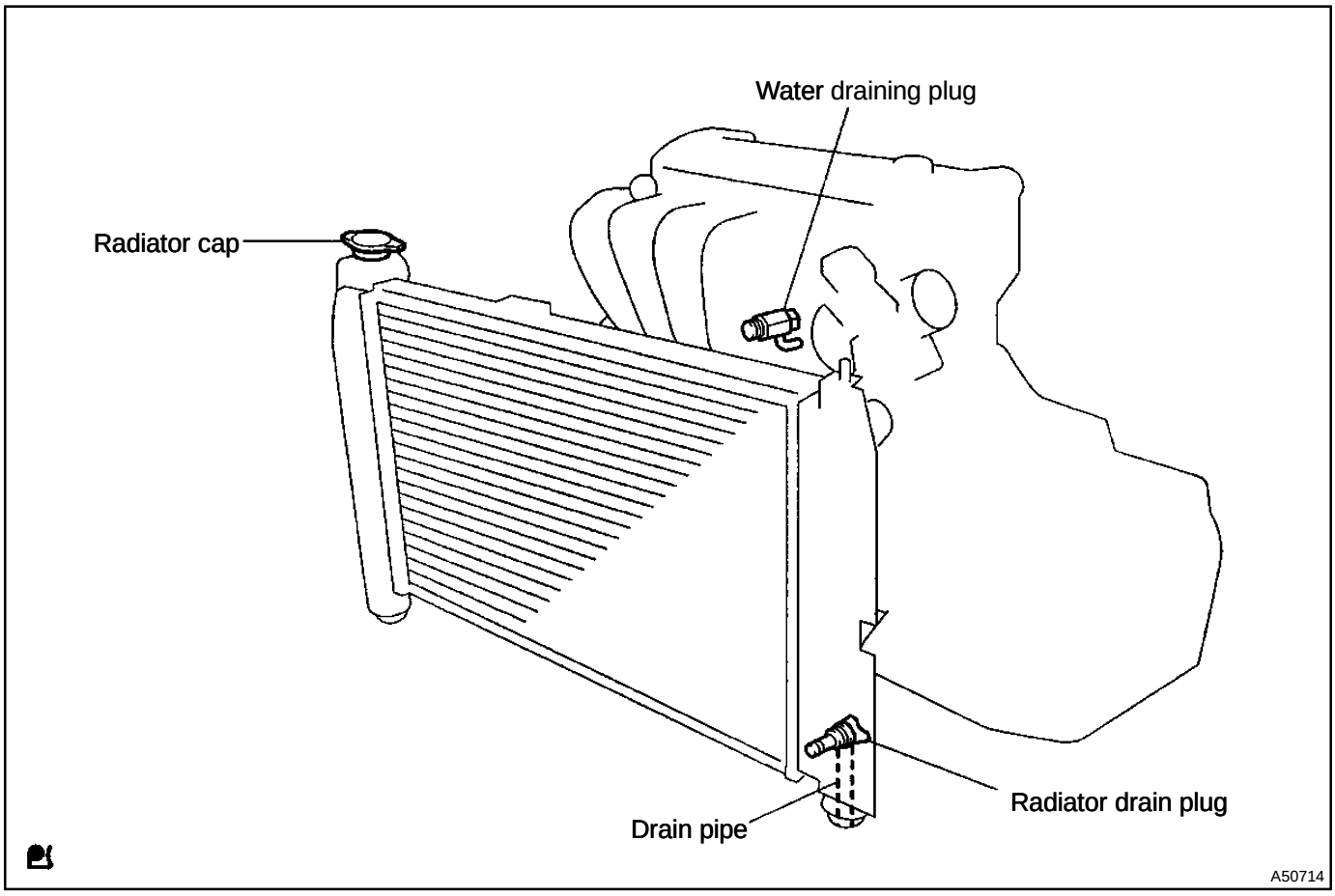
1. DRAIN COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(a) Remove the radiator cap.

(b) Loosen the radiator and engine drain plug and drain the coolant.



2. ADD COOLANT

(a) Tighten the radiator and engine drain plug, and pour coolant into radiator until it overflows.
Capacity: 6.5 liters (6.9 US qts, 5.7 lmp. qts)

HINT:

- Press the radiator inlet and outlet hose several times with hard.
- If the coolant level gets lower, pour coolant.

(b) Tighten the radiator cap.

(c) Pour engine coolant into the reservoir tank until it reaches full line.

(d) Warm up the engine until the thermostat valve begins to open.

HINT:

Press the radiator inlet and outlet hose several times with hard during the warming up.

(e) Stop the engine and wait until the coolant temp. gets cold. Then remove the radiator cap to check the coolant level.

(f) If the level gets lower, perform the procedures above again.

CONTINUED

(g) If the level does not gets lower, adjust the reservoir tank coolant level.

3. CHECK FOR ENGINE COOLANT LEAKS

(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi) and check leakage.

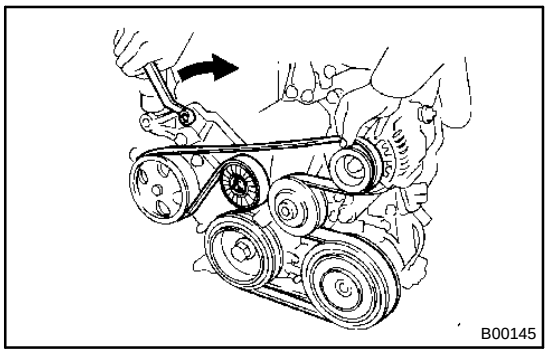
CONTINUED

WATER PUMP ASSY (4ZZ-FE)

1601A-04

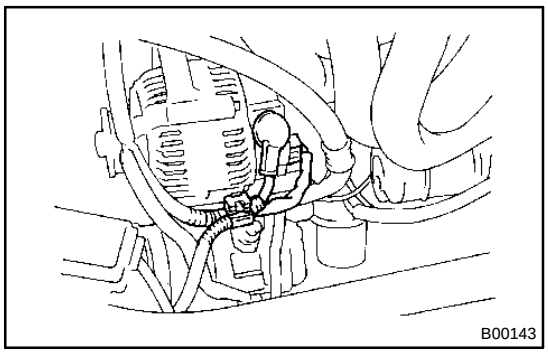
REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH
2. DRAIN COOLANT(See page 16-18)



3. REMOVE FAN AND GENERATOR V BELT

(a) Turn the drive belt tensioner slowly clockwise and loosen it. Then, remove the drive belt and put back the drive belt tensioner little by little and fix it quietly.

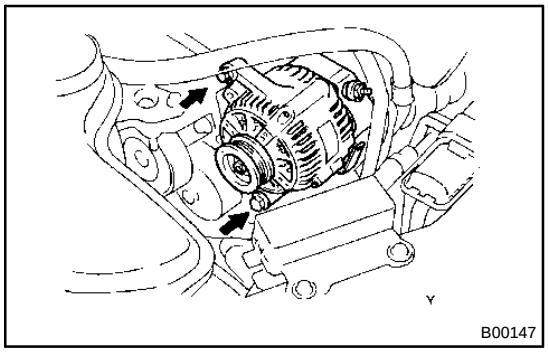


4. REMOVE GENERATOR ASSY

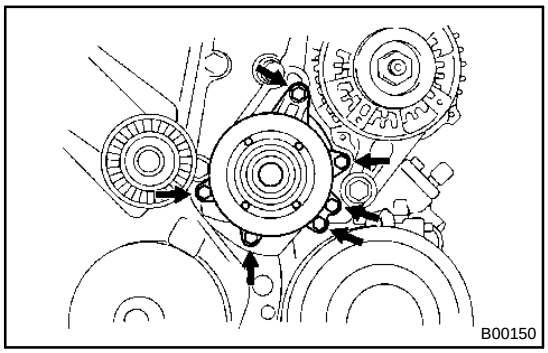
(a) Disconnect the wire clamp from the wire clip on the rectifire end frame.

(b) Remove the rubber cap and nut, and disconnect the alternator wire.

(c) Disconnect the alternator connector.



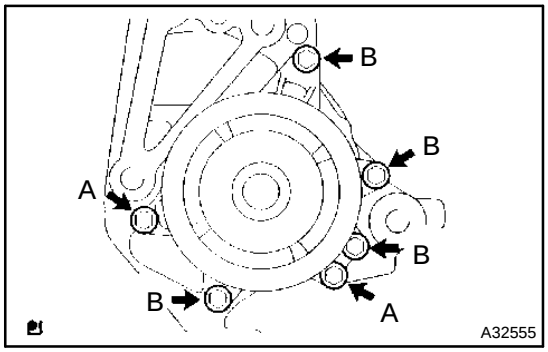
(d) Remove the 2 bolts and alternator.



5. REMOVE WATER PUMP ASSY

(a) Remove the 6 bolts, water pump and O-ring.

CONTINUED



6. INSTALL WATER PUMP ASSY

(a) Place a new O-ring on the timing chain cover.

(b) Install the water pump with the 6 bolts.

Torque:
9.0 N·m (92 kgf·cm, 80 in·lbf) for Bolt A
11 N·m (113 kgf·cm, 8 ft·lbf) for Bolt B

7. INSTALL GENERATOR ASSY

Torque:
12 mm head 25 N·m (250 kgf·cm, 18 ft·lbf)
14 mm head 54 N·m (550 kgf·cm, 39 ft·lbf)

8. ADD COOLANT**(See page 16-18)**

9. CHECK FOR ENGINE COOLANT LEAKS**(See page 16-13)**

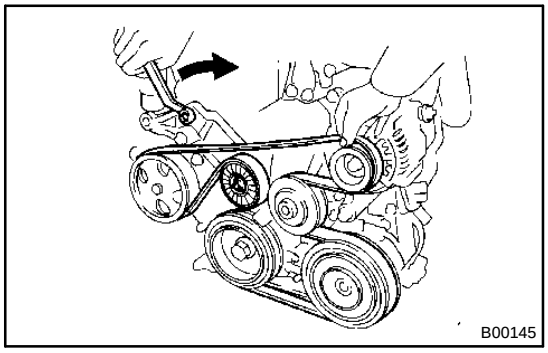
CONTINUED

THERMOSTAT (4ZZ-FE)

1601B-04

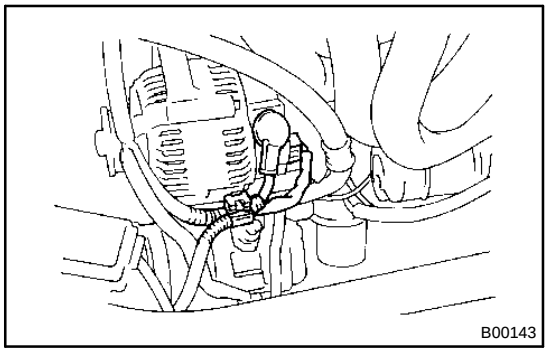
REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH
2. DRAIN COOLANT(See page 16-18)



3. REMOVE FAN AND GENERATOR V BELT

(a) Turn the drive belt tensioner slowly clockwise and loosen it. Then, remove the drive belt and put back the drive belt tensioner little by little and fix it quietly.

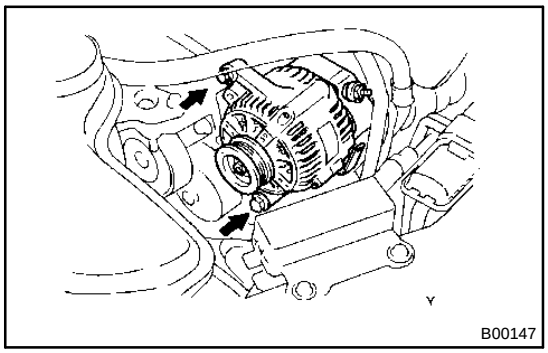


4. REMOVE GENERATOR ASSY

(a) Disconnect the wire clamp from the wire clip on the rectifire end frame.

(b) Remove the rubber cap and nut, and disconnect the alternator wire.

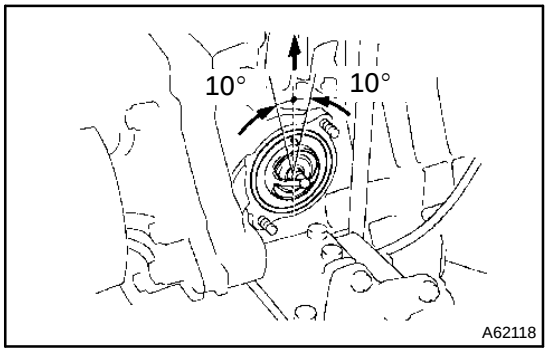
(c) Disconnect the alternator connector.



(d) Remove the 2 bolts and alternator.

5. REMOVE WATER INLET
6. REMOVE THERMOSTAT

CONTINUED



7. INSTALL THERMOSTAT

(a) Install a new gasket to the thermostat.

(b) Install the thermostat with the jiggle valve upward as shown in the illustration.

8. INSTALL WATER INLET
Torque: 11 N·m (113 kgf·cm, 8 ft·lbf)

9. INSTALL GENERATOR ASSY
Torque:
12mm head 25 N·m (250 kgf·cm, 18 ft·lbf)
14mm head 54 N·m (550 kgf·cm, 39 in.·lbf)

10. ADD COOLANT**(See page 16-18)**

11. CHECK FOR ENGINE COOLANT LEAKS**(See page 16-13)**

CONTINUED

RADIATOR ASSY (4ZZ-FE)

1600W-06

REPLACEMENT

1. **DRAIN COOLANT****(See page 16-18)**
2. **SEPARATE RADIATOR HOSE INLET**
3. **SEPARATE RADIATOR HOSE OUTLET**
4. **REMOVE RADIATOR SUPPORT UPPER**
5. **REMOVE RADIATOR ASSY**

(a) Disconnect the fan motor connector.
(b) Disconnect two clamps for wire-harness from fan-shroud.
(c) Remove the two fan mount bolts.
(d) Remove the fan w/motor.

6. **INSTALL RADIATOR ASSY**
7. **ADD COOLANT****(See page 16-18)**
8. **CHECK FOR ENGINE COOLANT LEAKS****(See page 16-13)**

CONTINUED

LUBRICATION

LUBRICATION SYSTEM (2ZZ-GE) 17-1
ON-VEHICLE INSPECTION 17-1/2
OIL PUMP ASSY (2ZZ-GE) 17-3
REPLACEMENT 17-3
OIL FILTER SUB-ASSY (2ZZ-GE) 17-4
REPLACEMENT 17-4
OIL COOLER ASSY (2ZZ-GE) 17-5
REPLACEMENT 17-5
LUBRICATION SYSTEM (4ZZ-FE) 17-6
ON-VEHICLE INSPECTION 17-6/7
OIL PUMP ASSY (4ZZ-FE) 17-8
REPLACEMENT 17-8
OIL FILTER SUB-ASSY (4ZZ-FE) 17-9
REPLACEMENT 17-9

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement	RM926E

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

CONTINUED

LUBRICATION SYSTEM (2ZZ-GE)

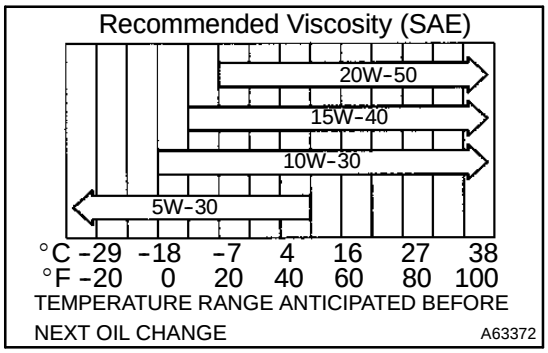
1700F-07

ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL

(a) After warming up the engine and then 5 minutes after the engine stop, oil level should be between the "L" and "F" marks on the dipstick. If low, check for leakage and add oil up to the "F" mark.

NOTICE:
Do not fill with engine oil above the "F" mark.

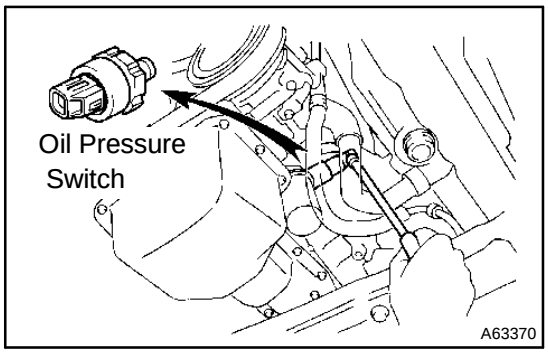


2. CHECK ENGINE OIL QUALITY

(a) Check the oil for deterioration, entry of water, discoloring or thinning.

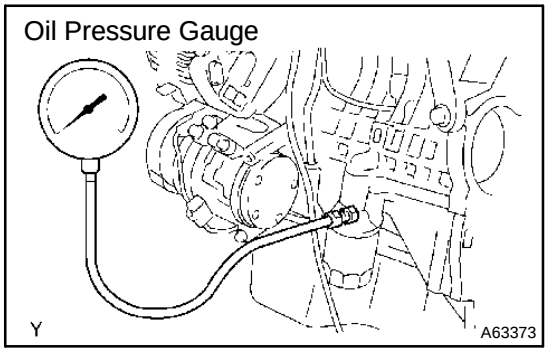
(b) If the quality is visibly poor, replace the oil.

Oil grade:
API grade "SJ" Energy-Conserving, "SL" Energy-Conserving or ILSAC multigrade engine oil. Recommended viscosity is as shown in the illustration.



3. REMOVE OIL PRESSURE SWITCH ASSY

(a) Disconnect the oil pressure switch connector and remove the oil pressure switch.



4. INSTALL OIL PRESSURE GAUGE

(a) Install the oil pressure gauge.

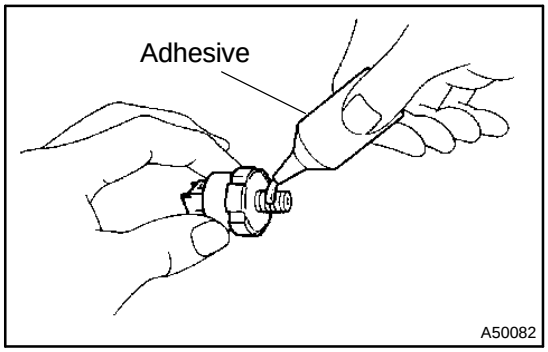
5. WARM UP ENGINE

6. CHECK OIL PRESSURE

Oil pressure:

Ebgine conditions	Oil pressure
At idle	39.2 kPa (0.4 kgf·cm^2, 5.7 psi) or more
At 3,000 rpm	294 - 539 kPa (3.0 - 5.5 kgf·cm^2, 43 - 78 psi) or more

CONTINUED



7. INSTALL OIL PRESSURE SWITCH

(a) Apply adhesive to 2 or 3 threads of the oil pressure switch.
Adhesive:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Install the oil pressure switch.
Torque: 13 N·m (130 kgf·cm, 9.0 ft·lbf)

(c) Connect the oil pressure switch connector.

8. START ENGINE AND CHECK FOR LEAKS

CONTINUED

OIL PUMP ASSY (2ZZ-GE)

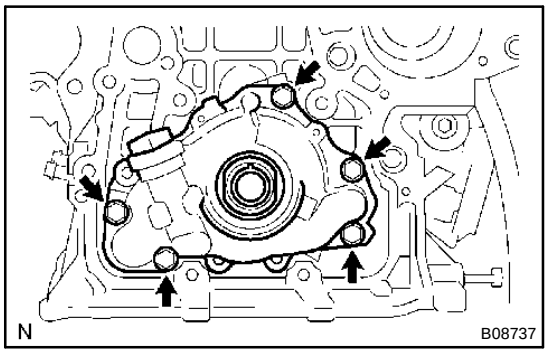
1700T-05

REPLACEMENT

1. DRAIN ENGINE OIL

(a) Remove the oil pan drain plug and drain the engine oil.

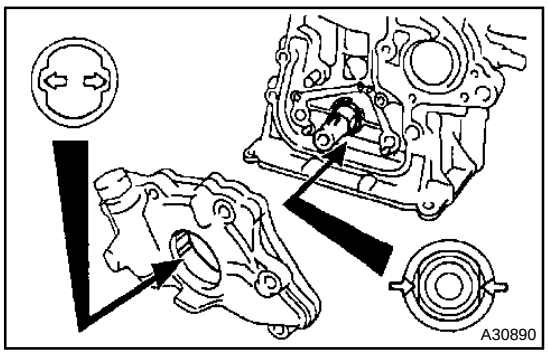
2. REMOVAL & INSTALLATION CHAIN SUB-ASSY **(See page 14-39)**



3. REMOVE OIL PUMP ASSY

(a) Remove 5 bolts.

(b) Remove the oil pump assy and gasket.



4. INSTALL OIL PUMP ASSY

(a) Place a new gasket on the cylinder block.

(b) Engine the spline teeth of the oil pump drive rotor with the large teeth on the crankshaft, and side the oil pump.

(c) Install the oil pump with 5 bolts.

Torque: 9.0 N·m (92 kgf·cm, 80 ft·lbf)

5. INSTALL OIL PAN DRAIN PLUG

(a) Clean and install the oil pan drain plug with a new gasket.

Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

6. ADD ENGINE OIL

Capacity:

Drain and refill w/ Oil filter change 4.4 liters (4.7 US qts, 3.9 lmp. qts)

Drain and refill w/o Oil filter change 4.2 Liters (4.4 US qts, 3.7 lmp. pts)

Dry fill 4.8 liters (5.1 US qts, 4.2 lmp. qts)

7. ADD COOLANT **(See page 16-6)**

8. INSPECT OIL LEAK

9. INSPECT CHECK FOR ENGINE COOLANT LEAKS **(See page 16-1)**

CONTINUED

OIL FILTER SUB-ASSY (2ZZ-GE)

1700V-08

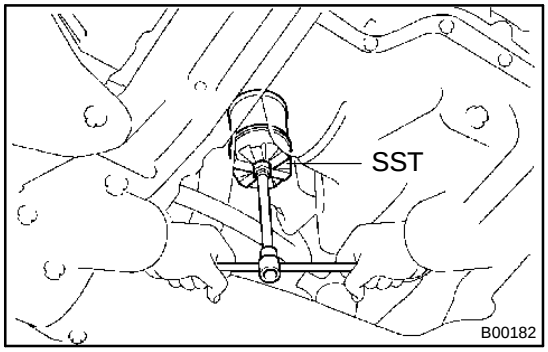
REPLACEMENT

CAUTION:

- **Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- **Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less hand cleaner to remove any used engine oil. Do not use gasoline, thinners, or solvents.**
- **In order to preserve the environment, used oil and used oil filter must be disposed of only at designated disposal sites.**

1. REMOVE ENGINE UNDER COVER RH

2. DRAIN ENGINE OIL



3. REMOVE OIL FILTER SUB-ASSY

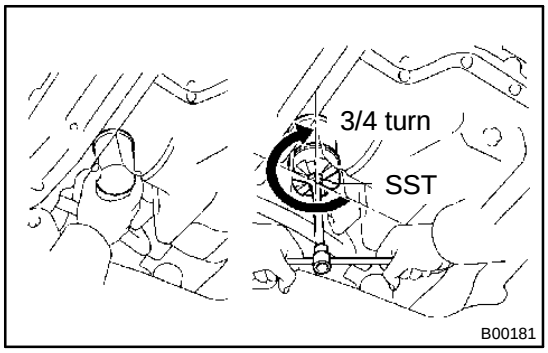
(a) Using SST, remove the oil filter.

SST 09228-06501

4. INSTALL OIL FILTER SUB-ASSY

(a) Check and clean the oil filter installation surface.

(b) Apply clean the engine oil to the gasket of a new oil filter.



(c) Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.

(d) Using SST, tighten it an additional 3/4 turn.

SST 09228-06501

5. INSTALL OIL PAN DRAIN PLUG

(a) Clean and install the oil drain plug with a new gasket.

Torque: 37 N·m (377 kgf·cm, 27 ft.·lbf)

6. ADD ENGINE OIL

Capacity:

Drain and refill w/ Oil filter change 4.4 liters (4.7 US qts, 3.9 Imp. qts)

Drain and refill w/o Oil filter change 4.2 liters (4.4 US qts, 3.7 Imp. qts)

Dry fill 4.8 liters (5.1 US qts, 4.2 Imp. qts)

7. INSPECT OIL LEAK

CONTINUED

OIL COOLER ASSY (2ZZ–GE)

1700U–03

REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH
2. DRAIN ENGINE OIL
3. DRAIN COOLANT **(See Page 16–6)**
4. REMOVE OIL FILTER SUB–ASSY **(See Page 17–4)**
SST 09228–06501
5. REMOVE OIL COOLER ASSY
(a) Disconnect 2 water by pass hoses.
(b) Using socket wrench (30mm), remove the union.
(c) Remove the oil cooler and O–ring.
6. INSTALL OIL COOLER ASSY
(a) Check and clean the oil cooler surface.
(b) Install the new O–ring to oil cooler.
(c) Apply clean engine oil to the O–ring.
(d) Using socket wrench (30mm), install the union and oil cooler.
Torque: 79 N·m (806 kgf·cm, 58 ft·lbf)
7. INSTALL OIL FILTER SUB–ASSY **(See Page 17–4)**
SST 09228–06501
8. INSTALL OIL PAN DRAIN PLUG
(a) Clean and install the oil drain plug with a new gasket.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)
9. ADD ENGINE OIL
10. ADD COOLANT **(See Page 16–6)**
11. INSPECT OIL LEAK
12. INSPECT CHECK FOR ENGINE COOLANT LEAKS **(See Page 16–1)**

CONTINUED

LUBRICATION SYSTEM (4ZZ-FE)

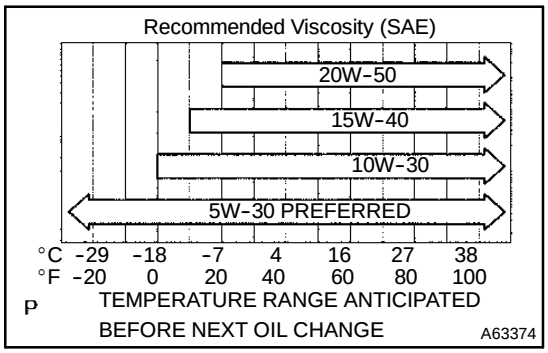
1700F-08

ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL

(a) After warming up the engine and then 5 minutes after the engine stop, oil level should be between the "L" and "F" marks on the dipstick. If low, check for leakage and add oil up to the "F" mark.

NOTICE:
Do not fill with engine oil above the "F" mark.



2. CHECK ENGINE OIL QUALITY

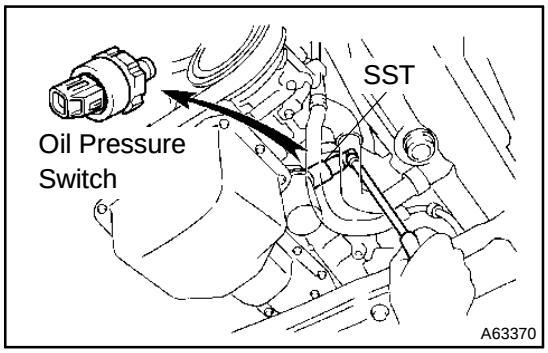
(a) Check the oil for deterioration, entry of water, discoloring or thinning.

(b) If the quality is visibly poor, replace the oil.

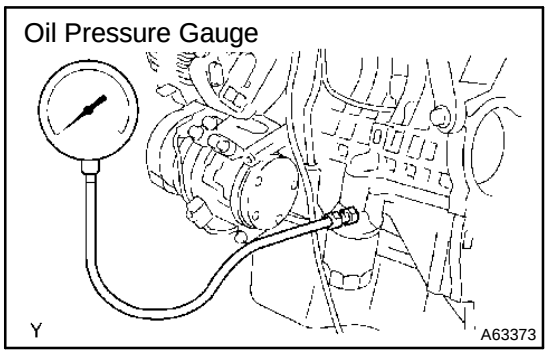
Oil grade:
API grade "SJ" Energy-Conserving, "SL" Energy-Conserving or ILSAC multigrade engine oil. Recommended viscosity is as shown in the illustration.

3. REMOVE OIL PRESSURE SWITCH ASSY

(a) Disconnect the oil pressure switch connector.



(b) Using SST, remove the oil pressure switch.
SST 09268-46021



4. INSTALL OIL PRESSURE GAUGE

(a) Install the oil pressure gauge.

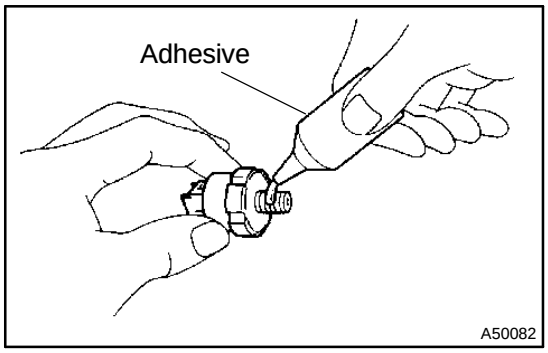
5. WARM UP ENGINE

CONTINUED

6. CHECK OIL PRESSURE

Oil pressure:

At idle	29 kPa (0.3 kgf·cm^2, 4.3 psi) or more
At 3,000 rpm	294 – 539 kPa (3.0 – 5.5 kgf·cm^2, 43 – 78 psi) or more



7. INSTALL OIL PRESSURE SWITCH

(a) Apply adhesive to 2 or 3 threads of the oil pressure switch.
Adhesive:
Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Using SST, install the oil pressure switch.
SST 09268–46021
Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)

(c) Connect the oil pressure switch connector.

8. START ENGINE AND CHECK FOR LEAKS

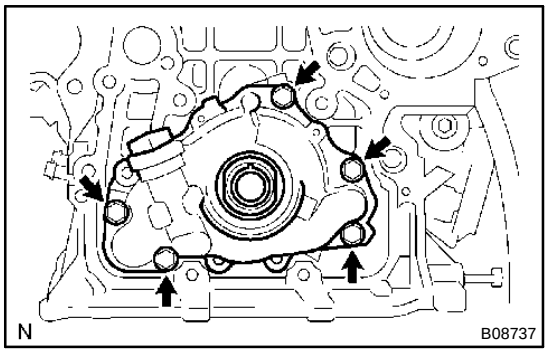
CONTINUED

OIL PUMP ASSY (4ZZ-FE)

1700T-06

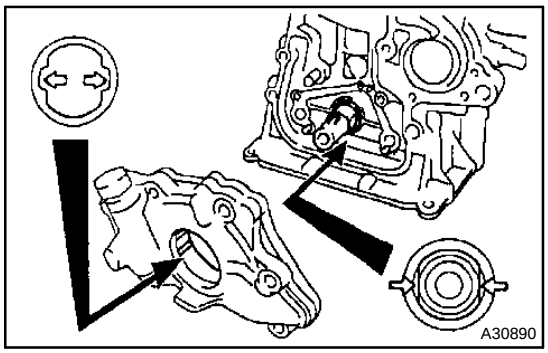
REPLACEMENT

1. REMOVE CHAIN SUB-ASSY **(See page 14-129)**



2. REMOVE OIL PUMP ASSY

(a) Remove the 5 bolts, oil pump and gasket.



3. INSTALL OIL PUMP ASSY

(a) Place a new gasket on the cylinder block.

(b) Engage the spline teeth of the oil pump drive rotor with the large teeth of the crankshaft, and side the oil pump.

(c) Install the oil pump with the 5 bolts.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

4. INSTALL CHAIN SUB-ASSY **(See page 14-129)**

CONTINUED

OIL FILTER SUB-ASSY (4ZZ-FE)

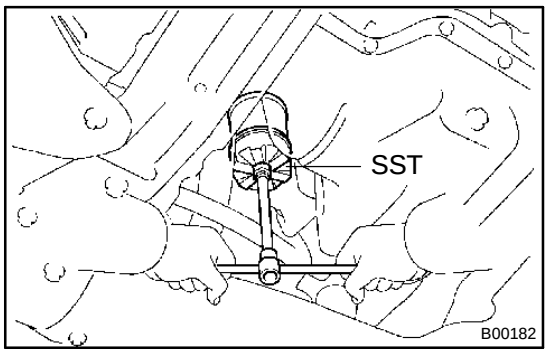
1700V-09

REPLACEMENT

CAUTION:

- **Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- **Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less hand cleaner to remove any used engine oil. Do not use gasoline, thinners, or solvents.**
- **In order to preserve the environment, used oil and used oil filter must be disposed of only at designated disposal sites.**

1. DRAIN ENGINE OIL



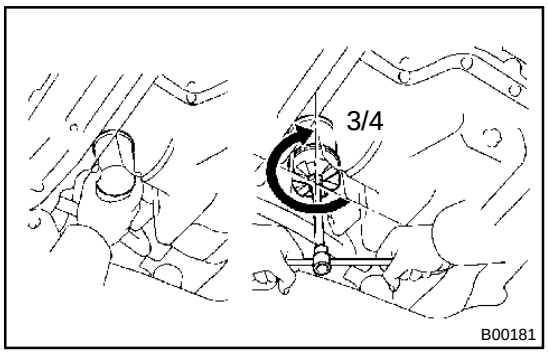
2. REMOVE OIL FILTER SUB-ASSY

(a) Using SST, remove the oil filter.
SST 09228-06501

3. INSTALL OIL FILTER SUB-ASSY

(a) Check and clean the oil filter installation surface.

(b) Apply clean engine oil to the gasket of a new oil filter.



(c) Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.

(d) Using SST, tighten it an additional 3/4 turn.
SST 09228-06501

4. INSTALL OIL PAN DRAIN PLUG

(a) Clean and install the oil drain plug with a new gasket.
Torque: 37 N·m (378 kgf·cm, 27 ft.·lbf)

5. ADD ENGINE OIL

Capacity:
Drain and refill w/ Oil filter change 3.7 liters (3.9 US qts, 3.3 lmp. qts)
Drain and refill w/o Oil filter change 3.5 liters (3.7 US qts, 3.1 lmp. qts)
Dry fill 4.2 liters (4.4 US qts, 3.7 lmp. qts)

6. INSPECT OIL LEAK

CONTINUED

IGNITION

IGNITION SYSTEM (2ZZ-GE) 18-1
ON-VEHICLE INSPECTION 18-1
INSPECTION 18-2/3
IGNITION SYSTEM (4ZZ-FE) 18-4
ON-VEHICLE INSPECTION 18-4/5
INSPECTION 18-6

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement	RM926E

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

CONTINUED

IGNITION SYSTEM (2ZZ-GE)

18005-05

ON-VEHICLE INSPECTION

NOTICE:

"Cold" and "Hot" in these sentences express the temperature of the coils themselves."Cold" is from -10°C (14°F) to 50 °C (122 °F) and "Hot" is from 50 °C (122 °F) to 100 °C (212 °F).

1. INSPECT IGNITION COIL (WITH IGNITER) AND SPARK TEST

(a) Confirm DTC.

NOTICE:

If DTC is indicated, carry out troubleshooting in accordance with the procedure on the following DTC.

(b) Check that the spark occurs.

(1) Remove the ignition coils (with igniter).

(2) Using a 16mm (0.63 in) plug wrench, remove the spark plugs.

(3) Install the spark plugs to each ignition coils (with igniter), and connect the ignition coil connectors.

(4) Disconnect 4 injector connectors.

(5) Ground the spark plugs.

(6) Check if spark occurs while engine is being cranked.

NOTICE:

- **Be sure to ground the spark plug, when checking.**
- **Replace the ignition coil when it is given an impact.**
- **Do not crank the engine for more than 2 seconds.**

If the spark does not occur, do the test as follow.

(c) Using a 16 mm (0.63 in.) plug wrench, install the spark plugs.

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

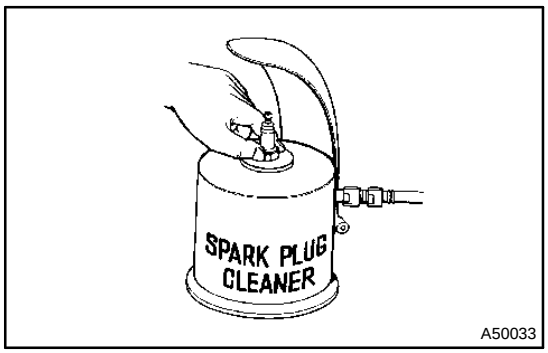
(d) Install the ignition coil with igniter.

Torque: 9.0 N·m (91 kgf·cm, 80 in.·lbf)

CONTINUED

18004-05

INSPECTION



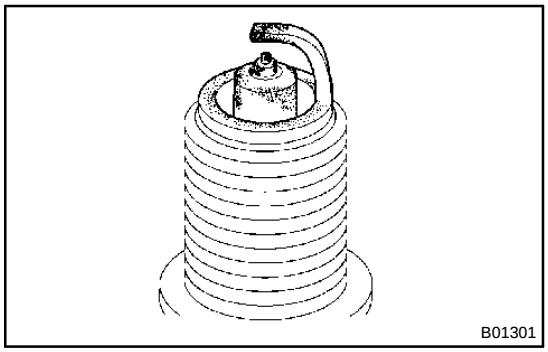
1. SPARK PLUG

NOTICE:

- **Never use a wire brush for cleaning.**
- **Never attempt to adjust the electrode gap on used spark plug.**
- **Spark plug should be replaced every 100,000 km (60,000 miles).**

(a) Clean the spark plugs.

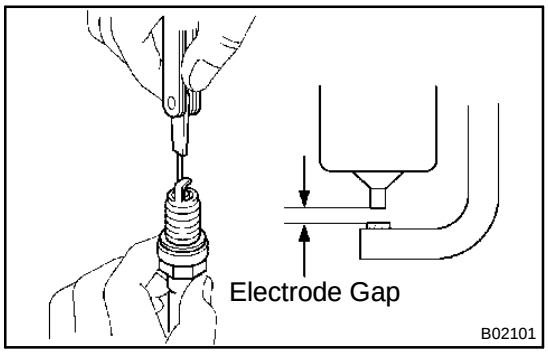
Air pressure: Below 588 kPa (6kg/cm^2, 85 psi)
Duration: 20 seconds or less



(b) Check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug:
SK20R11 (DENSO made)
IFR6A11 (NGK made)



(c) Check the spark plug electrode gap.

Electrode gap: 1.0 - 1.3mm (0.039 - 0.051 in.)

2. CAM POSITION SENSOR

(a) Using an ohmmeter, measure the resistance between terminals.

RESISTANCE:
At cold 835 - 1,400Ω
At hot 1,060 - 1,645Ω

If the resistance is not as specified, replace the camshaft position sensor.

NOTICE:

"Cold" and "Hot" on the table express the temperature of the coils themselves."Cold" is from -10°C (14°F) to 50 °C (122 °F) and "Hot" is from 50 °C (122 °F) to 100 °C (212 °F).

CONTINUED

3. CRANK POSITION SENSOR

(a) Using an ohmmeter, measure the resistance between terminals.

RESISTANCE:

At cold 1,630 – 2,740Ω

At hot 2,065 – 3,225Ω

If the resistance is not as specified, replace the camshaft position sensor.

NOTICE:

"Cold" and "Hot" on the table express the temperature of the coils themselves. "Cold" is from –10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

CONTINUED

IGNITION SYSTEM (4ZZ-FE)

18005-06

ON-VEHICLE INSPECTION

NOTICE:

"Cold" and "Hot" in these sentences express the temperature of the coils themselves."Cold" is from -10°C (14°F) to 50 °C (122 °F) and "Hot" is from 50 °C (122 °F) to 100 °C (212 °F).

1. INSPECT IGNITION COIL (WITH IGNITER) AND SPARK TEST

(a) Confirm DTC.

NOTICE:

If DTC is indicated, carry out troubleshooting in accordance with the procedure on the following DTC.

(b) Check that the spark occurs.

(1) Remove the ignition coils (with igniter).

(2) Using a 16mm (0.63 in) plug wrench, remove the spark plugs.

(3) Install the spark plugs to each ignition coils (with igniter), and connect the ignition coil connectors.

(4) Disconnect the 4 injector connectors.

(5) Ground the spark plugs.

(6) Check if spark occurs while engine is being cranked.

NOTICE:

- **Be sure to ground the spark plug, when checking.**
- **Replace the ignition coil when it is given an impact.**
- **Do not crank the engine for more than 2 seconds.**

If the spark does not occur, do the test as follow.

(c) Using a 16 mm (0.63 in.) plug wrench, install the spark plugs.

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

(d) Install the ignition coil with igniter.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

CONTINUED

2. FLOW CHART IN CASE THAT NO SPARK OCCURS

1	SPARK TEST (IF PARTIALLY OK, GO TO YES)

NO → GO TO STEP 4

YES

2	CHANGE THE FAILED SPARK PLUG TO THE OK PLUG, AND PERFORM SPARK TEST AGAIN.

OK → REPLACE THE SPARK PLUG NEW

NO

3	CHECK IGT SIGNAL FROM ECM. (See page 05-172)

NO → CHECK WIRING BETWEEN ECM AND IGNITION COIL WITH IGNITER, AND THEN TRY ANOTHER ECM.

OK

CHANGE TO NEW IGNITION COIL WITH IGNITER

4	CHECK IGT SIGNAL FROM ECM. (See page 05-172)

NO → CHECK WIRING BETWEEN ECM AND IGNITION COIL WITH IGNITER, AND THEN TRY ANOTHER ECM.

OK

5	CHANGE ALL SPARK PLUGS NEW, AND PERFORM SPARK TEST AGAIN.

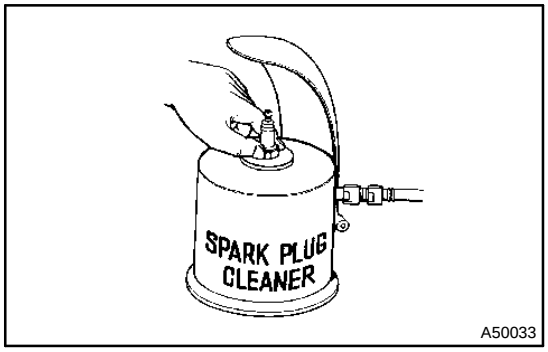
OK → THE SPARK PLUGS WERE BAD

NO

CHANGE TO NEW IGNITION COIL WITH IGNITER FOR FAILED ONES.

CONTINUED

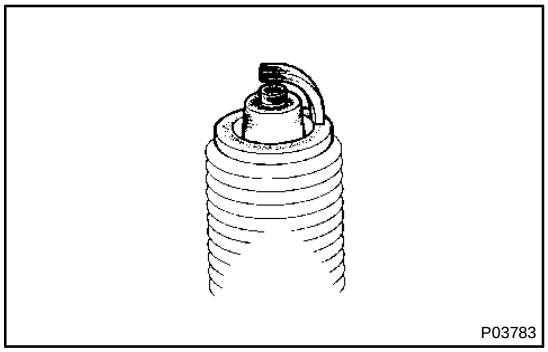
INSPECTION



A50033

1. SPARK PLUG

(a) Clean the spark plugs.
Air pressure: Below 588 kPa (6kg/cm^2, 85 psi)
Duration: 20 seconds or less

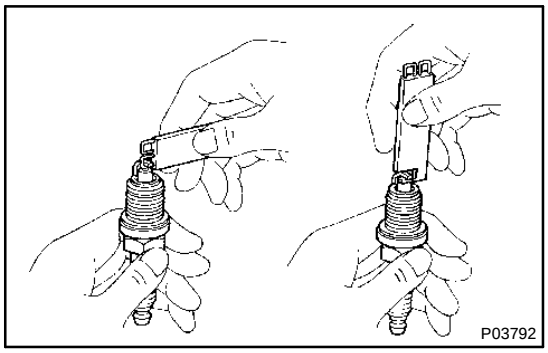

P03783

(b) Check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug:

DENSO made	K16R-U11
NGK made	BKR5EYA-11


P03792

(c) Adjust electrode gap.
Electrode gap:

DENSO made	1.1 mm (0.043 in.)
NGK made	1.1 mm (0.043 in.)

2. CRANK POSITION SENSOR NO.1

HINT:

Judge it by the pulse on oscilloscope because of check by value of resistance is impossible in this case.

(See page 05-169)

3. CRANK POSITION SENSOR

(a) Using an ohmmeter, measure the resistance between terminals.

RESISTANCE:

Cold	1,630 - 2,740 Ω
Hot	2,065 - 3,225 Ω

If the resistance is not as specified, replace the camshaft position sensor.

NOTICE:

"Cold" and "Hot" on the table express the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

CONTINUED

STARTING & CHARGING

STARTING SYSTEM (2ZZ-GE) 19-1
INSPECTION 19-1/2
STARTER ASSY (2ZZ-GE) 19-3
REPLACEMENT 19-3
CHARGING SYSTEM (2ZZ-GE) 19-4
PRECAUTION 19-4
ON-VEHICLE INSPECTION 19-5/7
GENERATOR ASSY (2ZZ-GE) 19-8
REPLACEMENT 19-8
STARTING SYSTEM (4ZZ-FE) 19-9
INSPECTION 19-9/10
STARTER ASSY (4ZZ-FE) 19-11
REPLACEMENT 19-11
CHARGING SYSTEM (4ZZ-FE) 19-12
PRECAUTION 19-12
ON-VEHICLE INSPECTION 19-13/15
GENERATOR ASSY (4ZZ-FE) 19-16
REPLACEMENT 19-16

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement	RM926E

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

CONTINUED

STARTING SYSTEM (2ZZ-GE)

INSPECTION

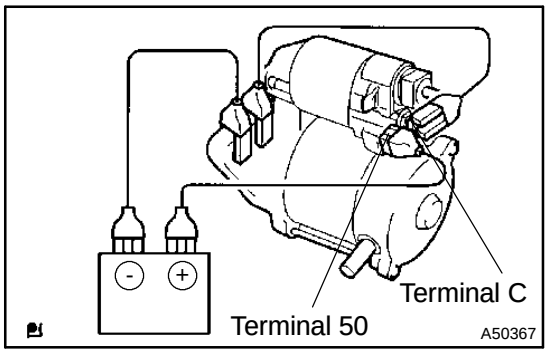
1900K-04

1. STARTER ASSY

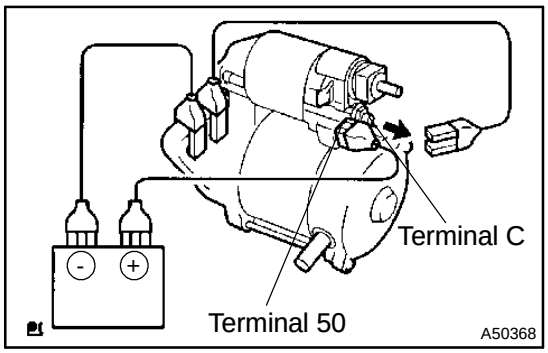
NOTICE:

These tests must be done within 3 to 5 seconds to avoid burning out the coil.

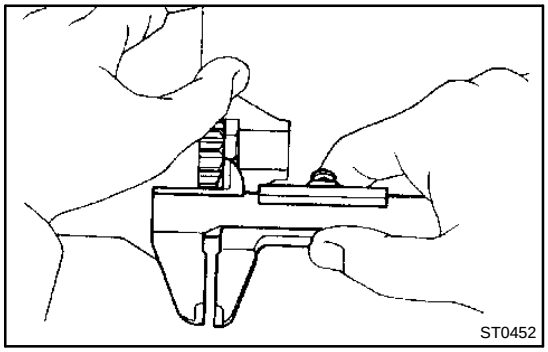
(a) Disconnect the field coil lead wire from terminal C.



(b) Connect the battery to the magnetic switch as shown. Check that the clutch pinion gear moves outward.

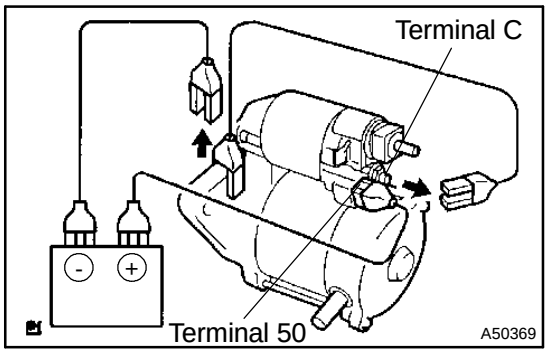


(c) With battery connected as above with the clutch pinion gear out, disconnect the negative (-) lead from terminal C. Check that the pinion gear remains out.



(d) Move the pinion gear toward the armature to remove slack and measure the clearance between the pinion gear end and stop collar.

Standard clearance: 1.0 - 5.0 mm (0.04 - 0.20 in.)

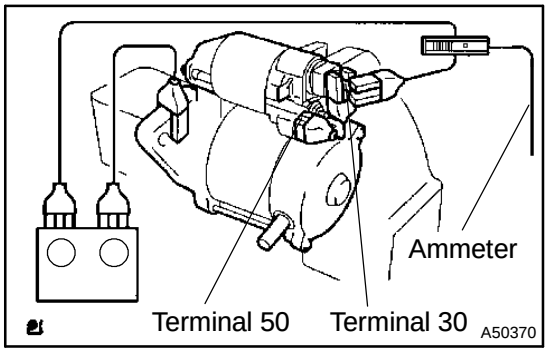


(e) Disconnect the negative (-) lead from the switch body. Check that the clutch pinion gear returns inward.

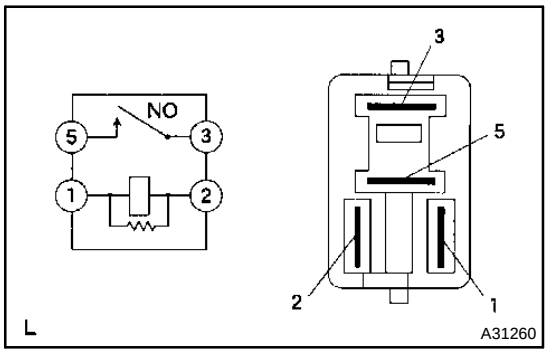
(f) Connect the field coil lead wire to terminal C.

Torque: 9.8 N·m (100 kgf·cm, 7.2 ft·lbf)

CONTINUED



(g) Grip the starter with a vise.
(h) Connect the battery and ammeter to the starter as shown.
(i) Check that the ammeter reads the specified current.
Specified current: 90 A or less at 11.5 V



2. STARTER RELAY ASSY
Specified condition:

Condition	Tester connection	Specified condition
Constant	1 - 2	Continuity
Apply B+ between terminals 1 and 2	3 - 5	Continuity

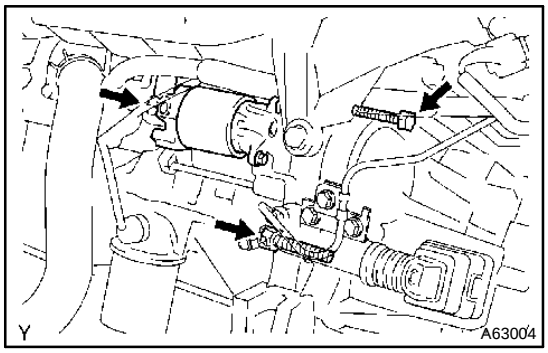
CONTINUED

STARTER ASSY (2ZZ-GE)

19013-05

REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH



2. REMOVE STARTER ASSY

(a) Disconnect the starter connector.

(b) Remove the nut and disconnect the starter wire.

(c) Remove 2 bolts and starter.

3. INSTALL STARTER ASSY

Torque:

Bolt 37 N·m (380 kgf·cm, 28 ft·lbf)

Wiring 9.8 N·m (100 kgf·cm, 7 ft·lbf)

CONTINUED

CHARGING SYSTEM (2ZZ-GE)

1900M-07

PRECAUTION

1. Check that the battery cables are connected to the correct terminals.
2. Disconnect the battery cables when the battery is given a quick charge.
3. Do not perform tests with a high voltage insulation resistance tester.
4. Never disconnect the battery while the engine is running.
5. Check that the charging cable is tightened on terminal B of the generator and the fuse box.
6. Do not check whether the alternator generates or not with connecting terminal F to other terminal.

CONTINUED

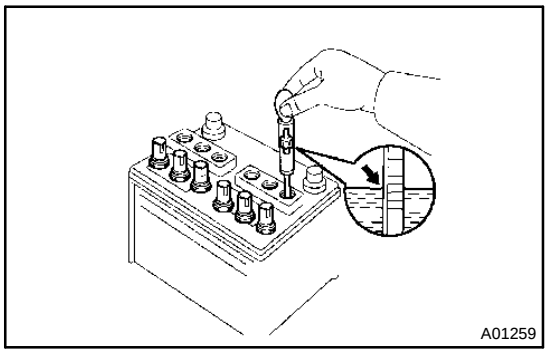
190EY-01

ON-VEHICLE INSPECTION

1. CHECK BATTERY ELECTROLYTE LEVEL

(a) Check the electrolyte quantity of each cell (Maintenance-Free Battery).
  (1) If under the lower level, replace the battery (or add distilled water if possible) and check the charging system.

(b) Check the electrolyte quantity of each cell (Except Maintenance-Free Battery).
  (1) If under the lower level, add distilled water.

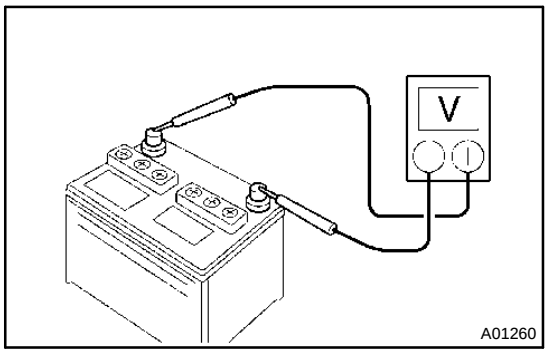


2. CHECK BATTERY SPECIFIC GRAVITY (Except Maintenance-Free Battery)

(a) Check the specific gravity of each cell.

Standard specific gravity: 1.25 - 1.29 at 20°C (68°F)

If the specific gravity is less than specification, charge the battery.



3. CHECK BATTERY VOLTAGE

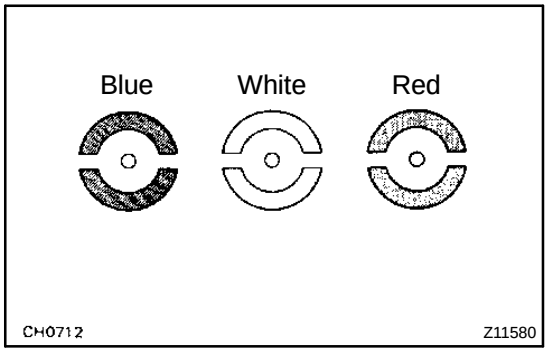
(a) After having driven the vehicle and in the case that 20 minutes have not passed after having stopped the engine, turn the ignition switch ON and turn on the electrical system (headlight, blower motor, rear defogger etc.) for 60 seconds to remove the surface charge.

(b) Turn the ignition switch OFF and turn off the electrical systems.

(c) Measure the battery voltage between the negative (-) and positive (+) terminals of the battery.

Standard voltage: 12.5 - 12.9 V at 20°C (68°F)

If the voltage is less than specification, charge the battery.



(d) Check the indicator as shown in the illustration (Except Maintenance-Free Battery).

HINT:

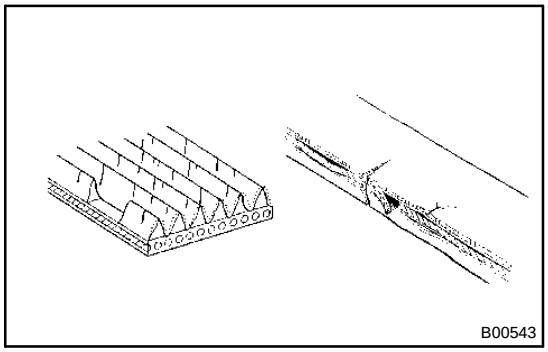
- Blue: OK
- White: Charging Necessary
- Red: Insufficient Water

4. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

(a) Check that the battery terminals are not loose or corroded.

(b) Check the fusible link, H-fuses and fuses for continuity.

CONTINUED



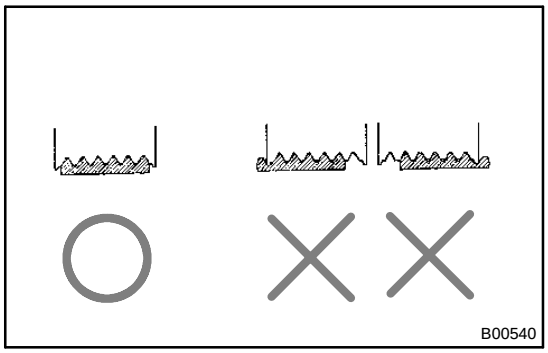
5. INSPECT DRIVE BELT

(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 belt has chunks missing from the ribs, it should be replaced.



(b) Check that it fits properly in the ribbed grooves.

HINT:

Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.

6. VISUALLY CHECK GENERATOR WIRING

(a) Check that the wiring is in good condition.

7. LISTEN FOR ABNORMAL NOISES FROM GENERATOR

(a) Check that there is no abnormal noise from the generator while the engine is running.

8. INSPECT CHARGE WARNING LIGHT CIRCUIT

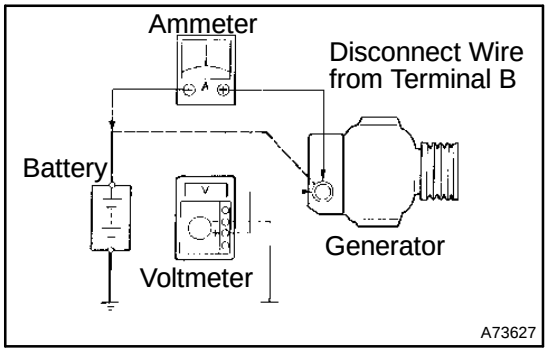
(a) Turn the ignition switch ON. Check that the charge warning light comes on.

(b) Start the engine. Check that the light goes off.

If the light does not operate as specified, troubleshoot the charge warning light circuit.

9. INSPECT CHARGING CIRCUIT WITHOUT LOAD

(a) If a battery/generator tester is available, connect the tester to the charging circuit as permanufacturer's instructions.



(b) If a tester is not available, connect a voltmeter to the charging circuit as follows.

(1) Disconnect to the wire from terminal B of the alternator and connect it to the negative (-) lead of the ammeter.

(2) Connect the positive (+) lead of the ammeter to terminal B of the generator.

(3) Connect the positive (+) lead of the voltmeter to terminal B of the generator.

(4) Ground the negative (-) lead of the voltmeter.

CONTINUED

(c) Check the charging circuit.

(1) With the engine running from idle to 2,000 rpm, check the reading on the ammeter and voltmeter.

Standard amperage: 10 A or less

Standard voltage: 13.2 – 14.8 V

HINT:

- If the voltmeter reading is more than standard voltage, replace the voltage regulator.
- If the voltmeter reading is less than the standard voltage, check the voltage regulator and generator as follows:

10. INSPECT CHARGING CIRCUIT WITH LOAD

(a) With the engine running at 2,000 rpm, turn on the high beam headlights and place the heater blower switch at ”HI”.

(b) Check the reading on the ammeter.

Standard amperage: 30 A or more

HINT:

- If the ammeter reading is less than standard amperage, repair the generator.
- If the battery is fully charged, the indication will sometimes be less than standard amperage.

CONTINUED

GENERATOR ASSY (2ZZ-GE)

190EZ-01

REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH

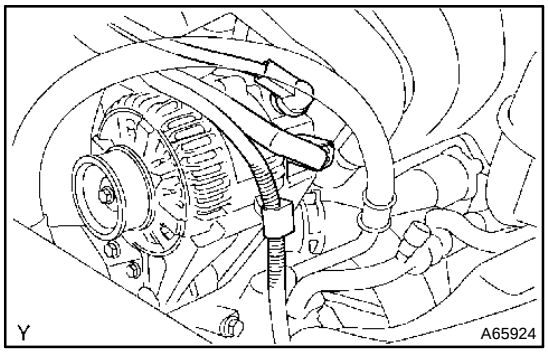
2. REMOVE COOLER REFRIGERANT SUCTION HOSE NO.1**(See page 14-1)**

3. REMOVE FAN AND GENERATOR V BELT**(See page 14-1)**

4. REMOVE INTAKE MANIFOLD INSULATOR NO.2

5. REMOVE GENERATOR BRACKET NO.1

(a) Remove 2 nuts and the generator bracket No.1.

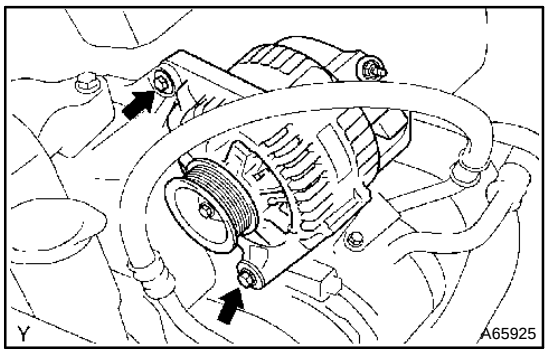


6. REMOVE GENERATOR ASSY

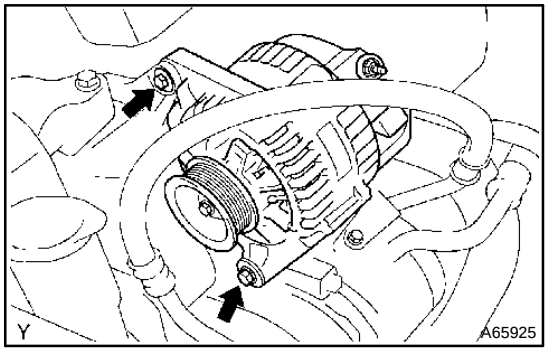
(a) Disconnect the wire clamp from the wire clip on the rectifire end frame.

(b) Remove the rubber cap and nut, and disconnect the alternator wire.

(c) Disconnect the alternator connector.



(d) Remove 2 bolts and alternator.



7. INSTALL GENERATOR ASSY

Torque:
12 mm head 25 N·m (250 kgf·cm, 18 ft·lbf)
14 mm head 58 N·m (591 kgf·cm, 43 ft·lbf)

8. INSTALL GENERATOR BRACKET NO.1

(a) Install 2 nuts and the generator bracket No.1.
Torque: 29 N·m (296 kgf·cm, 21 ft·lbf)

CONTINUED

STARTING SYSTEM (4ZZ-FE)

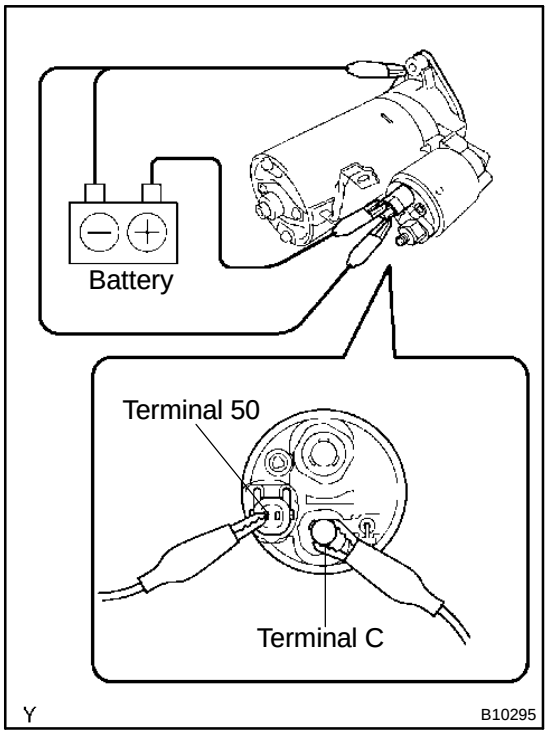
INSPECTION

190F0-01

1. STARTER ASSY

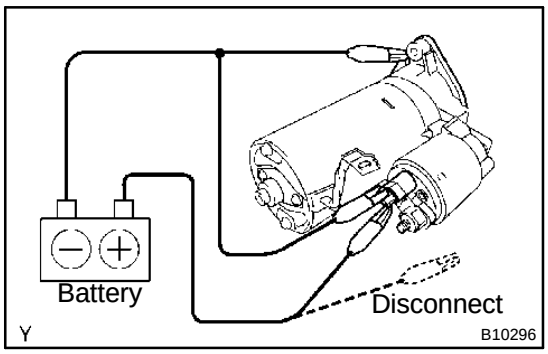
NOTICE:

These tests must be done within 3 to 5 seconds to avoid burning out the coil.

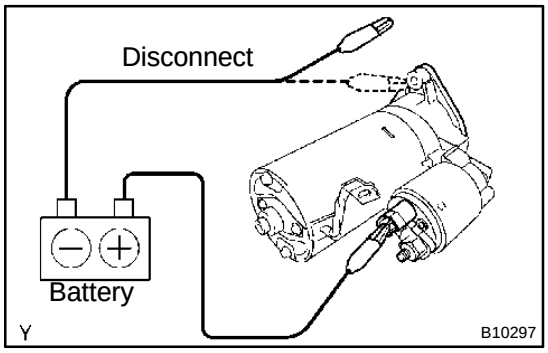


(a) Disconnect the field coil lead from terminal C.

(b) Connect the battery to the magnetic switch as shown.
Check that the clutch pinion gear moves outward.

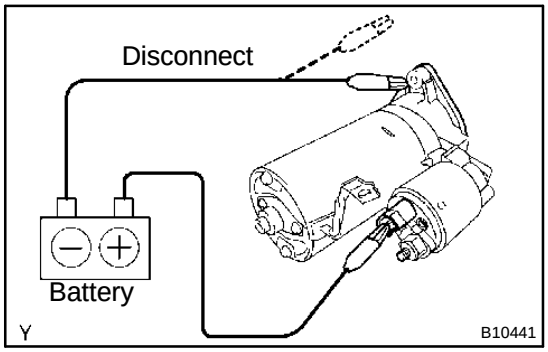


(c) With the battery connected as above and with the clutch pinion gear out, disconnect the negative (-) lead from terminal C.
Check that the clutch pinion gear remains out.

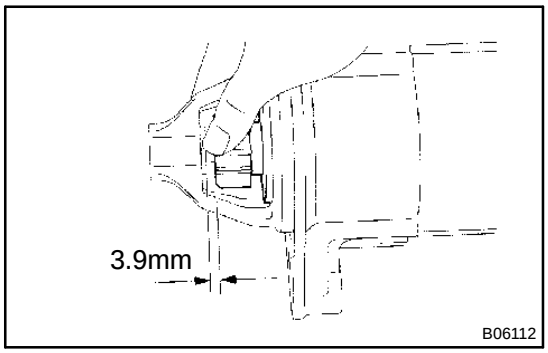


(d) Disconnect the negative (-) lead from the starter housing.
Check that the clutch pinion gear returns inward.

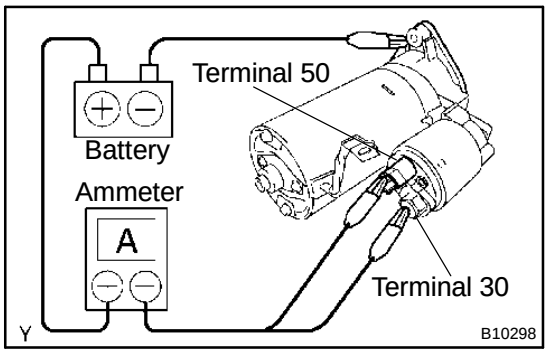
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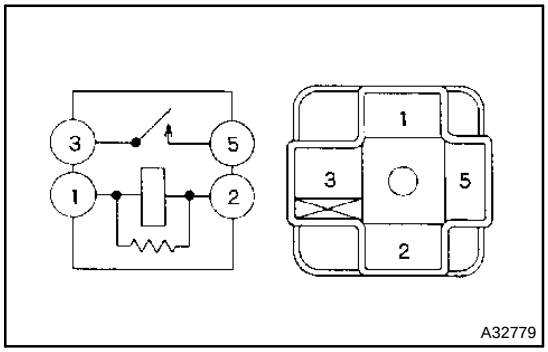
(e) Reconnect the negative (–) lead to the starter housing.



(f) Move the pinion gear toward the armature to remove slack and measure the clearance between the pinion gear end and stop collar.
Maximum clearance: 3.9 mm (0.154 in.)



(g) Connect the field coil lead to terminal C. Make sure the lead is not grounded.
(h) Connect the battery and ammeter to the starter as shown.
(i) Check that the starter rotates smoothly and steadily with the clutch pinion gear moving out. Check that the ammeter reads the specified current.
Specified current: 160 A or less at 10.5 V



2. STARTER RELAY ASSY
Specified condition:

Condition	Tester connection	Specified condition
Constant	1 – 2	Continuity
Apply B+ between terminals 1 and 2	3 – 5	Continuity

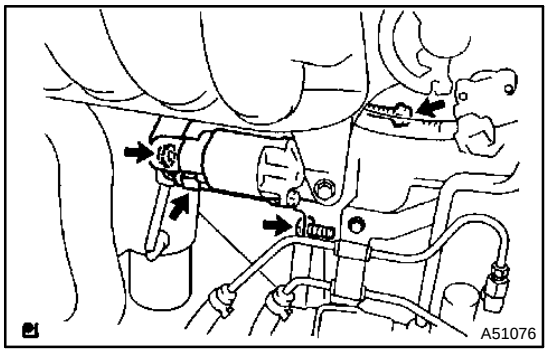
CONTINUED

STARTER ASSY (4ZZ–FE)

190B3-02

REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH



2. REMOVE STARTER ASSY

(a) Disconnect the starter connector.
(b) Remove the nut and disconnect the starter wire.
(c) Remove the 2 bolts and starter.

3. INSTALL STARTER ASSY

Torque:
Bolt 37 N·m (378 kgf·cm, 28 ft·lbf)
Wiring 9.8 N·m (100 kgf·cm, 7 ft·lbf)

CONTINUED

CHARGING SYSTEM (4ZZ–FE)

1900M–08

PRECAUTION

1. Check that the battery cables are connected to the correct terminals.
2. Disconnect the battery cables when the battery is given a quick charge.
3. Do not perform tests with a high voltage insulation resistance tester.
4. Never disconnect the battery while the engine is running.

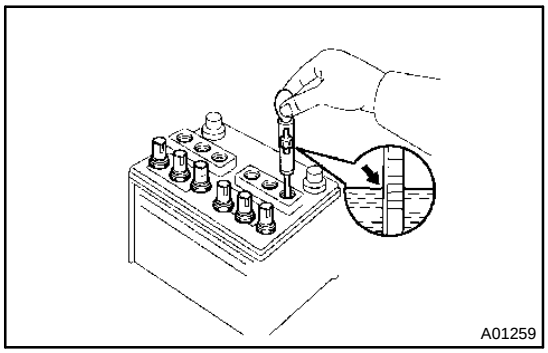
CONTINUED

ON-VEHICLE INSPECTION

1. CHECK BATTERY ELECTROLYTE LEVEL

(a) Check the electrolyte quantity of each cell (Maintenance-Free Battery).
  (1) If under the lower level, replace the battery (or add distilled water if possible) and check the charging system.

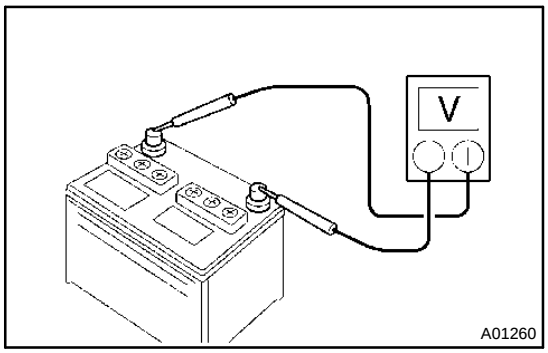
(b) Check the electrolyte quantity of each cell (Except Maintenance-Free Battery).
  (1) If under the lower level, add distilled water.



2. CHECK BATTERY SPECIFIC GRAVITY (Except Maintenance-Free Battery)

(a) Check the specific gravity of each cell.
  Standard specific gravity: 1.25 - 1.29 at 20°C (68°F)

HINT:
If the specific gravity is less than specification, charge the battery.



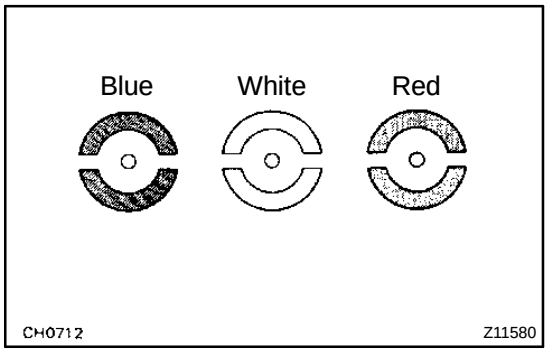
3. CHECK BATTERY VOLTAGE

(a) After having driven the vehicle and in the case that 20 minutes have not passed after having stopped the engine, turn the ignition switch ON and turn on the electrical system (headlight, blower motor, rear defogger etc.) for 60 seconds to remove the surface charge.

(b) Turn the ignition switch OFF and turn off the electrical systems.

(c) Measure the battery voltage between the negative (-) and positive (+) terminals of the battery.
  Standard voltage: 12.5 - 12.9 V at 20°C (68°F)

HINT:
If the voltage is less than specification, charge the battery.



(d) Check the indicator as shown in the illustration (Except Maintenance-Free Battery).

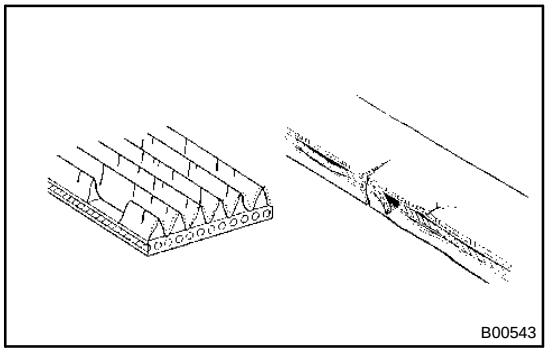
HINT:
- Blue: OK
- White: Charging Necessary
- Red: Insufficient Water

4. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

(a) Check that the battery terminals are not loose or corroded.

(b) Check the fusible link, H-fuses and fuses for continuity.

CONTINUED

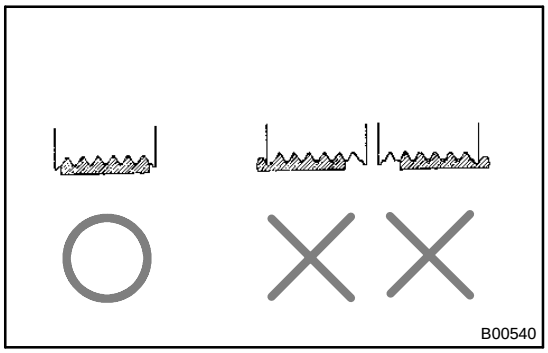


5. INSPECT DRIVE BELT

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

HINT:

- If any defect has been found, replace the drive belt.
- Cracks on the rib side of a belt are considered acceptable. If the belt has chunks missing from the ribs, it should be replaced.



(b) Check that it fits properly in the ribbed grooves.

HINT:

Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.

6. VISUALLY CHECK ALTERNATOR WIRING

(a) Check that the wiring is in good condition.

7. LISTEN FOR ABNORMAL NOISES FROM ALTERNATOR

(a) Check that there is no abnormal noise from the generator while the engine is running.

8. INSPECT CHARGE WARNING LIGHT CIRCUIT

(a) Turn the ignition switch ON. Check that the charge warning light comes on.

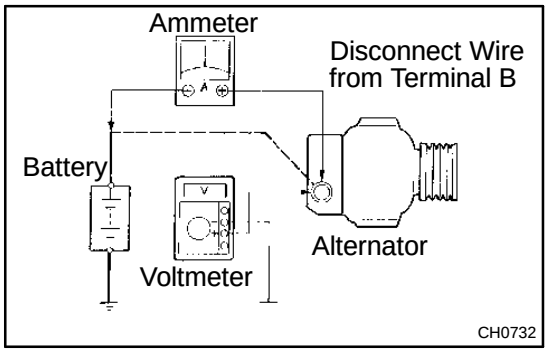
(b) Start the engine. Check that the light goes off.

HINT:

If the light does not operate as specified, troubleshoot the charge warning light circuit.

9. INSPECT CHARGING CIRCUIT WITHOUT LOAD

(a) If a battery/generator tester is available, connect the tester to the charging circuit as permanufacturer's instructions.



(b) If a tester is not available, connect a voltmeter to the charging circuit as follows.

(1) Disconnect to the wire from terminal B of the alternator and connect it to the negative (–) lead of the ammeter.

(2) Connect the positive (+) lead of the ammeter to terminal B of the generator.

(3) Connect the positive (+) lead of the voltmeter to terminal B of the generator.

(4) Ground the negative (–) lead of the voltmeter.

CONTINUED

(c) Check the charging circuit.

(1) With the engine running from idle to 2,500 rpm, check the reading on the ammeter and voltmeter.

Standard amperage: 5 A or less

Standard voltage: 13.2 - 14.6 V

HINT:

- If the voltmeter reading is more than standard voltage, replace the voltage regulator.
- If the voltmeter reading is less than the standard voltage, check the voltage regulator and generator.

10. INSPECT CHARGING CIRCUIT WITH LOAD

(a) With the engine running at 2,000 rpm, turn on the high beam headlights and place the heater blower switch at "HI".

(b) Check the reading on the ammeter.

Standard amperage: 30 A or more

HINT:

- If the ammeter reading is less than standard amperage, repair the generator.
- If the battery is fully charged, the indication will sometimes be less than standard amperage.

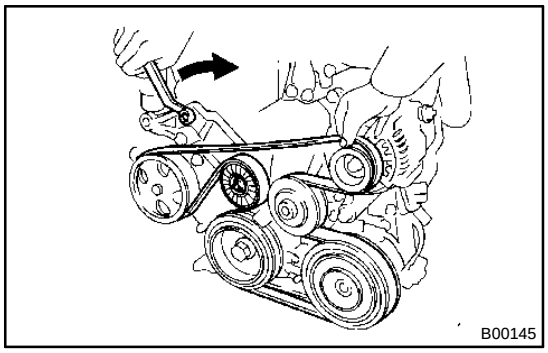
CONTINUED

GENERATOR ASSY (4ZZ-FE)

190B4-02

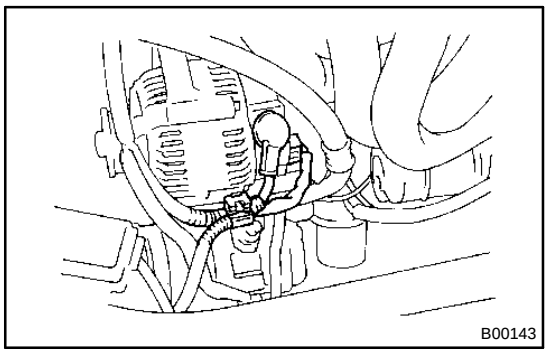
REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH



2. REMOVE FAN AND GENERATOR V BELT

(a) Turn the drive belt tensioner slowly clockwise and loosen it. Then, remove the drive belt and put back the drive belt tensioner littie by little and fix it quietly.

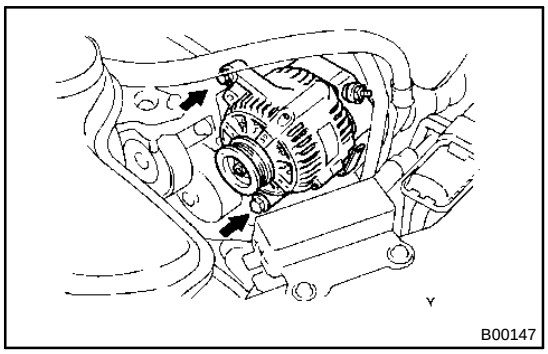


3. REMOVE GENERATOR ASSY

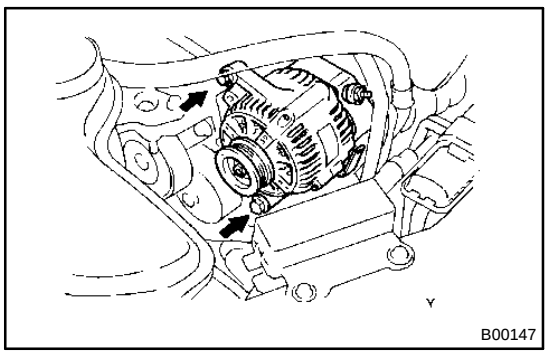
(a) Disconnect the wire clamp from the wire clip on the rectifire end frame.

(b) Remove the rubber cap and nut, and disconnect the generator wire.

(c) Disconnect the generator connector.



(d) Remove the 2 bolts and generator.



4. INSTALL GENERATOR ASSY

Torque:
12 mm head 25 N·m (250 kgf·cm, 18 ft·lbf)
14 mm head 54 N·m (550 kgf·cm, 39 ft·lbf)

CONTINUED

MANUAL TRANSMISSION/TRANSAXLE

MANUAL TRANSAXLE ASSY
(C50/C64/C150) 41–1
COMPONENTS 41–1/2
REPLACEMENT 41–3/11
FRONT DIFFERENTIAL OIL SEAL
(C50/C64/C150) 41–12
REPLACEMENT 41–12/13

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E

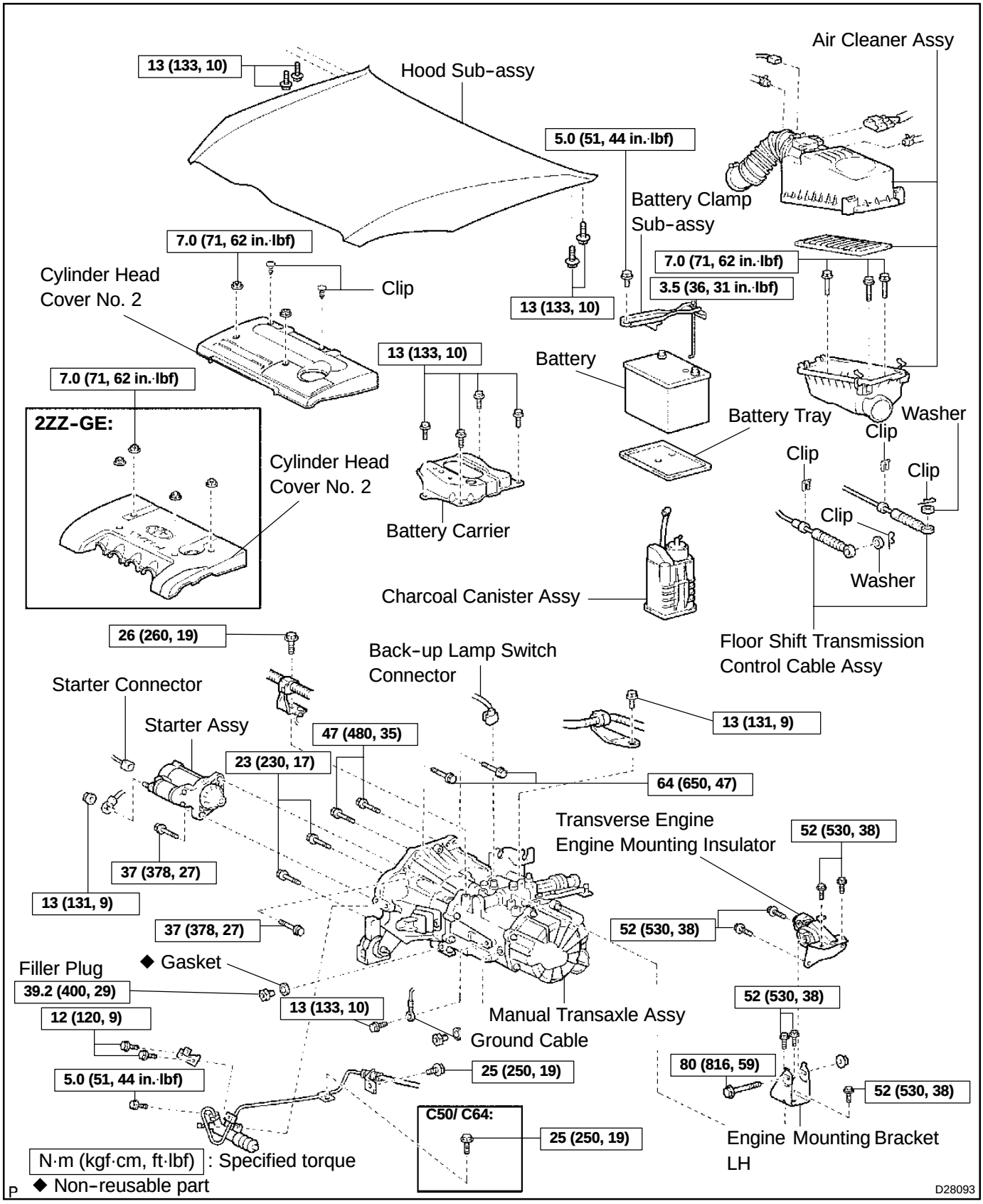
NOTE: The above pages contain only the points which differ from the above listed manuals.

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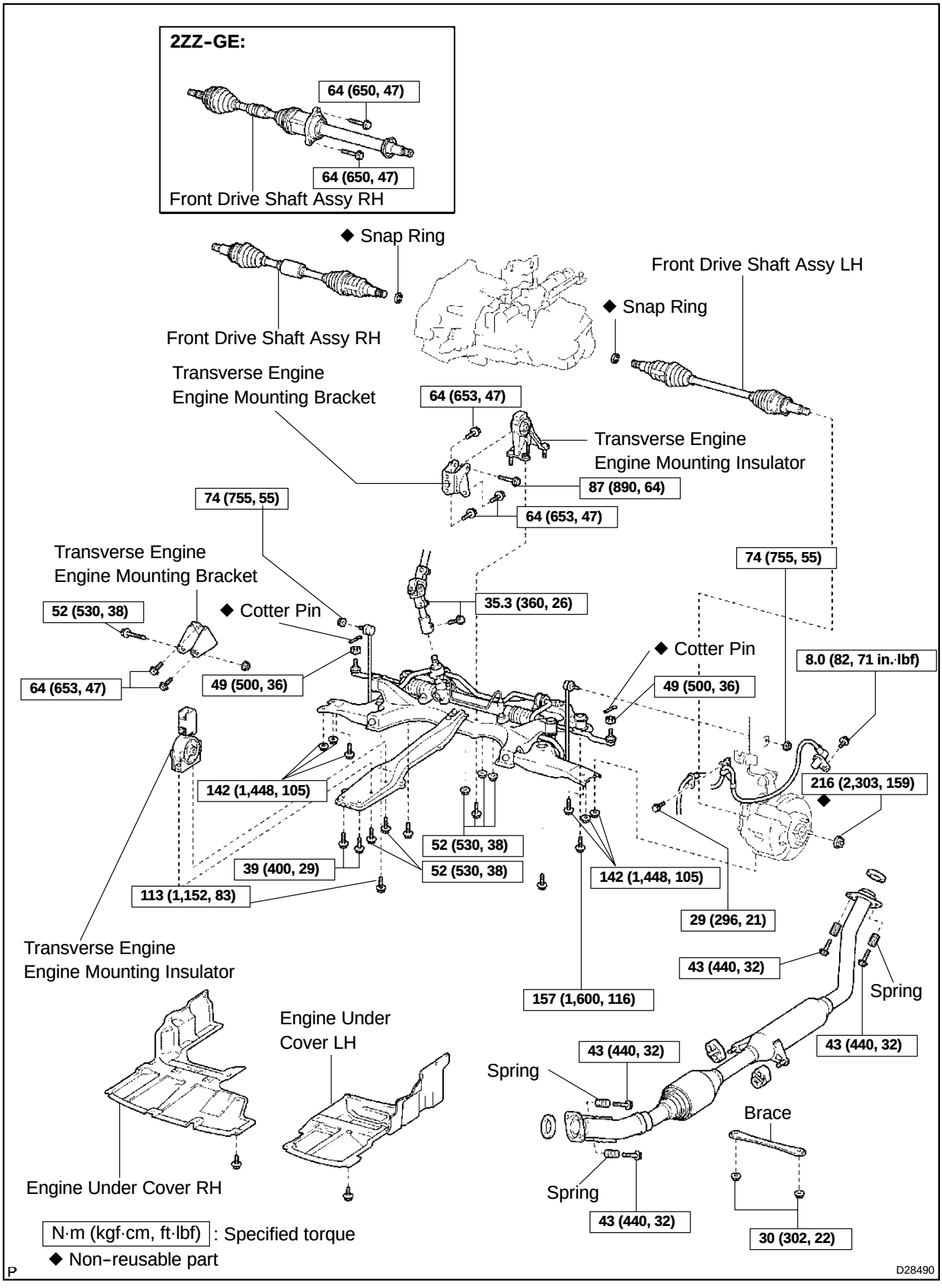
MANUAL TRANSAXLE ASSY (C50/C64/C150)

COMPONENTS

4105W-03



CONTINUED


2ZZ-GE:
64 (650, 47)
64 (650, 47)
Front Drive Shaft Assy RH
◆ Snap Ring
Front Drive Shaft Assy RH
Front Drive Shaft Assy LH
◆ Snap Ring
Transverse Engine
Engine Mounting Bracket
64 (653, 47)
Transverse Engine
Engine Mounting Insulator
87 (890, 64)
64 (653, 47)
74 (755, 55)
Transverse Engine
Engine Mounting Bracket
74 (755, 55)
35.3 (360, 26)
52 (530, 38)
◆ Cotter Pin
◆ Cotter Pin
8.0 (82, 71 in.·lbf)
64 (653, 47)
49 (500, 36)
49 (500, 36)
142 (1,448, 105)
216 (2,303, 159)
◆
52 (530, 38)
39 (400, 29)
52 (530, 38)
142 (1,448, 105)
113 (1,152, 83)
29 (296, 21)
Transverse Engine
Engine Mounting Insulator
43 (440, 32)
Spring
157 (1,600, 116)
Engine Under
Cover LH
43 (440, 32)
43 (440, 32)
Spring
Brace
Spring
43 (440, 32)
Engine Under Cover RH
30 (302, 22)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P
D28490

CONTINUED

REPLACEMENT

1. REMOVE COLUMN HOLE COVER SILENCER SHEET **(See Pub. No. RM821E, page 51-17)**

2. SEPARATE STEERING INTERMEDIATE SHAFT ASSY NO.2 **(See Pub. No. RM821E, page 51-17)**

3. REMOVE FRONT WHEELS

4. REMOVE ENGINE UNDER COVER LH

5. REMOVE ENGINE UNDER COVER RH

6. REMOVE EXHAUST PIPE

(a) 2ZZ-GE Engine (See page 15-2)

(b) 3ZZ-FE Engine (See Pub. No. RM821E, page 15-01)

(c) 4ZZ-FE Engine (See page 15-5)

7. DRAIN TRANSAXLE OIL

Torque: 39.2 N·m (400 kgf·cm, 29 ft·lbf)

8. REMOVE HOOD SUB-ASSY

9. REMOVE CYLINDER HEAD COVER NO.2

(a) 4ZZ-FE, 3ZZ-FE Engine:

Remove the 2 nuts, clip and cylinder head cove No.2.

(b) 2ZZ-GE Engine:

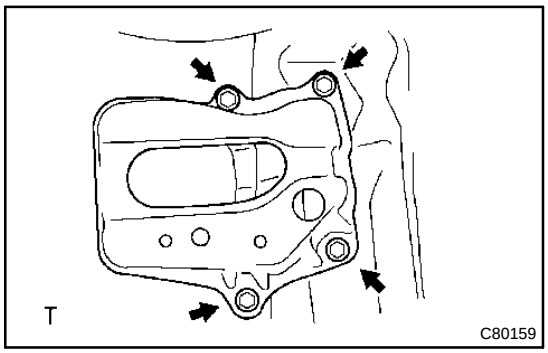
Remove the 4 nuts and cylinder head cove No.2.

10. REMOVE AIR CLEANER ASSY

11. REMOVE BATTERY CLAMP SUB-ASSY

12. REMOVE BATTERY

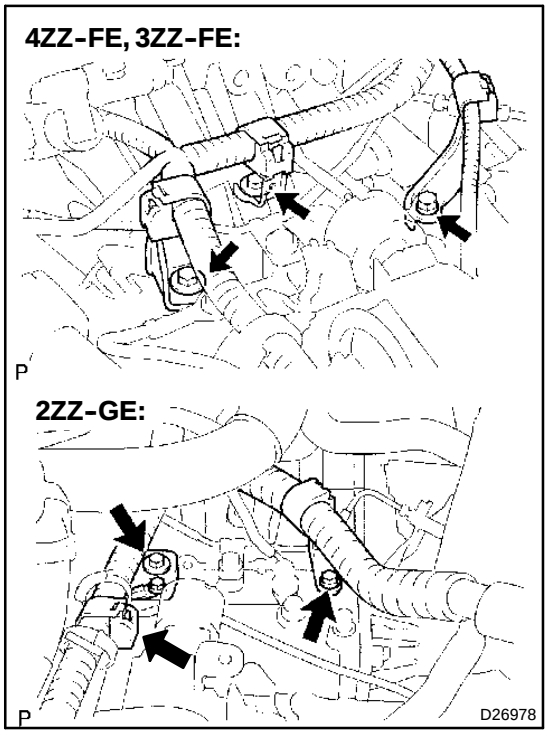
13. REMOVE BATTERY TRAY



14. REMOVE BATTERY CARRIER

(a) Remove the 4 bolts and battery carrier.

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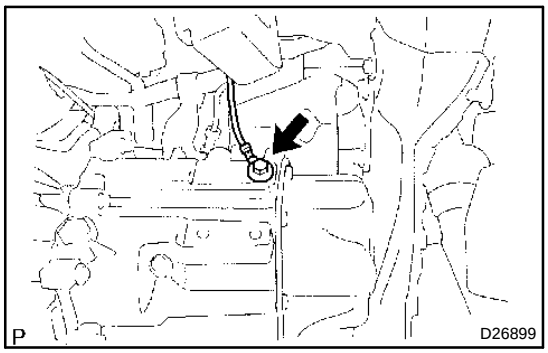


15. DISCONNECT WIRE HARNESS

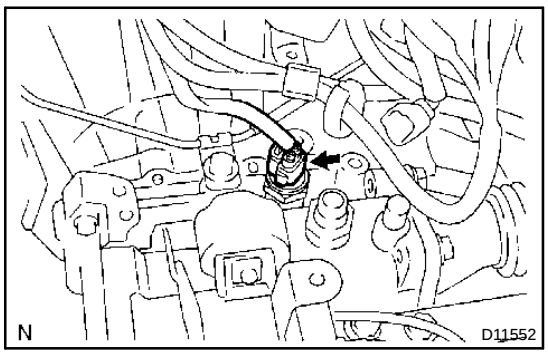
(a) 4ZZ-FE, 3ZZ-FE Engine:
Remove the 3 bolts, disconnect the wire harness clamps.

(b) 2ZZ-GE Engine:
Disconnect the wire harness clamp.

(c) 2ZZ-GE Engine:
Remove the 2 bolts, disconnect the wire harness clamps.



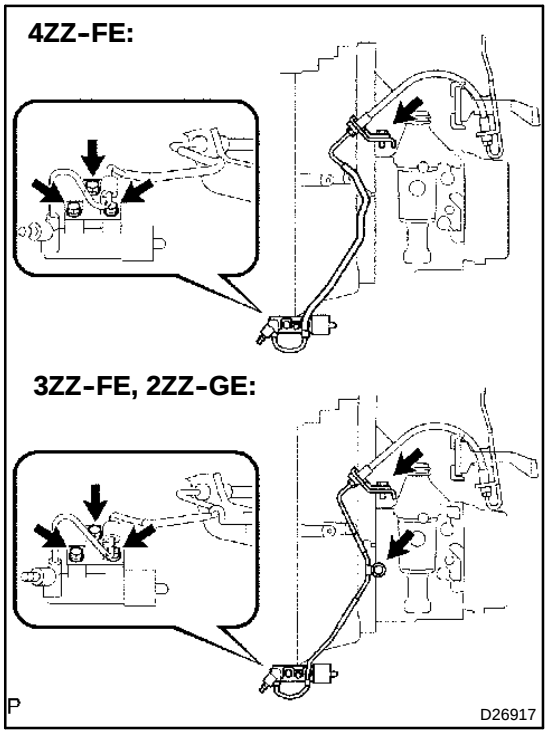
(d) Remove the bolt, disconnect the ground cable.



16. DISCONNECT CONNECTOR

(a) Disconnect the back-up lamp switch connector.

CONTINUED

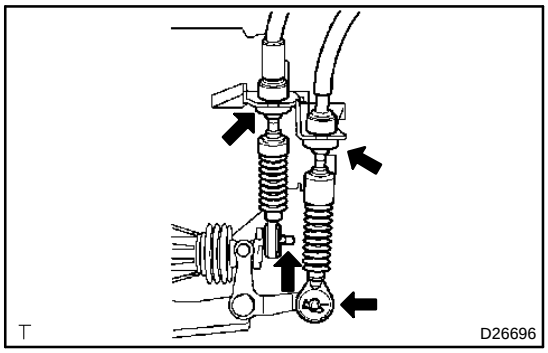


17. SEPARATE CLUTCH RELEASE CYLINDER ASSY

(a) 4ZZ-FE Engine:
Remove the 4 bolts, separate the release cylinder assy with clutch piping release cylinder bracket from the transaxle.

(b) 3ZZ-FE, 2ZZ-GE Engine:
Remove the 5 bolts, separate the release cylinder assy with clutch piping release cylinder bracket from the transaxle.

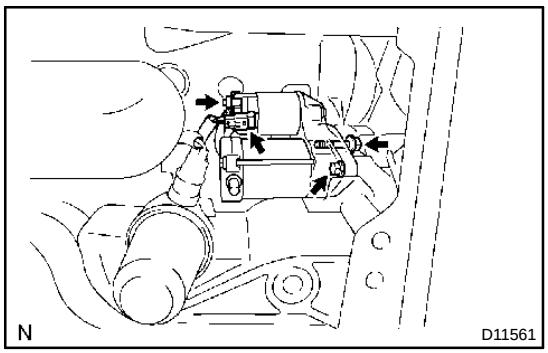
18. SEPARATE CHARCOAL CANISTER ASSY



19. SEPARATE TRANSMISSION CONTROL CABLE ASSY

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

(b) Remove the 2 clips, disconnect the 2 cables from the control cable bracket.



20. REMOVE STARTER ASSY

(a) Remove the nut and disconnect the starter wire.

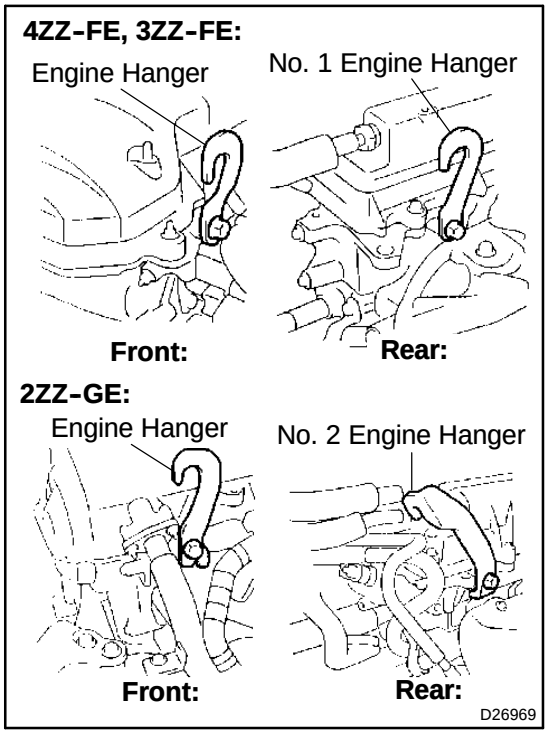
(b) Disconnect the connector.

(c) Remove the 2 bolts and starter assy.

21. REMOVE FRONT DRIVE SHAFT ASSY LH (See Pub. No. RM821E, page 30-05)
SST 09520-01010, 09520-24010 (09520-32040)

22. REMOVE FRONT DRIVE SHAFT ASSY RH (See Pub. No. RM821E, page 30-05)
SST 09520-01010, 09520-24010 (09520-32040)

CONTINUED



23. SUSPEND ENGINE ASSY

(a) Remove the 2 PCV hoses.

(b) Install the 2 hangers in the correct direction.

Torque:
4ZZ-FE, 3ZZ-FE: 30 N·m (306 kgf·cm, 22 ft·lbf)
2ZZ-GE: 38 N·m (387 kgf·cm, 28 ft·lbf)
Parts No.:
4ZZ-FE, 3ZZ-FE Engine:

Engin hanger	12281-22021
No.1 engin hanger	12281-15040
Bolt	91512-61020

2ZZ-GE Engine:

Engin hanger	12281-88600
No.1 engin hanger	12282-88600
Bolt	91512-61020

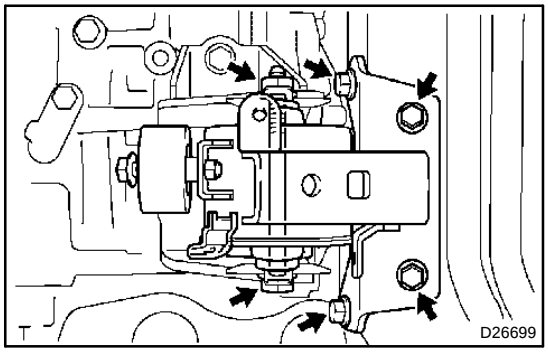
(c) Attach the engine chain hoist to the hangers.

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

24. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSY
(See Pub. No. RM821E, page 30-05)

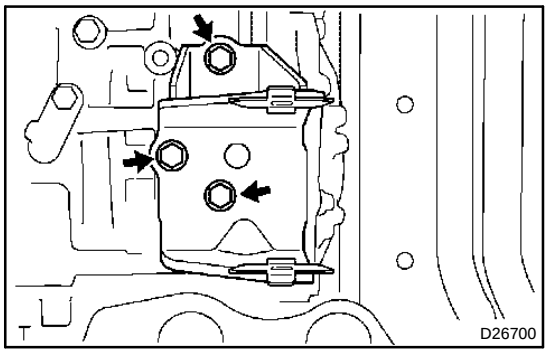
25. SUPPORT MANUAL TRANSAXLE ASSY

(a) Support the transaxle with a transmission jack.



26. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING INSULATOR

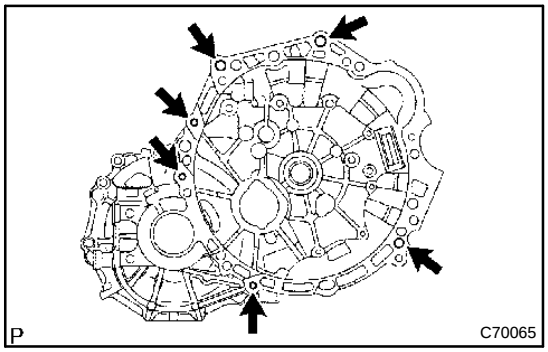
(a) Remove the 5 bolts, nut and engine mounting insulator LH from the body.



27. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

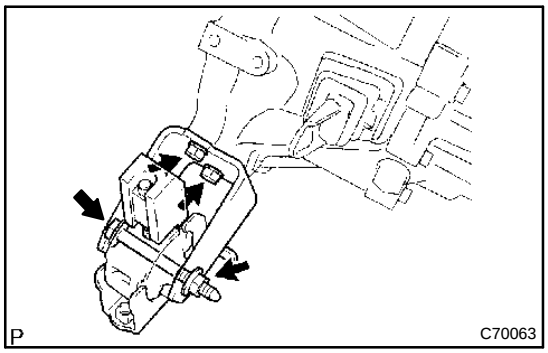
(a) Remove the 3 bolts and engine mounting bracket LH from the transaxle.

CONTINUED



28. REMOVE MANUAL TRANSAXLE ASSY

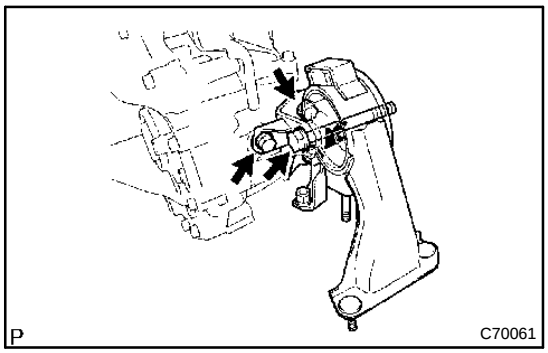
(a) Remove the 6 bolts and transaxle from the engine.



29. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Remove the bolt, nut and engine mounting insulator FR from the engine mounting bracket FR.

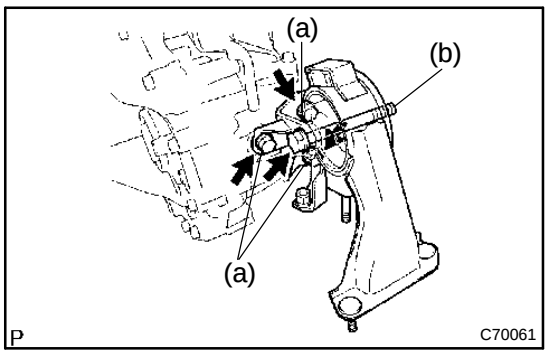
(b) Remove the 2 bolts and engine mounting bracket FR from the transaxle.



30. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Remove the bolt and engine mounting insulator RR from the engine mounting bracket RR.

(b) Remove the 3 bolts and engine mounting bracket RR from the transaxle.



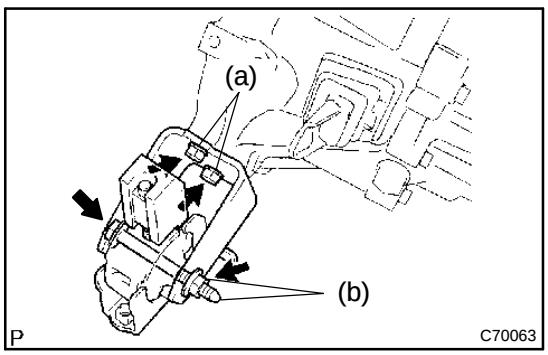
31. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Install the engine mounting bracket RR and 3 bolts to the transaxle.

Torque: 64 N·m (653 kgf·cm, 47 ft·lbf)

(b) Install the engine mounting insulator RR and bolt to the engine mounting bracket RR.

Torque: 87 N·m (890 kgf·cm, 64 ft·lbf)



32. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

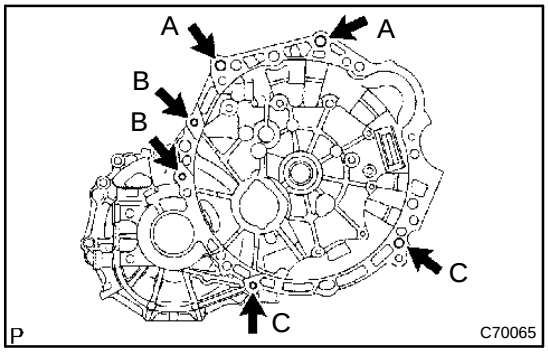
(a) Install the engine mounting bracket FR and 2 bolts to the transaxle.

Torque: 64 N·m (653 kgf·cm, 47 ft·lbf)

(b) Install the engine mounting insulator FR, bolt and nut to the engine mounting bracket FR.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

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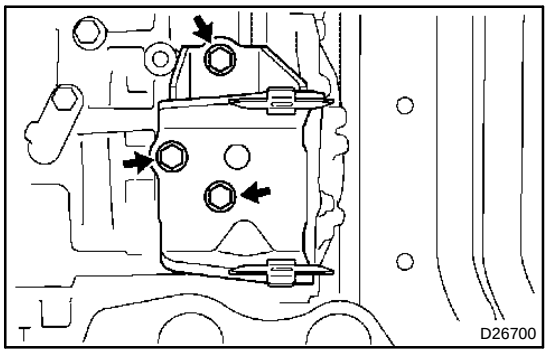


33. INSTALL MANUAL TRANSAXLE ASSY

(a) Align the input shaft with the clutch disc and install the transaxle to the engine.

(b) Install the 6 bolts.

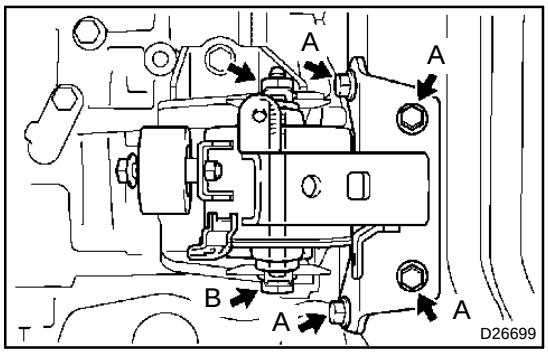
Torque:
Bolt A: 64 N·m (650 kgf·cm, 47 ft·lbf)
Bolt B: 47 N·m (480 kgf·cm, 35 ft·lbf)
Bolt C: 23 N·m (230 kgf·cm, 17 ft·lbf)



34. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

(a) Install the engine mounting bracket LH to the transaxle with the 3 bolts.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)



35. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING INSULATOR

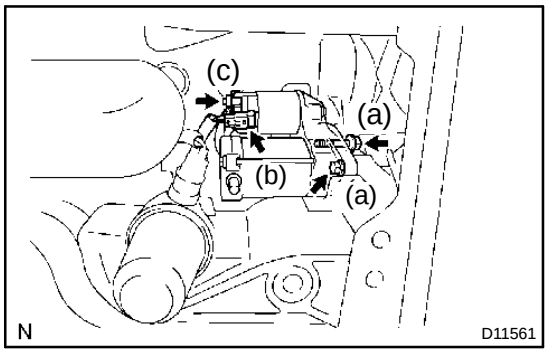
(a) Install the engine mounting insulator LH with the 5 bolts and nut.

Torque:
Bolt A: 52 N·m (530 kgf·cm, 38 ft·lbf)
Bolt B: 80 N·m (816 kgf·cm, 59 ft·lbf)

36. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSY
(See Pub. No. RM821E, page 30-05)
SST 09670-00010

37. INSTALL FRONT DRIVE SHAFT ASSY LH (See Pub. No. RM821E, page 30-05)

38. INSTALL FRONT DRIVE SHAFT ASSY RH (See Pub. No. RM821E, page 30-05)



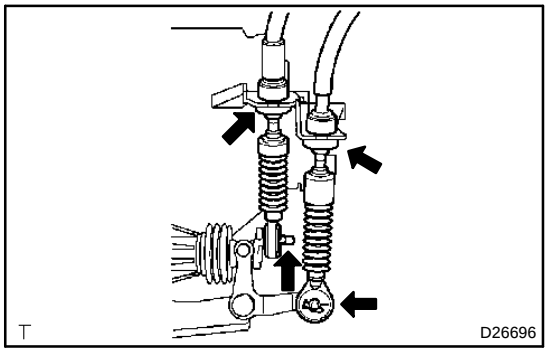
39. INSTALL STARTER ASSY

(a) Install the starter assy and 2 bolts to the transaxle.
Torque: 37 N·m (378 kgf·cm, 27 ft·lbf)

(b) Connect the starter connector.

(c) Install the wire and nut to starter assy.
Torque: 13 N·m (131 kgf·cm, 9 ft·lbf)

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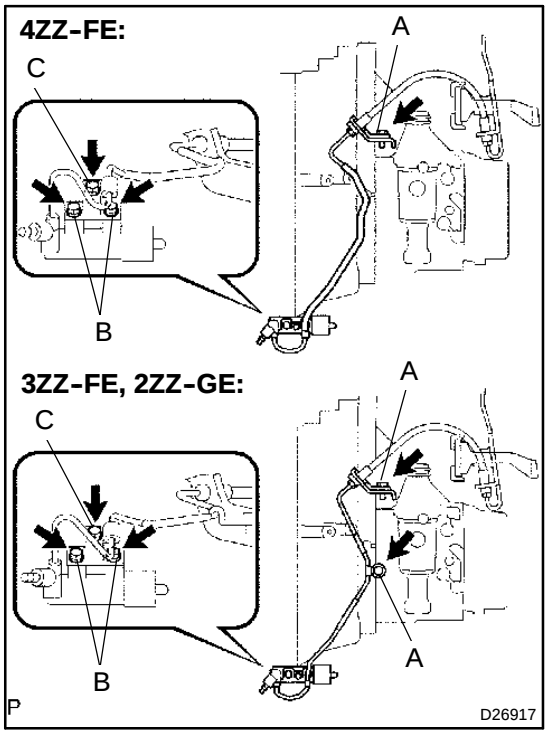


40. CONNECT TRANSMISSION CONTROL CABLE ASSY

(a) Connect the 2 cable ends, install the 2 washers and 2 clips.

(b) Install the 2 clips to the control cable bracket.

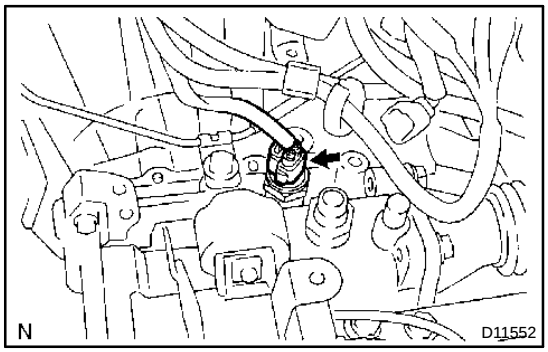
41. CONNECT CHARCOAL CANISTER ASSY



42. CONNECT CLUTCH RELEASE CYLINDER ASSY

(a) 4ZZ-FE Engine:
Install the release cylinder ,release cylinder bracket with the 4 bolts.
Torque:
Bolt A: 25 N·m (250 kgf·cm, 19 ft·lbf)
Bolt B: 12 N·m (120 kgf·cm, 9 ft·lbf)
Bolt C: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

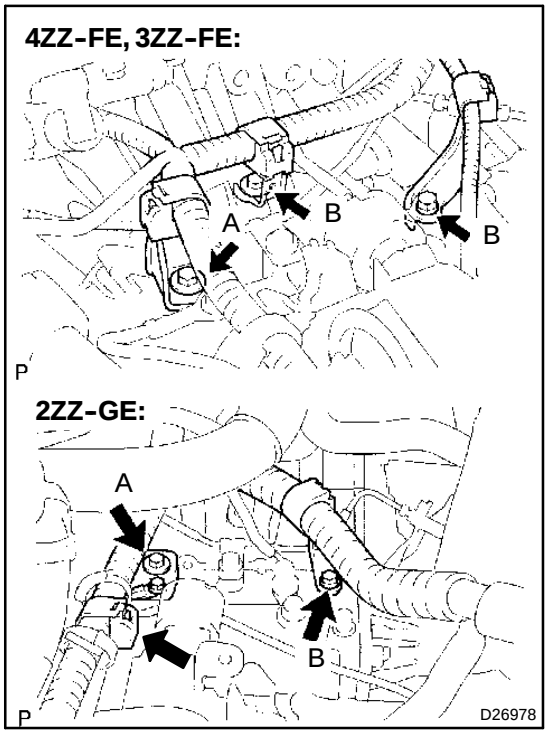
(b) 3ZZ-FE, 2ZZ-GE Engine:
Install the release cylinder ,release cylinder bracket with the 5 bolts.
Torque:
Bolt A: 25 N·m (250 kgf·cm, 19 ft·lbf)
Bolt B: 12 N·m (120 kgf·cm, 9 ft·lbf)
Bolt C: 5.0 N·m (51 kgf·cm, 44 in.·lbf)



43. CONNECT CONNECTOR

(a) Connect the back-up lamp switch connector.

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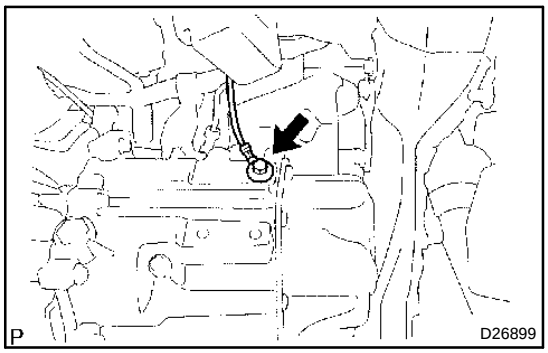


44. CONNECT WIRE HARNESS

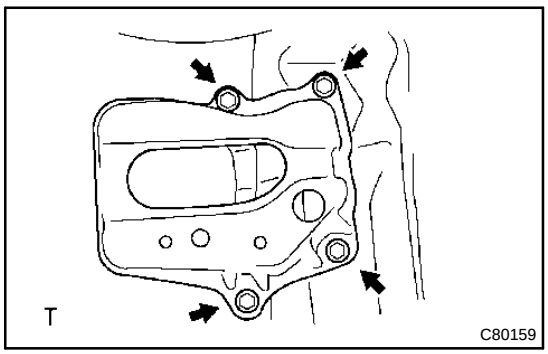
(a) 4ZZ-FE, 3ZZ-FE Engine:
Install the 3 wire harness clamps to the transaxle with the 3 bolts.
Torque:
Bolt A: 26 N·m (260 kgf·cm, 19 ft·lbf)
Bolt B: 13 N·m (131 kgf·cm, 9 ft·lbf)

(b) 2ZZ-GE Engine:
Install the 2 wire harness clamps to the transaxle with the 2 bolts.
Torque:
Bolt A: 25.5 N·m (260 kgf·cm, 19 ft·lbf)
Bolt B: 26 N·m (131 kgf·cm, 9 ft·lbf)

(c) 2ZZ-GE Engine:
Connect the wire harness clamp.



(d) Install the ground cable with the bolt.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)



45. INSTALL BATTERY CARRIER

(a) Install the battery carrier with the 4 bolts.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

46. INSTALL BATTERY TRAY

47. INSTALL BATTERY

48. INSTALL BATTERY CLAMP SUB-ASSY
Torque:
Bolt: 5.0 N·m (51 kgf·cm, 44 in.·lbf)
Nut: 3.5 N·m (36 kgf·cm, 31 in.·lbf)

49. INSTALL AIR CLEANER ASSY
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

CONTINUED

50. INSTALL CYLINDER HEAD COVER NO.2

(a) 4ZZ-FE, 3ZZ-FE Engine:
Install cylinder head cove No.2 with the 2 nuts and clip.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

(b) 2ZZ-GE Engine:
Install cylinder head cove No.2 with the 4 nuts.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

51. ADD TRANSAXLE OIL (See Pub. No. RM821E, page 41-02)

52. INSPECT TRANSAXLE OIL (See Pub. No. RM821E, page 41-02)

53. INSTALL FRONT WHEELS
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

54. INSTALL STEERING COLUMN HOLE COVER SUB-ASSY NO.1 (See Pub. No. RM821E, page 51-17)

55. INSTALL COLUMN HOLE COVER SILENCER SHEET (See Pub. No. RM821E, page 51-17)

56. INSTALL EXHAUST PIPE

(a) 2ZZ-GE Engine (See page 15-2)

(b) 3ZZ-FE Engine (See Pub. No. RM821E, page 15-01)

(c) 4ZZ-FE Engine (See page 15-5)

57. INSTALL ENGINE UNDER COVER LH

58. INSTALL ENGINE UNDER COVER RH

59. INSPECT FRONT WHEEL ALIGNMENT (See Pub. No. RM821E, page 26-02)

60. CHECK ABS SPEED SENSOR SIGNAL (See Pub. No. RM821E, page 05-344)

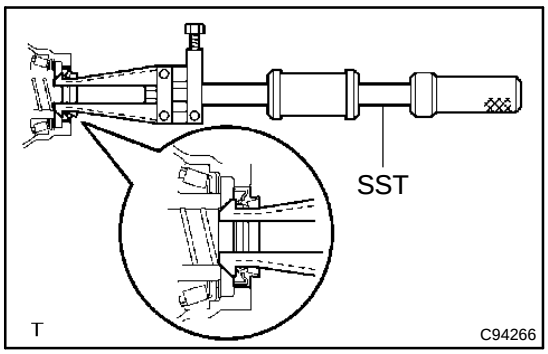
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FRONT DIFFERENTIAL OIL SEAL (C50/C64/C150)

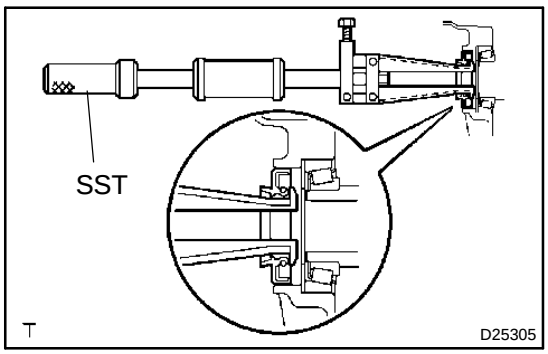
41046-09

REPLACEMENT

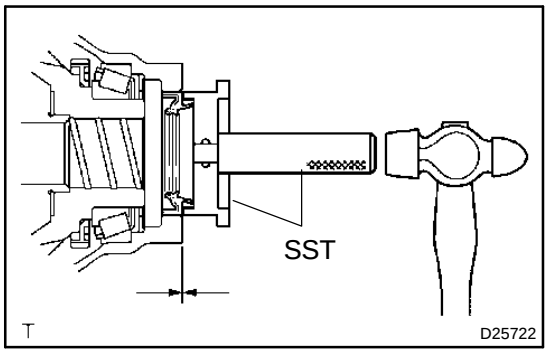
1. **DRAIN MANUAL TRANSAXLE OIL**
   Torque: 39.2 N·m (400 kgf·cm, 29 ft·lbf)
2. **REMOVE FRONT WHEELS**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE FRONT DRIVE SHAFT ASSY LH** **(See Pub. No. RM821E, page 30-05)**
   SST 09520-01010, 09520-24010 (09520-32040)
6. **REMOVE FRONT DRIVE SHAFT ASSY RH** **(See Pub. No. RM821E, page 30-05)**
   SST 09520-01010, 09520-24010 (09520-32040)



7. **REMOVE TRANSAXLE CASE OIL SEAL**
(a) Using SST, remove the oil seal.
SST 09308-00010



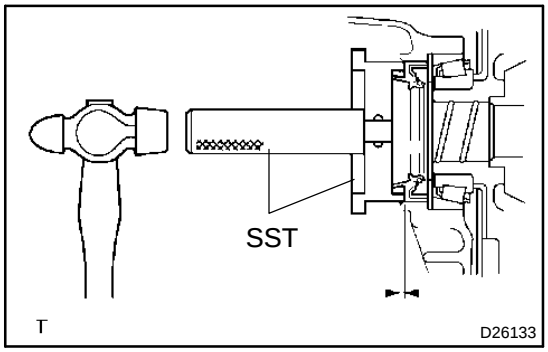
8. **REMOVE TRANSMISSION CASE OIL SEAL**
(a) Using SST, remove the oil seal.
SST 09308-00010



9. **INSTALL TRANSAXLE CASE OIL SEAL**
(a) Coat a new oil seal lip with MP grease.
(b) Using SST and a hammer, install the oil seal.
SST 09554-14010, 09950-70010 (09951-07200)
Drive in depth: 1.9 ± 0.3 mm (0.075 ± 0.012 in.)

NOTICE:
Be careful not to damage the oil seal lip.

CONTINUED



10. INSTALL TRANSMISSION CASE OIL SEAL

(a) Coat a new oil seal lip with MP grease.

(b) Using SST and a hammer, install the oil seal.

SST 09554–14010, 09950–70010 (09951–07200)

Drive in depth:

C50, C150: 2.4 ± 0.3 mm (0.095 ± 0.012 in.)

C64: 9.9 ± 0.3 mm (0.390 ± 0.012 in.)

NOTICE:

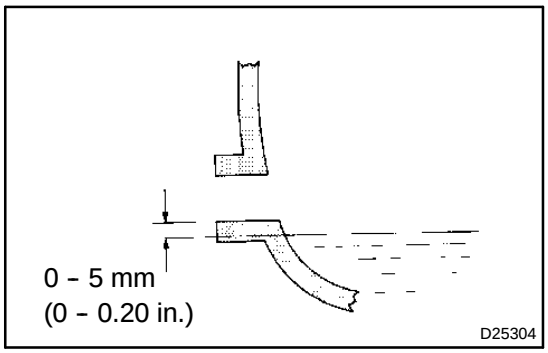
Be careful not to damage the oil seal lip.

11. INSTALL FRONT DRIVE SHAFT ASSY LH **(See Pub. No. RM821E, page 30–05)**

12. INSTALL FRONT DRIVE SHAFT ASSY RH **(See Pub. No. RM821E, page 30–05)**

13. INSTALL FRONT WHEELS

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



14. ADD MANUAL TRANSAXLE OIL

Oil grade: API GL–4 or GL–5

Viscosity: SAE 75 W–90

Capacity:

C50, C150: 1.9 liters (2.0 US qts, 1.7 lmp. qts)

C64: 2.3 liters (2.4 US qts, 2.0 lmp. qts)

Torque: 39.2 N·m (400 kgf·cm, 29 ft·lbf)

15. INSPECT MANUAL TRANSAXLE OIL **(See Pub. No. RM821E, page 41–02)**

16. INSPECT FRONT WHEEL ALIGNMENT **(See Pub. No. RM821E, page 26–02)**

17. CHECK ABS SPEED SENSOR SIGNAL **(See Pub. No. RM821E, page 05–344)**

CONTINUED

HEATER & AIR CONDITIONER

REFRIGERANT LINE
(SOUTH AFRICA) 55–1
COMPONENTS 55–1
COOLER COMPRESSOR ASSY
(2ZZ–GE FOR SOUTH AFRICA) 55–2
COMPONENTS 55–2
REPLACEMENT 55–3/7
COOLER COMPRESSOR ASSY
(4ZZ–FE FOR SOUTH AFRICA) 55–8
COMPONENTS 55–8
REPLACEMENT 55–9/13

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E

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

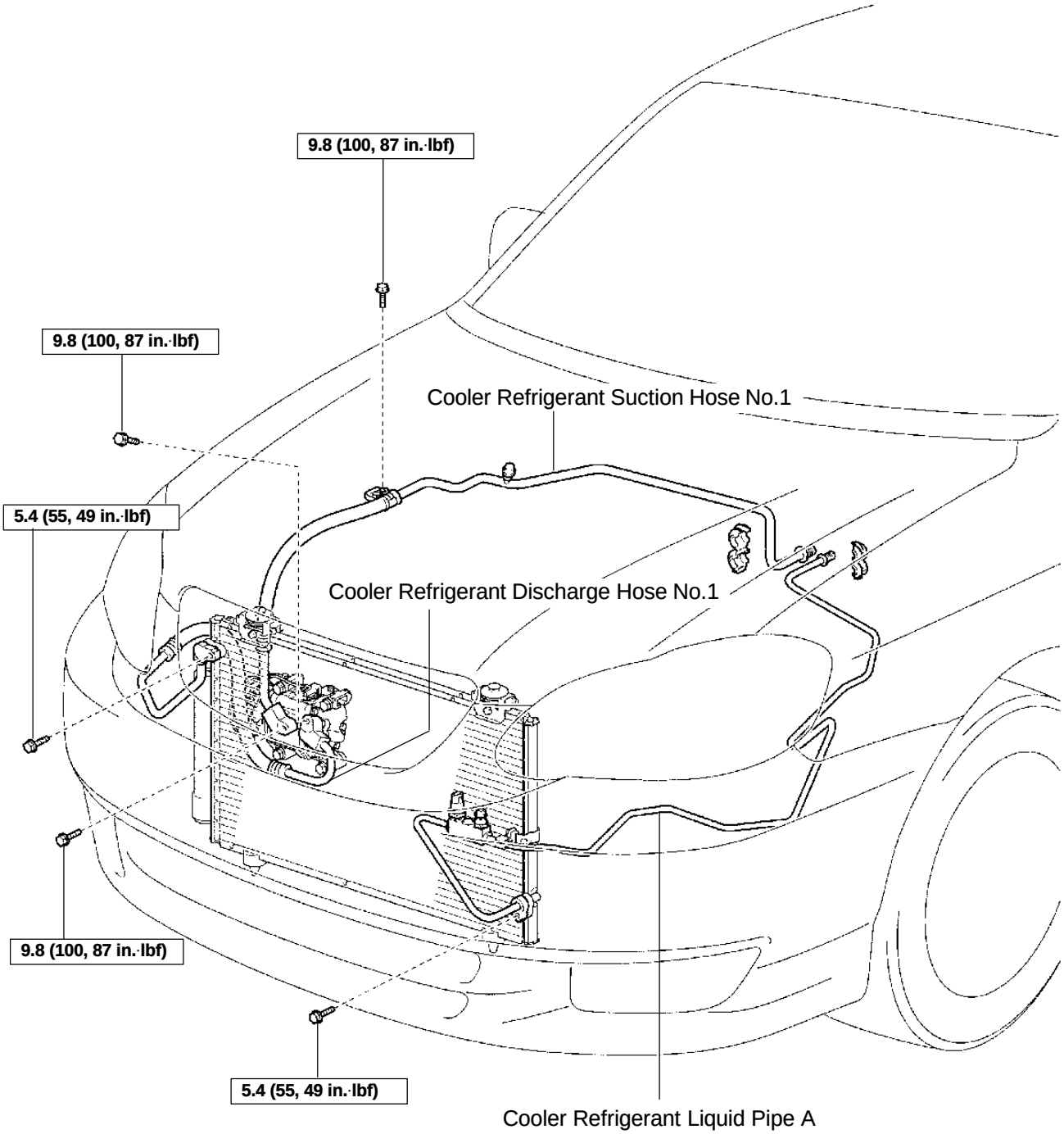
CONTINUED

REFRIGERANT LINE (SOUTH AFRICA)

COMPONENTS

550NK-01

2ZZ-GE:
4ZZ-FE:



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

P

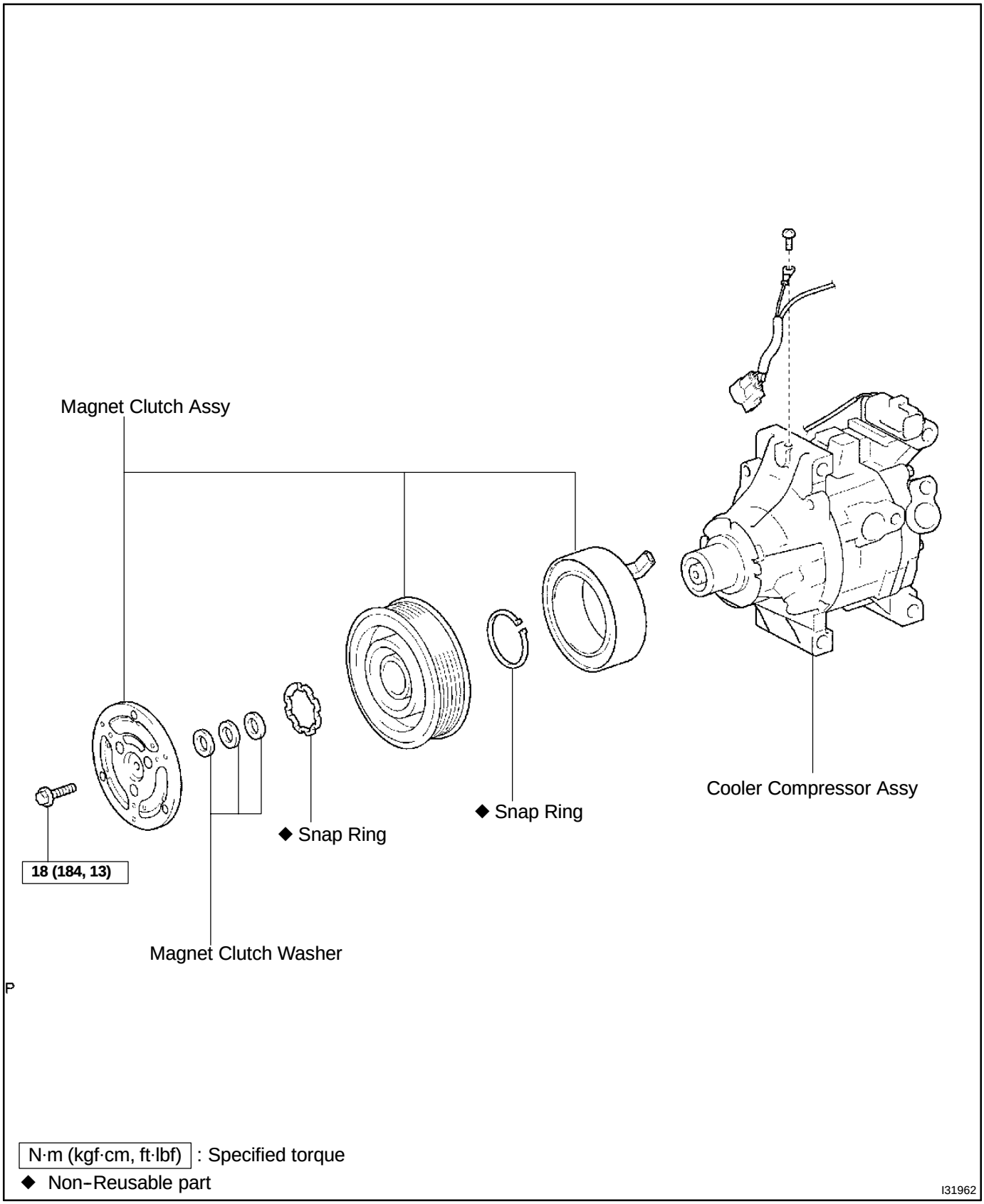
I33179

CONTINUED

COOLER COMPRESSOR ASSY (2ZZ-GE FOR SOUTH AFRICA)

COMPONENTS

550NL-01



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

I31962

CONTINUED

550NM-01

REPLACEMENT

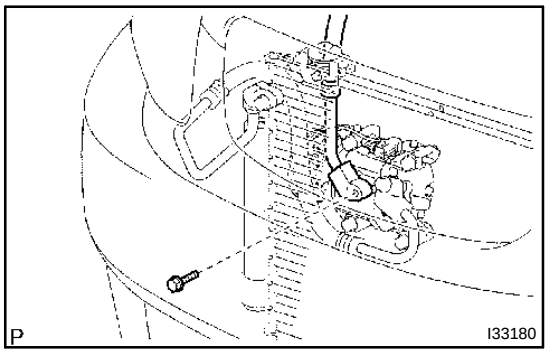
HINT:

COMPONENTS: 55-2

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

(See Pub. No. RM926E on page 55-1)

SST 07110-58060 (07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)



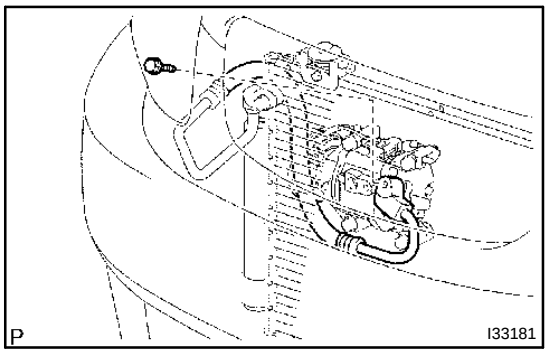
2. DISCONNECT COOLER REFRIGERANT SUCTION HOSE NO.1

(a) Remove the bolt and disconnect the cooler refrigerant suction hose No. 1 from the w/pulley compressor assy.

(b) Remove the O-ring from the cooler refrigerant suction hose No. 1.

NOTICE:

Seal the opening of the disconnected parts using vinyl tape to prevent moisture and foreign matter from entering.



3. DISCONNECT COOLER REFRIGERANT DISCHARGE HOSE NO.1

(a) Remove the bolt and disconnect the cooler refrigerant discharge hose No. 1 from the w/pulley compressor assy.

(b) Remove the O-ring from the cooler refrigerant discharge hose No. 1.

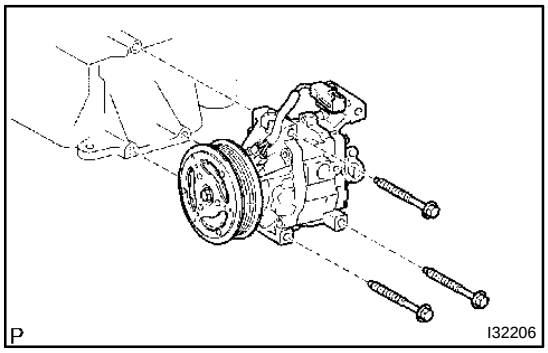
NOTICE:

Seal the opening of the disconnected parts using vinyl tape to prevent moisture and foreign matter from entering.

4. REMOVE ENGINE UNDER COVER RH

5. REMOVE V (COOLER COMPRESSOR TO CRANKSHAFT PULLEY) BELT NO.1

(See page 14-4)



6. REMOVE W/PULLEY COMPRESSOR ASSY

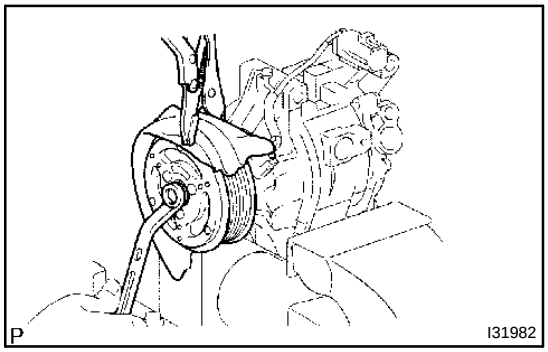
(a) Disconnect the connector.

(b) Remove the 3 bolts and w/pulley compressor assy.

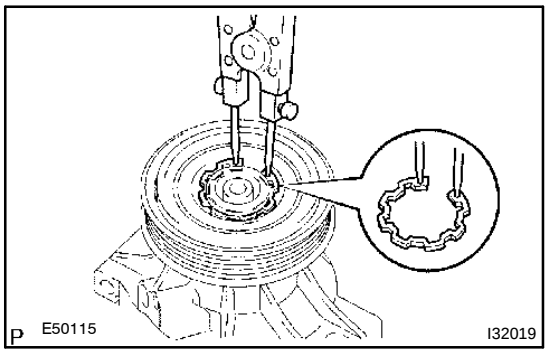
7. REMOVE MAGNET CLUTCH ASSY

(a) Place the compressor and magnetic clutch in vise.

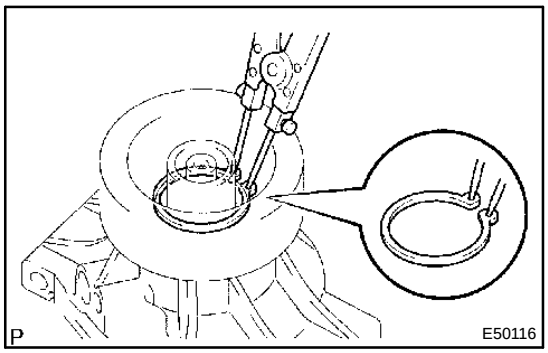
CONTINUED



(b) Using a vise pliers, hold the magnet clutch hub.
(c) Remove the bolt, magnet clutch hub and magnet clutch washer.

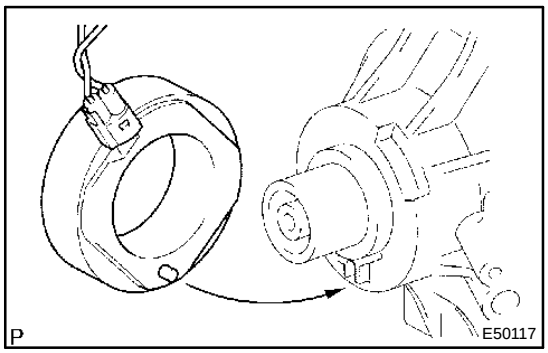


(d) Using a snap ring expander, remove the snap ring and magnet clutch rotor.
(e) Remove the screw, disconnect the connector.



(f) Using a snap ring expander, remove the snap ring and magnet clutch starter.

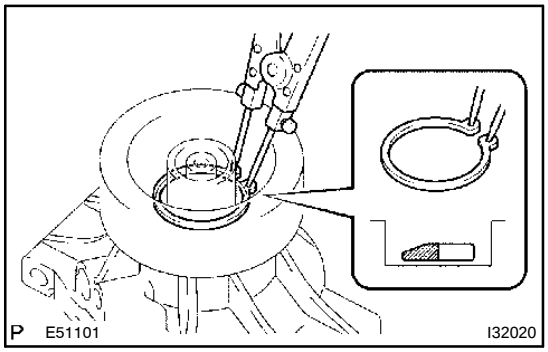
8. REMOVE COOLER COMPRESSOR ASSY



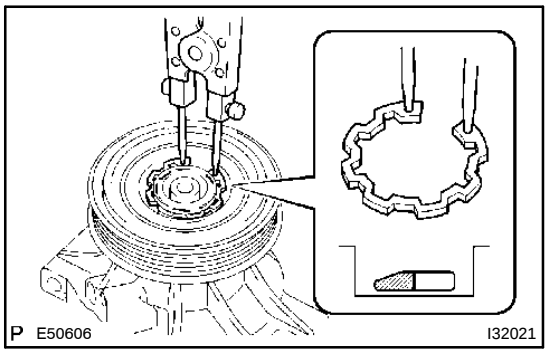
9. INSTALL MAGNET CLUTCH ASSY

(a) Matching the parts shown in the illustration, install the magnet clutch starter.

CONTINUED



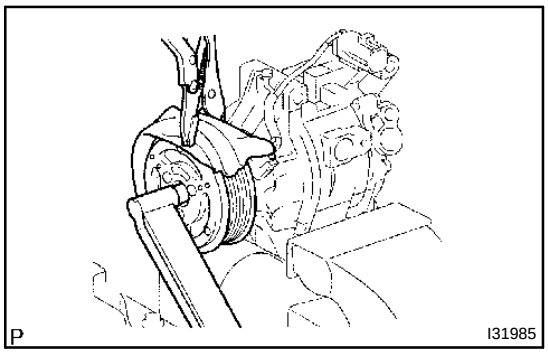
(b) Using a snap ring expander, install a new snap ring with the chamfered side facing up.
(c) Install the screw, connect the connector.



(d) Using a snap ring expander, install the magnet clutch rotor and a new snap ring with the chamfered side facing up.
(e) Install the magnet clutch washer and magnet clutch hub.

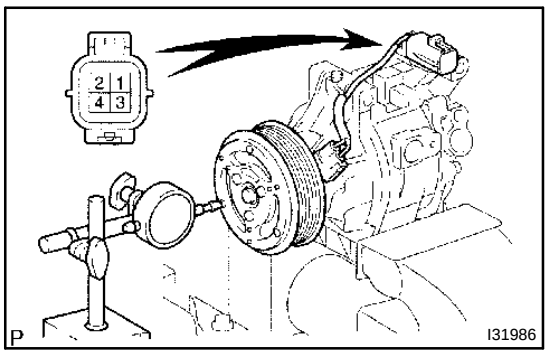
NOTICE:

Do not change the combination of the magnet clutch washers used before disassembly.



(f) Using a vise pliers, hold the magnet clutch hub and install the bolt.

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)



10. INSPECT MAGNETIC CLUTCH CLEARANCE

(a) Set the dial indicator to the magnet clutch hub.
(b) Connect the battery positive lead to the terminal 1 of magnet clutch connector and the negative lead to the earth wire. Turn on and off the magnet clutch and measure the clearance.

Standard clearance:

0.20 - 0.45 mm (0.008 - 0.018 in.)

If the measured value is out of the standard range, remove the magnet clutch hub and adjust it with magnet clutch washers.

NOTICE:

Adjustment shall be performed with 3 or less magnet clutch washers.

CONTINUED

11. INSPECT COMPRESSOR OIL

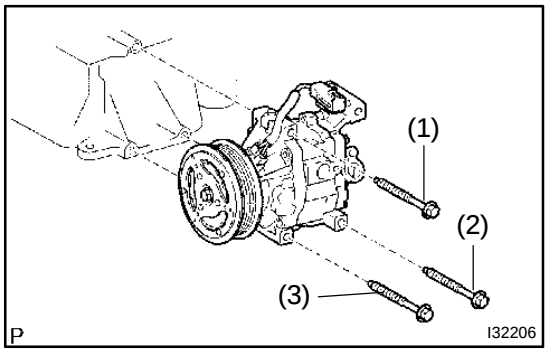
(a) When replacing the compressor and magnetic clutch with new one, after gradually removing the refrigerant gas from the service valve, drain the following amount of oil from the new compressor and magnetic clutch before installation.

Standard:

(Oil capacity inside new w/pulley compressor assy: 60 + 10 cc (2.0 + 0.3 fl. oz.)) - (Remaining oil amount in the removed w/pulley compressor assy) = (Oil amount to be removed when replacing)

NOTICE:

- **When checking the compressor oil level, observe the precautions on the cooler removal/installation.**
- **Because compressor oil remains in the pipes of the vehicle, if a new w/pulley compressor assy is installed without removing some oil inside, the oil amount becomes too much, preventing heat exchange in the refrigerant cycle and causing refrigerant failure.**
- **If the remaining oil in the removed w/pulley compressor assy is too small in volume, check for oil leakage.**
- **Be sure to use ND-OIL8 for compressor oil.**



12. INSTALL W/PULLEY COMPRESSOR ASSY

(a) Install the w/pulley compressor assy with the 3 bolts.

Toque: 25 N·m (250 kgf·cm, 18 ft·lbf)

NOTICE:

Tighten the bolts in following order shown in the illustration to install the w/pulley compressor assy.

(b) Connect the connector.

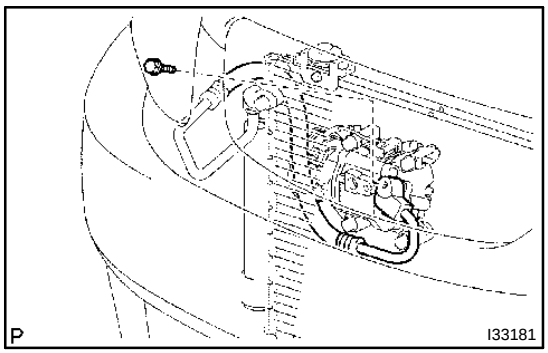
13. INSTALL COOLER REFRIGERANT DISCHARGE HOSE NO.1

(a) Remove the attached vinyl tape from the hose.

(b) Sufficiently apply compressor oil to the new O-ring and fit surface of the w/pulley compressor assy.

Compressor oil: ND-OIL8 or equivalent

(c) Install a O-ring to the cooler refrigerant discharge hose No.1.



(d) Connect the cooler refrigerant discharge hose No. 1 to the w/pulley compressor assy with the bolt.

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

14. INSTALL COOLER REFRIGERANT SUCTION HOSE NO.1

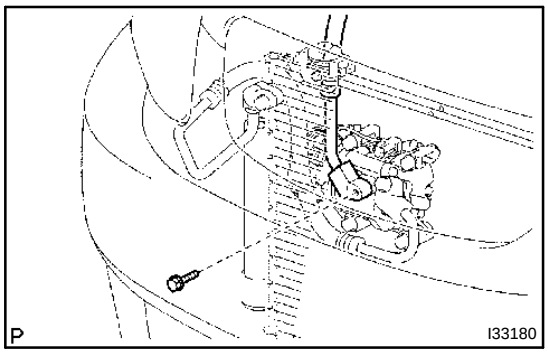
(a) Remove the attached vinyl tape from the hose.

(b) Sufficiently apply compressor oil to the new O-ring and fit surface of the w/pulley compressor assy.

Compressor oil: ND-OIL8 or equivalent

CONTINUED

(c) Install a O-ring to the cooler refrigerant suction hose No.1.



(d) Connect the cooler refrigerant suction hose No. 1 to the w/pulley compressor assy with the bolt.
Torque: 9.8 N·m (100 kgf·cm, 87 in.·lbf)

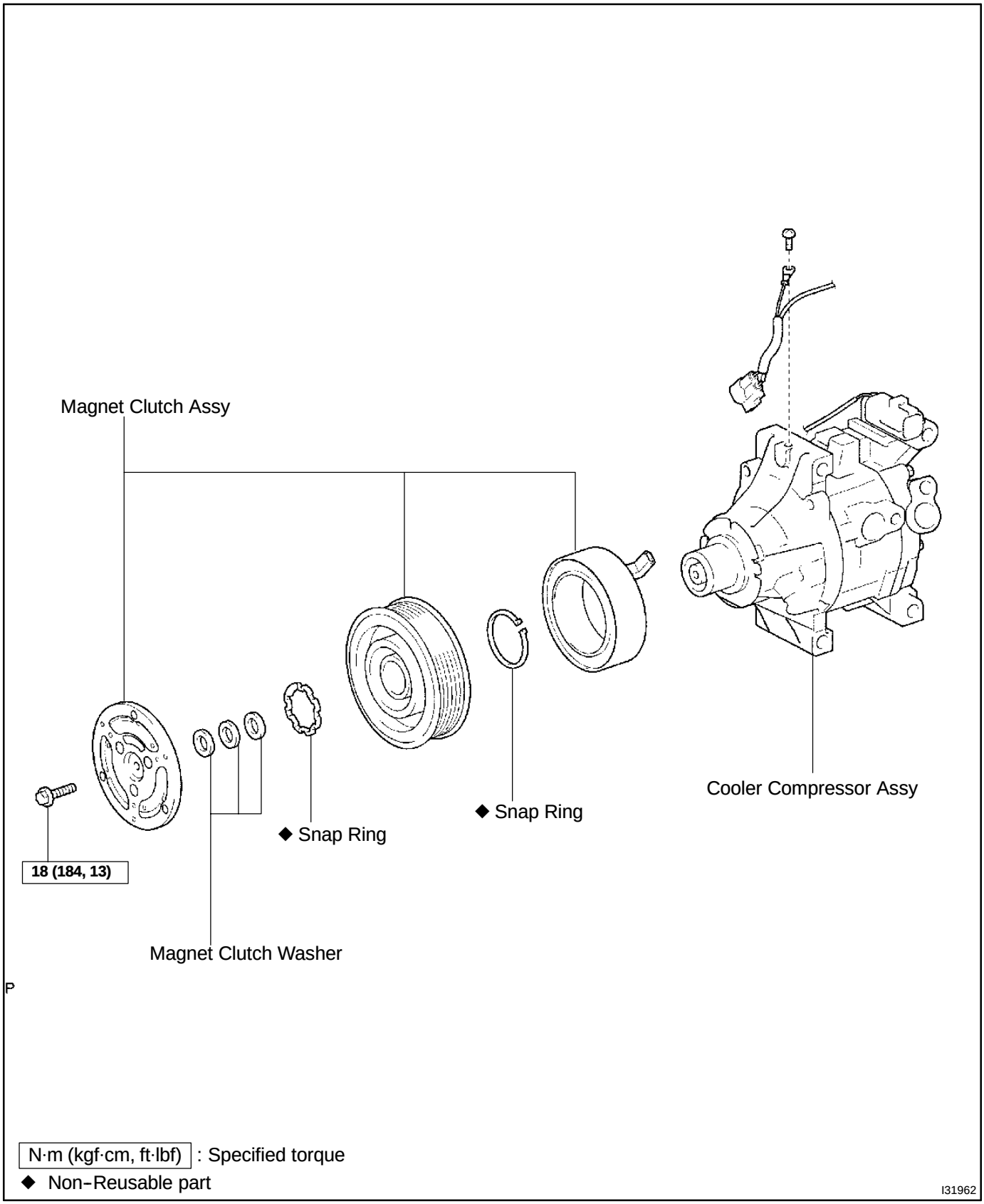
15. CHARGE REFRIGERANT **(See Pub. No. RM926E on page 55-1)**
SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080), 07117-48130, 07117-48140
Specified amount: 475 ± 25 g
16. WARM UP ENGINE
17. INSPECT LEAKAGE OF REFRIGERANT **(See Pub. No. RM926E on page 55-1)**

CONTINUED

COOLER COMPRESSOR ASSY (4ZZ-FE FOR SOUTH AFRICA)

COMPONENTS

550NN-01



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

I31962

REPLACEMENT

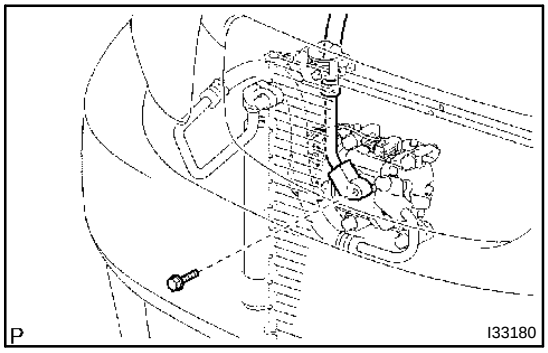
HINT:

COMPONENTS: 55-8

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

(See Pub. No. RM926E on page 55-1)

SST 07110-58060 (07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)



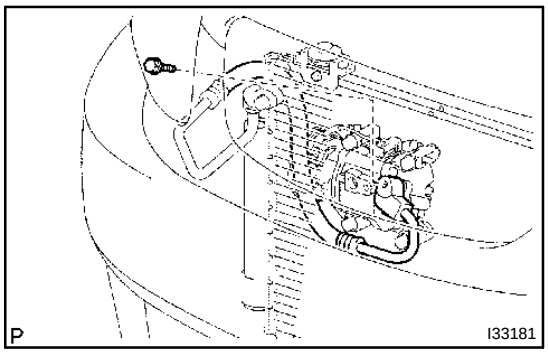
2. DISCONNECT COOLER REFRIGERANT SUCTION HOSE NO.1

(a) Remove the bolt and disconnect the cooler refrigerant suction hose No. 1 from the w/pulley compressor assy.

(b) Remove the O-ring from the cooler refrigerant suction hose No. 1.

NOTICE:

Seal the opening of the disconnected parts using vinyl tape to prevent moisture and foreign matter from entering.



3. DISCONNECT COOLER REFRIGERANT DISCHARGE HOSE NO.1

(a) Remove the bolt and disconnect the cooler refrigerant discharge hose No. 1 from the w/pulley compressor assy.

(b) Remove the O-ring from the cooler refrigerant discharge hose No. 1.

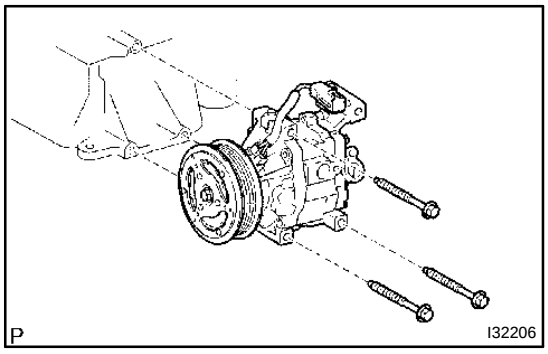
NOTICE:

Seal the opening of the disconnected parts using vinyl tape to prevent moisture and foreign matter from entering.

4. REMOVE ENGINE UNDER COVER RH

5. REMOVE V (COOLER COMPRESSOR TO CRANKSHAFT PULLEY) BELT NO.1

(See page 14-97)



6. REMOVE W/PULLEY COMPRESSOR ASSY

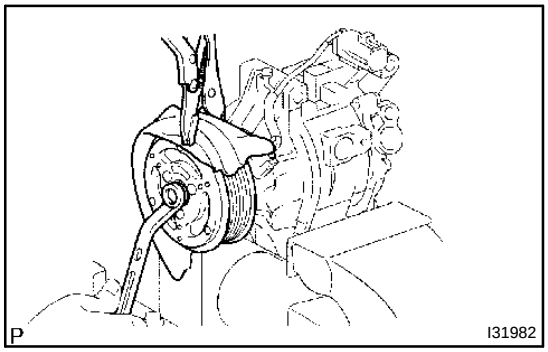
(a) Disconnect the connector.

(b) Remove the 3 bolts and w/pulley compressor assy.

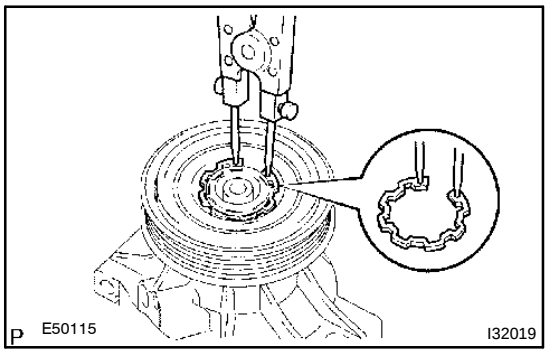
7. REMOVE MAGNET CLUTCH ASSY

(a) Place the w/pulley compressor assy in vise.

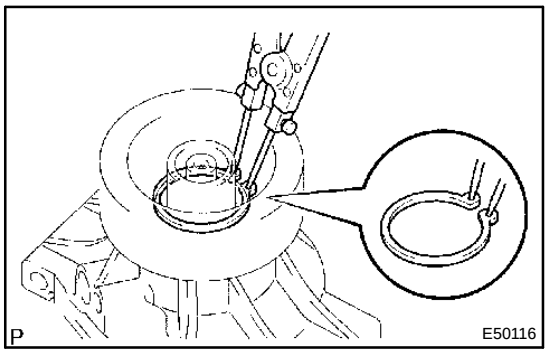
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(b) Using a vise pliers, hold the magnet clutch hub.
(c) Remove the bolt, magnet clutch hub and magnet clutch washer.

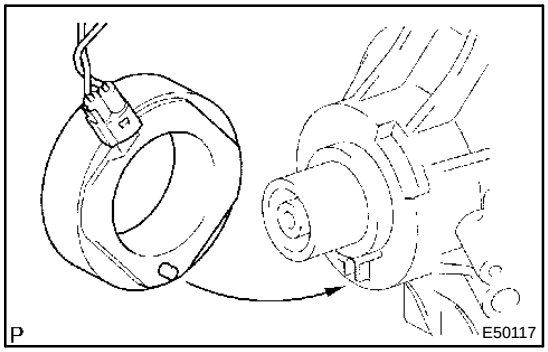


(d) Using a snap ring expander, remove the snap ring and magnet clutch rotor.
(e) Remove the screw, disconnect the connector.



(f) Using a snap ring expander, remove the snap ring and magnet clutch starter.

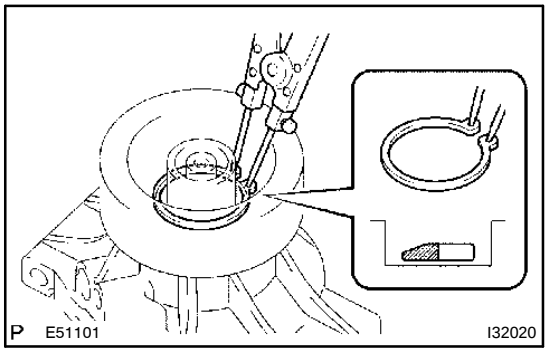
8. REMOVE COOLER COMPRESSOR ASSY



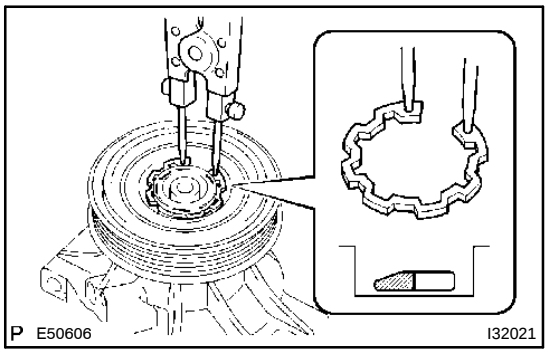
9. INSTALL MAGNET CLUTCH ASSY

(a) Matching the parts shown in the illustration, install the magnet clutch starter.

CONTINUED



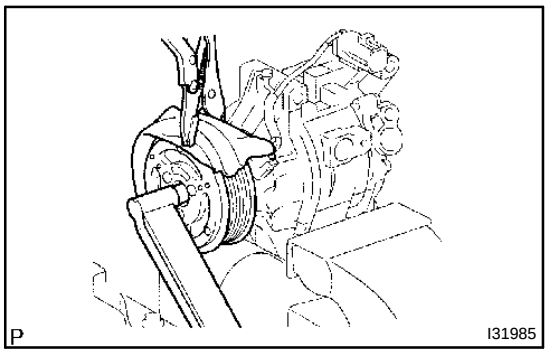
(b) Using a snap ring expander, install a new snap ring with the chamfered side facing up.
(c) Install the screw, connect the connector.



(d) Using a snap ring expander, install the magnet clutch rotor and a new snap ring with the chamfered side facing up.
(e) Install the magnet clutch washer and magnet clutch hub.

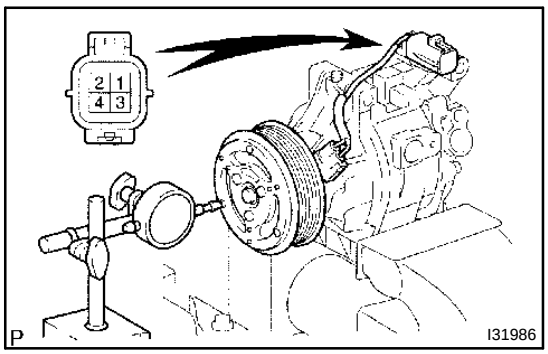
NOTICE:

Do not change the combination of the magnet clutch washers used before disassembly.



(f) Using a vise pliers, hold the magnet clutch hub and install the bolt.

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)



10. INSPECT MAGNETIC CLUTCH CLEARANCE

(a) Set the dial indicator to the magnet clutch hub.
(b) Connect the battery positive lead to the terminal 1 of magnet clutch connector and the negative lead to the earth wire. Turn on and off the magnet clutch and measure the clearance.

Standard clearance:

0.20 - 0.45 mm (0.008 - 0.018 in.)

If the measured value is out of the standard range, remove the magnet clutch hub and adjust it with magnet clutch washers.

NOTICE:

Adjustment shall be performed with 3 or less magnet clutch washers.

CONTINUED

11. INSPECT COMPRESSOR OIL

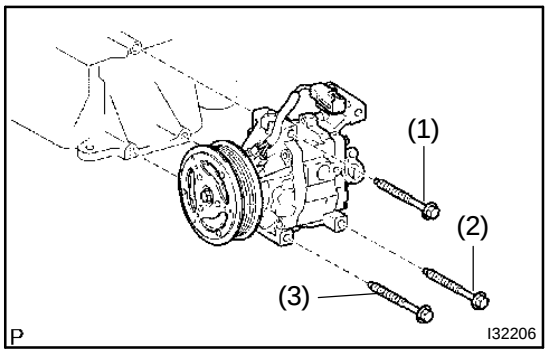
(a) When replacing the compressor and magnetic clutch with new one, after gradually removing the refrigerant gas from the service valve, drain the following amount of oil from the new compressor and magnetic clutch before installation.

Standard:

(Oil capacity inside new w/pulley compressor assy: 60 + 10 cc (2.0 + 0.3 fl. oz.)) - (Remaining oil amount in the removed w/pulley compressor assy) = (Oil amount to be removed when replacing)

NOTICE:

- **When checking the compressor oil level, observe the precautions on the cooler removal/installation.**
- **Because compressor oil remains in the pipes of the vehicle, if a new w/pulley compressor assy is installed without removing some oil inside, the oil amount becomes too much, preventing heat exchange in the refrigerant cycle and causing refrigerant failure.**
- **If the remaining oil in the removed w/pulley compressor assy is too small in volume, check for oil leakage.**
- **Be sure to use ND-OIL8 for compressor oil.**



12. INSTALL W/PULLEY COMPRESSOR ASSY

(a) Install the w/pulley compressor assy with the 3 bolts.

Toque: 25 N·m (250 kgf·cm, 18 ft·lbf)

NOTICE:

Tighten the bolts in following order shown in the illustration to install the w/pulley compressor assy.

(b) Connect the connector.

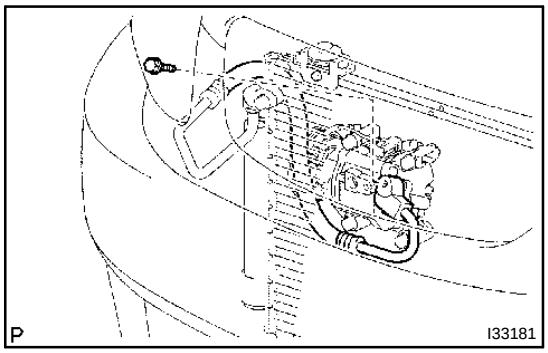
13. INSTALL COOLER REFRIGERANT DISCHARGE HOSE NO.1

(a) Remove the attached vinyl tape from the hose.

(b) Sufficiently apply compressor oil to the new O-ring and fit surface of the w/pulley compressor assy.

Compressor oil: ND-OIL8 or equivalent

(c) Install a O-ring to the cooler refrigerant discharge hose No.1.



(d) Connect the cooler refrigerant discharge hose No. 1 to the w/pulley compressor assy with the bolt.

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

14. INSTALL COOLER REFRIGERANT SUCTION HOSE NO.1

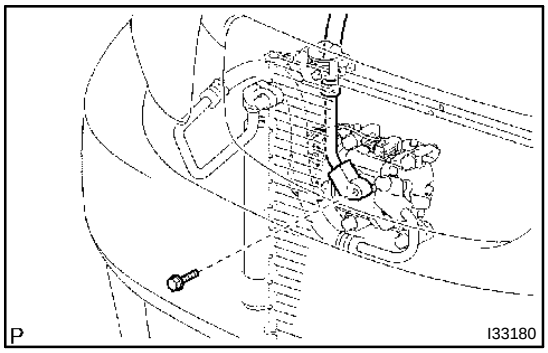
(a) Remove the attached vinyl tape from the hose.

(b) Sufficiently apply compressor oil to the new O-ring and fit surface of the w/pulley compressor assy.

Compressor oil: ND-OIL8 or equivalent

CONTINUED

(c) Install a O-ring to the cooler refrigerant suction hose No.1.



(d) Connect the cooler refrigerant suction hose No. 1 to the w/pulley compressor assy with the bolt.
Torque: 9.8 N·m (100 kgf·cm, 87 in.·lbf)

15. CHARGE REFRIGERANT **(See Pub. No. RM926E on page 55-1)**
SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080), 07117-48130, 07117-48140
Specified amount: 490 ± 30 g (17.28 ± 1.06 oz.)
16. WARM UP ENGINE
17. INSPECT LEAKAGE OF REFRIGERANT **(See Pub. No. RM926E on page 55-1)**

CONTINUED

LIGHTING

HEADLIGHT (SOUTH AFRICA) 65–1
ADJUSTMENT 65–1/2

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E

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

CONTINUED

HEADLIGHT (SOUTH AFRICA)

650JI-01

ADJUSTMENT

1. ADJUST HEADLIGHT AIM ONLY

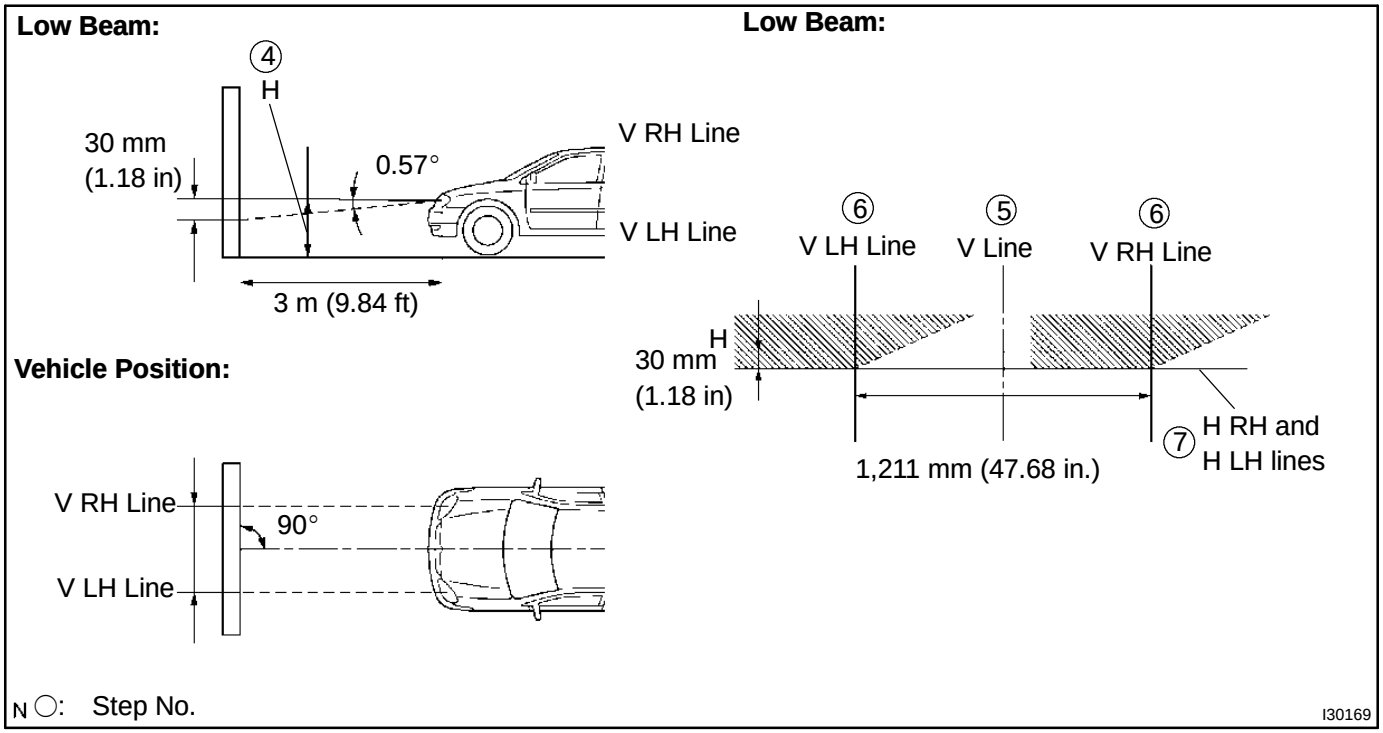
(a) Place the vehicle under the following conditions.
- The area around the headlight is not deformed.
- The vehicle is parked on a level surface.
- Tire inflation pressure is in the specified value.
- A driver is in the driver's seat and the vehicle is in a state ready for driving (with a tank full).
- The vehicle has been bounced several times.

(b) Check the headlight aiming.
(1) Prepare a thick white paper.
(2) Stand the paper perpendicular to the ground at the position 9.84 ft away from the headlights.
(3) Ensure that the center line of the vehicle and the paper face forms a 90–degree angle as shown in the illustration.
(4) Draw a horizontal line (H line) on the paper, showing where the headlights should strike.
(5) Draw a vertical line (V line) to where the center line of the vehicle is to be.
(6) Draw 2 vertical lines to where the both headlights should strike (V RH and V LH lines).
(7) Draw a horizontal line (by connecting the both low beam center marks) to where the headlights should strike (H RH and H LH lines).
(8) Take appropriate measures to prevent any influence of other lights.

HINT:

The H RH and H LH line is 0.57˚ below the horizontal line (H line) of the light axis.

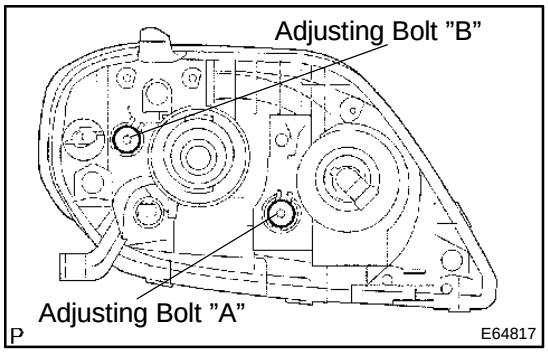
(9) Start the engine.
(10) Turn the headlights ON.
(11) Check that the headlights properly strike the position shown in the illustration.
(12) If not, adjust the lights in the vertical or horizontal direction.



CONTINUED

HINT:

- As shown in the illustration, adjust each aim of the RH and LH lights.
- Since to adjust the horizontal direction is impossible, the value * of the ”Low Beam” aim is reference value.



(c) When adjusting the headlight aim in the horizontal direction:
Using adjusting bolt B, adjust the headlight aim to be within the specified range.

(d) When adjusting it in the vertical direction:
Using adjusting bolt A, adjust the headlight aim to be within the specified range.

HINT:

The optical aim moves upward when turning a screwdriver clockwise, while it moves downward when turning a screwdriver counterclockwise.

CONTINUED

WIRING

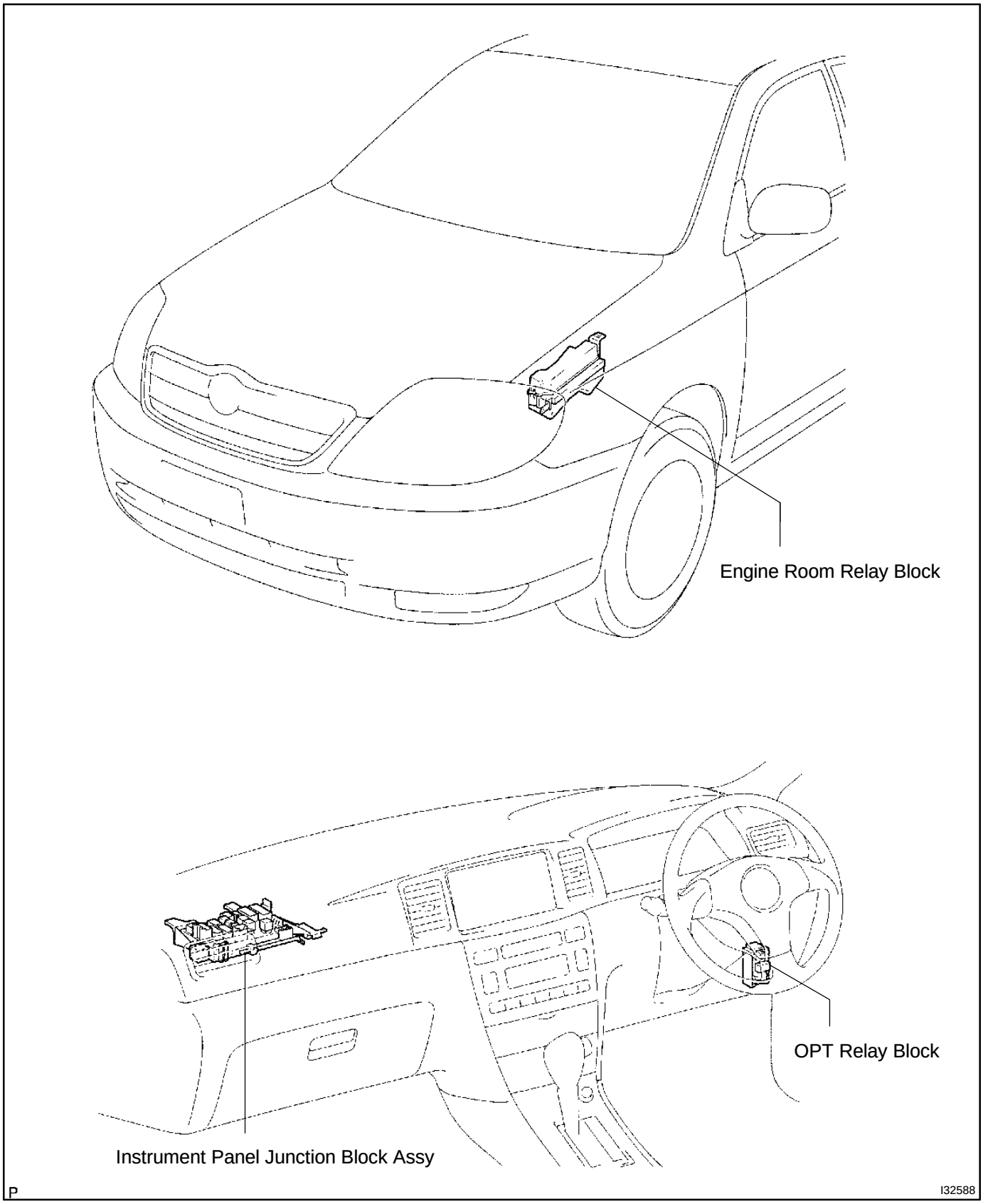
POWER SOURCE (SOUTH AFRICA) 68–1
LOCATION 68–1/4

CONTINUED

POWER SOURCE (SOUTH AFRICA)

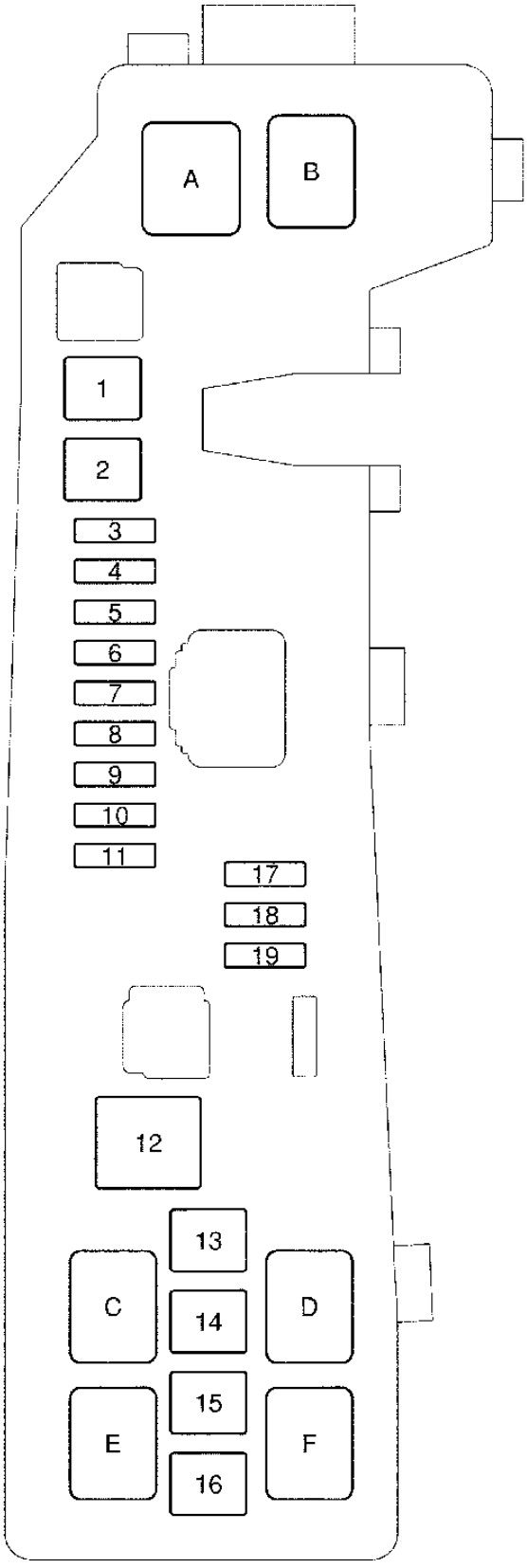
LOCATION

68041-01



CONTINUED

Engine Room Relay Block



FUSE

1.	-	
2.	-	
3.	HEAD RH	15 A
4.	HEAD LH	15 A
5.	HORN	10 A
6.	HAZARD	10 A
7.	ALT-S	5 A
8.	-	
9.	EFI	15 A
10.	DOME	15 A
11.	AM 2	30 A
12.	ALT	100 A
13.	-	
14.	RDI FAN	30 A
15.	ABS	50 A (*2)
	ABS No. 1	30 A (*1)
16.	ABS No. 2	40 A (*1)
17.	SPARE	5 A
18.	SPARE	10 A
19.	SPARE	15 A

(*1): 2ZZ-GE

(*2): Except 2ZZ-GE

RELAY

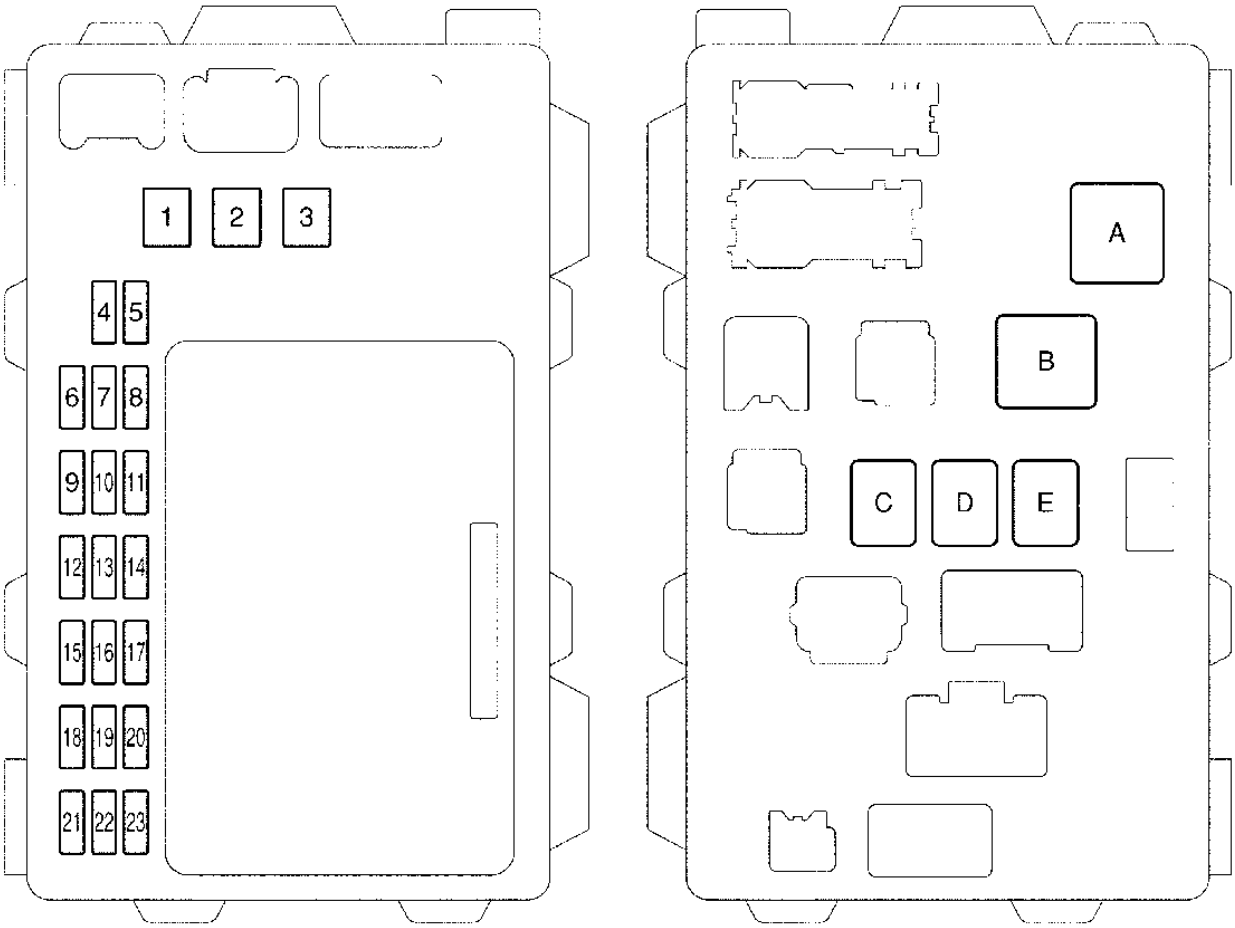
A. -	D. FAN No. 2
B. MG CLT	E. EFI
C. HORN	F. FAN No. 1

P

I32044

CONTINUED

Instrument Panel Junction Block Assy



FUSE

1, HEATER	40 A	13, -	
2, DEFOG	30 A	14, CIG	15 A
3, POWER	30 A	15, FR FOG	15 A
4, A/C	10 A	16, AM1	25 A
5, DEF I-UP	10 A	17, -	
6, AM2-2	15 A	18, OBD	7.5 A
7, RR WIPER	15 A	19, DOOR	25 A
8, WASHER	15 A	20, -	
9, FR WIPER	25 A	21, TAIL	15 A
10, ECU-IG	10 A	22, STOP	15 A
11, GAUGE	10 A	23, -	
12, -			

RELAY

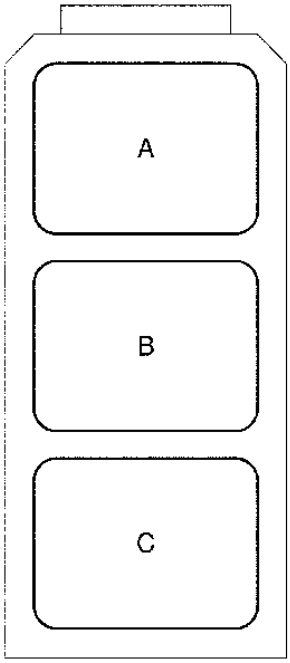
A, ST
B, DEF
C, C/OPN
D, P/W
E, IG 1

P

I32302

CONTINUED

OPT Relay Block



RELAY

A. -
B. FOG-LP
C. -

I32793

CONTINUED

EXTERIOR/INTERIOR TRIM

FRONT BUMPER COVER
(SOUTH AFRICA) 76–1
COMPONENTS 76–1
REPLACEMENT 76–2/3
FRONT SPOILER COVER
(SOUTH AFRICA) 76–4
REPLACEMENT 76–4
NAME PLATE (SOUTH AFRICA) 76–5
REPLACEMENT 76–5/6

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E

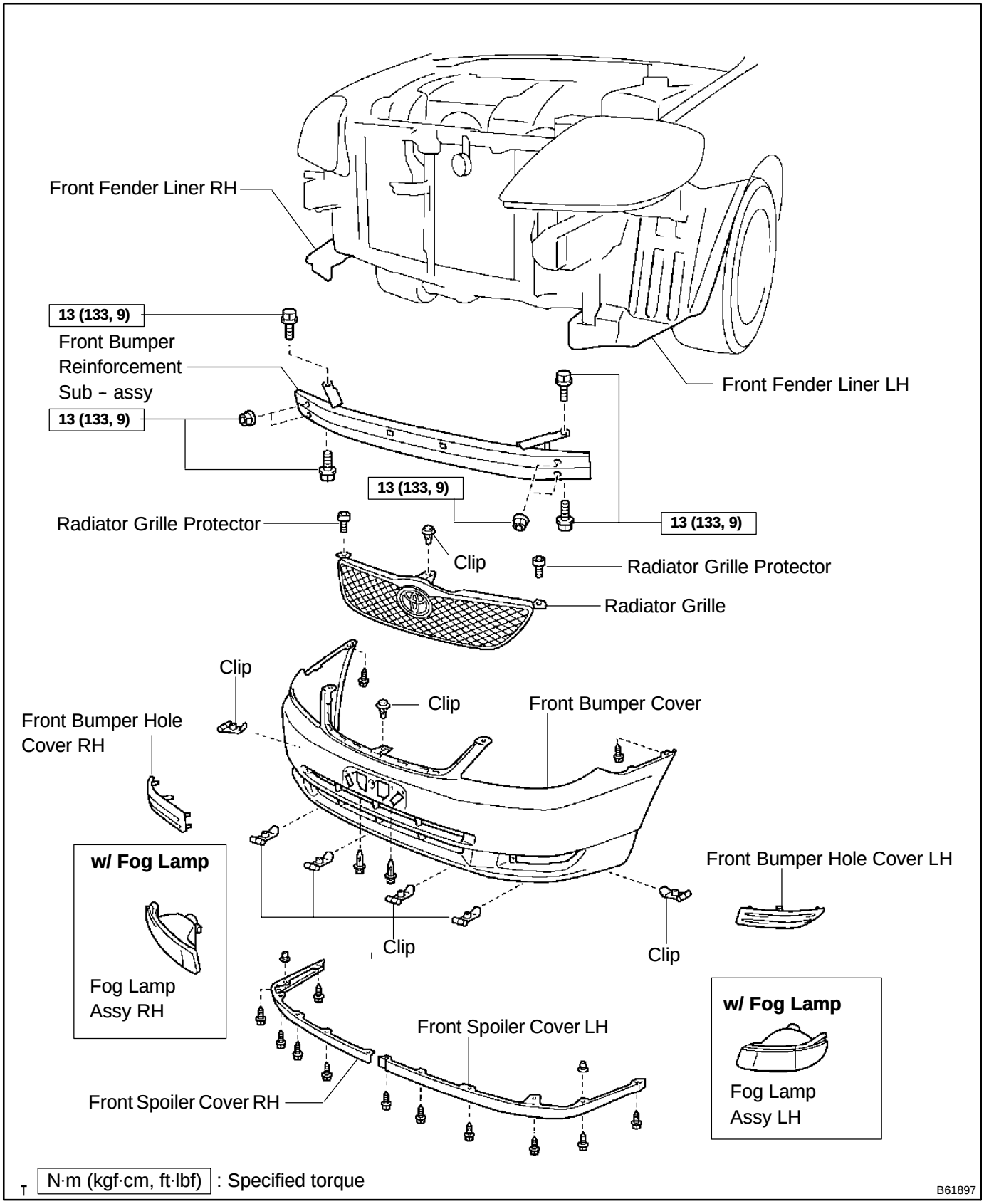
NOTE: The above pages contain only the points which differ from the above listed manuals.

CONTINUED

FRONT BUMPER COVER (SOUTH AFRICA)

COMPONENTS

760LH-01



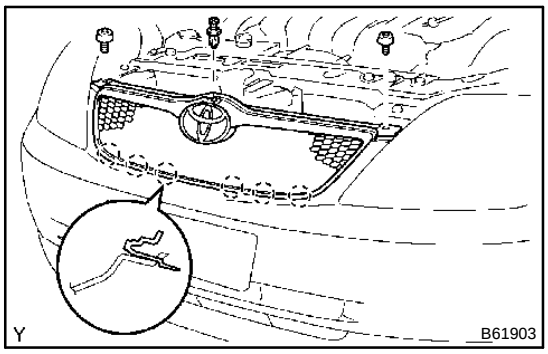
CONTINUED

760LI-01

REPLACEMENT

HINT:

- The installation is in the reverse order of the removal. However, when there is a special point concerning the installation, it is indicated.
- On the RH side, use the same procedures as on the LH side.

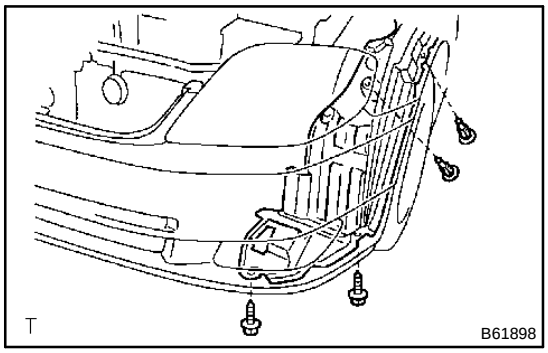


1. REMOVE RADIATOR GRILLE

(a) Using a clip remover, remove the clip.
(b) Remove the 2 radiator grille protectors.
(c) Disengage the hook and radiator grille.

2. FRONT SPOILER COVER LH (W/ FRONT SPOILER) **(See page 76-4)**

3. FRONT SPOILER COVER RH (W/ FRONT SPOILER) **(See page 76-4)**



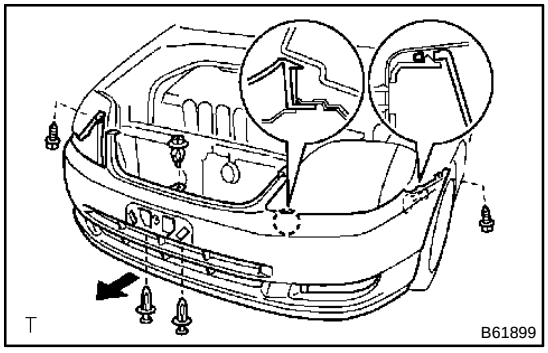
4. REMOVE FRONT FENDER LINER LH

(a) Using a clip remover, remove the 2 clips.
(b) Remove the 2 screws and partially remove the front fender liner LH.

HINT:

It is only necessary to partially remove the front fender liner LH in order to be able to remove the front bumper cover.

5. REMOVE FRONT FENDER LINER RH



6. REMOVE FRONT BUMPER COVER

(a) Remove the 2 screws and 3 clips.
(b) Disengage the hook and remove the front bumper cover.
(c) w/ Fog lamp:
Disconnect the connectors.

7. REMOVE FRONT FOG LAMP ASSY LH (W/ FOG LAMP)

(a) Remove the hook and fog lamp assembly LH.

8. REMOVE FRONT FOG LAMP ASSY RH (W/ FOG LAMP)

CONTINUED

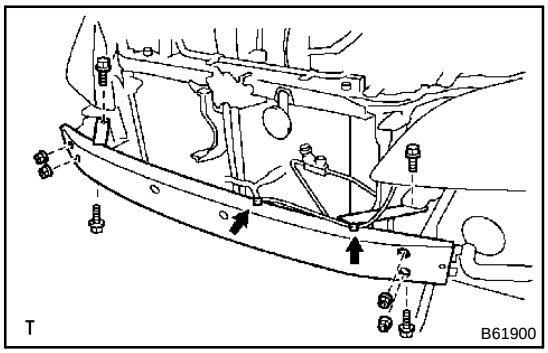
9. REMOVE FRONT BUMPER HOLE COVER LH (W/O FOG LAMP)

(a) Using a screwdriver, disengage the hook and remove the front bumper hole cover.

HINT:

Tape the screwdriver tip before use.

10. REMOVE FRONT BUMPER HOLE COVER RH (W/O FOG LAMP)

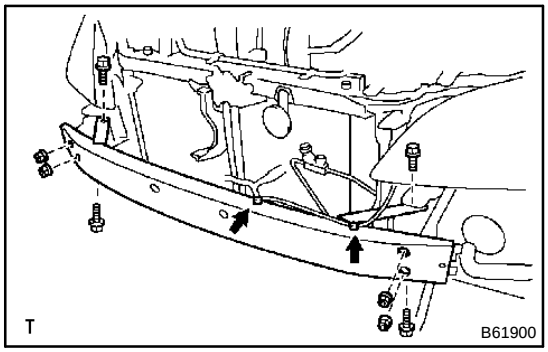


11. REMOVE FRONT BUMPER REINFORCEMENT SUB-ASSY

(a) Disconnect the 2 wire harness clips.

(b) Remove the 4 bolts.

(c) Remove the 4 nuts and front bumper reinforcement.



12. INSTALL FRONT BUMPER REINFORCEMENT SUB-ASSY

(a) Install the front bumper reinforcement with the 4 bolts and 4 nuts.

Torque: 13 N·m (133 kgf·cm, 9 ft·lbf)

(b) Connect the 2 wire harness clips.

CONTINUED

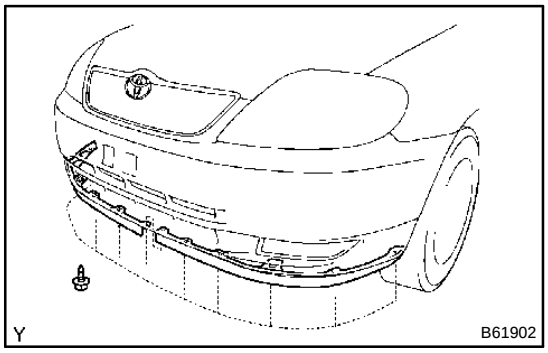
FRONT SPOILER COVER (SOUTH AFRICA)

760LJ-01

REPLACEMENT

HINT:

- The installation is in the reverse order of the removal.



1. REMOVE FRONT SPOILER COVER LH

(a) Remove the 6 bolts and front spoiler cover LH.

2. REMOVE FRONT SPOILER COVER RH

(a) Remove the 5 bolts and front spoiler cover RH.

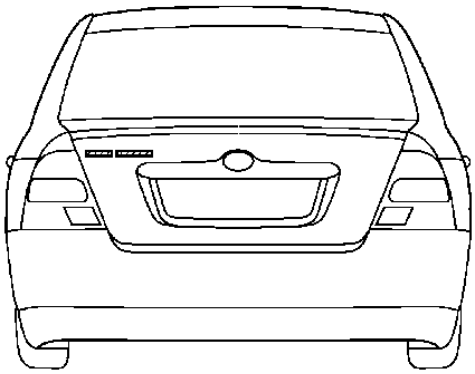
CONTINUED

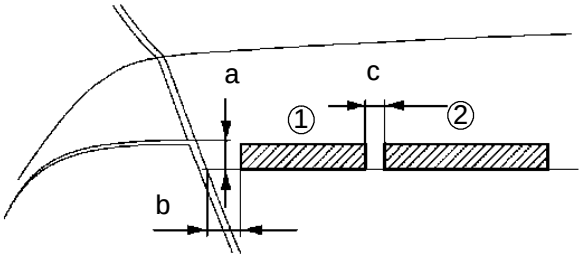
NAME PLATE (SOUTH AFRICA)

REPLACEMENT

760LK-01

SEDAN





a	22.8 (0.898)
b	25.6 (1.008)
c	15.0 (0.591)

mm (in.)

①







②







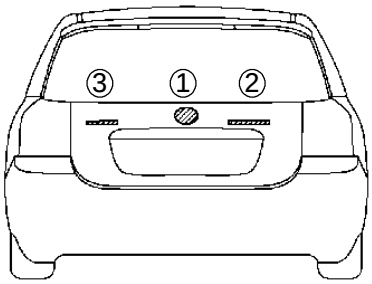
Notice:

All the angle for adhesion is horizontal.

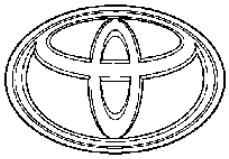
B62449

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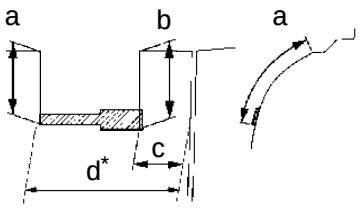
HATCHBACK



①



②



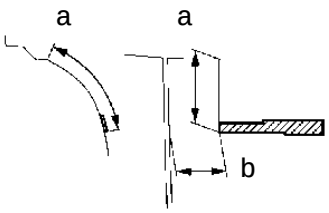


a	128.9 (5.075)	c	71.6 (2.819)
b	145.7 (5.736)	d*	246.7 (9.713)

mm (in.)

*: Reference

③















a	138.4 (5.449)
b	71.8 (2.827)

mm (in.)

Notice:

All the angle for adhesion is horizontal.

B62450

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ALPHABETICAL INDEX (A - F)

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