FOREWORD

This supplement has been prepared to provide information covering general service repairs for COROLLA which underwent changes in August, 2003.

Applicable models: ZZE120, 121, 122, 123 series

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

Manual Name	Pub. No.
S COROLLA Repair Manual	RM821E
S COROLLA Repair Manual Supplement (Oct., 2001)	RM926E
S COROLLA Repair Manual Supplement (Aug., 2002)	DR105E
S 1ZZ-FE, 3ZZ-FE Engine Repair Manual	RM823E
S 2ZZ-GE Engine Repair Manual	RM929E
S 3ZZ-FE, 4ZZ-FE Engine Repair Manual	RM928E
S C51, C52 Manual Transaxle Repair Manual	RM826E
S C64 Manual Transaxle Repair Manual	RM930E
S C150 Manual Transaxle Repair Manual	RM827E
S A245E, A246E Automatic Transaxle Repair Manual	RM847E
S COROLLA Electrical Wiring Diagram (Draft)	DR091W

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

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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.

TOYOTA COROLLA
GENERAL REPAIR SUPPLEMENT DR141E
MAIN INDEX

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HOW TO USE THIS MANUAL

GENERAL INFORMATION

010B2-17

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.

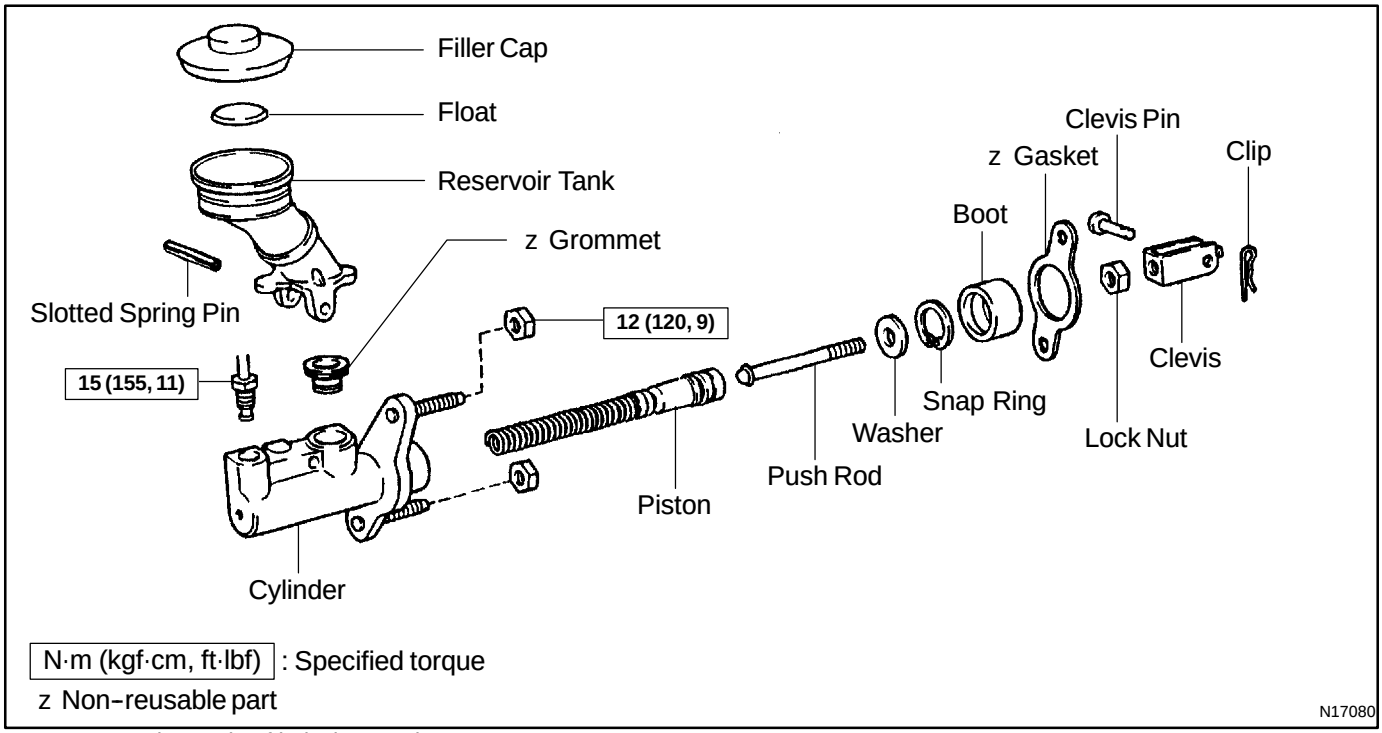
4. REPAIR PROCEDURES

(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:



(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.

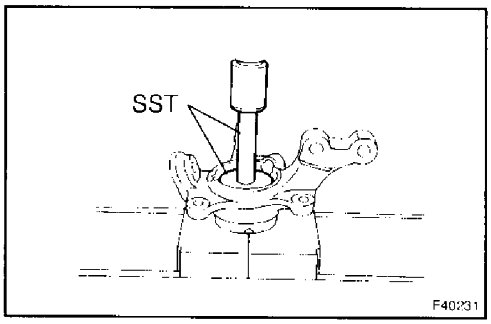
(2) The task heading tells what to do.

(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 text: 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.

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.

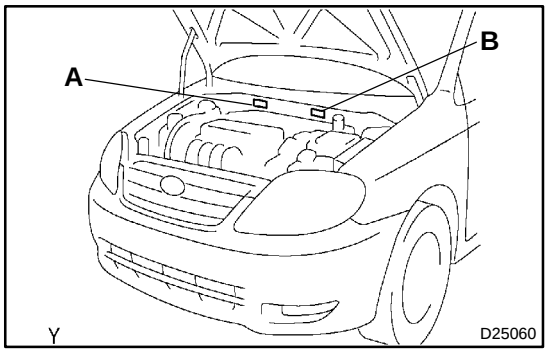
Example:

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

IDENTIFICATION INFORMATION

VEHICLE IDENTIFICATION AND SERIAL NUMBERS

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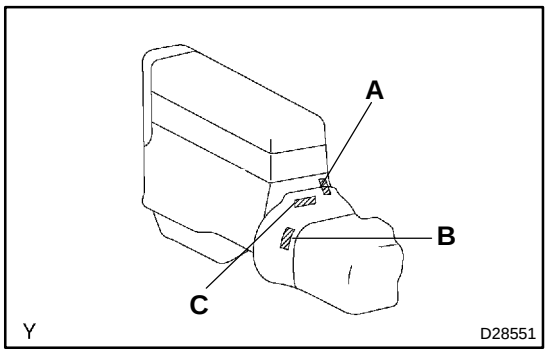


1. VEHICLE IDENTIFICATION NUMBER

(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

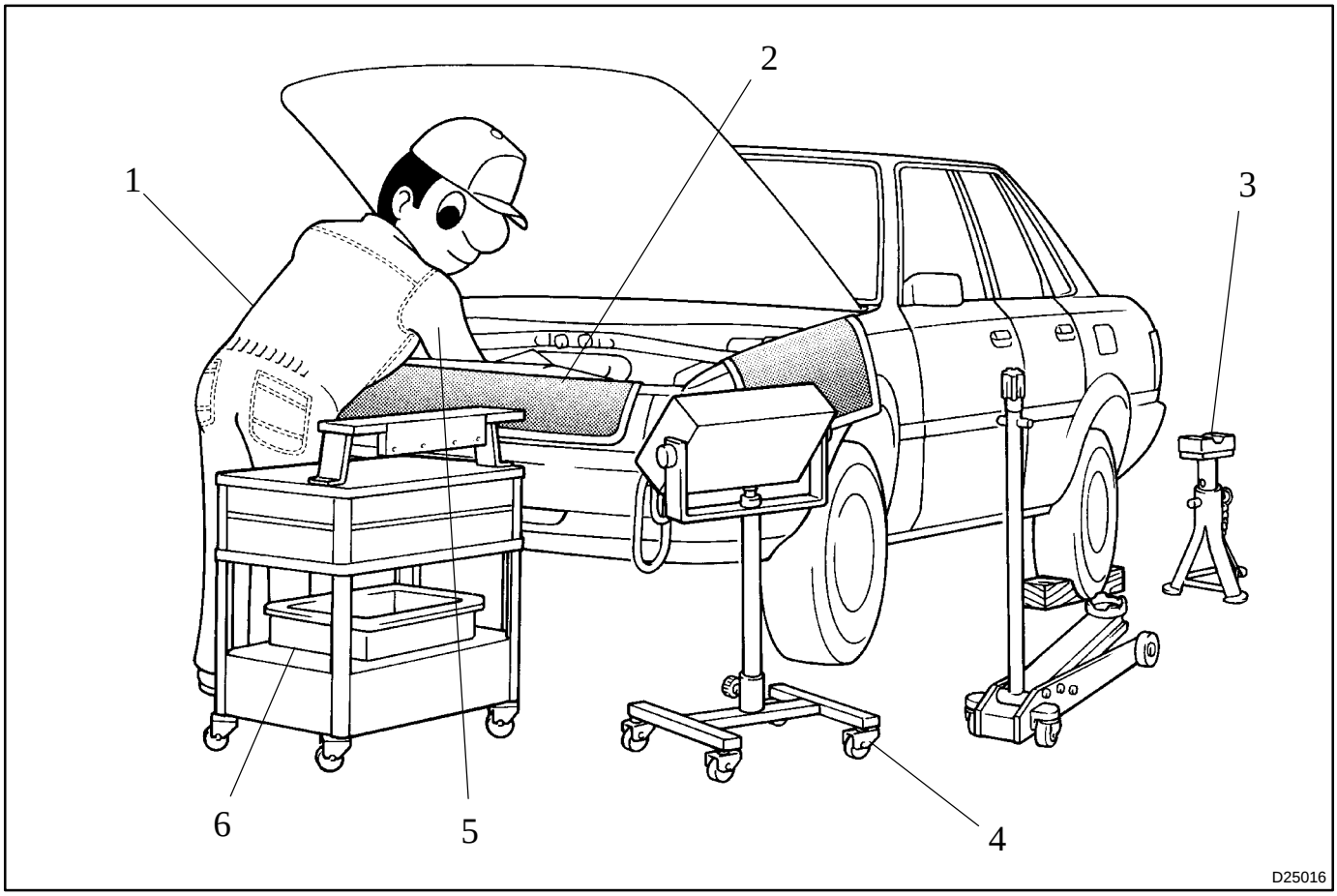
REPAIR INSTRUCTION

PRECAUTION

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1. BASIC REPAIR HINT

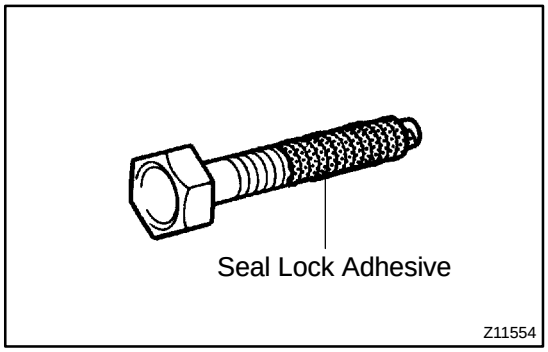
(a) HINTS ON OPERATIONS



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 01–16).



(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.

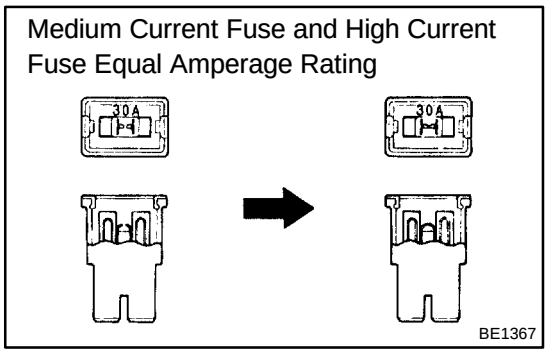
(4) Depending on the seal lock agent to apply, there may be a case where it is necessary to leave it for a specified time until it hardens.

(d) GASKETS

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

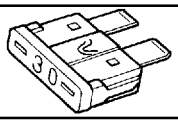
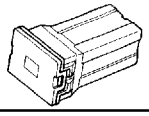
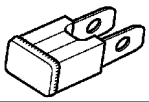
(e) BOLTS, NUTS AND SCREWS

(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

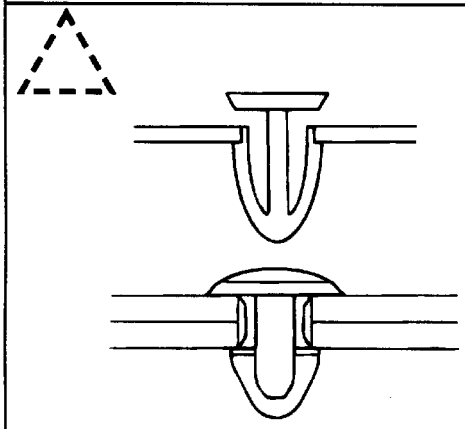
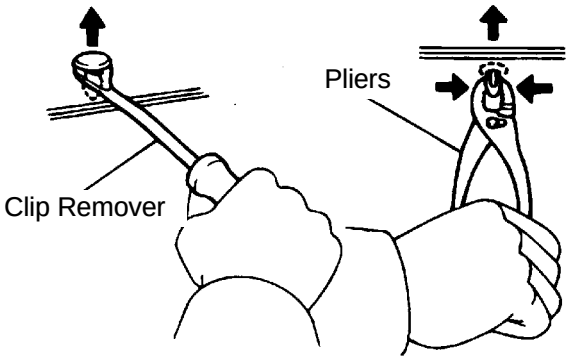
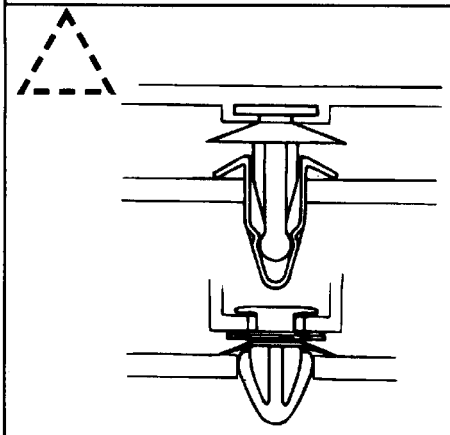
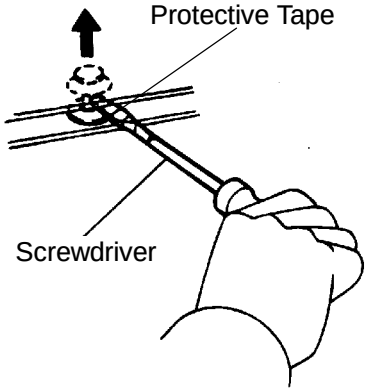
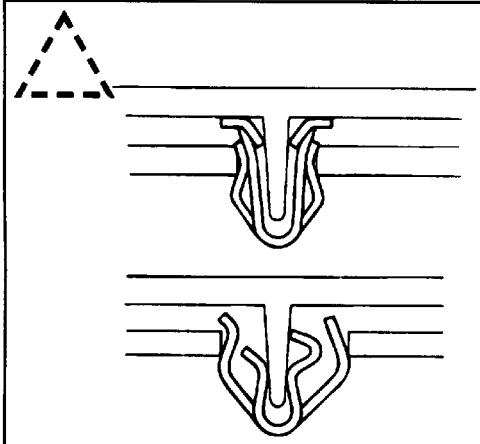
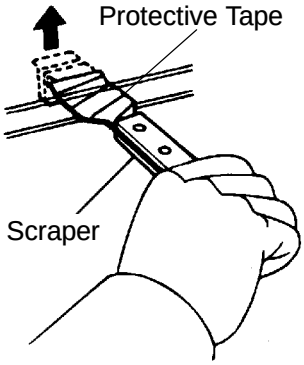
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(g) CLIPS

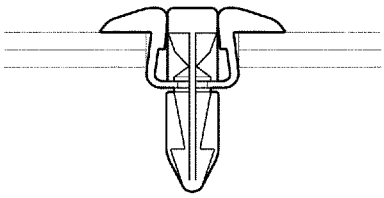
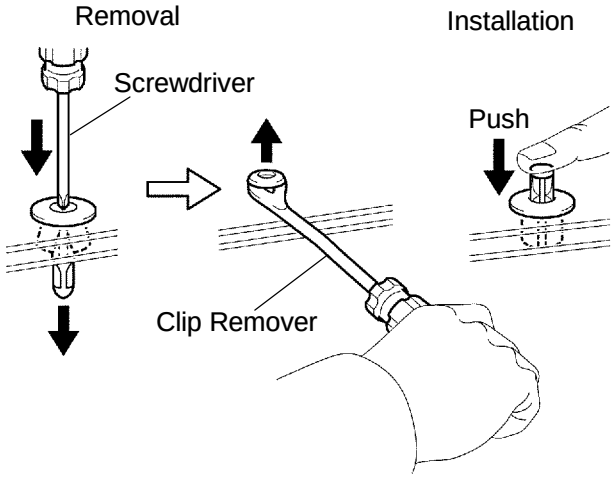
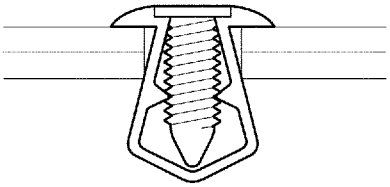
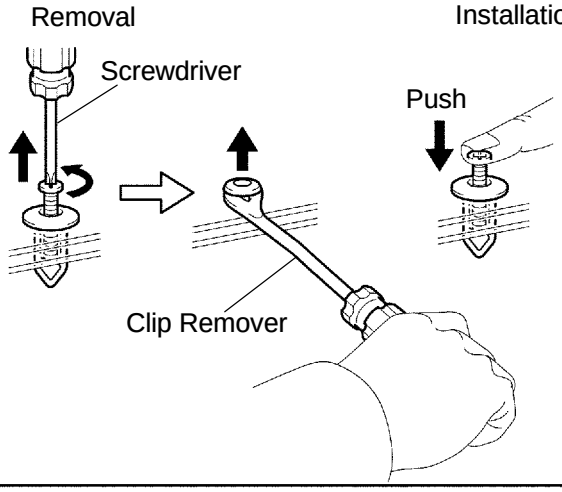
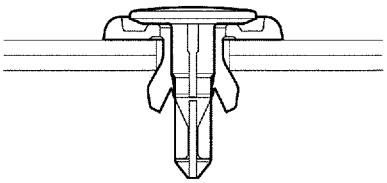
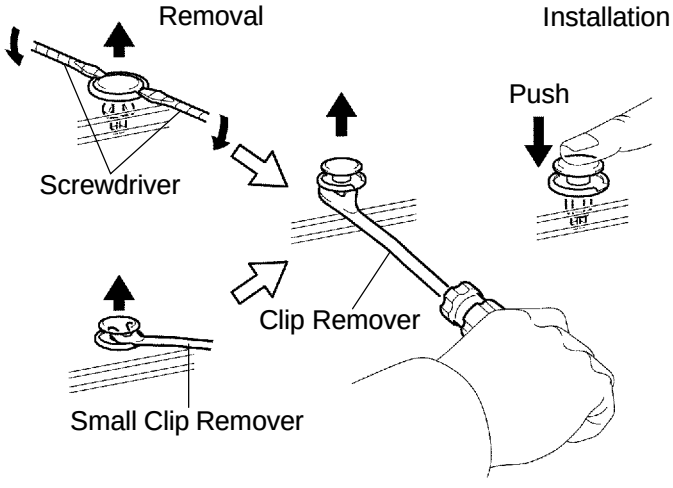
(1) The removal and installation methods of typical clips used in body parts are shown in the table below.

HINT:

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

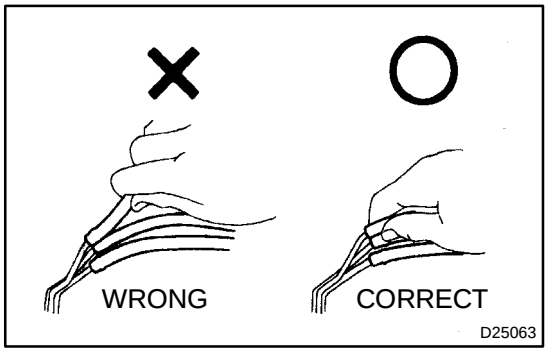
Shape (Example)	Removal/Installation
	
	
	

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Shape (Example)	Removal/Installation
	
	
	

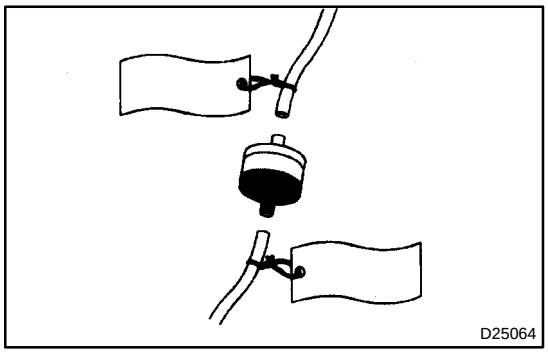
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(h) REMOVAL AND INSTALLATION OF VACUUM HOSES

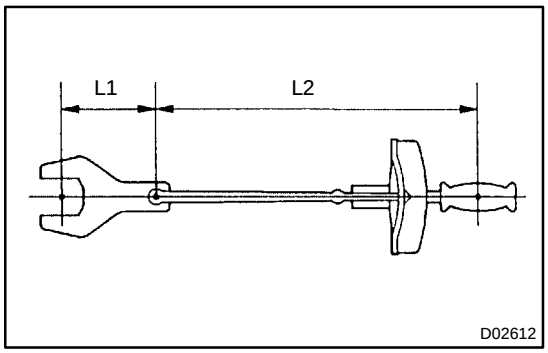
(1) To disconnect vacuum hoses, pull them by holding the end, not the middle of the hose.



(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.

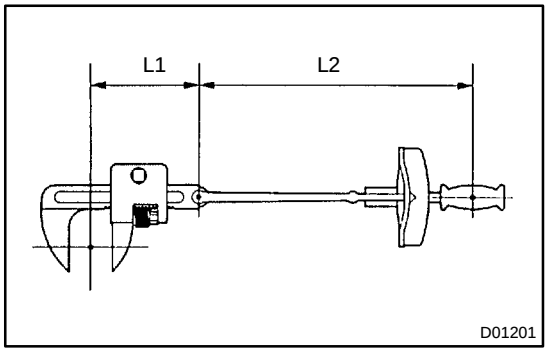


(i) TORQUE WHEN USING TORQUE WRENCH WITH EXTENSION TOOL

(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.

(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.

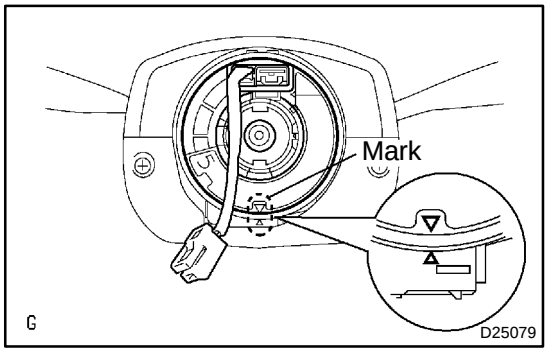
(7) If the airbag sensor assembly, horn button assembly, instrument panel passenger airbag assembly or seat belt pretensioner have been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.

(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.

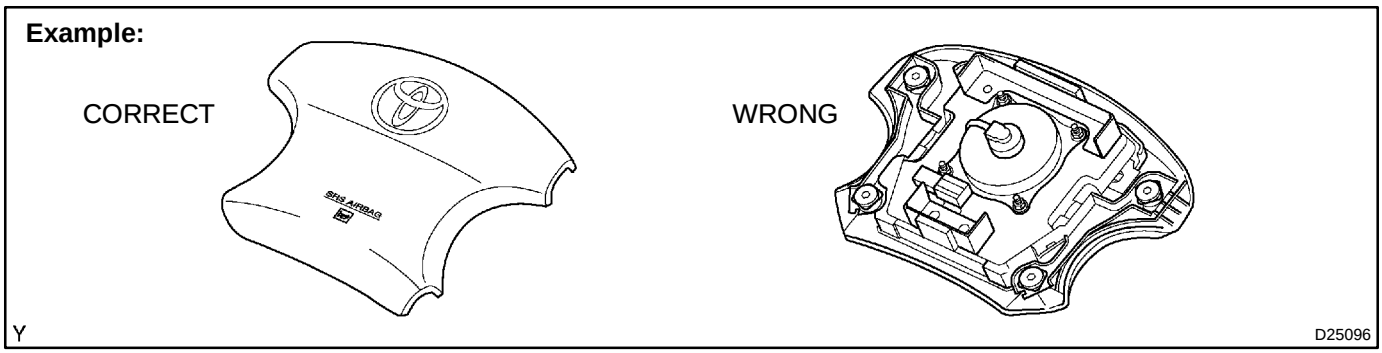
(2) Never measure the resistance of the airbag squib (This may cause the airbag to inflate, which is very dangerous.).

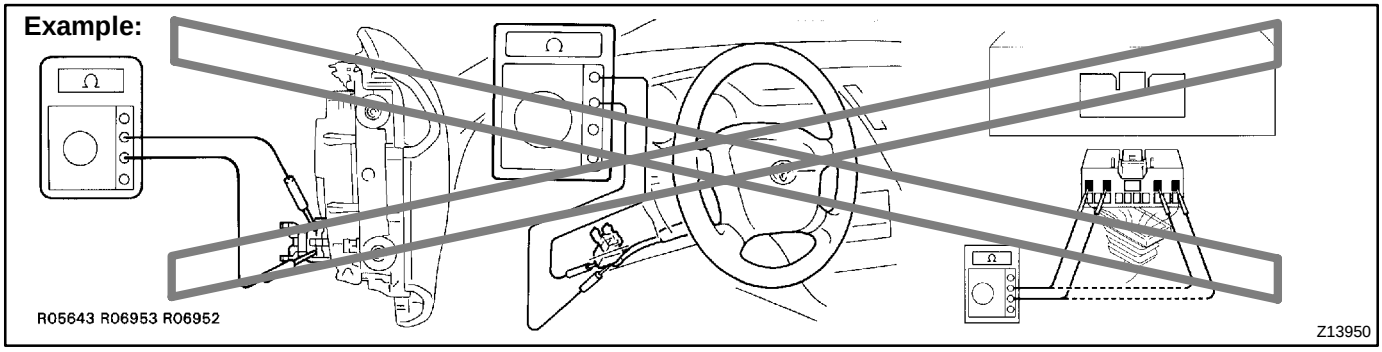
(3) Grease should not be applied to the horn button assembly and the pad should not be cleaned with detergents of any kinds.

(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.

(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.

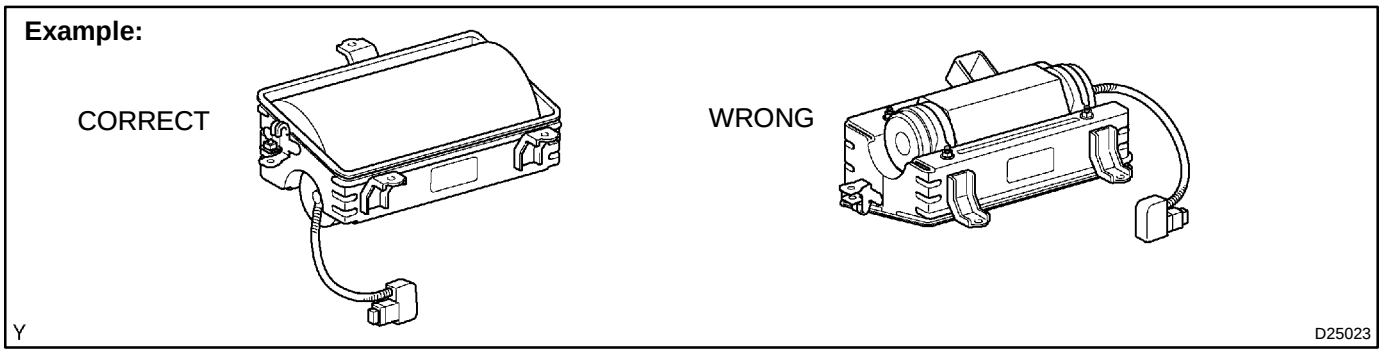
(2) Never measure the resistance of the airbag squib (This may cause the airbag to inflate, which is very dangerous.).

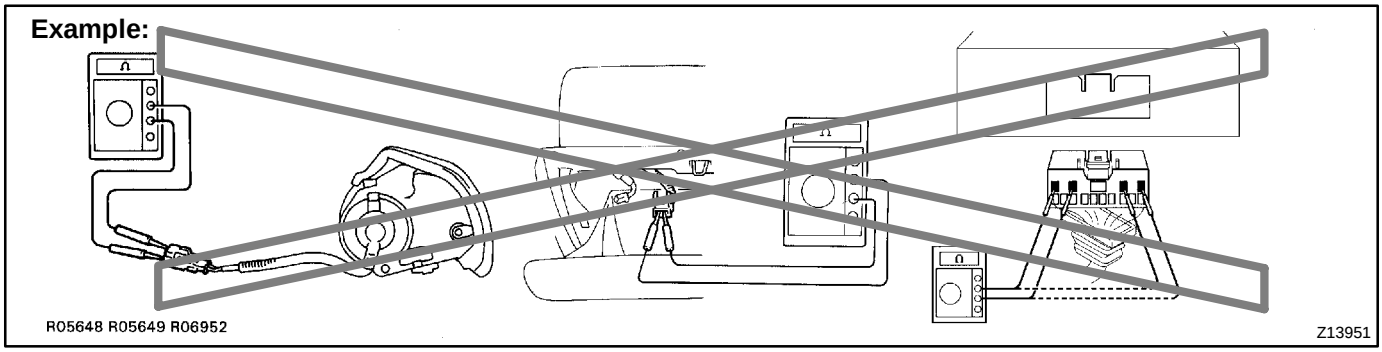
(3) Grease should not be applied to the instrument panel passenger airbag assembly and the airbag door should not be cleaned with detergents of any kind.

(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.





(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.

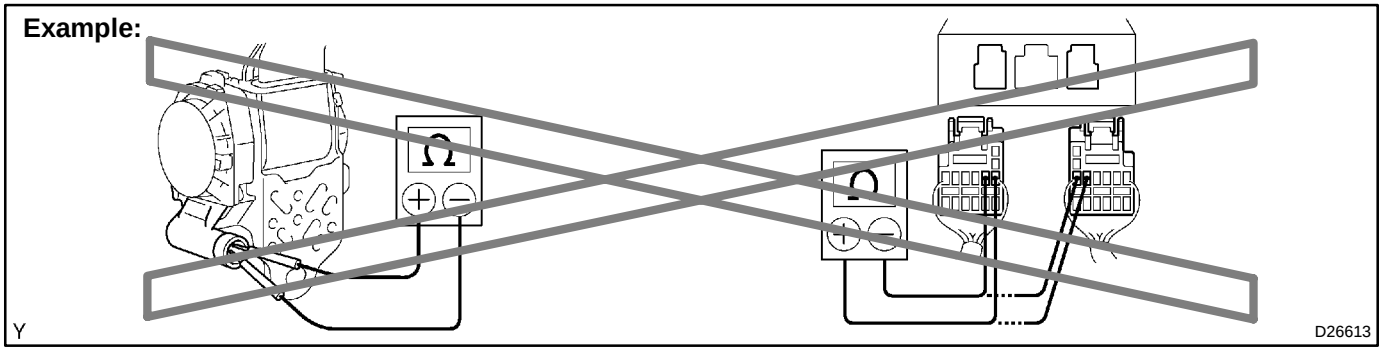
(4) Store the seat belt pretensioner where the ambient temperature remains below 80˚C (176˚F) without high humidity and away from electrical noise.

(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

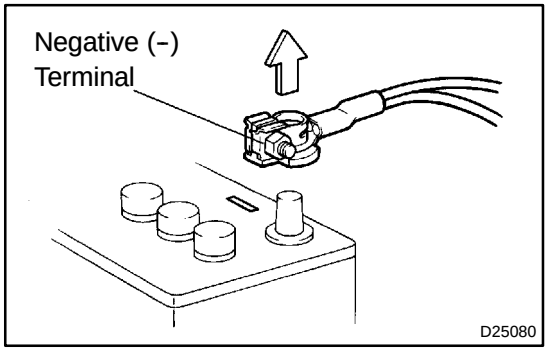
(1) Never reuse the airbag sensor assembly involved in a collision where the SRS has deployed.

(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.



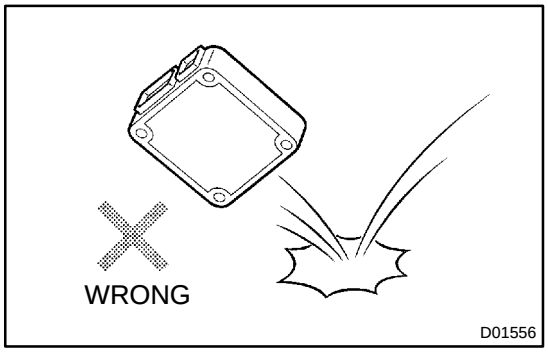
3. ELECTRONIC CONTROL

(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

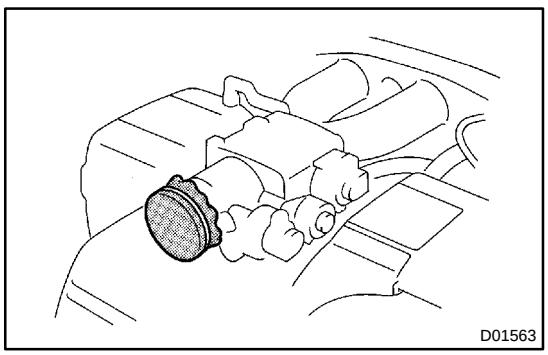
(1) Prepare a fire extinguisher before starting the operation.

(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.

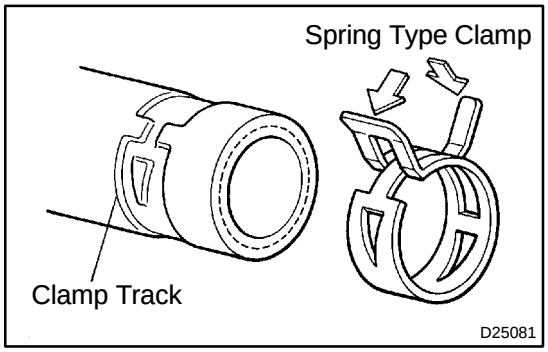


5. REMOVAL AND INSTALLATION OF ENGINE INTAKE PARTS

(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.



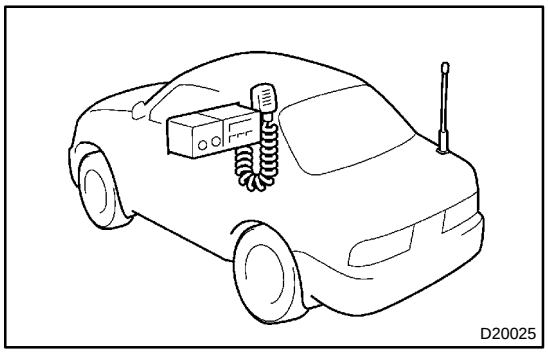
6. HANDLING OF HOSE CLAMPS

(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.

010B5-15

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

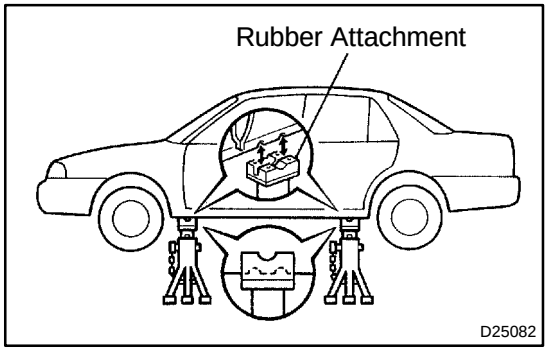
(a) Follow the instruction manual for a safety operation.

(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.

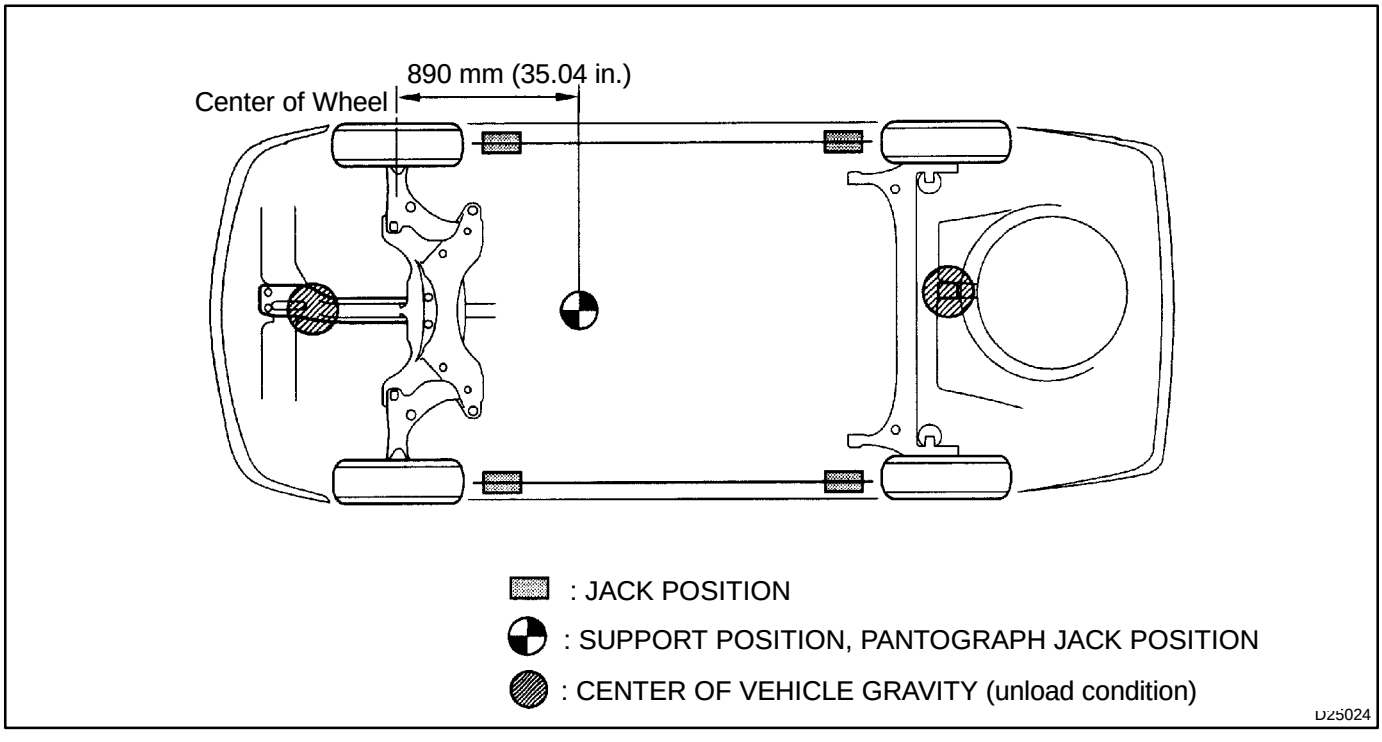
(c) Support the specified location with a jack and safety stand accurately.

(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.



4. NOTICE FOR USING SWING ARM TYPE LIFT

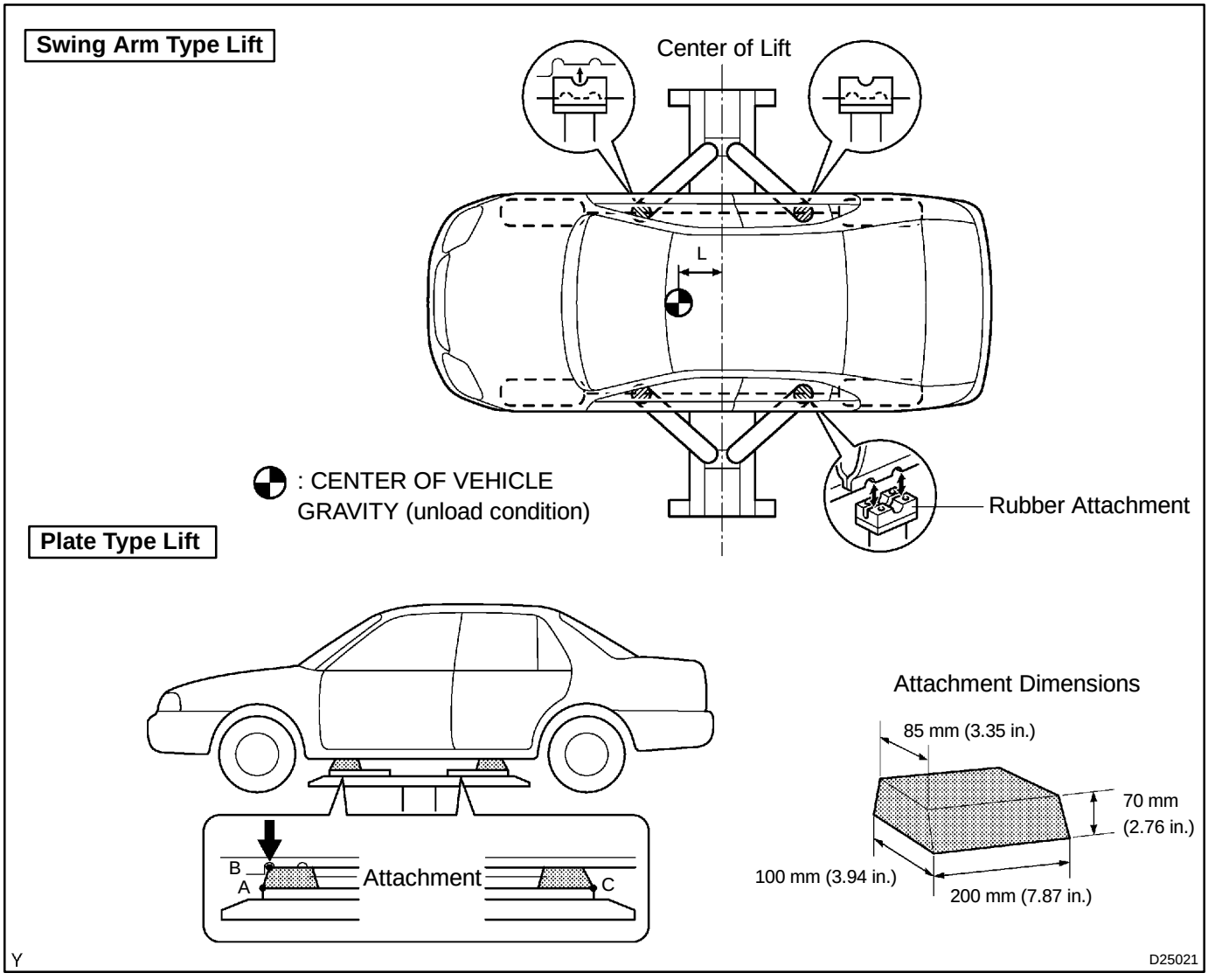
(a) Follow the instruction manual of the lift for a safe operation.
(b) Use a cradle with a rubber attachment, as shown in the illustration.
(c) Set in the vehicle so as to make its center of gravity as close as possible to the center of the lift. (”L” becomes short.)
(d) Place the vehicle horizontally 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	ŠPlace the vehicle over the center of the lift.
Front and rear set position	ŠAlign the cushion gum ends of the plate with the attachment lower ends (A and C). ŠAlign 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.



HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

010B6-16

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 (1ZZ-FE/3ZZ-FE)	05-1
2. Air Conditioning System	05-136
3. Audio System	05-202

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.

010B7-16

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 to 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.

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

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]

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)		
Air Conditioning System	(with Check Mode)		
Audio System			

- In the DTC check, it is very important to determine whether the problem indicated by the DTC is still occurring or has occurred in the past but returned to normal at present. In addition, 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**

	Problem symptoms exist
	No problem symptoms exist

a **Go to step 5**

b

4 **Simulation test using the symptom simulation methods**

5	DTC check

	DTC displayed
	Normal code displayed

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

b

6	Symptom confirmation

	No problem symptoms exist
	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 01-29).

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).

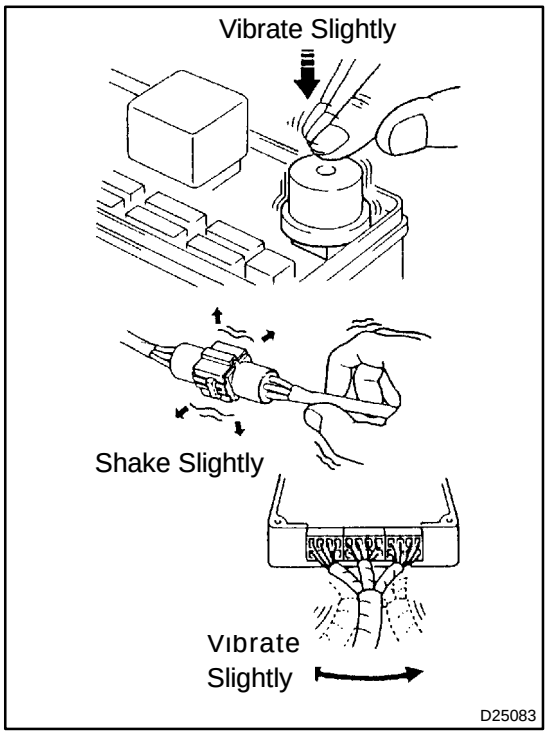
SYMPTOM SIMULATION

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.

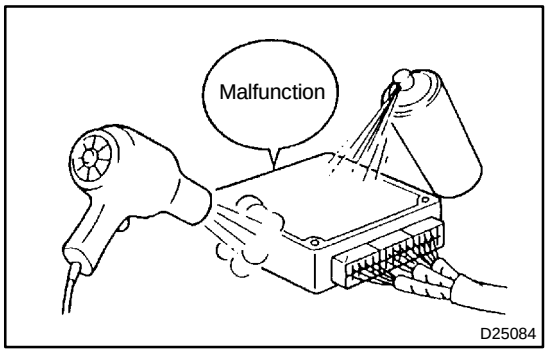
(b) CONNECTORS

(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.

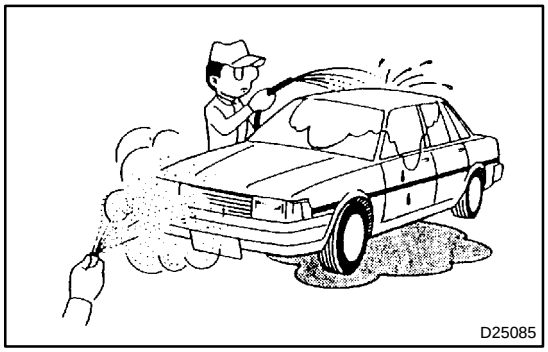


2. HEAT METHOD: When the problem seems to occur when the suspect area is heated.

(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.**



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

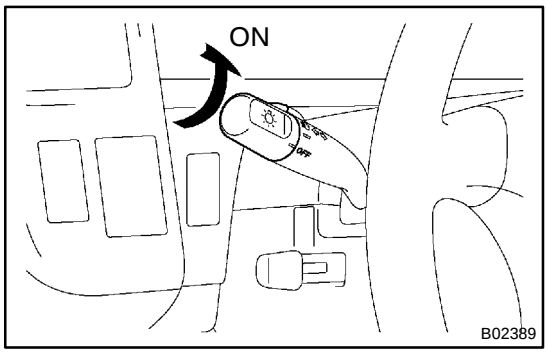
(a) Sprinkle water onto the vehicle and check if the malfunction occurs.

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.

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.

D DTC No.
Indicates the diagnostic trouble code.

D Page or Instructions
Indicates the page where the inspection procedure for each circuit is to be found, or gives instructions for checking and repairs.

D Trouble Area
Indicates the suspect area of the problem.

D 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).

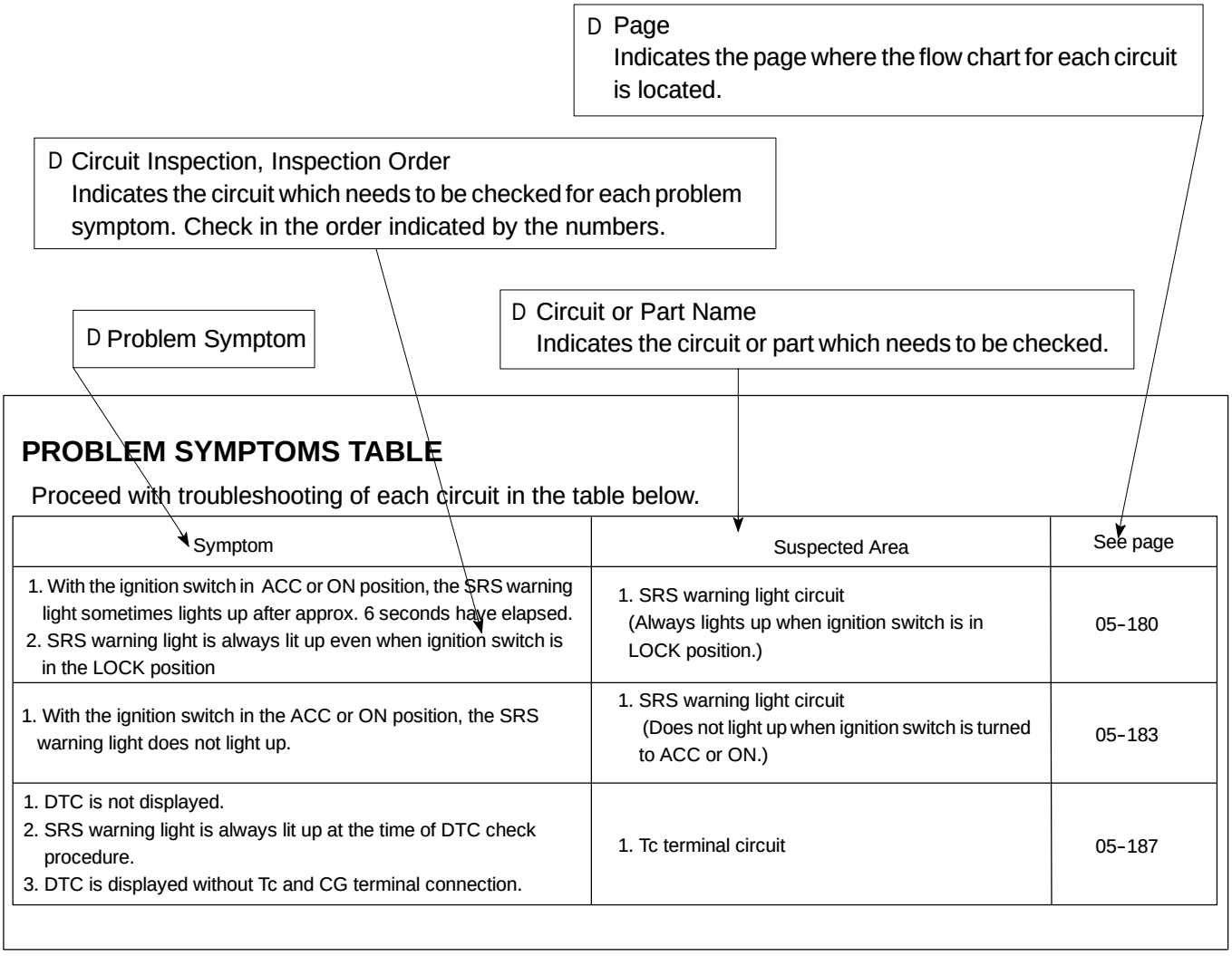
DTC No. (See page)	Detection Item	Trouble Area	SRS Warming Light
B0100/13 (05-119)	D Short in D squib circuit	D Steering wheel pad (squib) D Spiral cable D Airbag sensor assembly D Wire harness	ON
B0101/14 (05-124)	D Open in D squib circuit	D Steering wheel pad (squib) D Spiral cable D Airbag sensor assembly D Wire harness	ON
B0102/11 (05-128)	D Short in D squib circuit (to ground)	D Steering wheel pad (squib) D Spiral cable D Airbag sensor assembly D Wire harness	ON
B0103/12 (05-132)	D Short in D squib circuit (to B+)	D Steering wheel pad (squib) D Spiral cable D Airbag sensor assembly D Wire harness	ON
B0105/53 (05-136)	D Short in P squib circuit	D Front passenger airbag assembly (squib) D Airbag sensor assembly D Wire harness	ON
B0106/54	D Open in P squib circuit	D Front passenger airbag assembly (squib) D Airbag sensor assembly D Wire harness	
	circuit (to Ground)	D Front passenger airbag assembly (squib) D Airbag sensor assembly D Wire harness	

PROBLEM SYMPTOMS TABLE

The suspected circuits or parts for each problem symptom are shown in the table below. Use this table to troubleshoot the problem when a "Normal" code is displayed in the diagnostic trouble code 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

CIRCUIT INSPECTION

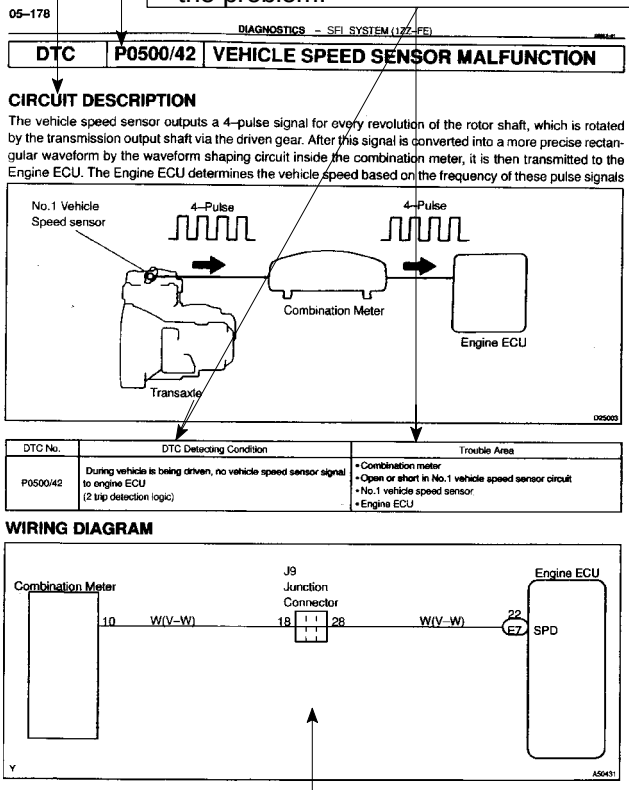
How to read and use each page is shown below.

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

D Diagnostic Trouble Code No. and Detection Item

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

D 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.



05–178

DIAGNOSTICS – SFI SYSTEM (1ZZ–FE)

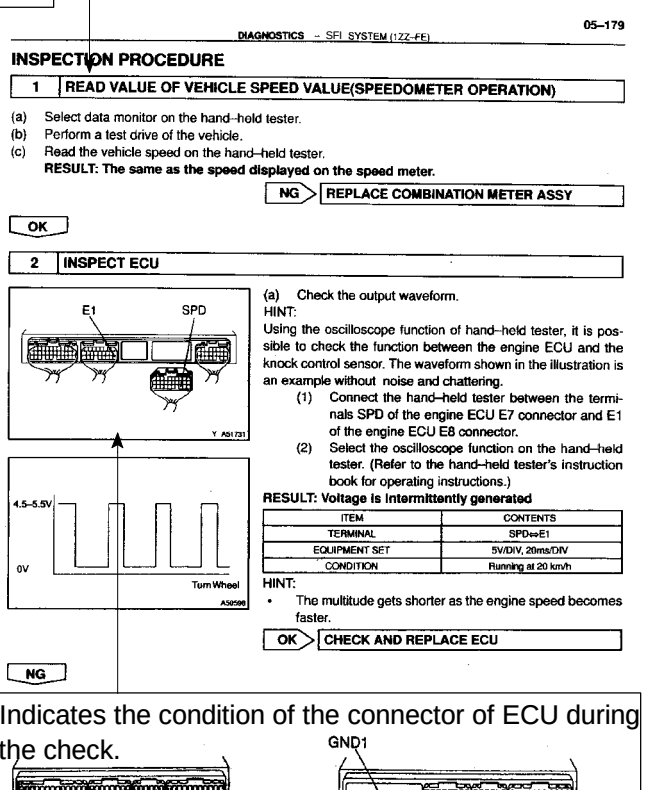
DTC P0500/42 VEHICLE SPEED SENSOR MALFUNCTION

CIRCUIT DESCRIPTION

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

DTC No.	DTC Detecting Condition	Trouble Area
P0500/42	During vehicle is being driven, no vehicle speed sensor signal to engine ECU (2 trip detection logic)	• Combination meter • Open or short in No.1 vehicle speed sensor circuit • No.1 vehicle speed sensor • Engine ECU

WIRING DIAGRAM



05–179

DIAGNOSTICS – SFI SYSTEM (1ZZ–FE)

INSPECTION PROCEDURE

1 READ VALUE OF VEHICLE SPEED VALUE(SPEEDOMETER OPERATION)

(a) Select data monitor on the hand–held tester.
(b) Perform a test drive of the vehicle.
(c) Read the vehicle speed on the hand–held tester.
RESULT: The same as the speed displayed on the speed meter.

NG → REPLACE COMBINATION METER ASSY

OK

2 INSPECT ECU

(a) Check the output waveform.
HINT:
Using the oscilloscope function of hand–held tester, it is possible to check the function between the engine ECU and the knock control sensor. The waveform shown in the illustration is an example without noise and chattering.
(1) Connect the hand–held tester between the terminals SPD of the engine ECU E7 connector and E1 of the engine ECU E8 connector.
(2) Select the oscilloscope function on the hand–held tester. (Refer to the hand–held tester's instruction book for operating instructions.)
RESULT: Voltage is intermittently generated

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

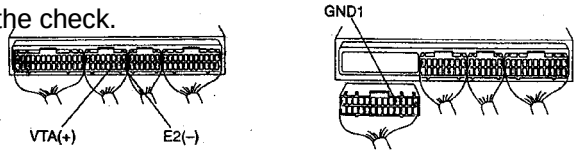
HINT:
- The multitude gets shorter as the engine speed becomes faster.

OK → CHECK AND REPLACE ECU

NG

D 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.

D 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.

D25842

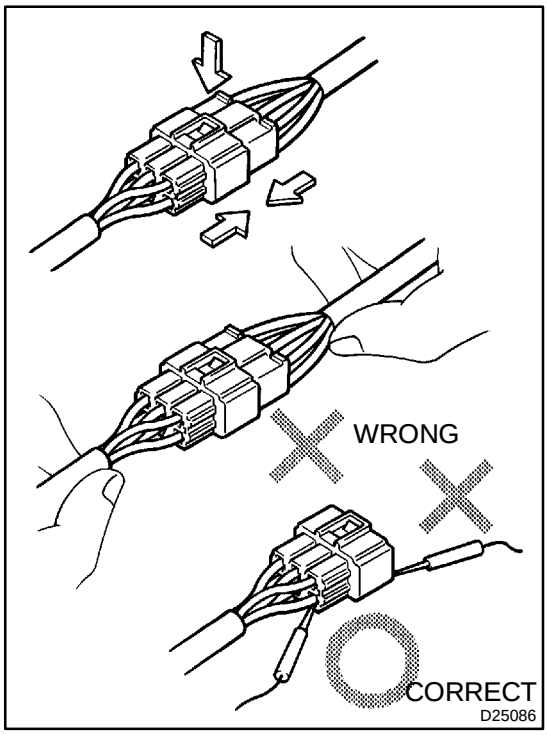
010B8-11

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.

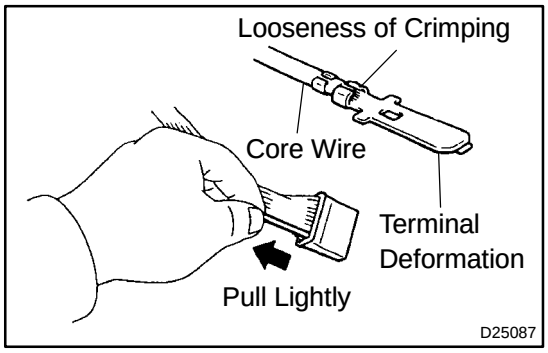
(5) In case of checking the connector with a Toyota electrical tester, perform it at the back side (harness side) of the connector using a mini test lead.

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

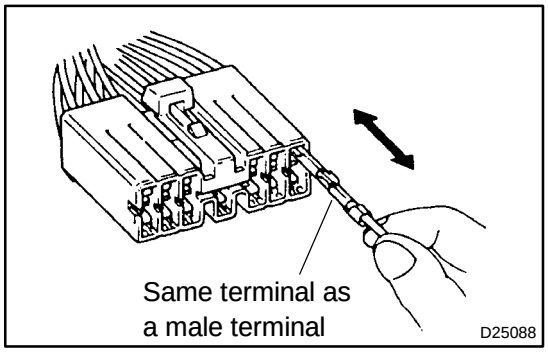
(1) Checking when the connector is connected:
By holding the connector, check the inserted condition and locking efficiency (engaged condition).



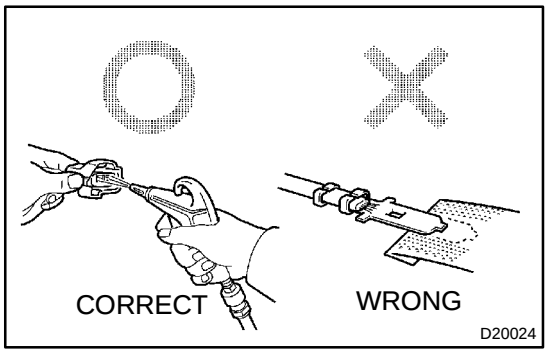
(2) Checking when the connector is removed:
Check the wire harness by pulling lightly (missing terminal, terminal crimping condition, core wire break).
Check visually if there is any rust, metal tip, water and bend of terminal (rust, mixing of foreign object, terminal deformation).

NOTICE:

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



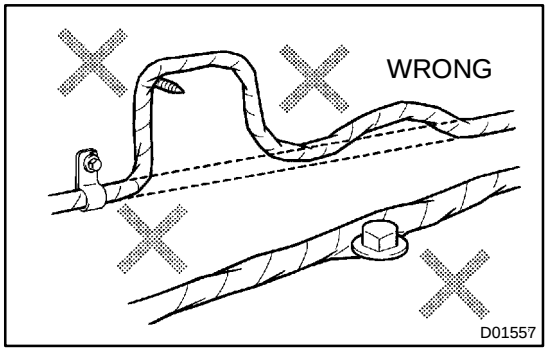
(3) Checking of the contact pressure of the terminal:
Prepare the same terminal as a male terminal.
By inserting it to a female terminal, check the engaged condition and sliding load.



(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.

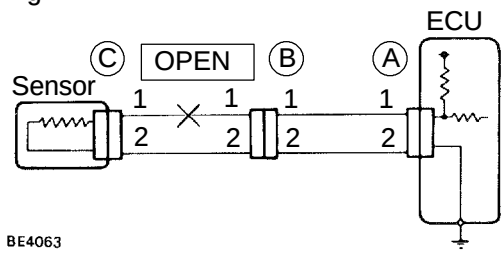
(2) Never twist, pull or slack off the wire harness more than necessary.

(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.

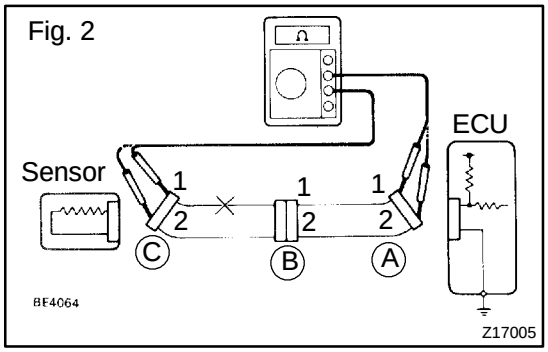
Fig. 1



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.

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.

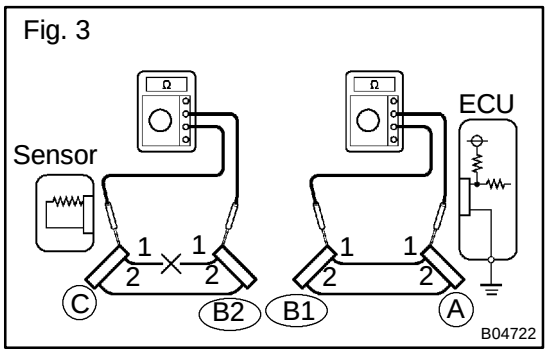
In the case of Fig. 2:

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.

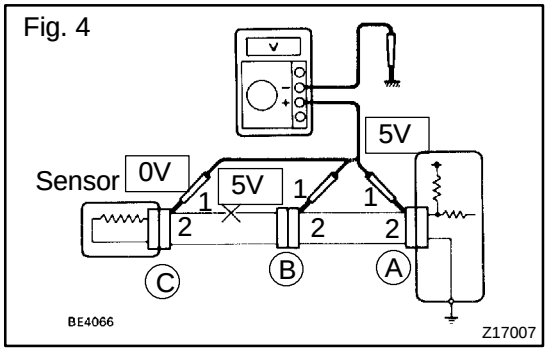
In the case of Fig. 3:

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:

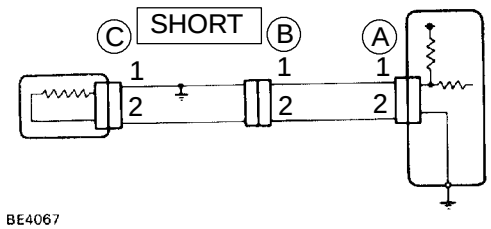
5 V: Between terminal 1 of connector "A" and body ground

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".

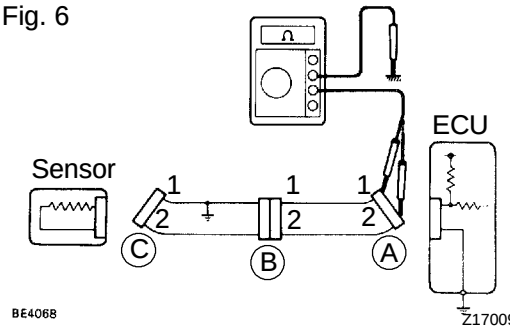
Fig. 5



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.

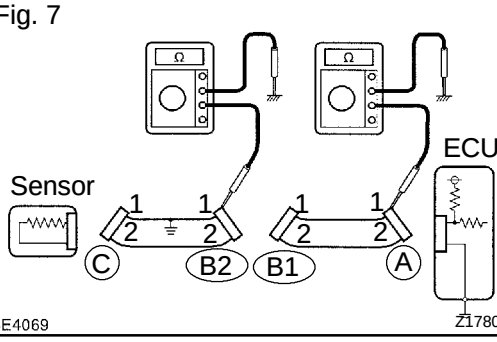
In the case of Fig. 6:

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)

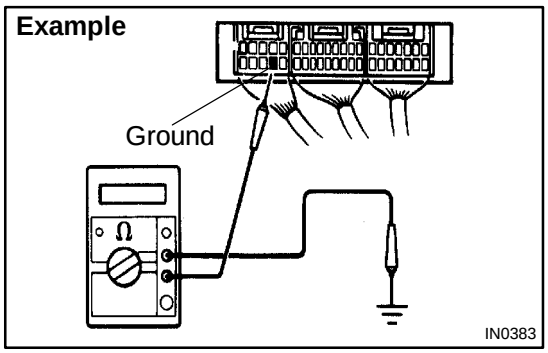
Therefore, it is found out that there is a short circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

4. CHECK AND REPLACE ECU

NOTICE:

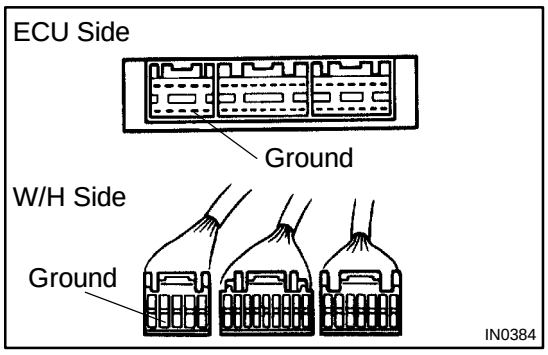
- **Start an inspection of the connector from the back-side of the connector at the wire harness side with the connector connected to the ECU.**
- **When no measuring condition is specified, perform the inspection with the engine stopped and also the ignition switched ON.**

(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.

TERMS

ABBREVIATIONS USED IN THIS MANUAL

010B9-15

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

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

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

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

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

010BA-18

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)
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 Code
DTM	Diagnostic Test Mode	–
ECL	Engine Coolant 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	TOYOTA Distributorless Ignition (TDI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	–
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	–
FEPROM	Flash Erasable Programmable Read Only Memory	–
FF	Flexible Fuel	–
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)
HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO_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 Airflow	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), CC_O
OL	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	Superchager 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 + CC_O
VAF	Volume Airflow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor
WOT	Wide Open Throttle	Full Throttle

WU-OC	Warm Up Oxidation Catalytic Converter	-
WU-TWC	Warm Up Three Way Catalytic Converter	-
3GR	Third Gear	-
4GR	Fourth Gear	-

PREPARATION

LIGHTING 02–1
PREPARATION 02–1
AUDIO & VISUAL SYSTEM 02–2
PREPARATION 02–2

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E
COROLLA Repair Manual Supplement (Aug., 2002)	DR105E

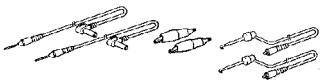
NOTE: The above pages contain only the points which differ from the above listed manuals.

LIGHTING

PREPARATION

022YK-01

Recomended Tools

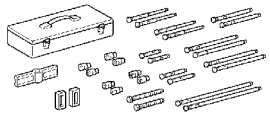
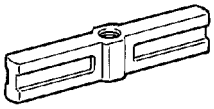
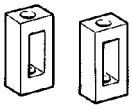
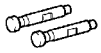
	09082-00040	TOYOTA Electrical Tester	LIGHTING SYSTEM(SOUTH AFRICA)(From August, 2003)
	(09083-00150)	Test Lead Set	LIGHTING SYSTEM(SOUTH AFRICA)(From August, 2003)

AUDIO & VISUAL SYSTEM

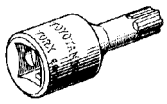
PREPARATION

022YM-01

SST

	09950-50013	Puller C Set	ANTENNA CORD SUB-ASSY(SOUTH AFRICA)(From August, 2003)
	(09951-05010)	Hanger 150	ANTENNA CORD SUB-ASSY(SOUTH AFRICA)(From August, 2003)
	(09952-05010)	Slide Arm	ANTENNA CORD SUB-ASSY(SOUTH AFRICA)(From August, 2003)
	(09953-05020)	Center Bolt 150	ANTENNA CORD SUB-ASSY(SOUTH AFRICA)(From August, 2003)
	(09954-05021)	Claw No.2	ANTENNA CORD SUB-ASSY(SOUTH AFRICA)(From August, 2003)

Recomended Tools

	09042-00010	Torx Socket T30	ANTENNA CORD SUB-ASSY(SOUTH AFRICA)(From August, 2003)
	09070-20010	Moulding Remover	ANTENNA CORD SUB-ASSY(SOUTH AFRICA)(From August, 2003) AMPLIFIER ANTENNA ASSY(SOUTH AFRICA)(From August, 2003)

Equipment

Torque wrench	

SERVICE SPECIFICATIONS

AUDIO & VISUAL SYSTEM
(SOUTH AFRICA)(From August, 2003) . . . 03–1
TORQUE SPECIFICATION 03–1

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E
COROLLA Repair Manual Supplement (Aug., 2002)	DR105E

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

AUDIO & VISUAL SYSTEM (SOUTH AFRICA)(From August, 2003)

TORQUE SPECIFICATION

031N2-01

Part Tightened	N·m	kgf·cm	ft·lbf
Amplifier antenna assy x Antenna nut	4.5	46	40 in.·lbf

DIAGNOSTICS

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REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E
COROLLA Repair Manual Supplement (Aug, 2002)	DR105E

NOTE: The above pages contain only the points which differ

EFI SYSTEM (1ZZ-FE/3ZZ-FE FOR SOUTH AFRICA)

HOW TO PROCEED WITH TROUBLESHOOTING

0504C-12

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

The hand-held tester can be used at steps 4, 5, 7 and 10.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (See page 05-6)

3	CONNECT THE HAND-HELD TESTER TO THE DLC3

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

4	CHECK DTC AND FREEZE FRAME DATA (See page 05-11)

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

5	CLEAR DTC AND FREEZE FRAME DATA (See page 05-11)

6	VISUAL INSPECTION

7	SETTING CHECK (TEST) MODE DIAGNOSIS (See page 05-12)

8	PROBLEM SYMPTOM CONFIRMATION

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

A	Malfunction does not occur
B	Malfunction occurs

B → GO TO STEP 10

A

9	SYMPTOM SIMULATION

10	DTC CHECK (See page 05-11)

A	Trouble code
B	No code

B → GO TO STEP 12

A

11	DTC CHART (See page 05-23)

GO TO STEP 14

12	BASIC INSPECTION (See page 05-14)

A	Not confirm wrong parts
B	Confirm wrong parts

B → GO TO STEP 16

A

13	PROBLEM SYMPTOMS TABLE (See page 05-27)

A	Confirm wrong circuit
B	Confirm wrong Parts

B → GO TO STEP 17

A

14	CHECK ECU POWER SOURCE CIRCUIT (See page 05-129)

15	CIRCUIT INSPECTION

A	Not confirm malfunction
B	Confirm malfunction

B → GO TO STEP 18

A

16	CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)

GO TO STEP 18

17	PARTS INSPECTION

18	IDENTIFICATION OF PROBLEM

19	ADJUSTMENT, REPAIR

20	CONFIRMATION TEST

END

When not using the 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 05-11)

4	PROBLEM SYMPTOM CONFIRMATION

A	Trouble occurs
B	Malfunction does not occur

B → SYMPTOM SIMULATION (See page 05-26)

A

5	DTC CHECK (See page 05-12)

A	Malfunction code
B	No code

B → GO TO STEP 7

A

6	DTC CHART (See page 05-23)

GO TO STEP 10

7	BASIC INSPECTION (See page 05-14)

A	Not confirm wrong parts
B	Confirm wrong parts

B → GO TO STEP 12

A

8	PROBLEM SYMPTOMS TABLE (See page 05-27)

A	Confirm wrong circuit
B	Confirm wrong Parts

B → GO TO STEP 12

A

9	CHECK ECU POWER SOURCE CIRCUIT (See page 05-129)

10	CIRCUIT INSPECTION

A	Not confirm malfunction
B	Confirm malfunction

B → GO TO STEP 12

A

11	CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)

GO TO STEP 13

12	PARTS INSPECTION

13	IDENTIFICATION OF PROBLEM

14	ADJUSTMENT, REPAIR

15	CONFIRMATION TEST

END

0504B-12

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		VIN	
Driver's Name		Production Date	
Date Vehicle Brought in		Licence No.	
Odometer Reading	km miles		

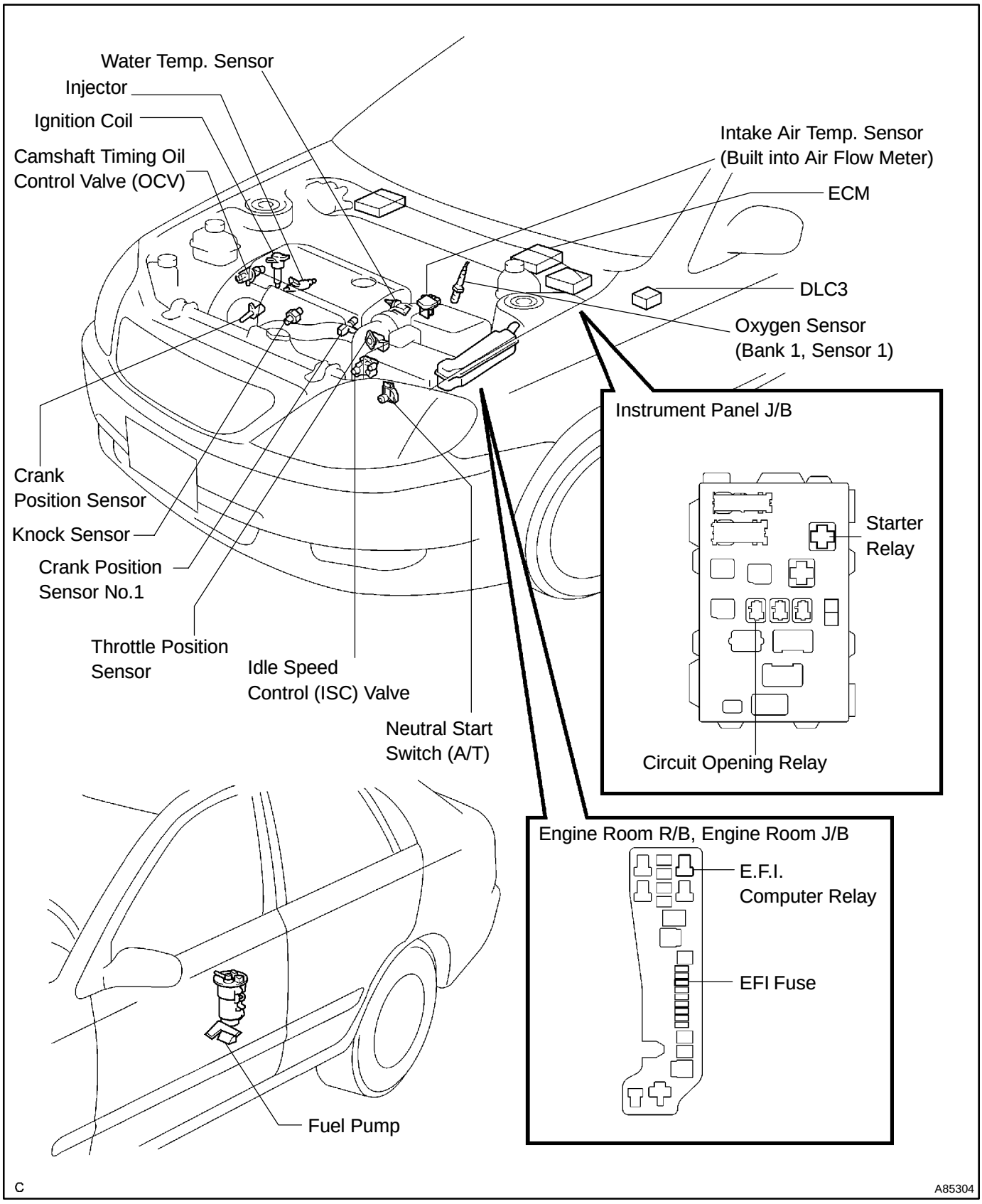
Problem Symptoms	☐ Engine does not Start	☐ Engine does not crank ☐ No initial combustion ☐ No complete combustion
	☐ Difficult to Start	☐ Engine cranks slowly ☐ Other _____
	☐ Poor Idling	☐ Incorrect first idle ☐ Idling rpm is abnormal ☐ High (rpm) ☐ Low (rpm) ☐ Rough idling ☐ Other _____
	☐ Poor Driveability	☐ 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	

Data 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.____ _C/____ _F)
	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 _____

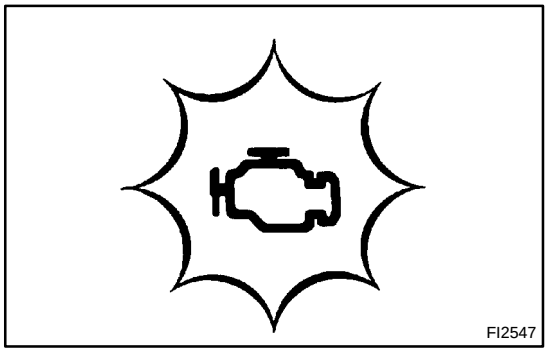
Condition of malfunction indicator light (MIL)		☐ Remains on ☐ Sometimes comes on ☐ Does not come on
DTC Inspection	Normal mode (Pre-check)	☐ Normal ☐ Trouble code(s) (code) ☐ Freeze frame data ( )
	Check Mode	☐ Normal ☐ Trouble code(s) (code) ☐ Freeze frame data ( )

05047-12

LOCATION



05E6U–01

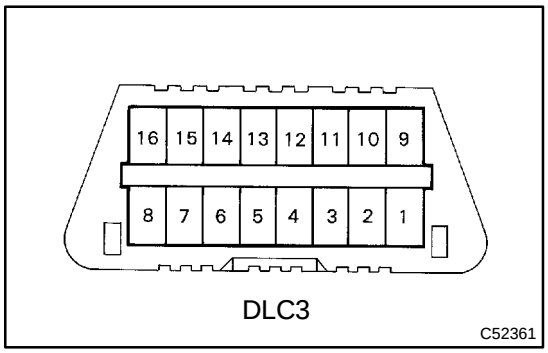


DIAGNOSIS SYSTEM

1. DESCRIPTION

- When troubleshooting Multiplex OBD (M–OBD) vehicles, the only difference from the usual troubleshooting procedure is to connect the vehicle to the hand–held tester, and read off various data output from the vehicle's ECM.
- The vehicle's on–board computer illuminates the check engine 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 illuminating the CHK ENG when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) are recorded in the ECM memory (See page 05–23). When the malfunction does not reoccur, the CHK ENG remains on until the ignition switch is turned off, and then the CHK ENG does not come on when the ignition switch is turned on again but the DTCs remain recorded in the ECU memory.
- To check the DTCs, connect the hand–held tester to the Data Link Connector 3 (DLC3) on the vehicle or read the DTC which is indicated on the multi information display when TC and CG terminals of the DLC3 are connected. The hand–held tester also enables you to erase the DTCs and check freeze 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. 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 the hand–held tester when troubleshooting, the technician can cause the CHK ENG to come on for a malfunction that is only detected once or momentarily (Hand–held tester only) (See step 2).
- * 2 trip detection logic
  When a logic malfunction is fist detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected again during the second drive test, this second detection causes the CHK ENG to come on (2nd trip).
  (However, the ignition switch must be turned off between the 1st and 2nd trips).

S 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.



DLC3

2. CHECK DLC3

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

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always

HINT:
If the display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the hand-held tester to the DLC3, turned the ignition switch to the ON position and operated the hand-held tester, there is a problem on the vehicle side or the tool side.

S If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.

S If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

3. INSPECT BATTERY VOLTAGE

Battery Voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

4. CHECK CHK ENG

(a) The CHK ENG comes on when the ignition switch is turned to the ON position and the engine is not running.

HINT:
If the CHK ENG does not come on, troubleshoot the combination meter circuit (See Pub. No. RM821E, page 05-783).

(b) When the engine is started, the CHK ENG should go off. If the light remains on, it means that the diagnosis system has detected a malfunction in the system.

05E6V-01

DTC CHECK/CLEAR

NOTICE:

Hand–held tester only:

When the diagnosis system is switched from the normal mode to the check (test) mode, it erases all DTCs and freeze frame data recorded in the normal mode. So before switching modes, always check DTCs and freeze frame data, and then write them down.

1. Checking DTCs using the hand–held tester:

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

(b) Turn the ignition switch to the ON position and push the hand–held tester main switch on.

(c) Use the hand–held tester to check DTCs and freeze frame data and then write them down. If you need help with the hand–held tester, refer to the hand–held tester's instruction book.

(d) See page 05–23 to confirm the details of the DTCs.

2. Clearing the DTCs using the hand–held tester:

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

(b) Turn the ignition switch to the ON position.

(c) When operating the hand–held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the hand–held tester's instruction book for operating instructions.)

3. Clearing the DTCs without using the hand–held tester:

(a) Disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.

CHECK MODE PROCEDURE

HINT:

Hand-held tester only:

Compared to the normal mode, the check mode has superior sensitivity to detect malfunctions. 05E6W-01

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

1. Procedure for check mode using the hand-held tester.

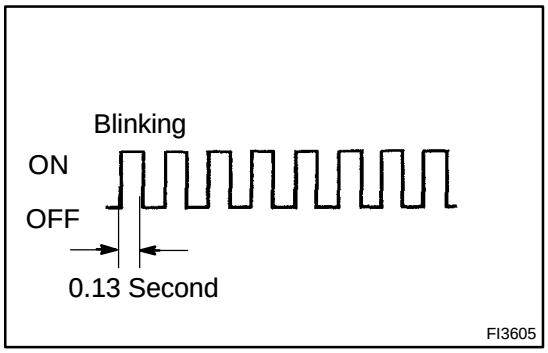
(a) Check the initial conditions
- Battery positive voltage of 11V or more.
- Throttle valve fully closed.
- Transmission in the "P" or "N" position.
- Air conditioning switched OFF.

(b) Turn the ignition switch off.

(c) Connect the hand-held tester to the DLC3.

(d) Turn the ignition switch to the ON position and push the hand-held tester main switch on.

(e) Switch the hand-held tester from the normal mode to the check (test) mode. The CHK ENG blinks at 0.13 second intervals as shown in the illustration.



NOTICE:

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

(f) Start the engine. (The CHK ENG goes off after engine start.)

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

NOTICE:

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

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

HINT:

Be sure not to turn the ignition switch off, because the diagnosis system is changed from the check mode to the normal mode and all of the DTCs and freeze frame data will be erased.

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

2. Clearing the DTCs using the hand-held tester

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

(b) Turn the ignition switch to the ON position.

(c) When operating the hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the hand-held tester's instruction book for operating instructions.)

3. Clearing the DTCs without using the hand-held tester:

(a) Disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.

05E6X-01

BASIC INSPECTION

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

1	CHECK BATTERY VOLTAGE

NOTICE:
Carry out this check with the engine stopped and ignition switch off.

	OK	NG
Voltage	11 V or more	Less than 11 V

NG → **CHARGE OR REPLACE BATTERY**

OK

2	CHECK IF ENGINE WILL CRANK

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05-27**

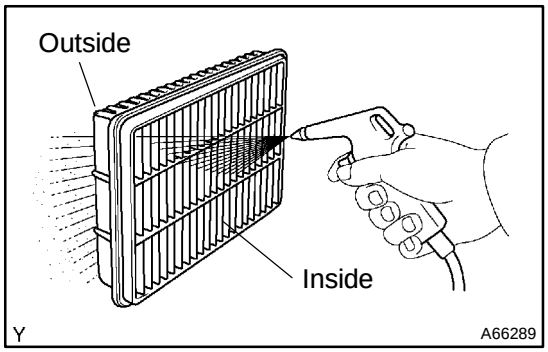
OK

3	CHECK IF ENGINE STARTS

NG → **GO TO STEP 7**

OK

4	CHECK AIR FILTER



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

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

NG → **CLEAN OR REPLACE**

OK

5	CHECK IDLE SPEED (See Pub. No. RM821E, page 14-1)

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05-27**

OK

6	CHECK IGNITION TIMING (See Pub. No. RM821E, page 18-3)

NG → PROCEED TO See Pub. No. RM821E, page 18-3 AND CONTINUE TO TROUBLESHOOT

OK

PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05-27

7	CHECK FUEL PRESSURE (See Pub. No. RM821E, page 11-5)

NG → PROCEED TO See Pub. No. RM821E, page 11-5 AND CONTINUE TO TROUBLESHOOT

OK

8	CHECK FOR SPARK (See Pub. No. RM821E, page 18-3)

NG → PROCEED TO See Pub. No. RM821E, page 18-3 AND CONTINUE TO TROUBLESHOOT

OK

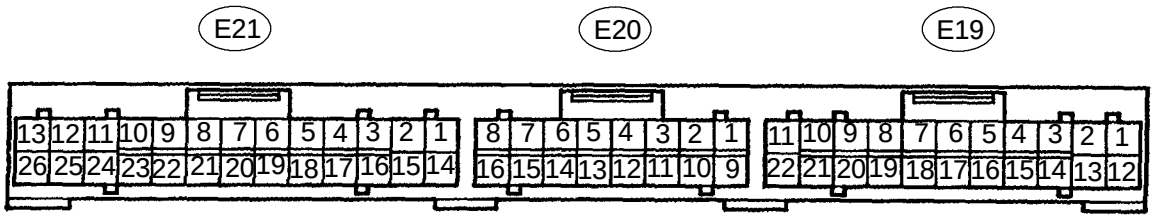
PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05-27

05767-03

TERMINALS OF ECU

M/T:

ECM Terminals



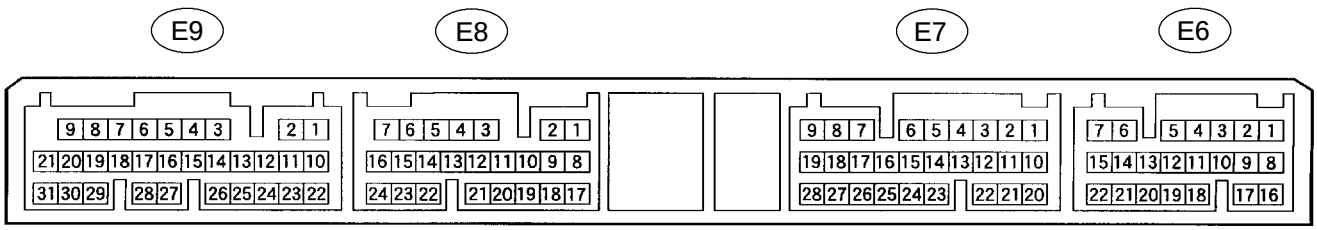
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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
BATT (E19-1) - E1 (E21-14)	R-W - BR	Battery (for measuring the battery voltage and for the ECM memory)	Always	9 to 14
IGSW (E19-15) - E1 (E21-14)	B-O - BR	Ignition switch	IG switch ON	9 to 14
+B (E19-12) - E1 (E21-14)	B - BR	Power source of ECM	IG switch ON	9 to 14
VC (E20-1) - E2 (E20-9)	Y - BR	Power source of sensor (a specific voltage)	IG switch ON	4.5 to 5.5
VTA (E20-11) - E2 (E20-9)	LG - BR	Throttle position sensor (for the engine control)	IG switch ON, Accelerator pedal is released	0.5 to 1.2
VTA (E20-11) - E2 (E20-9)	LG - BR	Throttle position sensor (for the engine control)	IG switch ON, Accelerator pedal is depressed	3.2 to 4.8
THA (E20-3) - E2 (E20-9)	Y-B - BR	Intake air temperature sensor	Idling, Intake air temp. 20_C (68_F)	0.5 to 3.4
THW (E20-4) - E2 (E20-9)	W - BR	Engine coolant temperature sensor	Idling, water temp. 80_C (176_F)	0.2 to 1.0
STA (E19-11) - E1 (E21-14)	B - BR	Starter signal	Shift lever in P or N position, IG switch START	6.0 or more
#10 (E21-12) - E01 (E21-13) #20 (E21-11) - E01 (E21-13) #30 (E21-25) - E01 (E21-13) #40 (E21-24) - E01 (E21-13)	Y - W-B B - W-B W - W-B L - W-B	Injector	IG switch ON	9 to 14
#10 (E21-12) - E01 (E21-13) #20 (E21-11) - E01 (E21-13) #30 (E21-25) - E01 (E21-13) #40 (E21-24) - E01 (E21-13)	Y - W-B B - W-B W - W-B L - W-B	Injector	Idling	Pulse generation
IGT1 (E21-20) - E1 (E21-14) IGT2 (E21-21) - E1 (E21-14) IGT3 (E21-22) - E1 (E21-14) IGT4 (E21-23) - E1 (E21-14)	R-L - BR Y-G - BR GR - BR W - BR	Ignition coil with igniter (ignition signal)	Idling	Pulse generation (See page 05-94)
IGF (E21-3) - E1 (E21-14)	L-Y - BR	Ignition coil with igniter (ignition confirmation signal)	IG switch ON	4.5 to 5.5

IGF (E21–3) – E1 (E21–14)	L–Y – BR	Ignition coil with igniter (ignition confirmation signal)	Idling	Pulse generation (See page 05–94)
G2 (E20–12) – NE– (E20–13)	B – W	Camshaft position sensor	Idling	Pulse generation (See page 05–79)
NE+(E20–5) – NE– (E20–13)	B – W	Crankshaft position sensor	Idling	Pulse generation (See page 05–74)
MREL (E19–16) – E01 (E21–13)	B–W – BR	EFI relay	IG switch ON	9 to 14
FC (E19–14) – E01 (E21–13)	G–R – BR	Circuit opening relay	IG switch ON	9 to 14
STP (E19–4) – E1 (E21–14)	G–W – BR	Stop light switch	Brake pedal is depressed	7.5 to 14
STP (E19–4) – E1 (E21–14)	G–W – BR	Stop light switch	Brake pedal is released	Below 1.5
OX (E20–6) – E1 (E21–14)	R – BR	Heated oxygen sensor	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (See page 05–58)
HT (E20–16) – E01 (E21–13)	P – BR	Heated oxygen sensor heater	Idling	Below 3.0
KNK (E21–18) – E1 (E21–14)	B – BR	Knock sensor	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See page 05–71)
TC (E19–6) – E1 (E21–14)	P–B – BR	Terminal TC of DLC3	IG switch ON	9 to 14
W (E19–5) – E1 (E21–14)	R–Y – BR	MIL	Idling	9 to 14
W (E19–5) – E1 (E21–14)	R–Y – BR	MIL	IG switch ON	Below 3.0
OCV+ (E21–2) – OCV– (E21–1)	Y – B–Y	Camshaft timing oil control valve (OCV)	Idling	Pulse generation (See page 05–104)
SIL (E19–17) – E1 (E21–14)	L–R – BR	Terminal SIL of DLC3	During transmission	Pulse generation
AC (E19–10) – E1 (E21–14)	Y–R – BR	A/C amplifier	A/C switch ON	9 to 14
ACT (E19–21) – E1 (E21–14)	R–L – BR	A/C amplifier	A/C switch ON	9 to 14
ACT (E19–21) – E1 (E21–14)	R–L – BR	A/C amplifier	A/C switch OFF	Below 2.0
EVP1 (E21–7) – E01 (E21–13)	L–B – BR	VSV for EVAP	IG switch ON	9 to 14
RSO (E21–15) – E1 (E21–14)	B–L – BR	ISC valve	IG switch ON	9 to 14

A/T:

ECM Terminals



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
BATT (E6-1) - E1 (E8-17)	R-W - BR	Battery (for measuring the battery voltage and for the ECM memory)	Always	9 to 14
IGSW (E6-8) - E1 (E8-17)	B-O - BR	Ignition switch	IG switch ON	9 to 14
+B (E6-16) - E1 (E8-17)	B - BR	Power source of ECM	IG switch ON	9 to 14
VC (E8-2) - E2 (E8-18)	Y - BR	Power source of sensor (a specific voltage)	IG switch ON	4.5 to 5.5
VTA (E8-23) - E2 (E8-18)	LG - BR	Throttle position sensor (for the engine control)	IG switch ON, Accelerator pedal is released	0.5 to 1.2
VTA (E8-23) - E2 (E8-18)	LG - BR	Throttle position sensor (for the engine control)	IG switch ON, Accelerator pedal is depressed	3.2 to 4.8
THA (E8-22) - E2 (E8-18)	Y-B - BR	Intake air temperature sensor	Idling, Intake air temp. 20_C (68_F)	0.5 to 3.4
THW (E8-14) - E2 (E8-18)	W - BR	Engine coolant temperature sensor	Idling, water temp. 80_C (176_F)	0.2 to 1.0
STA (E7-11) - E1 (E8-17)	B - BR	Starter signal	Shift lever in P or N position, IG switch START	6.0 or more
#10 (E9-1) - E01 (E9-21) #20 (E9-2) - E01 (E9-21) #30 (E9-3) - E01 (E9-21) #40 (E9-4) - E01 (E9-21)	Y - W-B B - W-B W - W-B L - W-B	Injector	IG switch ON	9 to 14
#10 (E9-1) - E01 (E9-21) #20 (E9-2) - E01 (E9-21) #30 (E9-3) - E01 (E9-21) #40 (E9-4) - E01 (E9-21)	Y - W-B B - W-B W - W-B L - W-B	Injector	Idling	Pulse generation
IGT1 (E9-10) - E1 (E8-17) IGT2 (E9-11) - E1 (E8-17) IGT3 (E9-12) - E1 (E8-17) IGT4 (E9-13) - E1 (E8-17)	R-L - BR Y-G - BR GR - BR W - BR	Ignition coil with igniter (ignition signal)	Idling	Pulse generation (See page 05-94)
IGF (E9-25) - E1 (E8-17)	L-Y - BR	Ignition coil with igniter (ignition confirmation signal)	IG switch ON	4.5 to 5.5
IGF (E9-25) - E1 (E8-17)	L-Y - BR	Ignition coil with igniter (ignition confirmation signal)	Idling	Pulse generation (See page 05-94)

G2 (E8-15) - NE- (E8-24)	B - W	Camshaft position sensor	Idling	Pulse generation (See page 05-79)
NE+ (E8-16) - NE- (E8-24)	B - W	Crankshaft position sensor	Idling	Pulse generation (See page 05-74)
MREL (E7-21) - E01 (E9-21)	B-W - BR	EFI relay	IG switch ON	9 to 14
FC (E6-3) - E01 (E9-21)	G-R - BR	Circuit opening relay	IG switch ON	9 to 14
STP (E7-6) - E1 (E8-17)	G-W - BR	Stop light switch	Brake pedal is depressed	7.5 to 14
STP (E7-6) - E1 (E8-17)	G-W - BR	Stop light switch	Brake pedal is released	Below 1.5
OX (E8-12) - E1 (E8-17)	R - BR	Heated oxygen sensor	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (See page 05-58)
HT (E8-3) - E01 (E9-21)	P - BR	Heated oxygen sensor heater	Idling	Below 3.0
KNK (E9-27) - E1 (E8-17)	B - BR	Knock sensor	Maintain engine speed at 4,000 rpm after warming	Pulse generation (See page 05-71)
TC (E7-5) - E1 (E8-17)	P-B - BR	Terminal TC of DLC3	IG switch ON	9 to 14
W (E6-15) - E1 (E8-17)	R-Y - BR	MIL	Idling	9 to 14
W (E6-15) - E1 (E8-17)	R-Y - BR	MIL	IG switch ON	Below 3.0
OCV+ (E9-24) - OCV- (E9-23)	Y - B-Y	Camshaft timing oil control valve (OCV)	Idling	Pulse generation (See page 05-104)
SIL (E6-11) - E1 (E8-17)	L-R - BR	Terminal SIL of DLC3	During transmission	Pulse generation
AC (E6-18) - E1 (E8-17)	Y-R - BR	A/C amplifier	A/C switch ON	9 to 14
ACT (E6-21) - E1 (E8-17)	R-L - BR	A/C amplifier	A/C switch ON	9 to 14
ACT (E6-21) - E1 (E8-17)	R-L - BR	A/C amplifier	A/C switch OFF	Below 2.0
EVP1 (E8-4) - E01 (E9-21)	L-B - BR	VSV for EVAP	IG switch ON	9 to 14
RSO (E9-18) - E1 (E8-17)	B-L - BR	ISC valve	IG switch ON	9 to 14

DATA LIST/ACTIVE TEST

1. DATA LIST

NOTICE:

The values given below for "Normal Condition" are representative values. A vehicle may still be considered normal even if its values differ from those listed here. Do not solely depend on the "Normal Condition" here when deciding whether a part is faulty or not.

HINT:

Using the DATA LIST displayed by the hand-held tester or the OBD II scan tool, you can read the values of the switches, sensors, actuators and other related parts without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten diagnostic time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the hand-held tester main switch on.
(f) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ALL".
(g) According to the display on the tester, read the "DATA LIST".

Item	Measurement Item/Range (Display)	Normal Condition*1	Diagnostic Note
INJECTOR	Injection period of the No.1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	Idling: 1.92 to 3.37 ms	—
IGN ADVANCE	Ignition timing advance for No.1 cylinder/ Min.: -64 deg., Max.: 63.5 deg.	Idling: BTDC 10 to 18˚	—
CALC LOAD	Calculated load by ECM/ Min.: 0 %, Max.: 100 %	S Idling: 27.5 to 46.4 S Running without load (2,500 rpm) : 19.7 to 40.5 %	—
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 16,383 rpm	Idling: 650 to 750 rpm	—
COOLANT TEMP	Coolant temperature/ Min.: -40˚C, Max.: 140˚C	After warming up: 80 to 95˚C (176 to 203˚F)	S If the value is -40_C (-40_F): sensor circuit is open. S If the value is 140_C (284_F): sensor circuit is shorted.
INTAKE AIR	Intake air temperature/ Min.: -40˚C, Max.: 140˚C	Equivalent to ambient temp.	
VEHICLE SPD	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
CTP SW	Closed throttle position switch/ ON or OFF	S Throttle fully closed: ON S Throttle open: OFF	—
A/C CUT SIG	A/C Cut Signal	A/C S/W OFF: ON	—
FC IDL	Idle fuel cut/ ON or OFF	Fuel cut operation: ON	FC IDL = "ON" when throttle valve fully closed and engine speed is over 1,500 rpm.
FC TAU	Fuel cut TAU: Fuel cut during very light load/ ON or OFF	Fuel cut operating ON	The fuel cut is being performed under very light load to prevent the engine combustion from becoming incomplete.
STARTER SIG	Starter signal/ ON or OFF	Cranking: ON	—
A/C SIG	A/C signal/ ON or OFF	A/C ON: ON	—

PNP SW [NSW] *2	Park/neutral position switch signal/ ON or OFF	P or N range: ON	—
STOP LIGHT SW	Stop light switch/ ON or OFF	$ Brake pedal depressed: ON $ Brake pedal released: OFF	—
FUEL PUMP/SPD	Fuel pump/speed status/ ON/H or OFF/M, L	Idling: ON	—
EVAP VSV	VSV status for EVAP control/ ON or OFF	VSV operating: ON	VSV for EVAP is controlled by the ECM (ground side duty control)

*1: If no conditions are specifically stated for "Idling", it means the shift lever is in the N or P position, the A/C switch is off and all accessory switches are off.
*2: A/T only

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and other related parts to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the hand-held tester main switch on.
(f) Select the item "DIAGNOSIS/OBD/MOBD/ACTIVE TEST".
(g) According to the display on the tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
INJ VOL	[Test Details] Control the injection volume Min.: -12.5 %, Max.: 25 % [Vehicle Condition] Engine speed: 3,000 rpm or less	$ All injectors are tested at once. $ Injection volume is gradually changed between -12.5 and 25 %.
IAC DUTY RATIO	[Test Details] Control the IAC duty ratio Min.: 0 %, Max.: 90 % [Vehicle Condition] Engine speed: Idling Battery voltage: 8.5 V or more	$ All injectors are tested at once. $ Injection volume is gradually changed between -12.5 and 25 %.
A/F CONTROL	[Test Details] Control the injection volume -12.5 or 25 % (Change the injection volume -12.5 % or 25 %.) [Vehicle Condition] Engine speed: 3,000 rpm or less	The following A/F CONTROL procedure enables the technician to check and graph the voltage outputs of both the A/F sensor and heated oxygen sensor. For displaying the graph indication, enter "ACTIVE TEST/A/F CONTROL/USER DATA", then select "AFS B1S1 and O2S B1S2" or "AFS B2S1 and O2S B2S2" by pressing "YES" button and push "ENTER" button before pressing "F4" button.

EVAP VSV (ALONE)	[Test Details] Activate the VSV for EVAP control. ON or OFF	-
FUEL PUMP / SPD	[Test Details] Control the fuel pump. ON or OFF	-
VVT CTRL B1	[Test Details] Activate the VVT system (Bank 1). ON or OFF	$ ON: Rough idle or engine stall. $ OFF: Normal engine speed.
TC / TE1	[Test Details] Connect the TC and TE1. ON or OFF	-
FC IDL PROHBT	[Test Details] Control the idle fuel cut prohibit. ON or OFF	-

05046-13

DIAGNOSTIC TROUBLE CODE CHART

HINT:

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

If a trouble code is displayed during the DTC check in the check mode, check the circuit for the code listed in the table below. For details of each code, refer to 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 (05-28)	Air Flow Meter Circuit Malfunction	S Open or short in air flow meter circuit S Air flow meter S ECM	f	f
P0110 (05-39)	Intake Air Temp. Circuit Malfunction	S Open or short in intake air temp. sensor circuit S Intake air temp. sensor (built into air flow meter) S ECM	f	f
P0115 (05-46)	Water Temp. Circuit Malfunction	S Open or short in engine coolant temp. sensor circuit S Engine coolant temp. sensor S ECM	f	f
P0120 (05-52)	Throttle Position Sensor Circuit Malfunction	S Open or short in throttle position sensor circuit S Throttle position sensor S ECM	f	f
P0130 (05-58)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)	S Open or short in oxygen sensor circuit S Heated oxygen sensor S EFI relay S Air induction system S Fuel pressure S Injector S ECM	f	f
P0131 (05-58)	Oxygen Sensor Circuit Low Voltage	S Open or short in oxygen sensor circuit S Heated oxygen sensor S EFI relay S Air induction system S Fuel pressure S Injector S ECM	-	f
P0135 (05-66)	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)	S Open or short in heater circuit of oxygen sensor S Heated oxygen sensor heater S EFI relay S ECM	f	f
P0325 (05-71)	Knock Sensor 1 Circuit Malfunction (Bank 1)	S Open or short in knock sensor circuit S Knock sensor (looseness) S ECM	f	f
P0335 (05-74)	Crankshaft Position Sensor Circuit Malfunction (NE Signal)	S Open or short in crankshaft position sensor circuit S Crankshaft position sensor S Signal plate (Crankshaft) S ECM	f	f
P0340 (05-79)	Camshaft Position Sensor Circuit Malfunction (G Signal)	S Open or short in camshaft position sensor circuit S Camshaft position sensor S Intake camshaft S ECM	f	f

P0500 (05-82)	Vehicle Speed Sensor Malfunction	S Combination meter S Open or short in vehicle speed sensor circuit S Vehicle speed sensor S ECM	-	f
P0505 (05-87)	Idle Control System Malfunction	S Open or short in ISC valve circuit S ISC valve is stuck or closed S PCV valve and hose S A/C switch circuit S Air induction system S ECM	f	f
P1300 (05-94)	Igniter Circuit Malfunction (No. 1)	S Ignition system S Open or short in IGF or IGT1 circuit from No. 1 ignition coil with igniter to ECM S No. 1 ignition coil with igniter S ECM	f	f
P1305 (05-94)	Igniter Circuit Malfunction (No. 2)	S Ignition system S Open or short in IGF or IGT2 circuit from No. 2 ignition coil with igniter to ECM S No. 2 ignition coil with igniter S ECM	f	f
P1310 (05-94)	Igniter Circuit Malfunction (No. 3)	S Ignition system S Open or short in IGF or IGT3 circuit from No. 3 ignition coil with igniter to ECM S No. 3 ignition coil with igniter S ECM	f	f
P1315 (05-94)	Igniter Circuit Malfunction (No. 4)	S Ignition system S Open or short in IGF or IGT4 circuit from No. 4 ignition coil with igniter to ECM S No. 4 ignition coil with igniter S ECM	f	f
P1335 (05-102)	Crankshaft Position Sensor Circuit Malfunction (During engine running)	S Open or short in crankshaft position sensor circuit S Crankshaft position sensor S Crank angle sensor plate S ECM	-	f
P1346 (05-103)	VVT Sensor/Camshaft Position Sensor Circuit Range/Performance Problem (Bank 1)	S Mechanical system malfunction (Timing chain teeth jumping, stretched chain) S ECM	f	f
P1349 (05-104)	VVT System Malfunction (Bank 1)	S Valve timing S Oil control valve S VVT controller assembly S ECM	f	f
P1656 (05-110)	OCV Circuit Malfunction (Bank 1)	S Open or short in OCV circuit S Oil control valve S ECM	f	f
B2795	Unmatch Key Code	S Key S Unregistered key inserted before?	-	f
B2796	No Communication in Immobiliser system	S Immobiliser system	-	f
B2797	Communication Malfunction No.1	S Immobiliser system	-	f
B2798	Communication Malfunction No.1	S Immobiliser system	-	f

*1: f ... CHK ENG (MIL) comes on. - ... CHK ENG (MIL) does not come on.

05E6Z-01

FAIL-SAFE CHART

1. FAIL-SAFE CHART

If any of the following codes are recorded, the engine ECU enters fail-safe mode.

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0100	Ignition timing fixed at 5˚ BTDC	Returned to normal condition
P0110	Intake air temp. is fixed at 20˚C (68˚F)	Returned to normal condition
P0115	Water temp. is fixed at 80˚C (176˚F)	Returned to normal condition
P0120	VTA is fixed at 0˚	The following condition must be repeated at least twice consecutively When closed throttle position switch is OFF: VTA ≧ 0.1 V and ≦ 0.95 V
P0135	The heater circuit in which a malfunction is detected is turned off	IG switch OFF
P0325	Max. timing retardation	IG switch OFF
P1300 P1305 P1310 P1315	Fuel cut	Returned to normal condition
P1656	It electronically turns off the circuit in which a malfunction is detected	Returned to normal condition

05E70-01

CHECK FOR INTERMITTENT PROBLEMS

Hand–held tester only:

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

(a) Clear the DTCs (See page 05–11).
(b) Set the check mode (See page 05–12).
(c) Perform a simulation test (See page 01–29).
(d) Check the connector and terminal (See page 01–29).
(e) Wiggle the harness and connector (See page 01–29).

05049-13

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See page
Engine does not crank (Does not start)	4. Starter 5. Starter relay 6. Park/neutral position switch	See Pub. No. RM821E, page 19-9 05-116 See Pub. No. RM821E, page 05-114
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. ECM	05-129 05-121 01-29
No complete combustion (Does not start)	1. Fuel pump control circuit	05-121
Engine cranks normally but difficult to start	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	05-116 05-121 See Pub. No. RM821E, page 14-1
Difficult to start with cold engine	1. Starter signal circuit 2. Fuel pump control circuit	05-116 05-121
Difficult to start with hot engine	1. Starter signal circuit 2. Fuel pump control circuit	05-116 05-121
High engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	See Pub. No. RM821E, page 05-637 05-129
Low engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. Fuel pump control circuit	See Pub. No. RM821E, page 05-637 05-121
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	See Pub. No. RM821E, page 14-1 05-121
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	05-129 05-121
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	05-121 See Pub. No. RM821E, page 40-1
Surging (Poor driveability)	1. Fuel pump control circuit	05-121
Engine stalls soon after starting	1. Fuel pump control circuit	05-121
Engine stalls during A/C operation	1. A/C signal circuit (Compressor circuit) 2. ECM	See Pub. No. RM821E, page 05-637 01-29

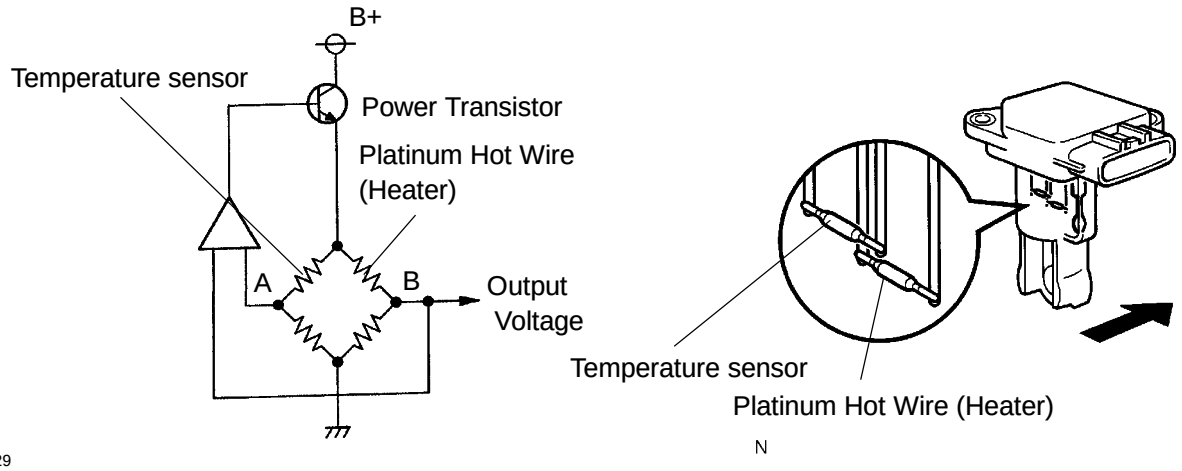
DTC	P0100	MASS AIR FLOW CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

The air flow meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air-fuel ratio. Inside the air flow meter, there is a heated platinum wire exposed to the flow of intake air.

By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and the internal thermistor, changing their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the air flow meter. The voltage level is proportional to the airflow through the sensor and the ECM interprets this voltage as the intake air amount.

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.



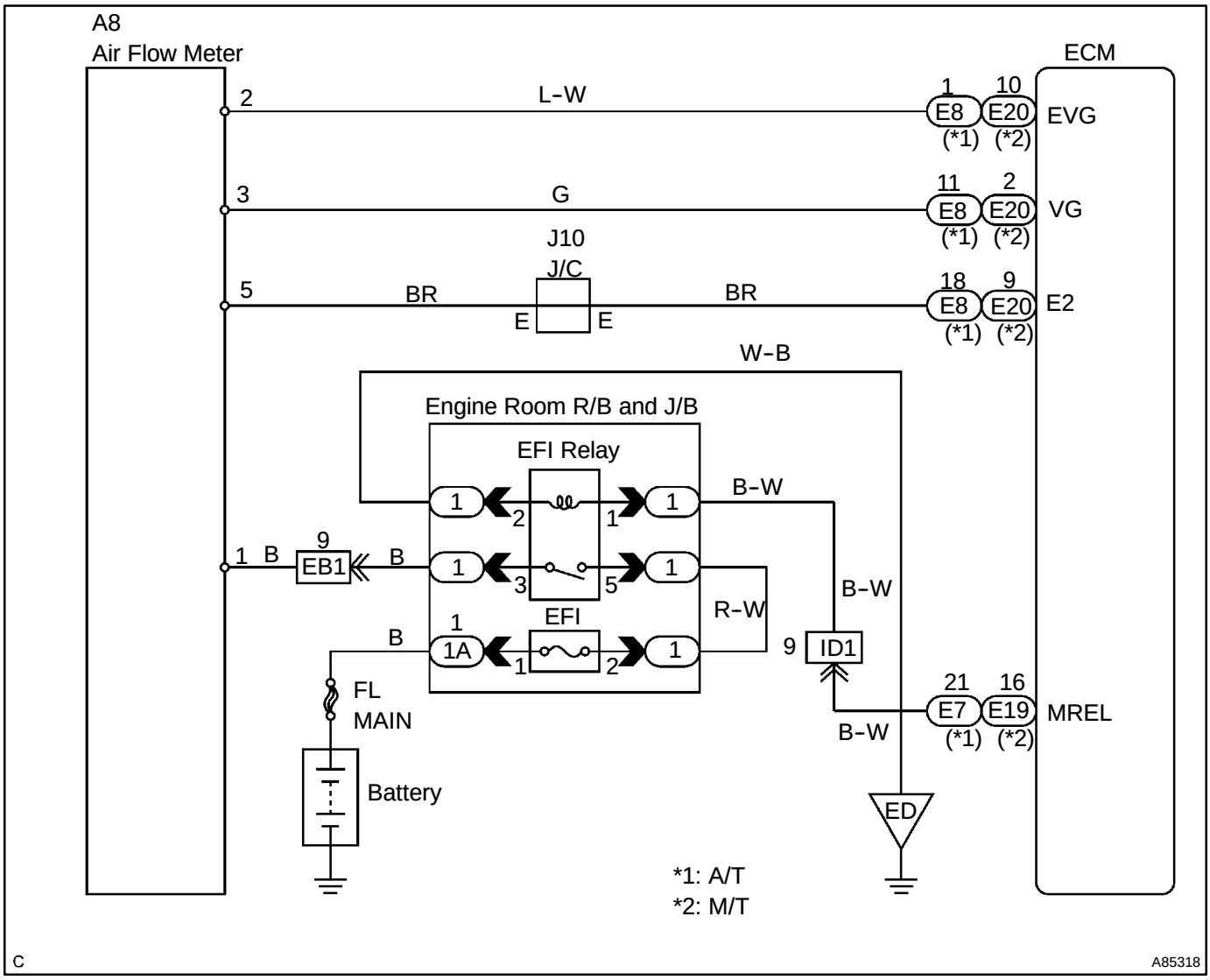
DTC No	DTC Detecting Condition	Trouble Area
P0100	Open or short in air flow meter circuit for more than 3 sec. with engine speed less than 4,000 rpm	S Open or short in air flow meter circuit S Air flow meter S ECM

HINT:

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

Air Flow Value (gm/sec.)	Malfunction
Approx. 0.0	S Air flow meter power source circuit open S VG circuit open or short
271.0 or more	S EVG circuit open

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the hand-held tester. 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.
- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.

When using the hand-held tester

1	READ VALUE OF HAND-HELD TESTER(MASS AIR FLOW RATE)

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Push the hand-held tester main switch on.
(d) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ALL/MAF" and read its value displayed on the hand-held tester.

Result:

Air flow rate (gm/sec)	Proceed to
0.0	A
271.0 or more	B
Between land 270.0 (*1)	C

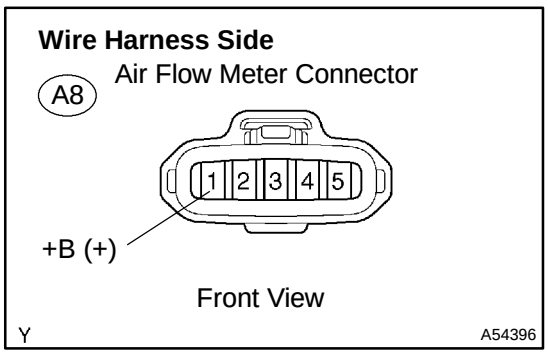
*1: The value must be changed when the throttle valve is opened or closed.

B → **Go to step 6**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-27)**

A

2	INSPECT MASS AIR FLOW METER(POWER SOUCE VOLTAGE)



(a) Turn the ignition switch to the ON position.
(b) Disconnect the A8 mass air flow meter connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

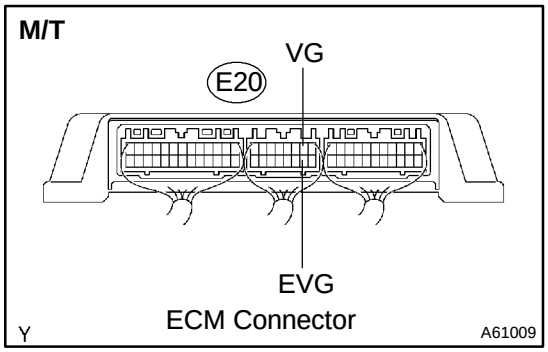
Tester Connection	Specified Condition
+B (A8-1) - Body ground	9 to 14 V

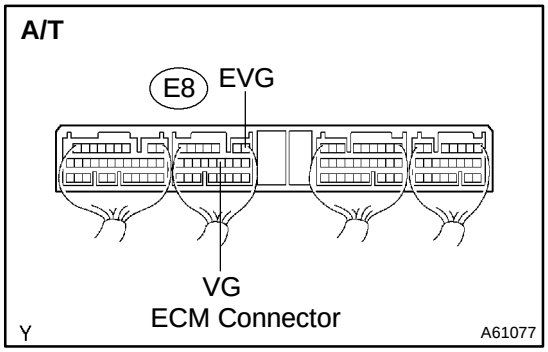
(d) Reconnect the mass air flow meter connector.

NG → **Go to step 5**

OK

3	INSPECT ECM





(a) Start the engine.

(b) Measure the voltage according to the value(s) in the table below.

HINT:

The shift position should be neutral and the A/C switch should be turned off.

Standard (M/T):

Tester Connection	Condition	Specified Condition
VG (E20-2) - EVG (E20-10)	Engine is idling	0.5 to 3.0 V

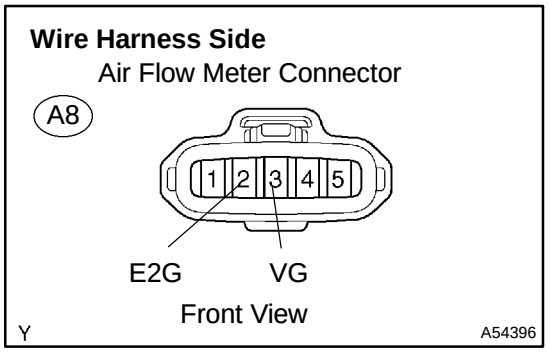
Standard (A/T):

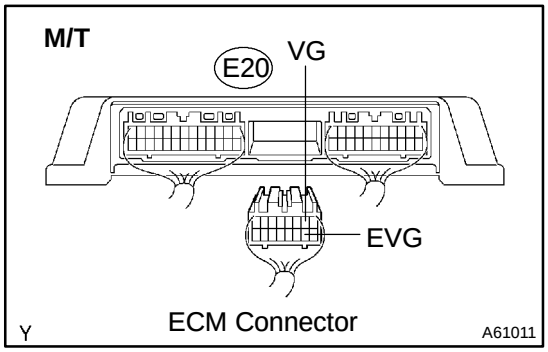
Tester Connection	Condition	Specified Condition
VG (E8-11) - EVG (E8-1)	Engine is idling	0.5 to 0.3 V

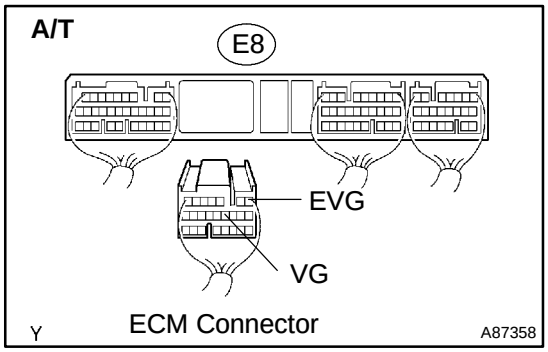
NG → **CHECK AND REPLACE ECM (See page 01-29)**

OK →

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







(a) Disconnect the A8 air flow meter connector.

(b) M/T models:
Disconnect the E20 ECM connector.

(c) A/T models:
Disconnect the E8 ECM connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
VG (A8-3) - VG (E20-2)	Below 1 Ω
E2G (A8-2) - EVG (E20-10)	Below 1 Ω

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
VG (A8-3) - VG (E8-11)	Below 1 Ω
E2G (A8-2) - EVG (E8-1)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
VG (A8-3) or VG (E20-2) - Body ground	10 kΩ or higher

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
VG (A8-3) or VG (E8-11) - Body ground	10 kΩ or higher

(e) Reconnect the air flow meter connector.

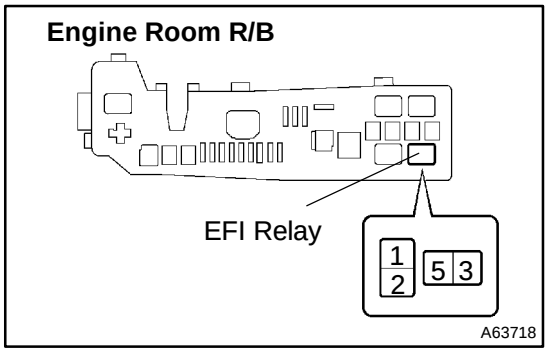
(f) Reconnect the ECM connector.

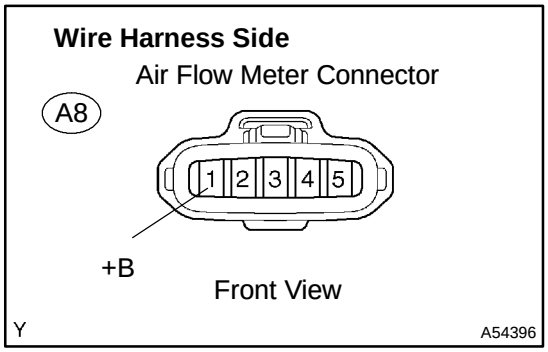
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

5	CHECK HARNESS AND CONNECTOR(EFI RELAY-MASS AIR FLOW METER)





(a) Remove the EFI relay from the engine room R/B.
(b) Disconnect the A8 mass air flow meter connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard (Check for open):

Tester Connection	Specified Condition
+B (A8-1) - EFI relay (3)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
+B (A8-1) or EFI relay (3) - Body ground	10 kΩ or higher

(d) Reconnect the mass air flow meter connector.
(e) Reinstall the EFI relay.

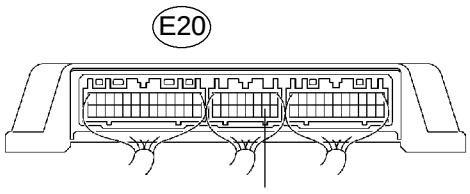
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK ECM POWER SOURCE CIRCUIT (See page 05-129)

6	INSPECT ECM(SENSOR GROUND)

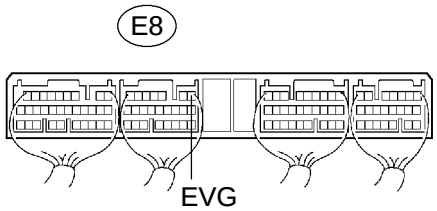
M/T



ECM Connector

Y A61009

A/T



ECM Connector A87359

(a) Measure the resistance according to the value(s) in the table below.

Standard (M/T):

Tester Connection	Specified Condition
EVG (E20-10) - Body ground	Below 1 Ω

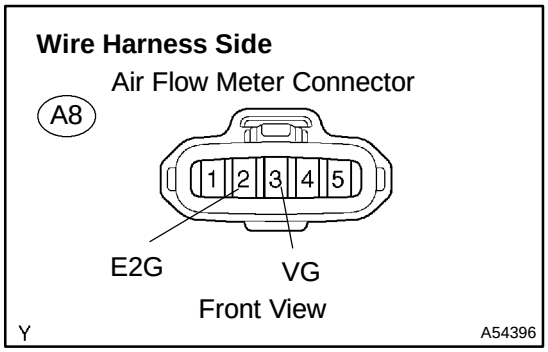
Standard (A/T):

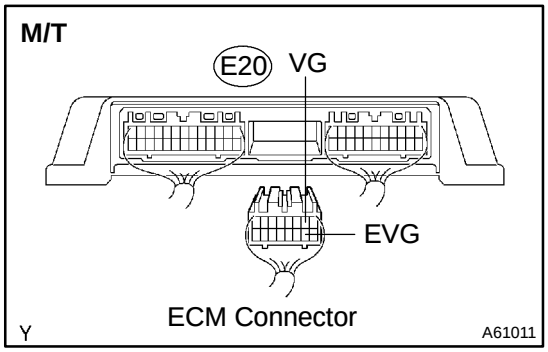
Tester Connection	Specified Condition
EVG (E8-1) - Body ground	Below 1 Ω

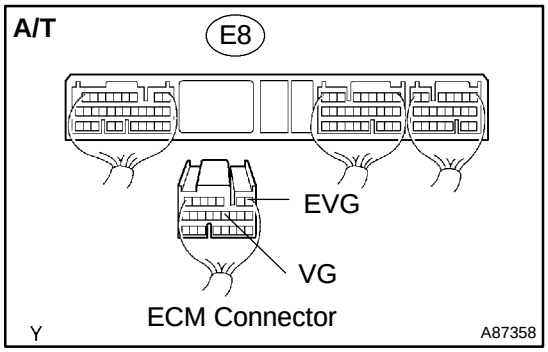
NG → **CHECK AND REPLACE ECM (See page 01-29)**

OK

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







(a) Disconnect the A8 air flow meter connector.
(b) M/T models:
Disconnect the E20 ECM connector.
(c) A/T models:
Disconnect the E8 ECM connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
VG (A8-3) - VG (E20-2)	Below 1 Ω
E2G (A8-2) - EVG (E20-10)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
VG (A8-3) or VG (E20-2) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
VG (A8-3) - VG (E8-11)	Below 1 Ω
E2G (A8-2) - EVG (E8-1)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
VG (A8-3) or VG (E8-11) - Body ground	10 kΩ or higher

(e) Reconnect the air flow meter connector.
(f) Reconnect the ECM connector.

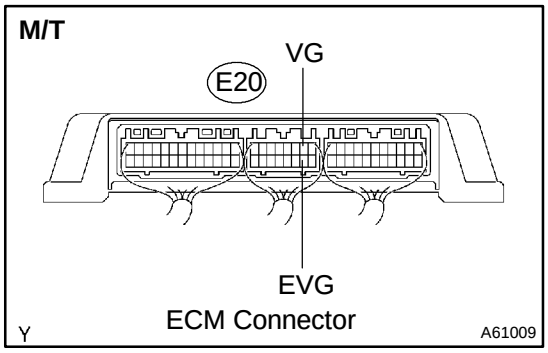
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

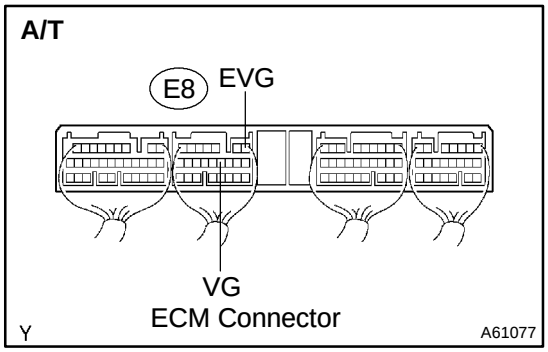
OK

REPLACE MASS AIR FLOW METER

When not using hand-held tester

1	INSPECT ECM





(a) Start the engine.
(b) Measure the voltage according to the value(s) in the table below.

HINT:
The shift position should be neutral and the A/C switch should be turned off.

Standard (M/T):

Tester Connection	Condition	Specified Condition
VG (E20-2) - EVG (E20-10)	Engine is idling	0.5 to 3.0 V

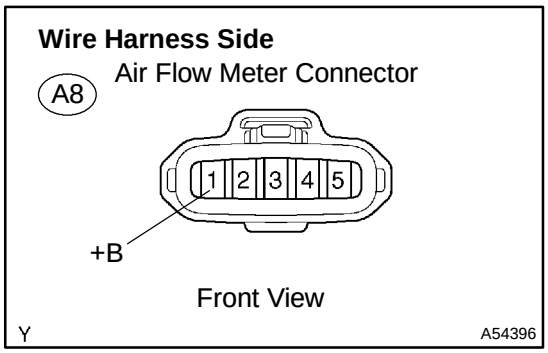
Standard (A/T):

Tester Connection	Condition	Specified Condition
VG (E8-11) - EVG (E8-1)	Engine is idling	0.5 to 0.3 V

NG → **CHECK AND REPLACE ECM (See page 01-29)**

OK

2	INSPECT MASS AIR FLOW METER(POWER SOURCE VOLTAGE)



(a) Turn the ignition switch to the ON position.
(b) Disconnect the A8 mass air flow meter connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

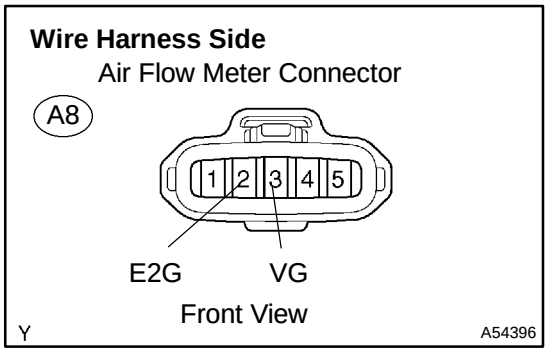
Tester Connection	Specified Condition
+B (A8-1) - Body ground	9 to 14 V

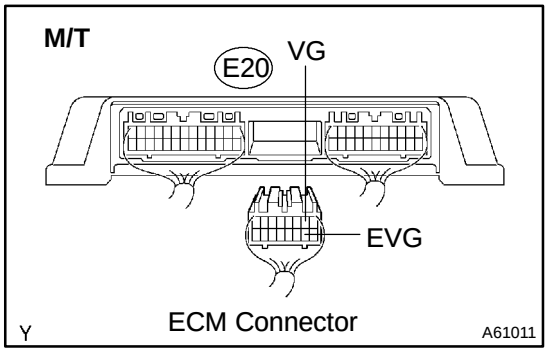
(d) Reconnect the mass air flow meter connector.

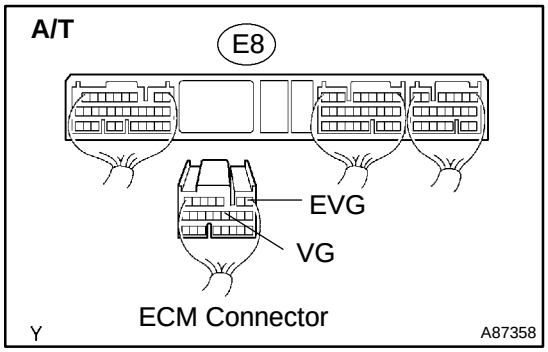
NG → **Go to step 4**

OK

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







(a) Disconnect the A8 air flow meter connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
VG (A8-3) - VG (E20-2)	Below 1 Ω
E2G (A8-2) - EVG (E20-10)	Below 1 Ω

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
VG (A8-3) - VG (E8-11)	Below 1 Ω
E2G (A8-2) - EVG (E8-1)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
VG (A8-3) or VG (E20-2) - Body ground	10 kΩ or higher

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
VG (A8-3) or VG (E8-11) - Body ground	10 kΩ or higher

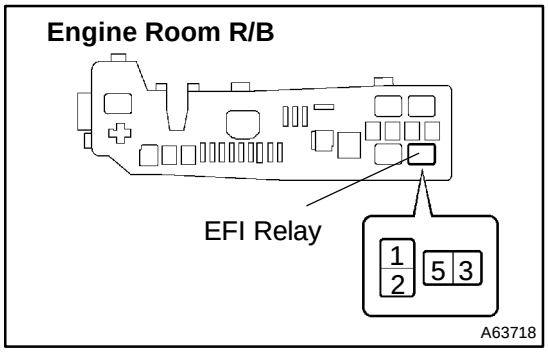
(d) Reconnect the air flow meter connector.
(e) Reconnect the ECM connector.

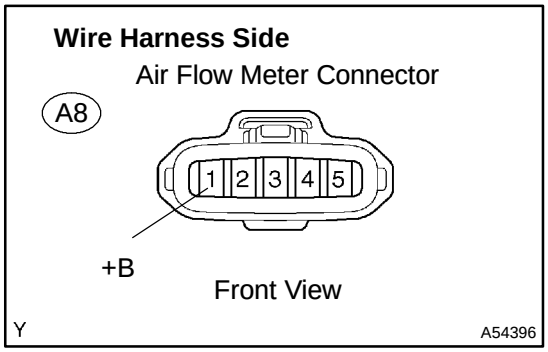
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

4	CHECK HARNESS AND CONNECTOR(EFI RELAY-MASS AIR FLOW METER)





(a) Remove the EFI relay from the engine room R/B.
(b) Disconnect the A8 mass air flow meter connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard (Check for open):

Tester Connection	Specified Condition
+B (A8-1) - EFI relay (3)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
+B (A8-1) or EFI relay (3) - Body ground	10 kΩ or higher

(d) Reconnect the mass air flow meter connector.
(e) Reinstall the EFI relay.

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

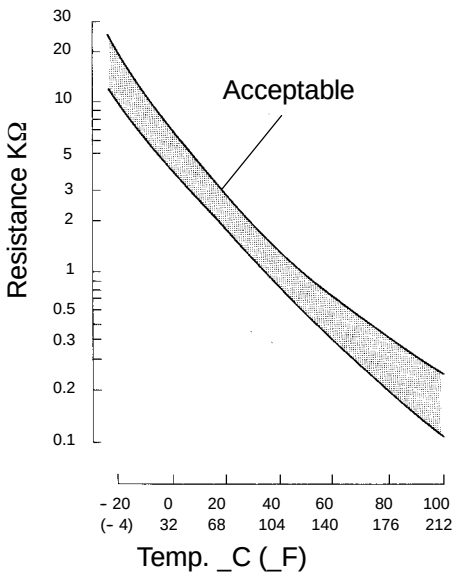
OK

CHECK ECM POWER SOURCE CIRCUIT (See page 05-129)

DTC P0110 INTAKE AIR TEMP. CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

(Fig.1)



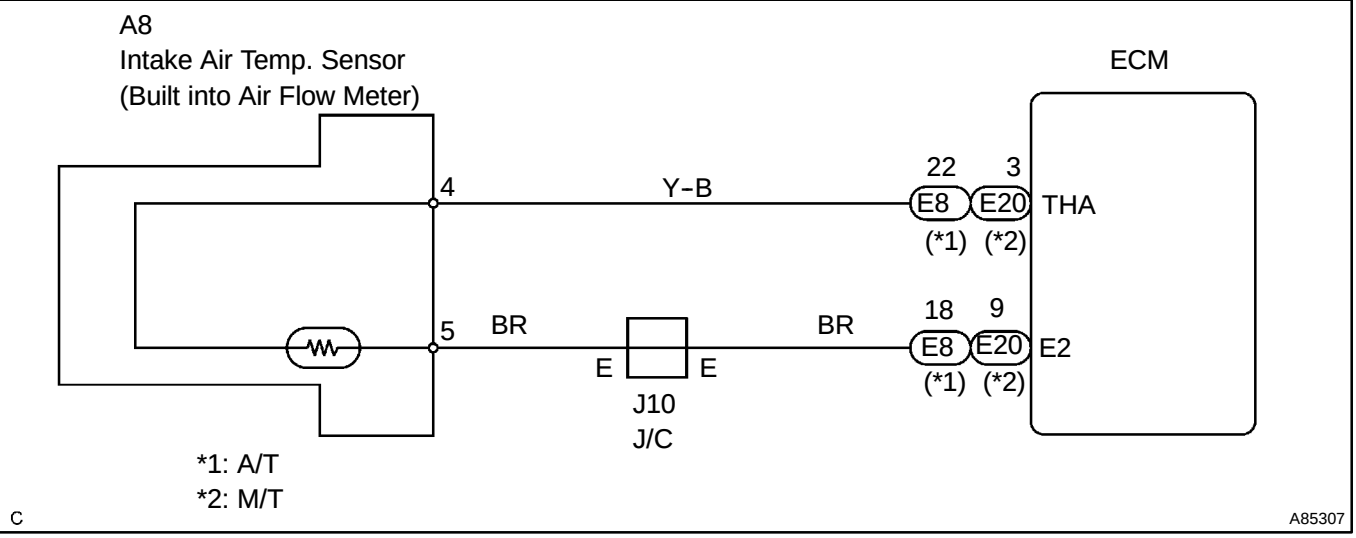
The intake air temperature (IAT) sensor, mounted on the mass air flow (MAF) sensor, monitors the intake air temperature. The IAT sensor has a thermistor that varies its resistance depending on the temperature of the intake air. When the air temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected as voltage changes to the ECM terminal. (See Fig. 1).

The intake air temperature sensor is connected to the ECM (See below). The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from terminal THA (THAR) via resistor R.

That is, the resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature 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 fuel injection volume to improve driveability during cold engine operation.

DTC No.	DTC Detecting Condition	Trouble Area
P0110	Open or short in intake air temp. sensor circuit	S Open or short in intake air temp. sensor circuit S Intake air temp. sensor (built into air flow meter) S ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand-held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

When using the hand-held tester

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

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(c) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ALL/INTAKE AIR" and read its value displayed on the hand-held tester.
Temperature: Same value as the actual intake air temperature.

Result:

Temperature Displayed	Proceed to
-40_C (-40_F)	A
140_C (284_F) or more	B
OK (Same as present temperature)	C

HINT:

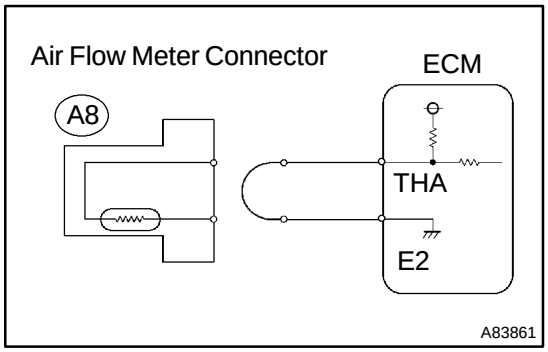
- If there is an open circuit, the hand-held tester indicates -40_C (-40_F).
- If there is a short circuit, the hand-held tester indicates 140_C (284_F) or more.

B → **Go to step 4**

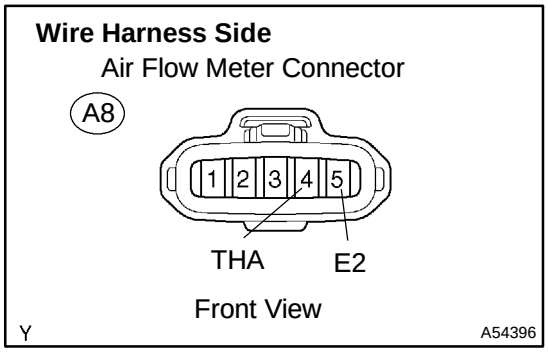
C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)**

A

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



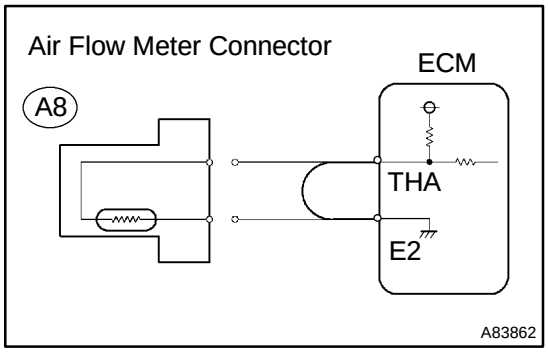
(a) Disconnect the A8 air flow meter connector.
(b) Connect terminals THA and E2 of the mass air flow meter wire harness side connector.
(c) Turn the ignition switch to the ON position.
(d) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ ALL/INTAKE AIR" and read its value displayed on the hand-held tester.
Temperature value: 140_C (284_F) or more
(e) Reconnect the air flow meter connector.



OK → **CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE MASS AIR FLOW METER**

NG

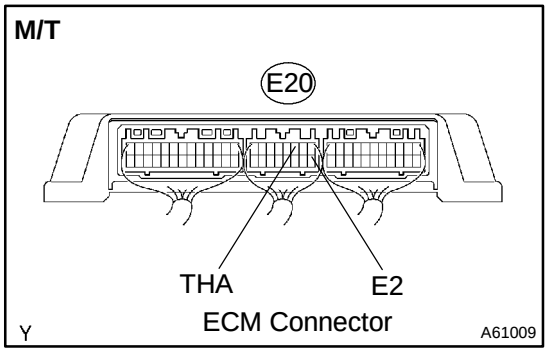
3	READ VALUE OF HAND-HELD TESTER(CHECK FOR OPEN IN ECM)

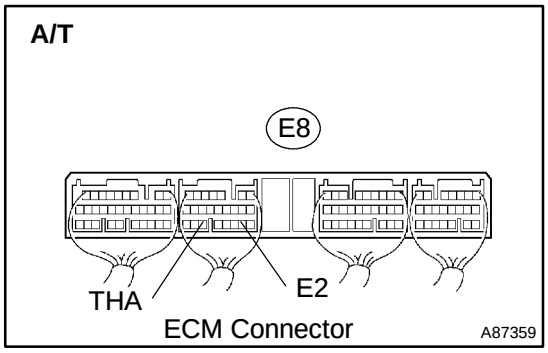


(a) Disconnect the A8 air flow meter connector.
(b) M/T models:
Connect terminals THA and E2 of the E20 ECM connector.
(c) A/T models:
Connect terminals THA and E2 of the E8 ECM connector.

HINT:
Before checking, do a visual and contact pressure check for the ECM connector.

(d) Turn the ignition switch to the ON position.
(e) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ALL/INTAKE AIR" and read its value displayed on the hand-held tester.
Temperature value: 140°C (284°F) or more
(f) Reconnect the air flow meter connector.



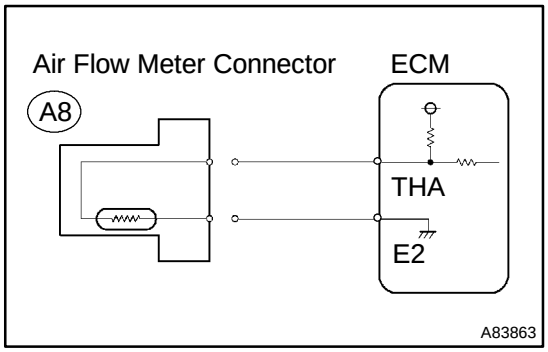


NG → **CONFIRM GOOD CONNECTION AT ECM. IF OK, CHECK AND REPLACE ECM (See page 01-29)**

OK →

REPAIR OR REPLACE HARNESS OR CONNECTOR

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

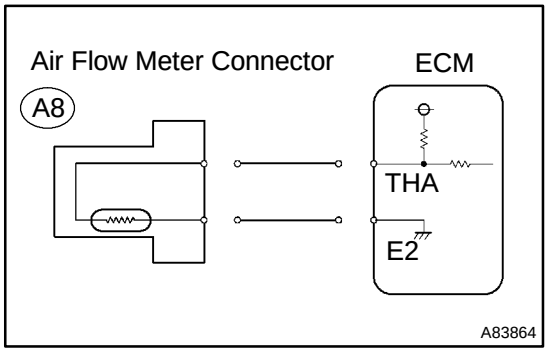


(a) Disconnect the A8 air flow meter connector.
(b) Turn the ignition switch to the ON position.
(c) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ ALL/INTAKE AIR" and read its value displayed on the hand-held tester.
Temperature value: -40_C(-40_F)
(d) Reconnect the air flow meter connector.

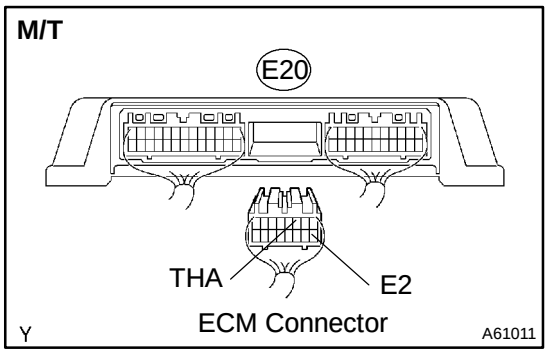
OK → **REPLACE MASS AIR FLOW METER**

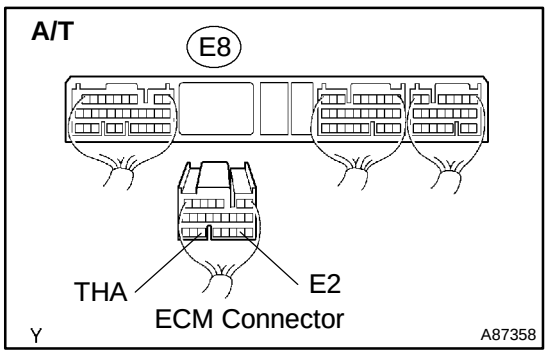
NG

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



(a) Disconnect the A8 air flow meter connector.
(b) M/T models:
Disconnect the E20 ECM connector.
(c) A/T models:
Disconnect the E8 ECM connector.
(d) Turn the ignition switch to the ON position.
(e) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ ALL/INTAKE AIR" and read its value displayed on the hand-held tester.
Temperature value: -40°C (-40°F)
(f) Reconnect the ECM connector.
(g) Reconnect the air flow meter connector.





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

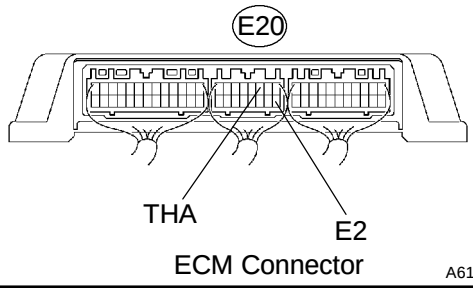
NG

CHECK AND REPLACE ECM (See page 01-29)

When not using the hand-held tester

1	INSPECT ECM(CHECK VOLTAGE)

M/T



(a) Turn the ignition switch to the ON position.

(b) M/T models:
Measure the voltage according to the value(s) in the table below.

Standard (M/T):

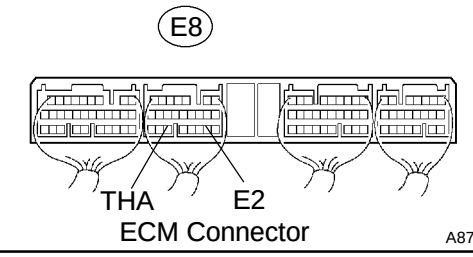
Tester Connection	Specified Condition
THA (E20-3) - E2 (E20-9)	0.5 to 3.4 V (at 20_C (68_F)
THA (E20-3) - E2 (E20-9)	0.2 to 1.0 V (at 60_C (140_F)

(c) A/T models:
Measure the voltage according to the value(s) in the table below.

Standard (A/T):

Tester Connection	Specified Condition
THA (E8-22) - E2 (E8-18)	0.5 to 3.4 V (at 20_C (68_F)
THA (E8-22) - E2 (E8-18)	0.2 to 1.0 V (at 60_C (140_F)

A/T



OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)**

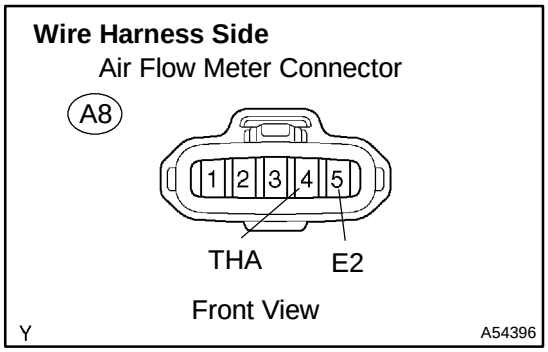
NG

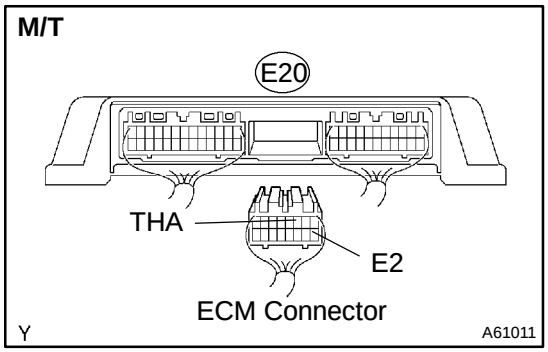
2	CHECK MASS AIR FLOW METER (See Pub. No. RM821E, page 10-3)

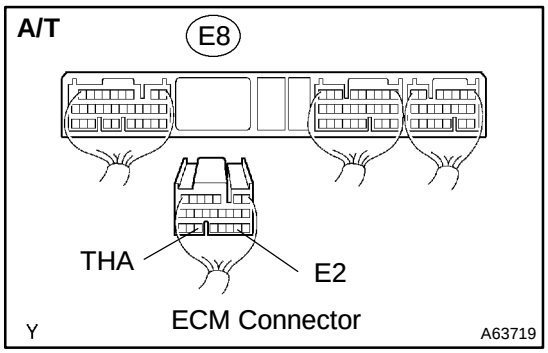
NG → **REPLACE MASS AIR FLOW METER**

OK

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







(a) Disconnect the A8 air flow meter connector.
(b) M/T models:
Disconnect the ECM E20 connector.
(c) A/T models:
Disconnect the ECM E8 connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
THA (A8-4) - THA (E20-3)	Below 1 Ω

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
THA (A8-4) - THA (E8-22)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
THA (A8-4) or THA (E20-3) - Body ground	10 kΩ or higher

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
THA (A8-4) or THA (E8-22) - Body ground	10 kΩ or higher

(e) Reconnect the air flow meter connector.
(f) Reconnect the ECM connector.

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

OK

CHECK AND REPLACE ECM (See page 01-29)

DTC	P0115	ENGINE COOLANT TEMP. CIRCUIT MALFUNCTION

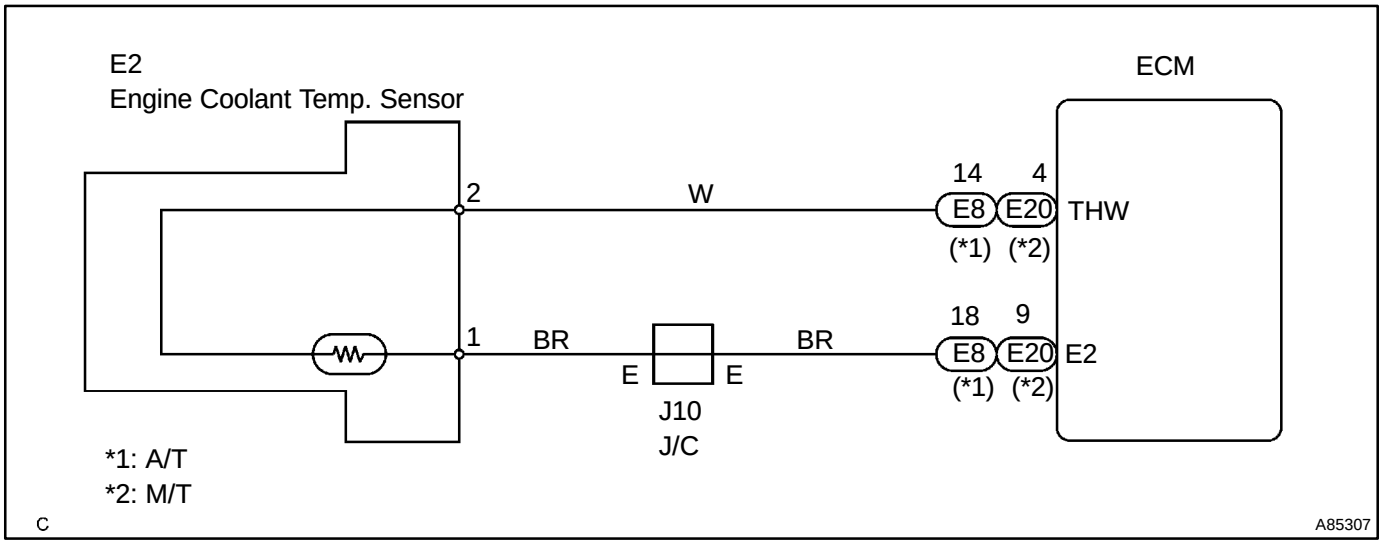
CIRCUIT DESCRIPTION

A thermistor is built into the engine coolant temperature sensor and changes the resistance value according to the engine coolant temperature.

The structure of the sensor and connection to the ECM is the same as those of the intake air temperature sensor.

DTC No.	DTC Detecting Condition	Trouble Area
P0115	Open or short in engine coolant temp. sensor circuit	S Open or short in engine coolant temp. sensor circuit S Engine coolant temp. sensor S ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may by open.
- Read freeze frame data using the hand-held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

When using the hand-held tester

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

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(c) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ALL/COOLANT TEMP" and read its value displayed on the hand-held tester.
Temperature: Same value as the actual engine coolant temperature.

Result:

Temperature Displayed	Proceed to
-40_C (-40_F)	A
140_C (284_F) or more	B
OK (Same as present temperature)	C

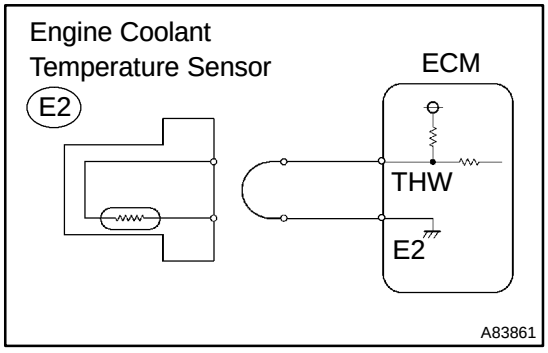
HINT:
- If there is an open circuit, the hand-held tester indicates -40_C (-40_F).
- If there is a short circuit, the hand-held tester indicates 140_C (284_F) or more.

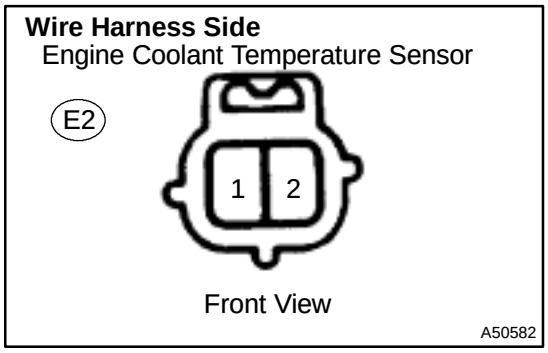
B → **Go to step 4**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)**

A

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



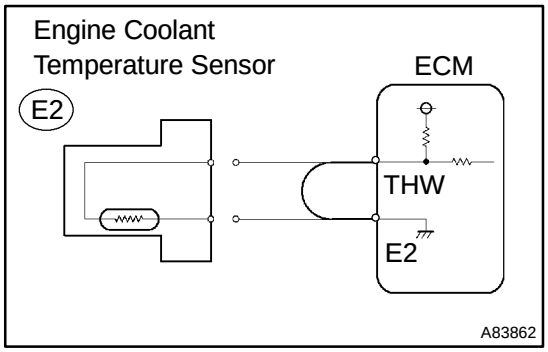


(a) Disconnect the E2 engine coolant temperature sensor connector.
(b) Connect terminals 1 and 2 of the engine coolant temperature sensor wire harness side connector.
(c) Turn the ignition switch to the ON position.
(d) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ALL/COOLANT TEMP" and read its value displayed on the hand-held tester.
Temperature value: 140°C (284°F) or more
(e) Reconnect the engine coolant temperature sensor connector.

OK → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

NG

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



(a) Disconnect the E2 engine coolant temperature sensor connector.

(b) M/T models:
Connect terminals THW and E2 of the E20 ECM connector.

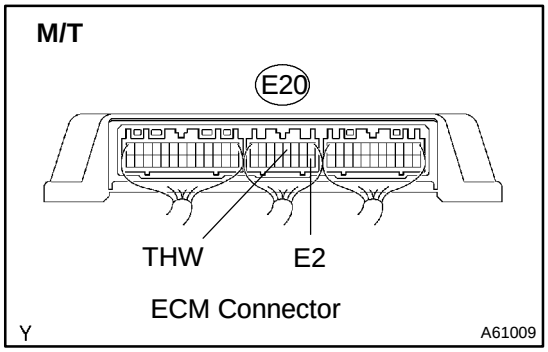
(c) A/T models:
Connect terminals THW and E2 of the E8 ECM connector.

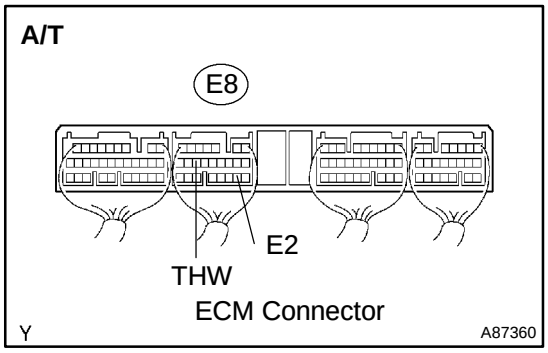
HINT:
Before checking, do a visual and contact pressure check for the ECM connector.

(d) Turn the ignition switch to the ON position.

(e) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ALL/COOLANT TEMP" and read its value displayed on the hand-held tester.
Temperature value: 140°C (284°F) or more

(f) Reconnect the engine coolant temperature sensor connector.



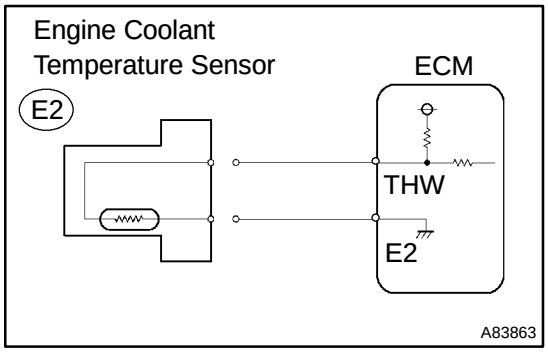


OK	REPAIR OR REPLACE HARNESS OR CONNECTOR

NG

CONFIRM GOOD CONNECTION AT ECM. IF OK, CHECK AND REPLACE ECM (See page 01-29)

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

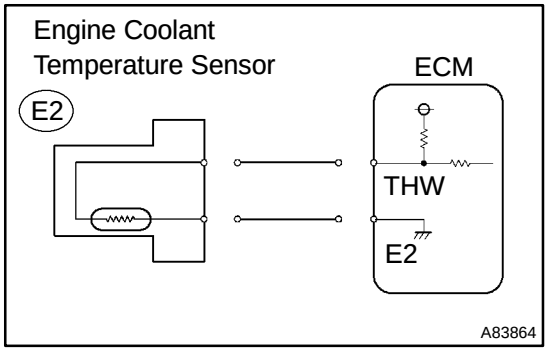


(a) Disconnect the E2 engine coolant temperature sensor connector.
(b) Turn the ignition switch to the ON position.
(c) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ ALL/COOLANT TEMP" and read its value displayed on the hand-held tester.
Temperature value: -40°C (-40°F)
(d) Reconnect the engine coolant temperature sensor connector.

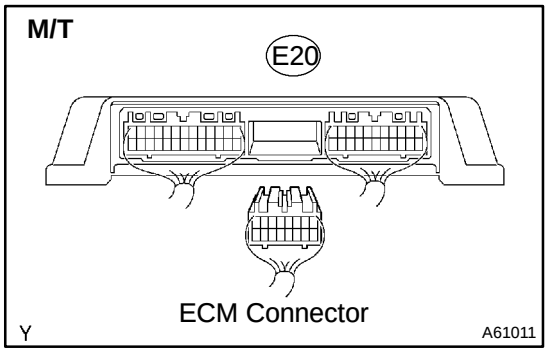
OK → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

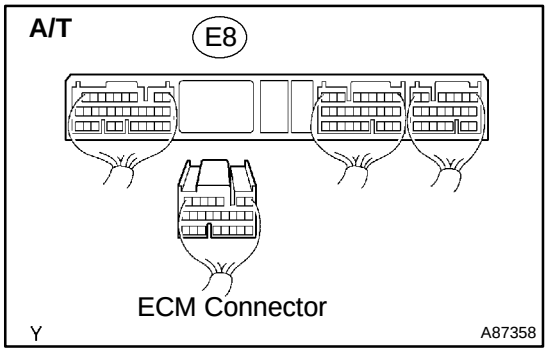
NG

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



(a) Disconnect the E2 engine coolant temperature sensor connector.
(b) M/T models:
Disconnect the E20 ECM connector.
(c) A/T models:
Disconnect the E8 ECM connector.
(d) Turn the ignition switch to the ON position.
(e) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ ALL/COOLANT TEMP" and read its value displayed on the hand-held tester.
Temperature: -40°C (-40°F)
(f) Reconnect the ECM connector.





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

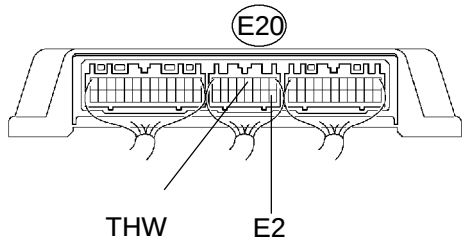
NG

CHECK AND REPLACE ECM (See page 01-29)

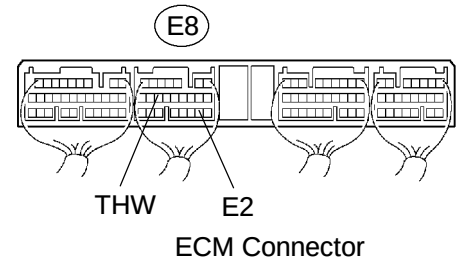
When not using the hand-held tester

1	INSPECT ECM(CHECK VOLTAGE)

M/T



A/T



(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

Standard (M/T):

Tester Connection	Specified Condition
THW (E20-4) - E2 (E20-9)	0.5 to 3.4 V (at 20_C (68_F)
THW (E20-4) - E2 (E20-9)	0.2 to 1.0 V (at 60_C (140_F)

Standard (A/T):

Tester Connection	Specified Condition
THW (E8-14) - E2 (E8-18)	0.5 to 3.4 V (at 20_C (68_F)
THW (E8-14) - E2 (E8-18)	0.2 to 1.0 V (at 60_C (140_F)

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)**

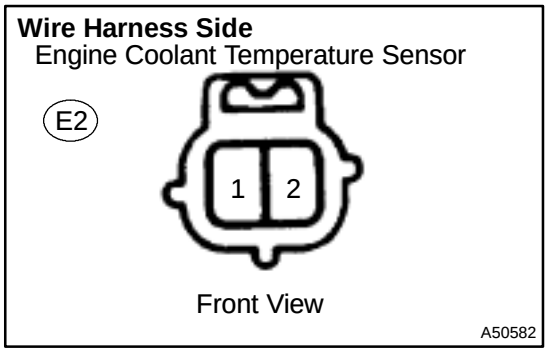
NG

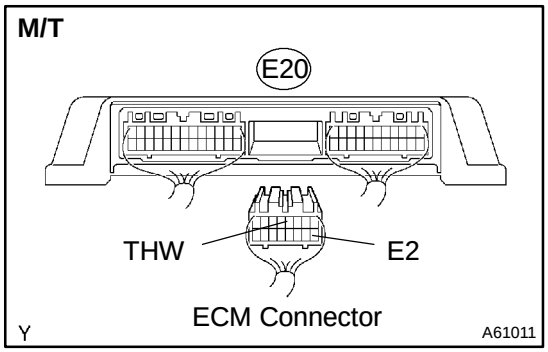
2	CHECK ENGINE COOLANT TEMPERATURE SENSOR (See Pub. No. RM821E, page 10-3)

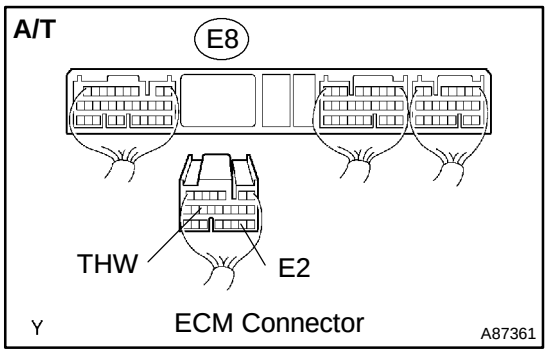
NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

3	CHECK HARNESS AND CONNECTOR(ECM-ENGINE COOLANT TEMPERATURE SENSOR)







(a) Disconnect the E2 engine coolant temperature sensor connector.

(b) M/T models:
Disconnect the ECM E20 connector.

(c) A/T models:
Disconnect the ECM E8 connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
Engine coolant temperature sensor (E2-1) - THW (E20-4)	Below 1 Ω

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
Engine coolant temperature sensor (E2-1) - THW (E8-14)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
Engine coolant temperature sensor (E2-1) or THW (E20-4) - Body ground	10 kΩ or higher

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
Engine coolant temperature sensor (E2-1) or THW (E8-14) - Body ground	10 kΩ or higher

(e) Reconnect the engine coolant temperature sensor connector.

(f) Reconnect the ECM connector.

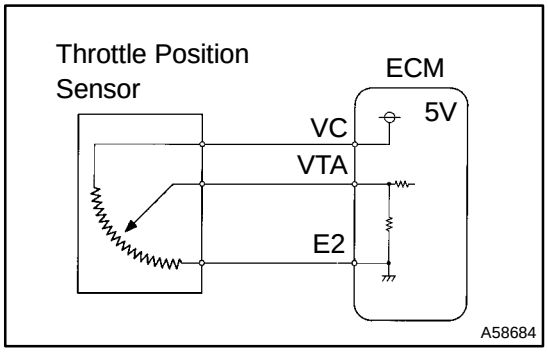
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPLACE ECM (See page 01-29)

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

CIRCUIT DESCRIPTION



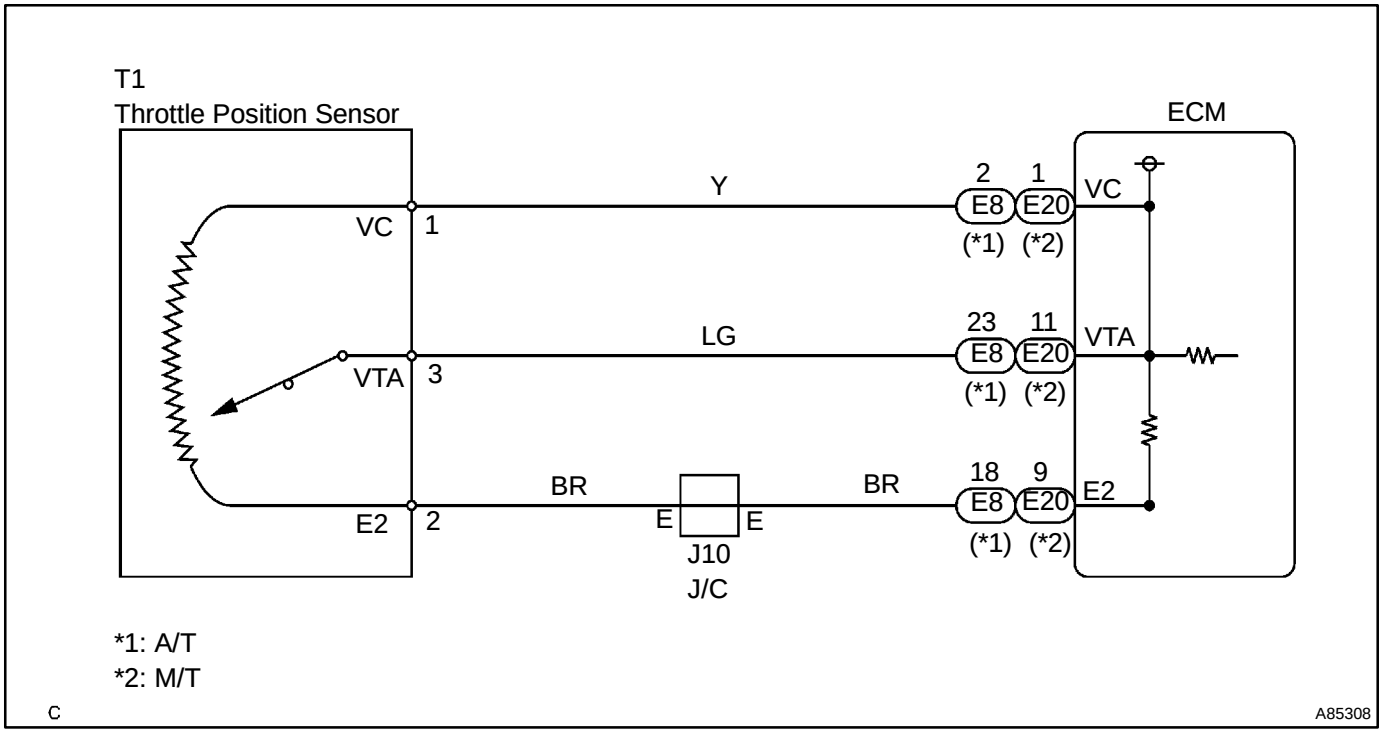
The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle.
When the throttle valve is fully closed, a voltage of approximately 0.3 to 0.8 V is applied to terminal VTA of the ECM. The voltage applied to terminal VTA of the ECM increases in proportion to the opening angle of the throttle valve and becomes approximately 3.2 to 4.9 V when the throttle valve is fully opened. The ECM judges the vehicle driving conditions from these signals input from terminal VTA, and uses them as one of the conditions for deciding the air-fuel ratio correction, power increase correction fuel-cut control, etc.

DTC No.	DTC Detecting Condition	Trouble Area
P0120	Condition (1) or (2) continues with more than 5 sec.: (1) VTA < 0.1 V (2) VTA > 4.9 V	S Open or short in throttle position sensor S Throttle position senor S ECM

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

Throttle valve opening position expressed in 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

WIRING DIAGRAM



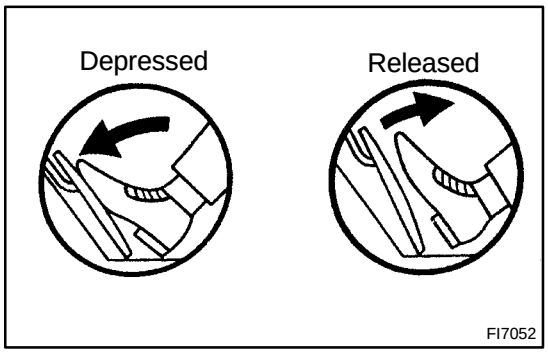
INSPECTION PROCEDURE

HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand-held tester. Freeze frame date records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

When using the hand-held tester

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



(a) Connect the hand-held tester to the DLC3.
(b) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ ETCS/THROTTLE POS" and read its value displayed on the hand-held tester.

Result:

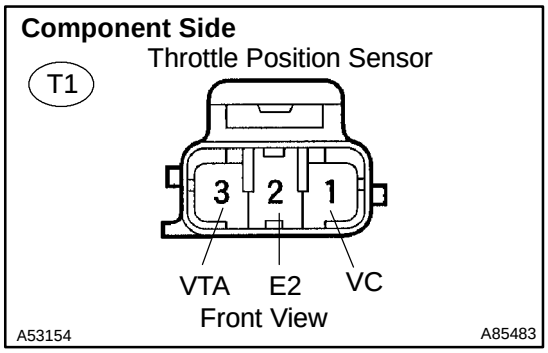
Accelerator pedal operation	Throttle valve opening position expressed as percentage	Proceed to
Released → Depressed	0 %	A
Released → Depressed	Approx. 10 % → 70 %	B
Released → Depressed	Approx. 100 %	C

B → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)**

C → **Go to step 4**

A

2	INSPECT THROTTLE POSITION SENSOR



(a) Disconnect the T1 throttle position sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

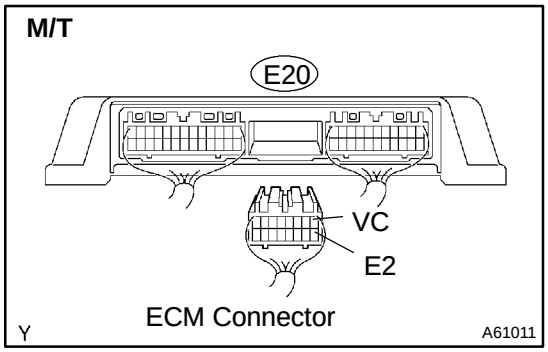
Tester Connection	Throttle Valve	Specified Condition
VC (T1-1) - E2 (T1-2)	-	2.5 to 5.9 kΩ
VTA (T1-3) - E2 (T1-2)	Fully closed	0.2 to 5.7 kΩ
VTA (T1-3) - E2 (T1-2)	Fully open	2.0 to 10.2 kΩ

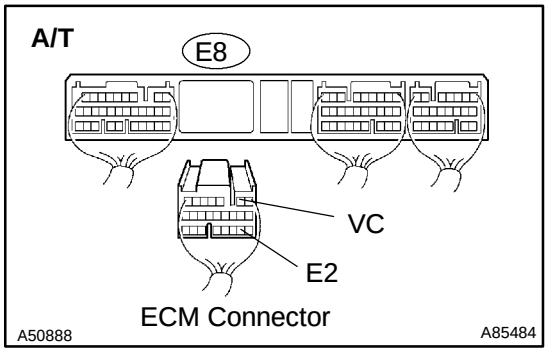
(c) Reconnect the throttle position sensor connector.

NG → **REPLACE THROTTLE POSITION SENSOR**

OK

3	CHECK HARNESS AND CONNECTOR(ECM-THROTTLE POSITION SENSOR)





(a) M/T models:
Disconnect the E20 ECM connector.

(b) A/T models:
Disconnect the E8 ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard (M/T):

Tester Connection	Throttle Valve	Specified Condition
VC (E20-1) - E2 (E20-9)	-	2.5 to 5.9 kΩ
VTA (E20-11) - E2 (E20-9)	Fully closed	0.2 to 5.7 kΩ
VTA (E20-11) - E2 (E20-9)	Fully open	2.0 to 10.2 kΩ

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
VC (E20-1) - Body ground	10 kΩ or higher
VTA (E20-11) - Body ground	10 kΩ or higher

Standard (A/T):

Tester Connection	Throttle Valve	Specified Condition
VC (E8-2) - E2 (E8-18)	-	2.5 to 5.9 kΩ
VTA (E8-23) - E2 (E8-18)	Fully closed	0.2 to 5.7 kΩ
VTA (E8-23) - E2 (E8-18)	Fully open	2.0 to 10.2 kΩ

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
VC (E8-2) - Body ground	10 kΩ or higher
VTA (E8-23) - Body ground	10 kΩ or higher

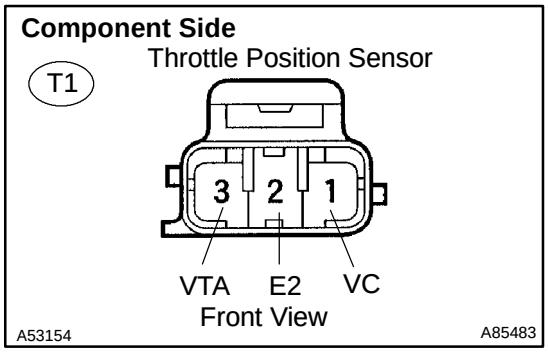
(d) Reconnect the ECM connector.

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

OK

CHECK AND REPLACE ECM (See page 01-29)

4 INSPECT THROTTLE POSITION SENSOR



(a) Disconnect the T1 throttle position sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

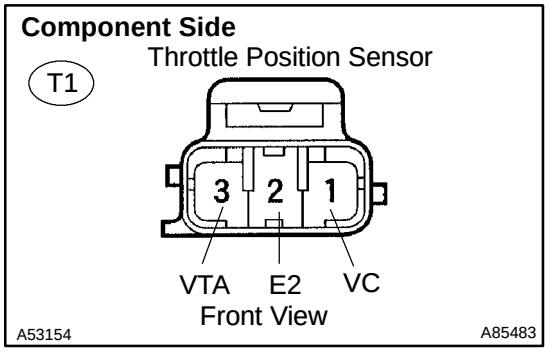
Tester Connection	Throttle Valve	Specified Condition
VC (T1-1) - E2 (T1-2)	-	2.5 to 5.9 kΩ
VTA (T1-3) - E2 (T1-2)	Fully closed	0.2 to 5.7 kΩ
VTA (T1-3) - E2 (T1-2)	Fully open	2.0 to 10.2 kΩ

(c) Reconnect the throttle position sensor connector.

NG → **REPLACE THROTTLE POSITION SENSOR**

OK

5 CHECK HARNESS AND CONNECTOR(ECM-THROTTLE POSITION SENSOR)



(a) Disconnect the T1 throttle position sensor connector.
(b) M/T models:
Disconnect the E20 ECM connector.
(c) A/T models:
Disconnect the E8 ECM connector.
(d) Measure the resistance according to the value(s) in the table below.

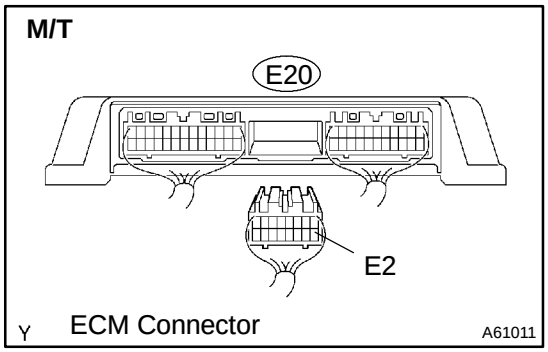
Standard (Check for open) (M/T):

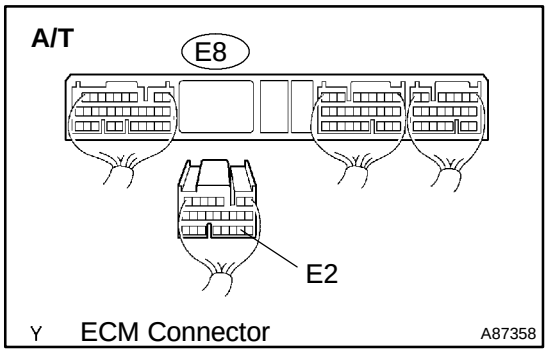
Tester Connection	Specified Condition
E2 (T1-2) - E2 (E20-9)	Below 1 Ω

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
E2 (T1-2) - E2 (E8-18)	Below 1 Ω

(e) Reconnect the throttle position sensor connector.
(f) Reconnect the ECM connector.





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

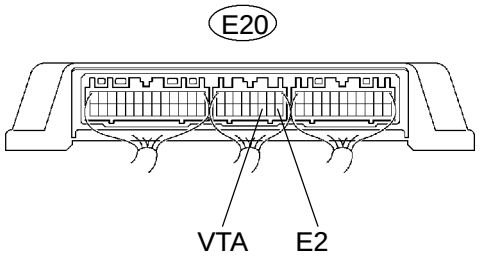
OK

CHECK AND REPLACE ECM (See page 01-29)

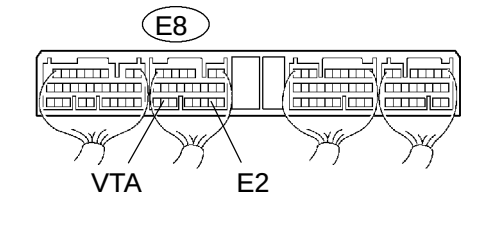
When not using the hand-held tester

1 INSPECT ECM(CHECK VOLTAGE)

M/T



A/T



(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

Standard (M/T):

Tester Connection	Throttle Valve	Specified Condition
VTA (E20-11) - E2 (E20-9)	Fully closed	0.3 to 1.0 V
VTA (E20-11) - E2 (E20-9)	Fully open	2.7 to 5.2 V

Standard (A/T):

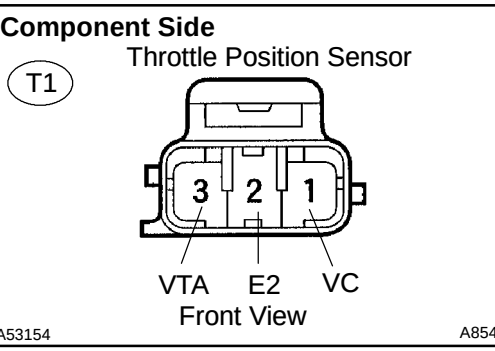
Tester Connection	Throttle Valve	Specified Condition
VTA (E8-23) - E2 (E8-18)	Fully closed	0.3 to 1.0 V
VTA (E8-23) - E2 (E8-18)	Fully open	2.7 to 5.2 V

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)**

NG

2 CHECK THROTTLE POSITION SENSOR

Component Side



(a) Disconnect the T1 throttle position sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

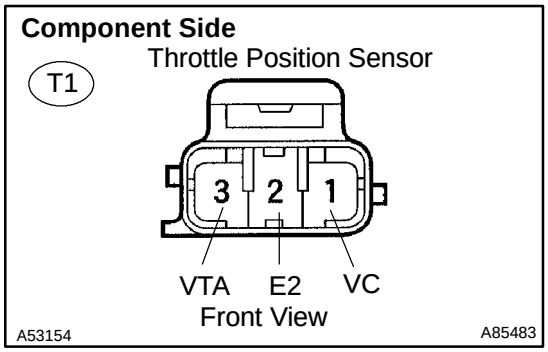
Tester Connection	Throttle Valve	Specified Condition
VC (T1-1) - E2 (T1-2)	-	2.5 to 5.9 kΩ
VTA (T1-3) - E2 (T1-2)	Fully closed	0.2 to 5.7 kΩ
VTA (T1-3) - E2 (T1-2)	Fully open	2.0 to 10.2 kΩ

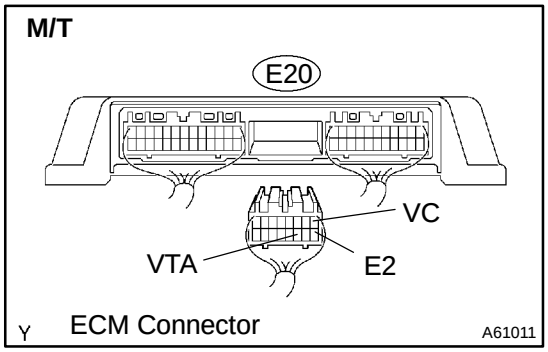
(c) Reconnect the throttle position sensor connector.

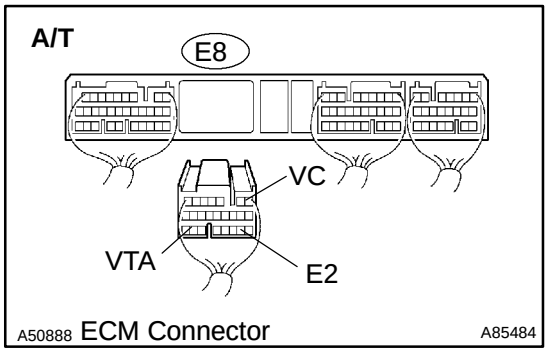
NG → **REPLACE THROTTLE POSITION SENSOR**

OK

3 CHECK HARNESS AND CONNECTOR(ECM-THROTTLE POSITION SENSOR)







(a) Disconnect the T1 throttle position sensor connector.
(b) M/T models:
Disconnect the ECM E20 connector.
(c) A/T models:
Disconnect the ECM E8 connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
VC (T1-1) - VC (E20-1)	Below 1 Ω
E2 (T1-2) - E2 (E20-9)	Below 1 Ω
VTA (T1-3) - VTA (E20-11)	Below 1 Ω

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
VC (T1-1) - VC (E8-2)	Below 1 Ω
E2 (T1-2) - E2 (E8-18)	Below 1 Ω
VTA (T1-3) - VTA (E8-23)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
VC (T1-1) or VC (E20-1) - Body ground	10 kΩ or higher
E2 (T1-2) or E2 (E20-9) - Body ground	10 kΩ or higher
VTA (T1-3) or VTA (E20-11) - Body ground	10 kΩ or higher

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
VC (T1-1) or VC (E8-2) - Body ground	10 kΩ or higher
E2 (T1-2) or E2 (E8-18) - Body ground	10 kΩ or higher
VTA (T1-3) or VTA (E8-23) - Body ground	10 kΩ or higher

(e) Reconnect the throttle position sensor connector.
(f) Reconnect the ECM connector.

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

OK

CHECK AND REPLACE ECM (See page 01-29)

DTC	P0130	HEATED OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 1)

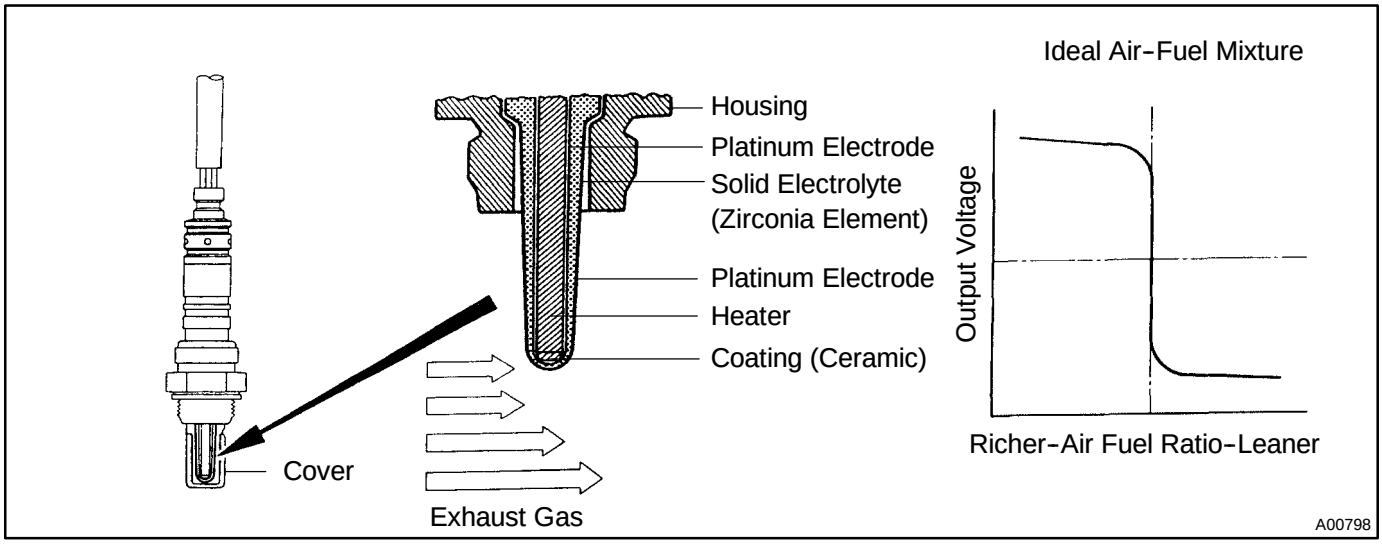
DTC	P0131	HEATED OXYGEN SENSOR CIRCUIT LOW VOLTAGE (BANK1 SENSOR1)

CIRCUIT DESCRIPTION

The front oxygen sensor is used to monitor oxygen concentration in the exhaust. For optimum catalytic converter operation, the air fuel mixture must be maintained near the ideal ”stoichiometric” ratio. The heated oxygen sensor’s output voltage changes suddenly at the stoichiometric ratio. The ECM adjusts the fuel injection time so that the air–fuel ratio is nearly stoichiometric.

When the air–fuel ratio becomes LEAN, oxygen concentration in the exhaust gas increases, and the heated oxygen sensor informs the ECM of the LEAN condition (low voltage, i.e. less than 0.45 V).

When the air–fuel ratio is RICHER, the oxygen will disappear from the exhaust gas. The heated oxygen sensor informs the ECM of the RICH condition (high voltage, i.e. more than 0.45 V).

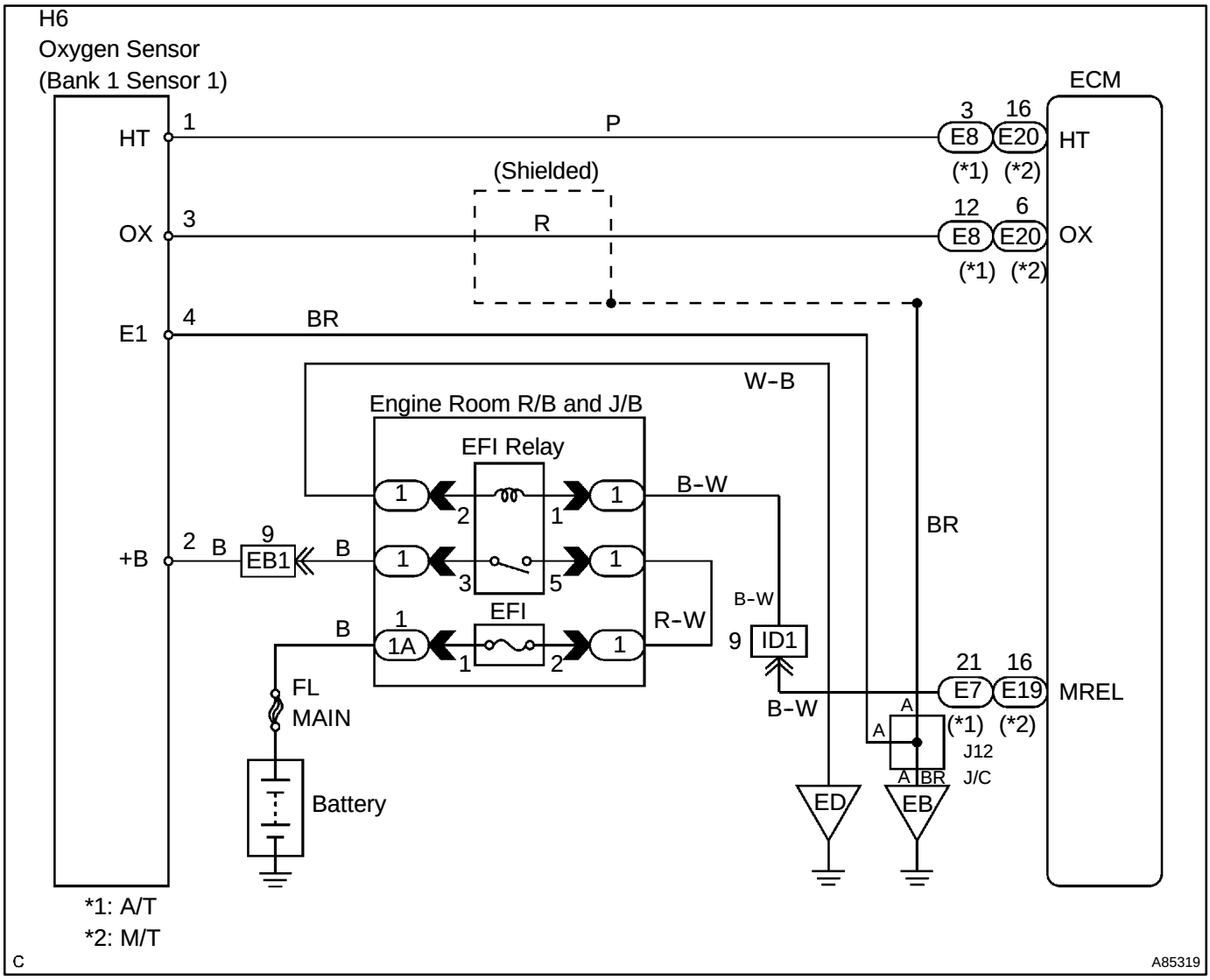


DTC No	DTC Detecting Condition	Trouble Area
P0130 P0131	Voltage output of oxygen sensor remains at 0.4 V or more, or 0.55 V or less, during idling after engine is warmed up (2 trip detection logic)	S Open or short in heated oxygen sensor circuit S Heated oxygen sensor S EFI relay S Air induction system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

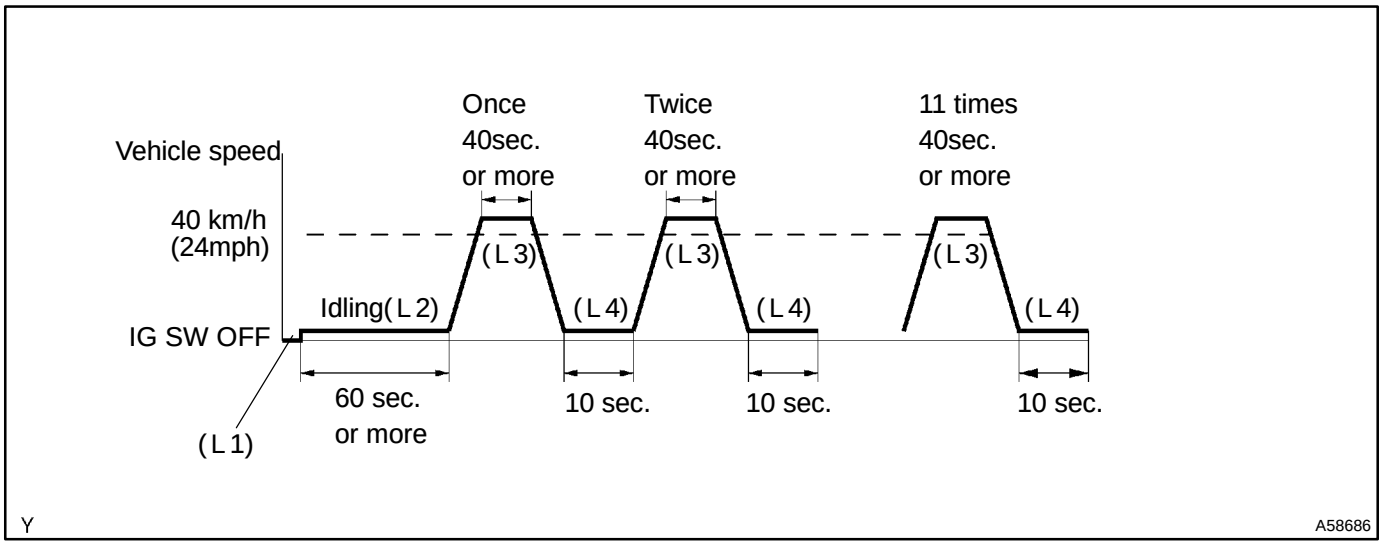
HINT:

The oxygen sensor’s output voltage and the short–term fuel trim value can be read using the hand–held tester.

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN



1. **Connect the hand-held tester to the DLC3. (L1)**
2. **Switch the hand-held tester from the normal mode to the check (test) mode (See page 05-12). (L1)**
3. **Start the engine and let idle for 60 seconds or more. (L2)**
4. **Drive the vehicle at 30 km/h (28 mph) or more for 40 seconds or more. (L3)**
5. **Let the engine idle for 10 seconds or more. (L4)**
6. **Preform steps (L3) and (L4) 9 times. (L5)**

HINT:
If a malfunction exists, the MIL will come on on the multi information display during step (L5).
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 (L2) to (L5), then perform steps from (L2) to (L5) again.

INSPECTION PROCEDURE

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

1 READ OUTPUT DTC(BESIDES P0130 OR P0131)

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(c) Select the item "DIAGNOSIS/OBD/MOBD/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the hand-held tester.
Result:

Display (DTC output)	Proceed to
Only "P0130 and/or P0131" are output	A
"P0130 and/or P0131" and other DTCs are output	B

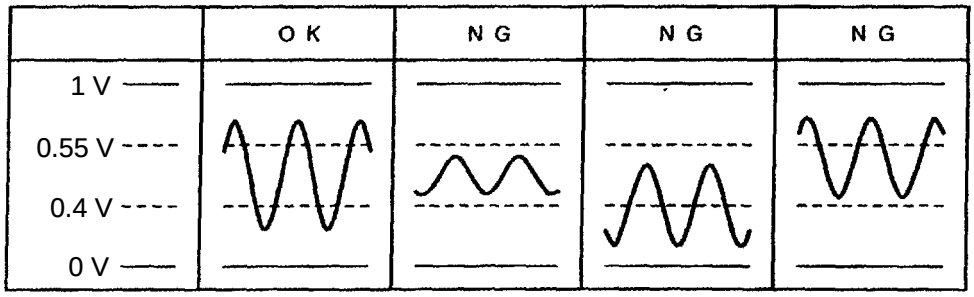
HINT:
If any other codes besides "P0130 and/or P0131" are output, perform the troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART (See page 05-23)**

A

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

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine and push the hand-held tester main switch on.
(c) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ALL/O2S B1S1".
(d) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
(e) Read the output voltage of the heated oxygen sensor during idling.
Heated oxygen sensor output voltage;
Alternates between less than 0.4 V and more than 0.55 V (See the following table).



A85277

OK → **Go to step 11**

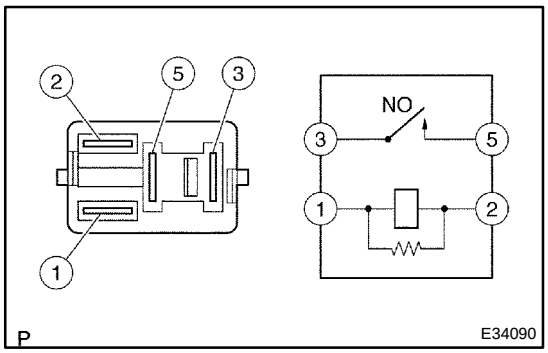
NG

3	INSPECT HEATED OXYGEN SENSOR(HEATER RESISTANCE)

NG → REPLACE HEATED OXYGEN SENSOR

OK

4	INSPECT EFI RELAY



(a) Remove the EFI relay from the engine room R/B.

(b) Inspect the EFI relay.

Standard:

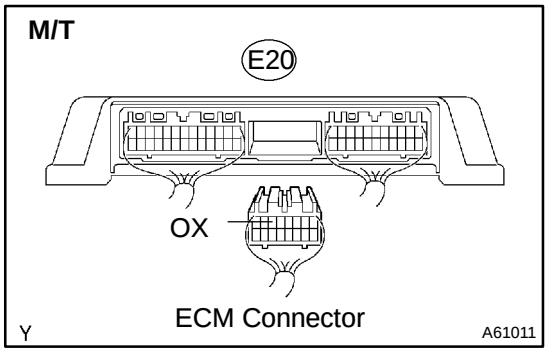
Tester Connection	Specified Condition
1 - 2	Below 1 Ω
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

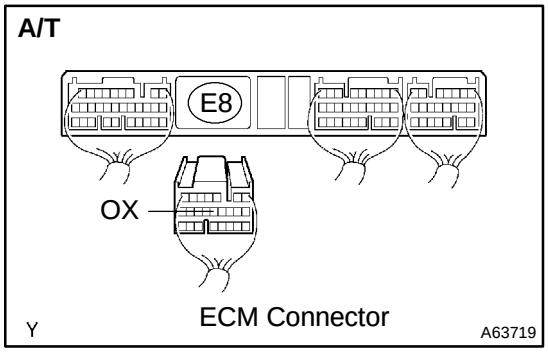
(c) Reinstall the EFI relay.

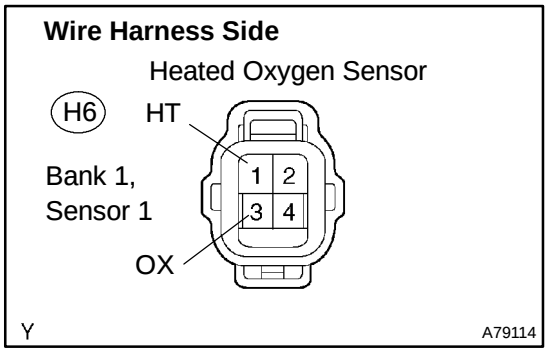
NG → REPLACE EFI RELAY

OK

5	CHECK HARNESS AND CONNECTOR(ECM-OXYGEN SENSOR)







(a) M/T models:
Disconnect the ECM E20 connector.

(b) A/T models:
Disconnect the ECM E8 connector.

(c) Disconnect the H6 oxygen sensor connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
OX (H6-3) - OX (E20-6)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
OX (H6-3) - OX (E20-6) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
OX (H6-3) - OX (E8-12)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
OX (H6-3) - OX (E8-12) - Body ground	10 kΩ or higher

(e) Reconnect the oxygen sensor connector.

(f) Reconnect the ECM connector.

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

OK

6	CHECK WHETHER MISFIRE IS OCCURRED OR NOT BY MONITORING DTC AND DATA LIST

NG → **CHECK FOR SPARK AND IGNITION**

OK

7	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in the air induction system.

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

OK

8	**CHECK FUEL PRESSURE (See Pub. No. RM821E, page 11-5)**

(a) Check the fuel pressure (high or low fuel pressure).

NG → **REPAIR OR REPLACE FUEL SYSTEM**

OK

9	**CHECK FUEL INJECTOR ASSY(INJECTION AND VOLUME) (See Pub. No. RM821E, page 11-7)**

NG → **REPLACE FUEL INJECTOR ASSY**

OK

10	**CHECK FOR EXHAUST GAS LEAKS**

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

HINT:
Refer to CONFIRMATION DRIVING PATTERN.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK

REPLACE HEATED OXYGEN SENSOR

11	**PERFORM CONFIRMATION DRIVING PATTERN**

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

HINT:
Refer to CONFIRMATION DRIVING PATTERN.

GO

12	**READ OUTPUT DTC(BESIDES P0130 OR P0131)**

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(c) Select the item "DIAGNOSIS / OBD/MOBD / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the hand-held tester.

Result:

Display (DTC output)	Proceed to
"P0130 and/or P0131" are output again	A
"P0130 and/or P0131" are not output again	B

B → CHECK AND REPLACE ECM (See page 01-29)

A

13	CONFIRM VEHICLE RAN 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 and P0131 are not output after the CONFIRMATION DRIVING PATTERN. This means that the ECM records DTC P0130 and P0131 because of the shortage of fuel in the past.

NO → CHECK FOR INTERMITTENT PROBLEMS

YES

DTC IS CAUSED SHORTAGE OF FUEL

DTC	P0135	OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION (BANK 1 SENSOR 1)

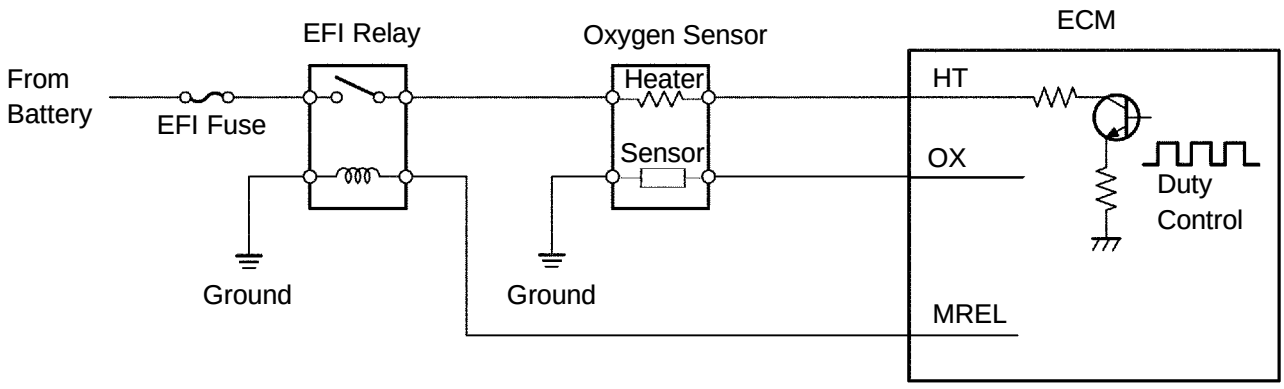
CIRCUIT DESCRIPTION

Refer to DTC P0130 on page 05-58.

HINT:

The ECM provides a pulse width modulated control circuit to adjust current through the heater. The oxygen sensor heater circuit uses a relay on the B+ side of the circuit.

Reference



DTC No	DTC Detecting Condition	Trouble Area
P0135	Open in heated oxygen sensor heater circuit	S Open or short in heater circuit of heated oxygen sensor S Heated oxygen sensor heater S EFI relay S ECM

WIRING DIAGRAM

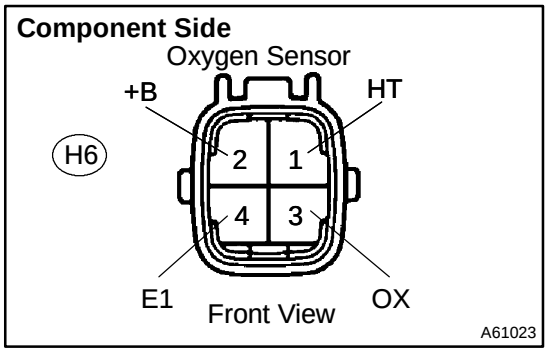
Refer to DTC P0130 on page 05-58.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester. 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 HEATED OXYGEN SENSOR(HEATER RESISTANCE)



(a) Disconnect the H6 oxygen sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

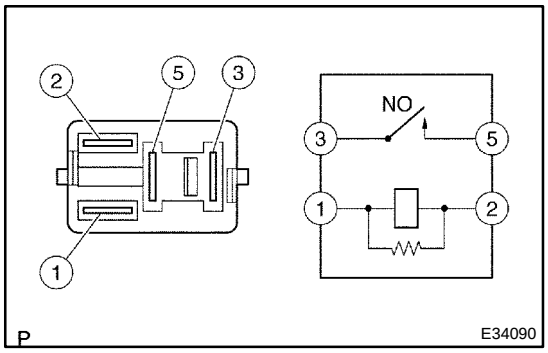
Standard:

Tester Connection	Specified Condition
HT (H6-1) - +B (H6-2)	5 to 9 Ω

OK → **REPLACE HEATED OXYGEN SENSOR**

OK

2 INSPECT EFI RELAY



(a) Remove the EFI relay from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
1 - 2	Below 1 Ω
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

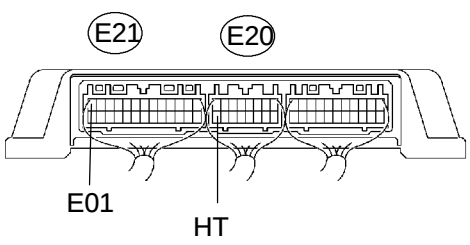
(c) Reinstall the EFI relay.

NG → **REPLACE EFI RELAY**

OK

3	INSPECT ECM(CHECK VOLTAGE)

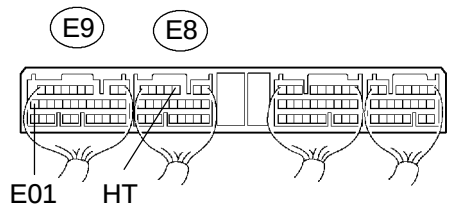
M/T



ECM Connector

Y A61009

A/T



ECM Connector

A63479

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

Standard (M/T):

Tester Connection	Specified Condition
HT (E20-16) - E01 (E21-13)	9 to 14V

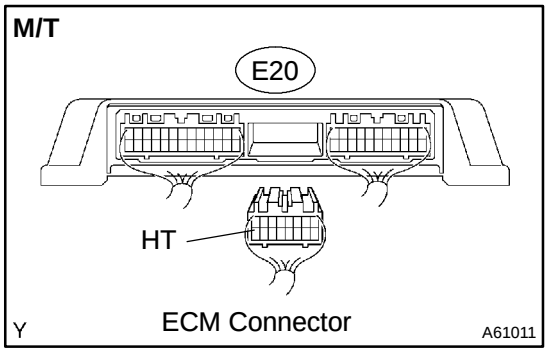
Standard (A/T):

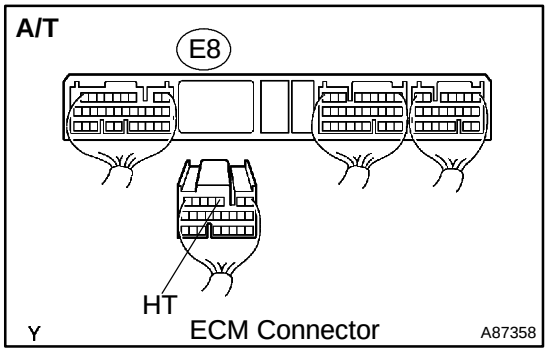
Tester Connection	Specified Condition
HT (E8-3) - E01 (E9-21)	9 to 14V

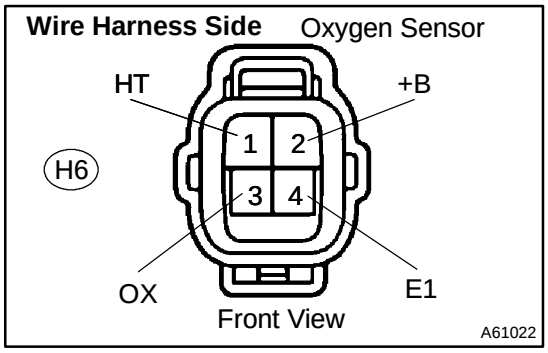
OK → **CHECK AND REPLACE ECM (See page 01-29)**

NG

4 CHECK HARNESS AND CONNECTOR(ECM-HEATED OXYGEN SENSOR)







(a) M/T models:
Disconnect the E20 ECM connector.

(b) A/T models:
Disconnect the E8 ECM connector.

(c) Disconnect the H6 oxygen sensor connector.

(d) Measure the resistance between the wire harness side connector.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
HT (H6-1) - HT (E20-16)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
HT (H6-1) or HT (E20-16) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
HT (H6-1) - HT (E8-3)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
HT (H6-1) or HT (E8-3) - Body ground	10 kΩ or higher

(e) Reconnect the ECM connector.

(f) Reconnect the oxygen sensor connector.

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

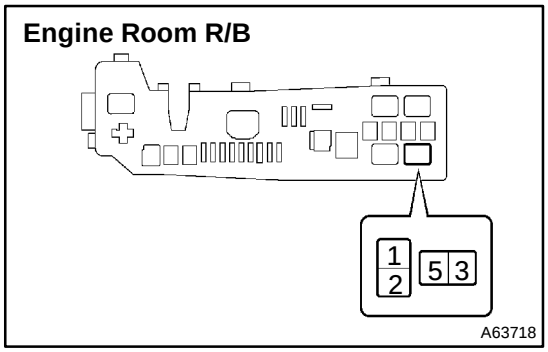
OK

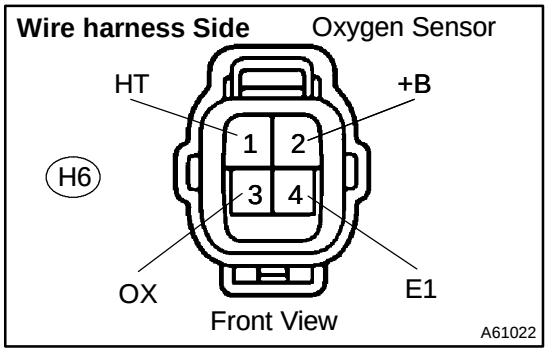
5 CHECK ECM POWER SOURCE CIRCUIT (See page 05-129)

NG → **REPAIR OR REPLACE ECM POWER SOURCE CIRCUIT**

OK

6	CHECK HARNESS AND CONNECTOR(EFI RELAY–HEATED OXYGEN SENSOR)





(a) Remove the EFI relay.
(b) Disconnect the oxygen sensor connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard (Check for open):

Tester Connection	Specified Condition
EFI relay (5) – +B (H6–2)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
EFI relay (5) – +B (H6–2) – Body ground	10 kΩ or higher

(d) Reconnect the oxygen sensor connector.
(e) Reinstall the EFI relay.

NOTICE:

Do not forcefully insert the tester leads in procedure (c), or the holder may be damaged.

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

OK

CHECK AND REPLACE ECM (See page 01–29)

DTC	P0325	KNOCK SENSOR 1 CIRCUIT MALFUNCTION (BANK 1)

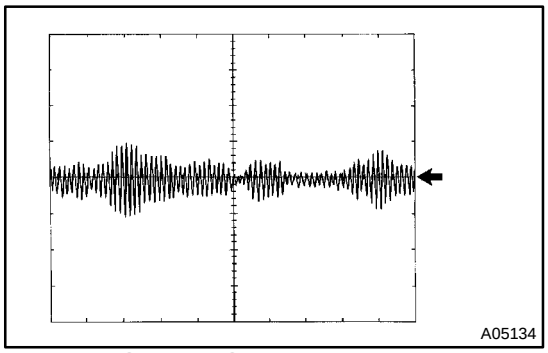
CIRCUIT DESCRIPTION

The knock sensor is fitted to the cylinder block to detect 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 engine knocking occurs, ignition timing is delayed in order to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No knock sensor signal to ECM with engine speed 1,280 rpm or more	• Open or short in knock sensor circuit • Knock sensor (looseness) • ECM

HINT:

If the ECM detects DTC "P0325", it enters fail-safe mode in which the corrective retarded angle value is set to the maximum value.



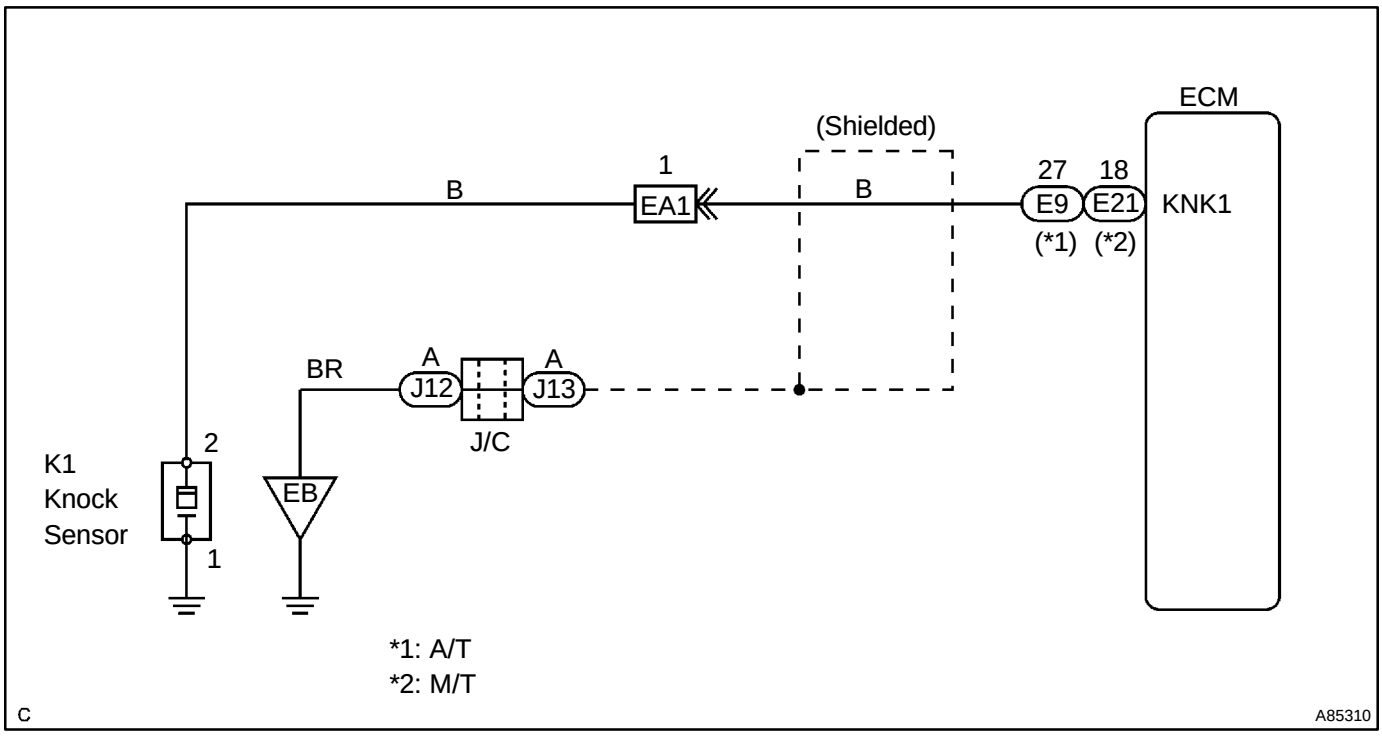
Reference: Inspection using the oscilloscope.

HINT:

The correct waveform is as shown on the left.

Item	Details
Terminal	KNK1 - E1
Equipment Settings	0.01 to 10 V/Division, 0.01 to 10 msec./Division
Condition	After warming up the engine, keep the engine speed at 4,000 rpm.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

1	CHECK HARNESS AND CONNECTOR

(a) Disconnect the K1 knock sensor connector.
(b) Check for short between the knock sensor connector and body ground.
Resistance: 1 MΩ or more
(c) Reconnect the knock sensor connector.

OK	Go to step 3

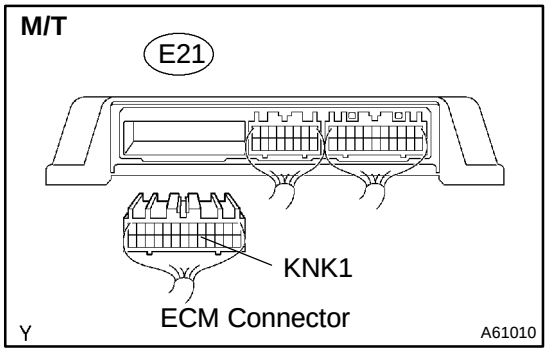
NG

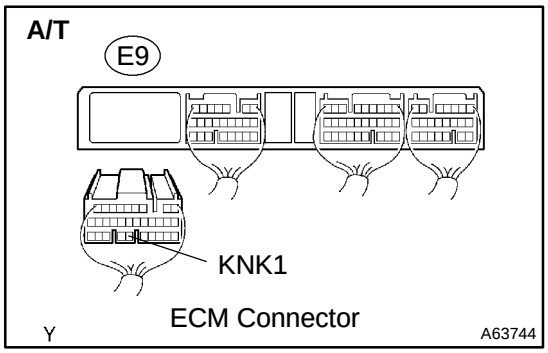
2	INSPECT KNOCK CONTROL SENSOR (See Pub. No. RM821E, page 10-3)

NG	REPLACE KNOCK CONTROL SENSOR

OK

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





(a) Disconnect the K1 knock sensor connector.
(b) M/T models:
Disconnect the E21 ECM connector.
(c) A/T models:
Disconnect the E9 ECM connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
Knock sensor (K1-1) - KNK1 (E21-18)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
Knock sensor (K1-1) or KNK1 (E21-18) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
Knock sensor (K1-1) - KNK1 (E9-27)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
Knock sensor (K1-1) or KNK1 (E9-27) - Body ground	10 kΩ or higher

(e) Reconnect the knock sensor connector.
(f) Reconnect the ECM connector.

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

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

(a) Replace the knock sensor with a new one.
  (1) Remove the knock sensor.
  (2) Install a new knock sensor.
  Torque: 44 N·m (450 kgf·cm, 32.6 ft·lbf)
(b) Perform the driving test.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(e) Select the item "DIAGNOSIS/OBD/MOBD/DTC INFO/CURRENT CODES".
(f) Read the DTC using the hand-held tester.
  Result:

Display (DTC output)	Proceed to
"P0325" is output	A
"P0325" is not output	B

B → REPLACE KNOCK CONTROL SENSOR

A

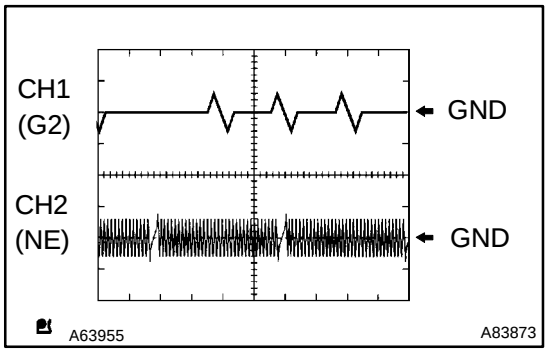
CHECK AND REPLACE ECM (See page 01-29)

DTC	P0335	CRANKSHAFT POSITION SENSOR "A" CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

The crank position sensor (NE signal) consists of a magnet, iron core and pickup coil.
The NE signal plate (crankshaft position sensor plate) has 34 teeth and is installed on the crankshaft. The NE signal sensor generates 34 signals for each engine revolution. This sensor monitors a plate (timing rotor) located on the crankshaft timing pulley and is used by the ECM to detect crankshaft angle and engine speed (RPM/NE). As the crankshaft timing pulley rotates through an engine revolution, this sensor communicates the rotation of the NE signal plate as a pulse signal to the ECM. Based on this signal, the ECM controls fuel injection time and ignition timing.

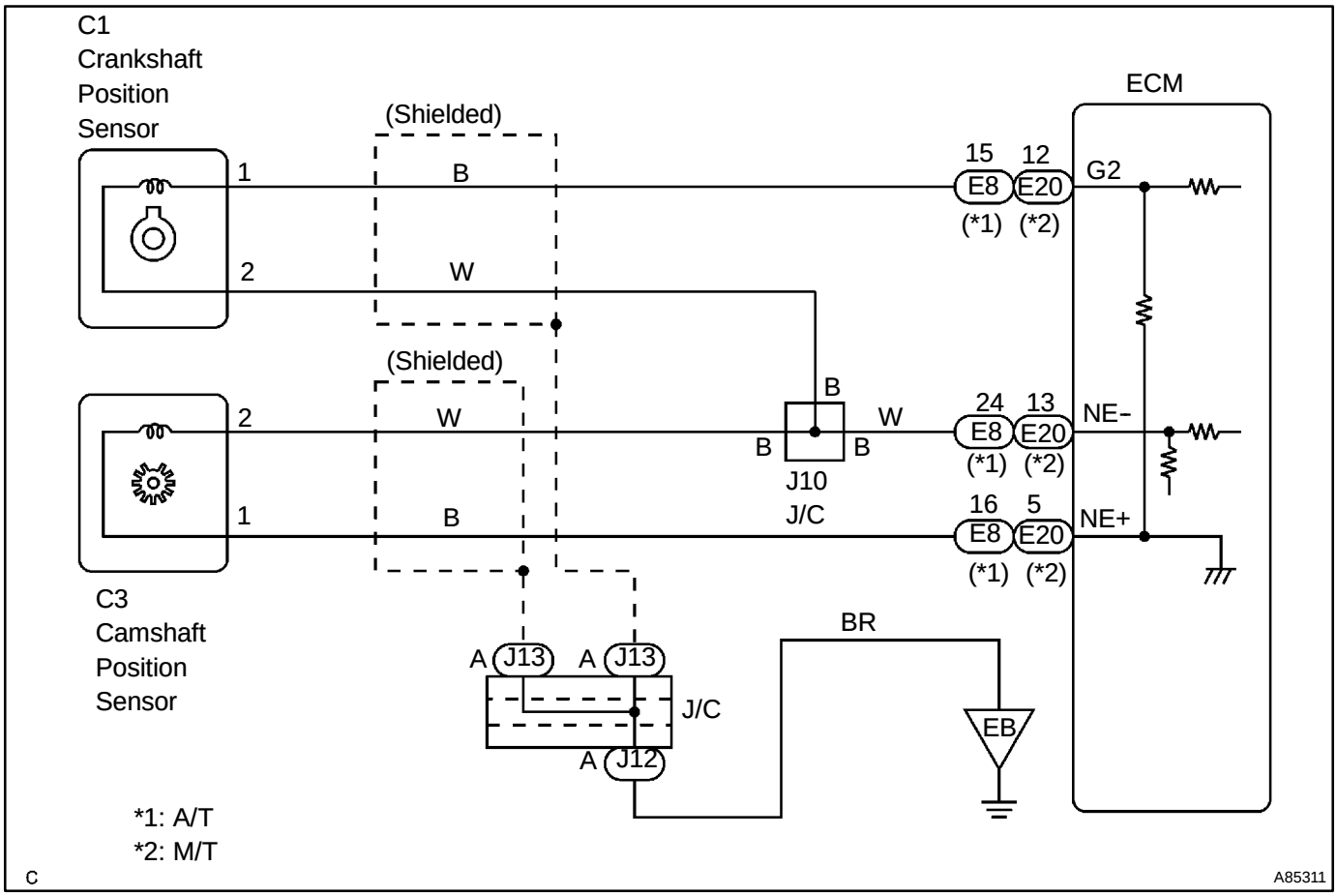
DTC No.	DTC Detection Condition	Trouble Area
P0335	No crank position sensor signal to ECM during cranking (2 trip detection logic)	S Open or short in crankshaft position sensor circuit S Crankshaft position sensor S Signal plate (crankshaft) S ECM
	No crank position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	



Reference: Inspection using the oscilloscope.
HINT:
The correct waveform is as shown on the left.

Item	Contents
Terminal	CH1: G2 - NE- CH2: NE - NE-
Equipment Setting	5V/Division, 20ms/Division
Condition	During cranking or idling

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- Perform troubleshooting for DTC P0335 first. If no trouble is found, troubleshoot the engine mechanical systems.
- Read freeze frame data using the hand-held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- READ VALUE ON HAND-HELD TESTER
  (a) Connect the hand-held tester to the DLC3.
  (b) Start the engine and push the hand-held tester main switch on.
  (c) Select the item "DIAGNOSIS/OBD/MOBD/DATA LIST/ALL/ENGINE SPD".

Engine speed can be observed in the DATA LIST using the hand-held tester. If there is no NE signals from the crankshaft position sensor, even when the engine is running, the engine speed will be indicated as zero. If voltage output from the crankshaft position sensor is insufficient, the engine speed will be indicated as lower RPM (than the actual RPM).

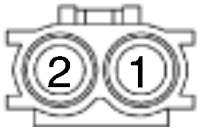
HINT:

- Read freed frame data using the hand-held tester. 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 for DTC P0335 first. If no trouble is found, troubleshoot the following mechanical system.

1	INSPECT CRANKSHAFT POSITION SENSOR(CHECK RESISTANCE)

Component Side

C3 Crankshaft Position Sensor



Front View

A78431

(a) Disconnect the C3 crankshaft position sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance:

Tester Connection	Specified Condition
1 - 2	1,630 to 2,740 Ω at cold
1 - 2	2,065 to 3,225 Ω at hot

NOTICE:

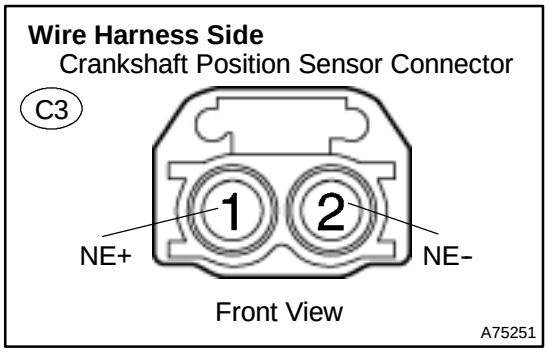
"Cold" and "Hot" shown above mean the temperature of the coils themselves. "Cold" is from -10_C (14_F) to 50_C (122_F) and "Hot" is from 50_C (122_F) to 100_C (212_F).

(c) Reconnect the crankshaft position sensor connector.

NG → **REPLACE CRANKSHAFT POSITION SENSOR**

OK

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



(a) Disconnect the C3 crankshaft position sensor connector.
(b) M/T models:
Disconnect the ECM E20 connector.
(c) A/T models:
Disconnect the ECM E8 connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
NE+ (C3-1) - NE+ (E20-5)	Below 1 Ω
NE- (C3-2) - NE- (E20-13)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
NE+ (C3-1) or NE (E20-5) - Body ground	10 kΩ or higher
NE- (C3-2) or NE- (E20-13) - Body ground	10 kΩ or higher

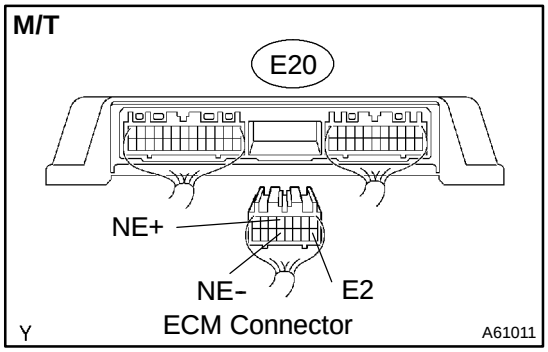
Standard (Check for open) (A/T):

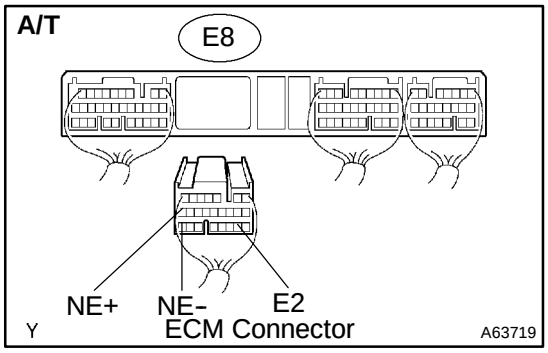
Tester Connection	Specified Condition
NE+ (C3-1) - NE+ (E8-16)	Below 1 Ω
NE- (C3-2) - NE- (E8-24)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
NE+ (C3-1) or NE+ (E8-16) - Body ground	10 kΩ or higher
NE- (C3-2) or NE- (E8-24) - Body ground	10 kΩ or higher

(e) Reconnect the crankshaft position sensor connector.
(f) Reconnect the ECM connector.





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

OK

3 INSPECT SENSOR ATTACHMENT PART

(a) Check the crankshaft position sensor installation .

NG → **REPAIR OR REPLACE SENSOR ATTACHMENT PART**

OK

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

(a) Check the teeth of the signal plate.

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

OK

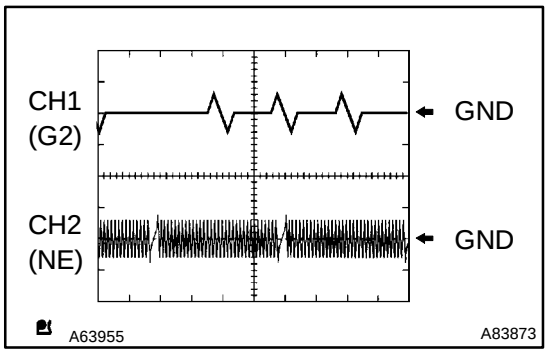
CHECK AND REPLACE ECM (See page 01-29)

DTC	P0340	CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

The camshaft position sensor (G2 signal) consists of a magnet, iron core and pickup coil.
The G2 signal plate has 3 teeth on its outer circumference and is installed on the camshaft timing pulley. When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil change, causing fluctuations in the magnetic field and generating voltage in the pickup coil.
The NE signal plate (crankshaft timing pulley) has 34 teeth and is installed to 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 signals, and the cylinder and the angle of the VVT based on the combination of the G2 and NE signals.

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



Reference: Inspection using the oscilloscope.
HINT:
The correct waveform is as shown on the left.

Item	Contents
Terminal	CH1: G2 - NE- CH2: NE - NE-
Equipment Setting	5 V/Division, 20 ms/Division
Condition	During cranking or idling

WIRING DIAGRAM

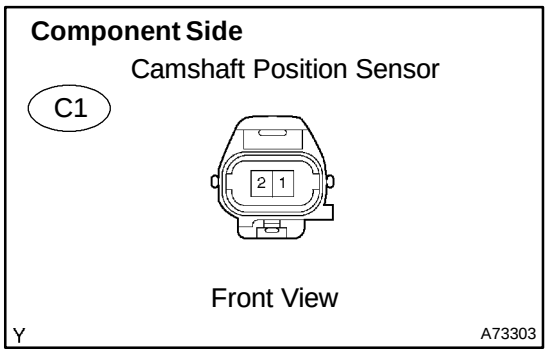
Refer to DTC P0335 on page 05-74.

INSPECTION PROCEDURE

HINT:

Read freed frame data using the hand-held tester. 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 CAMSHAFT POSITION SENSOR(CHECK RESISTANCE)



(a) Disconnect the C1 camshaft position sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance:

Tester Connection	Specified Condition
1 - 2	1,630 to 2,740 Ω at cold
1 - 2	2,065 to 3,225 Ω at hot

NOTICE:

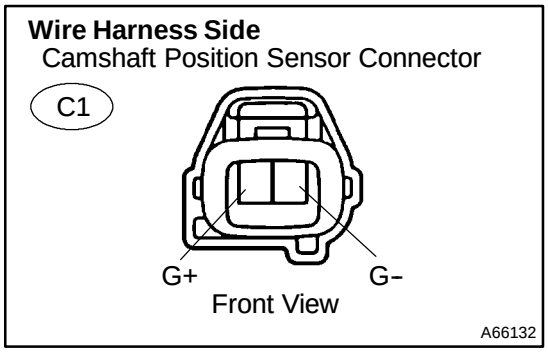
"Cold" and "Hot" shown above mean the temperature of the coils themselves. "Cold" is from -10_C (14_F) to 50_C (122_F) and "Hot" is from 50_C (122_F) to 100_C (212_F).

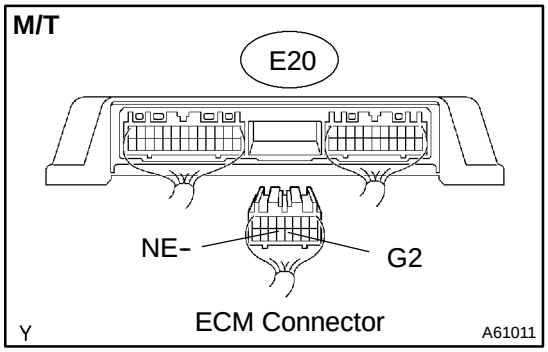
(c) Reconnect the camshaft position sensor connector.

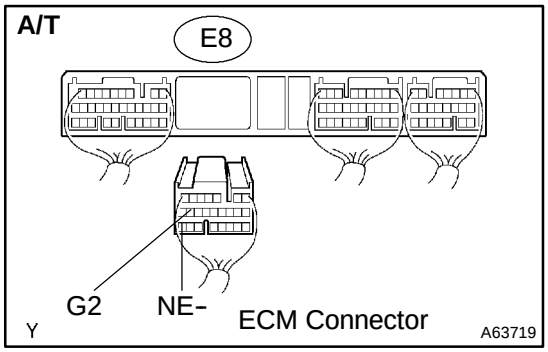
NG → **REPLACE CAMSHAFT POSITION SENSOR**

OK

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







(a) Disconnect the camshaft position sensor connector.
(b) M/T models:
Disconnect the ECM E20 connector.
(c) A/T models:
Disconnect the ECM E8 connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
G+ (C1-1) - G2 (E20-12)	Below 1 Ω
G- (C1-2) - NE- (E20-13)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
G+ (C1-1) or G2 (E20-12) - Body ground	10 kΩ or higher
G- (C1-2) or NE- (E20-13) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
G+ (C1-1) - G2 (E8-15)	Below 1 Ω
G- (C1-2) - NE- (E8-24)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
G+ (C1-1) or G2 (E8-15) - Body ground	10 kΩ or higher
G- (C1-2) or NE- (E8-24) - Body ground	10 kΩ or higher

(e) Reconnect the camshaft position sensor connector.
(f) Reconnect the ECM connector.

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

OK

3 INSPECT SENSOR INSTALLATION

(a) Check the camshaft position sensor installation.

NG → **TIGHTEN SENSOR**

OK

4 INSPECT CAMSHAFT

NG → **REPAIR OR REPLACE CAMSHAFT**

OK

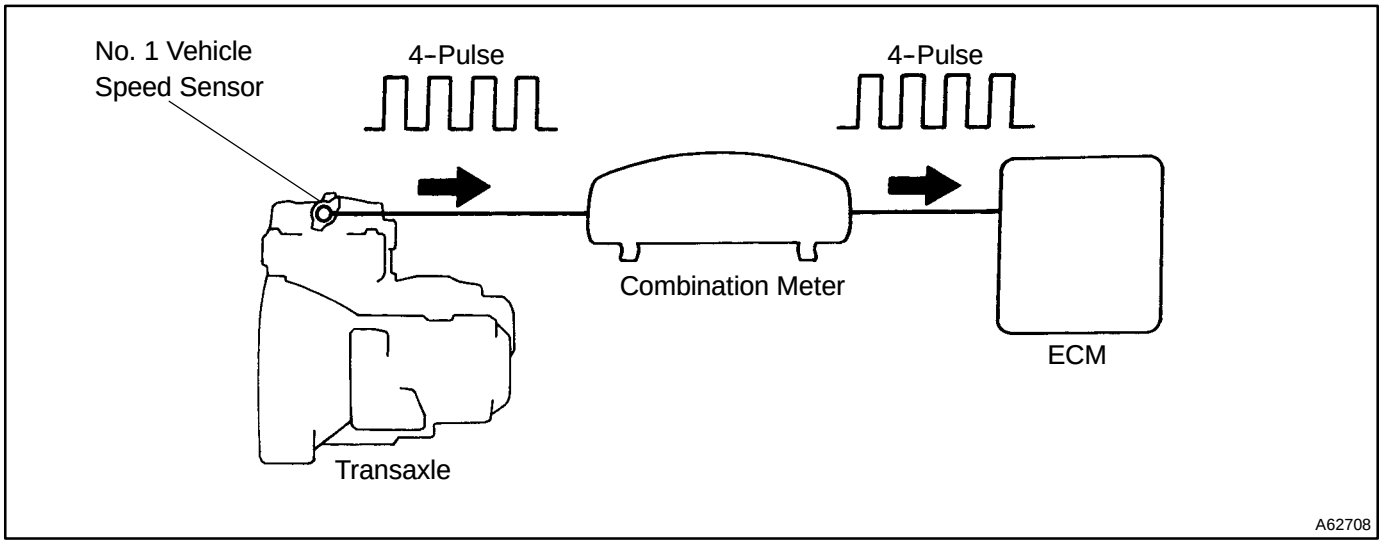
CHECK AND REPLACE ECM (See page 01-29)

DTC	P0500	VEHICLE SPEED SENSOR MALFUNCTION

CIRCUIT DESCRIPTION

Without ABS:

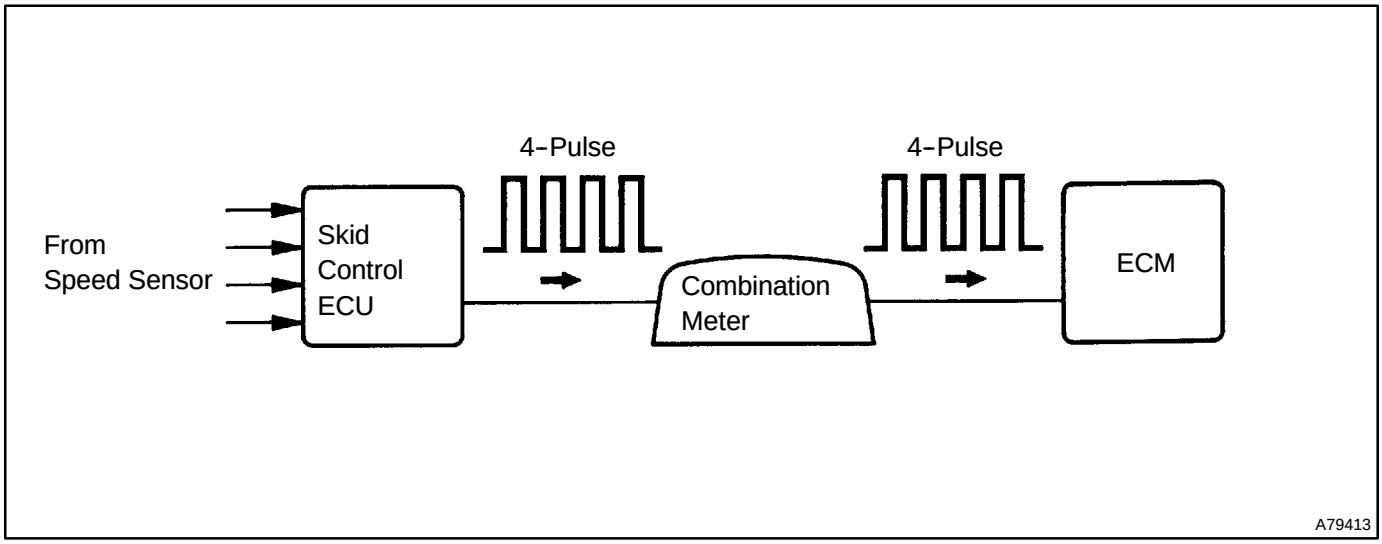
The vehicle speed sensor outputs a 4-pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is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



With ABS:

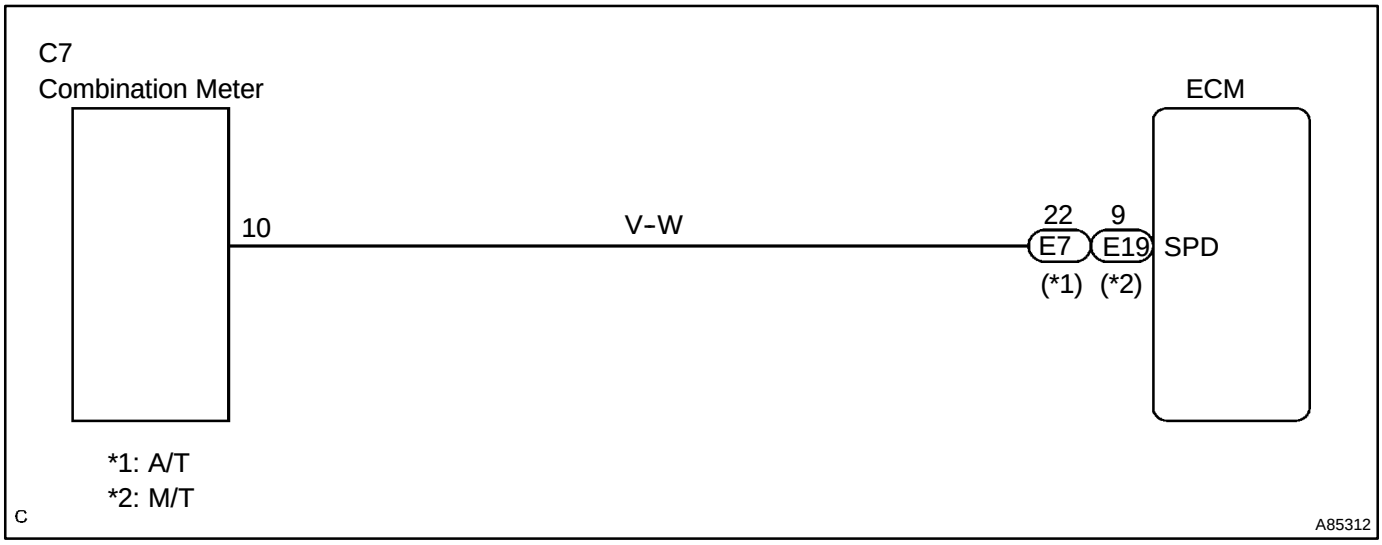
The speed sensor for the skid control ECU detects wheel speed and sends the appropriate signals to the skid control ECU.

The skid control ECU converts these signals into a 4-pulse signal and outputs it to the combination meter. 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 vehicle speed based on the frequency of these pulse signals.



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

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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

When using hand-held tester:

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:

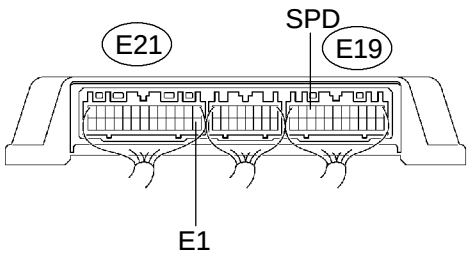
The vehicle speed sensor is operating normally if the speedometer display is normal.

NG → CHECK SPEEDOMETER CIRCUIT

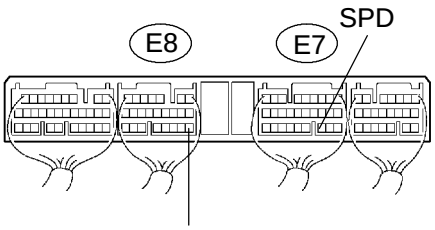
OK

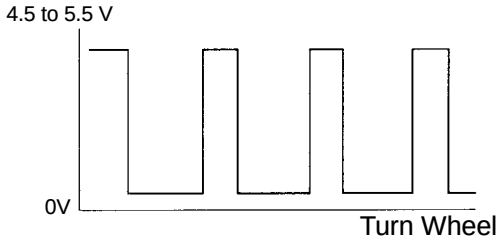
2	INSPECT ECM(CHECK VOLTAGE)

M/T



A/T





(a) Move the shift lever to the neutral position.
(b) Jack up the vehicle.
(c) Turn the ignition switch to the ON position.
(d) M/T models:
Measure the voltage between the specified terminals of the E19 and E21 ECM connectors as the wheel is turned slowly.

Standard (M/T):

Tester Connection	Specified Condition
SPD (E19-9) - E1 (E21-14)	Generate intermittently

(e) A/T models:
Measure the voltage between the specified terminals of the E7 and E8 ECM connectors as the wheel is turned slowly.

Standard (A/T):

Tester Connection	Specified Condition
SPD (E7-22) - E1 (E8-17)	Generate intermittently

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

OK

CHECK AND REPLACE ECM (See page 01-29)

When not using hand-held tester:

1	CHECK OPERATION OF SPEEDOMETER(SPEEDMETER OPERATION)

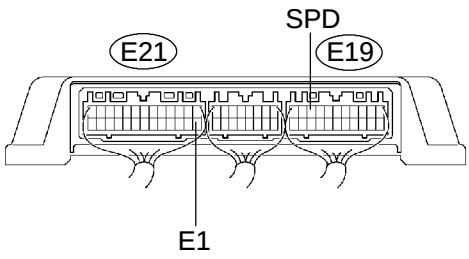
(a) Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed sensor is operating normally if the speedometer display is normal.

NG → **CHECK SPEEDOMETER CIRCUIT**

OK

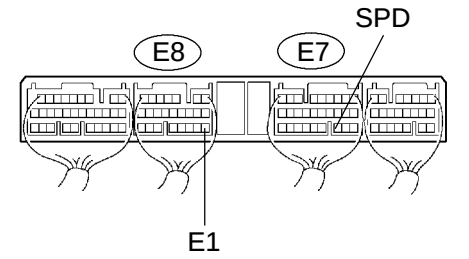
2	INSPECT ECM

M/T



(a) Check for continuity between terminals SPD and E1 of the ECM connector.
Resistance: No continuity

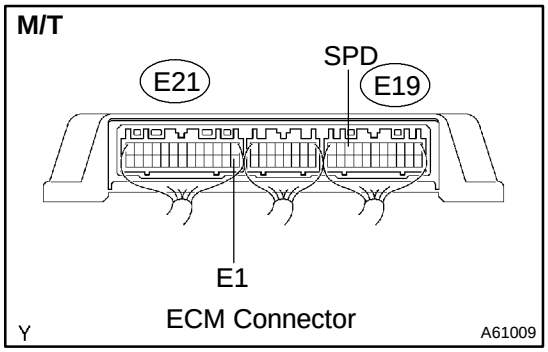
A/T



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

OK

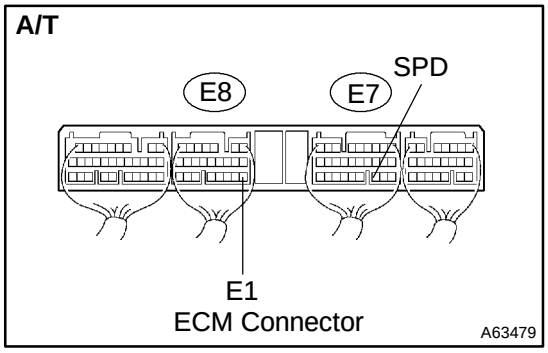
3 INSPECT ECM(CHECK VOLTAGE)



(a) Move the shift lever to the neutral position.
(b) Jack up the vehicle.
(c) Turn the ignition switch to the ON position.
(d) M/T models:
Measure the voltage between the specified terminals of the E19 and E21 ECM connectors as the wheel is turned slowly.

Standard (M/T):

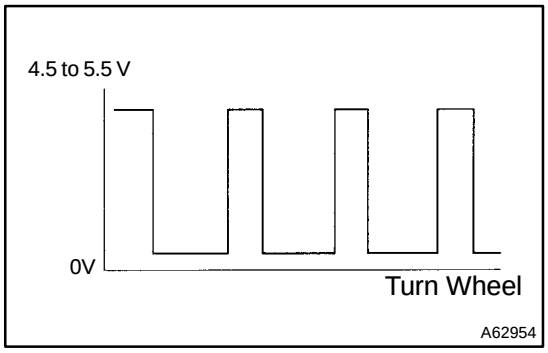
Tester Connection	Specified Condition
SPD (E19-9) - E1 (E21-14)	Generate intermittently



(e) A/T models:
Measure the voltage between the specified terminals of the E7 and E8 ECM connectors as the wheel is turned slowly.

Standard (A/T):

Tester Connection	Specified Condition
SPD (E7-22) - E1 (E8-17)	Generate intermittently



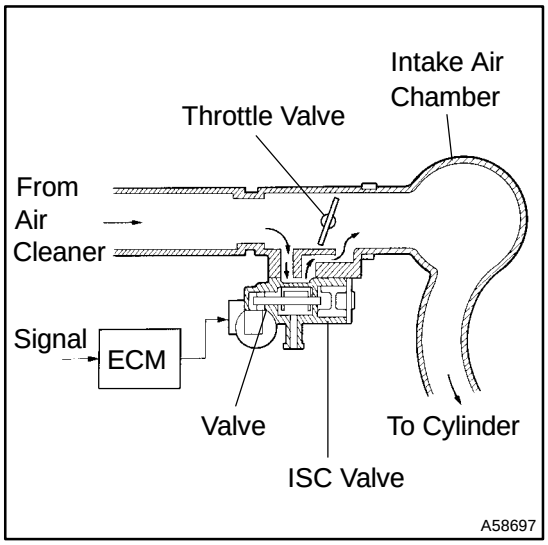
NG → **CHECK AND REPLACE ECM (See page 01-29)**

OK →

REPAIR OR REPLACE HARNESS OR CONNECTOR

DTC P0505 IDLE CONTROL SYSTEM MALFUNCTION

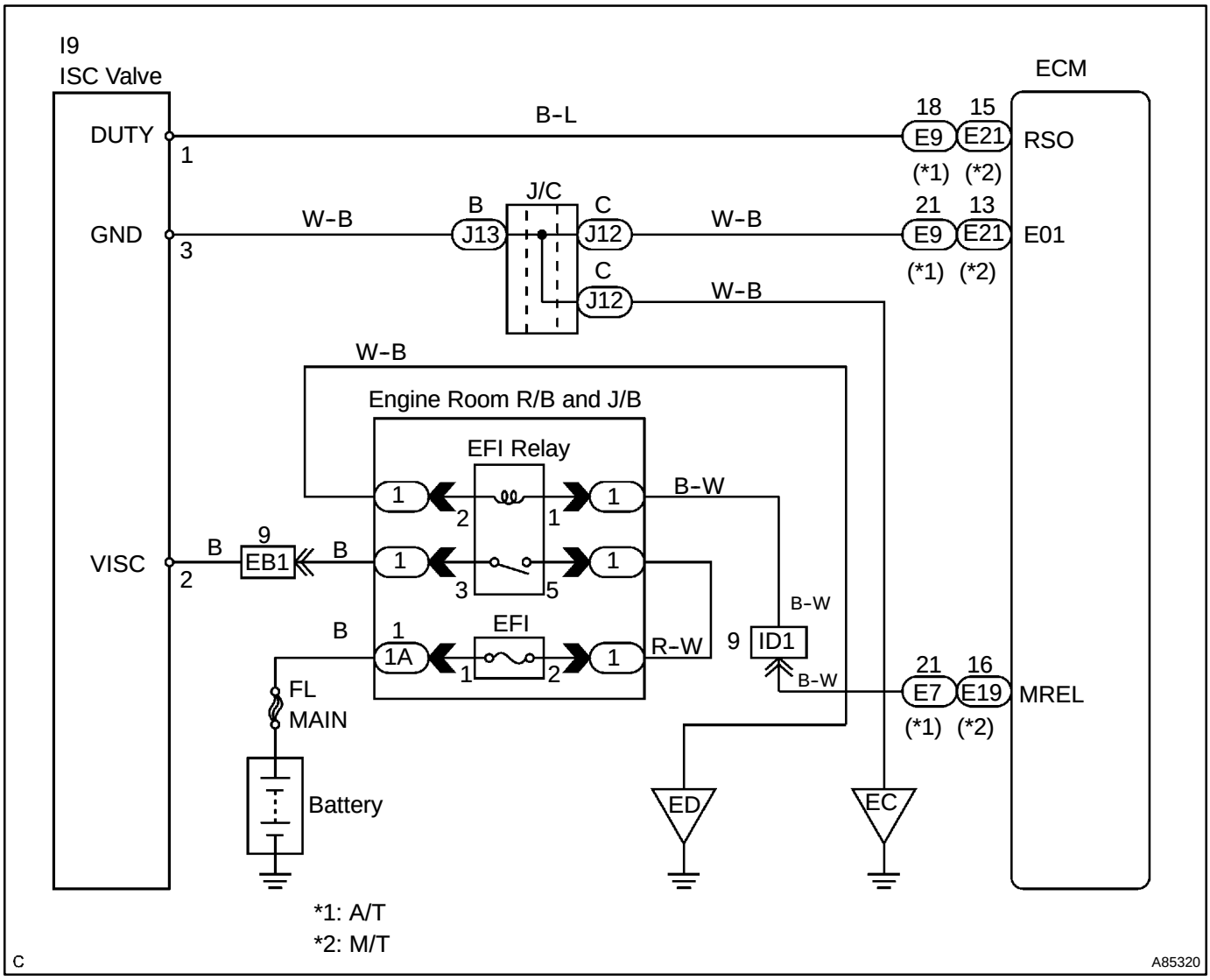
CIRCUIT DESCRIPTION



The rotary solenoid type idle speed control (ISC) valve is located under the throttle body. Intake air bypassing the throttle valve is directed to the idle speed control (ISC) valve through the passage.
In this way, the intake air volume bypassing the throttle valve is regulated to control engine speed.
The ECM operates the idle speed control (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 very be apart greatly from target speed	S Open or short in ISC valve circuit S ISC valve is stuck or closed S PCV valve and hose S A/C switch circuit S Air induction system S ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

When using hand-held tester

1	CHECK OTHER DTCS OUTPUT

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(c) Select the item "DIAGNOSIS / OBD/MOBD / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only "P0505" is output	A
"P0505" and other DTCs are output	B

HINT:
If any other codes besides "P0505" are output, perform the troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART (See page 05-23)**

A

2	PERFORM ACTIVE TEST USING HAND-HELD TESTER(CHECK OPERATION OF THE ISC VALVE)

(a) Connect the hand-held tester to the DLC3.
(b) Warm up the engine to the normal operating temperature.
(c) Switch off all the accessories.
(d) Switch off the A/C.
(e) Move the shift the lever to the neutral position.
(f) Select the item "DIAGNOSIS/OBD/MOBD/ACTIVE TEST/ISC DUTY RATIO".
(g) Check that the engine RPM varies when changing the ISC duty ratio.

Engine RPM:
Engine RPM fluctuates up and down in response to the ISC duty ratio variation.

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)**

NG

3	CHECK CONNECTION OF PCV HOSE

NG → **REPAIR OR REPLACE PCV HOSE**

OK

4	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in the air induction system.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

5	CHECK A/C SIGNAL CIRCUIT

NG → REPAIR OR REPLACE A/C SIGNAL CIRCUIT

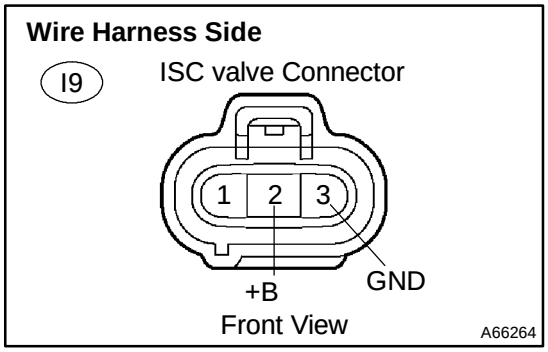
OK

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

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

OK

7	CHECK HARNESS AND CONNECTOR



(a) Disconnect the I9 ISC valve connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

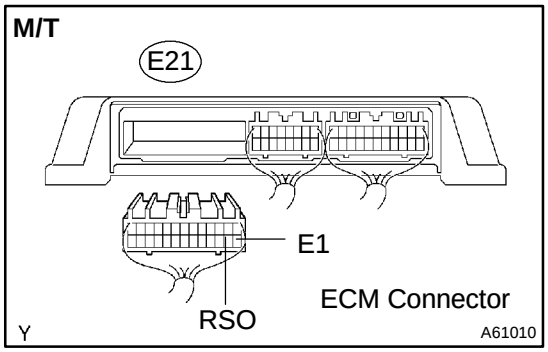
Tester Connection	Specified Condition
+B (I9-2) - GND (I9-3)	9 to 14 V

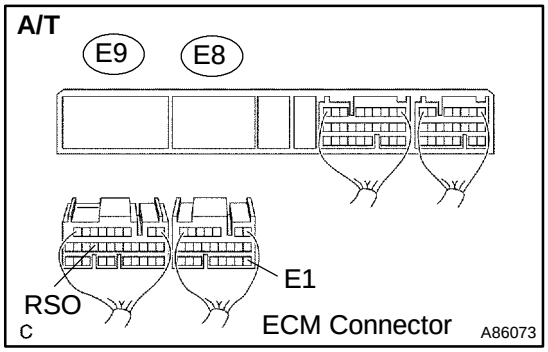
(d) Reconnect the ISC valve connector.

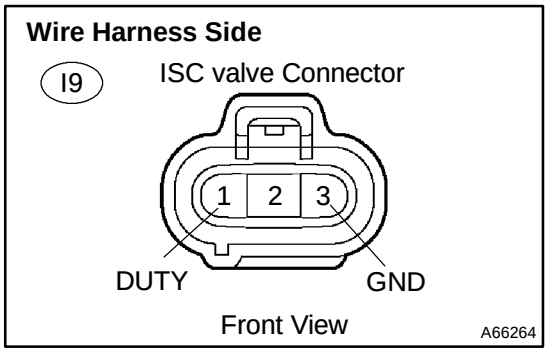
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

8	CHECK HARNESS AND CONNECTOR(ISC VALVE-ECM)







(a) M/T models:
Disconnect the E21 ECM connector.

(b) A/T models:
Disconnect the E9 ECM connector.

(c) Disconnect the I9 ISC valve connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
DUTY (I9-1) - RSD (E21-15)	Below 1 Ω
GND (I9-3) - E1 (E21-14)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
DUTY (I9-1) or RSD (E21-15) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
DUTY (I9-1) - RSD (E9-18)	Below 1 Ω
GND (I9-3) - E1 (E8-17)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
DUTY (I9-1) or RSD (E9-18) - Body ground	10 kΩ or higher

(e) Reconnect the ISC valve connector.

(f) Reconnect the ECM connector.

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

OK

9	INSPECT THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY (See Pub. No. RM821E, page 10-1)

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

OK

CHECK AND REPLACE ECM (See page 01-29)

When not using hand-held tester

1	CHECK CONNECTION OF PCV HOSE

NG → REPAIR OR REPLACE PCV HOSE

OK

2	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in the air induction system.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

3	CHECK A/C SIGNAL CIRCUIT

NG → REPAIR OR REPLACE A/C SIGNAL CIRCUIT

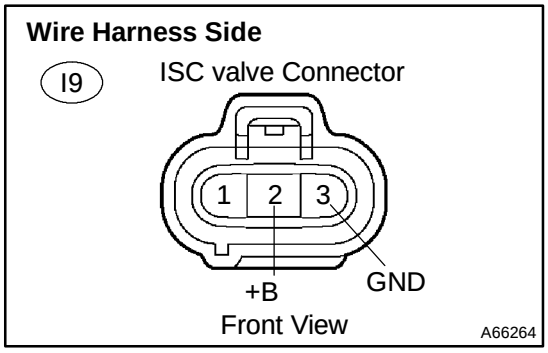
OK

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

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

OK

5	CHECK HARNESS AND CONNECTOR



(a) Disconnect the I9 ISC valve connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

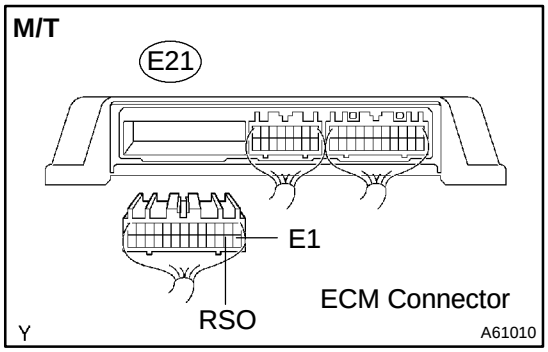
Tester Connection	Specified Condition
+B (I9-2) - GND (I9-3)	9 to 14 V

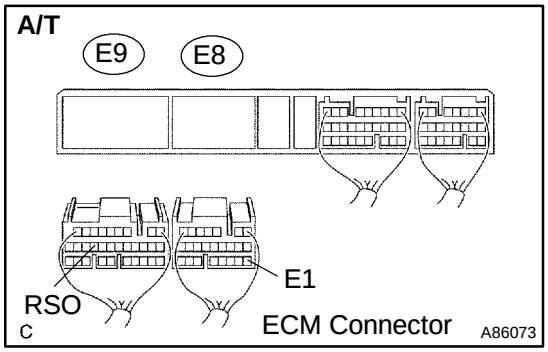
(d) Reconnect the ISC valve connector.

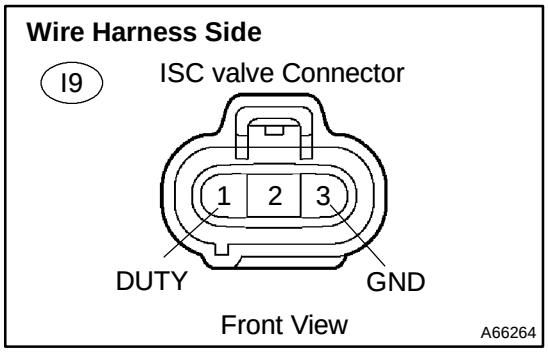
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6	CHECK HARNESS AND CONNECTOR(ISC VALVA-ECM)







(a) M/T models:
Disconnect the E21 ECM connector.

(b) A/T models:
Disconnect the E9 ECM connector.

(c) Disconnect the I9 ISC valve connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
DUTY (I9-1) - RSD (E21-15)	Below 1 Ω
GND (I9-3) - E1 (E21-14)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
DUTY (I9-1) or RSD (E21-15) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
DUTY (I9-1) - RSD (E9-18)	Below 1 Ω
GND (I9-3) - E1 (E8-17)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
DUTY (I9-1) or RSD (E9-18) - Body ground	10 kΩ or higher

(e) Reconnect the ISC valve connector.

(f) Reconnect the ECM connector.

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

OK

7	INSPECT THROTTLE BODY IDLE SPEED CONTROL VALVE ASSY (See Pub. No. RM821E, page 10-1)

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

OK

CHECK AND REPLACE ECM (See page 01-29)

DTC	P1300	IGNITER CIRCUIT MALFUNCTION (NO.1)

DTC	P1305	IGNITER CIRCUIT MALFUNCTION (NO.2)

DTC	P1310	IGNITER CIRCUIT MALFUNCTION (NO.3)

DTC	P1315	IGNITER CIRCUIT MALFUNCTION (NO.4)

CIRCUIT DESCRIPTION

HINT:

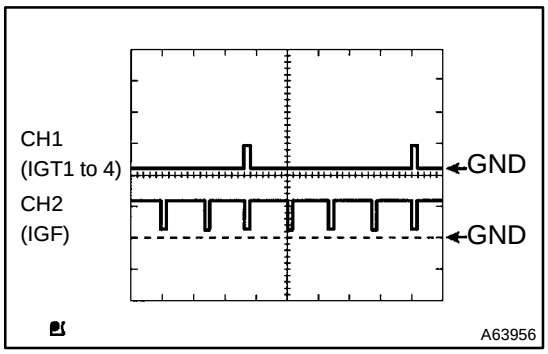
- These DTCs indicate malfunction related to the primary circuit.
- If DTC P1300 is displayed, check No.1 ignition coil with igniter circuit.
- If DTC P1305 is displayed, check No.2 ignition coil with igniter circuit.
- If DTC P1310 is displayed, check No.3 ignition coil with igniter circuit.
- If DTC P1315 is displayed, check No.4 ignition coil with igniter circuit.

A Direct Ignition System (DIS) is used on this vehicle. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the 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 one 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 from the center electrode to the ground electrode.

The ECM determines ignition timing and outputs the ignition signals (IGT) for each cylinder. Using the ignition (IGT) signal, the ECM turns on and off the power transistor inside the igniter and this switches on and off current to the primary coil. When current flow to the primary coil is cut off, high-voltage is generated in the secondary coil and this voltage is applied to the spark plugs to spark inside the cylinders.

As the ECM cuts current to the primary coil, the igniter sends back the ignition confirmation (IGF) signal for each cylinder ignition to the ECM.

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



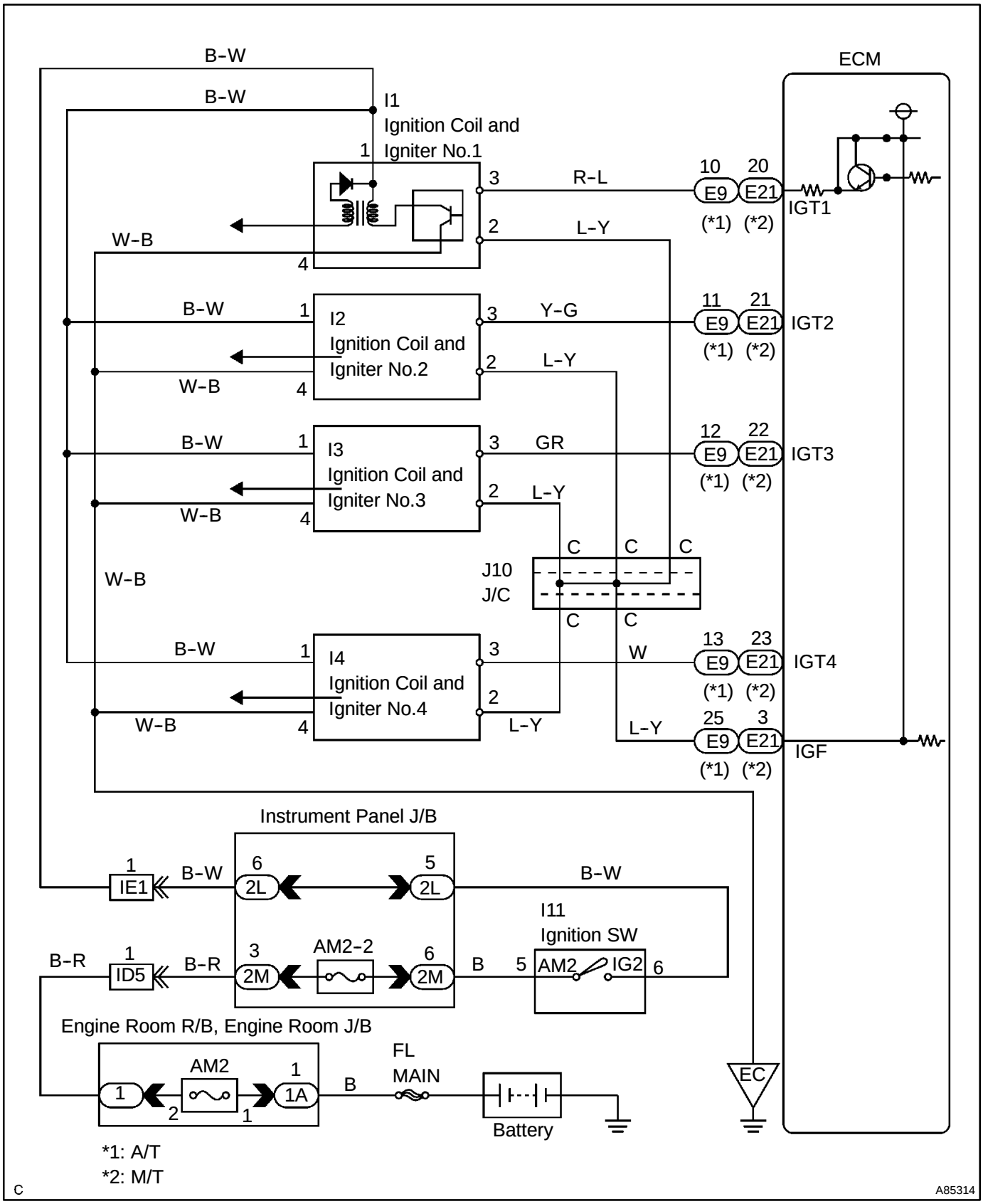
Reference: Inspection using the oscilloscope.

HINT:

The correct waveform is as shown on the left.

Item	Contents
Terminal	CH1: IGT1, IGT2, IGT3, IGT4 - E1 CH2: IGF - E1
Equipment Setting	2 V/ Division, 20 ms/ Division
Condition	While the engine is cranking or idling

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

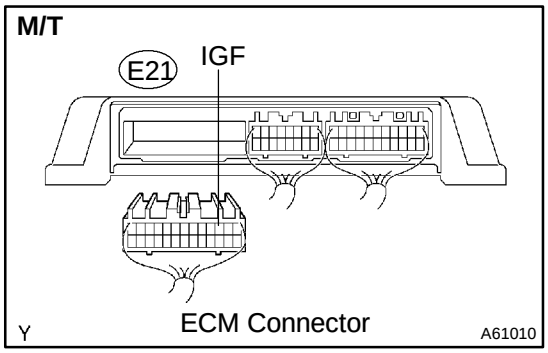
Read freeze frame data using the hand-held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc.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

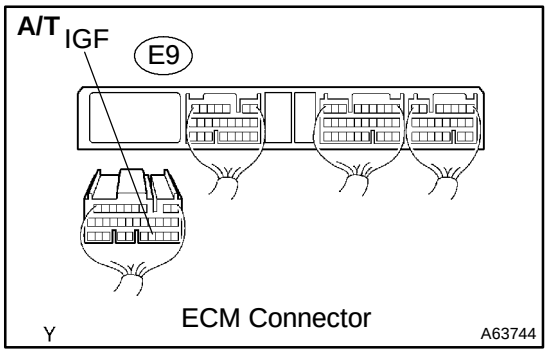
1	CHECK SPARK PLUG AND SPARK (See Pub. No. RM821E, page 18-3)

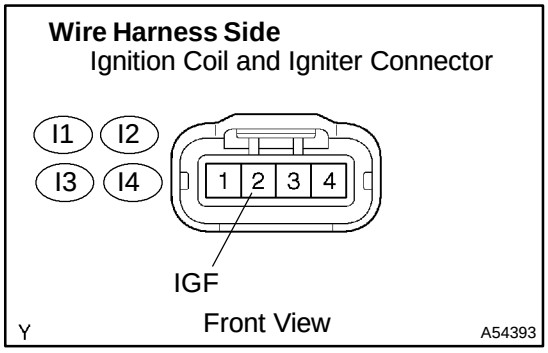
NG → Go to step 4

OK

2	CHECK HARNESS AND CONNECTOR(ECM-IGNITION COIL)







(a) Disconnect the I1, I2, I3 or I4 ignition coil connector.

(b) M/T models:
Disconnect the ECM E21 connector.

(c) A/T models:
Disconnect the ECM E9 connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
IGF (I1-2) - IGF (E21-3)	Below 1 Ω
IGF (I2-2) - IGF (E21-3)	Below 1 Ω
IGF (I3-2) - IGF (E21-3)	Below 1 Ω
IGF (I4-2) - IGF (E21-3)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
IGF (I1-2) or IGF (E21-3) - Body ground	10 kΩ or higher
IGF (I2-2) or IGF (E21-3) - Body ground	10 kΩ or higher
IGF (I3-2) or IGF (E21-3) - Body ground	10 kΩ or higher
IGF (I4-2) or IGF (E21-3) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
IGF (I1-2) - IGF (E9-25)	Below 1 Ω
IGF (I2-2) - IGF (E9-25)	Below 1 Ω
IGF (I3-2) - IGF (E9-25)	Below 1 Ω
IGF (I4-2) - IGF (E9-25)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
IGF (I1-2) or IGF (E9-25) - Body ground	10 kΩ or higher
IGF (I2-2) or IGF (E9-25) - Body ground	10 kΩ or higher
IGF (I3-2) or IGF (E9-25) - Body ground	10 kΩ or higher
IGF (I4-2) or IGF (E9-25) - Body ground	10 kΩ or higher

(e) Reconnect the ignition coil connector.

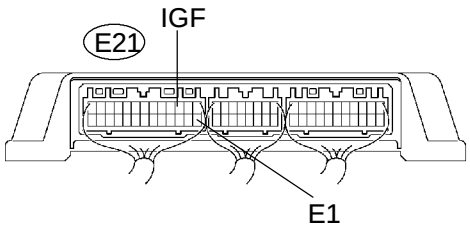
(f) Reconnect the ECM connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	INSPECT ECM(CHECK VOLTAGE)

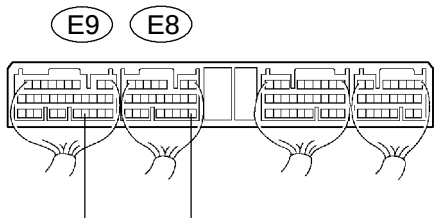
M/T



ECM Connector

Y A61009

A/T



ECM Connector

A63479

(a) Disconnect the ignition coil connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard (M/T):

Tester Connection	Specified Condition
IGF (E21-3) - E1 (E21-14)	4.5 to 5.5 V

Standard (A/T):

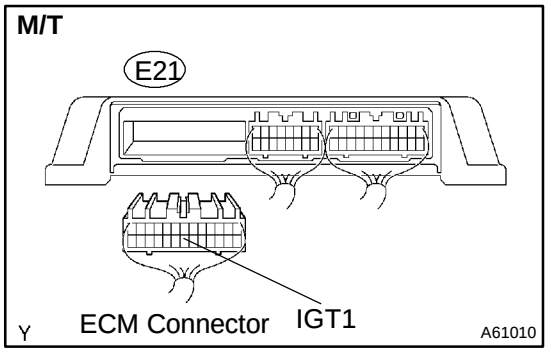
Tester Connection	Specified Condition
IGF (E9-25) - E1 (E8-17)	4.5 to 5.5 V

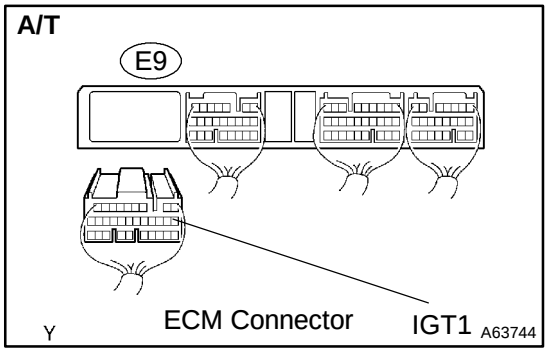
OK → REPLACE IGNITION COIL ASSY

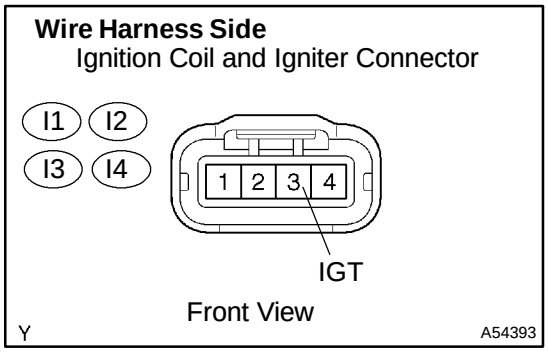
NG

CHECK AND REPLACE ECM (See page 01-29)

4 CHECK HARNESS AND CONNECTOR(ECM-IGNITION COIL)







(a) Disconnect the I1, I2, I3 or I4 ignition coil connector.
(b) M/T models:
Disconnect the ECM E21 connector.
(c) A/T models:
Disconnect the ECM E9 connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
IGT (I1-3) - IGT1 (E21-20)	Below 1 Ω
IGT (I2-3) - IGT2 (E21-21)	Below 1 Ω
IGT (I3-3) - IGT3 (E21-22)	Below 1 Ω
IGT (I4-3) - IGT4 (E21-23)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
IGT (I1-3) or IGT1 (E21-20) - Body ground	10 kΩ or higher
IGT (I2-3) or IGT2 (E21-21) - Body ground	10 kΩ or higher
IGT (I3-3) or IGT3 (E21-22) - Body ground	10 kΩ or higher
IGT (I4-3) or IGT4 (E21-23) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
IGT (I1-3) - IGT1 (E9-10)	Below 1 Ω
IGT (I2-3) - IGT2 (E9-11)	Below 1 Ω
IGT (I3-3) - IGT3 (E9-12)	Below 1 Ω
IGT (I4-3) - IGT4 (E9-13)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
IGT (I1-3) or IGT1 (E9-10) - Body ground	10 kΩ or higher
IGT (I2-3) or IGT2 (E9-11) - Body ground	10 kΩ or higher
IGT (I3-3) or IGT3 (E9-12) - Body ground	10 kΩ or higher
IGT (I4-3) or IGT4 (E9-13) - Body ground	10 kΩ or higher

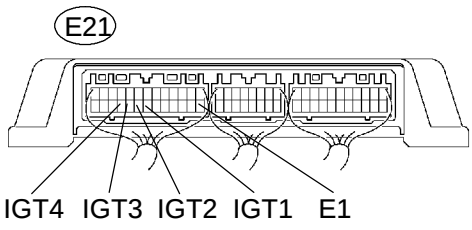
(e) Reconnect the ignition coil connector.
(f) Reconnect the ECM connector.

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

OK

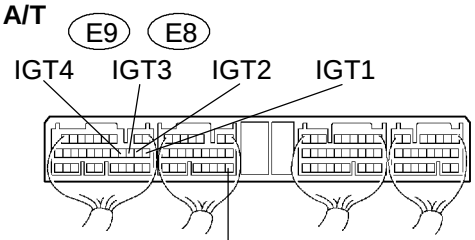
5 INSPECT ECM(CHECK VOLTAGE)

M/T



Y ECM Connector A61009

A/T



ECM Connector A63479

(a) Measure the voltage according to the value(s) in the table below when the engine is cranked.

Standard (M/T):

Tester Connection	Specified Condition
IGT1 (E21-20) - E1 (E21-14)	Between 0.1 V to 4.5 V
IGT2 (E21-21) - E1 (E21-14)	Between 0.1 V to 4.5 V
IGT3 (E21-22) - E1 (E21-14)	Between 0.1 V to 4.5 V
IGT4 (E21-23) - E1 (E21-14)	Between 0.1 V to 4.5 V

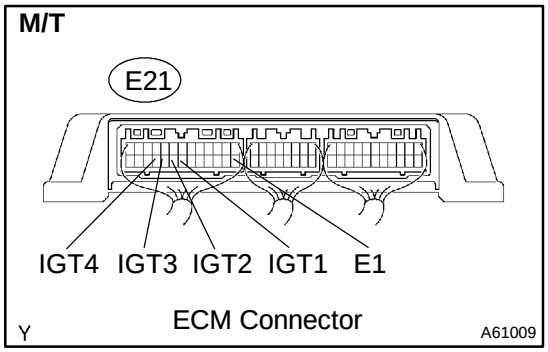
Standard (A/T):

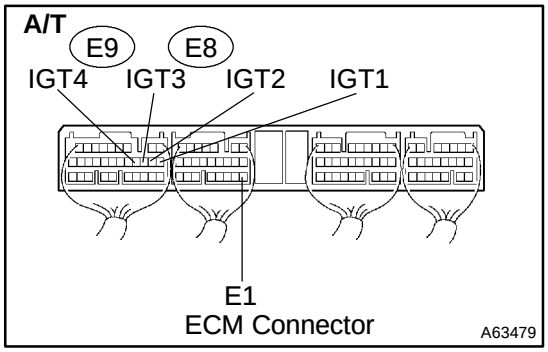
Tester Connection	Specified Condition
IGT1 (E9-10) - E1 (E8-17)	Between 0.1 V to 4.5 V
IGT2 (E9-11) - E1 (E8-17)	Between 0.1 V to 4.5 V
IGT3 (E9-12) - E1 (E8-17)	Between 0.1 V to 4.5 V
IGT4 (E9-13) - E1 (E8-17)	Between 0.1 V to 4.5 V

NG → **CHECK AND REPLACE ECM (See page 01-29)**

OK →

6 INSPECT ECM(CHECK VOLTAGE)





(a) Disconnect either the I1, I2, I3 or I4 ignition coil connector.

(b) Measure the voltage according to the value(s) in the table below when the engine is cranked.

Standard (M/T):

Tester Connection	Specified Condition
IGT1 (E21-20) - E1 (E21-14)	Between 0.1 V to 4.5 V
IGT2 (E21-21) - E1 (E21-14)	Between 0.1 V to 4.5 V
IGT3 (E21-22) - E1 (E21-14)	Between 0.1 V to 4.5 V
IGT4 (E21-23) - E1 (E21-14)	Between 0.1 V to 4.5 V

Standard (A/T):

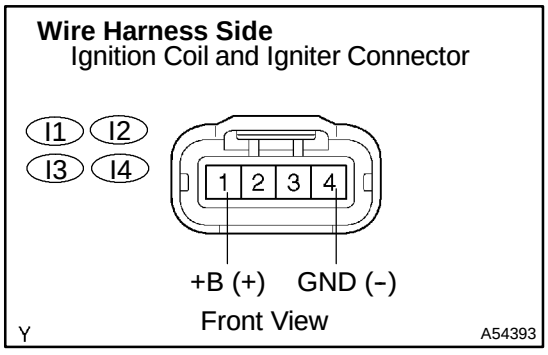
Tester Connection	Specified Condition
IGT1 (E9-10) - E1 (E8-17)	Between 0.1 V to 4.5 V
IGT2 (E9-11) - E1 (E8-17)	Between 0.1 V to 4.5 V
IGT3 (E9-12) - E1 (E8-17)	Between 0.1 V to 4.5 V
IGT4 (E9-13) - E1 (E8-17)	Between 0.1 V to 4.5 V

(c) Reconnect the ignition coil connector.

NG → **CHECK AND REPLACE ECM (See page 01-29)**

OK

7 CHECK IGNITION COIL ASSY(POWER SOURCE)



(a) Disconnect either the I1, I2, I3 or I4 ignition coil connector.

(b) Turn the ignition switch to the ON position.

(c) Measure the voltage between the wire harness side connectors.

Standard:

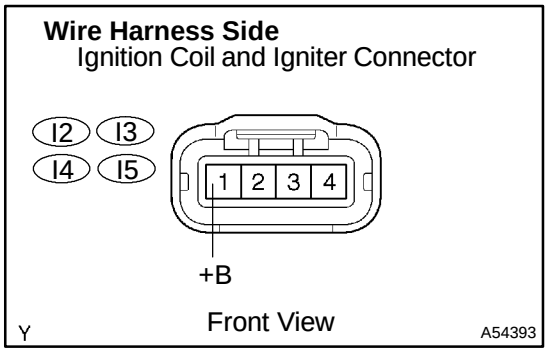
Tester Connection	Specified Condition
+B (I1-1) - GND (I1-4)	9 to 14 V
+B (I2-1) - GND (I2-4)	9 to 14 V
+B (I3-1) - GND (I3-4)	9 to 14 V
+B (I4-1) - GND (I4-4)	9 to 14 V

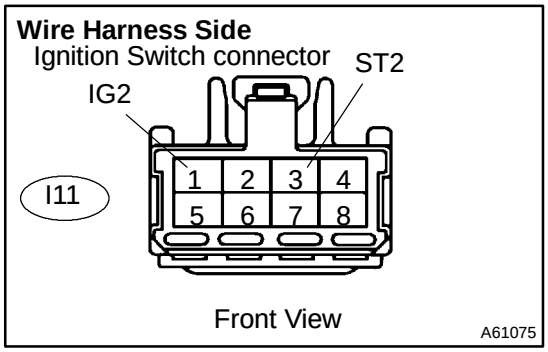
(d) Reconnect the ignition coil connector.

OK → **REPAIR OR REPLACE POWER SOURCE**

NG

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





(a) Disconnect either the I1, I2, I3 or I4 ignition coil with igniter connector.
(b) Disconnect the I11 ignition switch connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard (Check for open)

Tester Connection	Specified Condition
+B (I1-1) - IG2 (I11-1)	Below 1 Ω
+B (I2-1) - IG2 (I11-1)	Below 1 Ω
+B (I3-1) - IG2 (I11-1)	Below 1 Ω
+B (I4-1) - IG2 (I11-1)	Below 1 Ω

Standard (Check for short)

Tester Connection	Specified Condition
+B (I1-1) or IG2 (I11-1) - Body ground	10 kΩ or higher
+B (I2-1) or IG2 (I11-1) - Body ground	10 kΩ or higher
+B (I3-1) or IG2 (I11-1) - Body ground	10 kΩ or higher
+B (I4-1) or IG2 (I11-1) - Body ground	10 kΩ or higher

(d) Reconnect the ignition coil connector.
(e) Reconnect the ignition switch connector.

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

OK

REPLACE IGNITION COIL ASSY

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

CIRCUIT DESCRIPTION

Refer to DTC P0335 on page 05–74.

DTC No.	DTC Detecting Condition	Trouble Area
P1335	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	S Open or short in crank position sensor circuit S Crankshaft position sensor S Crank angle sensor plate S ECM

WIRING DIAGRAM

Refer to DTC P0335 on page 05–74.

INSPECTION PROCEDURE

Refer to DTC P0335 on page 05–74.

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

CIRCUIT DESCRIPTION

Refer to DTC P0335 on page 05-74.

DTC No.	Detection Item	Trouble Area
P1346	Deviation in crank position sensor No.1 signal and VVT sensor signal (2 trip detection logic)	S Mechanical system malfunction (Timing chain jumping teeth, stretched chain) S ECM

WIRING DIAGRAM

Refer to DTC P0335 on page 05-74.

INSPECTION PROCEDURE

HINT:

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

1	**CHECK VALVE TIMING(CHECK FOR LOOSE AND JUMPING TEETH OF TIMING CHAIN) (See Pub. No. RM821E, page 14-90)**

NG → **ADJUST VALVE TIMING**

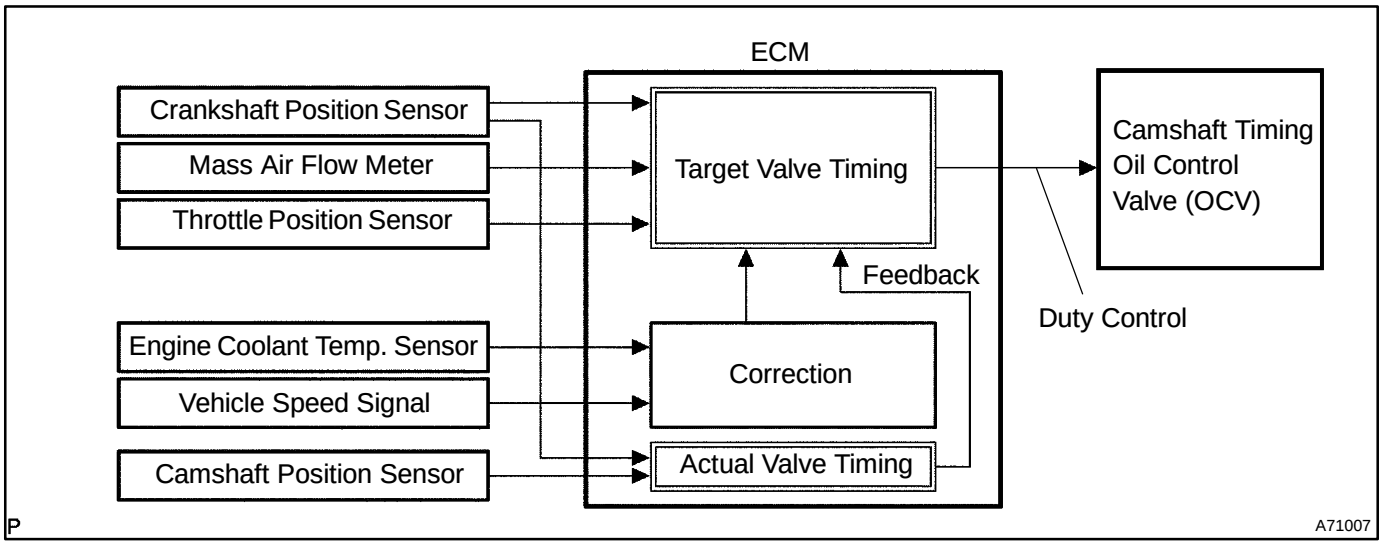
OK

CHECK AND REPLACE ECM (See page 01-29)

DTC	P1349	VVT SYSTEM MALFUNCTION (BANK 1)

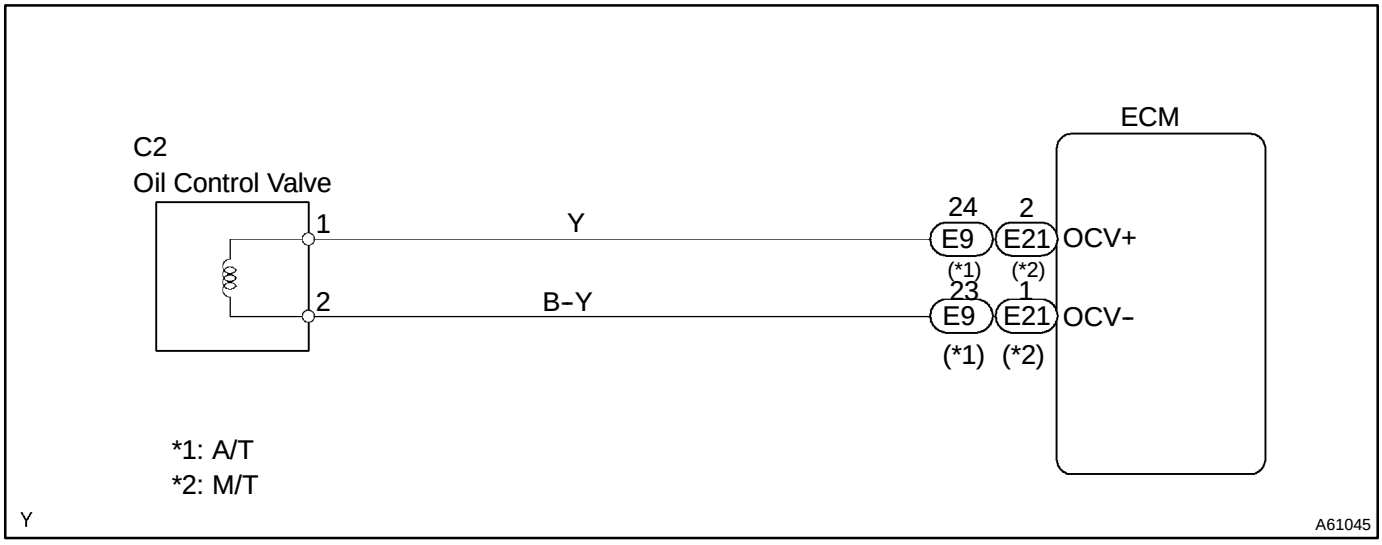
CIRCUIT DESCRIPTION

The VVT system controls the intake camshaft to provide optimal valve timing for every driving condition. This control is performed based on signals, such conditions as intake air volume, throttle position and engine coolant temperature. The ECM controls the oil control valve (OCV), based on the signals output from the sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the oil control valve (OCV). As a result, the relative position between the camshaft and the crankshaft becomes optimal, engine torque improves, fuel economy improves, and exhaust emissions decrease under overall driving conditions. Also, the ECM detects the actual valve timing using the signals from the camshaft position sensor and the crankshaft position sensor, and performs feedback control. This is how target valve timing is achieved by the ECM.



DTC No.	DTC Detecting Condition	Trouble Area
1349	Condition (a) or (b) continues after the engine is warmed up and engine speed at 400 ~ 4,000 rpm (Problem of the advance or retarded OCV): (a) Valve timing does not change from current valve timing (b) Current valve timing is fixed	S Valve timing S Oil control valve S VVT controller assembly S ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P1656 is displayed, check the VVT system circuit.
- Read freeze frame data using the hand-held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

When using the hand-held tester

1	**CHECK VALVE TIMING(CHECK FOR LOOSE AND JUMPING TEETH OF TIMING CHAIN) (See Pub. No. RM821E, page 14-90)**

NG → **ADJUST VALVE TIMING**

OK

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

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(d) Select the item "DIAGNOSIS/OBD/MOBD/ACTIVE TEST/VVT CTRL B1".
(e) Check engine speed when operating the OCV by the hand-held tester.
Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

NG → **Go to step 4**

OK

3	**PERFORM SIMULATION TEST(CHECK DTC)**

(a) Clear the DTC (See page 05-11).
(b) Perform the simulation test.
(c) Check whether or not DTC P1349 is stored (See page 05-11).
Result:

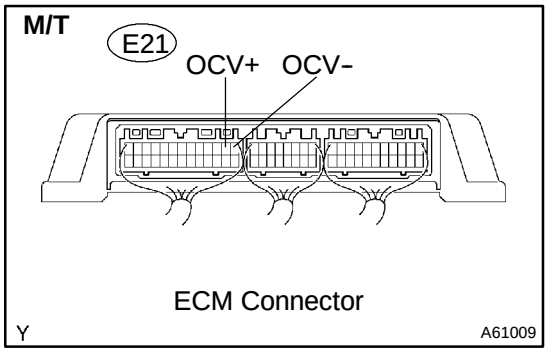
	A	B
RESULT	P1349 is output.	P1349 is not output.

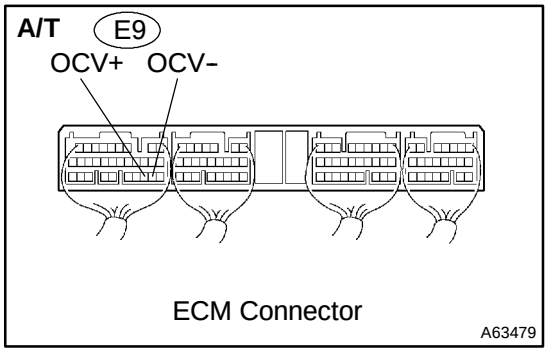
HINT:
DTC P1349 is also output when a foreign object is detected in some parts of the system in the engine oil, but then the system returns to normal after a short time. As ECM controls the OCV to eject a foreign object, there is no problem with the VVT. There is also no problem with the VVT as the oil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

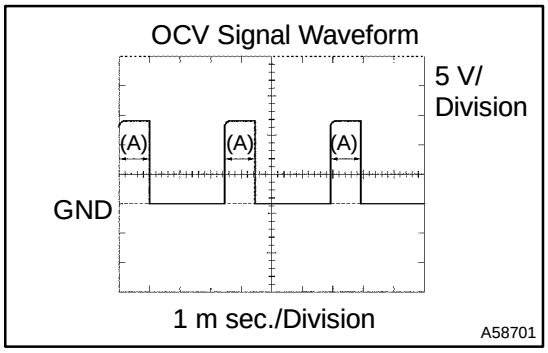
B → **VVT SYSTEM OK**

A

4	INSPECT ECM(CHECK VOLTAGE)







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

HINT:

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

NG → **CHECK AND REPLACE ECM (See page 01-29)**

OK

5	INSPECT CAMSHAFT TIMING GEAR ASSY(VVT CONTROLLER ASSEMBLY) (See Pub. No. RM821E, page 14-64)

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

OK

6	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See Pub. No. RM821E, page 10-3)

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

OK

7	CHECK BLOCKAGE(OIL CONTROL VALVE FILTER, OCV AND OIL HOLE)

NG → REPAIR OR REPLACE

OK

8	PERFORM SIMULATION TEST(CHECK DTC)

(a) Clear the DTC (See page 05-11).
(b) Perform the simulation test.
(c) Check whether or not DTC P1349 is stored (See page 05-11).

Result:

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

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

When not using hand held tester

B → VVT SYSTEM OK

A

CHECK AND REPLACE ECM (See page 01-29)

1	CHECK VALVE TIMING(CHECK FOR LOOSE AND JUMPING TEETH OF TIMING CHAIN) (See Pub. No. RM821E, page 14-90)

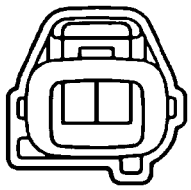
NG → ADJUST VALVE TIMING

OK

2	CHECK OPERATION OF OCV

Component Side

Oil Control Valve



Front View

A52113

(a) Start the engine.
(b) Check engine speed when disconnecting the OCV connector.
(c) Check 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 A	

B → Go to step 5

A

3 PERFORM SIMULATION TEST(CHECK DTC)

(a) Clear the DTC (See page 05–11).
(b) Perform the simulation test.
(c) Check whether or not DTC P1349 is stored (See page 05–11).
Result:

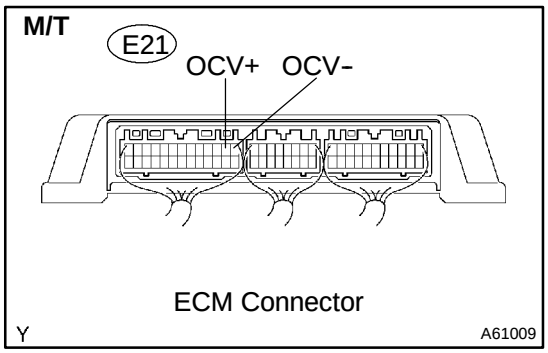
	A	B
RESULT	P1349 is output.	P1349 is not output.

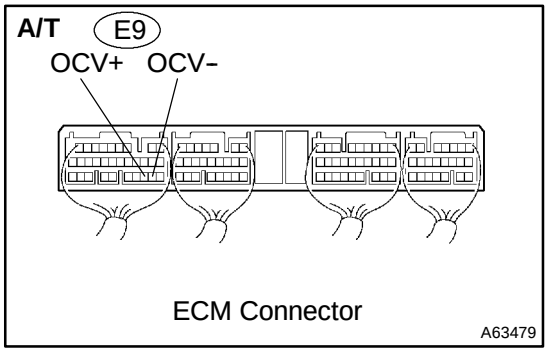
HINT:
DTC P1349 is also output when a foreign object is detected in some parts of the system in the engine oil, but then the system returns to normal after a short time. As ECM controls the OCV to eject a foreign object, there is no problem with the VVT. There is also no problem with the VVT as the oil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

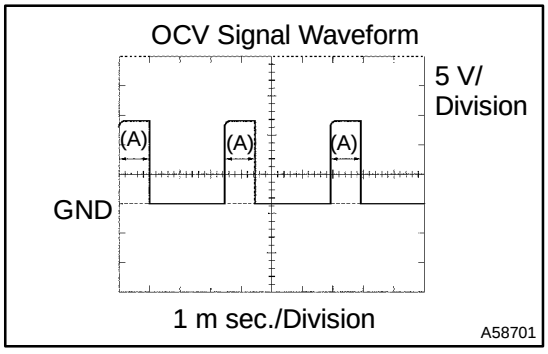
B → **VVT SYSTEM OK**

A

4 INSPECT ECM(CHECK VOLTAGE)







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

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

OK → **VVT SYSTEM OK**

NG

CHECK AND REPLACE ECM (See page 01-29)

5	**INSPECT CAMSHAFT TIMING GEAR ASSY(VVT CONTROLLER ASSEMBLY) (See Pub. No. RM821E, page 14-64)**

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

OK

6	**INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See Pub. No. RM821E, page 10-3)**

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

OK

7	**CHECK BLOCKAGE(OIL CONTROL VALVE FILTER, OCV AND OIL HOLE)**

NG → **REPAIR OR REPLACE**

OK

8	**PERFORM SIMULATION TEST(DTC CHECK)**

(a) Clear the DTC (See page 05-11).
(b) Perform the simulation test.
(c) Check whether or not DTC P1349 is stored (See page 05-11).

Result:

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

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

B → **VVT SYSTEM OK**

A

CHECK AND REPLACE ECM (See page 01-29)

DTC	P1656	OCV CIRCUIT MALFUNCTION (BANK 1)

CIRCUIT DESCRIPTION

Refer to DTC P1349 on page 05-103.

DTC No.	DTC Detecting Condition	Trouble Area
P1656	Open or short in oil control valve circuit	S Open or short in oil control valve circuit S Oil control valve S ECM

WIRING DIAGRAM

Refer to DTC P1349 on page 05-103.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester. 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.

When using hand-held tester

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

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(d) Select the item "DIAGNOSIS/OBD/MOBD/ACTIVE TEST/VVT CTRL B1".
(e) Check the engine speed when operating the OCV by the hand-held tester.

Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)**

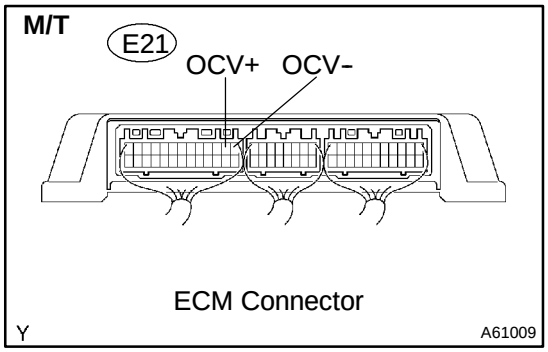
NG

2	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See Pub. No. RM821E, page 14-64)

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

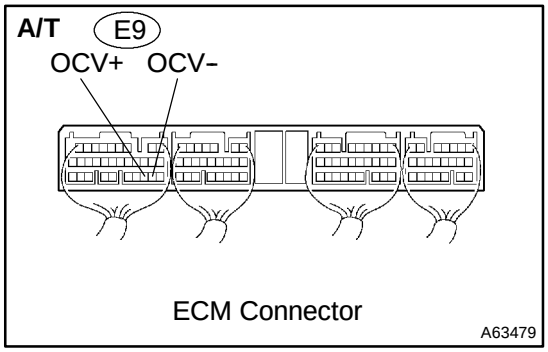
OK

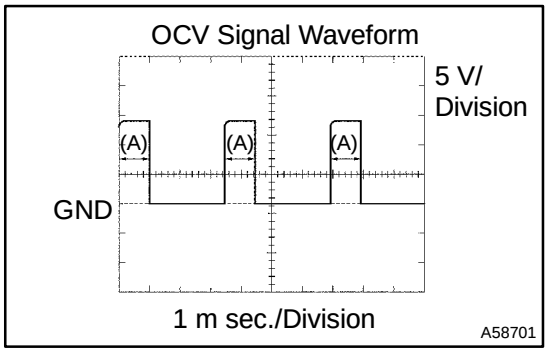
3	INSPECT ECM(CHECK VOLTAGE)



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

HINT:
- The correct waveform is as shown on the left.
- The waveform frequency (A) becomes longer as engine speed increases.

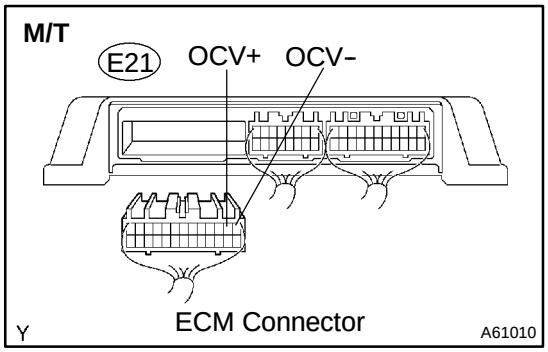


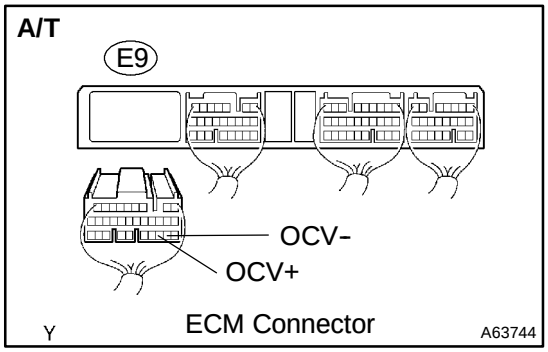


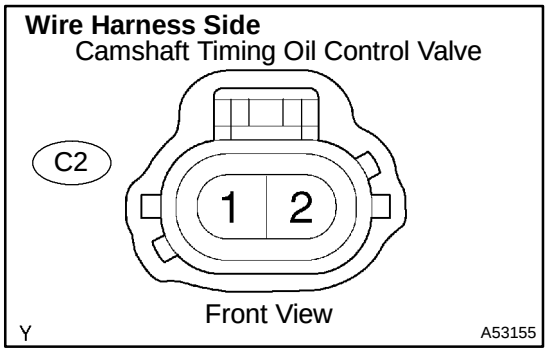
NG → **CHECK AND REPLACE ECM (See page 01-29)**

OK

4 CHECK HARNESS AND CONNECTOR(ECM-OCV)







(a) M/T models:
Disconnect the ECM E21 connector.

(b) A/T models:
Disconnect the ECM E9 connector.

(c) Disconnect the C2 camshaft timing oil control valve connector.

(d) Measure the resistance between the wire harness side connectors.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
Camshaft timing oil control valve (C2-1) - OCV+ (E21-2)	Below 1 Ω
Camshaft timing oil control valve (C2-2) - OCV- (E21-1)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
Camshaft timing oil control valve (C2-1) or OCV+ (E21-2) - Body ground	10 kΩ or higher
Camshaft timing oil control valve (C2-2) or OCV- (E21-1) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
Camshaft timing oil control valve (C2-1) - OCV+ (E9-24)	Below 1 Ω
Camshaft timing oil control valve (C2-2) - OCV- (E9-23)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
Camshaft timing oil control valve (C2-1) or OCV+ (E9-24) - Body ground	10 kΩ or higher
Camshaft timing oil control valve (C2-2) or OCV- (E9-23) - Body ground	10 kΩ or higher

(e) Reconnect the camshaft timing oil control valve connector.

(f) Reconnect the ECM connector.

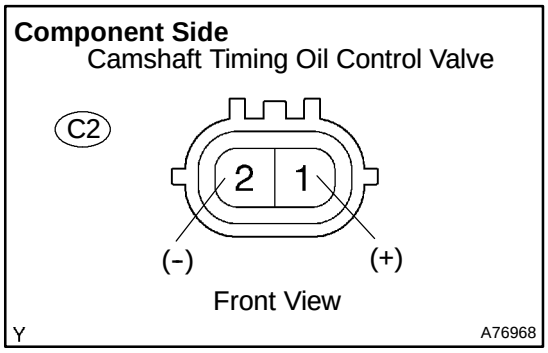
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)

When not using hand–held tester

1	CHECK OPERATION OF OCV



(a) Disconnect the C2 camshaft timing oil control valve connector.

(b) Apply positive battery voltage between the terminals of the camshaft timing oil control valve.

(c) Check the engine speed.

Standard:

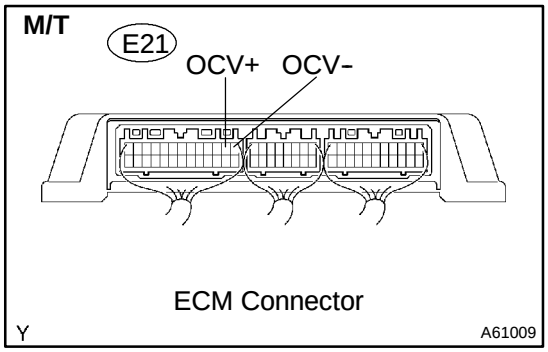
Engine speed is rough idle or engine is stalled.

(d) Reconnect the camshaft timing oil control valve connector.

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

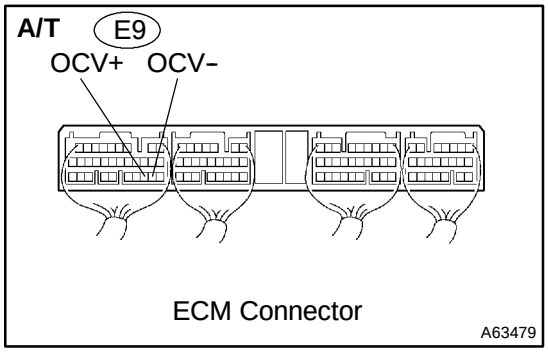
OK

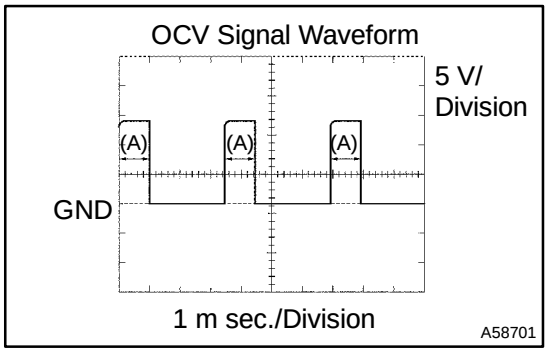
2 INSPECT ECM(CHECK VOLTAGE)



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

HINT:
- The correct waveform is as shown on the left.
- The waveform frequency (A) becomes longer as engine speed increases.

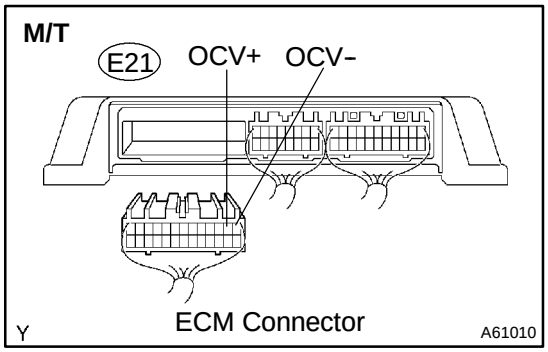


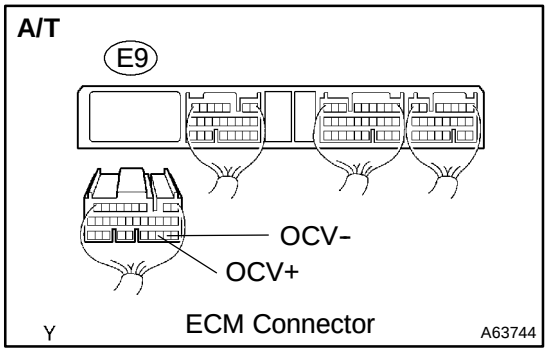


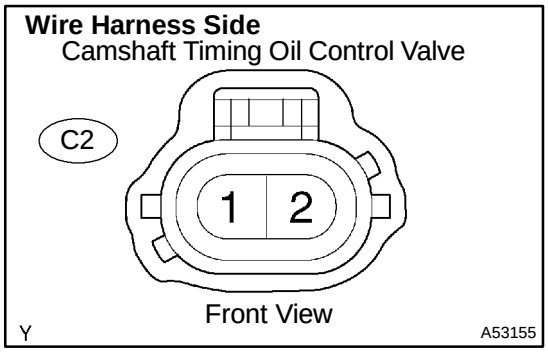
NG → **CHECK AND REPLACE ECM (See page 01-29)**

OK

3 CHECK HARNESS AND CONNECTOR(ECM-OCV)







(a) M/T models:
Disconnect the ECM E21 connector.

(b) A/T models:
Disconnect the ECM E9 connector.

(c) Disconnect the C2 camshaft timing oil control valve connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
Camshaft timing oil control valve (C2-1) - OCV+ (E21-2)	Below 1 Ω
Camshaft timing oil control valve (C2-2) - OCV- (E21-1)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
Camshaft timing oil control valve (C2-1) or OCV+ (E21-2) - Body ground	10 kΩ or higher
Camshaft timing oil control valve (C2-2) or OCV- (E21-1) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
Camshaft timing oil control valve (C2-1) - OCV+ (E9-24)	Below 1 Ω
Camshaft timing oil control valve (C2-2) - OCV- (E9-23)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
Camshaft timing oil control valve (C2-1) or OCV+ (E9-24) - Body ground	10 kΩ or higher
Camshaft timing oil control valve (C2-2) or OCV- (E9-23) - Body ground	10 kΩ or higher

(e) Reconnect the camshaft timing oil control valve connector.

(f) Reconnect the ECM connector.

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

OK

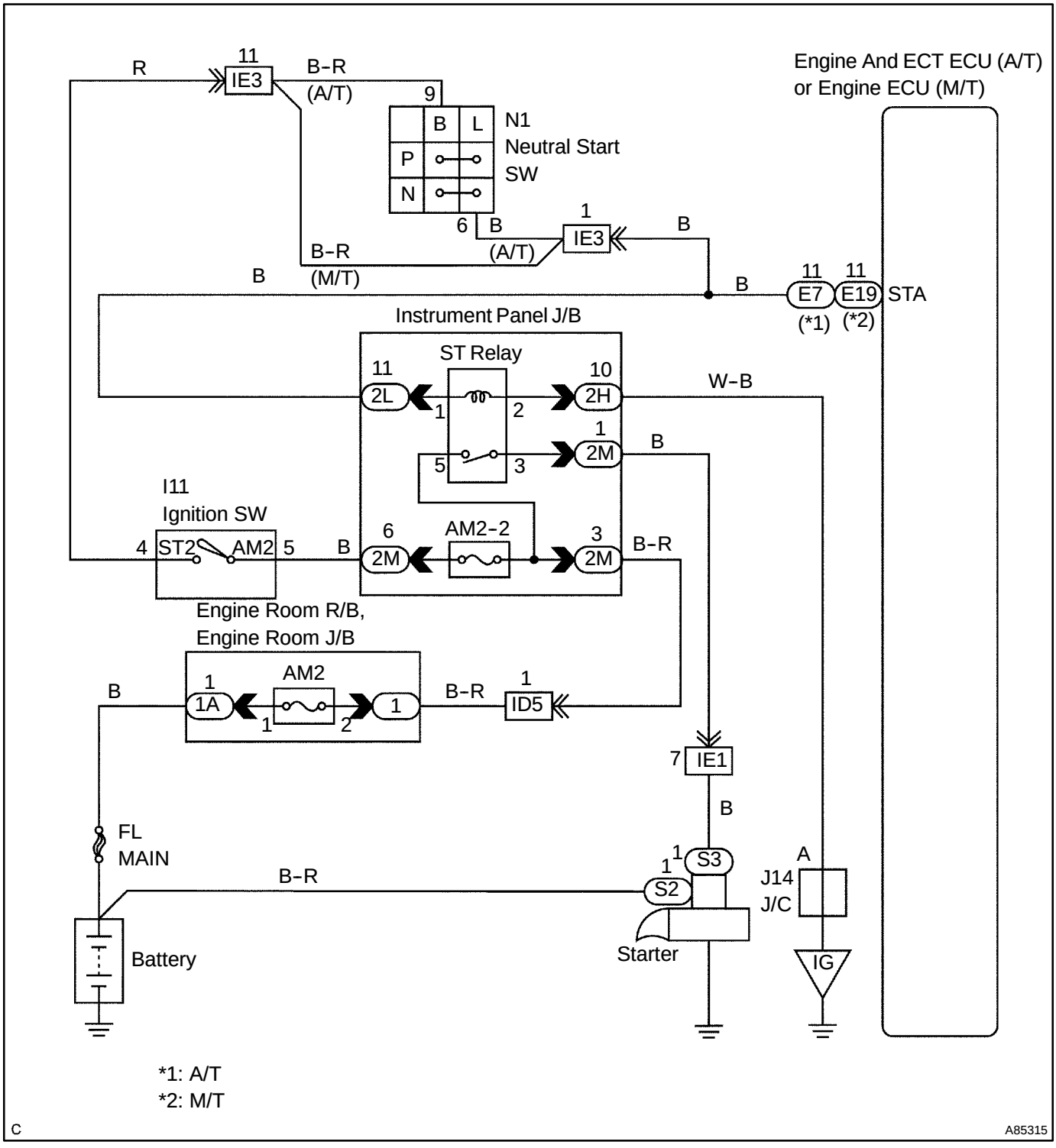
CHECK FOR INTERMITTENT PROBLEMS (See page 05-26)

STARTER SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

When the engine is cranked, 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, 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 cranked normally. If the engine is not cranked, proceed to the problem symptoms table on page 05–27.

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 to the ON position and push the hand–held tester main switch on.
(c) Select the item ”DIAGNOSIS/OBD/MOBD/DATA LIST/ALL/STA”.
(d) Read the STA signal on the hand–held tester while the starter is operating.

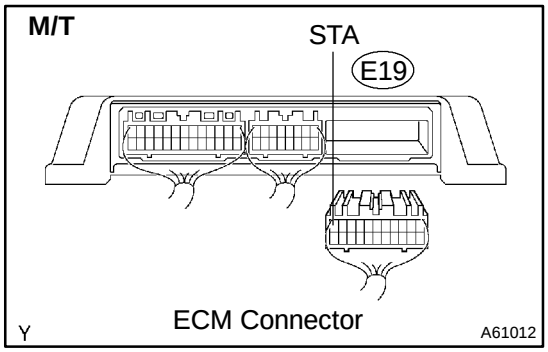
Result:

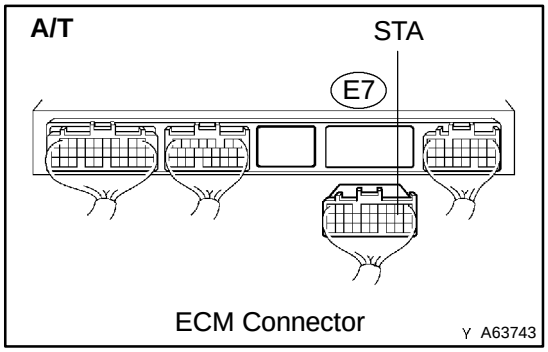
Ignition Switch Position	ON	START
STA Signal	OFF	ON

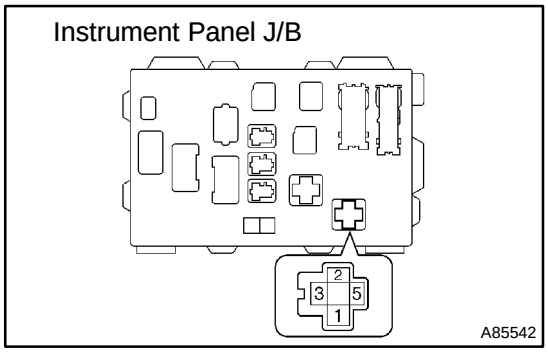
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05–27)**

NG

2 CHECK HARNESS OR CONNECTOR(ECM-STARTER RELAY)







(a) M/T models:
Disconnect the ECM E19 connector.

(b) A/T models:
Disconnect the ECM E7 connector.

(c) Remove the starter relay.

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
Starter relay (1) - STA (E19-11)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
Starter relay (1) or STA (E19-11) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
Starter relay (1) - STA (E7-11)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
Starter relay (1) or STA (E7-11) - Body ground	10 kΩ or higher

(e) Reinstall the starter relay.

(f) Reconnect the ECM connector.

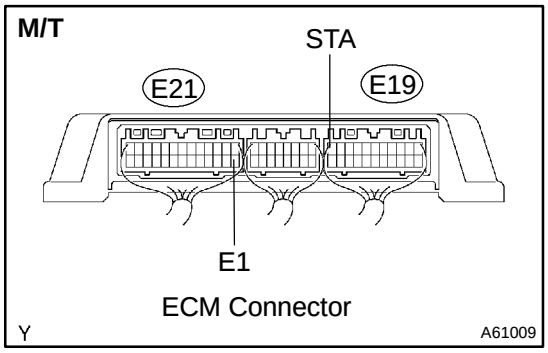
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPLACE ECM (See page 01-29)

When not using the hand-held tester:

1	INSPECT ECM(CHECK VOLTAGE)



(a) Turn the ignition switch to the ON position.

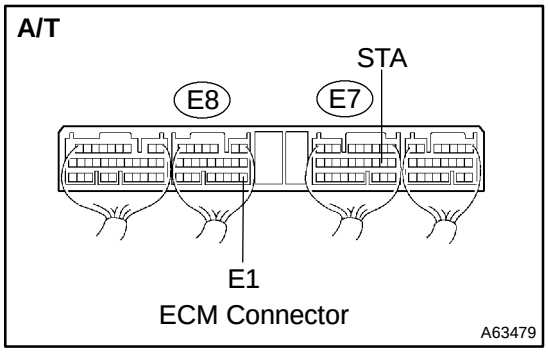
(b) Measure the voltage according to the value(s) in the table below during engine cranking.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
STA (E19-11) - E1 (E21-14)	6V or higher

Standard (Check for open) (A/T):

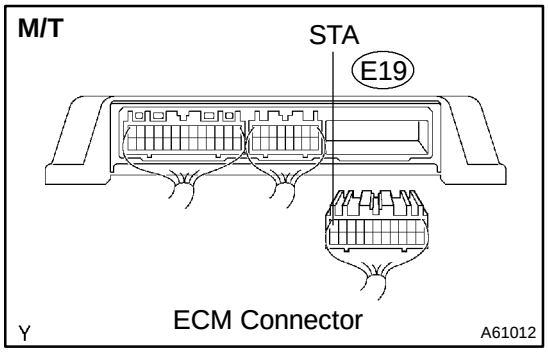
Tester Connection	Specified Condition
STA (E7-11) - E1 (E8-17)	6V or higher

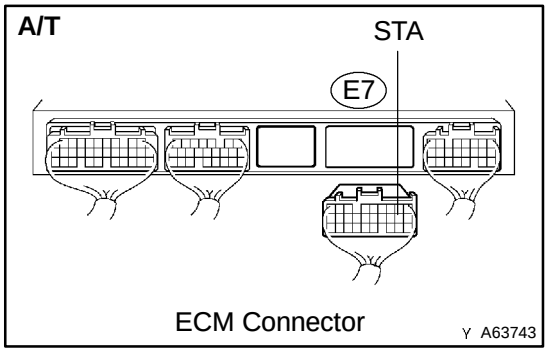


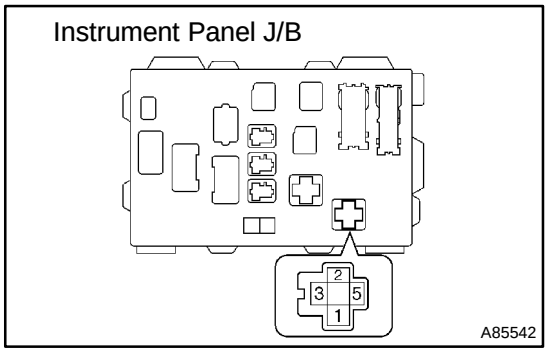
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-27)**

NG

2 CHECK HARNESS OR CONNECTOR(ECM-STARTER RELAY)







(a) M/T models:
Disconnect the ECM E19 connector.
(b) A/T models:
Disconnect the ECM E7 connector.
(c) Remove the starter relay.
(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
Starter relay (1) - STA (E19-11)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
Starter relay (1) or STA (E19-11) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
Starter relay (1) - STA (E7-11)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
Starter relay (1) or STA (E7-11) - Body ground	10 kΩ or higher

(e) Reinstall the starter relay.
(f) Reconnect the ECM connector.

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

OK

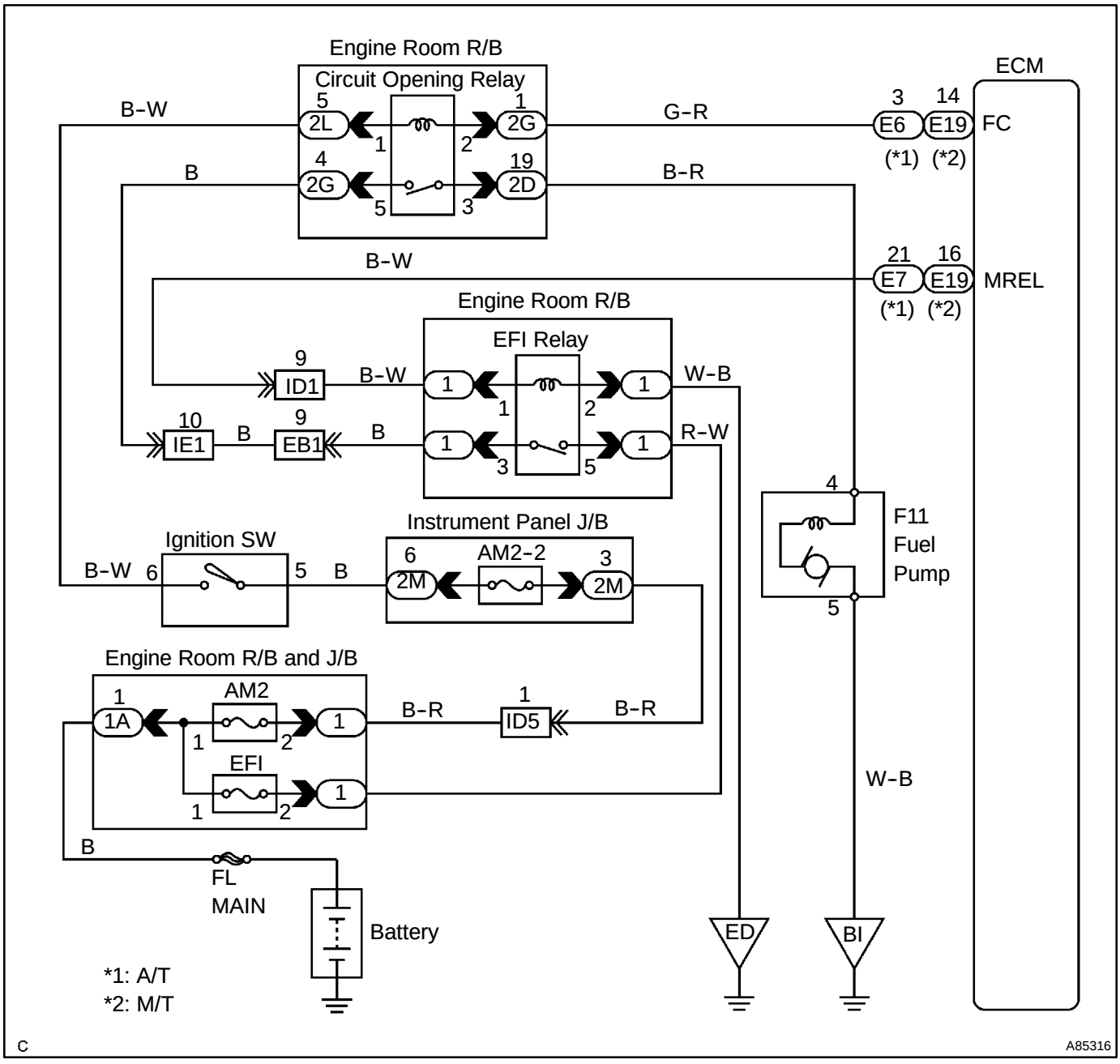
CHECK AND REPLACE ECM (See page 01-29)

FUEL PUMP CONTROL CIRCUIT

CIRCUIT DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal ST of the ignition switch to the starter relay coil and terminal STA of the 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.

WIRING DIAGRAM



INSPECTION PROCEDURE

When using hand-held tester:

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

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(c) Select the item "DIAGNOSIS/OBD/MOBD/ACTIVE TEST/FUEL PUMP / SPD".
(d) Check the relay operation while operating it with the hand-held tester.
Standard: Operating sound can be heard from the relay.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-27)**

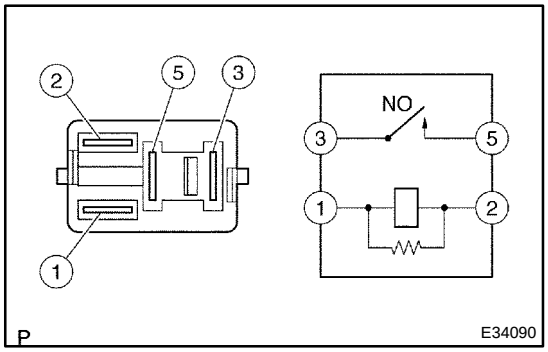
NG

2	CHECK ECM POWER SOURCE CIRCUIT (See page 05-129)

NG → **REPAIR OR REPLACE ECM POWER SOURCE CIRCUIT**

OK

3	INSPECT CIRCUIT OPENING RELAY



(a) Remove the circuit opening relay from the instrument panel J/B.
(b) Inspect the circuit opening relay.
Standard:

Tester Connection	Specified Condition
1 - 2	Below 1 Ω
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

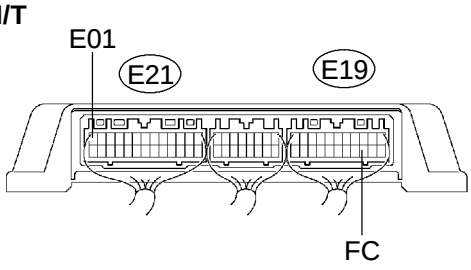
(c) Reinstall the circuit opening relay.

NG → **REPLACE CIRCUIT OPENING RELAY**

OK

4	INSPECT ECM(CHECK VOLTAGE)

M/T



ECM Connector

Y A61009

(a) Turn the ignition switch to the ON position.

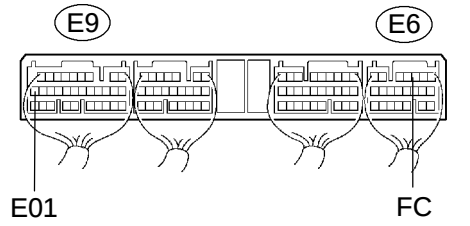
(b) M/T models:
Measure the voltage according to the value(s) in the table below.
Standard (M/T):

Tester Connection	Specified Condition
FC (E19-14) - E01 (E21-13)	9 to 14 V

(c) A/T models:
Measure the voltage according to the value(s) in the table below.
Standard (A/T):

Tester Connection	Specified Condition
FC (E6-3) - E01 (E9-21)	9 to 14 V

A/T



ECM Connector

A63479

OK → **Go to step 6**

NG

5	CHECK HARNESS OR CONNECTOR(EFI RELAY-CIRCUIT OPENING RELAY, CIRCUIT OPENING RELAY-FUEL PUMP)

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

OK

CHECK AND REPLACE ECM (See page 01-29)

6	INSPECT FUEL PUMP ASSY (See Pub. No. RM821E, page 11-5)

NG → **REPLACE FUEL PUMP ASSY**

OK

7	CHECK HARNESS OR CONNECTOR(CIRCUIT OPENING RELAY-FUEL PUMP, FUEL PUMP-BODY GROUND)

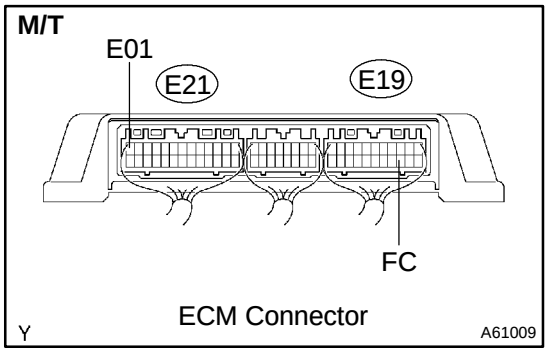
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK AND REPLACE ECM (See page 01-29)

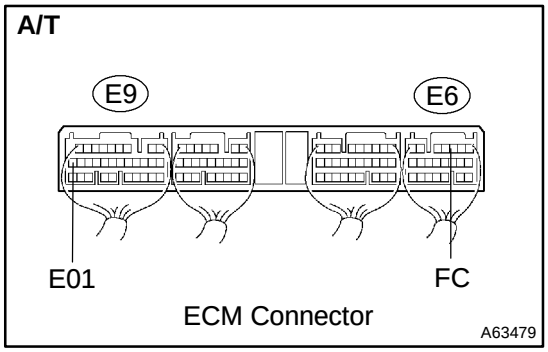
When not using the hand-held tester:

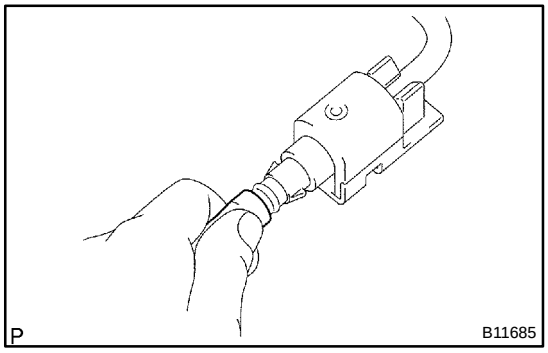
1	CHECK OPERATION OF FUEL PUMP



(a) Turn the ignition switch to the ON position.
(b) Connect between terminal FC and E01 of the ECM connector.
(c) Check for fuel pressure in the fuel inlet hose when it is pinched off.
Result: There is pressure in the fuel inlet hose.

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





OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-27)**

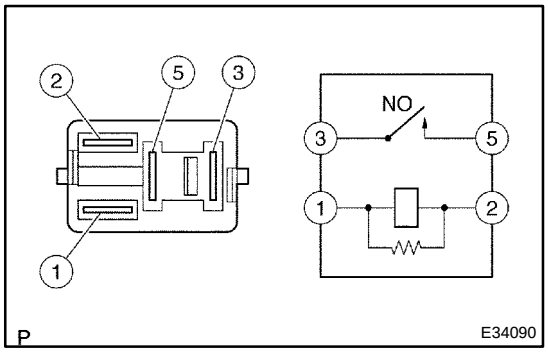
NG

2	CHECK ECM POWER SOURCE CIRCUIT (See page 05-129)

NG → **REPAIR OR REPLACE ECM POWER SOURCE CIRCUIT**

OK

3 INSPECT CIRCUIT OPENING RELAY



(a) Remove the circuit opening relay from the instrument panel J/B.

(b) Inspect the circuit opening relay.

Standard:

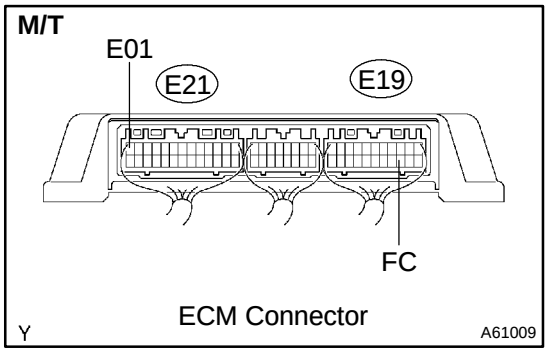
Tester Connection	Specified Condition
1 - 2	Below 1 Ω
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

(c) Reinstall the circuit opening relay.

NG → REPLACE CIRCUIT OPENING RELAY

OK

4 INSPECT ECM(CHECK VOLTAGE)



(a) Turn the ignition switch to the ON position.

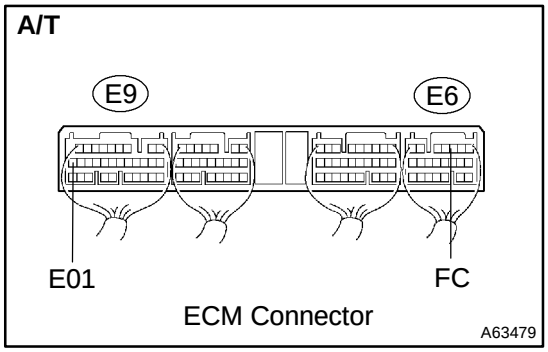
(b) Measure the voltage according to the value(s) in the table below.

Standard (M/T):

Tester Connection	Specified Condition
FC (E19-14) - E01 (E21-13)	9 to 14 V

Standard (A/T):

Tester Connection	Specified Condition
FC (E6-3) - E01 (E9-21)	9 to 14 V



OK → Go to step 6

NG

5	CHECK HARNESS AND CONNECTOR(EFI RELAY-CIRCUIT OPENING RELAY, CIRCUIT OPENING RELAY-FUEL PUMP)

OK → REPAIR OR REPLACE HARNESS OR CONNECTOR

NG

CHECK AND REPLACE ECM (See page 01-29)

6	INSPECT FUEL PUMP ASSY (See Pub. No. RM821E, page 11-5)

NG → REPLACE FUEL PUMP ASSY

OK

7	CHECK HARNESS AND CONNECTOR(OPEN BETWEEN TERMINAL 3 OF CIRCUIT OPENING RELAY AND TERMINAL 4 OF FUEL PUMP)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

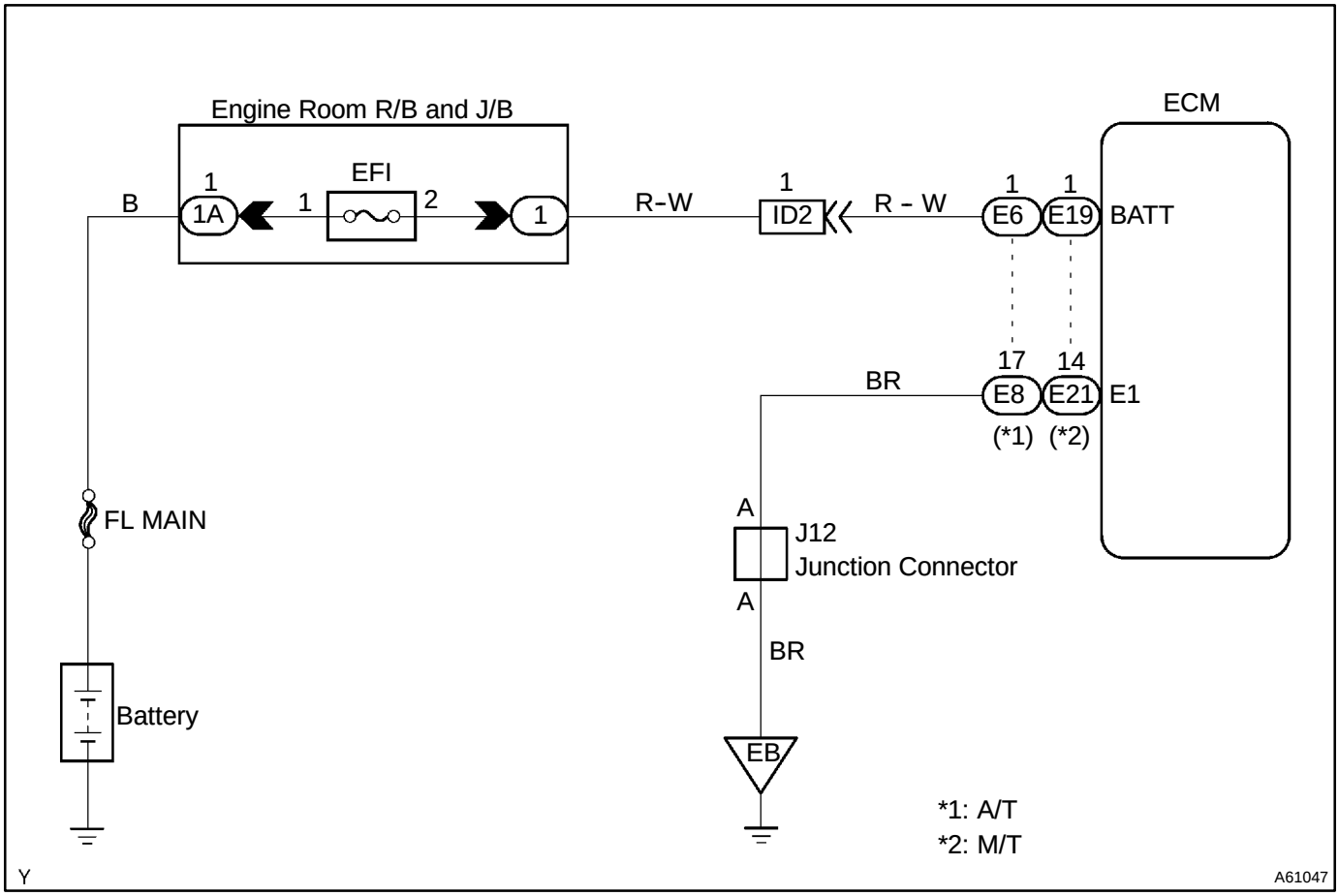
CHECK AND REPLACE ECM (See page 01-29)

ECM BACK-UP POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

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

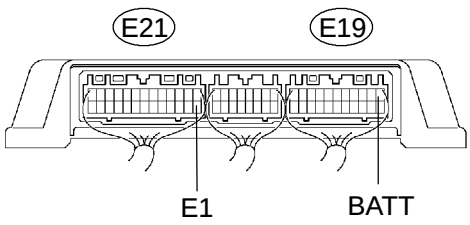
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ECM

M/T



ECM Connector

Y A61009

(a) Measure the voltage according to the value(s) in the table below.

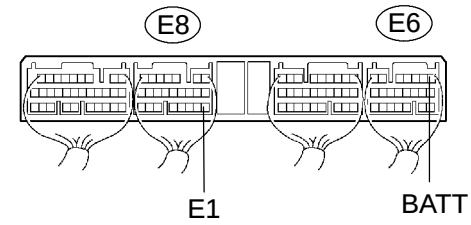
Standard (M/T):

Tester Connection	Specified Condition
BATT (E19-1) - E1 (E21-14)	9 to 14 V

Standard (A/T):

Tester Connection	Specified Condition
BATT (E6-1) - E1 (E8-17)	9 to 14 V

A/T



ECM Connector A63479

OK → **SYSTEM OK**

NG

2	CHECK FUSE(EFI FUSE) (See page 05-129)

NG → **CHECK FOR SHORT IN ALL HARNESSES AND COMPONENTS CONNECTED TO FUSE**

OK

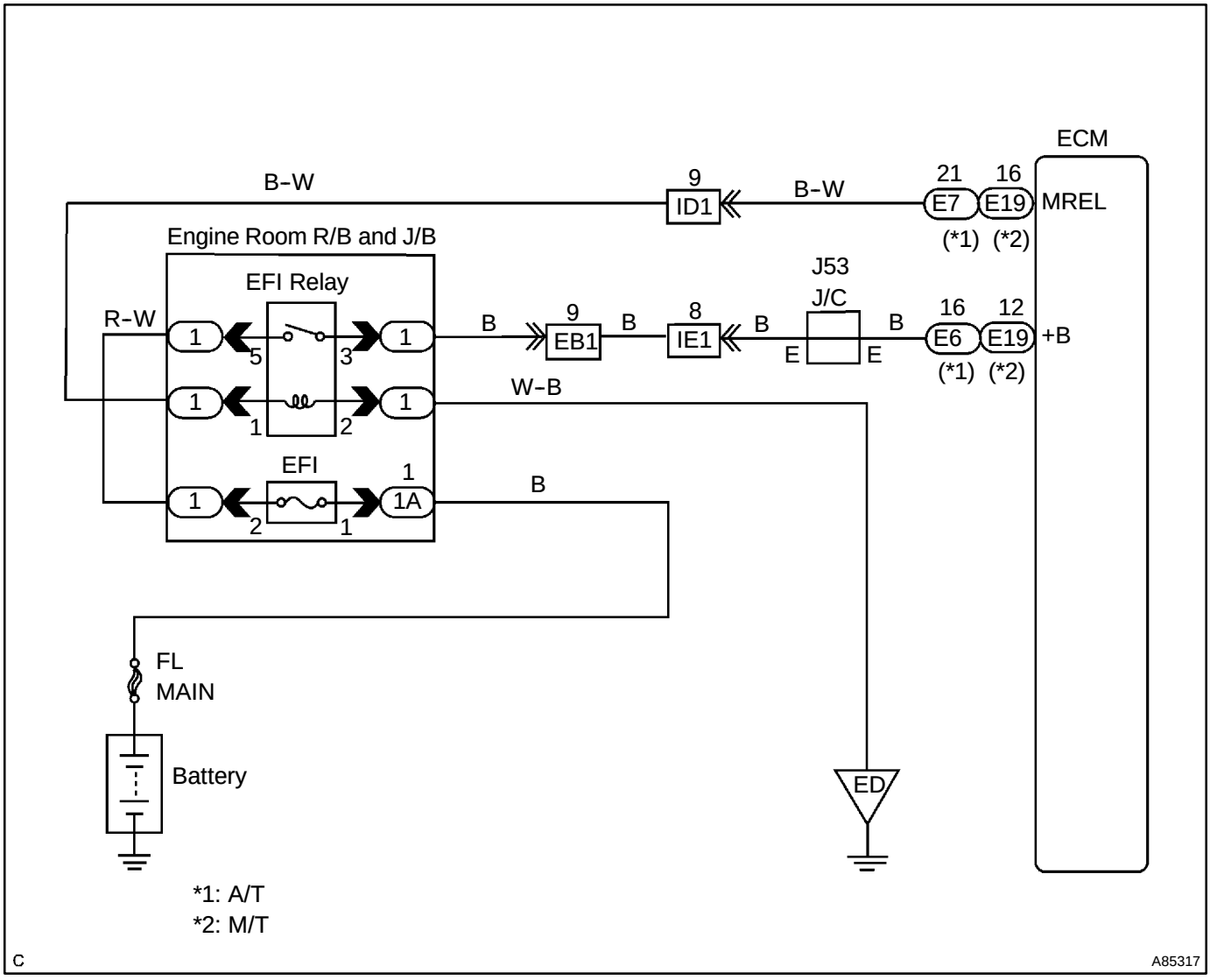
CHECK AND REPLACE ECM POWER SOURCE CIRCUIT (See page 05-129)

ECM POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

When the ignition switch is turned to the ON position, battery positive voltage is applied to the coil which closes the contacts of the EFI computer relay (Marking: EFI) and supplies power to terminal +B of the ECM.

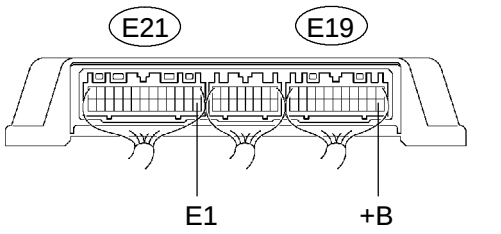
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ECM

M/T



Y ECM Connector A61009

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

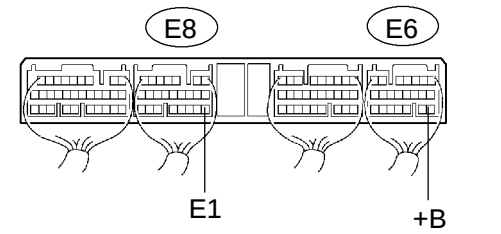
Standard (M/T):

Tester Connection	Specified Condition
+B (E19-1) - E1 (E21-14)	9 to 14 V

Standard (A/T):

Tester Connection	Specified Condition
+B (E6-16) - E1 (E8-17)	9 to 14 V

A/T

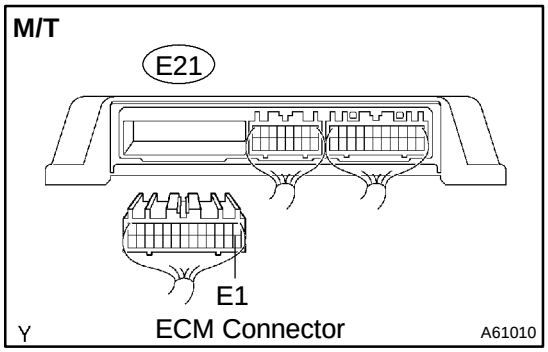


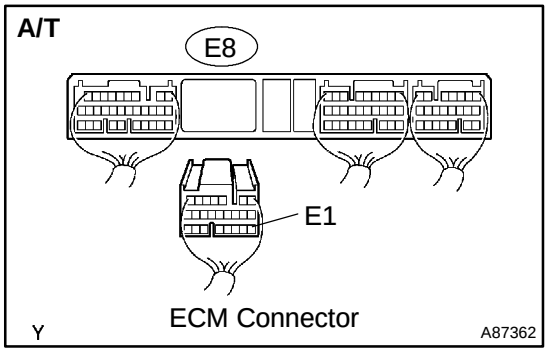
ECM Connector A63479

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-27)**

NG

2 CHECK HARNESS AND CONNECTOR(ECM GROUND)





(a) Disconnect the battery negative terminal.
(b) M/T models:
Disconnect the ECM E21 connector.
(c) A/T models:
Disconnect the ECM E8 connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard (M/T):

Tester Connection	Specified Condition
E1 (E21-14) - Body ground	Below 1 Ω

Standard (A/T):

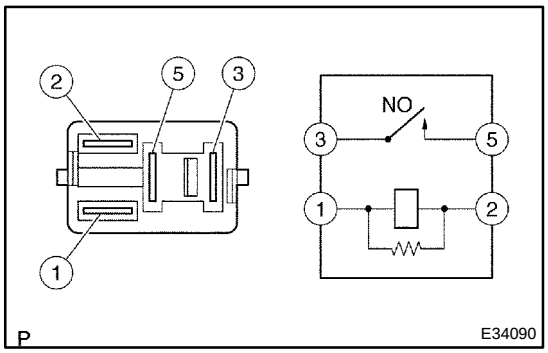
Tester Connection	Specified Condition
E1 (E8-14) - Body ground	Below 1 Ω

(e) Reconnect the ECM connector.

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

OK

3 CHECK EFI RELAY



(a) Remove the EFI relay from the engine room R/B.
(b) Inspect the EFI relay.

Standard:

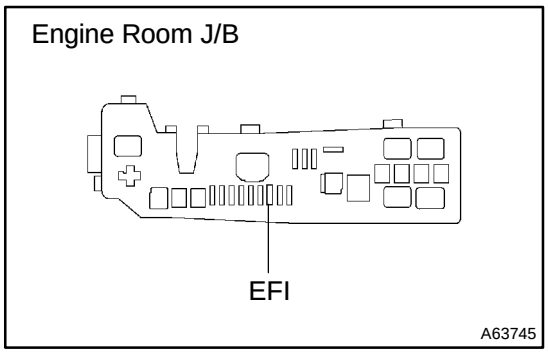
Tester Connection	Specified Condition
1 - 2	Below 1 Ω
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

(c) Reinstall the EFI relay.

NG → **REPLACE EFI RELAY**

OK

4	CHECK FUSE(EFI FUSE)

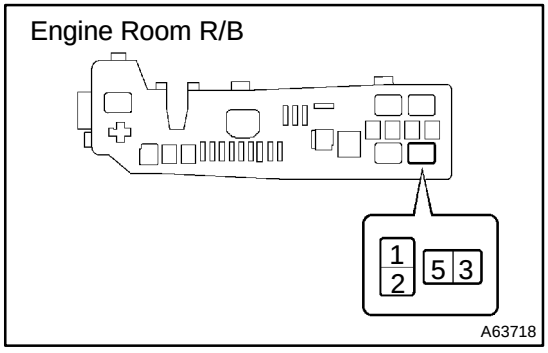


(a) Remove the EFI fuse from the engine room R/B.
(b) Check for continuity in the EFI fuse.
Standard: Continuity
(c) Reinstall the EFI fuse.

NG → **CHECK FOR SHORT IN ALL HARNESSES AND COMPONENTS CONNECTED TO FUSE**

OK

5	CHECK RELAY OPERATION(EFI RELAY)

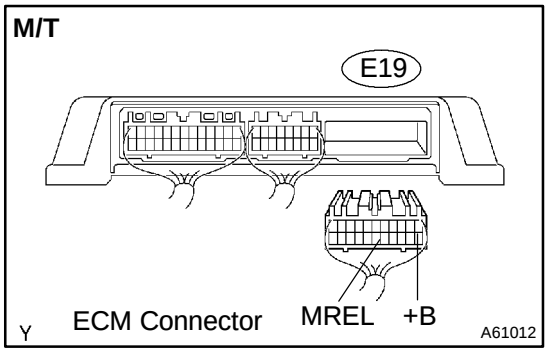


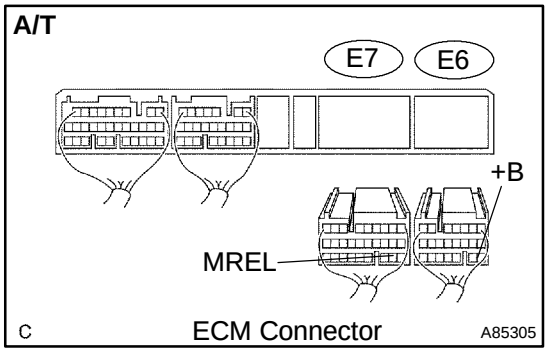
(a) Confirm that the EFI relay operates normally when turning the ignition switch to the ON position.
Result:
EFI relay operation sound is heard successively when turning the ignition switch to the ON position.

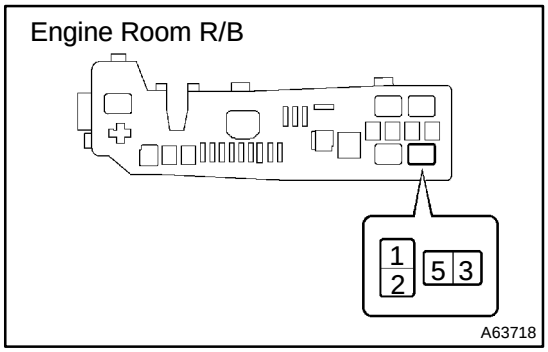
NG → **Go to step 8**

OK

6 CHECK HARNESS AND CONNECTOR(ECM-EFI RELAY)







(a) Check the harness and connector between the EFI relay and ECM connector.

(1) Remove the EFI relay from the engine room R/B.

(2) M/T models:
Disconnect the E19 ECM connector.

(3) A/T models:
Disconnect the E6 and E7 ECM connector.

(4) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
EFI relay (3) - +B (E19-12)	Below 1 Ω
EFI relay (3) - MREL (E19-16)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
EFI relay (3) or +B (E19-12) - Body ground	10 kΩ or higher
EFI relay (3) or MREL (E19-16) - Body ground	10 kΩ or higher

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
EFI relay (3) - +B (E6-16)	Below 1 Ω
EFI relay (3) - MREL (E7-21)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
EFI relay (3) or +B (E6-16) - Body ground	10 kΩ or higher
EFI relay (3) or MREL (E7-21) - Body ground	10 kΩ or higher

(5) Reinstall the EFI relay.

(6) Reconnect the ECM connector.

(b) Check the harness and connector between the EFI relay and body ground.

(1) Remove the EFI relay from the engine room R/B.

(2) Measure the resistance according to the value(s) in the table below.

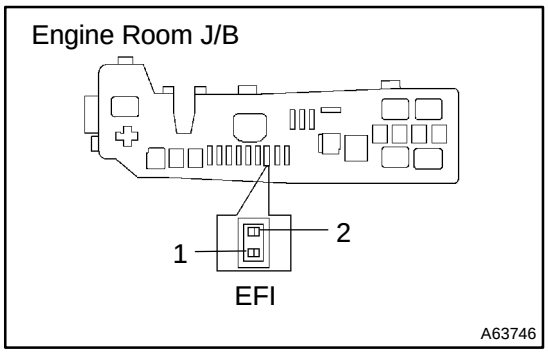
Tester Connection	Specified Condition
EFI relay (2) - Body ground	Below 1 Ω

(3) Reinstall the EFI relay.

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

OK

7 CHECK HARNESS AND CONNECTOR(EFI FUSE-BATTERY)



(a) Remove the EFI fuse.
(b) Measure the resistance according to the value(s) in the table below.

Tester Connection	Specified Condition
EFI fuse holder (1) - Body ground	Below 1 Ω

(c) Reinstall the EFI fuse.

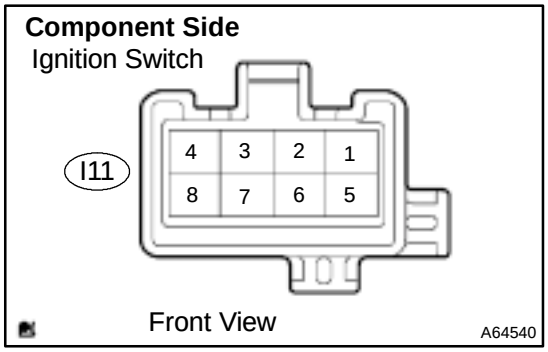
NOTICE:
Do not forcefully insert the tester leads in procedure (c), or the holder may be damaged.

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

OK

CHECK AND REPLACE ECM (See page 01-29)

8 INSPECT IGNITION OR STARTER SWITCH ASSY



(a) Disconnect the I11 ignition switch connector.
(b) Measure the resistance according to the value(s) in the table below.

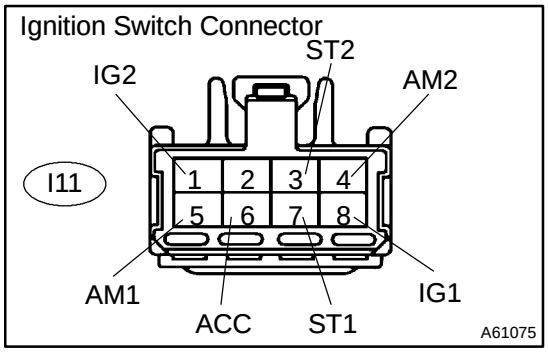
Switch Position	Tester Connection	Specified Condition
LOCK	All Terminals	10 kΩ or higher
ACC	5 - 6	Below 1 Ω
ON	5 - 6 - 8 1 - 4	Below 1 Ω
START	5 - 6 - 7 - 8 1 - 3 - 4	Below 1 Ω

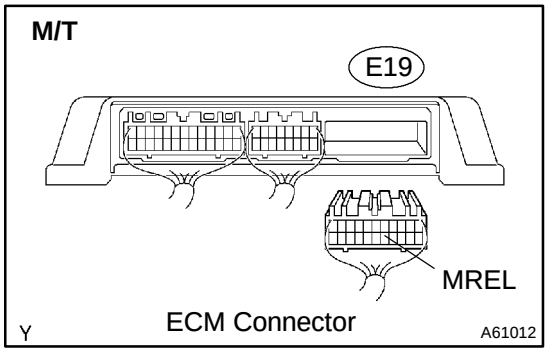
(c) Reconnect the ignition switch connector.

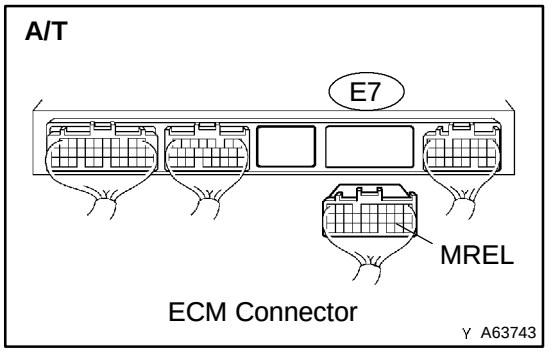
NG → **REPLACE IGNITION OR STARTER SWITCH ASSY**

OK

9	CHECK HARNESS AND CONNECTOR(IGNITION SWITCH-ECM)







(a) Disconnect the I11 ignition switch connector.
(b) M/T models:
Disconnect the E19 ECM connector.
(c) A/T models:
Disconnect the E7 ECM connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for open) (M/T):

Tester Connection	Specified Condition
IG2 (I11-1) - MREL (E19-15)	Below 1 Ω

Standard (Check for short) (M/T):

Tester Connection	Specified Condition
IG2 (I11-1) or MREL (E19-15) - Body ground	Below 1 Ω

Standard (Check for open) (A/T):

Tester Connection	Specified Condition
IG2 (I11-1) - MREL (E7-21)	Below 1 Ω

Standard (Check for short) (A/T):

Tester Connection	Specified Condition
IG2 (I11-1) or MREL (E7-21) - Body ground	Below 1 Ω

(e) Reconnect the ignition switch connector.
(f) Reconnect the ECM connector.

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

OK

CHECK AND REPLACE ECM (See page 01-29)

AIR CONDITIONING SYSTEM (SOUTH AFRICA)(From August, 2003)

HOW TO PROCEED WITH TROUBLESHOOTING

050TG-14

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (See page 05-138)

3	CHECK AND CLEAR DTC (See page 05-139)

4	PROBLEM SYMPTOM CONFIRMATION

SYMPTOM OCCURS (GO TO STEP 6)

SYMPTOM DOES NOT OCCUR (GO TO STEP 5)

5	SYMPTOM SIMULATION (See page 05-139)

6	DTC CHECK (See page 05-139)

TROUBLE CODE (GO TO STEP 7)

NORMAL SYSTEM CODE (GO TO STEP 8)

7	DTC CHART (See page 05-142)

GO TO STEP 10

8	PROBLEM SYMPTOMS TABLE (See page 05-148)

9	ACTUATOR CHECK (See page 05-139)

10	CIRCUIT INSPECTION (See page 05-150 - 05-196)

11	IDENTIFICATION OF PROBLEM

12	PARTS INSPECTION

13	REPAIR

14	CONFIRMATION TEST

15	END

050TH-12

CUSTOMER PROBLEM ANALYSIS CHECK

AIR CONDITIONING SYSTEM Check Sheet

Inspector's name:

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

Date of Problem Occurrence	/ /
Problem Occurrence Frequency	j Continuous j Intermittent (times a day)
Weather	j Fine j Cloudy j Snowy j Various / Other
Outdoor Temperature	j Hot j Warm j Cool j Cold (Approx. °F °C)

Symptoms	**Air Flow Control is Faulty**	j Blower motor does not operate. j Blower motor speed does not change. (Always Hi, Always Med, Always Lo)
	Temperature Control is Faulty	j Cabin temperature does not go down j Cabin temperature does not rise j Response is slow
	Air Inlet Control is Faulty	j Unable to change FRS and REC (Always FRS or REC)
	Vent Control is Faulty	j Unable to change modes j Unable to enter the desired mode

DTC Check	**1st Time**	j Normal System Code j Trouble Code (Code)
	2nd Time	j Normal System Code j Trouble Code (Code)

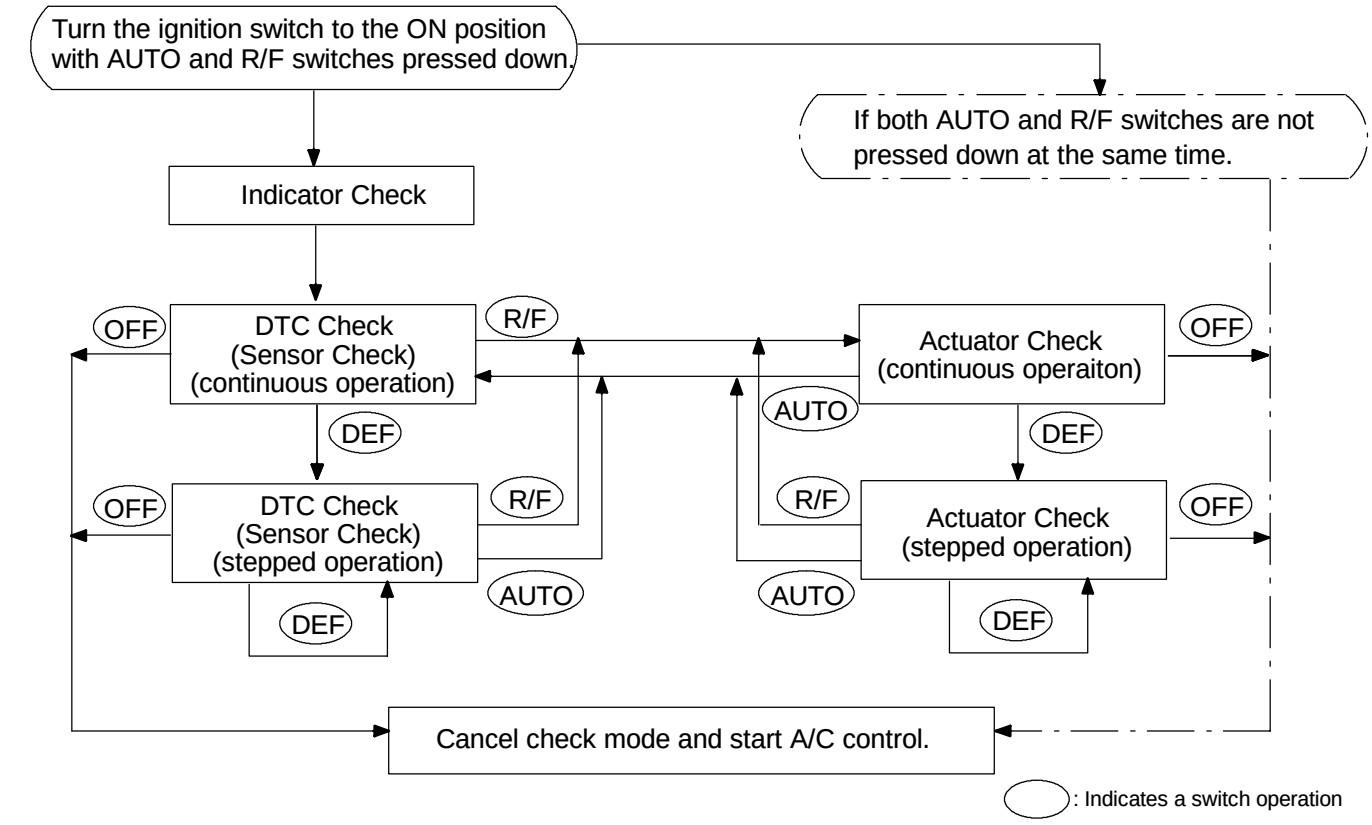
I30150

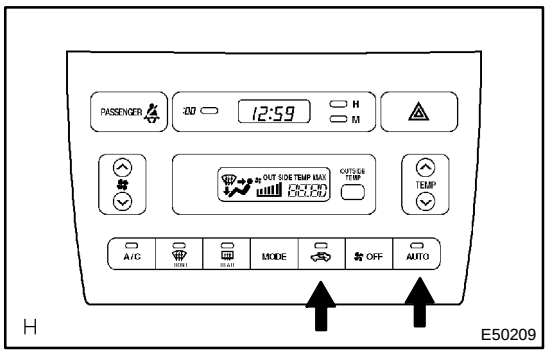
050TI-07

PRE-CHECK

1. LIST OF OPERATION METHODS

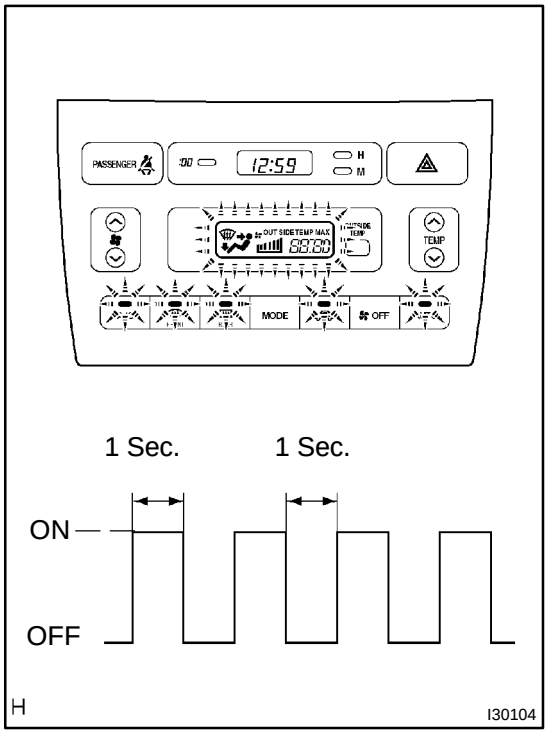
By operating each of the A/C control switches as shown in the diagram below, it is possible to enter the diagnosis check mode.





2. INDICATOR CHECK

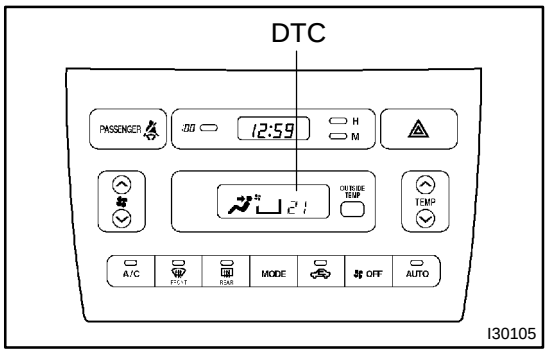
(a) Turn the ignition switch to the ON position while pressing down the A/C control AUTO and R/F switches simultaneously.



(b) Check that the indicators come on and go off at 1 second intervals 4 times in succession.

HINT:

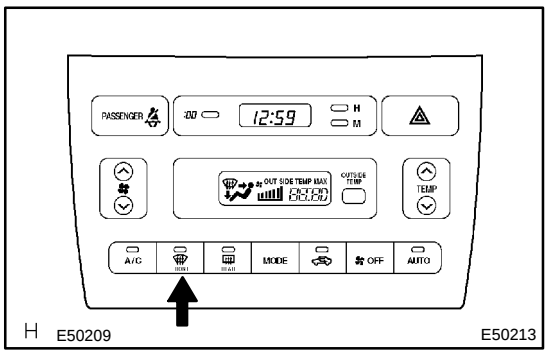
- After the indicator check is completed, the system enters the DTC check mode automatically.
- To cancel the check mode, press the OFF switch.



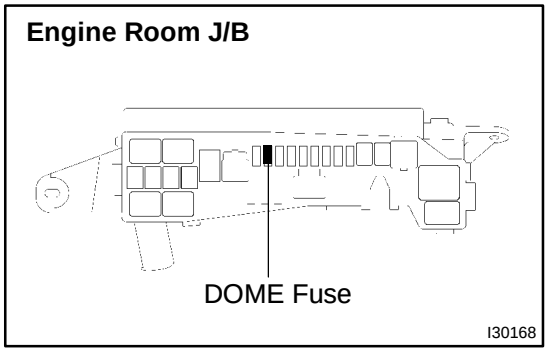
3. DTC CHECK (SENSOR CHECK)

(a) Perform the indicator check. After the indicator check is completed, the system enters the DTC check mode automatically.

(b) Read the code displayed on the panel. Refer to the list of codes on page 05-142 when reading the codes. (Trouble codes are output on the temperature display.)



(c) If the slower display is desired, press the front DEF switch and change it to stepped operation. Each time the front DEF switch is pressed, the display changes by 1 step.

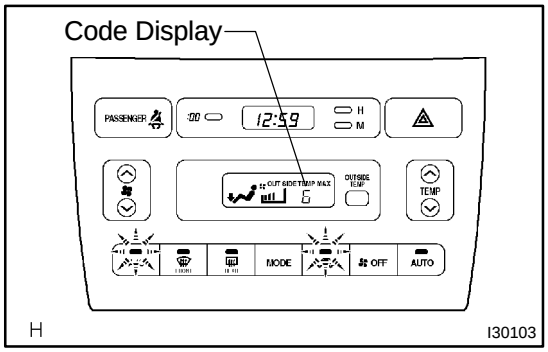


4. CLEARING DTC

(a) To clear diagnostic trouble code, there are 2 ways.

(1) During the sensor check, press the "DEF" switch and "Rr. DEF" switch at the same time.

(2) Pull the DOME fuse in engine room J/B for 20 seconds. or longer to clear the DTC memory.



5. ACTUATOR CHECK

(a) After entering the DTC check mode (Sensor Check Mode), press the R/F switch.

(b) Since each damper, motor and relay automatically operates at 1 second. intervals beginning in order from 10 on the temperature display, check the temperature and air flow visually and by hand.
If the slower display is desired, press the DEF switch and change it to stepped operation. Each time the DEF switch is pressed, the display changes by 1 step.

HINT:

- Codes are displayed in order from the smaller to the larger numbers.
- To cancel the check mode, press the OFF switch.

Step No.	Display code	Conditions				
		Blower level	Air flow vent	Air inlet damper	Magnetic clutch	Air mix damper
1	0	0	FACE	FRESH	OFF	"COOL" side (Full closed)
2	1	1	FACE	FRESH	OFF	"COOL" side (Full closed)
3	2	16	FACE	FRESH	ON	"COOL" side (Full closed)
4	3	16	FACE	FRESH	ON	"COOL" side (Full closed)
5	4	16	FACE	RECIRCULATION	ON	"COOL"/ "WARM " (50 % open)
6	5	16	B/L	RECIRCULATION	ON	"COOL"/ "WARM " (50 % open)
7	6	16	FOOT	RECIRCULATION	ON	"WARM" side (Full opened)
8	7	16	FOOT	RECIRCULATION	ON	"WARM" side (Full opened)
9	8	16	FOOT/ DEF	RECIRCULATION	ON	"WARM" side (Full opened)
10	9	31	DEF	RECIRCULATION	ON	"WARM" side (Full opened)

050TJ-16

DIAGNOSTIC TROUBLE CODE CHART

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

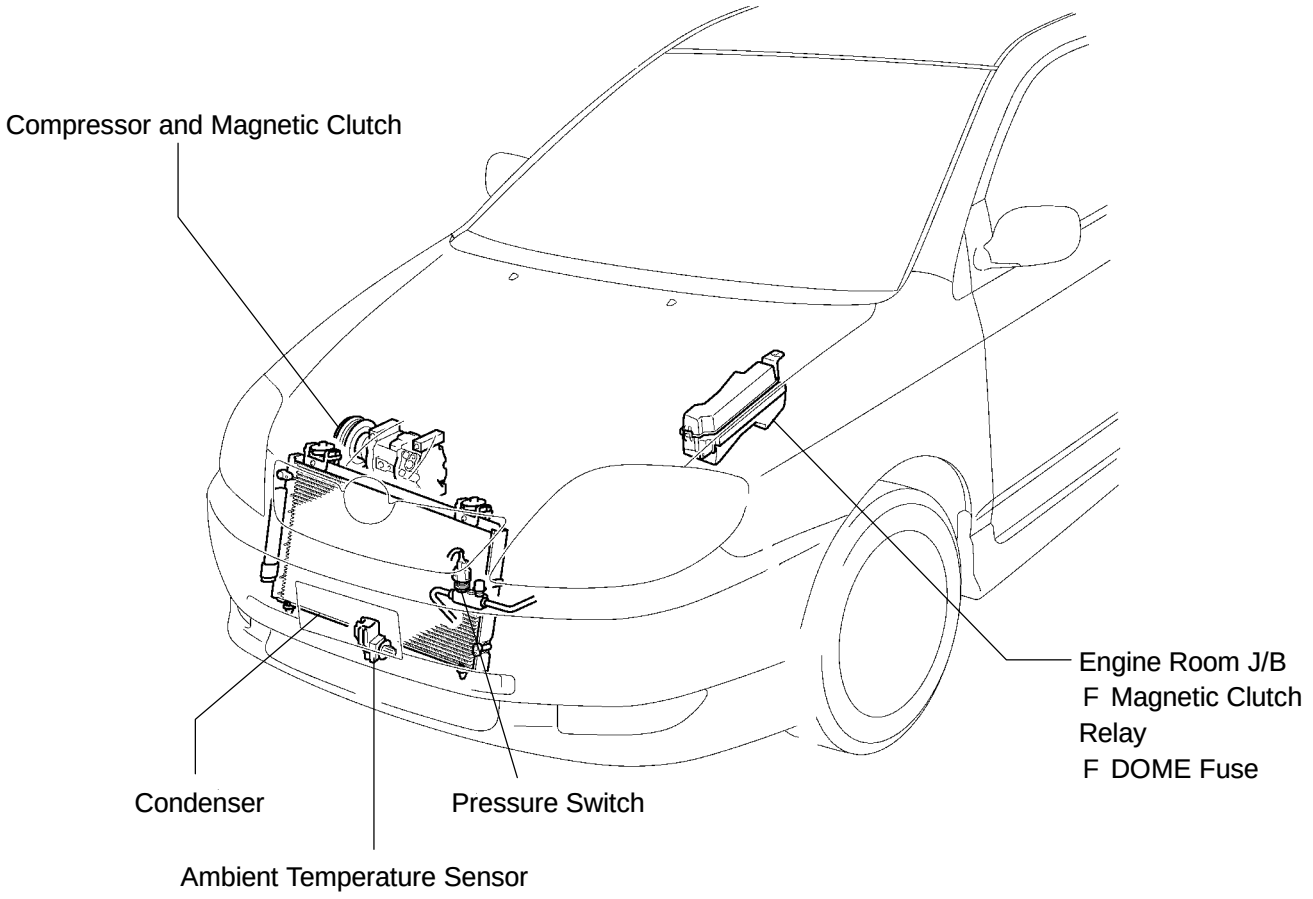
DTC No. (See Page)	Detection Item	Trouble Area	Memory*4
00	Normal	-	-
11*1 (05-150)	Room temperature sensor circuit	$ Room temp. sensor $ A/C amplifier $ Harness or connector between room temp. sensor and A/C amplifier	f (8.5 min. or more)
12*2 (05-152)	Ambient temperature sensor circuit	$ Ambient temp. sensor $ Harness or connector between ambient temp. sensor and A/C amplifier $ A/C amplifier	f (8.5 min. or more)
13 (05-154)	Evaporator temperature sensor circuit	$ Evaporator temp. sensor $ Harness or connector between evaporator temp. sensor and A/C amplifier $ A/C amplifier	f (8.5 min. or more)
14 (05-156)	Water temperature sensor circuit	$ Water temp. sensor $ Harness or connector between water temp. sensor and engine (and ECT) ECU $ Harness or connector between engine (and ECT) ECU and meter ECU $ Harness or connector meter ECU and A/C amplifier $ A/C amplifier	-
21*3 (05-158)	Solar sensor circuit (short)	$ Solar sensor $ Harness or connector between solar sensor and A/C amplifier $ A/C amplifier	f (8.5 min. or more)
21*3 (05-158)	Solar sensor circuit (open)	$ Solar sensor $ Harness or connector between solar sensor and A/C amplifier $ A/C amplifier	-
23 (05-161)	Pressure switch circuit	$ Pressure switch $ A/C amplifier $ Harness or connector between air mix damper position sensor and A/C amplifier	f (1 min. or more)
31 (05-164)	Air mix damper position sensor circuit	$ Air mix damper position sensor $ A/C amplifier $ Harness or connector between pressure switch and A/C amplifier	-
33 (05-167)	Air outlet damper position sensor circuit	$ Air outlet damper position sensor $ A/C amplifier $ Harness or connector between air outlet damper position sensor and A/C amplifier	f (1 min. or more)
41 (05-170)	Air mix control servomotor	$ Air mix control servomotor $ Air mix damper position sensor $ Harness or connector between air mix damper servomotor and A/C amplifier $ A/C amplifier	f (15 sec.)
43 (05-173)	Air outlet control servomotor	$ Air outlet control servomotor $ Air outlet damper position sensor $ Harness or connector between air inlet damper, servomotor and A/C amplifier $ A/C amplifier	f (15 sec.)

HINT:

- *1: If the room temp. is approx. −18.6˚C (−3.7˚F) or lower, trouble code 11 may be output even though the system is normal.
- *2: If the ambient temp. is approx. −52.9˚C (−61.4˚F) or lower, trouble code 12 may be output even though the system is normal.
- *3: If the check is performed in a dark place, trouble code 21 (solar sensor circuit abnormal) may be displayed.
- *4: The A/C amplifier memorizes the trouble code of the respective malfunction that has occurred for the time period indicated in the brackets.

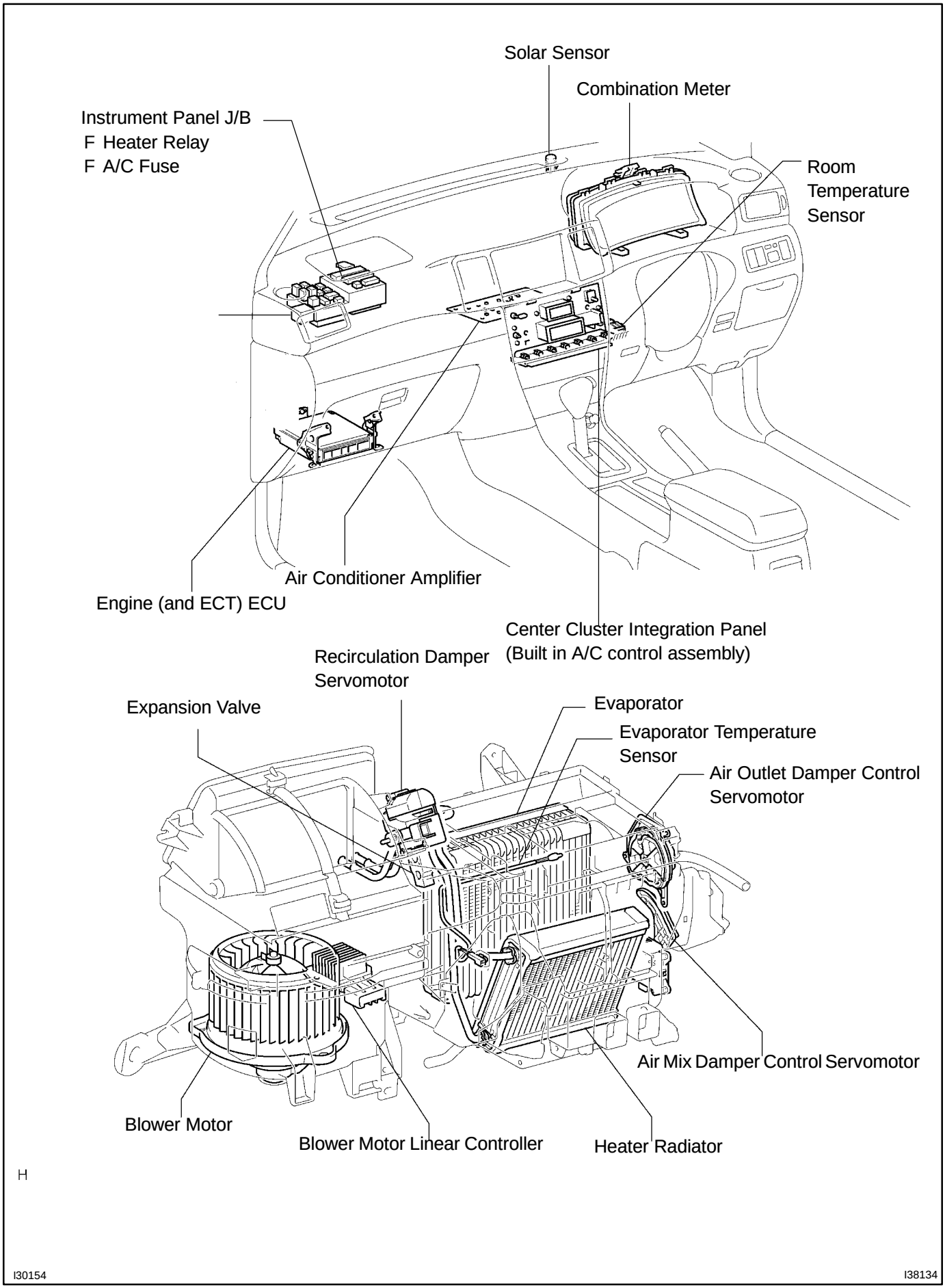
050TK-12

LOCATION



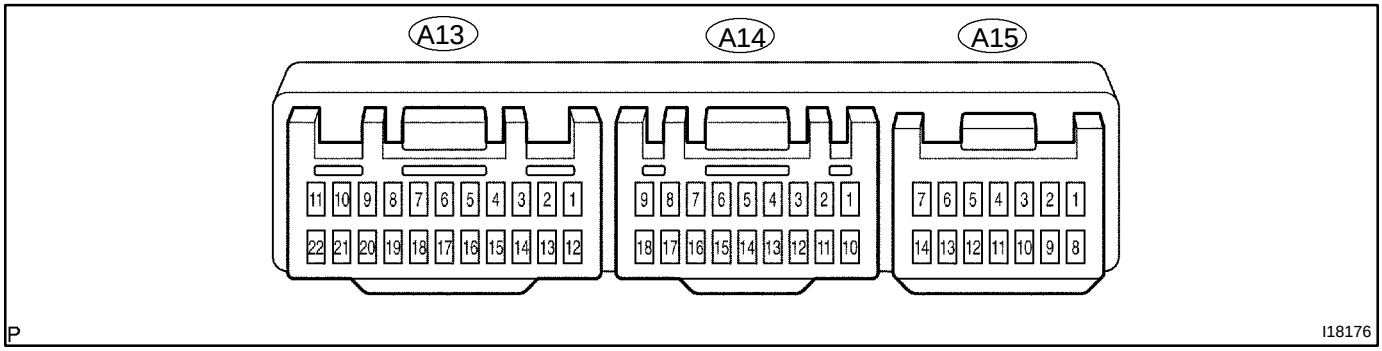
I30153

I38822


Solar Sensor
Combination Meter
Instrument Panel J/B
F Heater Relay
F A/C Fuse
Room Temperature Sensor
Air Conditioner Amplifier
Engine (and ECT) ECU
Center Cluster Integration Panel (Built in A/C control assembly)
Recirculation Damper Servomotor
Expansion Valve
Evaporator
Evaporator Temperature Sensor
Air Outlet Damper Control Servomotor
Air Mix Damper Control Servomotor
Blower Motor
Blower Motor Linear Controller
Heater Radiator
H
I30154
I38134

050TL-06

TERMINALS OF ECU



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
TP (A13-4) - SG-1 (A13-2)	W-L ⇔ BR-Y	Temperature switch signal (Passenger side)	Ignition switch: ON Set temperature: MAX. COOL → MAX. WARM	3.5 to 4.5 → 0.5 to 1.5 V
TPM (A13-5) - SG-2 (A13-3)	L-O ⇔ L-Y	Mode switch signal	Ignition switch: ON Set air flow: FACE → DEF	3.5 to 4.5 → 0.5 to 1.5 V
S5-1 (A13-6) - SG-1 (A13-2)	W-R ⇔ BR-Y	Power supply for air mix damper position sensor (Passenger side)	Ignition switch: ON	4.5 to 5.5 V
S5-2 (A13-7) - SG-2 (A13-3)	LG ⇔ L-Y	Power supply for air outlet damper position sensor	Ignition switch: ON	4.5 to 5.5 V
AMC (A13-8) - GND (A13-12)	R-W ⇔ W-B	Temperature switch signal (Passenger side)	Ignition switch: ON Set temperature: MAX. COOL → MAX. WARM	10 to 14 → Below 1.0 V
AMH (A13-9) - GND (A13-12)	L ⇔ W-B	Temperature switch signal (Passenger side)	Ignition switch: ON Set temperature: MAX. COOL → MAX. WARM	Below 1.0 → 10 to 14 V
AOF (A13-10) - GND (A13-12)	Y-B ⇔ W-B	Mode switch signal	Ignition switch: ON Set air flow setting: FACE → DEF	10 to 14 → Below 1.0 V
AOD (A13-11) - GND (A13-12)	R-B ⇔ W-B	Mode switch signal	Ignition switch: ON Set air flow setting: FACE → DEF	Below 1.0 → 10 to 14 V
GND (A13-12) - Body ground (Body Ground)	W-B ⇔ Body ground	Ground for main power supply	Always	Below 1 Ω
BLW (A13-13) - GND (A13-12)	L-B ⇔ W-B	Blower switch signal	Ignition switch: ON Blower motor: Operate	Pulse generation
HR (A13-14) - GND (A13-12)	L-O ⇔ W-B	Blower switch signal	Ignition switch: ON Blower switch: OFF → ON	10 to 14 → Below 1.0 V
RDFG (A13-15) - GND (A13-12)	B ⇔ W-B	Front defogger switch signal	Ignition switch: ON Rear defogger switch: OFF → ON	10 to 14 → Below 1.0 V
ACC (A13-20) - GND (A13-12)	GR ⇔ W-B	Power supply for accessories	Ignition switch: LOCK → ACC	0 → 10 to 14 V
IG+ (A13-21) - GND (A13-12)	R-L ⇔ W-B	Ignition switch signal	Ignition switch: LOCK or ACC → ON	0 → 10 to 14 V
B (A13-22) - GND (A13-12)	L-Y ⇔ W-B	Main power supply	Always	10 to 14 V
ACT (A14-5) - GND (A13-12)	R-L ⇔ W-B	Magnetic clutch signal	Ignition switch: START A/C magnetic clutch: Not engaged → engaged	10 to 14 → Below 1.0 V
AC1 (A14-7) - GND (A13-12)	Y-R ⇔ W-B	Magnetic clutch signal	Ignition switch: START A/C magnetic clutch: Not engaged → engaged	10 to 14 → Below 1.0 V

TW (A14-6) - GND (A13-12)	Y-G ⇔ W-B	Ignition switch signal	Ignition switch: START	Pulse generation
S5-3 (A14-10) - Body ground (Body Ground)	L-W ⇔ Body ground	Solar sensor signal (Passenger side)	Ignition switch: ON	4.5 to 5.5 V
TS (A14-11) - S5-3 (A14-10)	W-R ⇔ L-W	Solar sensor signal (Passenger side)	Ignition switch: ON Solar sensor is covered by a cloth. → Solar sensor is exposed to electric light.	4.5 to 5.5 → Below 4.0 V
TR (A14-12) - SG-3 (A14-14)	GR ⇔ BR-Y	Room temperature sensor signal	Ignition switch: ON Cabin temp.: 25 _C (77 _F) → 40 _C (104 _F)	1.8 to 2.2 → 1.2 to 1.6 V
TE (A14-13) - SG-4 (A14-15)	B-L ⇔ BR-Y	Evaporator temperature sensor signal	Ignition switch: ON Evaporator temp.: 0 _C (32 _F) → 15 _C (59 _F)	2.0 to 2.4 → 1.4 to 1.8 V
AIF (A14-16) - GND (A13-12)	G-Y ⇔ W-B	R/F switch signal	Ignition switch: ON Air intake setting: FRESH → RE-CIRCULATION	10 to 14 → Below 1.0 V
AIR (A14-17) - GND (A13-12)	L-W ⇔ W-B	R/F switch signal	Ignition switch: ON Air intake setting: FRESH → RE-CIRCULATION	Below 1.0 → 10 to 14 V
SPD (A14-18) - GND (A13-12)	V-W ⇔ W-B	Vehicle speed signal	Ignition switch: ON Turn front wheel slowly	Pulse generation
MGC (A15-1) - GND (A13-12)	Y-R ⇔ W-B	Magnetic clutch signal	Ignition switch: START A/C magnetic clutch: Not engaged → engaged	10 to 14 → Below 1.0 V
CFN+ (A15-2) - GND (A13-12)	LG ⇔ W-B	Condenser fan signal	Ignition switch: OFF → ON	10 to 14 → Below 1.0 V
CFN- (A15-3) - GND (A13-12)	LG-B ⇔ W-B	Condenser fan signal	Ignition switch: START Radiator fan motor speed: LO → HI	10 to 14 → Below 1.0 V
PSW (A15-4) - GND (A13-12)	Y-B ⇔ W-B	Pressure switch signal	Ignition switch: START Refrigerant pressure: Normal → Less than 0.19 MPa (2.0 kgf/ cm^2, 28 psi) or more than 1.34 MPa (32 2.0 kgf/ cm^2, 455 psi)	Below 1.0 → 10 to 14 V
TAM (A15-12) - SG-5 (A15-13)	W-G ⇔ BR-Y	Ambient temperature signal	Ignition switch: ON Ambient temperature: 25 _C (77 _F) → 40 _C (104 _F)	1.4 to 1.8 → 0.9 to 1.3 V

050TM-16

PROBLEM SYMPTOMS TABLE

Use the table below, with suspected areas listed in numeral order, to determine the cause of the problem. Inspect and repair or replace parts as necessary according to the steps on the following pages.

Symptom	Suspected Area	See page
The entire A/C system does not operate.	1. IG power source circuit 2. A/C amplifier	05-182 05-146
Air Flow Control : No blower operation	1. Heater relay circuit 2. Blower motor circuit 3. A/C amplifier	05-186 05-188 05-146
Air Flow Control : No blower control	1. Blower motor circuit	05-188
Air Flow Control : Insufficient air outflow	1. Blower motor circuit 2. A/C amplifier	05-188 05-146
Temperature Control : No cool air comes out.	1. Volume of refrigerant 2. Drive belt tension 3. Refrigerant pressure 4. Compressor circuit 5. Pressure switch circuit 6. Air mix control servomotor circuit 7. Air mix damper position sensor circuit 8. Room temp. sensor circuit 9. Ambient temp. sensor circuit 10. Vehicle speed signal circuit 11. Condenser fan circuit 12. A/C amplifier	L L L 05-190 05-161 05-170 05-164 05-150 05-152 05-194 05-196 05-146
Temperature Control : No warm air comes out.	1. Air mix control servomotor circuit 2. Air mix damper position sensor circuit 3. Ambient temp. sensor circuit 4. Vehicle speed signal circuit 5. Room temp. sensor circuit 6. Evaporator temp. sensor circuit 7. A/C amplifier 8. Heater radiator	05-170 05-164 05-152 05-194 05-150 05-154 05-146 -
Temperature Control : Output air is warmer or cooler than the set temperature or response is slow.	1. Room temp. sensor circuit 2. Ambient temp. sensor circuit 3. Vehicle speed signal circuit 4. Solar sensor circuit 5. Air mix damper position sensor circuit 6. Air mix control servomotor circuit 7. Water temp. sensor circuit 8. A/C amplifier	05-150 05-152 05-194 05-158 05-164 05-170 05-156 05-146
Temperature Control : No temperature control (only Max. cool or Max. warm)	1. Air mix control servomotor circuit 2. Air mix damper position sensor circuit 3. A/C amplifier	05-170 05-164 05-146
No air inlet control	1. Recirculation damper control servomotor circuit 2. A/C amplifier	05-176 05-146
No air outlet control	1. Air outlet damper position sensor circuit 2. Air outlet control servomotor circuit 3. A/C amplifier	05-167 05-173 05-146
Engine does not idle or idles continuously.	1. Compressor circuit 2. A/C amplifier	05-190 05-146
Set temperature value displayed does not match up with operation of temperature control switch.	1. A/C amplifier	05-146
Brightness does not change when rheostat volume or the light control is adjusted.	1. Illumination light system 2. A/C amplifier	- 05-146

Condenser fan does not operate.	1. Condenser fan circuit 2. Engine (and ECT) ECU (Water temp. sensor circuit) 3. A/C amplifier	05-196 05-146 05-146
Unable to access the diagnosis mode.	1. A/C amplifier	05-146
DTCs are not recorded. Set mode is cleared when IG switch is turned off.	1. Back-up power source circuit 2. A/C amplifier	05-180 05-146

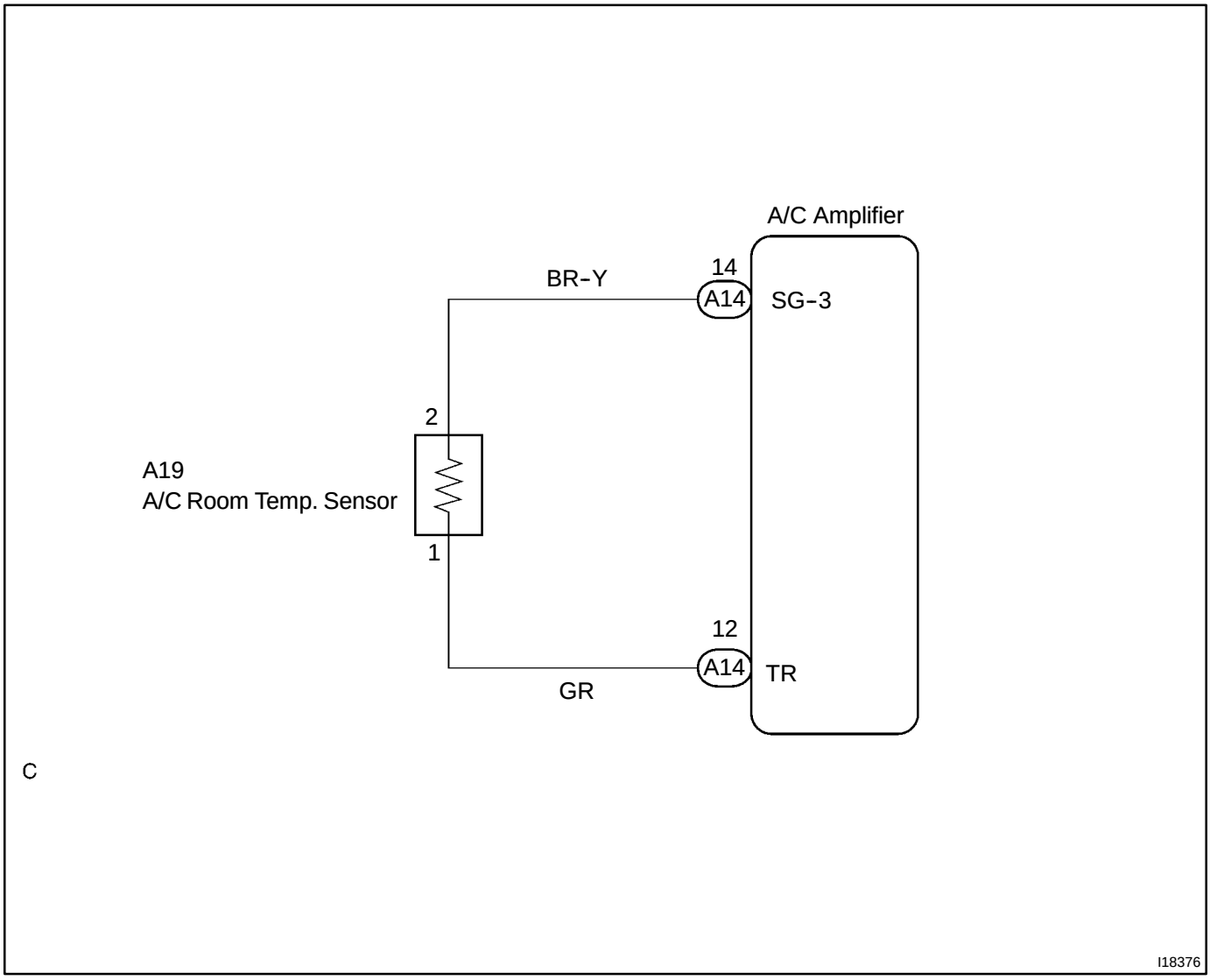
DTC 11 ROOM TEMPERATURE SENSOR CIRCUIT

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cabin and sends the appropriate signals to the A/C amplifier.

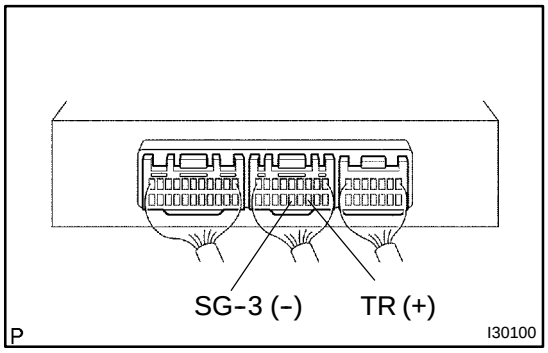
DTC No.	Detection item	Trouble Area
11	Open or short in room temperature sensor circuit	S Room temperature sensor S Harness or connector between room temperature sensor and A/C amplifier S A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT AIRCONDITIONER AMPLIFIER ASSY(TR, SG-3)



(a) Remove A/C amplifier with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

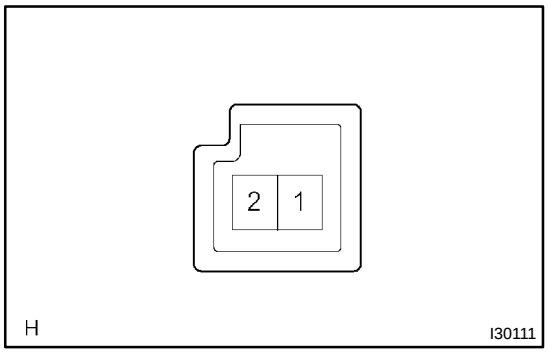
Tester connection	Condition	Specified condition
A14-12 (TR) - A14-14 (SG-3)	at 25_C (77_F)	1.8 to 2.2 V
A14-12 (TR) - A14-14 (SG-3)	at 40_C (104_F)	1.2 to 1.6 V

HINT:
As the temperature increases, the voltage decreases.

OK	PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)

NG

2	INSPECT COOLER (ROOM TEMP. SENSOR) THERMISTOR



(a) Remove cooler (room temp. sensor) thermistor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A19-1 - A19-2	at 25_C (77_F)	1.6 to 1.8 kΩ
A19-1 - A19-2	at 40_C (104_F)	0.8 to 1.0 kΩ

HINT:
As the temperature increases, the resistance decreases.

NG	REPLACE COOLER (ROOM TEMP. SENSOR) THERMISTOR

OK

3	CHECK HARNESS AND CONNECTOR(BETWEEN COOLER (ROOM TEMP. SENSOR) THERMISTOR AND AIR CONDITIONER AMPLIFIER ASSY)

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

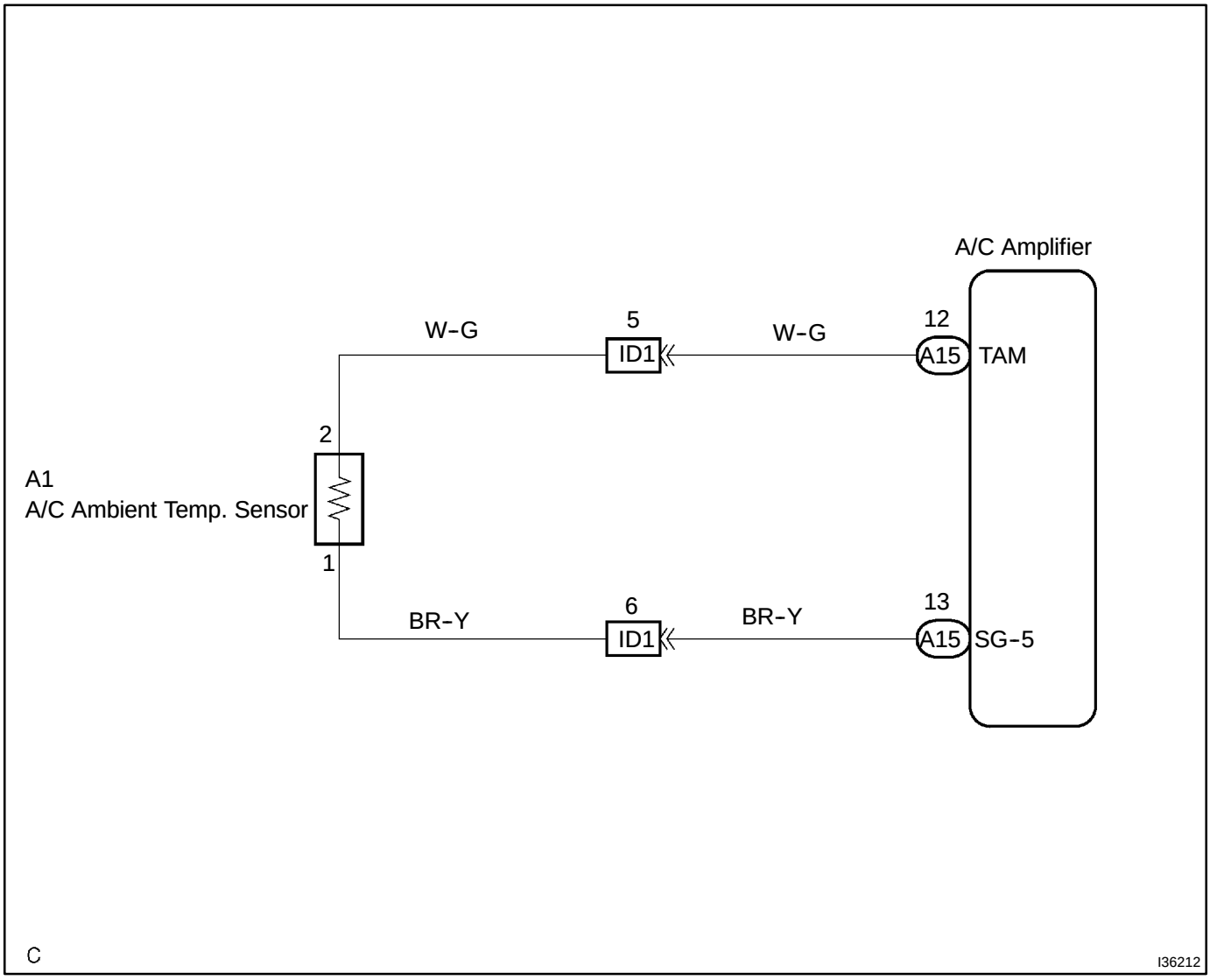
DTC 12 AMBIENT TEMPERATURE SENSOR CIRCUIT

CIRCUIT DESCRIPTION

This sensor detects the temperature outside the cabin and sends the appropriate signals to the A/C amplifier.

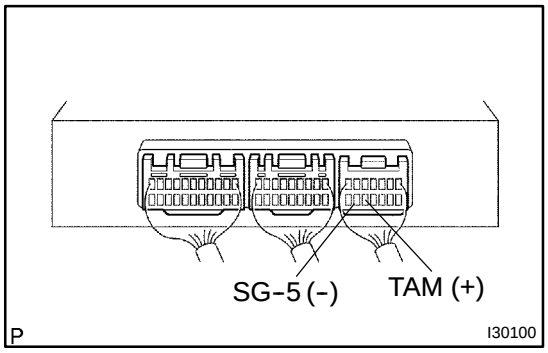
DTC No.	Detection item	Trouble Area
12	Open or short in ambient temperature sensor circuit	S Ambient temperature sensor S Harness or connector between ambient temperature sensor and A/C amplifier S A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK AIRCONDITIONER AMPLIFIER ASSY(TAM, SG-5)



(a) Remove A/C amplifier with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

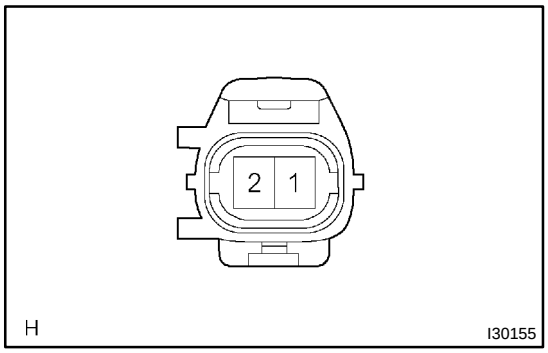
Tester connection	Condition	Specified condition
A15-12 (TAM) - A15-13 (SG-5)	at 25_C (77_F)	1.4 to 1.8 V
A15-12 (TAM) - A15-13 (SG-5)	at 40_C (104_F)	0.9 to 1.3 V

HINT:
As the temperature increases, the voltage decreases.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

2	INSPECT COOLER (AMBIENT TEMP. SENSOR) THERMISTOR



(a) Remove cooler (ambient temp. sensor).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A1-2 - A1-1	at 25_C (77_F)	1.6 to 1.8 kΩ
A1-2 - A1-1	at 40_C (104_F)	0.8 to 1.0 kΩ

HINT:
As the temperature increases, the resistance decreases.

NG → **REPLACE COOLER (AMBIENT TEMP. SENSOR) THERMISTOR**

OK

3	CHECK HARNESS AND CONNECTOR(BETWEEN AMBINENT TEMP. SENSOR AND AIR CONDITIONER AMPLIFIER ASSY)

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

OK

CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

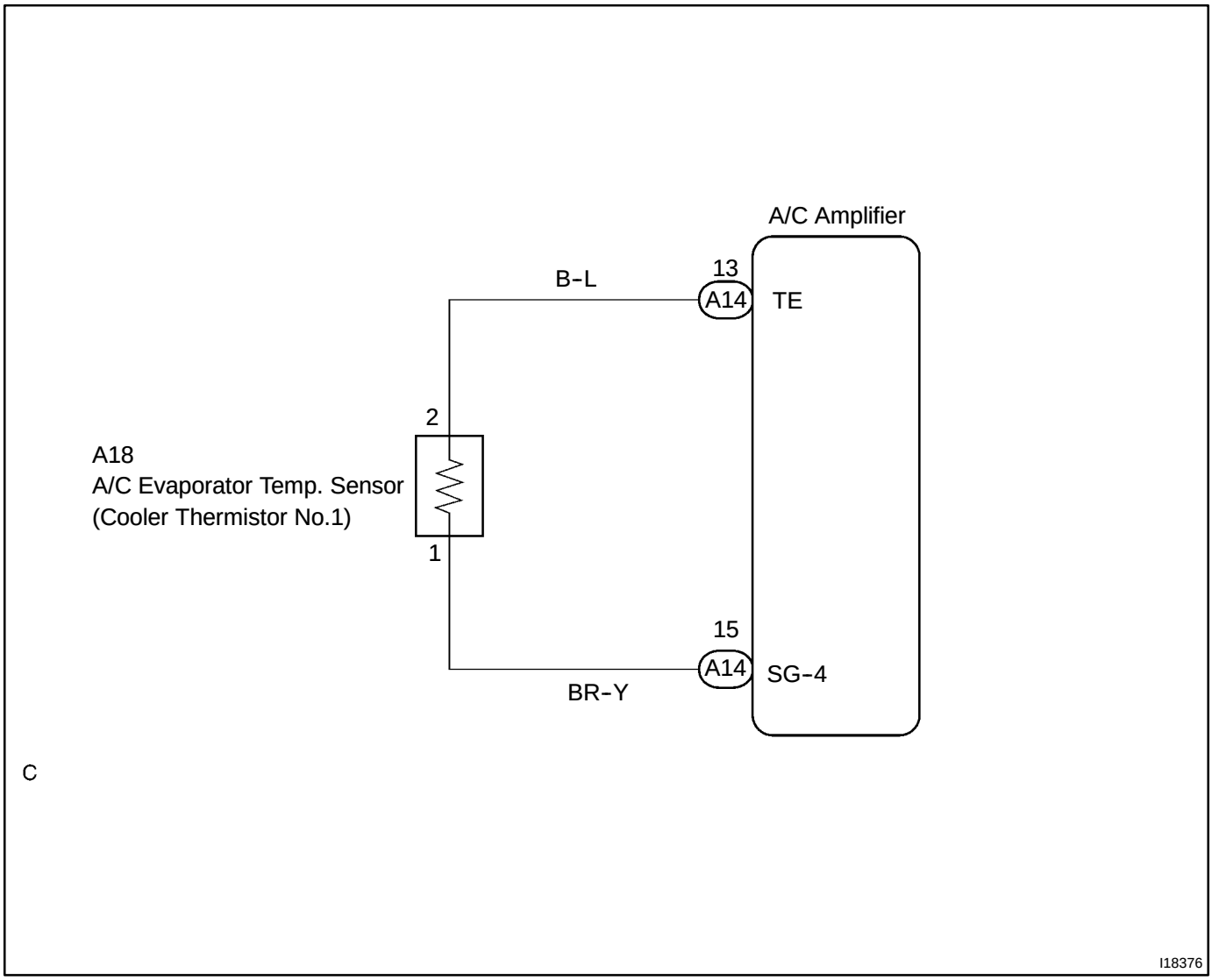
DTC	13	EVAPORATOR TEMPERATURE SENSOR CIRCUIT

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cooling unit and sends the appropriate signals to the A/C amplifier.

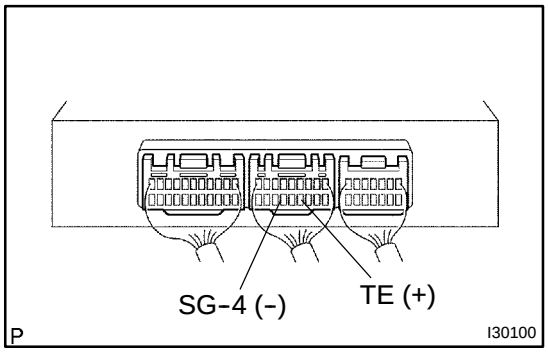
DTC No.	Detection Item	Trouble Area
13	Open or short in evaporator temperature sensor circuit.	S Evaporator temperature sensor. S Harness or connector between evaporator temperature sensor and A/C amplifier. S A/C control assembly.

WIRING DIAGRAM



CIRCUIT DESCRIPTION

1	INSPECT AIRCONDITIONER AMPLIFIER ASSY(TE, SG-4)



(a) Remove A/C amplifier with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

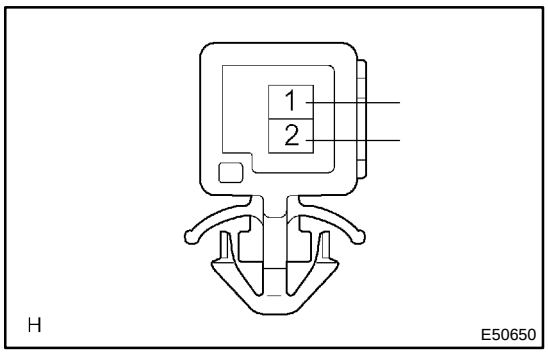
Standard:

Tester connection	Condition	Specified condition
A14-13 (TE) - A14-15 (SG-4)	at 0_C (32_F)	2.0 to 2.4 V
A14-13 (TE) - A14-15 (SG-4)	at 15_C (59_F)	1.4 to 1.8 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

2	INSPECT COOLER THERMISTOR NO.1



(a) Remove cooler thermistor No.1.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A18-2 - A18-1	at 0_C (32_F)	4.4 to 5.4 kΩ
A18-2 - A18-1	at 15_C (59_F)	2.1 to 2.6 kΩ

NG → **REPLACE COOLER THERMISTOR NO.1**

OK

3	CHECK HARNESS AND CONNECTOR(BETWEEN COOLER THERMISTOR NO.1 AND AIR CONDITIONER AMPLIFIER ASSY)

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

OK

CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

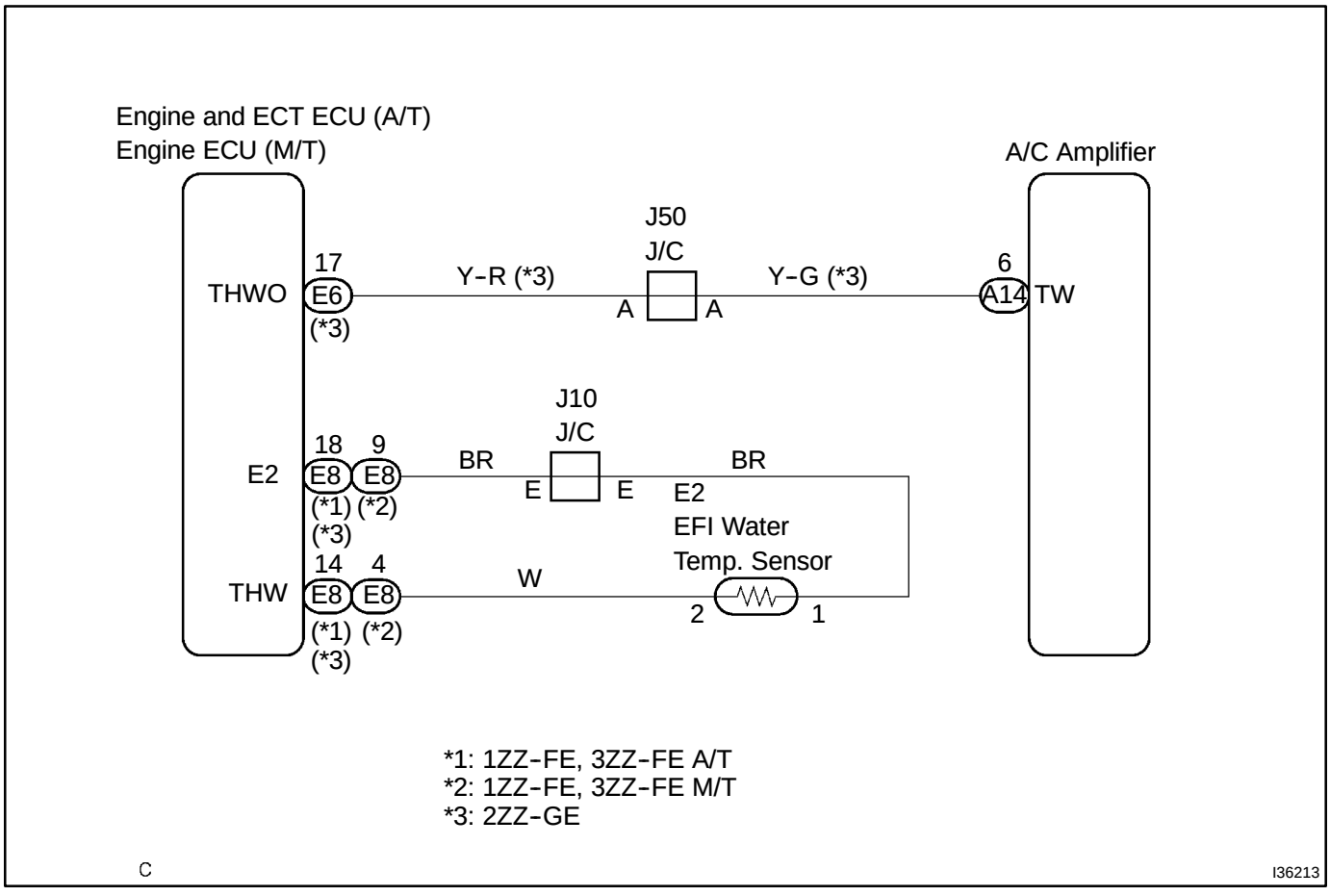
DTC	14	ENGINE COOLANT TEMPERATURE COMMUNICATION CIRCUIT

CIRCUIT DESCRIPTION

This sensor detects the engine coolant temperature and sends the appropriate signals to the engine (and ECT) ECU. Upon receiving the signal, the engine (and ECT) ECU sends signals to the A/C amplifier. These signals are used for warm up control when engine is cold.

DTC No.	Detection Item	Trouble Area
14	Open or short in A/C amplifier engine (and ECT) ECU circuit.	S Engine (and ECT) ECU S Harness or connector between evaporator temperature sensor and A/C amplifier S A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	DIAGNOSTIC TROUBLE CODE CHECK

(a) Does the DTC P0115 output?

YES → GO TO ENGINE CONTROL SYSTEM (See page 05-46)

NO

2	CHECK HARNESS AND CONNECTOR(BETWEEN ENGINE (AND ECT) ECU AND AIR CONDITIONER AMPLIFIER ASSY)

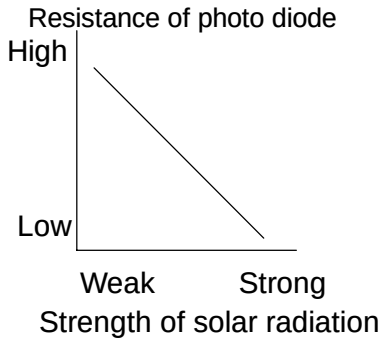
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

DTC 21 SOLAR SENSOR CIRCUIT

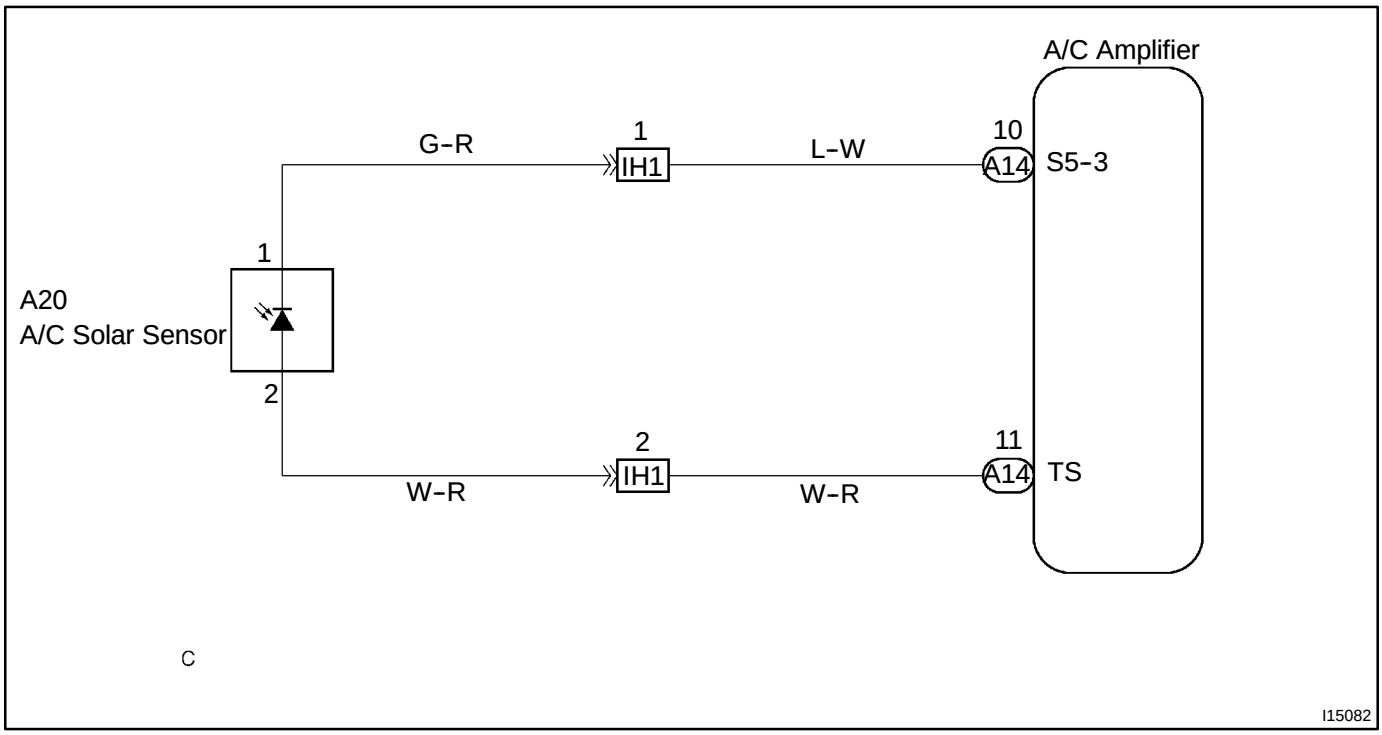
CIRCUIT DESCRIPTION



A photo diode in the solar sensor detects solar radiation and sends signals to the A/C amplifier.

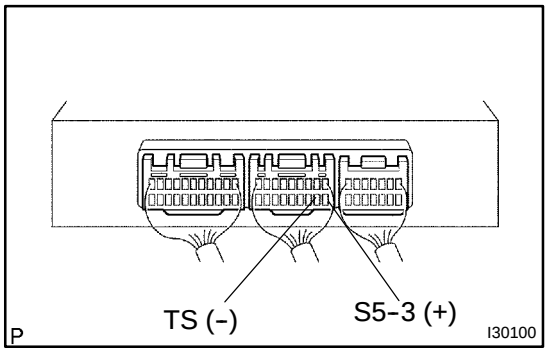
DTC No.	Detection Item	Trouble Area
21	Open or short in solar sensor circuit. (When the sensor is not receiving solar radiation, DTC 21 is output. This is not abnormal.)	·Solar sensor ·Harness or connector between solar sensor and A/C amplifier ·A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT AIRCONDITIONER AMPLIFIER ASSY(TS, S5-3)



(a) Remove A/C amplifier with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

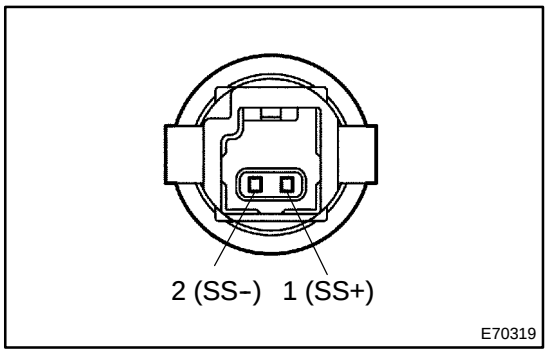
Tester connection	Condition	Specified condition
A14-10 (S5-3) - A14-11 (TS)	Sensor subject electric light	Below 4.0 V
A14-10 (S5-3) - A14-11 (TS)	Sensor is covered by a cloth	4.0 to 4.5 V

HINT:
As the inspection light is moved away from the sensor, the voltage increases.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

2	INSPECT COOLER (SOLAR SENSOR) THERMISTOR



(a) Remove cooler (solar sensor) thermistor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A20-1 - A20-2	Sensor subject electric light	Below 1.0 Ω
A20-1 - A20-2	Sensor is covered by a cloth	10 kΩ or higher

HINT:
Connect the positive (+) lead to terminal 1 of the ohmmeter and the negative (-) lead to terminal 2 of the solar sensor.

NG → **REPLACE COOLER (SOLAR SENSOR) THERMISTOR**

OK

3	CHECK HARNESS AND CONNECTOR(BETWEEN COOLER (SOLAR SENSOR) THERMISTOR AND AIR CONDITIONER AMPLIFIER ASSY)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE AIRCONDITIONER AMPLIFIER ASSY

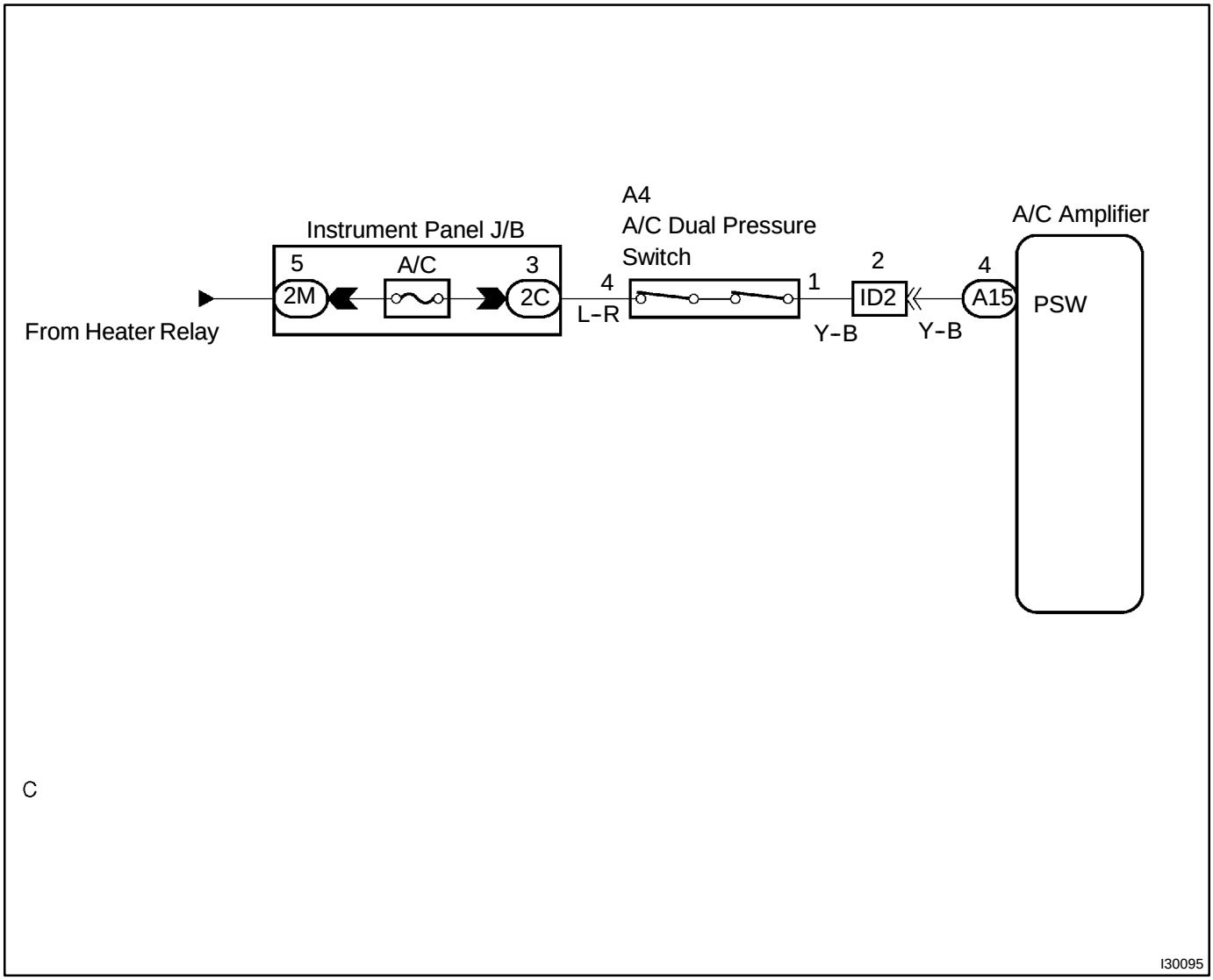
DTC	23	PRESSURE SWITCH CIRCUIT

CIRCUIT DESCRIPTION

The pressure switch sends the appropriate signals to the A/C amplifier when the A/C refrigerant pressure drops too low or rises too high. When the A/C amplifier receives these signals, it outputs signals via the A/C amplifier to switch OFF the compressor relay and turns the magnetic clutch OFF.

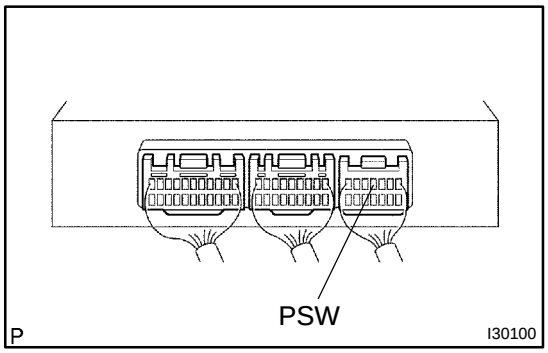
DTC No.	Detection Item	Trouble Area
23	S Open in pressure sensor circuit S Abnormal refrigerant pressure below 196 kPa (2.0 kg/cm^2, 28 psi) over 3,140 kPa (32.0 kgf/cm^2, 455 psi)	S Pressure switch. S Harness or connector between pressure switch and A/C amplifier S Refrigerant pipe line. S A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT AIRCONDITIONER AMPLIFIER ASSY(PSW)



(a) Install the manifold gauge set.
(b) Turn the ignition switch to the ON position.
(c) Check the voltage between terminal PSW of A/C amplifier connector and body ground when refrigerant pressure is changed.
(d) The voltage changes with refrigerant pressure, as shown in the diagram below.

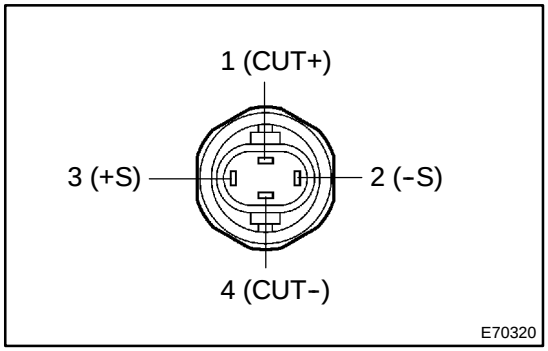
Voltage:

Low Pressure Cut Side	Reference : High Pressure Cut Side
ON (0V) → 225 kPa 196 kPa ← OFF (12V)	ON (0V) 2,550 kPa ↑ 3,140 kPa ↓ OFF (12V)

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

2 CHECK COOLER REFRIGERANT LIQUID PIPE A (PRESSURE SWITCH)



(a) Turn the ignition switch to the ON position.
(b) Check the continuity between terminals 1 and 4 of pressure switch when refrigerant pressure is changed.
(c) The continuity changes with refrigerant pressure as shown in the diagram below.

Continuity:

Low Pressure Cut Side	Reference : High Pressure Cut Side
ON (continuity) → 225 kPa 196 kPa ← OFF (continuity)	ON (continuity) 2,550 kPa ↑ 3,140 kPa ↓ OFF (continuity)

NG → **REPLACE COOLER REFRIGERANT LIQUID PIPE A**

OK

3	CHECK HARNESS AND CONNECTOR(BETWEEN PRESSURE SWITCH AND AIR CONDITIONER AMPLIFIER ASSY)

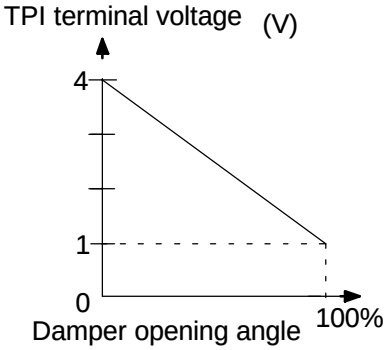
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

DTC 31 AIR MIX DAMPER POSITION SENSOR CIRCUIT

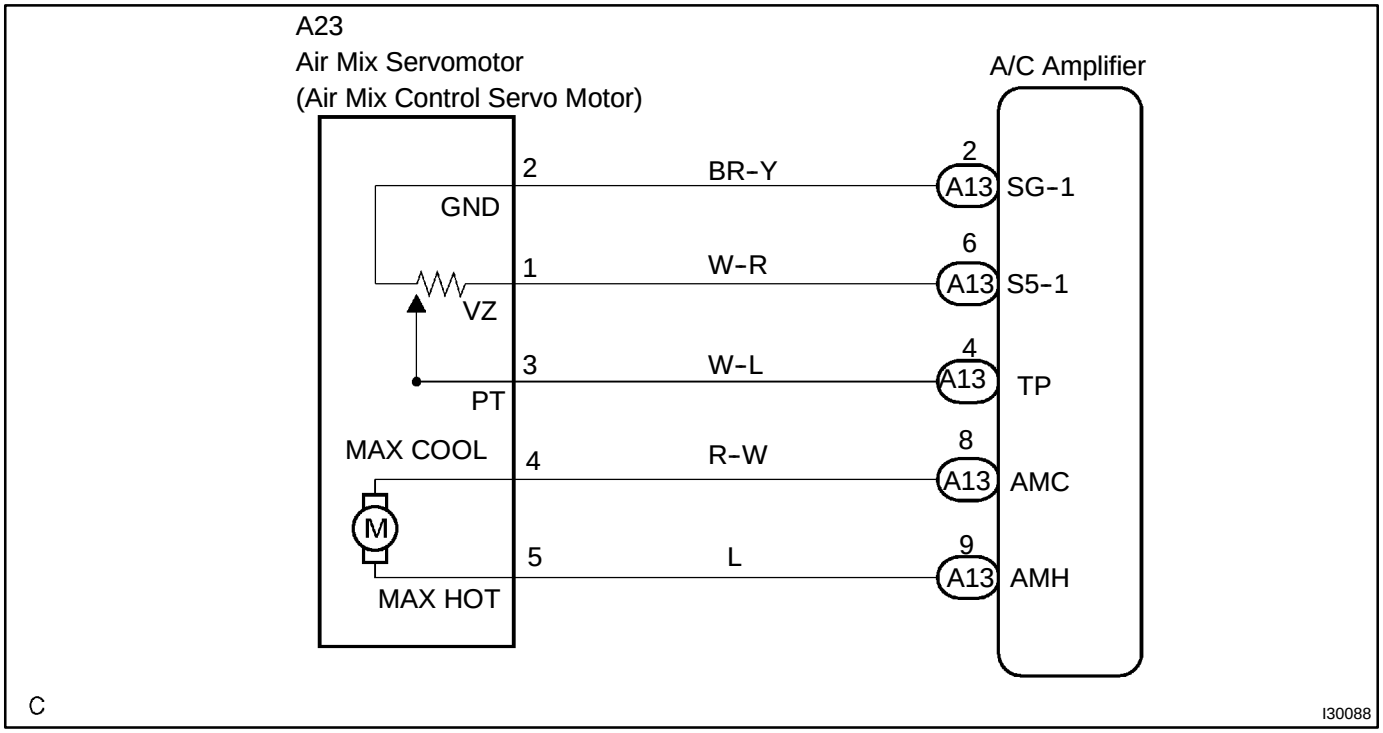
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix damper and sends the appropriate signals to the A/C amplifier. The position sensor is built into the air mix control servomotor.

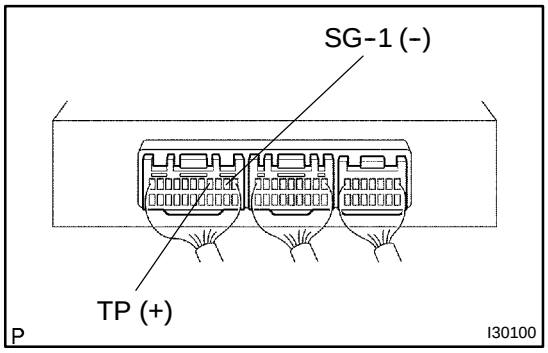
DTC No.	Detection Item	Trouble Area
31	Short to ground or power source circuit in air mix damper position sensor circuit	S Air mix damper position sensor. S Harness of connector between air mix control servomotor and A/C amplifier. S A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT AIRCONDITIONER AMPLIFIER ASSY(TP, SG-1)



(a) Remove the A/C amplifier with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Change the set temperature to activate the air mix damper and measure the voltage according to the values in the table below.

Standard:

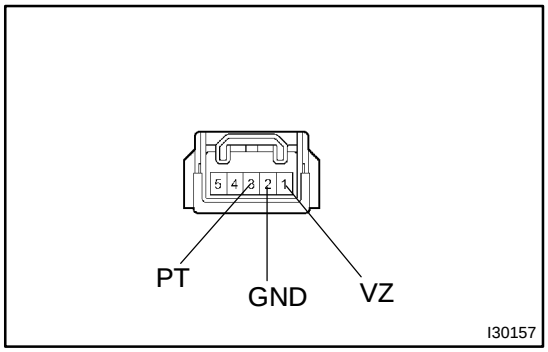
Tester connection	Condition	Specified condition
A13-4 (TP) - A13-2 (SG-1)	Max. cool	3.5 to 4.5 V
A13-4 (TP) - A13-2 (SG-1)	Max. warm	0.5 to 1.8 V

HINT:
As the set temperature increases, the voltage decreases gradually without interruption.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

2 INSPECT AIRMIX DAMPER SERVO SUB-ASSY



(a) Remove the air mix damper servomotor.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A23-1 (VZ) - A23-2 (GND)	Always	4.2 to 7.2 kΩ

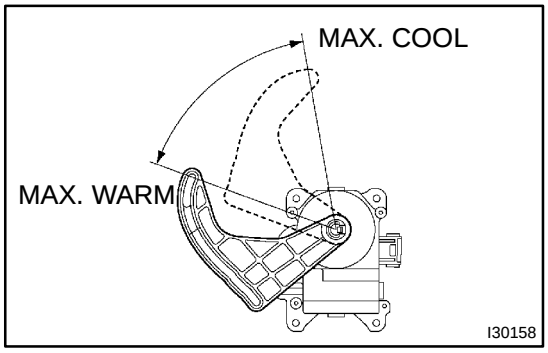
(c) While operating air mix damper servo sub-assy following the procedure on page 05-146, measure the resistance according to the values in the table below.

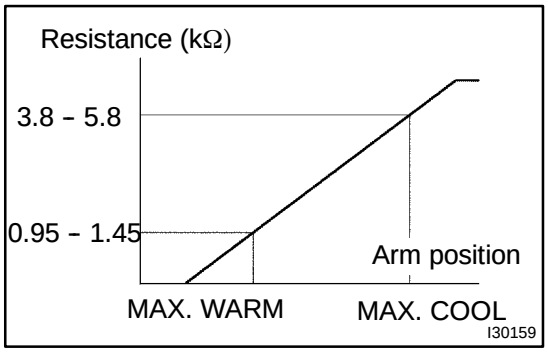
Standard:

Tester connection	Condition	Specified condition
A23-1 (VZ) - A23-3 (P1)	Max. cool	3.8 to 5.8 kΩ
A23-1 (VZ) - A23-3 (P1)	Max. warm	0.95 to 1.45 kΩ

HINT:

As the air mix damper servomotor moves from cool side to warm side, the resistance decreases gradually without interruption.





NG → REPLACE AIRMIX DAMPER SERVO SUB-ASSY

OK

3 CHECK HARNESS AND CONNECTOR(BETWEEN AIR MIX DAMPER POSITION SENSOR AND AIR CONDITIONER AMPLIFIER ASSY)

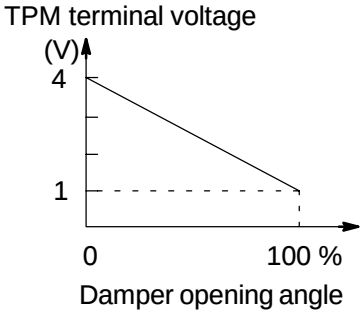
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

DTC	33	AIR OUTLET DAMPER POSITION SENSOR CIRCUIT

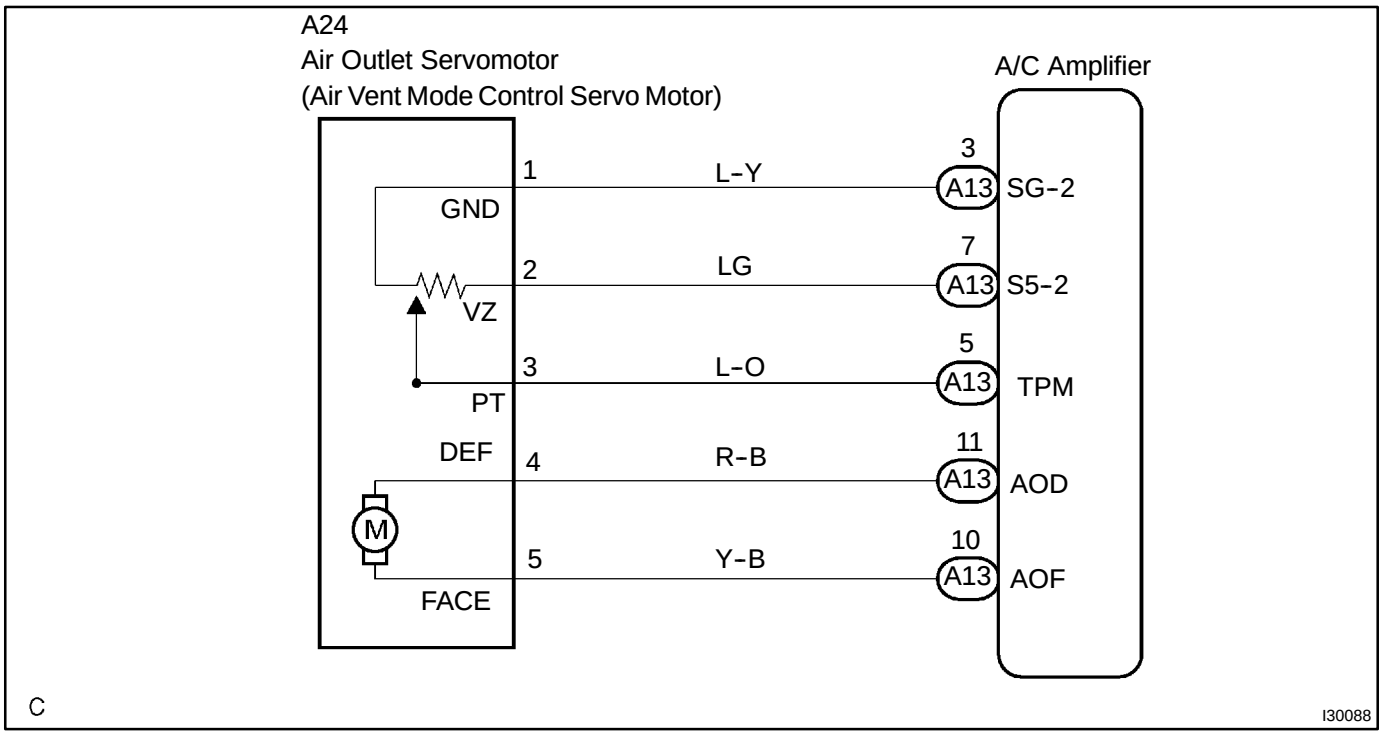
CIRCUIT DESCRIPTION



This sensor detects the position of the air outlet damper and sends the appropriate signals to the A/C amplifier. The position sensor is built into the mode damper servo sub-assy.

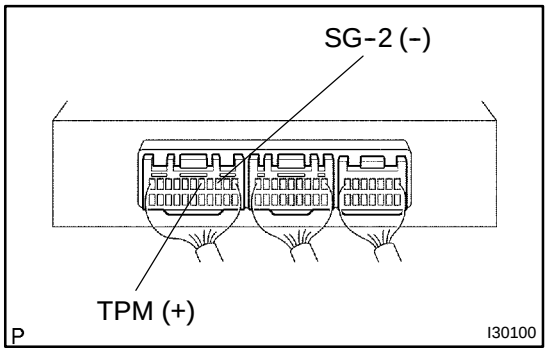
DTC No.	Detection Item	Trouble Area
33	Short to ground or power source circuit in air outlet damper position sensor circuit.	S Air outlet damper position sensor. S Harness or connector between mode damper servo sub-assy and A/C amplifier S A/C amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT AIRCONDITIONER AMPLIFIER ASSY(TPM, SG-2)



(a) Remove the A/C amplifier with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Change the set mode to activate the air outlet damper and measure the voltage according to the values in the table below.

Standard:

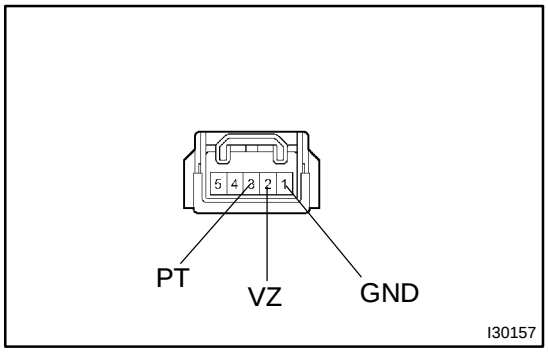
Tester connection	Condition	Specified condition
A13-5 (TPM) - A13-3 (SG-2)	FACE	3.5 to 4.5 V
A13-5 (TPM) - A13-3 (SG-2)	DEF	0.5 to 1.5 V

HINT:
As the air outlet servomotor is moved from FACE side to DEF side, the voltage decreases gradually without interruption.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

2 INSPECT MODE DAMPER SERVO SUB-ASSY



(a) Remove the air outlet servomotor.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A24-1 (VZ) - A24-2 (GND)	Always	4.2 to 7.2 kΩ

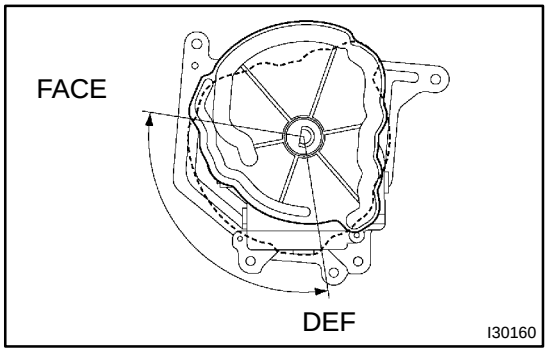
(c) While operating air outlet servomotor following the procedure on page 05-146, measure the resistance according to the values in the table below.

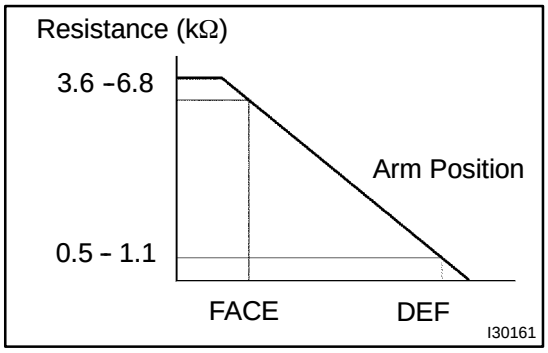
Standard:

Tester connection	Condition	Specified condition
A24-2 (VZ) - A24-3 (PT)	DEF	0.5 to 1.1 kΩ
A24-2 (VZ) - A24-3 (PT)	FACE	3.6 to 6.8 kΩ

HINT:

As the air outlet servomotor moved from DEF side to FACE side, the resistance decreases gradually with out interruption.





NG → REPLACE MODE DAMPER SERVO SUB-ASSY

OK

3 CHECK HARNESS AND CONNECTOR(BETWEEN AIR OUTLET DAMPER POSITION SENSOR AND AIR CONDITIONER AMPLIFIER ASSY)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

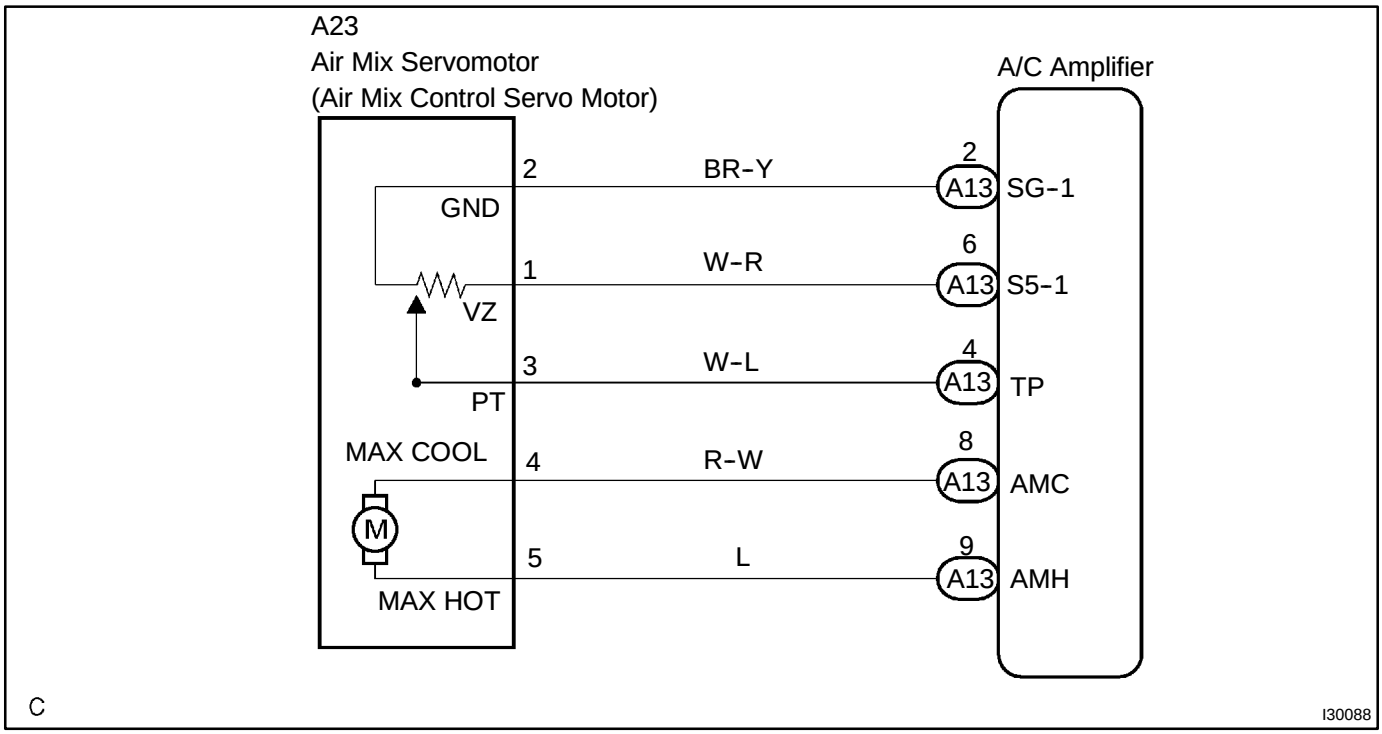
DTC	41	AIR MIX DAMPER CONTROL SERVOMOTOR CIRCUIT

CIRCUIT DESCRIPTION

This air mix servomotor is controlled by the air conditioner amplifier assy and moves the air mix damper to the desired position.

DTC No.	Detection Item	Trouble Area
41	Air mix damper position sensor value does not change even if air conditioner amplifier assy operates air mix servomotor.	S Air mix servomotor S Harness or connector between air conditioner amplifier assy and air mix servomotor. S Air conditioner amplifier assy

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTUATOR CHECK

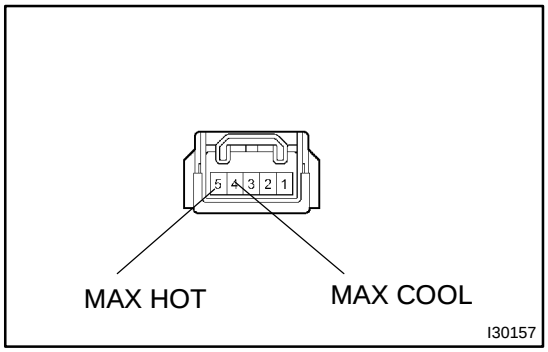
(a) Set to the actuator check mode (See page 05-139).
(b) Press the DEF switch and change to stepped operation.
(c) Check the air flow temperature by hand.

Display Code	Air Mix Damper Operation
0	COOL side (0% open)
1	COOL side (0% open)
2	COOL side (0% open)
3	COOL side (0% open)
4	COOL/WARM (50% open)
5	COOL/WARM (50% open)
6	COOL/WARM (50% open)
7	WARM side (100% open)
8	WARM side (100% open)
9	WARM side (100% open)

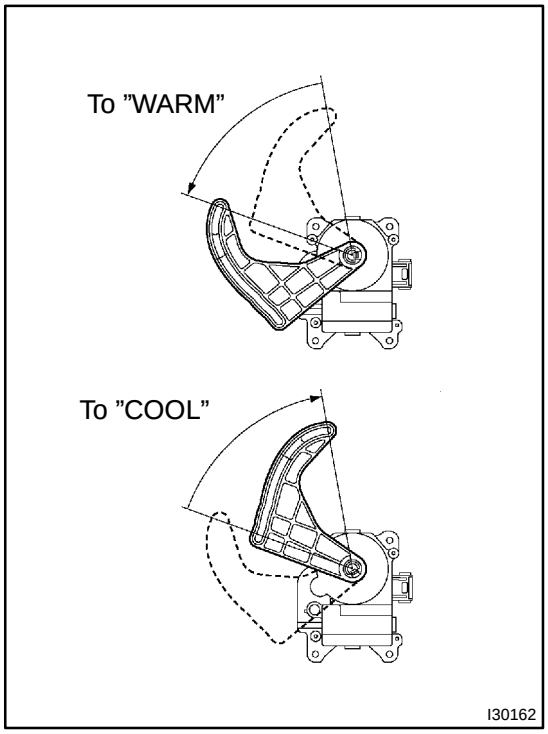
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

2	INSPECT AIRMIX DAMPER SERVO SUB-ASSY



(a) Remove the air mix servomotor.
(b) Connect the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 4, then check that the lever moves smoothly to the "WARM" side.
(c) Connect the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 5, then check that the lever moves smoothly to the "COOL" side.



NG → REPLACE AIRMIX DAMPER SERVO SUB-ASSY

OK

3	CHECK HARNESS AND CONNECTOR(BETWEEN AIR MIX DAMPER SERVOMOTOR AND AIR CONDITIONER AMPLIFIER ASSY)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

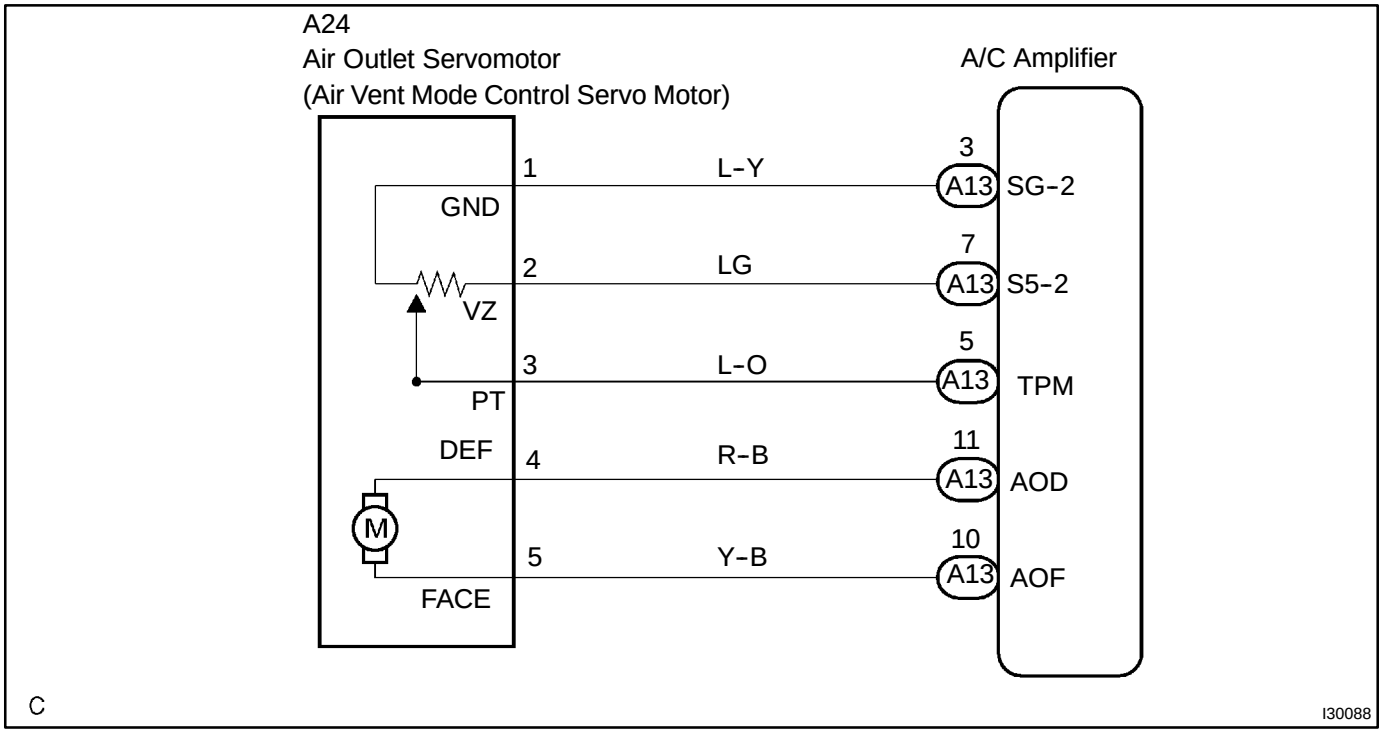
DTC	43	AIR OUTLET DAMPER CONTROL SERVOMOTOR CIRCUIT

CIRCUIT DESCRIPTION

This circuit activates the servomotor and changes each mode damper position by the signals from the air conditioner amplifier. When the AUTO switch is on, the air conditioner amplifier changes the modes automatically between (FACE), (BI-LEVEL) and (FOOT) according to the temperature setting.

DTC No.	Detection Item	Trouble Area
43	The air outlet damper position sensor value does not change even if the air conditioner amplifier operates the air outlet damper control servomotor.	S Air outlet damper control servomotor S Air outlet damper position sensor S Harness or connector between air conditioner amplifier air outlet damper control servomotor and air outlet damper position sensor S Air conditioner amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTUATOR CHECK

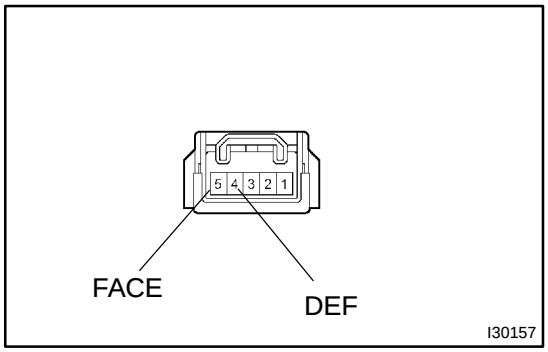
(a) Warm up engine.
(b) Set to the actuator check mode (See page 05-139).
(c) Press the DEF switch and change to stepped operation
(d) Press the DEF switch and check the air flow by hand.

Display code	Air flow condition
0	FACE
1	FACE
2	FACE
3	FACE
4	FACE
5	B/L
6	FOOT
7	FOOT
8	FOOT/DEF
9	DEF

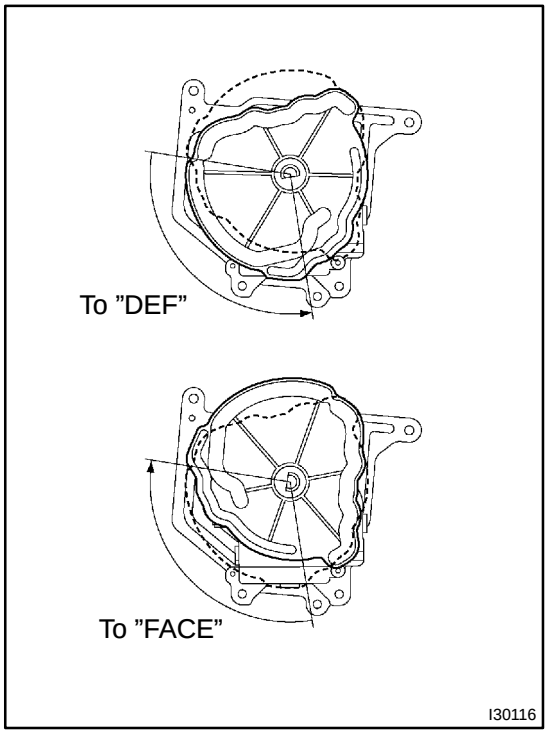
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

2	INSPECT MODE DAMPER SERVO SUB-ASSY



(a) Remove the air outlet servomotor.
(b) Connect the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 5, then check that the lever moves to the "DEF" position.
(c) Connect the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 4, then check that the lever moves to the "FACE" position.



NG → REPLACE MODE DAMPER SERVO SUB-ASSY

OK

3	CHECK HARNESS AND CONNECTOR(BETWEEN AIR OUTLET DAMPER SERVOMOTOR AND AIR CONDITIONER AMPLIFIER ASSY)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

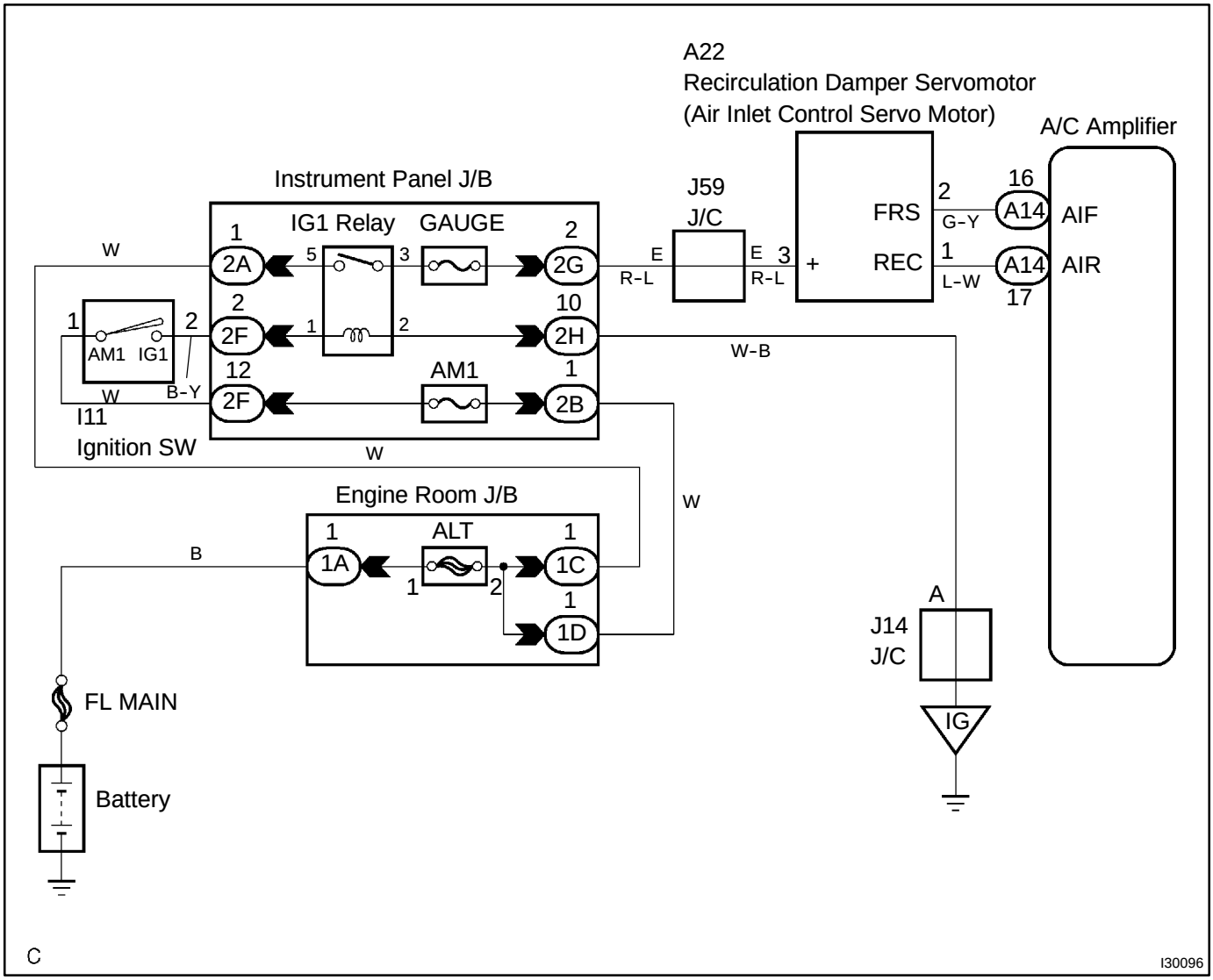
CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

RECIRCULATION DAMPER SERVOMOTOR CIRCUIT

CIRCUIT DESCRIPTION

The recirculation damper servomotor is controlled by the A/C amplifier and moves the recirculation damper to the desired position.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTUATOR CHECK

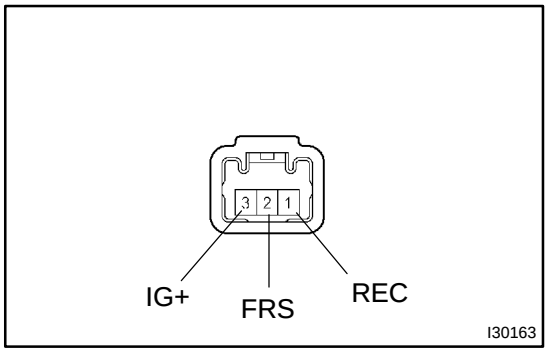
(a) Remove the glove box to check the recirculation damper operation.
(b) Set to the actuator check mode (See page 05-139).
(c) Press the DEF switch and change to stepped operation.
(d) Press the DEF switch in order and check the operation of the recirculation damper.

Display code	Recirculation damper position
0	FRESH
1	FRESH
2	FRESH
3	FRESH
4	RECIRCULATION
5	RECIRCULATION
6	RECIRCULATION
7	RECIRCULATION
8	RECIRCULATION
9	RECIRCULATION

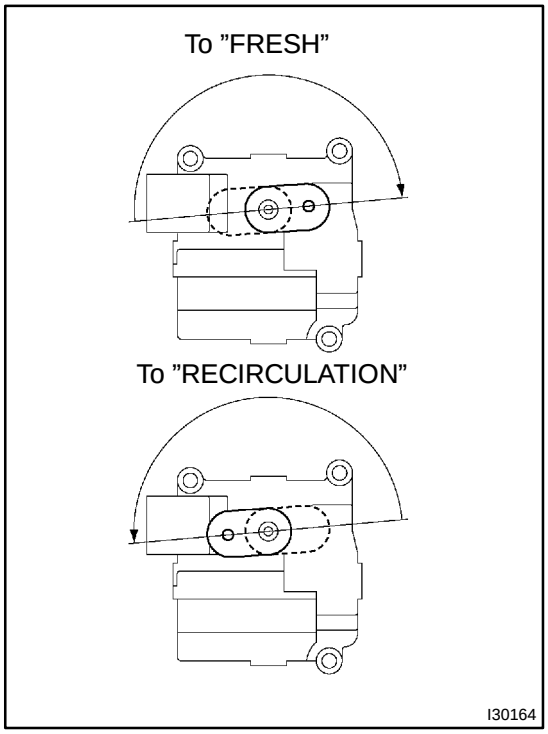
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

2	INSPECT RECIRCULATION DAMPER SERVO SUB-ASSY



(a) Remove the recirculation damper servomotor.
(b) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 2, then check that the lever moves smoothly to the "FRESH" side.
(c) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 1, then check that the lever moves smoothly to the "RECIRCULATION" side.



NG → REPLACE RECIRCULATION DAMPER SERVO SUB-ASSY

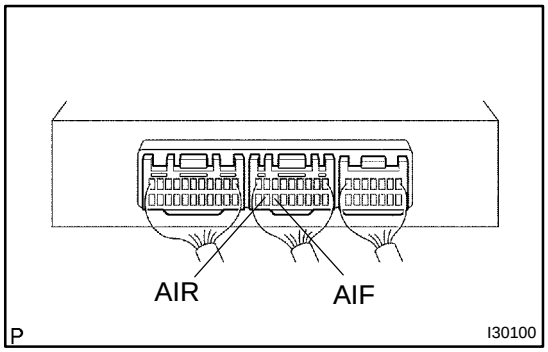
OK

3	CHECK HARNESS AND CONNECTOR(BETWEEN RECIRCULATON DAMPER SERVOMOTOR AND BATTERY)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	INSPECT AIRCONDITIONER AMPLIFIER ASSY(AIF, AIR)



(a) Remove A/C amplifier with connectors still connected.

(b) Measure the voltage between terminal AIF of A/C amplifier and body ground when recirculation switch is operated, as shown in the table below.

Voltage:

Recirculation switch	Voltage (V)
FRESH	10 to 14
RECIRCULATION	Below 1.0

(c) Measure the voltage between terminal AIR of A/C amplifier and body ground when recirculation switch is operated, as shown in the table below.

Voltage:

Recirculation switch	Voltage (V)
FRESH	Below 1.0
RECIRCULATION	10 to 14

NG → **CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY**

OK

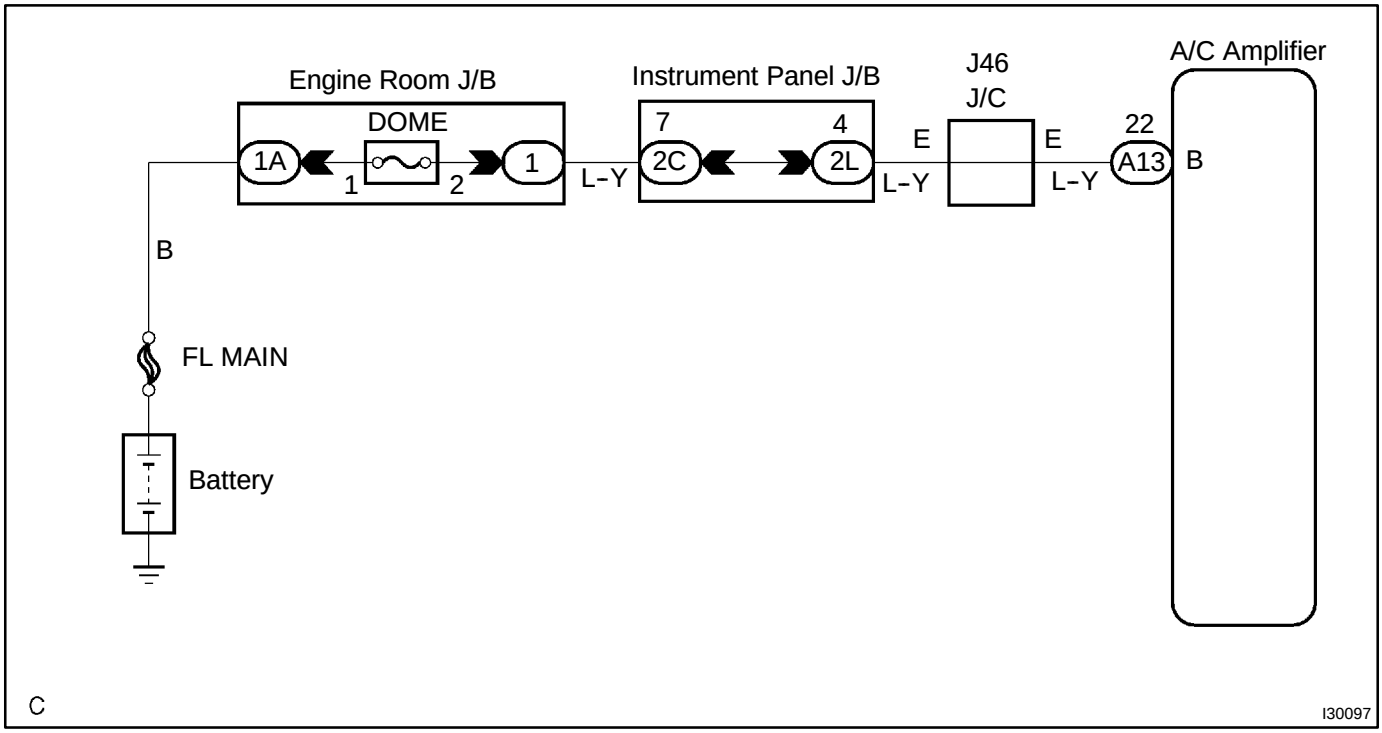
REPLACE HARNESS OR CONNECTOR(BETWEEN RECIRCULATION DAMPER SERVOMOTOR AND AIR CONDITIONER AMPLIFIER ASSY)

BACK-UP POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This is the back-up power source circuit for the air conditioner amplifier. Power is supplied even when the ignition switch is off and is used for diagnostic trouble code memory, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

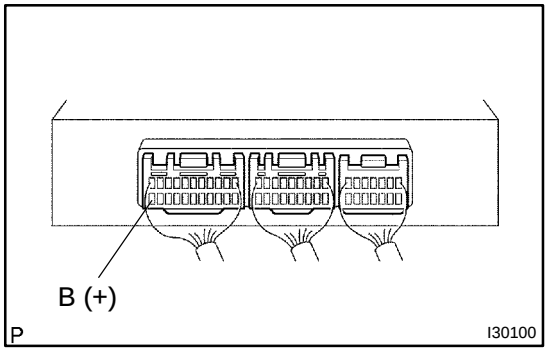
1	CHECK FUSE(DOME FUSE)

(a) Remove the DOME fuse from the engine room J/B.
(b) Check that continuity exists in the DOME fuse.

NG → **REPLACE FUSE**

OK

2	INSPECT AIRCONDITIONER AMPLIFIER ASSY(B)



(a) Remove the A/C amplifier with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A13-22 (B) - Body ground	Always	10 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

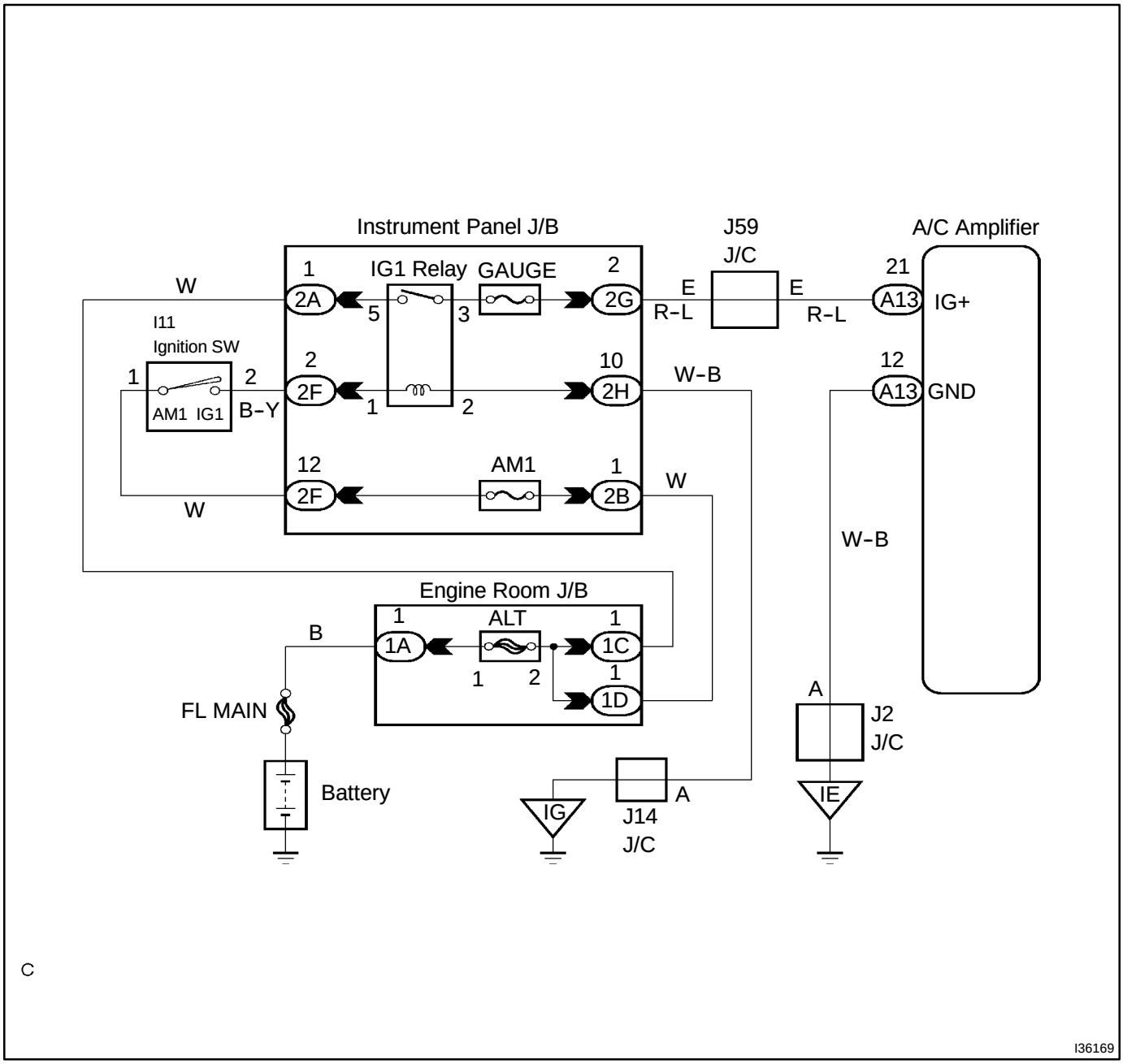
REPAIR OR REPLACE HARNESS OR CONNECTOR(BETWEEN AIR CONDITIONER AMPLIFIER ASSY AND BATTERY)

IG POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This is the power source circuit for the air conditioner amplifier (contains the ECU) and servomotor, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

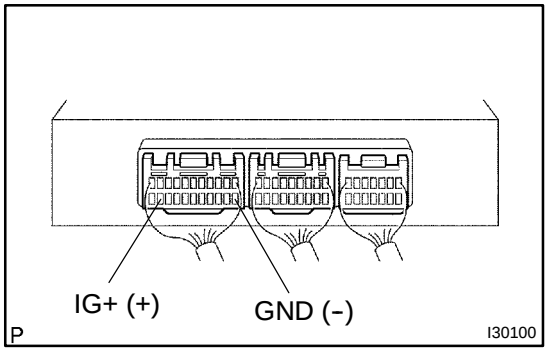
1	CHECK FUSE(GAUGE FUSE)

(a) Remove the GAUGE fuse from the engine room J/B.
(b) Check that continuity exists in the GAUGE fuse.

NG → REPLACE FUSE

OK

2	INSPECT AIRCONDITIONER AMPLIFIER ASSY(IG+, GND)



(a) Remove the air conditioner amplifier assy with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A13-21 (IG+) - A13-12 (GND)	Always	10 to 14 V

OK → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)

NG

3	CHECK HARNESS AND CONNECTOR(BETWEEN AIR CONDITIONER AMPLIFIER ASSY AND BODY GROUND)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	CHECK HARNESS AND CONNECTOR(BETWEEN AIR CONDITIONER AMPLIFIER ASSY AND BATTERY)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

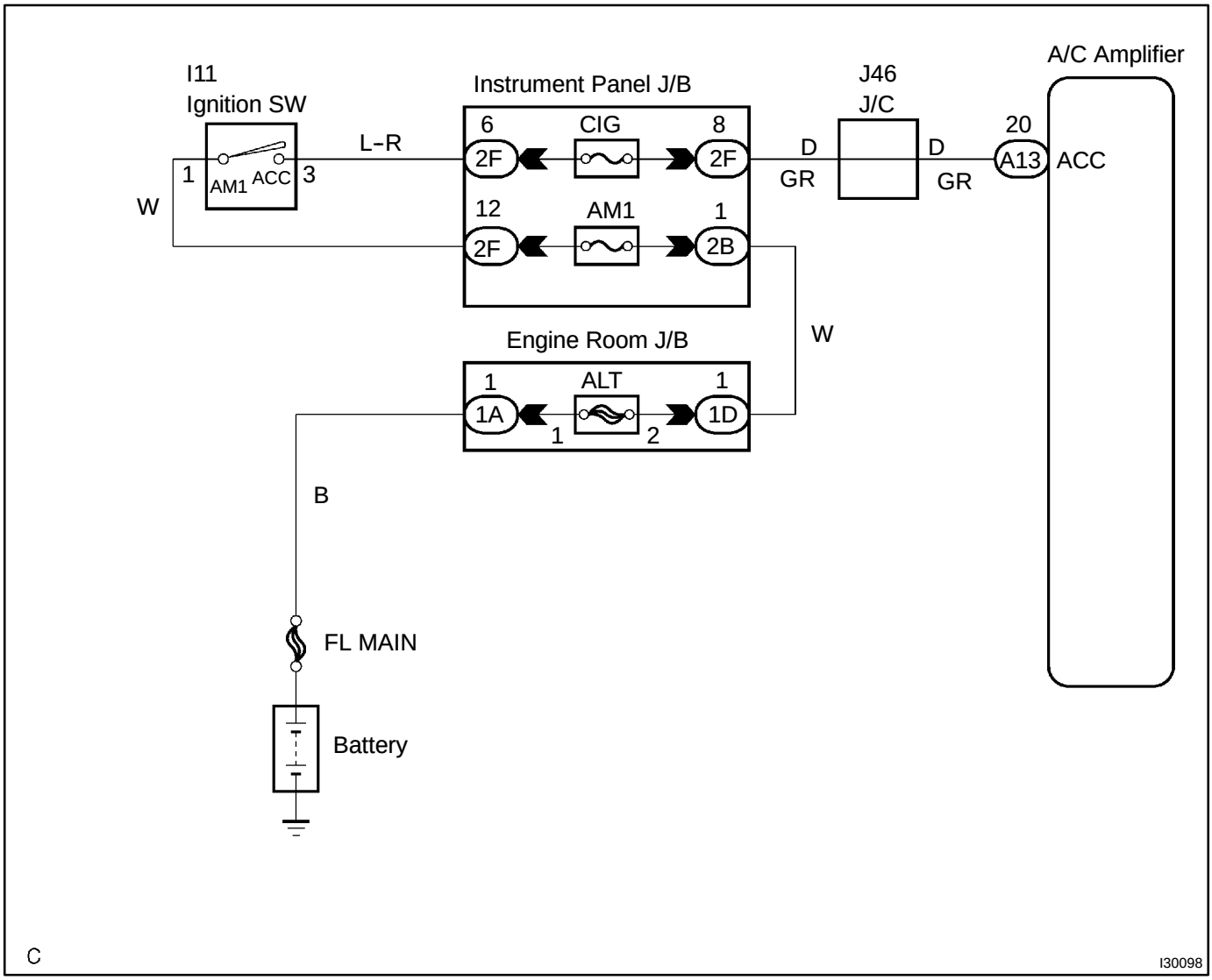
CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

ACC POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This circuit supplies power to the air conditioner amplifier and illuminates the clock.

WIRING DIAGRAM



INSPECTION PROCEDURE

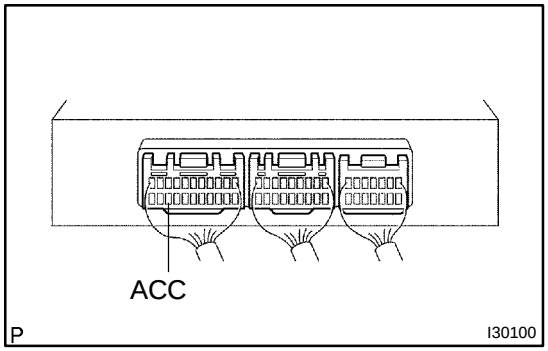
1	CHECK FUSE(CIG FUSE)

(a) Remove the CIG fuse from the instrument panel J/B.
(b) Check that continuity exists in the CIG fuse.

NG → REPLACE FUSE

OK

2	INSPECT AIRCONDITIONER AMPLIFIER ASSY(ACC)



(a) Remove the air conditioner amplifier assy with connectors still connected.
(b) Turn the ignition switch to the ACC position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A13-20 (ACC) - Body ground	Always	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR(BETWEEN AIR CONDITIONER AMPLIFIER ASSY AND BATTERY)

OK

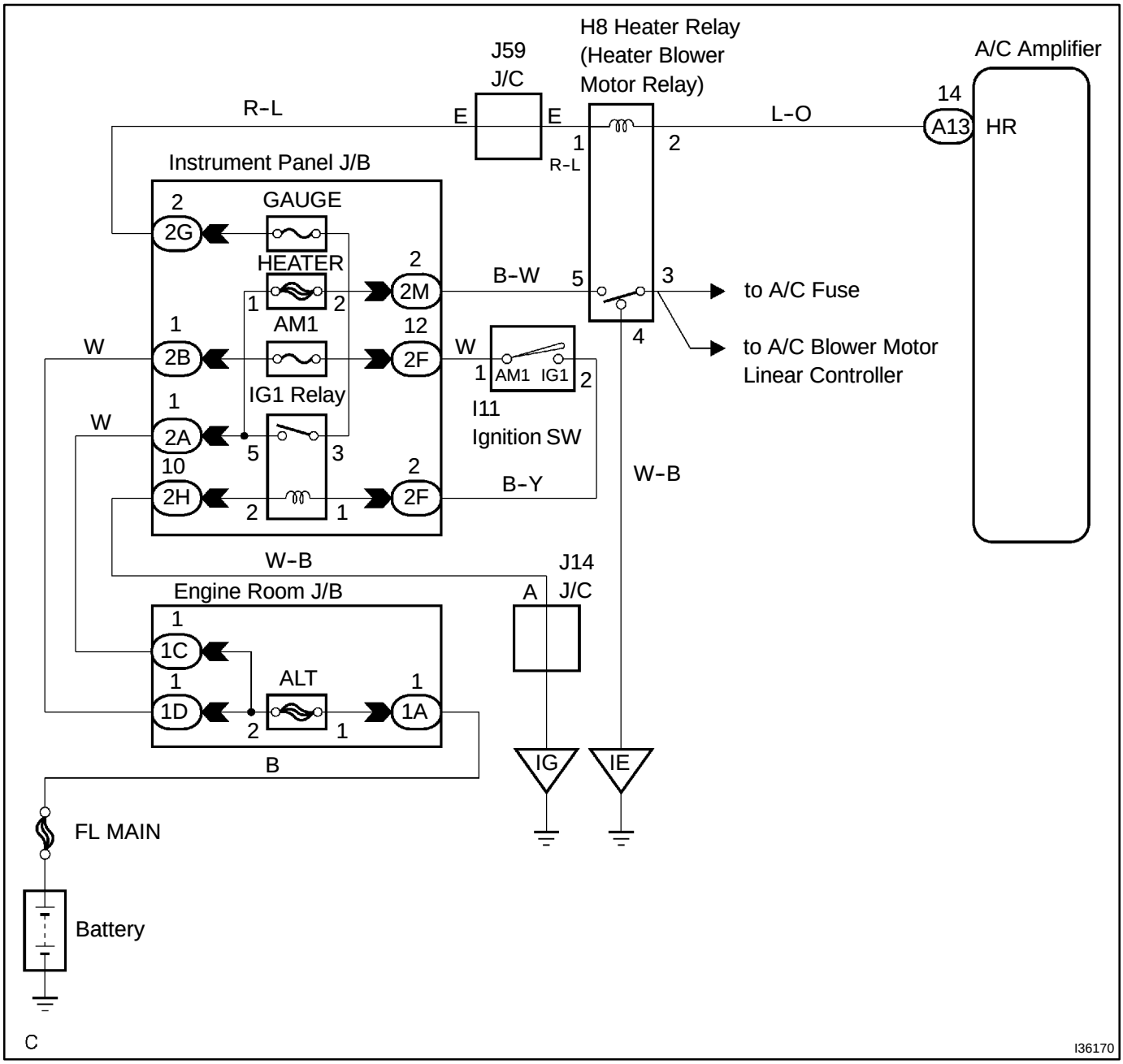
CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

HEATER RELAY CIRCUIT

CIRCUIT DESCRIPTION

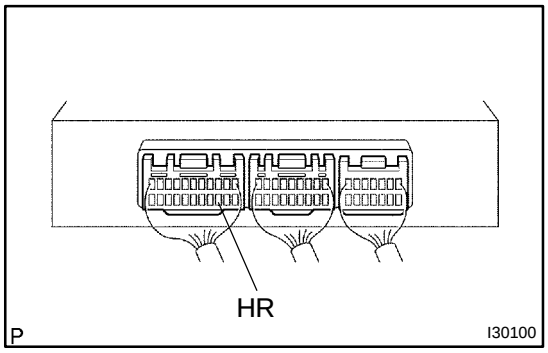
The heater relay is switched on by signals from the A/C amplifier. It supplies power to the blower motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT AIRCONDITIONER AMPLIFIER ASSY(HR)



(a) Remove the A/C amplifier with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

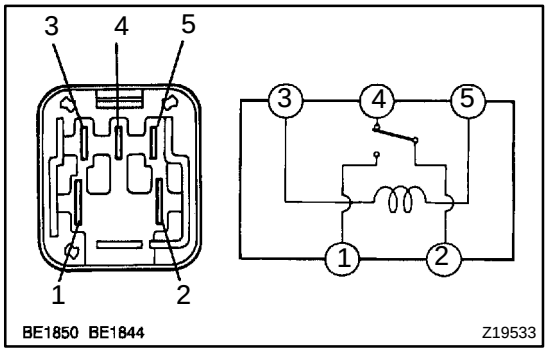
Standard:

Tester connection	Ignition switch position/ Blower switch position	Standard
A13-14 (HR) - Body ground	OFF/OFF	0 V
A13-14 (HR) - Body ground	ON/ON	Below 1 V
A13-14 (HR) - Body ground	ON/OFF	10 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-148)**

NG

2 INSPECT HEATER BLOWER MOTOR RELAY ASSY



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
1 - 2	Always	10 kΩ or higher
1 - 2	Always	Below 1.0 Ω (When battery voltage applied to terminals 3 and 5)
2 - 4	Always	Below 1.0 Ω
2 - 4	Always	10 kΩ or higher (When battery voltage applied to terminals 3 and 5)
3 - 5	Always	62.5 to 90.9 Ω

NG → **REPLACE HEATER BLOWER MOTOR RELAY ASSY**

OK

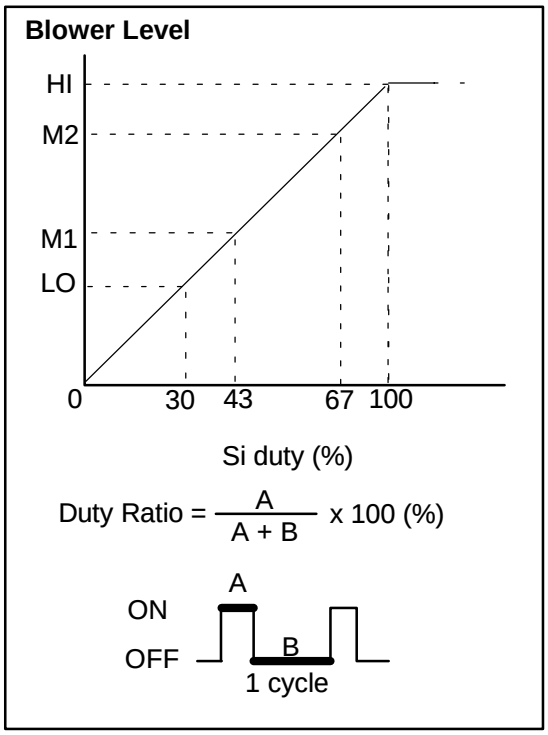
3 CHECK HARNESS AND CONNECTOR(BETWEEN HEATER RELAY AND BATTERY)

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

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR(BETWEEN HEATER RELAY AND AIR CONDITIONER AMPLIFIER ASSY)

BLOWER MOTOR CIRCUIT



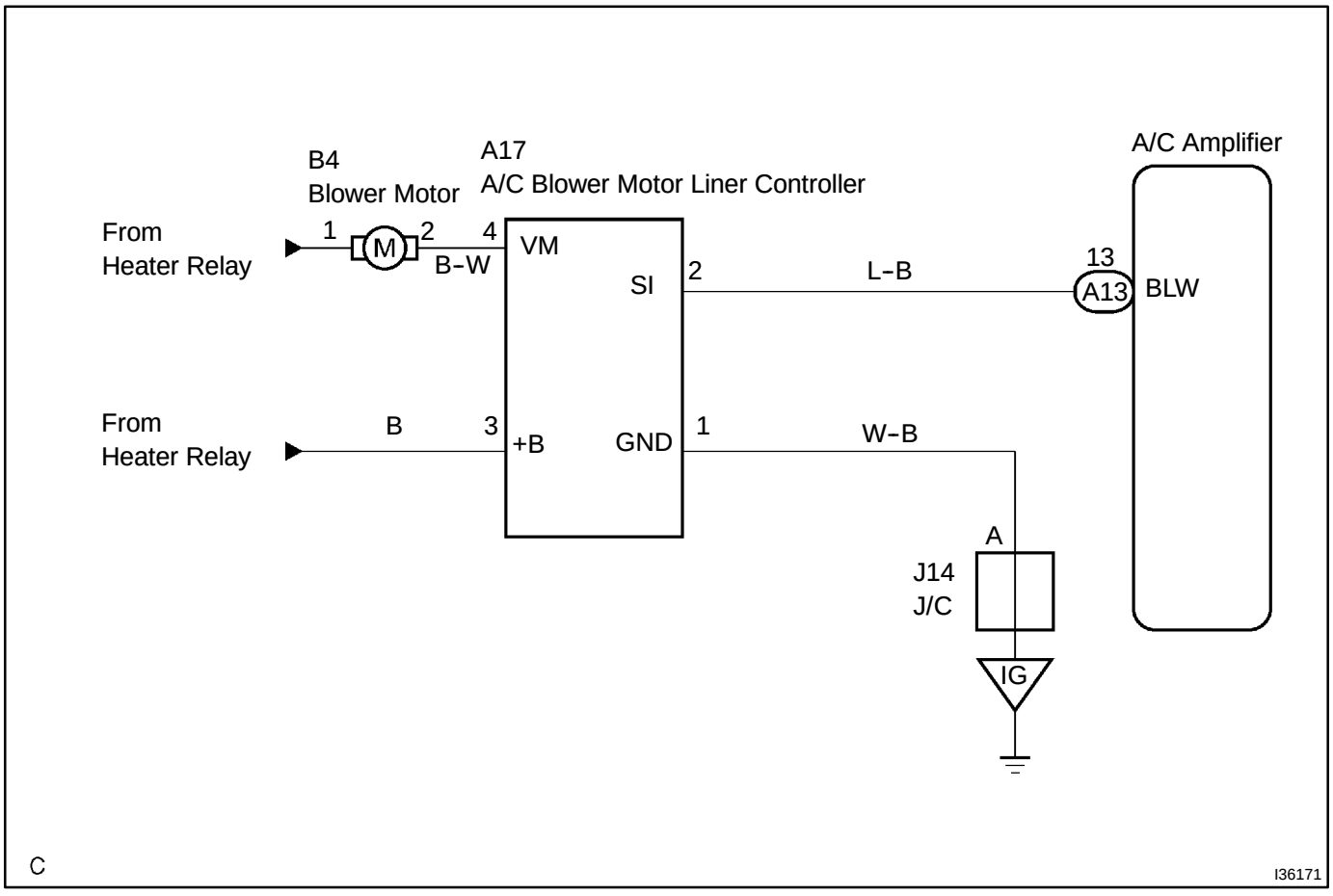
CIRCUIT DESCRIPTION

The blower motor is operated by signals from the A/C amplifier. Blower motor speed signals are transmitted by changes in the Duty Ratio.

Duty Ratio

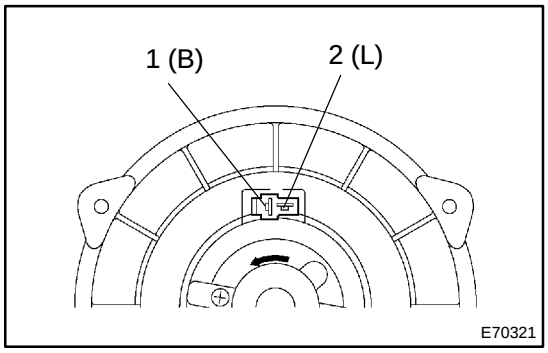
The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT BLOWER W/FAN MOTOR SUB-ASSY



(a) Remove blower motor.
(b) Connect the positive (+) lead to terminal 2 of blower motor connector and the negative (-) lead to terminal 1.
Standard: Blower motor operates smoothly.

NG → **REPLACE BLOWER W/FAN MOTOR SUB-ASSY**

OK

2	CHECK HARNESS AND CONNECTOR(BETWEEN BATTERY AND BLOWER MOTOR LINEAR CONTROLLER)

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

OK

3	CHECK HARNESS AND CONNECTOR(BETWEEN BLOWER MOTOR LINEAR CONTROLLER AND AIR CONDITIONER AMPLIFIER ASSY)

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

OK

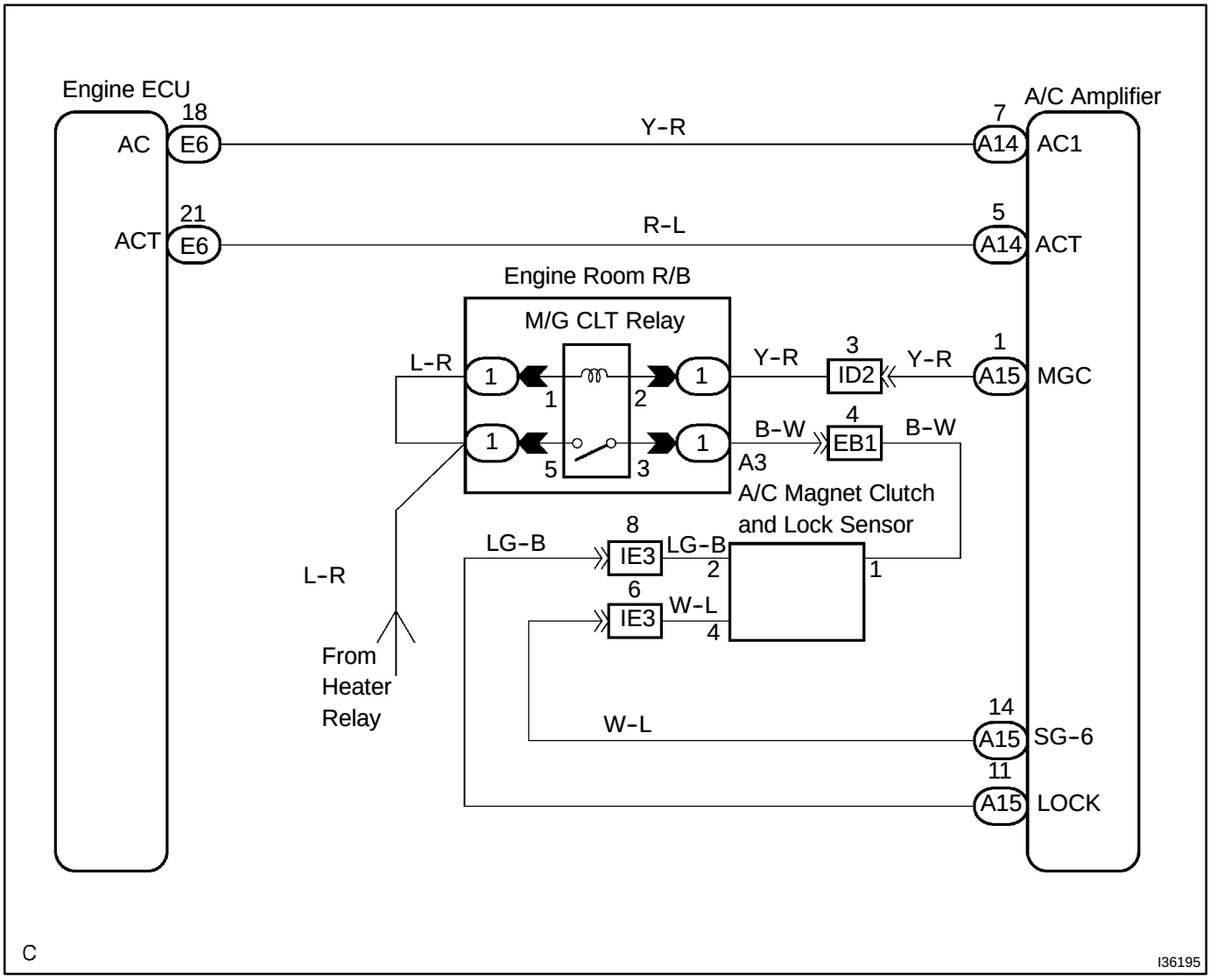
CHECK AND REPLACE BLOWER MOTOR CONTROL

COMPRESSOR CIRCUIT

CIRCUIT DESCRIPTION

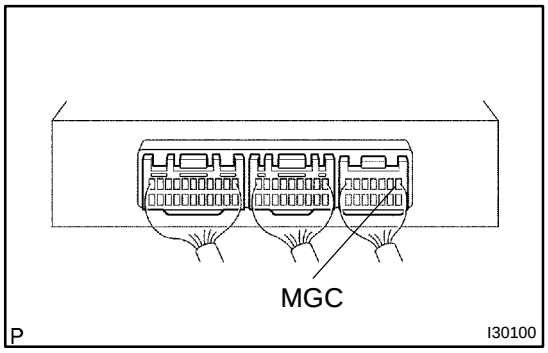
The A/C amplifier outputs the magnetic clutch ON signal from terminal AC1 to the engine (and ECT) ECU. Upon receiving this signal, the ECU sends a signal from terminal ACT to A/C amplifier. The magnetic clutch relay is turned ON to operate the magnetic clutch.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK AIRCONDITIONER AMPLIFIER ASSY(MGC)



(a) Remove air conditioner amplifier assy with connectors still connected.
(b) Start the engine and push AUTO switch.
(c) Measure the voltage according to the value(s) in the table below.

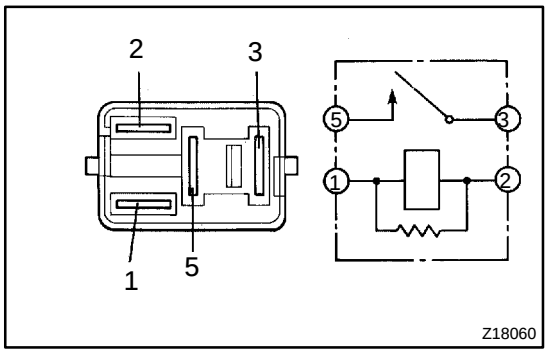
Standard:

Tester connection	Condition	Specified condition
A15-1 (MGC) - Body ground	A/C switch OFF	10 to 14 V
A15-1 (MGC) - Body ground	A/C switch ON	Below 1 V

NG → **Go to step 5**

OK

2 INSPECT MAGNET-CLUTCH RELAY



(a) Remove the relay (magnet-clutch relay) from engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

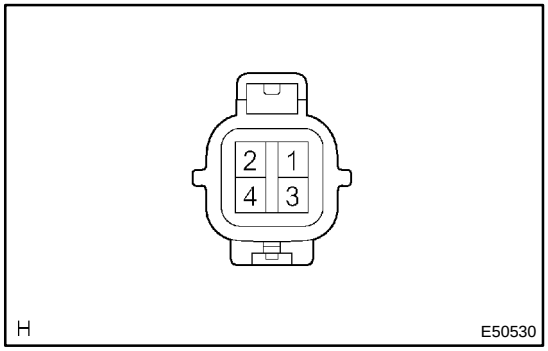
Standard:

Tester connection	Condition	Specified condition
1 - 2	Always	62.5 to 90.9 Ω
3 - 5	Always	10 kΩ or higher
3 - 5	Always	Below 1.0 Ω (When battery voltage applied to terminals 1 and 2)

NG → **REPLACE MAGNET-CLUTCH RELAY**

OK

3 CHECK MAGNET CLUTCH ASSY



(a) Disconnect the connector from the compressor.
(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to body ground, then check that the magnet clutch is engaged.

NG → **REPLACE MAGNET CLUTCH ASSY**

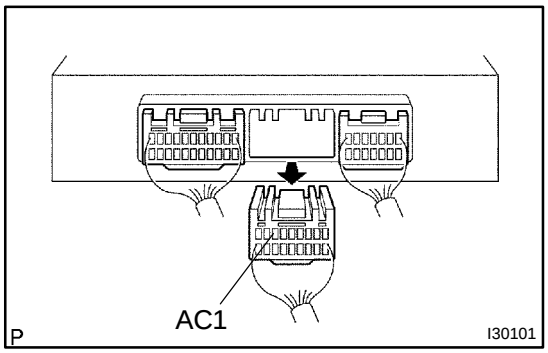
OK

4	CHECK HARNESS AND CONNECTOR(BETWEEN MAGNETIC CLUTCH RELAY AND COMPRESSOR, COMPRESSOR AND BODY GROUND)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5	CHECK AIRCONDITIONER AMPLIFIER ASSY(AC1)



(a) Disconnect the ”A14” connector of A/C amplifier.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

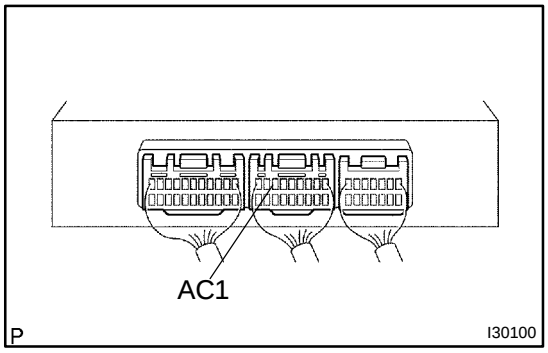
Standard:

Tester connection	Condition	Specified condition
A14-7 (AC1) - Body ground	Always	10 to 14 V

NG → CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

OK

6	CHECK AIRCONDITIONER AMPLIFIER ASSY(AC1)



(a) Connect the ”A14” connector to A/C amplifier.
(b) Start the engine.
(c) Push AUTO switch.
(d) Measure the voltage according to the value(s) in the table below.

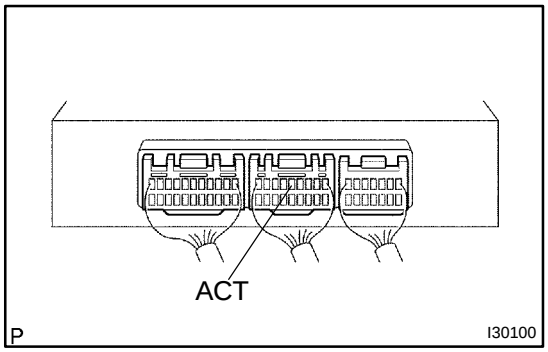
Standard:

Tester connection	Condition	Specified condition
A14-7 (AC1) - Body ground	Magnet clutch is engaged	Below 1 V
A14-7 (AC1) - Body ground	Magnet clutch is not engaged	10 to 14 V

NG → CHECK AND REPLACE ENGINE (AND ECT) ECU

OK

7	CHECK AIRCONDITIONER AMPLIFIER ASSY(ACT)



(a) Start the engine.
(b) Push AUTO switch.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A14-5 (ACT) - Body ground	A/C switch OFF	10 to 14 V
A14-5 (ACT) - Body ground	A/C switch ON	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR(BETWEEN ENGINE (AND ECT) ECU AND AIR CONDITIONER AMPLIFIER ASSY)**

OK

8	CHECK HARNESS AND CONNECTOR(BETWEEN AIR CONDITIONER AMPLIFIER ASSY AND ENGINE (AND ECT) ECU)

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

OK

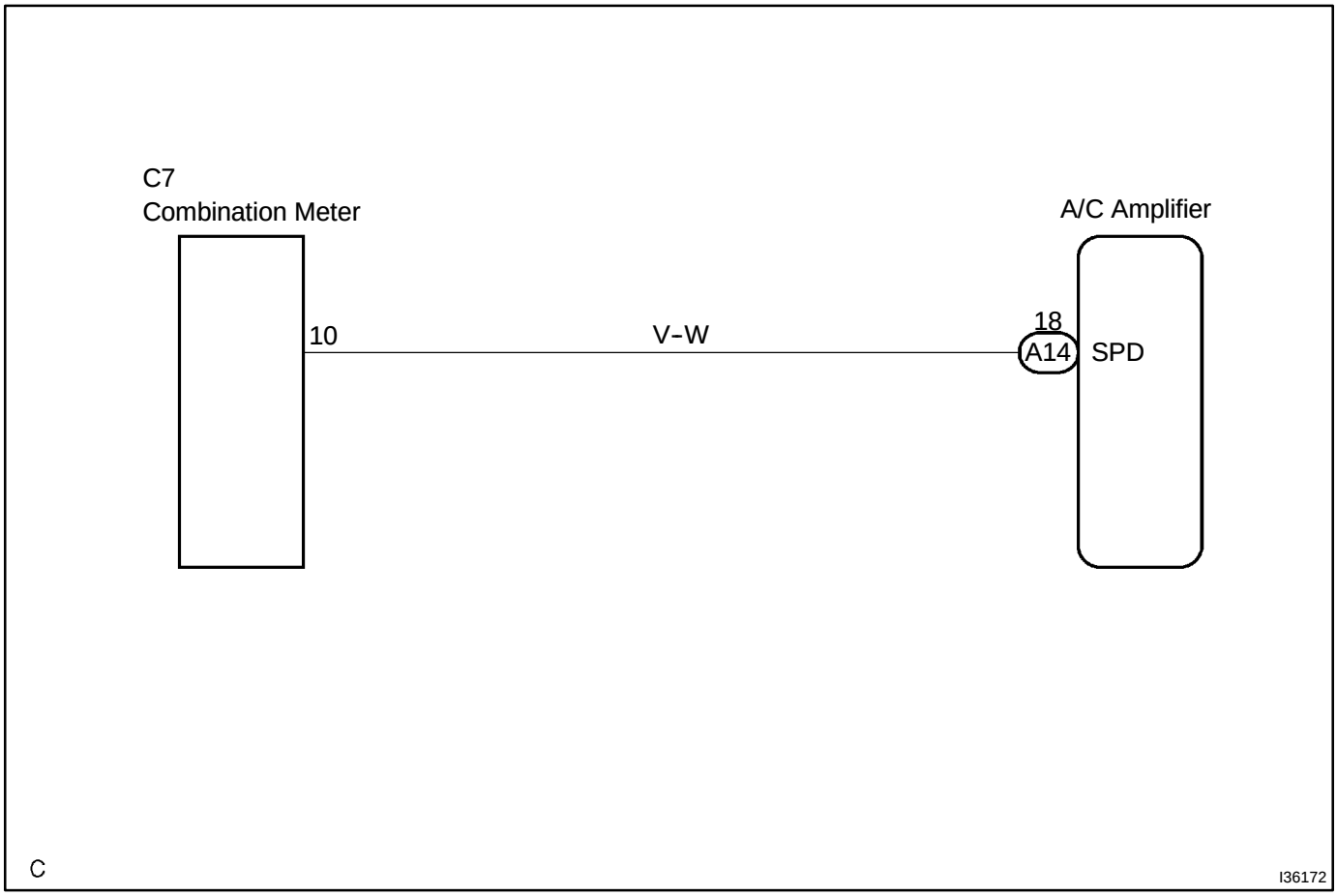
CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

VEHICLE SPEED SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

This A/C amplifier monitors the vehicle speed by signals sent from the speed sensor. The A/C amplifier uses these signals to correct the received ambient temperature sensor signal.

WIRING DIAGRAM



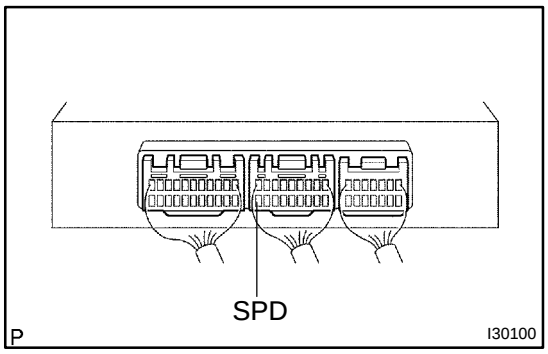
INSPECTION PROCEDURE

1	INSPECT COMBINATION METER ASSY (See Pub. No. RM821E, page 05-790)

NG → GO TO COMBINATION METER SYSTEM (See Pub. No. RM821E, page 05-783)

OK

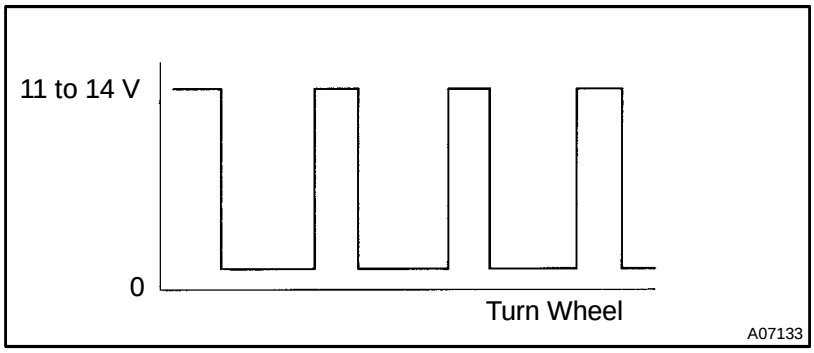
2	INSPECT AIRCONDITIONER AMPLIFIER ASSY(SPD)



(a) Adjust the shift lever to the N position.
(b) Lift up the vehicle.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the values when the wheel is turned slowly in the table below.

Standard:

Tester connection	Condition	Specified condition
A14-18 (SPD) - Body ground	Always	Voltage is generated intermittently



NG → CHECK AND REPLACE HARNESS OR CONNECTOR(BETWEEN COMBINATION METER AND AIR CONDITIONER AMPLIFIER ASSY)

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE

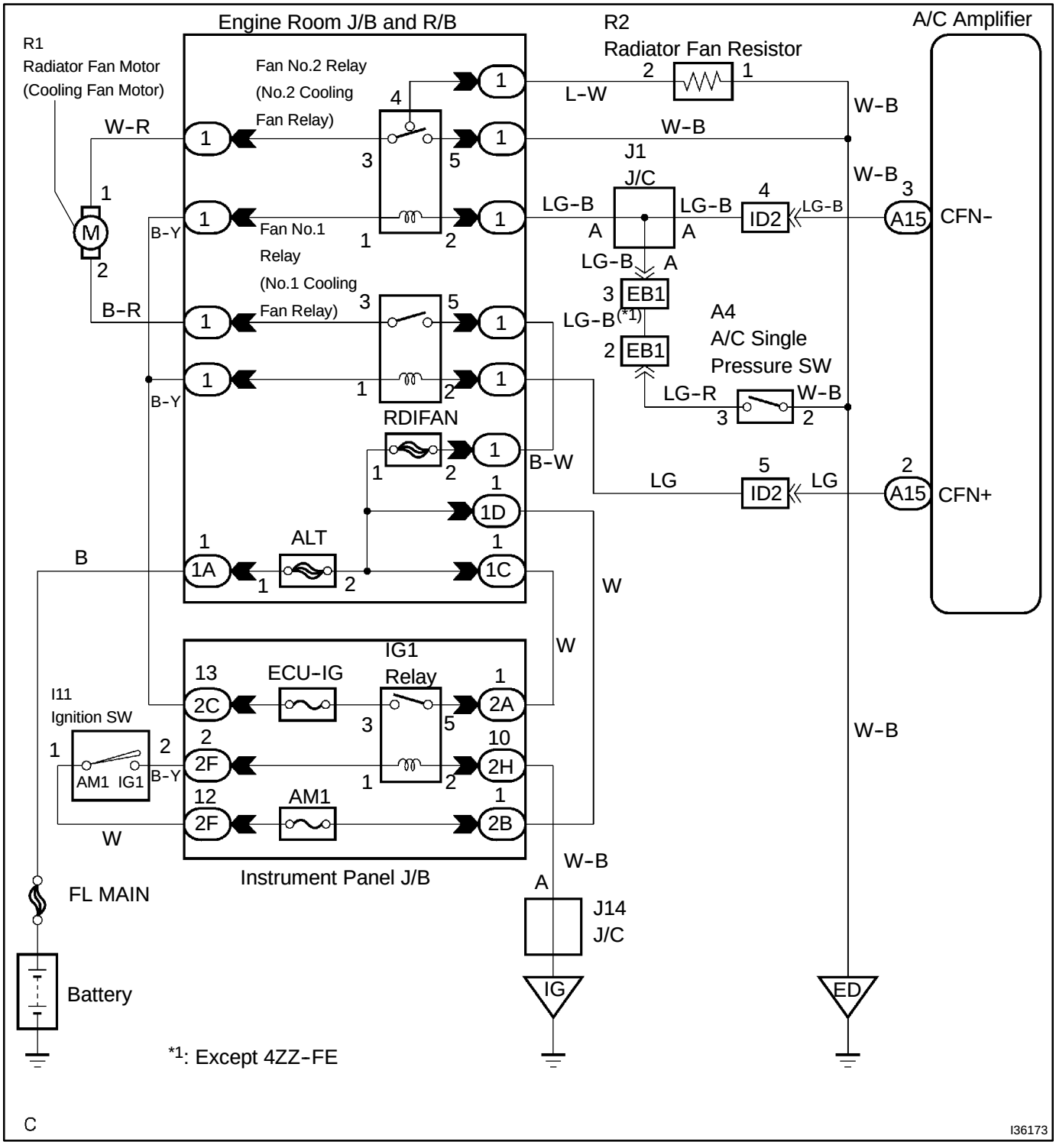
CONDENSER FAN CIRCUIT

CIRCUIT DESCRIPTION

The electric fan speed is controlled as described below, in accordance with the following signals:

- ON/OFF signal of A/C switch.
- ON/OFF signal detected by the pressure switch (cuts out at medium pressure).
- ON/OFF signal detected by water temperature switch.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK VEHICLE CONDITION

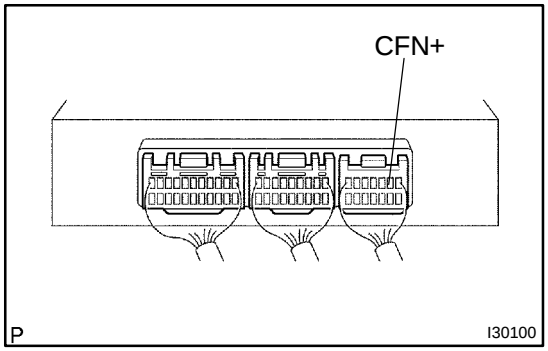
Check fan operation condition, as shown in the chart.

Fan condition	Result
Fan does not operate	A
Fan speed does not change	B

B → **Go to step 8**

A

2 CHECK AIRCONDITIONER AMPLIFIER ASSY(CFN+)



(a) Remove the A/C amplifier with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

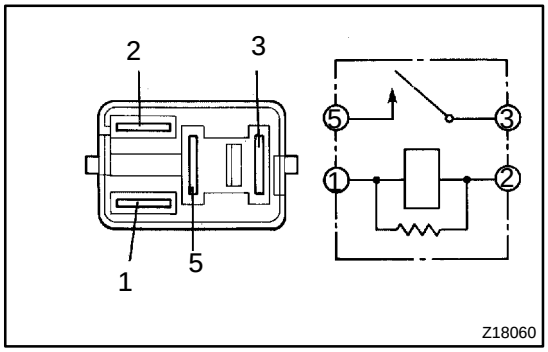
Standard:

Tester connection	Condition	Specified condition
A15-2 (CFN+) - Body ground	Ignition switch ON	Below 1 V
A15-2 (CFN+) - Body ground	Ignition switch OFF	10 to 14 V

OK → **Go to step 6**

NG

3 INSPECT COOLING FAN RELAY



(a) Remove the relay (cooling fan relay) from engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
1 - 2	Always	62.5 to 90.9 Ω
3 - 5	Always	10 kΩ or higher
3 - 5	Always	Below 1.0 Ω (When battery voltage applied to terminals 1 and 2)

NG → **REPLACE COOLING FAN RELAY**

OK

4	INSPECT COOLING FAN MOTOR

(a) Check cooling fan motor operation (See Pub. No. RM821E, page 16-4).

NG → REPLACE COOLING FAN MOTOR

OK

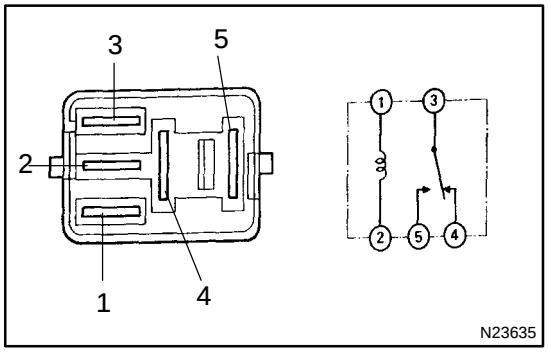
5	CHECK HARNESS AND CONNECTOR(BETWEEN COOLING FAN RELAY NO.1 AND AIR CONDITONER AMPLFIER ASSY)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

6	INSPECT COOLING FAN RELAY NO.2



(a) Remove the relay (cooling fan relay No.2) from engine room R/B.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
1 - 2	Always	62.5 to 90.9 Ω
3 - 4	Always	Below 1.0 Ω
3 - 4	Always	Below 1.0 Ω (When battery voltage applied to terminals 1 and 2)
3 - 5	Always	10 kΩ or higher
3 - 5	Always	10 kΩ or higher (When battery voltage applied to terminals 1 and 2)

NG → REPLACE COOLING FAN RELAY NO.2

OK

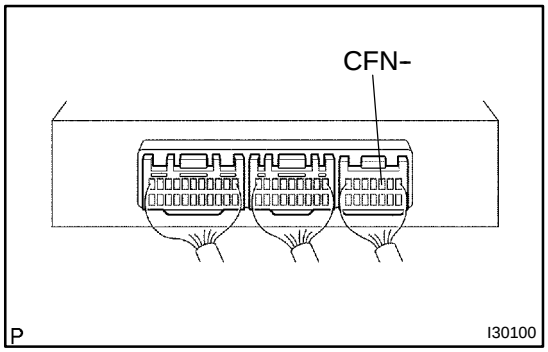
7	CHECK HARNESS AND CONNECTOR(BETWEEN COOLING FAN RELAY NO.2 AND FAN MOTOR, COOLING FAN RELAY NO.2 AND BODY GROUND)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE
(See page 05-148)

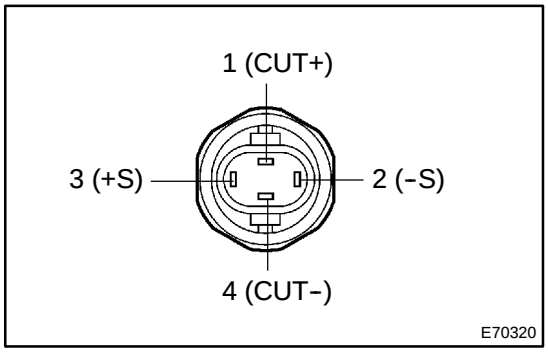
8 CHECK AIRCONDITIONER AMPLIFIER ASSY(CFN-)



(a) Remove the A/C amplifier with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A15-3 (CFN-) - Body ground	Low speed	10 to 14 V
A15-3 (CFN-) - Body ground	High speed	Below 1 V

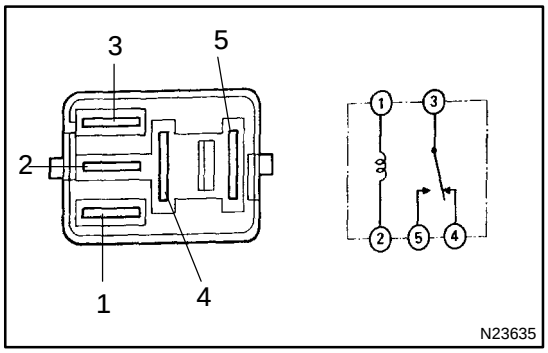


HINT:
To change from low speed to high speed, short terminals 2 and 3 of the pressure switch.
It is not necessary to short the terminals to change from high speed to low speed.

OK → **Go to step 12**

NG

9 INSPECT COOLING FAN RELAY NO.2



(a) Remove the relay (cooling fan relay No.2) from engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

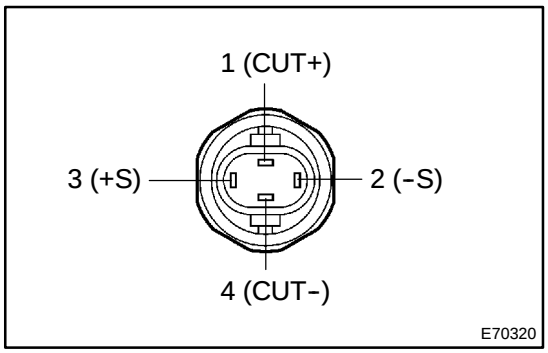
Standard:

Tester connection	Condition	Specified condition
1 - 2	Always	62.5 to 90.9 Ω
3 - 4	Always	Below 1.0 Ω
3 - 4	Always	Below 1.0 Ω (When battery voltage applied to terminals 1 and 2)
3 - 5	Always	10 kΩ or higher
3 - 5	Always	10 kΩ or higher (When battery voltage applied to terminals 1 and 2)

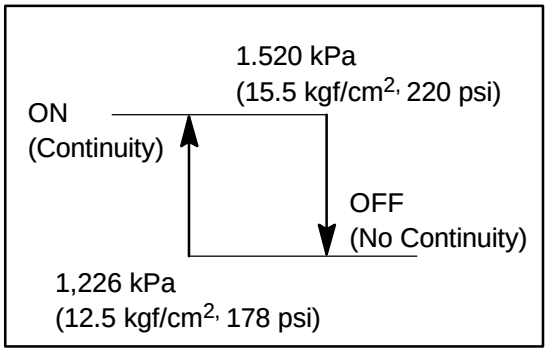
NG → **REPLACE COOLING FAN RELAY NO.2**

OK

10	INSPECT COOLER REFRIGERANT LIQUID PIPE A(A/C SINGLE PRESSURE S/W)



(a) Install manifold gauge set.
(b) Connect the positive (+) lead from the tester to terminal 2 and the negative (-) lead to terminal 3.
(c) Check that the continuity exists at each of the refrigerant pressures shown in the illustration.



NG → REPLACE COOLER REFRIGERANT LIQUID PIPE A

OK

11	CHECK HARNESS AND CONNECTOR(BETWEEN PRESSURE SWITCH AND AIR CONDITIONER AMPLIFIER ASSY)

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK AND REPLACE AIRCONDITIONER AMPLIFIER ASSY

12	INSPECT COOLING FAN RESISTOR

(a) Check cooling fan resistor (See Pub. No. RM821E, page 16-5).

NG → REPLACE COOLING FAN RESISTOR

OK

13	CHECK HARNESS AND CONNECTOR(BETWEEN COOLING FAN RELAY NO.2 AND COOLING FAN RESISTOR)

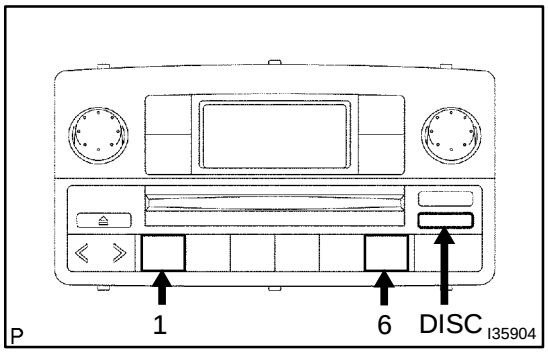
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE
(See page 05-148)

AUDIO SYSTEM (SOUTH AFRICA)(From August, 2003)

050VH-04



PRE-CHECK

1. DIAGNOSTIC CHECK

(a) Starting Diagnostic Mode (All elements come on during the SW check mode).

(1) Turn the ignition switch to the ACC position and turn off the audio system. While pressing the preset switches "1" and "6" at the same time, press the "DISC" 3 times.

(2) Reference:

- When the system enters the Diagnosis Mode, a beep sound is emitted 3 times and all the elements come on during the SW check mode.
- It takes approx. 40 seconds to complete the check.
- Turn all the elements in the LCD on.
- When pressing the switch, confirm beep sound is emitted.
- Press the "SEEK TRACK UP" button to enter the "Service Check Screen".

(b) Service Check Screen.

(1) Reference:

In the service check mode, the system check and the diagnostic memory check are performed, and the check results are displayed in ascending order of the component codes (physical address).

Terms	Meaning
Component code (Physical address)	Three-digit code (In hexadecimal) given to each device comprising AVC-LAN. Corresponding to its function, individual symbol is provided.
Logical address	Two-digit code (In hexadecimal) given to each function and device unit comprising AVC-LAN.

Code No. (physical address) List

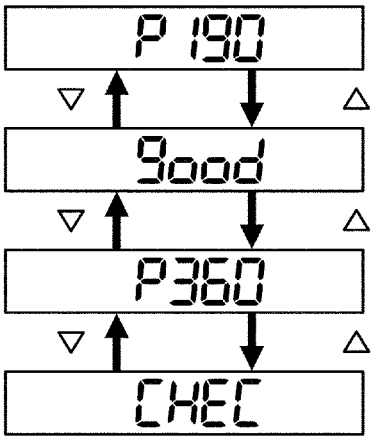
Code No. (physical address)	Equipment name
190	Radio receiver assy (Audio head unit)
440	Stereo component amplifier assy
1F6, 16C	Multi-display Controller Sub-assy

(c) Finishing Diagnostic Mode.

(1) Press the "DISC" for 2 seconds or more, or turn the ignition switch off.

(d) Service Check Mode Result Display (for checking the current and the past system conditions).

(1) Press the "SEEK TRACK" switch to see the check result of each component.



P---indicates physical address
190---physical address

good---"The component is normal".

P---indicates physical address
360---physical address

CHEC---"Check needed".

△ : SEEK TRACK UP
▽ : SEEK TRACK DOWN

The illustration shows the case that the system has 2 components with codes 190 and 360, and one component (code 360) requires a check.
The check result is displayed in ascending order of component code. The component device code is displayed first, and then the check result follows.

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(2) Check Result Display.

Display	Original Language	Meaning	Action to be taken
good	Good (normal)	No DTCs are detected in both "System Check Mode" and "Diagnostic Memory Mode".	-
NCON	No connection	The system recognized the component when it was registered, but the component gives no response to the "Diagnostic Mode ON Request".	Check the power source circuit and the communication circuit of the component indicated by the component code (physical address).
ECHN	Exchange	One or more DTCs for "Exchange" are detected in either "System Check Mode" or "Diagnostic Memory Mode".	Go to the detailed information mode to check the trouble area referring to the DTC list.
CHEC	Check	When no DTCs are detected for "Exchange", one or more DTCs for "Check" are detected "System Check Mode" or "Diagnostic Memory Mode".	Go to the detailed information mode to check the trouble area referring to the DTC list.

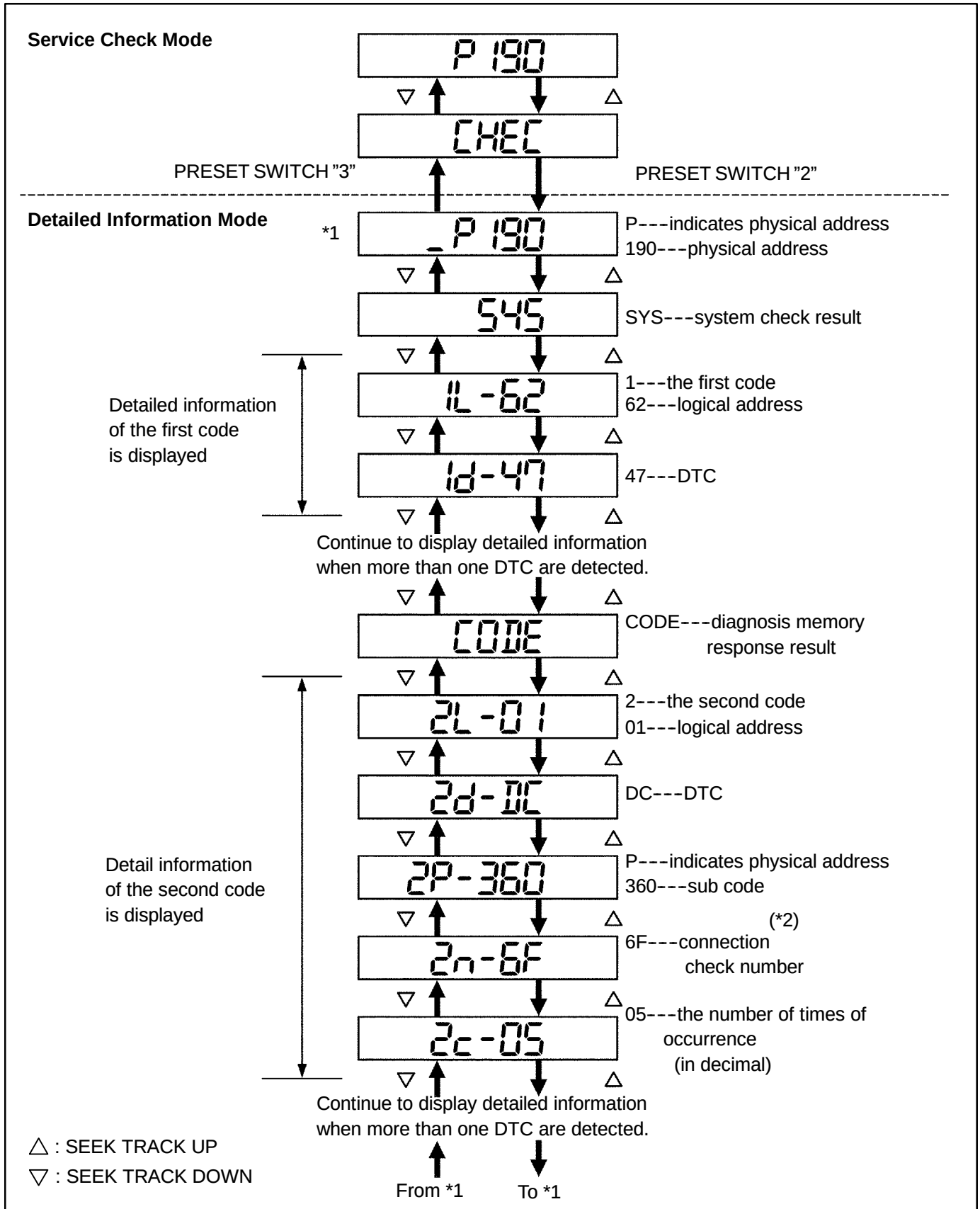
Display	Original Language	Meaning	Action to be taken
OLD	Old version	Old DTC application is identified and DTC is detected in either "System Check Mode" or "Diagnostic Memory Mode".	-
NRES	No response	The device gives no response to any one of "System Check Mode ON Request", "System Check Result Request" and "Diagnostic Memory Request".	Check the power source circuit and the communication circuit of the component indicated by the component code (physical address).

(3) To perform the Service Check again, press the preset switch "1".

(e) Detailed Information Mode (when displaying the DTC for a trouble component)

(1) When "CHEC" or "ECHn" is displayed, press the preset "2" switch to proceed to the detailed information mode.

(2) Press the "SEEK TRACK" switch to display the "System Check Result (SYS)" and "Diagnostic Memory Response (CODE)".



The illustration shows the case that the component with code 190 has DTC "47" and "dC" as a result of the system check and the diagnostic memory response.
The detailed information mode shows the system check result first, then the diagnostic memory response result follows. (*2): As for the DTCs that do not have any sub code, sub code is not displayed.

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(3) Displayed items in the detailed information mode are shown in the table below.

Division Code for DTC display	Meaning	The order of detailed information displayed when the "TUNE UP" switch is pressed. (The order is reversed when the "TUNE DOWN" switch is pressed.)
SYS	System check result is displayed.	Logical address → DTC
CODE	Diagnostic memory check result is displayed.	Logical address→ DTC→ Sub code→ Connection confirmation number→ The number of times of occurrence

(4) Check the trouble area referring to the DTC list.

(5) To return to the service check mode, press the preset switch "3".

(f) Clearing Individual DTC Memory (when clearing the memory of the DTC detected in the past individually)

(1) Press the preset switch "5" for 2 seconds or more while the "ECHN" is displayed in the service check mode or during the detailed information mode.

HINT:

- A beep sound is emitted once when the DTC memory is completely cleared.
- When the DTC memory is cleared, only the component code (physical address) is displayed for the target component.
- To check DTCs, press the preset switch "1" and perform the service check again.

(g) Clearance of all the DTC memory (when clearing all the memory of the DTCs detected in the past)

(1) Start the diagnostic mode after repairing the trouble area.

(2) Press the preset switch "5" for 2 seconds or more. ("CLR" is displayed at this time).

HINT:

- A beep sound is emitted once when the DTCs memory is completely cleared.
- When the DTCs memory for all the component is cleared, only the component codes (physical address) are displayed.

(3) Press the preset switch "1" to perform the service check again, and check that no DTCs are displayed for all the component codes (physical address).

2. IDENTIFICATION OF NOISE SOURCE

(a) Identify the condition in which the noise occurs, and check the noise filter on the related part.

Condition in which noise occurs	Noise Source
Depressing the acceleration pedal increases noise, and stopping the engine erases the noise immediately.	Generator
Noise occurs during the A/C or the heater operation.	Blower motor
Rapid acceleration while driving on an unpaved road or after the ignition switch is turned to the ON position makes noise.	Fuel pump
Pressing and then releasing the horn switch, and keeping the horn switch pressed makes unusual noise.	Horn
Stopping the engine erases small noise that has been heard.	Ignition
Noise occurs synchronously with the turn signal flash.	Flasher
Noise occurs during the window washer operation.	Washer
Noise occurs during the engine running, and it continues even after the engine stops.	Engine coolant temperature sensor
Noise occurs during the wiper operation.	Wiper
Noise occurs when the brake pedal is depressed.	Stop light switch
Others	Static electricity stored on the vehicle

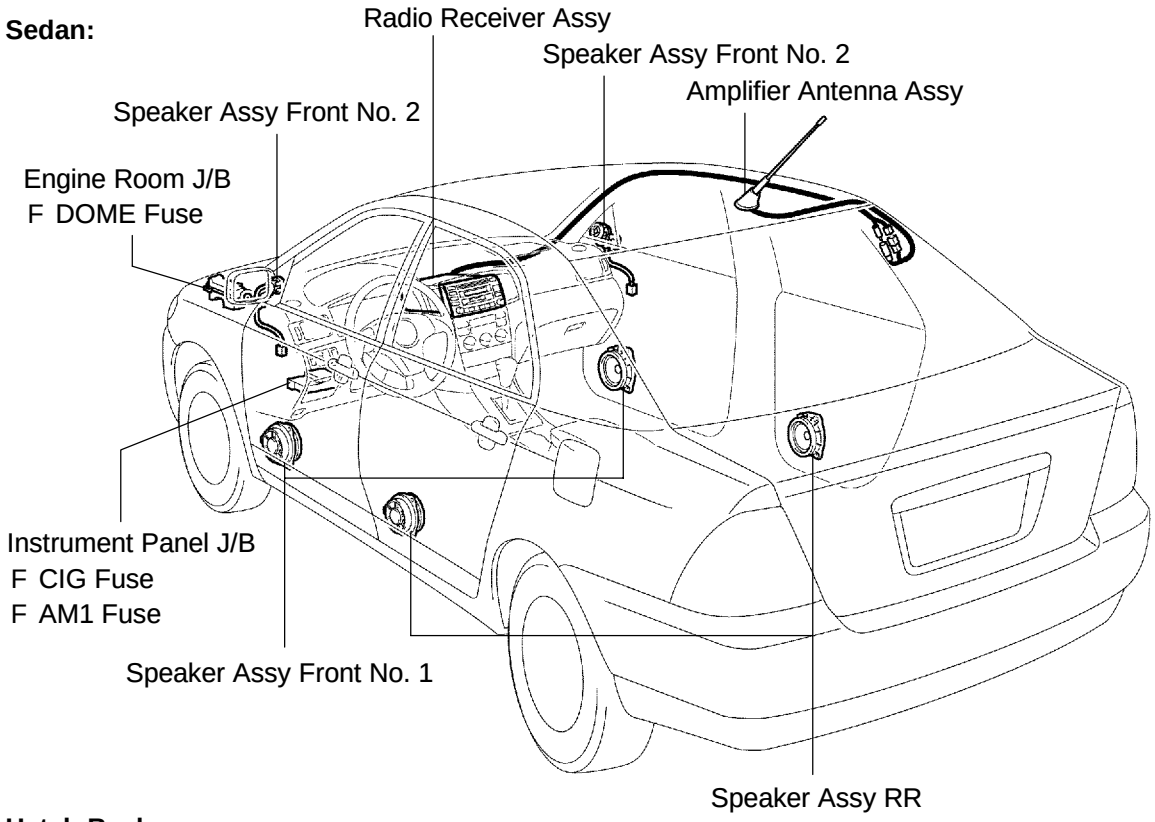
(b) Reference:

- Firstly, make sure that there is no noise from outside. Failing to do so makes the noise source detection difficult and leads to misunderstanding.
- The noise should be removed in descending order of loudness.
- Setting the radio untuned makes noise noticeable, making the recognition of the phenomenon easier.

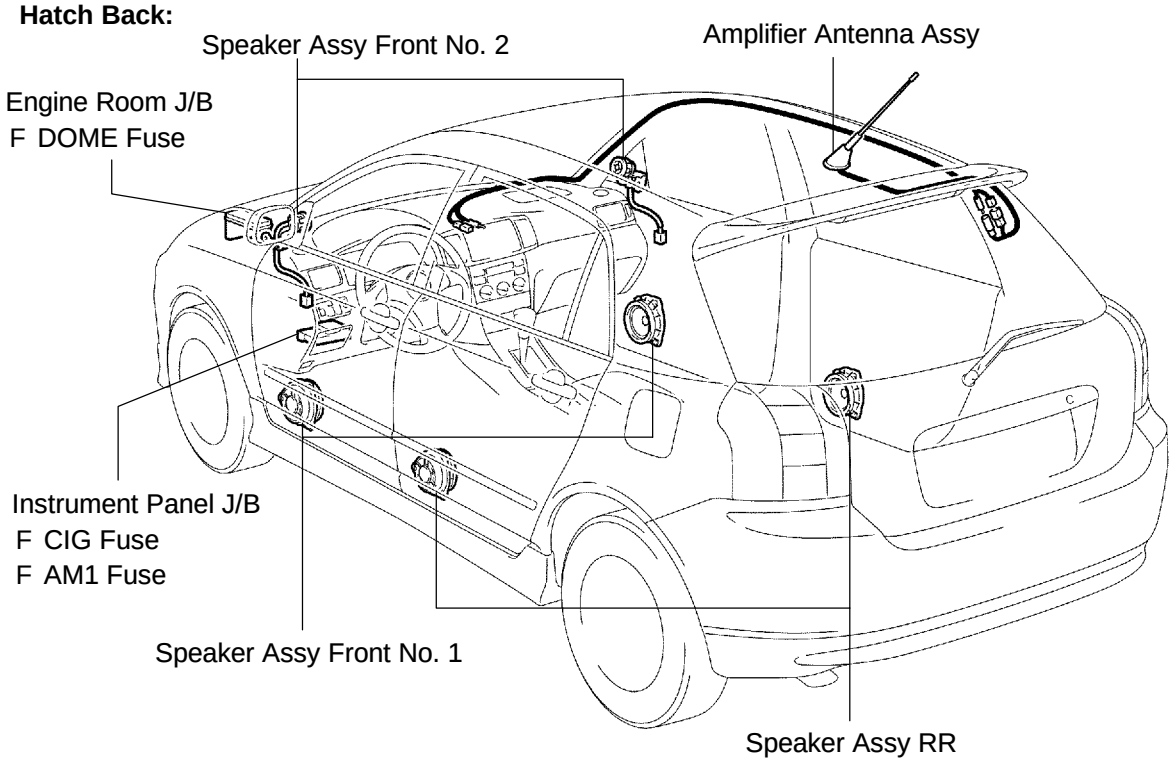
050UR-02

LOCATION

Sedan:



Hatch Back:



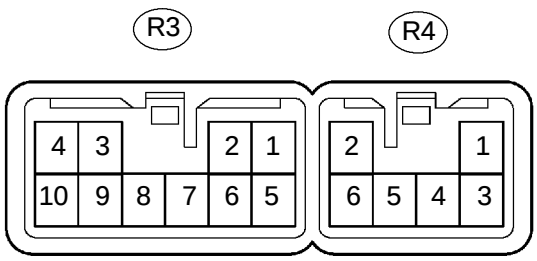
P

I35905

050US-02

TERMINALS OF ECU

RADIO RECEIVER ASSEMBLY



I30196

Terminal No. (Symbols)	Wiring Color	Condition	Specification
R4-1 - R3-7 (RR+ ⇔ GND)	*1 R - BR	Radio switch is ON	-
R4-2 - R3-7 (RL+ ⇔ GND)	*1 B - BR	Radio switch is ON	-
R4-3 - R3-7 (RR- ⇔ GND)	*1 W - BR	Radio switch is ON	-
R4-6 - R3-7 (RL- ⇔ GND)	*1 Y - BR	Radio switch is ON	-
R3-1 - R3-7 (FR+ ⇔ GND)	LG - BR	Radio switch is ON	-
R3-2 - R3-7 (FL+ ⇔ GND)	P - BR	Radio switch is ON	-
R3-3 - R3-7 (ACC+B ⇔ GND)	GR - BR	Ignition switch ACC or ON	10 to 14 V
R3-4 - R3-7 (BU+B ⇔ GND)	L-Y - BR	Constant	10 to 14 V
R3-5 - R3-7 (FR- ⇔ GND)	L - BR	Radio switch is ON	-
R3-6 - R3-7 (FL- ⇔ GND)	V - BR	Radio switch is ON	-
R3-7 - Body ground (GND ⇔ Body ground)	BR - Body ground	Constant	Below 1 V

*1: w/ Rear Speaker

05DZU-01

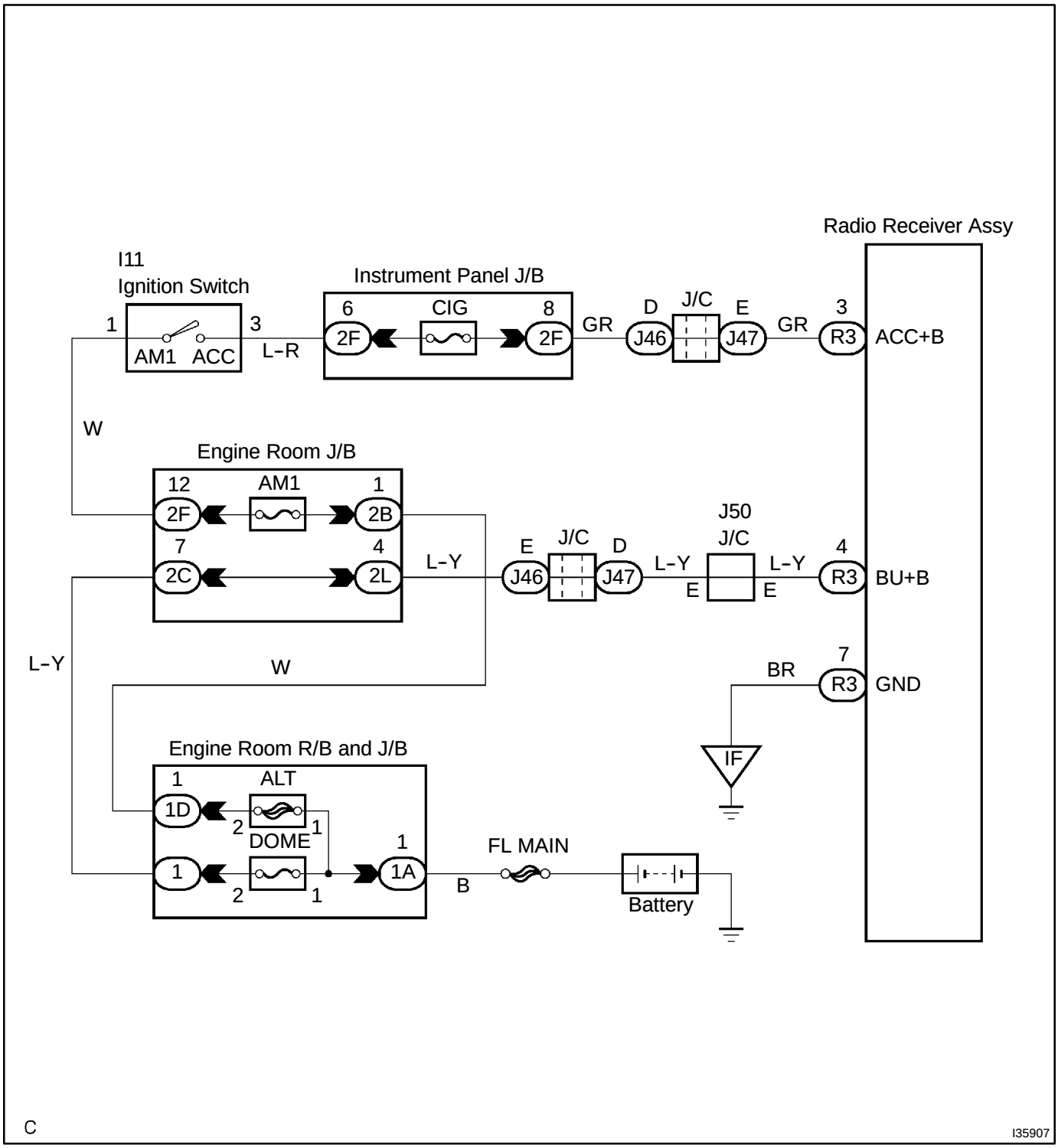
PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See page
Pressing the power switch does not start the system.	3. Radio and player power source circuit 4. Radio and player	05-211
Turning on the light switch does not light up the light time illumination of the radio receiver.	1. Radio and player ILL terminal circuit 2. Radio and player	L
No sound is head from the speaker in all modes.	1. Speaker circuit 2. Radio and player power source circuit 3. Radio and player	05-213
Sound quality is bad in all modes. (Volume is too low)	1. Speaker circuit 2. Radio and player power source circuit 3. Radio and player	05-216
Radio broadcast cannot be received. (Bad reception)	1. Antenna circuit 2. Radio and player	L
Cassette tape cannot be inserted or played.	1. Cassette tape 2. Radio and player power source circuit 3. Radio and player	L
Cassette tape cannot be ejected.	1. Cassette tape 2. Radio and player power source circuit 3. Radio and player	L
Sound quality is bad only when playing tape.	1. Cassette tape 2. Radio and player	L
Tape is tangled due to incorrect tape speed or auto-reverse malfunction.	1. Cassette tape 2. Radio and player	L
CD cannot be inserted or is ejected right after insertion.	1. CD 2. Radio and player power source circuit 3. Radio and player	L
Although the system powered, CD cannot be played.	1. CD 2. Radio and player power source circuit 3. Radio and player	L
CD cannot be taken out.	1. CD 2. Radio and player power source circuit 3. Radio and player	L
Sound quality is bad only when CD is played.(Volume is too low)	1. CD	L
CD sound skips.	1. CD 2. Radio installation	L
Noise occurs.	-	L

L: See Pub. No. RM821E

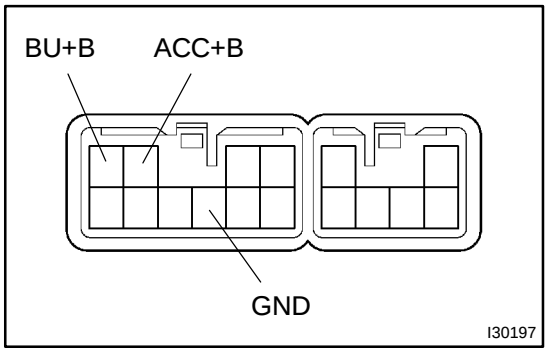
PRESSING POWER SWITCH DOES NOT START SYSTEM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT RADIO RECEIVER ASSY(BU+B,ACC+B,GND)



(a) Check the voltage between terminal BU+B and body ground.
Standard: 10 to 14 V

(b) Check the voltage between terminal GND and body ground.
Standard: Continuity

(c) Turn the ignition switch to the ON position.

(d) Check the voltage between terminal ACC+B and body ground.
Standard: 10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (See Pub. No. RM821E, page 01-27)**

OK

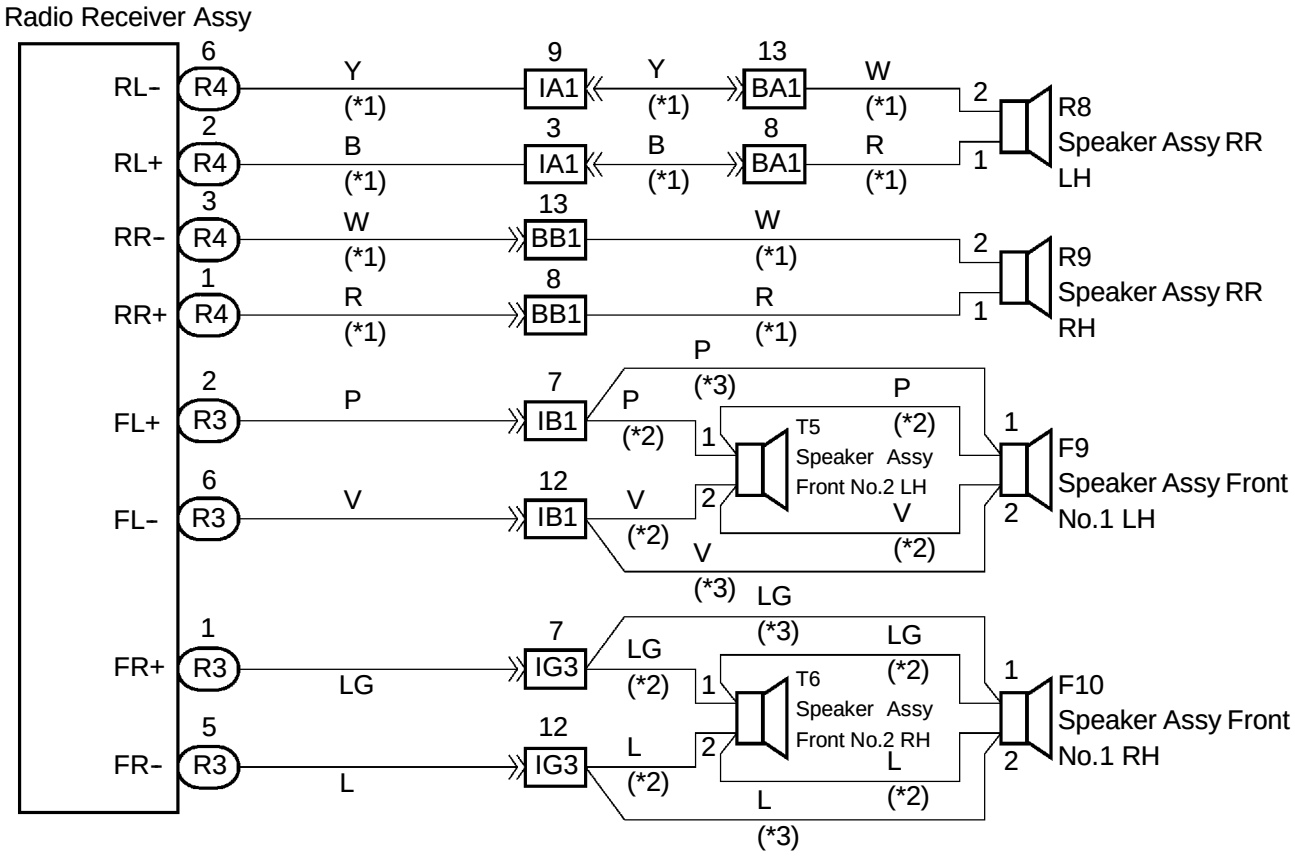
REPLACE RADIO RECEIVER ASSY(See Pub. No. RM821E, page 67-2)

NO SOUND IS HEARD FROM SPEAKER IN ALL MODES

WIRING DIAGRAM

HINT:

Power source wiring diagram (See page 05-211).



*1: w/ Rear Speaker
*2: w/ Tweeter
*3: w/o Tweeter

C

I35908

INSPECTION PROCEDURE

1	CHECK LCD (LIQUID CRYSTAL DISPLAY) FOR LIGHTING

(a) LCD Illumination Check
  (1) Turn the ignition switch to the ACC position.
  (2) Turn the radio receiver assembly ON.
  Standard: LCD illumination of the radio receiver assembly comes on.

NG → **Go to step 5**

OK

2	CONTROL FADER AND ADJUST SOUND BALANCE

(a) Fader and Balance Adjustment
  (1) Operate the radio receiver assembly to adjust the fader and the balance to identify the speaker that does not sound.

(A)	(B)
A specific speaker does not sound.	All speakers do not sound.

(B) → **REPLACE RADIO RECEIVER ASSY (See Pub. No. RM821E, page 67-2)**

(A)

3	INSPECT SPEAKER

(a) Preparation for Check
  (1) Disconnect the connectors of the speakers.
(b) Resistance Check
  (1) Check the resistance between the terminals of the speaker.

NOTICE:
The speaker should not be removed for checking.
  Standard value: 2 to 9 Ω

HINT:
Speaker assy front No.2:
Inspect by changing the right one with the left one, and vice versa.

NG → **REPLACE SPEAKER**

OK

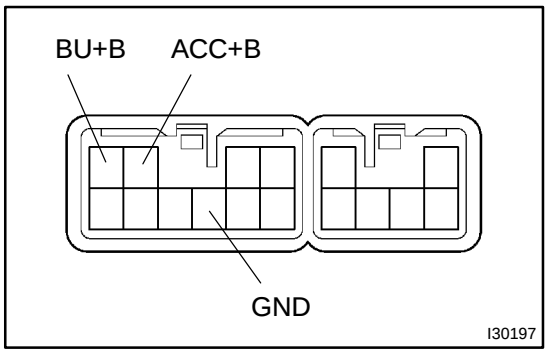
4	CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSEMBLY - SPEAKER)

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR(See Pub. No. RM821E, page 01-27)**

OK

REPLACE RADIO RECEIVER ASSY(See Pub. No. RM821E, page 67-2)

5	INSPECT RADIO RECEIVER ASSY(BU+B,ACC+B,GND)



(a) Check the voltage between terminal BU+B and body ground.
Standard: 10 to 14 V

(b) Check the voltage between terminal GND and body ground.
Standard: Continuity

(c) Turn the ignition switch to the ON position.

(d) Check the voltage between terminal ACC+B and body ground.
Standard: 10 to 14 V

OK → **REPLACE RADIO RECEIVER ASSY (See Pub. No. RM821E, page 67-2)**

NG

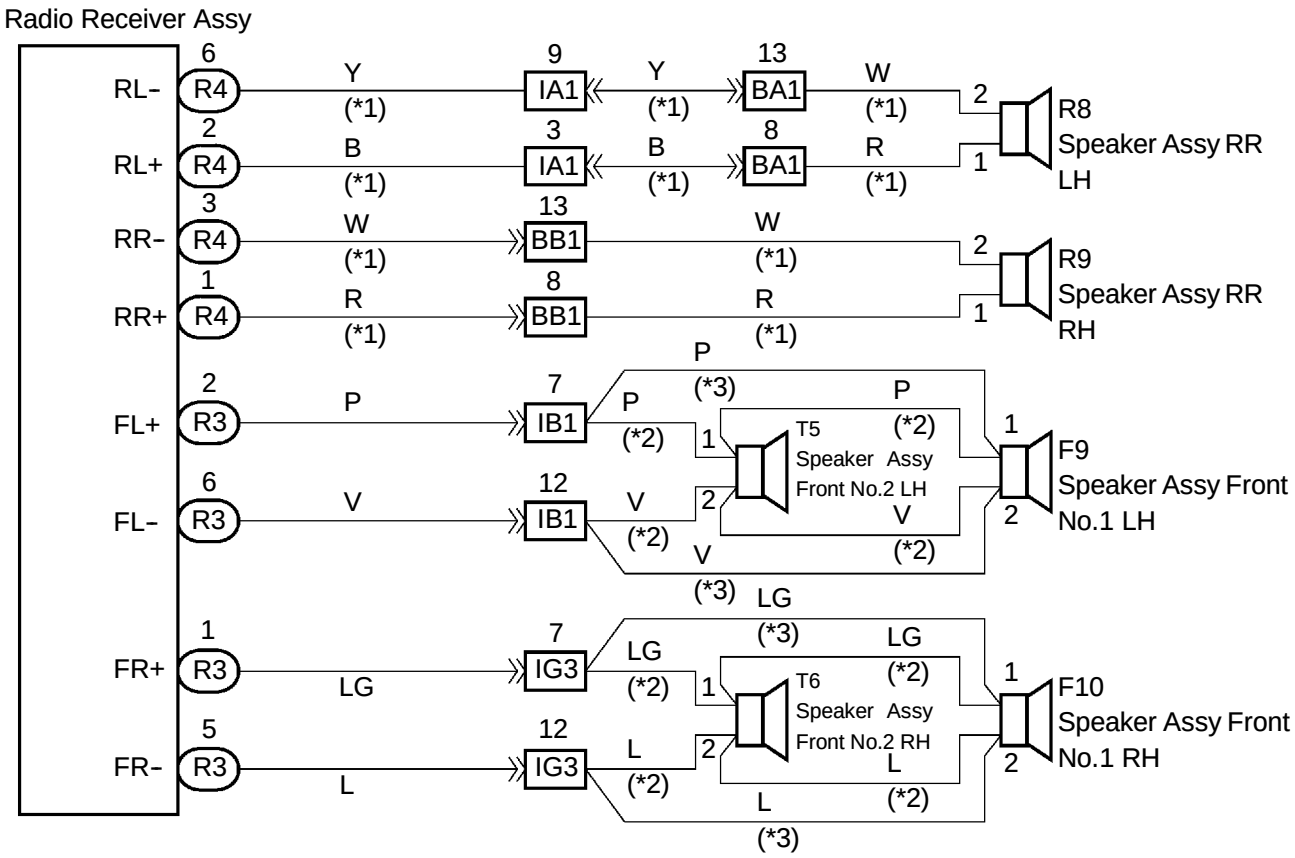
REPAIR OR REPLACE HARNESS OR CONNECTOR(See Pub. No. RM821E, page 01-27)

SOUND QUALITY IS BAD IN ALL MODES (VOLUME IS TOO LOW)

WIRING DIAGRAM

HINT:

Power source wiring diagram (See page 05-211).



*1: w/ Rear Speaker
*2: w/ Tweeter
*3: w/o Tweeter

C

I35908

INSPECTION PROCEDURE

1	ADJUST SOUND QUALITY

(a) Adjust the sound quality.
(1) Operate the radio receiver assembly to adjust the sound quality.
Standard: The operation returns to be normal.

OK	BAD SOUND QUALITY

NG

2	COMPARE IT WITH ANOTHER CAR OF SAME MODEL

(a) Compare it with another vehicle of the same model.
(1) Compare with the vehicle of the same type which does not have a trouble to see if there is any difference in the condition of trouble occurrence.
Standard: No difference found.

OK	SETTING

NG

3	CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSEMBLY - SPEAKER)

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR(See Pub. No. RM821E, page 01-27)

OK

4	INSPECT SPEAKER

(a) Preparation for Check
(1) Disconnect the connectors of the speakers.
(b) Resistance Check
(1) Check the resistance between the terminals of the speaker.

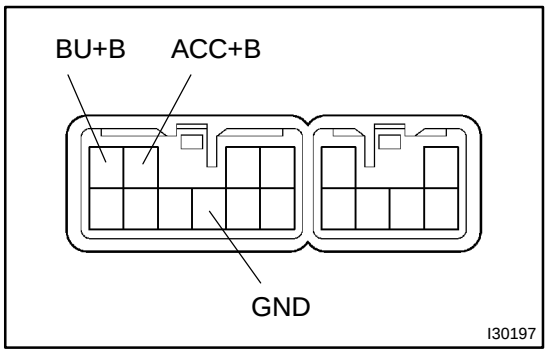
NOTICE:
The speaker should not be removed for checking.
Standard value: 2 to 9 Ω

HINT:
Speaker assy front No.2:
Inspect by changing the right one with the left one, and vice versa.

NG	REPLACE SPEAKER

OK

5	INSPECT RADIO RECEIVER ASSY(BU+B,ACC+B,GND)



(a) Check the voltage between terminal B and body ground.
Standard: 10 to 14 V

(b) Check voltage between terminal GND and body ground.
Standard: Continuity

(c) Turn the ignition switch to the ON position.

(d) Check the voltage between terminal ACC and body ground.
Standard: 10 to 14 V

OK → **REPLACE RADIO RECEIVER ASSY (See Pub. No. RM821E, page 67-2)**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR(See Pub. No. RM821E, page 01-27)

ENGINE CONTROL SYSTEM

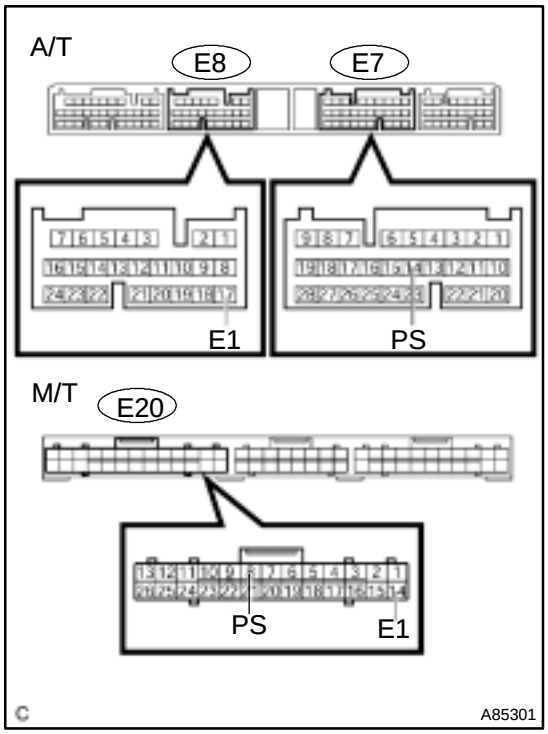
EFI SYSTEM
(1ZZ–FE/3ZZ–FE
FOR SOUTH AFRICA) 10–1
ON–VEHICLE INSPECTION 10–1

REFER TO COROLLA REPAIR MANUAL (Pub. No. RM821E)
NOTE: The above pages contain only the points which differ from the above listed manual.

EFI SYSTEM (1ZZ-FE/3ZZ-FE FOR SOUTH AFRICA)

ON-VEHICLE INSPECTION

100I4-01



1. INSPECT POWER STEERING OIL PRESSURE SWITCH

(a) Using a voltmeter, measure the voltage between terminals PS and E1 of the ECM.

HINT:

Terminal arrangement is on page 05-16.

Voltage:

Condition	Voltage (V)
Without turning the steering wheel at engine idle	8 to 14
Turn the steering wheel at engine idle	0 to 1.5

EMISSION CONTROL

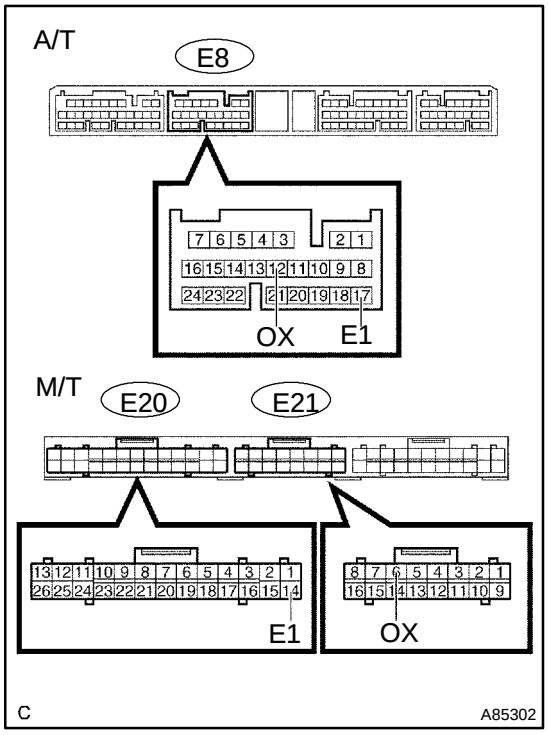
EMISSION CONTROL SYSTEM
(1ZZ–FE/3ZZ–FE
FOR SOUTH AFRICA) 12–1
ON–VEHICLE INSPECTION 12–1

REFER TO COROLLA REPAIR MANUAL (Pub. No. RM821E)
NOTE: The above pages contain only the points which differ from the above listed manual.

EMISSION CONTROL SYSTEM (1ZZ-FE/3ZZ-FE FOR SOUTH AFRICA)

ON-VEHICLE INSPECTION

120B7-01



1. INSPECT AIR-FUEL RATIO COMPENSATION SYSTEM

(a) Connect the voltmeter to terminals OX and E1 of the ECM.

CAUTION:

Connect test leads from the back of the connector with the ECM connected.

(b) Warm up the oxygen sensor with the engine speed at 2,500 rpm for approximately 2 minutes.

(c) Confirm that the voltage changes between 0V to 1V with the engine speed at 2,500 rpm.

OK:

The voltage changes more than 8 times within 10 seconds.

CAUTION:

- **Perform the check immediately after the sensor has been warmed up.**
- **If unable to confirm the change of voltage, warm up the oxygen sensor again.**

LIGHTING

LIGHTING SYSTEM
(SOUTH AFRICA)(From August, 2003) . . . 65-1
PROBLEM SYMPTOMS TABLE 65-1
ON-VEHICLE INSPECTION 65-3
INSPECTION 65-4

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E
COROLLA Repair Manual Supplement (Aug., 2002)	DR105E

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

LIGHTING SYSTEM (SOUTH AFRICA)(From August, 2003)

650WS-01

PROBLEM SYMPTOMS TABLE

1. HEADLIGHT AND TAILLIGHT SYSTEM

Symptom	Suspected Area	See page
Only one headlight comes on.	3. Bulb 4. HEAD LH, HEAD RH fuse 5. Wire harness	- - -
"LO-Beam" does not come on (All).	1. HEAD LH, HEAD RH fuse 2. Headlamp dimmer switch 3. Wire harness	- L -
"HI-Beam" does not come on. ("LO-Beam" is normal.)	1. Headlamp dimmer switch 2. Wire harness	L -
"HI-Beam" does not come on (One side).	1. Bulb 2. Wire harness	- -
"Flash" does not come on.	1. Headlamp dimmer switch 2. Wire harness	L -
Headlight is dark.	1. Bulb 2. Wire harness	- -
Only one taillight comes on.	1. Bulb 2. Wire harness	- -
Taillight does not come on. (Headlight is normal.)	1. TAIL Fuse 2. Headlamp dimmer switch 3. Wire harness	- L -
Taillight does not come on. (Headlight does not light.)	1. Headlamp dimmer switch 2. Wire harness	L -

HINT:

L : Refer to repair manual RM821E.

2. FOG LIGHT SYSTEM

Symptom	Suspected Area	See page
Front fog light does not come on when the light control switch is in TAIL or HEAD position (Headlight is normal).	1. FOG Fuse 2. Fog light relay 3. Headlamp dimmer switch 4. Wire harness	- L L -
Front fog light does not come on when the light control switch is in TAIL or HEAD position (Headlight does not come on).	1. *1 Other Parts 2. Wire harness	- -
Only one front fog light does not come on.	1. Bulb 2. Wire harness	- -

HINT:

- *1: Inspect Headlight System.
- L : Refer to repair manual RM821E.

3. STOP LIGHT SYSTEM

Symptom	Suspected Area	See page
Only one stop light does not come on.	1. Bulb 2. Wire harness	- -
Stop light does not come on (All).	1. STOP Fuse 2. Stop lamp switch assy 3. Wire harness	- 65-4 -

4. TURN SIGNAL AND HAZARD WARNING SYSTEM

Symptom	Suspected Area	See page
Hazard warning light and turn signal light do not come on.	1. GAUGE Fuse 2. HAZARD Fuse 3. Ignition switch assy 4. Turn signal flasher relay 5. Wire harness	- - - L -
Hazard warning light does not come on. (Turn is normal.)	1. Hazard warning switch assy (w/o Auto Air Conditioning) 2. Hazard warning switch assy (w/ Auto Air Conditioning) 3. Wire harness	L 65-3 -
Turn signal light does not come on. (Hazard is normal.)	1. Headlamp dimmer switch assy 2. Wire harness	L -
Turn signal light does not come on in one direction.	1. Headlamp dimmer switch assy 2. Wire harness	L -
Only one bulb does not come on.	1. Bulb 2. Wire harness	- -

HINT:

L : Refer to repair manual RM821E.

5. INTERIOR LIGHT SYSTEM

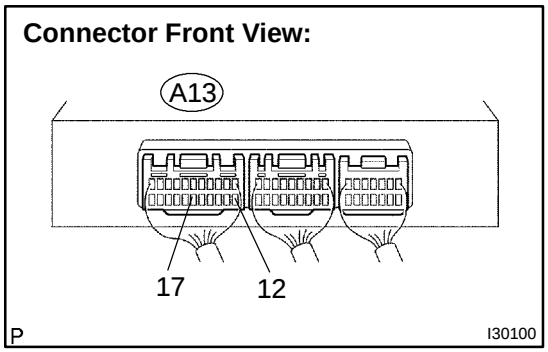
Symptom	Suspected Area	See page
All the lights do not come on.	1. DOME Fuse	-
The light does not come on when the driver's door is open.	1. Driver's door courtesy switch 2. Wire harness	L -
The light does not come on when the passenger's door is open.	1. Passenger's door courtesy switch 2. Wire harness	L -
The light does not come on when the rear-right door is open.	1. Rear-Right door courtesy switch 2. Wire harness	L -
The light does not come on when the rear-left door is open.	1. Rear-Left door courtesy switch 2. Wire harness	L -
Only one of the bulbs comes on.	1. Bulb	-
The illumination does not fade out when all the doors are closed.	1. Door courtesy switch 2. Wire harness	L -
The illumination does not fade out immediately when the ignition switch is turned to the ACC or ON position within 15 seconds after all the doors are closed.	1. Ignition switch assy 2. GAUGE Fuse 3. Integration relay (Perform illuminated entry system operation check.) 4. Wire harness	L - L -
Luggage compartment light does not come on.	1. Bulb 2. Luggage compartment room courtesy lamp switch assy (Sedan) 3. Back door lock assy (Hatch back) 4. Wire harness	- L 65-4 -

HINT:

L : Refer to repair manual RM821E.

650WT-01

ON-VEHICLE INSPECTION



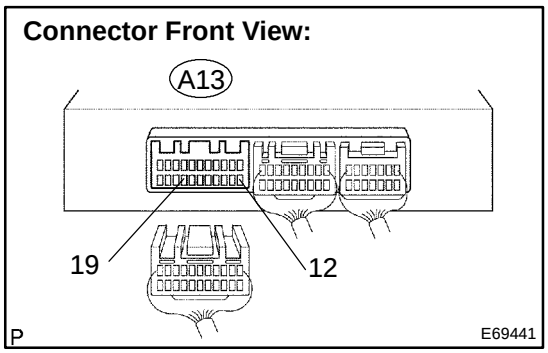
1. INSPECT HAZARD WARNING SIGNAL SWITCH(w/ AUTO AIR CONDITIONER)

(a) Remove A/C amplifier with the connectors still connected.

(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Switch operation	Specified condition
12 - 17	OFF	10 to 14 V
12 - 17	ON	Below 1 V



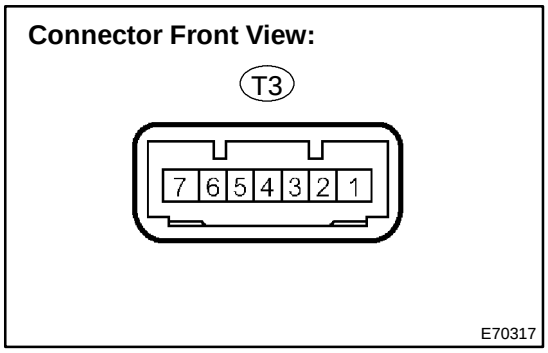
(c) Inspect illumination operation.

(1) Disconnect the connector from the A/C amplifier.

(2) Connect the positive (+) lead from the battery to terminal 19 and the negative (–) lead to terminal 12, then check that the illumination comes on.

650WU-01

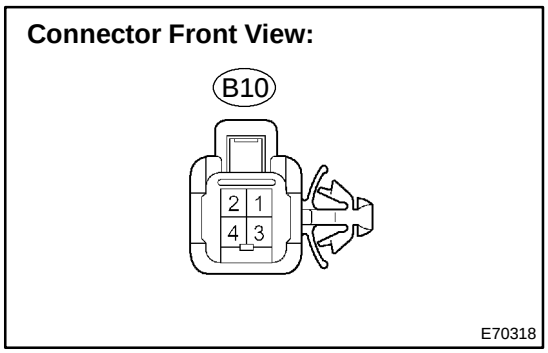
INSPECTION



1. TRANSPONDER KEY AMPLIFIER

(a) Inspect the ignition key cylinder illumination operation.

(1) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 6, then check that the illumination comes on.



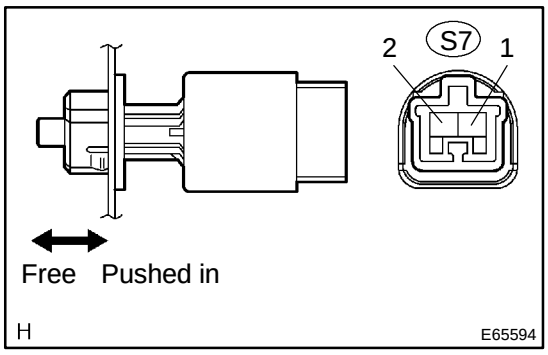
2. BACK DOOR LOCK ASSY (HATCH BACK BODY TYPE)

(a) Inspect the back door courtesy lamp switch operation.

(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Back door operation	Specified condition
1-2	Back door is closed.	10 kΩ or higher
1-2	Back door is open.	Below 1 Ω



3. STOP LAMP SWITCH ASSY

(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Switch operation	Specified resistance
1-2	Switch pin free	Below 1 Ω
1-2	Switch pin pushed in	10 kΩ or higher

AUDIO & VISUAL SYSTEM

AUDIO & VISUAL SYSTEM
(SOUTH AFRICA)(From August, 2003) . . . 67–1
LOCATION 67–1
ANTENNA CORD SUB–ASSY
(SOUTH AFRICA)(From August, 2003) . . . 67–2
REPLACEMENT 67–2
AMPLIFIER ANTENNA ASSY
(SOUTH AFRICA)(From August, 2003) . . . 67–5
REPLACEMENT 67–5

REFER TO FOLLOWING REPAIR MANUALS:

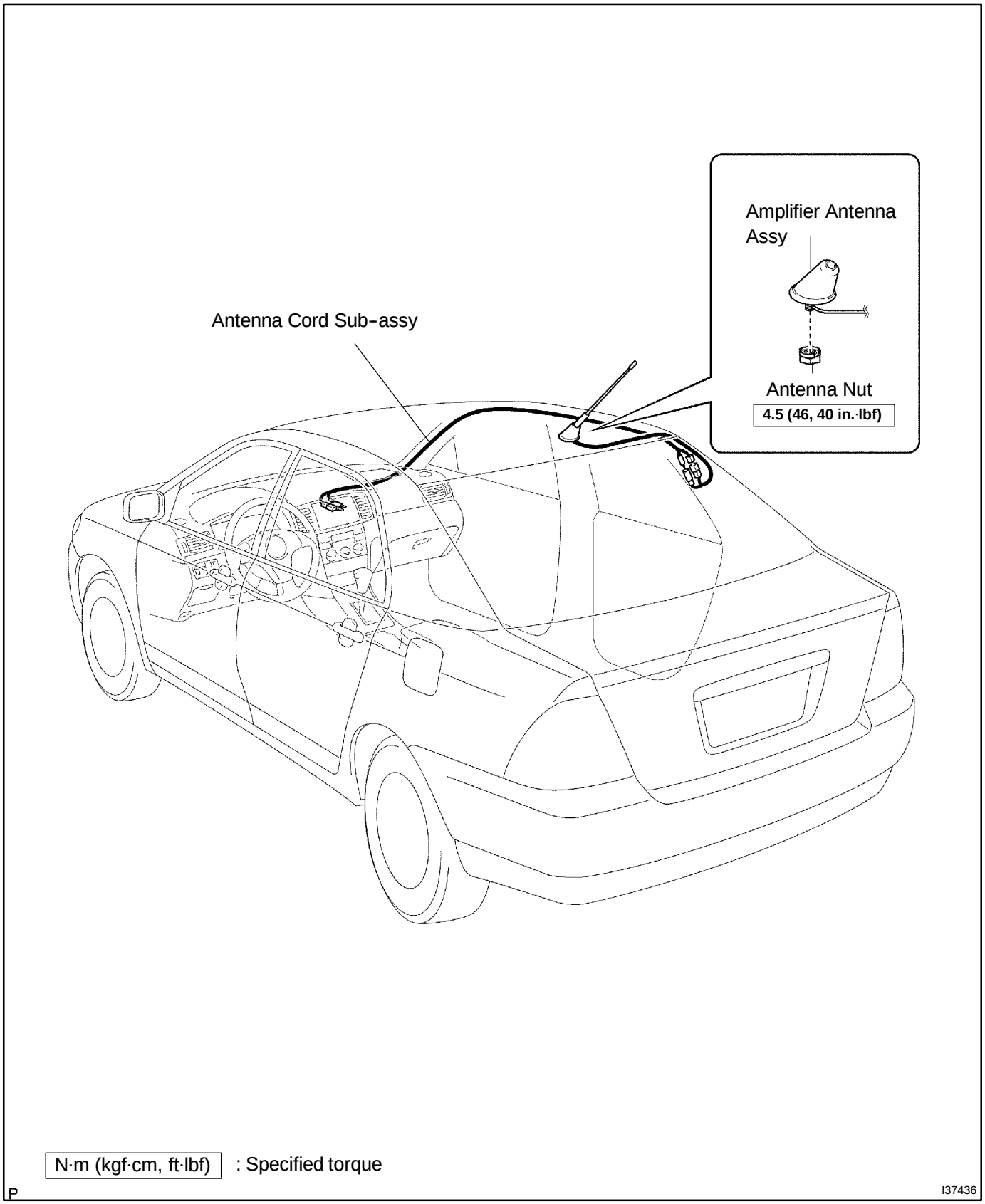
Manual Name	Pub. No.
COROLLA Repair Manual	RM821E
COROLLA Repair Manual Supplement (Oct., 2001)	RM926E
COROLLA Repair Manual Supplement (Aug., 2002)	DR105E

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

AUDIO & VISUAL SYSTEM (SOUTH AFRICA)(From August, 2003)

LOCATION

670WK-01



ANTENNA CORD SUB-ASSY (SOUTH AFRICA)(From August, 2003)

670WL-01

REPLACEMENT

HINT:

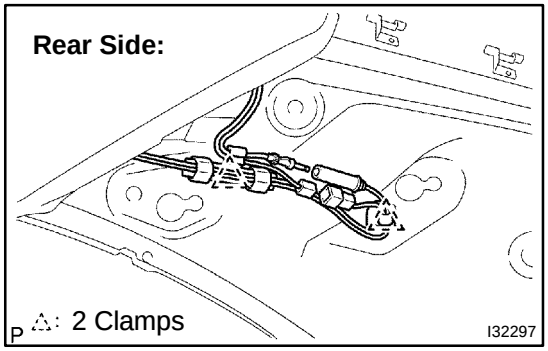
LOCATION: See page 67-1

1. REMOVE INSTRUMENT PANEL SUB-ASSY UPPER (See Pub. No. RM821E, page 71-11)

HINT:

- Refer to the procedures until the step, "REMOVE INSTRUMENT PANEL SUB-ASSY UPPER" of INSTRUMENT PANEL SUB-ASSY LOWER.
- Remove instrument panel sub-assy upper related parts so that the antenna cord sub-assy can be removed.

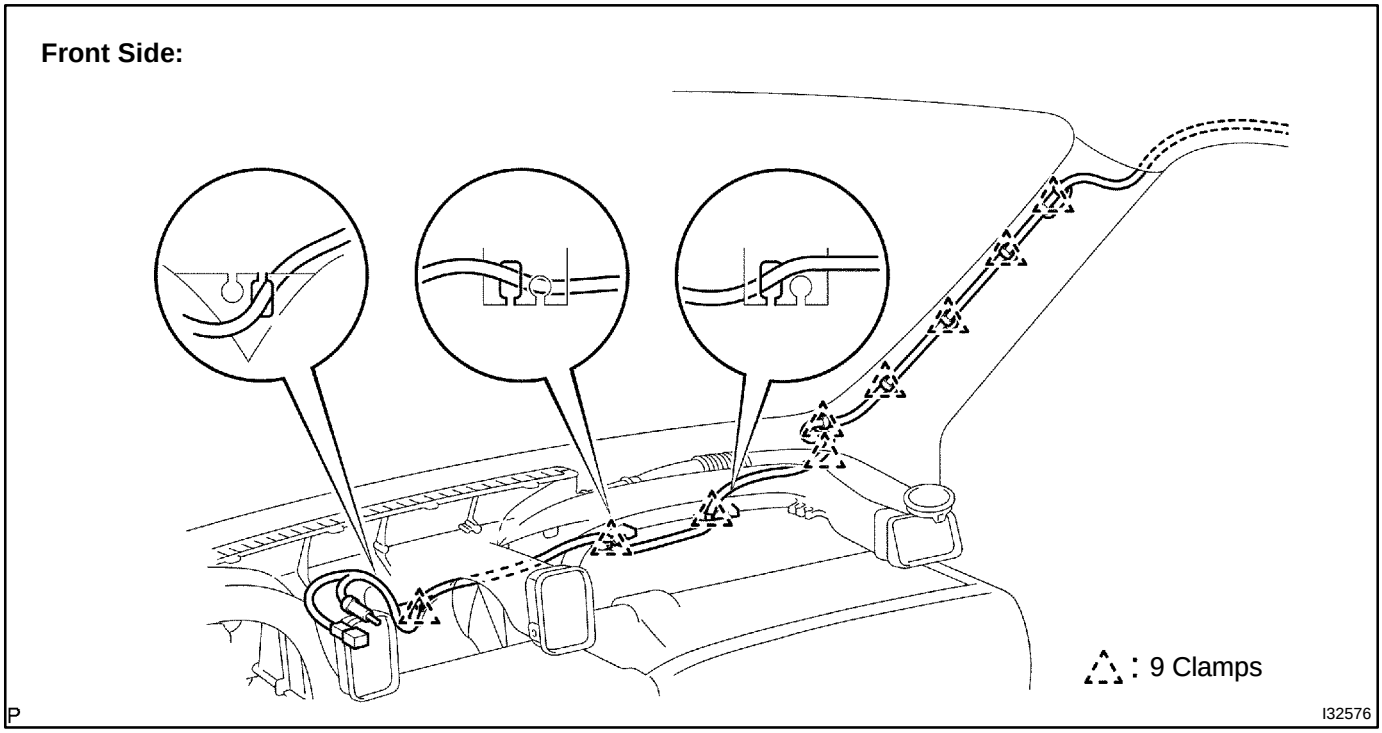
2. REMOVE ROOF SIDE GARNISH INNER RH



3. DISCONNECT ANTENNA CORD SUB-ASSY

(a) Rear Side:
Disconnect the connector and antenna cord plug, then remove the 2 clamps.

(b) Front Side:
Remove the 9 clamps.



4. REMOVE ROOF HEADLINING ASSY (See Pub. No. RM821E, page 76-20)

NOTICE:

Do not bend the roof headlining assy.

HINT:

- Refer to the procedures until the step, "REMOVE VISOR HOLDER" of ROOF HEADLINING ASSY (SEDAN).
- Remove roof headlining assy related parts so that the antenna cord sub-assy can be removed.

5. REMOVE ANTENNA CORD SUB-ASSY

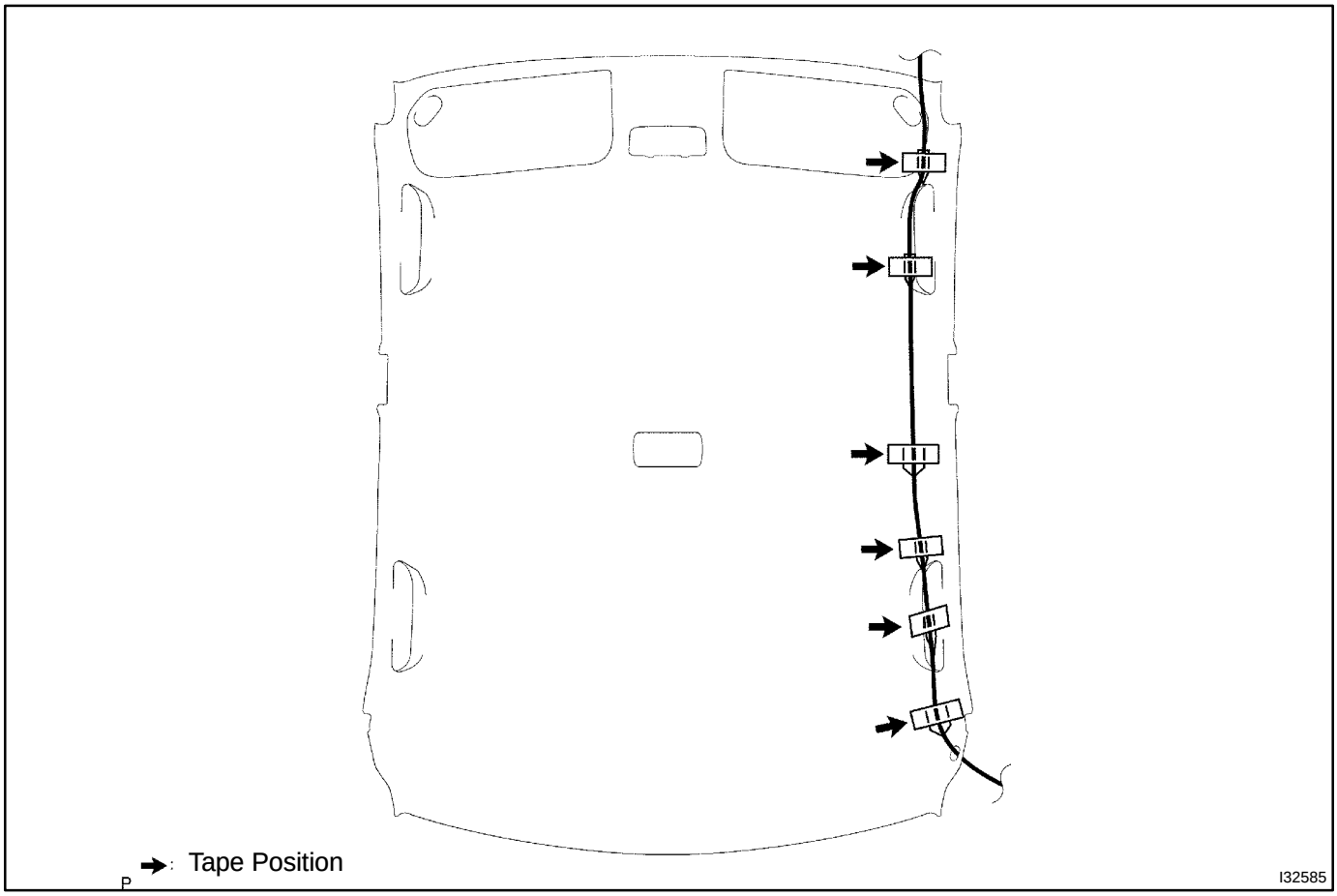
(a) Remove the antenna cord sub-assy from the roof headlining assy.

6. INSTALL ANTENNA CORD SUB-ASSY

(a) Place the antenna cord sub-assy on the roof headlining assy and tape it, as shown in the illustration.

NOTICE:

- **The antenna cord sub-assy should come to the center of the tape (100 mm (3.94 in.) x 25 mm (0.98 in.)) when taped.**
- **Try not to touch the adhesive side of the tape when taping.**



(b) Engage the 9 clamps at the front side of the antenna cord.

(c) Connect the antenna cord plug and connector at the rear side of the antenna cord.

(d) Engage the 2 clamps at the rear side of the antenna cord.

7. INSTALL ROOF HEADLINING ASSY (See Pub. No. RM821E, page 76-20)

HINT:

Refer to the procedures from "INSTALL ROOF HEADLINING ASSY" of ROOF HEADLINING ASSY (SEDAN).

8. INSTALL INSTRUMENT PANEL SUB-ASSY UPPER (See Pub. No. RM821E, page 71-11)

HINT:

Refer to the procedures from "INSTALL INSTRUMENT PANEL SUB-ASSY UPPER" of INSTRUMENT PANEL SUB-ASSY LOWER.

AMPLIFIER ANTENNA ASSY (SOUTH AFRICA)(From August, 2003)

REPLACEMENT

670WM–01

HINT:

LOCATION: See page 67–1

1. REMOVE ROOF HEADLINING ASSY (See Pub. No. RM821E, page 76–20)

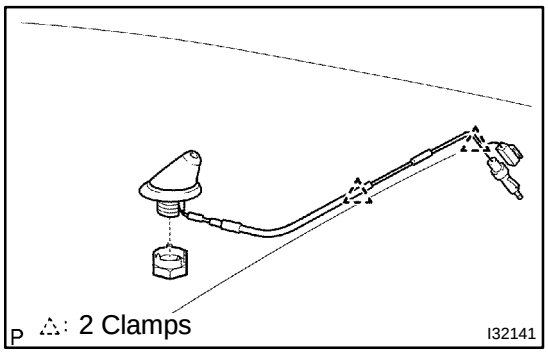
NOTICE:

Do not bend the roof headlining assy.

HINT:

- Refer to the procedures until the step, ”REMOVE ROOF HEADLINING ASSY” of ROOF HEADLINING ASSY (SEDAN).
- Remove roof headlining assy related parts so that the amplifier antenna assy can be removed.

2. REMOVE ROOF ANTENNA POLE SUB–ASSY(See Pub. No. RM926E, page 67–6)

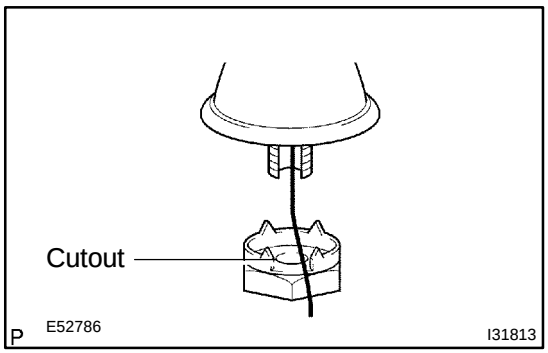


3. REMOVE AMPLIFIER ANTENNA ASSY

(a) Disconnect the connector and antenna cord plug.

(b) Remove the 2 clamps.

(c) Remove the antenna nut and amplifier antenna assy.



4. INSTALL AMPLIFIER ANTENNA ASSY

(a) Set the amplifier antenna assy to the hole on the roof, and place the antenna cord on the cutout on the antenna nut.

(b) Install the amplifier antenna assy with the antenna nut.
Torque: 4.5 N·m (46 kgf·cm, 40 in.·lbf)

5. INSTALL ROOF HEADLINING ASSY (See Pub. No. RM821E, page 76–20)

HINT:

Refer to the procedures from ”INSTALL ROOF HEADLINING ASSY” of ROOF HEADLINING ASSY (SEDAN).

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