HOW TO USE THIS MANUAL

IN00U-36

GENERAL INFORMATION

1. INDEX

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

2. PRECAUTION

At the beginning of each section, a PRECAUTION is given that pertains to all repair operations contained in that section.

Read these precautions before starting any repair task.

3. TROUBLESHOOTING

TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The fundamentals of how to proceed with troubleshooting are described on page IN-18 .

Be sure to read this before performing troubleshooting.

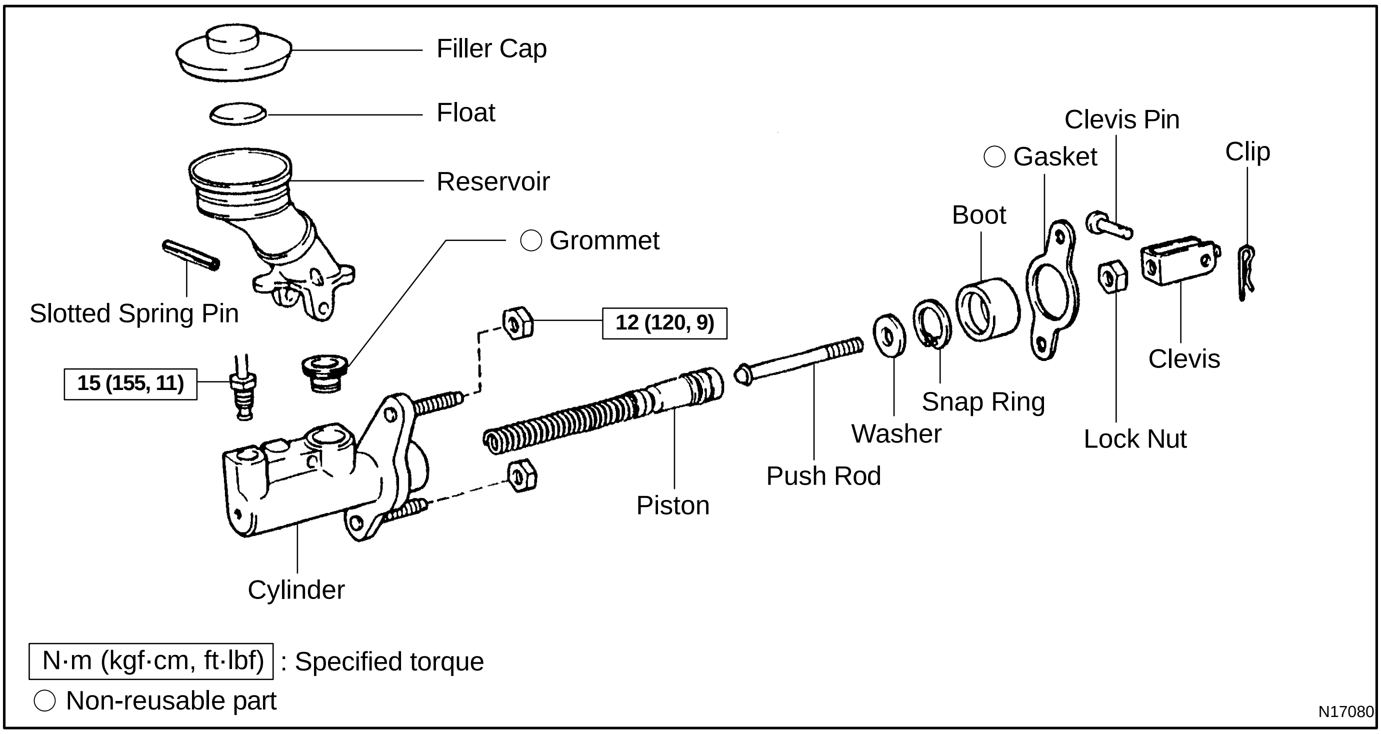
4. PREPARATION

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

5. REPAIR PROCEDURES

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

Example:



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

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

Example:

Task heading : what to do

Illustration:
what to do and where

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the illustration.

SST 09350-30020 (09350-06120)

Set part No. *Component part No.*

Detailed text : how to do task

(b) Measure the stroke applying and releasing the compressed air (392 — 785 kPa, 4 — 8 kgf/cm^2 or 57 — 114 psi) as shown in the illustration.

Piston stroke: 1.40 — 1.70 mm (0.0551 — 0.0669 in.)

Specification

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

6. REFERENCES

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

7. SPECIFICATIONS

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

8. CAUTIONS, NOTICES, HINTS:

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

9. SI UNIT

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

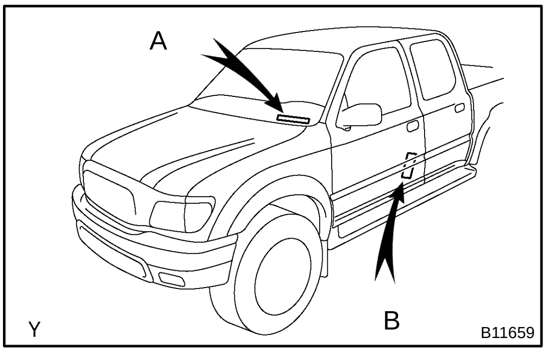
Example:

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

IDENTIFICATION INFORMATION

IN01P-06

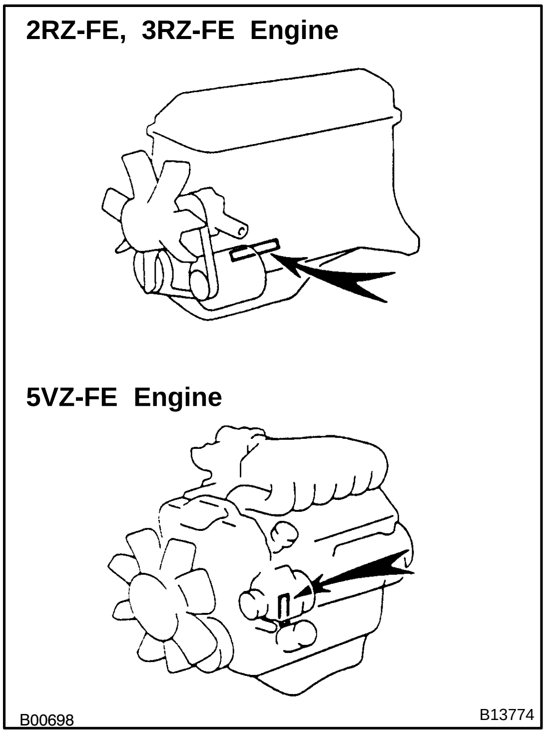
VEHICLE IDENTIFICATION AND ENGINE SERIAL NUMBER



1. VEHICLE IDENTIFICATION NUMBER

The vehicle identification number is stamped on the vehicle identification number plate and certification label.

A: Vehicle Identification Number Plate
B: Certification Label



2. ENGINE SERIAL NUMBER

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

REPAIR INSTRUCTIONS

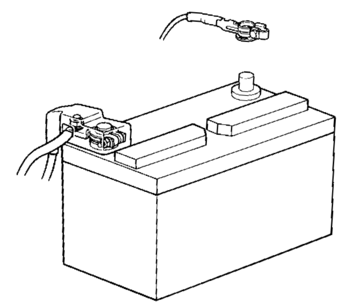
IN0CO-12

GENERAL INFORMATION

BASIC REPAIR HINT

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

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

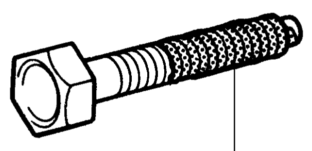


FI1066

(c) Installation and removal of battery terminal:
- (1) Before performing electrical work, disconnect the negative (-) terminal cable from the battery.
- (2) If it is necessary to disconnect the battery for inspection or repair, first disconnect the negative (-) terminal cable.
- (3) When disconnecting the terminal cable, to prevent damage to battery terminal, loosen the cable nut and raise the cable straight up without twisting or prying it.
- (4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.
- (5) Install the cable ends to the battery terminals after loosening the nut, and tighten the nut after installation. Do not use a hammer to tap the cable ends onto the terminals.
- (6) Be sure the cover for the positive (+) terminal is properly in place.

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

(e) Non-reusable parts
- (1) Always replace cotter pins, gaskets, O-rings, oil seals, etc. with new ones.
- (2) Non-reusable parts are indicated in the component illustrations by the "   " symbol.



Z11554

(f) Precoated parts

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

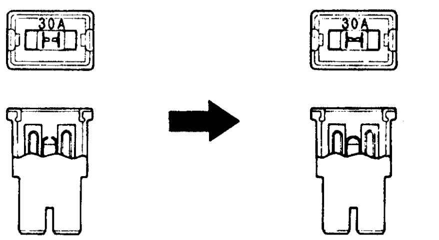
(3) Precoated parts are indicated in the component illustrations by the "●" symbol.

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

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

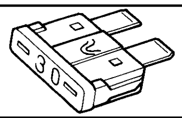
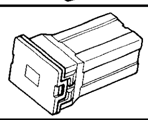
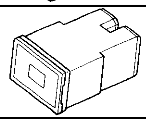
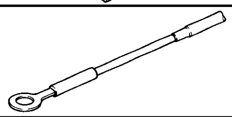
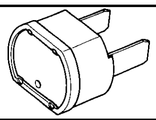
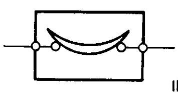
(i) Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found in Preparation section in this manual.

Medium Current Fuse and High Current Fuse Equal Amperage Rating



BE1367

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

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

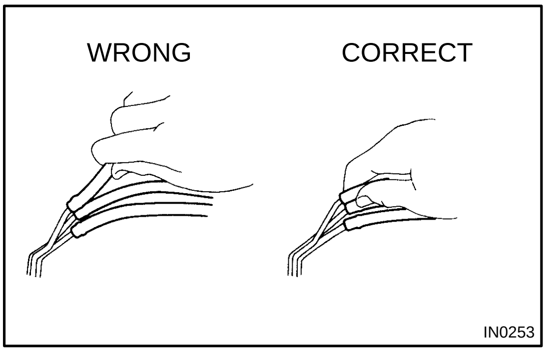
V00076

(k) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page IN-8).

- ○ Cancel the parking brake on the level place and shift the transmission in Neutral (or N position).
- ○ When jacking up the front wheels of the vehicle at first place stoppers behind the rear wheels.
- ○ When jacking up the rear wheels of the vehicle at first place stoppers before the front wheels.
- ○ When either the front or rear wheels only should be jacked up, set rigid racks and place stoppers in front and behind the other wheels on the ground.
- ○ After the vehicle is jacked up, be sure to support it on rigid racks . It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.

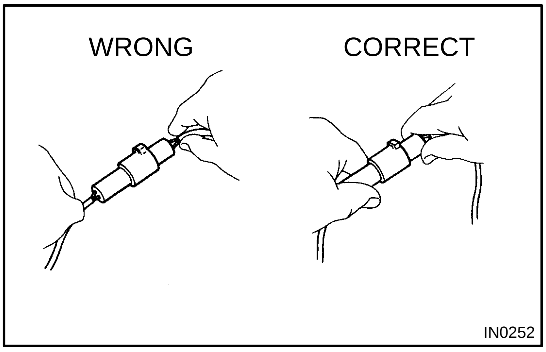
(l) Observe the following precautions to avoid damage to the following parts:

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



IN0253

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



IN0252

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

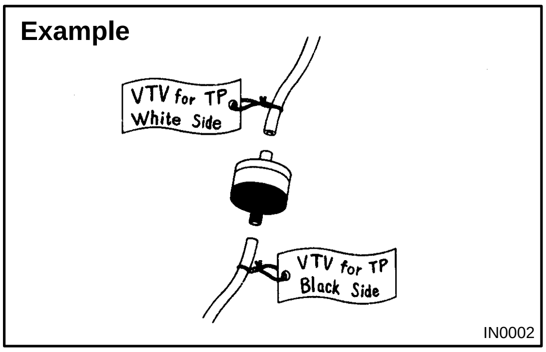
(4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.

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

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

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

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



(m) Installation and removal of vacuum hose:

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

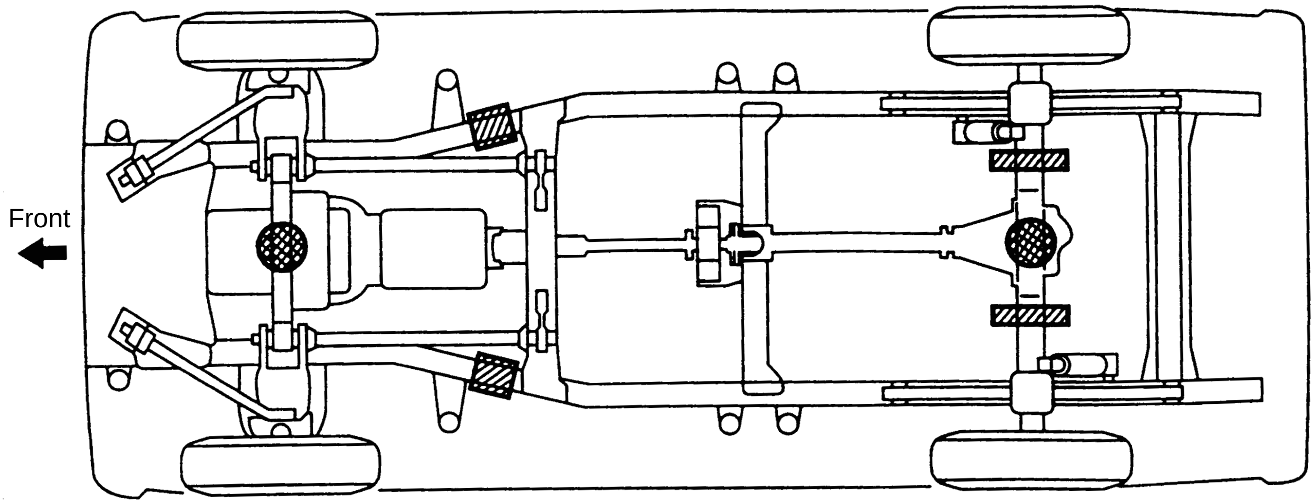
(2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

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

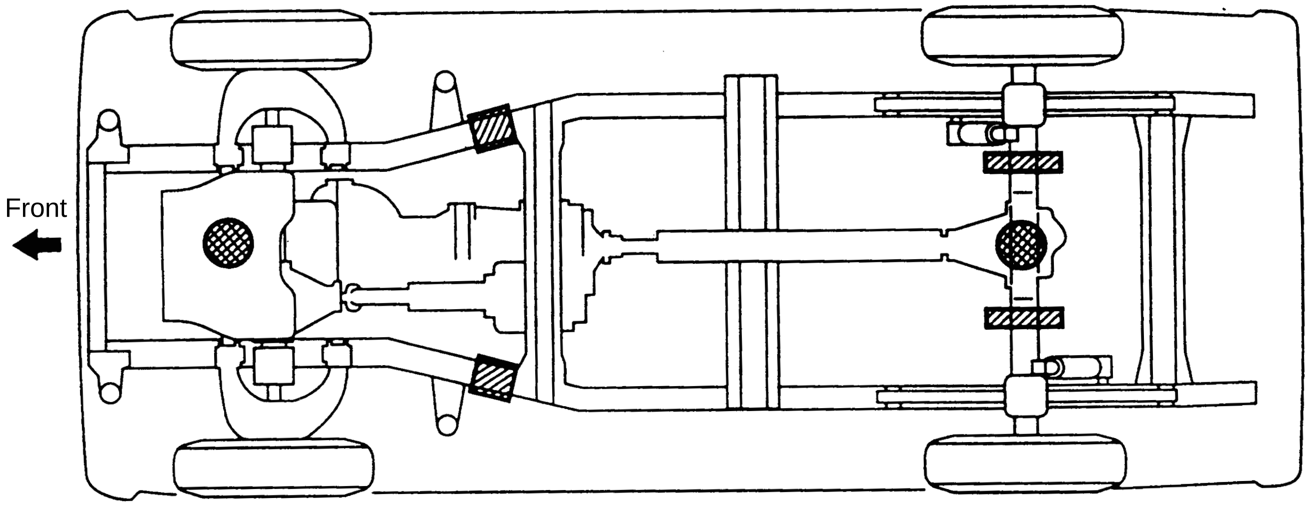
IN0DA-01

VEHICLE LIFT AND SUPPORT LOCATIONS

2WD Except PRE RUNNER



4WD

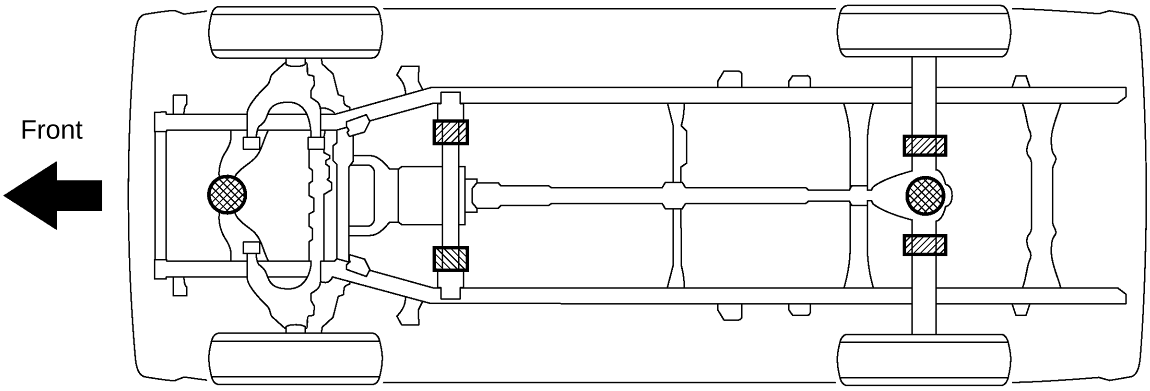


JACK POSITION
- Front: Center of crossmember
- Rear: Under the rear differential

SUPPORT POSITION
- Safety stand

B00699

PRE RUNNER



JACK POSITION ....

Front .... Center of crossmember

Rear .... Under the rear differential

SUPPORT POSITION

Safety stand ....

B04189

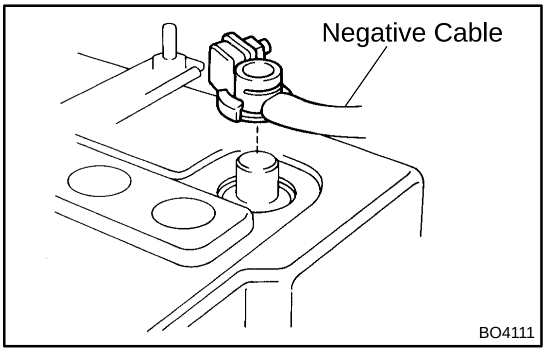
FOR ALL OF VEHICLES

IN0DB-05

PRECAUTION

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

(a) The TOYOTA TACOMA is equipped with an SRS (Supplemental Restraint System), such as the driver airbag, front passenger airbag assembly and seat belt pretensioner.
Failure to carry out service operations in the correct sequence could cause the supplemental restraint system to unexpectedly deploy during servicing, possibly leading to a serious accident.
Further, if a mistake is made in servicing the supplemental restraint system, it is possible the SRS may fail to operate when required. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedure described in this manual.



(b) GENERAL NOTICE
(1) Malfunction symptoms of the supplemental restraint system are difficult to confirm, so the diagnostic trouble codes become the most important source of information when troubleshooting. When troubleshooting the supplemental restraint system, always inspect the diagnostic trouble codes before disconnecting the battery (See page DI-381).
(2) Work must be started after 90 seconds from the time the ignition switch is turned to the ”LOCK” position and the negative (-) terminal cable is disconnected from the battery.
(The supplemental restraint system is equipped with a back-up power source so that if work is started within 90 seconds of disconnecting the negative (-) terminal cable from the battery, the SRS may deploy.)
When the negative (-) terminal cable is disconnected from the battery, memory of the clock and audio systems will be cancelled. So before starting work, make a record of the contents memorized by the each memory system. Then when work is finished, reset the clock and audio systems as before. To avoid erasing the memory of each memory system, never use a back-up power supply from another battery.

(3) Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad (See page RS-12), front passenger airbag assembly (See page RS-26) and seat belt pretensioner (See page BO-109) should be inspected.

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

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

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

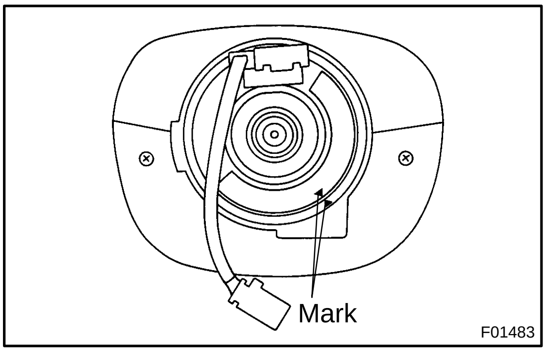
(7) If the airbag sensor assembly, steering wheel pad, front passenger airbag assembly or seat belt pretensioner has been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.

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

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

(10) Information labels are attached to the periphery of the SRS components. Follow the instructions on the notices.

(11) After work on the supplemental restraint system is completed, check the SRS warning light (See page DI-381).



(c) SPIRAL CABLE (in Combination Switch)

The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may result. Refer to SR-19 concerning correct steering wheel installation.

(d) STEERING WHEEL PAD (with Airbag)

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

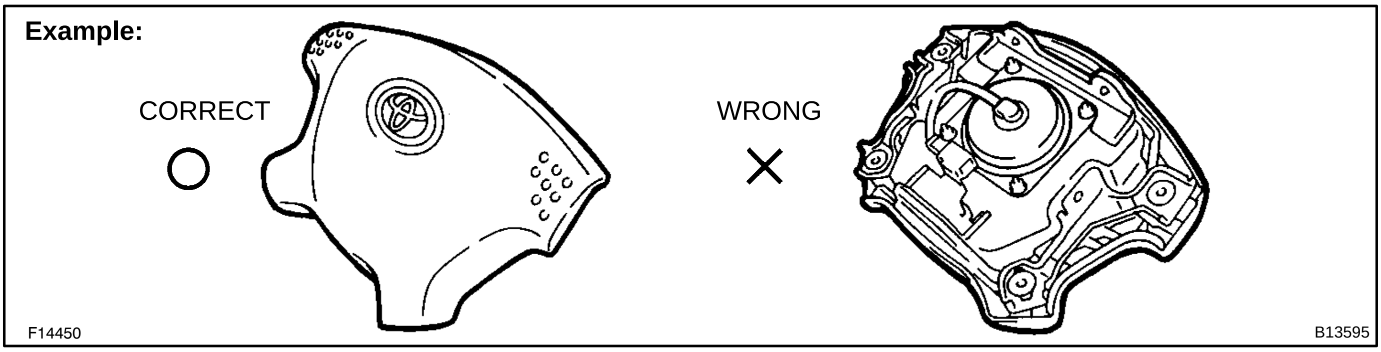
(2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)

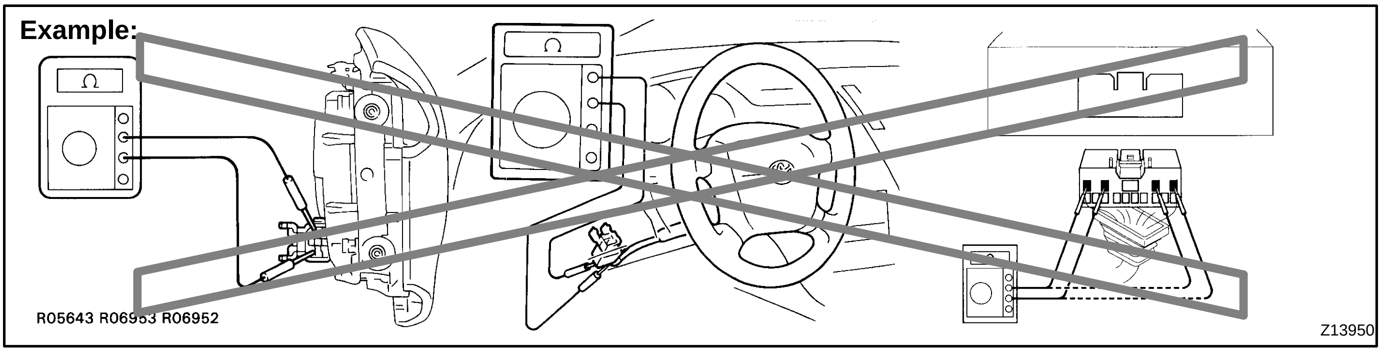
(3) Grease should not be applied to the steering wheel pad and the pad should not be cleaned with detergents of any kind.

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

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

(6) When disposing of a vehicle or the steering wheel pad alone, the airbag should be deployed using an SST before disposal (See page RS-14).
Perform the operation in a safe place away from electrical noise.





(e) FRONT PASSENGER AIRBAG ASSEMBLY

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

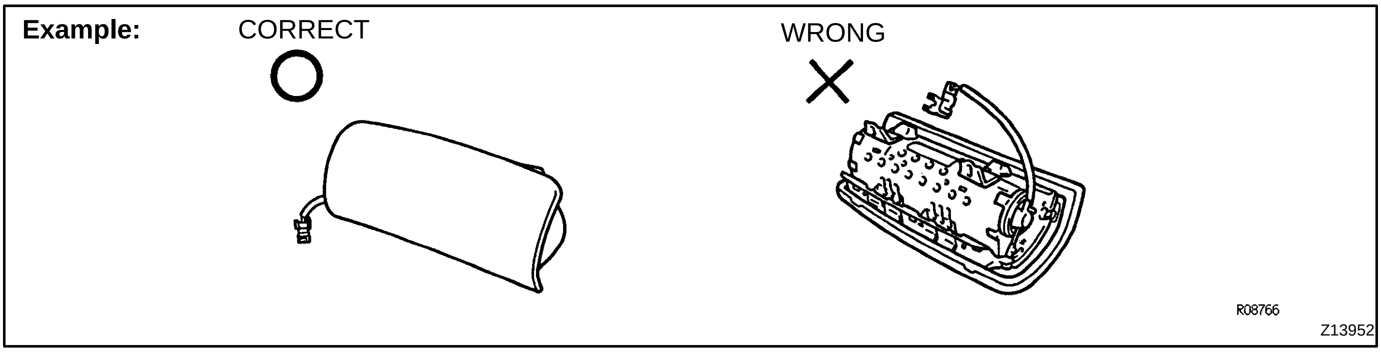
(2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)

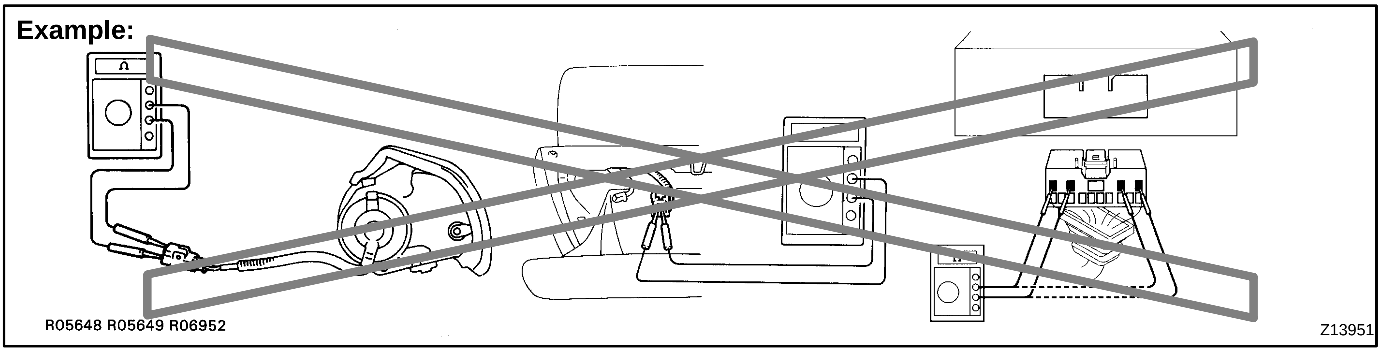
(3) Grease should not be applied to the front passenger airbag assembly and the airbag door should not be cleaned with detergents of any kind.

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

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

(6) When disposing of a vehicle or the airbag assembly alone, the airbag should be deployed using an SST before disposal (See page RS-28).
Perform the operation in a safe place away from electrical noise.





(f) SEAT BELT PRETENSIONER

(1) Never measure the resistance of the seat belt pretensioner. (This may cause the seat belt pretensioner activation which is very dangerous.)

(2) Never disassemble the seat belt pretensioner.

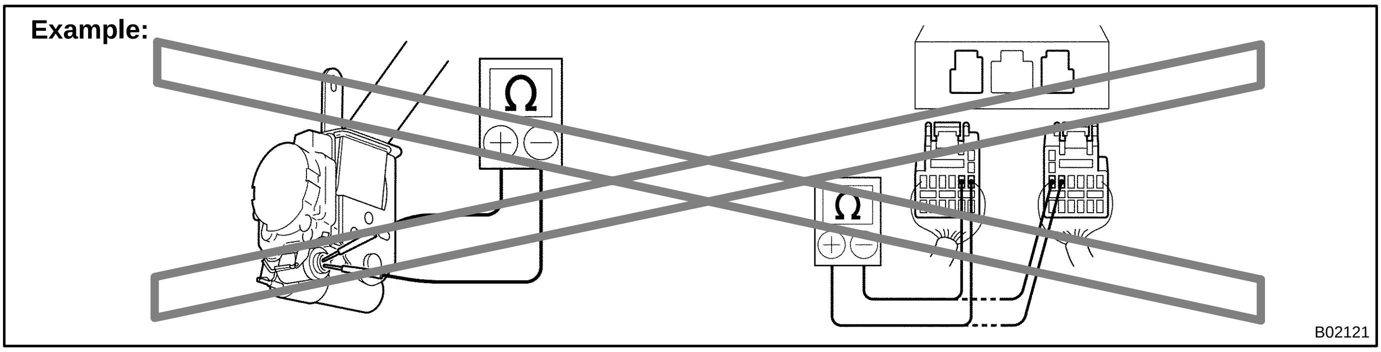
(3) Never install the seat belt pretensioner in another vehicle.

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

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

(6) When disposing of a vehicle or the seat belt pretensioner alone, the seat belt pretensioner should be activated before disposal (See page BO-1 10). Perform the operation in a safe place away from electrical noise.

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



(g) AIRBAG SENSOR ASSEMBLY

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

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

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

(h) WIRE HARNESS AND CONNECTOR

The SRS wire harness is integrated with the cowl wire harness assembly and floor wire harness assembly. All the connectors for the system are also 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.

2. FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

CAUTION:

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

(a) Use only unleaded gasoline.
(b) Avoid prolonged idling.
Avoid running the engine at idle speed for more than 20 minutes.
(c) Avoid spark jump test.
(1) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
(2) While testing, never race the engine.
(d) Avoid prolonged engine compression measurement
Engine compression tests must be done as rapidly as possible.
(e) Do not run engine when fuel tank is nearly empty.
This may cause the engine to misfire and create an extra load on the converter.
(f) Avoid coasting with ignition turned off.
(g) Do not dispose of used catalyst along with parts contaminated with gasoline or oil.

3. IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

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

(1) Install the antenna as far as possible away from the ECU and sensors of the vehicle's electronic system.
(2) Install the antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle's electronic systems. For details about ECU and sensors locations, refer to the section on the applicable component.
(3) Do not wind the antenna feeder together with the other wiring as much as possible, also avoid running the antenna feeder parallel with other wire harness.
(4) Check that the antenna and feeder are correctly adjusted.
(5) Do not install powerful mobile communications system.

4. FOR USING OBD II SCAN TOOL OR TOYOTA HAND-HELD TESTER

CAUTION:

Observe the following for safety reasons:

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

HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

GENERAL INFORMATION

IN01T-06

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

The troubleshooting procedure and how to make use of it are described on the following pages.

System	Page
1. Engine (2RZ-FE, 3RZ-FE)	DI-1
2. Engine (5VZ-FE)	DI-144
3. Automatic Transmission (A340E, A340F)	DI-275
4. Anti-Lock Brake System	DI-338
5. Supplemental Restraint System	DI-379
6. Cruise Control System	DI-482
7. Body Control System	DI-528

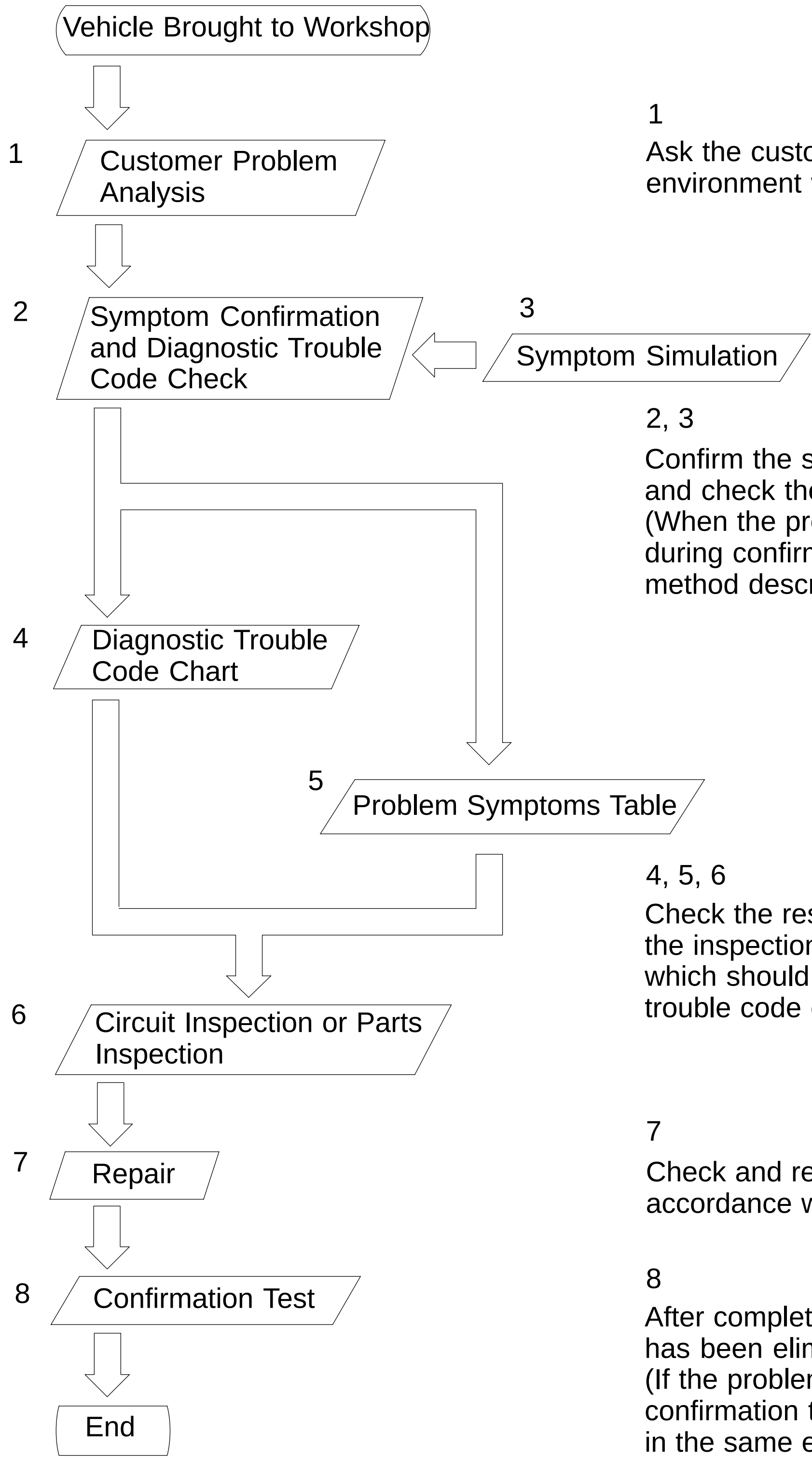
FOR USING OBD II SCAN TOOL OR TOYOTA HAND-HELD TESTER

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

IN01U-07

HOW TO PROCEED WITH TROUBLESHOOTING

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



1

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

2, 3

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

4, 5, 6

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

7

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

8

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

1. CUSTOMER PROBLEM ANALYSIS

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

Important Point in the Problem Analysis:

The following 5 items are important points in the problem analysis. Past problems which are thought to be unrelated and the repair history, etc. may also help in some cases, so as much information as possible should be gathered and its relationship with the problem symptoms should be correctly ascertained for reference in troubleshooting. A customer problem analysis table is provided in Diagnostics section for each system for your use.

Important Points in the Customer Problem Analysis

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

(Sample) Engine control system check sheet.

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name ______________________

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

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

...onstant ☐ **Sometimes (times per day/month)**

2. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE CHECK

The diagnostic system in the TOYOTA TACOMA fulfills various functions. The first function is the Diagnostic Trouble Code Check in which a malfunction in the signal circuits to the ECU is stored in code in the ECU memory at the time of occurrence, to be output by the technician during troubleshooting. Another function is the Input Signal Check which checks if the signals from various switches are sent to the ECU correctly. By using these check functions, the problem areas can be narrowed down quickly and troubleshooting can be performed effectively. Diagnostic functions are incorporated in the following systems in the TOYOTA TACOMA.

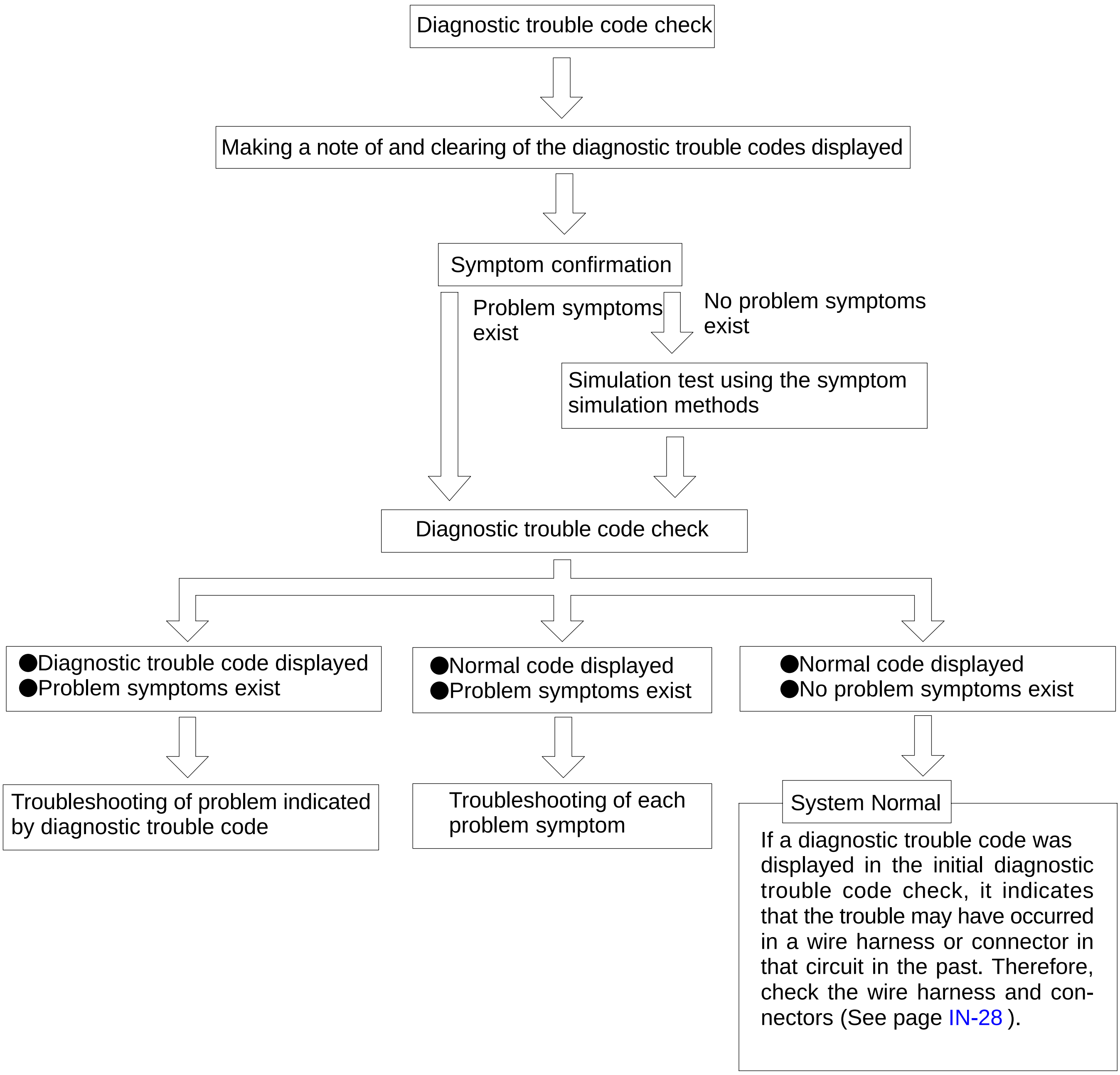
System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Diagnostic Test Mode (Active Test)
1. Engine (2RZ-FE, 3RZ-FE)	○ (with Check Mode)	○	○
2. Engine (5VZ-FE)	○ (with Check Mode)	○	○
3. Automatic Transmission	○ (with Check Mode)	○	
4. Anti-Lock Brake System	○	○	
5. Supplemental Restraint System	○		
6. Cruise Control System	○	○	

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

DIAGNOSTIC TROUBLE CODE CHECK PROCEDURE

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

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

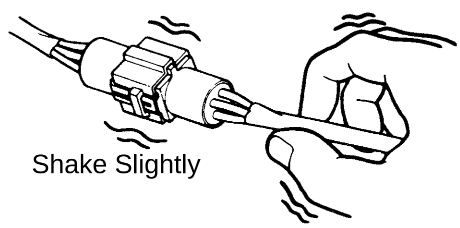
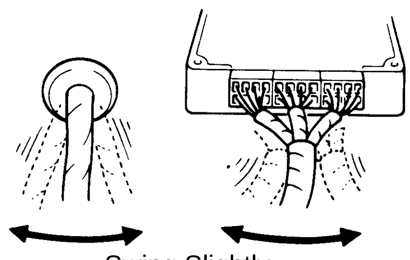
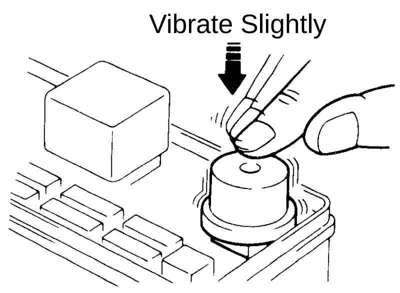


3. SYMPTOM SIMULATION

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

Important Points in the Symptom Simulation Test:

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

1	**VIBRATION METHOD: When vibration seems to be the major cause.**
CONNECTORS Slightly shake the connector vertically and horizontally. **WIRE HARNESS** Slightly shake the wire harness vertically and horizontally. The connector joint, fulcrum of the vibration, and body through portion are the major areas to be checked thoroughly.	  FI2331 FI2332
PARTS AND SENSOR Apply slight vibration with a finger to the part of the sensor considered to be the problem cause and check that the malfunction occurs. HINT: Applying strong vibration to relays may result in open relays.	 FI2330

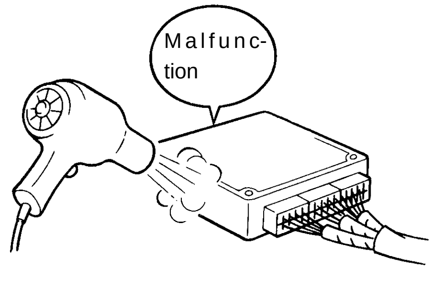
V07268

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

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

NOTICE:

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



FI2334

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

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

NOTICE:

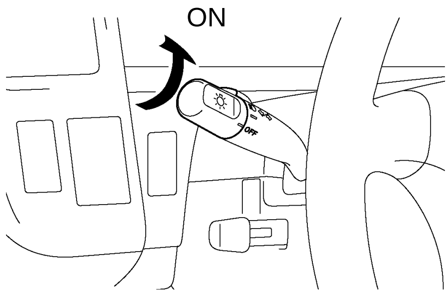
(1) Never sprinkle water directly into the engine compartment, but indirectly change the temperature and humidity by applying water spray onto the radiator front surface.
(2) Never apply water directly onto the electronic components.

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


FI6649

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

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



B02389

B02390

4. DIAGNOSTIC TROUBLE CODE CHART

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

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

- Trouble Area
  Indicates the suspect area of the problem.

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

DIAGNOSTIC TROUBLE CODE CHART

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

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

SAE CONTROLLED

DTC No. (See page)	Detection Item	Trouble Area	MIL*	Memory
P0100 (DI-24)	Mass Air Flow Circuit Malfunction	●Open or short in mass air flow meter circuit ●Mass air flow meter ●ECM	○	○
P0101 (DI-28)	Mass Air Flow Circuit Range/ Performance Problem	●Mass air flow meter	○	○
P0110 (DI-29)	Intake Air Temp. Circuit Malfunction	●Open or short in intake air temp. sensor circuit ●Intake air temp. sensor ●ECM	○	○
P0115 (DI-33)	Engine Coolant Temp. Circuit Malfunction	●Open or short in engine coolant temp. sensor circuit ●Engine coolant temp. sensor ●ECM	○	○
P0116 (DI-37)	Engine Coolant Temp. Circuit Range/ Performance Problem	●Engine coolant temp. sensor ●Cooling system	○	○
	... / Pedal Position Sensor/Switch ...nction	●Open or short in throttle position sensor circuit ●Throttle position sensor ●ECM		
	...sition Sensor/ Switch ...rformance Prob-	●Throttle position sensor		

5. PROBLEM SYMPTOMS TABLE

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

HINT:

When the problem is not detected by the diagnostic system even though the problem symptom is present, it is considered that the problem is occurring outside the detection range of the diagnostic system, or that the problem is occurring in a system other than the diagnostic system.

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

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

●Problem Symptom

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

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	ST-2 ST-17
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. ECM	DI-147 DI-151 IN-29
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-151
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-144 DI-151 EM-3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-144 DI-151
Hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI-144 DI-151
idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	AC-88
ing)	1. A/C signal circuit 2. Fuel pump control circuit	
	1. Compression	

6. CIRCUIT INSPECTION

How to read and use each page is shown below.

●Diagnostic Trouble Code No. and Detection Item

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

DTC	P0325	Knock Sensor 1 Circuit Malfunction

CIRCUIT DESCRIPTION

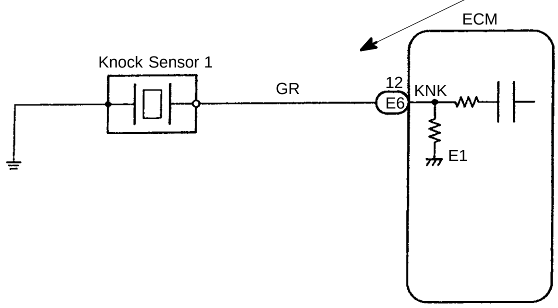
Knock sensor is fitted to the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detection Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed, 1,200 rpm or more.	●Open or short in knock sensor1 circuit ●Knock sensor 1 (looseness) ●ECM

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

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

WIRING DIAGRAM



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

V08423

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

LOCK Ignition Switch LOCK (OFF)

ON Ignition Switch ON

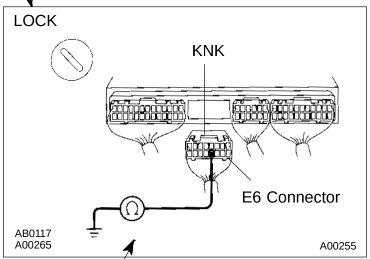
START Ignition Switch START

ACC Ignition Switch ACC

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

INSPECTION PROCEDURE

1	Check continuity between terminal KNK of ECM connector and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF-68).
(b) Disconnect the E6 connector from the ECM.

CHECK:
Measure the resistance between terminal KNK of the ECM connector and body ground.

OK:
Resistance: 1 MΩ or higher

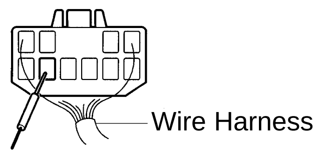
OK → **Go to step 3.**

NG

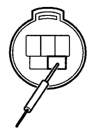
2	Check knock sensor (See page SF-61).

OK → **Replace knock sensor.**

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

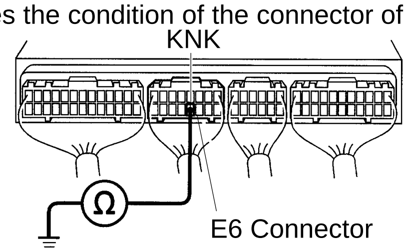


Check from the connector back side. (with harness)

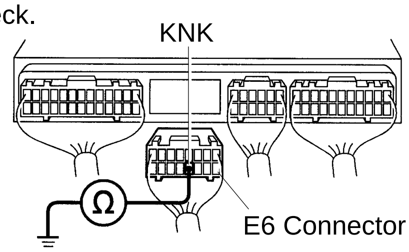


Check from the connector front side. (without harness) In this case, care must be taken not to bend the terminals.

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



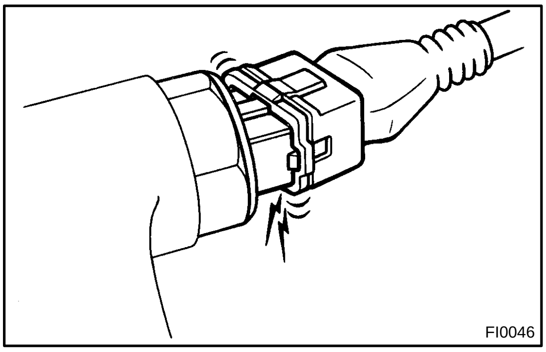
Connector being checked is connected.



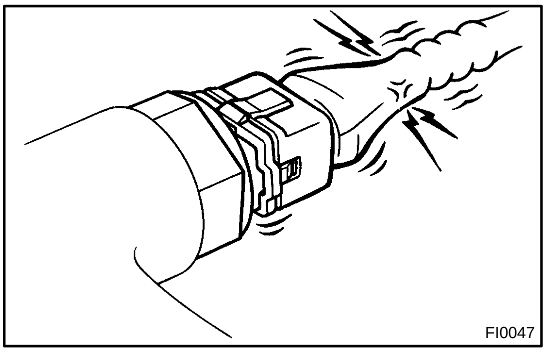
Connector being checked is disconnected.

V08425

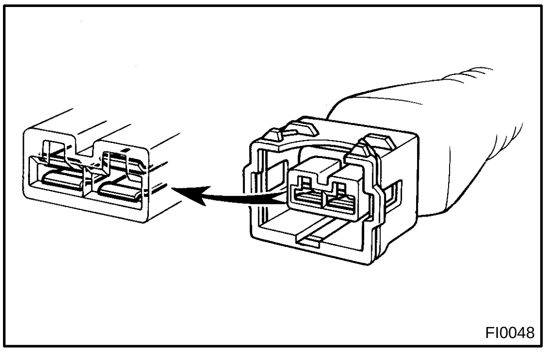
IN05X-13



FI0046



FI0047



FI0048

HOW TO USE THE DIAGNOSTIC CHART AND INSPECTION PROCEDURE

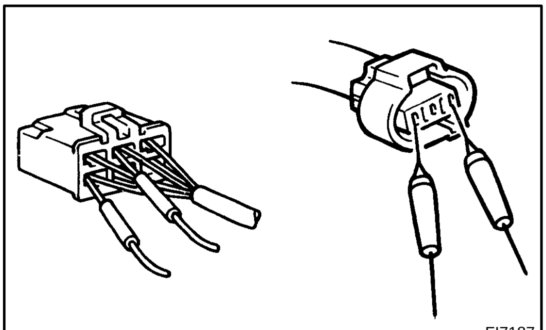
1. CONNECTOR CONNECTION AND TERMINAL INSPECTION

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

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

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

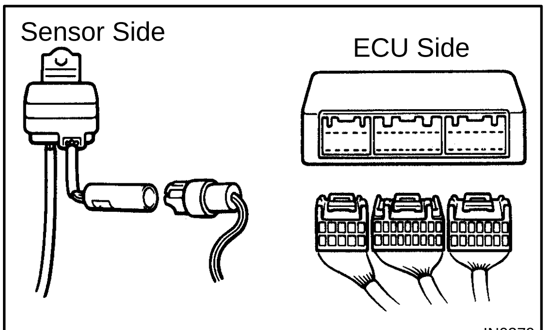
SHORT CIRCUIT:
This could be due to a contact between wire harness and the body ground or to a short circuit occurred inside the switch, etc.
HINT:
When there is a short circuit between the wire harness and body ground, check thoroughly whether the wire harness is caught in the body or is clamped properly.



FI7187

2. CONNECTOR HANDLING

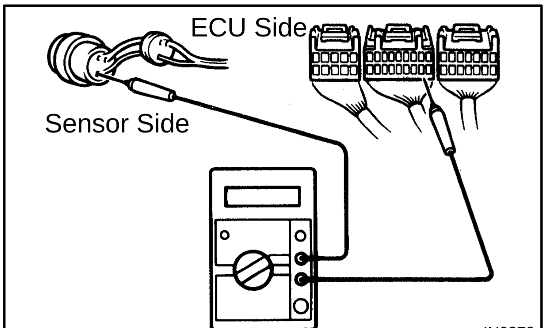
When inserting tester probes into a connector, insert them from the rear of the connector. When necessary, use mini test leads. For water resistant connectors which cannot be accessed from behind, take good care not to deform the connector terminals.



IN0379

3. CONTINUITY CHECK (OPEN CIRCUIT CHECK)

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



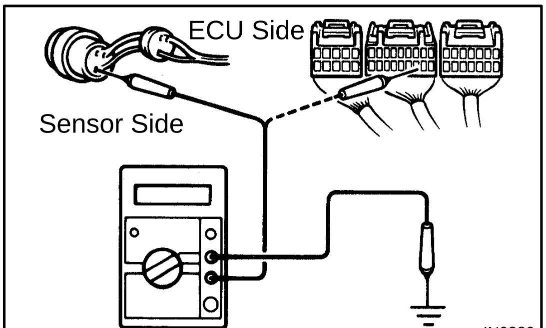
IN0378

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

Resistance: 1 Ω or less

HINT:

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



IN0380

4. RESISTANCE CHECK (SHORT CIRCUIT CHECK)

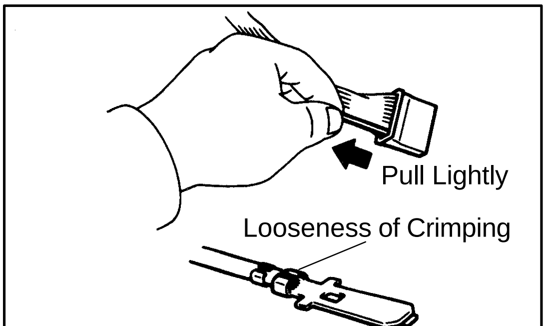
(a) Disconnect the connectors on both ends.

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

Resistance: 1 MΩ or higher

HINT:

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



IN0381

5. VISUAL CHECK AND CONTACT PRESSURE CHECK

(a) Disconnect the connectors at both ends.

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

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

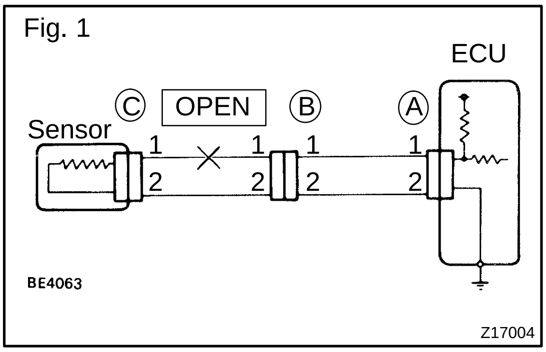
HINT:

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

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

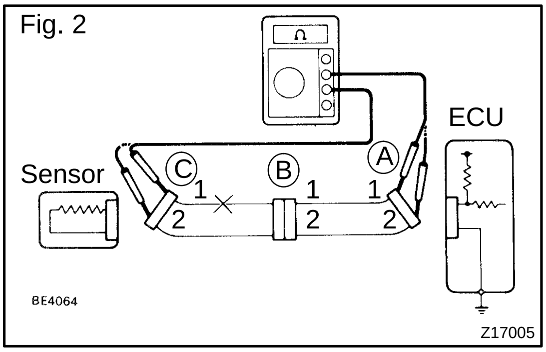
NOTICE:
When testing a gold-plated female terminal, always use a gold-plated male terminal.

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



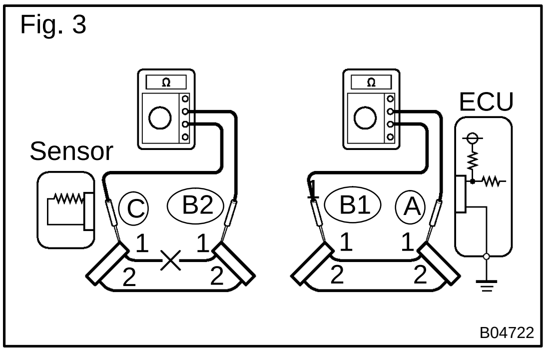
6. CHECK OPEN CIRCUIT

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



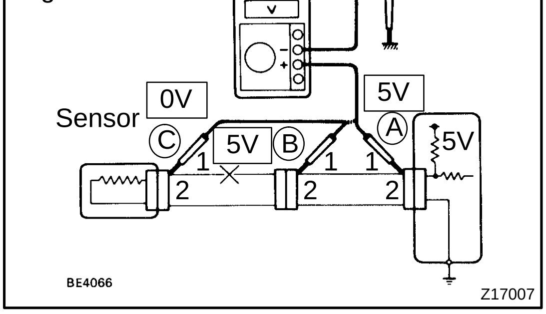
(a) Check the continuity.

(1) Disconnect connectors "A" and "C" and measure the resistance between them.
In the case of Fig. 2:
Between terminal 1 of connector "A" and terminal 1 of connector "C" → No continuity (open)
Between terminal 2 of connector "A" and terminal 2 of connector "C" → Continuity
Therefore, it is found out that there is an open circuit between terminal 1 of connector "A" and terminal 1 of connector "C".



(2) Disconnect connector "B" and measure the resistance between the connectors.
In the case of Fig. 3:
Between terminal 1 of connector "A" and terminal 1 of connector "B1" → Continuity
Between terminal 1 of connector "B2" and terminal 1 of connector "C" → No continuity (open)
Therefore, it is found out that there is an open circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

Fig. 4



(b) Check the voltage.

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

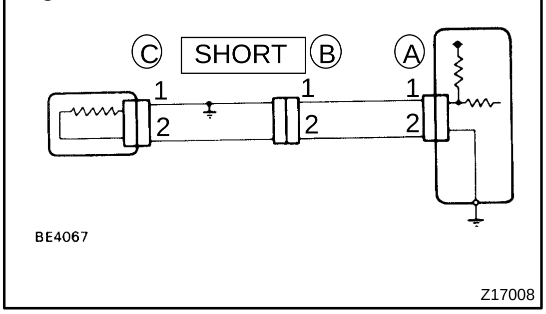
As shown in Fig. 4, with each connector still connected, measure the voltage between body ground and terminal 1 of connector ”A” at the ECU 5V output terminal, terminal 1 of connector ”B”, and terminal 1 of connector ”C”, in that order.

If the results are:

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

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

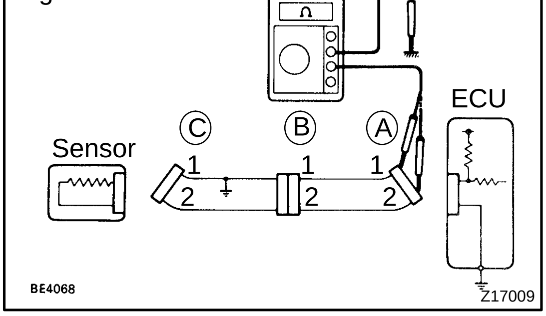
Fig. 5



7. CHECK SHORT CIRCUIT

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

Fig. 6



Check the continuity with ground.

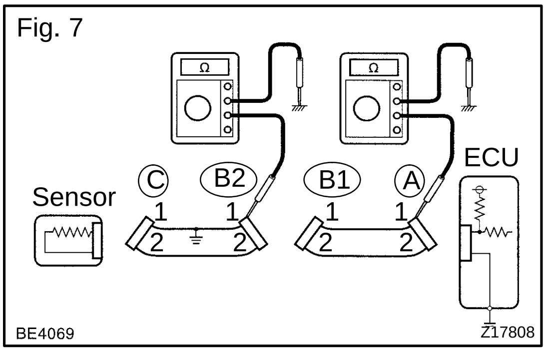
(1) Disconnect connectors ”A” and ”C” and measure the resistance between terminal 1 and 2 of connector ”A” and body ground.

In the case of Fig. 6:

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

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

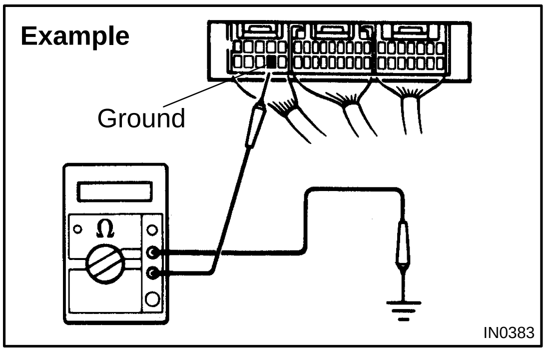
Therefore, it is found out that there is a short circuit between terminal 1 of connector ”A” and terminal 1 of connector ”C”.



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

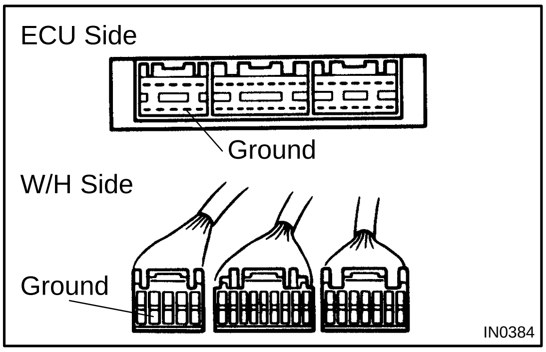
8. CHECK AND REPLACE ECU

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



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

Resistance: 1 Ω or less



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

TERMS

IN04Q-07

ABBREVIATIONS USED IN THIS MANUAL

Abbreviations	Meaning
ABS	Anti-Lock Brake System
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
A/T	Automatic Transmission (Transaxle)
ATF	Automatic Transmission Fluid
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AVS	Adaptive Variable Suspension
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
Calif.	California
CB	Circuit Breaker
CCo	Catalytic Converter For Oxidation
CD	Compact Disc
CF	Cornering Force
CG	Center Of Gravity
CH	Channel
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
DFL	Deflector
DIFF.	Differential
DIFF. LOCK	Differential Lock
D/INJ	Direct Injection
DLI	Distributorless Ignition
DOHC	Double Over Head Cam
DP	Dash Pot
DS	Dead Soak
DSP	Digital Signal Processor
EBD	Electronic Brake Force Distribution
ECAM	Engine Control And Measurement System
ECD	Electronic Controlled Diesel
ECDY	Eddy Current Dynamometer
ECU	Electronic Control Unit
ED	Electro-Deposited Coating
EDIC	Electric Diesel Injection Control
EDU	Electronic Driving Unit
EFI	Electronic Fuel Injection
E/G	Engine
EGR-VM	Exhaust Gas Recirculation-Vacuum Modulator
ELR	Emergency Locking Retractor
ENG	Engine
ESA	Electronic Spark Advance
ETCS	Electronic Throttle Control System
EVP	Evaporator
E-VRV	Electric Vacuum Regulating Valve
EXH	Exhaust
FE	Fuel Economy
FF	Front-Engine Front-Wheel-Drive
F/G	Fuel Gage
FIPG	Formed In Place Gasket
FL	Fusible Link
F/P	Fuel Pump
FPU	Fuel Pressure Up
Fr	Front
FR	Front-Engine Rear-Wheel-Drive
F/W	Flywheel
FW/D	Flywheel Damper
FWD	Front-Wheel-Drive
GAS	Gasoline
GSA	Gear Shift Actuator
GND	Ground
HAC	High Altitude Compensator

H/B	Hatchback
H-FUSE	High Current Fuse
HI	High
HID	High Intensity Discharge (Head Lamp)
HPU	Hydraulic Power Unit
HSG	Housing
HT	Hard Top
HWS	Heated Windshield System
IAC	Idle Air Control
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
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
MAX.	Maximum
M-FUSE	Medium Current Fuse
MIC	Microphone
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MP	Multipurpose
MPX	Multiplex Communication System
M/T	Manual Transmission (Transaxle)
MT	Mount
MTG	Mounting
N	Neutral

NA	Natural Aspiration
No.	Number
O/D	Overdrive
OEM	Original Equipment Manufacturing
OHC	Overhead Camshaft
OHV	Overhead Valve
OPT	Option
O/S	Oversize
P & BV	Proportioning And Bypass Valve
PCS	Power Control System
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PPS	Progressive Power Steering
PS	Power Steering
PTO	Power Take-Off
R & P	Rack And Pinion
R/B	Relay Block
RBS	Recirculating Ball Type Steering
R/F	Reinforcement
RFS	Rigid Front Suspension
RH	Right-Hand
RHD	Right-Hand Drive
RLY	Relay
ROM	Read Only Memory
Rr	Rear
RR	Rear-Engine Rear-Wheel Drive
RRS	Rigid Rear Suspension
RWD	Rear-Wheel Drive
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SMT	Sequential Manual Transmission
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
TIS	Total Information System For Vehicle Development
T/M	Transmission
TMC	TOYOTA Motor Corporation
TMMK	TOYOTA Motor Manufacturing Kentucky, Inc.
TRAC	Traction Control System
TURBO	Turbocharge
U/D	Underdrive
U/S	Undersize
VCV	Vacuum Control Valve
VENT	Ventilator
VIN	Vehicle Identification Number
VPS	Variable Power Steering
VSC	Vehicle Skid Control
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
w/	With
WGN	Wagon
W/H	Wire Harness
w/o	Without
1st	First
2nd	Second
2WD	Two Wheel Drive Vehicle (4x2)
4WD	Four Wheel Drive Vehicle (4x4)

IN0CI-02

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 Comunication Link (TDCL) 3: OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Code
DTM	Diagnostic Test Mode	-
ECL	Engine Control Level	-
ECM	Engine Control Module	Engine ECU (Electronic Control Unit)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM), Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	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 Air Flow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	-
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Lamp	Check Engine Lamp
MST	Manifold Surface Temperature	-
MVZ	Manifold Vacuum Zone	-
NVRAM	Non-Volatile Random Access Memory	-
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On-Board Diagnostic	On-Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalyst Convert (OC), CCo
OP	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	-
PNP	Park/Neutral Position	-
PROM	Programmable Read Only Memory	-
PSP	Power Steering Pressure	-
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	-
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	E-ABV
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	-
SRI	Service Reminder Indicator	-
SRT	System Readiness Test	-
ST	Scan Tool	-
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter

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

OUTSIDE VEHICLE

MA008-01

GENERAL MAINTENANCE

The owners are responsible for these maintenance and inspection items.
They can be done by the owner or they can have them done at a service shop.
These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to do.
Items and procedures for general maintenance are as follows.

1. GENERAL NOTES

- Maintenance items may vary from country to country. Check the owner's manual supplement in which the maintenance schedule is shown.
- Every service item in the periodic maintenance schedule must be performed.
- Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- Maintenance service after the last period should be performed at the same interval as before unless otherwise noted.
- Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

2. TIRES

(a) Check the pressure with a gauge.
If necessary, adjust.
(b) Check for cuts, damage or excessive wear.

3. WHEEL NUTS

When checking the tires, check the nuts for looseness or for missing nuts.
If necessary, tighten them.

4. TIRE ROTATION

Check the owner's manual supplement in which the maintenance schedule is shown.

5. WINDSHIELD WIPER BLADES

Check for wear or cracks whenever they do not wipe clean.
If necessary, replace.

6. FLUID LEAKS

(a) Check underneath for leaking fuel, oil, water or other fluid.
(b) If you smell gasoline fumes or notice any leak, have the cause found and corrected.

7. DOORS AND ENGINE HOOD

(a) Check that all doors and the tailgate operate smoothly, and that all latches lock securely.
(b) Check that the engine hood secondary latch secures the hood from opening when the primary latch is released.

INSIDE VEHICLE

MA009-02

GENERAL MAINTENANCE

The owners are responsible for these maintenance and inspection items.
They can be done by the owner or they can have them done at a service shop.
These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to do.
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- Maintenance service after the last period should be performed at the same interval as before unless otherwise noted.
- Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

2. LIGHTS

(a) Check that the headlights, stop lights, taillights, turn signal lights, and other lights are all working.
(b) Check the headlight aim.

3. WARNING LIGHTS AND BUZZERS

Check that all warning lights and buzzers function properly.

4. HORN

Check that it is working.

5. WINDSHIELD

Check for scratches, pits or abrasions.

6. WINDSHIELD WIPER AND WASHER

(a) Check operation of the wipers and washer.
(b) Check that the wipers do not streak.

7. WINDSHIELD DEFROSTER

Check that air comes out from the defroster outlet when operating the heater or air conditioner.

8. REAR VIEW MIRROR

Check that it is mounted securely.

9. SUN VISORS

Check that they move freely and are mounted securely.

10. STEERING WHEEL

Check that it has the specified freeplay. Be alert for changes in steering condition, such as hard steering, excessive freeplay or strange noises.

11. SEATS

(a) Check that the seat adjusters operate smoothly.
(b) Check that all latches lock securely in any position.
(c) Check that the head restraints move up and down smoothly and that the locks hold securely in any latch position.
(d) For fold-down seat backs, check that the latches lock securely.

12. SEAT BELTS

(a) Check that the seat belt system such as the buckles, retractors and anchors operate properly and smoothly.
(b) Check that the belt webbing is not cut, frayed, worn or dameged.

13. ACCELERATOR PEDAL

Check the pedal for smooth operation and uneven pedal effort or catching.

14. CLUTCH PEDAL (See page CL-2)

(a) Check the pedal for smooth operation.
(b) Check that the pedal has the proper freeplay.

15. BRAKE PEDAL

(a) Check the pedal for smooth operation.
(b) Check that the pedal has the proper reserve distance and freeplay.
(c) Check the brake booster function.

16. BRAKES

At a safe place, check that the brakes do not pull to one side when applied.

17. PARKING BRAKE

(a) Check that the lever has the proper travel.
(b) On a safe incline, check that the vehicle is held securely with only the parking brake applied.

18. AUTOMATIC TRANSMISSION ”PARK” MECHANISM

(a) Check the lock release button of the selector lever for proper and smooth operation.
(b) On a safe incline, check that the vehicle is held securely with the selector lever in the P position and all brakes released.

UNDER HOOD

MA00A-01

GENERAL MAINTENANCE

1. GENERAL NOTES

- Maintenance items may vary from country to country. Check the owner's manual supplement in which the maintenance schedule is shown.
- Every service item in the periodic maintenance schedule must be performed.
- Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- Maintenance service after the last period should be performed at the same interval as before unless otherwise noted.
- Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

2. WINDSHIELD WASHER FLUID

Check that there is sufficient fluid in the tank.

3. ENGINE COOLANT LEVEL

Check that the coolant level is between the FULL and LOW lines on the see-through reservoir.

4. RADIATOR AND HOSES

(a) Check that the front of the radiator is clean and not blocked with leaves, dirt or bugs.
(b) Check the hoses for cracks, kinks, rot or loose connections.

5. BATTERY ELECTROLYTE LEVEL

Check that the electrolyte level of all battery cells is between the upper and lower level lines on the case.

6. BRAKE AND CLUTCH FLUID LEVELS

Check that the brake and clutch fluid levels are near the upper level line on the see-through reservoirs.

7. ENGINE DRIVE BELTS

Check all drive belts for fraying, cracks, wear or oiliness.

8. ENGINE OIL LEVEL

Check the level on the dipstick with the engine turned off.

9. POWER STEERING FLUID LEVEL

(a) Check the level on the dipstick.
(b) The level should be in the HOT or COLD range depending on the fluid temperature.

10. AUTOMATIC TRANSMISSION FLUID LEVEL

(a) Park the vehicle on a level surface.
(b) With the engine idling and the parking brake applied, shift the selector into all positions from the P to L, and then shift into the P position.
(c) Pull out the dipstick and wipe off the fluid with a clean rag. Reinsert the dipstick and check that the fluid level is in the HOT range.
(d) Do this check with the fluid at normal driving temperature (70 - 80°C, 158 - 176°F).

HINT:
Wait until the engine cools down (approx. 30 min.) before checking the fluid level after extended driving at high speeds, in hot weather, in heavy traffic or pulling a trailer.

11. EXHAUST SYSTEM

If any change in the sound of the exhaust or smell of the exhaust fumes is noticed, have the cause located and corrected.

ENGINE

MA00B-05

INSPECTION

HINT:

Inspect these items when the engine is cold.

1. 5VZ-FE:
REPLACE TIMING BELT (See pages EM-13 and EM-19)

2. ADJUST VALVE CLEARANCE
(2RZ-FE, 3RZ-FE: See page EM-5)
(5VZ-FE: See page EM-4)

3. INSPECT DRIVE BELTS
(2RZ-FE, 3RZ-FE: See pages CH-1 , SR-3 and AC-16)
(5VZ-FE: See pages CH-1 , SR-3 and AC-16)

4. REPLACE ENGINE OIL AND OIL FILTER
(2RZ-FE, 3RZ-FE: See page LU-2)
(5VZ-FE: See page LU-2)

5. REPLACE ENGINE COOLANT
(2RZ-FE, 3RZ-FE: See page CO-1)
(5VZ-FE: See page CO-2)

6. INSPECT EXHAUST PIPES AND MOUNTINGS

Visually inspect the pipes, hangers and connections for severe corrosion, leaks or damage.

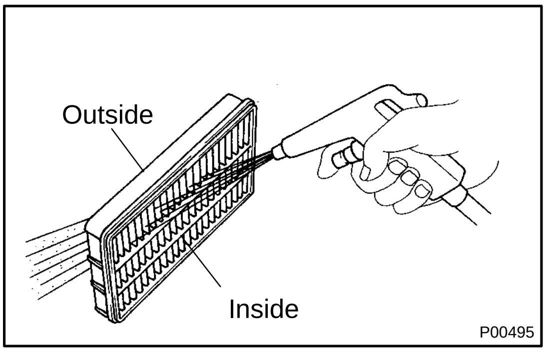
7. INSPECT AIR FILTER

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

HINT:

Oiliness may indicate a stuck PCV valve.

If necessary, replace the air filter.



(b) Clean the air filter with compressed air.
First blow from the inside thoroughly, then blow off the outside of the air filter.

8. REPLACE AIR FILTER

Replace the air filter with a new one.

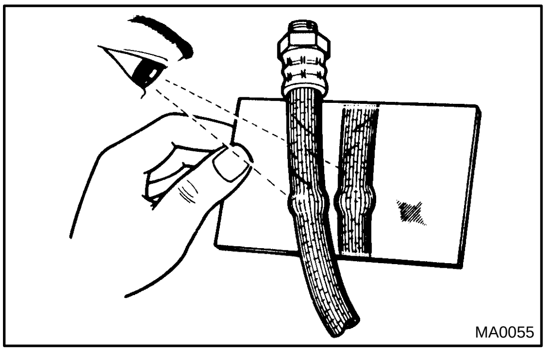
9. INSPECT FUEL LINES AND CONNECTIONS, AND FUEL TANK VAPOR VENT SYSTEM HOSES AND FUEL TANK BAND

Visually inspect the fuel lines for cracks, leakage loose connections, deformation or tank band looseness.

10. REPLACE GASKET IN FUEL TANK CAP
(2RZ-FE, 3RZ-FE: See page EC-5)
(5VZ-FE: See page EC-5)

11. REPLACE SPARK PLUGS
(2RZ-FE, 3RZ-FE: See page IG-1)
(5VZ-FE: See page IG-1)

12. INSPECT CHARCOAL CANISTER
(2RZ-FE, 3RZ-FE: See page EC-5)
(5VZ-FE: See page EC-5)



BRAKE

MA04L-01

INSPECTION

1. INSPECT BRAKE LINE PIPES AND HOSES

HINT:

Inspect in a well-lighted area. Inspect the entire circumference and length of the brake hoses using a mirror as required. Turn the front wheels fully right or left before inspecting the front brake.

(a) Check all brake lines and hoses.
- Check for damage.
- Check for wear.
- Check for deformation.
- Check for cracks.
- Check for corrosion.
- Check for leaks.
- Check for bends.
- Check for twists.

(b) Check all clamps for tightness and connections for leakage.

(c) Check that the hoses and lines are clear of sharp edges, moving parts and the exhaust system.

(d) Check that the lines installed in grommets pass through the center of the grommets.

2. INSPECT FRONT BRAKE PADS AND DISCS
(2WD: See page BR-27)
(4WD and PRE RUNNER: See page BR-33)

HINT:

If a squealing or scraping noise occurs from the brake during driving, check the pad wear indicator.

If there are traces of the indicator contacting the disc rotor, the disc pad should be replaced.

3. INSPECT REAR BRAKE LININGS AND DRUMS
(2WD: See page BR-39)
(4WD and PRE RUNNER: See page BR-45)

CHASSIS

MA04M-01

INSPECTION

1. INSPECT STEERING LINKAGE

(a) Check the steering wheel freeplay (See page SR-9).

(b) Check the steering linkage for looseness or damage.

- Check that the tie rod ends do not have excessive play.
- Check that the dust seals and boots are not damaged.
- Check that the boot clamps are not loose.

2. INSPECT STEERING GEAR HOUSING OIL

Check the steering gear housing for oil leaks.
If leakage is found, check for cause and repair.

3. INSPECT BALL JOINTS AND DUST COVERS

(a) Inspect the ball joints for excessive looseness.

(b) Inspect the dust cover for damage.

4. 4WD:
INSPECT DRIVE SHAFT BOOTS

Inspect the drive shaft boots for clamp looseness, grease leakage or damage.

5. CHECK OIL LEVEL IN MANUAL TRANSMISSION, TRANSFER AND DIFFERENTIAL

Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole.
If the level is low, add oil until it begins to run out of the filler hole.

Transmission oil (2WD for R150, R150F): See page MT-6 .
Transmission oil (4WD for R150, R150F): See page MT-11.
Transmission oil (2WD for W59): See page MT-7 .
Transmission oil (4WD for W59): See page MT-12 .
Transfer oil: See page TR-9 .
Front differential oil (4WD): See page SA-64 .
Rear differential oil (2RZ-FE): See page SA-156 .
Rear differential oil (3RZ-FE, 5VZ-FE w/o Diff. lock): See page SA-174 .
Rear differential oil (3RZ-FE, 5VZ-FE w/ Diff. lock): See page SA-195 .

6. REPLACE MANUAL TRANSMISSION, TRANSFER AND DIFFERENTIAL OIL

(a) Remove the drain plug and drain the oil.

(b) Reinstall drain plug securely.

(c) Add new oil until it begins to run out of the filler hole.

Transmission oil (2WD for R150, R150F): See page MT-6 .
Transmission oil (4WD for R150, R150F): See page MT-11.
Transmission oil (2WD for W59): See page MT-7 .
Transmission oil (4WD for W59): See page MT-12 .
Transfer oil: See page TR-9 .
Front differential oil (4WD): See page SA-64 .
Rear differential oil (2RZ-FE): See page SA-156 .
Rear differential oil (3RZ-FE, 5VZ-FE w/o Diff. lock): See page SA-174 .
Rear differential oil (3RZ-FE, 5VZ-FE w/ Diff. lock): See page SA-195 .

7. CHECK FLUID LEVEL IN AUTOMATIC TRANSMISSION (See page DI-277)

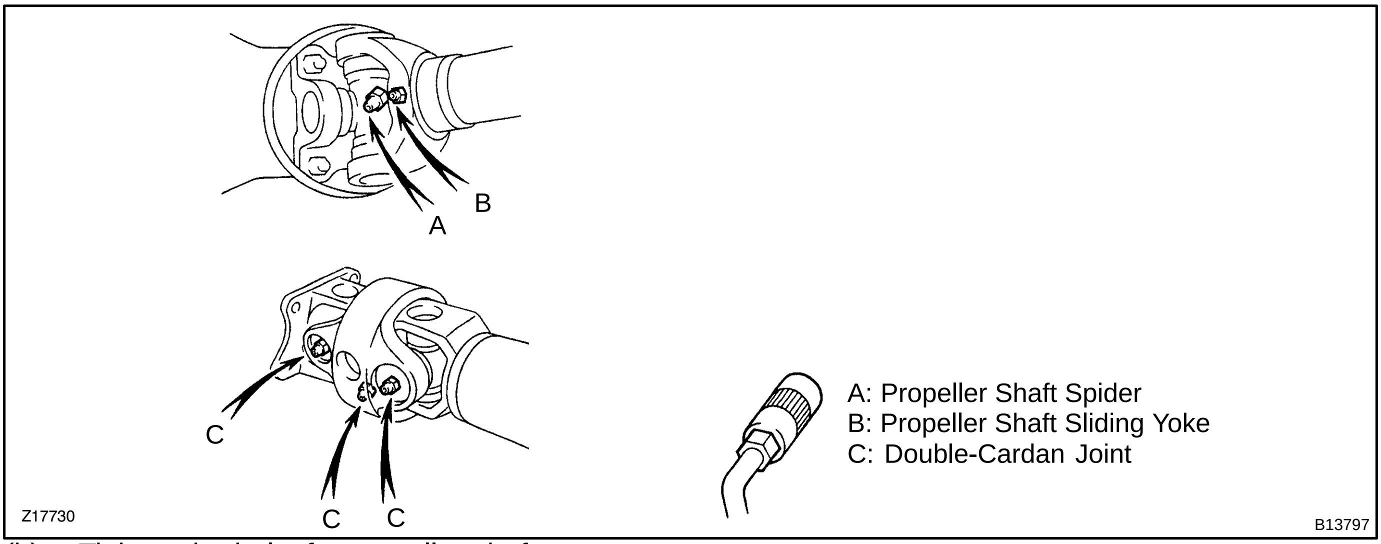
8. REPLACE AUTOMATIC TRANSMISSION FLUID (See page DI-277)

9. LUBRICATE PROPELLER SHAFT AND TIGHTEN BOLTS

(a) 4WD:

Lubricate propeller shaft, referring to the lubrication chart. Before pumping in grease, wipe off any mud and dust on the grease fitting.

Grease grade:
Spider: Lithium base chassis grease NLGI No. 2
Slide yoke and double-cardan joint:
Molybdenum disulphide lithium base chassis grease NLGI No. 2



(b) Tighten the bolts for propeller shaft.
(2WD: See page PR-8)
(4WD and PRE RUNNER: See page PR-16)

10. ROTATE TIRES (See page SA-3)

BODY

MA04H-01

INSPECTION

TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY

(a) Where necessary, tighten all parts of the chassis.
- Front axle and suspension
- Drive train
- Rear axle and suspension
- Brake system
- Engine mounting, etc.

(b) Where necessary, tighten all parts of the body.
- Seat belt system
- Seats
- Doors and hood
- Body mountings
- Fuel tank
- Exhaust pipe system, etc.

MAINTENANCE

PP00Y-01

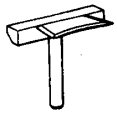
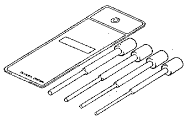
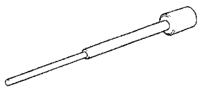
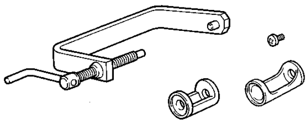
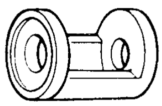
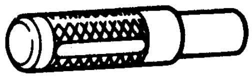
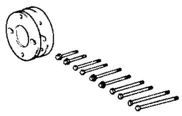
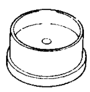
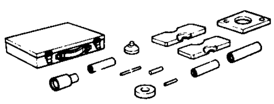
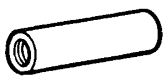
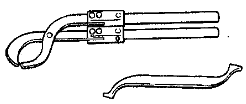
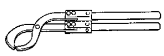
EQUIPMENT

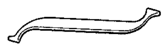
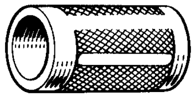
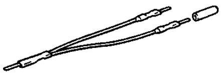
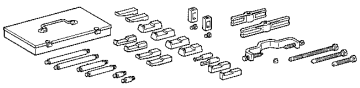
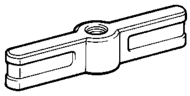
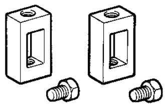
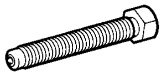
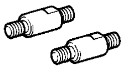
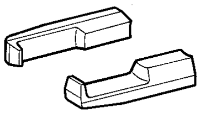
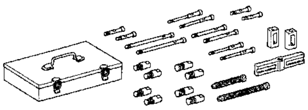
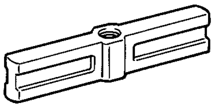
Mirror	Brake hose
Torque wrench	

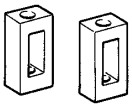
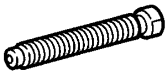
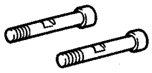
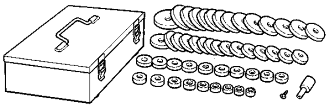
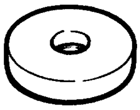
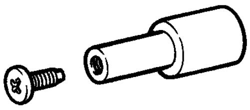
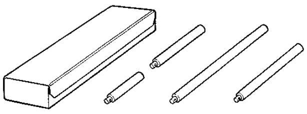
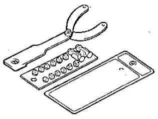
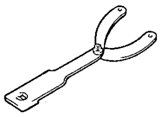
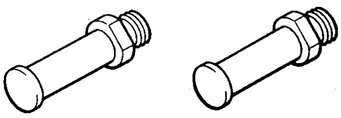
ENGINE MECHANICAL (2RZ-FE, 3RZ-FE)

PP07D-03

SST (Special Service Tools)

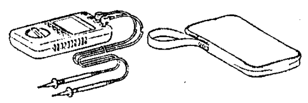
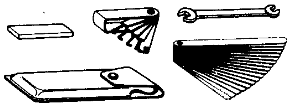
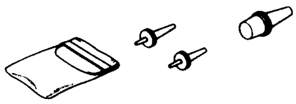
	09032-00100	Oil Pan Seal Cutter	
	09201-10000	Valve Guide Bushing Remover & Replacer Set	
	(09201-01060)	Valve Guide Bushing Remover & Replacer 6	
	09202-70020	Valve Spring Compressor	
	(09202-00010)	Attachment	
	09207-76010	Rocker Arm Bushing	
	09213-54015	Crankshaft Pulley Holding Tool	
	09223-15030	Oil Seal & Bearing Replacer	Crankshaft rear oil seal
	09236-00101	Water Pump Overhaul Tool Set	
	(09236-15010)	Bearing Stay	Valve stem oil seal
	09248-55040	Valve Clearance Adjust Tool Set	
	(09248-05410)	Valve Lifter Press	

	(09248-05420)	Valve Lifter Stopper	
	09330-00021	Companion Flange Holding Tool	Crankshaft pulley
	09636-20010	Upper Ball Joint Dust Cover Replacer	Crankshaft timing gear
	09816-30010	Oil Pressure Switch Socket	Knock sensor
	09843-18020	Diagnosis Check Wire	
	09950-4001 1	Puller B Set	Crankshaft timing gear
	(09951-04010)	Hanger 150	
	(09952-04010)	Slide Arm	
	(09953-04010)	Center Bolt 100	
	(09954-04010)	Arm 25	
	(09955-04061)	Claw No.6	
	09950-50012	Puller C Set	Crankshaft pulley
	(09951-05010)	Hanger 150	

	(09952-05010)	Slide Arm	
	(09953-05010)	Center Bolt 100	
	(09954-05020)	Claw No.2	
	09950-60010	Replacer Set	Spark plug tube gasket
	(09951-00260)	Replacer 26	
	(09951-00490)	Replacer 49	
	(09952-06010)	Adapter	
	09950-70010	Handle Set	
	(09951-07150)	Handle 150	Valve guide bushing Spark plug tube gasket Crankshaft rear oil seal
	09960-10010	Variable Pin Wrench Set	
	(09962-01000)	Variable Pin Wrench Arm Assy	
	(09963-00500)	Pin 5	Exhaust camshaft sub-gear
	(09963-01000)	Pin 10	PS pump pulley

PP07E-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09200-00010	Engine Adjust Kit .	
	09258-00030	Hose Plug Set .	Plug for the vacuum hose, fuel hose etc.

PP07F-01

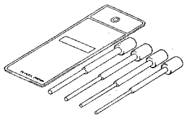
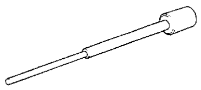
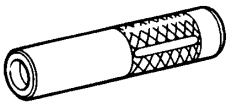
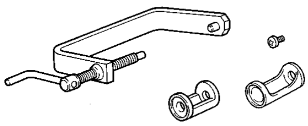
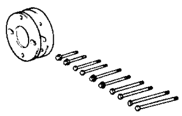
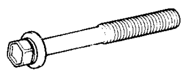
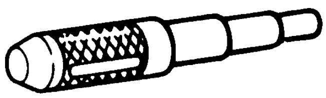
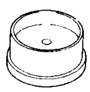
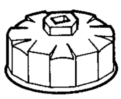
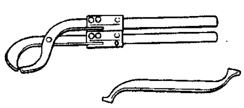
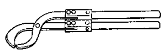
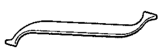
EQUIPMENT

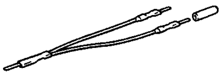
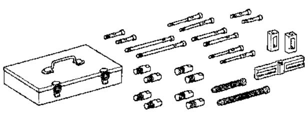
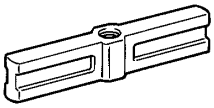
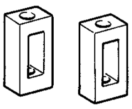
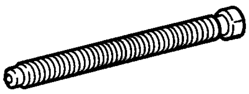
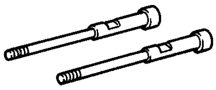
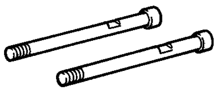
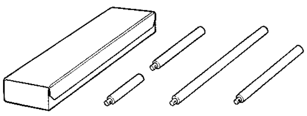
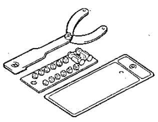
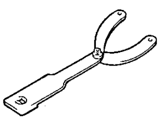
Caliper gauge	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune-up tester	
Heater	
Magnetic finger	
Micrometer	
OBDII scan tool	Engine speed
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Soft brush	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
V-block	
Valve seat cutter	
Vernier calipers	

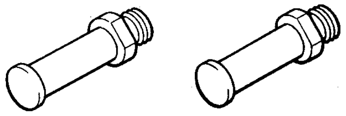
ENGINE MECHANICAL (5VZ-FE)

PP016-06

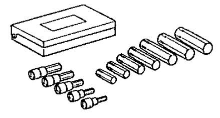
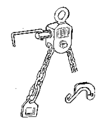
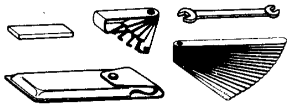
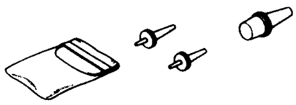
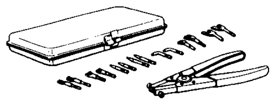
SST (Special Service Tools)

	09201-10000	Valve Guide Bushing Remover & Replacer Set	
	(09201-01060)	Valve Guide Bushing Remover & Replacer 6	
	09201-41020	Valve Stem Oil Seal Replacer	
	09202-70020	Valve Spring Compressor	
	09213-54015	Crankshaft Pulley Holding Tool	
	(90119-08216)	Bolt	
	09222-30010	Connecting Rod Bushing Remover & Replacer	
	09223-15030	Oil Seal & Bearing Replacer	Crankshaft rear oil seal
	09228-07501	Oil Filter Wrench	
	09248-55040	Valve Clearance Adjust Tool Set	
	(09248-05410)	Valve Lifter Press	
	(09248-05420)	Valve Lifter Stopper	

	09330-00021	Companion Flange Holding Tool	Crankshaft pulley
	09816-30010	Oil Pressure Switch Socket	Oil pressure switch
	09843-18020	Diagnosis Check Wire	
	09950-50012	Puller C Set	
	(09951-05010)	Hanger 150	Crankshaft pulley Crankshaft timing pulley
	(09952-05010)	Slide Arm	Crankshaft pulley Crankshaft timing pulley
	(09953-05020)	Center Bolt 150	Crankshaft pulley Crankshaft timing pulley
	(09954-05010)	Claw No.1	Crankshaft timing pulley
	(09954-05030)	Claw No.3	Crankshaft pulley
	09950-70010	Handle Set	
	(09951-07150)	Handle 150	Crankshaft rear oil seal Valve guide bushing
	09960-10010	Variable Pin Wrench Set	
	(09962-01000)	Variable Pin Wrench Arm Assy	Camshaft timing pulley Camshaft sub-gear

	(09963-01000) Pin 10	Camshaft timing pulley
	(09963-00600) Pin 6	Camshaft sub-gear

RECOMMENDED TOOLS

	09040-0001 1	Hexagon Wrench Set .	
	09090-04020	Engine Sling Device	For suspending engine
	09200-00010	Engine Adjust Kit .	
	09258-00030	Hose Plug Set .	Plug for the vacuum hose, fuel hose etc.
	09904-00010	Expander Set .	

PP018-01

EQUIPMENT

Caliper gauge	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Timing light	Ignition timing
OBDII scan tool	Engine speed
Heater	
Magnetic finger	
Micrometer	
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Soft brush	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
Valve seat cutter	
Vernier calipers	

EMISSION CONTROL (2RZ-FE, 3RZ-FE)

PP07H-02

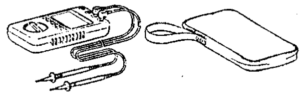
EQUIPMENT

Hose clipper	
MITYVAC (Hand-held vacuum pump)	
OBDII scan tool	Engine speed
Pressure gauge	
Torque wrench	
Vacuum gauge	

EMISSION CONTROL (5VZ-FE)

PP014-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	

PP015-04

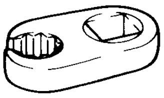
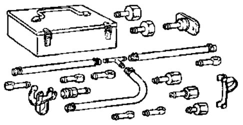
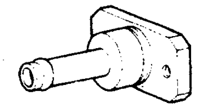
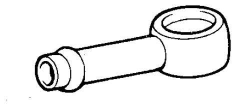
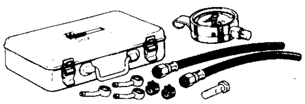
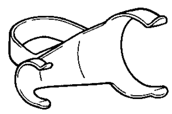
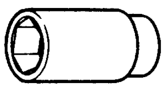
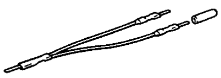
EQUIPMENT

Hose Clipper	
OBDII scan tool	Engine speed
Torque wrench	
Vacuum Gauge	

SFI (2RZ-FE, 3RZ-FE)

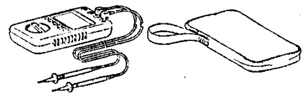
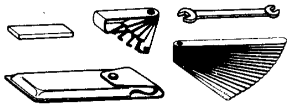
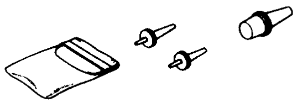
PP2G3-02

SST (Special Service Tools)

	09023-38400	Union Nut Wrench 14mm	Fuel line flare nut
	09268-41047	Injection Measuring Tool Set	
	(09268-41091)	NO.7 Union	
	(90405-09015)	No.1 Union	
	09268-45012	EFI Fuel Pressure Gauge	
	(09268-41 100)	Clamp	Except California Spec.
	(09268-41300)	Clamp	California Spec.
	09816-30010	Oil Pressure Switch Socket	Knock sensor
	09842-30070	Wiring ”F” EFI Inspection	
	09843-18020	Diagnosis Check Wire	

PP1Y9-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09200-00010	Engine Adjust Kit .	
	09258-00030	Hose Plug Set .	Plug for vacuum hose, fuel hose etc.

PP1YA-01

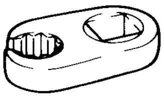
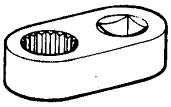
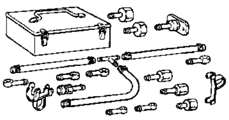
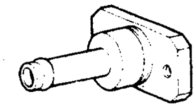
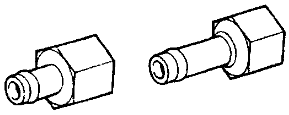
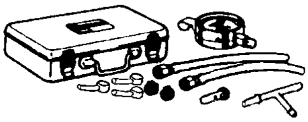
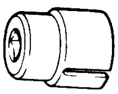
EQUIPMENT

Carburetor cleaner	Throttle body
Graduated cylinder	Injector
Heater	
Soft brush	Throttle body
Sound scope	Injector
OBDII scan tool	Engine speed
Thermometer	
Torque wrench	

SFI (5VZ-FE)

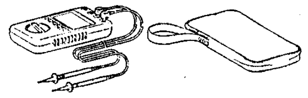
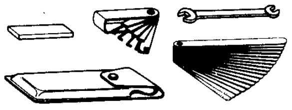
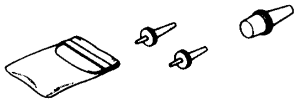
PP01D-10

SST (Special Service Tools)

	09023-38400	Union Nut Wrench 14mm	Fuel line flare nut
	09205-76030	Cylinder Head Setting Bolt Tightening Adaptor	ECT sensor
	09268-41047	Injection Measuring Tool Set	
	(09268-41091)	NO.7 Union	
	(09268-5201 1)	Injection Measuring Attachment	
	09268-45014	EFI Fuel Pressure Gauge	
	09817-1601 1	Back-up Light Switch Tool	Knock sensor
	09842-30070	Wiring ”F” EFI Inspection	
	09843-18020	Diagnosis Check Wire	

PP01E-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09200-00010	Engine Adjust Kit .	
	09258-00030	Hose Plug Set .	Plug for the vacuum hose, fuel hose etc.

PP01F-01

EQUIPMENT

OBDII scan tool	Engine speed
Graduated cylinder	Injector
Carburetor cleaner	Throttle body
Sound scope	Injector
Torque wrench	
Soft brush	Throttle body

COOLING (2RZ-FE, 3RZ-FE)

PP07L-01

EQUIPMENT

Heater	Thermostat
Radiator cap tester	
Thermometer	Thermostat
Torque wrench	

PP07M-01

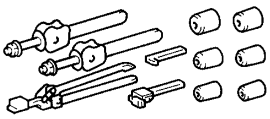
COOLANT

Item	Capacity	Classification
2WD		Ethylene-glycol base
M/T	8.0 liters (8.5 US qts, 7.0 lmp. qts)	
A/T	7.8 liters (8.2 US qts, 6.9 lmp. qts)	
4WD		
M/T	8.3 liters (8.8 US qts, 7.3 lmp. qts)	
A/T	8.2 liters (8.7 US qts, 7.2 lmp. qts)	

COOLING (5VZ-FE)

SST (Special Service Tools)

PP01I-01

	09230-01010	Radiator Service Tool Set	

PP01J-01

EQUIPMENT

Heater	
Radiator cap tester	
Thermometer	
Torque wrench	

PP01K-01

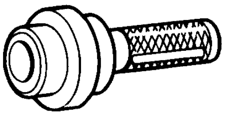
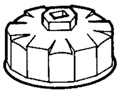
COOLANT

Item	Capacity	Classification
w/ Rear heater w/o Rear heater	9.0 liters (9.5 US qts, 7.9 lmp. qts) 8.0 liters (8.5 US qts, 7.0 lmp. qts)	Ethylene-glycol base

LUBRICATION (2RZ-FE, 3RZ-FE)

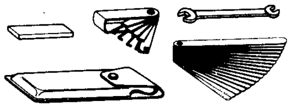
PP07N-01

SST (Special Service Tools)

	09223-50010	Crankshaft Front oil Seal Replacer	
	09228-07501	Oil Filter Wrench	
	09816-30010	Oil Pressure Switch Socket	

PP07O-01

RECOMMENDED TOOLS

	09200-00010	Engine Adjust Kit .	

PP07P-01

EQUIPMENT

Oil pressure gauge	
Precision straight edge	Oil pump
Torque wrench	

PP07Q-02

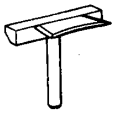
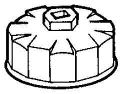
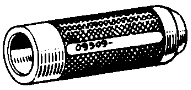
LUBRICANT

Item	Capacity	Classification
Engine oil		API grade SJ, Energy-Conserving or ILSAC multigrade engine oil. SAE 5W-30 is the best choice for your vehicle, for good fuel economy, and good starting in cold weather.
2WD		
Dry fill	6.0 liters (6.3 US qts, 5.3 lmp. qts)	
Drain and refill		
w/ Oil filter change	5.7 liters (6.0 US qts, 5.0 lmp. qts)	
w/o Oil filter change	5.0 liters (5.3 US qts, 4.4 lmp. qts)	
4WD		
Dry fill	6.0 liters (6.3 US qts, 5.3 lmp. qts)	
Drain and refill		
w/ Oil filter change	5.5 liters (5.8 US qts, 4.8 lmp. qts)	
w/o Oil filter change	4.8 liters (5.1 US qts, 4.2 lmp. qts)	

LUBRICATION (5VZ-FE)

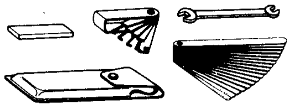
PP01R-01

SST (Special Service Tools)

	09032-00100	Oil Pan Seal Cutter	
	09228-07501	Oil Filter Wrench	
	09309-37010	Transmission Bearing Replacer	Camshaft front oil seal
	09816-30010	Oil Pressure Switch Socket	

PP01S-01

RECOMMENDED TOOLS

	09200-00010	Engine Adjust Kit .	

PP01T-01

EQUIPMENT

Oil pressure gauge	
Precision straight edge	Oil pump
Torque wrench	

PP01U-01

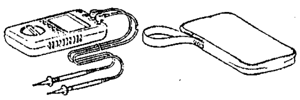
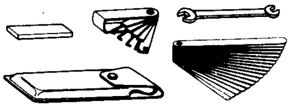
LUBRICANT

Item	Capacity	Classification
Engine oil Dry fill Drain and refill w/ Oil filter change w/o Oil filter change	 5.9 liters (6.2 US qts, 5.2 lmp. qts) 5.2 liters (5.5 US qts, 4.6 lmp. qts) 4.9 liters (5.2 US qts, 4.3 lmp. qts)	API grade SH, Energy-Conserving II multigrade engine oil or ILSAC multigrade engine oil and recommended viscosity oil, with SAE 5W-30 being preferred engine oil

IGNITION (2RZ-FE, 3RZ-FE)

PP07S-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09200-00010	Engine Adjust Kit .	

PP07T-01

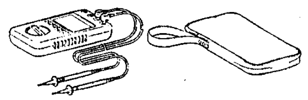
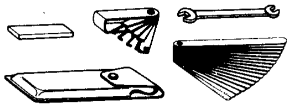
EQUIPMENT

Megger insulation resistance meter	Spark plug
Spark plug cleaner	

IGNITION (5VZ-FE)

PP01Z-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09200-00010	Engine Adjust Kit .	

PP020-01

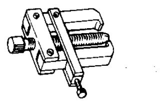
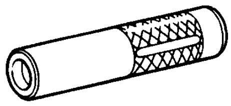
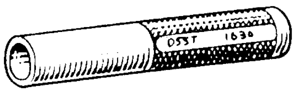
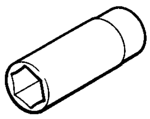
EQUIPMENT

Megger insulation resistance meter	Spark plug
Spark plug cleaner	

STARTING (2RZ-FE, 3RZ-FE)

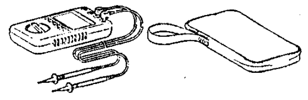
PP07U-01

SST (Special Service Tools)

	09286-4601 1	Injection Pump Spline Shaft Puller	Armature bearing
	09201-41020	Valve Stem Oil Seal Replacer	Armature rear bearing
	09285-76010	Injection Pump Camshaft Bearing Cone Replacer	Armature rear bearing
	09810-38140	Starter Magnet Switch Nut Wrench 14	Terminal nut

PP07V-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	

PP07W-01

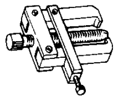
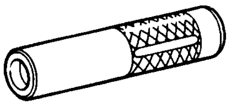
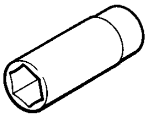
EQUIPMENT

Dial indicator	Commutator
Magnetic finger	
Pull scale	Brush spring
Sandpaper	Commutator
Torque wrench	
V-block	
Vernier calipers	Commutator, Brush

STARTING (5VZ-FE)

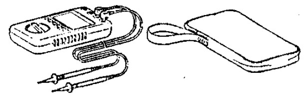
PP024-01

SST (Special Service Tools)

	09286-4601 1	Injection Pump Spline Shaft Puller	Armature bearing
	09201-41020	Valve Stem Oil Seal Replacer	Armature front bearing
	09810-38140	Starter Magnet Switch Nut Wrench 14	Terminal kit

PP025-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	

PP026-01

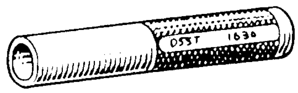
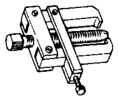
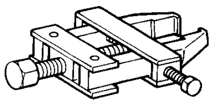
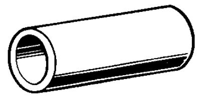
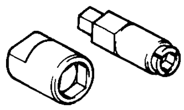
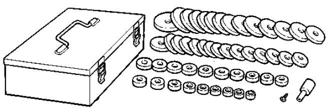
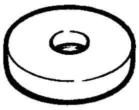
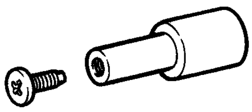
EQUIPMENT

Dial indicator	Commutator
Magnetic finger	Steel ball
Press	Magnetic switch terminal kit
Pull scale	Brush spring
Sandpaper	Commutator
Torque wrench	
V-block	Commutator
Vernier calipers	Commutator, Brush

CHARGING (2RZ-FE, 3RZ-FE)

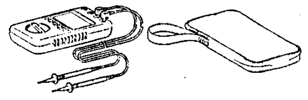
PP07X-01

SST (Special Service Tools)

	09285-76010	Injection Pump Camshaft Bearing Cone Replacer	Rotor rear bearing cover
	09286-46011	Injection Pump Spline Shaft Puller	Rectifier end frame
	09820-00021	Alternator Rear Bearing Puller	
	09820-00030	Alternator Rear Bearing Replacer	Rotor rear bearing
	09820-63010	Alternator Pulley Set Nut Wrench Set	
	09950-60010	Replacer Set	Rotor front bearing
	(09951-00260)	Replacer 26	
	(09951-00500)	Replacer 50	
	(09952-06010)	Adapter	

PP07Y-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	

PP07Z-01

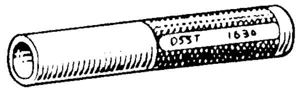
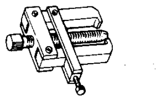
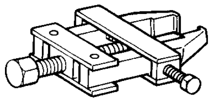
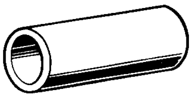
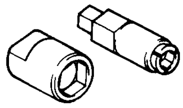
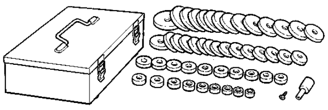
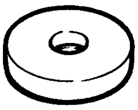
EQUIPMENT

Ammeter(A)	
Battery specific gravity gauge	
Belt tension gauge	
Torque wrench	
Vernier calipers	Rotor (Slip ring), Brush

CHARGING (5VZ-FE)

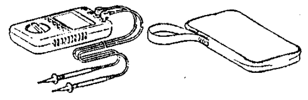
SST (Special Service Tools)

PP02A-01

	09285-76010	Injection Pump Camshaft Bearing Cone Replacer	Rotor rear bearing cover
	09286-4601 1	Injection Pump Spline Shaft Puller	Rectifier end frame
	09820-00021	Alternator Rear Bearing Puller	
	09820-00030	Alternator Rear Bearing Replacer	
	09820-63010	Alternator Pulley Set Nut Wrench Set	
	09950-60010	Replacer Set	Rotor front bearing
	(09951-00500)	Replacer 50	

PP02B-01

RECOMMENDED TOOLS

 09082-00040	TOYOTA Electrical Tester.	

PP02C-01

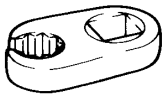
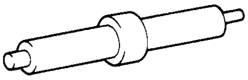
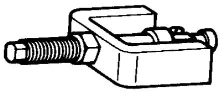
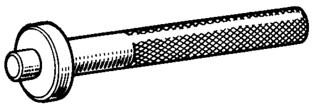
EQUIPMENT

Battery specific gravity gauge	Battery
Belt tension gauge	
Torque wrench	
Vernier calipers	Rotor (Slip ring)

CLUTCH

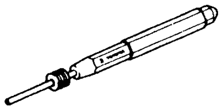
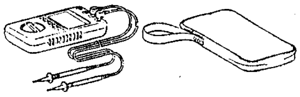
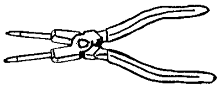
SST (Special Service Tools)

PP09W-01

	09023-00100	Union Nut Wrench 10 mm	Clutch line
	09301-001 10	Clutch Guide Tool	
	09303-3501 1	Input Shaft Front Bearing Puller	
	09304-30012	Input Shaft Front Bearing Replacer	
	09333-00013	Clutch Diaphragm Spring Aligner	

PP09X-01

RECOMMENDED TOOLS

	09031-00030	Pin Punch .	Reservoir tank
	09082-00040	TOYOTA Electrical Tester.	
	09905-00013	Snap Ring Pliers .	

PP09Y-01

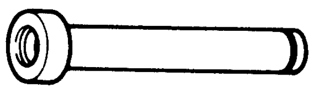
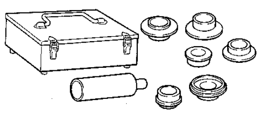
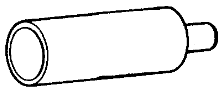
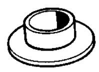
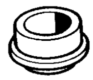
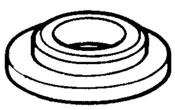
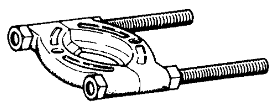
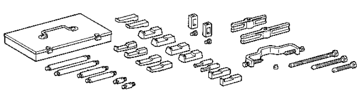
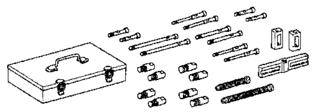
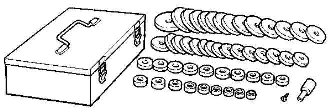
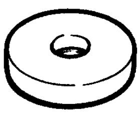
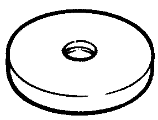
EQUIPMENT

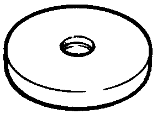
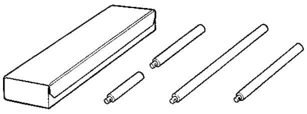
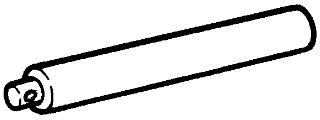
Calipers	
Torque wrench	
Dial indicator with magnetic base	

MANUAL TRANSMISSION (R150, R150F)

PP0A2-02

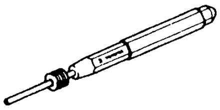
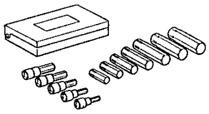
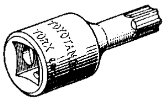
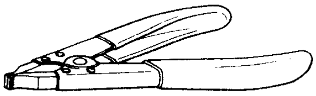
SST (Special Service Tools)

	09309-35010	Transmission Rear Bearing Replacer	2WD: Output shaft rear bearing Output shaft center bearing
	09316-6001 1	Transmission & Transfer Bearing Replacer	
	(09316-0001 1)	Replacer Pipe	Output shaft rear bearing Gear spline piece No.5
	(09316-00031)	Replacer "B"	5th gear
	(09316-00071)	Replacer "F"	4WD: Output shaft rear bearing Output shaft center bearing
	09506-35010	Differential Drive Pinion Rear Bearing Replacer	Input shaft bearing
	09950-00020	Bearing Remover	
	09950-4001 1	Puller B Set	Output shaft rear bearing
	09950-50012	Puller C Set	Gear spline piece No.5
	09950-60010	Replacer Set	
	(09951-00510)	Replacer 51	Front bearing retainer oil seal
	(09951-00570)	Replacer 57	Extension housing oil seal Transfer adaptor oil seal

	(09951-00620)	Replacer 62	Counter rear bearing
	09950-70010	Handle Set	
	(09951-07150)	Handle 150	

PP0A3-02

RECOMMENDED TOOLS

	09031-00030	Pin Punch .	
	09040-0001 1	Hexagon Wrench Set .	
	09042-00020	Torx Socket T40 .	
	09905-00012	Snap Ring No.1 Expander .	

PP0A4-01

EQUIPMENT

Dial indicator	
Micrometer	
Torque wrench	
Feeler gauge	
Magnetic finger	

PP0A5-01

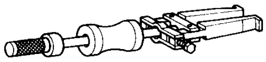
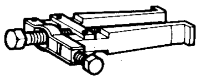
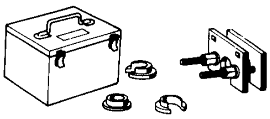
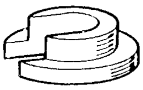
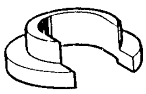
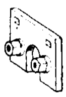
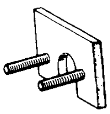
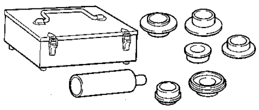
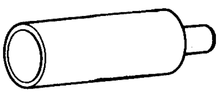
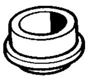
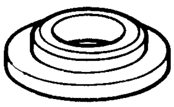
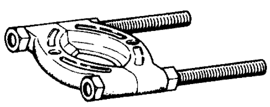
LUBRICANT

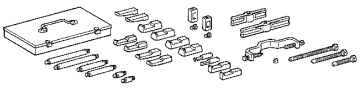
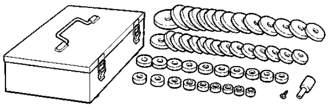
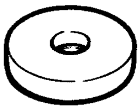
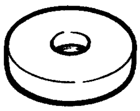
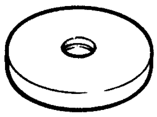
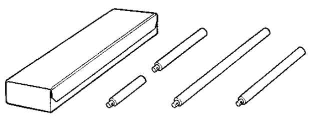
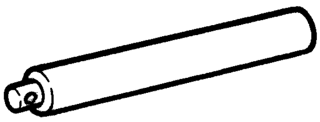
Item		Capacity	Classification
Manual transmission oil	2WD: 4WD:	2.6 liters (2.7 US qts, 2.3 Imp. qts) 2.2 liters (2.3 US qts, 1.9 Imp. qts)	API GL-4 or GL-5 SAE 75W-90

MANUAL TRANSMISSION (W59)

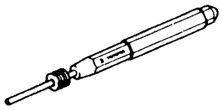
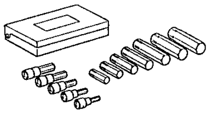
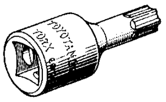
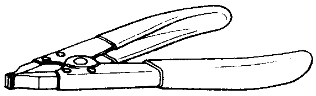
PP09R-02

SST (Special Service Tools)

	09308-00010	Oil Seal Puller	Output shaft rear bearing outer race
	(09308-10010)	Oil Seal Puller	Extension housing oil seal
	09312-20011	Transmission Gear Remover & Replacer	5th gear Output shaft rear bearing Reverse gear
	(09313-00010)	Reverse Gear Remover	
	(09313-00030)	Rear Bearing Replacer	
	(09313-00040)	Plate "A"	
	(09313-00050)	Plate "B"	
	09316-60011	Transmission & Transfer Bearing Replacer	No.3 clutch hub Counter gear center bearing outer race
	(09316-00011)	Replacer Pipe	
	(09316-00071)	Replacer "F"	
	09506-35010	Differential Drive Pinion Rear Bearing Replacer	Input shaft bearing Output shaft center bearing
	09950-00020	Bearing Remover	

	09950-40011	Puller B Set	Counter 5th gear No.3 clutch hub Reverse gear Counter gear side race
	09950-60010	Replacer Set	
	(09951-00440)	Replacer 44	Front bearing retainer oil seal
	(09951-00510)	Replacer 51	Counter gear center bearing outer race
	(09951-00560)	Replacer 56	Output shaft rear bearing outer race Extension housing oil seal Transfer adaptor oil seal
	09950-70010	Handle Set	
	(09951-07150)	Handle 150	

RECOMMENDED TOOLS

	09031-00030	Pin Punch .	
	09040-0001 1	Hexagon Wrench Set .	
	09042-00020	Torx Socket T40 .	
	09905-00012	Snap Ring No.1 Expander .	

PP09T-01

EQUIPMENT

Dial indicator	
Calipers	
Micrometer	
Torque wrench	
Feeler gauge	
Magnetic finger	

PP09U-01

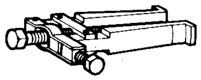
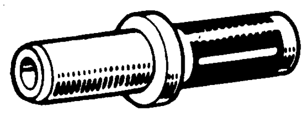
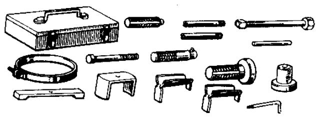
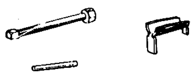
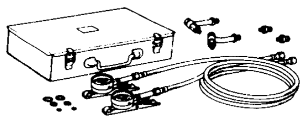
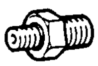
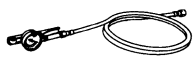
LUBRICANT

Item		Capacity	Classification
Manual transmission oil	2WD:	2.6 liters (2.7 US qts, 2.3 Imp. qts)	API GL-4 or GL-5
	4WD:	2.5 liters (2.6 US qts, 2.2 Imp. qts)	SAE 75W-90

AUTOMATIC TRANSMISSION (A44D)

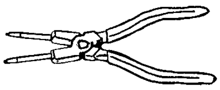
PP0A7-03

SST (Special Service Tools)

	09308-10010	Oil Seal Puller	
	09325-20010	Transmission Oil Plug	
	09350-20015	TOYOTA Automatic Transmission Tool Set	
	(09397-22020)	One-way Clutch Test Tool Set	
	09992-00095	Automatic Transmission Oil Pressure Gauge Set	
	(09992-001 12)	Adaptor A	
	(09992-00271)	Gauge Assy	

PP0A8-01

RECOMMENDED TOOLS

	09905-00013 Snap Ring Pliers .	

PP0A9-01

EQUIPMENT

OBDII scan tool	
Ohmmeter	
Voltmeter	
Torque wrench	
Dial indicator with magnetic base	Drive plate
Vernier calipers	Torque converter clutch
Straight edge	Torque converter clutch

PP0AA-01

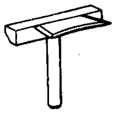
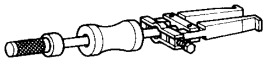
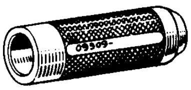
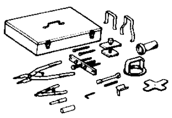
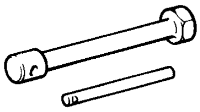
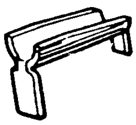
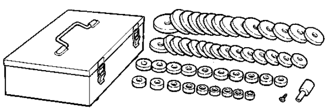
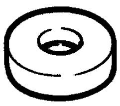
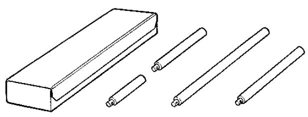
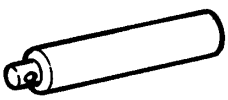
LUBRICANT

Item	Capacity	Classification
Automatic transmission fluid Dry fill Drain and refill	 6.5 liters (6.9 US qts, 5.7 lmp.qts) 2.4 liters (2.5 US qts, 2.1 lmp.qts)	ATF D-II or DEXRON®III (DEXRON®II)

AUTOMATIC TRANSMISSION (A340E, A340F)

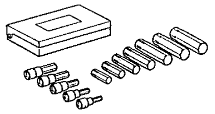
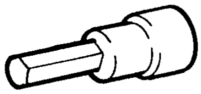
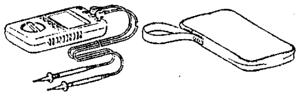
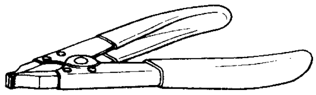
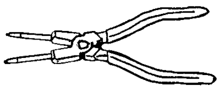
PP1YE-01

SST (Special Service Tools)

	09032-00100	Oil Pan Seal Cutter	Valve body assembly
	09308-00010	Oil Seal Puller	Extension housing oil seal
	09309-37010	Transmission Bearing Replacer	Extension housing oil seal
	09350-30020	TOYOTA Automatic Transmission Tool Set	
	(09351-32010)	One-way Clutch Test Tool	Torque converter clutch and drive plate
	(09351-32020)	Stator Stopper	Torque converter clutch and drive plate
	09950-60010	Replacer Set	
	(09951-00350)	Replacer 35	Extension housing oil seal
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	Extension housing oil seal

PP09E-02

RECOMMENDED TOOLS

	09040-0001 1	Hexagon Wrench Set .	
	(09043-20120)	Socket Hexagon Wrench 12.	
	09082-00040	TOYOTA Electrical Tester.	
	09905-00012	Snap Ring No.1 Expander .	
	09905-00013	Snap Ring Pliers .	

PP09F-01

EQUIPMENT

OBDII scan tool	
Torque wrench	
Dial indicator with magnetic base	Check drive plate runout
Vernier calipers	Check torque converter clutch installation
Straignt edge	Check torque converter clutch installation

PP09G-01

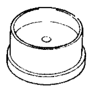
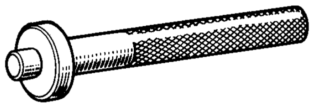
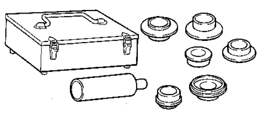
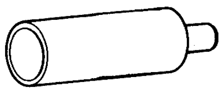
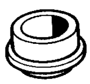
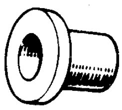
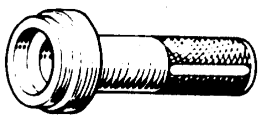
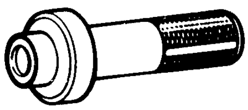
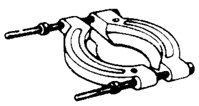
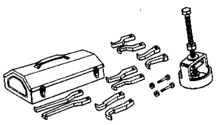
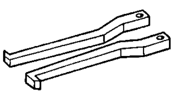
LUBRICANT

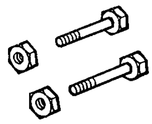
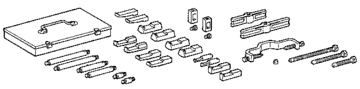
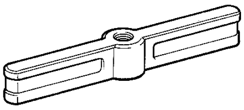
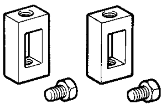
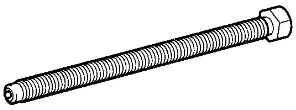
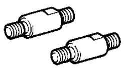
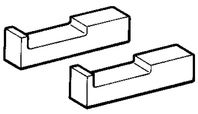
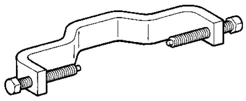
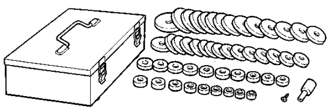
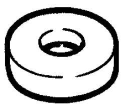
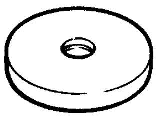
Item	Capacity	Classification
Automatic transmission fluid A340E: Dry fill Drain and refill A340F: Dry fill Drain and refill	 7.2 liters (7.6 US qts, 6.3 Imp.qts) 1.6 liters (1.7 US qts, 1.4 Imp.qts) 10.1 liters (10.7 US qts, 8.9 Imp.qts) 2.0 liters (2.1 US qts, 1.8 Imp.qts)	ATF D-II or DEXRON®III (DEXRON®II)

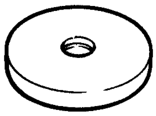
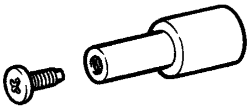
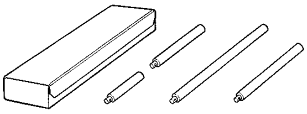
TRANSFER

SST (Special Service Tools)

PP0AC-03

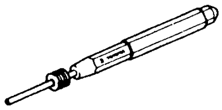
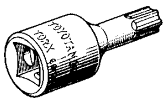
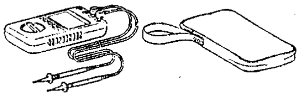
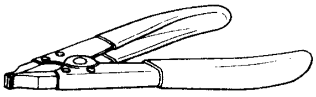
	09223-15020	Oil Seal & Bearing Replacer	Planetary gear outer bearing
	09304-12012	Input Shaft Front Bearing Replacer	Shift fork shaft oil seal
	09316-6001 1	Transmission & Transfer Bearing Replacer	
	(09316-0001 1)	Replacer Pipe	High and low clutch hub Rear output shaft bearing Front case oil seal
	(09316-00071)	Replacer "F"	Rear output shaft bearing
	09330-00021	Companion Flange Holding Tool	Companion flange
	09515-30010	Rear Wheel Bearing Replacer	Planetary gear outer bearing
	09554-22010	Differential Oil Seal Replacer	Extension housing oil seal
	09554-3001 1	Differential Oil Seal Replacer	Planetary gear outer bearing
	09555-55010	Differential Drive Pinion Bearing Replacer	Driven sprocket rear bearing Rear output shaft bearing Planetary gear outer bearing
	09612-65014	Steering Worm Bearing Puller	
	(09612-01030)	Claw "C"	Planetary gear inner bearing

	(09612-01050)	Hanger Pin with Nut	Planetary gear inner bearing
	09950-4001 1	Puller B Set	
	(09951-04020)	Hanger 200	Companion flange
	(09952-04010)	Slide Arm	Companion flange
	(09953-04030)	Center Bolt 200	Companion flange
	(09954-04010)	Arm 25	Companion flange
	(09955-04051)	Claw No.5	Companion flange
	(09957-04010)	Attachment	Companion flange
	(09958-0401 1)	Holder	Companion flange
	09950-60010	Replacer Set	
	(09951-00220)	Replacer 22	Companion flange oil seal
	(09951-00350)	Replacer 35	Companion flange oil seal
	(09951-00570)	Replacer 57	Planetary gear inner bearing

	(09951-00590)	Replacer 59	Front bearing retainer oil seal
	(09952-06010)	Adapter	Companion flange oil seal
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	Front bearing retainer oil seal Planetary gear outer bearing Planetary gear inner bearing Companion flange oil seal

PP0AD-01

RECOMMENDED TOOLS

	09031-00030	Pin Punch .	
	09042-00010	Torx Socket T30 .	
	09082-00040	TOYOTA Electrical Tester.	
	09905-00012	Snap Ring No.1 Expander .	

PP0AE-01

EQUIPMENT

Calipers	
Dial indicator	
Micrometer	
Torque wrench	
Feeler gauge	

PP0AF-01

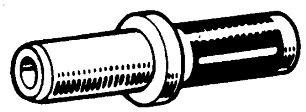
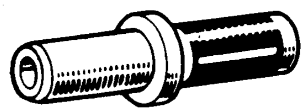
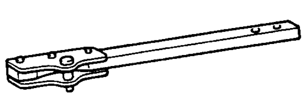
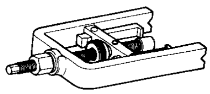
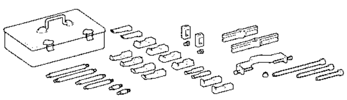
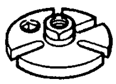
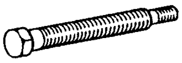
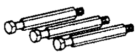
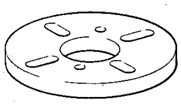
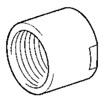
LUBRICANT

Item	Capacity	Classification
Transfer oil	1.0 liters (1.1 US qts, 0.9 lmp.qts)	API GL-4 or GL-5 SAE 75W-90

PROPELLER SHAFT

SST (Special Service Tools)

PP0AH-03

	09325-20010	Transmission Oil Plug	2-joint type: Transmission oil leakage prevention
	09325-40010	Transmission Oil Plug	3-joint type: Transmission oil leakage prevention
	09330-00021	Companion Flange Holding Tool	Flange
	09332-25010	Universal Joint Bearing Remover & Replacer	Spider bearing
	09950-3001 1	Puller A Set	
	(09951-03010)	Upper Plate	
	(09953-03010)	Center Bolt	
	(09954-03010)	Arm	
	(09955-03030)	Lower Plate 130	
	(09956-03020)	Adapter 18	

PP0AI-01

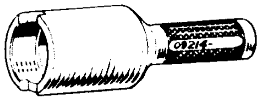
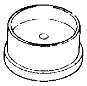
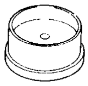
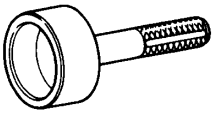
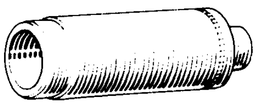
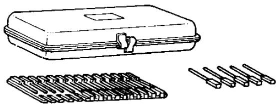
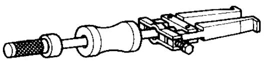
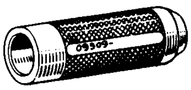
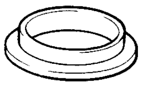
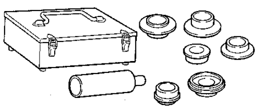
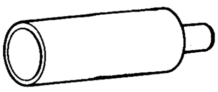
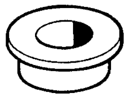
EQUIPMENT

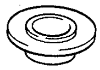
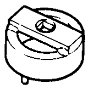
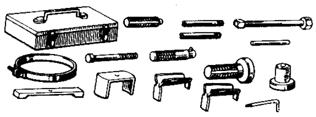
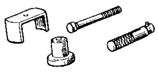
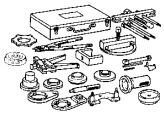
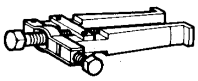
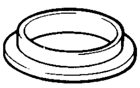
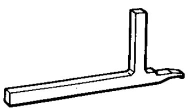
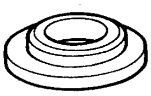
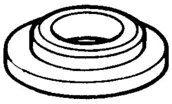
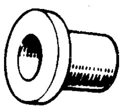
Dial indecator	
Torque wrench	

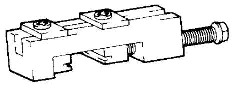
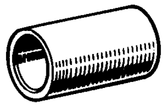
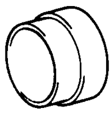
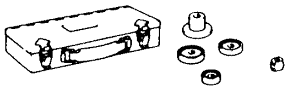
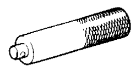
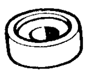
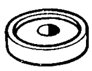
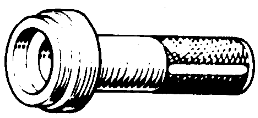
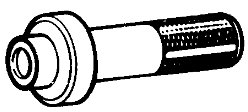
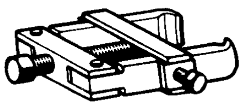
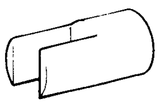
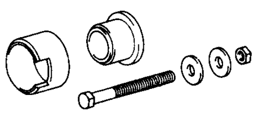
SUSPENSION AND AXLE

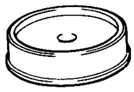
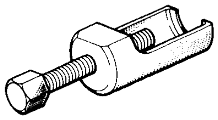
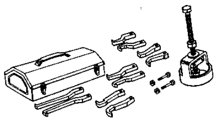
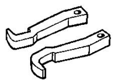
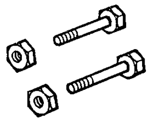
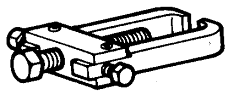
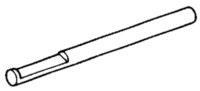
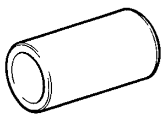
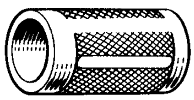
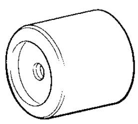
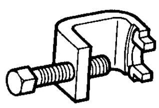
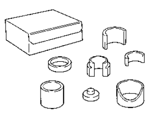
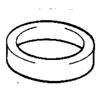
PP3HC-01

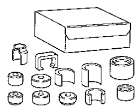
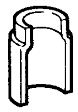
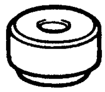
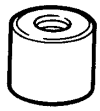
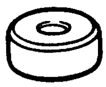
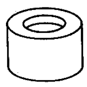
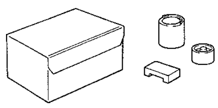
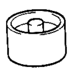
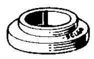
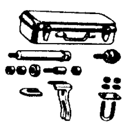
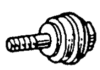
SST (Special Service Tools)

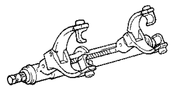
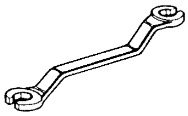
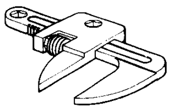
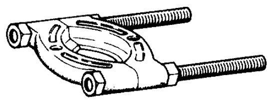
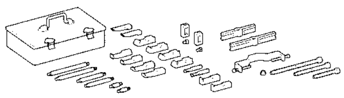
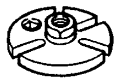
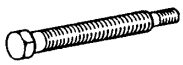
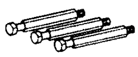
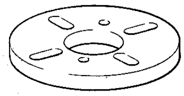
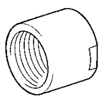
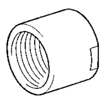
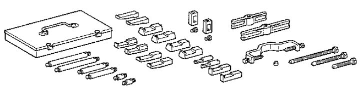
	09214-76011	Crankshaft Pulley Replacer	Rear differential (3RZ-FE, 5VZ-FE w/ Diff. lock)
	09223-15020	Oil Seal & Bearing Replacer	Front differential
	09223-15030	Oil Seal & Bearing Replacer	Front axle (4WD and pre runner)
	09223-56010	Crankshaft Rear Oil Seal Replacer	Rear axle
	09226-10010	Crankshaft Front & Rear Bearing Replacer	Front differential
	09240-00020	Wire Gauge Set	Front drive shaft (4WD)
	09308-00010	Oil Seal Puller	Front differential Rear axle Rear differential (3RZ-FE, 5VZ-FE w/ Diff. lock)
	09309-37010	Transmission Bearing Replacer	Front differential Front suspension (4WD and pre runner)
	09316-12010	Transfer Bearing Replacer	Rear differential (Except 2RZ-FE)
	09316-60011	Transmission & Transfer Bearing Replacer	
	(09316-00011)	Replacer Pipe	Rear differential
	(09316-00021)	Replacer "A"	Rear differential

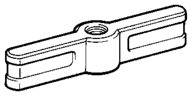
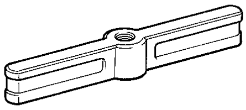
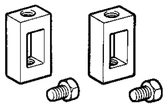
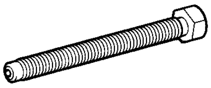
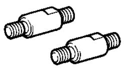
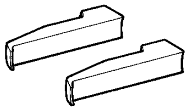
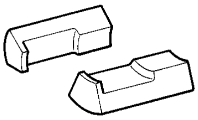
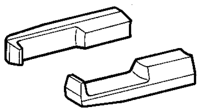
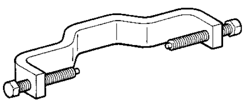
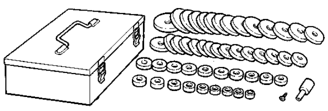
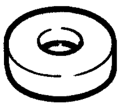
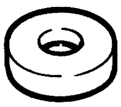
	(09316-00051)	Replacer "D"	Rear axle Rear differential (3RZ-FE, 5VZ-FE w/ Diff. lock)
	09318-12010	Transfer Bearing Adjusting Nut Wrench	Front axle (4WD and pre runner)
	09330-00021	Companion Flange Holding Tool	Front differential Rear differential
	09350-20015	TOYOTA Automatic Transmission Tool Set	Front differential
	(09369-20040)	Piston Spring Compressor Set	
	09350-32014	TOYOTA Automatic Transmission Tool Set	Front differential Rear differential
	09308-10010	Oil Seal Puller	
	09502-12010	Differential Bearing Replacer	Front differential
	09504-00011	Differential Side Bearing Adjusting Nut Wrench	Rear differential (2RZ-FE and 3RZ-FE, 5VZ-FE w/ Diff. lock)
	09504-22011	Differential Side Bearing Replacer	Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock)
	09506-30012	Differential Drive Pinion Rear Bearing Cone Replacer	Front differential Rear differential
	09506-35010	Differential Drive Pinion Rear Bearing Replacer	Front suspension (4WD and pre runner) Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock)
	09515-30010	Rear Wheel Bearing Replacer	Rear axle

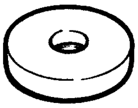
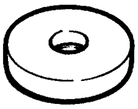
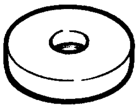
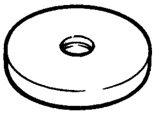
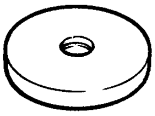
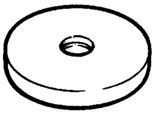
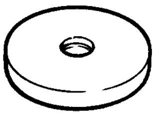
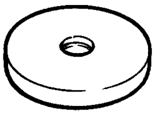
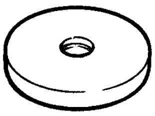
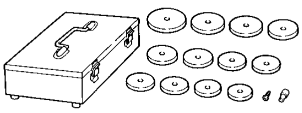
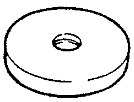
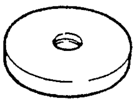
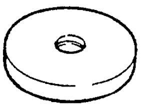
	09521-24010	Drive Shaft Boot Clamping Tool	Front drive shaft (4WD)
	09521-25011	Rear Axle Shaft Puller	Rear axle
	09523-36010	Rear Axle Hub Guide Tool	Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock)
	09527-17011	Rear Axle Shaft Bearing Remover	Front axle
	09550-10013	Replacer Set "B"	
	(09252-10010)	No. 1 Replacer Handle-	Rear differential Rear suspension
	(09553-10010)	Differential Side Bearing Replacer	Rear suspension
	(09557-10011)	Differential Drive Pinion Front Bearing Replacer	Rear differential (2RZ-FE)
	09554-22010	Differential Oil Seal Replacer	Front differential
	09554-30011	Differential Oil Seal Replacer	Rear differential (2RZ-FE)
	09556-22010	Drive Pinion Front Bearing Remover	Front differential Rear differential
	09564-32011	Differential Preload Adaptor	Front differential
	09570-22011	Differential Mounting Cushion Remover & Replacer	Front differential

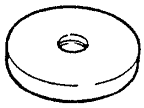
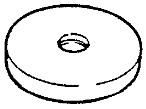
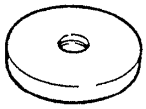
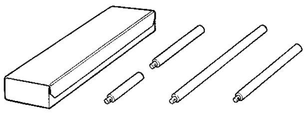
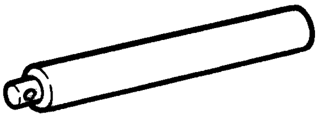
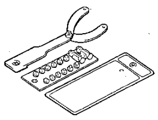
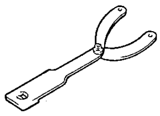
	09608-32010	Steering Knuckle Oil Seal Replacer	Front differential
	09610-20012	Pitman Arm Puller	Front suspension
	09612-65014	Steering Worm Bearing Puller	Front differential
	(09612-01020)	Claw "B"	
	(09612-01050)	Hanger Pin with Nut	
	09628-62011	Ball Joint Puller	Front axle (2WD) Front drive shaft (4WD) Front suspension
	09631-10030	Oil Seal Remover	Front drive shaft (4WD)
	09632-36010	Steering Vane Pump Bearing Replacer	Front suspension (4WD and pre runner)
	09636-20010	Upper Ball Joint Dust Cover Replacer	Front differential Rear differential
	09649-17010	Steering Knuckle Tool	Front axle (4WD and pre runner) Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock)
	09650-17011	Hub Bolt Remover	Front axle (4WD) Rear axle
	09710-28012	Front Suspension Bushing Tool Set	Rear suspension
	(09710-07062)	Bushing Replacer	

	09710-30021	Suspension Bushing Tool Set	
	(09710-03031)	Bushing Remover	Front suspension (2WD)
	(09710-03051)	Bushing Replacer	Front axle (4WD)
	(09710-03071)	Remover	Front suspension (2WD)
	(09710-03101)	Bushing Replacer	Front suspension (2WD)
	(09710-03141)	Bushing Remover Base	Front suspension (2WD)
	09710-30041	Rear Suspension Bushing Tool Set	Rear suspension
	(09710-0321 1)	Remover	
	09726-40010	Lower Control Shaft Bearing Replacer	Rear differential (3RZ-FE, 5VZ-FE w/ Diff. lock)
	09727-2201 1	Front Spring Compressor	Front suspension (2WD)
	(09727-23010)	Hook Set	
	(09727-23020)	Spacer	
	(09727-23030)	Rod Set	

	(09727-23040)	Attachment Set	
	09727-30021	Coil Spring Compressor	Front suspension (4WD and pre runner)
	09751-3601 1	Brake Line Union Nut 10 x 12 mm Wrench	Rear axle
	09922-10010	Variable Open Wrench	Front suspension (4WD and pre runner)
	09950-00020	Bearing Remover	Front differential Rear differential
	09950-3001 1	Puller A Set	
	(09951-03010)	Upper Plate	Front differential Rear differential
	(09953-03010)	Center Bolt	Front differential Rear differential
	(09954-03010)	Arm	Front differential Rear differential
	(09955-03030)	Lower Plate 130	Front differential Rear differential
	(09956-03020)	Adapter 18	Front differential Rear differential (2RZ-FE, 3RZ-FE, 5VZ-FE w/ Diff. lock)
	(09956-03050)	Adapter 24	Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock)
	09950-4001 1	Puller B Set	

	(09951-04010)	Hanger 150	Front axle (4WD and pre runner), Fron differential, Front suspension (4WD and pre runner), Rear differential
	(09951-04020)	Hanger 200	Front axle (4WD and pre runner)
	(09952-04010)	Slide Arm	Front axle (4WD and pre runner), Fron differential, Front suspension (4WD and pre runner), Rear differential
	(09953-04020)	Center Bolt 150	Front axle (4WD and pre runner), Fron differential, Front suspension (4WD and pre runner), Rear differential
	(09954-04010)	Arm 25	Front axle (4WD and pre runner), Fron differential, Front suspension (4WD and pre runner), Rear differential
	(09955-0401 1)	Claw No.1	Front differential
	(09955-04031)	Claw No.3	Front axle (4WD and pre runner), Front suspension (4WD and pre runner)
	(09955-04061)	Claw No.6	Front differential Rear differential
	(09957-04010)	Attachment	Front axle (4WD and pre runner), Fron differential, Front suspension (4WD and pre runner), Rear differential
	(09958-0401 1)	Holder	Front axle (4WD and pre runner), Fron differential, Front suspension (4WD and pre runner), Rear differential
	09950-60010	Replacer Set	
	(09951-00350)	Replacer 35	Rear suspension
	(09951-00380)	Replacer 38	Front differential

	(09951-00450)	Replacer 45	Rear differential (2RZ-FE)
	(09951-00480)	Replacer 48	Front differential Rear differential (Except 2RZ-FE)
	(09951-00490)	Replacer 49	Front axle (2WD)
	(09951-00540)	Replacer 54	Front differential
	(09951-00550)	Replacer 55	Rear differential (3RZ-FE, 5VZ-FE w/ Diff. lock)
	(09951-00560)	Replacer 56	Rear axle
	(09951-00610)	Replacer 61	Rear axle
	(09951-00640)	Replacer 64	Front axle (2WD) Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock)
	(09951-00650)	Replacer 65	Front axle (4WD and pre runner) Front differential
	09950-60020	Replacer Set No.2	
	(09951-00710)	Replacer 71	Front axle (2WD) Rear axle Rear differential
	(09951-00730)	Replacer 73	Rear differential (3RZ-FE, 5VZ-FE w/ Diff. lock)
	(09951-00790)	Replacer 79	Front differential Rear differential

	(09951-00810)	Replacer 81	Front axle (4WD)
	(09951-00890)	Replacer 89	Rear axle
	(09951-00910)	Replacer 91	Front axle (4WD and pre runner) Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock)
	09950-70010	Handle Set	Front axle Front differential Rear axle Rear differential
	(09951-07150)	Handle 150	
	09960-10010	Variable Pin Wrench Set	Rear differential (3RZ-FE, 5VZ-FE w/ Diff. lock)
	(09962-01000)	Variable Pin Wrench Arm Assy	
	(09963-00700)	Pin 7	

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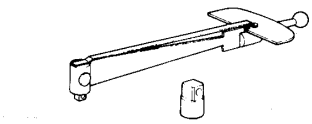
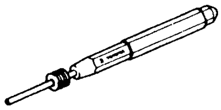
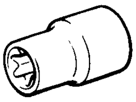
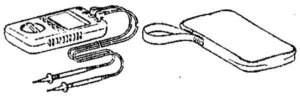
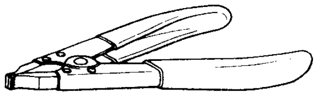
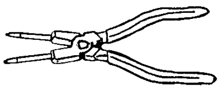
RECOMMENDED TOOLS

	09025-00010	Torque Wrench (30 kgf-cm)	
	09031-00030	Pin Punch .	
	09044-00010	Torx Socket E14 .	
	09082-00040	TOYOTA Electrical Tester.	
	09905-00012	Snap Ring No.1 Expander .	
	09905-00013	Snap Ring Pliers .	

PP09A-01

EQUIPMENT

Dial indicator or dial indicator with magnetic base	
Torque wrench	
Spring tension gauge	
Micrometer	
Voltmeter	
Ohmmeter	

PP09B-05

LUBRICANT

<table>
<tr><th>Item</th><th>Capacity</th><th>Application</th></tr>
<tr><td>Front drive shaft
Outboard joint grease (Color = Black)
Inboard joint grease
(Color = Yellow ocher)</td><td>215 - 235 g (7.58 - 8.29 oz.)

230 - 250 g (8.11 - 8.82 oz.)</td><td></td></tr>
<tr><td>Front differential
Differential oil</td><td>1.15 liters (1.22 US qts. 1.01 lmp. qts)</td><td>Hypoid gear oil API GL-5
SAE 75W-90</td></tr>
<tr><td>Rear differential
Differential oil (2RZ-FE)</td><td>1.35 liters (1.43 US qts. 1.19 lmp. qts)</td><td rowspan="5">Hypoid gear oil API GL-5SAE 75W-90
Above -18°C (0°F) SAE 90
Below -18°C (0°F) SAE 80W or 80W-90</td></tr>
<tr><td rowspan="4">Differential oil (3RZ-FE, 5VZ-FE)</td><td>4WD Extra long models:
2.45 liters (2.58 US qts. 2.16 lmp. qts)</td></tr>
<tr><td>w/ Diff. lock Short models:
2.65 liters (2.80 US qts. 2.33 lmp. qts)</td></tr>
<tr><td>w/ Diff. lock Extra long models:
2.95 liters (3.18 US qts. 2.60 lmp. qts)</td></tr>
<tr><td>w/o Diff. lock:
2.55 liters (2.69 US qts. 2.24 lmp. qts)</td></tr>
</table>

PP1YR-02

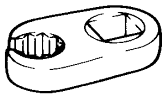
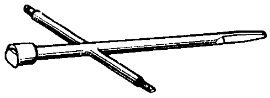
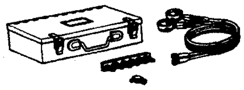
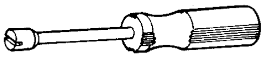
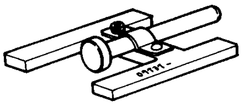
SSM (Special Service Materials)

08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	Front differential Rear differential (3RZ-FE, 5VZ-FE w/ Diff.lock)
08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	Front differential
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Rear differential (3RZ-FE, 5VZ-FE w/ Diff. lock)
08833-00100	THREE BOND 1360K or equivalent	Rear differential (3RZ-FE w/o Diff. lock)

BRAKE

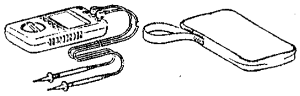
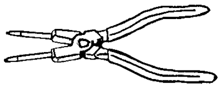
SST (Special Service Tools)

PP09N-01

	09023-00100	Union Nut Wrench 10 mm	
	09703-30010	Brake Shoe Return Spring Tool	
	09709-29018	LSPV Gauge Set	
	09718-00010	Shoe Hold Down Spring Driver	
	09737-00010	Brake Booster Push Rod Gauge	
	09843-18020	Diagnosis Check Wire	

PP09O-02

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09905-00013	Snap Ring Pliers .	

PP09P-03

EQUIPMENT

Torque wrench	
Micrometer	Brake disc
Dial indicator	Brake disc
Brake drum gauge	Brake drum
Vernier calipers	Brake drum

PP09Q-02

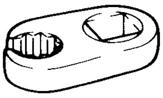
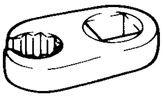
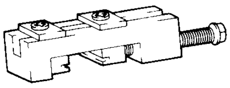
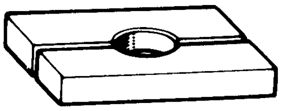
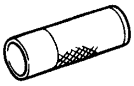
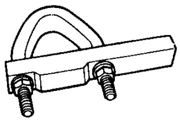
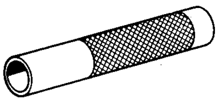
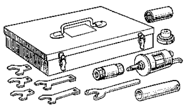
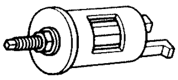
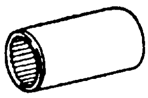
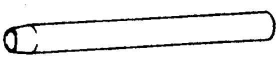
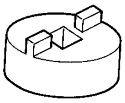
LUBRICANT

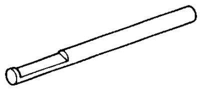
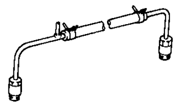
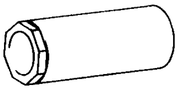
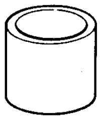
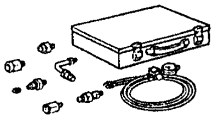
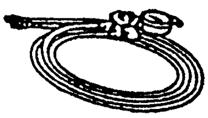
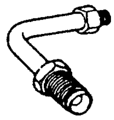
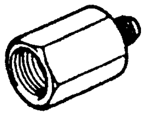
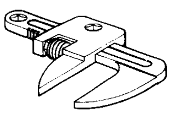
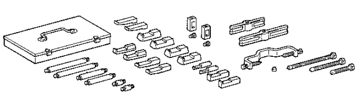
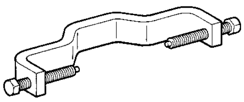
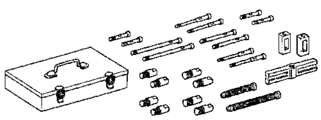
Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116 DOT 3

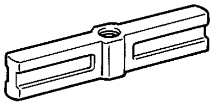
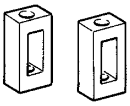
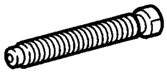
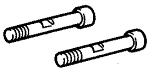
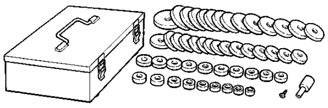
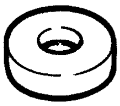
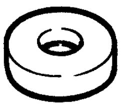
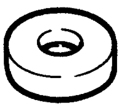
STEERING

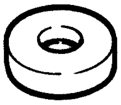
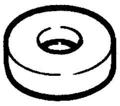
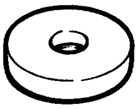
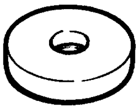
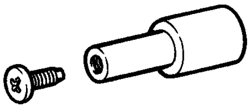
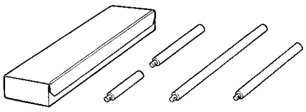
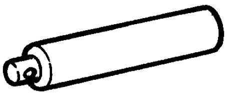
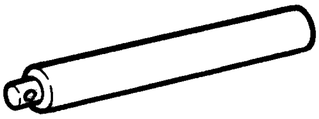
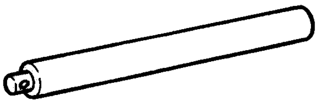
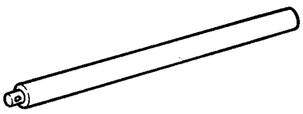
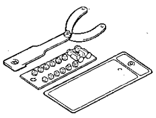
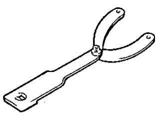
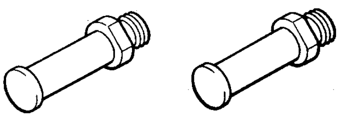
PP3HD-01

SST (Special Service Tools)

	09023-12700	Union Nut Wrench 17mm	PS gear (2WD, 4WD and Pre runner)
	09023-38200	Union Nut Wrench 12mm	PS gear (2WD, 4WD and Pre runner)
	09521-24010	Drive Shaft Boot Clamping Tool	PS gear (2WD)
	09527-20011	Rear Axle Shaft Bearing Remover	PS gear (2WD)
	09608-04031	Front Hub Inner Bearing Cone Replacer	PS vane pump (2RZ-FE, 3RZ-FE)
	09612-00012	Rack & Pinion Steering Rack Housing Stand	PS gear (2WD, 4WD and Pre runner)
	09612-22011	Tilt Handle Bearing Replacer	PS gear (2WD)
	09612-24014	Steering Gear Housing Overhaul Tool Set	
	(09613-22011)	Steering Rack Shaft Bushing Puller	PS gear (2WD)
	09616-00011	Steering Worm Bearing Adjusting Socket	PS gear (2WD, 4WD and Pre runner)
	09631-00350	Steering Rack Cover 35	PS gear (4WD and Pre runner)
	09631-10021	Rack Stopper Wrench	PS gear (2WD)

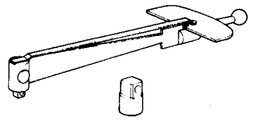
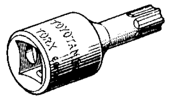
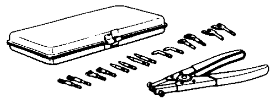
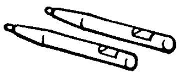
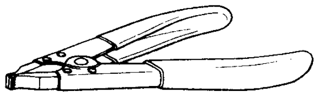
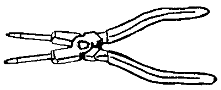
	09631-10030	Oil Seal Remover	PS vane pump (2RZ-FE, 3RZ-FE)
	09631-12071	Steering Rack Oil Seal Test Tool	PS gear (2WD, 4WD and Pre runner)
	09631-20060	Bearing Guide Nut Wrench	PS gear (4WD and Pre runner)
	09631-20081	Seal Ring Tool	PS gear (2WD, 4WD and Pre runner)
	09631-20102	Steering Rack Cover "H"	PS gear (2WD)
	09640-10010	Power Steering Pressure Gauge Set	
	(09641-01010)	Gauge Assy	Power steering fluid
	(09641-01030)	Attachment B	Power steering fluid
	(09641-01060)	Attachment E	Power steering fluid
	09922-10010	Variable Open Wrench	PS gear (2WD, 4WD and Pre runner)
	09950-4001 1	Puller B Set	
	(09958-0401 1)	Holder	Tilt steering column
	09950-50012	Puller C Set	

	(09951-05010)	Hanger 150	Non-tilt steering column Tilt steering column
	(09952-05010)	Slide Arm	Non-tilt steering column Tilt steering column
	(09953-05010)	Center Bolt 100	Non-tilt steering column Tilt steering column
	(09954-05020)	Claw No.2	Non-tilt steering column Tilt steering column
	09950-60010	Replacer Set	
	(09951-00180)	Replacer 18	PS gear (2WD, 4WD and Pre runner)
	(09951-00240)	Replacer 24	PS gear (2WD)
	(09951-00250)	Replacer 25	PS gear (2WD)
	(09951-00260)	Replacer 26	PS gear (2WD, 4WD and Pre runner)
	(09951-00280)	Replacer 28	PS gear (2WD, 4WD and Pre runner)
	(09951-00310)	Replacer 31	PS gear (2WD)
	(09951-00320)	Replacer 32	PS gear (2WD, 4WD and Pre runner)
	(09951-00330)	Replacer 33	PS vane pump (5VZ-FE) PS gear (2WD, 4WD and Pre runner)

	(09951-00360)	Replacer 36	PS gear (4WD and Pre runner)
	(09951-00400)	Replacer 40	PS gear (2WD)
	(09951-00420)	Replacer 42	PS gear (2WD)
	(09951-00490)	Replacer 49	PS gear (4WD and Pre runner)
	(09952-06010)	Adapter	PS gear (2WD, 4WD and Pre runner)
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	PS vane pump (5VZ-FE) PS gear (4WD and Pre runner)
	(09951-07150)	Handle 150	PS gear (2WD, 4WD and Pre runner)
	(09951-07200)	Handle 200	PS gear (2WD)
	(09951-07360)	Handle 360	PS gear (2WD, 4WD and Pre runner)
	09960-10010	Variable Pin Wrench Set	
	(09962-01000)	Variable Pin Wrench Arm Assy	PS vane pump (2RZ-FE, 3RZ-FE, 5VZ-FE)
	(09963-01000)	Pin 10	PS vane pump (2RZ-FE, 3RZ-FE, 5VZ-FE)

PP09J-04

RECOMMENDED TOOLS

	09025-00010	Small Torque Wrench (30 kgf-cm)	PS vane pump (2RZ-FE, 3RZ-FE, 5VZ-FE) PS gear (2WD, 4WD and Pre runner)
	09042-00010	Torx Socket T30 .	Non-tilt steering column Tilt steering column
	09904-00010	Expander Set .	
	(09904-00050)	No. 4 Claw	
	09905-00012	Snap Ring No.1 Expander .	
	09905-00013	Snap Ring Pliers .	

PP09K-04

EQUIPMENT

Belt tension gauge	Drive belt
Caliper gauge	PS vane pump (2RZ-FE, 3RZ-FE, 5VZ-FE)
Vernier calipers	PS vane pump (2RZ-FE, 3RZ-FE, 5VZ-FE)
Dial indicator	PS gear (2WD, 4WD and Pre runner)
Feeler gauge	PS vane pump (2RZ-FE, 3RZ-FE, 5VZ-FE)
Micrometer	PS vane pump (2RZ-FE, 3RZ-FE, 5VZ-FE)
Torque wrench	

PP09L-02

LUBRICANT

Item	Capacity	Classification
Power steering fluid Total	0.8 liters (0.9 US qts, 0.7 lmp.qts)	ATF DEXRON® II or III

PP1B9-09

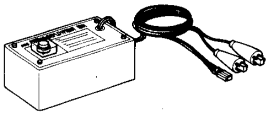
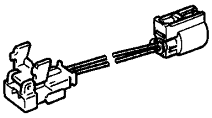
SSM (Special Service Materials)

08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	PS gear (2WD, 4WD and Pre runner)

SUPPLEMENTAL RESTRAINT SYSTEM

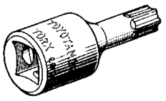
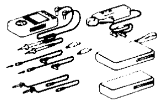
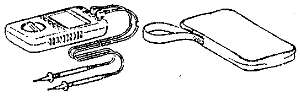
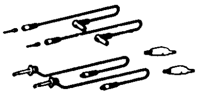
PP1YP-01

SST (Special Service Tools)

	09082-00700	SRS Airbag Deployment Tool	
	09082-00760	Airbag Deployment Wire Sub-harness No.4	
	09843-18020	Diagnosis Check Wire	

PP28H-01

RECOMMENDED TOOLS

	09042-00020	Torx Socket T40 .	Airbag sensor assembly
	09082-00050	TOYOTA Electrical Tester Set.	
	09082-00040	TOYOTA Electrical Tester.	
	(09083-00150)	Test Lead Set	

PP03F-02

EQUIPMENT

Torque wrench	
Bolt: Length: 35 mm (1.38 in.) Pitch: 1.0 mm (0.039 in.) Diam.: 6.0 mm (0.236 in.)	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diam.: 360mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposa
Vinyl bag	Airbag disposal

BODY ELECTRICAL

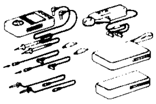
SST (Special Service Tools)

PP08Z-01

	09843-18020 Diagnosis Check Wire	

PP090-01

RECOMMENDED TOOLS

	09082-00050	TOYOTA Electrical Tester Set.	

PP091-05

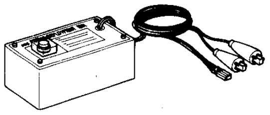
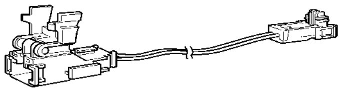
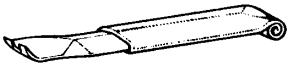
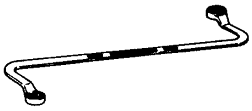
EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Engine coolant temperature sender gauge
Syphon	Brake fluid level warning switch
Bulb (3.4 W)	Fuel sender gauge, Integration relay
Bulb (21 W)	Turn signal flasher relay
Dry cell battery	Fuel sender gauge, Power mirror
Torque wrench	

BODY

PP1YH-02

SST (Special Service Tools)

	09082-00700	SRS Airbag Deployment Tool	
	09082-00770	Airbag Deployment Wire Sub-harness No.2	
	09806-30010	Windshield Moulding Remover	
	09812-00010	Door Hinge Set Bolt Wrench	

PP0MV-03

EQUIPMENT

Clip remover	
Torque wrench	
Torx driver	
Hog ring pliers	
Tape	To avoid surface damage
Adhesive tape	To avoid surface damage
Double - stick tape	
Adhesive	
Cleaner	
Shop rag	Regulator handle
Knife	Moulding
Heat light	Moulding
Piano wire	Windshield
Sealer gun	
Brush	
Putty spatula	
Wooden block or similar object	For tying both piano wire ends
Plastic sheet	To avoid surface damage
Rope (no projections, difficult to break)	Seat belt pretensioner disposal
Tire Width: 185 mm (7.28 in.) Inner diam: 360 mm (14.17 in.)	Seat belt pretensioner disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diam 360 mm (14.17 in.)	Seat belt pretinsioner disposal
Vinyl bag	Seat belt pretensioner disposal

PP0A0-01

LUBRICANT

Item	Capacity	Classification
MP grease	-	-

PP0TC-04

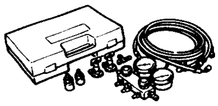
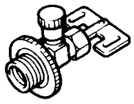
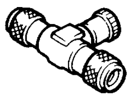
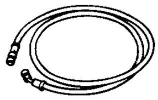
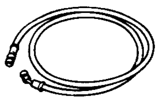
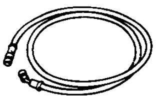
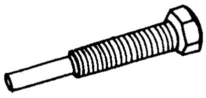
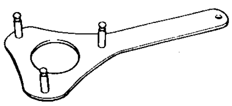
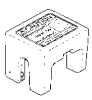
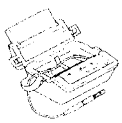
SSM (Special Service Materials)

	08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	
	08833-00030	Three cement black or equivalent	
	08850-00801	Windshield Glass Adhesive Set or equivalent	

AIR CONDITIONING

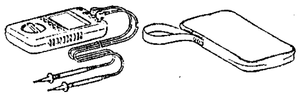
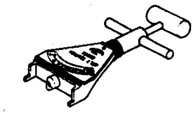
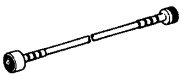
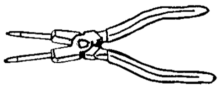
SST (Special Service Tools)

PP3H8-01

	07110-58060	Air Conditioner Service Tool Set	
	(07117-58060)	Refrigerant Drain Service Valve	
	(07117-58070)	T-Joint	
	(07117-58080)	Quick Disconnect Adapter	
	(07117-58090)	Quick Disconnect Adapter	
	(07117-88060)	Refrigerant Charging Hose	
	(07117-88070)	Refrigerant Charging Hose	
	(07117-88080)	Refrigerant Charging Hose	
	07112-66040	Magnetic Clutch Remover	
	07112-76060	Magnetic Clutch Stopper	
	09870-00025	A/C Quick Joint Puller No.2	Liquid tube
	95416-00140	Gas Leak Detector <Halogen Leak Detector> (DENSO Part No.)	

PP3H9-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09216-00021	Belt Tension Gauge .	
	09216-00030	Belt Tension Gauge Cable .	
	09905-00013	Snap Ring Pliers .	

PP095-07

EQUIPMENT

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

PP096-01

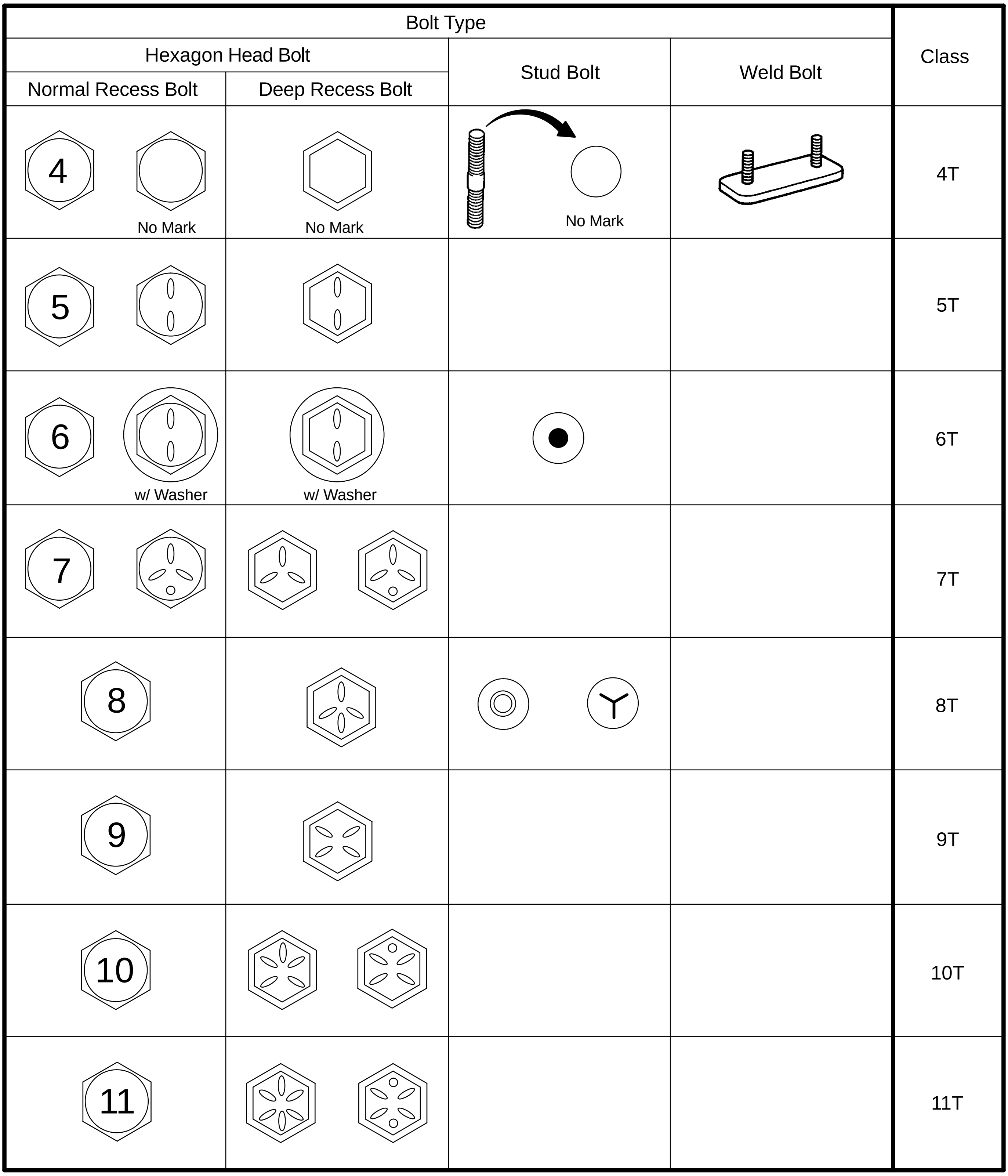
LUBRICANT

Item	Capacity	Classification
Compressor oil	-	ND-OIL 8 or equivalent
When replacing receiver	20 cc (0.71 fl.oz.)	
When replacing condenser	40 cc (1.4 fl. oz.)	
When replacing evaporator	40 cc (1.4 fl. oz.)	

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

SS0ZS-01



B06431

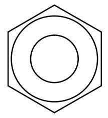
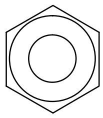
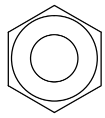
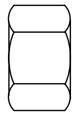
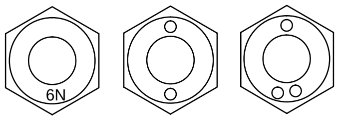
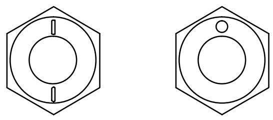
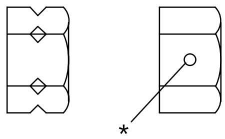
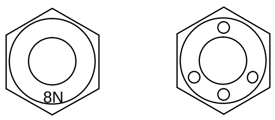
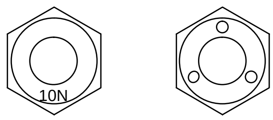
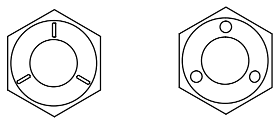
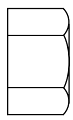
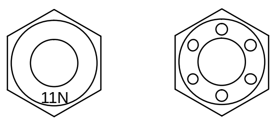
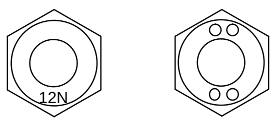
SS0ZT-01

SPECIFIED TORQUE FOR STANDARD BOLTS

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

SS0ZU-01

HOW TO DETERMINE NUT STRENGTH

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

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

B06432

HINT:
Use the nut with the same number of the nut strength classification or the greater than the bolt strength classification number when tightening parts with a bolt and nut.
Example: Bolt = 4T
Nut = 4N or more

ENGINE MECHANICAL (2RZ-FE, 3RZ-FE)

SS040-04

SERVICE DATA

Compression pressure	at 250 rpm	STD	1,230 kPa (12.5 kgf/cm^2, 178 psi) or more
		Minimum	880 kPa (9.0 kgf/cm^2, 127 psi)
	Difference of pressure between each cylinder		98 kPa (1.0 kgf/cm^2, 14 psi) or less
Valve clearance		Intake	0.15 - 0.25 mm (0.006 - 0.010 in.)
		Exhaust	0.25 - 0.35 mm (0.010 - 0.014 in.)
	Adjusting shim (for repair part)	Mark 2.500	2.500 mm (0.0984 in.)
		Mark 2.550	2.550 mm (0.1004 in.)
		Mark 2.600	2.600 mm (0.1024 in.)
		Mark 2.650	2.650 mm (0.1043 in.)
		Mark 2.700	2.700 mm (0.1063 in.)
		Mark 2.750	2.750 mm (0.1083 in.)
		Mark 2.800	2.800 mm (0.1102 in.)
		Mark 2.850	2.850 mm (0.1122 in.)
		Mark 2.900	2.900 mm (0.1142 in.)
		Mark 2.950	2.950 mm (0.1161 in.)
		Mark 3.000	3.000 mm (0.1181 in.)
		Mark 3.050	3.050 mm (0.1201 in.)
		Mark 3.100	3.100 mm (0.1220 in.)
		Mark 3.150	3.150 mm (0.1240 in.)
		Mark 3.200	3.200 mm (0.1260 in.)
		Mark 3.250	3.250 mm (0.1280 in.)
		Mark 3.300	3.300 mm (0.1299 in.)
Ignition timing	w/ Terminals TE1 and E1 connected of DLC1		3 - 7° BTDC @ idle
Idle speed	Engine at normal operating temperature		650 - 750 rpm
Cylinder head	Warpage		
	Cylinder block side	Maximum	0.05 mm (0.0020 in.)
	Manifold side	Maximum	0.10 mm (0.0039 in.)
	Valve seat		
	Refacing angle	Intake	30°, 45°, 60°
		Exhaust	45°, 60°
	Contacting angle		45°
	Contacting width		1.0 - 1.4 mm (0.039 - 0.055 in.)
	Cylinder head bolt outside diameter	STD	10.76 - 10.97 mm (0.4236 - 0.4319 in.)
		Minimum	10.40 mm (0.4094 in.)
Valve guide bushing	Inside diameter		6.010 - 6.030 mm (0.2366 - 0.2374 in.)
	Outside diameter (for repair part)	STD	11.000 - 11.027 mm (0.4331 - 0.4341 in.)
		O/S 0.05	11.050 - 11.077 mm (0.4350 - 0.4361 in.)
	Protrusion height		8.2 - 8.6 mm (0.323 - 0.339 in.)
	Replacing temperature (Cylinder head side)		80 - 100°C (176 -212°F)
Valve	Valve overall length	STD Intake	103.45 mm (4.0728 in.)
		Exhaust	103.60 mm (4.0787 in.)
		Minimum Intake	102.95 mm (4.0531 in.)
		Exhaust	103.10 mm (4.0590 in.)
	Valve face angle		44.5°
	Stem diameter	Intake	5.970 - 5.985 mm (0.2350 - 0.2356 in.)
		Exhaust	5.965 - 5.980 mm (0.2348 - 0.2354 in.)
	Stem oil clearance	STD Intake	0.025 - 0.060 mm (0.0010 - 0.0024 in.)
		Exhaust	0.030 - 0.065 mm (0.0012 - 0.0026 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD	1.0 mm (0.039 in.)
		Minimum	0.5 mm (0.020 in.)

Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Installed tension	at 35.7 mm (1.406 in.)	177 - 204 N (18.0 - 20.8 kgf, 39.7 - 45.9 lbf)
Valve lifter	Lifter diameter		30.966 - 30.976 mm (1.1578 - 1.2195 in.)
	Lifter bore diameter		31.000 - 31.016 mm (1.2205 - 1.2211 in.)
	Oil clearance	STD	0.024 - 0.050 mm (0.0009 - 0.0020 in.)
		Maximum	0.07 mm (0.0028 in.)
Manifold	Warpage	Maximum Intake	0.20 mm (0.0078 in.)
		Exhaust	0.50 mm (0.0197 in.)
Air intake chamber	Warpage	Maximum	0.20 mm (0.0078 in.)
Camshaft	Thrust clearance	STD	0.040 - 0.095 mm (0.0016 - 0.0037 in.)
		Maximum	0.12 mm (0.0047 in.)
	Journal oil clearance	STD	0.025 - 0.062 mm (0.0010 - 0.0024 in.)
		Maximum	0.08 mm (0.0031 in.)
	Journal diameter		26.959 - 26.975 mm (1.0614 - 1.0620 in.)
	Circle runout	Maximum	0.06 mm (0.0024 in.)
	Cam lobe height	Intake	45.31 - 45.41 mm (1.7839 - 1.7878 in.)
		Exhaust	45.06 - 45.16 mm (1.7740 - 1.7779 in.)
	Camshaft gear backlash	STD	0.020 -0.200 mm (0.0008 - 0.0079 in.)
		Maximum	0.30 mm (0.0188 in.)
	Camshaft gear spring end free distance		22.5 - 22.9 mm (0.886- 0.902 in.)
Spark plug tube	Protrusion		47.0 mm (1.850 in.)
Chain and timing gear	Chain length at 16 links	Maximum (No.1)	147.5 mm (5.807 in.)
		(No.2)	123.6 mm (4.866 in.)
	Camshaft timing gear wear (w/ chain)	Minimum	113.8 mm (4.480 in.)
	Crankshaft timing gear wear (w/ chain)	Minimum	59.4 mm (2.339 in.)
	Balance shaft drive gear wear (w/ chain)	Minimum	75.9 mm (2.988 in.)
	No.2 crankshaft timing sprocket wear (w/ chain)	Minimum	96.7 mm (3.807 in.)
Chain tensioner slipper and vibration damper	Wear	Maximum	1.0 mm (0.039 in.)
Cylinder block	Cylinder head surface warpage	Maximum	0.05 mm (0.0020 in.)
	Cylinder bore diameter	STD	94.990 - 95.003 mm (3.7400 - 3.7403 in.)
		Maximum	95.06 mm (3.7425 in.)
	Main bearing bolt outside diameter	STD	10.76 - 10.97 mm (0.4236 - 0.4319 in.)
		Minimum	10.40 mm (0.4094 in.)
	Cylinder block main journal bore diameter		
		STD Mark 1	64.004 - 64.010 mm (2.5198 - 2.5201 in.)
		Mark 2	64.011 - 64.016 mm (2.5201 - 2.5203 in.)
		Mark 3	64.017 - 64.022 mm (2.5203 - 2.5205 in.)
		U/S 0.25	64.000 - 64.024 mm (2.5197 - 2.5206 in.)

Piston and piston ring	Piston diameter		
	2RZ-FE	STD	94.923 - 94.933 mm (3.7371 - 3.7375 in.)
		O/S 0.50	95.423 - 95.433 mm (3.7568 - 3.7572 in.)
	3RZ-FE	STD	94.933 - 94.943 mm (3.7375 - 3.7379 in.)
		O/S 0.50	95.433 - 95.443 mm (3.7572 - 3.7576 in.)
	Piston oil clearance		
	2RZ-FE		0.057 - 0.080 mm (0.0022 - 0.0031 in.)
	3RZ-FE		0.047 - 0.070 mm (0.0019 - 0.0028 in.)
	Piston ring groove clearance	No.1	0.020 - 0.070 mm (0.0008 - 0.0028 in.)
		No.2	0.030 - 0.070 mm (0.0012 - 0.0028 in.)
	Piston ring end gap	No.1	0.300 - 0.400 mm (0.0118 - 0.0157 in.)
		No.2	0.400 - 0.500 mm (0.0157 - 0.0197 in.)
	Piston pin installing temperature		80 - 90˚C (176 - 194˚F)
Connecting rod	Thrust clearance	STD	0.160 - 0.312 mm (0.0063 - 0.0123 in.)
		Maximum	0.35 mm (0.0138 in.)
	Connecting rod bearing center wall thickness		
		STD Mark 4	1.482 - 1.485 mm (0.0583 - 0.0585 in.)
		Mark 5	1.485 - 1.488 mm (0.0585 - 0.0586 in.)
		Mark 6	1.488 - 1.491 mm (0.0586 - 0.0587 in.)
		U/S 0.25	1.601 - 1.607 mm (0.0630 - 0.0633 in.)
	Connecting rod big end inside diameter		
		STD Mark 4	56.000 - 56.006 mm (2.2047 - 2.2050 in.)
		Mark 5	56.006 - 56.012 mm (2.2050 - 2.2052 in.)
		Mark 6	56.012 - 56.018 mm (2.2052 - 2.2054 in.)
		U/S 0.25	56.000 - 56.018 mm (2.2047 - 2.2054 in.)
	Connecting rod oil clearance	STD	0.030 - 0.055 mm (0.0012 - 0.0022 in.)
		U/S 0.25	0.031 - 0.071 mm (0.0012 - 0.0026 in.)
		Maximum	0.10 mm (0.0039 in.)
	Rod out-of-alignment		
		Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)
	Bushing inside diameter		24.008 - 24.017 mm (0.9452 - 0.9455 in.)
	Piston pin diameter		24.000 - 24.009 mm (0.9449 - 0.9452 in.)
	Piston pin oil clearance	STD	0.005 - 0.011 mm (0.0002 - 0.0004 in.)
		Maximum	0.015 mm (0.0006 in.)
	Connecting rod bolt outside diameter	STD	7.80 - 7.90 mm (0.3071 - 0.3110 in.)
		Minimum	7.60 mm (0.2992 in.)

Crankshaft	Thrust clearance	STD	0.020 - 0.0220 mm (0.0008 - 0.0087 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness		2.440 - 2.490 mm (0.0961 - 0.0980 in.)
	Main journal oil clearance	STD No.3	0.030 - 0.055 mm (0.0012 - 0.0022 in.)
		Others	0.024 - 0.049 mm (0.0009 - 0.0019 in.)
		U/S 0.25 No.3	0.030 - 0.070 mm (0.0012 - 0.0028 in.)
		Others	0.025 - 0.065 mm (0.0010 - 0.0026 in.)
		Maximum	0.10 mm (0.0039 in.)
	Main journal diameter	STD No.3	59.981 - 59.994 mm (2.2615 - 2.3620 in.)
		Others	59.987 - 60.000 mm (2.3617 - 2.3622 in.)
		U/S 0.25 No.3	59.740 - 59.750 mm (2.3520 - 2.3524 in.)
		Others	59.745 - 59.755 mm (2.3522 - 2.3526 in.)
	Main bearing center wall thickness		
		STD Mark 1	1.987 - 1.990 mm (0.0782 - 0.0783 in.)
		Mark 2	1.991 - 1.993 mm (0.0784 - 0.0785 in.)
		Mark 3	1.994 - 1.996 mm (0.0785 - 0.0786 in.)
		U/S 0.25	2.106 - 2.112 mm (0.0829 - 0.0831 in.)
	Crank pin diameter	STD	52.987 - 53.000 mm (2.0861 - 2.0866 in.)
		U/S 0.25	52.745 - 52.755 mm (2.0766 - 2.0770 in.)
	Circle runout	Maximum	0.03 mm (0.0012 in.)
	Main journal taper and out-of-round	Maximum	0.005 mm (0.0002 in.)
	Crank pin taper and out-of-round	Maximum	0.005 mm (0.0002 in.)
Balance shaft	Thrust clearance	STD	0.07 - 0.13 mm (0.0027 - 0.0051 in.)
		Maximum	0.20 mm (0.0079 in.)
	Bearing inside diameter	No.1	38.025 - 38.045 mm (1.4970 - 1.4978 in.)
		No.2	37.525 - 37.545 mm (1.4774 - 1.4781 in.)
	Journal diameter	No.1	37.969 - 37.985 mm (1.4948 - 1.4955 in.)
		No.2	37.449 - 37.465 mm (1.4744 - 1.4750 in.)
	Journal oil clearance	STD No.1	0.040 - 0.076 mm (0.0016 - 0.0031 in.)
		No.2	0.060 - 0.096 mm (0.0024 - 0.0038 in.)
		Maximum	0.15 mm (0.0059 in.)

SS041-04

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head		19	200	14
Cylinder head x Cylinder block	1st	39	400	29
	2nd	Turn 90°	Turn 90°	Turn 90°
	3rd	Turn 90°	Turn 90°	Turn 90°
Cylinder head x Timing chain cover		21	210	15
Camshaft bearing cap x Cylinder head		15.5	160	12
Camshaft timing gear x Intake camshaft		73.5	750	54
Distributor gear x Exhaust camshaft		46	470	34
No.1 chain tensioner x Cylinder head		21	210	15
Engine hanger x Cylinder head		42	420	30
Cylinder head rear cover x Cylinder head		13.5	135	10
Water outlet x Cylinder head		20	200	14
Exhaust manifold x Cylinder head		49	500	36
Heat insulator x Exhaust manifold		5.5	55	48 in.·lbf
Intake manifold x Cylinder head		29	300	22
Fuel inlet pipe x Fuel filter		29	300	22
Air intake chamber x Intake manifold		21	210	15
Fuel inlet pipe x Delivery pipe		29	300	22
Intake chamber stay x Air intake chamber		20	200	15
Intake chamber stay x LH engine mounting bracket		20	200	15
EGR pipe x EGR valve		19	195	14
EGR pipe x Exhaust manifold		20	200	15
EGR pipe x Cylinder head		18	185	13
PS pump bracket x Cylinder head		20	200	15
PS pump bracket x PS pump		58	590	43
PS pump x PS pump pulley		43	440	32
Drive belt idler pulley for PS pump x Cylinder head		20	200	14
Oil dipstick guide x Cylinder head		20	200	15
Intake air connector x Cylinder head		18	185	13
Balance shaft drive gear x Balance shaft		25	250	18
No.2 chain tensioner x Cylinder block		18	185	13
No.3 vibration damper x Cylinder block		18	185	13
No.2 vibration damper x Cylinder block		27	270	20
Oil jet x Cylinder block		18	185	13
No.1 vibration damper x Cylinder block		29	300	22
No.1 timing chain tensioner slipper x Cylinder block		27	270	20
Timing chain cover x Cylinder block	12 mm head bolt A	20	200	14
	bolt B	24.5	250	18
	14 mm head bolt	44	440	32
	Nut	20	200	14
Timing chain cover mounting bolt		18	185	13
Water bypass pipe mounting nut		20	200	14
Crankshaft pulley x Crankshaft		260	2,650	193
No.2 crankshaft pulley x Crankshaft pulley		25	250	18

No.3 crankshaft pulley x Crankshaft pulley		25	250	18
Oil strainer x Cylinder block		18	185	13
Part tightened		N·m	kgf·cm	ft·lbf
Oil pan x Cylinder block		12.5	130	9
Stiffener plate x Cylinder block		37	380	27
Stiffener plate x Transmission		37	380	27
Crankshaft position sensor x Timing chain cover		8.5	85	74 in.·lbf
Generator bracket x Cylinder block		74.5	760	55
Generator bracket x Timing chain cover		18	185	13
Generator adjusting bar x Timing chain cover		63.5	650	47
A/C compressor bracket x Cylinder block		44	440	32
A/C compressor x A/C compressor bracket		25	250	18
Connecting rod cap x Connecting rod	1st 2nd	45 Turn 90°	460 Turn 90°	33 Turn 90°
Main bearing cap x Cylinder block	1st 2nd	39 Turn 90°	400 Turn 90°	29 Turn 90°
No.1 balance shaft x Timing gear		36	365	26
No.2 balance shaft x Timing sprocket		36	365	26
Balance shaft x Cylinder block		18	185	13
Rear oil seal retainer x Cylinder block		13.5	135	9.7
Engine mounting bracket x Cylinder block		52	520	38
Engine coolant drain plug x Cylinder block		24.5	250	18
Oil filter bracket union x Cylinder block		25	250	18
Oil filter bracket (2RZ-FE) x Cylinder block	Nut Union bolt	12 68.5	120 700	8.9 51
Oil filter bracket (3RZ-FE) x Cylinder block		28	290	21
Water bypass pipe x Cylinder block		20	200	14
Knock sensor x Cylinder block		37	380	27
Fuel filter x Cylinder block		20	200	14
Rear end plate x Cylinder block		18	185	13
Rear end plate x Water bypass pipe		20	200	14
Flywheel (2RZ-FE) x Crankshaft		88	900	65
Flywheel (3RZ-FE) x Crankshaft	1st 2nd	26.5 Turn 90°	270 Turn 90°	19 Turn 90°
Drive plate x Crankshaft		74	750	54
Engine rear mounting bracket x Front crossmember		25	260	19
Engine rear mounting bracket x Engine rear mounting insulator		18	183	13
Engine front mounting insulator x Frame		38	387	28
Clutch release cylinder bracket x Transmission		39	400	29
Clutch release cylinder x Transmission		13	130	9
No.1 exhaust pipe with TWC x Exhaust manifold		62	630	46
Exhaust support bracket x Transmission		44	450	33
No.1 exhaust pipe with TWC x No.2 exhaust pipe with TWC		48	490	35
No.2 exhaust pipe with TWC x Tail pipe		48	490	35
A/F sensor (Bank 1 sensor 1) x No.1 exhaust pipe with TWC		20	200	14

Heated oxygen sensor (Bank 1 sensor 2) x Tail pipe	20	200	14
Exhaust pipe support x Tail pipe	19	190	26

ENGINE MECHANICAL (5VZ-FE)

SS00O-06

SERVICE DATA

Compression pressure		at 250 rpm STD	1,200 kPa (12.2 kgf/cm^2, 174 psi) or more
		Minimum	1,000 kPa (10.2 kgf/cm^2, 145 psi)
	Difference of pressure between each cylinder		100 kPa (1.0 kgf/cm^2, 15 psi) or less
Valve clearance		at cold Intake	0.13 - 0.23 mm (0.006 - 0.009 in.)
		Exhaust	0.27 - 0.37 mm (0.011 - 0.014 in.)
	Adjusting shim for repair part	Mark 2.500	2.500 mm (0.0984 in.)
		Mark 2.550	2.550 mm (0.1004 in.)
		Mark 2.600	2.600 mm (0.1024 in.)
		Mark 2.650	2.650 mm (0.1043 in.)
		Mark 2.700	2.700 mm (0.1063 in.)
		Mark 2.750	2.750 mm (0.1083 in.)
		Mark 2.800	2.800 mm (0.1102 in.)
		Mark 2.850	2.850 mm (0.1122 in.)
		Mark 2.900	2.900 mm (0.1142 in.)
		Mark 2.950	2.950 mm (0.1161 in.)
		Mark 3.000	3.000 mm (0.1181 in.)
		Mark 3.050	3.050 mm (0.1201 in.)
		Mark 3.100	3.100 mm (0.1220 in.)
		Mark 3.150	3.150 mm (0.1240 in.)
		Mark 3.200	3.200 mm (0.1260 in.)
		Mark 3.250	3.250 mm (0.1280 in.)
		Mark 3.300	3.300 mm (0.1299 in.)
Ignition timing		w/ Terminals TE1 and E1 connected of DLC1	8 - 12° BTDC @ idle
Idle speed	-		700 ± 50 rpm
Intake manifold vacuum		at idle speed	60 kPa (450 mmHg, 17.7 in.Hg) or more
Timing belt tensioner	Protrusion from housing side		10.0 - 10.8 mm (0.394 - 0.425 in.)
Cylinder head	Warpage	Maximum	0.10 mm (0.039 in.)
	Valve seat		
	Refacing angle		30°, 45°, 60°
	Contacting angle		45°
	Contacting width		1.0 - 1.4 mm (0.039 - 0.055 in.)
	Valve guide bushing bore diameter	STD	10.985 - 11.027 mm (0.4325 - 0.4341 in.)
		O/S 0.05	11.050 - 11.077 mm (0.4350 - 0.4361 in.)
Valve guide bushing	Inside diameter		6.010 - 6.030 mm (0.2366 - 0.2374 in.)
	Outside diameter for repair part	STD	11.033 - 11.044 mm (0.4344 - 0.4348 in.)
		O/S 0.05	11.083 - 11.094 mm (0.4363 - 0.4368 in.)
Valve	Valve overall length	STD Intake	95.15 mm (3.7461 in.)
		Exhaust	94.90 mm (3.7362 in.)
		Minimum Intake	94.60 mm (3.7244 in.)
		Exhaust	94.40 mm (3.7165 in.)
	Valve face angle		44.5°
	Stem diameter	Intake	5.970 - 5.985 mm (0.2350 - 0.2356 in.)
		Exhaust	5.965 - 5.980 mm (0.2348 - 0.2354 in.)
	Stem oil clearance	STD Intake	0.025 - 0.060 mm (0.0010 - 0.0024 in.)
		Exhaust	0.030 - 0.065 mm (0.0012 - 0.0026 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD	1.0 mm (0.039 in.)
		Minimum	0.5 mm (0.020 in.)

Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Free length		44.78 mm (1.7630 in.)
	Installed tension	at 33.3 mm (1.311 in.)	186 - 206 N (19.0 - 21.0 kgf, 41.9 - 46.3 lbf)
Valve lifter	Lifter diameter		30.966 - 30.976 mm (1.2191 - 2.2195 in.)
	Lifter bore diameter		31.000 - 31.018 mm (1.2205 - 1.2212 in.)
	Oil clearance	STD	0.024 - 0.052 mm (0.0009 - 0.0020 in.)
		Maximum	0.08 mm (0.0031 in.)
Camshaft	Thrust clearance	STD	0.033 - 0.080 mm (0.0013 - 0.0031 in.)
		Maximum	0.12 mm (0.0047 in.)
	Journal oil clearance	STD	0.035 - 0.072 mm (0.0014 - 0.0028 in.)
		Maximum	0.10 mm (0.0039 in.)
	Journal diameter		26.949 - 26.965 mm (1.0610 - 1.0616 in.)
	Circle runout	Maximum	0.06 mm (0.0024 in.)
	Cam lobe height	STD Intake	42.31 - 42.41 mm (1.6657 - 1.6697 in.)
		Exhaust	41.96 - 42.06 mm (1.6520 - 1.6559 in.)
		Minimum Intake	42.16 mm (1.6598 in.)
		Exhaust	41.81 mm (1.6461 in.)
	Camshaft gear backlash	STD	0.020 - 0.200 mm (0.0008 - 0.0079 in.)
		Maximum	0.30 mm (0.0188 in.)
	Camshaft gear spring end free distance		18.2 - 18.8 mm (0.712 - 0.740 in.)
Air intake chamber	Warpage	Maximum	0.10 mm (0.0039 in.)
Intake air connector	Warpage	Maximum	0.10 mm (0.0039 in.)
Intake manifold	Warpage	Maximum	0.10 mm (0.0039 in.)
Exhaust manifold	Warpage	Maximum	1.00 mm (0.0394 in.)
Cylinder block	Cylinder head surface warpage	Maximum	0.05 mm (0.0020 in.)
	Cylinder bore diameter	STD Mark 1	93.500 - 93.510 mm (3.6811 - 3.6815 in.)
		Mark 2	93.510 - 93.520 mm (3.6815 - 3.6819 in.)
		Mark 3	93.520 - 93.530 mm (3.6819 - 3.6823 in.)
		Maximum STD	93.730 mm (3.6902 in.)
		O/S 0.50	94.230 mm (3.7098 in.)
Piston and piston ring	Piston diameter	STD Mark 1	93.356 - 93.366 mm (3.6754 - 3.6758 in.)
		Mark 2	93.367 - 93.376 mm (3.6759 - 3.6762 in.)
		Mark 3	93.377 - 93.386 mm (3.6763 - 3.6766 in.)
		O/S 0.50	93.856 - 93.886 mm (3.6951 - 3.6963 in.)
	Piston oil clearance	STD	0.134 - 0.154 mm (0.0053 - 0.0060 in.)
		Maximum	0.174 mm (0.0069 in.)
	Piston ring groove clearance	No.1	0.040 - 0.080 mm (0.0016 - 0.0031 in.)
		No.2	0.030 - 0.070 mm (0.0012 - 0.0028 in.)
	Piston ring end gap	STD No.1	0.300 - 0.500 mm (0.0118 - 0.0197 in.)
		No.2	0.400 - 0.600 mm (0.0157 - 0.0236 in.)
		Oil	0.150 - 0.550 mm (0.0059 - 0.0217 in.)
		Maximum No.1	1.100 mm (0.0433 in.)
		No.2	1.200 mm (0.0472 in.)
		Oil	1.150 mm (0.0453 in.)

Connecting rod	Thrust clearance	STD	0.150 - 0.330 mm (0.0059 - 0.0130 in.)
		Maximum	0.380 mm (0.0150 in.)
	Connecting rod bearing center wall thickness		
	Reference	Mark 1	1.484 - 1.488 mm (0.0584 - 0.0586 in.)
		Mark 2	1.488 - 1.492 mm (0.0586 - 0.0587 in.)
		Mark 3	1.492 - 1.496 mm (0.0587 - 0.0589 in.)
	Connecting rod oil clearance	STD	0.024 - 0.053 mm (0.0009 - 0.0021 in.)
		O/S 0.25	0.023 - 0.069 mm (0.0009 - 0.0027 in.)
		Maximum	0.08 mm (0.0031 in.)
	Rod bend	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)
	Bushing inside diameter		22.005 - 22.017 mm (0.8663 - 0.8668 in.)
	Piston pin diameter		21.997 - 22.009 mm (0.8660 - 0.8665 in.)
	Bushing oil clearance	STD	0.005 - 0.011 mm (0.0002 - 0.0004 in)
		Maximum	0.05 mm (0.0020 in.)
	Connecting rod bolt outer diameter	STD	7.860 - 8.000 mm (0.3094 - 0.3150 in.)
		Minimum	7.600 mm (0.2992 in.)
Crankshaft	Thrust clearance	STD	0.020 - 0.220 mm (0.0008 - 0.0087 in.)
		Maximum	0.300 mm (0.0118 in.)
	Thrust washer thickness		2.440 - 2.490 mm (0.0961 - 0.0980 in.)
	Main journal oil clearance	No.1 STD	0.020 - 0.038 mm (0.0008 - 0.0015 in.)
		U/S 0.25	0.019 - 0.059 mm (0.0007 - 0.0023 in.)
		Others STD	0.024 - 0.042 mm (0.0009 - 0.0017 in.)
		U/S 0.25	0.023 - 0.063 mm (0.0009 - 0.0025 in.)
		Maximum	0.08 mm (0.0031 in.)
	Main journal diameter	STD	63.985 - 64.000 mm (2.5191 - 2.5197 in.)
		U/S 0.25	63.745 - 63.755 mm (2.5096 - 2.5100 in.)
	Main bearing center wall thickness		
	Reference	No.1 Mark 1	1.991 - 1.994 mm (0.0784 - 0.0785 in.)
		Mark 2	1.994 - 1.997 mm (0.0785 - 0.0786 in.)
		Mark 3	1.997 - 2.000 mm (0.0786 - 0.0787 in.)
		Mark 4	2.000 - 2.003 mm (0.0787 - 0.0789 in.)
		Mark 5	2.003 - 2.006 mm (0.0789 - 0.0790 in.)
		Others Mark 1	1.989 - 1.992 mm (0.0783 - 0.0784 in.)
		Mark 2	1.992 - 1.995 mm (0.0784 - 0.0785 in.)
		Mark 3	1.995 - 1.998 mm (0.0785 - 0.0787 in.)
		Mark 4	1.998 - 2.001 mm (0.0787 - 0.0788 in.)
		Mark 5	2.001 - 2.004 mm (0.0788 - 0.0789 in.)
	Crank pin diameter	STD	54.987 - 55.000 mm (2.1648 - 2.1654 in.)
		U/S 0.25	54.745 - 54.755 mm (2.1553 - 2.1557 in.)
	Circle runout	Maximum	0.06 mm (0.0024 in.)
	Main journal taper and out-of-round	Maximum	0.02 mm (0.0008 in.)
	Crank pin taper and out-of-round	Maximum	0.02 mm (0.0008 in.)

SS00P-09

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
No.1 idler pulley x Oil pump		35	350	26
No.2 idler pulley x No.2 idler pulley bracket		40	400	30
No.1 timing belt cover x Oil pump		9	90	80 in.·lbf
Crankshaft pulley x Crankshaft		250	2,500	184
Camshaft timing pulley x Camshaft		295	3,000	217
Timing belt tensioner x Oil pump		27	280	20
No.2 timing belt cover x No.3 timing belt cover		9	90	80 in.·lbf
Oil dipstick guide x Generator bracket		8	80	71 in.·lbf
Fluid coupling x Fan bracket		5.4	54	48 in.·lbf
A/C compressor bracket x Cylinder block		47	479	35
A/C compressor x A/C compressor bracket		25	250	18
PS pump x PS pump bracket		43	440	31
Camshaft bearing cap x Cylinder head		16	160	12
Rear plate x Cylinder head		8	80	71 in.·lbf
Cylinder head x Cylinder block	12 pointed head 1st	34	350	25
	2nd	Turn 90°	Turn 90°	Turn 90°
	3rd	Turn 90°	Turn 90°	Turn 90°
	Recessed head	18	185	13
Cylinder head cover x Cylinder head		6	60	53 in.·lbf
Exhaust manifold x Cylinder head		40	400	30
Exhaust manifold heat insulator x Exhaust manifold		8	80	71 in.·lbf
Exhaust crossover pipe x Exhaust manifold		45	450	33
Generator bracket x LH cylinder head		18.5	185	14
PS pump bracket x RH cylinder head		18.5	185	14
Intake manifold, Intake manifold stay x Cylinder head		18	180	13
No.3 timing belt cover x Cylinder head		9	90	80 in.·lbf
Camshaft position sensor x RH cylinder head		8	80	71 in.·lbf
Intake air connector x Intake manifold		18	180	13
Air intake chamber x Intake air connector		18	180	13
Air intake chamber stay x LH cylinder head, Air intake chamber		40	400	30
Engine hanger No.2 x RH cylinder head		40	400	30
Frame crossmember x Engine rear mounting bracket		58	590	43
Engine rear mounting bracket x Engine rear mounting insulator		18	183	13
Engine front mounting insulator x Frame		38	387	28
Connecting rod cap x Connecting rod	1st	25	250	18
	2nd	Turn 90°	Turn 90°	Turn 90°
Main bearing cap x Cylinder block	1st	61	625	45
	2nd	Turn 90°	Turn 90°	Turn 90°
Rear oil seal retainer x Cylinder block		8	80	71 in.·lbf
Engine coolant drain cock x Cylinder block		39	400	29
Engine mounting bracket x Cylinder block		44	440	32
Oil filter union x Cylinder block		25	250	18
Oil pressure switch x Cylinder block		15	150	11
Generator adjusting bar x Cylinder block		42	420	31

No.2 idler pulley bracket x Cylinder block	38	380	28
Water bypass pipe x Cylinder block	8.5	85	75 in.·lbf
Rear end plate x Cylinder block	7.5	75	66 in.·lbf
Drive plate x Crankshaft	83	850	61
Flywheel x Crankshaft	85	850	63
No.1 exhaust pipe with TWC x Crossover pipe (2WD, 4WD)	62	630	46
No.1 exhaust pipe with TWC x No.2 exhaust pipe with TWC (2WD, 4WD)	48	490	35
No.2 exhaust pipe with TWC x Tail pipe (2WD, 4WD)	48	490	35
A/F sensor (bank 1 sensor 1) x No.1 exhaust pipe with TWC (2WD, 4WD)	20	200	14
Heated oxygen sensor (bank 1 sensor 2) x Tail pipe	20	200	14

EMISSION CONTROL (2RZ-FE, 3RZ-FE)

SS042-03

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Charcoal canister x Body	31	316	23
PCV valve x Cylinder head cover	27	270	20
No.1 exhaust pipe with TWC x Exhaust manifold	62	630	46
No.1 exhaust pipe with TWC x No.2 exhaust pipe with TWC	48	490	35
TWC x Tailpipe	48	490	35
No.2 exhaust pipe with TWC x Tailpipe	48	490	35

EMISSION CONTROL (5VZ-FE)

SS00R-09

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Charcoal canister x Body	31	316	23
No.1 exhaust pipe with TWC x Exhaust crossover pipe (2WD, 4WD)	62	630	46
No.1 exhaust pipe with TWC x No.2 exhaust pipe with TWC (2WD, 4WD)	48	490	35
No.2 exhaust pipe with TWC x Tail pipe (2WD, 4WD)	48	490	35
Support bracket x Transmission, Front exhaust pipe	44	450	33

SFI (2RZ-FE, 3RZ-FE)

SS112-03

SERVICE DATA

Fuel pressure regulator	Fuel pressure	at no vacuum	265 - 304 kPa (2.7 - 3.1 kgf/cm^2, 38 - 44 psi)
Fuel pump	Resistance	at 20°C (68°F)	0.2 - 3.0 Ω
Injector	Resistance Injection volume Difference between each cylinder Fuel leakage	at 20°C (68°F)	12 - 16 Ω 71 - 86 cm^3 (4.3 - 5.3 cu in.) per 15 seconds 15 cm^3 (1.0 cu in.) or less 1 drop or less per 12 minutes
MAF meter	Resistance (THA - E3)	at -20°C (-4°F) at 0°C (32°F) at 20°C (68°F) at 40°C (104°F) at 60°C (140°F) at 80°C (176°F)	10 - 20 kΩ 4 - 7 kΩ 2 - 3 kΩ 0.9 - 1.3 kΩ 0.4 - 0.7 kΩ 0.2 - 0.4 kΩ
Throttle body	Throttle valve fully closed angle Throttle opener setting speed		6° 1,200 - 1,500 rpm
Throttle position sensor	Clearance between stop screw and lever 0 mm (0 in.) Throttle valve fully open -	 VTA - E2 VTA - E2 VC - E2	 0.2 - 5.7 kΩ 2.0 - 10.2 kΩ 2.5 - 5.9 kΩ
IAC valve	Resistance (+B - RSC or RSO)	at cold at hot	17.0 - 24.5 Ω 21.5 - 28.5 Ω
ECT sensor	Resistance	at -20°C (-4°F) at 0°C (32°F) at 20°C (68°F) at 40°C (104°F) at 60°C (140°F) at 80°C (176°F)	10 - 20 kΩ 4 - 7 kΩ 2 - 3 kΩ 0.9 - 1.3 kΩ 0.4 - 0.7 kΩ 0.2 - 0.4 kΩ
Vapor pressure sensor	Power source voltage		4.5 - 5.5 V
VSV for EVAP	Resistance	at 20°C (68°F)	30 - 34 Ω
VSV for vapor pressure sensor	Resistance	at 20°C (68°F)	37 - 44 Ω
VSV for EGR	Resistance	at 20°C (68°F)	33 - 39 Ω
EGR gas temp. sensor	Resistance	at 50°C (122°F) at 100°C (212°F) at 150°C (302°F)	64 - 97 kΩ 11 - 16 kΩ 2 - 4 kΩ
A/F sensor	Heater coil resistance	 Bank 1 Sensor 1 at 20°C (68°F) at 800°C (1,472°F)	 0.8 - 1.4 Ω 1.8 – 3.2 Ω
Heated oxygen sensor	Heater coil resistance	 Bank 1 Sensor 1 at 20°C (68°F) Bank 1 Sensor 2 at 20°C (68°F)	 11 - 16 Ω 11 - 16 Ω
Fuel cut RPM	Fuel return rpm	M/T A/T	1,400 rpm 1,500 rpm

SS113-04

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Fuel line (Union bolt type)		29	300	22
Fuel line (Flare nut type)	w/ SST	26	262	19
Fuel pump bracket assembly x Fuel tank		3.5	36	31 in.·lbf
Fuel pressure regulator x Delivery pipe		8.8	90	78 in.·lbf
Fuel inlet pipe x Fuel filter		29	300	22
Delivery pipe x Cylinder head		21	210	15
Fuel inlet pipe x Delivery pipe		29	300	22
Throttle body x Air intake chamber		20	200	14
Fuel evaporation vent tube x Fuel tank		1.5	15	13 in.·lbf
Fuel tank filler pipe x Fuel tank		3.5	35	31 in.·lbf
Fuel tank filler pipe support bracket		29	300	22
Fuel tank x Body		29	300	22
Fuel tank band x Body		62	632	46
Fuel tank protector bracket x Body		30	306	22
Fuel tank protector x Fuel tank		30	306	22
MAF meter x Air cleaner cap		8.5	85	74 in.·lbf
ECT sensor x Cylinder head		20	200	14
Knock sensor x Cylinder block		44	450	33
Fuel filter x Cylinder block		20	200	14
A/F sensor (Bank 1 sennsor 1) x No.1 exhaust pipe with TWC		20	200	14
Heated oxygen sensor (Bank 1 sensor 2) x Tail pipe		20	200	14

SFI (5VZ-FE)

SS00U-06

SERVICE DATA

Fuel pressure regulator	Fuel pressure	at no vacuum	265 - 304 kPa (2.7 - 3.1 kgf/cm^2, 38 - 44 psi)
Fuel pump	Resistance	at 20°C (68°F)	0.2 - 3.0 Ω
Injector	Resistance Injection volume Difference between each cylinder Fuel leakage		Approx. 13.8 Ω 56 - 69 cm^3 (3.4 - 4.2 cu in.) per 15 sec. 1.3 cm^3 (0.08 cu in.) or less 1 drop or less per 12 minutes
MAF meter	Resistance (THA - E2)	at -20°C (-4°F) at 20°C (68°F) at 60°C (140°F)	13.6 - 18.4 kΩ 2.2 - 2.7 kΩ 0.5 - 0.7 kΩ
Throttle body	Throttle valve fully closed angle DP setting speed (M/T) Throttle opener setting speed		10° 1,800 - 2,200 rpm 900 - 1,950 rpm
Throttle position sensor	Clearance between stop screw and lever 0 mm (0 in.) Throttle valve fully open	 VTA - E2 VTA - E2 VC - E2	 0.28 - 6.4 kΩ 2.0 - 11.6 kΩ 2.7 - 7.7 kΩ
IAC valve	Resistance (+B - RSO or RSC)	at cold at hot	17.0 - 24.5 Ω 21.5 - 28.5 Ω
VSV for EVAP	Resistance	at 20°C (68°F)	30 - 34 Ω
VSV for vapor pressure sensor	Resistance	at 20°C (68°F)	37 - 44 Ω
ECT sensor	Resistance	at -20°C (-4°F) at 0°C (32°F) at 20°C (68°F) at 40°C (104°F) at 60°C (140°F) at 80°C (176°F)	10 - 20 kΩ 4 - 7 kΩ 2 - 3 kΩ 0.9 - 1.3 kΩ 0.4 - 0.7 kΩ 0.2 - 0.4 kΩ
Heated oxygen sensor	Heater resistance	at 20°C (68°F)	11 - 16 Ω
Vapor pressure sensor	Voltage(VC - E2)		4.5 - 5.5 V
Fuel cut rpm	Fuel return rpm	M/T A/T	1,000 rpm 1,200 rpm

SS00V-09

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Fuel line (Union bolt type)		34.3	350	25
Fuel line (Flare nut type)	using SST	24	245	18
Fuel inlet pipe x Intake manifold		8	80	71 in.·lbf
Fuel pressure regulator x LH delivery pipe		8	80	71 in.·lbf
Delivery pipe x Intake manifold		13	130	10
Fuel pump bracket assembly x Fuel tank		3.5	35	30 in.·lbf
Fuel pipe x Body		20	200	14
Fuel tank band x Body		40	410	30
Fuel tank protector x Fuel tank, Body		30	310	22
Fuel tube clamp bracket x Fuel tank		5.5	55	48 in.·lbf
Fuel tank filler pipe x Fuel tank		3	30	27 in.·lbf
Fuel evaporation vent tube x Fuel tank		1.5	15	13 in.·lbf
Fuel pressure regulator x LH delivery pipe		8	80	71 in.·lbf
MAF meter x Air cleaner cap		6.9	72	61 in.·lbf
Throttle body x Air intake chamber		18	180	13
ECT sensor x Intake manifold		20	200	14
Knock sensor x Cylinder block		39	400	29
A/F sensor (Bank 1 sensor 1) x No.1 exhaust pipe with TWC		20	200	14
Heated oxygen sensor (Bank 1 sensor 2) x Tail pipe		20	200	14

COOLING (2RZ-FE, 3RZ-FE)

SERVICE DATA

SS045-01

Thermostat	Valve opening pressure		80 - 84°C (176 - 183°F)
	Valve lift	at 95°C (203°F)	8.0 mm (0.31 in.) or more
Radiator cap	Relief valve opening pressure	STD	74 - 103 kPa (0.75 - 1.05 kgf/cm^2, 10.7 - 14.9 psi)
		Minimum	59 kPa (0.6 kgf/cm^2, 8.5 psi)

SS046-01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Cylinder block x Drain plug		24.5	250	18
Water pump pulley x Water pump		21	210	16
Water pump x Cylinder block	14 mm head bolt	24.5	250	18
	12 mm head bolt	8.9	90	78 in.·lbf
Fan x Fluid coupling		5.5	55	49 in.·lbf
Water inlet x Water inlet housing		20	200	15
Radiator support x Radiator		5.5	55	49 in.·lbf
Radiator x Body		12.5	125	9

COOLING (5VZ-FE)

SS00Y-01

SERVICE DATA

Thermostat	Valve opening pressure		80 - 84°C (176 - 183°F)
	Valve lift	at 95°C (203°F)	8.5 mm (0.335 in .) or more
Radiator cap	Relief valve opening pressure	STD	74 - 103 kPa (0.75 - 1.05 kgf/cm^2, 10.7 - 14.9 psi)
		Minimum	59 kPa (0.6 kgf/cm^2, 8.8 psi)

SS00Z-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Fan x Fluid coupling	7.4	75	65 in.·lbf
Water pump x Cylinder block	20	200	14
Water inlet x Water pump	20	200	14
Radiator support x Body	12	120	9
Radiator support x Radiator	12.7	130	9

LUBRICATION (2RZ-FE, 3RZ-FE)

SS047-01

SERVICE DATA

Oil pressure	Normal operating temperature	at idle speed	29 kPa (0.3 kgf/cm^2, 4.3 psi) or more
		at 3,000 rpm	245 - 490 kPa (2.5 - 5.0 kgf/cm^2, 36 - 71 psi)
Oil pump	Body clearance	STD	0.100 - 0.175 mm (0.0039 - 0.0069 in.)
		Maximum	0.30 mm (0.0118 in.)
	Tip clearance	STD	0.110 - 0.240 mm (0.0043 - 0.0094 in.)
		Maximum	0.25 mm (0.0098 in.)
	Side clearance	STD	0.030 - 0.090 mm (0.0012 - 0.0035 in.)
		Maximum	0.15 mm (0.0059 in.)

SS048-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Oil pan x Drain plug	37	375	27

LUBRICATION (5VZ-FE)

SS012-01

SERVICE DATA

Oil pressure	At idle speed (normal operating temperature)		29 kPa (0.3 kgf/cm^2, 4.3 psi) or more
	At 3,000 rpm (normal operating temperature)		245 - 520 kPa (2.5 - 5.3 kgf/cm^2, 36 - 75 psi)
Oil pump	Body clearance	STD	0.10 - 0.18 mm (0.0039 - 0.0069 in.)
		Maximum	0.30 mm (0.0118 in.)
	Tip clearance	STD	0.11 - 0.24 mm (0.0043 - 0.0094 in.)
		Maximum	0.35 mm (0.0138 in.)
	Side clearance	STD	0.03 - 0.09 mm (0.0012 - 0.0035 in.)
		Maximum	0.15 mm (0.0059 in.)

SS013-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Oil pressure switch x Cylinder block	15	150	11
Oil pump x Oil pump body cover	10	105	8
Oil pump x Cylinder block A	20	200	15
B	42	420	31
Oil strainer x Cylinder block	7.5	76	66 in.·lbf
Oil pan x Cylinder block	7.6	78	67 in.·lbf
Oil cooler x Cylinder block	59	600	43

IGNITION (2RZ-FE, 3RZ-FE)

SS049-04

SERVICE DATA

Spark plug	Recommended spark plug Recommended spark plug Correct electrode gap	DENSO made NGK made	K16R-U11 BKR5EYA-U 1.1 mm (0.043 in.)
Camshaft position sensor	Resistance	at cold at hot	835 - 1,400 Ω 1,060 - 1,645 Ω
Crankshaft position sensor	Resistance	at cold NE+ - NE- at hot NE+ - NE-	1,630 - 2,740 Ω 2,065 - 3,225 Ω

SS04A-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	20	200	14
Ignition coil x Cylinder head	10	100	7
Camshaft position sensor x Cylinder head	5.4	55	48 in.·lbf
Crankshaft position sensor x Oil pump	8.5	85	74 in.·lbf

IGNITION (5VZ-FE)

SERVICE DATA

SS016-01

High-tension cord	Resistance	Maximum	25 kΩ per cord
Spark plug	Recommended spark plug	ND	K16TR11
		NGK	BKR5EKB-11
	Correct electrode gap		1.1 mm (0.043 in.)
Ignition coil	Resistance	Primary at cold	0.67 - 1.05 Ω
		at hot	0.85 - 1.23 Ω
		Secondary at cold	9.3 -16.0 kΩ
		at hot	11.7 - 18.8 kΩ
Camshaft position sensor	Resistance	at cold	835 - 1,400 Ω
		at hot	1,060 - 1,645 Ω
Crankshaft position sensor	Resistance	at cold	1,630 - 2,740 Ω
		at hot	2,065 - 3,225 Ω

SS017-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	18	180	13
Ignition coil x Cylinder head	7.8	80	69 in.·lbf
Camshaft position sensor x Cylinder head	7.8	80	69 in.·lbf
Crankshaft position sensor x Oil pump	7.8	80	69 in.·lbf

STARTING (2RZ-FE, 3RZ-FE)

SS04B-01

SERVICE DATA

Starter (1.4 kW type)	Rated voltage and output power		12 V 1.4 kW
	No-load characteristics	Current	90 A or less at 11.5 V
		rpm	3,000 rpm or more
	Brush length	STD	15.5 mm (0.610 in.)
		Minimum	10.0 mm (0.394 in.)
	Spring installed load	STD	17.6 - 23.5 N (1.79 - 2.41 kgf, 3.9 - 5.3 lbf)
		Minimum	11.8 N (1.2 kgf, 2.6 lbf)
	Commutator		
	Diameter	STD	30 mm (1.18 in.)
		Minimum	29 mm (1.14 in.)
	Undercut depth	STD	0.6 mm (0.024 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)
Starter (2.0 kW type)	Rated voltage and output power		12 V 2.0 kW
	No-load characteristics	Current	100 A or less at 11.5 V
		rpm	2,500 rpm or more
	Brush length	STD	15.0 mm (0.591 in.)
		Minimum	9.0 mm (0.355 in.)
	Spring installed load	STD	21.5 - 27.5 N (2.19 - 2.81 kgf, 4.9 - 6.2 lbf)
		Minimum	12.7 N (1.3 kgf, 2.7 lbf)
	Commutator		
	Diameter	STD	35 mm (1.38 in.)
		Minimum	34 mm (1.34 in.)
	Undercut depth	STD	0.7 mm (0.028 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)
	Field coil resistance	At 20°C (68°F)	1.5 - 1.9 Ω

SS04C-01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Starter mounting bolt		39	400	29
Starter wire mounting nut		8.8	90	78 in.·lbf
Field frame x Armature	1.4 kW type	5.9	60	52 in.·lbf
	2.0 kW type	9.3	93	82 in.·lbf
Starter housing x Clutch assembly	1.4 kW type	5.9	60	52 in.·lbf
	2.0 kW type	9.3	93	82 in.·lbf
End cover x Field frame	1.4 kW type	1.5	15	13 in.·lbf
	2.0 kW type	3.8	38	34 in.·lbf
Lead wire x Terminal C		5.9	60	52 in.·lbf
Terminal nut x Terminal 30 of starter, Terminal C of starter		17	170	12
Magnetic switch end cover x Magnetic switch	1.4 kW type	2.5	26	23 in.·lbf
	2.0 kW type	3.6	37	32 in.·lbf

STARTING (5VZ-FE)

SS01A-07

SERVICE DATA

Starter	Rated voltage and output power		12 V 1.4 kW
(1.4 kW type)	No-load characteristics	Current	90 A or less at 11.5 V
		rpm	3,000 rpm or more
	Brush length	STD	15.5 mm (0.610 in.)
		Minimum	10.0 mm (0.394 in.)
	Spring installed load	STD	17.6 - 23.5 N (1.80 - 2.40 kgf, 4.0 - 5.3 lbf)
		Minimum	11.8 N (1.20 kgf, 2.6 lbf)
	Commutator		
	Diameter	STD	30 mm (1.180 in.)
		Minimum	29 mm (1.140 in.)
	Undercut depth	STD	0.6 mm (0.024 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)
Starter	Rated voltage and output power		12 V 1.8 kW
(1.8 kW type)	No-load characteristics	Current	100 A or less at 11.5 V
		rpm	2,500 rpm or more
	Shunt coil resistance	at 20°C (68°F)	1.4 - 1.9 Ω
	Brush length	STD	15.0 mm (0.591 in.)
		Minimum	9.0 mm (0.354 in.)
	Spring installed load	STD	21.5 - 27.5 N (2.20 - 2.80 kgf, 4.9 - 6.2 lbf)
		Minimum	12.7 N (1.30 kgf, 2.7 lbf)
	Commutator		
	Diameter	STD	35 mm (1.378 in.)
		Minimum	34 mm (1.339 in.)
	Undercut depth	STD	0.7 mm (0.028 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)

SS01B-01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Starter wire x Starer		8.8	90	78 in.·lbf
Starter x Transaxle		39	400	29
Lead wire x Terminal C of starter		5.9	60	52 in.·lbf
Field frame, Magnetic switch x Starter housing	1.4 kW type	5.9	60	52 in.·lbf
	1.8 kW type	9.3	95	82 in.·lbf
End cover x Field frame	1.4 kW type	1.5	15	13 in.·lbf
	1.8 kW type	3.8	39	34 in.·lbf
Terminal nut x Terminal C of starter, Terminal 30 of starter		17	170	12
Magnetic switch end cover x Magnetic switch	1.4 kW type	2.5	26	23 in.·lbf
	1.8 kW type	3.6	37	32 in.·lbf

CHARGING (2RZ-FE, 3RZ-FE)

SS04D-01

SERVICE DATA

Battery	Standard voltage	at 20°C (68°F)	12.7 -12.9 V
Drive belt	Tension		
	New belt		116 - 169 lbf
	Used belt		66 - 88 lbf
Generator	Rated output		12 V - 70 A
	Rotor coil resistance		2.1 - 2.5 Ω
	Slip ring diameter	STD	14.2 mm - 14.4 mm (0.559 - 0.567 in.)
		Minimum	12.8 mm (0.504 in.)
	Brush exposed length	STD	9.5 - 11.5 mm (0.374 - 0.453 in.)
		Minimum	1.5 mm (0.059 in.)
Voltage regulator	Regulating voltage	at 25°C (77°F)	13.8 - 14.7 V

SS04E-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Drive end frame x Rectifier end frame	4.5	46	40 in.·lbf
Generator pulley nut	110	1,125	81
Rectifier holder set screw	1.96	20	17.4 in.·lbf
Rear end cover x Rectifier end frame	4.5	46	40 in.·lbf
Terminal insulator mounting nut	4.1	42	36 in.·lbf
Pivot bolt (For generator)	59	600	43
Lock bolt (For generator)	29	300	21
Generator wire mounting nut	9.8	100	7.2
Bearing retainer x Drive end frame	2.6	26.5	23 in.·lbf
Rectifier holder x Drive end frame	3.9	40	34.7 in.·lbf
Voltage regulator x Rectifier holder	1.96	20	17.4 in.·lbf

CHARGING (5VZ-FE)

SS01A-01

SERVICE DATA

Battery	Voltage	at 20°C (68°F)	12.7 - 12.9 V
Drive belt	Tension	New belt	160 ± 20 lbf
		Used belt	100 ± 20 lbf
Generator	Rated output ampere		12 V 60 A
	Rotor coil resistance	at 20°C (68°F)	2.1 - 2.5 Ω
	Slip ring diameter	STD	14.2 - 14.4 mm (0.559 - 0.567 in.)
		Minimum	12.8 mm (0.504 in.)
	Brush exposed length	STD	10.5 mm (0.413 in.)
		Minimum	1.5 mm (0.059 in.)
Generator regulator	Regulating voltage	at 25°C (77°F)	13.7 - 14.7 V
		at 115°C (239°F)	13.2 - 14.0 V

SS01F-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Generator x Generator bracket	51	520	38
Generator x Adjusting lever	18.5	189	25
Rectifier end frame x Drive end frame	4.5	45	39 in.·lbf
Generator pulley x Rotor	110	1,125	81
Drive end frame x Voltage regulator	2.0	20	17 in.·lbf
Generator rear end cover x Rectifier end frame	4.5	45	39 in.·lbf
Terminal insulator x Rectifier Holder	4.1	42	36 in.·lbf

CLUTCH

SS05B-01

SERVICE DATA

Pedal height from floor panel		170.0-180.0 mm (6.692-7.086 in.)
Pedal height from asphalt sheet		167.0-177.0 mm (6.574-6.986 in.)
Pedal freeplay		5.0-15.0 mm (0.197-0.591 in.)
Push rod play at pedal top		1.0-5.0 mm (0.039-0.197 in.)
Clutch release point from pedal full stroke end position		25 mm (0.98 in.) or more
Clutch start switch	ON-OFF Stroke	8±0.5 mm (0.31±0.020 in.)
Slotted spring pin protrusion		1.5-3.5 mm (0.059-0.138 in.)
Disc rivet head depth	Min.	0.3 mm (0.012 in.)
Disc runout	Max.	0.8 mm (0.031 in.)
Flywheel runout	Max.	0.1 mm (0.004 in.)
Diaphragm spring finger wear	Max. depth	0.6 mm (0.024 in.)
Diaphragm spring finger wear	Max. width	5.0 mm (0.197 in.)
Diaphragm spring tip non-alignment	Max.	0.5 mm (0.020 in.)

SS05C-01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Clutch line union		15	155	11
Master cylinder installation nut		13	130	9
Bleeder plug		11	110	8
Release cylinder installation bolt		13	130	9
Clutch cover x Flywheel		19	195	14
Release fork support	2RZ-FE, 3RZ-FE	39	400	29
	5VZ-FE	47	480	35
Flywheel set bolt	2RZ-FE	88	900	65
	3RZ-FE	26.5	270	19
	5VZ-FE	85	850	63

MANUAL TRANSMISSION (R150, R150F)

SS05E-04

SERVICE DATA

Output shaft 1st gear journal diameter	Min.	38.979 mm (1.53446 in.)
Output shaft 2nd gear journal diameter	Min.	46.984 mm (1.8498 in.)
Output shaft 3rd gear journal diameter	Min.	37.984 mm (1.4954 in.)
Output shaft flange thickness	Min.	4.80 mm (0.1890 in.)
Output shaft runout	Max.	0.03 mm (0.0012 in.)
Gear thrust clearance 1st	STD Max.	0.20-0.45 mm (0.0079-0.0177 in.) 0.45 mm (0.0177 in.)
Gear thrust clearance 2nd and 3rd	STD Max.	0.10-0.25 mm (0.0039-0.0098 in.) 0.25 mm (0.0098 in.)
Gear radial clearance 1st	STD Max.	0.020-0.073 mm (0.0008-0.0029 in.) 0.073 mm (0.0029 in.)
Gear radial clearance 2nd and 3rd	STD Max.	0.015-0.068 mm (0.0006-0.0027 in.) 0.068 mm (0.0027 in.)
Shift fork to hub sleeve clearance Reverse gear Hub sleeve No. 2	 Max. Max.	 0.41 mm (0.016 in.) 0.35 mm (0.014 in.)
Synchronizer ring to 3rd gear clearance Synchronizer ring to 1st and 2nd gear clearance	Min. Min.	0.75 mm (0.030 in.) 0.65 mm (0.026 in.)
Input shaft snap ring thickness	 Mark A Mark B Mark C Mark D Mark E Mark F Mark G	 2.10-2.15 mm (0.0827-0.0846 in.) 2.15-2.20 mm (0.0846-0.0866 in.) 2.20-2.25 mm (0.0866-0.0886 in.) 2.25-2.30 mm (0.0886-0.0906 in.) 2.30-2.35 mm (0.0906-0.0925 in.) 2.35-2.40 mm (0.0925-0.0945 in.) 2.40-2.45 mm (0.0945-0.0965 in.)
Output shaft snap ring thickness Clutch hub No.1	 Mark A Mark B Mark C Mark D Mark E Mark F Mark G	 2.30-2.35 mm (0.0906-0.0925 in.) 2.35-2.40 mm (0.0925-0.0945 in.) 2.40-2.45 mm (0.0945-0.0965 in.) 2.45-2.50 mm (0.0965-0.0984 in.) 2.50-2.55 mm (0.0984-0.1004 in.) 2.55-2.60 mm (0.1004-0.1024 in.) 2.60-2.65 mm (0.1024-0.1043 in.)
Output shaft snap ring thickness Clutch hub No.2	 Mark A Mark B Mark C Mark D Mark E Mark F Mark G	 1.80-1.85 mm (0.0709-0.0728 in.) 1.85-1.90 mm (0.0728-0.0748 in.) 1.90-1.95 mm (0.0748-0.0768 in.) 1.95-2.00 mm (0.0768-0.0787 in.) 2.00-2.05 mm (0.0787-0.0807 in.) 2.05-2.10 mm (0.0807-0.0827 in.) 2.10-2.15 mm (0.0827-0.0846 in.)

Output shaft snap ring thickness		
Rear	Mark A	2.65-2.70 mm (0.1043-0.1063 in.)
	Mark B	2.70-2.75 mm (0.1063-0.1083 in.)
	Mark C	2.75-2.80 mm (0.1083-0.1102 in.)
	Mark D	2.80-2.85 mm (0.1102-0.1122 in.)
	Mark E	2.85-2.90 mm (0.1122-0.1142 in.)
	Mark F	2.90-2.95 mm (0.1142-0.1161 in.)
	Mark G	2.95-3.00 mm (0.1161-0.1181 in.)
	Mark H	3.00-3.05 mm (0.1181-0.1201 in.)
	Mark J	3.05-3.10 mm (0.1201-0.1220 in.)
	Mark K	3.10-3.15 mm (0.1220-0.1240 in.)
	Mark L	3.15-3.20 mm (0.1240-0.1260 in.)
	Mark M	3.20-3.25 mm (0.1260-0.1280 in.)
	Mark N	3.25-3.30 mm (0.1280-0.1299 in.)
	Mark P	3.30-3.35 mm (0.1299-0.1319 in.)
	Mark Q	3.35-3.40 mm (0.1319-0.1339 in.)
	Mark R	3.40-3.45 mm (0.1339-0.1358 in.)
	Mark S	3.45-3.50 mm (0.1358-0.1378 in.)
Counter gear roller bearing journal diameter	Min.	27.860 mm (1.0968 in.)
Counter 5th gear thrust clearance	STD	0.10-0.35 mm (0.0039-0.0138 in.)
	Max.	0.40 mm (0.0157 in.)
Counter 5th radial clearance	STD	0.015-0.068 mm (0.0006-0.0027 in.)
	Max.	0.160 mm (0.0063 in.)
Reverse idler gear radial clearance	STD	0.040-0.082 mm (0.0016-0.0032 in.)
	Max.	0.130 mm (0.0051 in.)
Reverse idler gear to shift arm clearance	STD	0.05-0.35 mm (0.0020-0.0138 in.)
	Max.	0.50 mm (0.0197 in.)
Counter gear snap ring thickness		
Front	Mark A	2.00-2.05 mm (0.0787-0.0807 in.)
	Mark B	2.05-2.10 mm (0.0807-0.0827 in.)
	Mark C	2.10-2.15 mm (0.0827-0.0846 in.)
	Mark D	2.15-2.20 mm (0.0846-0.0866 in.)
	Mark E	2.20-2.25 mm (0.0866-0.0886 in.)
	Mark F	2.25-2.30 mm (0.0886-0.0906 in.)
Counter gear snap ring thickness		
Rear	Mark A	2.80-2.85 mm (0.1102-0.1122 in.)
	Mark B	2.85-2.90 mm (0.1122-0.1142 in.)
	Mark C	2.90-2.95 mm (0.1142-0.1161 in.)
	Mark D	2.95-3.00 mm (0.1161-0.1181 in.)
	Mark E	3.00-3.05 mm (0.1181-0.1201 in.)
	Mark F	3.05-3.10 mm (0.1201-0.1220 in.)
	Mark G	3.10-3.15 mm (0.1220-0.1240 in.)
Oil seal drive in depth		
Front bearing retainer (from retainer end)		11.7 ± 0.5 mm (0.461 ± 0.020 in.)
Extension housing		0 ± 0.5 mm (0 ± 0.020 in.)
Transfer adaptor		45.6 ± 0.5 mm (1.795 ± 0.020 in.)

SS05F-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Transmission x Engine	72	730	53
Starter x Transmission	39	400	29
Engine rear mounting x Transmission	65	660	48
Rear end plate x Transmission	18	185	13
Clutch release cylinder x Clutch housing	12	120	9
Clutch release cylinder line x Clutch housing (2WD)	12	120	9
Front exhaust pipe x TWC	48	490	35
Front exhaust pipe support bracket	44	450	33
Front exhaust pipe x Exhaust manifold	62	630	46
Engine rear mounting bracket x Frame (2WD)	58	590	43
Engine rear mounting bracket x Engine rear mounting (2WD)	18	185	13
Crossmember x Engine rear mounting (4WD)	18	185	13
Crossmember x Frame (4WD)	65	660	48
Transmission x Transfer (4WD)	24	240	17
Reverse shift arm bracket set bolt	18	185	13
Rear bearing retainer x Intermediate plate	18	185	13
Shift fork x Shift fork shaft	20	200	14
Straight screw plug	19	190	14
Front bearing retainer x Transmission case	17	170	12
Transmission case x Transfer adaptor	37	380	27
Transmission case x Extension housing	37	380	27
Shift lever housing set bolt	38	390	28
Clutch housing x Transmission case	36	370	27
Oil receiver pipe x Extension housing	11	115	8
Back-up light switch	44	450	32
Restrict pin	37	380	27
Control shift lever retainer x Transfer adaptor	18	185	13
Control shift lever retainer x Extension housing	18	185	13
Filler and drain plug	37	380	27
Vehicle speed sensor set bolt (2WD)	11	115	8

MANUAL TRANSMISSION (W59)

SS059-01

SERVICE DATA

Output shaft 2nd gear journal diameter	Min.	42.975 mm (1.6919 in.)
Output shaft 3rd gear journal diameter	Min.	31.969 mm (1.2586 in.)
Output shaft flange thickness	Min.	5.60 mm (0.2205 in.)
Output shaft runout	Max.	0.06 mm (0.0024 in.)
1st gear inner race flange thickness	Min.	4.78 mm (0.1881 in.)
1st gear inner race outer diameter	Min.	42.975 mm (1.6919 in.)
Counter gear bearing journal diameter	Min.	29.950 mm (1.1791 in.)
Counter 5th gear journal diameter	Min.	26.975 mm (1.0620 in.)
1st, 2nd and 3rd gear thrust clearance	STD Max.	0.10 - 0.25 mm (0.0039 - 0.0098 in.) 0.30 mm (0.0118 in.)
Counter 5th gear thrust clearance	STD Max.	0.10 - 0.41 mm (0.0039 - 0.0161 in.) 0.46 mm (0.0181 in.)
1st, 2nd and counter 5th gear radial clearance	STD Max.	0.009 - 0.060 mm (0.0004 - 0.0024 in.) 0.150 mm (0.0059 in.)
3rd gear radial clearance	STD Max.	0.015 - 0.066 mm (0.0006 - 0.0026 in.) 0.200 mm (0.0079 in.)
Reverse idler gear radial clearance	STD Max.	0.041 - 0.074 mm (0.0016 - 0.0029 in.) 0.194 mm (0.0076 in.)
Reverse idler gear to shift arm shoe clearance	STD Max.	0.20 - 0.41 mm (0.0080 - 0.0161 in.) 0.90 mm (0.0354 in.)
Shift fork to hub sleeve clearance	Max.	1.0 mm (0.039 in.)
Synchronizer ring to 1st and 4th gear clearance	Min.	0.5 mm (0.020 in.)
Synchronizer ring to 2nd and 3rd gear clearance	Min.	0.7 mm (0.028 in.)
Input shaft snap ring thickness	Mark 1 Mark 2 Mark 3 Mark 4 Mark 5 Mark 11 Mark 12	2.05 - 2.10 mm (0.0807 - 0.0827 in.) 2.10 - 2.15 mm (0.0827 - 0.0846 in.) 2.15 - 2.20 mm (0.0846 - 0.0866 in.) 2.20 - 2.25 mm (0.0866 - 0.0886 in.) 2.25 - 2.30 mm (0.0886 - 0.0906 in.) 2.30 - 2.35 mm (0.0906 - 0.0925 in.) 2.35 - 2.40 mm (0.0925 - 0.0945 in.)
Output shaft snap ring thickness No.2 clutch hub	Mark C-1 Mark D Mark 11 Mark 12 Mark 13 Mark 14 Mark 15	1.75 - 1.80 mm (0.0689 - 0.0709 in.) 1.80 - 1.85 mm (0.0709 - 0.0728 in.) 1.86 - 1.91 mm (0.0732 - 0.0752 in.) 1.92 - 1.97 mm (0.0756 - 0.0776 in.) 1.98 - 2.03 mm (0.0780 - 0.0799 in.) 2.04 - 2.09 mm (0.0803 - 0.0823 in.) 2.10 - 2.15 mm (0.0827 - 0.0846 in.)
Output shaft snap ring thickness Rear bearing	Mark 8 Mark 9 Mark 10 Mark 11 Mark 12 Mark 13 Mark 14 Mark 15	2.31 - 2.36 mm (0.0909 - 0.0929 in.) 2.37 - 2.42 mm (0.0933 - 0.0953 in.) 2.43 - 2.48 mm (0.0957 - 0.0976 in.) 2.49 - 2.54 mm (0.0980 - 0.1000 in.) 2.55 - 2.60 mm (0.1004 - 0.1024 in.) 2.61 - 2.66 mm (0.1028 - 0.1047 in.) 2.68 - 2.73 mm (0.1055 - 0.1075 in.) 2.74 - 2.79 mm (0.1079 - 0.1098 in.)

Output shaft snap ring thickness		
Reverse gear	Mark 5	2.25 - 2.30 mm (0.0886 - 0.0906 in.)
	Mark 11	2.30 - 2.35 mm (0.0906 - 0.0925 in.)
	Mark 12	2.35 - 2.40 mm (0.0925 - 0.0945 in.)
	Mark 13	2.40 - 2.45 mm (0.0945 - 0.0965 in.)
	Mark 14	2.45 - 2.50 mm (0.0965 - 0.0984 in.)
	Mark 15	2.50 - 2.55 mm (0.0984 - 0.1004 in.)
	Mark 16	2.55 - 2.60 mm (0.1004 - 0.1024 in.)
	Mark 17	2.61 - 2.66 mm (0.1028 - 0.1047 in.)
	Mark 18	2.67 - 2.72 mm (0.1051 - 0.1071 in.)
	Mark 19	2.73 - 2.78 mm (0.1075 - 0.1094 in.)
	Mark 20	2.79 - 2.84 mm (0.1098 - 0.1118 in.)
	Mark 21	2.85 - 2.90 mm (0.1122 - 0.1142 in.)
	Mark 22	2.91 - 2.96 mm (0.1146 - 0.1165 in.)
	Mark 23	2.97 - 3.02 mm (0.1169 - 0.1189 in.)
Coutner gear snap ring thickness		
Front bearing	Mark A	2.05 - 2.10 mm (0.0807 - 0.0827 in.)
	Mark B	2.10 - 2.15 mm (0.0827 - 0.0846 in.)
	Mark C	2.15 - 2.20 mm (0.0846 - 0.0866 in.)
	Mark D	2.20 - 2.25 mm (0.0866 - 0.0886 in.)
	Mark E	2.25 - 2.30 mm (0.0886 - 0.0906 in.)
	Mark F	2.30 - 2.35 mm (0.0906 - 0.0925 in.)
Counter gear snap ring thickness		
No.3 clutch hub	Mark 2	2.06 - 2.11 mm (0.0811 - 0.0831 in.)
	Mark 3	2.12 - 2.17 mm (0.0835 - 0.0854 in.)
	Mark 4	2.18 - 2.23 mm (0.0858 - 0.0878 in.)
	Mark 5	2.24 - 2.29 mm (0.0882 - 0.0902 in.)
Counter gear snap ring thickness		
Rear bearing	Mark 1	1.90 - 1.95 mm (0.0748 - 0.0768 in.)
	Mark 2	1.96 - 2.01 mm (0.0772 - 0.0791 in.)
	Mark 3	2.02 - 2.07 mm (0.0795 - 0.0815 in.)
	Mark 4	2.08 - 2.13 mm (0.0819 - 0.0839 in.)
	Mark 5	2.14 - 2.19 mm (0.0843 - 0.0862 in.)
	Mark 6	2.20 - 2.25 mm (0.0866 - 0.0886 in.)
	Mark 7	2.26 - 2.31 mm (0.0890 - 0.0909 in.)
Oil seal drive in depth		
Speedometer drive gear		25 mm (0.98 in.)
Front bearing retainer (from retainer end)		12.2 ± 0.5 mm (0.480 ± 0.020 in.)
Extension housing		0 ± 0.5 mm (0 ± 0.020 in.)
Transfer adaptor		45.5 ± 0.5 mm (1.969 ± 0.020 in.)

SS05A-01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Transmission x Engine		72	730	53
Transmission x Starter		39	400	29
Stiffener plate x Engine (2WD)		37	380	27
Stiffener plate x Rear end plate (2WD)		37	380	27
Rear end plate x Transmission (4WD)		37	380	27
Front exhaust pipe clamp bolt (2WD)		19	195	14
Front exhaust pipe x Exhaust manifold		62	630	46
Front exhaust pipe x TWC		48	490	35
Front exhaust pipe bracket x Clutch housing (2WD)	Bolt A	71	720	52
(See page MT-4)	Bolt B	72	730	53
Front exhaust pipe bracket x Clutch housing (4WD)	Bolt A	71	720	52
(See page MT-9)	Bolt B	72	730	53
Engine rear mounting bracket x Frame (2WD)		58	590	43
Engine rear mounting bracket x Engine rear mounting (2WD)		18	183	13
Engine rear mounting x Crossmember (4WD)		18	183	13
Engine rear mounting x Transmission		65	660	48
Crossmember x Frame (4WD)		65	660	48
Transmission x Transfer (4WD)		24	240	17
Clutch release cylinder x Transmission		12	120	9
Shift fork set bolt		20	200	14
Straight screw plug		25	250	18
Reverse idler gear shaft stopper bolt		25	250	18
Oil separator x Intermediate plate		18	185	13
Front bearing retainer set bolt		25	250	18
Extension housing x Intermediate plate		37	380	27
Transfer adaptor x Intermediate plate		37	380	27
Restrict pin	(2WD)	40	410	30
	(4WD)	27	280	20
Shift lever housing x Shift and select lever shaft		39	400	29
Control shift lever retainer x Extension housing		18	185	13
Control shift lever retainer x Transfer adaptor		18	185	13
Drain and filler plugs		37	380	27
Back-up light switch		40	410	30
Clutch housing x Transmission case		37	380	27
Rear bearing retainer x Intermediate plate		18	185	13
Vehicle speed sensor driven gear set bolt (2WD)		13	130	9

AUTOMATIC TRANSMISSION (A44D)

SS05G-03

SERVICE DATA

Governor pressure		
Tire size: P205/75R15	Output shaft rpm (Vehicle speed reference)	
	1,000 rpm (32 km/h, 20 mph)	137 - 177 kPa (1.4 - 1.8 kgf/cm^2, 19 - 26 psi)
	1,800 rpm (57 km/h, 35 mph)	235 - 275 kPa (2.4 - 2.8 kgf/cm^2, 34 - 40 psi)
	3,500 rpm (111 km/h, 69 mph)	500 - 579 kPa (5.1 - 5.9 kgf/cm^2, 73 - 84 psi)
Tire size: P235/55R16	Output shaft rpm (Vehicle speed reference)	
	1,000 rpm (32 km/h, 20 mph)	137 - 177 kPa (1.4 - 1.8 kgf/cm^2, 19 - 26 psi)
	1,800 rpm (58 km/h, 36 mph)	235 - 275 kPa (2.4 - 2.8 kgf/cm^2, 34 - 40 psi)
	3,500 rpm (113 km/h, 70 mph)	500 - 579 kPa (5.1 - 5.9 kgf/cm^2, 73 - 84 psi)
Line pressure (Wheel locked)		
Engine idling	D position	441 - 500 kPa (4.5 - 5.1 kgf/cm^2, 64 - 73 psi)
	R position	667 - 745 kPa (6.8 - 7.6 kgf/cm^2, 97 - 108 psi)
A/T stall (Throttle valve fully opened)	D position	990 - 1,167 kPa (10.1 - 11.9 kgf/cm^2, 144 - 169 psi)
	R position	1,471 - 1,863 kPa (15.0 - 19.0 kgf/cm^2, 213 - 270 psi)
Engine stall revolution	D and R position	2,250 ± 150 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → R position	Less than 1.5 seconds
Engine idle speed (A/C OFF)	N position	700 ± 50 rpm
Throttle cable adjustment (Throttle valve fully opened)		
	Between boot and face and inner cable stopper	0 - 1 mm (0 - 0.04 in.)
Drive plate runout	Maximum	0.20 mm (0.0079 in.)
Torque converter clutch sleeve runout	Maximum	0.30 mm (0.0118 in.)
Torque converter clutch installation distance		More than 31.75 mm (1.2500 in.)
Shift point		
D position		
(Throttle valve fully opened)	1 → 2	49 - 57 km/h (30 - 36 mph)
	2 → 3	97 - 108 km/h (60 - 68 mph)
	O/D → 3	*
	3 → 2	90 - 101 km/h (56 - 64 mph)
	2 → 1	37 - 49 km/h (23 - 31 mph)
(Throttle valve fully closed)	3 → O/D	32 - 46 km/h (20 - 29 mph)
L position		
(Throttle valve fully opened)	2 → 1	40 - 51 km/h (25 - 32 mph)

* O/D → 3 down-shift is possible up to maximum speed.

SS05H-01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Torque converter clutch x Drive plate		41	420	30
Drive plate x Crankshaft		74	750	54
Extension housing x Transmission case		36	370	27
Parking lock pawl bracket x Transmission case		7.4	75	65 in.·lbf
Valve body x Transmission case		10	100	7
Oil strainer x Valve body		5.4	55	48 in.·lbf
Oil pan		4.4	45	39 in.·lbf
Governor body		3.9	40	35 in.·lbf
Oil cooler pipe union nut		34	350	25
Oil cooler elbow		34	350	25
Park/neutral position switch	Bolt	5.4	55	48 in.·lbf
	Nut	3.9	40	35 in.·lbf
Drain plug		20	205	15
Extension housing x Rear mounting insulator		25	260	19
Rear mounting bracket x Rear support member		58	590	43
Rear mounting bracket x Rear mounting insulator		18	185	13
Stiffener plate x Engine		37	380	27
Stiffener x Torque converter clutch housing		37	380	27
Control shaft lever x Control cable		13	130	9
Transmission x Engine		71	730	53
Vehicle speed sensor		16	160	12
Starter x Transmission case		39	400	29

AUTOMATIC TRANSMISSION (A340E, A340F)

SS053-05

SERVICE DATA

Line pressure (Wheel locked)		
(3RZ-FE)		
	Engine idling	
	D position	382 - 441 kPa (3.9 - 4.5 kgf/cm^2, 55 - 64 psi)
	R position	539 - 637 kPa (5.5 - 6.5 kgf/cm^2, 78 - 92 psi)
	at stall (Throttle valve fully opened)	
	D position	1,098 - 1,235 kPa (11.2 - 12.6 kgf/cm^2, 159 - 179 psi)
	R position	1,382 - 1,716 kPa (14.1 - 17.5 kgf/cm^2, 201 - 249 psi)
(5VZ-FE)		
	Engine idling	
	D position	382 - 441 kPa (3.9 - 4.5 kgf/cm^2, 55 - 64 psi)
	R position	588 - 686 kPa (6.0 - 7.0 kgf/cm^2, 85 - 100 psi)
	at stall (Throttle valve fully opened)	
	D position	1,089 - 1,226 kPa (11.1 - 12.5 kgf/cm^2, 158 - 178 psi)
	R position	1,461 - 1,794 kPa (14.9 - 18.3 kgf/cm^2, 212 - 260 psi)
Engine stall revolution (D and R positions)	3RZ-FE	2,000 ± 150 rpm
	5VZ-FE	2,250 ± 150 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → R position	Less than 1.5 seconds
Engine idle speed (A/C OFF and N position)		700 ± 50 rpm
Extension housing oil seal drive in depth from flat end		0 - 0.3 mm (0 - 0.012 in.)
Throttle cable adjustment (Throttle valve fully opened)		Between boot end face and inner cable stopper 0 - 1 mm (0 - 0.04 in.)
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter runout	Max.	0.30 mm (0.0118 in.)
Torque converter installation distance	3R-FE	More than 31.75 mm (1.2500 in.)
	5VZ-FE	More than 17.95 mm (0.7067 in.)

Lock-up point (NORM and PWR pattern)		
(3RZ-FE / A340E)	Tire size: P265 / 70R16	
D position		
(Throttle valve opening 5%)	Lock-up ON	82 - 86 km/h (51 - 53 mph)
	Lock-up OFF	75 - 79 km/h (47 - 49 mph)
(3RZ-FE / A340E)	Tire size: P225 / 75R15	
D position		
(Throttle valve opening 5%)	Lock-up ON	83 - 87 km/h (52 - 54 mph)
	Lock-up OFF	76 - 81 km/h (47 - 50 mph)
(3RZ-FE / A340F)	Tire size: P265 / 70R16	
D position		
(Throttle valve opening 5%)	Lock-up ON	76 - 81 km/h (47 - 50 mph)
	Lock-up OFF	70 - 75 km/h (44 - 47 mph)
(3RZ-FE / A340F)	Tire size: P225 / 75R15	
D position		
(Throttle valve opening 5%)	Lock-up ON	78 - 83 km/h (48 - 52 mph)
	Lock-up OFF	72 - 77 km/h (45 - 48 mph)
(5VZ-FE / A340E)	Tire size: P265 / 70R16	
D position		
(Throttle valve opening 5%)	Lock-up ON	73 - 78 km/h (45 - 48 mph)
	Lock-up OFF	66 - 71 km/h (41 - 44 mph)
(5VZ-FE / A340E)	Tire size: P225 / 75R15	
D position		
(Throttle valve opening 5%)	Lock-up ON	71 - 76 km/h (44 - 47 mph)
	Lock-up OFF	64 - 69 km/h (40 - 43 mph)
(5VZ-FE / A340F)	Tire size: P265 / 70R16	
D position		
(Throttle vale opening 5%)	Lock-up ON	73 - 78 km/h (45 - 48 mph)
	Lock-up OFF	66 - 71 km/h (41 - 44 mph)
(5VZ-FE / A340F)	Tire size: P225 / 75R15	
D position		
(Throttle vale opening 5%)	Lock-up ON	71 - 76 km/h (44 - 47 mph)
	Lock-up OFF	64 - 69 km/h (40 - 43 mph)

Shift schedule (NORM and PWR pattern)		
(3RZ-FE / A340E)	Tire size: P265 / 70R16	
D position		
(Throttle valve fully opened)	1 → 2	58 - 63 km/h (36 - 39 mph)
	2 → 3	107 - 114 km/h (66 - 71 mph)
	3 → O/D	141 - 149 km/h (88 - 93 mph)
	O/D → 3	135 - 142 km/h (84 - 88 mph)
	3 → 2	98 - 106 km/h (61 - 66 mph)
	2 → 1	46 - 51 km/h (29 - 32 mph)
(Throttle valve fully closed)	3 → O/D	34 - 38 km/h (21 - 24 mph)
	O/D → 3	25 - 30 km/h (16 - 19 mph)
2 position		
(Throttle valve fully opened)	1 → 2	58 - 63 km/h (36 - 39 mph)
	3 → 2	112 - 119 km/h (70 - 74 mph)
	2 → 1	46 - 51 km/h (29 - 32 mph)
L position		
(Throttle valve fully opened)	3 → 2	95 - 103 km/h (59 - 64 mph)
	2 → 1	54 - 58 km/h (34 - 36 mph)
(3RZ-FE / A340E)	Tire size: P225 / 75R15	
D position		
(Throttle valve fully opened)	1 → 2	58 - 64 km/h (36 - 40 mph)
	2 → 3	107 - 116 km/h (66 - 72 mph)
	3 → O/D	144 - 152 km/h (89 - 94 mph)
	O/D → 3	137 - 145 km/h (85 - 90 mph)
	3 → 2	98 - 108 km/h (61 - 67 mph)
	2 → 1	46 - 52 km/h (29 - 32 mph)
(Throttle valve fully closed)	3 → O/D	35 - 39 km/h (22 - 24 mph)
	O/D → 3	26 - 30 km/h (16 - 19 mph)
2 position		
(Throttle valve fully opened)	1 → 2	57 - 61 km/h (35 - 38 mph)
	3 → 2	114 - 121 km/h (71 - 75 mph)
	2 → 1	45 - 49 km/h (28 - 30 mph)
L position		
(Throttle valve fully opened)	3 → 2	97 - 105 km/h (60 - 65 mph)
	2 → 1	55 - 59 km/h (34 - 37 mph)
(3RZ-FE / A340F)	Tire size: P265 / 70R16	
D position		
(Throttle valve fully opened)	1 → 2	54 - 59 km/h (34 - 37 mph)
	2 → 3	99 - 108 km/h (62 - 67 mph)
	3 → O/D	132 - 140 km/h (82 - 87 mph)
	O/D → 3	126 - 134 km/h (78 - 83 mph)
	3 → 2	91 - 100 km/h (57 - 62 mph)
	2 → 1	43 - 48 km/h (27 - 30 mph)
(Throttle valve fully closed)	3 → O/D	32 - 36 km/h (20 - 22 mph)
	O/D → 3	24 - 28 km/h (15 - 17 mph)
2 position		
(Throttle valve fully opened)	1 → 2	54 - 59 km/h (34 - 37 mph)
	3 → 2	104 - 112 km/h (65 - 70 mph)
	2 → 1	43 - 48 km/h (27 - 30 mph)
L position		
(Throttle valve fully opened)	3 → 2	89 - 97 km/h (55 - 60 mph)
	2 → 1	50 - 55 km/h (31 - 34 mph)

(3RZ-FE / A340F)	Tire size: P225 / 75R15	
D position		
(Throttle valve fully opened)	1 → 2	56 - 61 km/h (35 - 38 mph)
	2 → 3	102 - 111 km/h (63 - 69 mph)
	3 → O/D	135 - 144 km/h (84 - 89 mph)
	O/D → 3	129 - 138 km/h (80 - 86 mph)
	3 → 2	94 - 103 km/h (58 - 64 mph)
	2 → 1	44 - 49 km/h (27 - 30 mph)
(Throttle valve fully closed)	3 → O/D	33 - 37 km/h (21 - 23 mph)
	O/D → 3	24 - 29 km/h (15 - 18 mph)
2 position		
(Throttle valve fully opened)	1 → 2	56 - 61 km/h (34 - 38 mph)
	3 → 2	107 - 116 km/h (66 - 72 mph)
	2 → 1	44 - 49 km/h (27 - 30 mph)
L position		
(Throttle valve fully opened)	3 → 2	91 - 100 km/h (57 - 62 mph)
	2 → 1	52 - 56 km/h (32 - 35 mph)
(5VZ-FE / A340E)	Tire size: P265 / 70R16	
D position		
(Throttle valve fully opened)	1 → 2	58 - 63 km/h (36 - 39 mph)
	2 → 3	109 - 117 km/h (68 - 73 mph)
	3 → O/D	147 - 156 km/h (91 - 97 mph)
	O/D → 3	140 - 149 km/h (87 - 93 mph)
	3 → 2	100 - 109 km/h (62 - 68 mph)
	2 → 1	46 - 50 km/h (29 - 31 mph)
(Throttle valve fully closed)	3 → O/D	42 - 47 km/h (26 - 29 mph)
	O/D → 3	22 - 27 km/h (14 - 18 mph)
2 position		
(Throttle valve fully opened)	1 → 2	58 - 63 km/h (36 - 39 mph)
	3 → 2	116 - 125 km/h (72 - 78 mph)
	2 → 1	46 - 50 km/h (29 - 31 mph)
L position		
(Throttle valve fully opened)	3 → 2	99 - 107 km/h (62 - 68 mph)
	2 → 1	56 - 61 km/h (35 - 38 mph)
(5VZ-FE / A340E)	Tire size: P225 / 75R15	
D position		
(Throttle valve fully opened)	1 → 2	56 - 61 km/h (35 - 38 mph)
	2 → 3	105 - 114 km/h (65 - 71 mph)
	3 → O/D	142 - 152 km/h (88 - 94 mph)
	O/D → 3	135 - 145 km/h (84 - 90 mph)
	3 → 2	97 - 106 km/h (60 - 66 mph)
	2 → 1	44 - 49 km/h (27 - 30 mph)
(Throttle valve fully closed)	3 → O/D	41 - 46 km/h (25 - 29 mph)
	O/D → 3	22 - 26 km/h (14 - 16 mph)
2 position		
(Throttle valve fully opened)	1 → 2	56 - 61 km/h (35 - 38 mph)
	3 → 2	112 - 121 km/h (70 - 75 mph)
	2 → 1	44 - 49 km/h (27 - 30 mph)
L position		
(Throttle valve fully opened)	2 → 1	95 - 105 km/h (59 - 65 mph)
	2 → 1	54 - 59 km/h (34 - 37 mph)

(5VZ-FE / A340F) Tire size: P265 / 70R16	
D position	
(Throttle valve fully opened) 1 → 2	58 - 63 km/h (36 - 39 mph)
2 → 3	109 - 117 km/h (68 - 73 mph)
3 → O/D	147 - 156 km/h (91 - 97 mph)
O/D → 3	140 - 149 km/h (87 - 93 mph)
3 → 2	100 - 109 km/h (62 - 68 mph)
2 → 1	46 - 50 km/h (29 - 31 mph)
(Throttle valve fully closed) 3 → O/D	42 - 47 km/h (26 - 29 mph)
O/D → 3	22 - 27 km/h (14 - 18 mph)
2 position	
(Throttle valve fully opened) 1 → 2	58 - 63 km/h (36 - 39 mph)
3 → 2	116 - 125 km/h (72 - 78 mph)
2 → 1	46 - 50 km/h (29 - 31 mph)
L position	
(Throttle valve fully opened) 3 → 2	99 - 107 km/h (62 - 68 mph)
2 → 1	56 - 61 km/h (35 - 38 mph)
(5VZ-FE / A340F) Tire size: P225 / 75R15	
D position	
(Throttle valve fully opened) 1 → 2	56 - 61 km/h (35 - 38 mph)
2 → 3	105 - 114 km/h (65 - 71 mph)
3 → O/D	142 - 152 km/h (88 - 94 mph)
O/D → 3	135 - 145 km/h (84 - 90 mph)
3 → 2	97 - 106 km/h (60 - 66 mph)
2 → 1	44 - 49 km/h (27 - 30 mph)
(Throttle valve fully closed) 3 → O/D	41 - 46 km/h (25 - 29 mph)
O/D → 3	22 - 26 km/h (14 - 16 mph)
2 position	
(Throttle valve fully opened) 1 → 2	56 - 61 km/h (35 - 38 mph)
3 → 2	112 - 121 km/h (70 - 75 mph)
2 → 1	44 - 49 km/h (27 - 30 mph)
L position	
(Throttle valve fully opened) 2 → 1	95 - 105 km/h (59 - 65 mph)
2 → 1	54 - 59 km/h (34 - 37 mph)

SS054-03

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Transmission output lock nut		123	1,250	90
Drain plug		20	205	15
Engine mounting spacer x Transmission		28.5	291	21
Engine rear mounting insulator x Engine mounting spacer		65	660	48
Crossmember x Frame		72	734	53
Crossmember x Engine rear mounting		18.5	189	14
No.1 vehicle speed sensor x Transmission		16	160	12
No.2 vehicle speed sensor x Transmission		5.4	55	48 in.·lbf
ATF temperature sensor x Transmission		15	155	11
Oil cooler pipe union nut		34	350	25
Park/neutral start switch	Nut	6.9	70	61 in.·lbf
	Bolt	13	130	9
Shift solenoid valve x Valve body		10	100	7
Valve body x Transmission		10	100	7
Oil strainer x Valve body (A340E)		10	100	7
Oil strainer case x Valve body (A340F)		10	100	7
Oil strainer x Oil strainer case (A340F)		6.9	70	61 in.·lbf
Oil pan x Transmission		7.4	75	65 in.·lbf
Parking lock pawl bracket x Transmission		7.4	75	65 in.·lbf
Throttle cable retainer x Transmission		10	100	7
Engine under cover		29	296	21
Oil filler pipe x Transmission		12	120	9
Oil cooler pipe clamp		4.9	50	43 in.·lbf
Shift control rod x Shift control lever		13	130	10
Rear end plate x Transmission	3RZ-FE	37	380	27
	5VZ-FE	18	185	13
Torque converter clutch x Drive plate		41	420	30
Starter x Transmission		39	400	29
Transmission x Engine		71	730	53
Front differential rear mounting cushion x Member (A340F)	Nut	87	890	64
	Bolt	108	1,100	80
Drive plate x Engine	3RZ-FE	74	750	54
	5VZ-FE	83	850	61

TRANSFER

SS05I-01

SERVICE DATA

Transfer unit		
Hose depth	Minimum	13 mm (0.51 in.)
Oil pump body		
Body clearance	STD	0.09 - 0.16 mm (0.0035 - 0.0063 in.)
	Maximum	0.16 mm (0.0063 in.)
Tip clearance	STD	0.05 - 0.15 mm (0.0020 - 0.0059 in.)
	Maximum	0.15 mm (0.0059 in.)
Side clearance	STD	0.03 - 0.10 mm (0.0012 - 0.0039 in.)
	Maximum	0.10 mm (0.0039 in.)
Rear output shaft assembly		
Drive sprocket thrust clearance	STD	0.10 - 0.25 mm (0.0039 - 0.0098 in.)
	Maximum	0.25 mm (0.0098 in.)
Rear output shaft journal diameter		
(part A)	Minimum	27.98 mm (1.1016 in.)
(part B)	Minimum	36.98 mm (1.4561 in.)
Drive sprocket radial clearance	STD	0.010 - 0.055 mm (0.0004 - 0.0022 in.)
	Maximum	0.055 mm (0.0022 in.)
Front drive shift fork to clutch sleeve clearance	Maximum	1.0 mm (0.039 in.)
High and low shift fork to sleeve clearance	Maximum	1.0 mm (0.039 in.)
Rear output shaft snap ring thickness	Mark	
	A	2.10 - 2.15 mm (0.0827 - 0.0846 in.)
	B	2.15 - 2.20 mm (0.0846 - 0.0866 in.)
	C	2.20 - 2.25 mm (0.0866 - 0.0886 in.)
	D	2.25 - 2.30 mm (0.0886 - 0.0906 in.)
	E	2.30 - 2.35 mm (0.0906 - 0.0925 in.)
	F	2.35 - 2.40 mm (0.0925 - 0.0945 in.)
	G	2.40 - 2.45 mm (0.0945 - 0.0965 in.)
	H	2.45 - 2.50 mm (0.0965 - 0.0984 in.)
	J	2.50 - 2.55 mm (0.0984 - 0.1004 in.)
	K	2.00 - 2.05 mm (0.0787 - 0.0807 in.)
	L	2.05 - 2.10 mm (0.0807 - 0.0827 in.)

Input shaft		
Input shaft journal outer diameter	Minimum	47.59 mm (1.8736 in.)
Input shaft bushing diameter	Maximum	39.14 mm (1.5409 in.)
Synchronizer ring to sprocket clearance	STD	1.05 - 1.85 mm (0.0413 - 0.0728 in.)
	Minimum	0.80 mm (0.0315 in.)
Input shaft snap ring thickness	Mark	
	A	2.10 - 2.15 mm (0.0827 - 0.0846 in.)
	B	2.15 - 2.20 mm (0.0846 - 0.0866 in.)
	C	2.20 - 2.25 mm (0.0866 - 0.0886 in.)
	D	2.25 - 2.30 mm (0.0886 - 0.0906 in.)
	E	2.30 - 2.35 mm (0.0906 - 0.0925 in.)
	F	2.35 - 2.40 mm (0.0925 - 0.0945 in.)
	G	2.40 - 2.45 mm (0.0945 - 0.0965 in.)
	H	2.45 - 2.50 mm (0.0965 - 0.0984 in.)
	J	2.50 - 2.55 mm (0.0984 - 0.1004 in.)
	K	2.55 - 2.60 mm (0.1004 - 0.1024 in.)
	L	2.60 - 2.65 mm (0.1024 - 0.1043 in.)
	M	2.65 - 2.70 mm (0.1043 - 0.1063 in.)
	N	2.70 - 2.75 mm (0.1063 - 0.1083 in.)
	P	2.75 - 2.80 mm (0.1083 - 0.1102 in.)
	Q	2.80 - 2.85 mm (0.1102 - 0.1122 in.)
	R	2.85 - 2.90 mm (0.1122 - 0.1142 in.)
	S	2.90 - 2.95 mm (0.1142 - 0.1161 in.)
	T	2.95 - 3.00 mm (0.1161 - 0.1181 in.)
	U	3.00 - 3.05 mm (0.1181 - 0.1201 in.)
Planetary gear		
Pinion gear thrust clearance	STD	0.11 - 0.84 mm (0.0043 - 0.0331 in.)
	Maximum	0.84 mm (0.0331 in.)
Pinion gear radial clearance	STD	0.009 - 0.038 mm (0.0004 - 0.0015 in.)
	Maximum	0.038 mm (0.0015 in.)
Outer bearing snap ring thickness	Mark	
	1	1.45 - 1.50 mm (0.0571 - 0.0591 in.)
	2	1.50 - 1.55 mm (0.0591 - 0.0610 in.)
	3	1.55 - 1.60 mm (0.0610 - 0.0630 in.)
	4	1.60 - 1.65 mm (0.0630 - 0.0650 in.)
	5	1.65 - 1.70 mm (0.0650 - 0.0669 in.)
Oil seal		
Shift fork shaft oil seal depth		-0.5 - 0.5 mm (-0.020 - 0.020 in.)

SS05J-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Transmission shift control rod x Shift lever	13	133	10
Transmission shift lever assembly	6.0	61	53 in.·lbf
Engine rear mounting x Crossmember	18	185	13
Crossmember x Frame	72	734	53
Engine rear mounting x Transmission	65	660	48
Transfer x Transfer adaptor	24	240	17
Vehicle speed sensor	11.5	115	8
4WD position switch	37	380	27
L4 position switch	37	380	27
Neutral position switch	37	380	27
Plug	37	380	27
Protector	18	185	13
Front bearing retainer	11.5	115	8
Control retainer x Front case	18	185	13
Upper cover x Front case	18	185	13
Companion flange lock nut	118	1,200	87
Extension housing x Rear case	12	120	9
Front case x Rear case	28	285	21
Straight screw plug for shift fork shaft	18.6	190	14
Front drive shift fork (w/ One touch 2-4 selector system)	24	240	17
Actuator assembly x Rear case (w/ One touch 2-4 selector system)	20	200	14
Separator with oil strainer x Front case	7.5	80	69 in.·lbf
Oil pump body x Front case	7.5	80	69 in.·lbf
Straight screw plug for ring gear	18.6	190	14
Relief valve x Oil pump body	29.4	300	21
Oil pump plate x Oil pump body	7.4	75	65 in.·lbf

PROPELLER SHAFT

SS05K-02

SERVICE DATA

Propeller shaft runout		Max.	0.8 mm (0.031 in.)
Spider bearing axial play		Max.	0.05 mm (0.0020 in.)
Spider bearing selection		Mark	
Bearing cup outer diameter		None	29.008 - 29.021 mm (1.1420 - 1.1426 in.)
		Red	29.028 - 29.041 mm (1.1428 - 1.1433 in.)
Bearing hole inner diameter		None	29.000 - 29.020 mm (1.1417 - 1.1425 in.)
		Drill	29.021 - 29.042 mm (1.1426 - 1.1434 in.)
Snap ring thickness			
TMC made	Mark	Color	
	1	-	2.100 - 2.150 mm (0.0827 - 0.0846 in.)
	2	-	2.150 - 2.200 mm (0.0846 - 0.0866 in.)
	3	-	2.200 - 2.250 mm (0.0866 - 0.0886 in.)
	-	Brown	2.250 - 2.300 mm (0.0886 - 0.0906 in.)
	-	Blue	2.300 - 2.350 mm (0.0906 - 0.0925 in.)
	6	-	2.350 - 2.400 mm (0.0925 - 0.0945 in.)
	7	-	2.400 - 2.450 mm (0.0945 - 0.0965 in.)
	8	-	2.450 - 2.500 mm (0.0965 - 0.0984 in.)
DANA made		Color	
		Green	1.384 mm (0.0545 in.)
		Red	1.435 mm (0.0565 in.)
		Black	1.486 mm (0.0585 in.)
		Copper	1.511 mm (0.0595 in.)
		Silver	1.537 mm (0.0605 in.)
		Yellow	1.588 mm (0.0625 in.)
		Blue	1.638 mm (0.0645 in.)

SS05L-02

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Front differential x Front propeller shaft	4WD	74	750	54
Front propeller shaft x Transfer	4WD	74	750	54
Propeller shaft x Rear differential	4WD and pre runner	74	750	54
Propeller shaft x Transmission (pre runner) / transfer (4WD)		74	750	54
Intermediate shaft x Propeller shaft	4WD and pre runner	74	750	54
Propeller shaft x Differential	2WD	74	750	54
Intermediate shaft x Propeller shaft	2WD	74	750	54
Center support bearing x Frame crossmember	3-joint type	36	370	27
Intermediate shaft x Center bearing x Joint flange	3-joint type			
	1st	181	1,850	134
	2nd	Loosen nut		
	3rd	69	700	51

SUSPENSION AND AXLE

SERVICE DATA

SS051-07

Cold tire inflation pressure	P205/75R15 97S	Front Rear	200 kPa (2.0 kgf/cm^2, 29 psi) 200 kPa (2.0 kgf/cm^2, 29 psi)
	P235/55R16 96T	Front Rear	200 kPa (2.0 kgf/cm^2, 29 psi) 220 kPa (2.2 kgf/cm^2, 32 psi)
	P225/75R15 102S	Front Rear	180 kPa (1.8 kgf/cm^2, 26 psi) 200 kPa (2.0 kgf/cm^2, 29 psi)
	P265/70R16 111S	Front Rear	180 kPa (1.8 kgf/cm^2, 26 psi) 180 kPa (1.8 kgf/cm^2, 26 psi)
	P265/70R16 111T Except double cab models Double cab models	 Front Rear Front Rear	 180 kPa (1.8 kgf/cm^2, 26psi) 200 kPa (2.0 kgf/cm^2, 29psi) 180 kPa (1.8 kgf/cm^2, 26psi) 180 kPa (1.8 kgf/cm^2, 26psi)
Front wheel Alignment (2WD except pre runner)	● Vehicle height		
	RZN140L-TRMDKAB	Front: A*1 - B*2 Rear: C*3 - D*4	26 mm (1.02 in.) 37 mm (1.46 in.)
	RZN140L-TRPDKAB	Front: A*1 - B*2 Rear: C*3 - D*4	28 mm (1.10 in.) 38 mm (1.50 in.)
	RZN150L-CRMDKAB	Front: A*1 - B*2 Rear: C*3 - D*4	25 mm (0.98 in.) 46 mm (1.18 in.)
	RZN150L-CRPDKAB	Front: A*1 - B*2 Rear: C*3 - D*4	27 mm (1.06 in.) 46 mm (1.18 in.)
	VZN150L-CRMDKAB	Front: A*1 - B*2 Rear: C*3 - D*4	35 mm (1.38 in.) 57 mm (2.24 in.)
	● Camber	 Right-left error	0°00' ± 45' (0.00° ± 0.75°) 30' (0.5°) or less
	● Caster		Right - left error: 30' (0.5°) or less
	RZN140L-TRMDKAB Tire size: P205/75R15 97S Tire size: P235/55R16 96T		 0°13' ± 45' (0.22° ± 0.75°) 0°12' ± 45' (0.20° ± 0.75°)
	RZN140L-TRPDKAB Tire size: P205/75R15 97S Tire size: P235/55R16 96T		 0°13' ± 45' (0.21° ± 0.75°) 0°12' ± 45' (0.20° ± 0.75°)
	RZN150L-CRMDKAB Tire size: P205/75R15 97S Tire size: P235/55R16 96T		 0°40' ± 45' (0.67° ± 0.75°) 0°40' ± 45' (0.66° ± 0.75°)
	RZN150L-CRPDKAB Tire size: P205/75R15 97S Tire size: P235/55R16 96T		 0°41' ± 45' (0.68° ± 0.75°) 0°40' ± 45' (0.67° ± 0.75°)
	VZN150L-CRMDKAB		0°55' ± 45' (0.92° ± 0.75°)
	● Steering axis inclination	 Right-left error	10°00' ± 45' (10.00° ± 0.75°) 30' (0.5°) or less

Measuring point
A*1: Ground clearance of spindle center
B*2: Ground clearance of lower suspension arm bolt center
C*3: Ground clearance of rear axle shaft center
D*4: Ground clearance of leaf spring front hanger pin bolt center

Front wheel Alignment (2WD except pre runner, cont'd)	● Toe-in (Total)	Rack end length difference: 1.5 mm (0.059 in.) or less
	RZN140L-TRMDKAB	0°09' ± 12' (0.15° ± 0.2°, 1.6 ± 2 mm, 0.06 ± 0.08 in.)
	RZN140L-TRPDKAB	0°08' ± 12' (0.13° ± 0.2°, 1.4 ± 2 mm, 0.06 ± 0.08 in.)
	RZN150L-CRMDKAB	0°09' ± 12' (0.15° ± 0.2°, 1.6 ± 2 mm, 0.06 ± 0.08 in.)
	RZN150L-CRPDKAB Tire size: P205/75R15 97S Tire size: P235/55R16 96T	 0°08' ± 12' (0.14° ± 0.2°, 1.5 ± 2 mm, 0.06 ± 0.08 in.) 0°09' ± 12' (0.14° ± 0.2°, 1.5 ± 2 mm, 0.06 ± 0.08 in.)
	VZN150L-CRMDKAB	0°09' ± 12' (0.16° ± 0.2°, 1.7 ± 2 mm, 0.07 ± 0.08 in.)
	● Wheel angle (Max.) Inside wheel Outside wheel: Reference	36° (33° – 36°) 31° (28° – 31°)
Front wheel Alignment (4WD and pre runner)	● Vehicle height	
	RZN161L-TRMDKAB Normal Front: A*1 - B*2 Rear: C*3 - D*4 Heavy duty leaf spring Tire size: P225/75R15 102S Front: A*1 - B*2 Rear: C*3 - D*4 Tire size: P265/70R16 111S, Front: A*1 - B*2 P265/70R16 111T Rear: C*3 - D*4	 42 mm (1.65 in.) -43 mm (-1.69 in.) 42 mm (1.65 in.) -40 mm (-1.57 in.) 42 mm (1.65 in.) -41 mm (-1.61 in.)
	RZN161L-TRPDKAB Normal Front: A*1 - B*2 Rear: C*3 - D*4 Heavy-duty leaf spring Tire size: P255/75R15 102S Front: A*1 - B*2 Rear: C*3 - D*4 Tire size: P265/70R16 111S, Front: A*1 - B*2 P265/70R16 111T Rear: C*3 - D*4	 40 mm (1.57 in.) -43 mm (-1.69 in.) 40 mm (1.57 in.) -40 mm (-1.57 in.) 40 mm (1.57 in.) -41 mm (-1.61 in.)
	VZN170L-CRMDKAB Normal Tire size: P225/75R15 102S, Front: A*1 - B*2 P265/75R15 111T Rear: C*3 - D*4 Tire size: P265/75R15 111S Front: A*1 - B*2 Rear: C*3 - D*4 Off-road package Front: A*1 - B*2 Rear: C*3 - D*4 Heavy-duty leaf spring Tire size: P225/75R15 102S, Front: A*1 - B*2 P265/70R16 111S Rear: C*3 - D*4 Tire size: P265/70R16 111T Front: A*1 - B*2 Rear: C*3 - D*4	 40 mm (1.57 in.) -44 mm (-1.73 in.) 40 mm (1.57 in.) -45 mm (-1.77 in.) 53 mm (2.10 in.) -39 mm (-1.54 in.) 40 mm (1.57 in.) -39 mm (-1.54 in.) 40 mm (1.57 in.) -38 mm (-1.50 in.)

Measuring point
A*1: Ground clearance of spindle center
B*2: Ground clearance of front adjusting cam bolt center
C*3: Ground clearance of rear axle shaft center
D*4: Ground clearance of leaf spring front hanger pin bolt center

Front wheel Alignment (4WD and pre runner, cont'd)	VZN170L-CRPDKAB		
	Normal		
	Tire size: P225/75R15 102S,	Front: A*1 - B*2	41 mm (1.61 in.)
	P265/70R16 111T	Rear: C*3 - D*4	-44 mm (-1.73 in.)
	Tire size: P265/70R16 111S	Front: A*1 - B*2	41 mm (1.61 in.)
		Rear: C*3 - D*4	-45 mm (-1.77 in.)
	Off-road package	Front: A*1 - B*2	49 mm (1.93 in.)
		Rear: C*3 - D*4	-39 mm (-1.54 in.)
	Heavy-duty leaf spring		
	Tire size: P225/75R15 102S,	Front: A*1 - B*2	41 mm (1.61 in.)
	P265/70R16 111T	Rear: C*3 - D*4	-38 mm (-1.50 in.)
	Tire size: P265/70R16 111S	Front: A*1 - B*2	41 mm (1.61 in.)
		Rear: C*3 - D*4	-39 mm (-1.54 in.)
	VZN170L-PRPDKAB		
	Normal	Front: A*1 - B*2	68 mm (2.68 in.)
		Rear: C*3 - D*4	-20 mm (-0.79 in.)
	Off-road package	Front: A*1 - B*2	69 mm (2.72 in.)
		Rear: C*3 - D*4	-17 mm (-0.67 in.)
	RZN171L-CRMDKAB		
	Normal		
	Tire size: P225/75R15 102S,	Front: A*1 - B*2	39 mm (1.54 in.)
	P265/70R16 111S	Rear: C*3 - D*4	-44 mm (-1.73 in.)
	Tire size: P265/70R16 111T	Front: A*1 - B*2	39 mm (1.54 in.)
		Rear: C*3 - D*4	-43 mm (-1.69 in.)
	Off-road package	Front: A*1 - B*2	52 mm (2.05 in.)
		Rear: C*3 - D*4	-38 mm (-1.50 in.)
	Heavy-duty leaf spring		
	Tire size: P225/75R15 102S,	Front: A*1 - B*2	39 mm (1.54 in.)
	P265/70R16 111T	Rear: C*3 - D*4	-38 mm (-1.50 in.)
	Tire size: P265/70R16 111S	Front: A*1 - B*2	39 mm (1.54 in.)
		Rear: C*3 - D*4	-39 mm (-1.54 in.)
	RZN171L-CRPDKAB		
	Normal		
	Tire size: P225/75R15 102S,	Front: A*1 - B*2	40 mm (1.57 in.)
	P265/70R16 111T	Rear: C*3 - D*4	-43 mm (-1.69 in.)
	Tire size: P265/70R16 111S	Front: A*1 - B*2	40 mm (1.57 in.)
		Rear: C*3 - D*4	-44 mm (-1.73 in.)
	Heavy-duty leaf spring		
	Tire size: P225/75R15 102S,	Front: A*1 - B*2	40 mm (1.57 in.)
	P265/70R16 111T	Rear: C*3 - D*4	-38 mm (-1.50 in.)
	Tire size: P265/70R16 111S	Front: A*1 - B*2	40 mm (1.57 in.)
		Rear: C*3 - D*4	-39 mm (-1.54 in.)

Measuring point
A*1: Ground clearance of spindle center
B*2: Ground clearance of front adjusting cam bolt center
C*3: Ground clearance of rear axle shaft center
D*4: Ground clearance of leaf spring front hanger pin bolt center

Front wheel Alignment (4WD and pre runner, cont'd)	RZN191L-TRPDKAB		
	Normal	Front: A*[1] - B*[2]	39 mm (1.54 in.)
		Rear: C*[3] - D*[4]	-46 mm (-1.18 in.)
	Heavy-duty leaf spring		
	Tire size: P225/75R15 102S	Front: A*[1] - B*[2]	39 mm (1.54 in.)
		Rear: C*[3] - D*[4]	-42 mm (-1.65 in.)
	Tire size: P265/70R16 111S,	Front: A*[1] - B*[2]	39 mm (1.54 in.)
	P265/70R16 111T	Rear: C*[3] - D*[4]	-43 mm (-1.69 in.)
	VZN195L-CRPDKAB		
	Normal	Front: A*[1] - B*[2]	42 mm (1.65 in.)
		Rear: C*[3] - D*[4]	-46 mm (-1.81 in.)
	Off-road package	Front: A*[1] - B*[2]	47 mm (1.85 in.)
		Rear: C*[3] - D*[4]	-41 mm (-1.61 in.)
	Heavy-duty leaf spring		
	Tire size: P225/75R15 102S	Front: A*[1] - B*[2]	42 mm (1.65 in.)
		Rear: C*[3] - D*[4]	-40 mm (-1.57 in.)
	Tire size: P265/70R16 111S,	Front: A*[1] - B*[2]	42 mm (1.65 in.)
	P265/70R16 111T	Rear: C*[3] - D*[4]	-39 mm (-1.54 in.)
	VZN195L-PRPDKAB		
	Normal	Front: A*[1] - B*[2]	67 mm (2.64 in.)
		Rear: C*[3] - D*[4]	-23 mm (-0.91 in.)
	Off-road package	Front: A*[1] - B*[2]	68 mm (2.68 in.)
		Rear: C*[3] - D*[4]	-20 mm (-0.79 in.)
	RZN196L-CRPDKAB		
	Normal	Front: A*[1] - B*[2]	39 mm (1.54 in.)
		Rear: C*[3] - D*[4]	-46 mm (-1.81 in.)
	Off-road package	Front: A*[1] - B*[2]	48 mm (1.89 in.)
		Rear: C*[3] - D*[4]	-41 mm (-1.61 in.)
	Heavy-duty leaf spring		
	Tire size: P225/75R15 102S,	Front: A*[1] - B*[2]	39 mm (1.54 in.)
	P265/70R16 111S	Rear: C*[3] - D*[4]	-40 mm (-1.57 in.)
	Tire size: P265/70R16 111T	Front: A*[1] - B*[2]	39 mm (1.54 in.)
		Rear: C*[3] - D*[4]	-39 mm (-1.54 in.)
	RZN196L-PRPDKAB		
	Normal	Front: A*[1] - B*[2]	66 mm (2.60 in.)
		Rear: C*[3] - D*[4]	-23 mm (-0.91 in.)
	Off-road package	Front: A*[1] - B*[2]	77 mm (3.03 in.)
		Rear: C*[3] - D*[4]	-19 mm (-0.75 in.)

Measuring point
A*[1]: Ground clearance of spindle center
B*[2]: Ground clearance of front adjusting cam bolt center
C*[3]: Ground clearance of rear axle shaft center
D*[4]: Ground clearance of leaf spring front hanger pin bolt center

Front wheel Alignment (4WD and pre runner, cont'd)	● Camber	Right - left error: 30' (0.5°) or less
	RZN161L models	0°18' ± 45' (0.3° ± 0.75°)
	VZN170L models	
	Except double cab models	
	Normal	0°18' ± 45' (0.3° ± 0.75°)
	Off-road package	0°06' ± 45' (0.1° ± 0.75°)
	Double cab models	
	Normal	-0 °12' ± 45' (-0.2° ± 0.75°)
	Off-road package	−0°18' ± 45' (-0.3° ± 0.75°)
	RZN171L models	
	Normal	0°18' ± 45' (0.3° ± 0.75°)
	Off-road package	0°06' ± 45' (0.1° ± 0.75°)
	RZN191L models	0°18' ± 45' (0.3° ± 0.75°)
	VZN195L models	
	Except double cab models	0°12' ± 45' (0.2° ± 0.75°)
	Double cab models	
	Normal	-0 °12' ± 45' (-0.2° ± 0.75°)
	Off-road package	-0 °18' ± 45' (-0.3° ± 0.75°)
	VZN196L models	
	Except double cab models	
	Normal	0°18' ± 45' (0.3° ± 0.75°)
	Off-road package	0°12' ± 45' (0.2° ± 0.75°)
	Double cab models	
	Normal	−0'12' ± 45' (-0.2° ± 0.75°)
	Off-road package	−0'30' ± 45' (-0.5° ± 0.75°)
	● Caster	Right-left error: 30' (0.5°) or less
	RZN161L-TRMDKAB	
	Normal	
	Tire size: P225/75R15 102S	1°37' ± 45' (1.62° ± 0.75°)
	Tire size: P265/70R16 111S	1°38' ± 45' (1.63° ± 0.75°)
	Tire size: P265/70R16 111T	1°37' ± 45' (1.61° ± 0.75°)
	Heavy-duty leaf spring	
	Tire size: P225/75R15 102S	1°41' ± 45' (1.69° ± 0.75°)
	Tire size: P265/70R16 111S	1°43' ± 45' (1.71° ± 0.75°)
	Tire size: P265/70R16 111T	1°41' ± 45' (1.68° ± 0.75°)
	RZN161L-TRPDKAB	
	Normal	
	Tire size: P225/75R15 102S	1°37' ± 45' (1.62° ± 0.75°)
	Tire size: P265/70R16 111S	1°38' ± 45' (1.64° ± 0.75°)
	Tire size: P265/70R16 111T	1°37' ± 45' (1.61° ± 0.75°)
	Heavy-duty leaf spring	
	Tire size: P225/75R15 102S	1°42' ± 45' (1.70° ± 0.75°)
	Tire size: P265/70R16 111S	1°43' ± 45' (1.71° ± 0.75°)
	Tire size: P265/70R16 111T	1°41' ± 45' (1.69° ± 0.75°)
	VZN170L-CRMDKAB	
	Normal	
	Tire size: P225/75R15 102S	1°42' ± 45' (1.70° ± 0.75°)
	Tire size: P265/70R16 111S	1°43' ± 45' (1.72° ± 0.75°)
	Tire size: P265/70R16 111T	1°41' ± 45' (1.69° ± 0.75°)
	Off-road package	2°02' ± 45' (2.03° ± 0.75°)
	Heavy-duty leaf spring	
	Tire size: P225/75R15 102S	1°50' ± 45' (1.83° ± 0.75°)
	Tire size: P265/70R16 111S	1°51' ± 45' (1.85° ± 0.75°)
	Tire size: P265/70R16 111T	1°49' ± 45' (1.82° ± 0.75°)

Front wheel Alignment (4WD and pre runner, cont'd)	VZN170L-CRPDKAB	
	Normal	
	Tire size: P225/75R15 102S, P265/70R16 111T	1°41' ± 45' (1.69° ± 0.75°)
	Tire size: P265/70R16 111S	1°43' ± 45' (1.71° ± 0.75°)
	Off-road package	1°58' ± 45' (1.96° ± 0.75°)
	Heavy-duty leaf spring	
	Tire size: P225/75R15 102S, P265/70R16 111T	1°49' ± 45' (1.82° ± 0.75°)
	Tire size: P265/70R16 111S	1°50' ± 45' (1.84° ± 0.75°)
	VZN170L-PRPDKAB	
	Normal	
	Tire size: P225/75R15 102S	2°36' ± 45' (2.60° ± 0.75°)
	Tire size: P265/70R16 111S	2°36' ± 45' (2.61° ± 0.75°)
	Tire size: P265/70R16 111T	2°35' ± 45' (2.59° ± 0.75°)
	Off-road package	2°39' ± 45' (2.66° ± 0.75°)
	VZN171L-CRMDKAB	
	Normal	
	Tire size: P225/75R15 102S	1°44' ± 45' (1.74° ± 0.75°)
	Tire size: P265/70R16 111S	1°45' ± 45' (1.75° ± 0.75°)
	Tire size: P265/70R16 111T	1°44' ± 45' (1.73° ± 0.75°)
	Off-road package	2°02' ± 45' (2.03° ± 0.75°)
	Heavy-duty leaf spring	
	Tire size: P225/75R15 102S	1°52' ± 45' (1.86° ± 0.75°)
	Tire size: P265/70R16 111S	1°52' ± 45' (1.87° ± 0.75°)
	Tire size: P265/70R16 111T	1°51' ± 45' (1.85° ± 0.75°)
	RZN171L-CRPDKAB	
	Normal	
	Tire size: P225/75R15 102S, P265/70R16 111T	1°44' ± 45' (1.73° ± 0.75°)
	Tire size: P265/70R16 111S	1°45' ± 45' (1.75° ± 0.75°)
	Heavy-duty leaf spring	
	Tire size: P225/75R15 102S	1°52' ± 45' (1.86° ± 0.75°)
	Tire size: P265/70R16 111S	1°52' ± 45' (1.87° ± 0.75°)
	Tire size: P265/70R16 111T	1°51' ± 45' (1.85° ± 0.75°)
	RZN191L-TRPDKAB	
	Normal	
	Tire size: P225/75R15 102S	1°37' ± 45' (1.62° ± 0.75°)
	Tire size: P265/70R16 111S	1°38' ± 45' (1.63° ± 0.75°)
	Tire size: P265/70R16 111T	1°37' ± 45' (1.61° ± 0.75°)
	Heavy-duty leaf spring	
	Tire size: P225/75R15 102S	1°43' ± 45' (1.72° ± 0.75°)
	Tire size: P265/70R16 111S	1°44' ± 45' (1.73° ± 0.75°)
	Tire size: P265/70R16 111T	1°43' ± 45' (1.71° ± 0.75°)
	VZN195L-CRPDKAB	
	Normal	
	Tire size: P225/75R15 102S	1°43' ± 45' (1.71° ± 0.75°)
	Tire size: P265/70R16 111S	1°44' ± 45' (1.73° ± 0.75°)
	Tire size: P265/70R16 111T	1°42' ± 45' (1.70° ± 0.75°)
	Off-road package	1°56' ± 45' (1.93° ± 0.75°)
	Heavy-duty leaf spring	
	Tire size: P225/75R15 102S	1°52' ± 45' (1.86° ± 0.75°)
	Tire size: P265/70R16 111S	1°53' ± 45' (1.88° ± 0.75°)
	Tire size: P265/70R16 111T	1°51' ± 45' (1.85° ± 0.75°)

Front wheel Alignment (4WD and pre runner, cont'd)	VZN195L-PRPDKAB	
	Normal	
	Tire size: P225/75R15 102S	2°31' ± 45' (2.53° ± 0.75°)
	Tire size: P265/70R16 111S	2°35' ± 45' (2.59° ± 0.75°)
	Tire size: P265/70R16 111T	2°33' ± 45' (2.56° ± 0.75°)
	Off-road package	2°39' ± 45' (2.66° ± 0.75°)
	RZN196L-CRPDKAB	
	Normal	
	Tire size: P225/75R15 102S	1°43' ± 45' (1.72° ± 0.75°)
	Tire size: P265/70R16 111S	1°44' ± 45' (1.73° ± 0.75°)
	Tire size: P265/70R16 111T	1°43' ± 45' (1.71° ± 0.75°)
	Off-road package	1°56' ± 45' (1.94° ± 0.75°)
	Heavy-duty leaf spring	
	Tire size: P225/75R15 102S	1°52' ± 45' (1.86° ± 0.75°)
	Tire size: P265/70R16 111S	1°52' ± 45' (1.87° ± 0.75°)
	Tire size: P265/70R16 111T	1°51' ± 45' (1.85° ± 0.75°)
	RZN196L-PRPDKAB	
	Normal	
	Tire size: P225/75R15 102S	2°34' ± 45' (2.58° ± 0.75°)
	Tire size: P265/70R16 111S	2°35' ± 45' (2.59° ± 0.75°)
	Tire size: P265/70R16 111T	2°33' ± 45' (2.56° ± 0.75°)
	Off-road package	2°45' ± 45' (2.75° ± 0.75°)
	● Steering axis inclination	Right - left error: 30' (0.5°) or less
	RZN161L models	10°30' ± 45' (10.5° ± 0.75°)
	VZN170L-CRMDKAB	
	Except off-road package	10°30' ± 45' (10.5° ± 0.75°)
	Off-road package	10°42' ± 45' (10.7° ± 0.75°)
	VZN170L-CRPDKAB	
	Except off-road package	10°30' ± 45' (10.5° ± 0.75°)
	Off-road package	10°36' ± 45' (10.6° ± 0.75°)
	VZN170L-PRPDKAB	11°00' ± 45' (11.0° ± 0.75°)
	RZN171L-CRMDKAB	
	Except off-road package	10°24' ± 45' (10.4° ± 0.75°)
	Off-road package	10°49' ± 45' (10.7° ± 0.75°)
	RZN171L-CRPDKAB	10°30' ± 45' (10.5° ± 0.75°)
	RZN191L-TRPDKAB	10°24' ± 45' (10.4° ± 0.75°)
	VZN195L-CRPDKAB	
	Except off-road package	10°30' ± 45' (10.5° ± 0.75°)
	Off-road package	10°36' ± 45' (10.6° ± 0.75°)
	VZN195L-PRPDKAB	11°00' ± 45' (11.0° ± 0.75°)
	VZN196L-CRPDKAB	
	Except off-road package	10°24' ± 45' (10.4° ± 0.75°)
	Off-road package	10°36' ± 45' (10.6° ± 0.75°)
	VZN196L-PRPDKAB	
	Normal	10°54' ± 45' (10.9° ± 0.75°)
	Off-road package	11°12' ± 45' (11.2° ± 0.75°)

Front wheel Alignment (4WD and pre runner, cont'd)	● Toe - in (Total)	Rack end length difference : 1.5 mm (0.059 in.) or less
	RZN161L-TRMDKAB	
	Tire size: P225/75R15 102S	0°07' ± 12' (0.12° ± 0.2°, 1.3 ± 2 mm, 0.05 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°07' ± 12' (0.11° ± 0.2°, 1.4 ± 2 mm, 0.06 ± 0.08 in.)
	RZN161L-TRPDKAB	
	Tire size: P225/75R15 102S	0°07' ± 12' (0.12° ± 0.2°, 1.4 ± 2 mm, 0.06 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°07' ± 12' (0.12° ± 0.2°, 1.5 ± 2 mm, 0.06 ± 0.08 in.)
	VZN170L-CRMDKAB	
	Except off-road package	
	Tire size: P225/75R15 102S	0°07' ± 12' (0.12° ± 0.2°, 1.4 ± 2 mm, 0.06 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°07' ± 12' (0.12° ± 0.2°, 1.5 ± 2 mm, 0.06 ± 0.08 in.)
	Off-road package	0°02' ± 12' (0.03° ± 0.2°, 0.4 ± 2 mm, 0.02 ± 0.08 in.)
	VZN170L-CRPDKAB	
	Except off-road package	
	Tire size: P225/75R15 102S	0°07' ± 12' (0.12° ± 0.2°, 1.3 ± 2 mm, 0.05 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°07' ± 12' (0.11° ± 0.2°, 1.4 ± 2 mm, 0.06 ± 0.08 in.)
	Off-road package	0°03' ± 12' (0.06° ± 0.2°, 0.7 ± 2 mm, 0.03 ± 0.08 in.)
	VZN170L-PRPDKAB	
	Except off-road package	
	Tire size: P225/75R15 102S	0°04' ± 12' (0.07° ± 0.2°, 0.8 ± 2 mm, 0.03 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°04' ± 12' (0.07° ± 0.2°, 0.9 ± 2 mm, 0.04 ± 0.08 in.)
	Off-road package	0°03' ± 12' (0.06° ± 0.2°, 0.8 ± 2 mm, 0.03 ± 0.08 in.)
	RZN171L-CRMDKAB	
	Except off-road package	
	Tire size: P225/75R15 102S	0°07' ± 12' (0.12° ± 0.2°, 1.4 ± 2 mm, 0.05 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°08' ± 12' (0.13° ± 0.2°, 1.6 ± 2 mm, 0.06 ± 0.08 in.)
	Off-road package	0°02' ± 12' (0.04° ± 0.2°, 0.5 ± 2 mm, 0.02 ± 0.08 in.)
	RZN171L-CRPDKAB	
	Tire size: P225/75R15 102S	0°07' ± 12' (0.12° ± 0.2°, 1.4 ± 2 mm, 0.06 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°07' ± 12' (0.12° ± 0.2°, 1.5 ± 2 mm, 0.06 ± 0.08 in.)
	RZN191L-TRPDKAB	
	Tire size: P225/75R15 102S	0°07' ± 12' (0.12° ± 0.2°, 1.4 ± 2 mm, 0.06 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°08' ± 12' (0.13° ± 0.2°, 1.6 ± 2 mm, 0.06 ± 0.08 in.)
	VZN195L-CRPDKAB	
	Except off-road package	
	Tire size: P225/75R15 102S	0°06' ± 12' (0.10° ± 0.2°, 1.1 ± 2 mm, 0.04 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°06' ± 12' (0.10° ± 0.2°, 1.2 ± 2 mm, 0.05 ± 0.08 in.)
	Off-road package	0°04' ± 12' (0.07° ± 0.2°, 0.8 ± 2 mm, 0.03 ± 0.08 in.)
	VZN195L-PRPDKAB	
	Normal	
	Tire size: P225/75R15 102S	0°04' ± 12' (0.07° ± 0.2°, 0.9 ± 2 mm, 0.04 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°04' ± 12' (0.07° ± 0.2°, 1.0 ± 2 mm, 0.04 ± 0.08 in.)
	Off-road package	0°03' ± 12' (0.06° ± 0.2°, 0.8 ± 2 mm, 0.03 ± 0.08 in.)
	RZN196L-CRPDKAB	
	Except off-road package	
	Tire size: P225/75R15 102S	0°07' ± 12' (0.12° ± 0.2°, 1.4 ± 2 mm, 0.06 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°08' ± 12' (0.13° ± 0.2°, 1.6 ± 2 mm, 0.06 ± 0.08 in.)
	Off-road package	0°04' ± 12' (0.07° ± 0.2°, 0.8 ± 2 mm, 0.03 ± 0.08 in.)
	RZN196L-PRPDKAB	
	Normal	
	Tire size: P225/75R15 102S	0°04' ± 12' (0.07° ± 0.2°, 1.0 ± 2 mm, 0.04 ± 0.08 in.)
	Tire size: P265/70R16 111S, P265/70R16 111T	0°05' ± 12' (0.08° ± 0.2°, 1.1 ± 2 mm, 0.04 ± 0.08 in.)
	Off-road package	0°00' ± 12' (0° ± 0.2°, 0 ± 2 mm, 0 ± 0.08 in.)
	● Wheel angle (max.) Inside wheel	35°05' - 38°05' (35.08° - 38.08°)
	Outside wheel: Reference	32°20' (32.33°)

Front axle (2WD except pre runner)	Axle hub bearing backlash Max.	0.05 mm (0.0020 in.)
	Axle hub preload (at starting)	Frictional force plus 6 - 18 N (0.6 - 1.8 kgf, 1.3 - 4.0 lbf)
Front drive shaft	Front drive shaft length	436.2 ± 2.0 mm (17.173 ± 0.079 in.)
Front suspension (2WD except pre runner)	Upper ball joint turning torque	0.5 - 3.5 N·m (5 - 35 kgf·cm, 4 - 30 in.·lbf)
	Lower ball joint turning torque	0.1 - 3.45 N·m (1 - 35 kgf·cm, 0.8 - 30 in.·lbf)
	Lower ball joint excessive play Max.	0.5 mm (0.020 in.)
Front suspension (4WD and pre runner)	Upper ball joint turning torque	0.7 - 4.4 N·m (7 - 45 kgf·cm, 6 - 39 in.·lbf)
	Lower ball joint turning torque	0.1 - 2.5 N·m (1 - 25 kgf·cm, 1 - 22 in.·lbf)
	Lower ball joint excessive play Max.	0.5 mm (0.020 in.)
	Stabilizer bar link ball joint turning toque	0.05 - 2.0 N·m (0.5 - 20 kgf·cm, 0.4 - 17 in.·lbf)
Rear axle shaft	Axle shaft bearing backlash Max.	0.7 mm (0.028 in.)
	Axle shaft deviation Max.	0.1 mm (0.0039 in.)
	Shaft runout Max.	2.0 mm (0.079 in.)
	Flange runout Max.	0.1 mm (0.004 in.)
Front differential	Companion flange vertical runout Max.	0.10 mm (0.0039 in.)
	Companion flange horizontal runout Max.	0.10 mm (0.0039 in.)
	Drive pinion preload (at starting) New bearing Reused bearing	1.2 - 1.9 N·m (12 - 19 kgf·cm, 10.4 - 16.5 in.·lbf) 0.6 - 1.0 N·m (6 - 10 kgf·cm, 5.2 - 8.7 in.·lbf)
	Total preload (at starting)	Drive pinion preload plus 0.4 - 0.6 N·m (4 - 6 kgf·cm, 3.5 - 5.2 in.·lbf)
	Drive pinion to ring gear backlash	0.13 - 0.18 mm (0.0051 - 0.0071 in.)
	Side gear backlash	0 - 0.20 mm (0 - 0.0079 in.)
	Rear oil seal drive in depth	4.5 ± 0.3 mm (0.177 ± 0.012 in.)
	Side oil seal drive in depth	0 mm (0 in.)
	Side tube oil seal drive in depth	5.5 ± 0.3 mm (0.217 ± 0.012 in.)
	Side gear thrust washer thickness	0.96 - 1.04 mm (0.0378 - 0.0409 in.)
		1.06 - 1.14 mm (0.0417 - 0.0449 in.)
		1.16 - 1.24 mm (0.0457 - 0.0488 in.)
		1.26 - 1.34 mm (0.0496 -0.0528 in.)

Front differential (cont'd)	Side gear bearing adjusting washer thickness	2.00 - 2.02 mm (0.0787 - 0.0795 in.)
		2.03 - 2.05 mm (0.0799 - 00807 in.)
		2.06 - 2.08 mm (0.0811 - 0.0819 in.)
		2.09 - 2.11 mm (0.0823 - 0.0831 in.)
		2.12 - 2.14 mm (0.0835 - 0.0843 in.)
		2.15 - 2.17 mm (0.0846 - 0.0854 in.)
		2.18 - 2.20 mm (0.0858 - 0.0866 in.)
		2.21 - 2.23 mm (0.0870 - 0.0878 in.)
		2.24 - 2.26 mm (0.0882 - 0.0890 in.)
		2.27 - 2.29 mm (0.0894 - 0.0902 in.)
		2.30 - 2.32 mm (0.0906 - 0.0913 in.)
		2.33 - 2.35 mm (0.0917 - 0.0925 in.)
		2.36 - 2.38 mm (0.0929 - 0.0937 in.)
		2.39 - 2.41 mm (0.0941 - 0.0949 in.)
		2.42 - 2.44 mm (0.0953 - 0.0961 in.)
		2.45 - 2.47 mm (0.0965 - 0.0972 in.)
		2.48 - 2.50 mm (0.0976 - 0.0984 in.)
		2.51 - 2.53 mm (0.0988 - 0.0996 in.)
		2.54 - 2.56 mm (0.1000 - 01008 in.)
		2.57 - 2.59 mm (0.1012 - 0.1020 in.)
		2.60 - 2.62 mm (0.1024 - 0.1031 in.)
		2.63 - 2.65 mm (0.1035 - 0.1043 in.)
		2.66 - 2.68 mm (0.1047 - 0.1055 in.)
		2.69 - 2.71 mm (0.1059 - 0.1067 in.)
		2.72 - 2.74 mm (0.1071 - 0.1079 in.)
		2.75 - 2.77 mm (0.1083 - 0.1091 in.)
		2.78 - 2.80 mm (0.1094 - 0.1102 in.)
	Drive pinion bearing adjusting washer thickness	1.69 - 1.71 mm (0.0665 - 0.0673 in.)
		1.72 - 1.74 mm (0.0677 - 0.0685 in.)
		1.75 - 1.77 mm (0.0689 - 0.0697 in.)
		1.78 - 1.80 mm (0.0701 - 0.0709 in.)
		1.81 - 1.83 mm (0.0713 - 0.0720 in.)
		1.84 - 1.86 mm (0.0724 - 0.0732 in.)
		1.87 - 1.89 mm (0.0736 - 0.0744 in.)
		1.90 - 1.92 mm (0.0748 - 0.0756 in.)
		1.93 - 1.95 mm (0.0760 - 0.0768 in.)
		1.96 - 1.98 mm (0.0772 - 0.0780 in.)
		1.99 - 2.01 mm (0.0783 - 0.0791 in.)
		2.02 - 2.04 mm (0.0795 - 0.0803 in.)
		2.05 - 2.07 mm (0.0807 - 0.0815 in.)
		2.08 - 2.10 mm (0.0819 - 0.0827 in.)

Front differential (cont'd)	Drive pinion bearing adjusting washer thickness	2.11 - 2.13 mm (0.0831 - 0.0839 in.)
		2.14 - 2.16 mm (0.0843 - 0.0850 in.)
		2.17 - 2.19 mm (0.0854 - 0.0862 in.)
		2.20 - 2.22 mm (0.0866 - 0.0874 in.)
		2.23 - 2.25 mm (0.0878 - 0.0886 in.)
		2.26 - 2.28 mm (0.0890 - 0.0898 in.)
		2.29 - 2.31 mm (0.0902 - 0.0909 in.)
		2.32 - 2.34 mm (0.0913 - 0.0921 in.)
	A.D.D. sleeve fork to clutch sleeve clearance	0.35 mm (0.0138 in.) or less
	Differential case needle bearing press in depth	0.3 ± 0.3 mm (0.012 ± 0.012 in.)
Rear differential (2RZ-FE)	Companion flange vertical runout Max.	0.10 mm (0.0039 in.)
	Companion flange lateral runout Max.	0.10 mm (0.0039 in.)
	Drive pinion preload (at starting) New bearing Reused bearing	1.4 - 2.1 N·m (14 - 21 kgf·cm, 12.2 - 18.3 in.·lbf) 0.6 - 1.0 N·m (6 - 10 kgf·cm, 5.2 - 8.7 in.·lbf)
	Total preload (at starting)	Drive pinion preload plus 0.4 - 0.6 N·m (4 - 6 kgf·cm, 3.5 - 5.2 in.·lbf)
	Drive pinion to ring gear backlash	0.13 - 0.18 mm (0.0051 - 0.0071 in.)
	Side gear backlash	0 05 - 0.20 mm (0.0020 - 0.0079 in.)
	Ring gear runout Max.	0.07 mm (0.0028 in.)
	Differential case runout Max.	0.07 mm (0.0028 in.)
	Drive pinion oil seal drive in depth	1.5 mm (0.059 in.)
	Side gear thrust washer thickness	1.0 mm (0.039 in.)
		1.1 mm (0.043 in.)
		1.2 mm (0.047 in.)
		1.3 mm (0.051 in.)
	Drive pinion bearing washer thickness	2.24 mm (0.0882 in.)
		2.27 mm (0.0894 in.)
		2.30 mm (0.0906 in.)
		2.33 mm (0.0917 in.)
		2.36 mm (0.0929 in.)
		2.39 mm (0.0941 in.)
		2.42 mm (0.0953 in.)
		2.45 mm (0.0965 in.)
		2.48 mm (0.0976 in.)
		2.51 mm (0.0988 in.)
		2.54 mm (0.1000 in.)
		2.57 mm (0.1012 in.)
		2.60 mm (0.1024 in.)
		2.63 mm (0.1035 in.)
		2.66 mm (0.1047 in.)
		2.69 mm (0.1059 in.)
		2.72 mm (0.1071 in.)
Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock)	Companion flange vertical runout Max.	0.09 mm (0.0035 in.)
	Companion flange lateral runout Max.	0.09 mm (0.0035 in.)

Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock, cont'd)	Drive pinion preload (at starting)	New bearing Reused bearing	1.1 - 1.7 N·m (12 - 18 kgf·cm, 10.0 - 15.2 in.·lbf) 0.6 - 0.9 N·m (7 - 10 kgf·cm, 5.7 - 8.3 in.·lbf)
	Total preload (at starting)		Drive pinion preload plus 0.4 - 0.6 N·m (4 - 6 kgf·cm, 3.5 - 5.2 in.·lbf)
	Drive pinion to ring gear backlash		0.13 - 0.18 mm (0.0051 - 0.0071 in.)
	Side gear backlash		0 05 - 0.20 mm (0.0020 - 0.0079 in.)
	Ring gear runout	Max.	0.05 mm (0.0020 in.)
	Differential case runout	Max.	0.04 mm (0.0016 in.)
	Drive pinion oil seal drive in depth		0.5 mm (0.020 in.)
	Side gear thrust washer thickness		1.50 mm (0.0590 in.)
			1.55 mm (0.0610 in.)
			1.60 mm (0.0630 in.)
			1.65 mm (0.0650 in.)
			1.70 mm (0.0669 in.)
			1.75 mm (0.0689 in.)
			1.80 mm (0.0709 in.)
			1.85 mm (0.0728 in.)
			1.90 mm (0.0748 in.)

Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock, cont'd)	Side bearing adjusting washer thickness	58	2.58 mm (0.1015 in.)
		60	2.60 mm (0.1024 in.)
		62	2.62 mm (0.1031 in.)
		64	2.64 mm (0.1039 in.)
		66	2.66 mm (0.1047 in.)
		68	2.68 mm (0.1055 in.)
		70	2.70 mm (0.1063 in.)
		72	2.72 mm (0.1071 in.)
		74	2.74 mm (0.1079 in.)
		76	2.76 mm (0.1087 in.)
		78	2.78 mm (0.1094 in.)
		80	2.80 mm (0.1102 in.)
		82	2.82 mm (0.1110 in.)
		84	2.84 mm (0.1118 in.)
		86	2.86 mm (0.1126 in.)
		88	2.88 mm (0.1134 in.)
		90	2.90 mm (0.1142 in.)
		92	2.92 mm (0.1150 in.)
		94	2.94 mm (0.1157 in.)
		96	2.96 mm (0.1165 in.)
		98	2.98 mm (0.1173 in.)
		00	3.00 mm (0.1181 in.)
		02	3.02 mm (0.1189 in.)
		04	3.04 mm (0.1197 in.)
		06	3.06 mm (0.1205 in.)
		08	3.08 mm (0.1213 in.)
		10	3.10 mm (0.1220 in.)
		12	3.12 mm (0.1228 in.)
		14	3.14 mm (0.1236 in.)
		16	3.16 mm (0.1244 in.)
		18	3.18 mm (0.1252 in.)
		20	3.20 mm (0.1260 in.)
		22	3.22 mm (0.1268 in.)
		24	3.24 mm (0.1276 in.)
		26	3.26 mm (0.1283 in.)
		28	3.28 mm (0.1291 in.)
		30	3.30 mm (0.1299 in.)
		32	3.32 mm (0.1307 in.)
		34	3.34 mm (0.1315 in.)
		36	3.36 mm (0.1323 in.)
		38	3.38 mm (0.1331 in.)
		40	3.40 mm (0.1339 in.)
		42	3.42 mm (0.1346 in.)
		44	3.44 mm (0.1354 in.)
		46	3.46 mm (0.1362 in.)
		48	3.48 mm (0.1370 in.)

Rear differential (3RZ-FE, 5VZ-FE w/o Diff. lock, cont'd)	Drive pinion bearing adjusting washer thickness	87	1.87 mm (0.0736 in.)
		88	1.88 mm (0.0740 in.)
		89	1.89 mm (0.0744 in.)
		90	1.90 mm (0.0748 in.)
		91	1.91 mm (0.0752 in.)
		92	1.92 mm (0.0756 in.)
		93	1.93 mm (0.0760 in.)
		94	1.94 mm (0.0764 in.)
		95	1.95 mm (0.0768 in.)
		96	1.96 mm (0.0772 in.)
		97	1.97 mm (0.0776 in.)
		98	1.98 mm (0.0780 in.)
		99	1.99 mm (0.0783 in.)
		00	2.00 mm (0.0787 in.)
		01	2.01 mm (0.0791 in.)
		02	2.02 mm (0.0795 in.)
		03	2.03 mm (0.0799 in.)
		04	2.04 mm (0.0803 in.)
		05	2.05 mm (0.0807 in.)
		06	2.06 mm (0.0811 in.)
		07	2.07 mm (0.0815 in.)
		08	2.08 mm (0.0819 in.)
		09	2.09 mm (0.0823 in.)
		10	2.10 mm (0.0827 in.)
		11	2.11 mm (0.0831 in.)
		12	2.12 mm (0.0835 in.)
		13	2.13 mm (0.0839 in.)
		14	2.14 mm (0.0843 in.)
		15	2.15 mm (0.0846 in.)
		16	2.16 mm (0.0850 in.)
		17	2.17 mm (0.0854 in.)
		18	2.18 mm (0.0858 in.)
		19	2.19 mm (0.0862 in.)
		20	2.20 mm (0.0866 in.)
		21	2.21 mm (0.0870 in.)
		22	2.22 mm (0.0874 in.)
		23	2.23 mm (0.0878 in.)
		24	2.24 mm (0.0882 in.)
		25	2.25 mm (0.0886 in.)
		26	2.26 mm (0.0890 in.)
		27	2.27 mm (0.0894 in.)
		28	2.28 mm (0.0898 in.)

Rear differential (3RZ-FE, 5VZ-FE w/ Diff. lock)	Companion flange vertical runout	Max.	0.10 mm (0.0039 in.)
	Companion horizontal lateral runout	Max.	0.10 mm (0.0039 in.)
	Drive pinion preload (at starting)	New bearing Reused bearing	0.9 - 1.6 N·m (10 - 16 kgf·cm, 8.7 - 13.9 in.·lbf) 0.5 - 0.8 N·m (5 - 8 kgf·cm, 4.3 - 6.9 in.·lbf)
	Total preload (at starting)		Drive pinion preload plus 0.4 - 0.6 N·m (4 - 6 kgf·cm, 3.5 - 5.2 in.·lbf)
	Drive pinion to ring gear backlash		0.13 - 0.18 mm (0.0051 - 0.0071 in.)
	Side gear backlash		0 05 - 0.20 mm (0.0020 - 0.0079 in.)
	Ring gear runout	Max.	0.10 mm (0.0039 in.)
	Differential case runout	Max.	0.07 mm (0.0028 in.)
	Drive pinion oil seal drive in depth		1.0 mm (0.039 in.)
	Diff. lock shift fork to sleeve clearance		0.15 - 0.35 mm (0.006 - 0.014 in.)
	Side gear thrust washer thickness		0.9 mm (0.035 in.)
			1.0 mm (0.039 in.)
			1.1 mm (0.043 in.)
			1.2 mm (0.047 in.)
			1.3 mm (0.051 in.)
	Drive pinion bearing adjusting washer thickness		1.70 mm (0.0669 in.)
			1.73 mm (0.0681 in.)
			1.76 mm (0.0693 in.)
			1.79 mm (0.0705 in.)
			1.82 mm (0.0717 in.)
			1.85 mm (0.0728 in.)
			1.88 mm (0.0740 in.)
			1.91 mm (0.0752 in.)
			1.94 mm (0.0764 in.)
			1.97 mm (0.0776 in.)
			2.00 mm (0.0787 in.)
			2.03 mm (0.0799 in.)
			2.06 mm (0.0811 in.)
			2.09 mm (0.0823 in.)
			2.12 mm (0.0835 in.)
			2.15 mm (0.0846 in.)
			2.18 mm (0.0858 in.)
			2.21 mm (0.0870 in.)
			2.24 mm (0.0882 in.)
			2.27 mm (0.0894 in.)
			2.30 mm (0.0906 in.)
			2.33 mm (0.0917 in.)

SS052-07

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Front (2WD):			
Axle hub x Disc	64	650	47
Hub nut	110	1,150	83
Tie rod end lock nut	54	550	40
Steering knuckle x Upper ball joint	110	1,100	80
Steering knuckle x Lower ball joint	160	1,600	116
Tie rod end x Lower ball joint	72	730	53
Steering knuckle x Dust cover	8.3	85	74 in.·lbf
Steering knuckle x Brake caliper	108	1,100	80
Upper suspension arm x Upper ball joint	39	400	29
Lower suspension arm x Spring bumper	43	440	32
Lower suspension arm x Lower suspension arm No. 3	150	1,530	111
Shock absorber x Frame	25	250	18
Lower suspension arm x Shock absorber	39	400	29
Stabilizer bar link x Stabilizer bar	29.5	300	22
Stabilizer bar link x Lower suspension arm	90	920	66
Lower suspension arm x Frame	200	2,050	148
Upper suspension arm shaft x Frame	130	1,300	94
Upper suspension arm shaft x Upper suspension arm	125	1,270	92
Lower suspension arm x Lower ball joint	110	1,100	80
Lower suspension arm x Strut bar	150	1,530	111
Strut bar x Frame	300	3,050	221
Stabilizer bar bracket x Frame	29	300	22
ABS speed sensor x Steering knuckle	8.0	82	71 in.·lbf
ABS speed sensor wire clamp x Steering knuckle	8.0	82	71 in.·lbf
ABS speed sensor wire clamp x Upper suspension arm	8.0	82	71 in.·lbf
Front (4WD and pre runner):			
Hub nut	110	1,150	83
Tie rod end lock nut	55	560	41
Steering knuckle x Lower ball joint (w/ Lower ball joint protector)	50	510	37
Steering knuckle x Lower ball joint (w/o Lower ball joint protector)	80	820	59
Tie rod end x Lower ball joint	90	930	67
Steering knuckle x Brake caliper	123	1,250	90
Steering knuckle x Dust cover	18	185	13
Flexible hose x Brake caliper	30	310	22
Drive shaft x Axle hub	235	2,400	174
Upper suspension arm x Upper ball joint	105	1,100	80
Lower suspension arm x Frame	130	1,325	96
Lower suspension arm x Lower ball joint	140	1,450	103
Lower suspension arm x No. 1, No. 2 spring bumper	31 (23)	315 (235)	23 (17)
Upper suspension arm x Frame	115	1,200	87
Frame x Suspension support	64	650	47
Shock absorber x Suspension support	29	300	22

( ) For use with SST

Part tightened		N·m	kgf·cm	ft·lbf
Lower suspension arm x Shock absorber		135	1,400	101
Stabilizer bar link x Stabilizer bar		69	700	51
Stabilizer bar link x Lower suspension arm		90	920	66
Stabilizer bar bracket x Frame		25	260	19
ABS speed sensor x Steering knuckle		8.0	82	71 in.·lbf
ABS speed sensor wire clamp x Steering knuckle		8.0	82	71 in.·lbf
ABS speed sensor wire clamp x Upper suspension arm		8.0	82	71 in.·lbf
Front differential				
Drive pinion x Companion flange		See page SA-54		
Differential front mounting cushion x Frame		137	1,400	101
Differential rear mounting cushion x Frame		87	890	64
Differential front mounting cushion x Differential		157	1,600	116
Differential rear mounting cushion x Differential		108	1,100	80
Ring gear x Differential case		97	985	71
Differential carrier x Differential tube		78	800	58
Differential carrier x Side bearing retainer		69	700	51
Differential x Front propeller shaft		74	750	54
A.D.D. clutch case x Differential		78	800	58
A.D.D. clutch case x Differential tube		78	800	58
A.D.D. actuator x A.D.D. clutch case		21	210	15
Differential carrier x Tube		13	130	9
Drain plug		65	660	48
Filler plug		39	400	29
Rear:				
Hub nut		110	1,150	83
Axle housing x Backing plate		68	700	50
Parking brake cable x Backing plate	2WD	9.3	95	82 in.·lbf
Parking brake cable clamp set bolt	2WD	26	260	19
Shock absorber x Spring seat	2WD	26	260	19
	4WD and pre runner	71	730	53
Shock absorber x Frame	2WD	26	260	19
	4WD and pre runner	71	730	53
Brake line union nut		15	155	11
U-bolt x Spring seat		123	1,250	90
Leaf spring hanger pin bolt x Frame		157	1,600	116
Shackle pin x Leaf spring		92	930	67
Shackle pin x Frame		92	930	67
Leaf spring center bolt		44	450	33
Spring bumper x Frame	2WD only	29	300	22
ABS speed sensor x Axle housing		8.0	82	71 in.·lbf
Rear differential (2RZ-FE)				
Differential x Propeller shaft		74	750	56
Differential carrier x Axle housing		25	250	18
Differential carrier x Bearing cap		85	870	63

Differential case x Ring gear	97	985	71
Part tightened	N·m	kgf·cm	ft·lbf
Drive pinion x Companion flange	See page SA-148		
Adjusting nut lock x Bearing cap	13	130	9
Drain plug, Filler plug	49	500	36
Rear differential (3RZ-FE, 5VZ-FE, w/o Diff. lock)			
Differential x Propeller shaft	74	750	56
DIfferential carrier x Axle housing	73	740	54
Differential carrier x Bearing cap	113	1,150	83
Drive pinion x Companion flange	See page SA-165		
Differential case x Ring gear	125	1,270	92
Drain plug, Filler plug	49	500	36
Rear differential (3RZ-FE, 5VZ-FE w/ Diff. lock)			
Differential x Propeller shaft	74	750	56
Differential carrier x Axle housing	25	250	18
Differential carrier x Bearing cap	78	800	58
Differential case x Ring gear	97	985	71
Adjusting nut lock x Bearing cap	13	130	9
Differential RH case x Differential LH case	47	480	35
Differential carrier x Diff. lock indicator switch	40	410	31
Differential carrier x Shaft retainer	24	240	17
Drive pinion x Companion flange	See page SA-184		
Differential carrier x Screw plug	22	220	16
DIfferential carrier x Actuator	26	270	20
Drain plug, Filler plug	49	500	36

BRAKE

SS057-08

SERVICE DATA

Brake pedal height (from asphalt seat)		154 - 168 mm (6.06 - 6.61 in.)
Brake pedal freeplay		1 - 6 mm (0.04 - 0.24 in.)
Brake pedal reserve distance at 490 N (50 kgf, 110.2 lbf)		More than 105 mm (4.13 in.)
Brake booster push rod to piston clearance (w/ SST)		0 mm (0 in.)
Front brake pad thickness		
2WD	STD	12.0 mm (0.472 in.)
4WD, pre runner	STD	11.5 mm (0.453 in.)
	Minimum	1.0 mm (0.039 in.)
Disc thickness	STD	22.0 mm (0.866 in.)
	Minimum	20.0 mm (0.787 in.)
Disc runout	Maximum	0.07 mm (0.0028 in.)
Rear brake drum inside diameter		
2WD	STD	254.0 mm (10.000 in.)
	Maximum	256.0 mm (10.079 in.)
4WD, pre runner	STD	295.0 mm (11.614 in.)
	Maximum	297.0 mm (11.693 in.)
Rear brake shoe lining thickness		
2WD	STD	5.6 mm (0.220 in.)
4WD, pre runner	STD	6.0 mm (0.236 in.)
	Minimum	1.0 mm (0.039 in.)
Rear brake drum to shoe clearance		0.6 mm (0.024 in.)
Parking brake lever travel at 196 N (20 kgf, 44.1 lbf)		12 - 18 clicks

SS058-06

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Master cylinder x Piston stopper bolt		8.0	80	69 in.·lbf
Master cylinder x Reservoir		1.5	15	13 in.·lbf
Master cylinder x Brake booster		13	130	9
Brake line union nut		15	155	11
Brake booster clevis lock nut		25	260	19
Brake booster x Pedal bracket		13	130	9
Bleeder plug		11	110	8
Front disc brake caliper x Torque plate	2WD	88	900	65
Front disc brake caliper x Steering knuckle	4WD, pre runner	123	1,250	90
Front disc brake torque plate x Steering knuckle	2WD	108	1,100	80
Front disc x Front axle hub	2WD	64	650	47
Front disc brake caliper x Flexible hose		30	310	22
Rear drum brake wheel cylinder x Baking plate		10	100	7
Parking brake bellcrank bracket x Backing plate		13	130	9
LSP & BV x LSP & BV bracket		13	130	9
LSP & BV bracket x Load sensing spring assembly		18	185	13
Load sensing spring assembly x Shackle No. 1		18	185	13
Shackle No. 1 x Shackle No. 2		13	130	9
Shackle No. 2 x Shackle bracket		13	130	9
LSP & BV bracket x Frame		29	300	22
Shackle bracket x Rear axle housing		29	300	22
ABS actuator bracket x ABS actuator		9.0	91.8	7
ABS actuator x ECU		1.8	18.4	16 in.·lbf
ABS actuator bracket x Body		19	195	14
Speed sensor installation bolt		8.0	82	71 in.·lbf
Front speed sensor harness x Upper arm		8.0	82	71 in.·lbf
Front speed sensor harness x Side rail		13	130	9
Rear speed sensor harness x Axle housing		13	130	9
Rear speed sensor harness x Fuel tank		13	130	9
Rear speed sensor harness x Side rail		13	130	9
Brake pedal x Pedal bracket		34	350	25

STEERING

SERVICE DATA

SS055-04

DRIVE BELT		
Drive belt tension	New belt	135-180 lbf
Drive belt tension	Used belt	85-120 lbf
POWER STEERING FLUID		
Oil level rise	Maximum	Below 5 mm (0.20 in.)
Oil pressure at idle speed with valve closed	Minimum	8,336 kPa (85 kgf/cm^2, 1,209 psi)
STEERING WHEEL		
Steering wheel freeplay	Maximum	30 mm (1.18 in.)
Steering effort at idle speed	Maximum	4.9 N·m (50 kgf·cm, 43 in.·lbf)
PS VANE PUMP		
2RZ-FE and 3RZ-FE:		
Pump shaft and front housing bushing oil clearance	STD	0.03-0.05 mm (0.0012-0.0020 in.)
Pump shaft and front housing bushing oil clearance	Maximum	0.07 mm (0.0028 in.)
Vane plate height	Minimum	8.6 mm (0.339 in.)
Vane plate thickness	Minimum	1.397 mm (0.05500 in.)
Vane plate length	Minimum	14.991 mm (0.59020 in.)
Vane plate and pump rotor groove clearance	Maximum	0.035 mm (0.0014 in.)
Vane plate length	Pump rotor and cam ring mark	
	None	14.999-15.001 mm (0.59051-0.59059 in.)
	1	14.997-14.999 mm (0.59043-0.59051 in.)
	2	14.995-14.997 mm (0.59035-0.59043 in.)
	3	14.993-14.995 mm (0.59027-0.59035 in.)
	4	14.991-14.993 mm (0.59020-0.59027 in.)
Flow control valve spring length	Minimum	33.2 mm (1.307 in.)
Pump rotating torque	Maximum	0.25 N·m (2.5 kgf·cm, 2.2 in.·lbf) or less
5VZ-FE:		
Pump shaft and front housing bushing oil clearance	STD	0.03-0.05 mm (0.0012-0.0020 in.)
Pump shaft and front housing bushing oil clearance	Maximum	0.07 mm (0.0028 in.)
Vane plate height	Minimum	8.6 mm (0.339 in.)
Vane plate thickness	Minimum	1.397 mm (0.05500 in.)
Vane plate length	Minimum	14.991 mm (0.59020 in.)
Vane plate and pump rotor groove clearance	Maximum	0.035 mm (0.0014 in.)
Vane plate length	Pump rotor and cam ring mark	
	None	14.999-15.001 mm (0.59051-0.59059 in.)
	1	14.997-14.999 mm (0.59043-0.59051 in.)
	2	14.995-14.997 mm (0.59035-0.59043 in.)
	3	14.993-14.995 mm (0.59027-0.59035 in.)
	4	14.991-14.993 mm (0.59020-0.59027 in.)
Flow control valve spring length	Minimum	33.2 mm (1.307 in.)
Pump rotating torque	Maximum	0.27 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less
PS GEAR		
2WD:		
Steering rack runout	Maximum	0.3 mm (0.0118 in.)

Total preload	Turning	0.9-1.5 N·m (9-15 kgf·cm, 7.8-13.0 in.·lbf)
4WD and Pre runner:		
Steering rack runout	Maximum	0.3 mm (0.0118 in.)
Total preload	Turning	0.5-1.7 N·m (4.7-17.2 kgf·cm, 4.1-14.9 in.·lbf)

SS056-03

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
STEERING COLUMN				
Steering wheel set nut		50	500	35
Steering wheel pad set screw (Torx screw)		9.0	90	78 in.·lbf
Steering column assembly set nut and bolt		26	260	19
Main shaft assembly x Universal joint No.2		35	360	26
Universal joint No.2 x Intermediate No.2 shaft		35	360	26
Control valve shaft x Intermediate No.2 shaft		35	360	26
Column hole cover x Body	2WD	8.0	80	69 in.·lbf
Column hole cover No.2 x Column hole cover x Body	4WD	8.0	80	69 in.·lbf
TILT STEERING COLUMN				
Tilt steering bolt		20	200	14
PS VANE PUMP				
2RZ-FE, 3RZ-FE and 5VZ-FE:				
Union bolt x Pressure feed tube		47	475	34
Pressure port union x Pump housing		83	850	61
Bracket x Pump assembly	5VZ-FE	43	440	32
Oil reservoir set bolt	Front	13	130	9
	Rear	24	240	17
Vane pump pulley set nut		43	440	32
Oil pressure switch x Pressure feed tube	5VZ-FE	21	210	15
Vane pump assembly with bracket set bolt and nut	5VZ-FE	43	440	32
Vane pump assembly set bolt	2RZ-FE, 3RZ-FE	39	400	29
Rear housing set bolt		24	240	17
Power steering idle pulley set nut		39	400	29
PS GEAR				
2WD:				
Self-locking nut		25	250	18
Rack housing cap		59	600	43
Control valve housing set bolt		18	185	13
Rack guide spring cap lock nut		50 (60)	513 (700)	37 (51)
Rack housing No.2 bracket set bolt		61	620	45
Rack x Rack end		60 (83)	615 (850)	45 (61)
Tie rod end lock nut		54	550	40
Turn pressure tube union nut		12 (13)	122 (130)	9 (9)
PS gear assembly set bolt		201	2,050	148
Pressure feed tube x Control valve housing		33 (45)	337 (450)	24 (33)
Return tube x Control valve housing		36 (49)	365 (500)	26 (36)
4WD and Pre runner:				
Cylinder end stopper		59 (78)	597 (800)	43 (58)
Rack guide spring cap lock nut		51 (69)	521 (700)	38 (51)
Rack x Rack end		76 (103)	770 (1,050)	56 (76)
Tie rod end lock nut		55	560	41

( ): For use without SST

Part tightened	N·m	kgf·cm	ft·lbf
4WD and Pre runner:			
Turn pressure tube union nut	23 (25)	235 (250)	17 (18)
PS gear assembly set bolt	167	1,700	123
PS gear assembly set bolt x nut	191	1,950	141
Bracket x Body	167	1,700	123
Pressure feed tube x Control valve housing	33 (45)	337 (450)	24 (33)
Return tube x Control valve housing	36 (49)	365 (500)	26 (36)
Control valve housing set bolt	18	185	13
Bearing guide nut	25	250	18

( ): For use without SST

SUPPLEMENTAL RESTRAINT SYSTEM

SS01W-09

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Steering wheel		50	500	35
Steering wheel pad		9.0	90	78 in.·lbf
Front passenger airbag assembly x Instrument panel		5.0	51	42 in.·lbf
Front passenger airbag assembly x Instrument panel reinforcement		20	205	15
Airbag sensor assembly		20	205	15
Front airbag sensor x Body	Bolt	13	130	9
	Nut	13	130	9

BODY ELECTRICAL

SS04Y-05

SERVICE DATA

DAYTIME RUNNING LIGHT RELAY (Wire harness side)	
Tester connection	Specified condition
3 - Ground (Constant)	Battery positive voltage
6 - Ground (Constant)	Battery positive voltage
9 - Ground (Engine stop)	No voltage
9 - Ground (Engine Running)	Battery positive voltage
10 - Ground (Brake fluid level warning position ON)	Battery positive voltage
12 - Ground (Ignition switch position: LOCK or ACC)	No voltage
12 - Ground (Ignition switch position: ON or START)	Battery positive voltage
TURN SIGNAL FLASHER	
Flashes / Minute	60 - 120
SPEEDOMETER (USING A SPEEDOMETER TESTER)	
USA:	
Standard indication (mph)	Allowable range (mph)
20	19 - 22
40	39 - 42.5
60	59.5 - 63.5
80	79.5 - 84
100	100 - 105
CANADA:	
Standard indication (km/h)	Allowable range (km/h)
20	18 - 23
40	40 - 44
60	60 - 64.5
80	80 - 85
100	100 - 105
120	120 - 125.5
140	140 - 146
160	160 - 167
TACHOMETER (ON-VEHICLE)	DC 13.5 V 20°C (68°F)
Standard indication (rpm)	Allowable range (rpm)
700	630 - 770
3,000	2,850 - 3,150
5,000	4,850 - 5,150
7,000	6,790 - 7,210
FUEL RECEIVER GAUGE (w/ Tachometer)	
Between terminals	Resistance Ω
A - B	Approx. 137
A - C	Approx. 260.3
B - C	Approx. 123.3
FUEL RECEIVER GAUGE (w/o Tachometer)	
Between terminals	Resistance Ω
A - B	Approx. 160

A - C	Approx. 84
B - C	Approx. 244
FUEL SENDER GAUGE (70 Litet Tank)	
Float position: mm (in.)	Resistance Ω
F Approx. 82.7 (3.26)	Approx. 3.0
1/2 17.1 (0.673)	Approx. 30.8
E Approx. 124.6 (4.91)	Approx. 110.0
FUEL SENDER GAUGE (60 Liter Tank)	
Float position: mm (in.)	Resistance Ω
F Approx. 69.3 (2.73)	Approx. 3.0
1/2 20.1 (0.79)	Approx. 30.8
E Approx. 108.8 (4.28)	Approx. 110.0
ENGINE COOLANT TEMPERATURE GAUGE (w/ Tachometer)	
Between terminals	Resistance Ω
A-B	Approx. 256.5
A-C	Approx. 181.5
B-C	Approx. 75
ENGINE COOLANT TEMPERATURE GAUGE (w/o Tachometer)	
Between terminals	Resistance Ω
A-B	Approx. 139
A-C	Approx. 75
B-C	Approx. 214

BODY

TORQUE SPECIFICATION

SS05D-04

Part tightened	N·m	kgf·cm	ft·lbf
FRONT BUMPER			
Front bumber arm x Front bumper assembly	23	230	17
Reinforcement x Body	20	200	15
Retainer x Bumper cover, Bumper	5.5	56	49 in.·lbf
Side mounting bracket x Bumper	5.5	56	49 in.·lbf
Bumper cover x Bumper	5.5	56	49 in.·lbf
Bumper x Valance Panel	5.5	56	49 in.·lbf
REAR BUMPER			
Rear bumper arm x Body	79	810	59
Rear bumper arm x Rear bumper assembly	79	810	59
Rear bumper bar x Reinforcement (with nut)	45	460	33
Rear bumper bar x Reinforcement (with torx bolt)	29	300	22
HEADLIGHT			
Headlight x Body	4.9	50	43 in.·lbf
HOOD			
Hood hinge x Hood	13	130	10
Hood hinge x Body	18	180	13
Hood lock x Body	8.0	82	71 in.·lbf
FRONT DOOR			
Outside handle x Front door	5.0	50	43 in.·lbf
Door lock x Body	12	120	9
Door hinge x Body	23	230	17
Door checker x Body	5.0	50	43 in.·lbf
Window regulator x Front door	5.0	50	43 in.·lbf
Door glass x Window regulator	5.0	50	43 in.·lbf
Door hinge x Front door	23	230	17
Door lock striker x Body	12	120	9
REAR DOOR			
Door lock x Body	5.0	50	43 in.·lbf
Door hinge x Rear door	23	230	17
Door hinge x Body	20	200	15
Door checker x Body	5.0	50	43 in.·lbf
Window regulator x Front door	5.0	50	43 in.·lbf
Door glass x Window regulator	5.0	50	43 in.·lbf
Door lock striker x Body	12	120	9
WIPER AND WASHER			
Wiper motor x Body	5.4	55	47 in.·lbf
Wiper link x Body	5.4	55	47 in.·lbf
Wiper arms x Wiper link	20	205	15

Part tightened		N·m	kgf·cm	ft·lbf
REMOVABLE ROOF				
Removable roof hinge case x Body		3.5	35	30 in.·lbf
Removable roof lock base x Body		6.0	60	52 in.·lbf
Removable roof handle x Removable roof		3.0	30	26 in.·lbf
INSTRUMENT PANEL				
Steering wheel set nut		35	375	26
Front passenger airbag assembly x Instrument panel		5.0	51	44 in.·lbf
Front passenger airbag assembly x Reinforcement		20	205	15
TAIL GATE				
Tail gate cable x Tail gate		14	140	10
Tail gate lock striker x Body		12	120	9
Tail gate hinge x Body	A bolt:	30	310	22
	B bolt:	24	240	17
	C bolt:	28	290	19
FRONT SEAT (Separate Type)				
Front seat assembly x Body		37	380	27
Seat back frame x Outer track, Inner track		18	185	13
Outer track, Inner track x Seat cushion frame		18	185	13
FRONT SEAT (Sports Type)				
Front seat assembly x Body		37	380	27
Outer track, Inner track x Seat cushion frame		20	205	15
Seat back frame x Outer track, Inner track		20	205	15
FRONT SEAT (Bench Type)				
Front seat assembly x Body		37	380	27
Seat cushion frame x Outer track		18	185	13
Seat back frame x Outer track, Inner track		18	185	13
FRONT SEAT (Split Bench Type)				
Front seat assembly x Body		37	380	27
Seat back frame x Outer Inner track		20	205	15
Seat adjuster x Outer track		20	205	15
Seat back frame x Seat adjuster		20	205	15
Armrest assembly x Inner track		20	205	15
Seatback lower bracket x Seat cushion frame		20	205	15
Armrest x Seatback lower bracket		5.0	51	44 in.·lbf
Armrest lock x Seatback lower bracket		20	205	15
Armrest lock x Armrest		20	205	15
REAR SEAT (Extra Cab)				
Rear seatback x Body		18	185	13
Rear seat hinge x Body		18	185	13
REAR SEAT (Double Cab)				
Side seat hinge upper plate x Seat cushion frame		21	215	15
Seatback stay bracket x Seat cushion frame		21	215	15
Seat cushion frame x Body		37	380	27

Part tightened		N·m	kgf·cm	ft·lbf
SEAT BELT (Regular Cab)				
Front seat outer belt x Body		42	430	31
Seat belt pretensioner x Body	upper bolt	36	365	27
	lower bolt	42	430	31
Front seat inner belt x Body		42	430	31
Shoulder belt anchor adjuster x Body		42	430	31
SEAT BELT (Extra Cab)				
Front seat outer belt x Body		42	430	31
Seat belt pretensioner x Body	upper bolt	36	365	27
	lower bolt	42	430	31
Front seat inner belt x Body		42	430	31
Rear seat inner belt x Body		42	430	31
Shoulder belt anchor adjuster x Body		42	430	31
Tether anchor x Body		18	185	13
SEAT BELT (Double Cab)				
Front seat outer belt x Body		42	430	31
Seat belt pretensioner x Body	upper bolt	36	365	27
	lower bolt	42	430	31
Front seat inner belt x Body		42	430	31
Rear seat inner belt x Body		42	430	31
Shoulder belt anchor adjuster x Body		42	430	31

AIR CONDITIONING

SS04Z-03

SERVICE DATA

Refrigerant	Charge volume		600 ± 50 g (21.16 ± 1.76 oz.)
Drive belt	Tension	New belt	160 ± 25 lbf
		Used belt	100 ± 20 lbf
Idle-up speed	2RZ-FE, 3RZ-FE		
		Magnetic clutch not engaged	700 ± 50 rpm
		Magnetic clutch engaged	900 ± 50 rpm
	5VZ-FE		
		Magnetic clutch not engaged	700 ± 50 rpm
		Magnetic clutch engaged	850 ± 50 rpm
Magnetic clutch	Clearance		0.5 ± 0.15 mm (0.020 ± 0.0059 in.)
	Adjust shim thickness		0.1 mm (0.004 in.)
			0.3 mm (0.012 in.)
			0.5 mm (0.020 in.)
Thermister	Resistance	at 25°C (77°F)	1.500 Ω

SS050-10

TORQUE SPECIFICATION

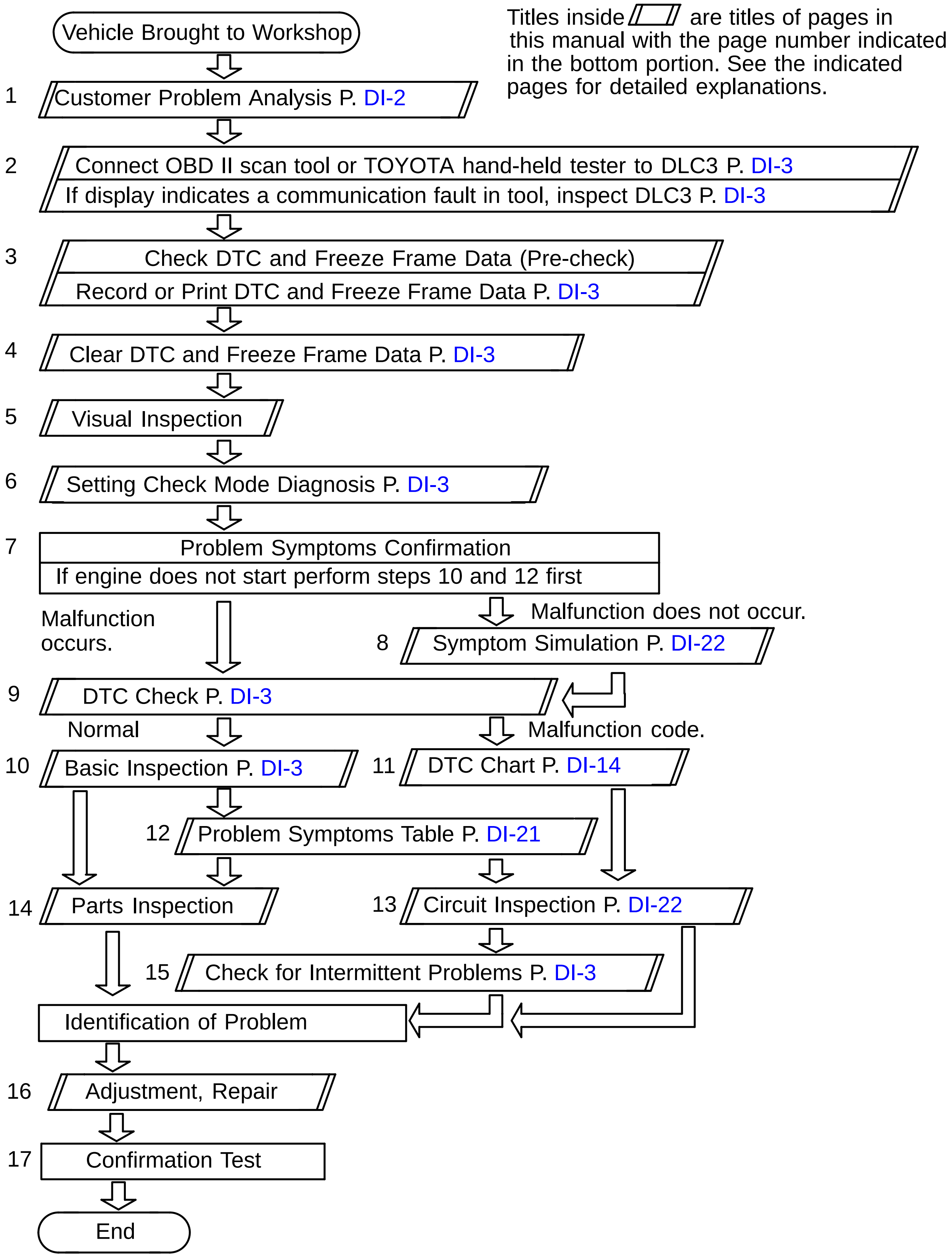
Part tightened	N·m	kgf·cm	ft·lbf
Receiver x Liquied tube	6.0	60	52 in.·lbf
Condenser x Discharge hose	10	100	7
Condenser x Liquid tube	10	100	7
Compressor x Discharge hose	10	100	7
Compressor x Suction hose	10	100	7
Cooling unit x Suction tube	32	330	24
Expansion valve x Evaporator	5.4	55	48in.·lbf
Suction line (Piping joint)	32	330	24
Liquid line (Piping joint)	14	140	10
Pressure switch x Liquied tube	10	100	7
Pressure plate x Compressor	13.2	135	9
Compressor x Compressor bracket	25	250	18
Compressor bracket x Engine	47	475	34
Idle pulley lock nut	39	400	29

ENGINE (2RZ-FE, 3RZ-FE)

DI129-08

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.



DI12A-08

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name ______

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

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

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

Condition of MIL		☐ Remains on ☐ Sometimes lights up ☐ Does not light up	
DTC Inspection	Normal Mode (Precheck)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freeze frame data ( )
	Check Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freeze frame data ( )

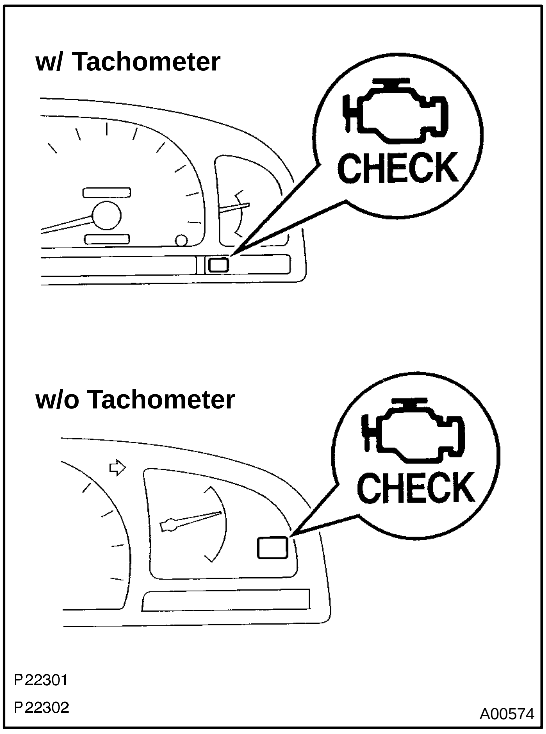
DI12B-12

PRE-CHECK

1. DIAGNOSIS SYSTEM

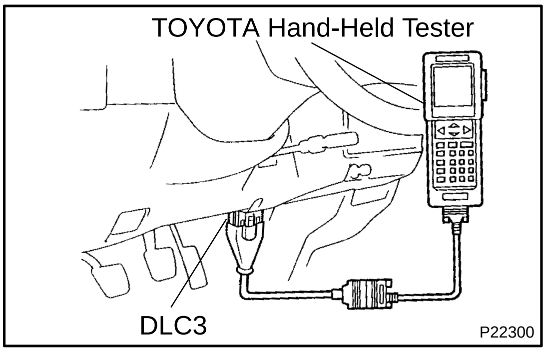
(a) Description

- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you need to connect the vehicle to the OBD II scan tool complying with SAE J1978 or TOYOTA hand-held tester, and read off various data output from the vehicle's ECM.



- OBD II regulations require that the vehicle's on-board computer lights up the Malfunction Indicator Light (MIL) on the instrument panel when the computer detects a malfunction in the emission control system/components or in the powertrain control components which affect vehicle emissions, or a malfunction in the computer. In addition to the MIL lighting up when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (See page DI-14).

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.



- To check the DTCs, connect the OBD II scan tool or TOYOTA hand-held tester to the Data Link Connector 3 (DLC3) on the vehicle. The OBD II scan tool or TOYOTA 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 OBD II scan tool's instruction book.). DTCs include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set freely by a manufacturer within the prescribed limits (See DTC chart on page DI-14).

- The diagnosis system operates in the normal mode during normal vehicle use. It also has a check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent an erroneous detection and ensure the malfunction detection. By switching the ECM to the check mode when troubleshooting, a technician can cause the MIL to light up for a malfunction that is only detected once or momentarily. (TOYOTA hand-held tester only) (See step 2)
- *2 trip detection logic:
  When a malfunction is first 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 MIL to light up. (2nd trip) (However, the ignition switch must be turned OFF between the 1st trip and 2nd trip.)

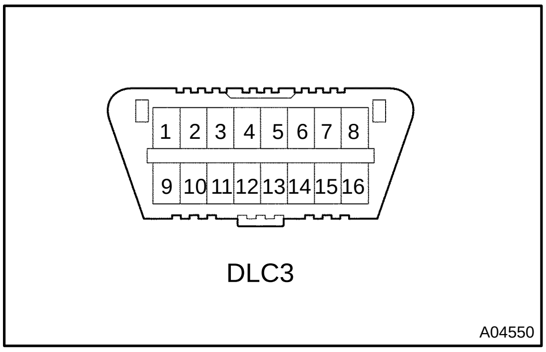
- Freeze frame data:
  Freeze frame data records the engine condition when a misfire (DTCs P0300 - P0304) or fuel trim malfunction (DTCs P0171 and P0172) or other malfunction (first malfunction only) is detected. Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when the malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

Priorities for troubleshooting:

If troubleshooting priorities for multiple DTCs are given in the applicable DTC chart, these should be followed.

If no instructions are given, troubleshoot DTCs according to the following priorities.

(1) DTCs other than fuel trim malfunction (DTCs P0171 and P0172), EGR (DTCs P0401 and P0402), and misfire (DTCs P0300 - P0304).
(2) Fuel trim malfunction (DTCs P0171 and P0172), and EGR (DTCs P0401 and P0402).
(3) Misfire (DTCs P0300 - P0304).

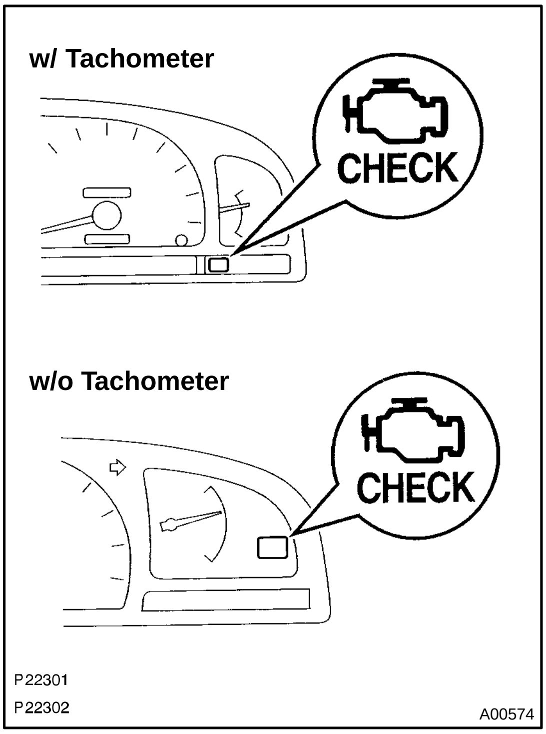


(b) Check the DLC3.
The vehicle's ECM uses the ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

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

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

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If the communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



2. Normal Mode:
INSPECT DIAGNOSIS

(a) Check the MIL.
(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

HINT:
If the MIL does not light up, troubleshoot the combination meter (See page BE-2).

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

(b) Check the DTC.

NOTICE:

- **If there is no DTC in the normal mode, check the 1st trip DTC using Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool or TOYOTA hand-held tester.**

- **TOYOTA hand-held tester only:**
  When the diagnosis system is switched from the normal mode to the check mode, all the DTCs and freeze frame data recorded in the normal mode will be erased. So before switching modes, always check the DTCs and freeze frame data, and note them down.
  (1) Prepare the OBD II scan tool (complying with SAE J1978) or TOYOTA hand-held tester.
  (2) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3 at the lower left of the instrument panel.
  (3) Turn the ignition switch ON and turn the OBD II scan tool or TOYOTA hand-held tester switch ON.
  (4) Use the OBD II scan tool or TOYOTA hand-held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book.).

If there is no DTC in the normal mode, check the 1st trip DTC using Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool or TOYOTA hand-held tester.

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

NOTICE:

- **When simulating symptoms with an OBD II scan tool (excluding TOYOTA hand-held tester) to check the DTCs, use the normal mode. For code on the DTC chart subject to "2 trip detection logic", perform the following either action.**
- **Turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again. When the problem has been simulated twice, the MIL lights up and the DTCs are recorded in the ECM.**
- **Check the 1st trip DTC using Mode 7 (Continuous Test Results) for SAE J1979.**

(c) Clear the DTC.
The DTCs and freeze frame data will be erased by either action.
- Operating the OBD II scan tool (complying with SAE J1978) or TOYOTA hand-held tester to erase the codes (See the OBD II scan tool's instruction book for operating instructions.).
- Disconnecting the battery terminals or EFI fuse.

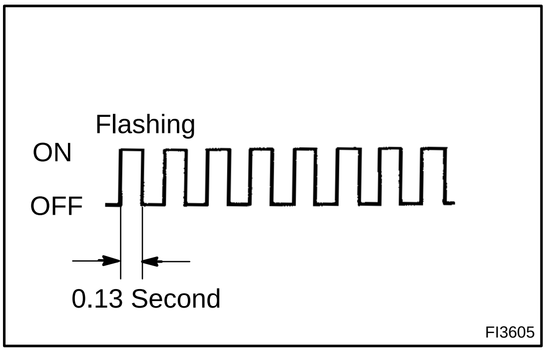
NOTICE:
If the TOYOTA hand-held tester switches the ECM from the normal mode to the check mode or vice-versa, or if the ignition switch is turned from ON to ACC or OFF during the check mode, the DTCs and freeze frame data will be erased.

3. Check Mode:
INSPECT DIAGNOSIS

HINT:
TOYOTA hand-held tester only:
Compared to the normal mode, the check mode has furthur sensitivity to detect malfunctions.
Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.
Check the DTC.

(1) Initial conditions
- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transmission in the P or N position
- A/C switched OFF

(2) Turn the ignition switch OFF.
(3) Prepare the TOYOTA hand-held tester.
(4) Connect the TOYOTA hand- held tester to the DLC3 in the at the lower left of the instrument panel.
(5) Turn the ignition switch ON and push the TOYOTA hand-held tester ON.



(6) Switch the TOYOTA hand-held tester from the normal mode to the check mode. (Check that the MIL flashes.)

NOTICE:
If the TOYOTA 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 ON to ACC or OFF during the check mode, the DTCs and freeze frame data will be erased.

(7) Start the engine (The MIL goes off after the engine started.).
(8) Simulate the conditions of the malfunction described by the customer.

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

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

HINT:
Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from the check mode to the normal mode, so all the DTCs, etc. are erased.

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

4. FAIL-SAFE CHART

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

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0100	●gnition timing fixed at 5° BTDC ●njection time fixed Starting - - - - - - - -11.6 msec. CTP switch ON - - - - 3.2 msec. CTP switch OFF - - - - 6.0 msec.	Returned to normal condition
P0110	Intake air temperature fixed at 20°C (68°F)	Returned to normal condition
P0115	Engine coolant temperature fixed at 80°C (176°F)	Returned to normal condition
P0120	VTA fixed at 0°	The following condition must be repeated at least 2 times consecutively When closed throttle position switch is ON: VTA > 0.1 V and < 0.95 V
P0135* P0141	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0325	Max. timing retardation	Ignition switch OFF
P0340	Fuel cut	Returned to normal condition
P1300 P1310	Fuel cut	Returned to normal condition

*: California Spec.

5. CHECK FOR INTERMITTENT PROBLEMS

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

(a) Clear the DTCs (See step 2).
(b) Set the check mode (See step 3).
(c) Perform a simulation test (See page IN-18).
(d) Check the connector and terminal (See page IN-28).
(e) Handle the connector (See page IN-28).

6. BASIC INSPECTION

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

1	**Is battery positive voltage 11 V or more when engine is stopped?**

NO → **Charge or replace battery.**

YES

2	Is engine cranked?

NO → Proceed to pages ST-16 , ST-18 , and continue to troubleshoot.

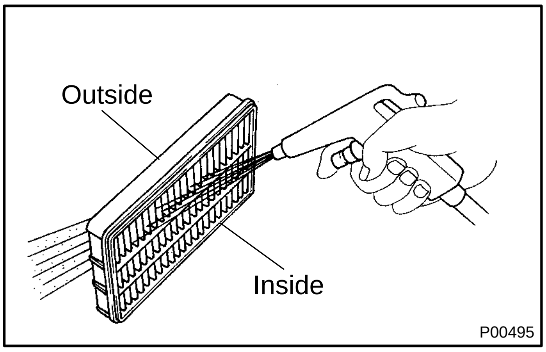
YES

3	Does engine start?

NO → Go to step NO TAG.

YES

4	Check air filter.



PREPARATION:
Remove the air filter.
CHECK:
Visually check that the air filter is not dirty nor excessive only.
HINT:
If necessary, clean the air filter with compressed air. First blow from inside thoroughly, then blow from outside of the air filter.

NG → Repair or replace.

OK

5	Check idle speed.

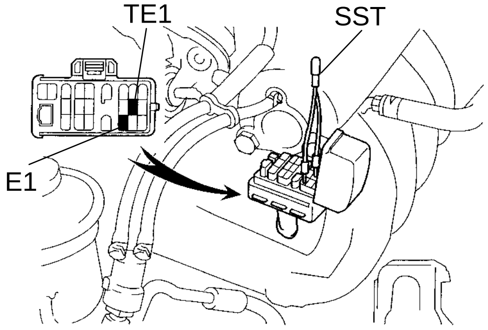
PREPARATION:
(a) Warm up the engine to the normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Shift the transmission into the N position.
(e) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3 of the vehicle.
CHECK:
Use the CURRENT DATA to check the idle speed.
OK:
Idle speed: 650 - 750 rpm

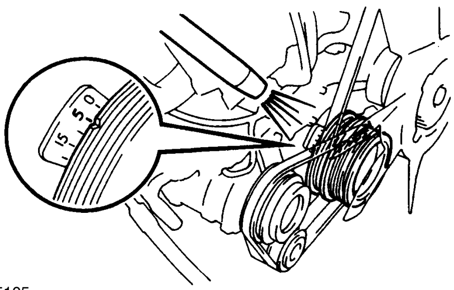
NG

Proceed to problem symptoms table on page DI-21 .

OK

6	**Check ignition timing.**





P25105
P15946
A00033

PREPARATION:

(a) Warm up the engine to the normal operating temperature.
(b) Shift the transmission into the N position.
(c) Keep the engine speed at idle.
(d) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843-18020
(e) Using a timing light, connect the tester to the No.1 high-tension cord.

CHECK:

Check ignition timing.

OK:

Ignition timing: 3 - 7° BTDC at idle

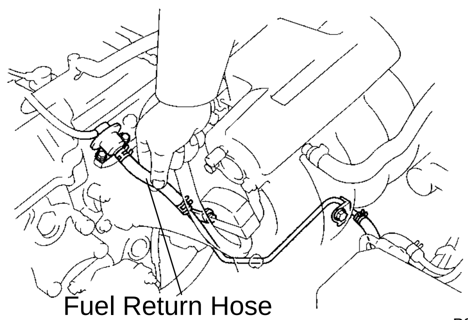
NG

Proceed to page IG-1 , and continue to troubleshoot.

OK

Proceed to problem symptoms table on page DI-21 .

7	**Check fuel pressure.**



P25111

PREPARATION:

(a) Be sure that the enough fuel is in the tank.
(b) Connect the TOYOTA hand-held tester to the DLC3.
(c) Turn the ignition switch ON and push the TOYOTA hand-held tester main switch ON.
(d) Use the ACTIVE TEST mode to operate the fuel pump.
(e) Please refer to the TOYOTA hand-held tester operator's manual for further details.

(f) If you have no TOYOTA hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page SF-5).

CHECK:

Check for the fuel pressure in the fuel return hose when it is pinched by hand.

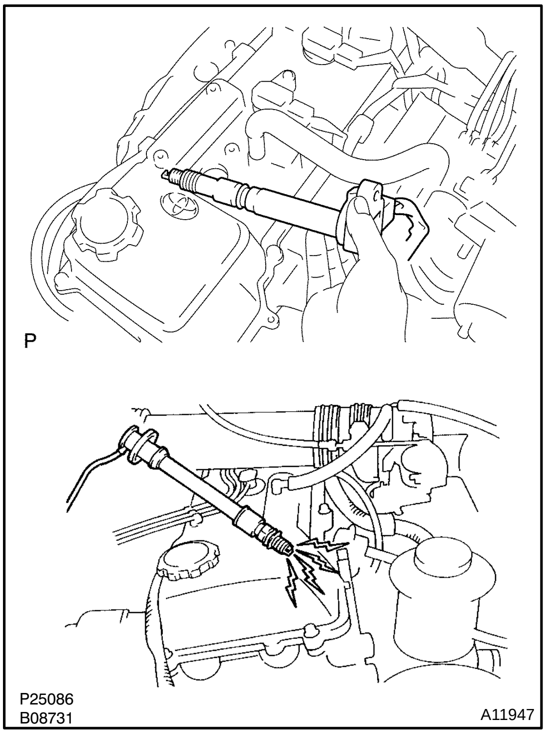
HINT:

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

NG — **Proceed to page SF-5 , and continue to troubleshoot.**

OK

8	**Check for spark.**



California Spec.:

PREPARATION:

(a) Remove the ignition coil.
(b) Remove the spark plug.
(c) Install the spark plug to the ignition coil.
(d) Disconnect the injector connector.
(e) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 - 10 seconds at a time.

Except California Spec.:

PREPARATION:

(a) Disconnect the high-tension cord from the spark plug.
(b) Remove the spark plug.
(c) Install the spark plug to the high-tension cord.
(d) Disconnect the injector connector.
(e) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 - 10 seconds at a time.

NG — **Proceed to page IG-1 , and continue to troubleshoot.**

OK

Proceed to problem symptoms table on page DI-21 .

7. ENGINE OPERATING CONDITION

NOTICE:
The values given below for ”Normal Condition” are representative values, so a vehicle may still be normal even if its value differs from those listed here. So do not solely depend on the ”Normal Condition” here when deciding whether a part is faulty or not.

(a) CARB mandated signals.

TOYOTA hand-held tester display	Measurement Item	Normal Condition*
FUEL SYS #1	Fuel System Bank 1 OPEN: Air-fuel ratio feedback stopped CLOSED: Air-fuel ratio feedback operating	Idling after warming up: CLOSED
CALC LOAD	Calculator Load: Current intake air volume as a proportion of max. intake air volume	Idling: 2RZ-FE: 17.2 - 24.6 % 3RZ-FE: 15.9 - 22.8 % Racing without load (2,500 rpm): 2RZ-FE: 16.4 - 23.1 % 3RZ-FE: 15.2 - 22.1 %
COOLANT TEMP	Engine Coolant Temp. Sensor Value	After warming up: 80 - 95°C (176 - 203°F)
SHORT FT #1	Short-term Fuel Trim Bank 1	0 ± 20 %
LONG FT #1	Long-term Fuel Trim Bank 1	0 ± 20 %
ENGINE SPD	Engine Speed	Idling: 650 - 750 rpm
VEHICLE SPD	Vehicle Speed	Vehicle stopped: 0 km/h (0 mph)
IGN ADVANCE	Ignition Advance: Ignition Timing of Cylinder No.1	Idling: 2RZ-FE: BTDC 5 - 17° 3RZ-FE: BTDC 4 - 17°
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to ambient temperature
MAF	Air Flow Rate Through Mass Air Flow Meter	Idling: 2.7 - 3.9 gm/sec. Racing without load (2,500 rpm): 2RZ-FE: 9.2 - 12.9 gm/sec. 3RZ-FE: 9.2 - 13.3 gm/sec.
THROTTLE POS	Voltage Output of Throttle Position Sensor Calculated as a percentage: 0 V → 0 %, 5 V → 100 %	Throttle fully closed: 7 - 11 % Throttle fully open: 65 - 75 %
O2S B1 S1	Voltage Output of Oxygen Sensor Bank 1 Sensor 1	Idling: 0.1 - 0.9 V (0.56 - 0.76 V*2)
O2FT B1 S1	Oxygen Sensor Fuel Trim Bank 1 Sensor 1 (Same as SHORT FT #1)	0 ± 20 %
O2S B1 S2	Voltage Output of Oxygen Sensor Bank 1 Sensor 2	Driving (50 km/h, 31 mph): 0.1 - 0.9 V
A/FS B1 S1*3	Voltage Output of A/F Sensor Bank 1 Sensor 1	Idling: 2.8 - 3.8 V
A/FS B2 S1*3	Voltage Output of A/F Sensor Bank 2 Sensor 1	Idling: 2.8 - 3.8 V
A/FFT B1 S1*3	A/F Sensor Fuel Trim Bank 1 Sensor 1 (Same as SHORT FT #1)	O ± 20 %

*1: If no conditions are specifically stated for ”Idling”, it means the shift lever is at the N or P position, the A/C switch is OFF and all accessory switches are OFF.
*2: Only for Calif. When you use the OBD II scan tool (excluding TOYOTA hand-held tester).
*3: Only for Calif. When you use the TOYOTA hand-held tester.

(b) TOYOTA enhanced signals.

TOYOTA hand-held tester display	Measurement Item	Normal Condition*
MISFIRE RPM	Engine RPM for first misfire range	Misfire 0: 0 rpm
MISFIRE LOAD	Engine load for first misfire range	Misfire 0: 0 g/r
INJECTOR	Fuel injection time for cylinder No.1	Idling: 2RZ-FE: 2.6 - 4.6 ms 3RZ-FE: 2.5 - 4.3 ms
IAC DUTY RATIO	Intake Air Control Valve Duty Ratio Opening ratio rotary solenoid type IAC valve	Idling: 24.8 - 50.0 %
STARTER SIG	Starter Signal	Cranking: ON
CTP SW	Closed Throttle Position Switch Signal	Throttle Fully Closed: ON
A/C SIG	A/C Switch Signal	A/C ON: ON
STOP LIGHT SW	Stop Light Switch Signal	Stop light switch ON: ON
FC IDL	Fuel Cut Idle: Fuel cut when throttle valve fully closed, during deceleration	Fuel cut operating: ON
FC TAU	Fuel Cut TAU: Fuel cut during very light load	Fuel cut operating: ON
CYL#1, CYL#2, CYL#3, CYL#4	Abnormal revolution variation for each cylinder	0 %
IGNITION	Total number of ignition for every 1,000 revolutions	0 - 2,000
EGRT GAS	EGR Gas Temp. Sensor Value	EGR not operating: Temp. between intake air temp. and engine coolant temp.
EGR SYSTEM*2	EGR System Operating Condition	Idling: OFF
A/C CUT SIG	A/C Cut Signal	A/C S/W OFF: ON
FUEL PUMP	Fuel Pump Signal	Idling: ON
EVAP (PURGE) VSV	EVAP VSV Signal	Idling: Below 30 %
VAPOR PRESS VSV	Vapor Pressure VSV Signal	VSV operating: ON (TANK)
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.8 - 1.2 V
O2 LR B1 S1*3	Oxygen Sensor Lean Rich Bank 1 Sensor 1: Response time for oxygen sensor output to switch from lean to rich	Idling after warming up: 0 - 1,000 msec.
O2 RL B1 S1*3	Oxygen Sensor Rich Lean Bank 1 Sensor 1: Response time for oxygen sensor output to switch from rich to lean	Idling after warming up: 0 - 1,000 msec.

*1: If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.
*2: Except 2RZ-FE for California Spec.
*3: Except California Spec.

DI12C-23

DIAGNOSTIC TROUBLE CODE CHART

HINT:
Parameters listed in the chart may not be exactly the same as your readings due to the type of instrument or other factors.
If a malfunction code is displayed during the DTC check in the check mode, check the circuit for the codes listed in the table below. For details of each code, refer to the "See page" under the respective "DTC No." in the DTC chart.

SAE DEFINED

DTC No. (See page)	Detection Item	Trouble Area	MIL*1	Memory
P0100 (DI-22)	Mass Air Flow Circuit Malfunction	●Open or short in mass air flow meter circuit ●Mass air flow meter ●ECM	○	○
P0101 (DI-26)	Mass Air Flow Circuit Range/ Performance Problem	●Mass air flow meter	○	○
P0110 (DI-27)	Intake Air Temp. Circuit Malfunction	●Open or short in intake air temp. sensor circuit ●Intake air temp. sensor (built into mass air flow meter) ●ECM	○	○
P0115 (DI-31)	Engine Coolant Temp. Circuit Malfunction	●Open or short in engine coolant temp. sensor circuit ●Engine coolant temp. sensor ●ECM	○	○
P0116 (DI-35)	Engine Coolant Temp. Circuit Range/Performance Problem	●Cooling system ●Engine coolant temp. sensor	○	○
P0120 (DI-37)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Malfunction	●Open or short in throttle position sensor circuit ●Throttle position sensor ●ECM	○	○
P0121 (DI-41)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Range/Performance Problem	●Throttle position sensor	○	○
P0125 (DI-42)	Insufficient Coolant Temp. for Closed Loop Fuel Control	●Open or short in A/F sensor (bank 1 sensor 1) circuit ●A/F sensor (bank 1 sensor 1) ●Air induction system ●EGR system ●Fuel pressure ●Injector ●Gas leakage on exhaust system ●ECM	○	○
P0136 (DI-47)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	●Open or short in heated oxygen sensor circuit ●Heated oxygen sensor	○	○
P0141 (DI-49)	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	●Open or short in heater circuit of heated oxygen sensor ●Heated oxygen sensor ●ECM	○	○
P0171 (DI-51)	System too Lean (Fuel Trim)	●Air induction system ●Injector blockage ●Mass air flow meter ●Engine coolant temp. sensor ●Fuel pressure ●Gas leakage on exhaust system ●Open or short in heated oxygen sensor (bank 1 sensor 1) circuit ●A/F sensor (bank 1 sensor 1) ●ECM	○	○

P0172 (DI-51)	System too Rich (Fuel Trim)	● Injector leak, blockage ● Mass air flow meter ● Engine coolant temp. sensor ● Ignition system ● Fuel pressure ● Gas leakage on exhaust system ● Open or short in heated oxygen sensor (bank 1 sensor 1) circuit ● A/F sensor (bank 1 sensor 1) ● ECM	○	○
P0300 (DI-56)	Random/Multiple Cylinder Misfire Detected	● Open or short in engine wire ● Connector connection ● Vacuum hose connection ● Ignition system ● Injector ● Fuel pressure ● EGR system ● Mass air flow meter ● Engine coolant temp. sensor ● Compression pressure ● Valve clearance ● Valve timing ● ECM	○*2	○
P0301 (DI-56)	Cylinder 1 Misfire Detected			
P0302 (DI-56)	Cylinder 2 Misfire Detected			
P0303 (DI-56)	Cylinder 3 Misfire Detected			
P0304 (DI-56)	Cylinder 4 Misfire Detected			
P0325 (DI-61)	Knock Sensor 1 Circuit Malfunction (Bank 1)	● Open or short in knock sensor 1 circuit ● Knock sensor 1 (looseness) ● ECM	○	○
P0335 (DI-64)	Crankshaft Position Sensor "A" Circuit Malfunction	● Open or short in crankshaft position sensor circuit ● Crankshaft position sensor ● Signal plate (Crankshaft position sensor rotor) ● ECM	○	○
P0340 (DI-66)	Camshaft Position Sensor Circuit Malfunction	● Open or short in camshaft position sensor circuit ● Camshaft position sensor ● ECM	○	○
P0401 (DI-68)	Exhaust Gas Recirculation Flow Insufficient Detected (Only for 3RZ-FE)	● Open in EGR gas temp. sensor circuit ● EGR gas temp. sensor ● Vacuum or EGR hose disconnected ● Open or short in VSV circuit for EGR ● VSV for EGR ● EGR system ● EGR vacuum modulator ● EGR valve stuck closed ● ECM	○	○
P0402 (DI-77)	Exhaust Gas Recirculation Flow Excessive Detected (Only for 3RZ-FE)	● Short in EGR gas temp. sensor circuit ● EGR gas temp. sensor ● Open in VSV circuit for EGR ● VSV for EGR ● EGR valve stuck open ● ECM	○	○
P0420 (DI-81)	Catalyst System Efficiency Below Threshold (Bank 1)	● Gas leakage on exhaust system ● A/F sensor ● Three-way catalytic convertor	○	○

P0440 (DI-84)	Evaporative Emission Control System Malfunction	● Hose or tube cracked, holed, damaged or loose seal ((3) in Fig. 1) ● Fuel tank cap incorrectly installed ● Fuel tank cap cracked or damaged ● Vacuum hose cracked, holed, blocked, damaged or disconnected ((1) or (2) in Fig. 1) ● Fuel tank cracked, holed or damaged ● Charcoal canister cracked, holed or damaged ● Open or short in vapor pressure sensor circuit ● Vapor pressure sensor ● ECM	○	○
P0441 (DI-90)	Evaporative Emission Control System Incorrect Purge Flow	● Vacuum hose cracked, holed, damaged, blocked or disconnected ((1), (4), (5), (6) and (7) in Fig. 1) ● Open or short in vapor pressure sensor circuit ● Vapor pressure sensor ● Open or short in VSV circuit for EVAP ● VSV for EVAP ● Open or short in VSV circuit for vapor pressure sensor ● VSV for vapor pressure sensor ● Charcoal canister cracked, holed or damaged ● ECM	○	○
P0446 (DI-90)	Evaporative Emission Control System Vent Control Malfunction			
P0450 (DI-101)	Evaporative Emission Control System Pressure Sensor Malfunction	● Open or short in vapor pressure sensor circuit ● Vapor pressure sensor ● ECM	○	○
P0451 (DI-101)	Evaporative Emission Control System Pressure Sensor Range/ Performance			
P0500 (DI-103)	Vehicle Speed Sensor Malfunction (For 2RZ-FE)	● Speedometer cable ● Open or short in vehicle speed sensor circuit ● Vehicle speed sensor ● ECM	○	○
P0500 (DI-103)	Vehicle Speed Sensor Malfunction (For 3RZ-FE)	● Combination meter ● Open or short in vehicle speed sensor circuit ● Vehicle speed sensor ● ECM	○	○
P0505 (DI-105)	Idle Control System Malfunction	● Open or short in IAC valve circuit ● IAC valve is stuck or closed ● Open or short in A/C switch circuit ● Air induction system ● ECM	○	○

*1: MIL lights up.

*2: MIL lights up or blinking.

MANUFACTURER DEFINED

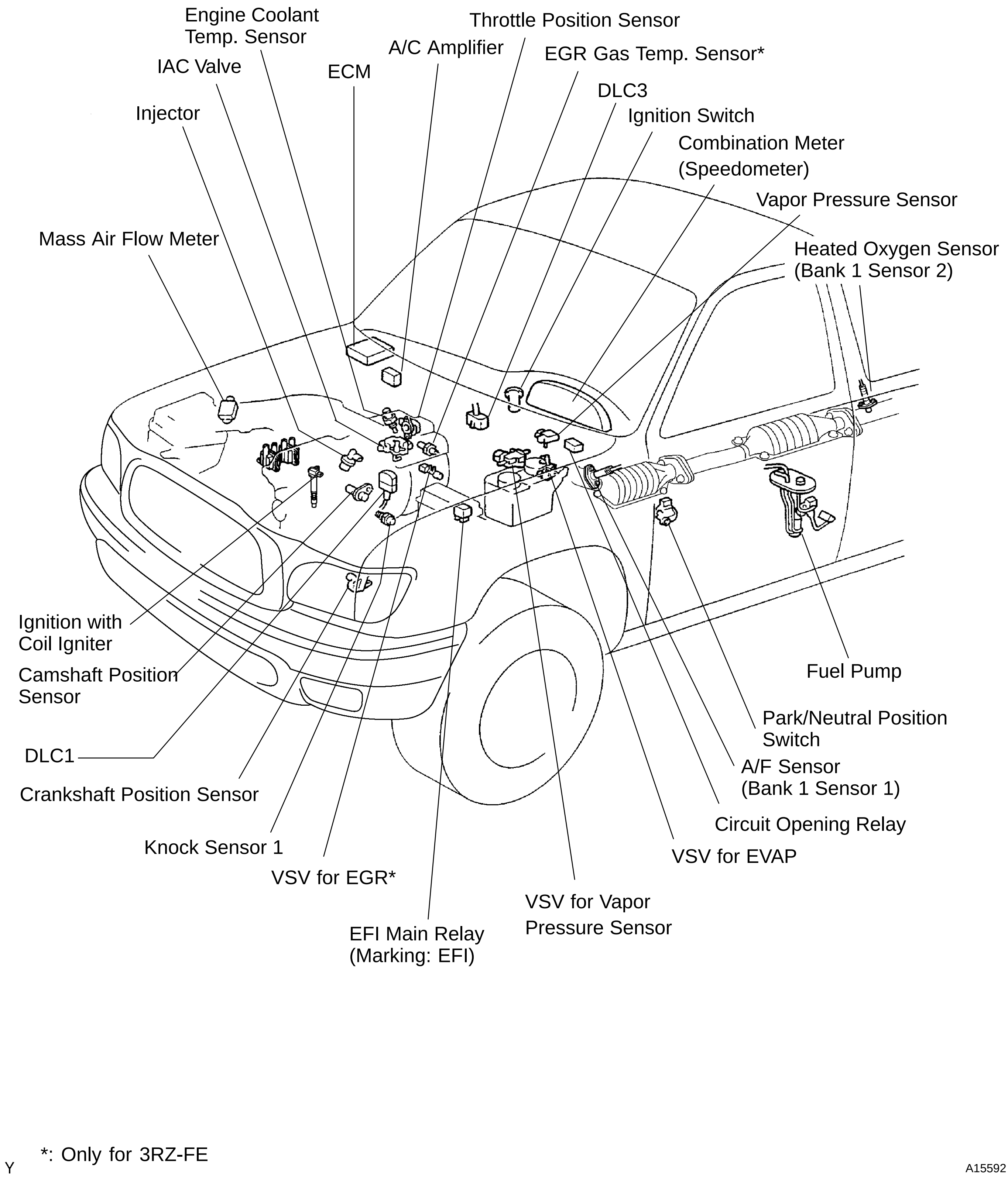
DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P1130 (DI-108)	A/F Sensor Circuit Range/Performance Malfunction (Bank 1 Sensor 1)	● Open or short in A/F sensor circuit ● A/F sensor ● Air induction system ● Fuel pressure ● Injector ● ECM	○	○

P1133 (DI-113)	A/F Sensor Circuit Response Malfunction (Bank 1 Sensor 1)	●Open or short in A/F sensor circuit ●A/F sensor ●Air induction system ●Fuel pressure ●Injector ●ECM	○	○
P1135 (DI-117)	A/F Sensor Heater Circuit Malfunction (Bank1 Sensor 1)	●Open or short in heater circuit of A/F sensor ●A/F sensor heater ●ECM	○	○
P1300 (DI-119)	Igniter Circuit Malfunction (No.1)	●Ignition system ●Open or short in IGF or IGT1 circuit from No.1 ignition coil with igniter to ECM ●No.1 ignition coil with igniter ●ECM	○	○
P1305 (DI-119)	Igniter Circuit Malfunction (No.2)	●Ignition system ●Open or short in IGF or IGT2 circuit from No.2 ignition coil with igniter to ECM ●No.2 ignition coil with igniter ●ECM	○	○
P1310 (DI-119)	Igniter Circuit Malfunction (No.3)	●Ignition system ●Open or short in IGF or IGT3 circuit from No.3 ignition coil with igniter to ECM ●No.3 ignition coil with igniter ●ECM	○	○
P1315 (DI-119)	Igniter Circuit Malfunction (No.4)	●Ignition system ●Open or short in IGF or IGT4 circuit from No.4 ignition coil with igniter to ECM ●No.4 ignition coil with igniter ●ECM	○	○
P1335 (DI-125)	Crankshaft Position Sensor Circuit Malfunction (During engine running)	●Open or short in crankshaft position sensor circuit ●Crankshaft position sensor ●Signal plate (Crankshaft position sensor rotor) ●ECM	-	○
P1520 (DI-126)	Stop Light Switch Signal Malfunction (Only for A/T)	●Short in stop light switch signal circuit ●Stop light switch ●ECM	○	○
P1600 (DI-129)	ECM BATT Malfunction	●Open in back up power source circuit ●ECM	○	○
P1780 (DI-131)	Park/Neutral Position Switch Malfunction (Only for 3RZ-FE A/T)	●Short in park/neutral position switch circuit ●Park/neutral position switch ●ECM	○	○

*: ○ ... MIL lights up. - ... MIL does not light up.

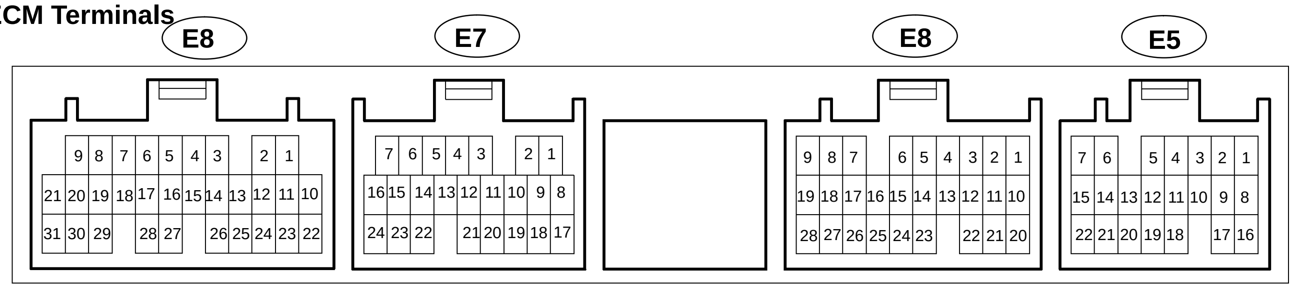
DI12D-10

PARTS LOCATION



*: Only for 3RZ-FE

TERMINALS OF ECM



Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E5-1) - E1 (E7-17)	B-Y - BR	Always	9 - 14
+B (E5-16) - E1 (E7-17)	W-R - BR	IG switch ON	9 - 14
VC (E7-2) - E2 (E7-18)	G-Y - BR-B	IG switch ON	4.5 - 5.5
VTA (E7-9) - E2 (E7-18)	Y - BR-B	IG switch ON, Throttle valve fully closed	0.3 - 1.0
		IG switch ON, Throttle valve fully open	3.2 - 4.9
VG (E7-14) - E2G (E7-22)	GR - B-W	Idling, A/C switch OFF, Shift position in N or P	1.1 - 1.5
THA (E7-21) - E2 (E7-18)	Y-G - BR-B	Idling, Intake air temp. 20°C (68° F)	0.5 - 3.4
THW (E7-12) - E2 (E7-18)	G-R - BR-B	Idling, Engine coolant temp. 80°C (176°F)	0.2 - 1.0
STA (E5-7) - E1 (E7-17)	B-W - BR	Cranking	6.0 or more
#10 (E8-1) - E01 (E8-21) #20 (E8-2) - E01 (E8-21) #30 (E8-3) - E01 (E8-21) #40 (E8-4) - E01 (E8-21)	W-R - BR W - BR R - BR R-L - BR	IG switch ON	9 - 14
		Idling	Pulse generation (See page DI-56)
IGT1 (E8-11) - E1 (E7-17)	B-L - BR	Idling	Pulse generation (See page DI-119)
IGT2 (E8-12) - E1 (E7-17)	L - BR		
IGT3 (E8-13) - E1 (E7-17)	L-R - BR		
IGT4 (E8-14) - E1 (E7-17)	L-Y - BR		
IGF (E8-10) - E1 (E7-17)	B-Y - BR	IG switch ON, Disconnect ignition coil connector	4.5 - 5.5
		Idling	Pulse generation (See page DI-119)
G2+ (E7-15) - NE- (E7-24)	R - G	Idling	Pulse generation (See page DI-61)
NE+ (E7-16) - NE- (E7- 23)	L - G	Idling	Pulse generation (See page DI-64)
FC (E6-6) - E01 (E8-21)	W-L - BR	IG switch ON	9 - 14
EGR (E7-5) -E01 (E8-21)*2	R-B - BR	IG switch ON	0 - 3
RSD (E8-15) - E1 (E7-21)	B-R - BR	IG switch ON, Disconnect E8 connector from ECM	Below 3.0
HAFL (E7-4) - E04 (E8-6)	R-W - BR	Idling	Below 3.0
	W - W-B	IG switch ON	9 - 14
AF+ (E7-11) - E1 (E7-17)	V - BR	Always (IG switch ON)	3.3 fixed*3
AF- (E7-20) - E1 (E7-17)	P - BR	Always (IG switch ON)	3.0 fixed*3
KNK (E8-28) - E1 (E7-17)	B-Y - BR	Idling	Pulse generation (See page DI-61)
NSW (E5-22) - E1 (E7-17) *1	B-W - BR	IG switch ON Shift position in P or N position	0 - 3.0

SP1 (E5-21) - E1 (E7-17)	G-O - BR	IG switch ON, Rotate driving wheel slowly	Pulse generation (See page DI-103)
TC (E6-7) - E1 (E7-17)	V-W - BR	IG switch ON	9 - 14
W (E5-6) - E1 (E7-17)	V-R - BR	Idling	9 - 14
		IG switch ON	Below 3.0
EVP (E7-6) - E1 (E7-17)	W-G - BR	IG switch ON	9 - 14
TPC (E7-7) - E1 (E7-17)	G-B - BR	IG switch ON	9 - 14
PTNK (E6-8) - E2 (E7-18)	R-Y - BR-B	IG switch ON, Disconnect vacuum hose from vapor pressure sensor	2.9 - 3.7
		Apply vacuum (less than 66.7 kPa (500 mmHg, 19.7 in.Hg))	Below 0.5
STP (E5-15) - E1 (E7-17)*1	G-W - BR	IG switch ON, Brake pedal depressed	7.5 - 14
		IG switch ON, Brake pedal released	Below 1.5
ELS (E5-20) - E1 (E7-17)	G-R - BR	Defogger switch and taillight switch OFF	Below 1.5
PSSW (E6-28) - E1 (E7-17)	Y - BR	IG switch ON	9 -14
		At idling, Turn steering wheel to lock position	Below 3.0
SIL (E5-12) - E1 (E7-17)	W - BR	During transmission	Pulse generation

*1: Only for A/T
*2: Only for 3RZ-FE
*3: The ECM terminal voltage is fixed regardless of the output voltage from the sensor.

DI12F-10

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	7. Starter 8. Starter relay	ST-16 ST-18
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. ECM	DI-135 DI-138 IN-28
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-138
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-132 DI-138 EM-3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-132 DI-138
Hot engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-132 DI-138
High engine idle speed (Poor idling)	1. ECM power source circuit	DI-135
Low engine idle speed (Poor idling)	1. Fuel pump control circuit	DI-138
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM-3 DI-138
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI-135 DI-138
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI-138 DI-295
Surging (Poor driveability)	1. Fuel pump control circuit	DI-138
Soon after starting (Engine stall)	1. Fuel pump control circuit	DI-138
During A/C operation (Engine stall)	1. ECM	IN-28

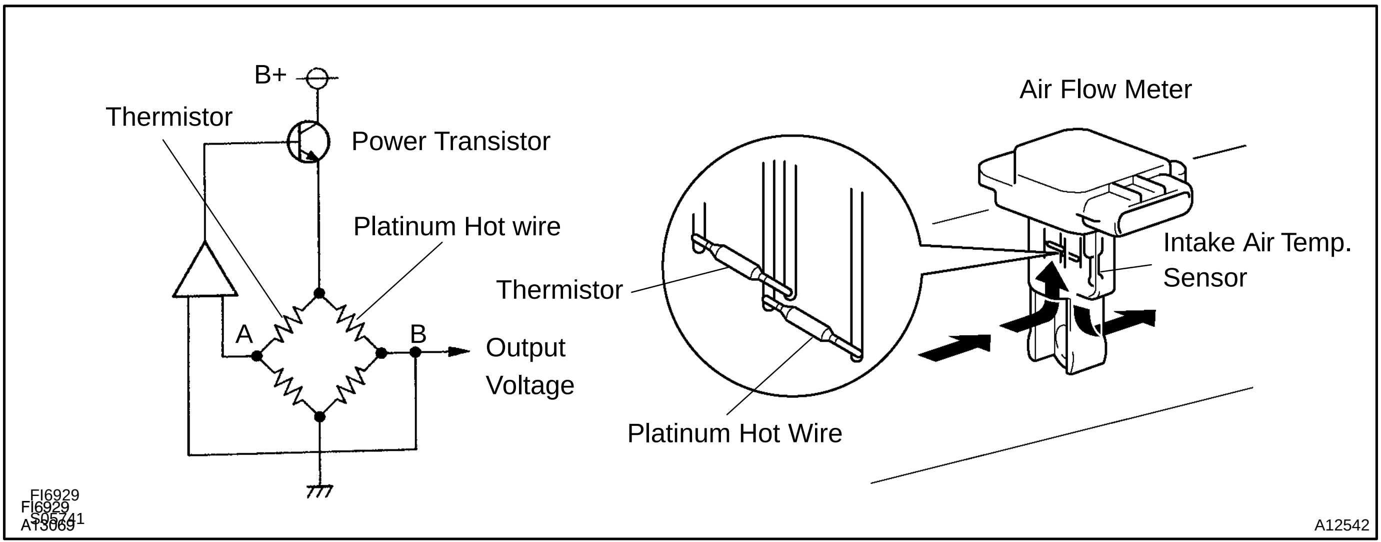
DI12G-10

CIRCUIT INSPECTION

DTC	P0100	Mass Air Flow Circuit Malfunction

CIRCUIT DESCRIPTION

The mass air flow meter uses a platinum hot wire. The hot wire air flow meter consists of a platinum hot wire, thermistor and a control circuit installed in a plastic housing. the hot wire air flow meter works on the principle that the hot wire and thermistor located in the intake air bypass of the housing detect any changes in the intake air temperature.
The hot wire is maintained at the set temperature by controlling the current flow through the hot wire. This current flow is ten measured as the output voltage of the mass air flow meter.
The circuit is constructed so that the platinum hot wire and thermistor provide a bridge circuit with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.

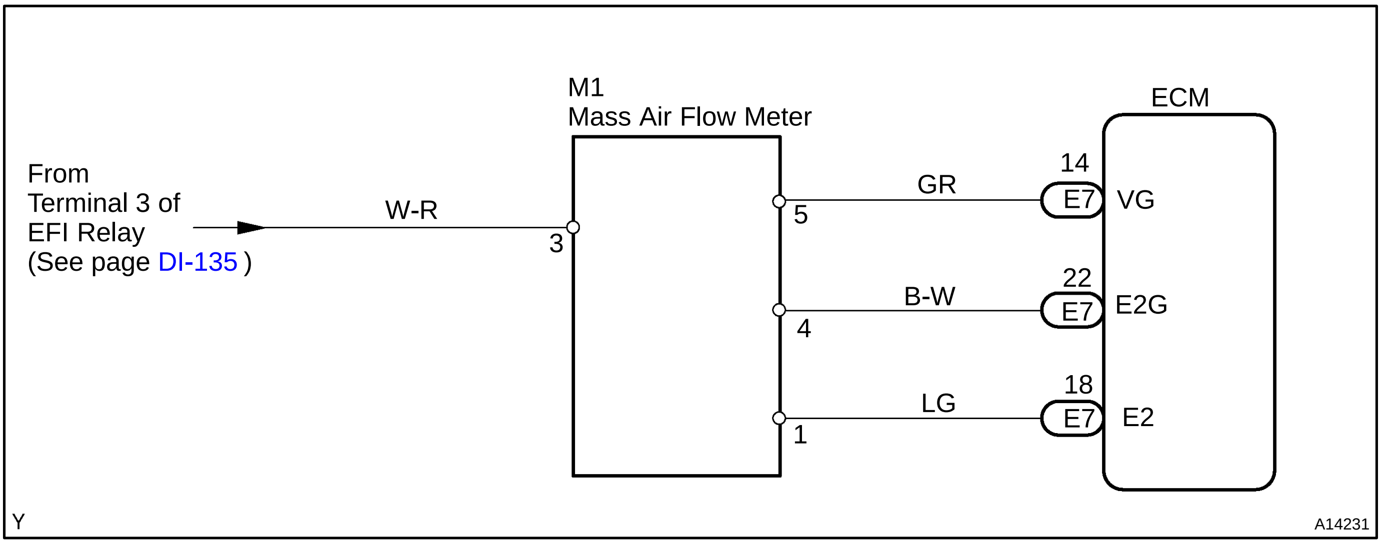


DTC No.	DTC Detection Condition	Trouble Area
P0100	Open or short in mass air flow meter circuit with more than 3 sec. engine speed 4,000 rpm or less	●Open or short in mass air flow meter circuit ●Mass air flow meter ●ECM
	Open or short in mass air flow meter circuit with more than 3 sec. engine speed 4,000 rpm or more (2 trip detection logic)	

HINT:
After confirming DTC P0100, use the OBD II scan tool or TOYOTA hand-held tester to confirm the mass air flow ratio from the CURRENT DATA.

Mass Air Flow Value (gm/sec.)	Malfunction
Approx. 0	●Mass air flow meter power source circuit open ●VG circuit open or short
202.2 or more	●E2G (California Spec.), E3 (Except California Spec.) circuit open

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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

1	**Connect OBD II scan tool or TOYOTA hand-held tester, and read value of mass air flow rate.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.

(c) Start the engine.

CHECK:

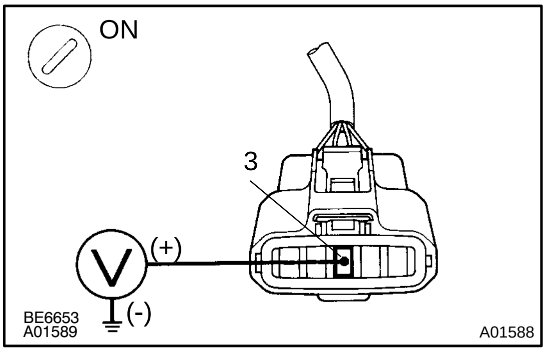
Read the mass air flow rate on the OBD II scan tool or TOYOTA hand-held tester.

RESULT:

	Type I	Type II
Mass Air Flow Rate (gm/sec.)	Approx. 0	202.2 gm/sec. or more

Type I	Go to step 2.
Type II	**Go to step 5.**

2	Check voltage of mass air flow meter power source.



PREPARATION:

(a) Disconnect the mass air flow meter connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal 3 of the mass air flow meter connector and the body ground.

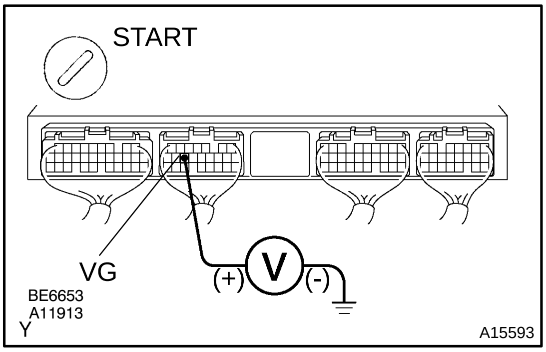
OK:

Voltage: 9 - 14 V

NG	Check for open in harness and connector between EFI main relay (Marking: EFI) and mass air flow meter (See page IN-28).

OK

3	Check voltage between terminal VG of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Start the engine.

CHECK:

Measure the voltage between terminal VG of the ECM connector and the body ground while the engine is idling.

OK:

Voltage:

1.1 - 1.5 V (P or N position and A/C switch OFF)

OK	Check and replace ECM (See page IN-28).

NG

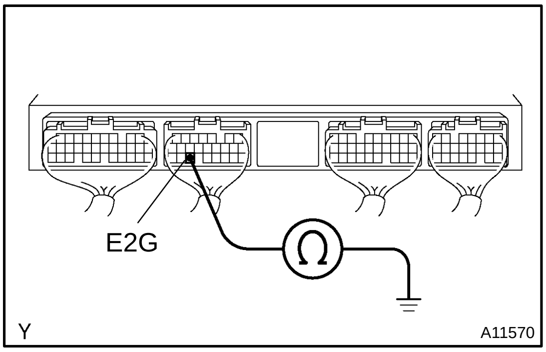
4	Check for open and short in harness and connector between mass air flow meter and ECM (See page IN-28).

NG	Repair or replace harness or connector.

OK

Replace mass air flow meter.

5	**Check continuity between terminal E2G of ECM connector and body ground.**



PREPARATION:

Remove the glove compartment (See page SF-49).

CHECK:

Check the continuity between terminal E2G or E3 of the ECM connector and the body ground.

OK:

Continuity (1 Ω or less)

NG → **Check and replace ECM (See page IN-28).**

OK

6	**Check for open in harness and connector between mass air flow meter and ECM (See page IN-28).**

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

OK

Replace mass air flow meter.

DI12H-10

DTC	P0101	Mass Air Flow Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100 on page DI-22 .

DTC No.	DTC Detection Condition	Trouble Area
P0101	After engine is warmed up, conditions (a) and (b) continue with more than 10 sec. engine speed 900 rpm or less: (2 trip detection logic) (a) Throttle valve fully closed (b) Mass air flow meter output > 2.2 V	●Mass air flow meter
	Conditions (a) and (b) continue with more than 10 sec. engine speed 1,850 rpm or more: (2 trip detection logic) (a) VTA < 0.75 V (b) Mass air flow meter output < 0.97 V for 2RZ-FE or Mass air flow meter output < 1.0 V for 3RZ-FE	

INSPECTION PROCEDURE

HINT:

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

1	Are there any other codes (besides DTC P0101) being output?

YES → **Go to relevant DTC chart (See page DI-14).**

NO ↓

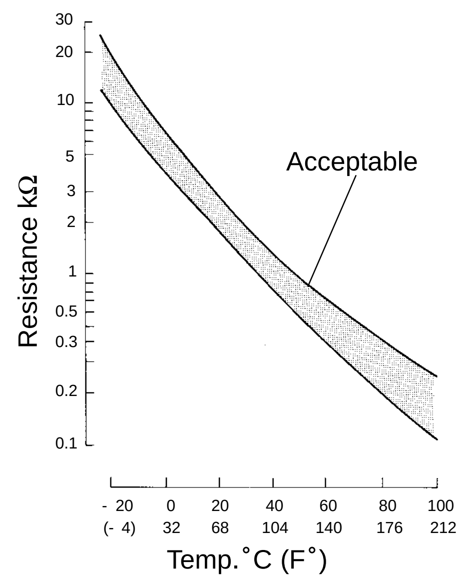
Replace mass air flow meter.

DI12I-10

DTC	P0110	Intake Air Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

Fig. 1



The intake air temperature sensor is Built Into Mass Air Flow Meter and senses the intake air temperature.
A thermistor built in the sensor changes the resistance value according to the intake air temperature. The lower the intake air temperature, the greater the thermistor resistance value, and the higher the intake air temperature, the lower the thermistor resistance value (See Fig. 1).
The intake air 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 via a resistor R.
That is, 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 also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during cold engine operation.

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

HINT:
After confirming DTC P110, use the OBD II scan tool or TOYOTA nand-held tester to confirm the intake air temperature from the CURRENT DATA.

Temperature Displayed	Malfunction
-40 °C (-40°F)	Open circuit
140°C (284°F) or more	Short circuit

WIRING DIAGRAM

INSPECTION PROCEDURE

HINT:

- If DTCs P0110, P0115 and P0120 are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand-held tester, and read value of intake air temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

OK:

Same value as the actual intake temperature.

HINT:

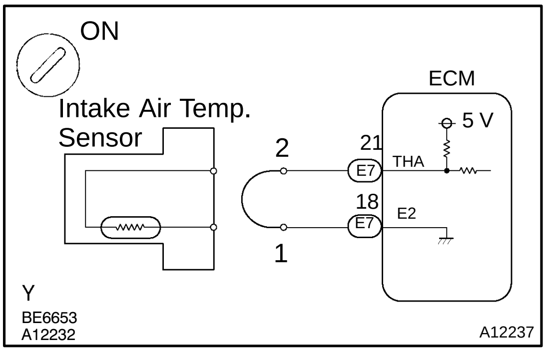
- If there is open circuit, OBD II scan tool or TOYOTA hand-held tester indicates -40°C (-40°F).
- If there is short circuit, OBD II scan tool or TOYOTA hand–held tester indicates 140°C (284°F) or more.

NG	**-40 °C (-40°F) ... Go to step 2.** **140°C (284°F) or more ... Go to step 4.**

OK

Check for intermittent problems (See page DI-3).

2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the mass air flow meter connector.

(b) Connect the sensor wire harness terminals together.

(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

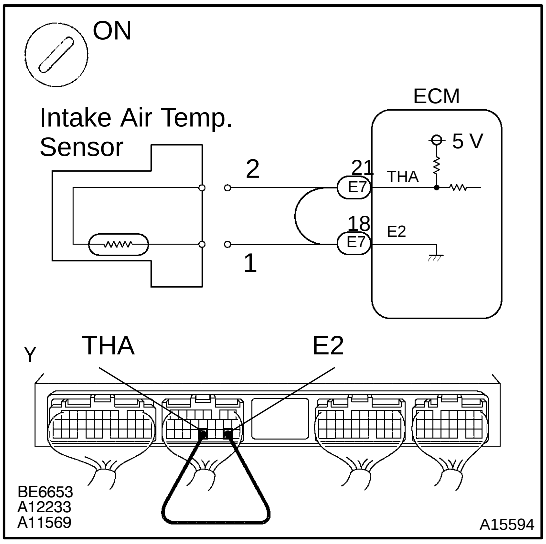
OK:

Temperature value: 140°C (284°F) or more

OK → **Confirm good connection at sensor. If OK, replace mass air flow meter.**

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Connect between terminals THA and E2 of the ECM connector.

HINT:

The mass air flow meter connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page IN-28).

(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

OK:

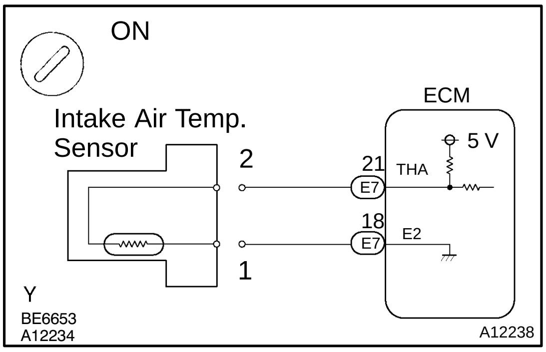
Temperature value: 140°C (284°F) or more

OK → **Open in harness between terminal E2 or THA, repair or replace harness.**

NG

Confirm good connection at ECM. If OK, replace ECM.

4	Check for short in harness and ECM.

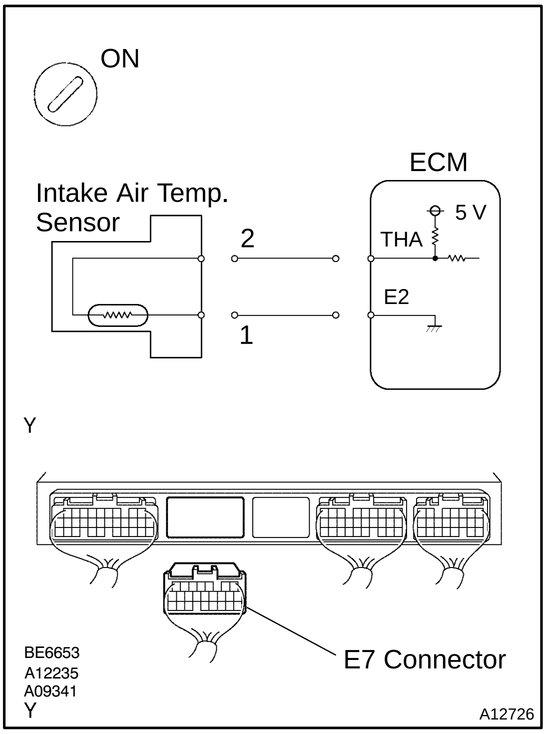


PREPARATION:
(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.
CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.
OK:
Temperature value: -40°C (-40°F)

OK	Replace mass air flow meter.

NG

5	Check for short in harness or ECM.



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Disconnect the E7 connector from the ECM.
HINT:
The mass air flow meter connector is disconnected.
(c) Turn the ignition switch ON.
CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.
OK:
Temperature value: -40°C (-40°F)

OK	Repair or replace harness or connector.

NG

Check and replace ECM (See page IN-28).

DI12J-10

DTC	P0115	Engine Coolant Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

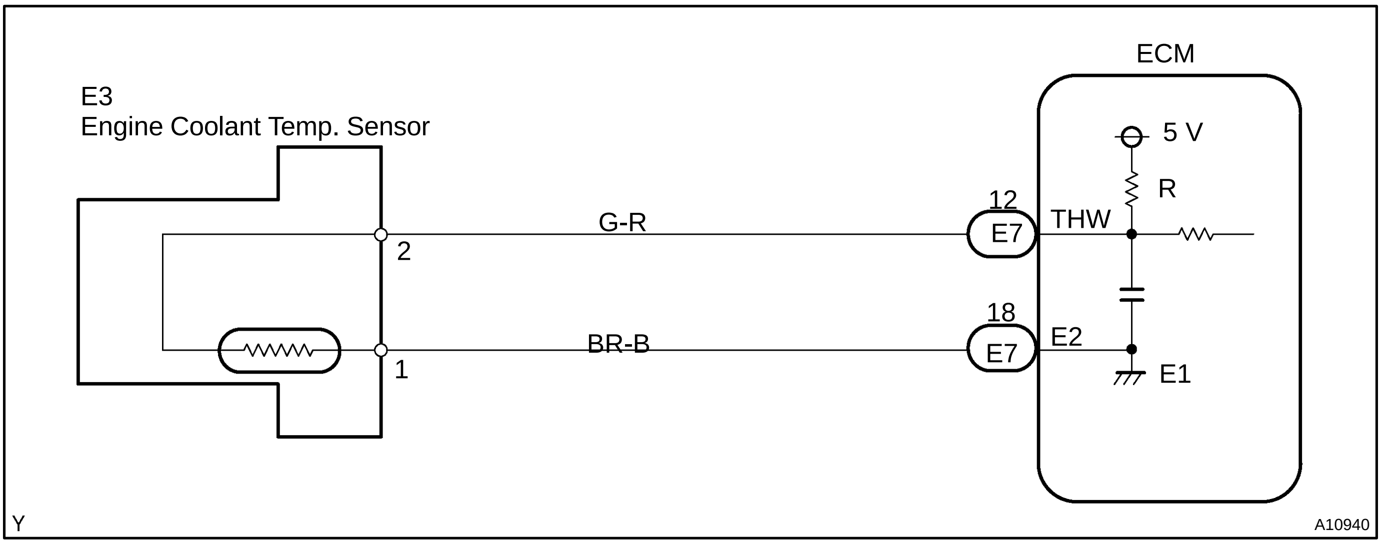
A thermistor built into the engine coolant temperature sensor changes the resistance value according to the engine coolant temperature.
The structure of the sensor and connection to the ECM is the same as in the DTC P0110 shown on page DI-27.

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

HINT:
After confirming DTC P0115, use the OBD II scan tool or TOYOTA hand-held tester to confirm the engine coolant temperature from the CURRENT DATA.

Temperature Displayed	Malfunction
-40 °C (-40°F)	Open circuit
140°C (284°F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
- If DTCs P0110, P0115 and P0120 are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand-held tester, and read value of engine coolant temperature.**

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.

CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

OK:
Same as actual engine coolant temperature.

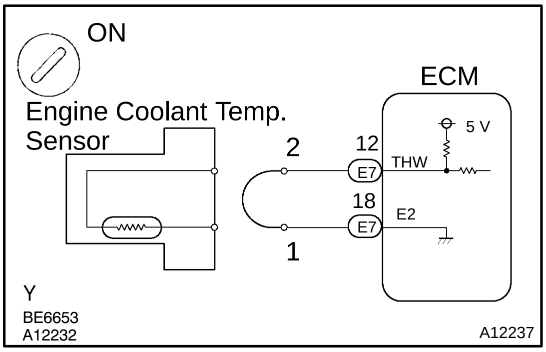
HINT:
- If there is open circuit, OBD II scan tool or TOYOTA hand-held tester indicates -40°C (-40°F).
- If there is open circuit, OBD II scan tool or TOYOTA hand–held tester indicates 140°C (284°F) or more.

NG → **-40 °C (-40°F) ... Go to step 2.**
140°C (284°F) or more ... Go to step 4.

OK

Check for intermittent problems (See page DI-3).

2	**Check for open in harness or ECM.**



PREPARATION:
(a) Disconnect the engine coolant temperature sensor connector.
(b) Connect the sensor wire harness terminals together.
(c) Turn the ignition switch ON.

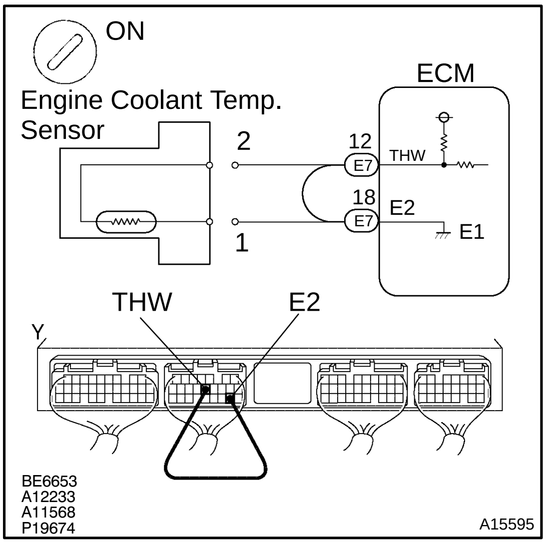
CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

OK:
Temperature value: 140°C (284°F) or more

OK → **Confirm good connection at sensor. If OK, replace engine coolant temperature sensor.**

NG

3 Check for open in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Connect between terminals THW and E2 of the ECM connector.

HINT:

The engine coolant temperature sensor connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page IN-28).

(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

OK:

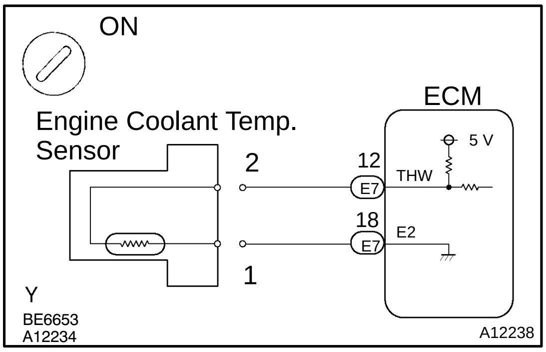
Temperature value: 140°C (284°F) or more

OK → **Open in harness between terminal E2 or THW, repair or replace harness.**

NG

Confirm good connection at ECM. If OK, replace ECM.

4 Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the engine coolant temperature sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

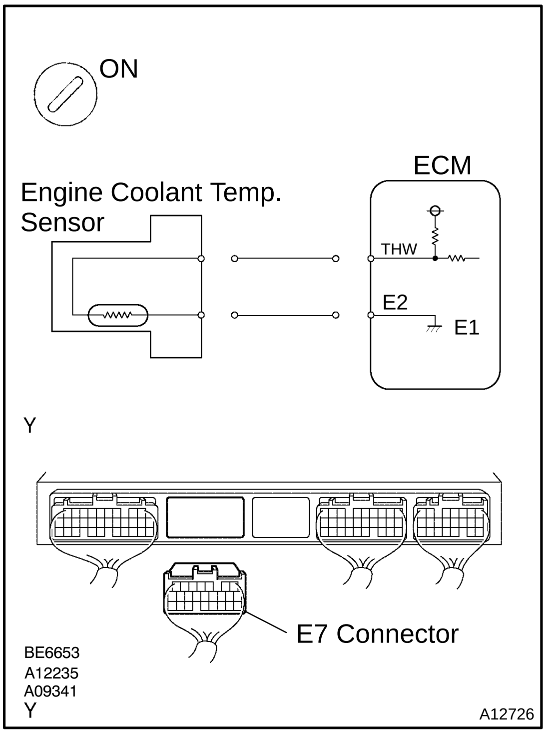
OK:

Temperature value: -40°C (-40°F)

OK → **Replace engine coolant temperature sensor.**

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Disconnect the E7 connector from the ECM.

HINT:

The engine coolant temp. sensor connector is disconnected.

(c) Turn ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

OK:

Temperature value: -40°C (-40°F)

OK	Repair or replace harness or connector.

NG

Check and replace ECM (See page IN-28).

DI12K-10

DTC	P0116	Engine Coolant Temp. Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI–31.

DTC No.	DTC Detection Condition	Trouble Area
P0116	If THW < -6.7°C (19.4°F) or THA < -6.7°C (19.4°F) 20 min. or more after starting engine, engine coolant temp. sensor value is 15°C (59°F) or less (2 trip detection logic)	●Cooling system ●Engine coolant temp. sensor
	If THW ⍰ -6.7°C (19.4°F) and THA < -6.7°C (19.4°F) and 10°C (50°F) at engine start, 5 min. or more after starting engine, engine coolant temp. sensor value is 30°C (86°F) or less (2 trip detection logic)	
	If THW < 10°C (50°F) and THA < 10°C (50°F) at engine start, 2 min. or more after starting engine, engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	
	When THW ⍰ 35°C (95°F) and 60°C (140°F), THA < -6.7 °C (19.4°F) when starting engine, conditions (a) and (b) continue (2 trip detection logic) (a) Vehicle speed is changing (Not stable) (b) Water temp. change is lower than 3°C (5.4°F) from water temp. since when starting engine	
	In case that reading value of water temp. sensor will not change more than 1°C (1.8°F) even after repeating 6 trips (detection logic) of adjusting speed pattern with THW more than 60°C (140°F) when starting engine	

INSPECTION PROCEDURE

HINT:

- If DTCs P0115 and P0116 are output simultaneously, engine coolant temp. sensor circuit may be open. Perform troubleshooting of DTC P0115 first.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0116) being output?**

YES → **Go to relevant DTC chart (See page DI–14).**

NO

2	**Check thermostat (See page CO-11).**

NG — Replace thermostat.

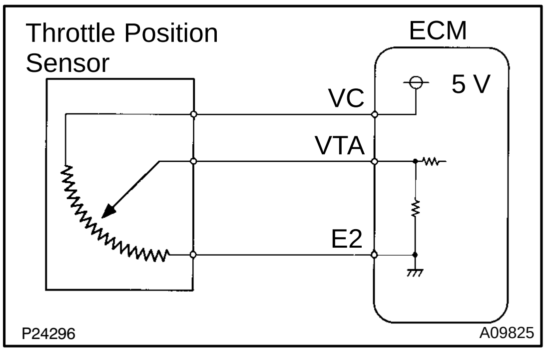
OK

Replace engine coolant temperature sensor.

DI6WO-02

DTC	P0120	Throttle/Pedal Position Sensor/Switch "A" Circuit Malfunction

CIRCUIT DESCRIPTION



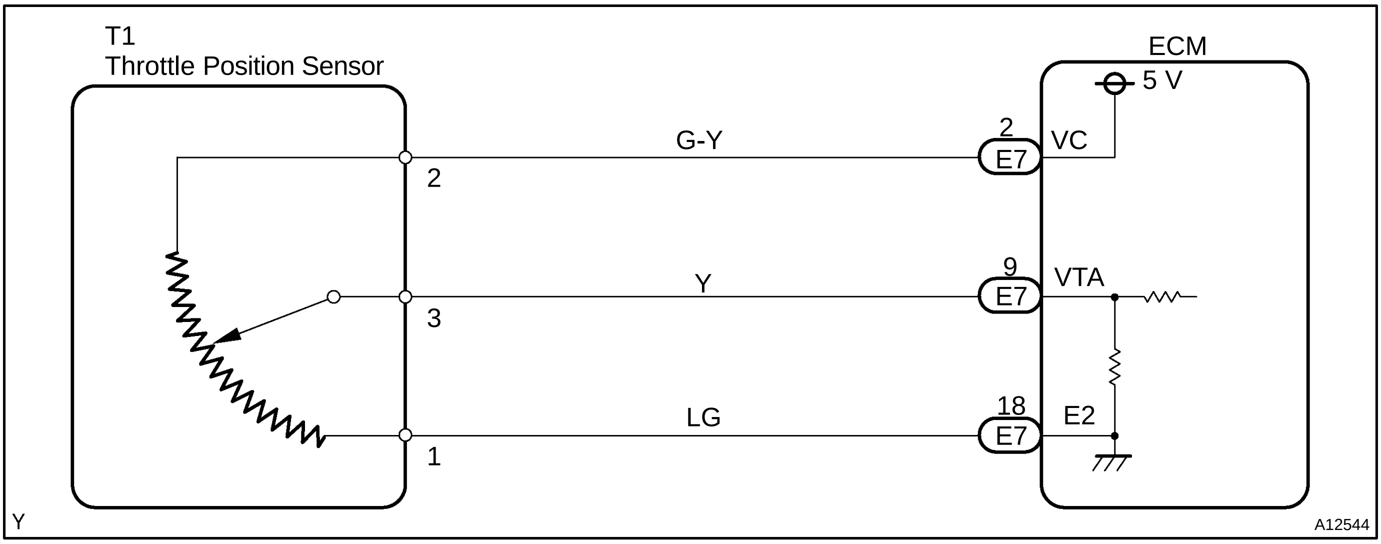
The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle.
When the throttle valve is fully closed, a voltage of approximately 0.3 - 0.8 V is applied to terminal VTA of the ECM. The voltage applied to the terminals VTA of the ECM increases in proportion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

DTC No.	DTC Detection Condition	Trouble Area
P0120	Condition (a) or (b) continues with more than 5 sec.: (a) VTA < 0.1 V (b) VTA > 4.9 V	● Open or short in throttle position sensor circuit ● Throttle position sensor ● ECM

HINT:
After confirming DTC P0120, use the OBD II scan tool or TOYOTA hand-held tester to confirm the throttle valve opening percentage and closed throttle position switch condition.

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

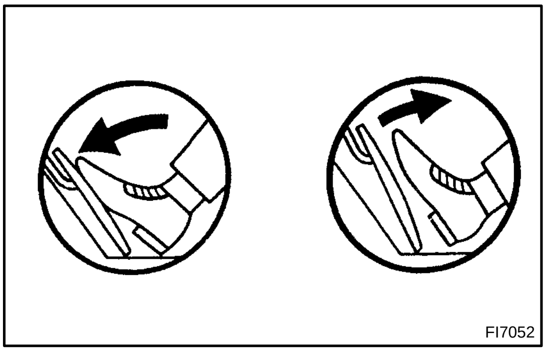
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
- If DTCs P0110, P0115 and P0120 are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1 Connect OBD II scan tool or TOYOTA hand-held tester, and read throttle valve opening percentage.



PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand-held tester to DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.

CHECK:
Read the throttle valve opening percentage.

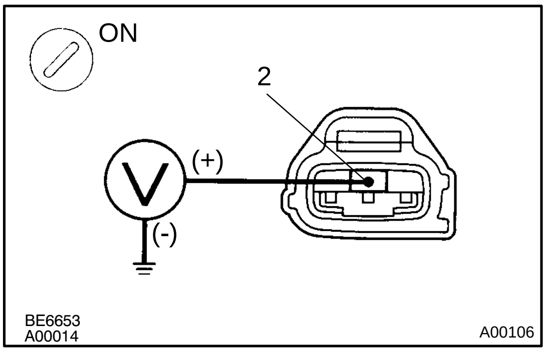
OK:

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

OK → **Check for intermittent problems (See page DI-3).**

NG

2 Check voltage between terminal 2 of throttle position sensor connector and body ground.



PREPARATION:
(a) Disconnect the throttle position sensor connector.
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminal 2 of the throttle position sensor connector and the body ground.

OK:
Voltage: 4.5 - 5.5 V

NG → **Go to step 5.**

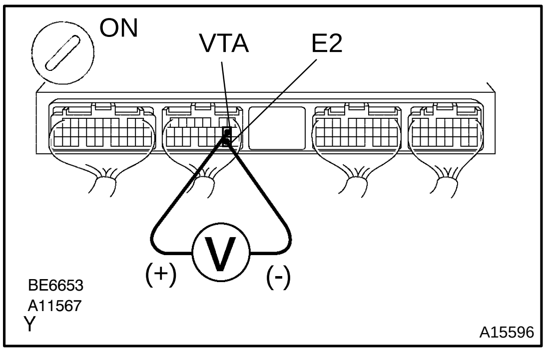
OK

3	**Check throttle position sensor (See page SF-30).**

NG → **Replace throttle position sensor.**

OK

4	**Check voltage between terminals VTA and E2 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VTA and E2 of the ECM connector.

OK:

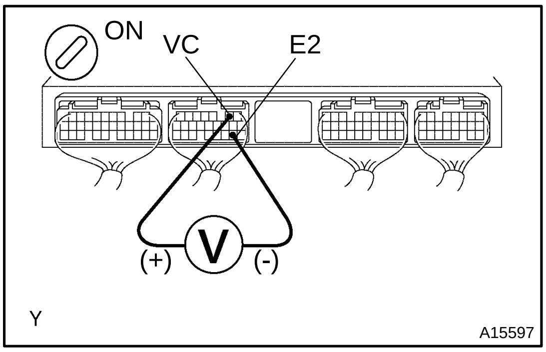
Throttle Valve	Voltage
Fully closed	0.3 - 0.8 V
Fully open	3.2 - 4.9 V

NG → **Check for open and short in harness and connector between ECM and throttle position sensor in VTA circuit (See page IN-28).**

OK

Check and replace ECM (See page IN-28).

5	**Check voltage between terminals VC and E2 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

OK:

Voltage: 4.5 - 5.5 V

NG → **Check and replace ECM (See page IN-28).**

OK

Check for open in harness and connector in VC circuit between ECM throttle position and sensor (See page IN-28).

DI12M-10

DTC	P0121	Throttle/Pedal Position Sensor/Switch ”A” Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page DI–37.

DTC No.	DTC Detection Condition	Trouble Area
P0121	While vehicle speed drops from 30 km/h (19 mph) or more to 0 km/h (0 mph), output value of throttle position sensor is out of applicable range (2 trip detection logic)	● Throttle position sensor

INSPECTION PROCEDURE

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

1	Are there any other codes (besides DTC P0121) being output?

YES → **Go to relevant DTC chart (See page DI–14).**

NO

Replace throttle position sensor.

DI12M-10

DTC	P0121	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page DI–37.

DTC No.	DTC Detection Condition	Trouble Area
P0121	While vehicle speed drops from 30 km/h (19 mph) or more to 0 km/h (0 mph), output value of throttle position sensor is out of applicable range (2 trip detection logic)	• Throttle position sensor

INSPECTION PROCEDURE

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

1	Are there any other codes (besides DTC P0121) being output?

YES → **Go to relevant DTC chart (See page DI–14).**

NO

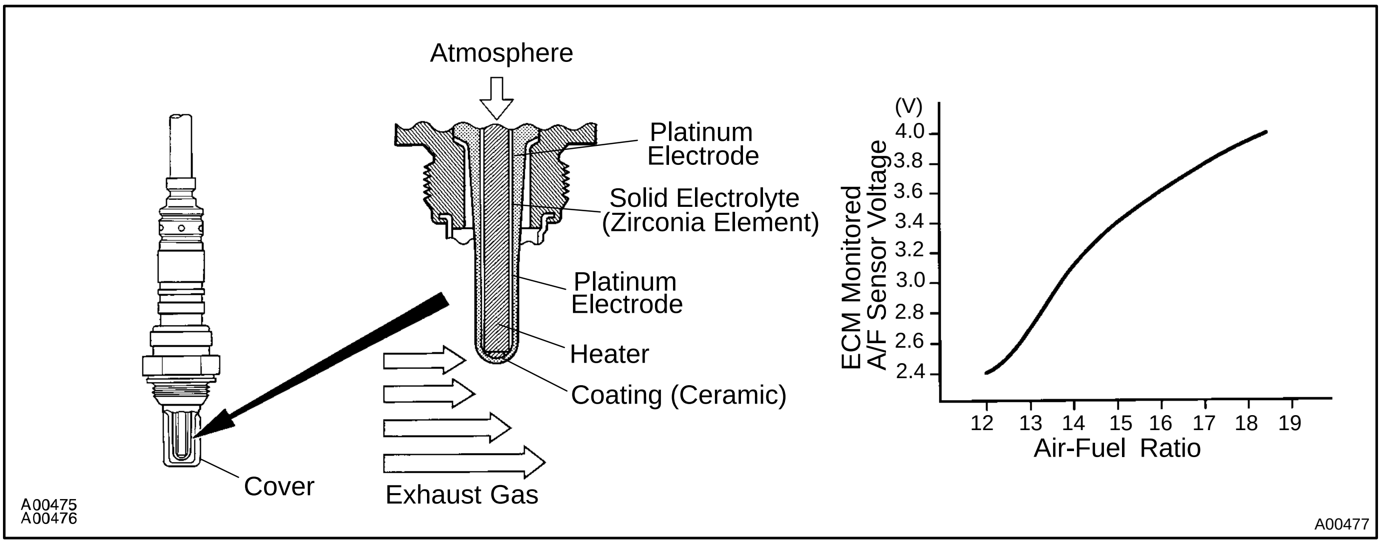
Replace throttle position sensor.

DI6WP-02

DTC	P0125	Insufficient Coolant Temp. for Closed Loop Fuel Control

CIRCUIT DESCRIPTION

To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three-way catalytic converter is used, but for the most efficient use of the three-way catalytic converter, the air-fuel ratio must be precisely controlled so that it is always close to the stoichiometric air-fuel ratio.
The A/F sensor has the characteristic that provides output voltage* approximately proportional to the existing air-fuel ratio. The A/F sensor output voltage* is used to provide feedback for the ECM to control the air-fuel ratio.
By the A/F sensor output, the ECM can determine the deviation amount from the stoichiometric air-fuel ratio and control the proper injection time immediately. If the A/F sensor is malfunctioning, ECM is unable to perform accurate air-fuel ratio control.
The A/F sensor is equipped with a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temp. of the exhaust gas is low), current flows to the heater to heat the sensor for accurate oxygen concentration detection.
*: The voltage value changes at the inside of the ECM only.

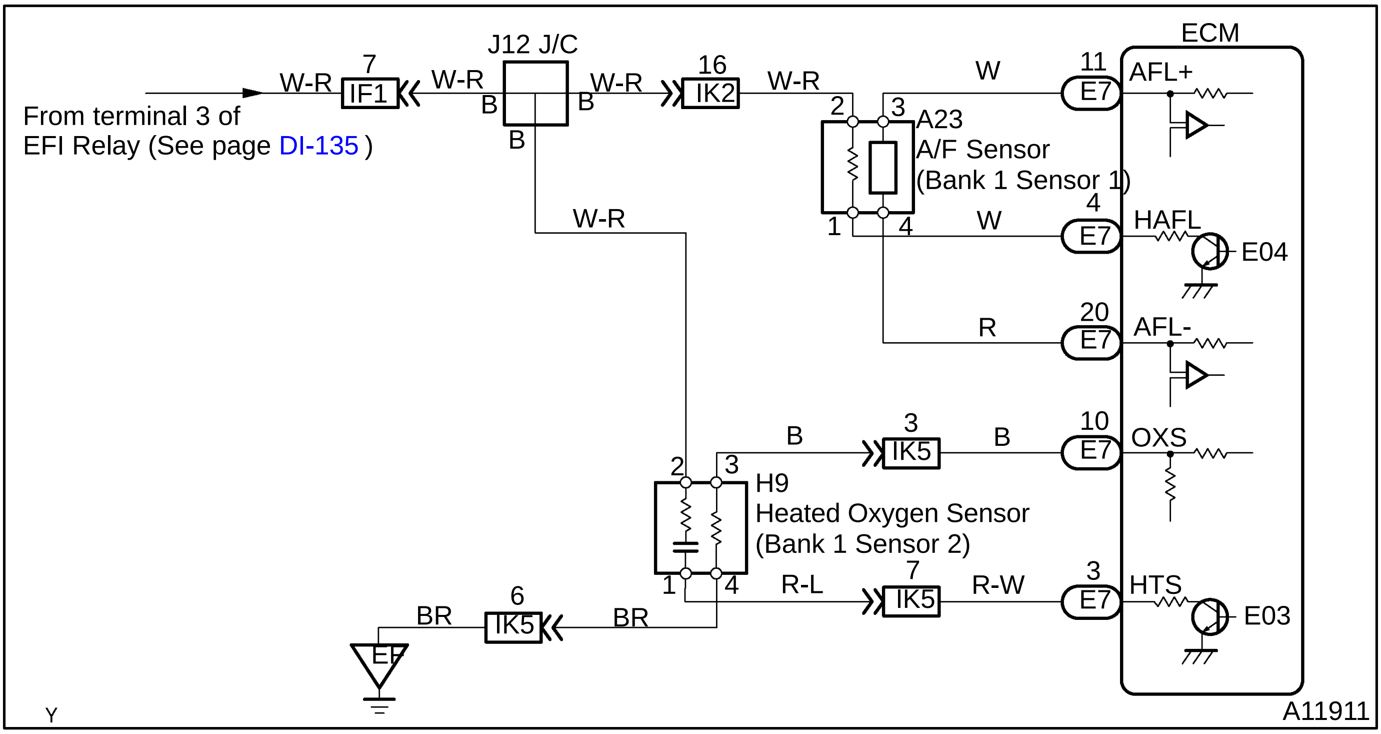


DTC No.	DTC Detection Condition	Trouble Area
P0125	After engine is warmed up, A/F sensor output* does not change when conditions (a), (b) and (c) continue for at least 1.5 min.: *: Output value changes at inside of ECM only (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 - 100 km/h (25 - 62 mph) (c) Throttle valve does not fully closed (d) After starting engine < 140 sec.	● Open or short in A/F sensor (bank 1 sensor 1) circuit ● A/F sensor (bank 1 sensor 1) ● Air induction system ● Fuel pressure ● Injector ● Gas leakage on exhaust system ● ECM

HINT:
- After confirming DTC P0125, use the OBD II scan tool or TOYOTA hand–held tester to confirm voltage output of the heated oxygen sensor (bank 1 sensor 1) from the CURRENT DATA.
- The ECM controls the voltage of the AFL+ and AFL- terminals of the ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand-held tester.

- OBD II scan tool (excluding TOYOTA hand-held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the TOYOTA hand-held tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If the vehicle run out of fuel, the air-fuel ratio is LEAN and DTC P0125 will be recorded. The MIL then comes on.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0125) being output?**

YES — **Go to relevant DTC chart (See page DI-14).**

NO

2	**Connect OBD II scan tool or TOYOTA hand-held tester, and read value for voltage output of A/F sensor (bank 1 sensor 1).**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.

(b) Warm up the A/F sensor with the engine speed at 2,500 rpm for approx. 90 sec.

CHECK:
Read the voltage value of the A/F sensor on the screen of the OBD II scan tool or TOYOTA hand-held tester when you perform all the following conditions.
HINT:
The voltage of AFL+ terminal of the ECM is 3.3 fixed and the AFL- terminal is 3.0 V fixed. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AFL+/AFL-) of the ECM.
OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.3. V (0.660 V*) ●Not remains at 3.8 V (0.76 V*) or more ●Not remains at 2.8 V (0.56 V*) or less *: When using the OBD II scan tool (excluding TOYOTA hand-held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or move, and operate throttle valve open and close	

HINT:
- During fuel enrichment, there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*), it is normal.
- During fuel cut, there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*), it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76 V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: When you use the OBD II scan tool (excluding TOYOTA hand-held tester).

OK	**Go to step 9.**

NG

3	**Check for open and short in harness and connector between ECM and A/F sensor (bank 1 sensor 1) (See page IN-28).**

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

OK

4	**Check resistance of A/F sensor heater (bank 1 sensor 1) (See page SF-46).**

NG	**Replace A/F sensor.**

OK

5	Check air induction system (See page SF-1).

NG → Repair or replace.

OK

6	Check fuel pressure (See page SF-5).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).

OK

7	Check injector injection (See page SF-17).

NG → Replace injector.

OK

8	Check gas leakage on exhaust system.

NG → Repair or replace.

OK

Replace A/F sensor (bank 1 sensor 1).

9	Perform confirmation driving pattern (See page DI-108).

Go

10	Is there DTC P0125 being output again?

YES → Check and replace ECM (See page IN-28).

NO ↓

11	Did vehicle run out of fuel in past?

NO → Check for intermittent problems (See page DI-3).

YES ↓

DTC P0125 is caused by shortage of fuel.

DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI-42 .

DTC No.	DTC Detection Condition	Trouble Area
P0136	Voltage output of heated oxygen sensor remains at 0.45 V or less 0.60V or more when vehicle is driven at 50 km/h (31 mph) or more after engine is warmed up (2 trip detection logic)	●Open or short in heated oxygen sensor circuit ●Heated oxygen sensor

HINT:
Sensor 2 refers to the sensor farther away from the engine body.

WIRING DIAGRAM

Refer to DTC P0125 on page DI-42 .

INSPECTION PROCEDURE

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

1	Are there any other codes (besides DTC P0136) being output?

YES → **Go to relevant DTC chart (See page DI-14).**

NO

2	Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN-28).

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

OK

3	Check output voltage of heated oxygen sensor.

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Warm up the engine to normal operating temperature.

CHECK:

Read the voltage output of the heated oxygen sensor when the engine is suddenly raced.

HINT:

Perform quick racing to 4,000 rpm 3 times using the accelerator pedal.

OK:

Heated oxygen sensor output voltage:
Alternates from 0.45 V or less to 0.60 V or more.

OK → **Check that each connector is properly connected.**

NG

Replace heated oxygen sensor.

DI12Q-12

DTC	P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI-42 .

DTC No.	DTC Detection Condition	Trouble Area
P0141	When heater operates, heater current exceeds 2 A (2 trip detection logic)	●Open or short in heater circuit of heated oxygen sensor ●Heated oxygen sensor heater ●ECM
	Heater current of 0.20 A or less when heater operates (2 trip detection logic)	

HINT:
Sensor 2 refers to the sensor farther away from the engine body.

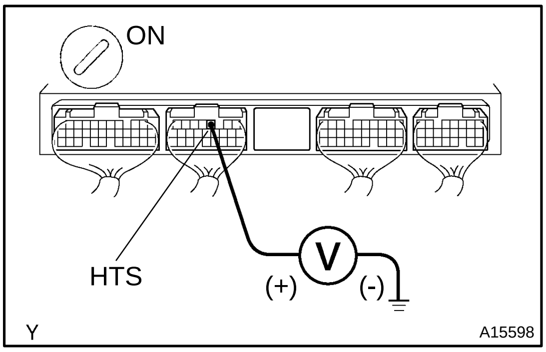
WIRING DIAGRAM

Refer to DTC P0125 on page DI-42 .

INSPECTION PROCEDURE

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

1	Check voltage between terminals HTS of ECM connector and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF-50).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals HTS or HT1, HT2 of the ECM connector and body ground.
HINT:
Connect terminal HT2 to bank 1 sensor 2.

OK:
Voltage: 9 - 14 V

OK → **Check and replace ECM (See page IN-28).**

NG

2	Check resistance of heated oxygen sensor heater (See page SF-48).

NG → **Replace heated oxygen sensor.**

OK

Check and repair harness or connector between EFI main relay (Marking: EFI) and heated oxygen sensor, and heated oxygen sensor and ECM (See page IN-28).

DI6WR-02

DTC	P0171	System too Lean (Fuel Trim)

DTC	P0172	System too Lean (Fuel Trim)

CIRCUIT DESCRIPTION

Fuel trim refers to the feedback compensation value compared to the basic injection time. Fuel trim includes short-term fuel trim and long-term fuel trim.
Short-term fuel trim is the short-term fuel compensation used to maintain the air-fuel ratio at its ideal theoretical value. The signal from the A/F sensor is approximately proportional to the existing air-fuel ratio, and ECM comparing it with the ideal theoretical value, the ECM reduces fuel volume immediately if the air-fuel ratio is rich and increases fuel volume if it is lean.
Long-term fuel trim compensates for the deviation from the central value of the short-term fuel trim stored up by each engine tolerance, and the deviation from the central value due to the passage of time and changes of environment.
If both the short-term fuel trim and long-term fuel trim exceed a certain value, it is detected as a malfunction and the MIL lights up.

DTC No.	DTC Detection Condition	Trouble Area
P0171	When air fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on RICH side (2 trip detection logic)	● Air induction system ● Injector blockage ● Mass air flow meter ● Engine coolant temp. sensor ● Fuel pressure ● Gas leakage on exhaust system ● Open or short in A/F sensor (bank 1 sensor 1) circuit ● A/F sensor (bank 1 sensor 1) ● ECM
P0172	When air fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on LEAN side (2 trip detection logic)	● Injector leak, blockage ● Mass air flow meter ● Engine coolant temp. sensor ● Ignition system ● Fuel pressure ● Gas leakage on exhaust system ● Open or short in A/F sensor (bank 1 sensor 1) circuit ● A/F sensor (bank 1 sensor 1) ● ECM

HINT:

- When the DTC P0171 is recorded, the actual air-fuel ratio is on the LEAN side. When DTC P0172 is recorded, the actual air-fuel ratio is on the RICH side.
- If the vehicle runs out of fuel, the air-fuel ratio is lean and DTC P0171 is recorded. The MIL then comes on.
- If the total of the short-term fuel trim value and long-term fuel trim value is within ±35 % (80˚C (176˚F) or more), the system is functioning normally.
- The A/F sensor (bank 1 sensor 1) output voltage and the short-term fuel trim value can be read using the OBD II scan tool or TOYOTA hand-held tester.
- The ECM controls the voltage of the AFL- and AFL- terminals of the ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand-held tester.

- OBD II scan tool (excluding TOYOTA hand-held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the TOYOTA hand-held tester.

WIRING DIAGRAM

Refer to DTC P0125 on page DI-42 .

INSPECTION PROCEDURE

HINT:

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

1	**Check air induction system (See page SF-1).**

NG → **Repair or replace.**

OK

2	**Check injector injection (See page SF-17).**

NG → **Replace injector.**

OK

3	**Check mass air flow meter (See page SF-24) and engine coolant temperature sensor (See page SF-42).**

NG → **Repair or replace.**

OK

4	**Check for spark and ignition (See page IG-1).**

NG → **Repair or replace.**

OK

5	**Check fuel pressure (See page SF-5).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

6	**Check gas leakage on exhaust system.**

NG → **Repair or replace.**

OK

7	**Check output voltage A/F sensor (bank 1 sensor 1).**

PREPARATION:

(a) Connect the OBDII scan tool or TOYOTA hand-held tester to the DLC3.

(b) Warm up the A/F sensor with the engine speed at 2,500 rpm for approximately 90 seconds.

CHECK:

Read the voltage value of the A/F sensor on the screen of the OBDII scan tool or TOYOTA hand-held tester when you perform all the following conditions.

HINT:

The voltage of the AFL+ terminal of the ECM is fixed at 3.3 V and AFL- terminal is fixed at 3.0 V. Therefore it is impossible to check the A/F sensor output voltage at the terminals (AFL+/AFL-) of the ECM.

OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.30 V (0.660 V*) ●Not remains at 3.8 V (0.76 V*) or more ●Not remains at 2.8 V (0.56 V*) or less *: When using the OBDII scan tool (excluding TOYOTA hand-held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25mph) or more, and operate throttle valve open and close	

HINT:

- During fuel enrichment, there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*), it is normal.
- During fuel cut, there is case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*), it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76 V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: When using the OBDII scan tool (excluding TOYOTA hand-held tester).

OK → **Go to step 9.**

NG

8	Check for open and short in harness and connector between ECM and A/F sensor (bank 1 sensor 1) (See page IN-28).

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

OK

Replace A/F sensor.

9	Perform confirmation driving pattern (See page DI-108).

Go

10	Is there DTC P0171 or P0172 being output again?

YES → **Check and replace ECM (See page IN-28).**

NO

11	Did vehicle run out of fuel in past?

NO → **Check for intermittent problems (See page DI-3).**

YES

DTC P0171 or P0172 is caused by shortage of fuel.

DI8ZU-01

DTC	P0300	Random/Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

CIRCUIT DESCRIPTION

Misfire: The ECM uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation for each cylinder.

The ECM counts the number of times the engine speed change rate indicates that misfire has occurred. And when the misfire rate equals or exceeds the count indicating that the engine condition has deteriorated, the MIL lights up.

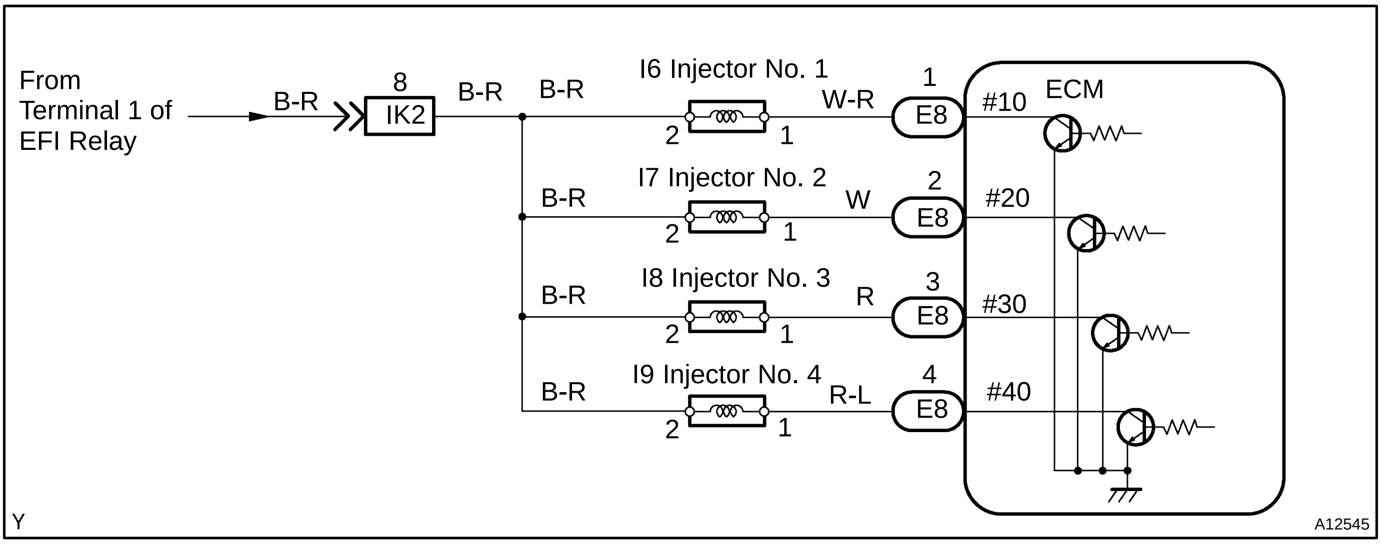
If the misfire rate is high enough and the driving conditions will cause catalyst overheating, the MIL blinks when misfiring occurs.

DTC No.	DTC Detection Condition	Trouble Area
P0300	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions	●Open or short in engine wire ●Connector connection ●Vacuum hose connection ●Ignition system ●Injector ●Fuel pressure ●EGR system (Except 2RZ-FE for California Spec.) ●Mass air flow meter ●Engine coolant temp. sensor ●Compression pressure ●Valve clearance ●Valve timing ●ECM
P0301 P0302 P0303 P0304	For any particular 200 revolutions for engine, misfiring is detected which can cause catalyst overheating (This causes MIL to blink) (2 trip detection logic)	
	For any particular 1,000 revolutions of engine, misfiring is detected which causes a deterioration in emissions (2 trip detection logic)	

HINT:

When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, it indicates that the misfires were detected and recorded at different times.

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

(a) Connect the TOYOTA hand-held tester or OBD II scan tool.
(b) Record DTC and the freeze frame data.
(c) Use the TOYOTA hand-held tester to set to the Check Mode (See page DI-3).
(d) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the data list.

If you have no TOYOTA hand-held tester, turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again.

HINT:

In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more
2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(e) Check whether there is misfire or not by monitoring DTC and the freeze frame data. After that, record them.
(f) Turn the ignition switch OFF and wait at least 5 seconds.

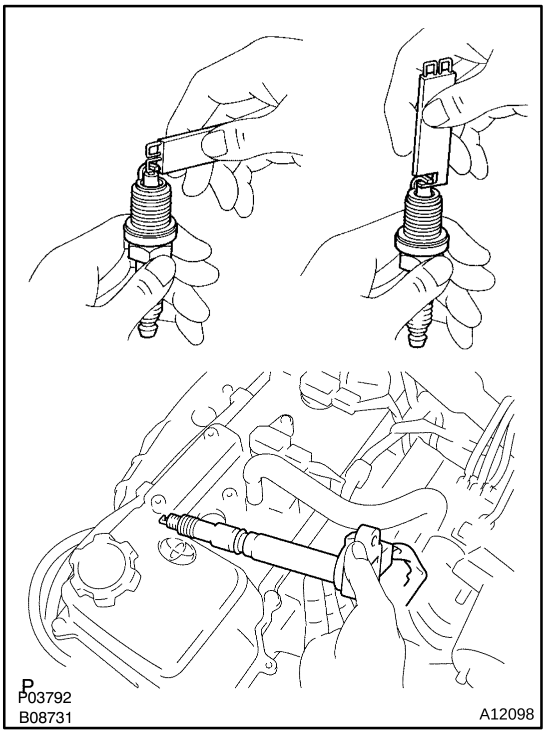
INSPECTION PROCEDURE

HINT:

- If it is the case that DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition of freeze frame data. Also, after finishing the repair, confirm that there is no misfire (See the confirmation driving pattern).

- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is besides the range of ± 20 %, there is a possibility that the air-fuel ratio is inclining either to RICH (-20 % or less) or LEAN (+20 % or more).
- When COOLANT TEMP in the freeze frame data is less than 80°C (176°F), there is a possibility of misfire only during warmed up.
- In the case that misfire cannot be reproduced, the reason may be because of the driving with lack of fuel, the use of improper fuel, a stain of the ignition plug, and etc.

1	**Check spark plug and spark of misfiring cylinder.**

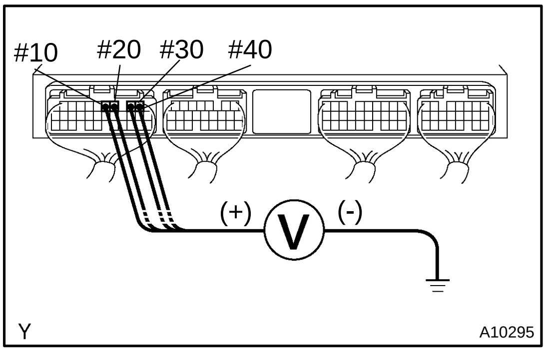


__PREPARATION:__
(a) Disconnect the ignition coil.
(b) Remove the spark plug.
__CHECK:__
(a) Check the electrode for carbon deposits.
(b) Check the electrode gap.
__OK:__
(a) No large carbon deposit present.
Not wet with gasoline or oil.
(b) Electrode gap: 1.1 mm (0.043 in.)
__PREPARATION:__
(a) Install the spark plug to the ignition coil.
(b) Disconnect the injector connector.
(c) Ground the spark plug.
__CHECK:__
Check if spark occurs while the engine is being cracked.
NOTICE:
To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 - 10 seconds at a time.
__OK:__
Spark jumps across electrode gap.

NG	**Replace or check ignition system (See page IG-1).**

OK

2	Check voltage of ECM terminals for injector of failed cylinder.



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between applicable terminal of the ECM connector and the body ground.

OK:

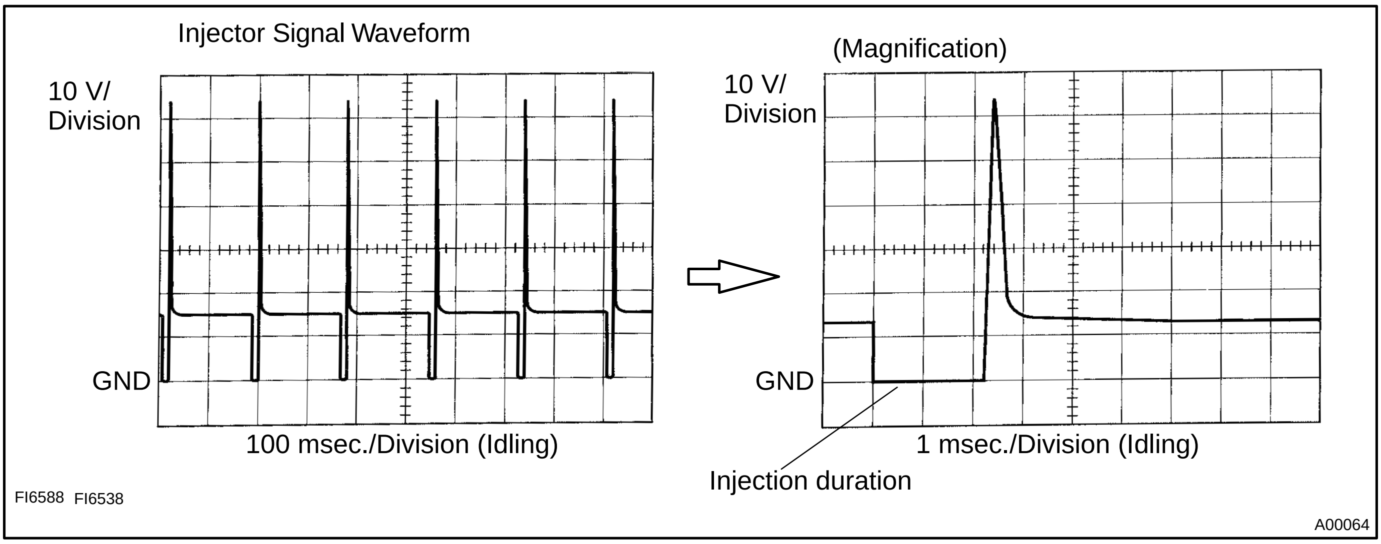
Voltage: 9 - 14 V

Reference: INSPECTION USING OSCILLOSCOPE

With the engine idling, check the waveform between terminals #10 - #40 and E01 of the ECM connector.

HINT:

The correct waveform is as shown.



OK	Go to step 4.

NG

3	Check resistance of injector of misfiring cylinder (See page SF-14).

NG	Replace injector.

OK

Check for open and short in harness and connector between injector and ECM (See page IN-28).

4	**Check fuel pressure (See page SF-5).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

5	**Check injector injection (See page SF-17).**

NG → **Replace injector.**

OK

6	**Check EGR system (Only for 3RZ-FE) (See page EC-9).**

NG → **Repair EGR system.**

OK

7	**Check mass air flow meter (See page SF-24) and engine coolant temperature sensor (See page SF-42).**

NG → **Repair or replace.**

OK

Check compression pressure (See page EM-3), valve clearance (See page EM-5) and valve timing (See page EM-22).

DI12U-10

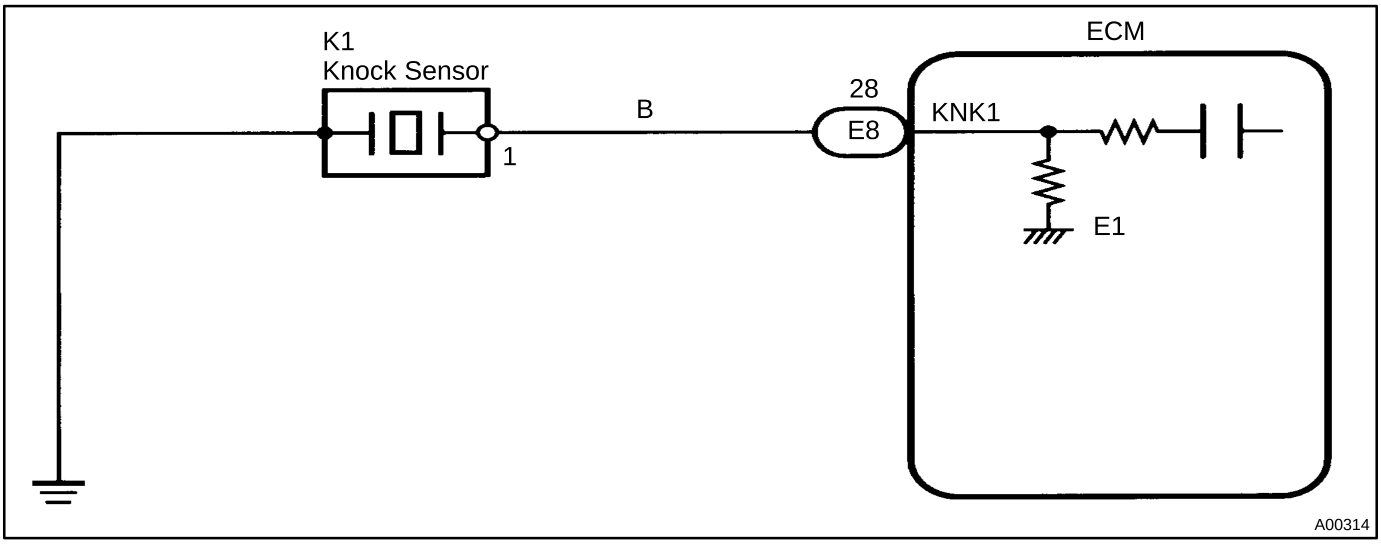
DTC	P0325	Knock Sensor 1 Circuit Malfunction (Bank 1)

CIRCUIT DESCRIPTION

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, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detection Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed 1,200 rpm or more	●Open or short in knock sensor 1 circuit ●Knock sensor 1 (looseness) ●ECM

WIRING DIAGRAM

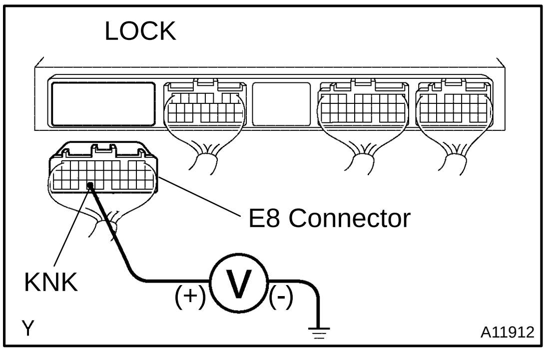


INSPECTION PROCEDURE

HINT:

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

1	Check continuity between terminal KNK1 of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

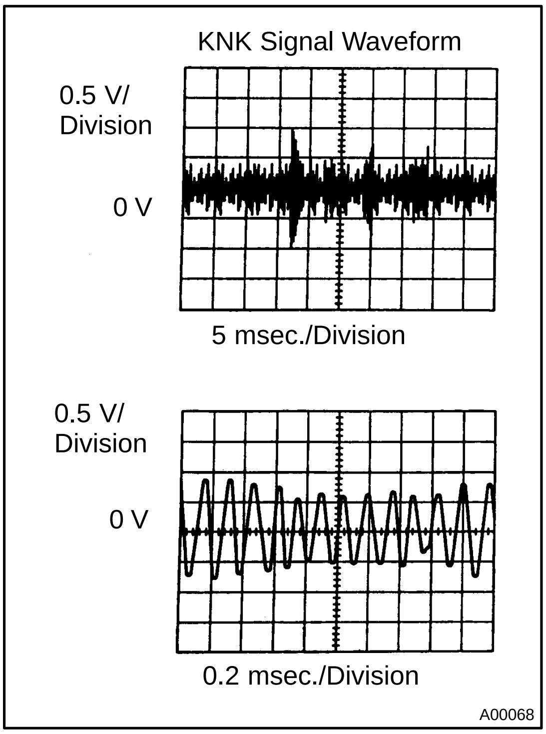
(b) Disconnect the E8 connector from the ECM.

CHECK:

Measure the resistance between terminal KNK of the ECM connector and the body ground.

OK:

Resistance: 1 MΩ or higher



Reference: INSPECTION USING OSCILLOSCOPE

- With the engine racing (4,000 rpm), check the waveform between terminal KNK1 of the ECM connector and body ground.

HINT:

The correct waveform is as shown.

- Spread the time on the horizontal axis, and confirm that period of the wave is 0.151 msec. (Normal mode vibration frequency of knock sensor: 6.6 kHz).

HINT:

If normal mode vibration frequency is not 6.6 kHz the sensor malfunctionsor KNK.

OK	Go to step 3.

NG

2	Check knock sensor (See page SF-44).¿

NG	Replace knock sensor.

OK

3	**Check for open and short in harness and connector between ECM and knock sensor (See page IN-28).**

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

OK

4	**Does malfunction disappear when good knock sensor is installed?**

YES → **Replace knock sensor.**

NO

Check and replace ECM (See page IN-28).

DI12V-10

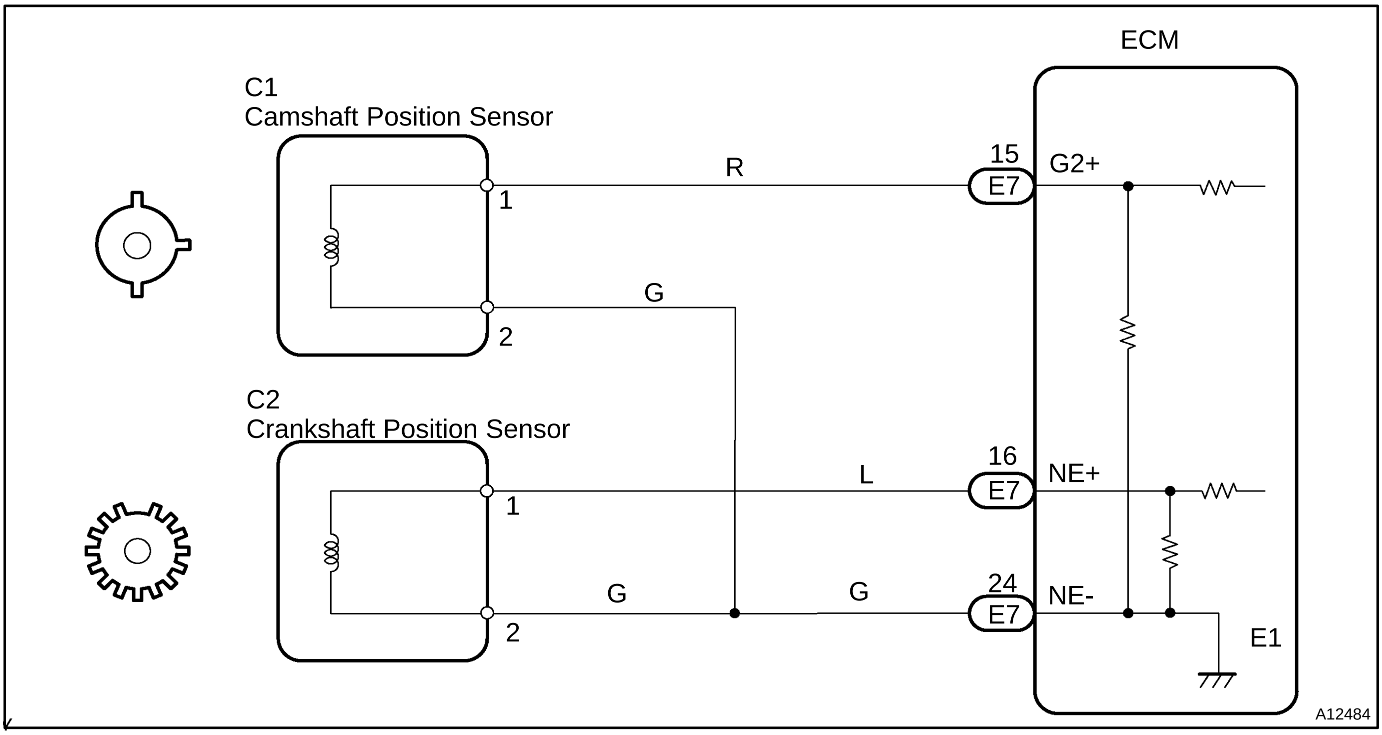
DTC	P0335	Crankshaft Position Sensor "A" Circuit Malfunction

CIRCUIT DESCRIPTION

Crankshaft position sensor (NE signal) consists of and pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the standard crankshaft angle based on the G signal, and the actual crankshaft angle and the engine speed by the NE signal.

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

WIRING DIAGRAM

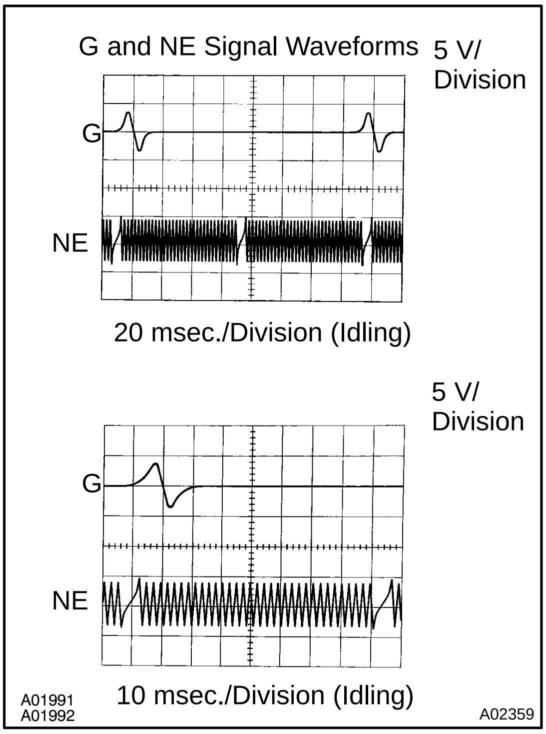


INSPECTION PROCEDURE

HINT:

- Perform troubleshooting of DTC P0335 first. If no trouble is found, troubleshoot the following mechanical system.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	Check resistance of crankshaft position sensor (See page IG-1).



Reference: INSPECTION USING OSCILLOSCOPE
California Spec.
During cranking or idling, check the waveforms between terminals G2 and NE-, and NE+ and NE- of the ECM connector.
HINT:
The correct waveforms are as shown.

NG	Replace crankshaft position sensor.

OK

2	Check for open and short in harness and connector between ECM and crankshaft position sensor (See page IN-28).

NG	Repair or replace harness or connector.

OK

3	Inspect sensor installation and teeth of signal plate.

NG	Tighten sensor. Replace signal plate.

OK

Check and replace ECM (See page IN-28).

DI6WU-02

DTC	P0340	Camshaft Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Camshaft position sensor (G signal) consists of a magnet, iron core and pickup coil. The G signal plate has 1 tooth on its outer circumference and is mounted on intake camshaft.
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 an electromotive force in the pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the standard crankshaft angle based on the G signal and the actual crankshaft angle and the engine speed by the NE signal.

DTC No.	DTC Detection Condition	Trouble Area
P0340	No camshaft position sensor signal to ECM during cranking (2 trip detection logic)	●Open or short in camshaft position sensor circuit ●Camshaft position sensor ●ECM
	No camshaft position sensor signal to ECM during engine running	

WIRING DIAGRAM

Refer to DTC P0335 on page DI-64 .

INSPECTION PROCEDURE

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

1	**Check resistance of camshaft position sensor (See page IG-1).**

Reference: INSPECTION USING OSCILLOSCOPE
Refer to DTC P0335 on page DI-64 .

NG → **Replace camshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and camshaft position sensor (See page IN-28).**

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

OK

3	Inspect sensor installation.

NG → **Tighten sensor.**

OK ↓

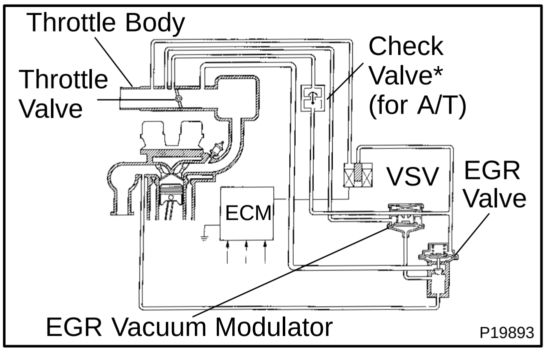
Check and replace ECM (See page IN-28).

DI12Y-12

DTC	P0401	Exhaust Gas Recirculation Flow Insufficient Detected (Only for 3RZ-FE)

CIRCUIT DESCRIPTION

The EGR system recirculates exhaust gas, which is controlled to the proper quantity to suit the driving conditions, into the intake air mixture to slow down combustion, reduce the combustion temperature and reduce NOx emissions. The amount of EGR is regulated by the EGR vacuum modulator according to the engine load.

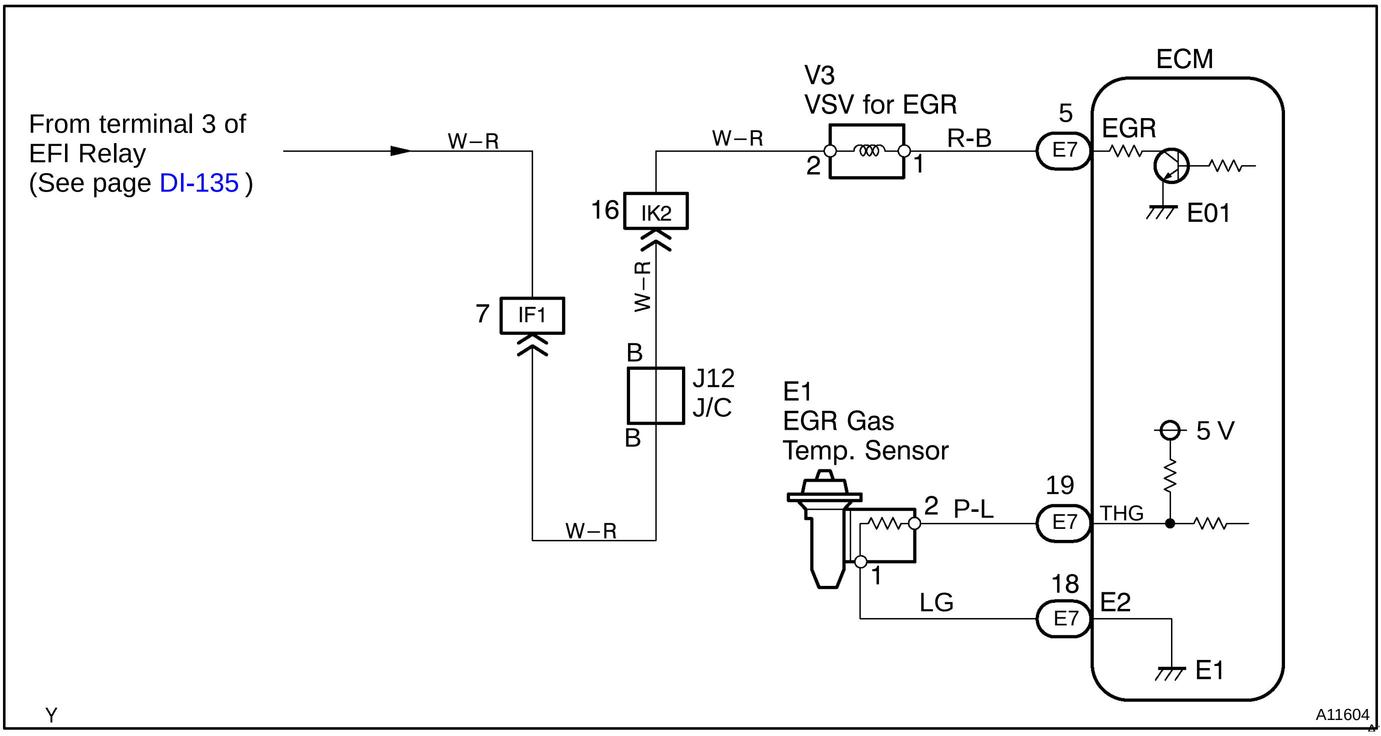


If even one of the following conditions is fulfilled, the VSV is turned ON by a signal from the ECM.
This results in atmospheric air acting on the EGR valve, closing the EGR valve and shutting off the exhaust gas (EGR cut-off).
Under the following conditions, EGR is cut to maintain driveability.

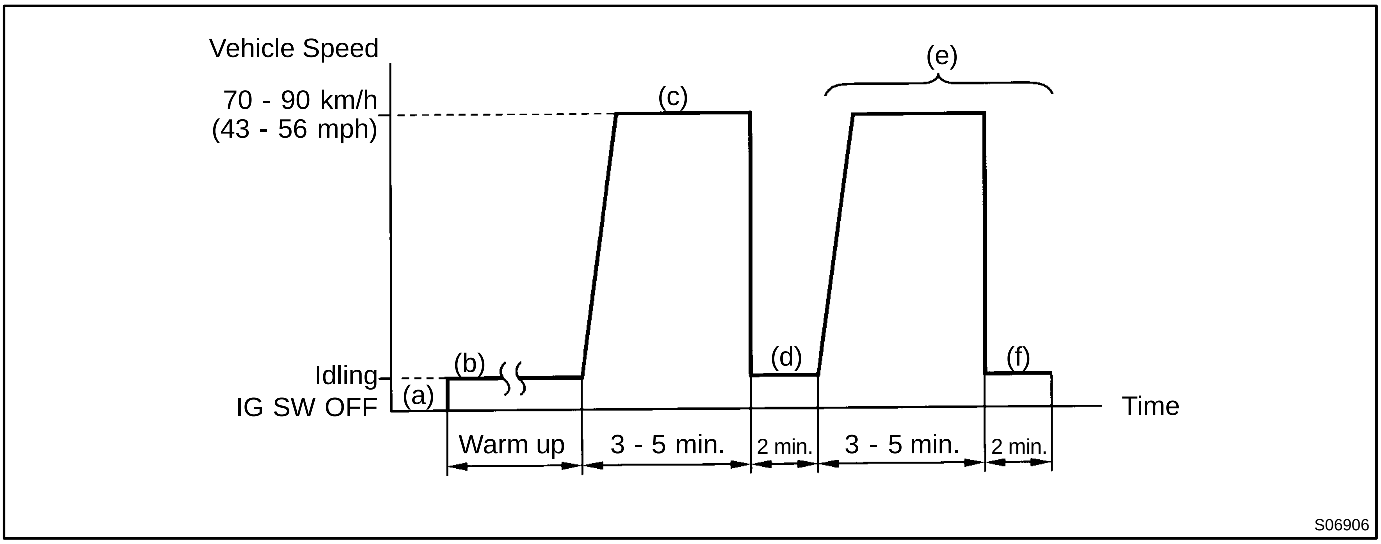
- Before the engine is warmed up.
- During deceleration (throttle valve closed).
- Light engine load (amount of intake air very small).
- Engine racing.

DTC No.	DTC Detection Condition	Trouble Area
P0401	After engine is warmed up and run at 80 km/h (50 mph) for 3 to 5 minutes, small difference between value of EGR gas temp. sensor and ambient air temp. (2 trip detection logic)	● Open in EGR gas temp. sensor circuit ● EGR gas temp. sensor ● Vacuum or EGR hose disconnected ● Open or short in VSV circuit for EGR ● VSV for EGR ● EGR system ● EGR vacuum modulator ● EGR valve stuck closed ● ECM

WIRING DIAGRAM



SYSTEM CHECK DRIVING PATTERN



(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Start and warm up the engine with all the accessories switched OFF.
(c) Run the vehicle at 70 - 90 km/h (43 - 56 mph) for 3 minutes or more.
(d) Idle the engine for about 2 minutes.
(e) Do steps (c) and (d) again.
(f) Check the READINESS TESTS mode on the OBD II scan tool or TOYOTA hand-held tester.

If COMPL is displayed and the MIL does not light up, the system is normal.

If INCMPL is displayed and the MIL does not light up, run the vehicle step (e) from some times and check it.

HINT:

INCMPL is displayed when either condition (1) or (2) exists.

(1) The system check is incomplete.

(2) There is a malfunction in the system.
If there is a malfunction in the system, the MIL will light up after steps (b) to (e) above are done (2 trip detection logic).

INSPECTION PROCEDURE

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

TOYOTA hand-held tester:

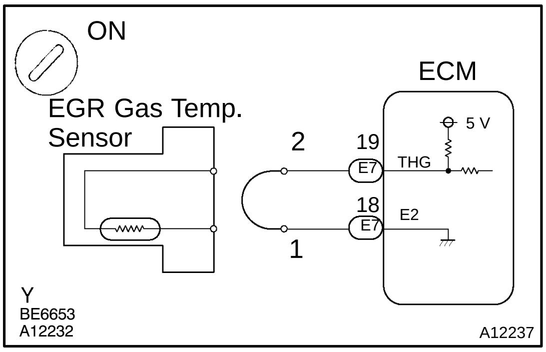
1	**Connect TOYOTA hand-held tester, and read value of EGR gas temperature value.**

PREPARATION:
(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand-held tester main switch ON.
CHECK:
Read the EGR gas temperature on the TOYOTA hand-held tester.
OK:
EGR gas temperature: 10˚C (50˚F) or more
HINT:
If there is an open circuit, the TOYOTA hand-held tester indicates 3.1˚C (37.6˚F).

OK → **Go to step 4.**

NG

2	**Check for open in harness or ECM.**

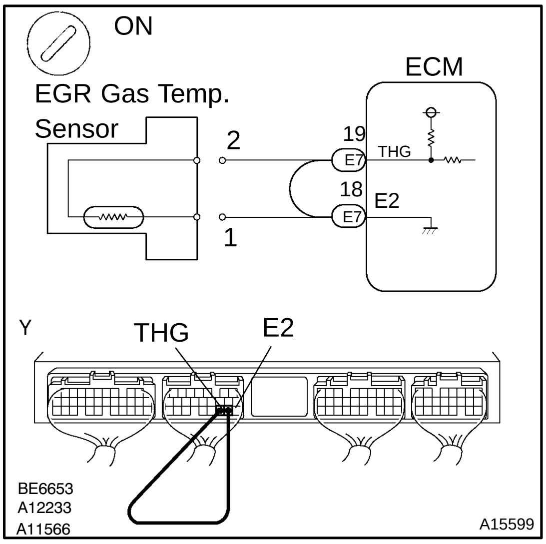


PREPARATION:
(a) Disconnect the EGR gas temperature sensor connector.
(b) Connect the sensor wire harness terminals together.
(c) Turn the ignition switch ON.
CHECK:
Read the EGR gas temperature on the TOYOTA hand-held tester.
OK:
EGR gas temperature: 159.3˚C (318.7˚F)

OK → **Confirm good connection at sensor. If OK, replace EGR gas temperature sensor.**

NG

3	**Check for open in harness or ECM.**



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Connect between terminals THG and E2 of the ECM connector.

HINT:

The EGR gas temperature sensor connector is disconnected. Before checking, do a visual check and contact pressure check for the ECM connector (See page IN-28).

CHECK:

Read the EGR gas temperature on the TOYOTA hand-held tester.

OK:

EGR gas temperature: 159.3°C (318.7°F)

OK	**Open in harness between terminal E2 or THG. Repair or replace harness.**

NG

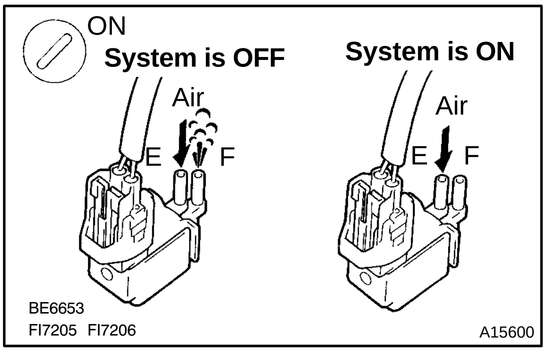
Confirm connection at ECM. If OK, replace ECM.

4	**Check connection of vacuum hose and EGR hose (See page EC-4).**

NG	**Repair or replace.**

OK

5	**Check VSV for EGR.**



PREPARATION:

Select the ACTIVE TEST mode on the TOYOTA hand-held tester.

CHECK:

Check the operation of the VSV when it is operated by the TOYOTA hand-held tester.

OK:

EGR system is OFF:
Air from port E flows out through port F.

EGR system is ON:
Air does not flow from port E to port F.

OK → **Go to step 8.**

NG

6	**Check operation of VSV for EGR (See page EC-9).**

NG → **Replace VSV for EGR.**

OK

Check for short in harness and connector between VSV and ECM (See page IN-28).

7	**Check EGR system (See page EC-9).**

NG → **Repair or replace.**

OK

8	**Check EGR vacuum modulator (See page EC-9).**

NG → **Repair or replace.**

OK

9	**Check EGR valve (See page EC-9).**

NG → **Repair or replace.**

OK

10	Check value of EGR gas temperature sensor.

PREPARATION:
(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the TOYOTA hand-held tester (EGR system ON).
(d) Race the engine at 4,000 rpm for 3 min.

CHECK:
Measure the EGR gas temperature while racing the engine at 4,000 rpm.

OK:
EGR gas temperature after 3 minutes 100°C (212°F) or more

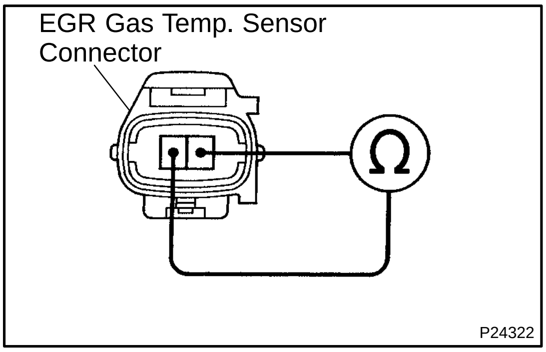
NG → **Replace EGR gas temperature sensor.**

OK

Check and replace ECM (See page IN-28).

OBD II scan tool (excluding TOYOTA hand-held tester):

1	Check resistance of EGR gas temperature sensor.



PREPARATION:
Disconnect the EGR gas temperature sensor connector.

CHECK:
Measure the resistance between terminals of the EGR gas temperature sensor connector.

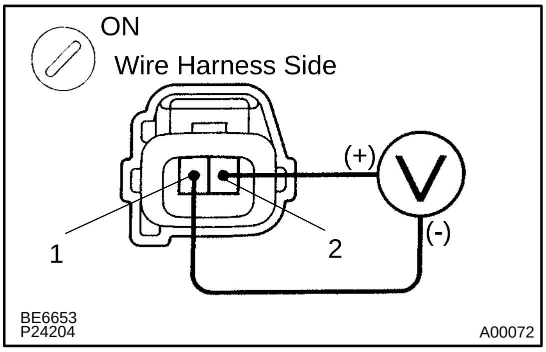
OK:
Resistance: 600 kΩ or less

HINT:
If there is open circuit, ohmmeter indicates 720 kΩ or more.

NG → **Check and replace EGR gas temperature sensor (See page EC-9).**

OK

2	Check for open in harness or ECM.



PREPARATION:
(a) Disconnect the EGR gas temperature sensor connector.
(b) Turn the ignition switch ON.

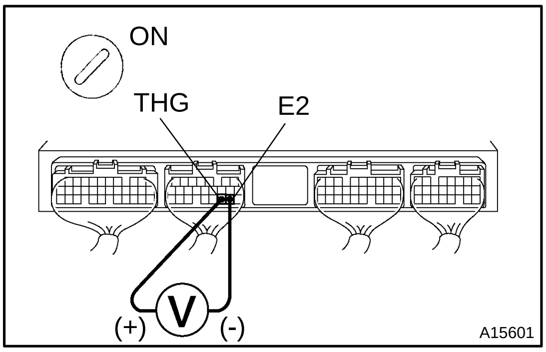
CHECK:
Measure the voltage between terminals of the EGR gas temperature sensor wire harness side connector.

OK:
Voltage: 4.5 - 5.5 V

OK → **Go to step 4.**

NG

3	Check for open in harness or ECM.



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals of THG and E2 of the ECM connector.

HINT:
The EGR gas temperature sensor connector is disconnected.

OK:
Voltage: 4.5 - 5.5 V

OK → **Open in harness between terminals E2 or THG. Repair or replace harness.**

NG

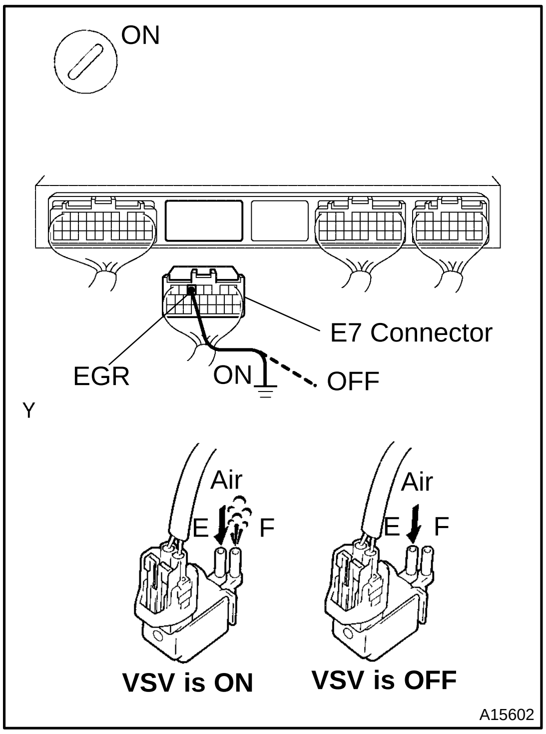
Confirm connection at ECM. If OK, replace ECM.

4	Check connection of vacuum hose and EGR hose (See page EC-4).

NG → **Repair or replace.**

OK

5	**Check VSV for EGR.**



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Disconnect the E7 connector from the ECM.
(c) Turn the ignition switch ON.

CHECK:
Check the VSV function.
(1) Connect terminal EGR of the ECM connector and the body ground (ON).
(2) Disconnect terminal EGR of ECM connector and the body ground (OFF).

OK:
(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK	**Go to step 8.**

NG

6	**Check operation for VSV for EGR (See page EC-9).**

NG	**Replace VSV for EGR.**

OK

Check for open in harness and connector between R/B No.2 and ECM (See page IN-28).

7	**Check EGR system (See page EC-9).**

NG	**Repair or replace.**

OK

8	Check EGR vacuum modulator (See page EC-9).

NG → **Repair or replace.**

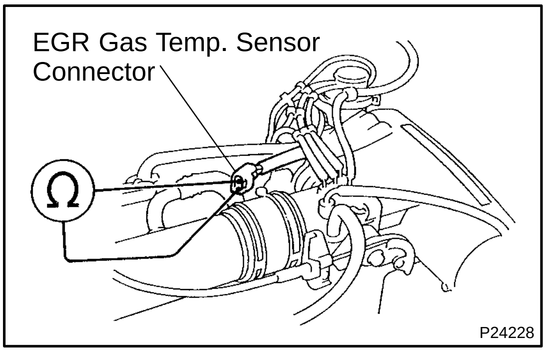
OK

9	Check EGR valve (See page EC-9).

NG → **Repair or replace.**

OK

10	Check resistance of EGR gas temperature sensor.



PREPARATION:

(a) Disconnect the EGR gas temperature sensor connector.
(b) Start the engine and warm it up.
(c) Disconnect the VSV connector for the EGR.
(d) Race the engine at 4,000 rpm for 3 min.

CHECK:

Measure the resistance of the EGR gas temperature sensor while racing the engine at 4,000 rpm.

OK:

Resistance of EGR gas temperature sensor after 3 min.: 4.3 kΩ or less

HINT:
188.6 - 439.0 kΩ for resistance at 20°C (68°F)

NG → **Replace EGR gas temperature sensor.**

OK

Check and replace ECM (See page IN-28).

DI12Z-12

DTC	P0402	Exhaust Gas Recirculation Flow Excessive Detected (Only for 3RZ-FE)

CIRCUIT DESCRIPTION

Refer to DTC P0401 on page DI-68 .

DTC No..	DTC Detection Condition	Trouble Area
P0402	EGR gas temp. sensor value is high during EGR cut-off when engine is cold and vacuum is applied to port E. (2 trip detection logic)	●Short in EGR gas temp. sensor circuit ●EGR gas temp. sensor ●Open in VSV circuit for EGR ●VSV for EGR ●EGR valve stuck open ●ECM
	EGR valve is always open (2 trip detection logic)	

WIRING DIAGRAM

Refer to DTC P0401 on page DI-68 .

SYSTEM CHECK DRIVING PATTERN

Refer to DTC P0401 on page DI-68 .

INSPECTION PROCEDURE

HINT:

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

TOYOTA hand-held tester:

1	Connect TOYOTA hand-held tester and read EGR gas temperature value.

PREPARATION:

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

(b) Turn the ignition switch ON and push the TOYOTA hand-held tester main switch ON.

CHECK:

Read the EGR gas temperature on the TOYOTA hand-held tester.

OK:

EGR gas temperature: 150˚C (302˚F) or less (Not immediately after driving)

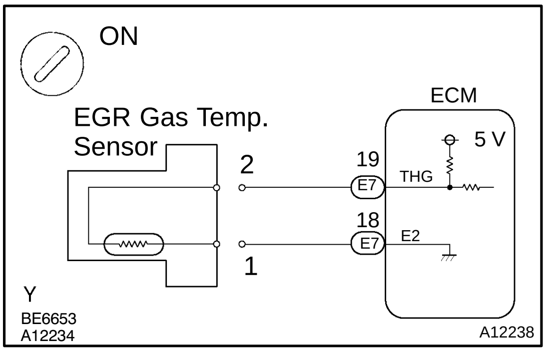
HINT:

If there is a short circuit, the TOYOTA hand-held tester indicates 159.3˚C (318.7˚F).

OK → **Go to step 4.**

NG

2	Check for short in harness and ECM.

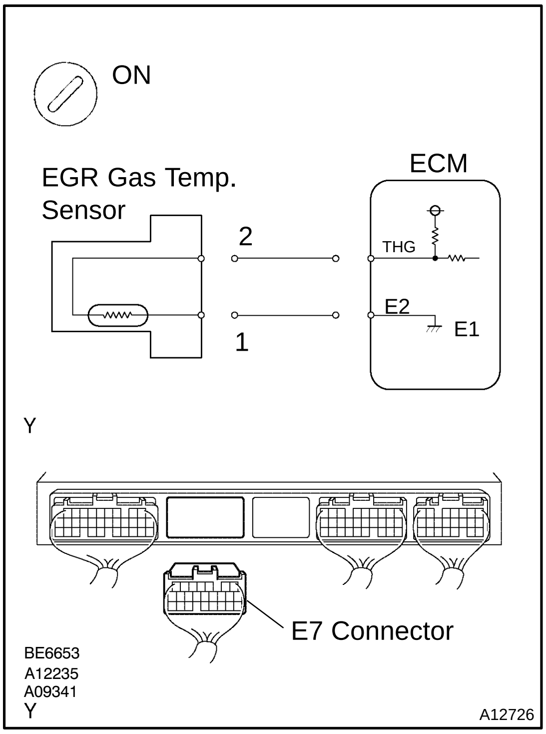


PREPARATION:
Disconnect the EGR gas temperature sensor connector.
CHECK:
Read the EGR gas temperature on the TOYOTA hand-held tester.
OK:
EGR gas temperature: 3.1°C (37.6°F)

OK	Replace EGR gas temperature sensor.

NG

3	Check for short in harness or ECM.



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Disconnect the E7 connector from the ECM.
HINT:
The EGR gas temperature sensor is disconnected.
CHECK:
Read the EGR gas temperature on the TOYOTA hand-held tester.
OK:
EGR gas temperature: 3.1°C (37.6°F)

OK	Repair or replace harness or connector.

NG

Check and replace ECM (See page IN-28).

4	Check VSV for EGR (See page DI-68 , step 5).

OK → **Check EGR valve (See page EC-9).**

NG

5	**Check operation of VSV for EGR (See page EC-9).**

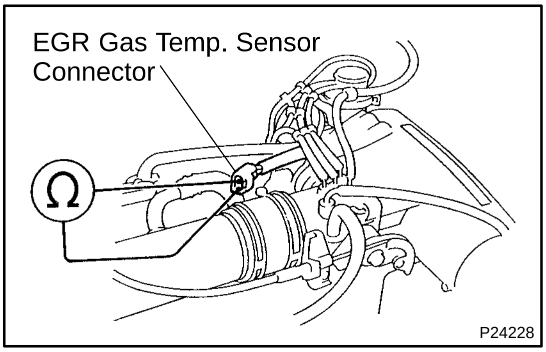
NG → **Replace VSV for EGR.**

OK

Check for open in harness and connector between R/B No.2 and ECM (See page IN-28).

OBD II scan tool (excluding TOYOTA hand-held tester):

1	**Check resistance of EGR gas temperature sensor.**



PREPARATION:

Disconnect the EGR gas temperature sensor connector.

CHECK:

Measure the resistance between terminals of the EGR gas temperature sensor connector.

OK:

Resistance:
2.5 kΩ or more (Not immediately after driving)

HINT:

If there is short circuit, ohmmeter indicates 200 Ω or less.

NG → **Replace EGR gas temperature sensor.**

OK

2	**Check for short in harness and connector EGR gas temperature sensor and ECM (See page IN-28).**

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

OK

3	**Check VSV for EGR (See page DI-68 step 5).**

OK → **Check EGR valve (See page EC-9).**

NG

4	**Check operation of VSV for EGR (See page EC-9).**

NG → **Replace VSV for EGR.**

OK

5	**Check for open in harness and connector between R/B No.2 and ECM (See page IN-28).**

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

OK

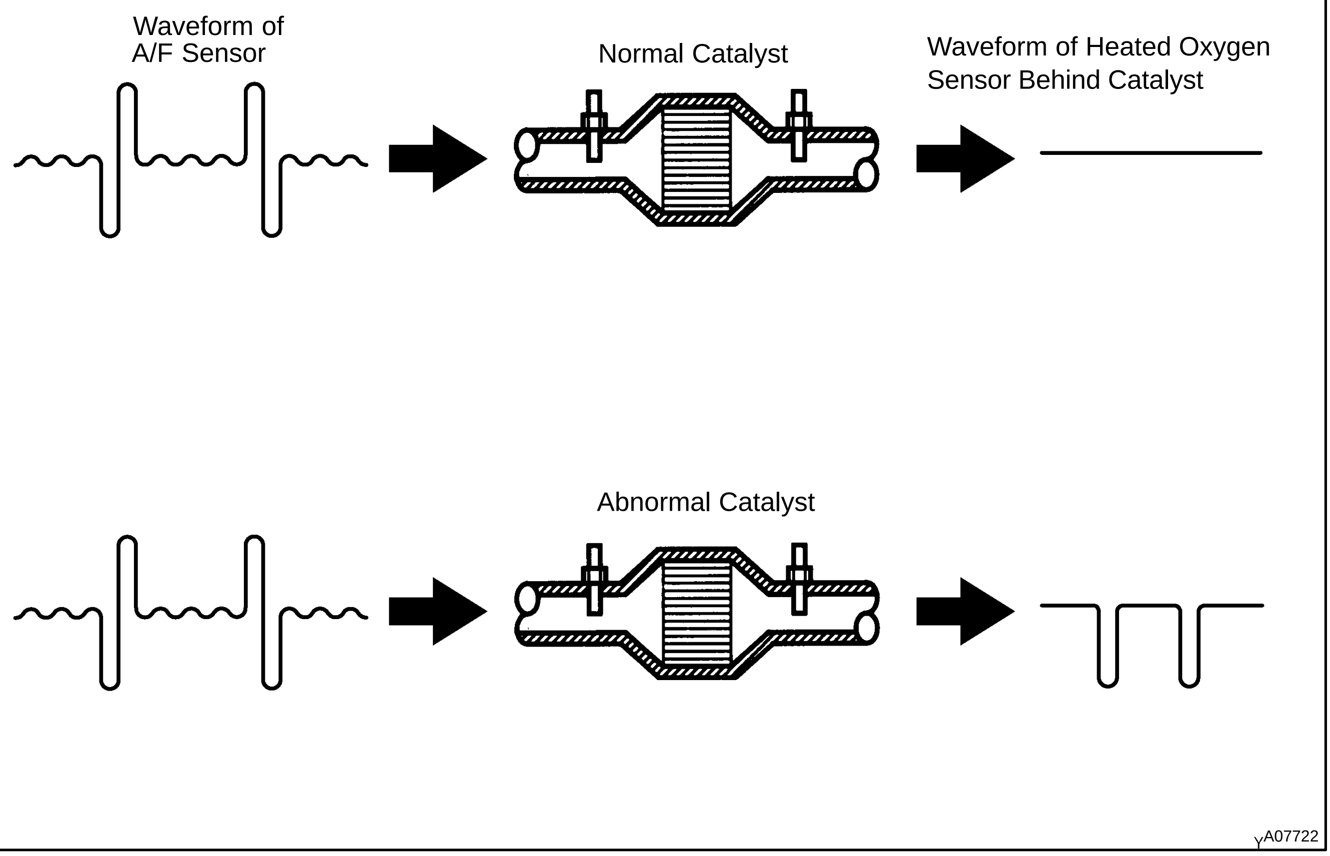
Check and replace ECM (See page IN-28).

DI6WV-02

DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

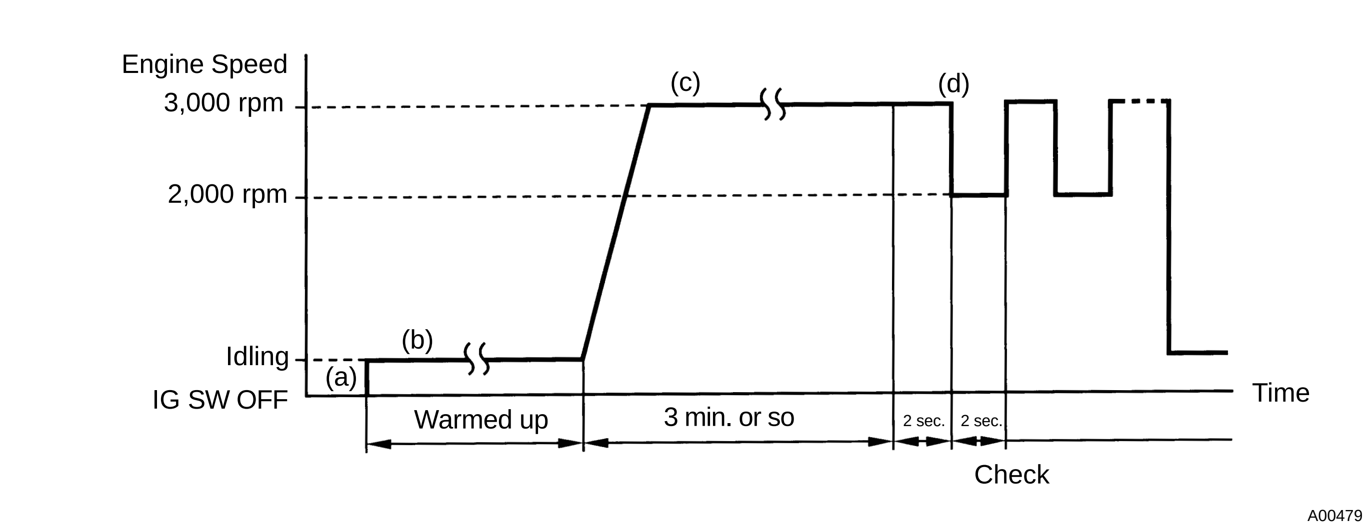
CIRCUIT DESCRIPTION

The ECM observes the waveform of the heated oxygen sensor located behind the catalyst to determine whether the catalyst is performance has deteriorated. If the catalyst is functioning normally, the waveform of the heated oxygen sensor located behind the catalyst switches back and forth between rich and lean much more slowly. When the waveform of the heated oxygen sensor located behind the catalyst alternates flatteringly between rich and lean, it indicates that catalyst performance has deteriorated.



DTC No.	DTC Detection Condition	Trouble Area
P0420	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveform of heated oxygen sensor (bank 1 sensor 2) alternates flatteringly between rich and lean (2 trip detection logic)	● Gas leakage on exhaust system ● A/F sensor (bank 1 sensor 1) ● Heated oxygen sensor (bank 1 sensor 2) ● Three-way catalytic converter

CONFIRMATION ENGINE RACING PATTERN



(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Start the engine and warm it up with all the accessories switched OFF until the water temperature is stable.
(c) Race the engine at 2,500 - 3,000 rpm for about 3 minutes.
(d) When racing the engine at 3,000 rpm for 2 seconds and 2,000 rpm for 2 seconds alternately, check the waveform of the heated oxygen sensor (bank 1 sensor 2).

INSPECTION PROCEDURE

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

1	**Are there any other codes (besides DTC P0420) being output?**

YES → **Go to relevant DTC chart (See page DI-14).**

NO

2	**Check gas leakage on exhaust system.**

NG → **Repair or replace.**

OK

3	Check A/F sensor (bank 1 sensor 1) (See page SF-46).

NG → Repair or replace.

OK ↓

4	Check heated oxygen sensor (bank 1 sensor 2) (See page SF-48).

NG → Repair or replace.

OK ↓

Replace three-way catalytic converter.

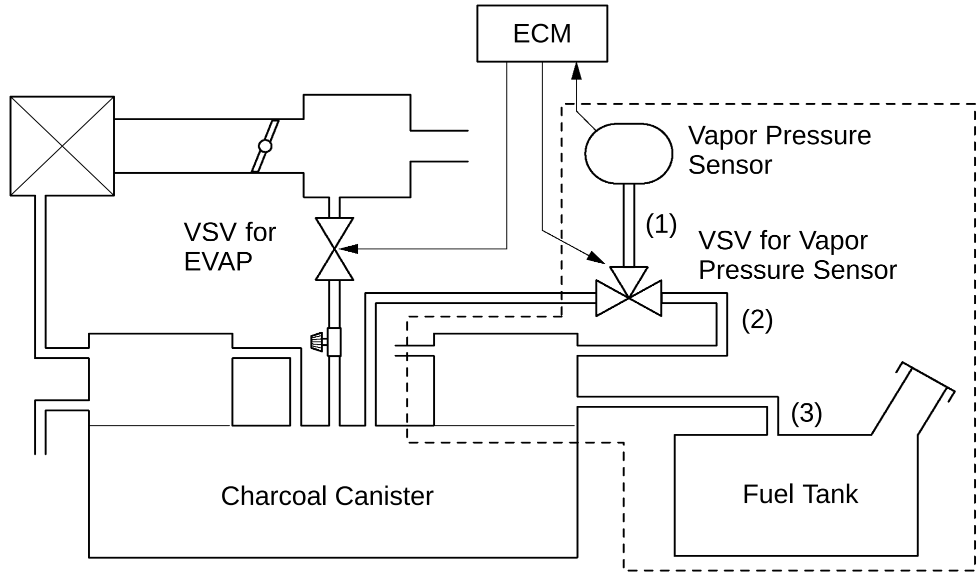
DI131-10

DTC	P0440	Evaporative Emission Control System Malfunction

CIRCUIT DESCRIPTION

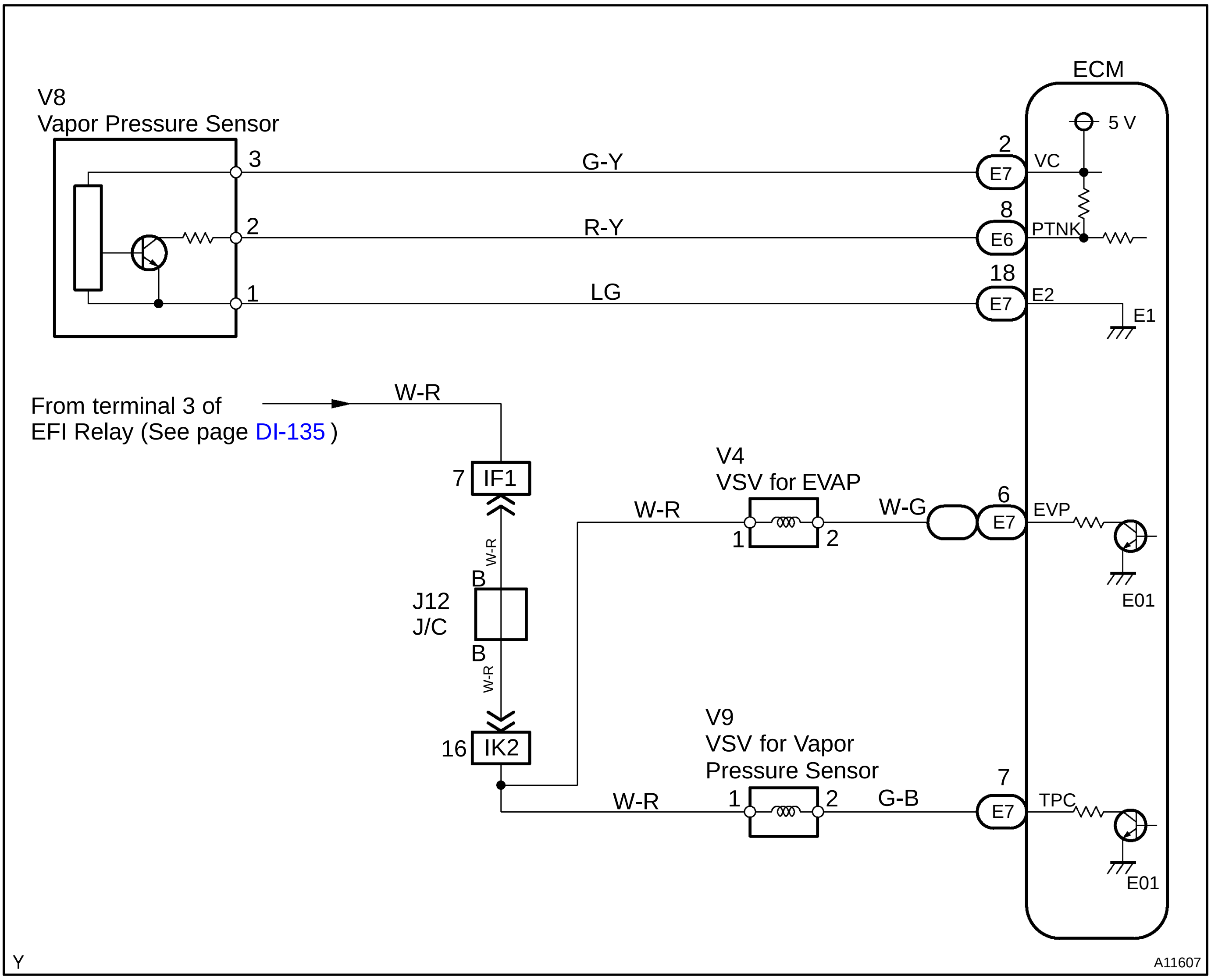
The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0440 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when the vapor pressure sensor malfunctions.

Fig. 1



DTC No.	DTC Detection Condition	Trouble Area
P0440	Fuel tank pressure is atmospheric pressure after vehicle is driven for 20 min. (2 trip detection logic)	●Hose or tube cracked, holed, damaged or loose seal ((3) in Fig. 1) ●Fuel tank cap incorrectly installed ●Fuel tank cap cracked or damaged ●Vacuum hose cracked, holed, blocked, damaged or disconnected ((1) or (2) in Fig. 1) ●Fuel tank cracked, holed or damaged ●Charcoal canister cracked, holed or damaged ●Open or short in vapor pressure sensor circuit ●Vapor pressure sensor ●ECM

WIRING DIAGRAM

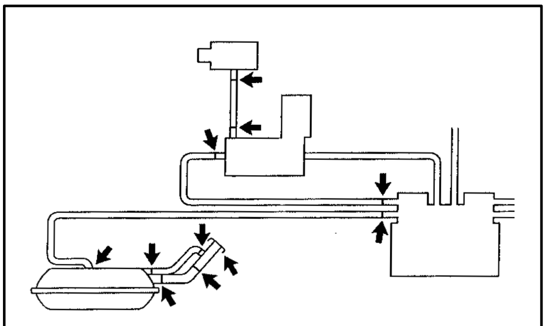


INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first troubleshoot DTC P0441, P0446, P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Ask the customer whether the customer found the fuel tank cap was loose and tightened it after the MIL comes on. Also ask the customer whether the fuel tank cap was loose when refuelling. If the fuel tank cap was loose, it was the cause of the DTC. If the fuel tank cap was not loose or if the customer was not sure if it was loose, troubleshoot according to the following procedure.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

1	Check whether hose close to fuel tank have been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.


S00024

CHECK:
Check for cracks, deformation and loose connection of the following parts.

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace.**

OK

2	Check that fuel tank cap is TOYOTA genuine parts.

NG → **Replace to TOYOTA genuine parts.**

OK

3	Check that fuel tank cap is correctly installed.

NG → **Correctly install fuel tank cap.**

OK

4	Check fuel tank cap (See page EC-5).

NG → **Replace fuel tank cap.**

OK

5	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler neck.**

OK

6	**Check vacuum hoses between vapor pressure sensor and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and charcoal canister.**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:
(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-5), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace.**

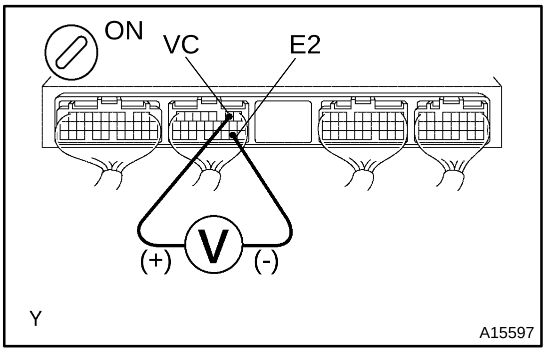
OK

8	**Check charcoal canister for cracks, hole and damage (See page EC-5).**

NG → **Replace charcoal canister.**

OK

9	**Check voltage between terminals VC and E2 of ECM connector.**



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Turn the ignition switch ON.

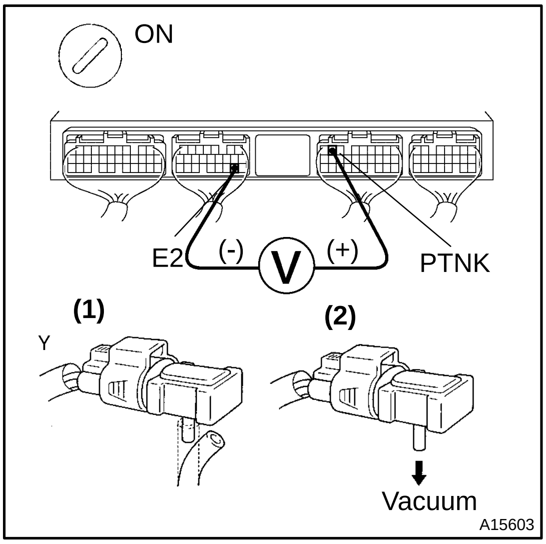
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.

OK:
Voltage: 4.5 - 5.5 V

NG	**Check and replace ECM (See page IN-28).**

OK

10	**Check voltage between terminals PTNK and E2 of ECM connectors.**



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors.
(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply vacuum 4.0 kPa (30 mm Hg, 1.18 in. Hg) to the vapor pressure sensor.

NOTICE:
The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:
(1) Voltage: 2.9 - 3.7 V
(2) Voltage: 0.5 V or less

OK	**Go to step 12.**

NG

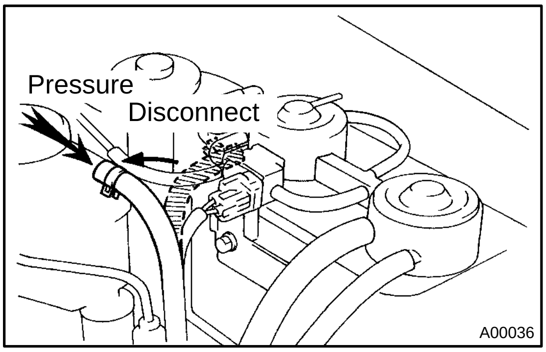
11	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-28).**

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

OK

Replace vapor pressure sensor.

12	**Check fuel tank for cracks and damage.**



PREPARATION:

(a) Disconnect the vacuum hose from the charcoal canister.

(b) Correctly install the fuel tank cap.

(c) Apply a pressure of 5 kPa (50 gf/cm^2, 0.7 psi) to the fuel tank.

CHECK:

Check whether the pressure is maintained after 1 minute.

OK:

Pressure applied to the fuel tank is maintained.

NG → **Replace fuel tank.**

OK

It is likely that vehicle user did not properly close fuel tank cap. Please explain to customer how to properly install fuel tank cap.

DI17A-04

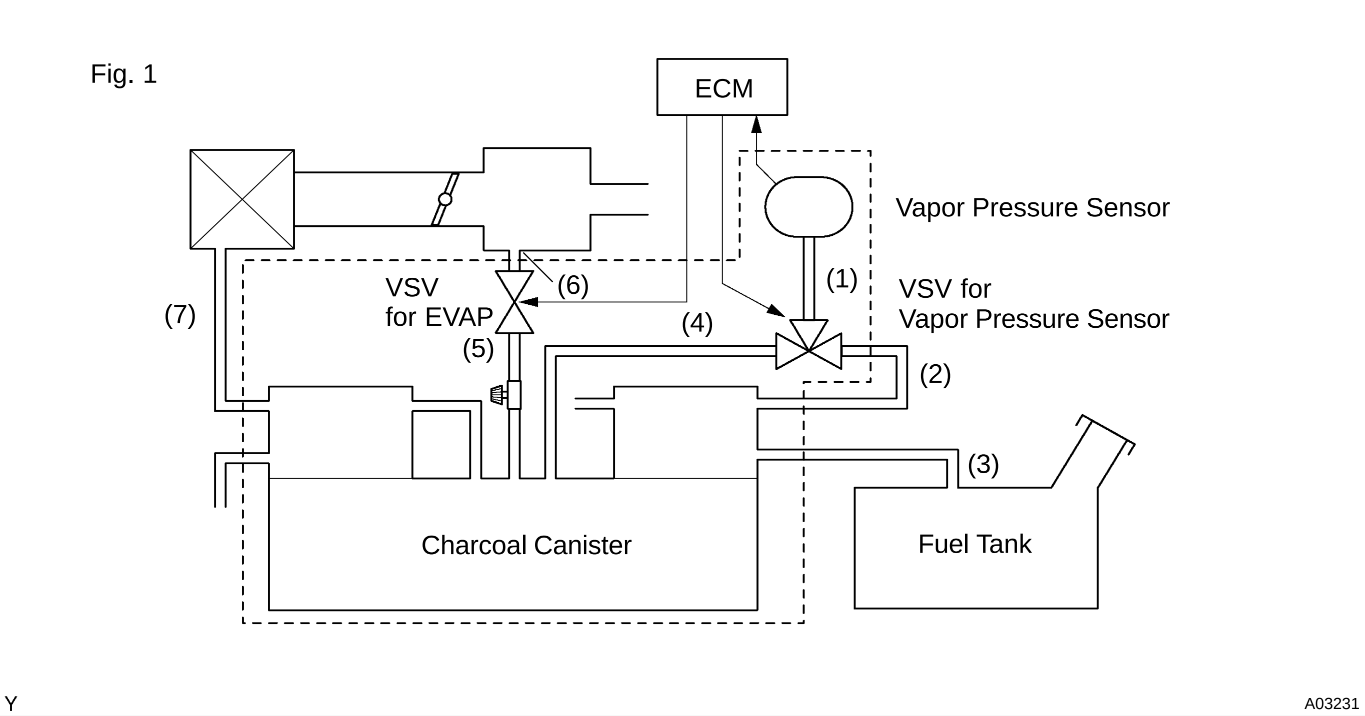
DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC	P0446	Evaporative Emission Control System Vent Control Malfunction

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0441 and P0446 are recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when there is a malfunction in either the VSV for EVAP, the VSV for vapor pressure sensor, or in the vapor pressure sensor itself.

Fig. 1



<table>
<tr><th>DTC No.</th><th>DTC Detection Condition</th><th>Trouble Area</th></tr>
<tr><td rowspan="2">P0441</td><td>Pressure in charcoal canister does not drop during purge control (2 trip detection logic)</td><td rowspan="5">● Vacuum hose cracks, holed blocked, damaged or disconnected ((1), (4), (5), (6) and (7) in Fig. 1)
● Open or short in vapor pressure sensor circuit
● VSV for vapor pressure sensor
● Open or short in VSV circuit for EVAP
● VSV for EVAP
● Open or short in VSV circuit for vapor pressure sensor
● Vapor pressure sensor
● Charcoal canister cracks, holed or damaged
● ECM</td></tr>
<tr><td>During purge cut-off, pressure in charcoal canister is very low compared with atmospheric pressure (2 trip detection logic)</td></tr>
<tr><td rowspan="3">P0446</td><td>When VSV for vapor pressure sensor is OFF, ECM judges that there is no continuity between vapor pressure sensor and charcoal canister (2 trip detection logic)</td></tr>
<tr><td>When VSV for vapor pressure sensor is ON, ECM judges that there is no continuity between vapor pressure sensor and fuel tank (2 trip detection logic)</td></tr>
<tr><td>After purge cut off operates, pressure in charcoal canister is maintained at atmospheric pressure (2 trip detection logic)</td></tr>
</table>

WIRING DIAGRAM

Refer to DTC P0440 on page DI-84 .

INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first troubleshoot DTC P0441, P0446, P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

TOYOTA hand-held tester:

1	**Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

OK

2	**Check vacuum hoses ((1), (4), (5), (6) and (7) in Fig. 1 in circuit description).**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

3	**Check voltage between terminals VC and E2 of ECM connector (See page DI-84 , step 9).**

NG → **Check and replace ECM (See page IN-28).**

OK

4	**Check voltage between terminals PTNK and E2 of ECM connector (See page DI-84 , step 10).**

OK → **Go to step 6.**

NG

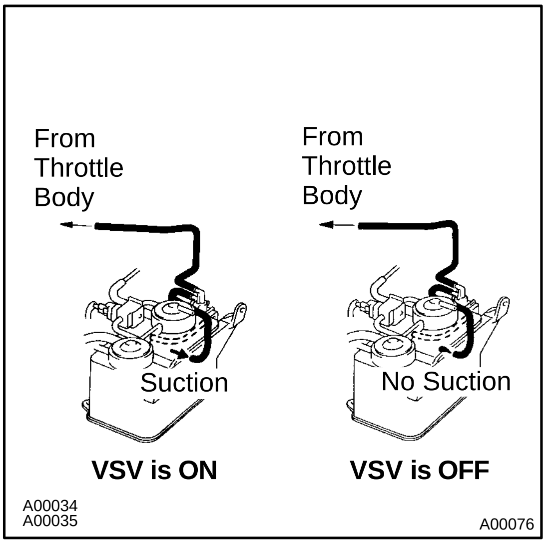
5	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-28).**

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

OK

Replace vapor pressure sensor.

6	**Check purge flow.**



PREPARATION:
(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Select the ACTIVE TEST mode on the TOYOTA hand-held tester.
(c) Disconnect the vacuum hose of the VSV for the EVAP from the charcoal canister.
(d) Start the engine.

CHECK:
When the VSV for the EVAP is operated by the TOYOTA hand-held tester, check whether the disconnected hose applies suction to your finger.

OK:
VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK	**Go to step 10.**

NG

7	**Check vacuum hoses between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister.**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG	**Repair or replace.**

OK

8	**Check operation of VSV for EVAP (See page SF-40).**

OK	**Go to step 9.**

NG

Replace VSV and charcoal canister, and then clean vacuum hoses between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister.

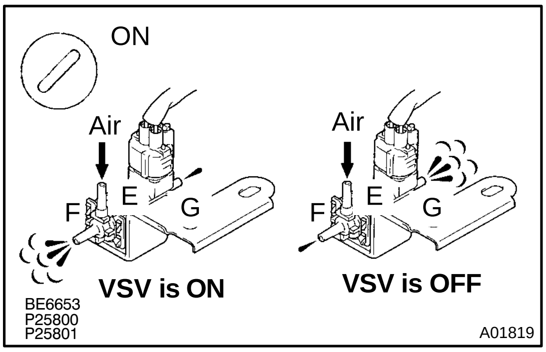
9	Check for open and short in harness and connector between EFI main relay (Marking:EFI) and VSV for EVAP, and VSV for EVAP and ECM (See page IN-28).

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

OK

Check and replace ECM (See page IN-28).

10	Check VSV for vapor pressure sensor.



PREPARATION:

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

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.

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

CHECK:

Check the VSV operation when it is operated by the TOYOTA hand-held tester.

PREPARATION:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air from port E flows out through port G.

OK → **Go to step 13.**

NG

11	Check operation of VSV for vapor pressure sensor (See page SF-41).

OK → **Go to step 12.**

NG

Replace VSV and charcoal canister, and then clean vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor.

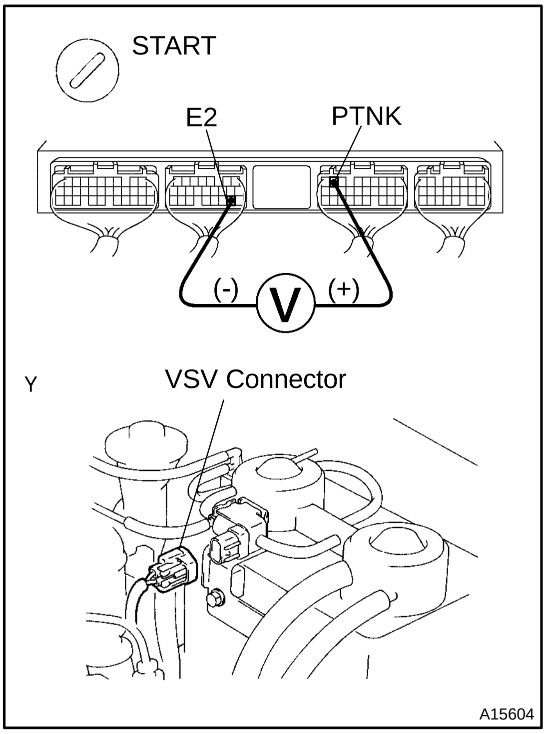
12	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and ECM (See page IN-28).**

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

OK

Check and replace ECM (See page IN-28).

13	**When VSV connector for vapor pressure sensor is disconnected and VSV for EVAP is ON, measure voltage between terminals PTNK and E2 of ECM connector.**



PREPARATION:

(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Disconnect the VSV connector for the vapor pressure sensor.
(c) Select the ACTIVE TEST mode on the TOYOTA hand-held tester.
(d) Start the engine.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connector using the TOYOTA hand-held tester when the VSV for the EVAP is ON.

OK:

Voltage: 2.0 V or less

OK → **Go to step 15.**

NG

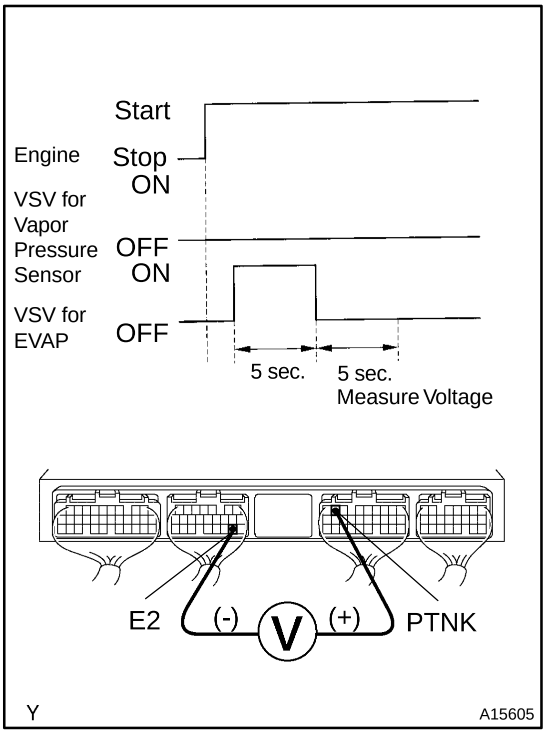
14	Check vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and vapor pressure sensor and VSV for vapor pressure sensor.

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

15	Check charcoal canister.



PREPARATION:
(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Remove the fuel tank cap.
(c) Disconnect the VSV connector for the vapor pressure sensor.
(d) Select the ACTIVE TEST mode on the TOYOTA hand-held tester.
(e) Start the engine.
(f) The VSV for the EVAP is ON by the TOYOTA hand-held tester and remains on for 5 sec.

CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connector 5 sec. after switching the VSV for the EVAP from ON to OFF.

OK:
Voltage: 2.5 V or less

NG → **Replace charcoal canister.**

OK

16	Remove charcoal canister and check it (See page EC-5).

NG → **Replace charcoal canister.**

OK

Check and replace ECM (See page IN-28).

OBD II scan tool (excluding TOYOTA hand-held tester):

1	**Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

OK

2	**Check vacuum hoses ((1), (4), (5), (6) and (7) in Fig 1. in circuit description).**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

3	**Check voltage between terminals VC and E2 of ECM connector (See page DI-84 , step 9).**

NG → **Check and replace ECM (See page IN-28).**

OK

4	**Check voltage between terminals PTNK and E2 of ECM connector (See page DI-84 , step 10).**

OK → **Go to step 6.**

NG

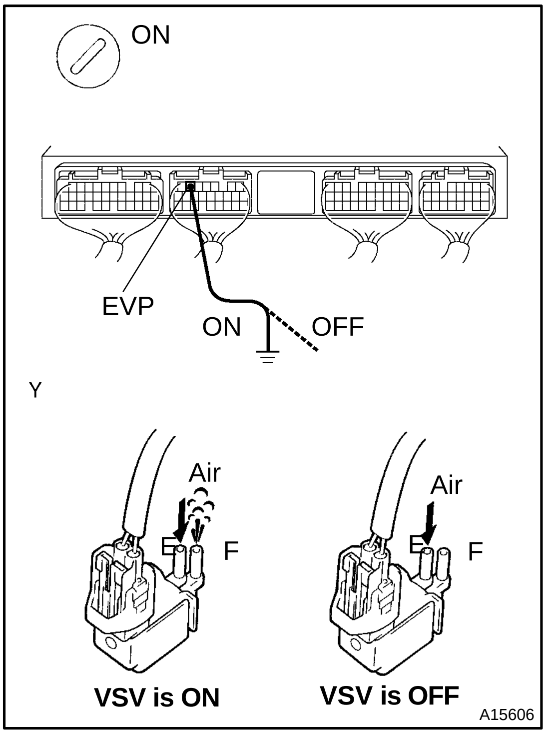
5	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-28).

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

OK

Replace vapor pressure sensor.

6	Check VSV for EVAP.



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal EVP of the ECM connector and body ground (ON).

(2) Disconnect between terminal EVP of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 9.**

NG

7	Check operation of VSV for EVAP (See page SF-40).

OK → **Go to step 8.**

NG

Replace VSV and charcoal canister, and then clean vacuum hoses between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister.

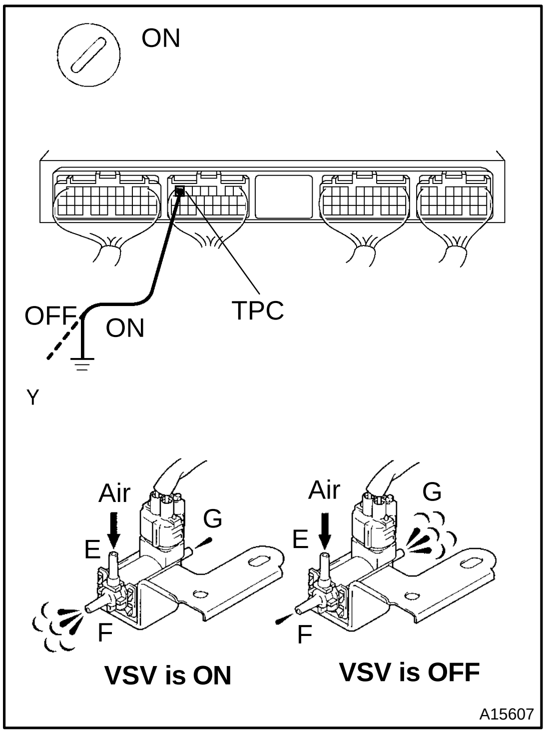
8	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP, and VSV for EVAP and ECM (See page IN-28).

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

OK

Check and replace ECM (See page IN-28).

9	Check VSV for vapor pressure sensor.



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal TPC of the ECM connector and the body ground (ON).

(2) Disconnect between terminal TPC of the ECM connector and the body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air from port E flows out through port G.

OK — **Check and replace charcoal canister (See page EC-5).**

NG

10	Check operation of VSV for vapor pressure sensor (See page SF-41).

OK → **Go to step 11.**

NG ↓

Replace VSV and charcoal canister, and then clean vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor.

11	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and ECM (See page IN-28).**

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

OK ↓

Check and replace ECM.

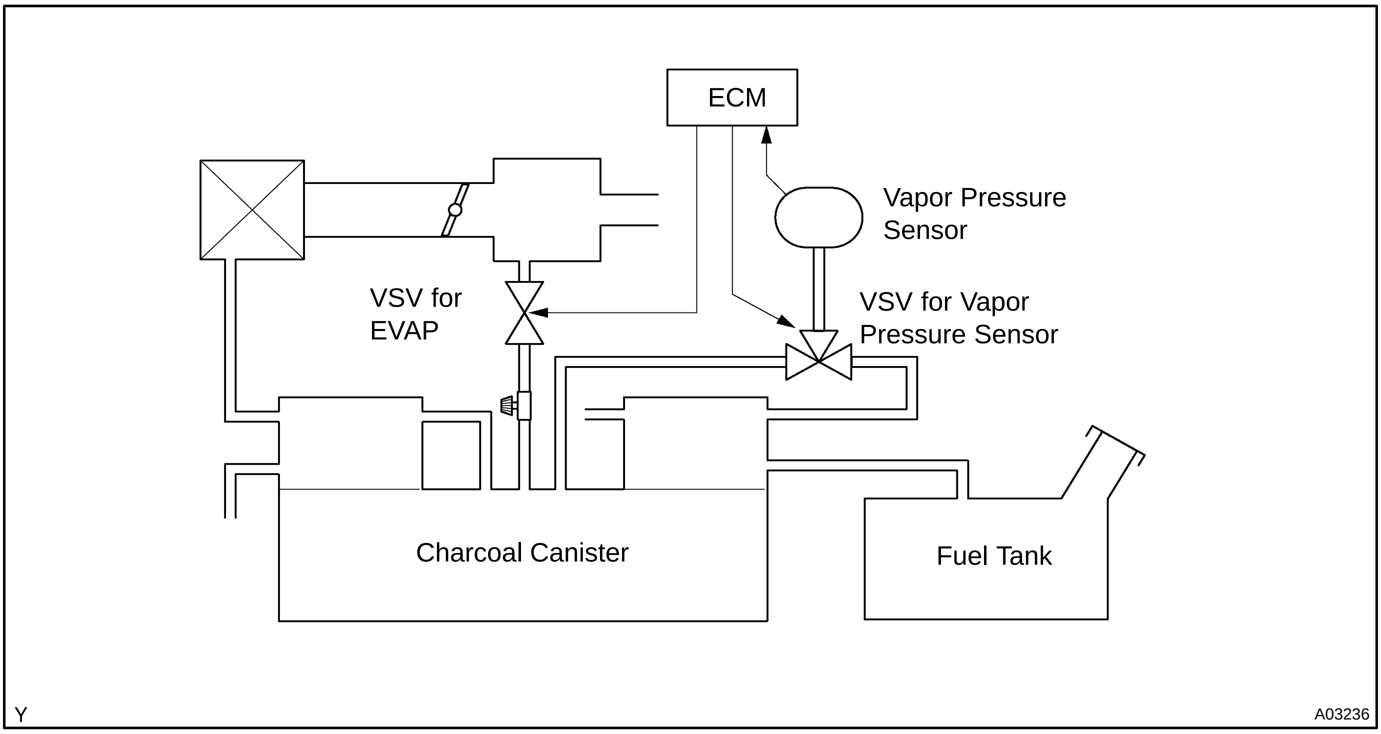
DI133-10

DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range/Performance

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0450 or P0451 is recorded by the ECM when the vapor pressure sensor malfunction.



DTC No.	DTC Detection Condition	Trouble Area
P0450	Condition (a) or (b) continues (2 trip detection logic) (a) PTNK < 0.5 V or PTNK > 4.9 V (Within 10 sec. after starting engine) (b) PTNK < 0.1 V or PTNK > 4.9 V (After 10 sec. after starting engine)	●Open or short in vapor pressure sensor circuit ●Vapor pressure sensor ●ECM
P0451	Vapor pressure sensor output extremely changes under conditions of (a), (b) and (c): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0mph) (b) Engine speed: Idling (c) VSV for vapor pressure sensor is ON	

WIRING DIAGRAM

Refer to DTC P0440 on page DI-84 .

INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first trouble shoot DTC P0441, P0446 P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

1	**Check voltage between terminals VC and E2 of ECM connector (See page DI-84 , step 9).**

NG → **Check and replace ECM (See page IN-28).**

OK

2	**Check voltage between terminals PTNK and E2 of ECM connector (See page DI-84 , step 10).**

OK → **Check and replace ECM (See page IN-28).**

NG

3	**Check for open and short in harness and connector between the vapor pressure sensor and ECM (See page IN-28).**

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

OK

Replace vapor pressure sensor.

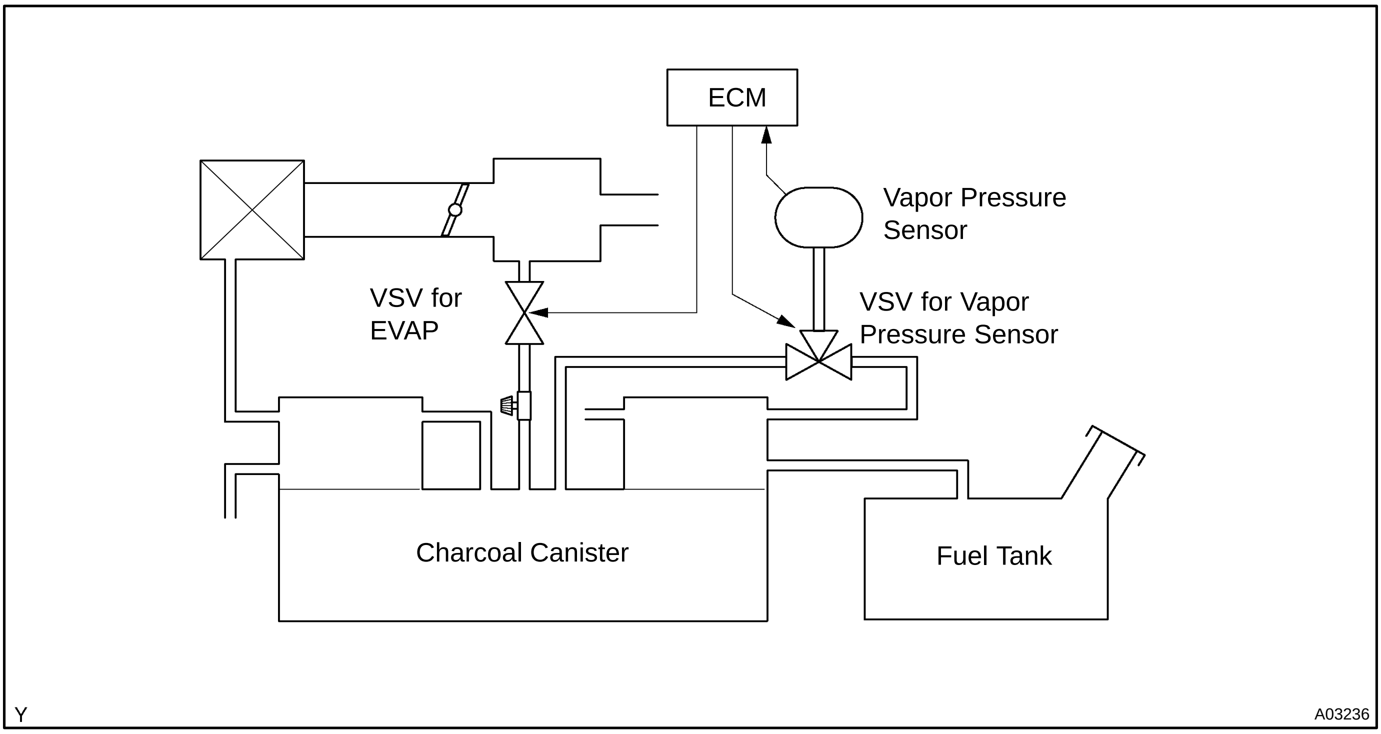
DI133-10

DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range/Performance

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0450 or P0451 is recorded by the ECM when the vapor pressure sensor malfunction.



DTC No.	DTC Detection Condition	Trouble Area
P0450	Condition (a) or (b) continues (2 trip detection logic) (a) PTNK < 0.5 V or PTNK > 4.9 V (Within 10 sec. after starting engine) (b) PTNK < 0.1 V or PTNK > 4.9 V (After 10 sec. after starting engine)	● Open or short in vapor pressure sensor circuit ● Vapor pressure sensor ● ECM
P0451	Vapor pressure sensor output extremely changes under conditions of (a), (b) and (c): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0mph) (b) Engine speed: Idling (c) VSV for vapor pressure sensor is ON	

WIRING DIAGRAM

Refer to DTC P0440 on page DI-84 .

INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first trouble shoot DTC P0441, P0446 P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

1	**Check voltage between terminals VC and E2 of ECM connector (See page DI-84 , step 9).**

NG → **Check and replace ECM (See page IN-28).**

OK

2	**Check voltage between terminals PTNK and E2 of ECM connector (See page DI-84 , step 10).**

OK → **Check and replace ECM (See page IN-28).**

NG

3	**Check for open and short in harness and connector between the vapor pressure sensor and ECM (See page IN-28).**

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

OK

Replace vapor pressure sensor.

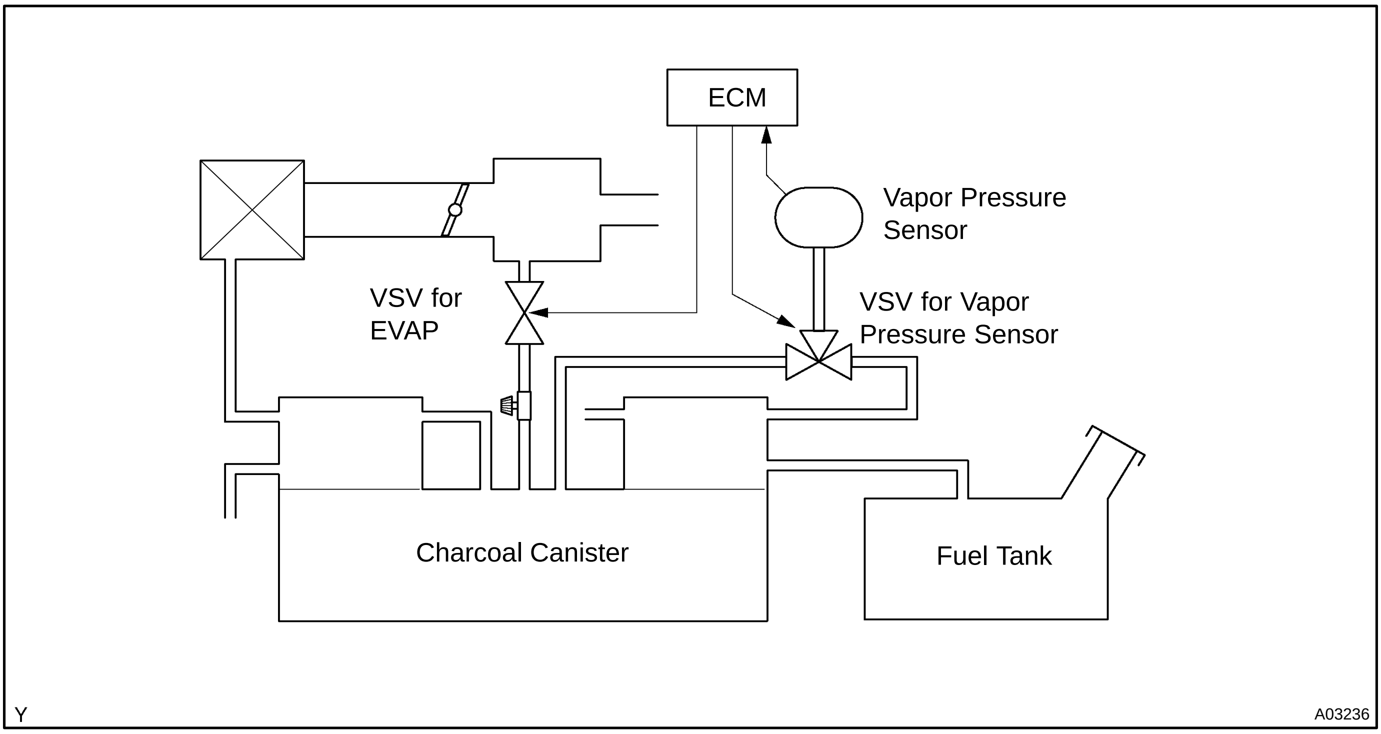
DI133-10

DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range/Performance

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0450 or P0451 is recorded by the ECM when the vapor pressure sensor malfunction.



DTC No.	DTC Detection Condition	Trouble Area
P0450	Condition (a) or (b) continues (2 trip detection logic) (a) PTNK < 0.5 V or PTNK > 4.9 V (Within 10 sec. after starting engine) (b) PTNK < 0.1 V or PTNK > 4.9 V (After 10 sec. after starting engine)	●Open or short in vapor pressure sensor circuit ●Vapor pressure sensor ●ECM
P0451	Vapor pressure sensor output extremely changes under conditions of (a), (b) and (c): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0mph) (b) Engine speed: Idling (c) VSV for vapor pressure sensor is ON	

WIRING DIAGRAM

Refer to DTC P0440 on page DI-84 .

INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first trouble shoot DTC P0441, P0446 P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

1	**Check voltage between terminals VC and E2 of ECM connector (See page DI-84 , step 9).**

NG → **Check and replace ECM (See page IN-28).**

OK

2	**Check voltage between terminals PTNK and E2 of ECM connector (See page DI-84 , step 10).**

OK → **Check and replace ECM (See page IN-28).**

NG

3	**Check for open and short in harness and connector between the vapor pressure sensor and ECM (See page IN-28).**

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

OK

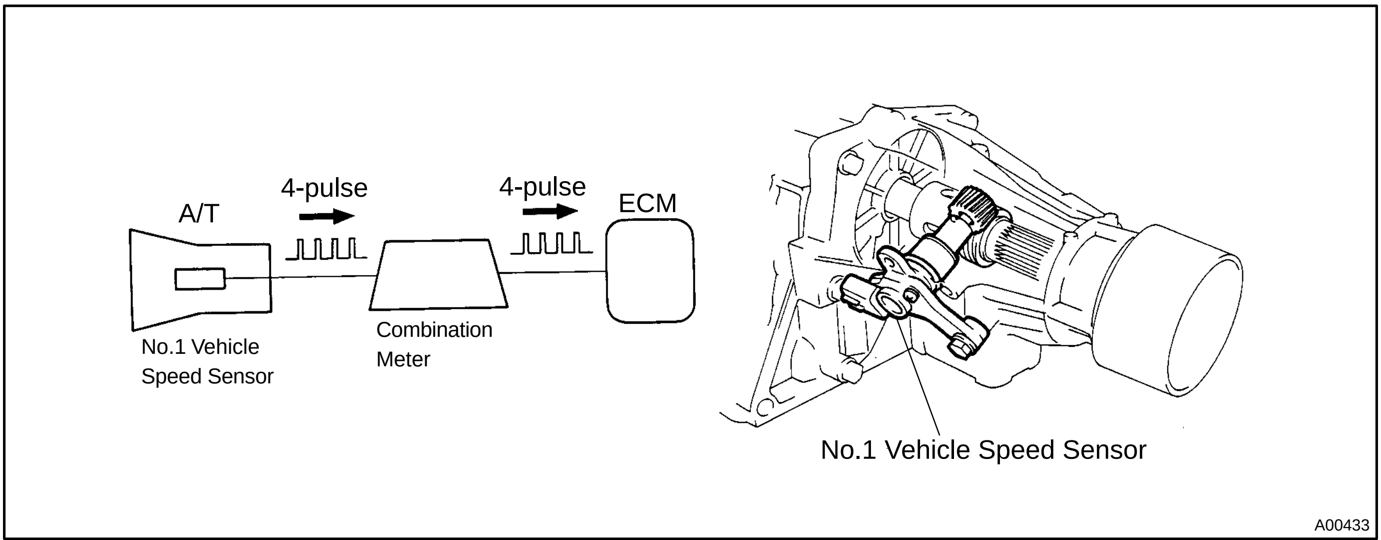
Replace vapor pressure sensor.

DI8ZV-01

DTC	P0500	Vehicle Speed Sensor Malfunction

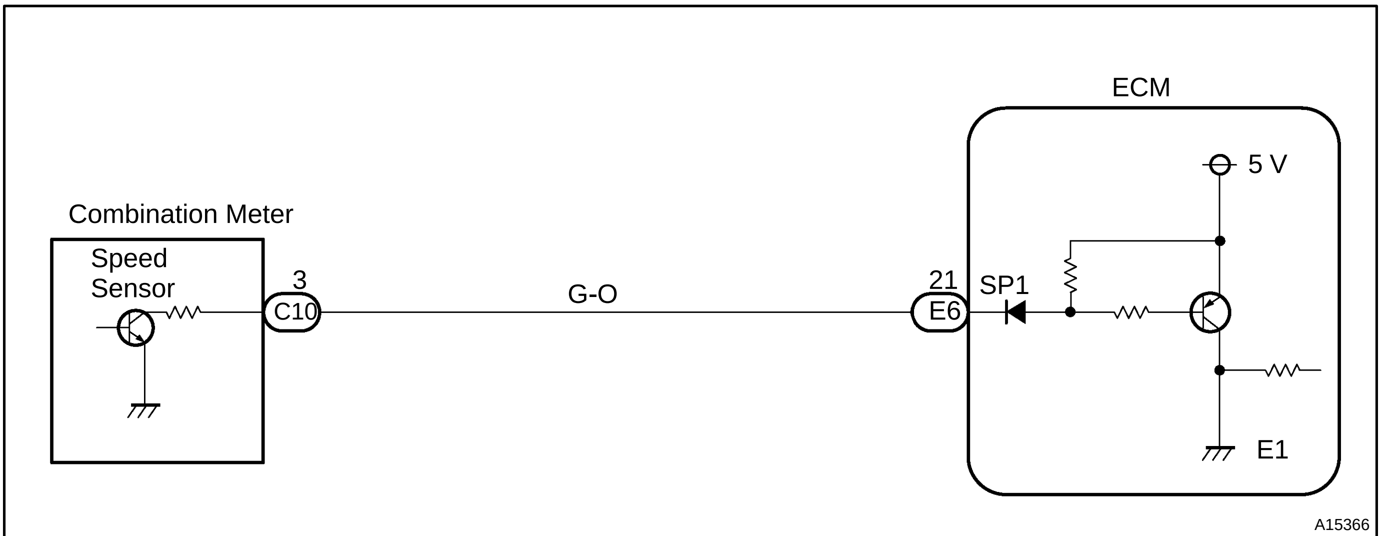
CIRCUIT DESCRIPTION

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



DTC No.	DTC Detection Condition	Trouble Area
P0500	No vehicle speed sensor signal to ECM under following conditions: (2 trip detection logic) For A/T: (a) Park/neutral position switch is OFF (b) Vehicle is being driven For M/T: (a) Engine speed is between 1,800 rpm and 4,000 rpm	●Combination meter ●Open or short in No.1 vehicle speed sensor circuit ●ECM ●No.1 vehicle speed sensor

WIRING DIAGRAM



INSPECTION PROCEDURE

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

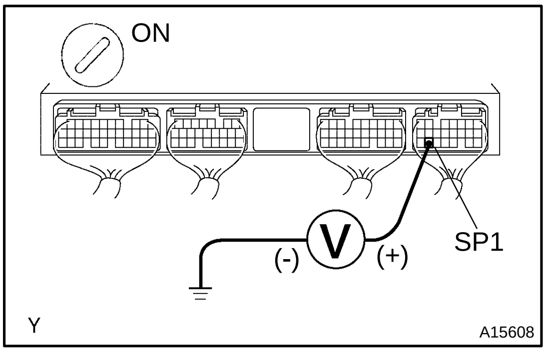
1	**Check operation of speedometer.**

CHECK:
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 (See page BE-39).**

OK

2	**Check voltage between terminal SP1 of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Disconnect the cruise control ECU connector.
(c) Shift the shift lever to the neutral.
(d) Jack up the rear wheels on one side.
(e) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminal SP1 of the ECM connector and the body ground when the wheel is turned slowly.

OK:
Voltage is generated intermittently.

NG	**Check and repair harness and connector between combination meter and ECM.**

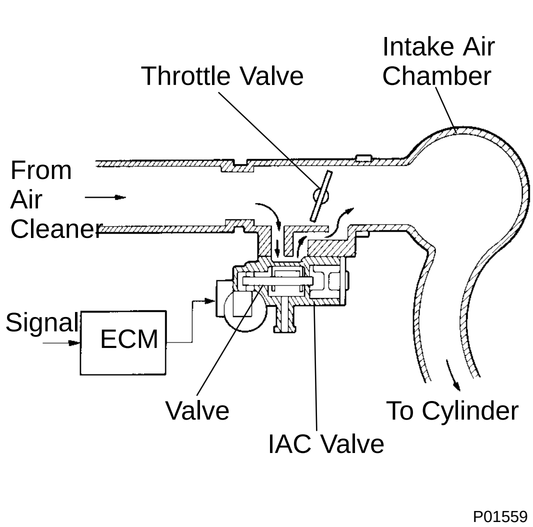
OK

Check and replace ECM (See page IN-28).

DI135-11

DTC	P0505	Idle Control System Malfunction

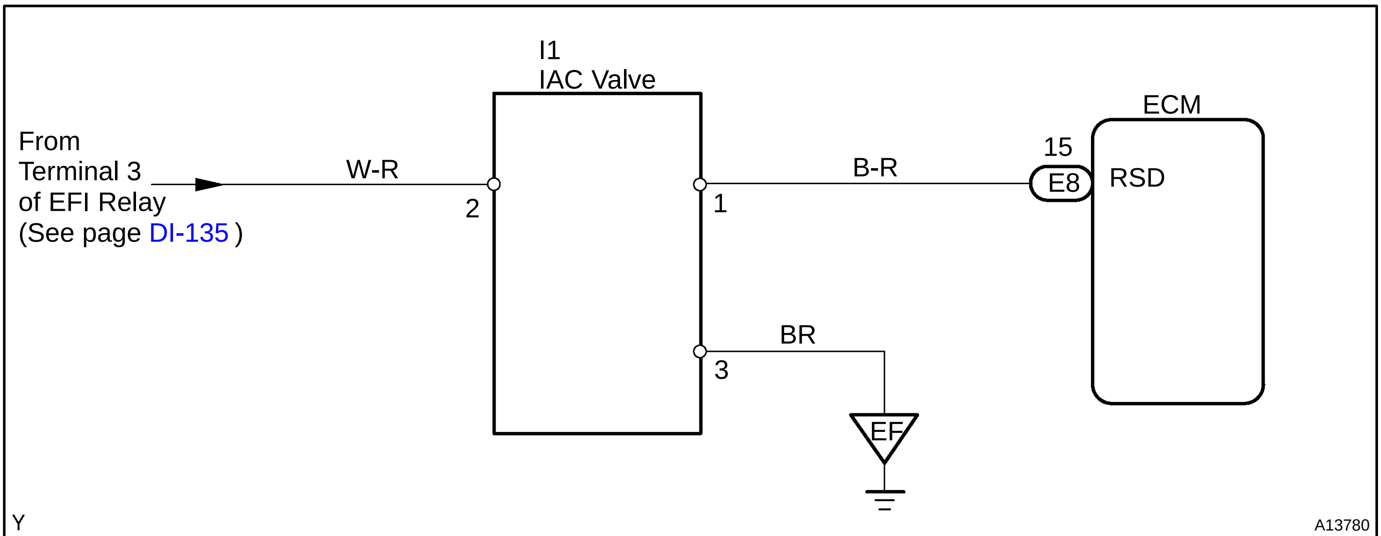
CIRCUIT DESCRIPTION



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

DTC No.	DTC Detection Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (2 trip detection logic)	●Open or short in IAC valve circuit ●IAC valve is stuck or closed ●Open or short in A/C switch circuit ●Air induction system ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

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

1	**Check engine idle speed.**

PREPARATION:
(a) Warm up the engine to normal operating temperature.
(b) Switch off the all accessories.
(c) Switch off the A/C.
(d) Shift the transmission into the N or neutral position.
(e) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3 on the vehicle.
(f) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843-18020

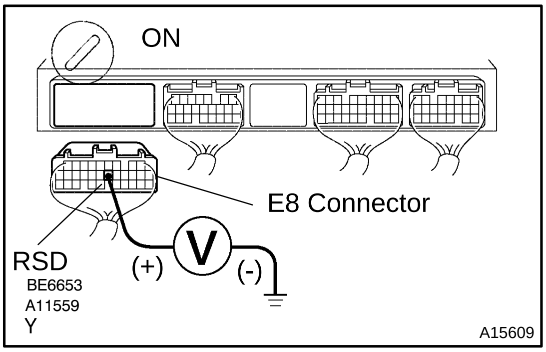
CHECK:
Check the difference of engine speed between the ones, less than 5 sec. and more than 5 sec. after connecting terminals TE1 and E1 of the DLC1.

OK:
Difference of engine speed: More than 100 rpm

OK → **Go to step 6.**

NG

2	**Check voltage between terminals RSD of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Disconnect the E8 connector from the ECM.
(c) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals RSD of ECM connector and the body ground,

OK:
Voltage: 9 - 14 V

OK → **Go to step 5.**

NG

3	**Check IAC valve (See page SF-32).**

NG → **Replace IAC valve.**

OK

Check for open and short in harness and connector between engine room R/B and IAC valve,and IAC valve and ECM (See page IN-28).

4	**Check operation of IAC valve (See page SF-35).**

NG → **Repair or replace IAC valve.**

OK

5	**Check blockage of IAC valve and passage to bypass throttle valve.**

NG → **Repair or replace IAC valve.**

OK

Check and replace ECM (See page IN-28).

6	**Check for A/C signal circuit (See page AC-14).**

NG → **Repair or replace.**

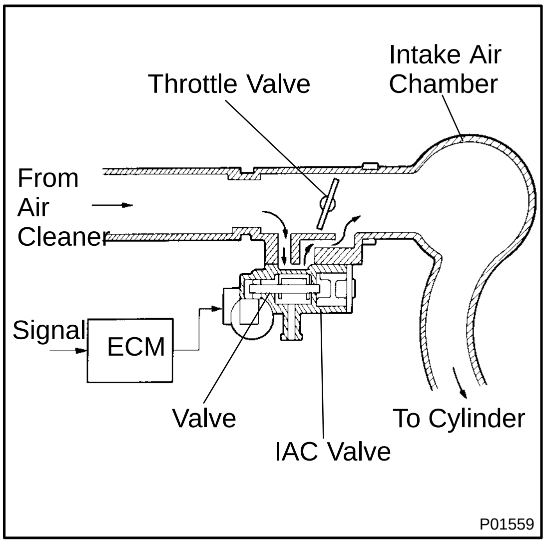
OK

Check air induction system (See page SF-1).

DI135-11

DTC	P0505	Idle Control System Malfunction

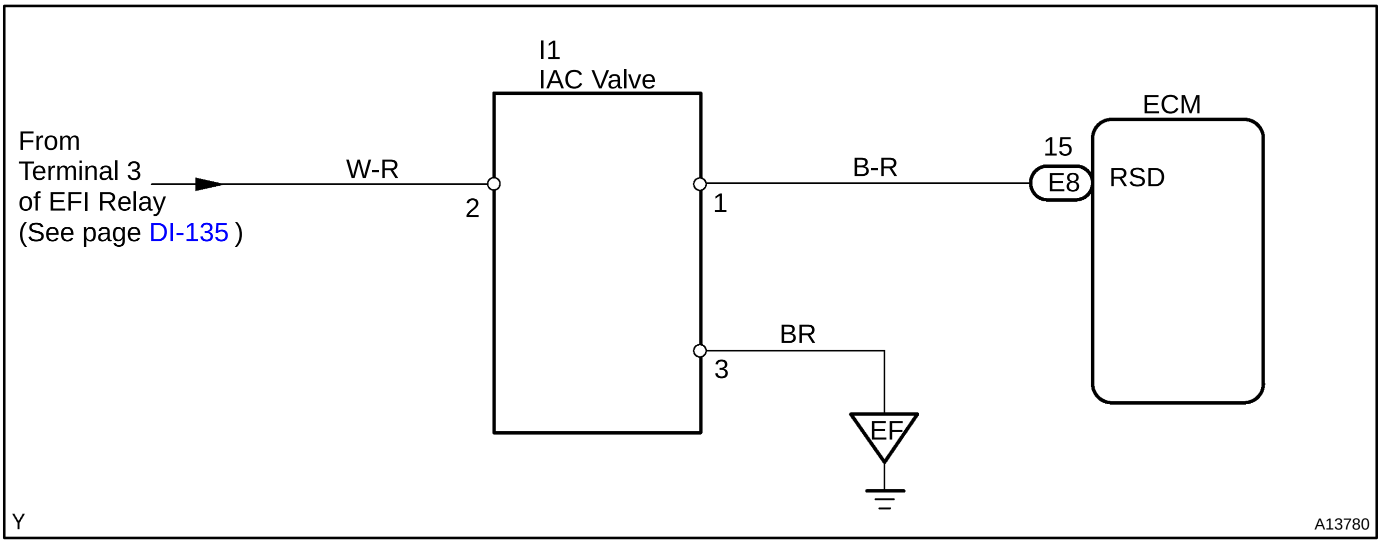
CIRCUIT DESCRIPTION



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

DTC No.	DTC Detection Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (2 trip detection logic)	●Open or short in IAC valve circuit ●IAC valve is stuck or closed ●Open or short in A/C switch circuit ●Air induction system ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

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

1	**Check engine idle speed.**

PREPARATION:
(a) Warm up the engine to normal operating temperature.
(b) Switch off the all accessories.
(c) Switch off the A/C.
(d) Shift the transmission into the N or neutral position.
(e) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3 on the vehicle.
(f) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843-18020

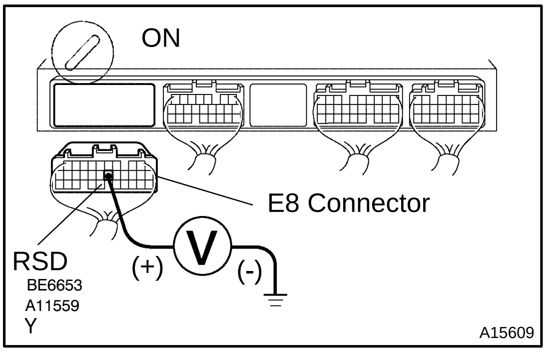
CHECK:
Check the difference of engine speed between the ones, less than 5 sec. and more than 5 sec. after connecting terminals TE1 and E1 of the DLC1.

OK:
Difference of engine speed: More than 100 rpm

OK → **Go to step 6.**

NG

2	**Check voltage between terminals RSD of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Disconnect the E8 connector from the ECM.
(c) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals RSD of ECM connector and the body ground,

OK:
Voltage: 9 - 14 V

OK → **Go to step 5.**

NG

3	**Check IAC valve (See page SF-32).**

NG → **Replace IAC valve.**

OK

Check for open and short in harness and connector between engine room R/B and IAC valve,and IAC valve and ECM (See page IN-28).

4	**Check operation of IAC valve (See page SF-35).**

NG → **Repair or replace IAC valve.**

OK

5	**Check blockage of IAC valve and passage to bypass throttle valve.**

NG → **Repair or replace IAC valve.**

OK

Check and replace ECM (See page IN-28).

6	**Check for A/C signal circuit (See page AC-14).**

NG → **Repair or replace.**

OK

Check air induction system (See page SF-1).

DI5CA-09

DTC	P1130	A/F Sensor Circuit Range/Performance Malfunction (Bank 1 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI-42 .

DTC No.	DTC Detection Condition	Trouble Area
P1130	Voltage output* of A/F sensor remains at 3.8 V or more, or 2.8 V or less, during engine running after engine is warmed up (2 trip detection logic) *: Output value changes at inside of ECM only	●Open or short in A/F sensor circuit ●A/F sensor ●Air induction system ●Fuel pressure ●Injector ●ECM
	Voltage output* of A/F sensor does not change from 3.30 V, during engine running after engine is warmed up (2 trip detection logic) *: Output value changes at inside of ECM only	
	Open or short in A/F sensor circuit (2 trip detection logic)	

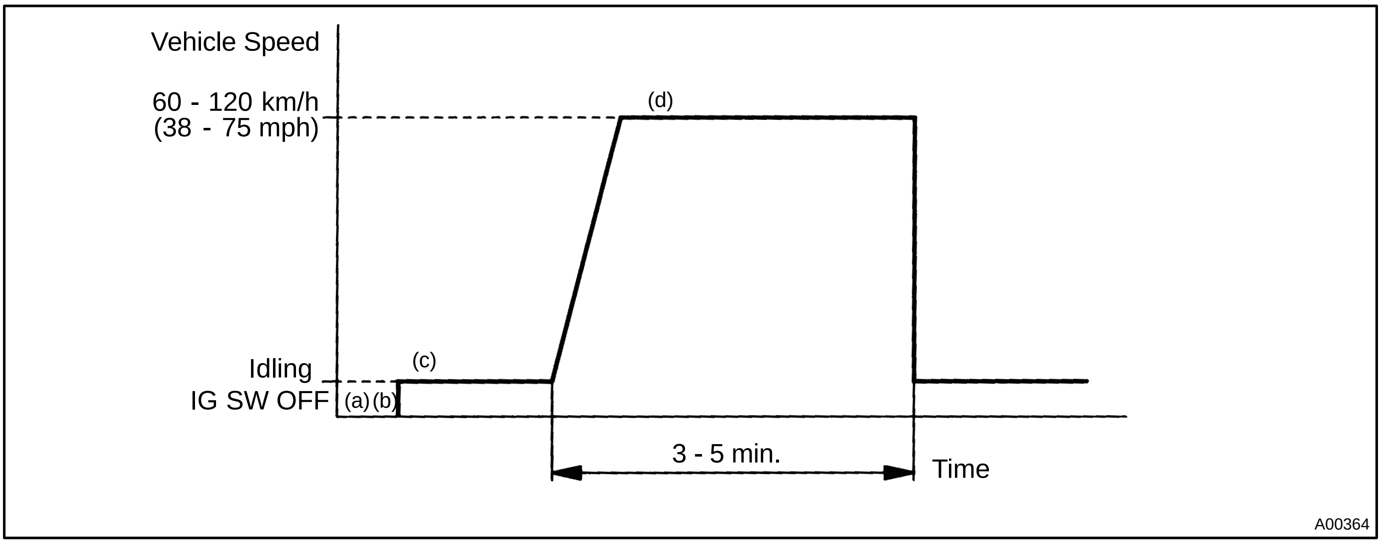
HINT:

- After confirming DTC P1130, use the OBD II scan tool or TOYOTA hand-held tester to confirm voltage output of the A/F sensor (AFS B1 S1/O2S B1 S1) from the CURRENT DATA.
- The A/F sensor's output voltage and the short-term fuel value can be read using the OBD II scan tool or TOYOTA hand-held tester.
- The ECM controls the voltage of AFL+ and AFL- terminals of ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand-held tester.
- OBD II scan tool (excluding TOYOTA hand-held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the TOYOTA hand-held tester.

WIRING DIAGRAM

Refer to DTC P0125 on page DI-42 .

CONFIRMATION DRIVING PATTERN



(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Switch the TOYOTA hand-held tester from the normal mode to the check mode (See page DI-3).
(c) Start the engine and warm it up with all the accessory switches OFF.
(d) Drive the vehicle at 60 - 120 km/h (38 - 75 mph) and the engine speed at 1,600 - 3,200 rpm for 3 - 5 minutes.

HINT:
If a malfunction exists, the MIL will light up during step (d).

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 TOYOTA hand-held tester, turn the ignition switch OFF after performing steps (c) and (d), then perform steps (c) and (d) again.**

INSPECTION PROCEDURE

HINT:
- If DTC P1130 is displayed, check bank 1 sensor 1 circuit.
- Read frame freeze data using the TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P1130) being output?**

YES → **Go to relevant DTC chart (See page DI-14).**

NO

2	**Connect OBD II scan tool or TOYOTA hand-held tester, and read value for voltage output of A/F sensor.**

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Warm up the A/F sensor with the engine speed at 2,500 rpm for approximately 90 seconds.

CHECK:
Read the voltage of the A/F sensor on the screen of OBD II scan tool or TOYOTA hand-held tester when you perform all the following conditions.

HINT:
The voltage of the AFL+ terminal of the ECM is fixed at 3.3 V and the voltage of the AFL- terminal is fixed at 3.0 V. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AFL+/AFL-) of the ECM.

OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.30 V (0.660 V*) ●Not remains at 3.8 V (0.76 V*) or more ●Not remains at 2.8 V (0.56 V*) or less *: When using the OBD II scan tool (excluding TOYOTA hand-held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close.	

HINT:

- During fuel enrichment, there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*), it is normal.
- During fuel cut, there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*), it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: When using the OBD II scan tool (excluding TOYOTA hand-held tester).

OK → **Go to step 8.**

NG

3	**Check for open and short in harness and connector between ECM and A/F sensor (See page IN-28).**

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

OK

4	**Check resistance of A/F sensor heater (See page SF-48).**

NG → **Replace A/F sensor.**

OK

5	**Check air induction system (See page SF-1).**

NG → **Repair or replace.**

OK

6	**Check fuel pressure (See page SF-5).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-5).**

OK

7	**Check injector injection (See page SF-17).**

NG → **Replace injector.**

OK

Replace A/F sensor.

8	**Perform confirmation driving pattern.**

Go

9	**Is there DTC P1130 being output again?**

YES → **Check and replace ECM (See page IN-28).**

NO

10	Did vehicle run out of fuel in past?

NO → Check for intermittent problems (See page DI-3).

YES ↓

DTC P1130 is caused by shortage of fuel.

DI5CB-09

DTC	P1133	A/F Sensor Circuit Response Malfunction (Bank 1 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI-42 .

DTC No.	DTC Detection Condition	Trouble Area
P1133	After engine is warmed up and during vehicle driving at engine speed 1,400 rpm or more and vehicle speed 60 km/h (38 mph) or more, if response characteristic of A/F sensor becomes deteriorated (2 trip detection logic)	●Open or short in A/F sensor circuit ●A/F sensors ●Air induction system ●Fuel pressure ●Injector ●ECM

WIRING DIAGRAM

Refer to DTC P0125 on page DI-42 .

INSPECTION PROCEDURE

HINT:

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

1	Are there any other codes (besides DTC P1133) being output?

YES → **Go to relevant DTC chart.**

NO

2	Connect OBDII scan tool or TOYOTA hand-held tester, and read value for voltage output of A/F sensor.

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.

(b) Warm up the A/F sensor with the engine at speed 2,500 rpm for approximately 90 seconds.

CHECK:

Read the voltage of the A/F sensor on the screen of the OBD II scan tool or TOYOTA hand-held tester when you perform all the following conditions.

HINT:

The voltage of the AFL+ terminal of the ECM is fixed at 3.3 V and the voltage of the AFL- terminal is fixed at 3.0 V. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AFL+/AFL-) of the ECM.

OK:

Condition	A/F Sensor Voltage Value
Engine idling	● Not remains at 3.30 V (0.660 V*) ● Not remains at 3.8 V (0.76 V*) or more ● Not remains at 2.8 V (0.56 V*) or less *: When using the OBD II scan tool (excluding TOYOTA hand-held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close.	

HINT:
- During fuel enrichment, there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*), it is normal.
- During fuel cut, there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*), it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76 V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: When you use the OBD II scan tool (excluding TOYOTA hand-held tester).

OK → **Go to step 8.**

NG

3	Check for open and short in harness and connector between ECM and A/F sensor (See page IN-28).

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

OK

4	Check resistance of A/F sensor heater (See page SF-46).

NG → **Replace A/F sensor.**

OK

5	Check air induction system (See page SF-1).

NG → **Repair or replace.**

OK

6	**Check fuel pressure (See page SF-5).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

7	**Check injector injection (See page SF-17).**

NG → **Replace injector.**

OK

Replace A/F sensor.

8	**Perform confirmation driving pattern (See page DI-108).**

Go

9	**Is there DTC P1133 being output again?**

YES → **Check and replace ECM (See page IN-28).**

NO

10	**Did vehicle run out of fuel in past?**

NO → **Check for intermittent problems (See page DI-3).**

YES

DTC P1133 is caused by shortage out of fuel.

DI5CC-09

DTC	P1135	A/F Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI-42 .

DTC No.	DTC Detection Condition	Trouble Area
P1135	When heater operates, heater current exceeds 8 A (2 trip detection logic) Heater current of 0.25 A or less when heater operates (2 trip detection logic)	● Open or short in heater circuit of A/F sensor ● A/F sensor heater ● ECM

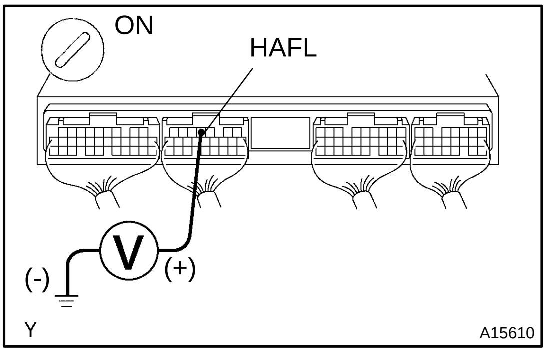
WIRING DIAGRAM

Refer to DTC P0125 on page DI-42 .

INSPECTION PROCEDURE

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

1	Check voltage between terminal HAFL of ECM connector and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals HAFL of the ECM connector and the body ground.

OK:
Voltage: 9 - 14 V

OK	Check and replace ECM (See page IN-28).

NG

2	Check resistance of A/F sensor heater (See page SF-46).

NG	Replace A/F sensor.

OK

Check and repair harness or connector between EFI main relay (Marking: EFI) and A/F sensor, and A/F sensor and ECM (See page IN-28).

DI136-11

DTC	P1300	Igniter Circuit Malfunction (No.1)

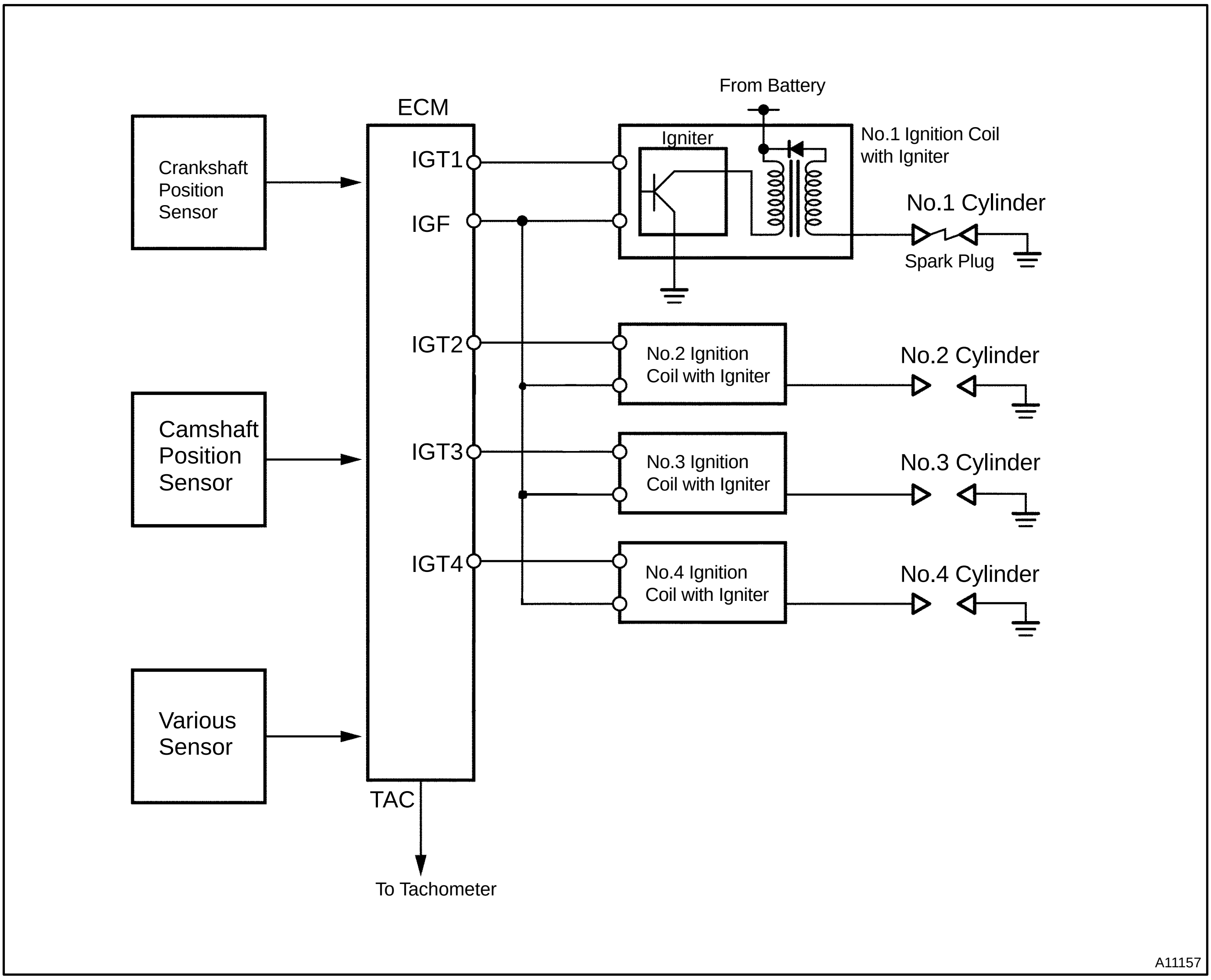
DTC	P1305	Igniter Circuit Malfunction (No.2)

DTC	P1310	Igniter Circuit Malfunction (No.3)

DTC	P1315	Igniter Circuit Malfunction (No.4)

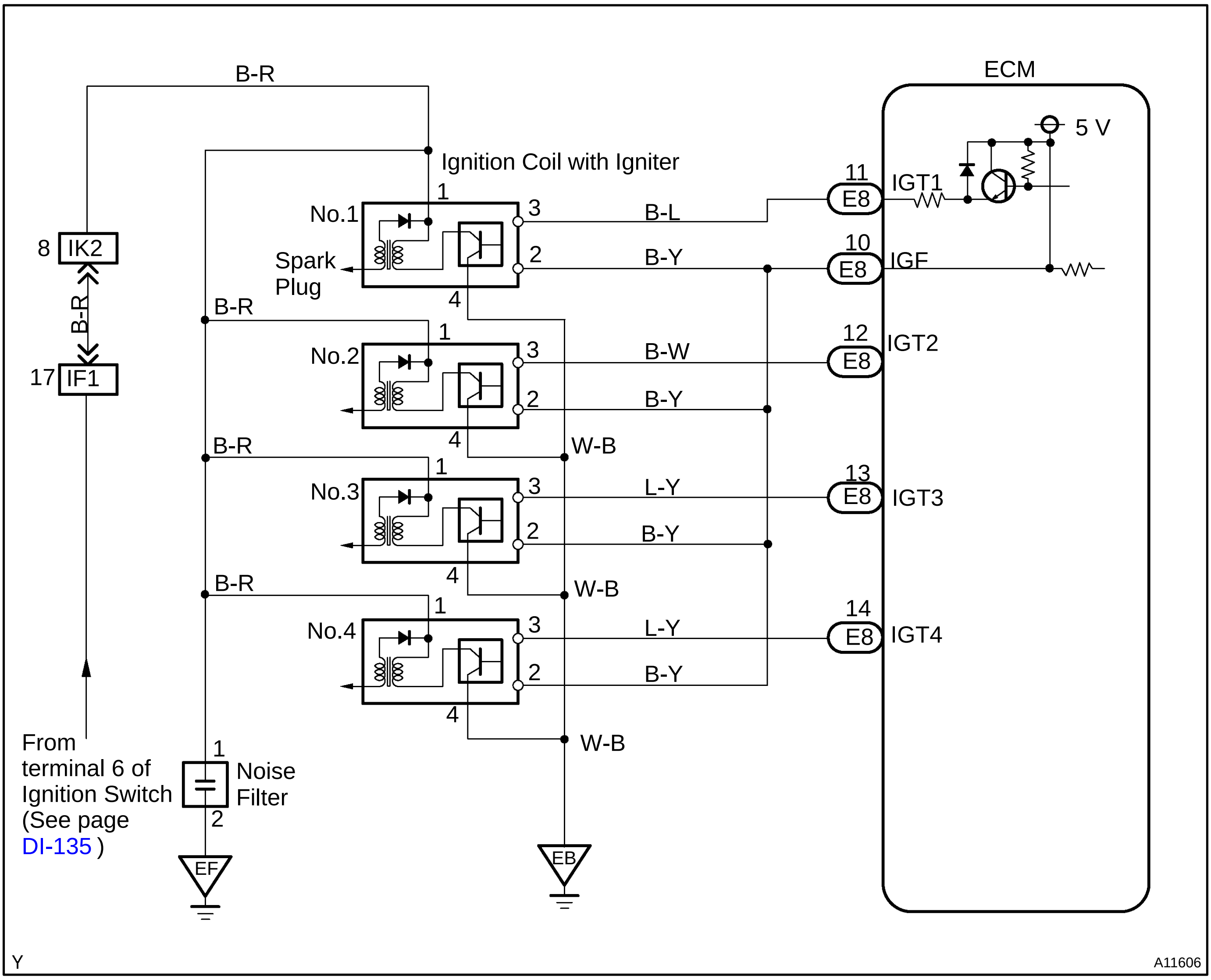
CIRCUIT DESCRIPTION

A Direct Ignition System (DIS) has been adopted. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the 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 pass from the center electrode to the ground electrode.
The ECM determines ignition timing and outputs the ignition signal (IGT) for each cylinder. Based on IGT signals, the power transistors in the igniter cuts off the current to the primary coil in the ignition coil is supplied to the spark plug that are connected to the end of the secondary coil. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail-safe measure to the ECM.



DTC No	DTC Detection 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 to ECM ●Ignition coil with igniter ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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

1	**Check spark plug and spark of misfiring cylinder (See page DI-56).**

NG → **Go to step 4.**

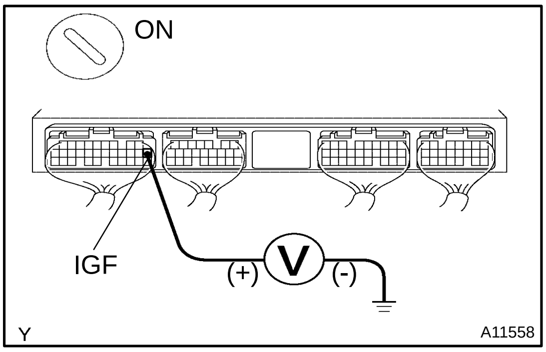
OK

2	Check for open and short in harness and connector in IGF and IGT signal circuit between ECM and ignition coil with igniter (See page IN-28).

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

OK

3	Disconnect ignition coil with igniter connector, and check voltage between terminal IGF of ECM connector and body ground.



PREPARATION:

(a) Disconnect the ignition coil with the igniter connector.

(b) Remove the glove compartment (See page SF-49).

(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal IGF of the ECM connector and the body ground.

OK:

Voltage: 4.5 - 5.5 V

OK → **Replace ignition coil with igniter.**

NG

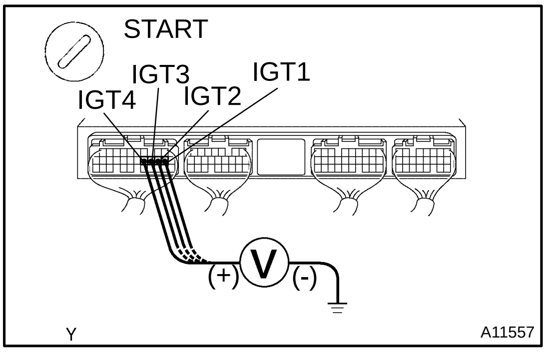
Check and replace ECM (See page IN-28).

4	Check for open and short in harness and connector in IGT signal circuit between ECM and ignition coil with igniter (See page IN-28).

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

OK

5	**Check voltage between terminals IGT1 - IGT4 of ECM connector and body ground.**



PREPARATION:

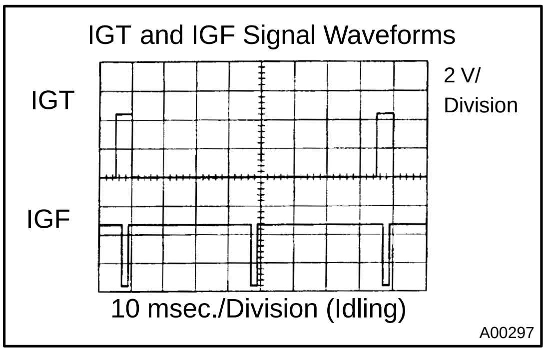
Remove the grove compartment (See page SF-49).

CHECK:

Measure the voltage between terminals IGT1 - IGT4 of the ECM connector and the body ground when the engine is cranked.

OK:

Voltage: More than 0.1 V and less than 4.5 V



Reference: INSPECTION USING OSCILLOSCOPE

During idling, check the waveform between terminals IGT1 - IGT4 and E1 of the ECM connector.

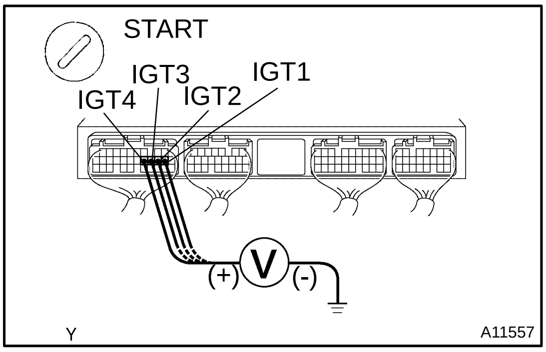
HINT:

The correct waveforms are as shown.

NG	**Check and replace ECM (See page IN-28).**

OK

6	**Disconnect ignition coil with igniter connector, and check voltage between terminals IGT1 - IGT4 of ECM connector and body ground.**



PREPARATION:

(a) Disconnect the ignition coil with the igniter connector.

(b) Remove the glove compartment (See page SF-49).

CHECK:

Measure the voltage between terminals IGT1 - IGT4 of the ECM connector and the body ground when the engine is cranked.

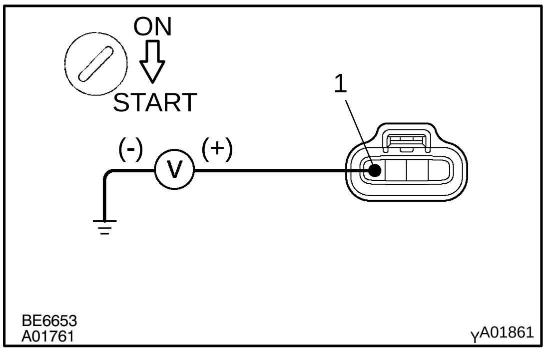
OK:

Voltage: More than 0.1 V and less than 4.5 V

NG	**Check and replace ECM (See page IN-28).**

OK

7	**Check ignition coil with igniter power source circuit.**



PREPARATION:
Disconnect the ignition coil with the igniter connector.

CHECK:
Measure the voltage between terminal 1 of the ignition coil with the igniter connector and the body ground when the ignition switch is turned to ON and STA position.

OK:
Voltage: 9 - 14 V

NG → **Repair ignition coil with igniter power source circuit.**

OK ↓

8	**Check for open and short in harness and connector between ignition switch and ignition coil with igniter (See page IN-28).**

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

OK ↓

Replace ignition coil with igniter.

DI137-10

DTC	P1335	Crankshaft Position Sensor Circuit Malfunction (During engine running)

CIRCUIT DESCRIPTION

Refer to DTC P0335 on page DI-64 .

DTC No.	DTC Detection Condition	Trouble Area
P1335	No crankshaft position sensor signal to ECM with engine speed 1,000 rpm or more	● Open or short in crankshaft position sensor circuit ● Crankshaft position sensor ● Signal plate (Crankshaft position sensor rotor) ● ECM

WIRING DIAGRAM

Refer to DTC P0335 on page DI-64 .

INSPECTION PROCEDURE

Refer to DTC P0335 on page DI-64 .

HINT:

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

DI139-10

DTC	P1600	ECM BATT Malfunction

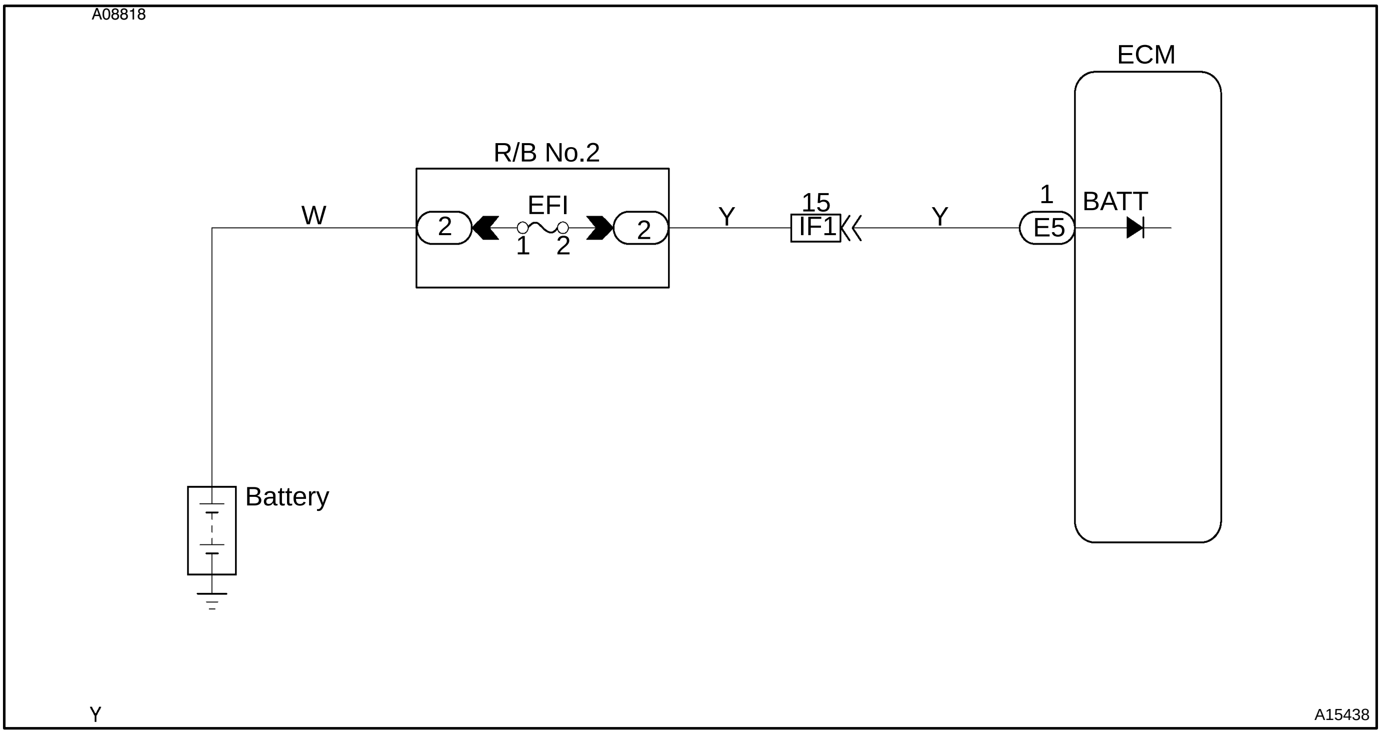
CIRCUIT DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
P1600	Open in back up power source circuit	● Open in back up power source circuit ● ECM

HINT:
If DTC P1600 appear, the ECM does not store another DTC.

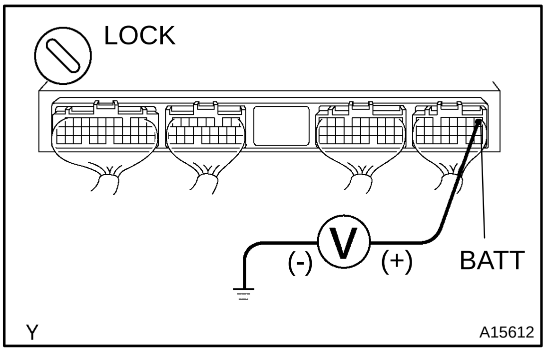
WIRING DIAGRAM



INSPECTION PROCEDURE

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

1	Check voltage between terminal BATT of ECM connector and body ground.

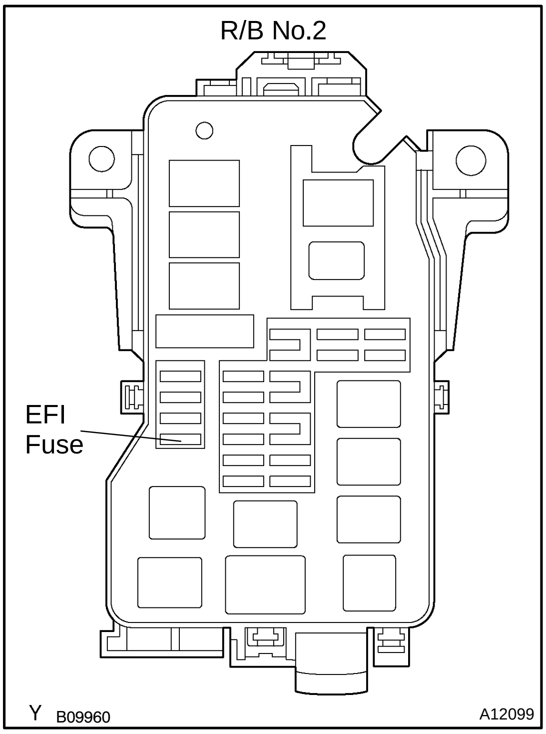


PREPARATION:
Remove the glove compartment (See page SF-49).
CHECK:
Measure the voltage between terminal BATT of the ECM connector and the body ground.
OK:
Voltage: 9 - 14 V

OK → **Check and replace ECM (See page IN-28).**

NG ↓

2	Check EFI fuse.



PREPARATION:
Remove the EFI fuse from the R/B No.2.
CHECK:
Check the continuity of the EFI fuse.
OK:
Continuity

NG → **Check for short in all harness and components connected to EFI fuse.**

OK ↓

Check and repair harness or connector between battery and EFI fuse, and EFI fuse and ECM.

DI13A-10

DTC	P1780	Park/Neutral Position Switch Malfunction (Only for A/T)

CIRCUIT DESCRIPTION

The park/neutral position switch goes on when the shift lever is in the N or P shift position. When it goes on, terminal NSW of the ECM is grounded to body ground via the starter relay, thus the terminal NSW voltage becomes 0V. When the shift lever is in the D, 2, L or R position, the park/neutral position switch goes off, so the voltage of ECM. Terminal NSW becomes battery positive voltage, the voltage of the ECM internal power source. If the shift lever is moved from the N position to the D position, this signal is used for air-fuel ratio correction and for idle speed control (estimated control), etc.

DTC No.	DTC Detection Condition	Trouble Area
P1780	Only for 3RZ-FE: 2 or more switches are ON simultaneously for P, R, N, D, 2 and L position (2 trip detection logic)	●Short in park/neutral position switch circuit ●Park/neutral position switch ●ECM
	When driving under conditions (a) and (b) for 30 sec. or more park/neutral position switch is ON (N position): (2 trip detection logic) (a) Vehicle speed: 70 km/h (44 mph) or more (b) Engine speed: 1,500 ~ 2,500 rpm	

HINT:
After confirming DTC P1780, use the TOYOTA hand-held tester to confirm the park/neutral position switch signal from CURRENT DATA.

WIRING DIAGRAM

Refer to DTC P1780 on page DI-318 .

INSPECTION PROCEDURE

Refer to DTC P1780 on page DI-318 .
HINT:
Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected, when troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

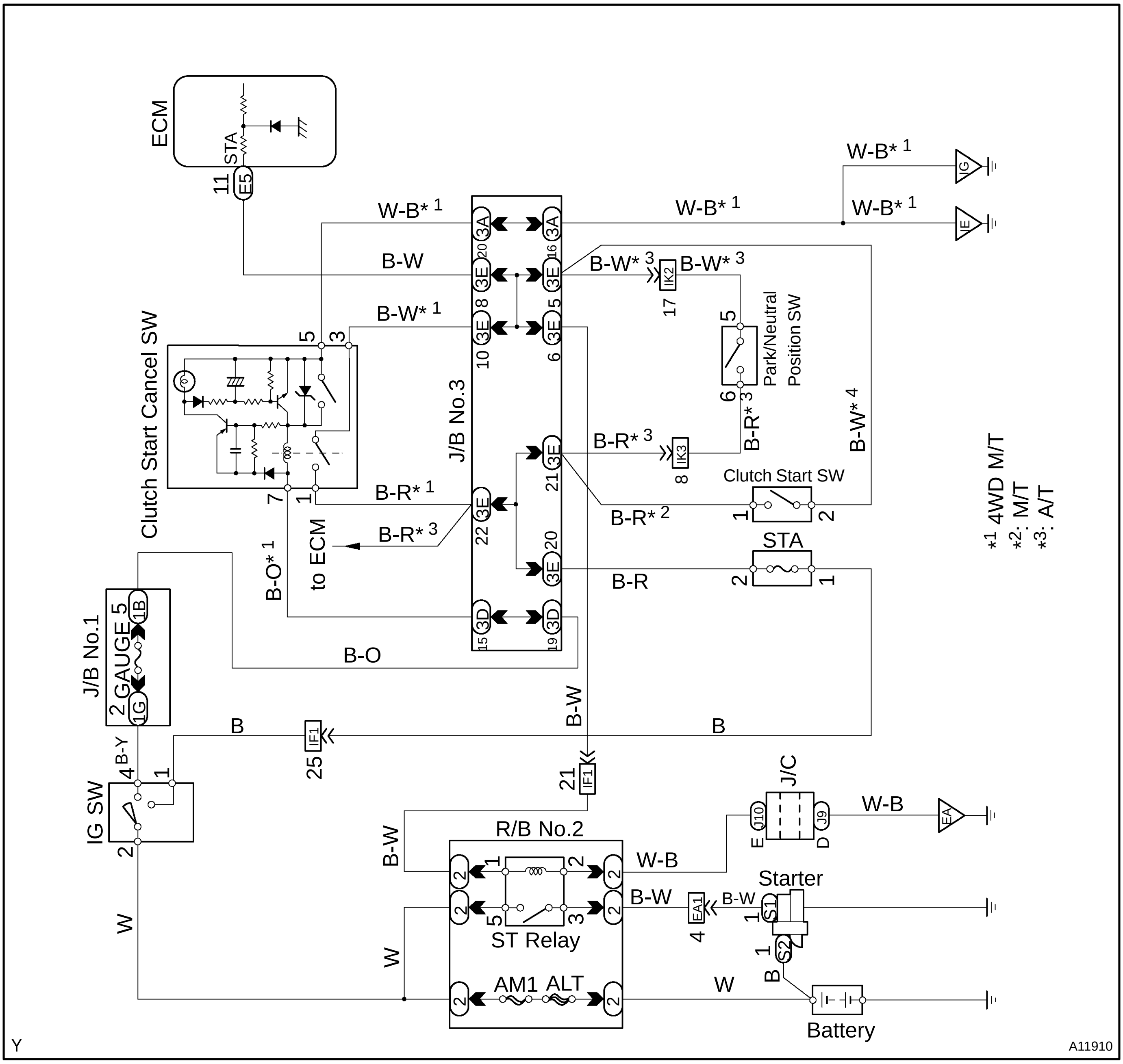
DI17C-04

Starter Signal Circuit

CIRCUIT DESCRIPTION

When the engine is cranked, the intake air flow is slow, so fuel vaporization is poor. A rich mixture is therefore necessary in order to achieve good startability. While the engine is being cranked, the battery positive 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 DI-21 .

TOYOTA hand-held tester:

1	**Connect TOYOTA hand-held tester, and check STA signal.**

PREPARATION:
(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand-held tester main switch ON.
CHECK:
Read the STA signal on the TOYOTA hand-held tester while the starter operates.
OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI-21).**

NG

2	**Check for open in harness and connector between ECM and starter relay (Marking: ST) (See page IN-28).**

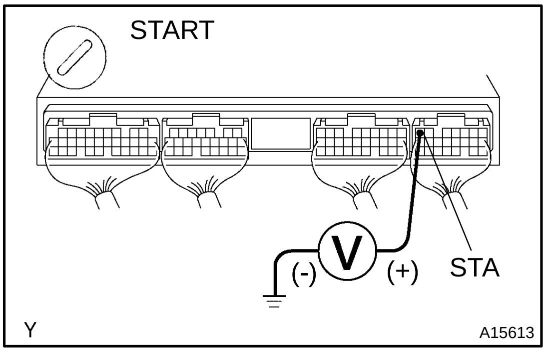
NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN-28).

OBD¿ scan tool (excluding TOYOTA hand-held tester):

1	**Check voltage between terminal STA of ECM connector and body ground.**



PREPARATION:
Remove the glove compartment (See page SF-49).
CHECK:
Measure the voltage between terminal STA of the ECM connector and the body ground during enigne cranking.
OK:
Voltage: 6.0 V or more

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI-21).**

NG

2	**Check for open in harness and connector between ECM and starter relay (Marking: ST) (See page IN-28).**

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

OK

Check and replace ECM (See page IN-28).

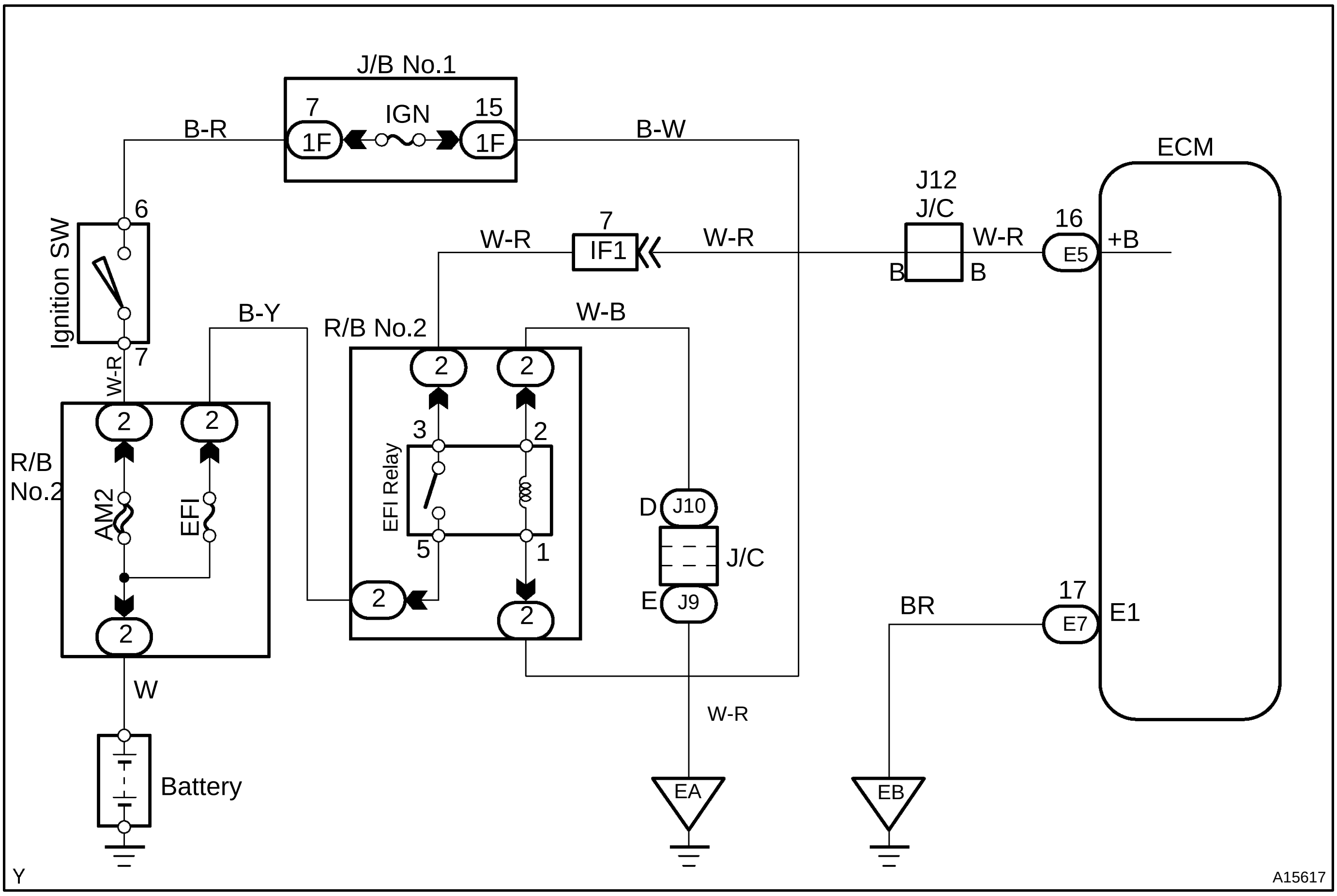
DI13C-10

ECM Power Source Circuit

CIRCUIT DESCRIPTION

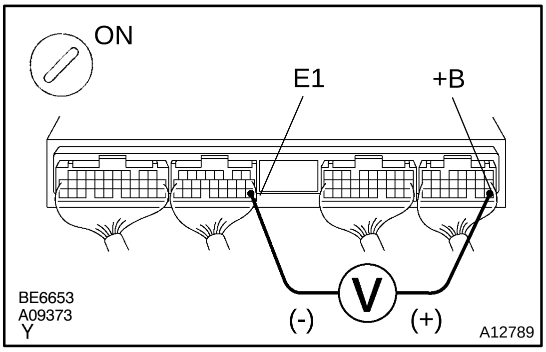
When the ignition switch is turned ON, battery positive voltage is applied to the coil, closing the contacts of the EFI main relay (Marking: EFI) and supplying power to terminal +B of the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals +B and E1 of ECM connectors.



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals +B and E1 of the ECM connectors.

OK:

Voltage: 9 - 14 V

OK	Proceed to next circuit inspection shown on Problem symptoms table (See page DI-21).

NG

2	Check for open in harness and connector between terminal E1 of ECM and body ground (See page IN-28).

NG → Repair or replace harness or connector.

OK

3	Check EFI main relay (Marking: EFI) (See page SF-37).

NG → Replace EFI main relay.

OK

4	Check EFI fuse (See page DI-129 , step 2).

NG → Check for short in all harness and components connected to EFI fuse.

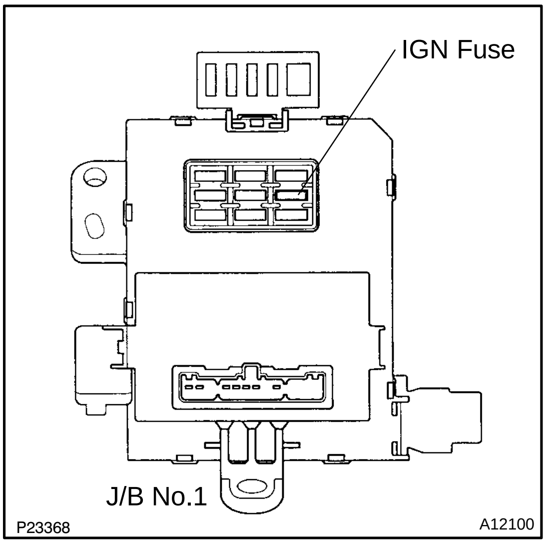
OK

5	Check for open in harness and connector between EFI main relay (Marking: EFI) and battery, and EFI main relay and ECM (See page IN-28).

NG → Repair or replace harness or connector.

OK

6	Check IGN fuse.



PREPARATION:
Remove the IGN fuse from the J/B No.1.
CHECK:
Check the continuity of the IGN fuse.
OK:
Continuity

NG → **Check for short in all harness and components connected to IGN fuse.**

OK

7	Check ignition switch (See page BE-14).

NG → **Replace ignition switch.**

OK

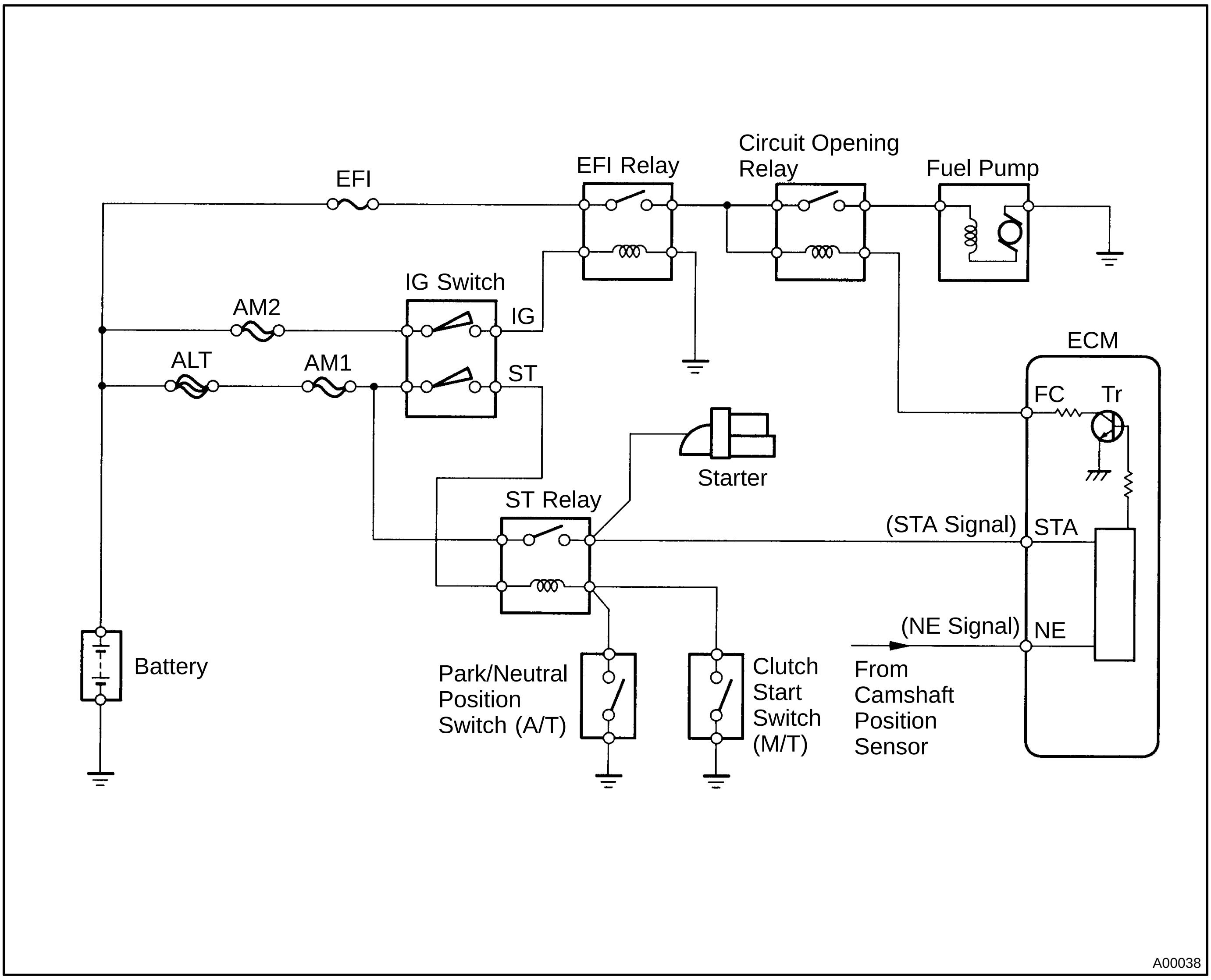
Check for open in harness and connector between ignition switch and EFI main relay (Marking: EFI), and EFI main relay and body ground (See page IN-28).

DI17D-04

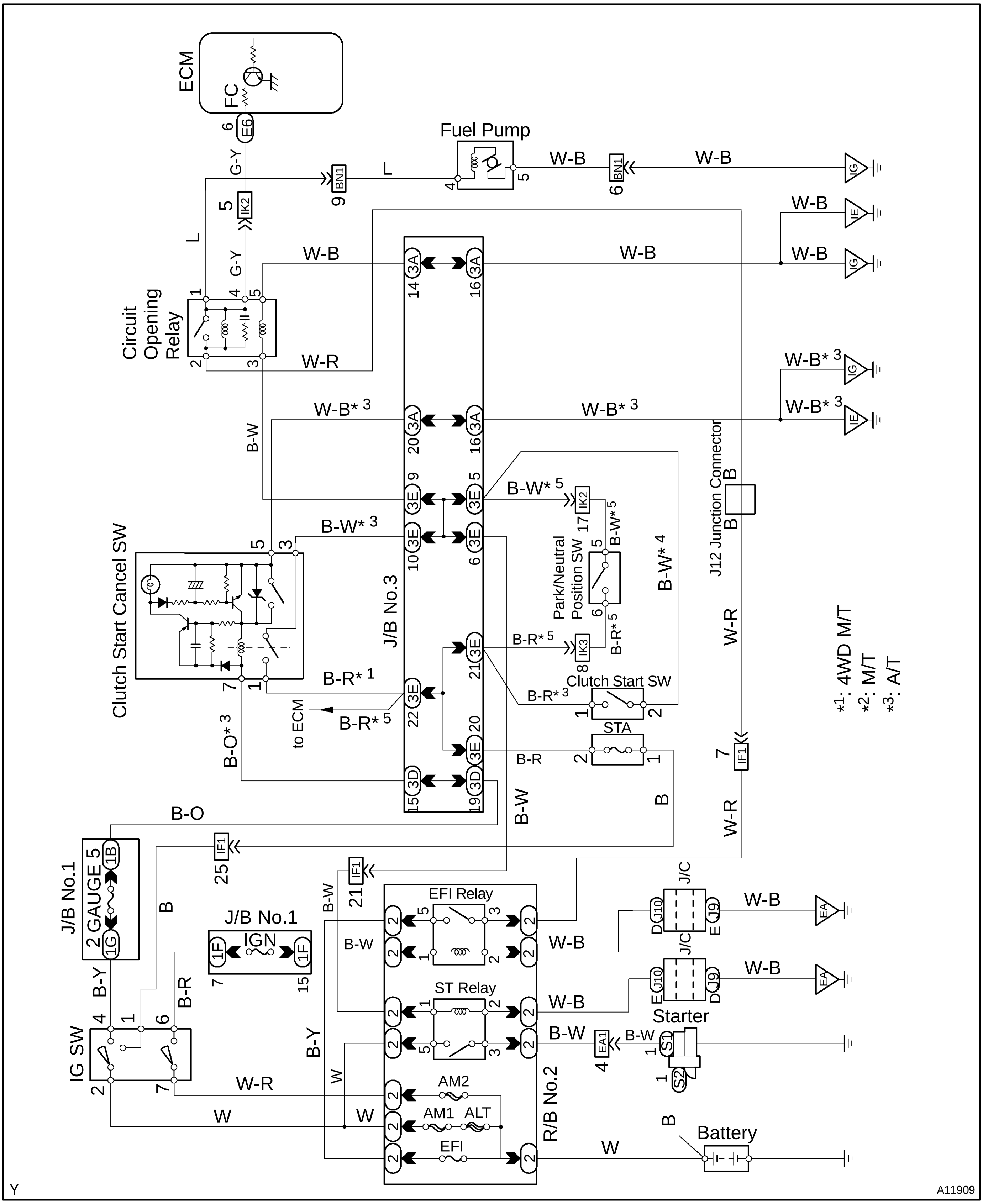
Fuel Pump Control Circuit

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 also current flows to terminal STA of ECM (STA signal).
When the STA signal and NE signal are input to the ECM, Tr is turned ON, current flows to 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

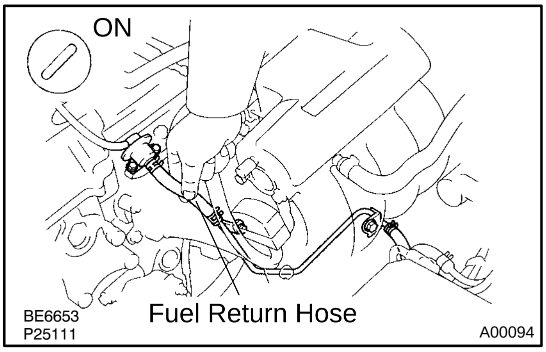


*1: 4WD M/T
*2: M/T
*3: A/T

INSPECTION PROCEDURE

TOYOTA hand-held tester:

1	**Connect TOYOTA hand-held tester, and check operation of fuel pump.**



PREPARATION:

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

(b) Turn the ignition switch ON and push the TOYOTA hand-held tester main switch ON.

(c) Use the ACTIVE TEST mode to operate the fuel pump.

CHECK:

Check for fuel pressure in the fuel return hose when it is pinched off.

OK:

There is pressure in the fuel return hose.

HINT:

At this time, you will hear a fuel flowing noise.

OK → **Check for starter signal circuit (See page DI-132).**

NG

2	**Check for ECM power source circuit (See page DI-135).**

NG → **Repair or replace.**

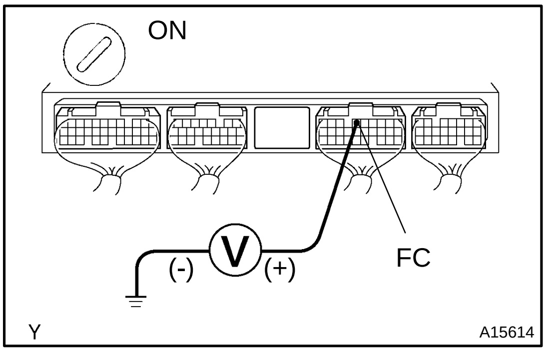
OK

3	**Check circuit opening relay (See page SF-39).**

NG → **Replace circuit opening relay.**

OK

4	Check voltage between terminal FC of ECM and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF-49).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminal FC of the ECM connector and the body ground.

OK:
Voltage: 9 - 14 V

NG → **Go to Step 5**

NG

Check for open in harness and connector between EFI main relay (Marking: EFI) and circuit opening relay, and circuit opening relay and ECM.

5	Check fuel pump (See page SF-5).

NG → **Repair or replace fuel pump.**

OK

6	Check for open in harness and connector between circuit opening relay and fuel pump, and fuel pump and body ground (See page IN-28).

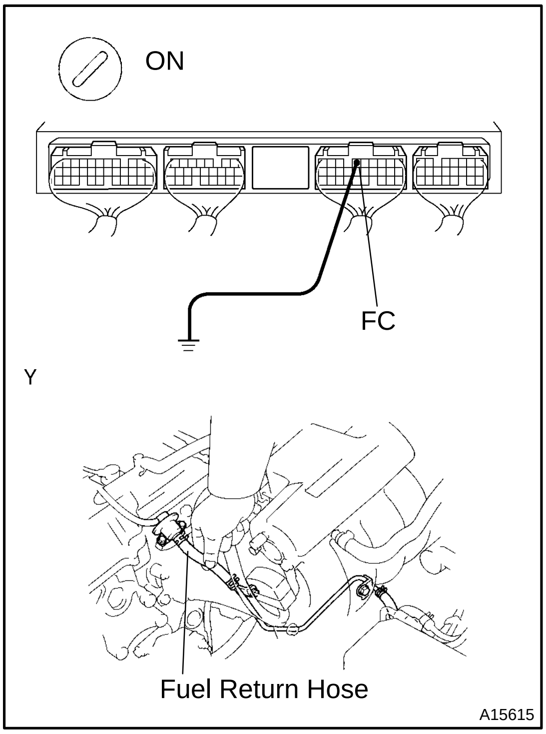
NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN-28).

OBD II scan tool (excluding TOYOTA hand-held tester)

1	**Check operation of fuel pump.**



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Turn the ignition switch ON.

CHECK:

(a) Connect between terminal FC of the ECM connector and the body ground.

(b) Check for fuel pressure in the fuel return hose when it is pinched by hand.

OK:

There is pressure in the fuel return hose.

HINT:

At this time, you will hear a fuel return flowing noise.

OK	**Check for starter signal circuit (See page DI-132).**

NG

2	**Check for ECM power source circuit (See page DI-135).**

NG	**Repair or replace.**

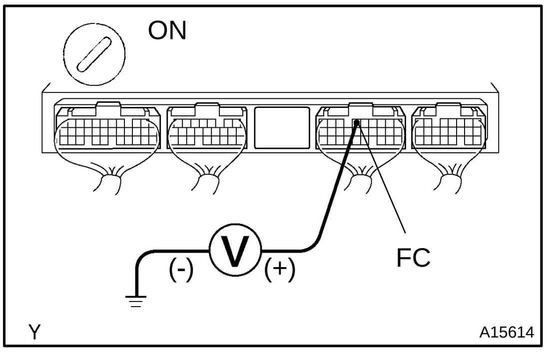
OK

3	**Check circuit opening relay (See page SF-39).**

NG	**Replace circuit opening relay.**

OK

4	**Check voltage between terminal FC of ECM and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF-49).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal FC of the ECM connector and the body ground.

OK:

Voltage: 9 - 14 V

NG → **Go to Step 5**

NG

Check for open in harness and connector between EFI main relay (Marking: EFI) and circuit opening relay, and circuit opening relay and ECM.

5	**Check fuel pump (See page SF-5).**

NG → **Repair or replace fuel pump.**

OK

6	**Check for open in harness and connector between circuit opening relay and fuel pump, and fuel pump and body ground (See page IN-28).**

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

OK

Check and replace ECM (See page IN-28).

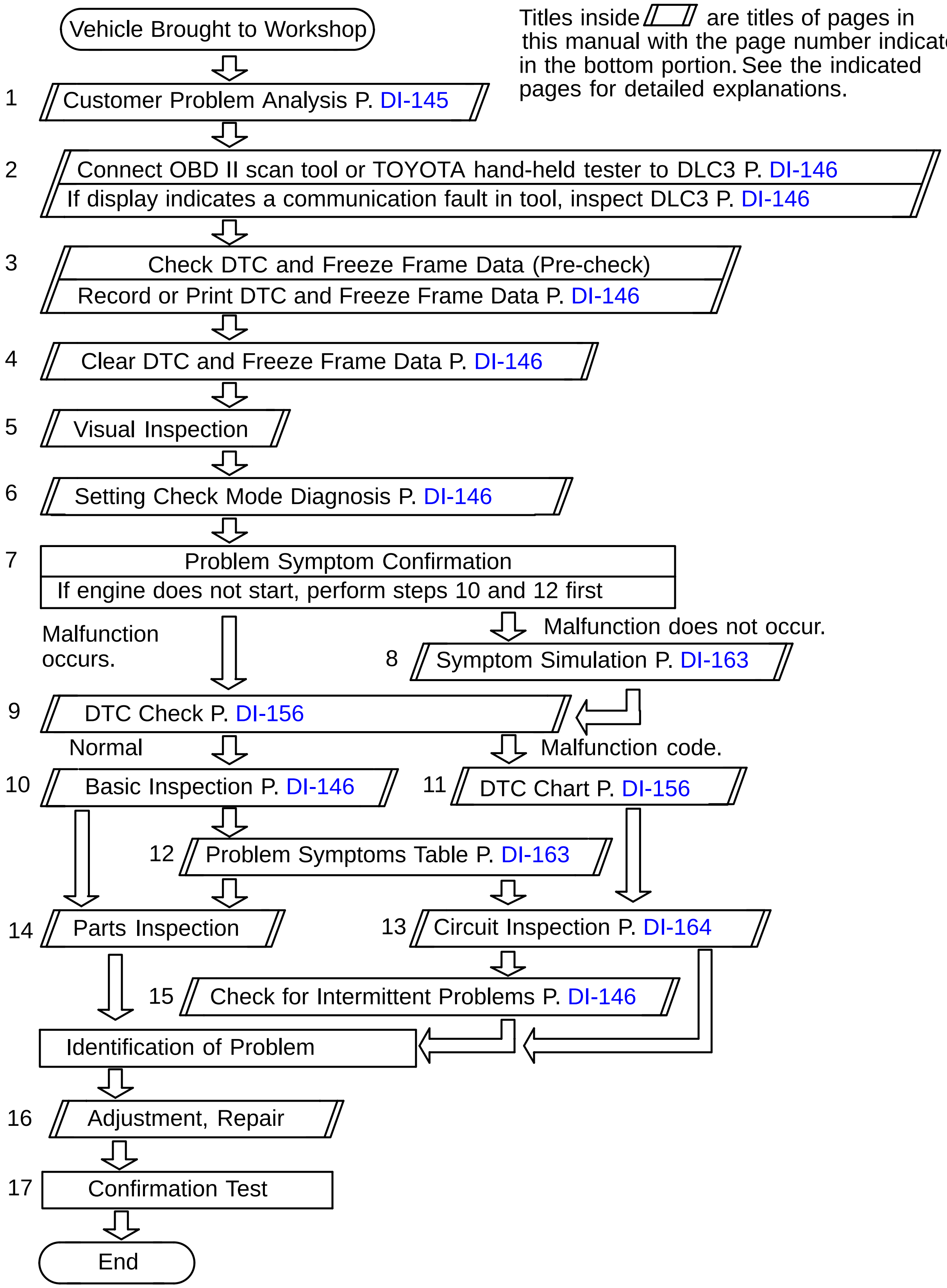
ENGINE (5VZ-FE)

DI0RJ-10

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.

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



DI0RK-09

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name ______________________

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

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

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

Condition of MIL		☐ Remains on ☐ Sometimes lights up	☐ Does not light up
DTC Inspection	Normal Mode (Pre-check)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freeze frame data ( )
	Check Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freeze frame data ( )

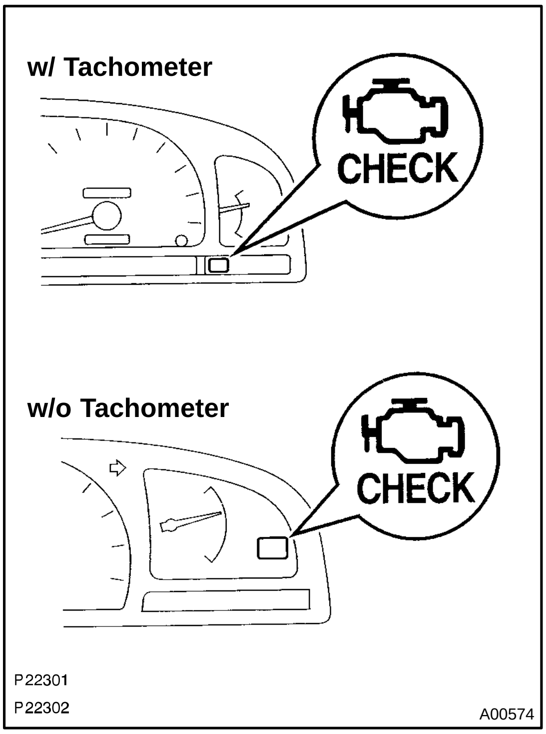
DI0RL-11

PRE-CHECK

1. DIAGNOSIS SYSTEM

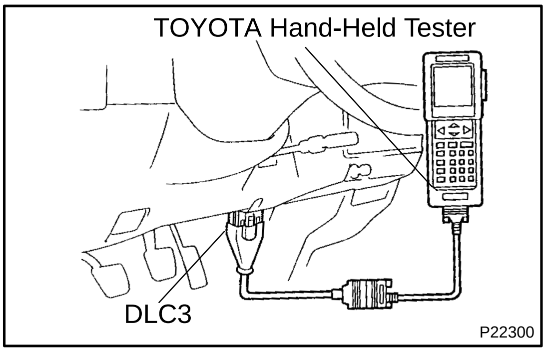
(a) Description

- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you need to connect the OBD II scan tool complying with SAE J1978 or TOYOTA hand-held tester to the vehicle, and read off various data output from the vehicle's ECM.



- OBD II regulations require that the vehicle's on-board computer lights up the Malfunction Indicator Light (MIL) on the instrument panel when the computer detects a malfunction in the emission control system/components or in the powertrain control components which affect vehicle emissions, or a malfunction in the computer. In addition to the MIL lighting up when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (See page DI-156).

If the malfunction does not reoccur in the 3 consecutive trips, the MIL goes off automatically but the DTCs remain in the ECM memory.



- To check the DTCs, connect the OBD II scan tool or TOYOTA hand-held tester to the Data Link Connector 3 (DLC3) of the vehicle. The OBD II scan tool or TOYOTA 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 OBD II scan tool's instruction book.) DTCs include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set freely by a manufacturer within the prescribed limits (See the DTC chart on page DI-156).

- The diagnosis system operates in normal mode during normal vehicle use. It also has a check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection and ensure the malfunction detection. By switching the ECM to check mode when troubleshooting, a technician can cause the MIL to light up for a malfunction that is only detected once or momentarily. (TOYOTA hand-held tester only) (See step 2)
- *2 trip detection logic:
  When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. (1st trip)

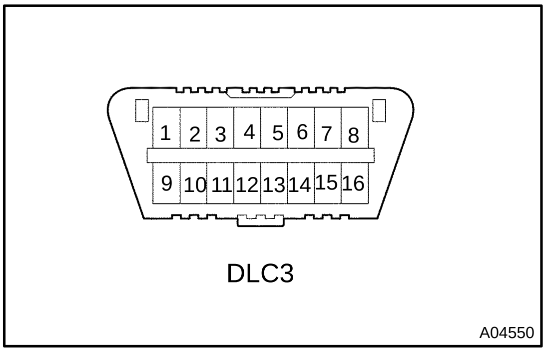
If the same malfunction is detected again during the second drive test, this second detection causes the MIL to light up. (2nd trip) (However, the ignition switch must be turned OFF between the 1st 2 trip and 2nd 2 trip.)

- Freeze frame data:
  Freeze frame data records the engine condition when a misfire (DTCs P0300) or fuel trim malfunction (DTCs P0171 and P0172) or other malfunction (first malfunction only), is detected.
  Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when the malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

Priorities of troubleshooting:
If troubleshooting priorities for multiple DTCs are given in the applicable DTC chart, these should be followed.
If no instructions are given, troubleshoot DTCs according to the following priorities.

(1) DTCs other than fuel trim malfunction (DTCs P0171 and P0172) and misfire (DTCs P0300).
(2) Fuel trim malfunction (DTCs P0171 and P0172).
(3) Misfire (DTCs P0300).

(b) Check the DLC3.
The vehicle's ECM uses the ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

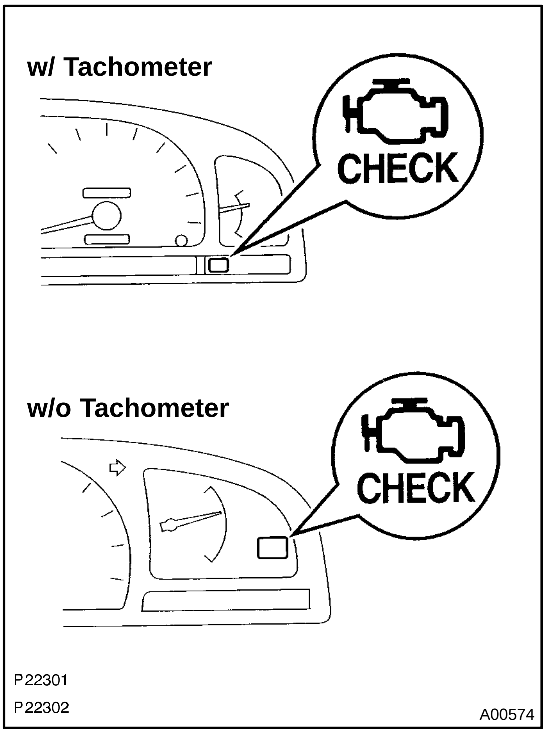


Terminal No.	Connection/Voltage or Resistance	Condition
7	Bus (+) Line/Pulse generation	During transmission
4	Chassis Ground - Body Ground/1 Ω or less	Always
5	Signal Ground - Body Ground/1 Ω or less	Always
16	Battery Positive - Body Ground/9 - 14 V	Always

HINT:

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

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



2. Normal Mode:
INSPECT DIAGNOSIS

(a) Check the MIL.

(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

HINT:

If the MIL does not light up, troubleshoot the combination meter (See page BE-39).

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

(b) Check the DTC.

NOTICE:

- **If there is no DTC in normal mode, check the 1st trip DTC using Continuous Test Results function (Mode 7 for SAE J1979) or the OBD II scan tool or TOYOTA hand-held tester.**
- **TOYOTA hand-held tester only:**
  When the diagnosis system is switched from normal mode to check mode all the DTCs and freeze frame data recorded in normal mode will be erased. So before switching modes, always check the DTCs and freeze frame data, and note them down.

(1) Prepare the OBD II scan tool (complying with SAE J1978) or TOYOTA hand-held tester.

(2) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3 at the lower left of the instrument panel.

(3) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.

(4) Use the OBD II scan tool or TOYOTA hand-held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book.).

If there is no DTC in normal mode, check the 1st trip DTC using Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool or TOYOTA hand-held tester.

(5) See page DI-156 to confirm the details of the DTCs.

NOTICE:

- **When simulating symptoms with an OBD II scan tool (excluding TOYOTA hand-held tester) to check the DTCs, use the normal mode. For code on the DTC chart subject to ”2 trip detection logic”, perform the following either action.**
- **Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL lights up and the DTCs are recorded in the ECM.**
- **Check the 1st trip DTC using Mode 7 (Continuous Test Results) for SAE J1979.**

(c) Clear the DTC.

The DTCs and freeze frame data will be erased by either action.

- Operating the OBD II scan tool (complying with SAE J1978) or TOYOTA hand-held tester to erase the codes. (See the OBD II scan tool's instruction book for operating instructions.)
- Disconnecting the battery terminals or EFI fuse.

NOTICE:

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

3. Check Mode:
INSPECT DIAGNOSIS

HINT:

TOYOTA hand-held tester only:

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

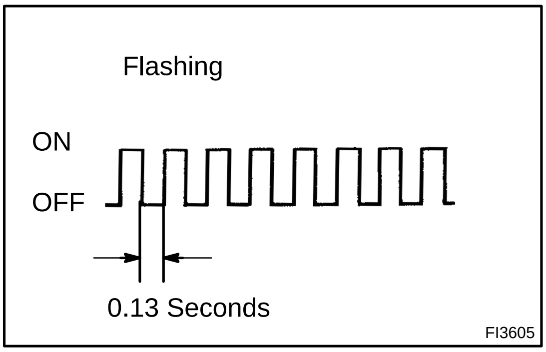
Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.

(a) Check the DTC.

(1) Initial conditions

- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transmission in P or N position
- Air conditioning switched OFF

(2) Turn ignition switch OFF.
(3) Prepare the TOYOTA hand-held tester.
(4) Connect the TOYOTA hand- held tester to the DLC3 at the lower left of the instrument panel.
(5) Turn the ignition switch ON and push the TOYOTA hand-held tester main switch ON.
(6) Switch the TOYOTA hand-held tester from the normal mode to the check mode (Check that the MIL flashes.).



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

(7) Start the engine (The MIL goes off after the engine started).
(8) Simulate the conditions of the malfunction described by the customer.

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

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

HINT:
Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from the check mode to the normal mode. so all the DTCs, etc. are erased.

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

4. FAIL-SAFE CHART

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

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0100	Ignition timing fixed at 10° BTDC	Returned to normal condition
P0110	Intake air temperature is fixed at 20°C (68°F)	Returned to normal condition
P0115	Engine coolant temperature 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 2 times consecutively VTA $>$ 0.1 V and $<$ 0.95 V
P0135 P0141	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0325 P0330	Max. timing retardation	Ignition switch OFF
P0340	Fuel cut	Returned to normal condition
P1300	Fuel cut	Returned to normal condition

5. CHECK FOR INTERMITTENT PROBLEMS

HINT:

TOYOTA hand-held tester only:

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

(a) Clear the DTCs (See step 2).
(b) Set the check mode (See step 3).
(c) Perform a simulation test (See page IN-18).
(d) Check the connector and terminal (See page IN-28).
(e) Handle the connector (See page IN-28).

6. BASIC INSPECTION

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

1	**Is battery positive voltage 11 V or more when engine is stopped?**

NO → **Charge or replace battery.**

YES

2	**Is engine cranked?**

NO → **Proceed to pages ST-16 , ST-18 , and continue to troubleshoot.**

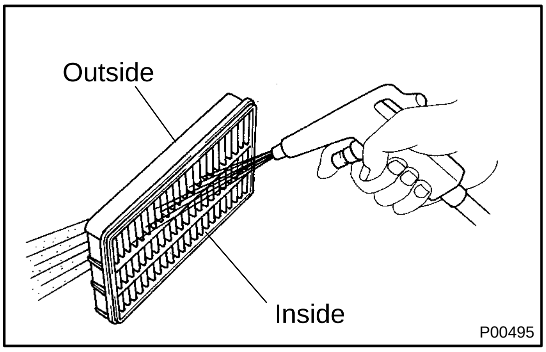
YES

3	**Does engine start?**

NO → **Go to step 7.**

YES

4	Check air filter.



PREPARATION:
Remove the air filter.
CHECK:
Visually check that the air filter is not dirty or excessive oily.
HINT:
If necessary, clean the air filter with compressed air. First blow from the inside thoroughly, then blow from the outside of the air filter.

NG	Repair or replace.

OK

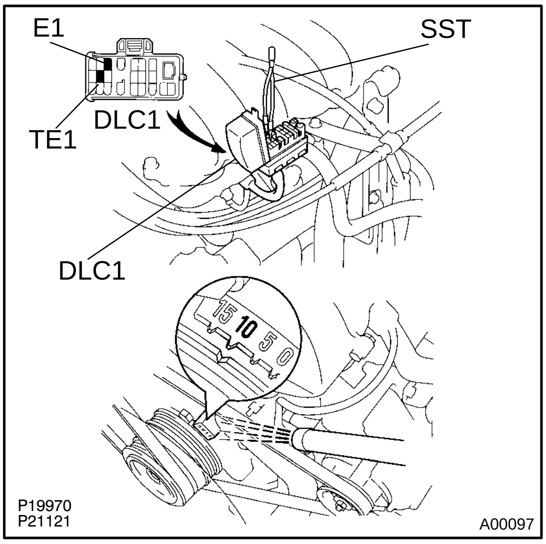
5	Check idle speed.

PREPARATION:
(a) Warm up the engine to the normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Shift the transmission into the N position.
(e) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3 of the vehicle.
CHECK:
Use the CURRENT DATA to check the idle speed.
OK:
Idle speed: 650 - 750 rpm

NG	Proceed to problem symptoms table on page DI-163 .

OK

6	Check ignition timing.



PREPARATION:

(a) Warm up the engine to the normal operating temperature.
(b) Shift the transmission into the N position.
(c) Keep the engine speed at idle.
(d) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843-18020
(e) Using a timing light, connect the tester to the No.1 high-tension cord.

CHECK:

Check ignition timing.

OK:

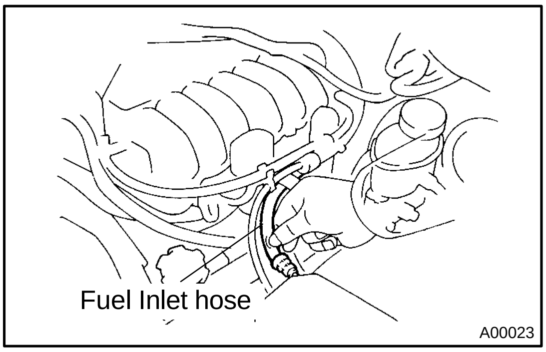
Ignition timing: 8 - 12° BTDC at idle

NG → **Proceed to page IG-1 , and continue to troubleshoot.**

OK ↓

Proceed to problem symptoms table on page DI-163 .

7	Check fuel pressure.



PREPARATION:

(a) Be sure that enough fuel is in the tank.
(b) Connect the TOYOTA hand-held tester to the DLC3.
(c) Turn the ignition switch ON and push the TOYOTA hand-held tester main switch ON.
(d) Use the ACTIVE TEST mode to operate the fuel pump.
(e) Please refer to the TOYOTA hand-held tester operator's manual for further details.
(f) Without TOYOTA hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page SF-5).

CHECK:

Check for the fuel pressure in the fuel inlet hose when it is pinched by hand.

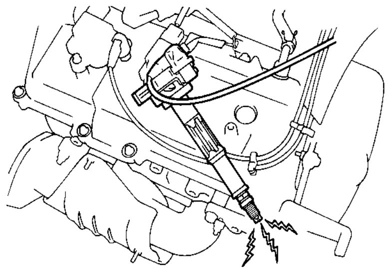
HINT:

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

NG → **Proceed to page SF-5 , and continue to troubleshoot.**

OK

8	**Check for spark.**


P21163

PREPARATION:

(a) Remove the ignition coil or disconnect the high-tension cord from spark plug.
(b) Remove the spark plug.
(c) Connect the high-tension cord to the spark plug again.
(d) Disconnect the injector connector.
(e) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 - 10 seconds at a time.

NG — **Proceed to page IG-1 , and continue to troubleshoot.**

OK

Proceed to problem symptoms table on page DI-163 .

7. ENGINE OPERATING CONDITION

NOTICE:

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

(a) CARB mandated signals.

TOYOTA hand-held tester display	Measurement Item	Normal Condition*
FUEL SYS #1	Fuel System Bank 1 OPEN: Air-fuel ratio feedback stopped CLOSED: Air-fuel ratio feedback operating	Idling after warming up: CLOSED
CALC LOAD	Calculator Load: Current intake air volume as a proportion of max. intake air volume	Idling: 14.9 - 21.3 % Racing without load (2,500rpm): 16.6 - 23.5 %
COOLANT TEMP	Engine Coolant Temp. Sensor Value	After warming up: 80 - 95°C (176 - 203°F)
SHORT FT #1	Short-term Fuel Trim Bank 1	0 ± 20 %
LONG FT #1	Long-term Fuel Trim Bank 1	0 ± 20 %
ENGINE SPD	Engine Speed	Idling: 650 - 750 rpm
VEHICLE SPD	Vehicle Speed	Vehicle stopped: 0 km/h (0 mph)

IGN ADVANCE	Ignition Advance: Ignition Timing of Cylinder No.1	Idling: BTDC 12.5 - 22.0°
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to ambient temp.
MAF	Air Flow Rate Through Mass Air Flow Meter	Idling: 3.3 - 4.7 gm/sec. Racing without load (2,500 rpm): 12.9 - 18.3 gm/sec.
THROTTLE POS	Output Voltage of Throttle Position Sensor Calculated as a percentage: 0 V → 0 %, 5 V → 100 %	Throttle valve fully closed: 7 - 11 % Throttle valve fully open: 65 - 75 %
O2S B1 S1	Output Voltage of Oxygen Sensor Bank 1 Sensor 1	Idling: 0.1 - 0.9 V
O2FT B1 S1	Oxygen Sensor Fuel Trim Bank 1 Sensor 1 (Same as SHORT FT #1)	0 ± 20 %
O2S B1 S2	Output Voltage of Oxygen Sensor Bank 1 Sensor 2	Driving 50 km/h (31 mph): 0.1 - 0.9 V

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

(b) TOYOTA Enhanced Signals.

TOYOTA hand-held tester display	Measurement Item	Normal Condition*
MISFIRE RPM	Engine RPM for first misfire range	Misfire 0: 0 rpm
MISFIRE LOAD	Engine load for first misfire range	Misfire 0: 0 g/r
INJECTOR	Fuel injection time for cylinder No.1	Idling: 1.82 - 3.15 ms
IAC DUTY RATIO	Intake Air Control Valve Duty Ratio Opening ratio rotary solenoid type IAC valve	Idling: 22 - 46 %
STARTER SIG	Starter Signal	Cranking: ON
A/C SIG	A/C Switch Signal	A/C ON: ON
PNP SW	Park/Neutral Position Switch Signal	P or N position: ON
STOP LIGHT SW	Stop Light Switch Signal	Stop light switch ON: ON
FC IDL	Fuel Cut Idle: Fuel cut when throttle valve fully closed, during deceleration	Fuel cut operating: ON
FC TAU	Fuel Cut TAU: Fuel cut during very light load	Fuel cut operating: ON
CYL#1 - CYL#6	Abnormal revolution variation for each cylinder	0 %
IGNITION	Total number of ignition for every 1,000 revolutions	0 - 3,000
A/C CUT SIG	A/C Cut Signal	A/C S/W OFF: ON
FUEL PUMP	Fuel Pump Signal	Idling: ON
EVAP (PURGE) VSV	EVAP VSV Signal	VSV operating: ON
VAPOR PRESS VSV	Vapor Pressure VSV Signal	VSV operating: ON
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.8 - 1.2 V
O2 LR B1 S1	Oxygen Sensor Lean Rich Bank 1 Sensor 1: Response time for oxygen sensor output to switch from lean to rich	Idling after warming up: 0 - 1,000 msec.
O2 RL B1 S1	Oxygen Sensor Rich Lean Bank 1 Sensor 1: Response time for oxygen sensor output to switch from rich to lean	Idling after warming up: 0 - 1,000 msec.

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

DI0RM-13

DIAGNOSTIC TROUBLE CODE CHART

HINT:
Parameters listed in the chart may not be exactly the same as your readings due to the type of instrument or other factors.
If a malfunction code is displayed during the DTC check in the check mode, check the circuit for the codes listed in the table below. For details of each code, refer to the ”See page” under the respective ”DTC No.” in the DTC chart.¿

SAE DEFINED

DTC No. (See page)	Detection Item	Trouble Area	MIL*1	Memory
P0100 (DI-164)	Mass Air Flow Circuit Malfunction	●Open or short in mass air flow meter circuit ●Mass air flow meter ●ECM	○	○
P0101 (DI-168)	Mass Air Flow Circuit Range/ Performance Problem	●Mass air flow meter	○	○
P0110 (DI-169)	Intake Air Temp. Circuit Malfunction	●Open or short in intake air temp. sensor circuit ●Intake air temp. sensor (built into mass air flow meter) ●ECM	○	○
P0115 (DI-173)	Engine Coolant Temp. Circuit Malfunction	●Open or short in engine coolant temp. sensor circuit ●Engine coolant temp. sensor ●ECM	○	○
P0116 (DI-177)	Engine Coolant Temp. Circuit Range/Performance Problem	●Cooling system ●Engine coolant temp. sensor	○	○
P0120 (DI-179)	Throttle/Pedal Position Sensor/ Switch ”A” Circuit Malfunction	●Open or short in throttle position sensor circuit ●Throttle position sensor ●ECM	○	○
P0121 (DI-183)	Throttle/Pedal Position Sensor/ Switch ”A” Circuit Range/Performance Problem	●Throttle position sensor	○	○
P0125 (DI-184)	Insufficient Coolant Temp. for Closed Loop Fuel Control	●Open or short in A/F sensor (bank 1 sensor 1) circuit ●A/F sensor (bank 1 sensor 1) ●Air induction system ●Fuel pressure ●Injector ●Gas leak of exhaust system ●ECM	○	○
P0136 (DI-189)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	●Open or short in heated oxygen sensor circuit ●Heated oxygen sensor	○	○
P0141 (DI-191)	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	●Open or short in heater circuit of heated oxygen sensor ●Heated oxygen sensor ●ECM	○	○
P0171 (DI-193)	System too Lean (Fuel Trim)	●Air induction system ●Injector blockage ●Mass air flow meter ●Engine coolant temp. sensor ●Fuel pressure ●Gas leak on exhaust system ●Open or short in A/F sensor (Bank 1 sensor 1) circuit ●A/F sensor (bank 1 sensor 1) ●ECM	○	○

P0172 (DI-193)	System too Rich (Fuel Trim)	● Injector leak, blockage ● Mass air flow meter ● Engine coolant temp. sensor ● Ignition system ● Fuel pressure ● Gas leak on exhaust system ● Open or short in A/F sensor (bank 1 sensor 1) circuit ● A/F sensor (bank 1 sensor 1) ● ECM	○	○
P0300 (DI-198)	Random/Multiple Cylinder Misfire Detected	● Open or short engine wire ● Connector connection ● Vacuum hose connection ● Ignition system ● Injector ● Fuel pressure ● EGR system ● Manifold abosolute pressure sensor ● Engine coolant temp. sensor ● Compression pressure ● Valve clearance ● Valve timing ● ECM	○*2	○
P0301 (DI-198)	Cylinder 1 Misfire Detected			
P0302 (DI-198)	Cylinder 2 Misfire Detected			
P0303 (DI-198)	Cylinder 3 Misfire Detected			
P0304 (DI-198)	Cylinder 4 Misfire Detected			
P0305 (DI-198)	Cylinder 5 Misfire Detected			
P0306 (DI-198)	Cylinder 6 Misfire Detected			
P0325 (DI-204)	Knock Sensor 1 Circuit Malfunction (Bank 1)	● Open or short in knock sensor 1 circuit ● Knock sensor 1 (looseness) ● ECM	○	○
P0330 (DI-204)	Knock Sensor 2 Circuit Malfunction (Bank 2)	● Open or short in knock sensor 2 circuit ● Knock sensor 2 (looseness) ● ECM	○	○
P0335 (DI-207)	Crankshaft Position Sensor "A" Circuit Malfunction	● Open or short in crankshaft position sensor circuit ● Crankshaft position sensor ● Crankshaft timing pulley ● ECM	○	○
P0340 (DI-209)	Camshaft Position Sensor Circuit Malfunction	● Open or short in camshaft position sensor circuit ● Camshaft position sensor ● RH camshaft timing pulley ● ECM	○	○
P0420 (DI-211)	Catalyst System Efficiency Below Threshold (Bank 1)	● Gas leakage on exhaust system ● A/F sensor (bank 1 sensor 1) ● Heated oxygen sensor (bank 1 sensor 2) ● Three-way catalytic converter	○	○
P0440 (DI-214)	Evaporative Emission Control System Malfunction	● Hose or tube cracked, holed, damaged or loose seal ● Fuel tank cap incorrectly installed ● Fuel tank cap cracked or damaged ● Vacuum hose cracked, holed, blocked, damaged or disconnected ● Fuel tank cracked, holed or damaged ● Charcoal canister cracked, holed or damaged ● Open or short in vapor pressure sensor circuit ● Vapor pressure sensor ● ECM	○	○

P0441 (DI-220)	Evaporative Emission Control System Incorrect Purge Flow	● Vacuum hose cracked, holed, blocked, damaged or disconnected ● Open or short in vapor pressure sensor circuit ● Vapor pressure sensor ● Open or short in VSV circuit for EVAP ● VSV for EVAP ● Open or short in VSV circuit for vapor pressure sensor ● VSV for vapor pressure sensor ● Charcoal canister cracked, holed or damaged ● ECM	○	○
P0446 (DI-220)	Evaporative Emission Control System Vent Control Malfunction		○	○
P0450 (DI-231)	Evaporative Emission Control System Pressure Sensor Malfunction	● Open or short in vapor pressure sensor circuit ● Vapor pressure sensor ● ECM	○	○
P0451 (DI-231)	Evaporative Emission Control System Pressure Sensor Range/ Performance			
P0500 (DI-233)	Vehicle Speed Sensor Malfunction	● Open or short in speed signal circuit ● Combination meter ● ECM ● Open or short in speed sensor circuit for ABS ● ABS ECU	○	○
P0505 (DI-236)	Idle Control System Malfunction	● Open or short in IAC valve circuit ● IAC valve is stuck or closed ● Open or short in A/C signal circuit ● Air induction system ● ECM	○	○

*1: MIL lights up.

*2: MIL lights up or blinking.

MANUFACTURER DEFINED

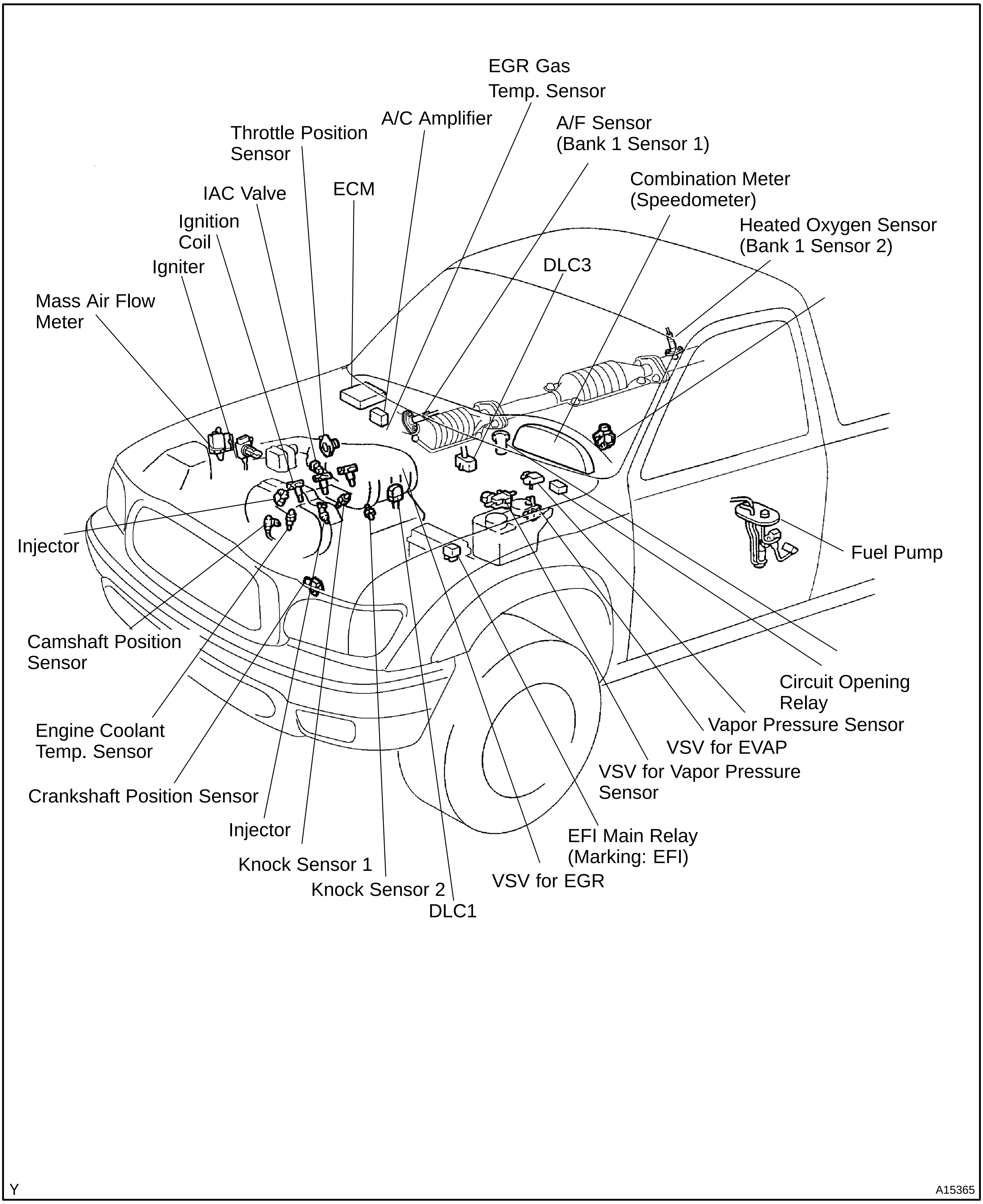
DTC No. (See page)	Detection Item	Trouble Area	MIL*	Memory
P1130 (DI-239)	A/F Sensor Circuit Range/Performance Malfunction (Bank 1 Sensor 1)	● Open or short in A/F sensor circuit ● A/F sensor ● Air induction system ● Fuel pressure ● Injector ● ECM	○	○
P1133 (DI-244)	A/F Sensor Circuit Response Malfunction (Bank 1 Sensor 1)	● Open or short in A/F sensor circuit ● A/F sensor ● Air induction system ● Fuel pressure ● Injector ● ECM	○	○
P1135 (DI-248)	A/F Sensor Heater Circuit Malfunction (Bank1 Sensor 1)	● Open or short in heater circuit of A/F sensor ● A/F sensor heater ● ECM	○	○
P1300 (DI-250)	Igniter Circuit Malfunction	● Ignition system ● Open or short in IGF or IGT circuit from igniter to ECM ● Igniter ● Ignition coil ● ECM	○	○
P1335 (DI-255)	Crankshaft Position Sensor Circuit Malfunction (During engine running)	● Open or short in crankshaft position sensor circuit ● Crankshaft position sensor ● Crankshaft timing pulley ● ECM	-	○

P1520 (DI-256)	Stop Light Switch Signal Malfunction (Only for A/T)	● Short in stop light switch signal circuit ● Stop light switch ● ECM	○	○
P1600 (DI-259)	ECM BATT Malfunction	● Open in back up power source circuit ● ECM	○	○
P1700 (DI-315)	Vehicle Speed Sensor No.2 Malfunction (No.2 Vehicle Speed Sensor)	● Open or short in No.2 vehicle speed sensor circuit ● No.2 vehicle speed sensor ● ECM	○	○
P1780 (DI-261)	Park/Neutral Position Switch Malfunction (Only for A/T)	● Short in park/neutral position switch circuit ● Park/neutral position switch ● ECM	○	○

*: - ... MIL does not light up. ○ ... MIL lights up.

DI0RN-12

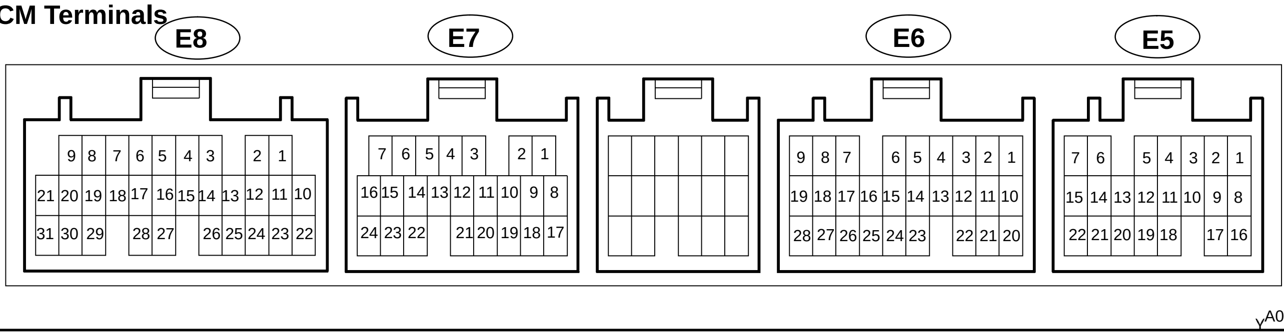
PARTS LOCATION



DI8YW-01

TERMINALS OF ECM

ECM Terminals



Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E5-1) - E1 (E7-17)	B-Y - BR	Always	9 - 14
+B (E5-16) - E1 (E7-17)	W-R - BR	IG switch ON	9 - 14
VC (E7-2) - E2 (E7-18)	G-B - BR-B	IG switch ON	4.5 - 5.5
VTA (E7-23) - E2 (E7-18)	Y - B	IG switch ON, Throttle valve fully closed	0.3 - 1.0
		IG switch ON, Throttle valve fully open	3.2 - 4.9
VG (E7-10) - E2G (E7-19)	GR-R - B-L	Idling, A/C switch OFF	1.1 - 1.5
THA (E7-22) - E2 (E7-18)	Y-G - BR-B	Idling, Intake air temp. 20°C (68°F)	0.5 - 3.4
THW (E7-14) - E2 (E7-18)	G-R - BR-B	Idling, Engine coolant temp. 80°C (176°F)	0.2 - 1.0
STA (E5-7) - E1 (E7-17)	B-W - BR	Cranking	6.0 or more
#10 (E7-5) - E01 (E8-21) #20 (E7-6) - E01 (E8-21) #30 (E8-1) - E01 (E8-21) #40 (E8-2) - E01 (E8-21) #50 (E8-3) - E01 (E8-21) #60 (E8-4) - E01 (E8-21)	W-R - BR W - BR W-G - BR L-R - BR W-L - BR L - BR	IG switch ON	9 - 14
		Idling	Pulse generation (See page DI-198)
IGT1 (E8-11) - E1 (E7-17)	B-L - BR	Idling	Pulse generation (See page DI-250)
IGT2 (E8-12) - E1 (E7-17)	BR-Y - BR		
IGT3 (E8-13) - E1 (E7-17)	B-W - BR		
IGF (E8-25) - E1 (E7-17)	B-Y - BR	IG switch ON	4.5 - 5.5
		Idling	Pulse generation (See page DI-250)
G2 (E8-10) - NE- (E7-24)	Y - G	Idling	Pulse generation (See page DI-207)
NE+ (E7-16) - NE- (E7-24)	R - G	Idling	Pulse generation (See page DI-207)
FC (E5-3) - E01 (E8-21)	G-Y - BR	IG switch ON	9 - 14
		Idling	0 - 3.0
EVP1 (E7-7) - E01 (E8-21)	W-G - BR	IG switch ON	9 - 14
RSC (E8-15) - E01 (E8-21)	B-R - BR	IG switch ON, Disconnect E8 connector from ECM	9 - 14
RSO (E8-16) - E01 (E8-21)	BR-R - BR		
OXS (E6-8) - E1 (E7-17)	B - BR	Maintain engine speed at 2,500 rpm for 3 min. after warming up	Pulse generation (See page DI-211)
HTS (E6-9) - E03 (E8-30)	R-L - BR	IG switch ON	Below 3.0
KNK1 (E8-27) - E1 (E7-17)	B - BR	Idling	Pulse generation (See page DI-204)
KNK2 (E8-28) - E1 (E7-17)	GR - BR		
NSW (E6-20) - E1 (E7-17)*1	B-R - BR	IG switch ON, Other shift position in P, N	9 - 14
		IG switch ON, Shift position in P, N	0 - 3.0

SP1 (E6-22) - E1 (E7-17)	G-O - BR	IG switch ON, Rotate driving wheel slowly	Pulse generation
TE1 (E8-6) - E1 (E7-17)	R - BR	IG switch ON	9 - 14
W (E5-6) - E01 (E8-21)	V-R - BR	IG switch ON	Below 3.0
PSW (E7-9) - E1 (E7-17)	Y - BR	IG switch ON	9 - 14
ACT (E6-13) - E1 (E7-17)	L-B - BR	A/C switch OFF	Below 2.0
		A/C switch ON at idling	9 - 14
AC1 (E6-25) - E1 (E7-17)	L-Y - BR	A/C switch ON at idling	Below 2.0
		A/C switch OFF	9 - 14
TPC (E5-9) - E01 (E8-21)	GR-G - BR	IG switch ON, Disconnect hose from vapor pressure sensor	9 - 14
PTNK (E5-17) - E1 (E7-17)	R-G - BR	IG switch ON	3.0 - 3.6
		IG switch ON, Apply vacuum 2.0 kPa (15 mmHg, 0.6 in.Hg)	1.3 - 2.1
SIL (E5-11) - E1 (E7-17)	W - BR	During transmission	Pulse generation
STP (E5-15) - E1 (E7-17)	G-W - BR	IG switch ON, Brake pedal depressed	7.5 - 14
		IG switch ON, Brake pedal released	Below 1.5
AF1+ (E7-12) - E1 (E7-17)	W - BR	IG switch ON	3.3*2
AF1- (E7-21) - E1 (E7-17)	R - BR	IG switch ON	3.0*2
HTAF1 (E7-4) - E05 (E7-8)	W - BR	Idling	Below 3.0
		IG switch ON	4 - 5
IGSW (E5-2) - E1 (E7-17)	B-R - BR	IG switch ON	9 - 14
MREL (E5-8) - E1 (E7-17)	B-O - BR	IG switch ON	9 - 14

*1: Only for A/T

*2: The ECM terminal voltage is fixed regardless of the output voltage from the sensor.

DI0RP-11

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	2. Starter 3. Starter relay	ST-16 ST-18
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. ECM	DI-265 DI-269 IN-28
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-269
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-262 DI-269 EM-3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-262 DI-269
Hot engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-262 DI-269
High engine idle speed (Poor idling)	1. ECM power source circuit	DI-265
Low engine idle speed (Poor idling)	1. Fuel pump control circuit	DI-269
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM-3 DI-269
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI-265 DI-269
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI-269 DI-295
Surging (Poor driveability)	1. Fuel pump control circuit	DI-269
Soon after starting (Engine stall)	1. Fuel pump control circuit	DI-269
During A/C operation (Engine stall)	1. ECM	IN-28

DI0RQ-13

CIRCUIT INSPECTION

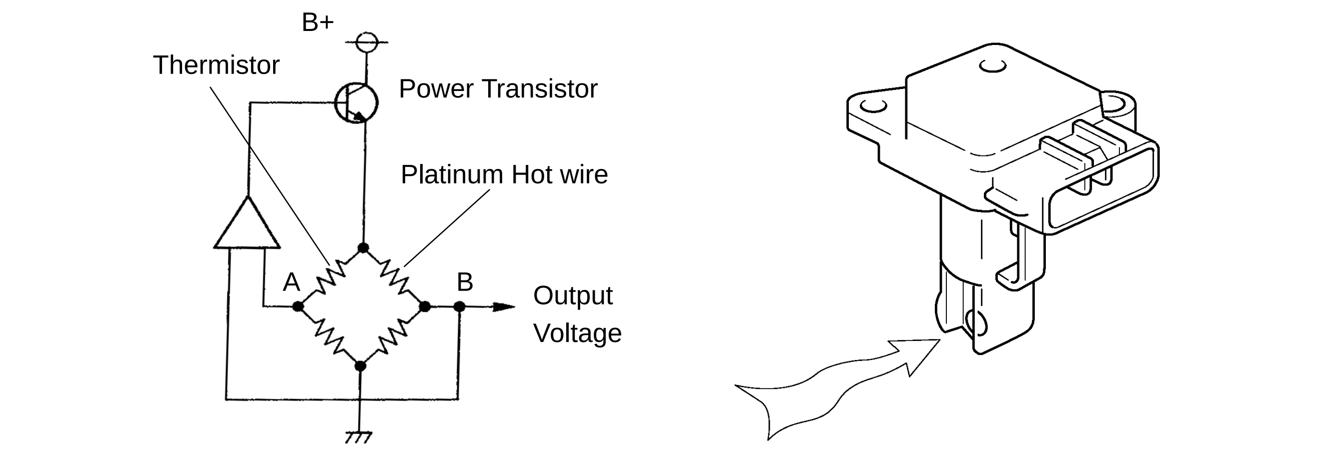
DTC	P0100	Mass Air Flow Circuit Malfunction

CIRCUIT DESCRIPTION

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

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

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



FI6929
S05741
A06106

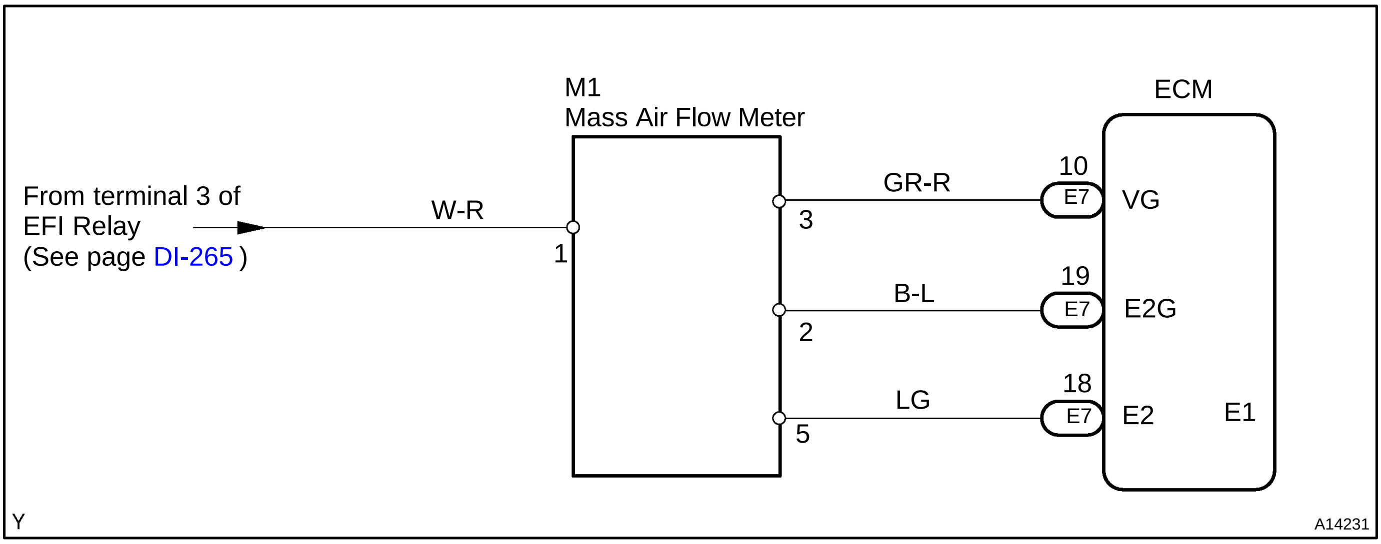
DTC No.	DTC Detection Condition	Trouble Area
P0100	Open or short in mass air flow meter circuit with engine speed 4,000 rpm or less	●Open or short in mass air flow meter circuit ●Mass air flow meter ●ECM
	Open or short in mass air flow meter circuit with engine speed 4,000 rpm or more (2 trip detection logic)	

HINT:

After confirming DTC P0100, use the OBD II scan tool or TOYOTA hand-held tester to confirm the mass air flow ratio from the CURRENT DATA.

Mass Air Flow Value (gm/sec.)	Malfunction
Approx. 0	●Mass air flow meter power source circuit open ●VG circuit open or short
11.0 - 25.1 (Idling after warmed up)	●E2G (California Spec.), E3 (Except California Spec.) circuit open

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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

1	**Connect OBD II scan tool or TOYOTA hand-held tester, and read value of mass air flow rate.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.

(c) Start the engine.

CHECK:

Read the mass air flow rate on the OBD II scan tool or TOYOTA hand-held tester.

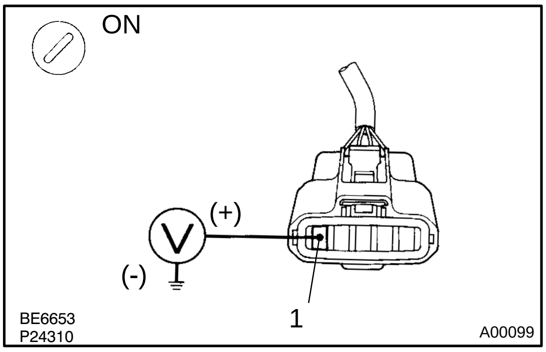
RESULT:

	Type I	Type II
Mass air flow rata (gm/sec.)	Approx. 0	11.0 - 25.1 (Idling after warmed up)

Type I → **Go to step 2.**

Type II → **Go to step 5.**

2	Check voltage of mass air flow meter power source.



PREPARATION:
(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.

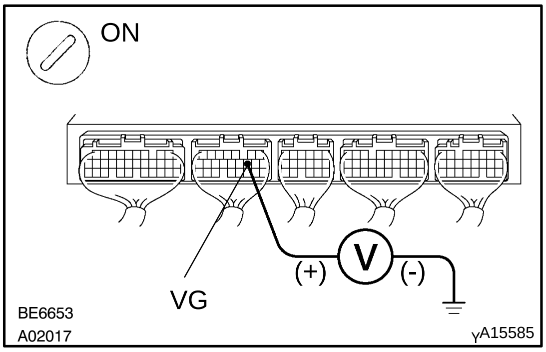
CHECK:
Measure the voltage between terminal 1 of the mass air flow meter connector and body ground.

OK:
Voltage: 9 - 14 V

NG → **Check for open in harness and connector between EFI main relay (Marking: EFI) and mass air flow meter (See page IN-28).**

OK ↓

3	Check voltage between terminal VG of ECM connector and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Start the engine.

CHECK:
Measure the voltage between terminal VG of the ECM connector and the body ground while the engine is idling.

OK:
Voltage:
1.1 - 1.5 V (P or N position and A/C switch OFF)

OK → **Check and replace ECM (See page IN-28).**

NG ↓

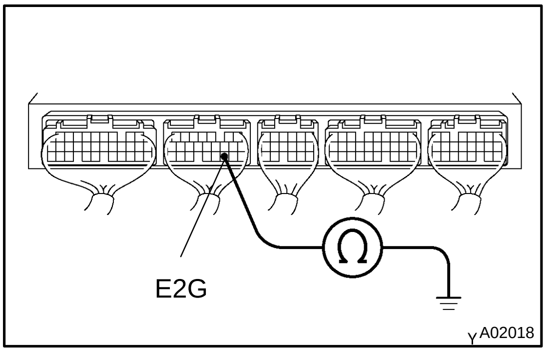
4	Check for open and short in harness and connector between mass air flow meter and ECM (See page IN-28).

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

OK ↓

Replace mass air flow meter.

5	Check continuity between terminal E2G of ECM connector and body ground.



PREPARATION:

Remove the glove compartment (See page SF-54).

CHECK:

Check the continuity between terminal E2G and E3 of the ECM connector and the body ground.

OK:

Continuity (1 Ω or less)

NG → **Check and replace ECM (See page IN-28).**

OK

6	Check for open in harness and connector between mass air flow meter and ECM (See page IN-28).

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

OK

Replace mass air flow meter.

DI0RR-12

DTC P0101 Mass Air Flow Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100 on page DI-164 .

DTC No.	DTC Detection Condition	Trouble Area
P0101	After engine is warmed up, conditions (a) and (b) continue with engine speed 900 rpm or less: (2 trip detection logic) (c) Throttle valve fully closed (d) Mass air flow meter output > 2.2 V	● Mass air flow meter
	Conditions (a) and (b) continue with engine speed 1,500 rpm or more: (2 trip detection logic) (a) VTA 0.63 V (b) Mass air flow meter output < 1.06 V	

INSPECTION PROCEDURE

HINT:

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

1	**Are there any other codes (besides DTC P0101) being output?**

NO → **Replace mass air flow meter.**

YES

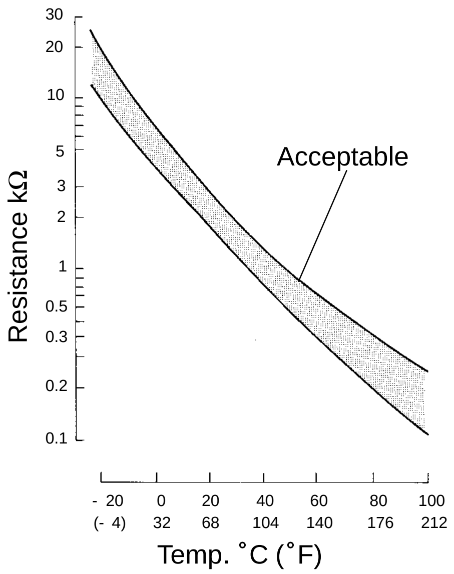
Go to relevant DTC chart (See page DI-156).

DI0RS-13

DTC	P0110	Intake Air Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

Fig. 1



FI4741

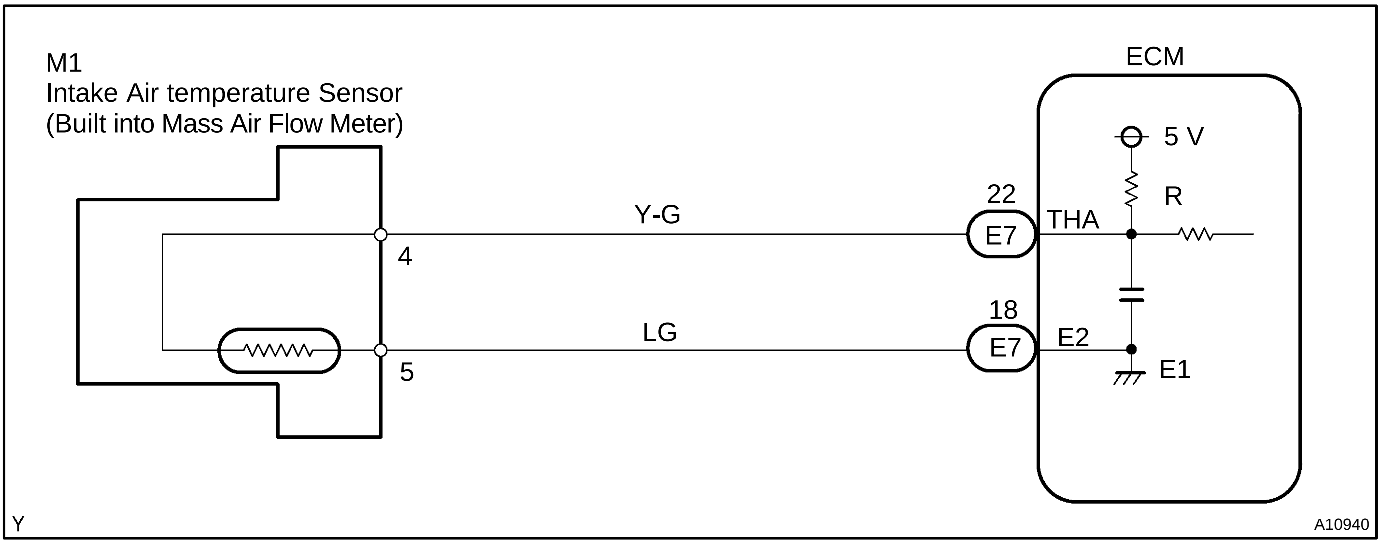
The intake air temperature sensor is built into the mass air flow meter and senses the intake air temperature.
A thermistor built in the sensor changes the resistance value according to the intake air temperature.
The lower the intake air temperature. The greater the thermistor resistance value becomes, and the higher the intake air temperature is, the lower the thermistor resistance value becomes (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 via resistor R.
That is, 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 also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during the cold engine operation.

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

HINT:
After confirming DTC P0110, use the OBD II scan tool or TOYOTA hand-held tester to confirm the intake air temperature from the CURRENT DATA.

Displayed Temperature	Malfunction
-40°C (-40°F)	Open circuit
140°C (284°F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs P0110, P0115 and P0120 are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand-held tester, and read value of intake air temperature.**

PREPARATION:

(a) Connector the OBD II scan tool or TOYOTA hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

OK:

Same value as the actual intake air temperature.

HINT:

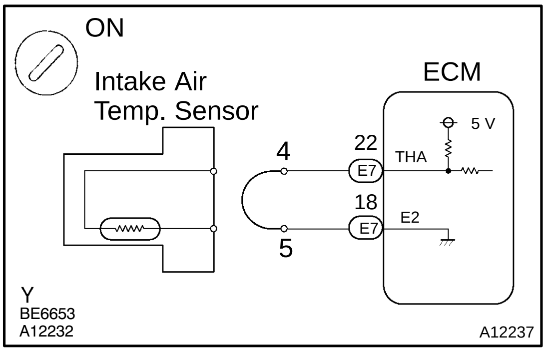
- If there is open circuit, OBD II scan tool or TOYOTA hand-held tester indicates -40°C (–40°F).
- If there is short circuit, OBD II scan tool or TOYOTA hand-held tester indicates 140°C (284°F) or more.

NG → **-40 °C (-40°F) ... Go to step 2.**
140°C (284°F) or more ... Go to step 4.

OK

Check for intermittent problems (See page DI-146).

2	**Check for open in harness or ECM.**



PREPARATION:
(a) Disconnect the mass air flow meter connector.
(b) Connect the sensor wire harness terminals together.
(c) Turn the ignition switch ON.

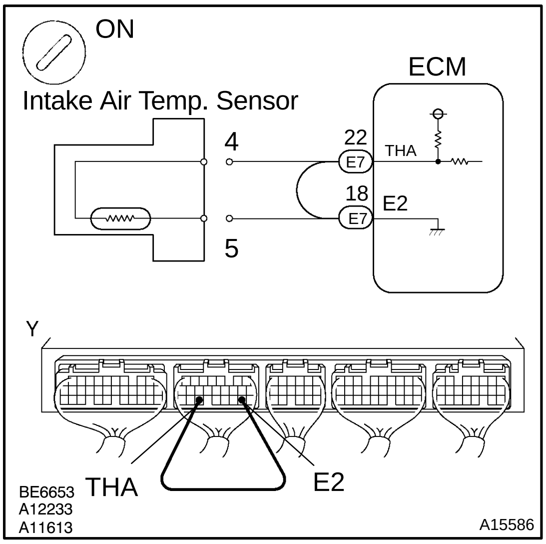
CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

OK:
Temperature value: 140°C (284°F) or more

OK → **Confirm good connection at sensor. If OK, replace mass air flow meter.**

NG

3	**Check for open in harness or ECM.**



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Connect terminals THA and E2 of the ECM connector.

HINT:
The mass air flow meter connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page IN-28).

CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

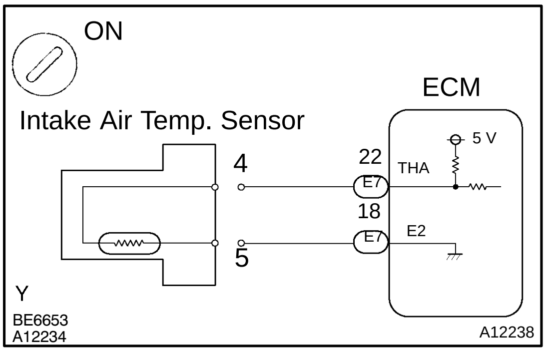
OK:
Temperature value: 140°C (284°F) or more

OK → **Open in harness between terminals E2 or THA, repair or replace harness.**

NG

Confirm good connection at ECM. If OK, check and replace ECM (See page IN-28).

4	Check for short in harness and ECM.

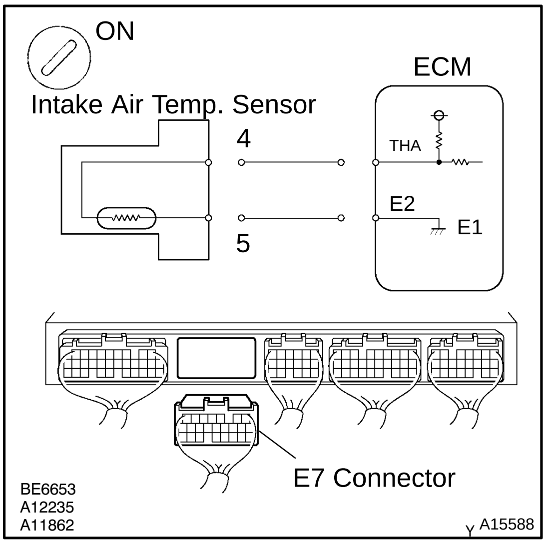


PREPARATION:
(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.
CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.
OK:
Temperature value: -40°C (-40°F)

OK	Replace mass air flow meter.

NG

5	Check for short in harness or ECM.



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Disconnect the E7 connector from the ECM.
HINT:
The mass air flow meter connector is disconnected.
(c) Turn the ignition switch ON.
CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.
OK:
Temperature value: -40°C (-40°F)

OK	Repair or replace harness or connector.

NG

Check and replace ECM (See page IN-28).

DI0RT-12

DTC	P0115	Engine Coolant Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

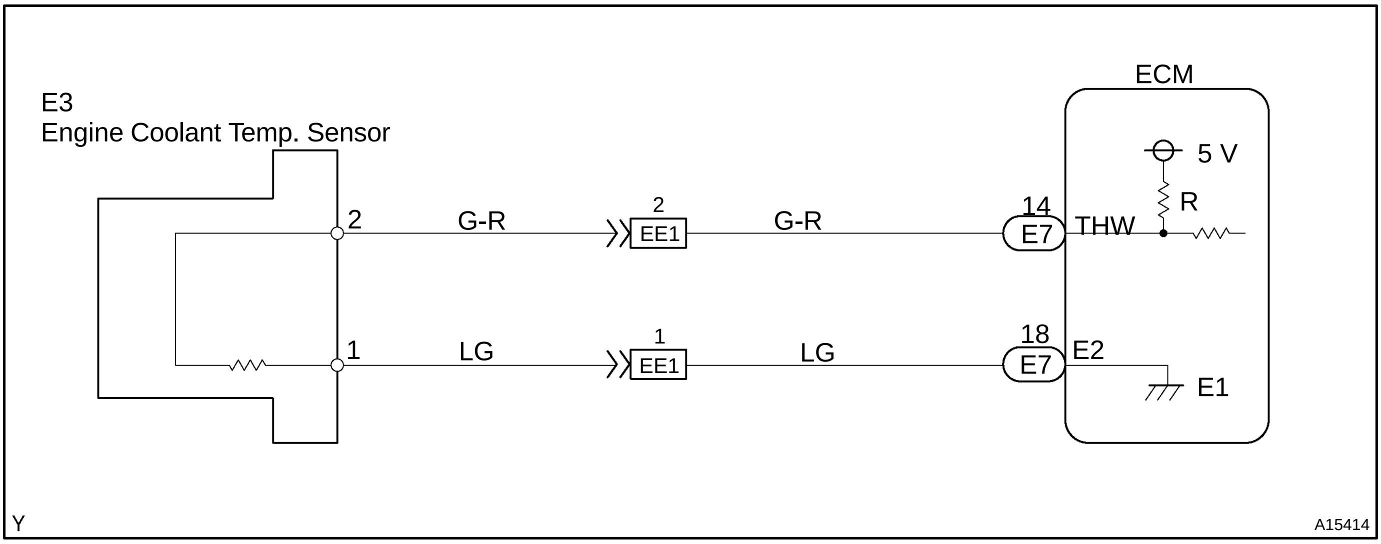
A thermistor built in the engine coolant temperature sensor changes the resistance value according to the engine coolant temperature.
The structure of the sensor and connection to the ECM is the same as in the DTC P0110 shown on page DI-169 .

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

HINT:
After confirming DTC P0115, use the OBD II scan tool or TOYOTA hand-held tester to confirm the engine coolant temperature from the CURRENT DATA.

Temperature Displayed	Malfunction
-40 °C (-40°F)	Open circuit
140C° (284°F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
- If DTCs P0110 , P0115 and P0120 are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand-held tester, and read value of engine coolant temperature.**

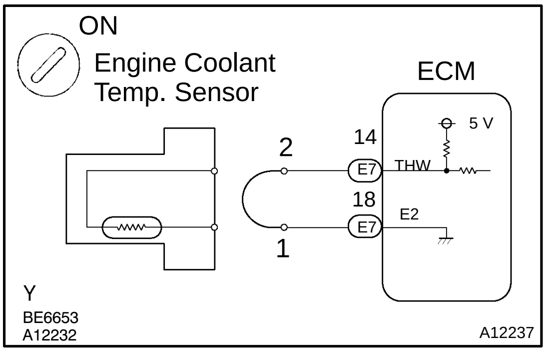
PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.
CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.
OK:
Same value as the actual engine coolant temperature.
HINT:
- If there is open circuit, OBD II scan tool or TOYOTA hand-held tester indicates -40°C (-40°F).
- If there is open circuit, OBD II scan tool or TOYOTA hand–held tester indicates 140°C (284°F) or more.

NG → **-40°C (-40°F) ... Go to step 2.**
140°C (284°F) or more ... Go to step 4.

OK

Check for intermittent problems
(See page DI-146).

2	**Check for open in harness or ECM.**

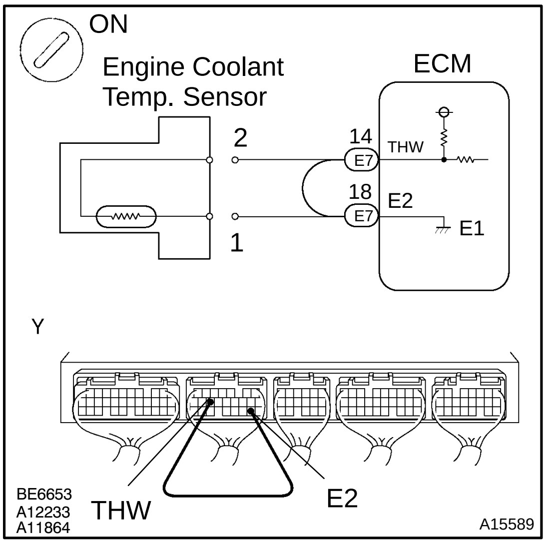


PREPARATION:
(a) Disconnect the engine coolant temperature sensor connector.
(b) Connect the sensor wire harness terminals together.
(c) Turn ignition switch ON.
CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.
OK:
Temperature value: 140°C (284°F) or more

OK → **Confirm good connection at sensor. If OK, replace engine coolant temperature sensor.**

NG

3	**Check for open in harness or ECM.**



PREPARATION:

(a) Remove the glove compartment (See page SF-54).

(b) Connect terminals THW and E2 of the ECM connector together.

HINT:

The engine coolant temperature sensor connector is disconnected. Before checking, do a visual and contact check of the pressur of the ECM connector (See page IN-28).

(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

OK:

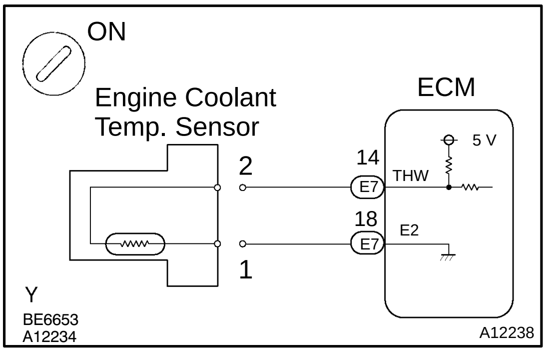
Temperature value: 140°C (284°F) or more

OK	**Open in harness between terminals E2 and THW, repair or replace harness.**

NG

Confirm good connection at ECM. If OK, check and replace ECM (See page IN-28).

4	**Check for short in harness and ECM.**



PREPARATION:

(a) Disconnect the engine coolant temperature sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.

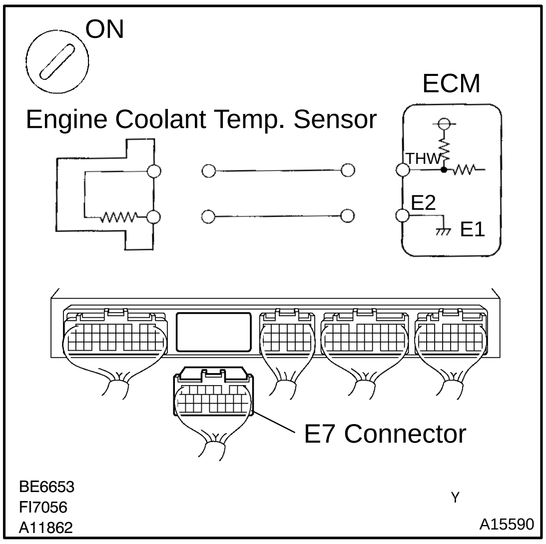
OK:

Temperature value: -40°C (-40°F)

OK	**Replace engine coolant temperature sensor.**

NG

5	Check for short in harness or ECM.



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Disconnect the E7 connector from the ECM.
HINT:
The engine coolant temperature sensor connector is disconnected.
(c) Turn the ignition switch ON.
CHECK:
Read the temperature value on the OBD II scan tool or TOYOTA hand-held tester.
OK:
Temperature value: -40°C (-40°F)

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

NG

Check and replace ECM (See page IN-28).

DI0RU-12

DTC P0116 Engine Coolant Temp. Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI-173 .

DTC No.	DTC Detection Condition	Trouble Area
P0116	If THW < -6.7°C (19.4°F) or THA < -6.7°C (19.4°F) 20 min. or more after starting engine, engine coolant temp. sensor value is 15°C (59°F) or less (2 trip detection logic)	● Cooling system ● Engine coolant temp. sensor
	If THW [illegible] -6.7°C (19.4°F) and THA < -6.7°C (19.4°F) and 10°C (50°F) at engine start, 5 min. or more after starting engine, engine coolant temp. sensor value is 30°C (86°F) or less (2 trip detection logic)	
	If THW < 10°C (50°F) and THA < 10°C (50°F) at engine start, 2 min. or more after starting engine, engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	
	When THW [illegible] 35°C (95°F) and 60°C (140°F), THA < -6.7 °C (19.4°F) when starting engine, conditions (a) and (b) continue: (2 trip detection logic) (a) Vehicle speed is changing (Not stable) (b) Water temp. change is lower than 3°C (5.4°F) from water temp. since when starting engine	
	In case that reading value of water temp. sensor will not change more than 1°C (1.8°F) even after repeating 6 trips (detection logic) of adjusting speed pattern with THW more than 60°C (140°F) when starting engine	

INSPECTION PROCEDURE

HINT:

- If DTCs P0115 and P0116 are output simultaneously, engine coolant temperature sensor circuit may be open. Perform a troubleshooting of DTC P0115 first.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0116) being output?

YES → **Go to relevant DTC chart (See page DI-156).**

NO

2	Check thermostat (See page CO-1 1).

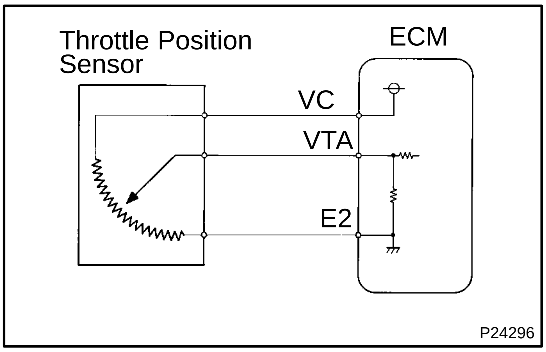
NG → **Replace thermostat.**

OK ↓

Replace engine coolant temperature sensor.

DTC	P0120	Throttle/Pedal position Sensor/Switch ”A” Circuit Malfunction

CIRCUIT DESCRIPTION



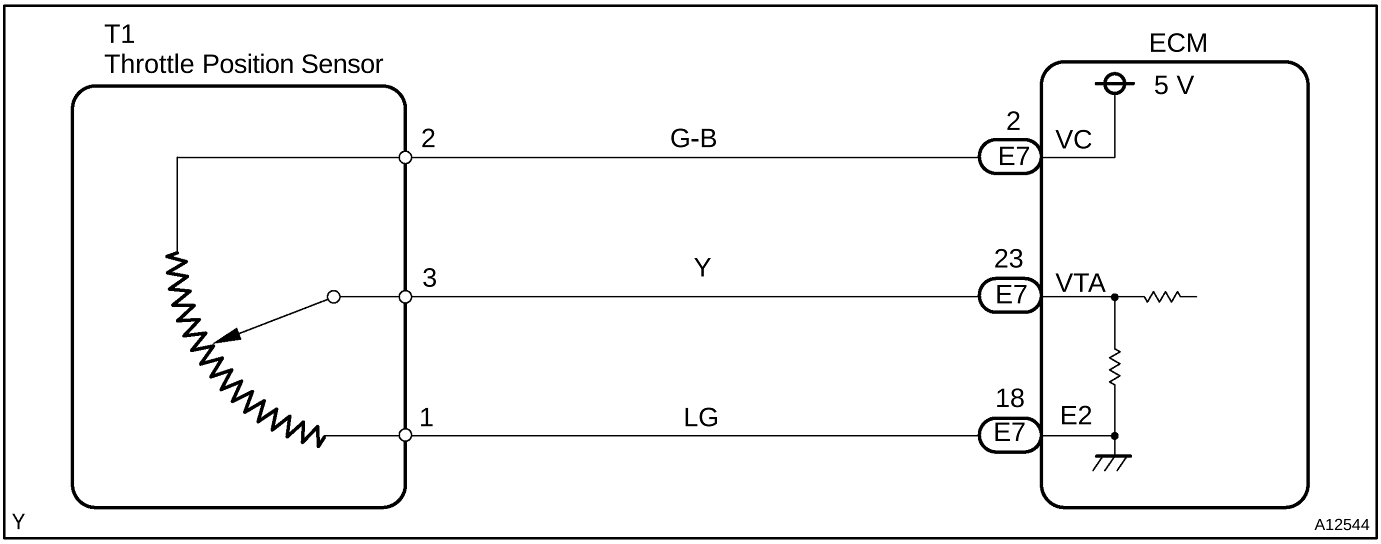
The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle. When the throttle valve is fully closed, a voltage of approximately 0.3 - 1.0 V is applied to terminal VTA of the ECM. The voltage applied to terminals VTA of the ECM increases in proportion to the opening angle of the throttle valve and becomes approximately 2.7 - 5.2 V when the throttle valve is fully opened. The ECM judges the vehicle driving conditions these signals input from terminals VTA and uses them as one of the conditions to decide the air-fuel ratio correction, power increase correction and fuel-cut control, etc.

DTC No.	DTC Detection Condition	Trouble Area
P0120	Condition (a) or (b) continues: (a) VTA < 0.1 V (b) VTA > 4.9 V	●Open or short in throttle position sensor circuit ●Throttle position sensor ●ECM

HINT:
After confirming DTC P0120, use the OBD II scan tool or TOYOTA hand-held tester to confirm the throttle valve opening percentage and closed throttle position switch condition.

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

WIRING DIAGRAM

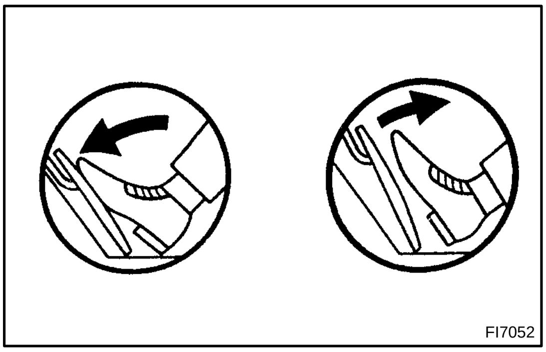


INSPECTION PROCEDURE

HINT:

- If DTCs P0110, P0115 and P0120 are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1 Connect OBD II scan tool or TOYOTA hand-held tester, and read throttle valve opening percentage.



FI7052

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.

CHECK:

Read the throttle valve opening percentage.

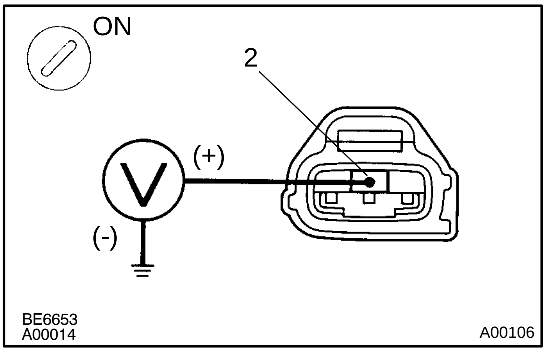
OK:

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

OK → **Check for intermittent problems (See page DI-146).**

NG ↓

2 Check voltage between terminal 2 of throttle position sensor connector and body ground.



PREPARATION:

(a) Disconnect the throttle position sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal 2 of the throttle position sensor connector and the body ground.

OK:

Voltage: 4.5 - 5.5 V

NG → **Go to step 5.**

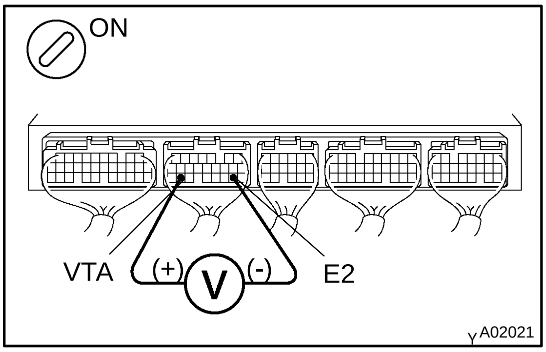
OK ↓

3	**Check throttle position sensor (See page SF-27).**

NG → **Replace throttle position sensor.**

OK

4	**Check voltage between terminals VTA and E2 of ECM connector.**



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals VTA and E2 of the ECM connector.

OK:

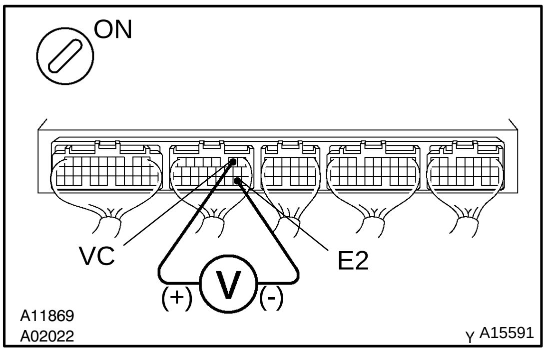
Throttle Valve	Voltage
Fully closed	0.3 - 1.0 V
Fully open	2.7 - 5.2 V

NG → **Check for open and short in harness and connector in VTA circuit between ECM and throttle position sensor (See page IN-28).**

OK

Check and replace ECM (See page IN-28).

5	**Check voltage between terminals VC and E2 of ECM of connector.**



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.

OK:
Voltage: 4.5 - 5.5 V

NG → **Check and replace ECM (See page IN-28).**

OK

Check for open in harness and connector in VC circuit between ECM and throttle position sensor (See page IN-28).

DI0RW-10

DTC	P0121	Throttle/Pedal Position Sensor/Switch ”A” Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page DI–179.

DTC No.	DTC Detection Condition	Trouble Area
P0121	While vehicle speed drops from 30 km/h (19 mph) or more to 0 km/h (0 mph), output value of throttle position sensor is out of applicable range (2 trip detection logic)	●Throttle position sensor

INSPECTION PROCEDURE

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

1	**Are there any other codes (besides DTC P0121) being output?**

YES → **Go to relevant DTC chart (See page DI–156).**

NO

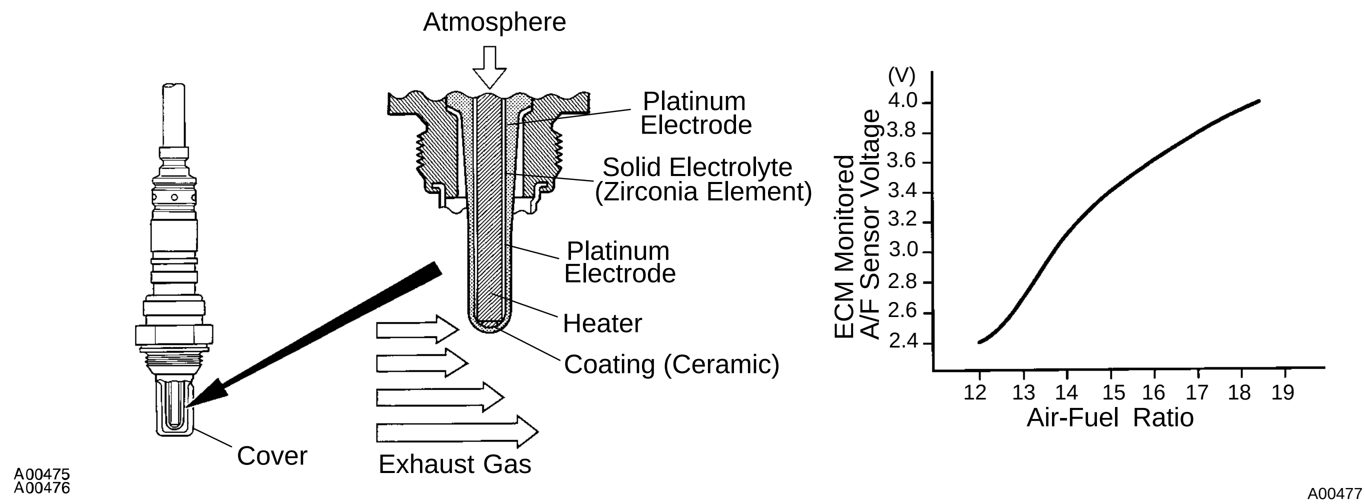
Replace throttle position sensor.

DI8YY-01

DTC	P0125	Insufficient Coolant Temp. for Closed Loop Fuel Control

CIRCUIT DESCRIPTION

To obtain a high purification rate of the CO, HC and NOx components of the exhaust gas, a three-way catalytic converter is used. For the most efficient use of the three-way catalytic converter, the air-fuel ratio must be precisely controlled so that it is always close to the stoichiometric air-fuel ratio.
The A/F sensor has a characteristic of providing an output voltage* approximately proportional to the existing air-fuel ratio. The A/F sensor output voltage* is used to provide feedback for the ECM to control the air-fuel ratio.
By the A/F sensor output, the ECM can determine the deviation amount from the stoichiometric air-fuel ratio and control the proper injection time immediately. If the A/F sensor is malfunctioning, the ECM is unable to perform the accurate air-fuel ratio control.
The A/F sensor is equipped with a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low), current flows to the heater to heat the sensor for the accurate oxygen concentration detection.
*: The voltage value changes at the inside of the ECM only.



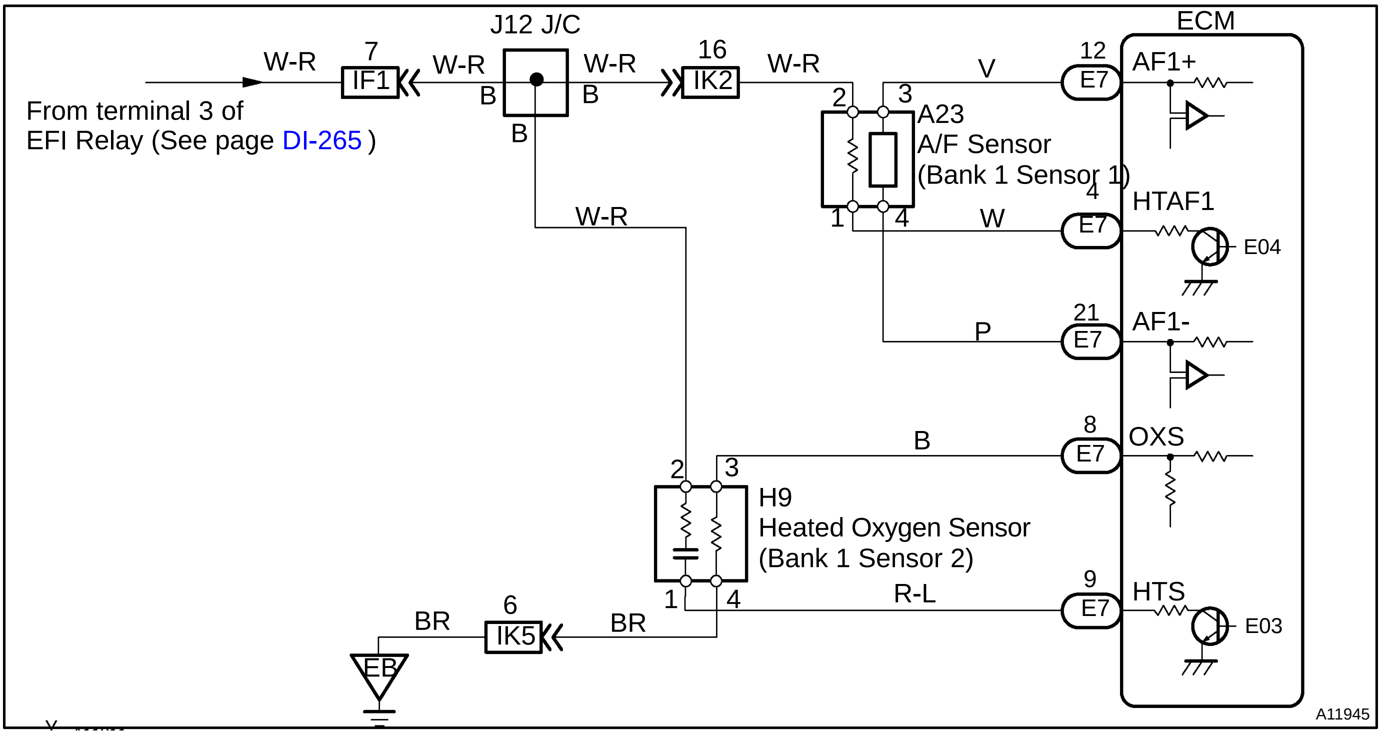
DTC No.	DTC Detection Condition	Trouble Area
P0125	After engine is warmed up, A/F sensor output* does not change when conditions (a), (b) and (c) continue for at least 1.5 min.: *: Output value changes at inside of ECM only (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 - 100 km/h (25 - 62 mph) (c) Throttle valve does not fully closed (d) After starting engine < 140 sec.	● Open or short in A/F sensor (bank 1 sensor 1) circuit ● A/F sensor (bank 1 sensor 1) ● Air induction system ● Fuel pressure ● Injector ● Gas leak on exhaust system ● ECM

HINT:

- After confirming DTC P0125, use the OBD II scan tool or TOYOTA hand−held tester to confirm output voltage of the heated oxygen sensor (bank 1 sensor 1) from the CURRENT DATA.
- The ECM controls the voltage of the AF1+ and AF1- terminals of the ECM to the fixed voltage. Therefore it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand-held tester.

- OBD II scan tool (excluding TOYOTA hand-held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the TOYOTA hand-held tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If the vehicle runs out of fuel, the air-fuel ratio is LEAN and DTC P0125 will be recorded. The MIL then comes on.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0125) being output?**

YES → **Go to relevant DTC chart (See page DI-156).**

NO

2	**Connect OBD II scan tool or TOYOTA hand-held tester, and read value for output voltage of A/F sensor (bank 1 sensor 1).**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Warm up the A/F sensor with the engine speed at 2,500 rpm for approxiwately 90 seconds.

CHECK:
Read the voltage value of the A/F sensor on the screen of the OBD II scan tool or TOYOTA hand-held tester when performing all the following conditions.
HINT:
The voltage of the AF1+ terminal of the ECM is fixed at 3.3 V and the AF1- terminal is fixed at 3.0 V. Therefore it is impossible to check the A/F sensor output voltage at the terminals (AF1+/AF1-) of the ECM.
OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.3. V (0.660 V*) ●Not remains at 3.8 V (0.76 V*) or more ●Not remains at 2.8 V (0.56 V*) or less *: When using the OBD II scan tool (excluding TOYOTA hand-held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or move, and operate throttle valve open and close	

HINT:
- Although there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*) during fuel enrichment, it is normal.
- Although there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*) during fuel cut, it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76 V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, A/F sensor circuit may be short.

*: When using the OBD II scan tool (excluding TOYOTA hand-held tester).

OK → **Go to step 9.**

NG

3	Check for open and short in harness and connector between ECM and A/F sensor (bank 1 sensor 1) (See page IN-28).

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

OK

4	Check resistance of A/F sensor heater (bank 1 sensor 1) (See page SF-51).

NG → **Replace A/F sensor.**

OK

5	Check air induction system (See page SF-1).

NG → Repair or replace.

OK

6	Check fuel pressure (See page SF-5).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).

OK

7	Check injector injection (See page SF-18).

NG → Replace injector.

OK

8	Check gas on exhaust system.

NG → Repair or replace.

OK

Replace A/F sensor (bank 1 sensor 1).

9	Perform confirmation driving pattern (See page DI-239).

Go

10	Is there DTC P0125 being output again?

YES → Check and replace ECM (See page IN-28).

NO ↓

11	Did vehicle run out of fuel in past?

NO → Check for intermittent problems (See page DI-146).

YES ↓

DTC P0125 is caused by shortage of fuel.

DI0S1-12

DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI-184 .

DTC No.	DTC Detection Condition	Trouble Area
P0136	Voltage output of heated oxygen sensor remains at 0.45 V or less to 0.60 V or more when vehicle is driven at 50 km/h (31 mph) or more after engine is warmed up (2 trip detection logic)	● Open or short in heated oxygen sensor circuit ● Heated oxygen sensor

HINT:
Sensor 2 refers to the sensor farther away from the engine body.

WIRING DIAGRAM

Refer to DTC P0125 on page DI-184 .

INSPECTION PROCEDURE

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

1	**Are there any other codes (besides DTC P0136) being output?**

YES → **Go to relevant DTC chart (See page DI-156).**

NO

2	**Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN-28).**

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

OK

3	**Check output voltage of heated oxygen sensor.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Warm up the engine to normal operating temperature.

CHECK:

Read the voltage output of the heated oxygen sensor when the engine is suddenly raced.

HINT:

Perform quick racing to 4,000 rpm 3 min. using the accelerator pedal.

OK:

Heated oxygen sensor output voltage:
Alternates from 0.45 V or less to 0.60 V or more.

OK → **Check that each connector is properly connected.**

NG ↓

Replace heated oxygen sensor.

DI8YX-01

DTC	P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI-184 .

DTC No.	DTC Detection Condition	Trouble Area
P0135 P0141	When heater operates, heater current exceeds 2.35 A (2 trip detection logic)	●Open or short in heater circuit of heated oxygen sensor ●Heated oxygen sensor heater ●ECM
	Heater current is 0.2 A or less when heater operates (2 trip detection logic)	

HINT:
Sensor 2 refers to the sensor farther away from the engine body.

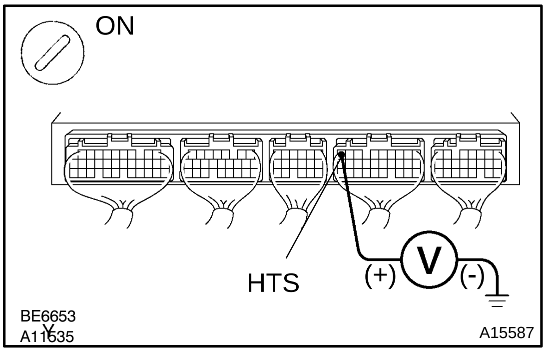
WIRING DIAGRAM

Refer to DTC P0125 on page DI-184 .

INSPECTION PROCEDURE

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

1	Check voltage between terminals HTS of ECM connector and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals HTS of the ECM connector and the body ground.
HINT:
Connect terminal of HTS to bank 1 sensor 2.
OK:
Voltage: 9 - 14 V

OK → **Check and replace ECM (See page IN-28).**

NG

2	Check resistance of heated oxygen sensor heater (See page SF-53).

NG → **Replace heated oxygen sensor.**

OK

Check and repair harness or connector between EFI main relay (Marking: EFI) and heated oxygen sensor, and heated oxygen sensor and ECM (See page IN-28).

DI8YZ-01

DTC	P0171	System too Lean (Fuel Trim)

DTC	P0172	System too Rich (Fuel Trim)

CIRCUIT DESCRIPTION

Fuel trim is related to the feedback compensation value, not to the basic injection time. Fuel trim includes short-term fuel trim and long-term fuel trim.
Short-term fuel trim is the short-term fuel compensation used to maintain the air-fuel ratio at its ideal theoretical value. The signal from the A/F sensor is approximately proportional to the existing air-fuel ratio, and ECM compares it with the ideal theoretical value, the ECM reduces fuel volume immediately if the air-fuel ratio is RICH and increases fuel volume if it is LEAN.
Long-term fuel trim compensates for the deviation from the central value of the short-term fuel trim stored by each engine tolerance, and the deviation from the central value due to the passage of time and changes of environment.
If both the short-term fuel trim and long-term fuel trim exceed a certain value, it is detected as a malfunction and the MIL lights up.

DTC No.	DTC Detection Condition	Trouble Area
P0171	When air fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on RICH side (2 trip detection logic)	● Air induction system ● Injector blockage ● Mass air flow meter ● Engine coolant temp. sensor ● Fuel pressure ● Gas leak on exhaust system ● Open or short in A/F sensor (bank 1 sensor 1) circuit ● A/F sensor (bank 1 sensor 1) ● ECM
P0172	When air fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on LEAN side (2 trip detection logic)	● Injector leak blockage ● Mass air flow meter ● Engine coolant temp. sensor ● Ignition system ● Fuel pressure ● Gas leak on exhaust system ● Open or short in A/F sensor (bank 1 sensor 1) circuit ● A/F sensor (bank 1 sensor 1) ● ECM

HINT:

- When the DTC P0171 is recorded, the actual air-fuel ratio is on the lean side. When DTC P0172 is recorded, the actual air-fuel ratio is on the rich side.
- If the vehicle runs out of fuel, the air-fuel ratio is lean and DTC P0171 is recorded. The MIL then comes on.
- If the total of the short-term fuel trim value and long-term fuel trim value is within ± 35 % (80°C (176°F) or more), the system is functioning normally.
- The A/F sensor (bank 1 sensor 1) output voltage and the short-term fuel trim value can be read using the OBD II scan tool or TOYOTA hand-held tester.
- The ECM controls the voltage of the terminals AF1+ and AF1- of the ECM to the fixed voltage. Therefore it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand-held tester.

- OBD II scan tool (excluding TOYOTA hand-held tester) displays the one fifth of the A/F sensor (bank 1 sensor 1) output voltage which is displayed on the TOYOTA hand-held tester.

WIRING DIAGRAM

Refer to DTC P0125 on page DI-184 .

INSPECTION PROCEDURE

HINT:

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

1	**Check air induction system (See page SF-1).**

NG → **Repair or replace.**

OK

2	**Check injector injection (See page SF-18).**

NG → **Replace injector.**

OK

3	**Check mass air flow meter (See page SF-25) and engine coolant temperature sensor (See page SF-45).**

NG → **Repair or replace.**

OK

4	**Check for spark and ignition (See page IG-1).**

NG → **Repair or replace.**

OK ↓

5	**Check fuel pressure (See page SF-5).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK ↓

6	**Check gas leak on exhaust system.**

NG → **Repair or replace.**

OK ↓

7	**Check output voltage A/F sensor (bank 1 sensor 1).**

PREPARATION:

(a) Connect the OBDII scan tool or TOYOTA hand-held tester to the DLC3.

(b) Warm up the A/F sensor with the engine speed of 2,500 rpm for approximately 90 seconds.

CHECK:

Read the voltage value of the A/F sensor on the screen of the OBDII scan tool or TOYOTA hand-held tester, when performing all the following conditions.

HINT:

The voltage of the AF1+ terminal of the ECM is fixed at 3.3 V and the AF- terminal is fixed at 3.0 V. Therefore it is impossible to check the A/F sensor output voltage at the terminals (AF1+/AF1-) of the ECM.

OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.30 V (0.660 V*) ●Not remains at 3.8 V (0.76 V*) or more ●Not remains at 2.8 V (0.56 V*) or less *: When using the OBDII scan tool (excluding TOYOTA hand-held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operating throttle valve open and close	

HINT:
- Although there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*) during fuel enrichment,, it is normal.
- Although there is case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*) during fuel cut, it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76 V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: When using the OBDII scan tool (excluding TOYOTA hand-held tester).

OK → **Go to step 9.**

NG ↓

8	**Check for open and short in harness and connector between ECM and A/F sensor (bank 1 sensor 1) (See page IN-28).**

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

OK ↓

Replace A/F sensor.

9	**Perform confirmation driving pattern (See page DI-239).**

Go ↓

10	**Is there DTC P0171 or P0172 being output again?**

YES → **Check and replace ECM (See page IN-28).**

NO ↓

11	**Did vehicle run out of fuel in past?**

NO

Check for intermittent problems (See page DI-146).

YES

DTC P0171 or P0172 is caused by shortage of fuel.

DI8ZW-01

DTC	P0300	Random/Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

DTC	P0305	Cylinder 5 Misfire Detected

DTC	P0306	Cylinder 6 Misfire Detected

CIRCUIT DESCRIPTION

Misfire: The ECM uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation of each cylinder.

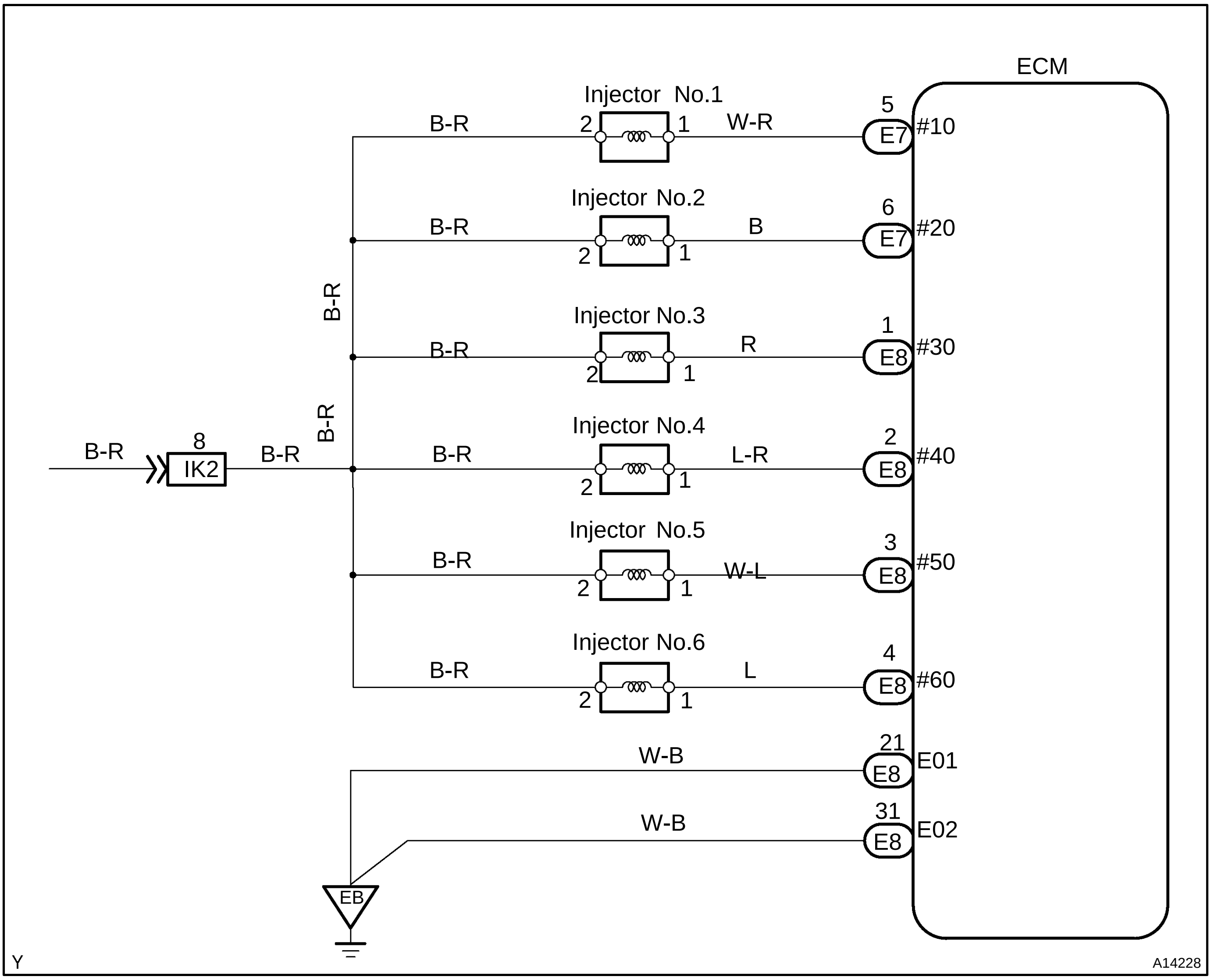
The ECM counts the number of times of indicating that misfire has occurred by using the engine speed change rate. And when the misfire rate equals to or exceeds the count of indicating that the engine condition has deteriorated, the MIL lights up.

If the misfire rate is very high and the driving conditions cause the catalyst to overheat, the MIL shows an occurence of misfire by blinking.

DTC No.	DTC Detection Condition	Trouble Area
P0300	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions	●Open or short in engine wire ●Connector connection ●Vacuum hose connection ●Ignition system ●Injector ●Fuel pressure ●Mass air flow meter ●Engine coolant temp. sensor ●Compression pressure ●Valve clearance ●Valve timing ●ECM
P0301 P0302 P0303 P0304 P0305 P0306	For any particular 200 revolutions for engine, misfiring is detected which can cause catalyst overheating (This causes MIL to blink)	
	For any particular 1,000 revolutions of engine, misfiring is detected which causes a deterioration in emission (2 trip detection logic)	

HINT:
When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no Random Misfire code is recorded, it indicates that the misfires were detected and recorded at different times.

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

(a) Connect the TOYOTA hand-held tester or OBD II scan tool.
(b) Record the DTC and freeze frame data.
(c) Use the TOYOTA hand-held tester to set to the check mode (See page DI-146).
(d) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the data list. Without TOYOTA hand-held tester, turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again.

HINT:
In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the following period of time in the data list.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more

2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(e) Check whether there is misfire or not by monitoring the DTC and freeze frame data, and then record them.
(f) Turn the ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- In case that DTCs besides misfire are memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- If the misfine does not occur when the vehicle is brought to the workshop, misfire can be confirmed by reproducing the condition of the freeze frame data. Also, after finishing the repair, confirm that there is no misfire (See the confirmation driving pattern).
- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT#2 in the freeze frame data is over the range of ±20 %, there is a possibility that the air-fuel ratio is inclining either to RICH (-20 % or less) or LEAN (+20 % or more).
- When COOLANT TEMP in the freeze frame data is less than 80°C (176°F), there is a possibility of misfire only during warmed up the engine.
- In case that the misfire cannot be reproduced, the reason may be because of driving with lack of fuel, a use of improper fuel, a stain of the ignition plug, and etc.

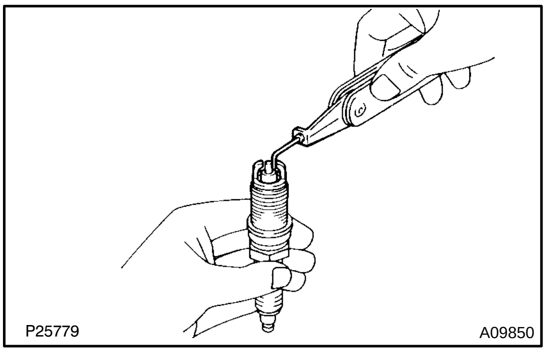
1	**Check wire harness, connector and vacuum hose in engine room.**

CHECK:
(a) Check the connection conditions of wire harness and connector.
(b) Check the disconnection, piping and break of vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See confirmation driving pattern).**

OK

2	**Check spark plug and spark of misfiring cylinder.**

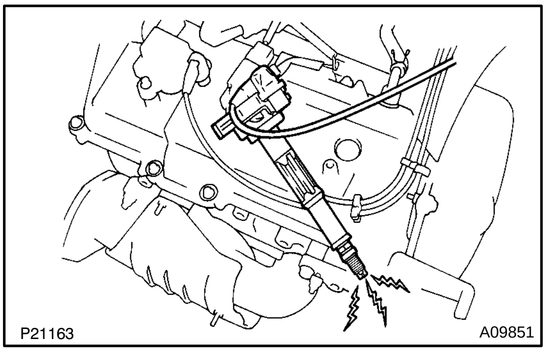


PREPARATION:
(a) Remove the ignition coil and high tension cord.
(b) Remove the spark plug.

CHECK:
(a) Check the spark plug type.
(b) Check the electrode for carbon deposits.
(c) Check the electrode gap.

OK:

(a) Twin ground electrodes type.
Recommended spark plug:
DENSO made: K16TR11
NGK made: BKR5EKB-11
(b) No large carbon deposit present.
(c) Electrode gap: 1.1 mm (0.043 in.)



PREPARATION:

(a) Install the spark plug to the ignition coil or high tension cord.
(b) Disconnect the injector connector.
(c) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 - 10 sec. at a time.

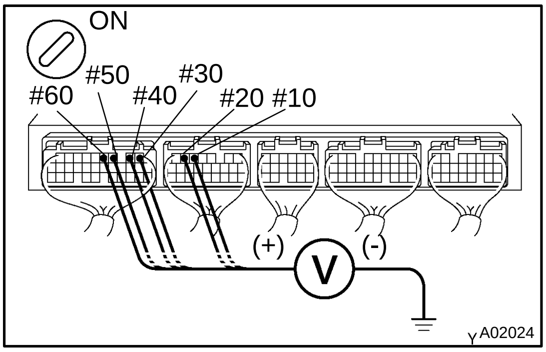
OK:

Spark is scattered on electrode gap.

NG	Replace or check ignition system (See page IG-1).

OK

3	Check voltage of ECM terminal for injector of failed cylinder.



PREPARATION:

(a) Remove the glove compartment (See page SF-54).
(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between applicable terminal of the ECM connector and the body ground.

OK:

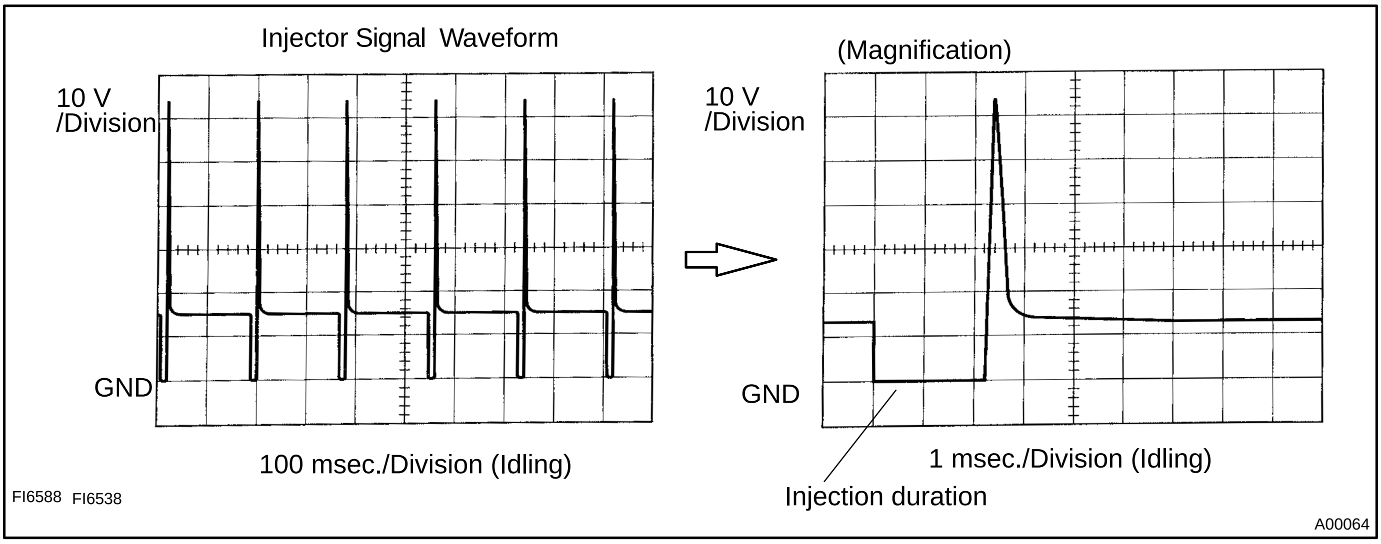
Voltage: 9 - 14 V

Reference: INSPECTION USING OSCILLOSCOPE

With the engine idling, check the waveform between terminals #10 - #60 and E01 of the ECM connector.

HINT:

The correct waveform is as shown.



OK → **Go to step 4.**

NG

4	**Check resistance of injector of misfiring cylinder (See page SF-18).**

NG → **Replace injector.**

OK

Check for open and short in harness and connector between injector and ECM (See page IN-28).

5	**Check fuel pressure (See page SF-5).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

6	Check injector injection (See page SF-18).

NG → Replace injector.

OK

7	Check mass air flow meter (See page SF-25) and engine coolant temperature sensor (See page SF-45).

NG → Repair or replace.

OK

Check compression pressure (See page EM-3), valve clearance (See page EM-4) and valve timing (See page EM-19 .

DI0S4-12

DTC	P0325	Knock Sensor 1 Circuit Malfunction (Bank 1)

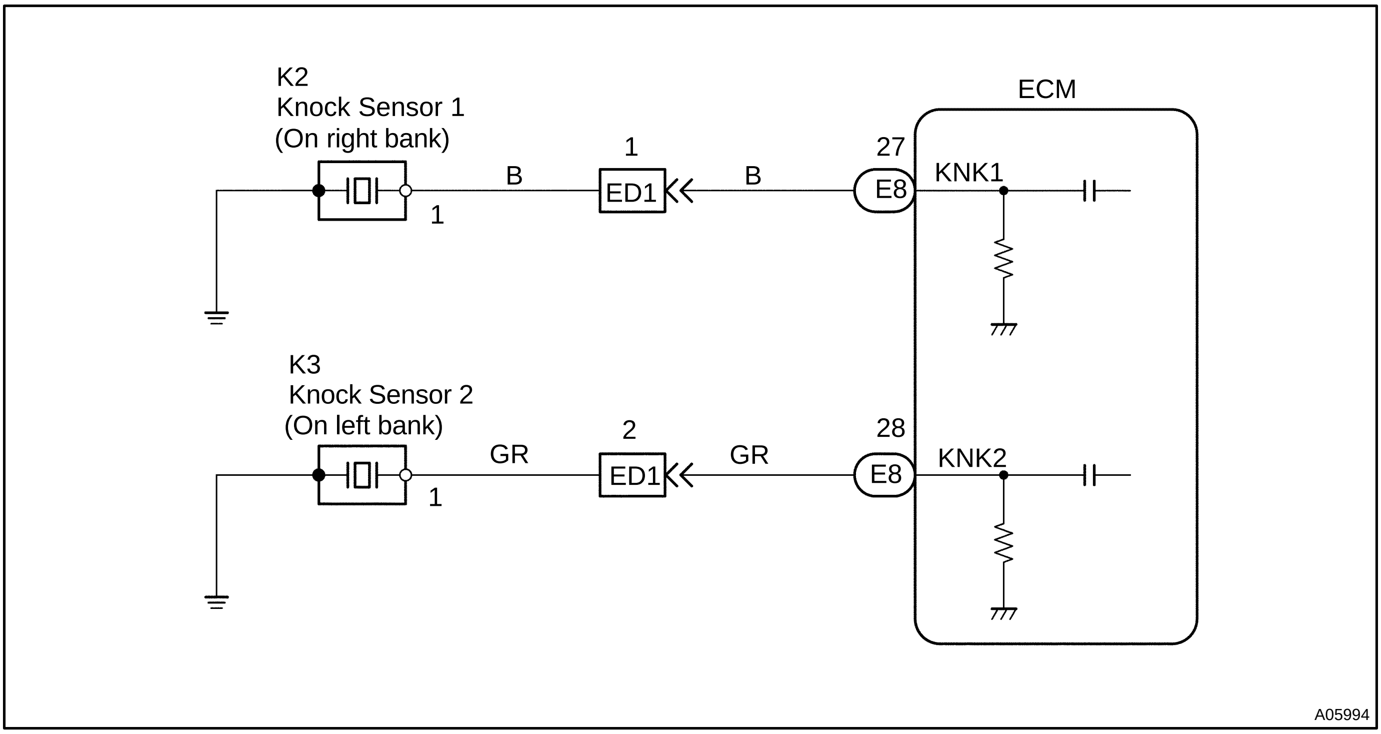
DTC	P0330	Knock Sensor 2 Circuit Malfunction (Bank 2)

CIRCUIT DESCRIPTION

Each knock sensor is fitted to the right bank and left bank of the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to the knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detection Condition	Trouble Area
P0325	No signal of knock sensor 1 to ECM with engine speed between 2,000 rpm and 5,600 rpm	●Open or short in knock sensor 1 circuit ●Knock sensor 1 (looseness) ●ECM
P0330	No signal of knock sensor 2 to ECM with engine speed between 2,000 rpm and 5,600 rpm	●Open or short in knock sensor 2 circuit ●Knock sensor 2 (looseness) ●ECM

WIRING DIAGRAM



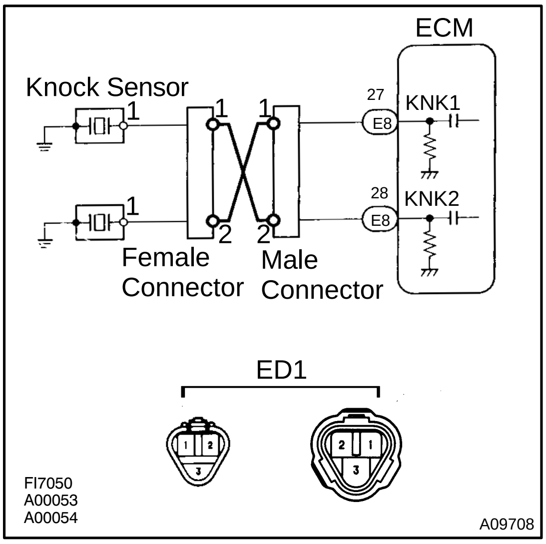
INSPECTION PROCEDURE

HINT:

- DTC P0325 is for the right bank knock sensor circuit.
- DTC P0330 is for the left bank knock sensor circuit.

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

1	**Connect OBD II scan tool or TOYOTA hand-held tester, and check knock sensor circuit.**



PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Disconnect the wire to wire connector ED1.
(c) Connect the terminals of the disconnected ED1 male connector and ED1 female as follows.

Male connector - Female connector
Terminal 1 - Terminal 2
Terminal 2 - Terminal 1

(d) Turn ignition switch ON and push the OBDII scan tool or TOYOTA hand-held tester main switch ON.
(e) After the engine is warmed up, perform quick racing to 4,000 rpm three times.

CHECK:

Check the DTC.

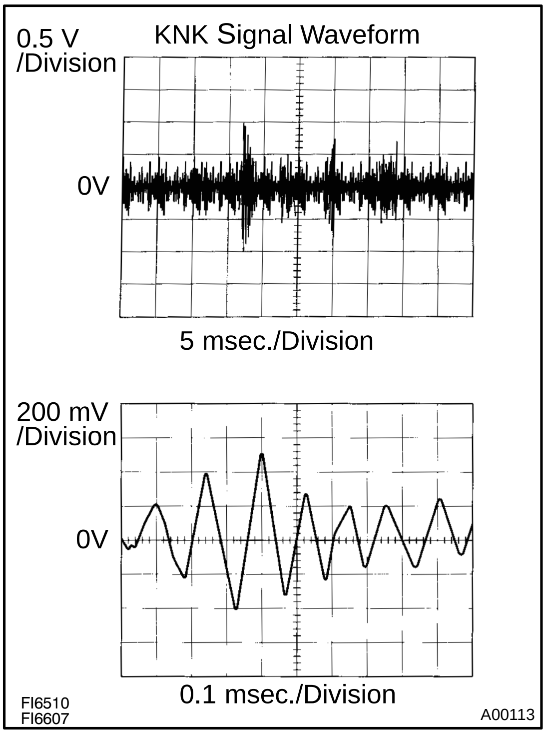
RESULT:

Type I	DTC same as when vehicle brought in P0325 → P0325 or P0330 → P0330
Type II	DTC different to when vehicle brought in P0325 → P0330 or P0330 → P0325

Reference: INSPECTION USING OSCILLOSCOPE

- With the engine racing (4,000 rpm), check the waveform between terminal KNK1, KNK2 of the ECM connector and the body ground.

HINT:
The correct waveform is as shown.



- Spread the time on the horizontal axis, and confirm that period of the wave is 0.141 msec. (Normal mode vibration the frequency of knock sensor: 7.1 kHz)

HINT:
If the normal mode vibration frequency is not 7.1 kHz, the sensor is malfunctioning.

Type II	**Go to step 3.**

Type I

2	Check for open and short in harness and connector between ED1 connector and ECM (See page IN-28).

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

OK

Check and replace ECM (See page IN-28).

3	Check for open and short in harness and connector between ED1 connector and knock sensor (See page IN-28).¿

HINT:

- If DTC P0325 has changed to P0330, check the knock sensor circuit on the right bank side.
- If DTC P0330 has changed to P0325, check the knock sensor circuit on the left bank side.

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

OK

Replace knock sensor.

DI0S5-12

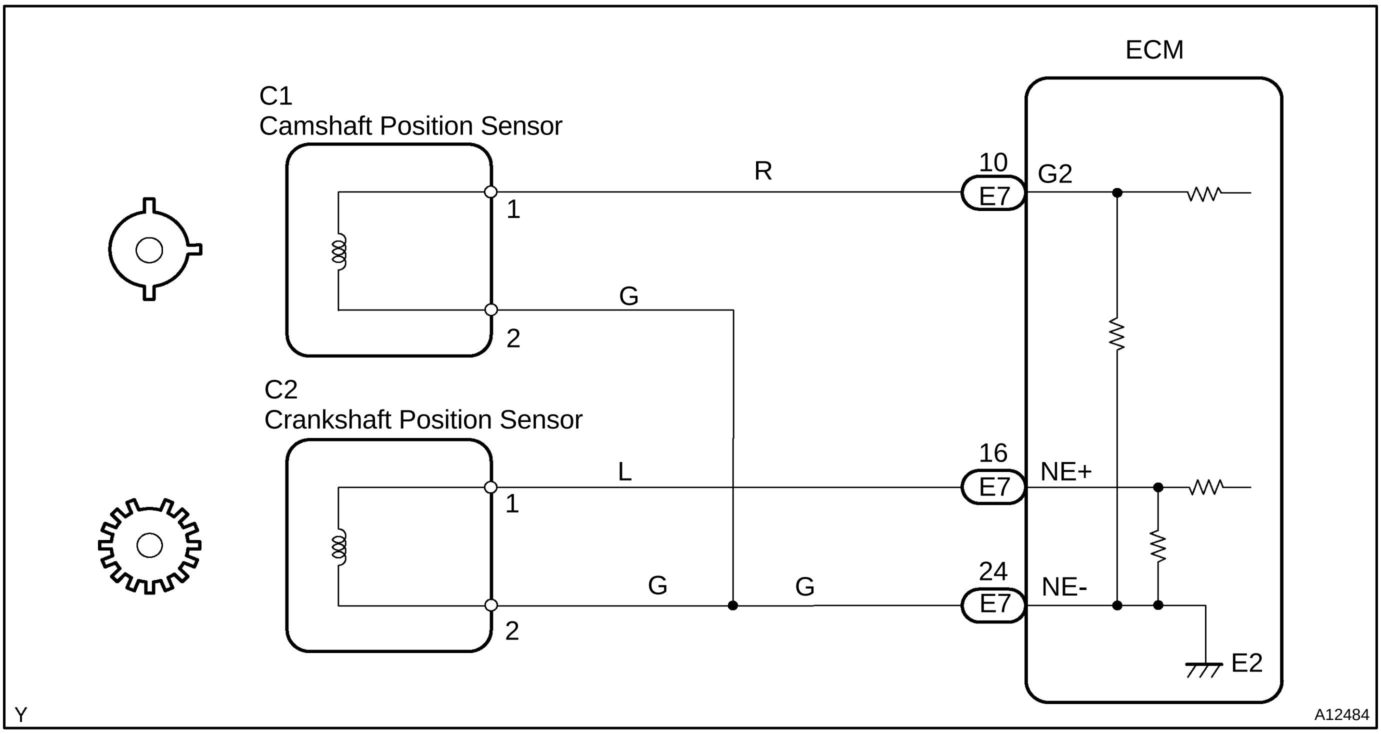
DTC	P0335	Crankshaft Position Sensor ”A” Circuit Malfunction

CIRCUIT DESCRIPTION

The crankshaft position sensor, which detects the engine speed and crankshaft angle signal (NE signal), has been installed on the oil pump body.
The NE signal plate has 34 teeth. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the standard crankshaft angle based on the G signal, and the actual crankshaft angle and the engine speed by the NE signal.

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

WIRING DIAGRAM

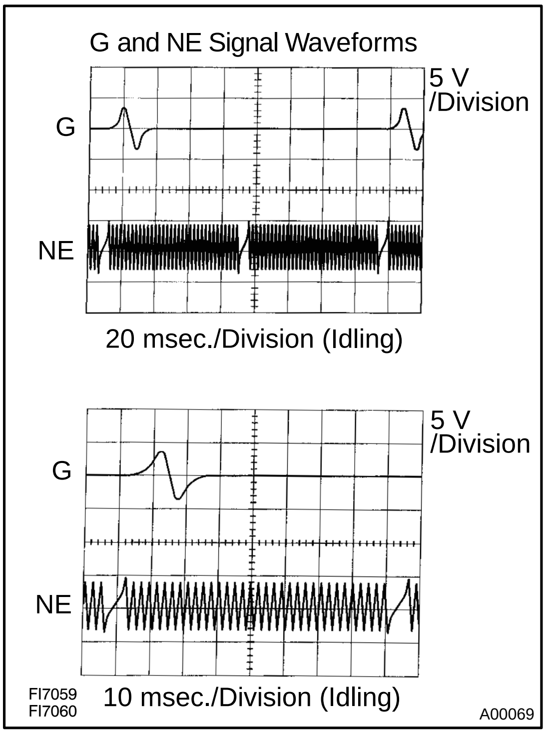


INSPECTION PROCEDURE

HINT:

- Perform a troubleshooting of DTC P0335 first. If no trouble is found, troubleshoot the following mechanical systems.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Check resistance of crankshaft position sensor (See page IG-1).**



Reference: INSPECTION USING OSCILLOSCOPE

During cranking or idling, check the waveform between terminals G2 (California Spec.) or G+ (Except California Spec.) and NE-, and NE+ and NE- of the ECM connector.

HINT:

The correct waveforms are as shown.

NG → **Replace crankshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and crankshaft position sensor (See page IN-28).**

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

OK

3	**Inspect sensor installation and teeth of crankshaft timing pulley.**

NG → **Tighten the sensor. Replace crankshaft timing pulley**

OK

Check and replace ECM (See page IN-28).

DI0S6-11

DTC	P0340	Camshaft Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Camshaft position sensor (G signal) consists of a magnet, iron core and pickup coil.
The G signal plate has 1 tooth, on its outer circumference and is mounted on the RH 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 an electromotive force in the pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft timing pulley. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the standard crankshaft angle based on the G signal and the actual crankshaft angle and the engine speed by the NE signal.

DTC No.	DTC Detection Condition	Trouble Area
P0340	No signal of camshaft position sensor to ECM during cranking (2 trip detection logic)	●Open or short in camshaft position sensor circuit ●Camshaft position sensor ●RH camshaft timing pulley ●ECM
	No signal of camshaft position sensor to ECM with engine speed 600 rpm or more	

WIRING DIAGRAM

Refer to DTC P0335 on page DI-207 .

INSPECTION PROCEDURE

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

1	Check resistance of camshaft position sensor (See page IG-1).

Reference: INSPECTION USING OSCILLOSCOPE
Refer to DTC P0335 on page DI-207 .

NG → **Replace camshaft position sensor.**

OK

2	Check for open and short in harness and connector between ECM and camshaft position sensor (See page IN-28).

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

OK

3	Inspect sensor installation and signal plate tooth of RH camshaft timing pulley.

NG → **Tighten sensor. Replace RH camshaft timing pulley.**

OK

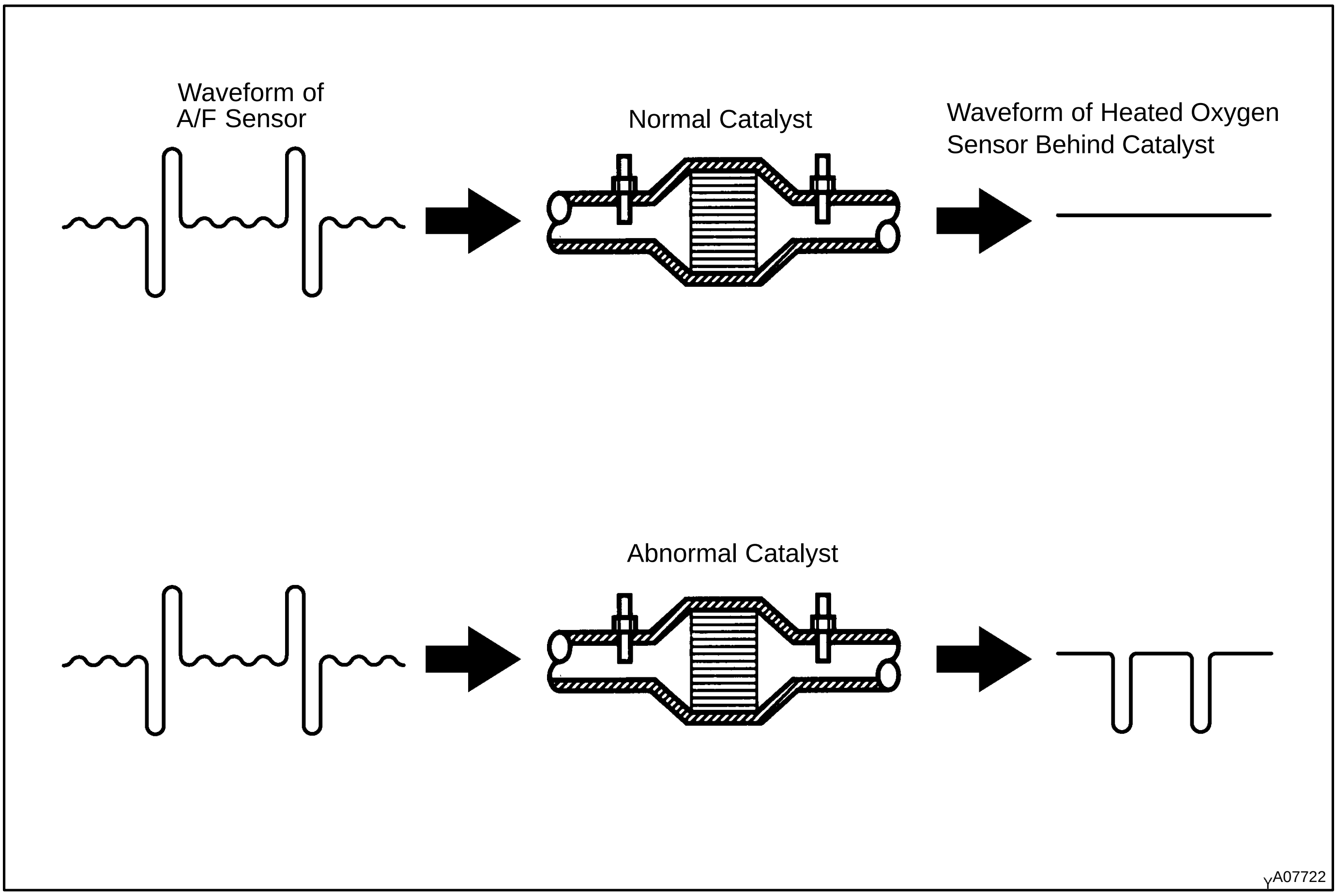
Check and replace ECM (See page IN-28).

DI5C9-07

DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

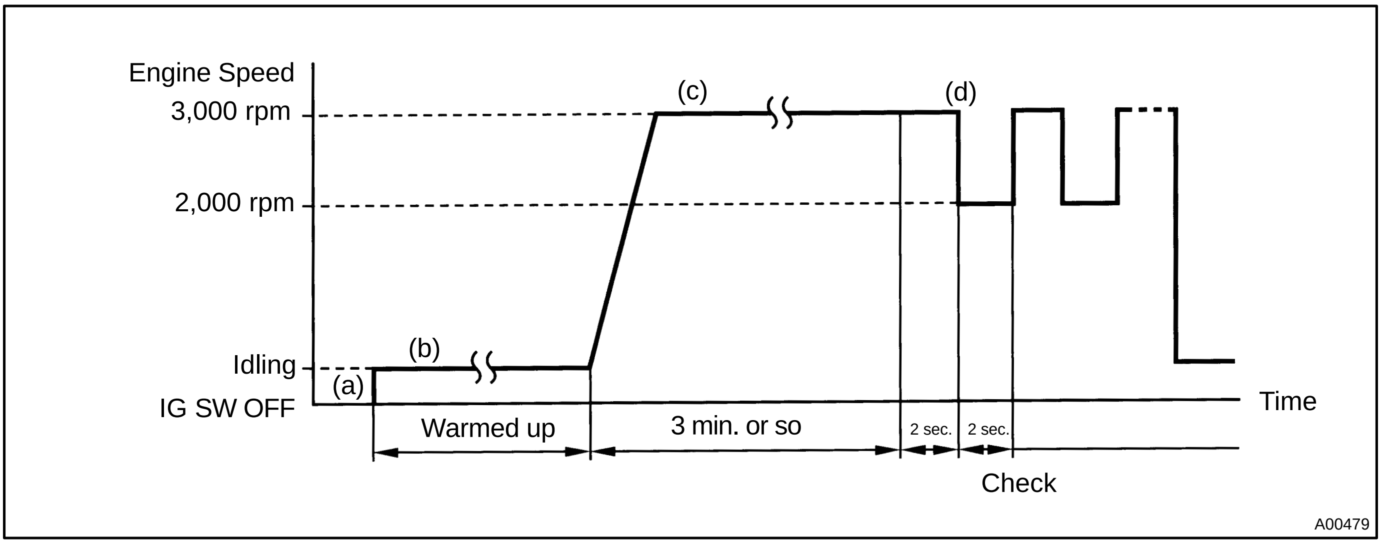
CIRCUIT DESCRIPTION

The ECM observes the waveform of the heated oxygen sensor located behind the catalyst to determine whether the catalyst is performance has deteriorated. If the catalyst functions normally, the waveform of the heated oxygen sensor located behind the catalyst switches back and forth between rich and lean much more slowly. When the waveform of the heated oxygen sensor located behind the catalyst alternates flatteringly between rich and lean, it indicates the catalyst performance has deteriorated.



DTC No.	DTC Detection Condition	Trouble Area
P0420	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveform of heated oxygen sensor (bank 1 sensor 2) alternates flatteringly between rich and lean (2 trip detection logic)	● Gas leak on exhaust system ● A/F sensor (bank 1 sensor 1) ● Heated oxygen sensor (bank 1 sensor 2) ● Three-way catalytic converter

CONFIRMATION ENGINE RACING PATTERN



(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Start the engine and warm it up with all the accessories switched OFF until the water temperature is stable.
(c) Race the engine at 2,500 - 3,000 rpm for about 3 minutes.
(d) When racing the engine at 3,000 rpm for 2 seconds and 2,000 rpm for 2 seconds alternately, check the waveform of the heated oxygen sensor (bank 1 sensor 2).

INSPECTION PROCEDURE

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

1	**Are there any other codes (besides DTC P0420) being output?**

YES	**Go to relevant DTC chart (See page DI-156).**

NO

2	**Check gas leak on exhaust system.**

NG	**Repair or replace.**

OK

3	**Check A/F sensor (bank 1 sensor 1) (See page SF-51).**

NG → **Repair or replace.**

OK

4	**Check heated oxygen sensor (bank 1 sensor 2) (See page SF-53).**

NG → **Repair or replace.**

OK

Replace three-way catalytic converter.

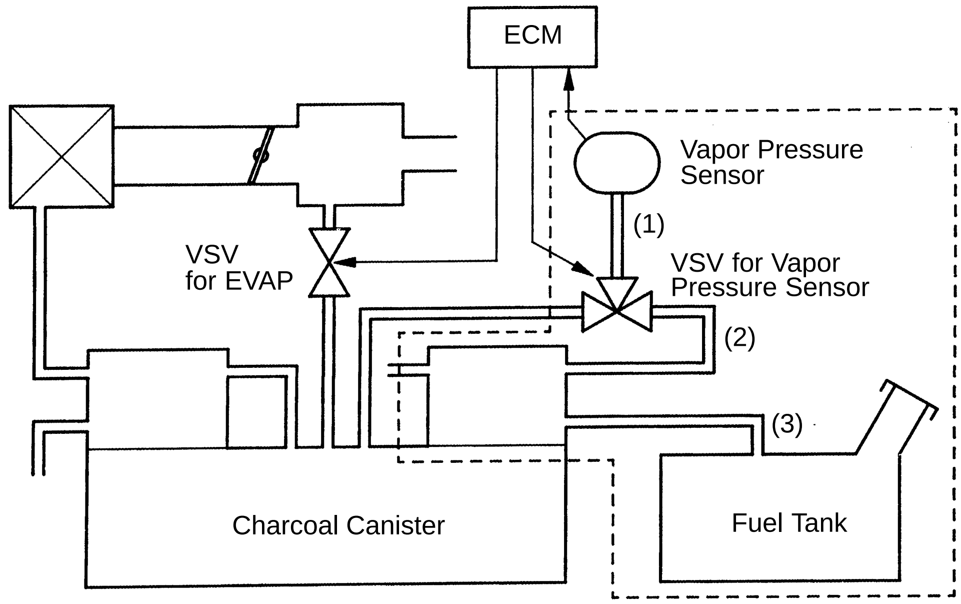
DI0S8-11

DTC	P0440	Evaporative Emission Control System Malfunction

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system by the vapor pressure sensor signal.
DTC P0440 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when the vapor pressure sensor malfunctions.

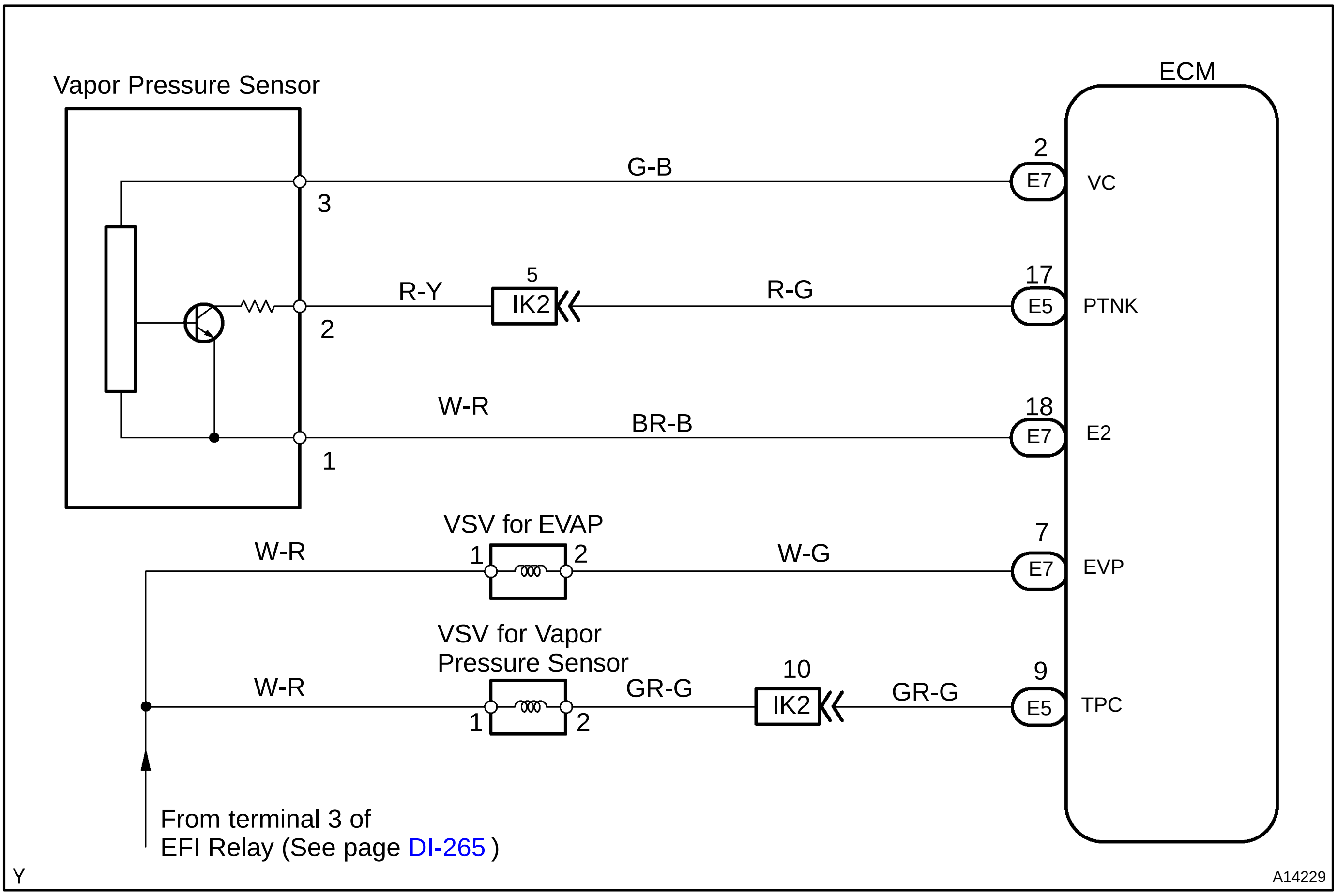
Fig. 1



S00043

DTC No.	DTC Detection Condition	Trouble Area
P0440	Pressure of fuel tank is the same as one of atomospheric after vehicle is driven for 20 min. (2 trip detection logic)	● Hose or tube cracked, holed, damaged or loose seal ((3) in Fig. 1) ● Fuel tank cap incorrectly installed ● Fuel tank cap cracked or damaged ● Vacuum hose cracked, holed, blocked, damaged or disconnected ((1) or (2) in Fig. 1) ● Fuel tank cracked, holed or damaged ● Charcoal canister cracked, holed or damaged ● Open or short in vapor pressure sensor circuit ● Vapor pressure sensor ● ECM

WIRING DIAGRAM

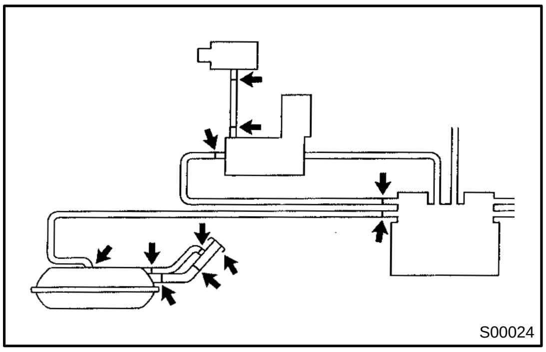


INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first troubleshoot DTC P0441, P0446, P0450 or P0451. If no more malfunction is detected, troubleshoot DTC P0440 next.
- Ask the customer whether, after the MIL came on, the customer found the fuel tank cap was loose and tightened it. Also ask the customer whether the fuel tank cap was loose when refuelling. If the fuel tank cap was loose, it was the cause of the DTC. If the fuel tank cap was not loose or if the customer was not sure if it was loose, troubleshoot according to the following procedure.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Check whether hose close to fuel tank have been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**


S00024

CHECK:
Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace.**

OK

2	**Check that fuel tank cap is TOYOTA genuine parts.**

NG → **Replace to TOYOTA genuine parts.**

OK

3	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

4	**Check fuel tank cap (See page EC-5).**

NG → **Replace fuel tank cap.**

OK

5	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

6	**Check vacuum hoses between vapor pressure sensor and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and charcoal canister.**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:
(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-5), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace.**

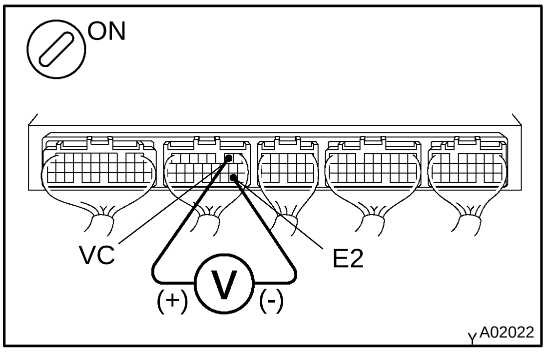
OK

8	**Check charcoal canister for cracks, hole and damage (See page EC-5).**

NG → **Replace charcoal canister.**

OK

9	Check voltage between terminals VC and E2 of ECM connector.

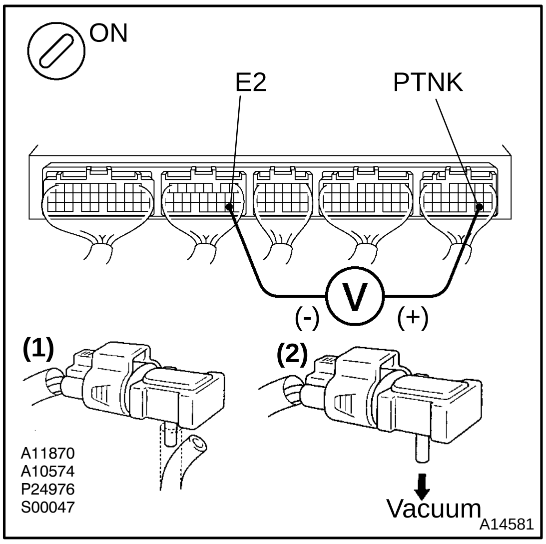


CHECK:
(a) Remove the glove compartment (See page SF-54).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.
OK:
Voltage: 4.5 - 5.5 V

NG	Check and replace ECM (See page IN-28).

OK

10	Check voltage between terminals PTNK and E2 of ECM connector.



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connector.
(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.
NOTICE:
The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).
OK:
(1) Voltage: 3.0 - 3.6 V
(2) Voltage: 0.5 V or less

OK	Go to step 12.

NG

11	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-28).

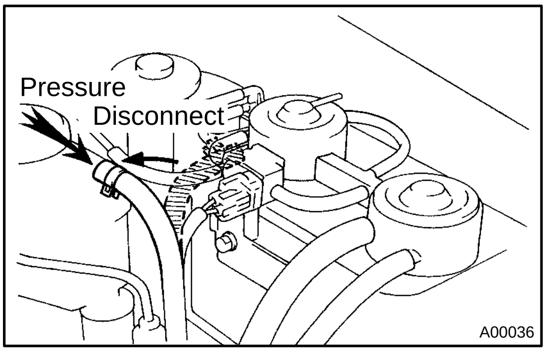
NG

Repair or replace harness or connector.

OK

Replace vapor pressure sensor.

12	**Check fuel tank for cracks and damage.**



PREPARATION:

(a) Disconnect the vacuum hose from the charcoal canister.

(b) Correctly install the fuel tank cap.

(c) Apply a pressure of 5 kPa (50 gf/cm^2, 0.7 psi) to the fuel tank.

CHECK:

Check whether the pressure is maintained after 1 minute.

OK:

Pressure applied to the fuel tank is maintained.

NG

Replace fuel tank.

OK

It is possible that vehicle user did not properly close fuel tank cap. Please explain to customer how to properly install fuel tank cap.

DI17F-04

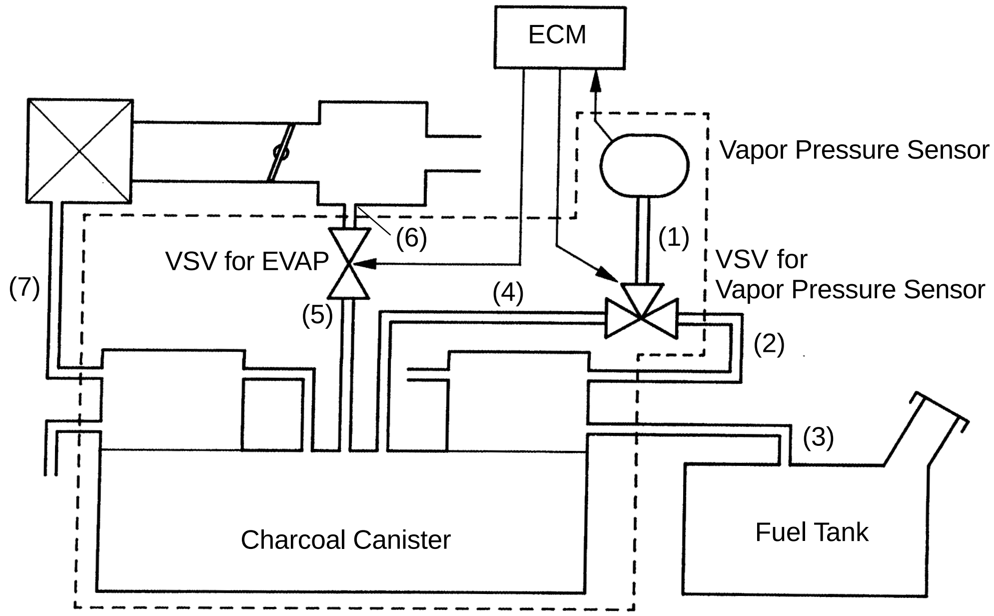
DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC	P0446	Evaporative Emission Control System Vent Control Malfunction

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system by the vapor pressure sensor signal.
DTCs P0441 and P0446 are recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when there is a malfunction anywhere in the VSV for EVAP, the VSV for vapor pressure sensor, or in the vapor pressure sensor itself.

Fig. 1



S00044

DTC No.	DTC Detection Condition	Trouble Area
P0441	The pressure in charcoal canister does not drop during purge control (2 trip detection logic)	●Vacuum hose cracked, holed blocked, damaged or disconnected ((1), (4), (5), (6) and (7) in Fig. 1) ●Open or short in vapor pressure sensor circuit ●Vapor pressure sensor ●Open or short in VSV circuit for EVAP ●VSV for EVAP ●Open or short in VSV circuit for vapor pressure sensor ●VSV for vapor pressure sensor ●Charcoal canister cracked, holed or damaged ●ECM
	During purge cut-off, the pressure in charcoal canister is very low compared with atmospheric pressure (2 trip detection logic)	
P0446	When VSV for vapor pressure sensor is OFF, ECM judges that there is no continuity between vapor pressure sensor and charcoal canister (2 trip detection logic)	
	When VSV for vapor pressure sensor is OFF, ECM judges that there is no continuity between vapor pressure sensor and fuel tank (2 trip detection logic)	
	After the purge cut off operates, pressure in charcoal canister is maintained at atmospheric pressure (2 trip detection logic)	

WIRING DIAGRAM

Refer to DTC P0440 on page DI-214 .

INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first troubleshoot DTC P0441, P0446, P0450 or P0451. If no more malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

TOYOTA hand-held tester:

1	Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.

NG → **Repair or connect VSV or sensor connector.**

OK

2	Check vacuum hoses ((1), (4), (5), (6) and (7) in Fig. 1 in circuit description).

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

3	**Check voltage between terminals VC and E2 of ECM connector (See page DI-214 , step 9).**

NG → **Check and replace ECM (See page IN-28).**

OK

4	**Check voltage between terminals PTNK and E2 of ECM connector (See page DI-214 , step 10).**

OK → **Go to step 6.**

NG

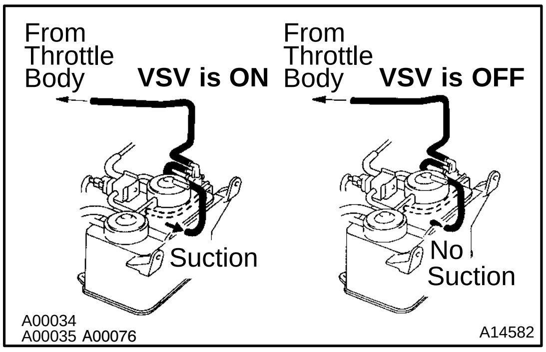
5	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-28).**

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

OK

Replace vapor pressure sensor.

6	**Check purge flow.**



PREPARATION:

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

(b) Select the ACTIVE TEST mode on the TOYOTA hand-held tester.

(c) Disconnect the vacuum hose of the VSV for the EVAP from the charcoal canister.

(d) Start the engine.

CHECK:

When the VSV for EVAP is operated by the TOYOTA hand-held tester, check whether the disconnected hose applies suction to your finger.

OK:

VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK → **Go to step 10.**

NG

7	Check vacuum hoses between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

8	Check operation of VSV for EVAP (See page SF-42).

OK → **Go to step 9.**

NG

Replace VSV and charcoal canister, and then clean the vacuum hoses between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister.

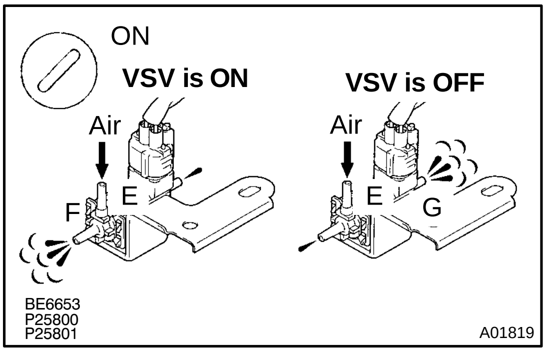
9	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP, and VSV for EVAP and ECM (See page IN-28).

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

OK

Check and replace ECM (See page IN-28).

10	Check VSV for vapor pressure sensor.



PREPARATION:

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

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand-held tester main switch ON.

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

CHECK:

Check the VSV operation when it is operated by the TOYOTA hand-held tester.

OK:

VSV is ON:
Air from port E is flows out through port F.
VSV is OFF:
Air from port E is flows out through port G.

OK → Go to step 13.

NG

11	Check operation of VSV for vapor pressure sensor (See page SF-43).

OK → Go to step 12.

NG

Replace VSV and charcoal canister, and then clean vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor.

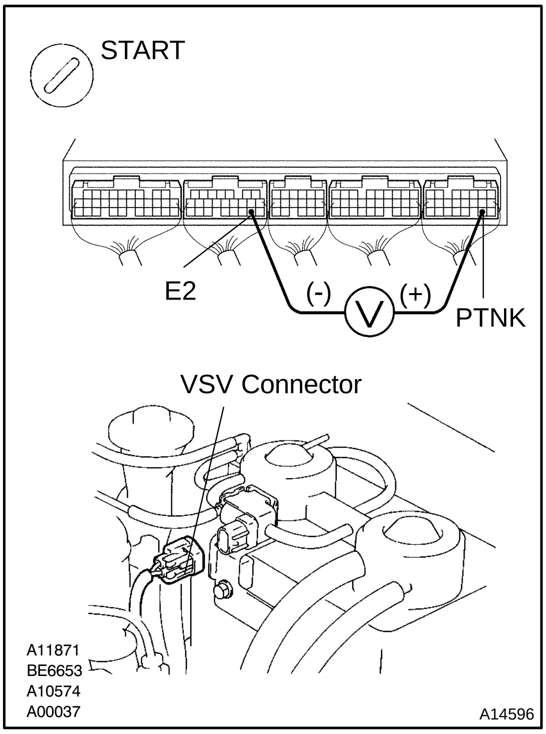
12	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor, and VSV for vapor presuure sensor and ECM (See page IN-28).

NG → Repair or replace harness or connector.

OK

Check and replace ECM (See page IN-28).

13	When VSV connector for vapor pressure sensor is disconnected and VSV for EVAP is ON, measure voltage between terminals PTNK and E2 of ECM connector.



PREPARATION:

(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Disconnect the VSV connector for the vapor pressure sensor.
(c) Select the ACTIVE TEST mode on the TOYOTA hand-held tester.
(d) Start the engine.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connector using the TOYOTA hand-held tester when the VSV for the EVAP is ON.

OK:

Voltage: 2.0 V or less

OK	Go to step 15.

NG

14	Check vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and vapor pressure sensor and VSV for vapor pressure sensor.

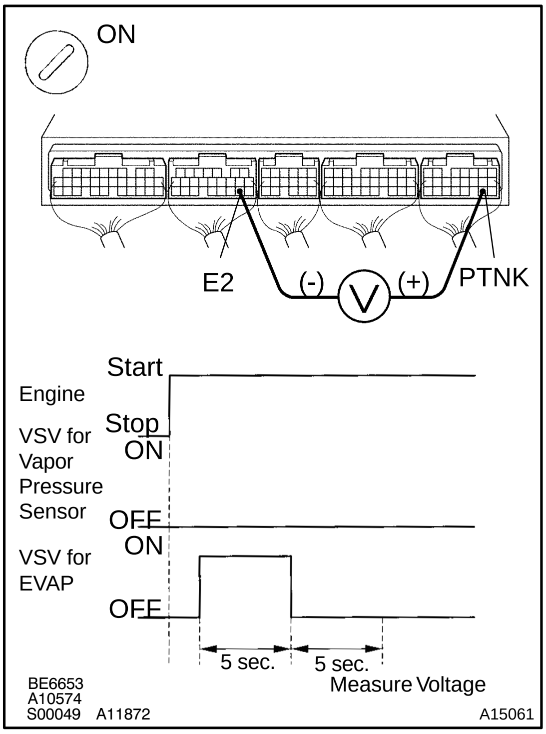
CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG	Repair or replace.

OK

15	**Check charcoal canister.**



PREPARATION:

(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Remove the fuel tank cap.
(c) Disconnect the VSV connector for the vapor pressure sensor.
(d) Select the ACTIVE TEST mode on the TOYOTA hand-held tester.
(e) Start the engine.
(f) The VSV for the EVAP is ON by the TOYOTA hand-held tester and remains on for 5 sec.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connector 5 seconds after switching the VSV for the EVAP from ON to OFF.

OK:

Voltage: 2.5 V or less

NG → **Replace charcoal canister.**

OK

16	**Remove charcoal canister and check it (See page EC-5).**

NG → **Replace charcoal canister.**

OK

Check and replace ECM (See page IN-28).

OBD II scan tool (excluding TOYOTA hand-held tester):

1	**Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect the VSV or sensor connector.**

OK

2	**Check vacuum hoses ((1), (4), (5), (6) and (7) in Fig. 1 in circuit description).**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK ↓

3	**Check voltage between terminals VC and E2 of ECM connector (See page DI-214 , step 9).**

NG → **Check and replace ECM (See page IN-28).**

OK ↓

4	**Check voltage between terminals PTNK and E2 of ECM connector (See page DI-214 , step 10).**

OK → **Go to step 6.**

NG ↓

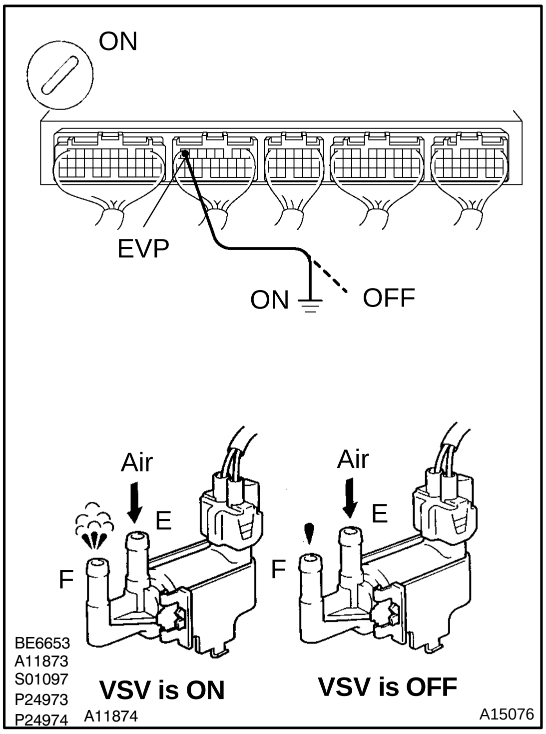
5	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-28).**

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

OK ↓

Replace vapor pressure sensor.

6	**Check VSV for EVAP.**



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Turn the ignition switch ON.
CHECK:
Check the VSV function.
(1) Connect terminal EVP of the ECM connector and the body ground (ON).
(2) Disconnect terminal EVP of the ECM connector and the body ground (OFF).
OK:
(1) VSV is ON:
Air from port E is flowing out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 9.**

NG

7	**Check operation of VSV for EVAP (See page SF-42).**

OK → **Go to step 8.**

NG

Replace VSV and charcoal canister, and then clean the vacuum hoses between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister.

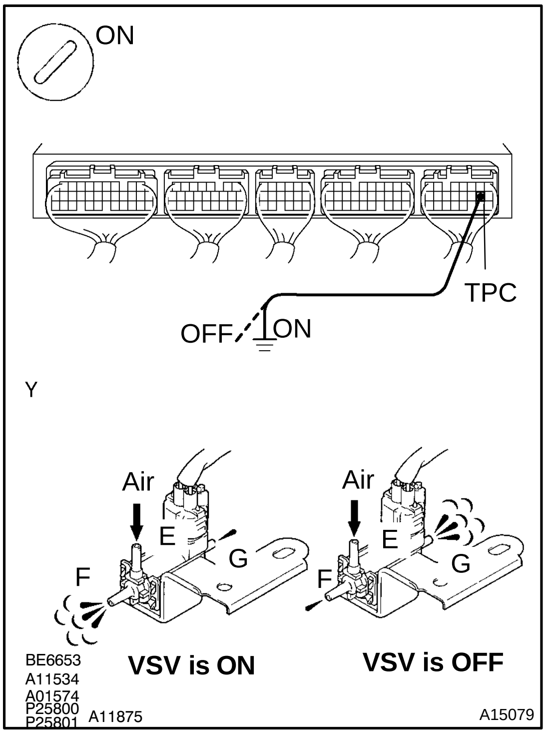
8	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP, and VSV for EVAP and ECM (See page IN-28).**

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

OK

Check and replace ECM (See page IN-28).

9	**Check VSV for vapor pressure sensor.**



PREPARATION:

(a) Remove the glove compartment (See page SF-54).
(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect terminal TPC of the ECM connector and the body ground (ON).
(2) Disconnect terminal TPC of the ECM connector and the body ground (OFF).

OK:

(1) VSV is ON:
Air from port E is flows out through port F.
(2) VSV is OFF:
Air from port E is flows out through port G.

OK → **Check and replace charcoal canister (See page EC-5).**

NG ↓

10	**Check operation of VSV for vapor pressure sensor (See page SF-43).**

OK → **Go to step 11.**

NG ↓

Replace VSV and charcoal canister, and then clean vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor.

11	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor, VSV for vapor pressure sensor and ECM (See page IN-28).**

NG

Repair or replace harness or connector.

OK

Check and replace ECM (See page IN-28).

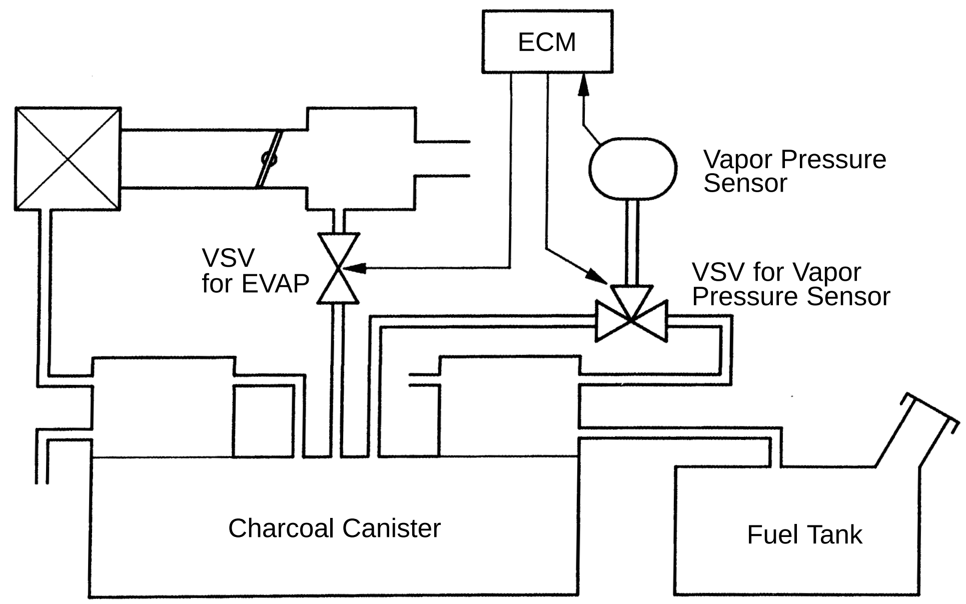
DI0SA-11

DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range/Performance

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system by the vapor pressure sensor signal.
DTC P0450 or P0451 is recorded by the ECM when the vapor pressure sensor malfunctions.



S00042

DTC No.	DTC Detection Condition	Trouble Area
P0450	10 seconds or more after engine starting condition (a) or (b) continues for 7 seconds or more: (2 trip detection logic) (a) Vapor pressure sensor value < -3.5 kPa (-26 mmHg, -1.0 in.Hg) (b) Vapor pressure sensor value < 1.5 kPa (11 mmHg, 0.4 in.Hg)	●Open or short in vapor pressure sensor circuit ●Vapor pressure sensor ●ECM
P0451	Vapor pressure sensor output extremely changes under conditions of (a), (b) and (c): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0mph) (b) Engine speed: Idling (c) VSV for vapor pressure sensor is ON	

WIRING DIAGRAM

Refer to DTC P0440 on page DI-214 .

INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440, first troubleshoot DTC P0441, P0446 P0450 or P0451. If no more malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Check voltage between terminals VC and E2 of ECM connector (See page DI-214 , step 9).**

NG → **Check and replace ECM (See page IN-28).**

OK

2	**Check voltage between terminals PTNK and E2 of ECM connector (See page DI-214 , step 10).**

OK → **Check and replace ECM (See page IN-28).**

NG

3	**Check for open and short in harness and connector between the vapor pressure sensor and ECM (See page IN-28).**

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

OK

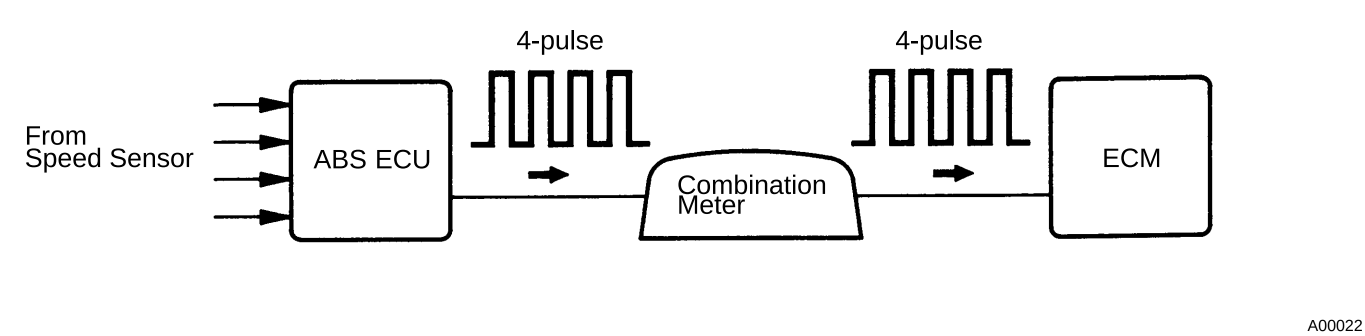
Replace vapor pressure sensor.

DI0SB-10

DTC	P0500	Vehicle Speed Sensor Malfunction

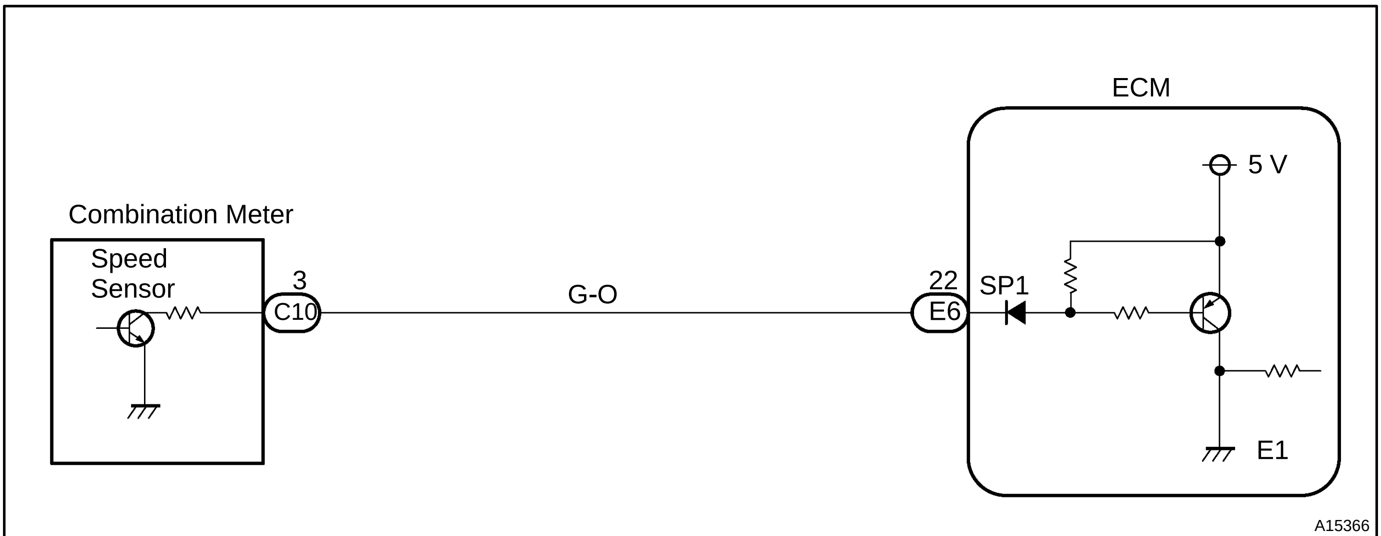
CIRCUIT DESCRIPTION

The speed sensor for ABS detects the wheel speed and sends the appropriate signals to the ABS ECU. The 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 the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detection Condition	Trouble Area
P0500	No speed sensor signal to ECM under following conditions: (2 trip detection logic) For A/T: (a) Park/neutral position switch is OFF (b) Vehicle is being driven For M/T: (a) Engine speed is between 1,800 rpm and 3,500 rpm	●Open or short in speed signal circuit ●Combination meter ●ECM ●Open or short in speed sensor circuit for ABS ●ABS ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

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

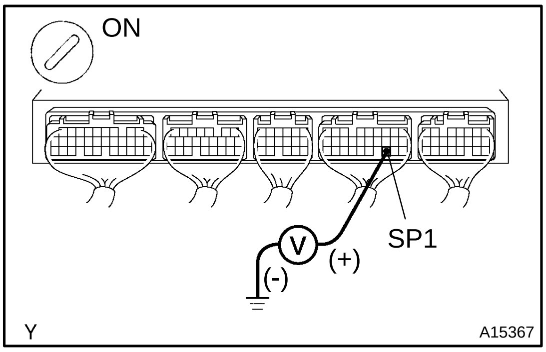
1	**Check operation of speedometer.**

CHECK:
Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed operates normally if the speedometer display is normal.

NG → **Check speedometer circuit (See page BE-39).**

OK

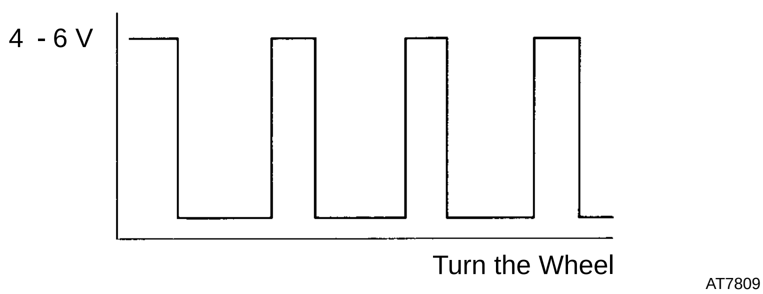
2	**Check voltage between terminal SP1 of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Disconnect the cruise control ECU connector.
(c) Shift the shift lever to the neutral.
(d) Jack up the rear wheel on one side.
(e) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminal SP1 of the ECM connector and the body ground when the wheel is turned slowly.

OK:
Voltage is generated intermittently.



OK → **Check and replace ECM (See page IN-28).**

NG

3	**Check for open or short in harness and connector between combination meter and ECM (See page IN-28).**

OK → **Check and replace ECM (See page IN-28).**

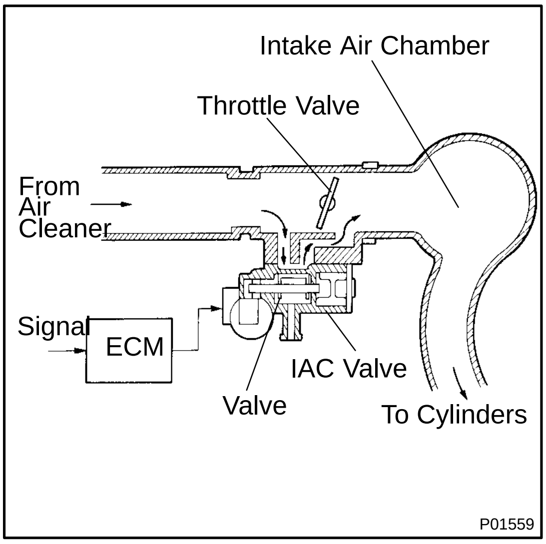
NG

Repair or replace harness or connector.

DI0SC-11

DTC	P0505	Idle Control System Malfunction

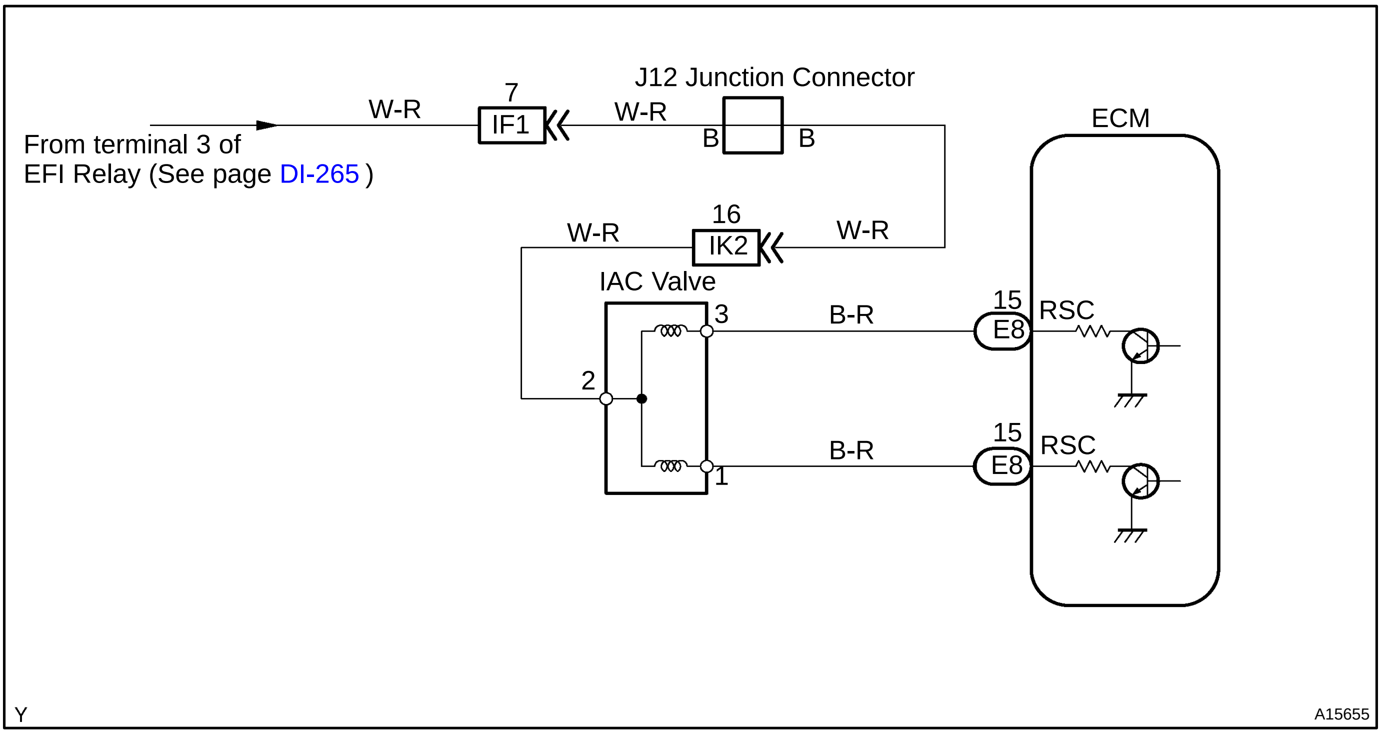
CIRCUIT DESCRIPTION



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

DTC No.	DTC Detection Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (2 trip detection logic)	●Open or short in IAC valve circuit ●IAC valve is stuck or closed ●Open or short in A/C signal circuit ●Air induction system ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

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

1	**Check engine idle speed.**

PREPARATION:
(a) Warm up the engine to normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Shift the transmission into the N or neutral position.
(e) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3 on the vehicle.
(f) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843-18020

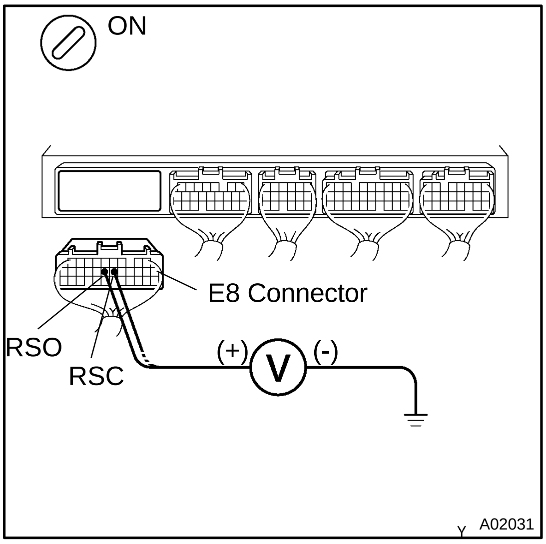
CHECK:
Check the difference of engine speed between the ones, less than 5 sec. and more than 5 sec. after connecting terminals TE1 and E1 of the DLC1.

OK:
Difference of engine speed: More than 100 rpm

NG	**Go to step 6.**

OK

2	**Check voltage terminals RSO, RSC of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Disconnect the E8 connector from the ECM.
(c) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals RSO, RSC of the ECM connector and the body ground.

OK:
Voltage: 9 - 14 V

OK	**Go to step 4.**

NG

3	Check IAC valve (See page SF-33).

NG → Replace IAC valve.

OK

Check for open and short in harness and connector between R/B No.2 and IAC valve, and IAC valve and ECM (See page IN-28).

4	Check operation of IAC valve (See page SF-37).

NG → Repair or replace IAC valve.

OK

5	Check operation of IAC valve and passage to bypass throttle valve.

NG → Repair or replace IAC valve.

OK

Check and replace ECM (See page IN-28).

6	Check A/C signal circuit (See page AC-14).

NG → Repair or replace.

OK

Check air induction system (See page SF-1).

DI5CA-08

DTC	P1130	A/F Sensor Circuit Range/Performance Malfunction (Bank 1 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI-184 .

DTC No.	DTC Detection Condition	Trouble Area
P1130	Output voltage* of A/F sensor remains at 3.8 V or more, or 2.8 V or less, during engine running after engine is warmed up (2 trip detection logic) *: Output value changes at inside of ECM only	●Open or short in A/F sensor circuit ●A/F sensor ●Air induction system ●Fuel pressure ●Injector ●ECM
	Output voltage* of A/F sensor does not change from 3.30 V, during engine running after engine is warmed up (2 trip detection logic) *: Output value changes at inside of ECM only	
	Open or short in A/F sensor circuit (2 trip detection logic)	

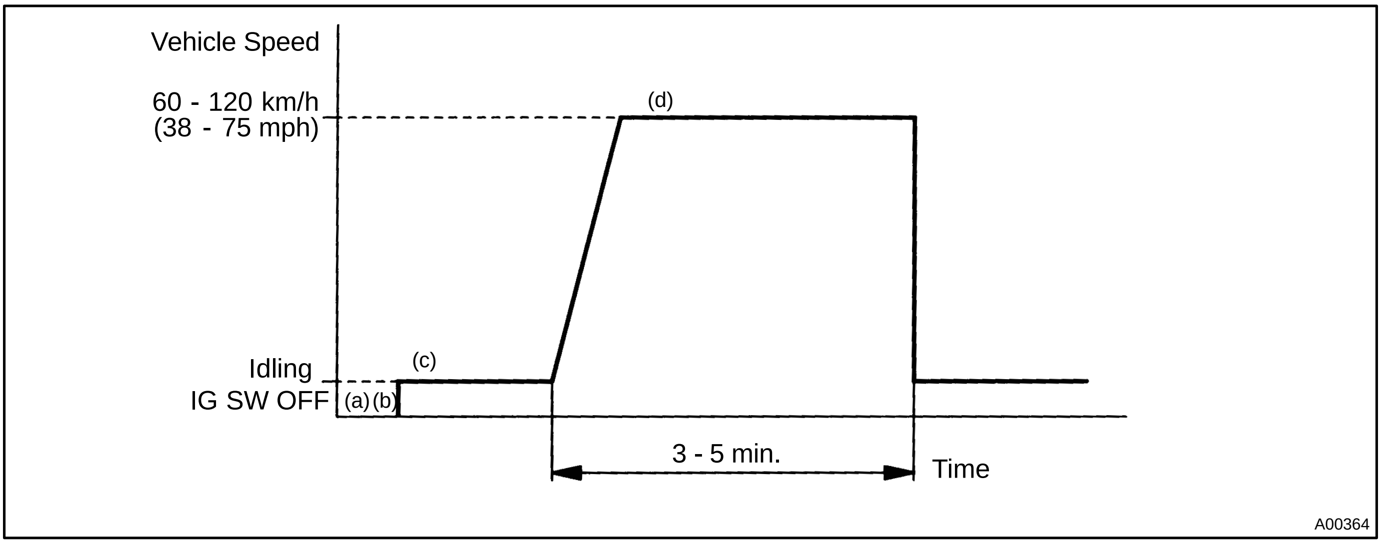
HINT:

- After confirming DTC P1130, use the OBD II scan tool or TOYOTA hand-held tester to confirm output voltage of the A/F sensor (AFS B1 S1/O2S B1 S1) from the CURRENT DATA.
- The A/F sensor's output voltage and the short-term fuel value can be read by using the OBD II scan tool or TOYOTA hand-held tester.
- The ECM controls the voltage of AF1+ and AF1- terminals of ECM to the fixed voltage. Therefore it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand-held tester.
- OBD II scan tool (excluding TOYOTA hand-held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the TOYOTA hand-held tester.

WIRING DIAGRAM

Refer to DTC P0125 on page DI-184 .

CONFIRMATION DRIVING PATTERN



(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Switch the TOYOTA hand-held tester from the normal mode to the check mode (See page DI-146).
(c) Start the engine and warm it up with all the accessory switched OFF.
(d) Drive the vehicle at 60 - 120 km/h (38 - 75 mph) and the engine speed at 1,600 - 3,200 rpm for 3 - 5 minutes.

HINT:
If a malfunction exists, the MIL will light up during step (d).

NOTICE:
- **If the conditions in this test are not strictly followed, detection of the malfunction will impossible.**
- **Without a TOYOTA hand-held tester, turn the ignition switch OFF after performing steps (c) and (d), then perform steps (c) and (d) again.**

INSPECTION PROCEDURE

HINT:
- If DTC P1130 is displayed, check bank 1 sensor 1 circuit.
- Read frame freeze data using the TOYOTA hand-held tester or OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P1130) being output?**

YES → **Go to relevant DTC chart (See page DI-156).**

NO

2	**Connect OBD II scan tool or TOYOTA hand-held tester, and read value of output voltage of A/F sensor.**

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.
(b) Warm up the A/F sensor with the engine speed of 2,500 rpm for approximately 90 seconds.

CHECK:
Read the voltage of the A/F sensor on the screen of OBD II scan tool or TOYOTA hand-held tester when performing all the following conditions.

HINT:
The voltage of the AF1+ terminal of the ECM is fixed at 3.3 V and the voltage of the AF1- terminal is fixed at 3.0 V. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AF1+/AF1-) of the ECM.

OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.30 V (0.660 V*) ●Not remains at 3.8 V (0.76 V*) or more ●Not remains at 2.8 V (0.56 V*) or less *: When using the OBD II scan tool (excluding TOYOTA hand-held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close.	

HINT:
- Although there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*) during fuel enrichment, it is normal.
- Although there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*) during fuel cut, it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: With the OBD II scan tool (excluding TOYOTA hand-held tester).

OK → **Go to step 8.**

NG ↓

3	**Check for open and short in harness and connector between ECM and A/F sensor (See page IN-28).**

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

OK ↓

4	**Check resistance of A/F sensor heater (See page SF-51).**

NG → **Replace A/F sensor.**

OK ↓

5	**Check air induction system (See page SF-1).**

NG → **Repair or replace.**

OK

6	Check fuel pressure (See page SF-5).

NG — Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).

OK

7	Check injector injection (See page SF-18).

NG — Replace injector.

OK

Replace A/F sensor.

8	Perform confirmation driving pattern.

Go

9	Is there DTC P1130 being output again?

YES — Check and replace ECM (See page IN-28).

NO

10	Did vehicle run out of fuel in past?

NO → **Check for intermittent problems (See page DI-146).**

YES

DTC P1130 is caused by shortage of fuel.

DI5CB-08

DTC	P1133	A/F Sensor Circuit Response Malfunction (Bank 1 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI-184 .

DTC No.	DTC Detection Condition	Trouble Area
P1133	After engine is warmed up and during vehicle driving at engine speed 1,400 rpm or more and vehicle speed 60 km/h (38 mph) or more, if response characteristics of A/F sensor becomes deteriorated (2 trip detection logic)	●Open or short in A/F sensor circuit ●A/F sensors ●Air induction system ●Fuel pressure ●Injector ●ECM

WIRING DIAGRAM

Refer to DTC P0125 on page DI-184 .

INSPECTION PROCEDURE

HINT:

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

1	Are there any other codes (besides DTC P1133) being output?

YES → **Go to relevant DTC chart (See page DI-156).**

NO ↓

2	Connect OBDII scan tool or TOYOTA hand-held tester, and read value of output voltage of A/F sensor.

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand-held tester to the DLC3.

(b) Warm up the A/F sensor with the engine of speed 2,500 rpm for approximately 90 seconds.

CHECK:

Read the voltage of the A/F sensor on the screen of the OBD II scan tool or TOYOTA hand-held tester when performing all the following conditions.

HINT:

The voltage of the AF1+ terminal of the ECM is fixed at 3.3 V and the voltage of the AF1- terminal is fixed at 3.0 V. Therefore it is impossible to check the A/F sensor output voltage at the terminals (AF1+/AF1-) of the ECM.

OK:

Condition	A/F Sensor Voltage Value
Engine idling	● Not remains at 3.30 V (0.660 V*) ● Not remains at 3.8 V (0.76 V*) or more ● Not remains at 2.8 V (0.56 V*) or less *: When using OBD II scan tool (excluding TOYOTA hand-held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operating throttle valve open and close.	

HINT:
- Although there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*) during fuel enrichment, it is normal.
- Although there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*) during fuel cut, it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76 V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: With the OBD II scan tool (excluding TOYOTA hand-held tester).

OK → **Go to step 8.**

NG

3	Check for open and short in harness and connector between ECM and A/F sensor (See page IN-28).

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

OK

4	Check resistance of A/F sensor heater (See page SF-51).

NG → **Replace A/F sensor.**

OK

5	Check air induction system (See page SF-1).

NG → **Repair or replace.**

OK

6	Check fuel pressure (See page SF-5).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).

OK

7	Check injector injection (See page SF-18).

NG → Replace injector.

OK

Replace A/F sensor.

8	Perform confirmation driving pattern (See page DI-239).

Go

9	Is there DTC P1133 being output again?

YES → Check and replace ECM (See page IN-28).

NO

10	Did vehicle run out of fuel in past?

NO → Check for intermittent problems (See page DI-146).

YES

DTC P1133 is caused by shortage of fuel.

DI5CC-08

DTC	P1135	A/F Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI-184 .

DTC No.	DTC Detection Condition	Trouble Area
P1135	When heater operates, heater current exceeds 8 A (2 trip detection logic)	●Open or short in heater circuit of A/F sensor ●A/F sensor heater ●ECM
	Heater current of 0.25 A or less when heater operates (2 trip detection logic)	

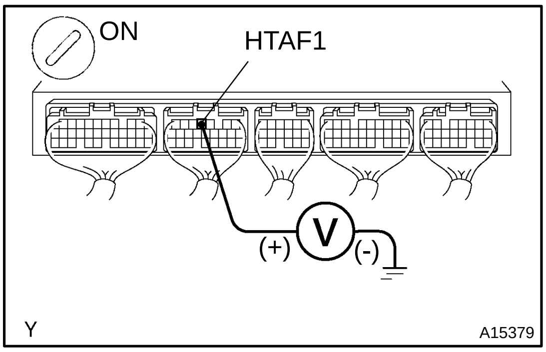
WIRING DIAGRAM

Refer to DTC P0125 on page DI-184 .

INSPECTION PROCEDURE

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

1	Check voltage between terminal HTAF1 of ECM connector and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals HTAF1 of the ECM connector and the body ground.

OK:
Voltage: 9 - 14 V

OK	Check and replace ECM (See page IN-28).

NG

2	Check resistance of A/F sensor heater (See page SF-51).

NG	Replace A/F sensor.

OK

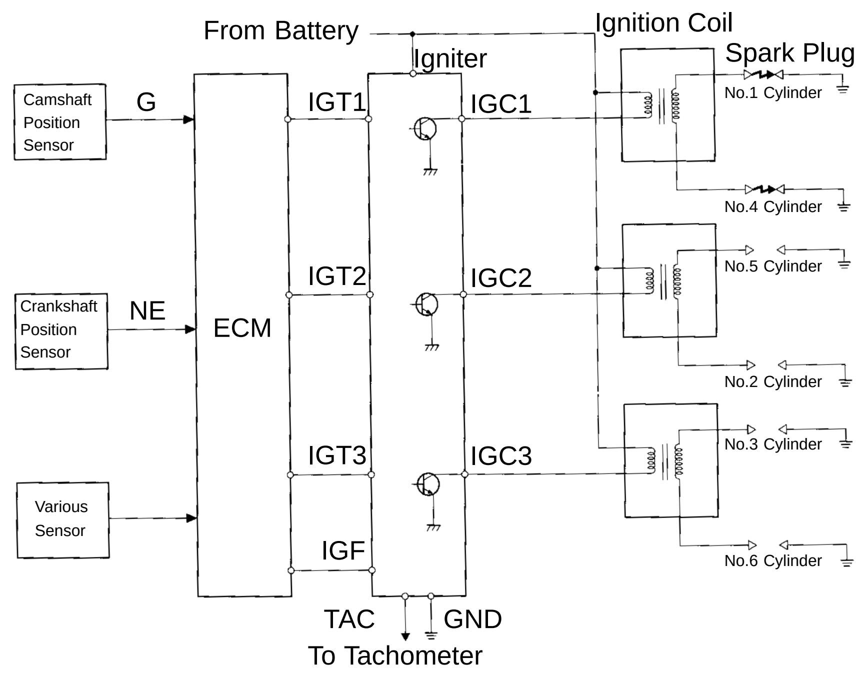
Check and repair harness or connector between EFI main relay (Marking: EFI) and A/F sensor, and A/F sensor and ECM (See page IN-28).

DI0SD-12

DTC	P1300	Igniter Circuit Malfunction

CIRCUIT DESCRIPTION

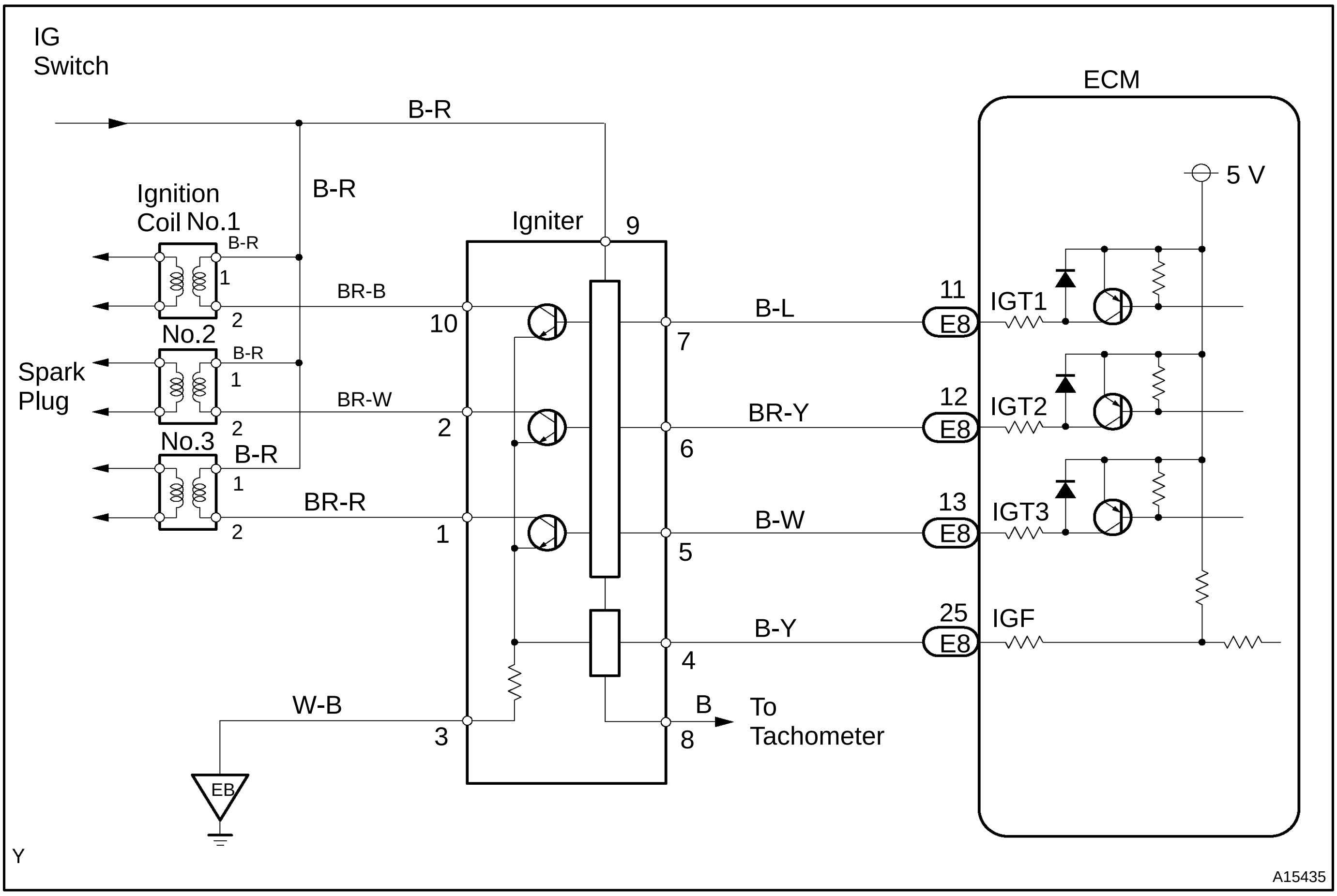
A DIS (Direct Ignition System) has been adopted. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor. The DIS is a 2-cylinder simultaneous ignition system which ignites 2 cylinders simultaneously with 1 ignition coil. In the 2-cylinder simultaneous ignition system, each of the 2 spark plugs is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plugs. The sparks of the 2 spark plugs pass simultaneously from the center electrode to the ground electrode.
The ECM determines ignition timing end outputs the ignition signals (IGT) for each cylinder. Based on IGT signals, the igniter controls the primary ignition signals (IGC) for all ignition coils. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail-safe measure to the ECM.



S00251

DTC No.	DTC Detection Condition	Trouble Area
P1300	Condition (a) is repeated 3 times consecutively during 6 consecutively IGT signals while engine is running: (a) IGF signal is not input to ECM for 2 or more ignitions	●Ignition system ●Open or short in IGF or IGT circuit from igniter to ECM ●Igniter ●Ignition coil ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

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

1	**Check spark plug and spark of misfiring cylinder (See page DI-198).**

NG	**Go to step 4.**

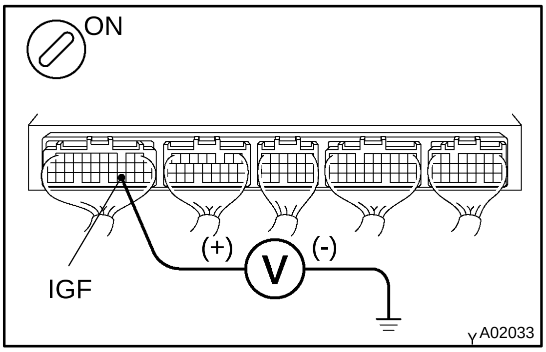
OK

2	**Check for open and short in harness and connector in IGF signal circuit between ECM and igniter (See page IN-28).**

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

OK

3	**Disconnect igniter connector, and check voltage between terminal IGF of ECM connector and body ground.**



PREPARATION:

(a) Disconnect the igniter connector.

(b) Remove the glove compartment (See page SF-54).

(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal IGF of the ECM connector and the body ground.

OK:

Voltage: 4.5 - 5.5 V

OK	**Replace igniter.**

NG

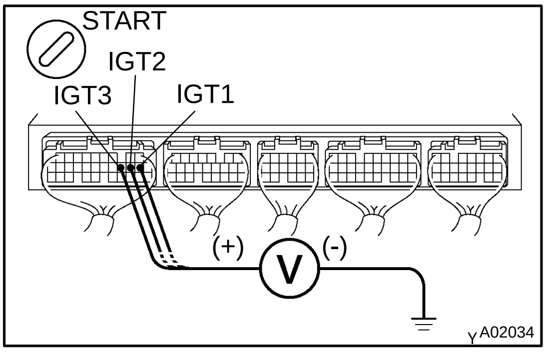
Check and replace ECM (See page IN-28).

4	**Check for open and short in harness and connector in IGT signal circuit between ECM and igniter (See page IN-28).**

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

OK

5	**Check voltage between terminals IGT1 - IGT3 of ECM connector and body ground.**



PREPARATION:

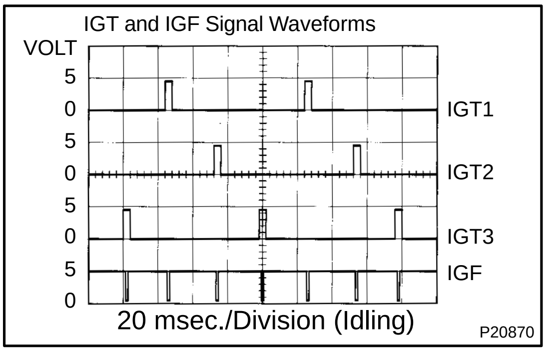
Remove the glove compartment (See page SF-54).

CHECK:

Measure the voltage between terminal IGT1 - IGT3 of the ECM connector and body ground when the engine is cranked.

OK:

Voltage: More than 0.1 V and less than 4.5 V



Reference: INSPECTION USING OSCILLOSCOPE

During idling, check the waveforms between terminals IGT1 - IGT3 and E1, and IGF and E1 of the ECM connector.

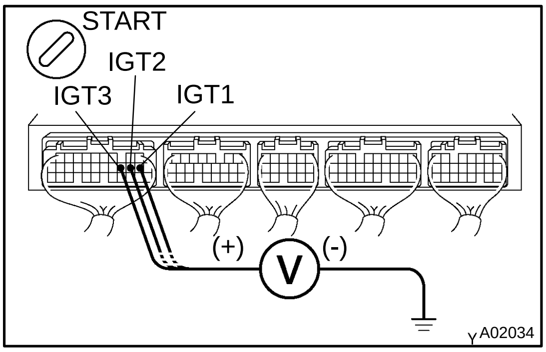
HINT:

The correct waveforms are as shown.

NG | **Check and replace ECM (See page IN-28).**

OK

6	**Disconnect igniter connector, and check voltage between terminals IGT1 - IGT3 of ECM connector and body ground.**



PREPARATION:

(a) Disconnect the igniter connector.

(b) Remove the glove compartment (See page SF-54).

CHECK:

Measure the voltage between terminals IGT1 - IGT3 of the ECM connector and the body ground when the engine is cranked.

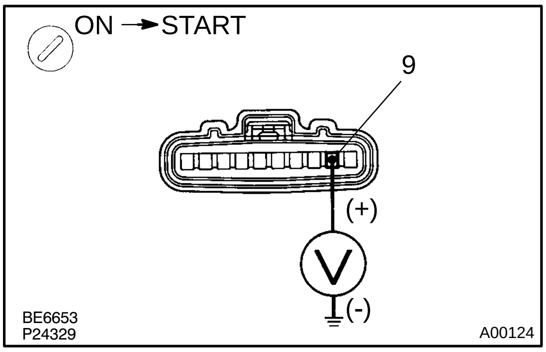
OK:

Voltage: More than 0.1 V and less than 5.0 V

NG | **Check and replace ECM (See page IN-28).**

OK

7	**Check voltage between terminal 9 of igniter connector and body ground.**



PREPARATION:

Disconnect the igniter connector.

CHECK:

Measure the voltage between terminal 9 of the igniter connector and the body ground when the ignition switch is turned to ON and START position.

OK:

Voltage: 9 - 14 V

NG | **Check and repair igniter power source circuit.**

OK

8	**Check for open and short in harness and connector between ignition switch and ignition coil, and ignition coil and igniter (See page IN-28).**

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

OK

9	**Check ignition coil (See page IG-1).**

NG → **Replace ignition coil.**

OK

Replace igniter.

DI0SE-11

DTC	P1335	Crankshaft Position Sensor Circuit Malfunction (During engine running)

CIRCUIT DESCRIPTION

Refer to DTC P0335 on page DI-207 .

DTC No.	DTC Detection Condition	Trouble Area
P1335	No crankshaft position sensor signal to ECM with engine speed 1,000 rpm or more	●Open or short in crankshaft position sensor circuit ●Crankshaft position sensor ●Crankshaft timing pulley ●ECM

WIRING DIAGRAM

Refer to DTC P0335 on page DI-207 .

INSPECTION PROCEDURE

Refer to DTC P0335 on page DI-207 .

HINT:

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

DI17G-04

DTC	P1520	Stop Light Switch Signal Malfunction (Only for A/T)

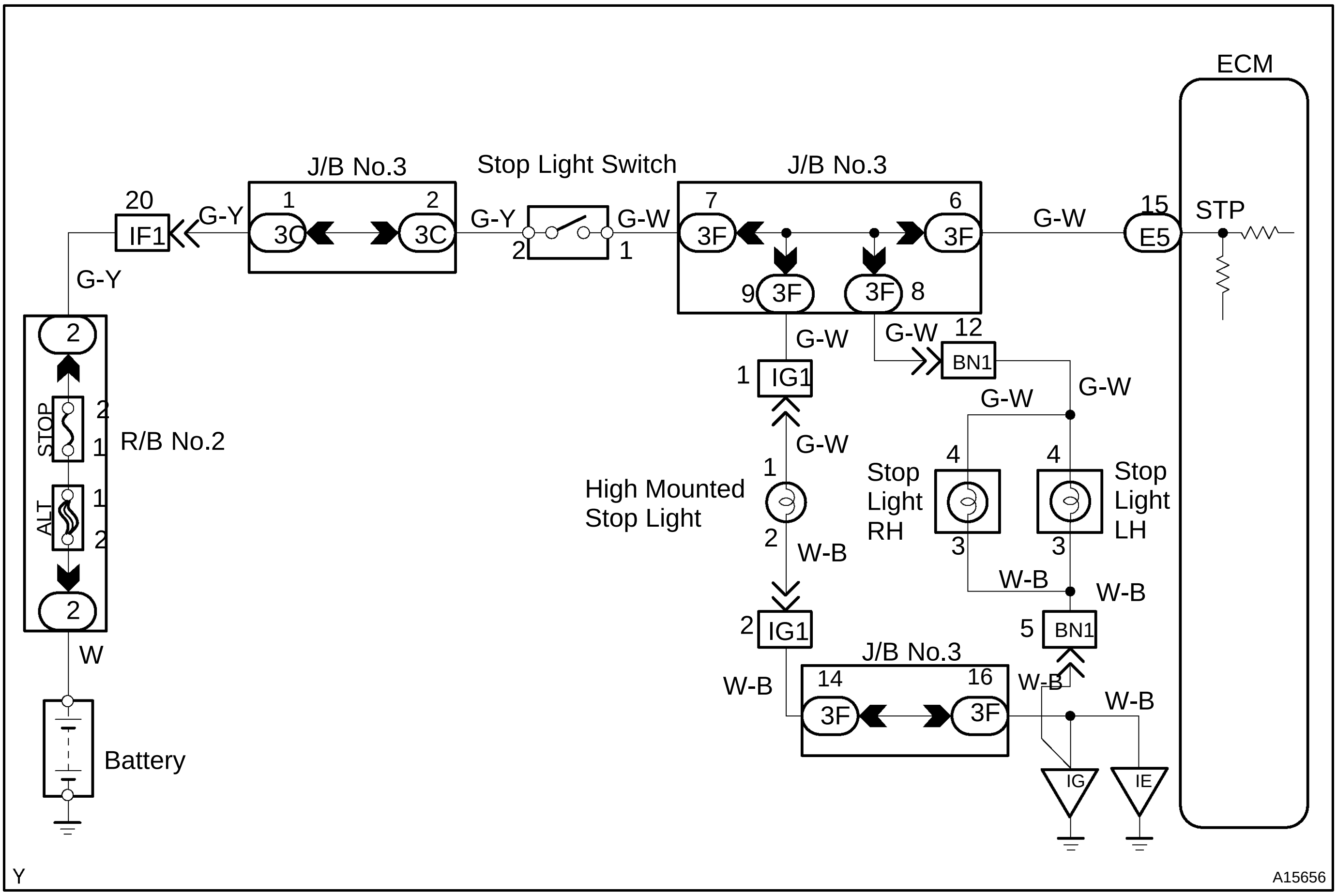
CIRCUIT DESCRIPTION

This signal is used to detect when the brakes have been applied. The STP signal voltage is the same as the voltage supplied to the stop lights. The STP signal is used mainly to control the fuel cutoff engine speed. (The fuel cutoff engine speed is reduced slightly when the vehicle is braking.)

DTC No.	DTC Detection Condition	Trouble Area
P1520	Stop light switch does not turn off even once vehicle is driven (2 trip detection logic)	● Short in stop light switch signal circuit ● Stop light switch ● ECM

HINT:
In this circuit, diagnosis can only be made in the check mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

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

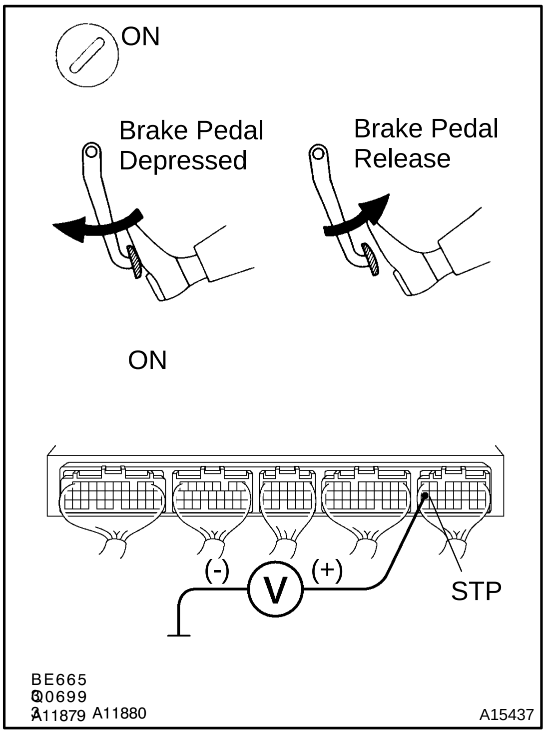
1	Check operation of stop light.

CHECK:
Check if stop lights come on and go off normally when the brake pedal is depressed and released.

NG → **Check and repair the stop light circuit (See page BE-29).**

OK

2	Check STP signal.



When using TOYOTA hand-held tester:
PREPARATION:
(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand-held tester main switch ON.
CHECK:
Read the STP signal on the TOYOTA hand-held tester.
OK:

Brake Pedal	STP Signal
Depressed	ON
Released	OFF

When not using TOYOTA hand-held tester:
PREPARATION:
(a) Remove the glove compartment (See page SF-54).
(b) Turn the ignition switch ON.
CHECK:
Check the voltage between terminal STP of the ECM connector and the body ground.
OK:

Brake pedal	Voltage
Depressed	7.5 - 14 V
Released	Below 1.5 V

OK → **Check for intermittent problems (See page DI-146).**

NG

3	Check harness and connector between stop light switch and ECM (See page IN-28).

NG	Repair or replace harness or connector.

OK

Check and replace ECM (See page SF-54).