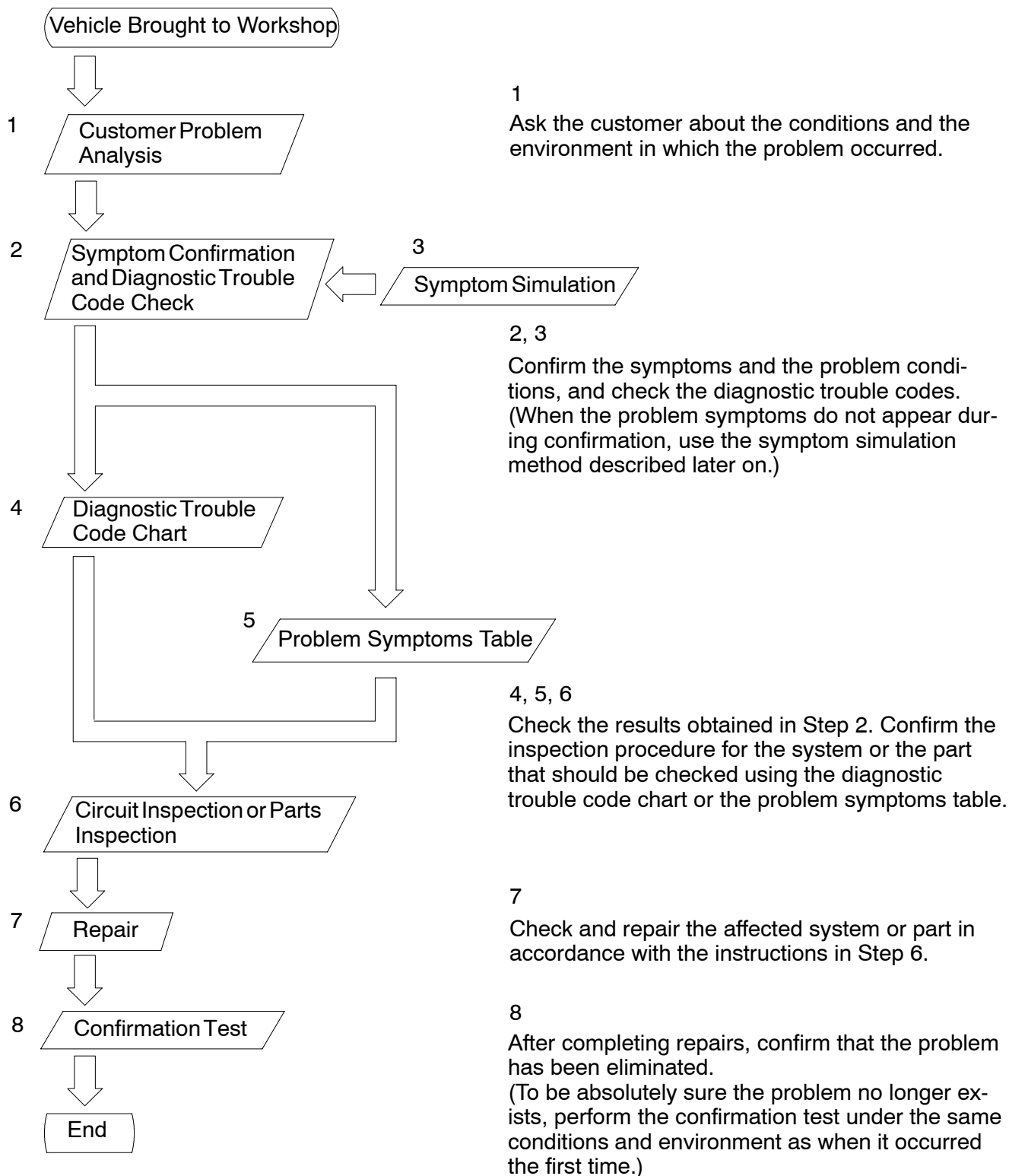


HOW TO PROCEED WITH TROUBLESHOOTING

Carry out troubleshooting in accordance with the procedure below. Only a basic procedure is shown. Details in the diagnostics Section show the most effective methods for each circuit. Confirm troubleshooting procedures first for the relevant circuit before beginning troubleshooting of that circuit.



1. CUSTOMER PROBLEM ANALYSIS

- The 5 items in the table below are important points in the problem analysis:
- In troubleshooting, the problem symptoms must be confirmed accurately. Preconceptions should be discarded in order to give an accurate judgement. To ascertain 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 Points in the Customer Problem Analysis

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

(Sample) Supplemental restraint system check sheet.

<div style="display: inline-block; border: 1px solid black; padding: 2px 5px; margin-right: 10px;">Supplemental Restraint System Check Sheet</div> <div style="display: inline-block;">Inspector's Name _____</div>			
Customer's Name		VIN	
		Production Date	/ /
		LicenceNo.	
Date Vehicle Brought In	/ /	Odometer Reading	km miles
Date Problem First Occurred	/ /		
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Other		
Temperature	Approx. _____		
Vehicle Operation	<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div> <input type="checkbox"/> Starting <input type="checkbox"/> Driving </div> <div> <input type="checkbox"/> Idling <input type="checkbox"/> Constant speed <input type="checkbox"/> Other </div> <div> <input type="checkbox"/> Acceleration </div> <div> <input type="checkbox"/> Deceleration </div> </div>		

2. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE CHECK

The diagnostic system in the LAND CRUISER fulfills various functions.

- The first function is the Diagnostic Trouble Code Check (DTC) Check. In a DTC Check, a previous malfunction's DTC can be checked by a technician during troubleshooting. (A DTC is a code stored in the ECU memory whenever a malfunction in the signal circuits to the ECU occurs.)
- 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 and troubleshooting is more effective. Diagnostic functions are incorporated in the following systems in the LAND CRUISER:

System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Other Diagnosis Function
Engine	<input type="checkbox"/> (with Check Mode)	<input type="checkbox"/>	Diagnostic Test Mode

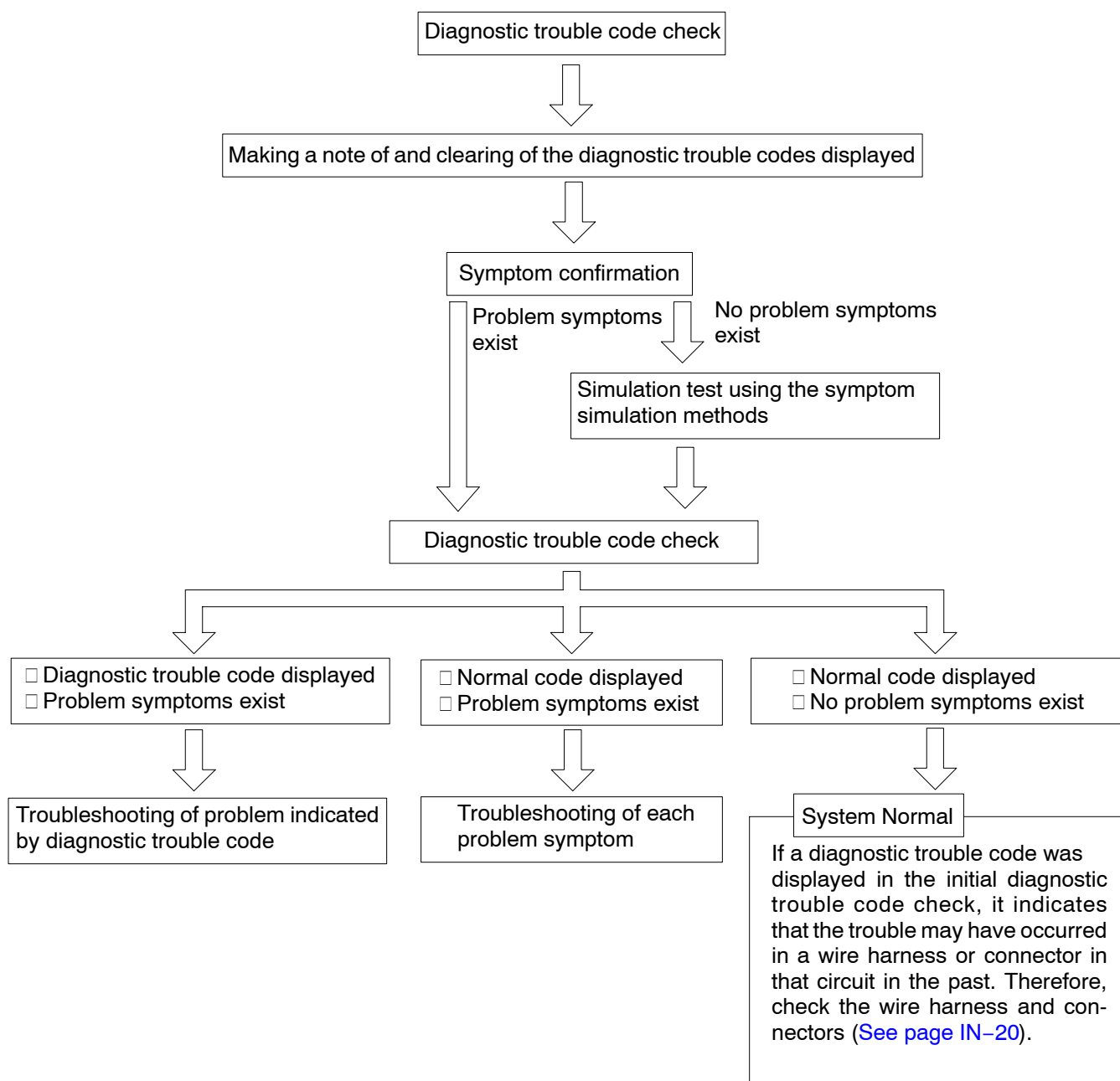
In the DTC Check, it is very important to determine whether the problem indicated by the DTC is: 1) still occurring, or 2) occurred in the past but has since returned to normal. In addition, the DTC should be compared to the problem symptom to see if they are related. For this reason, DTCs should be checked before and after confirmation of symptoms (i.e., whether or not problem symptoms exist) to determine current conditions, as shown in the table below.

Never skip the DTC Check. Failure to check DTCs may, depending on the case, result in unnecessary troubleshooting for systems operating normally or lead to repairs not pertinent to the problem. Follow the procedures listed above in the correct order.

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 DTC check is shown below. Directions from the flow chart will indicate how to proceed to DTC troubleshooting or to the troubleshooting of problem symptoms table.



3. SYMPTOM SIMULATION

The most difficult case in troubleshooting is when no problem symptoms occurring. In such cases, a thorough customer problem analysis must be carried out. then simulate A simulation of the same or similar conditions and environment in which the problem occurred in the customer’s vehicle should be carried out. No matter how much skill or experience a technician has, troubleshooting without confirming the problem symptoms will lead to something important in the repair operation being overlooked and lead to mistakes or delays in repairs.

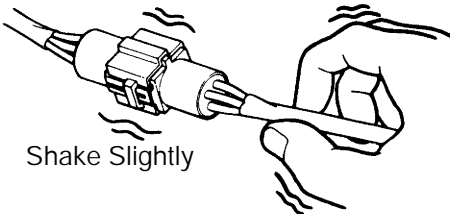
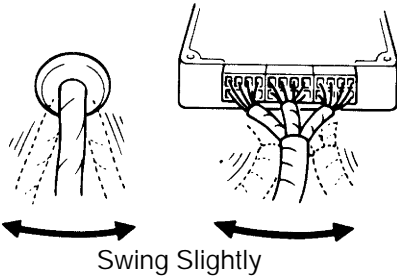
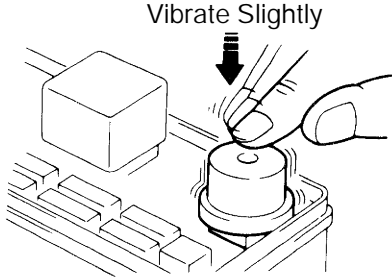
For example:

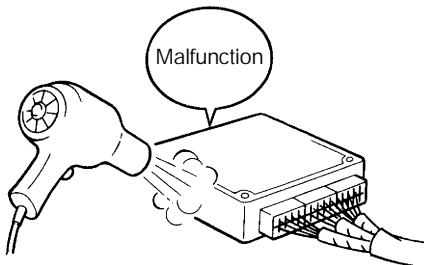
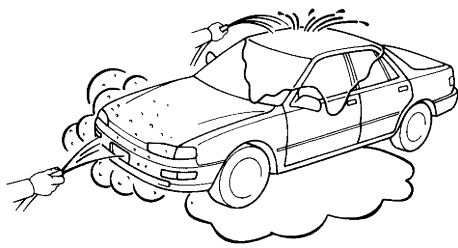
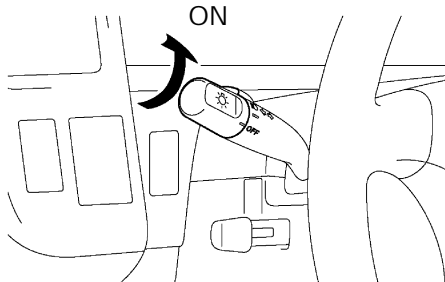
With a problem that only occurs when the engine is cold, or occurs as a result of vibration caused by the road during driving, the problem can never be determined as long as the symptoms are being checked on a stationary vehicle or a vehicle with a warmed-up engine.

Vibration, heat or water penetration (moisture) is difficult to reproduce. The symptom simulation tests below are effected substitutes for the conditions and can be applied on a stationary vehicle.

Important Points in the Symptom Simulation Test:

In the symptom simulation test, the problem symptoms as well as the problem area or parts must be confirmed. First, narrow down the possible problem circuits according to the symptoms. Then, connect the tester and 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 that should be checked thoroughly.		 FI2331 FI2332
PARTS AND SENSOR Apply slight vibration with a finger to the part of the sensor considered to be the cause of the problem and check whether or not the malfunction occurs. HINT: Applying strong vibration to relays may result in open relays.		 FI2330

2	HEAT METHOD: When the problem seems to occur when the suspect area is heated.
<p>Heat the component that is the likely cause of the malfunction with a hair dryer or similar device. Check whether or not the malfunction occurs.</p> <p>NOTICE:</p> <p>(1) Do not heat to more than 60 °C (140 °F). (Exceeding this temperature may damage components.)</p> <p>(2) Do not apply heat directly to parts in the ECU.</p>	 <p>F12334</p>
3	WATER SPRINKLING METHOD: When the malfunction seems to occur on a rainy day or in a high-humidity condition.
<p>Sprinkle water onto the vehicle and check whether or not the malfunction occurs.</p> <p>NOTICE:</p> <p>(1) Never sprinkle water directly into the engine compartment. Indirectly change the temperature and humidity by applying water spray onto the front of the radiator. Never apply water directly onto electronic components.</p> <p>(2)</p> <p>HINT:</p> <p>If a vehicle is subject to water leakage, the leaked water may damage the ECU. When testing a vehicle with a water leakage problem, special caution must be taken.</p>	 <p>F16649</p>
4	OTHER: When a malfunction seems to occur when electrical load is excessive.
<p>Turn on all electrical loads including the heater blower, head lights, rear window defogger, etc. and check to see if the malfunction occurs.</p>	 <p>B02389</p>

4. DIAGNOSTIC TROUBLE CODE CHART

Use Diagnostic Trouble Codes (DTCs) (from the DTC checks) in the table below to determine the trouble area and proper inspection procedure. The Supplemental Restraint System (SRS) diagnostic trouble code chart is shown below as an example.

D DTC No.

Indicates the diagnostic trouble code.

D Page or Instructions

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

D Trouble Area

Indicates the suspect area of the problem.

D Detection Item

Indicates the system of the problem or contents of the problem.

DIAGNOSTIC TROUBLE CODE CHART

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

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

5. PROBLEM SYMPTOMS TABLE

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

HINT:

In some cases, a problem is not detected by the diagnostic system even though a problem symptom is present. It is possible that the problem is occurring outside the detection range of the diagnostic system, or that the problem is occurring in a completely different.

D Page

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

D Circuit Inspection, Inspection Order

Indicates the circuit which needs to be checked for a problem symptom.

D Problem Symptom

D Circuit or Part Name

Indicates the circuit or part which needs to be checked.

PROBLEM SYMPTOMS TABLE

Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspect Area	See page
D With the ignition switch in the ACC or ON position, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed. D SRS warning light is always lit up even when ignition switch is in the LOCK position	D SRS warning light circuit (Always lights up when ignition switch is in LOCK position.)	DI-180
D With the ignition switch in the ACC or ON position, the SRS warning light does not light up.	D SRS warning light circuit (Does not light up when ignition switch is turned to ACC or ON.)	DI-183
D DTC is not displayed. D SRS warning light is always lit up at the time of DTC check procedure. D DTC is displayed without Tc and E1 terminal connection.	D Tc terminal circuit	DI-187

6. CIRCUIT INSPECTION

How to read and use each page is shown below.

D Diagnostic Trouble Code No. and Detection Item

D Circuit Description
The major role and operation 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 Detecting Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed, 1,200 rpm or more.	D Open or short in knock sensor1 circuit D Knock sensor 1 (looseness) D 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.

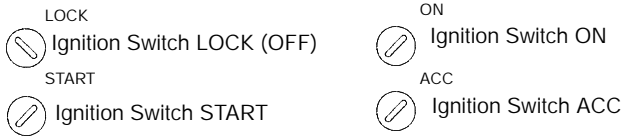
D Indicates the diagnostic trouble code (DTC), (DTC) set parameter and suspect area of the problem.

WIRING DIAGRAM

The diagram shows a knock sensor connected to the ECM. The sensor is grounded on one side and its signal line (GR) goes to terminal 12 (E6) on the ECM. Inside the ECM, terminal 12 is connected to a resistor and then to terminal E1, which is also grounded.

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

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

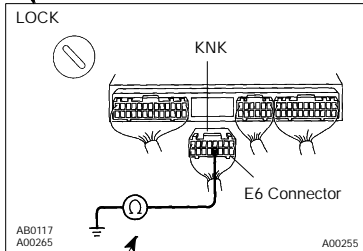


D Inspection Procedure

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

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 of ECM.

CHECK:

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

OK:

Resistance: 1 MΩ or higher

OK

Go to step 3.

NG

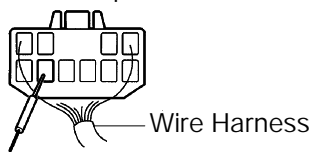
2 Check knock sensor (See page SF-61).

OK

Replace knock sensor.

D Indicates the place to check the voltage or resistance.

D Indicates the connector position to checked (from the front or back side).

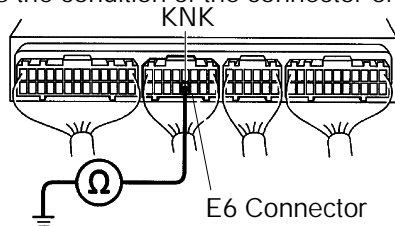


Check from the connector back side (with harness).

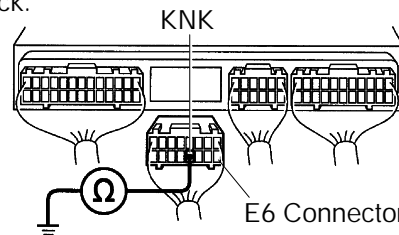


Check from the connector front side (without harness). In this case, care must be taken not to bend the terminals.

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



Connector being checked is connected.



Connector being checked is disconnected.