BASIC TROUBLESHOOTING

Basic Troubleshooting Guide

1	**Bring Vehicle to Workshop**
2	**Analyze Customer's Problem**
	• Ask the customer about the conditions and environment relative to the issue. (Use CUSTOMER PROBLEM ANALYSIS SHEET).
3	**Verify Symptom, and then Check DTC and Freeze Frame Data**
	• Connect the GDS to Diagnostic Link Connector (DLC). • Record the DTC and Freeze Frame Data. **Information** *To erase DTC and Freeze Frame Data, refer to Step 5.*
4	**Confirm the Inspection Procedure for the System or Part**
	• Using the SYMPTOM TROUBLESHOOTING GUIDE CHART, choose the correct inspection procedure for the system or part to be checked.
5	**Erase the DTC and Freeze Frame Data**
	NOTICE **NEVER erase DTC and Freeze Frame Data before completing Step 2 : MIL/DTC in CUSTOMER PROBLEM ANALYSIS SHEET.**
6	**Inspect Vehicle Visually**
	• Go to Step 11, if you recognize the problem.
7	**Recreate (Simulate) Symptoms of the DTC**
	• Try to recreate or simulate the symptoms and conditions of the malfunction as described by customer. • If DTC(s) is/are displayed, simulate the condition according to troubleshooting procedure for the DTC.
8	**Confirm Symptoms of Problem**
	• If DTC(s) is/are not displayed, go to Step 9. • If DTC(s) is/are displayed, go to Step 11.
9	**Recreate (Simulate) Symptom**
	• Try to recreate or simulate the condition of the malfunction as described by the customer.
10	**Check the DTC**
	• If DTC(s) does(do) not occur, refer to INTERMITTENT PROBLEM PROCEDURE in BASIC INSPECTION PROCEDURE. • If DTC(s) occur(s), go to Step 11.
11	**Perform Troubleshooting Procedure for DTC**
12	**Adjust or repair the vehicle**
13	**Confirmation test**
14	**END**

Customer Problem Analysis Sheet

English

1. VEHICLE INFORMAITON

VIN No.		Transmission	☐ M/T ☐ A/T ☐ CVT ☐ etc.
Production date		Driving type	☐ 2WD (FF) ☐ 2WD (FR) ☐ 4WD
Odometer Reading	_____km/mile	DPF (Diesel Engine)	☐ With DPF ☐ Without DPF

2. SYMPTOMS

☐ Unable to start	☐ Engine does not turn over ☐ Incomplete combustion ☐ Initial combustion does not occur
☐ Difficult to start	☐ Engine turns over slowly ☐ Other_____
☐ Poor idling	☐ Rough idling ☐ Incorrect idling ☐ Unstable idling (High:_____ rpm, Low:_____rpm) ☐ Other
☐ Engine stall	☐ Soon after starting ☐ After accelerator pedal depressed ☐ After accelerator pedal released ☐ During A/C ON ☐ Shifting from N to D-range ☐ Other_____
☐ Others	☐ Poor driving (Surge) ☐ Knocking ☐ Poor fuel economy ☐ Back fire ☐ After fire ☐ Other_____

3. ENVIRONMENT

Problem frequency	☐ Constant ☐ Sometimes (_____) ☐ Once only ☐ Other_____
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other_____
Outdoor temperature	Approx. _____ °C/°F
Place	☐ Highway ☐ Suburbs ☐ Inner City ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other_____
Engine temperature	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temperature
Engine operation	☐ Starting ☐ Just after starting (____min) ☐ Idling ☐ Racing ☐ Driving ☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ A/C switch ON/OFF ☐ Other_____

4. MIL/DTC

MIL (Malfunction Indicator Lamp)		☐ Remains ON ☐ Sometimes lights up ☐ Does not light
DTC	Normal check (Pre-check)	☐ Normal ☐ DTC (_____) ☐ Freeze Frame Data
	Check mode	☐ Normal ☐ DTC (_____) ☐ Freeze Frame Data

5. ECM/PCM INFORMATION

ECM/PCM Part No.	
ROM ID	

Basic Inspection Procedure

Measuring Condition of Electronic Parts' Resistance

The measured resistance at high temperature after vehicle running may be high or low. So all resistance must be measured at ambient temperature (20°C, 68°F), unless stated otherwise.

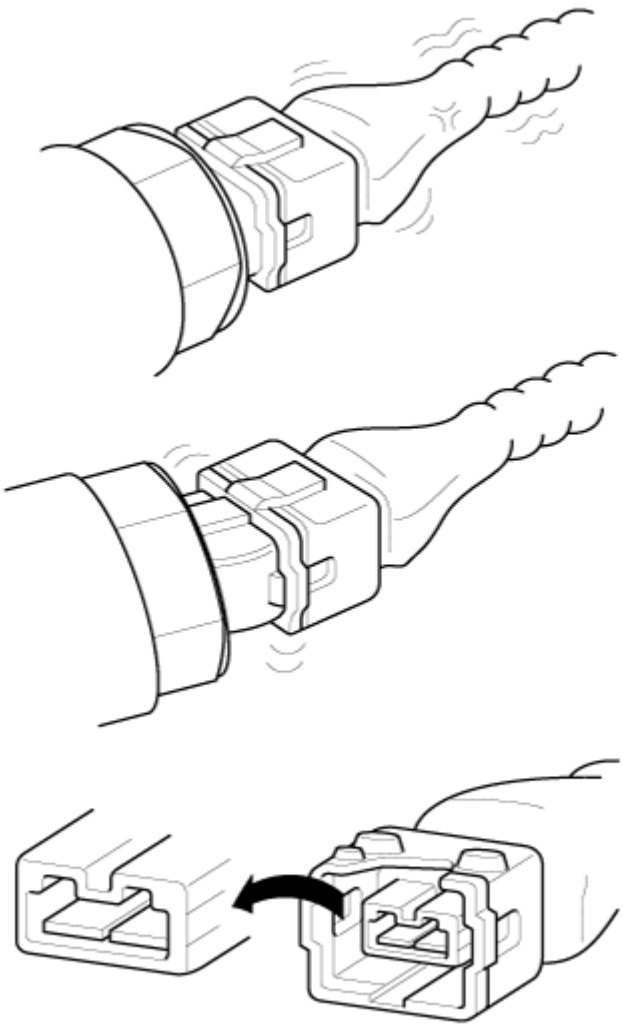
NOTICE

The measured resistance except at ambient temperature (20°C, 68°F) is the reference value.

Intermittent Problem Inspection Procedure

Sometimes the most difficult case in troubleshooting is when a problem symptom occurs but does not reoccur during test [illegible] would be if a problem appears only when the vehicle is cold but has not appeared when warm. In this case, the technician should thoroughly make out a "Customer Problem Analysis Sheet" and recreate (simulate) the environment and condition in which the vehicle was having the issue.

1. Clear Diagnostic Trouble Code (DTC).
2. Inspect all connections, check terminal for poor connections, loose wires, bent, broken or corroded pins, and then verify that the connectors are securely fastened at all times.



3. Lightly shake the connector and wiring harness vertically and horizontally.
4. Repair or replace the component with a problem.
5. Perform road test to verify that the problem has disappeared.

● Simulating Vibration

a. Sensors and Actuators
: Lightly shake sensors, actuators or relays by finger.

> **WARNING**
>
> Strong vibration may break sensors, actuators or relays.

b. Connectors and Harness
: Lightly shake the connector and wiring harness vertically and then horizontally.

● Simulating Heat

a. Heat components suspected of causing the malfunction with a hair dryer or other heat source.

WARNING

- DO NOT heat components to the point of damaging them.
- DO NOT heat the ECM directly.

● Simulating Water Sprinkling

a. Sprinkle water onto vehicle to simulate a rainy day or a high humidity condition.

WARNING

DO NOT sprinkle water directly onto the engine compartment or electronic components.

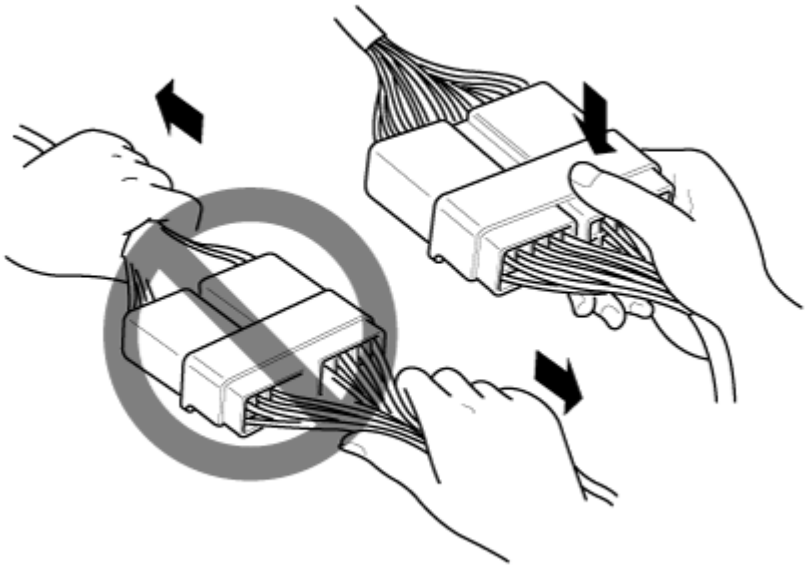
● Simulating Electrical Load

a. Turn on all electrical systems to simulate excessive electrical loads (Radios, fans, lights, rear window defogger, etc.).

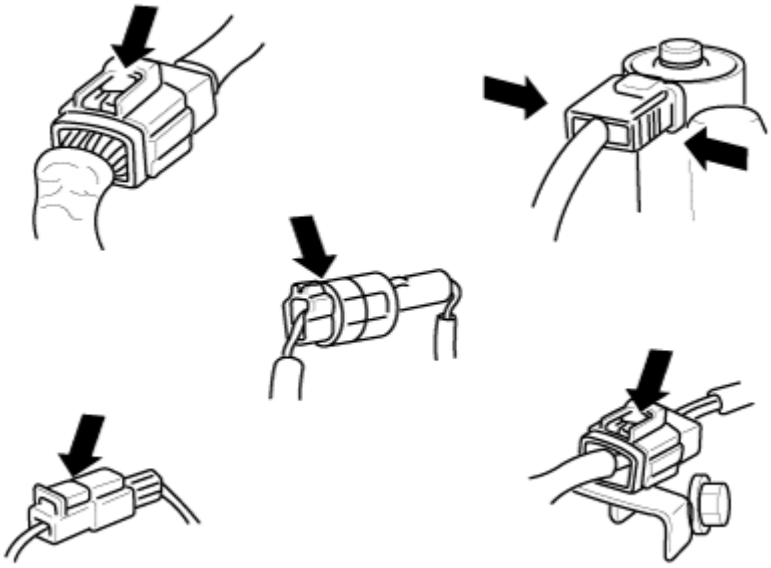
Connector Inspection Procedure

1. Handling of Connector

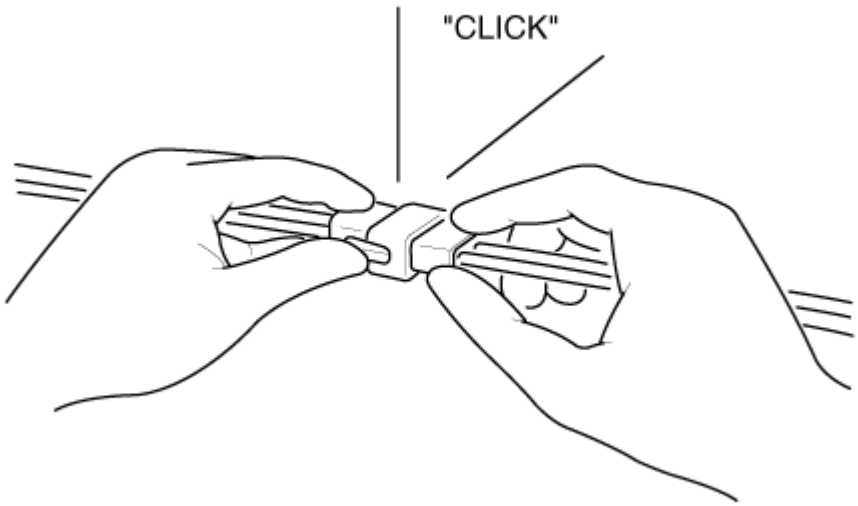
   a. Turn on all electrical systems to simulate an excessive electrical load (Radios, fans, lights, rear window defogger, etc.).



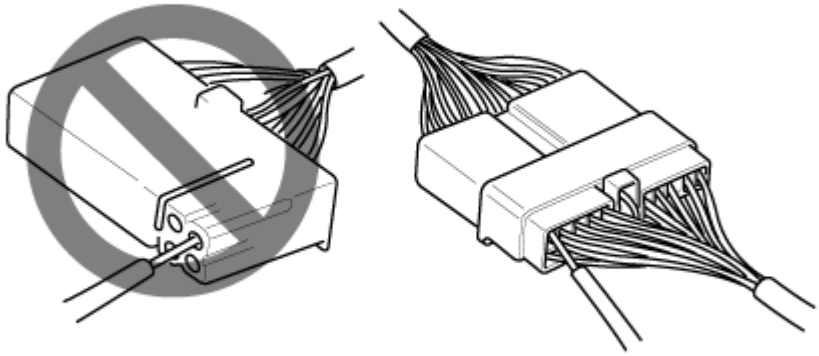
   b. When removing the connector with a latch, press or pull locking lever.



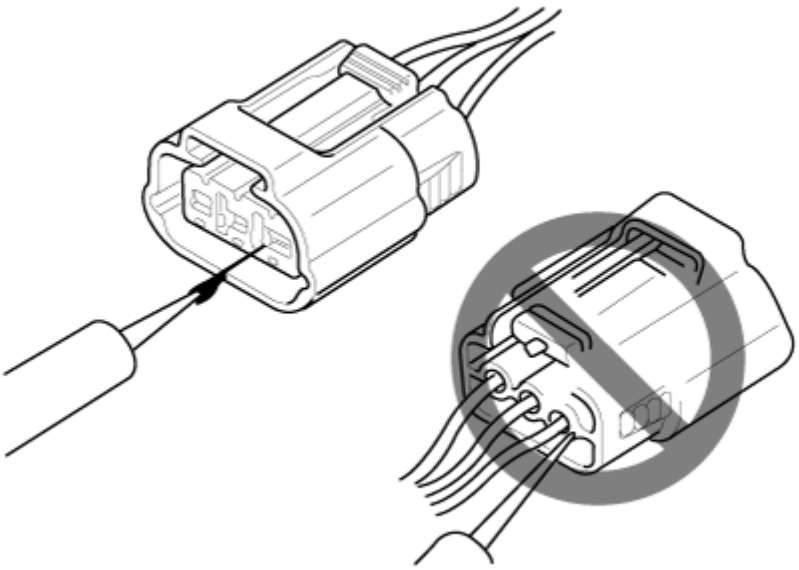
c. Listen for a click when locking connectors. This sound indicates that they are securely locked.



d. When a tester is used to check for continuity, or to measure voltage, always insert tester probe from wire harness side.



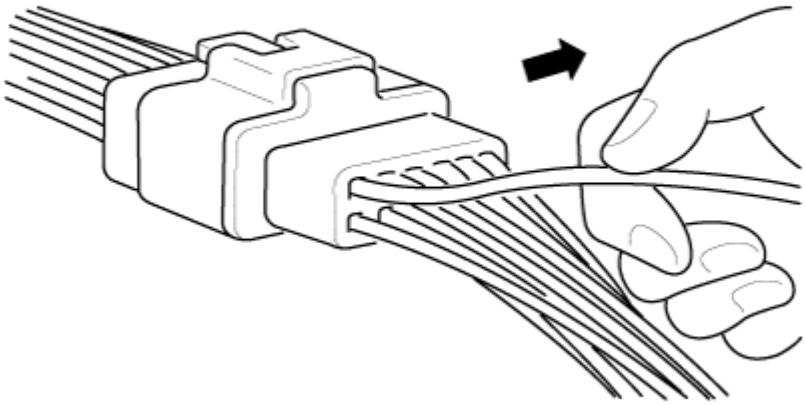
e. Check waterproof connector terminals from the connector side. Waterproof connectors cannot be accessed from harness side.



NOTICE

- Use a fine wire to prevent damaging the terminal.
- Do not damage the terminal when inserting the tester lead.

2. Checking Point for Connector
   a. While the connector is connected:
      Hold the connector, and check connecting condition and locking efficiency.
   b. When the connector is disconnected:
      Check for missing terminal, crimped terminal or broken core wire by lightly pulling the wire harness.
      Visually check for rust, contamination, deformation and bending.
   c. Check terminal tightening condition:
      Insert a spare male terminal into a female terminal, and then check terminal tightening conditions.
   d. Pull lightly on individual wires to ensure that each wire is secured in the terminal.



3. Connector Terminal Repairing Method
   a. Clean the contact points using air gun and/or shop rag.

> **NOTICE**
>
> Never use sand paper when polishing the contact points, otherwise the contact point may be damaged.

   b. In case of abnormal contact pressure, replace the female terminal.

Wire Harness Inspection Procedure

1. Before removing the wire harness, check the wire harness position and crimping in order to restore it correctly.
2. Check for twisted, pulled or loose wire harness.
3. Check if the temperature of the wire harness is abnormally high.
4. Check for rotating, moving or vibrating wire harness against the sharp edge of a part.
5. Check the connection between the wire harness and any installed part.
6. If the covering of wire harness is damaged; secure, repair or replace the harness.

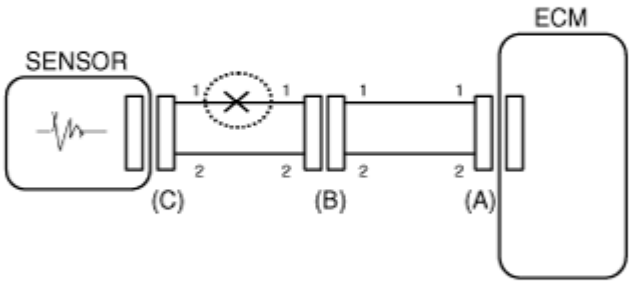
Electrical Circuit Inspection Procedure

● Open Circuit Test

1. Procedures for Open Circuit
   - Continuity Check
   - Voltage Check

   If an open circuit occurs (as seen in [FIG. 1]), it can be found by performing Step 2 (Continuity Check Method) or Step 3 (Voltage Check Method) as shown below.

FIG 1



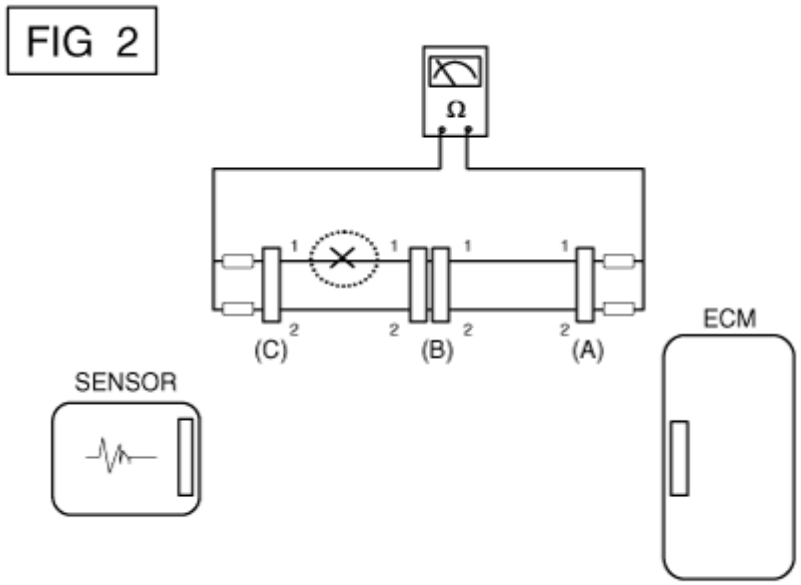
2. Continuity Check Method

> **NOTICE**
>
> When measuring the resistance, lightly shake the wire harness vertically or horizontally.

Specification (Resistance)
1Ω or less → Normal Circuit
1MΩ or Higher → Open Circuit

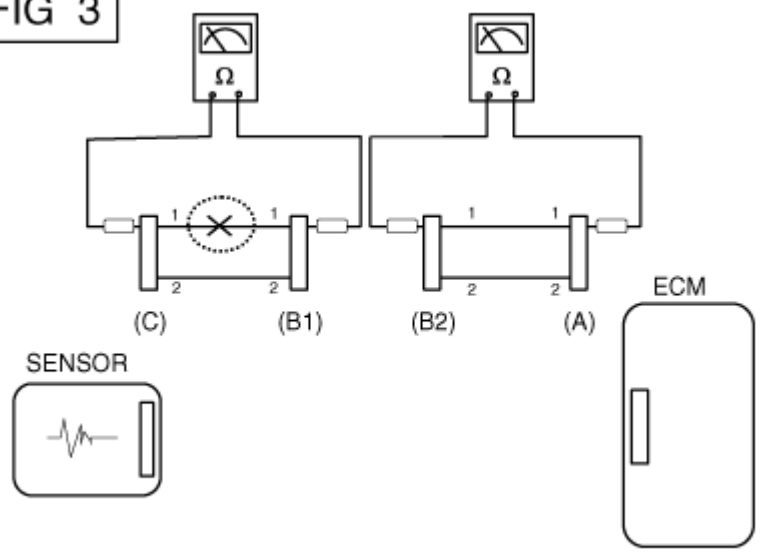
a. Disconnect connectors (A) and (C), and measure resistance between connectors (A) and (C) as shown in [FIG. 2]. In [FIG. 2], if the measured resistances in lines 1 and 2 are "over 1 MΩ" and "below 1 Ω" respectively, line 1 has an open circuit. (Line 2 is normal.) To find the exact broken point, check the sub line of line 1 as described in the next step.

FIG 2



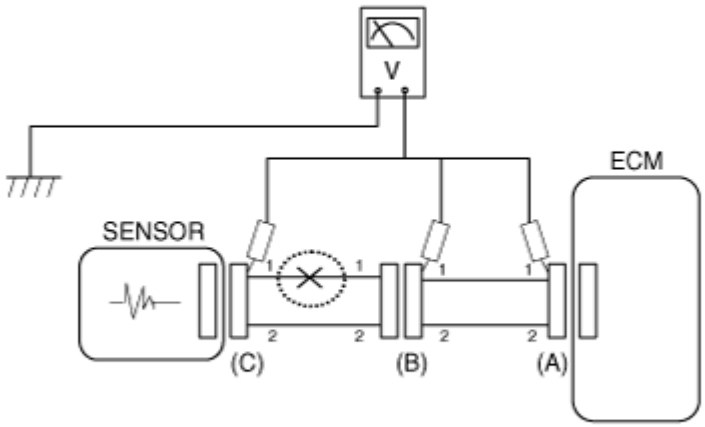
b. Disconnect connector (B), and measure the resistances between connectors (C) and (B1), and between (B2) and (A) as shown in [FIG. 3].
In this case, the measured resistance between connectors (C) and (B1) is higher than 1 MΩ and the open circuit is between terminal 1 of connector (C) and terminal 1 of connector (B1).

FIG 3



3. Voltage Check Method
   a. With each connector still connected, measure the voltage between the chassis ground and terminal 1 of each of connectors (A), (B) and (C) as shown in [FIG. 4].
   The measured voltages of connectors are 5V, 5V and 0V respectively. So the open circuit is between connectors (C) and (B).

FIG 4



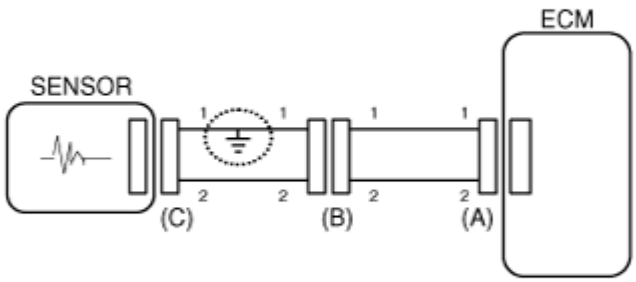
● Short Circuit Test

1. Test Method for Short to Ground Circuit
   - Continuity Check with Chassis Ground

   If short to ground circuit occurs as shown in [FIG. 5], the broken point can be found by performing Step 2 (Continuity Check Method with Chassis Ground) as shown below.

English

FIG 5



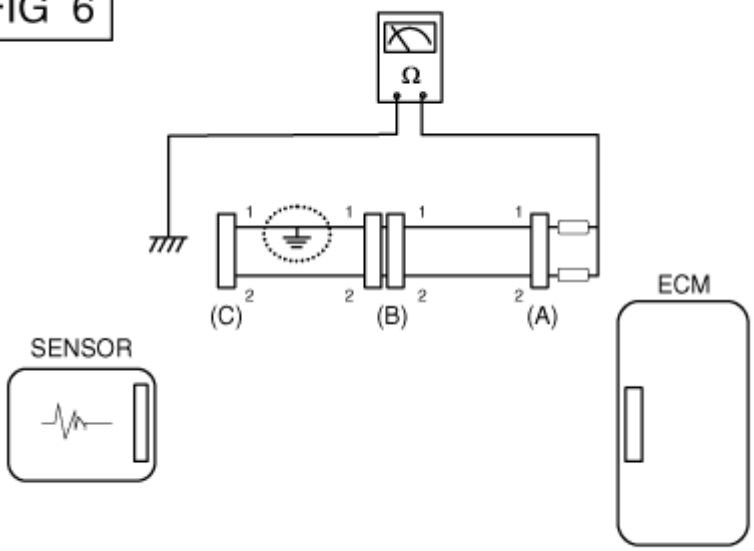
2. Continuity Check Method (with Chassis Ground)

> **NOTICE**
>
> Lightly shake the wire harness vertically or horizontally when measuring the resistance.

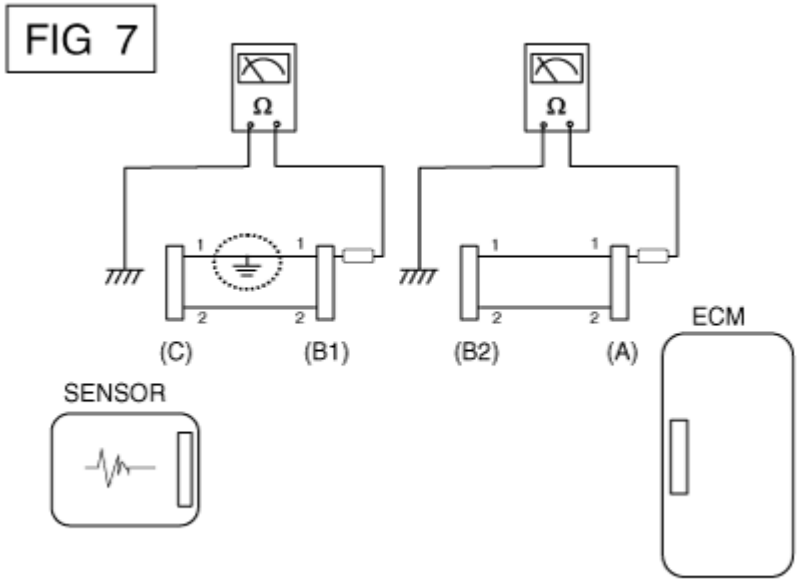
Specification (Resistance)
1Ω or less → Short to Ground Circuit
1MΩ or Higher → Normal Circuit

a. Disconnect connectors (A) and (C), and measure the resistance between connector (A) and Chassis Ground as shown in [FIG. 6].
If the measured resistances in lines 1 and 2 are "below 1 Ω" and "over 1 MΩ" respectively, line 1 has an open circuit. (Line 2 is normal.) To find the exact broken point, check the sub line of line 1 as described in the next step.

FIG 6



b. Disconnect connector (B), and measure the resistances between connector (A) and chassis ground, and between (B1) and chassis ground as shown in [FIG. 7].
The measured resistance between connector (B1) and chassis ground is 1Ω or less. The short to ground circuit is between terminal 1 of connector (C) and terminal 1 of connector (B1).



● Voltage Drop Test

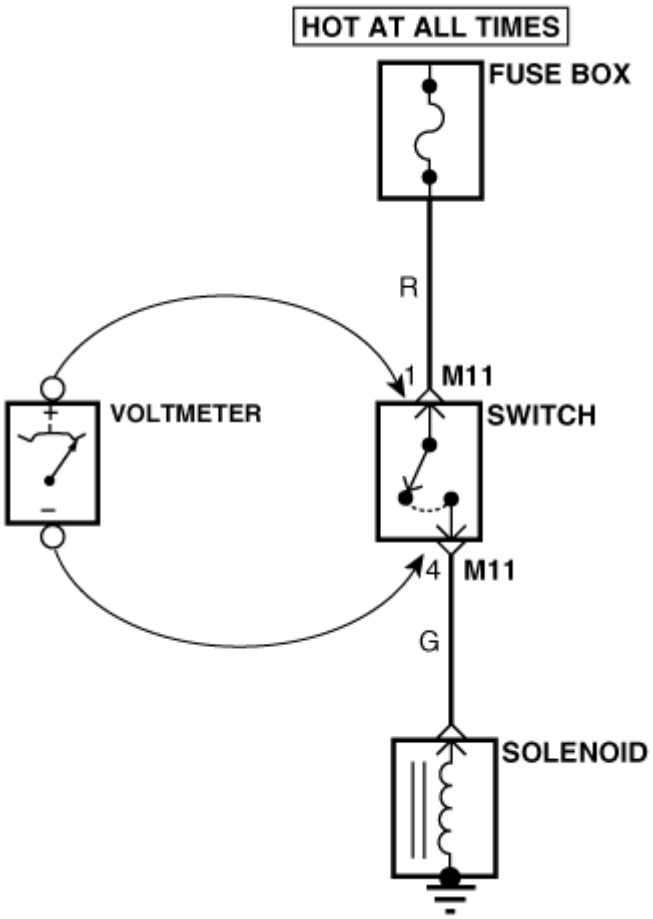
This test checks for voltage drop along a wire, or through a connection or a switch.

A. Connect the positive lead of a voltmeter to the end of the wire (or to the side of the connector or switch) closest to the battery.

B. Connect the negative lead to the other end of the wire (or the other side of the connector or switch).

C. Operate the circuit.

D. The voltmeter will show the difference in voltage between the two points. A difference, or drop of more than 0.1 volts (50mV in 5V circuits), may indicate a problem. Check the circuit for loose or dirty connections.



Symptom Troubleshooting Guide Chart

Main symptom	Diagnostic procedure	Also chec
Unable to start (Engine does not turn over)	1) Test the battery. **(Refer to Engine Electrical System - "Battery")** 2) Test the starter. **(Refer to Engine Electrical System - "Starter")** 3) Inhibitor switch (A/T) or clutch start switch (M/T)	
Unable to start (Incomplete combustion)	1) Test the battery. **(Refer to Engine Electrical System - "Battery")** 2) Check the fuel pressure **(Refer to Fuel Delivery System - "Fuel Pressure Test")** 3) Check the ignition circuit. **(Refer to Engine Electrical System - "Ignition System")** 4) Troubleshoot the immobilizer system. (Refer to Body Electrical System - "Immobilizer System") (In case of immobilizer lamp flashing)	• DTC • Low compression • Intake air leaks • Slipped or broken timing belt • Contaminated fuel
Difficult to start	1) Test the battery. **(Refer to Engine Electrical System - "Battery")** 2) Check the fuel pressure **(Refer to Fuel Delivery System - "Fuel Pressure Test")** 3) Check the ECT sensor and circuit (Check DTC) 4) Check the ignition circuit. **(Refer to Engine Electrical System - "Ignition System")**	• DTC • Low compression • Intake air leaks • Contaminated fuel • Weak ignition spark
Poor idling (Rough, unstable or incorrect idle)	1) Check the fuel pressure. **(Refer to Fuel Delivery System - "Fuel Pressure Test")** 2) Check the injector. **(Refer to Engine Control System - "Injector")** 3) Check the long term fuel trim and short term fuel trim. (Refer to CUSTOMER DATASTREAM) 4) Check the idle speed control circuit. (Check DTC.) 5) Inspect and test the Throttle Body. 6) Check the ECT sensor and circuit. (Check DTC.)	• DTC • Low compression • Intake air leaks • Contaminated fuel • Weak ignition spark
Engine stalling	1) Test the battery. **(Refer to Engine Electrical System - "Battery")** 2) Check the fuel pressure. **(Refer to Fuel Delivery System - "Fuel Pressure Test")** 3) Check the idle speed control circuit. (Check DTC.) 4) Check the ignition circuit. **(Refer to Engine Electrical System - "Ignition System")** 5) Check the CKPS circuit. (Check DTC.)	• DTC • Intake air leaks • Contaminated fuel • Weak ignition spark
Poor driving (Surge)	1) Check the fuel pressure. **(Refer to Fuel Delivery System - "Fuel Pressure Test")** 2) Inspect and test Throttle Body. 3) Check the ignition circuit. **(Refer to Engine Electrical System - "Ignition System")** 4) Check the ECT sensor and circuit. (Check DTC.) 5) Test the exhaust system for a possible restriction. **(Refer to**	• DTC • Low compression • Intake air leaks • Contaminated fuel • Weak ignition spark

	Engine Mechanical System - "Exhaust Manifold") 6) Check the long term fuel trim and short term fuel trim. (Refer toCUSTOMER DATASTREAM.)	
Knocking	1) Check the fuel pressure. **(Refer to Fuel Delivery System - "Fuel Pressure Test")** 2) Inspect the engine coolant. **(Refer to Engine Mechanical System - "Radiator")** 3) Inspect the radiator and the electric cooling fan. **(Refer to Engine Mechanical System - "Radiator")** 4) Check the spark plugs. **(Refer to Engine Electrical System - "Ignition System")**	• DTC • Contaminated fuel
Poor fuel economy	1) Check customer's driving habits. · Is the A/C or the defroster mode on full time? · Are tires at correct pressure? · Is excessively heavy load being carried? · Is acceleration too much, too often? 2) Check the fuel pressure. **(Refer to Fuel Delivery System - "Fuel Pressure Test")** 3) Check the injector. **(Refer to Engine Control System - "Injector")** 4) Test the exhaust system for a possible restriction. 5) Check the ECT sensor and circuit.	• DTC • Low compression • Intake air leaks • Contaminated fuel • Weak ignition spark
Hard to refuel (Overflow during refueling)	1) Inspect the fuel filler hose/pipe. · Pinched, kinked or blocked? · Filler hose is torn 2) Inspect the fuel tank vapor vent hose between the EVAP. canister and air filter. 3) Check the EVAP. canister.	• Malfunctioning gas station filling nozzle (If this problem occurs at a specific gas station during refueling)

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