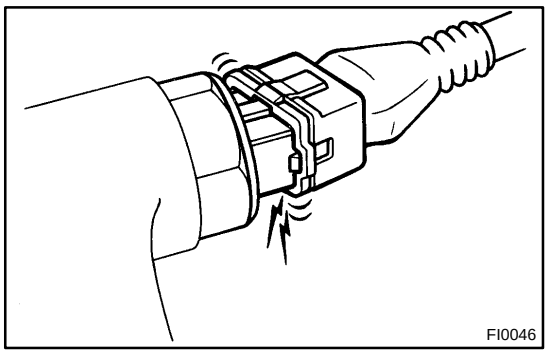
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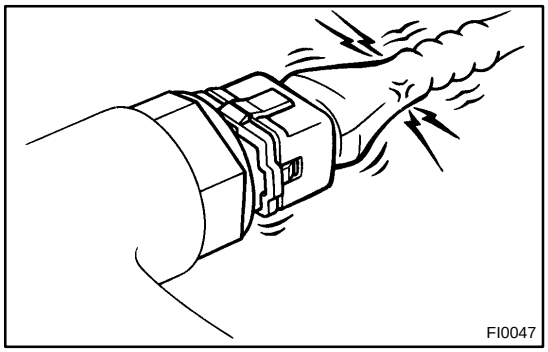
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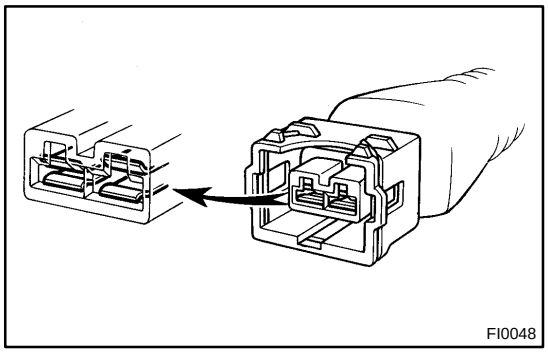
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IN05X−32

HOW TO USE THE DIAGNOSTIC CHART AND INSPECTION PROCEDURE

1. CONNECTOR CONNECTION AND TERMINAL INSPECTION

- For troubleshooting, diagnostic trouble code (DTC) charts or problem symptom table are provided for each circuit with detailed inspection procedures in this manual.
- When component parts, wire harnesses and connectors of each circuit are found to be normal in troubleshooting, the problem is most likely in the ECU. Accordingly, if diagnosis is performed without the problem symptoms occurring, refer to Step 8 to replace the ECU. 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 DTCs. Follow the procedure outlined below whenever these instructions appear.

OPEN CIRCUIT:

An open circuit could result from a disconnected wire harness, a faulty contact in the connector, a connector terminal pulled out, etc.

HINT:

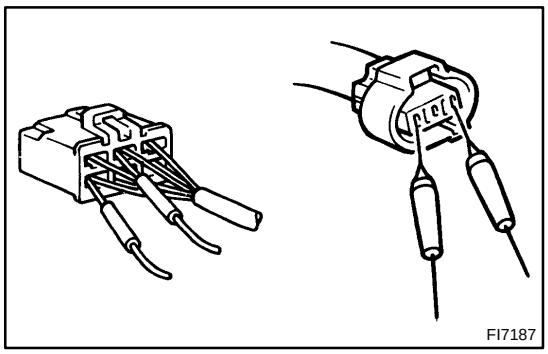
- A wire is rarely broken in its middle. Most problems occur at the wire ends. Carefully check the connectors of sensors and actuators.
- Faulty contacts could be due to rusting, contamination, and/or deformation of connector terminals. In some cases: 1) simply disconnecting and reconnecting the connectors will fix the problem, or 2) even though no abnormality is found in the wire harness or connector, the problem disappears after the check (meaning the cause was most likely in the wire harness or connectors).

SHORT CIRCUIT:

A short circuit could result from contact between the wire harness and the body ground or a short circuiting switch.

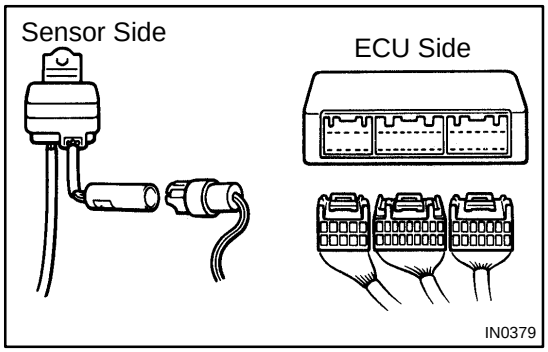
HINT:

When there is a short circuit between the wire harness and body ground, check thoroughly if wire harness is caught in the body or is clamped properly.



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.



3. CONTINUITY CHECK (OPEN CIRCUIT CHECK)

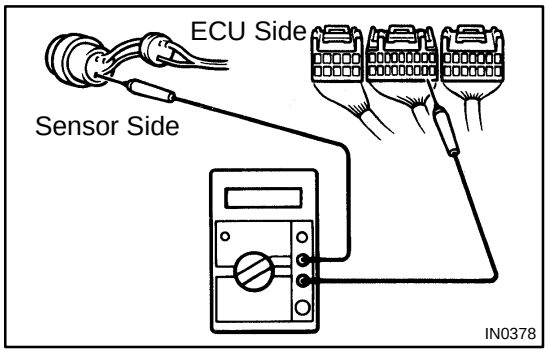
(a) Disconnect the connectors at both ECU and sensor sides.

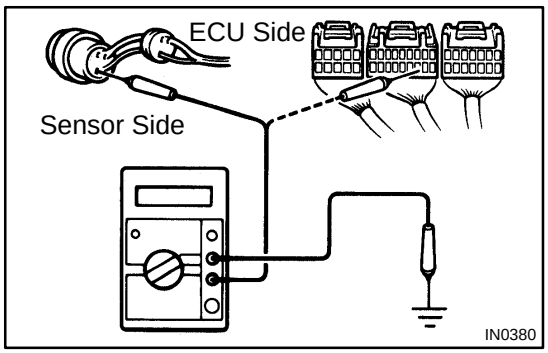
(b) Measure the resistance between the applicable terminals of the connectors.

Resistance: Below 1 Ω

HINT:

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





4. RESISTANCE CHECK (SHORT CIRCUIT CHECK)

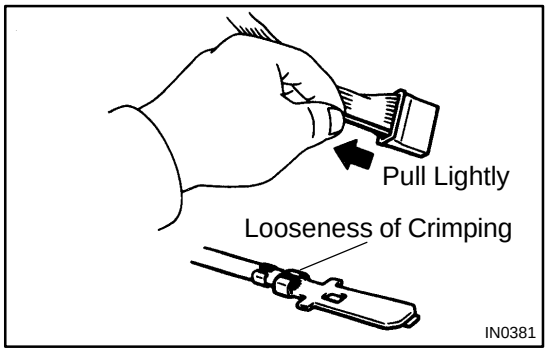
(a) Disconnect the connectors on both ends.

(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: 10 kΩ or higher

HINT:

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



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 the 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.

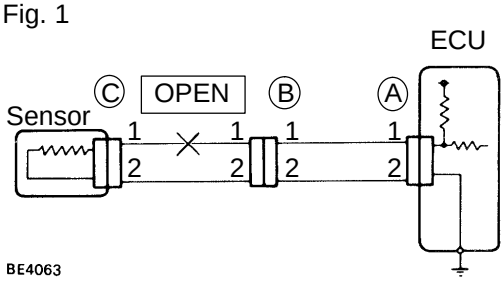
NOTICE:

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

HINT:

If a test terminal is pulled out more easily than others, there may be poor contact in that section.

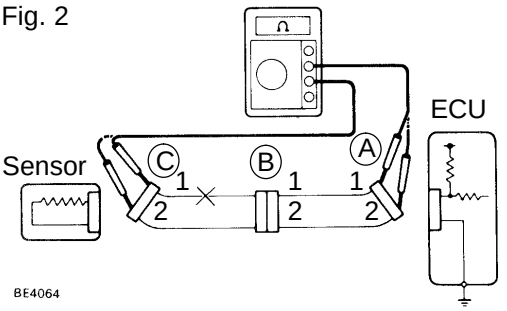
Fig. 1



6. CHECK OPEN CIRCUIT

For an open circuit in the wire harness in Fig. 1, perform a continuity check (step (a) below) or a voltage check (step (b) below).

Fig. 2



(a) Check the continuity.

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

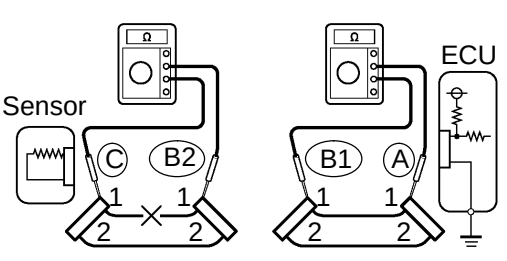
In the case of Fig. 2:

Between terminal 1 of connector A and terminal 1 of connector C → 10 kΩ or higher (open)

Between terminal 2 of connector A and terminal 2 of connector C → Below 1 Ω

An open circuit exists in the wire harness between terminal 1 of A and terminal 1 of C.

Fig. 3



(2) Disconnect connector B and measure the resistance between the connectors.

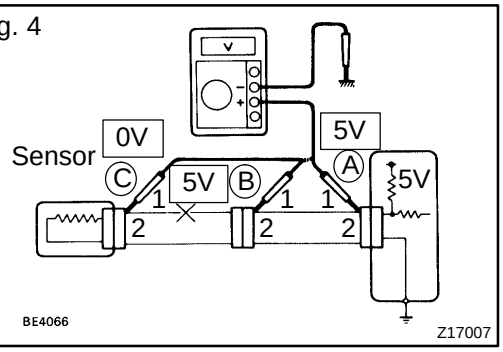
In the case of Fig. 3:

Between terminal 1 of connector A and terminal 1 of connector B1 → Below 1 Ω

Between terminal 1 of connector B2 and terminal 1 of connector C → 10 kΩ or higher (open)

An open circuit exists in the wire harness between terminal 1 of B2 and terminal 1 of 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 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).

Example results:

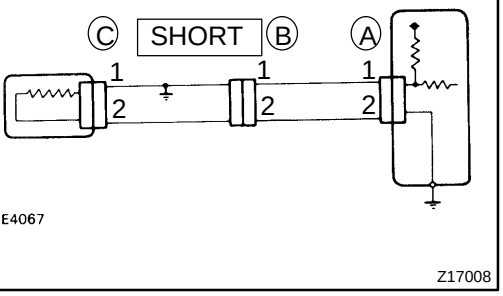
5V: Between Terminal 1 of connector A and Body Ground

5V: Between Terminal 1 of connector B and Body Ground

0V: Between Terminal 1 of connector C and Body Ground

In the above example, an open circuit is in the wire harness between terminal 1 of B and terminal 1 of C.

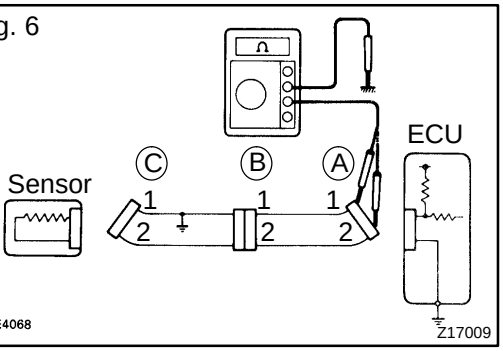
Fig. 5



7. CHECK SHORT CIRCUIT

If the wire harness is shorted (Fig. 5), locate the section by conducting a resistance check with ground below.

Fig. 6



Check the resistance with ground.

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

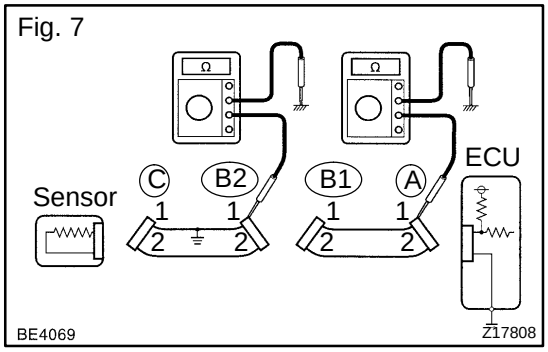
In the case of Fig. 6:

Between terminal 1 of connector A and body ground $\rightarrow$ Below 1 Ω (short)

Between terminal 2 of connector A and body ground $\rightarrow$ 10 kΩ or higher

A short circuit is between terminal 1 of connector A and terminal 1 of connector C.

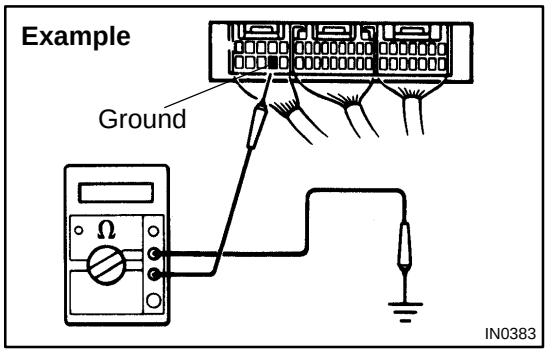
Fig. 7



(2) Disconnect connector B and measure the resistance between terminal 1 of connector A and 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 → 10 kΩ or higher
Between terminal 1 of connector B2 and body ground → Below 1 Ω (short)
A short circuit is between terminal 1 of connector B2 and terminal 1 of connector C.

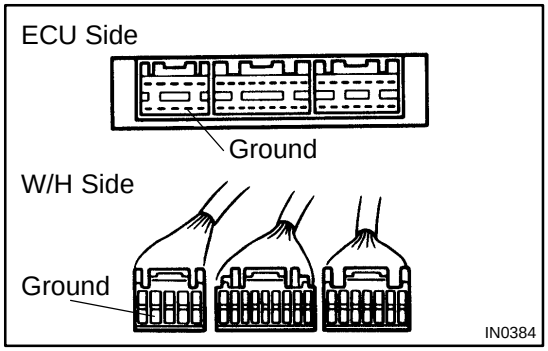
8. CHECK AND REPLACE ECU

First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty. Replace the ECU with a functioning one and check if the symptoms occur.
If the trouble symptoms stop, replace the ECU.



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

Resistance: Below 1 Ω



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