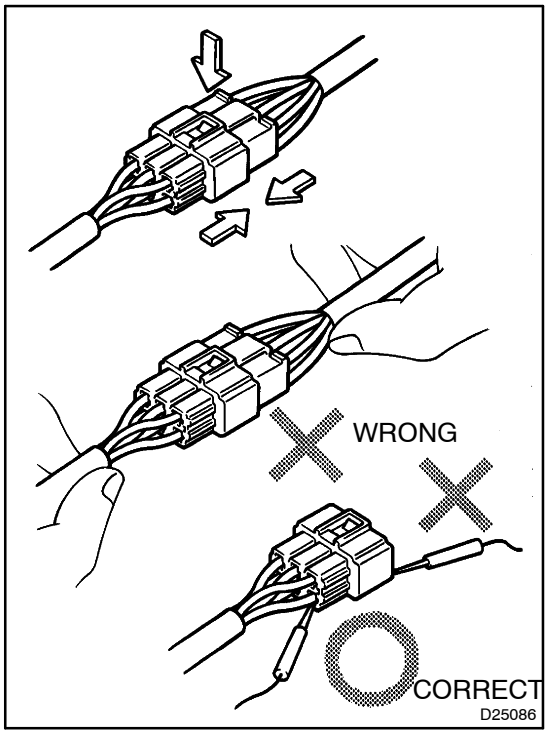
0108X–02

ELECTRONIC CIRCUIT INSPECTION PROCEDURE

1. BASIC INSPECTION

(a) RESISTANCE MEASURING CONDITION OF ELECTRONIC PARTS

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



(b) HANDLING OF CONNECTOR

(1) When removing the connector with lock, press the connector in the direction of the engagement and remove the lock by lightly pressing the lock claw.

(2) When removing the connector, do not hold the harness, but hold the connector.

(3) Before connecting the connector, check that there is no deformation, damage or missing terminals.

(4) The connector with a lock should be securely connected until it makes a ”click” sound.

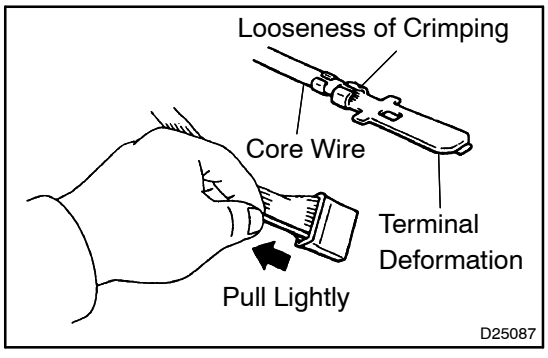
(5) When checking the connector with a Toyota electrical tester, check it from the backside (harness side) of the connector using a mini test lead.

NOTICE:

- **As a water proof connector cannot be checked from the backside, check by connecting the sub–harness.**
- **Do not damage the terminals by moving the inserted tester needle.**

(c) CONNECTOR CHECKING POINTS

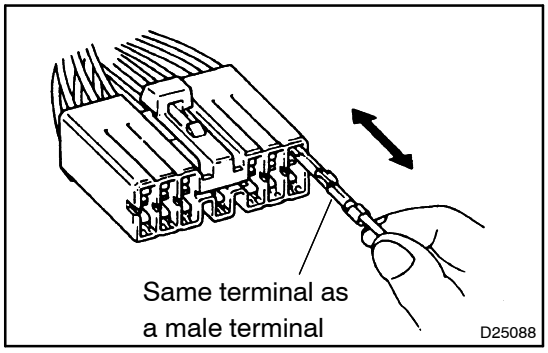
(1) Checking when the connector is connected:
By holding the connector, check the inserted condition and locking efficiency (engaged condition).



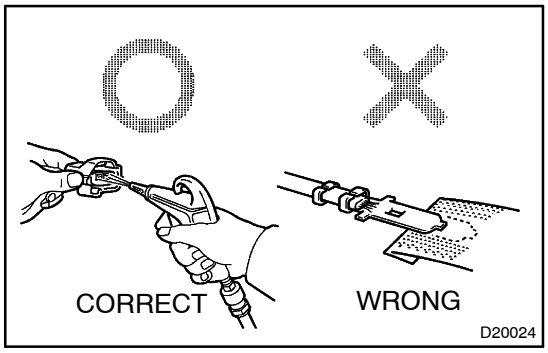
(2) Checking when the connector is removed:
Check by lightly pulling the wire harness (missing terminal, terminal crimping condition, core wire break).
Check visually for any rust, metal particles, water and bent terminals (rust, mixing of foreign object, terminal deformation).

NOTICE:

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



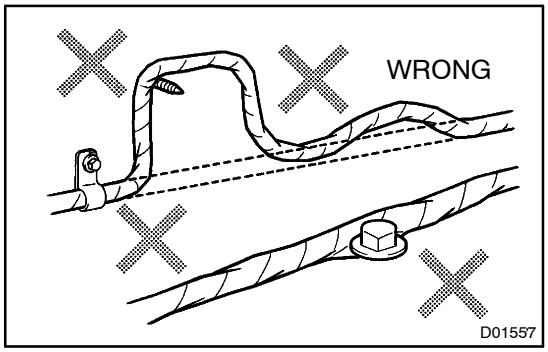
(3) Checking of the contact pressure of the terminal:
Prepare a spare male terminal.
Insert it into a female terminal, check the engaged condition and sliding resistance.



(d) REPAIR METHOD OF CONNECTOR TERMINAL

(1) If there is on the contact point, clean the contact point using an air gun or shop rag. However, never polish the contact point using a sand paper as the platings may come off.

(2) In case of abnormal contact pressure, replace the female terminal. However, if a male terminal is gold–plated (gold color), use gold–plated female terminals and if it is silver–plated (silver color), use silver–plated female terminals.



(e) HANDLING OF WIRE HARNESS

(1) When removing the wire harness, check the positioning of the wiring and clamping before starting work in order to be able to restore it correctly.

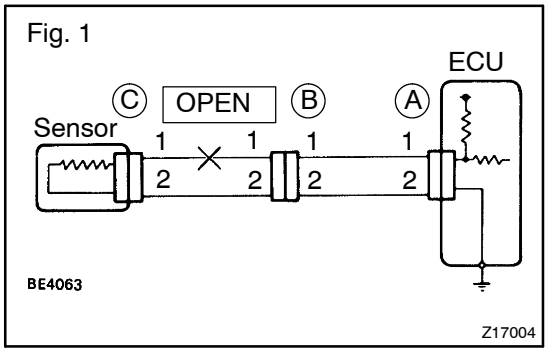
(2) Never twist, pull or loosen the wire harness more than necessary.

(3) Never allow the wire harness to come into contact with a high–temperature, rotating, moving, vibrating or sharp (edge of the panel, tip of the screw, etc.) part.

(4) When installing parts, never let the wire harness be interfered with.

(5) Never cut or break the cover of the wire harness. If it is cut or broken, replace it or securely repair it with electrical tape.

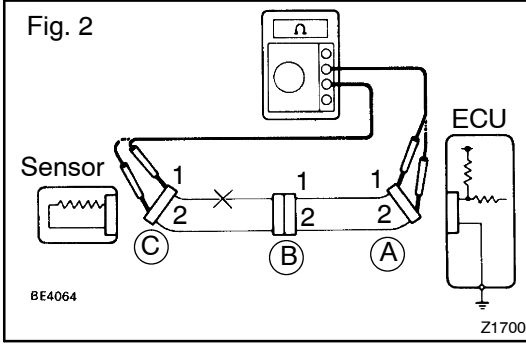
Fig. 1



2. CHECK OPEN CIRCUIT

(a) For the open circuit in the wire harness in Fig. 1, perform a continuity check in step (b) or a voltage check in step (c) to locate the section.

Fig. 2



(b) Check the continuity.

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

Resistance: 1 Ω or less

HINT:

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

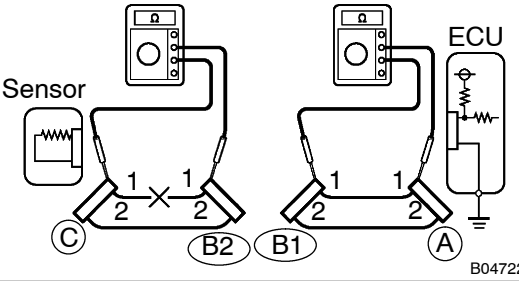
In the case of Fig. 2:

Between terminal 1 of connector A and terminal 1 of connector C → No continuity (open)

Between terminal 2 of connector A and terminal 2 of connector C → Continuity

Therefore, the cause is an open circuit between terminal 1 of connector A and terminal 1 of connector C.

Fig. 3



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

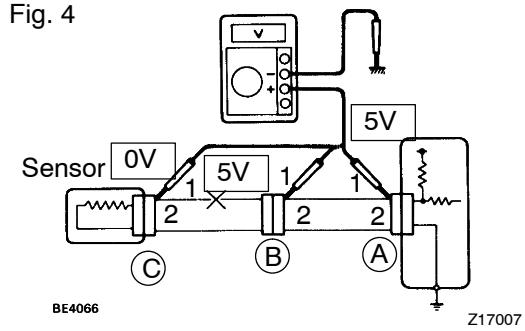
In the case of Fig. 3:

Between terminal 1 of connector A and terminal 1 of connector B1 → Continuity

Between terminal 1 of connector B2 and terminal 1 of connector C → No continuity (open)

Therefore, the cause is an open circuit between terminal 1 of connector B2 and terminal 1 of connector C.

Fig. 4



(c) Check the voltage.

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

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

(2) If the results are:

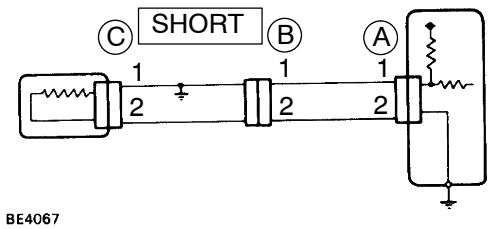
5 V: Between terminal 1 of connector A and body ground

5 V: Between terminal 1 of connector B and body ground

0 V: Between terminal 1 of connector C and body ground

Therefore, the cause is an open circuit in the wire harness between terminal 1 of connector B and terminal 1 of connector C.

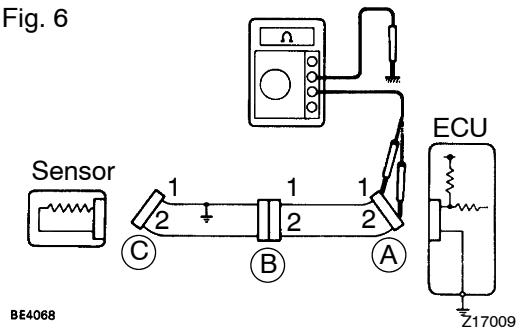
Fig. 5



3. CHECK SHORT CIRCUIT

(a) If the wire harness is ground shorted as shown in Fig. 5, locate the section by conducting a continuity check with the body ground in step (b).

Fig. 6



(b) Check the continuity with the body ground.

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

Resistance: 1 MΩ or higher

HINT:

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

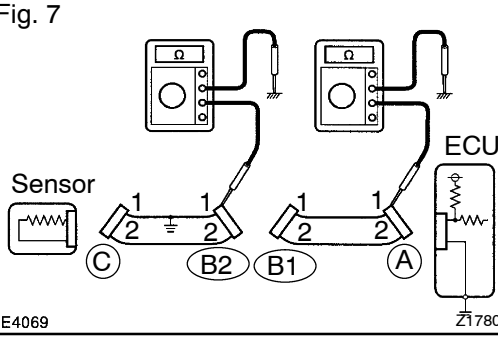
In the case of Fig. 6:

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

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

Therefore, the cause is a short circuit between terminal 1 of connector A and terminal 1 of connector C.

Fig. 7



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

In the case of Fig. 7:

Between terminal 1 of connector A and body ground → No continuity

Between terminal 1 of connector B2 and body ground → Continuity (short)

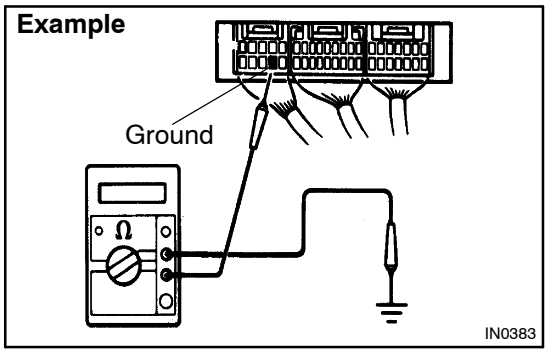
Therefore, the cause is a short circuit between terminal 1 of connector B2 and terminal 1 of connector C.

4. CHECK AND REPLACE ECU

NOTICE:

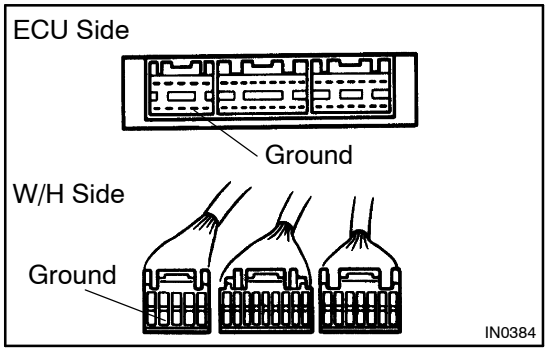
- **Start an inspection of the connector from the backside of the connector on the wire harness side with the connector connected to the ECU.**
- **When no measurement condition is specified, perform the inspection with the engine stopped and also the ignition switch ON.**

(a) First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty. In this case, replace the ECU with a normally functioning one and check if the symptoms appear.



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

Resistance: 1 Ω or less



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