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## 1990 MAZDA 121 (Mk.1) OEM Service and Repair Workshop Manual

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| | |
|---|---|
| DESCRIPTION | P02CC:00: Fuel injector No.1 system: Correction amount relative to fuel injection amount and fuel injection timing learning via feedback control is too low |
| | P02CE:00: Fuel injector No.2 system: Correction amount relative to fuel injection amount and fuel injection timing learning via feedback control is too low |
| | P02D0:00: Fuel injector No.3 system: Correction amount relative to fuel injection amount and fuel injection timing learning via feedback control is too low |
| | P02D2:00: Fuel injector No.4 system: Correction amount relative to fuel injection amount and fuel injection timing learning via feedback control is too low |
| POSSIBLE CAUSE | • Fuel injector No.1 malfunction<br>• Fuel injector No.2 malfunction<br>• Fuel injector No.3 malfunction<br>• Fuel injector No.4 malfunction<br>• Fuel pressure sensor/fuel temperature sensor No.1 (built-into fuel injector No.1) malfunction<br>• Fuel pressure sensor/fuel temperature sensor No.2 (built-into fuel injector No.2) malfunction<br>• Fuel pressure sensor/fuel temperature sensor No.3 (built-into fuel injector No.3) malfunction<br>• Fuel pressure sensor/fuel temperature sensor No.4 (built-into fuel injector No.4) malfunction<br>• PCM malfunction |

## System Wiring Diagram

• Not applicable

## Function Explanation (DTC Detection Outline)

• The PCM corrects the fuel injection amount and the fuel injection timing.
• When the correction amount of the fuel injection amount and the fuel injection timing is the maximum value (decrease direction) continuously for a certain period of time, the PCM stores a DTC.

## Repeatability Verification Procedure

1. Try to reproduce the malfunction by driving the vehicle for 5 min based on the values in the FREEZE FRAME DATA/snapshot data.

## PID Item/Simulation Item Used In Diagnosis

• Not applicable

## Function Inspection Using M-MDS

| STEP | INSPECTION | RESULTS | ACTION |
|---|---|---|---|
| 1 | PURPOSE: VERIFY RELATED REPAIR INFORMATION AVAILABILITY<br>• Verify related Service Bulletins and/or on-line repair information availability.<br>• Is any related repair information available? | Yes | Perform repair or diagnosis according to the available repair information.<br>• If the vehicle is not repaired, go to the next step. |
| | | No | Go to the next step. |

# DTC P02CD:00, P02CF:00, P02D1:00, P02D3:00 [PCM (SKYACTIV-D 2.2)]

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**Note**

**• To determine the malfunctioning part, proceed with the diagnostics from "Function Inspection Using M-MDS".**

## Details On DTCs

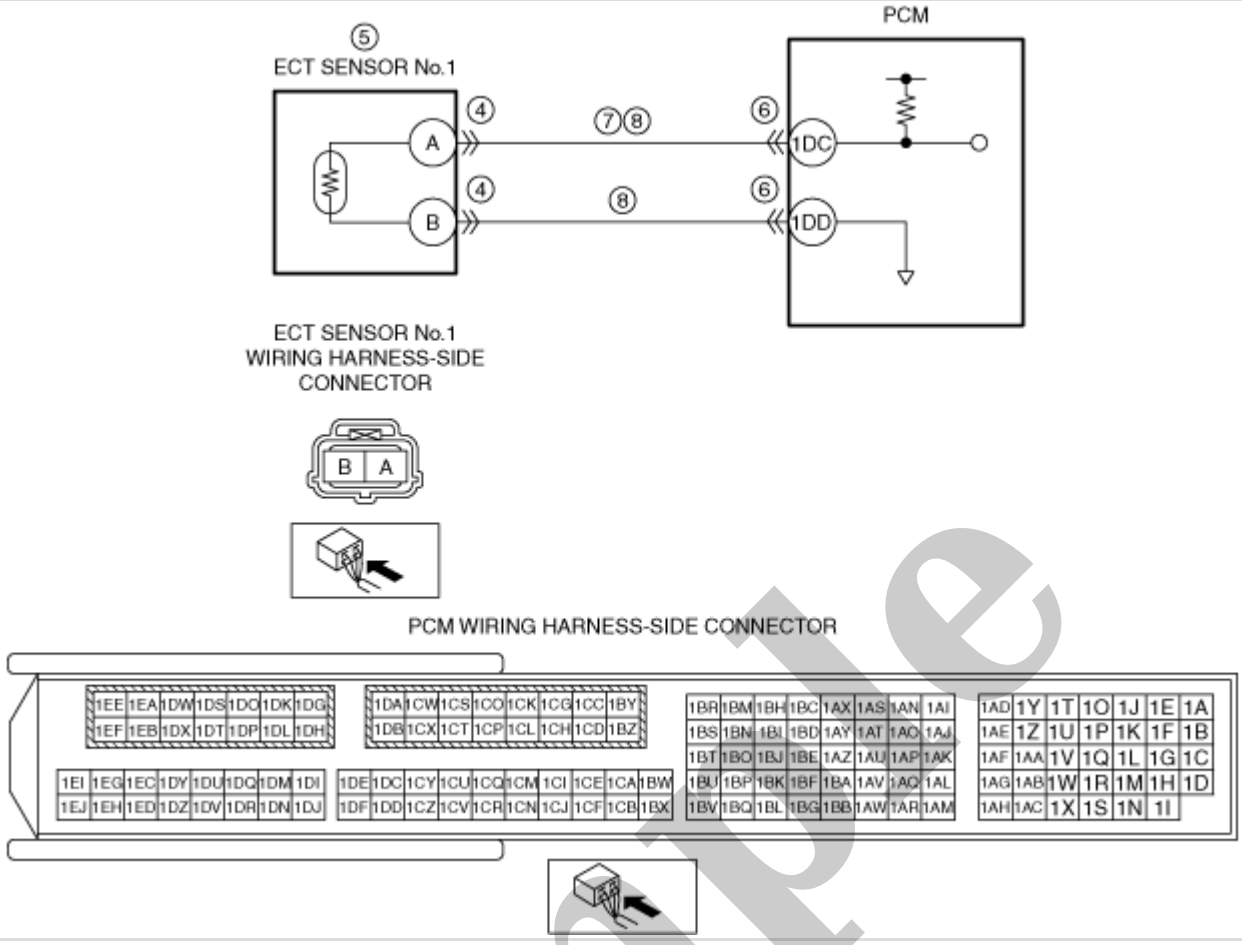
| | | |
|---|---|---|
| DESCRIPTION | **P02CD:00: Fuel injector No.1 system: Correction amount relative to fuel injection amount and fuel injection timing learning via feedback control is too high** | |
| | **P02CF:00: Fuel injector No.2 system: Correction amount relative to fuel injection amount and fuel injection timing learning via feedback control is too high** | |
| | **P02D1:00: Fuel injector No.3 system: Correction amount relative to fuel injection amount and fuel injection timing learning via feedback control is too high** | |
| | **P02D3:00: Fuel injector No.4 system: Correction amount relative to fuel injection amount and fuel injection timing learning via feedback control is too high** | |
| DETECTION CONDITION | Determination conditions | • The PCM detects that the correction amount relative to the fuel injection amount and the fuel injection timing learning reaches the upper limit during the specified rotation. |
| | Preconditions | • During fuel injector injection |
| | Malfunction determination period | • 50 times/injection (Accumulative) |
| | Drive cycle | • 2 |
| | Self test type | • CMDTC self test |
| | Sensor used | • Fuel injector No.1<br>• Fuel injector No.2<br>• Fuel injector No.3<br>• Fuel injector No.4<br>• Fuel pressure sensor/fuel temperature sensor No.1 (built-into fuel injector No.1)<br>• Fuel pressure sensor/fuel temperature sensor No.2 (built-into fuel injector No.2)<br>• Fuel pressure sensor/fuel temperature sensor No.3 (built-into fuel injector No.3)<br>• Fuel pressure sensor/fuel temperature sensor No.4 (built-into fuel injector No.4) |
| FAIL-SAFE FUNCTION | • Not applicable | |
| VEHICLE STATUS WHEN DTCs ARE OUTPUT | • Illuminates check engine light. | |

| STEP | INSPECTION | RESULTS | ACTION |
|---|---|---|---|
| 1 | **PURPOSE: DETERMINE INTEGRITY OF FUEL INJECTOR No.1–No.4**<br>• Inspect the fuel injector No.1–No.4. (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2].)<br>• Is there any malfunction? | Yes | Replace the suspected fuel injector, then go to Step 4.<br>(See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) |
| | | No | Go to the next step. |
| 2 | **PURPOSE: INSPECT FUEL PRESSURE SENSOR No.1–No.4**<br>• Inspect the fuel pressure sensor No.1–No.4. (See FUEL PRESSURE SENSOR INSPECTION [SKYACTIV-D 2.2].)<br>• Is there any malfunction? | Yes | Replace the suspected fuel injector, then go to Step 4.<br>(See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) |
| | | No | Go to the next step. |
| 3 | **PURPOSE: INSPECT FUEL TEMPERATURE SENSOR No.1–No.4**<br>• Inspect the fuel temperature sensor No.1–No.4. (See FUEL TEMPERATURE SENSOR INSPECTION [SKYACTIV-D 2.2].)<br>• Is there any malfunction? | Yes | Replace the suspected fuel injector, then go to the next step.<br>(See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) |
| | | No | Go to the next step. |
| 4 | **PURPOSE: VERIFICATION OF VEHICLE REPAIR COMPLETION**<br>• Always reconnect all disconnected connectors.<br>• Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-D 2.2)].)<br>• Implement the repeatability verification procedure. (See Repeatability Verification Procedure.)<br>• Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].)<br>• Is the PENDING CODE/DTC P02CD:00, P02CF:00, P02D1:00 or P02D3:00 also present? | Yes | Repeat the inspection from Step 1.<br>• If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)<br>Go to the next step. |
| | | No | Go to the next step. |
| 5 | **PURPOSE: VERIFY IF THERE IS ANY OTHER MALFUNCTION**<br>• Is any other DTC or pending code stored? | Yes | Go to the applicable DTC inspection.<br>(See DTC TABLE [PCM (SKYACTIV-D 2.2)].) |
| | | No | DTC troubleshooting completed. |

| STEP | INSPECTION | RESULTS | ACTION |
|---|---|---|---|
| 7 | **INSPECT IAT SENSOR No.1 CIRCUIT FOR OPEN CIRCUIT**<br>• Verify that the MAF sensor/IAT sensor No.1 and PCM connectors are disconnected.<br>• Switch the ignition off.<br>• Inspect for continuity between the following terminals (wiring harness-side):<br>— MAF sensor/IAT sensor No.1 terminal A—PCM terminal 2Y<br>— MAF sensor/IAT sensor No.1 terminal B—PCM terminal 2V<br>• Is there continuity? | Yes | Go to the next step. |
| | | No | Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals:<br>• MAF sensor/IAT sensor No.1 terminal A—PCM terminal 2Y<br>• MAF sensor/IAT sensor No.1 terminal B—PCM terminal 2V<br>**If there is a common connector:**<br>• Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for an open circuit.<br>• Repair or replace the malfunctioning part.<br>**If there is no common connector:**<br>• Repair or replace the wiring harness which has an open circuit.<br>Go to the next step. |
| 8 | **VERIFY DTC TROUBLESHOOTING COMPLETED**<br>• Always reconnect all disconnected connectors.<br>• Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-D 2.2)].)<br>• Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-D 2.2)].)<br>• Is the PENDING CODE for this DTC present? | Yes | Repeat the inspection from Step 1.<br>• If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)<br>Go to the next step. |
| | | No | Go to the next step. |
| 9 | **VERIFY AFTER REPAIR PROCEDURE**<br>• Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-D 2.2)].)<br>• Are any DTCs present? | Yes | Go to the applicable DTC inspection.<br>(See DTC TABLE [PCM (SKYACTIV-D 2.2)].) |
| | | No | DTC troubleshooting completed. |

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 3 | **INSPECT INTAKE SHUTTER VALVE CONNECTOR CONDITION**<br>• Switch the ignition off.<br>• Disconnect the intake shutter valve connector.<br>• Inspect for poor connection (such as damaged/pulled-out pins, corrosion).<br>• Is there any malfunction? | Yes | Repair or replace the connector and/or terminals, then go to Step 9. |
| | | No | Go to the next step. |
| 4 | **INSPECT PCM CONNECTOR CONDITION**<br>• Disconnect the PCM connector.<br>• Inspect for poor connection (such as damaged/pulled-out pins, corrosion).<br>• Is there any malfunction? | Yes | Repair or replace the connector and/or terminals, then go to Step 9. |
| | | No | Go to the next step. |
| 5 | **INSPECT INTAKE SHUTTER VALVE POSITION SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY**<br>• Verify that the intake shutter valve and PCM connectors are disconnected.<br>• Switch the ignition ON (engine off).<br>**Note**<br>**• Another DTC may be stored by the PCM detecting an open circuit.**<br>• Measure the voltage at the intake shutter valve terminal F (wiring harness-side).<br>• Is the voltage 0 V? | Yes | Go to the next step. |
| | | No | Refer to the wiring diagram and verify whether or not there is a common connector between intake shutter valve terminal F and PCM terminal 1BA.<br>**If there is a common connector:**<br>• Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for a short to power supply.<br>• Repair or replace the malfunctioning part.<br>**If there is no common connector:**<br>• Repair or replace the wiring harness which has a short to power supply.<br>Go to Step 9. |
| 6 | **INSPECT INTAKE SHUTTER VALVE POSITION SENSOR POWER SUPPLY CIRCUIT AND SIGNAL CIRCUIT FOR SHORT TO EACH OTHER**<br>• Verify that the intake shutter valve and PCM connectors are disconnected.<br>• Switch the ignition off.<br>• Inspect for continuity between intake shutter valve terminals E and F (wiring harness-side).<br>• Is there continuity? | Yes | Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals:<br>• Intake shutter valve terminal E—PCM terminal 1AZ<br>• Intake shutter valve terminal F—PCM terminal 1BA<br>**If there is a common connector:**<br>• Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for a short to each other.<br>• Repair or replace the malfunctioning part.<br>**If there is no common connector:**<br>• Repair or replace the wiring harness which has a short to each other.<br>Go to Step 9. |
| | | No | Go to the next step. |
| 7 | **INSPECT INTAKE SHUTTER VALVE POSITION SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT**<br>• Verify that the intake shutter valve and PCM connectors are disconnected.<br>• Inspect for continuity between intake shutter valve terminal C (wiring harness-side) and PCM terminal 1AY (wiring harness-side).<br>• Is there continuity? | Yes | Go to the next step. |
| | | No | Refer to the wiring diagram and verify whether or not there is a common connector between intake shutter valve terminal C and PCM terminal 1AY.<br>**If there is a common connector:**<br>• Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for an open circuit.<br>• Repair or replace the malfunctioning part.<br>**If there is no common connector:**<br>• Repair or replace the wiring harness which has an open circuit.<br>Go to Step 9. |

| DTC P0117:00 | ECT sensor No.1 circuit low input |
|---|---|






Diagnostic Procedure

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 1 | RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION<br>Note<br>• Recording can be facilitated using the screen capture function of the PC.<br>• Record the FREEZE FRAME DATA/snapshot data on the repair order. | – | Go to the next step. |
| 2 | VERIFY RELATED REPAIR INFORMATION AVAILABILITY<br>• Verify related Service Bulletins and/or on-line repair information availability.<br>• Is any related repair information available? | Yes | Perform repair or diagnosis according to the available repair information.<br>• If the vehicle is not repaired, go to the next step. |
| | | No | Go to the next step. |
| 3 | VERIFY ENGINE CONDITION<br>• Verify the engine condition.<br>• Is the engine overheating? | Yes | Perform the symptom troubleshooting “NO.22 COOLING SYSTEM CONCERNS-OVERHEATING”.<br>(See NO.22 COOLING SYSTEM CONCERNS-OVERHEATING [SKYACTIV-D 2.2].) |
| | | No | Go to the next step. |

# DTC P0118:00 [PCM (SKYACTIV-D 2.2)]

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| DTC P0118:00 | ECT sensor No.1 circuit high input |
|---|---|
| DETECTION CONDITION | • The PCM monitors the ECT sensor No.1 signal. If the PCM detects that the ECT sensor No.1 voltage at the PCM terminal 1DC is above 4.91 V for 5 s, the PCM determines that the ECT sensor No.1 circuit has a malfunction.<br>MONITORING CONDITIONS<br>— Battery voltage: 8 V or more<br>Diagnostic support note<br>• This is a continuous monitor (CCM).<br>• The check engine light illuminates if the PCM detects the above malfunction condition during the first drive cycle.<br>• FREEZE FRAME DATA/Snapshot data is available.<br>• DTC is stored in the PCM memory. |
| FAIL-SAFE FUNCTION | • PCM restricts engine torque.<br>• Inhibits the automatic diesel particulate filter regeneration control and compulsory diesel particulate filter regeneration control.<br>• Inhibits the DENOx/DESOx control.<br>• Stops activation of the A/F sensor heater.<br>• Inhibits the EGR control.<br>• Inhibits the A/C control.<br>• Increase the idle speed.<br>• PCM restricts engine-transaxle integration control. |
| POSSIBLE CAUSE | • Ambient temperature is too low<br>• ECT sensor No.1 connector or terminals malfunction<br>• PCM connector or terminals malfunction<br>• Short to power supply in wiring harness between ECT sensor No.1 terminal A and PCM terminal 1DC<br>• Open circuit in wiring harness between the following terminals:<br>— ECT sensor No.1 terminal A—PCM terminal 1DC<br>— ECT sensor No.1 terminal B—PCM terminal 1DD<br>• ECT sensor No.1 malfunction<br>• PCM malfunction |

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 8 | VERIFY DTC TROUBLESHOOTING COMPLETED<br>• Always reconnect all disconnected connectors.<br>• Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-D 2.2)].)<br>• Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-D 2.2)].)<br>• Is the same DTC present? | Yes | Repeat the inspection from Step 1.<br>• If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)<br>Go to the next step. |
| | | No | Go to the next step. |
| 9 | VERIFY AFTER REPAIR PROCEDURE<br>• Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-D 2.2)].)<br>• Are any DTCs present? | Yes | Go to the applicable DTC inspection.<br>(See DTC TABLE [PCM (SKYACTIV-D 2.2)].) |
| | | No | DTC troubleshooting completed. |

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 3 | INSPECT INTAKE SHUTTER VALVE CONNECTOR CONDITION<br>• Switch the ignition off.<br>• Disconnect the intake shutter valve connector.<br>• Inspect for poor connection (such as damaged/pulled-out pins, corrosion).<br>• Is there any malfunction? | Yes | Repair or replace the connector and/or terminals, then go to Step 9. |
| | | No | Go to the next step. |
| 4 | INSPECT PCM CONNECTOR CONDITION<br>• Disconnect the PCM connector.<br>• Inspect for poor connection (such as damaged/pulled-out pins, corrosion).<br>• Is there any malfunction? | Yes | Repair or replace the connector and/or terminals, then go to Step 9. |
| | | No | Go to the next step. |
| 5 | INSPECT INTAKE SHUTTER VALVE POSITION SENSOR CIRCUIT FOR SHORT TO GROUND<br>• Verify that the intake shutter valve and PCM connectors are disconnected.<br>• Inspect for continuity between the following terminals (wiring harness-side) and body ground:<br>— Intake shutter valve terminal E<br>— Intake shutter valve terminal F<br>• Is there continuity? | Yes | Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals:<br>• Intake shutter valve terminal E—PCM terminal 1AZ<br>• Intake shutter valve terminal F—PCM terminal 1BA<br>If there is a common connector:<br>• Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for a short to ground.<br>• Repair or replace the malfunctioning part.<br>If there is no common connector:<br>• Repair or replace the wiring harness which has a short to ground.<br>Go to Step 9. |
| | | No | Go to the next step. |
| 6 | INSPECT INTAKE SHUTTER VALVE POSITION SENSOR SIGNAL CIRCUIT AND GROUND CIRCUIT FOR SHORT TO EACH OTHER<br>• Verify that the intake shutter valve and PCM connectors are disconnected.<br>• Inspect for continuity between intake shutter valve terminals F and C (wiring harness-side).<br>• Is there continuity? | Yes | Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals:<br>• Intake shutter valve terminal F—PCM terminal 1BA<br>• Intake shutter valve terminal C—PCM terminal 1AY<br>If there is a common connector:<br>• Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for a short to each other.<br>• Repair or replace the malfunctioning part.<br>If there is no common connector:<br>• Repair or replace the wiring harness which has a short to each other.<br>Go to Step 9. |
| | | No | Go to the next step. |
| 7 | INSPECT INTAKE SHUTTER VALVE POSITION SENSOR CIRCUIT FOR OPEN CIRCUIT<br>• Verify that the intake shutter valve and PCM connectors are disconnected.<br>• Inspect for continuity between the following terminals (wiring harness-side):<br>— Intake shutter valve terminal E—PCM terminal 1AZ<br>— Intake shutter valve terminal F—PCM terminal 1BA<br>• Is there continuity? | Yes | Go to the next step. |
| | | No | Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals:<br>• Intake shutter valve terminal E—PCM terminal 1AZ<br>• Intake shutter valve terminal F—PCM terminal 1BA<br>If there is a common connector:<br>• Determine the malfunctioning part by inspecting the common connector and the terminal for corrosion, damage, or pin disconnection, and the common wiring harness for an open circuit.<br>• Repair or replace the malfunctioning part.<br>If there is no common connector:<br>• Repair or replace the wiring harness which has an open circuit.<br>Go to Step 9. |