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## 1987 MAZDA 121 (Mk.1) OEM Service and Repair Workshop Manual

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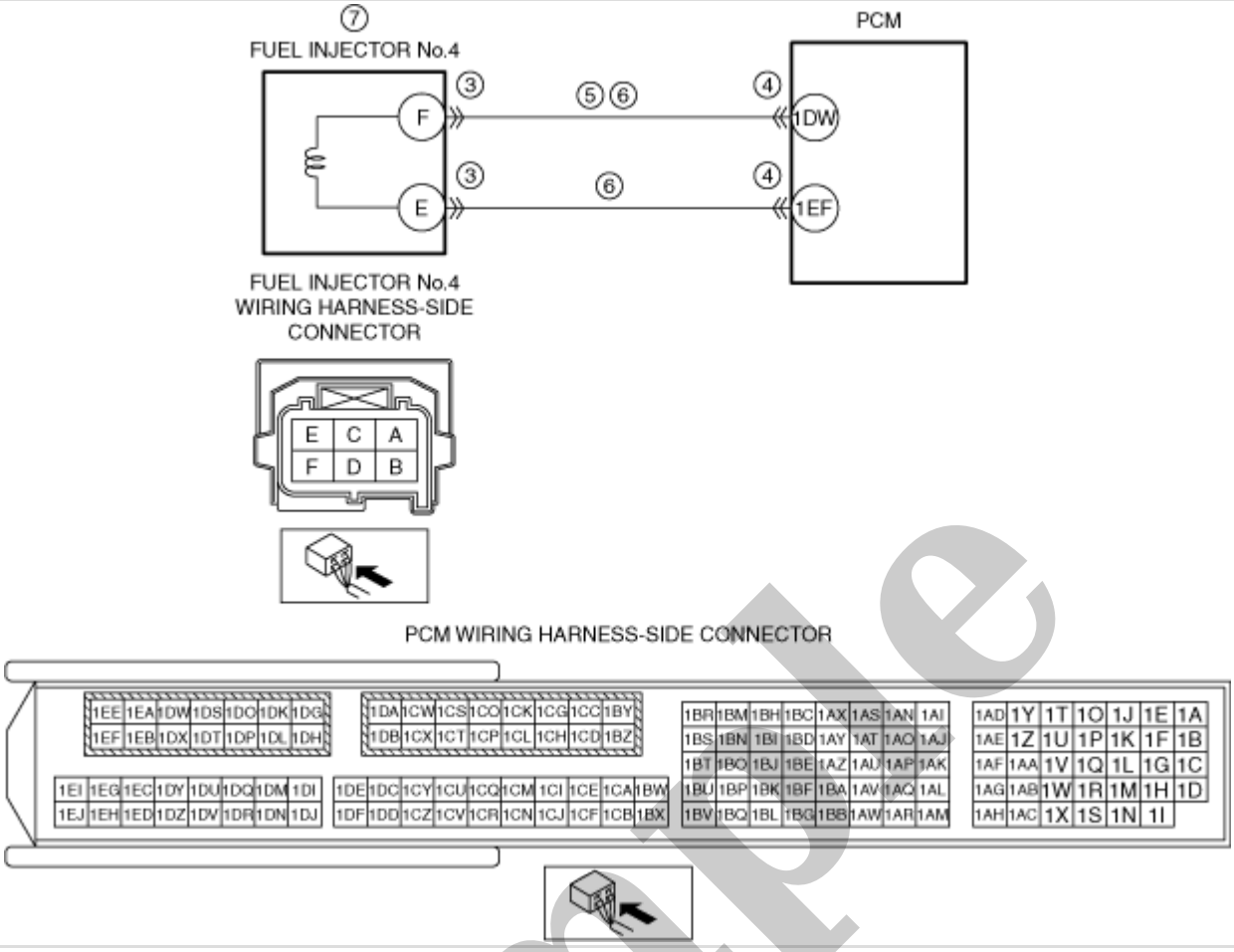
| STEP | INSPECTION | RESULTS | ACTION |
|---|---|---|---|
| 2 | VERIFY RELATED REPAIR INFORMATION AVAILABILITY<br>• Verify related Service Bulletins and/or on-line repair information availability.<br>• Is any related repair information available? | Yes | Perform repair or diagnosis according to the available repair information.<br>• If the vehicle is not repaired, go to the next step. |
| | | No | Go to the next step. |
| 3 | INSPECT DEF QUALITY SENSOR CONNECTOR CONDITION<br>• Switch the ignition off.<br>• Disconnect the DEF quality sensor 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 8. |
| | | No | Go to the next step. |
| 4 | INSPECT DOSING CONTROL UNIT CONNECTOR CONDITION<br>• Disconnect the dosing control unit 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 8. |
| | | No | Go to the next step. |
| 5 | INSPECT DEF QUALITY SENSOR<br>• Switch the ignition off.<br>• Inspect the DEF quality sensor. (See DEF QUALITY SENSOR INSPECTION [SKYACTIV-D 2.2].)<br>• Is there any malfunction? | Yes | Replace the DEF quality sensor, then go to Step 8.<br>(See DEF QUALITY SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) |
| | | No | Go to the next step. |
| 6 | 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 8. |
| | | No | Go to the next step. |
| 7 | VERIFY DOSING CONTROL UNIT MALFUNCTION<br>• Always reconnect all disconnected connectors.<br>• Clear the DTC from the dosing control unit memory using the M-MDS. (See CLEARING DTC [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].)<br>• Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-D 2.2)].)<br>• Perform the DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].)<br>• Is the same DTC present? | Yes | Replace the dosing control unit, then go to the next step.<br>(See DOSING CONTROL UNIT REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) |
| | | No | Go to Step 9. |
| 8 | VERIFY DTC TROUBLESHOOTING COMPLETED<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 | RESULTS | 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><br>Note<br><br>• When this DTC is detected, the vehicle may not be able to be driven due to inducement (laws and regulations requirement) in the SCR system on-board diagnostic. Perform the following according to availability of driving.<br><br>If the vehicle can be driven:<br>— Drive the vehicle at 31 km/h {19 mph} or more for 11 min or more or after the engine is started, idle it until the SCR light and SCR warning light turn off.<br><br>If vehicle cannot be driven:<br>— After the engine is started, idle it until the SCR light and SCR warning light turn off.<br>• Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC 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 | RESULTS | ACTION |
|---|---|---|---|
| 6 | **INSPECT EXHAUST GAS TEMPERATURE SENSOR No.5 SIGNAL CIRCUIT AND GROUND CIRCUIT FOR SHORT TO EACH OTHER**<br>• Verify that the exhaust gas temperature sensor No.5 and PCM connectors are disconnected.<br>• Inspect for continuity between exhaust gas temperature sensor No.5 terminals A and B (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>• Exhaust gas temperature sensor No.5 terminal A–PCM terminal 1DQ<br>• Exhaust gas temperature sensor No.5 terminal B–PCM terminal 1DZ<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 8. |
| | | No | Go to the next step. |
| 7 | **INSPECT EXHAUST GAS TEMPERATURE SENSOR No.5**<br>• Inspect the exhaust gas temperature sensor No.5. (See EXHAUST GAS TEMPERATURE SENSOR INSPECTION [SKYACTIV-D 2.2].)<br>• Is there any malfunction? | Yes | Replace the exhaust gas temperature sensor No.5, then go to the next step.<br>(See EXHAUST GAS TEMPERATURE SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) |
| | | No | 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 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 |
|---|---|---|---|
| 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 | **INSPECT FUEL INJECTOR No.3 CONNECTOR CONDITION**<br>• Switch the ignition off.<br>• Disconnect the fuel injector No.3 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 8. |
| | | 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 8. |
| | | No | Go to the next step. |
| 5 | **INSPECT FUEL INJECTOR No.3 CIRCUIT FOR SHORT TO GROUND**<br>• Verify that the fuel injector No.3 and PCM connectors are disconnected.<br>• Inspect for continuity between fuel injector No.3 terminal F (wiring harness-side) and body ground.<br>• Is there continuity? | Yes | Refer to the wiring diagram and verify whether or not there is a common connector between fuel injector No.3 terminal F and PCM terminal 1DA.<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 8. |
| | | No | Go to the next step. |
| 6 | **INSPECT FUEL INJECTOR No.3 CIRCUIT FOR OPEN CIRCUIT**<br>• Verify that the fuel injector No.3 and PCM connectors are disconnected.<br>• Inspect for continuity between the following terminals (wiring harness-side):<br>— Fuel injector No.3 terminal F–PCM terminal 1DA<br>— Fuel injector No.3 terminal E–PCM terminal 1CS<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>• Fuel injector No.3 terminal F–PCM terminal 1DA<br>• Fuel injector No.3 terminal E–PCM terminal 1CS<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 8. |
| 7 | **INSPECT FUEL INJECTOR No.3**<br>• Inspect the fuel injector No.3. (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2].)<br>• Is there any malfunction? | Yes | Replace the fuel injector No.3, then go to the next step. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) |
| | | No | Go to the next step. |

| DTC P0204:00 | Fuel injector No.4 circuit operating abnormally |
|---|---|




Caution

• If a hand or tool touches a fuel injector terminal or fuel injector connector terminal, the fuel injector might be damaged. To prevent damage to a fuel injector, do not touch the terminals.
• If high-voltage generating parts or components and electronic devices come near a fuel injector, the fuel injector could be damaged. To prevent damage to a fuel injector, always keep high-voltage generating parts or components and electronic devices away from it.

Diagnostic Procedure

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 1 | RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION<br><br>Note<br><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. |

# DTC P0219:00 [PCM (SKYACTIV-D 2.2)]

SM2896021

id0102j514830

| DTC P0219:00 | Engine overspeed condition |
|---|---|
| DETECTION CONDITION | • PCM detects that the engine speed is 5,630 rpm or more.<br>**Diagnostic support note**<br>• This is an intermittent monitor (other).<br>• The check engine light does not illuminate.<br>• FREEZE FRAME DATA/Snapshot data is not available.<br>• DTC is not stored in the PCM memory. |
| FAIL-SAFE FUNCTION | Not applicable |
| POSSIBLE CAUSE | • Engine oil dilution (oil level abnormally high)<br>• ATX system malfunction<br>— Excessive rotation due to improper gear lock<br>• Malfunction caused by the following driving operations:<br>— Excessive rotation due to improper shift operation<br>— Deceleration using improper gear, and descending slope<br>• Crankshaft Position (CKP) sensor malfunction<br>• Camshaft Position (CMP) sensor malfunction<br>• Mechanical (engine) malfunction<br>• Fuel injector malfunction<br>• PCM malfunction |
| SYSTEM WIRING DIAGRAM | Not applicable |

**Caution**

**• If a hand or tool touches a fuel injector terminal or fuel injector connector terminal, the fuel injector might be damaged. To prevent damage to a fuel injector, do not touch the terminals.**
**• If high-voltage generating parts or components and electronic devices come near a fuel injector, the fuel injector could be damaged. To prevent damage to a fuel injector, always keep high-voltage generating parts or components and electronic devices away from it.**

## Diagnostic Procedure

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 1 | **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. |
| 2 | **VERIFY RELATED PENDING CODE AND/OR DTC**<br>• Switch the ignition off, then ON (engine off).<br>• Perform the Pending Trouble Code Access Procedure and DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].)<br>• Is the PENDING CODE/DTC P0336:00 also present? | Yes | Go to the applicable PENDING CODE or DTC inspection.<br>(See DTC P0336:00 [PCM (SKYACTIV-D 2.2)].) |
| | | No | Go to the next step. |

# DTC P0234:00 [PCM (SKYACTIV-D 2.2)]

SM2896022

id0102j514840

**Note**

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

## Details On DTCs

| | | |
|---|---|---|
| **DESCRIPTION** | **Small-type turbocharger overboost condition** | |
| DETECTION CONDITION | Determination conditions | • As the result of comparing the actual air charging pressure with the target air charging pressure, the actual air charging pressure exceeds the specified value higher than the target air charging pressure for a continuous 10 s. |
| | Preconditions | • When any of the following conditions is met:<br>— Intake shutter valve position: 80° or more<br>— Barometric pressure: 72 kPa {0.73 kgf/cm$^2$, 10 psi} or more<br>— Intake air temperature: -10 °C {14 °F} or more<br>— Engine coolant temperature: -10 °C {14 °F} or more<br>— Target intake air pressure: 135 kPa {1.38 kgf/cm$^2$, 19.6 psi} or more<br>— Turbocharger control area: AREA 2 (feedback control range of small-type turbocharger) or AREA 3 (boost stop of small-type turbocharger, full boost of large-type turbocharger)<br>— The following DTCs are not detected:<br>• BARO sensor: P2227:00, P2228:00, P2229:00<br>• EGR cooler bypass valve position sensor: P2494:00, P2495:00<br>• EGR cooler bypass valve: P245A:00, P245B:00, P24A5:00<br>• EGR valve: P0404:00,P0488:00<br>• ECT sensor No.1: P0116:00, P0117:00, P0118:00, P011A:00<br>• Exhaust gas temperature sensor No.1: P0545:00, P0546:00, P2080:00<br>• Exhaust gas pressure sensor No.1: P0471:00, P0472:00, P0473:00<br>• IAT sensor No.1: P0111:00, P0112:00, P0113:00<br>• IAT sensor No.2: P00E9:00, P00EA:00, P00EB:00<br>• MAP sensor No.2: P0106:00, P0107:00, P0108:00<br>• MAF sensor: P0101:00, P0102:00, P0103:00<br>• Intake shutter valve position sensor: P0122:00, P0123:00<br>• Intake shutter valve: P2101:00, P2118:00<br>• Regulating valve position sensor: P2564:00, P2565:00<br>• Regulating valve: P2263:00<br>• Regulating solenoid valve: P0047:00, P0048:00<br>• Compressor bypass solenoid valve: P0034:00, P0035:00<br>• Wastegate solenoid valve: P0245:00, P0246:00<br>• EGR valve position sensor: P0405:00, P0406:00 |
| | Drive cycle | • 2 |
| | Self test type | • CMDTC self test |
| | Sensor used | • MAP sensor No.2<br>• Exhaust gas pressure sensor No.1<br>• Exhaust gas temperature sensor No.1 |

## Function Inspection Using M-MDS

| STEP | INSPECTION | | 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. |
| 2 | **PURPOSE: IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA**<br>• Is the DTC P0234:00 on FREEZE FRAME DATA? | Yes | Go to the next step. |
| | | No | Go to the troubleshooting procedure for DTC on FREEZE FRAME DATA.<br>(See DTC TABLE [PCM (SKYACTIV-D 2.2)].) |
| 3 | **PURPOSE: 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. |
| 4 | **PURPOSE: VERIFY IF DIAGNOSTIC RESULT IS AFFECTED BY OTHER RELATED DTCs OCCURRING**<br>• Switch the ignition off, then ON (engine off).<br>• Perform the Pending Trouble Code Access Procedure and DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].)<br>• Is the other PENDING CODE/DTC also present? | Yes | Go to the applicable DTC inspection.<br>(See DTC TABLE [PCM (SKYACTIV-D 2.2)].) |
| | | No | Go to the next step. |
| 5 | **PURPOSE: VERIFY IF THERE IS PID ITEM CAUSING DRASTIC CHANGES OF ACCELERATION FLUCTUATION BY INPUT SIGNAL TO PCM**<br>• Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].)<br>— MAP_DSD<br>— INTK_MAPA<br>• Is there any signal that is far out of specification? | Yes | Go to the next step. |
| | | No | Go to the troubleshooting procedure to perform the procedure from Step 1. |
| 6 | **PURPOSE: VERIFY CONNECTOR CONNECTIONS**<br>• Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].)<br>— MAP_DSD<br>— INTK_MAPA<br>• When the following parts are shaken, does the PID value include a PID item which has changed?<br>— MAP sensor No.2<br>— PCM | Yes | Inspect the related wiring harness and connector.<br>• Repair or replace the malfunctioning part.<br>Go to the troubleshooting procedure to perform the procedure from Step 6. |
| | | No | Go to the troubleshooting procedure to perform the procedure from Step 1. |



## Troubleshooting Diagnostic Procedure

**Intention of troubleshooting procedure**

• Step 1

— Verify whether malfunction is related wiring harness or other.

| | | |
|---|---|---|
| DESCRIPTION | Small-type turbocharger underboost condition | |
| DETECTION CONDITION | Determination conditions | • The difference between the actual intake air pressure and the target intake air pressure less than the specified value for a continuous 18 s when the following conditions are met. |
| | Preconditions | • When any of the following conditions is met:<br>— Intake shutter valve position: 80° or more<br>— Barometric pressure: 72 kPa {0.73 kgf/cm$^2$, 10 psi} or more<br>— Intake air temperature: -10 °C {14 °F} or more<br>— Engine coolant temperature: -10 °C {14 °F} or more<br>— Target intake air pressure: 135 kPa {1.38 kgf/cm$^2$, 19.6 psi} or more<br>— Turbocharger control area: AREA 1 (full boost of small-type turbocharger) or AREA 2 (feedback control range of small-type turbocharger)<br>— The following DTCs are not detected:<br>• BARO sensor: P2227:00, P2228:00, P2229:00<br>• EGR cooler bypass valve position sensor: P2494:00, P2495:00<br>• EGR cooler bypass valve: P245A:00, P245B:00, P24A5:00<br>• EGR valve: P0404:00,P0488:00<br>• ECT sensor No.1: P0116:00, P0117:00, P0118:00, P011A:00<br>• Exhaust gas temperature sensor No.1: P0545:00, P0546:00, P2080:00<br>• Exhaust gas pressure sensor No.1: P0471:00, P0472:00, P0473:00<br>• IAT sensor No.1: P0111:00, P0112:00, P0113:00<br>• IAT sensor No.2: P00E9:00, P00EA:00, P00EB:00<br>• MAP sensor No.2: P0106:00, P0107:00, P0108:00<br>• MAF sensor: P0101:00, P0102:00, P0103:00<br>• Intake shutter valve position sensor: P0122:00, P0123:00<br>• Intake shutter valve: P2101:00, P2118:00<br>• Regulating valve position sensor: P2564:00, P2565:00<br>• Regulating valve: P2263:00<br>• Regulating solenoid valve: P0047:00, P0048:00<br>• Compressor bypass solenoid valve: P0034:00, P0035:00<br>• Wastegate solenoid valve: P0245:00, P0246:00<br>• EGR valve position sensor: P0405:00, P0406:00 |
| | Drive cycle | • 2 |
| | Self test type | • CMDTC self test |
| | Sensor used | • MAP sensor No.2<br>• Exhaust gas pressure sensor No.1<br>• Exhaust gas temperature sensor No.1 |
| FAIL-SAFE FUNCTION | • Not applicable | |
| VEHICLE STATUS WHEN DTCs ARE OUTPUT | • Check engine light is illuminated | |