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## 1992 MAZDA MX-5 / Miata OEM Service and Repair Workshop Manual

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Sample

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Diagnostic Procedure

| STEP | INSPECTION | RESULTS | ACTION |
|---|---|---|---|
| 1 | **RECORD FREEZE FRAME DATA/SNAPSHOT DATA AND DIAGNOSTIC MONITORING TEST RESULTS 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 and DIAGNOSTIC MONITORING TEST RESULTS (A/F sensor heater, HO2S heater related) 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 | **INSPECT A/F SENSOR CONNECTOR CONDITION**<br>• Switch the ignition off.<br>• Disconnect the A/F 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 9. |
| | | No | Go to the next step. |

Sample

# DTC P0054:00 [PCM (SKYACTIV-G 2.5T)]

SM2896629

id0102s893390

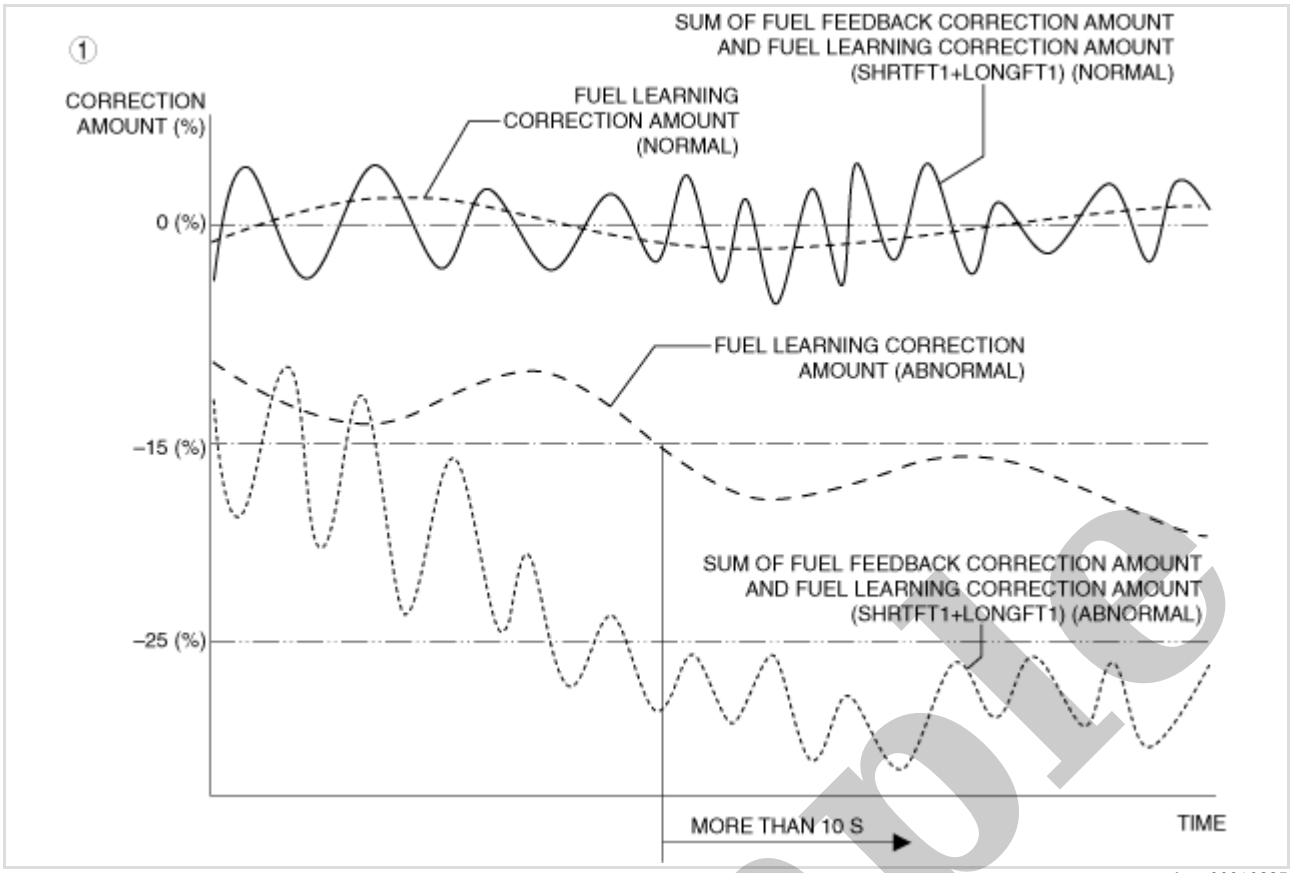
| DTC P0054:00 | HO2S heater resistance |
|---|---|
| DETECTION CONDITION | • The PCM monitors the HO2S heater resistance when under the HO2S heater control. If the resistance is more than 34 ohms, the PCM determines that there is a HO2S heater circuit problem.<br>Diagnostic support note<br>• This is an intermittent monitor (A/F sensor heater, HO2S heater).<br>• The check engine light illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM.<br>• PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle.<br>• FREEZE FRAME DATA/Snapshot data is available.<br>• DTC is stored in the PCM memory. |
| FAIL-SAFE FUNCTION | • Stops fuel feedback control of HO2S |
| POSSIBLE CAUSE | • HO2S connector or terminals malfunction<br>• Short to ground or open circuit in HO2S heater power supply circuit<br>— Short to ground in wiring harness between ENGINE1 15 A fuse and HO2S terminal C<br>— ENGINE1 15 A fuse malfunction<br>— Open circuit in wiring harness between main relay terminal C and HO2S terminal C<br>• HO2S heater malfunction<br>• PCM connector or terminals malfunction<br>• Open circuit in wiring harness between HO2S terminal D and PCM terminal 2C<br>• Short to ground in wiring harness between HO2S terminal D and PCM terminal 2C<br>• PCM malfunction |

Sample

| STEP | INSPECTION | RESULTS | ACTION |
|---|---|---|---|
| 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 9. |
| | | No | Go to the next step. |
| 7 | **INSPECT HO2S HEATER CONTROL CIRCUIT FOR OPEN CIRCUIT**<br>• Verify that the HO2S and PCM connectors are disconnected.<br>• Inspect for continuity between HO2S terminal D (wiring harness-side) and PCM terminal 2C (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 HO2S terminal D and PCM terminal 2C.<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. |
| 8 | **INSPECT HO2S HEATER CONTROL CIRCUIT FOR SHORT TO GROUND**<br>• Verify that the HO2S and PCM connectors are disconnected.<br>• Inspect for continuity between HO2S terminal D (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 HO2S terminal D and PCM terminal 2C.<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 the next step. |
| | | No | Go to the next step. |
| 9 | **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-G 2.5T)].)<br>• Perform the KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5T)].)<br>• Is the same Pending DTC present? | Yes | Repeat the inspection from Step 1.<br>• If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)<br>Go to the next step. |
| | | No | Go to the next step. |
| 10 | **VERIFY AFTER REPAIR PROCEDURE**<br>• Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-G 2.5T)].)<br>• Are any DTCs present? | Yes | Go to the applicable DTC inspection.<br>(See DTC TABLE [PCM (SKYACTIV-G 2.5T)].) |
| | | No | DTC troubleshooting completed. |

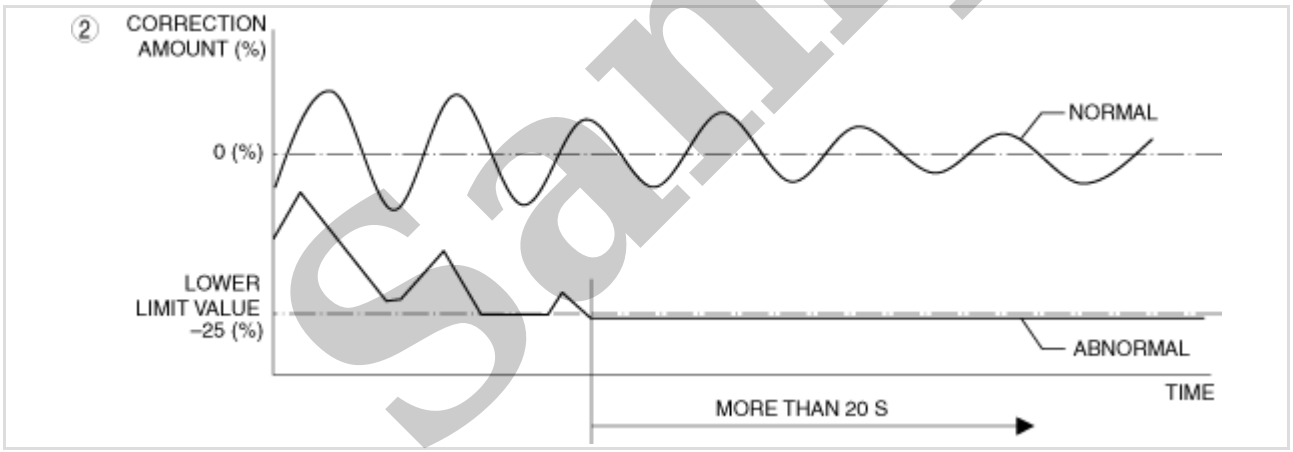
Sample

1. The sum of the fuel feedback correction amount (SHRTFT1) and the fuel learning correction amount (LONGFT1) is the specified value ( −25%) or less, and 10 s or more have elapsed with the fuel learning correction amount (LONGFT1) at the specified value ( −15%) or less. Engine coolant temperature: 0−45 °C {32−113 °F}, 60 °C {140 °F} or more



am6xuw00010895

2. Fuel learning correction amount (LONGFT1) at the specified value ( −25%) or less. Engine coolant temperature: 0−45 °C {32−113 °F} 60 °C {140 °F} or more



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## Repeatability Verification Procedure

1. Warm up the engine to allow the engine coolant temperature to reach 80 °C {176 °F} or more.
2. Start the engine and leave it idling for 1 min.

**Note**

**• Match the engine coolant temperature in the recorded FREEZE FRAME DATA/snapshot data, the vehicle speed, and engine speed values to the best extent possible while driving the vehicle.**

3. 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

Sample

| Item | Applicable component | Unit/Condition | Engine condition | Other condition |
|---|---|---|---|---|
| INJ_1 | Fuel injector No.1 | OFF | • Under the following conditions:<br>— Ignition is switched ON (engine off)<br>— Idle | Warning<br>• Do not use the simulation function while the vehicle is being driven. Stopping the fuel ejection causes the engine to stall which may cause the brakes to not function. |
| INJ_2 | Fuel injector No.2 | OFF | • Under the following conditions:<br>— Ignition is switched ON (engine off)<br>— Idle | |
| INJ_3 | Fuel injector No.3 | OFF | • Under the following conditions:<br>— Ignition is switched ON (engine off)<br>— Idle | |
| INJ_4 | Fuel injector No.4 | OFF | • Under the following conditions:<br>— Ignition is switched ON (engine off)<br>— Idle | |

## 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. |
| 2 | PURPOSE: IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA<br>• Is the DTC P0172:00 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-G 2.5T)].) |
| 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. |

Sample

| STEP | INSPECTION | RESULTS | ACTION |
|---|---|---|---|
| 11 | PURPOSE: VERIFY MAP SENSOR<br>• Start the engine and idle it.<br>• Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].)<br>— MAP<br>— MAP_V<br>• Are all items normal? | Yes | Go to the next step. |
| | | No | Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 7. |
| 12 | PURPOSE: VERIFY INTAKE VALVE TIMING<br>• Start the engine and idle it.<br>• Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].)<br>— VT_IN_ACT<br>— VT_IN_DES<br>• Depress the accelerator pedal to increase the engine speed.<br>• Does the monitor value of the PID item VT_IN_ACT conform to the VT_IN_DES PID value? | Yes | Go to the next step. |
| | | No | Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 8. |
| 13 | PURPOSE: VERIFY EXHAUST VALVE TIMING<br>• Start the engine and idle it.<br>• Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].)<br>— VT_EX_ACT<br>— VT_EX_DES<br>• Perform the following:<br>1. Warm up the engine to allow the engine coolant temperature to reach 80 °C {176 °F} or more.<br>2. Shift to D position and rapidly accelerate the vehicle to 50 km/h {31 mph} (to operate hydraulic variable valve timing control).<br>3. Decelerate to idling.<br>4. Shift to D position and rapidly accelerate the vehicle to 50 km/h {31 mph} again.<br>• Does the monitor value of the PID item VT_EX_ACT conform to the VT_EX_DES PID value? | Yes | Go to the next step. |
| | | No | Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 11. |
| 14 | PURPOSE: VERIFY A/F SENSOR<br>• Access the O2S11 PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].)<br>• Is the O2S11 PID value normal? | Yes | Go to the next step. |
| | | No | Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 12. |
| 15 | PURPOSE: VERIFY DTC<br>• Switch the ignition off, then ON (engine off).<br>• Retrieve the PCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].)<br>• Are any DTCs present? | Yes | Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5T)].)<br>Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 1. |
| | | No | Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 1. |

Sample

## Troubleshooting Diagnostic Procedure

### Intention of troubleshooting procedure

# DTC P0504:00 [PCM (SKYACTIV-G 2.5T)]

SM2896464

id0102s815560

| DTC P0504:00 | Brake switch circuit problem |
|---|---|
| DETECTION CONDITION | • The condition in which the brake switch No.1 and No.2 signals are both on or off continues for 3 s or more and the condition is repeated 5 times.<br>**Diagnostic support note**<br>• This is a continuous monitor (other).<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 | • Not applicable |
| POSSIBLE CAUSE | **Caution**<br>**• Inspect the brake switch with it installed to the brake pedal, otherwise the brake switch may not operate normally. If the brake switch is removed from the brake pedal, replace the brake switch with a new one.**<br>• Brake switch connector or terminals malfunction<br>• Short to ground or open circuit in brake switch No.1 power supply circuit<br>— Short to ground in wiring harness between MAIN 200 A fuse and brake switch terminal A<br>— MAIN 200 A fuse and/or STOP 10 A fuse malfunction<br>— Open circuit in wiring harness between battery positive terminal and brake switch terminal A<br>• Open circuit in wiring harness between brake switch terminal B and body ground<br>• Short to ground in wiring harness between the following terminals:<br>— Brake switch terminal D—PCM terminal 2G<br>— Brake switch terminal C—PCM terminal 2R<br>• PCM connector or terminals malfunction<br>• Short to power supply in wiring harness between the following terminals:<br>— Brake switch terminal D—PCM terminal 2G<br>— Brake switch terminal C—PCM terminal 2R<br>• Open circuit in wiring harness between the following terminals:<br>— Brake switch terminal D—PCM terminal 2G<br>— Brake switch terminal C—PCM terminal 2R<br>• Brake switch malfunction<br>• PCM malfunction |

Sample

| STEP | INSPECTION | RESULTS | ACTION |
|---|---|---|---|
| 6 | **INSPECT BRAKE SWITCH No.2 GROUND CIRCUIT FOR OPEN CIRCUIT**<br>• Verify that the brake switch connector is disconnected.<br>• Inspect for continuity between brake switch terminal B (wiring harness-side) and body ground.<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 brake switch terminal B and body ground.<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>• Inspect for the following:<br>— Open circuit between brake switch and body ground<br>— Loose or lifting ground point<br>• Repair or replace the malfunctioning part.<br>Go to Step 12. |
| 7 | **INSPECT BRAKE SWITCH CIRCUIT FOR SHORT TO GROUND**<br>• Verify that the brake switch connector is disconnected.<br>• Inspect for continuity between the following terminals (wiring harness-side) and body ground:<br>— Brake switch terminal D<br>— Brake switch terminal C<br>• Is there continuity? | Yes | Disconnect the PCM connector and inspect the wiring harness for short to ground.<br>• If the short to ground circuit could be detected in the wiring harness:<br>— Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals:<br>• Brake switch terminal D—PCM terminal 2G<br>• Brake switch terminal C—PCM terminal 2R<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>• If the short to ground circuit could not be detected in the wiring harness:<br>— Replace the PCM (short to ground in the PCM internal circuit). (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)<br>Go to Step 12. |
| | | No | Go to the next step. |
| 8 | **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 12. |
| | | No | Go to the next step. |

Sample

Diagnostic Procedure

| STEP | INSPECTION | RESULTS | 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 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 | **INSPECT AIR BYPASS VALVE CONNECTOR CONDITION**<br>• Switch the ignition off.<br>• Disconnect the air bypass 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. |

Sample