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1992 MAZDA RX-7 (FC) OEM Service and Repair Workshop Manual

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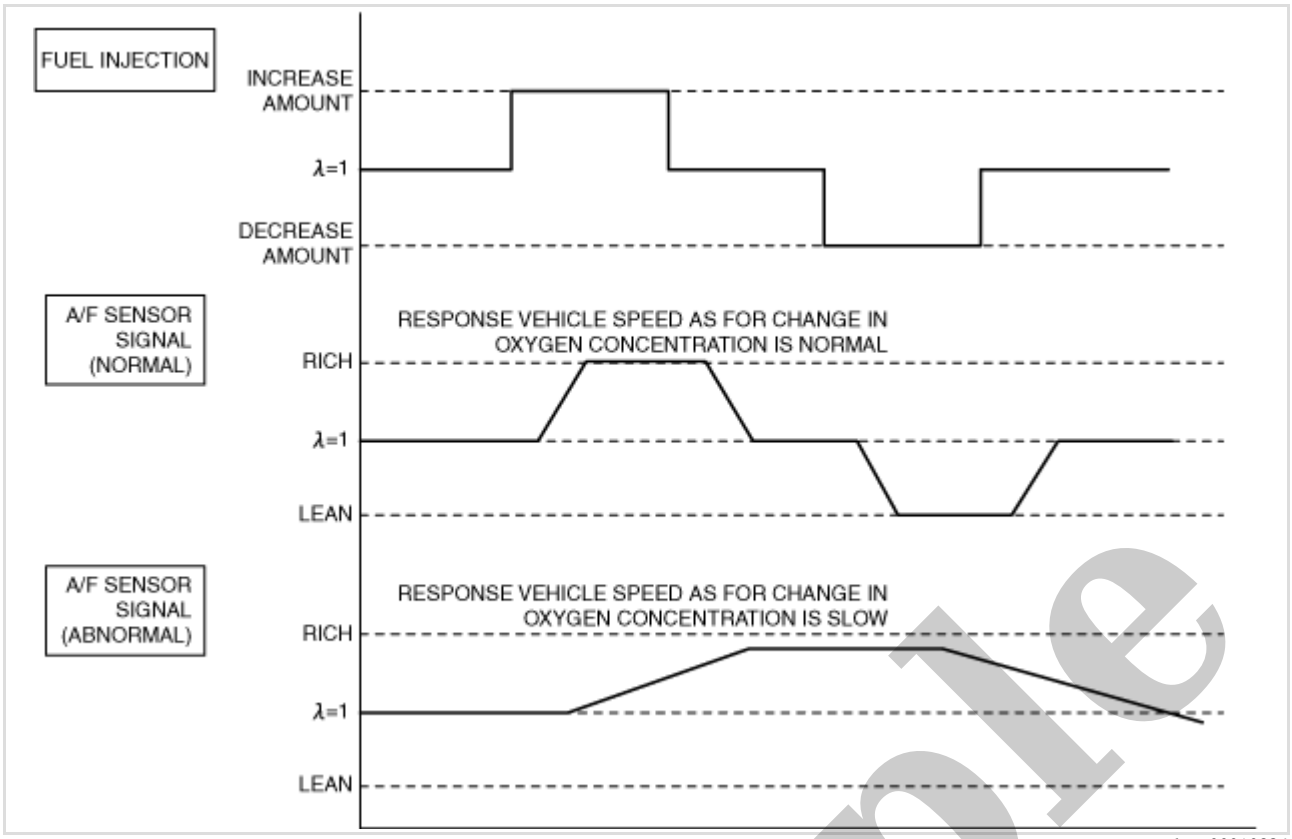
speed of the A/F sensor to sudden changes in the oxygen concentration. If the response speed of the signal input from the A/F sensor is slow while switching repeatedly between rich and lean, the PCM determines an A/F sensor malfunction and stores a DTC.



am6xuw00010824

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.
3. Shift to 3rd gear and drive the vehicle for 10 min at an engine speed of 1,500 rpm or more and a vehicle speed of 50 km/h {31 mph} or more.

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.

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

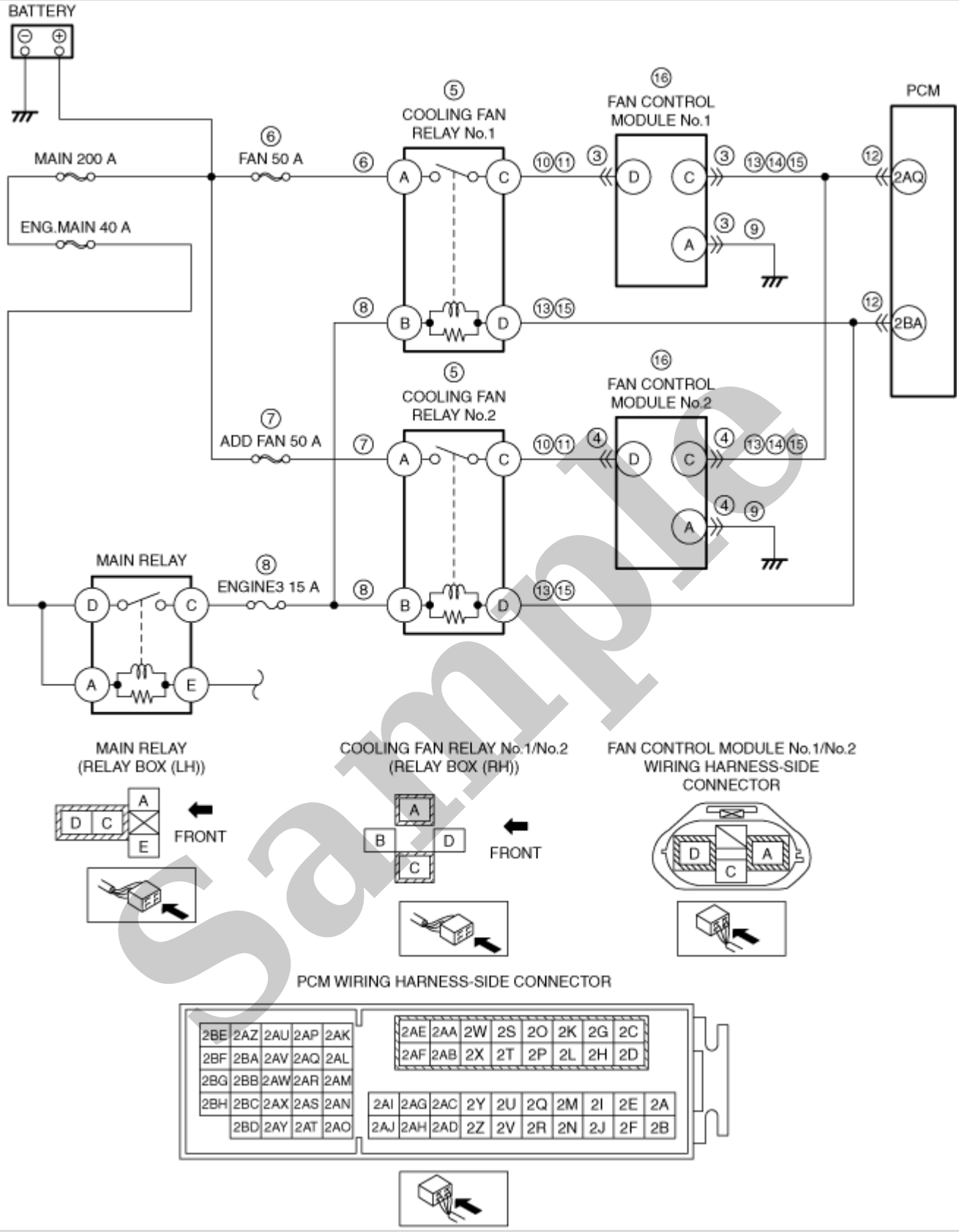
PID Item/Simulation Item Used In Diagnosis

PID/DATA monitor item table

Item	Definition	Unit	Condition/Specification
HTR11	A/F sensor heater operation status	Off/On	• Ignition switched ON (engine off): Off • Idle (after warm up): On
	A/F sensor heater control duty value	%	• Ignition switched ON (engine off): 0% • Idle (after warm up): 32−34%
O2S11	A/F sensor current	μA	• Idle (after warm up): 0−50 μA • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 3.84 mA

STEP	INSPECTION	RESULTS	ACTION
6	PURPOSE: VERIFICATION OF VEHICLE REPAIR COMPLETION • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5T)].) • Implement the repeatability verification procedure. (See Repeatability Verification Procedure.) • Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	DTC troubleshooting completed.

DTC P0480:00	Cooling fan control circuit malfunction



Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
7	**INSPECT COOLING FAN RELAY No.2 POWER SUPPLY CIRCUIT FOR SHORT TO GROUND OR OPEN CIRCUIT** • Cooling fan relay No.1 and No.2 are removed. • Verify that the fan control module No.1 and No.2 connectors are disconnected. • Measure the voltage at the cooling fan relay No.2 terminal A (wiring harness-side). • Is the voltage B+?	Yes	Go to the next step.
		No	Inspect the ADD FAN 50 A fuse. • If the fuse is blown: — Refer to the wiring diagram and verify whether or not there is a common connector between ADD FAN 50 A fuse and cooling fan relay No.2 terminal A. **If there is a common connector:** • 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. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has a short to ground. • Replace the fuse. • If the fuse is damaged: — Replace the fuse. • If the fuse is normal: — Refer to the wiring diagram and verify whether or not there is a common connector between battery positive terminal and cooling fan relay No.2 terminal A. **If there is a common connector:** • 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. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has an open circuit. Go to Step 17.

STEP	INSPECTION	RESULTS	ACTION
12	**INSPECT PCM CONNECTOR CONDITION** • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the connector and/or terminals, then go to Step 17.
		No	Go to the next step.
13	**INSPECT FAN CONTROL MODULE AND COOLING FAN RELAY CIRCUITS FOR SHORT TO GROUND** • Cooling fan relay No.1 and No.2 are removed. • Verify that the fan control module No.1, fan control module No.2 and PCM connectors are disconnected. • Inspect for continuity between the following terminals (wiring harness-side) and body ground: — Fan control module No.1 terminal C — Fan control module No.2 terminal C — Cooling fan relay No.1 terminal D — Cooling fan relay No.2 terminal D • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: • Fan control module No.1 terminal C—PCM terminal 2AQ • Fan control module No.2 terminal C—PCM terminal 2AQ • Cooling fan relay No.1 terminal D—PCM terminal 2BA • Cooling fan relay No.2 terminal D—PCM terminal 2BA **If there is a common connector:** • 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. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has a short to ground. Go to Step 17.
		No	Go to the next step.
14	**INSPECT FAN CONTROL MODULE No.1 AND No.2 SIGNAL CIRCUITS FOR SHORT TO POWER SUPPLY** • Cooling fan relay No.1 and No.2 are removed. • Verify that the fan control module No.1, fan control module No.2 and PCM connectors are disconnected. • Switch the ignition ON (engine off). **Note** **• Another DTC may be stored by the PCM detecting an open circuit.** • Measure the voltage at the following terminals (wiring harness-side): — Fan control module No.1 terminal C — Fan control module No.2 terminal C • 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 the following terminals: • Fan control module No.1 terminal C—PCM terminal 2AQ • Fan control module No.2 terminal C—PCM terminal 2AQ **If there is a common connector:** • 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. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has a short to power supply. Go to Step 17.

STEP	INSPECTION	RESULTS	ACTION
1	RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION **Note** **• Recording can be facilitated using the screen capture function of the PC.** • Record the FREEZE FRAME DATA/snapshot data on the repair order.	–	Go to the next step.
2	VERIFY RELATED REPAIR INFORMATION AVAILABILITY • Verify related Service Bulletins and/or on-line repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	VERIFY STORED DTC IN DSC HU/CM • Retrieve the DSC HU/CM DTC using the M-MDS. (See DTC INSPECTION [DSC HU/CM].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [DSC HU/CM].)
		No	Go to the next step.
4	VERIFY DTC TROUBLESHOOTING COMPLETED • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5T)].) • Access the RPM and LOAD PIDs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) **Caution** **• While performing this step, always operate the vehicle in a safe and lawful manner.** **• When the M-MDS is used to observe monitor system status while driving, be sure to have another technician with you, or record the data in the M-MDS using the PID/DATA MONITOR AND RECORD capturing function and inspect later.** • Drive the vehicle under the following conditions for 14 s. — Shift position: except P or N position — Absolute load: above 40 % — Engine speed: above 2,000 rpm — Brake switch: OFF • Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • Is the same Pending DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.
5	VERIFY AFTER REPAIR PROCEDURE • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-G 2.5T)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5T)].)
		No	DTC troubleshooting completed.

DTC P0601:00 [PCM (SKYACTIV-G 2.5T)]

SM2896564

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DTC P0601:00	PCM memory check sum error
DETECTION CONDITION	• PCM internal memory check sum error. Diagnostic support note • This is a continuous monitor (CCM). • The check engine light illuminates if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA/Snapshot data is available. • DTC is stored in the PCM memory.
FAIL-SAFE FUNCTION	• Restricts the upper limit of the engine speed. • Stops the drive-by-wire control (throttle valve is open at approx. 8 ° by return spring force).
POSSIBLE CAUSE	• PCM connector or terminals malfunction • PCM malfunction — PCM internal memory malfunction
SYSTEM WIRING DIAGRAM	• Not applicable

Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
1	RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION Note • Recording can be facilitated using the screen capture function of the PC. • Record the FREEZE FRAME DATA/snapshot data on the repair order.	–	Go to the next step.
2	VERIFY RELATED REPAIR INFORMATION AVAILABILITY • Verify related Service Bulletins and/or on-line repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	INSPECT PCM CONNECTOR CONDITION • Switch the ignition off. • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the connector and/or terminals, then go to the next step.
		No	Go to the next step.
4	VERIFY DTC TROUBLESHOOTING COMPLETED • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5T)].) • Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5T)].) • Is the same Pending DTC present?	Yes	Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
1	**RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION** **Note** **• Recording can be facilitated using the screen capture function of the PC.** • Record the FREEZE FRAME DATA/snapshot data on the repair order.	–	Go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related Service Bulletins and/or on-line repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT BOOST PRESSURE SENSOR/BOOST AIR TEMPERATURE SENSOR CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the boost pressure sensor/boost air temperature sensor connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • 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	**DETERMINE IF BOOST AIR TEMPERATURE SENSOR OR WIRING HARNESS MALFUNCTION** • Verify that the boost pressure sensor/boost air temperature sensor connector is disconnected. • Switch the ignition ON (engine off). **Note** **• Another DTC may be stored by the PCM detecting an open circuit.** • Measure the voltage at the boost pressure sensor/boost air temperature sensor terminal B (wiring harness-side). • Is the voltage approx. 5 V?	Yes	Replace the boost pressure sensor/boost air temperature sensor, then go to Step 9. (See BOOST PRESSURE SENSOR/BOOST AIR TEMPERATURE SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.

DTC P007C:00 [PCM (SKYACTIV-G 2.5T)]

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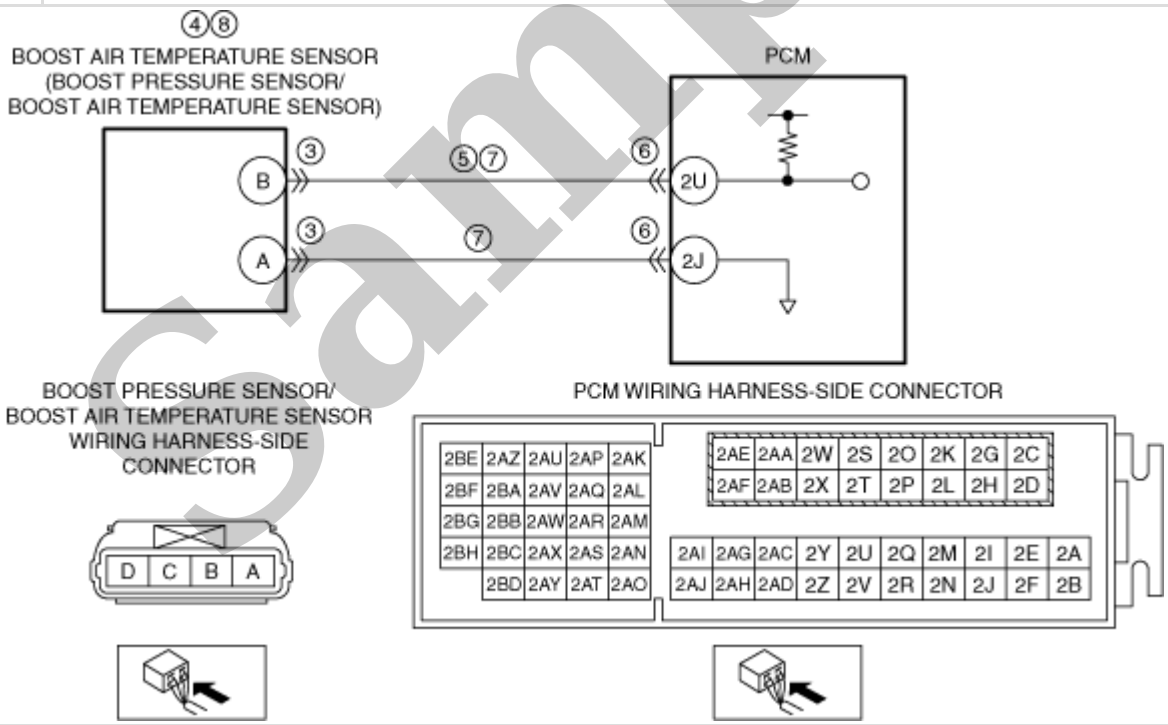
DTC P007C:00	Boost air temperature sensor circuit low input
DETECTION CONDITION	• The PCM monitors the input signal from the boost air temperature sensor. If the voltage from the boost air temperature sensor is below 0.13 V, the PCM determines that the boost air temperature sensor circuit has a malfunction. Diagnostic support note • This is a continuous monitor (CCM). • The check engine light illuminates if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA/Snapshot data is available. • DTC is stored in the PCM memory.
FAIL-SAFE FUNCTION	• Not applicable
POSSIBLE CAUSE	• Boost pressure sensor/boost air temperature sensor connector or terminals malfunction • Boost air temperature sensor malfunction • Short to ground in wiring harness between boost pressure sensor/boost air temperature sensor terminal B and PCM terminal 2U • PCM connector or terminals malfunction • Boost air temperature sensor signal circuit and ground circuit are shorted to each other • PCM malfunction
	

Diagnostic Procedure