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

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Sample

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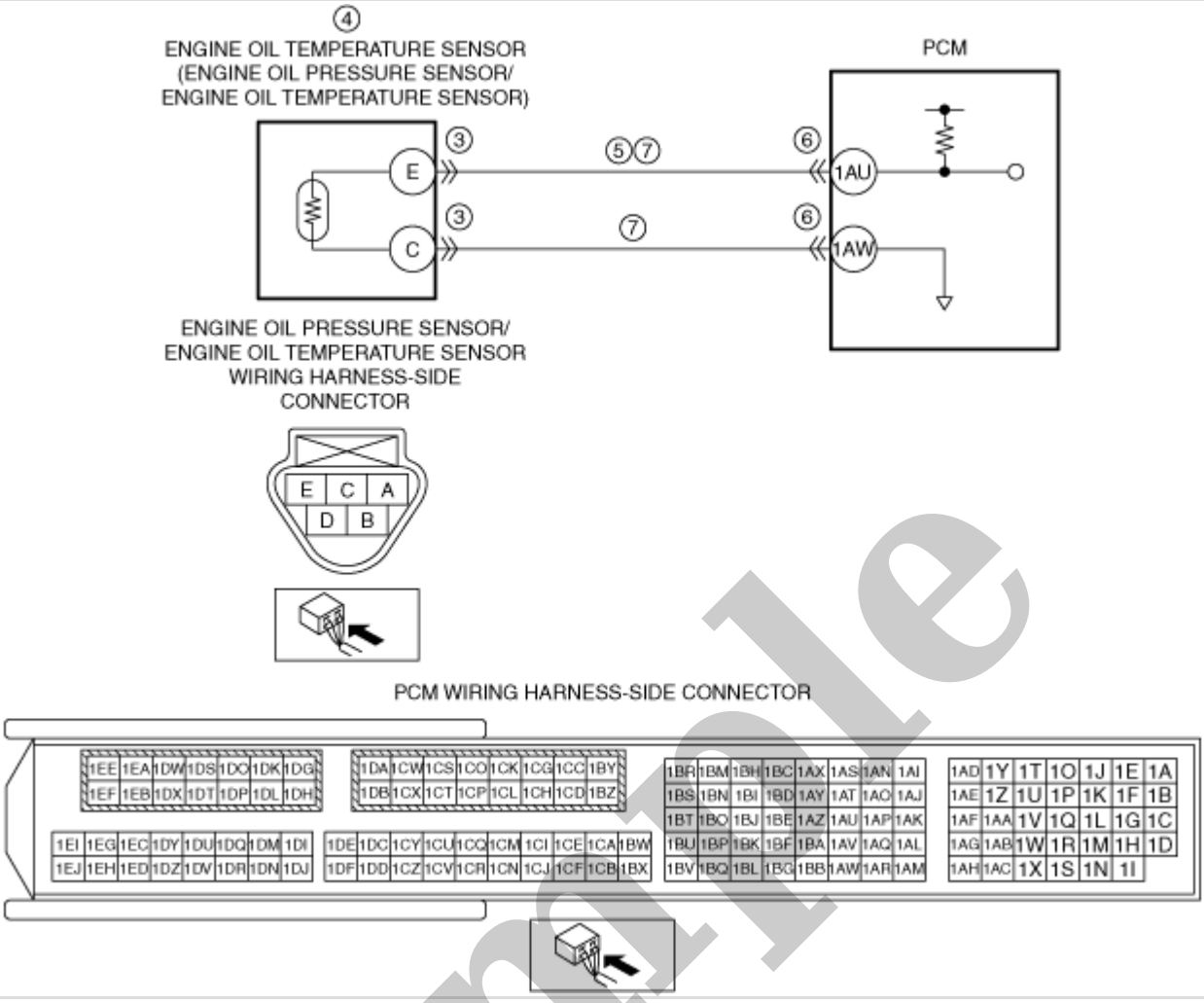
STEP	INSPECTION	RESULTS	ACTION
9	VERIFY DTC TROUBLESHOOTING COMPLETED • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5T)].) • Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5T)].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].) Go to the next step.
		No	Go to the next step.
10	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.

Sample

STEP	INSPECTION	RESULTS	ACTION
7	**DETERMINE IF BOOST AIR TEMPERATURE SENSOR SIGNAL CIRCUIT OR BOOST AIR TEMPERATURE SENSOR GROUND CIRCUIT MALFUNCTION** • Switch the ignition off. • Disconnect the boost pressure sensor/boost air temperature sensor connector. • Access the TP_UP_TEMP PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • Verify the TP_UP_TEMP PID value. • Is the TP_UP_TEMP PID value 5 V or B+?	Yes	Go to the next step.
		No	Go to Step 9.
8	**INSPECT BOOST AIR TEMPERATURE SENSOR SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Verify that the boost pressure sensor/boost air temperature sensor connector is disconnected. • Switch the ignition off. • Disconnect the PCM connector. • Inspect for continuity between boost pressure sensor/boost air temperature sensor terminal B (wiring harness-side) and PCM terminal 2U (wiring harness-side). • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between boost pressure sensor/boost air temperature sensor terminal B and PCM terminal 2U. **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 10.
		No	Refer to the wiring diagram and verify whether or not there is a common connector between boost pressure sensor/boost air temperature sensor terminal B and PCM terminal 2U. **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 10.
9	**INSPECT BOOST AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN CIRCUIT** • Verify that the boost pressure sensor/boost air temperature sensor connector is disconnected. • Switch the ignition off. • Disconnect the PCM connector. • Inspect for continuity between boost pressure sensor/boost air temperature sensor terminal A (wiring harness-side) and PCM terminal 2J (wiring harness-side). • Is there continuity?	Yes	Replace the boost pressure sensor/boost air temperature sensor, then go to the next step. (See BOOST PRESSURE SENSOR/BOOST AIR TEMPERATURE SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Refer to the wiring diagram and verify whether or not there is a common connector between boost pressure sensor/boost air temperature sensor terminal A and PCM terminal 2J. **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 the next step.

Sample

DTC P0197:00	Engine oil temperature sensor circuit low input



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 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.

Sample

DTC P0198:00 [PCM (SKYACTIV-G 2.5T)]

SM2896473

id0102s821210

DTC P0198:00	Engine oil temperature sensor circuit high input
DETECTION CONDITION	• The PCM monitors the engine oil temperature sensor signal. If the PCM detects that the engine oil temperature sensor voltage at the PCM terminal 1AU is above 4.95 V for 4 s, the PCM determines that the engine oil temperature sensor circuit has a malfunction. MONITORING CONDITIONS — Battery voltage: 8–20 V — 0.5 s have elapsed after the ignition was switched ON (engine off or on) Diagnostic support note • This is a continuous monitor (CCM). • The check engine light does not illuminate. • FREEZE FRAME DATA is not available. • Snapshot data is available. • DTC is stored in the PCM memory.
FAIL-SAFE FUNCTION	• Not applicable
POSSIBLE CAUSE	• Engine oil pressure sensor/engine oil temperature sensor connector or terminals malfunction • PCM connector or terminals malfunction • Short to power supply in wiring harness between engine oil pressure sensor/engine oil temperature sensor terminal E and PCM terminal 1AU • Open circuit in wiring harness between the following terminals: — Engine oil pressure sensor/engine oil temperature sensor terminal E–PCM terminal 1AU — Engine oil pressure sensor/engine oil temperature sensor terminal C–PCM terminal 1AW • Engine oil temperature sensor malfunction • PCM malfunction

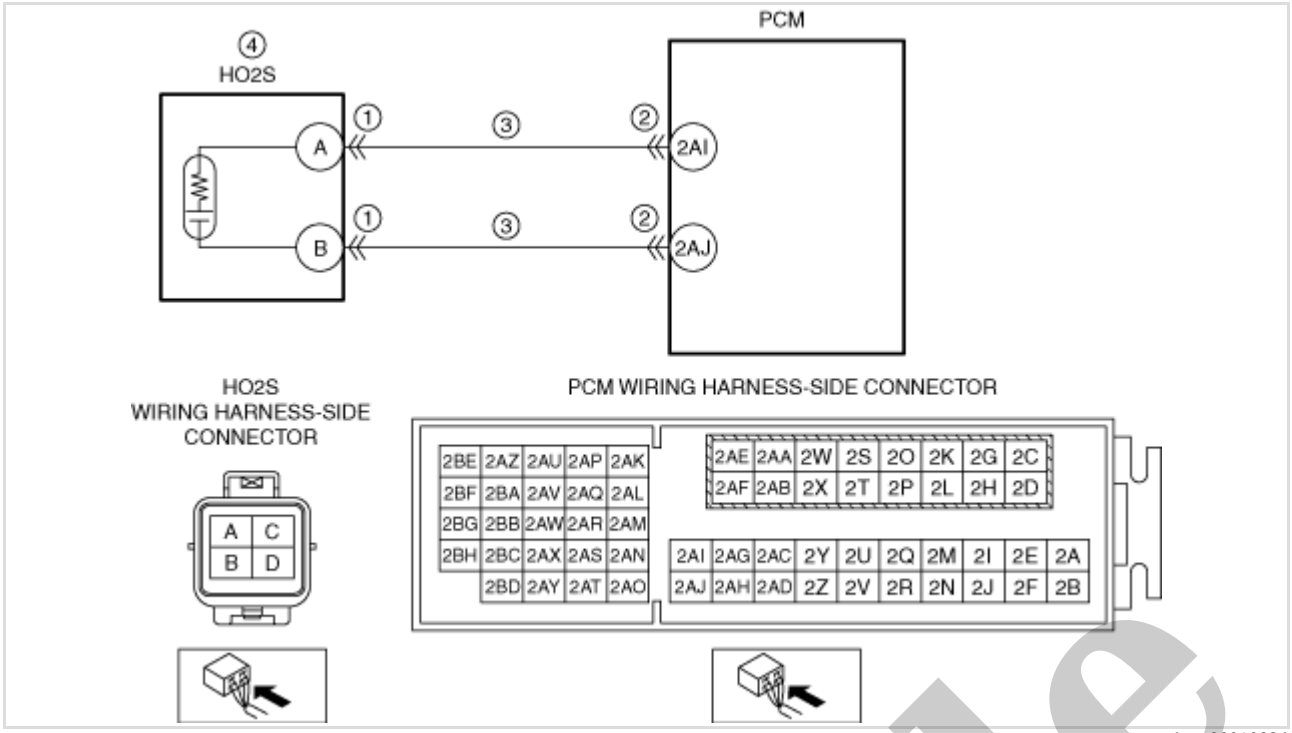
Sample

STEP	INSPECTION	RESULTS	ACTION
8	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	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].) Go to the next step.
		No	Go to the next step.
9	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.

Sample

STEP	INSPECTION	RESULTS	ACTION
1	**PURPOSE: 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.
2	**PURPOSE: IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is the DTC P0134:00 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedure for DTC on FREEZE FRAME DATA. (See DTC TABLE [PCM (SKYACTIV-G 2.5T)].)
3	**PURPOSE: RECORD FREEZE FRAME DATA/SNAPSHOT DATA AND DIAGNOSTIC MONITORING TEST RESULTS 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 and DIAGNOSTIC MONITORING TEST RESULTS (A/F sensor, HO2S related) on the repair order.	–	Go to the next step.
4	**PURPOSE: VERIFY DTC** • Switch the ignition off, then ON (engine off). • Perform the Pending Trouble Code Access Procedure and DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5T)].) Go to the next step.
		No	Go to the next step.
5	**PURPOSE: PERFORM DTC INSPECTION RELATED TO A/F SENSOR OPEN CIRCUIT** • Perform the DTC P2243:00 and DTC P2251:00 procedure. (See DTC P2243:00 [PCM (SKYACTIV-G 2.5T)].) (See DTC P2251:00 [PCM (SKYACTIV-G 2.5T)].)	–	Go to the next step.
6	**PURPOSE: VERIFY A/F SENSOR INPUT SIGNAL** • Start the engine and warm it up completely. • Access the O2S11 PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • Drive the vehicle under the following conditions. **Warning** **• 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.** **• While performing this step, always operate the vehicle in a safe and lawful manner.** — After increasing the engine speed to 3,000 rpm, decelerate using engine braking. • Is the displayed PID value as follows? — O2S11: 0.25 mA or more	Yes	Go to the Troubleshooting Diagnostic Procedure to perform the procedure from Step 2.
		No	Go to the next step.

Sample



am6xuw00010826

Function Explanation (DTC Detection Outline)

• The PCM detects the oxygen concentration in the exhaust gas based on the HO2S signal. The PCM determines a HO2S signal error based on the condition in which the HO2S input voltage continues to exceed the specified value, and stores a DTC.

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

• Not applicable

Function Inspection Using M-MDS

STEP	INSPECTION	RESULTS	ACTION
1	PURPOSE: 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.

Sample

DTC P0140:00 [PCM (SKYACTIV-G 2.5T)]

SM2896548

id0102s870270

Note

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

Details On DTCs

DESCRIPTION	**HO2S circuit no activity detected**	
DETECTION CONDITION	Determination conditions	• With the estimated temperature of the HO2S element exceeding the specified value, a condition in which the HO2S signal voltage is less than the specified value continues for the specified period.
	Preconditions	• Battery voltage: above 11 V *1 • The following DTCs are not detected: — HO2S: P0137:00, P0138:00 — ECT sensor: P0117:00, P0118:00 — MAF sensor: P0101:00, P0102:00, P0103:00 *1: Standard can be verified by displaying PIDs using M-MDS
	Drive cycle	• 2
	Self test type	• CMDTC self test
	Sensor used	• HO2S
FAIL-SAFE FUNCTION	• Not applicable	
VEHICLE STATUS WHEN DTCs ARE OUTPUT	• Illuminates check engine light.	
POSSIBLE CAUSE	• HO2S signal line error — HO2S connector or terminals malfunction — PCM connector or terminals malfunction — Short to ground in wiring harness between HO2S terminal A and PCM terminal 2AI — Open circuit in wiring harness between HO2S terminal A and PCM terminal 2AI • HO2S loose • HO2S malfunction • Exhaust gas leakage from exhaust system (between A/F sensor and HO2S) • Insufficient engine compression • HO2S heater malfunction • PCM malfunction	

System Wiring Diagram

Sample

— Perform an inspection of the engine compression.

• Step 9

— Perform an inspection of the HO2S heater.

• Step 10–11

— Verify that the primary malfunction is resolved and there are no other malfunctions.

STEP	INSPECTION	RESULTS	ACTION
1	PURPOSE: INSPECT HO2S CONNECTOR CONDITION • Switch the ignition off. • Disconnect the HO2S 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 10.
		No	Go to the next step.
2	PURPOSE: 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 10.
		No	Go to the next step.
3	PURPOSE: INSPECT HO2S SIGNAL CIRCUIT FOR SHORT TO GROUND • Verify that the HO2S and PCM connectors are disconnected. • Inspect for continuity between HO2S terminal A (wiring harness-side) and body ground. • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between HO2S terminal A and PCM terminal 2AI. **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 10.
		No	Go to the next step.
4	PURPOSE: INSPECT HO2S CIRCUIT FOR OPEN CIRCUIT • Verify that the HO2S and PCM connectors are disconnected. • Inspect for continuity between HO2S terminal A (wiring harness-side) and PCM terminal 2AI (wiring harness-side). • 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 A and PCM terminal 2AI. **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 10.
5	PURPOSE: INSPECT INSTALLATION OF HO2S • Verify the installation condition of the HO2S (installation angle, tightening torque value). (See HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].) • Is the HO2S installed securely?	Yes	Go to the next step.
		No	Retighten the HO2S, then go to Step 10. (See HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)

Sample