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1995 MAZDA RX-7 (FD) OEM Service and Repair Workshop Manual

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STEP	INSPECTION	RESULTS	ACTION
5	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 2.5 (WITH CYLINDER DEACTIVATION))].) • Start the engine and warm it up completely. **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 snapshot data condition. • Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) • Is the PENDING CODE for this DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) Go to the next step.
		No	Go to the next step.
6	VERIFY AFTER REPAIR PROCEDURE • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)
		No	DTC troubleshooting completed.

STEP	INSPECTION	RESULTS	ACTION
3	**INSPECT FUEL GAUGE SENDER UNIT (MAIN) CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the fuel gauge sender unit (main) 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 13.
		No	**2WD:** • Go to Step 5. **AWD:** • Go to the next step.
4	**INSPECT FUEL GAUGE SENDER UNIT (SUB) CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the fuel gauge sender unit (sub) 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 13.
		No	Go to the next step.
5	**INSPECT REAR BODY CONTROL MODULE (RBCM) CONNECTOR CONDITION** • Disconnect the rear body control module (RBCM) 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 13.
		No	Go to the next step.
6	**INSPECT FUEL GAUGE SENDER UNIT (MAIN) SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Verify that the fuel gauge sender unit (main) and rear body control module (RBCM) 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 fuel gauge sender unit (main) terminal D (wiring harness-side). • Is the voltage 0 V?	Yes	**2WD:** • Go to Step 8. **AWD:** • Go to the next step.
		No	Refer to the wiring diagram and verify whether or not there is a common connector between fuel gauge sender unit (main) terminal D and rear body control module (RBCM) terminal 3I. **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 13.
7	**INSPECT FUEL GAUGE SENDER UNIT (SUB) SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Verify that the fuel gauge sender unit (sub) and rear body control module (RBCM) 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 fuel gauge sender unit (sub) terminal A (wiring harness-side). • 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 fuel gauge sender unit (sub) terminal A and rear body control module (RBCM) terminal 3K. **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 13.

DTC P0462:00 [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))]

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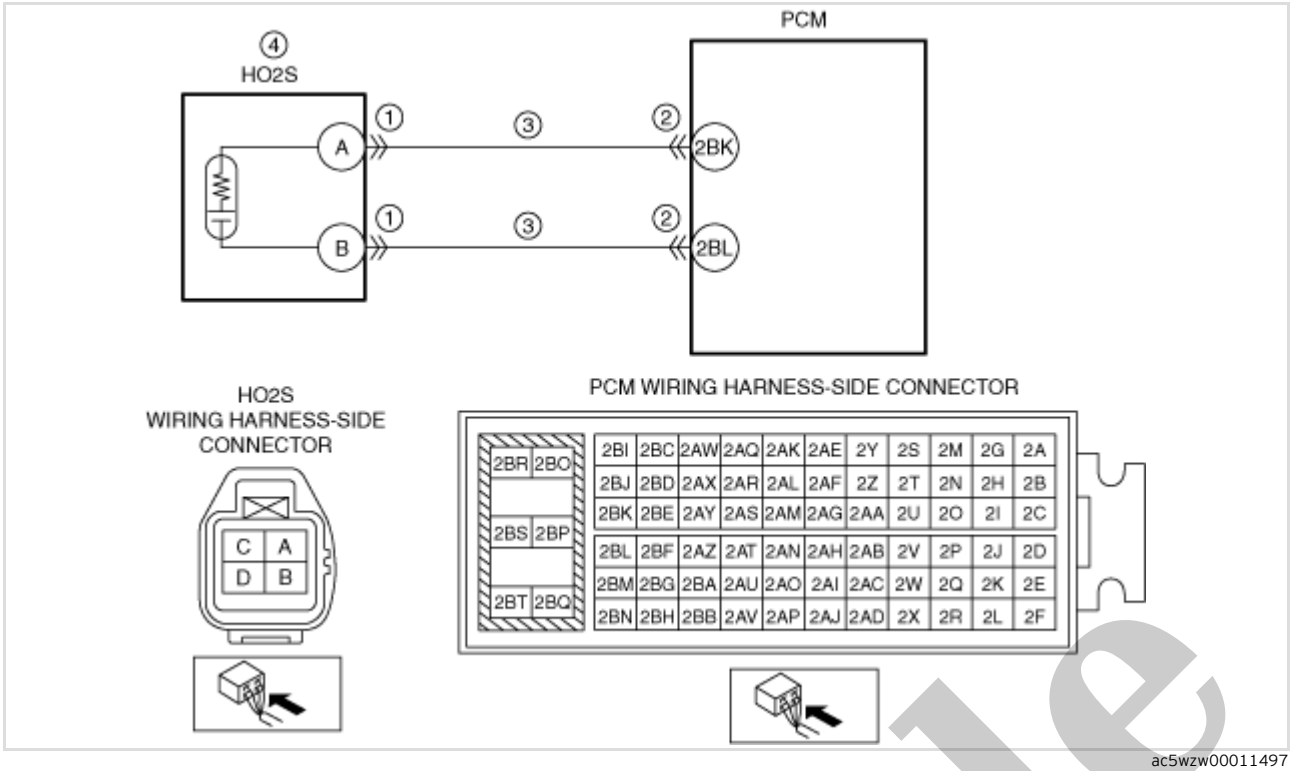
DTC P0462:00	Fuel gauge sender unit circuit low input
DETECTION CONDITION	• The PCM monitors the fuel level signal and fuel gauge sender unit output voltage from the instrument cluster. If the PCM detects that the fuel level, fuel gauge sender unit output voltage is too low, the PCM determines that the fuel gauge sender unit 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	• Fuel gauge sender unit (main) connector or terminals malfunction • Fuel gauge sender unit (sub) connector or terminals malfunction (AWD) • Rear body control module (RBCM) connector or terminals malfunction • Short to ground in wiring harness between the following terminals: — Fuel gauge sender unit (main) terminal D—Rear body control module (RBCM) terminal 3I — Fuel gauge sender unit (sub) terminal A—Rear body control module (RBCM) terminal 3K (AWD) • Fuel gauge sender unit (main) signal circuit and ground circuit are shorted to each other • Fuel gauge sender unit (sub) signal circuit and ground circuit are shorted to each other (AWD) • Fuel gauge sender unit (main) malfunction • Fuel gauge sender unit (sub) malfunction (AWD) • Rear body control module (RBCM) malfunction • Instrument cluster malfunction • PCM malfunction

STEP	INSPECTION	RESULTS	ACTION
8	**INSPECT FUEL GAUGE SENDER UNIT (MAIN) SIGNAL CIRCUIT AND GROUND CIRCUIT FOR SHORT TO EACH OTHER** • Verify that the fuel gauge sender unit (main) and rear body control module (RBCM) connectors are disconnected. • Inspect for continuity between fuel gauge sender unit (main) terminals D and C (wiring harness-side). • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: • Fuel gauge sender unit (main) terminal D–Rear body control module (RBCM) terminal 3I • Fuel gauge sender unit (main) terminal C–Rear body control module (RBCM) terminal 3C **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 each other. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has a short to each other. Go to Step 13.
		No	**2WD:** • Go to Step 10. **AWD:** • Go to the next step.
9	**INSPECT FUEL GAUGE SENDER UNIT (SUB) SIGNAL CIRCUIT AND GROUND CIRCUIT FOR SHORT TO EACH OTHER** • Verify that the fuel gauge sender unit (sub) and rear body control module (RBCM) connectors are disconnected. • Inspect for continuity between fuel gauge sender unit (sub) terminals A and B (wiring harness-side). • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: • Fuel gauge sender unit (sub) terminal A–Rear body control module (RBCM) terminal 3K • Fuel gauge sender unit (sub) terminal B–Rear body control module (RBCM) terminal 3C **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 each other. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has a short to each other. Go to Step 13.
		No	Go to the next step.
10	**INSPECT FUEL GAUGE SENDER UNIT** • Inspect the fuel gauge sender unit (main) or fuel gauge sender unit (sub) (AWD). (See FUEL GAUGE SENDER UNIT INSPECTION [2WD].) (See FUEL GAUGE SENDER UNIT INSPECTION [AWD].) • Is there any malfunction?	Yes	Replace the fuel gauge sender unit (main) or fuel gauge sender unit (sub) (AWD), then go to Step 13. (See FUEL GAUGE SENDER UNIT REMOVAL/INSTALLATION [2WD].) (See FUEL GAUGE SENDER UNIT REMOVAL/INSTALLATION [AWD].)
		No	Go to the next step.
11	**INSPECT REAR BODY CONTROL MODULE (RBCM)** • Inspect the rear body control module (RBCM). (See REAR BODY CONTROL MODULE (RBCM) INSPECTION.) • Is there any malfunction?	Yes	Replace the rear body control module (RBCM), then go to Step 13. (See REAR BODY CONTROL MODULE (RBCM) REMOVAL/INSTALLATION.)
		No	Go to the next step.
12	**INSPECT INSTRUMENT CLUSTER** • Inspect the instrument cluster. (See INSTRUMENT CLUSTER INSPECTION.) • Is there any malfunction?	Yes	Replace the instrument cluster, then go to the next step. (See INSTRUMENT CLUSTER REMOVAL/INSTALLATION.)
		No	Go to the next step.

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	**DETERMINE IF TP SENSOR No.2 OR WIRING HARNESS MALFUNCTION** • Access the TP2 PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) • Verify the TP2 PID value. • Is the TP2 PID value 5 V or B+?	Yes	Go to Step 7.
		No	Go to the next step.
4	**INSPECT THROTTLE BODY CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the throttle body 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.
5	**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 9.
		No	Go to the next step.
6	**INSPECT TP SENSOR No.2** • Reconnect all disconnected connectors. • Inspect the TP sensor No.2. (See THROTTLE POSITION (TP) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the throttle body, then go to Step 9. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [SKYACTIV-G (WITHOUT EGR COOLER)].) (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [SKYACTIV-G (WITH EGR COOLER)].)
		No	Go to Step 9.
7	**INSPECT TP SENSOR No.2 SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Switch the ignition off. • Disconnect the throttle body connector. • Access the TP2 PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) • Verify the TP2 PID value. • Is the TP2 PID value 5 V or B+?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between throttle body terminal C and PCM terminal 1V. **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 9.
		No	Go to the next step.



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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.

DTC P0140:00 [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))]

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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 No.1: P0117:00, P0118:00 — MAF sensor: P0100:00, P0101:00, U060F: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 2BK — Open circuit in wiring harness between HO2S terminal A and PCM terminal 2BK • 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

— Perform an exhaust system parts inspection.

• Step 8

— Perform an inspection of the engine compression.

• Step 9

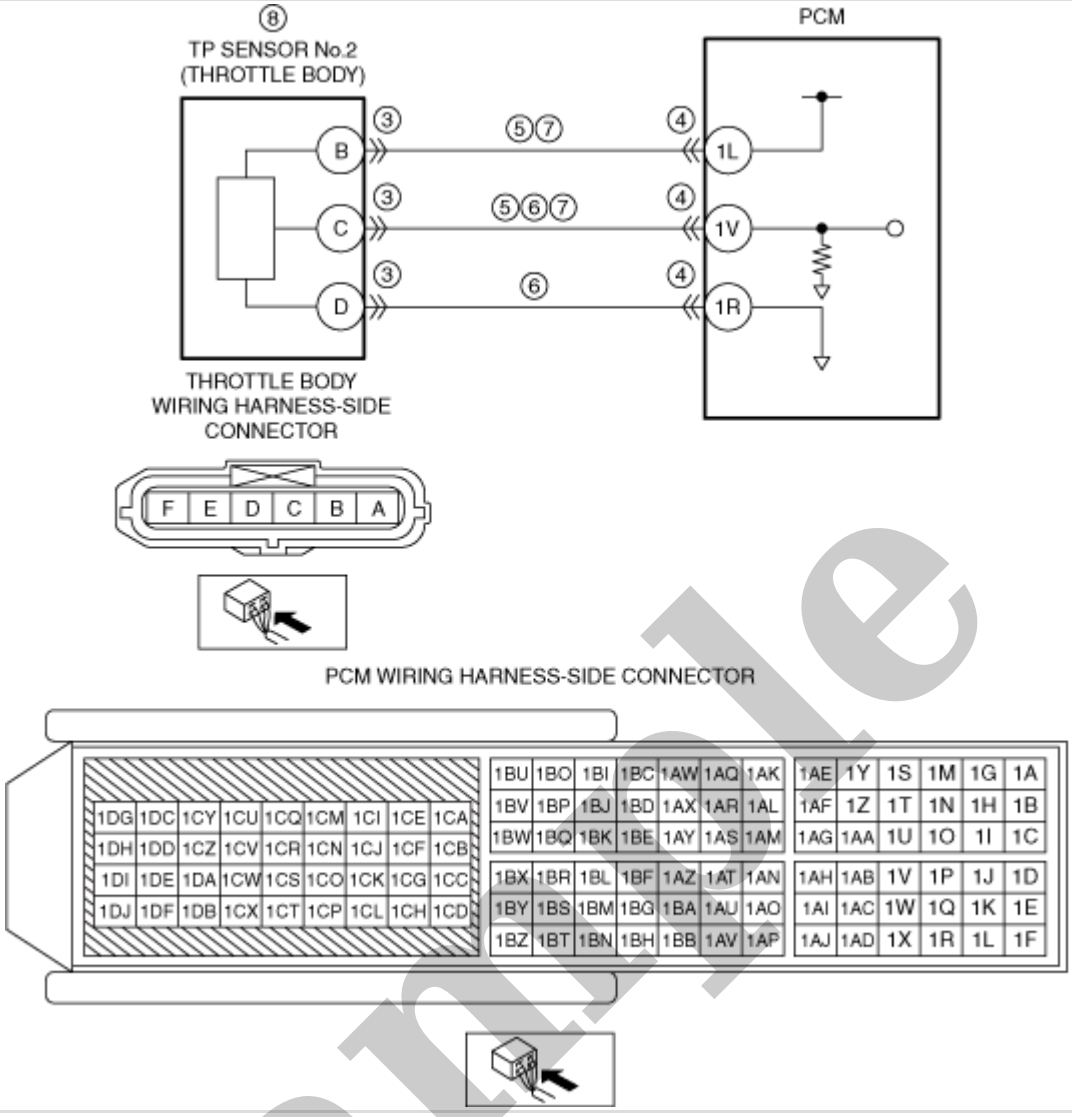
— Perform an inspection of the HO2S heater.

• 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 2BK. 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 2BK (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 2BK. 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 2.5 (WITH CYLINDER DEACTIVATION)].) • 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 2.5 (WITH CYLINDER DEACTIVATION)].)

DTC P0222:00	TP sensor No.2 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 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.