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1997 MAZDA 626 (Mk.5) Sedan OEM Service and Repair Workshop Manual

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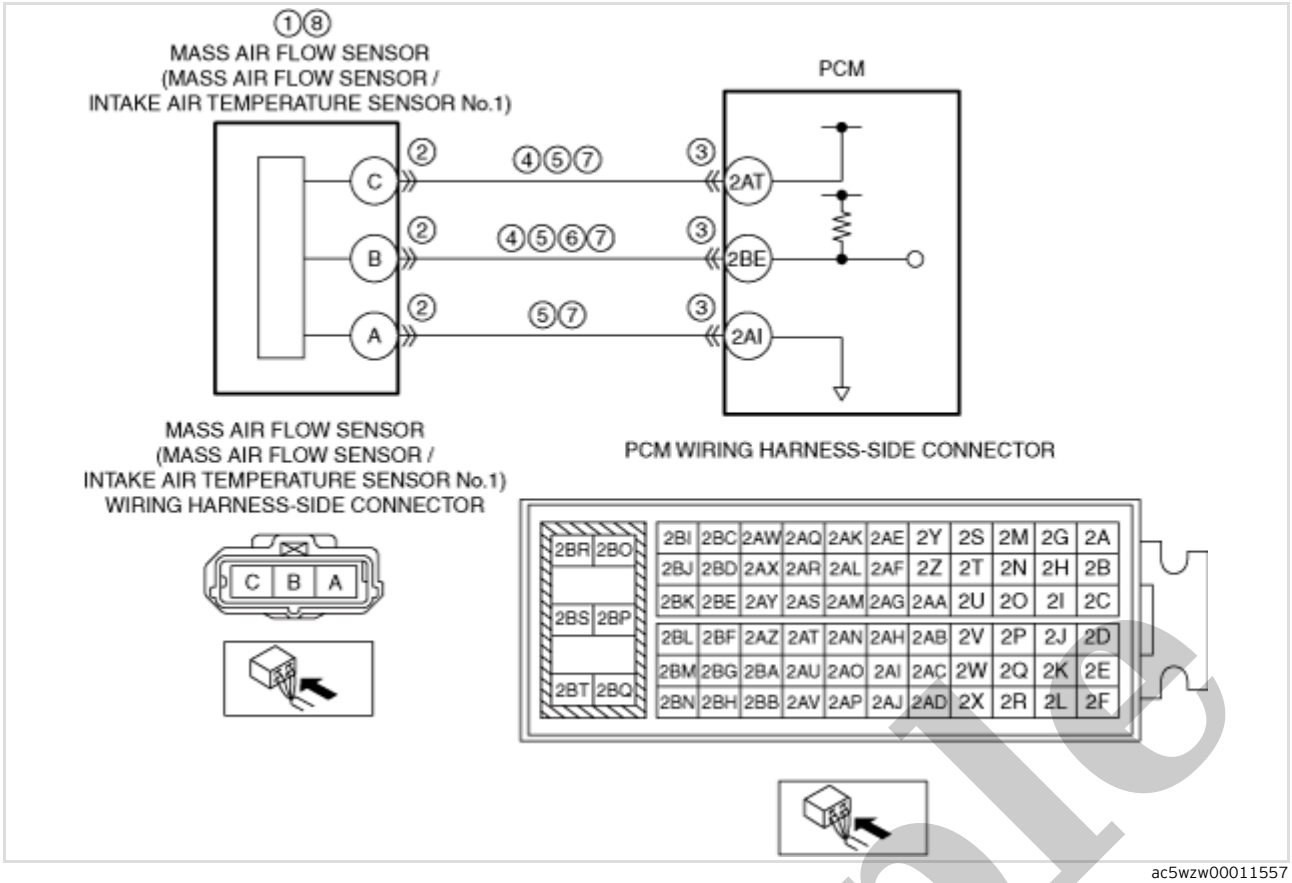

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Function Explanation (DTC Detection Outline)

• When there is an internal malfunction in IAT sensor No.1, the MAF sensor/IAT sensor No.1 sends a malfunction signal to the PCM. When the PCM receives a malfunction signal from the MAF sensor/IAT sensor No.1, the MAF sensor/IAT sensor No.1 determines an internal malfunction and stores a DTC. In addition, when the PCM receives a value other than the preset standard for the output value from IAT sensor No.1 continuously, the PCM determines that there is an internal malfunction in the MAF sensor/IAT sensor No.1 and stores a DTC.

Repeatability Verification Procedure

• Not applicable

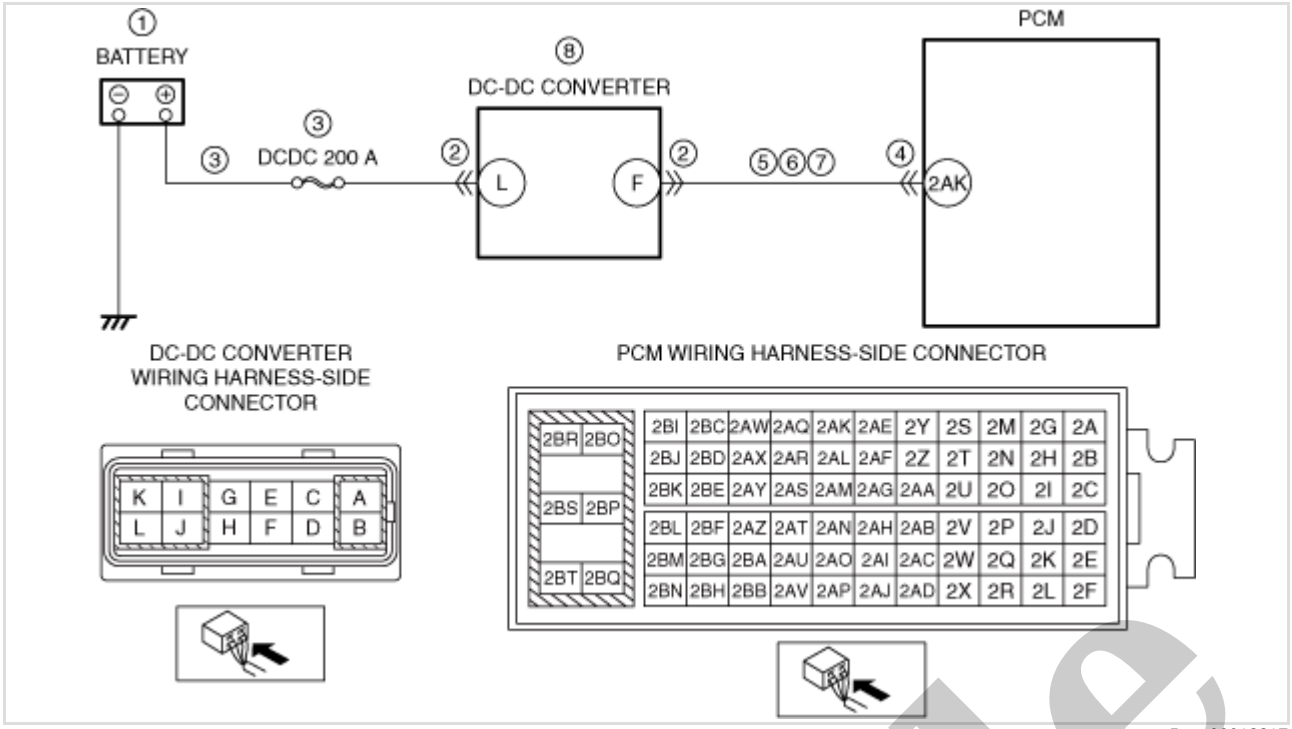
PID Item/Simulation Item Used In Diagnosis

PID/DATA monitor item table

–: Not applicable

Item	Definition	Unit	Condition/Specification
MAF	Mass air flow input from MAF sensor	g/Sec	• Displays MAF
	MAF sensor voltage	V	• Ignition switched ON (engine off) (MAF: 0.00 g/s {0 lb/min}): Approx. 1.69 V (ECT is 53 °C {127 °F}) • Idle (after warm up) (MAF: 2.50 g/s {0.331 lb/min}): Approx. 1.89 V (ECT is 93 °C {199 °F}) • Racing (engine speed is 2,000 rpm) (MAF: 3.80 g/s {0.503 lb/min}): Approx. 2.02 V (ECT is 95 °C {203 °F})

STEP	INSPECTION	RESULTS	ACTION
5	**INSPECT MAF SENSOR/IAT SENSOR No.1 CIRCUIT FOR OPEN CIRCUIT** • Verify that the MAF sensor/IAT sensor No.1 and PCM connectors are disconnected. • Inspect for continuity between the following terminals (wiring harness-side): — MAF sensor/IAT sensor No.1 terminal A–PCM terminal 2AI — MAF sensor/IAT sensor No.1 terminal B–PCM terminal 2BE — MAF sensor/IAT sensor No.1 terminal C–PCM terminal 2AT • 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: • MAF sensor/IAT sensor No.1 terminal A–PCM terminal 2AI • MAF sensor/IAT sensor No.1 terminal B–PCM terminal 2BE • MAF sensor/IAT sensor No.1 terminal C–PCM terminal 2AT **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 9.
6	**INSPECT MAF SENSOR/IAT SENSOR No.1 SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Verify that the MAF sensor/IAT sensor No.1 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 MAF sensor/IAT sensor No.1 terminal B (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 MAF sensor/IAT sensor No.1 terminal B and PCM terminal 2BE. **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.
7	**INSPECT MAF SENSOR/IAT SENSOR No.1 CIRCUITS FOR SHORT TO EACH OTHER** • Verify that the MAF sensor/IAT sensor No.1 and PCM connectors are disconnected. • Inspect for continuity between MAF sensor/IAT sensor No.1 terminals A, C 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: • MAF sensor/IAT sensor No.1 terminal A–PCM terminal 2AI • MAF sensor/IAT sensor No.1 terminal B–PCM terminal 2BE • MAF sensor/IAT sensor No.1 terminal C–PCM terminal 2AT **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 9.
		No	Go to the next step.



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Function Explanation (DTC Detection Outline)

• The DC-DC converter is equipped with a boost function to stabilize the power supply to the vehicle's electrical devices when the engine is restarted by i-stop. If the DC-DC converter does not operate, the supply voltage to the vehicle's electrical devices decreases. In this diagnostic, the response condition of the DC-DC converter to the boost demand from the PCM, or the boost by the on-board diagnostic function of the DC-DC converter is not detected, and verification of vehicle malfunctions/safety assurance is performed.

Repeatability Verification Procedure

1. Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].)
2. Start the engine.
3. Stop the engine by operating the i-stop function.

PID Item/Simulation Item Used In Diagnosis

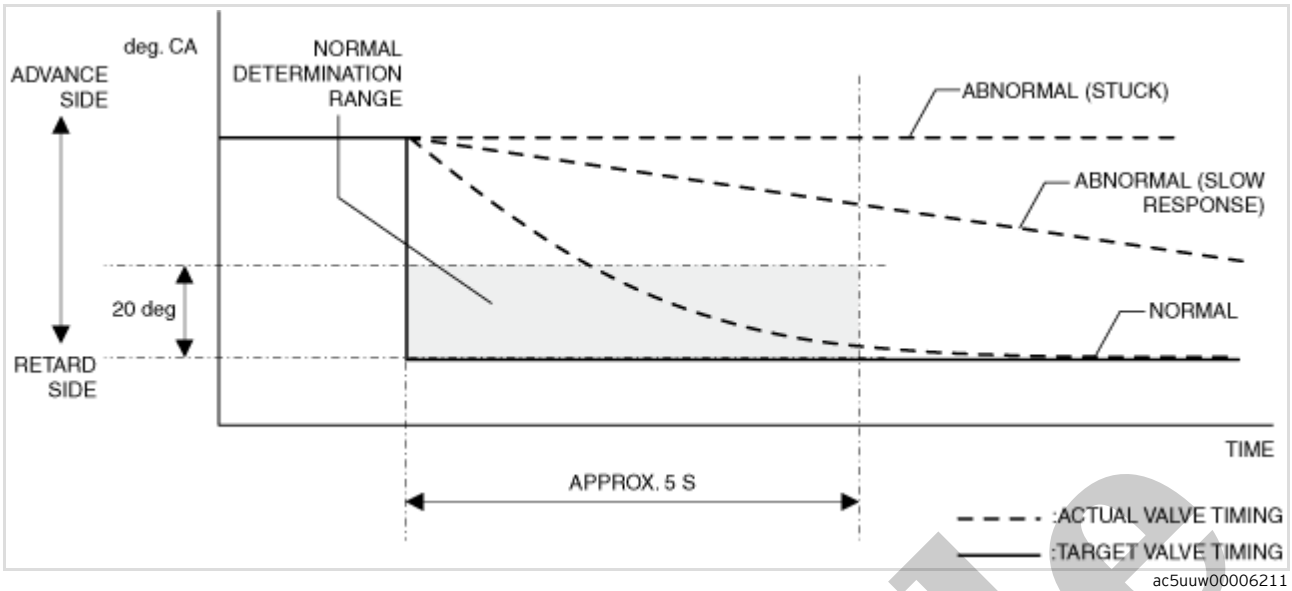
• Not applicable

Function Inspection Using M-MDS

STEP	INSPECTION	RESULTS	ACTION
1	PURPOSE: VERIFY RELATED REPAIR INFORMATION OR SERVICE INFORMATION AVAILABILITY • Verify related Service Bulletins, on-line repair information, or Service Information availability. • Is any related Information available?	Yes	Perform repair or diagnosis according to the available information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.

STEP	INSPECTION		ACTION
5	**PURPOSE: INSPECT DC-DC CONVERTER SIGNAL CIRCUIT FOR SHORT TO GROUND** • Verify that the DC-DC converter and PCM connectors are disconnected. • Inspect for continuity between DC-DC converter terminal F (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 DC-DC converter terminal F and PCM terminal 2AK. **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 8.
		No	Go to the next step.
6	**PURPOSE: INSPECT DC-DC CONVERTER SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Verify that the DC-DC converter 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 DC-DC converter terminal F (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 DC-DC converter terminal F and PCM terminal 2AK. **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 8.
7	**PURPOSE: INSPECT DC-DC CONVERTER SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Verify that the DC-DC converter and PCM connectors are disconnected. • Switch the ignition off. • Inspect for continuity between DC-DC converter terminal F (wiring harness-side) and PCM terminal 2AK (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 DC-DC converter terminal F and PCM terminal 2AK. **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.
8	**PURPOSE: 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))].) • Implement the repeatability verification procedure. (See Repeatability Verification Procedure.) • Perform the DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) • Is the same Pending DTC present?	Yes	Replace the DC-DC converter, and then perform Step 8 again. (See DC-DC CONVERTER REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • 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.

• With the preconditions met, the PCM verifies the conformity of the actual timing relative to the target valve timing. If it does not conform to the normal determination range (difference between target valve timing and actual valve timing is 20 degrees or less) during the malfunction determination period (approx. 5 s), even if the target valve timing is set to the retard side, the PCM determines an excess advance malfunction condition 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. Shift to D position and rapidly accelerate the vehicle to 50 km/h {31 mph} (to operate hydraulic variable valve timing control).
3. Decelerate to idling.
4. Shift to D position and rapidly accelerate the vehicle to 50 km/h {31 mph} again.

PID Item Used In Diagnosis

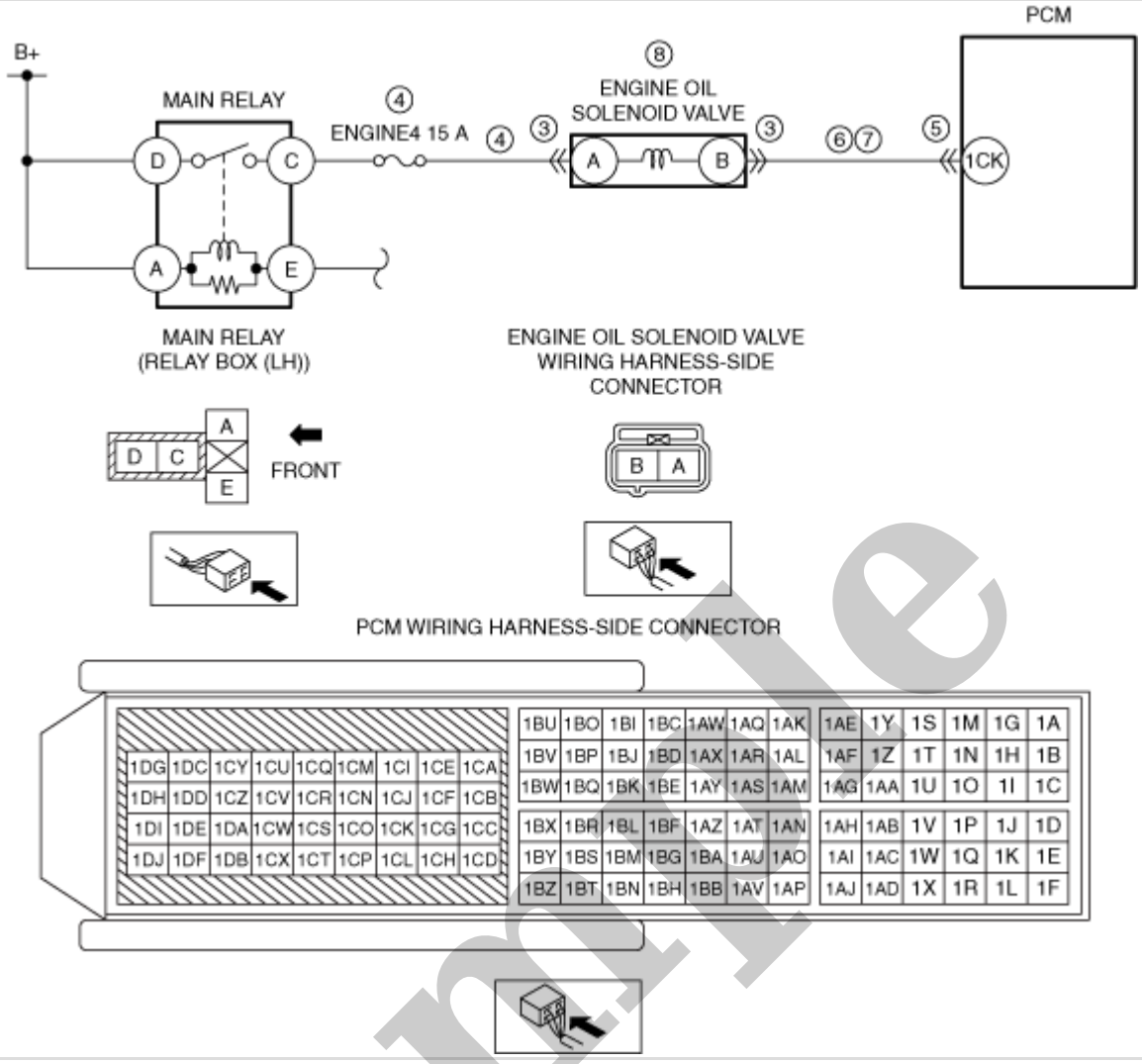
PID/DATA monitor item table

Item	Definition	Unit	Condition/Specification
VT_EX_ACT	Actual exhaust variable valve timing control • Retard amount from max advance position	° (deg)	• Displays actual exhaust variable valve timing−retard amount from max advance position
VT_EX_DES	Target exhaust variable valve timing control • Retard amount from max advance position	° (deg)	• Displays target exhaust variable valve timing−retard amount from max advance position

Function Inspection Using M-MDS

STEP	INSPECTION	RESULTS	ACTION
3	PURPOSE: DETERMINE INTEGRITY OF HYDRAULIC VARIABLE VALVE TIMING ACTUATOR • Inspect the hydraulic variable valve timing actuator. (See HYDRAULIC VARIABLE VALVE TIMING ACTUATOR INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the hydraulic variable valve timing actuator, then go to Step 9. (See ELECTRIC VARIABLE VALVE TIMING ACTUATOR, HYDRAULIC VARIABLE VALVE TIMING ACTUATOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
		No	Go to the next step.
4	PURPOSE: VERIFY ASSEMBLY CONDITION OF TIMING CHAIN • Verify the condition of the timing chain assembly (exhaust valve timing, looseness, jumping). (See TIMING CHAIN REMOVAL/INSTALLATION [SKYACTIV-G (WITHOUT EGR COOLER)].) (See TIMING CHAIN REMOVAL/INSTALLATION [SKYACTIV-G (WITH EGR COOLER)].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part. Assemble the timing chain using the correct timing, then go to Step 9. (See TIMING CHAIN REMOVAL/INSTALLATION [SKYACTIV-G (WITHOUT EGR COOLER)].) (See TIMING CHAIN REMOVAL/INSTALLATION [SKYACTIV-G (WITH EGR COOLER)].)
		No	Go to the next step.
5	PURPOSE: VERIFY IF FOREIGN MATTER ON EXHAUST CMP SENSOR DETECTION AREA AFFECTS DIAGNOSTIC RESULTS • Visually inspect for exhaust CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • Is there foreign matter such as metallic dust on the exhaust CMP sensor detection area?	Yes	Remove the foreign matter, then go to Step 9.
		No	Go to the next step.
6	PURPOSE: INSPECT IF INSUFFICIENT HYDRAULIC PRESSURE CAUSED BY USE OF UNSPECIFIED ENGINE OIL • Is the specified engine oil being used?	Yes	Go to the next step.
		No	Replace the engine oil with genuine engine oil, then go to Step 9. (See ENGINE OIL REPLACEMENT [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
7	PURPOSE: INSPECT ENGINE OIL PRESSURE • Inspect the engine oil pressure. (See OIL PRESSURE INSPECTION [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 9.
8	PURPOSE: VERIFY IF MALFUNCTION RELATED TO ENGINE OIL LEAK OR RESTRICTION AFFECTS DIAGNOSTIC RESULTS • Start the engine. • Verify if there is engine oil leakage in the oil passage or restriction. • Is there engine oil leakage in the oil passage or restriction?	Yes	Repair or replace the malfunctioning part according to the inspection results. Add genuine engine oil, then go to the next step. (See ENGINE OIL REPLACEMENT [SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION)].)
		No	Go to the next step.
9	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 2.5 (WITH CYLINDER DEACTIVATION))].) • Implement the repeatability verification procedure. (See Repeatability Verification Procedure.) • Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (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.

DTC P06DB:00	Engine oil solenoid valve circuit low input



Diagnostic Procedure

STEP	INSPECTION		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.

DTC P0198:00 [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))]

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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 1AN 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 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	• 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 1AN • Open circuit in wiring harness between the following terminals: — Engine oil pressure sensor/engine oil temperature sensor terminal E–PCM terminal 1AN — Engine oil pressure sensor/engine oil temperature sensor terminal C–PCM terminal 1AB • Engine oil temperature sensor malfunction • PCM malfunction

STEP	INSPECTION		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 2.5 (WITH CYLINDER DEACTIVATION))].) • Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5 (WITH CYLINDER DEACTIVATION))].) • 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 2.5 (WITH CYLINDER DEACTIVATION)].) 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 2.5 (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.