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1999 MAZDA 626 (Mk.5) Sedan OEM Service and Repair Workshop Manual

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STEP	INSPECTION	RESULTS	ACTION
8	**INSPECT BRAKE SWITCH No.1 SIGNAL CIRCUIT FOR OPEN CIRCUIT** • Verify that the brake switch and PCM connectors are disconnected. • Switch the ignition off. • Inspect for continuity between brake switch terminal D (wiring harness-side) and PCM terminal 2AB (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 brake switch terminal D and PCM terminal 2AB. **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 BRAKE SWITCH No.1** • Inspect the brake switch No.1. (See BRAKE SWITCH INSPECTION.) • Is there any malfunction?	Yes	Replace the brake switch, then go to the next step. (See BRAKE PEDAL REMOVAL/INSTALLATION.)
		No	Go to the next step.
10	**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 (WITHOUT CYLINDER DEACTIVATION))].) **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. • Stop the vehicle 8 times repeatedly from a vehicle speed of 30 km/h {19 mph} or more. • Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT 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 (WITHOUT CYLINDER DEACTIVATION)].) Go to the next step.
		No	Go to the next step.
11	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)
		No	DTC troubleshooting completed.

DTC P0610:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))]

SM2896970

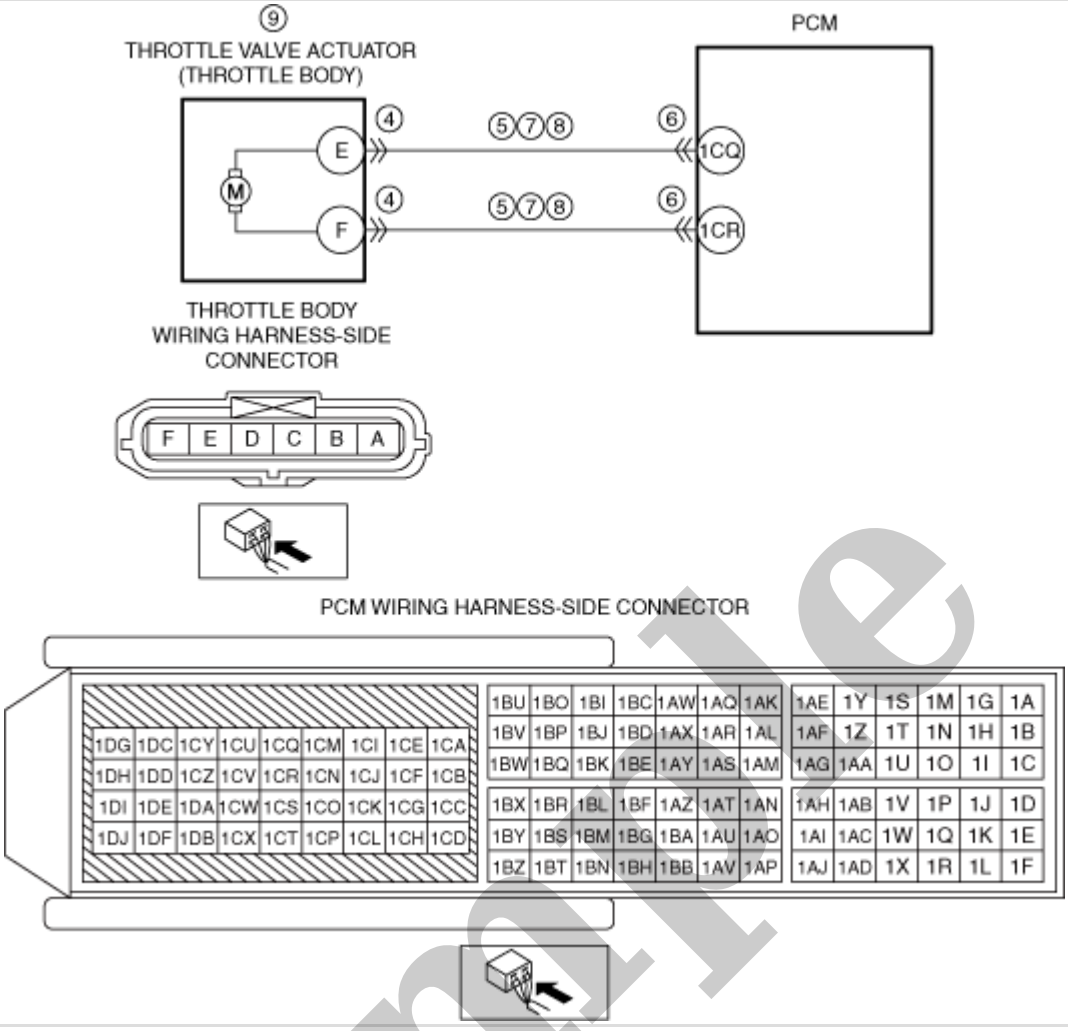
id0102t370600

DTC P0610:00	PCM vehicle configuration error
DETECTION CONDITION	• PCM data configuration 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	• Not applicable
POSSIBLE CAUSE	• Configuration procedure has not been completed • PCM connector or terminals malfunction • PCM 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	PERFORM PCM CONFIGURATION (USING READ/WRITE FUNCTION) • Perform the PCM configuration (using read/write function). (See PCM CONFIGURATION (USING READ/WRITE FUNCTION) [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the same Pending DTC present?	Yes	Go to the next step.
		No	Go to Step 6.

DTC P0638:00	Throttle valve actuator control range/performance problem



Diagnostic Procedure

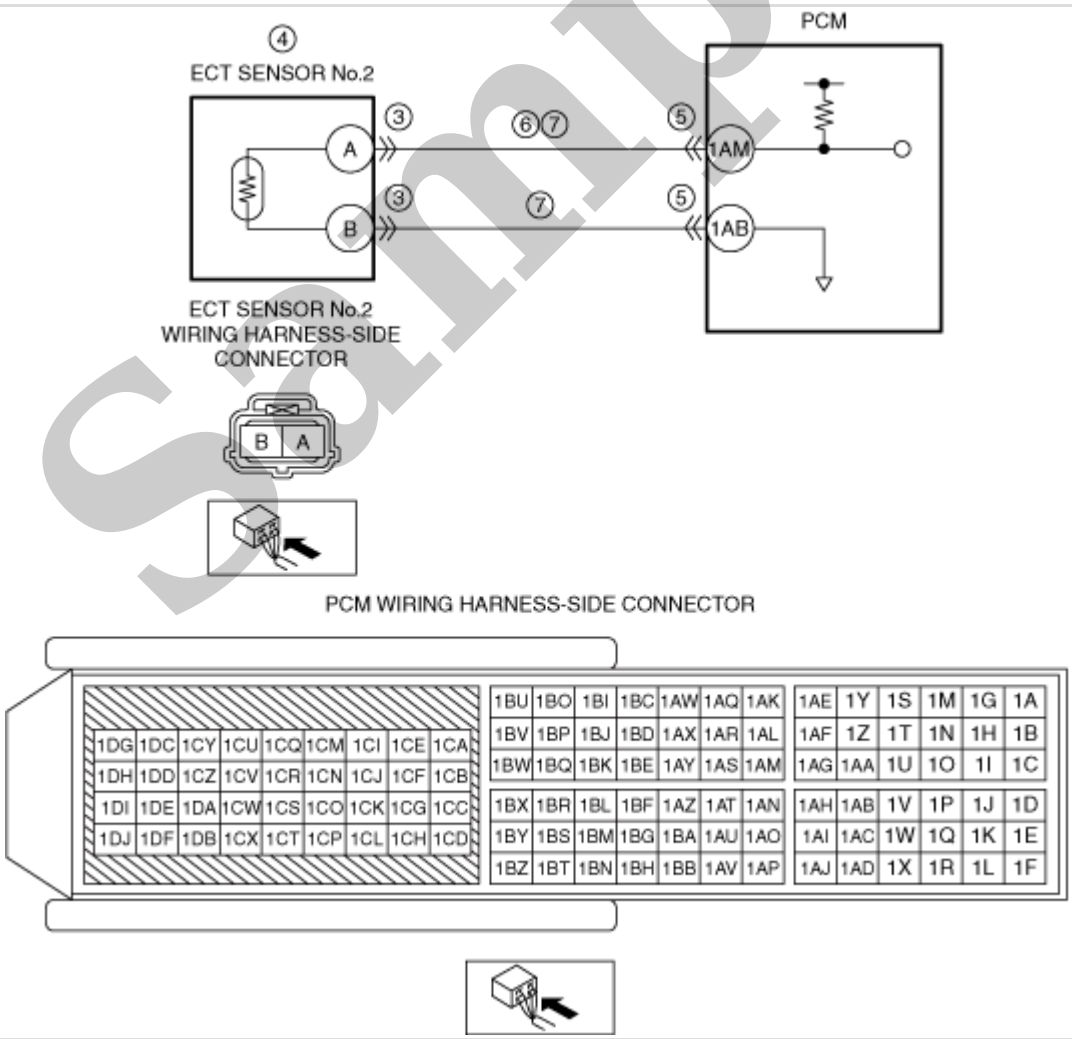
STEP	INSPECTION	RESULTS	ACTION
1	**IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Perform the Freeze Frame PID Data Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the DTC P0638:00 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedure for DTC on FREEZE FRAME DATA. (See DTC TABLE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)
2	**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.

DTC P2184:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))]

SM2897035

id0102t397500

DTC P2184:00	ECT sensor No.2 circuit low input
DETECTION CONDITION	• The PCM monitors the ECT sensor No.2 signal. If the PCM detects that the ECT sensor No.2 voltage at the PCM terminal 1AM is below 0.23 V for 5 s, the PCM determines that the ECT sensor No.2 circuit has a malfunction. **Diagnostic support note** • This is a continuous monitor (engine cooling system). • 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	• ECT sensor No.2 connector or terminals malfunction • ECT sensor No.2 malfunction • PCM connector or terminals malfunction • Short to ground in wiring harness between ECT sensor No.2 terminal A and PCM terminal 1AM • ECT sensor No.2 signal circuit and ground circuit are shorted to each other • PCM malfunction



Caution

• Verify the malfunction symptom according to not only the PID value but also the symptom troubleshooting.

DTC P0171:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))]

SM2897032

id0102t393420

Note

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

Details On DTCs

DESCRIPTION	**Fuel trim system too lean**	
DETECTION CONDITION	Determination conditions	• Any one of the following conditions is met: — The sum of the fuel feedback correction amount (SHRTFT1) and the fuel learning correction amount (LONGFT1) is the specified value (30 %) or more, and 10 s or more have elapsed with the fuel learning correction amount (LONGFT1) at the specified value (15 %) or more. — While the engine is idling or the vehicle is driven, the fuel feedback correction amount reaches the upper limit (25 % or more) for 20 s or more.
	Preconditions	• Engine coolant temperature: 0–45 °C {32–113 °F}, 60 °C {140 °F} or more *1 *1: Standard can be verified by displaying PIDs using M-MDS
	Malfunction determination period	• 10 s or 20 s period
	Drive cycle	• 2
	Self test type	• CMDTC self test
	Sensor used	• A/F sensor
FAIL-SAFE FUNCTION	• Not applicable	
VEHICLE STATUS WHEN DTCs ARE OUTPUT	• Illuminates check engine light.	

PID Item/Simulation Item Used In Diagnosis

PID/DATA monitor item table

Item	Definition	Unit	Condition/Specification
APP	Accelerator pedal opening angle (relative value) with the fully released status as 0% and fully depressed status as 100%	%	• Accelerator pedal released: Approx. 0% • Accelerator pedal fully depressed: Approx. 100%
ECT	Engine coolant temperature input from ECT sensor	°C, °F	• Displays ECT
	ECT sensor voltage	V	• ECT is 20 °C {68 °F}: Approx. 3.10 V • ECT is 40 °C {104 °F}: Approx. 2.16 V • ECT is 60 °C {140 °F}: Approx. 1.40 V • ECT is 80 °C {176 °F}: Approx. 0.87 V • ECT is 100 °C {212 °F}: Approx. 0.54 V
EVAPCP	Purge solenoid valve control duty value	%	• Idle (after warm up): 0% (Engine coolant temperature 59 °C {140 °F} or less) • Racing (Engine speed 2,000 rpm): 4.7% • Racing (Engine speed 4,000 rpm): 35.35%
FP	Fuel pump operation status	Off/On	• Ignition switched ON (engine off): Off • Cranking: On • Idle (after warm up): On
FUEL_PRES	Fuel pressure input from fuel pressure sensor	KPa {MPA}, mBar {BAR}, psi, in H20	• Displays fuel pressure
	Fuel pressure sensor voltage	V	• Idle (ECT 80 °C {176 °F}) — Fuel pressure is 10 MPa {102 kgf/cm ^{2}, 1450 psi}: Approx. 1.4 V
IAT2	Intake air temperature (No.2) input from IAT sensor No.2	°C, °F	• Displays IAT (No.2)
	IAT sensor No.2 voltage	V	• IAT2 is 20 °C {68 °F}: Approx. 3.57 V • IAT2 is 40 °C {104 °F}: Approx. 2.70 V • IAT2 is 60 °C {140 °F}: Approx. 1.87 V
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})
MAP	Manifold absolute pressure input from MAP sensor	KPa {MPA}, mBar {BAR}, psi, in H20	• Displays MAP
MAP_V	MAP sensor voltage	V	• Ignition switched ON (engine off) (MAP:100 kPa {1.02 kgf/cm ^{2}, 14.5 psi}): Approx. 4.04 V • Idle (after warm up) (MAP: 35 kPa {0.36 kgf/cm ^{2}, 5.1 psi}): Approx. 1.40 V • Racing (engine speed is 2,000 rpm) (MAP: 26 kPa {0.27 kgf/cm ^{2}, 3.8 psi}): Approx. 1.01 V
O2S11	A/F sensor current	µA	• Idle (after warm up): Approx. −39 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: VERIFY FUEL PRESSURE (HIGH-SIDE) MALFUNCTION** • Switch the ignition off. • Reconnect all disconnected connectors. • Start the engine and idle it. • Access the FUEL_PRES PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the FUEL_PRES PID value approx. 10.0 MPa {102 kgf/cm^2, 1450 psi}?	Yes	Go to the next step.
		No	FUEL_PRES PID value is lower than approx. 10.0 MPa {102 kgf/cm^2, 1450 psi}: • Go to Troubleshooting Diagnostic Procedure to perform the procedure from Step 1. FUEL_PRES PID value is higher than approx. 10.0 MPa {102 kgf/cm^2, 1450 psi}: • Go to Step 8.
7	**PURPOSE: VERIFY FUEL PRESSURE (LOW-SIDE) MALFUNCTION** **Note** **• Verify the fuel pressure on the low pressure side with the operation of the high pressure fuel pump turned off.** • Bleed the remaining pressure in the fuel line using the following procedure. 1. Switch the ignition off. 2. Disconnect the high pressure fuel pump connector. 3. Remove the fuel pump relay. (See RELAY LOCATION.) 4. Start the engine and wait until the engine stalls. • Switch the ignition off. • Install the fuel pump relay. • Switch the ignition ON (engine off). • Display PID FUEL_PRES and simulation item FP using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Turn simulation item FP on. • Is the FUEL_PRES PID value 405–485 kPa {4.13–4.94 kgf/cm^2, 58.8–70.3 psi}?	Yes	Go to the next step.
		No	Go to Troubleshooting Diagnostic Procedure to perform the procedure from Step 5.
8	**PURPOSE: VERIFY IF MALFUNCTION CAUSED BY FUEL INJECTOR IMPROPER OPERATION** • Switch the ignition off. • Reconnect all disconnected connectors. • Start the engine and idle it. • Access the following simulation items using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) — INJ_1 — INJ_2 — INJ_3 — INJ_4 • Turn each fuel injector from on to off using the simulation items. • Does the vibration during idling worsen?	Yes	Go to the next step.
		No	Go to Troubleshooting Diagnostic Procedure to perform the procedure from Step 7.
9	**PURPOSE: VERIFY IF MALFUNCTION CAUSED BY PURGE SOLENOID VALVE IMPROPER OPERATION** • Start the engine and idle it. • Access the EVAPCP PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the EVAPCP PID value normal?	Yes	Go to the next step.
		No	Go to Troubleshooting Diagnostic Procedure to perform the procedure from Step 8.

STEP	INSPECTION	RESULTS	ACTION
7	PURPOSE: DETERMINE INTEGRITY OF FUEL INJECTOR • Inspect the fuel injector. (See FUEL INJECTOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the fuel injector, then go to Step 20. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
8	PURPOSE: DETERMINE INTEGRITY OF PURGE SOLENOID VALVE • Inspect the purge solenoid valve. (See PURGE SOLENOID VALVE INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the purge solenoid valve, then go to Step 20. (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
9	PURPOSE: DETERMINE INTEGRITY OF PCV VALVE • Inspect the PCV valve. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the PCV valve, then go to Step 20. (See POSITIVE CRANKCASE VENTILATION (PCV) VALVE REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
10	PURPOSE: DETERMINE INTEGRITY OF MAF SENSOR • Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the MAF sensor/IAT sensor No.1, then go to Step 20. (See MASS AIR FLOW (MAF) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR NO.1 REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
11	PURPOSE: VERIFY IF MALFUNCTION RELATED TO AIR CLEANER ELEMENT AFFECTS MEASUREMENT OF INTAKE AIR AMOUNT • Inspect the air cleaner element. (See AIR CLEANER ELEMENT INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the air cleaner element, then go to Step 20. (See AIR CLEANER ELEMENT REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
12	PURPOSE: DETERMINE INTEGRITY OF MAP SENSOR • Reconnect all disconnected connectors. • Inspect the MAP sensor. (See MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the MAP sensor/IAT sensor No.2, then go to Step 20. (See MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR NO.2 REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
13	PURPOSE: VERIFY IF MALFUNCTION RELATED TO INTAKE AIR SYSTEM AFFECTS DIAGNOSTIC RESULTS • Visually inspect for loose, cracked or damaged hoses on intake air system. • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results, then go to Step 20.
		No	Go to the next step.
14	PURPOSE: DETERMINE INTEGRITY OF ELECTRIC VARIABLE VALVE TIMING DRIVER • Inspect the electric variable valve timing driver. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the electric variable valve timing motor/driver, then go to Step 20. (See ELECTRIC VARIABLE VALVE TIMING MOTOR/DRIVER REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.

DESCRIPTION	Fuel trim system too rich
POSSIBLE CAUSE	• Erratic signal to PCM — ECT sensor signal malfunction — MAF sensor signal malfunction — MAP sensor signal malfunction — IAT sensor No.2 signal malfunction — Related connector or terminals malfunction — Related wiring harness malfunction • High-pressure side fuel delivery system malfunction — Fuel pressure sensor malfunction — Relief valve (built-into high pressure fuel pump) malfunction — Spill valve control solenoid valve control circuit malfunction (damage to driver in PCM caused by short circuit to ground system) — Spill valve control solenoid valve (built-into high pressure fuel pump) malfunction — High pressure fuel pump malfunction • Low-pressure side fuel delivery system malfunction — Fuel filter clogged (built-into fuel pump unit) — Low pressure side fuel line restriction (between fuel pump unit and high pressure fuel pump) — Fuel pump unit malfunction — Pressure regulator (built-into fuel pump unit) malfunction — Fuel pump control module malfunction • Fuel injector malfunction — Improper operation of fuel injector — Fuel injector related wiring harness malfunction • Improper operation of purge control system — Purge solenoid valve malfunction — Purge solenoid hoses improper connection • MAF sensor malfunction • MAP sensor malfunction • Improper operation of electric variable valve timing control system — Electric variable valve timing driver malfunction — Electric variable valve timing motor malfunction — Electric variable valve timing actuator malfunction • Improper operation of hydraulic variable valve timing control system • A/F sensor malfunction — A/F sensor loose • PCM malfunction

System Wiring Diagram

• Not applicable

Function Explanation (DTC Detection Outline)

• The PCM detects the oxygen concentration in the exhaust gas from the A/F sensor signal and performs fuel injection amount feedback to maintain the optimum air/fuel ratio. If a condition in which the feedback correction amount is small (fuel injection amount being decreased) continues for the specified time, a feedback correction amount malfunction is determined, and a DTC is stored. The feedback correction amount has a "Fuel feedback correction amount" for the air/fuel ratio and a "Fuel learning correction amount" fo fuel injector deterioration over time.
• "Fuel feedback correction amount (SHRTFT1)" and "Fuel learning correction amount (LONGFT1)" can be verified from the M-MDS PID item.