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2004 MAZDA 3 / Axela Sedan OEM Service and Repair Workshop Manual

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SYMPTOM DIAGNOSTIC INDEX [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)]

SM2897149

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• Verify malfunction symptoms using the following diagnostic index, then go to the appropriate troubleshooting chart.

Diagnostic Index

–: Not applicable

No.	TROUBLESHOOTING ITEM	DESCRIPTION
1	Blown fuses	–
2	Check engine light illuminates	• Check engine light illuminates incorrectly.
3	Will not crank	• Starter does not work.
4	Hard to start/long crank/erratic start/erratic crank	• Starter cranks engine at normal speed but engine requires excessive cranking time before starting. • Battery is operating normally.
5	Engine stalls-after start/at idle	• Stalling occurs if vehicle is left idling under no load. • Stalling occurs when load (electric, A/C) is applied during idling. • Stalling occurs if the accelerator pedal is depressed from an idling condition when accelerating from a stop.
6	Cranks normally but will not start	• Cranking occurs but no ignition.
7	Engine oil warning light illuminated/message related to engine hydraulic pressure malfunction indicated in display	• Engine oil warning light illuminated. • Message related to engine hydraulic pressure indicated in display.
8	Engine runs rough/rolling idle	• Idle speed lower than the specification. • Idling speed unstable, increases/decreases.
9	Fast idle/runs on	• Engine speed continues at fast idle after warm-up. • Engine runs after ignition is switched off.
10	Low idle/stalls during deceleration	• Engine speed decreases when the accelerator pedal is released. • Stalls during deceleration with the accelerator pedal fully released. • When the accelerator pedal is fully released, vehicle stalls directly after vehicle stops.
11	Engine stalls/quits, engine runs rough, misses, buck/jerk, hesitation/stumble, surges	• Stalling occurs while driving with the throttle open.
12	Lack/loss of power-acceleration/cruise	• Engine speed increase delays when the accelerator pedal is fully depressed.
13	Knocking/pinging-acceleration/cruise	• Abnormal combustion occurs under the condition such as the temperature in the combustion chamber is too high resulting in abnormal noise. • Knocking sound occurs from the engine compartment during acceleration.
14	Poor fuel economy	• Fuel economy is unsatisfactory.
15	Emission compliance	• Fails emissions test.
16	High oil consumption/leakage	• Oil consumption is excessive.
17	Cooling system concerns-overheating	• The engine coolant temperature is abnormally high.
18	Cooling system concerns-runs cold	• Engine does not reach normal operating temperature.
19	Exhaust smoke	• Blue, black, or white smoke from exhaust system.
20	Fuel odor (in engine compartment)	• Gasoline fuel smell or visible leakage.

X: Applied

Troubleshooting item		Possible factor	Engine or transaxle mounts are improperly installed	Cooling fan or condenser fan seats improper	Fuel quality	Improper engine oil viscosity	Improper valve timing	Oil leakage	Improper oil or fluid level	Coolant leakage	Electric variable valve timing system malfunction	Hydraulic variable valve timing system malfunction	Engine overheating	Air cleaner element clogged or restricted	Air leakage from intake-air system (loose tubes, cracks, gaskets breakage)	Air suction in intake-air system	Intake-air system restriction
1	Blown fuses																
2	Check engine light illuminates										X	X					
3	Will not crank																
4	Hard to start/long crank/erratic start/erratic crank			X		X								X	X		X
5	Engine stalls-after start/at idle			X							X	X	X		X		X
6	Cranks normally but will not start			X		X							X	X	X		X
7	Engine oil warning light illuminated/message related to engine hydraulic pressure malfunction indicated in display				X		X	X									
8	Engine runs rough/rolling idle			X		X							X		X		X
9	Fast idle/runs on										X	X			X		
10	Low idle/stalls during deceleration					X									X		X
11	Engine stalls/quits, engine runs rough, misses, buck/jerk, hesitation/stumble, surges			X		X							X	X			X
12	Lack/loss of power-acceleration/cruise			X		X					X	X	X	X	X		X
13	Knocking/pinging-acceleration/cruise			X									X		X		
14	Poor fuel economy			X		X								X			
15	Emission compliance			X		X							X	X	X		
16	High oil consumption/leakage				X			X									
17	Cooling system concerns-overheating									X							
18	Cooling system concerns-runs cold																
19	Exhaust smoke							X		X				X	X		
20	Fuel odor (in engine compartment)																
21	Engine noise								X								
22	Vibration concerns (engine)		X	X													
23	Sulfuric smell occurs				X												
24	Fuel refill concerns																
25	Fuel filling shut off concerns																
26	Spark plug condition																
27	ATX concerns	Upshift/downshift/engagement	See Section 05-03 TRANSAXLE, SYMPTOM TROUBLESHOOTING [FW6A-EL, FW6AX-EL].														

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X: Applied

Troubleshooting item		Possible factor	Constant voltage supply circuit malfunction	Main relay malfunction (mechanically or electrically)	No battery power supply to PCM	Poor PCM ground or vehicle ground (open)	Electrical connector disconnection	Oil pressure switch or related circuit malfunction	ECT sensor or related circuit malfunction	Transaxle range sensor malfunction	Brake switch or related circuit malfunction	A/F sensor or HO2S or related circuit malfunction	IAT sensor No.1 (integrated in MAF sensor/ IAT sensor No.1) or related circuit malfunction	IAT sensor No.2 (integrated in MAP sensor/ IAT sensor No.2) or related circuit malfunction	Fuel pressure sensor or related circuit malfunction	MAP sensor or related circuit malfunction
1	Blown fuses															
2	Check engine light illuminates						X		X		X	X	X		X	X
3	Will not crank			X		X										
4	Hard to start/long crank/erratic start/erratic crank					X			X			X			X	X
5	Engine stalls-after start/at idle				X	X	X		X			X			X	X
6	Cranks normally but will not start				X	X	X		X			X			X	
7	Engine oil warning light illuminated/message related to engine hydraulic pressure malfunction indicated in display							X								
8	Engine runs rough/rolling idle						X		X			X			X	X
9	Fast idle/runs on								X			X				
10	Low idle/stalls during deceleration								X		X	X			X	X
11	Engine stalls/quits, engine runs rough, misses, buck/jerk, hesitation/stumble, surges			X					X			X	X		X	X
12	Lack/loss of power-acceleration/cruise								X			X	X		X	X
13	Knocking/pinging-acceleration/cruise												X	X	X	X
14	Poor fuel economy								X				X		X	X
15	Emission compliance								X			X	X		X	X
16	High oil consumption/leakage															
17	Cooling system concerns-overheating															
18	Cooling system concerns-runs cold															
19	Exhaust smoke								X			X	X		X	X
20	Fuel odor (in engine compartment)															
21	Engine noise															
22	Vibration concerns (engine)															
23	Sulfuric smell occurs															
24	Fuel refill concerns															
25	Fuel filling shut off concerns															
26	Spark plug condition								X			X				
27	ATX concerns	Upshift/downshift/engagement	See Section 05-03 TRANSAXLE, SYMPTOM TROUBLESHOOTING [FW6A-EL, FW6AX-EL].													

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X: Applied

Troubleshooting item		Possible factor	Instrument cluster malfunction	Driver-side buckle switch malfunction	Door latch switch or liftgate latch switch malfunction	Hood latch switch malfunction	Battery malfunction (deterioration)	Ambient temperature sensor malfunction	ABS wheel-speed sensor malfunction	Steering angle sensor malfunction	Driver-side air mix actuator malfunction	Climate control unit malfunction	Keyless antenna malfunction
1	Blown fuses												
2	Check engine light illuminates		X										
3	Will not crank		X										
4	Hard to start/long crank/erratic start/erratic crank												
5	Engine stalls-after start/at idle												
6	Cranks normally but will not start												
7	Engine oil warning light illuminated/message related to engine hydraulic pressure malfunction indicated in display		X										
8	Engine runs rough/rolling idle												
9	Fast idle/runs on												
10	Low idle/stalls during deceleration												
11	Engine stalls/quits, engine runs rough, misses, buck/jerk, hesitation/stumble, surges												
12	Lack/loss of power-acceleration/cruise												
13	Knocking/pinging-acceleration/cruise												
14	Poor fuel economy												
15	Emission compliance												
16	High oil consumption/leakage												
17	Cooling system concerns-overheating		X										
18	Cooling system concerns-runs cold		X										
19	Exhaust smoke												
20	Fuel odor (in engine compartment)												
21	Engine noise												
22	Vibration concerns (engine)												
23	Sulfuric smell occurs												
24	Fuel refill concerns												
25	Fuel filling shut off concerns												
26	Spark plug condition												
27	ATX concerns	Upshift/downshift/engagement	See Section 05-03 TRANSAXLE, SYMPTOM TROUBLESHOOTING [FW6A-EL, FW6AX-EL].										

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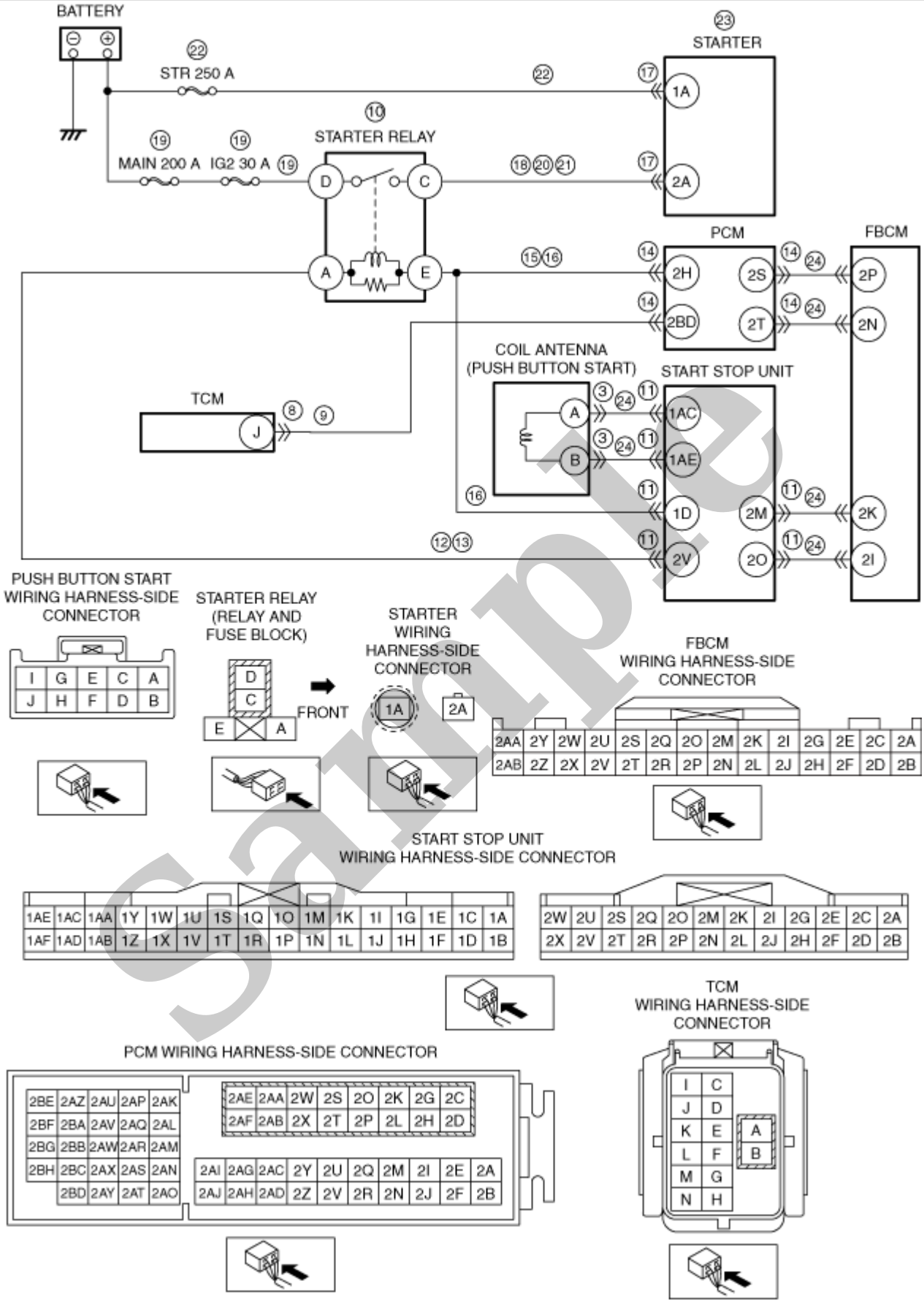
3	WILL NOT CRANK



Caution

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

STEP	INSPECTION	RESULTS	ACTION
7	**DETERMINE IF MALFUNCTION CAUSE IS STARTER RELAY CONTROL SIGNAL CIRCUIT OR OTHER** • Switch the ignition ON (engine on). • Is a clicking sound heard from the starter relay?	Yes	Go to Step 17.
		No	Go to the next step.
8	**INSPECT TCM CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the TCM 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 repeat Step 7.
		No	Go to the next step.
9	**INSPECT TCM CIRCUIT FOR OPEN CIRCUIT** • Verify that the TCM connector is disconnected. • Inspect for continuity between TCM terminal J (wiring harness-side) and PCM terminal 2BD (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 TCM terminal J and PCM terminal 2BD. **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. Repeat Step 7.
10	**INSPECT STARTER RELAY** • Remove the starter relay. (See RELAY LOCATION.) • Inspect the starter relay. (See RELAY INSPECTION.) • Is there any malfunction?	Yes	Replace the starter relay. Repeat Step 7.
		No	Go to the next step.
11	**INSPECT START STOP UNIT CONNECTOR CONDITION** • Disconnect the start stop unit 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 repeat Step 7.
		No	Go to the next step.
12	**INSPECT STARTER RELAY CONTROL CIRCUIT FOR SHORT TO GROUND** • Verify that starter relay is removed. • Verify that the start stop unit connector is disconnected. • Inspect for continuity between starter relay 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 starter relay terminal A and start stop unit terminal 2V. **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. Repeat Step 7.
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
22	**INSPECT STARTER POWER SUPPLY CIRCUIT FOR SHORT TO GROUND OR OPEN CIRCUIT** • Verify that the starter connector is disconnected. • Switch the ignition off. • Measure the voltage at the starter terminal 1A (wiring harness-side) • Is the voltage B+?	Yes	Go to the next step.
		No	Inspect the STR 250 A fuse. • If the fuse is blown: — Repair or replace the wiring harness for a possible short to ground. — Replace the fuse. • If the fuse is deteriorated: — Replace the fuse. • If the fuse is normal: — Repair or replace the wiring harness for a possible open circuit. Go to Step 27.
23	**INSPECT STARTER** • Inspect the starter. (See STARTER INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is the starter normal?	Yes	Go to the next step.
		No	Replace the starter, then go to Step 27. (See STARTER REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
24	**INSPECT IMMOBILIZER SYSTEM RELATED CIRCUIT** • Inspect the following wiring harness and connectors: — Between push button start terminal A and start stop unit terminal 1AC — Between push button start terminal B and start stop unit terminal 1AE — Between start stop unit terminal 2M and front body control module (FBCM) terminal 2K — Between start stop unit terminal 2O and front body control module (FBCM) terminal 2I — Between front body control module (FBCM) terminal 2P and PCM terminal 2S — Between front body control module (FBCM) terminal 2N and PCM terminal 2T • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
25	**VERIFY PRESENT MALFUNCTION DTC** • Perform the KOEO self test. (See KOEO/KOER SELF TEST [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	Go to the next step.
26	**DETERMINE IF MALFUNCTION CAUSE IS BASE ENGINE OR OTHER** • Inspect for a seized drive plate. • Is the drive plate seized?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Base engine malfunction or engine damage during compression due to liquid (such as water, fuel, or engine oil) penetration into cylinder. • Overhaul or replace the engine.

4	HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK
POSSIBLE CAUSE	Note • If the ignition is not switched off (to LOCK or ACC) after the engine stalls, and then an engine restart is attempted, the PCM corrects the difference between CKP sensor and CMP sensor signals caused by engine stalling, which may result in more time needed to restart the engine. • Engine overheating • PCM DTC is stored • Erratic signal to PCM — ECT sensor or related circuit malfunction — MAF sensor or related circuit malfunction — MAP sensor or related circuit malfunction — A/F sensor or related circuit malfunction — HO2S or related circuit malfunction — Improper air/fuel mixture ratio control • Improper operation of drive-by-wire control system • Incorrect fuel injection timing • Fuel injector malfunction • Purge solenoid valve malfunction • Contamination in MAF sensor • Under the condition in which the engine starts and stops repeatedly while the vehicle is not driven, the fuel injected prior to complete ignition during engine start may drop into the oil pan from the cylinder and mix with the engine oil. The situation in which excess quantities of fuel continue to be injected due to an engine coolant temperature signal error is the same. • Intermittent open circuit in PCM ground circuit • Poor fuel quality • Fuel leakage • Air leakage from intake-air system • Intake-air system restriction • Vacuum leakage • Improper engine oil viscosity • Erratic signal from CMP sensor — Loose installation — Damaged trigger wheel (intake camshaft and/or exhaust camshaft) — Open or short circuit in related wiring harness • Erratic signal from CKP sensor — Loose installation — Damaged trigger wheel (crankshaft pulley) — Open or short circuit in related wiring harness • Inadequate fuel pressure (high or low pressure side) — Fuel pressure sensor malfunction — 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 malfunction (built-into high pressure fuel pump) — Relief valve (built-into high pressure fuel pump) malfunction — Fuel line restriction — Fuel filter clogged — Fuel pump unit malfunction • Starting system malfunction • Low engine compression • Improper intake valve timing • Improper exhaust valve timing • Spark plug malfunction • Erratic signal to ignition coils • Exhaust system or TWC restriction • PCV valve malfunction • Injector driver (built-into PCM) malfunction

STEP	INSPECTION	RESULTS	ACTION
3	VERIFY CURRENT INPUT SIGNAL STATUS 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. • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) — ECT — MAF — MAP — MAP_V — O2S11 — O2S12 — SHRTFT1 — LONGFT1 • Do the PIDs indicate the correct values under the malfunction condition? (See PCM INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)	Yes	Go to the next step.
		No	ECT PID is not as specified: • Inspect the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) MAF PID is not as specified: • Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) MAP, MAP_V PIDs are not as specified: • Inspect the MAP sensor. (See MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) O2S11, SHRTFT1, LONGFT1 PIDs are not as specified: • Inspect the A/F sensor. (See AIR FUEL RATIO (A/F) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) O2S12 PID is not as specified: • Inspect the HO2S. (See HEATED OXYGEN SENSOR (HO2S) INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) Repair or replace the malfunctioning part according to the inspection results. • If the malfunction remains: — Perform the "INTERMITTENT CONCERN TROUBLESHOOTING" procedure. (See INTERMITTENT CONCERN TROUBLESHOOTING [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
4	DETERMINE IF MALFUNCTION CAUSE IS DRIVE-BY-WIRE CONTROL SYSTEM OR OTHER • Will the engine run smoothly at part throttle?	Yes	Go to Step 6.
		No	Go to the next step.
5	INSPECT DRIVE-BY-WIRE CONTROL SYSTEM OPERATION • Perform the Electronic Control Throttle Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Does the drive-by-wire control system work properly?	Yes	Visually inspect the throttle body (damage/scratching). • If there is any malfunction: — Repair or replace the malfunctioning part according to the inspection results. • If there is no malfunction: — Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
6	INSPECT FUEL INJECTOR OPERATION • Perform the Fuel Injector Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Do the fuel injectors operate properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.