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1989 MAZDA 626 (Mk.3) Sedan OEM Service and Repair Workshop Manual

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DTC P0101:00 [PCM (SKYACTIV-D 2.2)]

SM2896201

id0102j570080

DTC P0101:00	MAF sensor circuit range/performance problem
DETECTION CONDITION	• If any of the following conditions is met for 6 s under condition A, condition B or condition C: **Condition A:** • When the following conditions are met, the percentage of the estimated intake air amount and the actual intake air amount is not within the specified range. **MONITORING CONDITIONS** — 1 s or more has elapsed after selector lever is operated — Estimated intake air amount: 0.02–1.5 g/stroke — Estimated intake air amount does not change 1 g/stroke or more for 32 msec — Barometric pressure: 72.2 kPa {0.73 kgf/cm^2, 10.5 psi} or more — IAT (IAT sensor No.1): -10 °C {14 °F} or more — ECT (ECT sensor No.1): -10 °C {14 °F} or more — Engine speed: 1,000–2,600 rpm — Fuel injection control: during fuel cut — Intake shutter valve position: 25–95 ° — Intake shutter valve does not change 100 ° or more for 32 msec — Regulating valve position: Closed — Target wastegate valve position: Closed — Target compressor bypass valve position: Closed — EGR cooler bypass valve position: 2.5 % or less — EGR valve position: 0.2 % or less — The following DTCs are not detected: • Regulating solenoid valve: P2263:00 • Wastegate solenoid valve: P0245:00, P0246:00 • EGR cooler bypass valve: P245A:00, P245B:00, P24A5:00 • Compressor bypass solenoid valve: P0034:00, P0035:00 • EGR valve: P0404:00, P048800 • EGR cooler bypass valve position sensor: P2494:00, P2495:00 • EGR valve position sensor: P0405:00, P0406:00 • MAF sensor: P0102:00, P0103:00 • BARO sensor: P2227:00, P2228:00, P2229:00 • MAP sensor No.2: P0106:00, P0107:00, P0108:00 • IAT sensor No.1: P0111:00, P0112:00, P0113:00 • ECT sensor No.1: P0116, P0117:00, P0118:00, P011A:00 • IAT sensor No.3: P00E9:00, P00EA:00, P00EB:00 • Regulating valve position sensor: P2564:00, P2565:00 • Regulating solenoid valve: P0047:00, P0048:00 **Condition B:** • The difference between the maximum and minimum value of the MAF sensor output voltage in less than 0.0019 V when the following conditions are met. **MONITORING CONDITIONS** — Engine speed is 650 rpm or more for 5 s or more — The following DTCs are not detected: • MAF sensor: P0102:00, P0103:00

STEP	INSPECTION		ACTION
9	INSPECT EXHAUST SYSTEM (EGR) RELATED PIPE • Visually inspect the exhaust system (EGR) related pipe for restriction and damaged. (See EMISSION SYSTEM LOCATION INDEX [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results then go to Step 13.
		No	Go to the next step.
10	INSPECT MAF SENSOR • Reconnect all disconnected connectors. • Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the MAF sensor/IAT sensor No.1, then go to Step 13. (See MASS AIR FLOW (MAF) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR NO.1 REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
11	INSPECT TURBOCHARGER • Inspect the turbocharger. (See TURBOCHARGER INSPECTION [SKYACTIV-D 2.2].) • Is the turbocharger normal?	Yes	Go to the next step.
		No	Replace the turbocharger, then go to Step 13. (See TURBOCHARGER REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
12	VERIFY REPEATABILITY OF KOEO SELF TEST • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-D 2.2)].) • Perform the KOEO self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-D 2.2)].) • Is the PENDING CODE for this DTC present?	Yes	Inspect installation of MAF sensor/IAT sensor No.1. (See MASS AIR FLOW (MAF) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR NO.1 REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) • If there is any malfunction: — Repair or replace the malfunctioning part according to the inspection results, then go to the next step. • If there is no malfunction: — Go to the next step.
		No	Go to the next step.
13	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-D 2.2)].) • Start the engine. **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.** • Try to reproduce the malfunction. • Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) • 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-D 2.2].) Go to the next step.
		No	Go to the next step.
14	VERIFY AFTER REPAIR PROCEDURE • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-D 2.2)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-D 2.2)].)
		No	DTC troubleshooting completed.

Repair order form and malfunction symptom check sheet

	Repair order	Check with customer	Diagnosis	Repair	Explanation to customer
Date/time					
In-charge					

Customer statement (When? What? What time(s)? Where it occurs. Warning light illumination? Can anyone replicate problem?)

Vehicle body number:	Registration date:	Date of malfunction occurrence:	Odometer reading km (mile)
Engine (SOHC/DOHC/RE/DE) (Cab /EGI/ Turbo/ Miller cycle/ LPG/Direct injection)		Transmission (MT/HAT/EC-AT/CVT)	

Environmental conditions				Occurrence frequency	Driving conditions										
Weather	Ambient temp.	Drive scenario	Grade		Fuel	Warm-up condition	Driving operation	Driving posture	Load	Accelerator opening angle	Shift position		Eng RPM	Vehicle speed	Pattern of use
Sunny Cloudy Rain Snow High wind Wind gusts N/A Other	-10°C (14°F) or less -10— 0°C (14—32°F) 0—10°C (32—50°F) 10—15°C (50—59°F) 15—20°C (59—68°F) 20—25°C (68—77°F) 25—30°C (77—86°F) 30—35°C (86—95°F) 35—40°C (95—104°F) 40—45°C (104—113°F) 45°C (113°F) or more N/A Other	Depart/arrive Traffic jam (city) Standard city street Suburbs Highway Uneven road Dry road surface Wet road surface Snow bound road Icy road Other	Flat Upgrade Down grade N/A Other	Once/day 2-3 times/day 4-5 times/day Many times/day Once/week 2-3 times/week 4-5 times/week Once/month 2-3 times/month 4-5 times/month Other	Regular High Oct. Diesel LPG Other Fuel gauge F E	Cold Half-warmed Fully warmed N/A Other Water temp. gauge H C	When starting After starting Re-starting (min. after stopped) Idling Racing Accel. from stop Normal driving Deceleration Braking Soft braking Clutch disengage Sudden accel. Light accel. Shifting (km/h (mph) → km/h (mph)) Other	Vehicle stopped Straight-on driving Reversing Right turn Left turn Other	Headlights on Exterior lights on A/C on AUTO °C(°F) Blower: 1 step Blower: 2 steps Blower: 3 steps Blower: 4 steps Power steering lock to lock Rear defrost on Wipers on Audio on Other	0/8 1/8 2/8 3/8 4/8 5/8 6/8 7/8 8/8	MT AT	1 2 3 4 5 6 N R P R N D S L Hold M (km/h (mph))	Idle Less than 1,000 Less than 1,500 Less than 2,000 Less than 2,500 Less than 3,000 Less than 4,000 Less than 4,500 Less than 5,000 Less than 5,500 Less than 6,000 Less than 6,500 7,000 or more	5 km/h (3 mph) 10 km/h (6.2 mph) 20 km/h (12 mph) 30 km/h (19 mph) 40 km/h (25 mph) 50 km/h (31 mph) 60 km/h (37 mph) 70 km/h (43 mph) 80 km/h (50 mph) 90 km/h (56 mph) 100 km/h (62.1 mph) 110 km/h (68.4 mph) 120 km/h (74.6 mph) 130 km/h (80.8 mph) 140 km/h (87 mph) 150 km/h (93.2 mph) 160 km/h (99.4 mph)	Work_____% Minor use_____% Trips_____% Other_____% Between ENG. start→Stop: Distance, time Approx km (mile) Approx Hrs. No. of occupants: Load condition kg Other

DTC, measured data (fuel pressure, intake manifold vacuum, throttle sensor electromotive force, air flow electromotive force, other), maintenance, repair, accident history, installation of commercial devices

OBD-II ON-BOARD SYSTEM READINESS TEST [PCM (SKYACTIV-D 2.2)]

SM2896281

id0102j580060

• This shows the OBD-II systems operating status. If any monitor function is incomplete, the M-MDS will identify which monitor functio has not been completed. Misfires, Fuel System and Comprehensive Components (CCM) are continuous monitoring-type functions. The catalyst, evaporation system and oxygen sensor will be monitored under drive cycles. The OBD-II diagnostic system is initialized by performing the DTC cancellation procedure or disconnecting the negative battery terminal.

DTC P0402:00 [PCM (SKYACTIV-D 2.2)]

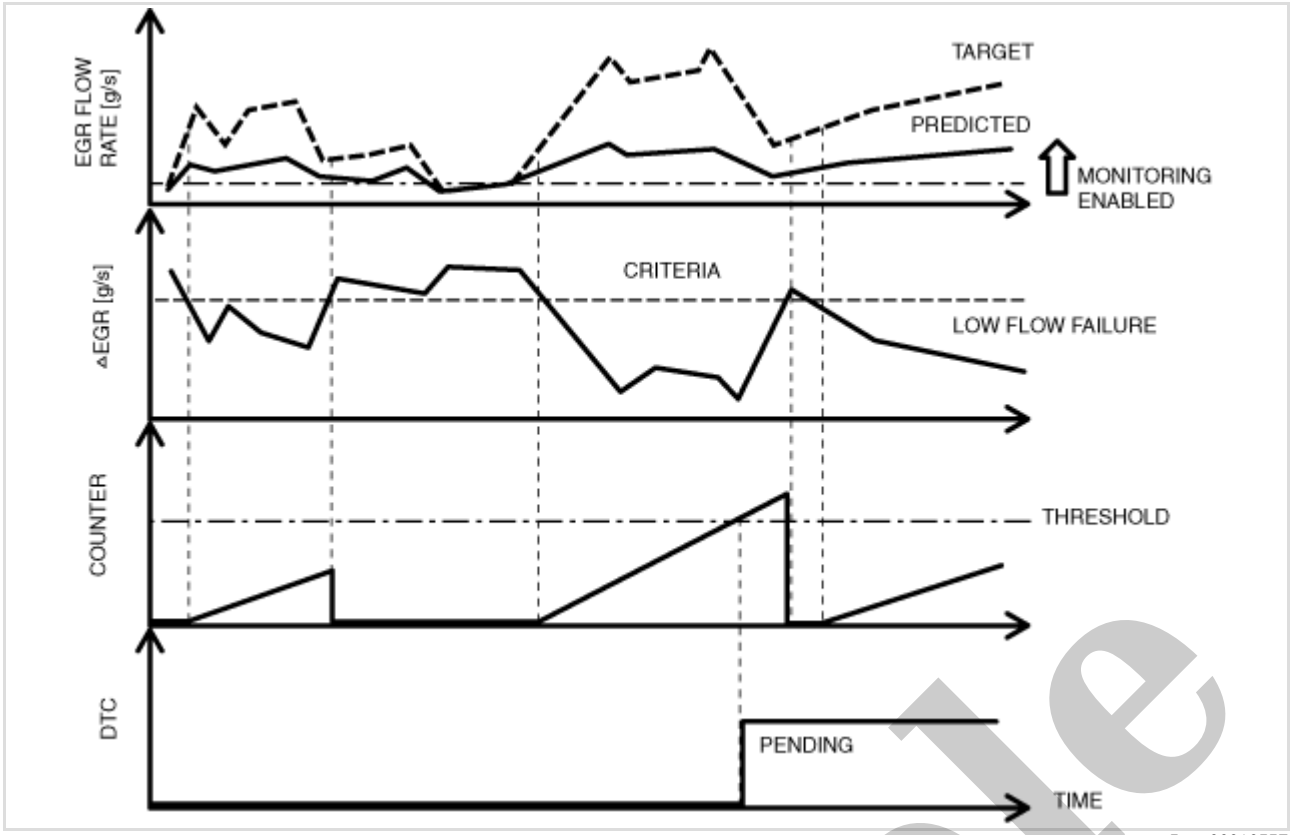
SM2896044

id0102j515520

Note

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

Details On DTCs



ac5uuw00010557

Repeatability Verification Procedure

Warning

• While performing this step, always operate the vehicle in a safe and lawful manner.

1.Start the engine.

2.Accelerate the vehicle to 50 km/h {31 mph} taking 30 s.

PID Item/Simulation Item Used In Diagnosis

PID/DATA monitor item table

Item	Definition	Unit	Condition/Specification
EXHPRES1	Exhaust gas pressure (No.1)	KPa {MPA}, mBar {BAR}, psi, in H20	• Idle (after warm up): Approx. 100 kPa {1 bar, 14.5 psi} • Racing (engine speed above 4,000 rpm): Approx. 193 kPa {1.97 kgf/cm2, 28.0 psi} • Racing (engine speed above 5,000 rpm): Approx. 266 kPa {2.71 kgf/cm2, 38.6 psi}
EXHTEMP1	Exhaust gas temperature (No.1)	°C, °F	Displays the exhaust gas temperature (No.1)
INTK_MAPA	Manifold absolute pressure	KPa {MPA}, mBar {BAR}, psi	• Displays the manifold absolute pressure (No.2).

STEP	INSPECTION		ACTION
4	**PURPOSE: INSPECT EGR VALVE CONTROL SYSTEM OPERATION** • Perform the EGR Valve Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results, then go to Step 7.
		No	Go to the next step.
5	**PURPOSE: INSPECT EGR VALVE POSITION SENSOR** • Inspect the EGR valve position sensor. (See EGR VALVE INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the EGR valve, then go to Step 7. (See EGR VALVE REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
6	**PURPOSE: INSPECT INTAKE AIR SYSTEM FOR AIR SUCTION** • Inspect for air leakage at the following: — Around connection of turbocharger and intake manifold **Note** **• Engine speed may change when rust penetrating agent is sprayed on the air suction area.** • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results, then go to the next step.
		No	Go to the next step.
7	**PURPOSE: PERFORM DTC INSPECTION AND VERIFY IF MALFUNCTIONING PART IS PCM** • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-D 2.2)].) • Implement the repeatability verification procedure. (See Repeatability Verification Procedure.) • Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) • 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-D 2.2].) Go to the next step.
		No	Go to the next step.
8	**PURPOSE: VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-D 2.2)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-D 2.2)].)
		No	DTC troubleshooting completed.

STEP	INSPECTION		ACTION
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 8.
		No	Go to the next step.
6	INSPECT EGR VALVE CIRCUIT FOR SHORT TO POWER SUPPLY • Verify that the EGR valve 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 following terminals (wiring harness-side): — EGR valve terminal E — EGR valve terminal A • Is the voltage 0 V?	Yes	Go to the next step.
		No	If there is no common connector: Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: • EGR valve terminal E—PCM terminal 1BR • EGR valve terminal A—PCM terminal 1BM 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. • Repair or replace the wiring harness which has a short to power supply. Go to Step 8.
7	INSPECT EGR VALVE • Inspect the EGR valve. (See EGR VALVE INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction ?	Yes	Replace the EGR valve, then go to the next step. (See EGR VALVE REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
8	VERIFY DTC TROUBLESHOOTING COMPLETED • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-D 2.2)].) • Start the engine and idle it. • Wait until the ECT PID value is above 80 °C {176 °F}. • Wait for 1 min (idle). • Perform the DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) • Is the same DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) 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-D 2.2)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-D 2.2)].)
		No	DTC troubleshooting completed.

STEP	INSPECTION		ACTION
3	**INSPECT EGR VALVE CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the EGR valve 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.
4	**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.
5	**INSPECT EGR VALVE POSITION SENSOR CIRCUIT FOR SHORT TO GROUND** • Verify that the EGR valve and PCM connectors are disconnected. • Inspect for continuity between the following terminals (wiring harness-side) and body ground: — EGR valve terminal B — EGR valve terminal D • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: • EGR valve terminal B—PCM terminal 1AP • EGR valve terminal D—PCM terminal 1AQ **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 9.
		No	Go to the next step.
6	**INSPECT EGR VALVE POSITION SENSOR SIGNAL CIRCUIT AND GROUND CIRCUIT FOR SHORT TO EACH OTHER** • Verify that the EGR valve and PCM connectors are disconnected. • Inspect for continuity between EGR valve 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: • EGR valve terminal D—PCM terminal 1AQ • EGR valve terminal C—PCM terminal 1AO **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.
7	**INSPECT EGR VALVE POSITION SENSOR POWER SUPPLY CIRCUIT FOR OPEN CIRCUIT** • Verify that the EGR valve and PCM connectors are disconnected. • Inspect for continuity between EGR valve terminal B (wiring harness-side) and PCM terminal 1AP (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 EGR valve terminal B and PCM terminal 1AP. **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.