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2003 MAZDA Tribute OEM Service and Repair Workshop Manual

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STEP	INSPECTION	RESULTS	ACTION
3	**INSPECT ECT SENSOR SIGNAL** • Access the ECT PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Compare the ECT PID and low engine coolant temperature indicator light and high engine coolant temperature warning light operation. • Is the ECT PID value same as indicator/warning light readings?	Yes	Go to the next step.
		No	Inspect the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • If there is any malfunction: — Replace the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • If there is no malfunction: — Perform the instrument cluster symptom troubleshooting "LOW ENGINE COOLANT TEMPERATURE INDICATOR LIGHT/HIGH ENGINE COOLANT TEMPERATURE WARNING LIGHT ILLUMINATES OR FLASHES CONTINUOUSLY". (See LOW ENGINE COOLANT TEMPERATURE INDICATOR LIGHT/HIGH ENGINE COOLANT TEMPERATURE WARNING LIGHT ILLUMINATES OR FLASHES CONTINUOUSLY [INSTRUMENT CLUSTER].)
4	**INSPECT COOLING FAN CONTROL SYSTEM OPERATION** • Perform the Cooling Fan Control System Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Does the cooling fan control system operate properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
5	**INSPECT COOLANT CONTROL VALVE** • Inspect the coolant control valve. (See COOLANT CONTROL VALVE INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the coolant control valve. (See COOLANT CONTROL VALVE REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Reinstall the coolant control valve, then go to the next step. (See COOLANT CONTROL VALVE REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
6	**VERIFY THAT NO FOREIGN MATTER IS IN ENGINE COOLANT** • Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Has foreign matter penetrated the engine coolant?	Yes	Replace the engine coolant. (See ENGINE COOLANT REPLACEMENT [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
7	Verify the test results. • If normal, return to the diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • If the malfunction remains, inspect the related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. — If the vehicle is repaired, troubleshooting is completed. — If the vehicle is not repaired or additional diagnostic information is not available, reprogram the PCM if a later calibration is available. Retest.		

Related PIDs

Item (definition)	Unit/Condition	Definition	Condition/Specification (Reference)
APP1	%	APP sensor No.1	• Accelerator pedal released: Approx. 15% • Accelerator pedal depressed: Approx. 90.58%
	V		• Accelerator pedal released: Approx. 0.75 V • Accelerator pedal depressed: Approx. 4.52 V
APP2	%	APP sensor No.2	• Accelerator pedal released: Approx. 7.45% • Accelerator pedal depressed: Approx. 45.49%
	V		• Accelerator pedal released: Approx. 0.38 V • Accelerator pedal depressed: Approx. 2.26 V
ECT	°C, °F	Engine coolant temperature	• Displays ECT
	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
FUEL_PRES	KPa {MPA}, mBar {BAR}, psi, in H20	Fuel pressure input from fuel pressure sensor	• Displays fuel pressure
	V	Fuel pressure sensor voltage	• Idle (ECT 80 °C {176 °F}) — Fuel pressure is 10 MPa {102 kgf/cm ^{2}, 1450 psi}: Approx. 1.4 V
IAT	°C, °F	IAT sensor No.1 voltage	• Displays IAT (No.1)
	V		• IAT is 20 °C {68 °F}: Approx. 2.70 V • IAT is 40 °C {104 °F}: Approx. 1.80 V • IAT is 60 °C {140 °F}: Approx. 1.20 V
LOAD	%	Engine load	• Idle (after warm up): Approx. 16.07% • Racing (engine speed is 2,000 rpm): Approx. 13.33% • Racing (engine speed is 4,000 rpm): Approx. 15.29%
LONGFT1	%	Long term fuel trim	• Idle (after warm up): Approx. -3.9% • Racing (engine speed is 2,000 rpm): Approx. -0.78% • Racing (engine speed is 4,000 rpm): Approx. -0.78%
MAF	g/Sec	Mass air flow	• Displays MAF
	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	KPa {MPA}, mBar {BAR}, psi, in H20	Manifold absolute pressure	• Displays MAP
MAP_V	V	MAP sensor voltage	• 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	μA	A/F sensor	• 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
O2S12	V	HO2S	• Idle (after warm up): 0−1.0 V • Deceleration fuel cut (accelerator pedal released from engine speed of 4,000 rpm or more): Approx. 0 V
RPM	RPM	Engine speed	• Displays engine speed
SHRTFT1	%	Short term fuel trim	• Idle (after warm up): Approx. 2.34% • Racing (engine speed is 2,000 rpm): Approx. 3.9% • Racing (engine speed is 4,000 rpm): Approx. 1.56%
TP_REL	%	Throttle position signal (relative value)	• Accelerator pedal released: Approx. 12% • Accelerator pedal depressed: Approx. 82%

STEP	INSPECTION	RESULTS	ACTION
8	**INSPECT EXHAUST SYSTEM FOR LEAKAGE** • Visually inspect for exhaust gas leakage from exhaust manifold. • Is there any leakage?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
9	**INSPECT FUEL PRESSURE (HIGH-SIDE)** • Start the engine and warm it up completely. • Access the FUEL_PRES PID using the M-MDS at idle. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the FUEL_PRES PID value approx. 10 MPa {102 kgf/cm^2, 1,450 psi}?	Yes	Go to Step 13.
		No	Lower than 10 MPa {102 kgf/cm^2, 1,450 psi}: • Inspect the following: — Fuel leakage at the fuel line and fuel injector — Fuel pump • Perform the Fuel Pump (Low-pressure Side) Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) — Fuel pressure sensor (See FUEL PRESSURE SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) — High pressure fuel pump (See HIGH PRESSURE FUEL PUMP INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • If there is any malfunction: — Repair or replace the malfunctioning part according to the inspection results. • If there is no malfunction: — Go to Step 12. Higher than 10 MPa {102 kgf/cm^2, 1,450 psi}: • Go to the next step.
10	**DETERMINE IF MALFUNCTION CAUSE IS FUEL PRESSURE SENSOR OR HIGH PRESSURE FUEL PUMP** • Is the vehicle acceleration performance normal?	Yes	Go to the next step.
		No	Go to Step 12.
11	**INSPECT FUEL PRESSURE SENSOR** • Inspect the fuel pressure sensor. (See FUEL PRESSURE SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the fuel distributor. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to Step 13.

NO.20 FUEL ODOR (IN ENGINE COMPARTMENT) [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)]

SM2897166

id0103s380260

20	FUEL ODOR (IN ENGINE COMPARTMENT)
DESCRIPTION	• Gasoline fuel smell or visible leakage.
POSSIBLE CAUSE	• Missing or loose fuel filler cap • Fuel filler cap malfunction (seal malfunction) • Fuel leakage from fuel system • Charcoal canister damage • Vacuum hose (disconnection, damage) between fuel tank, charcoal canister, purge solenoid valve, and intake manifold • Fuel leakage at the fuel injector • Purge solenoid valve malfunction (stuck) Warning The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services: • Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel. • Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injury or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) (See AFTER SERVICE PRECAUTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) Caution • Disconnecting/connecting the quick release connector without cleaning it may possibly cause damage to the fuel pipe and quick release connector. Always clean the quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign matter.

Caution

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

Related PIDs

Item (definition)	Unit/Condition	Definition	Condition/Specification (Reference)
FUEL_PRES	KPa {MPA}, mBar {BAR}, psi, in H20	Fuel pressure input from fuel pressure sensor	• Displays fuel pressure
	V	Fuel pressure sensor voltage	• Idle (ECT 80 °C {176 °F}) — Fuel pressure is 10 MPa {102 kgf/cm ^{2}, 1450 psi}: Approx. 1.4 V

NO.21 ENGINE NOISE [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)]

SM2897167

id0103s380270

21	ENGINE NOISE
DESCRIPTION	• Engine noise from under hood.

STEP	INSPECTION	RESULTS	ACTION
4	**VERIFY IF THERE IS THUMPING/RATTLING OR CREAKING SOUND** • Inspect the following: — Drive belt tension — Loose parts in engine compartment — Loose fitting heater hoses vibrating the heater hose bracket protector • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to Step 9.
5	**VERIFY IF THERE IS HISSING SOUND** • Inspect the following: — Vacuum leakage — Spark plug loose — Intake-air system leakage • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to Step 9.
6	**VERIFY IF THERE IS CLATTERING SOUND** • Inspect the location of rattle for loose parts. • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to Step 9.
7	**VERIFY IF THERE IS LIGHTLY TAPPING OR RUMBLING SOUND** • Inspect the following: — Exhaust system installation condition — Intake system installation condition • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to Step 9.
8	**VERIFY IF THERE IS KNOCK SOUND** • Is knocking noise present?	Yes	Perform the symptom troubleshooting "NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE". (See NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	If noise comes from engine internal: • Inspect the following: — Timing chain — Hydraulic lash adjuster (HLA) noise — Electric variable valve timing actuator — Hydraulic variable valve timing actuator — Engine compression • Repair or replace the malfunctioning part according to the inspection results.
9	Verify the test results. • If normal, return to the diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • If the malfunction remains, inspect the related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. — If the vehicle is repaired, troubleshooting is completed. — If the vehicle is not repaired or additional diagnostic information is not available, reprogram the PCM if a later calibration is available. Retest.		

ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)]

SM2897171

id0103s380370

Special Service Tool (SST)

MAZ-95-130-KT Dual purpose diagnostic leak detector	

Main Relay Operation Inspection

1.Verify that the main relay clicks when the ignition is switched ON and then off.

- If there is no operation sound, inspect the following:
  - — Main relay (See RELAY INSPECTION.)
  - — Wiring harness and connector between battery and main relay terminal A
  - — Wiring harness and connector between PCM terminal 2B and main relay terminal E

Intake Manifold Vacuum Inspection

1.Verify the air intake hoses are installed properly.

2.Start the engine and let it idle.

3.Disconnect the vacuum hose between the intake manifold and purge solenoid valve from the intake manifold side.

4.Connect a vacuum gauge to the intake manifold and measure the intake manifold vacuum.

- If not within specification, inspect the following:

Specification

−60.0 kPa {−450 mmHg, −17.7 inHg}

Note

• Air suction can be located by the engine speed change when lubricant is sprayed on the area where suction is occurring. Check the following places:

  - **— Air suction at throttle body, charge air cooler, intake manifold and PCV valve installation points**

Item (definition)	Unit/Condition	Definition	Condition/Specification (Reference)
RPM	RPM	Engine speed	• Displays engine speed

Drive-by-wire Control System Inspection

Engine coolant temperature compensation inspection

1.Connect the M-MDS to the DLC-2.

2.Select the following PIDs: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)

- ECT
- IAT
- RPM

3.Verify that the engine is cold, then start the engine.

4.Verify that the engine speed decreases as the engine warms up.

- If the engine speed does not decrease or decreases slowly, inspect the following:
  - — ECT sensor and related wiring harness (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
  - — Throttle body and related wiring harness (See THROTTLE BODY INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)

Related PIDs

Item (definition)	Unit/Condition	Definition	Condition/Specification (Reference)
ECT	°C, °F	Engine coolant temperature	• Displays ECT
	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
IAT	°C, °F	Intake air temperature (No.1)	• Displays IAT (No.1)
	V		• IAT is 20 °C {68 °F}: Approx. 2.70 V • IAT is 40 °C {104 °F}: Approx. 1.80 V • IAT is 60 °C {140 °F}: Approx. 1.20 V
RPM	RPM	Engine speed	• Displays engine speed

Load compensation inspection

— If the engine speed does not become approx. 1,200 rpm, inspect for the following parts, then repair or replace the malfunctioning part:

- APP sensor (See ACCELERATOR PEDAL POSITION (APP) SENSOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
- Brake switch (See BRAKE SWITCH INSPECTION.)
- Communication between PCM and TCM (See CONTROLLER AREA NETWORK (CAN) MALFUNCTION DIAGNOSIS FLOW [TYPE-A (SKYACTIV-G 2.5)].)

Fuel Injector Operation Inspection

If simulation function of M-MDS is used:

STEP	INSPECTION		ACTION
1	Start the engine and warm it up completely. Access the INJ_1, INJ_2, INJ_3 and INJ_4 PIDs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) Turn each fuel injector from on to off using the PIDs for each cylinder. Does the engine speed drop?	Yes	Fuel injectors work properly.
		No	Engine speed does not drop an any cylinder: • Go to the next step. Engine speed drops on some cylinders: • Go to Step 4.
2	Perform the Main Relay Operation Inspection. (See Main Relay Operation Inspection.) Does the main relay work properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
3	Inspect the fuel injector of the suspected cylinder. (See FUEL INJECTOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) Is there any malfunction?	Yes	Replace the fuel injector. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Inspect the fuel injector power and/or ground systems related wiring harness and connectors for the suspected cylinder. • If all items normal: — Replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • If not: — Repair or replace the malfunctioning part according to the inspection results.
4	Perform the KOER self test using the M-MDS. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) Are the DTCs P0201:00, P0202:00, P0203:00 and/or P0204:00 present?	Yes	Go to the appropriate DTC inspection. (See DTC P0201:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) (See DTC P0202:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) (See DTC P0203:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) (See DTC P0204:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)
		No	Go to the next step.