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2002 MAZDA 6/Atenza Hatchback OEM Service and Repair Workshop Manual

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ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-D 2.2]

SM2897042

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Intake Shutter Valve Operation Inspection

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

2.Start the engine and run it at idle.

3.Access the PCM PID ISV_ACT using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].)

4.Access the PCM simulation item ISV_DSD using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].)

5.Verify that the ISV_ACT PID increases linearly, while increasing the opening angle of the intake shutter valve using the active command mode function of ISV_DSD.

- If the PID ISV_ACT value does not increase, perform the following procedures.

  1. Remove the intake shutter valve with connector connected. (See INTAKE SHUTTER VALVE REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
  2. Verify that the intake shutter valve opens and closes while it is operated using the active command mode function of the ISV_DSD.

     — If not verified, retest after cleaning the intake shutter valve and inspecting related wiring harness and connectors.
  3. If the intake shutter valve does not operate, replace the intake shutter valve. (See INTAKE SHUTTER VALVE REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)

- If the PID ISV_ACT value increases, the intake shutter valve is normal.

Brake Override System Operation Inspection

Note

- **If the brake override system operates normally after performing the following inspection, the PCM detects DTC P2299:00.**

1.Start the engine and run it is idling.

2.Verify that the engine speed becomes approx. 1,000 rpm under the following conditions.

- Neutral
- Engine speed of 875 rpm or more other than idle
- Brake pedal depressed

3.Perform the KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-D 2.2)].)

4.Verify that DTCs P0201:00, P0202:00, P0203:00 and/or P0204:00 are not shown using the KOER self test.

- If DTC P0201:00, P0202:00, P0203:00 and/or P0204:00 are shown, perform the DTC troubleshooting procedure. (See DTC TABLE [PCM (SKYACTIV-D 2.2)].)

5.Verify that the engine speed drops or stalls when each cylinder fuel injector turns to off from on using the M-MDS active command mode function. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].)

- If it cannot be verified, inspect the following for the suspected cylinder;
  - — Fuel injector (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2].)
  - — Wiring harness for PCM−Fuel injector

A/C Cut-off Control System Inspection

1.Start the engine.

2.Turn the A/C switch on.

3.Verify that the A/C compressor magnetic clutch actuates.

- If it does not actuate, go to symptom troubleshooting "A/C DOES NOT WORK SUFFICIENTLY". (See A/C DOES NOT WORK SUFFICIENTLY [FULL-AUTO AIR CONDITIONER].) (See A/C DOES NOT WORK SUFFICIENTLY [MANUAL AIR CONDITIONER].)

4.Fully open the throttle valve and verify that the A/C compressor magnetic clutch does not actuate for 2−5 s.

- If it actuates, inspect as follows:
  - — A/C relay (See RELAY INSPECTION.)
  - — Open or short to ground circuit in wiring harness and connectors (Front body control module (FBCM) terminal 1C−A/C relay−PCM terminal 2BE)
  - — A/C related parts
  - — APP1, APP2 PIDs (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) (See PCM INSPECTION [SKYACTIV-D 2.2].)

Engine Oil Solenoid Valve Operation Inspection

1.Verify that the oil pressure is normal. (See OIL PRESSURE INSPECTION [SKYACTIV-D 2.2].)

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

3.Start the engine.

STEP	INSPECTION	RESULTS	ACTION
4	INSPECT TIMING CHAIN INSTALLATION CONDITION • Verify the condition of the timing chain assembly (valve timing, looseness, jumping). (See TIMING CHAIN REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results. Assemble the timing chain using the correct timing, then go to Step 6. (See TIMING CHAIN REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
5	INSPECT INSTRUMENT CLUSTER • Inspect the instrument cluster. (See INSTRUMENT CLUSTER INSPECTION.) • Is the instrument cluster normal?	Yes	Go to the next step.
		No	Replace the instrument cluster, then go to the next step. (See INSTRUMENT CLUSTER REMOVAL/INSTALLATION.)
6	Verify the test results. • If normal, return to the diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [SKYACTIV-D 2.2].) • 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.		

NO.3 DIESEL PARTICULATE FILTER INDICATOR LIGHT ILLUMINATED FREQUENTLY/MESSAGE RELATED TO ACCUMULATION CONDITION IN DIESEL PARTICULATE FILTER INDICATED IN DISPLAY [SKYACTIV-D 2.2]

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3	DIESEL PARTICULATE FILTER INDICATOR LIGHT ILLUMINATED FREQUENTLY/MESSAGE RELATED TO ACCUMULATION CONDITION IN DIESEL PARTICULATE FILTER INDICATED IN DISPLAY
DESCRIPTION	• Diesel particulate filter indicator light illuminated frequently. • Message related to accumulation condition in diesel particulate filter indicated on the display. (With center display or with multi-information display)
POSSIBLE CAUSE	• PCM DTC is stored. • Exhaust gas pressure sensor No.2 malfunction • Diesel particulate filter clogged • Engine coolant temperature is low (overcooling) • Instrument cluster malfunction • Poor engine oil quality • Poor fuel quality • Abnormal engine combustion **Warning** **• The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:** **— Always keep sparks and flames away from fuel. Fuel can be easily ignited which could cause serious injury or death, and damage to equipment.** **— Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death, and damage to property and facilities. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure", while referring to the "BEFORE SERVICE PRECAUTION". (See BEFORE SERVICE PRECAUTION [SKYACTIV-D 2.2].)** **— Fuel is highly flammable and dangerous. Fuel line spills and leakage can cause serious injury or death, and damage to equipment. When installing the fuel hose, always refer to the "AFTER SERVICE PRECAUTION" and perform the "Fuel Hose Installation Procedure". (See AFTER SERVICE PRECAUTION [SKYACTIV-D 2.2].)**

Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
1	**VERIFY PCM DTC** • Retrieve PCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [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	Go to the next step.
2	**DETERMINE IF MALFUNCTION IS DUE TO OVERCOOLING** • Verify the symptom. • Is the cooling system normal?	Yes	Go to the next step.
		No	Perform the symptom troubleshooting "NO.23 COOLING SYSTEM CONCERNS-RUNS COLD". (See NO.23 COOLING SYSTEM CONCERNS-RUNS COLD [SKYACTIV-D 2.2].)

NO.7 CHARGING SYSTEM WARNING LIGHT ILLUMINATED/MESSAGE RELATED TO CHARGING SYSTEM MALFUNCTION INDICATED IN DISPLAY [SKYACTIV-D 2.2]

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7	CHARGING SYSTEM WARNING LIGHT ILLUMINATED/MESSAGE RELATED TO CHARGING SYSTEM MALFUNCTION INDICATED IN DISPLAY
DESCRIPTION	• Charging system warning light illuminated. • Message related to charging system malfunction indicated on the display. (With center display or with multi-information display)
POSSIBLE CAUSE	• Erratic signal to PCM — Generator or related circuit malfunction • Battery malfunction • Generator malfunction • Instrument cluster malfunction

Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
1	VERIFY PCM DTC • Retrieve PCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [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	Go to the next step.
2	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-D 2.2)].) — ALTT V • Do the PIDs indicate the correct values under the trouble condition? (See PCM INSPECTION [SKYACTIV-D 2.2].)	Yes	Go to the next step.
		No	Inspect the related sensor and circuit. • If there is any malfunction: — Repair or replace the malfunctioning part according to the inspection results, then go to Step 6. • If there is no malfunction: — Go to the next step.
3	INSPECT BATTERY • Inspect the battery. (See BATTERY INSPECTION.) • Is the battery normal?	Yes	Go to the next step.
		No	Recharge or replace the battery, then go to Step 6. (See BATTERY RECHARGING.) (See BATTERY REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)

NO.1 BLOWN FUSES [SKYACTIV-D 2.2]

SM2897053

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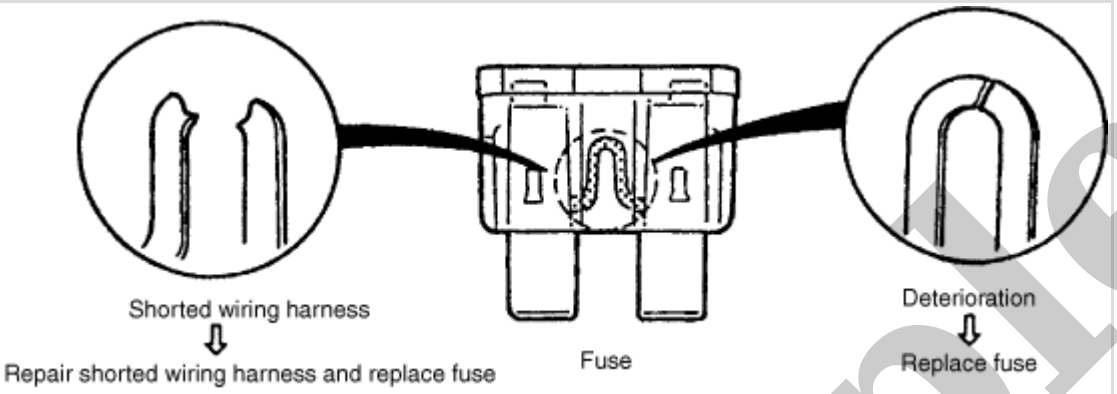
1	BLOWN FUSES

[TROUBLESHOOTING HINTS]
• Inspect condition of fuse.



Damaged fuse	Related fuse, wiring harness
MAIN	• FAN DE fuse • ADD FAN DE fuse • FUEL PUMP fuse • FUEL WARM fuse • IG2 fuse • ENG.+B fuse • ENG.MAIN fuse • SCR1 fuse • SCR2 fuse
FAN DE	• Cooling fan relay No.1
ADD FAN DE	• Cooling fan relay No.2
FUEL WARM	• Fuel warmer
STR	• Generator • Starter
GLOW	• Glow control module
IG2	• Starter relay
ENG.+B	• DLC-2 • PCM
ENG.MAIN	• Main relay
ENGINE.IG1	• PCM
ENGINE1	• Glow control module • MAF sensor/IAT sensor No.1 • Engine oil solenoid valve • A/F sensor
ENGINE2	• Wastegate solenoid valve • Compressor bypass solenoid valve • Regulating solenoid valve • PCM

STEP	INSPECTION	RESULTS	ACTION
1	**VERIFY PCM DTC** • Retrieve PCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [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	Go to the next step.
2	**VERIFY TCM DTC** • Retrieve TCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC SYSTEM DTC INSPECTION [TCM (GW6A-EL, GW6AX-EL)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See ON-BOARD DIAGNOSTIC SYSTEM DTC TABLE [TCM (GW6A-EL, GW6AX-EL)].)
		No	Go to the next step.
3	**VERIFY DOSING CONTROL UNIT DTC** • Retrieve Dosing control unit DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].)
		No	Go to the next step.
4	**INSPECT COMMUNICATION LINE BETWEEN PCM AND INSTRUMENT CLUSTER** • Inspect for short or open circuit between the following terminals: — Instrument cluster terminal B −Front body control module (FBCM) terminal 2K — Instrument cluster terminal D −Front body control module (FBCM) terminal 2I — Front body control module (FBCM) terminal 2P−PCM terminal 2AK — Front body control module (FBCM) terminal 2N−PCM terminal 2AL • Is the wiring harness normal?	Yes	Inspect the instrument cluster. (See INSTRUMENT CLUSTER INSPECTION.) • If there is any malfunction: — Repair or replace the malfunctioning part according to the inspection results, then go to the next step. (See INSTRUMENT CLUSTER REMOVAL/INSTALLATION.)
		No	Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: • Instrument cluster terminal B−Front body control module (FBCM) terminal 2K • Instrument cluster terminal D−Front body control module (FBCM) terminal 2I • Front body control module (FBCM) terminal 2P−PCM terminal 2AK • Front body control module (FBCM) terminal 2N−PCM terminal 2AL **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 or open circuit. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has a short to ground or open circuit. Go to the next step.
5	Verify the test results. • If normal, return to the diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [SKYACTIV-D 2.2].) • 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.		

STEP	INSPECTION	RESULTS	ACTION
1	**INSPECT POWER SUPPLY** • Access the VPWR PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) • Is the VPWR PID value B+?	Yes	Go to the next step.
		No	Inspect the following: • Battery connection • Battery condition (See BATTERY INSPECTION.) • Fuse (See NO.1 BLOWN FUSES [SKYACTIV-D 2.2].) — If there is any malfunction: • Repair or replace the malfunctioning part according to the inspection results, then repeat this step.
2	**VERIFY DOSING CONTROL UNIT RELATED DTC** • Retrieve dosing control unit DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].)
		No	Go to the next step.
3	**DETERMINE IF MALFUNCTION CAUSE IS IMMOBILIZER SYSTEM OR OTHER** • Are any of the following conditions present? — Engine does not start completely. — PCM DTC P1260:00 is displayed.	Yes	Both conditions present: • Go to Step 5.
		No	Either or other condition present: • Go to the next step.
4	**INSPECT PUSH BUTTON START CONNECTOR CONNECTION** • Inspect the connection of push button start connector. • Is the push button start connector securely connected to the coil antenna?	Yes	Go to the next step.
		No	Reconnect the push button start securely, then repeat from Step 2.
5	**VERIFY IMMOBILIZER SYSTEM DTC** • Retrieve the immobilizer system DTCs using the M-MDS. (See DTC INSPECTION [START STOP UNIT].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [START STOP UNIT].)
		No	Go to the next step.
6	**VERIFY THAT COMMUNICATION ERROR MESSAGE IS DISPLAYED** • Retrieve any DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) • Is the communication error message displayed?	Yes	Inspect the following: • Open circuit in wiring harness between main relay terminal E and PCM terminal 2K • Open circuit in wiring harness between main relay terminal C and PCM terminal 2S, 2T, 1DH, 1DL • Main relay (stuck open) • Open or short circuit in wiring harness between DLC-2 and PCM terminal 2AK, 2AL Repair or replace the malfunctioning part according to the inspection results, then go to Step 25.
		No	Go to the next step.
7	**DETERMINE IF MALFUNCTION CAUSE IS STARTER RELAY CONTROL SIGNAL CIRCUIT OR OTHER** • Crank the engine. • Is a clicking sound heard from the starter relay?	Yes	Go to Step 15.
		No	Go to the next step.
8	**INSPECT STARTER RELAY** • Switch the ignition off. • Remove the starter relay. • Inspect the starter relay. (See RELAY INSPECTION.) • Is the starter relay normal?	Yes	Go to the next step.
		No	Replace the starter relay, then go to Step 25.

STEP	INSPECTION	RESULTS	ACTION
17	INSPECT FOR SHORT TO GROUND AND OPEN CIRCUIT IN SECONDARY (STARTER POWER SUPPLY) OF STARTER RELAY • Switch the ignition off. • Remove the starter relay. • Verify that the starter connector is disconnected. • Measure the voltage at the starter relay terminal D (wiring harness-side) • Is the voltage B+?	Yes	Go to the next step.
		No	Inspect the MAIN 200 A fuse and IG2 30 A fuse. • If the fuse is blown: — Refer to the wiring diagram and verify whether or not there is a common connector between MAIN 200 A fuse and starter relay terminal D. **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. • Replace the fuse. • If the fuse is damaged: — Replace the fuse. • If all fuses are normal: — Refer to the wiring diagram and verify whether or not there is a common connector between battery positive terminal and starter relay terminal D. **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 25.
18	INSPECT STARTER POWER SUPPLY CIRCUIT FOR SHORT TO GROUND • Verify that the starter relay is removed. • Verify that the starter connector is disconnected. • Inspect for continuity between starter relay terminal C (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 C and starter terminal 2A. **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 25.
		No	Go to the next step.