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2002 MAZDA RX-7 (FD) OEM Service and Repair Workshop Manual

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• The air only test must be done first because the vapor test generates heat that can increase pressure and affect the accuracy of the pressure gauge.
• Always perform the air only test before the vapor test.

1.Move the vehicle to a location where safety can be assured.

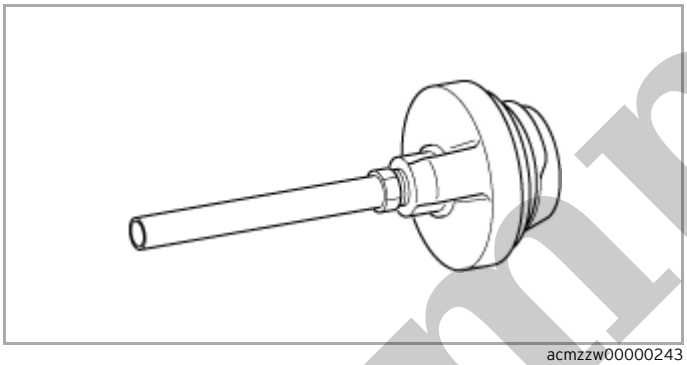
2.Ignition switched ON (engine off).

3.Access the following PIDs using the M-MDS. (See PCM INSPECTION [SKYACTIV-G 2.5T].)

— EVAPCV

4.Remove the fuel-filler cap from the vehicle and clean the fuel-filler cap installation surface of the vehicle.

5.Install the gas cap single thread to the fuel-filler cap installation surface.



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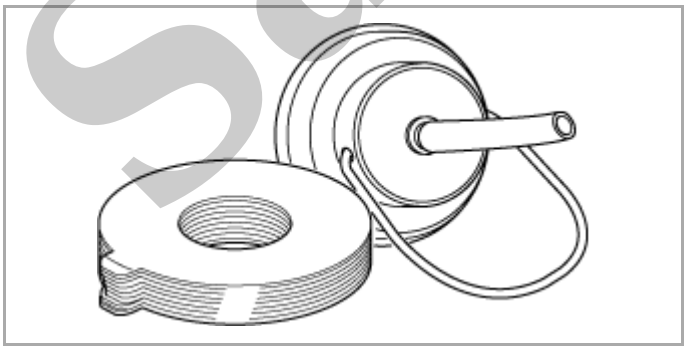
Note

• If the gas cap single thread does not fit to the fuel-filler cap installation surface, use the universal filler neck connector.
• EVAP test tools for older vehicles (1998–2013 MY) are available via eStore.



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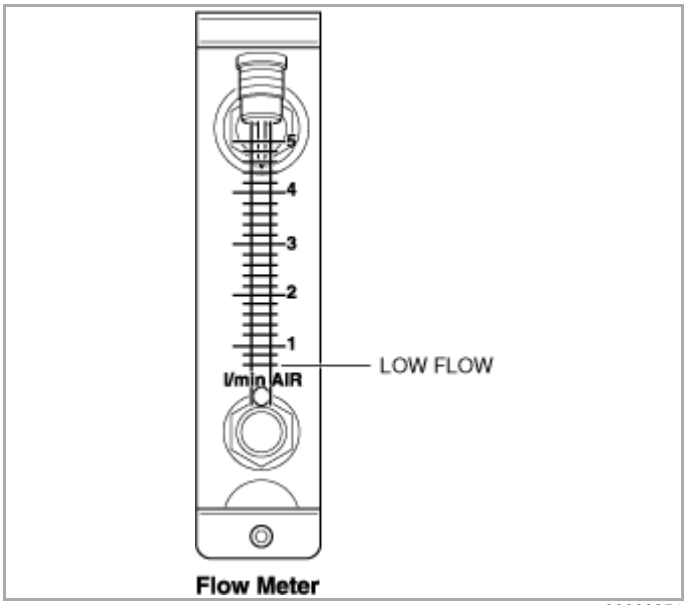
6.Insert the EVAP/low pressure vapor output hose nozzle into the gas cap single thread hose as shown in the figure.



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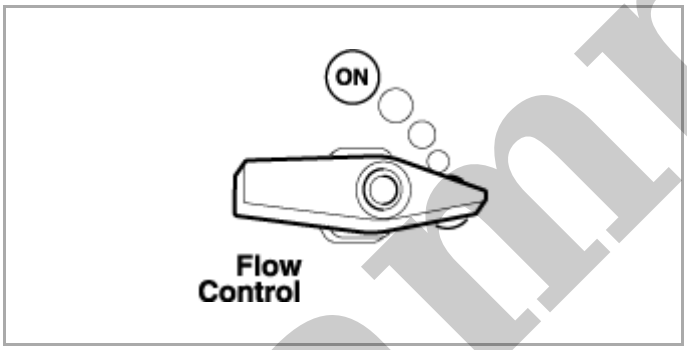
• If the flow meter indication does not decrease to the minimum flow rate, it means that there is leakage in the EVAP system. Perform the vapor test. (See Vapor test.)

14.Turn the EVAP/low pressure flow control valve for the EVAP/low pressure testing (right side of tester) to OFF.



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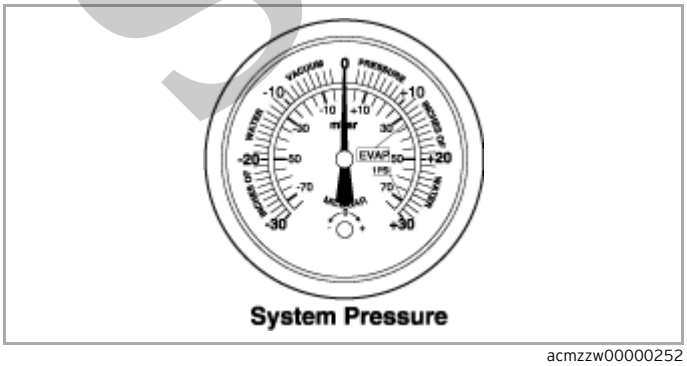
15.Read and record the value indicated by the system pressure gauge for the EVAP/low pressure testing (right side of tester).



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16.Leave the tester for 2 min.

17.Read the value indicated by the system pressure gauge again and check if there is any change from the value recorded in Step 15.

There is no change in the value

NO.24 FUEL REFILL CONCERNS [SKYACTIV-G 2.5T]

SM3065994

id0103q480570

24	FUEL REFILL CONCERNS
DESCRIPTION	• Fuel tank does not fill smoothly.
POSSIBLE CAUSE	• PCM DTC is stored. • Evaporative emissions system hoses restriction • Non-return valve malfunction • Check valve malfunction (U.S.A., CANADA and Israel) • Improper use of fuel nozzle • Inadequate fuel filling speed **Warning** **• The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system:** **— 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 injuries 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 2.5T].) (See AFTER SERVICE PRECAUTION [SKYACTIV-G 2.5T].)** **Caution** **• Disconnecting/connecting the quick release connector without cleaning it may cause damage to the fuel pipe and the quick release connector. Always clean the quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign matter.**

Diagnostic Procedure

STEP	INSPECTION		ACTION
1	**VERIFY PCM DTC** • Retrieve PCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5T)].)
		No	Go to the next step.
2	**INSPECT EVAPORATIVE SYSTEM HOSES FOR RESTRICTION** • Inspect for restriction in the evaporative system hoses. • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.

NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [SKYACTIV-G 2.5T]

SM2897106

id0103q481210

13	KNOCKING/PINGING-ACCELERATION/CRUISE
DESCRIPTION	• 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.

STEP	INSPECTION	RESULTS	ACTION
8	INSPECT MAF SENSOR • Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [SKYACTIV-G 2.5T].) • Is there any malfunction?	Yes	Replace the MAF sensor/IAT sensor No.1. (See MASS AIR FLOW (MAF) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR NO.1 REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.
9	INSPECT IAT SENSOR No.2 • Inspect the IAT sensor No.2 resistance. (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [SKYACTIV-G 2.5T].) • Is there any malfunction?	Yes	Replace the MAP sensor/IAT sensor No.2. (See MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR NO.2 REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.
10	INSPECT ECT SENSOR • Inspect the ECT sensor resistance. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [SKYACTIV-G 2.5T].) • Is there any malfunction?	Yes	Replace the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Go to the next step.
11	INSPECT KS • Inspect the KS. (See KNOCK SENSOR (KS) INSPECTION [SKYACTIV-G 2.5T].) • Is there any malfunction?	Yes	Replace the KS, then go to the next step. (See KNOCK SENSOR (KS) REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	Remove the accumulated matter in the cylinder head using the following procedure: • Carbon remover • Overhauling Go to the next step.
12	Verify the test results. • If normal, return to the diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [SKYACTIV-G 2.5T].) • 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.		

26	SPARK PLUG CONDITION
POSSIBLE CAUSE	Note • Inspecting the spark plug conditions can determine whether a problem is related to a specific cylinder or possibly all cylinders. Wet/carbon stuck on specific plug: • Spark–Weak, not visible • Air/fuel mixture–Excessive fuel injection volume • Compression–No compression, low compression • Malfunction spark plug Grayish white with specific plug: • Air/fuel mixture–Insufficient fuel injection volume • Malfunction spark plug If a spark plug on a specific cylinder is damaged or corroded: • Malfunction spark plug — Damage or corrosion due to pre-ignition or knocking Wet/carbon is stuck on all plugs: • Spark–Spark weak • Air/fuel mixture–Too rich, excessive fuel line pressure • Erratic signal to PCM — ECT sensor or related circuit malfunction — MAF sensor or related circuit malfunction — A/F sensor or related circuit malfunction — HO2S or related circuit malfunction • Compression–Low compression • Restriction in intake/exhaust system Grayish white with all plugs: • Erratic signal to PCM — ECT sensor or related circuit malfunction — MAF sensor or related circuit malfunction — A/F sensor or related circuit malfunction — HO2S or related circuit malfunction • Air/fuel mixture–Too lean, insufficient fuel line pressure 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. — Highly pressurized fuel may spray out if the fuel line is cut. Due to the following dangers occurring with a fuel spray, always complete the "Fuel Line Safety Procedure" to prevent the fuel from spraying. (See BEFORE SERVICE PRECAUTION [SKYACTIV-G 2.5T].) • Fuel may cause irritation if it comes in contact with skin and eyes. • If fuel ignites and causes a fire, it may lead to serious injury or death, and damage to property and facilities. — Fuel is highly flammable and dangerous. Fuel line spills and leakage can cause serious injury or death, and damage to equipment. Always refer to the "Quick Release Connector Removal/Installation (fuel system)" before performing the fuel hose installation, and execute the "Fuel Leakage Inspection" after installation. (See QUICK RELEASE CONNECTOR (FUEL SYSTEM) REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].) (See AFTER SERVICE PRECAUTION [SKYACTIV-G 2.5T].) Caution

STEP	INSPECTION	RESULTS	ACTION
10	VERIFY CURRENT INPUT SIGNAL STATUS • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) — ECT — MAF — O2S11 (When engine can be started) — O2S12 (When engine can be started) • Are the PIDs normal? (See PCM INSPECTION [SKYACTIV-G 2.5T].)	Yes	Go to the next step.
		No	ECT PID is not as specified: • Inspect for an intermittent open circuit of the ECT sensor and the related wiring harness. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [SKYACTIV-G 2.5T].) MAF PID is not as specified: • Inspect for an intermittent open circuit of the MAF sensor and the related wiring harness. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [SKYACTIV-G 2.5T].) O2S11 PID is not as specified: • Inspect for an intermittent open circuit of the A/F sensor and the related wiring harness. (See AIR FUEL RATIO (A/F) SENSOR INSPECTION [SKYACTIV-G 2.5T].) O2S12 PID is not as specified: • Inspect for an intermittent open circuit of the HO2S and the related wiring harness. (See HEATED OXYGEN SENSOR (HO2S) INSPECTION [SKYACTIV-G 2.5T].) Repair or replace the malfunctioning part according to the inspection results.
11	INSPECT PURGE CONTROL SYSTEM OPERATION • Perform the Purge Control System Inspection when the engine can be started. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5T].) • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
12	INSPECT IGNITION SYSTEM OPERATION • Perform the Spark Test. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-G 2.5T].) • Is a strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
13	INSPECT ENGINE COMPRESSION • Measure the compression pressure for each cylinder. (See COMPRESSION INSPECTION [SKYACTIV-G 2.5T].) • Are compression pressures within specification?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.

NO.25 FUEL FILLING SHUT OFF CONCERNS [SKYACTIV-G 2.5T]

SM3065997

id0103q493330

25	FUEL FILLING SHUT OFF CONCERNS
DESCRIPTION	• Fuel does not shut off properly.
POSSIBLE CAUSE	• PCM DTC is stored. • Nonreturn valve malfunction • Check valve malfunction (U.S.A., CANADA and Israel) • Fuel nozzle is not inserted correctly. • Fuel nozzle malfunction • Fuel shut-off valve malfunction (U.S.A., CANADA and Israel) Warning • The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before servicing the fuel system: — 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 injuries 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 2.5T].) (See AFTER SERVICE PRECAUTION [SKYACTIV-G 2.5T].) Caution • Disconnecting/connecting the quick release connector without cleaning it may cause damage to the fuel pipe and the quick release connector. Always clean the quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign matter.

Diagnostic Procedure

STEP	INSPECTION		ACTION
1	VERIFY PCM DTC • Retrieve PCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5T)].)
		No	Go to the next step.
2	DETERMINE IF MALFUNCTION CAUSE IS NON-RETURN VALVE • Remove the fuel-filler pipe. • Make sure non-return valve is installed properly. • Inspect the non-return valve operation. • Is there any malfunction?	Yes	Replace the fuel tank. (See FUEL TANK REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)
		No	U.S.A., CANADA and Israel: • Go to the next step. Except U.S.A., CANADA and Israel: • Inspect the following: — Improper use of fuel nozzle — Inadequate fuel filling speed Repair or replace the malfunctioning part according to the inspection results.

Damaged fuse	Related wiring harness
ENGINE2	• Fuel injector relay • Purge solenoid valve • OCV • PCM • Exhaust CMP sensor • Ignition coil/ion sensor No.1 • Ignition coil/ion sensor No.2 • Ignition coil/ion sensor No.3 • Ignition coil/ion sensor No.4
ENGINE3	• Cooling fan relay No.1 • Cooling fan relay No.2 • Engine oil solenoid valve • Engine oil level sensor • Forward sensing camera (FSC)

*1:U.S.A., CANADA and Israel