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1983 MAZDA RX-7 (SA/FB) OEM Service and Repair Workshop Manual

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Step	Inspection	Results	Action
1	RECORD VEHICLE STATUS WHEN DTC WAS DETECTED TO UTILIZE WITH REPEATABILITY VERIFICATION Note • Recording can be facilitated using the screen capture function of the PC. • Record the FREEZE FRAME DATA/snapshot data on the repair order.	–	Go to the next step.
2	VERIFY OTHER RELATED DTCs • Switch the ignition OFF, and then switch it ON (engine off). • Display the DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)]) • Has any DTC other than P10CA:00 been stored?	Yes	Repair the malfunctioning location according to the applicable DTC troubleshooting. (See DTC TABLE [PCM (SKYACTIV-D 2.2)])
		No	Go to the next step.
3	INSPECT FUEL INJECTOR NO.4 CONNECTOR CONDITION • Switch the ignition OFF. • Disconnect the fuel injector No.4 connector. • Inspect the connector engagement and connection condition, and inspect the terminals for damage, deformation, corrosion, or disconnection. • Is the connector normal?	Yes	Go to the next step.
		No	Repair or replace the connector, then go to Step 6.
4	INSPECT PCM CONNECTOR CONDITION • Disconnect the PCM connector. • Inspect the connector engagement and connection condition, and inspect the terminals for damage, deformation, corrosion, or disconnection. • Is the connector normal?	Yes	Go to the next step.
		No	Repair or replace the connector, then go to Step 6.
5	INSPECT FUEL PRESSURE SENSOR (INTEGRATED WITH FUEL INJECTOR NO.4) • Inspect the fuel pressure sensor (integrated with fuel injector No.4). (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2]) • Is the fuel pressure sensor (integrated with fuel injector No.4) normal?	Yes	Go to the next step.
		No	Replace fuel injector No.4, then go to the next step. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2])
6	VERIFY THAT REPAIRS HAVE BEEN COMPLETED • Reconnect all the disconnected connectors. • Refer to the [MEMORY CLEARING PROCEDURE] and clear the DTC. (See CLEARING DTC [PCM (SKYACTIV-D 2.2)]) • Perform the KOER self test. (See KOEO/KOER SELF 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, then go to the next step. (See PCM REMOVAL/INSTALLATION [SKYACTIV-D 2.2])
		No	Go to the next step.
7	VERIFY OTHER DTCs • Has any other DTC or pending code been stored?	Yes	Repair the malfunctioning location according to the applicable DTC troubleshooting. (See DTC TABLE [PCM (SKYACTIV-D 2.2)])
		No	DTC troubleshooting completed.

STEP	INSPECTION		ACTION
1	**RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION** **Note** **• Recording can be facilitated using the screen capture function of the PC.** • Record the FREEZE FRAME DATA/snapshot data on the repair order.	–	Go to the next step.
2	**VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related Service Bulletins and/or on-line repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
3	**INSPECT MAF SENSOR/IAT SENSOR No.1 CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the MAF sensor/IAT sensor No.1 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 11.
		No	Go to the next step.
4	**INSPECT IAT SENSOR No.3 CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the IAT sensor No.3 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 11.
		No	Go to the next step.
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 11.
		No	Go to the next step.

DTC P106B:00 [PCM (SKYACTIV-D 2.2)]

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Note

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

Details On DTCs

DESCRIPTION	**DESOx temperature feedback high**	
DETECTION CONDITION	Determination conditions	• The exhaust gas temperature detected by exhaust gas temperature sensor No.3 after the DESOx control stops exceeds 710 °C {1310 °F}.
	Preconditions	• IAT (IAT sensor No.1): -10 °C {14 °F} or more • Barometric pressure: 72 kPa {0.73 kgf/cm^2, 10.4 psi} or more • DESOx control: Implementing high temperature feedback • Diesel particulate filter regeneration: Auto regeneration control • Time from when post fuel injection feedback amount of DESOx control reaches minimum value: More than 10 s • Post fuel injection: Stopped (condition after post fuel injection feedback amount of DESOx control reaches minimum value) • The following DTCs are not detected — BARO sensor: P2227:00, P2228:00, P2229:00 — Exhaust gas temperature sensor No.3: P242B:00, P242C:00, P242D:00 — Fuel injection quantity: P1051:00, P1052:00, P1053:00, P1054:00, P1055:00, P1056:00, P1057:00, P1058:00 — Fuel pressure sensor (integrated with fuel injector): P10CB:00, P10CC, P10CD:00 — Fuel temperature sensor (built-into fuel injector): P10D1:00, P10D2:00, P10D3:00, P10D4:00, P10D5:00 — IAT sensor No.1: P0111:00, P0112:00, P0113:00
	Drive cycle	• 2
	Self test type	• CMDTC self test
	Sensor used	• Exhaust Temperature Sensor No.3 • PCM
FAIL-SAFE FUNCTION	• Inhibits the DENOx/DESOx control.	
VEHICLE STATUS WHEN DTCs ARE OUTPUT	• Illuminates check engine light.	
POSSIBLE CAUSE	• A/F sensor malfunction • Fuel injector malfunction • Air charging system malfunction • NSC (NOx Storage Catalyst) malfunction (deterioration) • PCM malfunction • Misfire	

System Wiring Diagram

• Not applicable

• If high-voltage generating parts or components and electronic devices come near a fuel injector, the fuel injector could be damaged. To prevent damage to a fuel injector, always keep high-voltage generating parts or components and electronic devices away from it.

Intention of troubleshooting procedure

• Step 1–6

— Perform inspection of each separate part.

• Step 7–8

— Verify that primary malfunction is resolved and there are no other malfunctions.

STEP	INSPECTION	RESULTS	ACTION
1	PURPOSE: INSPECT A/F SENSOR • Inspect the A/F sensor. (See AIR FUEL RATIO (A/F) SENSOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 4.
2	PURPOSE: INSPECT INSTALLATION OF A/F SENSOR • Inspect installation of A/F sensor. • Is the A/F sensor installed securely?	Yes	Go to the next step.
		No	Retighten the A/F sensor, then go to Step 7. (See AIR FUEL RATIO (A/F) SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
3	PURPOSE: INSPECT EXHAUST SYSTEM FOR LEAKAGE • Visually inspect for exhaust gas leakage in the exhaust system. • Is there any leakage?	Yes	Repair or replace the malfunctioning part according to the inspection results, then go to Step 7.
		No	Replace the A/F sensor, then go to Step 7. (See AIR FUEL RATIO (A/F) SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
4	PURPOSE: INSPECT FUEL INJECTOR • Inspect the fuel injectors. (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the suspect fuel injector, then go to Step 7. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
5	PURPOSE: VERIFY IF MISFIRE IS OCCURRING • Verify if a misfire is occurring referring to the troubleshooting procedure for DTC P0300:00. (See DTC P0300:00 [PCM (SKYACTIV-D 2.2)].) • Has a misfire occurred?	Yes	Specify the cause of the misfire and repair or replace the malfunctioning location referring to the troubleshooting procedure for DTC P0300:00. (See DTC P0300:00 [PCM (SKYACTIV-D 2.2)].) Go to the next step.
		No	Go to the next step.
6	PURPOSE: DETERMINE IF MALFUNCTION CAUSE IS DETERIORATION OF TURBOCHARGER SYSTEM OR CATALYTIC CONVERTER • Inspect the turbocharger. (See TURBOCHARGER INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the turbocharger, then go to the next step. (See TURBOCHARGER REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Replace the catalytic converter, then go to the next step. (See EXHAUST SYSTEM REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
7	PURPOSE: VERIFICATION OF VEHICLE REPAIR COMPLETION • 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 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.

DESCRIPTION	DESOx temperature feedback low
POSSIBLE CAUSE	• A/F sensor malfunction • Fuel injector malfunction • Air charging system malfunction • NSC (NOx Storage Catalyst) malfunction (deterioration) • PCM malfunction • Misfire

System Wiring Diagram

• Not applicable

Function Explanation (DTC Detection Outline)

• The PCM diagnoses deterioration of the SOx purification performance via the DESOx control by monitoring the post-injection feedback status and the exhaust gas temperature of the NSC downstream by the DeSOx control.
• The PCM compares the temperature detected by exhaust gas temperature sensor No.3 at post injection during the DESOx control and the NSC downstream temperature calculated from the vehicle driving conditions. At this time, if the temperature detected by exhaust gas temperature sensor No.3 is less than the threshold even though the maximum of the post-injection feedback amount is controlled at this time, the PCM determines that the SOx purification performance by the DESOx control has deteriorated.
• If the PCM determines a malfunction, it stores a pending code.
• If the PCM determines that the malfunction recurs from the next drive cycle and thereafter, it stores a DTC and turns on the check engine light.

Repeatability Verification Procedure

1.Start the engine.

2.Perform the auto diesel particulate filter regeneration control.

Note

• To allow stable diesel particulate filter auto regeneration, drive the vehicle at a constant speed without stopping to the extent possible.
• 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.

3.Drive the vehicle under the condition close to the driving condition recorded in the FREEZE FRAME DATA/snapshot data until the diesel particulate filter auto regeneration is completed.

PID Item/Simulation Item Used In Diagnosis

PID/DATA monitor item table

Item	Definition	Unit	Condition/Specification
EXHTEMP2	Exhaust gas temperature sensor No.3	°C, °F	• Displays the exhaust gas temperature (No.3).

STEP	INSPECTION	RESULTS	ACTION
5	**PURPOSE: VERIFY IF MISFIRE IS OCCURRING** • Verify if a misfire is occurring referring to the troubleshooting procedure for DTC P0300:00. (See DTC P0300:00 [PCM (SKYACTIV-D 2.2)].) • Has a misfire occurred?	Yes	Specify the cause of the misfire and repair or replace the malfunctioning location referring to the troubleshooting procedure for DTC P0300:00. (See DTC P0300:00 [PCM (SKYACTIV-D 2.2)].) Go to the next step.
		No	Go to the next step.
6	**PURPOSE: DETERMINE IF MALFUNCTION CAUSE IS DETERIORATION OF TURBOCHARGER SYSTEM OR CATALYTIC CONVERTER** • Inspect the turbocharger. (See TURBOCHARGER INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the turbocharger, then go to the next step. (See TURBOCHARGER REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Replace the catalytic converter, then go to the next step. (See EXHAUST SYSTEM REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
7	**PURPOSE: VERIFICATION OF VEHICLE REPAIR COMPLETION** • 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 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.
8	**PURPOSE: VERIFY IF THERE IS ANY OTHER MALFUNCTION** • Is any other DTC or pending code stored?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-D 2.2)].)
		No	DTC troubleshooting completed.

Item	Definition	Unit	Condition/Specification
O2S11	A/F sensor current	µA	• Idle: Approx. 1.01 mA • Deceleration fuel cut: Approx. 3.84 mA
	A/F sensor voltage	V	• Switch ignition ON (engine off): 3.24 V • Deceleration fuel cut: Approx. 3.74 V

Function Inspection Using M-MDS

STEP	INSPECTION	RESULTS	ACTION
1	**PURPOSE: VERIFY RELATED REPAIR INFORMATION AVAILABILITY** • Verify related Service Bulletins and/or on-line repair information availability. • Is any related repair information available?	Yes	Perform repair or diagnosis according to the available repair information. • If the vehicle is not repaired, go to the next step.
		No	Go to the next step.
2	**PURPOSE: IDENTIFY TRIGGER DTC FOR FREEZE FRAME DATA** • Is the DTC P106C:00 on FREEZE FRAME DATA?	Yes	Go to the next step.
		No	Go to the troubleshooting procedure for DTC on FREEZE FRAME DATA. (See DTC TABLE [PCM (SKYACTIV-D 2.2)].)
3	**PURPOSE: RECORD FREEZE FRAME DATA/SNAPSHOT DATA AND DIAGNOSTIC MONITORING TEST RESULTS TO UTILIZE WITH REPEATABILITY VERIFICATION** **Note** **• Recording can be facilitated using the screen capture function of the PC.** • Record the FREEZE FRAME DATA/Snapshot data and DIAGNOSTIC MONITORING TEST RESULTS (A/F sensor related) on the repair order.	–	Go to the next step.
4	**PURPOSE: VERIFY IF DIAGNOSTIC RESULT IS AFFECTED BY OTHER RELATED DTCs OCCURRING** • Switch the ignition off, then ON (engine off). • Perform the Pending Trouble Code Access Procedure and DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) • Is the other PENDING CODE/DTC also present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-D 2.2)].)
		No	Go to the next step.
5	**PURPOSE: VERIFY IF THERE IS PID ITEM CAUSING DRASTIC CHANGES OF ACCELERATION FLUCTUATION BY INPUT SIGNAL TO PCM** • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) — O2S11 • Is there any signal that is far out of specification?	Yes	Go to the next step.
		No	Go to the troubleshooting procedure to perform the procedure from Step 1.
6	**PURPOSE: VERIFY CONNECTOR CONNECTIONS** • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) — O2S11 • When the following parts are shaken, does the PID value include a PID item which has changed? — A/F sensor — PCM	Yes	Inspect the related wiring harness and connector. • Repair or replace the malfunctioning part. Go to the troubleshooting procedure to perform the procedure from Step 7.
		No	Go to the troubleshooting procedure to perform the procedure from Step 1.

DTC P106D:00 [PCM (SKYACTIV-D 2.2)]

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Note

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

Details On DTCs

DESCRIPTION	**DESOx lambda feedback high**	
DETECTION CONDITION	Determination conditions	• The actual lambda value in the exhaust gas during DESOx control is 0.04 or more higher than the target value for a continuous 4.7 s.
	Preconditions	• IAT (IAT sensor No.1): -10 °C {14 °F} or more • Barometric pressure: 72 kPa {0.73 kgf/cm^2, 10.4 psi} or more • DESOx control: During implementation of rich feedback control • Engine speed and fuel injection amount are within specified range • The following conditions continue for 0.5 s — Fuel injection amount fluctuation rate: Less than 0.73 mm^3/st within 0.008 s — Intake manifold pressure fluctuation rate: Less than 0.16 kPa {0.0017 kgf/cm^2, 0.024 psi} within 0.008 s • Post fuel injection feedback amount of DESOx control: Upper limit • The following DTCs are not detected — BARO sensor: P2227:00, P2228:00, P2229:00 — Fuel injection quantity: P1051:00, P1052:00, P1053:00, P1054:00, P1055:00, P1056:00, P1057:00, P1058:00 — Fuel pressure sensor (integrated with fuel injector): P10CB:00, P10CC, P10CD:00 — Fuel temperature sensor (built-into fuel injector): P10D1:00, P10D2:00, P10D3:00, P10D4:00, P10D5:00 — IAT sensor No.1: P0111:00, P0112:00, P0113:00 — A/F sensor heater: P0031:00, P0032:00, P0053:00 — A/F sensor: P0130:00, P0131:00, P0132:00, P0133:00, P0134:00, P2195:00, P2196:00 — Regulating valve position sensor: P2564:00, P2565:00 — Regulating valve: P2263:00 — Air charging system: P0234:00, P02CA:00, P226C:00 (over boost) — Regulating solenoid valve: P0047:00, P0048:00 — Compressor bypass solenoid valve: P0034:00, P0035:00 — Wastegate solenoid valve: P0245:00, P0246:00
	Drive cycle	• 2
	Self test type	• CMDTC self test
	Sensor used	• A/F sensor • PCM
FAIL-SAFE FUNCTION	• Inhibits the DENOx/DESOx control.	
VEHICLE STATUS WHEN DTCs ARE OUTPUT	• Illuminates check engine light.	

Troubleshooting Diagnostic Procedure

Caution

• If a hand or tool touches a fuel injector terminal or fuel injector connector terminal, the fuel injector might be damaged. To prevent damage to a fuel injector, do not touch the terminals.
• If high-voltage generating parts or components and electronic devices come near a fuel injector, the fuel injector could be damaged. To prevent damage to a fuel injector, always keep high-voltage generating parts or components and electronic devices away from it.

Intention of troubleshooting procedure

• Step 1–6

— Perform inspection of each separate part.

• Step 7–8

— Verify that primary malfunction is resolved and there are no other malfunctions.

STEP	INSPECTION	RESULTS	ACTION
1	PURPOSE: INSPECT A/F SENSOR • Inspect the A/F sensor. (See AIR FUEL RATIO (A/F) SENSOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Go to the next step.
		No	Go to Step 4.
2	PURPOSE: INSPECT INSTALLATION OF A/F SENSOR • Inspect installation of A/F sensor. • Is the A/F sensor installed securely?	Yes	Go to the next step.
		No	Retighten the A/F sensor, then go to Step 7. (See AIR FUEL RATIO (A/F) SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
3	PURPOSE: INSPECT EXHAUST SYSTEM FOR LEAKAGE • Visually inspect for exhaust gas leakage in the exhaust system. • Is there any leakage?	Yes	Repair or replace the malfunctioning part according to the inspection results, then go to Step 7.
		No	Replace the A/F sensor, then go to Step 7. (See AIR FUEL RATIO (A/F) SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
4	PURPOSE: INSPECT FUEL INJECTOR • Inspect the fuel injectors. (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the suspect fuel injector, then go to Step 7. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
5	PURPOSE: INSPECT TURBOCHARGER SYSTEM • Inspect the turbocharger. (See TURBOCHARGER INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the turbocharger, then go to the next step. (See TURBOCHARGER REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
6	PURPOSE: VERIFY IF MISFIRE IS OCCURRING • Verify if a misfire is occurring referring to the troubleshooting procedure for DTC P0300:00. (See DTC P0300:00 [PCM (SKYACTIV-D 2.2)].) • Has a misfire occurred?	Yes	Specify the cause of the misfire and repair or replace the malfunctioning location referring to the troubleshooting procedure for DTC P0300:00. (See DTC P0300:00 [PCM (SKYACTIV-D 2.2)].) Go to the next step.
		No	Go to the next step.