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1986 MAZDA RX-7 (FC) OEM Service and Repair Workshop Manual

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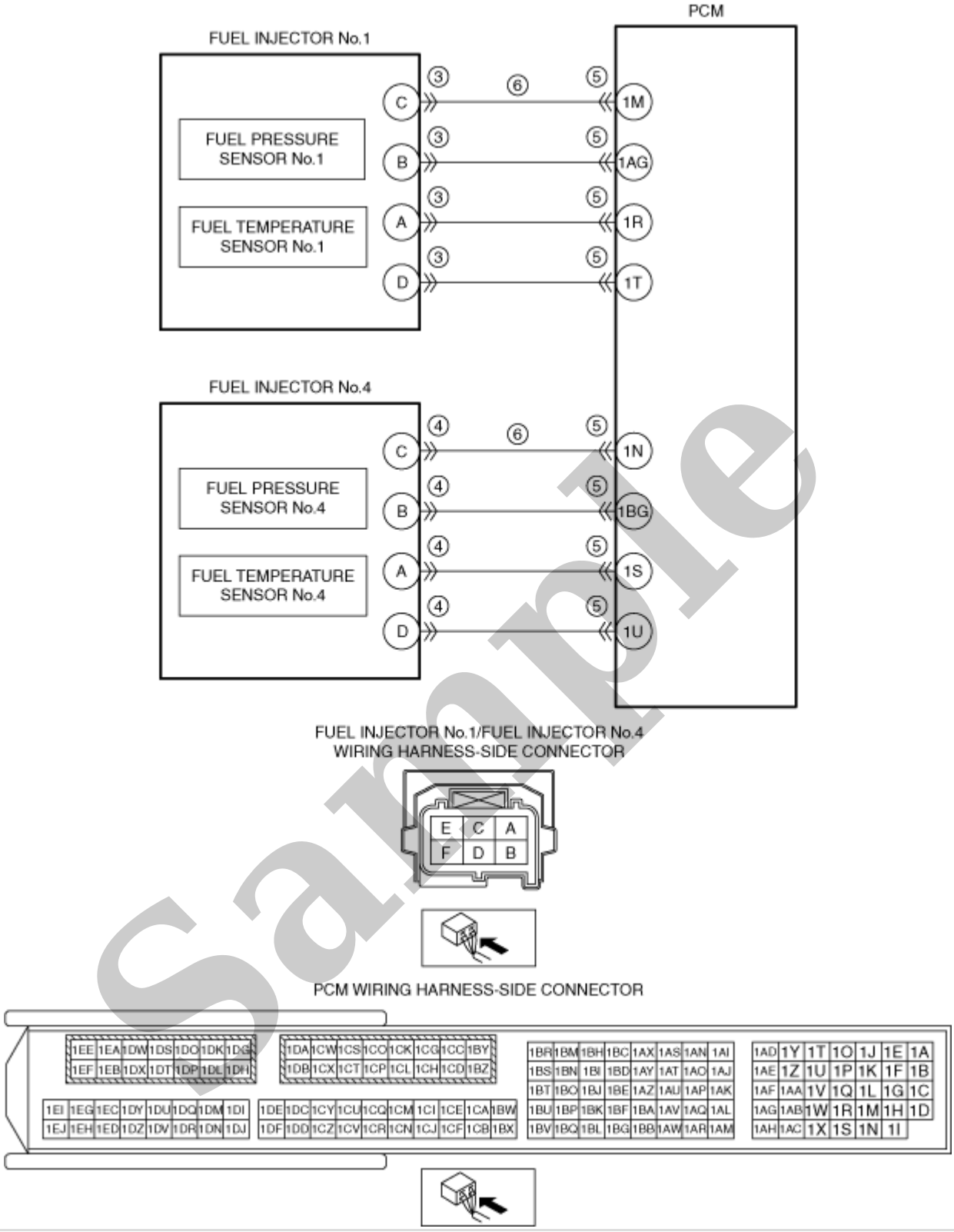
DTC P0698:00	Fuel injector No.1 and No.4 power supply circuit low input



Diagnostic Procedure

DTC P026D:00 [PCM (SKYACTIV-D 2.2)]

SM2896177

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DTC P026D:00	Idle speed control system: fuel injector injection high
DETECTION CONDITION	• The PCM detects that the actual fuel injection amount is 50% or more higher relative to the target fuel injection amount for 13.5 s. MONITORING CONDITIONS • The following conditions are met: — Accelerator pedal position is 0% for 2.7 s. — Vehicle speed is 2 km/h {1 mph} or less for 1 s. — Vehicle speed increases to above 0 km/h {0 mph} for 1 s. — Ambient air temperature: −10 °C {14 °F} or more — Barometric pressure: 72.2 kPa {0.736 kgf/cm^2, 10.5 psi} or more — Idle speed control is activated. — 4.5 s or more have elapsed after selector lever is operated — Diesel particulate filter regeneration control is not performed. — DENOx control is not performed. — DESOx control is not performed. — Engine oil temperature estimated by oil pan: 3.8 °C {39 °F} or more — 3.2 s have elapsed since fuel injection pattern was switched — While post injection is being stopped — 5 s or more have elapsed with fuel injector protection function not performed — Target engine speed: 650 rpm or more — The following DTCs are not detected: • Fuel pressure sensor: P10C4:00, P10C5:00, P10C6:00, P10C7:00, P10C8:00, P10C9:00, P10CD:00 • Suction control valve: P062A:00 • Fuel injector: P0201:00, P0202:00, P0203:00, P0204:00, P1378:00, P1379:00, P2146:00, P2147:00, P2148:00, P2149:00, P2150:00, P2151:00, P2696:00, P268C:00, P268D:00, P268E:00, P268F:00 • PCM: P0606:00, P062B:00 • Common rail: P0089:00, P1282:00, P1329:00 • Fuel pressure control system: P0093:00 • Fuel system: P01CB:00, P01CC:00, P01CD:00, P01CE:00, P01CF:00, P01D0:00, P01D1:00, P01D2:00, P1051:00, P1053:00, P1055:00, P1057:00, P020A:00, P020B:00, P020C:00, P020D:00 • BARO sensor: P2228:00, P2229:00 • TCM: P0706:00, P0707:00, P0708:00, P0711:00, P0712:00, P0713:00, P0715:00, P0716:00, P0717:00, U0101:00 Diagnostic support note • This is an intermittent monitor (CCM). • The check engine light illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA/Snapshot data is available. • DTC is stored in the PCM memory.
FAIL-SAFE FUNCTION	• Not applicable

STEP	INSPECTION		ACTION
8	**INSPECT FUEL INJECTION RELATED PARTS** • Inspect the following parts: — Common rail (See COMMON RAIL INSPECTION [SKYACTIV-D 2.2].) — Supply pump (See SUPPLY PUMP INSPECTION [SKYACTIV-D 2.2].) — Suction control valve (See SUCTION CONTROL VALVE INSPECTION [SKYACTIV-D 2.2].) — Fuel pressure relief valve (See FUEL PRESSURE RELIEF VALVE INSPECTION [SKYACTIV-D 2.2].) — Fuel feed valve (See FUEL FEED VALVE INSPECTION [SKYACTIV-D 2.2].) — Fuel filter (clogged) (See FUEL FILTER REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) • Are all items normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results, then go to Step 26.
9	**DETERMINE INTEGRITY OF FUEL INJECTOR No.1–No.4** • Inspect the fuel injector No.1–No.4. (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the suspected fuel injector, then go to Step 26. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
10	**INSPECT FUEL PRESSURE SENSOR No.1–No.4** • Inspect the fuel pressure sensor No.1–No.4. (See FUEL PRESSURE SENSOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the suspected fuel injector, then go to Step 26. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
11	**INSPECT FUEL TEMPERATURE SENSOR No.1–No.4** • Inspect the fuel temperature sensor No.1–No.4. (See FUEL TEMPERATURE SENSOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the suspected fuel injector, then go to Step 26. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
12	**INSPECT CKP SENSOR** • Inspect the CKP sensor. (See CRANKSHAFT POSITION (CKP) SENSOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the CKP sensor, then go to Step 26. (See CRANKSHAFT POSITION (CKP) SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
13	**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 Step 26. (See EGR VALVE REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
14	**INSPECT EGR VALVE POSITION SENSOR** • Reconnect all disconnected connectors. • Inspect the EGR valve position sensor. (See EGR VALVE POSITION SENSOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the EGR valve, then go to Step 26. (See EGR VALVE REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
15	**INSPECT EGR COOLER BYPASS VALVE** • Inspect the EGR cooler bypass valve. (See EGR COOLER BYPASS VALVE INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the EGR cooler bypass valve, then go to Step 26. (See EGR COOLER BYPASS VALVE REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.

DTC P10D3:00 [PCM (SKYACTIV-D 2.2)]

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DTC P10D3:00	**Fuel temperature sensor(integrated with fuel injector No.3) circuit range/performance problem**
DETECTION CONDITION	• With all of the following conditions met, the PCM detects that the difference between the value of the fuel temperature sensor (integrated with fuel injector No.3) and the value of the fuel temperature sensor for each cylinder is 23.6 °C {74.5 °F} or more for 6 s. — Battery positive voltage: 10.5–18.0 V — The following DTCs are not detected • Fuel pressure sensor: P10C2:00, P10C3:00, P10C5:00, P10C6:00, P10C8:00, P10C9:00, P10CB:00, P10CC:00 • Fuel injector: P2696:00, P268C:00, P268D:00, P268E:00, P268F:00 • LIN communication system: U1201:00, U1202:00, U1203:00, U1204:00 **Diagnostic support note** • This is a continuous monitor (CCM). • The check engine light illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. • PENDING CODE is available if the PCM detects the above malfunction condition during first drive cycle. • FREEZE FRAME DATA/Snapshot data is available. • DTC is stored in the PCM memory.
FAIL-SAFE FUNCTION	• Inhibits the DENOx/DESOx control.
POSSIBLE CAUSE	• Fuel injector No.3 connector or terminal malfunction • PCM connector or terminal malfunction • Fuel temperature sensor (integrated with fuel injector No.3) malfunction • PCM malfunction
SYSTEM WIRING DIAGRAM	Not applicable

Diagnostic Procedure

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 P10D3:00 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.

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 P10D4:00 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 TEMPERATURE SENSOR (INTEGRATED WITH FUEL INJECTOR NO.4) • Inspect the fuel temperature sensor (integrated with fuel injector No.4). (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2]) • Is the fuel temperature 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)]) • Switch the ignition ON (engine off) and leave for 1 min. • Start the engine and warm it up. • Display the DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)]) • Has DTC P10D4:00 been recorded?	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	Results	Action
8	**INSPECT FUEL TEMPERATURE SENSOR (INTEGRATED WITH FUEL INJECTOR NO.1)** • Inspect the fuel temperature sensor (integrated with fuel injector No.1). (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2]) • Is the fuel temperature sensor (integrated with fuel injector No.1) normal?	Yes	Go to the next step.
		No	Replace fuel injector No.1, then go to the next step. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2])
9	**INSPECT FUEL TEMPERATURE SENSOR (INTEGRATED WITH FUEL INJECTOR NO.2)** • Inspect the fuel temperature sensor (integrated with fuel injector No.2). (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2]) • Is the fuel temperature sensor (integrated with fuel injector No.2) normal?	Yes	Go to the next step.
		No	Replace fuel injector No.1, then go to the next step. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2])
10	**INSPECT FUEL TEMPERATURE SENSOR (INTEGRATED WITH FUEL INJECTOR NO.3)** • Inspect the fuel temperature sensor (integrated with fuel injector No.3). (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2]) • Is the fuel temperature sensor (integrated with fuel injector No.3) normal?	Yes	Go to the next step.
		No	Replace fuel injector No.1, then go to the next step. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2])
11	**INSPECT FUEL TEMPERATURE SENSOR (INTEGRATED WITH FUEL INJECTOR NO.4)** • Inspect the fuel temperature sensor (integrated with fuel injector No.4). (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2]) • Is the fuel temperature 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])
12	**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)]) • Switch the ignition ON (engine off) and leave for 1 min. • Start the engine and warm it up. • Display the DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)]) • Has DTC P10D5:00 been recorded?	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.
13	**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.

DTC P206C:00 [PCM (SKYACTIV-D 2.2)]

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DTC P206C:00	DEF quality sensor circuit low input
DETECTION CONDITION	• If the PCM detects that the DEF quality sensor voltage is below 0.2 V for 5 s with the following condition met, the PCM determines that the DEF quality sensor circuit voltage is low. MONITORING CONDITIONS — Urea level: 61–400 mm {2.5–15.7 in} — 9 s have elapsed after the ignition was switched ON — The following DTC is not detected: • DEF quality sensor malfunction: U02A2:00 Diagnostic support note • This is a continuous monitor (CCM). • The check engine light illuminates if the PCM detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA/Snapshot data is available. • DTC is stored in the PCM memory. Note • When this DTC is detected, inducement DTC P2BAF:00 is also detected. • This DTC is established to record that the inducement warning has been activated with the remaining distance to empty at 402 km {250 miles} or less due to an inducement malfunction.
FAIL-SAFE FUNCTION	• Not applicable
POSSIBLE CAUSE	• DEF quality sensor connector or terminals malfunction • Dosing control unit connector or terminals malfunction • DEF quality sensor malfunction • PCM connector or terminals malfunction • Dosing control unit malfunction • PCM malfunction
SYSTEM WIRING DIAGRAM	• Not applicable

Diagnostic Procedure

STEP	INSPECTION	RESULTS	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.

DTC P21CE:00	Reductant quality module performance
FAIL-SAFE FUNCTION	• The instrument cluster warns the driver with the following functions. — Selective catalytic reduction (SCR) system warning light — Buzzer — Message **Note** **• The remaining distance to empty is a maximum of 402 km {250 miles} until the malfunction targeted by inducement (laws and regulations requirement) is repaired. This distance is displayed in the instrument cluster and counts down until the targeted malfunction is repaired.** **• Perform the following restrictions while driving the vehicle according to the remaining distance to empty.** **— 201 to 402 km {125 to 250 miles}: No restriction** **— 0 to 201 km {0 to 125 miles}: Maximum vehicle speed 48 km/h {30 mph} is restricted** **— 0 km {0 miles}: Engine speed is fixed at idle speed**
POSSIBLE CAUSE	• Dosing control unit malfunction • Diesel exhaust fluid (DEF) quality sensor connector or terminals malfunction • Dosing control unit connector or terminals malfunction • Open or short circuit in wiring harness between diesel exhaust fluid (DEF) quality sensor terminal A and dosing control unit terminal T • Diesel exhaust fluid (DEF) quality sensor malfunction — Power supply circuit in diesel exhaust fluid (DEF) quality sensor — CPU in diesel exhaust fluid (DEF) quality sensor — Heater in diesel exhaust fluid (DEF) quality sensor • Dosing control unit malfunction • PCM malfunction

STEP	INSPECTION		ACTION
7	**INSPECT DIESEL EXHAUST FLUID (DEF) QUALITY SENSOR CIRCUIT FOR SHORT TO POWER SUPPLY** • Verify that the diesel exhaust fluid (DEF) quality sensor and dosing control unit connectors are disconnected. • Switch the ignition ON (engine off). **Note** **• Another DTC may be stored by the dosing control unit detecting an open circuit.** • Measure the voltage at the following terminals (wiring harness-side): — Diesel exhaust fluid (DEF) quality sensor terminal A • Is the voltage 0 V?	Yes	Go to the next step.
		No	• Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: — Diesel exhaust fluid (DEF) quality sensor terminal A—Dosing control unit terminal T **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 11.
8	**INSPECT DIESEL EXHAUST FLUID (DEF) QUALITY SENSOR CIRCUIT FOR SHORT TO GROUND** • Verify that the diesel exhaust fluid (DEF) quality sensor and dosing control unit connectors are disconnected. • Inspect for continuity between the following terminals (wiring harness-side) and body ground: — Diesel exhaust fluid (DEF) quality sensor terminal A • Is there continuity?	Yes	• Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: — Diesel exhaust fluid (DEF) quality sensor terminal A—Dosing control unit terminal T **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 11.
		No	Go to the next step.
9	**INSPECT DIESEL EXHAUST FLUID (DEF) QUALITY SENSOR** • Inspect the diesel exhaust fluid (DEF) quality sensor. (See DEF QUALITY SENSOR INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the diesel exhaust fluid (DEF) quality sensor, then go to Step 11. (See DEF QUALITY SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
10	**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 the next step.
		No	Go to the next step.