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1991 MAZDA RX-7 (FC) OEM Service and Repair Workshop Manual

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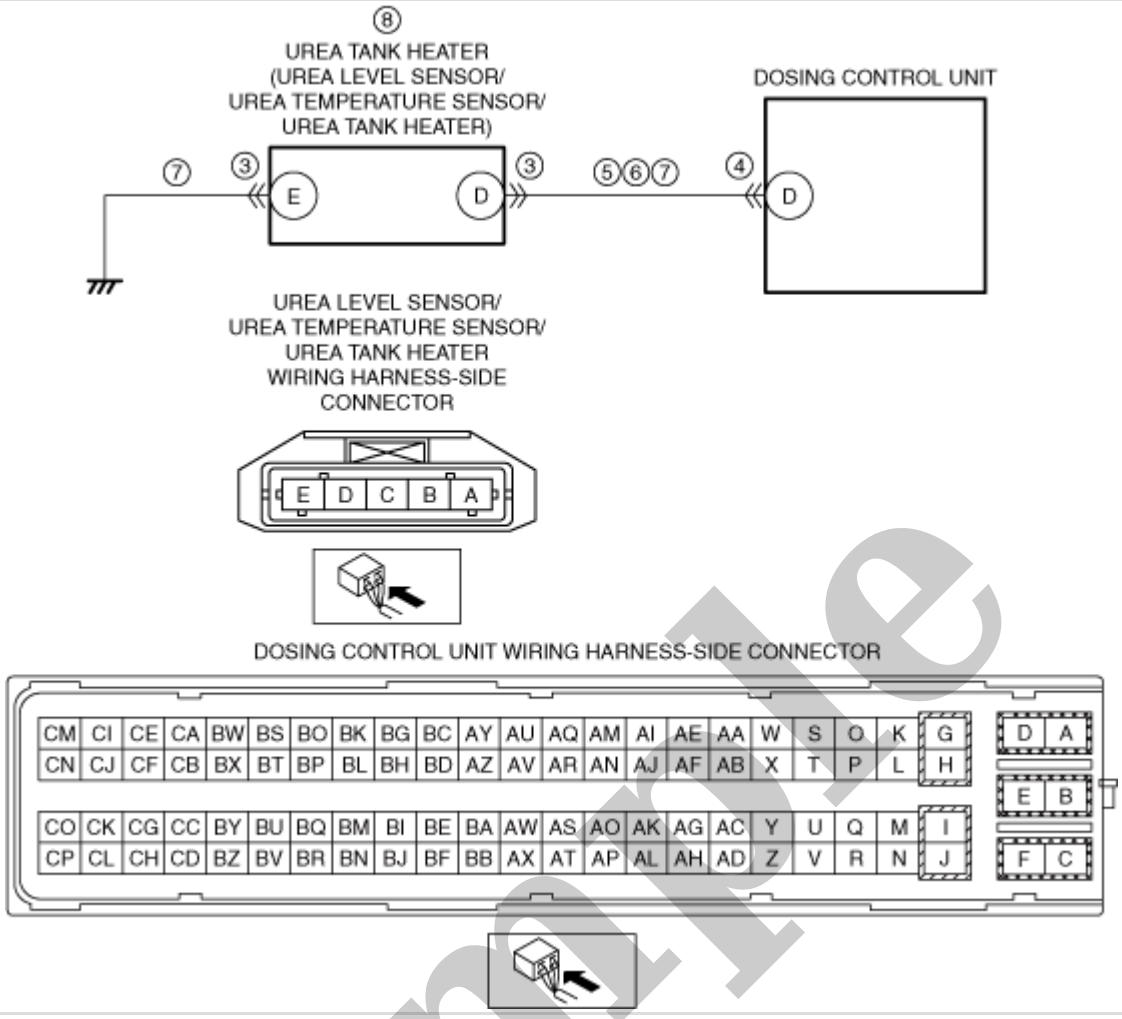
STEP	INSPECTION	RESULTS	ACTION
3	**INSPECT DEF PUMP CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the DEF pump connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes	Repair or replace the connector and/or terminals, then go to Step 8.
		No	Go to the next step.
4	**INSPECT DOSING CONTROL UNIT CONNECTOR CONDITION** • Disconnect the dosing control unit 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 8.
		No	Go to the next step.
5	**INSPECT DEF PUMP CIRCUIT FOR SHORT TO GROUND** • Verify that the DEF pump and dosing control unit connectors are disconnected. • Inspect for continuity between the following terminals (wiring harness-side) and body ground: — DEF pump terminal A — DEF pump terminal B — DEF pump terminal C — DEF pump terminal D • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: • DEF pump terminal A—Dosing control unit terminal Y • DEF pump terminal B—Dosing control unit terminal CN • DEF pump terminal C—Dosing control unit terminal I • DEF pump terminal D—Dosing control unit terminal H **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 8.
		No	Go to the next step.
6	**INSPECT DEF PUMP CIRCUIT FOR OPEN CIRCUIT** • Verify that the DEF pump and dosing control unit connectors are disconnected. • Inspect for continuity between the following terminals (wiring harness-side): — DEF pump terminal A—Dosing control unit terminal Y — DEF pump terminal B—Dosing control unit terminal CN — DEF pump terminal C—Dosing control unit terminal I — DEF pump terminal D—Dosing control unit terminal H • Is there continuity?	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: • DEF pump terminal A—Dosing control unit terminal Y • DEF pump terminal B—Dosing control unit terminal CN • DEF pump terminal C—Dosing control unit terminal I • DEF pump terminal D—Dosing control unit terminal H **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 8.
7	**INSPECT DEF PUMP** • Inspect the DEF pump. (See DEF PUMP INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the DEF pump, then go to Step 8. (See DEF PUMP REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.

DTC P20B9:00	Urea tank heater control circuit malfunction



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 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.

DTC P20BB:00 [DOSING CONTROL UNIT (SKYACTIV-D 2.2)]

SM2896350

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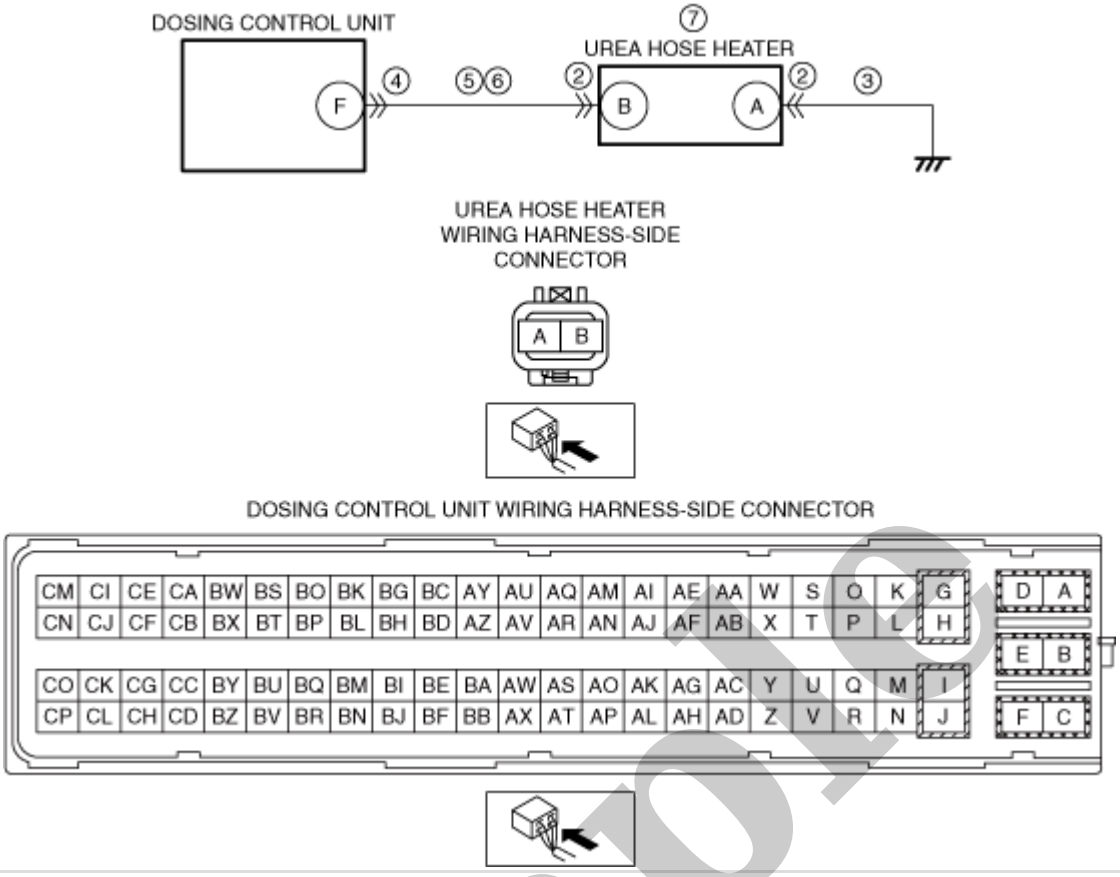
DTC P20BB:00	Urea tank heater circuit low input
DETECTION CONDITION	• If any of the following conditions is met under condition A or condition B: **Condition A:** • The dosing control unit detects that the voltage of the urea tank heater control circuit is 0–0.35 V for 2 s. **MONITORING CONDITIONS** — Ignition switched ON — Urea tank heater is activated. — Battery voltage: 10.9–16 V **Condition B:** • The dosing control unit detects that the voltage of the urea tank heater control circuit is exceeds 3.29 V for 2 s. **MONITORING CONDITIONS** — Ignition switched ON — Urea tank heater is activated. — Battery voltage: 10.9–16 V **Note** • DTC P2BAF:00 is also stored in the PCM and the vehicle speed is restricted. • DTC P1640:00 is also stored in the PCM. **Diagnostic support note** • This is a continuous monitor (CCM). • The check engine light illuminates if the dosing control unit detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA/Snapshot data is available. • DTC is stored in the dosing control unit memory.
FAIL-SAFE FUNCTION	• Restricts the maximum remaining distance to empty. • Limits the upper limit of the engine speed.
POSSIBLE CAUSE	• Urea level sensor/urea temperature sensor/urea tank heater connector or terminals malfunction • Dosing control unit connector or terminals malfunction • Short to ground in wiring harness between the following terminals: — Urea tank heater terminal D–Dosing control unit terminal D • Open circuit in wiring harness between the following terminals: — Urea tank heater terminal E–Body ground — Urea tank heater terminal D–Dosing control unit terminal D • Urea level sensor malfunction • Dosing control unit malfunction

STEP	INSPECTION	RESULTS	ACTION
7	**INSPECT UREA TANK HEATER CONTROL CIRCUIT FOR OPEN CIRCUIT** • Verify that the urea level sensor/urea temperature sensor/urea tank heater and dosing control unit connectors are disconnected. • Inspect for continuity between urea level sensor/urea temperature sensor/urea tank heater terminal D (wiring harness-side) and dosing control unit terminal D (wiring harness-side). • Is there continuity?	Yes	Go to the next step.
		No	Refer to the wiring diagram and verify whether or not there is a common connector between urea level sensor/urea temperature sensor/urea tank heater terminal D and dosing control unit 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 9.
8	**INSPECT UREA TANK HEATER** • Inspect the urea tank heater. (See UREA TANK HEATER INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the DEF pump, then go to the next step. (See DEF PUMP REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
9	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Always reconnect all disconnected connectors. • Clear the DTC from the dosing control unit memory using the M-MDS. (See CLEARING DTC [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].) • Display the simulation function item HTR_TANK and operate the urea tank heater for 60 s using the M-MDS. • Leave for 1 min while idling. • Retrieve the dosing control unit DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the dosing control unit. (See DOSING CONTROL UNIT REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) Go to the next step.
		No	Go to the next step.
10	**VERIFY IF OTHER DTCs DISPLAYED** • Are any other DTCs displayed?	Yes	Repair or replace the malfunctioning part according to the applicable DTC troubleshooting. (See DTC TABLE [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].)
		No	DTC troubleshooting completed.

STEP	INSPECTION	RESULTS	ACTION
3	**INSPECT UREA LEVEL SENSOR/UREA TEMPERATURE SENSOR/UREA TANK HEATER CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the urea level sensor/urea temperature sensor/urea tank heater 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 7.
		No	Go to the next step.
4	**INSPECT DOSING CONTROL UNIT CONNECTOR CONDITION** • Disconnect the dosing control unit 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 7.
		No	Go to the next step.
5	**INSPECT UREA TANK HEATER CONTROL CIRCUIT FOR SHORT TO POWER SUPPLY** • Verify that the urea level sensor/urea temperature sensor/urea tank heater and dosing control unit connectors are disconnected. • Switch the ignition ON (engine off). • Measure the voltage at the urea level sensor/urea temperature sensor/urea tank heater terminal D (wiring harness-side). • Is the voltage 0 V?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between urea level sensor/urea temperature sensor/urea tank heater terminal D and dosing control unit 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 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 7.
		No	Go to the next step.
6	**INSPECT UREA TANK HEATER** • Inspect the urea tank heater. (See UREA TANK HEATER INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the DEF pump, then go to the next step. (See UREA TANK REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
7	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Always reconnect all disconnected connectors. • Clear the DTC from the dosing control unit memory using the M-MDS. (See CLEARING DTC [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].) • Leave for 1 min while idling. • Display the DTCs using the M-MDS. (See CLEARING DTC [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].) • Retrieve the dosing control unit DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the dosing control unit. (See DOSING CONTROL UNIT REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) Go to the next step.
		No	Go to the next step.
8	**VERIFY IF OTHER DTCs DISPLAYED** • Are any other DTCs displayed?	Yes	Repair or replace the malfunctioning part according to the applicable DTC troubleshooting. (See DTC TABLE [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].)
		No	DTC troubleshooting completed.

STEP	INSPECTION	RESULTS	ACTION
4	**INSPECT DOSING CONTROL UNIT CONNECTOR CONDITION** • Disconnect the dosing control unit 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 8.
		No	Go to the next step.
5	**INSPECT UREA HOSE HEATER CIRCUIT FOR SHORT TO GROUND** • Verify that the urea hose heater and dosing control unit connectors are disconnected. • Inspect for continuity between urea hose heater terminal B (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 urea hose heater terminal B and dosing control unit terminal F. **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 8.
		No	Go to the next step.
6	**INSPECT UREA HOSE HEATER CIRCUIT FOR OPEN CIRCUIT** • Verify that the urea hose heater and dosing control unit connectors are disconnected. • Switch the ignition off. • Inspect for continuity between the following terminals (wiring harness-side): — Urea hose heater terminal B–dosing control unit terminal F — Urea hose heater terminal A–body ground • Is there continuity?	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: • Urea hose heater terminal B–dosing control unit terminal F • Urea hose heater terminal A–body ground **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 8.
7	**INSPECT UREA HOSE HEATER** • Inspect the urea hose heater. (See UREA HOSE HEATER INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction?	Yes	Replace the urea hose heater, then go to the next step. (See EMISSION SYSTEM LOCATION INDEX [SKYACTIV-D 2.2].)
		No	Go to the next step.
8	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Always reconnect all disconnected connectors. • Clear the DTC from the dosing control unit memory using the M-MDS. (See CLEARING DTC [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].) • Start the engine and leave it idling for 1 min. • Retrieve the dosing control unit DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the dosing control unit. (See DOSING CONTROL UNIT REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) Go to the next step.
		No	Go to the next step.
9	**VERIFY IF OTHER DTCs DISPLAYED** • Are any other DTCs displayed?	Yes	Repair or replace the malfunctioning part according to the applicable DTC troubleshooting. (See DTC TABLE [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].)
		No	DTC troubleshooting completed.

DTC P20BF:00	Urea hose heater control circuit low input



Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
1	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	INSPECT UREA HOSE HEATER CONNECTOR CONDITION • Switch the ignition off. • Disconnect the urea hose heater 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 8.
		No	Go to the next step.

DTC P20C0:00 [DOSING CONTROL UNIT (SKYACTIV-D 2.2)]

SM2896354

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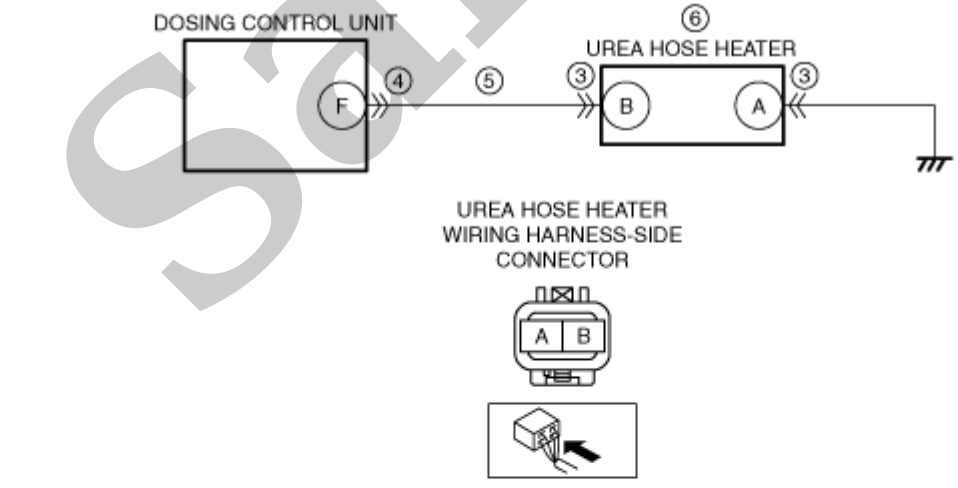
DTC P20C0:00	Urea hose heater circuit high input
DETECTION CONDITION	• With all of the following conditions met, the urea hose heater voltage is not within 1.65 to 1.94 V for a continuous 2 s. MONITORING CONDITIONS — Ignition switched ON (engine off or on) — Battery voltage: 10.9–16 V Note • DTC P2BAF:00 is also stored in the PCM and the vehicle speed is restricted. • DTC P1640:00 is also stored in the PCM. Diagnostic support note • This is a continuous monitor (CCM). • The check engine light illuminates if the dosing control unit detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA/Snapshot data is available. • DTC is stored in the dosing control unit memory.
FAIL-SAFE FUNCTION	• Restricts the maximum remaining distance to empty. • Limits the upper limit of the engine speed.
POSSIBLE CAUSE	• Urea level sensor/urea temperature sensor/urea tank heater connector or terminals malfunction • Dosing control unit connector or terminals malfunction • Short to power in wiring harness between urea hose heater terminal B and dosing control unit terminal F • Urea level sensor malfunction • Dosing control unit malfunction



DTC P20EA:00 [DOSING CONTROL UNIT (SKYACTIV-D 2.2)]

SM2896355

id0102k172390

DTC P20EA:00	Selected catalytic relay No.1 malfunction
DETECTION CONDITION	• With the following conditions met, the dosing control unit detects that there is no selected catalytic relay No.1 open signal 3 times or more. MONITORING CONDITIONS • Ignition switched ON (engine on) • Battery voltage: 10.9–16 V Note • DTC P1640:00 is also stored in the PCM. Diagnostic support note • This is a continuous monitor (CCM). • The check engine light illuminates if the dosing control unit detects the above malfunction condition during the first drive cycle. • FREEZE FRAME DATA/Snapshot data is available. • DTC is stored in the dosing control unit memory.
FAIL-SAFE FUNCTION	• Not applicable
POSSIBLE CAUSE	• Selected catalytic relay No.1 malfunction • Dosing control unit connector or terminals malfunction • Short to ground or open circuit in selected catalytic relay No.1 power supply circuit — Short to ground in wiring harness between MAIN 200 A fuse and selected catalytic relay No.1 terminal A — MAIN 200 A fuse and/or SCR1 20 A fuse malfunction — Open circuit in wiring harness between battery positive terminal and selected catalytic relay No.1 terminal A • Short to ground in wiring harness between the following terminals: — Selected catalytic relay No.1 terminal E–dosing control unit terminal BV — Selected catalytic relay No.1 terminal C–dosing control unit terminal B — Selected catalytic relay No.1 terminal C–dosing control unit terminal C • Open circuit in wiring harness between the following terminals: — Selected catalytic relay No.1 terminal E–dosing control unit terminal BV — Selected catalytic relay No.1 terminal C–dosing control unit terminal B — Selected catalytic relay No.1 terminal C–dosing control unit terminal C • Dosing control unit malfunction