

Your Ultimate Source for OEM Repair Manuals

FactoryManuals.net is a great resource for anyone who wants to save money on repairs by doing their own work. The manuals provide detailed instructions and diagrams that make it easy to understand how to fix a vehicle.

1985 MAZDA RX-7 (SA/FB) OEM Service and Repair Workshop Manual

[Go to manual page](#)

DESCRIPTION	DENox lambda feedback low
POSSIBLE CAUSE	<ul style="list-style-type: none"> • A/F sensor malfunction • Fuel injector malfunction • Air charging system malfunction • PCM malfunction • Misfire

System Wiring Diagram

- Not applicable

Function Explanation (DTC Detection Outline)

- The PCM diagnoses deterioration in the NOx purification performance via the DENox control by monitoring the oxygen concentration feedback status of the post-injection exhaust gas by the DENox control.
- The PCM compares the exhaust gas concentration before the NSC (NOx Storage Catalyst) with the actual Lambda value detected by the A/F sensor and the target Lambda value calculated from the vehicle driving conditions. When the post injection amount with the DENox control is at the lower limit, if the actual value for the target value exceeds the threshold and is low, the PCM determines that the NOx purification performance by the DENox 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. Verify if the M-MDS PID NOX_C_B1S1 exceeds 0.5 g {0.02 oz}.

- If it is less than 0.5 g , drive the vehicle until it exceeds 0.5 g {0.02 oz}.

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.

2. Drive the vehicle under the DENox control implementation conditions while the condition is close to the driving condition recorded in the FREEZE FRAME DATA/snapshot data.

(Refer to the Service Highlights for the DENox control implementation conditions.)

PID Item/Simulation Item Used In Diagnosis

PID/DATA monitor item table

Item	Definition	Unit	Condition/Specification
O2S11	A/F sensor current	μA	<ul style="list-style-type: none"> • Idle: Approx. 1.01 mA • Deceleration fuel cut: Approx. 3.84 mA
	A/F sensor voltage	V	<ul style="list-style-type: none"> • Switch ignition ON (engine off): 3.24 V • Deceleration fuel cut: Approx. 3.74 V

STEP	INSPECTION	RESULTS	ACTION
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.

Sample

Function Inspection Using M-MDS

STEP	INSPECTION	RESULTS	ACTION
1	PURPOSE: VERIFY RELATED REPAIR INFORMATION AVAILABILITY <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Is the DTC P106F: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 <p>Note</p> <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) <ul style="list-style-type: none"> — 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 <ul style="list-style-type: none"> • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) <ul style="list-style-type: none"> — O2S11 • When the following parts are shaken, does the PID value include a PID item which has changed? <ul style="list-style-type: none"> — 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.

Troubleshooting Diagnostic Procedure

Caution

DTC P1640:00 [PCM (SKYACTIV-D 2.2)]

SM2896250

id0102j572080

DTC P1640:00	Powertrain DTCs available in dosing control unit
DETECTION CONDITION	<ul style="list-style-type: none"> PCM receives DTC detection signal from dosing control unit Diagnostic support note <ul style="list-style-type: none"> This is an intermittent monitor (other). The check engine light does not illuminate. * FREEZE FRAME DATA/Snapshot data is not available. DTC is not stored in the PCM memory. <p>*: This DTC does not turn on the check engine light. The dosing control unit turns on or flash the check engine light due to a SCR system malfunction.</p>
FAIL-SAFE FUNCTION	<ul style="list-style-type: none"> The dosing control unit performs control according to the fail-safe contents of the detected DTC.
POSSIBLE CAUSE	<ul style="list-style-type: none"> Dosing control unit detects DTC Dosing control unit malfunction PCM malfunction
SYSTEM WIRING DIAGRAM	Not applicable

Diagnostic Procedure

STEP	INSPECTION	ACTION
1	VERIFY RELATED SERVICE INFORMATION AVAILABILITY <ul style="list-style-type: none"> Verify related Service Bulletins and/or on-line repair information availability. Is any related Service 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	VERIFY DOSING CONTROL UNIT RELATED DTC <ul style="list-style-type: none"> 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	VERIFY DTC TROUBLESHOOTING COMPLETED <ul style="list-style-type: none"> Always reconnect all disconnected connectors. Clear the DTC from the PCM memory using the M-MDS. (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-D 2.2)].) Perform the Drive Mode. (See OBD-II DRIVE MODE [PCM (SKYACTIV-D 2.2)].) Perform the PCM and Dosing unit DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) Is the same DTC present? 	Yes Dosing control unit DTC is output: • Go to the applicable DTC inspection again. (See DTC TABLE [DOSING CONTROL UNIT (SKYACTIV-D 2.2)] .) Dosing control unit DTC is not output: • Replace the PCM, then go to the next step. (See PCM REMOVAL/INSTALLATION [SKYACTIV-D 2.2] .)
		No Go to the next step.
4	VERIFY AFTER REPAIR PROCEDURE <ul style="list-style-type: none"> Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [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 DTC troubleshooting completed.

STEP	INSPECTION		ACTION
7	<p>INSPECT WHETHER MALFUNCTION IS LACK OF DIESEL EXHAUST FLUID (DEF) OR OTHER</p> <ul style="list-style-type: none"> Position the vehicle on level ground. Refill the DEF above 4 L (1 US gal, 0.9 Imp gal). Perform the "Reset for urea tank level" procedure using the M-MDS. (See DIESEL EXHAUST FLUID (DEF) REPLACEMENT [SKYACTIV-D 2.2].) Clear the DTC from the PCM memory using the M-MDS. (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-D 2.2)].) Switch the ignition off. Switch the ignition ON (engine off) for 1 min. Switch the ignition off. Switch the ignition ON (engine off). Perform the DTC Reading Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) Is the DTC P203F:00 present? <p>Note</p> <ul style="list-style-type: none"> If the refueling amount is low, the PCM stored DTC P203F:00 continues. 	Yes	Go to the next step.
		No	<p>Any other PENDING CODEs and/or DTCs are present:</p> <ul style="list-style-type: none"> Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-D 2.2)].) <p>Any other PENDING CODEs and/or DTCs are not present:</p> <ul style="list-style-type: none"> The cause of this DTC is low DEF level. <p>— DTC troubleshooting completed.</p>
8	<p>INSPECT PCM CONNECTOR CONDITION</p> <ul style="list-style-type: none"> 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.
9	<p>INSPECT DOSING CONTROL UNIT CONNECTOR CONDITION</p> <ul style="list-style-type: none"> 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 11.
		No	Go to the next step.
10	<p>INSPECT UREA LEVEL SENSOR</p> <ul style="list-style-type: none"> Inspect the urea level sensor. (See UREA LEVEL SENSOR INSPECTION [SKYACTIV-D 2.2].) Is there any malfunction? 	Yes	Replace the urea level sensor, then go to the next step. (See UREA LEVEL SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
11	<p>VERIFY DTC TROUBLESHOOTING COMPLETED</p> <ul style="list-style-type: none"> Always reconnect all disconnected connectors. Position the vehicle on level ground. Perform the "Reset for urea tank level" procedure using the M-MDS. (See DIESEL EXHAUST FLUID (DEF) REPLACEMENT [SKYACTIV-D 2.2].) Clear the DTC from the PCM memory using the M-MDS. (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-D 2.2)].) Switch the ignition off. Switch the ignition ON (engine off) for 1 min. Switch the ignition off. Switch the ignition ON (engine off). Perform the Pending Trouble Code Access Procedure. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) Is the PENDING CODE for this DTC present? 	Yes	<p>Repeat the inspection from Step 1.</p> <ul style="list-style-type: none"> If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) <p>Go to the next step.</p>
		No	Go to the next step.
12	<p>VERIFY AFTER REPAIR PROCEDURE</p> <ul style="list-style-type: none"> Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [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	DTC troubleshooting completed.

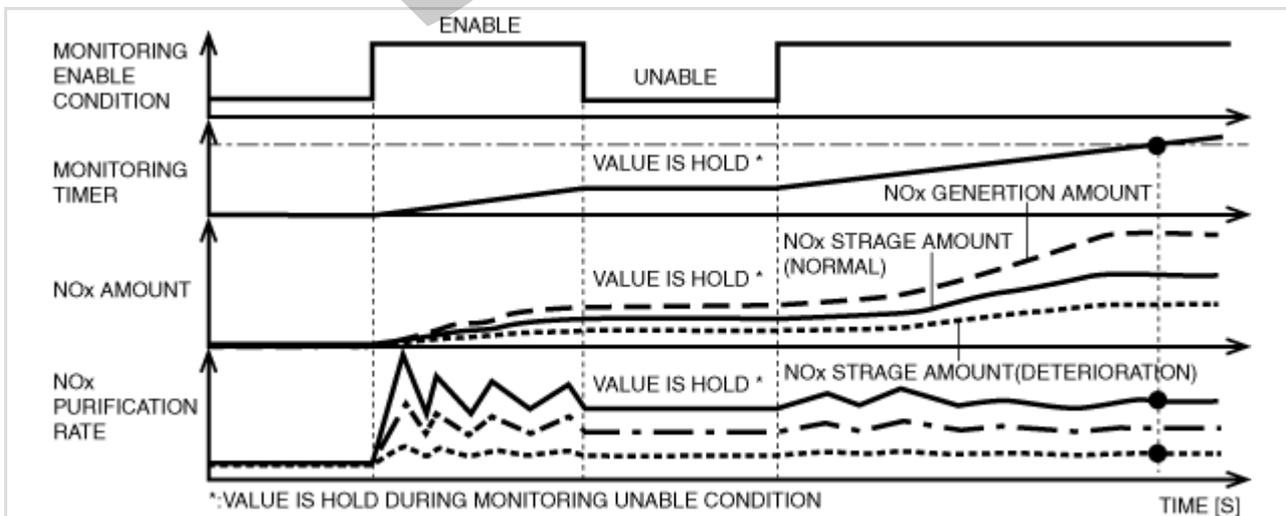
DESCRIPTION	NOx absorber efficiency below threshold	
	Drive cycle	• 2
	Self test type	• CMDTC self test
	Sensor used	<ul style="list-style-type: none"> • NOx sensor No.1 • MAF sensor • Exhaust pressure sensor No.1 • Exhaust temperature sensor No.1 • Exhaust temperature sensor No.2 • Exhaust temperature sensor No.3 • IAT sensor No.3 • MAP sensor No.2 • PCM
FAIL-SAFE FUNCTION	• Not applicable	
VEHICLE STATUS WHEN DTCs ARE OUTPUT	• Illuminates check engine light.	
POSSIBLE CAUSE	<ul style="list-style-type: none"> • Fuel injection system malfunction • NOx sensor No.1 malfunction • NSC (NOx Storage Catalyst) malfunction — Damage — Deformation • PCM malfunction • Misfire 	

System Wiring Diagram

- Not applicable

Function Explanation (DTC Detection Outline)

- The PCM performs diagnosis of the NSC based on the purification rate calculated by comparing the NSC before and after NOx concentration.
- The PCM detects the NSC before NOx concentration according to the engine operation conditions, and the NSC after NOx concentration by NOx sensor No.1. The PCM calculates the NSC purification rate based on this by comparing the NSC before and after NOx concentration.
- When the specified time has elapsed with the troubleshooting conditions met, the PCM determines that the NSC performance has lowered due to deterioration or damage if the NOx purification rate is less than the threshold value.
- 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.



STEP	INSPECTION	RESULTS	ACTION
6	<p>PURPOSE: VERIFY CONNECTOR CONNECTIONS</p> <ul style="list-style-type: none"> • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)].) (See ON-BOARD DIAGNOSTIC TEST [DOSING CONTROL UNIT (SKYACTIV-D 2.2)].) <ul style="list-style-type: none"> — NOX_C_B1S1 *2 — MAF *1 — EXHPRES1 *1 — EXHTEMP *1 — EXHTEMP1 *1 — EXHTEMP2 *1 — IAT13 *1 — MAP *1 <p>*1: PCM PID *2: Dosing control unit PID</p> <ul style="list-style-type: none"> • When the following parts are shaken, does the PID value include a PID item which has changed? <ul style="list-style-type: none"> — NOx sensor No.1 — MAF sensor — Exhaust gas pressure sensor No.1 — Exhaust gas temperature sensor No.1 — Exhaust gas temperature sensor No.2 — Exhaust gas temperature sensor No.3 — IAT sensor No.3 — MAP sensor No.2 — Dosing control unit — PCM 	Yes	<p>Inspect the related wiring harness and connector.</p> <ul style="list-style-type: none"> • Repair or replace the malfunctioning part. <p>Go to the troubleshooting procedure to perform the procedure from Step 3.</p>
			No

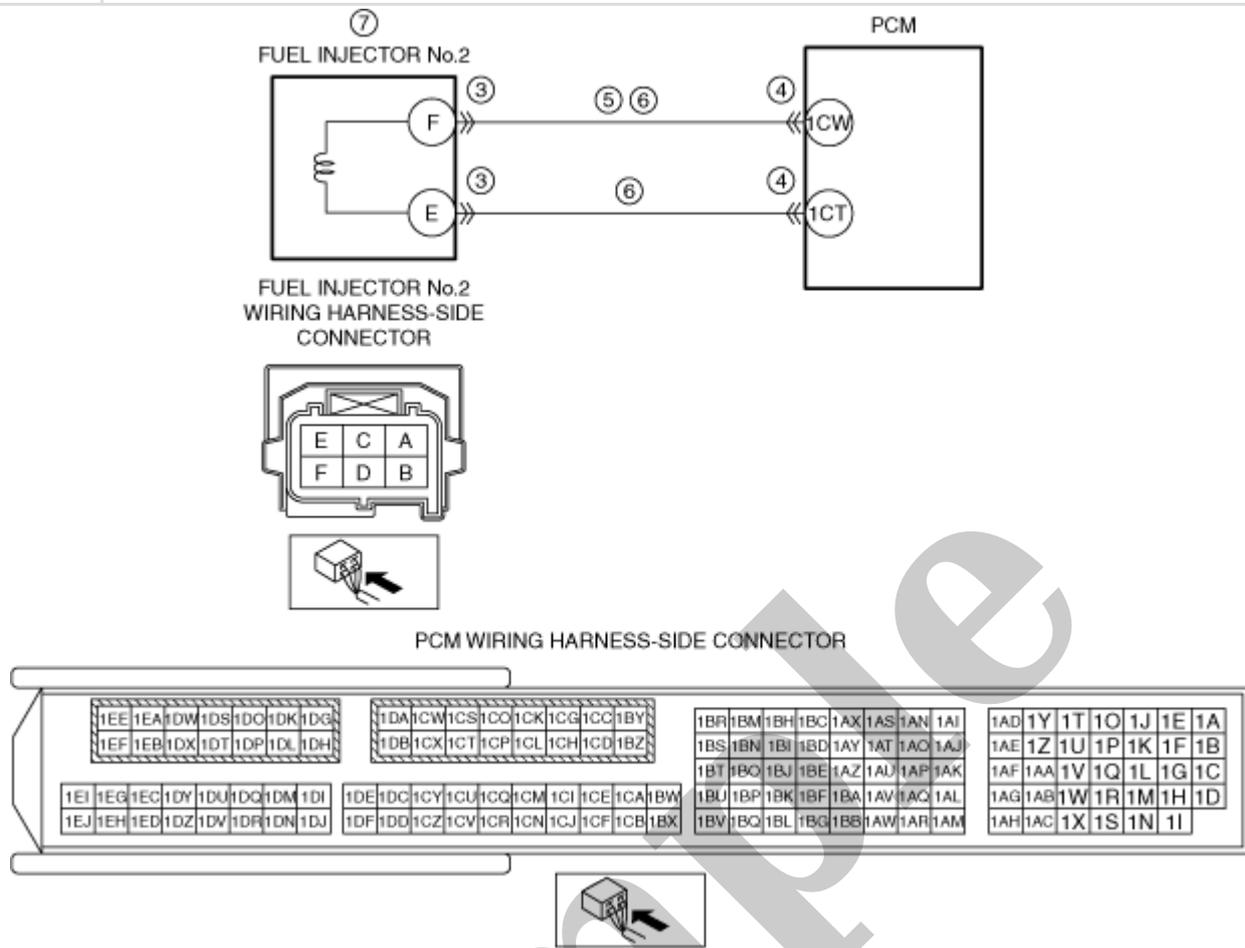
Troubleshooting Diagnostic Procedure

Intention of troubleshooting procedure

- Step 1–2
 - Perform inspection of each separate part.
- Step 3–4
 - Verify that primary malfunction is resolved and there are no other malfunctions.

STEP	INSPECTION	RESULTS	ACTION
1	<p>PURPOSE: VERIFY IF MISFIRE IS OCCURRING</p> <ul style="list-style-type: none"> • 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	<p>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)].)</p> <p>Go to the next step.</p>
		No	<p>Go to the next step.</p>
2	<p>PURPOSE: DETERMINE IF MALFUNCTION CAUSE IS FUEL INJECTION SYSTEM OR DETERIORATION OF CATALYTIC CONVERTER</p> <ul style="list-style-type: none"> • Perform the Fuel Injector Operation Inspection. (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [SKYACTIV-D 2.2].) • Is there any malfunction? 	Yes	<p>Repair or replace the malfunctioning part according to the inspection results.</p> <p>Then go to the next step.</p>
		No	<p>Replace the catalytic converter, then go to the next step.</p> <p>(See EXHAUST SYSTEM REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)</p>

STEP	INSPECTION	RESULTS	ACTION
1	<p>RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION</p> <p>Note</p> <ul style="list-style-type: none"> 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	<p>VERIFY RELATED REPAIR INFORMATION AVAILABILITY</p> <ul style="list-style-type: none"> 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	<p>INSPECT IAT SENSOR No.2 CONNECTOR CONDITION</p> <ul style="list-style-type: none"> Switch the ignition off. Disconnect the IAT sensor No.2 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	<p>INSPECT PCM CONNECTOR CONDITION</p> <ul style="list-style-type: none"> 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 8.
		No	Go to the next step.
5	<p>INSPECT IAT SENSOR No.2 SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY</p> <ul style="list-style-type: none"> Verify that the IAT sensor No.2 and PCM connectors are disconnected. Switch the ignition ON (engine off). <p>Note</p> <ul style="list-style-type: none"> Another DTC may be stored by the PCM detecting an open circuit. Measure the voltage at the IAT sensor No.2 terminal A (wiring harness-side). 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 IAT sensor No.2 terminal A and PCM terminal 2Q. 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 8.



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.

Diagnostic Procedure

STEP	INSPECTION	ACTION
1	<p>RECORD VEHICLE STATUS AT TIME OF DTC DETECTION TO UTILIZE WITH REPEATABILITY VERIFICATION</p> <p>Note</p> <ul style="list-style-type: none"> • Recording can be facilitated using the screen capture function of the PC. • Record the FREEZE FRAME DATA/snapshot data on the repair order. 	<p>–</p> <p>Go to the next step.</p>