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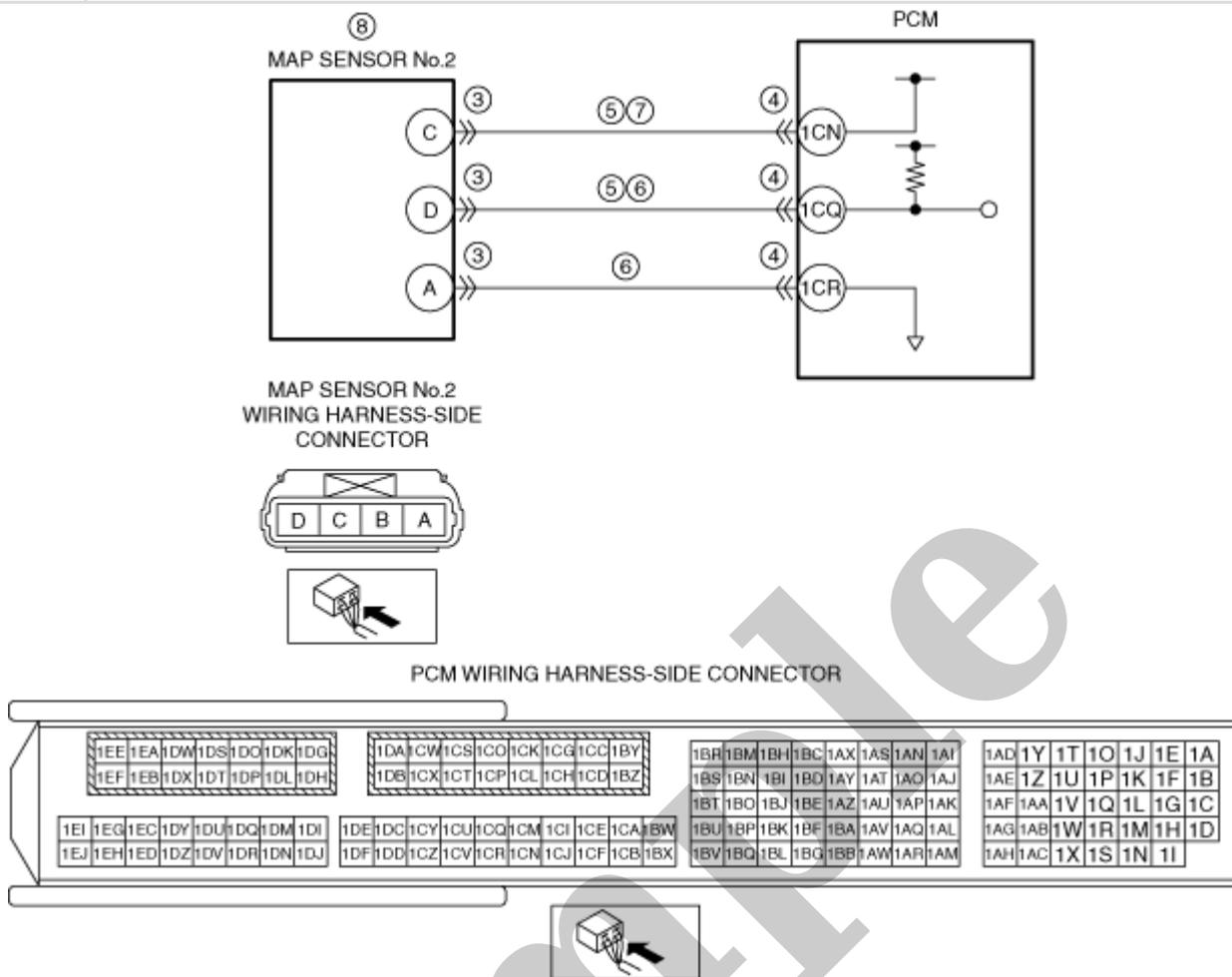
FactoryManuals.net is a great resource for anyone who wants to save money on repairs by doing their own work. The manuals provide detailed instructions and diagrams that make it easy to understand how to fix a vehicle.

1989 MAZDA MX-5 / Miata OEM Service and Repair Workshop Manual

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Diagnostic Procedure

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 MAF SENSOR/IAT SENSOR No.1 CONNECTOR CONDITION</p> <ul style="list-style-type: none"> 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 9.
		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 9.
		No	Go to the next step.
5	<p>INSPECT MAF SENSOR SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY</p> <ul style="list-style-type: none"> Verify that the MAF sensor/IAT sensor No.1 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 MAF sensor/IAT sensor No.1 terminal C (wiring harness-side). Is the voltage 0 V? 	Yes	Go to the next step.
		No	<p>Refer to the wiring diagram and verify whether or not there is a common connector between MAF sensor/IAT sensor No.1 terminal C and PCM terminal 2U.</p> <p>If there is a common connector:</p> <ul style="list-style-type: none"> 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. <p>If there is no common connector:</p> <ul style="list-style-type: none"> Repair or replace the wiring harness which has a short to power supply. <p>Go to Step 9.</p>



Diagnostic Procedure

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? 	<p>Yes</p> <p>No</p>	<p>Perform repair or diagnosis according to the available repair information.</p> <ul style="list-style-type: none"> If the vehicle is not repaired, go to the next step. <p>Go to the next step.</p>

DTC P0108:00 [PCM (SKYACTIV-D 2.2)]

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DTC P0108:00	MAP sensor No.2 circuit high input
DETECTION CONDITION	<ul style="list-style-type: none">• The PCM monitors the input voltage from the MAP sensor No.2. If the input voltage at the PCM terminal 1CQ is above 4.81 V for 4.2 s, the PCM determines that the MAP sensor No.2 circuit has a malfunction. <p>MONITORING CONDITIONS</p> <ul style="list-style-type: none">— Battery voltage: 8 V or more <p>Diagnostic support note</p> <ul style="list-style-type: none">• 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.
FAIL-SAFE FUNCTION	<ul style="list-style-type: none">• Inhibits the automatic diesel particulate filter regeneration control and compulsory diesel particulate filter regeneration control.• Inhibits the DENOx/DESOx control.• Stops activation of the A/F sensor heater.• Fully opens the intake shutter valve opening angle.• Inhibits the EGR control.• PCM restricts engine-transaxle integration control.
POSSIBLE CAUSE	<ul style="list-style-type: none">• Turbocharger malfunction• MAP sensor No.2 connector or terminals malfunction• PCM connector or terminals malfunction• Short to power supply in wiring harness between MAP sensor No.2 terminal D and PCM terminal 1CQ• MAP sensor No.2 power supply circuit and signal circuit are shorted to each other• Open circuit in wiring harness between the following terminals:<ul style="list-style-type: none">— MAP sensor No.2 terminal D-PCM terminal 1CQ— MAP sensor No.2 terminal A-PCM terminal 1CR• MAP sensor No.2 malfunction• PCM malfunction

STEP	INSPECTION	RESULTS	ACTION
8	INSPECT MAP SENSOR No.2 CIRCUIT FOR OPEN CIRCUIT <ul style="list-style-type: none"> • Verify that the MAP sensor No.2 and PCM connectors are disconnected. • Inspect for continuity between the following terminals (wiring harness-side): <ul style="list-style-type: none"> — MAP sensor No.2 terminal D–PCM terminal 1CQ — MAP sensor No.2 terminal A–PCM terminal 1CR • 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: <ul style="list-style-type: none"> • MAP sensor No.2 terminal D–PCM terminal 1CQ • MAP sensor No.2 terminal A–PCM terminal 1CR If there is a common connector: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Repair or replace the wiring harness which has an open circuit. Go to Step 10.
9	INSPECT MAP SENSOR No.2 <ul style="list-style-type: none"> • Reconnect all disconnected connectors. • Inspect the MAP sensor No.2. (See MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) • Is there any malfunction? 	Yes	Replace the MAP sensor No.2, then go to the next step. (See MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Go to the next step.
10	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 CLEARING DTC [PCM (SKYACTIV-D 2.2)].) • Perform the KOEO or 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. <ul style="list-style-type: none"> • 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.
11	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
8	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)].) • Leave the vehicle for 6 hours or more. • Start the engine and idle it for 6 min. • 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 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.
9	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.

Sample

STEP	INSPECTION	RESULTS	ACTION
6	INSPECT IAT SENSOR No.1 SIGNAL CIRCUIT FOR SHORT TO GROUND <ul style="list-style-type: none"> • Verify that the MAF sensor/IAT sensor No.1 and PCM connectors are disconnected. • Inspect for continuity between MAF sensor/IAT sensor No.1 terminal A (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 MAF sensor/IAT sensor No.1 terminal A and PCM terminal 2Y. If there is a common connector: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Repair or replace the wiring harness which has a short to ground. Go to Step 8.
		No	Go to the next step.
7	INSPECT IAT SENSOR No.1 SIGNAL CIRCUIT AND GROUND CIRCUIT FOR SHORT TO EACH OTHER <ul style="list-style-type: none"> • Verify that the MAF sensor/IAT sensor No.1 and PCM connectors are disconnected. • Inspect for continuity between MAF sensor/IAT sensor No.1 terminals A and B (wiring harness-side). • Is there continuity? 	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: <ul style="list-style-type: none"> • MAF sensor/IAT sensor No.1 terminal A–PCM terminal 2Y • MAF sensor/IAT sensor No.1 terminal B–PCM terminal 2V If there is a common connector: <ul style="list-style-type: none"> • 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 each other. • Repair or replace the malfunctioning part. If there is no common connector: <ul style="list-style-type: none"> • Repair or replace the wiring harness which has a short to each other. Go to the next step.
		No	Go to the next step.
8	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 CLEARING DTC [PCM (SKYACTIV-D 2.2)].) • Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-D 2.2)].) • Is the PENDING CODE for this DTC present? 	Yes	Repeat the inspection from Step 1. <ul style="list-style-type: none"> • 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.
9	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.

ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-D 2.2)]

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DTC Reading Procedure

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
 - (1) Select "Self Test".
 - (2) Select "Modules".
 - (3) Select "PCM".
3. Then, select the "Retrieve CMDTCs" and perform procedures according to directions on the M-MDS screen.
4. Verify the DTC according to the directions on the M-MDS screen.
 - If any DTCs are displayed, perform troubleshooting according to the corresponding DTC inspection.
5. After completion of repairs, clear all DTCs stored in the PCM, while referring to "AFTER REPAIR PROCEDURE".

Pending Trouble Code Access Procedure

1. Connect the M-MDS to the DLC-2.
2. After the vehicle is identified, select the following items from the initialization screen of the M-MDS.
 - (1) Select "Self Test".
 - (2) Select "Modules".
 - (3) Select "PCM".
3. Then, select the "Retrieve CMDTCs" and perform procedures according to directions on the M-MDS screen.
4. Retrieve the pending trouble codes according to the directions on the M-MDS screen.

Freeze Frame PID Data Access Procedure

Freeze frame data item	Description	Unit	Corresponding PID data monitor item
FUEL_RATE	Engine fuel rate	l/min	-
FUEL_TIMING	Main injection timing relative to top dead center	°	-
FUEL_TYP	Type of fuel currently being utilized by the vehicle	NONE/Gas/METH/ETH/DSL/E LEC	-
IAT	intake air temperature	°C, °F	IAT
IAT11	intake air temperature sensor No.1	°C, °F	IAT
IAT13	intake air temperature sensor No.3	°C, °F	-
INTK_MAPA	Manifold absolute pressure	KPa {MPA}, mBar {BAR}, psi, in H2O	INTK_MAPA
LOAD	Engine load	%	LOAD
LOAD_C	Calculated load value	%	-
LPEGR_ERR	Percentage of abnormal low pressure side EGR	%	-
LPEGRP	Low pressure EGR valve position	%	-
LPEGRP_ACT	Low pressure EGR valve actual opening angle	%	-
M_AR_F_SENA	Mass airflow	g/sec	-
NOX_ADS_DESULF	NOx adsorber desulfurization status	Inactive/Active	-
NOX_ADS_REGEN	NOx adsorber regeneration status	Inactive/Active	-
RE_TANK_LV	Urea tank level	%	-
REGRP	Regulating valve position sensor	%	-
REGVP_DSD	Regulating valve position desired value	%	-
RPM	Engine speed	RPM	RPM
TAC_A_CMD	Intake shutter valve control desired value	%	-
TCA_CINP	Manifold absolute pressure sensor No.1	KPa {MPA}, mBar {BAR}, psi, in H2O	-
TCB_CINP	Manifold absolute pressure sensor No.2	KPa {MPA}, mBar {BAR}, psi, in H2O	-
TP_A_REL	Relative throttle valve position	%	-
TP_REL	Relative throttle position	%	-
TP1	Intake shutter valve position	%	ISV_POS
VPWR	Module supply voltage	V	VPWR
VS	Vehicle speed	KPH, MPH	VSS

Snapshot data table

Note

- Refer to PID monitor table for confirm the engine control system operation status while the PCM does not store the DTC. (See **PCM INSPECTION [SKYACTIV-D 2.2].**)
- Snapshot data items are not displayed, according to detected DTC.

--: Not applicable

Snapshot data item	Definition	Unit	Corresponding PID data monitor item
AAT	Ambient air temperature	°C, °F	IAT
ALT_CUR_DSD	Generator target generated current	A	-
ALTT_V	Generator output voltage	V	ALTT V

1.Connect the M-MDS to the DLC-2.

2.After the vehicle is identified, select the following items from the initialization screen of the M-MDS.

(1)Select "DataLogger".

(2)Select "Modules".

(3)Select "PCM".

3.Select the applicable PID from the PID table.

4.Verify the PID data according to the detections on the screen.

Diagnostic Monitoring Test Results Access Procedure

1.Connect the M-MDS to the DLC-2.

2.After the vehicle is identified, select the following items from the initialization screen of the M-MDS.

(1)Select "Powertrain".

(2)Select "OBD Test Modes".

(3)Select "Mode 6 On-Board Test Results".

3.Verify the diagnostic monitoring test result according to the directions on the M-MDS screen.

Active Command Modes Procedure

1.Connect the M-MDS to the DLC-2.

2.After the vehicle is identified, select the following items from the initialization screen of the M-MDS.

(1)Select "DataLogger".

(2)Select "Modules".

(3)Select "PCM".

3.Select the simulation items from the PID table.

4.Using the active command modes function, inspect the operations for each parts.