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1998 MAZDA MX-5 / Miata OEM Service and Repair Workshop Manual

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STEP	INSPECTION	RESULTS	ACTION
7	**INSPECT TP SENSOR No.2 SIGNAL CIRCUIT FOR SHORT TO POWER SUPPLY** • Switch the ignition off. • Disconnect the throttle body connector. • Access the TP2 PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Verify the TP2 PID value. • Is the TP2 PID value 5 V or B+?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between throttle body terminal C and PCM terminal 1V. **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 9.
		No	Go to the next step.
8	**INSPECT TP SENSOR No.2 GROUND CIRCUIT FOR OPEN CIRCUIT** • Verify that the throttle body connector is disconnected. • Switch the ignition off. • Disconnect the PCM connector. • Inspect for continuity between throttle body terminal D (wiring harness-side) and PCM terminal 1R (wiring harness-side). • Is there continuity?	Yes	Replace the throttle body, then go to the next step. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Refer to the wiring diagram and verify whether or not there is a common connector between throttle body terminal D and PCM terminal 1R. **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 the next step.
9	**VERIFY DTC TROUBLESHOOTING COMPLETED** • Always reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See CLEARING DTC [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Perform the KOEO or KOER self test. (See KOEO/KOER SELF TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Is the same Pending DTC present?	Yes	Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) Go to the next step.
		No	Go to the next step.
10	**VERIFY AFTER REPAIR PROCEDURE** • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)
		No	DTC troubleshooting completed.

STEP	INSPECTION	RESULTS	ACTION
4	**INSPECT KS** • Inspect the KS. (See KNOCK SENSOR (KS) INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the KS, then go to Step 9. (See KNOCK SENSOR (KS) REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		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 9.
		No	Go to the next step.
6	**INSPECT KS CIRCUIT FOR SHORT TO GROUND** • Verify that the KS and PCM connectors are disconnected. • Inspect for continuity between the following terminals (wiring harness-side) and body ground: — KS terminal A — KS terminal B • Is there continuity?	Yes	Refer to the wiring diagram and verify whether or not there is a common connector between the following terminals: • KS terminal A—PCM terminal 1Y • KS terminal B—PCM terminal 1Z **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 9.
		No	Go to the next step.
7	**INSPECT KS CIRCUITS FOR SHORT TO EACH OTHER** • Verify that the KS and PCM connectors are disconnected. • Inspect for continuity between KS 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: • KS terminal A—PCM terminal 1Y • KS terminal B—PCM terminal 1Z **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 each other. • Repair or replace the malfunctioning part. **If there is no common connector:** • Repair or replace the wiring harness which has a short to each other. Go to Step 9.
		No	Go to the next step.
8	**INSPECT KS CIRCUIT FOR OPEN CIRCUIT** • Verify that the KS and PCM connectors are disconnected. • Inspect for continuity between the following terminals (wiring harness-side): — KS terminal A—PCM terminal 1Y — KS terminal B—PCM terminal 1Z • 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: • KS terminal A—PCM terminal 1Y • KS terminal B—PCM terminal 1Z **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 the next step.

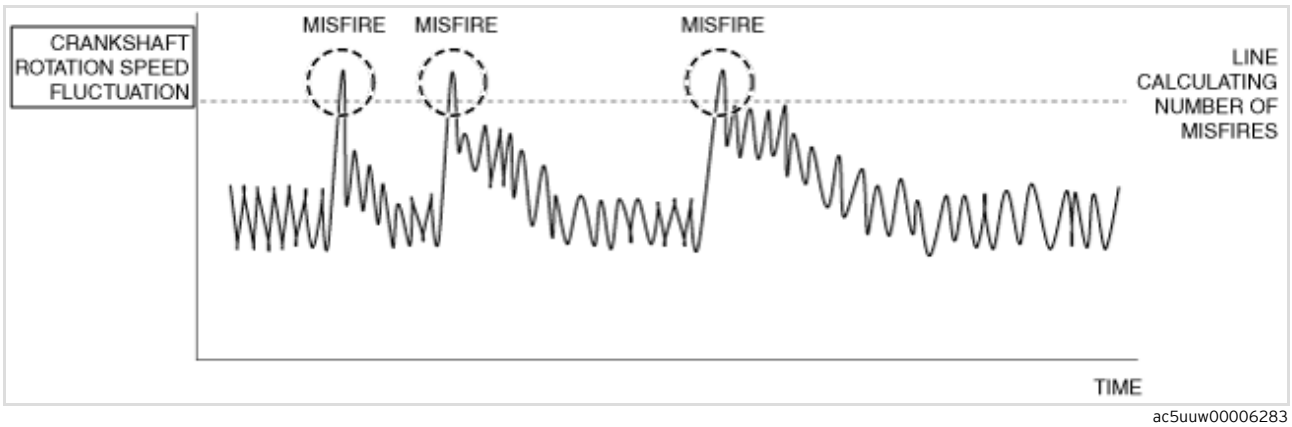
DESCRIPTION	Random misfire detected
POSSIBLE CAUSE	• Improper operation of ignition system — Spark plug malfunction — Ignition coil related wiring harness or connector malfunction — Ignition coil malfunction • Fuel injector malfunction — Improper operation of fuel injector — Fuel injector related wiring harness malfunction • Erratic signal to PCM — CKP sensor signal malfunction — ECT sensor signal malfunction — MAF sensor signal malfunction — MAP sensor signal malfunction — IAT sensor No.1 signal malfunction — APP sensor signal malfunction — TP sensor signal malfunction — VSS signal malfunction — Related connector or terminals malfunction — Related wiring harness malfunction • Poor drive belt assembly or adhesion of oil • Drive belt auto tensioner malfunction • Air leakage from intake air system (between intake manifold and cylinder head) • Engine malfunction — Insufficient engine compression — Engine coolant leakage to combustion chamber • PCM malfunction

System Wiring Diagram

• Not applicable

Function Explanation (DTC Detection Outline)

• The PCM detects the crankshaft rotation speed based on the crankshaft position sensor signal. If there is a small amount of fluctuation in crankshaft rotation speed due to the effect of combustion of each cylinder while the engine is rotating and a misfire occurs in any of the pistons, the crankshaft rotation speed will change suddenly. The PCM adds the number of changes in sudden rotation speed (misfire rate) to each specified crankshaft rotation speed, and if the misfire rate exceeds a certain value, a DTC is recorded.



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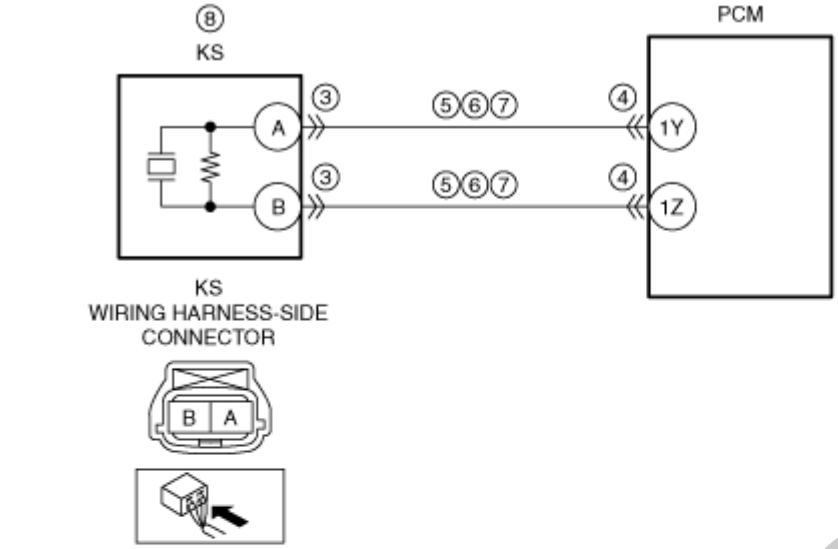
Repeatability Verification Procedure

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 P0300:00 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-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)
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 (misfire related) on the repair order.	–	Go to the next step.
4	**PURPOSE: VERIFY RELATED PENDING CODE AND/OR DTC** • 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-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) • Are any other PENDING CODEs and/or DTCs present?	Yes	Go to the applicable PENDING CODE or DTC inspection. (See DTC TABLE [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].)
		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** • Start the engine. • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) — APP1 — APP2 — ECT — IAT — MAF — MAP — MAP_V — RPM — TP_REL — VSS • Is there a PID item affected by acceleration fluctuation?	Yes	Inspect the suspected sensor and related wiring harness. • If there is any malfunction: — Repair or replace the malfunctioning part. — Go to Troubleshooting Diagnostic Procedure to perform the procedure from Step 10. • If there is no malfunction: — Go to the next step.
		No	Go to the next step.

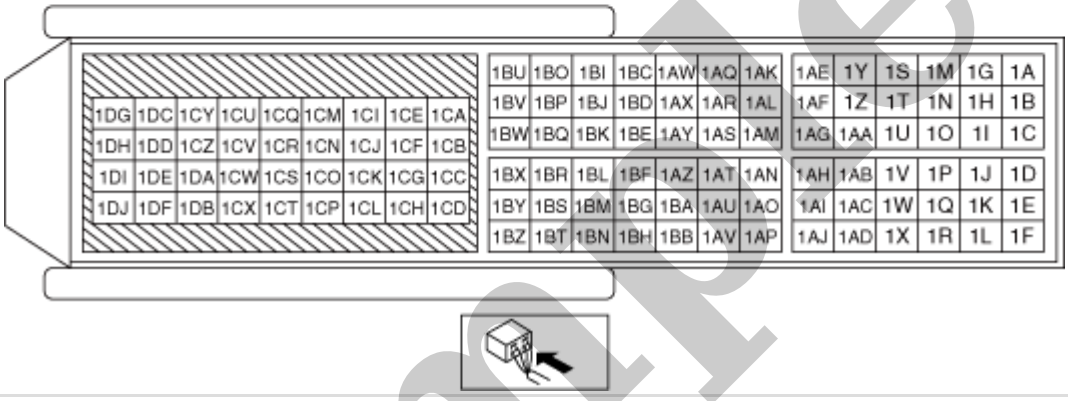
STEP	INSPECTION	RESULTS	ACTION
9	PURPOSE: RECORD NUMBER OF CURRENT MISFIRES WHILE DRIVING UNDER LOAD TO SPECIFY MISFIRING CYLINDER • Start the engine. **Note** **• The fuel injection control enters the deceleration fuel cut zone when the accelerator pedal is fully released while the vehicle is being driven. At this time, the count for the number of misfires is stopped.** • Verify the number of misfires while the vehicle is being driven for 1 min under the condition of the freeze frame data recorded in Step 3. — Access the following PIDs using the M-MDS (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))].) (See PCM INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • MF_CAT1 • MF_CAT_2 • MF_CAT_3 • MF_CAT_4 • MF_EMI1 • MF_EMI_2 • MF_EMI_3 • MF_EMI_4 • Can a misfire be verified?	Yes	Record each of the verified values, then go to the next step.
		No	Referring to the service questioning results, verify the misfire rate again with the driving mode data added before recording the freeze frame data/snapshot data.

STEP	INSPECTION	RESULTS	ACTION
1	PURPOSE: DETERMINE INTEGRITY OF SPARK PLUG • Inspect the spark plug. (See SPARK PLUG INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the spark plug, then go to Step 10. (See SPARK PLUG REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
2	PURPOSE: DETERMINE INTEGRITY OF IGNITION COIL • Inspect the ignition coil. (See IGNITION COIL INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the ignition coil/ion sensor, then go to Step 10. (See IGNITION COIL/ION SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
3	PURPOSE: DETERMINE INTEGRITY OF FUEL INJECTOR • Inspect the fuel injector. (See FUEL INJECTOR INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the fuel injector, then go to Step 10. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
4	PURPOSE: VERIFY IF MALFUNCTION RELATED TO INTAKE-AIR SYSTEM IS CAUSE OF MISFIRE • Visually inspect for loose, cracked or damaged hoses on intake air system. • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results, then go to Step 10.
		No	Go to the next step.
5	PURPOSE: VERIFY IF POOR DRIVE BELT ASSEMBLY IS CAUSE OF MISFIRE • Verify the condition of the drive belt assembly. (See DRIVE BELT INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Assemble drive belt correctly, then go to Step 10. (See DRIVE BELT REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
6	PURPOSE: VERIFY IF FOREIGN MATTER ON DRIVE BELT IS CAUSE OF MISFIRE • Verify if oil is on the drive belt. • Is there foreign matter on the drive belt?	Yes	Remove the foreign matter on the drive belt, then go to Step 10.
		No	Go to the next step.
7	PURPOSE: DETERMINE INTEGRITY OF DRIVE BELT AUTO TENSIONER • Inspect the drive belt auto tensioner. (See DRIVE BELT AUTO TENSIONER INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Is there any malfunction?	Yes	Replace the drive belt auto tensioner, then go to Step 10. (See DRIVE BELT AUTO TENSIONER REMOVAL/INSTALLATION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].)
		No	Go to the next step.
8	PURPOSE: VERIFY IF MALFUNCTION RELATED TO ENGINE COMPRESSION IS CAUSE OF MISFIRE • Inspect the engine compression. (See COMPRESSION INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Are compression pressures within specification?	Yes	Go to the next step.
		No	Replace or overhaul the engine, then go to Step 10.
9	PURPOSE: VERIFY IF MALFUNCTION RELATED TO SEALING OF ENGINE UNIT (COMBUSTION CHAMBER AND ENGINE COOLANT PASSAGE) IS CAUSE OF MISFIRE • Perform the "ENGINE COOLANT LEAKAGE INSPECTION". (See ENGINE COOLANT LEAKAGE INSPECTION [SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION)].) • Does the radiator cap tester needle drop even though there is no engine coolant leakage from the radiator or the hoses?	Yes	Engine coolant leakage from the engine (between the combustion chamber and the engine coolant passage) may have occurred. • Verify the conditions of the gasket and the cylinder head. — If there is any malfunction: • Repair or replace the malfunctioning part according to the inspection results, then go to the next step.
		No	Go to the next step.

DTC P0328:00	KS circuit high input



PCM WIRING HARNESS-SIDE CONNECTOR



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.
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 KS CONNECTOR CONDITION** • Switch the ignition off. • Disconnect the KS 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.

DTC U0302:00 [PCM (SKYACTIV-G 2.5 (WITHOUT CYLINDER DEACTIVATION))]

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DTC U0302:00	TCM processor error
DETECTION CONDITION	• When any of the following conditions is met: — CAN communication line malfunction between TCM and PCM — TCM internal malfunction **Diagnostic support note** • This is a continuous monitor (other). • 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	• Not applicable
POSSIBLE CAUSE	• TCM connector or terminals malfunction • PCM connector or terminals malfunction • CAN communication line malfunction between PCM and TCM (local CAN between PCM and TCM) — TCM terminal G—PCM terminal 1A — TCM terminal H—PCM terminal 1B • TCM DTC is stored. • CAN drive error (TCM or PCM) • PCM malfunction • TCM malfunction