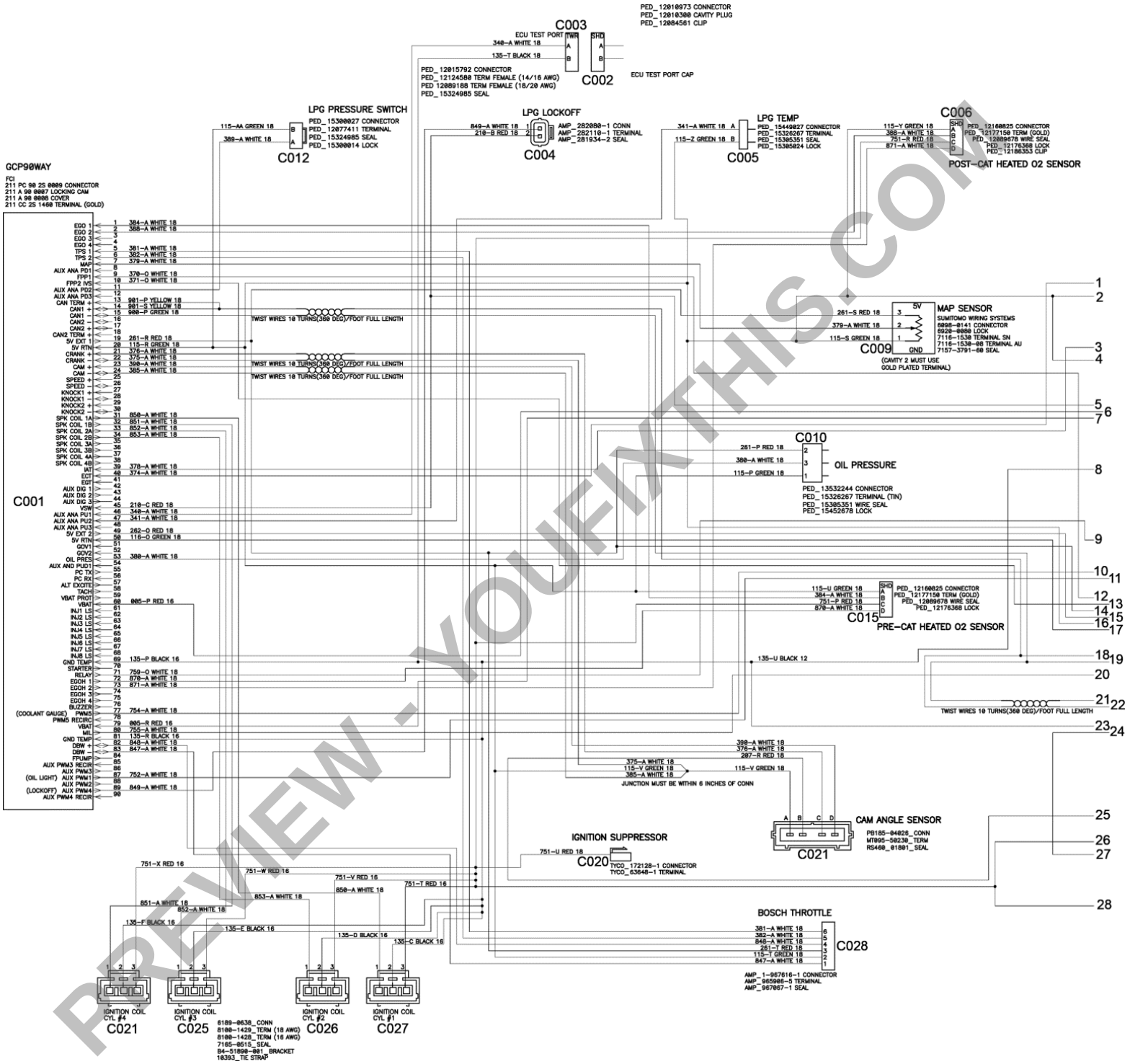
Engine Wiring Schematic (LPG Fuel System)



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DTC 129-BP Low Pressure

Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD System Check Section
2	• Key On. • DST (Diagnostic Scan Tool) connected in System Data Mode Does DST display BP pressure of 8.30 psia or less?		Go to Step (3)	Intermittent problem Go to Intermittent section
3	• Key OFF • Disconnect the MAP sensor connector C009 (LPG) or C008 (Gasoline) • Jump the 5 volt reference pin 3 and MAP signal pin 2 together • Key ON Does the DST display BP pressure of 16.00 psia or greater?		Go to Step (4)	Go To Step (8)
4	• Inspect MAP connector and wire harness connector terminals for corrosion, contamination or mechanical damage Any problems found?		Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.	Go To Step (5)
5	• Key OFF • Disconnect ECM connector C001 • Check for continuity between MAP sensor connector signal pin 2 and ECM connector pin 7 Do you have continuity between them?		Go to Step (6)	Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.
6	• Check for continuity between MAP sensor connector 5 volt pin 3 and ECM connector pin 19 Do you have continuity between them?		Go To Step (7)	Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.
7	• Check for continuity between MAP sensor connector ground pin 1 and ECM connector pin 20 Do you have continuity between them?		Go To Step (17)	Repair the circuit as necessary. Refer to Wiring Repairs in Engine Electrical.

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I. ENGINE CONTROL MODULE

This procedure relates to removal and installation of the ECM--see Diagnostic Scan Tool for accessing ECM software.

REMOVAL PROCEDURE

1. Disconnect Negative battery cable.
2. Remove four screws mounting the controller to the mounting bracket.
3. Unplug the ECM and remove.
4. Push connector lock back to unlock connector.

INSTALLATION PROCEDURE

IMPORTANT
The ECM is calibrated for each engine. Verify you have the correct controller by noting the P/N on the ECM label. The calibration number can also be found by connecting the DST and finding the calibration number on the Gauge page.

1. Mount controller into mounting bracket with four screws. Torque to 7.5 N•m (5.5 ft. lbs.)
2. Plug connector into controller.
3. Push lock into place.
4. Reconnect the negative battery cable.
5. Install Diagnostic service tool.
6. Start engine.
7. Check for any DTC codes and clear.
8. Verify engine is in closed loop and no MIL light is present.

II. ENGINE WIRE HARNESS REPLACEMENT

1. Disconnect negative battery cable.
2. Lay out the new wire harness, noting the location, type of connectors, and identifying markings. Take special note of identical or similar connectors (such as the ignition coils or HEGO Sensors) to avoid crossing connections during installation. Note the routing of the existing wire harness in and around the engine and the vehicle. Refer the Electrical Schematic.

CAUTION

Ensure that all connections are made to the correct locations on the engine and its components. Crossing connections may cause poor engine performance, a MIL warning and/or permanent damage to the ECM.

3. Remove all wire harness connectors on the vehicle.
4. Remove all clips and brackets holding the wire harness and remove harness from vehicle.
5. Lay the new wire harness over the engine and route each end to its connection. Verify that all connectors match prior to installation.
6. Connect all connectors and ring terminals.
7. Install all clips and brackets to hold down the harness.
8. Reconnect negative battery cable.
9. Start the vehicle.

III. FUEL TEMPERATURE (FT) SENSOR REPLACEMENT

1. Disconnect the negative battery cable.
2. Relieve the LPG fuel system pressure. Refer to *IX. LPG Fuel System Pressure Relief.*
3. Locate the Fuel Temperature Sensor on the lower right port on the EPR.
4. Remove retaining clip holding the FT and remove the sensor from the EPR port.
5. Inspect the EPR for debris or “heavy ends” and remove with a Safety Solvent if necessary.

WARNING

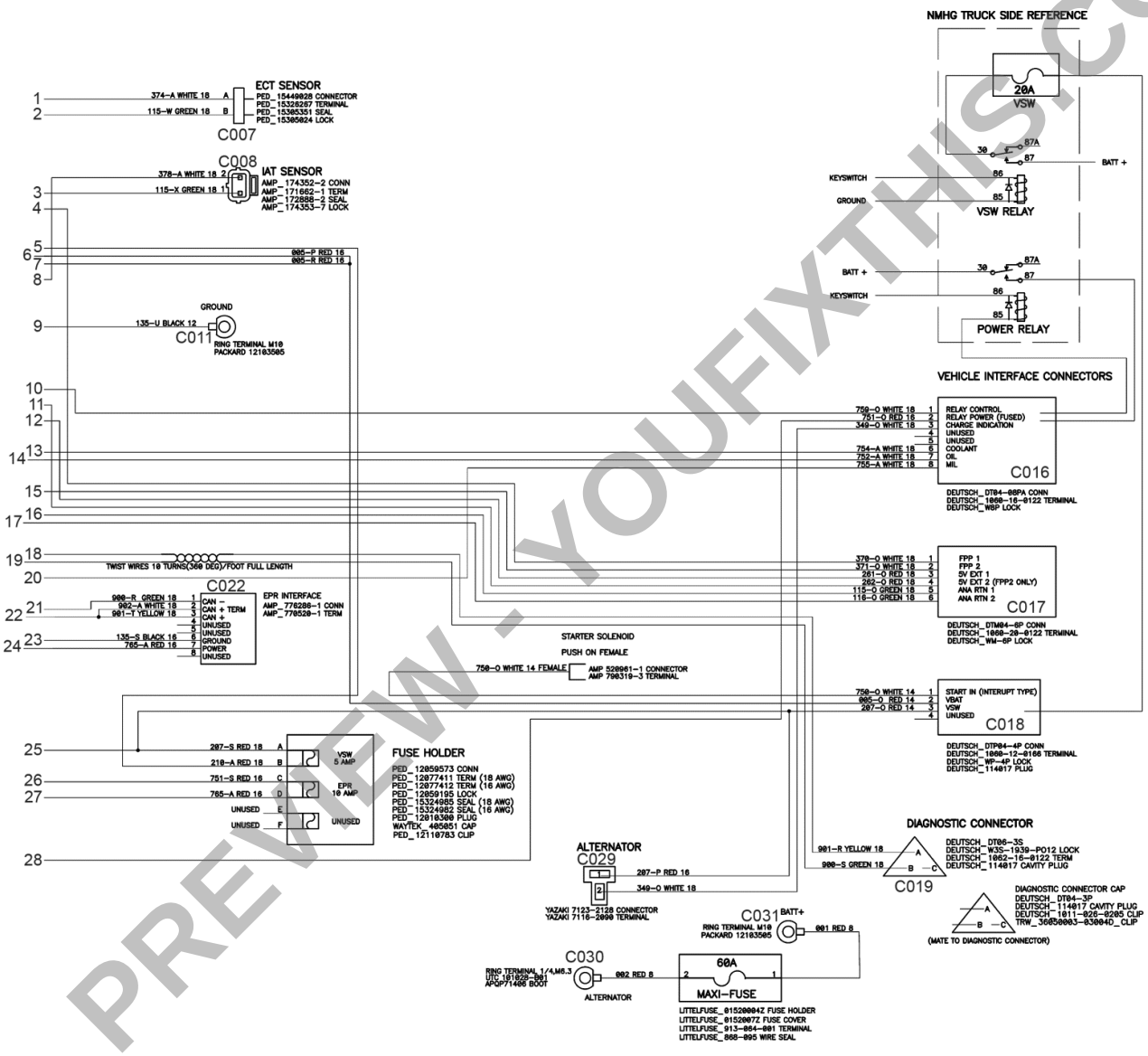
Only use a Safety Solvent to clean any part of the fuel system. Harsh cleaners such as carb or brake cleaners may damage gaskets, O-rings, seals and other non-metallic components in the fuel system.

INSTALLATION

1. Lubricate O-rings on the sensor with petroleum jelly or Vaseline.

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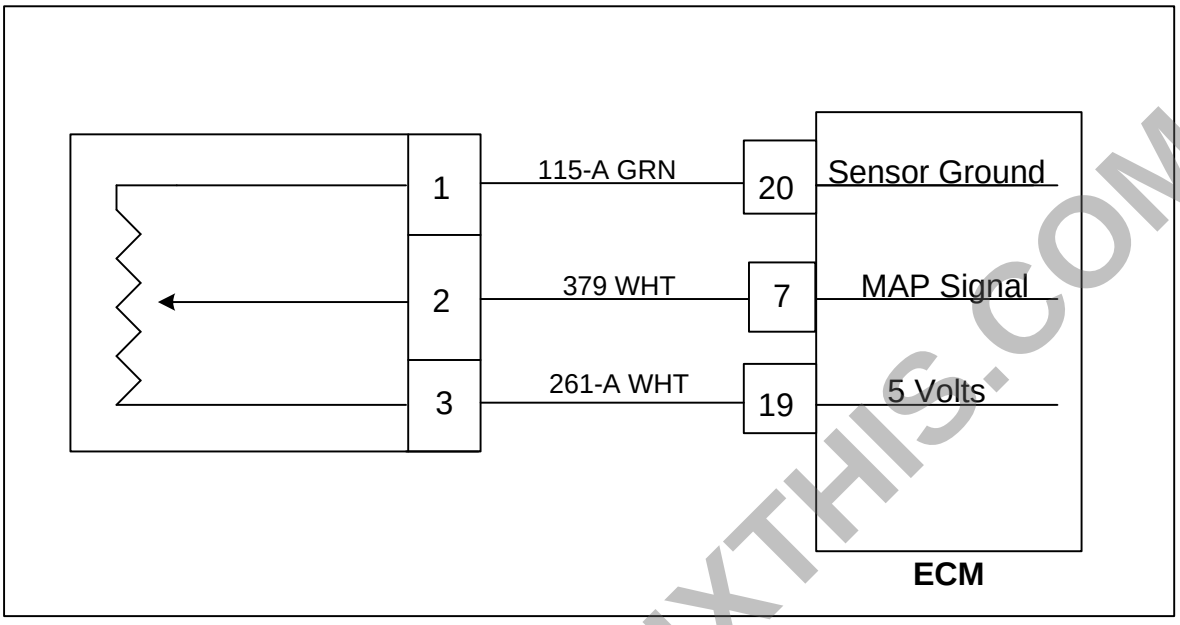
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DTC 107-MAP Low Voltage



Conditions for Setting the DTC

- Manifold Absolute Pressure Sensor
- Check Condition-Engine cranking or running
- Fault Condition-MAP voltage less than 0.200 with throttle position greater than 3.5% and engine RPM less than 3000
- MIL-ON
- Adaptive-Disabled
- Fueling is based on RPM and TPS Limp-Home Condition during this fault.

Circuit Description

The Manifold Absolute Pressure sensor is a pressure transducer connected to the intake manifold. It is used to measure the pressure of air in the intake manifold. This reading is used in conjunction with other inputs to estimate the airflow rate to the engine, which determines the fuel flow rate. This fault will set if the MAP voltage is less than 0.200 with TPS greater than 3.5% and engine RPM less than 3000. The adaptive Learn will be disabled for the remainder of the key on cycle and the MIL command is on.

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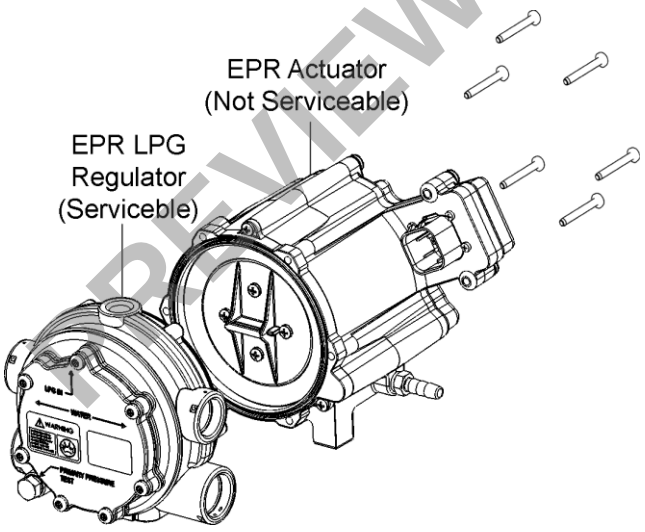
REPAIR INSTRUCTIONS

DISASSEMBLY OF EPR

1. Disconnect negative battery cable.
2. Relieve the LPG fuel system pressure. Refer to *IX. LPG Fuel System Pressure Relief.*
3. Disconnect electrical connector from EPR.
4. Remove three nuts securing EPR to Mounting Bracket.
5. Inspect the outside of the EPR assembly for cracks, signs of leakage, corrosion, electrolysis, damage, stripped threads, etc. If damage is found, the EPR assembly is not repairable and must be replaced.
6. Remove the six screws (M4 x 28 Tamper Proof Torx Panhead) that connect the Regulator to the Actuator.

NOTE
Be sure to identify the type of screw and its location during each stage of disassembly to ensure proper placement during reassembly.

7. Gently pull the Regulator away from the Actuator. If necessary, tap around the edge of the face plate with the handle of a plastic screwdriver to break the regulator free. Note that the lever from the primary valve slides into a slot of the secondary diaphragm, requiring the Regulator to be moved sideways to free the tab from the diaphragm. Remove and discard Clamp Plate Seal.



The two major components of the EPR Assembly: Regulator and the Actuator.

WARNING

Care must be used when removing regulator from the actuator to prevent damage to the lever and diaphragm. Neither part is serviceable and if damaged, the entire EPR assembly must be replaced.

8. Place Regulator face down and remove the retaining screw, (M4 x 12 Torx panhead) holding the secondary lever.
9. Remove secondary lever, fulcrum pin and spring.
10. Inspect lever and fulcrum pin for excessive wear. If the pin diameter is reduced at any point or if the holes in the lever are irregular (oblong), the EPR assembly is not repairable and must be replaced.
11. Turn the Regulator over and remove the seven screws (M4 x 28 Tamper Proof Torx Panhead) from the face of the Regulator. Remove cover.
12. Remove the primary diaphragm.
13. Remove the body cover plate and C-clip from the primary valve pin.
14. Turn the plate over and remove pin and spring. Discard pin and keep the spring.
15. Remove the secondary body gasket.
16. Inspect the Regulator body and cover plates for debris, deposits or “heavy ends” and remove using a Safety Solvent as necessary. Ensure all mating surfaces are clean.

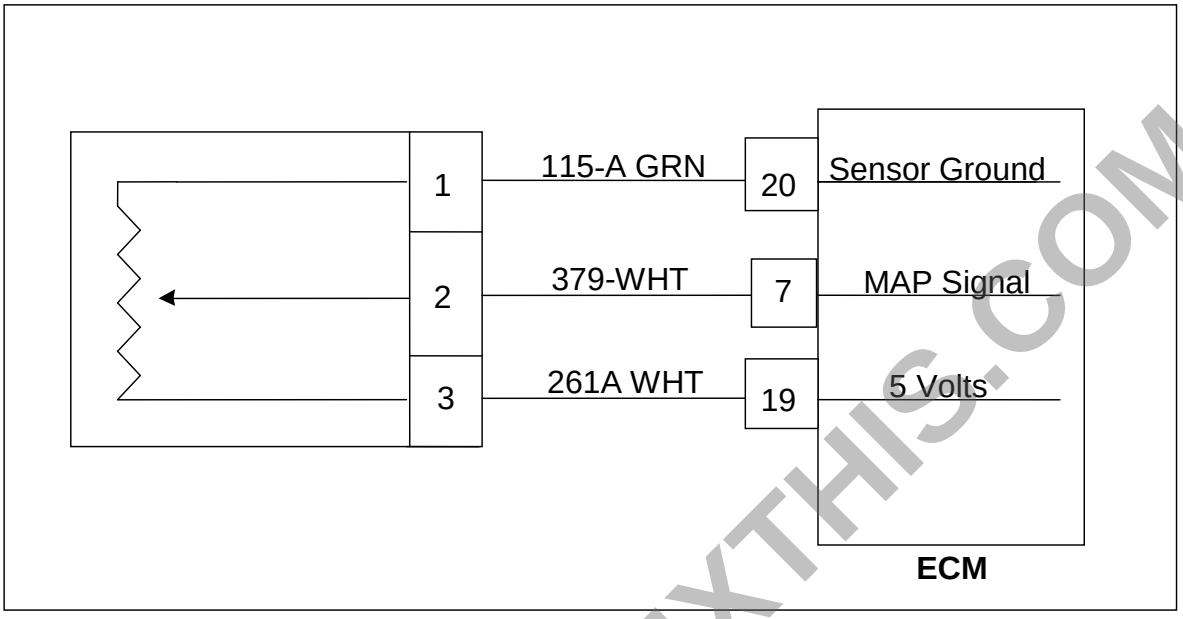
Optional:
If leaks are detected or if the replacement of the O-rings on the Coolant Hose(s), Fuel Temperature Sensor or the Fuel Vapor Hose is deemed necessary, the follow the additional steps. Otherwise, continue to Reassembly.

17. Release coolant pressure.
18. Clamp off the two radiator hoses near the point where they connect to the EPR.
19. Remove Coolant Hoses, Fuel Temperature Sensor and Fuel Vapor Hose by first removing Retaining Clips, then pulling each out of the EPR ports.
20. Remove O-rings from the Temperature Sensor, both Coolant Hose fittings, and the Fuel Vapor Hose. Clean Temperature Sensor

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DTC 108-MAP High Pressure



Conditions for Setting the DTC

- Barometric pressure check
- Check condition-engine running
- Fault Condition-MAP greater than 12.00 psia with TPS less than 8% and RPM greater than 750
- MIL-On
- Adaptive-disabled

Circuit Description

The Manifold Absolute Pressure sensor is a pressure transducer connected to the intake manifold. It is used to measure the pressure of air in the intake manifold. This reading is used in conjunction with other inputs to estimate the airflow rate to the engine, which determines the fuel flow rate. This fault will set if the MAP pressure is greater than 12.00 psia with TPS greater than 8% and engine RPM less than 3000. The adaptive Learn will be disabled and the MIL command is on.

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EPR ports and hose fittings as necessary using a Safety Solvent.

WARNING

Use only Safety Solvents for the cleaning of the regulator and its components. Solvents such as carburetor or brake cleaners may damage gaskets, seals, O-rings, diaphragms or other non-metal components.

REASSEMBLY OF EPR

1. Inspect all parts to ensure the Repair Kit is complete and all components are free of deterioration, cracks, tears, etc.
2. Place the new primary valve pin into the cover plate orifice.
3. Holding the valve pin in place, turn the body cover plate over. Place the valve pin spring over the valve pin and install C-clip or retaining clip.
4. Place a new secondary body gasket ensuring the small hole in the gasket is aligned with the small hole in the body cover. Place body cover and gasket on the front of Regulator body, ensuring the holes in the gasket are aligned with all screw holes.
5. Set new primary diaphragm on the face of the body cover using the screw hole for proper alignment.
6. Place the Regular face over the diaphragm and hand thread all seven screws (M4 x 28 Tamper Proof Torx Panhead) through the face plate and body cover into the Regulator body. Torque the screws to 4.5 N•m (40 in. lbs.) in a criss-cross pattern.
7. Using side-cutters, cut off the nose of the soft secondary seat and remove from secondary lever.
8. Push the nose or button of the new secondary seat through the hole of the secondary lever.
9. Set the secondary spring on its seat on the back of the Regulator body, then position the secondary lever and fulcrum pin assembly on top of the secondary spring. Push down, compressing the spring until the fulcrum pin can be slid into place.
10. Insert screw (M4 x 12 Torx panhead) to hold lever and torque to 4.5 N•m (40 in. lbs.).
11. Verify the secondary lever height by placing a straight edge over the mating surface (rim) of the Regular body. The distance between the rim of the Regulator (as determined by a straight edge) and lever should be 1/32" (.794mm). If the measurement does not meet this specification, the EPR cannot be repaired and must be replaced.
12. Place the EPR Actuator facing upward and place the new clamp plate seal into the open end of the Actuator.
13. Place the Regulator above the Actuator, noting the position of the lever tab and slot on the secondary diaphragm. Carefully slide the lever tab into the slot of the secondary diaphragm and align the Regulator to the Actuator. Place the Regulator on top the Actuator, aligning the screw holes.
14. Insert the six screws (M4 x 28 Tamper Proof Torx Panhead) through the Actuator holes and into the Regulator. Finger tighten as many screws as possible.
15. Holding the Regulator to the Actuator, turn the assembly over so that it is resting on its face. Torque screws to 4.5 N•m (40 in. lbs.).

Optional:
If hoses and O-rings were removed during the Removal Procedure, then follow the additional steps 17-20; otherwise, continue to Step 21.

16. Lubricate new O-rings using petroleum jelly or Vaseline. Mount new O-rings on the Temperature Sensor and hose fittings.

WARNING

Never use silicone based lubricants on any component related to the fuel system. The use of silicone may contaminate and/or damage the HEGO.

17. Mount EPR assembly in vehicle and reconnect electrical connector to EPR.
18. Insert Temperature Sensor and hose fittings into EPR and lock each into place using original retaining clips.
19. Remove clamps on coolant hoses. Check coolant fluid level.

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SPECTRUM by IMPCO

2012 Emission Certified LPG Fuel System 2.2L Mazda Engine

Including Labor Time Guide

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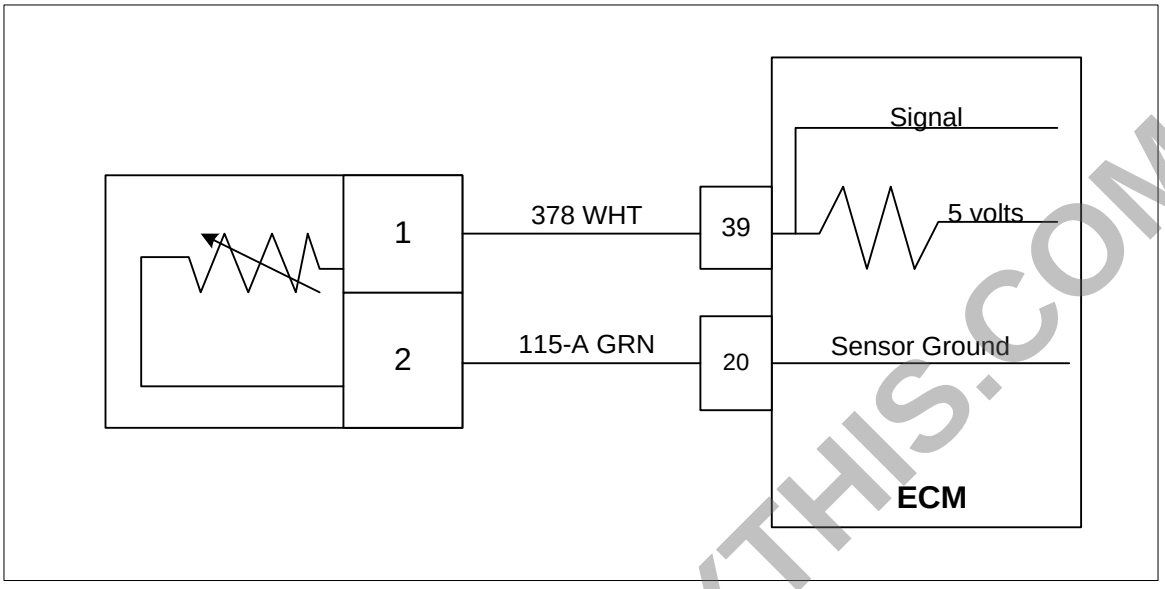
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DTC 113-IAT Voltage High



Conditions for Setting the DTC

- Intake Air Temperature
- Check Condition-Engine Running
- Fault Condition-IAT Sensor Voltage greater than 4.950
- MIL-On
- Adaptive-Disabled during active fault

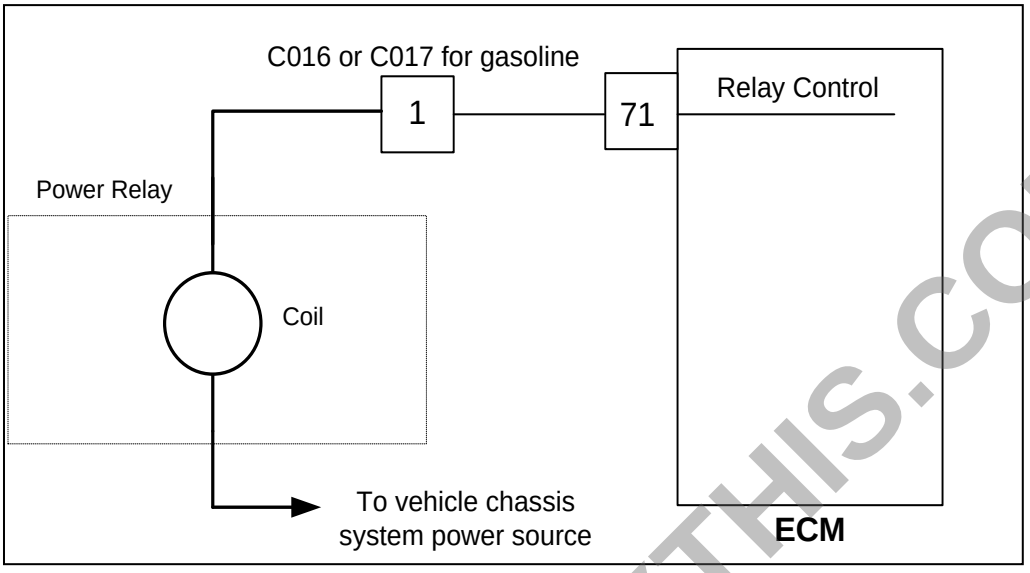
Circuit Description

The IAT (Intake Air Temperature) is used by the ECM to monitor incoming air temperature to help calculate the engines airflow requirement. The ECM provides a voltage divider circuit so that when the air is cool, the signal reads higher voltage, and lower when warm. This fault will set if the signal voltage is greater than 4.950 volts anytime the engine is running. The ECM will use a default value for the IAT sensor in the event of this fault.

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DTC 686-Relay Control Ground Short



Conditions for Setting the DTC

- Power relay ground control
- Check Condition-Key ON
- Fault Condition-Relay control shorted to ground

Circuit Description

The power relay switches power out to various sensors, actuators and solenoids in the fuel system. This fault will set if the ECM detects a direct short to ground on the relay control output.

Diagnostic Aid

Relay coil resistance changes with temperature. The following diagnostic charts have steps to measure relay coil resistance values. When checking the resistance values, be sure the relay is at a reasonable temperature, between +20 and +100 degrees F.

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