For a complete wiring diagram, refer to the Wiring Information.

**Theory of Operation**

The Mass Air Flow (MAF) Sensor is a frequency based device. A constant voltage is applied to a heated wire. This wire is positioned in the air stream and is heated by the electrical current that the voltage produces. As air flows across it, it cools down. The heated wire or film is a Positive Temperature Coefficient (PTC) resistor, which means that the resistance of it
drops when the temperature drops. The drop in resistance allows more current to flow through it in order to maintain the programmed temperature. The current flow is changed to a frequency, which is sent to the Powertrain Control Module (PCM) and interpreted as air flow. Adjustments for air temperature and humidity are taken into consideration, since they also affect the temperature of the heated wire or film. The engine running monitor compares an estimated fresh air flow value to the Mass Air Flow Sensor reading. The PCM will light the Malfunction Indicator Lamp (MIL) immediately after this diagnostic runs and fails. The PCM will turn off the MIL when the diagnostic runs and passes in four consecutive drive cycles.

- **When Monitored:**

  When the PCM is powered on.

- **Set Condition:**

  The frequency detected is below what is allowable for the sensor.

<table>
<thead>
<tr>
<th>Possible Causes</th>
</tr>
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<tbody>
<tr>
<td>INTAKE OR EXHAUST SYSTEM LEAKING OR RESTRICTED</td>
</tr>
<tr>
<td>(F344) SMART POWER RELAY OUTPUT CIRCUIT OPEN</td>
</tr>
<tr>
<td>(F344) SMART POWER RELAY OUTPUT CIRCUIT SHORTED TO THE (K916) RETURN CIRCUIT</td>
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<tr>
<td>(K157) MAF SENSOR SIGNAL CIRCUIT OPEN</td>
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<tr>
<td>(K157) MAF SENSOR SIGNAL CIRCUIT SHORTED TO THE (K916) RETURN CIRCUIT</td>
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<tr>
<td>(K157) MAF SENSOR SIGNAL CIRCUIT SHORTED TO GROUND</td>
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<tr>
<td>MASS AIR FLOW (MAF) SENSOR</td>
</tr>
<tr>
<td>POWERTRAIN CONTROL MODULE (PCM)</td>
</tr>
</tbody>
</table>

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

1. **ACTIVE DTC**
   1. Ignition on, engine not running.
   2. With the scan tool, erase DTCs.
   3. Start the engine and let idle for at least two minutes.
   4. With the scan tool, read DTCs.

   **Did the DTC return?**

   **Yes**
   - Go To 2

   **No**
   - Perform the INTERMITTENT CONDITION diagnostic procedure. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

2. **CHECK THE (F344) SMART POWER RELAY OUTPUT CIRCUIT**
   1. Turn the ignition off.
   2. Disconnect the MAF harness connector.
   3. Turn the ignition on, engine not running.
NOTE:  Check connectors - Clean/repair as necessary.

4. Measure the voltage of the (F344) Smart Power Relay Output circuit at the MAF Sensor harness connector.

**Is the voltage equal to battery voltage?**

Yes  •  Go To  3

No  •  Repair the (F344) Smart Power Relay Output circuit for an open or short to ground.

• Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

3. **CHECK FOR THE (F344) SMART POWER RELAY OUTPUT CIRCUIT SHORTED TO THE (K916) RETURN CIRCUIT**

1. Turn the ignition off.

2. Disconnect the PCM C1 harness connector.

3. Measure the resistance between the (F344) Smart Power Relay Output circuit and (K916) Return circuit at the MAF Sensor harness connector.

**Is the resistance below 10k Ohms?**

Yes  •  Repair the short between the (F344) Smart Power Relay Output circuit and (K916) Return circuit.

• Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

No  •  Go To  4
4. CHECK FOR THE (K157) MAF SENSOR SIGNAL CIRCUIT SHORTED TO THE (K916) RETURN CIRCUIT

1. Measure the resistance between the (K157) MAF Sensor Signal circuit and (K916) Return circuit at the MAF Sensor harness connector.

**Is the resistance below 10k Ohms?**

**Yes**
- Repair the short between the (K157) MAF Sensor Signal Signal circuit and (K916) Return circuit.
- Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

**No**
- Go To 5

5. CHECK THE (K157) MAF SENSOR SIGNAL CIRCUIT FOR AN OPEN/HIGH RESISTANCE

1. Measure the resistance of the (K157) MAF Sensor Signal circuit between the MAF Sensor harness connector and the PCM C1 harness connector.

**Is the resistance below 5.0 Ohms?**

**Yes**
- Go To 6

**No**
- Repair the (K157) MAF Sensor Signal circuit for an open or high resistance.
- Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).
6. **CHECK THE (K157) MAF SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND**

1. Measure the resistance between ground and the (K157) MAF Sensor Signal circuit at the Mass Air Flow Sensor harness connector.

   **Is the resistance below 10k Ohms?**

   **Yes**  
   • Repair the (K157) MAF Sensor Signal circuit for a short to ground.  
   • Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

   **No**  
   • Go To 7

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7. **CHECK THE INTAKE SYSTEM**

1. Visually inspect the Intake System for any restrictions.
2. Perform the INTAKE AIR PRESSURE TEST diagnostic procedure. (Refer to 29 - Non-DTC Diagnostics/Drivability - Diesel - Diagnosis and Testing)

   **Were any leaks or restrictions found?**

   **Yes**  
   • Repair as necessary.  
   • Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

   **No**  
   • Go To 8

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8. **CHECK THE EXHAUST SYSTEM**

1. Visually inspect the Exhaust System for any restrictions.
2. Perform the CHECKING THE EXHAUST SYSTEM FOR LEAKS diagnostic procedure. (Refer to 29 - Non-DTC Diagnostics/Drivability - Diesel - Diagnosis and Testing)

   **Were any leaks or restrictions found?**

   **Yes**  
   • Repair as necessary.  
   • Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

   **No**  
   • Go To 9

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9. **CHECK THE MASS AIR FLOW SENSOR**
1. Replace the MAF Sensor in accordance with the Service Information.
2. Reconnect the PCM C1 harness connector.
3. Turn the ignition on.
4. With the scan tool, erase DTCs.
5. Start the engine and allow it to idle for one minute.
6. With the scan tool, read DTCs.

**Does the DTC P0102 return?**

**Yes**
- Replace the Powertrain Control Module in accordance with the Service Information.
- Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

**No**
- Test Complete.
- Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).