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Are You Missing Out on Blocked Monitors?

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With the introduction of OBD testing well behind us now, most technicians and service personnel are familiar with the concept of OBD monitors. They are the embedded diagnostics written into the programming for all OBDII Powertrain Control Modules, (PCM). Some are always running (continuous monitors) - Misfire Monitor, Fuel System Monitor and Comprehensive Component Monitor, for example. Others are non-continuous and require specific operating conditions to run - Catalyst Monitor, Evaporative System Monitor, Oxygen Sensor Monitor, for example.

What you may not be aware of is that some defects will block other monitors from running. For example, an O2 sensor defect that has generated a trouble code is likely to prevent a catalyst monitor from running since this sensor is used in running the catalyst monitor.

There are also many less obvious examples where a sensor is not reading correctly, but still within its normal range, and not generating any trouble codes. This can still be keeping monitors from running, as it is preventing the right combination of sensor values that are required to allow a monitor to run. For example, if a cold start is required to run a specific monitor, and that PCM defines a cold start as the Coolant Temperature Sensor (CTS) be within a few degrees of the Intake Air Temperature Sensor (IAT) then a skewed value of more than a few degrees from either of those sensor could block that monitor from running.

Figure 1 (on page 2) lists the conditions required for running the catalyst monitor on a 2000 Chevrolet C1500 pickup with a 4.3 liter engine. In ALLDATA, these are found in the P0420 (catalyst system low efficiency bank one), diagnostic charts that can be located under the path.

What is noteworthy here is that there are no fewer than fifteen diagnostic trouble codes (DTCs) that will block the catalyst monitor from running on this calibration, and this includes all the possible transmission codes being counted as one. As you can see, there is huge potential to miss out on needed repairs due to blocked monitors.

Blocked monitors can have different consequences depending on the situation. If a vehicle fails it's AirCare inspection with a P0300 (random misfire code), it is likely to have blocked several monitors from running, as it would have with this Chevy. If this misfire has been happening for the last six months, this is very likely to have damaged the catalyst. How can that affect you as a repair technician when the owner arrives at your shop for a diagnostic and repair? Let's take a look.

Diagnostic and Repair Example

To keep things simple, let's assume this is our same 2000 model year Chevy P/U, so we are clear there are no repair cost limits that apply. This means that you should not be entering your repair data until you are sure you have repaired all existing emissions defects.

The first step here should be to inform the vehicle owner that there may be defects being masked on this vehicle, other than those causing the misfire, and that you will have to repair the misfire first before you can identify any possible masked defects and complete your diagnostics on the vehicle.

Once you have diagnosed and corrected the cause of the misfire, the next step would be to clear codes and reset monitors with your scanner so all adaptive values can be reset to base values and the monitors can be reset to not complete.

2000 Chevy Truck C1500 P/U 2WD V6-4.3L VIN W

Vehicle Level - Powertrain Management - Computers and Control Systems - Testing and Inspection - Diagnostic Trouble Code Tests and Associated Procedures
P. Code Charts - P0420

CONDITIONS FOR RUNNING THE DTC

No active secondary AIR DTCs

No active Camshaft Position (CMP) sensor DTCs

No active Engine Coolant Temperature (ECT) sensor DTCs

No active Exhaust Gas Recirculation (EGR) DTCs

No active fuel trim DTCs

No active Idle Air Control (IAC) DTCs

No active Intake Air Temperature (IAT) sensor DTCs

No active Mass Air Flow (MAF) sensor DTCs

No active Manifold Absolute Pressure (MAP) sensor DTCs

No active Oxygen (O₂) sensor DTCs

No active transmission DTCs

No active Evaporative Emission (EVAP) system DTCs

No active Throttle Position (TP) sensor DTCs

No active Vehicle Speed Sensor (VSS) DTCs

No active misfire DTCs

The engine speed is 900 RPM or more for more than 35 seconds since last idle period.

The engine has been running for more than 346 seconds and the long term fuel trim is stable.

The predicted catalyst temperature is more than 425 °C (797 °F)

The system is in Closed Loop.

The BARO is 73 kPa or more.

The IAT is between -7.0 - + 75 °C (20-167 °F).

The ECT is between 75 -117 °C (167-243 °F).

The engine has been idling for less than 60 seconds.

The actual engine speed is within 100 RPM of the desired idle speed.

Figure 1: Conditions for running the catalyst monitor/DTC on 2000 Chevy Truck

Readiness Monitor	Status
Misfire Monitor	Ready
Fuel System Monitor	Ready
Comprehensive Component Monitor	Ready
Catalyst Monitor	Ready
Heated Catalyst Monitor	Not Supported
Evaporative System Monitor	Ready
Secondary Air Monitor	Not Supported
AC System/Refrigerant Monitor	Not Supported
Oxygen Sensor Monitor	Ready
Heated Oxygen Monitor	Ready
EGR System Monitor	Ready

At that point, it is a matter of performing a road test and targeting the specific operating conditions to complete all the monitors. Make sure you are viewing the monitor status on the global OBD side of the PCM, not the manufacturer specific side. Once they are complete you should check for pending codes to see if there are further defects that need to be repaired. Remember, most OBD codes have to occur on two trips in a row before maturing to hard codes and causing the Malfunction Indicator Light, (MIL) to be commanded on. This is why explaining the possibility of further defects to the customer right up front is very important. If you have to call them to get the OK for further repairs, it won't come as a big surprise or give them the impression you are now trying to sell them extra repairs they might not require. Worse yet would be to repair the misfire

and return the vehicle to the customer only to have them come back with the check engine light on, assuming you did not correct the original defect!

Description	
P0306	Cylinder 6 Misfire Detected
P0442	Evaporative Emission System Leak Detected (small leak)

Figure 2: OBD report on initial AirCare failure

Here is a real-world example of this exact situation. I received a call on this vehicle from a non-certified repair shop that was dealing with an angry customer. The vehicle was a 2001 Chevy Silver-

ado with misfire and evap codes (see Figure 2). It all looks to be pretty straightforward. Two codes set, all other monitors complete / ready.

Or so thought the repair tech / shop owner. He called me after the repairs had been performed saying he was having troubles with completing monitors.

He had given the vehicle back to the customer and told him to drive it around for a few days and then take it back to AirCare for testing. Before the customer had a chance to go back for re-inspection, the MIL was back on so the owner returned to the repair shop. The tech scanned the vehicle and now there was a P0420 code for catalyst system low efficiency bank one. In desperation, the tech cleared the codes and asked the customer to take it back through AirCare. He did, but with three monitors still not ready, the vehicle was rejected, as it was not ready enough to be tested (see Figure 3 on page 4).

This happened several times before the tech called, and it took some pointed questions to the tech before he admitted he had been clearing codes to avoid telling the customer about the catalyst defect. Once he did, the owner had lost all confidence in the shop and the vehicle, so it is now sitting on a car lot, a trade in for a new vehicle!

Abort Code	Description
22	OBD readiness monitors are not set
<u>Readiness Monitor</u>	<u>Status</u>
Misfire Monitor	Ready
Fuel System Monitor	Ready
Comprehensive Component Monitor	Ready
Catalyst Monitor	Not Ready
Heated Catalyst Monitor	Not Supported
Evaporative System Monitor	Ready
Secondary Air Monitor	Not Supported
AC System/Refrigerant Monitor	Not Supported
Oxygen Sensor Monitor	Ready
Heated Oxygen Monitor	Ready
EGR System Monitor	Ready

Figure 3: Vehicle rejected for readiness on re-inspection

I hope this article has helped you be more aware of the potential problems and lost opportunity's that can be caused by blocked monitors on OBDII technology vehicles.