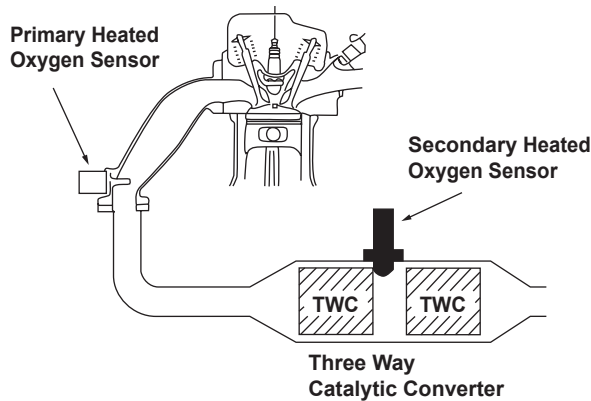
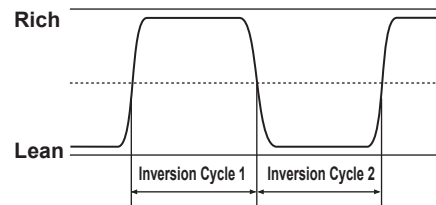


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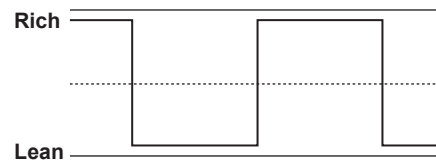
DTC P0420: Catalyst System Efficiency Below Threshold (M/T)



Secondary HO2S Output Voltage



Fuel Correction Factor



$$\text{Inversion Cycle} = (\text{Inversion Cycle 1} + \text{Inversion Cycle 2}) / 2$$

P0420-9871

General Description

The three way catalytic converter (TWC) is installed in the exhaust system. The TWC converts hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to water vapor, carbon dioxide (CO₂), and dinitrogen (N₂) simultaneously. The TWC adsorbs/releases oxygen during this process. This ability to adsorb oxygen deteriorates as the TWC performance deteriorates. The TWC performance correlates with the storage capacity for oxygen, so the TWC deterioration can be detected by monitoring the storage capacity for oxygen. Also, the storage capacity for oxygen can be monitored according to the inversion cycle of the secondary HO₂S (Sensor 2) which detects the oxygen content after passing through the TWC.

The engine control module (ECM) determines fuel feedback control by monitoring the secondary HO₂S for a set time period, and then calculates the average time of the inversion cycle of the secondary HO₂S, whose waveform alternates between rich and lean. This inversion cycle varies by the amount of the exhaust gas entering into the TWC and needs to be regulated by the OSC INDEX (Oxygen Storage Capacity INDEX):

OSC INDEX = The inversion cycle of the secondary HO₂S x (times) the amount of exhaust gas during calculation of the inversion cycle.

The ECM calculates the moving average of six drive cycles and compares it to the predetermined threshold in the ECM. If the latest moving average is cleared by resetting the ECM, each threshold is applied according to the number of drive cycles until the moving average of six drive cycles is evaluated. If the calculated value is less than the threshold, the TWC performance is considered to be deteriorated and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	After judged OK for the secondary HO ₂ S
Duration	6 seconds or more
DTC Type	Two drive cycles, MIL ON

Enable Conditions

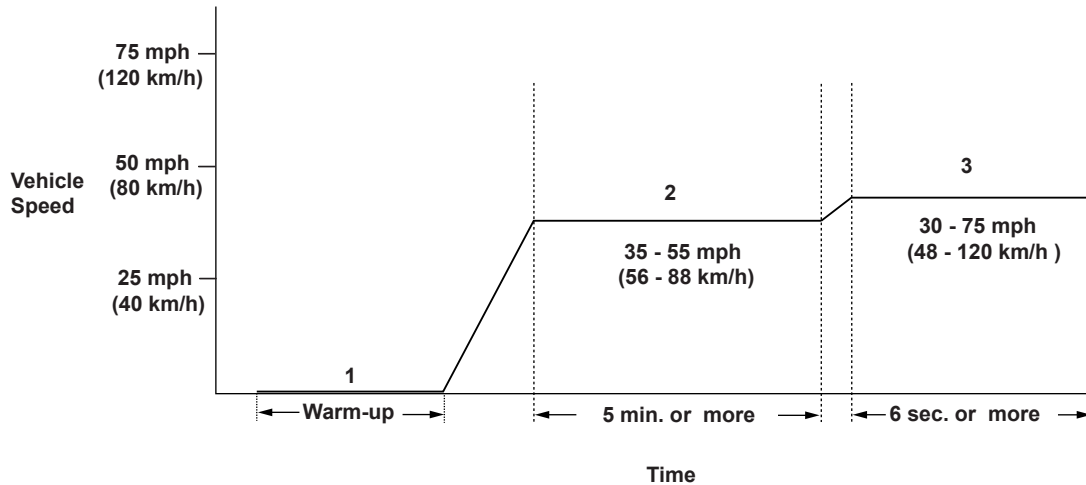
Condition	Minimum	Maximum
Engine coolant temperature	158°F (70°C)	—
Intake air temperature	-14°F (-25°C)	—
Engine speed	1,300 rpm	2,700 rpm
MAP value	26 kPa (191 mmHg, 7.6 in.Hg)	90 kPa (680 mmHg, 26.7 in.Hg)
Vehicle speed	30 mph (48 km/h)	—
Fuel trim	0.65	1.4
Fuel feedback	Closed loop control at stoichiometric ratio	
Monitoring priority	EVAP, A/F Sensor	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S, Secondary HO2S Heater, MAP, ECT, TP, IAT, EGR, VSS, VTEC System, Fuel System	
Other	The TWC temperature is high enough	

Malfunction Threshold

OSC INDEX is the value shown in the table or less.

The number of detections	OSC INDEX
1 time	3,828
2 times	3,458
3 times	3,284
4 times	3,189
5 times	3,116
6 times or more	3,064

Driving Pattern



P0420-0154

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 35 - 55 mph (56 - 88 km/h) for at least 5 minutes.
3. Then, drive immediately at a steady speed between 30 - 75 mph (48 - 120 km/h) for at least 6 seconds.

- If the EVAP monitor runs instead of the HO2S monitor, turn the engine off, then restart it, and the HO2S monitor will restart.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

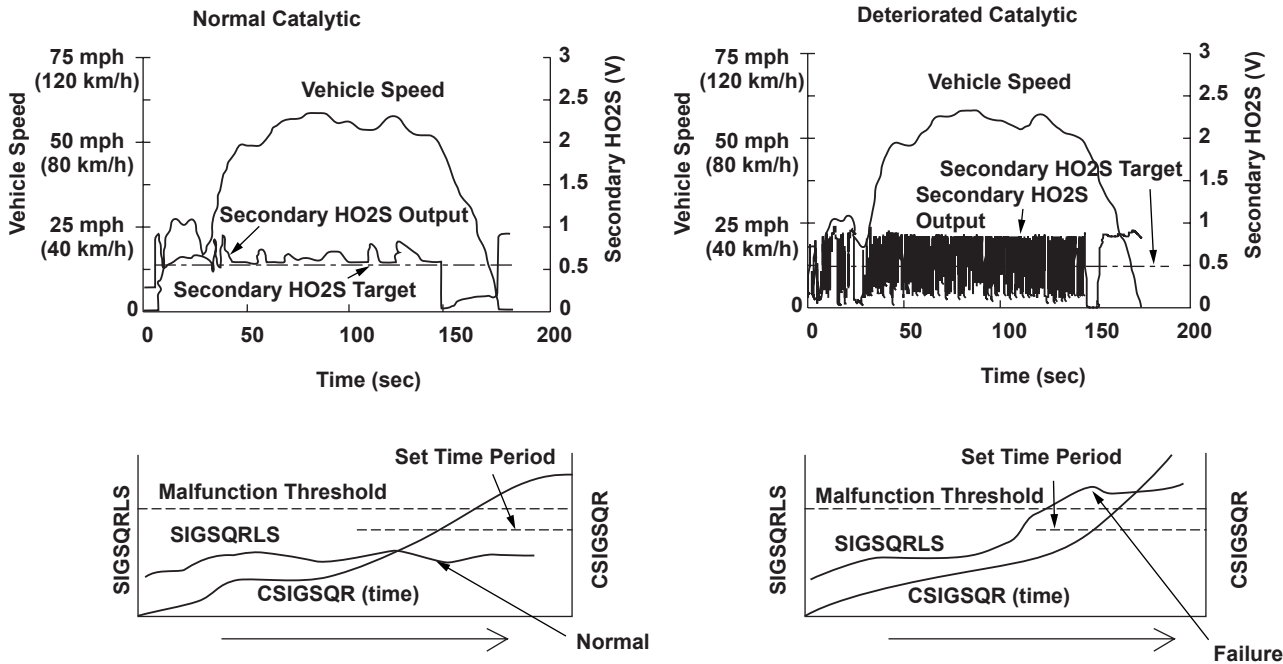
Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.

The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.

Advanced Diagnostics

DTC P0420: Catalyst System Efficiency Below Threshold (CVT)



P0420-0071

General Description

The three way catalytic converter (TWC) converts hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to water vapor, carbon dioxide (CO₂), and dinitrogen (N₂).

The TWC efficiency does not depend on the engine conditions or the deterioration level of the TWC. It can be optimized by stabilizing the secondary HO₂S output.

If the TWC deteriorates, the air/fuel ratio downstream (the secondary HO₂S output) often differs from the target secondary HO₂S output, and the status is represented by the parameter (SIGSQRLS).

Therefore, if the SIGSQRLS exceeds a specified value for a set time period, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	After judged OK for the secondary HO ₂ S
Duration	50 seconds or more
DTC Type	Two drive cycles, MIL ON

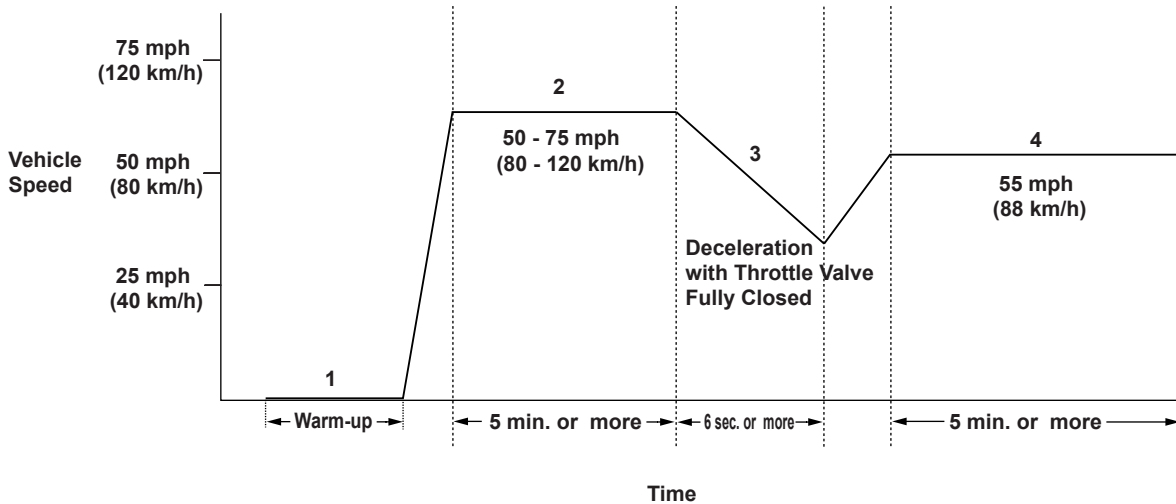
Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	158°F (70°C)	—
Intake air temperature	-15°F (-25°C)	—
Engine speed	1,200 rpm	2,700 rpm
MAP value	26 kPa (191 mmHg, 7.5 in.Hg)	90 kPa (680 mmHg, 26.7 in.Hg)
Vehicle speed	4 mph (5 km/h)	—
Fuel trim	0.65	1.40
Fuel feedback	Closed loop control at stoichiometric ratio	
No active DTCs	ECM, A/F Sensor, A/F Sensor Heater, Secondary HO2S, Secondary HO2S Heater, MAP, ECT, TP, IAT, EGR, VSS, VTEC System, Fuel System	
Others	The TWC temperature is high enough	
	Other than when there is excessive vapor generation (fuel level is 40 - 80%)	

Malfunction Threshold

The number of detections is 200 or more.

Driving Pattern



P0420-0054

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 50 - 75 mph (88 - 120 km/h) for at least 5 minutes.
3. Decelerate with the throttle valve fully closed for at least 6 seconds.
4. Set a vehicle speed of 55 mph (88 km/h) with the cruise control, and drive for at least 5 minutes.

- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs. The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.