

General

IUMPR Statement:

The OBD II System of this test group is designed to comply with the provisions of CCR 1968.2, section (d)(3.2) requirements.

Cold Start Reduction Strategy

The new 997 Turbo is equipped with a cold start emission reduction monitoring strategy. The system works as follows:

The Porsche system currently uses a combination of the following measures to enhance the catalyst warm-up:

- spark retard
- elevated idle speed
- retarded transmission shifts, rich lambda during secondary air injection
- camshaft position
- variable valve lift

According to (e)(11.2.1), the individual component related to the above strategies has to be monitored. The table below demonstrates that all catalyst heating measures are covered by components which are monitored individually. The long term fuel system and the valve lift diagnosis, which need a lambda signal for monitoring, are finished after the catalyst warm-up phase. Errors will be detected before the next catalyst warm-up.

Overview:

Cold Start Strategies and their monitoring components

Monitored components and their timing			Cold Start Emission Reduction Strategies					
Components	Diagnosis	Diagnosis Phase	Spark Retard	Idle Speed	Transmission Shift	Engine Lambda	Camshaft Position	Valve Lift
Injection Valve	driver stage diagnosis / fuel system diagnosis *	cold start / after cold start *	X	X		X		
MAF	MAF diagnosis / fuel system diagnosis *	cold start / after cold start *	X	X		X		
Throttle	ETC diagnosis	cold start	X	X				
Purge Flow Valve	driver stage diagnosis / purge flow diagnosis (evap)	cold start / after cold start *		X		X		
Crankshaft Sensor	crankshaft diagnosis	cold start	X	X		X	X	
Camshaft Sensor	camshaft sensor diagnosis	cold start					X	
Camshaft	VVT diagnosis	cold start	X	X			X	
Electric Fuel Pump	driver stage diagnosis	cold start	X	X		X		
Ignition Coil	misfire diagnosis	cold start	X	X				
Slipped Cam/Crank	camshaft/crankshaft alignment diagnosis	cold start					X	
Leakage	fuel system diagnosis *	after cold start *	X	X		X		
Automatic Transmission	automatic transmission diagnosis	cold start			X			
CAN-Communication	CAN-diagnosis	cold start			X			
Variable Valve Lift **	valve lift diagnosis **	after cold start **						X

* Fuel system Diagnosis: The monitoring is activated after the cold start phase because the diagnosis depends on: engine temperature > threshold, driving conditions in defined load/speed regions, oxygen sensor in closed loop operation

** Variable Valve Lift: The monitoring is activated after the cold start phase because the diagnosis depends on the oxygen sensors in closed loop operation. In that case errors will be detected before the next catalyst warm-up.

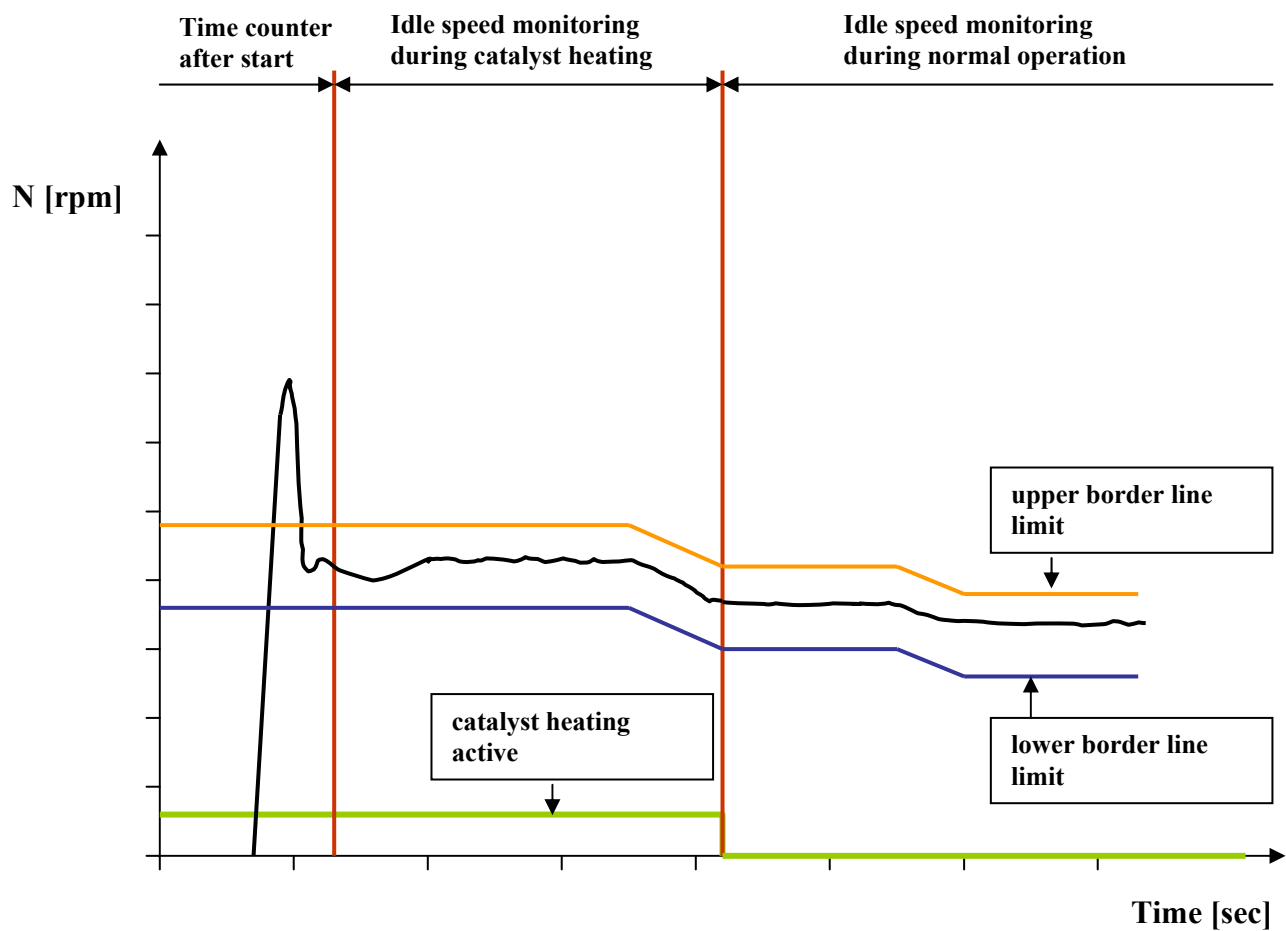
Monitoring of idle speed

The monitoring of the idle speed is now also active during the cold start phase.
The following P-codes are set in case of an error:

P050D: idle air control system RPM higher than expected during cold start phase

P050A: idle air control system RPM lower than expected during cold start phase

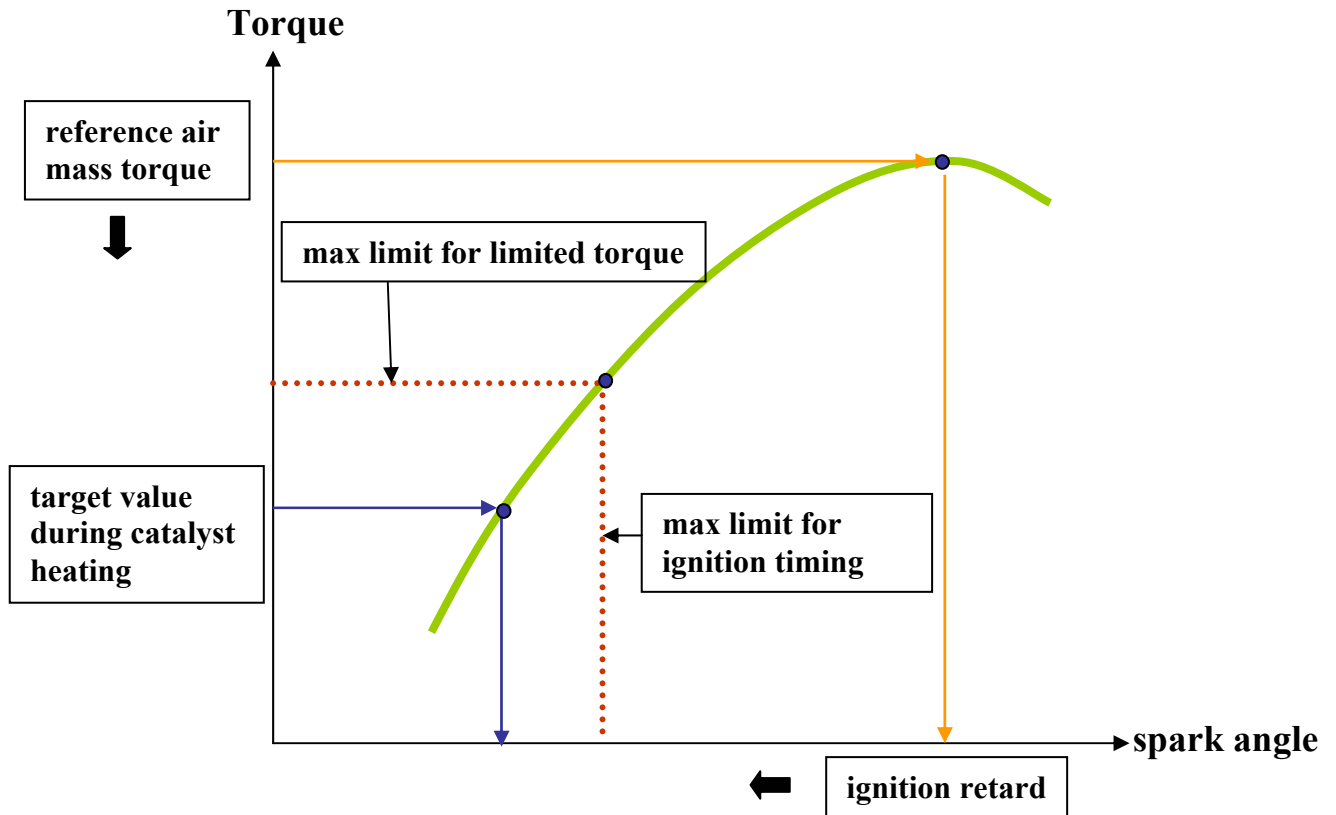
The following chart shows the working principle of the idle speed monitoring:



Spark retard

The spark retard is limited (fixed) during the catalyst heating phase. There is no diagnosis implemented.

The following chart explains the working principle:



Emission influence of spark retard during FTP-test



Explanation to graph: all measured variables are from a 20° C FTP-test

- green: vehicle speed in [km/h]
- red: engine speed [rpm]
- yellow: spark retard under normal catalyst warm-up conditions (i.O condition, spark retard)
- violet: spark retard, reduced catalyst warm-up measures. This is equivalent to the with the maximum possible reduction of the spark retard for catalyst heating. The delta of approx. 5 degrees spark retard shown in the diagram is the maximum possible reduction due to spark retardation for the 997 Turbo.

Influence on emissions during the 20° C FTP-test:

	i.o. test	reduced cat. heating spark retard
NMHC [g/mi]	0.0421	0.0475
CO [g/mi]	2.08	2.52
NOx [g/mi]	0.053	0.053