



## 3.7 Crankshaft and Camshaft Position Sensor

### 3.7.1 Description

#### 1. Diagnostic Trouble Codes:

Crankshaft Position Sensor Circuit Malfunction	P0335
Crankshaft Position Sensor Range/Performance	P0336
Camshaft Position Sensor Circuit Malfunction	P0340

#### 2. Monitoring Procedure

##### Summary

Problems with the crankshaft and camshaft position sensors will be detected by cross - checking each sensor's output, identifying when one sensor is operating and the other is not. A missing tooth check will test that all tooth edges are being correctly detected and that there is a missing tooth present. As the crankshaft speed sensor is central to engine management system operation there is no default operation, which would allow the car to run when there is a crankshaft position sensor circuit malfunction.

##### Crankshaft Position Sensor Check

If more than CRANK DIAG MAX CAM PULSES camshaft position sensor pulses are detected during CRANK DIAG MIN TEST TIME, while the engine is in STALL, then a crankshaft position sensor fault is present. When the engine enters CRANKING mode, implying the crankshaft position sensor is operational, there is no crankshaft position sensor circuit malfunction present.

##### Camshaft Position Sensor Check

If CRANK DIAG MIN CRANK REVS crankshaft revolutions occur from exiting STALL conditions, without CAM SIGNAL VERIFIED being detected, then there is a camshaft position sensor fault present. There is no fault present if CAM SIGNAL VERIFIED is detected on every engine revolution for CRANK DIAG MIN ENG REVS.

##### Crankshaft Range / Performance Check

Missing teeth are expected to be NO OF TEETH ON WHEEL crankshaft teeth apart.

If the number of crankshaft position inaccurate fault event occurs then the fault event counter should be incremented by one, up to a limit of CRANK DIAG FAULT LIMIT. Every time the tooth count equals the actual number of teeth between missing teeth then decrement the fault event counter by one, down to a limit of zero.

If the fault event count reaches CRANK DIAG FAULT LIMIT then there is a crankshaft position inaccurate fault present. There is no fault present only when the fault event counter reaches zero. The fault event counter is cleared to zero at the start of a trip.

#### 3. Primary Detection Parameter

Crankshaft Position Sensor – Crankshaft Position sensor signal edges.

Camshaft Position Sensor – Camshaft Position sensor signal edges.

#### 4. Fault Criteria Limits

General - presence or not of sensor edges.



**Crankshaft Position Sensor Check**

The non-existence of at least 6 CRANK DIAG MAX CAM PULSES within the minimum CRANK DIAG MIN TEST TIME period of 9 seconds. Indicating an average speed of 80 rpm.

**Camshaft Position Sensor Check**

The non-setting of the Camshaft Position signal verified flag within the limit of CRANK DIAG MIN CRANK REVS' 100 revolutions.

**Crankshaft Range / Performance Check**

NO OF TEETH ON WHEEL constant is dependent upon the sensor wheel design (35 teeth), a fault is registered if the tooth count total between missing teeth is out by one or more.

**5. Monitoring Conditions**

The crankshaft position sensor check will be run if the engine is in stall.

The camshaft position sensor check will be run if the engine has exited stall and battery voltage is greater than 8V.

The missing tooth position check will run when the engine is running.

**6. Monitoring Time Length / Frequency of Checks**

The crankshaft position sensor check will be run if the engine is in stall.

The camshaft position sensor check will be run if the engine has exited stall.

The missing tooth position check will be run once every engine revolution.

**7. Criteria for Storing a Diagnostic Trouble Code**

Two successive trips where the diagnostic routines indicate a failed crank or cam sensor.

**8. Criteria for Illuminating MIL**

Two successive trips where the diagnostic routines indicate a failed crank or cam sensor.

**9. Criteria for Determining Out of Range Input Signals**

The crank / cam sensors produce non-linear outputs; the criteria will be signal/no signal.