

DR: Camshaft Position (CMP) Sensor

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DR1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P0340, P0344, P0345, or P0349 present?

Yes	No
For DTCs P0340, P0344, P0345 or P0349, GO to DR2 .	For all others, GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions .

DR2 CONTINUOUS MEMORY DTCS P0340, P0344, P0345 AND P0349: CHECK IF THE ENGINE STARTS

- Attempt to start the engine.

Does the engine start?

Yes	No
GO to DR3 .	RETURN to Section 3 , Symptom Charts for further direction.

DR3 CLEAR AND ATTEMPT TO RETRIEVE THE DTC

Note: If DTCs P0340, P0344, P0345, or P0349 are present, ignition, alternator noise, RFI and CKP concerns should be considered.

- Key ON, engine OFF.
- Clear the PCM DTCs.
- Key ON, engine running.
- Increase engine speed to greater than 1,500 RPM for 10 seconds. Repeat this 3 times.
- Retrieve the continuous memory DTCs.

Are DTCs P0340, P0344, P0345 or P0349 present?

Yes	No
GO to DR4 .	GO to Pinpoint Test Z .

DR4 CHECK THE GENERATOR FOR EXCESSIVE ELECTRICAL NOISE

Note: If the generator/regulator is electrically noisy, the noise decreases when the B+ connector is disconnected.

- PCM connector connected.
- CMP Sensor connector connected.
- Key ON, engine running.
- Monitor the generator for an audible electric noise.
- Key in OFF position.
- Generator/regulator B+ connector disconnected.
- Key ON, engine running.
- With the engine running, determine if the generator is still noisy.

Does the noise remain constant when the B+ connector is disconnected?

Yes	No
For continuous memory DTCs P0340 or P0344, GO to DR5 . For continuous memory DTCs P0345 or P0349, GO to DR13 .	REFER to the Workshop Manual Section 414-00, Charging System to diagnose the generator is noisy symptom.

DR5 DETERMINE THE CMP SENSOR PHYSICAL TYPE

- Key in OFF position.

Is the CMP sensor a synchronizer (gear driven) type?

Yes	No
GO to DR6 .	GO to DR7 .

DR6 VERIFY THE CORRECT INSTALLATION OF THE CMP SENSOR

- A CMP sensor identifies the cylinder 1 power stroke. A sensor that is improperly installed/indexed can identify the wrong cylinder as 1, produce a tip-in hesitation and generate DTC P0340.

Is the CMP sensor installed correctly?

Yes	No
GO to DR7 .	INSTALL the CMP sensor correctly. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

DR7 DETERMINE THE CMP SENSOR ELECTRONIC TYPE

Note: The variable reluctance (VR) sensors have 2-wire connectors, Hall-effect sensors have 3-wire connectors.

Is the CMP sensor a VR type?

Yes	No
GO to DR8 .	The CMP sensor is a Hall-effect type. GO to DR19 .

DR8 CONTINUOUS MEMORY DTCS P0340 AND P0344: CHECK THE CMP SENSOR RESISTANCE

- Key in OFF position.
- CMP Sensor connector disconnected.
- Measure the resistance between:

(+) CMP Sensor Connector, Component Side	(-) CMP Sensor Connector, Component Side
CMP	SIGRTN

Vehicle	Low Limit	High Limit
F-150, Mark LT	300 ohms	425 ohms
All others	250 ohms	1,000 ohms

Is the resistance within specification?

Yes	No
GO to DR9 .	INSTALL a new CMP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

DR9 CHECK THE CMP CIRCUIT FOR A SHORT TO VOLTAGE IN THE HARNESS

- PCM connector disconnected.
- Key ON, engine OFF.
- Measure the voltage between:

(+) CMP Sensor Connector, Harness Side	(-) Vehicle Battery
CMP	Negative terminal

Is the voltage less than 1 V?

Yes	No
GO to DR10 .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

DR10 CHECK THE CMP CIRCUIT FOR AN OPEN IN THE HARNESS

- Key in OFF position.
- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) CMP Sensor Connector, Harness Side
CMP	CMP
SIGRTN	SIGRTN

Are the resistances less than 5 ohms?

Yes	No
GO to DR11 .	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

DR11 CHECK FOR A SHORT IN THE HARNESS BETWEEN THE PCM AND THE CMP SENSOR

- Measure the resistance between:

(+) CMP Sensor Connector, Harness Side	(-) CMP Sensor Connector, Harness Side
CMP	SIGRTN

- Measure the resistance between:

(+) CMP Sensor Connector, Harness Side	(-) Vehicle Battery
CMP	Negative terminal
SIGRTN	Negative terminal

Are the resistances greater than 10K ohms?

Yes	No
GO to DR12 .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

DR12 CHECK THE CMP SENSOR OUTPUT

- Key in OFF position.
- Generator/regulator B+ connector connected.
- CMP Sensor connector disconnected.
- Key ON, engine running.
- Digital multimeter (DMM) on low voltage AC scale.
- Measure the voltage between:

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(+) CMP Sensor Connector, Component Side	(-) CMP Sensor Connector, Component Side
CMP	SIGRTN

- Run the engine at approximately 2,500 RPM.

Is the voltage greater than 0.25 V?

Yes	No
For F-150 5.4L, Mark LT, and Mustang 4.6L, GO to DR25 . For all others, GO to DR26 .	INSTALL a new CMP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

DR13 CONTINUOUS MEMORY DTCS P0345 AND P0349: CHECK THE CMP2 SENSOR RESISTANCE

- Key in OFF position.
- CMP2 Sensor connector disconnected.
- Measure the resistance between:

(+) CMP2 Sensor Connector, Component Side	(-) CMP2 Sensor Connector, Component Side
CMP2	SIGRTN

Vehicle	Low Limit	High Limit
F-150, Mark LT	300 ohms	425 ohms
All others	250 ohms	1,000 ohms

Is the resistance value(s) within specifications?

Yes	No
GO to DR14 .	INSTALL a new CMP2 sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls.

CLEAR the DTCs. REPEAT the self-test.

DR14 CHECK THE CMP2 CIRCUIT FOR A SHORT TO VOLTAGE IN THE HARNESS

- PCM connector disconnected.
- Key ON, engine OFF.
- Measure the voltage between:

(+) CMP2 Sensor Connector, Harness Side	(-) Vehicle Battery
CMP2	Negative terminal

Is the voltage less than 1 V?

Yes	No
GO to DR15 .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

DR15 CHECK THE CMP2 CIRCUIT FOR AN OPEN IN THE HARNESS

- Key in OFF position.
- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) CMP2 Sensor Connector, Harness Side
CMP2	CMP2
SIGRTN	SIGRTN

Are the resistances less than 5 ohms?

Yes	No
GO to DR16 .	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

DR16 CHECK FOR A SHORT IN THE HARNESS BETWEEN THE PCM AND THE

CMP2 SENSOR

- Measure the resistance between:

(+) CMP2 Sensor Connector, Harness Side	(-) CMP2 Sensor Connector, Harness Side
CMP2	SIGRTN

- Measure the resistance between:

(+) CMP2 Sensor Connector, Harness Side	(-) Vehicle Battery
CMP2	Negative terminal
SIGRTN	Negative terminal

Are the resistances greater than 10K ohms?

Yes	No
GO to DR17 .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

DR17 CHECK FOR A SHORT BETWEEN THE CMP AND THE CMP2 CIRCUITS

- CMP Sensor connector disconnected.
- CMP2 Sensor connector disconnected.
- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
CMP	CMP2

Is the resistance greater than 10K ohms?

Yes	No
GO to DR18 .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

DR18 CHECK THE CMP2 SENSOR OUTPUT

- Key in OFF position.
- Generator/regulator B+ connector connected.
- CMP2 Sensor connector disconnected.
- Key ON, engine running.
- DMM on low voltage AC scale.
- Measure the voltage between:

(+) CMP2 Sensor Connector, Component Side	(-) CMP2 Sensor Connector, Component Side
CMP2	SIGRTN

- Run the engine at approximately 2,500 RPM.

Is the voltage greater than 0.25 V?

Yes	No
For F-150 5.4L, Mark LT, and Mustang 4.6L, GO to DR25 . For all others, GO to DR26 .	INSTALL a new CMP2 sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

DR19 CONTINUOUS MEMORY DTCS P0340 AND P0344: CHECK THE VPWR VOLTAGE TO CMP SENSOR

- CMP Sensor connector disconnected.
- Key ON, engine OFF.
- Measure the voltage between:

(+) CMP Sensor Connector, Harness Side	(-) Vehicle Battery
VPWR	Negative terminal

Is the voltage greater than 10 V?

Yes	No
GO to DR20 .	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

DR20 CHECK THE PWRGND VOLTAGE TO CMP SENSOR

- Key in OFF position.
- Measure the voltage between:

(+) Vehicle Battery	(-) CMP Sensor Connector, Harness Side
Positive terminal	PWRGND

Is the voltage greater than 10 V?

Yes	No
GO to DR21 .	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

DR21 CHECK THE CMP CIRCUIT FOR A SHORT TO VOLTAGE IN THE HARNESS

- PCM connector disconnected.
- Key ON, engine OFF.
- Measure the voltage between:

(+) CMP Sensor Connector, Harness Side	(-) Vehicle Battery
CMP	Negative terminal

Is the voltage less than 1 V?

Yes	No
GO to DR22 .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

DR22 CHECK FOR AN OPEN CIRCUIT BETWEEN THE PCM AND CMP SENSOR

- Key in OFF position.
- CMP Sensor connector disconnected.
- Measure the resistance between:

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(+) CMP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
CMP	CMP

Is the resistance less than 5 ohms?

Yes	No
GO to DR23 .	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

DR23 CHECK THE CMP SENSOR CIRCUIT FOR A SHORT TO GND IN THE HARNESS

Note: The measurement may be taken at the PCM or CMP connector, whichever is easier to access.

- Measure the resistance between:

(+) CMP Sensor Connector, Harness Side	(-) CMP Sensor Connector, Harness Side
CMP	PWRGND

Is the resistance greater than 10K ohms?

Yes	No
GO to DR24 .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

DR24 CHECK THE CMP SENSOR FOR CORRECT OPERATION

- PCM connector connected.
- Connect a 5 amp fused jumper wire between the following:

Point A CMP Sensor Connector, Harness Side	Point B CMP Sensor Connector, Component Side
VPWR	VPWR
PWRGND	PWRGND

- Key ON, engine running.

- DMM on low voltage DC scale.
- Measure the voltage between:

(+) CMP Sensor Connector, Component Side	(-) Vehicle Battery
CMP	Negative terminal

Does the voltage switch between LOW (less than 2 volts DC) and HIGH (greater than 8 volts DC)?

Yes	No
GO to DR26 .	INSTALL a new CMP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

DR25 CHECK THE VARIABLE CAMSHAFT TIMING (VCT) SYSTEM

Note: Only diagnose the bank indicated by the DTC.

Note: Concerns with the engine oil level, oil contamination, or VCT system may cause camshaft positioning errors.

- Key in OFF position.
- Check that the engine oil is at the correct level.
- Check the engine oil for contaminants.
- Check the VCT system for correct operation.

Is a concern present?

Yes	No
REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.	GO to DR26 .

DR26 CHECK FOR CORRECT PCM OPERATION

- Disconnect all the PCM connectors.
- Visually inspect for:

- pushed out pins
 - corrosion
- Connect all the PCM connectors and make sure they seat correctly.
- Carry out the PCM self-test and verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) .	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
