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Model Year: 2007	Model: Camry	Doc ID: RM000000XH301BX
Title: 2GR-FE ENGINE CONTROL SYSTEM: SFI SYSTEM: P0300: Random / Multiple Cylinder Misfire Detected (2007 Camry)		

DTC	P0300	Random / Multiple Cylinder Misfire Detected
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DTC	P0301	Cylinder 1 Misfire Detected
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DTC	P0302	Cylinder 2 Misfire Detected
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DTC	P0303	Cylinder 3 Misfire Detected
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DTC	P0304	Cylinder 4 Misfire Detected
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DTC	P0305	Cylinder 5 Misfire Detected
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DTC	P0306	Cylinder 6 Misfire Detected
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DESCRIPTION

When the engine misfires, high concentrations of hydrocarbons (HC) enter the exhaust gas. Extremely high HC concentration levels can cause an increase in exhaust emission levels. High concentrations of HC can also cause increases in the Three-Way Catalytic Converter (TWC) temperature, which may cause damage to the TWC. To prevent this increase in emissions and to limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the TWC reaches the point of thermal degradation, the ECM blinks the MIL. To monitor misfires, the ECM uses both the Camshaft Position (CMP) sensor and the Crankshaft Position (CKP) sensor. The CMP sensor is used to identify any misfiring cylinders and the CKP sensor is used to measure variations in the crankshaft rotation speed. Misfires are counted

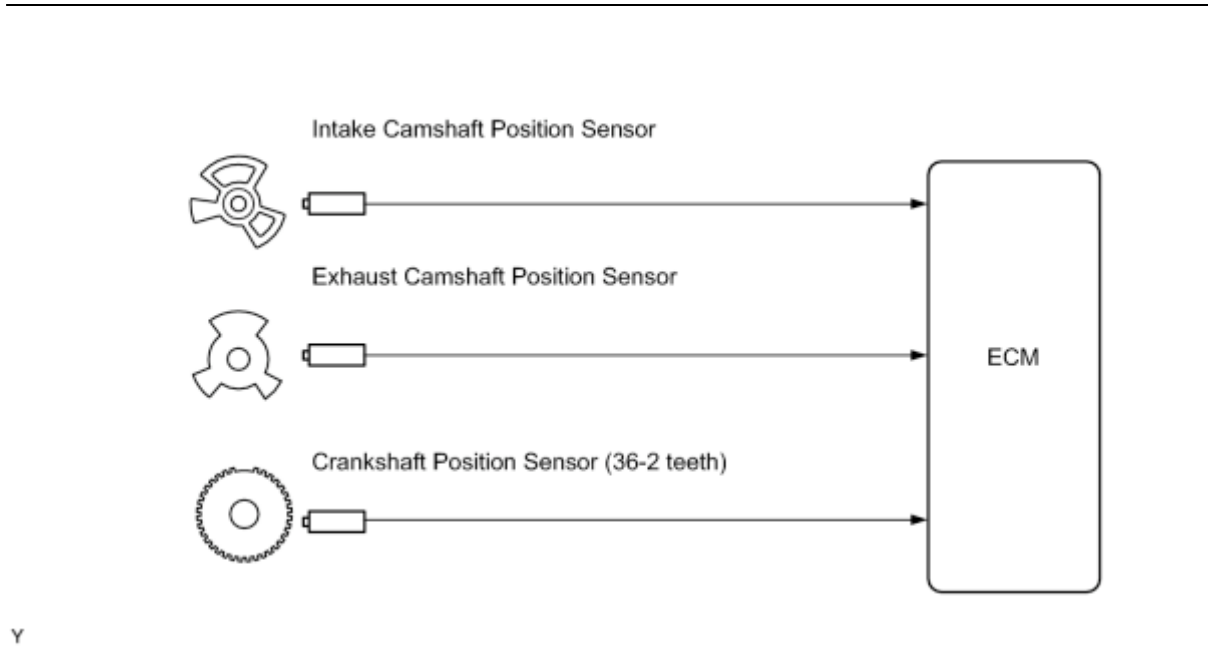
when the crankshaft rotation speed variations exceed predetermined thresholds.

If the misfire exceeds the threshold levels and may cause emission deterioration, the ECM illuminates the MIL and sets a DTC.

DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA
P0300	Simultaneous misfiring of several cylinder detected (2 trip detection logic)	<ul style="list-style-type: none"> • Open or short in engine wire harness • Connector connection • Vacuum hose connections • Ignition system • Injector • Fuel pressure • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor • Compression pressure • Valve clearance • Valve timing • PCV valve and hose • PCV hose connections • Air induction system • ECM
P0301 P0302 P0303 P0304 P0305 P0306	Misfiring of specific cylinder detected (2 trip detection logic)	<ul style="list-style-type: none"> • Open or short in engine wire harness • Connector connection • Vacuum hose connections • Ignition system • Injector for direct injector • Injector for port injector • Fuel pressure • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor • Compression pressure • Valve clearance • Valve timing • PCV valve and hose • PCV hose connections • Air induction system • ECM

If DTCs that indicate misfires are set for different cylinders, but DTC P0300 is not set, it indicates that misfires have been detected in different cylinders at different times. DTC P0300 is only set when several misfiring cylinders are detected at the same time.

MONITOR DESCRIPTION



The ECM illuminates the MIL and sets a DTC when either one of the following conditions, which could cause emission deterioration, is detected (2 trip detection logic):

- Within the first 1,000 crankshaft revolutions of the engine starting, an excessive misfiring rate (approximately 20 to 50 misfires per 1,000 crankshaft revolutions) occurs once.
- After the first 1,000 crankshaft revolutions, an excessive misfiring rate (approximately 20 to 60 misfires per 1,000 crankshaft revolutions) occurs 4 times in sequential crankshaft revolutions.

The ECM flashes the MIL and sets a DTC when either one of the following conditions, which could cause the Three-Way Catalytic Converter (TWC) damage, is detected (2 trip detection logic):

- In every 200 crankshaft revolutions at a high engine rpm, the threshold misfiring percentage is recorded once.
- In every 200 crankshaft revolutions at a normal engine rpm, the threshold misfiring percentage is recorded 3 times.

MONITOR STRATEGY

Related DTCs	P0300: Multiple cylinder misfire P0301: Cylinder 1 misfire P0302: Cylinder 2 misfire P0303: Cylinder 3 misfire P0304: Cylinder 4 misfire P0305: Cylinder 5 misfire
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	P0306: Cylinder 6 misfire
Required Sensors/Components (Main)	Injector, Ignition coil, Spark plug
Required Sensors/Components (Related)	Crankshaft, Camshaft, Engine coolant temperature and intake air temperature sensors and Mass air flow meter
Frequency of Operation	Continuous
Duration	1,000 to 4,000 crankshaft revolutions: Emission related misfire 200 to 600 crankshaft revolutions: Catalyst damaged misfire
MIL Operation	2 driving cycles: Emission related misfire MIL flashes immediately: Catalyst damaged misfire
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Misfire:

Monitor runs whenever following DTCs are not present	P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0327 - P0333 (Knock sensor) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0500 (VSS)
Battery voltage	8 V or more
VVT system	Not operated by scan tool
Engine RPM	450 to 6,500 rpm
Either of following conditions (a) or (b) is met:	-
(a) ECT at engine start	More than -7°C (19°F)
(b) ECT	More than 20°C (68°F)
Fuel cut	OFF

Monitor period of emission-related-misfire:

First 1,000 revolutions after engine start, or Check Mode	Crankshaft 1,000 revolutions
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Except above	Crankshaft 1,000 revolutions x 4
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Monitor period of catalyst-damaged-misfire (MIL blinks):

All of following conditions 1, 2 and 3 are met:	Crankshaft 200 revolutions
1. Driving cycles	1st
2. Check mode	OFF
3. Engine RPM	Less than 2,500 rpm
Except above	Crankshaft 200 revolutions x 3

TYPICAL MALFUNCTION THRESHOLDS

Monitor period of emission-related-misfire:

Misfire rate	1 % or more
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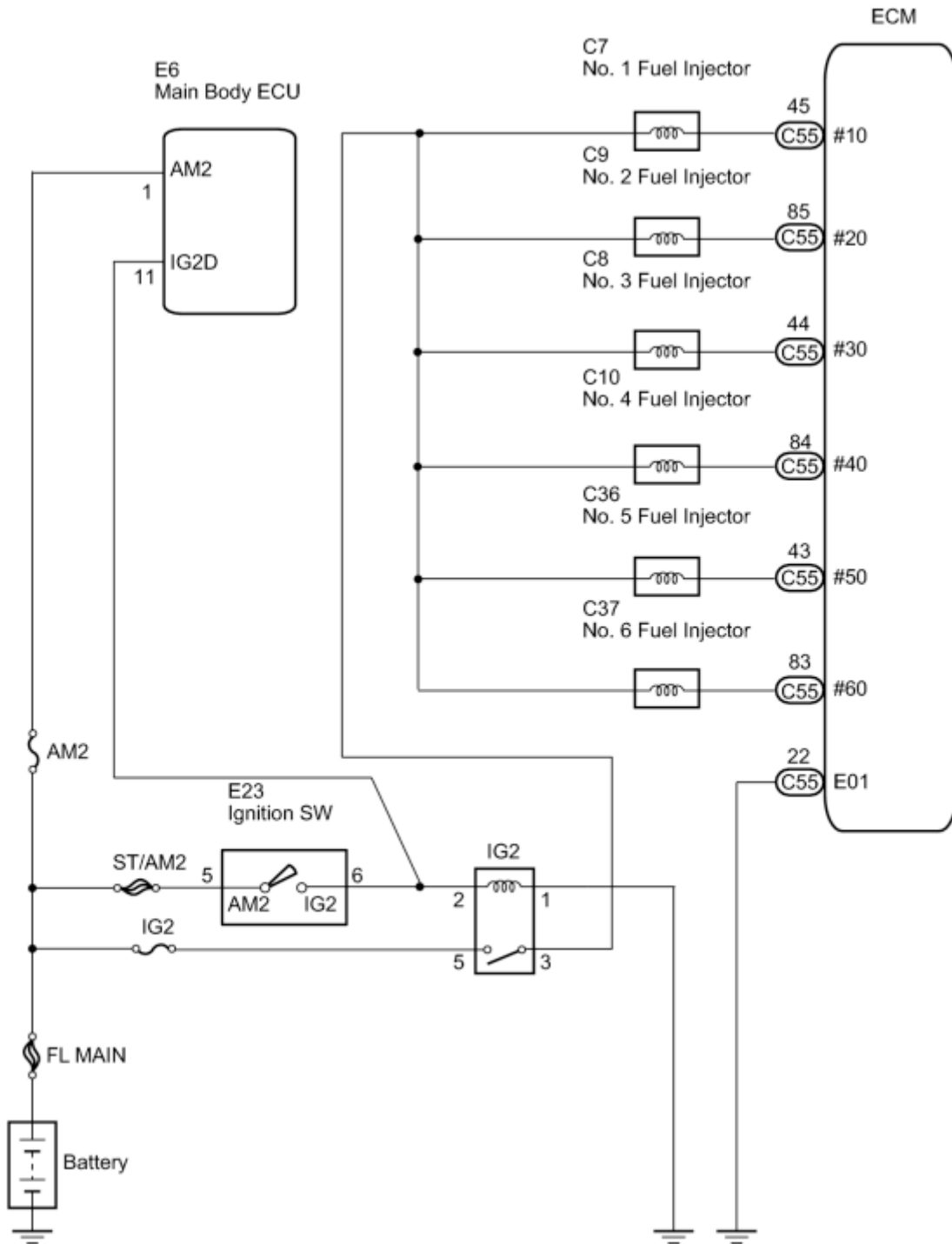
Monitor period of catalyst-damage-misfire (MIL blinks):

Number of misfire per 200 revolutions	94 or more (varies with intake air amount and RPM)
Paired cylinders misfire (MIL blinks immediately)	Detected

MONITOR RESULT


Refer to CHECKING MONITOR STATUS  .

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch on (IG).
3. Turn the tester on.

4. Record the DTC(s) and freeze frame data.
5. Using the tester, switch the ECM from normal mode to check mode  .
6. Read the misfire counts of each cylinder (CYL #10 to #60) with the engine in an idling condition. If any misfire count is displayed, skip the following confirmation driving pattern.
7. Drive the vehicle several times with the conditions, such as engine rpm and engine load, shown in MISFIRE RPM and MISFIRE LOAD in the DATA LIST.

In order to store misfire DTCs, it is necessary to operate the vehicle for the period of time shown in the table below, using the MISFIRE RPM and MISFIRE LOAD in the DATA LIST.

ENGINE RPM	DURATION
Idling	3.5 minutes or more
1,000	3 minutes or more
2,000	1.5 minutes or more
3,000	1 minute or more


8. Check whether misfires have occurred by checking DTCs and freeze frame data.

Do not turn the engine switch off until the stored DTC(s) and freeze frame data have been recorded. When the ECM returns to normal mode (default), the stored DTC(s), freeze frame data and other data will be erased.

9. Record the DTC(s), freeze frame data and misfire counts.
10. Turn the engine switch off and wait for at least 5 seconds.


INSPECTION PROCEDURE

HINT:

- If any DTCs other than misfire DTCs are output, troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction  .
- If the misfire does not recur when the vehicle is brought to the workshop, reproduce the conditions stored in the ECM as freeze frame data.
- If the misfire still cannot be reproduced even though the conditions stored in the ECM as freeze frame data have been reproduced, one of the following factors is considered to be a possible cause of the problem:
 - a. There was insufficient fuel in the tank.
 - b. Improper fuel is used.
 - c. The spark plugs have been contaminated.
 - d. The problem requires further diagnosis.
- After finishing repairs, check the misfire counts of the cylinders (CYL #1, #2, #3, #4, #5 and #6).

- Be sure to confirm that no misfiring cylinder DTCs are set again by conducting the confirmation driving pattern after finishing repairs.
- For 6 and 8 cylinder engines, the ECM intentionally does not set the specific misfiring cylinder DTCs at high engine RPM. If misfires occur only in high engine RPM areas, only DTC P0300 is set.

In the event of DTC P0300 being present, perform the following operations:

- Clear the DTC  .
 - Start the engine and conduct the confirmation driving pattern.
 - Read the misfiring rates of each cylinder or DTC(s) using the tester.
 - Repair the cylinder(s) that has a high misfiring rate or is indicated by the DTC.
 - After finishing repairs, conduct the confirmation driving pattern again, in order to verify that DTC P0300 is not set.
- When one of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is outside the range of +-20 %, the air-fuel ratio may be RICH (-20 % or less) or LEAN (+20 % or more).
 - When the COOLANT TEMP in the freeze frame data is less than 75°C (167°F), the misfire have occurred only while warming up the engine.

PROCEDURE

1.	CHECK ANY OTHER DTC OUTPUT (IN ADDITION TO MISFIRE DTCs)
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- Connect the intelligent tester to the DLC3.
- Turn the ignition switch on (IG).
- Turn the tester on.
- Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- Read the DTCs.

Result:

DISPLAY (DTC OUTPUT)	PROCEED TO
P0300, P0301, P0302, P0303, P0304, P0305 and/or P0306	A
P0300, P0301, P0302, P0303, P0304, P0305 and/or P0306 and other DTCs	B

If any DTCs other than P0300, P0301, P0302, P0303, P0304, P0305 and P0306 are output, troubleshoot those DTCs first.

B  **GO TO DTC CHART**

A
▼

2.	READ VALUE USING INTELLIGENT TESTER (MISFIRE RPM AND MISFIRE LOAD)
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- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch on (IG) and turn the tester on.
- (c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / MISFIRE RPM and MISFIRE LOAD.
- (d) Read and note the MISFIRE RPM and MISFIRE LOAD (engine load) values.

The MISFIRE RPM and MISFIRE LOAD values indicate the vehicle conditions under which the misfire occurred.

NEXT
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3.	CHECK PCV HOSE (HOSE CONNECTIONS)
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OK:
PCV hose is connected correctly and is not damaged.

NG ► **REPAIR OR REPLACE PCV HOSE**

OK
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4.	CHECK MISFIRE COUNT (CYL #1, #2, #3, #4, #5 AND #6)
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- (a) Connect the intelligent tester to the DLC3.

- (b) Turn the ignition switch on (IG).
- (c) Turn the tester on.
- (d) Clear DTCs.
- (e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / CYL #1, #2, #3, #4, #5 and #6 (Step "A").
- (f) Allow the engine to idle (Step "B").
- (g) Read the value of CYL #1 to #6 displayed on the tester. If no misfire counts occur in any cylinders, perform the following operations (Step "C"):
 - (1) Shift the gear selector lever to the D position.
 - (2) Repeat steps "A" to "C" above.
 - (3) Check the CYL #1 to #6.
 - (4) If misfire counts are still no displayed, perform steps "D" and "E" and then check the misfire counts again.
- (h) Drive the vehicle with the MISFIRE RPM and MISFIRE LOAD noted in step 2 (Step "D").
- (i) Read the CYL #1 to #6 or DTCs displayed on the tester (Step "E").

Result:

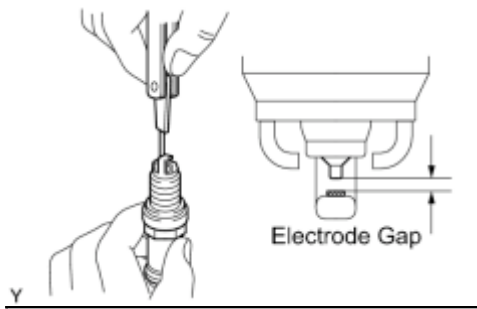
MISFIRE COUNT	PROCEED TO
1 or 2 cylinders have misfire counts	A
3 cylinders or more have misfire counts	B

B  **CHECK AIR INDUCTION SYSTEM**

A



5.	CHECK SPARK PLUG
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- (a) Remove the ignition coil and the spark plug of the misfiring cylinder.
- (b) Measure the spark plug electrode gap.

Standard:

Between 1.0 mm and 1.4 mm (0.039 in. and 0.055 in.)

- (c) Check the electrode for carbon deposits.

Recommended spark plug:

MANUFACTURE	PRODUCT
DENSO	FK20HBR11

If the electrode gap is larger than standard, replace the spark plug. Do not adjust the electrode gap.

NG **REPLACE SPARK PLUG**

OK



6.	CHECK FOR SPARKS AND IGNITION
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- (a) Disconnect the injector connectors, in order to prevent the engine from starting.
- (b) Install the spark plug to the ignition coil.
- (c) Attach the spark plug assembly to the cylinder head cover.
- (d) Crank the engine for less than 2 seconds and check the sparks.

OK:

Sparks jump across the electrode gap.

(e) Reconnect the injector connectors.

NG ▶ **CHANGE SPARK PLUG WITH NORMAL ONE AND CHECK FOR SPARKS OF MISFIRING CYLINDER**

OK
▼

7.	CHECK CYLINDER COMPRESSION PRESSURE (MALFUNCTION CYLINDER)
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(a) Measure the cylinder compression pressure of the misfiring cylinder.

OK ▶ **INSPECT ECM (#10, #20, #30, #40, #50 AND/OR #60 VOLTAGE)**

NG ▶ **REPAIR OR REPLACE ENGINE TO DETERMINE CAUSE OF LOW COMPRESSION**

8.	CHANGE SPARK PLUG WITH NORMAL ONE AND CHECK FOR SPARKS OF MISFIRING CYLINDER
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(a) Change the installed spark plug with a spark plug that functions normally.

(b) Perform a spark test.

Always disconnect each injector connector.

Do not crank the engine for more than 2 seconds.

- (1) Install the spark plug to the ignition coil and connect the ignition coil connector.
- (2) Disconnect the injector connector.
- (3) Ground the spark plug.
- (4) Check if sparks occur while the engine is being cranked.

OK:

Sparks jump across the electrode gap.

NG ▶ **REPLACE IGNITION COIL ASSEMBLY**

OK  **REPLACE SPARK PLUG**

