DTC	P0351/14	IGNITION COIL ”A” PRIMARY/SECONDARY CIRCUIT

DTC	P0352/15	IGNITION COIL ”B” PRIMARY/SECONDARY CIRCUIT

DTC	P0353/14	IGNITION COIL ”C” PRIMARY/SECONDARY CIRCUIT

DTC	P0354/15	IGNITION COIL ”D” PRIMARY/SECONDARY CIRCUIT

CIRCUIT DESCRIPTION

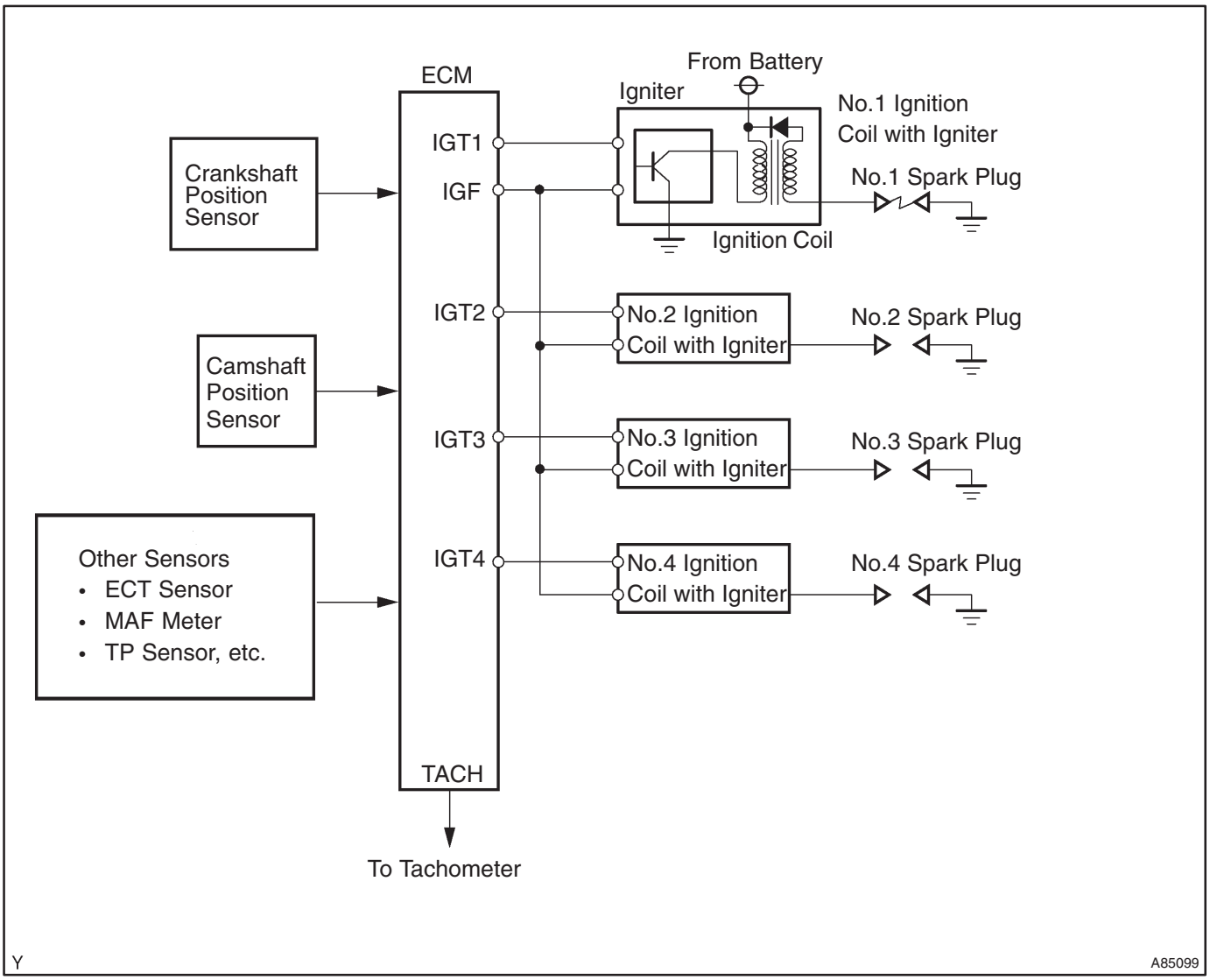
HINT:

- These DTCs indicate a malfunction related to the primary circuit.
- If DTC P0351 is displayed, check No.1 ignition coil with igniter circuit.
- If DTC P0352 is displayed, check No.2 ignition coil with igniter circuit.
- If DTC P0353 is displayed, check No.3 ignition coil with igniter circuit.
- If DTC P0354 is displayed, check No.4 ignition coil with igniter circuit.

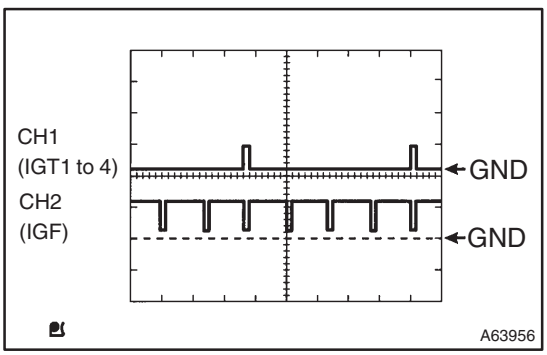
A Direct Ignition System (DIS) is used on this vehicle.

The DIS is a 1–cylinder ignition system which ignites one cylinder with one ignition coil. In the 1–cylinder ignition system, one spark plug is connected to the end of the secondary winding. High–voltage is generated in the secondary winding and is applied directly to the spark plug. The spark of the spark plug passes from the center electrode to the ground electrode.

The ECM determines the ignition timing and transmits the ignition (IGT) signals for each cylinder. Using the IGT signals, the ECM turns ON and OFF the power transistor inside the igniter, which switches ON and OFF a current to the primary coil. When the current to the primary coil is cut off, high–voltage is generated in the secondary coil and this voltage is applied to the spark plugs to create sparks inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back the ignition confirmation (IGF) signal to the ECM.



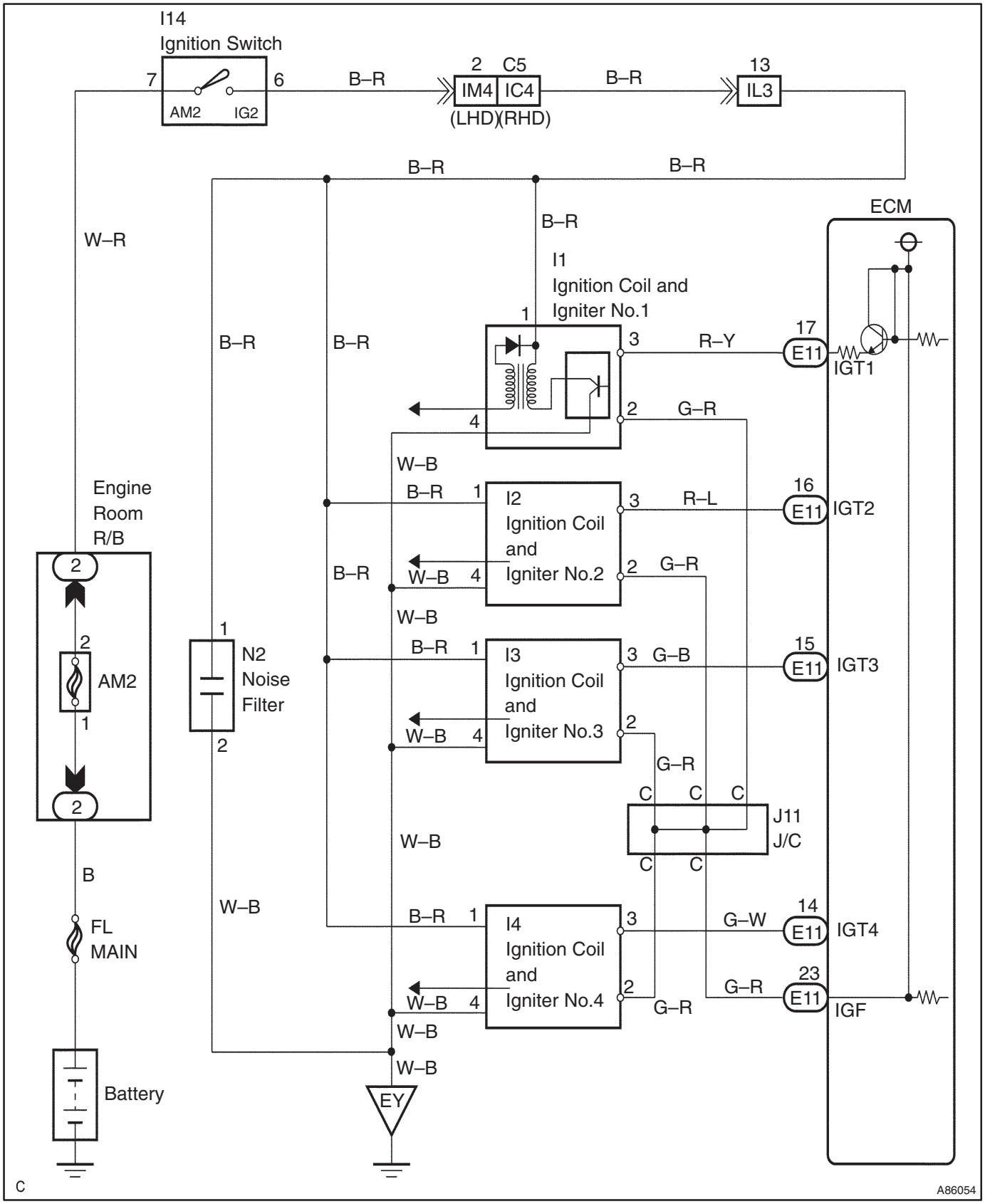
DTC No.	DTC Detection Condition	Trouble Area
P0351/14 P0352/15 P0353/14 P0354/15	No IGF signal to ECM while engine is running	• Ignition system • Open or short in IGF or IGT1 to 4 circuit from ignition coil with igniter to ECM • No.1 to No.4 ignition coil with igniter • ECM



Reference: Inspection using the oscilloscope.
While cranking or idling, check the waveform between terminals IGT1 to IGT4 and E1, and IGF and E1 of the E14 ECM connector.

Item	Contents
Terminal	CH1: IGT1, IGT2, IGT3, IGT4 – E1 CH2: IGF1 – E1
EquipmentSetting	2 V/Division, 20 ms/Division
Condition	While cranking or idling

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 PERFORM SIMULATION TEST

(a) Clear DTCs (see page 05–18).

(b) Shuffle arrangement of the ignition coils with igniters.

NOTICE:

Do not shuffle the connectors.

(c) Perform the simulation test.

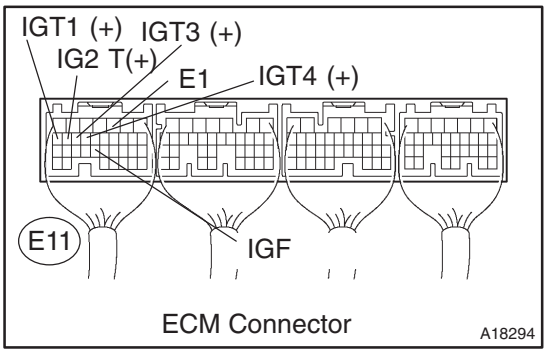
Result:

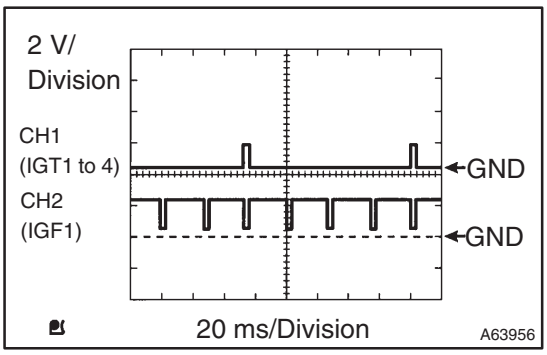
Display (DTC Output)	Proceed To
Same DTCs (that have been erased)	A
Other DTCs	B

B → **REPLACE IGNITION COIL ASSY**

A

2 INSPECT ECM(IGT1, IGT2, IGT3, IGT4 AND IGF1 SIGNAL)





(a) Inspect the ECM waveform using the oscilloscope.

(1) While cranking or idling, check the waveform between the terminals of the E11 ECM connector.

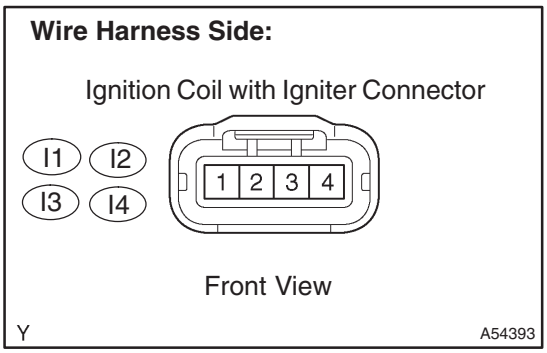
OK:

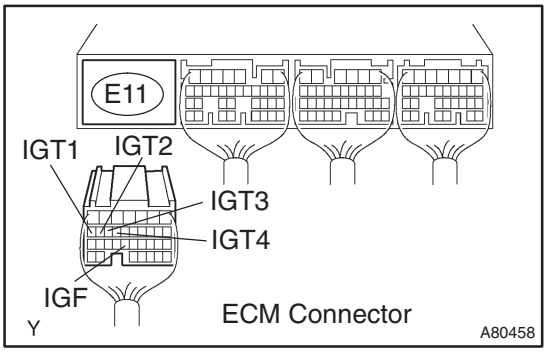
Tester Connection	Specified Condition
IGT1 (E11–17) – E1 (E11–3)	Correct waveform is as shown on the left
IGT2 (E11–16) – E1 (E11–3)	Correct waveform is as shown on the left
IGT3 (E11–15) – E1 (E11–3)	Correct waveform is as shown on the left
IGT4 (E11–14) – E1 (E11–3)	Correct waveform is as shown on the left
IGF (E11–23) – E1 (E11–3)	Correct waveform is as shown on the left

NG → **REPLACE ECM (See page 10–12)**

OK

3 CHECK HARNESS AND CONNECTOR(IGNITION COIL ASSY – ECM)





(a) Disconnect the I1, I2, I3 and/or I4 ignition coil with igniter connector(s).
(b) Disconnect the E11 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard (Check for open):

Tester Connection	Specified Condition
Ignition coil (I1–2) – IGF (E11–23)	Below 1 Ω
Ignition coil (I2–2) – IGF (E11–23)	Below 1 Ω
Ignition coil (I3–2) – IGF (E11–23)	Below 1 Ω
Ignition coil (I4–2) – IGF (E11–23)	Below 1 Ω

Standard (Check for open):

Tester Connection	Specified Condition
Ignition coil (I1–3) – IGT1 (E11–17)	Below 1 Ω
Ignition coil (I2–3) – IGT2 (E11–16)	Below 1 Ω
Ignition coil (I3–3) – IGT3 (E11–15)	Below 1 Ω
Ignition coil (I4–3) – IGT4 (E11–14)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
Ignition coil (I1–2) or IGF (E11–23) – Body ground	10 kΩ or higher
Ignition coil (I2–2) or IGF (E11–23) – Body ground	10 kΩ or higher
Ignition coil (I3–2) or IGF (E11–23) – Body ground	10 kΩ or higher
Ignition coil (I4–2) or IGF (E11–23) – Body ground	10 kΩ or higher

Standard (Check for short):

Tester Connection	Specified Condition
Ignition coil (I1–3) or IGT1 (E11–17) – Body ground	10 kΩ or higher
Ignition coil (I2–3) or IGT2 (E11–16) – Body ground	10 kΩ or higher
Ignition coil (I3–3) or IGT3 (E11–15) – Body ground	10 kΩ or higher
Ignition coil (I4–3) or IGT4 (E11–14) – Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the ignition coil with igniter connector(s).

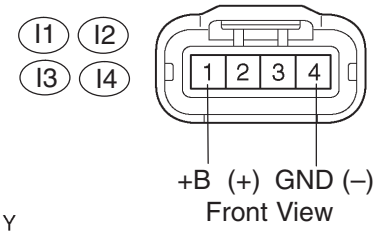
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT IGNITION COIL ASSY(POWER SOURCE)

Wire Harness Side:

Ignition Coil with Igniter Connector



(a) Disconnect the I1, I2, I3 and/or I4 ignition coil with igniter connector(s).

(b) Measure the resistance according to the value(s) in the table below.

Standard (Check for open):

Tester Connection	Specified Condition
GND (I1–4) – Body ground	Below 1 Ω
GND (I2–4) – Body ground	Below 1 Ω
GND (I3–4) – Body ground	Below 1 Ω
GND (I4–4) – Body ground	Below 1 Ω

(c) Turn the ignition switch to ON.

(d) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
+B (I1–1) – GND (I1–4)	9 to 14 V
+B (I2–1) – GND (I2–4)	9 to 14 V
+B (I3–1) – GND (I3–4)	9 to 14 V
+B (I4–1) – GND (I4–4)	9 to 14 V

(e) Reconnect the ignition coil with igniter connector(s).

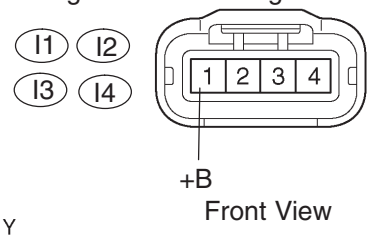
OK → **REPLACE IGNITION COIL ASSY**

NG

5 CHECK HARNESS AND CONNECTOR(IGNITION COIL ASSY – IGNITION SWITCH)

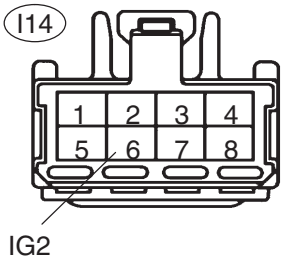
Wire Harness Side:

Ignition Coil with Igniter Connector



Y A54393

Wire Harness Side: Ignition Switch



A61075

(a) Disconnect the I1, I2, I3 and/or I4 ignition coil with igniter connector(s).
(b) Disconnect the I14 ignition switch connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard (Check for open):

Tester Connection	Specified Condition
Ignition coil (I1–1) – IG2 (I14–6)	Below 1 Ω
Ignition coil (I2–1) – IG2 (I14–6)	Below 1 Ω
Ignition coil (I3–1) – IG2 (I14–6)	Below 1 Ω
Ignition coil (I4–1) – IG2 (I14–6)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
Ignition coil (I1–1) or IG2 (I14–6) – Body ground	10 kΩ or higher
Ignition coil (I2–1) or IG2 (I14–6) – Body ground	10 kΩ or higher
Ignition coil (I3–1) or IG2 (I14–6) – Body ground	10 kΩ or higher
Ignition coil (I4–1) or IG2 (I14–6) – Body ground	10 kΩ or higher

(d) Reconnect the ignition coil with igniter connector(s).
(e) Reconnect the ignition switch connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE IGNITION COIL ASSY