

DTC	P0351	Ignition Coil "A" Primary / Secondary Circuit
DTC	P0352	Ignition Coil "B" Primary / Secondary Circuit
DTC	P0353	Ignition Coil "C" Primary / Secondary Circuit
DTC	P0354	Ignition Coil "D" Primary / Secondary Circuit

DESCRIPTION

HINT:

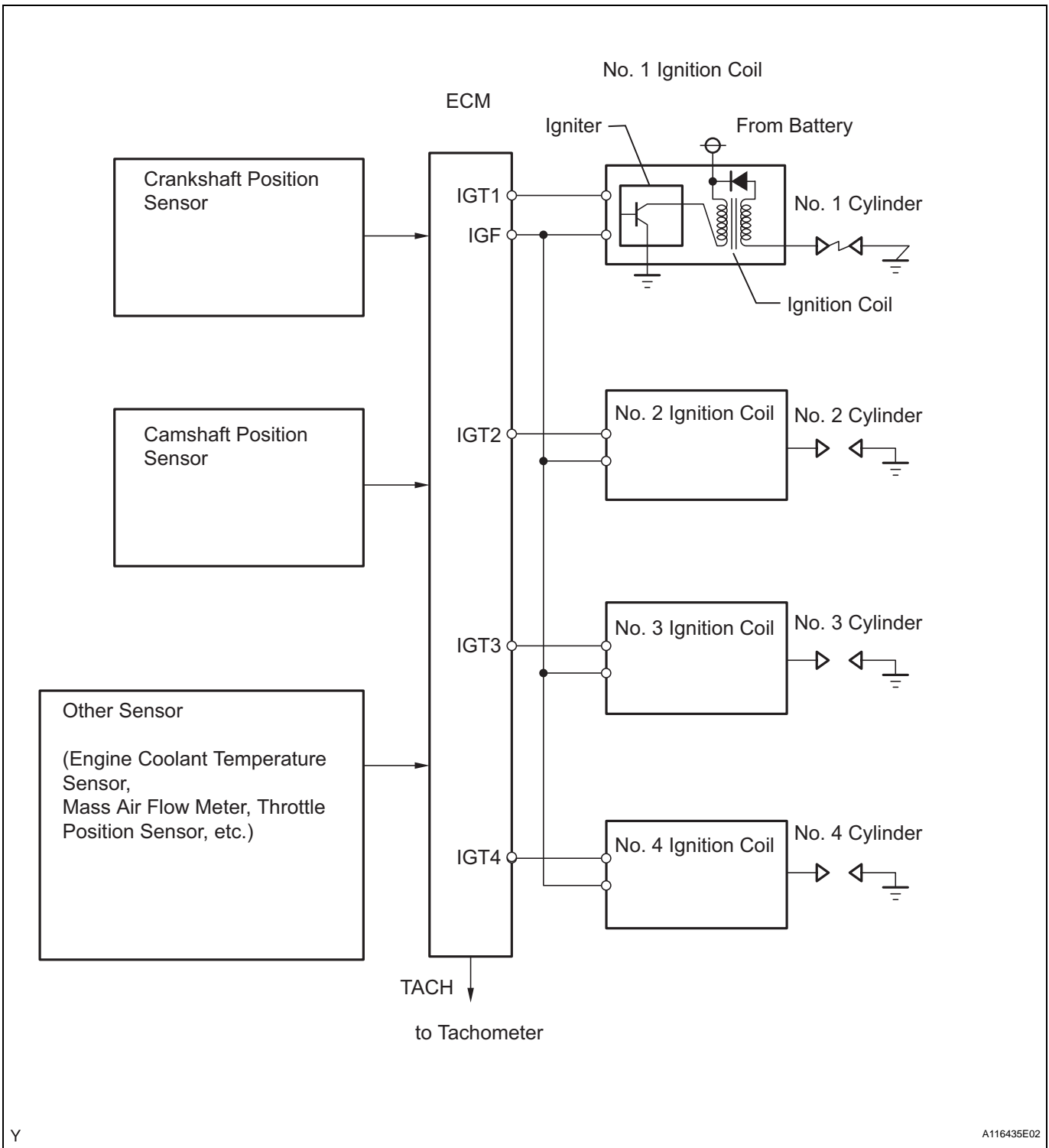
- These DTCs indicate malfunctions relating to the primary circuit.
- If DTC P0351 is set, check No. 1 ignition coil circuit.
- If DTC P0352 is set, check No. 2 ignition coil circuit.
- If DTC P0353 is set, check No. 3 ignition coil circuit.
- If DTC P0354 is set, check No. 4 ignition coil circuit.

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

The DIS is a 1-cylinder ignition system in which each cylinder is ignited by 1 ignition coil, and 1 spark plug is connected to the end of each secondary wiring. A powerful voltage, generated in the secondary wiring, is applied directly to each spark plug. The sparks of the spark plugs pass from the center electrodes to the ground electrodes.

The ECM determines the ignition timing and transmits the ignition (IGT) signals to each cylinder. Using the IGT signal, the ECM turns the power transistor inside the igniter on and off. The power transistor, in turn, switches on and off the current to the primary coil. When the current to the primary coil is cut off, a powerful voltage is generated in the secondary coil. This voltage is applied to the spark plugs, causing them to spark inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back an ignition confirmation (IGF) signal to the ECM, for each cylinder ignition.

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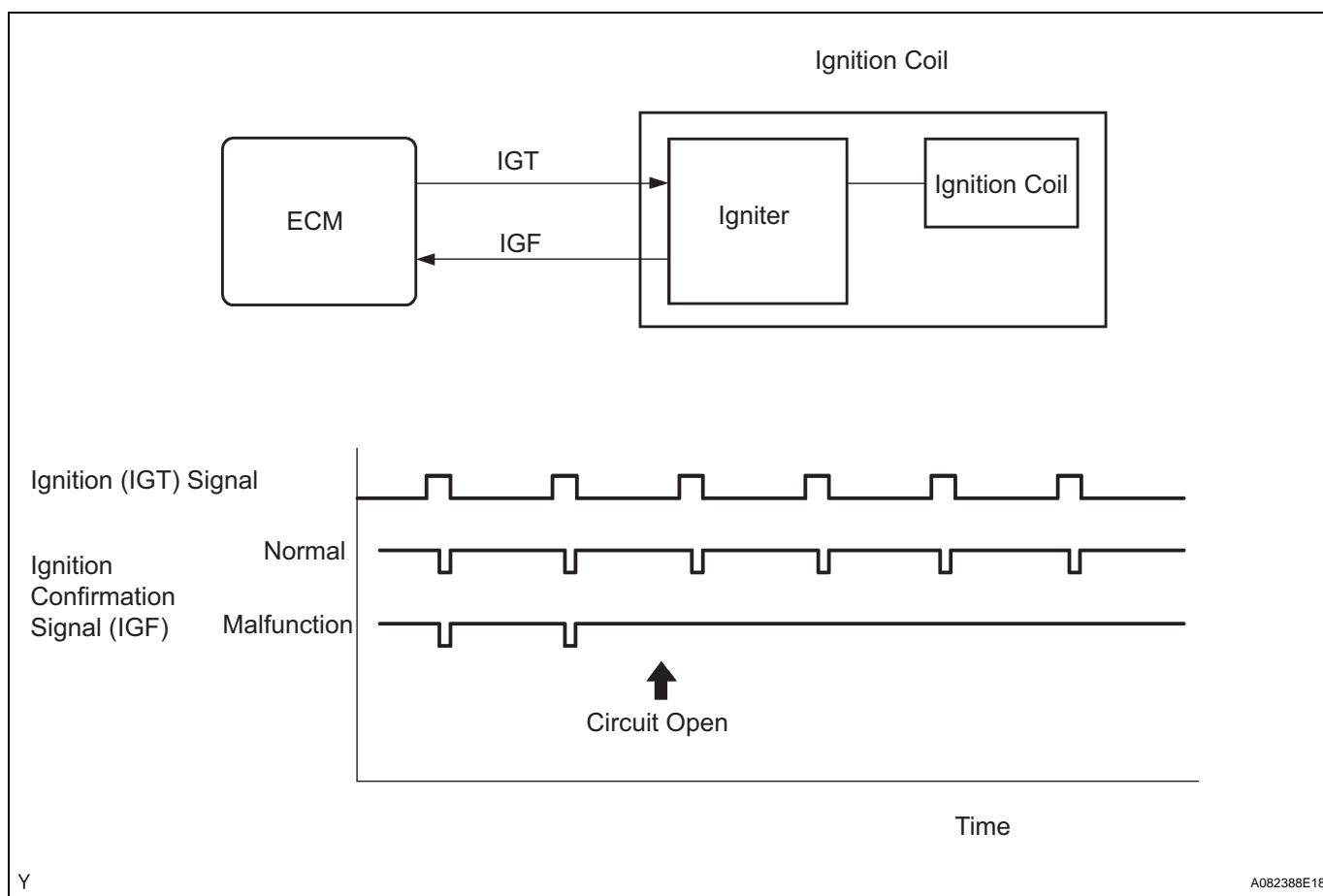
DTC No.	DTC Detection Condition	Trouble Area
P0351 P0352 P0353 P0354	No IGF signal to ECM while engine is running (1 trip detection logic)	<ul style="list-style-type: none"> Ignition system Open or short in IGF or IGT circuit (1 to 4) between ignition coil and ECM No. 1 to No. 4 ignition coil ECM

Reference: Inspection using an oscilloscope.

While cranking or idling, check the waveform between terminals IGT (1 to 4) and E1, and IGF and E1 of the E5 ECM connectors.

Item	Content
Terminals	CH1: IGT1, IGT2, IGT3, IGT4 - E1 CH2: IGF - E1
Equipment Settings	2 V/DIV., 20 ms/DIV.
Conditions	Cranking or idling

MONITOR DESCRIPTION



If the ECM does not receive any IGF1 signals despite transmitting the IGT signal, it interprets this as a fault in the igniter and sets a DTC.

If the malfunction is not repaired successfully, a DTC is set 1 second after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0351: Igniter (Cylinder 1) malfunction P0352: Igniter (Cylinder 2) malfunction P0353: Igniter (Cylinder 3) malfunction P0354: Igniter (Cylinder 4) malfunction
Required sensors / components (Main)	Igniter
Required sensors / components (Related)	Crankshaft position sensor
Frequency of operation	Continuous
Duration	0.256 seconds
MIL operation	Immediate
Sequence of operation	None

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TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Either of following conditions met	-
Engine RPM	1,500 rpm or less
Starter	OFF

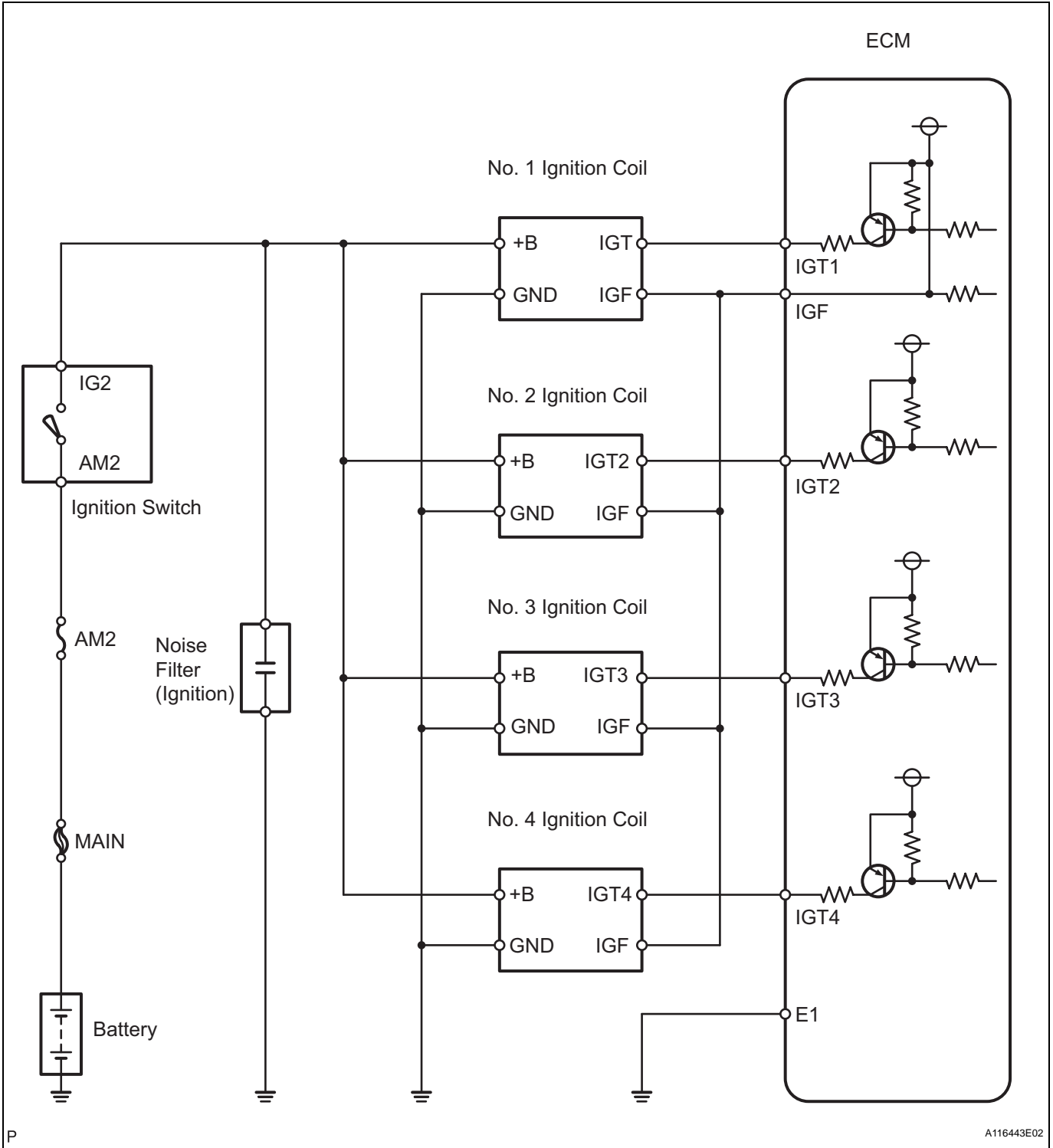
TYPICAL MALFUNCTION THRESHOLDS

IGF signal	ECM does not receive any IGF signal despite ECM sending IGT signal to igniter
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COMPONENT OPERATING RANGE**ES**

IGF signal	Igniter transmits IGF signal when it receives IGT signal from ECM
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WIRING DIAGRAM



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HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records 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 CHECK WHETHER DTC OUTPUT RECURS (DTC P0351, P0352, P0353 OR P0354)

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON and turn the tester ON.
- (c) Clear DTCs (see page ES-37).
- (d) Shuffle arrangement of the ignition coils (among No. 1 to No. 4 cylinders).

NOTICE:

Do not shuffle the connectors.

- (e) Perform a simulation test.
- (f) Check DTCs displayed on the tester.

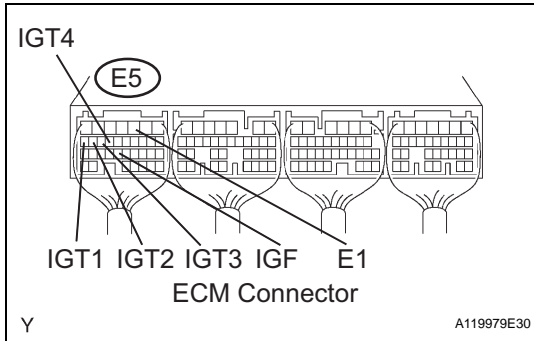
Result

Display (DTC Output)	Proceed to
P0351, P0352, P0353 or P0354	A
Other ignition coil DTC output	B

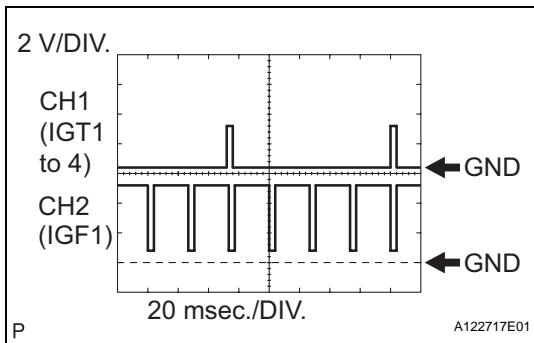
B → **REPLACE IGNITION COIL**

A

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



- (a) Inspect the ECM using an oscilloscope.



- (b) While cranking or idling, check the waveform between the terminals of the E5 ECM connectors.

Standard voltage

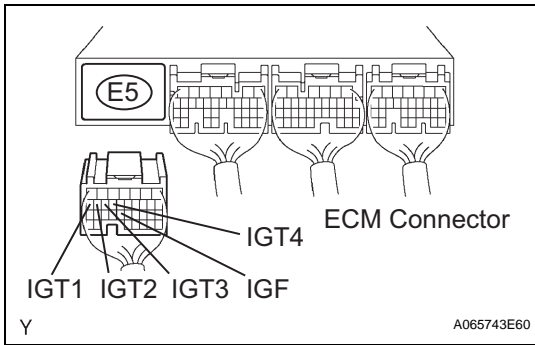
Tester Connection	Specified Condition
IGT1 (E5-17) - E1 (E5-3)	Correct waveform is as shown
IGT2 (E5-16) - E1 (E5-3)	Correct waveform is as shown
IGT3 (E5-15) - E1 (E5-3)	Correct waveform is as shown
IGT4 (E5-14) - E1 (E5-3)	Correct waveform is as shown
IGF (E5-23) - E1 (E5-3)	Correct waveform is as shown

OK → **REPLACE ECM**

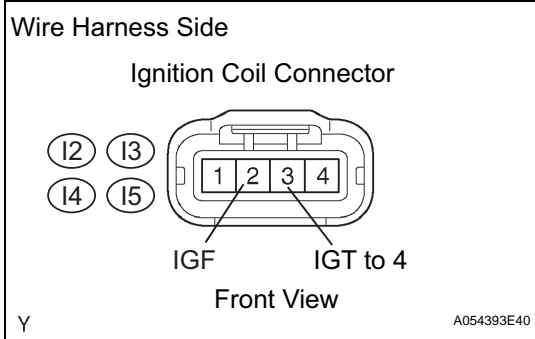
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3 CHECK HARNESS AND CONNECTOR (IGNITION COIL - ECM)

- (a) Disconnect the I2, I3, I4 or I5 ignition coil connector.



(b) Disconnect the E5 ECM connector.



(c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
IGF (I2-2) - IGF (E5-23)	Below 1 Ω
IGF (I3-2) - IGF (E5-23)	Below 1 Ω
IGF (I4-2) - IGF (E5-23)	Below 1 Ω
IGF (I5-2) - IGF (E5-23)	Below 1 Ω

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Standard resistance (Check for open)

Tester Connection	Specified Condition
IGT (I2-3) - IGT1 (E5-17)	Below 1 Ω
IGT2 (I3-3) - IGT2 (E5-16)	Below 1 Ω
IGT3 (I4-3) - IGT3 (E5-15)	Below 1 Ω
IGT4 (I5-3) - IGT4 (E5-14)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
IGF (I2-2) or IGF (E5-23) - Body ground	10 kΩ or higher
IGF (I3-2) or IGF (E5-23) - Body ground	10 kΩ or higher
IGF (I4-2) or IGF (E5-23) - Body ground	10 kΩ or higher
IGF (I5-2) or IGF (E5-23) - Body ground	10 kΩ or higher

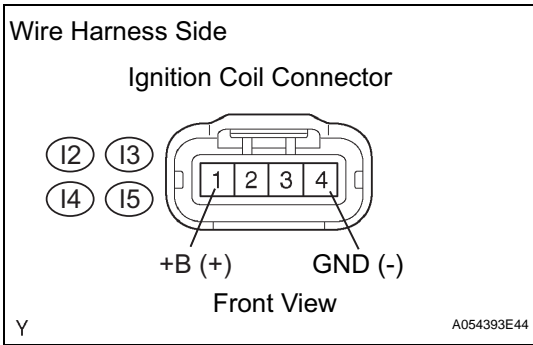
Standard resistance (Check for short)

Tester Connection	Specified Condition
IGT (I2-3) or IGT1 (E5-17) - Body ground	10 kΩ or higher
IGT2 (I3-3) or IGT2 (E5-16) - Body ground	10 kΩ or higher
IGT3 (I4-3) or IGT3 (E5-15) - Body ground	10 kΩ or higher
IGT4 (I5-3) or IGT4 (E5-14) - Body ground	10 kΩ or higher

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4 INSPECT IGNITION COIL (POWER SOURCE)



- (a) Disconnect the I2, I3, I4 or I5 ignition coil connector.
- (b) Measure the resistance of the ignition coil connectors.
Standard resistance (Check for open)

Tester Connection	Specified Condition
GND (I2-4) - Body ground	Below 1 Ω
GND (I3-4) - Body ground	
GND (I4-4) - Body ground	
GND (I5-4) - Body ground	

- (c) Turn the ignition switch ON.
- (d) Measure the voltage between the terminals of the wire harness side connectors.
Standard voltage

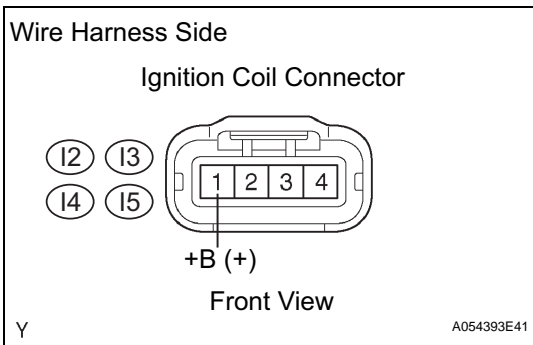
Tester Connection	Specified Condition
+B (I2-1) - GND (I2-4)	9 to 14 V
+B (I3-1) - GND (I3-4)	9 to 14 V
+B (I4-1) - GND (I4-4)	9 to 14 V
+B (I5-1) - GND (I5-4)	9 to 14 V

NG → **Go to step 5**

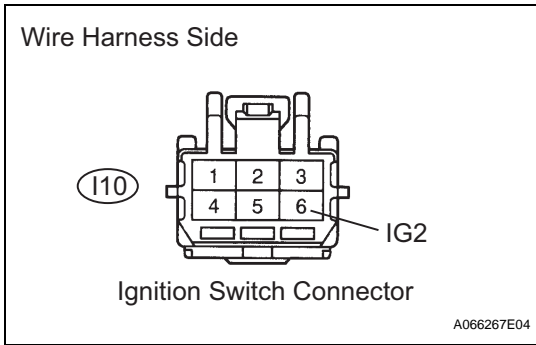
OK

REPLACE IGNITION COIL

5 CHECK HARNESS AND CONNECTOR (IGNITION COIL ASSEMBLY - IGNITION SWITCH)



- (a) Disconnect the I2, I3, I4 or I5 ignition coil connector.



- (b) Disconnect the I10 ignition switch connector.
- (c) Measure the resistance of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
+B (I2-1) - IG2 (I10-6)	Below 1 Ω
+B (I3-1) - IG2 (I10-6)	Below 1 Ω
+B (I4-1) - IG2 (I10-6)	Below 1 Ω
+B (I5-1) - IG2 (I10-6)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
+B (I2-1) or IG2 (I10-6) - Body ground	10 kΩ or higher
+B (I3-1) or IG2 (I10-6) - Body ground	10 kΩ or higher
+B (I4-1) or IG2 (I10-6) - Body ground	10 kΩ or higher
+B (I5-1) or IG2 (I10-6) - Body ground	10 kΩ or higher

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NG **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE IGNITION COIL