

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

HINT:

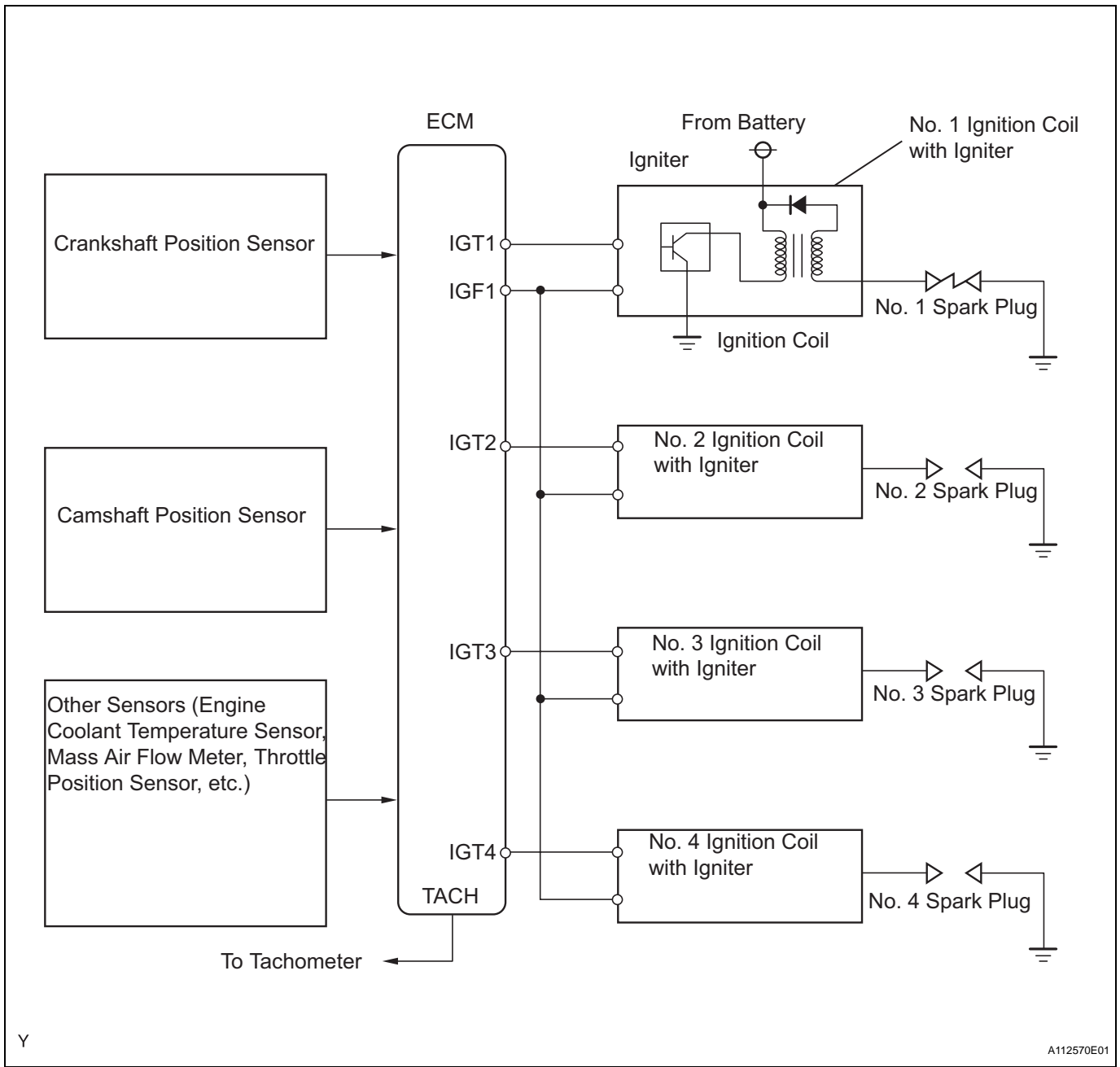
- These DTCs indicate malfunctions relating to the primary circuit.
- If DTC P0351 is set, check No.1 ignition coil with igniter circuit.
- If DTC P0352 is set, check No.2 ignition coil with igniter circuit.
- If DTC P0353 is set, check No.3 ignition coil with igniter circuit.
- If DTC P0354 is set,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

ES**DESCRIPTION**

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 one ignition coil and one 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.

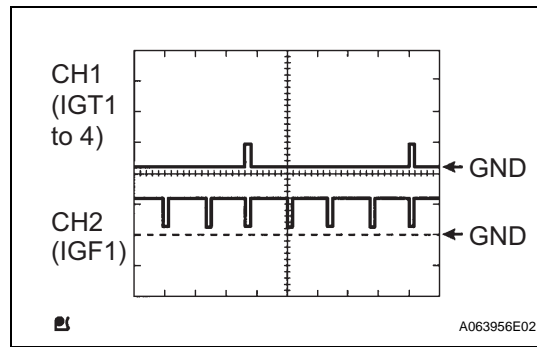
The ECM determines the ignition timing and transmits the ignition (IGT) signals to each cylinder. Using the IGT signal, the ECM turns the power transistor inside the igniter on and off. The power transistor, in turn, switches on and off the current to the primary coil. When the current to the primary 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 Conditions	Trouble Areas
P0351 P0352 P0353 P0354	No IGF signal to ECM while engine running (1 trip detection logic)	<ul style="list-style-type: none"> Ignition system Open or short in IGF1 or IGT circuit (1 to 4) between ignition coil with igniter and ECM No. 1 to No. 4 ignition coils with igniters ECM



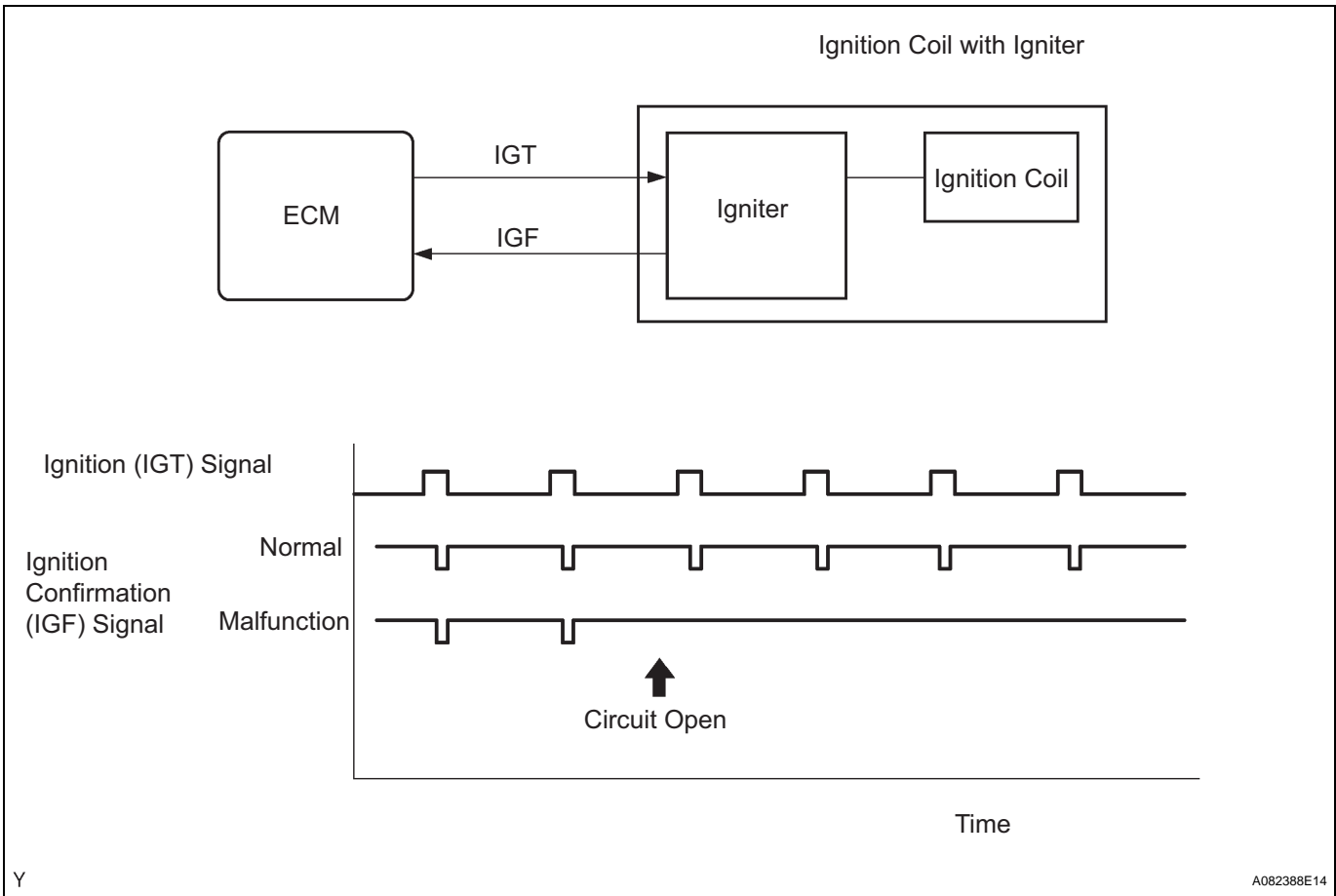
Reference: Inspection using an oscilloscope.

While cranking or idling, check the waveform between terminals IGT(1 to 4) and E1, and IGF1 and E1 of the ECM connector.

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Items	Contents
Terminals	CH1: IGT1, IGT2, IGT3, IGT4 - E1 CH2: IGF1 - E1
Equipment Settings	2 V/Division, 20 ms/Division
Conditions	Cranking or idling

MONITOR DESCRIPTION



If the ECM does not receive any IGF 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 and 4 sparks
MIL Operation	Immediate
Sequence of Operation	None

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

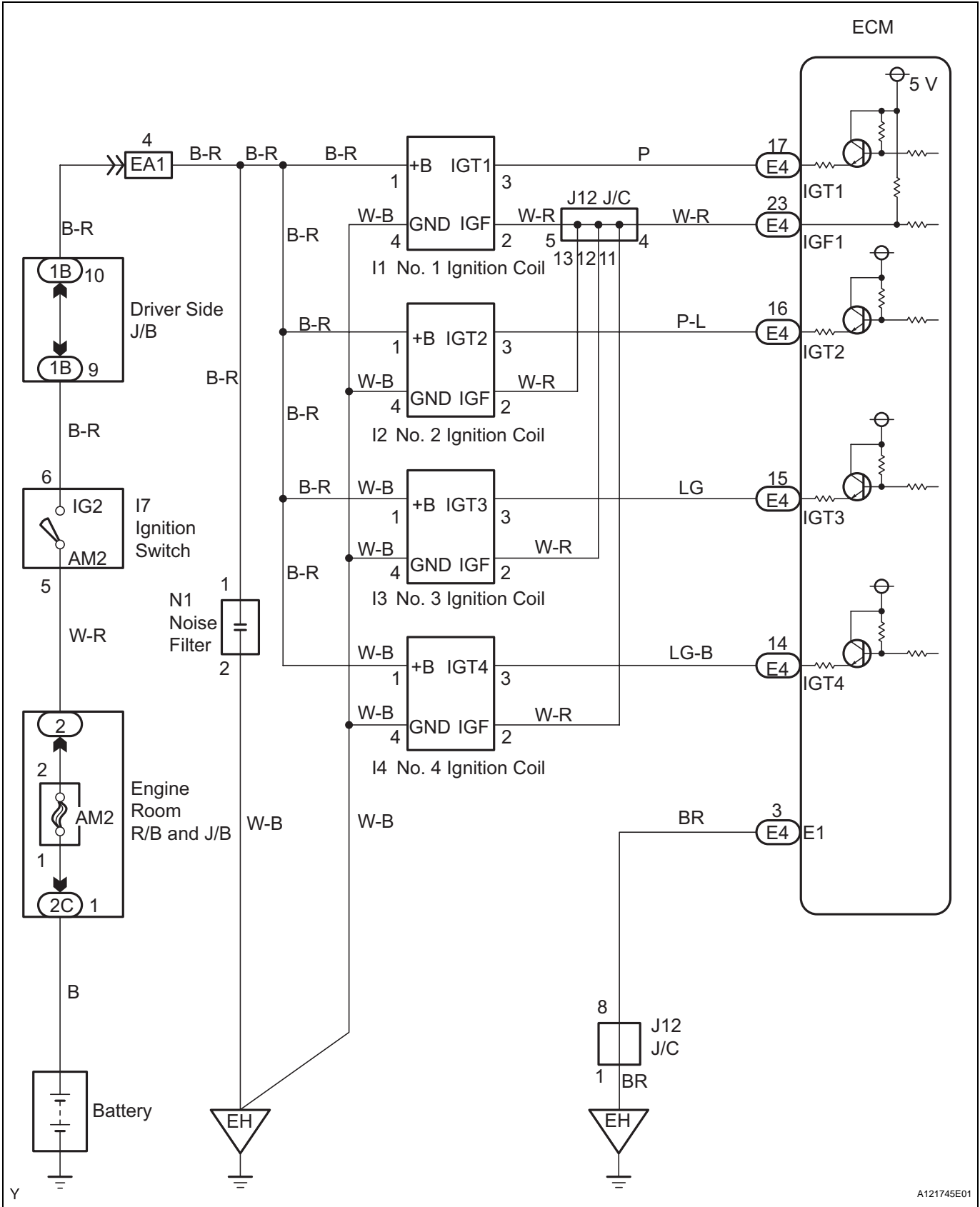
ES**TYPICAL MALFUNCTION THRESHOLDS**

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

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 an intelligent tester. 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 CHECK WHETHER DTC OUTPUT RECURS (DTC P0351, P0352, P0353 OR P0354)

- (a) Connect an intelligent tester to the DLC3.
- (b) Turn the ignition switch to ON.
- (c) Turn the tester ON.
- (d) Clear DTCs (see page ES-40).
- (e) Shuffle arrangement of the ignition coils with igniters (among No. 1 to No. 4 cylinders).

NOTICE:

Do not shuffle the connectors.

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

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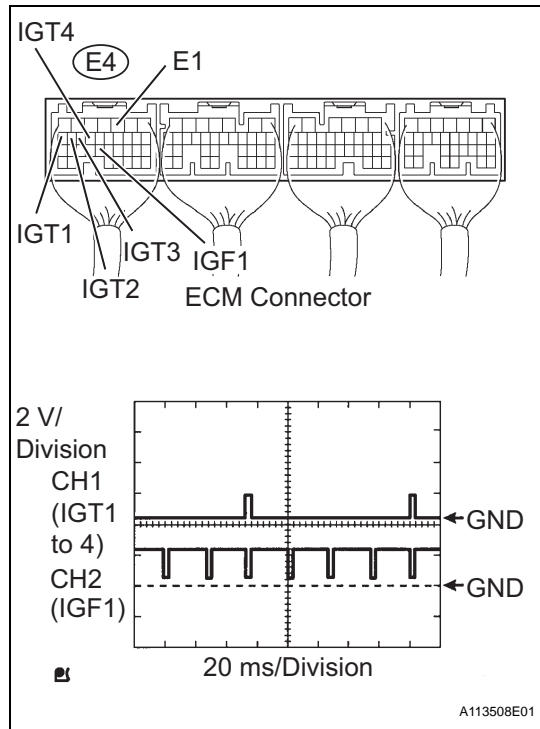
Result

Display (DTC Output)	Proceed To
Same DTC output	A
Other ignition coil DTC output	B

B → **REPLACE IGNITION COIL ASSEMBLY**

A

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



- (a) Inspect the ECM using an oscilloscope.
- (b) While cranking or idling, check the waveform between the terminals of the E4 ECM connector.

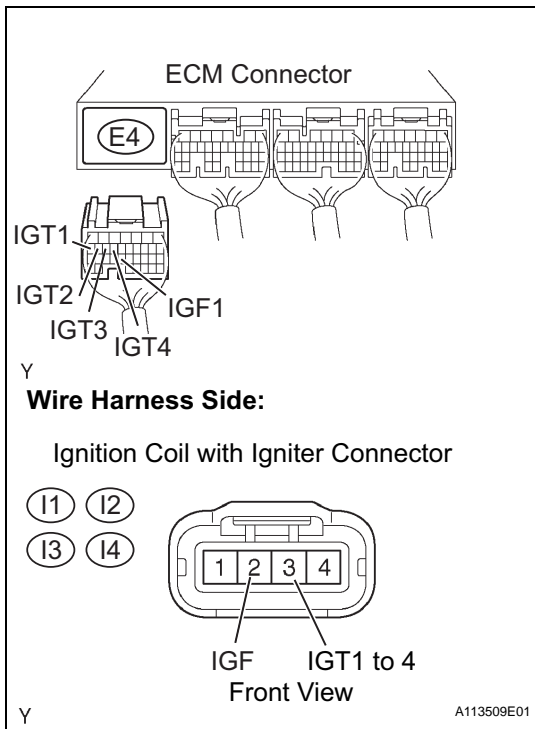
Standard

Tester Connections	Specified Conditions
IGT1 (E4-17) - E1 (E4-3)	Correct waveform shown
IGT2 (E4-16) - E1 (E4-3)	Correct waveform shown
IGT3 (E4-15) - E1 (E4-3)	Correct waveform shown
IGT4 (E4-14) - E1 (E4-3)	Correct waveform shown
IGF1 (E4-23) - E1 (E4-3)	Correct waveform shown

NG → **REPLACE ECM**

OK

3 CHECK HARNESS AND CONNECTOR (IGNITION COIL ASSEMBLY - ECM)



- (a) Disconnect the ignition coil with igniter connector.
- (b) Disconnect the E4 ECM connector.
- (c) Check the resistance.

Standard Resistance (Check for open)

Tester Connections	Specified Conditions
IGF (I1-2) - IGF1 (E4-23)	Below 1 Ω
IGF (I2-2) - IGF1 (E4-23)	Below 1 Ω
IGF (I3-2) - IGF1 (E4-23)	Below 1 Ω
IGF (I4-2) - IGF1 (E4-23)	Below 1 Ω

Standard Resistance (Check for open)

Tester Connections	Specified Conditions
IGT1 (I1-3) - IGT1 (E4-17)	Below 1 Ω
IGT2 (I2-3) - IGT2 (E4-16)	Below 1 Ω
IGT3 (I3-3) - IGT3 (E4-15)	Below 1 Ω
IGT4 (I4-3) - IGT4 (E4-14)	Below 1 Ω

Standard Resistance (Check for short)

Tester Connections	Specified Conditions
IGF (I1-2) or IGF1 (E4-23) - Body ground	10 kΩ or higher
IGF (I2-2) or IGF1 (E4-23) - Body ground	10 kΩ or higher
IGF (I3-2) or IGF1 (E4-23) - Body ground	10 kΩ or higher
IGF (I4-2) or IGF1 (E4-23) - Body ground	10 kΩ or higher

Standard Resistance (Check for short)

Tester Connections	Specified Conditions
IGT1 (I1-3) or IGT1 (E4-17) - Body ground	10 kΩ or higher
IGT2 (I2-3) or IGT2 (E4-16) - Body ground	10 kΩ or higher
IGT3 (I3-3) or IGT3 (E4-15) - Body ground	10 kΩ or higher
IGT4 (I4-3) or IGT4 (E4-14) - Body ground	10 kΩ or higher

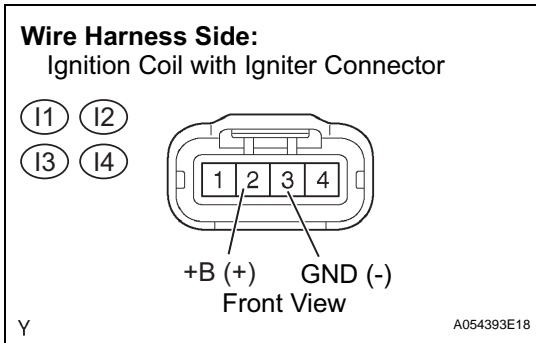
- (d) Reconnect the ECM connector.
- (e) Reconnect the ignition coil with igniter connector.

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ES

4 INSPECT IGNITION COIL ASSEMBLY (POWER SOURCE)



- (a) Disconnect the ignition coil with igniter connector.
- (b) Check the resistance.

Standard Resistance (Check for open)

Tester Connections	Specified Conditions
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 between the terminals of the wire harness side connector.

Standard Voltage

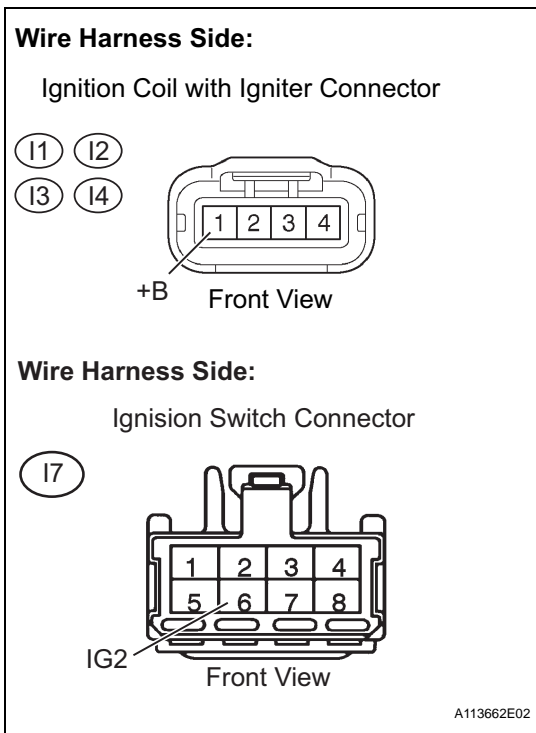
Tester Connections	Specified Conditions
+B (I1-1) - GND (I1-4)	9 to 14 V
+B (I2-1) - GND (I2-4)	9 to 14 V
+B (I3-1) - GND (I3-4)	9 to 14 V
+B (I4-1) - GND (I4-4)	9 to 14 V

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

OK → **REPLACE IGNITION COIL ASSEMBLY**

NG

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



- (a) Disconnect the ignition coil with igniter connector.
- (b) Disconnect the I7 ignition switch connector.
- (c) Check the resistance.

Standard Resistance (Check for open)

Tester Connections	Specified Conditions
+B (I1-1) - IG2 (I7-6)	Below 1 Ω
+B (I2-1) - IG2 (I7-6)	Below 1 Ω
+B (I3-1) - IG2 (I7-6)	Below 1 Ω
+B (I4-1) - IG2 (I7-6)	Below 1 Ω

Standard Resistance (Check for short)

Tester Connections	Specified Conditions
+B (I1-1) or IG2 (I7-6) - Body ground	10 kΩ or higher
+B (I2-1) or IG2 (I7-6) - Body ground	10 kΩ or higher
+B (I3-1) or IG2 (I7-6) - Body ground	10 kΩ or higher
+B (I4-1) or IG2 (I7-6) - Body ground	10 kΩ or higher

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

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

OK

REPLACE IGNITION COIL ASSEMBLY