Last Modified: 7-13-2007		1.6 C
Service Category: Engine/Hybrid System	**Section:** Engine Control	
Model Year: 2008	**Model:** ES350	**Doc ID:** RM000000XH404BX
Title: 2GR-FE ENGINE CONTROL SYSTEM: SFI SYSTEM: P0351: Ignition Coil "A" Primary / Secondary Circuit (2008 ES350)		

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**

DTC	**P0355**	**Ignition Coil "E" Primary / Secondary Circuit**

DTC	**P0356**	**Ignition Coil "F" Primary / Secondary Circuit**

DESCRIPTION

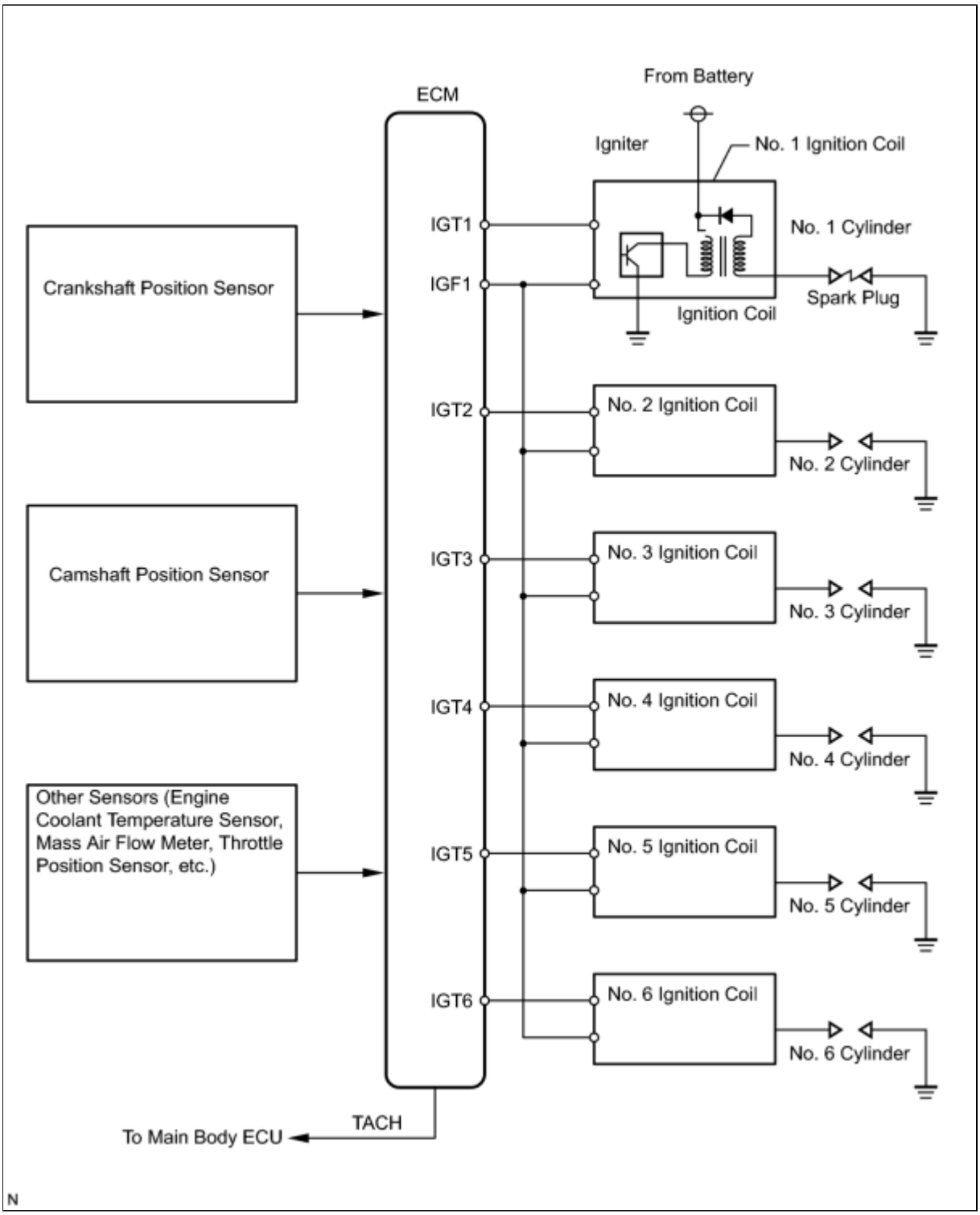
HINT:

- These DTCs indicate malfunctions relating to the primary circuit.
- If DTC P0351 is set, check the No. 1 ignition coil circuit.
- If DTC P0352 is set, check the No. 2 ignition coil circuit.
- If DTC P0353 is set, check the No. 3 ignition coil circuit.
- If DTC P0354 is set, check the No. 4 ignition coil circuit.
- If DTC P0355 is set, check the No. 5 ignition coil circuit.
- If DTC P0356 is set, check the No. 6 ignition coil circuit.

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

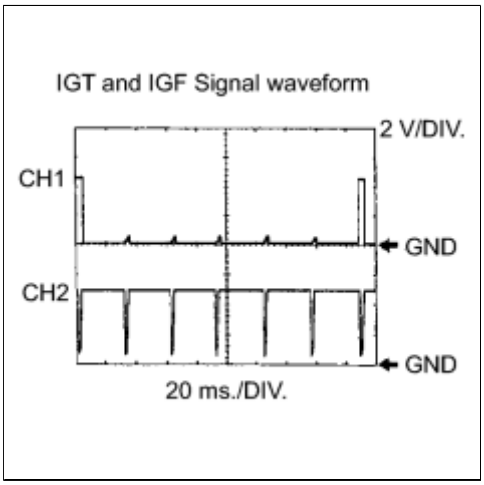
The DIS is a 1-cylinder ignition system in which each cylinder is ignited by one ignition coil and spark plug is connected to the end of each secondary wiring. A powerful voltage, generated in the secondary wiring, is applied directly to each spark plug. Sparks of the spark plugs pass from the center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

The ECM determines the ignition timing and transmits the ignition signals (IGT) 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 off, the igniter sends back an ignition confirmation signal (IGF) to the ECM, for each cylinder ignition.



DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA
P0351 P0352 P0353 P0354 P0355 P0356	No IGF signal to ECM while engine is running (1 trip detection logic)	• Ignition system • Open or short in IGF1 or IGT circuit (1 to 6) between ignition coil and ECM • No. 1 to No. 6 ignition coils • ECM

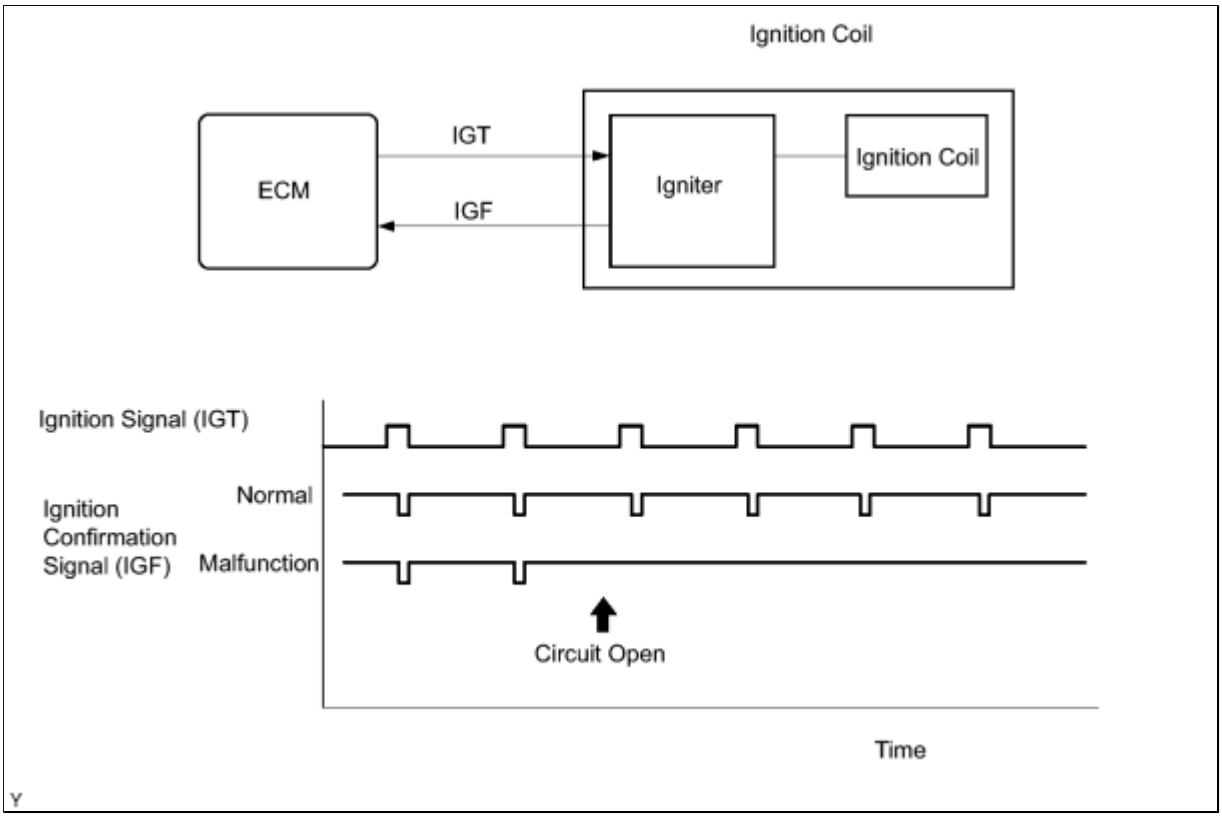
Reference: Inspection using an oscilloscope.



While cranking or idling the engine, check the waveform between terminals IGT (1 to 6) and E1, IGF1 and E1 of the ECM connector.

ITEM	CONTENT
Terminals	CH1: IGT1, IGT2, IGT3, IGT4, IGT5, IGT6 - E1 CH2: IGF1 - E1
Equipment Settings	2 V/DIV. 20 ms./DIV.
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 P0355: Igniter (cylinder 5) malfunction P0356: Igniter (cylinder 6) malfunction
Required Sensors/Components (Main)	Igniter (Cylinder 1 to 6)
Required Sensors/Components (Sub)	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 the following DTCs are not present	None
Either following condition A or B is met:	-
A. Engine RPM	1,500 rpm or less
B. Starter	OFF
Either following condition C or D is met:	-
C. Both of the following conditions are met:	-
(a) Engine speed	500 rpm or less
(b) Battery voltage	6 V or more
D. All of the following conditions are met:	-
(a) Engine speed	More than 500 rpm
(b) Battery voltage	10 V or more
(c) Number of sparks after CPU reset	5 sparks or more

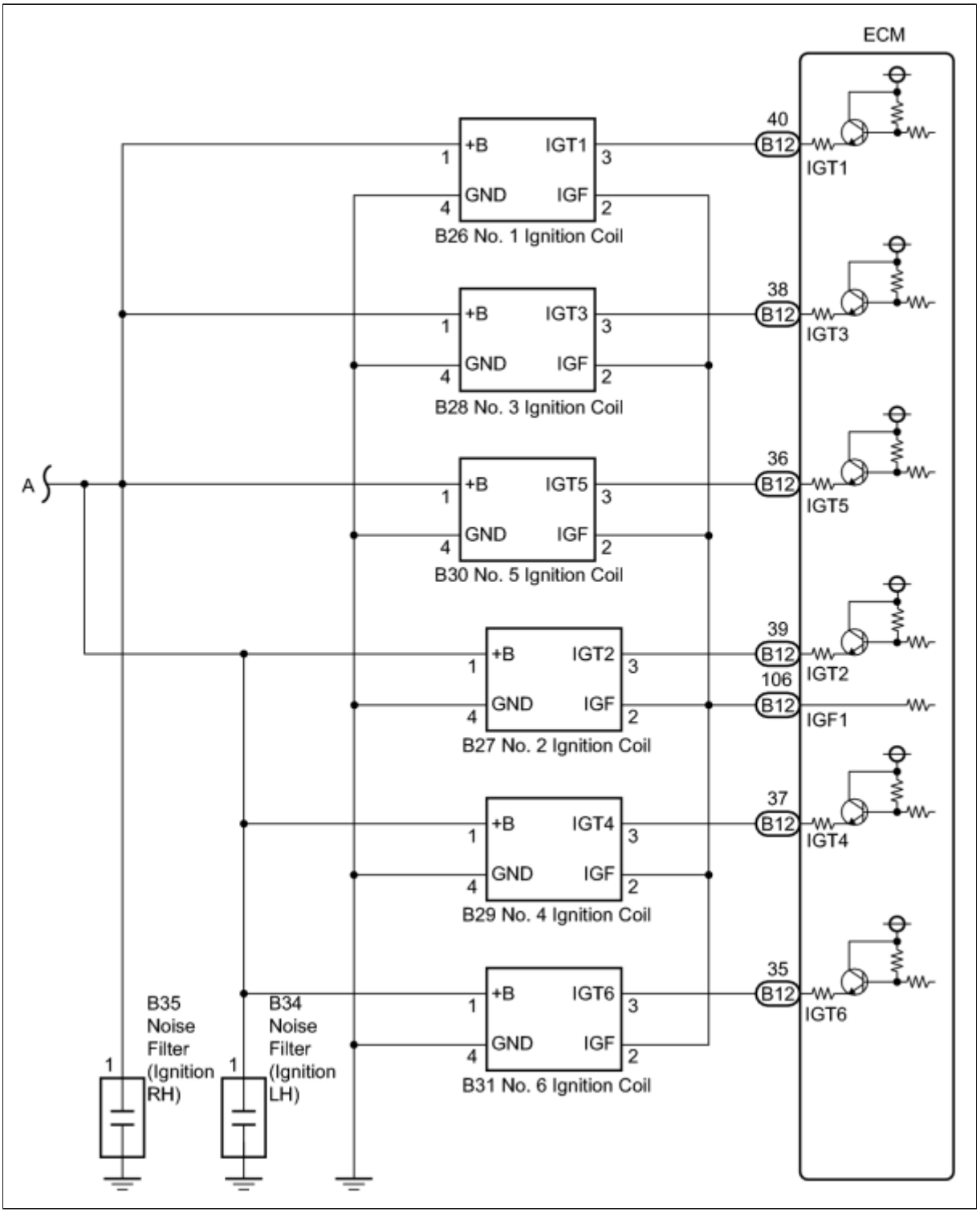
TYPICAL MALFUNCTION THRESHOLDS

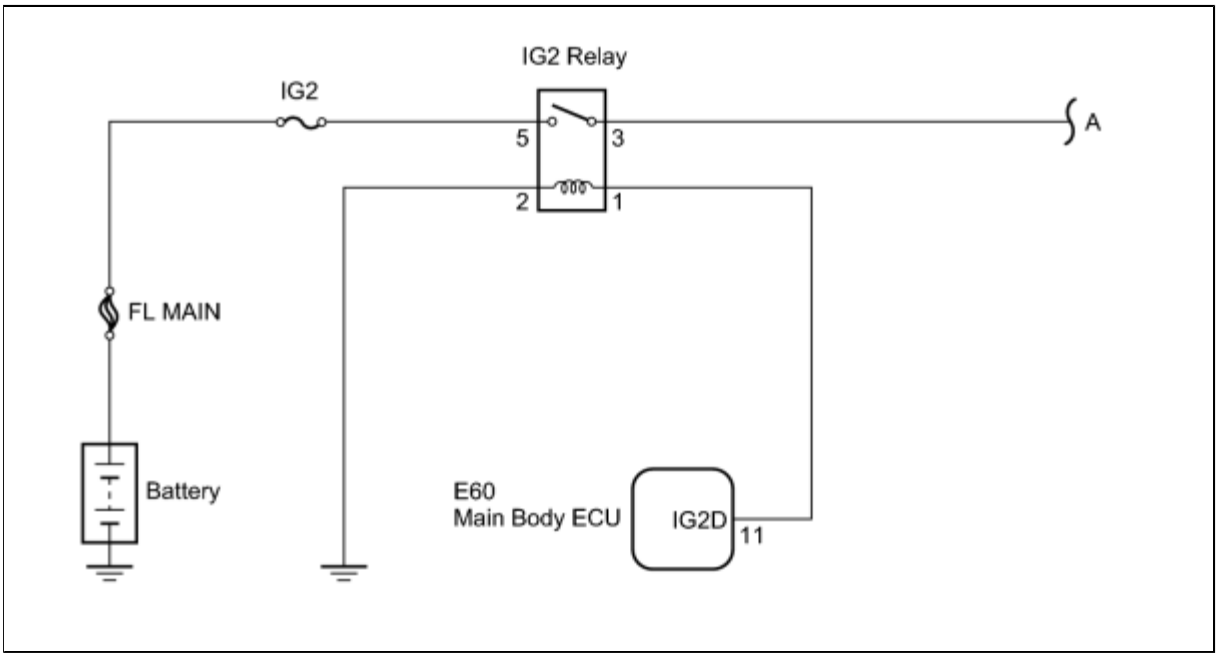
Ignition signal fail count	More than 2 times
Ignition signal fail count	No ignition confirmation signal from igniter

COMPONENT OPERATING RANGE

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

WIRING DIAGRAM


ECM
40
B12
IGT1
38
B12
IGT3
36
B12
IGT5
39
B12
IGT2
106
B12
IGF1
37
B12
IGT4
35
B12
IGT6
A
+B
IGT1
GND
IGF
B26 No. 1 Ignition Coil
+B
IGT3
GND
IGF
B28 No. 3 Ignition Coil
+B
IGT5
GND
IGF
B30 No. 5 Ignition Coil
+B
IGT2
GND
IGF
B27 No. 2 Ignition Coil
+B
IGT4
GND
IGF
B29 No. 4 Ignition Coil
+B
IGT6
GND
IGF
B31 No. 6 Ignition Coil
B35
Noise
Filter
(Ignition
RH)
B34
Noise
Filter
(Ignition
LH)



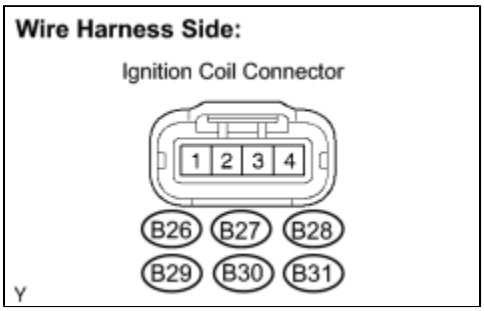
INSPECTION PROCEDURE

HINT:

Read freeze frame data using Techstream. 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 INFO **.**

PROCEDURE

1.	**INSPECT IGNITION COIL ASSEMBLY (POWER SOURCE)**



(a) Disconnect the B26, B27, B28, B29, B30 or B31 ignition coil connector.

(b) Turn the engine switch on (IG).

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

Standard voltage:

TESTER CONNECTION	SPECIFIED CONDITION
B26-1 - Body ground	9 to 14 V
B27-1 - Body ground	9 to 14 V

B28-1 - Body ground	9 to 14 V
B29-1 - Body ground	9 to 14 V
B30-1 - Body ground	9 to 14 V
B31-1 - Body ground	9 to 14 V

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

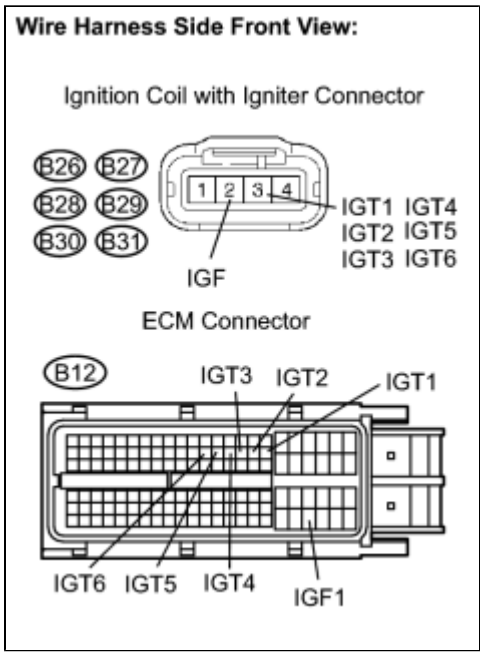
Standard resistance:

TESTER CONNECTION	SPECIFIED CONDITION
B26-4 - Body ground	Below 1 Ω
B27-4 - Body ground	Below 1 Ω
B28-4 - Body ground	Below 1 Ω
B29-4 - Body ground	Below 1 Ω
B30-4 - Body ground	Below 1 Ω
B31-4 - Body ground	Below 1 Ω

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▼

2.	**CHECK HARNESS AND CONNECTOR (IGNITION COIL ASSEMBLY - ECM (IGT SIGNAL TERMINAL))**



(a) Disconnect the B26, B27, B28, B29, B30 or B31 ignition coil connector.

(b) Disconnect the ECM B12 connector.

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

Standard resistance (Check for open):

TESTER CONNECTION	SPECIFIED CONDITION
IGT1 (B26-3) - IGT1 (B12-40)	Below 1 Ω
IGT2 (B27-3) - IGT2 (B12-39)	Below 1 Ω
IGT3 (B28-3) - IGT3 (B12-38)	Below 1 Ω
IGT4 (B29-3) - IGT4 (B12-37)	Below 1 Ω
IGT5 (B30-3) - IGT5 (B12-36)	Below 1 Ω
IGT6 (B31-3) - IGT6 (B12-35)	Below 1 Ω

Standard resistance (Check for short):

TESTER CONNECTION	SPECIFIED CONDITION
IGT1 (B26-3) or IGT1 (B12-40) - Body ground	10 kΩ or higher
IGT2 (B27-3) or IGT2 (B12-39) - Body ground	10 kΩ or higher
IGT3 (B28-3) or IGT3 (B12-38) - Body ground	10 kΩ or higher
IGT4 (B29-3) or IGT4 (B12-37) - Body ground	10 kΩ or higher
IGT5 (B30-3) or IGT5 (B12-36) - Body ground	10 kΩ or higher
IGT6 (B31-3) or IGT6 (B12-35) - Body ground	10 kΩ or higher

Standard resistance (Check for open):

TESTER CONNECTION	SPECIFIED CONDITION
IGF (B26-2) - IGF1 (B12-106)	Below 1 Ω
IGF (B27-2) - IGF1 (B12-106)	Below 1 Ω
IGF (B28-2) - IGF1 (B12-106)	Below 1 Ω
IGF (B29-2) - IGF1 (B12-106)	Below 1 Ω
IGF (B30-2) - IGF1 (B12-106)	Below 1 Ω
IGF (B31-2) - IGF1 (B12-106)	Below 1 Ω

Standard resistance (Check for short):

TESTER CONNECTION	SPECIFIED CONDITION
IGF (B26-2) or IGF1 (B12-106) - Body ground	10 kΩ or higher
IGF (B27-2) or IGF1 (B12-106) - Body ground	10 kΩ or higher
IGF (B28-2) or IGF1 (B12-106)- Body ground	10 kΩ or higher
IGF (B29-2) or IGF1 (B12-106) - Body ground	10 kΩ or higher
IGF (B30-2) or IGF1 (B12-106) - Body ground	10 kΩ or higher
IGF (B31-2) or IGF1 (B12-106) - Body ground	10 kΩ or higher

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

3.	PERFORM SIMULATION TEST

(a) Clear the DTC(s) INFO .

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

NOTICE:

Do not change the location of the connectors.

(c) Perform a simulation test.

Result:

DISPLAY (DTC OUTPUT)	PROCEED TO
Same DTCs (that have been erased)	A
Other DTCs	B

B ▶ **REPLACE IGNITION COIL ASSEMBLY**

A ▶ **REPLACE ECM**