

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

ES**DESCRIPTION****HINT:**

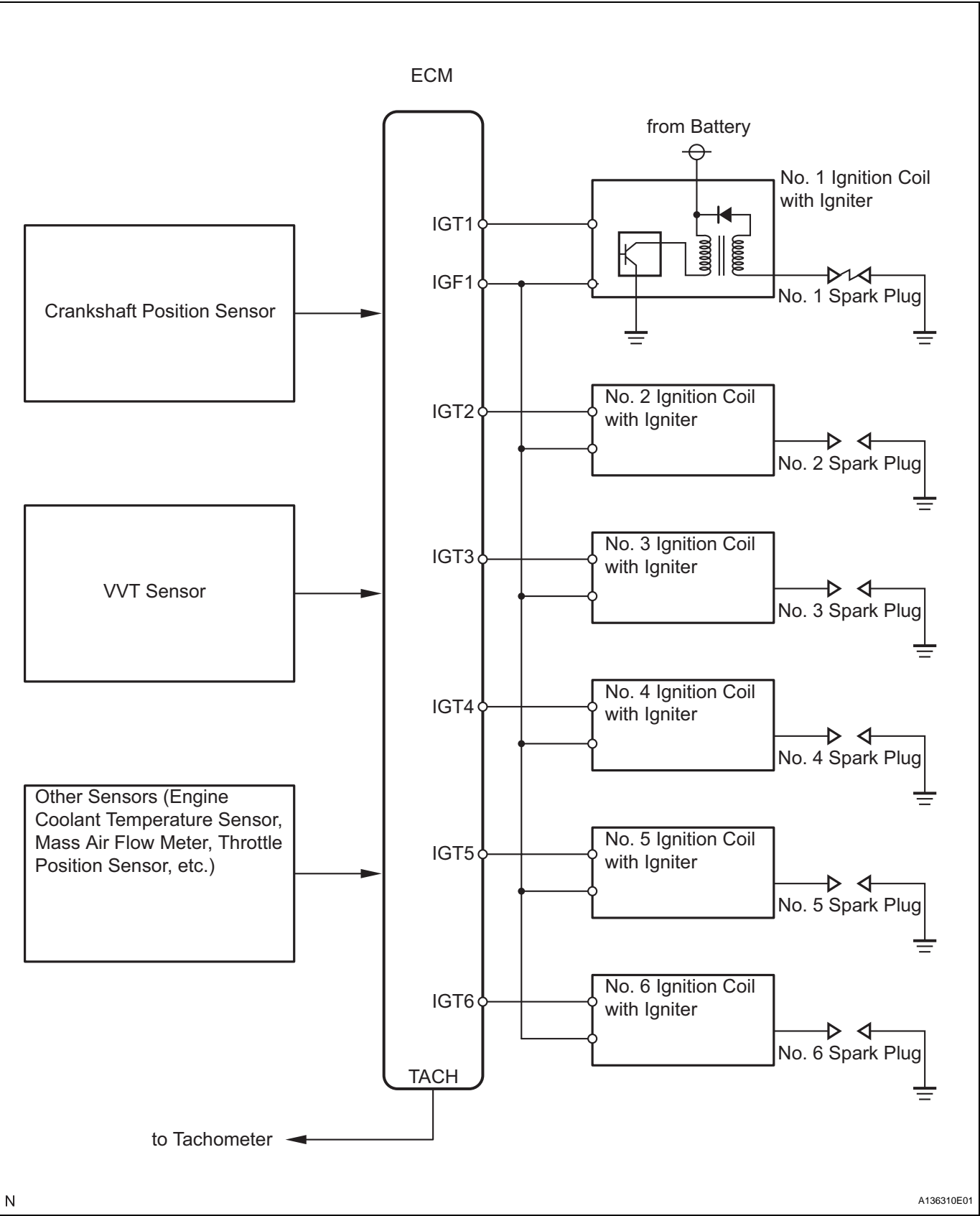
- These DTCs indicate malfunctions relating to the primary circuit.
- If DTC P0351 is set, check No. 1 ignition coil with igniter circuit.
- If DTC P0352 is set, check No. 2 ignition coil with igniter circuit.
- If DTC P0353 is set, check No. 3 ignition coil with igniter circuit.
- If DTC P0354 is set,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

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

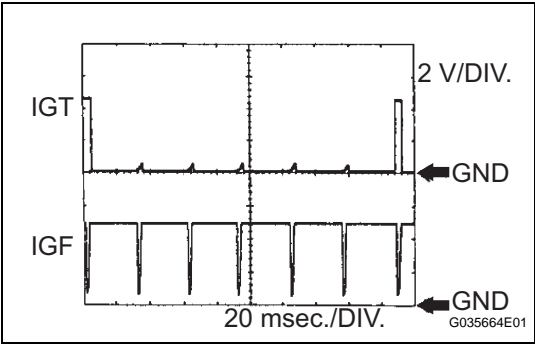
The DIS is a 1-cylinder ignition system in which each cylinder is ignited by one ignition coil and one spark plug is connected to the end of each secondary wiring. A powerful voltage, generated in the secondary wiring, is applied directly to each spark plug. The sparks of the spark plugs pass from the center electrode 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 P0355 P0356	No IGF signal to ECM while engine running (1 trip detection logic)	<ul style="list-style-type: none">Ignition systemOpen or short in IGF1 or IGT circuit (1 to 6) between ignition coil with igniter and ECMNo. 1 to No. 6 ignition coils with ignitersECM



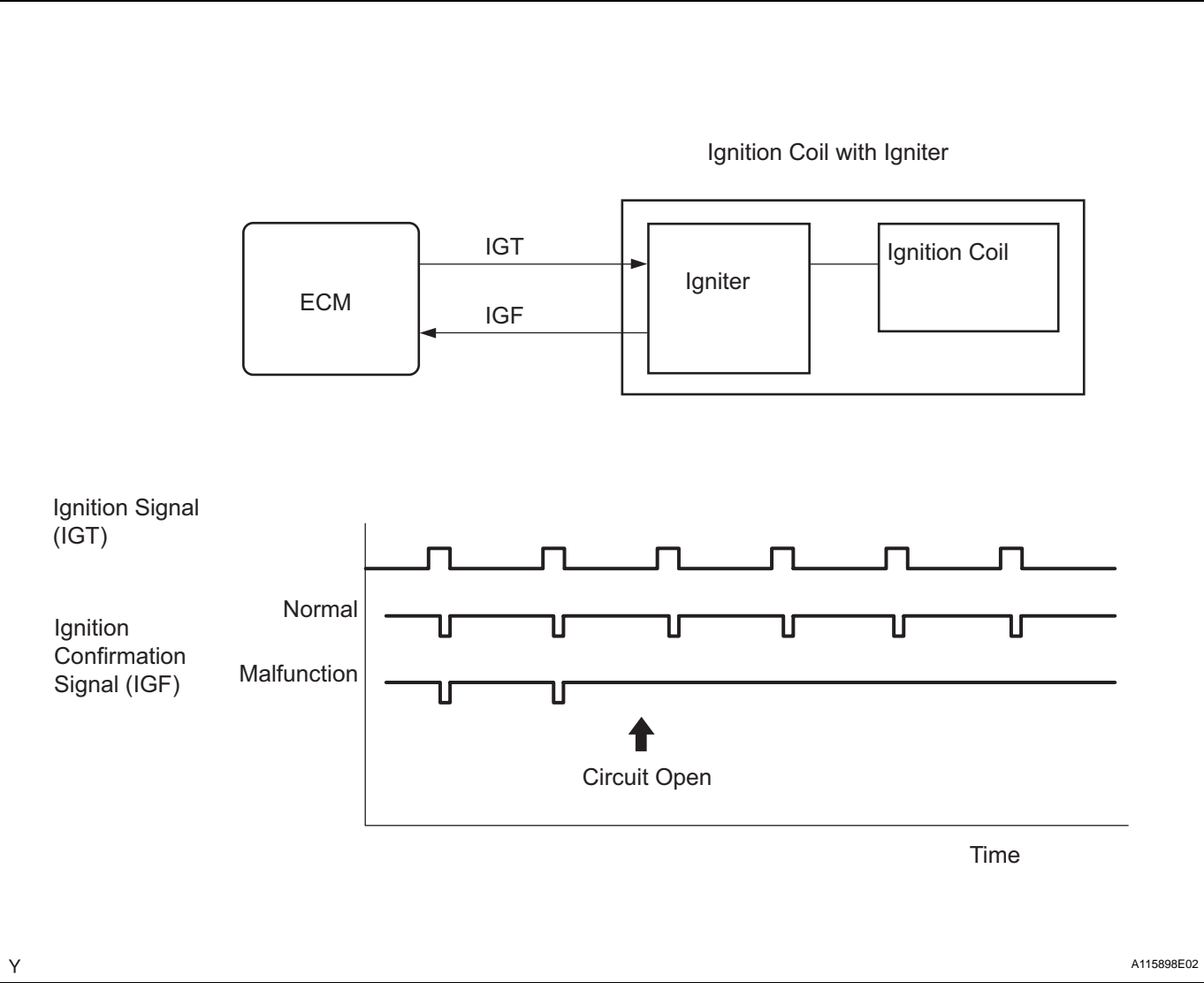
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Reference: Inspection using an oscilloscope.

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

Item	Content
Terminal	CH1: IGT1, IGT2, IGT3, IGT4, IGT5, IGT6 - E1 CH2: IGF1 - E1
Equipment Setting	2 V/DIV. 20 msec./DIV.
Condition	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
Required Sensors/Components (Related)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	About 1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
Either of following conditions A or B met	-
A. Engine RPM	1,500 rpm or less
B. Starter	OFF
Either of following conditions C or D met	-
C. Both of following conditions (a) and (b) met	-
(a) Engine speed	500 rpm or less
(b) Battery voltage	6 V or more
D. All of following conditions (a), (b) and (c) 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

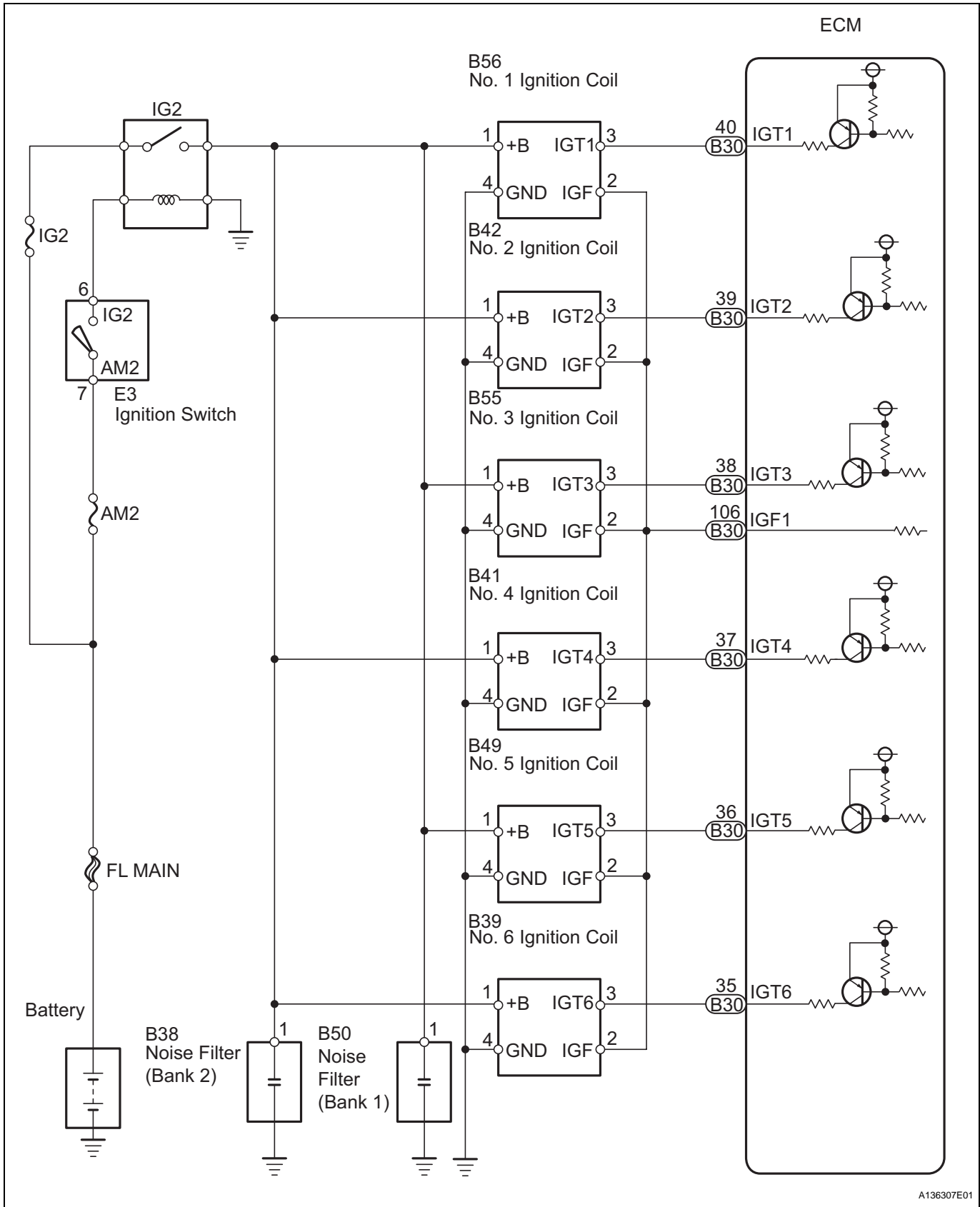
ES**TYPICAL MALFUNCTION THRESHOLDS**

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



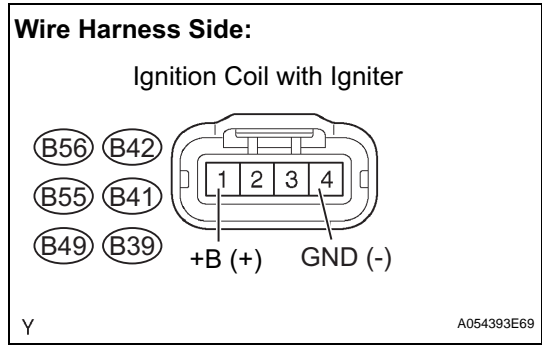
INSPECTION PROCEDURE

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

INSPECT IGNITION COIL ASSEMBLY (POWER SOURCE)



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

Standard resistance

Tester Connection	Specified Condition
B56-4 (GND) - Body ground	Below 1 Ω
B42-4 (GND) - Body ground	Below 1 Ω
B55-4 (GND) - Body ground	Below 1 Ω
B41-4 (GND) - Body ground	Below 1 Ω
B49-4 (GND) - Body ground	Below 1 Ω
B39-4 (GND) - Body ground	Below 1 Ω

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

Standard voltage

Tester Connection	Specified Condition
B56-1 (+B) - B56-4 (GND)	9 to 14 V
B42-1 (+B) - B42-4 (GND)	9 to 14 V
B55-1 (+B) - B55-4 (GND)	9 to 14 V
B41-1 (+B) - B41-4 (GND)	9 to 14 V
B49-1 (+B) - B49-4 (GND)	9 to 14 V
B39-1 (+B) - B39-4 (GND)	9 to 14 V

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

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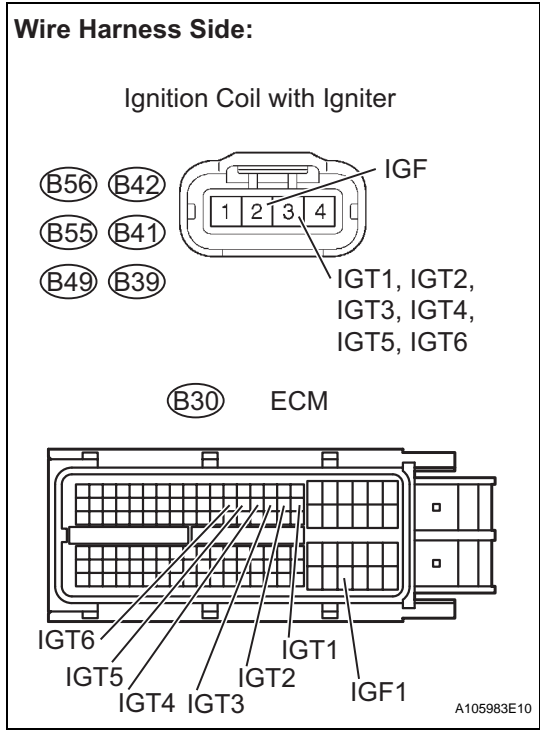
REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

ES

2

CHECK WIRE HARNESS (IGNITION COIL ASSEMBLY - ECM)



- (a) Disconnect the ignition coil with connector.
(b) Disconnect the B30 ECM connector.
(c) Measure the resistance.

Standard resistance

Tester Connection	Specified Condition
B56-2 (IGF) - B30-106 (IGF1)	Below 1 Ω
B42-2 (IGF) - B30-106 (IGF1)	Below 1 Ω
B55-2 (IGF) - B30-106 (IGF1)	Below 1 Ω
B41-2 (IGF) - B30-106 (IGF1)	Below 1 Ω
B49-2 (IGF) - B30-106 (IGF1)	Below 1 Ω
B39-2 (IGF) - B30-106 (IGF1)	Below 1 Ω
B56-3 (IGT1) - B30-40 (IGT1)	Below 1 Ω
B42-3 (IGT2) - B30-39 (IGT2)	Below 1 Ω
B55-3 (IGT3) - B30-38 (IGT3)	Below 1 Ω
B41-3 (IGT4) - B30-37 (IGT4)	Below 1 Ω
B49-3 (IGT5) - B30-36 (IGT5)	Below 1 Ω
B39-3 (IGT6) - B30-35 (IGT6)	Below 1 Ω
B56-2 (IGF) or B30-106 (IGF1) - Body ground	10 kΩ or higher
B42-2 (IGF) or B30-106 (IGF1) - Body ground	10 kΩ or higher
B55-2 (IGF) or B30-106 (IGF1) - Body ground	10 kΩ or higher
B41-2 (IGF) or B30-106 (IGF1) - Body ground	10 kΩ or higher
B49-2 (IGF) or B30-106 (IGF1) - Body ground	10 kΩ or higher
B39-2 (IGF) or B30-106 (IGF1) - Body ground	10 kΩ or higher
B56-3 (IGT1) or B30-40 (IGT1) - Body ground	10 kΩ or higher
B42-3 (IGT2) or B30-39 (IGT2) - Body ground	10 kΩ or higher
B55-3 (IGT3) or B30-38 (IGT3) - Body ground	10 kΩ or higher
B41-3 (IGT4) or B30-37 (IGT4) - Body ground	10 kΩ or higher
B49-3 (IGT5) or B30-36 (IGT5) - Body ground	10 kΩ or higher
B39-3 (IGT6) or B30-35 (IGT6) - Body ground	10 kΩ or higher

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

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REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3

CHECK WHETHER DTC OUTPUT RECURS (DTC P0351, P0352, P0353, P0354, P0355 OR P0356)

- (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-39).
 - (d) Shuffle arrangement of the ignition coils with igniters (among No. 1 to No. 6 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
Same DTC output	A
Different ignition coil DTC output	B

ES

B REPLACE IGNITION COIL ASSEMBLY

A

REPLACE ECM