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

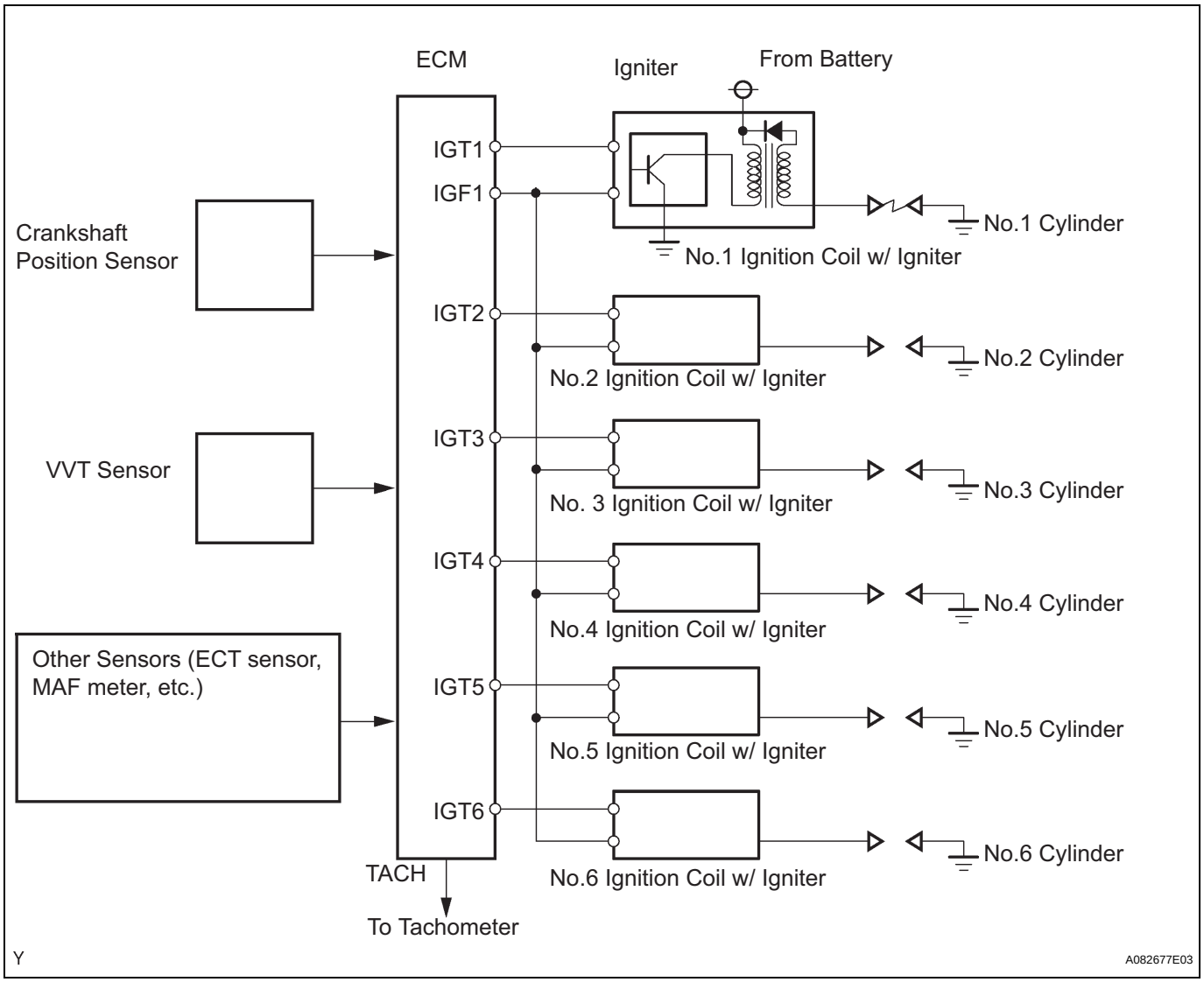
HINT:

- These DTCs indicate malfunctions relating to the primary circuit.
- IF DTC P0351 is set, check No. 1 ignition coil 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.
- IF DTC P0355 is set, check No. 5 ignition coil circuit.
- IF DTC P0356 is set, check No. 6 ignition coil circuit.

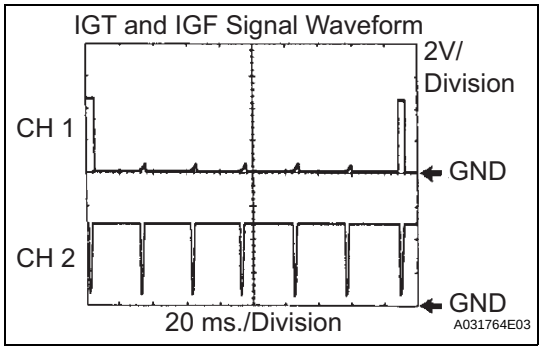
A Direct Ignition System (DIS) is used on this vehicle.

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. The sparks of the spark plugs pass from the center electrode to the ground electrodes.

The ECM (Included in 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, 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 running (1 trip detection logic)	• Ignition system • Open or short in IGF1 and IGT circuit (1 to 6) between ignition coil and ECM • No. 1 to No. 6 ignition coils • ECM

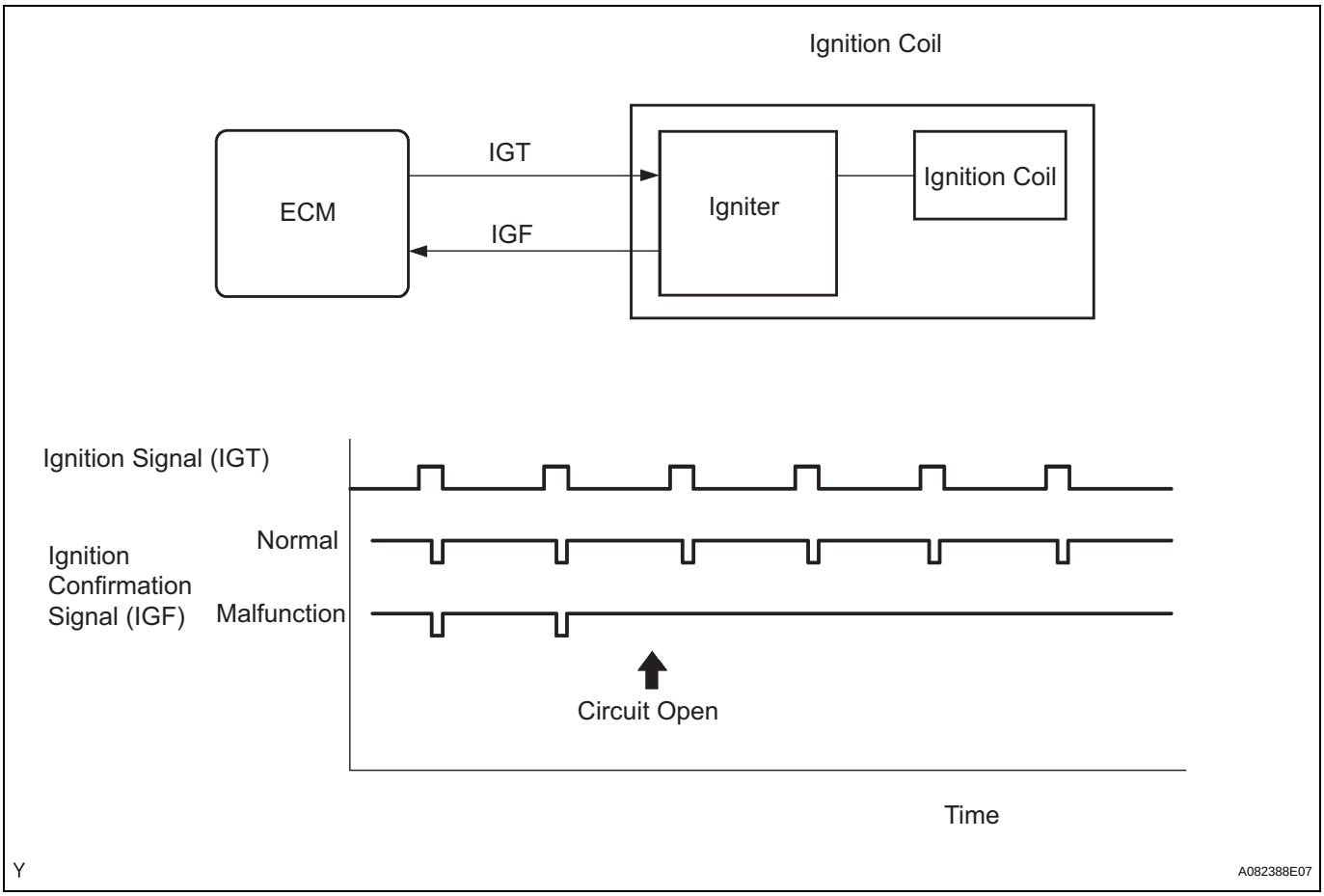


Reference: Inspection using an oscilloscope.

While cranking or idling the engine, check the waveform between terminals IGT (1 to 6) and E1, and 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/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 P0355: Igniter (cylinder 5) malfunction P0356: Igniter (cylinder 6) malfunction
Required Sensors/Components (Main)	Igniter (Cylinder 1 to 6)
Frequency of Operation	Continuous
Duration	0.256 seconds and 4 sparks
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will runs whenever these DTCs are not present	None
Either of the following condition is met	Condition 1 or 2
1. Starter	OFF
2. Engine RPM	1,500 rpm or less
Either of the following condition is met	Condition (a) or (b)
(a) All of the following conditions are met	-
Engine RPM	500 rpm or less
Battery voltage	6 V or more
(b) All of the following conditions are met	-
Engine RPM	More than 500 rpm
Battery voltage	10 V or more
Number of sparks after CPU is reset	5 sparks or more

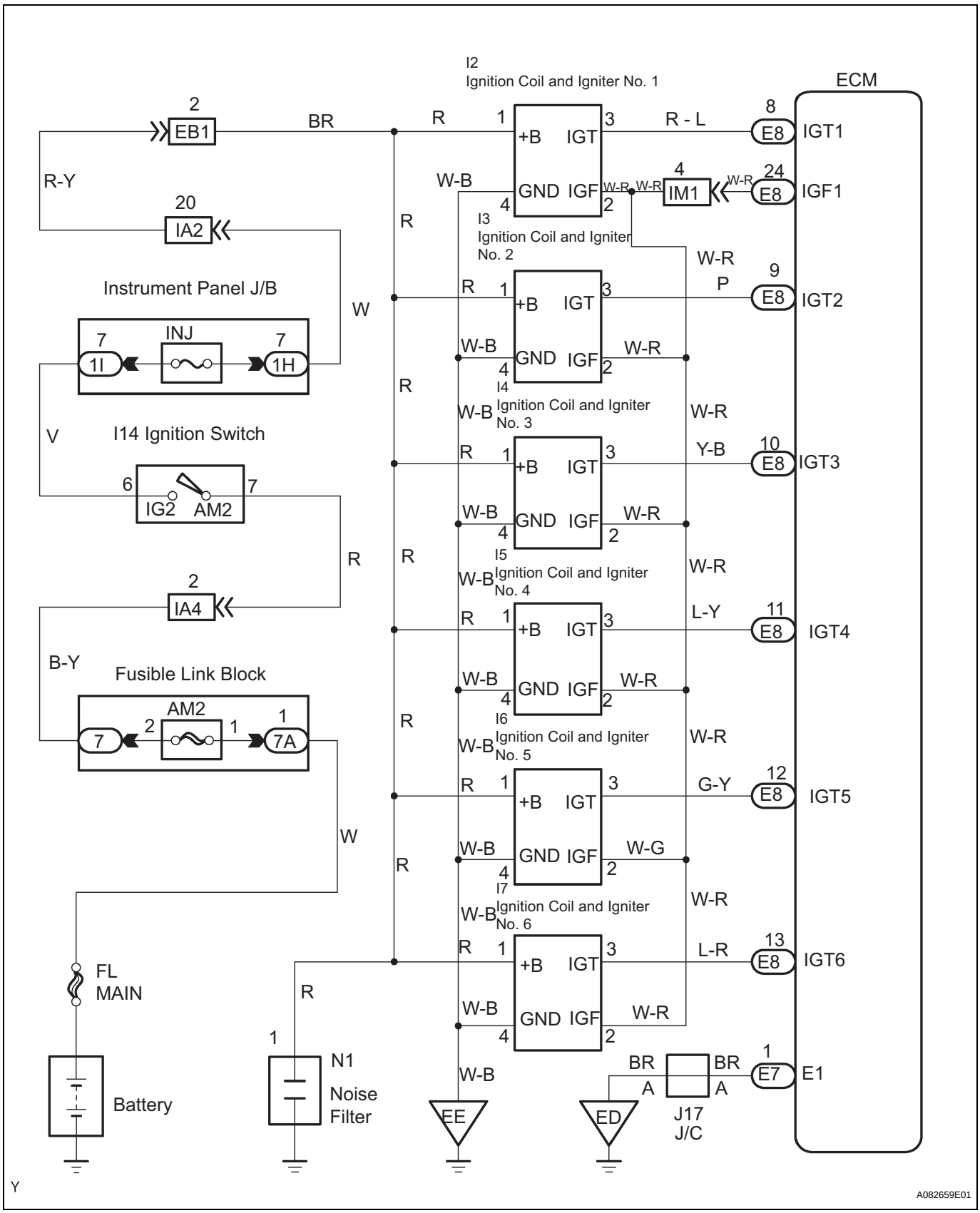
TYPICAL MALFUNCTION THRESHOLDS

Ignition signal fail count	More than 2 times
Ignition signal fail count is on the right:	When IGF does not return despite sending IGT

COMPONENT OPERATING RANGE

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

WIRING DIAGRAM



HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, 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 the DTC(s) (See page ES-28).
(b) Change the arrangement of the ignition coils (with igniters).
NOTICE:
Do not change the location of the connectors.
(c) Reform a simulation test.

ES

Result

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

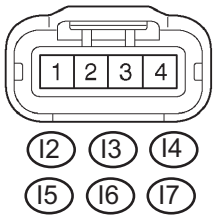
B → REPLACE IGNITION COIL ASSEMBLY

A

2 INSPECT IGNITION COIL ASSEMBLY (POWER SOURCE)

Wire Harness Side:

Ignition Coil Connector



(a) Disconnect the I2, I3, I4, I5, I6 or I7 ignition coil connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the terminal of the wire harness side connector and body ground.
Standard voltage

Tester Connection	Specified Condition
I2-1 (+B) - Body ground	9 to 14 V
I3-1 (+B) - Body ground	9 to 14 V
I4-1 (+B) - Body ground	9 to 14 V
I5-1 (+B) - Body ground	9 to 14 V
I6-1 (+B) - Body ground	9 to 14 V
I7-1 (+B) - Body ground	9 to 14 V

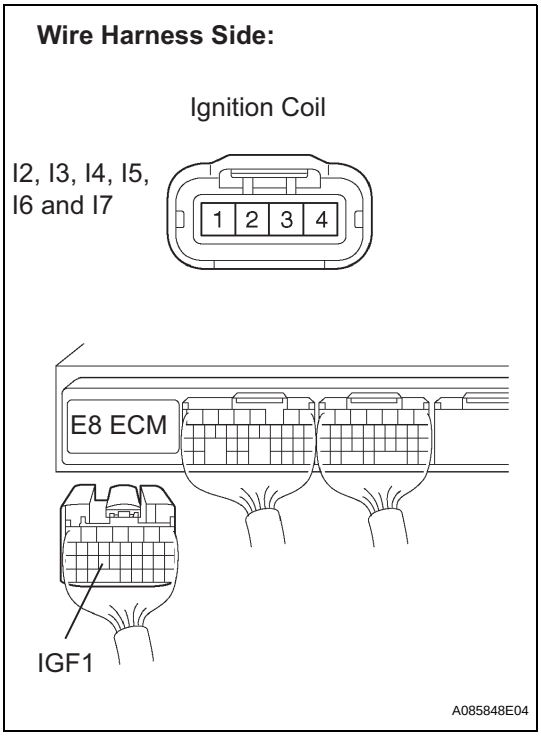
(d) Measure the resistance between the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
I2-4 (GND) - Body ground	Below 1 Ω
I3-4 (GND) - Body ground	Below 1 Ω
I4-4 (GND) - Body ground	Below 1 Ω
I5-4 (GND) - Body ground	Below 1 Ω
I6-4 (GND) - Body ground	Below 1 Ω
I7-4 (GND) - Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

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



(a) Disconnect the I2, I3, I4, I5, I6 or I7 ignition coil connector.
(b) Disconnect the ECM E8connectors.
(c) Measure the resistance between the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
I2-2 (IGF) - E8-24 (IGF1)	Below 1 Ω
I3-2 (IGF) - E8-24 (IGF1)	Below 1 Ω
I4-2 (IGF) - E8-24 (IGF1)	Below 1 Ω
I5-2 (IGF) - E8-24 (IGF1)	Below 1 Ω
I6-2 (IGF) - E8-24 (IGF1)	Below 1 Ω
I7-2 (IGF) - E8-24 (IGF1)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
I2-2 (IGF) - E8-24 (IGF1) - Body ground	10 kΩ or higher
I3-2 (IGF) - E8-24 (IGF1) - Body ground	10 kΩ or higher
I4-2 (IGF) - E8-24 (IGF1) - Body ground	10 kΩ or higher
I5-2 (IGF) - E8-24 (IGF1) - Body ground	10 kΩ or higher
I6-2 (IGF) - E8-24 (IGF1) - Body ground	10 kΩ or higher
I7-2 (IGF) - E8-24 (IGF1) - Body ground	10 kΩ or higher

Standard resistance (Check for open)

Tester Connection	Specified Condition
I2-3 (IGT) - E8-8 (IGT1)	Below 1 Ω
I3-3 (IGT) - E8-9 (IGT2)	Below 1 Ω
I4-3 (IGT) - E8-10 (IGT3)	Below 1 Ω
I5-3 (IGT) - E8-11 (IGT4)	Below 1 Ω
I6-3 (IGT) - E8-12 (IGT5)	Below 1 Ω
I7-3 (IGT) - E8-13 (IGT6)	Below 1 Ω

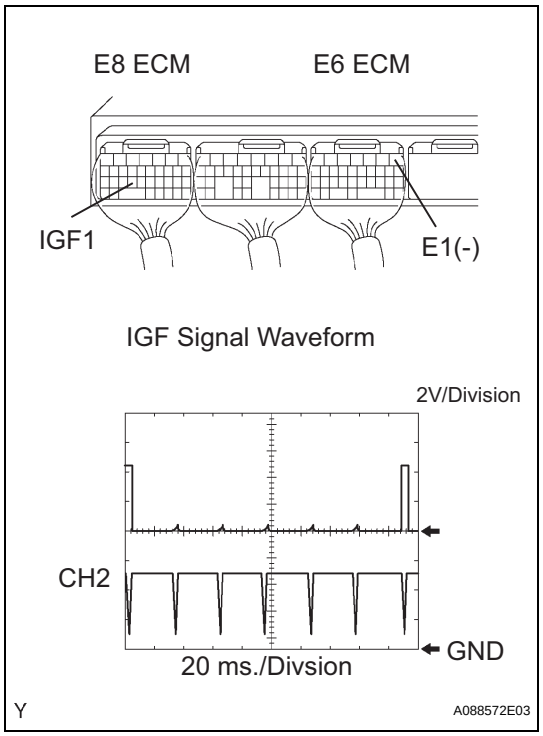
Standard resistance (Check for short)

Tester Connection	Specified Condition
I2-3 (IGT) - E8-8 (IGT1) - Body ground	10 kΩ or higher
I3-3 (IGT) - E8-9 (IGT2) - Body ground	10 kΩ or higher
I4-3 (IGT) - E8-10 (IGT3)- Body ground	10 kΩ or higher
I5-3 (IGT) - E8-11 (IGT4) - Body ground	10 kΩ or higher
I6-3 (IGT) - E8-12 (IGT5) - Body ground	10 kΩ or higher
I7-3 (IGT) - E8-13 (IGT6) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4 CHECK ECM (IGT1, IGT2, IGT3, IGT4, IGT5, IGT6, IGF1 SIGNAL)



(a) Inspect using an oscilloscope.
(b) Start the engine.
(c) Check the waveform of the ECM connectors.

Standard

Tester Connection	Specified Condition
E8-24 (IGF1) - E6-1 (E1) E8-8 (IGT1) - E6-1 (E1) E8-9 (IGT2) - E6-1 (E1) E8-10 (IGT3) - E6-1 (E1) E8-11 (IGT4) - E6-1 (E1) E8-12 (IGT5) - E6-1 (E1) E8-13 (IGT6) - E6-1 (E1)	Correct waveform is shown

ES

NG → **REPLACE ECM**

OK

5 CHECK IF DTC OUTPUT RECURS

(a) Clear the DTC (See page ES-28).
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch ON and turn the intelligent tester ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read DTC.

Result

Display (DTC Output)	Proceed to
P0351, P0352, P0353, P0354, P0355 and/or P0356 are output	A
No output	B

B → **SYSTEM OK**

A

REPLACE ECM