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

HINT:

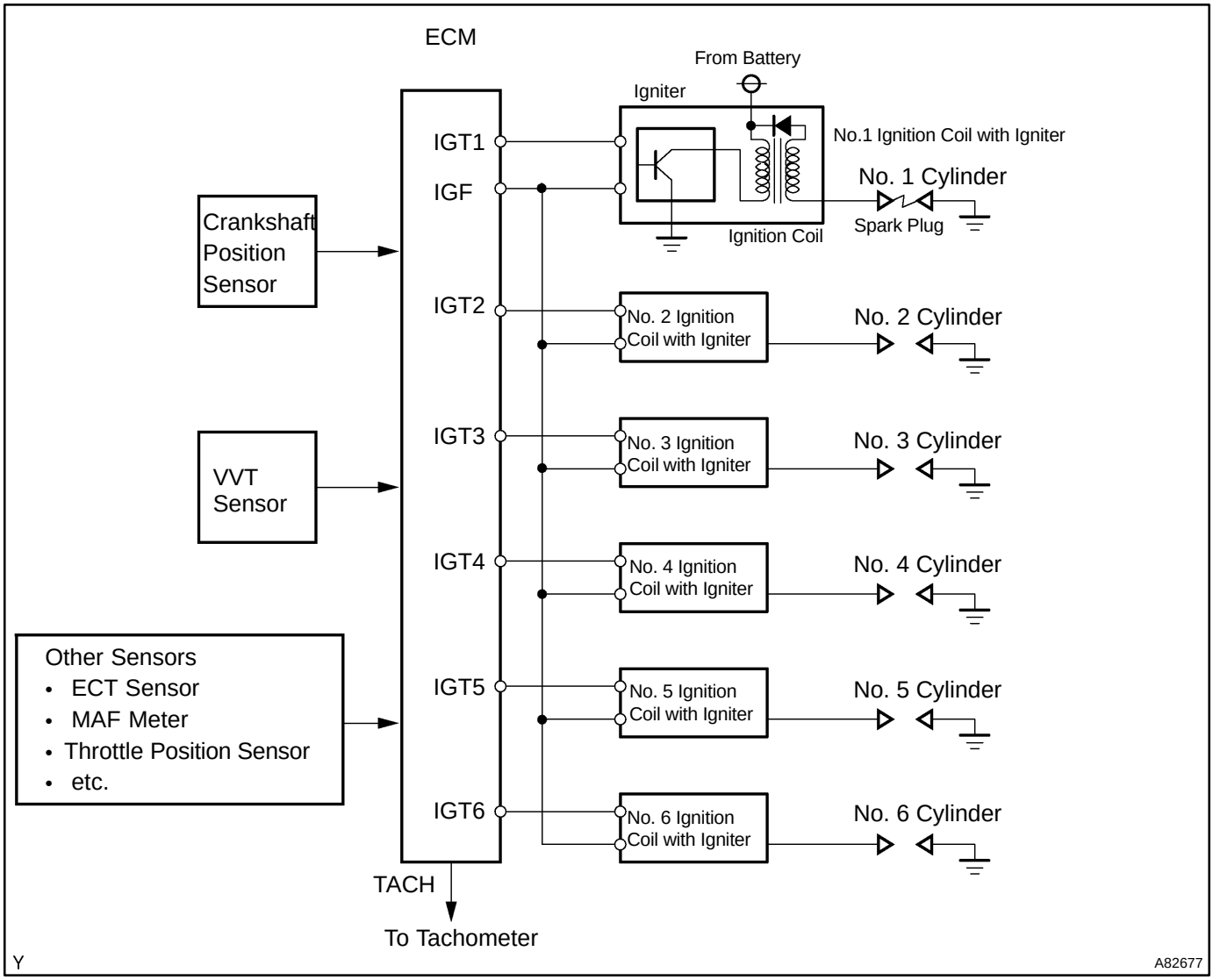
- These DTCs indicate a malfunction related to primary circuit.
- If DTC P0351 is displayed, check No.1 ignition coil with igniter circuit.
- If DTC P0352 is displayed, check No.2 ignition coil with igniter circuit.
- If DTC P0353 is displayed, check No.3 ignition coil with igniter circuit.
- If DTC P0354 is displayed, check No.4 ignition coil with igniter circuit.
- If DTC P0355 is displayed, check No.5 ignition coil with igniter circuit.
- If DTC P0356 is displayed, check No.6 ignition coil with igniter circuit.

CIRCUIT DESCRIPTION

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

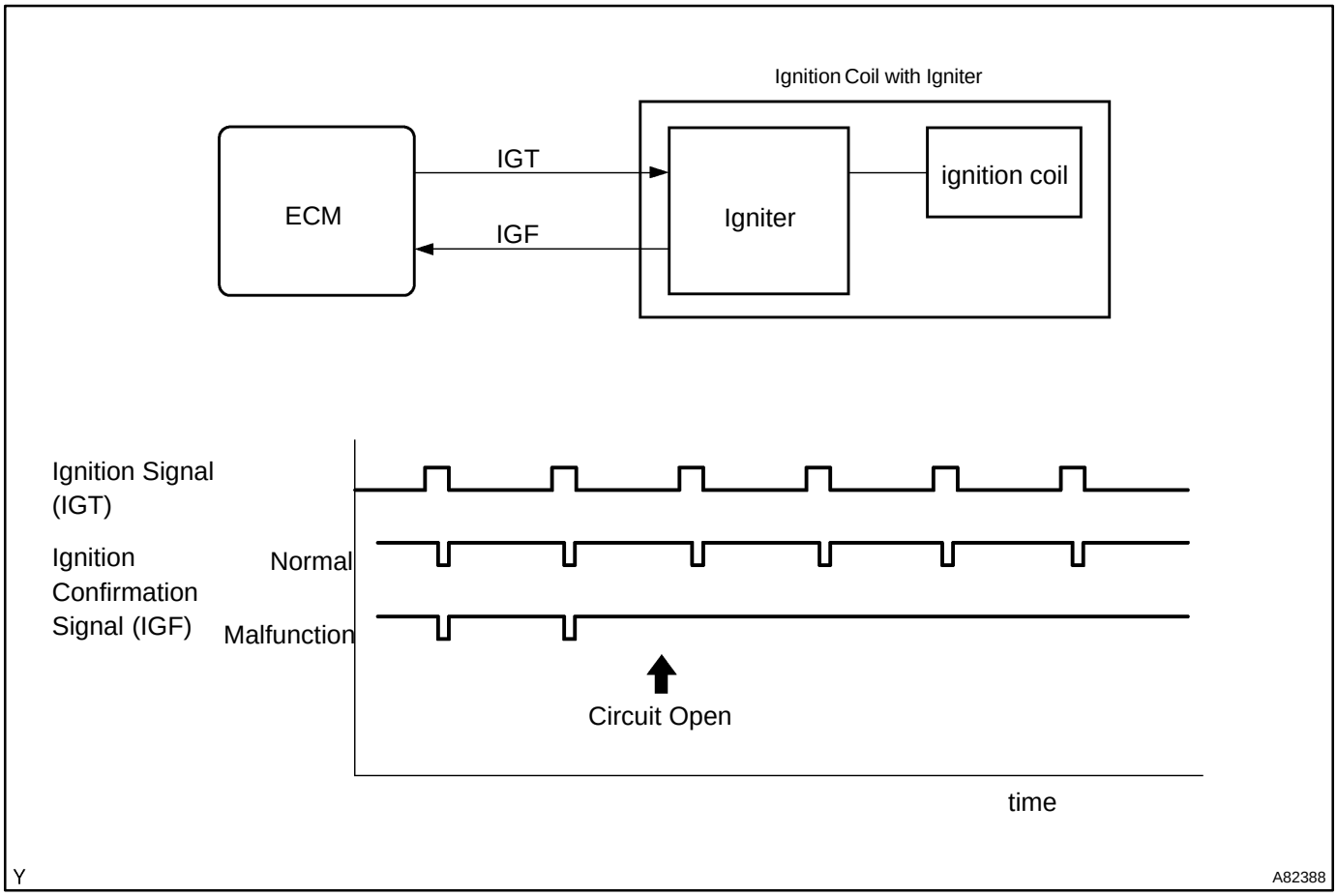
The DIS is a 1−cylinder ignition system which ignites one cylinder with one ignition coil. In the 1−cylinder ignition system, the one spark plug is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plug. The spark of the spark plug passes from the center electrode to the ground electrode.

The ECM determines the ignition timing and outputs the ignition signals (IGTs) for each cylinder. Using the IGT, the ECM turns on and off the power transistor inside the igniter, which switches on and off current to the primary coil. When current to the primary coil is cut off, high−voltage is generated in the secondary coil and this voltage is applied to the spark plugs to create sparks inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back the ignition confirmation signal (IGF) for each cylinder ignition to the ECM.



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 IGF and IGT circuits (1 through 6) from ignition coil assy to ECM • Ignition coil assy (No. 1 through No. 6) • ECM

MONITOR DESCRIPTION



If the ECM does not receive the IGF after sending the IGT, it interprets this as a fault in the igniter and sets a DTC.

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	0.256 seconds + 4 sparks
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05−507
Either of the following conditions is met:	Condition 1 or 2
1. Starter	OFF
2. Engine RPM	1,500 rpm or less

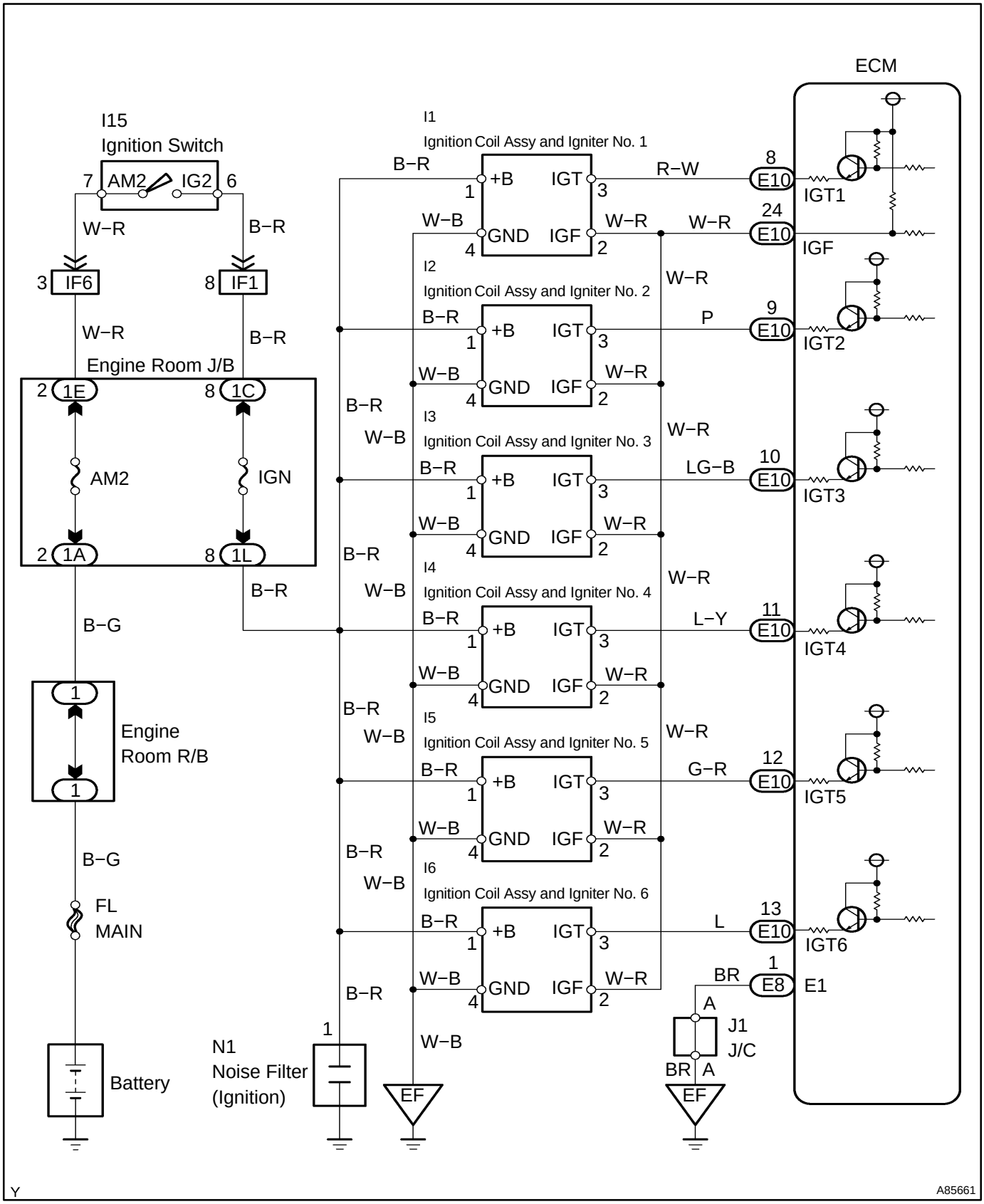
TYPICAL MALFUNCTION THRESHOLDS

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

COMPONENT OPERATING RANGE

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

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. 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.

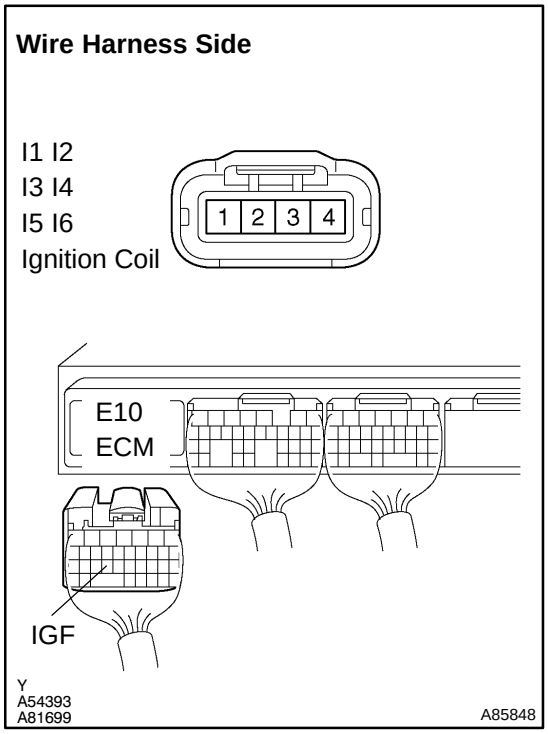
1	CHECK SPARK PLUG AND SPARK OF MISFIRING CYLINDER (See page 18−9)

OK: Spark occurs.

NG → **Go to step 4**

OK

2	CHECK WIRE HARNESS (IGNITION COIL ASSY − ECM (IGF TERMINAL))



(a) Disconnect the I1, I2, I3, I4, I5 and I6 ignition coil connectors.

(b) Disconnect the E10 ECM connector.

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

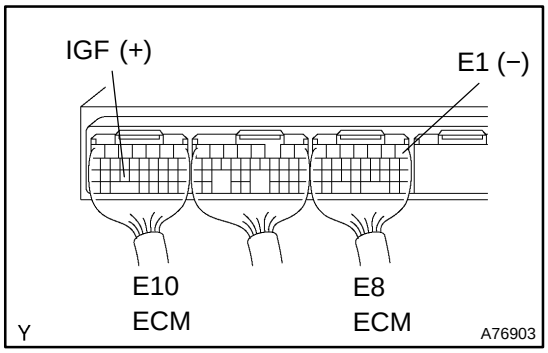
Standard:

Tester Connection	Specified Condition
I1−2 − E10−24 (IGF) I2−2 − E10−24 (IGF) I3−2 − E10−24 (IGF) I4−2 − E10−24 (IGF) I5−2 − E10−24 (IGF) I6−2 − E10−24 (IGF)	Below 1 Ω
I1−2 or E10−24 (IGF) − Body ground I2−2 or E10−24 (IGF) − Body ground I3−2 or E10−24 (IGF) − Body ground I4−2 or E10−24 (IGF) − Body ground I5−2 or E10−24 (IGF) − Body ground I6−2 or E10−24 (IGF) − Body ground	10 kΩ or higher

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

OK

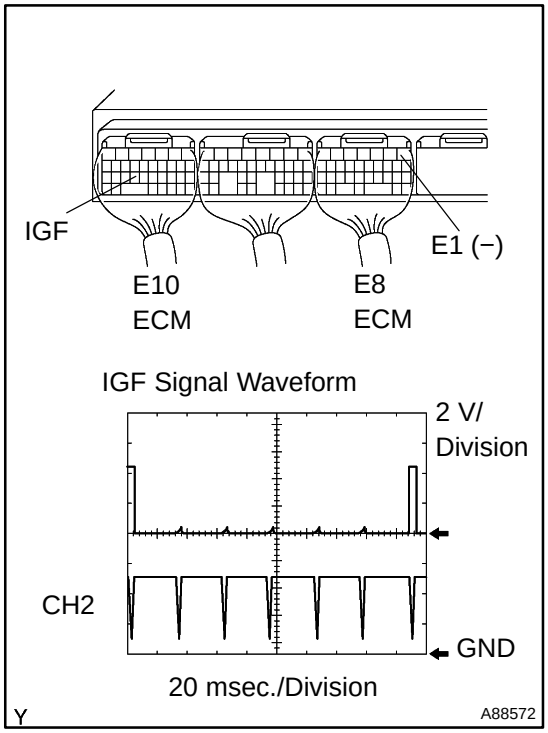
3 CHECK ECM (IGF VOLTAGE)



(a) Disconnect the I1, I2, I3, I4, I5 and I6 ignition coil connectors.
(b) Turn the ignition switch ON.
(c) Check the voltage between the terminals of the ECM connectors.

Standard:

Tester Connection	Specified Condition
E10−24 (IGF) − E8−1 (E1)	4.5 to 5.5 V



HINT:
Reference: Inspection using the oscilloscope.
During cranking or idling, check the waveform of the ECM connectors.

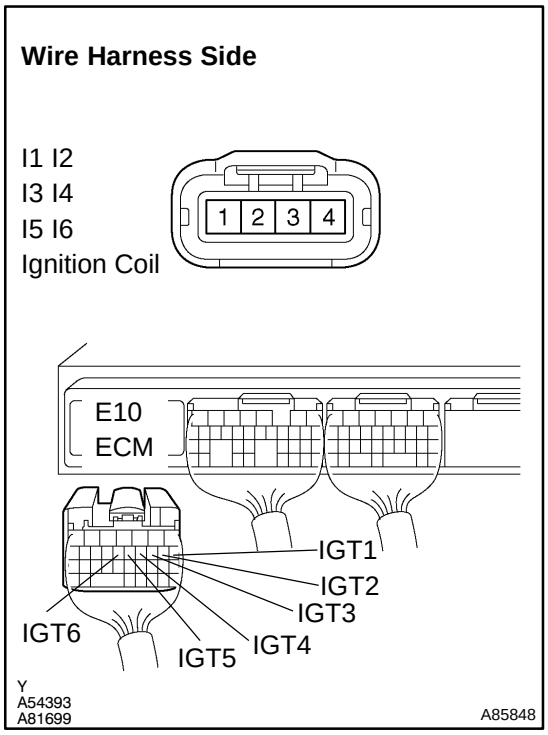
Tester Connection	Specified Condition
E10−24 (IGF) − E8−1 (E1)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10−25)**

OK

REPLACE IGNITION COIL ASSY

4 CHECK WIRE HARNESS (IGNITION COIL ASSY − ECM (IGT TERMINAL))



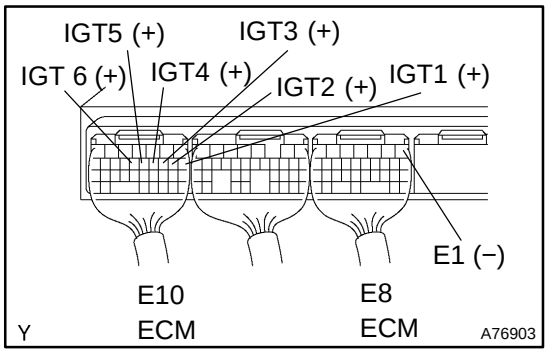
(a) Disconnect the I1, I2, I3, I4, I5 and I6 ignition coil connectors.
(b) Disconnect the E10 ECM connector.
(c) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
I1−3 − E10−8 (IGT1) I2−3 − E10−9 (IGT2) I3−3 − E10−10 (IGT3) I4−3 − E10−11 (IGT4) I5−3 − E10−12 (IGT5) I6−3 − E10−13 (IGT6)	Below 1 Ω
I1−3 or E10−8 (IGT1) − Body ground I2−3 or E10−9 (IGT2) − Body ground I3−3 or E10−10 (IGT3) − Body ground I4−3 or E10−1 (1IGT4) − Body ground I5−3 or E10−12 (IGT5) − Body ground I6−3 or E10−13 (IGT6) − Body ground	10 kΩ or higher

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

OK

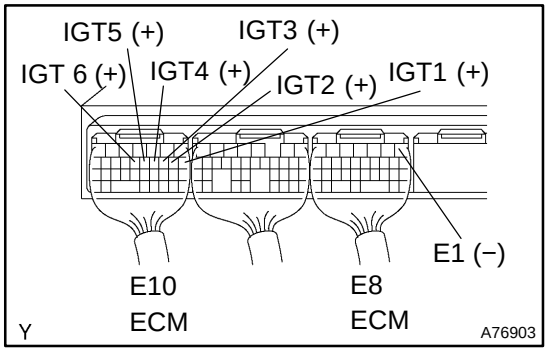
5 CHECK ECM (IGT1, IGT2, IGT3, IGT4, IGT5 OR IGT6 VOLTAGE)



(a) Check the voltage of the ECM connectors when the engine is cranked.

Standard:

Tester Connection	Specified Condition
E10−8I (GT1) − E8−1 (E1) E10−9 (IGT2) − E8−1 (E1) E10−10 (IGT3) − E8−1 (E1) E10−11 (IGT4) − E8−1 (E1) E10−12 (IGT5) − E8−1 (E1) E10−13 (IGT6) − E8−1 (E1)	More than 0.1 V or less than 4.5 V



(b) Disconnect the I1, I2, I3, I4, I5 and I6 ignition coil connectors.

(c) Check the voltage of the ECM connectors when the engine is cranked.

Standard:

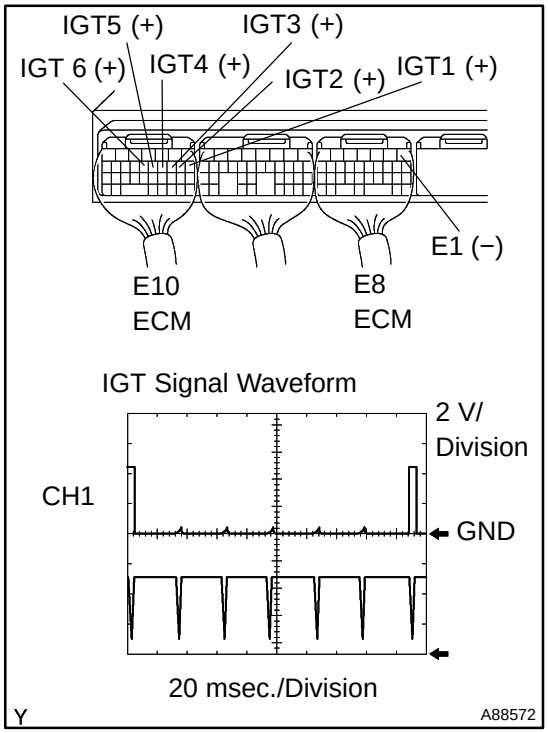
Tester Connection	Specified Condition
E10−8 (IGT1) − E8−1 (E1) E10−9 (IGT2) − E8−1 (E1) E10−10 (IGT3) − E8−1 (E1) E10−11 (IGT4) − E8−1 (E1) E10−12 (IGT5) − E8−1 (E1) E10−13 (IGT6) − E8−1 (E1)	4.5 V or more

HINT:

Reference: Inspection using the oscilloscope.

During cranking or idling, check the waveform of the ECM connectors.

Tester Connection	Specified Condition
E10−8 (GT1) − E8−1 (E1) E10−9 (IGT2) − E8−1 (E1) E10−10 (IGT3) − E8−1 (E1) E10−11 (IGT4) − E8−1 (E1) E10−12 (IGT5) − E8−1 (E1) E10−13 (IGT6) − E8−1 (E1)	Correct waveform is as shown



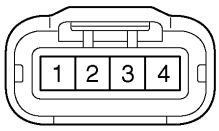
NG → **REPLACE ECM (See page 10−25)**

OK

6 INSPECT IGNITION COIL ASSY (POWER SOURCE)

Wire Harness Side

I1 I2
I3 I4
I5 I6
Ignition Coil



Y A54393

(a) Disconnect the I1, I2, I3, I4, I5 and I6 ignition coil connectors.
(b) Turn the ignition switch ON.
(c) Check the voltage of the wire harness side connector and body ground.

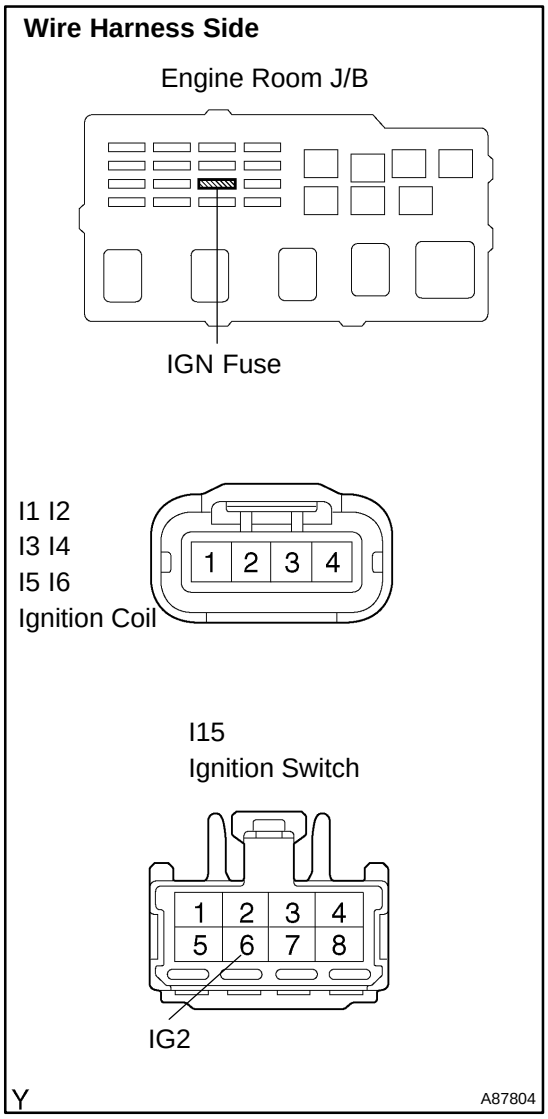
Standard:

Tester Connection	Specified Condition
I1−1 − Body ground I2−1 − Body ground I3−1 − Body ground I4−1 − Body ground I5−1 − Body ground I6−1 − Body ground	9 to 14 V

OK → **REPLACE IGNITION COIL ASSY**

NG

7 CHECK WIRE HARNESS (IGNITION COIL ASSY − IGNITION SWITCH)



(a) Check the IGN fuse.
  (1) Remove the IGN fuse from the engine room J/B.
  (2) Check for resistance of the IGN fuse.
  Standard: Below 1Ω

(b) Disconnect the I1, I2, I3, I4, I5 and I6 ignition coil connectors.

(c) Disconnect the I15 ignition switch connector.

(d) Check the resistance of the wire harness side connectors.
  Standard:

Tester Connection	Specified Condition
I1−1 − I15−6 (IG2) I2−1 − I15−6 (IG2) I3−1 − I15−6 (IG2) I4−1 − I15−6 (IG2) I5−1 − I15−6 (IG2) I6−1 − I15−6 (IG2)	Below 1 Ω
I1−1 or I15−6 (IG2) − Body ground I2−1 or I15−6 (IG2) − Body ground I3−1 or I15−6 (IG2) − Body ground I4−1 or I15−6 (IG2) − Body ground I5−1 or I15−6 (IG2) − Body ground I6−1 or I15−6 (IG2) − Body ground	10 kΩ or higher

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

OK

REPLACE IGNITION COIL ASSY