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:

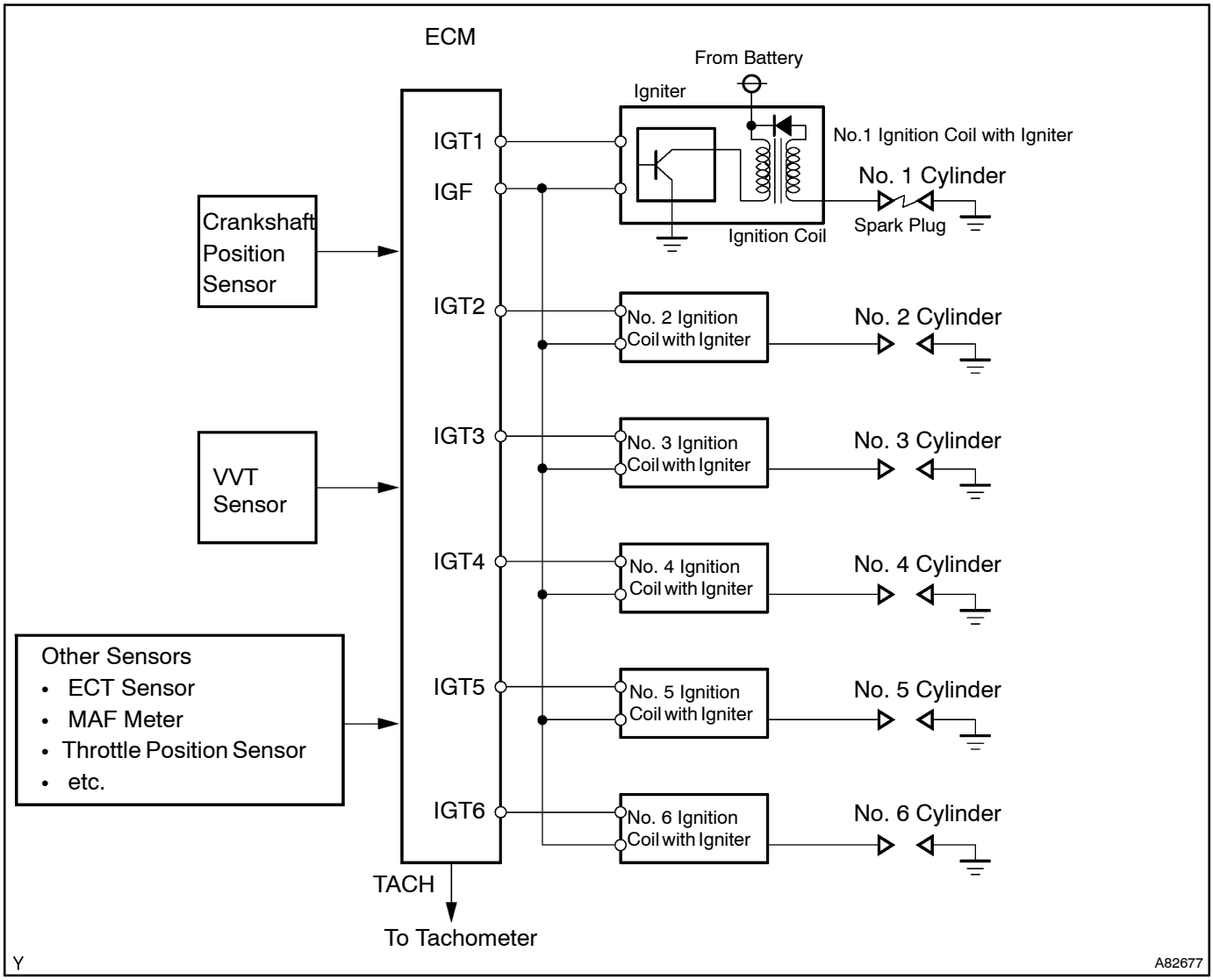
- These DTCs indicate a malfunction related to primary circuit.
- If DTC P0351 is displayed, check No.1 ignition coil with igniter circuit.
- If DTC P0352 is displayed, check No.2 ignition coil with igniter circuit.
- If DTC P0353 is displayed, check No.3 ignition coil with igniter circuit.
- If DTC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

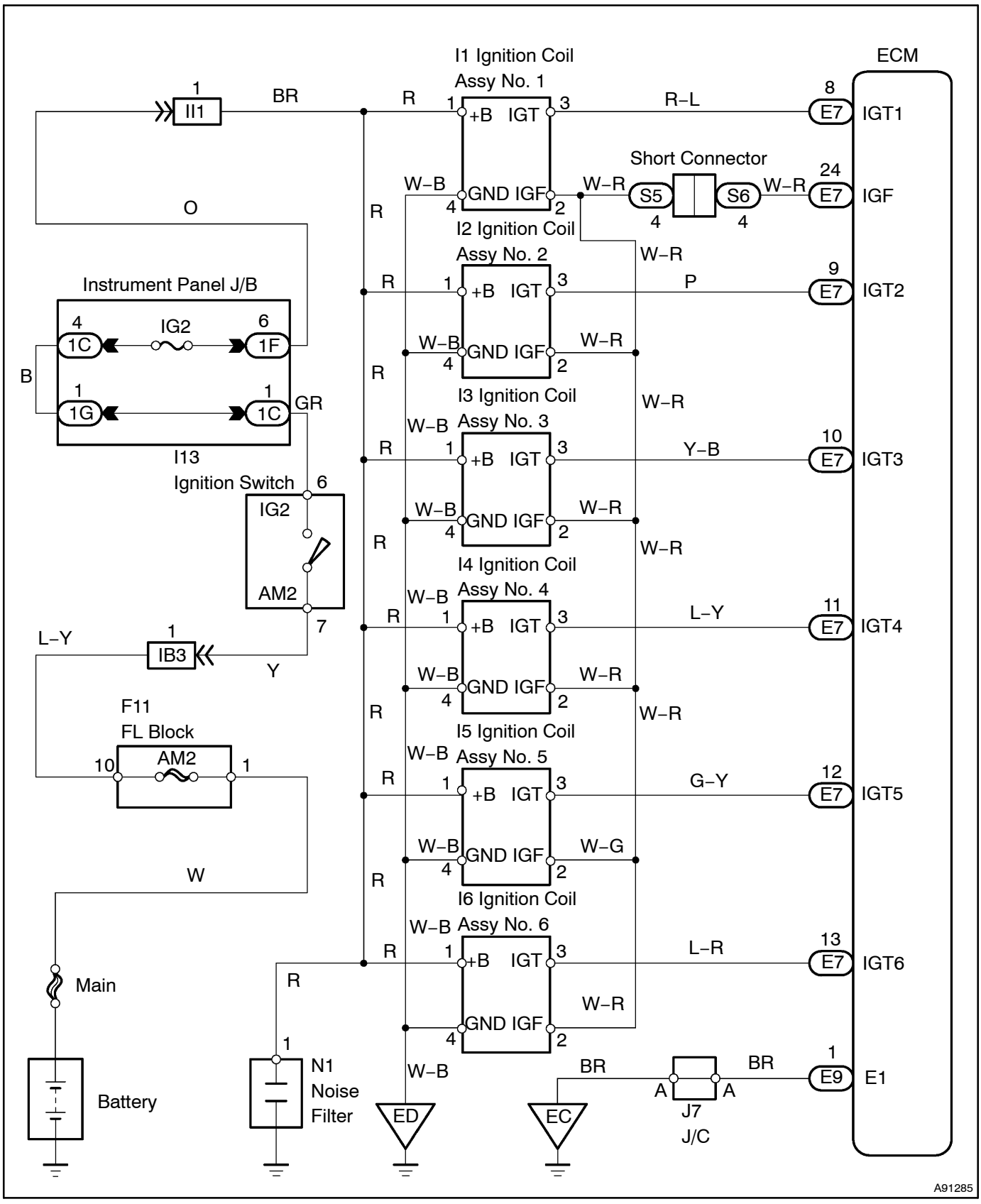
The DIS is a 1–cylinder ignition system which ignites one cylinder with one ignition coil. In the 1–cylinder ignition system, the one spark plug is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plug. The spark of the spark 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 this 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	• Ignition system • Open or short in IGF1 and IGT circuits (1 through 6) from ignition coil assy to ECM • Ignition coil assy (No.1 through No.6) • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. 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.

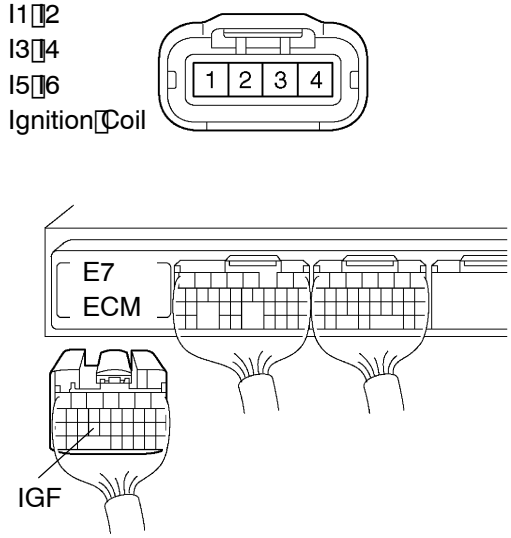
1	CHECK SPARK PLUG AND SPARK OF MISFIRING CYLINDER (See page 18–3)

OK: Spark occurs.

NG → **Go to step 7**

OK

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



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

(b) Disconnect the E7 ECM connector.

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

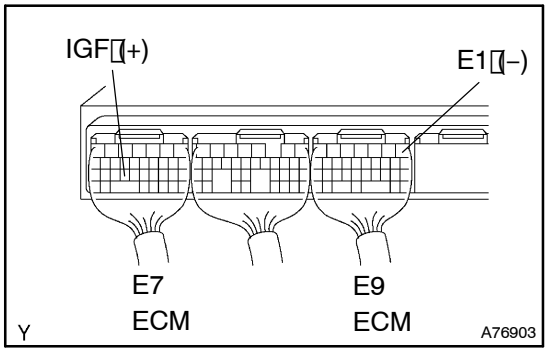
Standard:

Tester Connection	Specified Condition
I1–2 – E7–24 (IGF) I2–2 – E7–24 (IGF) I3–2 – E7–24 (IGF) I4–2 – E7–24 (IGF) I5–2 – E7–24 (IGF) I6–2 – E7–24 (IGF)	Below 1 Ω
I1–2 or E7–24 (IGF) – Body ground I2–2 or E7–24 (IGF) – Body ground I3–2 or E7–24 (IGF) – Body ground I4–2 or E7–24 (IGF) – Body ground I5–2 or E7–24 (IGF) – Body ground I6–2 or E7–24 (IGF) – Body ground	10 kΩ or higher

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

OK

3 CHECK ECM (IGF VOLTAGE)



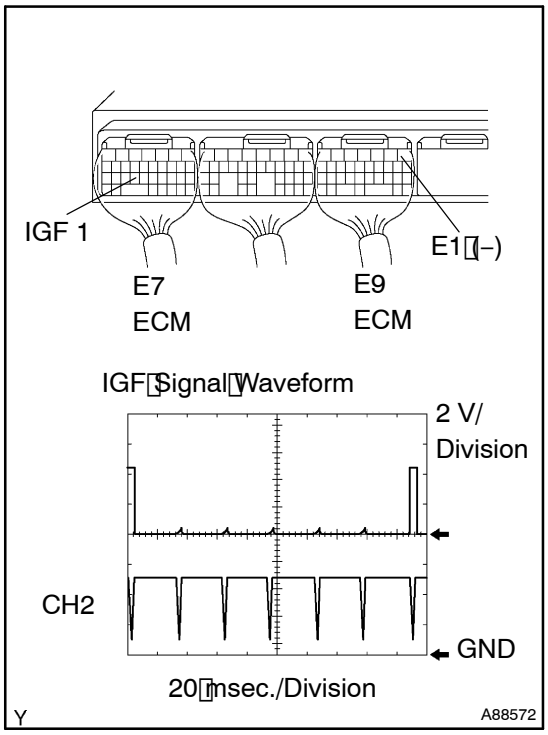
(a) Disconnect the #1, #2, #3, #4, #5 and #6 ignition coil connectors.
(b) Turn the ignition switch ON.
(c) Check the voltage of the terminals of the ECM connectors.

Standard:

Tester Connection	Specified Condition
E7–24 (IGF) – E9–1 (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
E7–24 (IGF) – E9–1 (E1)	Correct waveform is as shown

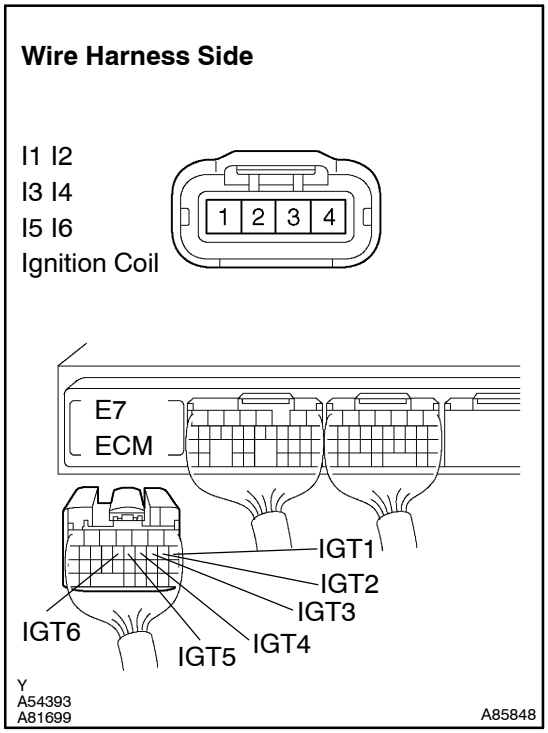


NG → REPLACE ECM (See page 10–13)

OK

REPLACE IGNITION COIL ASSY

4 CHECK WIER HARNESS (IGNITION COIL ASSY – ECM (IGT TERMINAL))



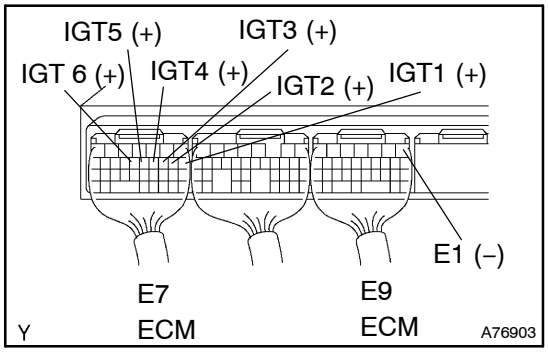
(a) Disconnect the I1, I2, I3, I4, I5 and I6 ignition coil connectors.
(b) Disconnect the E7 ECM connector.
(c) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
I1–3 – E7–8 (IGT1) I2–3 – E7–9 (IGT2) I3–3 – E7–10 (IGT3) I4–3 – E7–11 (IGT4) I5–3 – E7–12 (IGT5) I6–3 – E7–13 (IGT6)	Below 1 Ω
I1–3 or E7–8 (IGT1) – Body ground I2–3 or E7–9 (IGT2) – Body ground I3–3 or E7–10 (IGT3) – Body ground I4–3 or E7–1 (1IGT4) – Body ground I5–3 or E7–12 (IGT5) – Body ground I6–3 or E7–13 (IGT6) – Body ground	10 kΩ or higher

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

OK

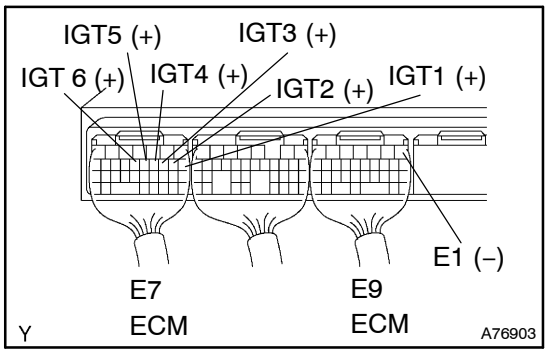
5	INSPECT ECM (IGT1, IGT2, IGT3, IGT4, IGT5 OR IGT6 VOLTAGE)



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

Standard:

Tester Connection	Specified Condition
E7–8 (GT1) – E9–1 (E1) E7–9 (IGT2) – E9–1 (E1) E7–10 (IGT3) – E9–1 (E1) E7–11 (IGT4) – E9–1 (E1) E7–12 (IGT5) – E9–1 (E1) E7–13 (IGT6) – E9–1 (E1)	More than 0.1 V or less than 4.5 V

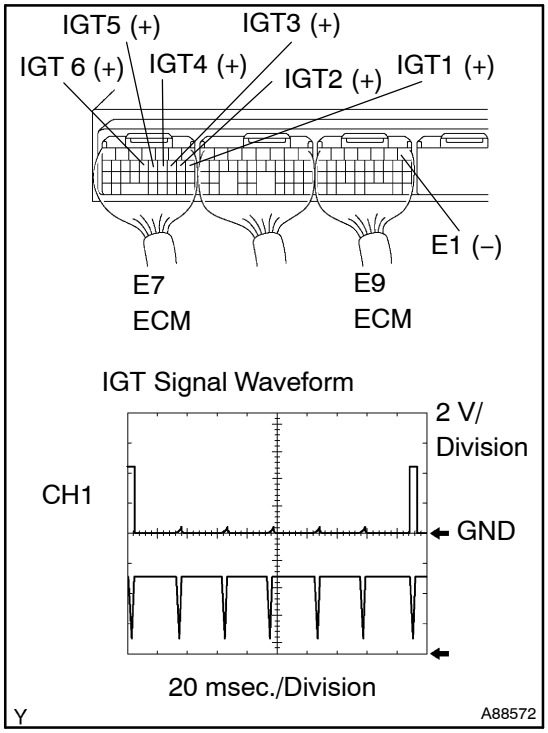


(b) Disconnect the I1, I2, I3, I4, I5 and I6 ignition coil connectors.

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

Standard:

Tester Connection	Specified Condition
E7–8 (IGT1) – E9–1 (E1) E7–9 (IGT2) – E9–1 (E1) E7–10 (IGT3) – E9–1 (E1) E7–11 (IGT4) – E9–1 (E1) E7–12 (IGT5) – E9–1 (E1) E7–13 (IGT6) – E9–1 (E1)	4.5 V or more



HINT:

Reference: Inspection using the oscilloscope.

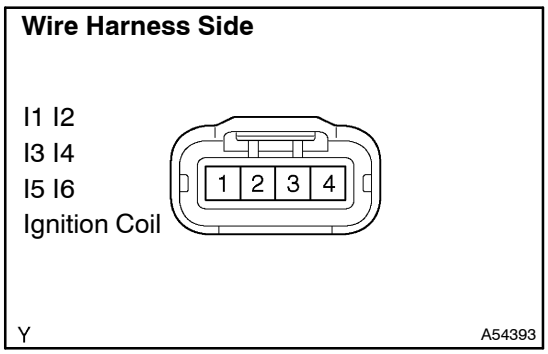
During cranking or idling, check the waveform of the ECM connectors.

Tester Connection	Specified Condition
E7–8 (GT1) – E9–1 (E1) E7–9 (IGT2) – E9–1 (E1) E7–10 (IGT3) – E9–1 (E1) E7–11 (IGT4) – E9–1 (E1) E7–12 (IGT5) – E9–1 (E1) E7–13 (IGT6) – E9–1 (E1)	Correct waveform is as shown

NG → **REPLACE ECM**

OK

6	INSPECT IGNITION COIL ASSY



(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.

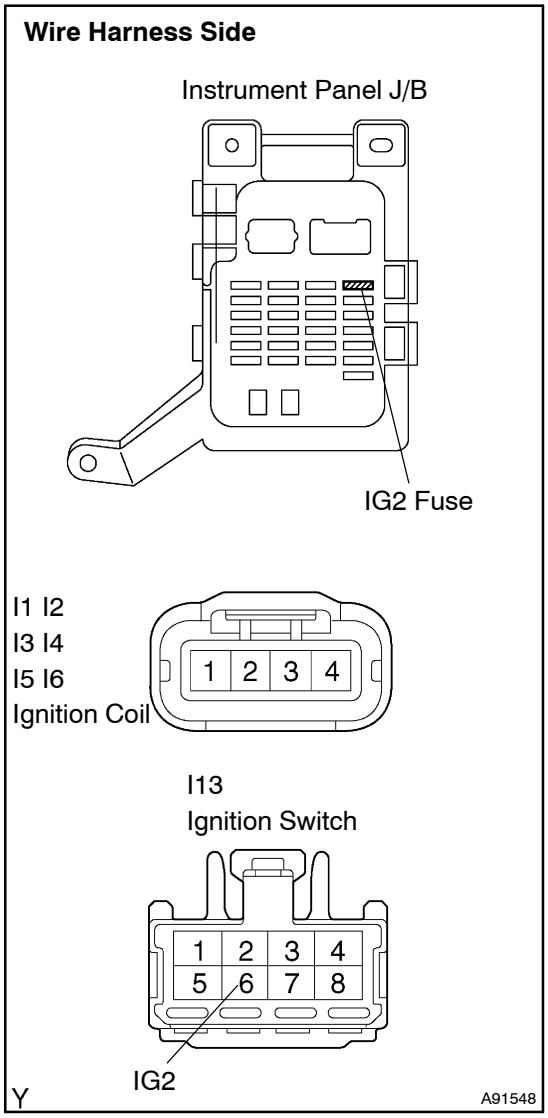
Standard:

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

NG → **REPLACE IGNITION COIL ASSY**

OK

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



(a) Check the IG2 fuse.
  (1) Remove the IG2 fuse from the instrument panel J/B.
  (2) Check for resistance of the IG2 fuse.
  Standard: Below 1Ω

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

(c) Disconnect the I13 ignition switch connector.

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

Tester Connection	Specified Condition
I1–1 – I13–6 (IG2) I2–1 – I13–6 (IG2) I3–1 – I13–6 (IG2) I4–1 – I13–6 (IG2) I5–1 – I13–6 (IG2) I6–1 – I13–6 (IG2)	Below 1 Ω
I1–1 or I13–6 (IG2) – Body ground I2–1 or I13–6 (IG2) – Body ground I3–1 or I13–6 (IG2) – Body ground I4–1 or I13–6 (IG2) – Body ground I5–1 or I13–6 (IG2) – Body ground I6–1 or I13–6 (IG2) – Body ground	10 kΩ or higher

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

OK →

REPLACE IGNITION COIL ASSY