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

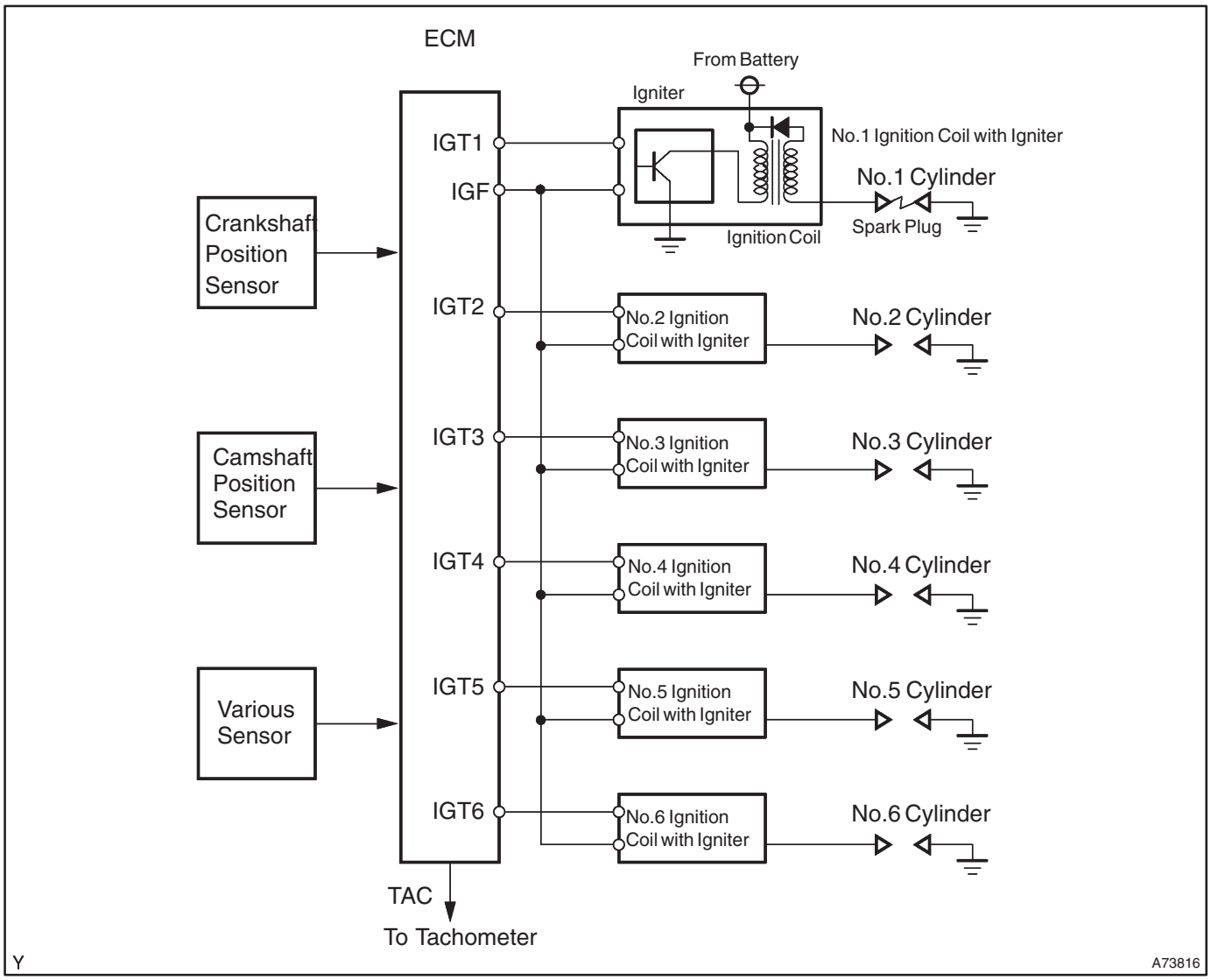
CIRCUIT DESCRIPTION

HINT:

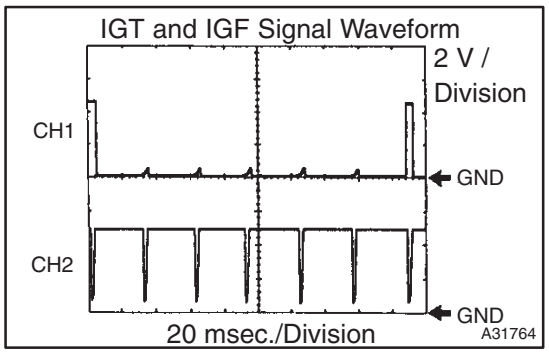
- These DTCs indicate a malfunction related to primary circuit.
- If DTC P0351 is displayed, check No.1 ignition coil with igniter circuit.
- If DTC P0352 is displayed, check No.2 ignition coil with igniter circuit.
- If DTC P0353 is displayed, check No.3 ignition coil with igniter circuit.
- If DTC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

A Direct Ignition System (DIS) has been adopted. The DIS improves the ignition timing accuracy, reduces high–voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor. 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 (IGT) for each cylinder. Based on the IGT signals, the power transistors in the igniter cut off the current to the primary coil in the ignition coil is supplied to the spark plug that is connected to the end of the secondary coil. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail–safe measure to the ECM.

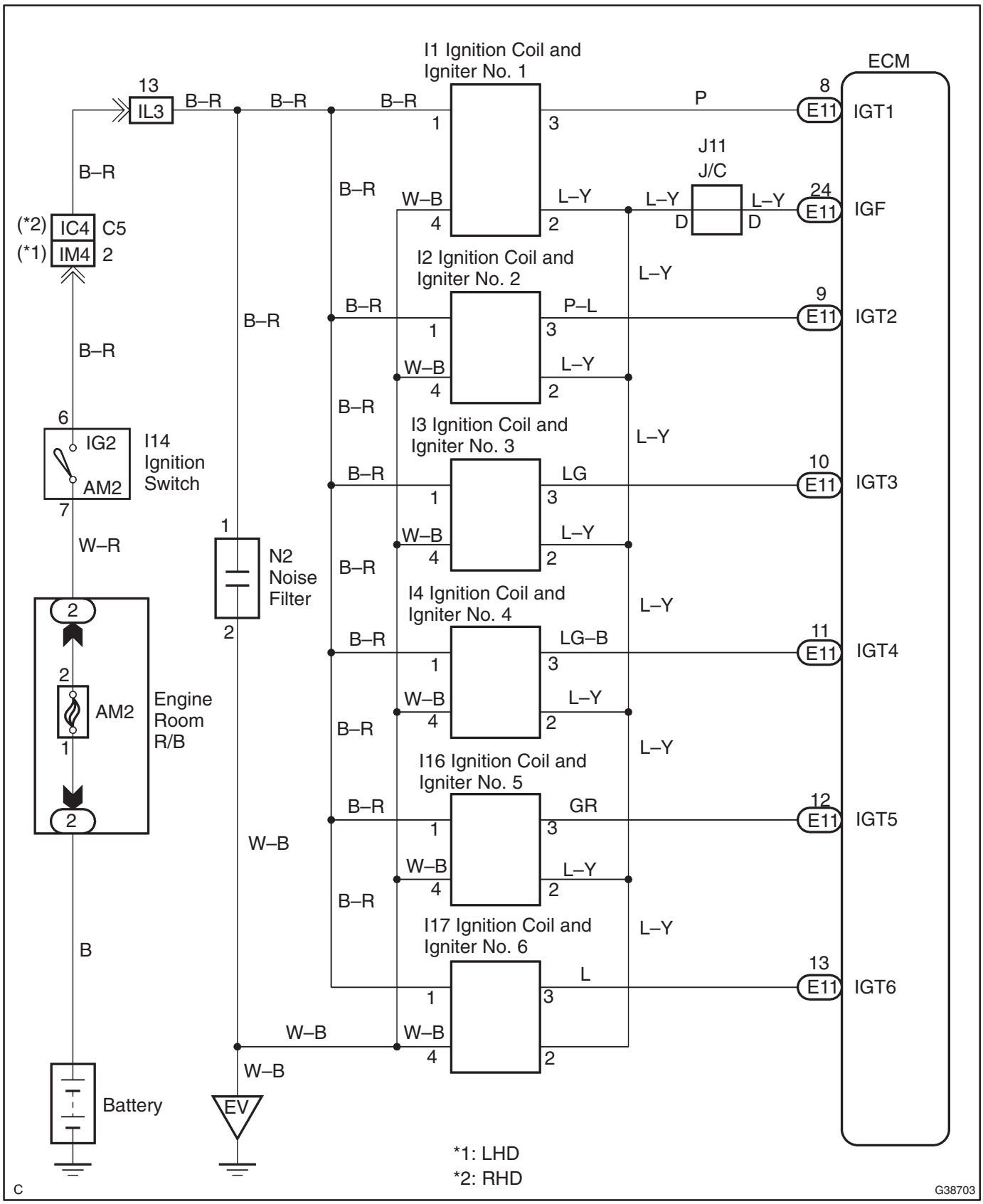


DTC No.	DTC Detection Condition	Trouble Area
P0351 P0352 P0353 P0354 P0355 P0356	No IGF signal to ECM while engine is running	• Ignition system • Open or short in IGF or IGT1 to 6 circuit from ignition coil with igniter to ECM • No.1 to No.6 ignition coil with igniter • ECM



Reference:
Inspection using the oscilloscope.
During cranking or idling, check the waveform between terminals IGT1 to IGT6 and E1, and IGF and E1 of the E11 and E13 ECM connectors.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

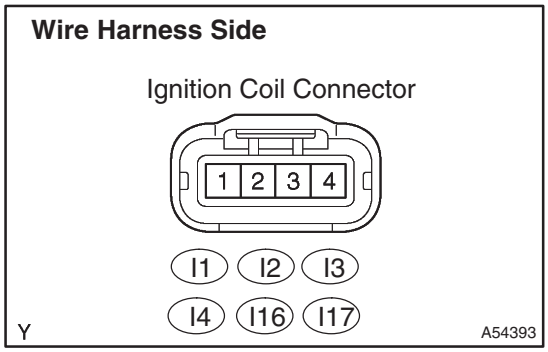
Read freeze frame data using the Intelligent Tester II. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

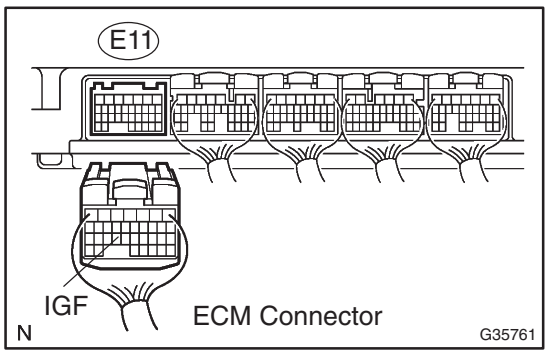
1	**CHECK SPARK PLUG AND SPARK OF MISFIRING CYLINDER (See Pub. No. RM1017E, page 18–3)**

NG → **Go to step 4**

OK

2	**CHECK HARNESS AND CONNECTOR(IGNITION COIL ASSY – ECM (IGF SIGNAL TERMINAL))**





(a) Disconnect the I1, I2, I3, I4, I16 or I17 ignition coil connector.

(b) Disconnect the ECM E11 connector.

(c) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
Ignition coil (I1–2) – IGF (E11–24)	Below 1 Ω
Ignition coil (I2–2) – IGF (E11–24)	Below 1 Ω
Ignition coil (I3–2) – IGF (E11–24)	Below 1 Ω
Ignition coil (I4–2) – IGF (E11–24)	Below 1 Ω
Ignition coil (I16–2) – IGF (E11–24)	Below 1 Ω
Ignition coil (I17–2) – IGF (E11–24)	Below 1 Ω

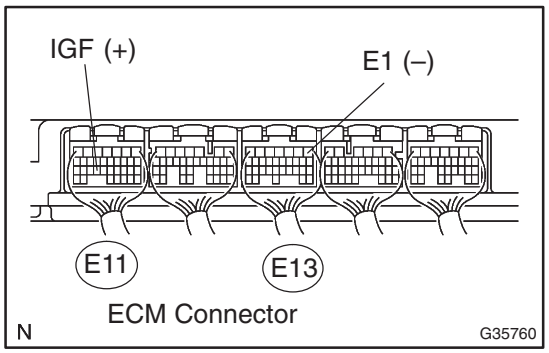
Standard (Check for short):

Symbols (Terminal No.)	Specified condition
Ignition coil (I1–2) or IGF (E11–24) – Body ground	10 kΩ or higher
Ignition coil (I2–2) or IGF (E11–24) – Body ground	10 kΩ or higher
Ignition coil (I3–2) or IGF (E11–24) – Body ground	10 kΩ or higher
Ignition coil (I4–2) or IGF (E11–24) – Body ground	10 kΩ or higher
Ignition coil (I16–2) or IGF (E11–24) – Body ground	10 kΩ or higher
Ignition coil (I17–2) or IGF (E11–24) – Body ground	10 kΩ or higher

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

OK

3 INSPECT ECM(IGF1 VOLTAGE)



(a) Disconnect the ignition coil connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the terminals of the E11 and E13 ECM connectors.

Standard:

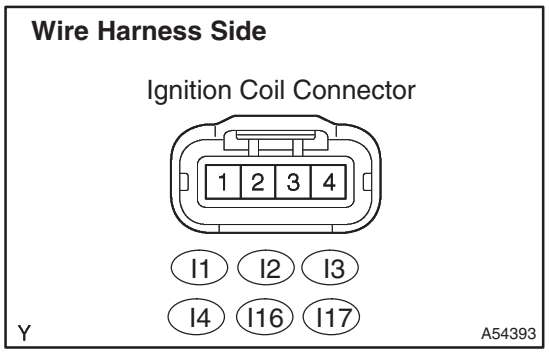
Symbols (Terminal No.)	Specified condition
IGF (E11–24) – E1 (E13–1)	4.5 to 5.5 V

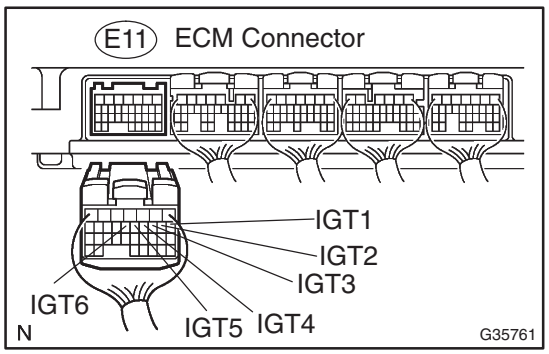
NG → **REPLACE ECM (See Pub. No. RM1017E, page 10–11)**

OK

REPLACE IGNITION COIL ASSY

4 CHECK HARNESS AND CONNECTOR(IGNITION COIL ASSY – ECM (IGT SIGNAL TERMINAL))





(a) Disconnect the I1, I2, I3, I4, I16 or I17 ignition coil connector.
(b) Disconnect the ECM E11 connector.
(c) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
Ignition coil (I1–3) – IGT1 (E11–8)	Below 1 Ω
Ignition coil (I2–3) – IGT2 (E11–9)	Below 1 Ω
Ignition coil (I3–3) – IGT3 (E11–10)	Below 1 Ω
Ignition coil (I4–3) – IGT4 (E11–11)	Below 1 Ω
Ignition coil (I16–3) – IGT5 (E11–12)	Below 1 Ω
Ignition coil (I17–3) – IGT6 (E11–13)	Below 1 Ω

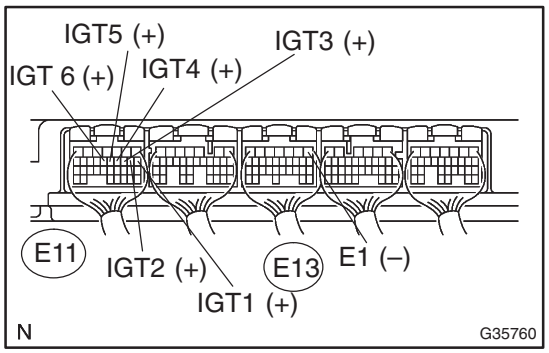
Standard (Check for short):

Symbols (Terminal No.)	Specified condition
Ignition coil (I1–3) or IGT1 (E11–8) – Body ground	10 kΩ or higher
Ignition coil (I2–3) or IGT2 (E11–9) – Body ground	10 kΩ or higher
Ignition coil (I3–3) or IGT3 (E11–10) – Body ground	10 kΩ or higher
Ignition coil (I4–3) or IGT4 (E11–11) – Body ground	10 kΩ or higher
Ignition coil (I16–3) or IGT5 (E11–12) – Body ground	10 kΩ or higher
Ignition coil (I17–3) or IGT6 (E11–13) – 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) Measure the voltage between the terminals of the E11 and E13 ECM connectors when the engine is cranked.

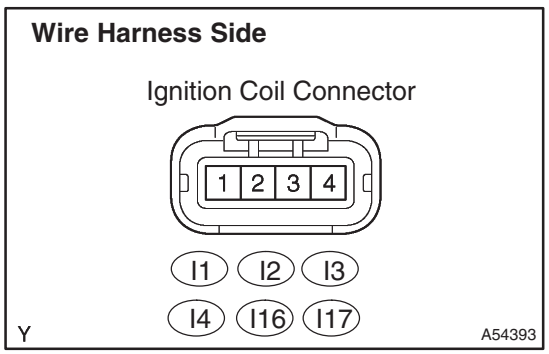
Standard:

Symbols (Terminal No.)	Specified condition
IGT1 (E11–8) – E1 (E13–1)	Between 0.1 V and 4.5 V
IGT2 (E11–9) – E1 (E13–1)	Between 0.1 V and 4.5 V
IGT3 (E11–10) – E1 (E13–1)	Between 0.1 V and 4.5 V
IGT4 (E11–11) – E1 (E13–1)	Between 0.1 V and 4.5 V
IGT5 (E11–12) – E1 (E13–1)	Between 0.1 V and 4.5 V
IGT6 (E11–13) – E1 (E13–1)	Between 0.1 V and 4.5 V

NG → **REPLACE ECM (See Pub. No. RM1017E, page 10–11)**

OK

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

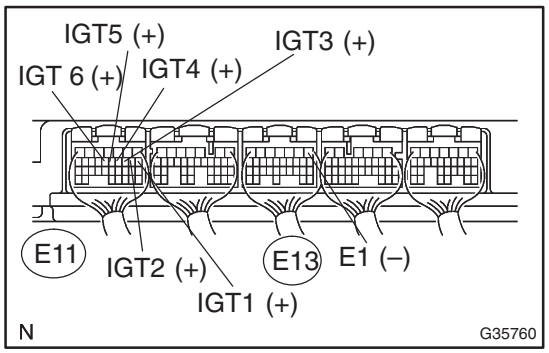


(a) Disconnect the I1, I2, I3, I4, I16 or I17 ignition coil connector.

(b) Measure the voltage between the terminals of the E11 and E13 ECM connectors when the engine is cranked.

Standard:

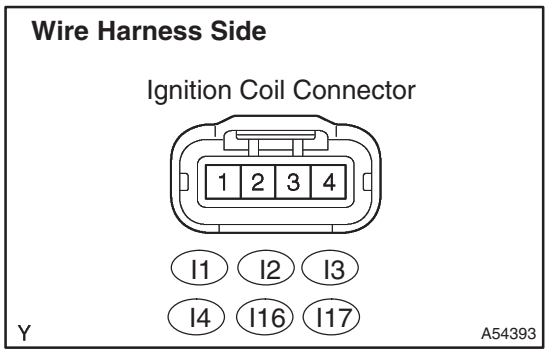
Symbols (Terminal No.)	Specified condition
IGT1 (E11–8) – E1 (E13–1)	4.5 V or more
IGT2 (E11–9) – E1 (E13–1)	4.5 V or more
IGT3 (E11–10) – E1 (E13–1)	4.5 V or more
IGT4 (E11–11) – E1 (E13–1)	4.5 V or more
IGT5 (E11–12) – E1 (E13–1)	4.5 V or more
IGT6 (E11–13) – E1 (E13–1)	4.5 V or more



NG → **REPLACE ECM (See Pub. No. RM1017E, page 10–11)**

OK

7 INSPECT IGNITION COIL ASSY(POWER SOURCE)



(a) Disconnect the I1, I2, I3, I4, I16 or I17 ignition coil connector.
(b) Turn the ignition switch to ON.
(c) Measure the voltage between the terminal of the wire harness side connector and the body ground.

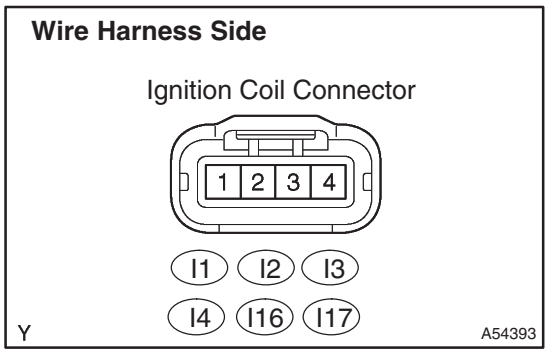
Standard:

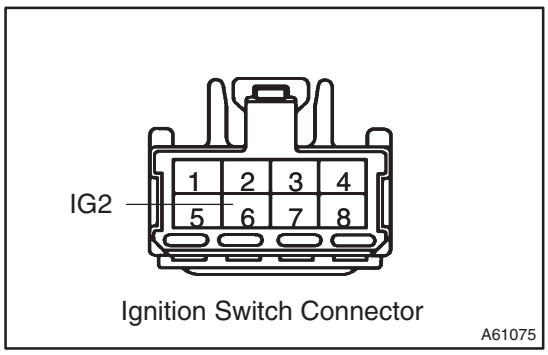
Terminal No.	Specified condition
I1–1 – Body ground	9 to 14 V
I2–1 – Body ground	9 to 14 V
I3–1 – Body ground	9 to 14 V
I4–1 – Body ground	9 to 14 V
I16–1 – Body ground	9 to 14 V
I17–1 – Body ground	9 to 14 V

OK > **REPLACE IGNITION COIL ASSY**

NG

8 CHECK HARNESS AND CONNECTOR(IGNITION COIL ASSY – IGNITION SWITCH)





(a) Disconnect the I1, I2, I3, I4, I16 or I17 ignition coil connector.
(b) Disconnect the ignition switch connector.
(c) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
Ignition coil (I1–1) – IG2 (6)	Below 1 Ω
Ignition coil (I2–1) – IG2 (6)	Below 1 Ω
Ignition coil (I3–1) – IG2 (6)	Below 1 Ω
Ignition coil (I4–1) – IG2 (6)	Below 1 Ω
Ignition coil (I16–1) – IG2 (6)	Below 1 Ω
Ignition coil (I17–1) – IG2 (6)	Below 1 Ω

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
Ignition coil (I1–1) or IG2 (6) – Body ground	10 kΩ or higher
Ignition coil (I2–1) or IG2 (6) – Body ground	10 kΩ or higher
Ignition coil (I3–1) or IG2 (6) – Body ground	10 kΩ or higher
Ignition coil (I4–1) or IG2 (6) – Body ground	10 kΩ or higher
Ignition coil (I16–1) or IG2 (6) – Body ground	10 kΩ or higher
Ignition coil (I17–1) or IG2 (6) – Body ground	10 kΩ or higher

NG > **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE IGNITION COIL ASSY