DICN4−02

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

DTC	P0357	Ignition Coil ”G” Primary/Secondary Circuit

DTC	P0358	Ignition Coil ”H” Primary/Secondary Circuit

HINT:

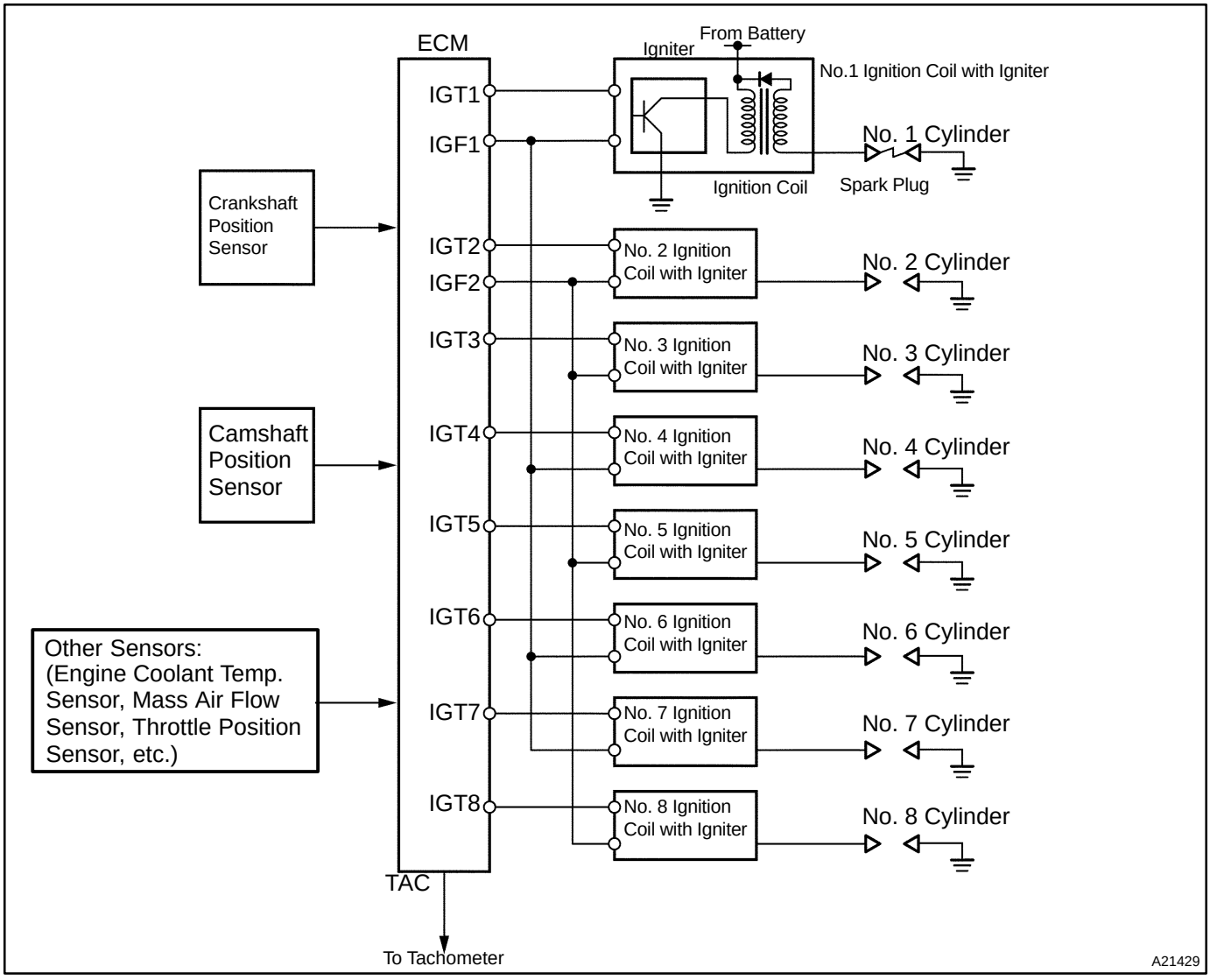
- These DTCs indicate a malfunction related to primary circuit.
- If DTC P0351 is displayed, check No. 1 ignition coil with igniter circuit.
- If DTC P0352 is displayed, check No. 2 ignition coil with igniter circuit.
- If DTC P0353 is displayed, check No. 3 ignition coil with igniter circuit.
- If DTC 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.
- If DTC P0357 is displayed, check No. 7 ignition coil with igniter circuit.
- If DTC P0358 is displayed, check No. 8 ignition coil with igniter circuit.

CIRCUIT DESCRIPTION

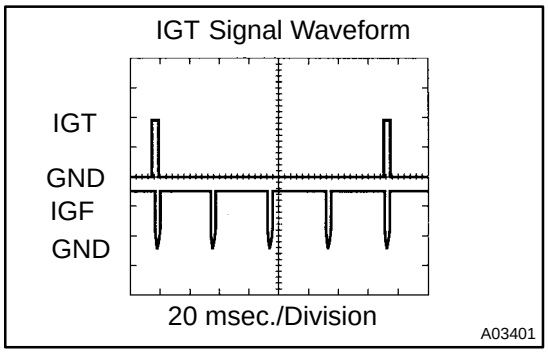
These DTCs indicate a malfunction related to primary circuit.

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 and this switches on and off the current to the primary coil. When the 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.

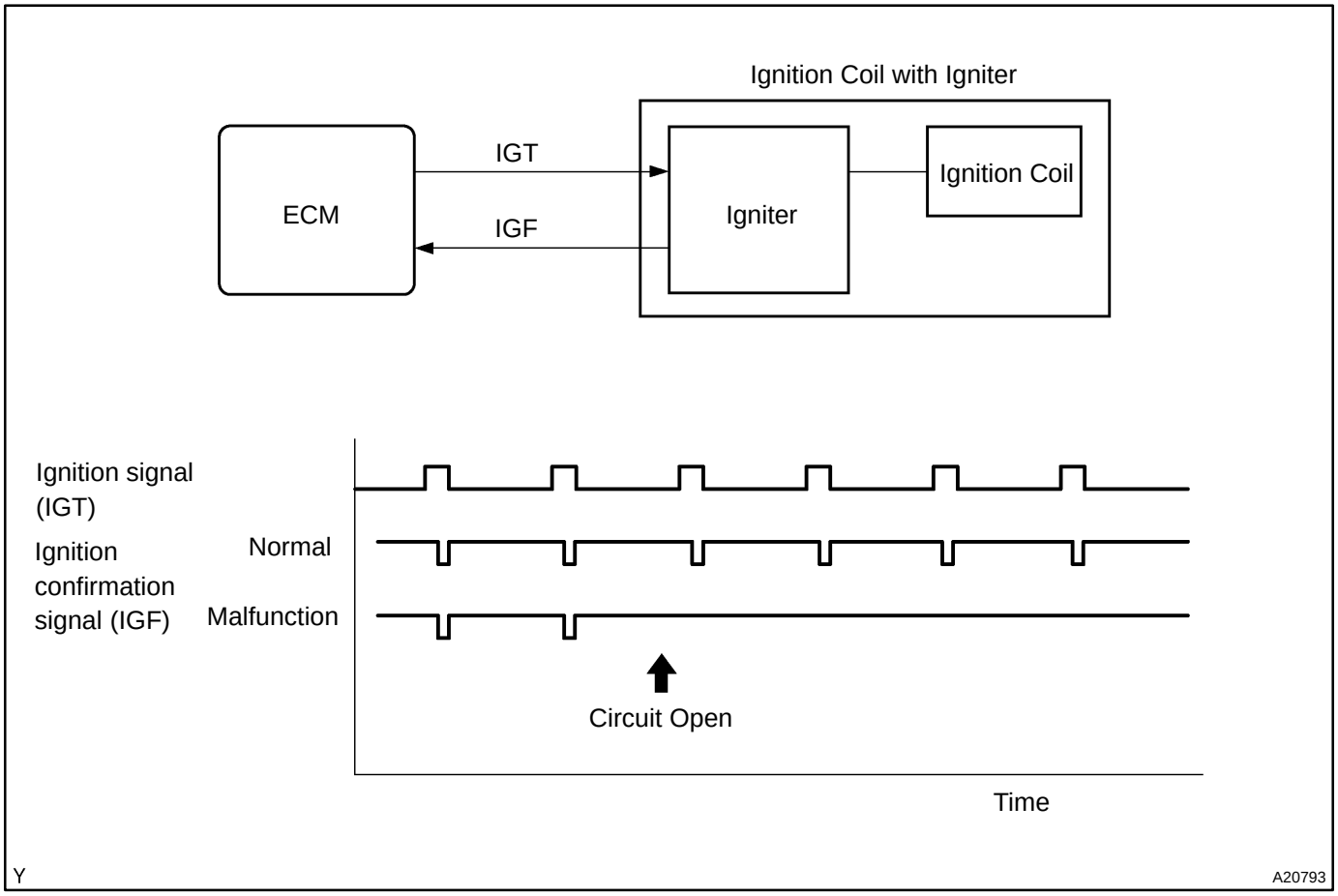


DTC No.	DTC Detecting Condition	Trouble Area
P0351 P0352 P0353 P0354 P0355 P0356 P0357 P0358	No IGF signal to ECM while engine is running	• Open or short in IGF1 or IGF2 and IGT1 to IGT8 circuit from ignition coil with igniter to ECM • No. 1 to No. 8 ignition coil with igniter (primary ignition) • Ignition system • ECM



Reference: Inspection using the oscilloscope.
During cranking or idling, check the waveform between terminals IG1 to IG8 and E1, and IGF1, IGF2 and E1 of the E5 and E7 ECM connectors.

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	No. 1 ignition coil with igniter circuit malfunction
	P0352	No. 2 ignition coil with igniter circuit malfunction
	P0353	No. 3 ignition coil with igniter circuit malfunction
	P0354	No. 4 ignition coil with igniter circuit malfunction
	P0355	No. 5 ignition coil with igniter circuit malfunction
	P0356	No. 6 ignition coil with igniter circuit malfunction
	P0357	No. 7 ignition coil with igniter circuit malfunction
	P0358	No. 8 ignition coil with igniter circuit malfunction
Required sensors/components	Igniter	
Frequency of operation	Continuous	
Duration	0.256 sec. + 4 sparks	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI−437	
Either of the following conditions is met:	Condition 1 or 2	
1. Engine speed	−	1,500 rpm
2. Starter	OFF	
Either of the following conditions is met:	Condition (a) or (b)	
(a) All of the following conditions are met	−	
Engine speed	−	500 rpm
Battery voltage	6 V	−
(b) All of the following conditions are met	−	
Engine speed	500 rpm	−
Battery voltage	10 V	−
Number of sparks after CPU is reset	5 sparks	−

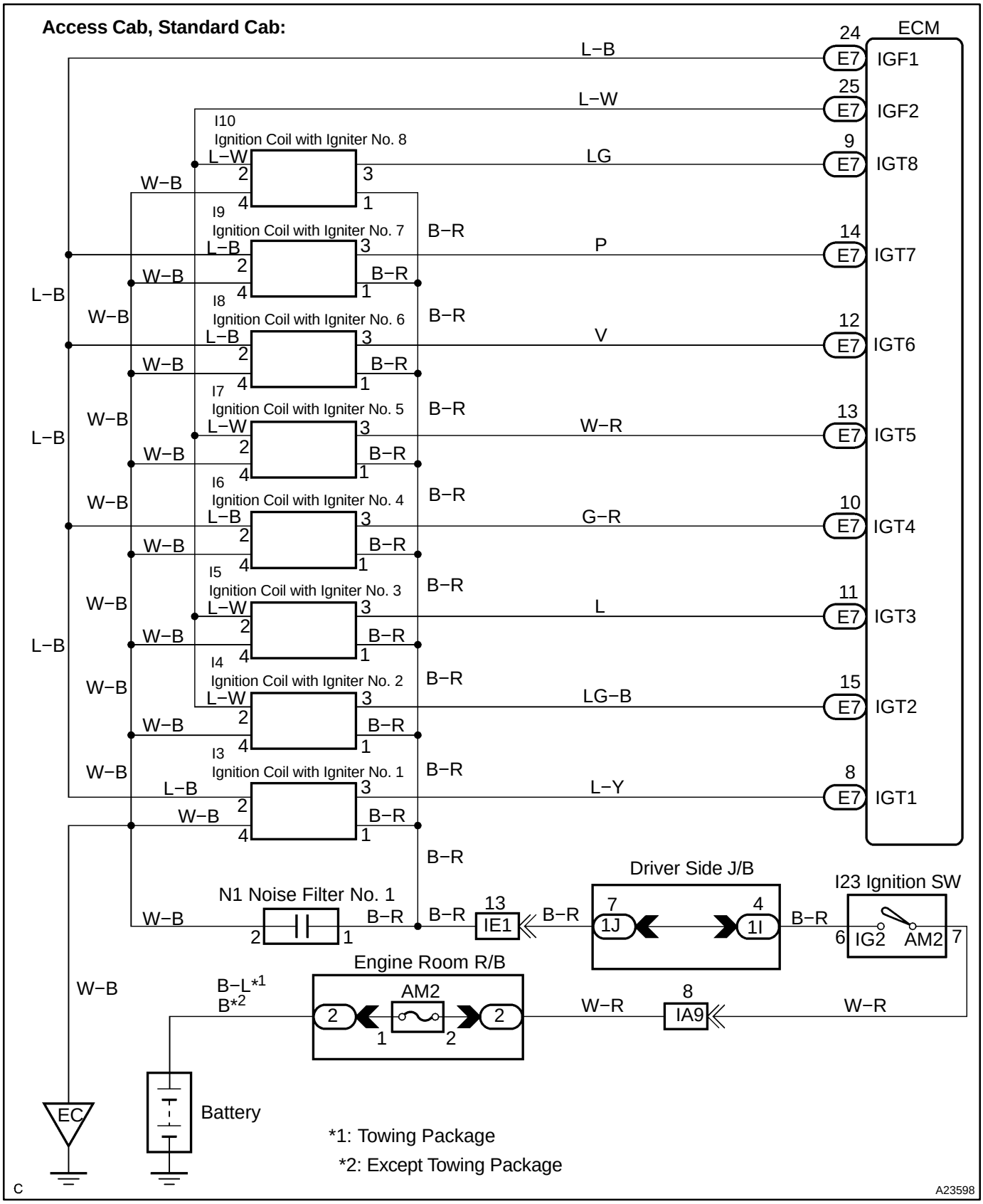
TYPICAL MALFUNCTION THRESHOLDS

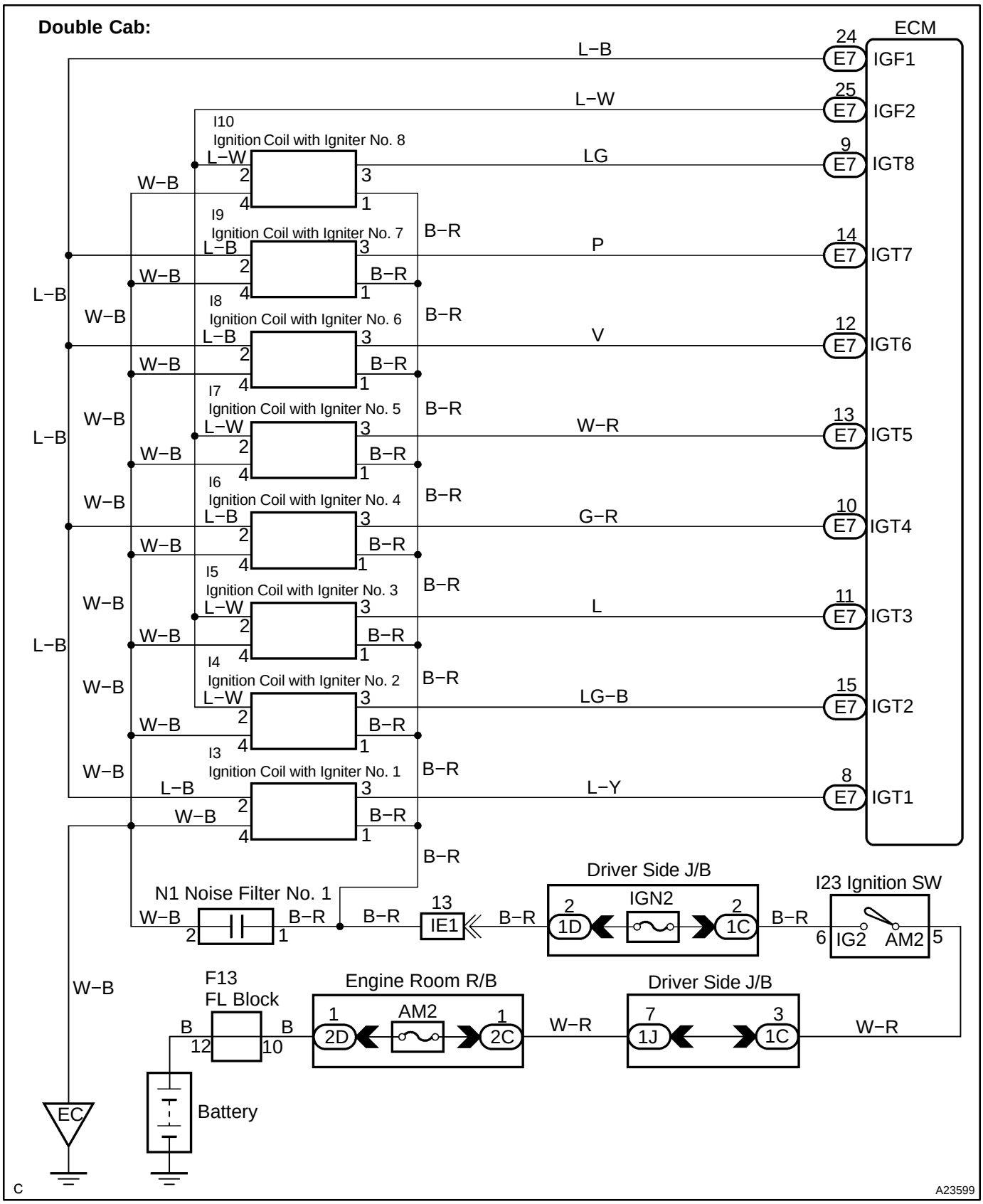
Detection Criteria	Threshold
”Ignition signal fail count”	More than 2 times
”Ignition signal fail count” is on the right:	When IGF does not return despite sending IGT.

COMPONENT OPERATING RANGE

Standard Value
Confirmed signal number = ignition signal number

WIRING DIAGRAM




Double Cab:
ECM
24
E7
IGF1
L−B
25
E7
IGF2
L−W
I10
Ignition Coil with Igniter No. 8
9
E7
IGT8
LG
I9
Ignition Coil with Igniter No. 7
14
E7
IGT7
P
I8
Ignition Coil with Igniter No. 6
12
E7
IGT6
V
I7
Ignition Coil with Igniter No. 5
13
E7
IGT5
W−R
I6
Ignition Coil with Igniter No. 4
10
E7
IGT4
G−R
I5
Ignition Coil with Igniter No. 3
11
E7
IGT3
L
I4
Ignition Coil with Igniter No. 2
15
E7
IGT2
LG−B
I3
Ignition Coil with Igniter No. 1
8
E7
IGT1
L−Y
W−B
B−R
N1 Noise Filter No. 1
13
IE1
Driver Side J/B
IGN2
1D
1C
I23 Ignition SW
IG2
AM2
F13
FL Block
Engine Room R/B
AM2
2D
2C
Driver Side J/B
1J
1C
Battery
EC
C
A23599

INSPECTION PROCEDURE

HINT:

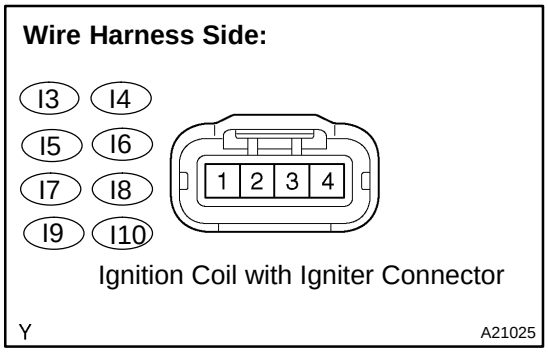
- If DTCs P0351, P0354, P0356 and P0357 are output simultaneously, IGF1 circuit may be open or short.
- If DTCs P0352, P0353, P0355 and P0358 are output simultaneously, IGF2 circuit may be open or short.
- Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions 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, as well as other data from the time when a malfunction occurred.

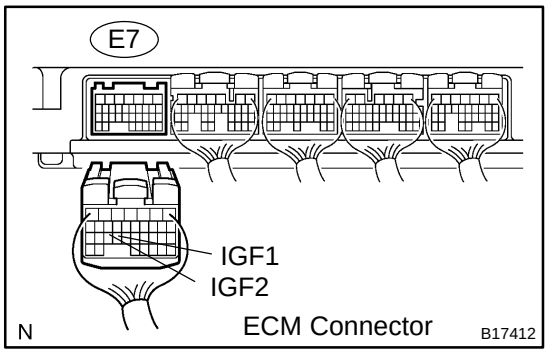
1	**Check spark plug and spark (See page IG−1).**

NG → **Go to step 4.**

OK

2	**Check for open and short in harness and connector in IGF signal circuits between ECM and ignition coil with igniter.**





PREPARATION:

(a) Disconnect the I3, I4, I5, I6, I7, I8, I9 or I10 ignition coil will igniter connector.

(b) Disconnect the E7 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

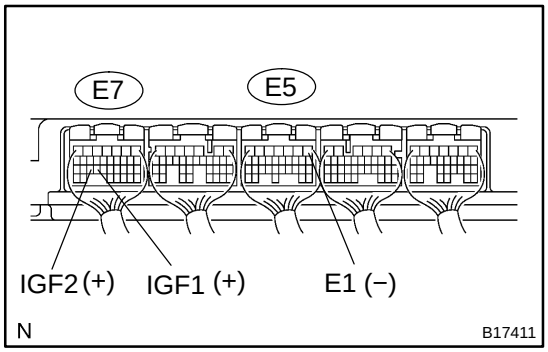
Standard:

Tester Connection	Specified Condition
Ignition coil (I3−2) − IGF1 (E7−24)	Below 1 Ω
Ignition coil (I4−2) − IGF2 (E7−25)	Below 1 Ω
Ignition coil (I5−2) − IGF1 (E7−24)	Below 1 Ω
Ignition coil (I6−2) − IGF2 (E7−25)	Below 1 Ω
Ignition coil (I7−2) − IGF1 (E7−24)	Below 1 Ω
Ignition coil (I8−2) − IGF2 (E7−25)	Below 1 Ω
Ignition coil (I9−2) − IGF1 (E7−24)	Below 1 Ω
Ignition coil (I10−2) − IGF2 (E7−25)	Below 1 Ω
Ignition coil (I3−2) or IGF1 (E7−24) − Body ground	10 kΩ or higher
Ignition coil (I4−2) or IGF2 (E7−25) − Body ground	10 kΩ or higher
Ignition coil (I5−2) or IGF1 (E7−24) − Body ground	10 kΩ or higher
Ignition coil (I6−2) or IGF2 (E7−25) − Body ground	10 kΩ or higher
Ignition coil (I7−2) or IGF1 (E7−24) − Body ground	10 kΩ or higher
Ignition coil (I8−2) or IGF2 (E7−25) − Body ground	10 kΩ or higher
Ignition coil (I9−2) or IGF1 (E7−24) − Body ground	10 kΩ or higher
Ignition coil (I10−2) or IGF2 (E7−25) − Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

3	**Disconnect ignition coil with igniter connector, and check voltage between terminals IGF1, IGF2 and E1 of ECM connector.**



PREPARATION:

(a) Disconnect the I3, I4, I5, I6, I7, I8, I9 or I10 ignition coil with igniter connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the E7 and E5 ECM connectors.

OK:

Standard:

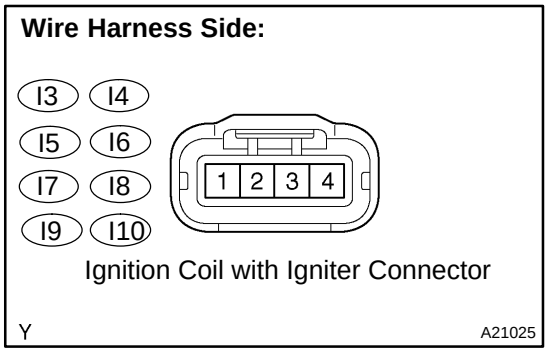
Tester Connection	Specified Condition
IGF1 (E7−24) − E1 (E5−1)	4.5 to 5.5 V
IGF2 (E7−25) − E1 (E5−1)	4.5 to 5.5 V

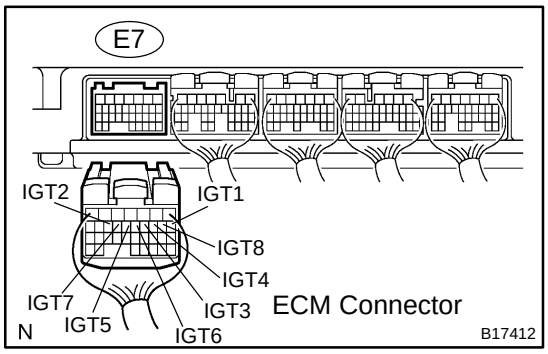
NG → **Replace ECM (See page SF−82).**

OK

Replace ignition coil with igniter.

4	**Check for open and short in harness and connector in IGT signal circuit between ECM and ignition coil with igniter.**





PREPARATION:

(a) Disconnect the I3, I4, I5, I6, I7, I8, I9 or I10 ignition coil connector.

(b) Disconnect the E7 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

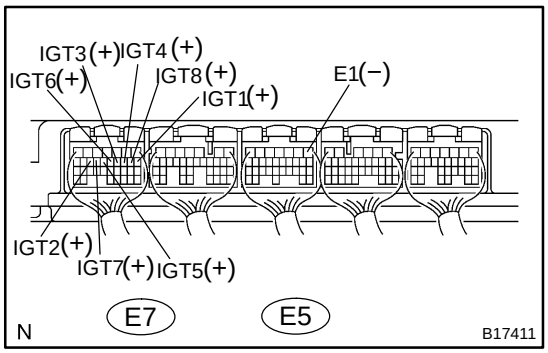
Standard:

Tester Connection	Specified Condition
Ignition coil (I3−2) − IGT1 (E7−8)	Below 1 Ω
Ignition coil (I4−2) − IGT2 (E7−15)	Below 1 Ω
Ignition coil (I5−2) − IGT3 (E7−11)	Below 1 Ω
Ignition coil (I6−2) − IGT4 (E7−10)	Below 1 Ω
Ignition coil (I7−2) − IGT5 (E7−13)	Below 1 Ω
Ignition coil (I8−2) − IGT6 (E7−12)	Below 1 Ω
Ignition coil (I9−2) − IGT7 (E7−14)	Below 1 Ω
Ignition coil (I10−2) − IGT8 (E7−9)	Below 1 Ω
Ignition coil (I3−2) or IGT1 (E7−8) − Body ground	10 kΩ or higher
Ignition coil (I4−2) or IGT2 (E7−15) − Body ground	10 kΩ or higher
Ignition coil (I5−2) or IGT3 (E7−11) − Body ground	10 kΩ or higher
Ignition coil (I6−2) or IGT4 (E7−10) − Body ground	10 kΩ or higher
Ignition coil (I7−2) or IGT5 (E7−13) − Body ground	10 kΩ or higher
Ignition coil (I8−2) or IGT6 (E7−12) − Body ground	10 kΩ or higher
Ignition coil (I9−2) or IGT7 (E7−14) − Body ground	10 kΩ or higher
Ignition coil (I10−2) or IGT8 (E7−9) − Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

5	Check voltage between terminals IGT1 − IGT8 and E1 of ECM connector.



PREPARATION:

Turn the ignition switch to ON.

CHECK:

Measure the voltage between terminals the E7 and E5 ECM connectors when the engine is cranked.

OK:

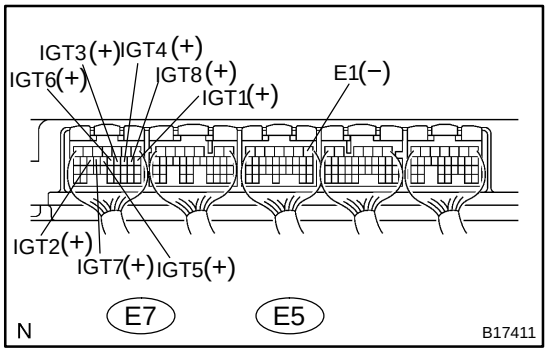
Standard:

Tester Connection	Specified Condition
IGT1 (E7−8) − E1 (E5−1)	More than 0.1 V or less than 4.5 V
IGT2 (E7−15) − E1 (E5−1)	More than 0.1 V or less than 4.5 V
IGT3 (E7−11) − E1 (E5−1)	More than 0.1 V or less than 4.5 V
IGT4 (E7−10) − E1 (E5−1)	More than 0.1 V or less than 4.5 V
IGT5 (E7−13) − E1 (E5−1)	More than 0.1 V or less than 4.5 V
IGT6 (E7−12) − E1 (E5−1)	More than 0.1 V or less than 4.5 V
IGT7 (E7−14) − E1 (E5−1)	More than 0.1 V or less than 4.5 V
IGT8 (E7−9) − E1 (E5−1)	More than 0.1 V or less than 4.5 V

NG	Replace ECM (See page SF−82).

OK

6	**Disconnect ignition coil with igniter connector, and check voltage between terminals IGT1 − IGT8 and E1 of ECM connector.**



PREPARATION:

(a) Disconnect the I3, I4, I5, I6, I7, I8, I9 or I10 ignition coil with igniter connector.

(b) Turn the ignition switch to ON.

CHECK:

Measure the voltage between terminals the E5 and E7 ECM connectors when the engine is cranked.

OK:

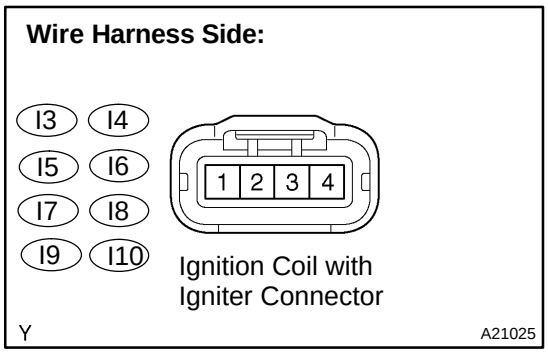
Standard:

Tester Connection	Specified Condition
IGT1 (E7−8) − E1 (E5−1)	4.5 V or more
IGT2 (E7−15) − E1 (E5−1)	4.5 V or more
IGT3 (E7−11) − E1 (E5−1)	4.5 V or more
IGT4 (E7−10) − E1 (E5−1)	4.5 V or more
IGT5 (E7−13) − E1 (E5−1)	4.5 V or more
IGT6 (E7−12) − E1 (E5−1)	4.5 V or more
IGT7 (E7−14) − E1 (E5−1)	4.5 V or more
IGT8 (E7−9) − E1 (E5−1)	4.5 V or more

NG → **Replace ECM (See page SF−82).**

OK →

7	Check ignition coil with igniter power source circuit.



PREPARATION:

(a) Disconnect the I3, I4, I5, I6, I7, I8, I9 or I10 ignition coil with igniter connector.

(b) Turn the ignition switch to ON.

CHECK:

Measure the voltage between the terminal of the wire harness side connector and body ground.

OK:

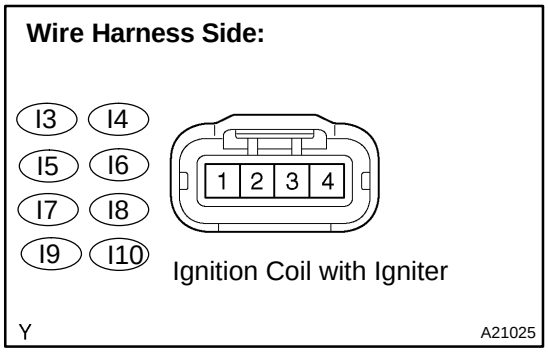
Standard:

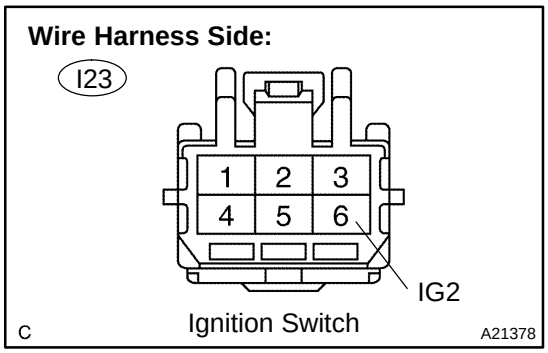
Tester Connection	Specified Condition
I3−1 − Body ground	9 to 14 V
I4−1 − Body ground	
I5−1 − Body ground	
I6−1 − Body ground	
I7−1 − Body ground	
I8−1 − Body ground	
I9−1 − Body ground	
I10−1 − Body ground	

OK → **Repair ignition coil with igniter.**

NG

8	**Check for open and short in harness and connector between ignition switch and ignition coil with igniter.**





PREPARATION:

(a) Disconnect the I3, I4, I5, I6, I7, I8, I9 or I10 ignition coil with igniter connector.

(b) Disconnect the I23 ignition switch connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
Ignition coil (I3−1) − IG2 (I23−6)	Below 1 Ω
Ignition coil (I4−1) − IG2 (I23−6)	Below 1 Ω
Ignition coil (I5−1) − IG2 (I23−6)	Below 1 Ω
Ignition coil (I6−1) − IG2 (I23−6)	Below 1 Ω
Ignition coil (I7−1) − IG2 (I23−6)	Below 1 Ω
Ignition coil (I8−1) − IG2 (I23−6)	Below 1 Ω
Ignition coil (I9−1) − IG2 (I23−6)	Below 1 Ω
Ignition coil (I10−1) − IG2 (I23−6)	Below 1 Ω
Ignition coil (I3−1) or IG2 (I23−6) − Body ground	10 kΩ or higher
Ignition coil (I4−1) or IG2 (I23−6) − Body ground	10 kΩ or higher
Ignition coil (I5−1) or IG2 (I23−6) − Body ground	10 kΩ or higher
Ignition coil (I6−1) or IG2 (I23−6) − Body ground	10 kΩ or higher
Ignition coil (I7−1) or IG2 (I23−6) − Body ground	10 kΩ or higher
Ignition coil (I8−1) or IG2 (I23−6) − Body ground	10 kΩ or higher
Ignition coil (I9−1) or IG2 (I23−6) − Body ground	10 kΩ or higher
Ignition coil (I10−1) or IG2 (I23−6) − Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace ignition coil with igniter.