A L L Diagnostic Trouble Codes (DTC): P Code Charts

P0052

DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

Description

Description
UBS00LS4

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

SYSTEM DESCRIPTION

The ECM performs ON/OFF duty control of the air fuel ratio (A/F) sensor 1 heater corresponding to the engine operating condition to keep the temperature of air fuel ratio (A/F) sensor 1 element at the specified range.

CONSULT-II Reference Value in Data Monitor Mode
UBS00LS5

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1) A/F S1 HTR (B2)	• Engine: After warming up, idle the engine	0 - 100%

CONSULT-II Reference Value in Data Monitor Mode

On Board Diagnosis Logic
UBS00LS6

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031 (Bank 1) P0051 0051 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit low input	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	• Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1 heater
P0032 0032 (Bank 1) P0052 0052 (Bank 2)	Air fuel ratio (A/F) sensor 1 heater control circuit high input	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	• Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is shorted.) • Air fuel ratio (A/F) sensor 1 heater

On Board Diagnosis Logic

DTC Confirmation Procedure

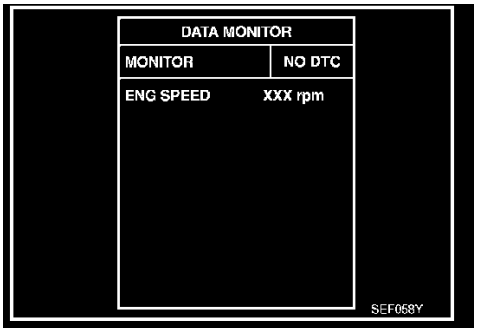
NOTE: If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least **10 seconds** before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between **10.5 V** and **16 V** at idle.

With CONSULT-II

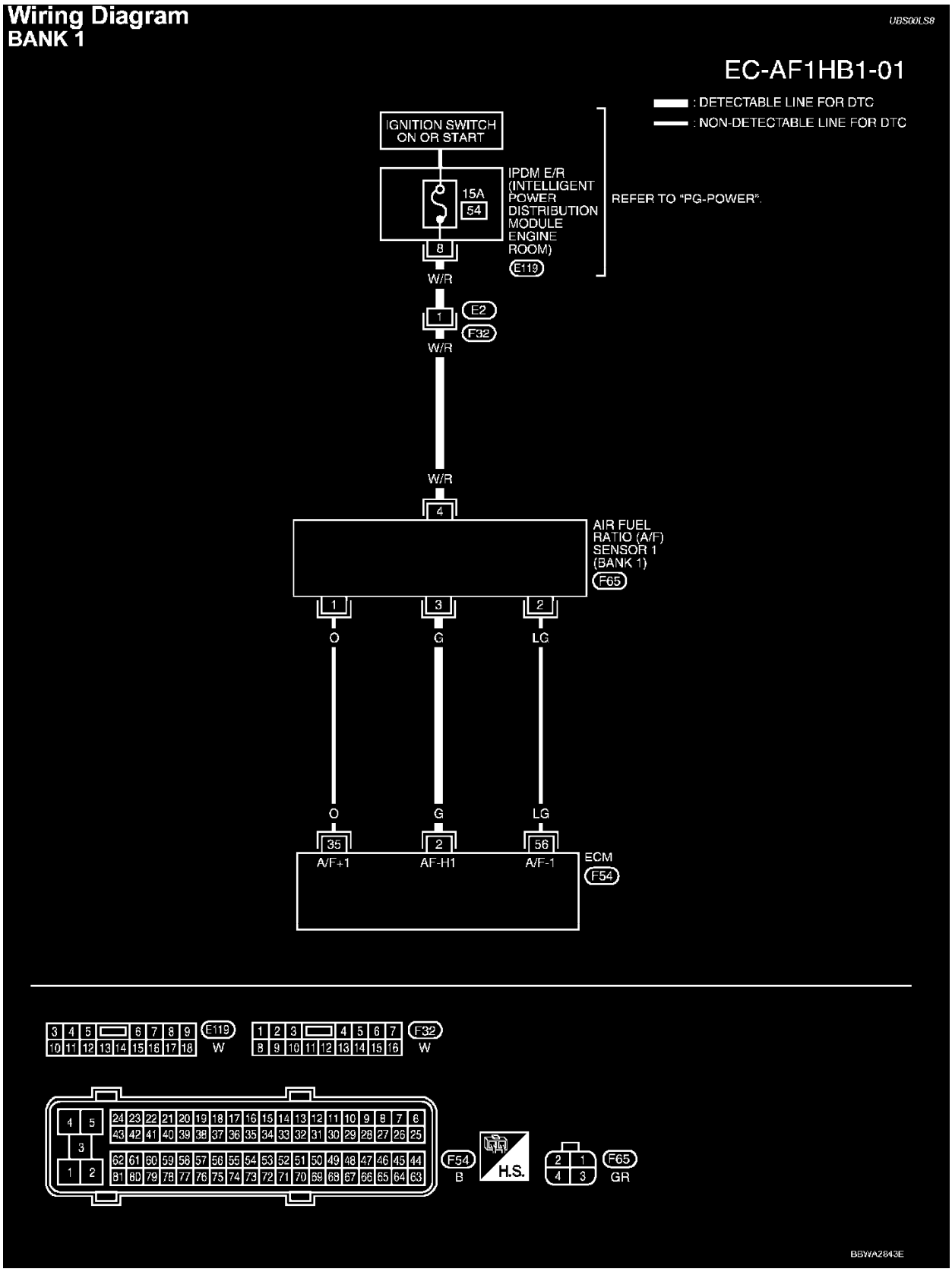
WITH CONSULT-II



1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and let it idle for at least **10 seconds**.
3. If 1st trip DTC is detected, go to "Diagnostic Procedure" below.

WITH GST

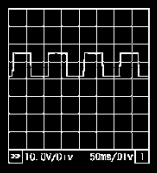
Follow the procedure "WITH CONSULT-II".


Wiring Diagram
BANK 1
UBS00LS8
EC-AF1HB1-01
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
IGNITION SWITCH ON OR START
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E119
15A
54
8
REFER TO "PG-POWER".
W/R
1
E2
F32
W/R
W/R
4
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)
F65
1
3
2
O
G
LG
O
G
LG
35
2
56
A/F+1
AF-H1
A/F-1
ECM
F54
E119
W
F32
W
F54
B
H.S.
F65
GR
BBWA2643E

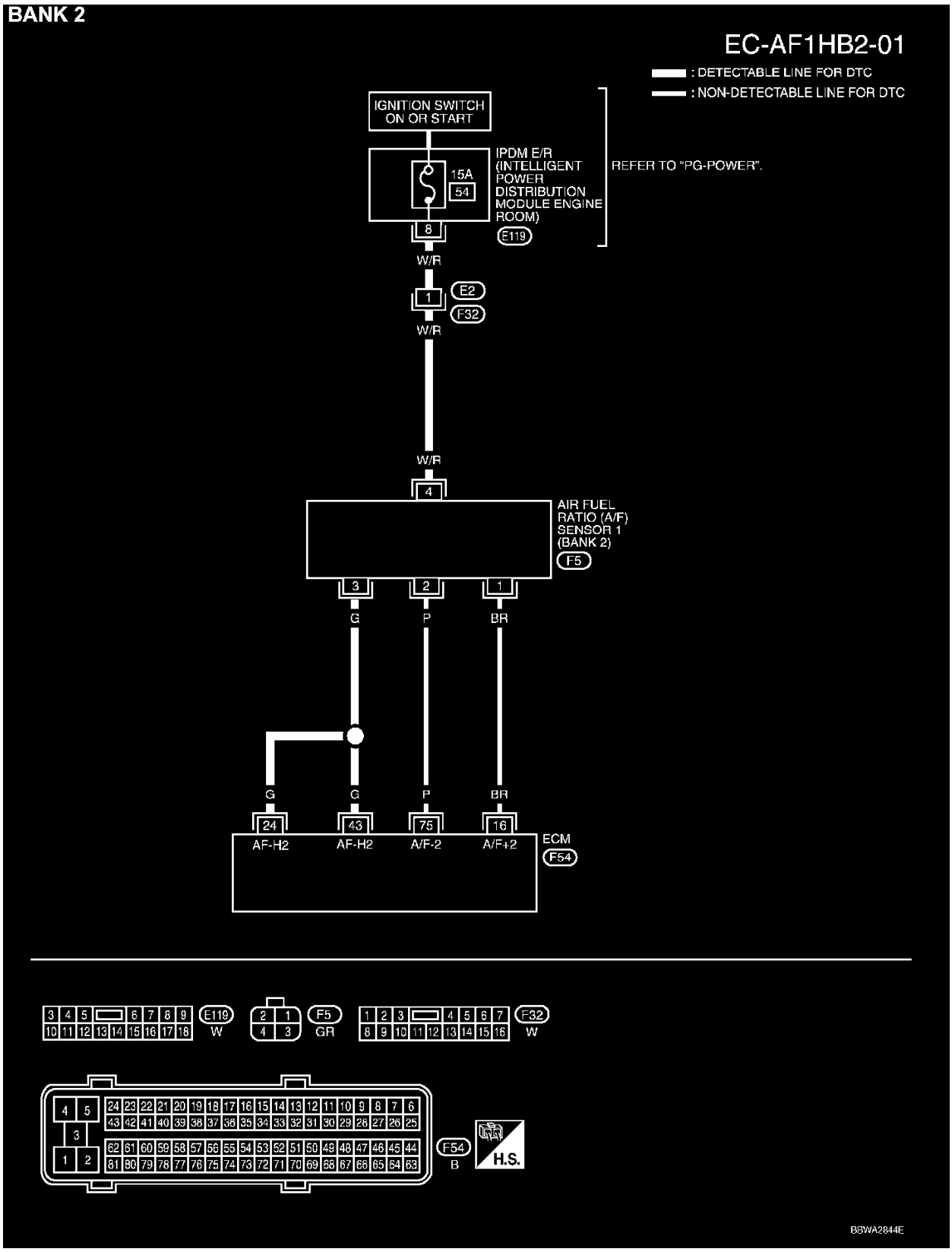
EC-AF1HB1-01

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	G	A/F sensor 1 heater (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  PBIA8148J
35	O	A/F sensor 1 (Bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
56	LG	A/F sensor 1 (Bank 1)	**[Ignition switch: ON]**	Approximately 2.2V

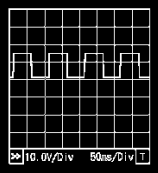
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)


BANK 2
EC-AF1HB2-01
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
IGNITION SWITCH ON OR START
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E119
15A
54
8
REFER TO "PG-POWER".
W/R
1
E2
F32
W/R
W/R
4
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2)
F5
3
2
1
G
P
BR
G
G
P
BR
24
43
75
16
AF-H2
AF-H2
A/F-2
A/F+2
ECM
F54
E119
W
F5
GR
F32
W
F54
B
H.S.
BBWA2844E

EC-AF1HB2-01

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	BR	A/F sensor 1 (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
24 43	G G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V★  PBIA8146J
75	P	A/F sensor 1 (Bank 2)	**[Ignition switch: ON]**	Approximately 2.2V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

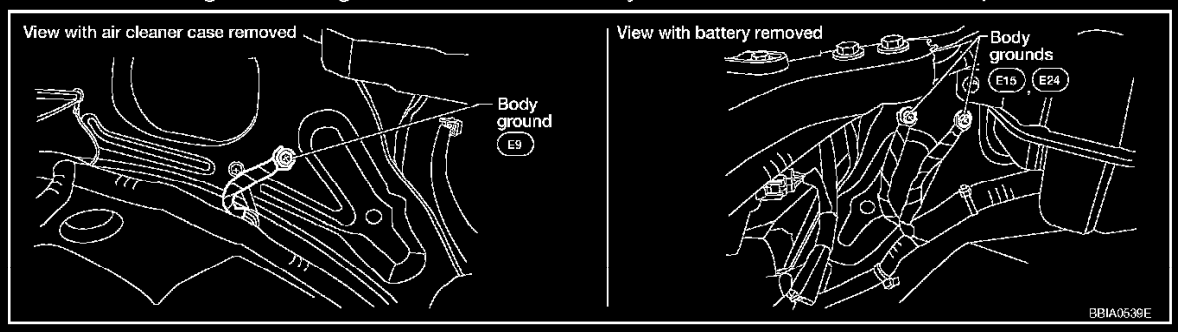
Wiring Diagram

Diagnostic Procedure

UBS00LS9

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-765, "Ground Inspection" .



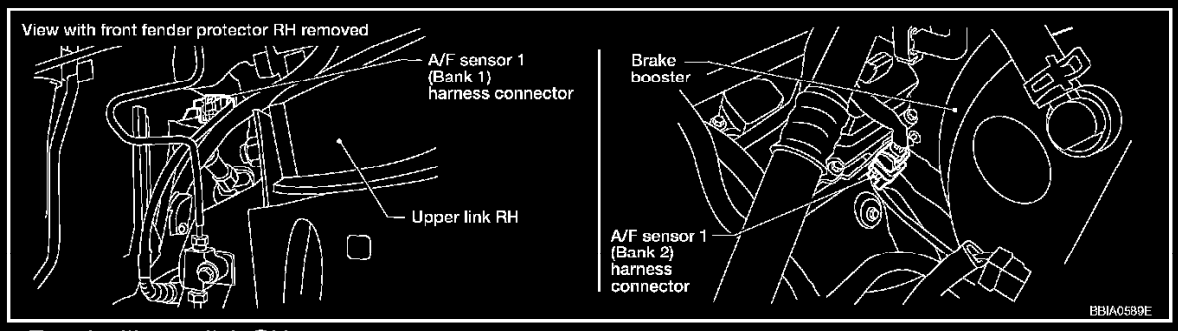
OK or NG

OK >> GO TO 2.
NG >> Repair or Replace ground connections.

Step 1

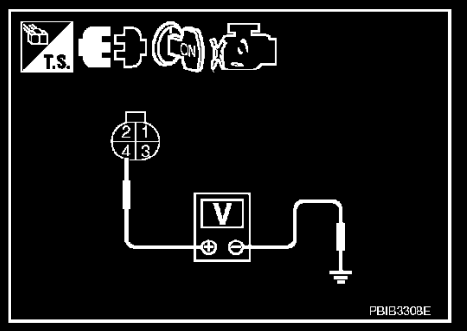
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



2. Turn ignition switch ON.
3. Check voltage between air fuel ratio sensor 1 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E2, F32
- IPDM E/R harness connector E119
- 15A fuse
- Harness for open or short between air fuel ratio sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 (bank 1) or 24, 43 (bank 2) and air fuel ratio (A/F) sensor 1 terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 7.

6. CHECK INTERMITTENT INCIDENT

Perform EC-757, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 7.
NG >> Repair or replace.

7. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> INSPECTION END

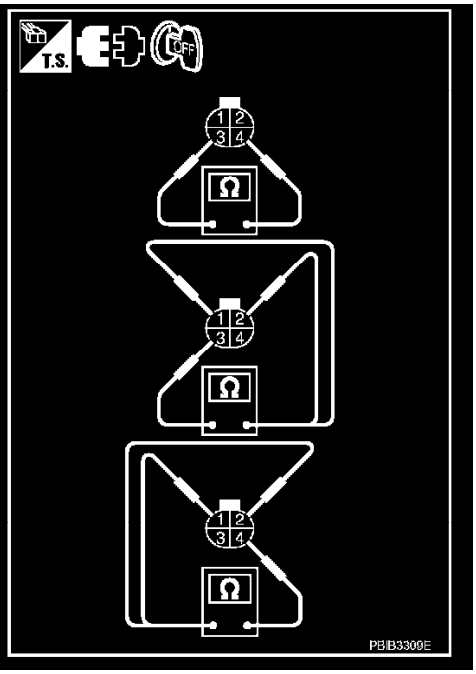
Step 5-7

Diagnostic Procedure

Component Inspection

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Terminal No.	Resistance
3 and 4	1.80 - 2.44 Ω [at 25°C (77°F)]
3 and 1, 2	∞ Ω (Continuity should not exist)
4 and 1, 2	



1. Check resistance between A/F sensor 1 terminals as shown.
2. If NG, replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**