

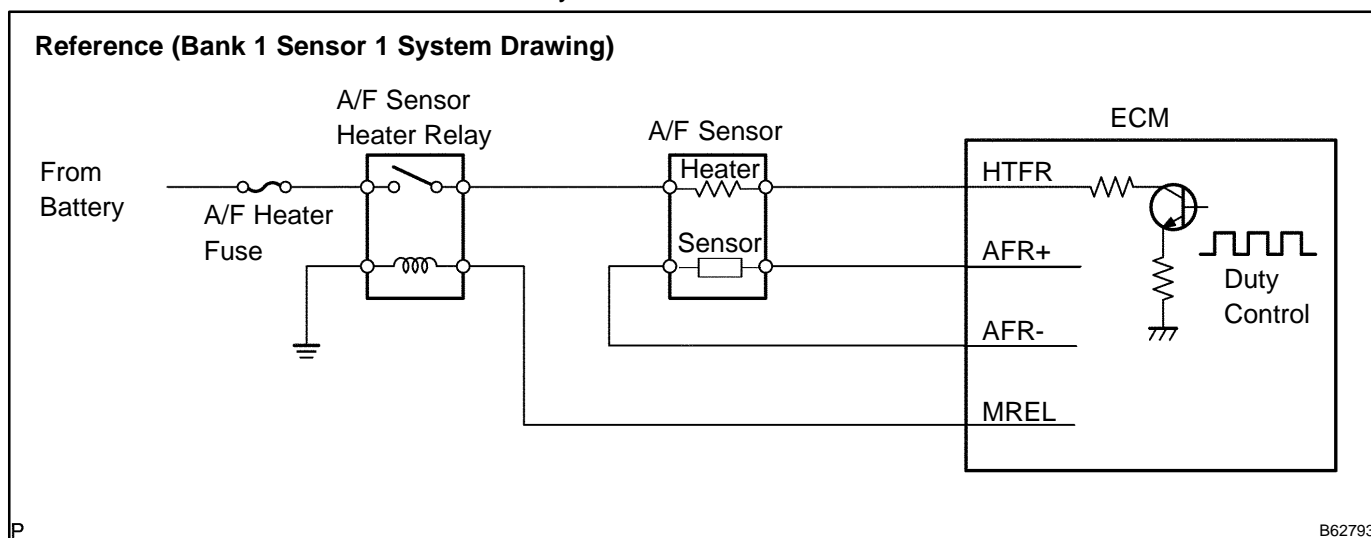
DTC	P0031	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)
DTC	P0032	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)
DTC	P0051	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1)
DTC	P0052	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1)

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page [05-195](#) .

HINT:

- This DTC is related to A/F sensor, although the caption is heated oxygen sensor.
- The ECM provides a pulse width modulated control circuit to adjust current through the heater. The A/F sensor heater circuit uses a relay on the B+ side of the circuit.



DTC No.	DTC Detection Condition	Trouble Area
P0031 P0051	Heated current is 0.8 A or less when heater operates (1 trip detection logic)	<ul style="list-style-type: none"> • Open or short in heater circuit of A/F sensor • A/F sensor heater
P0032 P0052	When the heater operates, heated current exceeds 19.7 A (1 trip detection logic)	<ul style="list-style-type: none"> • A/F sensor heater relay • ECM

HINT:

- Bank 1 refers to the bank that includes cylinder No.1.
- Bank 2 refers to the bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closest to the engine assembly.
- Sensor 2 refers to the sensor farthest away from the engine assembly.

WIRING DIAGRAM

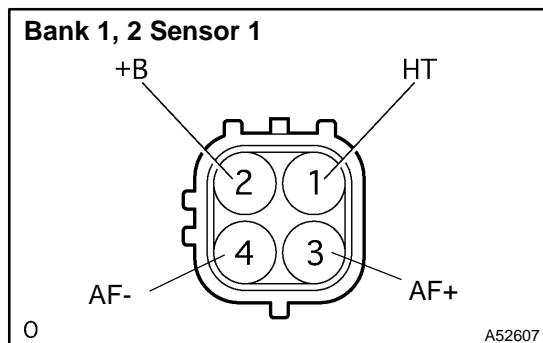
Refer to DTC P2195 on page [05-195](#) .

INSPECTION PROCEDURE

HINT:

- If different DTCs that are related to a different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand-held tester or the OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1 INSPECT AIR FUEL RATIO SENSOR(HEATER RESISTANCE)



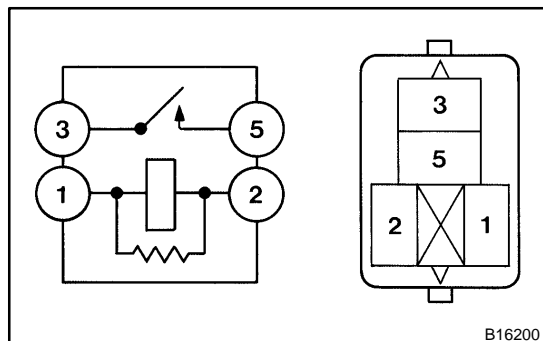
- Disconnect the air fuel ratio sensor connector.
- Measure resistance between the terminals HT and +B of the air fuel ratio sensor.
Resistance: 1.8 to 3.4 Ω (20 °C)

NG

REPLACE AIR FUEL RATIO SENSOR

OK

2 INSPECT AIR FUEL RATIO SENSOR HEATER RELAY



- Remove the A/F sensor heater relay from the engine room R/B.
- Inspect the A/F sensor heater relay.

Standard:

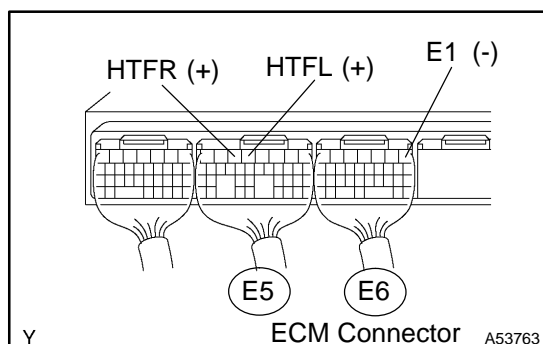
Terminal No.	Specified condition
1 - 2	Continuity
3 - 5	No Continuity
	Continuity (Apply battery voltage terminals 1 and 2)

NG

REPLACE AIR FUEL RATIO SENSOR HEATER RELAY

OK

3 INSPECT ECM(HTFR OR HTFL VOLTAGE)



- Turn the ignition switch ON.
- Measure the voltage between the applicable terminals of the E5 and E6 ECM connectors.

Standard:

Symbols (Terminal No.)	Specified condition
HTFR (E5-5) - E1 (E6-1)	9 to 14 V
HTFL (E5-4) - E1 (E6-1)	

HINT:

- The HTFR means the heated oxygen sensor bank 1 sensor 1.
- The HTFL means the heated oxygen sensor bank 2 sensor 1.

OK

CHECK AND REPLACE ECM
 (See page 01-35)

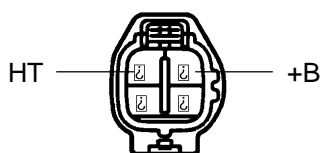
NG

4

CHECK HARNESS AND CONNECTOR(A/F SENSOR - ECM, A/F SENSOR - A/F SENSOR HEATER RELAY)
Wire Harness Side

(A12) Bank 1 Sensor 1

(A13) Bank 2 Sensor 1



A/F Sensor Connector

A76787

- (a) Check the harness and connector between the ECM and A/F sensor connectors.

- (1) Disconnect the A12 or A13 A/F sensor connector.
- (2) Disconnect the E5 ECM connector.
- (3) Check for continuity between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
HT (A12-1) - HTFR (E5-5)	Continuity
HT (A13-1) - HTFL (E5-4)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
HT (A12-1) or HTFR (E5-5) - Body ground	No continuity
HT (A13-1) or HTFL (E5-4) - Body ground	

- (b) Check the harness and connector between the A/F sensor connector and A/F sensor heater relay.

- (1) Disconnect the A12 or A13 A/F sensor connector.
- (2) Remove the A/F sensor heater relay from the engine room R/B.
- (3) Check for continuity between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
+B (A12-2) - A/F sensor heater relay (3)	Continuity
+B (A13-2) - A/F sensor heater relay (3)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
+B (A12-2) or A/F sensor heater relay (3) - Body ground	No continuity
+B (A13-2) or A/F sensor heater relay (3) - Body ground	

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK AND REPLACE ECM (See page 01-35)
