

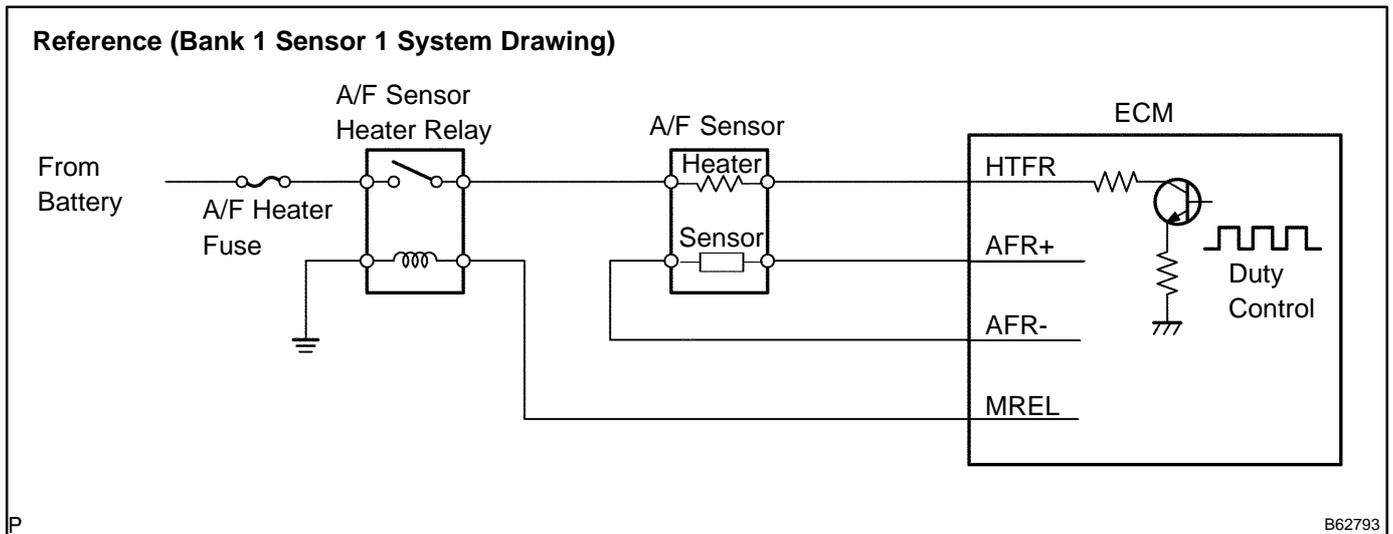
DTC	P0031	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)
DTC	P0032	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)
DTC	P0051	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1)
DTC	P0052	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1)

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

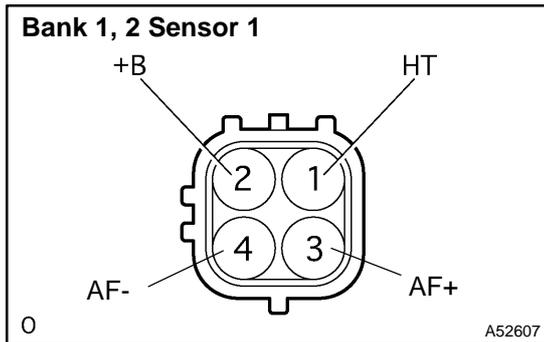
Refer to DTC P2195 on page 05-195 .

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)

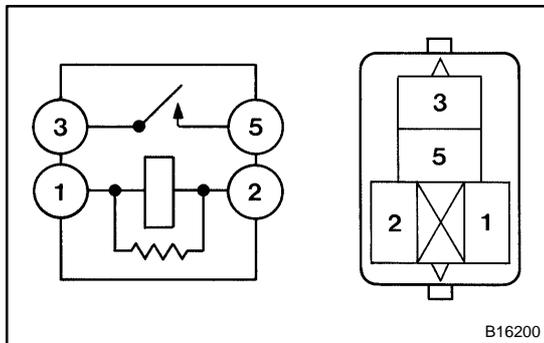


- (a) Disconnect the air fuel ratio sensor connector.
- (b) Measure resistance between the terminals HT and +B of the air fuel ratio sensor.
Resistance: 1.8 to 3.4 Ω (20 °C)

NG → REPLACE AIR FUEL RATIO SENSOR

OK

2 INSPECT AIR FUEL RATIO SENSOR HEATER RELAY



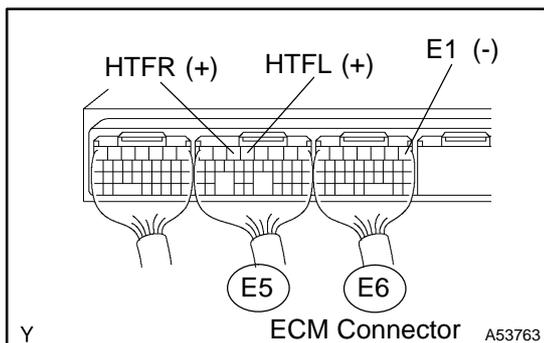
- (a) Remove the A/F sensor heater relay from the engine room R/B.
- (b) Inspect the A/F sensor heater relay.
Standard:

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)



- (a) Turn the ignition switch ON.
- (b) 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)	

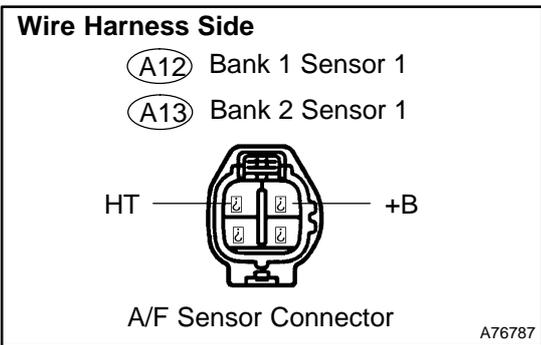
HINT:

- 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)

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4 CHECK HARNESS AND CONNECTOR(A/F SENSOR - ECM, A/F SENSOR - A/F SENSOR HEATER RELAY)



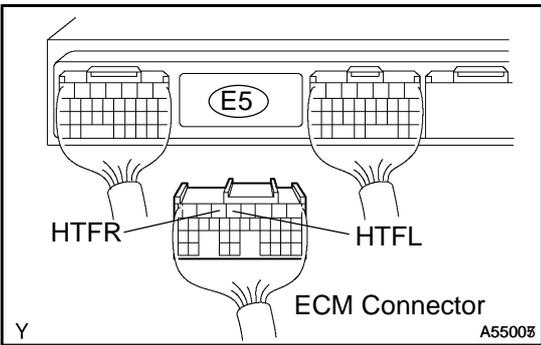
- (a) Check the harness and connector between the ECM and A/F sensor connectors.
- (1) Disconnect the A12 or A13 A/F sensor connector.
 - (2) Disconnect the E5 ECM connector.
 - (3) Check for continuity between the wire harness side connectors.

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	



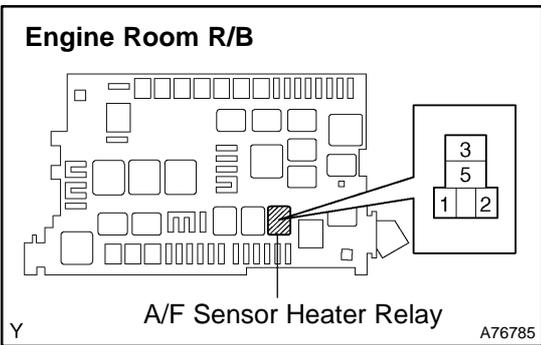
- (b) Check the harness and connector between the A/F sensor connector and A/F sensor heater relay.
- (1) Disconnect the A12 or A13 A/F sensor connector.
 - (2) Remove the A/F sensor heater relay from the engine room R/B.
 - (3) Check for continuity between the wire harness side connectors.

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)