DTC	P0031	OXYGEN (A/F) SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

DTC	P0032	OXYGEN (A/F) SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

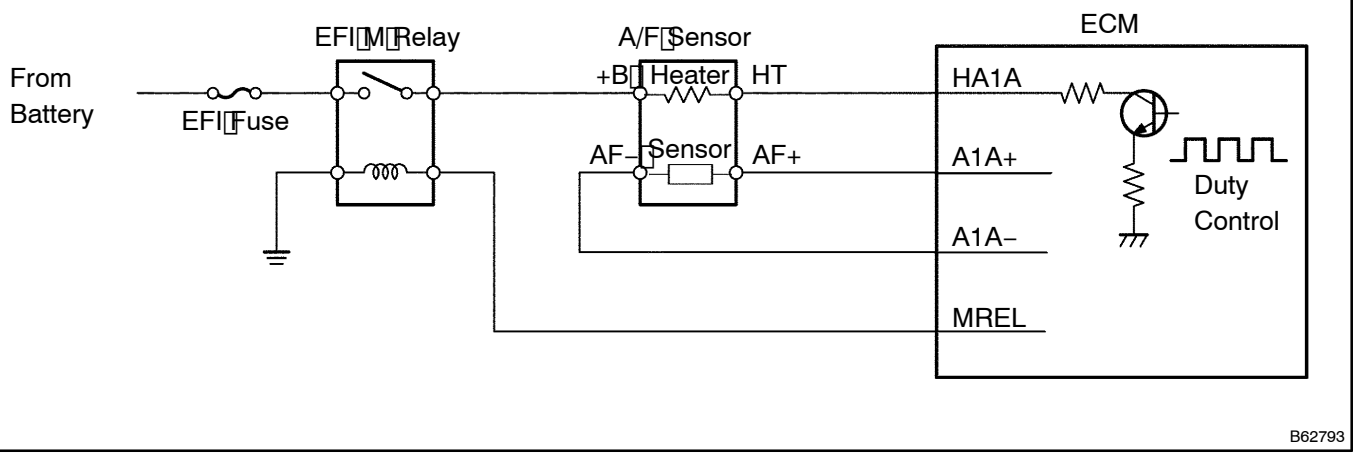
HINT:
Although each DTC title says "oxygen sensor," these DTCs are related to the air–fuel ratio sensor (A/F sensor).

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page 05–165.

HINT:
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.

Reference (Bank 1 Sensor 1 System Diagram):



DTC No.	DTC Detection Condition	Trouble Area
P0031	Heater current is 0.8 A or less when the heater operates (1 trip detection logic)	• Open or short in heater circuit of A/F sensor • A/F sensor heater • EFI MAIN relay (integration relay) • ECM
P0032	Heater current exceeds 1.0 A when the heater operates (1 trip detection logic)	• Short in heater circuit of A/F sensor • A/F sensor heater • EFI MAIN relay (integration relay) • ECM

HINT:
- Sensor 1 refers to the sensor mounted before the TWC and is located near the engine assembly.
- Sensor 2 refers to the sensor mounted after the TWC and is located far from the engine assembly.

WIRING DIAGRAM

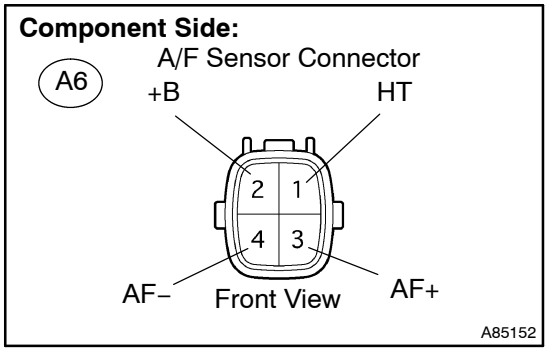
Refer to DTC P2195 on page 05–165.

INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the intelligent tester II. Freeze frame data records the engine condition when 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.
- When DTC P0032 is detected, proceed to step 4 if heater resistance is in normal range.

1 INSPECT AIR FUEL RATIO SENSOR(HEATER RESISTANCE)



(a) Disconnect the A6 A/F sensor connector.
(b) Measure the resistance between the terminals of the A/F sensor.

Standard:

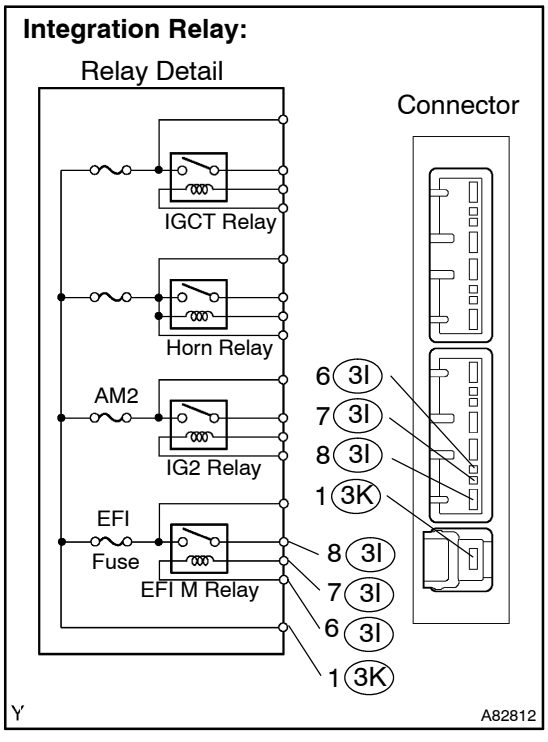
Tester Connection	Resistance
HT (1) – +B (2)	1.8 to 3.4 Ω at 20°C (68°F)

(c) Reconnect the A/F sensor connector.

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

2 INSPECT INTEGRATION RELAY(EFI M RELAY)



(a) Remove the integration relay from the engine room R/B.
(b) Inspect the EFI M relay.

Standard:

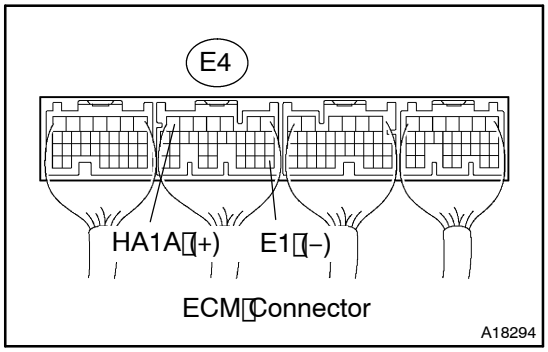
Tester Connection	Specified Condition
(3K–1) – (3I–8)	10 kΩ or higher
(3K–1) – (3I–8)	Below 1 Ω (Apply battery voltage to terminals 3I–6 and 3I–7)

(c) Reinstall the integration relay.

NG → **REPLACE INTEGRATION RELAY**

OK

3	INSPECT ECM (HA1A VOLTAGE)



(a) Turn the power switch ON (IG).
(b) Measure the voltage between the applicable terminals of the E4 ECM connector.

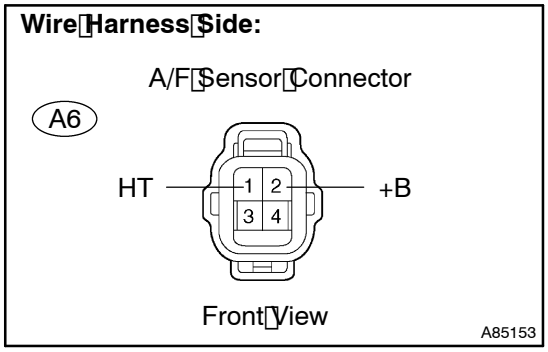
Standard:

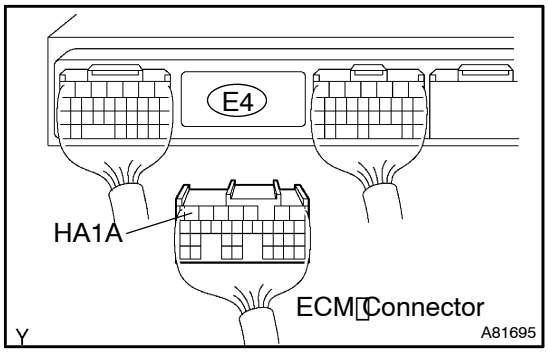
Tester Connection	Specified Condition
HA1A (E4–7) – E1 (E4–28)	9 to 14 V

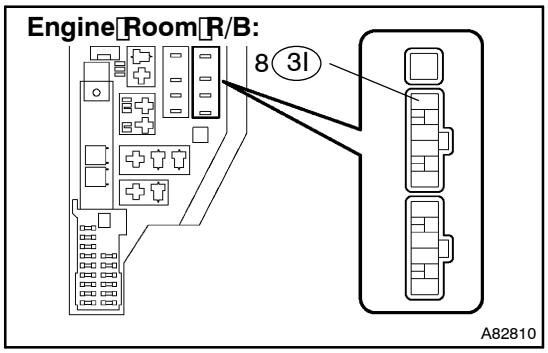
OK → REPLACE ECM (See page 10–24)

NG

4	CHECK HARNESS AND CONNECTOR(A/F SENSOR – ECM, A/F SENSOR – EFI M RELAY)







(a) Check the harness and the connectors between the ECM and the A/F sensor connectors.
(1) Disconnect the A6 A/F sensor connector.
(2) Disconnect the E4 ECM connector.
(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
HT (A6–1) – HA1A (E4–7)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
HT (A6–1) or HA1A (E4–7) – Body ground	10 kΩ or higher
HT (A6–1) – +B (A6–2)	10 kΩ or higher

(4) Reconnect the A/F sensor connector.
(5) Reconnect the ECM connector.

(b) Check the harness and connectors between the A/F sensor connector and the EFI M relay.
(1) Disconnect the A6 A/F sensor connector.
(2) Remove the integration relay from the engine room R/B.
(3) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
+B (A6–2) – EFI M relay (3I–8)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
+B (A6–2) or EFI M relay (3I–8) – Body ground	10 kΩ or higher

(4) Reconnect the A/F sensor connector.
(5) Reinstall the integration relay.

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

OK

REPLACE ECM (See page 10–24)