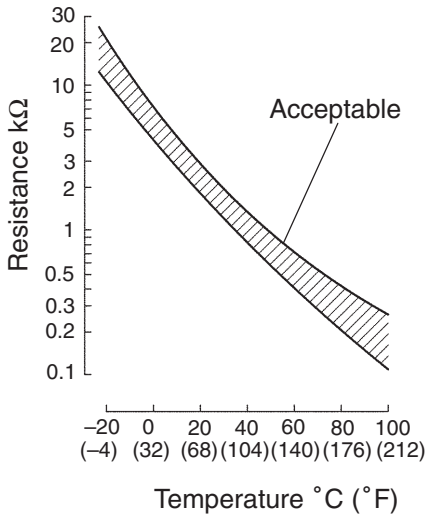
DTC	P0095/23	INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT

DTC	P0097/23	INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT LOW

DTC	P0098/23	INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT HIGH

CIRCUIT DESCRIPTION

(Fig. 1)

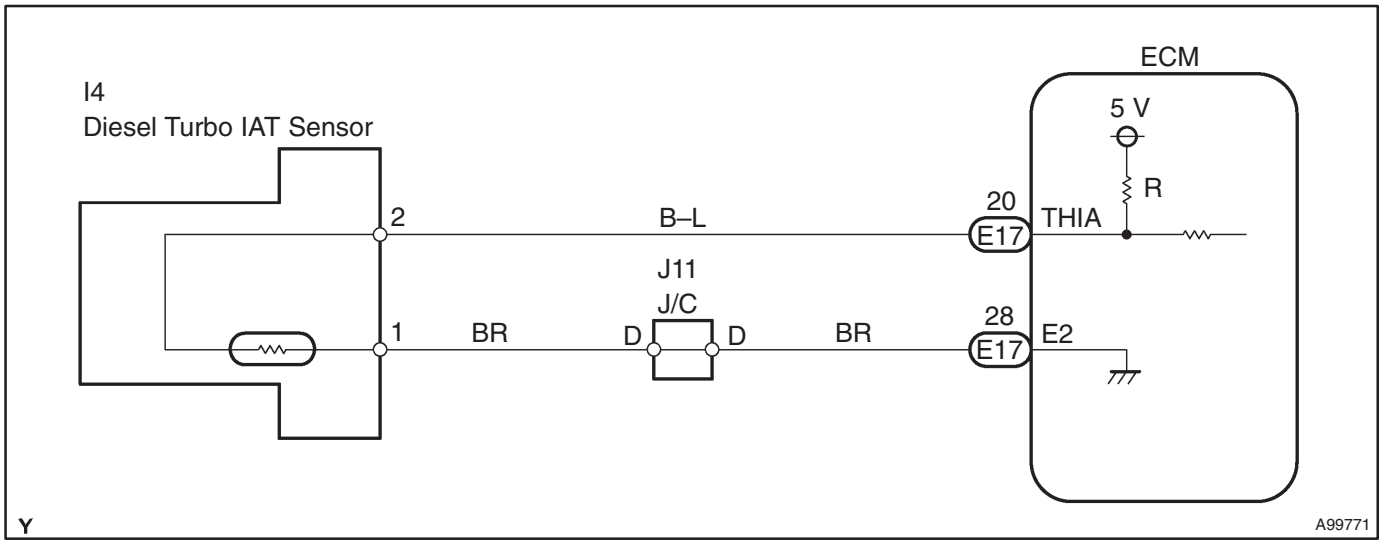


The diesel turbo Intake Air Temperature (IAT) sensor is built into the charge air cooler and senses the IAT. A built–in thermistor of the sensor changes the resistance value according to the intake air temperature. The lower the IAT is, the greater the thermistor resistance value becomes, and the higher the temperature is, the lower the resistance value becomes (see Fig. 1).

The sensor is connected to the ECM. The 5 V power source voltage in the ECM is applied to the sensor from terminal THIA via resistor R. Resistor R and the sensor are connected in series. When the resistance value of the sensor changes in accordance with changes in the IAT, the potential at terminal THIA also changes. Based on this signal, the ECM corrects the fuel injection volume to improve the driveability with a cold engine.

DTC No.	DTC Detection Condition	Trouble Area	Proceed to
P0095/23	Open or short in diesel turbo IAT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in diesel turbo IAT sensor circuit • Diesel turbo IAT sensor • ECM	Step 1
P0097/23	Short in diesel turbo IAT sensor circuit for 0.5 seconds (sensor resistance value less than 25 Ω [sensor output voltage less than 0.05 V]) (1 trip detection logic)	• Open or short in diesel turbo IAT sensor circuit • Diesel turbo IAT sensor • ECM	Step 4
P0098/23	Open in diesel turbo IAT sensor circuit for 0.5 seconds (sensor resistance value more than 156 kΩ [sensor output voltage more than 4.9 V]) (1 trip detection logic)	• Open or short in diesel turbo IAT sensor circuit • Diesel turbo IAT sensor • ECM	Step 2

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester II. 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, and other data from the time the malfunction occurred.

NOTICE:

Before starting the diagnostic procedures, check if the intellignt tester II Data List's "Intake Air Temp (Turbo)" is displayed. Enter the following the menus: Powertrain / Engine / Data List.

Result:

Tester Displayed	Proceed to
"Intake Air Temp (Turbo)" is displayed	"When using intelligent tester II" diagnostic procedures
"Intake Air Temp (Turbo)" is not displayed	"When not using intelligent tester II" diagnostic procedures

When using intelligent tester II:

1	READ DATA LIST (DIESEL TURBO INTAKE AIR TEMPERATURE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester II ON.
(c) Enter the following menus: Powertrain / Engine / Data List / Intake Air Temp (Turbo).
(d) Read the value.
OK: Same value as the actual intake air temperature.
Result:

Temperature Displayed	Proceed to
–40°C (–40°F)	A
140°C (284°F) or more	B
OK (same as air temperature near to intake manifold)	C

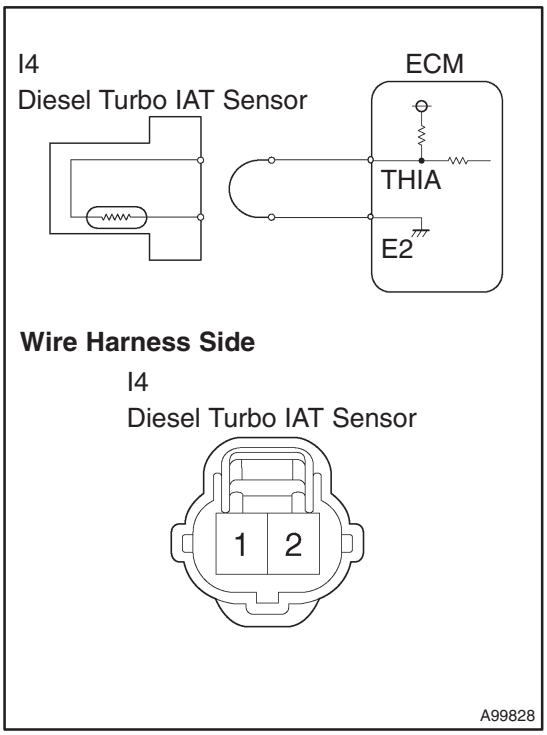
HINT:
- If there is an open circuit, the intelligent tester II indicates –40°C (–40°F).
- If there is a short circuit, the intelligent tester II indicates 140°C (284°F) or more.

B → **Go to step 4**

C → **CHECK FOR INTERMITTENT PROBLEMS** (See page 05–439)

A

2	READ DATA LIST (CHECK FOR OPEN IN WIRE HARNESS)

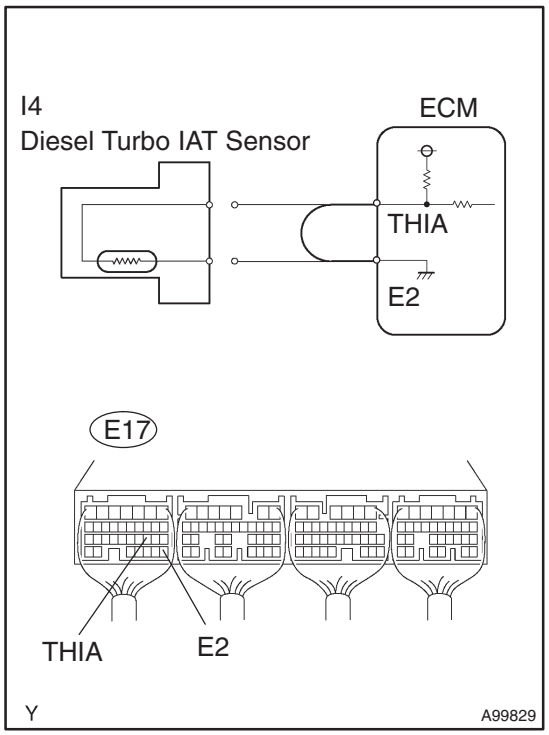


(a) Disconnect the I4 diesel turbo IAT sensor connector.
(b) Connect terminals 1 and 2 of the diesel turbo IAT sensor wire harness side connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the ignition switch ON and turn the intelligent tester II ON.
(e) Enter the following menus: Powertrain / Engine / Data List / Intake Air Temp (Turbo).
(f) Read the values.
Standard: 140°C (284°F) or more

OK → **CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE DIESEL TURBO INTAKE AIR TEMPERATURE SENSOR**

NG

3	READ DATA LIST (CHECK FOR OPEN IN ECM)



(a) Disconnect the I4 diesel turbo IAT sensor connector.
(b) Connect terminals THIA and E2 of the E17 ECM connector.

HINT:
Before checking, perform a visual and contact pressure check on the ECM connector.

(c) Connect the intelligent tester II to the DLC3.
(d) Turn the ignition switch ON and turn the intelligent tester II ON.
(e) Enter the following menus: Powertrain / Engine / Data List / Intake Air Temp (Turbo).
(f) Read the values.
Standard: 140°C (284°F) or more

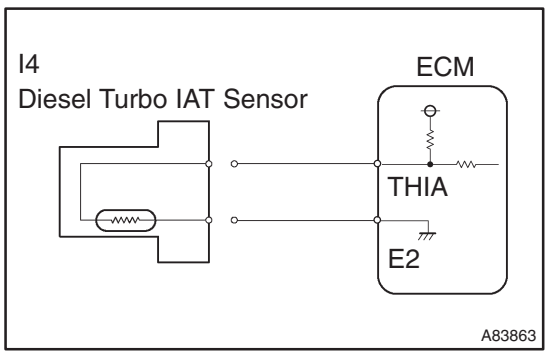
OK	REPAIR OR REPLACE HARNESS AND CONNECTOR

NG

CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See Pub. No. RM990E, page 10–34)

NOTICE:
After replacing the ECM, allow for ECM learning start the engine and idle it until it is fully warmed up.

4	READ DATA LIST (CHECK FOR SHORT IN WIRE HARNESS)

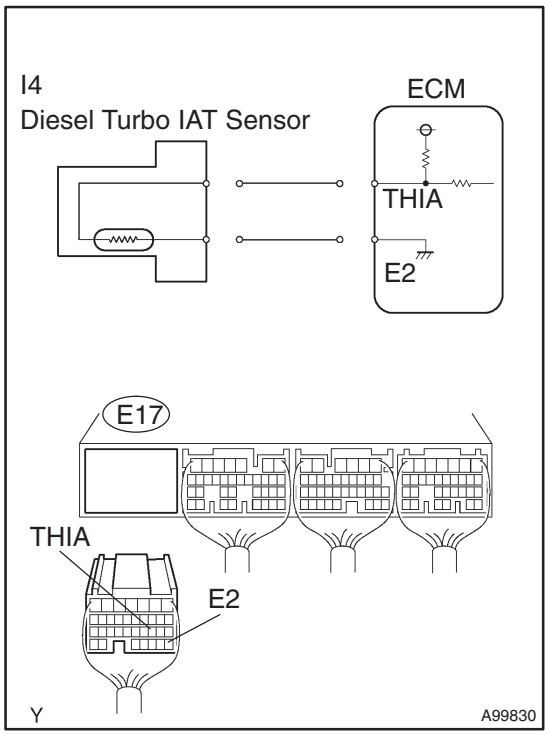


(a) Disconnect the I4 diesel turbo IAT sensor connector.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the ignition switch ON and turn the intelligent tester II ON.
(d) Enter the following menus: Powertrain / Engine / Data List / Intake Air Temp (Turbo).
(e) Read the values.
Standard: –40°C (–40°F)

OK	REPLACE DIESEL TURBO INTAKE AIR TEMPERATURE SENSOR

NG

5	READ DATA LIST (CHECK FOR SHORT IN ECM)



(a) Disconnect the I4 diesel turbo IAT sensor connector.
(b) Disconnect the E17 ECM connector.
(c) Connect the intelligent tester II to the DLC3.
(d) Turn the ignition switch ON and turn the intelligent tester II ON.
(e) Enter the following menus: Powertrain / Engine / Data List / Intake Air Temp (Turbo).
(f) Read the values.
Standard: –40°C (–40°F)

OK	REPAIR OR REPLACE HARNESS AND CONNECTOR

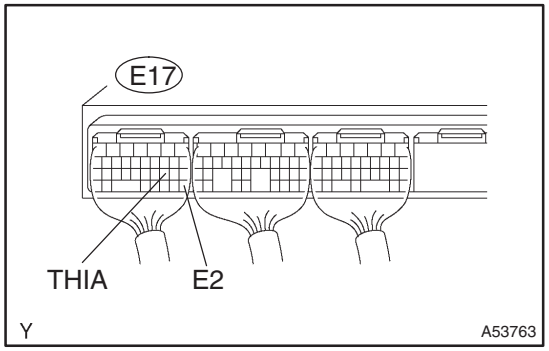
NG

REPLACE ECM (See Pub. No. RM990E, page 10–34)

NOTICE:
After replacing the ECM, allow for ECM learning start the engine and idle it until it is fully warmed up.

When not using intelligent tester II:

1 CHECK ECM (THIA VOLTAGE)



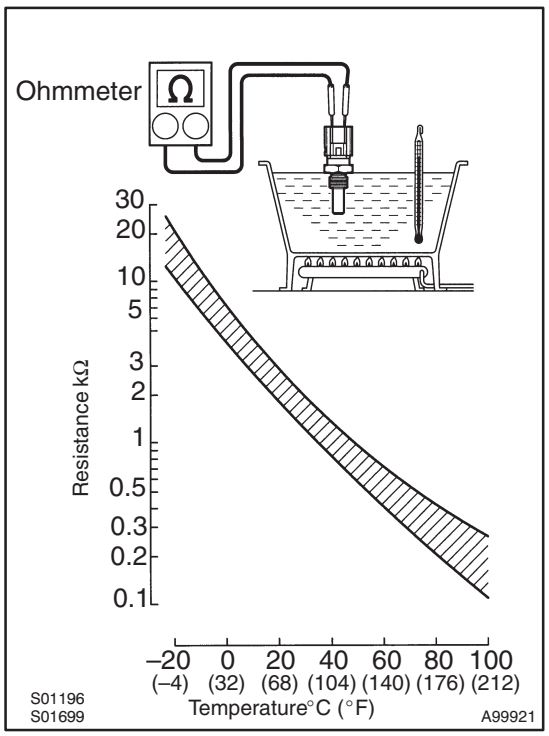
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connector.
Standard:

Tester Connection	Condition	Specified Condition
E17–20 (THIA) – E17–28 (E2)	20°C (68°F)	0.5 to 3.4 V

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–439)**

NG

2 INSPECT DIESEL TURBO INTAKE AIR TEMPERATURE SENSOR



(a) Remove the diesel turbo IAT sensor.
(b) Measure the resistance of the sensor.
Standard:

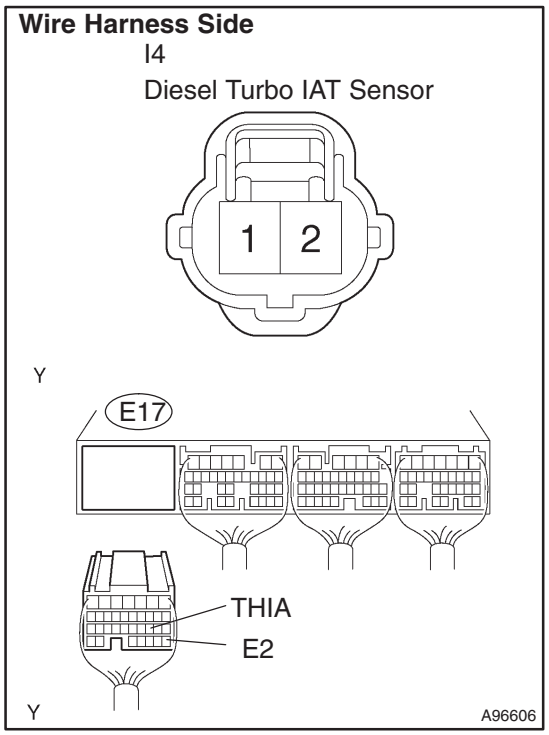
Connection	Specified Condition
20°C (68°F)	2.16 to 2.17 kΩ

NOTICE:
If checking the IAT sensor in the water, keep the terminals dry. After the check, wipe the sensor dry.

NG → **REPLACE DIESEL TURBO INTAKE AIR TEMPERATURE SENSOR**

OK

3	CHECK WIRE HARNESS (ECM – DIESEL TURBO INTAKE AIR TEMPERATURE SENSOR)



(a) Disconnect the I4 diesel turbo IAT sensor connector.
(b) Disconnect the E17 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
E17–20 (THIA) – I4–2	Below 1 Ω
E17–28 (E2) – I4–1	Below 1 Ω
E17–20 (THIA) or I4–2 – Body ground	10 kΩ or higher
E17–28 (E2) or I4–1 – Body ground	10 kΩ or higher

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

OK

REPLACE ECM (See Pub. No. RM990E, page 10–34)

NOTICE:
After replacing the ECM, allow for ECM learning start the engine and idle it until it is fully warmed up.