DN: Motor Electronics Coolant Temperature (MECT) Sensor

WARNING: This vehicle is equipped with high voltage cables, components, and wiring. The high voltage warning labels containing the high voltage symbol are located on each high voltage component. High voltage cables and wiring are orange in color. Certified rubber insulating gloves and a face shield must be worn when working with the high voltage cables, components, or wiring. The ignition key must be cycled to the OFF position for a minimum of 5 minutes, and the high voltage traction battery service disconnect plug placed in the servicing/shipping position before disconnecting the high voltage cables. Failure to follow these instructions may result in personal injury or death.

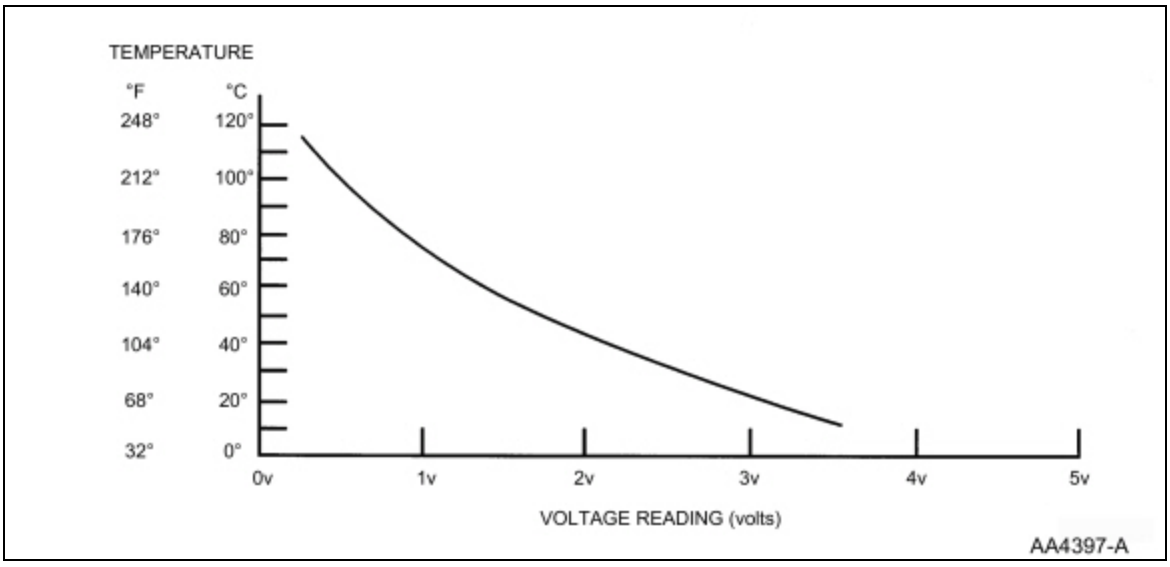
Do not disconnect, disable, or touch the high voltage cables, components, or wiring during the module reprogramming procedure because high voltage is present. The high voltage warning labels containing the high voltage symbol are located on each high voltage component. High voltage cables and wiring are orange in color. Failure to follow these instructions may result in personal injury or death.

Note: *Carefully check the motor electronics cooling system integrity. Over-temperature diagnostic trouble codes (DTCs) can be stored as a result of extreme driving conditions. Under normal operating conditions, the motor electronics coolant temperature should not exceed 65°C (150°F) and maintain a temperature of approximately 11°C (20° F) over ambient temperature during a steady cruise above 65 km/h (40mph).*

This pinpoint test is intended to diagnose the following:

- MECT (12B579)
- harness circuits: MECT, VREF, and SIGRTN
- powertrain control module (PCM) (12A650)

Voltage values calculated for VREF = 5 volts. These values can vary by 15% due to sensor and VREF variations.

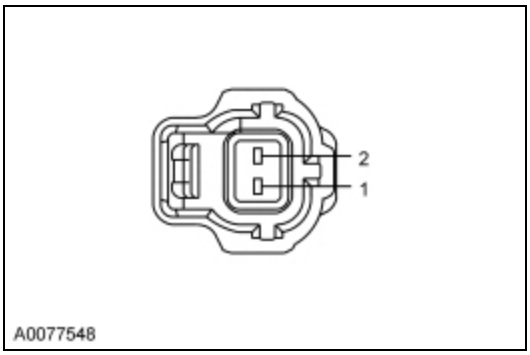


TEMPERATURE SENSOR VOLTAGE AND RESISTANCE SPECIFICATIONS

Temperature		Temperature Sensor Values	
°C	°F	Voltage	Resistance (K ohms)
120	248	0.28	1.18
110	230	0.36	1.55
100	212	0.47	2.07
90	194	0.61	2.80
80	176	0.80	3.84
70	158	1.05	5.37
60	140	1.37	7.70

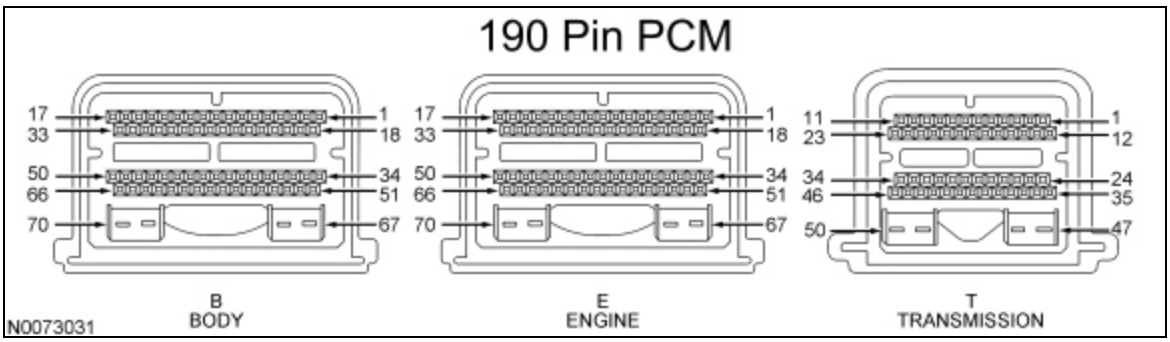
Temperature		Temperature Sensor Values	
°C	°F	Voltage	Resistance (K ohms)
50	122	1.77	10.97
40	104	2.23	16.15
30	86	2.74	24.27
20	68	3.26	37.30
10	50	3.73	58.75
0	32	4.14	95.85
-10	14	4.45	160.31

Motor Electronics Coolant Temperature (MECT) Sensor Connector



Pin	Circuit
2	SIGRTN (Signal Return)
1	MECT (Motor Electronics Coolant Temperature)

Powertrain Control Module (PCM) Connector



Pin	Circuit
B66	VREF (Reference Voltage)
T40	SIGRTN (Signal Return)
T29	MECT (Motor Electronics Coolant Temperature)

DN1 DTCS P0A00, P0A01, P0A02, P0A03, P0A05 AND P0A7C: CHECK FOR SELF-TEST DTCS
Are DTCs P0A00, P0A01, P0A02, P0A03, P0A05, or P0A7C present during PCM or transaxle control module (TCM) self-test?

Yes	For DTCs P0A00 or P0A7C, GO to DN2. For DTC P0A01, GO to DN15. For KOEO and KOER DTC P0A02, GO to DN10. For KOEO and KOER DTC P0A03, GO to DN6. For continuous memory DTCs P0A02 or P0A03, GO to DN12. For DTC P0A05, GO to Pinpoint Test KT.
No	Unable to duplicate or identify the concern at this time. RETURN to Section 3, Symptom Charts for further direction.

DN2 DTCS P0A00 AND P0A7C: VISUALLY INSPECT THE MOTOR ELECTRONICS COOLING SYSTEM

- Visually inspect the motor electronics cooling system for leaks, pinched hoses, restricted radiator air flow, correct coolant level, fan operation, and loose electrical connections.

Is the motor electronics cooling system OK?

Yes	For DTC P0A7C, GO to DN3. For all others, GO to DN4.
No	REFER to the Workshop Manual Section 307-02, Transaxle/Transmission Cooling to diagnose the motor electronics cooling system overheating concern.

DN3 P0A7C: CHECK FOR COOLANT FLOWING INTO THE DEGAS BOTTLE

- Ignition ON, engine OFF.
- Access the PCM and control the MECP PID.
- Run the MECS pump while observing the coolant flowing into the degas bottle.
- Command the MECS pump OFF.

Did the coolant flow into the degas bottle?

Yes	GO to DN4.
No	Refer to the Workshop Manual Section 307-02B, pinpoint test A: motor electronics cooling system MECS cooling pump fault. Follow the pinpoint test as if there are no DTCs present. If the MECS cooling pump passed the pinpoint test, go to DN4 in this pinpoint test.

DN4 ROAD TEST THE VEHICLE AND MONITOR THE MECT_V PID

Note: *Under normal operating conditions, the motor electronics coolant temperature should not exceed 65°C (150°F) and maintain a temperature of approximately 11°C (20° F) over ambient temperature during a steady cruise above 65 km/h (40mph).*

- Access the PCM and monitor the MECT_V PID.
- Road test the vehicle by performing heavy accelerations and decelerations over a 15 minute period.
- Refer to the chart at the beginning of this pinpoint test for voltage specifications.

Does the MECT sensor operate in the normal temperature range?

Yes	GO to DN12.
No	GO to DN5.

DN5 CHECK THE RESISTANCE OF THE MECT SENSOR

Note: *Refer to the table at the beginning of this pinpoint test for temperature versus resistance specifications.*

- MECT Sensor connector disconnected.
- Measure the resistance between:

(+) MECT Sensor Connector, Component Side	(-) MECT Sensor Connector, Component Side

(+) MECT Sensor Connector, Component Side	(-) MECT Sensor Connector, Component Side
MECT - Pin 1	SIGRTN - Pin 2

Does the resistance of the MECT sensor match the actual motor electronics coolant system coolant temperature?

Yes	REFER to the Workshop Manual Section 307-02, Transaxle/Transmission Cooling to diagnose the motor electronics cooling system overheating concern.
No	INSTALL a new MECT sensor. CLEAR the DTCs. REPEAT the self-test.

DN6 DTC P0A03: CHECK THE MECT CIRCUIT FOR A SHORT TO PWR IN THE HARNESS

- MECT Sensor connector disconnected.
- PCM connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) MECT Sensor Connector, Harness Side	(-)
MECT - Pin 1	Ground

Is the voltage less than 5 V?

Yes	GO to DN7.
No	REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test. CHECK MECT sensor for damage. GO to DN7.

DN7 CHECK THE RESISTANCE OF THE MECT SENSOR WITH THE ENGINE OFF

Note: *Refer to the chart at the beginning of this test for the resistance specifications.*

- Ignition OFF.
- Measure the resistance between:

(+) MECT Sensor Connector, Component Side	(-) MECT Sensor Connector, Component Side
MECT - Pin 1	SIGRTN - Pin 2

Is the resistance within specification?

Yes	GO to DN8.
No	INSTALL a new MECT sensor. CLEAR the DTCs. REPEAT the self-test.

DN8 CHECK THE SIGNAL AND SIGRTN CIRCUITS FOR AN OPEN IN THE HARNESS

- Ignition OFF.
- Measure the resistance between:

(+) MECT Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
MECT - Pin 1	MECT - Pin T29
SIGRTN - Pin 2	SIGRTN - Pin T40

Is each resistance less than 5 ohms?

Yes	GO to DN9.
No	REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

DN9 CHECK THE SENSOR SIGNAL FOR A SHORT TO VREF

- Ignition OFF.
- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
MECT - Pin T29	VREF - Pin B66

Is the resistance greater than 10K ohms?

Yes	GO to DN18.
No	REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

DN10 DTC P0A02: SIMULATE AN OPPOSITE SIGNAL TO THE PCM

- MECT Sensor connector disconnected.
- Ignition ON, engine OFF.
- Access the PCM and monitor the MECT_V PID.

Is the voltage greater than 4.2 V?

Yes	INSTALL a new MECT sensor. CLEAR the DTCs. REPEAT the self-test.
No	GO to DN11.

DN11 CHECK THE SENSOR SIGNAL FOR A SHORT TO GROUND

- Ignition OFF.
- PCM connector disconnected.
- Measure the resistance between:

(+) MECT Sensor Connector, Harness Side	(-) MECT Sensor Connector, Harness Side
MECT - Pin 1	SIGRTN - Pin 2

- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) Vehicle Battery
MECT - Pin T29	Negative terminal

Are the resistances greater than 10,000 ohms?

Yes	GO to DN18.
No	REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

DN12 CONTINUOUS MEMORY DTCS P0A00, P0A02, P0A03 AND P0A7C: CHECK THE MECT SENSOR FOR AN INTERMITTENT CONCERN

- Ignition ON, engine OFF.
- Access the PCM and monitor the MECT_V PID.
- While observing the PID, carry out the following:
  - Tap on the sensor to simulate road shock
  - Wiggle the sensor connector

Does the MECT_V PID voltage indicate a concern in the MECT sensor?

Yes	DISCONNECT and INSPECT the connector. If OK, INSTALL a new MECT sensor. CLEAR the DTCs. REPEAT the self-test.
No	GO to DN13.

DN13 CHECK THE MECT CIRCUIT FOR AN INTERMITTENT CONCERN

- Access the PCM and monitor the MECT_V PID.
- While observing the PID, wiggle, shake, and bend small sections of the wiring harness working from the sensor to the PCM.

Does the MECT_V PID voltage indicate a concern in the MECT circuit?

Yes	ISOLATE the concern and REPAIR as necessary. CARRY OUT the Comprehensive Component Monitor Drive Cycle. REFER to Section 2, On Board Diagnostic (OBD) Drive Cycle.
No	GO to DN14.

DN14 CHECK THE PCM AND VEHICLE HARNESS CONNECTORS

- PCM connector disconnected.
- MECT Sensor connector disconnected.

Are the connectors and terminals OK?

Yes	Unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z.
No	REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.

DN15 DTC P0A01: CHECK FOR THE PRESENCE OF PCM DTCS P0A00, P0A02, P0A03, P0A7C

Note: *The TCM DTC P0A01 may be stored as a result of the MECT sensor or a corresponding circuit concern.*
The PCM DTCs P0A00, P0A02, P0A03, or P0A7C present along with a P0A05 indicate the MECT sensor or harness concern.

Are any of the above listed DTCs present?

Yes	DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions.
No	GO to DN16.

DN16 VERIFY THAT THE CONCERN IS PRESENT

Note: *Clearing the TCM DTCs erases any TCM recorded freeze frame data. Record any TCM freeze frame information before proceeding any further. Refer to the scan tool instruction manual for freeze frame PID menu.*

- Clear and retrieve the TCM continuous DTCs.

Is DTC P0A01 present?

Yes	GO to DN17.
No	Unable to duplicate or identify the concern at this time.

DN17 CHECK THE TCM MECT PID

- Ignition ON, engine OFF.
- Access the TCM and monitor the MECT PID.
- Start the engine using the engine running diagnostic mode. Refer to Section 2 Diagnostic Modes.
- Turn on all optional electrical loads.
- Idle the engine for 5 minutes with the load on and monitor the MECT PID.

Does the MECT PID temperature increase by at least 1 degree?

Yes	INSTALL a new transaxle assembly. REFER to the Workshop Manual Section 307-01 Automatic Transaxle/Transmission.
No	GO to DN18.

DN18 CHECK FOR CORRECT PCM OPERATION

- Disconnect all the PCM connectors.
- Visually inspect for:
  - pushed out pins
  - corrosion
- Connect all the PCM connectors and make sure they seat correctly.
- Carry out the PCM self-test and verify the concern is still present.

Is the concern still present?

Yes	INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM).
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

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