

General Service Bulletin (GSB):	Ambient Air Temperature (AAT) Sensor
GSB Overview:	This GSB provides information on the AAT sensor temperature sensing logic and diagnostics for inaccurate readings of outside air temperature
NOTE: This information is not intended to replace or supersede any warranty, parts and service policy, Work Shop Manual (WSM) procedures or technical training or wiring diagram information.	

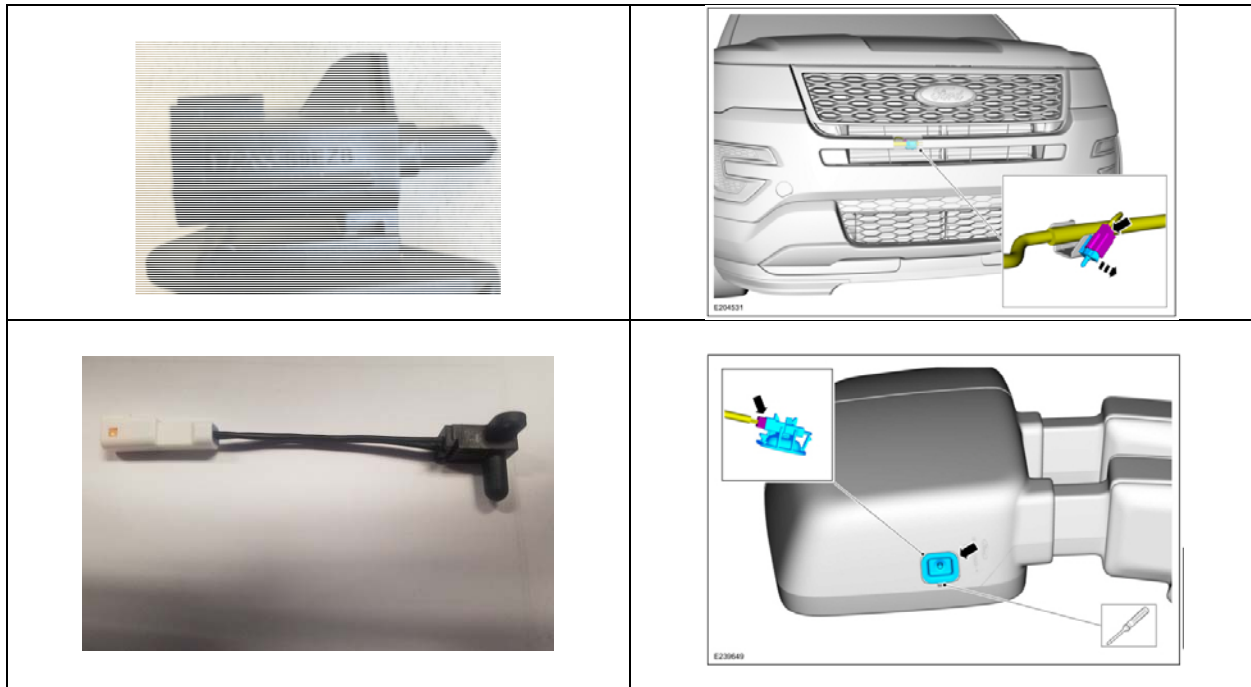
This GSB includes information on the following topics:

- **Outside air temperature sensing process and information routing**
- **Displayed temperature for different error states**
- **Symptom and diagnostics**

Outside air temperature sensing process and information routing

Note: Complete information on the AAT function, operation, testing and removal and installation procedures can be found in the Workshop Manual, Section 4-12 Climate Control and PC/ED Manual AAT pinpoint test.

The AAT sensor, base part number 12A647, is located either in the fascia / bumper area or in the driver's side rear view mirror.



The air temperature surrounding the sensor changes the resistance of the thermocouple within the sensor which equates to a voltage reading to the PCM. The PCM sends raw ambient air temperature data through the HS CAN 1 Bus, to the Gateway Module, through the MS CAN Bus to the front control interface module (FCIM), where the FCIM filters the raw data. The filtered data is sent through the MS CAN Bus to the Gateway Module, through the HS CAN 3 Bus to the APIM Module, to the FDIM and/or instrument cluster modules to display the outside air temperature.

Outside Air Temperature Display

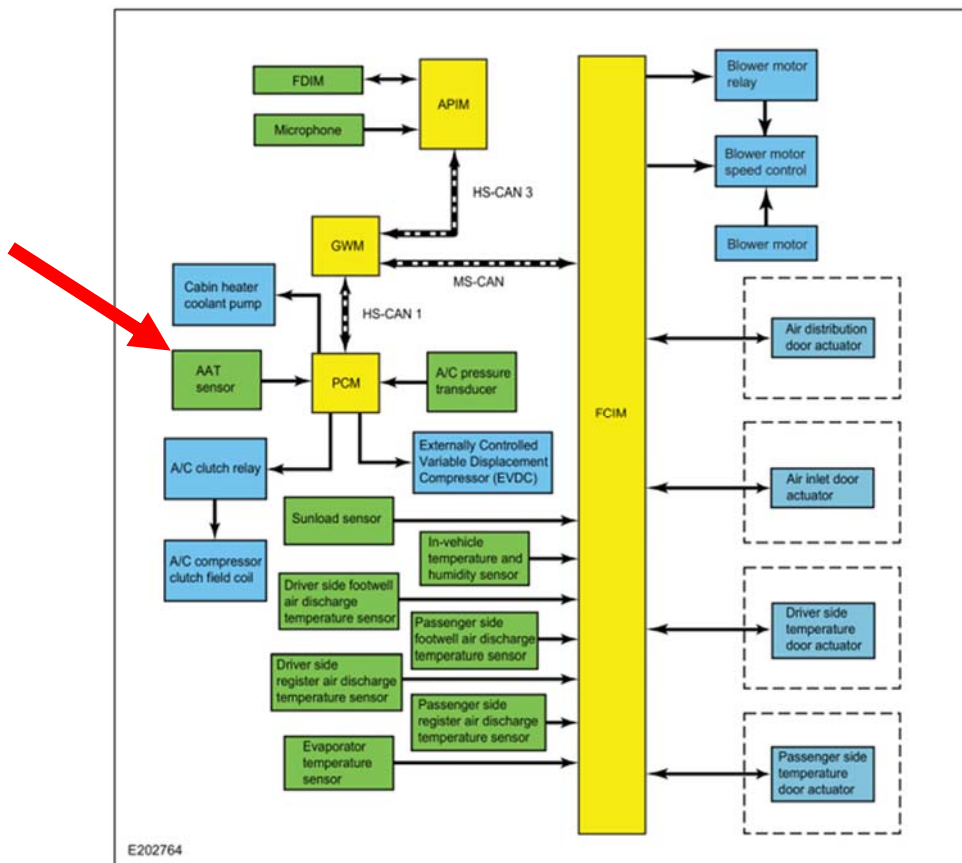
The PCM is programmed to update the messaged outside temperature data at different rates depending on several criteria to prevent false temperature displays due to a condition known as heat soaking. Heat soaking is where the outside air temperature is hotter in the location of the AAT sensor than the actual outside air temperature.

When the sensed outside temperature rises, the display updates slowly at varying rates based on vehicle speed. When the sensed outside temperature drops, the display updates more quickly following the drop experienced by the AAT sensor.

After replacing an AAT sensor, the sensor data must be reset by either driving the vehicle at speeds consistently about 20 MPH for at least 5 minutes to update the filtered data or perform the multiple button press reset procedure to update to the current raw value.

NOTE: Reference the applicable Workshop Manual (WSM) as this reset process can vary.

System Diagram



Displayed temperature for different error states

One of the functions of the AAT Sensor is to inhibit air conditioning compressor operation in cold temperatures. At temperatures of 32°F and below the air conditioning compressor operation is inhibited at the PCM, no clutch enable signal is sent.

When the sensor is disconnected or an open circuit detected by the FCIM, the temperature displayed will be -40°F to assist technicians in the repair diagnosis process.

When the FCIM does not receive a reliable raw data temperature signal, the temperature displayed and set within the FCIM will be 50°F all the time and not change. This default temperature allows heating, air conditioning and defogging to function.

The indicated display of -40°F or 50°F and the lack of function of the A/C compressor in these cases do not indicate a specific failed component. The WSM pinpoint tests should be followed to determine the root cause, whether a component or module has failed, or if there is a connection or wiring damage or corrosion issue, etc.

The resistance check of the AAT Sensor should be the final check, as described in the WSM and PC/ED pinpoint tests, before a sensor is changed (sample chart provided below) The temperature of the sensor itself should be used in the WSM table to evaluate sensor operation. A best practice is to use an infrared thermometer or equivalent to check the ambient temperature at the AAT and use this when comparing the readings with the applicable chart.

Please refer to the applicable Workshop Manual or PC/ED Manual for the AAT Sensor Expected Value chart for each specific vehicle.

AMBIENT AIR TEMPERATURE (AAT) SENSOR EXPECTED VALUES

Temperature		AAT Sensor Values
°C	°F	Resistance (K ohms)
-1.1 to 4.4	30 to 40	8.14 to 9.85 (Focus), 27.49 to 33.47 (All Others)
4.4 to 10	40 to 50	6.01 to 8.14 (Focus), 22.06 to 28.86 (All Others)
10 to 15.6	50 to 60	4.90 to 6.01 (Focus), 16.63 to 23.10 (All Others)
15.6 to 21.1	60 to 70	3.79 to 4.90 (Focus), 11.74 to 17.32 (All Others)
21.1 to 26.7	70 to 80	2.86 to 3.79 (Focus), 9.34 to 12.14 (All Others)
26.7 to 32.2	80 to 90	2.34 to 2.86 (Focus), 8.49 to 9.62 (All Others)
32.2 to 37.8	90 to 100	1.81 to 2.34 (Focus), 5.93 to 7.87 (All Others)
37.8 to 43.3	100 to 110	1.43 to 1.82 (Focus), 4.78 to 6.11 (All Others)

Symptoms and diagnostics:

Note: It is critical to the accuracy of these tables that the temperature of the sensor, not the outside air temperature, be used to determine the resistance value that should be measured.

When there is a customer symptom like inaccurate temperature or stuck temperature, the applicable WSM pinpoint test should be followed. When there are DTCs, including P0071, P0072 and P0073, the applicable PC/ED pinpoint test should be followed.

There may be a customer concern with an illuminated MIL or Check Engine lamp. These lights may or may not be associated with the P0071, P0072 or P0073 DTCs. In some cases these may be the result of moisture / corrosion at the AAT connector. When directed by the WSM or PC/ED, the AAT and other associated connectors integrity should be verified.

A high number of AAT sensors returned to Ford are tested and found to be functioning properly. When diagnosing issues related to the AAT follow the WSM and PC/ED pinpoint tests closely.