

Broadcast Message	Originating Module	Message Purpose
Climate control touchscreen and voice requests	APIM	This message contains both the climate control system voice commands as well as all climate control system touch screen inputs.
Climate control status	HVAC control module	This message contains the HVAC mode status for the mode indicators.

Module Network Input Messages - HVAC control module

Broadcast Message	Originating Module	Message Purpose
Remote start status	BCM	This message contains the climate control system controls request for remote start.
A/C clutch status	PCM	This message contains the A/C compressor clutch status.
Ambient air temperature	PCM	This message contains raw value from the ambient temperature sensor.

Module Network Input Messages - PCM

Broadcast Message	Originating Module	Message Purpose
A/C request	HVAC control module	This message requests the A/C compressor to be engaged.
Evaporator temperature	HVAC control module	This message contains the evaporator temperature. The PCM uses the evaporator temperature to determine the A/C compressor output.
HVAC remote start request	HVAC control module \ RCCM	This message contains the climate control system controls for ambient air temperature information.

Module Network Input Messages - RACM

Broadcast Message	Originating Module	Message Purpose
Driver set temperature	APIM	This message contains the climate control system controls for the driver side temperature.

Module Network Input Messages - SCME

Broadcast Message	Originating Module	Message Purpose
Climate control seat settings request	HVAC control module \ RCCM	This message contains the climate control system controls for the seat settings request.
Climate control seat settings status	HVAC control module \ RCCM	This message contains the status of the climate control system controls for the seat settings request.

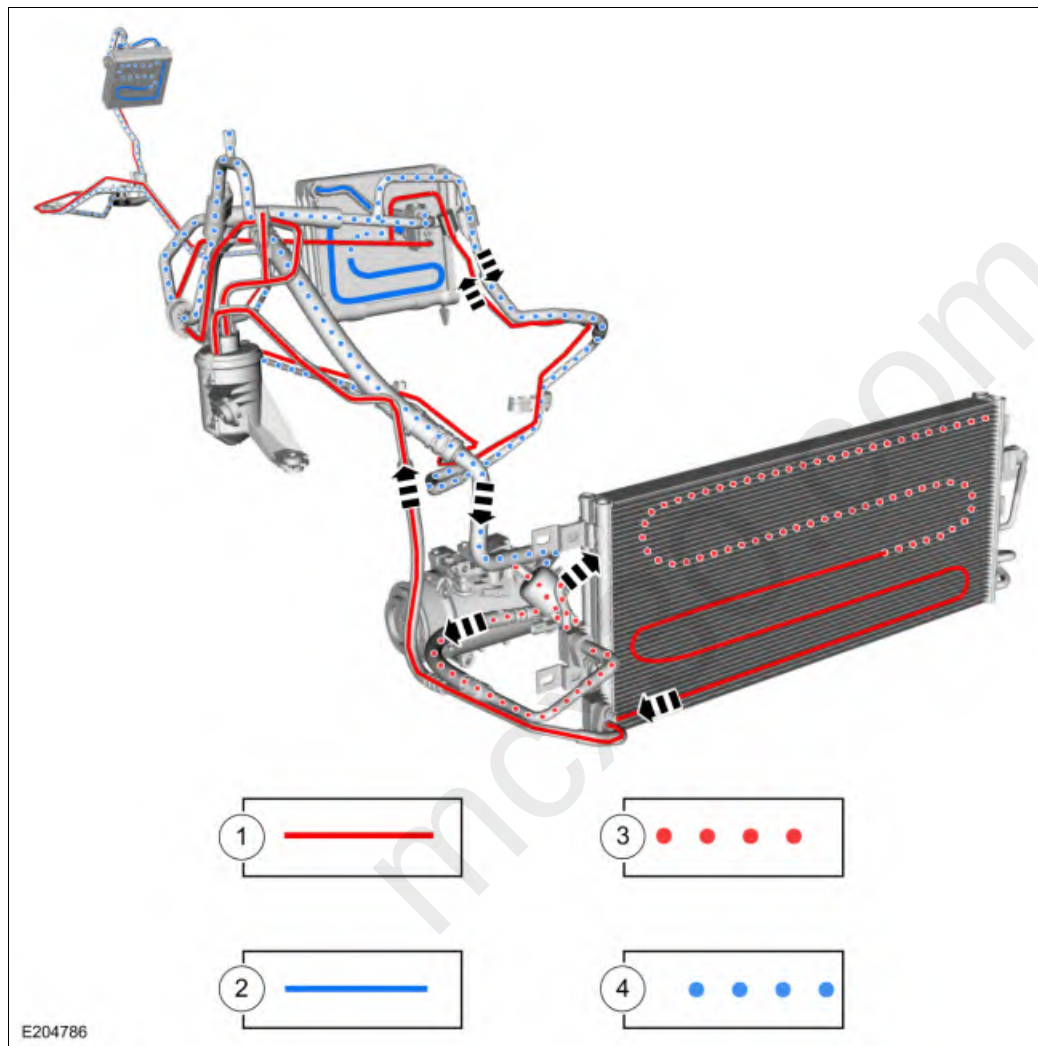
The Refrigerant Cycle

For information regarding basic HVAC system refrigerant operation, refer to the current Ford Web Based Technical Training courses. The following diagram shows the refrigerant system state in each component.

The following are characteristics of the DATC system

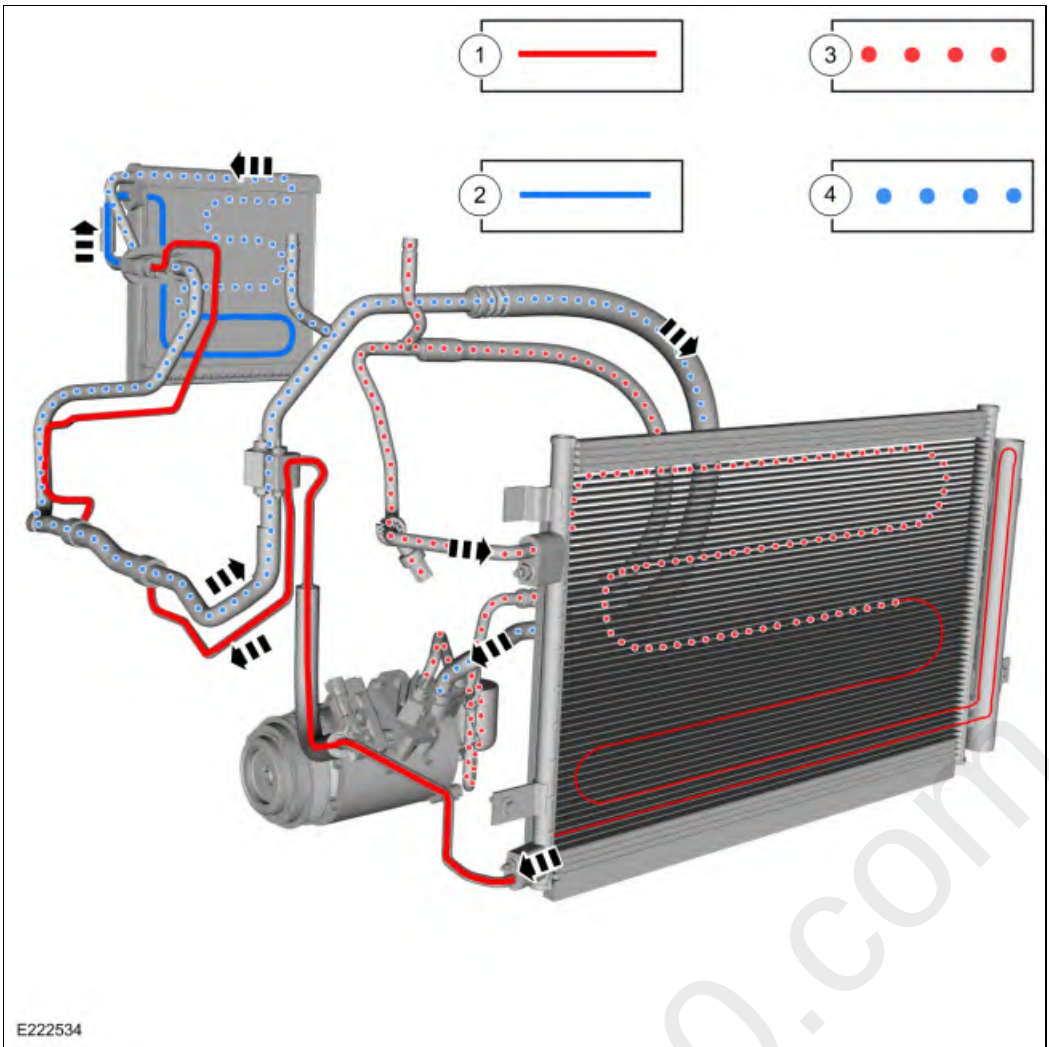
- The PCM controls the A/C clutch relay.
- The evaporator temperature sensor monitors the temperature of the air that has passed through the evaporator core and sends a signal to the PCM. If the temperature of the evaporator core discharge air is low enough to cause the condensed water vapor to freeze, the PCM disengages the A/C clutch relay.
- The line pressure is monitored so that A/C compressor operation is interrupted if the system pressure becomes too high or too low.
- The A/C compressor relief valve opens and vents refrigerant to relieve unusually high system pressure.

A/C Flow and State (2.3L EcoBoost)

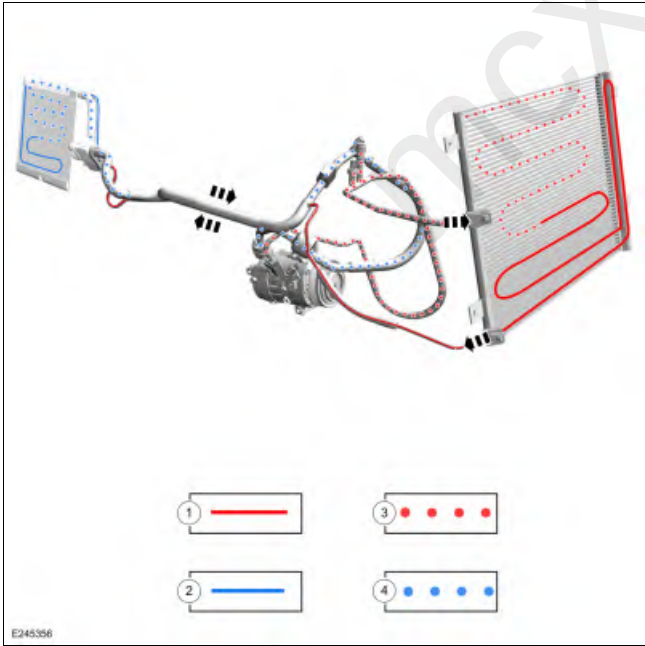


Item	Description
1	High pressure liquid
2	Low pressure liquid
3	High pressure vapor
4	Low pressure vapor

A/C Flow and State (3.0L EcoBoost)



A/C Flow and State (3.3L Duratec-V6)



Item	Description
1	High pressure liquid
2	Low pressure liquid
3	High pressure vapor

Item	Description
4	Low pressure vapor

Control System Logic

The DATC system controls are in one or more locations depending on vehicle option content:

- Front Controls Interface Control Module B (FCIM-B)
- Touchscreen FDIM (part of APIM)

When the FDIM touchscreen or voice commands are used and A/C is selected, the APIM sends the request message over the HS-CAN3 to the GWM. The GWM sends the request to the PCM over the HS-CAN1. The PCM controls the A/C clutch relay. The GWM also sends the request to the HVAC control module over the MS-CAN.

When the customer inputs an A/C request into the Front Controls Interface Control Module B (FCIM-B), the module sends the request to the GWM over the HS-CAN3. The GWM sends the request to the PCM over the HS-CAN1. The PCM controls the A/C clutch relay. The GWM also sends the request to the HVAC control module over the MS-CAN.

The HVAC control module requires PMI when it is replaced.

A/C Request

When an A/C request is received by the PCM, the PCM engages the A/C clutch relay when all of the following conditions are met:

- Excessively high or low refrigerant pressure from the A/C pressure transducer is not detected.
- Engine coolant temperature conditions are within normal parameters.
- Ambient air temperature is above approximately 0Â°C (32.0Â°F).
- Wide Open Throttle (WOT) condition is not present.
- Evaporator temperature is above approximately 1Â°C (33.8Â°F).
- Engine torque conditions are within normal parameters.
- Battery state of charge conditions are within normal parameters.

Compressor control and the evaporator temperature are a function of many parameters, not just a straight on/off, to avoid freezing the evaporator. The PCM monitors multiple temperature sensors for correlation including, but not limited to, AAT, CACT, CHT, ECT, IAT, IAT2, MAF, MAPT, TCB and TCIPPT Parameter Identifications (PIDs) (as applicable). The PCM runs this logic after an engine off and a calibrated soak period, typically 6 to 8 hours. This soak period allows the Ambient Air Temperature (AAT) sensor and the other temperature sensors to stabilize and not differ by greater than a calibrated value, typically 18Â°C (32.4Â°F). If a sensor input is found to be reporting a temperature imbalance the PCM does not allow the A/C clutch to engage. For more information on PCM sensors, Refer to Powertrain Control/Emissions Diagnosis (PC/ED) manual.

The PCM monitors the discharge pressure measured by the A/C pressure transducer. The PCM interrupts A/C compressor operation in the event the A/C pressure transducer indicates high system discharge pressures. It is also used to sense low charge conditions. If the pressure is below a predetermined value for a given ambient temperature, the PCM does not allow the A/C clutch to engage.

Rear Climate Control

For system operation and component description information on the rear climate control system,

Refer to: Rear Climate Control - System Operation and Component Description (412-02 Rear Climate Control, Description and Operation).

Supplemental Heating

For system operation and component description information on the supplemental heating climate control system,

Refer to: Supplemental Climate Control - System Operation and Component Description (412-03 Supplemental Climate Control, Description and Operation).

Heating and Ventilation

The heating and ventilation system:

- controls the temperature of the air inside the vehicle.
- reduces the relative humidity of the air inside the vehicle (during A/C compressor operation).
- delivers heated or cooled air to maintain the vehicle interior temperature and comfort level.

The heating and ventilation system uses a reheat method to provide conditioned air to the passenger compartment. Temperature blending is controlled by temperature doors, which regulate the amount of air that flows through and around the heater core, where it is then mixed and distributed. All airflow from the blower motor passes through the A/C evaporator core.

Instrument Panel Console Switch Assembly - Auto Start-Stop Deactivation Switch (if equipped)

The Instrument Panel Console Switch Assembly - Auto Start-Stop deactivation switch is available on vehicles equipped with Auto Start- Stop feature only. Auto Start-Stop deactivation switch is a momentary contact switch that includes a LED indicator. This switch is used to deactivate the Auto Start-Stop mode. Refer to the Owner's Literature, Unique Driving Characteristics, for full Auto Start-Stop enabling/disabling information.

Air Handling

There are 4 door actuators that control the air flow into the passenger compartment:

- Air distribution
- Air inlet
- Driver side temperature
- Passenger side temperature

All of the door actuators contain a reversible electric motor and a potentiometer. The potentiometer circuit consists of a 5-volt reference signal connected to one end of a variable resistor, and a signal ground connected to the other. A signal circuit is connected to a contact wiper, which is driven along the variable resistor by the actuator shaft. The signal to the HVAC control module from the contact wiper indicates the position of the actuator door. The HVAC control module powers the actuator motors to move the doors to the desired positions. The desired door positions are calculated by the HVAC control module based on the set temperature, in-vehicle temperature, ambient air temperature and sunload.

When an airflow mode, desired temperature, fresh air, or recirculation mode is selected, the HVAC control module moves the actuator motor in the desired direction.

The HVAC control module may adjust the air inlet door based on the in-vehicle temperature and humidity sensor information to maintain the desired humidity of the passenger cabin air.

The HVAC control module sends a PWM signal to the blower motor speed control to regulate the blower speed as necessary. The blower motor speed control provides variable ground feed for the blower motor based on the input from the HVAC control module. A delay function provides a gradual increase or decrease in blower motor speed under all conditions.

AUTO

When AUTO is selected:

- the HVAC system operates in a manner to achieve and maintain the temperature set by the operator.
- the driver and passenger side temperature doors are automatically controlled by the HVAC control module based on the temperature setting.
- the A/C compressor is automatically controlled by the PCM from information sent by the HVAC control module, based on the temperature setting. The A/C compressor operates as long as the outside temperature is above approximately 0Â°C (32Â°F).
- the blower motor speed is automatically controlled through the blower motor speed control that receives a PWM signal from the HVAC control module based on the temperature setting, but can be manually overridden.
- the HVAC control module controls the air inlet door to recirculate, partially recirculate or open to the fresh air position depending on the in-car temperature and humidity sensor inputs.

OFF

When OFF is selected:

- the air inlet door closes, preventing outside air and allowing only recirculated air.
- the blower motor is off.

MAX A/C

When MAX A/C is selected:

- the air inlet door closes, preventing outside air and allowing only recirculated air.
- the recirculated air indicator is illuminated (recirculated air forced on).
- the footwell vent doors and defrost vent/register doors operate in combination to direct airflow to the instrument panel registers.
- the temperature doors move to the full cool position. Air temperature can be manually overridden.
- the A/C button is illuminated.
- the A/C compressor operates as long as the outside temperature is above approximately 0Â°C (32Â°F).
- the blower motor is commanded to the highest speed. The blower motor speed is adjustable.

PANEL

When PANEL mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes,

preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.

- the footwell vent doors and defrost vent/register doors operate in combination to direct airflow to the instrument panel registers.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

PANEL/FLOOR

When PANEL/FLOOR mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the floor duct and the instrument panel registers. A small amount of airflow from the side window demisters and defrost duct is present.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

FLOOR

When FLOOR mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the floor duct. A small amount of airflow from the defroster duct and side window demisters is present.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

FLOOR/DEFROST

When FLOOR/DEFROST mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the floor duct, the defroster duct and the side window demisters.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

MAX DEFROST

When MAX DEFROST mode is selected:

- the recirculated air request button is disabled. The air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the defroster duct and side window demisters. A small amount of airflow from the floor duct is present.
- the A/C is turned on in defrost mode. The A/C compressor operates as long as the outside temperature is above approximately 0°C (32°F).
- the temperature is set to the highest setting and is **not** adjustable.
- the fan is set to the highest speed and is **not** adjustable.
- MAX DEFROST can be exited by pressing the AUTO button.

MyTemp

The MyTemp feature can be used to store and recall a preset driver's temperature. This feature is provided so this temperature can be quickly adjusted to a frequently used setting with a single button press. For additional information about MyTemp, refer to the Owner's Literature.

Remote Start - Message Center Set To Auto

Remote start is an optional feature available on this vehicle. In addition to being able to start the vehicle remotely, the remote start feature also utilizes other vehicle systems to increase the level of comfort to the vehicle occupants upon entering the vehicle. For additional information on the remote start feature and the other vehicle systems, refer to the Owner's Literature.

Set the climate control to operate in Auto mode through the information display controls: Remote Start > Climate Control > Heater/A/C > Auto. The climate control system automatically sets the interior temperature to 72°F (22°C). Refer to the Owner's Literature for more information.

When the factory remote start feature is used, the DATC system automatically sets certain parameters in an attempt to achieve a comfortable cabin temperature. These parameters are set based on multiple inputs including the in-vehicle temperature and humidity, sunload and outside air temperature sensors.

Remote Start - Message Center Set To Last User Settings

Remote start is an optional feature available on this vehicle. In addition to being able to start the vehicle remotely, the remote start feature also utilizes other vehicle systems to increase the level of comfort to the vehicle occupants upon entering the vehicle. For additional information on the remote start feature and the other vehicle systems, refer to the Owner's Literature.

Set the climate control to operate using the last climate control settings through the information display controls: Remote Start > Climate Control > Heater/A/C > Last Settings. The climate control system automatically uses the settings last selected before the vehicle was turned off. The climate control system cannot be adjusted during remote start operation. Turn the ignition on to return the system to its previous settings. Refer to the Owner's Literature for more information.

Component Description

HVAC Control Module - Dual Automatic Temperature Control (DATC)

The DATC system uses the HVAC control module, and it also controls the outputs for rear window defrost and climate controlled seats. For details on the HVAC control module communication, refer to Control System Logic in this section.

The HVAC control module utilizes a Field-Effect Transistor (FET) protective circuit strategy for its actuator outputs. Output load (current level) is monitored for excessive current (typically short circuits) and is shut down (turns off the voltage or ground provided by the module) when a fault event is detected. A short circuit DTC is stored at the fault event and a cumulative counter is started.

When the demand for the output is no longer present, the module resets the Field-Effect Transistor (FET) circuit protection to allow the circuit to function. The next time the driver requests a circuit to activate that has been shut down by a previous short (Field-Effect Transistor (FET) protection) and the circuit is still shorted, the Field-Effect Transistor (FET) protection shuts off the circuit again and the cumulative counter advances.

When the excessive circuit load occurs often enough, the module shuts down the output until a repair procedure is carried out. The Field-Effect Transistor (FET) protected circuit has 3 predefined levels of short circuit tolerance based on the harmful effect of each circuit fault on the Field-Effect Transistor (FET) and the ability of the Field-Effect Transistor (FET) to withstand it. A module lifetime level of fault events is established based upon the durability of the Field-Effect Transistor (FET). If the total tolerance level is determined to be 600 fault events, the 3 predefined levels would be 200, 400 and 600 fault events.

When each tolerance level is reached, the short circuit DTC that was stored on the first failure cannot be cleared by a command to clear the Diagnostic Trouble Codes (DTCs). The module does not allow the DTC to be cleared or the circuit to be restored to normal operation until a successful self-test proves that the fault has been repaired. After the self-test has successfully completed (no on-demand Diagnostic Trouble Codes (DTCs) present), DTC U1000:00 and the associated DTC (the DTC related to the shorted circuit) automatically clears and the circuit function returns.

When each level is reached, the DTC associated with the short circuit sets along with DTC U1000:00. These Diagnostic Trouble Codes (DTCs) can be cleared using the module self-test, then the Clear DTC operation on the scan tool. The module never resets the fault event counter to zero and continues to advance the fault event counter as short circuit fault events occur.

If the number of short circuit fault events reach the third level, then Diagnostic Trouble Codes (DTCs) U1000:00 and U3000:49 set along with the associated short circuit DTC. DTC U3000:49 cannot be cleared and a new module must be installed after the repair.

The HVAC control module requires Programmable Module Installation (PMI) when it is replaced.

Ambient Air Quality Sensor (if equipped)

The ambient air quality sensor is an input to the HVAC control module. When pollution and bad odors coming from the external environment are detected, the air inlet door automatically closes.

Outside Air Temperature Display

The Ambient Air Temperature (AAT) sensor is hardwired to the PCM through separate input and return circuits. The PCM provides a reference voltage to the Ambient Air Temperature (AAT) sensor and monitors the change in voltage resulting from changes in resistance as determined by outside air temperature. The PCM filters the ambient air temperature input and sends the data to the GWM through the HS-CAN1. The GWM sends the air ambient temperature filtered message to the HVAC control module over the MS-CAN. The HVAC control module returns the message as the Outside Air Temperature message to the GWM. The GWM sends outside air temperature message to the APIM for the touchscreen to display the outside air temperature.

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 Ambient Air Temperature (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 Ambient Air Temperature (AAT) sensor.

After replacing an Ambient Air Temperature (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.

The multiple button reset for the Ambient Air Temperature (AAT) sensor is as follows:

- On the HVAC panel controls, press the A/C and Recirc buttons simultaneously, then, release both.
- Within 2 seconds press the A/C button again.

Blower Motor Control Module

The blower motor and the blower motor speed control are combined into one assembly called the blower motor control module. The blower motor pulls air from the air inlet and forces it into the climate control housing and the plenum chamber where it is mixed and distributed. The blower motor speed control uses a PWM signal from the HVAC control module to determine the desired blower speed and varies the ground feed for the blower motor to control the speed.

Evaporator Core

The evaporator core is an aluminum tube and fin design heat exchanger located in the climate control housing. A mixture of liquid refrigerant and oil enters through the evaporator core inlet tube and exits out of the evaporator core through the evaporator core outlet tube as a vapor. During A/C compressor operation, airflow from the blower motor is cooled and dehumidified as it flows through the evaporator core fins.

Heater Core

The heater core, located in the climate control housing, consists of fins and tubes arranged to extract heat from the engine coolant and transfer it to air passing through the heater core.

Climate Control Housing

The climate control housing directs airflow from the blower motor through the evaporator core and heater core. All airflow from the blower motor passes through the evaporator core. The airflow is then directed through or around the heater core by the temperature door(s). After passing through the heater core, the airflow is distributed to the selected outlet by the airflow mode doors.

Air Distribution Door Actuator

The air distribution door actuator contains a reversible electric motor and a potentiometer. The potentiometer allows the HVAC control module to monitor the position of the airflow mode door.

Air Inlet Door Actuator

The air inlet door actuator contains a reversible electric motor and a potentiometer. The potentiometer allows the HVAC control module to monitor the position of the airflow mode door.

Driver Side Temperature Door Actuator

The driver side temperature door actuator contains a reversible electric motor and potentiometer. The potentiometer allows the HVAC control module to monitor the position of the temperature door.

Passenger Side Temperature Door Actuator

The passenger side temperature door actuator contains a reversible electric motor and potentiometer. The potentiometer allows the HVAC control module to monitor the position of the temperature door.

A/C Pressure Transducer

The PCM monitors the discharge pressure measured by the A/C pressure transducer. As the refrigerant pressure changes, the resistance of the A/C pressure transducer changes. It is not necessary to recover the refrigerant before removing the A/C pressure transducer.

A 5-volt reference voltage is supplied to the A/C pressure transducer from the PCM. The A/C pressure transducer receives a ground from the PCM. The A/C pressure transducer then sends a voltage to the PCM to indicate the A/C refrigerant pressure.

Evaporator Temperature Sensor

The evaporator temperature sensor contains a thermistor. The sensor varies its resistance with the temperature. As the temperature rises, the

resistance falls. As the temperature falls, the resistance rises. The evaporator temperature sensor is an input to the HVAC control module and the information is relayed to the PCM over the CAN. If the evaporator temperature is below approximately 1°C (33.8°F), the PCM does not allow the A/C compressor to operate.

Air Discharge Temperature Sensors

There are 4 air discharge temperature sensors in the DATC system:

- Driver side footwell air discharge temperature sensor
- Driver side register air discharge temperature sensor
- Passenger side footwell air discharge temperature sensor
- Passenger side register air discharge temperature sensor

The air discharge temperature sensors contain a thermistor and are inputs to the HVAC control module. The sensors vary their resistance with the temperature. As the temperature rises, the resistance falls. As the temperature falls, the resistance rises. The HVAC control module uses the sensor information to maintain the desired temperature of the passenger cabin air.

In-Vehicle Temperature And Humidity Sensor

The in-vehicle temperature and humidity sensor contains a thermistor and a sensing element which separately measures the in-vehicle air temperature and the humidity, then sends those readings to the HVAC control module. The in-vehicle temperature and humidity sensor has an electric fan within the sensor that draws in-vehicle air across the two sensing elements. The HVAC control module may adjust the air inlet door based on the in-vehicle temperature and humidity sensor information to maintain the desired humidity of the passenger cabin air.

Sunload Sensor

The sunload sensor supplies information to the HVAC control module indicating the intensity of the sun on the vehicle. The HVAC control module compensates high sun load with higher blower and reduced discharge temperatures.

Externally Controlled Variable Displacement A/C Compressor

NOTE: Proper Air Conditioning (A/C) system diagnosis on a vehicle's compressor is dependent on correct refrigerant system charge and tested in ambient temperatures above 21.1°C (70°F).

The externally controlled variable displacement compressor has:

- a non-serviceable shaft seal.
- a non-serviceable pressure relief valve installed in the rear of the compressor to protect the refrigerant system against excessively high refrigerant pressures.
- the appropriate compressor oil that contains special additives required for the A/C compressor. The oil may have some slightly dark-colored streaks while maintaining normal oil viscosity. This is normal for this A/C compressor because of break-in wear that can discolor the oil.

Variable displacement compressors have a swash plate that rotates to reciprocate pistons, which compresses refrigerant. Variable displacement compressors change the swash plate angle to change the refrigerant displacement. The externally controlled variable displacement compressor changes the swash plate angle in response to an electrical signal from the PCM. The externally controlled variable displacement compressor manages displacement by controlling refrigerant differential pressure before and after a throttle at the discharge side; achieving precise cooling capability control in response to cabin environment and driving conditions.

The PCM sends a PWM signal to the solenoid in the compressor to control the compressor displacement based upon the:

- Ambient air temperature
- Evaporator temperature
- Engine RPM
- Vehicle speed
- A/C high side pressure
- Temperature and mode settings of the climate control head
- Intake air temperature

Condenser

The A/C condenser is an aluminum fin-and-tube design heat exchanger. It cools compressed refrigerant gas by allowing air to pass over fins and tubes to extract heat, and condenses gas to liquid refrigerant as it is cooled.

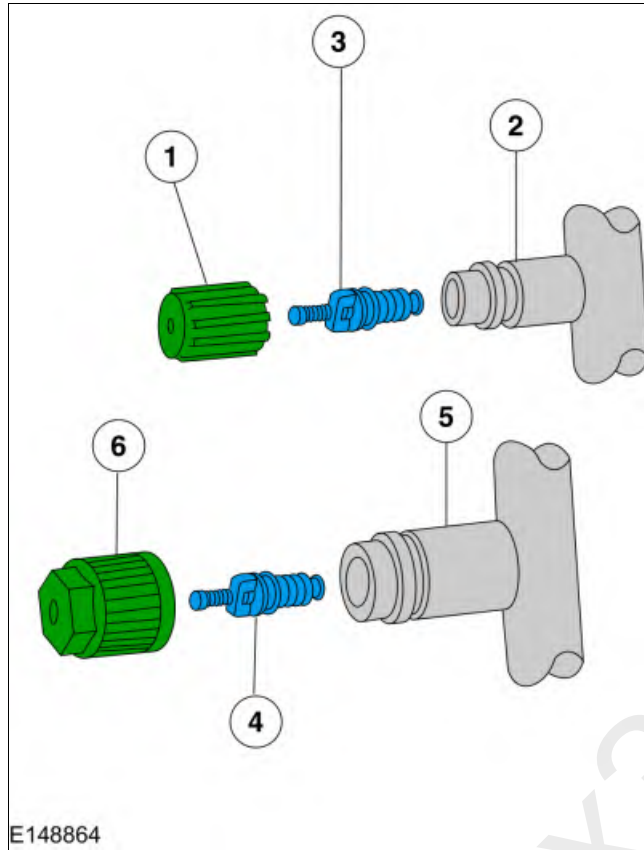
Receiver Drier

The receiver drier stores high-pressure liquid and the desiccant bag mounted inside the receiver drier removes any retained moisture from the refrigerant.

Thermostatic Expansion Valve (TXV)

The Thermostatic Expansion Valve (TXV) is located at the evaporator core inlet and outlet tubes at the center rear of the engine compartment. The TXV provides a restriction to the refrigerant flow and separates the low-pressure and high-pressure sides of the refrigerant system. Refrigerant entering and exiting the evaporator core passes through the TXV through 2 separate flow paths. An internal temperature sensing bulb senses the temperature of the refrigerant flowing out of the evaporator core and adjusts an internal pin-type valve to meter the refrigerant flow into the evaporator core. The internal pin-type valve decreases the amount of refrigerant entering the evaporator core at lower temperatures and increases the amount of refrigerant entering the evaporator core at higher temperatures.

Service Gauge Port Valves



Item	Description	Torque
1	Low-pressure service gauge port valve cap	0.8 Nm (7 lb-in)
2	Low-pressure service gauge port valve	â€”
3	Low-pressure Schrader-type valve	2.26 Nm (20 lb-in)
4	High-pressure Schrader-type valve	3.4 Nm (30 lb-in)
5	High-pressure service gauge port valve	â€”
6	High-pressure service gauge port valve cap	0.8 Nm (7 lb-in)

The service gauge port fitting is an integral part of the refrigerant line or component.

- Prior to leak testing, blow air over the service gauge port valves to ensure an accurate test.
- Special couplings are required for both the high-side and low-side service gauge ports.
- A very small amount of leakage around the Schrader-type valve with the service gauge port valve cap removed is considered normal. Install a new Schrader-type valve core if the seal leaks excessively.
- The A/C service gauge port valve caps are used as primary seals in the refrigerant system to prevent leakage through the Schrader-type valves from reaching the atmosphere. Always install and tighten the A/C service gauge port valve caps to the correct torque after they are removed.
- Follow the procedure and the notes for electronic leak testing. REFER to the appropriate Electronic Leak Detection procedure in General Procedures.

Refrigerant System Dye

A fluorescent dye wafer is added to the receiver drier desiccant bag at the factory to assist in refrigerant system leak diagnosis. This fluorescent dye wafer dissolves after about 30 minutes of continuous A/C operation. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks, even if a significant amount of refrigerant has been removed from the system.

Replacement desiccant bags, either separately or part of the receiver drier assembly, are equipped with a new fluorescent dye wafer. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks. If the system has been out of refrigerant through the winter the dye at the leak point may have oxidized and may not fluoresce. If this happens, recharge and operate the A/C system to circulate the oil and allow any residual dye to show up at the leak point. It is important to understand that dye adheres to the oil not the refrigerant; the refrigerant carries the oil out of the leak point.

NOTE: *Check for leaks using a Rotunda-approved UV lamp and dye enhancing glasses.*

REFER to the appropriate Fluorescent Dye Leak Detection procedure in General Procedures.

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Diagnosis and Testing

Climate Control System

Diagnostic Trouble Code (DTC) Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Diagnostic Trouble Code Chart

Module	DTC	Description	Action <i>New: hover over Pinpoint Test links to show title</i>
ACCM	B11EE:19	A/C Compressor: Circuit Current Above Threshold	GO to Pinpoint Test AI
ACCM	B11EE:41	A/C Compressor: General Checksum Failure	GO to Pinpoint Test AR
ACCM	B11EE:4B	A/C Compressor: Over Temperature	GO to Pinpoint Test AI
ACCM	B11EE:92	A/C Compressor: Performance or Incorrect Operation	GO to Pinpoint Test AI
ACCM	P0562:00	System Voltage Low: No Sub Type Information	GO to Pinpoint Test AI
ACCM	P0563:00	System Voltage High: No Sub Type Information	GO to Pinpoint Test AI
ACCM	P0AFA:16	Hybrid/EV Battery System Voltage Low: Circuit Voltage Below Threshold	GO to Pinpoint Test AI
ACCM	P0AFB:17	Hybrid/EV Battery System Voltage High: Circuit Voltage Above Threshold	GO to Pinpoint Test AI
ACCM	P0AFB:1C	Hybrid/EV Battery System Voltage High: Circuit Voltage Out of Range	GO to Pinpoint Test AI
ACCM	U0001:88	High Speed CAN Communication Bus: Bus Off	GO to Pinpoint Test AO
ACCM	U0100:00	Lost Communication with ECM/PCM "A": No Sub Type Information	GO to Pinpoint Test AK
ACCM	U0111:00	Lost Communication With Battery Energy Control Module "A": No Sub Type Information	GO to Pinpoint Test AL
ACCM	U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test Q
ACCM	U3000:04	Control Module: System Internal Failure	GO to Pinpoint Test AR
ACCM	U3000:42	Control Module: General Memory Failure	GO to Pinpoint Test AR
ACCM	U3000:49	Control Module: Internal Electronic Failure	GO to Pinpoint Test AR
BCMC	B3A01:00	A/C Refrigerant Distribution Valve Actuator "C" Control Circuit/Open: No Sub Type Information	GO to Pinpoint Test AU
BCMC	B3A02:00	A/C Refrigerant Distribution Valve Actuator "C" Control Circuit Low: No Sub Type Information	GO to Pinpoint Test AU
BCMC	B3A03:00	A/C Refrigerant Distribution Valve Actuator "C" Control Circuit High: No Sub Type Information	GO to Pinpoint Test AU
BCMC	P2611:00	A/C Refrigerant Distribution Valve "A" Control Circuit/Open: No Sub Type Information	GO to Pinpoint Test AS
BCMC	P2612:00	A/C Refrigerant Distribution Valve "A" Control Circuit Low: No Sub Type Information	GO to Pinpoint Test AS
BCMC	P2613:00	A/C Refrigerant Distribution Valve "A" Control Circuit High: No Sub Type Information	GO to Pinpoint Test AS
BCMC	P2CFC:00	A/C Clutch Control Circuit: No Sub Type Information	GO to Pinpoint Test B
BCMC	P2CFD:00	A/C Clutch Control Circuit Low: No Sub Type Information	GO to Pinpoint Test B
BCMC	P2CFE:00	A/C Clutch Control Circuit: No Sub Type Information	GO to Pinpoint Test B
BCMC	P2E62:00	Engine Coolant Bypass Valve "E" Control Circuit/Open: No Sub Type Information	GO to Pinpoint Test AT