



About This Manual

Introduction

⚠️ WARNING: Before beginning any service procedure in this manual, refer to health and safety warnings in section 100-00 General Information. Failure to follow this instruction may result in serious personal injury.

For additional information, refer to: [Health and Safety Precautions](#) (100-00 General Information, Description and Operation).

This manual describes and directs repair procedures specified by Ford Motor Company for the vehicle. Critical health and safety precautions are included. Anyone who deviates from these instructions risks compromising personal safety or vehicle integrity.

SECTION CONTENT

This manual is divided into groups, each containing sections numbered based on the component part number. Section contents may include:

- Specifications
 - Fluid capacities, component specifications and torque values not covered in other procedures
- Description and Operation
 - Overview of the system, component locations, and system operation
- Diagnosis and Testing
 - Symptom charts, DTC charts and diagnostic tests
 - See the Diagnosis and Testing Information in this document
- General Procedures
 - Service adjustments, electronic programming and other special procedures
- Removal and Installation
 - Component removal and installation instructions
- Removal
 - Component removal instructions
- Installation
 - Component installation instructions
- Disassembly and Assembly
 - Component disassembly and assembly instructions
- Disassembly and Assembly of Subassemblies
 - Assembly disassembly and assembly instructions

IMPORTANT INFORMATION

Section number 100-00 General Information contains the following important information (including this document):

- Critical Health and Safety Precautions - service safety precautions applicable to the entire manual. For additional information, refer to: [Health and Safety Precautions](#) (100-00 General Information, Description and Operation).
- A Symbols Glossary - definitions of the action directed by each symbol. For additional information, refer to: [Symbols Glossary](#) (100-00 General Information, Description and Operation).
- Diagnostic Methods - support information for diagnostics.

Yes	CHECK <u>OASIS</u> for any applicable Technical Service Bulletins (TSBs). If a <u>TSB</u> exists for this concern, DISCONTINUE this test and FOLLOW <u>TSB</u> instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new <u>HVAC</u> control module. REFER to: Heating, Ventilation and Air Conditioning (HVAC) Control Module (412-00 Climate Control System - General Information, Removal and Installation).
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

Insufficient, Erratic Or No Heat

Normal Operation and Fault Conditions

When the engine is at operating temperature hot coolant flows from the engine through the heater core and back to the engine. Correct coolant temperatures are critical for good heater performance.

Possible Sources

- Wiring, terminals or connectors
- Temperature door actuator(s)
- Heater core

Visual Inspection and Diagnostic Pre-checks

- Inspect for low engine coolant level.

PINPOINT TEST F : INSUFFICIENT, ERRATIC OR NO HEAT

F1 CHECK FOR CORRECT ENGINE COOLANT LEVEL

- Ignition OFF.
- Check the engine coolant level.

Is the engine coolant at the correct level as indicated on the engine coolant recovery reservoir?

Yes	GO to E3
No	GO to E2

F2 CHECK THE ENGINE COOLING SYSTEM FOR LEAKS

- Pressure test the cooling system for leaks. Refer to the appropriate procedure in section 303-03.

Does the engine cooling system leak?

Yes	REPAIR the engine coolant leak. Refer to the appropriate procedure in section 303-03. TEST the system for normal operation.
No	FILL and BLEED the cooling system. Refer to the appropriate procedure in section 303-03. After filling and bleeding the cooling system, GO to E3

F3 CHECK FOR COOLANT FLOW TO THE HEATER CORE

- Run the motor until it reaches normal operating temperature. Select the floor position on the HVAC control assembly. Set the temperature control to full warm and the blower to the lowest setting.
- Using a suitable temperature measuring device, check the heater core inlet hose to see if it is hot.

Cruise Control

DTC Charts

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).

DTC Chart: Powertrain Control Module (PCM)

PCM DTC Chart

DTC	Description	Action
P0504	Brake Switch A / B Correlation	GO to Pinpoint Test B
P0572	Brake Switch A Circuit Low	GO to Pinpoint Test B
P0573	Brake Switch A Circuit High	GO to Pinpoint Test B
P1703	Brake Switch Out Of Self-Test Range	GO to Pinpoint Test B
P193D	Cruise Control Multi-Function Input Signal	GO to Pinpoint Test C
All other Diagnostic Trouble Codes (DTCs)	–	For 2.3L TiVCT, REFER to: Electronic Engine Controls (303-14A Electronic Engine Controls - 2.3L EcoBoost (201kW/273PS), Diagnosis and Testing). For 3.5L TiVCT, REFER to: Electronic Engine Controls (303-14B Electronic Engine Controls - 3.5L EcoBoost (257kW/350PS), Diagnosis and Testing). For 3.5L GTDI, REFER to: Electronic Engine Controls (303-14C Electronic Engine Controls - 3.5L Duratec (209kW/284PS), Diagnosis and Testing). For 3.7L, REFER to: Electronic Engine Controls (303-14D Electronic Engine Controls - 3.7L Duratec (227kW/301PS), Diagnosis and Testing).

DTC Chart: Steering Column Control Module (SCCM)

SCCM DTC Chart

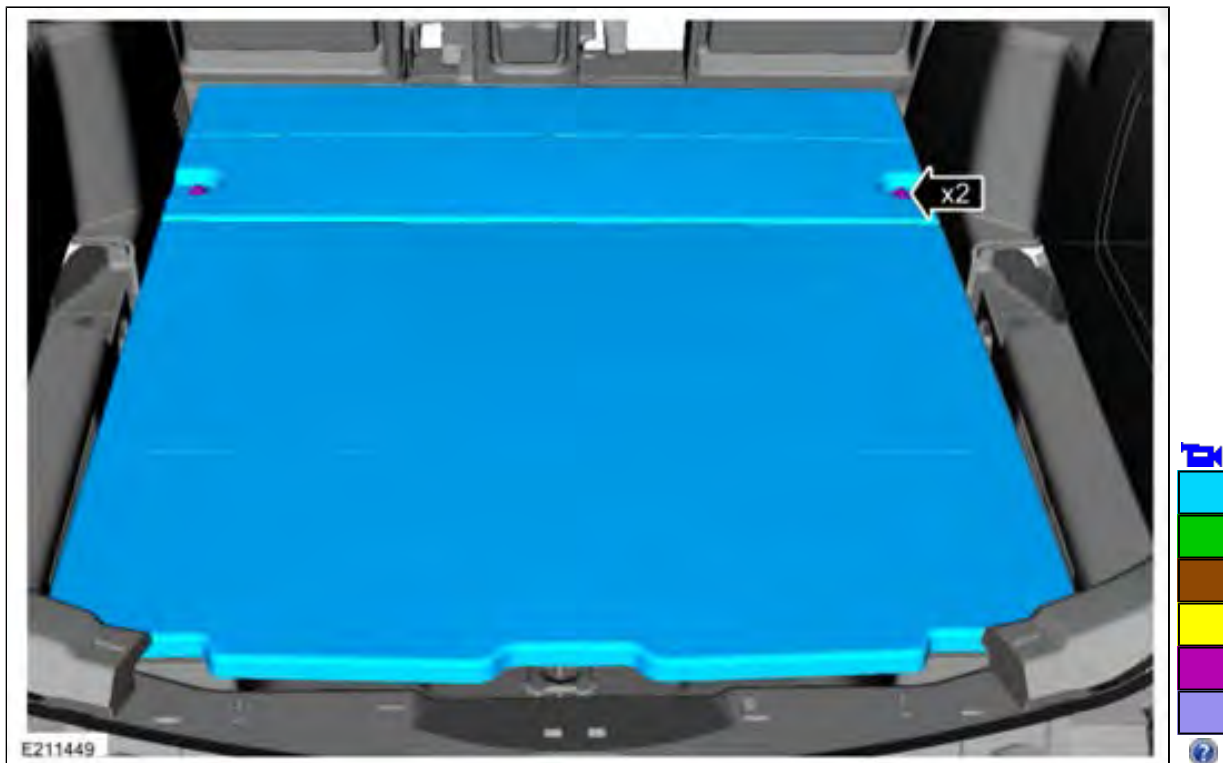
DTC	Description	Action
B137F:09	Steering Wheel Left Switch Pack: Component Failure	GO to Pinpoint Test A
B137F:11	Steering Wheel Left Switch Pack: Circuit Short to Ground	GO to Pinpoint Test A
B137F:17	Steering Wheel Left Switch Pack: Circuit Voltage Above Threshold	GO to Pinpoint Test A
All other Diagnostic Trouble Codes (DTCs)	–	REFER to: Steering Wheel and Column Electrical Components (211-05 Steering Wheel and Column Electrical Components, Diagnosis and Testing).

Flasher Lighting Relay Panel

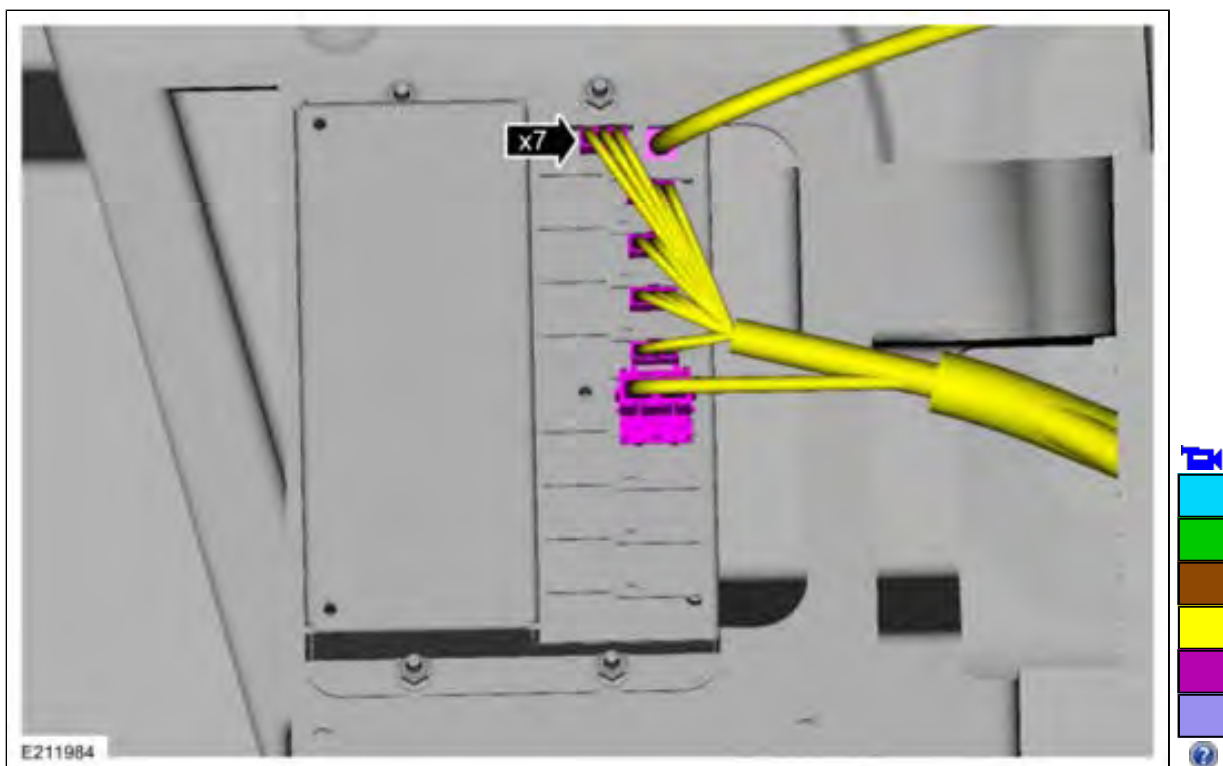
Removal

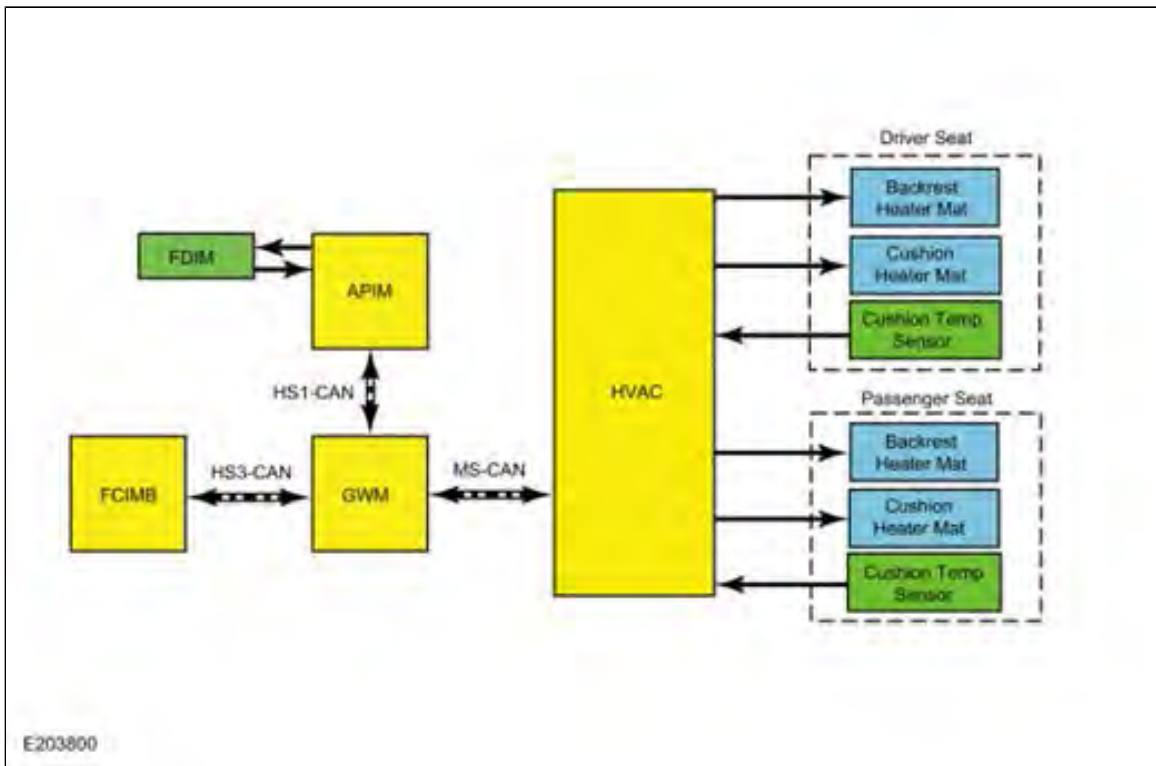
NOTE: Removal steps in this procedure may contain installation details.

1. Remove the bolts and the loadspace floor panel.
Torque: 16 lb.ft (22 Nm)



2. Disconnect the relay center electrical connectors.





Network Message Chart - Heated Seats

HVAC Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Climate control requests	<u>FDIM</u>	The climate control requests message contains the heated seat request information.
Climate control requests	FCIMB (Front Controls Interface Module "B")	The climate control requests message contains the heated seat request information.

FDIM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Climate control button status	<u>HVAC</u> Module	The <u>HVAC</u> module provides this message to the <u>FDIM</u> for the purpose of updating the displayed status of the heated seat buttons on the <u>FDIM</u> (touchscreen).

FCIMB (Front Controls Interface Module "B") Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Climate control button status	<u>HVAC</u> Module	The <u>HVAC</u> module provides this message to the FCIMB (Front Controls Interface Module "B") for the purpose of updating the displayed status of the heated seat buttons on the FCIMB (Front Controls Interface Module "B").

PINPOINT TEST AO : U0237:00

AO1 VERIFY THE CUSTOMER'S CONCERN

- Ignition ON.
- Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AO2
No	The system is operating correctly at this time. The <u>DTC</u> may have been set due to high network traffic or an intermittent fault condition.

AO2 CHECK THE COMMUNICATION NETWORK

- Using a diagnostic scan tool, perform the network test.

Does the DACMC pass the network test?

Yes	GO to AO3
No	REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).

AO3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCs) FROM THE ACM (AUDIO FRONT CONTROL MODULE) AND AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE SELF-TEST

- Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from the ACM and audio DSP module.

Are any non-network Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to <u>DTC</u> Chart for the appropriate module: <u>ACM</u> , or audio <u>DSP</u> module in this section.
No	GO to AO4

AO4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCs) FROM THE DACMC (DIGITAL AUDIO CONTROL MODULE C) SELF-TEST

- Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from the DACMC.

Are any non-network Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to: Information and Entertainment System (415-00D Information and Entertainment System - General Information - Vehicles With: Sony Audio System, Diagnosis and Testing).
No	GO to AO5

AO5 RECHECK THE ACM (AUDIO FRONT CONTROL MODULE) AND AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE DIAGNOSTIC TROUBLE CODES (DTCs)

Is the concern still present?

Yes	CHECK <u>OASIS</u> for any applicable Technical Service Bulletins (TSBs). If a <u>TSB</u> exists for this concern, DISCONTINUE this test and FOLLOW <u>TSB</u> instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new <u>ACM</u> . Refer to the appropriate section in Group 415 for the procedure.
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

U0199:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0199:00	Lost Communication With "Door Control Module A": No Sub Type Information	Sets in continuous memory in the <u>IPC</u> if data messages received from the <u>DDM</u> through the <u>GWM</u> are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- GWM concern
- DDM
- IPC

PINPOINT TEST BZ : U0199:00

BZ1 VERIFY THE CUSTOMER CONCERN

- Ignition ON.
- Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BZ2
No	The system is operating normally at this time. The <u>DTC</u> may have been set due to high network traffic or an intermittent fault condition.

BZ2 CHECK THE COMMUNICATION NETWORK

- Using a diagnostic scan tool, perform the network test.

Does the DDM pass the network test?

Yes	GO to BZ3
No	REFER to: Communications Network (418-00 Module Communications Network) .

B12EE:15	Liftgate/Tailgate/Trunk Release: Circuit Short To Battery or Open	Sets when the <u>BCM</u> detects an open from the liftgate latch release output circuit.
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Possible Causes

- Wiring, terminals or connectors
- Liftgate release switch
- Liftgate latch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the liftgate release switch for damage.

PINPOINT TEST O : THE LIFTGATE LATCH RELEASE IS INOPERATIVE (EXCEPT POLICE)

NOTE: This pinpoint test does not diagnose liftgate release concerns for vehicles with the power liftgate feature. Refer to Section 501-03 for power liftgate diagnostics.

O1 CHECK THE LIFTGATE RELEASE INPUT FOR A SHORT TO GROUND USING THE BCM (BODY CONTROL MODULE) LIFTGATE RELEASE SWITCH STATUS (LFTGATE_R_SW) PID (PARAMETER IDENTIFICATION)

- Ignition ON.
- Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).
- Using a diagnostic scan tool, view the BCM PID LFTGATE_R_SW.

Does the PID indicate the liftgate release switch is continuously pressed?

Yes	GO to O2
No	GO to O4

O2 CHECK THE LIFTGATE RELEASE SWITCH USING THE BCM (BODY CONTROL MODULE) LIFTGATE RELEASE SWITCH STATUS (LFTGATE_R_SW) PID (PARAMETER IDENTIFICATION)

- Ignition OFF.
- Disconnect Liftgate Release Switch [C4216](#).
- Ignition ON.
- Using a diagnostic scan tool, view the BCM PID LFTGATE_R_SW.

Does the PID continue to indicate the switch is pressed?

Yes	GO to O3
No	INSTALL a new liftgate release switch. REFER to: Liftgate Release Switch (501-14 Handles, Locks, Latches and Entry Systems, Removal and Installation).

O3 CHECK THE LIFTGATE RELEASE SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.
- Disconnect BCM [C2280E](#).
- Measure:

[Click to display connectors](#)

Positive Lead	Measurement / Action	Negative Lead
C4216-2	Ω	Ground

Is the resistance greater than 10,000 ohms?

Yes	GO to O12
No	REPAIR the circuit.

O4 CHECK THE BCM (BODY CONTROL MODULE) LIFTGATE RELEASE SWITCH STATUS (LFTGATE_R_SW) PID (PARAMETER IDENTIFICATION)

- Using a diagnostic scan tool, view the BCM LFTGATE_R_SW PID while pressing the liftgate release switch.

The Rear Parking Aid Camera Is Inoperative - Vehicles With Rear Only Parking Aid Camera

Refer to Wiring Diagrams Cell [145](#) for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: [Parking Aid - System Operation and Component Description](#) (413-13B Parking Aid - Vehicles With: Parking Aid Camera, Description and Operation).

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B115E:01	Camera Module: General Electrical Failure	A continuous and on-demand DTC that sets in the BCM when an internal electrical failure is detected from the camera.
B115E:02	Camera Module: General Signal Failure	A continuous and on-demand DTC that sets in the BCM when invalid LIN data is received from the video camera.
B115E:08	Camera Module: Bus Signal/Message Failure	A continuous and on-demand DTC that sets in the BCM when there is a LIN communication fault from the video camera.

APIM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C1001:01	Vision System Camera: General Electrical Failure	A continuous and on-demand DTC that sets in the APIM when no video signal is detected from the rear parking aid camera when the vehicle is in reverse.

FCDIM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C1001:01	Vision System Camera: General Electrical Failure	A continuous and on-demand DTC that sets in the FCDIM when no video signal is detected from the rear parking aid camera when the vehicle is in reverse.

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Communication network concern
- Rear parking aid camera
- **TR** input concern
- Interior auto-dimming rear view mirror (with video display in interior auto-dimming mirror)
- **LIN** concern
- **BCM**
- **APIM** (vehicles equipped with 203 mm (8 inch) touchscreen display)
- **FCDIM** concern (vehicles equipped with 107 mm (4.2 inch) centerstack infotainment display)

Visual Inspection and Diagnostic Pre-Checks

Yes	GO to A11
No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE DRIVER SEATBELT ANCHOR PRETENSIONER CIRCUITS

- Ignition OFF.
- Depower the **SRS**.
REFER to: [Supplemental Restraint System \(SRS\) Depowering and Repowering](#) (501-20B Supplemental Restraint System, General Procedures).
- Disconnect **RCM** [C310A](#) and [C310B](#).
- Measure:

[Click to display connectors](#)

Positive Lead	Measurement / Action	Negative Lead
C3065-2	Ω	C3065-1


Is the resistance greater than 10,000 ohms?

Yes	GO to A12
No	REPAIR the circuit(s). Refer to Wiring Diagrams Cell 5 for schematic and connector information. GO to A17

A6 CHECK THE DRIVER SEATBELT ANCHOR PRETENSIONER CIRCUITS FOR AN OPEN

- Ignition OFF.
- Depower the **SRS**.
REFER to: [Supplemental Restraint System \(SRS\) Depowering and Repowering](#) (501-20B Supplemental Restraint System, General Procedures).
- Disconnect Driver Safety Belt Anchor Pretensioner [C3065](#).
- Disconnect **RCM** [C310A](#) and [C310B](#).
- Measure:

[Click to display connectors](#)

Positive Lead	Measurement / Action	Negative Lead
C310B-16	Ω	C3065-2
C310B-15		C3065-1

Are the resistances less than 0.5 ohm?

Codes (DTCs)	Description (419-07 Lane Keeping System, Description and Operation).
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DTC Chart: HVAC

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).

DTC	Description	Action
B1C83:12	Rear Defog Relay: Circuit Short to Battery	See HVAC Module DTC Chart. Refer to the appropriate section in Group 501 for the procedure.
B1C83:14	Rear Defog Relay: Circuit Short To Ground or Open	
All other HVAC Diagnostic Trouble Codes (DTCs)	-	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) (412-00 Climate Control System - General Information, Diagnosis and Testing). REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) (412-00 Climate Control System - General Information, Diagnosis and Testing).

Symptom Chart(s)

Symptom Chart: Rear View Mirrors - Exterior

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).

NOTE: Clean the entire mirror assembly and glass to assist in verification of the customer concern and/or impact damage. Do not clean any mirror glass or housing with an ice scraper, razor blade, abrasive pad, harsh chemicals or petroleum based cleaning products, as these may damage the mirror glass and/or housing.

Condition	Possible Sources	Action
One or both exterior mirrors fold inward due to wind pressure	<ul style="list-style-type: none"> Power folding mirrors are not synchronized (vehicles equipped with power folding mirrors only) Mirror structural bracket is damaged 	<ul style="list-style-type: none"> For vehicles equipped with power folding mirror, SYNCHRONIZE the power folding mirrors. REFER to: Power Mirrors Synchronization (501-09 Rear View Mirrors, General Procedures). <ul style="list-style-type: none"> If the concern is still present after the power folding mirrors synchronization procedure was performed, INSPECT the mirror for structural damage. If necessary, INSTALL a new mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation). For vehicles not equipped with power folding mirror, INSPECT the mirror for structural damage. If necessary, INSTALL a new mirror. REFER to: Exterior Mirror (501-09 Rear View Mirrors, Removal and Installation).
Both exterior mirrors are inoperative (without memory mirrors)	<ul style="list-style-type: none"> Wiring, terminals or connectors 	<ul style="list-style-type: none"> VERIFY that all power windows can be operated normally from the driver door window control switch.


Are the resistances less than 3 ohms?

Yes	INSTALL a new RH power-stow seat motor. REFER to: Power Stow Seat Motor (501-10C Third Row Seats, Removal and Installation).
No	REPAIR the affected circuit.

D6 CHECK THE PFSM (POWER FOLD SEAT MODULE) FOR OUTPUT VOLTAGE TO THE STOW SENSOR

- Connect: [PFSM C4250C](#).
- Verify the vehicle is in PARK and the liftgate is open.
- Verify the courtesy lights are on. If needed, close and open any door on the vehicle.
- **NOTICE:** This pinpoint test step directs testing circuits using a back-probe method. Use an appropriate back-probe tool. Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage while making sure that good electrical contact is made with the circuit or terminal. Failure to follow these instructions may cause damage to wiring, terminals, or connectors and subsequent electrical faults.

Back-probe:

Positive Lead	Measurement / Action	Negative Lead
 <p>E206558 C4250B-3</p>	?	+
		C4250B-1

Is the voltage greater than 5 volts?

Yes	GO to D9
No	GO to D7

D7 CHECK THE RH (RIGHT-HAND) POWER-STOW SEAT MOTOR SENSOR AND CIRCUIT FOR A SHORT TO GROUND

- Disconnect: [PFSM C4250B](#).
- Disconnect: [RH Power-Stow Seat Motor C4182](#).
- Measure:

[Click to display connectors](#)

Positive Lead	Measurement / Action	Negative Lead
C4250B-3	Ω	Ground

Trough Assembly

Removal

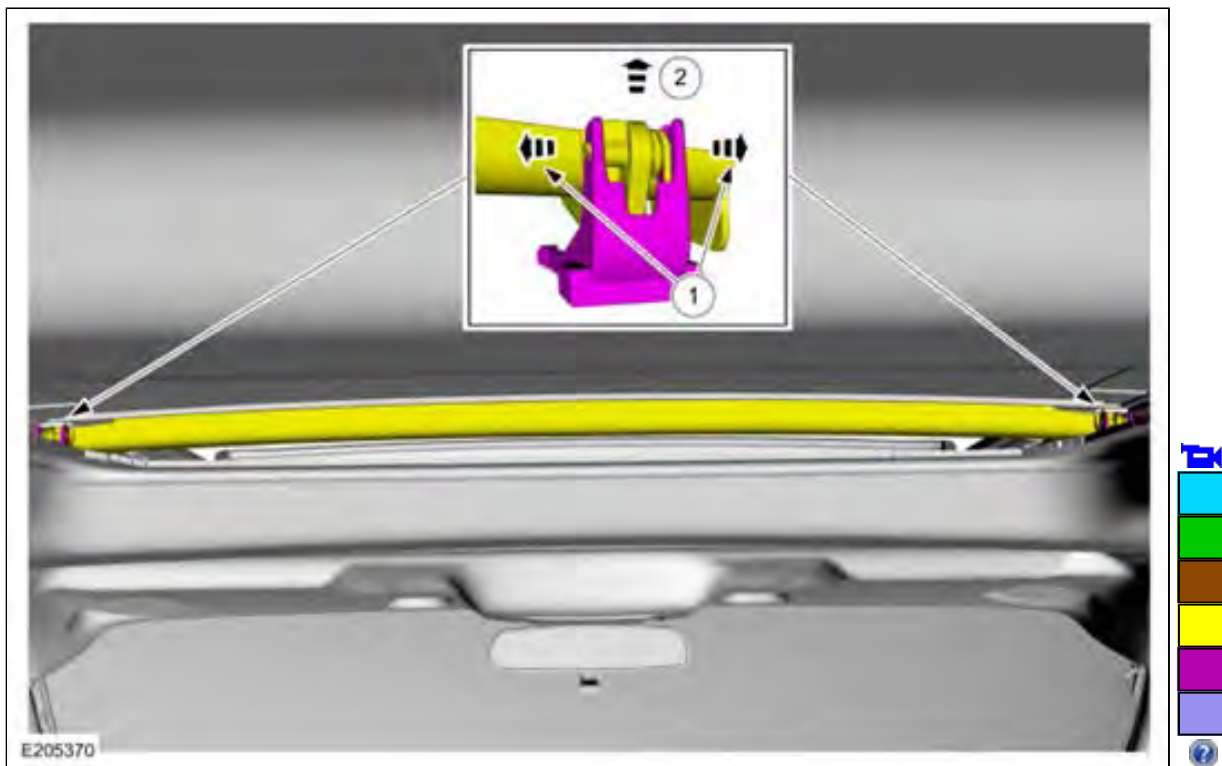
NOTE: Removal steps in this procedure may contain installation details.

1. Remove the sliding glass panel.
Refer to: [Roof Opening Panel Glass](#) (501-17 Roof Opening Panel, Removal and Installation).
2. **NOTE:** Note the spring orientation during removal. If installing a new drain trough, the spring will need to be transferred to the new drain trough and placed in the same position during installation.

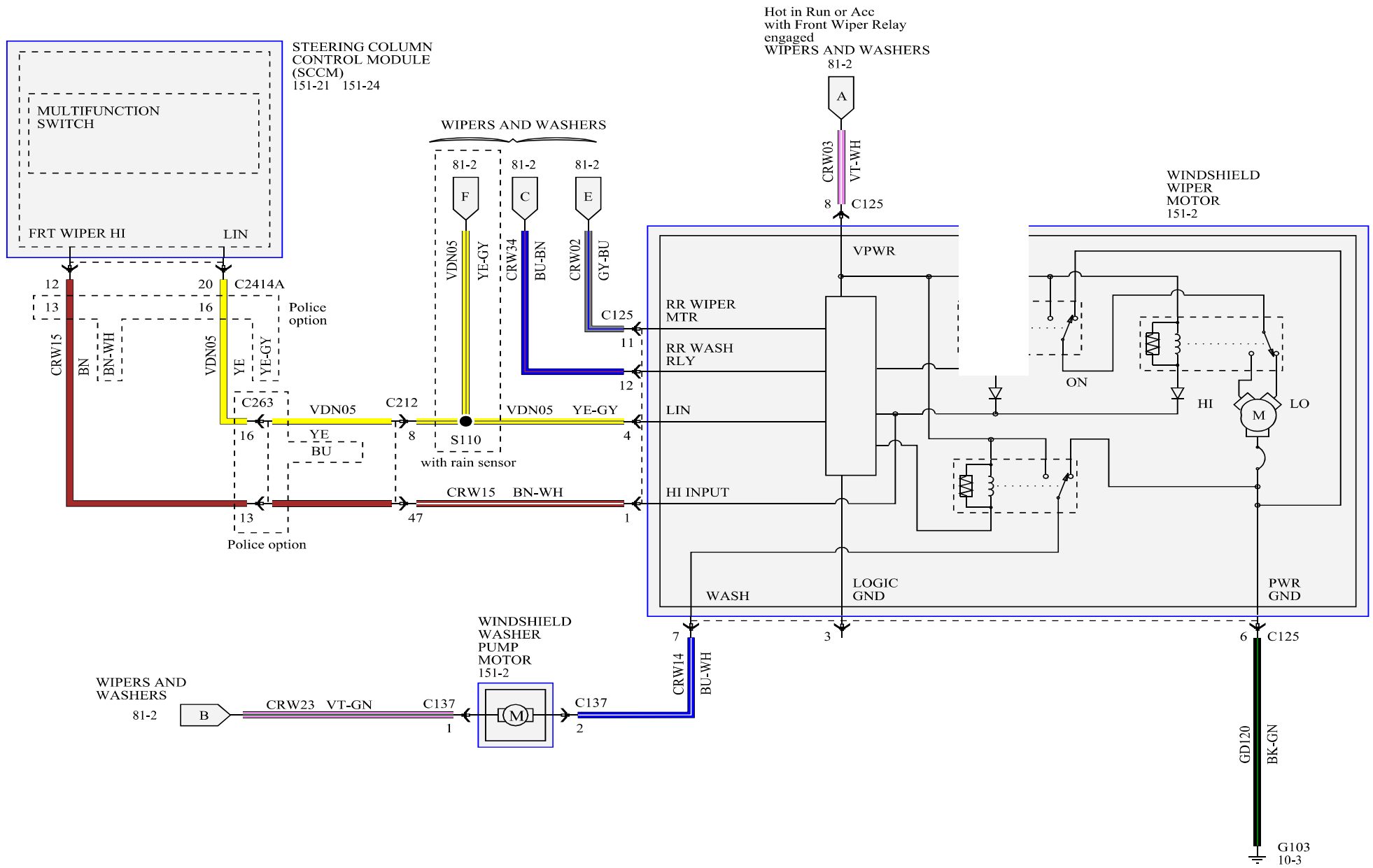
From inside the vehicle.

Release the trough from the guides.

1. Spread the trough retaining tabs on the guide.
2. Lift the back of the trough to disconnect from the guides.



3. Remove the trough.
 1. From outside the vehicle, handling the trough from both sides simultaneously.
Tilt the front of the trough down.
 2. Pull the trough forward to remove.



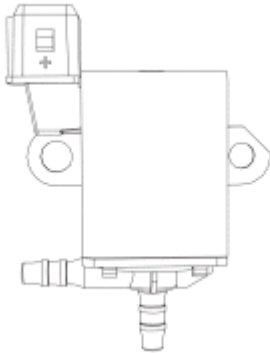


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Typical Cold Start Fuel Pump

Cold Start Valve

The cold start valve is located on the cold start fuel reservoir. The cold start valve allows the fuel supplied by the cold start fuel pump into the cold start fuel line to the intake manifold, when the cold start fuel valve is commanded on by the PCM.



N00146294

Typical Cold Start Valve

Cooling Fan

The PCM monitors certain parameters (such as engine coolant temperature, vehicle speed, A/C ON/OFF status, A/C pressure) to determine engine cooling fan needs.

For Variable Speed Electric Fans:

The PCM controls the fan speed and operation using a duty cycle output on the FCV circuit. The fan controller (located at or integral to the engine cooling fan assembly) receives the FCV command and operates the cooling fan at the speed requested (by varying the power applied to the fan motor).

The fan controller is able to detect certain failure modes within the fan motors. Under certain failure modes, such as a motor that is drawing excessive current, the fan controller shuts the fans off. Fan motor concerns may not set a specific DTC. With the fan motor disconnected from the fan controller, voltage may not be present at the fan controller.

For Relay Controlled Fans:

The PCM controls the fan operation through the fan control LFC (single speed applications), and LFC (low speed), MFC (medium speed), HFC (high speed) for multiple speed applications. Some applications have the xFC circuit wired to 2 separate relays.

For 2 speed fans, although the PCM output circuits are called LFC and HFC, cooling fan speed is controlled by a combination of these outputs.

For 3 speed fans, although the PCM output circuits are called LFC, MFC, and HFC, cooling fan speed is controlled by a combination of these outputs.