

A/C Performance Diagnosis

Problem—Warm Airflow When the Air Conditioner is On, A/C Not Working, or Poor A/C Performance (dash outlet temperature is too high)

Problem—Warm Airflow When the Air Conditioner is On, A/C Not Working, or Poor A/C Performance (dash outlet temperature is too high)	
Possible Cause	Remedy
Refrigerant charge too low.	Perform leak test. Repair any leaks, evacuate the system, replace the receiver-drier (only if color indicates it is saturated with moisture), add a full charge of refrigerant.
Contaminated refrigerant.	Check refrigerant for moisture and/or mixed refrigerant contamination, repair as necessary.
Refrigerant charge too high.	Evacuate the system, charge system with proper amount of refrigerant.
Moisture in the system.	Moisture in the system may cause ice crystals to form and possibly block the flow of refrigerant at the expansion valve or other places in the system. Recover the refrigerant, replace the receiver-drier, evacuate the system, and add a full charge of refrigerant.
A/C compressor not working.	The refrigerant charge is too high or too low (will cause the binary pressure switch to open and prevent the compressor from operating).
	Worn or loose A/C compressor drive belt, tighten or replace as necessary.
	Faulty A/C compressor or clutch, repair as necessary.
	A/C compressor clutch not engaging. See "A/C Clutch Circuit" for diagnosis.
Ice formed on evaporator core.	Ice buildup on the evaporator core can block airflow through the evaporator, thus producing little or no cooling. This may occur if the compressor is not cycling off at the correct temperature. For evaporator sensor testing, see "Evaporator Temperature Sensor."
Temperature door not operating correctly, front and auxiliary units.	Electrical problem with temperature actuator. Check for fault codes. See fault code tables, in Subject 340 , for diagnosis.
	Mechanical problem with temperature door. Check for obstructions or broken components, repair as necessary.
	NOTE: The actuator has no feedback to the FCU/ACU to verify position. If there are no fault codes and the actuator signal appears to be working in the DataLink Monitor template, then suspect a mechanical problem.
Wiring problem between climate control panel and ACU, auxiliary unit only.	See Table 11 , Sleeper Climate Control Panel Circuit Diagnosis.
Faulty temperature control potentiometer.	See Table 11 , Sleeper Climate Control Panel Circuit Diagnosis.
Blockage or restriction in refrigerant system.	A blockage or restriction can usually be found by locating an abrupt temperature change at a location in the system; for example, in a line or the condenser. Repair as necessary.
Blower motor in protection mode (reduced airflow).	See "Blower Motor."
System out of calibration, front unit only.	See "Calibration Procedure."

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Heater and Air Conditioner, Blend Air System, Troubleshooting

Symptom Driven Diagnosis

Problem—No Fresh Air, Front Unit Only (nonrecirculation mode)

Problem—No Fresh Air, Front Unit Only (nonrecirculation mode)	
Possible Cause	Remedy
Recirc door not operating correctly.	Electrical problem with recirc door actuator. Check for fault codes. See fault code tables, in Subject 340 , for diagnosis. Also see "Recirculation" and "Actuator Stepper Motors—Temperature, Recirc, and Mode."
	Mechanical problem with recirc door. Check for obstructions or broken components, repair as necessary. NOTE: The actuator has no feedback to the FCU/ACU to verify position. If there are no fault codes and the actuator signal appears to be working in the DataLink Monitor template, then suspect a mechanical problem.
Restricted filter or intake.	Clean as necessary.
System out of calibration.	See "Calibration Procedure."

Problem—Low Side Pressure Too Low

Problem—Low Side Pressure Too Low	
Possible Cause	Remedy
Refrigerant system restriction or blockage.	Check the expansion valve and other components for blockage (blockage may be due to moisture causing ice buildup).
Refrigerant charge too low.	Perform leak test. Repair any leaks, evacuate the system, replace the receiver-drier (only if color indicates it is saturated with moisture), add a full charge of refrigerant.

Problem—High Side Pressure Too High

Problem—High Side Pressure Too High	
Possible Cause	Remedy
Restricted airflow through condenser.	Check for dirt and debris buildup in front of condenser, clean as necessary.
	Check engine fan operation.
Restriction or blockage in condenser or line from condenser to receiver-drier.	Restriction or blockage will usually be indicated by a cool spot or ice buildup near the restriction or blockage. Repair as necessary. NOTE: If the compressor has recently failed, the restriction may be due to leftover debris from the failed compressor.
Air in refrigerant.	Check refrigerant purity, evacuate, and charge as necessary.
Engine overheating.	Check engine cooling system.
Engine fan not working correctly.	See Group 20 , check fan cycling switch.

Symptom Driven Diagnosis

Problem—Compressor Runs Continuously

Problem—Compressor Runs Continuously*	
Possible Cause	Remedy
Refrigerant charge too high.	Evacuate the system, replace the receiver-drier (only if color indicates it is saturated with moisture), add a full charge of refrigerant.
Faulty evaporator temperature sensor.	See "Evaporator Temperature Sensor."

* This is normal when the ambient temperature and/or relative humidity is high.

Problem—Little or No Heat, Front and Auxiliary Units

Problem—Little or No Heat, Front and Auxiliary Units	
Possible Cause	Remedy
Low engine coolant.	Check coolant level.
Plugged heater core.	Flush coolant system or replace heater core as necessary. NOTE: This can be checked by feeling the inlet and outlet heater hoses. There should be a slight temperature difference when the temperature is set to hot and the fan is on high (engine at operating temperature). A large temperature difference indicates a blockage.
Faulty engine thermostat.	Check if thermostat is stuck open, this may cause the engine to not reach operating temperature under light load or when ambient temperatures are low.
Temperature door not operating correctly.	Electrical problem with temperature actuator. Check for fault codes. See fault code tables, in Subject 340 , for diagnosis. Also see "Override." Mechanical problem with temperature door. Check for obstructions or broken components, repair as necessary. NOTE: The actuator has no feedback to the FCU/ACU to verify position. If there are no fault codes and the actuator signal appears to be working in the DataLink Monitor template, then suspect a mechanical problem.
System out of calibration, front unit only.	See "Calibration Procedure."

Problem—Water or Engine Coolant Leaking from HVAC Unit Inside the Cab, Front and Auxiliary Units

Problem—Water or Engine Coolant Leaking from HVAC Unit Inside the Cab, Front and Auxiliary Units*	
Possible Cause	Remedy
Plugged drain tubes.	Clean as necessary.
Leaking heater core.	Replace heater core.

* Clear water dripping from the HVAC unit under the hood is normal when the A/C is on. This is from moisture condensing out of the air as it cools going through the evaporator.

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Heater and Air Conditioner, Blend Air System, Troubleshooting

Symptom Driven Diagnosis

Problem—Recirculation Mode Not Working, Front Unit Only

Problem—Recirculation Mode Not Working, Front Unit Only	
Possible Cause	Remedy
Recirc door not operating correctly.	<p>Electrical problem with recirc actuator. Check for fault codes. See fault code tables, in Subject 340, for diagnosis.</p> <p>Also see "Recirculation" and "Actuator Stepper Motors—Temperature, Recirc and Mode."</p> <p>Mechanical problem with recirculation door. Check for obstructions or broken components, repair as necessary.</p> <p>NOTE: The actuator has no feedback to the FCU/ACU to verify position. If there are no fault codes and the actuator signal appears to be working in the DataLink Monitor template, then suspect a mechanical problem.</p>
System out of calibration.	See "Calibration Procedure."

Problem—Air Does Not Come Out of Correct Outlets, Front Unit Only

Problem—Air Does Not Come Out of Correct Outlets, Front Unit Only*	
Possible Cause	Remedy
Mode door not operating correctly.	<p>Electrical problem with mode actuator. Check for fault codes. See fault code tables, in Subject 340, for diagnosis.</p> <p>Also see "Recirculation" and "Actuator Stepper Motors—Temperature, Recirc and Mode."</p> <p>Mechanical problem with mode door. Check for obstructions or broken components, repair as necessary.</p> <p>NOTE: The actuator has no feedback to the FCU/ACU to verify position. If there are no fault codes and the actuator signal appears to be working in the DataLink Monitor template, then suspect a mechanical problem.</p>
Broken or disconnected duct.	Repair as necessary.
System out of calibration.	See "Calibration Procedure."

* For example, air directed to windshield outlets when air selection switch is set to floor outlets.

Problem—Warm Air from Outlets When Temperature is Set to Cold (A/C not on)

Problem—Warm Air from Outlets When Temperature is Set to Cold (A/C not on)	
Possible Cause	Remedy
Temperature door not operating correctly.	<p>Electrical problem with temperature actuator. Check for fault codes. See fault code tables, in Subject 340, for diagnosis.</p> <p>Also see "Actuator Stepper Motors—Temperature, Recirc, and Mode."</p> <p>Mechanical problem with temperature door. Check for obstructions or broken components, repair as necessary.</p> <p>NOTE: The actuator has no feedback to the FCU/ACU to verify position. If there are no fault codes and the actuator signal appears to be working in the DataLink Monitor template, then suspect a mechanical problem.</p>

Symptom Driven Diagnosis

Problem—Warm Air from Outlets When Temperature is Set to Cold (A/C not on)	
Possible Cause	Remedy
System out of calibration, front unit only.	See "Calibration Procedure."
Wiring/temperature control problem, auxiliary unit only.	See Table 11 , Sleeper Climate Control Panel Circuit Diagnosis.

Problem—No Backlighting, Front Unit Only

Problem—No Backlighting, Front Unit Only	
Possible Cause	Remedy
Dim signal not reaching the FCU or faulty FCU.	See "Backlighting Diagnosis."

Problem—Blower Not Working, Operates at Reduced Speed, or Runs Then Shuts Off, Front and Auxiliary Units

Problem—Blower Not Working, Operates at Reduced Speed, or Runs Then Shuts Off, Front and Auxiliary Units	
Possible Cause	Remedy
Blower in protection mode.	Check for fault codes.
Wiring problem.	See fault code tables, in Subject 340 , for diagnosis.
Faulty blower motor.	If there are no active fault codes, refer to "Blower Motor" for more information.
Wiring problem between sleeper climate control panel and ACU, auxiliary unit only.	See Table 11 , Sleeper Climate Control Panel Circuit Diagnosis.
Faulty blower control potentiometer, auxiliary unit only.	See Table 11 , Sleeper Climate Control Panel Circuit Diagnosis.

Problem—Bunk Override Does Not Work, SleeperCab Only (cannot override auxiliary blower and temperature settings from the front)

Problem—Bunk Override Does Not Work, SleeperCab Only (cannot override auxiliary blower and temperature settings from the front)	
Possible Cause	Remedy
Faulty bunk override switch.	Check switch. See "Override" for diagnosis. Verify switch operation using DataLink Monitor template.
Wiring problem.	Check wiring between override switch and FCU.
No J1587 databus communication between FCU and ACU.	Using ServiceLink, make sure both the FCU (MID 146) and ACU (MID 200) appear in the ECU list. If one ECU does not appear in the list, troubleshoot the J1587 databus. See Group 54 for more information. Also see "Override" for diagnosis. NOTE: Vehicles without a sleeper do not have an ACU.
Faulty FCU.	See "Override" for diagnosis.
Faulty ACU.	See "Override" for diagnosis.

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Symptom Driven Diagnosis

Problem—Rear Override Does Not Work, SleeperCab Only (minimum A/C support)

Problem—Rear Override Does Not Work, SleeperCab Only (minimum A/C support)*	
Possible Cause	Remedy
Front not providing A/C support for auxiliary (rear override not working).	Check rear override function. See "Override" for diagnosis. Problem may be no J1587 databus communication between the ACU and FCU.

* Rear cannot override to request A/C compressor when front unit is off. This should also cause front unit to operate at minimum blower speed if off.

A/C Clutch Circuit Diagnosis

NOTE: Do not perform the test procedures in [Table 3](#) before performing the test procedures in [Table 1](#).

Before performing tests on the A/C clutch circuit, perform the diagnostic tests in [Table 1](#).

A/C Clutch Does Not Engage				
Test No.	Test	Test Procedure	Test Result	Action
1	Check control settings.	In order for the A/C compressor to operate, the controls must be set as follows: <ul style="list-style-type: none"> blower speed at any setting other than off air selection in one of A/C or defrost settings A/C button is pressed; light on engine running above 450 rpm ambient temperature at the evaporator sensor must be above 44°F (7°C) for A/C compressor to engage If these conditions are met, the A/C compressor should engage. It may cycle on/off.	Conditions met, A/C compressor engages.	No problem found.
			Conditions met, A/C compressor does not engage.	Go to test no. 2.
2	Check for fault codes.	Connect ServiceLink and check for fault codes. Check if one of the following fault codes is active: <ul style="list-style-type: none"> 146 s011 05 146 s011 06 NOTE: See Front Control Unit (FCU) (MID 146) J1587 Fault Codes by SID table, in Subject 340 , for fault code descriptions.	One of these faults is active.	See Table 3 .
			Faults other than these are active.	Repair fault before proceeding.
			No active faults.	Go to test no. 3.

Symptom Driven Diagnosis

A/C Clutch Does Not Engage				
Test No.	Test	Test Procedure	Test Result	Action
3	Check if A/C request is being sent.	<p>Connect PC to vehicle and open the Behr CDTC Blend Air HVAC System DataLink Monitor template. Do the following:</p> <ul style="list-style-type: none"> • Start the engine. • Set the blower to any speed except off. • Set the air selection switch to face mode. • Press the A/C button; the light should be on. <p>Observe the A/C request annunciator in the template. The A/C request signal should be active and the A/C compressor should engage when the previous conditions are met and the following conditions are met:</p> <ul style="list-style-type: none"> • Evaporator sensor is above 44°F (7°C). • Engine speed above 450 rpm. See template. • Low air pressure signal is not being broadcast by the instrument cluster. See template. 	A/C request signal is active.	See Table 4 .
			A/C request signal is not active.	Go to test no. 4.
4	Check evaporator sensor.	<p>Note the ambient air temperature. Measure the resistance of the evaporator temperature sensor and compare the reading with the value in Table 2 or Fig.1. The reading should correspond to a temperature approximately equal to the ambient temperature.</p> <p>NOTE: The evaporator sensor temperature must be above 44°F (7°C) before the FCU will send the A/C request signal to the A/C clutch relay. Therefore the sensor resistance must be below approximately 6500 ohms. See Table 2 or Fig. 1. Also see Fig. 2.</p>	Less than 6500 ohms	Check wiring between FCU and evaporator temperature sensor. If okay and all other inputs are met, such that the A/C request signal should be sent, then replace the FCU. Go to test no. 5.
			More than 6500ohms	The FCU is not sending an A/C request signal because the sensor is indicating the temperature is below 44°F (7°C). If temperature is known to be well above this temperature, then replace the sensor. Go to test no. 5.

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Symptom Driven Diagnosis

A/C Clutch Does Not Engage				
Test No.	Test	Test Procedure	Test Result	Action
5	Verify repair.	Verify that repair resolved the problem.	Problem resolved	Done
			Problem unresolved	Repeat test no. 1.

Table 1, A/C Clutch Does Not Engage

Evaporator Temperature Sensor Temperature versus Resistance			
Temperature °F (°C)	Resistance (ohms)	Temperature °F (°C)	Resistance (ohms)
20 (-6.7)	12,814	55 (12.8)	4792
25 (-3.9)	11,036	60 (15.6)	4209
30 (-1.1)	9535	65 (18.3)	3706
32 (0)	9000	70 (21.1)	3271
35 (1.7)	8265	75 (23.9)	2894
40 (4.4)	7183	80 (26.7)	2566
45 (7.2)	6259	85 (29.4)	2281
50 (10)	5468		

Table 2, Evaporator Temperature Sensor Temperature versus Temperature Resistance

A/C Request Circuit Test				
Test No.	Test	Test Procedure	Test Result	Action
1	Which fault code is active?	NOTE: Circuit problems between the FCU and A/C clutch relay (coil side) will activate fault codes.	146 s011 05 is active	Go to test no. 2.
			146 s011 06 is active	Go to test no. 5.
2	Check A/C clutch relay.	Remove the A/C clutch relay from the PDM. Measure the resistance across the relay coil (pins 85 and 86). NOTE: If the relay coil is open, the resistance will be approximately 680 ohms.	72–87 ohms	Go to test no. 3.
			Not 72–87 ohms	Replace relay. Go to test no. 7.
3	Check A/C clutch relay coil ground.	With the A/C clutch relay removed, check resistance between the ground side of the relay coil (PDM side) and the negative battery terminal. Make sure the batteries are disconnected or result may be inconclusive.	Less than 1 ohm	Go to test no. 4.
			More than 1 ohm	Repair relay coil ground circuit. Go to test no. 7.

Symptom Driven Diagnosis

A/C Request Circuit Test				
Test No.	Test	Test Procedure	Test Result	Action
4	Check circuit 97T.	Remove the A/C clutch relay. Disconnect the B connector from the back of the FCU. Measure resistance between the power side of the relay coil (PDM side) and pin B10 at the FCU B connector.	Less than 1 ohm	No problem found. Repeat test numbers 1 through 4.
			More than 1 ohm	Locate and repair high resistance or open in circuit 97T. Go to test no. 7.
5	Check A/C clutch relay.	Remove the A/C clutch relay from the PDM. Measure the resistance across the relay coil (pins 85 and 86). NOTE: If the relay coil is open, the resistance will be approximately 680 ohms.	72–87 ohms	Go to test no. 6.
			Not 72–87 ohms	Replace relay. Go to test no. 7.
6	Check circuit 97T for short to ground.	Disconnect the B connector from the back of the FCU. Measure resistance between pin B10 of the FCU B connector and the negative battery terminal. Make sure batteries are disconnected or result may be inconclusive.	72–87 ohms	No problem found. Repeat tests and look for possible intermittent short to ground in circuit 97T. Go to test no. 7.
			Less than 72 ohms	Locate short to ground in circuit 97T. Repair as necessary. Go to test no. 7.
7	Verify repair.	Verify that repair corrected the fault code and the problem is resolved.	Problem resolved	Done.
			Problem unresolved	Repeat test no. 1.

Table 3, A/C Request Circuit Test

NOTE: Do not perform the test procedures in

Table 4 before performing the test procedures in **Table 1**.

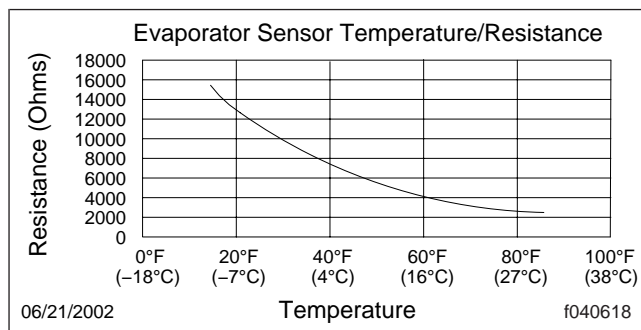


Fig. 1, Evaporator Sensor Temperature/Resistance

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Symptom Driven Diagnosis

A/C Clutch Circuit Test				
Test No.	Test	Test Procedure	Test Result	Action
1	Check power to A/C clutch relay.	Remove the A/C clutch relay from the PDM. Turn the ignition on and check for voltage on the PDM socket that corresponds to pin 87 A/C clutch relay.	No voltage	Go to test no. 2.
			12V	Go to test no. 3.
2	Check A/C clutch fuse.	Check the 20A A/C clutch fuse in the PDM (fuse 55).	Fuse okay	Check to make sure power is getting to fuse. If okay, check circuit between fuse and A/C clutch relay. Repair as necessary, then go to test no. 6.
			Fuse blown	Locate source of high current between the PDM and the A/C compressor clutch. The circuit may be shorted to ground. Repair as necessary, then go to test no. 6.
3	Check A/C clutch circuit resistance.	Remove the A/C clutch relay from the PDM. Measure the resistance between the PDM socket that corresponds to circuit 97T and the negative battery terminal. NOTE: Make sure batteries are disconnected. Failure to do so may give inconclusive results.	2.85 to 4 ohms	Check the A/C clutch relay. Make sure pin 87 is making contact with pin 30 when the relay is energized. Replace as necessary, then go to test no. 6.
			More than 4 ohms	Go to test no. 4.
4	Check binary switch.	Disconnect the binary switch and check continuity across the switch terminals.	Continuity	Go to test no. 5.
			No continuity	Check refrigerant pressures. If pressure is below the binary switch cutout pressure, the system is severely undercharged. Locate source of leak and recharge. If pressures are within the binary switch range, replace the binary switch then go to test no. 6.

Symptom Driven Diagnosis

A/C Clutch Circuit Test				
Test No.	Test	Test Procedure	Test Result	Action
5	Measure resistance of the A/C clutch.	Disconnect the connector at the A/C compressor. Measure resistance on the compressor side of the connector.	2.85–3.33 ohms	Problem is most likely high resistance or open circuit in wiring between the A/C clutch relay in the PDM and the A/C compressor. Be sure to check A/C compressor clutch ground circuit. The most definitive way to isolate the problem is to manually energize the circuit at the relay and use voltage drop measurements to isolate the problem, then go to test no. 6.
			Not 2.85–3.33 ohms	Replace A/C compressor clutch, then go to test no. 6.
6	Verify repair.	Verify that repair corrected the fault code and the problem is resolved.	Problem resolved	Done.
			Problem unresolved	Repeat test no. 1.

Table 4, A/C Clutch Circuit Test

Bunk Override Diagnosis

The front control unit will remember bunk override setting after an ignition cycle and initiate bunk over-

ride again. Both the front and auxiliary units will be in bunk override mode.

See [Table 5](#) for bunk override diagnosis procedures.

Bunk Override Diagnosis				
Test No.	Test	Test Procedure	Test Result	Action
1	Check bunk override function with DataLink Monitor Test.	<p>Open the DataLink Monitor template for this system.</p> <p>Turn the ignition on.</p> <p>Set the front blower to high and the temperature to hot.</p> <p>Set the auxiliary blower to off and the temperature to cold.</p> <p>In the template, press the bunk override ON test button.</p> <p>The ACU bunk override mode annunciator state should be ON and the auxiliary blower and temperature settings should match the front settings (can be observed on the template. Note that it takes about a minute for the settings to completely change.)</p>	The ACU bunk override mode state is ON and auxiliary blower and temperature settings closely match front settings.	Go to test no. 3.
			The ACU bunk override mode state is ON and auxiliary blower and/or temperature settings do not match the front unit.	Replace ACU, then go to test no. 5.
			The ACU bunk override mode state is OFF or NA/ERR.	Go to test no. 2.

Symptom Driven Diagnosis

Bunk Override Diagnosis				
Test No.	Test	Test Procedure	Test Result	Action
2	Verify J1587 communication.	Connect ServiceLink to the vehicle. Check if both the FCU (MID 146) and ACU (MID 200) appear in the ECU list.	Both ECUs appear in the ECU list.	Go to test no. 3.
			One or both ECUs do not appear in the ECU list or ServiceLink is unable to connect to vehicle.	Troubleshoot and repair J1587 databus. Refer to Group 54 for more information. Go to test no. 5.
3	Check override switch operation.	<p>Open the DataLink Monitor template for this system.</p> <p>While observing the bunk override switch annunciator in DLM, press the switch to the momentary on position, then to the momentary off position.</p> <p>The annunciator should indicate switch position. When the switch is in the normal position, the annunciator should indicate NA/ERR.</p>	Switch functions as described.	Go to test no. 4
			Switch does not function as described.	Check override switch and wiring. Repair as necessary. If okay, replace the FCU. Go to test no. 5.
4	Check if FCU is sending bunk override request.	<p>Open the DataLink Monitor template for this system.</p> <p>While observing the Bunk O/R Request annunciator, press the bunk override switch to the momentary on position then release it. The O/R request annunciator should be in the ON state then read NA/ERR.</p>	Bunk O/R request annunciator briefly indicates ON then goes to NA/ERR and FCU and ACU bunk override mode state is ON.	Problem not found. Verify complaint, check for intermittent problems, repeat tests if necessary.
			Bunk O/R request annunciator remains in the ON state.	Check ACU; it is not responding to the bunk override request. Make sure it has power and ground and J1587 databus communication. If okay, replace ACU. Go to test no. 5.
			Bunk O/R request annunciator does not ever indicate it is in the ON state.	Repeat test 3. If okay, replace FCU, then go to test no. 5.
5	Verify repair.	Verify that repair corrected the fault code and the problem is resolved.	Problem resolved.	Done.
			Problem unresolved.	Repeat test no. 1.

Table 5, Bunk Override Diagnosis

See **Table 6** for rear override diagnosis procedures.

Symptom Driven Diagnosis

Rear Override Diagnosis				
Test No.	Test	Test Procedure	Test Result	Action
1	Check rear override function with DataLink Monitor Test. NOTE: If the front unit diagnoses a bad blower motor, then it will not go into rear override mode and will not activate the A/C request signal.	Open the DataLink Monitor template for this system. Turn the ignition on. Set the front blower to off. Set the auxiliary blower to high and the temperature to full cold.	FCU rear override mode state annunciator in ON and A/C mode annunciator is ON.	Go to test no. 3.
		In the template, press the rear override ON test button. On the template, the FCU rear override mode annunciator state should be ON and the A/C mode annunciator should be ON. The A/C clutch annunciator will not be on unless the A/C request rules are met (engine running, air pressure up, etc.).	FCU rear override mode state annunciator is ON and A/C mode annunciator is OFF.	Replace FCU, then go to test no. 4.
		The front blower should be on low speed and the A/C indicator light on the A/C button should be on.	FCU rear override mode state annunciator is OFF.	Go to test no. 2
2	Verify J1587 communication.	Connect ServiceLink to the vehicle.	Both ECUs appear in the ECU list.	Replace FCU, then go to test no. 4.
		Check if both the FCU (MID 146) and ACU (MID 200) appear in the ECU list.	One or both ECUs do not appear in the ECU list or ServiceLink is unable to connect to vehicle.	Troubleshoot and repair J1587 databus. Refer to Group 54 for more information. Go to test no. 4.

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Rear Override Diagnosis				
Test No.	Test	Test Procedure	Test Result	Action
3	Check if ACU is sending rear override request.	<p>Open the DataLink Monitor template for this system.</p> <p>Start the engine.</p> <p>Turn the front blower off.</p> <p>While observing the Rear Override O/R Request annunciator in DataLink monitor, set the auxiliary temperature control switch to full cold and the auxiliary blower speed to high.</p> <p>The O/R Request annunciator should momentarily be in the ON state, then read NA/ERR. It may take a moment for this to happen.</p>	O/R Request annunciator briefly indicates ON , then goes to NA/ERR, and FCU and ACU rear override mode state annunciators are ON, and A/C mode state annunciator is ON.	Problem not found. Rear override is functioning normally.
			O/R Request annunciator stays in the ON state.	Check FCU. It is not responding to the rear override request. Make sure it has power and ground and J1587 databus communication. If okay, replace FCU. Go to test no. 4.
			O/R Request annunciator does not ever indicate it is in the ON state.	Repeat test no. 3. If ambient temperature is low, the auxiliary unit may not request rear override. Replace ACU if repeated test fails. Go to test no. 4
4	Verify repair.	Verify that repair resolved the problem.	Problem resolved.	Done.
			Problem unresolved.	Repeat test no. 1.

Table 6, Rear Override Diagnosis

Actuator Diagnosis

See [Table 7](#) for the actuator circuit test procedures.

Actuator Circuit Test														
Test No.	Test	Test Procedure	Test Result	Action										
1	Check for fault codes.	<p>Check if any one of the following fault codes is active:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Group A</th> <th style="width: 50%;">Group B</th> </tr> </thead> <tbody> <tr> <td>146 s005 05</td> <td>146 s005 06</td> </tr> <tr> <td>146 s006 05</td> <td>146 s006 06</td> </tr> <tr> <td>146 s009 05</td> <td>146 s009 06</td> </tr> <tr> <td>200 s009 05</td> <td>200 s009 06</td> </tr> </tbody> </table> <p>07/02/2002 f040619</p>	Group A	Group B	146 s005 05	146 s005 06	146 s006 05	146 s006 06	146 s009 05	146 s009 06	200 s009 05	200 s009 06	Single fault in Group A is active.	Go to test no. 2.
			Group A	Group B										
			146 s005 05	146 s005 06										
			146 s006 05	146 s006 06										
			146 s009 05	146 s009 06										
200 s009 05	200 s009 06													
All three MID 146 faults are active in Group A.	Go to test no. 6.													
Single fault in Group B is active.	Go to test no. 8.													
No faults listed in Group A or B are active.	No problem found.													

Symptom Driven Diagnosis

Actuator Circuit Test				
Test No.	Test	Test Procedure	Test Result	Action
2	<p>Check voltage to the actuator.</p> <p>NOTE: In order to measure a valid voltage, it may be necessary to move the respective control :for recirc, press the recirc button; for mix door actuator, move the temperature control switch; for the mode actuator, move the air selection switch.</p>	<p>For code 146s005 05 (front unit) disconnect the recirc actuator connector, turn the ignition on, measure voltage between connector pin 1 and ground.</p> <p>For code 146 s006 05 (front unit) disconnect the mode actuator connector, turn the ignition on, measure voltage between connector pin 1 and ground.</p> <p>For code 146 s009 05 (front unit) disconnect the temperature actuator connector, turn the ignition on, measure voltage between connector pin 1 and ground.</p> <p>For code 200 s006 05 (auxiliary unit) disconnect the temperature actuator connector, turn the ignition on, measure voltage between connector pin 1 and ground.</p> <p>NOTE: See Fig. 2, Fig. 3, and Fig. 4.</p>	Approximately 12V	Go to test no. 3.
			Much less than 12V.	Check wire between pin 1 of the actuator and the FCU/ACU for open circuit. If okay, replace FCU/ACU. Go to test no. 9.

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Heater and Air Conditioner, Blend Air System, Troubleshooting

Symptom Driven Diagnosis

Actuator Circuit Test				
Test No.	Test	Test Procedure	Test Result	Action
3	Check for short to ground on return side of actuator.	<p>For code 146s005 05 (front unit) disconnect all three actuator connectors and the FCU connector. At the recirc actuator connector, check continuity between connector pin 3 and ground. Repeat for pins 4, 5, and 6.</p> <p>For code 146 s006 05 (front unit) disconnect all three actuator connectors and the FCU connector. At the mode actuator connector, check continuity between connector pin 3 and ground. Repeat for pins 4, 5, and 6.</p> <p>For code 146 s009 05 (front unit) disconnect all three actuator connectors and the FCU connector. At the temperature actuator connector, check continuity between connector pin 3 and ground. Repeat for pins 4, 5, and 6.</p> <p>For code 200 s009 05 (auxiliary unit) disconnect the temperature actuator connector and the ACU connector. At the temperature actuator connector, check continuity between connector pin 3 and ground. Repeat for pins 4, 5, and 6.</p> <p>NOTE: See Fig. 2, Fig. 3, and Fig. 4.</p>	Continuity to ground on any pin.	Locate short to ground, repair as necessary, then go to test no. 9.
			No continuity to ground on any pin.	Go to test no. 4.

Symptom Driven Diagnosis

Actuator Circuit Test														
Test No.	Test	Test Procedure	Test Result	Action										
4	Check continuity of actuator return side.	<p>For code 146s005 05 disconnect the recirc actuator connector.</p> <p>For code 146 s006 05 disconnect the mode actuator connector.</p> <p>For code 146 s009 05 disconnect the temperature actuator connector.</p> <p>Check continuity between the following connector pins:</p> <table border="1"> <thead> <tr> <th>FCU</th> <th>Actuator</th> </tr> </thead> <tbody> <tr> <td>A2</td> <td>3</td> </tr> <tr> <td>B1</td> <td>4</td> </tr> <tr> <td>B2</td> <td>5</td> </tr> <tr> <td>B3</td> <td>6</td> </tr> </tbody> </table> <p>07/02/2002 f040620</p>	FCU	Actuator	A2	3	B1	4	B2	5	B3	6	Continuity on all pin combinations.	Go to test no. 5.
		FCU	Actuator											
A2	3													
B1	4													
B2	5													
B3	6													
<p>For code 200 s009 05 (auxiliary unit) disconnect the auxiliary unit temperature actuator connector and the ACU connector.</p> <p>Check continuity between the following connector pins:</p> <table border="1"> <thead> <tr> <th>ACU</th> <th>Actuator</th> </tr> </thead> <tbody> <tr> <td>B8</td> <td>3</td> </tr> <tr> <td>B7</td> <td>4</td> </tr> <tr> <td>B6</td> <td>5</td> </tr> <tr> <td>B5</td> <td>6</td> </tr> </tbody> </table> <p>07/02/2002 f040621</p> <p>NOTE: See Fig. 2, Fig. 3, and Fig. 4.</p>	ACU	Actuator	B8	3	B7	4	B6	5	B5	6	No continuity on one or more pin combinations.	Locate open circuit, repair as necessary, then go to test no. 9.		
ACU	Actuator													
B8	3													
B7	4													
B6	5													
B5	6													

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Symptom Driven Diagnosis

Actuator Circuit Test												
Test No.	Test	Test Procedure	Test Result	Action								
5	Check actuator.	For code 146s005 05 (front unit) perform "Actuator Stepper Motor Electrical Test" on the recirc actuator.	Actuator okay.	Replace FCU/ACU, then go to test no. 9 .								
		For code 146 s006 05 (front unit) perform "Actuator Stepper Motor Electrical Test" on the mode actuator. For code 146 s009 05 (front unit) perform "Actuator Stepper Motor Electrical Test" on the temperature actuator. For code 200 s009 05 (auxiliary unit) perform "Actuator Stepper Motor Electrical Test" on the temperature actuator (auxiliary unit).	Actuator not okay.	Replace actuator, then go to test no. 9 .								
6	Check actuator return circuits for open.	For all three active codes at the same time, 146 s005 05, 146 s006 05, 146 s009 05 , disconnect all three actuator connectors and the FCU connector. At each actuator connector, check continuity between the following connector pins:	Continuity on all pin combinations.	Go to test no. 7.								
		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>FCU</th> <th>Actuator</th> </tr> </thead> <tbody> <tr> <td>A2</td> <td>3</td> </tr> <tr> <td>B1</td> <td>4</td> </tr> <tr> <td>B2</td> <td>5</td> </tr> <tr> <td>B3</td> <td>6</td> </tr> </tbody> </table> <p style="text-align: center;">07/02/2002 f040620</p> <p>NOTE: See Fig. 2, Fig. 3, and Fig. 4.</p>	FCU	Actuator	A2	3	B1	4	B2	5	B3	6
FCU	Actuator											
A2	3											
B1	4											
B2	5											
B3	6											
7	Check actuator return circuits for short to ground.	Disconnect all three actuator connectors and the FCU connector. At the FCU connector, check continuity between pin A2 and ground. Repeat for pins B1, B2, and B3. NOTE: See Fig. 2, Fig. 3, and Fig. 4.	Continuity to ground on any pin.	Repair short to ground, then go to test no. 9 .								
			No continuity to ground on any pin.	Replace FCU, then go to test no. 9 .								

Symptom Driven Diagnosis

Actuator Circuit Test				
Test No.	Test	Test Procedure	Test Result	Action
8	Check for shorted actuator coil.	<p>For code 146s005 06 disconnect the recirc actuator connector, check if fault no longer active (different fault maybe active).</p> <p>For code 146 s006 06 disconnect the mode actuator connector, check if fault no longer active (different fault may be active).</p> <p>For code 146 s009 06 disconnect the temperature actuator connector, check if fault no longer active (different fault may be active).</p> <p>For code 200 s009 06 disconnect the temperature actuator connector (auxiliary unit), check if fault no longer active (different fault may be active). See Fig. 2.</p>	Fault no longer active (FMI06), different fault may be active (FMI 05).	Shorted actuator motor is likely. Perform "Actuator Stepper Motor Electrical Test" to confirm, then go to test no. 9 .
			Fault still active (FMI06).	Check for short to ground in power wire between actuator and FCU/ACU. If no short is found, replace FCU/ACU, then go to test no. 9 .
9	<p>Verify repair.</p> <p>NOTE: In order to check if a fault status has changed from active to inactive, the recirc button, temperature control switch, or air selection switch needs to be moved while the ignition is on.</p>	Verify that repair resolved the problem.	Problem resolved.	Done.
			Problem unresolved.	Repeat test no. 1.

Table 7, Actuator Circuit Test

Temperature Sensor Diagnosis

See [Table 8](#) for the evaporator temperature sensor circuit test procedures.

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Symptom Driven Diagnosis

Evaporator Temperature Sensor Circuit Test				
Test No.	Test	Test Procedure	Test Result	Action
1	Are evaporator temperature sensor fault codes active?	Check if fault code 146 s002 03 or 146 s002 04 is active.	Neither fault is active.	Go to test no. 2.
			146s002 03 is active	Check for sensor signal wire shorted to power. If okay, go to test no. 2.
			146s002 04 is active.	Check for sensor signal wire shorted to ground. If okay, replace FCU. Go to test no. 3.
2	Check sensor reference voltage.	Disconnect the evaporator sensor. Turn the ignition on and measure the voltage across the sensor connector pins (harness side). The voltage should be 5V if the circuit and FCU are operating correctly.	5V	Perform "Evaporator Temperature Sensor Test."
			Less than 5V.	Check for open circuit in sensor signal and ground wires. If okay, replace FCU. Go to test no. 3.
3	Verify repair.	Verify that repair resolved the problem.	Problem solved.	Done.
			Problem unresolved.	Repeat test no. 1.

Table 8, Evaporator Temperature Sensor Circuit Test

See **Table 9** for the CDTC temperature sensor circuit test procedures.

CDTC Temperature Sensor Circuit Test				
Test No.	Test	Test Procedure	Test Result	Action
1	Are CDTC temperature sensor fault codes active?	Check if one of the following fault codes is active: 146 s001 03 , 146 s001 04 , or 200 s001 03 , 200 s001 04 .	None of these faults is active.	Go to test no. 2.
			146s001 03 or 200 s001 03 is active.	Check for sensor signal wire shorted to power. If okay, go to test no. 2.
			146s001 04 or 200 s001 04 is active.	Check for sensor signal wire shorted to ground. If okay, replace FCU/ACU. Go to test no. 3.
2	Check sensor reference voltage.	Disconnect the CDTC sensor. Turn the ignition on and measure the voltage across the sensor connector pins (harness side). The voltage should be 5V if the circuit and FCU/ACU are operating correctly.	5V	Perform "CDTC Temperature Sensor Test."
			Less than 5V.	Check for open circuit in sensor signal and ground wires. If okay, replace FCU/ACU. Go to test no. 3.

Symptom Driven Diagnosis

CDTC Temperature Sensor Circuit Test				
Test No.	Test	Test Procedure	Test Result	Action
3	Verify repair.	Verify that repair resolved the problem.	Problem resolved.	Done.
			Problem unresolved.	Repeat test no. 1.

Table 9, CDTC Temperature Sensor Circuit Test

Backlighting Diagnosis

See [Table 10](#) for backlighting diagnosis.

Backlighting Diagnosis				
Test No.	Test	Test Procedure	Test Result	Action
1	Check backlighting operation.	Turn on the headlights and check for the following conditions: <ul style="list-style-type: none"> • Condition 1—all backlighting (instrument cluster, panel switches, and HVAC FCU) not working • Condition 2—HVAC FCU and bunk override switch backlighting not working • Condition 3—only HVAC FCU backlighting not working • Condition 4—only bunk override switch backlighting not working 	Condition 1	See Group 54 for backlighting diagnosis.
			Condition 2	Go to test no. 2.
			Condition 3	Go to test no. 3.
			Condition 4	Go to test no. 4.
2	Check circuits 29A and GND1.	Disconnect AS2 connector. Turn headlights on. Measure voltage at pins A(+) and F(-) of the AS2 connector on the main cab harness side.	9–16V	Check AS2 connector for damaged pins. If damaged pins are found, repair as necessary then go to test no. 5. If no damage is found, repeat test no. 1.
			Less than 9V (0V)	Check for open in circuits 29A and GND1 in the main cab harness. Repair as necessary, then go to test no. 5.
3	Check circuits DIM+ and GND1 to FCU.	Disconnect the FCU connector. Turn headlights on. Measure voltage at pins A6(+) and A7(-) of the FCU connector.	9–16V	Replace FCU, then go to test no. 5.
			Less than 9V (0V)	Check circuits DIM+ and GND1 between the FCU connector and the AS2 connector for circuit fault (open or short). Repair as necessary, then go to test no. 5.

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Heater and Air Conditioner, Blend Air System, Troubleshooting

Symptom Driven Diagnosis

Backlighting Diagnosis				
Test No.	Test	Test Procedure	Test Result	Action
4	Check circuits DIM+ and GND1 to override switch.	Disconnect the override switch connector. Turn headlights on. Measure voltage at pins 10(+) and 8(-) of the override switch connector.	9–16V	Replace the override switch, then go to test no. 5.
			Less than 9V (0V)	Check circuits DIM+ and GND1 between the override switch and AS2 connectors for circuit faults (open or short). Repair as necessary, then go to test no. 5.
5	Verify repair.	Verify that repair solved the backlighting problem.	Problem resolved.	Done.
			Problem unresolved.	Repeat test no. 1.

Table 10, Backlighting Diagnosis

Sleeper Climate Control Panel Circuit Diagnosis

See [Table 11](#) for sleeper climate control panel circuit diagnosis.

Sleeper Climate Control Panel Circuit Diagnosis				
Test No.	Test	Test Procedure	Test Result	Action
1	Does the symptom involve both the blower and temperature control?	—	No, affects only one of these	Go to test no. 4.
			Yes, affects both	Go to test no. 2.
2	Check the 12VDC ignition supply to the control panel.	Gain access to the back of the sleeper control panel. Disconnect the blower and temperature potentiometer connectors. Turn the ignition on. At the blower speed potentiometer connector, check for voltage at pin A (circuit 98N). Repeat test for temperature potentiometer connector pin A (circuit 98N).	Voltage at both pins	Go to test no. 3.
			Voltage at only one pin	Check circuit 98N between connector with no voltage and splice in harness. Repair as necessary.
			No voltage at either pin	Check 10A fuse in B-pillar PDM. If blown, check for short in circuit 98N. If okay, check circuit 98N for open and check ignition supply to fuse panel. Repair as necessary.

Symptom Driven Diagnosis

Sleeper Climate Control Panel Circuit Diagnosis				
Test No.	Test	Test Procedure	Test Result	Action
3	Check control panel ground circuit.	Make sure the ignition is off and the batteries are disconnected. Failure to do this may give inconclusive test results.	Both less than one ohm	Check ACU power and ground wiring. ACU may be malfunctioning.
		Disconnect the blower and temperature potentiometer connectors.	One more than 1 ohm	Check GND circuit between affected potentiometer circuit and the splice in the harness. Repair as necessary.
		At the blower speed potentiometer connector, check resistance between pin C (circuit GND) and the battery negative terminal. Repeat test for temperature potentiometer connector pin C (circuit GND).	Both more than 1 ohm	Check GND wiring to potentiometers. Check ACU ground circuit.
4	Which potentiometer circuit is affected?		Blower control	Go to test no. 5.
			Temperature control	Go to test no. 6.
5	Check for blower potentiometer voltage signal at the ACU.	Remove the ACU from the HVAC unit; leave the connector plugged in.	Voltage ranges from 0.5 to 12.5VDC	Sleeper climate control panel circuit is not the problem. Check for fault codes and see "Blower Motor Diagnostics—Front and Auxiliary Units."
		Turn the ignition on. Backprobe ACU connector pin A2 and check for voltage while rotating the blower speed control knob from low to high.	Voltage does not vary; remains steady regardless of value	Check circuit 98M between blower speed potentiometer and ACU. Repair as necessary. If okay, replace potentiometer.
6	Check for temperature potentiometer voltage signal at the ACU.	Remove the ACU from the HVAC unit; leave the connector plugged in.	Voltage ranges from 0.5 to 12.5 VDC	Sleeper climate control panel circuit is not the problem. Check for fault codes and see "Actuator Stepper Motors—Temperature, Recirc, and Mode" for temperature actuator diagnostics.
		Turn the ignition on. Backprobe ACU connector pin A5 and check for voltage while rotating the temperature control knob from cold to hot.	Voltage does not vary; remains steady regardless of value	Check circuit 98T between temperature potentiometer and ACU. Repair as necessary. If okay, replace potentiometer.

Table 11, Sleeper Climate Control Panel Circuit Diagnosis

Blower Motor Diagnostics— Front and Auxiliary Units

See [Table 12](#) and [Table 13](#) for blower motor diagnostics.

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Symptom Driven Diagnosis

Blower Will Not Operate or Operates at Reduced Speed				
Test No.	Test	Test Procedure	Test Result	Action
1	Is fault 146 s010 02 or 200 s010 02 active?	—	Yes	See fault code tables, in Subject 340 , for diagnosis.
			No	Go to test no. 2.
2	Check power and ground.	Disconnect the blower motor connector. Turn ignition on. Check for voltage across pins 3 and 4 of the connector. NOTE: If system voltage is too high or too low, this may cause the blower motor to enter voltage protection mode. This will cause the blower to operate at reduced speed or stop working altogether.	12–17V (should be approx. battery voltage)	Go to test no. 3.
			0V	Check 30A blower motor fuse in PDM. Check blower motor power and ground circuits for open (circuits 98 and GND). Repair as necessary, then go to test no. 7.
			Less than 12V (not 0) or more than 17V	Blower has most likely entered voltage protection mode. Correct voltage problem as necessary, then go to test no. 7.
3	Check speed control signal at blower motor.	Disconnect the blower motor connector. Turn ignition on. Check voltage between connector pin 6 and ground while rotating the blower control switch from off to full speed. The voltage should be approximately 0V (off) to 5V+ (high).	Voltage full range (0–5V+)	Go to test no. 4.
			Voltage stays at 0V	Check speed control wire for open circuit between blower motor and FCU or ACU. If okay, check FCU/ACU. Repair/replace as necessary, then go to test no. 7.
4	Check for mechanical obstruction/locked rotor.	Remove the blower motor from the HVAC housing. Check for obstruction preventing blower from turning. Check if rotor spins freely by hand.	Obstruction	Remove obstruction as necessary, then go to test no. 7.
			Rotor locked	Replace blower motor, then go to test no. 7.
			Neither	Go to test no. 5.

Symptom Driven Diagnosis

Blower Will Not Operate or Operates at Reduced Speed				
Test No.	Test	Test Procedure	Test Result	Action
5	Check voltage drop.	Remove the blower motor from the HVAC housing. Turn ignition on, set blower speed to high. Check voltage on the power and ground circuits by back-probing the blower motor connector. Check between the positive and negative battery posts. NOTE: High voltage drop may cause the blower motor to enter voltage protection mode. This will cause the blower to operate at reduced speed and, if severe enough, may stop the blower altogether.	Less than 0.2V	Go to test no. 6.
			More than 0.2V	Locate source of high resistance causing voltage drop. Repair as necessary then go to test no. 7.
6	Does the blower motor operate at all?	—	Yes	Check if blower motor feels hot and make sure there are no obstructions to airflow. If no obstructed airflow or blower feels hot, replace blower motor then go to test no. 7.
			No	Replace blower motor, then go to test no. 7.
7	Verify repair.	Verify that repair resolved the problem.	Problem resolved	Done
			Problem unresolved	Repeat test no. 1.

Table 12, Blower Will Not Operate or Operates at Reduced Speed

Diagnosis for Blower Speed is Not Available				
Test No.	Test	Test Procedure	Test Result	Action
1	Does blower operate at all?	—	Yes	Go to test no. 2.
			No	Perform the tests in Table 12.
2	Check feedback speed/diagnostic circuit.	Check for open or short circuit in blower motor feedback speed/diagnostic circuit between the blower motor and the FCU/ACU.	Circuit is open or shorted	Repair blower motor feedback speed/diagnostic circuit then, go to test no. 3.
			Circuit okay	Perform the tests in Table 12.
3	Verify repair.	Verify that repair resolved the problem.	Problem resolved	Done
			Problem unresolved	Repeat test no. 1.

Table 13, Diagnosis for Blower Speed is Not Available

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Symptom Driven Diagnosis

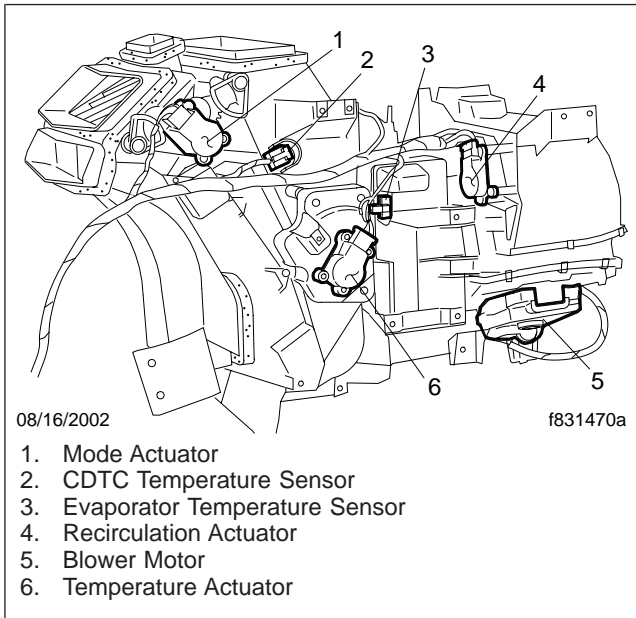


Fig. 2, Cab HVAC Assembly

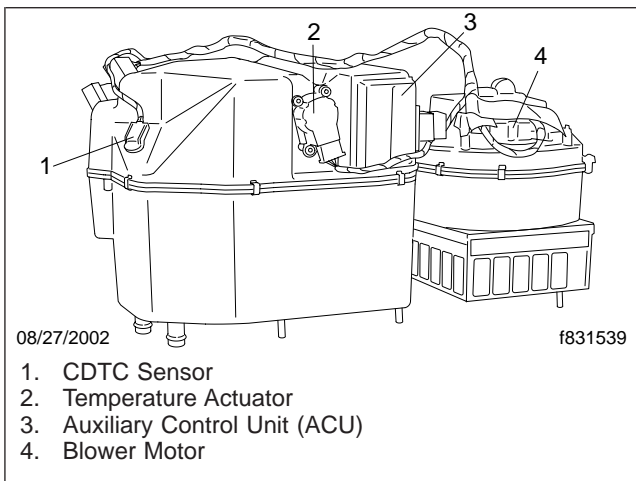
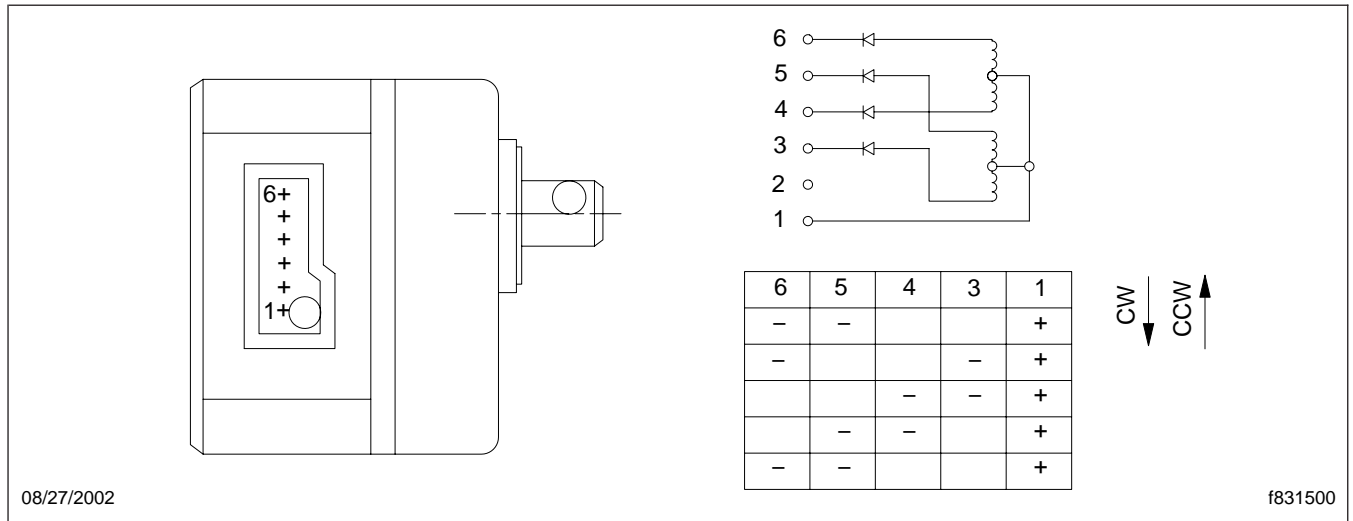


Fig. 3, Auxiliary HVAC Assembly



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Fig. 4, Actuator Motor Pinouts