



Recreational Vehicle Dual Zone Front HVAC Service Manual

Updated: 9/6/2023

Note (Not applicable for hard copies):

1. Phrases in **blue** are “**hyperlinks**” that allow user to jump directly to the respective section. Hold “**ctrl**” and click the link to use.
2. All section titles are “**hyperlinks**” allowing the user to jump back to the top of the document.

Table of Contents

	<u>Page</u>
<u>Service</u>	
• Contact Information	5
• Request for Technical Support, Questionnaire	6
• Comments	7
<u>Electrical Systems</u>	
• Electrical Schematics	8
• Diagnostic Guide	9
<u>Air Flow Systems</u>	
• Basic Description	11
• Main HVAC System Components	12
<u>Component Servicing</u>	
• Outdoor HVAC Unit	14
• Indoor HVAC Unit	15
• Freeze Probe	16
• Fresh and Recirculation Air Filters	17
• Actuator(s)	18
• Evaporator Coil	19
• Heater Core	20
• Blower Assembly	21
• Condenser Fan	22
• Condenser Coil	23
• Thermostatic Expansion Valve (TXV)	24
• Other Serviceable Components	25

Table of Contents

Air Conditioning System

- [Diagnostic Guide](#) 29
- [A/C System Operation Check](#) 31
- [Expected A/C Performance](#) 32
- [Compressor Function Test](#) 33
- [Thermostatic Expansion Valve \(TXV\) Function Test](#) 34
- [Refrigerant Charge Information](#) 35
- [Service Tips](#) 35
- [R134a Temperature/Pressure Chart](#) 36

Dual Zone Front HVAC Owner's Manual

- [Control Panel Operation](#) 38
- [Air Distribution](#) 39
- [Operating Features](#) 40
- [Warranty/Service](#) 41

Service

Disclaimer:

WARNING!!

The technical information, provided in this service guide, is intended for use by properly trained HVAC service personnel, who can ensure a safe and properly operating system. It is assumed that the user of this guide is trained and experienced in basic refrigeration principles, in addition to being familiar with Bergstrom HVAC systems installed on Recreational Vehicles. Technicians who repair or service motor vehicle A/C systems must be certified by Section 609 (MACS) approved by the EPA.

Before any air conditioning service is started, it is the technician's responsibility to determine what type of refrigerant is contained in the system. Component marking and/or service port peculiarities are good places to start to identify the contents.

Bergstrom advises that the usual precautions associated, with servicing a motor vehicle, be exercised when servicing the HVAC system and assumes no liability regarding vehicle damage or personal injury. Additionally, Federal and any Local regulations regarding the handling and use of refrigerants should be always complied with.

NOTES:

TECHNICAL SUPPORT IS PROVIDED TO CERTIFIED TECHNICIANS ONLY. BERSTROM DOESN'T SUPPLY TECHNICAL SUPPORT TO RV OWNERS.

THE AIR CONDITIONING SYSTEM CONTAINS REFRIGERANT R134A, UNDER HIGH PRESSURE, AND SHOULD BE SERVICED BY ONLY QUALIFIED PERSONNEL.

REPAIRS THAT ALTER THE DESIGN OF THE BERGSTROM SYSTEM, INCLUDING USE OF NON-BERGSTROM SUPPLIED PARTS, WILL VOID THE WARRANTY AND ANY BERGSTROM LIABILITY FOR THE HVAC SYSTEM.

THE BERGSTROM HVAC SYSTEM SHOULD BE SERVICED BY A FULLY TRAINED AND ENVIRONMENTALLY LICENSED TECHNICIAN. FAILURE TO AGREE TO ALL STATEMENTS COULD RESULT IN SERIOUS INJURIES, FINES AND POSSIBLE VOIDING OF ANY WARRANTIES.

Service

Contact Information

Address:

Bergstrom HQ
2390 Blackhawk Road
Rockford, IL 61109
USA

Phone:

(866) 204-8570

Website:

www.bergstrominc.com

Service

Request for Technical Support Questionnaire

Open the front service door of the coach and verify if you are servicing a Bergstrom HVAC system by checking the base unit mounted on the front firewall. Verify customer complaint by operating the vehicle. (Print this page for reference).

DESCRIPTION OF COMPLAINT:

DEALER:

CONTACT/TECH: _____ PHONE #:

CHASSIS: _____ MODEL YR: _____ MODEL:

COACH MANUFACTURER: _____

CONDENSER TYPE & LOCATION _____

PRESSURE GAUGE READINGS:

LOW _____ PSIG @ 1500 RPM, HIGH BLOWER SPEED

HIGH _____ PSIG @ 1500 RPM, HIGH BLOWER SPEED

R134A REFRIGERANT CHARGE WEIGHT:

_____ POUNDS

AIR TEMPERATURE & HUMIDITY READINGS:

HUMIDITY LEVEL: _____ %RH

RECIRCULATION INLET AIR TEMPERATURE: _____ °F

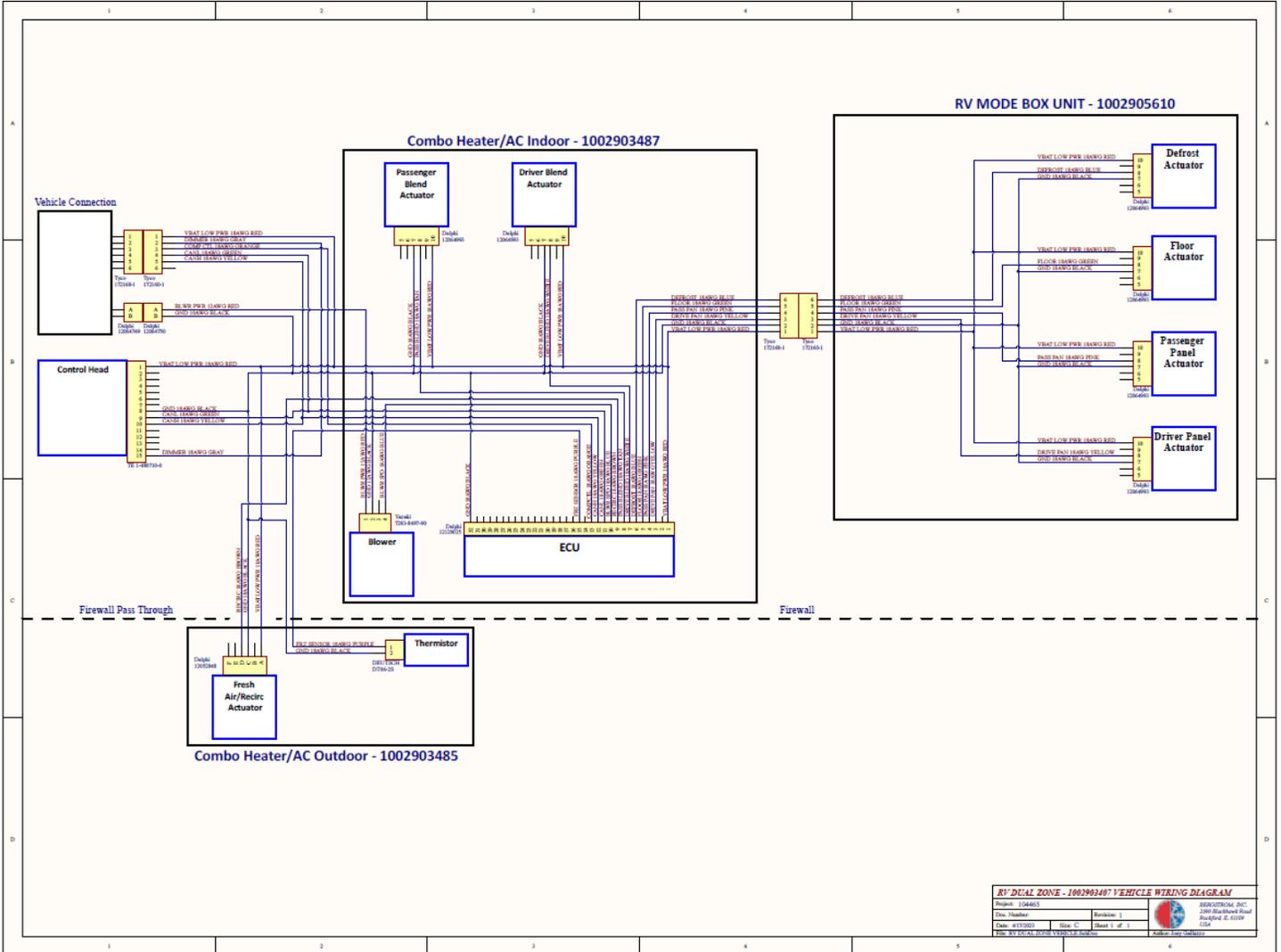
DISCHARGE AIR TEMPERATURE (VENT CLOSEST TO BASE UNIT): _____ °F

SUBTRACT THE TWO AIR TEMPERATURES = _____ °F

DIFFERENTIAL

Electrical Systems

Electrical Schematics



Electrical Systems

Diagnostics Guide

Problem	Possible Cause	Corrective Action
Control Panel is not functional	<ol style="list-style-type: none"> 1. Vehicle ignition switch isn't activated. 2. Loss of power supply. 3. Open circuit between vehicle connection and control panel. 4. Loose or wrong connection(s) at the control panel. 5. Failed control panel. 	<ol style="list-style-type: none"> 1. Activate vehicle ignition switch. 2. Examine the chassis' HVAC circuit's protection device for failure (i.e. fuse or circuit breaker). 3. Check primary connections at vehicle connection and the control panel. Verify vehicle voltage at each connection. Verify ground connection. Repair or replace harness if necessary. 4. Ensure all connections are mated properly. Ensure the harness is pinned properly in the connector using the wiring diagram. 5. Replace control panel.
Discharge and/or inlet air systems are not functioning properly.	<ol style="list-style-type: none"> 1. Open circuit between control panel and ECU. Open circuit between ECU and actuator. 2. Faulty shutter actuator. 3. Faulty control panel. 4. Faulty ECU. 	<ol style="list-style-type: none"> 1. Verify vehicle voltage and ground at actuator. Perform continuity test of CAN high and low between control panel and ECU. Perform continuity test of actuator signal between ECU and actuator. Repair or replace harness if necessary. 2. Replace the actuator if needed. Refer to ACTUATOR(S) 3. Replace the control panel if needed. 4. Replace ECU if necessary.
Blower does not operate at any speed	<ol style="list-style-type: none"> 1. Open circuit in harness between the vehicle connection and blower connection. 2. Open circuit between ECU and blower connection. 3. Faulty ECU 	<ol style="list-style-type: none"> 1. Verify vehicle voltage and ground at vehicle connection and blower connection. Perform continuity test between connections. Repair or replace harness if necessary. 2. Perform continuity test between ECU and blower connection for blower speed control. Repair or replace harness if necessary. 3. Rotate the blower control between LOW and HIGH speed. Verify voltage change when speed is adjusted. Replace ECU if necessary.

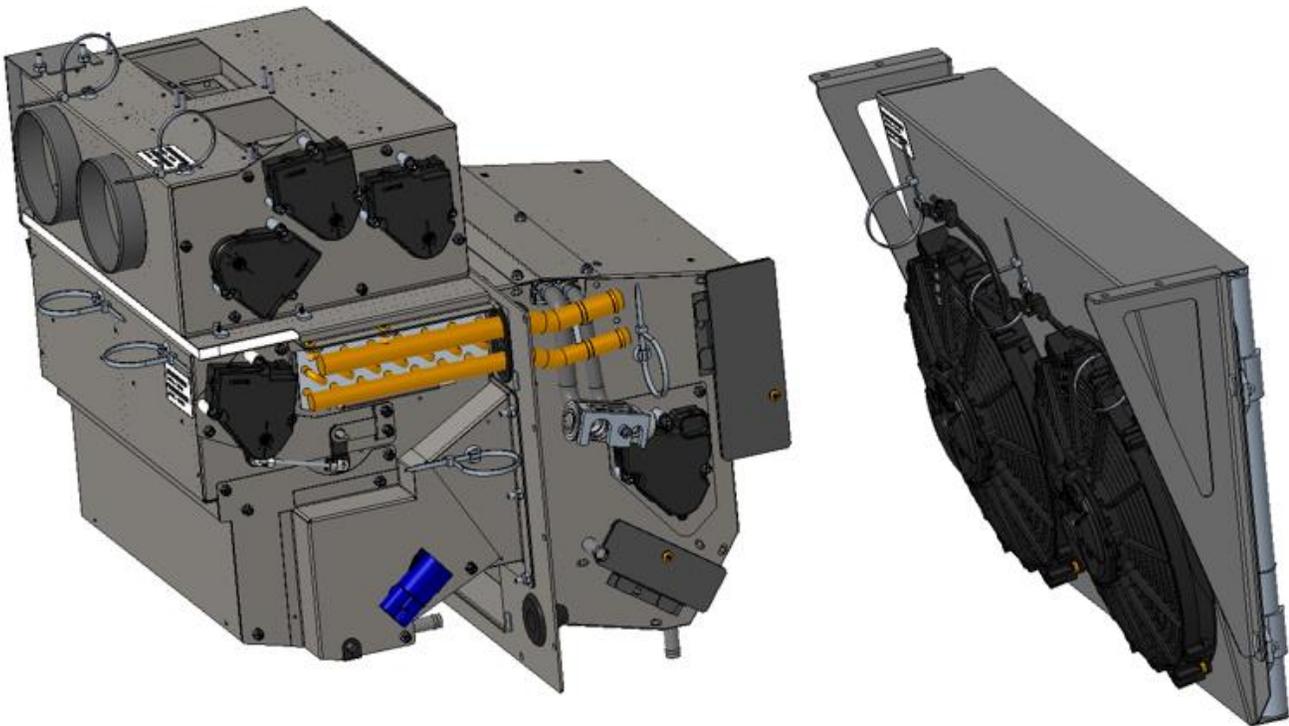
Electrical Systems

Problem	Possible Cause	Corrective Action
A/C Clutch does not operate	<ol style="list-style-type: none"> 1. Blower switch is not activated. 	<ol style="list-style-type: none"> 1. Blower must be ON for A/C clutch to operate.
A/C Clutch does not operate. Blower is operating properly	<ol style="list-style-type: none"> 1. A/C switch is not activated. 2. Open circuit between control head and ECU. 3. Defective A/C freeze probe. 4. Faulty A/C clutch. 	<ol style="list-style-type: none"> 1. Verify A/C switch is depressed and illuminating correctly. Replace control panel if necessary. 2. Perform continuity test of CAN high and low between control panel and ECU. Repair or replace harness if necessary. 3. Perform continuity check for freeze probe power and ground between probe and ECU. Replace harness if no continuity. Replace probe otherwise. 4. With the engine OFF apply a separate 12V+ supply directly to clutch terminals and listen for clutch engagement. Replace clutch if there is no engagement.

Air Flow Systems

Basic Description

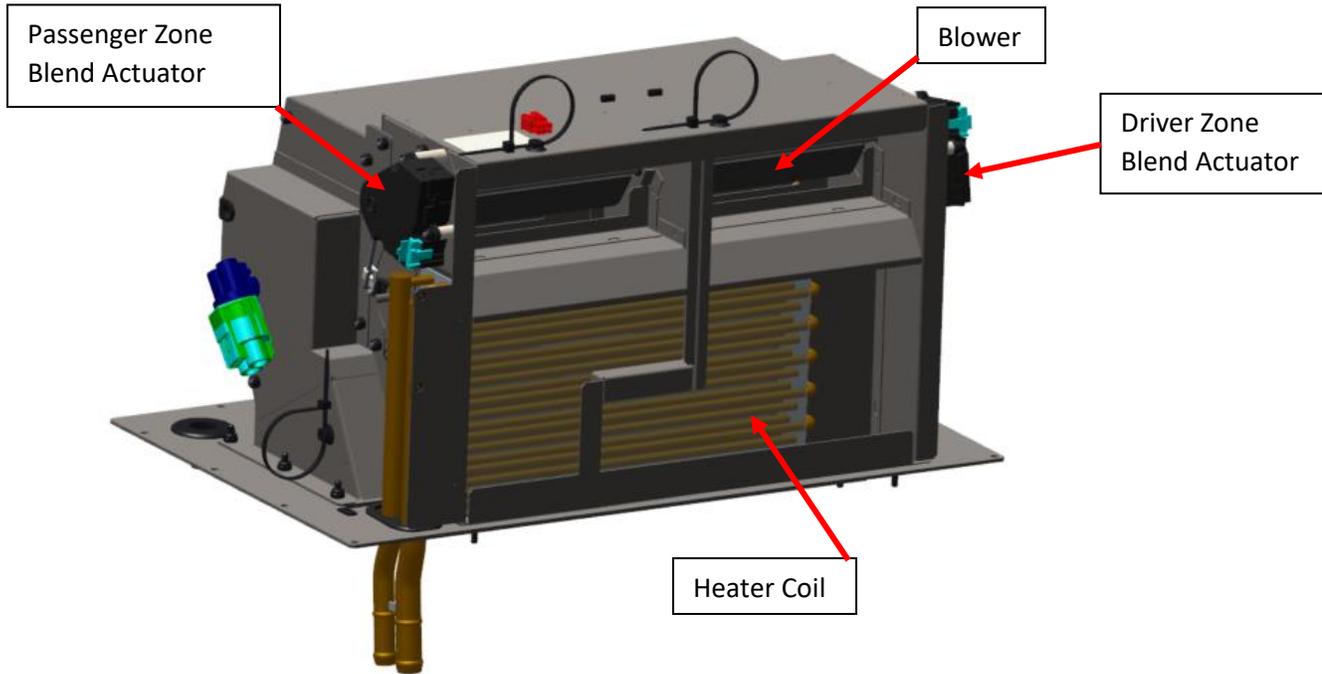
The Bergstrom Dual Zone HVAC System for Jayco consists of four HVAC modules designed to provide air that has been conditioned to the occupants of the vehicle cockpit. The driver zone and passenger zone of the panel mode outlets can be controlled independently for air temperature and blower speed. Two of the HVAC modules are mounted under the dash, and two under the vehicle hood. The serviceable components are located within these modules.



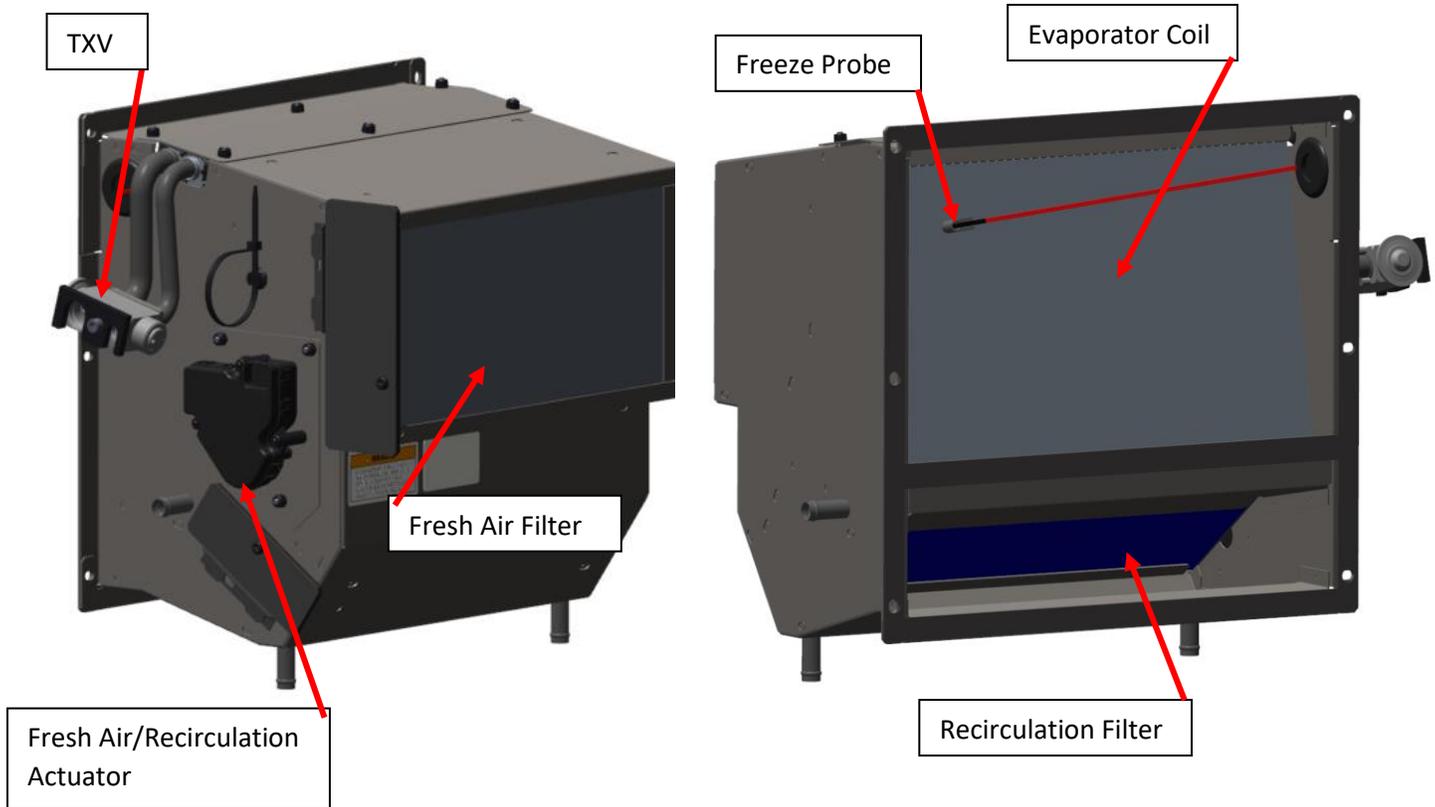
Air Flow Systems

Main HVAC System Components

Indoor HVAC Unit

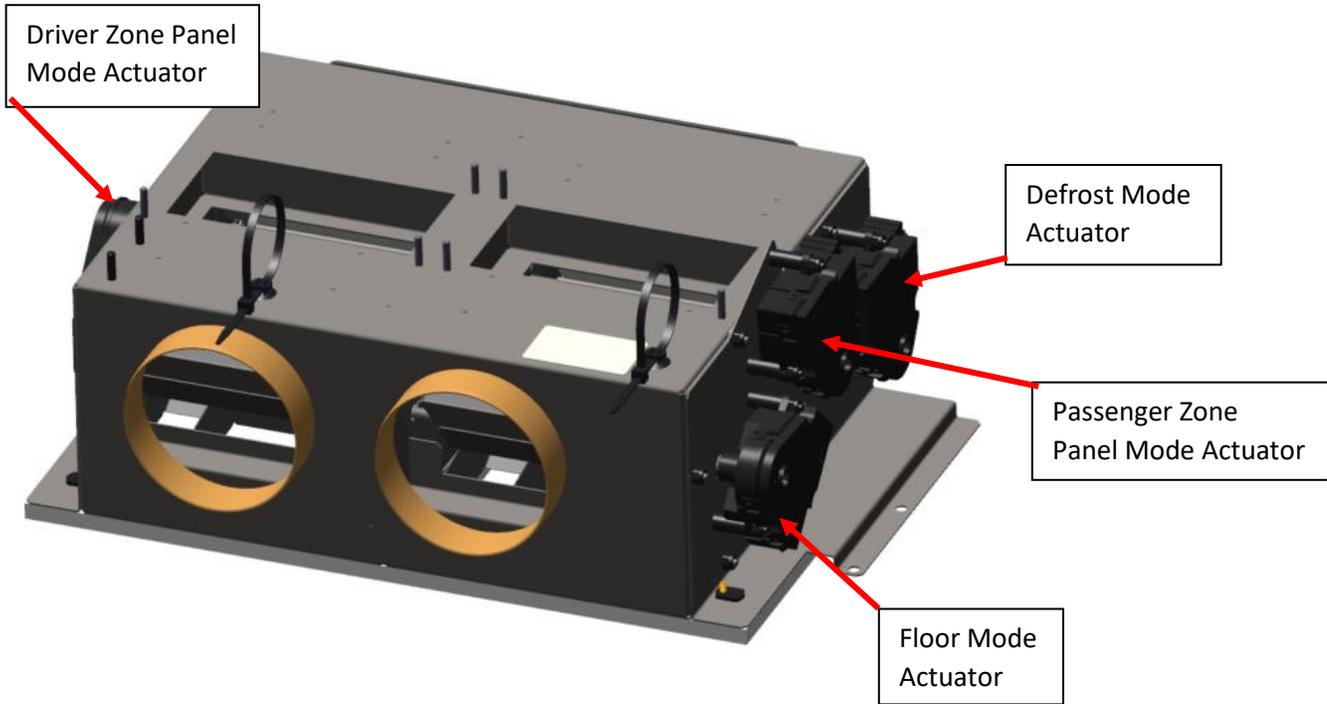


Outdoor HVAC Unit

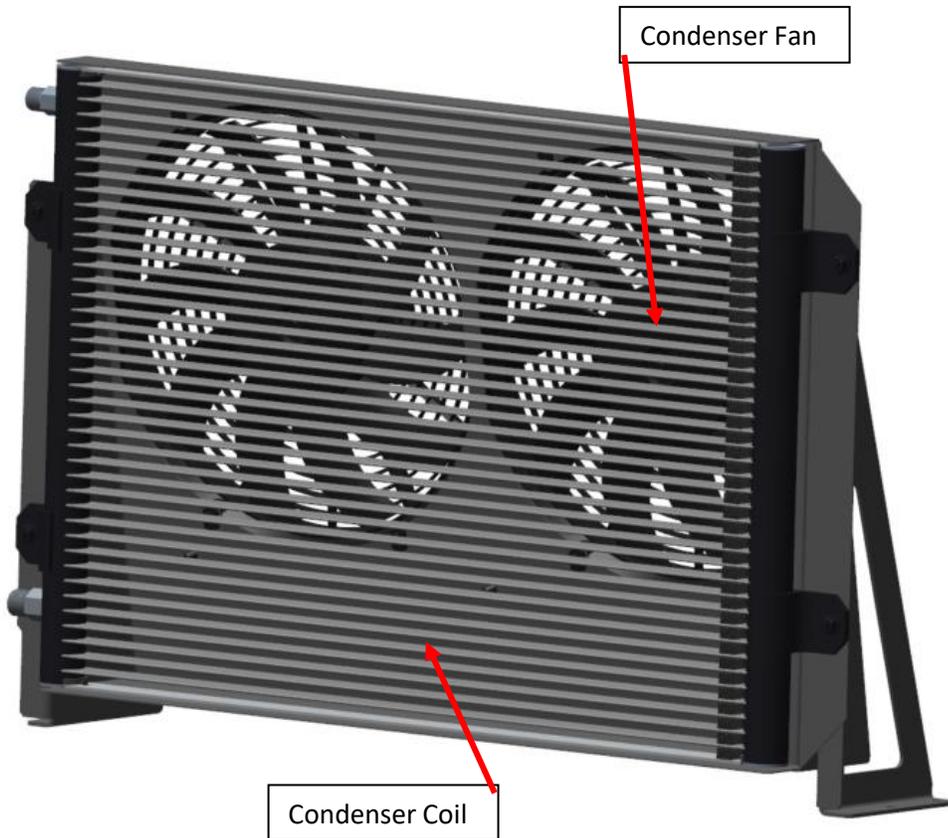


Air Flow Systems

Mode Box



Condenser Assembly



Component Servicing

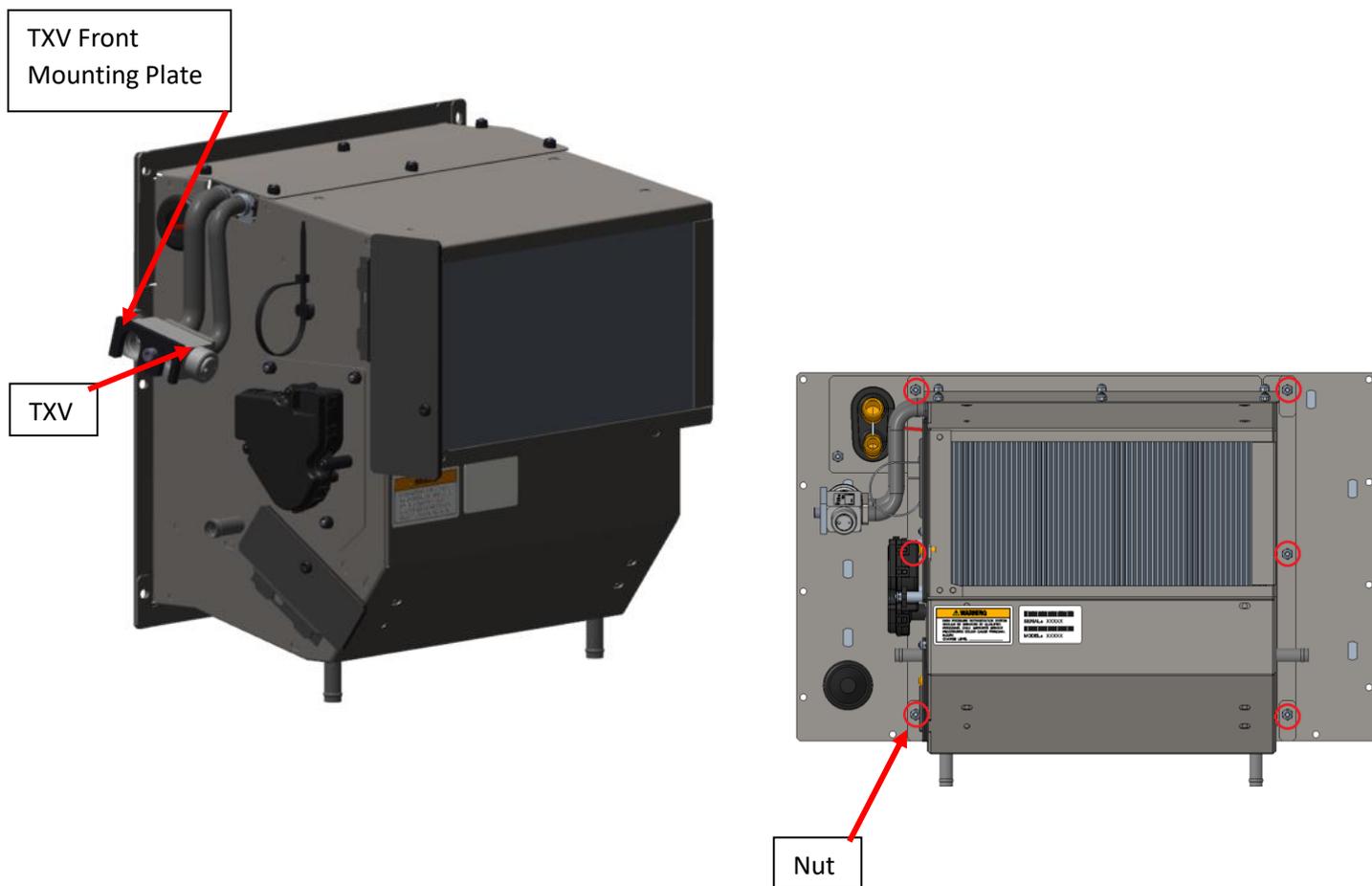
Outdoor HVAC Unit

Outdoor HVAC Unit Removal

1. Discharge A/C system. Refer to [REFRIGERANT CHARGE INFORMATION](#)
2. Remove any hoses/fittings connected to the TXV and the front mounting plate by removing the 1 Allen screw.
3. Disconnect the actuator harness and freeze probe harness.
4. Remove outdoor HVAC unit from the front of the indoor HVAC unit by removing 6 nuts.

Outdoor HVAC Unit Installation

1. Install outdoor HVAC unit to the front HVAC unit with 6 nuts.
2. Connect actuator harness and freeze probe harness.
3. Install hoses/fittings to TXV with front mounting plate and 1 Allen screw (Torque 10 Nm).
4. Charge A/C system. Refer to [REFRIGERANT CHARGE INFORMATION](#)



Component Servicing

Indoor HVAC Unit

Indoor HVAC Unit Removal

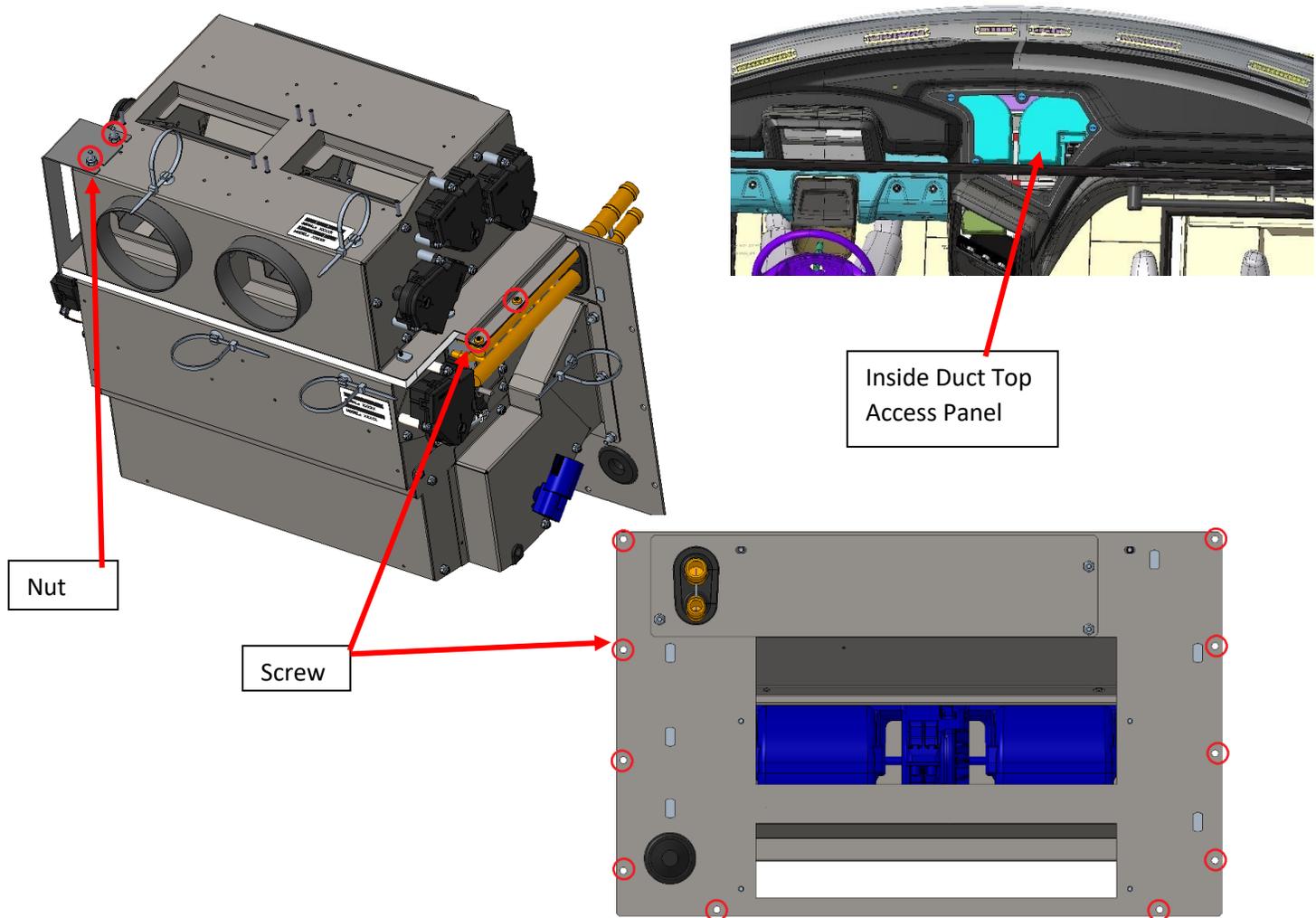
1. Remove outdoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#)
2. Drain engine coolant from heater core and connected heater hoses.

NOTE – Before removing heater hoses, label hoses to ensure correct installation.

3. Remove 2 spring clamps and disconnect both heater hoses from heater core tubes.
4. Use inside duct top access panel to remove 2 nuts and slide clamp plate away. Remove 2 screws on opposite side.
5. Remove 10 screws holding indoor unit to vehicle.

Indoor HVAC Unit Installation

1. Insert indoor unit and secure to vehicle with 10 screws.
2. Use inside duct top access panel to position clamp plate under top flange of indoor unit and over the top of mode box, securing with 2 nuts. Secure 2 screws on opposite side.
3. Install heater hoses onto heater core tubes. Fill coolant system.
4. Install outdoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#)



Component Servicing

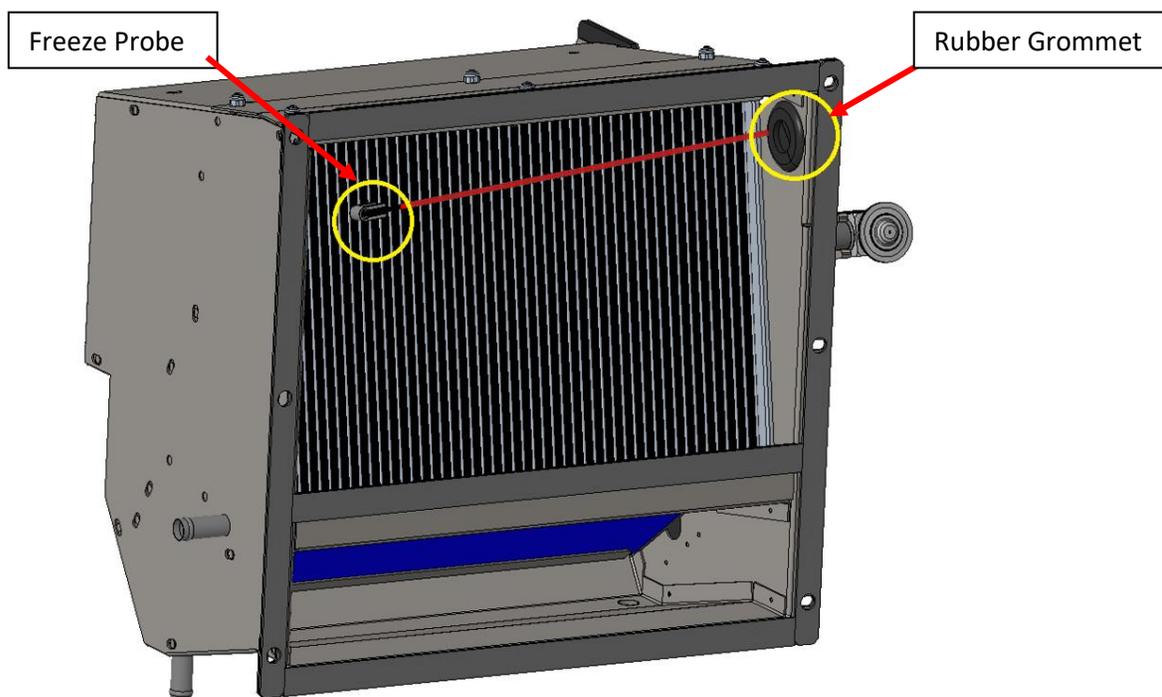
Freeze Probe

Freeze Probe Removal

1. Remove outdoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#)
2. Gently pull freeze probe out of the face of the evaporator, noting probe depth and location of indentation left behind.
3. Remove rubber grommet from side of HVAC module and from freeze probe.
4. Pull freeze probe out of HVAC module.

Freeze Probe Installation

1. Route new freeze probe through hole on side of HVAC unit.
2. Gently push freeze probe into the face of the evaporator at the same location and to the same depth as noted during removal.
3. Secure rubber grommet around freeze probe wires and into the hole on the side of the HVAC module.
4. Install outdoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#)



Component Servicing

Fresh and Recirculation Air Filters

Fresh or Recirculation Air Filter Removal

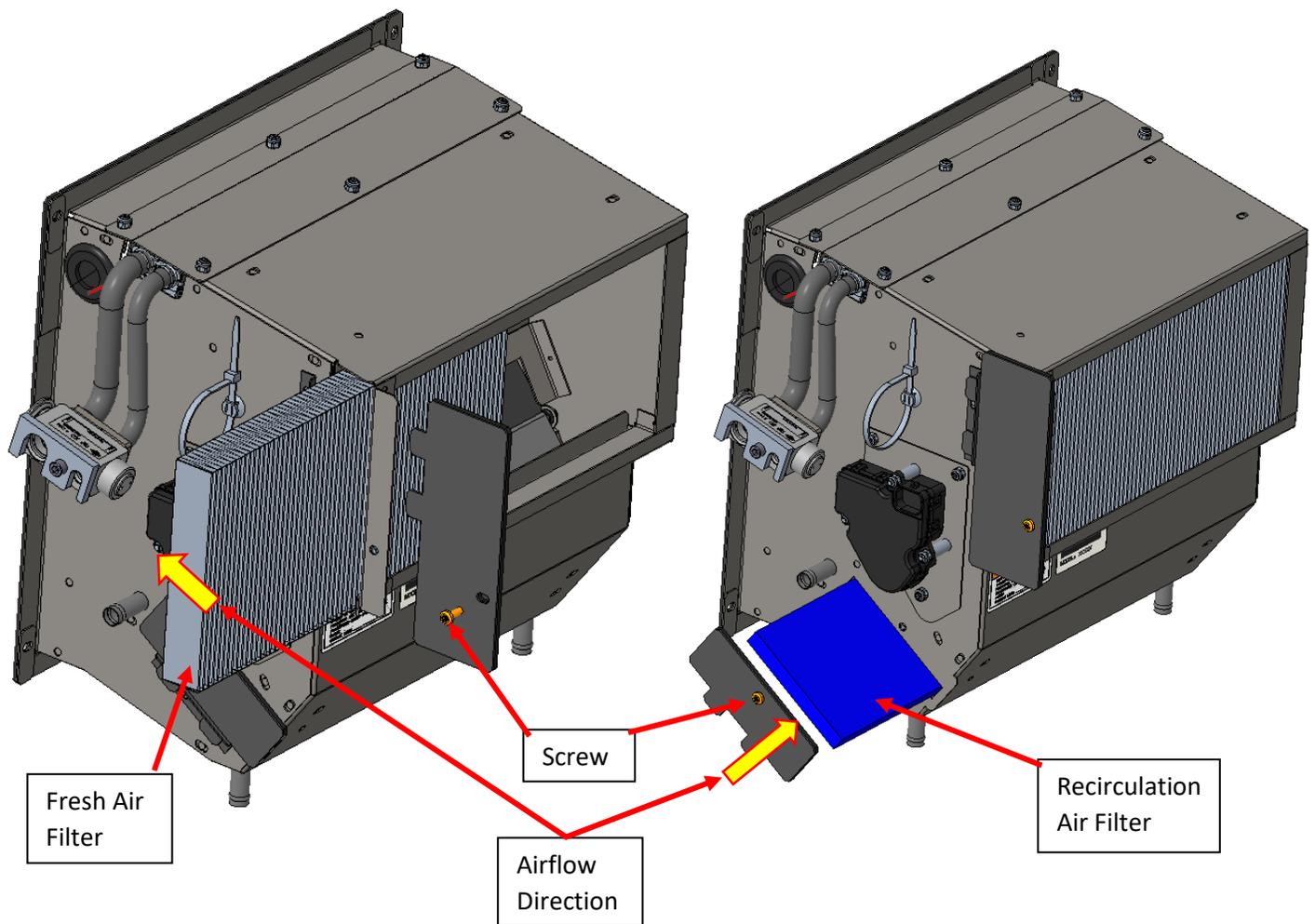
1. Identify outdoor HVAC unit. It is the unit with the TXV.
2. Remove 1 screw and slide cover tabs out of slots.
3. Remove filter by pulling straight out of the door.

Fresh or Recirculation Air Filter Installation

1. Insert filter into respective area.

NOTE – Orient printed filter arrow with airflow direction as shown (towards unit).

2. Secure door by sliding tabs into slots and with 1 screw.



Component Servicing

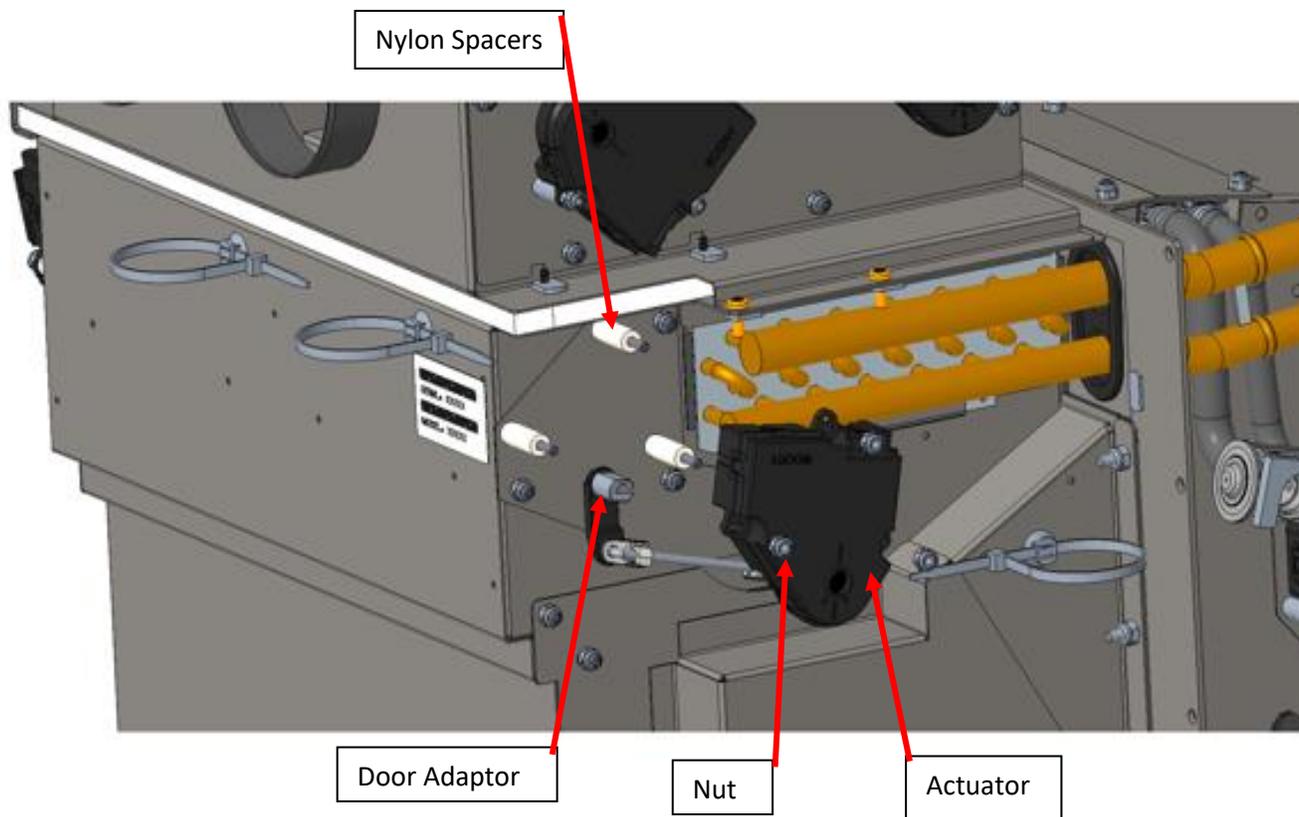
Actuator(s)

Actuator Removal

1. Depending on actuator location, removal of outdoor or indoor unit may be necessary. Refer to [OUTDOOR HVAC UNIT](#) and [INDOOR HVAC UNIT](#)
2. Disconnect electrical connector from the specific actuator that is being replaced (passenger zone blend door actuator shown for reference).
3. Remove 3 nuts to remove actuator.
4. Check to make sure the 3 nylon spacers behind the actuator stay in place over the threaded studs on the HVAC module.
5. Check to make sure the door adaptor piece stays located on the door rod protruding from the HVAC module.

Actuator Installation

1. Secure actuator to HVAC unit using 3 nuts.
2. Connect electrical connector to actuator.
3. If necessary, install outdoor or indoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#) and [INDOOR HVAC UNIT](#)



Component Servicing

Evaporator Coil

Evaporator Coil Removal

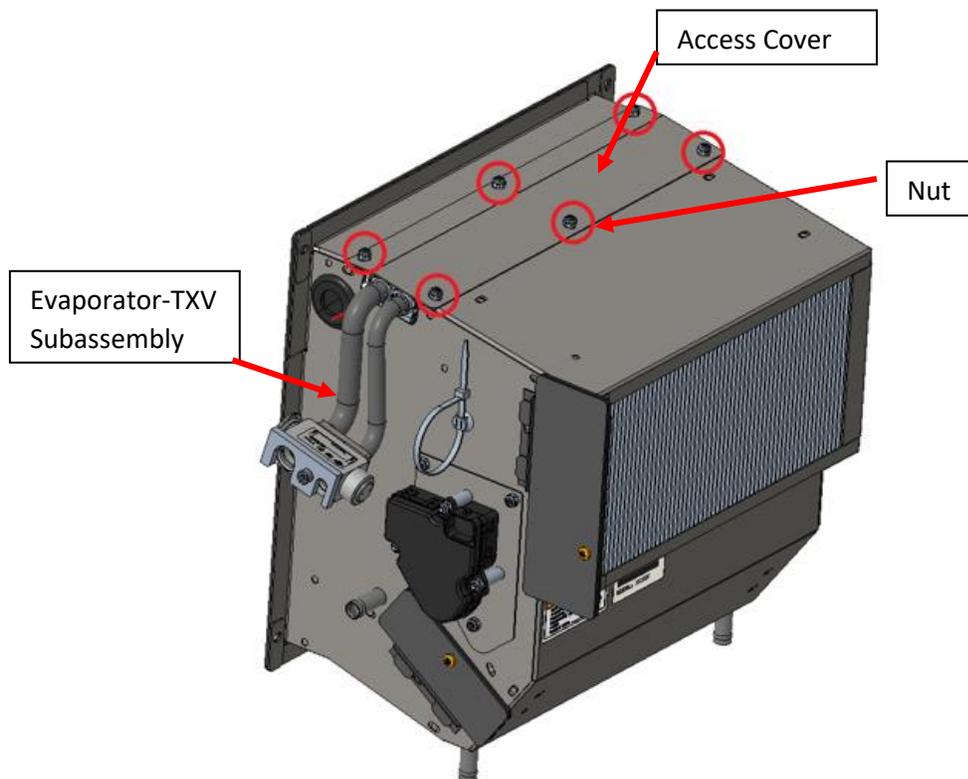
1. Remove outdoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#)
2. Remove evaporator access cover from the HVAC module by removing 6 nuts.
3. Remove freeze probe. Refer to [FREEZE PROBE](#)
4. Slide evaporator-TXV subassembly out of the HVAC module.

Evaporator Coil Installation

1. If A/C system is to be flushed, perform that operation before re-assembling the system. Refer to [REFRIGERANT CHARGE INFORMATION](#)

NOTE – During installation, always lubricate O-rings on fittings with mineral-based oil.

2. Slide evaporator-TXV subassembly into the HVAC module.
3. Install freeze probe. Refer to [FREEZE PROBE](#)
4. Secure evaporator access cover using 6 nuts.
5. Install outdoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#)



Component Servicing

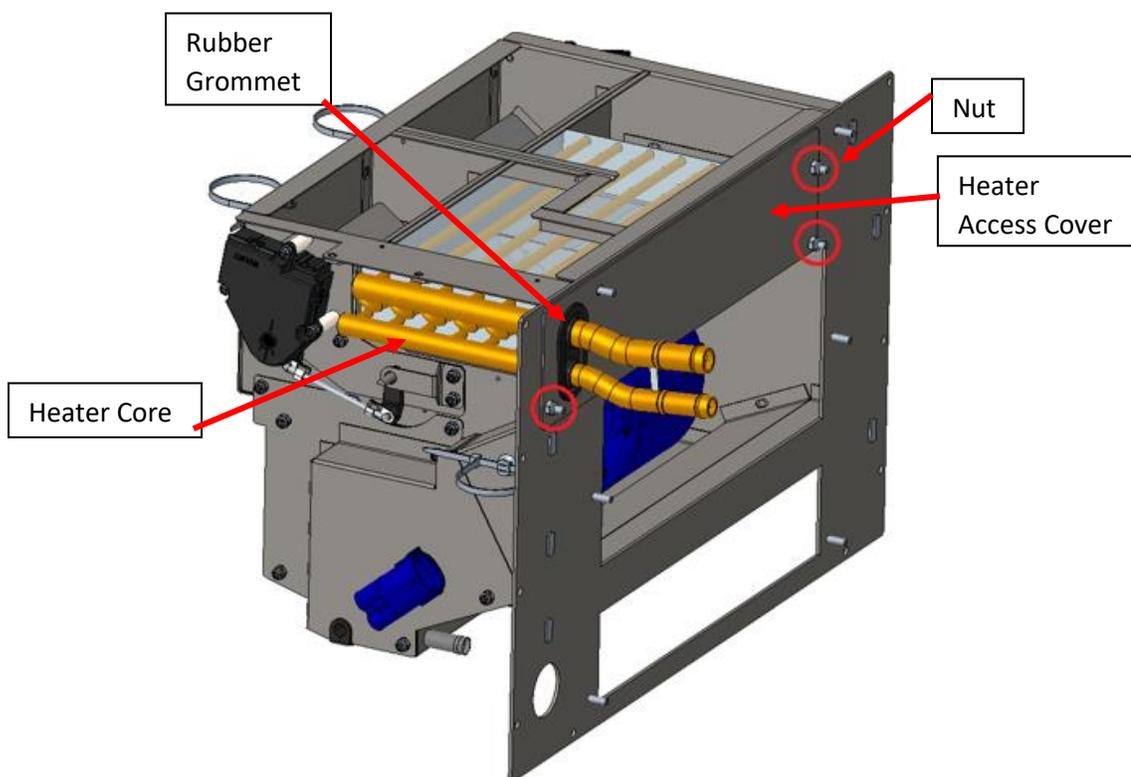
Heater Core (Indoor HVAC Unit)

Heater Core Removal

1. Remove outdoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#)
2. Remove heater access cover from indoor HVAC unit by removing 3 nuts.
3. Remove and retain rubber grommet from heater tubes and service cover.
4. Pull heater core out of the indoor HVAC unit.

Heater Core Installation

1. Push heater core into indoor HVAC unit.
2. Secure heater access cover using 3 nuts.
3. Secure rubber grommet into plate around tubes.
4. Install outdoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#)



Component Servicing

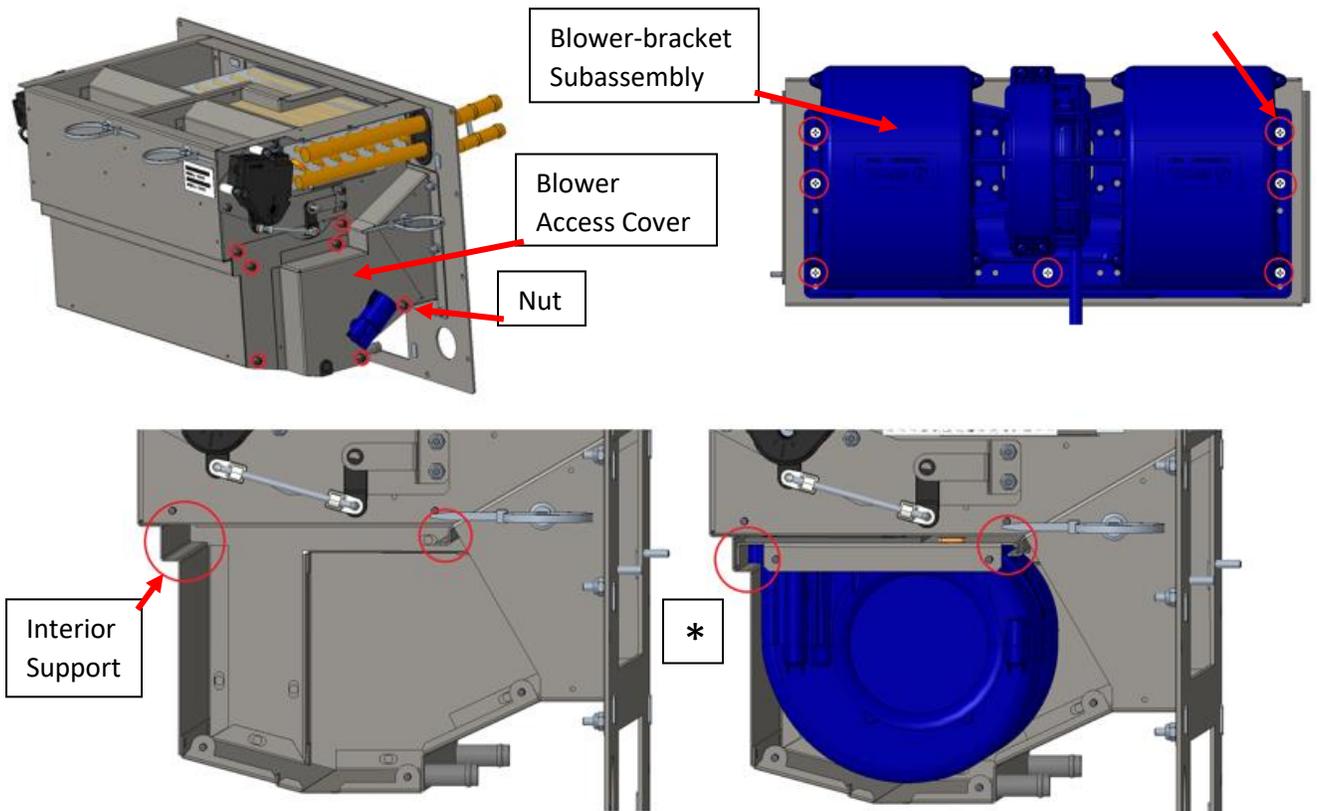
Blower Assembly (Indoor HVAC Unit)

Blower Assembly Removal

1. Remove outdoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#)
2. Remove indoor HVAC unit. Refer to [INDOOR HVAC UNIT](#)
3. Disconnect electrical connection for the blower.
4. Pull on blower connector to separate it from blower access cover.
5. Remove blower access cover with 7 nuts.
6. Remove rubber grommet from blower wires and blower access cover.
7. Pull blower-bracket subassembly out of indoor HVAC unit.
8. Remove blower assembly from the bracket with 7 screws.

Blower Assembly Installation

1. Attach blower assembly to mounting bracket with 7 **NEW** provided screws (1.7 Nm Torque).
2. Slide blower-bracket subassembly into indoor HVAC unit. Orient as shown*. The flanges of the mounting bracket should ride along the interior supports of the indoor HVAC unit.
3. Secure blower access cover to the side of the indoor HVAC unit using 7 nuts (blower connector must be outside unit).
4. Secure rubber grommet into blower access cover and around blower wires.
5. Secure blower connector onto blower access cover by pressing in the “Christmas tree” zip tie and locating the feature of the connector into the holes of the cover.
6. Connect electrical wiring harness to blower.
7. Install indoor HVAC unit. Refer to [INDOOR HVAC UNIT](#)
8. Install outdoor HVAC unit. Refer to [OUTDOOR HVAC UNIT](#)



Component Servicing

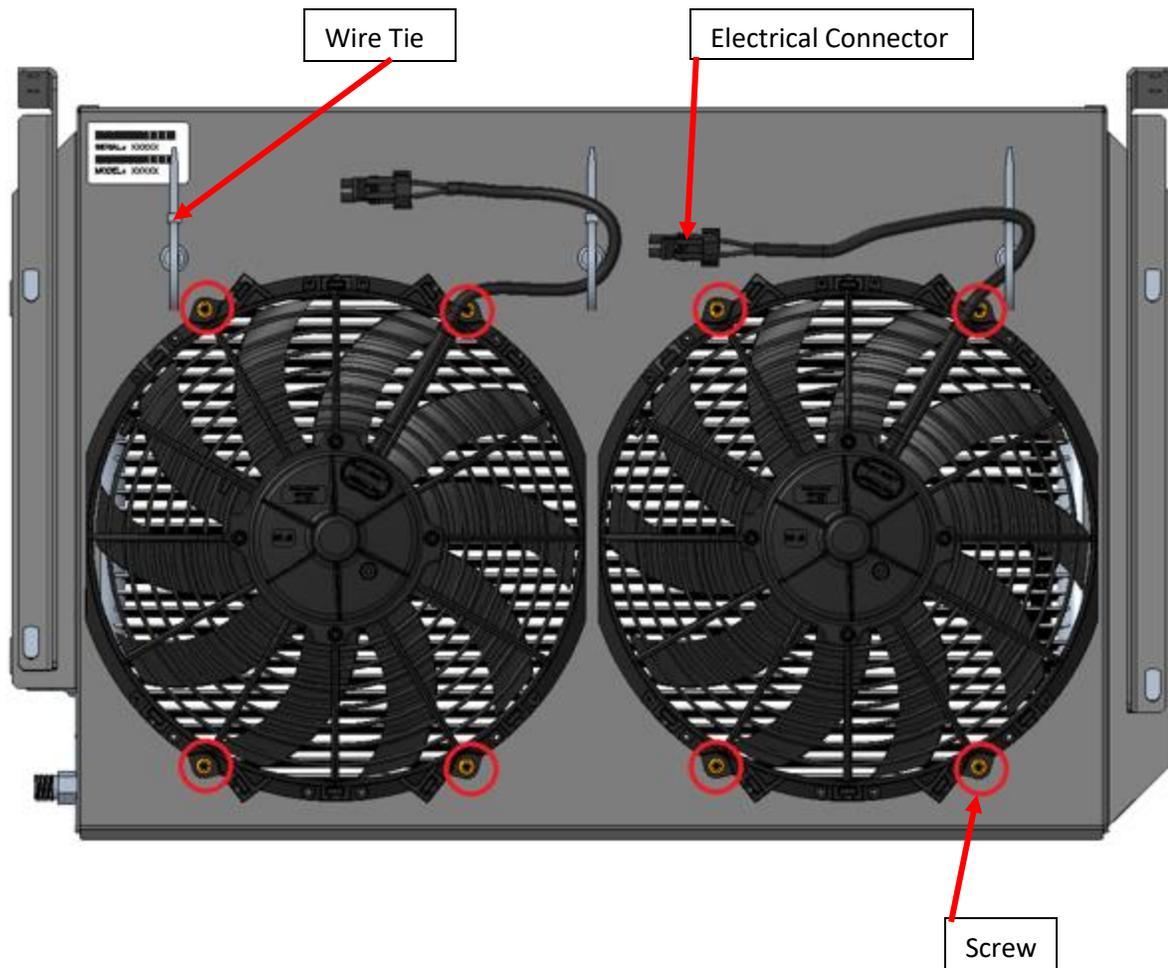
Condenser Fan

Condenser Fan Removal

1. Disconnect electrical connection between vehicle wiring harness and fan connector.
2. Cut and remove wire tie holding fan wires to tie-mount.
3. Remove fan with 4 screws.

Condenser Fan Installation

1. Secure fan using 4 screws (2.3 Nm Torque).
2. Secure fan wire to tie-mount using new wire tie.
3. Connect fan connector to vehicle wiring harness.



Component Servicing

Condenser Coil

Condenser Coil Removal

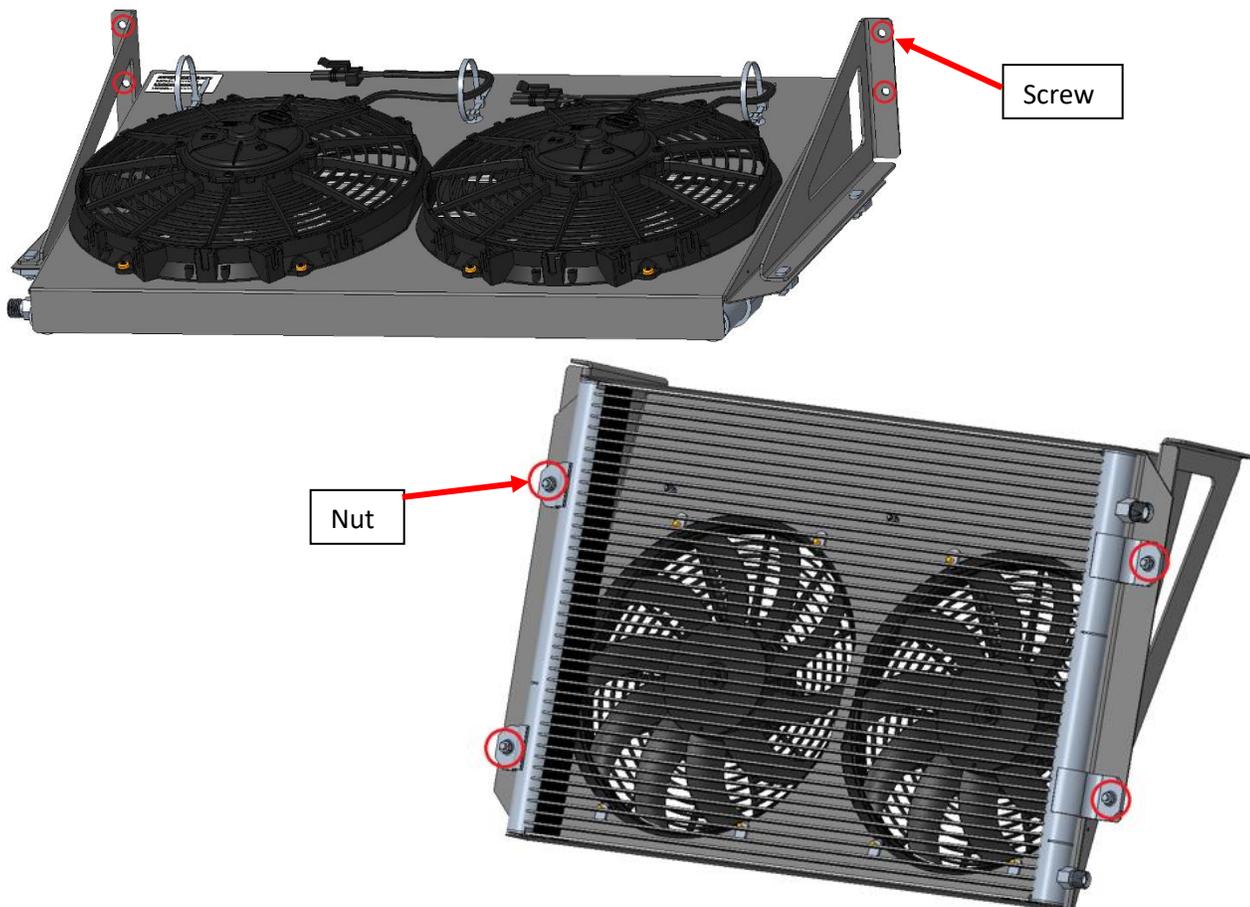
1. Discharge A/C system. Refer to [REFRIGERANT CHARGE INFORMATION](#)
2. Disconnect hoses connected to condenser coil inlet and outlet.
3. Remove condenser assembly from vehicle with 4 screws.
4. Remove condenser coil from condenser assembly with 4 nuts.

Condenser Coil Installation

1. If A/C system is to be flushed, perform that operation before re-assembling the system. Refer to [REFRIGERANT CHARGE INFORMATION](#)

NOTE – During installation, lubricate O-rings on fittings with mineral-based oil.

2. Secure condenser coil to condenser unit with 4 nuts.
3. Install condenser assembly into vehicle with 4 screws.
4. Install new, lubricated O-rings on all fittings being connected to condenser.
5. Install hoses/fittings to condenser inlet and outlet ports.
6. Recharge A/C system. Refer to [REFRIGERANT CHARGE INFORMATION](#)



Component Servicing

Thermostatic Expansion Valve (TXV)

TXV Removal

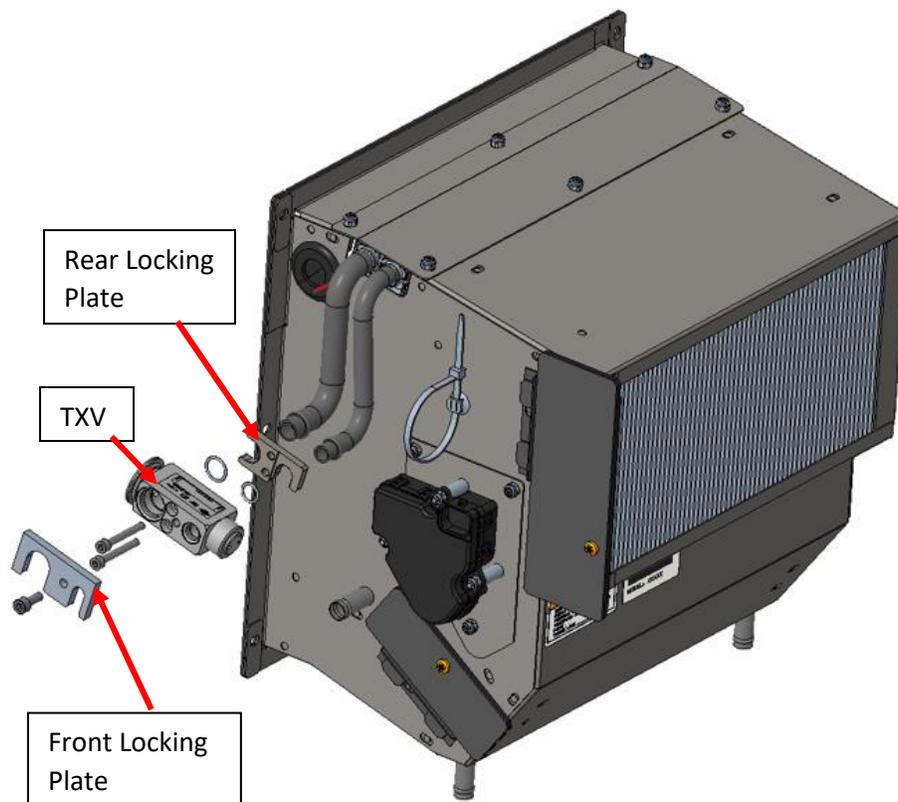
1. Discharge A/C System. Refer to [REFRIGERANT CHARGE INFORMATION](#)
2. Remove any attached hoses/fittings connected to TXV and front mounting plate by removing 1 Allen screw.
3. Remove 2 Allen screws from the expansion valve body. Remove and retain rear locking plate.
4. Remove TXV.

TXV Installation

1. If A/C system is to be flushed, perform that operation before reassembling the TXV. Refer to [REFRIGERANT CHARGE INFORMATION](#)

NOTE – During installation always lubricate O-rings on fittings with mineral-based oil.

2. Ensure that newly lubricated O-rings are installed on all lines being connected to TXV.
3. Position rear locking plate over evaporator inlet and outlet lines.
4. Install expansion valve on rear locking plate over the inlet and outlet lines and secure expansion valve with 2 Allen screws (5.65 Nm Torque).
5. Install refrigerant fittings to TXV using the front locking plate (10 Nm Torque).
6. Recharge A/C system. Refer to [REFRIGERANT CHARGE INFORMATION](#)



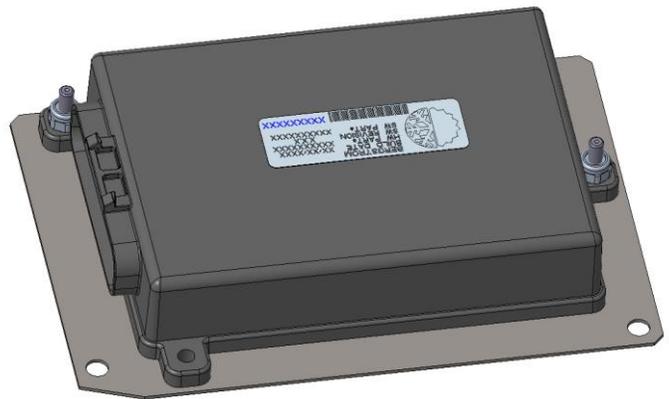
Component Servicing

Other Serviceable Components

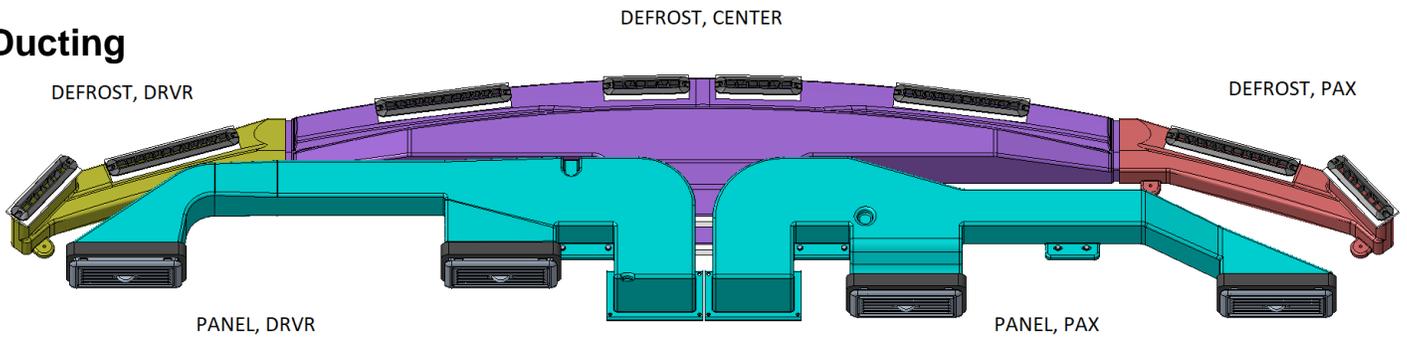
HVAC Control



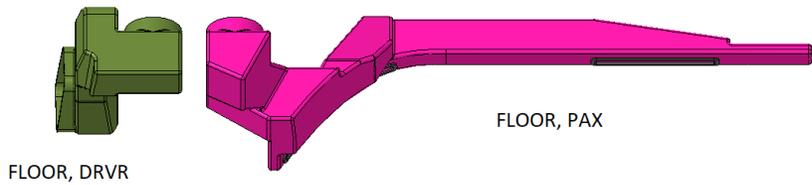
ECU (Electronic Control Unit)



Ducting



Louver



Component Servicing

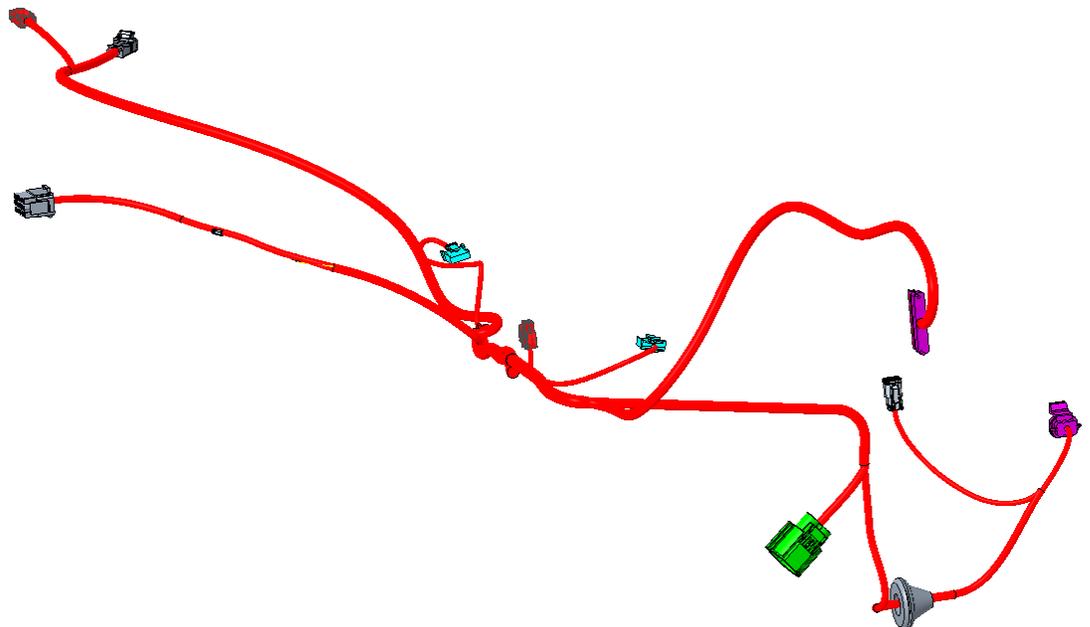
Binary Switch



Receiver Dryer



Wire Harness



Component Servicing

Vent



Refrigerant Hose



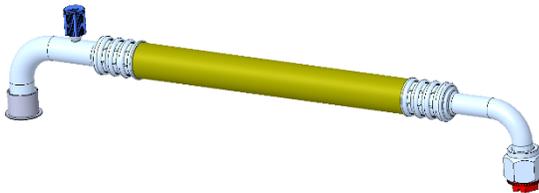
Condenser to Dryer



Discharge



Dryer to Evaporator



Suction

Air Conditioning System

Safety Precautions & Warnings

Servicing Refrigerant Systems:

1. Always wear the proper protective eyewear and clothing before working on any refrigeration system. Remember, refrigerant in the air conditioning system can reach pressures of over 500 PSI – if one of those lines bursts while you're working on the system, it can cause serious injury. If refrigerant gets in your eye, it can freeze your eyeball, causing permanent damage or blindness.
2. Always wear work gloves whenever you're working with condensers or evaporators. The aluminum edges are sharp and can cause serious cuts.
3. Always stay clear of the belts and fan blade and be careful revving the engine on a vehicle with a flex fan – damaged blades have been known to come flying off without a moment's warning.
4. Always use a DOT-approved tank for storing used and recycled refrigerants. Look for the Department of Transportation stamp: DOT 4BW or DOT 4BA.
5. Always provide plenty of ventilation when using any electrical testing, recycling, or recovery equipment. Avoid breathing any refrigerant vapor, lubricant vapor, or mist. Exposure to these (particularly PAG oil mist) may irritate your eyes, nose, and throat.
6. Always follow the instructions for your recycling equipment; failure to follow those directions could end up causing personal injury or damaging your equipment. Never perform any maintenance or service on your recycling equipment while the unit is plugged in (unless directed to do so) or without first consulting with authorized service personnel. Removing internal fittings and filters can release pressurized refrigerant. Use care and always wear appropriate safety wear.
7. Never use compressed air to leak test or pressure test an R-134a system or R-134a service equipment. Under certain conditions, pressurized mixtures of R-134a and air can be combustible. Always follow the proper procedures to prevent any safety hazards. In addition, shop air injects moisture into the system, and a pressure surge could damage the evaporator.
8. Microprocessors and computers are susceptible to damage from electrostatic discharge. Always use a static strap when working with these components, and always take the necessary precautions to prevent damage to electronic components.

Note: To prevent cross contamination between refrigerants, verify that the A/C system has the correct label and unique service fittings designed for R134a refrigerant. If you're ever in doubt, check the system with a refrigerant identifier.

Air Conditioning System

Diagnostic Guide

Problem	Possible Causes	Corrective Action
<p>Inadequate Cooling (Discharge air from A/C vents is only slightly cool or neutral)</p>	<ol style="list-style-type: none"> 1. Temperature control knob not adjusted to cold far enough. 2. Incorrect refrigerant charge in system. If charge is excessively low or high, the compressor clutch will not engage or remain engaged. 3. Faulty blend door actuator. 4. Condenser clogged with road debris or condenser fan inoperative. 5. Restriction in the TXV resulting in a starved evaporator. 	<ol style="list-style-type: none"> 1. Turn temperature control to full cold. 2. Run A/C SYSTEM OPERATION CHECK. Verify the system has the proper refrigerant charge level. Refer to REFRIGERANT CHARGE INFORMATION 3. Adjust the temperature control and verify the blend door actuator moves as adjusted. Make sure to match up driver versus passenger temperature control with respective blend door actuator. Refer to HVAC SYSTEM COMPONENTS. If not, replace actuator. Refer to ACTUATOR(S) 4. Examine fin region of the condenser for debris and bent fins. Clean and straiten as required. Repair and/or replace the condenser fan components as required. Refer to CONDENSER FAN 5. If low pressure readings are excessively low and/or the liquid line at the expansion valve is cool to the touch or showing signs of sweating or frosting, recover the refrigerant. Evacuate and recharge the system with the proper refrigerant amount. Perform the TXV FUNCTION TEST. If symptoms repeat, then replace the TXV following the same service procedure. Refer to TXV

Air Conditioning System

Problem	Possible Causes	Corrective Action
Inadequate cooling during hot part of the day	1. Excessive moisture in system which can cause the expansion valve to frost and restrict refrigerant flow.	1. Recover refrigerant. Replace receiver/drier, add 2 ounces of oil, evacuate the system, and recharge. Refer to REFRIGERANT CHARGE INFORMATION
Compressor clutch cycles too rapidly or discharge air temperature increased excessively during compressor clutch "OFF" cycle.	1. Defective freeze probe.	1. Replace freeze probe. Refer to FREEZE PROBE

Air Conditioning System

A/C System Operation Check

The following is an A/C system **"Field Test" and Evaluation Procedure** to be used by service personnel. This procedure can be used to determine if a Bergstrom A/C system is performing properly and contains the correct refrigerant charge. The performance guidelines shown are approximate, and subject to many operational variables. Ambient temperature must be 50 degrees F or above to accurately test for A/C performance.

1. Park the vehicle and set the engine speed at 1500 RPM.
2. Set the HVAC controls to AC on, recirculation inlet air, blower at HIGH speed, and the temperature control dial to the coldest setting.
3. Visually verify that the A/C compressor clutch is engaged, and the compressor is operating. Verify that the heater coil tubes are neutral or cool to the touch.
4. The suction hose fitting (at the evaporator outlet) should be cold to the touch. This fitting may sweat or even frost slightly. The liquid hose fitting (at the evaporator inlet) should be warm to the touch.
5. Chilled air should be discharged from the supply louvers in the dash. After 3-5 minutes of A/C operation the system should begin to cool.
6. Air inlet / outlet temperature differentials are greatly affected by ambient temperature and relative humidity. In cool ambient conditions, differentials smaller than 30 degrees may be seen. Air can only be chilled to a certain level, and then the A/C compressor will cycle off to prevent evaporator freeze-up. High humidity may also result in smaller differentials; a large amount of cooling capacity is required to dehumidify the air, as well as cool it.
7. Measure and record the inlet air to the HVAC unit (near front passenger foot area) and vent discharge air temperature closest to the unit (usually center vent on the front passenger side) and calculate the differential of the two values. Record the humidity value for the day.
8. Measure and record the suction and discharge refrigerant pressures.
9. Refer to [Expected A/C Performance](#)
10. If the values fall within the guidelines, then the system is functioning properly. If the values don't meet the guidelines, then troubleshooting will be required.

Air Conditioning System

Expected A/C Performance

The following performance guidelines are based on test conditions outlined under [A/C System Operation Check](#). Variables such as engine speed, condenser airflow, sun load, blower motor, speed, and chassis voltage will all affect A/C system performance.

Air Temperature (F) Entering A/C Unit FRESH OR RECIRCULATED	Inlet - Outlet Air Temperature Differential**	
	LOW HUMIDITY	HIGH HUMIDITY
50	5-10	5-10
60	10-20	10-15
70	20-25	15-20
80	25-30	20-25
90	25-35	20-30
100	30-35	25-30
110	35-40	30-35

** The outlet louver closest to the A/C unit usually discharges the coldest air. The warmest inlet air temperature (fresh or recirculated) should also be used for the Differential calculation.

Ambient Air Temp (F) Entering Condenser	A/C System Operating Pressures	
	Suction Pressure (PSIG) @ Evaporator Outlet	Discharge Pressure (PSIG) @ Compressor Outlet
50	5-15	75-125
60	5-15	100-150
70	10-20	125-175
80	10-20	150-225
90	15-25	175-250
100	15-25	200-275
110	15-30	225-325

Air Conditioning System

Compressor Function Test

A/C Compressor Operation

The A/C compressor is the heart of the system since it produces the refrigerant flow. Check to see if the compressor's clutch is engaged or rotating and the compressor is operating by producing low and high side pressure ratios listed in the "Estimated A/C Performance Chart".

Compressor and engine fan belts should be in good condition and tightened to the correct tension. Check the belts when the engine is off, and the belt is still warm. Do not replace the compressor unless its function has been properly tested.

These are general guidelines to check the compressor function as part of the AC system, consult the chassis manufacturer or the compressor supplier before any repair or replacements to the compressor. Bergstrom does not supply the compressor for RV A/C systems.

A/C Compressor Function Test

1. Restrict inlet airflow to the condenser with a piece of cardboard to increase the high side refrigerant pressure.
2. Monitor high side pressure gauge to see if the pressure rises to approx. 300-500 psig. If the pressure does not rise to this level, then remove the cardboard.
3. This is a quick and simple test to see if the compressor has the capacity to build pressure and pump refrigerant. If it does not achieve the high-pressure range, check the items below.
 - a. Low refrigerant charge.
 - b. High side refrigerant blockage.
 - c. Ambient temperature is below 50 degrees F.
 - d. Clutch slippage or low voltage.
 - e. Inspect compressor front seal and pressure relief valve for leaks.
 - f. Clutch voltage should be approx. 11.5 VDC. Clutch coil resistance between 2.2 and 4.4 ohms.
 - g. Check compressor rotation for smoothness.

Air Conditioning System

Thermostatic Expansion Valve (TXV) Function Test

TXV Operation

The thermostatic expansion valve or TXV is an interactive device that senses pressure and temperature then adjusts refrigerant flow to maintain a given superheat. Do not replace this device unless its function has been properly tested.

Perform the A/C System Operation Check first to ensure that there aren't any other possible restrictions to refrigerant flow. Look for frost, potentially caused by a restriction, on components such as evaporator, receiver/dryer, condenser, or adjoining refrigerant hoses.

TXV Function Test

1. A/C system is fully charged.
2. Blower motor set for high speed.
3. Engage compressor and allow A/C system to stabilize.
4. After 5 – 10 minutes observe low side refrigerant operating pressures and record.
5. Change the blower motor speed to low and continue to watch the low side pressure. The pressure should drop 3-4 psig depending on the heat load in 1-2 minutes.
6. Repeat this procedure 2-3 more times.
7. If the low side pressure can be influenced by changing the blower motor fan speed, then the TXV is responding to the changing of the evaporator's heat load as designed.

Air Conditioning System

Refrigerant Charge Information

A correct refrigerant charge is necessary to achieve optimum performance from an A/C system. When servicing the refrigerant system, the only way to be certain of an exact charge is to fill an empty system with the specified amount of refrigerant. If the A/C system is operating and the amount of refrigerant within the system is not known, some simple checks can be performed to determine if the operating charge is adequate:

1. Compressor clutch engaged, and compressor running.
2. Suction hose fitting (at evaporator outlet) cold to the touch. This fitting may sweat or even frost lightly.
3. Chilled discharge air at the dash louvers when the temperature control is set at the coolest setting.

Recommended Charge Level:

2 lbs. 10 oz. virgin R-134a

Service Tips

1. Use only virgin (new, not reclaimed) R134a refrigerant.
2. Reclaiming refrigerant, evacuating the A/C system, and charging with the proper amount of refrigerant resolved many A/C issues.
3. Some refrigerant loss will occur in one year's time, and this is recognized as normal. Vibration, hose porosity and general construction of the system make a leak proof system nearly impossible.
4. Bergstrom does not recommend or endorse the use of "Stop Leak" or "Leak Sealing" products.

Air Conditioning System

R134a Temperature/Pressure Chart

Pressure	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp	Pressure	Temp
psig/Hg"	Deg F	psig	Deg F	psig	Deg F	psig	Deg F	psig	Deg F	psig	Deg F
22	-62.38	13	11.77	37	42	61	62.75	145	109.4	265	150.6
20	-55.02	14	13.38	38	43	62	63.5	150	111.5	270	152
18	-48.85	15	14.94	39	43.98	63	64.24	155	113.6	275	153.4
16	-43.5	16	16.46	40	44.95	64	64.98	160	115.6	280	154.7
14	-38.76	17	17.95	41	45.91	65	65.71	165	117.6	285	156.1
12	-34.49	18	19.4	42	46.85	66	66.43	170	119.6	290	157.4
10	-30.6	19	20.81	43	47.78	67	67.14	175	121.5	295	158.7
8	-27.02	20	22.19	44	48.7	68	67.85	180	123.3	300	160
6	-23.7	21	23.55	45	49.61	69	68.55	185	125.2	305	161.3
4	-20.59	22	24.87	46	50.51	70	69.24	190	126.9	310	162.5
2	-17.67	23	26.16	47	51.39	75	72.62	195	128.7	315	163.8
0	-14.92	24	27.43	48	52.26	80	75.86	200	130.4	320	165
1	-12.31	25	28.68	49	53.13	85	78.98	205	132.1	325	166.2
2	-9.84	26	29.9	50	53.98	90	81.97	210	133.8	330	167.4
3	-7.47	27	31.1	51	54.82	95	84.87	215	135.5	335	168.6
4	-5.21	28	32.27	52	55.65	100	86.66	220	137.1	340	169.8
5	-3.04	29	33.43	53	56.48	105	90.37	225	138.7	345	171
6	-0.95	30	34.56	54	57.29	110	92.99	230	140.2	350	172.1
7	1.05	31	35.68	55	58.1	115	95.53	235	141.8	355	173.3
8	2.99	32	36.77	56	58.89	120	98	240	143.3	360	174.4
9	4.86	33	37.85	57	59.68	125	100.4	245	144.8	365	175.4
10	6.67	34	38.91	58	60.46	130	102.7	250	146.3	370	176.3
11	8.42	35	39.96	59	61.23	135	105	255	147.7	375	177.3
12	10.12	36	40.99	60	62	140	107.2	260	149.2	380	178.2

The numbers above represent the boiling points for R134a

Bergstrom Inc.
Dual Zone A/C Heater



Owner's Manual
Operating Instructions

For additional owner and operator information visit us at

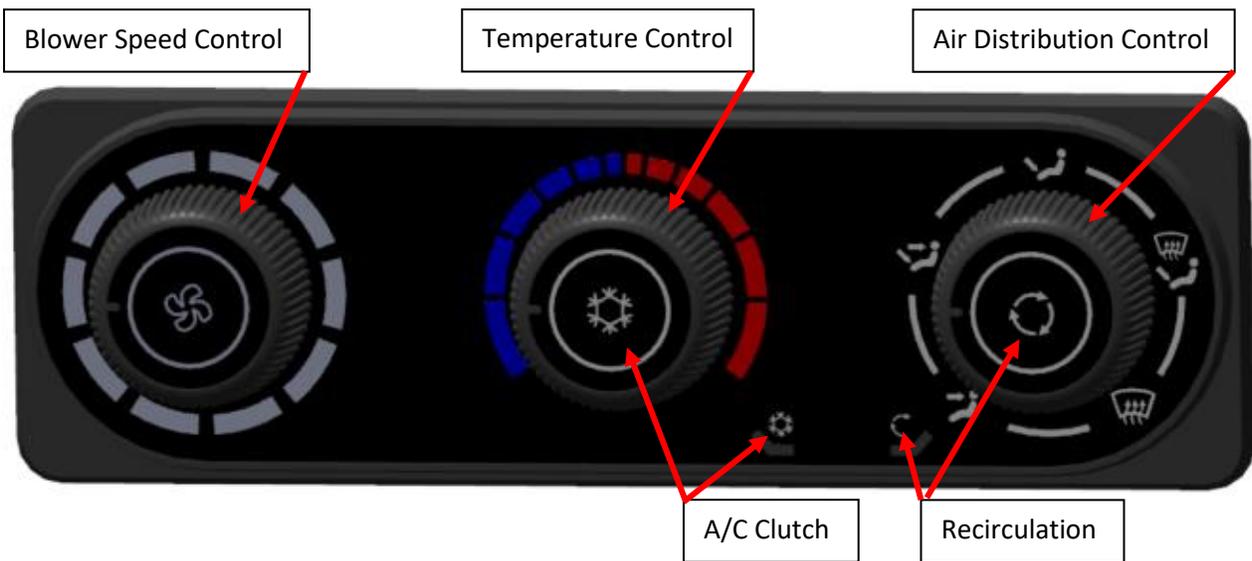
www.bergstrominc.com

WARNING

This heater / air conditioner should be serviced by a fully trained and environmentally licensed technician. Failure to do the above could result in serious injuries, fines, and possible voiding of any warranties.

Owner's Manual

Control Panel Operation



Blower Speed Control

One of the best ways of controlling temperature is by changing the speed of the blower. The blower switch controls the system on/off and provides several different speeds in any mode.

Temperature Control

The temperature control dial controls only the heat content of the discharge air. The temperature control dial will also control the overall temperature of the discharge air if the AC system is operating. Turn the knob to the right (red area) for warmer air, and to the left (blue area) for cooler air. Use of the temperature control will also moderate the discharge temperature when the cooling system is engaged.

A/C Clutch

Illuminates when compressor clutch is engaged. This means the compressor is on and discharging refrigerant.

Recirculation

Your driver/passenger heater and air conditioning system is designed to operate in fresh air mode by default. The recirculating air feature is primarily used for faster passenger area cool downs during the summer and warmups during the winter by closing off the fresh air source and recirculating the passenger compartment air. Pressing this switch will place your system in the recirculated air mode.

NOTE: Prolonged use of this feature can cause stale air quality and moisture to form on the windows.

Owner's Manual

Air Distribution

To achieve the maximum comfort in your vehicle, the air must be directed where it is needed. The mode switch (right of center) gives the user the ability to select where the air will flow.



Panel Mode – Air is drawn into the system and discharged through the dash louvers only.



Bi-level – Air is drawn into the system and discharged through the dash louvers and floor outlets.



Floor – Air is drawn into the system and discharged through the floor outlets.



Mix – Air is drawn into the system and discharged through the floor outlets and defrost outlets.



Defrost – Air is drawn into the system and discharged through the defrost and demist outlets.

Owner's Manual

Operating Features

The A/C system is designed to operate in all air distribution modes. This provides significant moisture, dust, and pollen removal for enhanced passenger comfort.

The Bergstrom vehicle A/C system will not function if the outside temperature is below approximately 40 degrees F. For cool air circulation during low temperatures, it is suggested the operator utilize fresh air mode.

Important Operating Features and Tips

Window Fogging

In mild, but rainy or humid weather, windows may fog on the inside. To clear the fog of all driver area windows, turn on the air conditioning, set the system air intake to FRESH AIR by disengaging the RECIRC button, adjust the temperature and fan control to maintain comfort, position the mode control to DEFROST.

Winter Operation

- Remove snow and ice from windshields and system air intakes if applicable.
- The discharge air will heat up faster if the blower is operated on lower speeds until the engine is hot and the recirculation switch is engaged.
- For windshield de-icing, use defrost mode.
- Ensure the air intake is free of ice and slush.

Summer Operation

Air-conditioned vehicles must be protected with a high-quality antifreeze coolant during summer to provide corrosion protection and to raise the boiling point of the coolant for protection against overheating. A 50% concentration is recommended.

- Use recirculated air control for a quick cool down.
- Close all windows and vents to hot humid outside air.
- Close all curtains which do not obstruct the driver's vision.

Care and Service

- Keep the condenser and radiator free of bugs and debris.
- During periods of little use, operate the A/C system monthly to keep the compressor seals lubricated.
- Periodically inspect the belts and hoses for wear and proper tension.
- Periodically check the proper coolant levels.

Owner's Manual

Warranty/Service

Warning:

The A/C system contains refrigerant 134a under high pressure and should be serviced by qualified personnel only.

Repairs that alter the design of the Bergstrom system including the use of non-Bergstrom supplied parts will void the warranty and any Bergstrom liability for the system.

If repairs are required contact your dealer or RV manufacturer for warranty period and details. If traveling and service is required, you can contact you RV manufacturer for the nearest dealer or contact Bergstrom by phone or email.