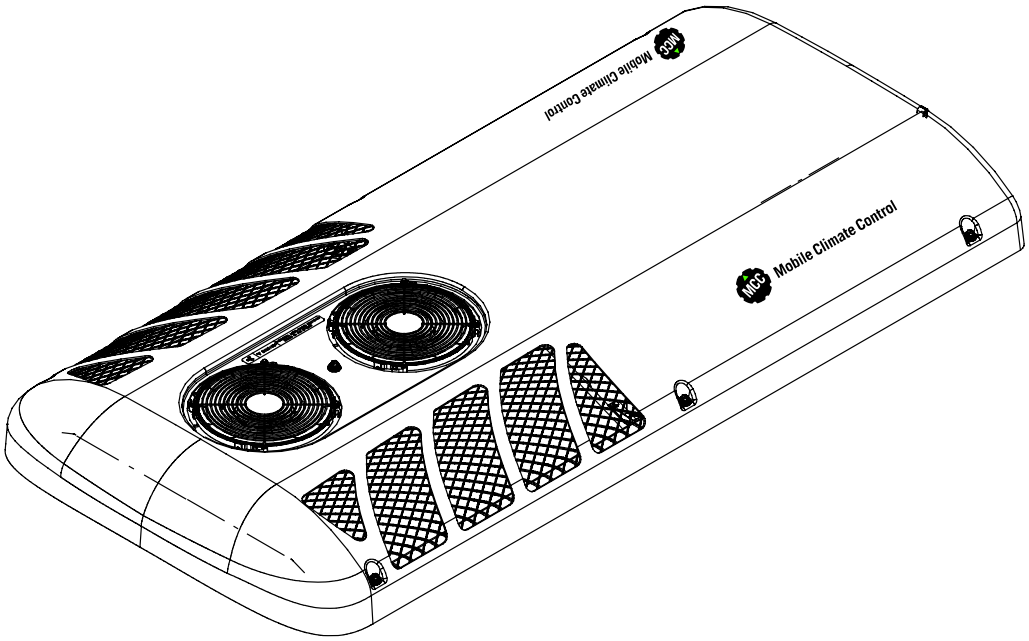
Mobile Climate Control

T-353 Manual



OPERATION / SERVICE
for
68AC430-100

T-353

REV. 01/2013

Mobile Climate Control

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SAFETY SUMMARY

GENERAL SAFETY NOTICES

The following general safety notices supplement the specific warnings and cautions appearing elsewhere in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered herein. A listing of the specific warnings and cautions appearing elsewhere in the manual follows the general safety notices.

FIRST AID

An injury, no matter how slight, should never go unattended. Always obtain first aid or medical attention immediately.

OPERATING PRECAUTIONS

Always wear safety glasses.

Keep hands, clothing and tools clear of the evaporator and condenser fans.

No work should be performed on the unit until all start-stop switches are placed in the OFF position, and power supply is disconnected.

Always work in pairs. Never work on the equipment alone.

In case of severe vibration or unusual noise, stop the unit and investigate.

MAINTENANCE PRECAUTIONS

Beware of unannounced starting of the evaporator and condenser fans. Do not open the unit cover before turning power off.

Be sure power is turned off before working on motors, controllers, solenoid valves and electrical controls. Tag circuit breaker and power supply to prevent accidental energizing of circuit.

Do not bypass any electrical safety devices, e.g. bridging an overload, or using any sort of jumper wires. Problems with the system should be diagnosed, and any necessary repairs performed by qualified service personnel.

When performing any arc welding on the unit, disconnect all wire harness connectors from the modules in the control box. Do not remove wire harness from the modules unless you are grounded to the unit frame with a static-safe wrist strap.

In case of electrical fire, open circuit switch and extinguish with CO_2 (never use water).

SPECIFIC WARNINGS AND CAUTIONS

⚠ WARNING

Be sure to observe warnings listed in the safety summary in the front of this manual before performing maintenance on the hvac system

⚠ WARNING

Read the entire procedure before beginning work. Park the vehicle on a level surface, with parking brake applied. Turn main electrical disconnect switch to the off position.

⚠ WARNING

Do Not Use A Nitrogen Cylinder Without A Pressure Regulator

⚠ WARNING

Do Not Use Oxygen In Or Near A Refrigeration System As An Explosion May Occur.

⚠ WARNING

The Filter-drier May Contain Liquid Refrigerant. Slowly Loosen The Connecting Nuts And Avoid Contact With Exposed Skin Or Eyes.

⚠ CAUTION

The AC430 Rooftop Systems has R134a service port couplings installed on the compressor and on the unit piping.

⚠ CAUTION

To prevent trapping liquid refrigerant in the manifold gauge set be sure set is brought to suction pressure before disconnecting.

SECTION 1

DESCRIPTION

1.1 INTRODUCTION

This manual contains Operating Instructions, Service Instructions and Electrical Data for the Model 68AC430 Air Conditioning and Heating equipment furnished by Mobile Climate Control as shown in Table 1-1.

Model 68AC430 systems consists of a Rooftop unit containing the condensing section, the evaporator section and engine compartment mounted compressor(s). To complete the system, the air conditioning and heating equipment interfaces with an optional drivers evaporator (dash-air), electrical cabling, refrigerant piping, engine coolant piping (for heating), duct work and other components furnished by Mobile Climate Control and/or the bus manufacturer.

Additional support manuals are shown in Table 1-2.

Operation of the unit is controlled automatically by an electronic thermostat. The controls maintain the vehicle's interior temperature at the desired set point.

Table 1-1 68AC430 Models

Model	Voltage	Controller	With Heat	Dual Loop	Single Loop	Roof Radius
68AC430-100	12 VDC	BT324	Yes		X	4.6M
68AC430-100-2	12 VDC	BT324	No		X	4.6M
68AC430-100-4	12 VDC	BT324	Yes		X	4.6M
68AC430-100-5	12 VDC	BT324	No		X	4.6M
68AC430-100-6	12 VDC	BT324	Yes		X	7.8M
68AC430-100-7	12 VDC	BT324	No		X	7.8M
68AC430-100-8 *	12 VDC	BT324	No		X	7.8M

Table 1-2 Additional Support Manuals

MANUAL NUMBER	EQUIPMENT COVERED	TYPE OF MANUAL
T-353PL	68AC-430-100	Service Parts List

* Denotes Special Packaging

1.2 GENERAL DESCRIPTION

1.2.1 Rooftop Unit

The rooftop unit includes the condenser section and the evaporator section (See Figure 1-1).

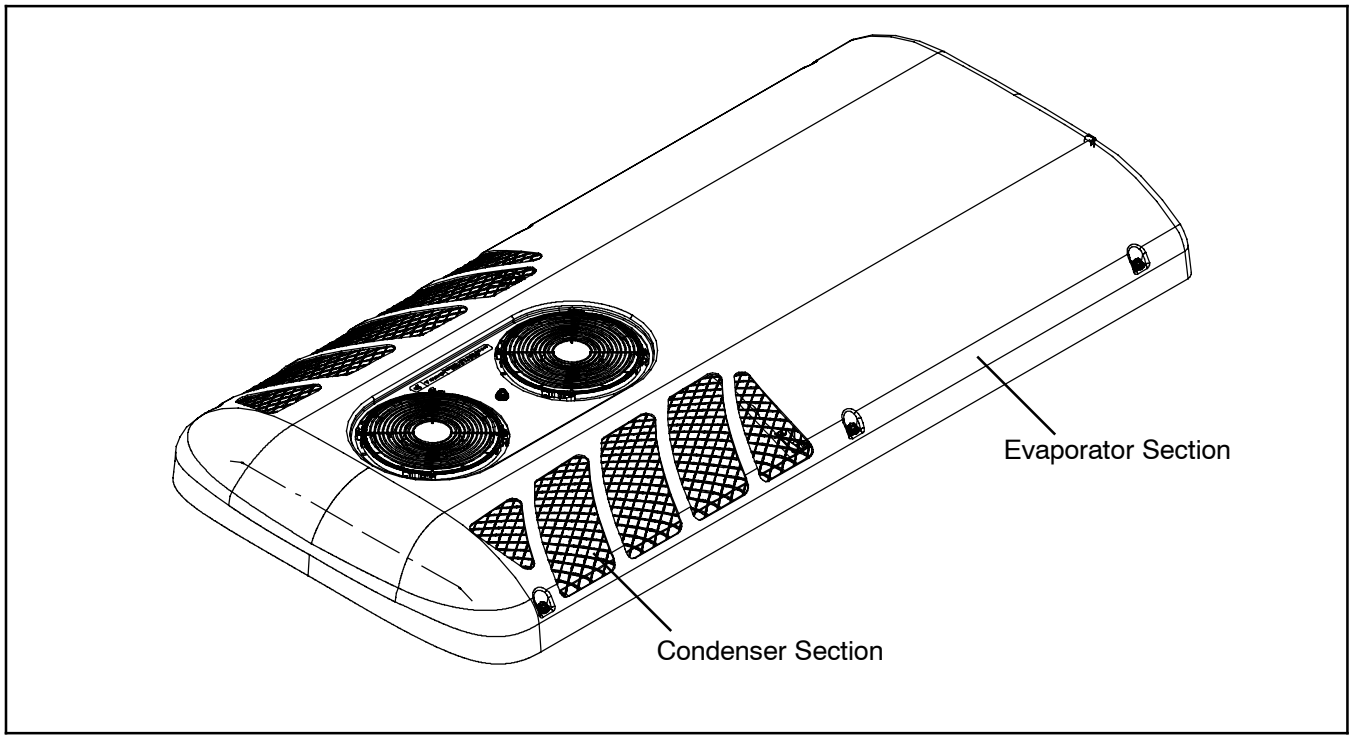


Figure 1-1 AC430 Rooftop Unit

1.2.2 Condensing Section

The condensing section includes the condenser coils, two (2)fan and motor assemblies, receiver, filter-drier and filter-drier service valves.

The condenser coils provide heat transfer surface for condensing refrigerant gas at a high temperature and pressure into a liquid at high temperature and pressure. The condenser fans circulate ambient air across the outside of the condenser tubes at a temperature lower than refrigerant circulating inside the tubes; this results in condensation of the refrigerant into a liquid. The receiver collects and stores liquid refrigerant. The receiver is also fitted with a pressure relief valve which protects the system from unsafe high pressure conditions. The filter-drier removes moisture and debris from the liquid refrigerant before it enters the thermostatic expansion valve in the evaporator assembly. The service valves enable isolation of the filter-drier for service.

1.2.3 Evaporator Section

The evaporator section includes the evaporator coils, two (2) single-shafted blower/motor assemblies, two (optional) heater coil assemblies, a thermostatic expansion valve and condensate drain connections.

The evaporator coils provide heat transfer surface for transferring heat from air circulating over the outside of the coil to refrigerant circulating inside the tubes; thus providing cooling. The heating coils (if equipped) provide a heat transfer surface for transferring heat from engine coolant water circulating inside the tubes to air circulating over the outside surface of the tubes, thus providing heating. The fans circulate the air over the coils. The air filters remove dirt particles from the air before it passes over the coils. The thermostatic expansion valve meters the flow of refrigerant entering the evaporator coils. The heat valve controls the flow of engine coolant to the heating coils upon receipt of a signal from the controller. The condensate drain connections provide a means for connecting tubing for disposing of condensate collected on the evaporator coils during cooling operation.

1.2.4 BT-324 Microprocessor

This BT-324 controller has three (3) modes, Auto, Vent (Cycle clutch type) and Heat.

In the auto mode the compressor is energized while the evaporator and condenser fans are operated to provide refrigeration as required. The compressor (s) capacity is matched to the bus requirements. Once interior temperature reaches the desired set point, the compressor(s) is de-energized.

In the heat mode the heat valves are opened to allow a flow of engine coolant through the heat coils located in the evaporator section. The evaporator fans operate to circulate air over the heat coils in the same manner as the cooling mode.

1.3 REFRIGERATION SYSTEM COMPONENT SPECIFICATIONS

a. Refrigerant Charge R-134a (Approximate)

NOTE

Refrigerant charge will depend on hose lengths and diameters; or if there is an In-Dash unit (front evaporator). The following should only be used as a guideline.

AC430 Single Loop TM-21 Compressor
11 Pounds (5 kg)

b. Compressors

Compressor	TM-21
Weight, (Dry)	7.5 Lbs. (3.4 kg)
Oil Charge	6.1 Oz. (180 cc) PAG

c. Thermostatic Expansion Valves:

TDEN 5.8 TR

Superheat Setting Factory Set at 12°F (±1.8°F)

6.7°C (±1°C)

TGEN 4.5

Superheat Setting Factory Set at 7.2°F (4°C)

MOP 70 psig (4.8 bar)

d. High Pressure Switch (HPS) *Normally Closed*

Opens at: 360 ±10 psig (20.41 ±0.68bar)
Closes at: 280 ±10 psig (13.61 ±0.68bar)

e. Low Pressure Switch (LPS) *Normally Open*

Opens at: 6 ±3psig (0.41 ±0.20 bar)
Closes at: 25 ±3 psig (1.7 ±0.20 bar)

1.4 ELECTRICAL SPECIFICATIONS - MOTORS

a. Evaporator Blower/Motor

Evaporator Motor	Brushless
	12 VDC
Horsepower (kW)	.375 (.28)
Full Load Amps (FLA)	20.7
Operating Speed High(RPM)	3250
Bearing Lubrication	Factory Lubricated (additional grease not required)

b. Condenser Fan Motor

Condenser Motor	Permanent Magnet
	12 VDC
Horsepower (kW)	1/4 (.18)
Full Load Amps (FLA) @ 13.5 VDC	14.4
Operating Speed High(RPM)	3222
Bearing Lubrication	Factory Lubricated (additional grease not required)

c. Return Air Sensor

Input Range: -40 to 176° F (-40 to 80°C)
Output: 20K ohms at 77° F (25°C)

d. Ambient Sensor (location chosen by Installer)

Input Range: -40 to 302° F (-40 to 150°C)
Output: 20K ohms at 77° F (25°C)

Opens at: 25° F (10°C)
Closes at: 35° F (1.7°C)

1.5 SAFETY DEVICES

System components are protected from damage caused by unsafe operating conditions with safety devices. Safety devices with Mobile Climate Control supplied equipment include high pressure switch (HPS), low pressure switch (LPS), circuit breakers and fuses.

a. Pressure Switches

High Pressure Switch (HPS)

During the air conditioning cycle, compressor clutch operation will automatically stop if the HPS switch contacts open due to an unsafe operating condition. Opening HPS contacts de-energizes the compressor clutch shutting down the compressor. The high pressure switch (HPS) is installed in the condenser section.

Low Pressure Switch (LPS)

The low pressure switch is installed in the evaporator section and opens on a pressure drop to shut down the system when a low pressure condition occurs.

b. Fuses and Circuit Breakers

The Relay Board is protected against high current by an OEM supplied circuit breaker or fuse located in the bus battery compartment (150 Amp for 12 VDC systems). Independent 20 Amp, 12 VDC fuses protect each condenser motor. Independent 25 Amp, 12 VDC fuses protect each evaporator motor. Output circuits are protected by additional 2,3,5 and 10 Amp fuses according to circuit loads. During a high current condition, the fuse may open.

1.6 AIR CONDITIONING REFRIGERATION CYCLE

When air conditioning (cooling) is selected by the controller, the unit operates as a vapor compression system using R-134a as a refrigerant (See Figure 1-2 refrigerant flow diagram). The main components of the system are the A/C compressor, air-cooled condenser coils, receiver, filter-drier, thermostatic expansion valve, liquid line solenoid valve (if equipped), and evaporator coils.

The compressor raises the pressure and the temperature of the refrigerant and forces it into the condenser tubes. The condenser fan circulates surrounding air (which is at a temperature lower than the refrigerant) over the outside of the condenser tubes. Heat transfer is established from the refrigerant (inside the tubes) to the condenser air (flowing over the tubes). The condenser tubes have fins designed to improve the transfer of heat from the refrigerant gas to the air; this removal of heat causes the refrigerant to liquefy, thus liquid refrigerant leaves the condenser and flows to the receiver.

The refrigerant leaves the receiver and passes through the receiver outlet/service valve, through a filter-drier where a desiccant keeps the refrigerant clean and dry.

From the filter-drier, the liquid refrigerant then flows through the liquid line to the sight-glass and then to the thermostatic expansion valve. The thermal expansion valve reduces pressure and temperature of the liquid and meters the flow of liquid refrigerant to the evaporator to obtain maximum use of the evaporator heat transfer surface.

The low pressure, low temperature liquid that flows into the evaporator tubes is colder than the air that is circulated over the evaporator tubes by the evaporator fans (fans). Heat transfer is established from the evaporator air (flowing over the tubes) to the refrigerant (flowing inside the tubes). The evaporator tubes have aluminum fins to increase heat transfer from the air to the refrigerant; therefore the cooler air is circulated to the interior of the bus.

The transfer of heat from the air to the low temperature liquid refrigerant in the evaporator causes the liquid to vaporize. This low temperature, low pressure vapor passes through the suction line and returns to the compressor where the cycle repeats.

1.7 HEATING CYCLE

Heating circuit (See Figure 1-2) components furnished by Mobile Climate Control include the heater cores and solenoid operated heat valves. Components furnished by the bus manufacturer may include a water temperature switch (WTS) and boost water pump.

The controller automatically controls the heat valves during the heating mode to maintain required temperatures inside the bus. Engine coolant (glycol solution) is circulated through the heating circuit by the engine and an auxiliary boost water pump. When the heat valve solenoids are energized, the valves will open to allow engine coolant to flow through the heater coils. The valves are normally closed so that if a failure occurs, the system will be able to cool.

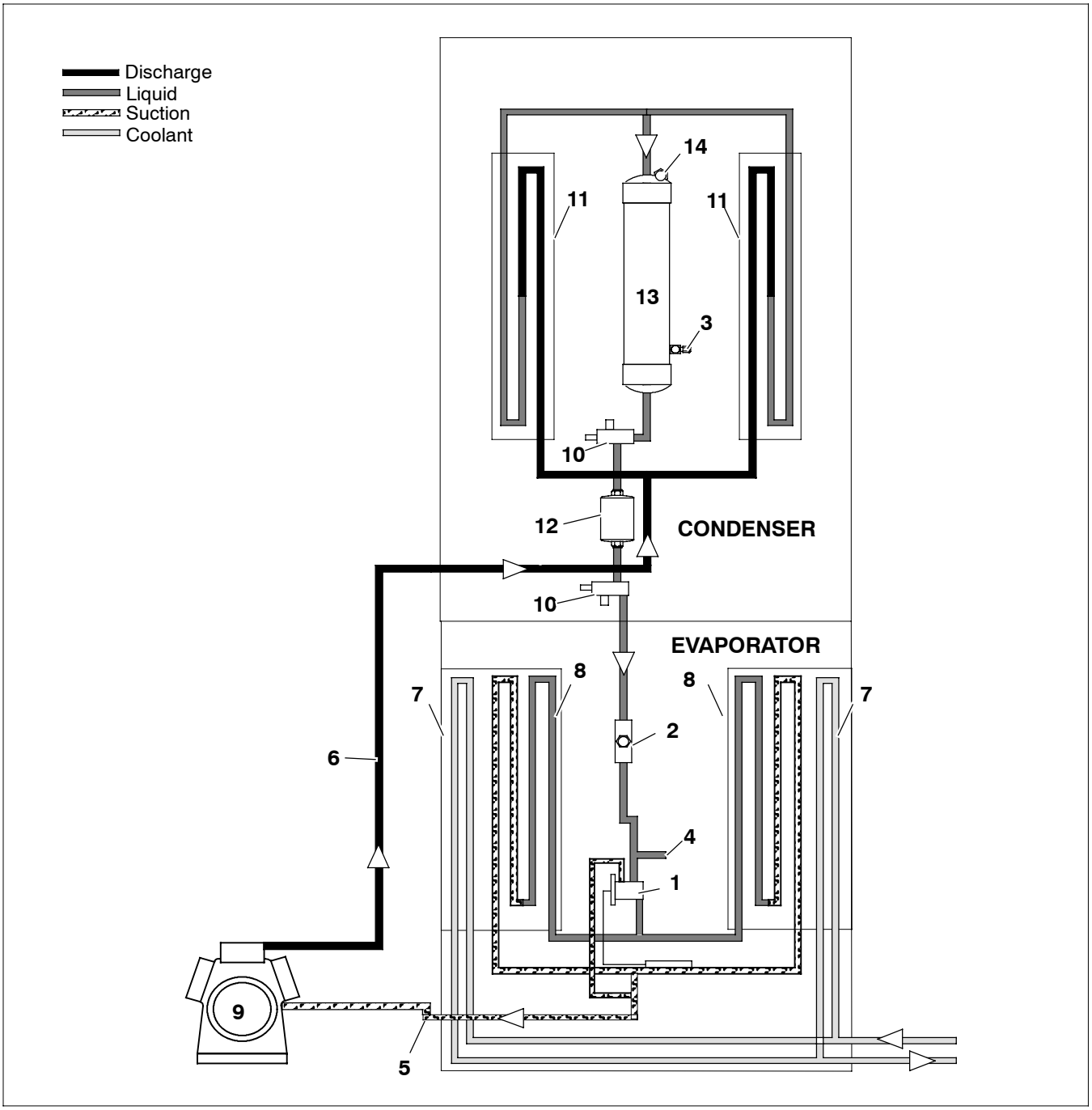


Figure 1-2 Refrigerant/Heat Flow Diagram, AC430

1. Thermal Expansion Valve
2. Liquid Line Sight Glass
3. Fusible Plug
4. Dash Air Liquid Line
5. Suction Line
6. Discharge Line
7. Heater Coil
8. Evaporator Coil
9. Compressor
10. Service Valve
11. Condenser Coil
12. Filter-Drier
13. Receiver
14. Receiver Liquid Level Sight Glass

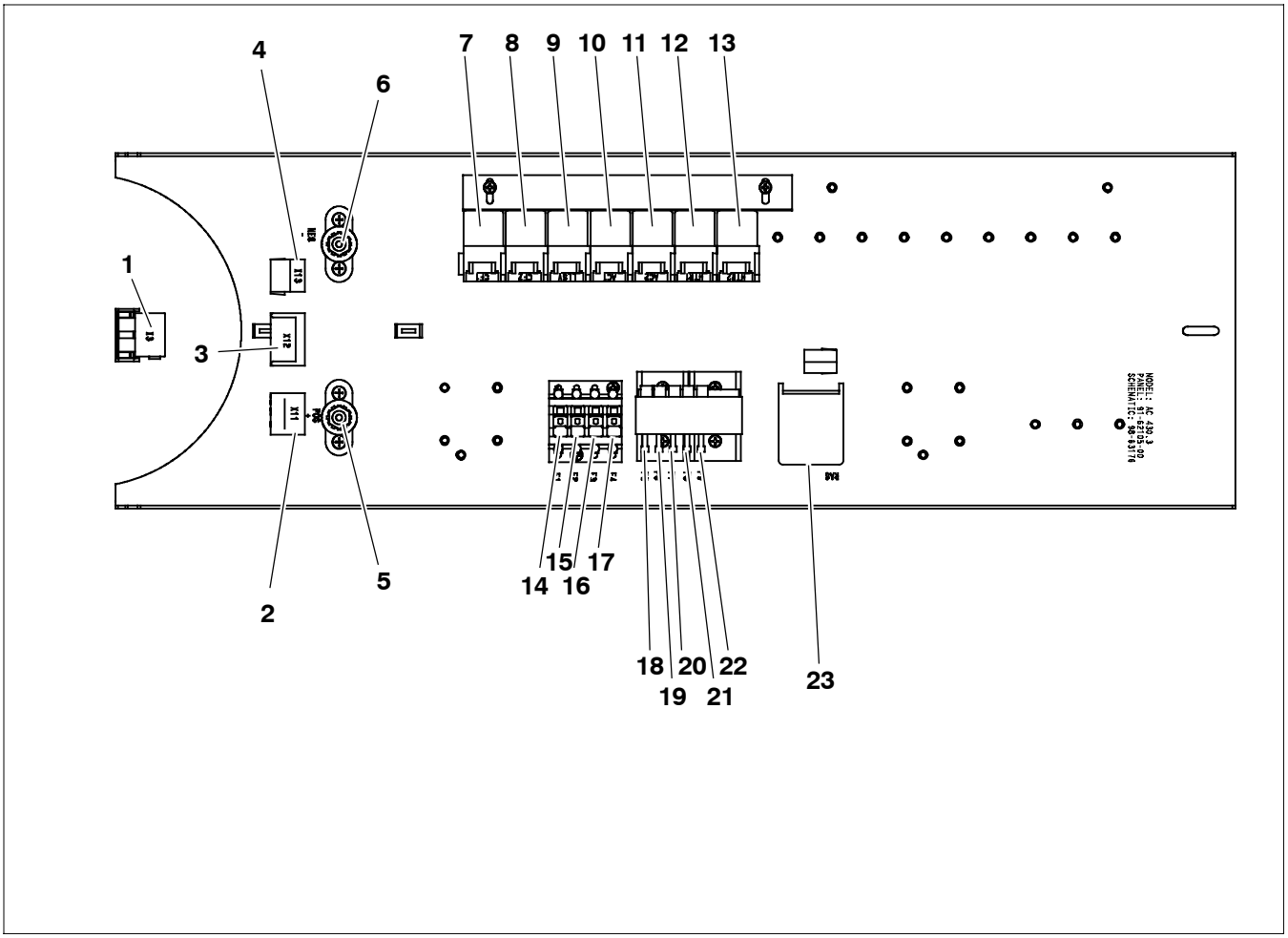


Figure 1-3 AC430 With BT324 Control Board

1. X3, Connector, Controller/Driver Display
2. X11, Connector, Evaporator Blower Motors
3. X12, Connector, Condenser Fan Motors/ High Pressure Switch
4. X13, Connector, Low Pressure Switch, Fresh Air Flap
5. POS, 12VDCPower Connection
6. NEG, Ground Connection
7. CF1, Condenser Fan Relay 1
8. CF2, Condenser Fan Relay 2
9. LLSV, Liquid Line Solenoid Valve Relay
10. AC1, Condenser Fan On Relay
11. AC2, Condenser Fan On Relay
12. HTR1, Relay, Evaporator High Speed
13. HTR2, Relay, Evaporator Low Speed
14. F1, Fuse, Evaporator Motor
15. F2, Fuse, Evaporator Motor
16. F3, Fuse, Condenser Motor
17. F4, Fuse, Condenser Motor
18. F5, Fuse, LLSV
19. F6, Fuse, Condenser Fan Relay
20. F7, Fuse, Pressure Switch Relay
21. F8, Fuse, Heat Valve/ Pump Relay
22. F9, Fuse, Heat Valve/Floor Relay
23. RAS, Return Air Sensor

SECTION 2

OPERATION BT324 CONTROLLER

2.1 STARTING, STOPPING AND OPERATING INSTRUCTIONS

The BT324 Digital Display is marked with international symbols (See Figure 3-1).

2.1.1 Starting

a. If the engine is not running, start the engine.

b. When the 12VDC power is applied, the driver display will illuminate and show return air set point. Press the A/C key (Item 5 Figure 3-1) on the display to trigger the start up sequence.

c. After the pre-trip inspection is completed, the switches may be set in accordance with the desired control modes.

Before starting, electrical power must be available from the bus power supply.

A fuse located in the battery compartment passes power for the clutch, evaporator and condenser assemblies.

2.1.2 Stopping

Toggling the A/C key (Item 5 Figure 3-1) on the display again will stop the system operation.

2.2 PRE-TRIP INSPECTION

After starting system, allow system to stabilize for ten to fifteen minutes and check for the following:

a. Listen for abnormal noises in compressor or fan motors.

b. Check refrigerant charge. (Refer to section 4.7.1)

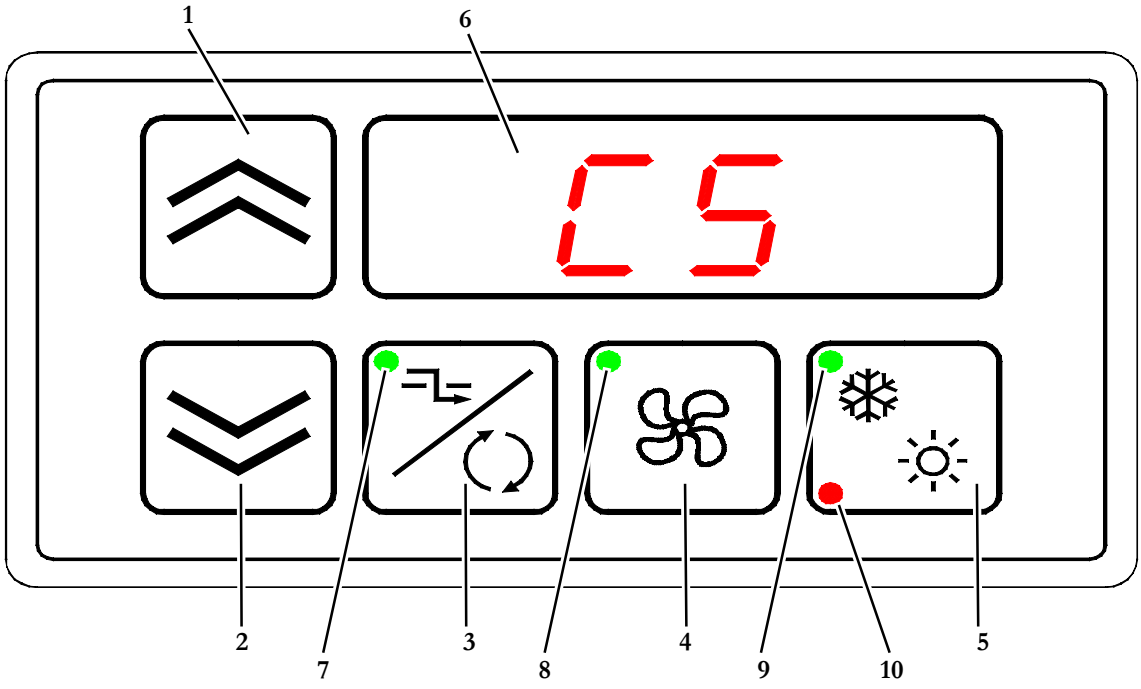


Figure 3-1 BT324 Controller

KEYS

1. Plus Key
2. Minus Key
3. Recirculate/Fresh Air Key
4. Blower Control Key
5. Automatic Climate Control (A/C)

LEDS

6. Display
7. Fresh Air Operation (Green)
8. Manual Blower Control 'ON' (Green)
9. Heating Mode (Green)
10. Malfunction Light (Red)

2.3 SEQUENCE OF OPERATION BT324

2.3.1 Function of Keys when "Engine On" and controller active:

a. Plus Key - Increases interior temperature set point by 1° per stroke or increases manual blower speed, depending on displayed mode.

b. Minus Key - Decreases interior temperature set point by 1° per stroke or decreases manual blower speed, depending on displayed mode.

c. Recirculating Air/Fresh Air - Switches from Recirculating Air to Fresh Air and vice-versa.

d. Blower Control - Switches on the manual blower control.

e. Automatic Climate Control - Switches on the Automatic Temperature Control.

f. Temperature Indicator **(Key 2 + Key 3)** - Shows the inside temperature for 10 seconds. If pressed a second time shows the outside temperature for 10 seconds (optional).

g. Reheat (optional) **(Key 3 + Key 5)** - Starts Reheat mode for 3 minutes (duration adjustable).

h. Controller Off **(A/C Switch To Off)** - Switches off all control functions and the display.

NOTE

The following blower steps are disabled when the automatic climate control is on:
2-, 3-step blower: Off
Continuously adjustable blower: Off

2.3.2 Illuminating Indications (Display)

With "Engine-On" and Controller active

2.4 OPERATING INSTRUCTIONS BT324

When the engine is running, toggle the A/C Switch to on to activate the Air Conditioning Unit.

2.4.1 Display

When the unit is ON, the display shows the interior set point temperature. When selecting individual functions, the display shows the corresponding information for a short period of time. The display is dark when the engine and control unit are OFF.

2.4.2 Interior Temperature Control

Press the Plus (1) or Minus (2) keys to set the desired interior temperature.

The temperature can be adjusted between 64° F (18° C) and 82° F (28° C).

When the outside temperatures are below 35° F (2° C) (adjustable parameter), the cooling function remains disabled.

2.4.3 Ventilation

When the unit is operating in Automatic Climate Control mode, the blower speed is controlled based on the room temperature.

However, the blowers may be switched to manual mode of operation by pressing the blower key.

Press the Plus or Minus keys to select different blower steps. The blowers can not be switched OFF when Automatic Climate Control is ON.

When Automatic Climate Control is OFF, the blowers stop when the manual control is turned to zero.

2.4.4 Reheat (optional)

The Reheat mode is used to remove air humidity and to help defog the windshield. Press **Key 3** (Recirculating Air/Fresh Air) and **Key 5** (Automatic Climate Control) at the same time to activate Reheat. Heating and cooling will be energized on for 3 minutes (adjustable parameter). In addition, the blowers are switched to maximum speed and the fresh air flap is closed. At the end of the pre-set duration of time, the functions return to the previously selected settings.

Reheat mode is disabled with the outside temperature is below 35° F (2° C) (adjustable parameter), when the sensor is not installed, or when there is a sensor failure.

2.4.5 Temperature Indication

Press **key 2** (minus) **and key 3** (Recirculating Air/Fresh Air) at the same time to display the inside temperature for 10 seconds.

Optionally, the outside temperature may be displayed when pressing the keys a second time.

A sensor malfunction is displayed by **"i --"** or **"o --"**.

2.5 CHANGING BETWEEN °F (FAHRENHEIT) AND °C (CELCIUS)

Procedures for changing the BT324 Controller between Fahrenheit and Celsius is as follows:

a. Engine "OFF" & Ignition "ON".

b. Press **Key 1** (plus) **and Key 2** (minus) at the same time until the display shows the word **"Code"**.

NOTE

After the display shows the word "Code" you have 5 seconds to enter the correct access code.

c. Press **Key 1** (Plus Key) one time and release.

d. Press **Key 3** (Recirculating Air/Fresh Air) one time and release.

e. Press **Key 4** (blower control) one time and release.

The display will show the mode "Fah" for temperatures in °F or the mode "Cel" for temperatures in °C.

f. Press **Key 1** (plus) or **Key 2** (minus) to change the temperature mode.

g. Press **Key 5** (automatic climate control) one time to end the program.

SECTION 3

TROUBLESHOOTING

Table 3-1 General System Troubleshooting Procedures

INDICATION - TROUBLE	POSSIBLE CAUSES	REFERENCE SECTION
3.1 System Will Not Cool		
Compressor will not run	Drive-Belt loose or defective Clutch coil defective Clutch malfunction Compressor malfunction	Check Check/Replace Check/Replace See Table 1-2
Electrical malfunction	Coach power source defective Circuit Breaker/safety device open	Check/Repair Check/Reset
3.2 System Runs But Has Insufficient Cooling		
Compressor	Drive-Belt loose or defective Compressor valves defective	Check See Table 1-2
Refrigeration system	Abnormal pressures No or restricted evaporator air flow Expansion valve malfunction Restricted refrigerant flow Low refrigerant charge Service valves partially closed Safety device open	3.3 3.5 3.6 4.10 4.7 Open 1.5
Restricted air flow	No evaporator air flow or restriction	3.5
Heating system	Heat valve stuck open	3.7
3.3 Abnormal Pressures		
High discharge pressure	Refrigerant overcharge Noncondensable in system Condenser motor failure Condenser coil dirty	4.7.1 Check Check Clean
Low discharge pressure	Compressor valve(s) worn or broken Low refrigerant charge	See Table 1-2 4.7
High suction pressure	Compressor valve(s) worn or broken	See Table 1-2
Low suction pressure	Suction service valve partially closed Filter-drier inlet valve partially closed Filter-drier partially plugged Low refrigerant charge Expansion valve malfunction Restricted air flow	Open Check/Open 4.10 4.7 3.6 3.5
Suction and discharge pressures tend to equalize when system is operating	Compressor valve defective	See Table 1-2
3.4 Abnormal Noise Or Vibrations		
Compressor	Loose mounting hardware Worn bearings Worn or broken valves Liquid slugging Insufficient oil Clutch loose, rubbing or is defective Drive-Belt cracked, worn or loose Dirt or debris on fan blades	Check/Tighten See Table 1-2 SeeTable 1-2 3.6 1.3 Repair/Replace Adjust/Replace Clean

Table 3-1 General System Troubleshooting Procedures - Continued

INDICATION - TROUBLE	POSSIBLE CAUSES	REFERENCE SECTION
3.4 Abnormal Noise Or Vibrations - Continued		
Condenser or evaporator fans	Loose mounting hardware Defective bearings Blade interference Blade missing or broken	Check/Tighten Replace Check Check/Replace
3.5 No Evaporator Air Flow Or Restricted Air Flow		
Air flow through coil blocked	Coil frosted over Dirty coil Dirty filter	Defrost coil Clean Clean/Replace
No or partial evaporator air flow	Motor(s) defective Motor brushes defective Evaporator fan loose or defective Fan damaged Return air filter dirty Icing of coil Fan relay(s) defective Safety device open Fan rotation incorrect	Repair/Replace Replace Repair/Replace Repair/Replace Clean/Replace Clean/Defrost Check/Replace 1.5 Check
3.6 Expansion Valve Malfunction		
Low suction pressure with high superheat	Low refrigerant charge Wax, oil or dirt plugging valve orifice Ice formation at valve seat Power assembly failure Loss of bulb charge Broken capillary tube	4.7 Check 4.6 Replace Replace 4.14
Low superheat and liquid slugging in the compressor	Bulb is loose or not installed. Superheat setting too low Ice or other foreign material holding valve open	4.14 4.14
Side to side temperature difference (Warm Coil)	Wax, oil or dirt plugging valve orifice Ice formation at valve seat Power assembly failure Loss of bulb charge Broken capillary	Check 4.6 Replace Replace 4.14
3.7 Heating Malfunction		
Insufficient heating	Dirty or plugged heater core Coolant solenoid valve(s) malfunctioning or plugged Low coolant level Strainer(s) plugged Hand valve(s) closed Water pumps defective Auxiliary Heater malfunctioning.	Clean Check/Replace Check Clean Open Repair/Replace Repair/Replace
No Heating	Coolant solenoid valve(s) malfunctioning or plugged Controller malfunction Pump(s) malfunctioning Safety device open	Check/Replace Replace Repair/Replace 1.5
Continuous Heating	Coolant solenoid valve stuck open	4.11

SECTION 4

SERVICE

WARNING

Be sure to observe warnings listed in the safety summary in the front of this manual before performing maintenance on the hvac system

WARNING

Read the entire procedure before beginning work. Park the coach on a level surface, with parking brake applied. Turn main electrical disconnect switch to the off position.

NOTE

To avoid damage to the earth's ozone layer, use a refrigerant recovery system whenever removing refrigerant. When working with refrigerants you must comply with all local government environmental laws.

4.1 MAINTENANCE SCHEDULE

SYSTEM ON	SYSTEM OFF	SYSTEM	REFERENCE SECTION
a. Daily Maintenance			
X		Pre-trip Inspection - after starting	2.2
	X	Check tension and condition of drive belts.	None
b. Weekly Inspection			
	X	Perform daily inspection	See above
	X	Check condenser, evaporator coils and air filters for cleanliness	None
	X	Check refrigerant hoses, fittings and component connections for leaks	4.5
X		Feel filter-drier for excessive temperature drop across drier	4.10
c. Monthly Inspection and Maintenance			
	X	Perform weekly inspection and maintenance	See above
	X	Clean evaporator drain pans and hoses	None
	X	Check wire harnesses for chafing and loose terminals	Replace/Tighten
	X	Check fan motor bearings	None
	X	Check compressor mounting bolts for tightness	None

4.2 REMOVING COVER

To remove the cover do the following:

1. Turn all the 1/4 turn cam locks counterclockwise.

2. Using two people carefully grasp the cover under the bottom edge and lift up.

4.3 MANIFOLD GAUGE SET

A manifold gauge set can be used to determine system operating pressures, add charge, equalize or evacuate system.

When the suction pressure hand valve is front seated (turned all the way in), the suction (low) pressure can be read. When the discharge pressure hand valve is front seated, discharge (high) pressure can be read.

When both valves are open (turned counterclockwise), high pressure vapor will flow into the low side. When only the low pressure valve is open, the system can be charged or evacuated.

CAUTION

The AC430 Rooftop Systems has R134a service port couplings installed on the unit piping.

4.3.1 Installing R-134a Manifold Gauge/Hose Set

An R-134a manifold gauge/hose set with self-sealing hoses is pictured in Figure 4-1. The manifold gauge/hose set is available from Mobile Climate Control. (Mobile Climate Control P/N 07-00294-00, which includes items 1 through 6, Figure 4-1). To perform service using the manifold gauge/hose set, do the following:

a. Preparing Manifold Gauge/Hose Set for use.

1. If the manifold gauge/hose set is new or was exposed to the atmosphere it will need to be evacuated to remove contaminants and air as follows:
2. Back-seat (turn counterclockwise) both field service couplers (see Figure 4-1) and mid-seat both hand valves.
3. Connect the yellow hose to a vacuum pump and an R-134a cylinder.
4. Evacuate to 10 inches of vacuum and then charge with R134a to slightly positive pressure of 1.0 psig.
5. Front-seat both manifold gauge set hand valves and disconnect from cylinder. The gauge set is now ready for use.

b. Connecting the Manifold Gauge Gauge/Hose Set.

To connect the manifold gauge/hose set for reading pressures, do the following:

1. Connect the field service couplers (see Figure 4-1) to the high and low in-line service ports.

2. Turn the field service coupling knobs clockwise, which will open the system to the gauge set.

3. Read the system pressures.

c. Removing the Manifold Gauge Set.

1. While the compressor is still ON, backseat (counterclockwise) the high side field service coupler on the manifold gauge set. Mid-seat both hand valves on the manifold gauge set and allow the pressure in the manifold gauge set to be drawn down to low side pressure. This returns any liquid that may be in the high side hose to the system.

CAUTION

To prevent trapping liquid refrigerant in the manifold gauge set be sure set is brought to suction pressure before disconnecting.

2. Back-seat the low side field service coupler and front-seat both manifold set hand valves. Back-seat the in-line system access valves (if applicable). Remove the couplers from the in-line access valves.
3. Install both in-line access valve caps.

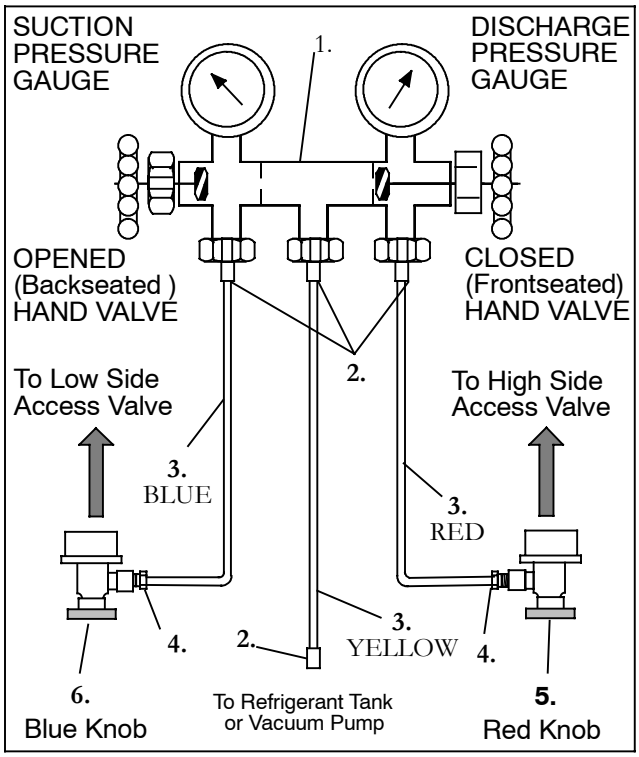


Figure 4-1 Manifold Gauge Set (R-134a)

1. Manifold Gauge Set
2.. Hose Fitting (0.5-16 Acme)
3.. Refrigeration and/or Evacuation Hose (SAE J2196/R-134a)
4.. Hose Fitting w/O-ring (M14 x 1.5)
5.. High Side Field Service Coupling
6.. Low Side Field Service Coupling

4.4 REMOVING THE REFRIGERANT CHARGE

NOTE

To avoid damage to the earth's ozone layer, use a refrigerant recovery system whenever removing refrigerant.

4.4.1 Removing Entire System Charge

To remove the entire refrigerant charge, do the following:

a. Connect a manifold gauge set to the system as shown in Figure 4-2 .

b. Connect a reclaimer to the center manifold gauge set connection.

c. Recover refrigerant in accordance with reclaimer manufacturers instructions.

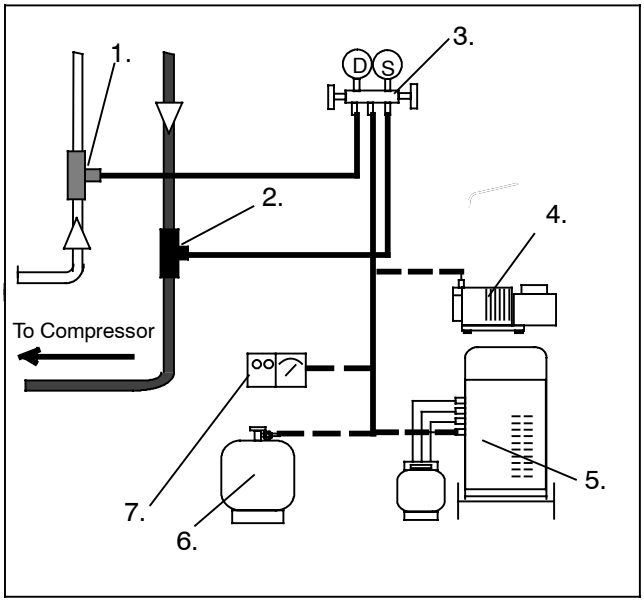


Figure 4-2 In-Line Service Connections

1. Discharge Service Port
2. Suction Service Port
3. Manifold Gauge Set
4. Vacuum Pump
5. Reclaimer
6. Refrigerant Cylinder
7. Thermistor Vacuum Gauge

4.5 REFRIGERANT LEAK CHECK

A refrigerant leak check should always be performed after the system has been opened to replace or repair a component.

To check for leaks in the refrigeration system, perform the following procedure:

NOTE

It must be emphasized that only the correct refrigerant should be used to pressurize the system. Use of any other refrigerant will contaminate the system, and require additional evacuation.

a. Ensure filter drier service and solenoid valves(if equipped) are open.

1. Filter drier service valves should be back seated.

b. If system is without refrigerant, charge system with refrigerant vapor to build up pressure between 20 to 30 psig (1.36 to 2.04 bar).

c. Add sufficient nitrogen to raise system pressure to 150 to 200 psig *(10.21 to 13.61 bar)*.

d. Check for leaks. The recommended procedure for finding leaks in a system is with an electronic leak detector. Testing joints with soapsuds is satisfactory only for locating large leaks.

e. Remove test gas and replace filter-drier.

f. Evacuate and dehydrate the system. (Refer to paragraph 4.6.)

g. Charge the unit. (Refer to paragraph 4.7.)

4.6 EVACUATION AND DEHYDRATION

4.6.1 General

The presence of moisture in a refrigeration system can have many undesirable effects. The most common are copper plating, acid sludge formation, "freezing-up" of metering devices by free water, and formation of acids, resulting in metal corrosion. An evacuation should take place after a system repair (replacement of filter drier. expansion valve, solenoid valve, etc).

4.6.2 Preparation

NOTE

Using a compound gauge (manifold gauge) for determination of vacuum level is not recommended because of its inherent inaccuracy.

a. Evacuate and dehydrate only after pressure leak test. (Refer to paragraph 4.5)

b. Essential tools to properly evacuate and dehydrate any system include a good vacuum pump with a minimum of 5 cfm *(8.5 m^3/hr)* volume displacement, (MCC P/N 07-00176-11), and a good micron gauge (MCC P/N 07-00414-00).

c. Keep the ambient temperature above 60°F *(15.6°C)* to speed evaporation of moisture. If ambient temperature is lower than 60°F *(15.6°C)*, ice may form before moisture removal is complete.

4.6.3 Procedure for Evacuation and Dehydrating System

a. Remove refrigerant using a refrigerant recovery system. Refer to paragraph 4.4.1

b. The recommended method is connecting 3/8" OD refrigerant hoses designed for vacuum service as shown in Figure 5-1.

c. Make sure vacuum pump valve is open.

d. Start vacuum pump. Slowly open valves halfway and then open vacuum gauge valve.

e. Evacuate unit until vacuum gauge indicates 500 microns Hg vacuum. Close gauge valve, vacuum pump valve, and stop vacuum pump.

f. Wait five minutes to see if vacuum holds.

g. Charge system. Refer to paragraph 4.7.2

4.7 ADDING REFRIGERANT TO SYSTEM

4.7.1 Checking Refrigerant Charge

The following conditions must be met to accurately check the refrigerant charge.

a. Bus engine operating at high idle.

b. Unit operating in cool mode for 15 minutes.

c. Compressor discharge pressure at least 150 psig (10.21 bar). (It may be necessary to block condenser air flow to raise discharge pressure.)

d. Under the above conditions, the system is properly charged when the float ball in the receiver tank sight glass is showing ½ to ¾ level.

4.7.2 Adding Full Charge

a. Install manifold gauge set at the in-line suction and discharge service ports.

b. Evacuate and dehydrate system. (Refer to paragraph 4.6)

c. Place appropriate refrigerant cylinder on scales. Prepare to charge liquid refrigerant by connecting charging hose from container to center connection on gage manifold. Purge air from hoses.

d. Note weight of refrigerant and cylinder.

e. Open cylinder valve, backseat discharge valve on gauge manifold and allow liquid refrigerant to flow into the high side of the system

f. When correct charge has been added (refer to paragraph 1.3, refrigerant specifications), close cylinder valve and front seat manifold discharge valve.

g. Prepare the cylinder as required to allow vapor charging. Backseat the manifold suction valve and charge vapor until the correct charge has been added. Close cylinder valve and front seat suction manifold set.

h. Check charge level in accordance with the procedures of paragraph 4.7.1.

4.8 CHECKING FOR NONCONDENSIBLES

To check for noncondensibles, proceed as follows:

a. Stabilize system to equalize pressure between the suction and discharge side of the system.

b. Check temperature at the condenser and receiver.

c. Check pressure at the discharge (in-line) service port.

d. Check saturation pressure as it corresponds to the condenser/receiver temperature. See temperature-Pressure chart Table Table 4-1 for R134a.

e. If gauge reading is 3 psig or more than the calculated P/T pressure in step d., non-condensables are present.

f. Remove refrigerant using a refrigerant recovery system.

g. Evacuate and dehydrate the system. (Refer to paragraph 4.6.)

h. Charge the unit. (Refer to paragraph 4.7.2.)

4.9 CHECKING AND REPLACING HIGH OR LOWPRESSURE CUTOUT SWITCH

4.9.1 Replacing High Or Low Pressure Switches

a. The high and low pressure switches are equipped with Schreader valves to allow removal and installation without recovering the refrigerant charge.

b. Disconnect wiring from defective switch.

c. Install new cutout switch after verifying switch settings.

4.9.2 Checking High Pressure Switches

WARNING

Do not use a nitrogen cylinder without a pressure regulator

WARNING

Do not use oxygen in or near a refrigeration system as an explosion may occur.

a. Disconnect wiring and remove switch from system.

b. Connect an ohmmeter across switch terminals. If the switch is good, the ohmmeter will indicate no resistance, indicating that the contacts are closed.

c. Connect switch to a cylinder of dry nitrogen. (SeeFigure 4-3).

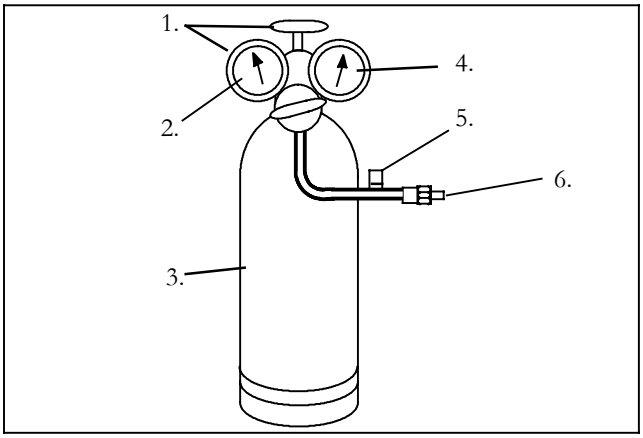


Figure 4-3 Checking High Pressure Switch

1. Cylinder Valve and Gauge
2. Pressure Regulator
3. Nitrogen Cylinder
4. Pressure Gauge (0 to 400 psig = 0 to 27.22 bar)
5. Bleed-Off Valve
6. 1/4 inch Connection

d. Set nitrogen pressure regulator higher than switch cutout setting. (refer to paragraph 1.3.)

e. Open cylinder valve. Slowly open the regulator valve to increase the pressure until it reaches cut-out point. The switch should open, which is indicated by an infinite reading on an ohmmeter (no continuity).

f. Close cylinder valve and release pressure through the bleed-off valve. As pressure drops to cut-in point, the switch contacts should close, indicating no resistance (continuity) on the ohmmeter.

g. Replace switch if it does not function as outlined above.

4.9.3 Checking Low Pressure Switches

a. Disconnect wiring and remove switch from system.

b. Connect an ohmmeter across switch terminals. If the switch is good, the ohmmeter will indicate an infinite reading on an ohmmeter (no continuity).

c. Connect switch to a cylinder of dry nitrogen. (SeeFigure 4-3).

d. Set nitrogen pressure regulator higher than switch cutout setting. (refer to paragraph 1.3.)

e. Open cylinder valve. Slowly open the regulator valve to increase the pressure until it reaches cut in point. The switch should close, which is indicated by no resistance on an ohmmeter (continuity).

f. Close cylinder valve and release pressure through the bleed-off valve. As pressure drops to cut-out point, the switch contacts should open, indicating infinite resistance (no continuity) on the ohmmeter.

4.10 FILTER-DRIER

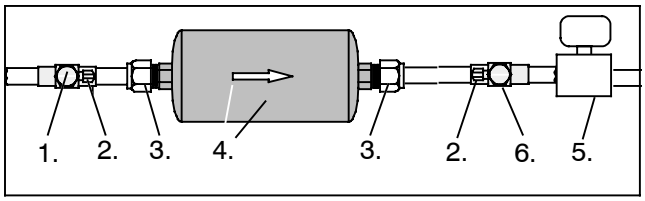


Figure 4-4 Filter-Drier Removal

1. Filter–Drier Inlet Service Valve
2. Valve Service Port
3. Flare Nut
4. Filter–Drier
5. Liquid Line Solenoid Valve
6. Filter–Drier Outlet Service Valve

4.10.1 To Check Filter-Drier

The filter-drier (See Figure 4-4) must be changed if the system has been opened, (for any reason), or the filter drier is partially restricted. Restriction can be identified by either the outlet frosting or a temperature difference between the inlet and outlet.

4.10.2 To Replace Filter-Drier Assembly

Filter Drier replacement can be accomplished by performing the following procedure.

a. Turn the driver's A/C switch to “OFF” position.

b. Front seat the filter-drier service valves on both sides of the filter drier.

c. Connect manifold gauge set and reclaimer to the filter drier service valve access ports and reclaim any refrigerant contained in the filter drier.

d. Place a new filter-drier near the unit for immediate installation.

⚠ WARNING

The filter-drier may contain liquid refrigerant. Slowly loosen the connecting nuts and avoid contact with exposed skin or eyes.

e. Using two open end wrenches, slowly crack open the connecting nuts on each side of the filter-drier assembly. Remove the filter-drier assembly.

f. Remove seal caps from the new filter-drier. Apply a light coat of mineral oil to the filter-drier connections.

g. Assemble the new filter-drier to lines ensuring that the arrow on the body of the filter-drier points in the direction of the refrigerant flow (refrigerant flows from the receiver to the evaporator). Finger tighten the connecting nuts.

h. Tighten filter-drier connecting nuts using two open end wrenches.

i. Connect vacuum pump to manifold gauge set and evacuate filter to 500 microns. Close gauge valve, vacuum pump valve, and stop vacuum pump.

j. Backseat (fully close) both service valve ports and replace valve caps.

k. Remove Gauges.

4.11 SERVICING THE HEAT VALVE

The heat valve (Figure 4-5) requires no maintenance unless a malfunction to the internal parts or coil occurs. This may be caused by foreign material such as: dirt, scale, or sludge in the coolant system, or improper voltage to the coil.

NOTE

The OEM supplied heating (hot water) Solenoid Valve is normally located outside of the AC430 rooftop air conditioning system.

There are only three possible valve malfunctions: coil burnout, failure to open, or failure to close.

Coil burnout may be caused by the following:

1. Improper voltage
2. Continuous over-voltage, more than 10% or Under-voltage of more than 15%.
3. Incomplete magnetic circuit due to the omission of the coil housing or plunger.
4. Mechanical interference with movement of plunger which may be caused by a deformed enclosing tube.

Failure to open may be caused by the following:

1. Coil burned out or an open circuit to coil connections.
2. Improper voltage.
3. Torn diaphragm.
4. Defective plunger or deformed valve body assembly.

Failure to close may be caused by the following:

1. Defective plunger or deformed valve body assembly.
2. Foreign material in the valve.
3. Torn diaphragm.

4.11.1 Coil Replacement

a. It is not necessary to drain the coolant from the system.

b. Place main battery disconnect switch in OFF position and lock.

c. Disconnect wire leads to coil.

d. Remove coil retaining screw and nameplate.

e. Lift burned-out coil from enclosing tube and replace.

f. Connect wire leads and test operation.

4.11.2 Internal Part Replacement

a. Disconnect system from bus battery.

b. Open the vent fitting at the top of the outlet header of the heater coil.

c. Drain coil by opening the drain-cock on the inlet tube.

d. Disassemble valve and replace defective parts.

e. Assemble valve, refill and bleed coolant lines.

4.11.3 Replace Entire Valve

a. Disconnect system from bus battery.

b. Drain coolant from lines as previously described and disconnect hoses to valve .

c. Disconnect wire leads to coil.

d. Remove valve assembly from bracket.

e. Install new valve and re-connect hoses. It is not necessary to disassemble the valve when installing.

f. Refill and bleed coolant lines.

g. Connect wire leads and test operation.

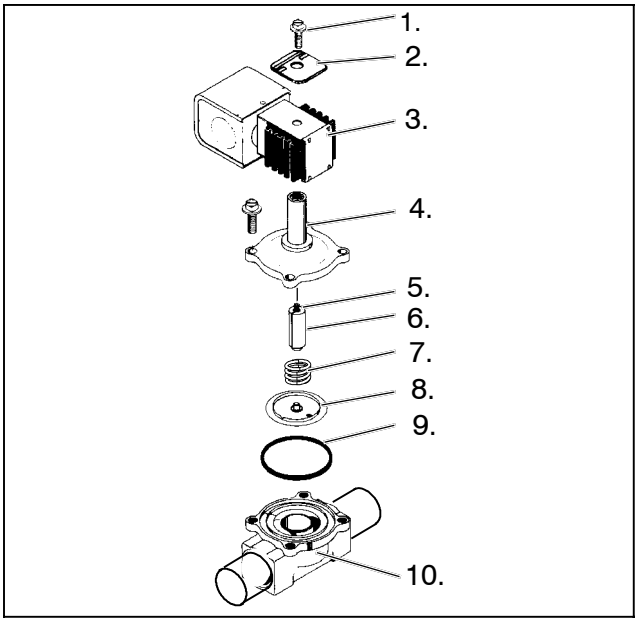


Figure 4-5 Heat Valve

1. Coil Retaining Screw
2. Nameplate
3. Coil Housing Assembly
4. Enclosing Tube & Bonnet Assembly
5. Kick–Off Spring
6. Plunger
7. Closing Spring
8. Diaphragm
9. O–Ring
10. Valve Body

4.12 SERVICE VALVES

The filter/drier (High Side) service valves (Figure 4-6) are provided with a double seat and a gauge port, which allows servicing of the filter drier assembly.

Turning the valve stem counterclockwise (all the way out) will *backseat* the valve to open the line to the system and close off the gauge port. In normal operation, the valve is backseated to allow full flow through the valve. The valve should always be backseated before removing the service port cap.

Turning the valve stem clockwise (all the way forward) will *frontseat* the valve to isolate the system and open the service port.

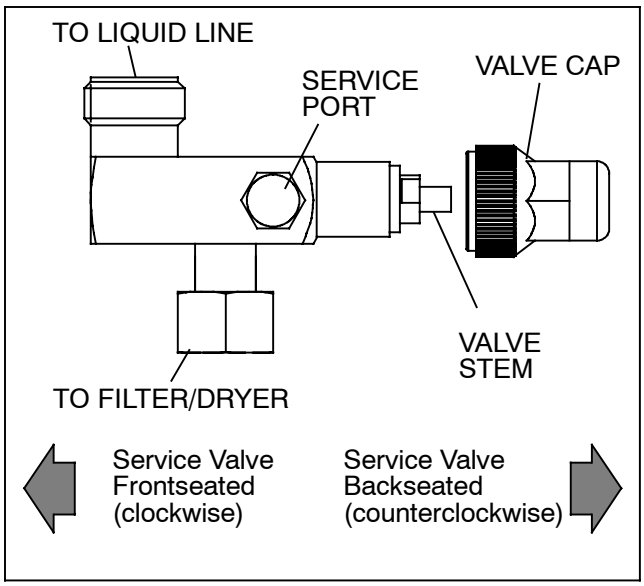


Figure 4-6 Service Valve R134a (High Side)

4.13 REPLACING RETURN AIR FILTERS

The return air filters are located behind the return air grill, inside the vehicle.

The filters should be checked for cleanliness periodically depending on operating conditions. A dirty filter will restrict air flow over the evaporator coil which may cause insufficient cooling or heating and possible frost buildup on the coil. To remove the filters, do the following.

a. Insure air conditioning system is in the off position.

b. Remove the return air grille with the filter-diffuser assembly, by turning the six 1/4 turn fasteners counterclockwise.

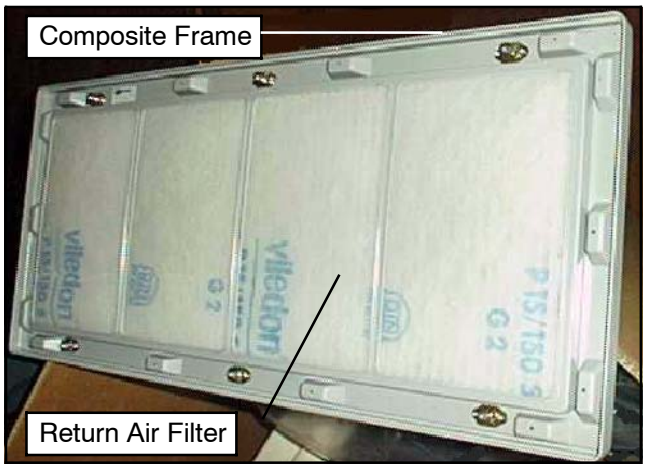


Figure 4-7 Return Air Grill Assembly With Air Filter Showing

c. Remove diffuser from the bus composite frame.

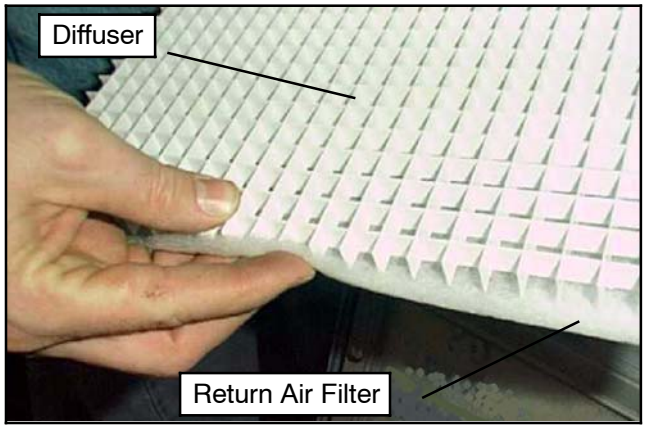


Figure 4-8 Diffuser and Filter Element

d. Remove and replace the filter element.

e. Center diffuser on filter element.

f. Pull filter element approximately 1/4 inch over ends of the diffuser.

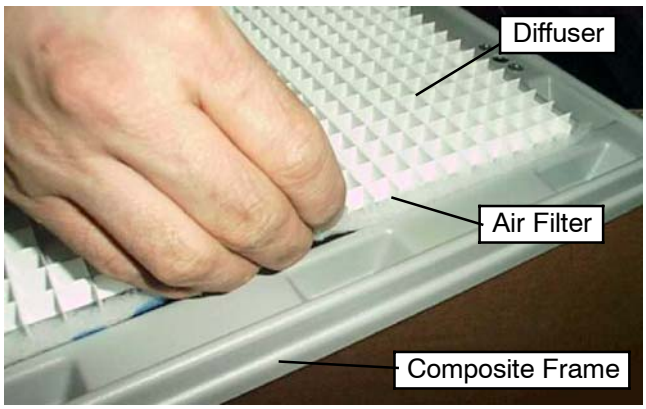


Figure 4-9 Filter, Diffuser and Composite Frame

g. Place filter and diffuser into composite frame, with filter element down (See Figure 4-9).

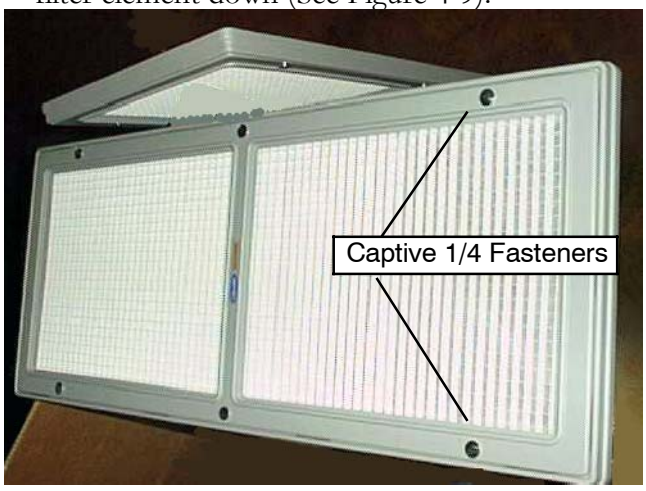


Figure 4-10 Return Air Grill Assembly With Diffuser And Composite Frame Showing

h. Insert filter-diffuser assembly into composite frame on bus with the six captive 1/4 fasteners. (See Figure 4-10)

i. Lock the six captive 1/4 turns in place by rotating clockwise.

4.14 THERMOSTATIC EXPANSION VALVE

The thermostat expansion valve (Figure 4-11) is an automatic device which maintains constant superheat of the refrigerant gas leaving the

evaporator regardless of suction pressure. The valve functions are: (a) automatic control of refrigerant flow to match the evaporator load and (b) prevention of liquid refrigerant entering the compressor. Unless the valve is defective, it seldom requires any maintenance.

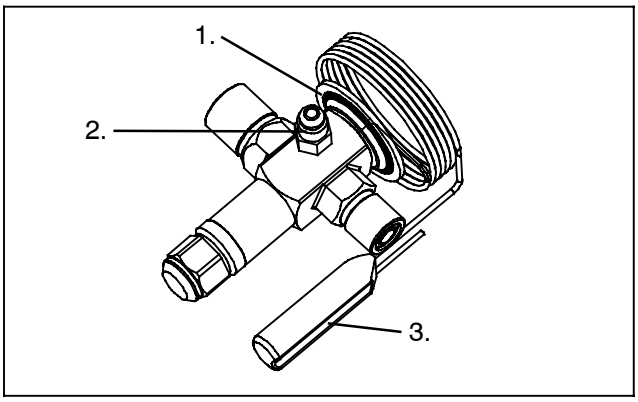


Figure 4-11 Thermostatic Expansion Valve

1.. Power Head Assembly
2.. Equalizer Connection
3.. Bulb

4.14.1 Valve Replacement

a. Recover and recycle refrigerant from the system.(refer to 4.4.1)

b. Remove insulation from expansion valve bulb. (See Figure 4-11 and Figure 4-12.)

c. Loosen retaining straps holding bulb to suction line and detach bulb from the suction line.

d. Loosen flare nuts on equalizer line and disconnect equalizer line from the expansion valve.

e. Check, clean and remove any foreign material from the valve body, valve seat and mating surfaces. If required, replace the valve.

NOTE

R-134a valves are adjustable. Valves are preset at the factory.

f. The thermal bulb is installed below the center of the suction line (four or eight o'clock position). This area must be clean to ensure positive bulb contact. Strap thermal bulb to suction line. Ensure that retaining straps are tight and renew insulation.

g. Fasten equalizer line to the expansion valve.

h. Leak check the new valve (Refer to paragraph 4.5)

i. Evacuate and recharge the system. (Refer to paragraph 4.6.)

j. Run the coach for approximately 30 minutes on fast idle.

k.Check refrigerant charge. (Refer to 4.7.1)

4.14.2 Superheat Measurement

NOTE

All readings must be taken from the TXV bulb location and out of the direct air stream.

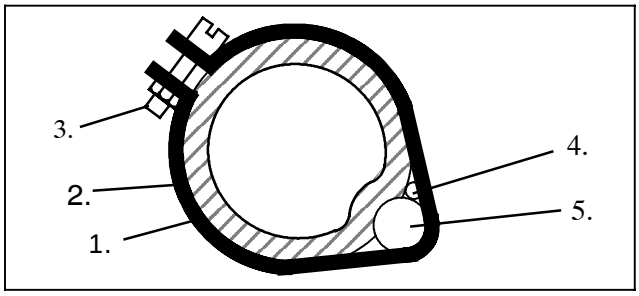


Figure 4-12 Thermostatic Expansion Valve Bulb and Thermocouple

1.. Suction Line (section view)
2.. TXV Bulb Clamp
3.. Nut & Bolt (clamp)
4.. Thermocouple
5.. TXV Bulb (Shown in the 4'clock position)

a. Open top cover.

b. Remove Presstite insulation from expansion valve bulb and suction line.

c. Loosen one TXV bulb clamp and make sure area under clamp is clean.

d. Place temperature thermocouple in contact with the suction tube and parallel to the TXV bulb, and then secure loosened clamp making sure both bulb and thermocouple are firmly secured to suction line. (See Figure 4-12). Reinstall insulation around the bulb.

e. Connect an accurate low pressure gauge to the low pressure port.

f. Close top cover being careful to route thermocouple sensing wire and gauge hose outside the unit.

g. Start bus and run on fast idle until unit has stabilized, about 20 to 30 minutes.

NOTE

When conducting this test, the suction pressure must be at least 6 psig *(0.41 bar)* below the expansion valve maximum operating pressure (MOP). Refer to paragraph 1.3 for MOP.

h. From the temperature/pressure chart, determine the saturation temperature corresponding to the evaporator outlet pressure.

i. Note the temperature of the suction gas at the expansion valve bulb. Subtract the saturation temperature from this temperature. The difference is the superheat of the suction gas.

j. The superheat may cycle from a low to high reading. Monitor the superheat taking readings every 3-5 minutes for a total of 5-6 readings. Calculate the superheats, add the readings and divide by the number of readings taken to determine average superheat. The superheat should be 12 ± 1.8°F.

k. If superheat is not within tolerance, replace the valve.

Table 4-1 R-134a Temperature - Pressure Chart

Temperature		Vacuum			
°F	°C	"/hg	cm/hg	kg/cm2	bar
-40	-40	14.6	49.4	37.08	0.49
.35	.37	12.3	41.6	31.25	0.42
-30	-34	9.7	32.8	24.64	0.33
-25	-32	6.7	22.7	17.00	0.23
-20	-29	3.5	11.9	8.89	0.12
-18	-28	2.1	7.1	5.33	0.07
-16	-27	0.6	2.0	1.52	0.02

Temperature		Pressure			
°F	°C	psig	kPa	kg/cm2	bar
-14	-26	0.4	1.1	0.03	0.03
-12	-24	1.2	8.3	0.08	0.08
-10	-23	2.0	13.8	0.14	0.14
-8	-22	2.9	20.0	0.20	0.20
-6	-21	3.7	25.5	0.26	0.26
-4	-20	4.6	31.7	0.32	0.32
-2	-19	5.6	36.6	0.39	0.39
0	-18	6.5	44.8	0.46	0.45
2	-17	7.6	52.4	0.53	0.52
4	-16	8.6	59.3	0.60	0.59
6	-14	9.7	66.9	0.68	0.67
8	-13	10.8	74.5	0.76	0.74
10	-12	12.0	82.7	0.84	0.83
12	-11	13.2	91.0	0.93	0.91
14	-10	14.5	100.0	1.02	1.00
16	-9	15.8	108.9	1.11	1.09
18	-8	17.1	117.9	1.20	1.18
20	-7	18.5	127.6	1.30	1.28
22	-6	19.9	137.2	1.40	1.37
24	-4	21.4	147.6	1.50	1.48
26	-3	22.9	157.9	1.61	1.58

Temperature		Pressure			
°F	°C	psig	kPa	kg/cm2	bar
28	-2	24.5	168.9	1.72	1.69
30	-1	26.1	180.0	1.84	1.80
32	0	27.8	191.7	1.95	1.92
34	1	29.6	204.1	2.08	2.04
36	2	31.3	215.8	2.20	2.16
38	3	33.2	228.9	2.33	2.29
40	4	35.1	242.0	2.47	2.42
45	7	40.1	276.5	2.82	2.76
50	10	45.5	313.7	3.20	3.14
55	13	51.2	353.0	3.60	3.53
60	16	57.4	395.8	4.04	3.96
65	18	64.1	441.0	4.51	4.42
70	21	71.1	490.2	5.00	4.90
75	24	78.7	542.6	5.53	5.43
80	27	86.7	597.8	6.10	5.98
85	29	95.3	657.1	6.70	6.57
90	32	104.3	719.1	7.33	7.19
95	35	114.0	786.0	8.01	7.86
100	38	124.2	856.4	8.73	8.56
105	41	135.0	930.8	9.49	9.31
110	43	146.4	1009	10.29	10.09
115	46	158.4	1092	11.14	10.92
120	49	171.2	1180	12.04	11.80
125	52	184.6	1273	12.98	12.73
130	54	198.7	1370	13.97	13.70
135	57	213.6	1473	15.02	14.73
140	60	229.2	1580	16.11	15.80
145	63	245.6	1693	17.27	16.93
150	66	262.9	1813	18.48	18.13
155	68	281.1	1938	19.76	19.37

SECTION 5

ELECTRICAL

5.1 INTRODUCTION

This section includes electrical wiring schematics. The schematics shown in this section provides information for the AC430 model rooftop air conditioning units which are fitted with two (2) double-shafted evaporator blower/motor assemblies and two (2) condenser fan motors. Figure 5-2 thru Figure 5-6 shows the BT324 controller used with the AC430 system.

UNIT	CONTROLLER	FIGURE NUMBERS
68AC430	BT324	Figure 5-1 Thru Figure 5-6
68AC430 (Electrical Panel 91-62105-00)	BT324	Figure 5-7 Thru Figure 5-8

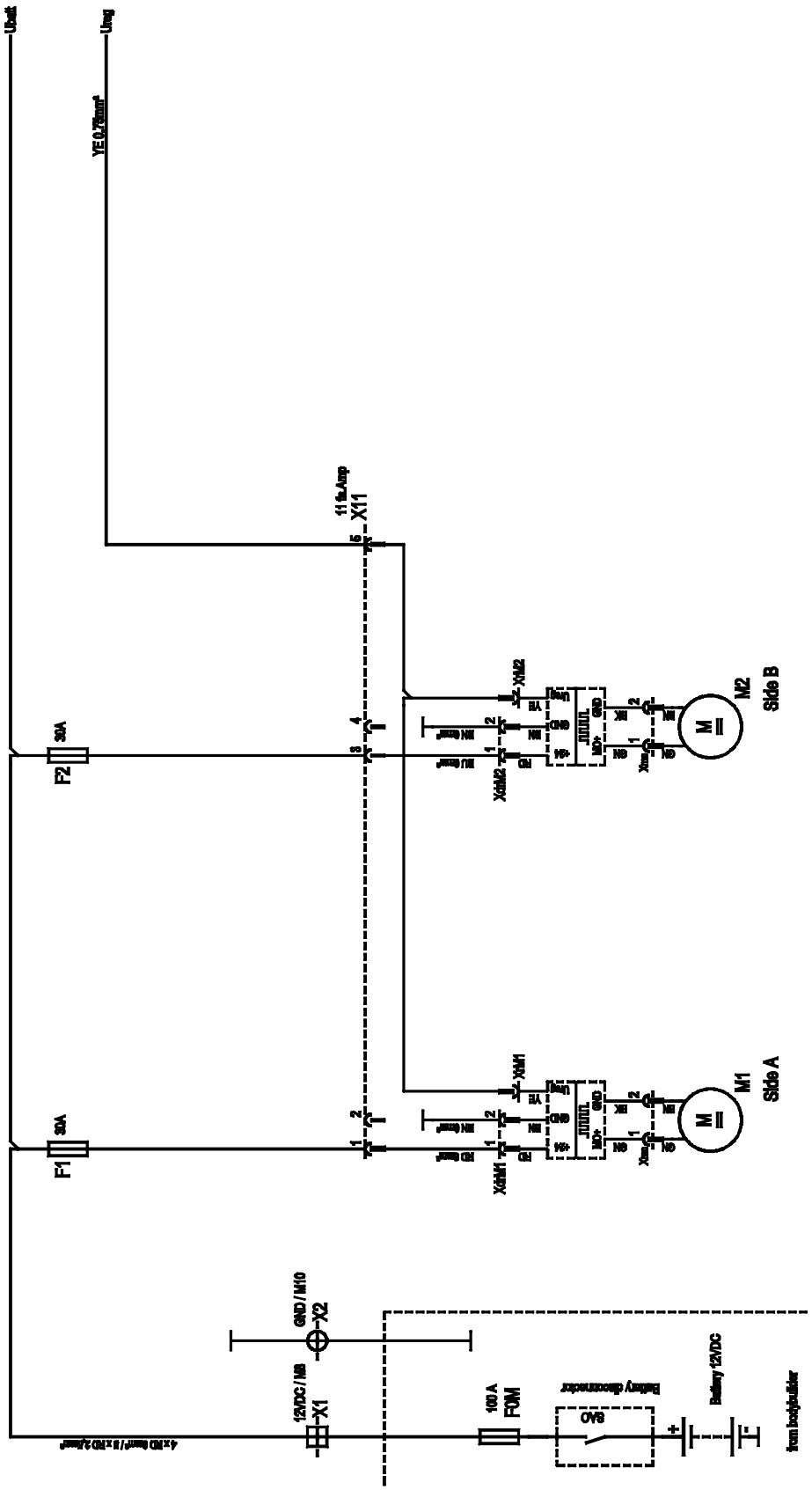


Figure 5-2 Evaporator Motors

98-67037-00

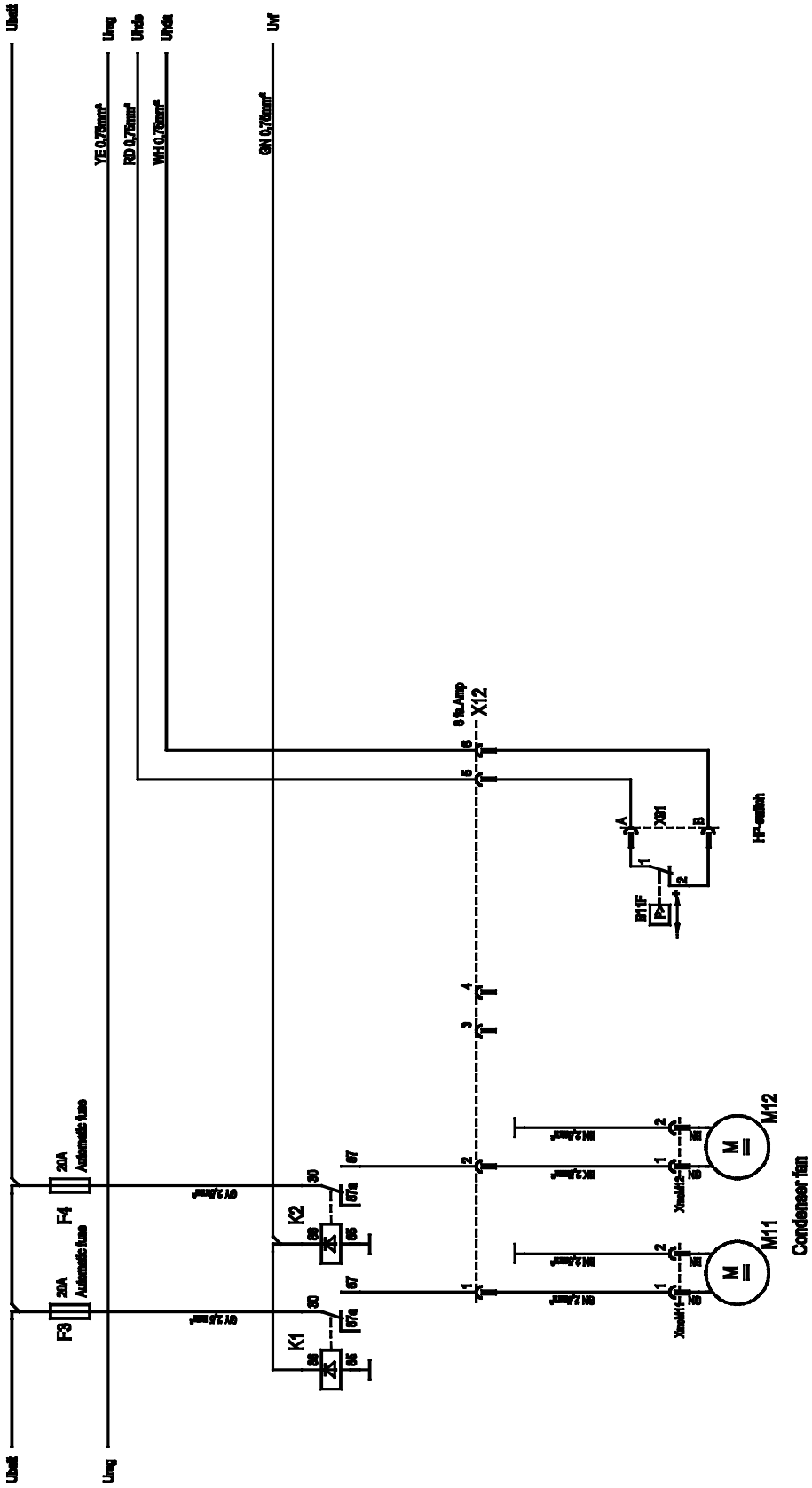


Figure 5-3 Condenser Motors

98-67037-00

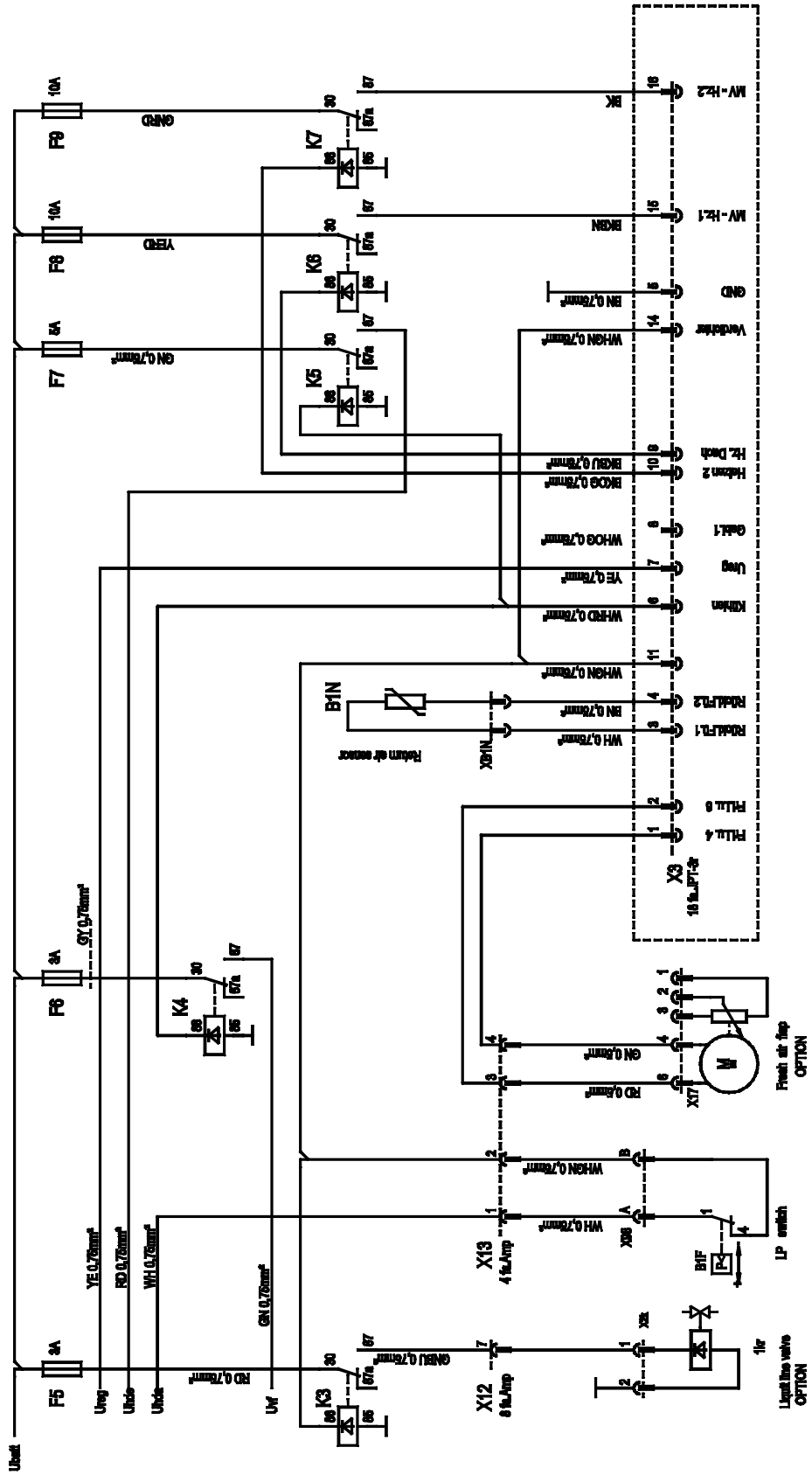


Figure 5-4 BT324 Controls With (1) Compressor

98-67037-00

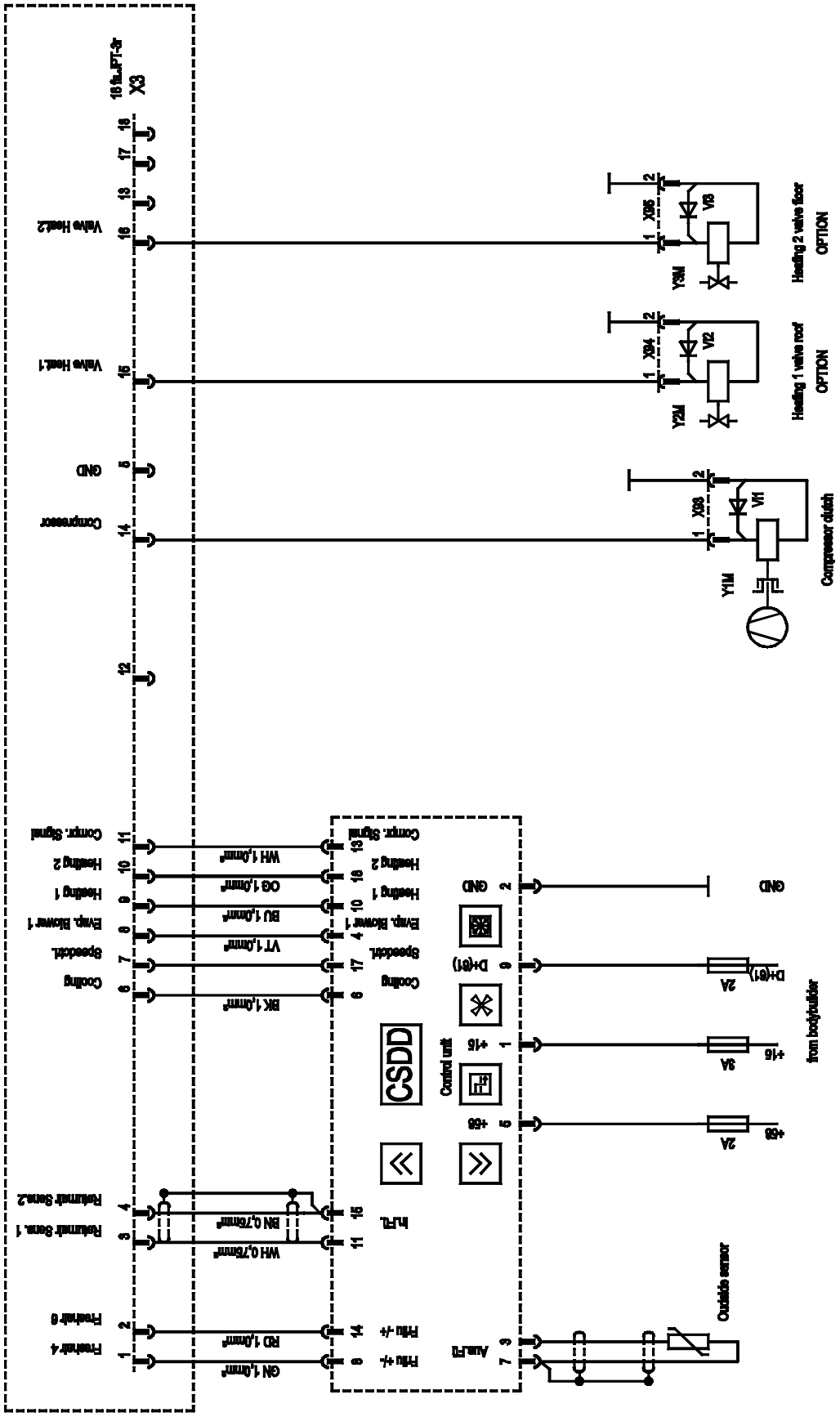


Figure 5-5 BT324 Control Circuit

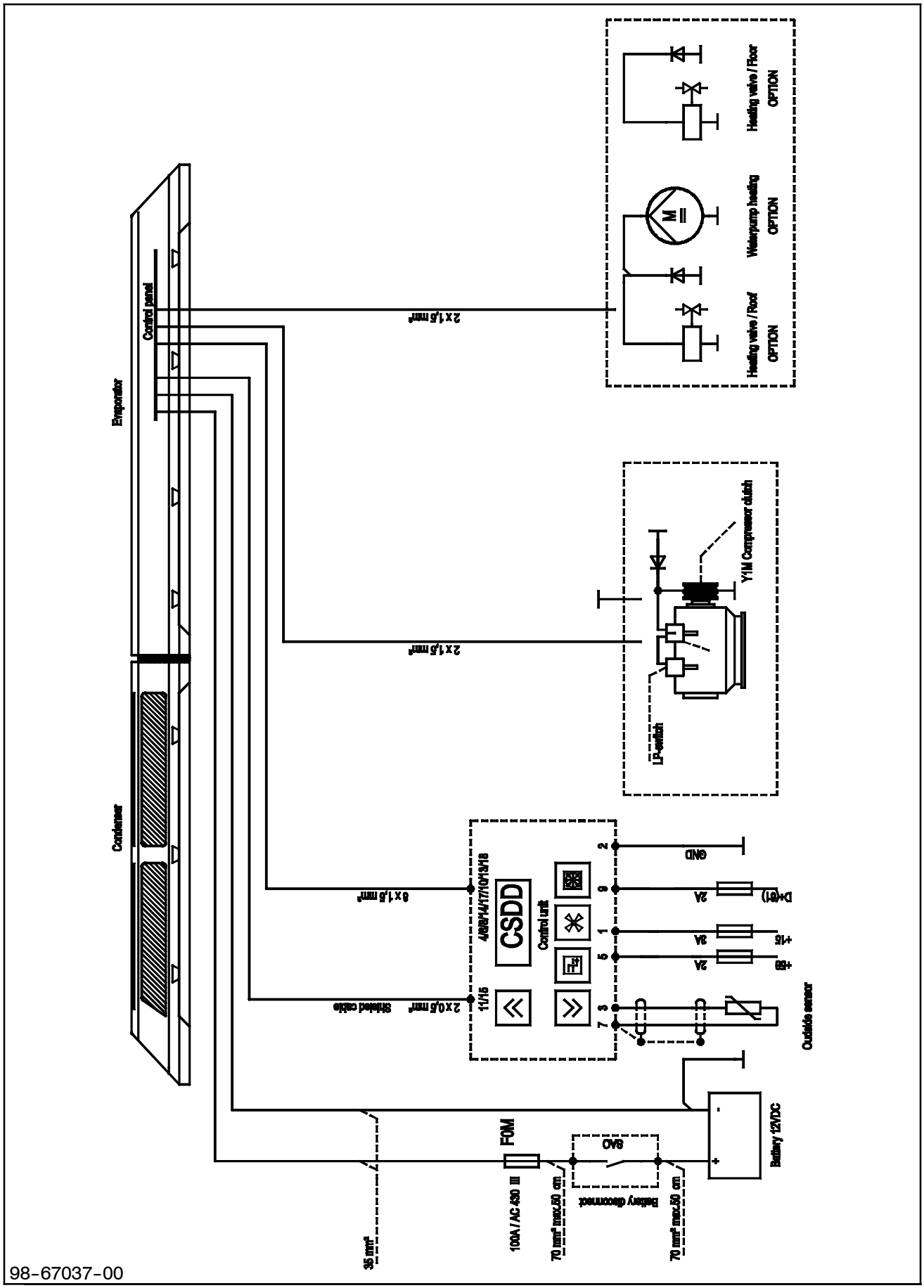
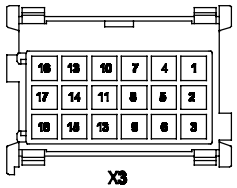
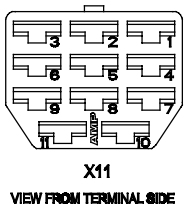
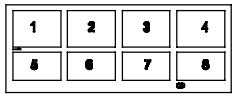


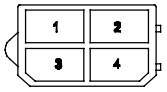
Figure 5-6 AC430 With BT324 Control

SYMBOL	DESCRIPTION
———	INDICATES WIRING INTERNAL TO UNIT
———	INDICATES WIRING EXTERNAL TO UNIT
.....	INDICATES OPTIONAL UNIT WIRING OR FEATURE
– – – –	INDICATES OPTIONAL WIRING OR FEATURE
GRD	INDICATES A WIRE GROUND
○	INDICATES A TERMINAL CONNECTION
—<←	INDICATES A CONNECTOR (VARIOUS STYLES)
	INDICATES RELAY CONTACTS (NORMALLY OPEN)
	INDICATES RELAY CONTACTS (NORMALLY CLOSED)
	INDICATES RELAY COIL
◯	INDICATES ELECTRICAL COMPONENT
	INDICATES FUSE
	INDICATES FUSE WITH MANUAL RESET
ATS	INDICATES AMBIENT TEMPERATURE SENSOR (ATS)

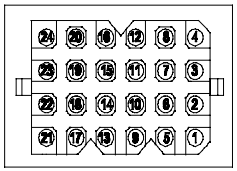








CONNECTOR PIN LOCATION DETAILS



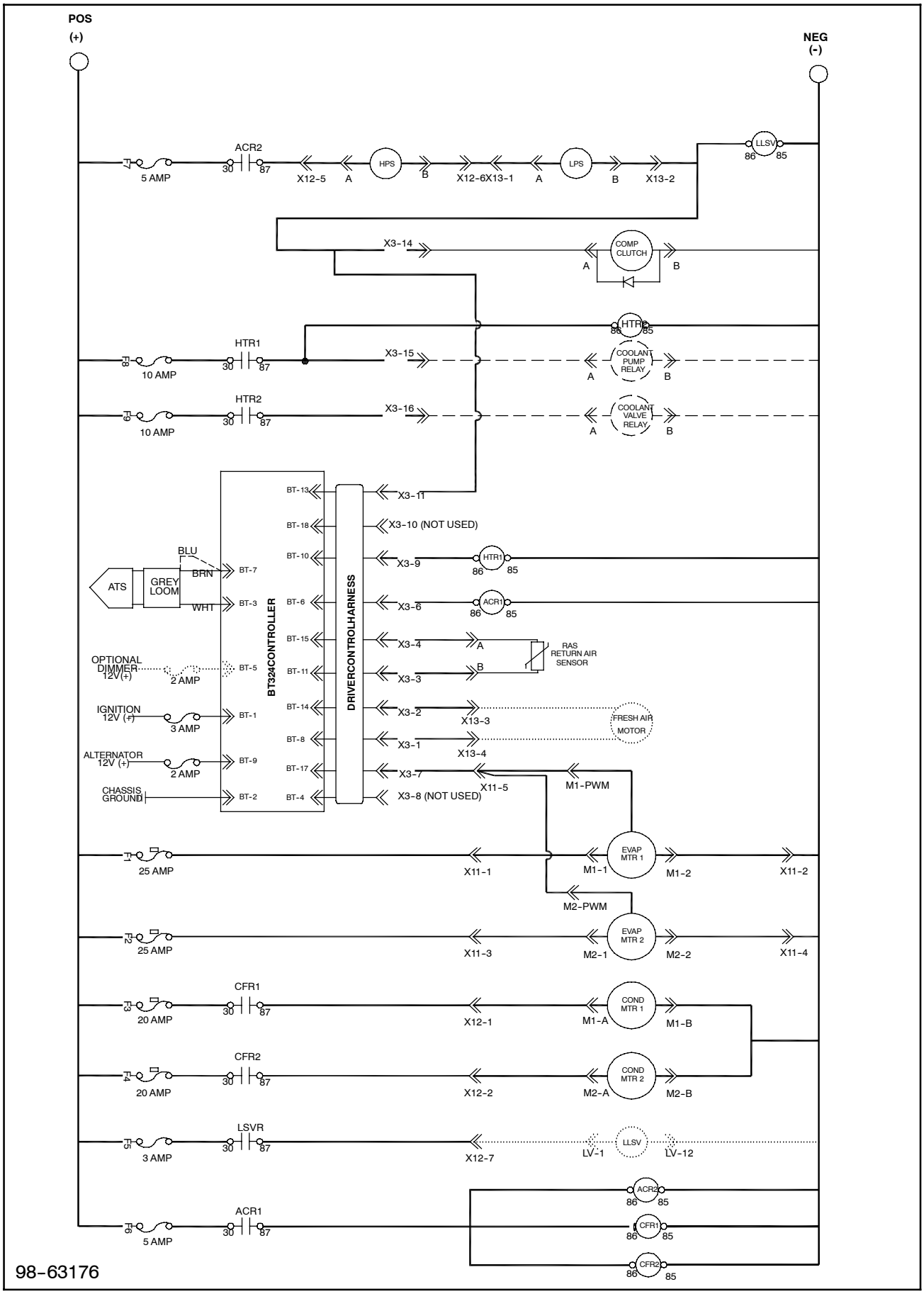
BT324 CONTROLLER RECEPTACLE - REAR VIEW

BT324 CONTROLLER BASIC I/O

TERMINAL	I/O	DESCRIPTION
1	INPUT	IGNITION (+12VDC)
2	INPUT	CHASSIS GROUND (-12VDC)
3	INPUT	AMBIENT TEMP SENSOR (+)
4	NOT USED	EVAP BLOW 1
5	INPUT	DIMMER (+12VDC)
6	OUTPUT	COOLING/AC (+12VDC)
7	INPUT	AMBIENT TEMP SENSOR (-)
8	OUTPUT	FRESH AIR (OPTIONAL) (+12VDC)
9	INPUT	ALTERNATOR (+12VDC)
10	OUTPUT	HEAT #1 (OPTIONAL) (+12VDC)
11	INPUT	RETURN AIR SENSOR (+)
12	NOT USED	
13	INPUT	COMPRESSOR SIGNAL (+12VDC)
14	OUTPUT	FRESH AIR (OPTIONAL) (-)
15	INPUT	RETURN AIR SENSOR (-)
16	NOT USED	
17	OUTPUT	EVAP BLOW SPEED (UREG)
18	OUTPUT	HEAT #2 (OPTIONAL) (+12VDC)

SYMBOL	DESCRIPTION
ACR1-ACR2	A/CRELAY
ATS	AMBIENTTEMPERATURESENSOR
CFR1-CFR2	CONDENSERFANRELAY
F1-F2	FUSE,25AMP
F3-F4	FUSE,20AMP
F5	FUSE,3AMP
F6-F7	FUSE,5AMP
F8-F9	FUSE,10AMP
HPS	HIGHPRESSURESWITCH
HTR1-HTR1	HEAT RELAY
LPS	LOWPRESSURESWITCH
LLSR	LIQUIDLINESOLENOIDRELAY
LLSV	LIQUIDLINESOLENOIDVALVE
RAS	RETURNAIRSENSOR

Figure 5-7 AC430 With BT324 Control (Electrical Panel 91-62105-00)



98-63176

Figure 5-8 AC430 With BT324 Control (Electrical Panel 91-62105-00)

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