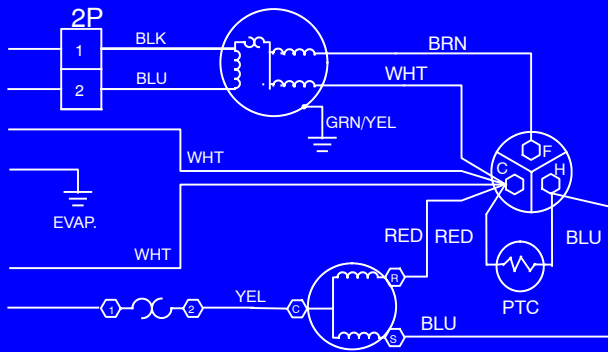


**Carrier** Transport Air Conditioning



**SERVICE MANUAL**  
for  
**MODEL AirV**  
Rooftop Air Conditioning Systems



**TRANSICOLD**

# **SERVICE MANUAL**

**For**

**AirV**

**AIR CONDITIONING AND  
HEATING EQUIPMENT**

## **MODELS**

**68RV11112A**

**68RV11122A**

**68RV11302A**

**68RV14102A**

**68RV14103A**

**68RV14113A**

**68RV14123A**

**68RV15102A**

**68RV15103A**

# 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. The general safety notices are presented in the following three sections labeled: First Aid, Operating Precautions and Maintenance Precautions. 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 clear of the evaporator blower and condenser fan.

No work should be performed on the unit until all circuit breakers and start-stop switches are turned off, and power supply is disconnected.

Always work in pairs. Never work alone.

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

### MAINTENANCE PRECAUTIONS

Beware of unannounced starting of the evaporator blower & condenser fan. Do not remove the ceiling grill assembly or the upper unit cover assembly before turning the power off, and disconnecting the power supply. Before disconnecting, discharge capacitors by shorting across the capacitors terminals. (See Paragraph 3.6.8)

When disassembling wiring, use numbered stickers to identify wire leads and terminals. This aids in quick, accurate reassembly.

Be sure power is turned off before working on motors, controllers, or electrical control switches. Tag any circuit breakers and power supply to prevent accidental energizing of circuits.

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 must be performed by qualified service personnel.

In case of electrical fire, open circuit switch and extinguish with CO<sub>2</sub> (never use water).

Use dry nitrogen to pressurize the system for leak checking. Be careful not to exceed 150 psig test pressure in the hermetic compressor.

Coil fins are sharp. Use care when removing the cover from the base pan to avoid personal injury.

Oil vapor in piping stubs can ignite from torch flame and cause serious injury. Exercise extreme care when brazing, and keep brazing cloth and fire extinguisher handy for emergency use.

Disconnect power to the AirV unit before checking the capacitor.

## SPECIFIC WARNING AND CAUTION STATEMENTS

The statements listed below are applicable to the refrigeration unit and appear elsewhere in this manual. These recommended precautions must be understood and applied during operation and maintenance of the equipment covered herein.

### 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 AirV system

#### **WARNING**

Before working on the unit be sure to first disconnect all electric power to the unit to avoid the possibility of electrical shock and personal injury. *Before disconnecting, discharge capacitors by shorting across the capacitors terminals* (Refer to paragraph 3.6.8)

#### **WARNING**

Shield coils with cardboard to protect hands against injury from sharp metal edges when removing compressor and other components.

#### **WARNING**

Oil vapor in piping stubs can ignite from torch flame and cause serious injury. Exercise extreme care when brazing, and keep brazing cloth and fire extinguisher handy for emergency use.

#### **WARNING**

Disconnect power to the AirV unit before checking the capacitor.

#### **WARNING**

Do not touch the metal of the screwdriver when discharging the capacitor. You could receive a shock.

#### **WARNING**

Before installing thermostat, turn off all power to unit. There may be more than one power disconnect. Electrical shock can cause personal injury or death.

#### **CAUTION**

In order for the AirV systems to operate efficiently, a dedicated 115 Volt 20 Amp power connection is required.

 **CAUTION**

Do not use carbon tetrachloride, solvents, or waxes containing solvents to clean plastic sections.

 **CAUTION**

Coil fins are sharp. Use care when removing the cover from the base pan to avoid personal injury.

 **CAUTION**

The change from Fahrenheit to Celsius will be permanent. It cannot be changed back to Fahrenheit.

 **CAUTION**

When re-assembling, ensure the battery springs are correctly placed in the battery spring holders.

 **CAUTION**

Improper wiring or installation may damage thermostat. Wiring must conform to local and national electrical codes.

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## SECTION 1

### DESCRIPTION

#### 1.1 INTRODUCTION

This manual contains service instructions and electrical data for the AirV, Carrier Transport Air Conditioning's Recreational Vehicle air conditioning unit.

The AirV units are two piece systems, consisting of the Upper Unit and the Ceiling unit. The Upper Unit contains the refrigeration system while the Ceiling Unit contains the controls and vents. The Ceiling Units are available in a free-blow or ducted configuration.

The free-blow units (see Figure 1-2) deliver air to the vehicle by means of front and rear end vents and one downward vent (air shower). The vents may all be opened or closed to direct air as desired. The front and rear vents are fitted with motorized dampers that oscillates to produce an "air-sweep" effect. These units may be fitted with optional electric heat.

The ducted units (see Figure 1-5 and Figure 1-10) deliver air through ducting built in the vehicle ceiling. These units are fitted with a 12 VDC microprocessor control system, a display panel (PCB display) and a remote controller. These units may be wired to provide thermostatic control of the vehicle furnace.

Carrier's AirV air conditioning models include cooling only units, heating/cooling units, and heat pump units. The cooling only units are available with free blow or ducted air delivery. Cooling units with heat strips are available for free blow only.

Operation of the AirV units is controlled automatically by the temperature controller (thermostat), which maintains the vehicle's interior temperature at the desired set point. Free Blow, cool-only units are available with a wall mounted thermostat.

Table 1-1 lists Upper Unit AirV model numbers and descriptions. Table 1-2 lists Ceiling Unit model numbers and descriptions. Table 1-3 lists additional support manuals that are available.

#### 1.2 SERIAL NUMBER IDENTIFICATION

Separate part numbers and serial numbers are provided for the upper and lower unit assemblies. The numbers may be found on plates readable from inside the vehicle, See Figure 1-11 or Figure 1-12.


The first two numbers of the serial number, see Figure 3-23, is the week the unit was manufactured. For example, 01 would designate the first week of the year and 52 would designate the last week of the year.

The third and fourth numbers designate the year in which the unit was manufactured. For example, 99

would represent the year 1999, 00 the year 2000, and so on.

The letter Y and all the numbers after it designates the unit serial number. Example: Y43210

A serial number of 1303Y12345 designates that the unit was manufactured the 13th week of 2003 and the serial number is Y12345.

	MODEL No.		<b>68RV14102A</b>	
	Part No.		<b>99-00468-01</b>	
VOLTS		<b>115</b> V		
ph		<b>1</b>	hz	<b>60</b>
<b>Carrier</b> Air Conditioning <small>Division of Carrier Corporation</small>	CAPACITY		<b>13,500</b> Btu/h	
			<b>3,955</b> W	
USE <b>20</b> AMP <small>TIME DELAY FUSE OR CIRCUIT BREAKER</small>		AMPS		<b>13.5</b> A
		DATE OF Mfg		<b>05/03</b>
		SERIAL No.		<b>1303Y12345</b>
		DESIGN PSIG HIGH 350 LO 150		
		R-22	oz	<b>15.9</b>
			kg	<b>0.45</b>
COMPRESSOR		RLA	<b>12.5</b>	
FAN MOTOR		FLA	<b>2.58</b>	
USE CEILING ASSY/ANY		<b>99-00469-01</b>		

**Figure 1-1 Model/Serial Number Plate (Typical)**

#### 1.3 DESIGN CHANGE DESCRIPTIONS

The following list provides a description of changes in design and serial number breaks for those changes.

**0703Y (Power Assembly) & 1903Y (Control Assembly)**  
 New style PCB - Cool Mode - Control & Power Assembly (Fans shut off in auto mode).

**0803Y (Power Assembly) & 2603Y (Control Assembly)**  
 New style PCB - Heat Pump - Control & Power Assembly (Fans shut off in auto mode).

**4204Y** Minimum furnace setpoint lowered from 63°F to 45°F.

**3808Y** Changed standard profile blower wheel type from aluminum boss to ring compression type.

**Table 1-1 Model Chart**

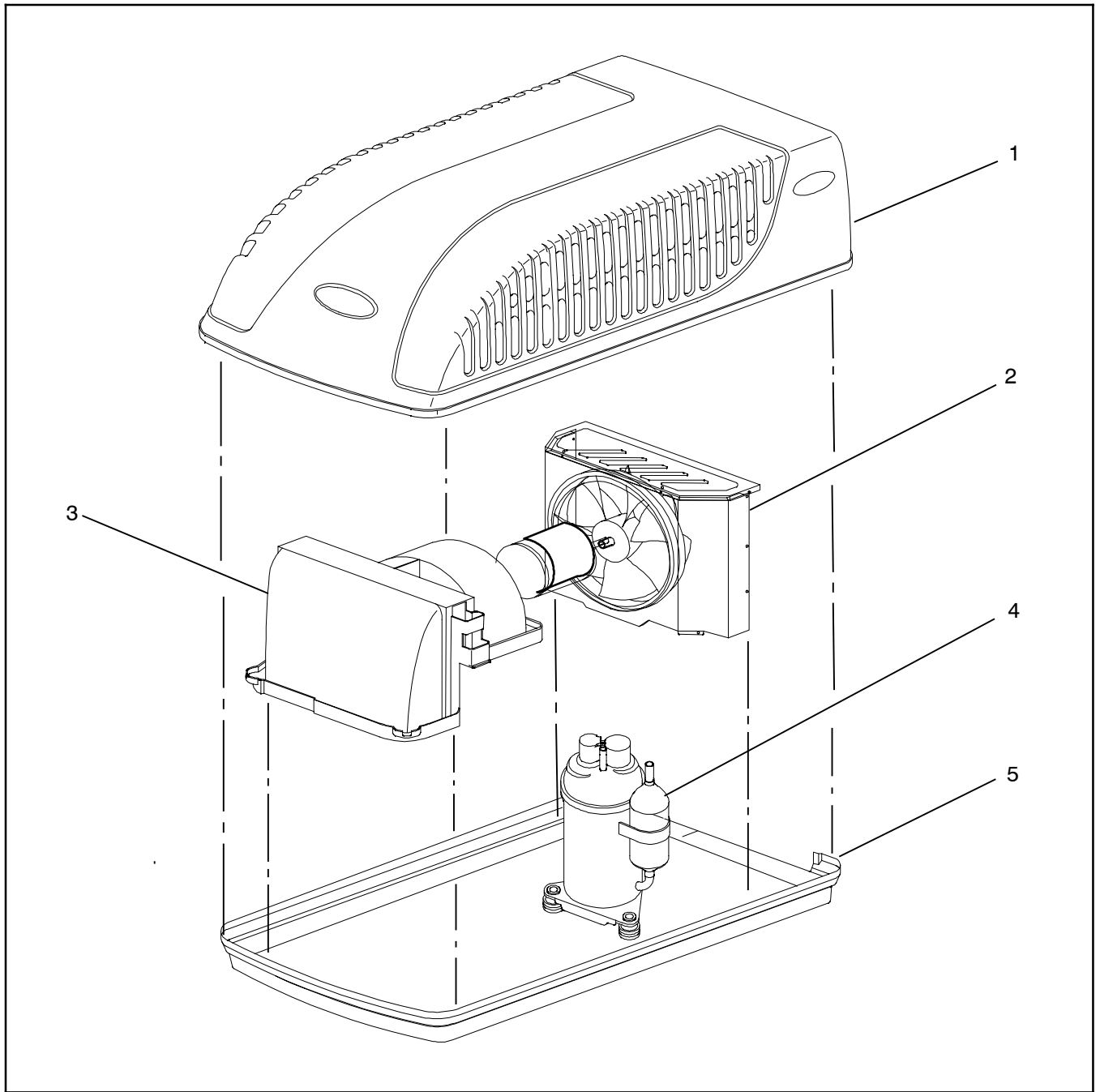
<b>UPPER UNIT (ROOF)</b>					
<b>MODEL NUMBER</b>	<b>PART NUMBER</b>	<b>CONFIGURATION</b>	<b>VOLTAGE</b>	<b>AMPS</b>	<b>COLOR</b>
68RV14102A	99-00468-00	STANDARD A/C	115/1/60	12.8	WHITE
	99-00468-01	STANDARD A/C	115/1/60	12.8	IVORY
	99-00469-20	STANDARD A/C	115/1/60	12.8	BLACK
68RV11302A	99-00468-02	STANDARD A/C	220/1/50	5.3 COOL	WHITE
	99-00468-03	STANDARD A/C	220/1/50	6.7 HEAT	IVORY
68RV15102A	99-00468-08	HIGH-CAPACITY	115/1/60	14.1	WHITE
	99-00468-09	HIGH-CAPACITY	115/1/60	14.1	IVORY
	99-00468-28	HIGH-CAPACITY	115/1/60	14.1	BLACK
HEAT PUMP 68RV11122A	99-00468-04	HEAT PUMP FREE-BLOW	115/1/60	12.7 COOL 10.9 HEAT	WHITE
	99-00468-05	HEAT PUMP FREE-BLOW	115/1/60	12.7 COOL 10.9 HEAT	IVORY
	99-00468-24	HEAT PUMP FREE-BLOW	115/1/60	12.7 COOL 10.9 HEAT	BLACK
HEAT PUMP 68RV11112A	99-00468-06	HEAT PUMP DUCTED	115/1/60	12.7 COOL 10.9 HEAT	WHITE
	99-00468-07	HEAT PUMP DUCTED	115/1/60	12.7 COOL 10.9 HEAT	IVORY
	99-00468-26	HEAT PUMP DUCTED	115/1/60	12.7 COOL 10.9 HEAT	BLACK
LOW PROFILE 68RV15103A	99-00468-10	FREE-BLOW HIGH CAPACITY	115/1/60	14.1 COOL 13.8 HEAT	WHITE
	99-00468-32	FREE-BLOW HIGH CAPACITY	115/1/60	14.1 COOL 13.8 HEAT	BLACK
LOW PROFILE 68RV14103A	99-00468-12	FREE-BLOW STANDARD	115/1/60	13.4 COOL 13.8 HEAT	WHITE
	99-00468-30	FREE-BLOW STANDARD	115/1/60	13.4 COOL 13.8 HEAT	BLACK
LOW PROFILE 68RV14113A	99-00468-13	HEAT PUMP HIGH CAPACITY	115/1/60	14.5 COOL 13.8 HEAT	WHITE
	99-00468-33	HEAT PUMP DUCTED	115/1/60	12.7 COOL 10.9 HEAT	BLACK
LOW PROFILE 68RV14123A	99-00468-11	HEAT PUMP FREE-BLOW	115/1/60	12.7 COOL 10.9 HEAT	WHITE

**TABLE 1-2 MODEL CHART**

<b>CEILING UNIT</b>					
<b>MODEL NUMBER</b>	<b>PART NUMBER</b>	<b>VOLTAGE</b>	<b>COLOR</b>	<b>OPTIONS</b>	<b>INTERFACE</b>
68RV0010AA	99-00469-00	115/1/60	White	Cool Only	Free-Blow
	99-00469-01	115/1/60	Ivory	Cool Only	Free-Blow
68RV0010BA	99-00469-02	115/1/60	White	Heat/Cool	Free-Blow
	99-00469-03	115/1/60	Ivory	Heat/Cool	Free-Blow
68RV0010KA	99-00469-06	115/1/60 (12VDC)	White	Cool Only	Ducted
68RV0030AA	99-00469-04	220/1/50	White	Cool Only	Free-Blow
	99-00469-05	220/1/50	Ivory	Cool Only	Free-Blow
68RV0030BA	99-00469-08	220/1/50	White	Heat/Cool	Free-Blow
68RV0030KA	99-00469-10	220/1/50	White	Cool Only	Ducted
68RV0012CA	99-00469-11	115/1/60	White	Heat Pump	Free-Blow
	99-00469-12	115/1/60	Ivory	Heat Pump	Free-Blow
68RV0011LA	99-00469-13	115/1/60 (12VDC)	White	Heat Pump	Ducted
68RV0010EA	99-00469-17	115/1/60 (12VDC)	White	Heat/Cool	Free-Blow Wall Thermostat
68RV0040MA	99-00469-22	115/1/60	White	Cool Only	Ducted Wall Thermostat
68RV0010AB (Phased Out)	99-00469-23	115/1/60	White	Cool Only	Free-Blow
	99-00469-24	115/1/60	Ivory	Cool Only	Free-Blow
68RV0010BB (Phased Out)	99-00469-25	115/1/60	White	Heat/Cool	Free-Blow
	99-00469-26	115/1/60	Ivory	Heat/Cool	Free-Blow
68RV0010DB	99-00469-29	115/1/60	White	Cool Only	Free-Blow Wall Thermostat
68RV0010EB	99-00469-31	115/1/60	White	Heat/Cool	Free-Blow Wall Thermostat
68RV0012FB	99-00469-33	115/1/60	White	Heat Pump	Free-Blow Wall Thermostat
68RV0010KS	99-00469-35	115/1/60	White	Cool Only Thick Roof Kit	Ducted Remote
68RV0011KS	99-00469-36	115/1/60	White	Heat Pump Thick Roof Kit	Ducted Remote
68RV0010MS (Phased Out)	99-00469-37	115/1/60	White	Cool Only Thick Roof Kit	Ducted W/Wall Sensor
68RV0011OS (Phased Out)	99-00469-38	115/1/60	White	Heat Pump Thick Roof Kit	Ducted W/Wall Sensor

**TABLE 1-3 ADDITIONAL SUPPORT MANUALS**

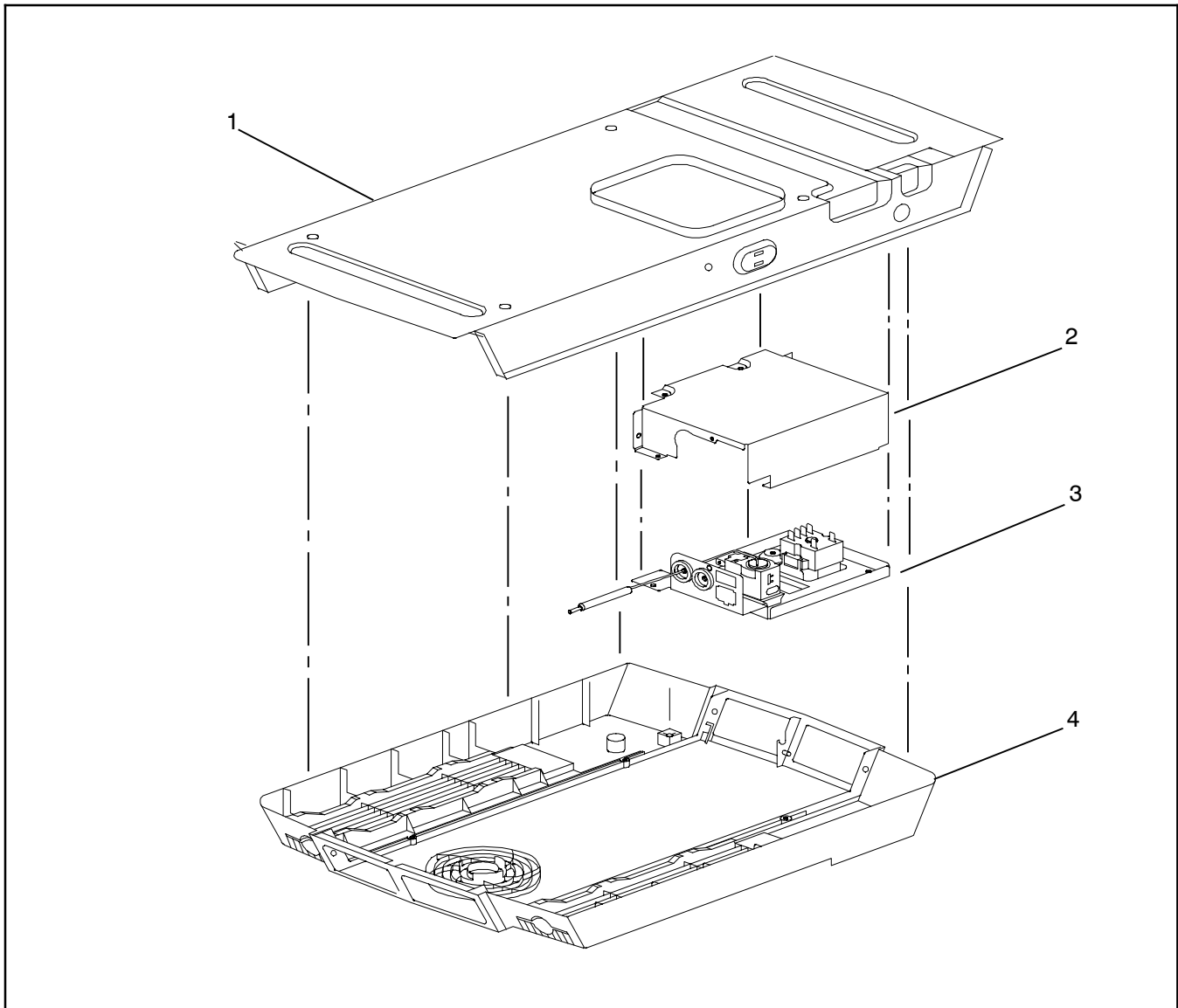
<b>MANUAL-FORM NO.</b>	<b>EQUIPMENT COVERED</b>	<b>TYPE OF MANUAL</b>	<b>(For) PART NO.</b>
71LC6A5431A	AirV 115 Volts-Free Blow (Cool Only)	Owner's Guide	99-00469-00 99-00469-01
71LH6A5407A	AirV 115 Volts-Free Blow (Heat-Cool)	Owner's Guide	99-00469-02 99-00469-03
71LD6A54070	AirV 115 Volts-Ducted (Cool Only)	Owner's Guide	99-00469-06
71LH6A5407A	AirV 220 Volts-Free Blow (Heat-Cool)	Owner's Guide	99-00469-08 99-00469-09
71RQ6A5401B	AirV 115 Volts-Free Blow (Heat Pump)	Owner's Guide	99-00469-11 99-00469-12
71LQ6A54010	AirV 115 Volts-Ducted (Heat Pump)	Owner's Guide	99-00469-13
71DW6A54070	AirV 115 Volts-Ducted Wired Thermostat	Owner's Guide	99-00469-22
71LC6A5431A	AirV 115 Volts-Free Blow (Cool Only)	Owner's Guide	99-00469-23 99-00469-24
71LH6A5407A	AirV 115 Volts-Free Blow (Heat-Cool)	Owner's Guide	99-00469-25 99-00469-26
71RW6A54310	AirV 115 Volts-Free Blow Wired Thermostat	Owner's Guide	99-00469-29
71LD6A54070	AirV 115 Volts-Free Blow Wired Thermostat	Owner's Guide	99-00469-35
71LQ6A54010	AirV 115 Volts-Free Blow Wired Thermostat	Owner's Guide	99-00469-36
71DJ6A54070	AirV 115 Volts-Free Blow Wired Thermostat	Owner's Guide	99-00469-37
71DK6A54010	AirV 115 Volts-Free Blow Wired Thermostat	Owner's Guide	99-00469-38
T-298PL	AirV	Service Parts	ALL
62-50455-00	Basic refrigeration	Service Training	ALL



- 1. Cover
- 2. Condenser
- 3. Evaporator

- 4. Compressor
- 5. Base Pan

**Figure 1-2 Roof Unit (Standard) Component Identification**

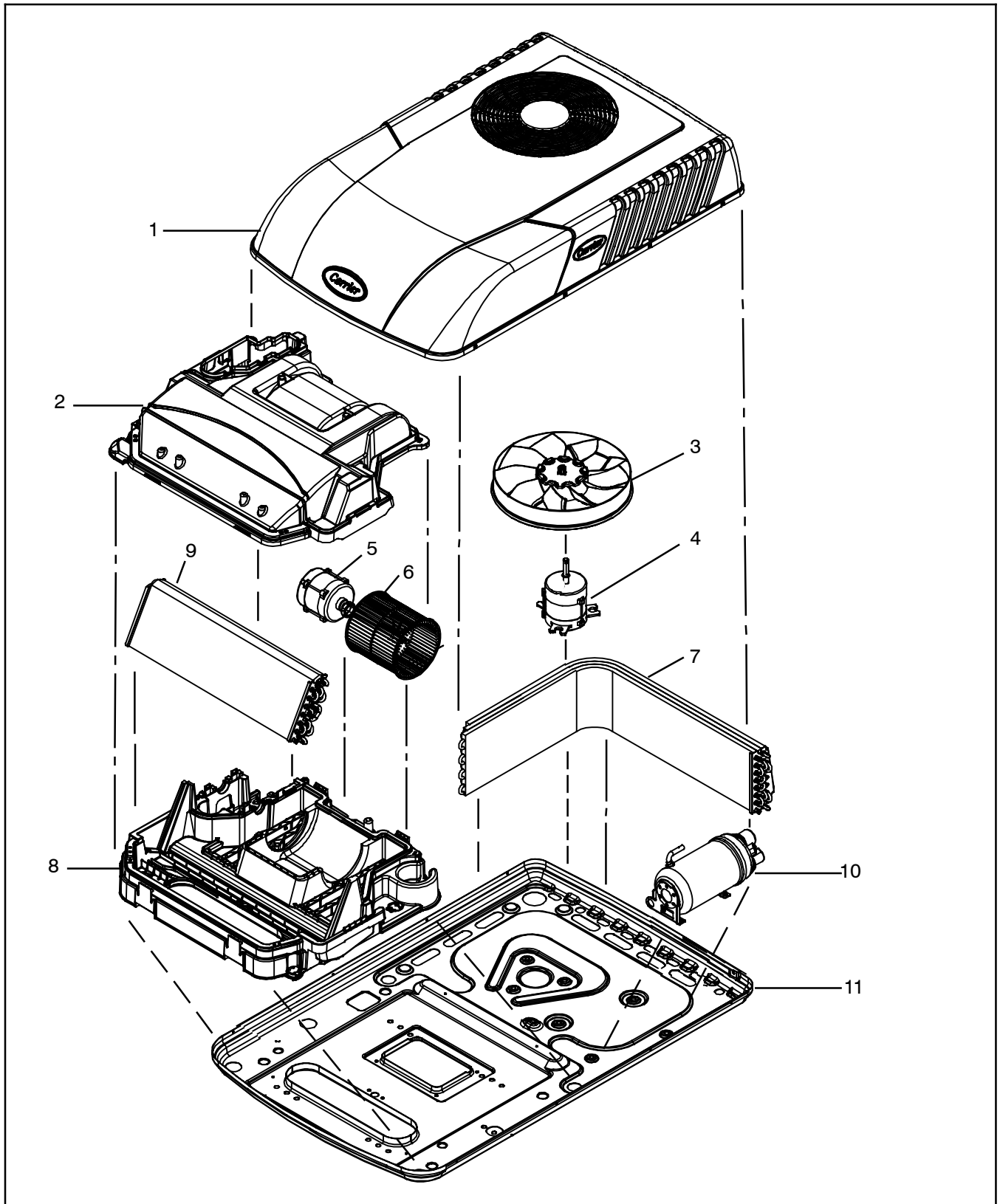


- 1. Ceiling Panel Assembly
- 2. Control Box Cover

- 3. Control Assembly
- 4. Ceiling Grill Assembly

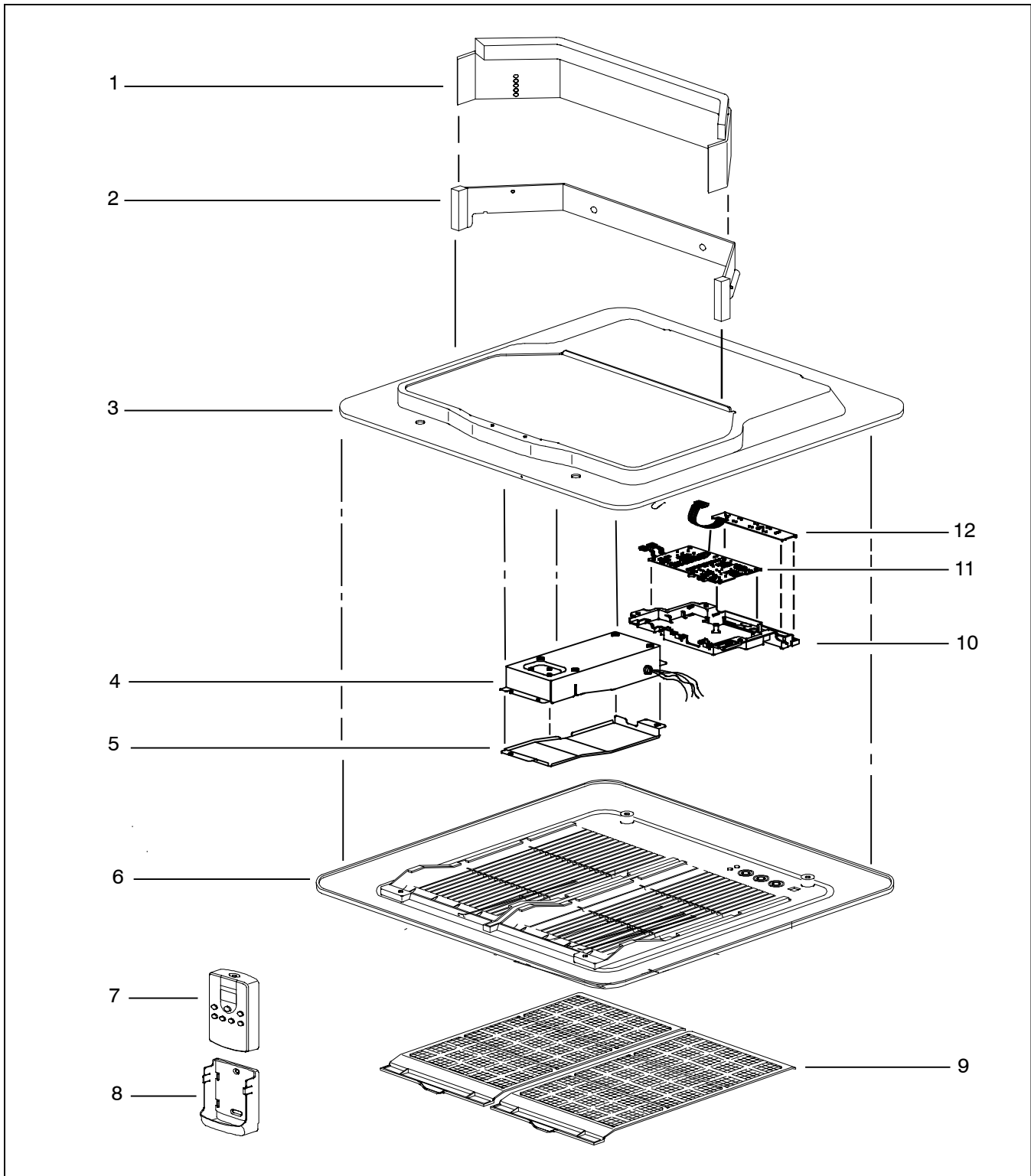
**Figure 1-3 Ceiling Unit Component Identification (Free-Blow)**





- |                            |  |
|----------------------------|--|
| 1. Cover Assembly          | 7. Condenser Coil                              |
| 2. Scroll Assembly - Upper | 8. Scroll Assembly - Lower                     |
| 3. Condenser Fan           | 9. Evaporator Coil                             |
| 4. Condenser Motor         | 10. Compressor                                 |
| 5. Evaporator Motor        | 11. Base Pan Assembly                          |
| 6. Evaporator Blower Wheel | See Figure 1-3 for Ceiling Package (Free-Blow) |

**Figure 1-4 Component Identification - Low Profile - Upper Unit**



- |  |                                    |
|--|------------------------------------|
| 1. Telescoping Divider (3 different sizes available) | 7. Remote Control Assembly         |
| 2. Divider Assembly                                  | 8. Remote Control Bracket Assembly |
| 3. Frame Panel, Insulation Assembly                  | 9. Filter Assemblies (2)           |
| 4. Control Box Assembly                              | 10. PCB Cover                      |
| 5. Control Box Cover                                 | 11. PCB Main Assembly              |
| 6. Suction Packing Assembly                          | 12. PCB Display                    |

**Figure 1-5 Component Listing-Ceiling Unit For Ducted Systems**

#### 1.4 SYSTEM (UNIT) INSTALLED DIMENSIONS

Refer to Figure 1-6 thru Figure 1-9 for installation dimensions of Standard & Low Profile Upper Units & Ducted & Free-Blow Ceiling units.

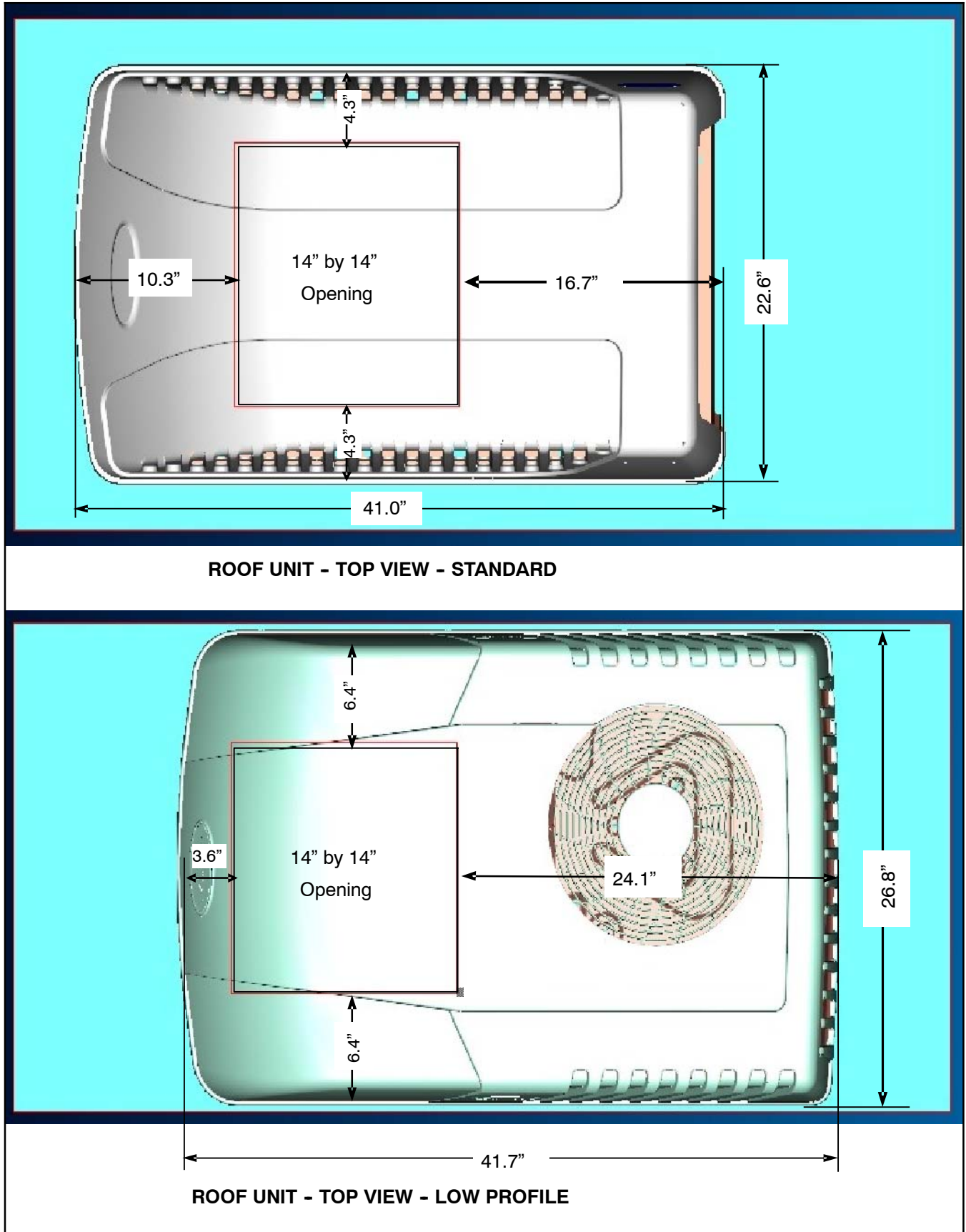
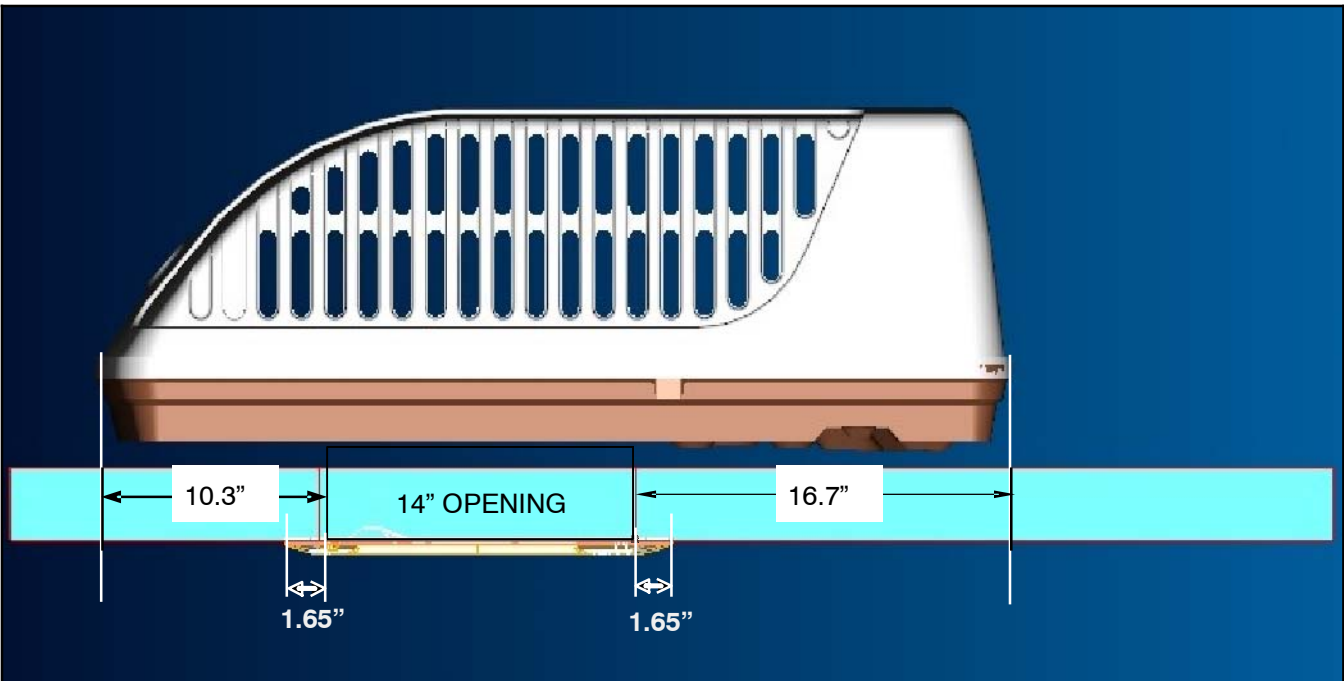
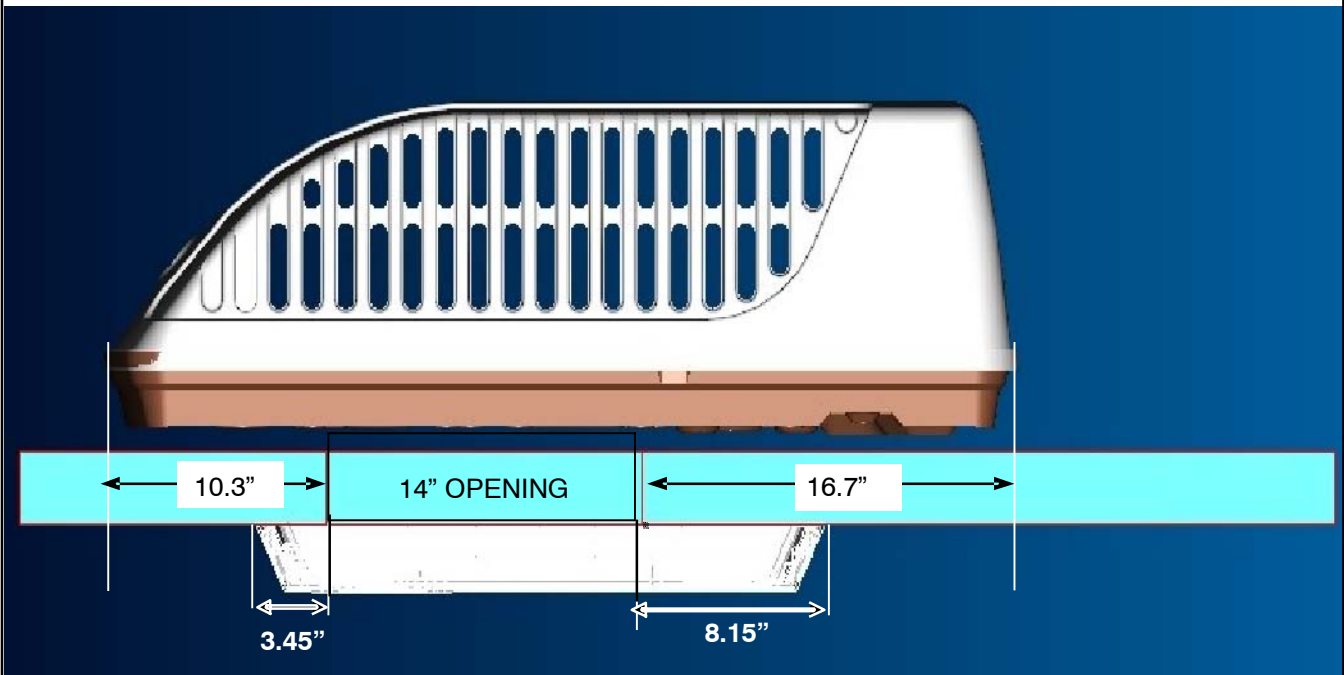


Figure 1-6 Unit Dimensions - Top View - Upper Unit (Roof) Installed



**STANDARD ROOF - DUCTED CEILING**



**STANDARD ROOF - FREEBLOW CEILING**

**Figure 1-7 Unit Dimensions - Standard - Side View - Roof + Ceiling**

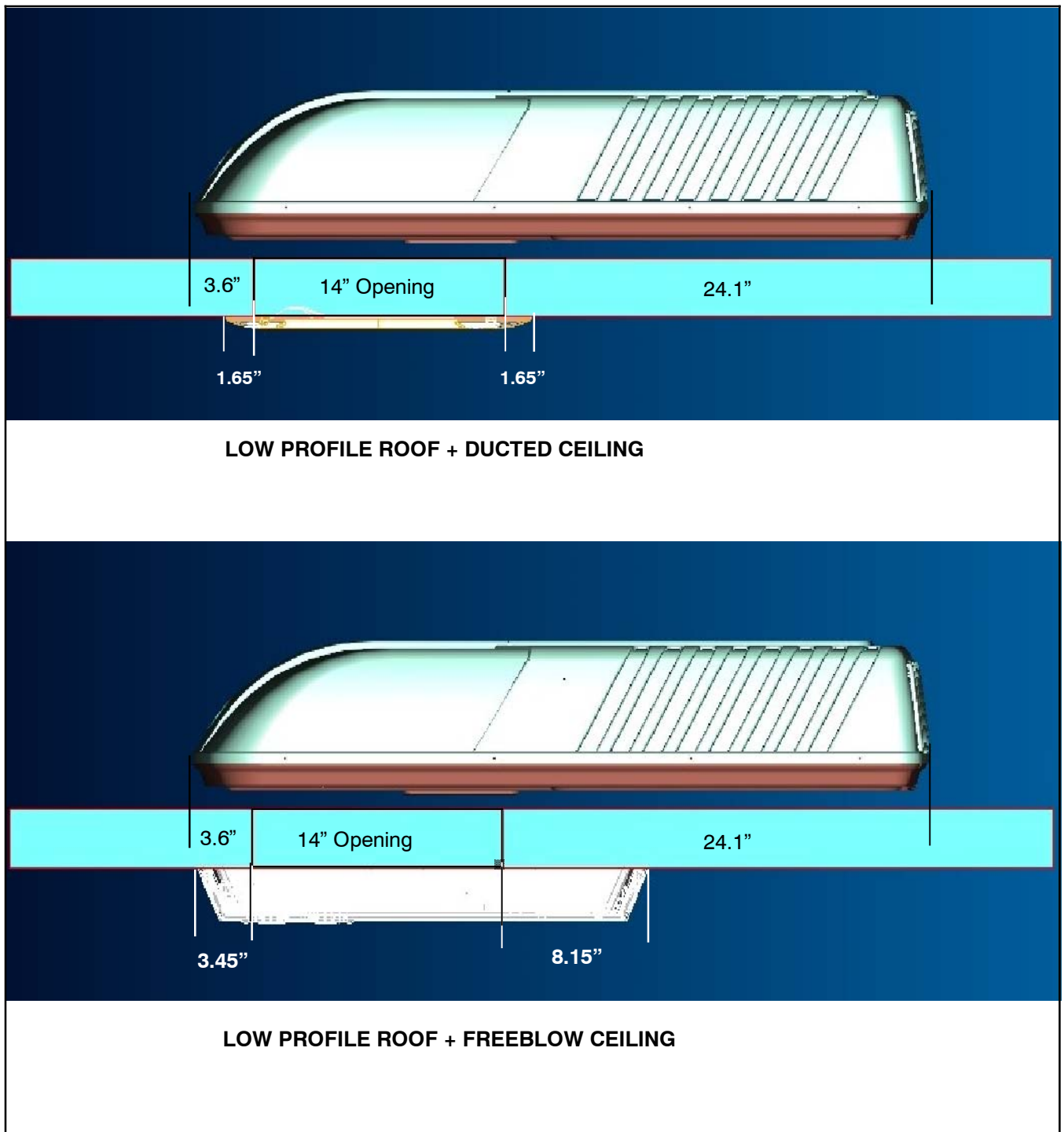
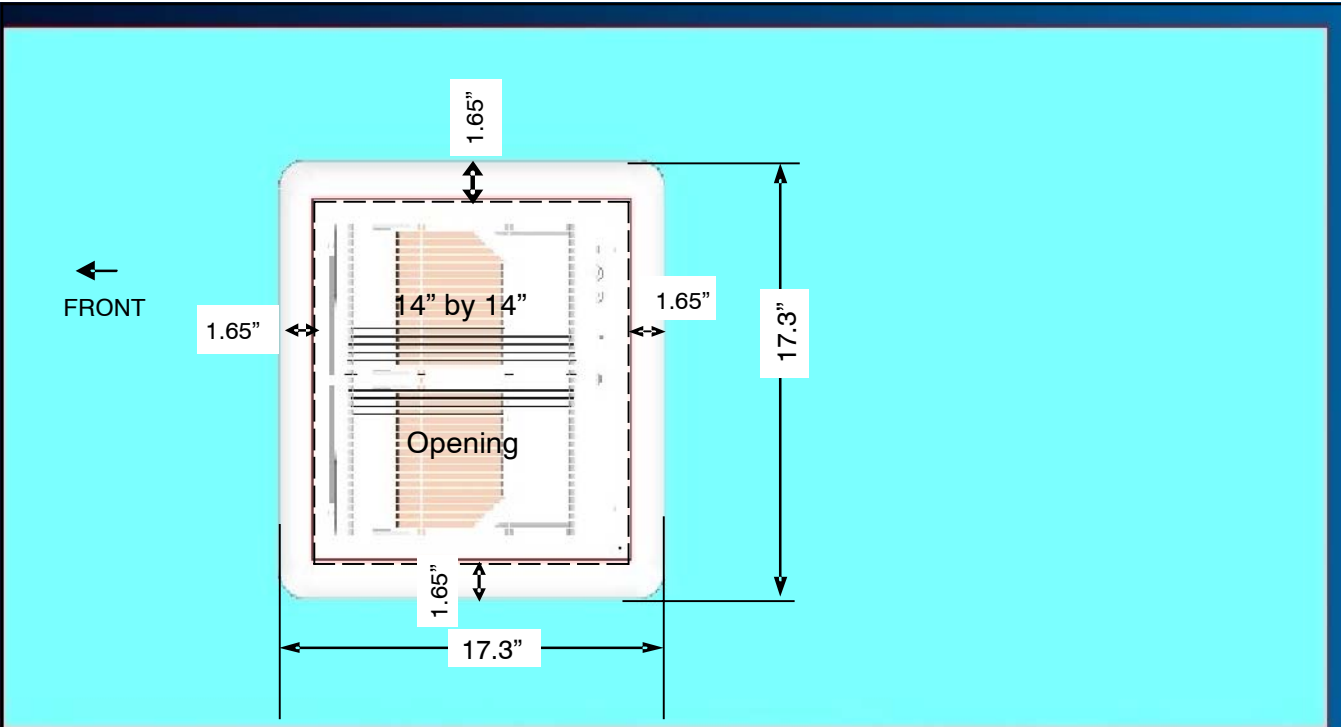
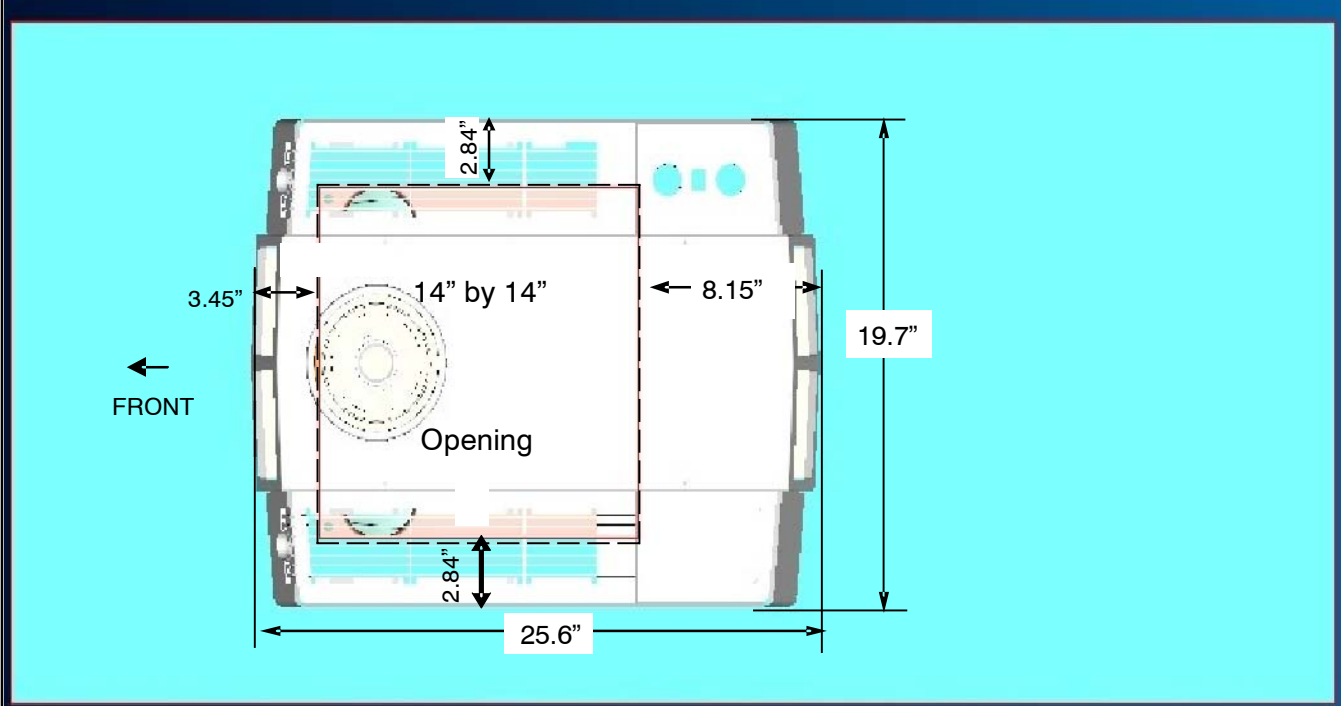


Figure 1-8 Unit Dimensions - Low Profile - Side View - Roof + Ceiling

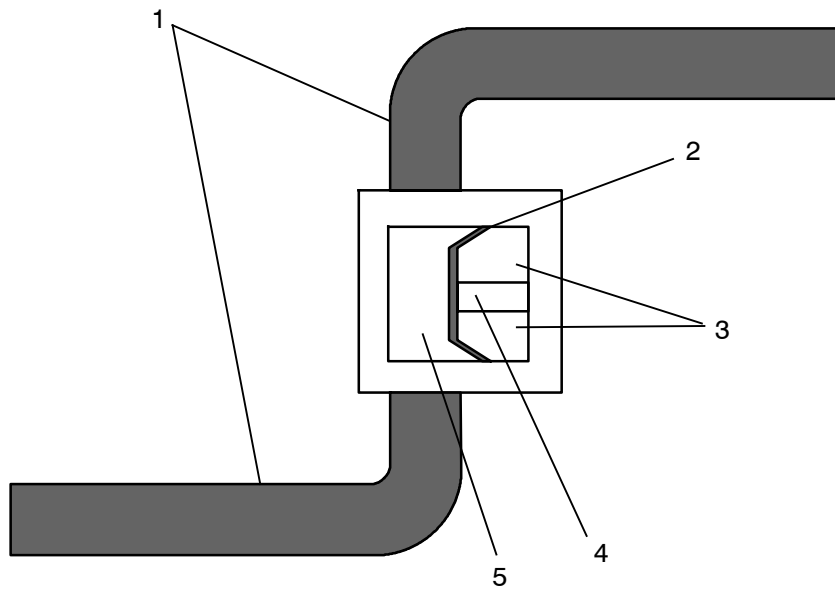


DUCTED UNIT

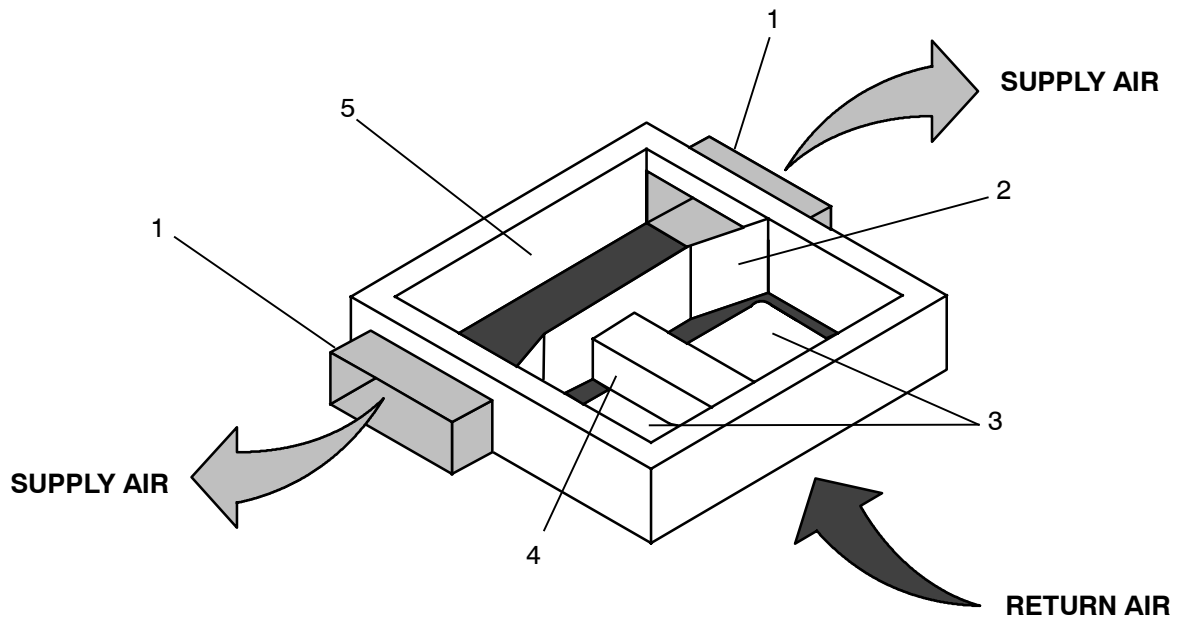


FREEBLOW UNIT

Figure 1-9 Unit Dimensions - Ceiling Unit - Bottom View



### SCHEMATIC VIEW



### INSTALLED VIEW

- |  |                              |
|--|------------------------------|
| 1. Vehicle Duct System (Connection)                  | 4. Control Box Assembly      |
| 2. Telescoping Divider (3 different sizes available) | 5. Supply Air Discharge Area |
| 3. Return Air Suction Area                           |                              |

**Figure 1-10 Ducted System Air Flow Arrangement**

### 1.5 SERIAL NUMBER LOCATIONS

On most applications the Serial/Model Numbers of the Upper Unit and Ceiling Unit have been recorded on the Warranty Registration Form during Installation of the AirV system. In the event that Serial Numbers have not been recorded refer to Figure 1-11 and Figure 1-12 for the location of the Serial/Model Number tags. The ceiling unit covers must be removed in order to see the tags. To see the Free-Blow upper unit tag you must look around the metal ceiling panel. The Serial/Model Number tag for the Ducted Unit is located on the side of the control box.

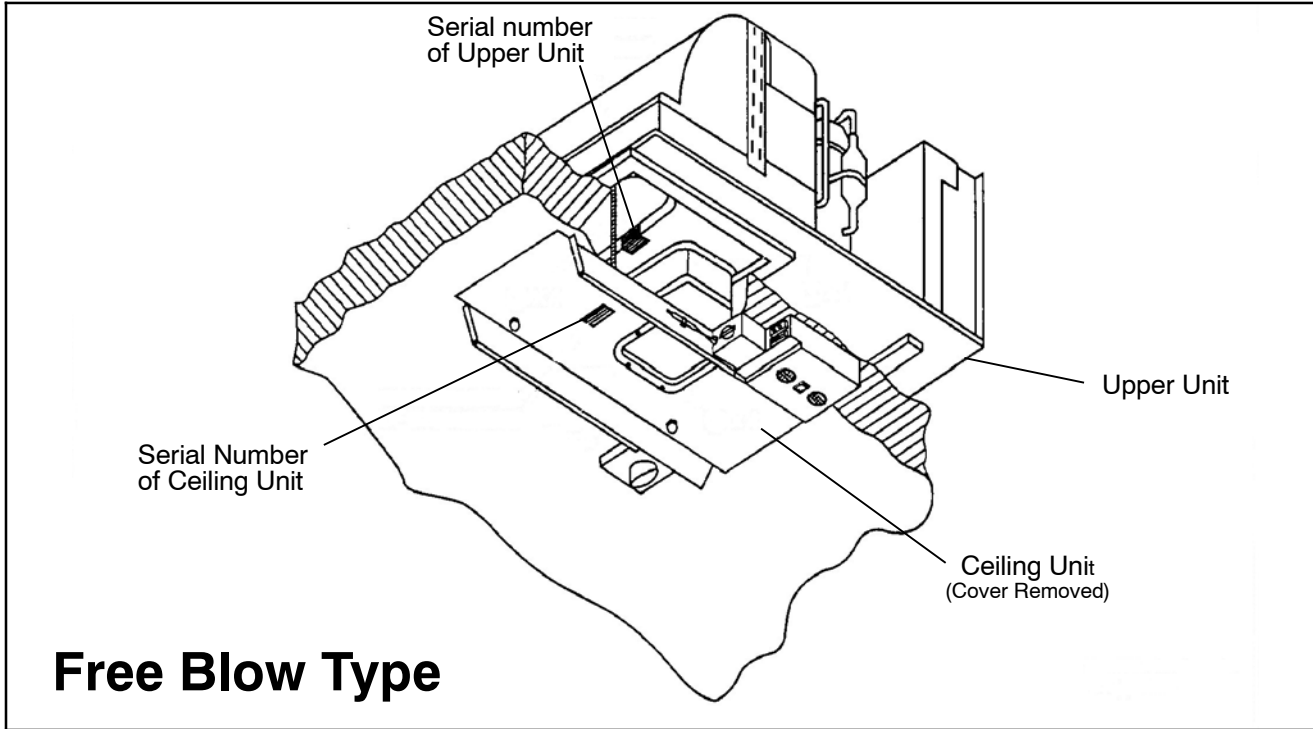


Figure 1-11 Serial Number Locations (Free-Blow)

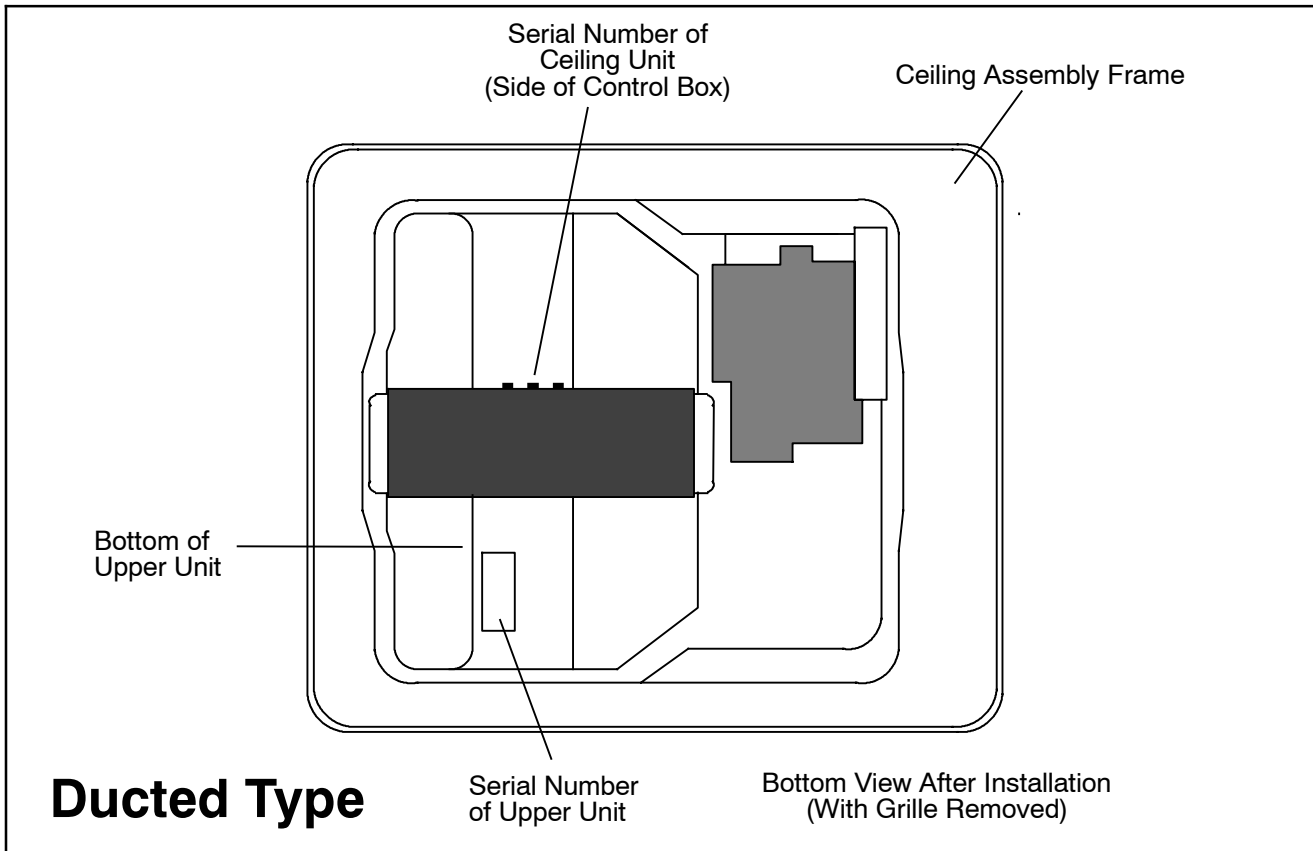


Figure 1-12 Serial Number Locations (Ducted)



## 1.6 AirV SYSTEM COMPONENT SPECIFICATIONS

### 1.6.1 Refrigerant Charge

Standard - High Capacity - Heat Pump

R-22 - 15.9 Ounces

Low Profile (All)

R-22 - 16.9 Ounces

### 1.6.2 Compressor - 115 Volts, 60 Cycles, 1 Phase

#### NOTE

AirV Compressor mounting bolts must be torqued 15/17 ft./lbs.

#### 1. Locked Rotor Amps - Standard - High Capacity - Heat Pump

60.0 AMPS

#### 2. Locked Rotor Amps - Low Profile High Capacity

59.0 AMPS

#### 3. Fully Loaded Amps - Standard

Cooling - Approximate 12.8 AMPS

Heating - N/A

#### 4. Fully Loaded Amps - High Capacity

Cooling - Approx. 14.1 AMPS

Heating - Approx. 11 AMPS

#### 5. Fully Loaded Amps - Low Profile

Cooling - Approx. 13.4 AMPS

Heating - Approx. 13.8 AMPS

#### 6. Fully Loaded Amps - Heat Pump

Cooling - Approx. 12.9 AMPS

Heating - Approx. 13.8 AMPS

### 1.6.3 Compressor - 220 Volts, 50 Cycles, 1 Phase

#### 1. Locked Rotor Amps

23.6 AMPS

#### 1.6.4 Thermostat Range (All Free Blow Units)

61° F (16° C) to 89° F (32° C)

#### 1.6.5 Return Air Sensor (Thermistor)

The Return-Air-Sensor (Thermistor) is part of the PCB Main Assembly. The sensor has a yellow coating and protrudes about 3/16 inch thru the ceiling panel when installed. Refer to Table 3-1 for resistance table.

#### 1.6.6 Heat Pump Sensors (Thermistors)

The Heat Pump systems have a (ODA) outdoor air thermistor and a (ODC) outdoor coil thermistor, both located in the upper unit and a (IDC) indoor coil thermistor located in the ceiling unit. Resistance values for these thermistors can be found in Table 3-2.

## 1.7 START-UP

Refer to operating instructions in Owners Guide (see Table 1-3) packaged with the vehicle system.

## 1.8 Dry Mode Function

This operation effectively eliminates moisture by operating the compressor and fan motor intermittently, so that the room temperature is maintained at set temperature. Compressor will be "on" for 5 minutes, then "off" for 5 minutes. System fan motor will operate on low speed.

#### NOTE

Unit determines Dry Mode by sensing Room Temperature every 5 minutes (3 minute minimum operation of compressor is not applied).

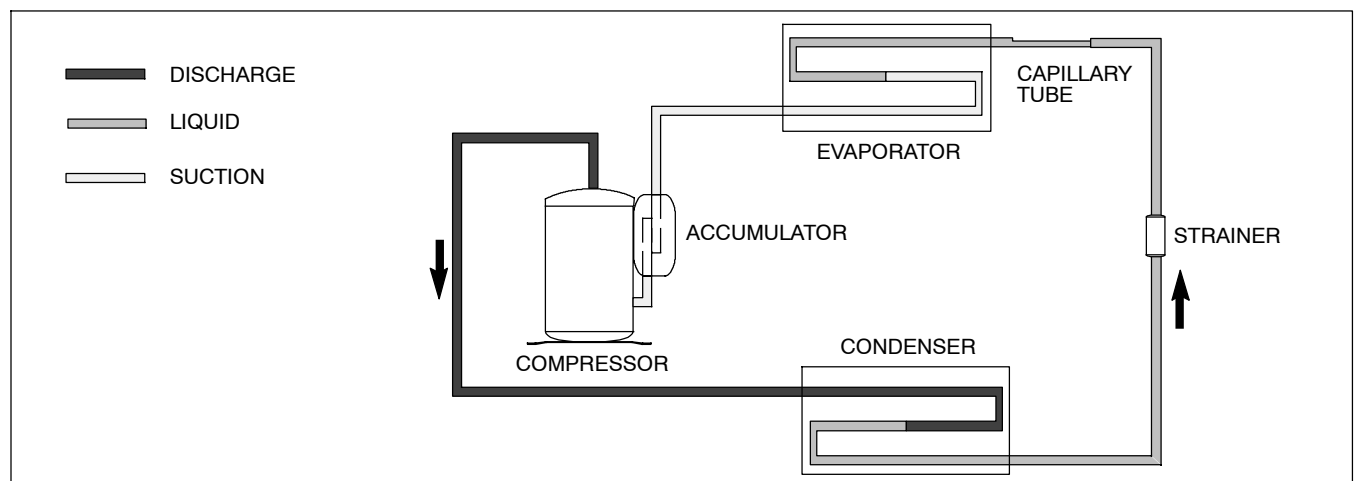


Figure 1-13 Refrigerant Flow Schematic (Standard System)

## 1.9 REFRIGERANT CYCLE-STANDARD SYSTEM

The cooling cycle is energized when the thermostat, located on the ceiling unit, calls for cooling. The main components of the system are the compressor, air-cooled condenser coil, strainer, capillary tube, evaporator coil and accumulator.

The compressor raises the pressure and the temperature of the refrigerant and forces it through the discharge line into the condenser coil. (See Figure 1-13.)

The condenser fan circulates surrounding air (which is at a temperature lower than the refrigerant) over the outside of the coil tubes. Heat transfer is established

from the refrigerant (inside the tubes) to the air (flowing over the tubes). The 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 coil and flows through a strainer to the capillary tube. The strainer removes any impurities within the refrigerant system.

The capillary tube meters the flow of liquid refrigerant to the evaporator coil. As the refrigerant flows through the capillary tube, there is a reduction in pressure and temperature.

The evaporator blower (fan) pulls vehicle air through the filters, which remove particulate matter, and then pass the cleaned air through the evaporator coil.

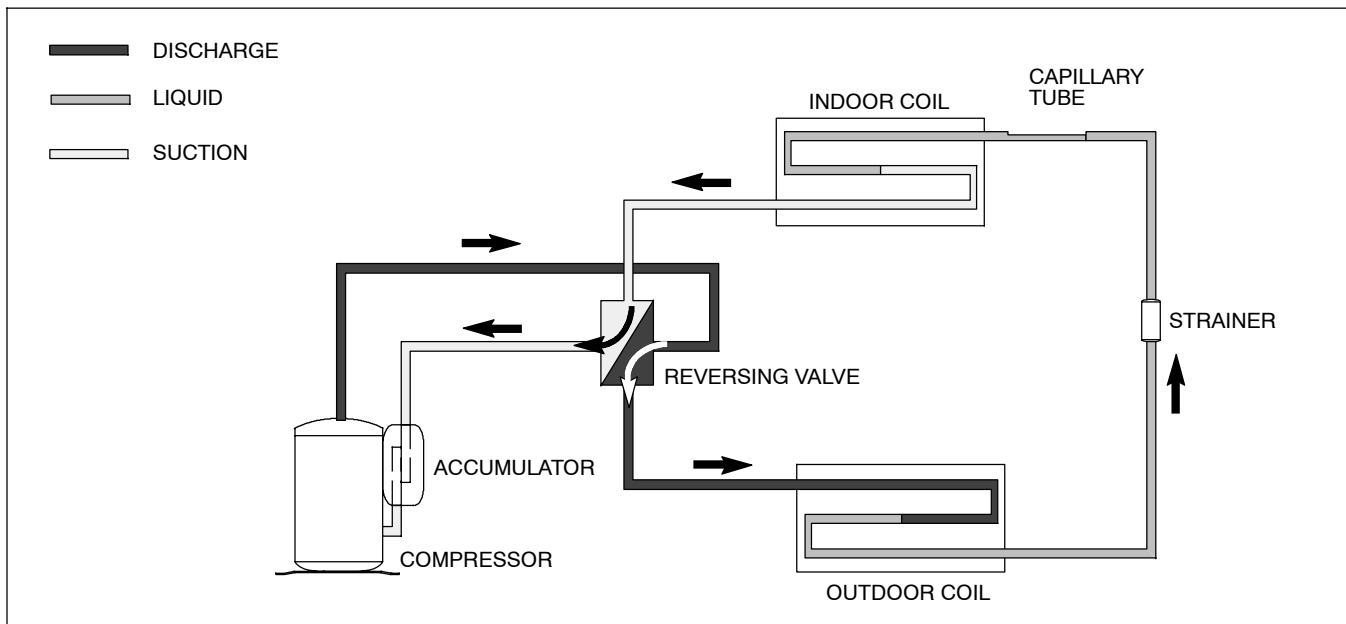
The low pressure, low temperature liquid that flows into the evaporator coil tubes is colder than the air that is circulated over the tubes. Heat transfer is established

from the vehicle air (flowing over the tubes) to the refrigerant (flowing inside the tubes). The evaporator coil 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 vehicle.

The transfer of heat from the air to the low temperature liquid refrigerant in the indoor coil causes the liquid to vaporize. This low temperature, low pressure vapor passes into the accumulator. The accumulator is designed with the inlet tube delivering refrigerant to the bottom of the tank and the outlet tube taking refrigerant from the top of the tank. This arrangement ensures that only vapor refrigerant is returned to the compressor, where the cycle repeats.

When ventilation only is selected, the indoor fan functions to circulate air throughout the vehicle. The refrigerant cycle will remain off.

## 1.10 REFRIGERANT CYCLE - HEAT PUMP



**Figure 1-14 Refrigerant Flow Schematic - Heat Pump - (Cool Mode)**

### 1.10.1 Cooling

The cooling cycle is energized when the thermostat, located in the ceiling unit, calls for cooling. The system controls are positioned for “normal” refrigerant flow, with the compressor discharge delivered to the outdoor coil and liquid delivered to the indoor coil. (See Figure 1-14.)

The main components of the system are the compressor, reversing valve, air-cooled outdoor coil, strainer, capillary tube, indoor coil, and the accumulator.

The compressor raises the pressure and the temperature of the refrigerant and forces it through the discharge line and reversing valve into the outdoor coil.

The outdoor fan circulates surrounding air (which is at a temperature lower than the refrigerant) over the outside of the coil tubes. Heat transfer is established from the refrigerant (inside the tubes) to the outdoor air (flowing over the tubes). The 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 coil and flows through the strainer to the capillary tube. The strainer removes any impurities within the refrigerant system.

The capillary tube meters the flow of liquid refrigerant to the indoor coil. As the refrigerant flows through the capillary tube, there is a reduction in pressure and temperature.

The indoor blower (fan) pulls inside air through the filters, which remove particulate matter, and then pass the cleaned air through the indoor coil.

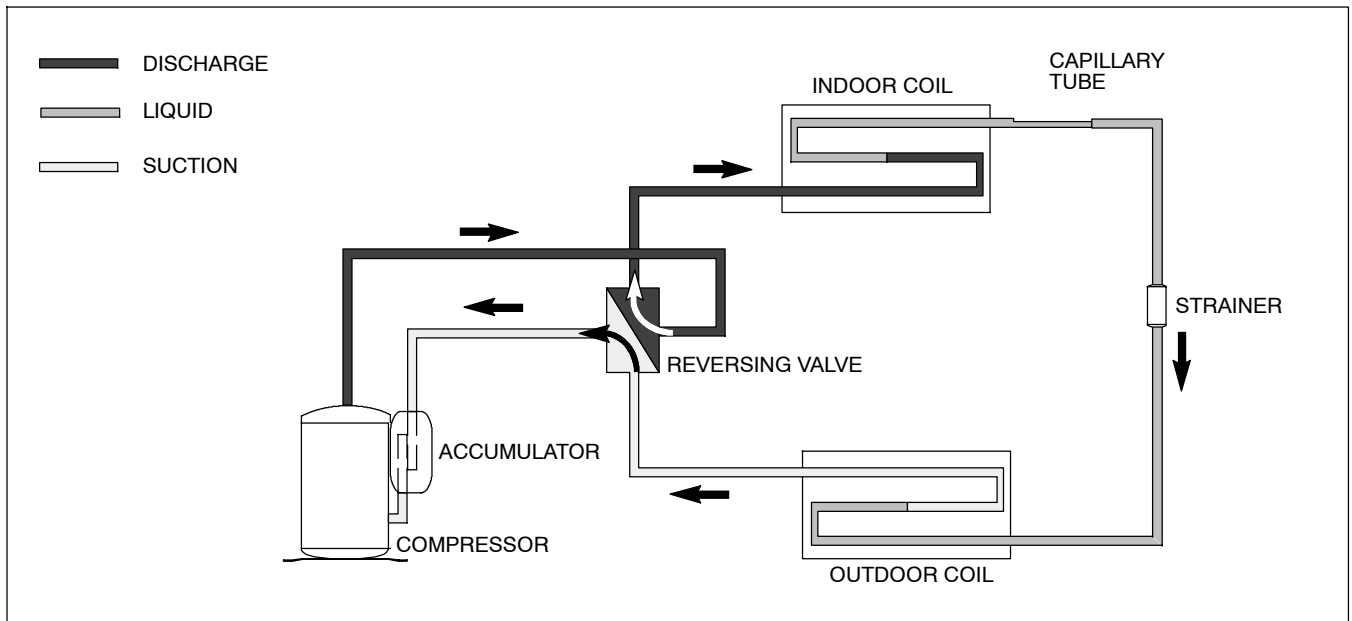
The low pressure, low temperature liquid that flows into the indoor coil tubes is colder than the air that is circulated over the tubes. Heat transfer is established from the indoor air (flowing over the tubes) to the refrigerant (flowing inside the tubes). The indoor coil tubes have aluminum fins to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

The transfer of heat from the air to the low temperature liquid refrigerant in the indoor coil causes the liquid to vaporize. This low temperature, low pressure vapor

passes into the accumulator. The accumulator is designed with the inlet tube delivering refrigerant to the bottom of the tank and the outlet tube taking refrigerant from the top of the tank. This arrangement ensures that only vapor refrigerant is returned to the compressor,

where the cycle repeats.

When ventilation only is selected, the indoor fan functions to circulate air throughout the vehicle. The refrigerant cycle will remain off.



**Figure 1-15 Refrigerant Flow Schematic - Heat Pump - (Heat Mode)**

### 1.10.2 Heating

The heating cycle is energized when the thermostat, located in the ceiling unit, calls for heat. The system controls are positioned for “reverse” refrigerant flow, with the compressor discharge delivered to the indoor coil and liquid delivered to the outdoor coil. (See Figure 1-15.)

The main components of the system are the compressor, reversing valve, indoor coil, capillary tube, strainer, air-cooled outdoor coil, and the accumulator.

The compressor raises the pressure and the temperature of the refrigerant and forces it through the discharge line and reversing valve into the indoor coil.

The indoor blower (fan) pulls inside air through the filters, which remove particulate matter, and then pass the cleaned air through the indoor coil.

The vehicle air (which is at a temperature lower than the refrigerant) passes over the outside of the coil tubes. Heat transfer is established from the refrigerant (inside the tubes) to the vehicle air (flowing over the tubes). The 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 coil and flows through the strainer to the outdoor coil. The strainer removes any impurities within the refrigerant system.

The capillary tube meters the flow of liquid refrigerant to the outdoor coil. As the refrigerant flows through the capillary tube, there is a reduction in pressure and temperature.

The low pressure, low temperature liquid that flows into the outdoor coil tubes is colder than the outdoor air that is circulated over the tubes. Heat transfer is established from the outdoor air (flowing over the tubes) to the

refrigerant (flowing inside the tubes). The outdoor coil tubes have aluminum fins to increase heat transfer from the air to the refrigerant.

The transfer of heat from the air to the low temperature liquid refrigerant in the outdoor coil causes the liquid to vaporize. This low temperature, low pressure vapor passes into the accumulator. The accumulator is designed with the inlet tube delivering refrigerant to the bottom of the tank and the outlet tube taking refrigerant from the top of the tank. This arrangement ensures that only vapor refrigerant is returned to the compressor, where the cycle repeats.

When ventilation only is selected, the indoor fan functions to circulate air throughout the vehicle. The refrigerant cycle will remain off.

## 1.11 FREQUENTLY ASKED QUESTIONS AND ANSWERS

### 1. Q) - Can a Heat Strip be added to a (Cool Only) Freelow Unit?

A) No. The addition of a heat strip requires a new ceiling assembly (Pt# 99-00469-02). The Master Switch and Thermostat have additional functions to accommodate heat. The Thermostat is dual position (SPDT) contacts as opposed to single position (SPST).

### 2. Q) - Why is the plug on the heat strip too short to reach the connector?

A) The heat strip is secured for shipping purposes. Remove the heat strip, flip it over and mount it in the airflow. When properly installed in this manner the interface cable will reach.

**3. Q) - Why will the ducted (remote control) unit run in fan and heat mode, and the green "ON" light flash 5 times over and over?**

A) The system has locked out due to "Compressor Circuit" being interrupted for abnormal reason during operation. This can be caused by power interruption or voltage drop (Brown-Out). The electronics monitors the voltage to the unit and will lock-out for safety. To 're-set", disconnect the 12 VDC from the electronic controls for 15 seconds and re-connect. If the alarm comes back in, check the 115 vac with amp meter to determine unit amp draw (with compressor and fan running) is within specifications according to unit model (Refer to Table 1-1).

**4. Q) - How do I know if the unit is cooling OK? It doesn't seem to be cold enough.**

A) Check to see if filters are clean. Once cleaned, take the temperature of the air going into the filters and compare to the air temperature coming out of the unit (If ducted - take reading as close as possible to unit air outlet). The temperature difference (Delta-T) should be 20 to 25 degrees. This test requires the interior temperature to be warm enough to provide a good heat load to the air conditioning system. If the interior temperature is cold, the temperature drop may not be as high as 20 to 25 degrees.

If the temperature drop is not as described above, take an amp draw on the units 115 vac and compare to correct model in Table 1-1.

**5. Q) - When the remote controlled unit is turned on, the compressor runs 5 minutes and then shuts off, then repeats. You reset the 12 VDC and the same thing keeps happening. What's is wrong?**

A) There is a temperature sensor probe that should be inserted into the indoor (evaporator) coil at time of installation. It needs to see a temperature drop within 5 minutes of compressor start up to confirm proper operation. Check to see if the probe has been inserted into the coil and if properly. Probe is 2.5 to 3 inches in length with 2 brown wires (See "Owner's Guide" that came with the system).

**6. Q) - The temperature on the remote control goes up 2 degree increments most of the time and 1 degree increments other times. Why?**

A) When the remote control was developed, it was done using the Celsius scale. When converted to Fahrenheit, it will stage in 2 degree (F) increments most times, and occasionally kit 1 degree increment. This is normal, and cannot be changed.

**7. Q) - On some remote control systems the temperature on furnace mode goes down to 63 degrees, while on another remote control system the temperature in furnace mode goes down to 45 degrees. Why is that?**

A) Initially the lowest set point for furnace mode 63 degrees. Starting with ceiling unit serial numbers after 4204Y the furnace setpoint was lowered to 45 degrees.

**Note**

The first 2 numbers in the serial number relate to the week of the year manufactured; the 3rd and 4th digits relate to the year of manufacture. Example: 4204Y was manufactured the 42nd week of 2004.

**8. Q) - The Freeblow ceiling package with manual thermostat, what is the temperature range?**

A) The manual control Thermostat on a freeblow ceiling unit is 61 to 89 degrees F.

**9. Q) - The Freeblow ceiling unit fan runs all the time, even when the compressor shuts down. Is this normal?**

A) Yes, the Freeblow unit is designed to have the fan run continuously.

**10. Q) - There is a red light blinking on the ducted remote control unit. What is this?**

A) The blinking red light indicates that 12 VDC is installed and powered to the unit controls. If there is no light blinking, the unit controls will not operate the 115 VAC equipment.

**11. Q) - Is there a wall mounted thermostat available to control a Carrier AirV Heat Pump?**

A) No, wall mounted thermostats are only available for Freeblow and Ducted Cool Only units.

**12. Q) - What are the electrical requirements for each AirV unit.**

A) Each unit should have a dedicated 20 Amp (12 gage wire with ground) protected circuit.

**13. Q) - The heat strip on the Freeblow unit no longer works. Is a new one needed?**

A) Not necessarily. Heat strips manufactured after 3507Y are equipped with a manual reset overload protector. Remove required components to access the electrical connections at the heat strip assembly. On the back of the overload protector there is a "RED" reset button. Push the button in till it clicks to reset. If no reset button is present the unit was manufactured prior to 3507Y. Check element for open circuit or resistance value of 9 Ohms.

**14. Q) - The remote control set temperature seems to be off by 3 or 4 degrees from the ceiling unit. Why is this?**

A) The temperature is sensed at the ceiling unit, not at the remote control. The temperature offset can be even more with RV's with higher ceilings. This is more common in heat mode, as warm air rises.

## SECTION 2

### TROUBLESHOOTING

For ducted units, the GREEN operation indicator LED (See Figure 3-9) will flash if there is a problem. Refer to Table 2-1 for diagnostic information.

SYMPTOM AND PROBABLE CAUSE	PROBABLE REMEDY
<b>2.1 NO POWER TO UNIT</b>	
<ol style="list-style-type: none"><li>1. Master switch off</li><li>2. Open circuit breaker</li><li>3. Defective wiring</li><li>4. Loose electrical connections</li><li>5. Faulty switches, thermostat, or fan</li><li>6. 12 VDC not connected (Ducted System)</li><li>7. 12 VDC in-line fuse open (Ducted)</li></ol>	<ol style="list-style-type: none"><li>1. Reset master switch</li><li>2. Reset circuit breaker</li><li>3. Replace wiring</li><li>4. Tighten connections</li><li>5. Replace defective components</li><li>6. Connect to 12 VDC power source</li><li>7. Replace fuse</li></ol>
<b>2.2 DUCTED UNIT WILL NOT OPERATE</b>	
<ol style="list-style-type: none"><li>1. Display not illuminated</li><li>2. Display illuminated</li></ol>	<ol style="list-style-type: none"><li>1. Check 12 Volt DC in-line fuse</li><li>2. Check 115 Volt AC Connections</li></ol>
<b>2.3 DUCTED UNIT WILL NOT COOL</b>	
<ol style="list-style-type: none"><li>1. Green LED light flashes 5 times</li><li>2. Unit cools for a few moments then stops cooling</li></ol>	<ol style="list-style-type: none"><li>1. Check 115 volt AC power source Momentarily disconnect 12 VDC power source Disable compressor malfunction test switch. Check AMP draw. Check Δ T</li><li>2. Remove grill, verify evaporator coil probe is inserted into coil. Check AMP draw. Check Δ T Replace unit</li></ol>
<b>2.4 COMPRESSOR POWER SUPPLY OPEN</b>	
<ol style="list-style-type: none"><li>1. Loose leads at compressor terminals</li><li>2. Defective motor overload switch</li><li>3. Defective capacitor</li><li>4. Open compressor windings</li><li>5. Seized compressor</li><li>6. Capacitor incorrectly wired</li></ol>	<ol style="list-style-type: none"><li>1. Tighten leads</li><li>2. Replace switch</li><li>3. Replace capacitor - Refer to Paragraph 3.6.8</li><li>4. Replace compressor</li><li>5. Replace compressor</li><li>6. Verify capacitor wiring (Refer to wiring diagram)</li></ol>
<b>2.5 COMPRESSOR RUNS BUT CYCLES, FAN OPERATING ERRATICALLY</b>	
<ol style="list-style-type: none"><li>1. Loose lead at fan motor</li><li>2. Defective or burned out motor</li><li>3. Outdoor air restricted or recirculating</li><li>4. Overcharge or noncondensables in system</li><li>5. Restricted discharge line</li><li>6. Defective motor overload switch</li></ol>	<ol style="list-style-type: none"><li>1. Tighten lead.</li><li>2. Replace motor.</li><li>3. Check for dirty condenser coil, proper clearance around unit, remove any obstructions.</li><li>4. Check AMP draw</li><li>5. Check for obstruction in line. Check Δ T. Replace unit.</li><li>6. Replace switch.</li></ol>

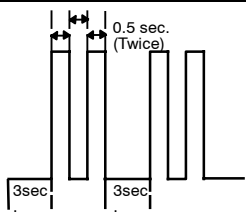
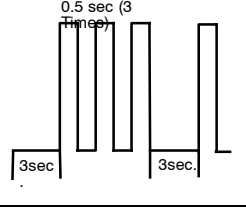
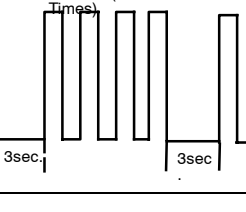
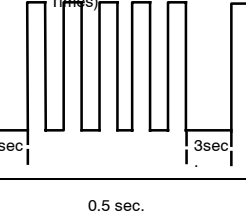
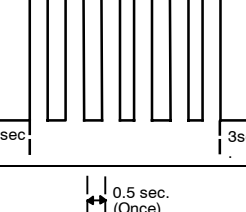
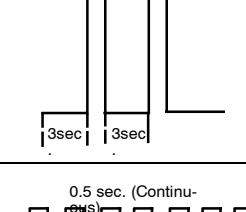
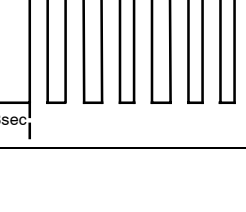
SYSTEM AND PROBABLE CAUSE	PROBABLE REMEDY
<b>2.6 CYCLES ON COMPRESSOR OVERLOAD</b>	
1. Defective run capacitor 2. Defective compressor bearings or valves 3. Greatly restricted evaporator air, iced evaporator coil. 4. Low refrigerant charge 5. Evaporator capillary restricted 6. Liquid line restricted 7. Compressor hot  8. Weak or inconsistent line power	1. Replace capacitor – Refer to Paragraph 3.6.8 2. Replace unit. 3. Defrost evaporator coil.  4. Replace unit. 5. Replace unit. 6. Replace unit. 7. Verify refrigerant charge. Check AMP draw. Check $\Delta$ T. 8. Check line voltage at time of compressor start-up.
<b>2.7 INSUFFICIENT COOLING, COOLING AIR NOT ADEQUATE</b>	
1. Dirty evaporator coil 2. Iced evaporator coil, slightly low refrigerant charge 3. Improper fan operation 4. Defective fan motor 5. Return air filter is dirty	1. Clean as required. 2. Defrost or Recharge. 3. Verify fan rotation (Refer to wiring diagram) 4. Replace fan motor. 5. Remove and clean filters (Refer to paragraphs 3.4.1 & 3.5.1)
<b>2.8 CONDENSER AIR NOT ADEQUATE</b>	
1. Outside Air Restricted 2. Dirty coil 3. Defective fan motor	1. Check for obstruction at coil. Remedy as required. 2. Clean coil. 3. Replace fan motor.
<b>2.9 INSUFFICIENT COOLING</b>	
1. Unit undersized 2. Capillary restricted	1. Re-evaluate unit for proper capacity. 2. Check AMP draw. Check $\Delta$ T. Replace unit.
<b>2.10 COMPRESSOR FLOODING</b>	
1. Unit overcharged  2. Low evaporator airflow 3. Defective electrical connections	1. Check AMP draw. Check $\Delta$ T. Replace unit. 2. Clean filter and/or evaporator coil. 3. Check connections per wiring diagram and tighten any loose connections.
<b>2.11 HEATER CYCLES ON LIMIT SWITCH (HEAT/ COOL VERSION ONLY)</b>	
1. Dirty filter 2. Blocked evaporator air inlet (indoor) 3. Low airflow due to fan motor speed	1. Clean or replace filter. 2. Remove blockage. 3. Check fan motor. Repair or replace as necessary.
<b>2.12 AIR SWEEP NOT WORKING (FREE BLOW VERSION ONLY)</b>	
1. Ceiling grill not properly aligned 2. Linkage in upper control box stuck 3. Air sweep motor failure	1. Align ceiling grill. 2. Align and lubricate linkage. 3. Replace motor.
<b>2.13 WATER LEAKAGE</b>	
1. Water dripping from ceiling unit.	1. Verify vehicle is level Tighten unit mounting bolts evenly or replace unit gasket.

SYSTEM AND PROBABLE CAUSE	PROBABLE REMEDY
<b>2.14 INADEQUATE HEAT (FREE-BLOW HEAT ONLY)</b>	
1. No heat from heat strip.	1. Verify AMP draw (13.8 AMP) Verify resistance through heating element. (9 OHM) Check bi-metal switch. If open, replace switch.
<b>2.15 INADEQUATE HEAT (HEAT-PUMP)</b>	
NOTE: Allow unit to operate 15 minutes after switching from cooling mode. 1. Reversing valve not operating  2. Outdoor coil icing.	1. Check for 115 volts at reversing valve coil Check for reversing valve restriction Verify compressor operation 2. Check outdoor coil sensor

#### Clearing Diagnostic Alarms

**When a repair has been accomplished due to a corresponding alarm, the alarm must be cleared. This is done by disconnecting the 12 VDC power to the ducted ceiling assembly for one or two seconds. Once the 12 VDC power is reconnected, the alarm should have been cleared.**

**Table 2-1 System Self-diagnostics Function (Ducted Remote)**

Flashes	Error Codes (Priority)	Error Contents (Malfunction)	Display Pattern	Allowed Modes
2	1	ROOM AIR THERMISTOR FAILURE		FAN Mode
3	2	INDOOR COIL THERMISTOR FAILURE		FAN Mode FURNACE Mode
4	3	OUTDOOR COIL THERMISTOR FAILURE		FAN Mode FURNACE Mode
5	4	COMPRESSOR DRIVE MALFUNCTION		FAN Mode FURNACE Mode
6	5	REVERSING VALVE DRIVE MALFUNCTION		FAN Mode FURNACE Mode
1	6	DISCHARGE AIR THERMISTOR FAILURE		FAN Mode FURNACE Mode
Continuous	7	THERMISTOR WIRING WRONG (only in cooling test mode)		FAN Mode

**NOTE:**

If more than two errors occur, the highest ranked code is displayed. If the highest ranked error is cleared, the next highest ranked error code is displayed.



## SECTION 3

### SERVICE AND MAINTENANCE

#### 3.1 PREVENTATIVE MAINTENANCE

**Cleaning**—Clean evaporator coil and condenser coil. Hold flashlight behind coil to see if all spaces are clear. Dust accumulation obstructs or reduces airflow and results in loss of cooling capacity. Both coils may be vacuumed when dry. Coils may also be brushed with a stiff brush and then blown out with compressed air.

Thoroughly clean base pan, motors, fan wheels, and other components.

Clean cover and ceiling grill. Mild detergents reduce electrostatic charges on plastic sections of the grill and are good cleaners.

#### CAUTION

**Do not use carbon tetrachloride, solvents, or waxes containing solvents to clean plastic sections.**

**Painting**—Paint any parts that show evidence of rust with a good rust-prevention paint.

**Wiring**— Check all wiring for deterioration and all electrical contacts for tightness or corrosion.

**Mounting**—Make sure unit is secure on roof according to installation instructions provided in Owner's Guide. Check fans to insure that they are correctly positioned in the center of the orifice, and tight on the shaft.

**Leaks**—Check any connections that show evidence of oil or leaks. When unit is properly installed (refer to Owner's Guide) check gaskets for possible air leakage.

**Controls**—Check unit to ensure all controls are functioning correctly and unit operation is normal. Vibrations can cause unwanted noise.

#### NOTE

**Check to ensure that piping is not vibrating against side of the unit.**

#### NOTE

**For proper cleaning and flushing, use a UL approved refrigerant recovery/recycling system.**

#### NOTE

**Refrigerant removal must always include recovering the refrigerant, not allowing it to escape to the atmosphere.**

#### 3.2 OPERATING INSTRUCTIONS

System operating instructions, along with installation instructions are included in the Air V "Owner's Guide", which is supplied with all Carrier Transport Air V systems. If the "Owner's Guide" is not with the Air V system contact Carrier Transport A/C Service Hot Line

at 1-800-450-2211 for assistance, or to obtain the appropriate manual.

#### 3.3 SERVICE - GENERAL

**General Notes**—These Service Instructions are provided to assist the trained and qualified Carrier service technician in repairing or replacing components of the AirV units.

#### WARNING

**Before working on the unit be sure to first disconnect all electric power to the unit to avoid the possibility of electrical shock and personal injury. Before disconnecting, discharge capacitors by shorting across the capacitors terminals (Refer to paragraph 3.6.8)**

#### WARNING

**Shield coils with cardboard to protect hands against injury from sharp metal edges when removing compressor and other components.**

#### 3.4 CEILING UNIT - FREE BLOW SYSTEMS

##### 3.4.1 Filter Removal

The filters (Figure 3-1) are located in the ceiling grill. To remove the filters, do the following:

- Grasp the edge of the filter at recess in the end of the ceiling grill.
- Pull filter completely out of the filter slot.
- Vacuum filter or wash filter in luke-warm water. Shake off excess water and dry thoroughly.
- Replace filter by sliding the filter into the filter slot in the ceiling grill until the filter frame is flush with the interior grill.

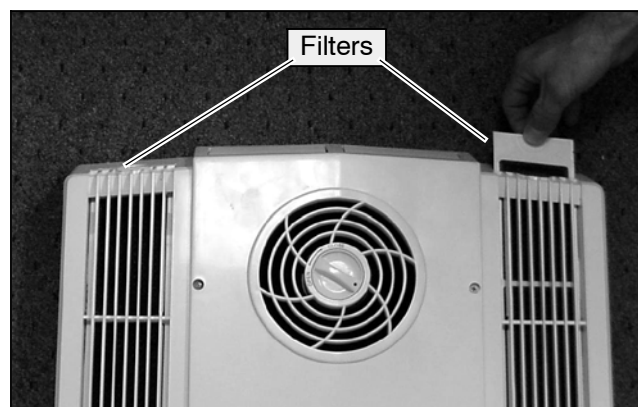


Figure 3-1 Filter Removal - Free Blow

### 3.4.2 Ceiling Grill Removal

To remove the ceiling grill (Figure 3-2) do the following:

- Before working on unit place the master switch in the OFF position and disconnect all electrical power.
- Remove 4 screws located on the ceiling grill, making sure to support the weight of the grill.
- Lower the ceiling grill from the ceiling panel.
- To replace the grill, place the grill up against the ceiling panel and align the screw holes in the grill with the ceiling panel.
- Replace 4 screws.

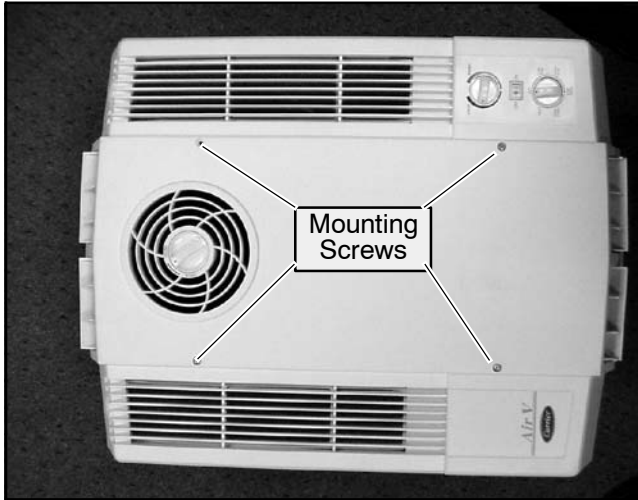


Figure 3-2 Ceiling Grill - Free Blow

### 3.4.3 Ceiling Panel Removal

To remove the ceiling panel (Figure 3-3) do the following:

- Remove the ceiling grill. (Refer to paragraph 3.4.2.)
- Remove 5 screws securing the duct plate to the ceiling panel.
- Remove 4 mounting bolts making sure to support the weight of the ceiling panel.
- Disconnect the unit harnesses and main power wires from the ceiling panel.
- Lower the ceiling panel from the air conditioning unit.
- Reverse above procedure for reassembly.

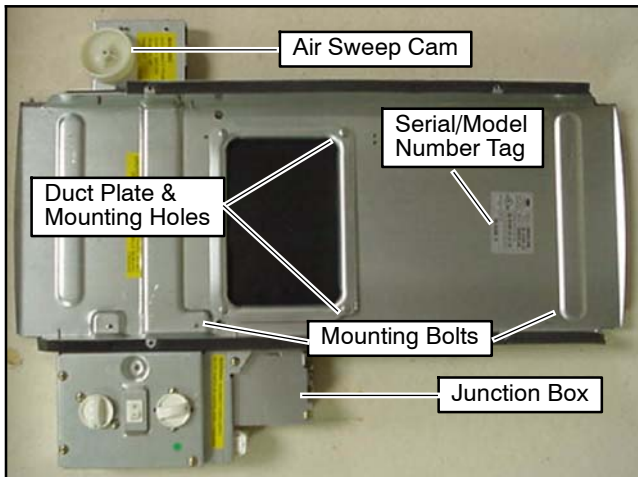


Figure 3-3 Ceiling Panel Assembly

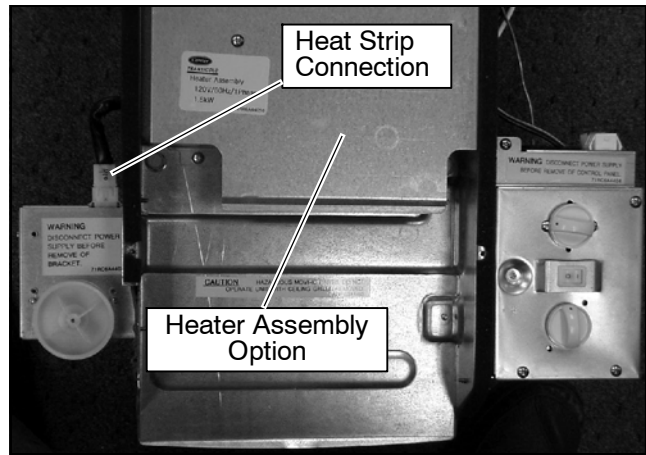


Figure 3-4 Ceiling Panel With Heat Option

### 3.4.4 Master Control Switch

To remove the master control switch, do the following:

- Remove ceiling grill. (Refer to paragraph 3.4.2.)
- Remove 5 screws that secure the control assembly (Item 2, Figure 1-3) to the control box cover.
- Remove the master control switch knob by grabbing the outside edge of the knob and pulling it off of the switch stem.
- Remove 2 screws securing the master control switch to the control assembly.
- Carefully disconnect wires from the master control switch. Label wires to aid in reassembly.
- Reverse above procedure for reassembly.

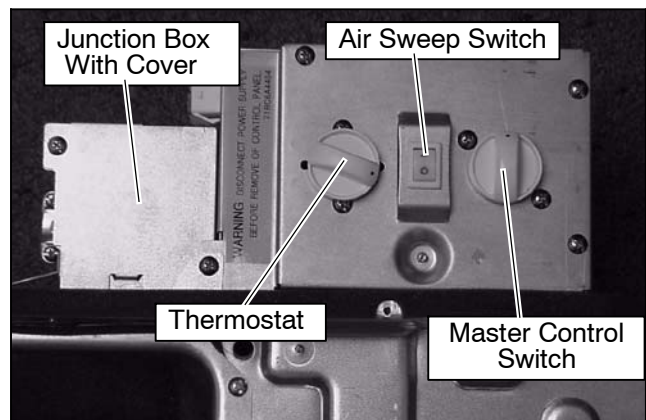


Figure 3-5 Control Box Assembly - Free Blow

### 3.4.5 Air Sweep Switch Removal

To remove the air sweep switch, do the following:

- Remove ceiling grill. (Refer to paragraph 3.4.2.)
- Remove 5 screws securing the control assembly (Item 2, Figure 1-3) to the control box cover.
- Disconnect wires from the air sweep switch.
- Pinch tabs on either end of the switch and slide out of lower control box cover.
- Reverse above procedure for reassembly.

### 3.4.6 Indoor Thermostat Removal

To remove the indoor thermostat (Figure 3-6) do the following:

- Remove ceiling grille. (Refer to paragraph 3.4.2.)
- Remove 5 screws securing the control assembly (item 3, Figure 1-3) to the control box cover.
- Remove the indoor thermostat knob by grabbing the outside edge of the knob and pulling it off of the thermostat stem.
- Remove 2 screws that secure the indoor thermostat to the lower control box cover.
- Carefully disconnect the 2 wires from the indoor thermostat.
- Remove the sensing bulb from the plastic clip.
- Carefully slide the sensing bulb through the rubber grommet.
- Remove the thermostat from the control assembly.
- Reverse above procedure for reassembly.

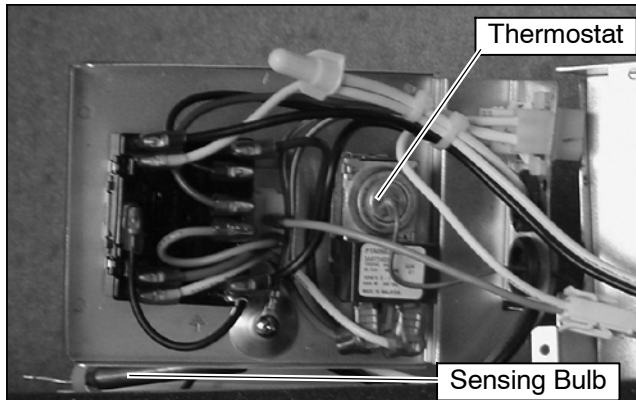


Figure 3-6 Indoor Thermostat

### 3.4.7 Air Sweep Removal

To remove the air sweep, do the following:

- Remove ceiling grille. (Refer to paragraph 3.4.2.)
- Remove cam (See Figure 3-3) from air sweep motor shaft.
- Remove 4 screws securing air sweep motor bracket to the ceiling panel assembly.
- Carefully disconnect air sweep motor wire terminations.
- Remove 2 screws securing air sweep motor (Figure 3-7) to control box and remove motor.
- Reverse above procedure for reassembly.

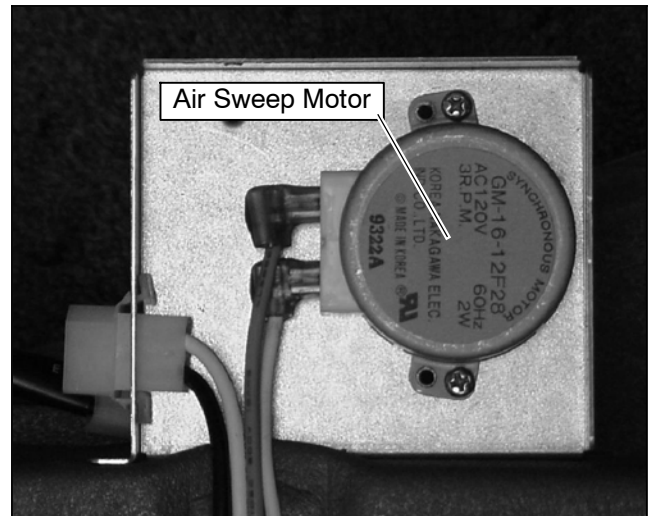


Figure 3-7 Air sweep motor

### 3.4.8 Heat Strip Assembly Removal

To remove the heat strip assembly (Figure 3-8) do the following:

- Remove ceiling grille. (Refer to paragraph 3.4.2.)
- Unplug electrical connection at air sweep motor assembly.
- Remove two screws securing heat strip assembly to the ceiling panel assembly.
- Slide heat strip assembly away from air sweep motor assembly and pull down, easing the electrical connection through the access hole.
- Reverse the procedures for reassembly.

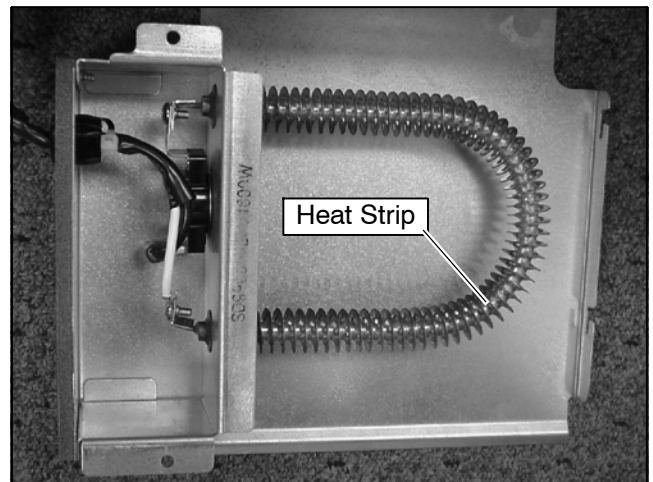


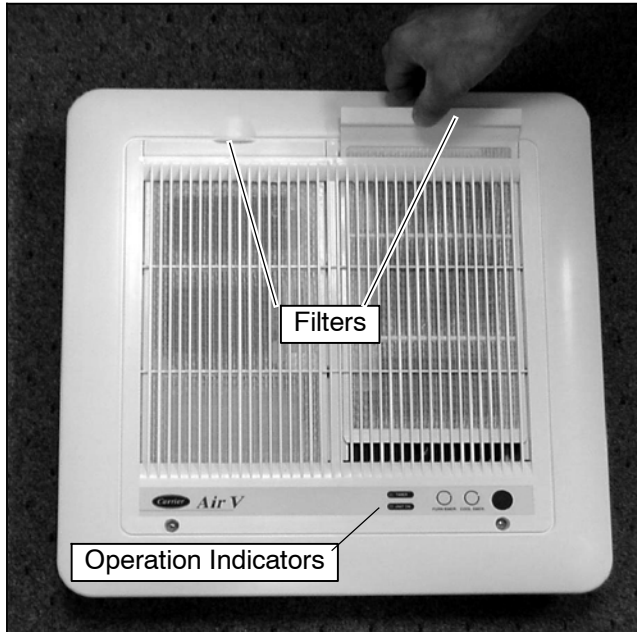
Figure 3-8 Heat Strip Assembly

### 3.5 CEILING UNIT - DUCTED SYSTEMS

#### 3.5.1 Filter Removal

The filters (Figure 3-9) are located in the ceiling grill. To remove the filters, do the following:

- Grasp the edge of the filter at recess in the end of the ceiling grill.
- Pull filter completely out of the filter slot.
- Vacuum filter or wash filter in luke-warm water. Shake off excess water and dry thoroughly.
- Replace filter by sliding the filter into the filter slot in the ceiling grill until the filter frame is flush with the interior grill.



**Figure 3-9 Filter Removal - Ducted Unit**

#### 3.5.2 Ceiling Grill Removal

To remove the ceiling grill (Figure 3-10) do the following:

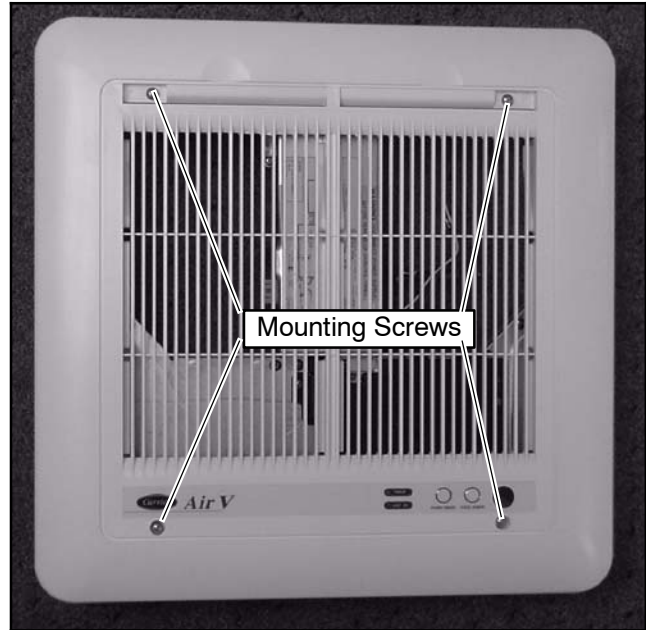
- Before working on unit place the master switch in the OFF position and disconnect all electrical power.
- Remove filters (Refer to paragraph 3.4.1).
- Remove 4 screws located on the ceiling grill, (two are under the filters) making sure to support the weight of the grill.
- Lower the ceiling grill from the ceiling panel.
- To replace the grill, place the grill up against the ceiling panel and align the screw holes in the grill with the ceiling panel.
- Replace 4 screws and 2 filters.

#### 3.5.3 Control Box Assembly Removal

To remove the control box assembly (Figure 3-11 & Figure 3-12) do the following:

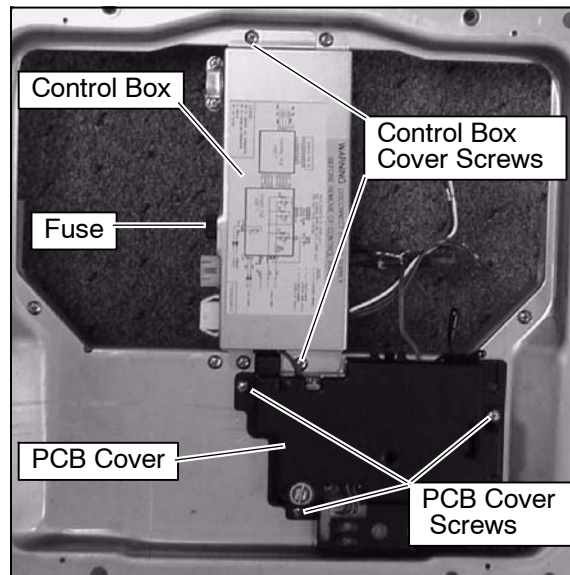
- Remove ceiling grill. Refer to paragraph 3.5.2.
- Disconnect 115 volt (AC) and 12 volt (DC) power wires.

- Remove two screws securing control box cover to control box assembly. See Figure 3-11.
- Remove control box assembly cover.



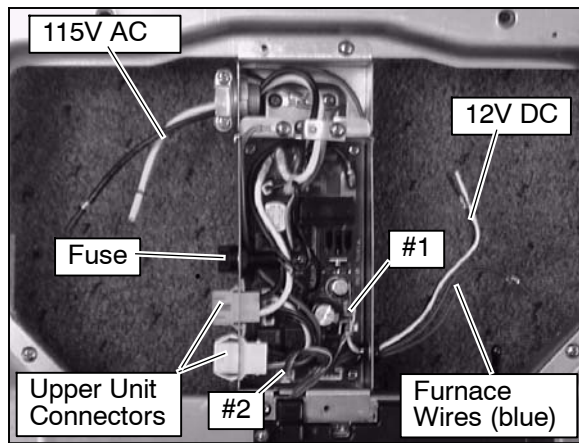
**Figure 3-10 Ceiling Grill - Ducted**

- Disconnect blue furnace wires.
- Unplug two connectors from upper unit.
- Unplug DC power plug #1 (red/yellow/black wires) See Figure 3-12
- Unplug relay signal plug #2 (brown/red/orange/yellow wires). See Figure 3-12
- While supporting control box assembly remove two screws securing control box assembly to ducted ceiling unit.
- Pull control box assembly from the ducted ceiling unit.
- Reverse above procedure to reassemble.



**Figure 3-11 Control Box & PCB Cover**



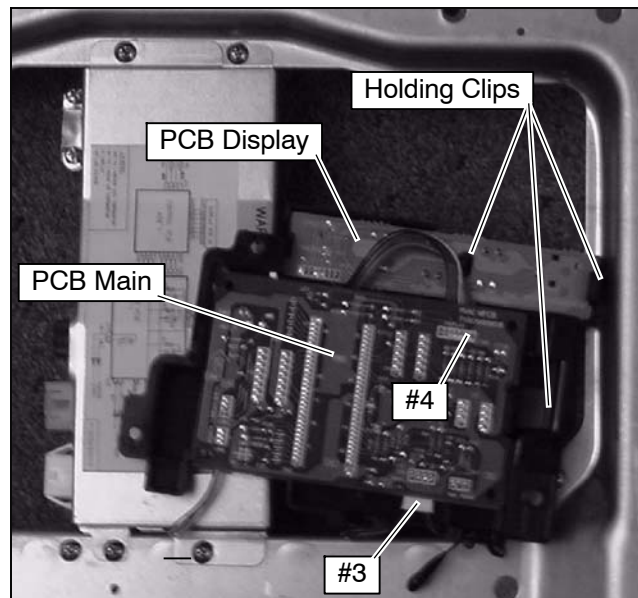


**Figure 3-12 Control Box Assembly - Ducted**

### 3.5.4 Main PCB Board Removal

To remove the Main PCB board (Figure 3-13) do the following:

- a. Remove ceiling grill. Refer to paragraph 3.5.2.
- b. Remove three screws securing the PCB cover to the ducted ceiling unit.
- c. Carefully turn over the PCB cover exposing the PCB main and the PCB display assemblies.
- d. Gently push holding clip away from PCB main assembly.
- e. Lift PCB main assembly from PCB cover assembly.
- f. Unplug display wiring plug #4. Figure 3-13
- g. Unplug thermistor/thermostat wiring plug #3. Figure 3-13
- h. Unplug power wiring plug #1. Figure 3-12
- i. Unplug signal wiring plug #2. Figure 3-12
- j. Reverse above procedures for reassembly.



**Figure 3-13 Main/Display PCB's**

### 3.5.5 PCB Display Removal

To remove the PCB display assembly (Figure 3-13) do the following.

- a. Remove ceiling grill. Refer to paragraph 3.5.2.
- b. Push large clip away from PCB display assembly.
- c. Push center clip towards large clip.
- d. Pull PCB display assembly from PCB cover.
- e. Unplug display wiring from PCB main assembly.
- f. Reverse above procedures of reassembly.

### 3.5.6 Fuse Removal

To remove the fuse (Figure 3-11) do the following:

- a. Remove ceiling grill. Refer to paragraph 3.5.2.
- b. Turn fuse holder in direction of arrow (counter-clockwise).
- c. Pull fuse from fuse holder.
- d. Test and/or replace.
- e. Reverse above procedures for reassembly.

### 3.5.7 Dip Switch Functions

The Ducted Ceiling unit has 5 dip switches on the main (PCB) circuit board. Dip Switches are pre-set (default)

at the factory. This section is for information purposes only. A description of the Dip Switch operation follows.

Dip SW No.	FJ# On PCB	Functions	Logic =Low FJ Open	Logic=High FJ Close	Default (Factory Setting)
1	FJ1	Address Configuration	DCCA	DCCB	DCCA
2	FJ2	Compressor drive malfunction test	Enabled	Disabled	Enabled
3	FJ3	ODAT conditions for SLO mode	Cooler	Warmer	Cooler
4	FJ4	System limited operation mode (HP)	Enabled	Disabled	Enabled
5	FJ5	Defrost operation mode (Heat Pump)	Enabled	Disabled	Enabled

#### System Limited Operation Mode (SLO Mode) according to Outdoor Air Temperature (ODAT)

System Limited Operation Mode	FJ3 Selection (Cooler - Warmer)	
	Cooler	Warmer
Start Conditions (Furnace Mode)	Less than or equal to 4° C (39.2° F)	Less than or equal to 7° C (44.6° F)
Release Conditions (Heat Pump Mode)	Greater than or equal to 6° C (42.8° F)	Greater than or equal to 9° C (48.2° F)

**Figure 3-14 Dip Switch Function**

### 3.5.8 Return Air Thermistor

The Return-Air Sensor (Thermistor 12-50084-00) is located in the ceiling assembly. The sensor has a yellow coating and protrudes about 3/16 inch from the ceiling panel. To check resistance do the following:

1. Remove 4 screws from ceiling cover.
2. Remove 3 screws holding PCB cover.
3. Un-plug thermistor plug from PC board.
4. Check thermistor resistance. Refer to Table 3-1.

**Table 3-1 Resistance-Temperature Coefficient**

° C	° F	Resistance (K-Ohms)	° C	° F	Resistance (Ohms)
5	41.0	12.07	25	77.0	5.369
6	43.0	11.57	26	78.5	5.168
7	44.5	11.09	27	80.0	4.976
8	46.5	10.63	28	82.5	4.792
9	48.0	10.19	29	84.0	4.616
10	50.0	9.771	30	86.0	4.447
11	52.0	9.373	31	87.5	4.286
12	53.5	8.993	32	89.5	4.131
13	55.5	8.631	33	91.5	3.982
14	57.0	8.286	34	93.0	3.840
15	59.0	7.956	35	95.0	3.703
16	61.0	7.641	36	96.5	3.573
17	62.5	7.341	37	98.5	3.447
18	64.5	7.054	38	100.5	3.326
19	66.0	6.779	39	102.0	3.211
20	68.0	6.517	40	104.0	3.100
21	69.5	6.267	41	105.5	2.993
22	71.5	6.027	42	107.5	2.890
23	73.5	5.798	43	109.5	2.792
24	75.0	5.579	44	111.0	2.698

### 3.5.9 Heat Pump Thermistors

On the Heat Pump Systems the IDC (InDoor Coil Thermistor) is located in the ceiling unit. The ODA (OutDoor Air Thermistor) and the ODC (OutDoor Coil

Thermistor) is located in the Upper Unit. To check the resistance of these thermistors at a set temperature refer to Table 3-2.

**Table 3-2 Resistance-Temperature Coefficient (IDC - ODA - ODC)**

° C	° F	Resistance (K-Ohms)	° C	° F	Resistance (Ohms)
0	32.0	32.62	36	97.0	6.27
1	34.0	31.00	37	99.0	6.02
2	36.0	29.48	38	100.0	5.78
3	37.0	28.03	39	102.0	5.55
4	39.0	26.67	40	104.0	5.33
5	41.0	25.38	41	106.0	5.12
6	43.0	24.16	42	108.0	4.92
7	45.0	23.01	43	109.0	4.73
8	46.0	21.91	44	111.0	4.55
9	48.0	20.88	45	113.0	4.37
10	50.0	19.90	46	115.0	4.20
11	52.0	18.97	47	117.0	4.04
12	54.0	18.09	48	118.0	3.89
13	55.0	17.25	49	120.0	3.75
14	57.0	16.46	50	122.0	3.61
15	59.0	15.71	51	124.0	3.47
16	61.0	15.00	52	126.0	3.34
17	63.0	14.32	53	127.0	3.22
18	64.0	13.68	54	129.0	3.10
19	66.0	13.07	55	131.0	2.99
20	68.0	12.49	56	133.0	2.88
21	70.0	11.94	57	135.0	2.78
22	72.0	11.42	58	136.0	2.68
23	73.0	10.92	59	138.0	2.58
24	75.0	10.45	60	140.0	2.49
25	77.0	10.00	61	142.0	2.41
26	79.0	9.57	62	144.0	2.32
27	81.0	9.17	63	145.0	2.24
28	82.0	8.78	64	147.0	2.16
29	84.0	8.41	65	149.0	2.09
30	86.0	8.06	66	151.0	2.02
31	88.0	7.72	67	153.0	1.95
32	90.0	7.40	68	154.0	1.88
33	91.0	7.10	69	156.0	1.82
34	93.0	6.90	70	158.0	1.76
35	95.0	6.53	71	160.0	1.70

### 3.6 SERVICE - UPPER UNIT - STANDARD, HC & HP

#### 3.6.1 Exterior Cover Removal



Coil fins are sharp. Use care when removing the cover from the base pan to avoid personal injury.

To remove the exterior cover, do the following:

- Before working on unit place the master switch in the OFF position and disconnect all electrical power.
- Remove 15 screws securing the unit cover to the base pan assembly. See Figure 3-15.
- Carefully lift the exterior cover off of the unit base pan assembly.
- Reverse above procedure for reassembly.

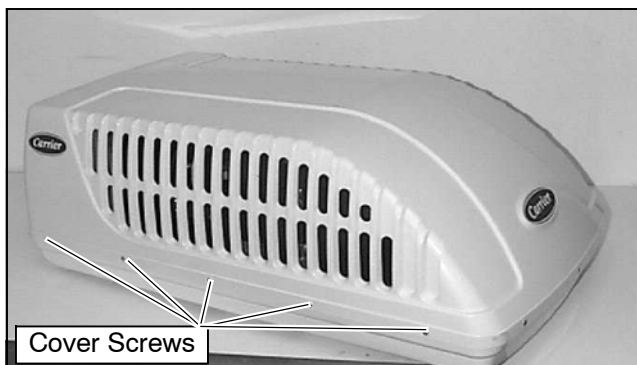


Figure 3-15 Cover Assembly - Standard

#### 3.6.2 Compressor Replacement

Replacement of the AirV compressor (standard or low profile), during Carrier Transport A/C standard two (2) year limited warranty is not recommended.

The recommended procedure is to replace the entire upper unit.

Many service centers, dealers and/or distributors lack the necessary equipment, certification and skills necessary to perform the replacement satisfactorily.

Compressor replacement after the warranty period is left up to the service center, though Carrier TAC recommends the Upper Unit be replaced.

#### 3.6.3 Control Box Assembly Removal

To remove the control box assembly, do the following:

- Remove exterior cover assembly. Refer to paragraph 3.6.1.
- Remove 2 screws securing control box assembly to the lower scroll assembly. (See Figure 3-16.)

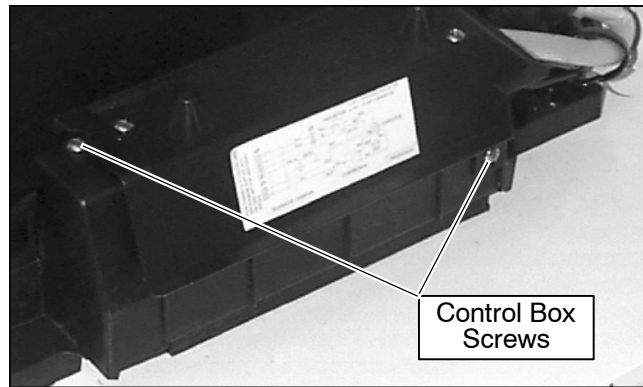


Figure 3-16 Control Box

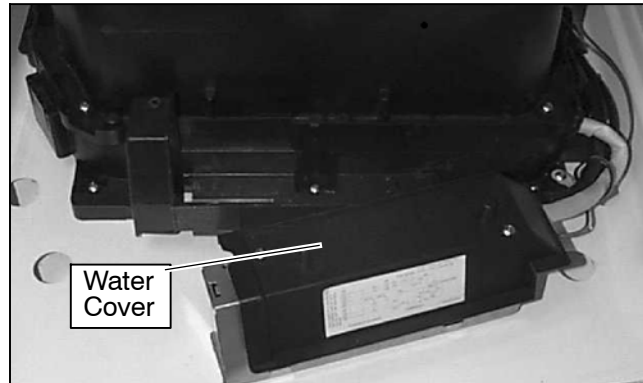


Figure 3-17 Control Box Removal

- Slide control box out of the lower scroll assembly. (See Figure 3-17.)
- To open control box remove 2 screws securing the water cover to the control box cover.
- Gently lift the water cover off of the control box. (See Figure 3-18.)
- Reverse above procedure for reassembly.

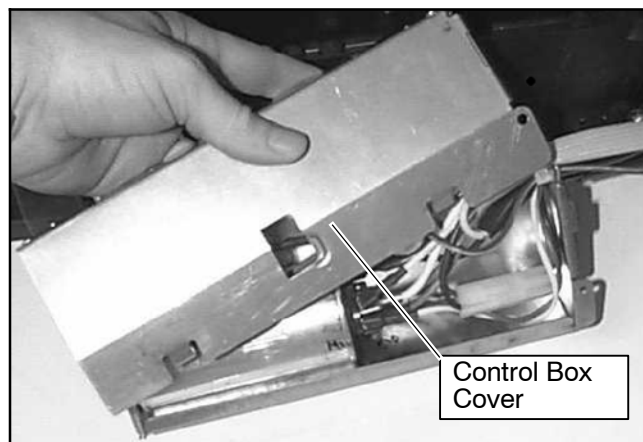


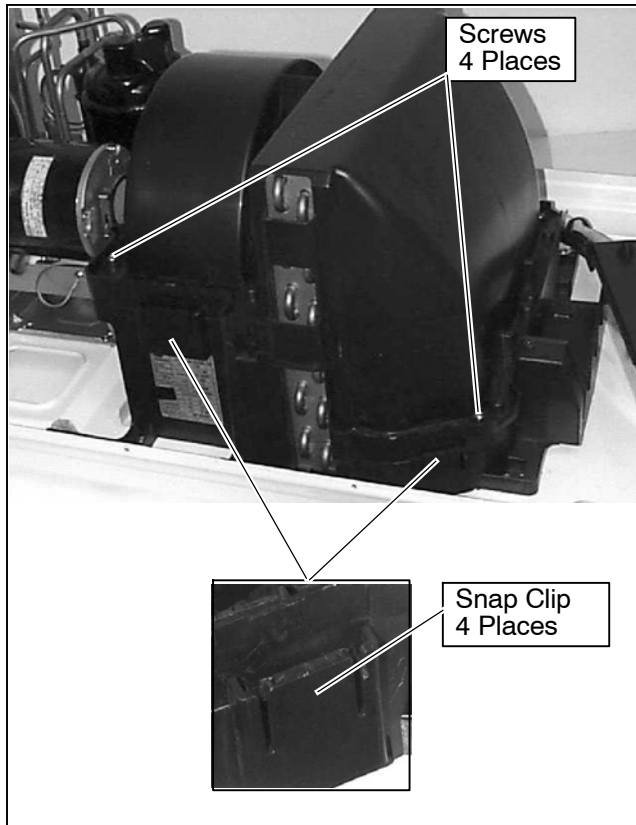
Figure 3-18 Water Cover Removal

#### 3.6.4 Upper Scroll Assembly Removal

- Remove exterior cover assembly. Refer to paragraph 3.6.1.
- Remove 4 screws securing upper scroll assembly to the lower scroll assembly. (See Figure 3-19)



- c. Gently pry 4 snap clips open and lift the upper scroll assembly off of the lower scroll assembly.
- d. Reverse above procedure for reassembly.

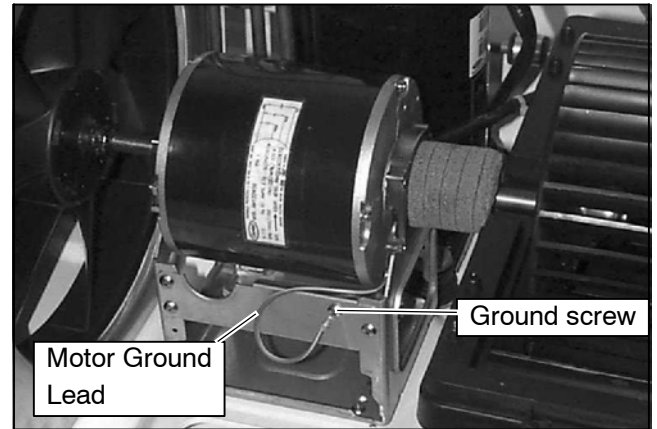


**Figure 3-19 Upper Scroll Assembly**

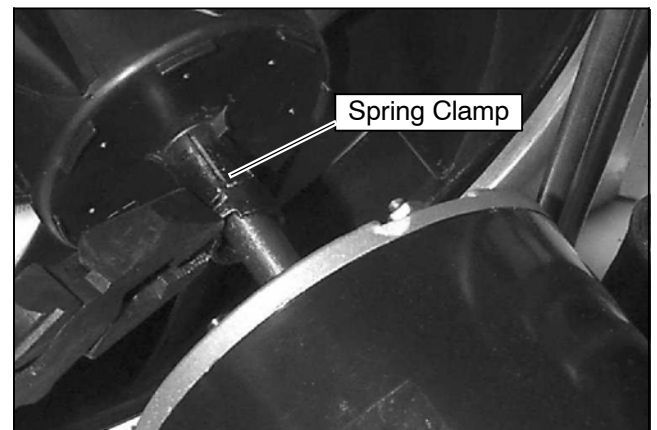
### 3.6.5 Motor Assembly and Condenser Fan Removal

- a. Remove exterior cover assembly. Refer to paragraph 3.6.1.
- b. Remove control box assembly. Refer to paragraph 3.6.3.
- c. Remove upper scroll assembly. Refer to paragraph 3.6.4.
- d. Remove 4 screws securing the condenser cover to the condenser orifice. (See Figure 3-25.)
- e. Carefully disconnect motor wire terminations from within the control box.
- f. Remove 1 screw securing the motor ground lead to the motor bracket assembly. (See Figure 3-20)
- g. Using flat-nosed pliers, depress the motor spring clamp and slide it off of the condenser fan (See Figure 3-21).
- h. Lift and slide motor towards evaporator coil to remove condenser fan from the motor shaft.
- i. Remove condenser fan from motor shaft and lift fan out through the top of the condenser orifice. (See Figure 3-23)

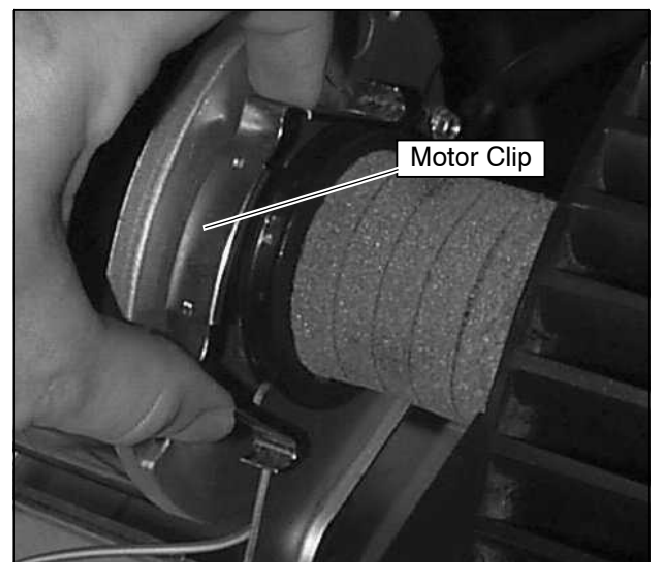
- j. Remove motor assembly.
- k. Reverse above procedure for reassembly.



**Figure 3-20 Motor Assembly**



**Figure 3-21 Spring Clamp Removal**



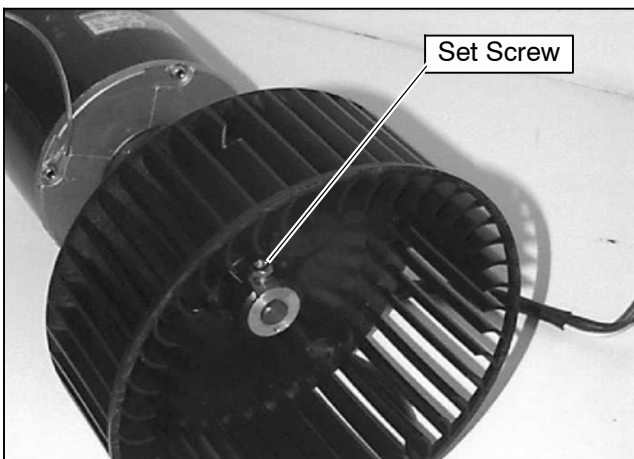
**Figure 3-22 Motor Clip Removal**



**Figure 3-23 Condenser Fan Removal**

**3.6.6 Evaporator Blower Wheel Adjustment or Removal**

- a. Remove exterior cover assembly. Refer to Exterior Cover Assembly Removal instructions 3.6.1
- b. Remove control box assembly. Refer to Control Box Assembly Removal instructions 3.6.3
- c. Remove upper scroll assembly. Refer to Upper Scroll Assembly Removal instructions 3.6.4
- d. Loosen motor assembly. Refer to Motor Assembly Removal instructions 3.6.5.
- e. Mark shaft at a point where wheel hub and motor shaft meet to aid in reassembly. (See Figure 3-24.)
- f. Remove 1 set screw holding the blower wheel to the motor shaft. (See Figure 3-24)
- g. Slide off blower wheel from motor shaft
- h. Reverse above procedure for reassembly.

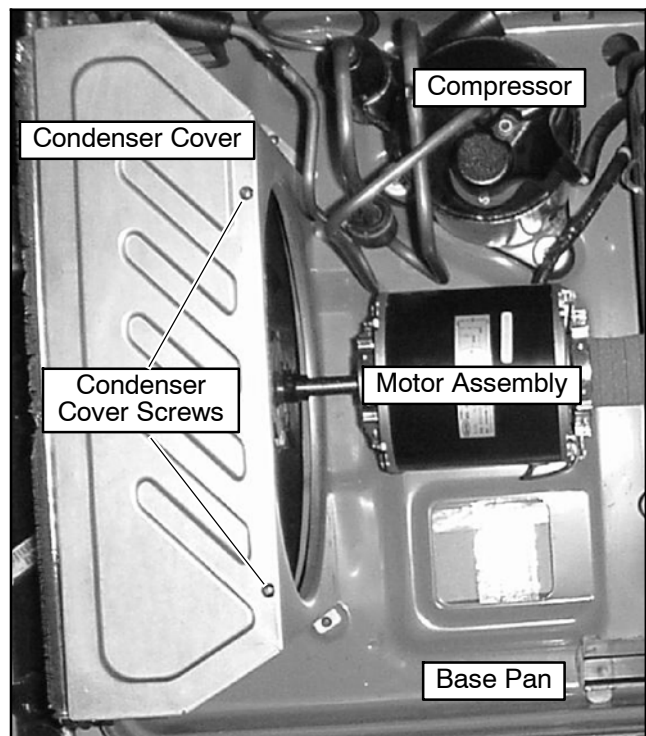


**Figure 3-24 Blower Wheel**

**3.6.7 Air Handling System Removal**

- a. Remove exterior cover assembly. Refer to paragraph 3.6.1.

- b. Remove control box assembly. Refer to paragraph 3.6.3.
- c. Remove upper scroll assembly. Refer to paragraph 3.6.4.
- d. Remove motor assembly. Refer to paragraph 3.6.5.
- e. Remove 8 screws securing lower scroll assembly to the base pan assembly.
- f. Remove 1 screw from clamp securing suction tube to the base pan assembly.
- g. Remove 3 nuts securing the compressor to the base pan assembly.
- h. Remove 2 screws securing the condenser orifice to the base pan assembly.
- i. Remove 2 screws securing the condenser coil assembly to the base pan assembly.
- j. Carefully lift the entire assembly off of the base pan assembly.
- k. Reverse the above procedure for reassembly, ensuring that the air handling system is positioned correctly. Tighten all screws.



**Figure 3-25 Condenser With Motor Assembly & Compressor**

**3.6.8 Capacitor Troubleshooting**



**Disconnect power to the AirV unit before checking the capacitor.**

To test capacitor to determine if good, open or shorted, an ohm meter can be used. To determine a capacitor's capacitance, a capacitor meter is required.

Capacitors showing signs of leaks or bulging should be replaced immediately.

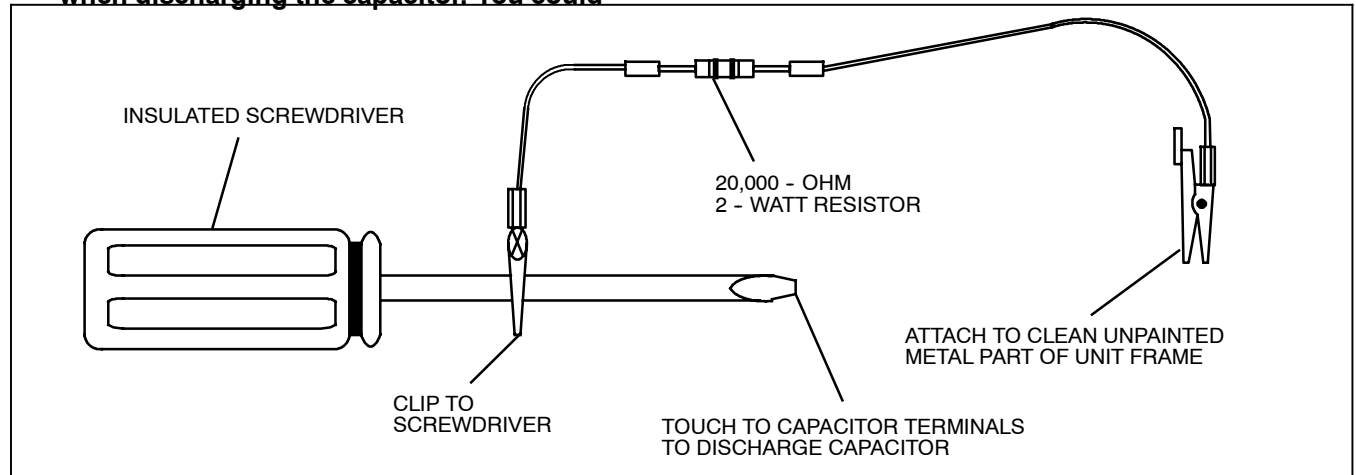
### 3.6.9 Capacitor Testing and Replacement

Capacitors must be discharged properly before testing.

- Place a 20,000 ohm, 2 watt resistor across the terminals of the capacitor for approximately 30 seconds (See Figure 3-26 for a suggested tool).



**Do not touch the metal of the screwdriver when discharging the capacitor. You could**



**Figure 3-26 Set-Up For Discharging a Capacitor**

### 3.6.10 Positive Temperature Coefficient Thermistor (PTC) (Start Thermistor) Troubleshooting

- Disconnect power from the AirV unit.
- Disconnect the wires to the PTC.
- Using an ohm meter, check for continuity across the PTC.

If the PTC does not have continuity, it must be replaced.

If continuity exists, reconnect the wires to the PTC.

- Reconnect power to the AirV unit.
- Turn on the AirV unit to start.
- Use a clamp-on amp probe to monitor the amp draw of the compressor during its start-up.

**receive a shock.**

- After the capacitor has been discharged and all wires removed from the capacitor terminals, use an ohmmeter to test its resistance.
- Set the scale to R x 1K or 10K ohm and place the ohmmeter leads across the capacitor terminals.
- If the ohmmeter first reads 0, then rises toward infinity or some higher resistance, the capacitor is good.
- If the ohmmeter goes to 0 or a low resistance and stays there, the capacitor is shorted and needs to be replaced.
- If the ohmmeter reads infinity (OL) the capacitor is open and needs to be replaced.

When the compressor starts, an amp draw will be indicated for almost a second.

If no amp draw is indicated or if the amp draw occurs for much longer than a second, the PTC is defective and must be replaced.

### 3.6.11 Line Voltage - 10%

Line voltage should be checked during peak electrical load periods.

With the AirV unit on and the compressor operating, use a voltmeter to check the voltage being supplied to the AirV unit. The voltage must be within 10% of the units required voltage. A voltage drop greater than 10% will cause a premature compressor failure and needs to be corrected immediately.

### 3.7 SERVICE - UPPER UNIT - LOW PROFILE

#### 3.7.1 Exterior Cover Removal



Coil fins are sharp. Use care when removing the cover from the base pan to avoid personal injury.

To remove the exterior cover, do the following:

- Before working on unit place the master switch in the OFF position and disconnect all electrical power.
- Remove (8) screws securing the unit cover to the base pan assembly. See Figure 3-27.
- Carefully lift the exterior cover off of the unit base pan assembly.
- Reverse above procedure for reassembly.



Figure 3-27 Cover Assembly - Low Profile

#### 3.7.2 Upper Scroll Assembly Removal

To remove the upper scroll assembly, do the following:

- Remove exterior cover assembly. Refer to paragraph 3.7.1.
- Release the (2) front, (2) rear, (1) left side and (1) right side locking tabs (See Figure 3-28) by pulling back on the tabs (See Figure 3-29).
- Remove the screw (1) from the control box cover (See Figure 3-28).
- With all (6) locking tabs released and control box screw removed, lift the upper scroll assembly off of the lower scroll assembly.
- Reverse above procedure for reassembly. Ensure all (6) locking tabs snap shut & lock.

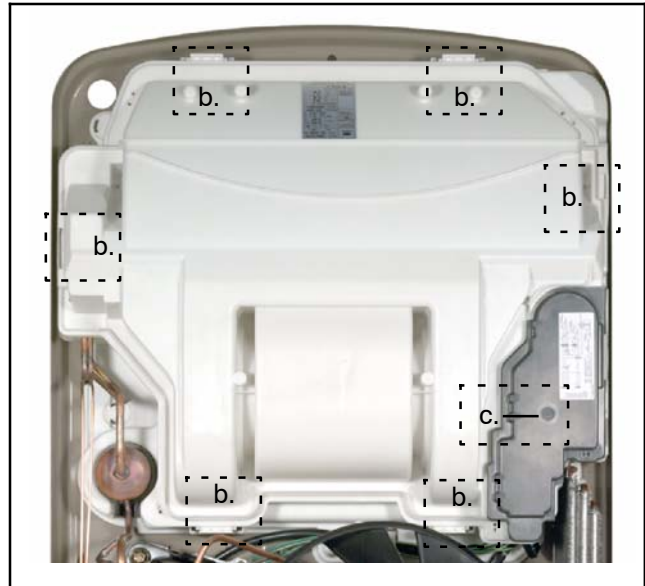


Figure 3-28 Upper Scroll Assembly Locking Tabs (b.) & Screw Locations (c.)



Figure 3-29 Upper Scroll Assembly Keeper Tab Release

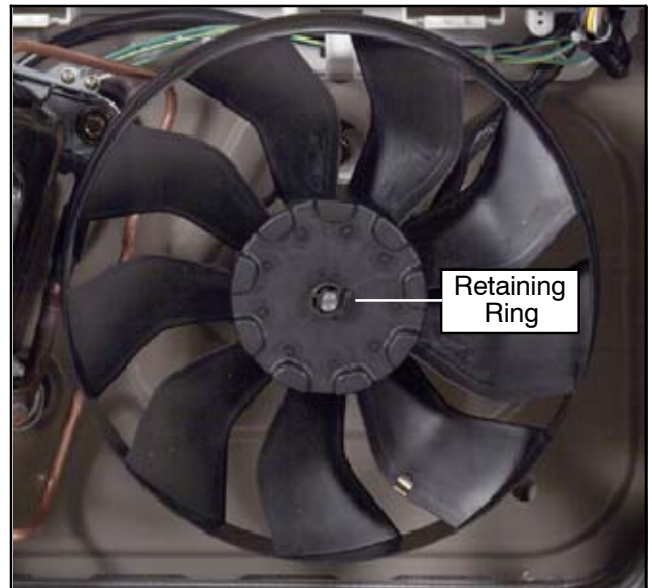


**Figure 3-30 Upper Scroll & Control Box Cover Removed**

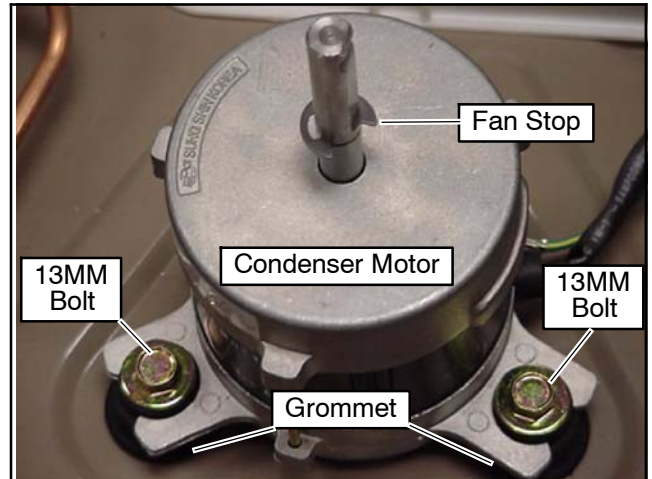
### 3.7.3 Condenser Fan Assembly Removal

To remove condenser fan assembly, do the following:

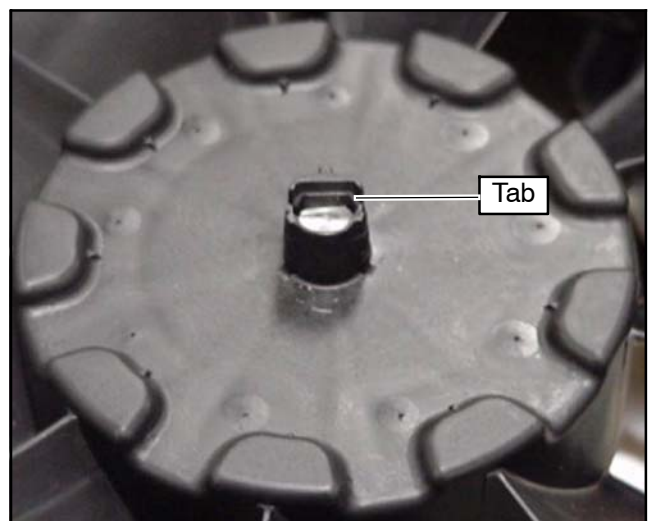
- a. Perform steps outlined in Section 3.7.2.
- b. Depress and remove Retaining Ring (See Figure 3-31).
- c. Using both hands, carefully pull up on fan assembly until it is free of the motor shaft.
- d. When replacing the fan assembly make sure the fan assembly is against the stop on the shaft (See Figure 3-32).
- e. Push back on tab to allow fan assembly to rest against stop (See Figure 3-33). Fan assembly will now be flush with the end of the motor shaft.
- f. Reverse above procedure for reassembly.



**Figure 3-31 Condenser Fan Assembly & Retaining Ring**



**Figure 3-32 Condenser Fan Motor & Fan Assembly Stop**



**Figure 3-33 Condenser Fan Motor & Fan Assembly Tab**



### 3.7.4 Condenser Motor Removal

To remove condenser fan motor, do the following:

- Perform steps outlined in Section 3.7.2.
- Remove (3) 13MM bolts (See Figure 3-32).
- Remove (3) Grommets. Inspect, replace or reuse.
- Cut Tie-Wraps & discard (2 locations). When re-assembling, tie-wrap at same 2 locations.
- Remove ground wire from compressor bracket (See Figure 3-34).
- Un-plug (yellow/brown/white) from control box assembly.
- Reverse above procedure for reassembly.

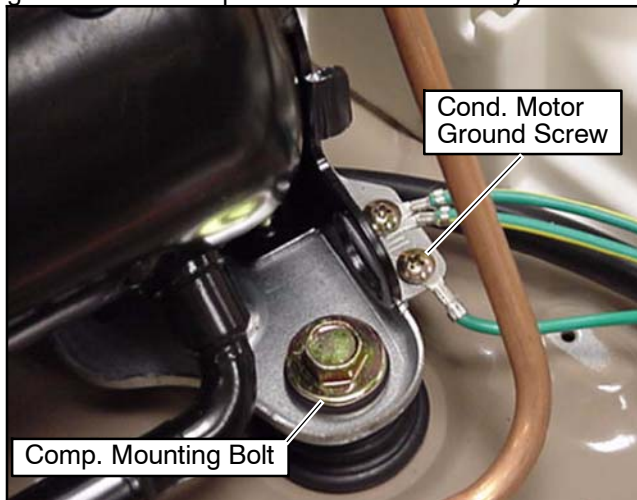


Figure 3-34 Condenser Motor Ground

### 3.7.5 Evaporator Motor/Blower Assembly Removal

To remove the evaporator motor, do the following:

- Perform steps outlined in Section 3.7.2.
- Pull back on and release the (4) locking tabs. There are 2 on each side of the control box assembly. (See Figure 3-35).
- Lift control box assembly from lower scroll assembly, exposing evaporator motor.
- Un-plug (black/blue/white/brown) evaporator motor from control box assembly.
- Remove ground wire (green/yellow) from motor housing.
- Lift motor/blower assembly from lower scroll assembly cradle.
- Carefully remove the blower wheel from the evaporator motor shaft by pushing out from the motor side.

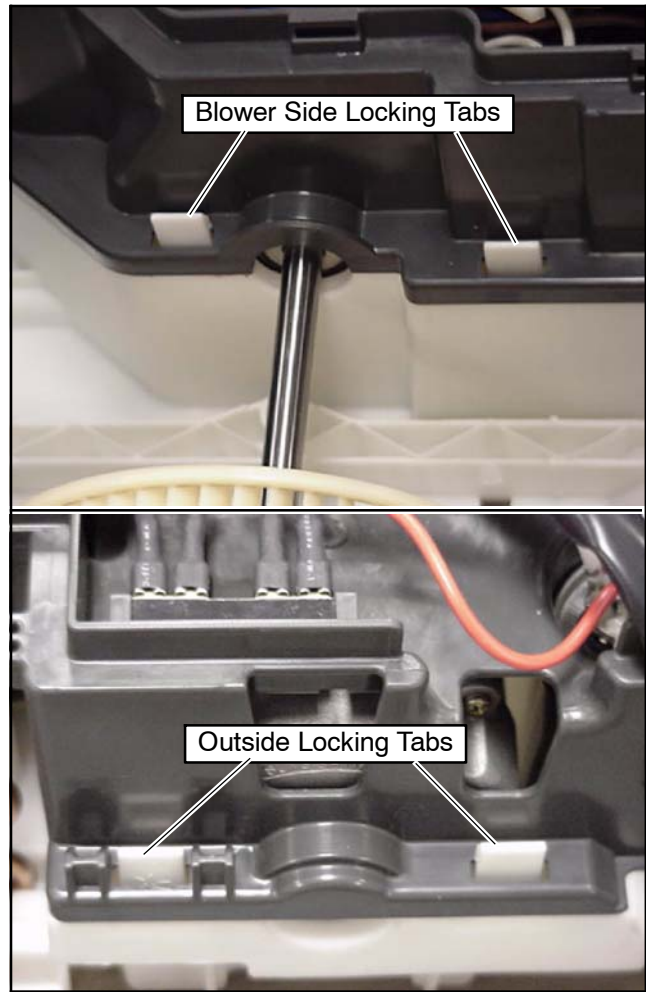


Figure 3-35 Evaporator Motor Locking Tabs

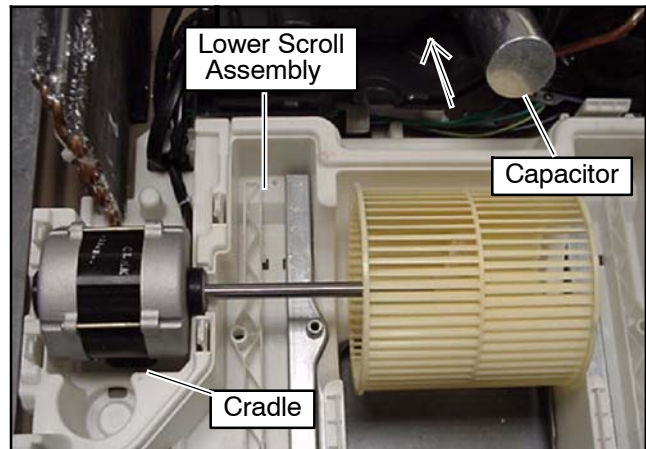


Figure 3-36 Evaporator Motor/Blower Assembly In Cradle

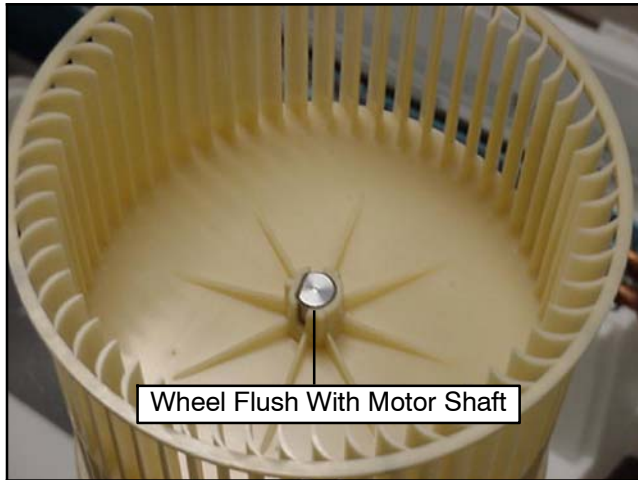
**NOTE**

When reassembling the blower wheel on to the motor shaft ensure that the blower wheel is flush with the end of the motor shaft (See Figure 3-37).

**NOTE**

When placing the evaporator motor/blower assembly back into the lower scroll assembly cradle, make sure that the assembly is seated securely in the cradle. (See Figure 3-36).

h. Reverse above procedure for reassembly.



**Figure 3-37 Evaporator Blower Wheel (Flush With End Of Motor Shaft)**

**3.7.6 Compressor Replacement**

Perform the procedures outlined in Section 3.6.2

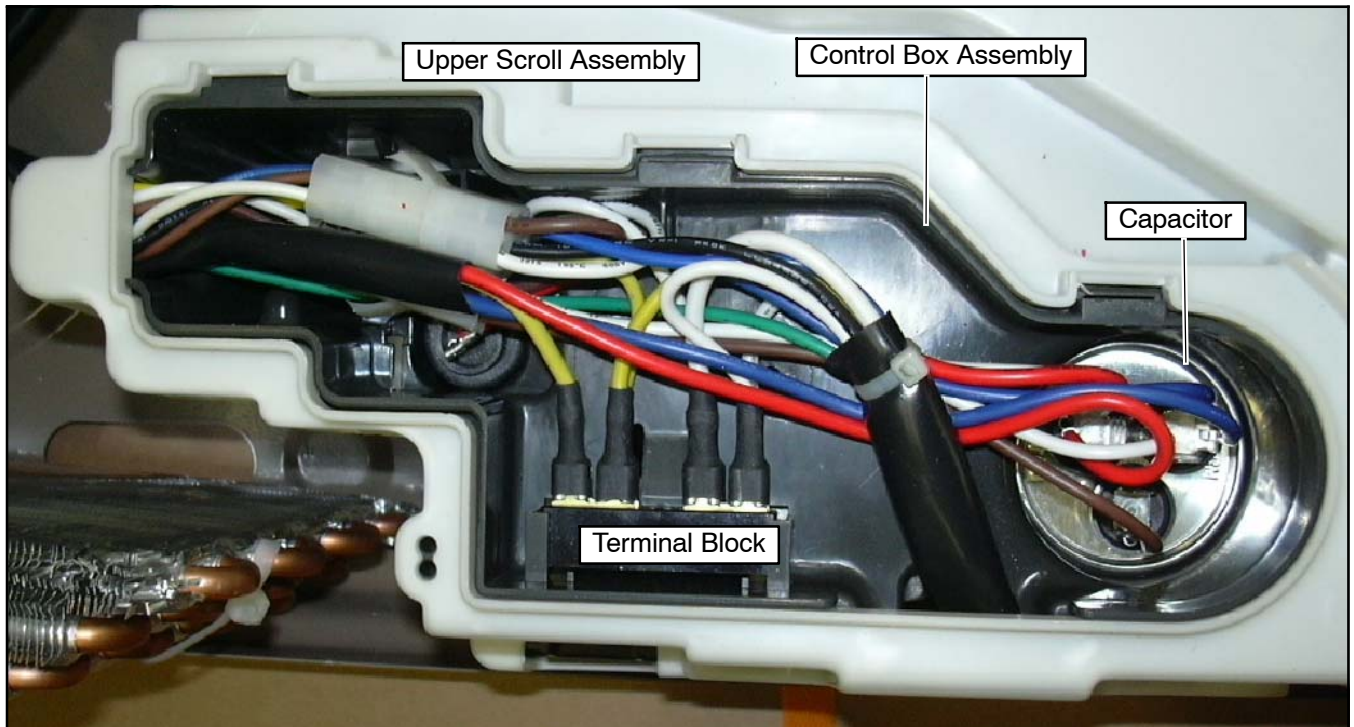
There are 4 bolts with the Low Profile Compressor.

The system charge for the Low Profile unit is 16.9 OZ.

**3.7.7 Capacitor Removal**

To remove the capacitor, do the following:

- a. Perform steps a., b. & c. as outlined in Section 3.7.5.
- b. Perform steps outlined in Sections 3.6.8 & 3.6.9.
- c. The Low Profile Capacitor is removed from the control box assembly by pushing on the capacitor from under the control box assembly (See Figure 3-36).



**Figure 3-38 Control Box Assembly With Capacitor**

**3.7.8 Remote Control (Fahrenheit to Celsius)**

All Remote Control Assemblies in the United States are pre-set to display in Fahrenheit degrees (see Figure 3-39). To change from a Fahrenheit display to a Celsius display do the following:



**The change from Fahrenheit to Celsius will be permanent. It cannot be changed back to Fahrenheit.**

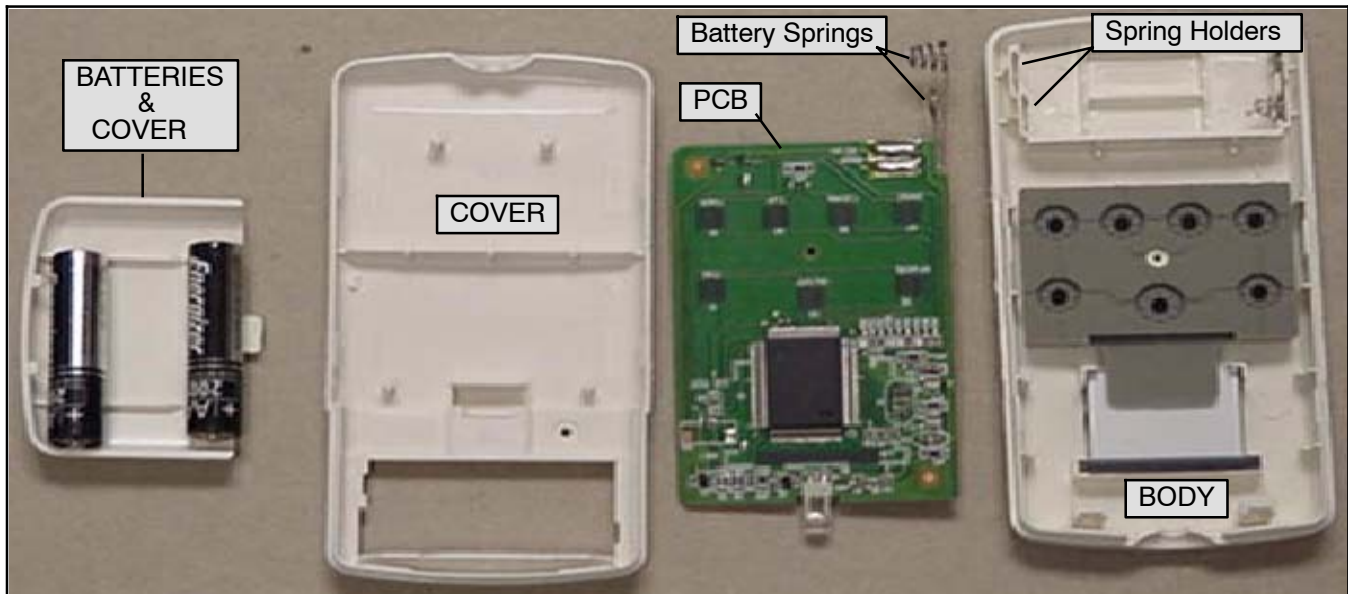


- a. Remove the batteries from the remote control.
- b. Carefully remove the remote cover by inserting a narrow flat object between the cover and remote body and prying apart.
- c. Remove the brass screw holding the PCB in place.
- d. Carefully remove the PCB board from the remote body, making sure the battery springs release from their holders.
- e. Locate FR9 on the PCB board (see Figure 3-40).

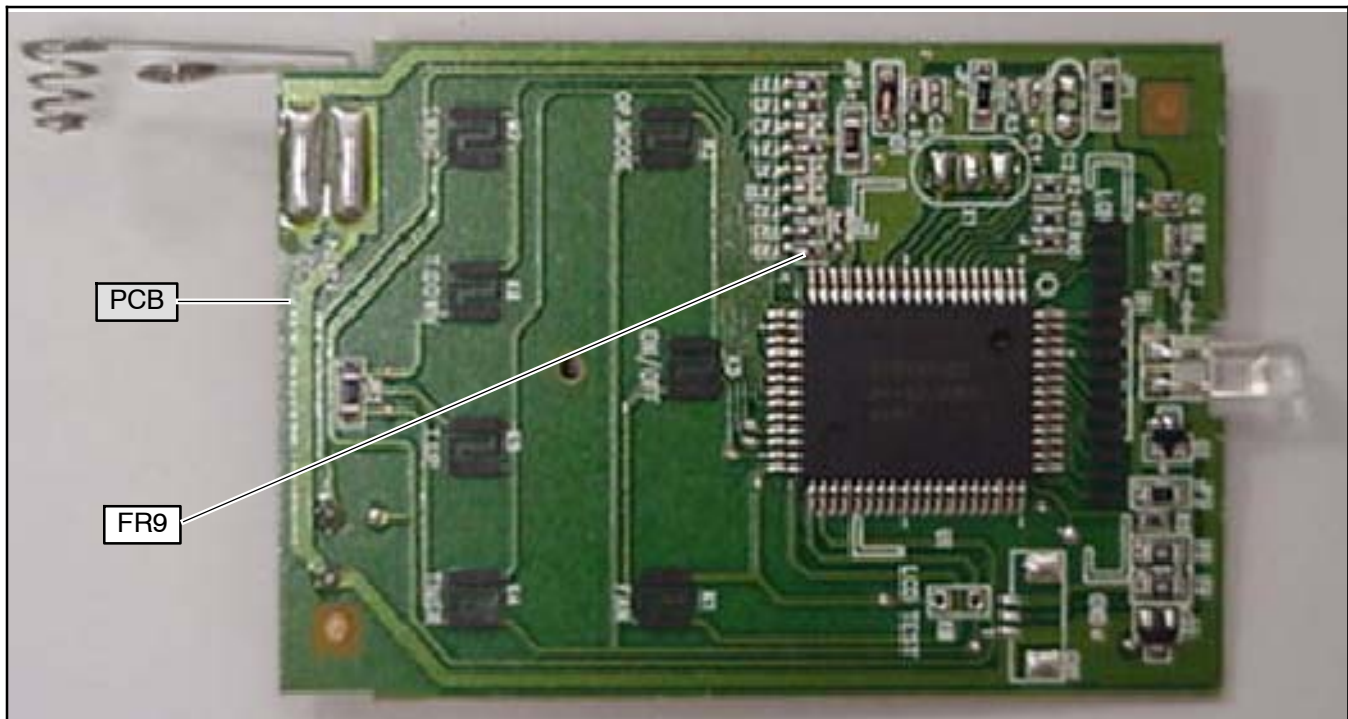
- f. Carefully cut the FR9 jumper wire.
- g. Reverse above procedure for reassembly.

**⚠ CAUTION**

**When re-assembling, ensure the battery springs are correctly placed in the battery spring holders.**



**Figure 3-39 Remote Control Components**



**Figure 3-40 Remote Control PCB (FR9 Location)**



### 3.8 THERMOSTAT INSTALLATION AND START-UP INSTRUCTIONS (WALL MOUNTED)

#### 3.8.1 Introduction

The thermostat is a wall mounted, low-voltage thermostat which maintains room temperature by controlling the operation of a heating and air conditioning system. Temperature and mode settings are preserved with the power off. Refer to Figure 3-41 for Cool Only wiring diagram and Figure 3-42 or Figure 3-43 for Cool/Heat



#### CAUTION

**Improper wiring or installation may damage thermostat. Wiring must conform to local and national electrical codes.**



#### WARNING

**Before installing thermostat, turn off all power to unit. There may be more than one power disconnect. Electrical shock can cause personal injury or death.**

#### 3.8.2 Installation

##### NOTE

Read all instructions before starting the installation.

##### NOTE

The thermostat requires no batteries. The thermostat is not a power stealing device and **MUST** have both R and C connected.

#### 3.8.3 Thermostat Location

The thermostat should be mounted:

Approximately 5 foot (1.5m) from the floor.

Close to or in a frequently used room, preferably on an inside partitioning wall.

On a section of wall without pipes or duct work.

The thermostat should **NOT** be mounted:

Close to a window, or an outside wall, or next to a door leading to the outside.

Exposed to direct light and heat from a lamp, sun, fireplace, or other temperature-radiating object which may cause a false reading.

Close to or in direct airflow from supply registers and return-air grilles.

In areas with poor air circulation, such as behind a door or in an alcove.

#### 3.8.4 Install Thermostat - 12VDC

- a. Turn off all power to unit.
- b. If an existing thermostat is being replaced:

1. Remove existing thermostat from wall.
2. Disconnect wires from existing thermostat, one at a time. Be careful not to allow wires to fall back into the wall.
3. As each wire is disconnected, record wire color and terminal marking.
4. Discard or recycle old thermostat.

##### NOTE

Mercury is a hazardous waste and must be disposed of properly.

- c. Separate the front and back pieces of plastic.
- d. Route thermostat wires through hole in back piece of plastic. Level plastic against wall (for aesthetic value only - thermostat need not be leveled for proper operation) and mark wall through 2 mounting holes.
- e. Drill two 3/16 inch mounting holes in wall where marked.

##### NOTE

Mounting holes on thermostat are designed to fit on a horizontal J-Box.

- f. Secure back plastic to wall with 2 anchors and screws provided, making sure all wires extend through hole in plastic.
- g. Connect wires to proper terminal of the connector block in the front piece of plastic.
- h. Push any excess wire back into wall. Excess wire inside the thermostat plastic case can interfere with proper air flow across the temperature sensor. Seal hole in wall to prevent air leaks. Leaks can effect operation.
- i. Snap front and back pieces of plastic together.
- j. Turn on power to the unit.

### 3.9 LCD DISPLAY

#### 3.9.1 Cool Only Thermostat (Part No. 1110-421)

On power up, the LCD readout will display C (Cool Only).

#### 3.9.2 Heat/Cool Thermostat (Part No. 1110-420)

On power up, the LCD readout will display HC (Heat/Cool).

### 3.10 SET THERMOSTAT CONFIGURATION

While in configuration mode, three option choices can be made.

**A** - Anticipator Value Adjustment

**d** - Display Temperature Fahrenheit/Celsius Selection

**oF** - Offset Adjustment For Room Temperature

#### 3.10.1 Enter Configuration Mode

Enter and hold the FAN button for approximately 10 seconds until room temperature disappears and the display reads **A**. You are now in the configuration mode.

## NOTE

If the FAN button is pressed again or if no button is pressed for two minutes, the thermostat will exit the configuration mode and return to normal operation. To re-enter the configuration mode, the FAN button must be pressed and held for 10 seconds again.

While in the configuration mode, the following options are available:

### A. ANTICIPATOR - Value Adjustment

This adjustment controls the sensitivity and cycle rate of the thermostat. Higher numbers decrease the sensitivity and slow the cycle rate. Lower numbers increase the sensitivity and increase the cycle rate. However, a limiting feature will not allow more than 4 equipment cycles per hour, regardless of setting. Values can range from 1 to 3. Factory default setting is 2. This default selection will provide optimum performance in nearly all installations. Try it first. Do not change settings unless there is evidence of need to do so. Unlike conventional anticipators, this setting is not determined by current draw. There is no need to measure, know, or compensate for current.

#### To Adjust:

- Enter configuration mode (if not already there).
- Use UP & DOWN buttons to display A.
- Press MODE button once to display current value.
- Use UP & DOWN buttons to move between values.
- Press MODE button to return to A. UP & DOWN buttons now move between option choices A, d, °F or press FAN button to exit configuration mode.

### d. Fahrenheit/Celsius Selection

This selection operates the thermostat in either Fahrenheit or Celsius.

#### To Select:

- Enter configuration mode (if not already there).
- Use UP & DOWN buttons to display d.
- Press MODE button once to display current selection of F or C.
- Use UP & DOWN buttons to change between F & C.
- Press MODE button to return to d. UP & DOWN buttons now move between option choices; or press FAN button to exit configuration mode.

### °F. Room Temperature Offset Adjust Selection

The selected number is the number of degrees, plus or minus, which will be added to the actual temperature. The numbers can range between -5 and +5. Factory default is 0. This adjusted value will be used as actual temperature for both display and control action. The effect is that a positive number selection will make the room temperature lower, and vice versa. The thermostat is calibrated within an accuracy of plus or minus 2 degrees when shipped from the factory; this adjustment will provide the best accuracy when set to 0.

#### To Select:

- Enter configuration mode (if not already there).
- Use UP & DOWN buttons to display °F.

- Press MODE button once to display offset value.
- Use UP & DOWN buttons to select a value between -5 and 5.
- Press MODE button to return to °F. UP & DOWN buttons now move between option choices; or press FAN button to exit configuration mode.

## 3.11 CHECK THERMOSTAT OPERATION

### 3.11.1 Fan Operation (Cool Only)

- Press FAN button, starting fan operation. FAN annunciator turns on; Lo is displayed in the room temperature area for 5 seconds indicating Fan Low Speed.
- Press FAN button, FAN annunciator remains on; Hi is displayed in room temperature area for 5 seconds indicating Fan High Speed.
- Press FAN button, stopping fan operation. FAN annunciator turns off.

### 3.11.2 Fan Operation (Heat/Cool)

- Press FAN button, starting low fan (Lo) operation. FAN annunciator turns on.
- Press FAN button, starting high fan (Hi) operation. FAN annunciator remains on.
- Press FAN button, stopping fan operation. FAN annunciator turns off.

### 3.11.3 Cooling Operation (Cool Only)

- Press and release MODE button until COOL is displayed.
- Press DOWN button until LCD readout reads 10 degrees below room temperature. Cooling and High Fan system should begin to operate within 5 minutes.

### 3.11.4 Cooling Operation (Heat/Cool)

- Press and release MODE button until COOL is displayed.
- Press DOWN button until LCD readout reads 10 degrees below room temperature. Cooling and High Fan system should begin to operate within 5 minutes.

### 3.11.5 Heating Operation (Heat/Cool)

- Press and release MODE button until HEAT is displayed.
- Press UP button until LCD readout reads 10 degrees above room temperature. Heating system should begin to operate within 1 minute.

## 3.12 CHECK THERMOSTAT OPERATION

### 3.12.1 Temperature Display

The thermostat will display room temperature until the UP or DOWN button is pressed. The word SET appears when these buttons are pressed and the current set point is displayed. If no buttons are pressed for 5 seconds, the display will change back to show room temperature.

### 3.12.2 Timeguard Timer

A 3-minute timeguard is built into the thermostat immediately upon power up, and any time the compressor (output “Y”) turns off. The compressor will not turn on until the timeguard has expired. Pressing UP and FAN buttons simultaneously will override the timeguard for 1 cycle.

### 3.12.3 Cycle Timer

In normal cooling (and heating) operation the thermostat will not allow more than 4 equipment cycles per hour (or 1 cycle every 15 minutes). Both the “Y” (cooling) and “W” (heating) outputs have a 15-minute timer that starts counting down when the output is turned on, (e.g., if “Y” output is turned on for 9 minutes and then satisfies, it cannot turn back on for another 6

minutes regardless of demand). However, pressing UP and FAN buttons simultaneously or changing the set point will override the timer for 1 cycle.

### 3.12.4 Minimum On Timer

Once the equipment has turned on, it will remain on for a minimum of 2 minutes regardless of demand. However, the equipment can turn off in less than 2 minutes if a change in set point, or a change in mode occurs.

### 3.12.5 Error Messages

E4 will be displayed if the thermostat has an internal memory failure. If E4 appears, replace the thermostat.

-- (two dashes) will be displayed if the thermostat cannot properly read the room temperature. If -- appears, replace the thermostat.

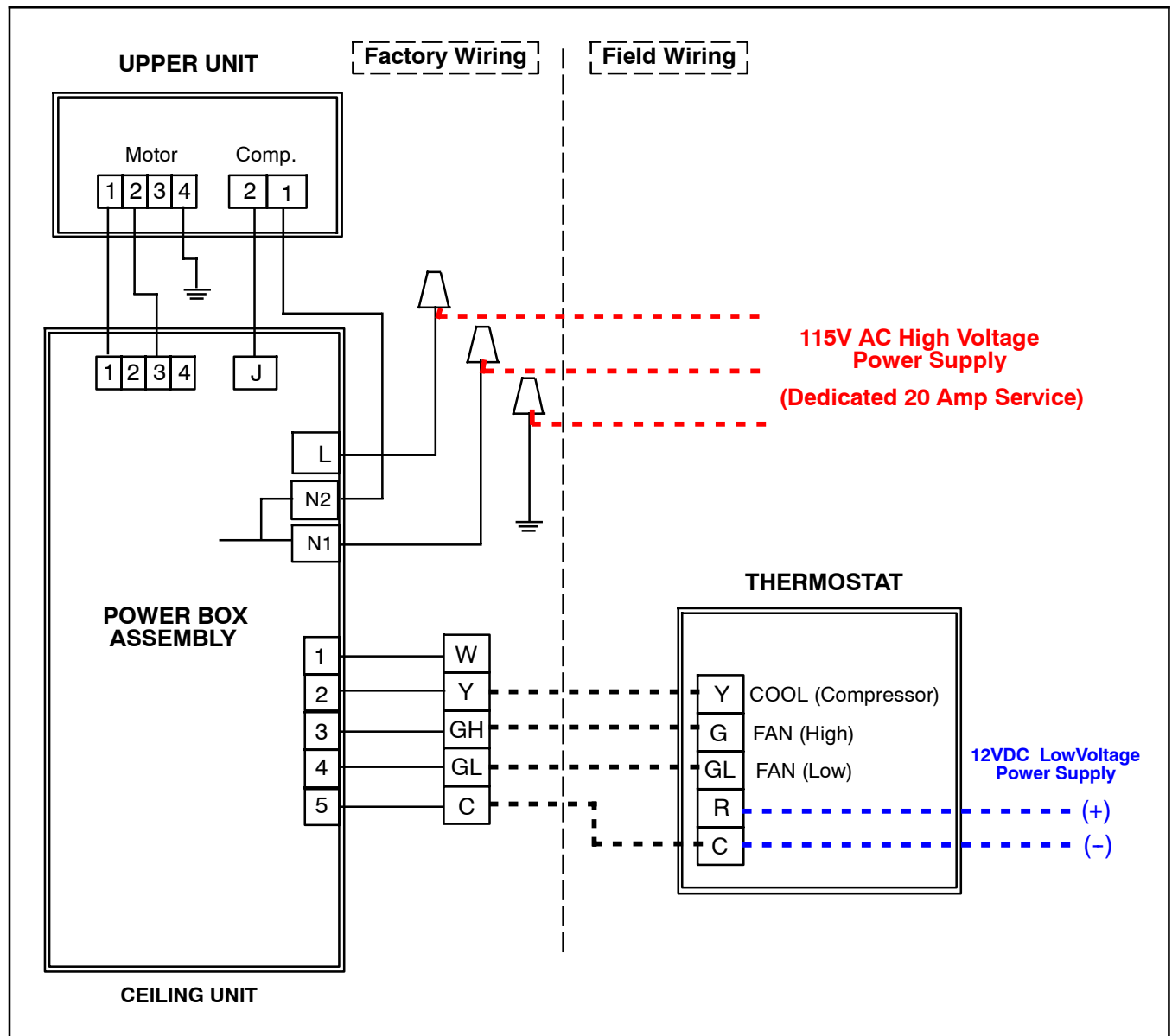


Figure 3-41 Wall Thermostat Wiring Diagram - Cool Only Model

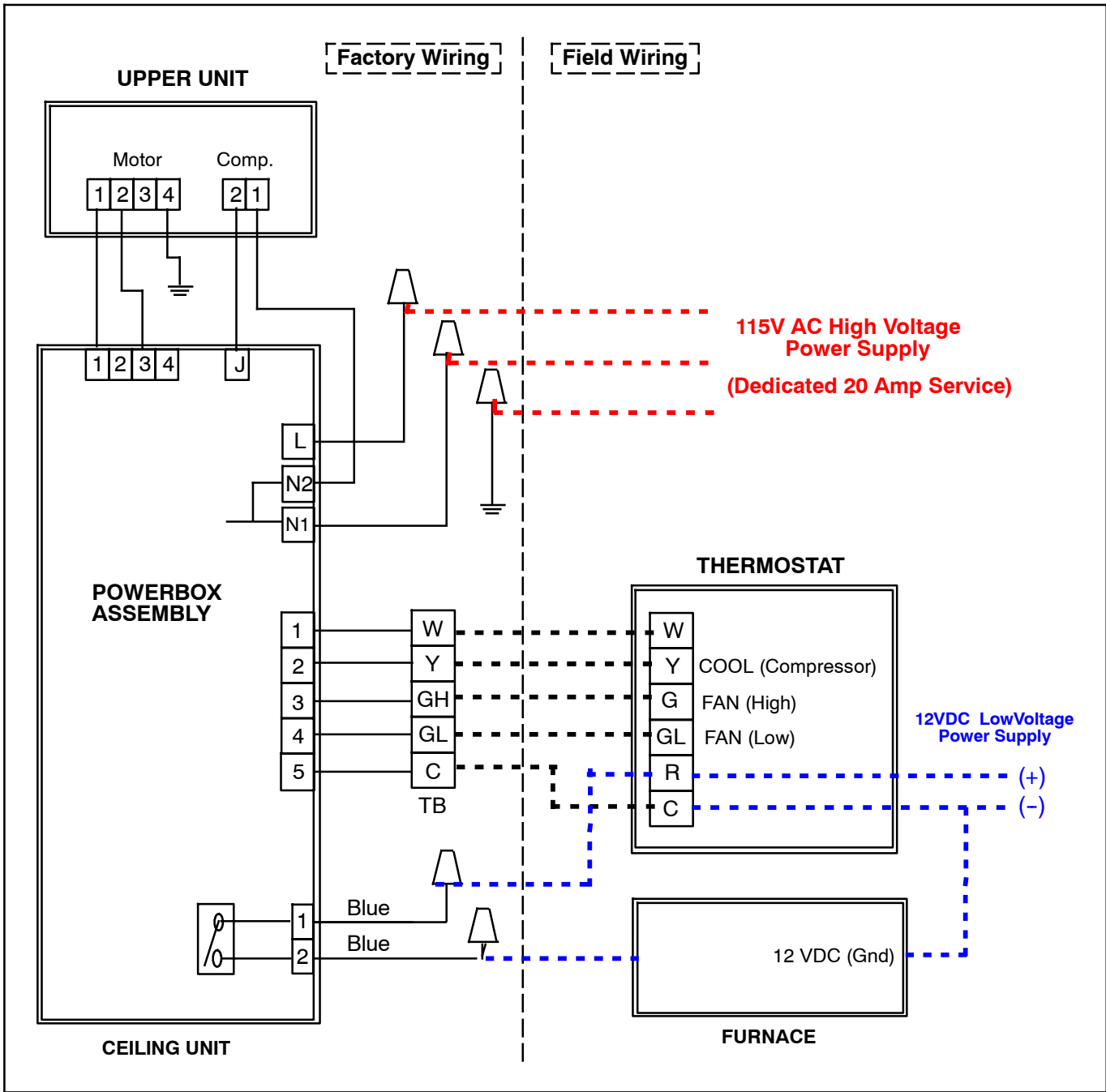


Figure 3-42 Wall Thermostat Wiring Diagram - Heat/Cool Model

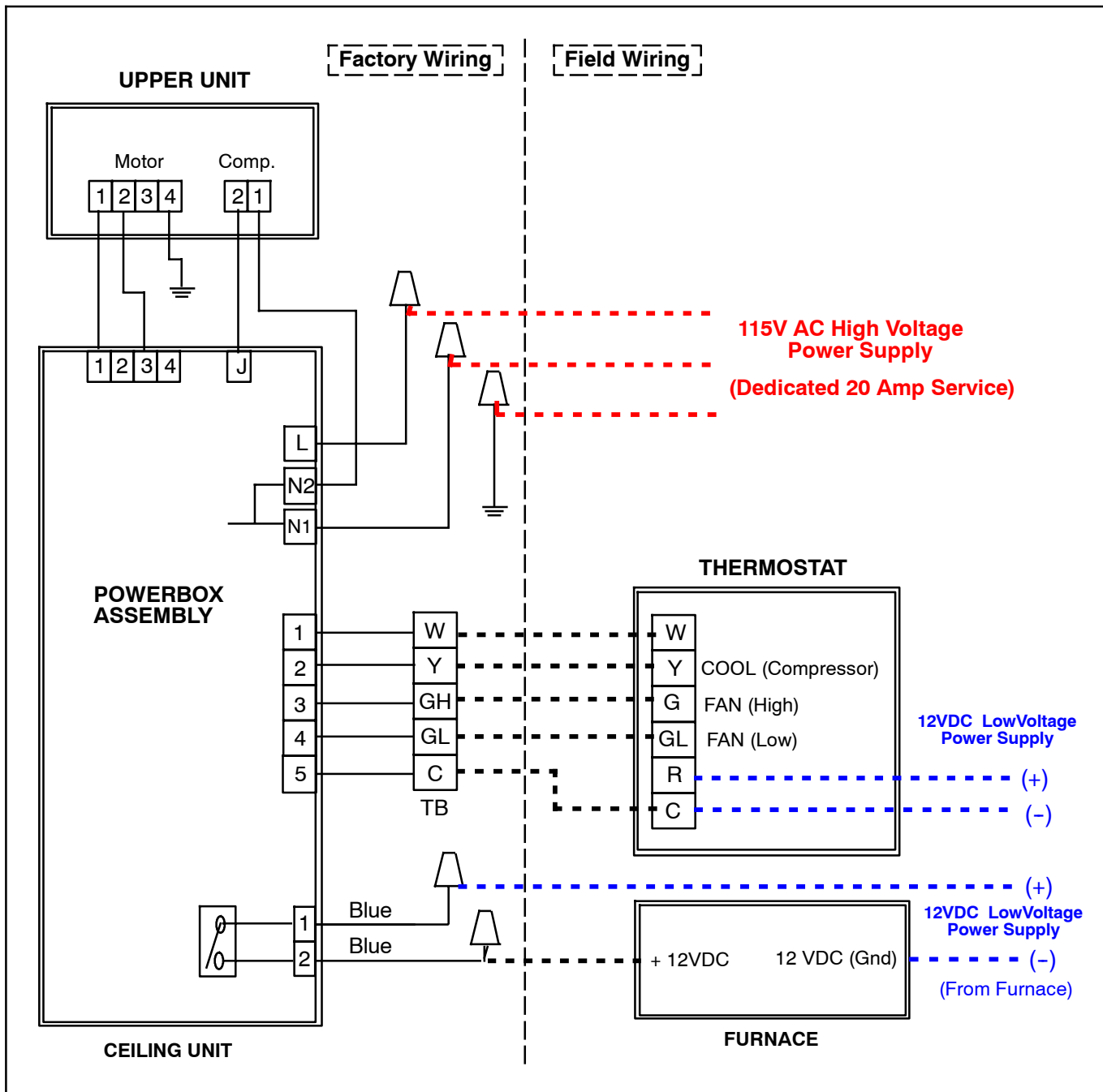


Figure 3-43 (Optional) Wall Thermostat Wiring Diagram - Heat/Cool Model

# SECTION 4

## WIRING SCHEMATICS

### 4.1 INTRODUCTION

This Section contains wiring schematics for the AirV units.

Figure 4-1 is the schematic for the standard upper unit assembly and it is applicable to all standard units.

Figure 4-2 is the schematic for the Low Profile upper unit assembly.

Figure 4-3 is the schematic for a free blow ceiling unit without heat while Figure 4-4 is a free blow unit with heat.

Figure 4-5 is for a ducted unit with microprocessor control.

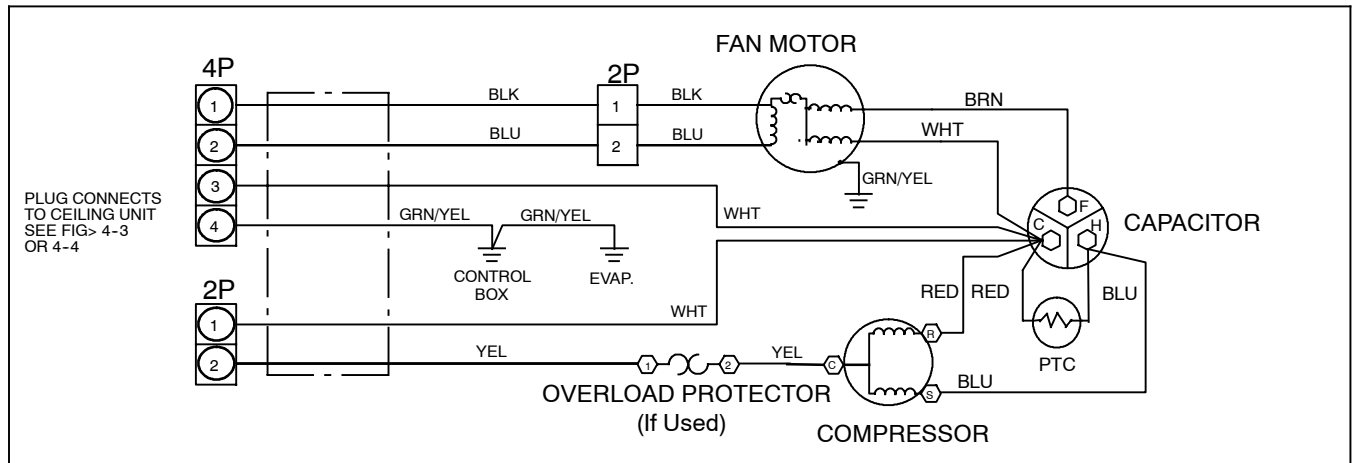
Figure 4-6 is for an Upper Unit Heat Pump with free blow application and Figure 4-7 is the matching free blow ceiling unit.

Figure 4-8 is for the Upper Unit Heat Pump ducted application and Figure 4-10 is the matching ducted ceiling unit. Note that the ducted units have 115 VAC power for the components and 12 VDC power for the microprocessor control system.

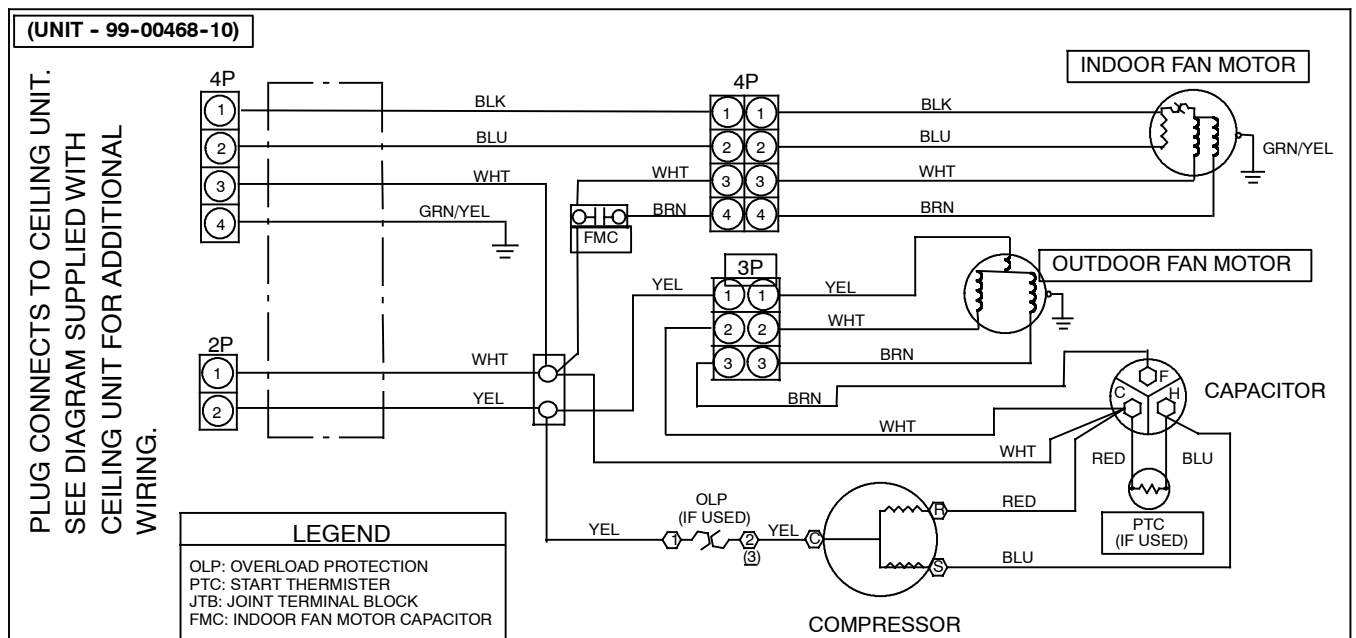
Figure 4-9 is the schematic for a Low Profile upper unit for ducted application.

Figure 4-11 is for the ducted or free blow application that uses a wall-mounted thermostat, with or without the furnace option and Figure 4-12 is wall-mounted thermostat, free blow ceiling unit with heating assembly.

Where applicable, diagrams that designate 115 Volt, 60 H, 1 Phase, are also available using 220 Volts, 50 H, 1 Phase. Most notably Figure 4-1 and Figure 4-5.



**Figure 4-1 Upper Unit Schematic - Standard & HC**



**Figure 4-2 Upper Unit Schematic - Low Profile**

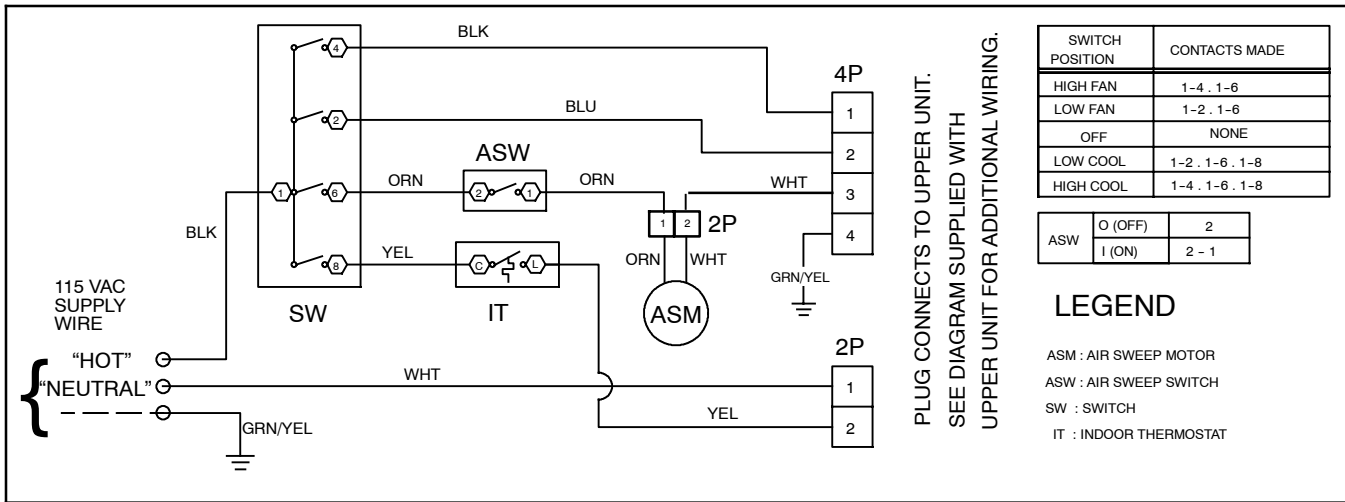


Figure 4-3 Ceiling Unit Schematic - Cooling Only

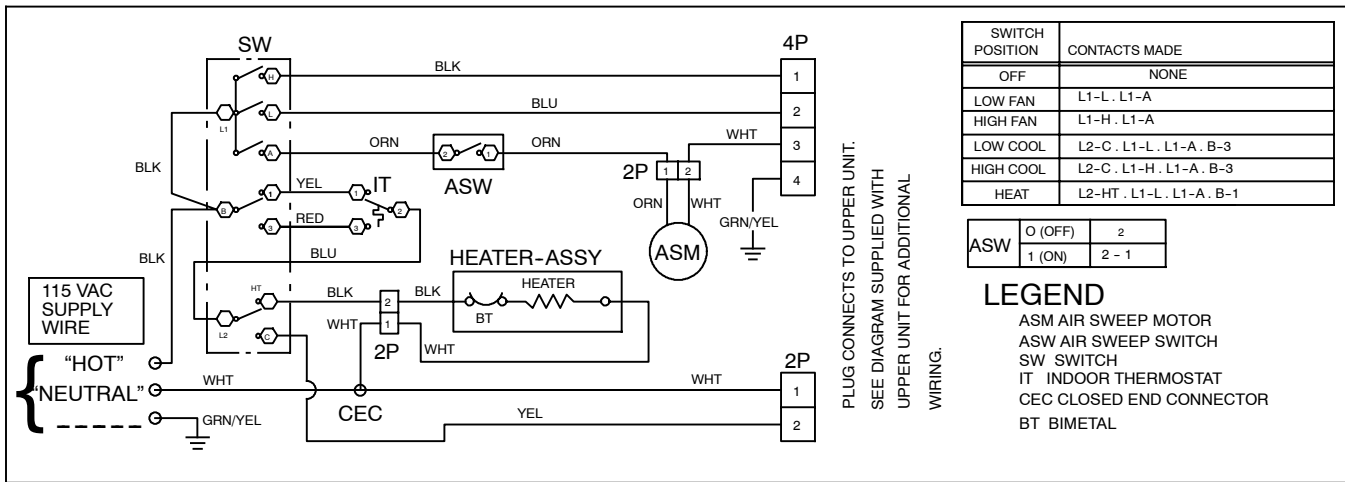


Figure 4-4 Ceiling Unit Schematic - Heat/Cool

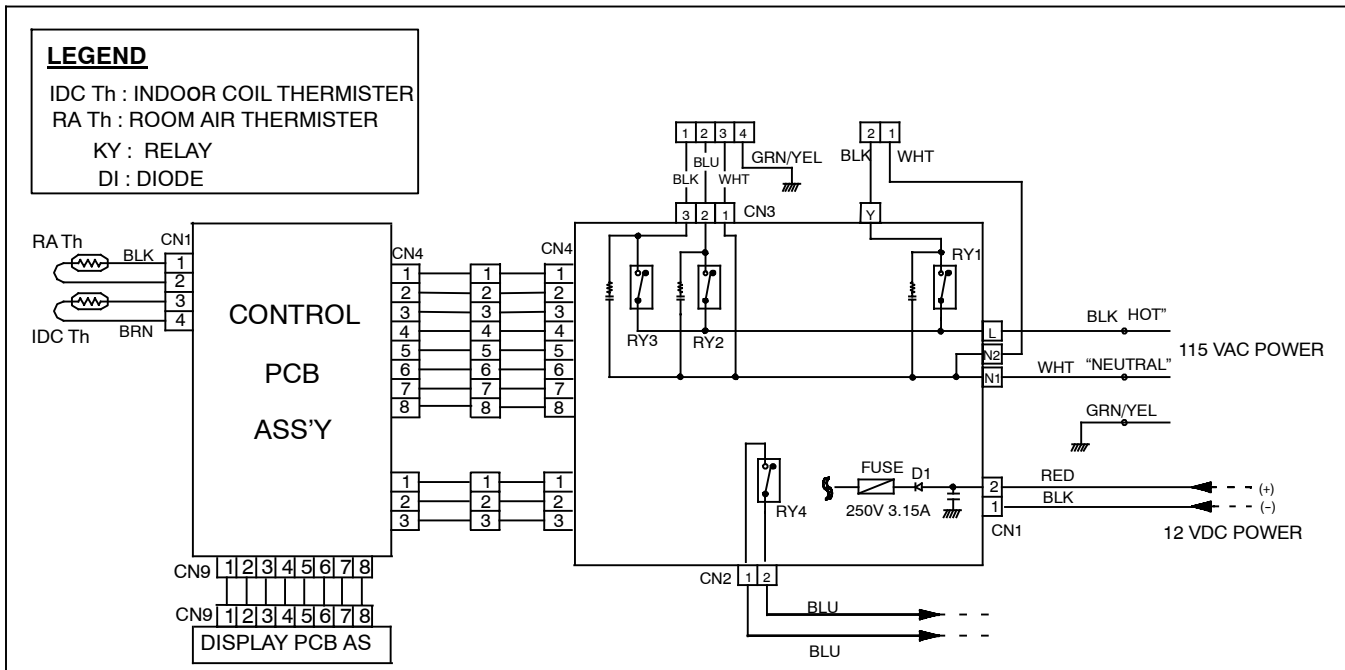
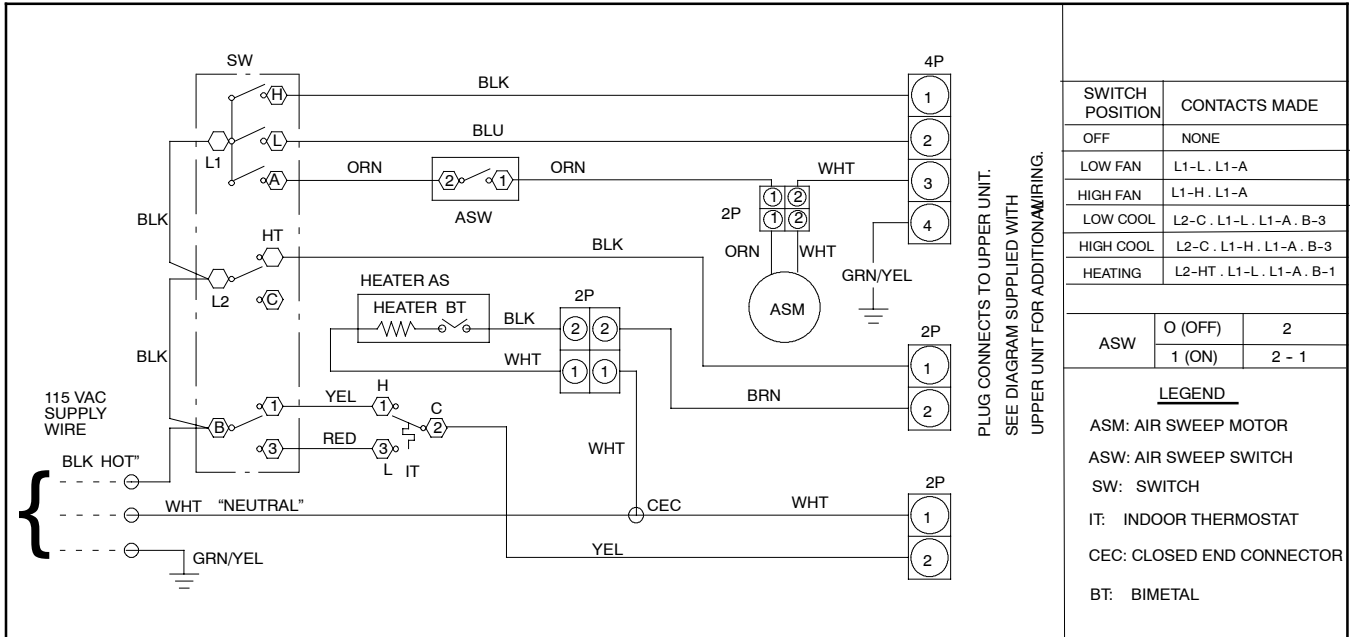
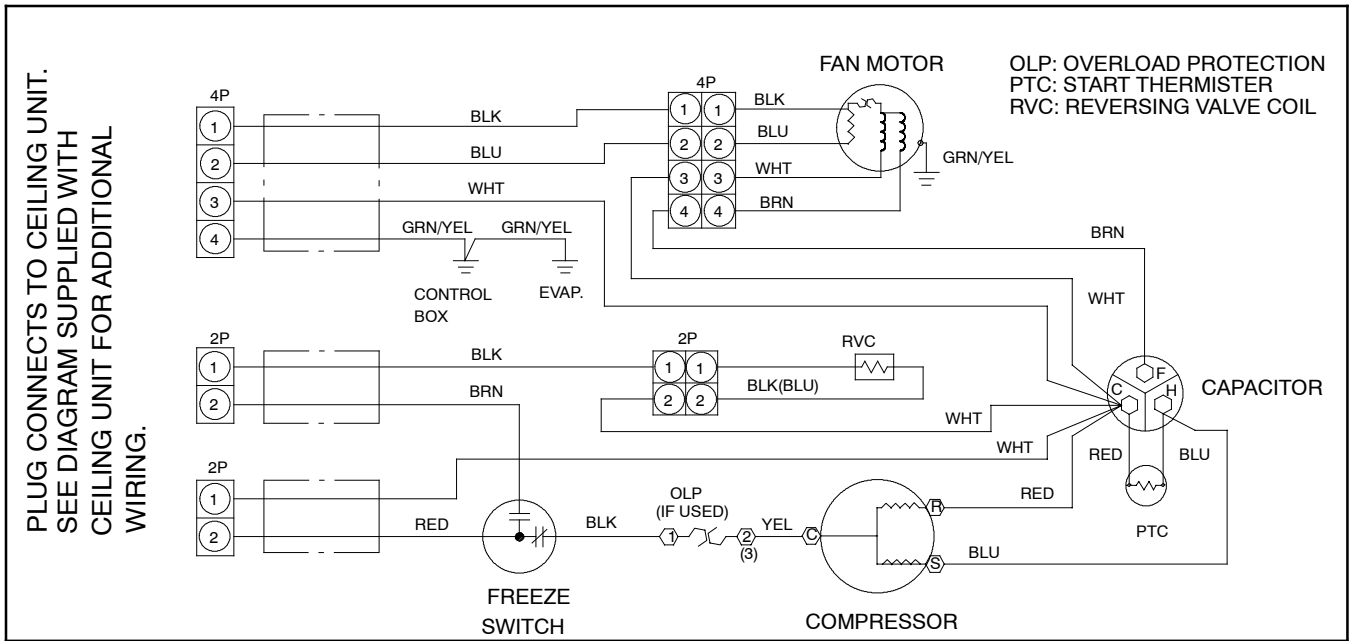
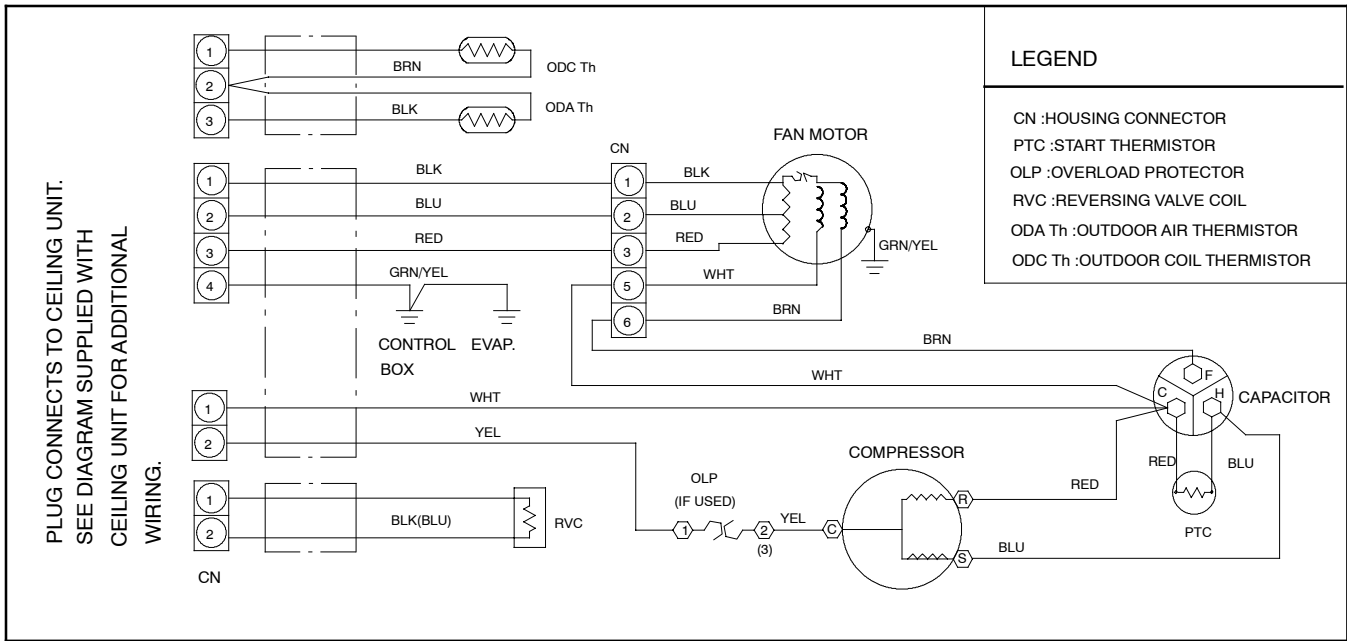


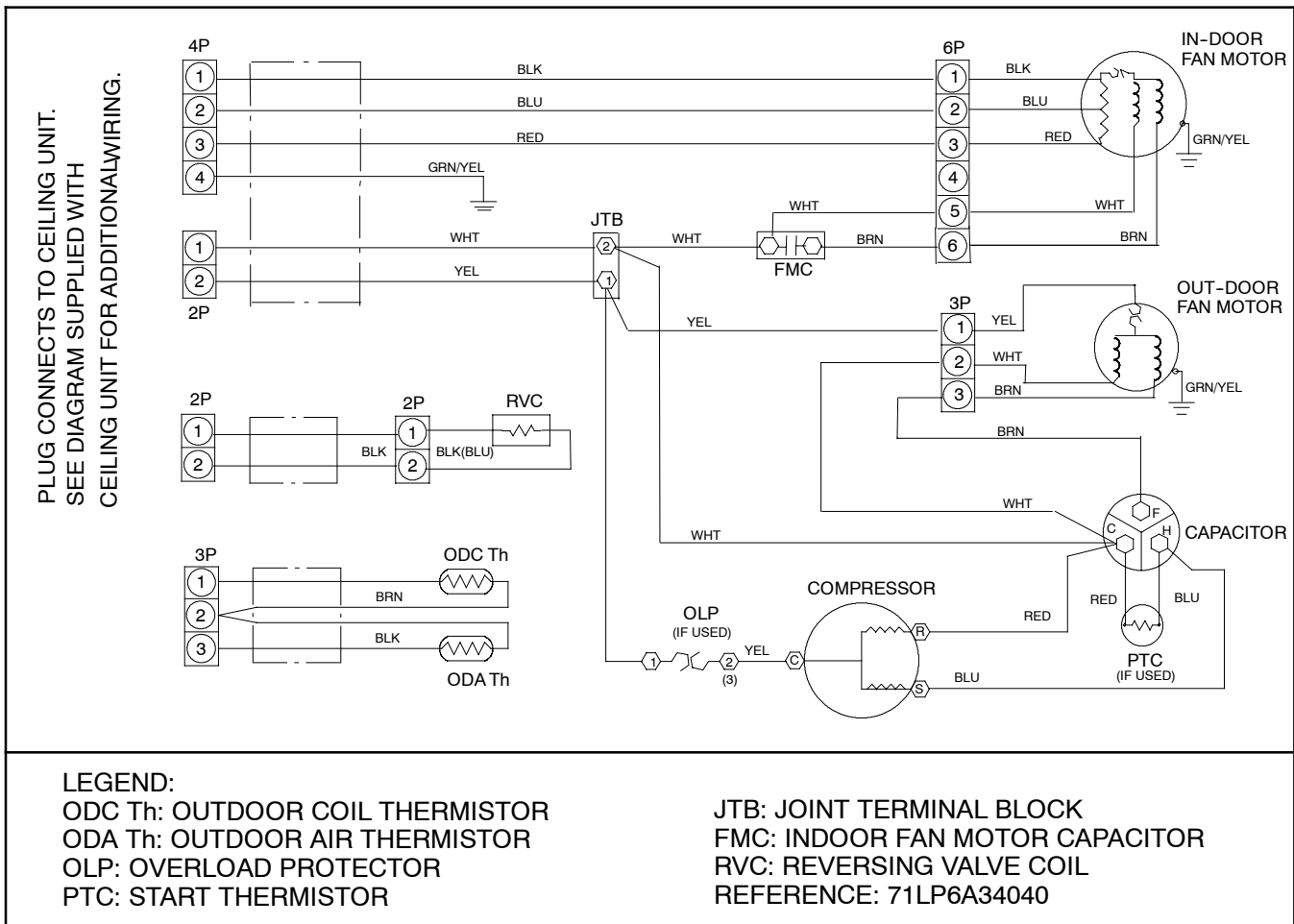
Figure 4-5 Ceiling Unit, Standard - Ducted







**Figure 4-8 Heat Pump - Upper Unit - Standard - Ducted**



**Figure 4-9 Heat Pump - Upper Unit - Low Profile - Ducted**

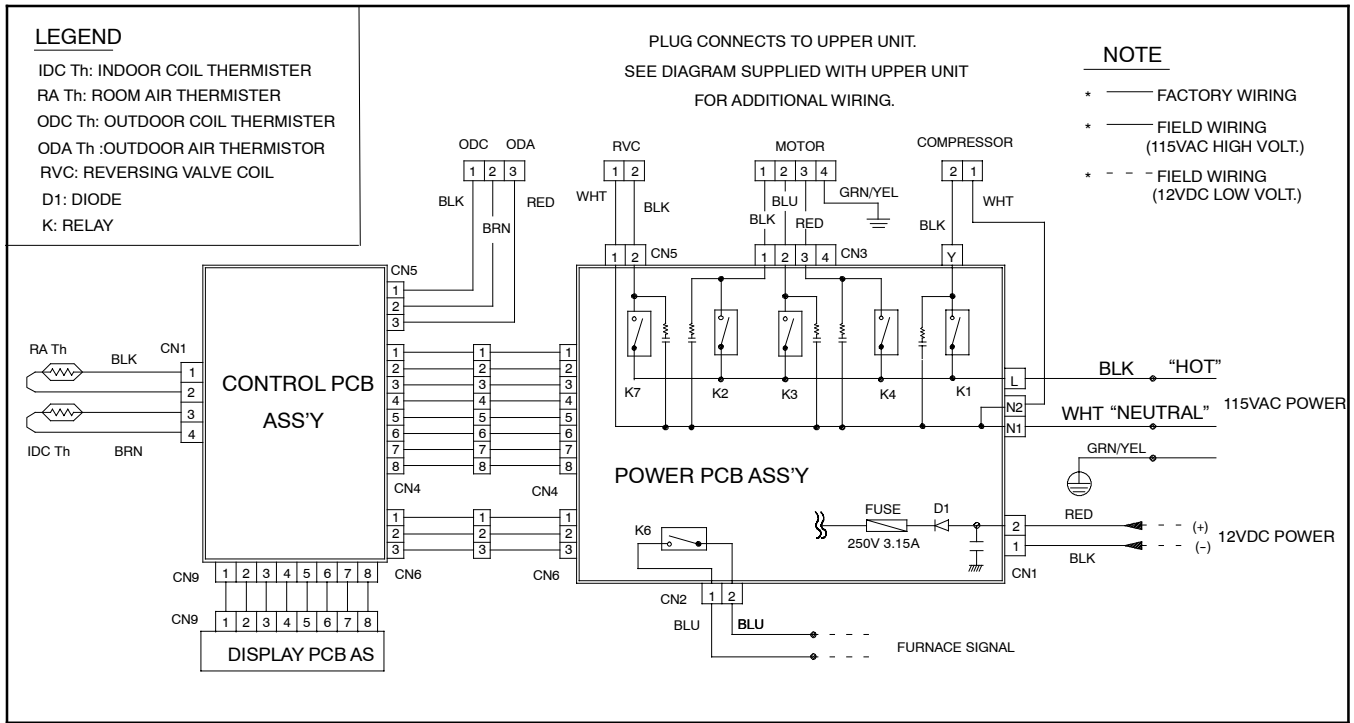


Figure 4-10 Heat Pump - Ceiling Unit - Ducted

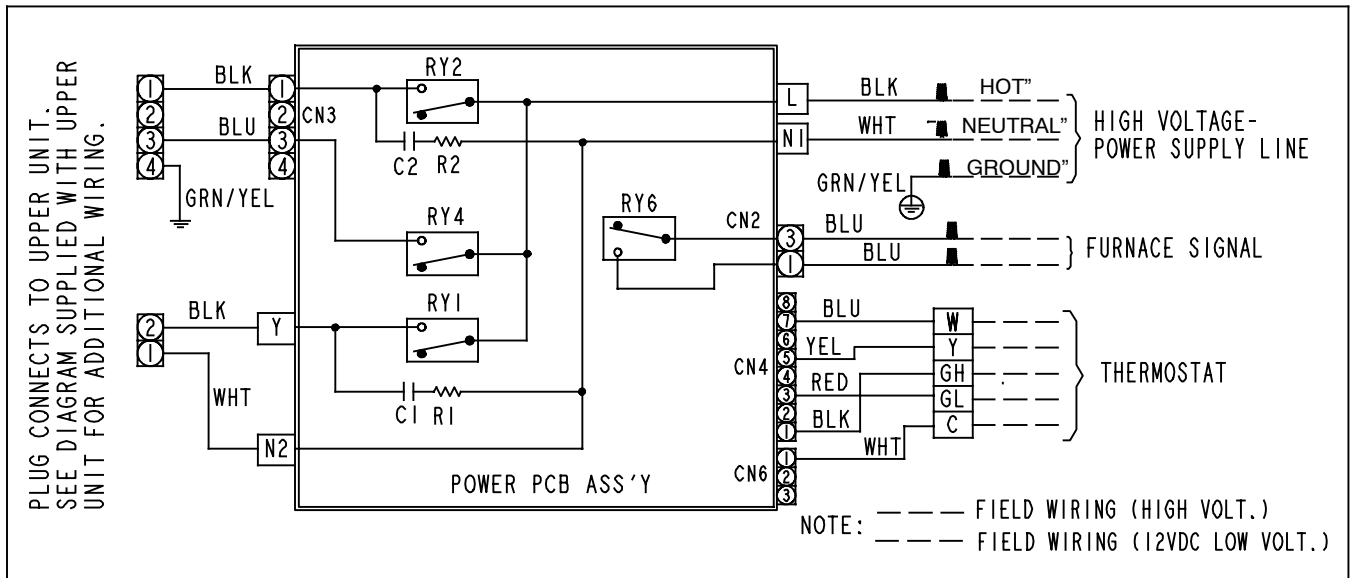


Figure 4-11 Ceiling Unit - Wall Thermostat - Cool Only - Ducted & Free Blow

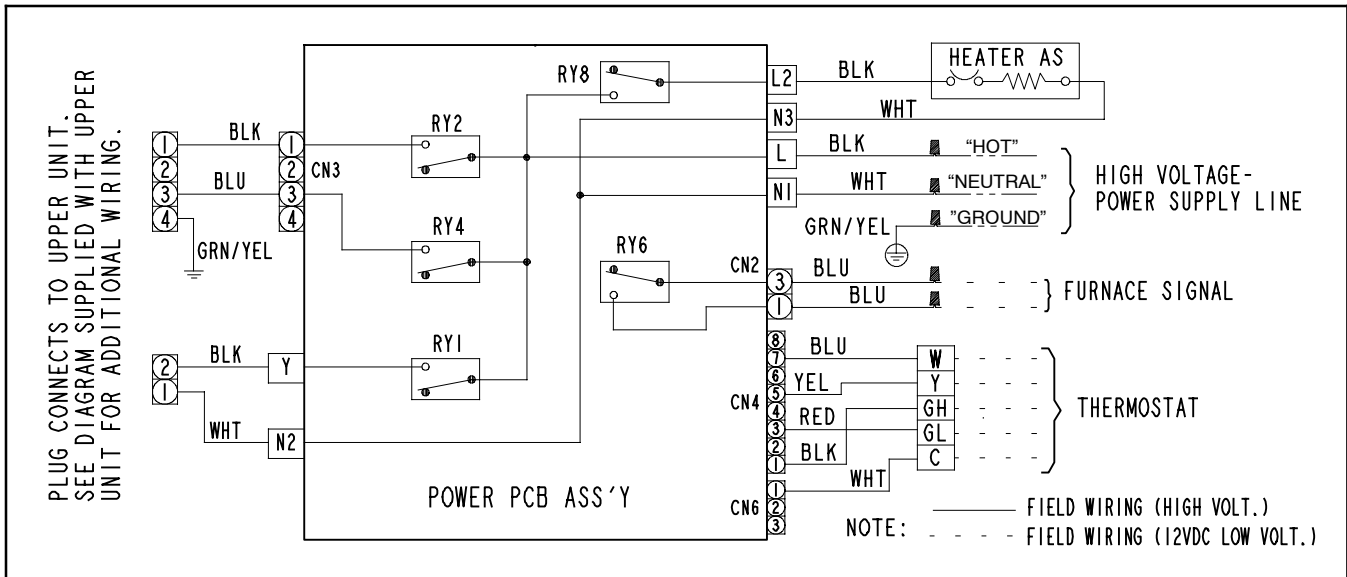


Figure 4-12 Ceiling Unit - Wall Thermostat - Heat/Cool - Free Blow

**4.2 WALL MOUNTED THERMOSTATS**

For proper wiring of Wall Mounted Thermostats as an accessory, refer to Figure 3-41 (Wall Thermostat Wiring Diagram - Cool Only Model) or Figure 3-43 (Wall Thermostat Wiring Diagram - Heat/Cool Model).

**4.3 WALL-MOUNTED SENSOR FOR REMOTE CONTROL**

The ducted remote control wall-mounted sensor operates the same as the standard ducted ceiling unit, except with the wall-mounted sensor you must point the remote control at the wall sensor instead of the ceiling unit. The wall sensor temperature reading will give a more accurate reading of the temperature in the living area. The wall-mounted sensor is hard-wired to the ceiling unit. Refer to the owners guide for information on the optional wall mounted sensor for remote control.

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