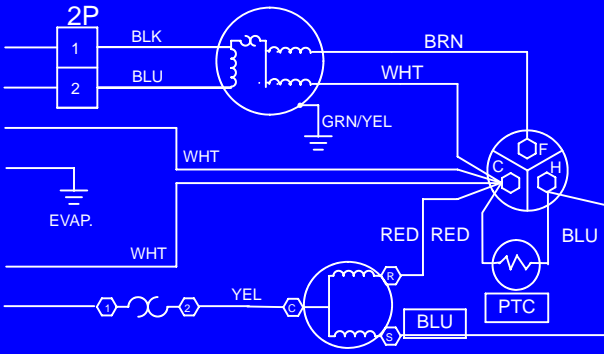


Carrier Transport Air Conditioning



SERVICE MANUAL
for
MODEL AirV
Rooftop Air Conditioning Systems



TRANSICOLD

SERVICE MANUAL

For

AirV

AIR CONDITIONING AND HEATING EQUIPMENT

MODELS

68RV11302A

68RV14102A

68RV14103A

68RV14112A

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 3.5.8)

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 CO₂ (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 3.5.8)

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

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 1-6) 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 model numbers and descriptions of the AirV units, and Table 1-2 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 a plate readable from inside the vehicle, See Figure 1-7.

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

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.

1400Y A diode was added to the Ducted Ceiling assembly control board to stop DC ripple from the converters,

2900Y Cover screw coating was changed in order to eliminate corrosion.

3400Y The plastic shroud was modified to improve drainage.

5100Y A new compressor and capacitor is introduced, improving stability and increasing capacity.

1201Y The temperature sensor was moved to the grill to improve temperature sensing during furnace mode,

2501Y The dual air sweep was added.

4501Y A switch was added to skip compressor malfunction test.

4601Y Change in material was made in order to strengthen the fan propeller.

4901Y The mounting bolt lengths were increased 3/4 inch.

4901Y The polar white ducted ceiling color was cut-in.

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

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

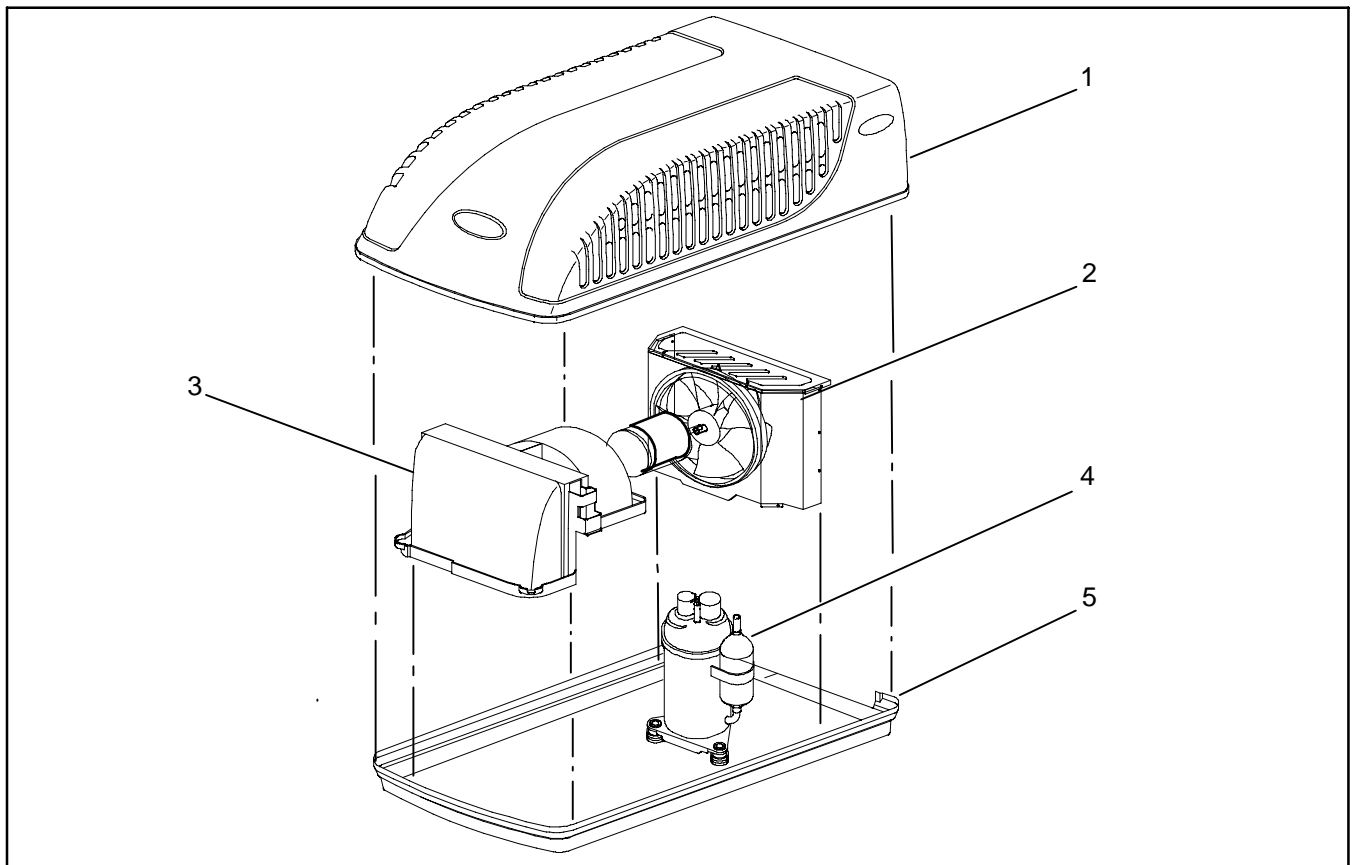
4204Y Minimum furnace setpoint lowered from 63°F to 45°F.

Table 1-1. Model Chart

UPPER UNIT (ROOF)					
Model Number	Part Number	Voltage	Amps	Color	
115V Standard System 68RV14102A	99-00468-00	115/1/60	12.8	White	
	99-00468-01	115/1/60	12.8	Ivory	
220V Standard System 68RV11302A	99-00468-02	220/1/50	5.3 Cool 6.7 Heat	White	
	99-00468-03	220/1/50		Ivory	
High Capacity 68RV15102A	99-00468-08	115/1/60	14.5	White	
	99-00468-09	115/1/60	14.5	Ivory	
Heat Pump Systems 68RV14112A	99-00468-04 (Free Blow)	115/1/60	12.7 Cool 10.9 Heat	White	
	99-00468-05 (Free Blow)	115/1/60	12.7 Cool 10.9 Heat	Ivory	
	99-00468-06 (Ducted)	115/1/60	12.7 Cool 10.9 Heat	White	
	99-00468-07 (Ducted)	115/1/60	12.7 Cool 10.9 Heat	Ivory	
LOW PROFILE 68RV15103A	99-00468-10 (Free Blow - High Capacity)	115/1/60	15.1 Cool 13.8 Heat	White	
LOW PROFILE 68RV14103A	99-00468-12 (Free Blow - Standard)	115/1/60	15.0 Cool 13.7 Heat	White	
CEILING UNIT					
Model Number	Part Number	Voltage	Color	Options	Interface
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
68RV0010AB	99-00469-23	115/1/60	White	Cool Only	Free Blow
68RV0010AB	99-00469-24	115/1/60	Ivory	Cool Only	Free Blow
68RV0010BB	99-00469-25	115/1/60	White	Heat/Cool	Free Blow
68RV0010BB	99-00469-26	115/1/60	Ivory	Heat/Cool	Free Blow
68RV0040MA	99-00469-22	115/1/60	White	Cool Only	Ducted Wall Thermostat
68RV0010DB	99-00469-29	115/1/60	White	Cool Only	Free Blow Wall Thermostat

Table 1-2 Additional Support Manuals

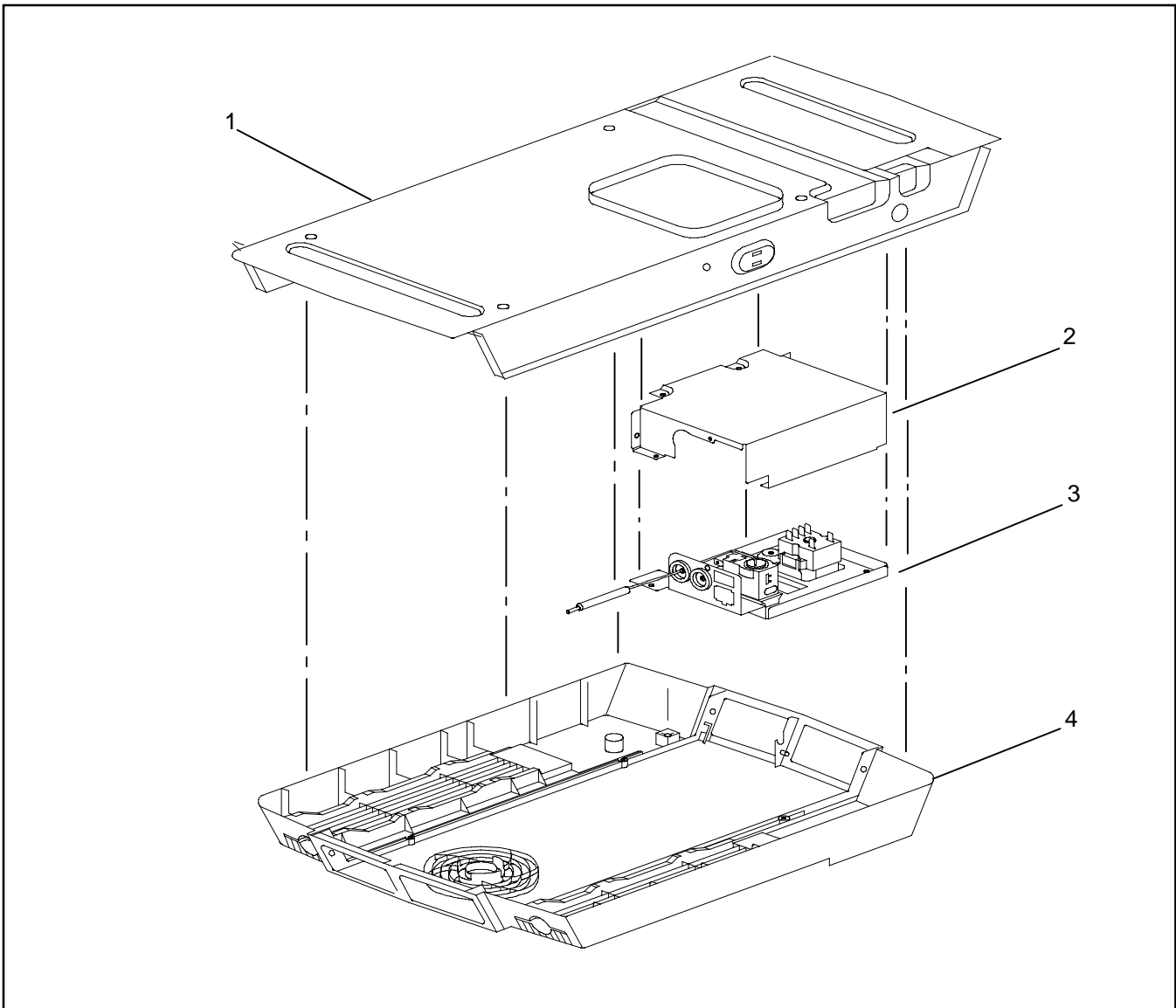
MANUAL-FORM NO.	EQUIPMENT COVERED	TYPE OF MANUAL	(For) PART NO.
71LC6A54310	AirV 115 Volts-Free Blow (Cool Only)	Owner's Guide	99-00469-00 99-00469-01
71LH6A54070	AirV 115 Volts-Free Blow (Heat-Cool)	Owner's Guide	99-00469-02 99-00469-03
71LD6A54070	AirV 115 Volts-Ducted (Cool Only)	Owner's Guide	99-00469-06
71LH6A54070	AirV 220 Volts-Free Blow (Heat-Cool)	Owner's Guide	99-00469-08 99-00469-09
71RQ6A5401A	AirV 115 Volts-Free Blow (Heat Pump)	Owner's Guide	99-00469-11 99-00469-12
71DQ6A5401A	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
71LC6A54310	AirV 115 Volts-Free Blow (Cool Only)	Owner's Guide	99-00469-23 99-00469-24
71LH6A54070	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
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

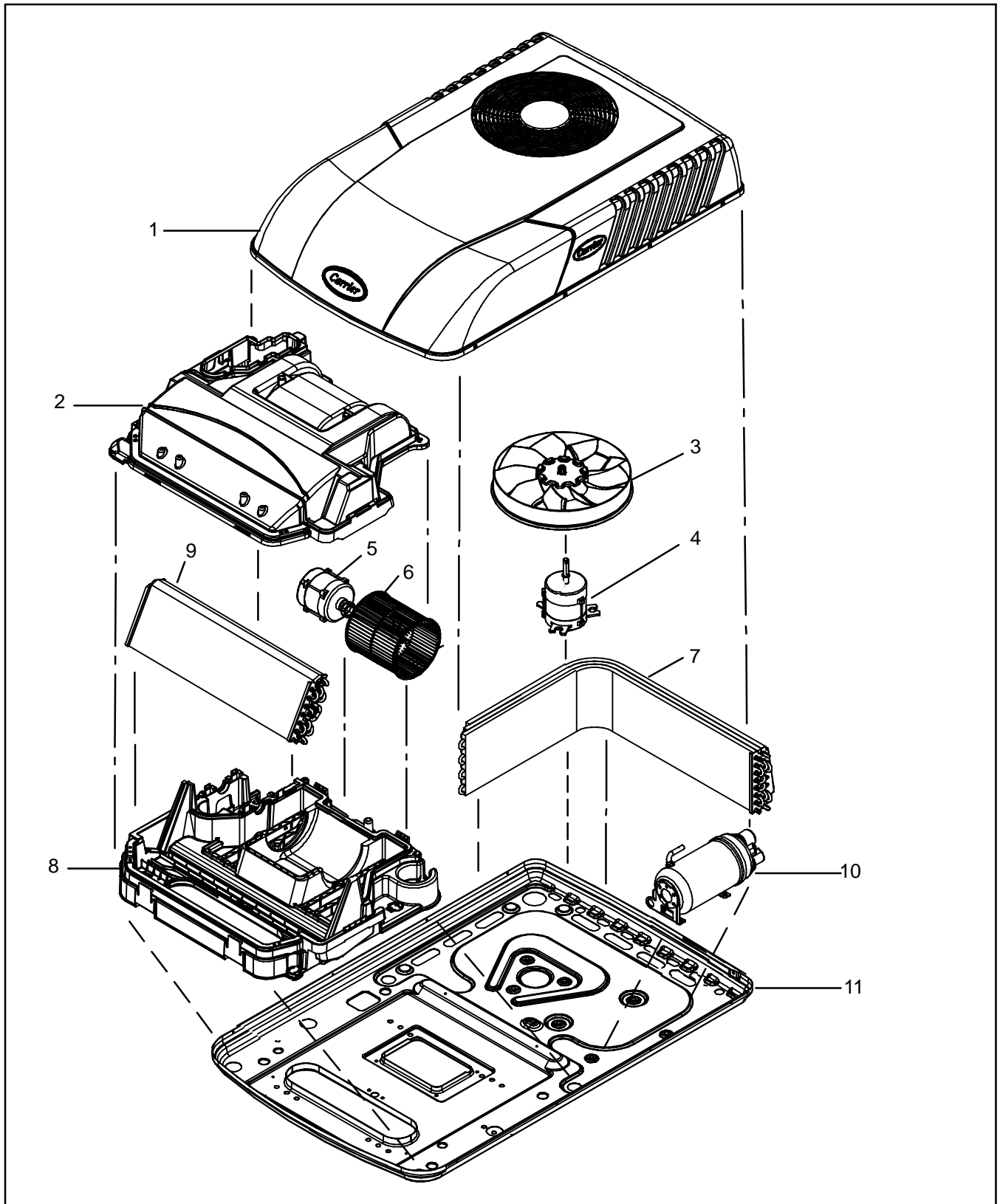
Figure 1-2 Roof Unit Component Identification



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

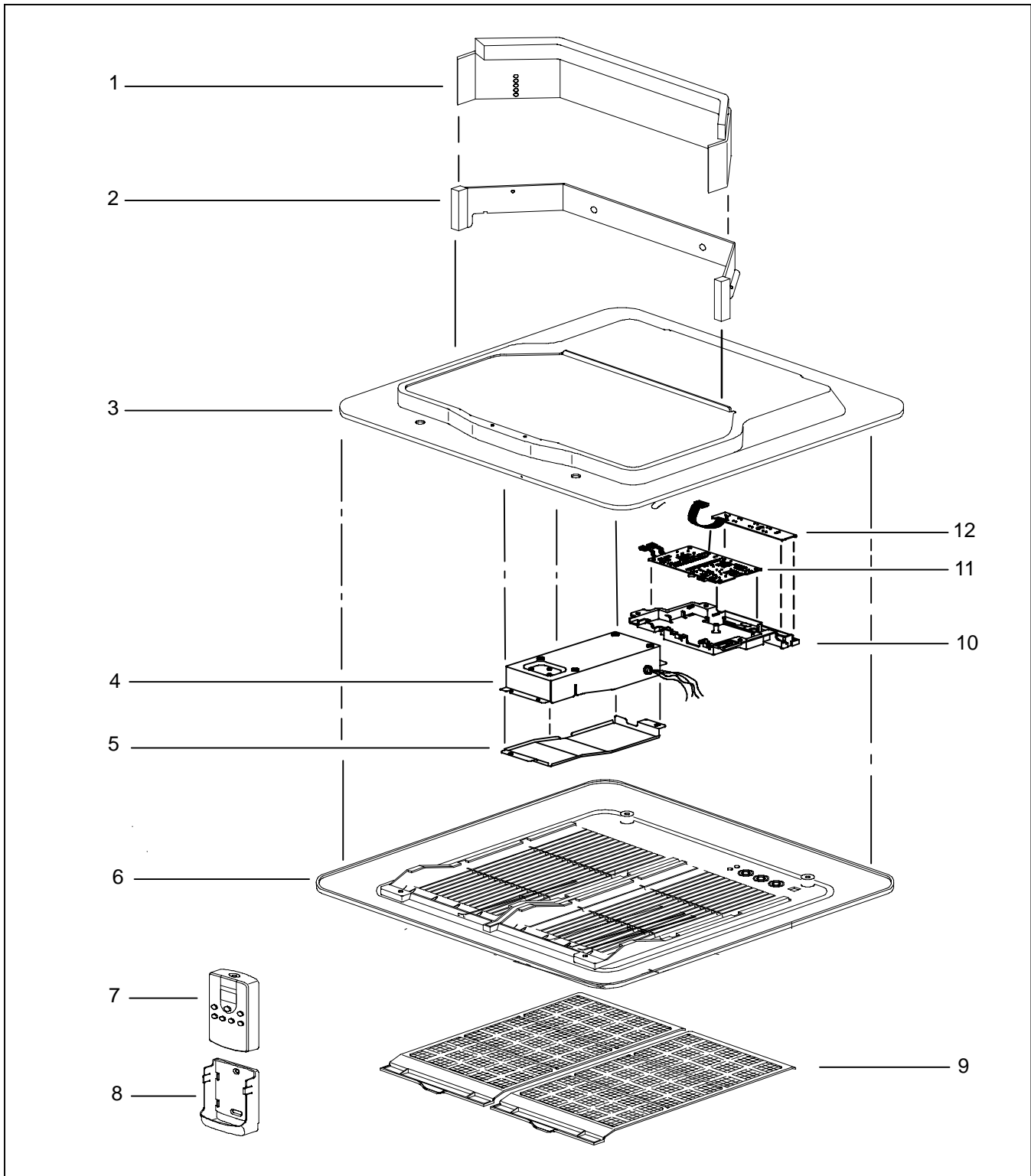
- 3. Control Assembly
- 4. Ceiling Grill Assembly

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



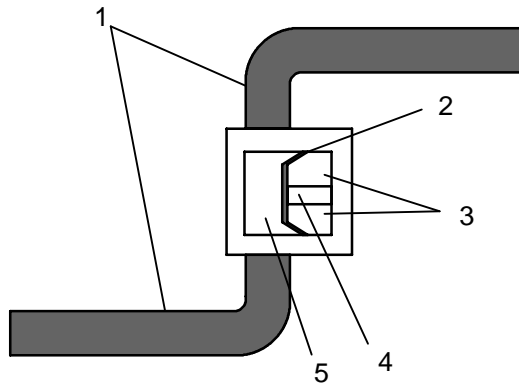
- | | |
|----------------------------|--|
| 1. Cover Assembly | 7. Condenser Coil |
| 2. Scroll Assembly - Upper | 8. Scroll Assembly - Lower |
| 3. Condenser Fan | 9. Evaporator Coil |
| 4. Condenser Motor | 10. Compressor |
| 5. Evaporator Motor | 11. Base Pan Assembly |
| 6. Evaporator Blower Wheel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

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

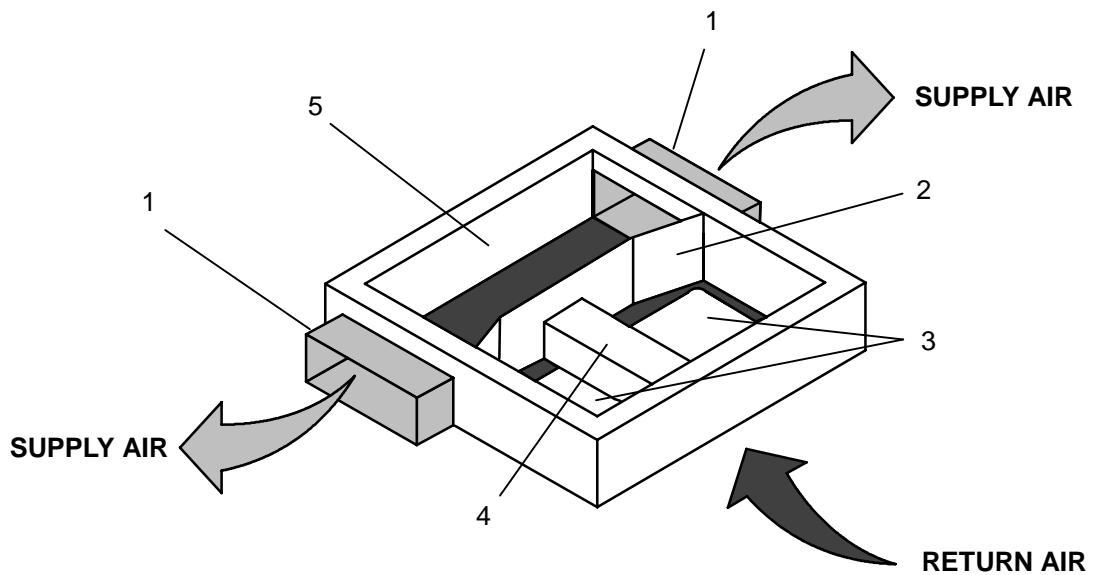


- | | |
|--|------------------------------------|
| 1. Telescoping Divider (3 different sizes available) | 7. Remote Control Assembly |
| 2. Divider Assembly | 8. Remote Control Bracket Assembly |
| 3. Frame Panel, Insulation Assembly | 9. Filter Assemblies (2) |
| 4. Control Box Assembly | 10. PCB Cover |
| 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



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 1-6 Ducted System Air Flow Arrangement

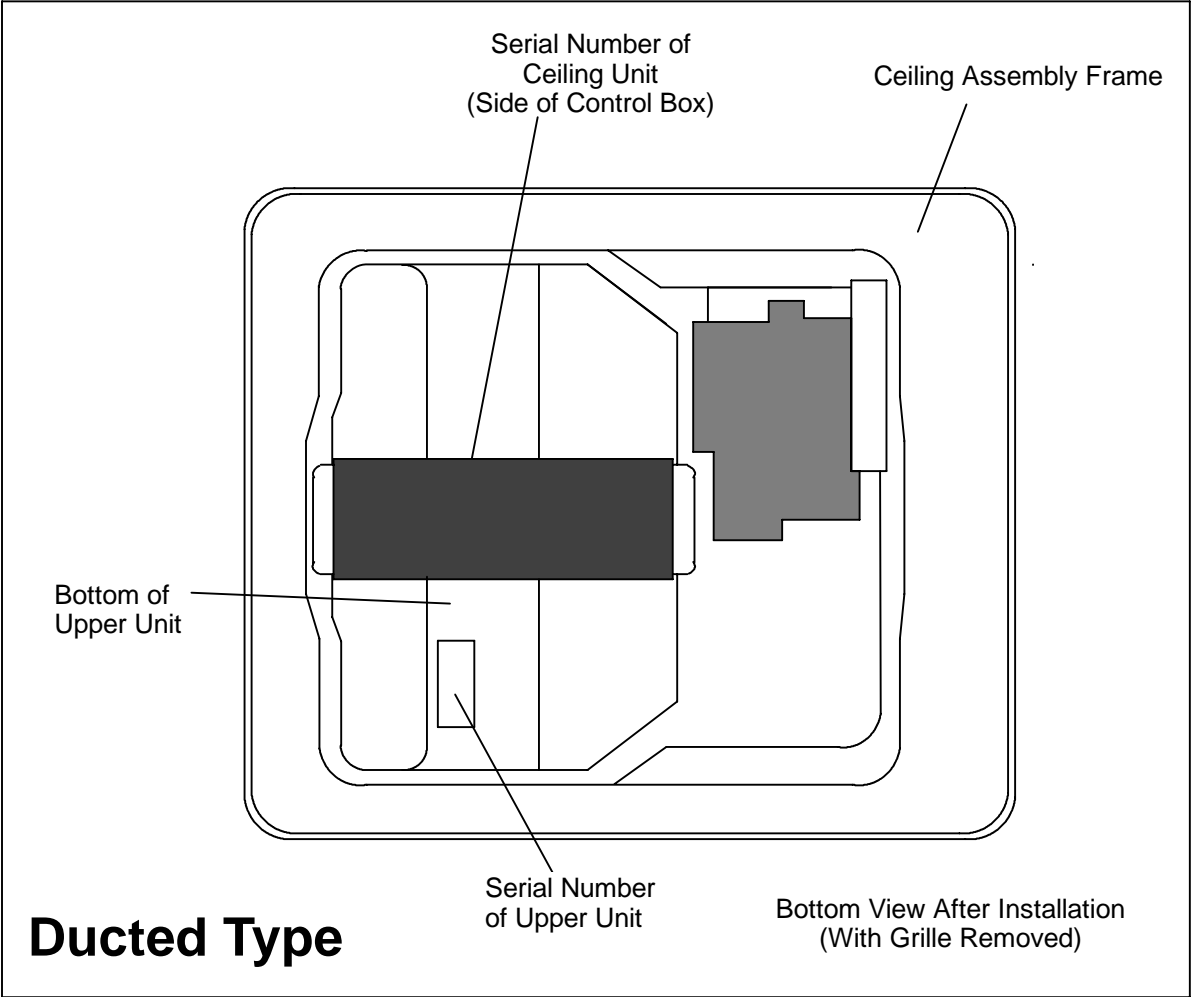
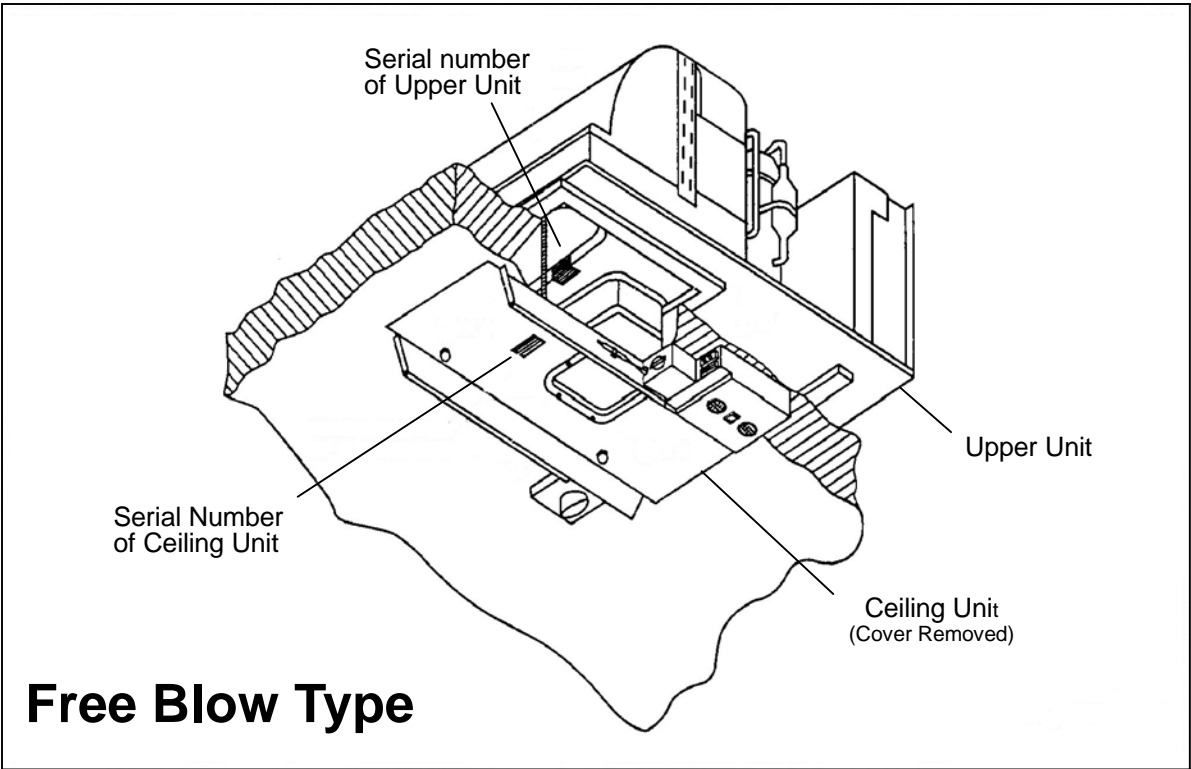


Figure 1-7 Serial Number Locations

1.4 AirV SYSTEM COMPONENT SPECIFICATIONS

1.4.1 Refrigerant Charge

Standard - High Capacity - Heat Pump

R-22 - 15.9 Ounces

Low Profile (All)

R-22 - 16.9 Ounces

1.4.2 Compressor - 115 Volts, 60 Cycles, 1 Phase

a. Locked Rotor Amps - Standard - High Capacity - Heat Pump

64.5 AMPS

b. Locked Rotor Amps - Low Profile High Capacity

59.0 AMPS

c. Fully Loaded Amps - Standard

Cooling - Approximate 12.8 AMPS

Heating - N/A

d. Fully Loaded Amps - High Capacity

Cooling - Approx. 14.5 AMPS

Heating - Approx. 11 AMPS

e. Fully Loaded Amps - Low Profile

Cooling - Approx. 14.1 AMPS

Heating - Approx. 13.8 AMPS

f. Fully Loaded Amps - Heat Pump

Cooling - Approx. 12.8 AMPS

Heating - Approx. 11 AMPS

1.4.3 Compressor - 220 Volts, 50 Cycles, 1 Phase

a. Locked Rotor Amps

23.6 AMPS

1.4.4 Thermostat Range (All Free Blow Units)

61° F (16° C) to 89° F (32° C)

1.5 START-UP

Refer to operating instructions in Owners Guide (see Table 1-2) packaged with the vehicle system.

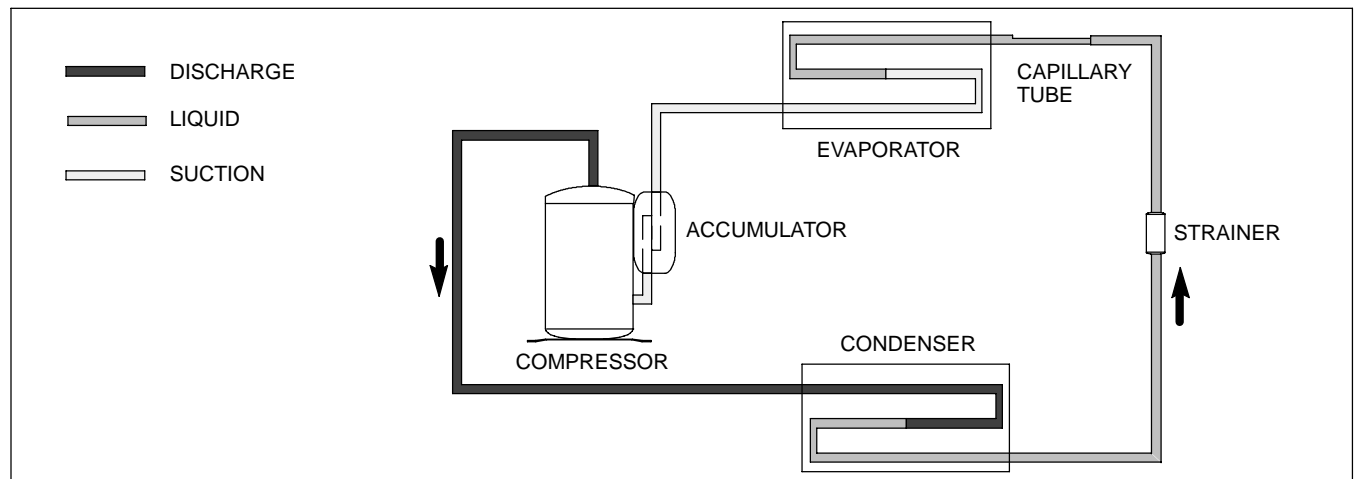


Figure 1-8 Refrigerant Flow Schematic (Standard System)

1.6 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 1-8.)

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.

1.7 REFRIGERANT CYCLE - HEAT PUMP

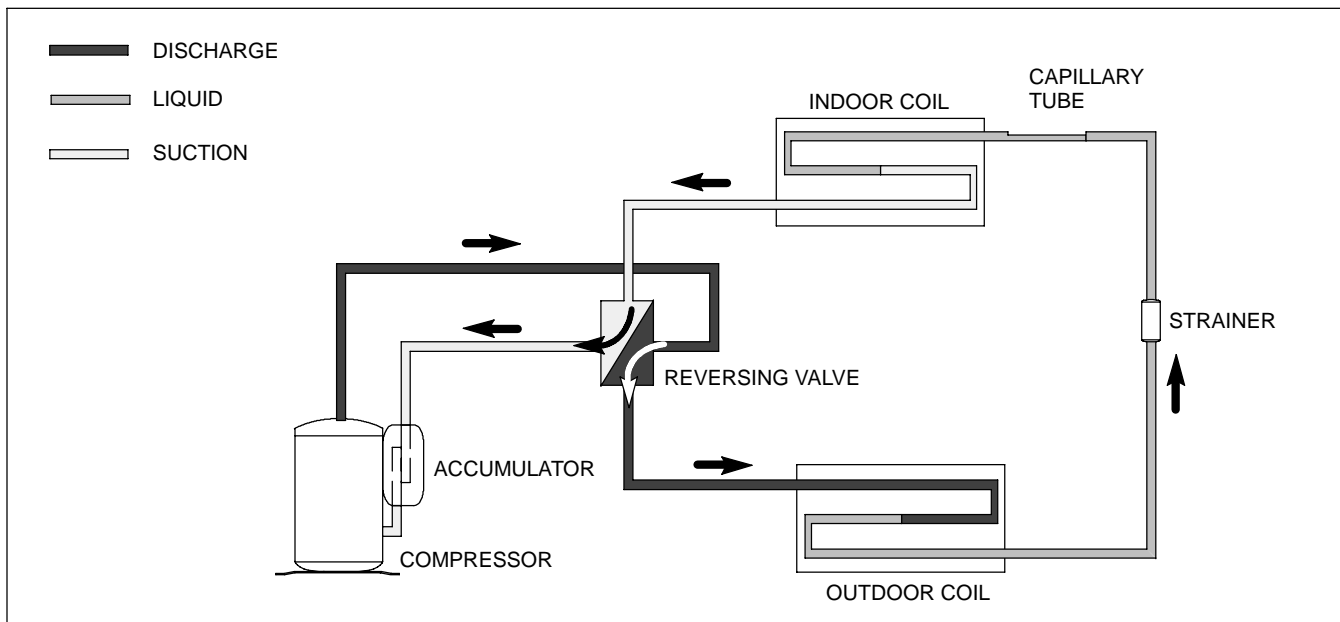


Figure 1-9 Refrigerant Flow Schematic - Heat Pump - (Cool Mode)

1.7.1 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 1-9.)

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.

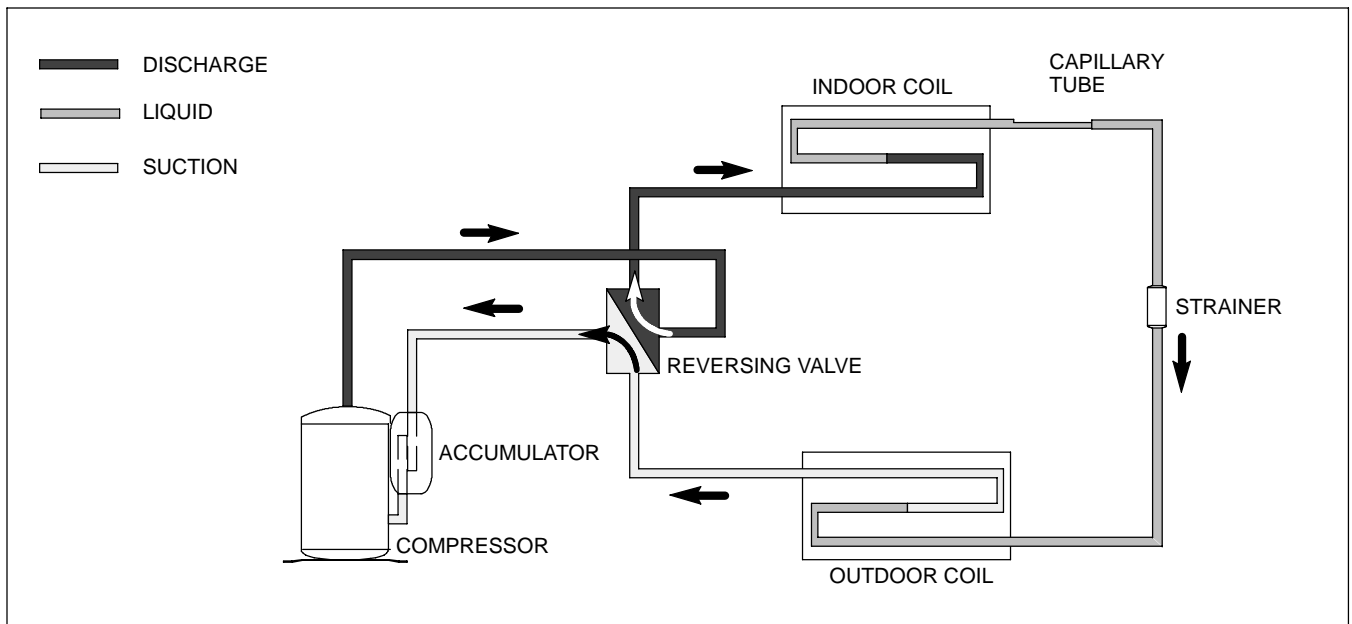


Figure 1-10 Refrigerant Flow Schematic - Heat Pump - (Heat Mode)

1.7.2 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 1-10.)

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.

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
2.1 NO POWER TO UNIT	
<ol style="list-style-type: none"> 1. Master switch off 2. Open circuit breaker 3. Defective wiring 4. Loose electrical connections 5. Faulty switches, thermostat, or fan 6. 12 VDC not connected (Ducted System) 7. 12 VDC in-line fuse open (Ducted) 	<ol style="list-style-type: none"> 1. Reset master switch 2. Reset circuit breaker 3. Replace wiring 4. Tighten connections 5. Replace defective components 6. Connect to 12 VDC power source 7. Replace fuse
2.2 DUCTED UNIT WILL NOT OPERATE	
<ol style="list-style-type: none"> 1. Display not illuminated 2. Display illuminated 	<ol style="list-style-type: none"> 1. Check 12 Volt DC in-line fuse 2. Check 115 Volt AC Connections
2.3 DUCTED UNIT WILL NOT COOL	
<ol style="list-style-type: none"> 1. Green LED light flashes 5 times 2. Unit cools for a few moments then stops cooling 	<ol style="list-style-type: none"> 1. Check 115 volt AC power source Momentarily disconnect 12 VDC power source Disable compressor malfunction test switch. Check AMP draw. Check ΔT 2. Remove grill, verify evaporator coil probe is inserted into coil. Check AMP draw. Check ΔT Replace unit
2.4 COMPRESSOR POWER SUPPLY OPEN	
<ol style="list-style-type: none"> 1. Loose leads at compressor terminals 2. Defective motor overload switch 3. Defective capacitor 4. Open compressor windings 5. Seized compressor 6. Capacitor incorrectly wired 	<ol style="list-style-type: none"> 1. Tighten leads 2. Replace switch 3. Replace capacitor - Refer to Paragraph 3.5.8 4. Replace compressor 5. Replace compressor 6. Verify capacitor wiring (Refer to wiring diagram)
2.5 COMPRESSOR RUNS BUT CYCLES, FAN OPERATING ERRATICALLY	
<ol style="list-style-type: none"> 1. Loose lead at fan motor 2. Defective or burned out motor 3. Outdoor air restricted or recirculating 4. Overcharge or noncondensables in system 5. Restricted discharge line 6. Defective motor overload switch 	<ol style="list-style-type: none"> 1. Tighten lead. 2. Replace motor. 3. Check for dirty condenser coil, proper clearance around unit, remove any obstructions. 4. Check AMP draw 5. Check for obstruction in line. Check ΔT. Replace unit. 6. Replace switch.

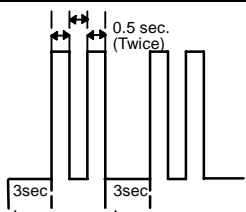
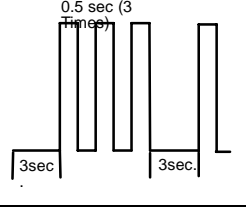
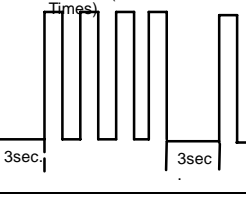
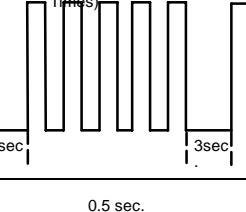
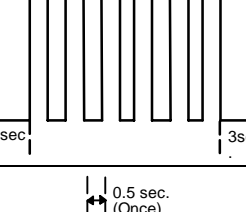
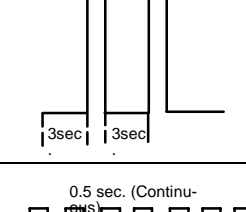
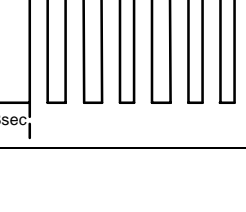
SYSTEM AND PROBABLE CAUSE	PROBABLE REMEDY
2.6 CYCLES ON COMPRESSOR OVERLOAD	
<ol style="list-style-type: none"> 1. Defective run capacitor 2. Defective compressor bearings or valves 3. Greatly restricted evaporator air, iced evaporator coil. 4. Low refrigerant charge 5. Evaporator capillary restricted 6. Liquid line restricted 7. Compressor hot 8. Weak or inconsistent line power 	<ol style="list-style-type: none"> 1. Replace capacitor - Refer to Paragraph 3.5.8 2. Replace unit. 3. Defrost evaporator coil. 4. Replace unit. 5. Replace unit. 6. Replace unit. 7. Verify refrigerant charge. Check AMP draw. Check Δ T. 8. Check line voltage at time of compressor start-up.
2.7 INSUFFICIENT COOLING, COOLING AIR NOT ADEQUATE	
<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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 3.3.1 & 3.4.1)
2.8 CONDENSER AIR NOT ADEQUATE	
<ol style="list-style-type: none"> 1. Outside Air Restricted 2. Dirty coil 3. Defective fan motor 	<ol style="list-style-type: none"> 1. Check for obstruction at coil. Remedy as required. 2. Clean coil. 3. Replace fan motor.
2.9 INSUFFICIENT COOLING	
<ol style="list-style-type: none"> 1. Unit undersized 2. Capillary restricted 	<ol style="list-style-type: none"> 1. Re-evaluate unit for proper capacity. 2. Check AMP draw. Check Δ T. Replace unit.
2.10 COMPRESSOR FLOODING	
<ol style="list-style-type: none"> 1. Unit overcharged 2. Low evaporator airflow 3. Defective electrical connections 	<ol style="list-style-type: none"> 1. Check AMP draw. Check Δ T. Replace unit. 2. Clean filter and/or evaporator coil. 3. Check connections per wiring diagram and tighten any loose connections.
2.11 HEATER CYCLES ON LIMIT SWITCH (HEAT/ COOL VERSION ONLY)	
<ol style="list-style-type: none"> 1. Dirty filter 2. Blocked evaporator air inlet (indoor) 3. Low airflow due to fan motor speed 	<ol style="list-style-type: none"> 1. Clean or replace filter. 2. Remove blockage. 3. Check fan motor. Repair or replace as necessary.
2.12 AIR SWEEP NOT WORKING (FREE BLOW VERSION ONLY)	
<ol style="list-style-type: none"> 1. Ceiling grill not properly aligned 2. Linkage in upper control box stuck 3. Air sweep motor failure 	<ol style="list-style-type: none"> 1. Align ceiling grill. 2. Align and lubricate linkage. 3. Replace motor.
2.13 WATER LEAKAGE	
<ol style="list-style-type: none"> 1. Water dripping from ceiling unit. 	<ol style="list-style-type: none"> 1. Verify vehicle is level Tighten unit mounting bolts evenly or replace unit gasket.

SYSTEM AND PROBABLE CAUSE	PROBABLE REMEDY
2.14 INADEQUATE HEAT (FREE-BLOW HEAT ONLY)	
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.
2.15 INADEQUATE HEAT (HEAT-PUMP)	
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 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 3.5.8)

WARNING

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

3.3 CEILING UNIT - FREE BLOW SYSTEMS

3.3.1 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.

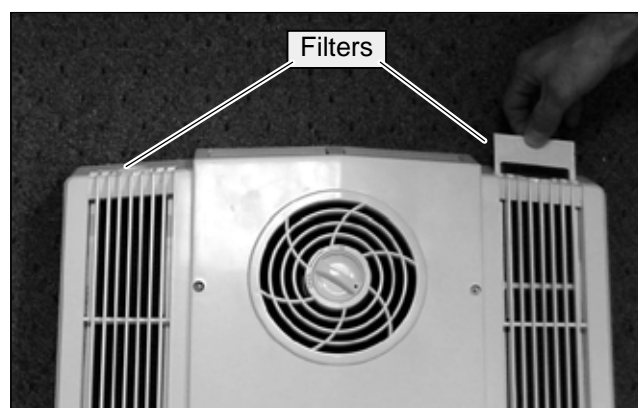


Figure 3-1 Filter Removal - Free Blow

3.3.2 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.

- d. To replace the grill, place the grill up against the ceiling panel and align the screw holes in the grill with the ceiling panel.
- e. Replace 4 screws.

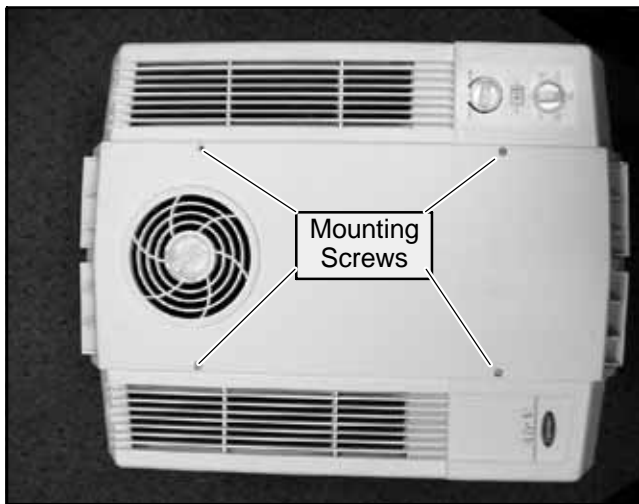


Figure 3-2 Ceiling Grill - Free Blow

3.3.3 Ceiling Panel Removal

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

- a. Remove the ceiling grill. (Refer to paragraph 3.3.2.)
- b. Remove 5 screws securing the duct plate to the ceiling panel.
- c. Remove 4 mounting bolts making sure to support the weight of the ceiling panel.
- d. Disconnect the unit harnesses and main power wires from the ceiling panel.
- e. Lower the ceiling panel from the air conditioning unit.
- f. Reverse above procedure for reassembly.

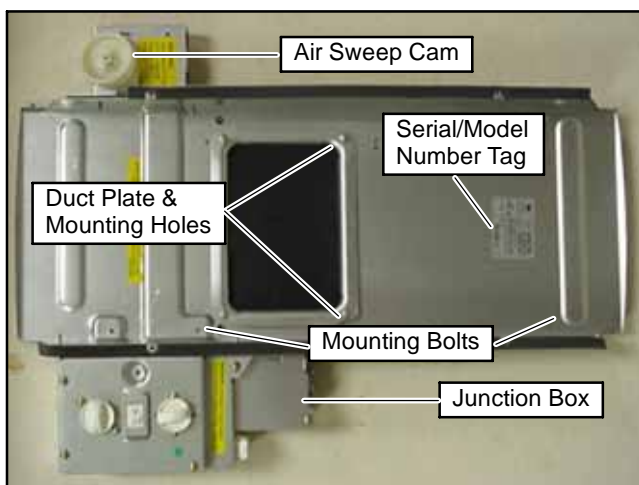


Figure 3-3 Ceiling Panel Assembly

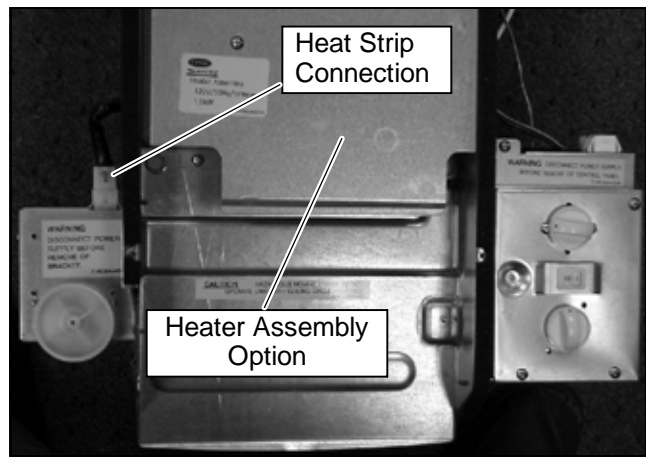


Figure 3-4 Ceiling Panel With Heat Option

3.3.4 Master Control Switch

To remove the master control switch, do the following:

- a. Remove ceiling grill. (Refer to paragraph 3.3.2.)
- b. Remove 5 screws that secure the control assembly (Item 2, Figure 1-3) to the control box cover.
- c. Remove the master control switch knob by grabbing the outside edge of the knob and pulling it off of the switch stem.
- d. Remove 2 screws securing the master control switch to the control assembly.
- e. Carefully disconnect wires from the master control switch. Label wires to aid in reassembly.
- f. Reverse above procedure for reassembly.

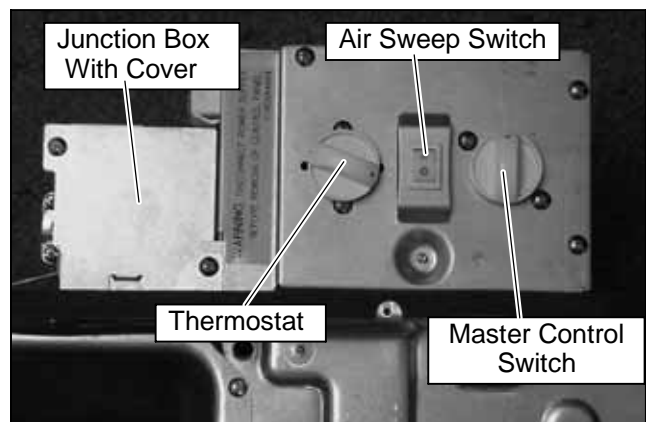


Figure 3-5 Control Box Assembly - Free Blow

3.3.5 Air Sweep Switch Removal

To remove the air sweep switch, do the following:

- a. Remove ceiling grill. (Refer to paragraph 3.3.2.)
- b. Remove 5 screws securing the control assembly (Item 2, Figure 1-3) to the control box cover.
- c. Disconnect wires from the air sweep switch.
- d. Pinch tabs on either end of the switch and slide out of lower control box cover.
- e. Reverse above procedure for reassembly.

3.3.6 Indoor Thermostat Removal

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

- a. Remove ceiling grille. (Refer to paragraph 3.3.2.)
- b. Remove 5 screws securing the control assembly (item 3, Figure 1-3) to the control box cover.
- c. Remove the indoor thermostat knob by grabbing the outside edge of the knob and pulling it off of the thermostat stem.
- d. Remove 2 screws that secure the indoor thermostat to the lower control box cover.
- e. Carefully disconnect the 2 wires from the indoor thermostat.
- f. Remove the sensing bulb from the plastic clip.
- g. Carefully slide the sensing bulb through the rubber grommet.
- h. Remove the thermostat from the control assembly.
- i. Reverse above procedure for reassembly.

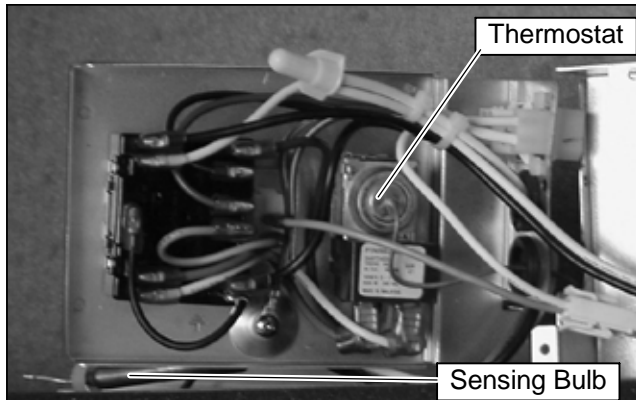


Figure 3-6 Indoor Thermostat

3.3.7 Air Sweep Removal

To remove the air sweep, do the following:

- a. Remove ceiling grille. (Refer to paragraph 3.3.2.)
- b. Remove cam (See Figure 3-3) from air sweep motor shaft.
- c. Remove 4 screws securing air sweep motor bracket to the ceiling panel assembly.
- d. Carefully disconnect air sweep motor wire terminations.
- e. Remove 2 screws securing air sweep motor (Figure 3-7) to control box and remove motor.
- f. Reverse above procedure for reassembly.

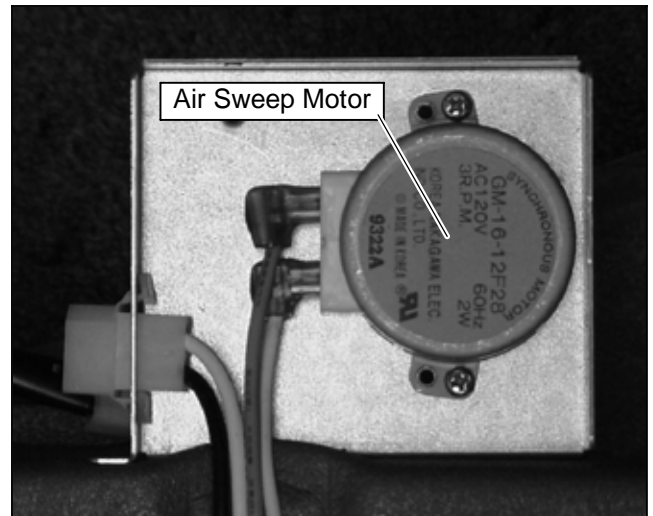


Figure 3-7 Air sweep motor

3.3.8 Heat Strip Assembly Removal

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

- a. Remove ceiling grille. (Refer to paragraph 3.3.2.)
- b. Unplug electrical connection at air sweep motor assembly.
- c. Remove two screws securing heat strip assembly to the ceiling panel assembly.
- d. Slide heat strip assembly away from air sweep motor assembly and pull down, easing the the electrical connection through the access hole.
- e. Reverse the procedures for reassembly.

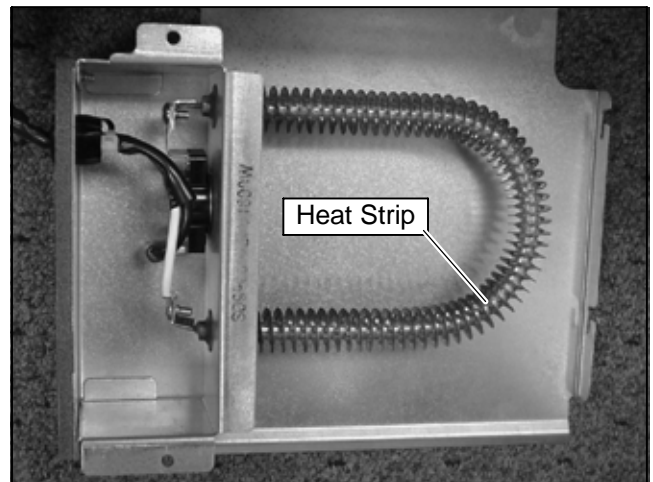


Figure 3-8 Heat Strip Assembly

3.4 CEILING UNIT - DUCTED SYSTEMS

3.4.1 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.

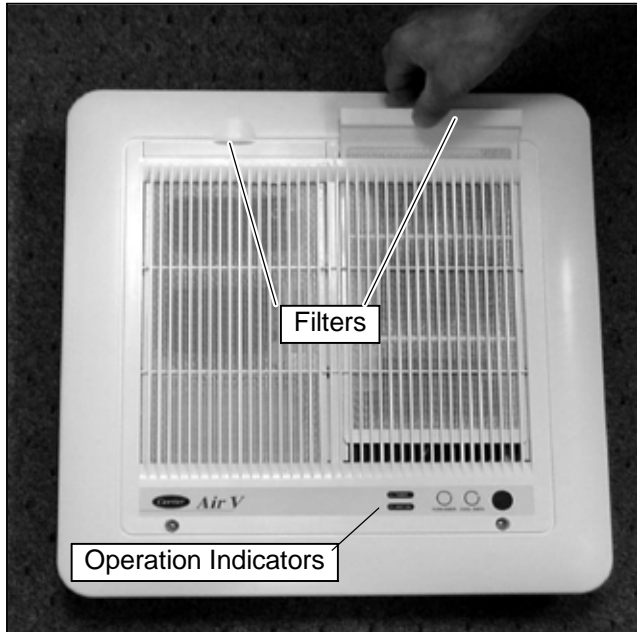


Figure 3-9 Filter Removal - Ducted Unit

3.4.2 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.

3.4.3 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 3.4.2.
- 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.

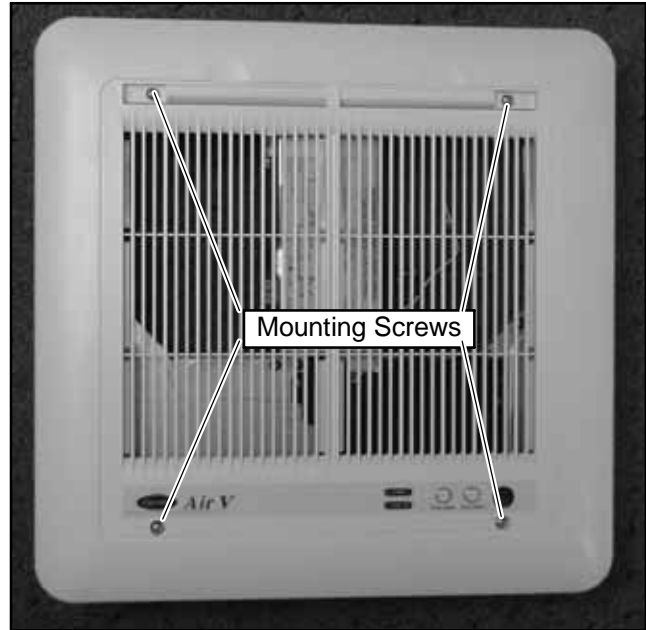


Figure 3-10 Ceiling Grill - Ducted

- 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.

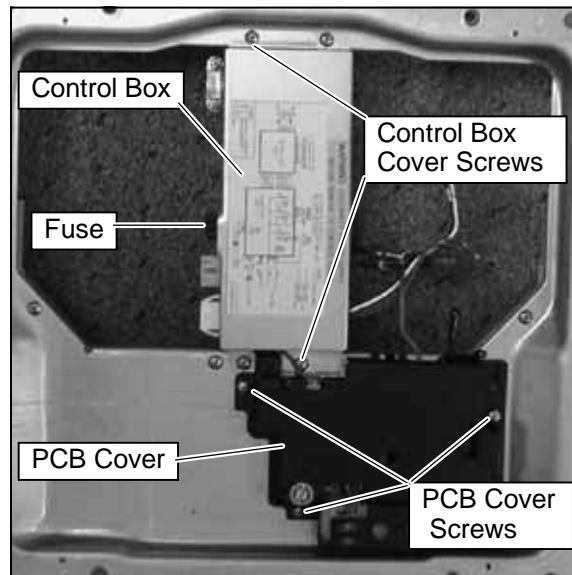


Figure 3-11 Control Box & PCB Cover

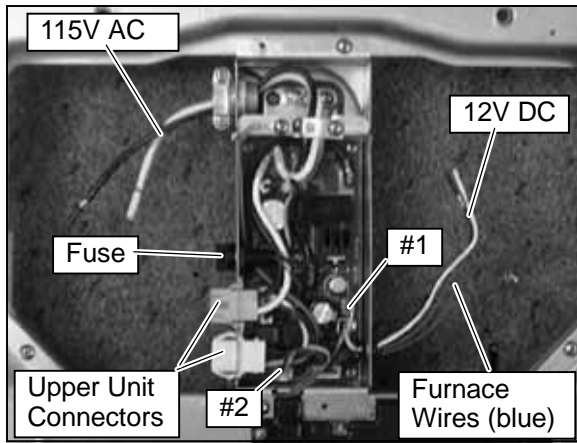


Figure 3-12 Control Box Assembly - Ducted

3.4.4 Main PCB Board Removal

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

- Remove ceiling grill. Refer to paragraph 3.4.2.
- Remove three screws securing the PCB cover to the ducted ceiling unit.
- Carefully turn over the PCB cover exposing the PCB main and the PCB display assemblies.
- Gently push holding clip away from PCB main assembly.
- Lift PCB main assembly from PCB cover assembly.
- Unplug display wiring plug #4. Figure 3-13
- Unplug thermistor/thermostat wiring plug #3. Figure 3-13
- Unplug power wiring plug #1. Figure 3-12
- Unplug signal wiring plug #2. Figure 3-12
- Reverse above procedures for reassembly.

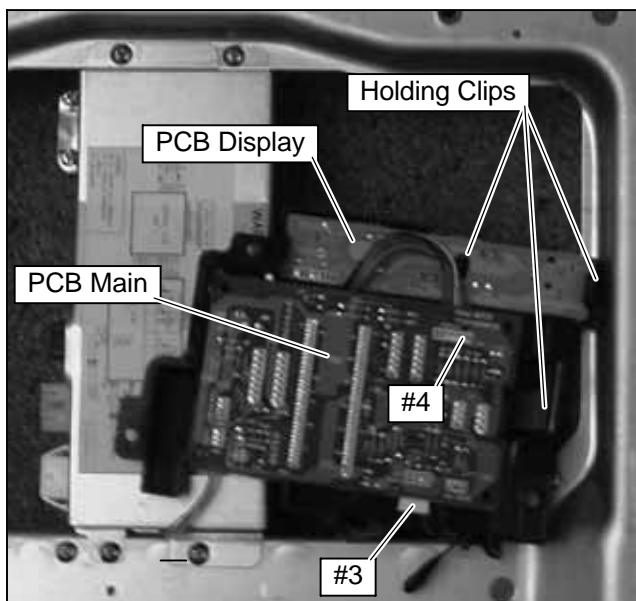


Figure 3-13 Main/Display PCB's

3.4.5 PCB Display Removal

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

- Remove ceiling grill. Refer to paragraph 3.4.2.
- Push large clip away from PCB display assembly.
- Push center clip towards large clip.
- Pull PCB display assembly from PCB cover.
- Unplug display wiring from PCB main assembly.
- Reverse above procedures of reassembly.

3.4.6 Fuse Removal

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

- Remove ceiling grill. Refer to paragraph 3.4.2.
- Turn fuse holder in direction of arrow (counter-clockwise).
- Pull fuse from fuse holder.
- Test and/or replace.
- Reverse above procedures for reassembly.

3.5 SERVICE - UPPER UNIT - STANDARD, HC & HP

3.5.1 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 3-14.
- Carefully lift the exterior cover off of the unit base pan assembly.
- Reverse above procedure for reassembly.

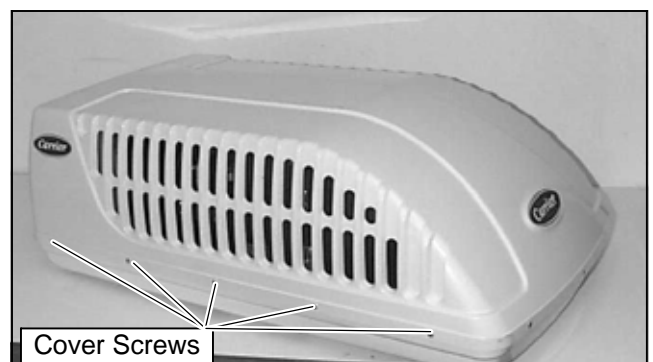


Figure 3-14 Cover Assembly - Standard

3.5.2 Compressor Replacement

Observe the same procedures for rotary compressors as for reciprocating compressors.

- a. Follow all safety codes. Reminder: use protective goggles, work gloves, and water soaked quenching cloth.
- b. Remove exterior cover. refer to paragraph 3.5.1. Disconnect all wiring from the compressor.
- c. Apply field-supplied, line-tap-valves to the suction and discharge lines as close to the compressor as possible.
- d. Recover the refrigerant charge from the unit. After recovering, cut the discharge and suction line process tubes below the tube crimps. If you choose a good tubing location for cutting the refrigeration lines initially, the location is easily accessible when making the final joints.



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.

- e. Connect a nitrogen supply to the unit at one of the line-tap-valve connectors (5-psig maximum flow), leaving the other connector open to the atmosphere. Braze angle valves with stubs to each process tube.
- f. Remove compressor from unit (3 bolts).
- g. Remove line-tap-valves from suction and discharge lines. Carefully braze the holes closed from where the line-tap-valves were removed.
- h. Clean system: add or replace liquid line filter drier. For proper cleaning and flushing use a UL approved refrigerant recycling system.
- i. Install new compressor and braze into place with field-supplied copper slip couplings.
- j. Connect wiring: replace wire terminals if necessary.
- k. Proceed with evacuation and charging (15.9 OZ. - .45 KG R22). Pinch off lines where angle valves were added. Cut off angle valves above pinch-off, and braze tubes.
- l. Start up unit.

3.5.3 Control Box Assembly Removal

To remove the control box assembly, do the following:

- a. Remove exterior cover assembly. Refer to paragraph 3.5.1.
- b. Remove 2 screws securing control box assembly to the lower scroll assembly. (See Figure 3-15.)

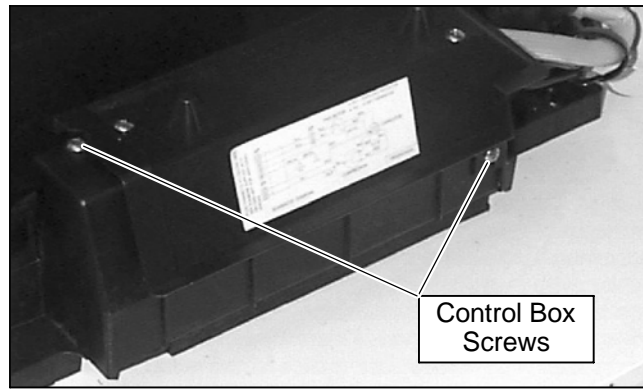


Figure 3-15 Control Box

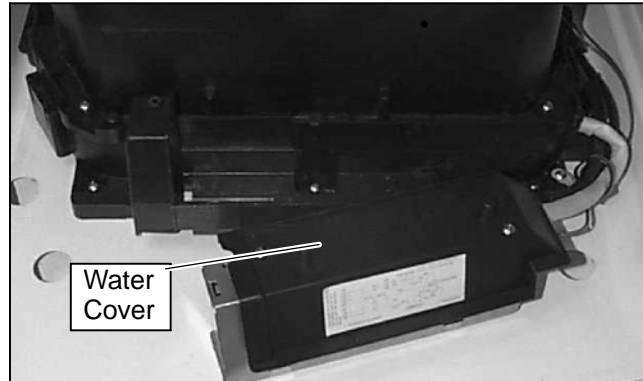


Figure 3-16 Control Box Removal

- c. Slide control box out of the lower scroll assembly. (See Figure 3-16.)
- d. To open control box remove 2 screws securing the water cover to the control box cover.
- e. Gently lift the water cover off of the control box. (See Figure 3-17.)
- f. Reverse above procedure for reassembly.

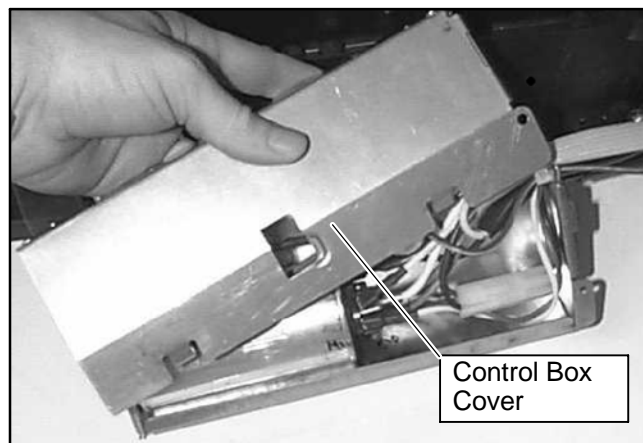


Figure 3-17 Water Cover Removal

3.5.4 Upper Scroll Assembly Removal

- a. Remove exterior cover assembly. Refer to paragraph 3.5.1.
- b. Remove 4 screws securing upper scroll assembly to the lower scroll assembly. (See Figure 3-18)
- 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.

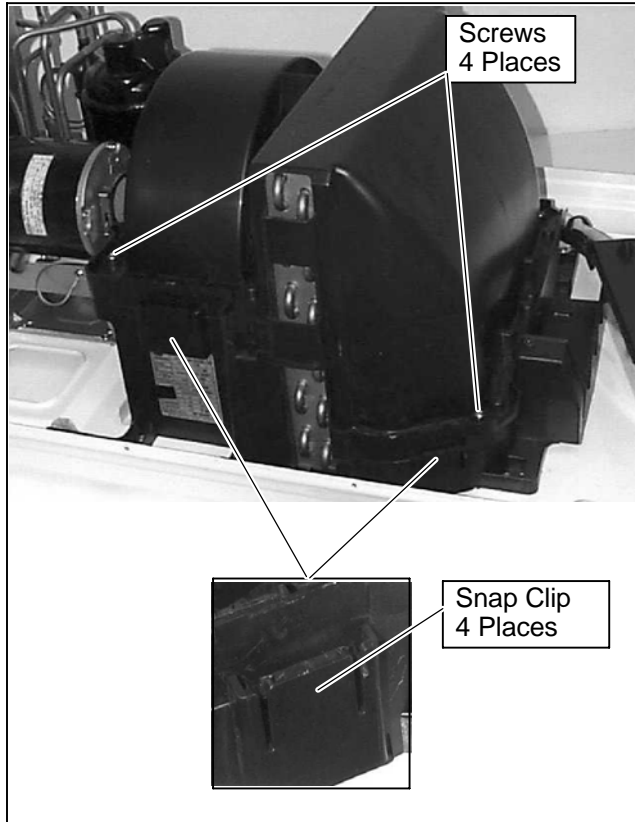


Figure 3-18 Upper Scroll Assembly

3.5.5 Motor Assembly and Condenser Fan Removal

- a. Remove exterior cover assembly. Refer to paragraph 3.5.1.
- b. Remove control box assembly. Refer to paragraph 3.5.3.
- c. Remove upper scroll assembly. Refer to paragraph 3.5.4.
- d. Remove 4 screws securing the condenser cover to the condenser orifice. (See Figure 3-24.)
- 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 3-19)
- g. Using flat-nosed pliers, depress the motor spring clamp and slide it off of the condenser fan (See Figure 3-20).
- 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 3-22)
- j. Remove motor assembly.
- k. Reverse above procedure for reassembly.

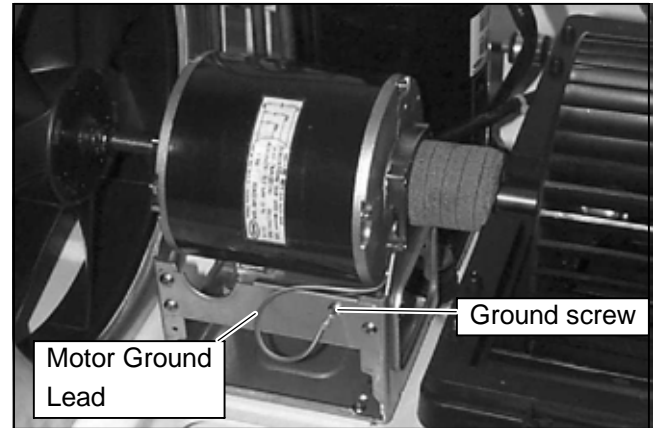


Figure 3-19 Motor Assembly

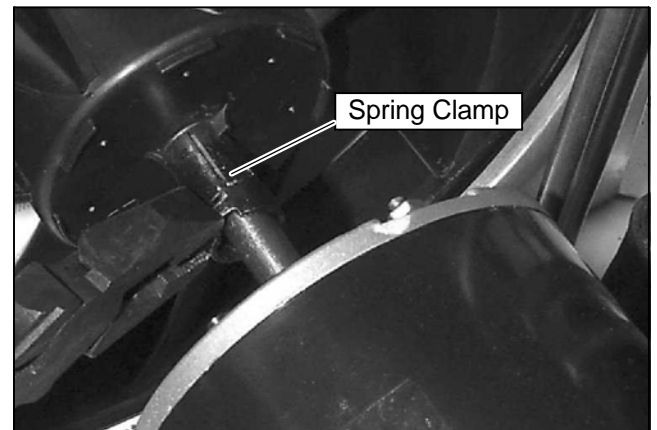


Figure 3-20 Spring Clamp Removal

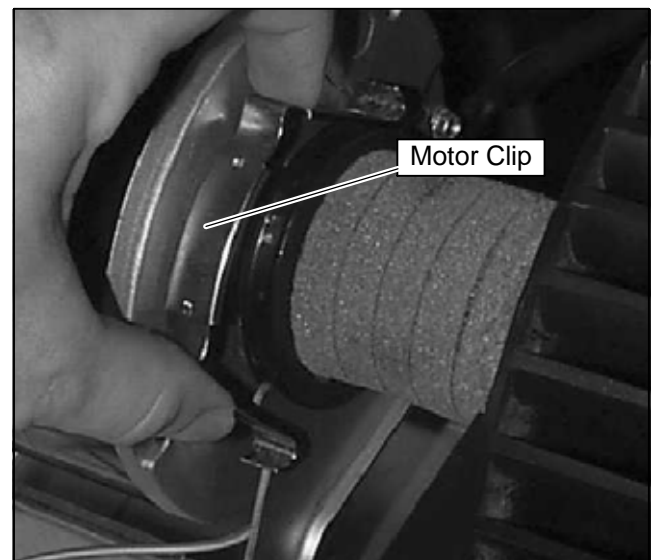


Figure 3-21 Motor Clip Removal



Figure 3-22 Condenser Fan Removal

3.5.6 Evaporator Blower Wheel Adjustment or Removal

- a. Remove exterior cover assembly. Refer to Exterior Cover Assembly Removal instructions 3.5.1
- b. Remove control box assembly. Refer to Control Box Assembly Removal instructions 3.5.3
- c. Remove upper scroll assembly. Refer to Upper Scroll Assembly Removal instructions 3.5.4
- d. Loosen motor assembly. Refer to Motor Assembly Removal instructions 3.5.5.
- e. Mark shaft at a point where wheel hub and motor shaft meet to aid in reassembly. (See Figure 3-23.)
- f. Remove 1 set screw holding the blower wheel to the motor shaft. (See Figure 3-23)
- g. Slide off blower wheel from motor shaft
- h. Reverse above procedure for reassembly.

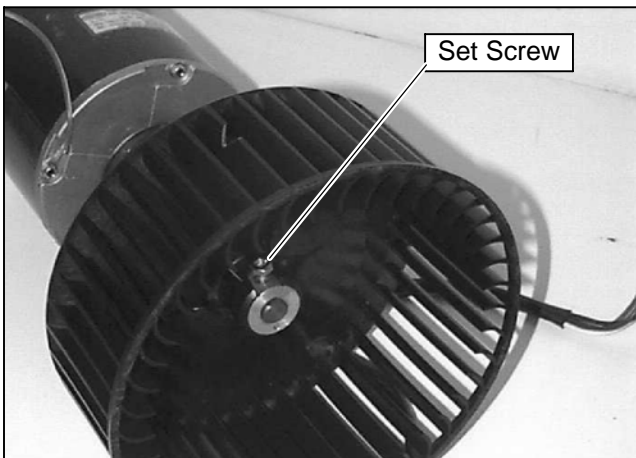


Figure 3-23 Blower Wheel

3.5.7 Air Handling System Removal

- a. Remove exterior cover assembly. Refer to paragraph 3.5.1.
- b. Remove control box assembly. Refer to paragraph 3.5.3.
- c. Remove upper scroll assembly. Refer to paragraph 3.5.4.
- d. Remove motor assembly. Refer to paragraph 3.5.5.
- 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.

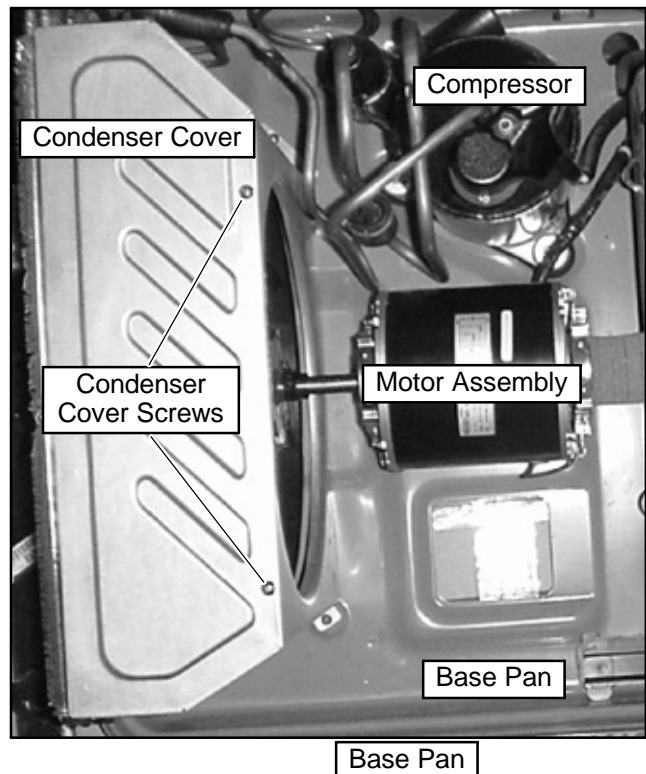


Figure 3-24 Condenser With Motor Assembly & Compressor

3.5.8 Capacitor Troubleshooting

WARNING

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.

3.5.9 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 3-25 for a suggested tool).

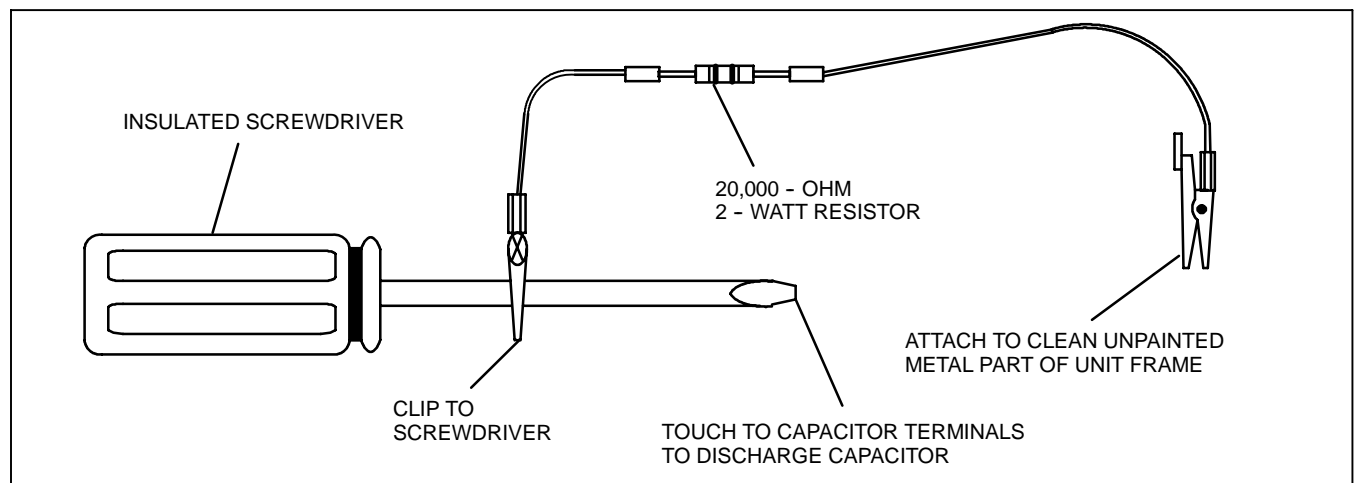


Figure 3-25 Set-Up For Discharging a Capacitor

3.5.10 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.

WARNING

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

3.5.11 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.

3.6 SERVICE - UPPER UNIT - LOW PROFILE

3.6.1 Exterior Cover Removal



CAUTION

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 3-26.
- Carefully lift the exterior cover off of the unit base pan assembly.
- Reverse above procedure for reassembly.



Figure 3-26 Cover Assembly - Low Profile

3.6.2 Upper Scroll Assembly Removal

To remove the upper scroll assembly, do the following:

- Remove exterior cover assembly. Refer to paragraph 3.6.1.
- Release the (2) front, (2) rear, (1) left side and (1) right side locking tabs (See Figure 3-27) by pulling back on the tabs (See Figure 3-28).
- Remove the screw (1) from the control box cover (See Figure 3-27).
- 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.

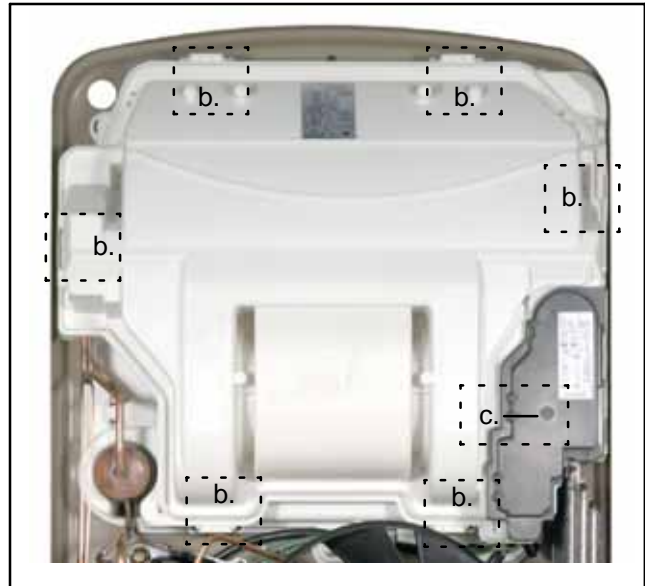


Figure 3-27 Upper Scroll Assembly Locking Tabs (b.) & Screw Locations (c.)



Figure 3-28 Upper Scroll Assembly Keeper Tab Release



Figure 3-29 Upper Scroll & Control Box Cover Removed

3.6.3 Condenser Fan Assembly Removal

To remove condenser fan assembly, do the following:

- a. Perform steps outlined in Section 3.6.2.
- b. Depress and remove Retaining Ring (See Figure 3-30).
- 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 3-31)
- e. Push back on tab to allow fan assembly to rest against stop (See Figure 3-32). Fan assembly will now be flush with the end of the motor shaft.
- f. Reverse above procedure for reassembly.

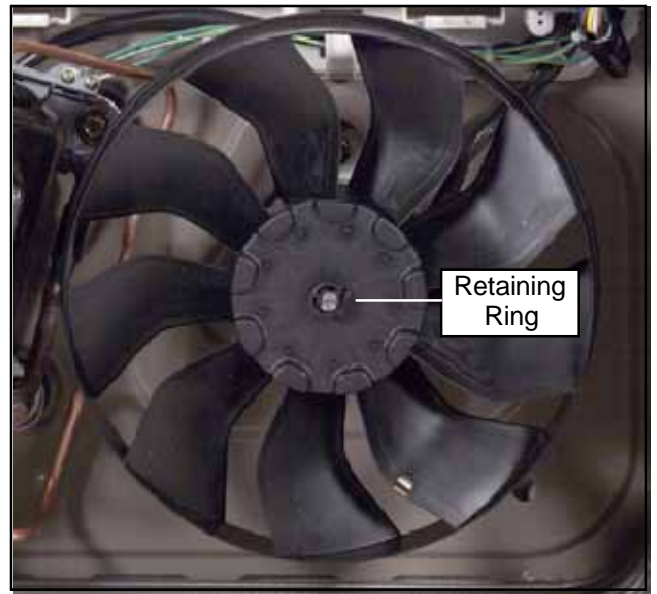


Figure 3-30 Condenser Fan Assembly & Retaining Ring

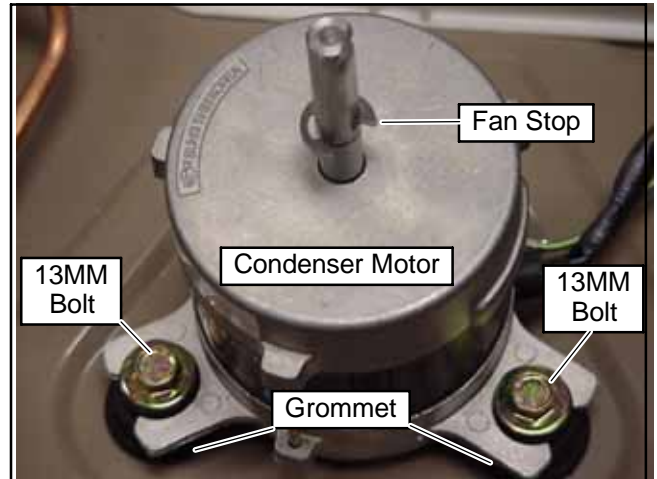


Figure 3-31 Condenser Fan Motor & Fan Assembly Stop

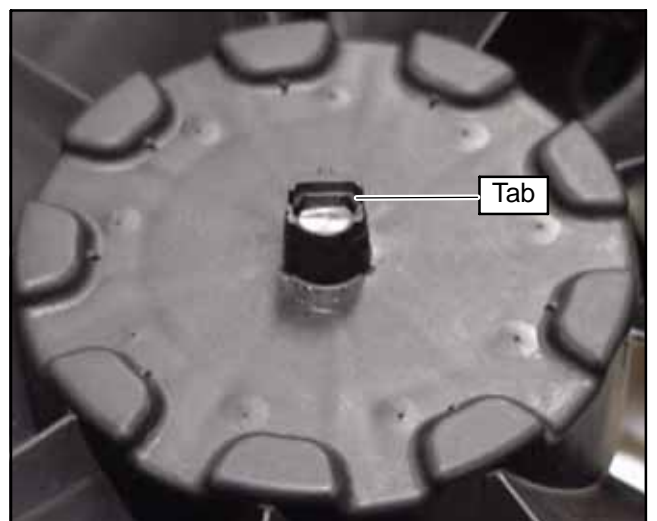


Figure 3-32 Condenser Fan Motor & Fan Assembly Tab

3.6.4 Condenser Motor Removal

To remove condenser fan motor, do the following:

- Perform steps outlined in Section 3.6.2.
- Remove (3) 13MM bolts (See Figure 3-31).
- 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 3-33).
- Un-plug (yellow/brown/white) from control box assembly.
- Reverse above procedure for reassembly.

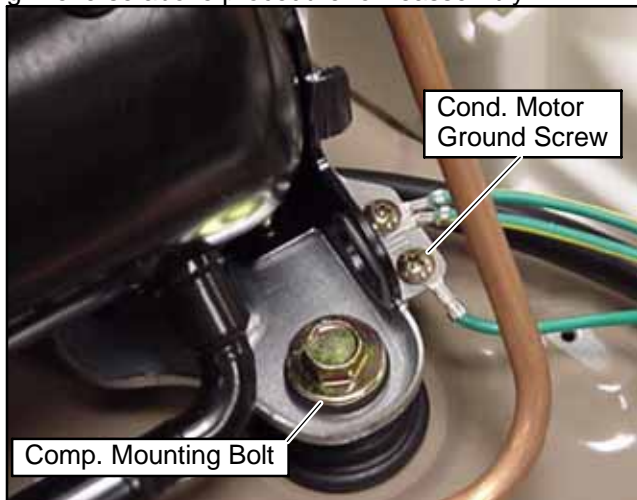


Figure 3-33 Condenser Motor Ground

3.6.5 Evaporator Motor/Blower Assembly Removal

To remove the evaporator motor, do the following:

- Perform steps outlined in Section 3.6.2.
- Pull back on and release the (4) locking tabs. There are 2 on each side of the control box assembly. (See Figure 3-34).
- 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 3-34 Evaporator Motor Locking Tabs

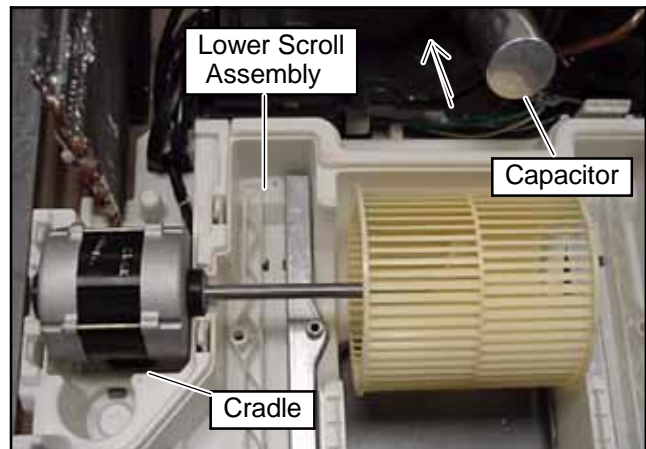


Figure 3-35 Evaporator Motor/Blower Assembly In Cradle

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 3-36).

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 3-35).

h. Reverse above procedure for reassembly.



Figure 3-36 Evaporator Blower Wheel (Flush With End Of Motor Shaft)

3.6.6 Compressor Replacement

Perform the procedures outlined in Section 3.5.2

There are 4 bolts with the Low Profile Compressor.

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

3.6.7 Capacitor Removal

To remove the capacitor, do the following:

- a. Perform steps a., b. & c. as outlined in Section 3.6.5.
- b. Perform steps outlined in Sections 3.5.8 & 3.5.9.
- 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 3-35).

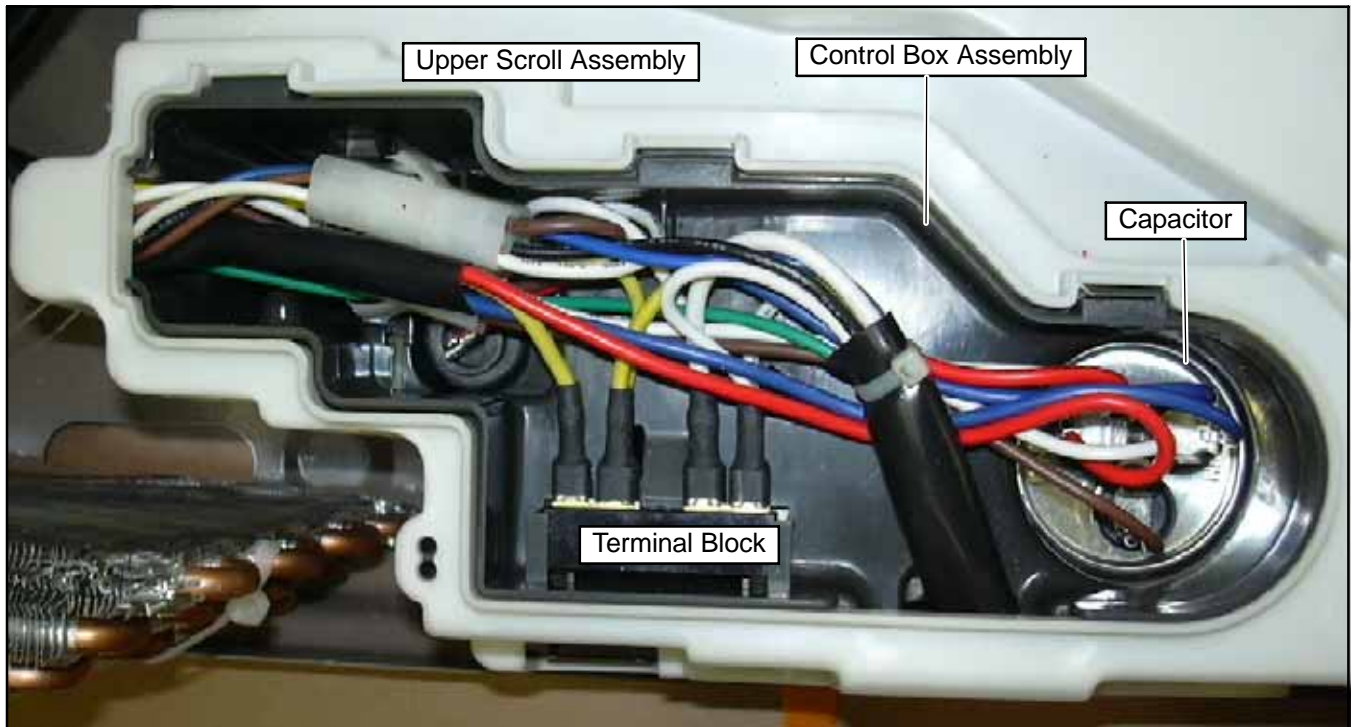


Figure 3-37 Control Box Assembly With Capacitor

3.6.8 Remote Control (Fahrenheit to Celsius)

All Remote Control Assemblies in the United States are pre-set to display in Fahrenheit degrees (see Figure 3-38). 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 3-39).

- 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.

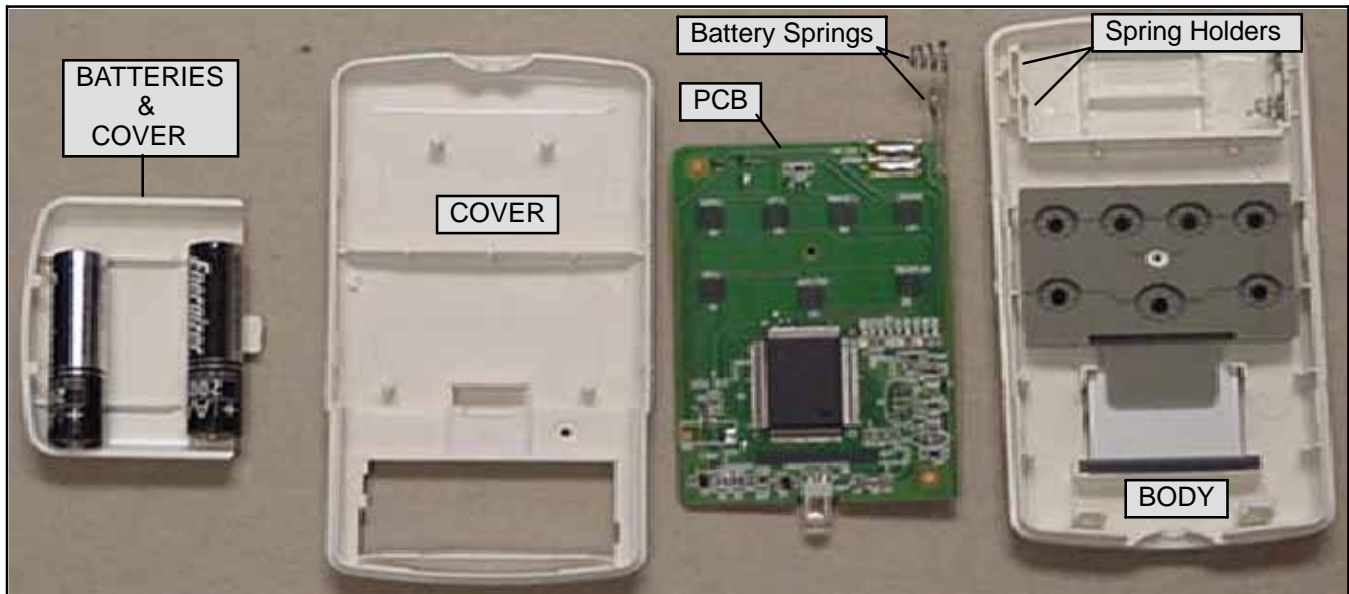


Figure 3-38 Remote Control Components

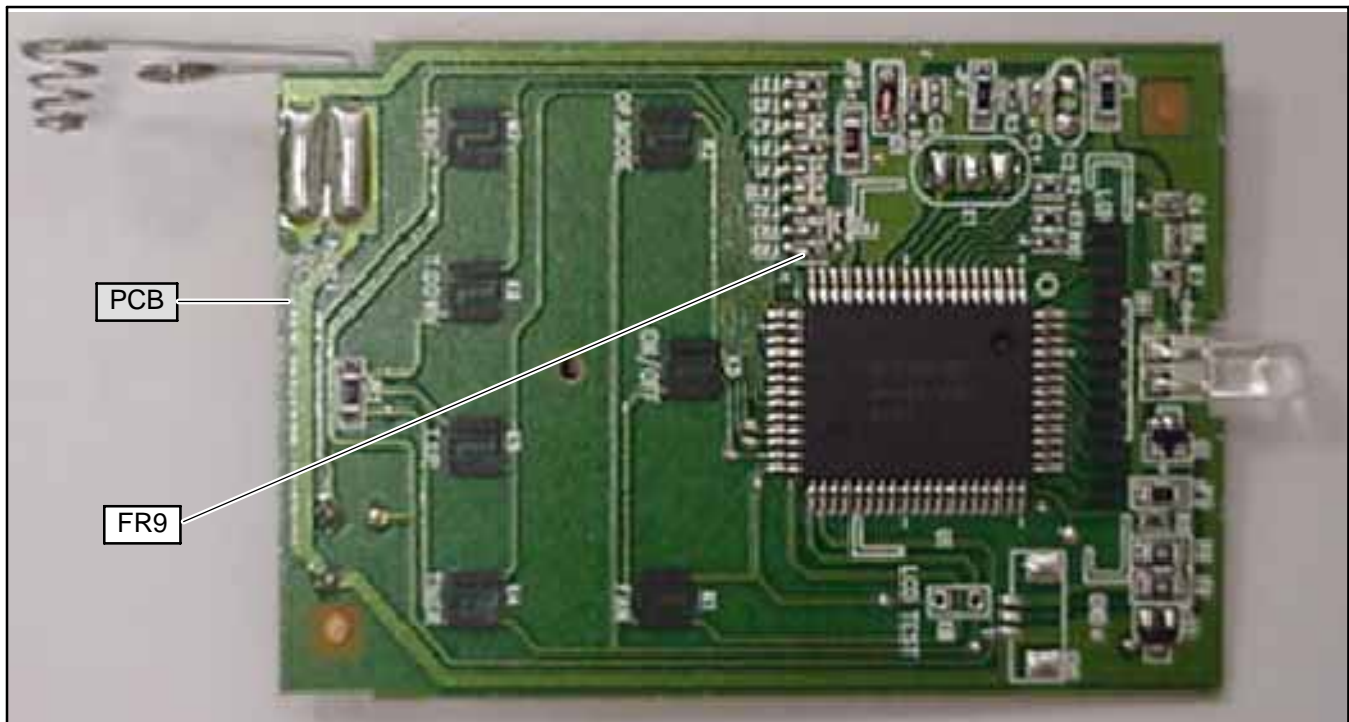


Figure 3-39 Remote Control PCB (FR9 Location)

3.7 THERMOSTAT INSTALLATION AND START-UP INSTRUCTIONS (WALL MOUNTED)

3.7.1 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. Batteries are not required; temperature and mode settings are preserved with the power off.



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.

3.7.2 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.

3.7.3 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.

3.7.4 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.

3.8 LCD DISPLAY

3.8.1 Cool Only Thermostat (Part No. 1110-421)

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

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

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

3.9 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

3.9.1 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, oF 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.

oF. 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 oF.

- 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 oF. UP & DOWN buttons now move between option choices; or press FAN button to exit configuration mode.

3.10 CHECK THERMOSTAT OPERATION

3.10.1 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.

3.10.2 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.

3.10.3 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.

3.10.4 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.

3.10.5 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.

3.11 CHECK THERMOSTAT OPERATION

3.11.1 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.

3.11.2 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.

3.11.3 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.

3.11.4 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.

3.11.5 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.

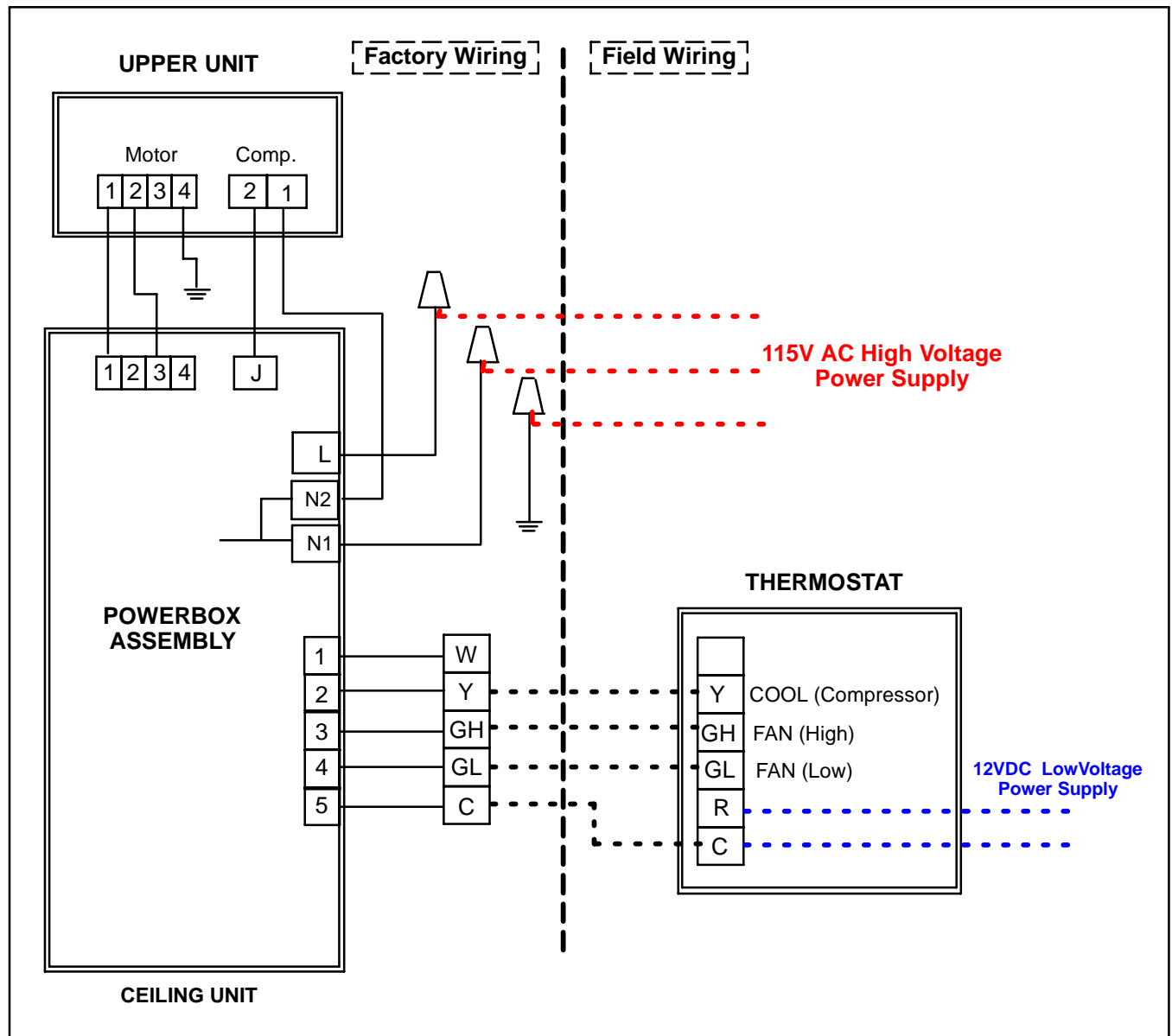


Figure 3-40 Wall Thermostat Wiring Diagram - Cool Only Model

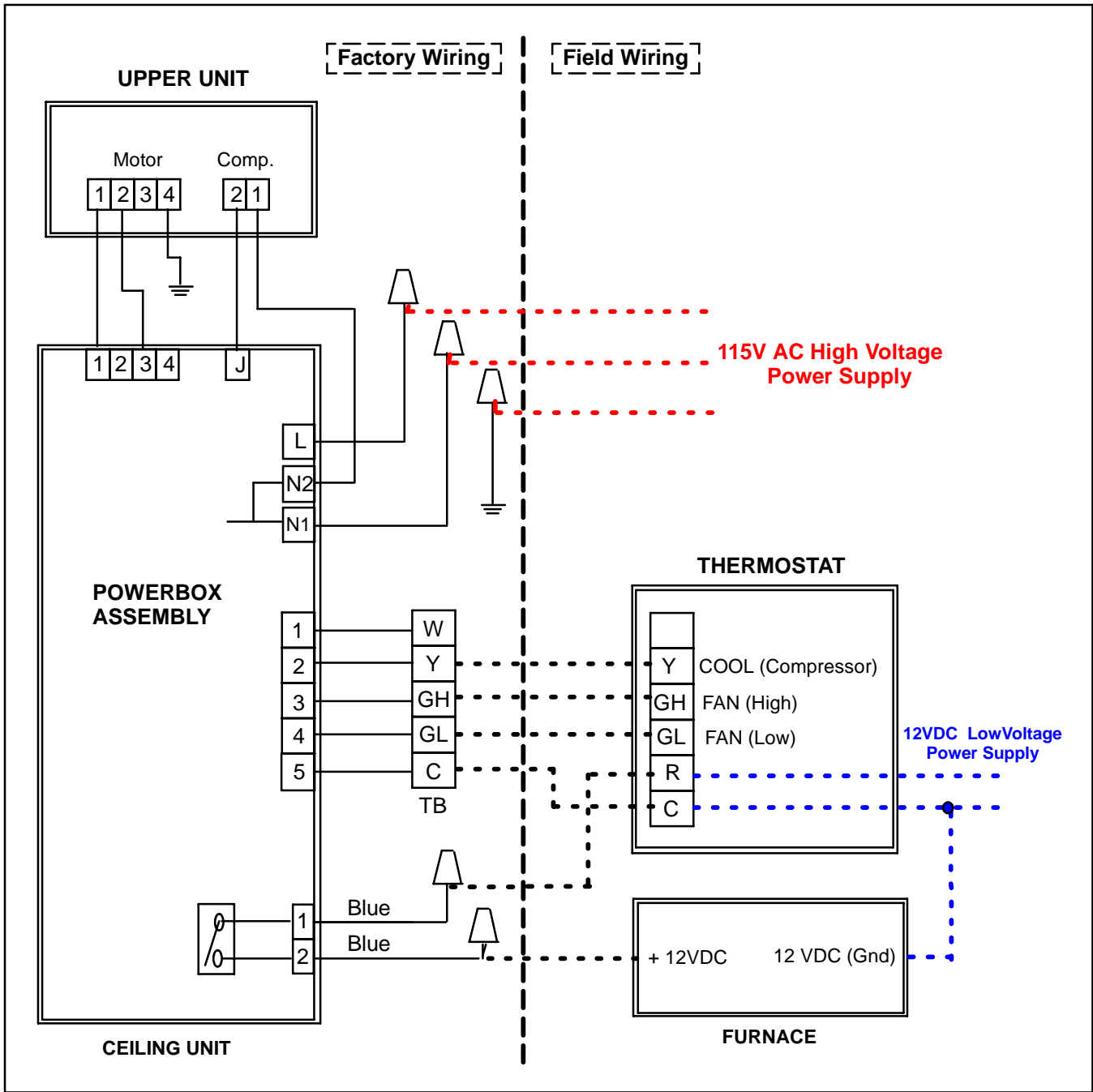


Figure 3-41 Wall Thermostat Wiring Diagram - Heat/Cool Model

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 4-9 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 4-10 is for the ducted or free blow application that uses a wall-mounted thermostat, with or without the furnace option.

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.

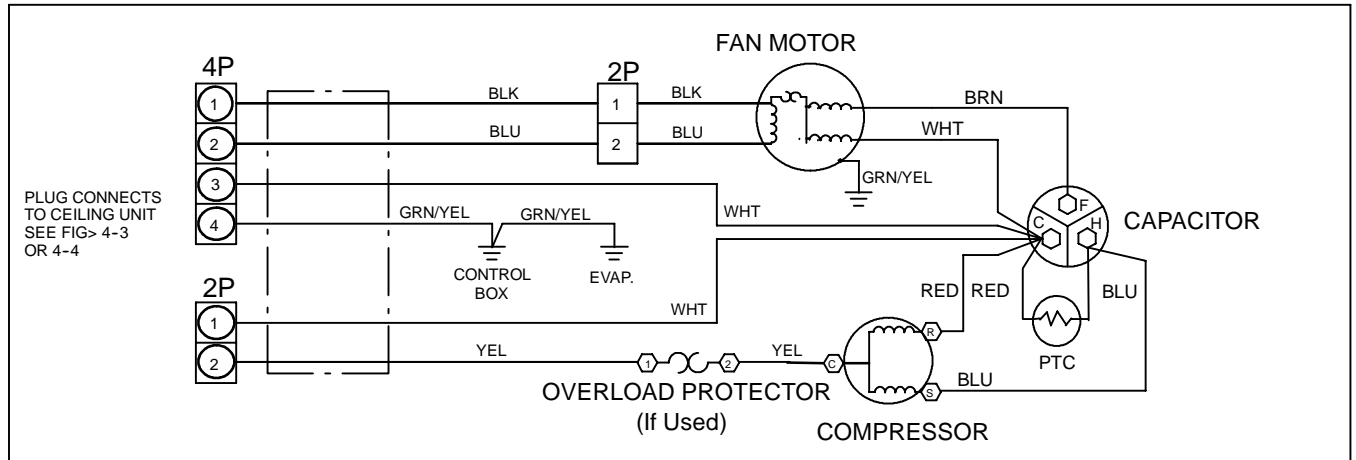


Figure 4-1 Upper Unit Schematic - Standard & HC

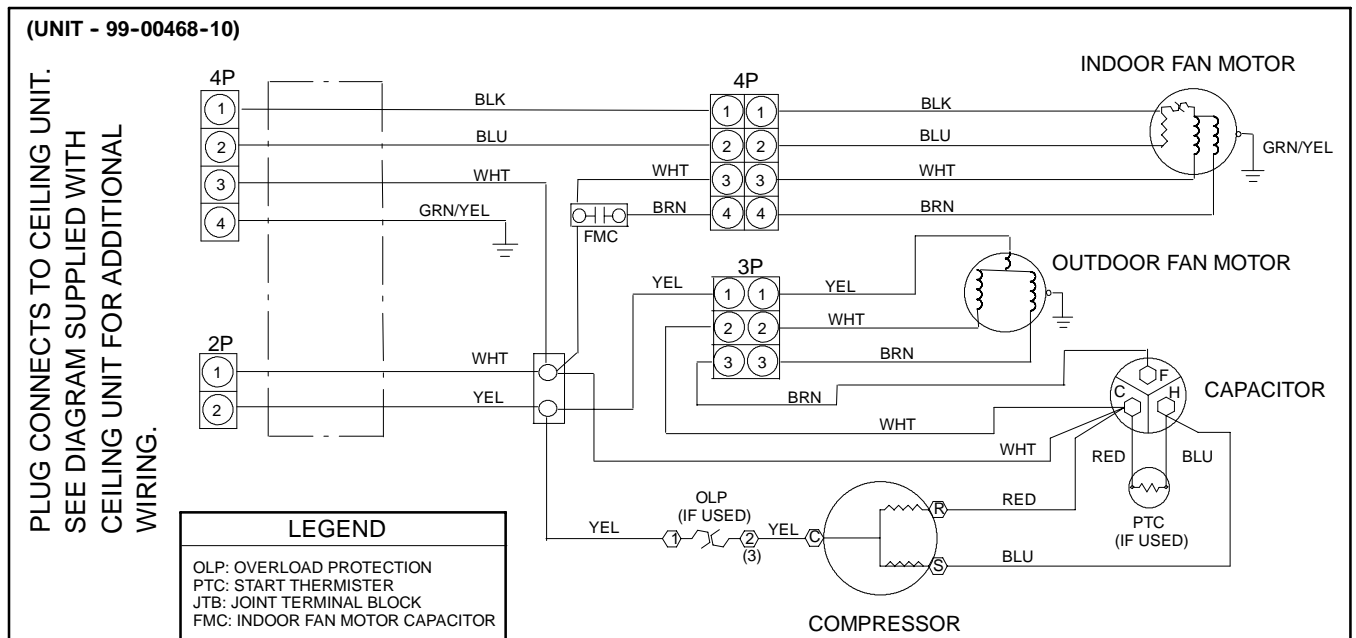


Figure 4-2 Upper Unit Schematic - Low Profile

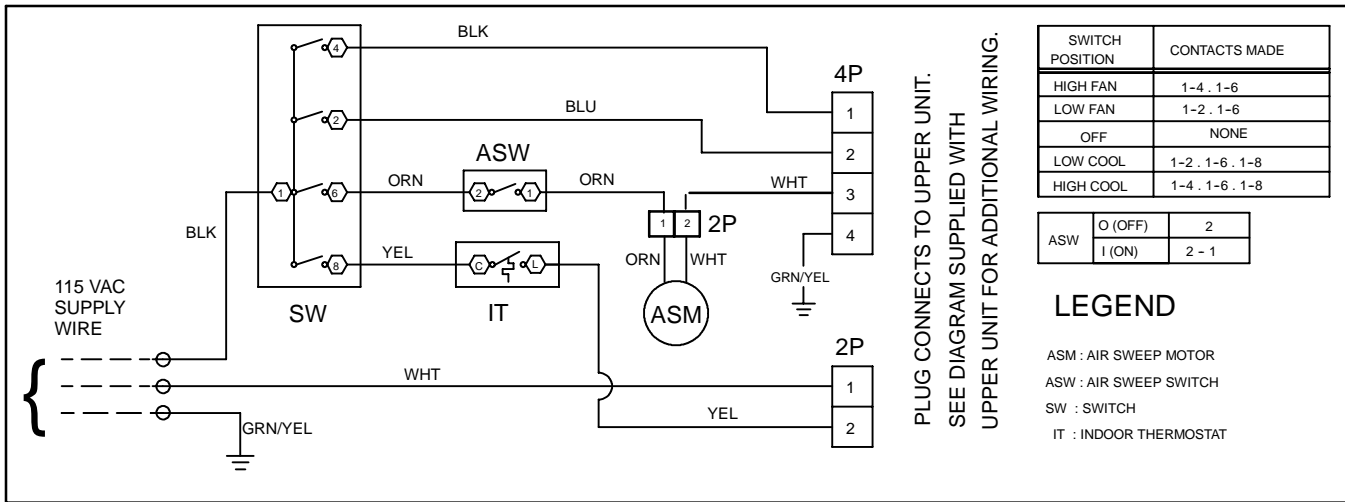


Figure 4-3 Ceiling Unit Schematic - Cooling Only

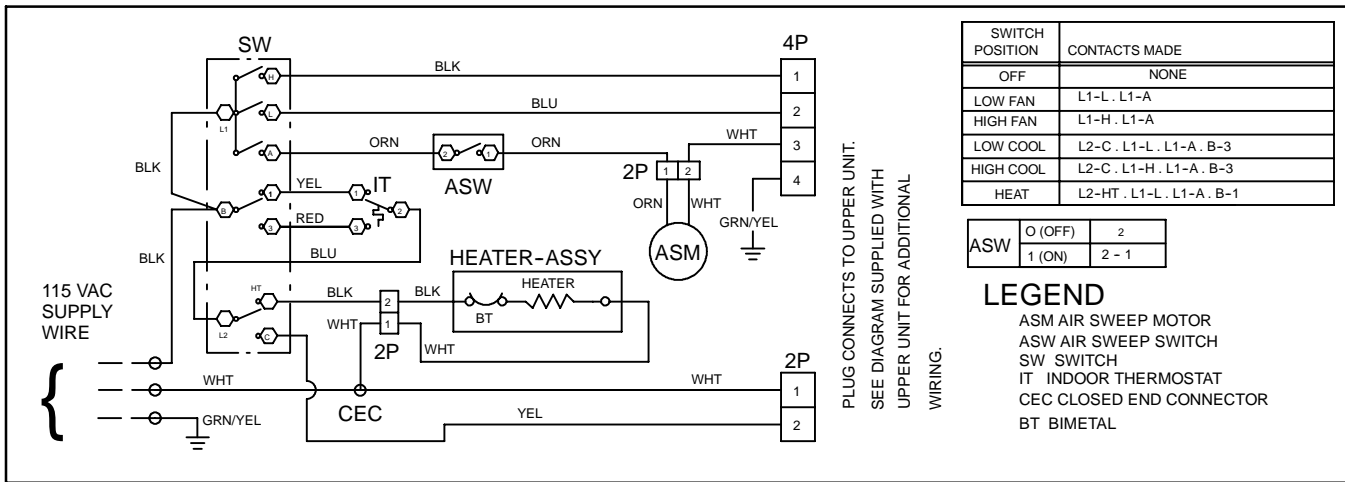


Figure 4-4 Ceiling Unit Schematic - Heat/Cool

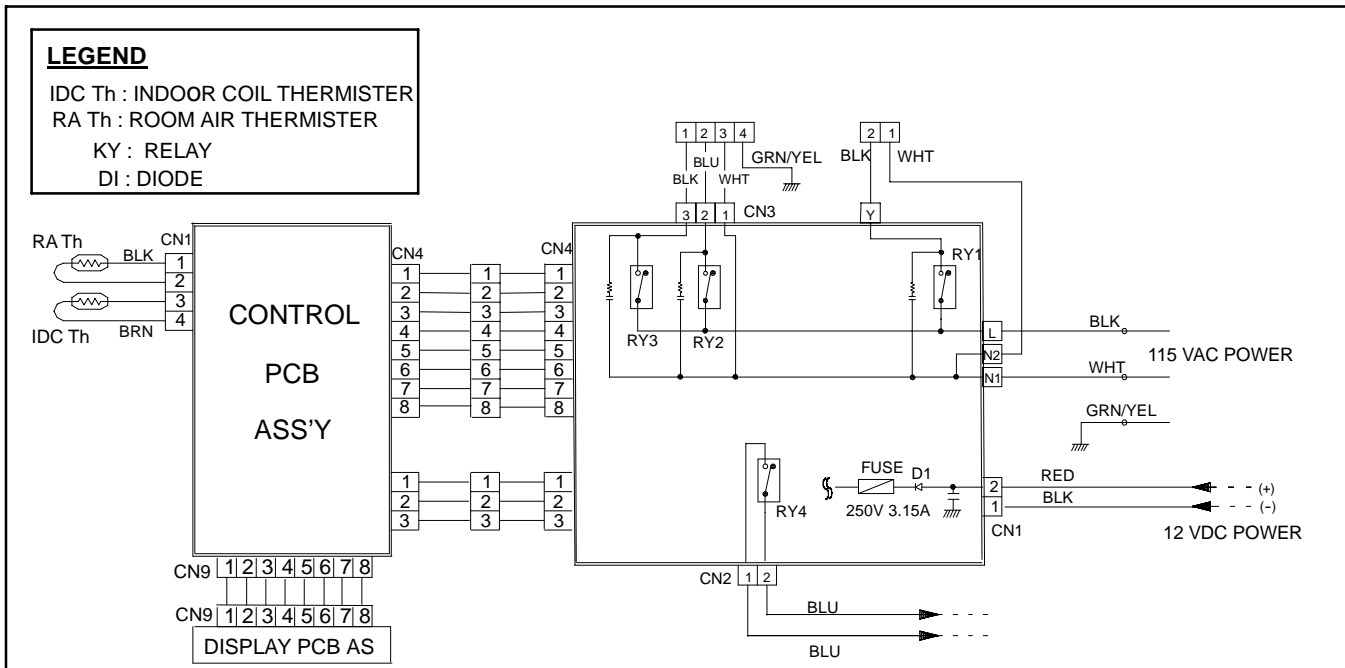


Figure 4-5 Ceiling Unit, Standard - Ducted

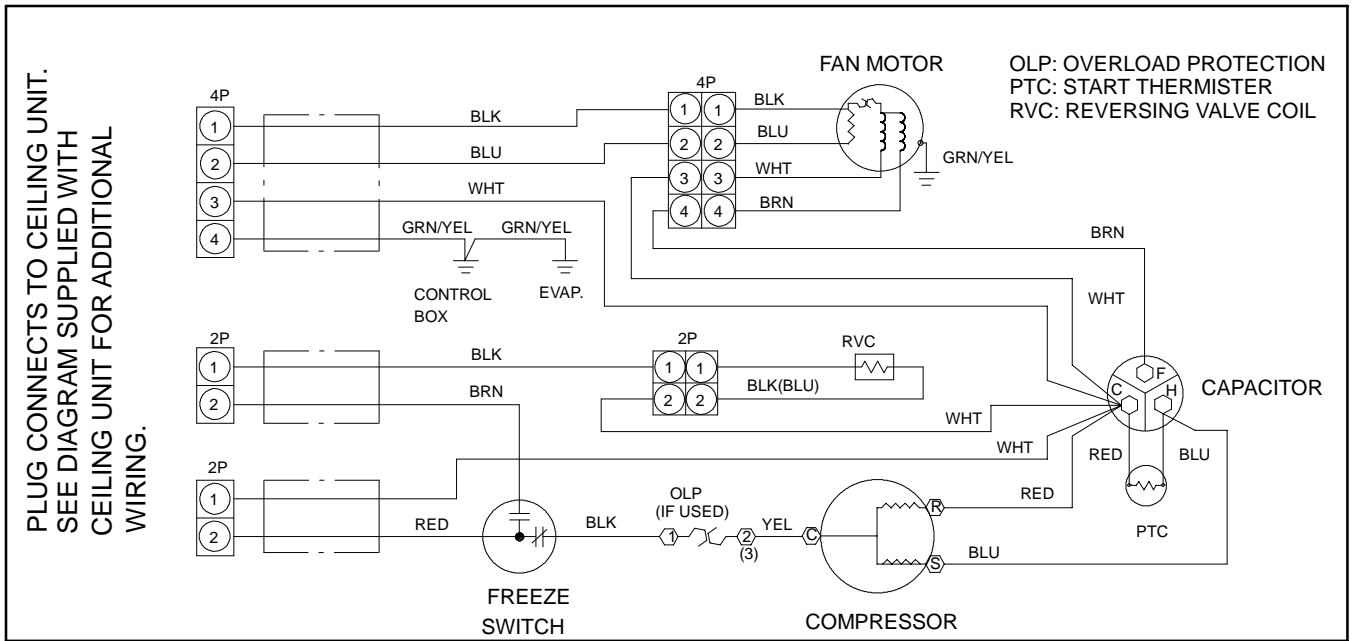


Figure 4-6 Heat Pump - Upper Unit - Free Blow

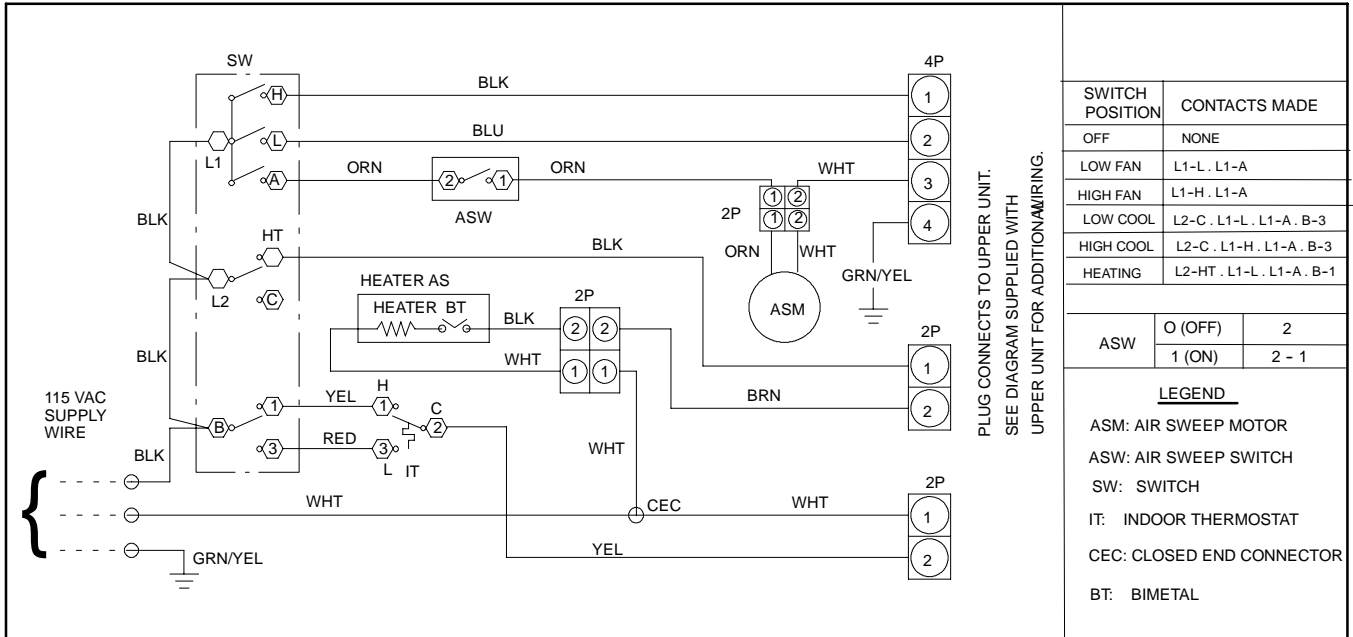


Figure 4-7 Heat Pump - Ceiling Unit - Free Blow

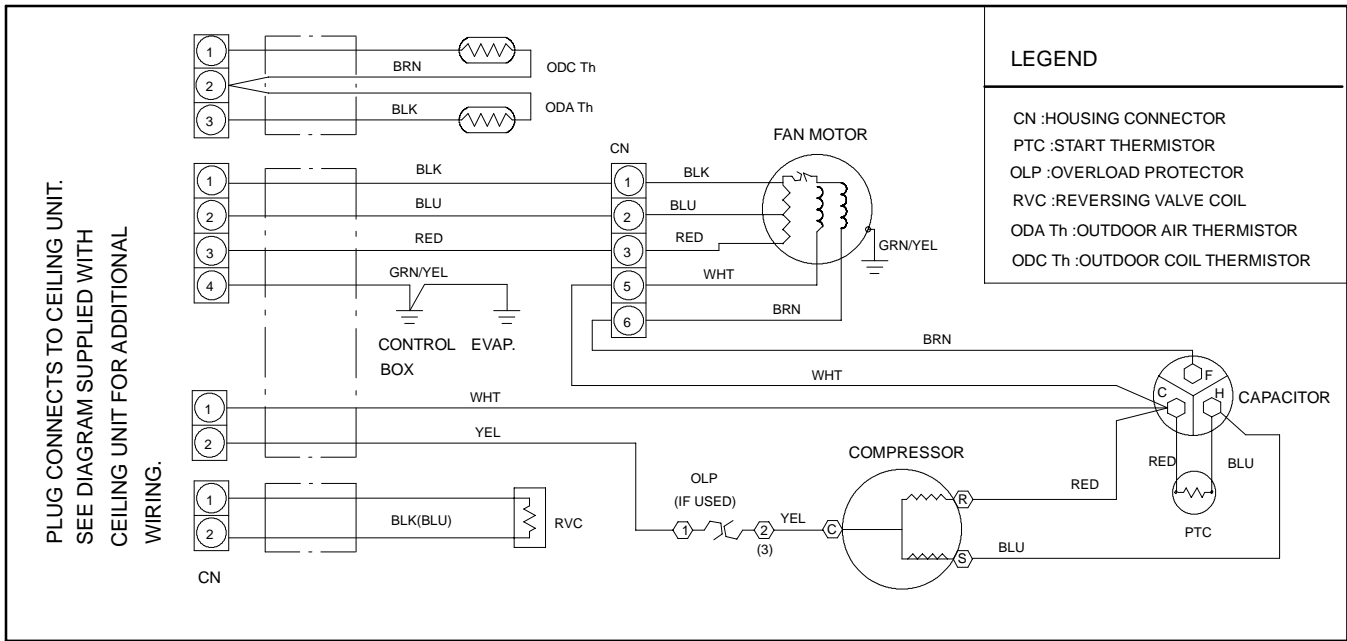


Figure 4-8 Heat Pump - Upper Unit - Ducted

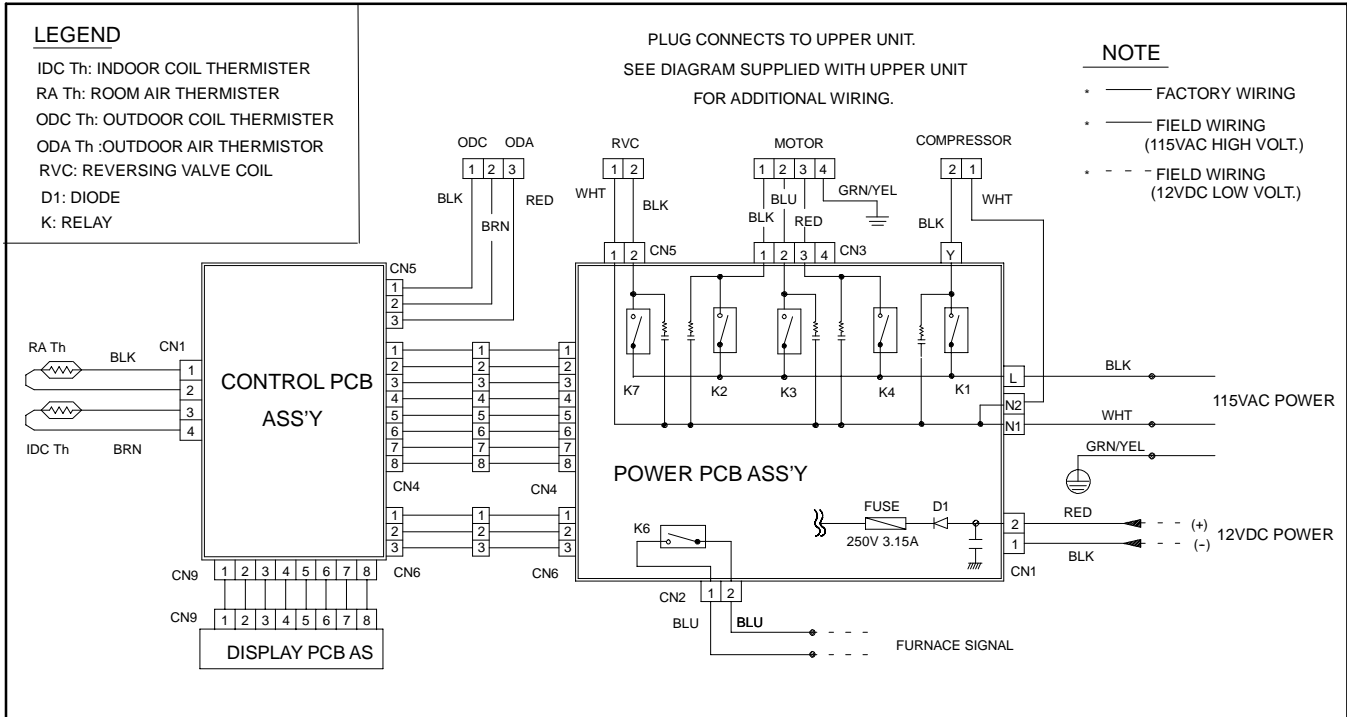


Figure 4-9 Heat Pump - Ceiling Unit - Ducted

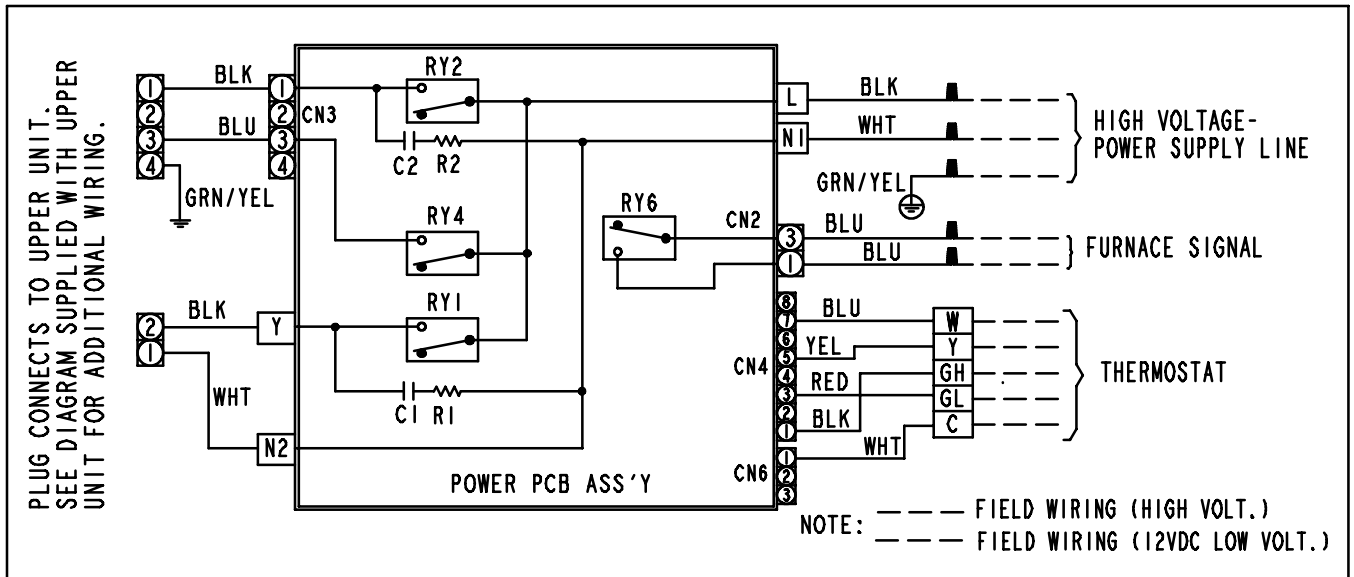


Figure 4-10 Ceiling Unit - Wall Thermostat - Ducted & Free Blow

4.2 WALL MOUNTED THERMOSTATS

For proper wiring of Wall Mounted Thermostats as an accessory, refer to Figure 3-40 (Wall Thermostat Wiring Diagram - Cool Only Model) or Figure 3-41 (Wall Thermostat Wiring Diagram - Heat/Cool Model).

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Carrier Transport Air Conditioning
50 Grumbacher Road
York PA 17402 USA
Tel: 1-800-673-2431
Fax: 1-717-764-0401



Carrier

A United Technologies Company
Carrier Transicold Division,
Carrier Corporation
Transport Air Conditioning Group
P.O. Box 4805
Syracuse, N.Y. 13221 U.S.A

www.carrier.transicold.com



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