SECTION 1

DESCRIPTION

1.1 INTRODUCTION

This manual contains service instructions, electrical data and parts listing for the Air V, Carrier Transport Air Conditioning's Recreational Vehicle air conditioning units.

The Air V 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. 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 1-3 and Figure 1-4) 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 Air V 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 Air V units is controlled automatically by the temperature controller (thermostat), which maintains the vehicle's interior temperature at the desired set point.

The unit requires an operating charge of 15.9 ounces of R22.

Table 1-1 lists model numbers and descriptions of the Air V, and Table 1-2 lists additional support manuals that are available.

Table 1-1. Model Chart

UPPER UNIT (ROOF)					
Model Number	**Part Number**	**Voltage**	**Amps**	**Color**	**Capacity Rating**
Standard System 68RV14102A	99-00468-00	115/1/60	12.8	White	13,500 btu
	99-00468-01	115/1/60	12.8	Ivory	
	99-00468-08	115/1/60	14.5	White	High Capacity
	99-00468-09	115/1/60	14.5	Ivory	
Heat Pump Systems 68RV14111A	99-00468-04 (Free Blow)	115/1/60	12.7 Cool 10.9 Heat	White	High Capacity
	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	

CEILING UNIT				
Part Number	**Voltage**	**Color**	**Interface**	**Options**
99-00469-00	115/1/60	White	Free Blow	Cool Only
99-00469-01	115/1/60	Ivory	Free Blow	Cool Only
99-00469-02	115/1/60	White	Free Blow	Heat/Cool
99-00469-03	115/1/60	Ivory	Free Blow	Heat/Cool
99-00469-06	115/1/60 - 12VDC	White	Ducted	Cool Only
99-00469-11	115/1/60	White	Free Blow	Heat Pump
99-00469-12	115/1/60	Ivory	Free Blow	Heat Pump
99-00469-13	115/1/60 - 12VDC	White	Ducted	Heat Pump

Table 1-2 Additional Support Manuals

MANUAL/FORM NO.	EQUIPMENT COVERED	TYPE OF MANUAL
71RC6A5415G	Air V 115 Volts-Free Blow (Cool Only)	Owner's Guide
71RH6A5401D	Air V 115 Volts-Free Blow (Heat & Cool)	Owner's Guide
71DC6A5407C	Air V 115 Volts-Ducted (Cool Only)	Owner's Guide
71RQ6A54010	Air V 115 Volts-Free Blow (Heat Pump)	Owner's Guide
71DQ6A54010	Air V 115 Volts-Ducted (Heat Pump)	Owner's Guide
71RC6C54010	Air V 220 Volts	Owner's Guide
62-50455-00	Basic refrigeration	Service Training

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 1-5.

The first two numbers of the serial number, see Figure 1-1, is the week the unit was manufactured. 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.

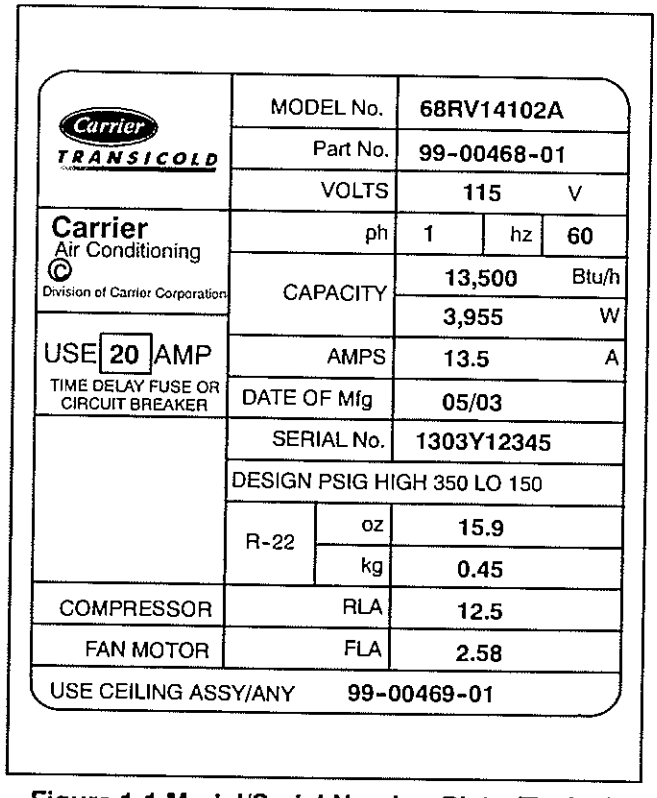


Figure 1-1 Model/Serial Number Plate (Typical)

1.3 DESIGN CHANGE DESCRIPTIONS

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

3099Y Motor bracket stiffness was increased.

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,

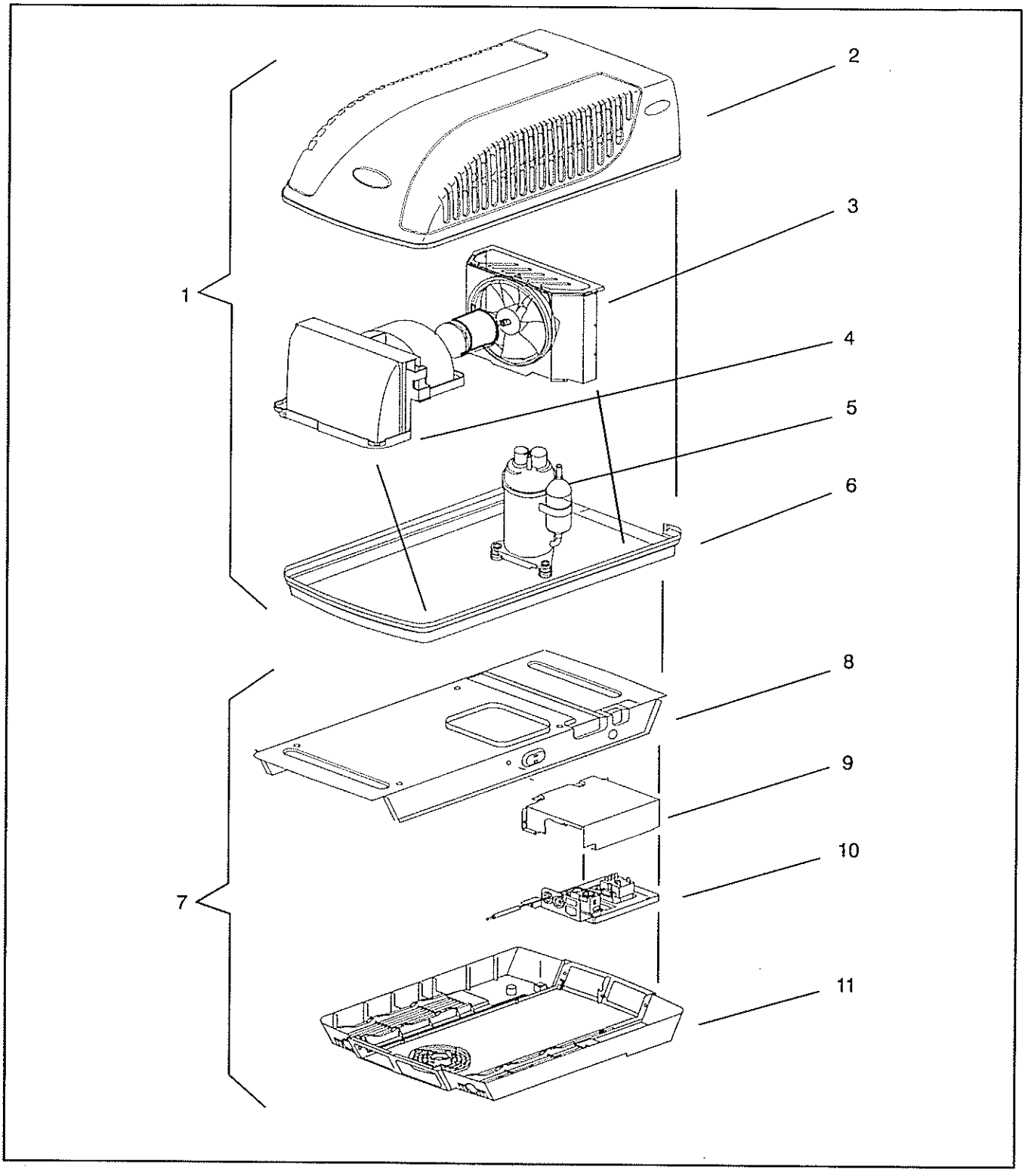
2501Y The dual air sweep was added.

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

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

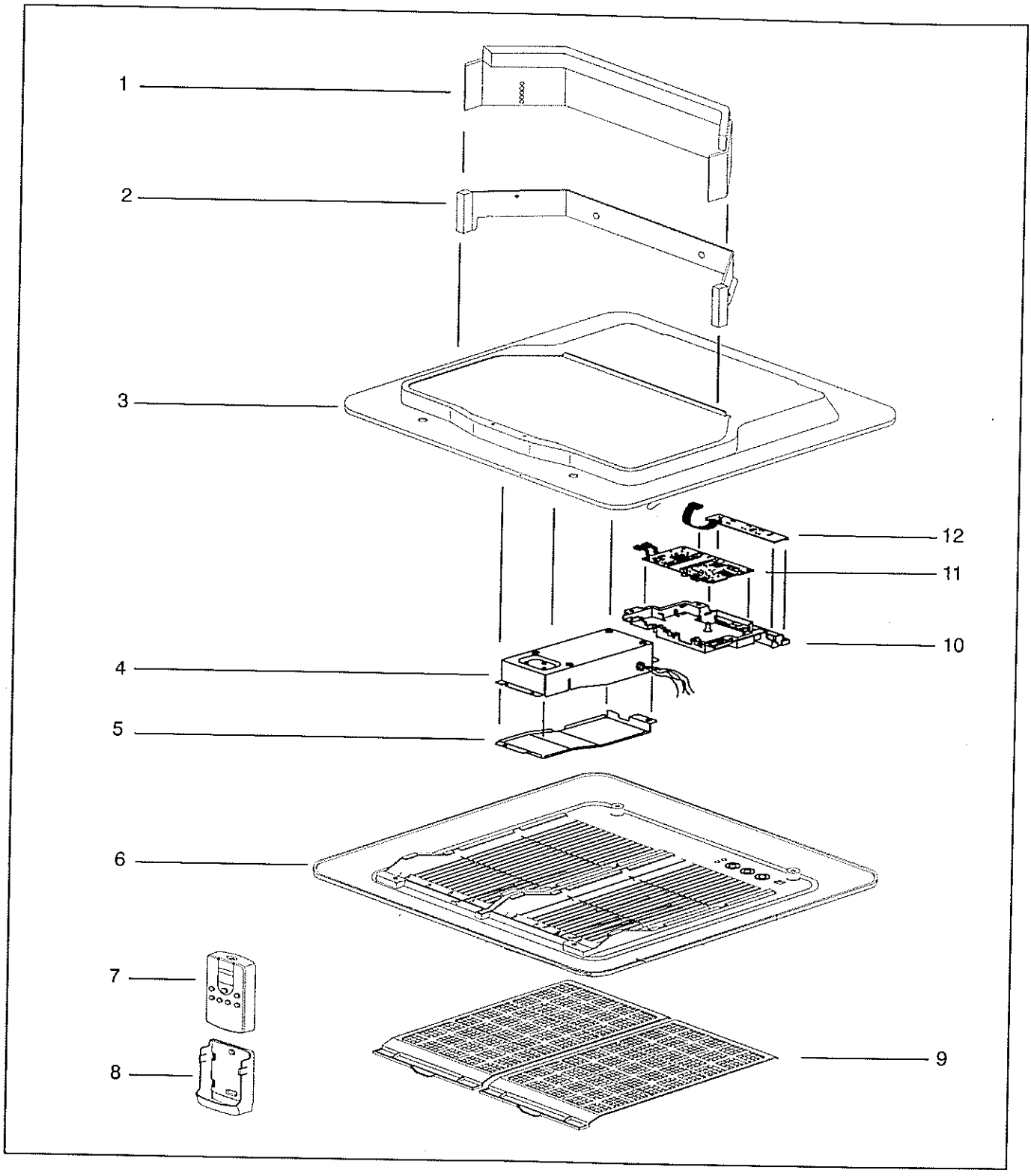
4901Y The mounting bolt lengths were increased 3/4 inch.

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



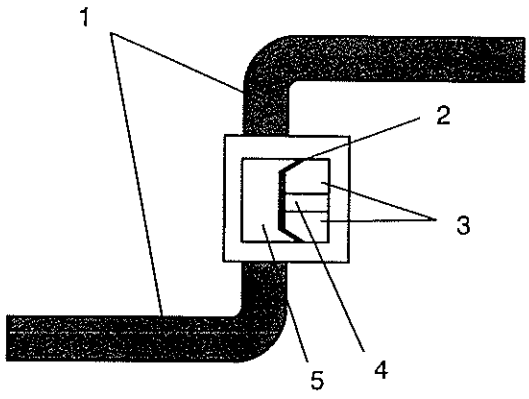
1. Upper Unit Assembly
2. Cover
3. Condenser
4. Evaporator
5. Compressor
6. Base Pan
7. Ceiling Unit Assembly (See Figure 1-3 For Ducted Unit)
8. Ceiling Panel Assembly
9. Control Box Cover
10. Control Assembly
11. Ceiling Grill Assembly

Figure 1-2 Component Identification (Free-Blow)

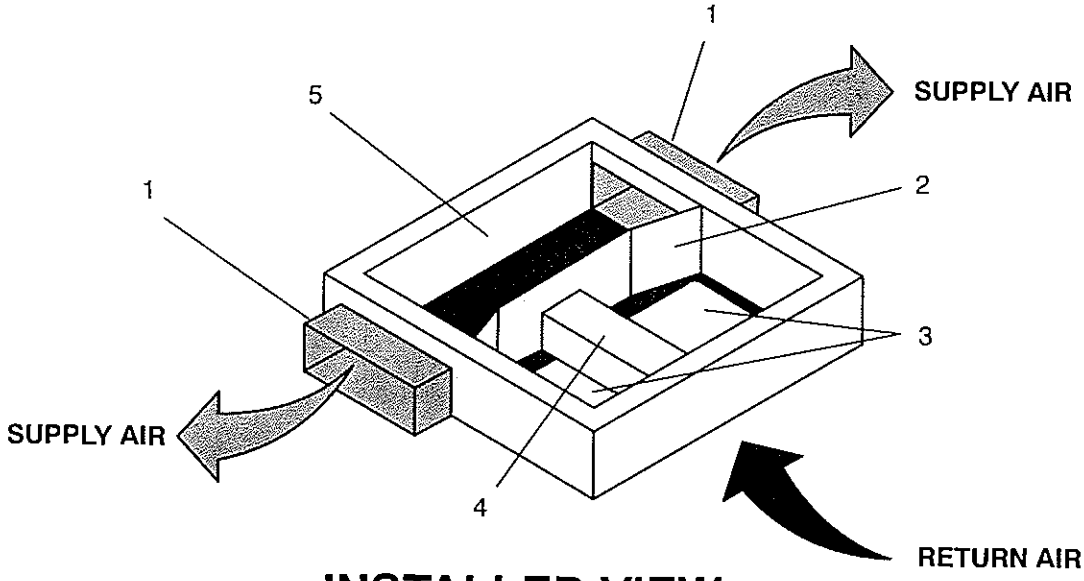


1. Telescoping Divider (3 different sizes available)
2. Divider Assembly
3. Frame Panel, Insulation Assembly
4. Control Box Assembly
5. Control Box Cover
6. Suction Packing Assembly
7. Remote Control Assembly
8. Remote Control Bracket Assembly
9. Filter Assemblies (2)
10. PCB Cover
11. PCB Main Assembly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

Figure 1-3 Component Listing-Ceiling Unit For Ducted Systems



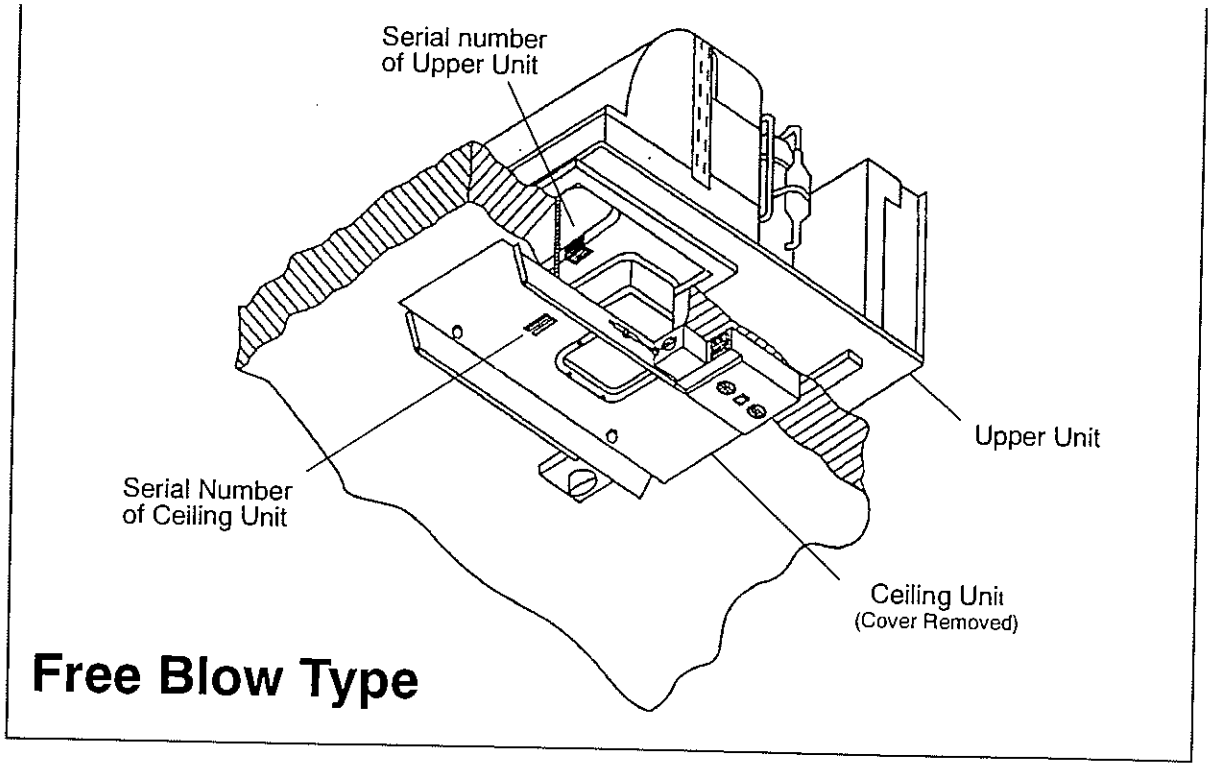
SCHEMATIC VIEW



INSTALLED VIEW

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

Figure 1-4 Ducted System Air Flow Arrangement



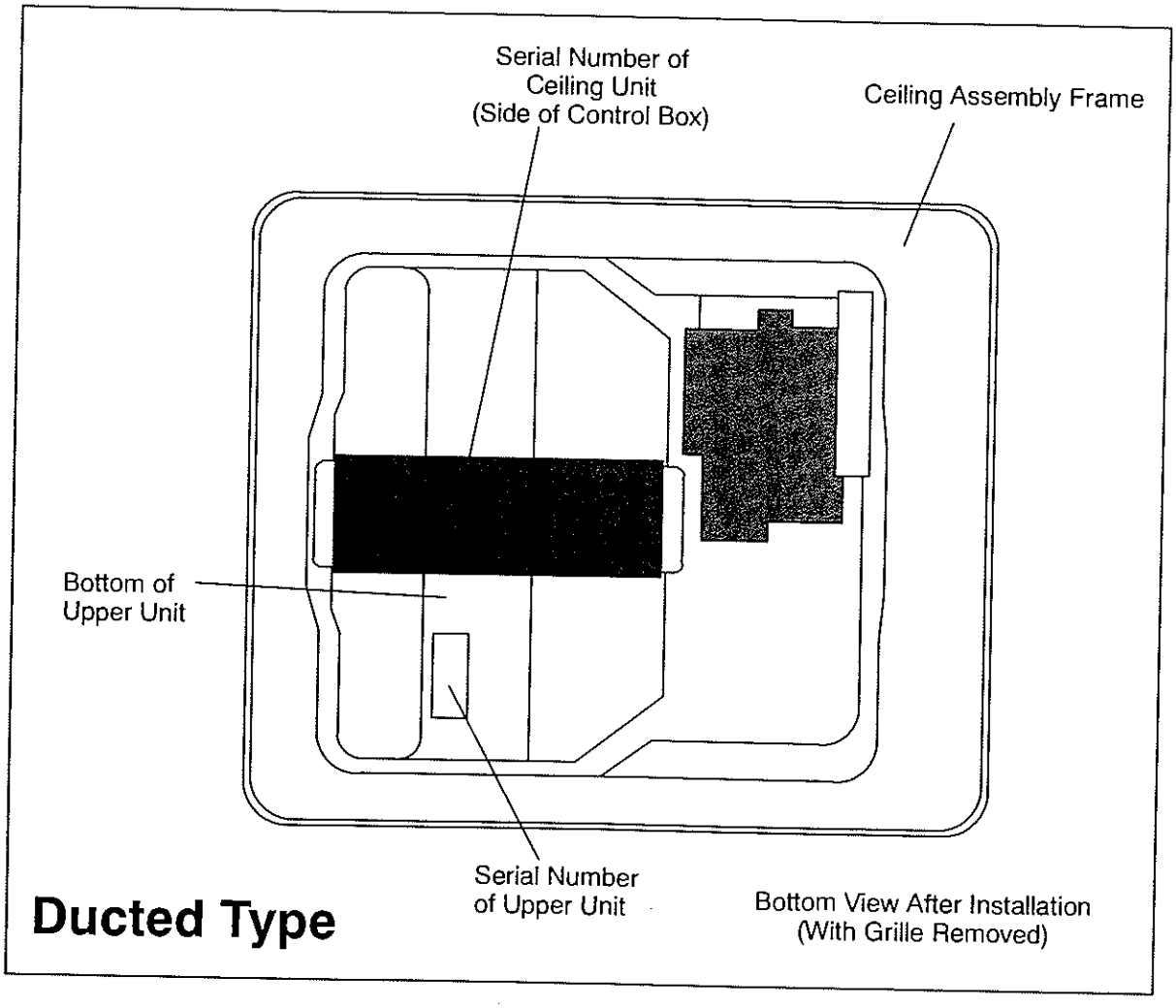


Figure 1-5 Serial Number Locations

1.4 SAFETY SUMMARY

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.

1.4.1 First Aid

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

1.4.2 Maintenance Precautions

Always wear safety glasses.

Keep hands clear of the evaporator/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.

Beware of unannounced starting of the evaporator-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 CO_2 (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.

1.5 START-UP

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

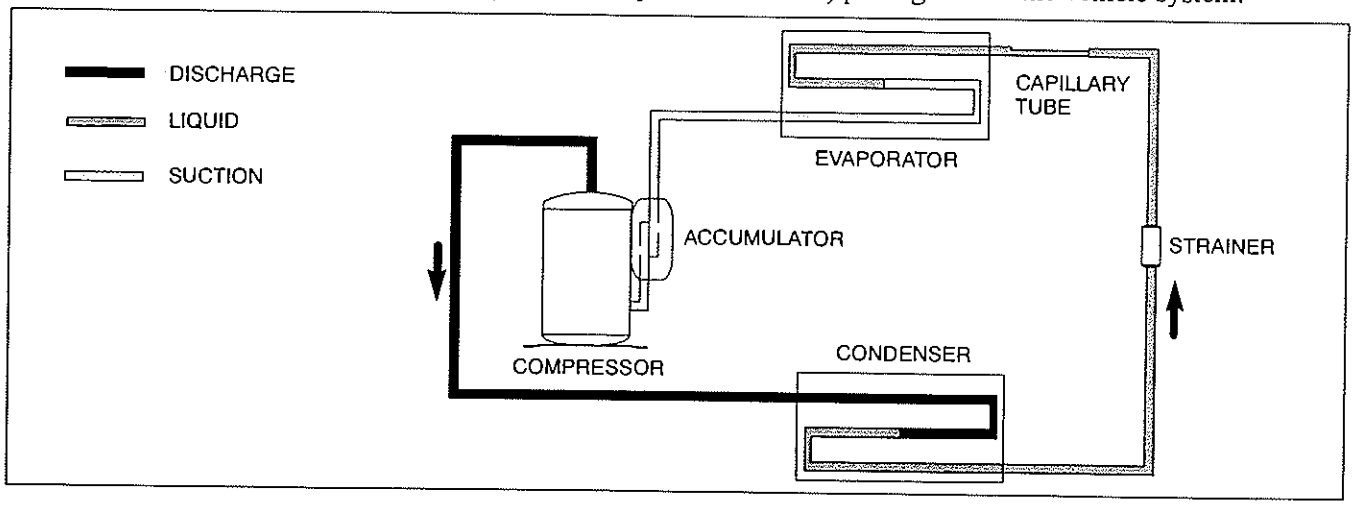


Figure 1-6 Refrigerant Flow Schematic (Standard System)

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 reciprocating 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 1-6.)

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 form 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

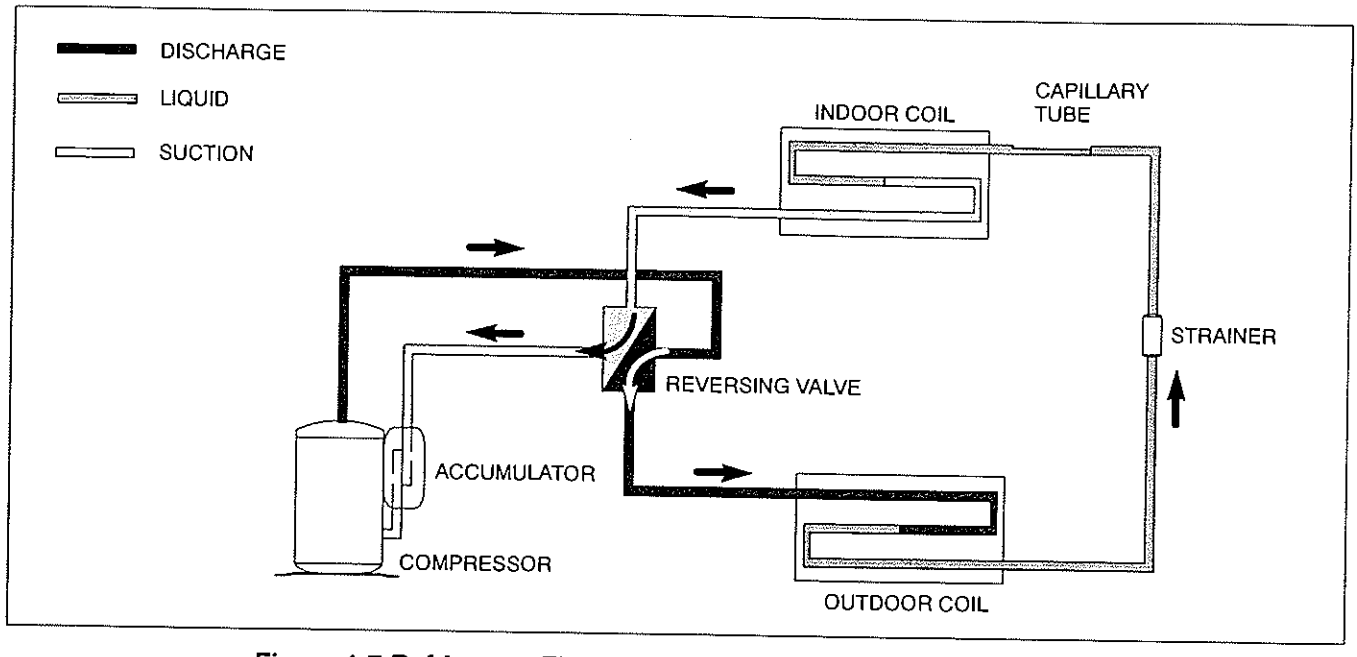


Figure 1-7 Refrigerant Flow Schematic - Heat Pump - (Cool Mode)

1.7.1 Cooling

The cooling cyele 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 1-7.)

The main components of the system are the reciprocating 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 form 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.

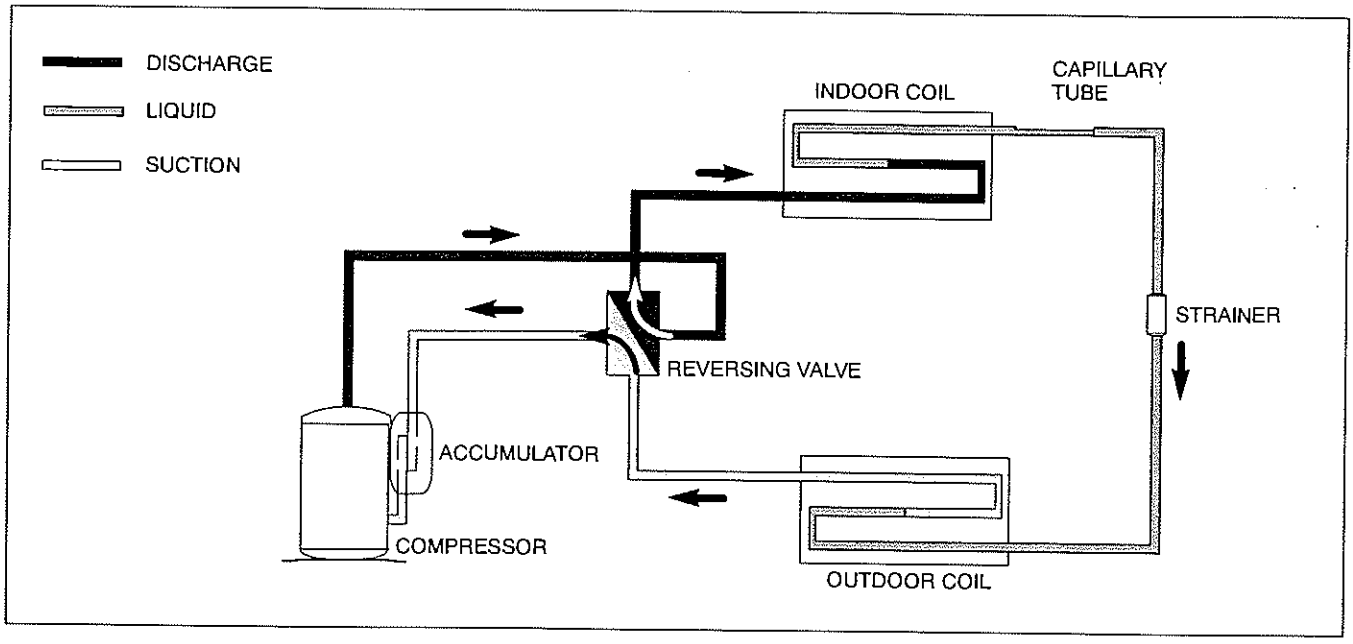


Figure 1-8 Refrigerant Flow Schematic - Heat Pump - (Heat Mode)

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 1-8.)

The main components of the system are the reciprocating 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 form 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.

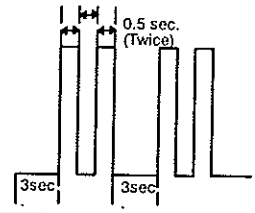
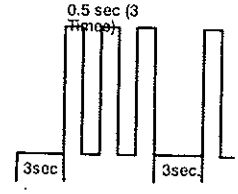
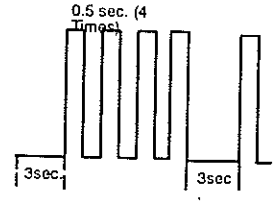
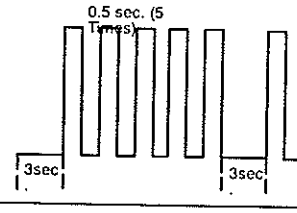
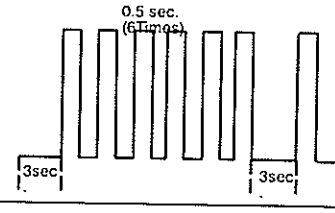
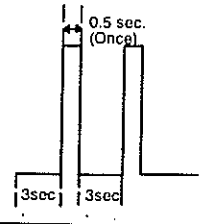
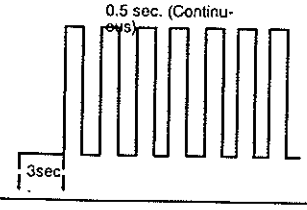
SECTION 2

TROUBLESHOOTING

For ducted units, the green operation indicator LED (SeeFigure 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	
1. Master switch off	1. Reset master switch
2. Open circuit breaker	2. Reset circuit breaker
3. Defective wiring	3. Replace wiring
4. Loose electrical connections	4. Tighten connections
5. Faulty switches, thermostat, or fan	5. Replace defective components
6. 12 VDC not connected (Ducted System)	6. Connect to 12 VDC power source
7. 12 VDC in-line fuse open (Ducted)	7. Replace fuse
2.2 DUCTED UNIT WILL NOT OPERATE	
1. Display not illuminated	1. Check 12 Volt DC in-line fuse
2. Display illuminated	2. Check 115 Volt AC Connections
2.3 DUCTED UNIT WILL NOT COOL	
1. Green LED light flashes 5 times	1. Check 115 volt AC power source Momentarily disconnect 12 VDC power source Disable compressor malfunction test switch. Check AMP draw. Check Δ T
2. Unit cools for a few moments then stops cooling	2. Remove grill, verify evaporator coil probe is inserted into coil. Check AMP draw. Check Δ T Replace unit
2.4 COMPRESSOR POWER SUPPLY OPEN	
1. Loose leads at compressor terminals	1. Tighten leads
2. Defective motor overload switch	2. Replace switch
3. Defective capacitor	3. Replace capacitor - Refer to Paragraph 3.5.8
4. Open compressor windings	4. Replace compressor
5. Seized compressor	5. Replace compressor
6. Capacitor incorrectly wired	6. Verify capacitor wiring (Refer to wiring diagram)
2.5 COMPRESSOR RUNS BUT CYCLES, FAN OPERATING ERRATICALLY	
1. Loose lead at fan motor	1. Tighten lead.
2. Defective or burned out motor	2. Replace motor.
3. Outdoor air restricted or recirculating	3. Check for dirty condenser coil, proper clearance around unit, remove any obstructions.
4. Overcharge or noncondensables in system	4. Check AMP draw
5. Restricted discharge line	5. Check for obstruction in line. Check Δ T. Replace unit.
6. Defective motor overload switch	6. Replace switch.

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 MAL-FUNCTION		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 AIR V 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.***

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:

a. Grasp the edge of the filter at recess in the end of the ceiling grill.

b. Pull filter completely out of the filter slot.

c. Vacuum filter or wash filter in luke-warm water. Shake off excess water and dry thoroughly.

d. Replace filter by sliding the filter into the filter slot in the ceiling grill until the filter frame is flush with the interior grill.

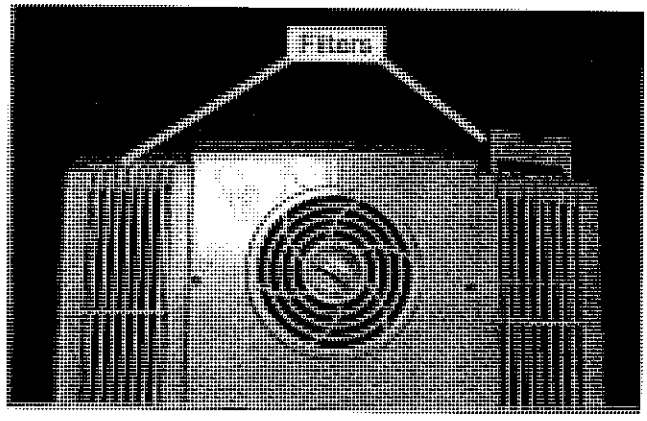


Figure 3-1 Filter Removal - Free Blow

3.3.2 Ceiling Grill Removal

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

a. Before working on unit place the master switch in the OFF position and disconnect all electrical power.

b. Remove 4 screws located on the ceiling grill, making sure to support the weight of the grill.

c. 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.

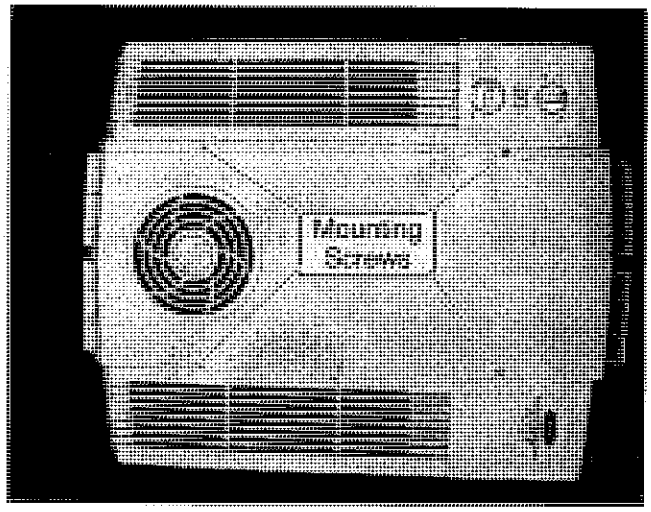


Figure 3-2 Ceiling Grill - Free Blow

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.

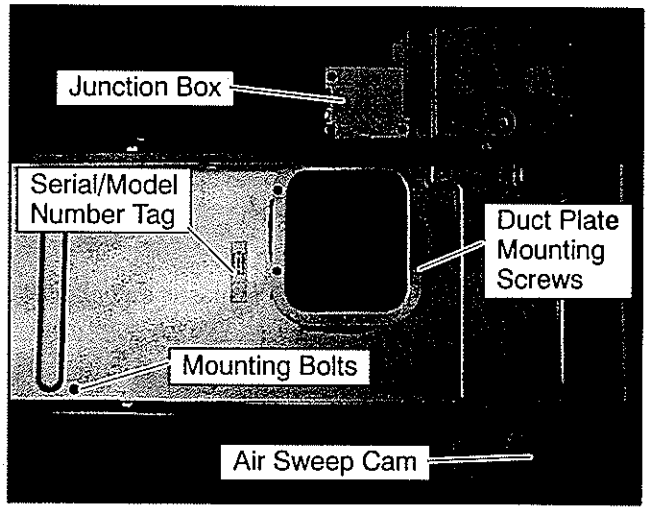


Figure 3-3 Ceiling Panel Assembly

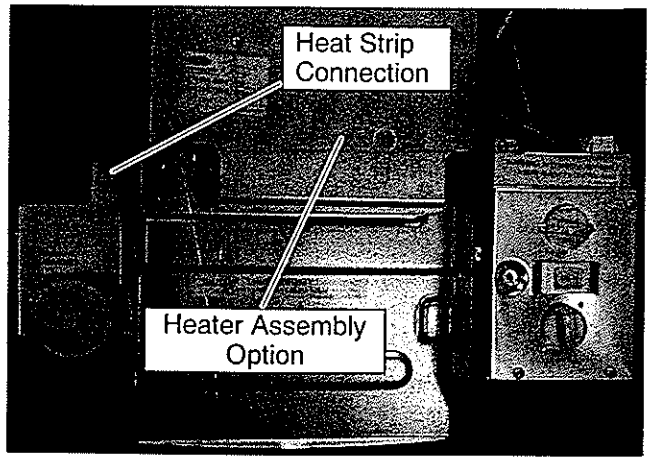


Figure 3-4 Ceiling Panel With Heat Option

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 10, Figure 1-2) 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.

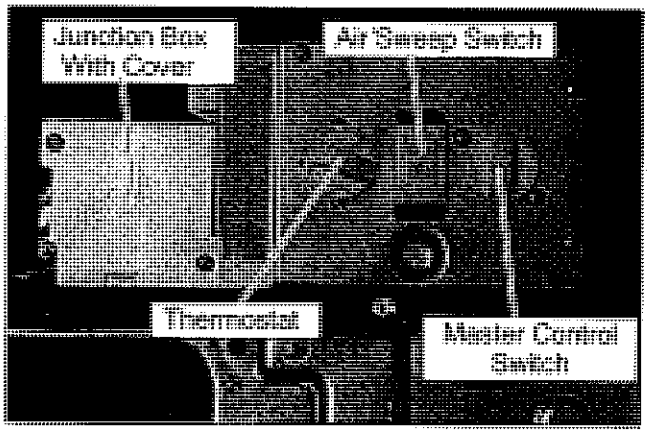


Figure 3-5 Control Box Assembly - Free Blow

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 10, Figure 1-2) 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 10, Figure 1-2) 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.

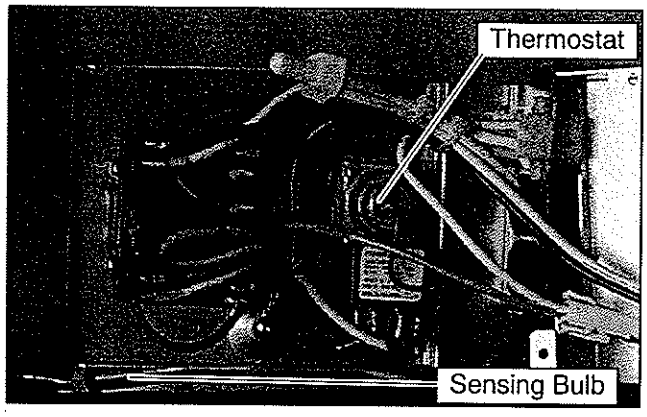


Figure 3-6 Indoor Thermostat

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.

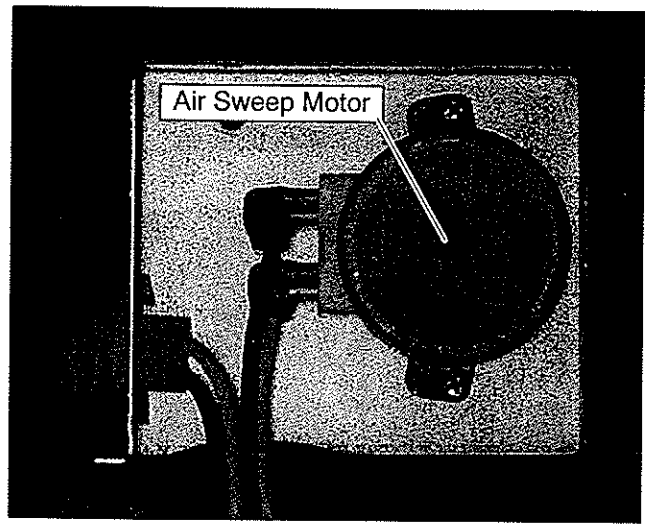


Figure 3-7 Air sweep motor

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.

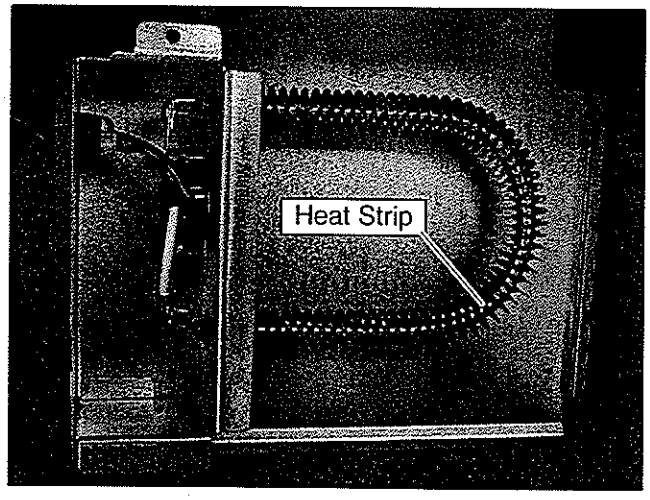


Figure 3-8 Heat Strip Assembly

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:

a. Grasp the edge of the filter at recess in the end of the ceiling grill.

b. Pull filter completely out of the filter slot.

c. Vacuum filter or wash filter in luke-warm water. Shake off excess water and dry thoroughly.

d. Replace filter by sliding the filter into the filter slot in the ceiling grill until the filter frame is flush with the interior grill.

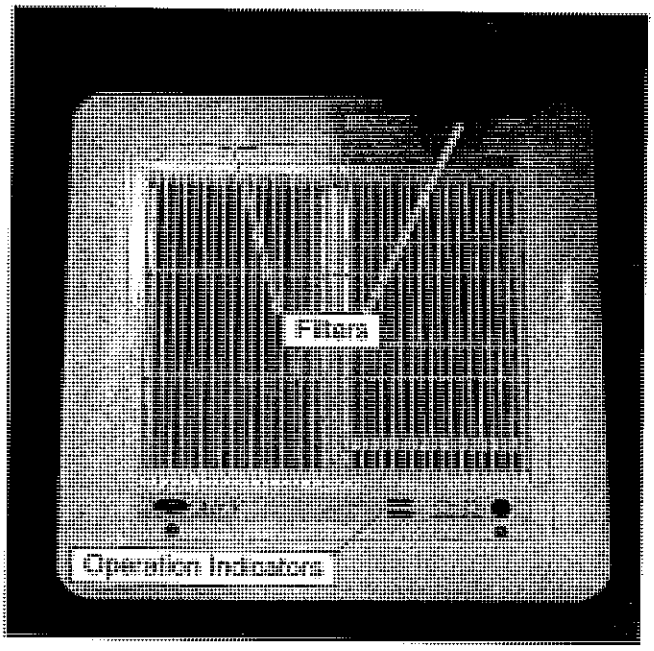


Figure 3-9 Filter Removal - Ducted Unit

3.4.2 Ceiling Grill Removal

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

a. Before working on unit place the master switch in the OFF position and disconnect all electrical power.

b. Remove filters (Refer to paragraph 3.4.1).

c. Remove 4 screws located on the ceiling grill, (two are under the filters) making sure to support the weight of the grill.

d. Lower the ceiling grill from the ceiling panel.

e. To replace the grill, place the grill up against the ceiling panel and align the screw holes in the grill with the ceiling panel.

f. 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:

a. Remove ceiling grill. Refer to paragraph 3.4.2.

b. Disconnect 115 volt (AC) and 12 volt (DC) power wires.

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

d. Remove control box assembly cover.

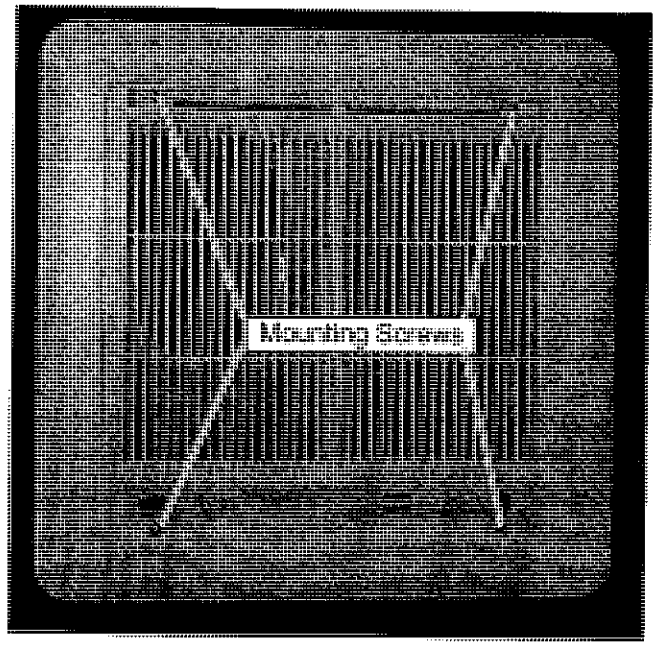


Figure 3-10 Ceiling Grill - Ducted

e. Disconnect blue furnace wires.

f. Unplug two connectors from upper unit.

g. Unplug DC power plug #1 (red/yellow/black wires) See Figure 3-12

h. Unplug relay signal plug #2(brown/red/orange/ yellow wires). See Figure 3-12

i. While supporting control box assembly remove two screws securing control box assembly to ducted ceiling unit.

j. Pull control box assembly from the ducted ceiling unit.

k. Reverse above procedure to reassemble.

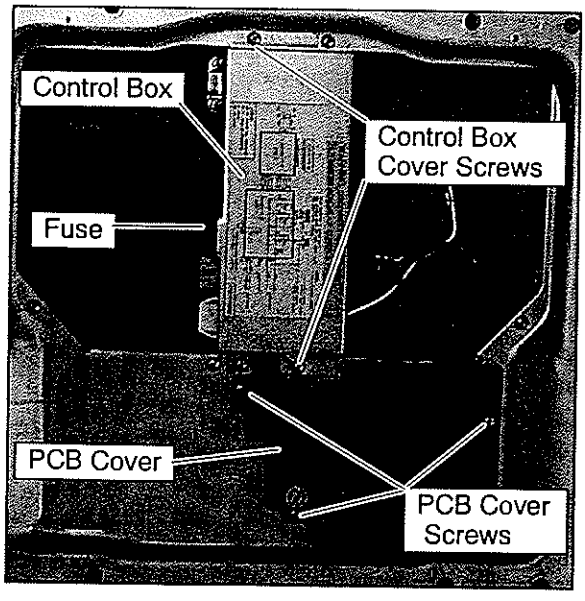


Figure 3-11 Control Box & PCB Cover

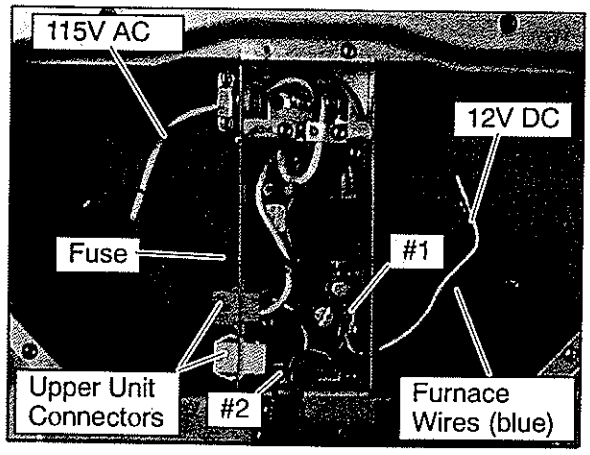


Figure 3-12 Control Box Assembly - Ducted

3.4.4 Main PCB Board Removal

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

a. Remove ceiling grill. Refer to paragraph 3.4.2.

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.

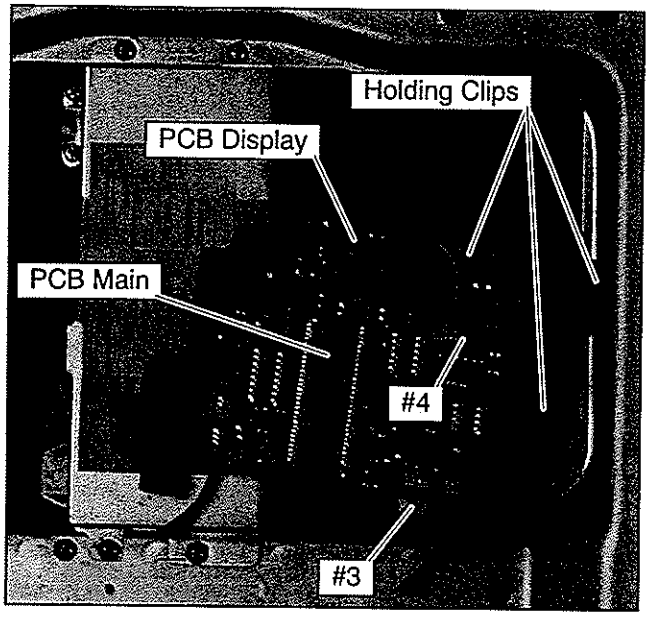


Figure 3-13 Main/Display PCB's

3.4.5 PCB Display Removal

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

a. Remove ceiling grill. Refer to paragraph 3.4.2.

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.

3.4.6 Fuse Removal

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

a. Remove ceiling grill. Refer to paragraph 3.4.2.

b. Turn fuse holder in direction of arrow (counter-clock-wise).

c. Pull fuse from fuse holder.

d. Test and/or replace.

e. Reverse above procedures for reassembly.

3.5 SERVICE - UPPER UNIT

3.5.1 Exterior Cover Removal

CAUTION

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

To remove the exterior cover, do the following:

a. Before working on unit place the master switch in the OFF position and disconnect all electrical power.

b. Remove 15 screws securing the unit cover to the base pan assembly. See Figure 3-14.

c. Carefully lift the exterior cover off of the unit base pan assembly.

d. Reverse above procedure for reassembly.

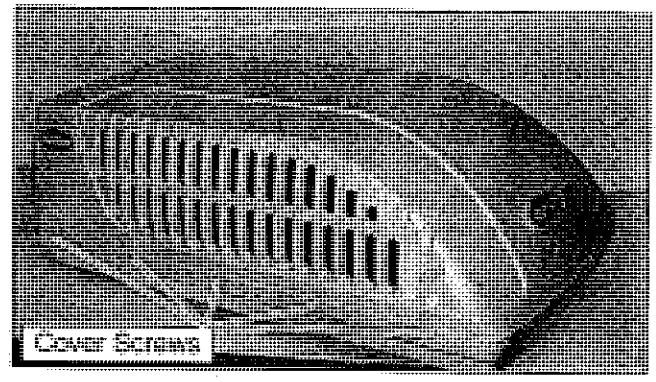


Figure 3-14 Cover Assembly

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. (SeeFigure 3-15.)

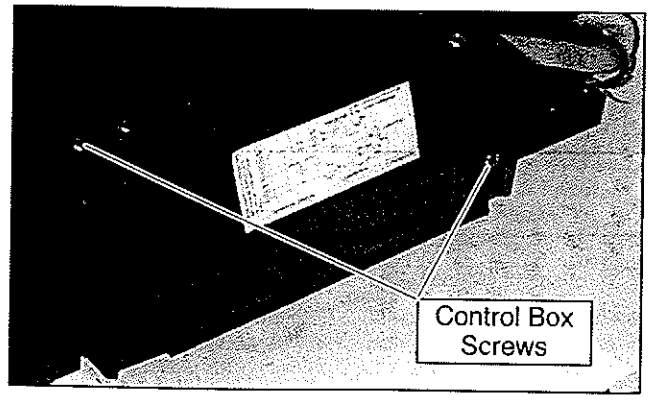


Figure 3-15 Control Box

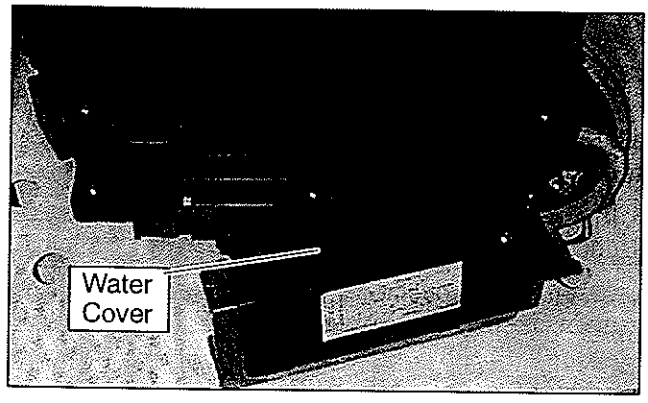


Figure 3-16 Control Box Removal

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.

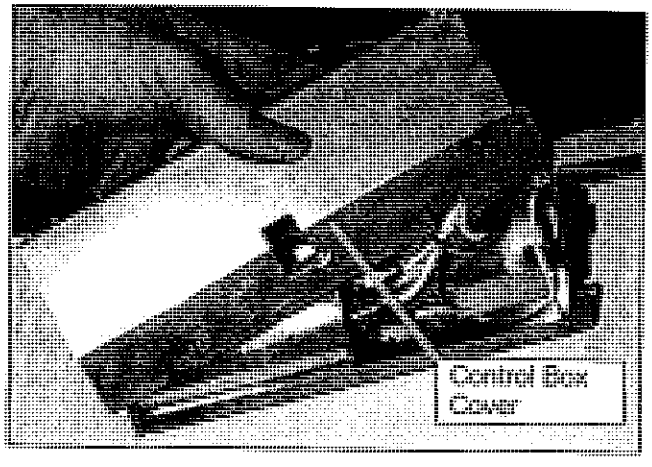


Figure 3-17 Water Cover Removal

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.

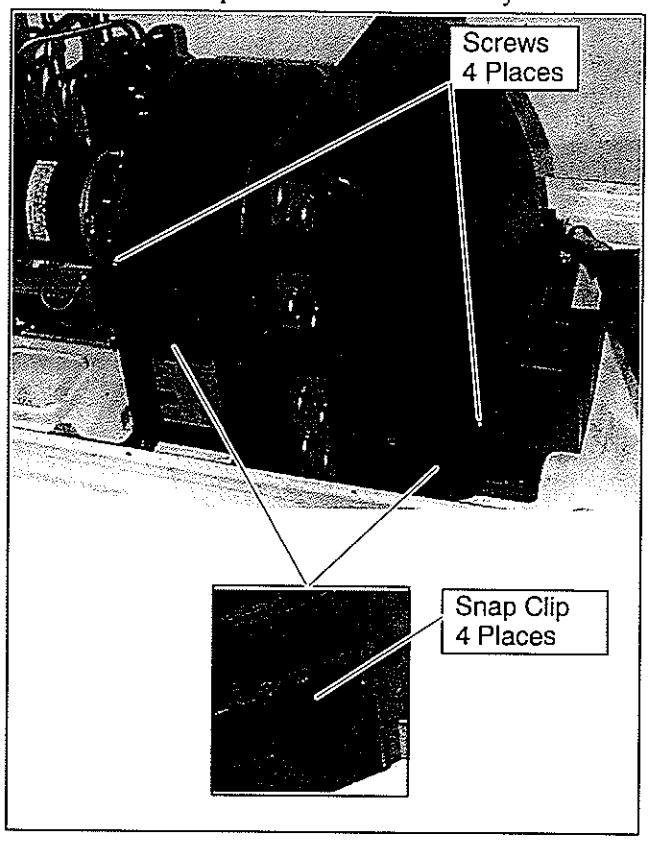


Figure 3-18 Upper Scroll Assembly

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. Lift and slide motor towards evaporator coil to remove condenser fan from the motor shaft.

h. Remove condenser fan from motor shaft and lift fan out through the top of the condenser orifice. (See Figure 3-22)

i. Remove motor assembly.

j. Reverse above procedure for reassembly.

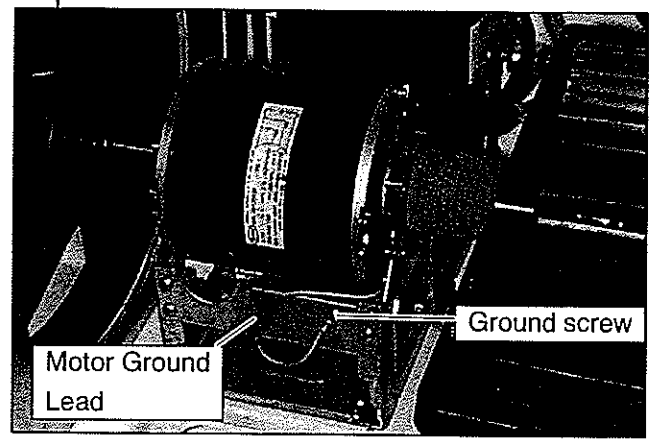


Figure 3-19 Motor Assembly

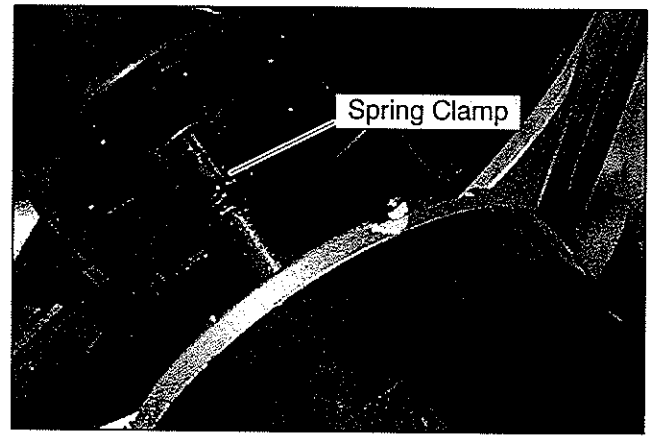


Figure 3-20 Spring Clamp Removal

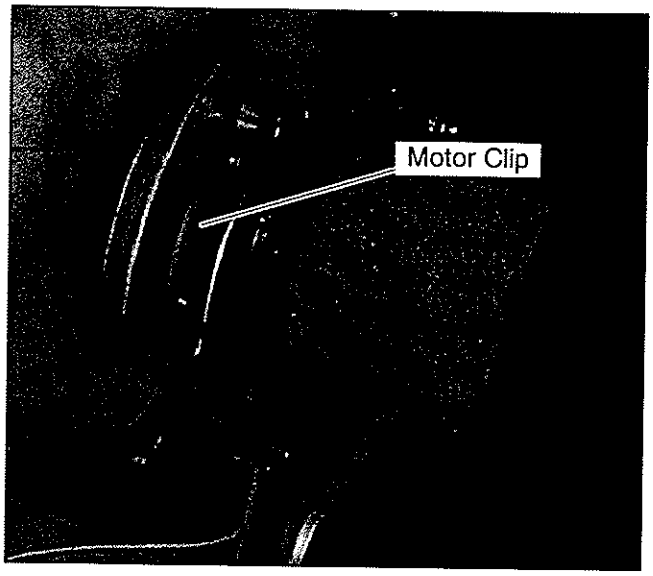


Figure 3-21 Motor Clip Removal

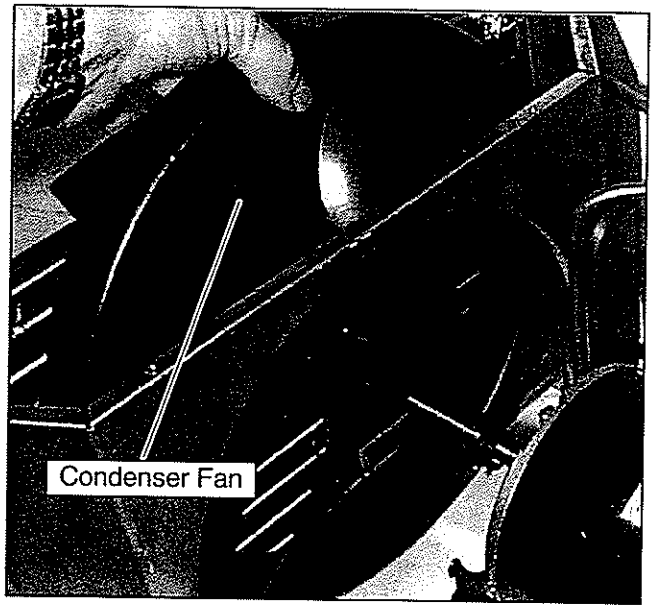


Figure 3-22 Condenser Fan Removal

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.

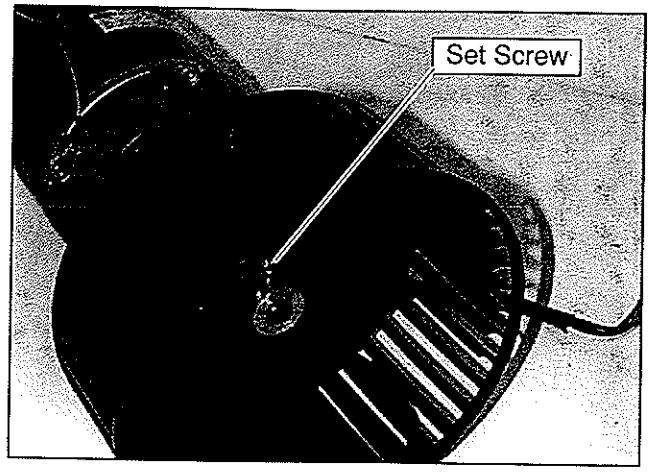


Figure 3-23 Blower Wheel

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.

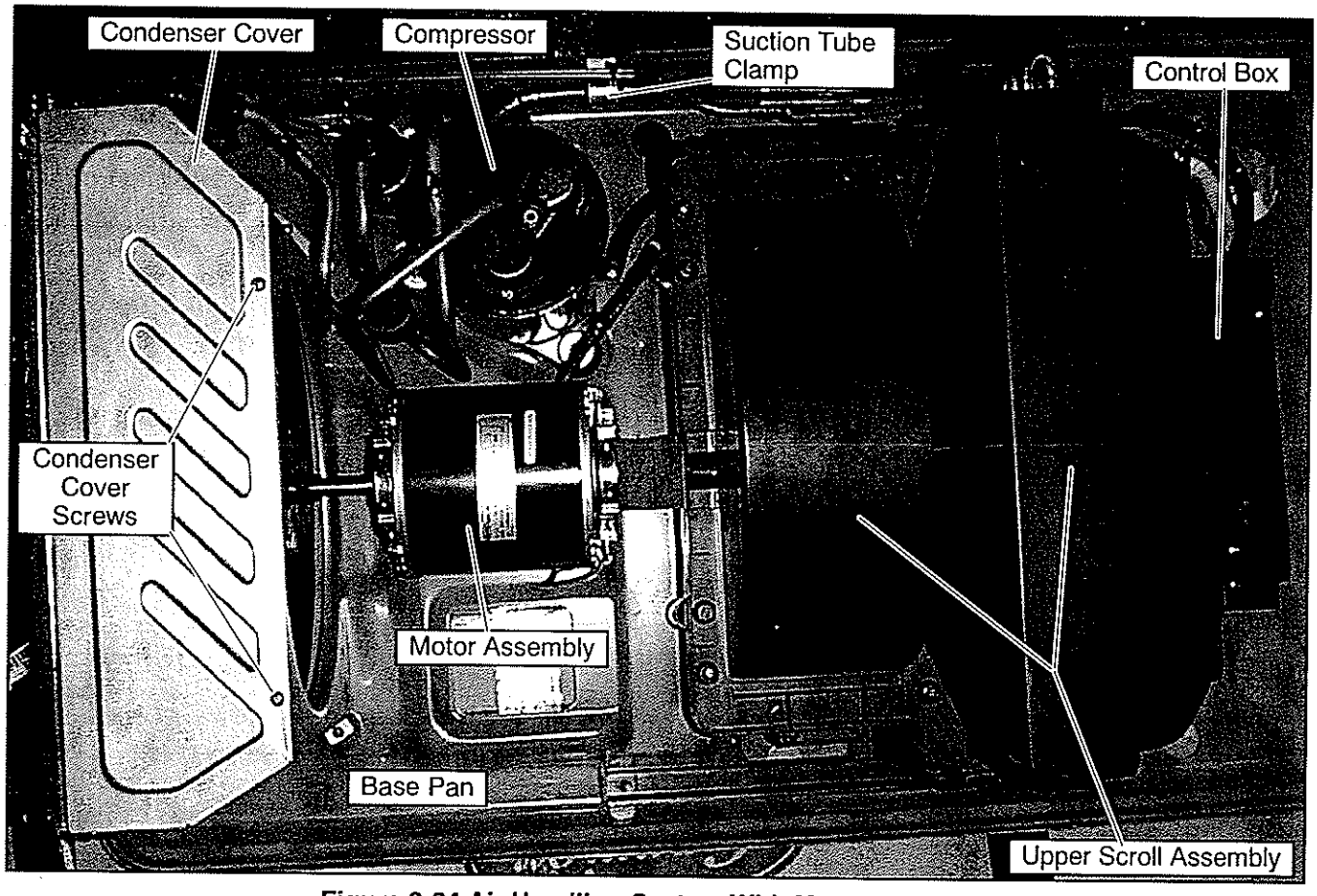


Figure 3-24 Air Handling System With Motor Assembly

3.5.8 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).

WARNING

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

After the capacitor has been discharged 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.

a. If the ohmmeter first reads 0, then rises toward infinity or some higher resistance, the capacitor is good.

b. If the ohmmeter goes to 0 or a low resistance and stays there, the capacitor is shorted and needs to be replaced.

c. If the ohmmeter reads infinity (OL) the capacitor is open and needs to be replaced.

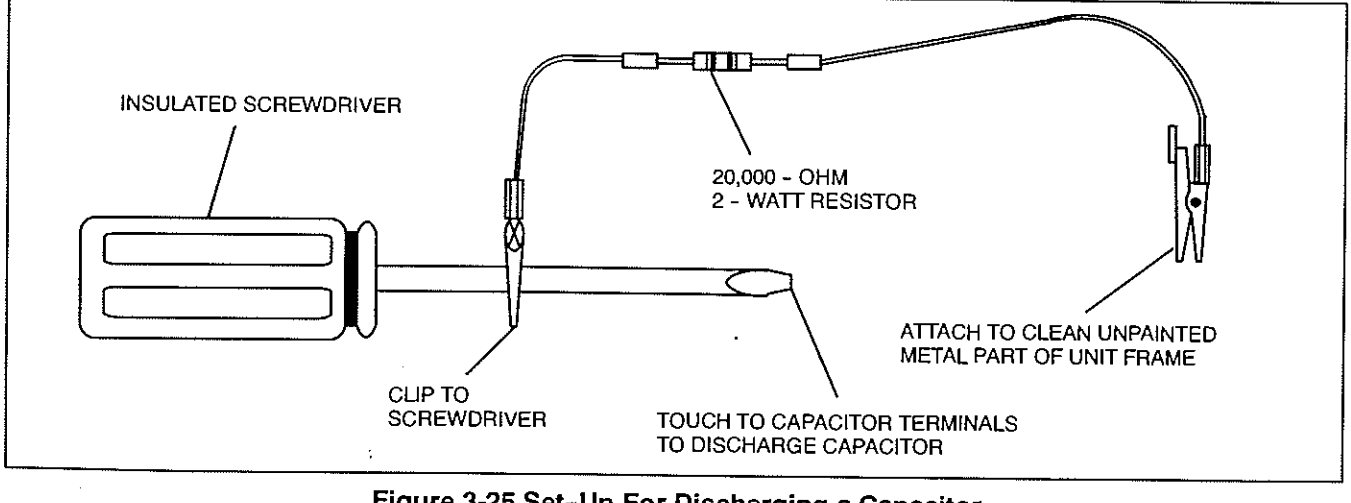


Figure 3-25 Set-Up For Discharging a Capacitor

SECTION 4

WIRING SCHEMATICS

4.1 INTRODUCTION

This Section contains wiring schematics for the AIR V 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 a free blow unit without heat while Figure 4-3 is a free blow unit with heat. Figure 4-4 is for a ducted unit with microprocessor control.

Figure 4-5 is for an Upper Unit Heat Pump with free blow application and Figure 4-6 is the matching free blow ceiling unit. Figure 4-7 is for the Upper Unit Heat Pump ducted application and Figure 4-8 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.

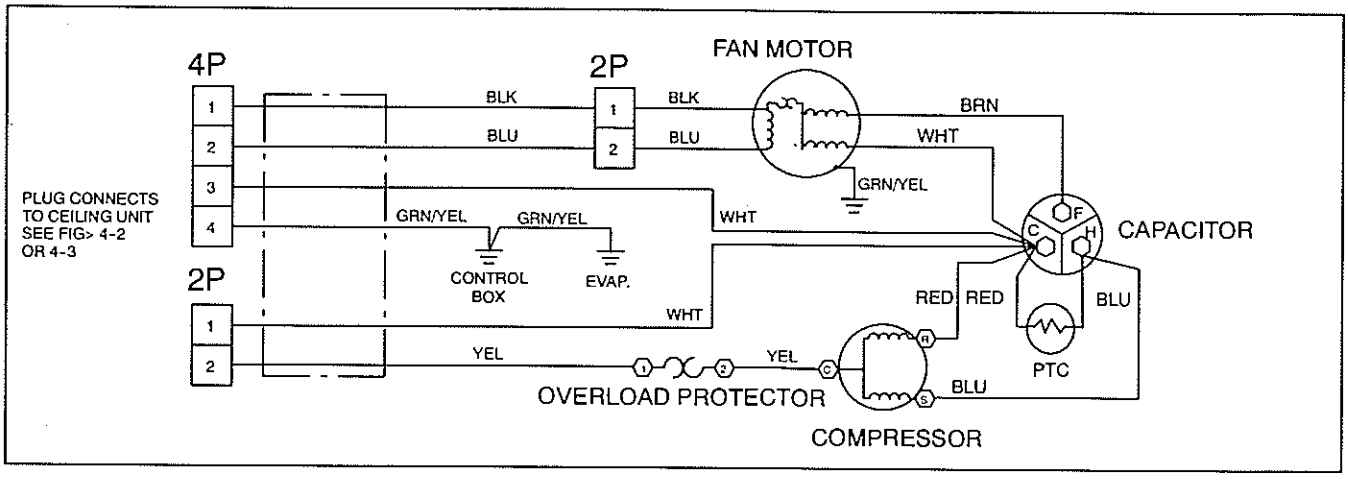


Figure 4-1 Upper Unit Schematic

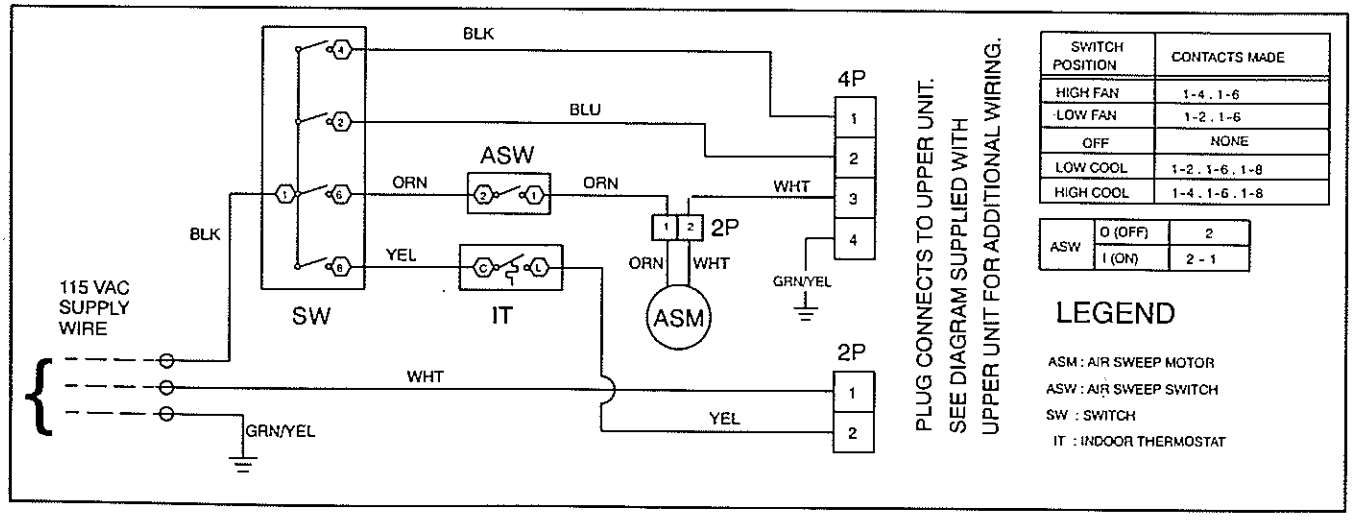


Figure 4-2 Ceiling Unit Schematic - Cooling Only

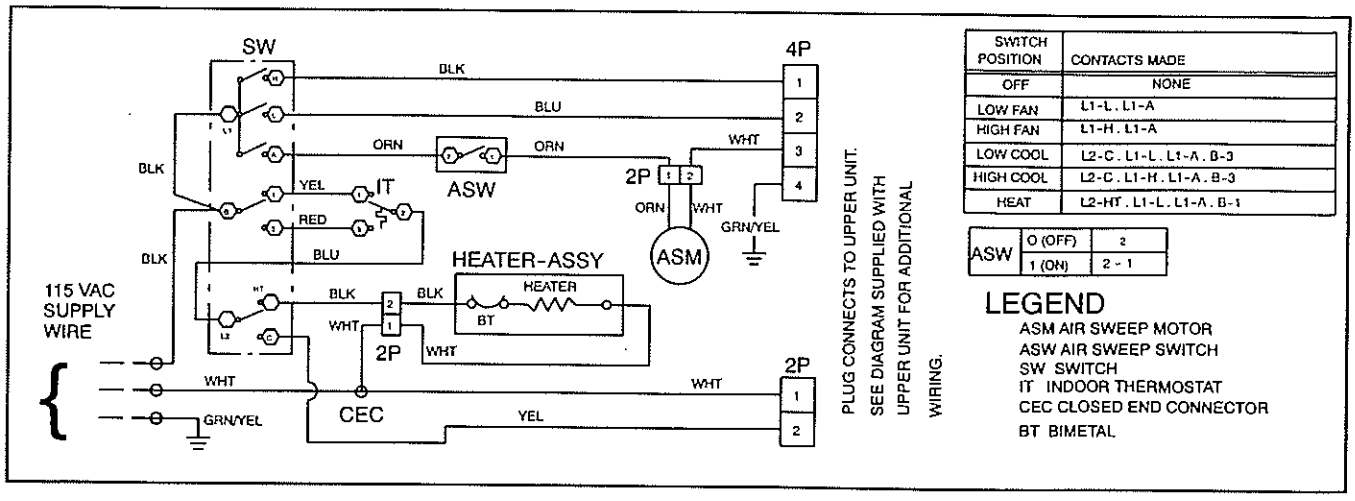


Figure 4-3 Ceiling Unit Schematic - Heat/Cool

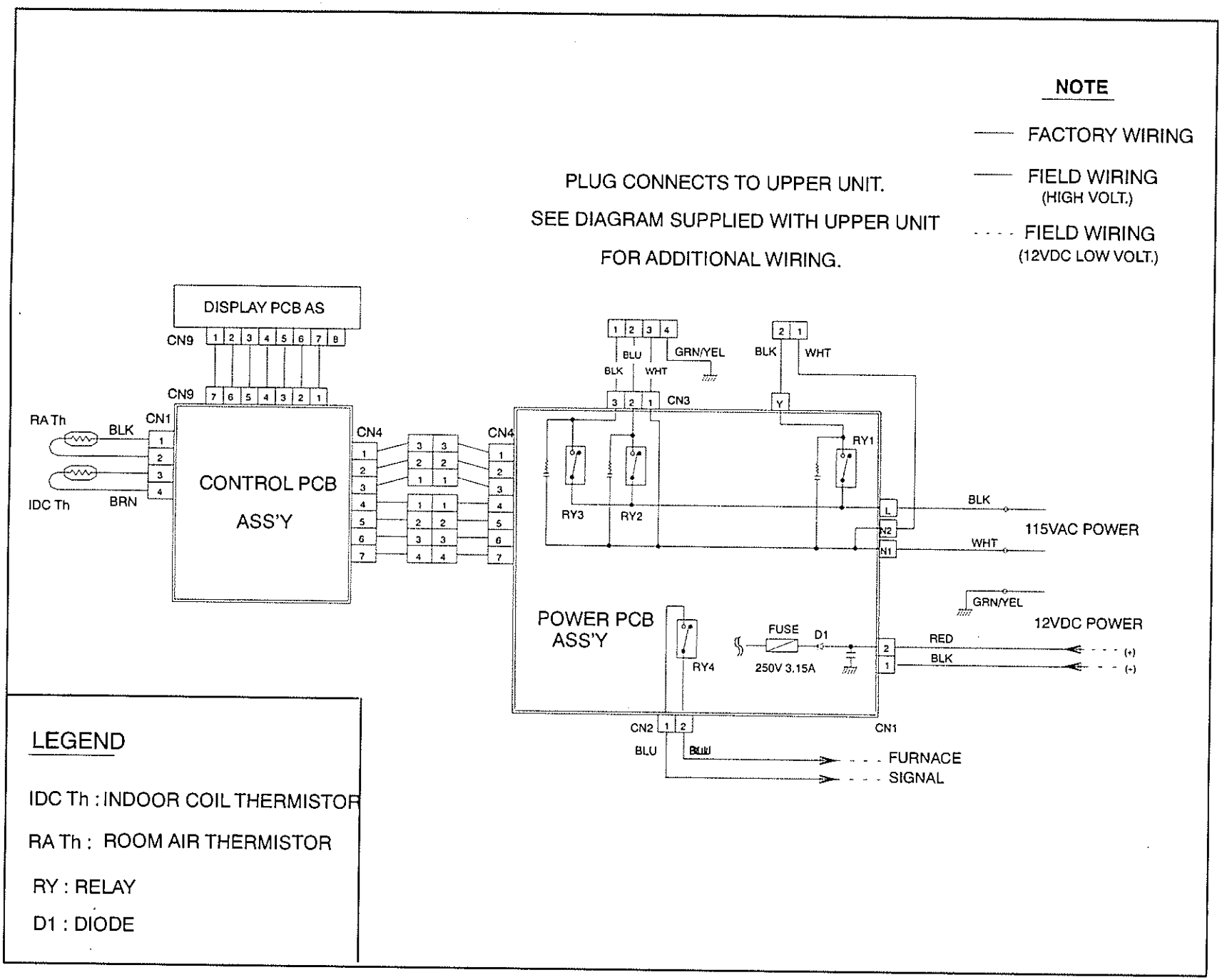


Figure 4-4 Ceiling Unit, Standard - Ducted

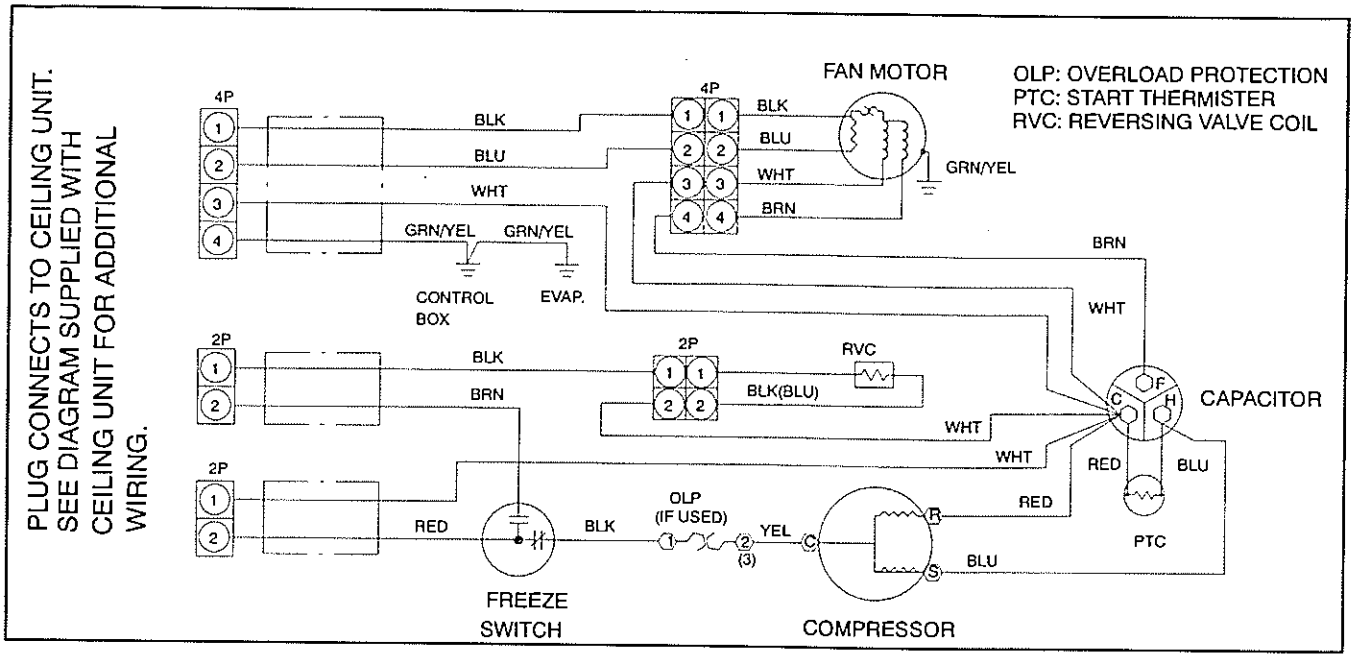
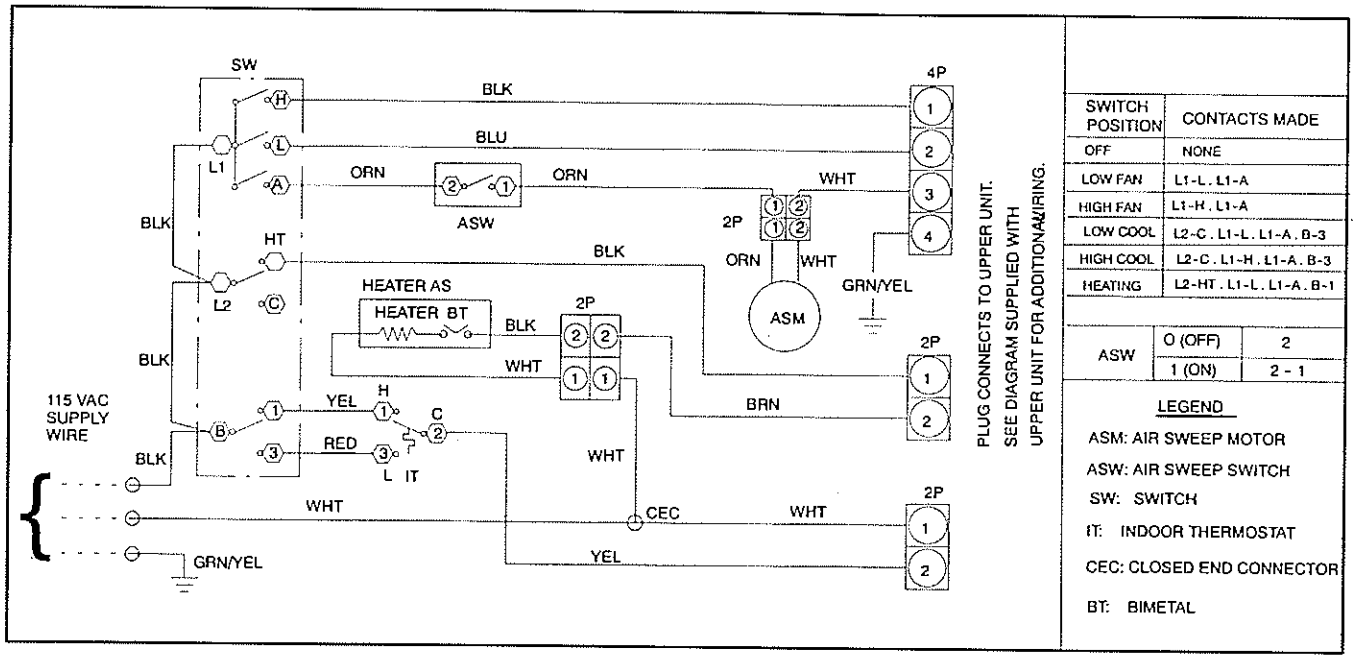


Figure 4-5 Heat Pump - Upper Unit - Free Blow



SWITCH POSITION	CONTACTS MADE
OFF	NONE
LOW FAN	L1-L, L1-A
HIGH FAN	L1-H, L1-A
LOW COOL	L2-C, L1-L, L1-A, B-3
HIGH COOL	L2-C, L1-H, L1-A, B-3
HEATING	L2-HT, L1-L, L1-A, B-1

ASW		
	0 (OFF)	2
	1 (ON)	2 - 1

LEGEND

ASM: AIR SWEEP MOTOR

ASW: AIR SWEEP SWITCH

SW: SWITCH

IT: INDOOR THERMOSTAT

CEC: CLOSED END CONNECTOR

BT: BIMETAL

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

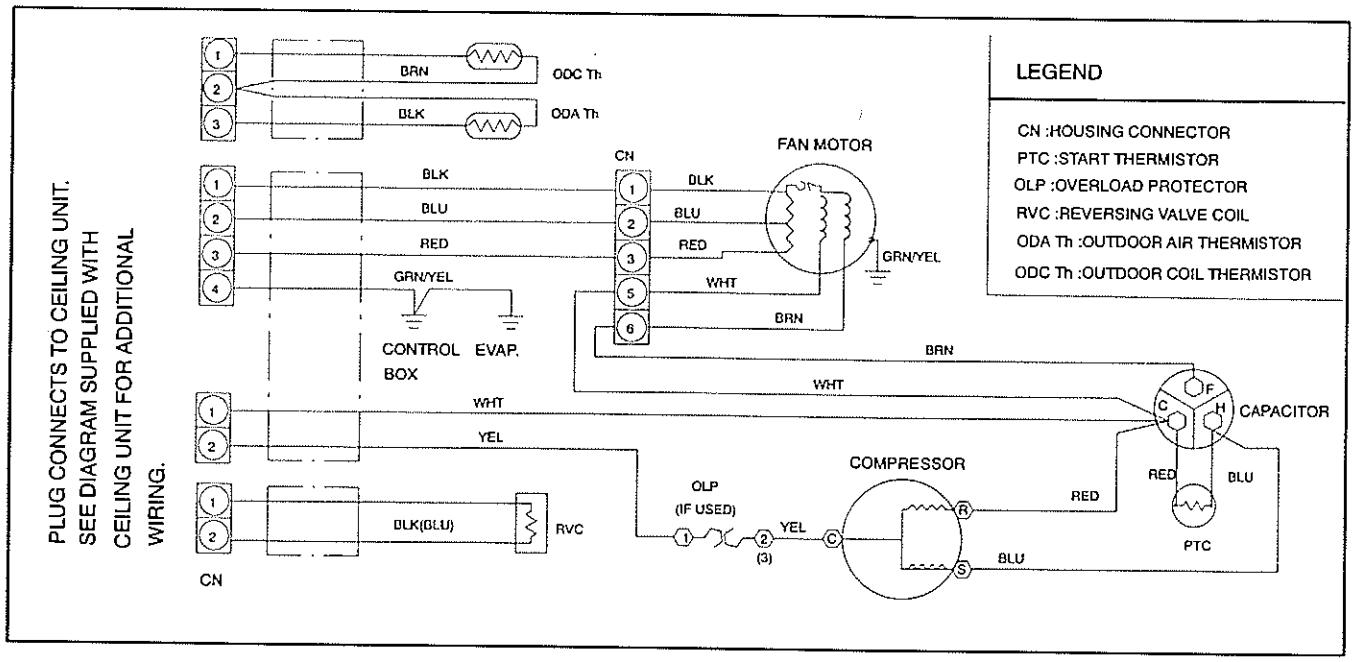


Figure 4-7 Heat Pump - Upper Unit - Ducted

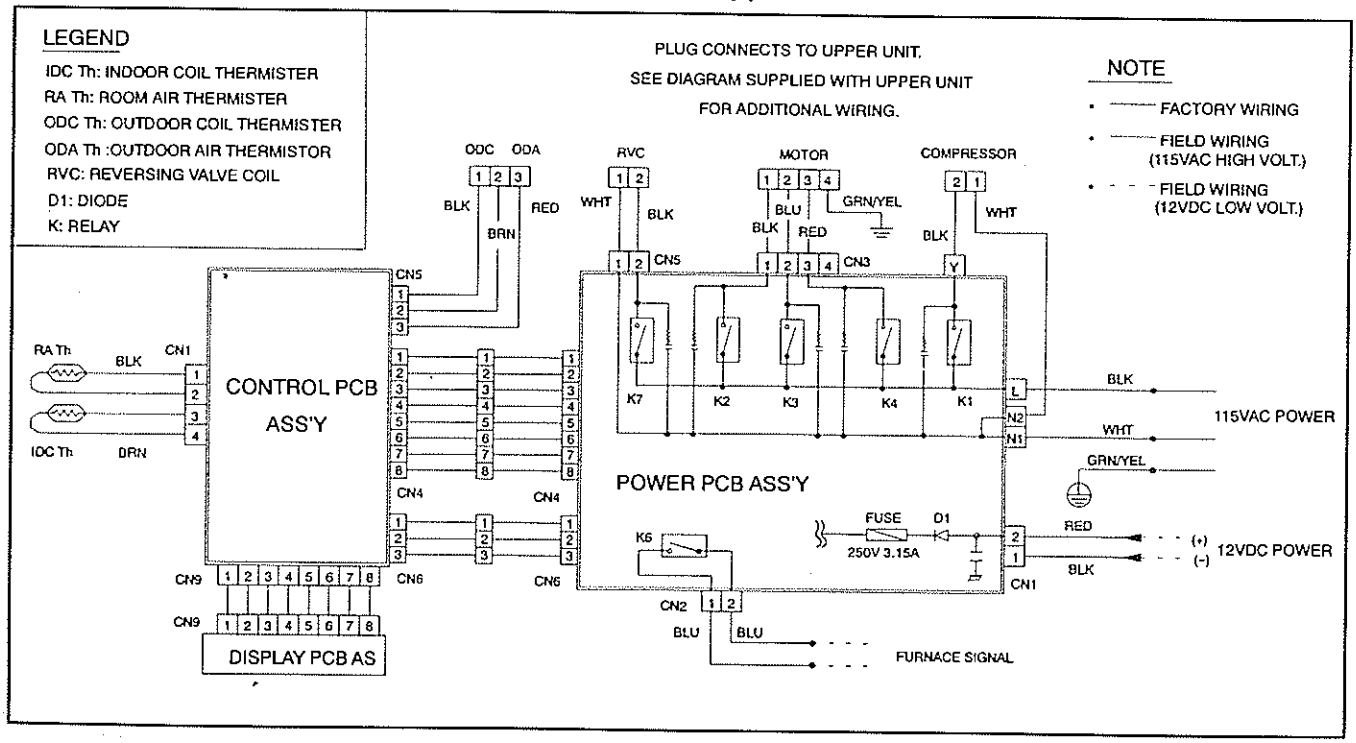


Figure 4-8 Heat Pump - Ceiling Unit - Ducted