Installation Instructions

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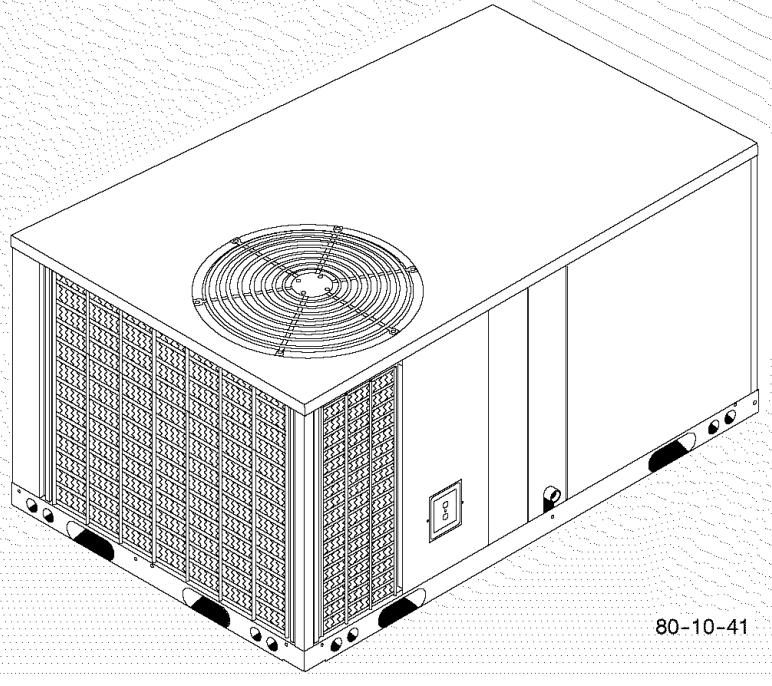
- Air Distribution
- Economizer Accessory
- Ductwork Connections
- Wiring
- Start-Up Procedures
- Maintenance
- Hoisting/Rigging



80-10-41

RESIDENTIAL SINGLE PHASE WITH DIRECT DRIVE BLOWER

2 to 5 TON

SINGLE PACKAGE HEAT PUMPS ELECTRIC HEAT (OPTIONAL)

Printed in U.S.A.

518 01 1001 00 7/97

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1. Safety Labeling and Signal Words

Danger, Warning and Caution

The signal words **DANGER, WARNING** and **CAUTION** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used on product labels to signify an immediate hazard. The signal words **WARNING** and **CAUTION** will be used on product labels and throughout this manual and other manuals that may apply to the product.

Signal Words

DANGER - Immediate hazards which **WILL** result in severe personal injury or death.

WARNING - Hazards or unsafe practices which **COULD** result in severe personal injury or death.

CAUTION - Hazards or unsafe practices which **COULD** result in minor personal injury or product or property damage.

Signal Words in Manuals

The signal word **WARNING** is used throughout this manual in the following manner:

WARNING

The signal word **CAUTION** is used throughout this manual in the following manner:

CAUTION

Product Labeling

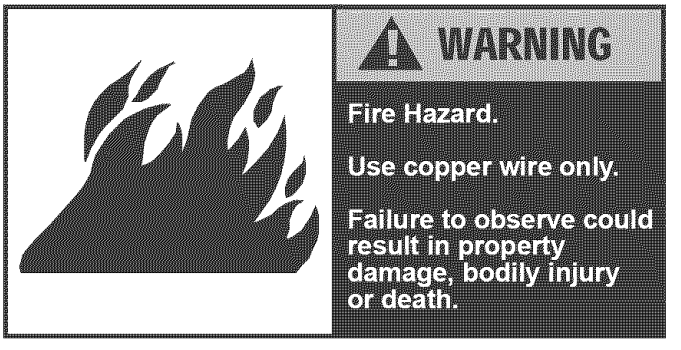
Signal words are used in combination with colors and/or pictures on product labels. Following are examples of product labels with explanations of the colors used.

Danger Label

White lettering on a black background except the word **DANGER** which is white with a red background.

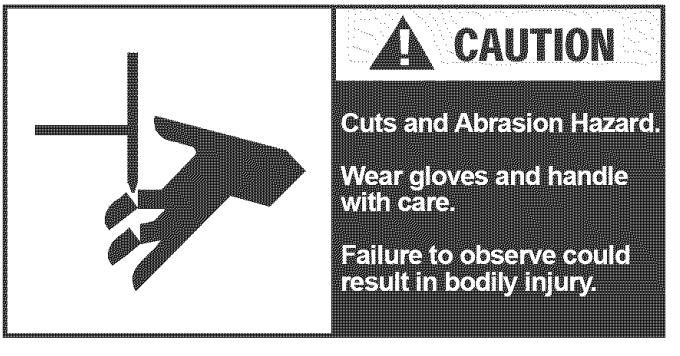
Warning Label

White lettering on a black background except the word **WARNING** which is black with an orange background.



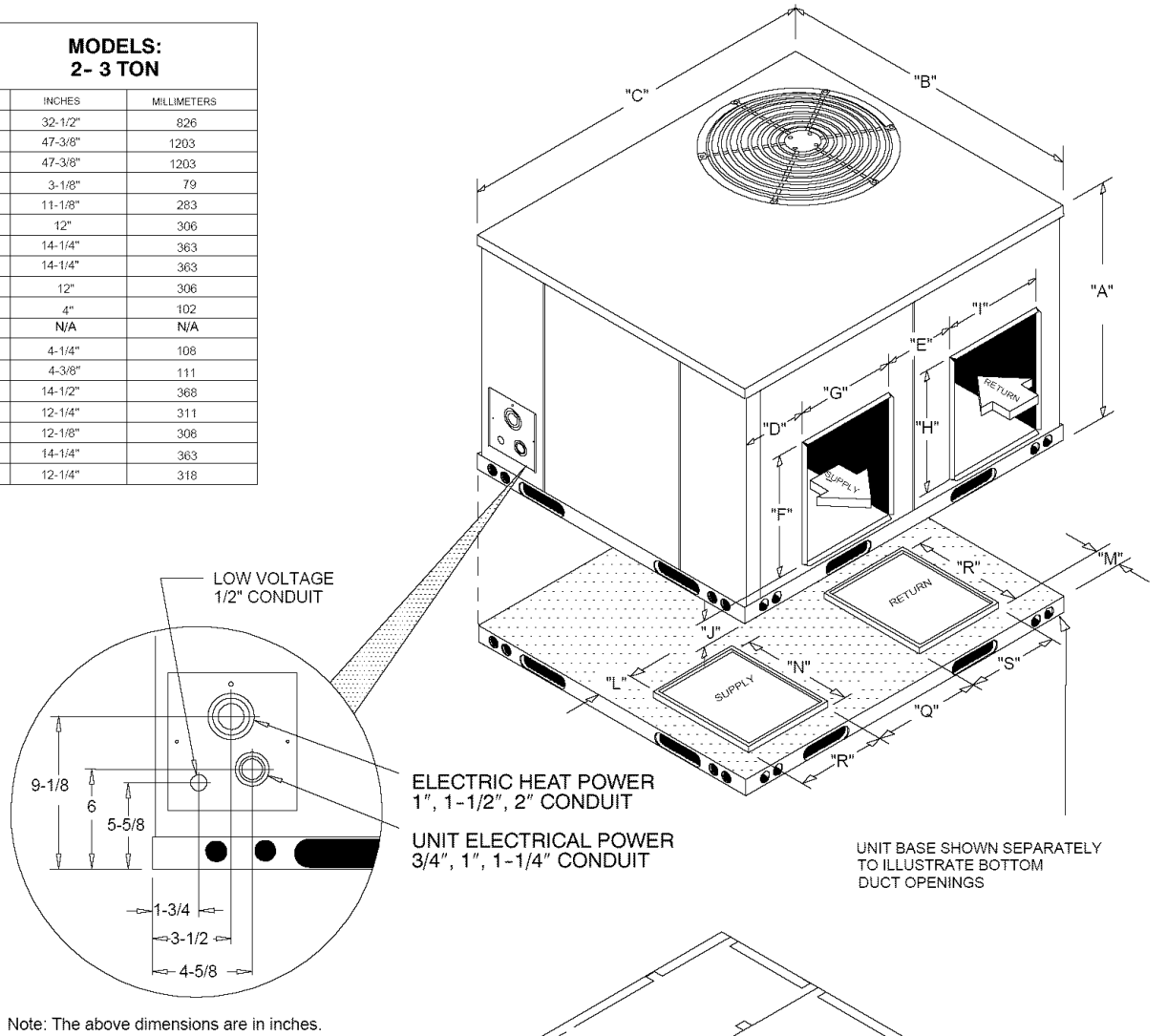
Caution Label

White lettering on a black background except the word **CAUTION** which is black with a yellow background.



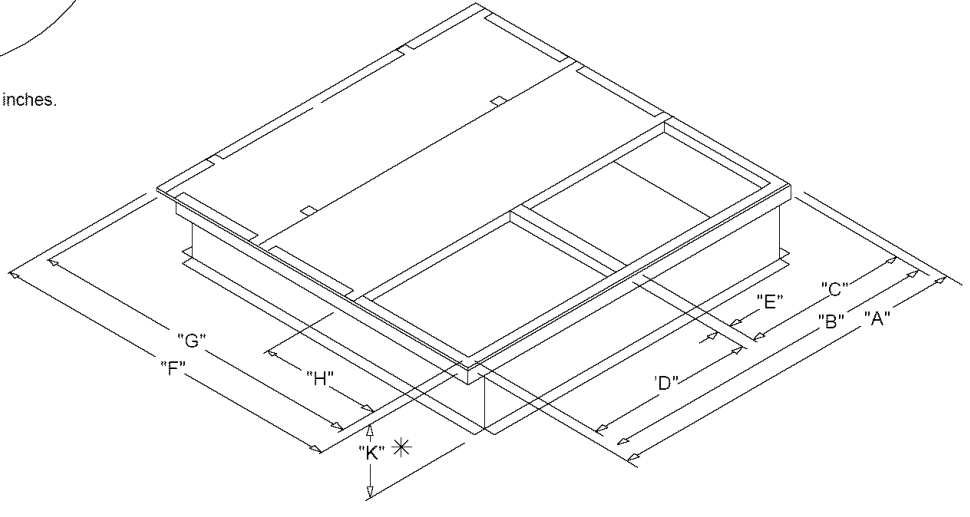
2. Unit Dimensions

MODELS: 2- 3 TON		
DIM.	INCHES	MILLIMETERS
A	32-1/2"	826
B	47-3/8"	1203
C	47-3/8"	1203
D	3-1/8"	79
E	11-1/8"	283
F	12"	306
G	14-1/4"	363
H	14-1/4"	363
I	12"	306
J	4"	102
K	N/A	N/A
L	4-1/4"	108
M	4-3/8"	111
N	14-1/2"	368
P	12-1/4"	311
Q	12-1/8"	308
R	14-1/4"	363
S	12-1/4"	318



Note: The above dimensions are in inches.

ROOF CURB MODELS: 2- 3 TON		
DIM.	INCHES	MILLIMETERS
A	42-3/4"	1086
B	39-3/4"	1010
C	18"	457
D	18"	457
E	3-3/4"	95
F	42-3/4"	1086
G	39-3/4"	1010
H	18"	457
K ✳	14"	356



* Roof curbs are also available in 8" (203mm) and 24" (610mm) heights (K dimension).

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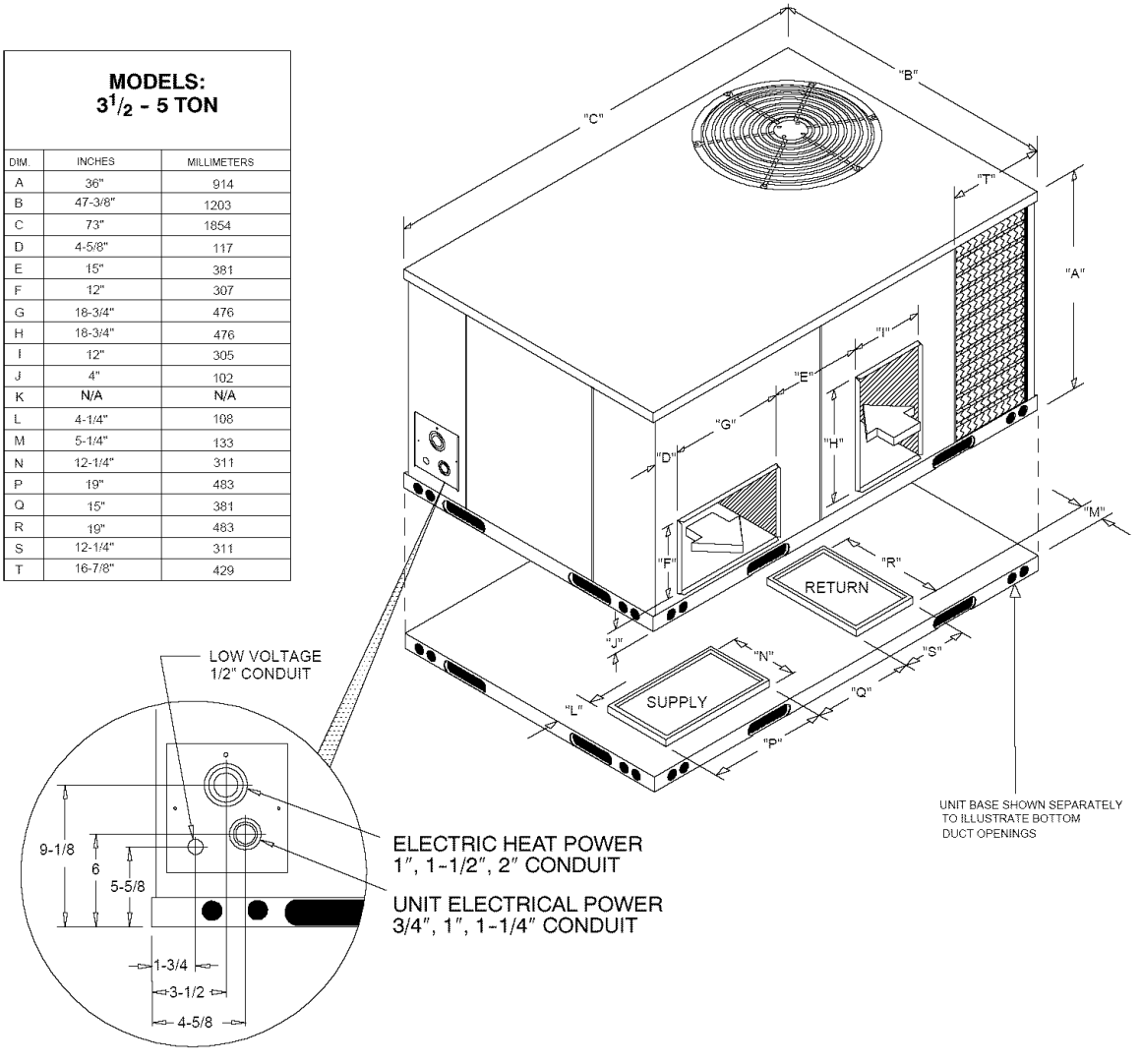
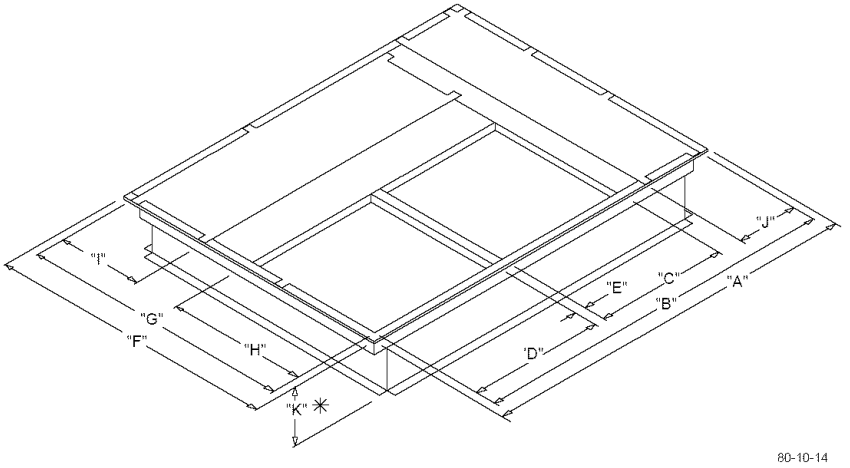
UNIT DIMENSIONS

MODELS: 3 1/2 - 5 TON		
DIM.	INCHES	MILLIMETERS
A	36"	914
B	47-3/8"	1203
C	73"	1854
D	4-5/8"	117
E	15"	381
F	12"	307
G	18-3/4"	476
H	18-3/4"	476
I	12"	305
J	4"	102
K	N/A	N/A
L	4-1/4"	108
M	5-1/4"	133
N	12-1/4"	311
P	19"	483
Q	15"	381
R	19"	483
S	12-1/4"	311
T	16-7/8"	429



Note: Above dimensions are in inches.

ROOF CURB MODELS: 3 1/2 - 5 TON		
DIM.	INCHES	MILLIMETERS
A	67-3/4"	1721
B	64-3/4"	1645
C	23"	584
D	23"	584
E	2-1/2"	64
F	42-3/4"	1086
G	39-3/4"	1010
H	23"	584
I	12"	305
J	12"	305
K ✳	14"	356



80-10-14

* Roof curbs are also available in 8" (203mm) and 24" (610mm) heights (K dimension).

3. Safe Installation Requirements

WARNING

Installation or repairs made by unqualified persons can result in hazards to you and others. Installation MUST conform with local building codes or, in the absence of local codes, with the National Electrical Code NFPA70-1990 or current edition or in Canada CSA C22.1 - Canadian Electrical Code Part 1 or current edition.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.

Failure to carefully read and follow all instructions in this manual can result in unit malfunction, property damage, personal injury and/or death.

- Seal supply and return air ducts.
- Check to see that filters are installed correctly and are the proper type and size.

NOTE: It is the personal responsibility and obligation of the customer to contact a qualified installer to ensure that the installation is adequate and conforms to governing codes and ordinances.

4. Locating The Unit

The unit is designed for outdoor installation only. The unit may be installed on a concrete slab (or other adequate platform) at ground level, or on a rooftop with an adequate platform or a roof curb. Typical installations are shown in **FIGURE 3** through **FIGURE 5**.

Avoid installations under roof overhangs without guttering. Water draining from the roof onto the unit could produce excessive noise, and may cause ice to build up on coil or fan.

Roof top installations are acceptable providing the roof will support the unit and provisions are made for water drainage and for the noise or vibration through the structure.

Access Panels

CAUTION

Unit will NOT operate properly without all access panels in place.
Unit MUST NOT be moved unless all access panels are in place.

See **FIGURE 1** on page 5 for a general view of unit and location of access panels.

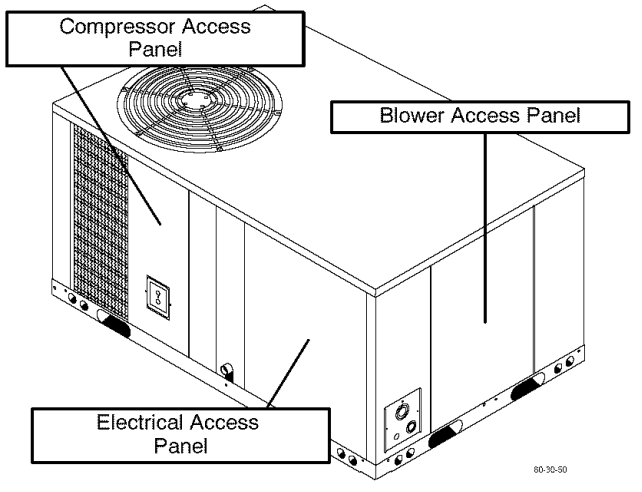
Clearances

The location **MUST** allow for minimum clearances and should not be adjacent to a patio or other area where the unit's operating sound level might be objectionable. Local codes **MUST** be observed.

Minimum clearances, as specified below and in **FIGURE 2**, **MUST** be maintained from adjacent structures to provide adequate air circulation and room for service personnel.

While minimum clearances are acceptable for safety reasons, they may not allow adequate air circulation around the unit for proper operation. Whenever possible, it is desirable to allow additional clearance, especially around the condenser inlet and discharge openings.

FIGURE 1 Access Panels



Do **NOT** install the unit in a location that will permit discharged air from the condenser to recirculate to the condenser inlet.

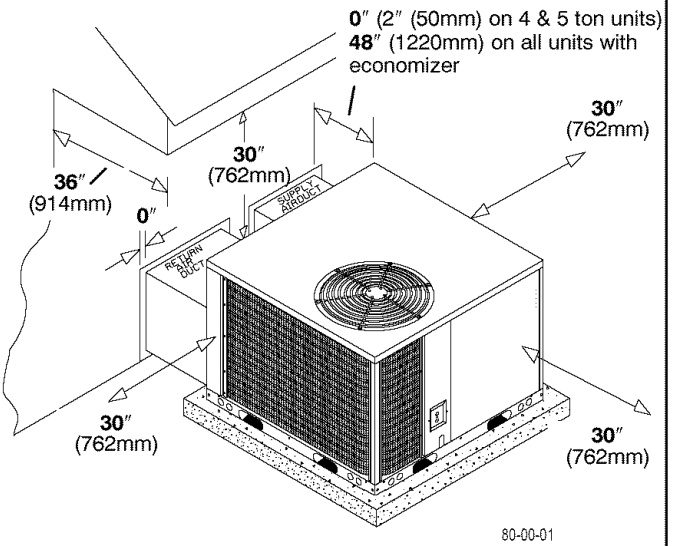
CAUTION

Do NOT operate unit in a corrosive atmosphere containing chlorine, fluorine, or any other corrosive chemicals.

Minimum Clearances to Combustible Construction

Supply and Return Air Ducts ..... 0″
Duct Connection Side (no economizer)
..... 0″ (2″ (50mm) on 4 & 5 ton models)
Duct Connection Side (with economizer) . 48″ (1220mm)
Compressor Access Panel Side ..... 30″ (762mm)
Blower Access Panel Side ..... 30″ (762mm)
Electrical Access Panel Side ..... 30″ (762mm)
Clearance between 3 Ft. Overhang
and Top of Unit ..... 30″ (762mm)
Combustible Base
(Wood or Class A, B or C
roof covering material) ..... 0″

FIGURE 2 Minimum Clearances (Typical 2 to 3 ton unit shown)



Installation

CAUTION

Unit will NOT operate properly unless it is installed level front to rear and side to side.

The slope MUST NOT be greater than $^1/_8$″ per foot (10mm per meter). For side to side leveling, the control box side MUST always be lower.

Ground Level Installation

Ground level platform requirements:

- The unit **MUST** be situated to provide safe access for servicing.
- Platform may be made of either concrete or pressure treated wood and **MUST** be level and strong enough to support unit weight.
- Position platform separate from building foundation.
- Install in well-drained area, with top surface of platform above grade level and above the average winter snow levels to prevent coil blockage.
- Platform **MUST** be high enough to allow for proper condensate trap installation and drainage. See **Figure 8** and associated text for more information about condensate drainage.

See **FIGURE 3** for illustration of a typical ground level installation.

Rooftop Installation

Rooftop platform requirements:

- The unit **MUST** be situated to provide safe access for servicing.
- The existing roof structure **MUST** be adequate to support the weight of the unit or the roof **MUST** be reinforced.

  Check the weight of the unit in relation to the roof structure and local building codes or ordinances and reinforce roof structure if necessary. See **NO TAG** on the back cover of this manual for unit weights and corner weights.
- Support for the unit **MUST** be level and strong enough to carry unit weight. The support may consist of a platform or a combination of platform and roof beams or curb.

  The platform may be constructed of pressure treated wood and may be covered with Class A, B or C roof covering.
- The unit MUST be installed above average snowfall levels to prevent coil blockage and to provide adequate drainage for water created in the defrost mode.
- Platform **MUST** allow for proper condensate trap installation and drainage. See **FIGURE 8** and associated text for more information about condensate drainage.
- See *Hoisting* section below for hoisting instructions.

See **FIGURE 4** and **FIGURE 5** for illustrations of typical rooftop installations.

Hoisting

NOTE: All access panels **MUST** be secured in place before hoisting.

The unit should be hoisted with two lifting slings. Attach the slings to rigging shackles that have been hooked through holes in the base rail.

Two spreader bars **MUST** be placed on top of the unit to protect the unit from damage from the pressure exerted by the slings. Make sure that all equipment is adequate to handle the weight of the unit and that the slings will not allow the unit to shift.

Refer to **FIGURE 19** on the back cover of this manual for illustrated rigging instructions and weight chart.

FIGURE 3 **Typical Installation (Ground Level) 2-3 ton unit shown**

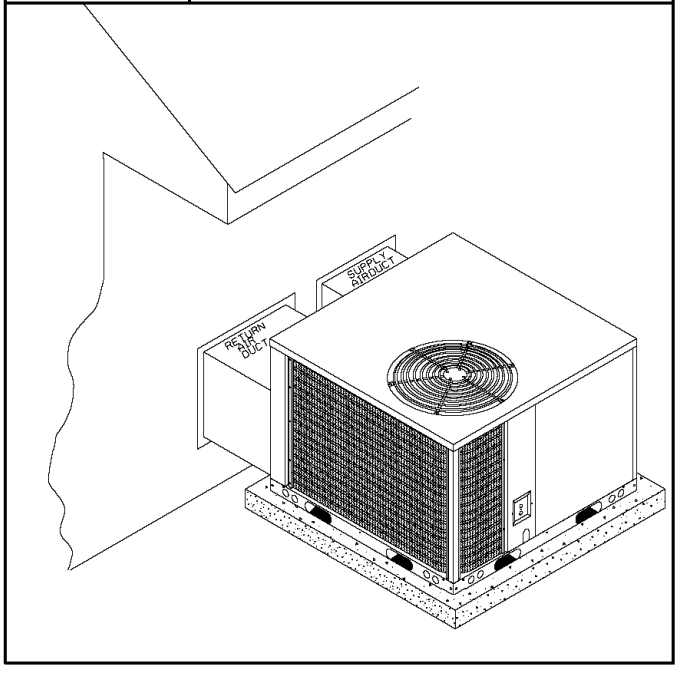


FIGURE 4	Typical Installation (Roof Curb) 2-3 ton unit shown

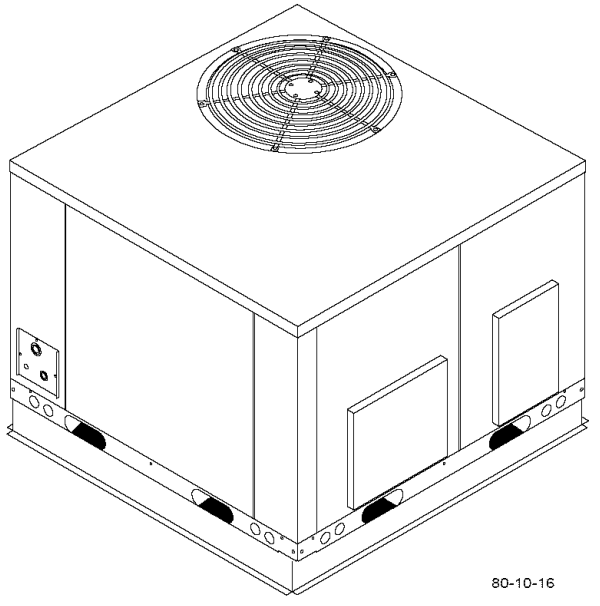
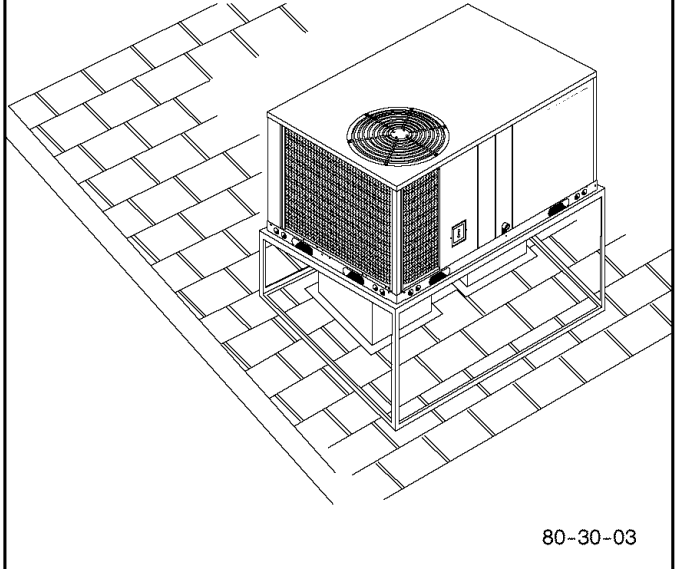


FIGURE 5	Typical Installation (Pitched Roof) $3^1/_2$-5 ton unit shown



Downflow Conversion

These units are shipped ready for horizontal operation but are adaptable to downflow use. To convert to downflow use, follow these steps:

1. Remove the blockoff plates found in the return air compartment and the supply air compartment. See **FIGURE 6** and **FIGURE 7.**

NOTE: Blockoff plate in the supply air compartment only contains one screw. If reinstalling plate, back part of plate **MUST** fit into mating dimples of downflow flange. To reinstall, slant plate into dimples, then put plate into position and fasten with screw.

2. Install the removed plates on the horizontal return and supply air openings.

NOTE: It is the installer's personal responsibility to follow all local codes and ordinances and instructions contained herein, as well as instructions included with accessory items when installing unit. It is the installer's personal responsibility to locate directions for installation of this unit and any or all accessories. Manufacturer is **NOT** responsible for improper installation practices.

3. Position and install appropriate roof curb. (See **Page 2** or **Page 3** for appropriate curb to use with your model.)
4. Install unit on roof curb.

FIGURE 6	Blockoff Plate (Return Air Compartment)

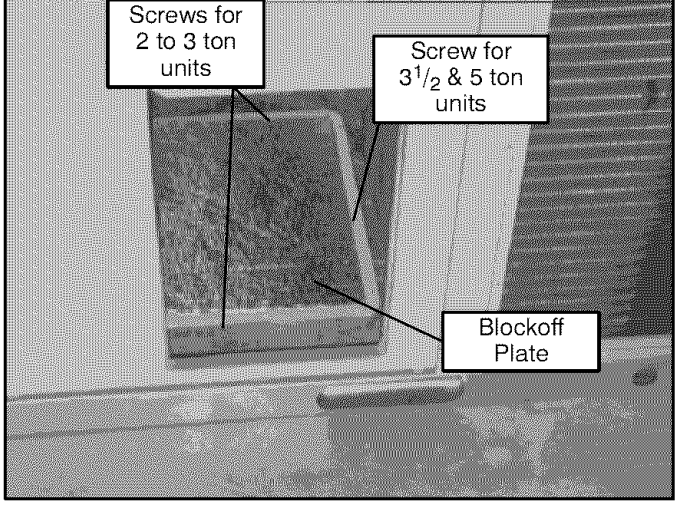
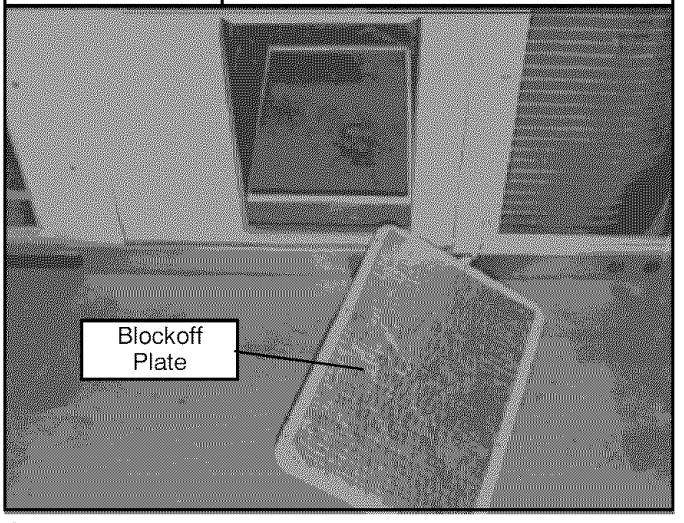


FIGURE 7 Blockoff Plate Removed (Return Air Compartment)



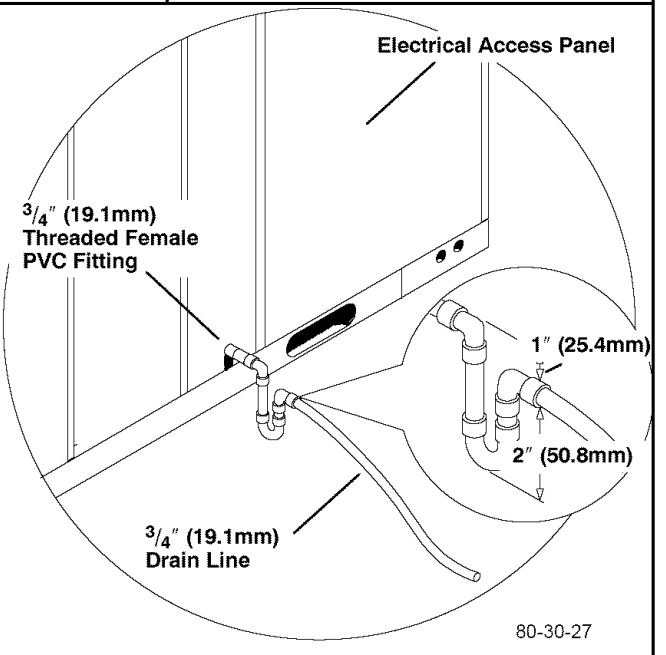
Condensate Drain

The condensate drain outlet is a $^{3}/_{4}$″ (19.1mm) threaded female PVC connection located at the bottom of the unit to the left of the electrical access panel (see **FIGURE 8**). Condensate drain outlet **MUST** be held with wrench when installing trap and drain line.

The circulating blower and the condenser fan create a negative pressure on the condensate drain line that will prevent the condensate from draining properly without a trap. To combat this negative pressure, a field supplied condensate trap that will allow a standing column of water of at least 2″ (50.8mm) **MUST** be installed. Top of outlet from trap **MUST** be at least 1″ (25.4mm) below top of outlet from unit. **Install the trap as near to the unit as possible for proper drainage.**

A $^{3}/_{4}$″ (19.1mm) drain line **MUST** be installed if required by local codes or if location of unit requires it. Run the drain line to an open drain or other suitable disposal point.

FIGURE 8 Condensate Drain Information*



*** Condensate trap MUST be installed.**

5. Electrical Wiring

WARNING

Electrical shock hazard.

Disconnect power at fuse box or service panel before making any electrical connections.

Unit MUST be grounded to electrical service panel.

Failure to follow this warning can result in property damage, personal injury, and/or death.

NOTE: All electrical work **MUST** conform with the requirements of local codes and ordinances and in the United States with National Electrical Code ANSI/NFPA 70-1990 (or current edition) and in Canada with CSA C22.1 - Canadian Electrical Code Part 1 (or current edition). Provide line voltage power supply from a separate fused circuit with a disconnect switch (when required) located within sight of the unit. Supply voltage, amperage, wire, fuse and disconnect switch sizes **MUST** conform with specifications in the *Parts List* and on the unit rating plate.

Wiring **MUST** be protected from possible mechanical damage and **MUST NOT** interfere with removal of access panels, filters, etc.

All exposed wiring and connections **MUST** be made with weatherproof cable or wire unless installed in conduit.

Low Voltage Wiring

Low voltage connections are made on the low voltage terminal board inside the electrical control compartment (see **FIGURE 11**). For access, remove the electrical control access panel (see **FIGURE 1**).

Refer to the Parts List for the connection wiring diagram for the applicable model and to the instructions included with the thermostat.

Route low voltage wires through the port located at the bottom left corner of the blower access panel side of the unit. Route low voltage wires behind unit cornerpost, through the wire clip provided, and up to the low voltage terminal board.

NOTE: If an Electric Heat Accessory is installed, see the Electric Heat Accessory *Installation Manual* for low voltage connections. If an economizer is installed, see the following section, *Low Voltage Wiring With Economizer Option*.

Low Voltage Wiring With Economizer Option

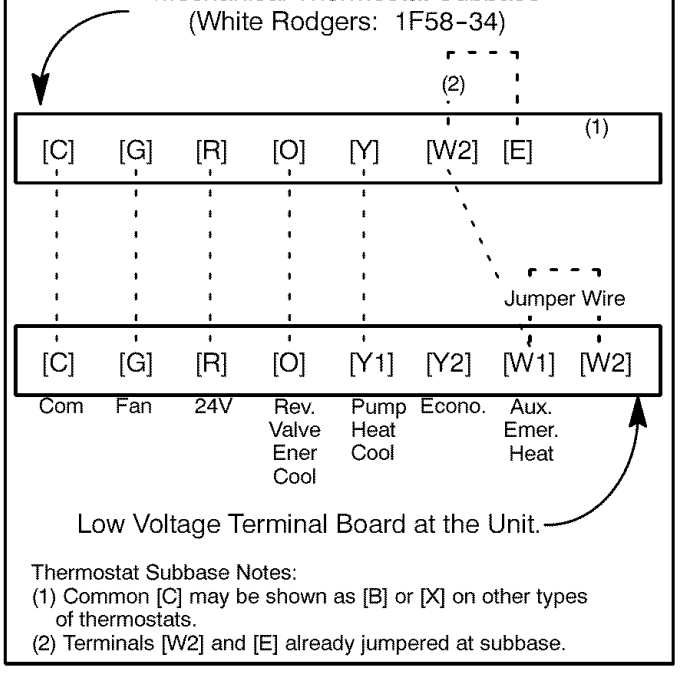
Same as the above *Low Voltage Wiring* section except refer to the connection wiring diagram supplied with the economizer.

NOTE: The jumper wire on the heat/cool relay must be disconnected from terminal number 3 and reconnected to the economizer wire terminated with an insulated male quick connect. See the installation/operation manual accompanying the economizer for more information.

Thermostat

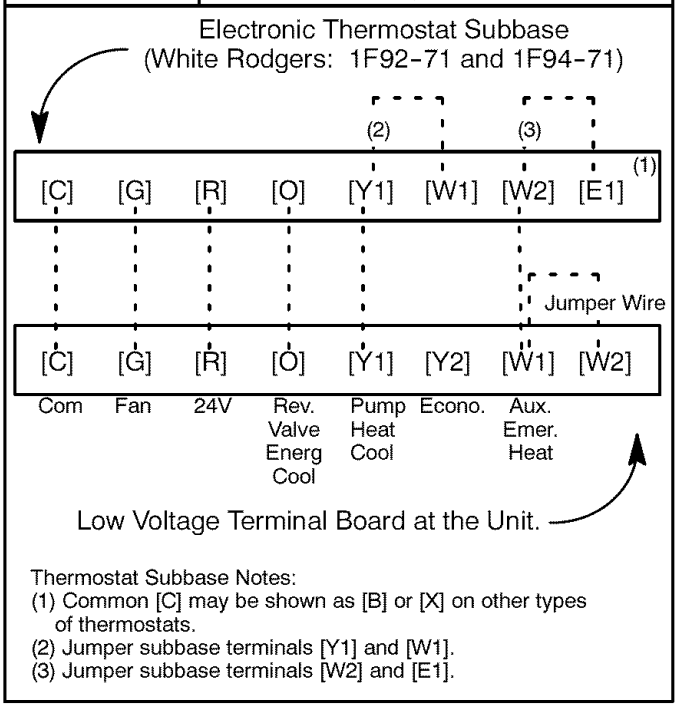
The location of the thermostat has an important effect on the operation of the unit. **FIGURE 9** and **FIGURE 10** show typical wiring connections for both manual and electronic thermostats. **FOLLOW THE INSTRUCTIONS INCLUDED WITH THE THERMOSTAT FOR CORRECT LOCATION, MOUNTING AND WIRING** .

FIGURE 9 | **Mechnical Thermostat Low Voltage Connection Diagram**



Thermostat Subbase Notes:
(1) Common [C] may be shown as [B] or [X] on other types of thermostats.
(2) Terminals [W2] and [E] already jumpered at subbase.

FIGURE 10 **ElectronicThermostat Low Voltage Connection Diagram**



Thermostat Subbase Notes:
(1) Common [C] may be shown as [B] or [X] on other types of thermostats.
(2) Jumper subbase terminals [Y1] and [W1].
(3) Jumper subbase terminals [W2] and [E1].

Unit Without Economizer

A field supplied two stage heating-single stage cooling heat pump thermostat is required.

Unit With Economizer

A field supplied two stage cooling-two stage heating thermostat is recommended for use with an economizer. If a single stage cooling thermostat is used, the compressor will not start if the economizer can not satisfy the demand for cooling.

Ground Connections

A ground lug is installed on the control plate for the ground connection (see **FIGURE 11**). Use a copper conductor of the appropriate size from the unit to a grounded connection in the electrical service panel or to a properly driven and electrically grounded ground rod. See warning above.

Line Voltage Wiring

Do **NOT** complete line voltage connections until unit is permanently grounded. All line voltage connections and the ground connection **MUST** be made with copper wire.

Connections for line voltage are made on the unit electrical control plate (see **FIGURE 11**). For access, remove the electrical access panel (see **FIGURE 1**).

Refer to applicable wiring diagram in the *Parts List*. Complete the line service connections to the contactor 'L' terminals on the electrical control plate. Check all screw terminals to ensure they are tight.

NOTE: If an Electric Heat Accessory is installed, refer to the Electric Heat Accessory *Installation Manual* to determine line voltage connections. The Electric Heat Accessory mounts inside the unit. Field supplied line voltage wires for the Electric Heat Accessory (separate from the field supplied line voltage wires to the unit) connect to the circuit breaker(s) in the Electric Heat Accessory.

Converting 230V Units to 208V

To convert 230V units to 208V:

1. Turn electric power **OFF**.
2. Remove the electrical access panel.
3. Locate the 24V control transformer.
4. Remove wires from the terminal labeled "240V" on the 24V control transformer and reconnect them to the 208V terminal of the 24V control transformer.
5. Replace the electrical access panel.

Field Installed Equipment

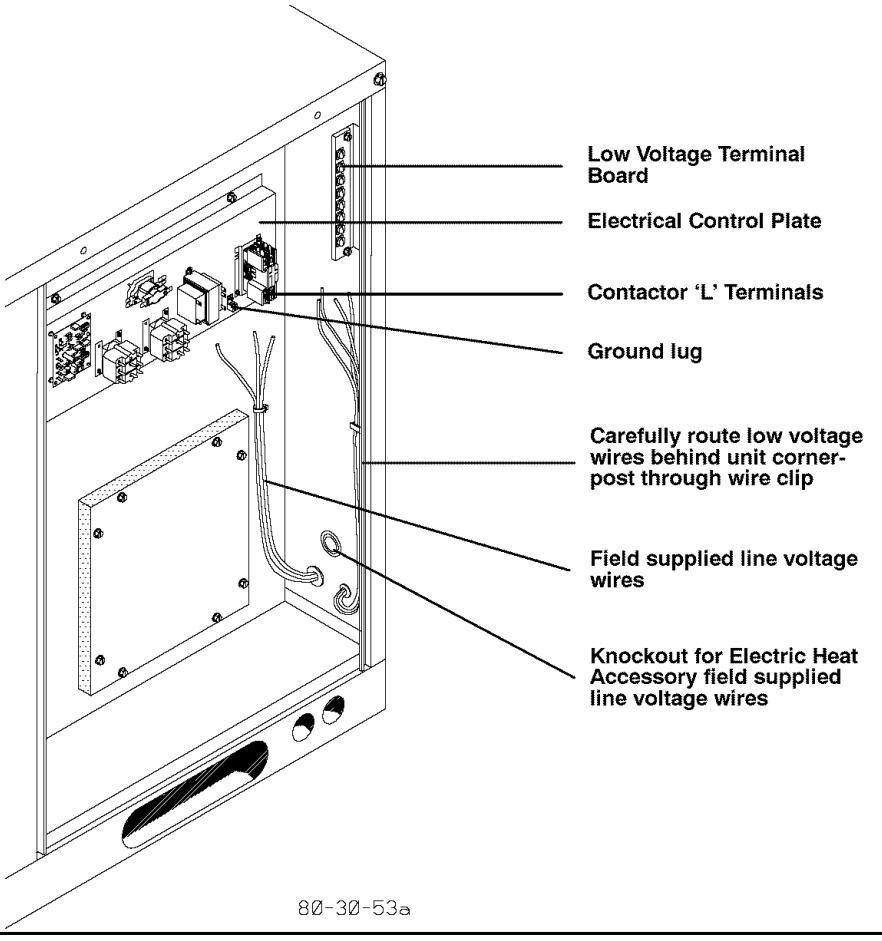
Wiring to be done in the field between the unit and other devices, or between separate devices which are field installed and located, **MUST NOT** exceed the temperature limitations for type T wire and **MUST** be installed according to the manufacturer's instructions for the devices.

Final Electrical Check

Make a final wiring check to be sure system is correctly wired. Inspect field installed wiring and the routing to ensure that rubbing or chafing due to vibration will not occur.

NOTE: Wiring **MUST** be installed so it is protected from possible mechanical damage.

FIGURE 11 Typical Wiring Installation



6. Air Distribution System

For airflow data (blower performance data, blower speed tap settings, filter sizes, etc.) see the *Parts List*.

Ductwork

NOTE: The total heat gain/heat loss from the structure as expressed in total Btu/hr **MUST** be calculated by manufacturer's method or in accordance with "A.S.H.R.A.E. Guide" or "Manual J - Load Calculations" published by the Air Conditioning Contractors of America or in Canada "H.R.A.I. Residential Heating and Cooling Load Calculation Manual." **The total heat gain calculated should be equal to or less than the cooling capacity output** based on D.O.E. test procedures, steady state efficiency times input.

Ductwork, supply registers, and return air grilles **MUST** be designed and sized to handle the **unit's cooling air volume** requirements. If the unit is connected to an existing system, the ductwork **MUST** be checked to make sure it is adequate. Extra runs or larger duct sizes may have to be installed.

Maximum recommended velocity in trunk ducts is 1000 feet per minute (5.08m/s). Velocity in branches should not exceed 800 feet per minute (4.06m/s). Refer to the *Parts List* for unit air volume requirements and system sizing recommendations.

NOTE: Ductwork sizing affects temperature rise and cooling temperature differential. Be sure to properly size ductwork to the capacity and airflow characteristics of your unit. Failure to do so can affect limit controls, compressors, motors, and other components and will lead to premature failure of components. This will also adversely affect day to day unit performance.

Refer to unit rating plate for proper Electric Heat Accessory sizing and see the *Temperature Rise Check* section in the Electric Heat Accessory *Installation Instructions*.

Ductwork Insulation

It is recommended that ductwork installed outdoors have a minimum of 2″ (51mm) of fiberglass insulation and be covered by a weatherproof vapor barrier that is protected against damage. Caulking and flashings, or other means adequate to provide a permanent weather seal, must be used.

It is recommended that ductwork installed in attics or other areas exposed to outdoor temperatures have a minimum of 2″ (51mm) fiberglass insulation and have an indoor type vapor barrier.

Ductwork Connections

The use of flexible, **non-combustible** connectors between main trunk ducts and supply and return air plenums is recommended to minimize vibration transmission .

NOTE: Connect supply and return air plenums to unit in a manner that will allow the top of the unit to be removed without removing plenums. Plenums **MUST** be individually sealed to unit casing. Ducts **MUST** be terminated inside structure.

Filters

All return air **MUST** pass through a filter before entering the unit. An electronic air cleaner, optional filter racks or other accessible filter arrangements **MUST** be installed in the *return* air ductwork. Minimum recommended filter areas are listed in the *Parts List* and are based on a velocity of 300 ft/min (1.2m/s) for disposable filters and 500 ft/min (2.54m/s) for washable high velocity filters.

CAUTION

Do NOT operate the unit without all filters in place.

7. Economizer Accessory

NOTE: For installation and wiring of economizer see"Low Voltage Wiring of Economizer Option" (pg.10).

The purpose of an economizer is to:

- Provide cool outdoor air to the conditioned space during the cooling cycle to minimize the use of compressors.
- Bring outdoor air into the conditioned space to meet minimum ventilation air requirements whenever the circulation blower is running.

Theory of Operation

The economizer has two sets of dampers that are mechanically linked together. The outdoor air dampers regulate the intake of outdoor air and the return air dampers regulate the flow of return air (see **FIGURE 12**). When the outdoor air dampers modulate open, the linkage causes the return air dampers to modulate closed. A barometric relief damper is installed in the return air side of the system. It relieves any positive pressure in the unit created by the economizer.

The economizer is controlled by a logic module which field connects to the unit controls through a harness plug. The logic module also controls the compressor staging based on the thermostat input.

The minimum opening position of the outdoor air dampers is field adjustable. It is set on the logic module of modulating economizers or on the actuator motor of three-position economizers.

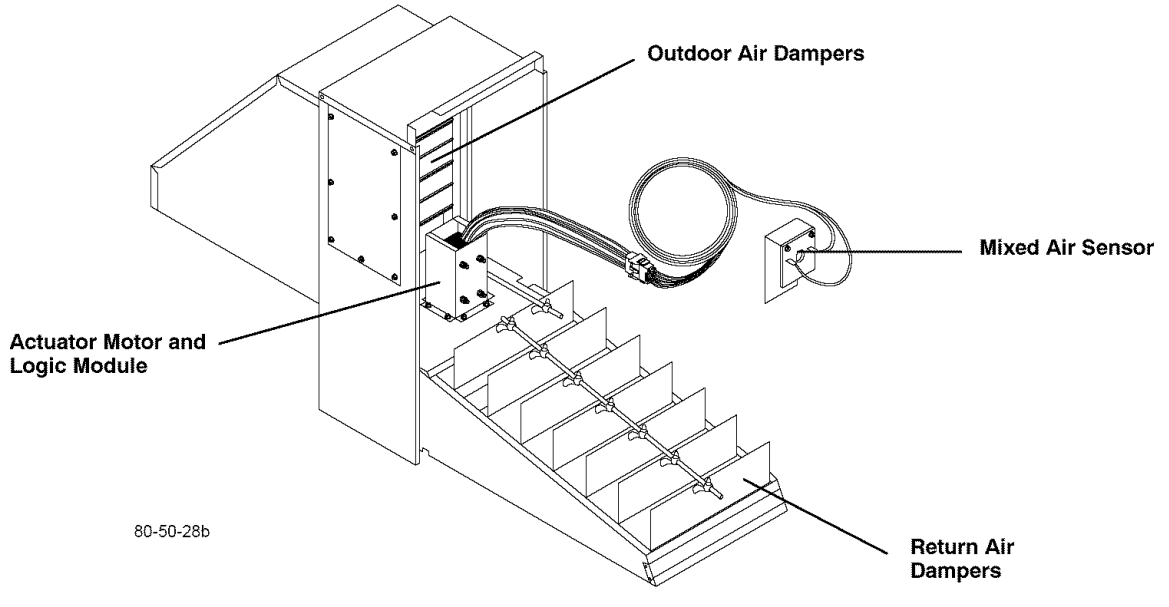
The outdoor air enthalpy sensor is factory installed on the outdoor air dampers. The enthalpy change-over point is adjustable on the logic module.

A mixed air sensor is field installed in the blower inlet. The mixed air sensor keeps the mixed air above 56°F (13.3°C). See the economizer installation instructions for the location of the mixed air sensor.

A positive pressure is created in the building when the outdoor air dampers open and the return dampers close. This pressure must be vented or the air will not circulate properly. This is the function of the barometric relief dampers. A positive pressure forces the passive exhaust dampers to swing open.

The outdoor air dampers open to the mininum position for outside air whenever the circulation blower is ON in the cooling or heating mode.

FIGURE 12 **Typical Downflow Economizer**



Sequence of Operation

NOTE: For correct wiring to the low voltage terminal board, see the connection wiring diagram in the economizer's documentation and page 10 of this manual.

Cooling Mode

When a field supplied two stage thermostat is in the FAN ON position:

1. The outdoor air dampers will open to the minimum position with **R** & **G** energized.
2. On the thermostat's call for cooling, the thermostat completes Circuit 1 between thermostat terminals **R, G, O** and **Y1** for first stage cooling.

   If the economizer's outdoor air enthalpy sensor determines that the outdoor air conditions are *below* the setting for economizer operation, the outdoor air dampers will modulate open and the return air dampers will modulate closed.
3. The mixed air sensor at the blower inlet modulates the economizer dampers to prevent the mixed air from falling below 56°F (13.3°C). (Mixed air refers to return air after it combines with outdoor air from the economizer.) The mixed air sensor modulates the outdoor air dampers between the full open and minimum outdoor air positions.

   If the mixed air is not cold enough to maintain the conditioned space at the selected temperature, the thermostat will make **Y2** and call for second stage cooling by energizing the economizer logic module. This energizes the **Y1** anti-cycle delay timer and contactor **C1** which starts the condenser fan and the compressor.
4. If the thermostat is still calling for cooling and the economizer's outdoor air enthalpy sensor determines that the outdoor air conditions have risen *above* the setting for economizer operation:
   a. The economizer dampers will close to the minimum position for outdoor air and remain there.
   b. Contactor **C1** will remain energized and the compressor will continue to run.

Heating Mode

1. The outdoor air dampers will open to the minimum position with **R** & **G** energized.
2. The damper operates at minimum position with **R, G** & **Y1** energized; in heating operation **O** is de-energized. The dampers will not modulate based on the enthalpy changeover setpoint. Turn to the "D" setpoint and dampers will remain at the minimum position setting at high enthalpy conditions for outdoor air. Turn to the "A" setpoint and the dampers will remain at the minimum setting at low enthalpy conditions for outdoor air. This can be checked by putting a 1.2K ohm resistor across terminals **O** & + and then by adjusting the setpoint on the enthalpy setpoint changeover potentiometer. The compressor will run at the "D" setting: as the setting is moved to "A" the compressor will continue to run and the dampers will remain at minimum position. As the setting is changed from "A" to "D" the dampers will remain at minimum position and the compressor will continue to run.
3. The minimum damper position setting can be set by adjusting the setting damper position potentiometer. This can be set so that the dampers will fully close for a minimum setting if required.
4. The economizer can be set at a minimum damper position in heating. The economizer will not modulate in the heating mode.

NOTE: For residential applications, it is recommended that the minimum damper position be set to fully closed position unless fresh air requirements in the heating mode are necessary.

8. Start-up Procedures

WARNING

Electrical shock hazard.

Use extreme care during all of the following checks and procedures.

Make sure electric power is turned OFF as instructed in appropriate steps.

Failure to follow this warning can result in property damage, personal injury, and/or death.

Circulating Air Blower

Determining Blower Speed

1. Turn electric power **OFF**.
2. From the system design, determine the external static pressure (ESP) for the supply ducts, return ducts and registers, diffusers, grilles, dampers, heaters and filters.
3. To your system ESP determined in **Step 2**, add 0.05 In. W.C. for a wet coil.
4. From the system design, determine the desired cooling airflow in cubic feet per minute (CFM).
5. Locate the unit's Blower Performance Data table in the tech data sheet for the unit's voltage. (The tech data sheet is attached to the inside of the electrical access panel and is also published in the *Parts List*.) From the table, determine the speed tap the desired airflow requires.
6. See next section, *Speed Taps*, to set the blower motor speed terminal block (speed taps) determined in the following steps.

Speed Taps

After determining the required CFM and speed tap data from the tech data sheet, follow the steps below to change speeds if necessary.

NOTE: The yellow lead **MUST** always be connected to the speed tap block at the common quick connect terminal. The terminal is identified as **COM**. Also, this is the only lead which is $^{3}/_{16}$" wide. All other quick connects are $^{1}/_{4}$" wide.

Refer to **FIGURE 13** on **Page 18** and the unit's wiring diagram, which is attached to the inside of the electrical access panel and is also published in the *Parts List* for the desired speed tap to achieve the required CFM for the applicable model.

Cooling, Heating (Heat Pump) and Auxiliary Electric Strip Heat

NOTE: The cooling, heat pump and strip heat airflows are all on the same speed tap. The refrigerant system requires the same specific CFM for proper operation in the cooling and the heat pump mode. For this reason, cooling and heating airflow must be the same. DO NOT SPLITOUT INTO A COOLING SPEED AND HEATING SPEED.

Check Before Starting

1. Check that the blower motor speed terminal block is set to the proper speed. Refer to the unit wiring diagram and the Technical Labels in the *Parts List*.
2. Check to see that clean, properly sized field supplied air filters are installed in the return air duct.
3. Inspect the inside of the unit to be sure that all wires are in place and all tools, etc. are removed.
4. Replace all service access panels.

Check the unit's operation as outlined in the following instructions. If any unusual sparking, odors or noises are encountered, shut **OFF** electric power immediately. Recheck for wiring errors, or obstructions in or near blower motors.

Circulating Air Blower

1. Be sure electric power is **OFF**.
2. Set thermostat Heat-Cool selector to **OFF**.
3. Set thermostat fan switch to **AUTO**.
4. Turn electric power **ON**. Nothing should start running.
5. Set thermostat fan switch to **ON**. The circulating air blower should come **ON** after a 30 second delay.
6. Reset thermostat fan switch to **AUTO**. The circulating air blower should go **OFF** after a 30 second delay. Nothing should be running.
7. Turn electric power **OFF.**

Sequence of Operation

Cooling Mode: Energized (R,G,O,Y1) De-energized (N/A)

(a) When high and low voltage is initially applied to unit:

(1) **On a call for cooling.....:**
The compressor and condenser fan will have a delay on and will energize after 3 minutes. The evaporator blower motor will have a delay on and will energize after 30 seconds. The delay on for the compressor and the condenser fan can be by-passed by jumpering the test pins on the defrost board control.

(2) **When the cooling setpoint has been satisfied.....:**
The compressor and condenser fan will de-energize immediately. The evaporator blower motor will have a delay off and will de-energize after 30 seconds.

(b) When high and low voltage has been applied to unit for more than 3 minutes:

(1) **On a call for cooling.....:**
The compressor and condenser fan will energize immediately. The evaporator blower motor will have a delay on and will energize after 30 seconds.

(2) **When the cooling setpoint has been satisfied.....:**
The compressor and condenser fan will de-energize immediately. The evaporator blower motor will have a delay off and will de-energize after 30 seconds.

Heating Mode: Energized (R,G,Y1) De-energized (O)

(a) When high and low voltage is initially applied to unit:

(1) **On a call for heating.....:**
The compressor and condenser fan will have a delay on and will energize after 3 minutes. The evaporator blower motor will have a delay on and will energize after 30 seconds. The delay on for the compressor and the condenser fan can be by-passed by jumpering the test pins on the defrost board control.

(2) **When the heating setpoint has been satisfied.....:**
The compressor and condenser fan will de-energize immediately. The evaporator blower motor will have a delay off and will de-energize after 30 seconds.

(b) When high and low voltage has been applied to unit for more than 3 minutes

(1) **On a call for heating.....:**
The compressor and condenser fan will energize immediately. The evaporator blower motor will have a delay on and will energize after 30 seconds.

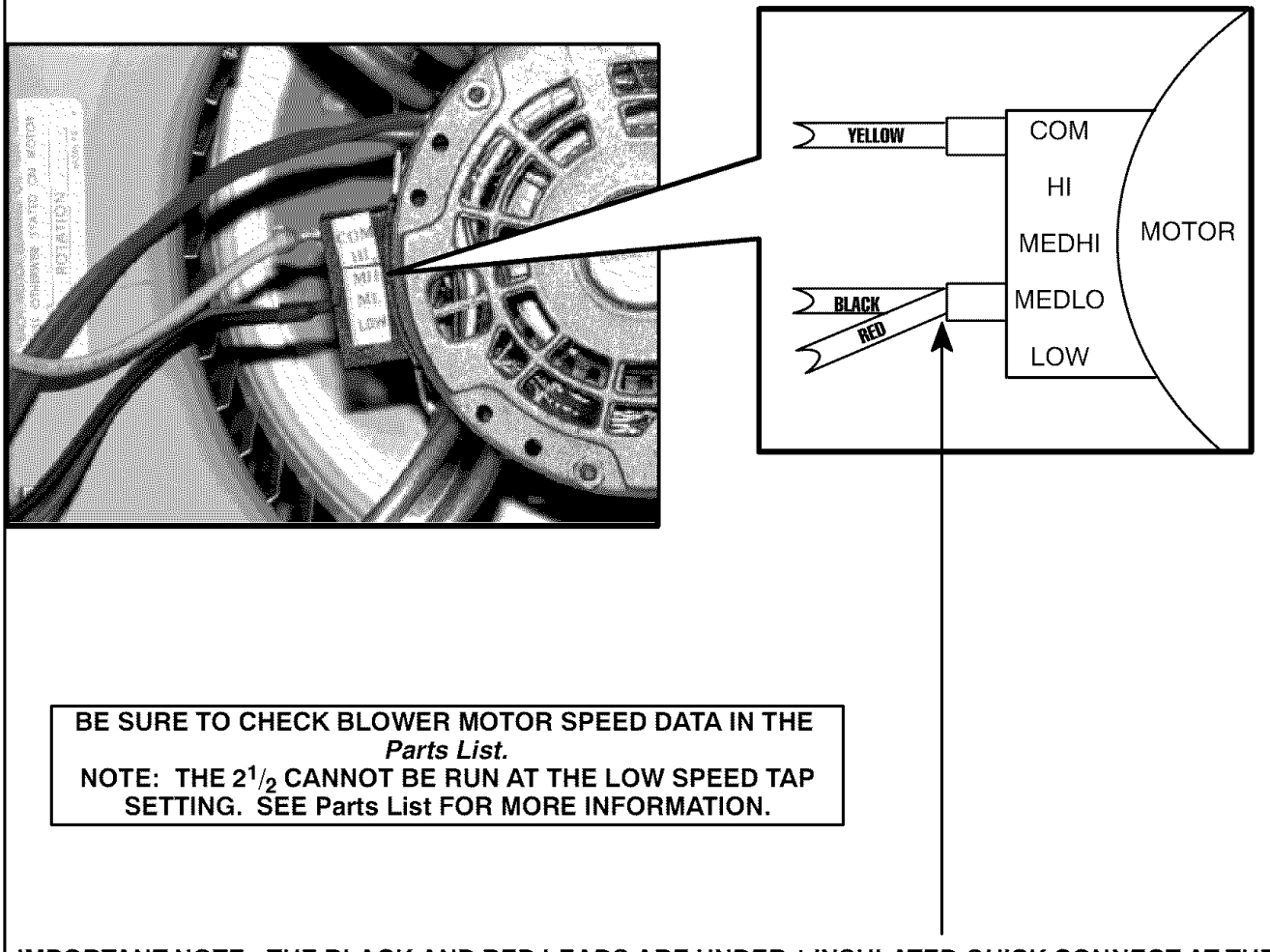
(2) **When the heating setpoint has been satisfied.....:**
The compressor and condenser fan will de-energize immediately. The evaporator blower motor will have a delay off and will de-energize after 30 seconds.

Defrost Mode:Energized (R,G,Y1) De-energized (O) Defrost Sensor Closed

(1) **On a call for defrost.....**
When the defrost sensor closes (this can be simulated by jumpering across reset & common on the defrost board control) in the heating mode,there is a 30,60 or 90 minute defrost on delay before the defrost mode begins. This delay is determined by the jumper connecting to T1,T2 or T3 on the defrost board. This delay can be by-passed by jumpering the test pins on the defrost board control (this reduces the delay from 30 minutes to 7 seconds, from 60 minutes to 14 seconds and from 90 minutes to 21 seconds). In the defrost mode the reversing valve will energize and the condenser fan will de-energize.

(2) **When defrost has been completed.....**
This condition will be maintained until the defrost sensor opens (this can be simulated by removing the jumper across reset & common on the defrost board control) or until the defrost mode operates for 10 minutes (or 2 seconds if test pins are jumpered), whichever comes first.

FIGURE 13 | Blower Motor Speed Taps (4-Speed Motors)



BE SURE TO CHECK BLOWER MOTOR SPEED DATA IN THE *Parts List.*
NOTE: THE $2^1/_2$ CANNOT BE RUN AT THE LOW SPEED TAP SETTING. SEE Parts List FOR MORE INFORMATION.

IMPORTANT NOTE: THE BLACK AND RED LEADS ARE UNDER 1 INSULATED QUICK CONNECT AT THE MOTOR TERMINAL BLOCK. THE RED LEAD IS FOR ELECTRIC HEAT ACCESSORY BLOWER INTERLOCK. THUS, THE COOLING/HEAT PUMP/ELECTRIC HEAT MOTOR SPEED TAP WILL ALWAYS BE ON ONE SPEED TAP. IF THE SPEED TAP IS ADJUSTED, THE COOLING/HEAT PUMP/ELECTRIC HEAT WILL ALL BE ADJUSTED TO THE SAME AIRFLOWS.

9. Operation

WARNING

Electrical shock hazard.

Turn OFF electric power supply at disconnect switch or service panel before removing any access or service panel from unit.

Failure to follow this warning can result in property damage, personal injury, and/or death.

Features

Scroll Anti-Cycle Timer

All single phase heat pumps with scroll compressors are equipped with a defrost control board which features an internal anti-short cycle timer that delays the start of the compressor in the event of a power interruption. This feature is to allow pressure equalization throughout the system and prevent possible reverse rotation of the scroll compressor.

Thermal Expansion Valves

The evaporator and condenser coil each have a Thermal Expansion Valve for refrigerant metering. All of the valves used on evaporator coils have internal check valves for reverse flow. The valves on the condenser coils may have internal or external check valves for reverse flow. There is also a strainer tube located just in front of each valve for contaminant protection, along with the system bi-flow driers.

Loss of Charge Pressure Switch

A low pressure switch on the liquid line (high side) has been installed to prevent system damage due to a loss of charge. The switch will open and de-energize the contactor if the high side pressure drops below the set point of the switch.

Defrost Control Time Interval Adjustment

WARNING

Electrical shock hazard.

Turn OFF electric power supply at disconnect switch or service panel before removing any access or service panel from unit.

Failure to follow this warning can result in property damage, personal injury, and/or death.

To adjust defrost interval:

1. Turn off all power to Heat Pump.
2. Remove control box cover.
3. Locate electronic defrost control board.
4. The Defrost Control Board has a jumper wire connected from W1 to T1, T2, or T3. To change the time interval, unplug the jumper wire at T1, T2, or T3 ONLY and connect it to terminal for desired time interval:
   T1 = 30 minutes, T2 = 60minutes, T3 = 90 minutes.

Cooling

Adjust thermostat setting to desired temperature and set thermostat Heat-Cool switch to **COOL**. The unit will come on and operate automatically under control of the thermostat. Close all doors and windows. The unit may run continuously for several hours or longer on the initial run because of residual heat and moisture in the house. This is normal for any air conditioning system.

CAUTION

Do NOT operate unit on cooling when the outdoor temperature is below 40°F (4.4°C). This is necessary to prevent possible damage to the compressor.

Turning The Unit Off

1. Set the thermostat selector switch to **OFF** and set the fan switch to **AUTO**. To restart, set thermostat selector switch to **COOL** and set thermostat to temperature desired.
2. To shut the unit down completely, turn electric power **OFF**.

Thermostat Fan Switch Operation

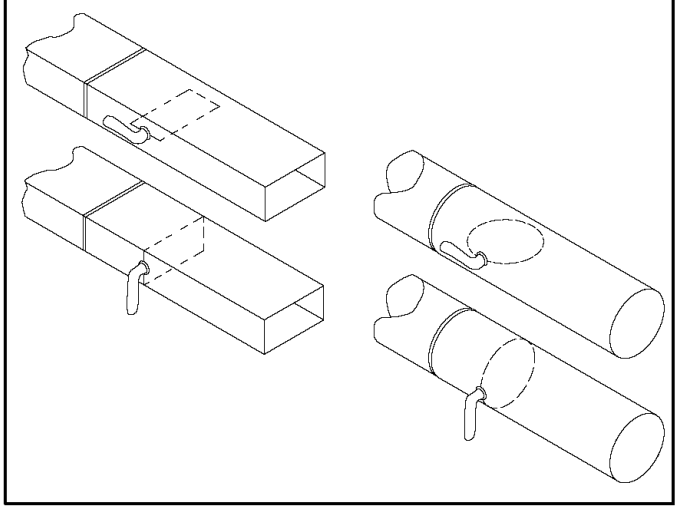
With the thermostat fan switch in the **ON** position, the circulating air blower will run continuously.

With the thermostat fan switch in the **AUTO** position, the circulating air blower will only run during a cooling or heating cycle and when the electric heat accessory is required if the electric heat accessory is installed.

Adjusting Room Temperatures

If the temperature in individual rooms is not as desired, balance the system by adjusting the dampers in the branch ducts. Adjust a little at a time and wait a day after each change to judge the effect. Once the dampers are adjusted for normal weather conditions, it is best to leave them that way. Compensate for temporary weather changes by adjusting the thermostat setting .

FIGURE 14 Typical Branch Duct Dampers



10. Maintenance

Air Filters, Condenser Coil and Condensate Drain Maintenance

Refer to Home Owners Manual supplied with your heat pump for information on filter sizes, condenser coil clearances from shrubbery and condensate drainage allowances.

CAUTION

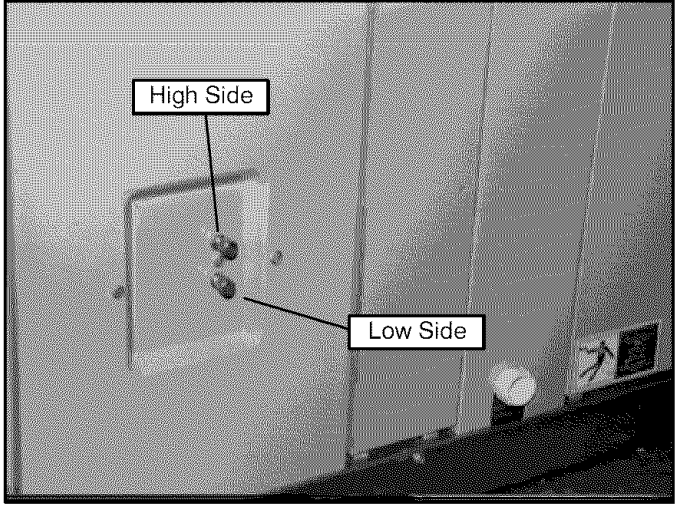
Do NOT operate unit without filters in place. Inspect filters monthly and clean and/or replace as needed.

Refrigeration Access Ports

This unit is equipped with refrigeration access ports mounted on the side of the unit. Refer to **FIGURE 15** for identification of ports.

This unit is also equipped with internal access ports on the suction and discharge tubing line which can be used for evacuation, pull down and recharging of the refrigeration system.

FIGURE 15 Typical Access Ports



Annual Maintenance and Inspection

WARNING

Electrical shock hazard.

Turn OFF electric power supply at disconnect switch or service panel before removing any access or service panel from unit.

Failure to follow this warning can result in property damage, personal injury, and/or death.

Condenser Fan Motor

CAUTION

Do NOT use 3 in 1 oil, penetrating oil, WD40 or similar oils to oil motor bearings.

Oil the condenser fan motor after five years of operation and every five years thereafter.

Use SAE I0W30 motor oil. To oil, remove the hole plugs from the motor end bells and add several drops (approximately 1/2 teaspoonful) of oil with a squeeze type, flexible tube oiler. Replace hole plugs after oiling. Do **NOT** over oil.

Clean the surrounding area and the condenser and evaporator coils. Use caution to avoid damage to coil fins. **Do not use an acid-based cleaner on coated fin material.**

Blower Motor Access

To remove the blower motor and/or the blower motor housing assembly, refer to **Method 1** and **Method 2** below.

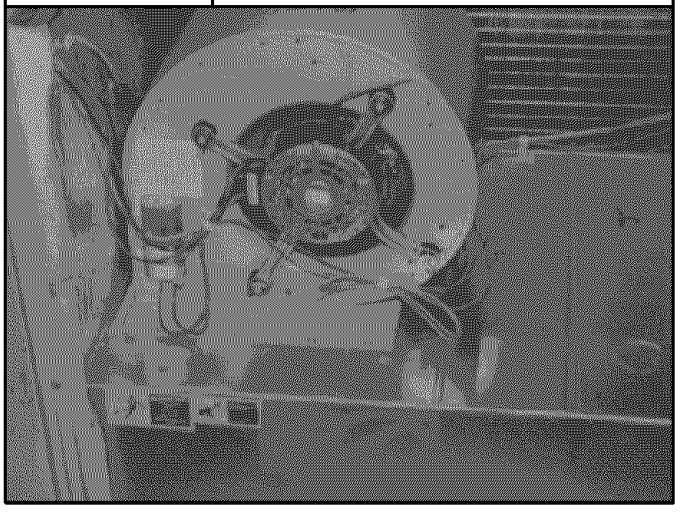
Refer to **FIGURE 16** for a view of blower motor and compartment.

Method 1 and Method 2

Method 1 allows the motor to be removed without removing the entire blower housing assembly. If it is desirable to remove the entire blower housing assembly to work on the motor, use Method 2.

With Method 2, the top of the unit is lifted up so that the entire blower housing assembly can be removed. Use Method 2 to replace or repair blower wheel, blower housing, or any unreachable components behind blower assembly.

FIGURE 16 Blower Motor and Housing



Blower Motor Removal Using Method 1

1. Turn electric power **OFF**.
2. Remove the blower access panel.
3. Remove the four screws securing the blower housing to blower deck. If the unit has a support bracket, remove the two screws securing the support bracket to the blower housing.
4. Slide entire housing toward you. This will allow easier access to the speed tap block, motor, and wires.
5. Reach behind blower housing and locate blower wheel set nut. Loosen blower wheel set nut.
6. Disconnect all wires from motor and remove the four pins securing the blower motor mounting cradle to blower housing.
7. Pull motor towards you and remove.
8. When finished, reassemble in reverse order.

Blower Motor and Blower Housing Removal Using Method 2

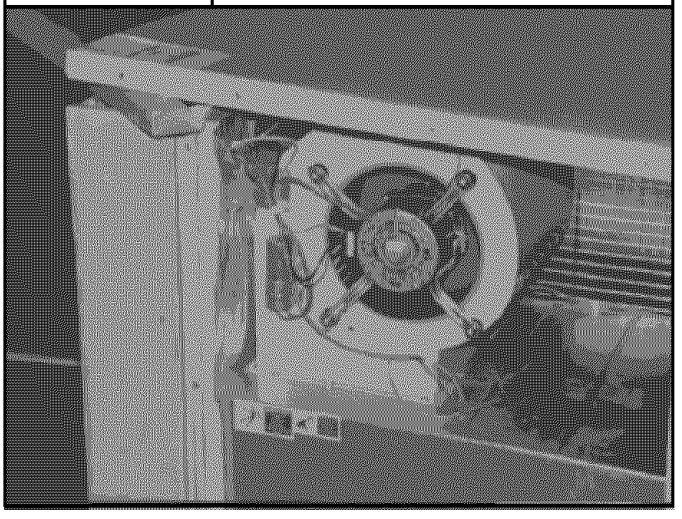
1. Turn electric power **OFF**.
2. Remove the blower access panel.
3. Remove four screws securing blower housing to blower deck. If the unit has a support bracket, remove the two screws securing the support bracket to the blower housing.
4. Slide entire housing toward you.
5. Remove screws securing corner and front of unit top (see **FIGURE 17**).

CAUTION

Do NOT place fingers between unit top and unit.

6. Raise corner of unit top at least 2″ (50.8mm). Place a sturdy brace at least 2″ (50.8mm) thick between corner and unit top. A 2X4 piece of wood is ideal for this.
7. Disconnect all wires from blower housing and slide blower housing out of unit.
8. When finished, reassemble in reverse order.

FIGURE 17 **Blower Access Showing Lid Propped with 2X4**

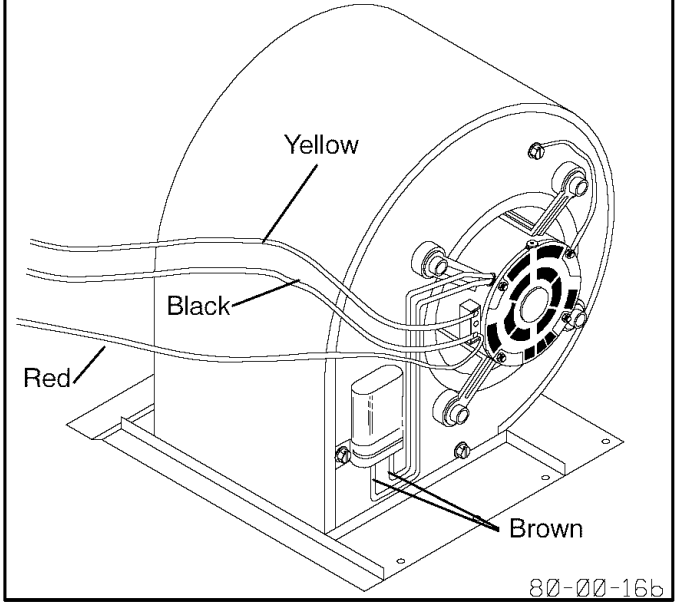


Blower Wire Color Identification

Use **FIGURE 18** on page 23 to identify wires on blower motor.

To change speed tap settings, see *Speed Taps* in the *Start-up Procedures* section of this manual.

FIGURE 18 **Wire Colors**



Circulating Air Blower

Visually inspect the blower wheel for accumulations of dirt or lint. Clean the compartment and the blower wheel. If accumulation is excessive on blower wheel, or does not easily remove, it will be necessary to remove the blower assembly.

CAUTION

Do NOT use 3 in 1 oil, penetrating oil, WD40 or similar oils to oil motor bearings.

Oil the blower motor by adding $^1/_2$ teaspoonful (1cc) of SAE 10W30 to each motor bearing. The blower motor should be oiled after five years of operation and every five years thereafter.

11. Rigging Instructions

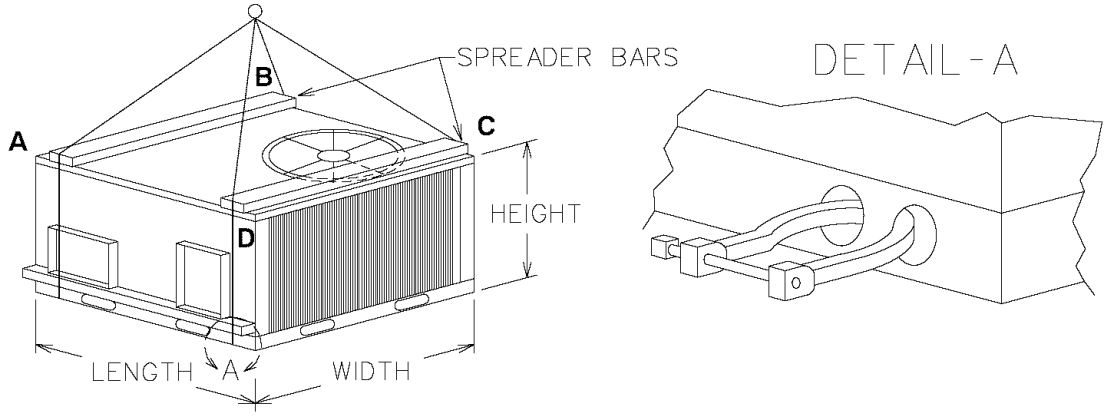
FIGURE 19	Rigging Instructions

RIGGING INSTRUCTIONS

⚠ WARNING

FAILURE TO FOLLOW THESE WARNINGS CAN RESULT IN PROPERTY DAMAGE, PERSONAL INJURY AND/OR DEATH.

- All panels **MUST** be in place when rigging and lifting.
- Hook rigging shackles through holes in base rail, as shown in Detail-A.
- Use spreader bars, when rigging, to prevent unit damage.
- Be sure rigging and shackles are sufficient to handle weight listed below.



CABINET	COOLING CAPACITY RANGE	LENGTH		WIDTH		HEIGHT		MAX. WEIGHT	
		IN	MM	IN	MM	IN	MM	LB	KG
B	2.0 - 3 TONS	48.00	1219	48.00	1219	33.00	838	430	195
C	3.5-5 TONS	73.00	1854	48.00	1219	36.50	927	670	303

CORNER WEIGHTS in LBS. (KG)

MODEL	OPERATING WEIGHT	CORNER WEIGHTS			
		A	B	C	D
2 TON	380(172.25)	81 (36.75)	111 (50.25)	108 (49)	80 (36.25)
$2^1/_2$ TON	387(175.50)	83(37.75)	113 (51.25)	110 (50)	81 (36.75)
3 TON	396 (179.50)	84(38)	117 (53)	113 (51.25)	82 (37)
$3^1/_2$ TON	540(245.0)	113(51.0)	146(66.0)	158(72.0)	123(56.0)
4 TON	600(272.25)	116(52.85)	163(74.0)	187(84.85)	134(60.6)
5 TON	600(272.25)	116(52.85)	163(74.0)	187(84.85)	134(60.6)