

# **INSTALLATION INSTRUCTIONS**

## **WALL MOUNTED PACKAGE AIR CONDITIONERS**

### **MODELS**

**WA421**

**WA481**

**WA601**

**PATENT PENDING**

**DATE: 09-06-93**

**MANUAL 2100-218 REV. B  
SUPERSEDES REV. A  
FILE VOL. III, TAB 16**

## SECTION 1 --GETTING OTHER INFORMATION AND PUBLICATIONS

These publications can help you install the air conditioner or heat pump. You can usually find these at your local library or purchase them directly from the publisher. Be sure to consult current edition of each standard.

National Electrical Code	-ANSI/NFPA 70
Standard For The Installation Of Air Conditioning and Ventilating Systems	-ANSI/NFPA 90A
Standard For Warm Air Heating and Air Conditioning Systems	-ANSI/NFPA 90B
Load Calculation For Residential Winter and Summer Air Conditioning	-ACCA Manual J
Duct Design For Residential Winter and Summer Air Conditioning and Equipment Selection	-ACCA Manual D

---

### FOR MORE INFORMATION, CONTACT THESE PUBLISHERS

ACCA:	AIR CONDITIONING CONTRACTORS OF AMERICA 1513 16th Street NW Washington, DC 20036 Telephone: (202) 483-9370	Fax: (202) 234-4721
ANSI:	AMERICAN NATIONAL STANDARDS INSTITUTE 11 West Street, 13th Floor New York, NY 10036 Telephone: (212) 642-4900	Fax: (212) 302-1286
ASHRAE:	AMERICAN SOCIETY OF HEATING REFRIGERATING AND AIR CONDITIONING ENGINEERS, INCORPORATED 1791 Tullie Circle, N.E. Atlanta, GA 30329-2305 Telephone: (404) 636-8400	Fax: (404) 321-5478
NFPA:	NATIONAL FIRE PROTECTION ASSOCIATION Batterymarch Park P. O. Box 9101 Quincy, MA 02269-9901 Telephone: (800) 344-3555	Fax: (617) 984-7057

## TABLE OF CONTENTS

### PART 1 -- WALL MOUNT--GENERAL INSTALLATION INFORMATION

Air Conditioner Wall Mount Model Nomenclature . . . . .	1
Shipping Damage . . . . .	1
General . . . . .	4
Duct Work . . . . .	4
Filters . . . . .	5
Fresh Air Intake . . . . .	5
Condensate Drain . . . . .	5

### PART 2 -- INSTALLATION INSTRUCTIONS

Wall Mounting Information . . . . .	5
Mounting The Unit . . . . .	5

#### WIRING

Wiring--Main Power . . . . .	9
Wiring: Low Voltage Wiring . . . . .	9

### PART 3 -- START-UP

Important Installer Note . . . . .	11
Crankcase Heaters . . . . .	11
High Pressure Switch. . . . .	11
Three Phase Scroll Compressor Start Up. . . . .	12
Service Hints . . . . .	12
Sequence of Operation . . . . .	12
Pressure Service Ports . . . . .	12

### PART 4 -- TROUBLESHOOTING

Fan Blade Setting Dimensions . . . . .	12
Removal of The Fan Shroud . . . . .	13
Refrigerant Charge . . . . .	13
Pressure Table . . . . .	14
Optional Accessories. . . . .	15

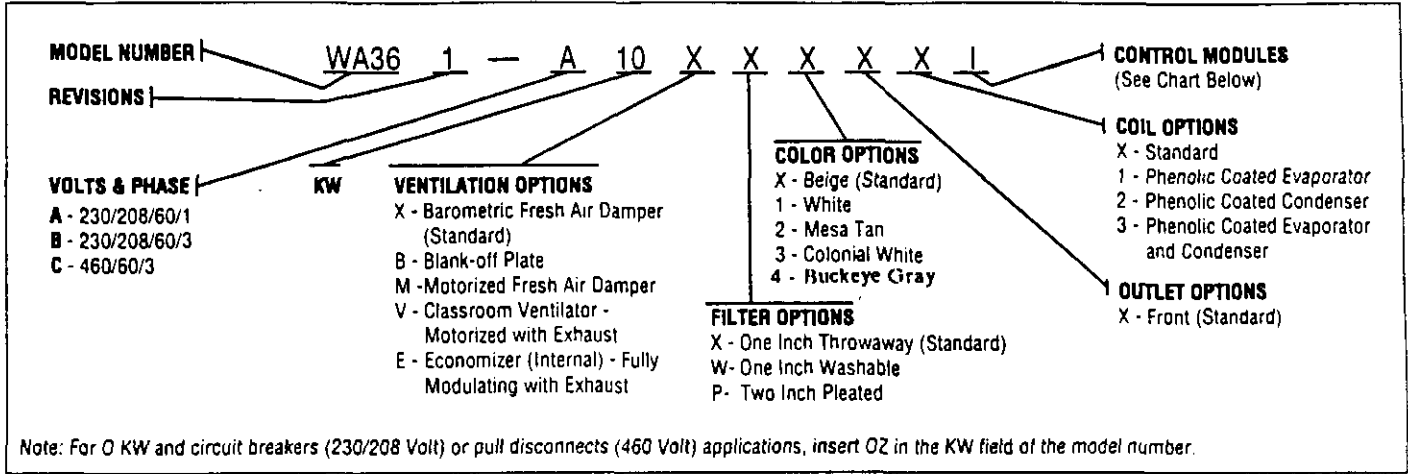
## FIGURES AND TABLES

Figure 1	Unit Dimensions . . . . .	2
Figure 2	Mounting Locations . . . . .	7
Figure 2A	Electric Heat Clearance . . . . .	8
Figure 3	Unit 24V Terminal Board . . . . .	10
Figure 4	Start-Up . . . . .	11
Figure 5	Fan Blade Setting . . . . .	12

Table 1	Electric Heat Table . . . . .	1
Table 2	Electrical Specifications . . . . .	3
Table 3	Thermostat Wire Sizes and Thermostat Combinations . . . . .	9
Table 3A	Wall Thermostat and Subbase Combinations. . . . .	9
Table 4	Fan Blade Settings. . . . .	12
Table 5	Refrigerant Charge . . . . .	13
Table 6	Indoor Blower Performance . . . . .	13
Table 7	Recommended Operating Ranges. . . . .	14
Table 8	Maximum ESP of Operation . . . . .	14
Table 9	Cooling--Pressure (PSI) . . . . .	14
Table 10	Optional Accessories . . . . .	15

**PART 1 -- WALL MOUNT GENERAL INFORMATION**

**AIR CONDITIONER WALL MOUNT MODEL NOMENCLATURE**



**TABLE 1 ELECTRIC HEAT TABLE**

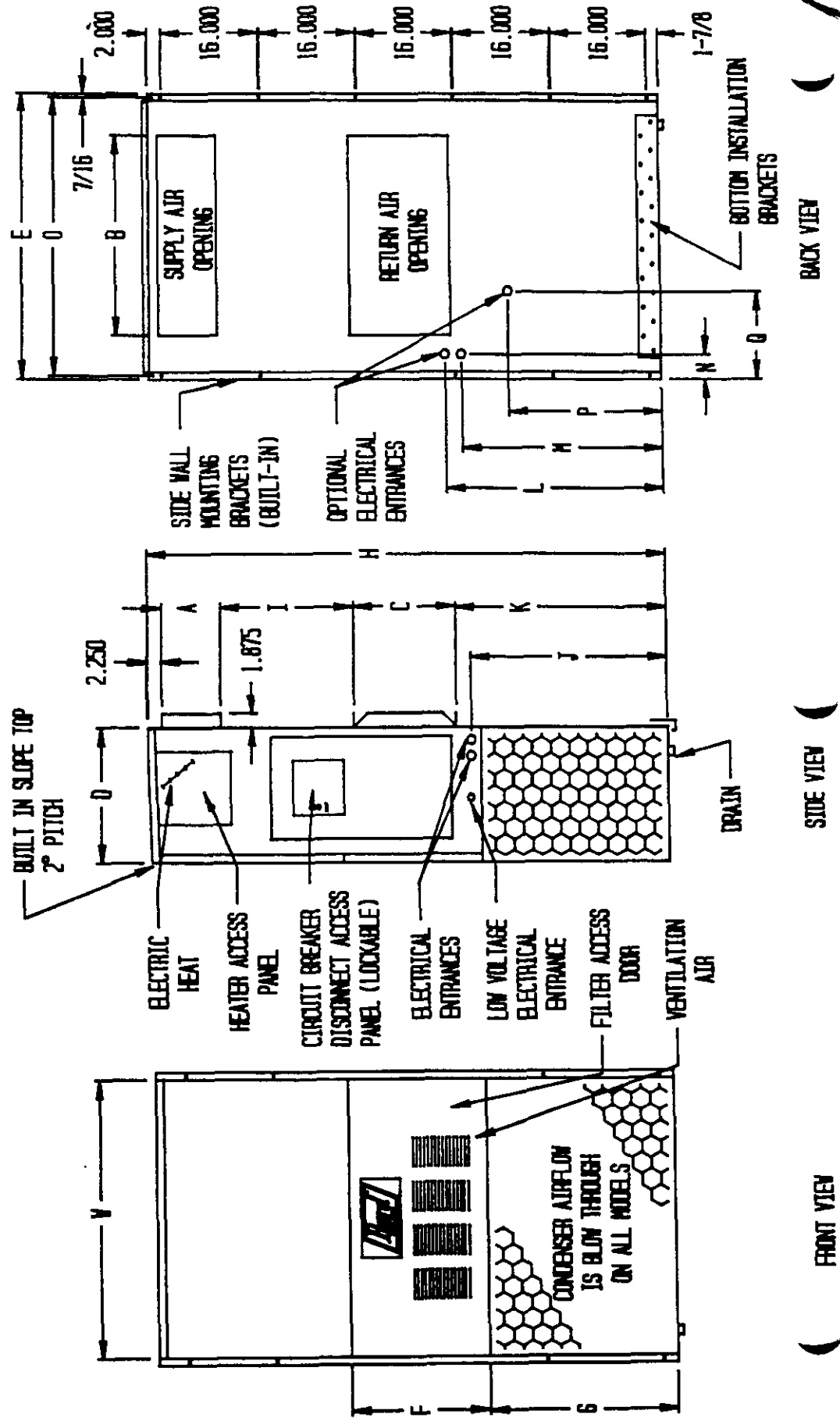
Models	WA421-A		WA421-B		WA421-C					
	WA481-A		WA481-B		WA481-C					
	WA601-A		WA601-B		WA601-C					
KW	240-1		208-1		240-3		208-3		460-3	
	A	BTU	A	BTU	A	BTU	A	BTU	A	BTU
5	20.8	17050	18.1	12800						
9					21.7	30600	18.7	23030	10.8	30700
10	41.6	34130	36.2	25600						
15	62.5	51200	54.1	38400	36.2	51200	31.2	38400	17.3	47000
18					43.3	61430	37.5	46100		
20	83.2	68260	72.1	51200						

**SHIPPING DAMAGE**

Upon receipt of equipment, the carton should be checked for external signs of shipping damage. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.

FIGURE 1  
 SIZE SPECS FOR MIS-411

UNIT	WIDTH (W)	DEPTH (D)	HEIGHT (H)	SUPPLY		RETURN		E	F	G	I	J	K	L	M	N	O	P	Q
				A	B	C	B												
42 & 60	42	22-1/4	84-7/8	9-7/8	29-7/8	15-7/8	29-7/8	43-7/8	19	31-5/8	30	32-11/16	27	34-3/4	32-1/2	3-1/4	43	23-7/8	10



ELECTRICAL SPECIFICATIONS

TABLE 2

SINGLE CIRCUIT							DUAL CIRCUIT							
Model	Rated Volts and Phase	No. Field Power Ckts.	(3) Minimum Circuit Ampacity	(1) Maximum External Fuse Or Circuit Breaker	(2) Field Power Wire Size	(2) Ground Wire Size	(3) Minimum Circuit Ampacity		(1) Maximum External Fuse Or Ckt. Breaker		(2) Field Power Wire Size		(2) Ground Wire Size	
							Ckt A	Ckt B	Ckt A	Ckt B	Ckt A	Ckt B	Ckt A	Ckt B
WA421-A00, A0Z A05 A10 A15 A20	230/208-1	1	32	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	31	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	56	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1 or 2	83	90	4	8	56	26	60	30	6	10	10	10
		1 or 2	108	110	2	6	56	52	60	60	6	6	10	10
WA421-B00, B0Z B09 B15 B18	230/208-3	1	22	35	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	32	35	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	50	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	59	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WA421-C00, C0Z C09 C15	460-3	1	11	15	14	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	16	20	12	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	25	25	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WA481-A00, A0Z A05 A10 A15 A20	230/208-1	1	36	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	36	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	56	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1 or 2	83	90	4	8	56	26	60	30	6	10	10	10
		1 or 2	108	110	2	6	56	52	60	60	6	6	10	10
WA481-B00, B0Z B09 B15 B18	230/208-3	1	24	35	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	32	35	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	50	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	59	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WA481-C00, C0Z C09 C15	460-3	1	12	15	14	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	16	20	12	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	25	25	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WA601-A00, A0Z A05 A10 A15 A20	230/208-1	1	42	60	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	42	60	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	56	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1 or 2	83	90	4	8	56	26	60	30	6	10	10	10
		1 or 2	108	110	2	6	56	52	60	60	6	6	10	10
WA601-B00, B0Z B09 B15 B18	230/208-3	1	30	45	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	32	45	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	50	50	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	59	60	6	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WA601-C00, C0Z C09 C15	460-3	1	15	20	12	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	16	20	12	12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	25	25	10	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- (1) Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.
- (2) Based on 75°C copper wire. All wiring must conform to NEC and all local codes.
- (3) These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electric Code (latest revision), article 310 for power conductor sizing. Caution: When more than one field power conductor circuit is run thru one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than 3 conductors are in a raceway.

## GENERAL

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians.

The refrigerant system is completely assembled and charged. All internal wiring is complete.

The unit is designed for use with or without duct work. Flanges are provided for attaching the supply and return ducts.

These instructions explain the recommended method to install the air cooled self-contained unit and the electrical wiring connections to the unit.

These instructions and any instructions packaged with any separate equipment required to make up the entire air conditioning system should be carefully read before beginning the installation. Note particularly "Starting Procedure" and any tags and/or labels attached to the equipment.

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See Page 1 for information on codes and standards.

Size of unit for a proposed installation should be based on heat loss calculation made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

## DUCT WORK

All duct work, supply and return, must be properly sized for the design air flow requirement of the equipment. Air Conditioning Contractors of America (ACCA) is an excellent guide to proper sizing. All duct work or portions thereof not in the conditioned space should be properly insulated in order to both conserve energy and prevent condensation or moisture damage.

Refer to Table 8 for maximum static pressure available for duct design.

Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). When duct runs through unheated spaces, it should be insulated with a minimum of one inch of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum.

A 1/4-inch clearance to combustible material for the first three feet of duct attached to the outlet air frame is required. See Pages 5, 6 and 7 Wall Mounting Instructions and Figures 2 and 2A for further details.

Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture entering the wall cavity.

Some installations may not require any return air duct. It is recommended that on this type of installation that a filter grille be located in the wall. Filters must be of sufficient size to allow a maximum velocity of 400 FPM.

**NOTE:** If no return air duct is used, applicable installation codes may limit this cabinet to installation only in a single story structure.



## **FILTERS**

A 1-inch throwaway filter is supplied with each unit. The filter slides into position making it easy to service. This filter can be serviced from the outside by removing the service door. A 1-inch washable filter and 2-inch pleated filter are also available as optional accessories. The internal filter brackets are adjustable to accommodate the 2-inch filter by loosening 2 screws in each bracket assembly and sliding the brackets apart to the required width and retightening the 4 screws.

## **FRESH AIR INTAKE**

All units are built with fresh air inlet slots punched in the service panel.

The fresh air damper assembly is standard equipment with the unit because of the variety of state or local codes requiring fresh air capability. It is shipped already attached to each unit.

All capacity, efficiency and cost of operation information as required for Department of Energy "Energyguide" Fact Sheets is based upon the fresh air blank-off plate in place and is recommended for maximum energy efficiency.

The blank-off plate is available upon request from the factory and is installed in place of the fresh air damper shipped with each unit.

## **CONDENSATE DRAIN**

A plastic drain hose extends from the drain pan at the top of the unit down to the unit base. There are openings in the unit base for the drain hose to pass through. In the event the drain hose is connected to a drain system of some type, it must be an open or vented type system to assure proper drainage.

## **PART 2 -- INSTALLATION INSTRUCTIONS**

### **WALL MOUNTING INFORMATION**

1. Two holes, for the supply and return air openings, must be cut through the wall as shown in Figure 2.
2. On wood-frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration. **WARNING:** Fire hazard can result if 1/4-inch clearance to combustible materials for supply air duct is not maintained. See Figure 2.
3. Concrete block walls must be thoroughly inspected to insure that they are capable of carrying the weight of the installing unit.

### **MOUNTING THE UNIT**

1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides. A bottom mounting bracket is provided for ease of installation.
2. The unit itself is suitable for "0" inch clearance, but the supply air duct flange and the first 3 feet of supply air duct require a minimum of 1/4-inch clearance to combustible material. If a combustible wall, use a minimum of 30-1/2" x 10-1/2" dimensions for sizing. However, it is generally recommended that a 1-inch clearance is used for ease of installation and maintaining the required clearance to combustible material. The supply air opening would then be 32" x 12". See Figures 2 and 2A for details.

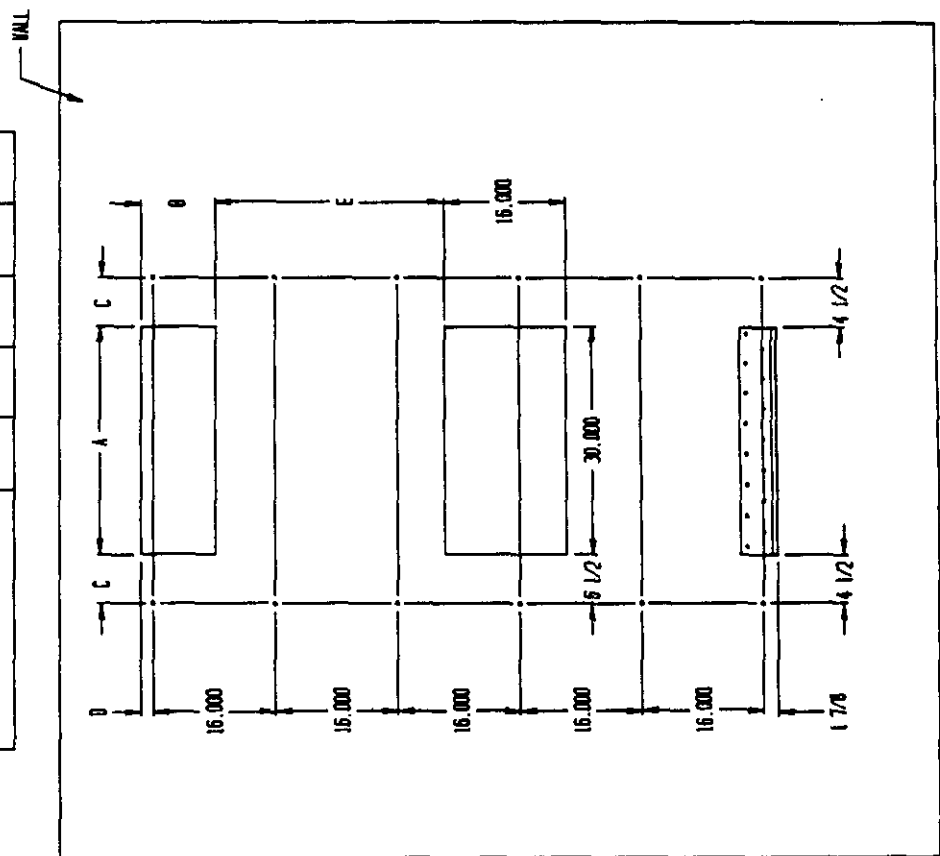
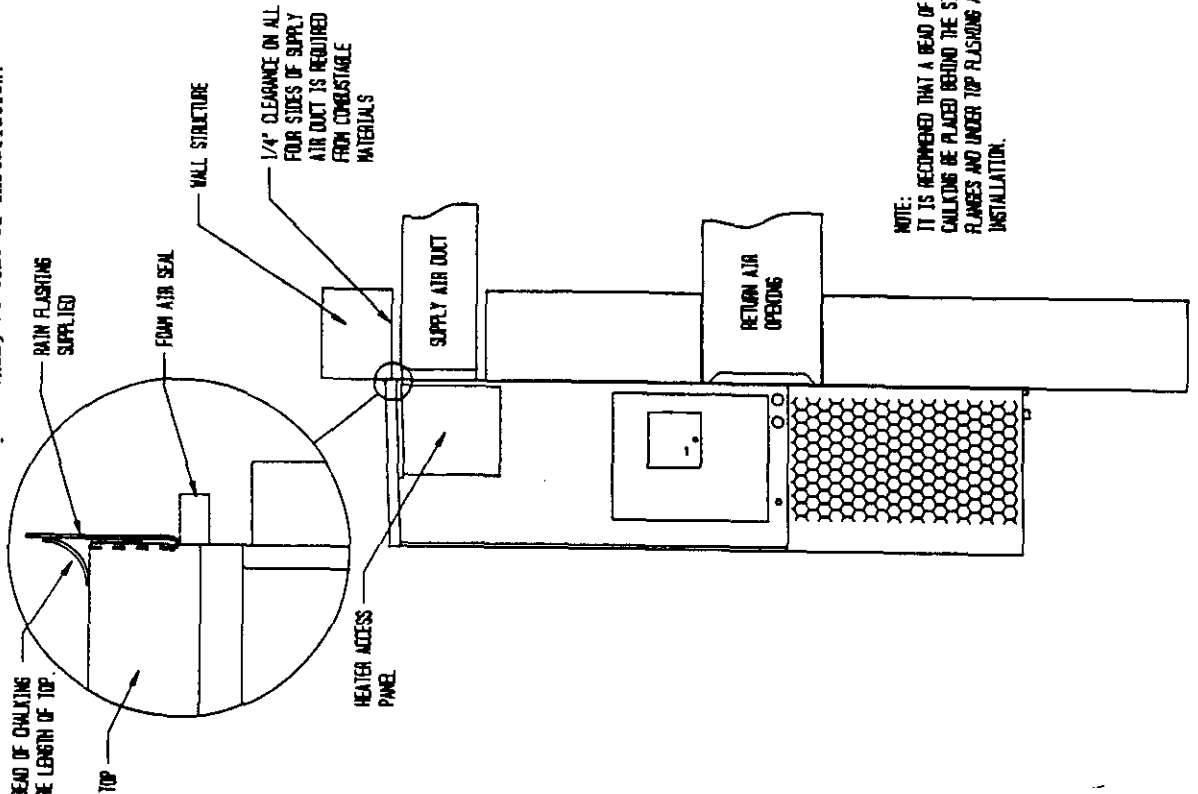
\*\*\*\*\*  
**WARNING:** Failure to provide the 1/4-inch clearance between the supply duct and a combustible surface for the first 3 feet of duct can result in fire.  
\*\*\*\*\*

3. Locate and mark lag bolt locations and bottom mounting bracket location. See Figure 2.
4. Mount bottom mounting bracket.
5. Hook top rain flashing under back bend of top. Top rain flashing is shipped secured to the right side of the back.
6. Position unit in opening and secure with 5/16 lag bolts; use 7/8-inch diameter flat washers on the lag bolts.
7. Secure rain flashing to wall and caulk across entire length of top. See Figure 2.
8. For additional mounting rigidity, the return air and supply air frames or collars can be drilled and screwed or welded to the structural wall itself (depending upon wall construction). Be sure to observe required clearance if combustible wall.
9. On side by side installations, maintain a minimum of 20-inches clearance on right side to allow access to heat strips and control panel and to allow proper airflow to the outdoor coil.

FIGURE 2  
MOUNTING INSTRUCTIONS

	A	B	C	D	E
REQUIRED DIMENSIONS TO MAINTAIN 1/4" MIN. CLEARANCE FROM COMBUSTIBLE MATERIALS	30 1/2	10 1/2	6 1/4	1 5/16	29 1/2
REQUIRED DIMENSIONS TO MAINTAIN RECOMMENDED 1" CLEARANCE FROM COMBUSTIBLE MATERIALS	32	12	5 1/2	9/16	28

NOTE: It is recommended that a bead of silicone caulking be placed behind the side mounting flanges and under the top flashing at time of installation.



## WIRING--MAIN POWER

Refer to the unit rating plate for wire sizing information and maximum fuse or "HACR Type" circuit breaker size. Each outdoor unit is marked with a "Minimum Circuit Ampacity". This means that the field wiring used must be sized to carry that amount of current. Depending on the installed KW of electric heat, there may be two field power circuits required. If this is the case, the unit serial plate will so indicate. All models are suitable only for connection with copper wire. Each unit and/or wiring diagram will be marked "Use Copper Conductors Only". These instructions MUST BE adhered to. Refer to the National Electrical Code (NEC) for complete current carrying capacity data on the various insulation grades of wiring material. All wiring must conform to NEC and all local codes.

The electrical data lists fuse and wire sizes (75°C copper) for all models, including the most commonly used heater sizes. Also shown are the number of field power circuits required for the various models with heaters.

The unit rating plate lists a "Maximum Time Delay Relay Fuse" or "HACR Type" circuit breaker that is to be used with the equipment. The correct size must be used for proper circuit protection and also to assure that there will be no nuisance tripping due to the momentary high starting current of the compressor motor.

The disconnect access door on this unit may be locked to prevent unauthorized access to the disconnect. To convert for the locking capability, bend the tab located in the bottom left hand corner of the disconnect opening under the disconnect access panel straight out. This tab will now line up with the slot in the door. When shut, a padlock may be placed through the hole in the tab preventing entry.

See startup section for information on three phase scroll compressor startups.

## WIRING: LOW VOLTAGE WIRING

230/208V, 1 phase and 3 phase equipment dual primary voltage transformers. All equipment leaves the factory wired on 240V tap. For 208V operation, reconnect from 240V to 208V tap. The acceptable operating voltage range for the 240 and 208V taps are:

TAP	RANGE
240	253 - 216
208	220 - 187

**NOTE:** The voltage should be measured at the field power connection point in the unit and while the unit is operating at full load (maximum amperage operating condition).

Five (5) wires should be run from thermostat subbase to the 24V terminal board in the unit. A five conductor, 18 gauge copper, color-coded thermostat cable is recommended. The connection points are shown in Figure 3.

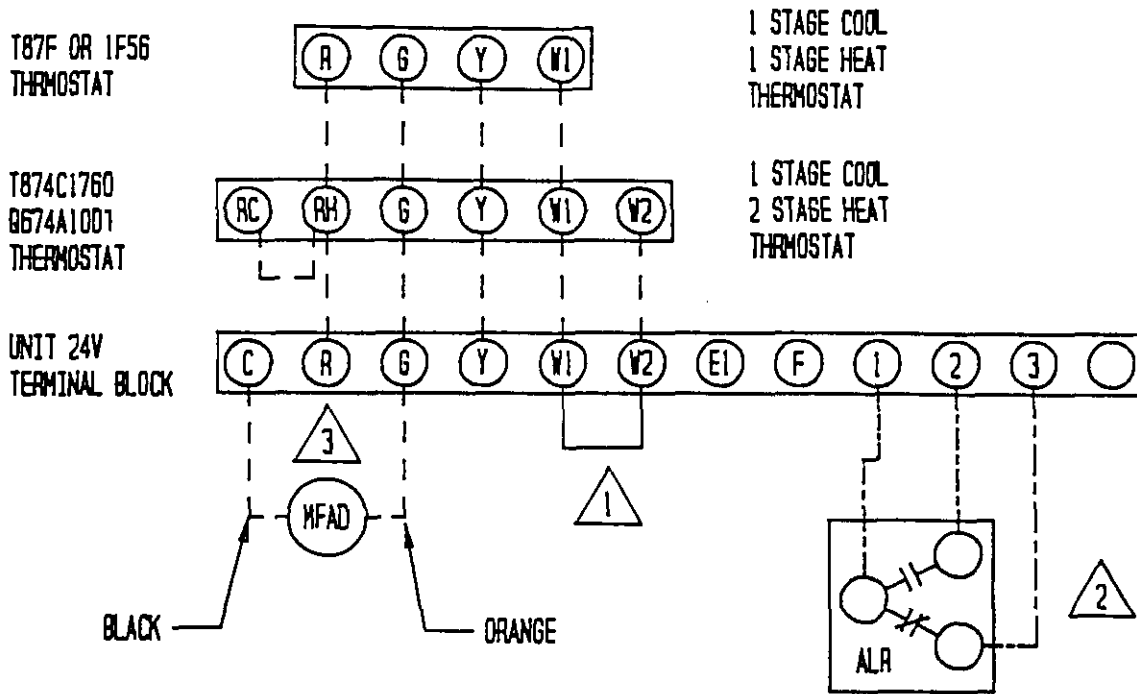
TABLE 3 THERMOSTAT WIRE SIZE

Transformer VA	FLA	Wire Gauge	Maximum Distance In Feet
55	2.3	20 Gauge	45
		18 "	60
		16 "	100
		14 "	160
		12 "	250

TABLE 3A WALL THERMOSTAT AND SUBBASE COMBINATIONS

Thermostat	Subbase	Predominate Features
8403-019	8404-012	1 stage cool, 2 stage heat
T874C1760	Q674A1001	System: heat-auto-cool Fan: on-auto
8403-002	8404-003	1 stage heat, 1 stage cool
T87E3111	Q539A1220	System: heat-off-cool Fan: on-auto
8403-009	----	1 stage heat, 1 stage cool
1F56-318		

FIGURE 3  
LOW VOLTAGE WIRING



- △ 1 REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
- △ 2 OPTIONAL ALARM RELAY PROVIDED ON UNITS WITH CONTROL MODULE "M" OR "J" INSTALLED. CONTACT RATING 24VAC • 125VA
- △ 3 OPTIONAL MOTORIZED FRESH AIR DAMPER SUGGESTED HOOK UP

OPTIONAL ECONOMIZER LOW VOLTAGE WIRING

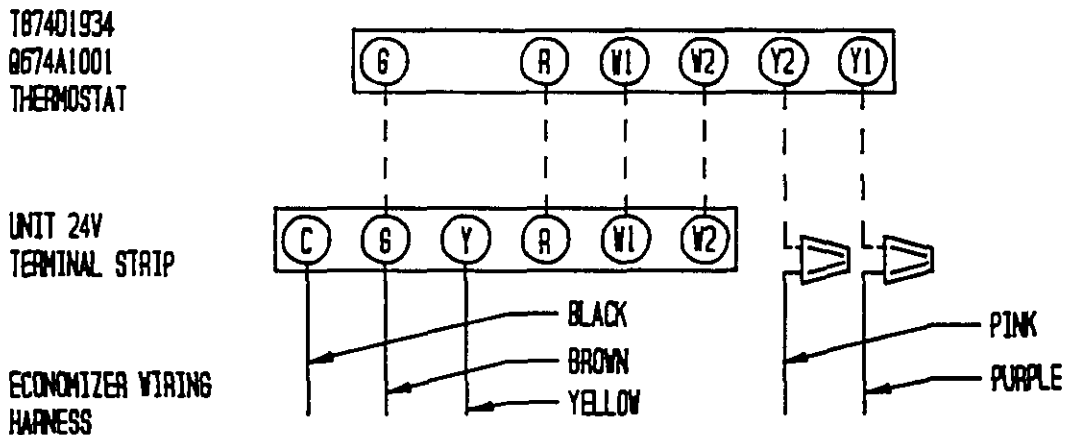
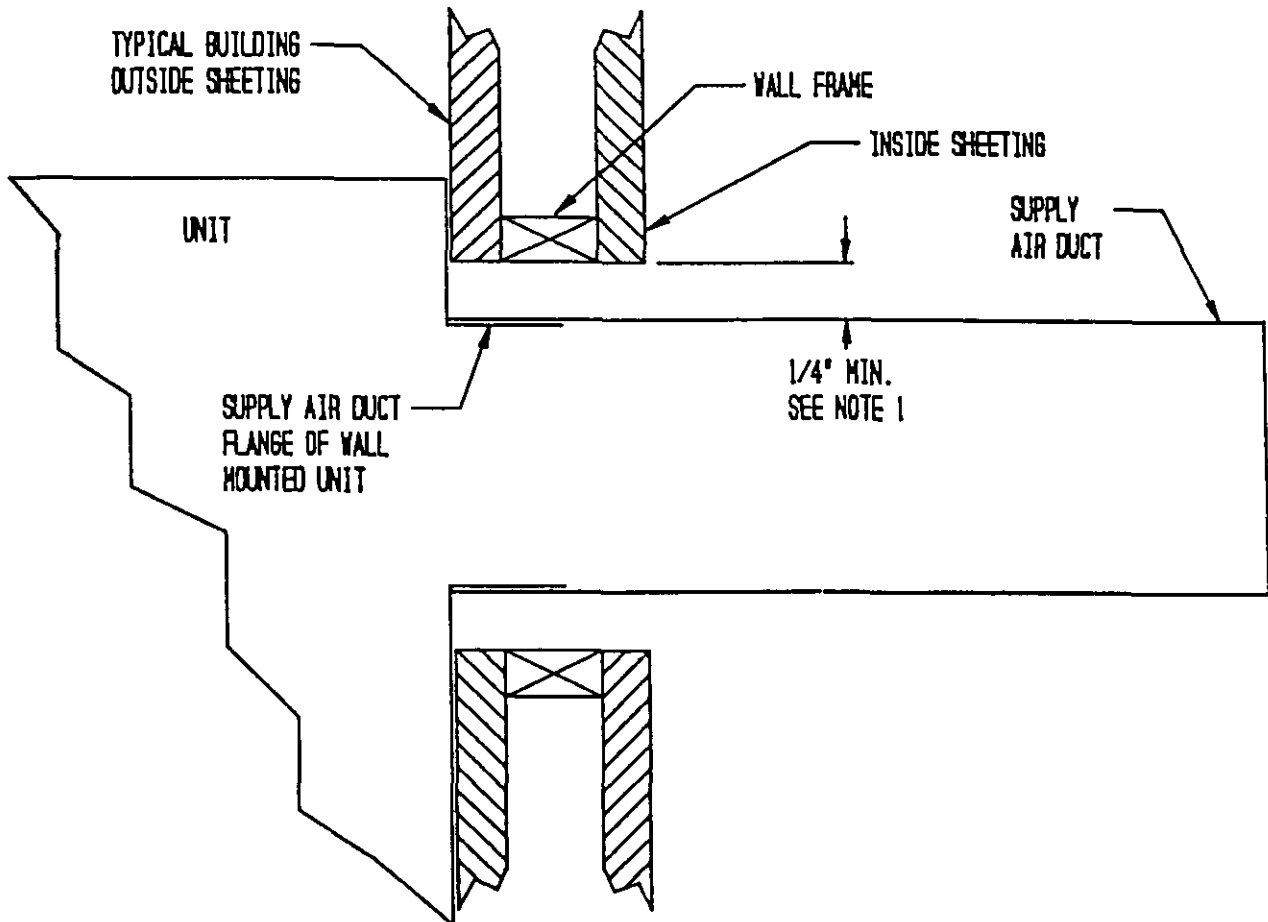


FIGURE 2A  
ELECTRIC HEAT CLEARANCE



Side section view of supply air duct for wall mounted unit showing 1/4" clearance to combustible surfaces.

NOTE 1:

WARNING
<p>A <u>minimum</u> of 1/4" clearance must be maintained between the supply air duct and combustible materials. This is required for the first 3 feet of ducting.</p> <p>It is important to insure that the 1/4-inch minimum spacing is maintained at all points.</p> <p>Failure to do this could result in overheating the combustible material and may result in a fire.</p>

## PART 3 -- START-UP

### **IMPORTANT INSTALLER NOTE**

For improved start-up performance, wash the indoor coil with a dishwasher detergent.

### **CRANKCASE HEATERS**

WA421 units are provided with compressor crankcase heat. WA601 and WA481 units are not provided with crankcase heat. These units utilize scroll compressors which do not require crankcase in this application.

The WA421 models have an insertion well-type heater located in the lower section of the compressor housing. This is a self-regulating type heater that draws only enough power to maintain the compressor at a safe temperature on these units.

Some form of crankcase heat is essential to prevent liquid refrigerant from migrating to the compressor, causing oil pump out on compressor start-up and possible valve failure due to compressing a liquid.

The decal in Figure 4 is affixed to all WA421 units detailing start-up procedure. This is very important. Please read carefully.

### **HIGH PRESSURE SWITCH**

The WA481 and WA601 models are supplied with a remote reset high pressure switch. If tripped, this pressure switch may be reset by turning the thermostat off then back on again.

### **THREE PHASE SCROLL COMPRESSOR START UP INFORMATION**

Scroll compressors, like several other types of compressors, will only compress in one rotational direction. Direction of rotation is not an issue with single phase compressors since they will always start and run in the proper direction.

However, three phase compressors will rotate in either direction depending upon phasing of the power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, verification of proper rotation must be made. Verification of proper rotation direction is made by observing that suction pressure drops and discharge pressure rises when the compressor is energized. Reverse rotation also results in an elevated sound level over that with correct rotation, as well as, substantially reduced current draw compared to tabulated values.

There is no negative impact on durability caused by operating three phase Compliant Scroll compressors in the reversed direction. However, after several minutes of operation, the compressor's internal protector will trip.

All three phase ZR\*2 compressors are wired identically internally. As a result, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the same Fusite terminal should maintain proper rotation direction.

**THE DIRECTION OF ROTATION OF THE MOTOR MAY BE CHANGED BY REVERSING ANY TWO LINE CONNECTIONS TO THE UNIT.**

FIGURE 4

## **IMPORTANT**

**THESE PROCEDURES MUST BE FOLLOWED AT INITIAL START-UP AND AT ANY TIME POWER HAS BEEN REMOVED FOR 12 HOURS OR LONGER.**

**TO PREVENT COMPRESSOR DAMAGE WHICH MAY RESULT FROM THE PRESENCE OF LIQUID REFRIGERANT IN THE COMPRESSOR CRANKCASE.**

- 1. MAKE CERTAIN THE ROOM THERMOSTAT IS IN THE "OFF" POSITION. (THE COMPRESSOR IS NOT TO OPERATE).**
- 2. APPLY POWER BY CLOSING THE SYSTEM DISCONNECT SWITCH THIS ENERGIZES THE COMPRESSOR HEATER WHICH EVAPORATES THE LIQUID REFRIGERANT IN THE CRANKCASE.**
- 3. ALLOW 4 HOURS OR 60 MINUTES PER POUND OF REFRIGERANT IN THE SYSTEM AS NOTED ON THE UNIT RATING PLATE, WHICHEVER IS GREATER.**
- 4. AFTER PROPERLY ELAPSED TIME THE THERMOSTAT MAY BE SET TO OPERATE THE COMPRESSOR.**
- 5. EXCEPT AS REQUIRED FOR SAFETY WHILE SERVICING — DO NOT OPEN SYSTEM DISCONNECT SWITCH.**

7961-061

## SERVICE HINTS

1. Caution homeowner to maintain clean air filters at all times. Also, not to needlessly close off supply and return air registers. This reduces air flow through the system, which shortens equipment service life as well as increasing operating costs.
2. Switching to heating cycle at 75°F or higher outside temperature may cause a nuisance trip of the remote reset high pressure switch. Turn thermostat off, then on to reset the high pressure switch.
3. Check all power fuses or circuit breakers to be sure they are the correct rating.
4. Periodic cleaning of the outdoor coil to permit full and unrestricted airflow circulation is essential.

## SEQUENCE OF OPERATION

**COOLING**--Circuit R-Y makes at thermostat pulling in compressor contactor, starting the compressor and outdoor motor. The G (indoor motor) circuit is automatically completed on any call for cooling operation or can be energized by manual fan switch on subbase for constant air circulation. On a call for heating, circuit R-W1 make at the thermostat pulling in heat contact for the strip heat and blower operation. On a call for second stage heat, R-W2 makes bringing on second heat contactor, if so equipped.

## PRESSURE SERVICE PORTS

High and low pressure service ports are installed on all units so that the system operating pressures can be observed. Pressure curves can be found later in the manual covering all models. It is imperative to match the correct pressure curve to the unit by model number.

## PART 4 -- TROUBLESHOOTING

### FAN BLADE SETTING DIMENSIONS

Shown in the drawing below are the correct fan blade setting dimensions for proper air delivery across the outdoor coil.

Any service work requiring removal or adjustment in the fan and/or motor area will require that the dimensions below be checked and blade adjusted in or out on the motor shaft accordingly.

FIGURE 5

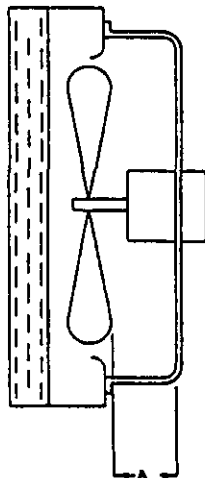


TABLE 4

Model	Dimension A
WA421 WA481 WA601	1.75



## REMOVAL OF THE FAN SHROUD

1. Disconnect all power to unit.
2. Remove the screws holding both grills--one on each side of unit--and remove grills.
3. Remove screws holding fan shroud to condenser and bottom. (9) screws.
4. Unwire condenser fan motor.
5. Slide complete motor, fan blade, and shroud assembly out the left side of the unit.
6. Service motor/fan as needed.
7. Reverse steps to reinstall.

## REFRIGERANT CHARGE

The correct system R-22 charge is shown on the unit rating plate. Optimum unit performance will occur with a refrigerant charge resulting in a suction line temperature (6" from compressor) as shown in the following table:

TABLE 5

Model	Rated Airflow	95° F OD Temperature	82° F OD Temperature
WA421	1400	52 - 54	64 - 66
WA481	1550	54 - 56	65 - 67
WA601	1700	53 - 55	60 - 62

The above suction line temperatures are based upon 80°F dry/bulb/67°F wet bulb (50 percent R.H.) temperature and rated airflow across the evaporator during cooling cycle.

TABLE 6 INDOOR BLOWER PERFORMANCE--CFM @ 230V

E.S.P. In H <sub>2</sub> O	WA421, WA481		WA601	
	Lo 230V Dry/Wet Coil	Hi 230V Dry/Wet Coil	Lo 230V Dry/Wet Coil	Hi 230V Dry/Wet Coil
.0	1650 / 1600	1885 / 1800	1600 / 1450	2200 / 2000
.1	1550 / 1500	1770 / 1665	1525 / 1375	2100 / 1900
.2	1450 / 1400	1635 / 1540		2000 / 1800
.3	1350 / 1300	1500 / 1400		1875 / 1700
.4	1300 / 1175	1370 / 1285		1775 / 1600
.5	---	1250 / 1150		1650 / 1475

TABLE 7

Model	Rated CFM*	Rated ESP*	Recommended Airflow Range
WA421	1400	.30	1600 - 1150
WA481	1550	.20	1750 - 1285
WA601	1700	.30	1950 - 1375
*Rated CFM and ESP on high speed tap.			

MAXIMUM ESP OF OPERATION  
ELECTRIC HEAT ONLY

TABLE 8

Model	WA421		WA481		WA601	
	High Speed	Low Speed	High Speed	Low Speed	High Speed	Low Speed
-A05	.50	.50	.50	.50	.50	.50
-A10	.50	.50	.50	.50	.50	.50
-A15	.50	.50	.50	.50	.50	.50
-A20	.50	.45	.50	.45	.50	.40
-B00	.50	.50	.50	.50	.50	.50
-B09	.50	.50	.50	.50	.50	.50
-B15	.50	.50	.50	.50	.50	.50
-B18	.50	.50	.50	.50	.50	.50
-C09	.50	.50	.50	.50	.50	.50
-C15	.50	.50	.50	.50	.50	.50
Values shown are for units equipped with STD 1-inch throw-away filter or 1-inch washable filter. Derate ESP by .15 for 2-inch pleated filters.						

COOLING

TABLE 9  
Air Temperature Entering Outdoor Coil °F

Model	Return Air Temperature	Pressure	75	80	85	90	95	100	105	110	115
			WA421	75 deg. DB	Low Side	68	71	74	76	78	80
62 deg. WB	High Side	213		228	243	259	274	290	305	321	337
80 deg. DB	Low Side	72		76	79	82	84	86	88	89	90
67 deg. WB	High Side	218		234	249	265	281	297	313	330	346
WA481	85 deg. DB	Low Side	78	82	85	88	90	92	94	96	97
	72 deg. WB	High Side	226	242	258	274	290	307	323	341	358
	75 deg. DB	Low Side	73	74	76	78	79	80	82	83	84
	62 deg. WB	High Side	204	217	232	248	265	284	304	325	348
WA601	80 deg. DB	Low Side	78	79	81	82	84	86	87	89	90
	67 deg. WB	High Side	210	223	238	254	272	291	312	334	357
	85 deg. DB	Low Side	84	85	87	88	90	92	93	95	97
	72 deg. WB	High Side	217	231	247	264	282	302	323	345	369
WA601	75 deg. DB	Low Side	71	72	74	75	76	77	78	78	79
	62 deg. WB	High Side	233	247	262	278	295	313	331	351	371
	80 deg. DB	Low Side	76	78	79	80	81	82	83	84	85
	67 deg. WB	High Side	237	253	269	285	303	321	340	360	381
WA601	85 deg. DB	Low Side	84	85	85	86	87	88	89	90	91
	72 deg. WB	High Side	245	261	278	296	314	333	353	373	394

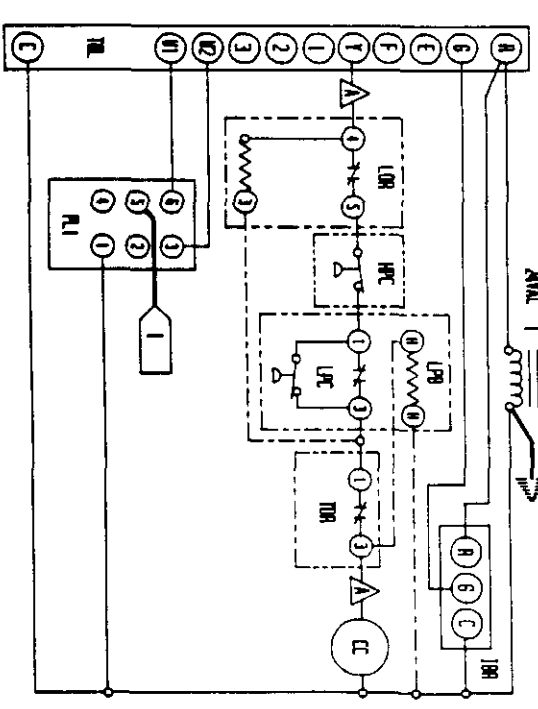
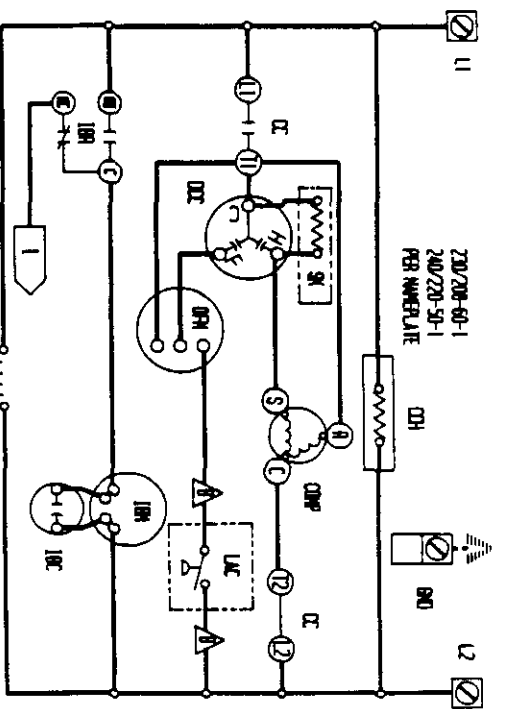
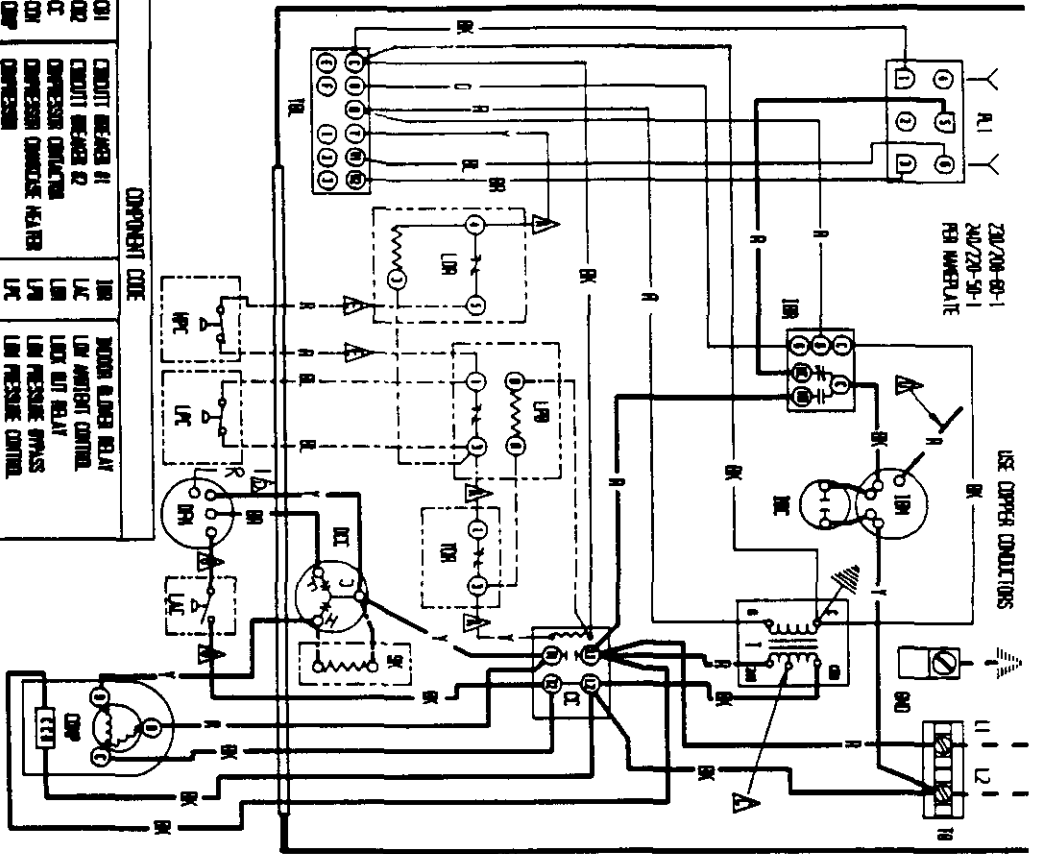
Low side pressure + 2 PSIG  
High side pressure + 5 PSIG

Tables are based upon rated CFM (airflow) across the evaporator coil and should be found under section titled "Refrigerant Charge" elsewhere in manual. If there is any doubt as to correct operating charge being in the system, the charge should be removed, system evacuated, and recharged to serial plate instructions.

TABLE 10

## OPTIONAL ACCESSORIES

Model	Description	W	W	W	W	W	W	W	W	W
		A	A	A	A	A	A	A	A	A
		4	4	4	4	4	4	6	6	6
		2	2	2	8	8	8	0	0	0
		1	1	1	1	1	1	1	1	1
		-	-	-	-	-	-	-	-	-
		A	B	C	A	B	C	A	B	C
EHWA05-A05	Heater Packages	X			X			X		
EHWA05-A08	Heater Packages	X			X			X		
EHWA05-A10	Heater Packages	X			X			X		
EHWA05-A15	Heater Packages	X			X			X		
EHWA05-B09	Heater Packages		X			X			X	
EHWA05-B15	Heater Packages		X			X			X	
EHWA05-B18	Heater Packages		X			X			X	
EBWCO5-C05	Heater Packages			X			X			X
EHWA05-C15	Heater Packages			X			X			X
BOP-5	Blank Off Plate	X	X	X	X	X	X	X	X	X
BEAD-5	Barometric Fresh Air Damper	X	X	X	X	X	X	X	X	X
MFAD-5	Motorized Fresh Air Damper	X	X	X	X	X	X	X	X	X
CRV-5	Classroom Ventilator With Exhaust	X	X	X	X	X	X	X	X	X
EIPM-5	Economizer With Exhaust	X	X	X	X	X	X	X	X	X
CMA-1	High Pressure Control (HPC)	X	X	X						
CMA-2	Low Pressure Control (LPC)	X	X	X						
CMA-4	Low and High Pressure Control	X	X	X						
CMA-5	Time Delay Relay (TDR)	X	X	X	X	X	X	X	X	X
CMA-6	Low Ambient Control (LAC)	X	X		X	X		X	X	
CMA-8	TDR + HPC	X	X	X						
CMA-10	LPC + HPC + TDR	X	X	X						
CMA-11	LPC + HPC + LAC	X	X							
CMA-12	LAC + TDR	X	X							
CMA-13	LPC + HPC + TDR + LAC + Alarm Relay	X	X							
CMC-15	Start Kit	X								
CMA-16	Low Pressure Control				X	X	X	X	X	X
CMA-17	LPC & TDR				X	X	X	X	X	X
CMA-18	LPC & LAC				X	X		X	X	
CMA-19	LAC & TDR				X	X		X	X	
CMC-20	LAC & TDR & LPC				X	X		X	X	
WMCB-05B	Circuit Breaker Kit		X			X				
WMPD-01C	Pull Disconnect Kit			X			X			X
WMCB-08A	Circuit Breaker Kit	X			X					
WMCB-09A	Circuit Breaker Kit							X		
WMCB-07B	Circuit Breaker Kit								X	

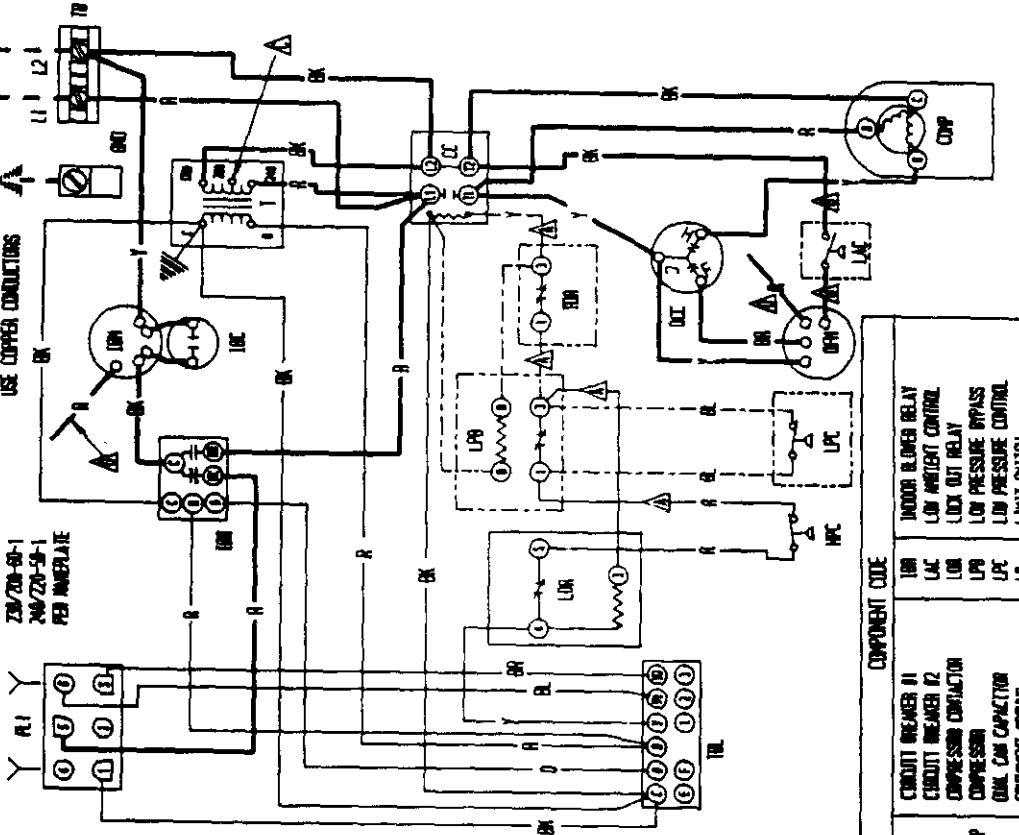
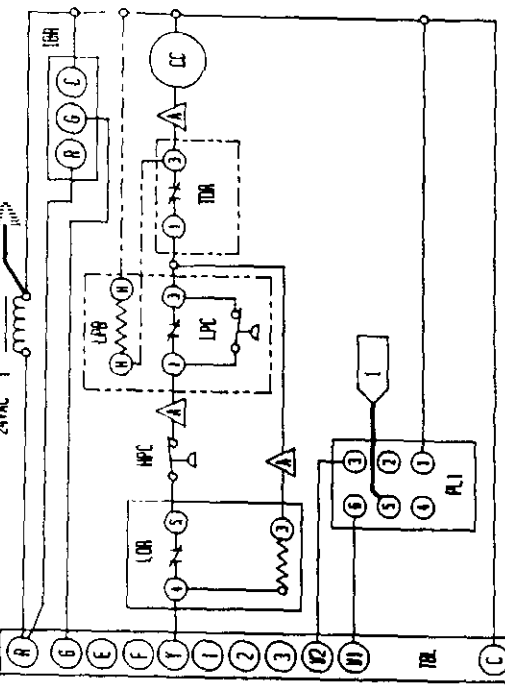
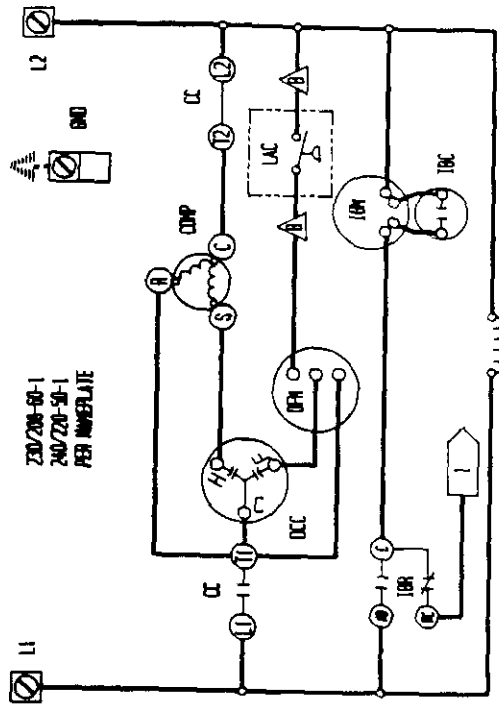


COMPONENT CODE	DESCRIPTION
CM1	CONDENSER FAN MOTOR
CM2	CONDENSER FAN MOTOR
CC	COMPRESSOR CONTACTOR
CC1	COMPRESSOR CONTACTOR
CC2	COMPRESSOR CONTACTOR
CC3	COMPRESSOR CONTACTOR
CC4	COMPRESSOR CONTACTOR
CC5	COMPRESSOR CONTACTOR
CC6	COMPRESSOR CONTACTOR
CC7	COMPRESSOR CONTACTOR
CC8	COMPRESSOR CONTACTOR
CC9	COMPRESSOR CONTACTOR
CC10	COMPRESSOR CONTACTOR
CC11	COMPRESSOR CONTACTOR
CC12	COMPRESSOR CONTACTOR
CC13	COMPRESSOR CONTACTOR
CC14	COMPRESSOR CONTACTOR
CC15	COMPRESSOR CONTACTOR
CC16	COMPRESSOR CONTACTOR
CC17	COMPRESSOR CONTACTOR
CC18	COMPRESSOR CONTACTOR
CC19	COMPRESSOR CONTACTOR
CC20	COMPRESSOR CONTACTOR
CC21	COMPRESSOR CONTACTOR
CC22	COMPRESSOR CONTACTOR
CC23	COMPRESSOR CONTACTOR
CC24	COMPRESSOR CONTACTOR
CC25	COMPRESSOR CONTACTOR
CC26	COMPRESSOR CONTACTOR
CC27	COMPRESSOR CONTACTOR
CC28	COMPRESSOR CONTACTOR
CC29	COMPRESSOR CONTACTOR
CC30	COMPRESSOR CONTACTOR
CC31	COMPRESSOR CONTACTOR
CC32	COMPRESSOR CONTACTOR
CC33	COMPRESSOR CONTACTOR
CC34	COMPRESSOR CONTACTOR
CC35	COMPRESSOR CONTACTOR
CC36	COMPRESSOR CONTACTOR
CC37	COMPRESSOR CONTACTOR
CC38	COMPRESSOR CONTACTOR
CC39	COMPRESSOR CONTACTOR
CC40	COMPRESSOR CONTACTOR
CC41	COMPRESSOR CONTACTOR
CC42	COMPRESSOR CONTACTOR
CC43	COMPRESSOR CONTACTOR
CC44	COMPRESSOR CONTACTOR
CC45	COMPRESSOR CONTACTOR
CC46	COMPRESSOR CONTACTOR
CC47	COMPRESSOR CONTACTOR
CC48	COMPRESSOR CONTACTOR
CC49	COMPRESSOR CONTACTOR
CC50	COMPRESSOR CONTACTOR
CC51	COMPRESSOR CONTACTOR
CC52	COMPRESSOR CONTACTOR
CC53	COMPRESSOR CONTACTOR
CC54	COMPRESSOR CONTACTOR
CC55	COMPRESSOR CONTACTOR
CC56	COMPRESSOR CONTACTOR
CC57	COMPRESSOR CONTACTOR
CC58	COMPRESSOR CONTACTOR
CC59	COMPRESSOR CONTACTOR
CC60	COMPRESSOR CONTACTOR
CC61	COMPRESSOR CONTACTOR
CC62	COMPRESSOR CONTACTOR
CC63	COMPRESSOR CONTACTOR
CC64	COMPRESSOR CONTACTOR
CC65	COMPRESSOR CONTACTOR
CC66	COMPRESSOR CONTACTOR
CC67	COMPRESSOR CONTACTOR
CC68	COMPRESSOR CONTACTOR
CC69	COMPRESSOR CONTACTOR
CC70	COMPRESSOR CONTACTOR
CC71	COMPRESSOR CONTACTOR
CC72	COMPRESSOR CONTACTOR
CC73	COMPRESSOR CONTACTOR
CC74	COMPRESSOR CONTACTOR
CC75	COMPRESSOR CONTACTOR
CC76	COMPRESSOR CONTACTOR
CC77	COMPRESSOR CONTACTOR
CC78	COMPRESSOR CONTACTOR
CC79	COMPRESSOR CONTACTOR
CC80	COMPRESSOR CONTACTOR
CC81	COMPRESSOR CONTACTOR
CC82	COMPRESSOR CONTACTOR
CC83	COMPRESSOR CONTACTOR
CC84	COMPRESSOR CONTACTOR
CC85	COMPRESSOR CONTACTOR
CC86	COMPRESSOR CONTACTOR
CC87	COMPRESSOR CONTACTOR
CC88	COMPRESSOR CONTACTOR
CC89	COMPRESSOR CONTACTOR
CC90	COMPRESSOR CONTACTOR
CC91	COMPRESSOR CONTACTOR
CC92	COMPRESSOR CONTACTOR
CC93	COMPRESSOR CONTACTOR
CC94	COMPRESSOR CONTACTOR
CC95	COMPRESSOR CONTACTOR
CC96	COMPRESSOR CONTACTOR
CC97	COMPRESSOR CONTACTOR
CC98	COMPRESSOR CONTACTOR
CC99	COMPRESSOR CONTACTOR
CC100	COMPRESSOR CONTACTOR

WIRE COLOR	WIRE SIZE	WIRE TYPE	WIRE LENGTH	WIRE WEIGHT
BLACK	14	THIN	100	0.01
BROWN	14	THIN	100	0.01
RED	14	THIN	100	0.01
ORANGE	14	THIN	100	0.01
YELLOW	14	THIN	100	0.01
GREEN	14	THIN	100	0.01
BLUE	14	THIN	100	0.01
WHITE	14	THIN	100	0.01
VIOLET	14	THIN	100	0.01
PURPLE	14	THIN	100	0.01
GRAY	14	THIN	100	0.01
SLATE	14	THIN	100	0.01
PINK	14	THIN	100	0.01
TAPE	14	THIN	100	0.01
PAINT	14	THIN	100	0.01
LAQUER	14	THIN	100	0.01
OK / AMPL	14	THIN	100	0.01

230/208-60-1  
 240/220-50-1  
 PER WIREPLATE

230/208-60-1  
 240/220-50-1  
 PER WIREPLATE



USE COPPER CONDUCTORS

Z30/Z30-50-1  
Z40/Z40-50-1  
PER INHERITATE

Z30/Z30-50-1  
Z40/Z40-50-1  
PER INHERITATE

COMPONENT CODE	
IBR	INDOOR BLOWER RELAY
IAC	LOW AMBIENT CONTROL
LAC	LOCK OUT RELAY
LPB	LOW PRESSURE BYPASS
LPC	LOW PRESSURE CONTROL
LS	LIMIT SWITCH
OFM	OUTDOOR FAN MOTOR
RLA	RELAY-IN-AIR
SN	START KIT
T	TRANSFORMER
IB	INDOOR BLOWER RELAY
IBL	INDOOR BLOWER RELAY
IBO	INDOOR BLOWER RELAY
IBP	INDOOR BLOWER RELAY
IBR	INDOOR BLOWER RELAY
IBS	INDOOR BLOWER RELAY
IBT	INDOOR BLOWER RELAY
IBU	INDOOR BLOWER RELAY
IBV	INDOOR BLOWER RELAY
IBW	INDOOR BLOWER RELAY
IBX	INDOOR BLOWER RELAY
IBY	INDOOR BLOWER RELAY
IBZ	INDOOR BLOWER RELAY

MOVE RED WIRE TO Z06V TAP FOR Z06V OPERATION

WIRE COLOR	WIRE CODE	WIRE COLOR	WIRE CODE
BLACK	Y	WHITE	1
BROWN	G	PURPLE	7
RED	B	GRAY	2
ORANGE	V	SLATE	4

RED (LOW) BLACK (HIGH)

LABELLED WIRES CONNECT IF NO OPTIONS USED.

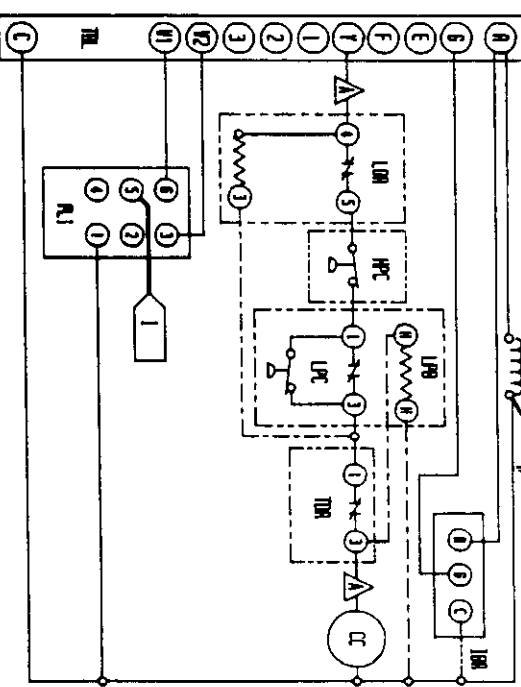
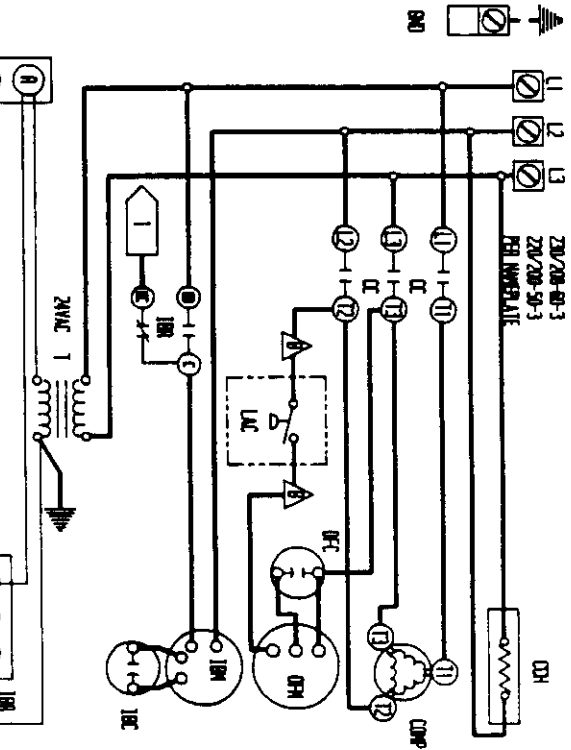
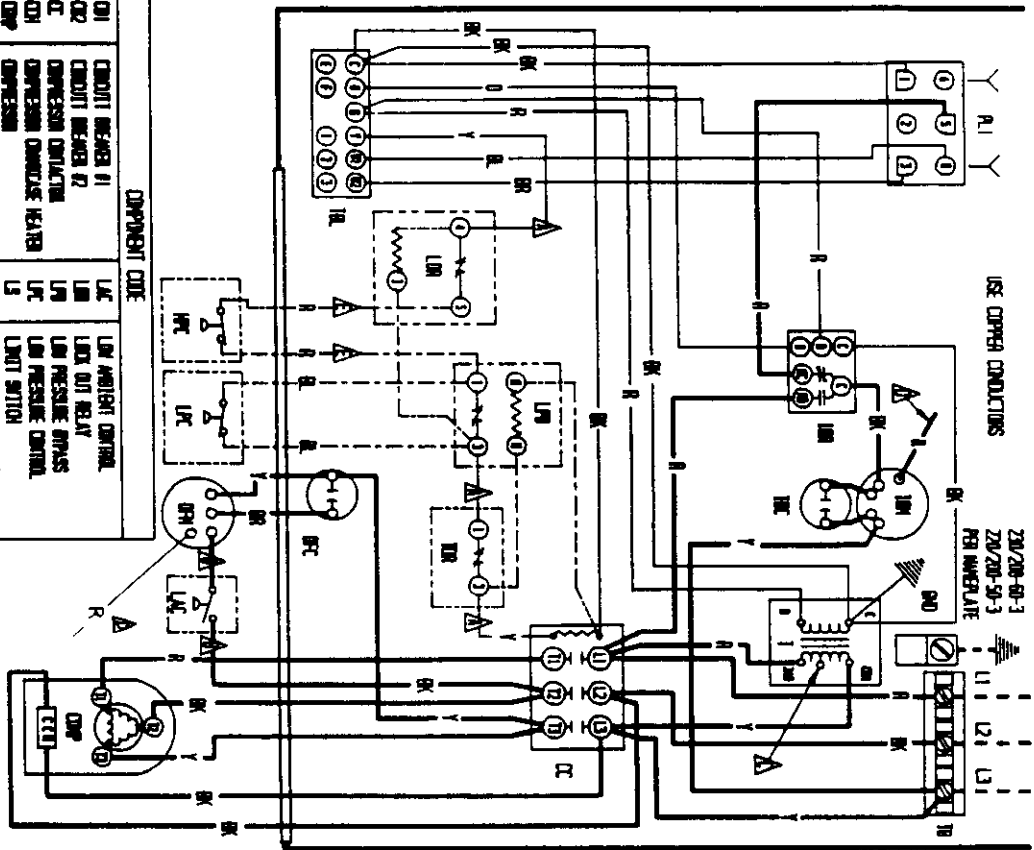
WIRE TYPE	WIRE CODE	WIRE TYPE	WIRE CODE
HIGH VOLTAGE	Y	OPTIONAL	
LOW VOLTAGE	G		
ACCESSORY	B		
	V		

BARAD MFG. CO.

DWG. 4055-112

DRAWN BY: CB

CHECKED BY: CB/APP



### COMPONENT CODE

CR1	COMPRESSOR
CR2	COMPRESSOR
CR3	COMPRESSOR
CR4	COMPRESSOR
CR5	COMPRESSOR
CR6	COMPRESSOR
CR7	COMPRESSOR
CR8	COMPRESSOR
CR9	COMPRESSOR
CR10	COMPRESSOR
CR11	COMPRESSOR
CR12	COMPRESSOR
CR13	COMPRESSOR
CR14	COMPRESSOR
CR15	COMPRESSOR
CR16	COMPRESSOR
CR17	COMPRESSOR
CR18	COMPRESSOR
CR19	COMPRESSOR
CR20	COMPRESSOR

### WIRE COLOR

L	BLACK
M	RED
E	YELLOW
F	GREEN
T	BLUE
M1	WHITE
M2	BLACK
M3	RED
M4	YELLOW
M5	GREEN
M6	BLUE
M7	WHITE

### RAID INC. CO.

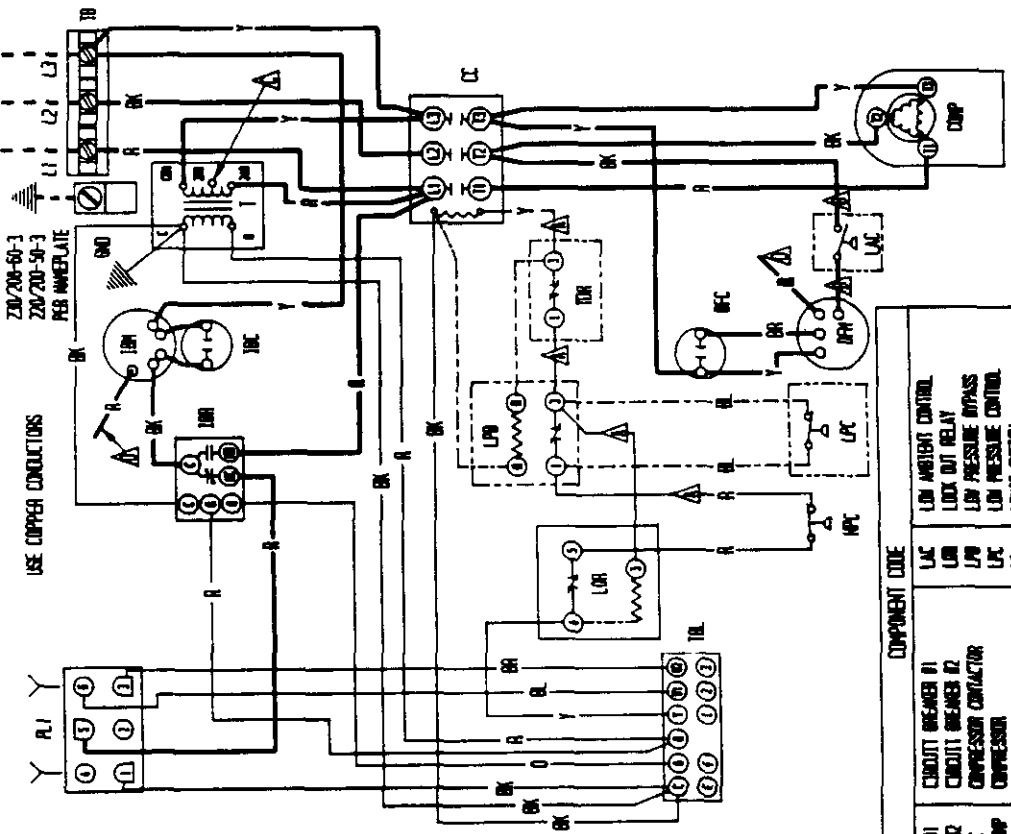
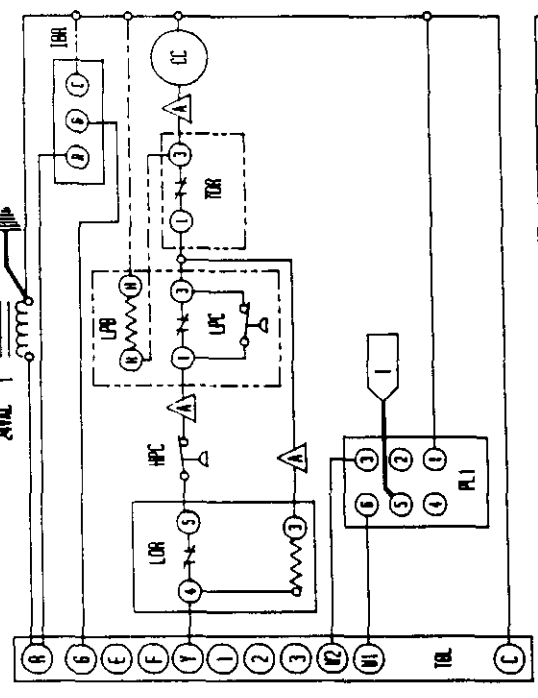
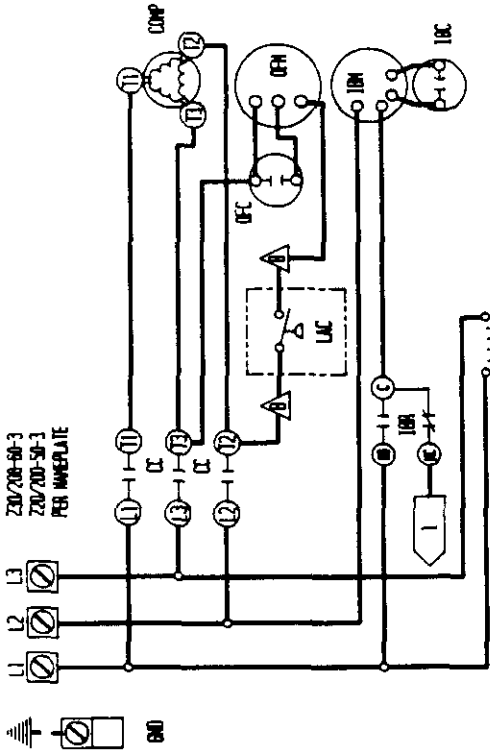
4085-210 C

INC. IND

IND. IND

IND. IND

RED WIRE TO BE USED. Δ WIRE RED WIRE TO BE USED FOR 220V OPERATION. Δ WIRE RED WIRE TO BE USED FOR 208V OPERATION.



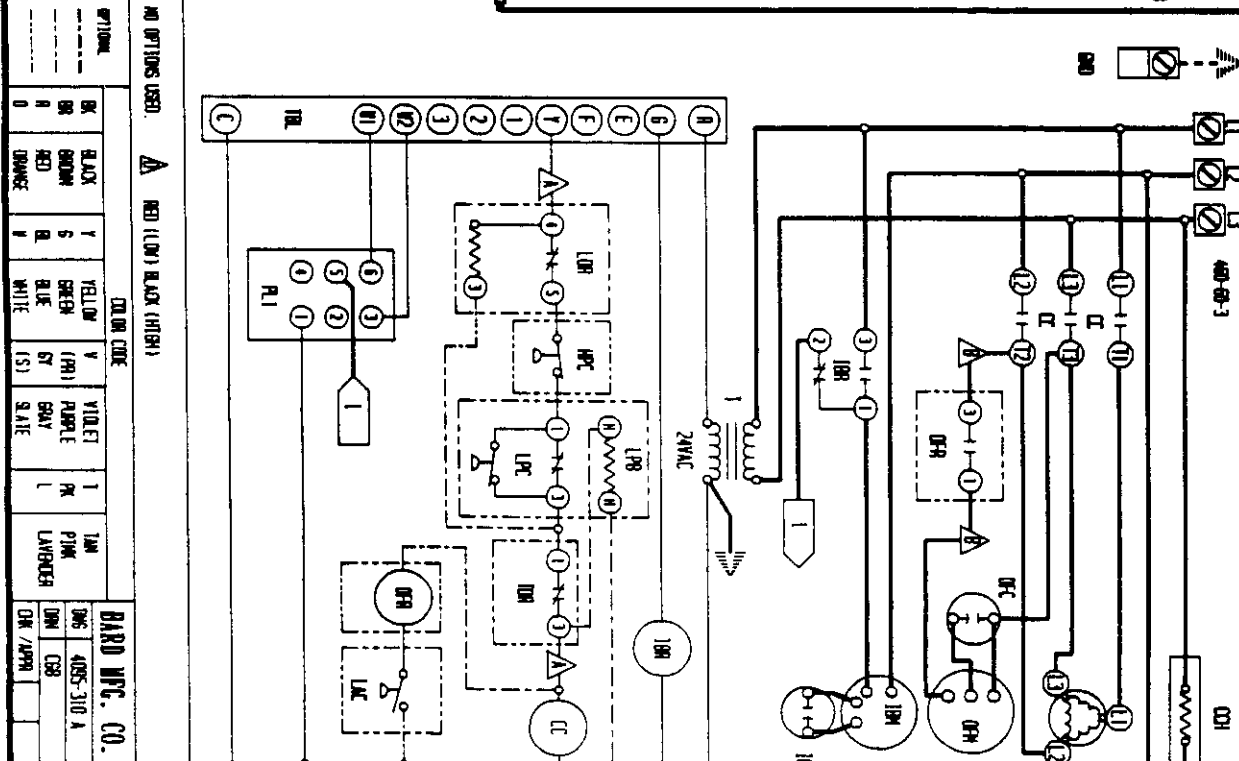
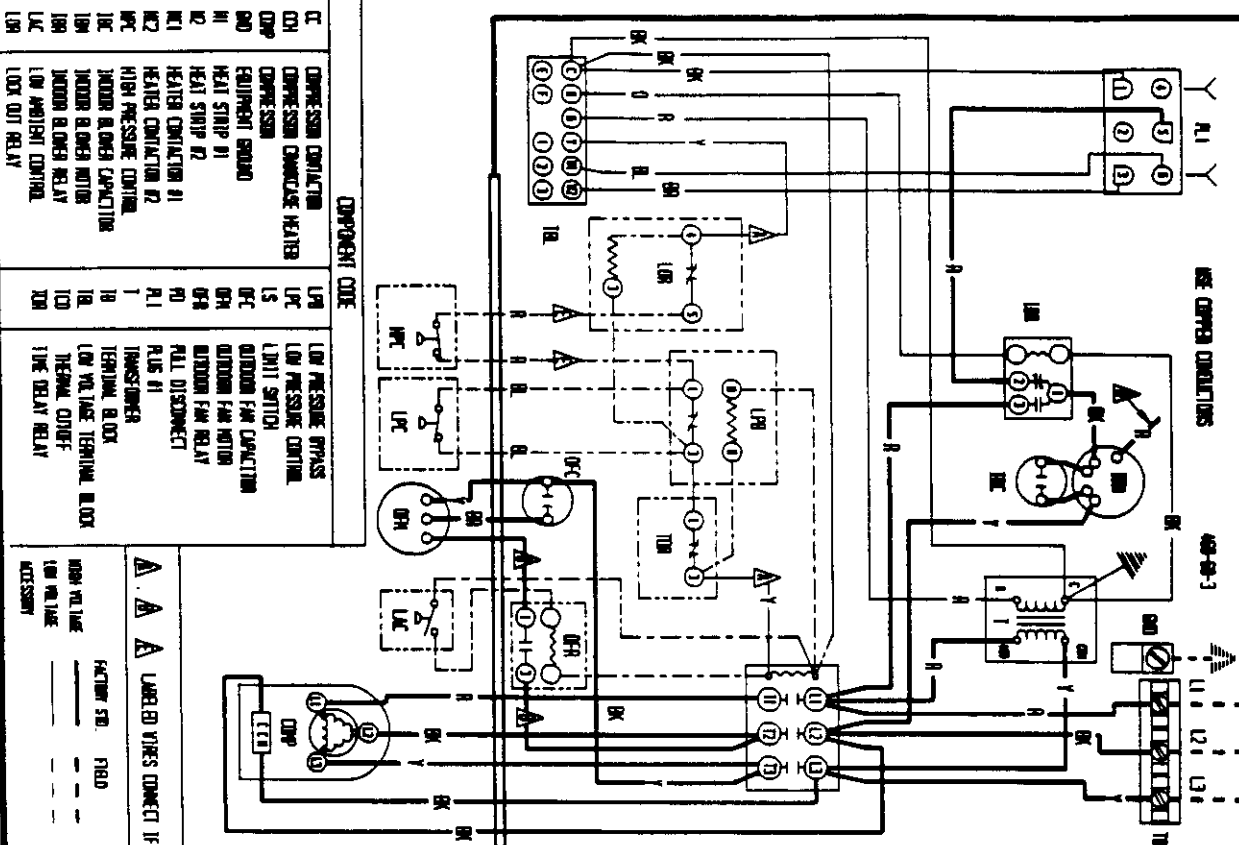
USE COPPER CONDUCTORS  
Z30/200-50-3  
Z20/200-50-3  
PER MANUFACTURER

COMPONENT CODE	DESCRIPTION
CB1	CIRCUIT BREAKER #1
CB2	CIRCUIT BREAKER #2
CC	COMPRESSOR CONTACTOR
COMP	COMPRESSOR
EQ	EQUIPMENT GROUND
HS1	HEAT STRIP #1
HS2	HEAT STRIP #2
HC1	HEATER CONTACTOR #1
HC2	HEATER CONTACTOR #2
HPC	HIGH PRESSURE CONTROL
IM1	INDOOR BLOWER MOTOR
IM2	INDOOR BLOWER RELAY
LAC	LOW AMBIENT CONTROL
LOR	LOCK OUT RELAY
LPI	LOW PRESSURE INPASS
LPC	LOW PRESSURE CONTROL
LS	LIMIT SWITCH
OPC	OUTDOOR FAN CAPACITOR
OPR	OUTDOOR FAN MOTOR
PL1	PLUS #1
SC	START KIT
T	TEMPERATURE
TR	TRANSFORMER
TV	TEMPERATURE BLOCK
TVL	LOW VOLTAGE TERMINAL BLOCK
TVH	HIGH VOLTAGE TERMINAL BLOCK
TRM	TERMINAL STRIP
TRR	THE RELAY RELAY

▲ Labeled wires connect if no options used. ▲ Move red wire to 200V tap for 200V operation. ▲ Red (low) black (high)

FACTORY WIRE	FIELD	OPTIONAL	COLOR CODE
HIGH VOLTAGE	---	---	BLACK
LOW VOLTAGE	---	---	RED
ACCUMULATOR	---	---	WHITE
---	---	---	BLUE
---	---	---	GREEN
---	---	---	YELLOW
---	---	---	VIOLET
---	---	---	PINK
---	---	---	TAN
---	---	---	LAURENCE

BARCO MFG. CO.  
DWS 405-212  
DWN. CSB  
CHK./APP.



COMPONENT CODE	COMPONENT DESCRIPTION
CC	COMPRESSOR CONTACTOR
CD	CONDENSER CONTACTOR
CP	COMPRESSOR CONTACTOR HEATER
EQ	EQUIPMENT GROUND
HS	HEAT STRIP #1
HT	HEAT STRIP #2
H1	HEATER CONTACTOR #1
H2	HEATER CONTACTOR #2
HP	HIGH PRESSURE CONTACTOR
IR	INDOOR BLOWER RELAY
OR	INDOOR BLOWER RELAY
LR	LOW AMBIENT CONTROL
LO	LOOT OUT RELAY
LRA	LOW PRESSURE BYPASS
LRC	LOW PRESSURE CONTROL
LRF	LOW PRESSURE CONTROL
LRS	LOW PRESSURE CONTROL
LRT	LOW PRESSURE CONTROL
LRU	LOW PRESSURE CONTROL
LRV	LOW PRESSURE CONTROL
LRW	LOW PRESSURE CONTROL
LRX	LOW PRESSURE CONTROL
LRY	LOW PRESSURE CONTROL
LRA	LOW PRESSURE CONTROL
LRC	LOW PRESSURE CONTROL
LRF	LOW PRESSURE CONTROL
LRS	LOW PRESSURE CONTROL
LRT	LOW PRESSURE CONTROL
LRU	LOW PRESSURE CONTROL
LRV	LOW PRESSURE CONTROL
LRW	LOW PRESSURE CONTROL
LRX	LOW PRESSURE CONTROL
LRY	LOW PRESSURE CONTROL
LRA	LOW PRESSURE CONTROL
LRC	LOW PRESSURE CONTROL
LRF	LOW PRESSURE CONTROL
LRS	LOW PRESSURE CONTROL
LRT	LOW PRESSURE CONTROL
LRU	LOW PRESSURE CONTROL
LRV	LOW PRESSURE CONTROL
LRW	LOW PRESSURE CONTROL
LRX	LOW PRESSURE CONTROL
LRY	LOW PRESSURE CONTROL
LRA	LOW PRESSURE CONTROL
LRC	LOW PRESSURE CONTROL
LRF	LOW PRESSURE CONTROL
LRS	LOW PRESSURE CONTROL
LRT	LOW PRESSURE CONTROL
LRU	LOW PRESSURE CONTROL
LRV	LOW PRESSURE CONTROL
LRW	LOW PRESSURE CONTROL
LRX	LOW PRESSURE CONTROL
LRY	LOW PRESSURE CONTROL

WIRE BOND VIBES CONNECT IF NO OPTIONS USED.

▲ RED (LOW) BLACK (HIGH)

▲ ▲ ▲

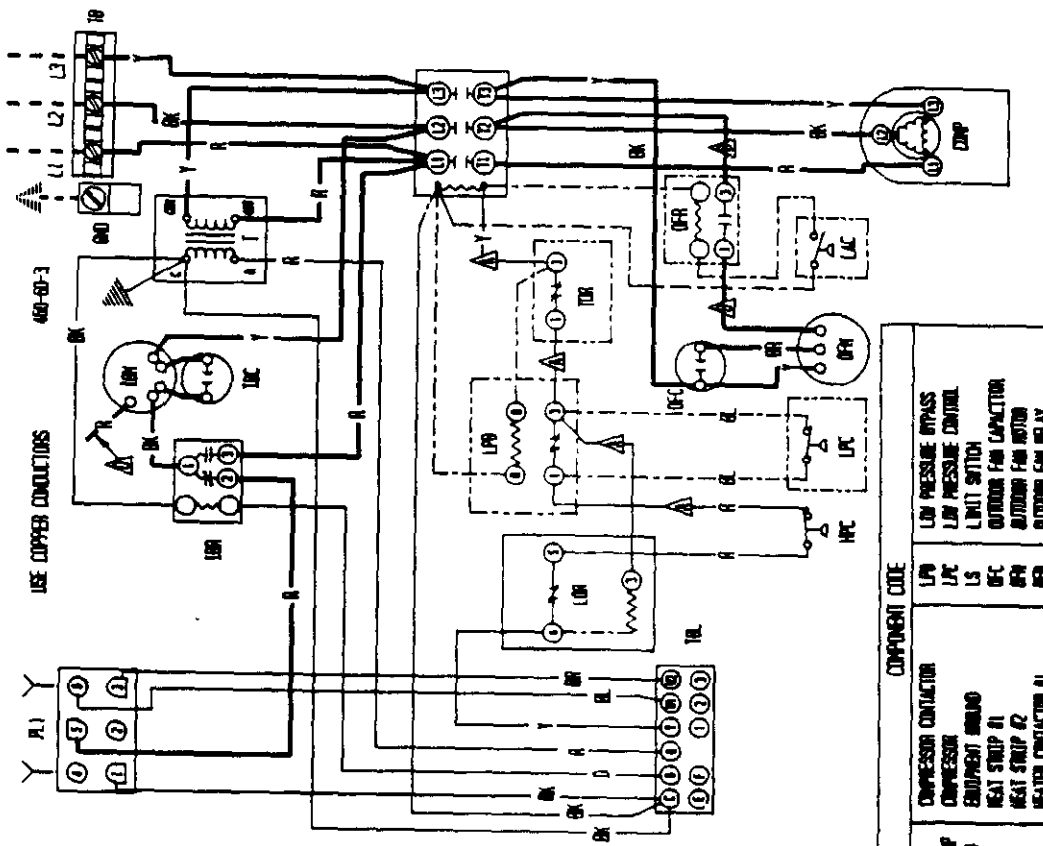
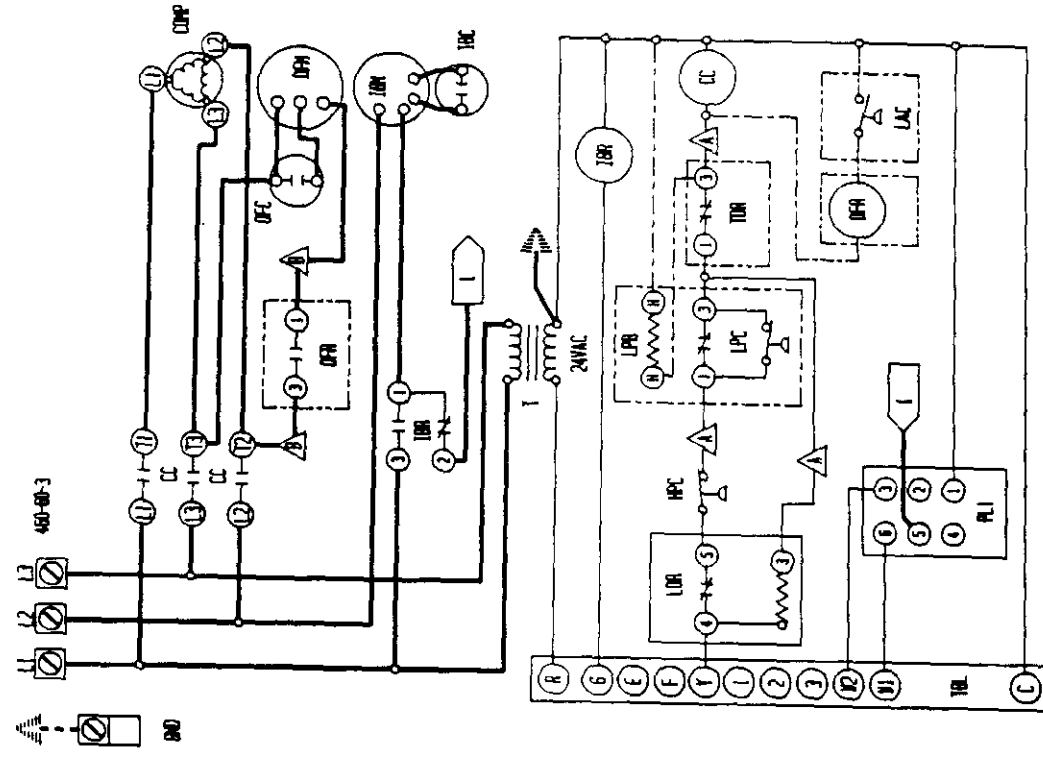
OPTIONAL

WIRE BOND VIBES CONNECT IF NO OPTIONS USED.

▲ RED (LOW) BLACK (HIGH)

▲ ▲ ▲





COMPONENT CODE	
CC	COMPRESSOR CAPACITOR
CCP	COMPRESSOR CAPACITOR
CCO	COMPRESSOR CAPACITOR
CC1	HEAT STRIP #1
CC2	HEAT STRIP #2
CC3	HEAT STRIP #3
CC4	HEAT STRIP #4
CC5	HEAT STRIP #5
CC6	HEAT STRIP #6
CC7	HEAT STRIP #7
CC8	HEAT STRIP #8
CC9	HEAT STRIP #9
CC10	HEAT STRIP #10
CC11	HEAT STRIP #11
CC12	HEAT STRIP #12
CC13	HEAT STRIP #13
CC14	HEAT STRIP #14
CC15	HEAT STRIP #15
CC16	HEAT STRIP #16
CC17	HEAT STRIP #17
CC18	HEAT STRIP #18
CC19	HEAT STRIP #19
CC20	HEAT STRIP #20
CC21	HEAT STRIP #21
CC22	HEAT STRIP #22
CC23	HEAT STRIP #23
CC24	HEAT STRIP #24
CC25	HEAT STRIP #25
CC26	HEAT STRIP #26
CC27	HEAT STRIP #27
CC28	HEAT STRIP #28
CC29	HEAT STRIP #29
CC30	HEAT STRIP #30
CC31	HEAT STRIP #31
CC32	HEAT STRIP #32
CC33	HEAT STRIP #33
CC34	HEAT STRIP #34
CC35	HEAT STRIP #35
CC36	HEAT STRIP #36
CC37	HEAT STRIP #37
CC38	HEAT STRIP #38
CC39	HEAT STRIP #39
CC40	HEAT STRIP #40
CC41	HEAT STRIP #41
CC42	HEAT STRIP #42
CC43	HEAT STRIP #43
CC44	HEAT STRIP #44
CC45	HEAT STRIP #45
CC46	HEAT STRIP #46
CC47	HEAT STRIP #47
CC48	HEAT STRIP #48
CC49	HEAT STRIP #49
CC50	HEAT STRIP #50

BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK
BROWN	BROWN	BROWN	BROWN	BROWN	BROWN	BROWN	BROWN
RED	RED	RED	RED	RED	RED	RED	RED
ORANGE	ORANGE	ORANGE	ORANGE	ORANGE	ORANGE	ORANGE	ORANGE
WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
BLUE	BLUE	BLUE	BLUE	BLUE	BLUE	BLUE	BLUE
PURPLE	PURPLE	PURPLE	PURPLE	PURPLE	PURPLE	PURPLE	PURPLE
VIOLET	VIOLET	VIOLET	VIOLET	VIOLET	VIOLET	VIOLET	VIOLET
PINK	PINK	PINK	PINK	PINK	PINK	PINK	PINK
LAVENDER	LAVENDER	LAVENDER	LAVENDER	LAVENDER	LAVENDER	LAVENDER	LAVENDER
C	C	C	C	C	C	C	C
F	F	F	F	F	F	F	F
G	G	G	G	G	G	G	G
H	H	H	H	H	H	H	H
J	J	J	J	J	J	J	J
K	K	K	K	K	K	K	K
L	L	L	L	L	L	L	L
M	M	M	M	M	M	M	M
N	N	N	N	N	N	N	N
P	P	P	P	P	P	P	P
Q	Q	Q	Q	Q	Q	Q	Q
R	R	R	R	R	R	R	R
S	S	S	S	S	S	S	S
T	T	T	T	T	T	T	T
V	V	V	V	V	V	V	V
W	W	W	W	W	W	W	W
X	X	X	X	X	X	X	X
Y	Y	Y	Y	Y	Y	Y	Y
Z	Z	Z	Z	Z	Z	Z	Z

BARCO MFG. CO.  
 ENG. 4085-312  
 DRG. 130  
 CAL/MFR.

UNLABELED WIRES CONNECT IF NO OPTIONS USED.  $\Delta$  RED (LOW) BLACK (HIGH)

USE COPPER CONDUCTORS

