



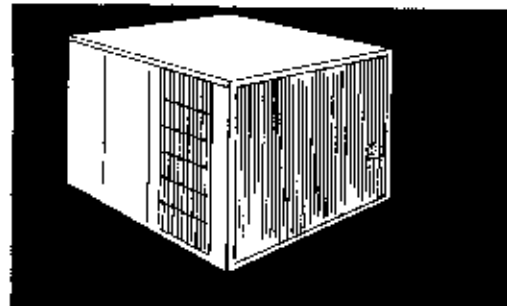
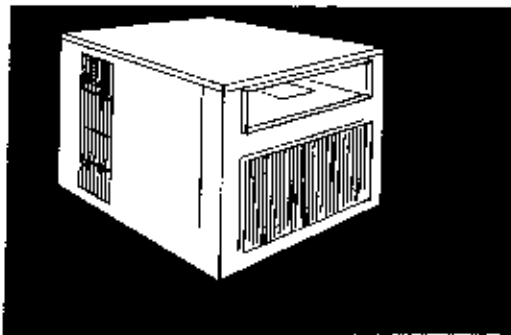
**MODELS**  
**P24A2**

**PACKAGED AIR CONDITIONER**  
**INSTALLATION INSTRUCTIONS**  
**FOR RESIDENTIAL AND COMMERCIAL**  
**HEATING / COOLING APPLICATIONS**

**BARD MANUFACTURING CO. • BRYAN, OHIO 43506**

*Dependable quality home equipment . . . since 1914*

Model	NOMINAL CABINET DIMENSIONS (Inches)						DUCT OPENINGS (Inches)			
	A	B	C	H	J	K	D	E	F	G
P2AA2	23 1/2	40	32	1 1/2	21 1/4	11	24	6	28	12
P3AA4 P31A	24 1/2	48 1/2	38 1/2	1 1/2	25 1/4	17 1/4	33	6	33	14
P4AA4, P6AA4	31 1/2	50	42	1 1/2	22 1/4	16 1/4	38	10	38	16



MODEL	Rated Volts & Ph	Operating Voltage Range	Heater* kW	Max Unit Amps	No. Field Power Circuits	Internal Fuses Ckt. A/B	Required Δ Overcurrent Protection	WIRING INFORMATION**			
								Min. Ckt. Ampacity Ckt. A/B	Field Power Wiring Ckt. A/B	Ground Wire Size Ckt. A/B	Wiring Diagram Number
P2AA2	230/208-1	197-253	0	17.3	1		30	21	10	10	4000-110A
			5	24.8	1		35	31	8	10	-120A
			10	45.6	1		60	57	4	10	-130A
P31A	230/208-1	197-253	0	20.4	1		40	25	10	10	4048-110
			6	23.6	1		40	30	10	10	-120A
			10	44.4	1		60	56	4	10	-130A
			15	65.3	1	60/30	90	82	3	8	-140A
P3AA4	230/208	197-253	0	22.4	1		40	27	10	10	4001-110D
			5	23.6	1		40	30	10	10	-120D
			10	44.4	1		60	56	4	10	-130D
			15	65.3	1	60/30	90	82	3	8	-140D
P4AA4	230/208-3	197-253	0	17.4	1		30	21	10	10	4001-210C
			9	24.6	1		35	31	8	10	-220C
			12	31.7	1		40	40	8	10	-230C
			15	39	1		50	50	6	10	-230D
P3AA4	460-3	414-506	0	9.7	1		15	15	14	14	4001-310C
			9	12.1	1		20	16	12	12	-320E
			12	16.7	1		20	20	12	12	-320E
			15	19.3	1		25	25	10	10	-320E
P4AA4	230/208-1	197-253	0	28	1		50	34	8	10	4002-110C
			5	28	1		60	34	8	10	-120C
			10	44.8	1		60	56	4	10	-130C
			15	65.7	1	60/30	90	83	3	8	-140E
			20	86.5	1	60/60	110	108	1	6	-150E
P4AA4	230/208-3	197-253	0	20	1		35	24	10	10	4002-210C
			9	24.9	1		35	32	8	10	-220C
			12	32.1	1		45	41	6	10	-230D
			15	39.4	1		50	50	6	10	-230D
			18	46.6	1		60	59	4	10	-240E
P4AA4	460-3	414-506	0	11	1		20	15	14	14	4002-310B
			9	12.4	1		20	16	12	12	-320B
			12	16	1		20	20	12	12	-320B
			15	19.6	1		25	25	10	10	-320B
			18	23.3	1		30	30	10	10	-330B
P6AA4	230/208-1	197-253	0	36.5	1		60	45	6	10	4002-110C
			5	36.5	1		80	45	6	10	-120C
			10	44.8	1		90	86	4	10	-130C
			15	65.7	1	60/30	90	83	3	8	-140E
			20	86.5	1	60/60	110	108	1	6	-160E
P6AA4	230/208-3	197-253	0	27.5	1		50	34	8	10	4002-210C
			9	27.5	1		50	34	8	10	-220C
			12	32.1	1		50	41	6	10	-230D
			15	39.4	1		60	50	6	10	-230D
			18	46.6	1		60	59	4	10	-240E
P6AA4	460-3	414-506	0	13.8	1		25	17	12	12	4002-310B
			9	13.8	1		25	17	12	12	-320B
			12	16	1		25	20	12	12	-320B
			15	19.4	1		25	25	10	10	-320B
			18	23.3	1		30	30	10	10	-330B

\*Electric heaters are nominal kW @ 240V or 480V.  
 \*\*Based on 60°C copper wire. Other wiring materials must be rated for marked "minimum circuit ampacity" or greater. Not all models approved for aluminum wire.

⚠ Time delay fuses or "NACR Type" circuit breakers must be used for 60 and smaller sizes. Standard fuses or circuit breakers are suitable for sizes 70 and larger.

# APPLICATION AND INSTALLATION INSTRUCTIONS FOR SINGLE PACKAGE AIR CONDITIONERS

## IMPORTANT

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians. Any heat pump is more critical of proper operating charge and an adequate duct system than a straight air conditioning unit. All duct work, supply and return, must be properly sized for the design air flow requirement of the equipment. NESCA 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.

## 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.

## GENERAL

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.

## INSTALLATION

Size of unit for a proposed installation should be based on heat loss calculation made according to methods of National Warm Air Heating and Air Conditioning Association. 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.

## LOCATION

The unit must be located outside, or in a well ventilated area. It must not be in the space being heated or cooled. A sound absorbing material should be considered if the unit is to be installed in such a position or location that might cause transmission of sound or vibration to the living area or adjacent buildings.

## TYPICAL INSTALLATIONS

- Roof-Mounted** - The unit is mounted on a sturdy base on the roof of the building. Return air to the unit is brought through a single return grille (grilles with built-in filters are best, since they enable easy access for filter changing). Return air ducts are attached to the lower section of the front panel. Supply air is brought from the unit to attic duct work or to a furred down hall. Supply air duct is attached to the top of the front panel. CAUTION: All outdoor duct work must be thoroughly insulated and weatherproofed. All attic duct work must be thoroughly insulated. Two inch thick insulation with suitable vapor barrier is recommended for both outdoor and attic runs. In roof-top installation, as in all installations, the heat pump must be level from side to side. However, the unit should have a pitch along the length to assure complete external drainage of precipitation and of defrost condensate.
- Crawl Space** - Duct work installed in crawl space must be well insulated and provided with a vapor barrier. In addition, the crawl space must be thoroughly ventilated and provided with a good vapor barrier as a ground cover. It is most desirable to install the unit outdoors, rather than inside the crawl space, so that it will be readily accessible for service. In addition, it is necessary to dispose of the condensate from the outdoor coil on the heating cycle, and this is virtually impossible with the unit installed inside the crawl space.
- Slab Mounted at Ground Level** - This type installation is ideal for homes with slab floor construction, where a roof-mounted unit is not desired. The supply and return duct work can be run through a furred closet space.
- Thru-The-Wall** - This type installation requires a suitable framework to be fabricated, capable of withstanding the unit weight. Normally the unit will be installed so as to minimize supply and return duct work.
- Other Installations** - Many other installations are possible with the packaged air conditioner. No matter what the installation, always consider the following facts:
  - Insure that the discharge air is not obstructed in any way so as to cause operation difficulties.
  - The indoor coil drain pan is equipped with a coupling that must be piped through a condensate drain trap to a suitable drain.
  - Always mount the unit in such a position that it may be easily reached for servicing and maintenance.
  - Insure that the unit is clear so that proper air flow over the outdoor coil will be maintained.

INDOOR BLOWER PERFORMANCE CFM — DRY COIL WITH FILTER			
H.S.P. In. H <sub>2</sub> O	MODELS		
	P24A2	P31A P35A4	P46A4 P60A4
.0	990	1420	1870
.10	889	1370	1830
.20	825	1320	1780
.30	747	1270	1720
.40	671	1200	1640
.50	608	1130	1565

## WIRING - MAIN POWER

Refer to the unit rating plate for wire sizing information and maximum fuse or "NACR 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. Some models are suitable only for connection with copper wire, while others can be wired with either copper or aluminum wire. Each unit and/or wiring diagram will be marked "Use Copper Conductors Only" or "Use Copper or Aluminum Conductors." These instructions **MUST** be adhered to. Refer to the National Electrical Code for complete current carrying capacity data on the various insulation grades of wiring material.

The electrical data lists fuse and wire sizes (60°F 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 Fuse" or "NACR 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.

## 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 on both cooling and heating cycles. It is imperative to match the correct pressure curve to the unit by model number.

## AIR FILTERS

Air filters for the return air side of the system are not provided as part of the basic piece of equipment because of the various types of application for these models, and must be field supplied and installed as part of the final installation.

Prior thought should be given to return air location and placement of the air filter(s). The air filter(s) must be of adequate size and readily accessible to the operator of the equipment. Filters must be adequate in size and properly maintained for proper operation. If this is not done, excessive energy use, poor performance, and multiple service problems will result. **IT IS IMPOSSIBLE TO OVERSIZE AIR FILTERS.** Generous sizing will result in cleaner air and coils, as well as lower operating costs and extend the time between required changes. The following table shows minimum filter areas and recommended filter sizes. Actual filter sizes can vary with the installation due to single or multiple returns utilizing a filter/grille arrangement or being placed immediately ahead of the indoor coil face in the return air duct.

MODEL	MINIMUM FILTER AREA	RECOMMENDED SIZE
P24A2	336 sq. in. (2.34 sq. ft)	12x30-5/8x1
P31A, P36A4	462 sq. in. (3.21 sq. ft)	15x30-5/8x1
P48A4, P60A4	608 sq. in. (4.62 sq. ft)	(2)16x20x1

NOTE: If Roof Hood Accessory is to be used, information on air filters may be found under that heading in this manual. Air filters are supplied as part of that package.

MODEL	RATED AIRFLOW	95°F O.D. Temp.	82°F O.D. Temp.
P24A2	900	49 - 51	61 - 63
P31A	1150	58 - 60	62 - 64
P36A4	1275	55 - 57	60 - 62
P48A4	1700	52 - 54	59 - 61
P60A4	1700	50 - 52	60 - 62

## CRANKCASE HEATERS

All units are provided with some form of compressor crankcase heat. Some single phase units utilize the compressor motor start winding in series with a portion of the run capacitor to generate heat within the compressor shell to prevent liquid refrigerant migration.

Some three phase units utilize a wraparound type of crankcase heater that warms the compressor oil from the outside.

Some single and three phase 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.

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.

Refer to unit wiring diagram to find exact type of crankcase heater used.

The following decal is affixed to all outdoor units detailing start-up procedure. This is very important. Please read carefully.

**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:

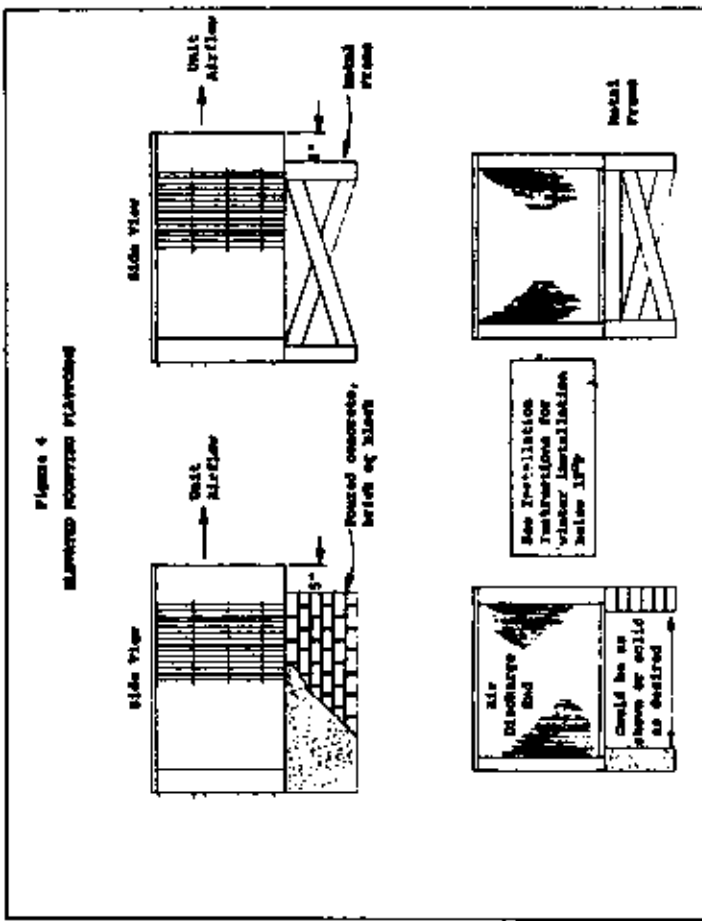
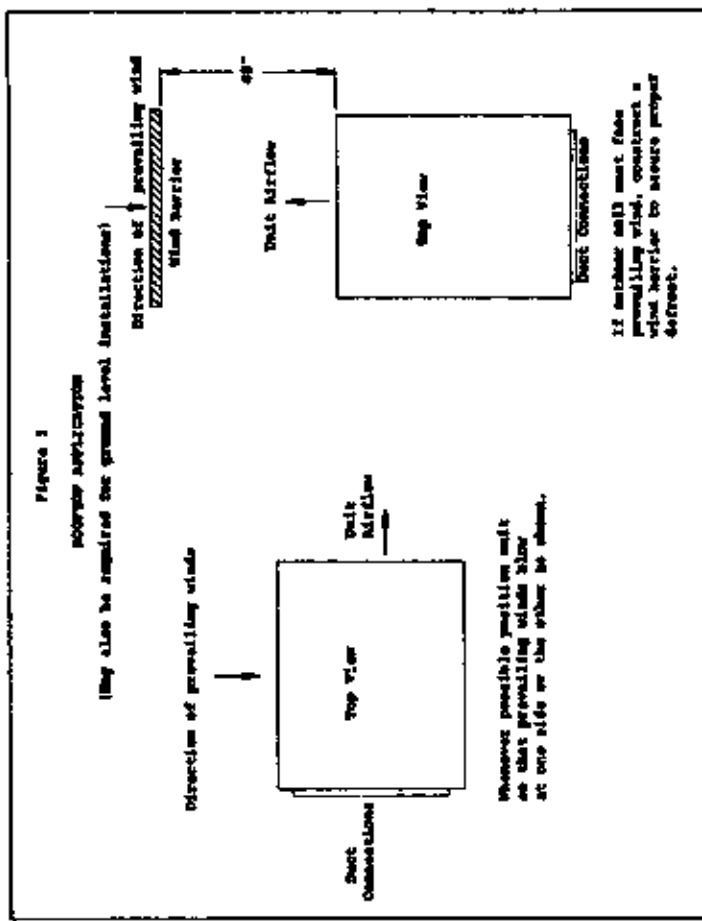
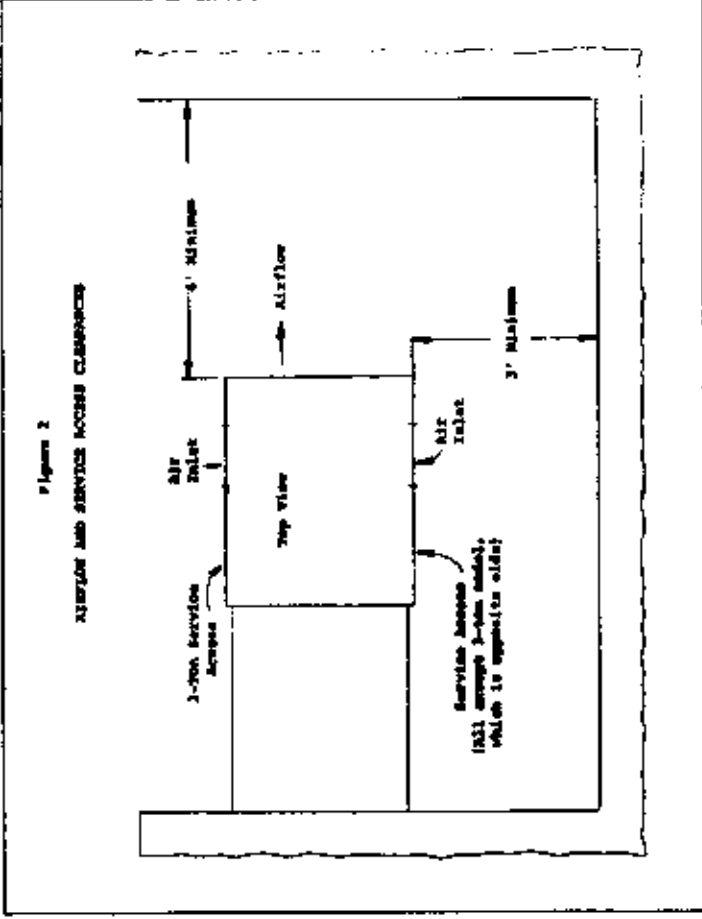
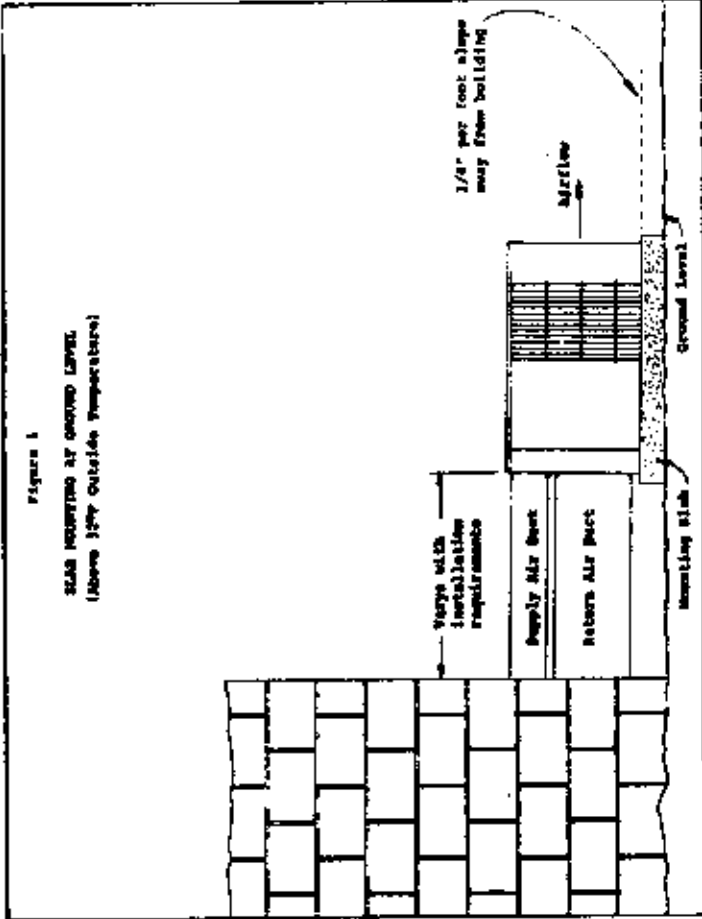
1. MAKE CERTAIN THE ROOM THERMOSTAT IS IN THE "OFF" POSITION (THE COMPRESSOR IS NOT TO OPERATE).
2. APPLY POWER BY CLOSING THE SYSTEM DISCONNECT SWITCH. THIS ENERGIZES THE COMPRESSOR HEATER WHICH EVAPORATES THE LIQUID REFRIGERANT IN THE CRANKCASE.
3. ALLOW 4 HOURS OR 60 MINUTES PER POUND OF REFRIGERANT 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.

7861-001

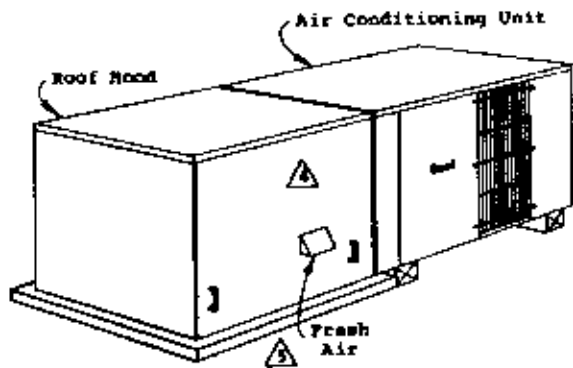
## IMPORTANT INSTALLER NOTES:

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

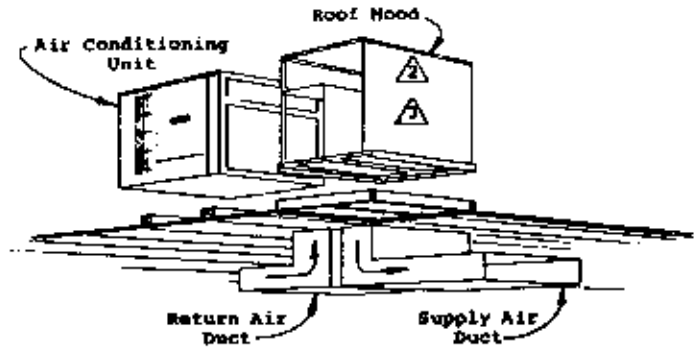
RATED CFM AND E.S.P. (NET COIL--COOLING)			
MODEL	RATED CFM	RATED E.S.P.	RECOMMENDED AIRFLOW RANGE
P24A2	900	.20	800 - 975
P31A	1150	.35	1025 - 1275
P36A4	1275	.15	1150 - 1400
P48A4	1700	.20	1520 - 1850
P60A4	1700	.20	1500 - 1850



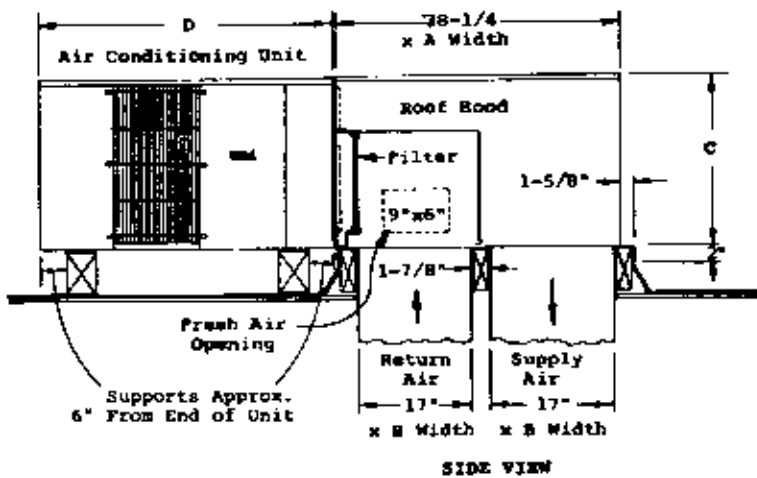
# ROOF HOOD ACCESSORY FOR SINGLE PACKAGE HEAT Pumps AND AIR CONDITIONERS



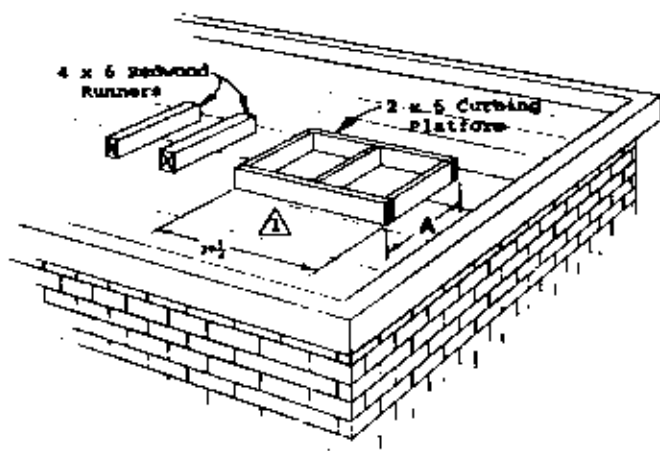
**FIG. 1 - TYPICAL ROOFTOP INSTALLATION**



**FIG. 2 - TYPICAL DUCT INSTALLATION**



**FIG. 3 - UNIT AND ROOF HOOD DETAILS**



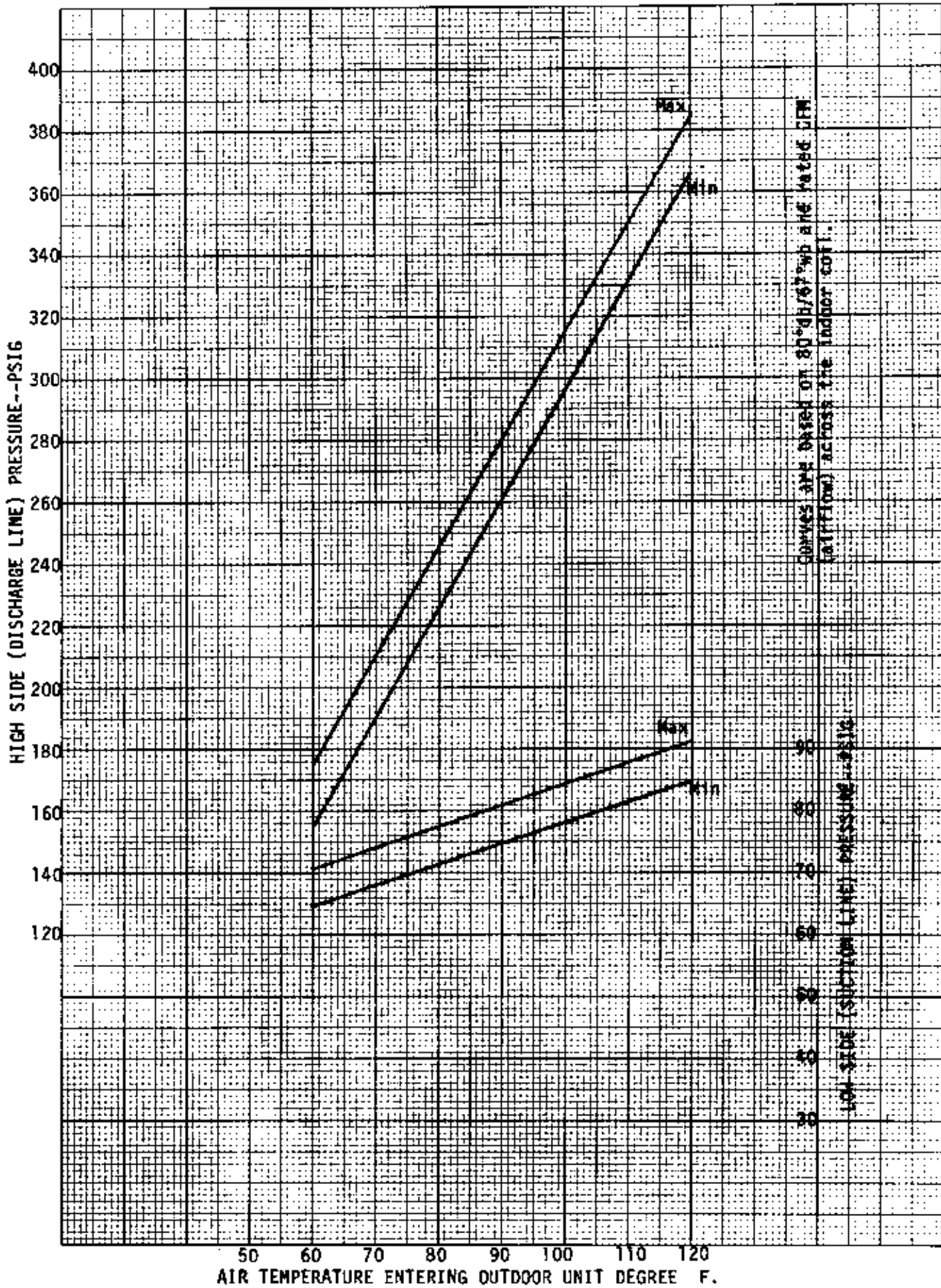
**FIG. 4 - CURBING DETAILS (FIELD FABRICATED)**

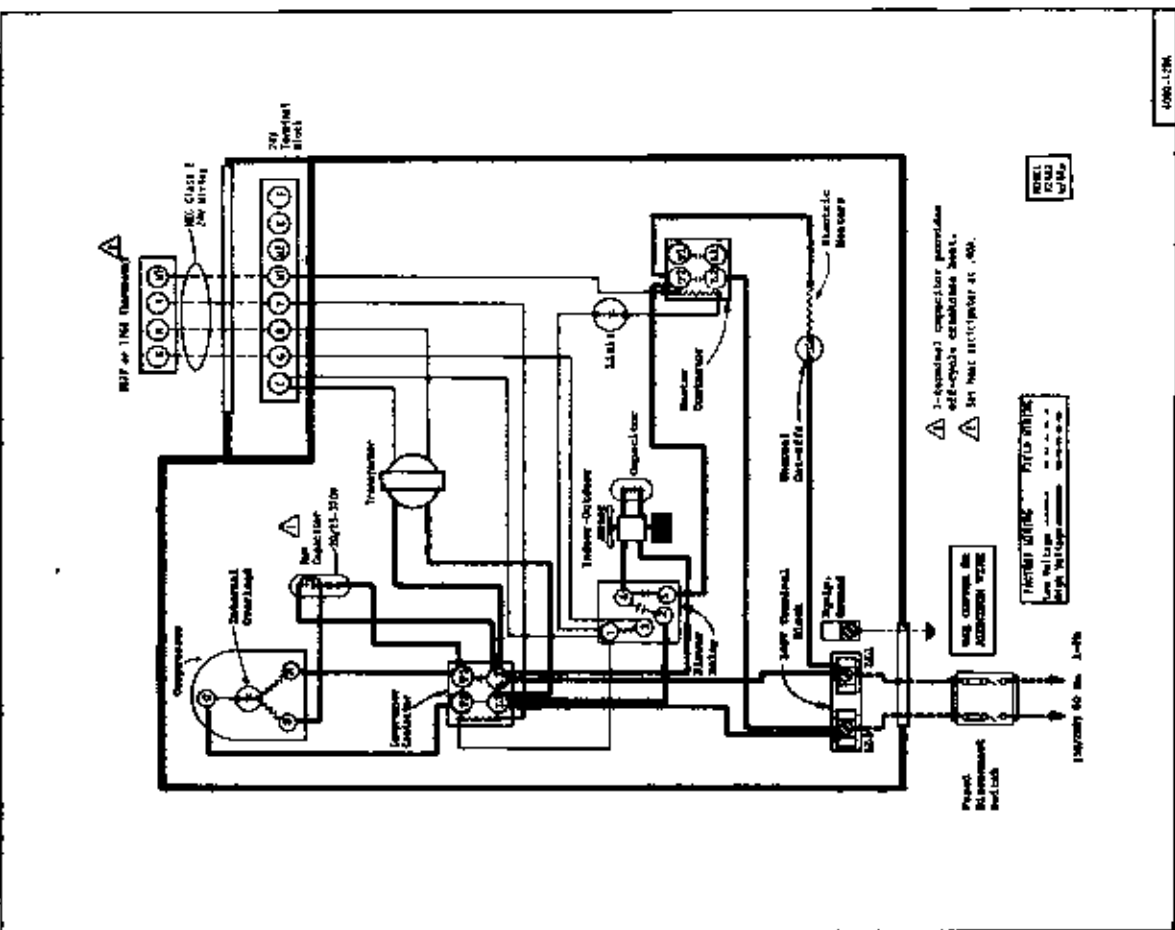
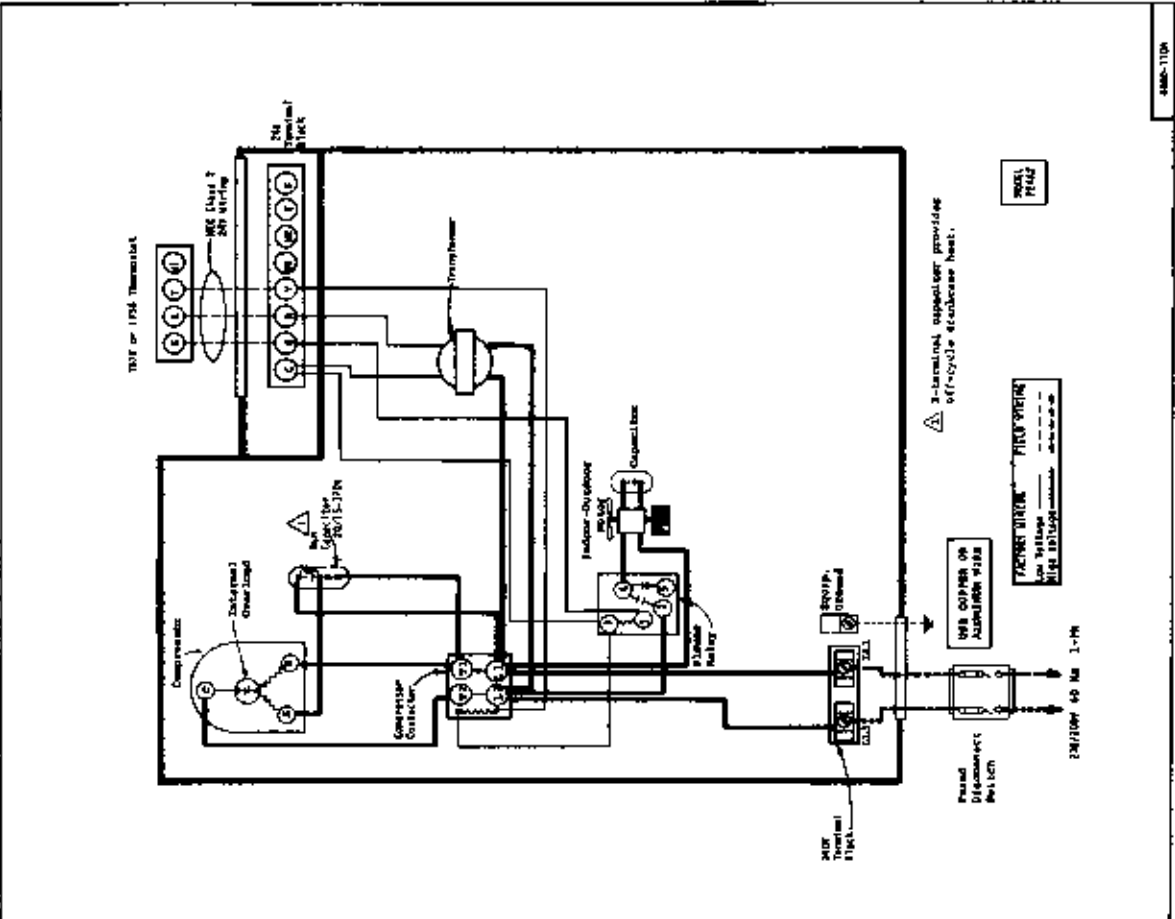
UNIT DIMENSIONS					
MODEL	A	B	C	D	1" Filter
P24A2	32	31-1/2	23-1/8	40	15 x 30-5/8
PH24-1	32	31-1/2	23-1/8	40	15 x 30-5/8
P31A	38-1/8	37-1/2	24	42-3/16	
PH31-1	38-1/8	37-1/2	24	42-3/16	(1) 16x16 &
P36A4	38-1/8	37-1/2	24	42-3/16	(1) 16x20
PH36-2	38-1/8	37-1/2	24	42-3/16	
PH42	42	41-1/2	31-1/8	50	(2) 16 x 20
PH4A4	42	41-1/2	31-1/8	50	(2) 16 x 20
PH48-2	42	41-1/2	31-1/8	50	(2) 16 x 20
PH60A4	42	41-1/2	31-1/8	50	(2) 16 x 20
PH60-2	42	41-1/2	31-1/8	50	(2) 16 x 20

- 1 A separate metal flashing should be installed around wood curbing. Caulk and seal all joints and weatherproof.
- 2 Galvannealed cabinets painted to match basic unit design - heavy 1/2" insulation - built-in filter included.
- 3 Roof hood to be assembled in field. (See FIG. 5 on back side)
- 4 Remove this side to gain access to air filter. (Opposite side on PH48 & PH60 Roof Hood)
- 5 Provides 15% fresh air. (Opposite side on PH24, PH30, PH31, & PH36 Roof Hood)

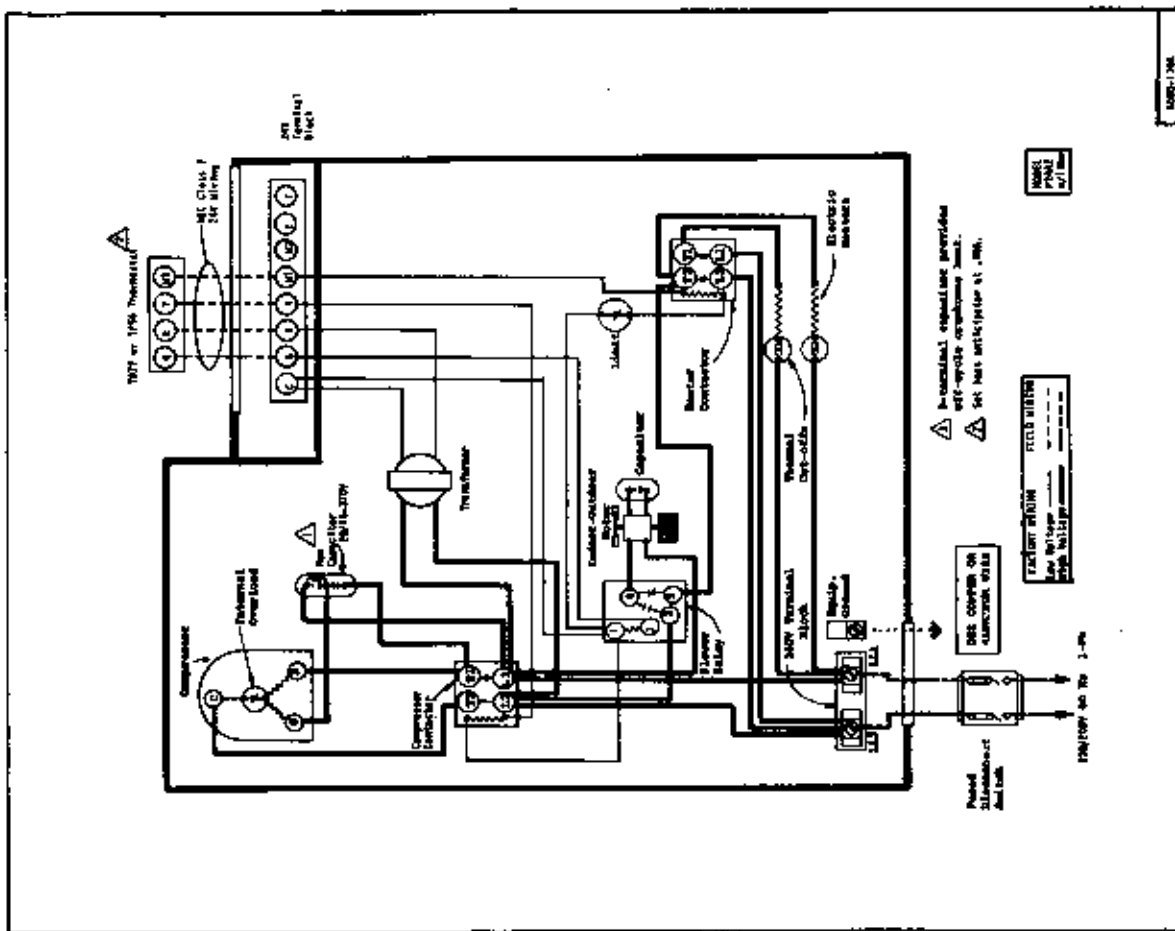
MODEL	A
P24A2	34-7/8
PH24-1	34-7/8
P31A	41
PH31-1	41
P36A4	41
PH36-2	41
PH42	44-7/8
PH4A4	44-7/8
PH48-2	44-7/8
PH60A4	44-7/8
PH60-2	44-7/8

BARD MANUFACTURING COMPANY  
MODEL P24A2









## PARTS LIST

## SINGLE PACKAGE AIR CONDITIONERS

PART NO.	DESCRIPTION	P24A2
5152-020	Blower Housing S1110-6AT	X
5152-009	Blower Wheel FE-1024-519 ccw	X
8552-040	Capacitor 20/15 370V	X
8552-005	Capacitor 10/370V	X
5811-008	Capillary Tube - Cool	(2)
8000-071	Compressor AB225HT-015-A4	X
5051-025	Condenser Coil	X
7051-009	Condenser Grille	X
8401-007	Contactator 1P25A	X
8401-006	Contactator - Heat 2P18A	X
5060-027	Evaporator Coil	X
5151-024	Fan Blade A-1831-5 ccw	X
8604-042	Heat Strip 5Kw	X
8604-044	Heat Strip 10Kw	X
8402-015	Limit Switch 130°	X
8106-014	Motor - Fan 1/2 hp	X
8201-009	Relay - Blower	X
5210-004	Strainer 3/8 x 2 cap	X
8607-006	Terminal Board 24V	X
8607-001	Terminal Block 230V	X
8402-026	Thermal Cut-off	X
8407-007	Transformer 40VA	X
7051-006	Wire Grille - Inlet	(2)

Minimum Net Billing \$15.00. Supersedes all previous lists.  
 Subject to change without notice. F.O.B. Bryan, Ohio.