



Installation Instructions

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SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform the basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

⚠ WARNING

1. Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or loss of life. Refer to the User's Information Manual provided with this unit for more details.
2. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

What to do if you smell gas:

1. DO NOT try to light any appliance.
2. DO NOT touch any electrical switch, or use any phone in your building.
3. IMMEDIATELY call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
4. If you cannot reach your gas supplier, call the fire department.

⚠ WARNING

Disconnect gas piping from unit when pressure testing at pressure greater than 0.5 psig. Pressures greater than 0.5 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it *must* be replaced before use. When pressure testing field-supplied gas piping at pressures of 0.5 psig or less, a unit connected to such piping must be isolated by closing the manual gas valve(s).

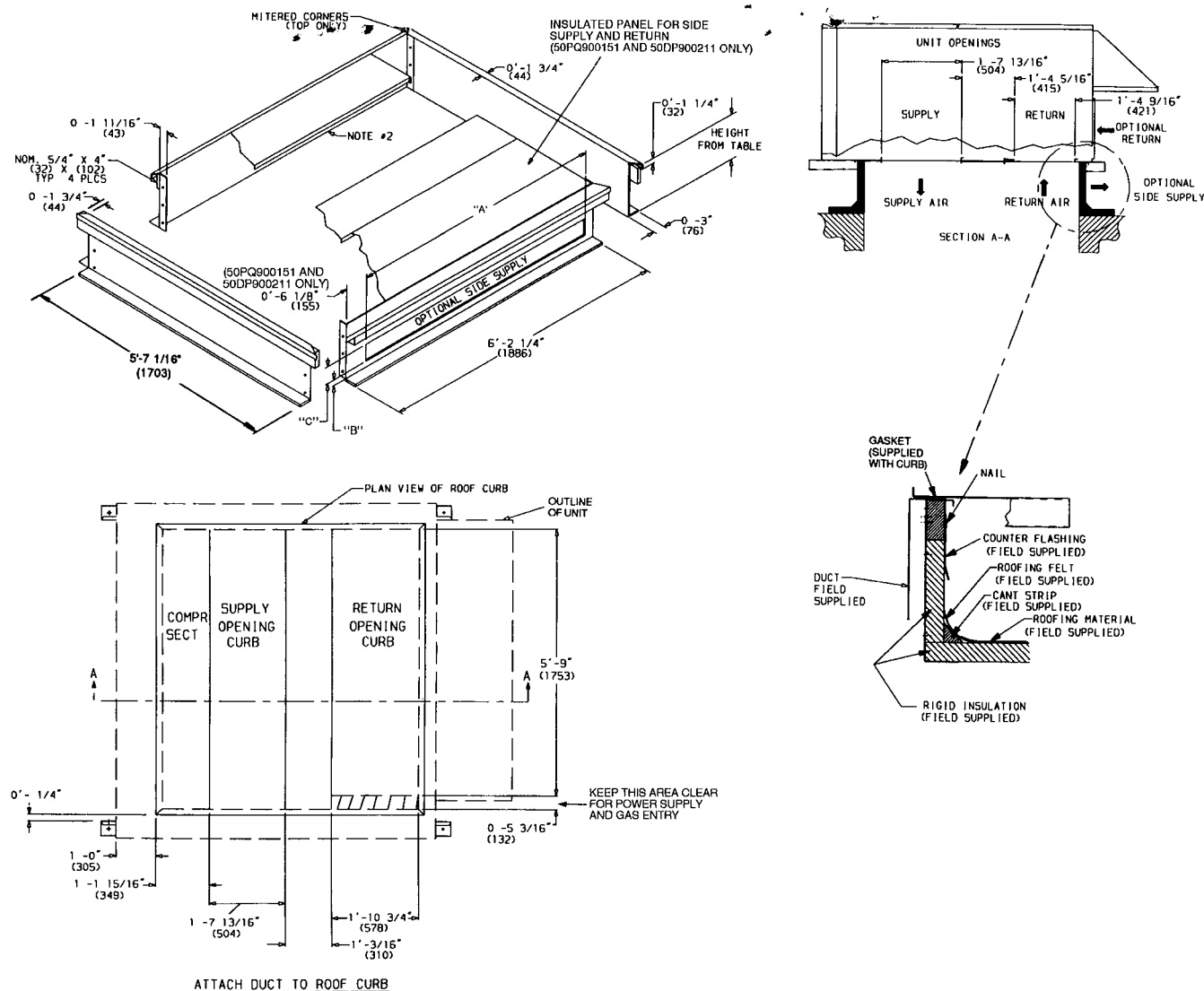
INSTALLATION

Step 1 — Provide Unit Support

ROOF CURB — Assemble or install accessory roof curb in accordance with instructions shipped with this accessory. See Fig. 1 and 2. Install insulation, cant strips, roofing, and counter flashing as shown. Ductwork can be installed to roof curb before unit is set in place. Curb should be level. This is necessary to permit unit drain to function properly. Unit leveling tolerance is $\pm \frac{1}{16}$ in. per linear ft in any direction. Refer to Accessory Roof Curb Installation Instructions for additional information as required. When accessory roof curb is used, unit may be installed on class A, B, or C roof covering material.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket with the roof curb as shown in Fig. 1. Improperly applied gasket can also result in air leaks and poor unit performance.

Instructions continued on page 3.



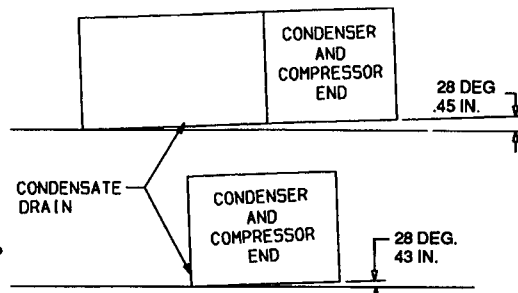
ACCESSORY PACKAGE NO.	CURB HEIGHT	DESCRIPTION	"A"	"B"	"C"
50PQ900221	1'-2" (305)	Standard Curb — 14" High	—	—	—
50PQ900141	2'-0" (610)	Standard Curb for Units Requiring High Installation	—	—	—
50PQ900151	2'-0" (610)	Horizontal Supply and Return Curb	5'-6" (1676)	0'-2 1/2" (64)	1'-6" (457)
50DP900211	1'-11" (584)	Pre-Assembled, High-Static, Horizontal Adapter	6'-2" (1880)	0'-6 1/4" (159)	1'-2 5/8" (371)

LEGEND

COMP SECT. — Compressor Section

NOTES:

1. Roof curb accessory is shipped unassembled.
2. Insulated panels, 1/2-in. thick neoprene-coated, 2 lb density.
3. Dimensions in () are in millimeters.
4. Direction of airflow.
5. Roof curb: 18 gage steel.
6. Attach all ductwork to roof curb.
7. Field installation of sidewall is mandatory



NOTE: To prevent the hazard of stagnant water build-up in the drain pan of the indoor-air section, unit can only be pitched as shown

Fig. 1 — Roof Curb and Horizontal Adapter Details

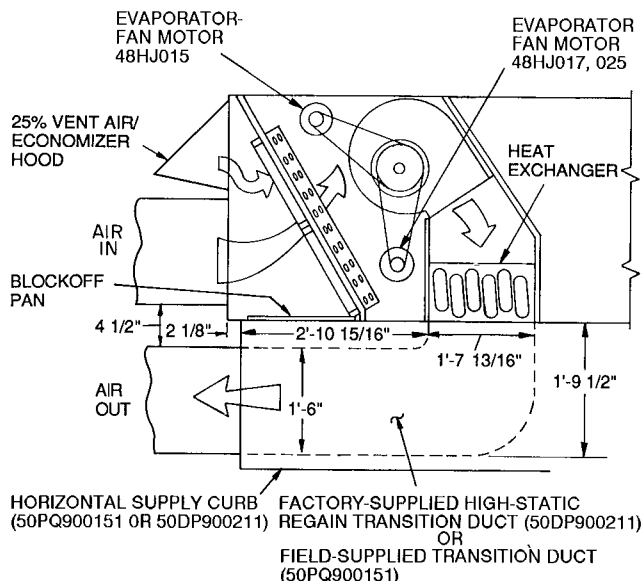


Fig. 2 – Horizontal Supply/Return Curb and Horizontal Adapter Details

ALTERNATE UNIT SUPPORT — When the curb cannot be used, install unit on a noncombustible surface. Support unit with sleepers, using unit curb support area. If sleepers cannot be used, support long sides of unit with a minimum of 3 equally spaced 4-in. x 4-in. pads on each side.

Step 2 — Rig and Place Unit — Inspect unit for transportation damage. File any claim with transportation agency.

Do not drop unit; keep upright. Use spreader bars over unit to prevent sling or cable damage. Rollers may be used to move unit across a roof. Level by using unit frame as a reference; leveling tolerance is $\pm 1/16$ in. per linear ft in any direction. See Fig. 3 for additional information. Unit operating weight is shown in Table 1.

Four lifting holes are provided in ends of unit base rails as shown in Fig. 3. Refer to rigging instructions on unit.

POSITIONING — Maintain clearance, per Fig. 4 and 5, around and above unit to provide minimum distance from combustible materials, proper airflow, and service access.

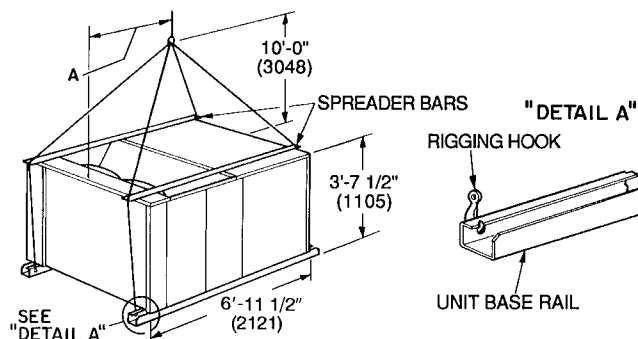
Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air. For proper unit operation, adequate combustion and ventilation air must be provided in accordance with Section 5.3 (Air for Combustion and Ventilation) of the National Fuel Gas Code, ANSI Z223.1 (American National Standards Institute).

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Locate mechanical draft system flue assembly at least 4 ft from any opening through which combustion products could enter the building, and at least 4 ft from any adjacent building. When unit is located adjacent to public walkways, flue assembly must be at least 7 ft above grade.

ROOF MOUNT — Check building codes for weight distribution requirements. Unit weight is shown in Table 1.

Instructions continued on page 7.



UNIT 48HJ	MAXIMUM SHIPPING WEIGHT	
	Lb	Kg
D015	1920	871
E015	1940	880
E017	2310	1048
D025	2535	1150

Dimension A

UNIT	Ft-in.	mm
48HJD015	3-1 $\frac{3}{8}$	949
48HJE015	3-1 $\frac{1}{4}$	946
48HJE017	3-4 $\frac{3}{4}$	1035
48HJD025	3-4 $\frac{3}{4}$	1010

NOTES:

1. Dimensions in () are in millimeters.
2. Refer to Table 1 for unit operating weights.
3. Remove boards at ends of unit and runners prior to rigging.
4. Rig by inserting hooks into unit base rails as shown. Use corner post from packaging to protect coil from damage. Use bumper boards for spreader bars.
5. Weights do not include optional economizer. See Table 1 for economizer weight.
6. Weights given are for aluminum evaporator coil plate fins and copper condenser coil plate fins. Weights of other metal combinations are listed in Table 1.

CAUTION

All panels must be in place when rigging

Fig. 3 — Rigging Details

Table 1 — Physical Data

UNIT SIZE 48	HJD015/HJE015		HJE017	HJD025
	208/230, 460 V	575 V		
OPERATING WT (lb)				
AI/AI*	1640/1660		2010	2235
Unit AI/Cu*	1770/1790		2160	2385
Cu/Cu*	1840/1860		2250	2515
Economizer	110		110	110
Roof Curb†	200		200	200
COMPRESSOR	06D Semi-Hermetic			
Number	1		2	2
Cylinders	6		4	6
REFRIGERANT TYPE	R-22			
Charge (lb)				
System 1	22.50		14.25	17.50
System 2	—		15.00	17.00
CONDENSER COIL	Copper Tubes, Aluminum or Copper Plate Fins			
Rows	3		4	4
Fins/in.	15		15	15
Total Face Area (sq ft)	22.2		22.2	22.2
CONDENSER FAN	Propeller Type, Direct Drive			
Nominal Cfm	10,500		10,500	14,200
Number...Diameter (in.)	3...22		3...22	2. 30
Motor Hp (1075 Rpm)	1/2		1/2	1 .1075
Watts Input (Total)	1090		1090	3400
EVAPORATOR COIL	Copper Tubes, Aluminum or Copper Plate Fins			
Rows	2		3	4
Fins/in.	17		15	15
Total Face Area (sq ft)	17.9		17.9	17.9
EVAPORATOR FAN	Centrifugal, Adjustable Pitch Belt Drive			
Quantity...Size (in.)	2.. 10 x 10	2 10 x 10	2 .12 x 12	2...12 x12
Nominal Cfm	5000	5000	6000	8000
Fan Rpm Range	1194-1526	1201-1462	1238-1494	1323-1579
Maximum Allowable Rpm	1550	1550	1550	1550
Motor Pulley Pitch Diameter (in.)	3.4/4 4	4.3/5.3	5.4/6.6	5.8/7.0
Fan Pulley Pitch Diameter (in.)	5 2	6 4	7.9	7.9
Belt, Quantity...Type...Length (in.)	1 AX. 42	1 B 45	1...BX .50	1 .BX. 51
Factory Speed Setting (Rpm)	1293	1279	1366	1451
Motor Hp (Service Factor)	3 7 (1 15)	3 (1 15)	5 (1.15)	10 (1.15)
Motor Frame Size	56H	56H	184T	215T
FURNACE SECTION				
Rollout Switch Cutout Temp (F)**	190		190	190
Burner Orifice Diameter (in. ...drill size)	.113...33		.113 .33	.113 .33
Natural Gas				
Pilot Orifice Diameter (Quantity) in. ...drill size	(1) .055 54/		(1) .055.. 54	(1) 055 .54
Natural Gas	(1) 055 54		(1) .041. 59	(1) 041 59
Thermostat Heat Anticipator Setting				
Stage 1	1 2/1 2		1.2	1.2
Stage 2	—/0 6		0.6	0.6
Gas Valve Quantity	1/2		2	2
HIGH-PRESSURE SWITCH				
Cutout (psig)			426	
Reset (psig)			320	
LOW-PRESSURE SWITCH				
Cutout (psig)			7	
Reset (psig)			22	
AIR INLET SCREENS	Cleanable			
Economizer, Quantity...Size (in.)			2 ..20 x 25 x 1	
			1 ..20 x 20 x 1	
RETURN-AIR FILTERS (TYPE)	10% Efficient — 2-in Throwaway Fiberglass			
Quantity... Size (in.)			4.. 20 x 20 x 2	
			4.. 16 x 20 x 2	

LEGEND

AI — Aluminum

Cu — Copper

*Evaporator coil fin material/condenser coil fin material

†Weight of 14 in. roof curb

**Rollout switch is manual reset.

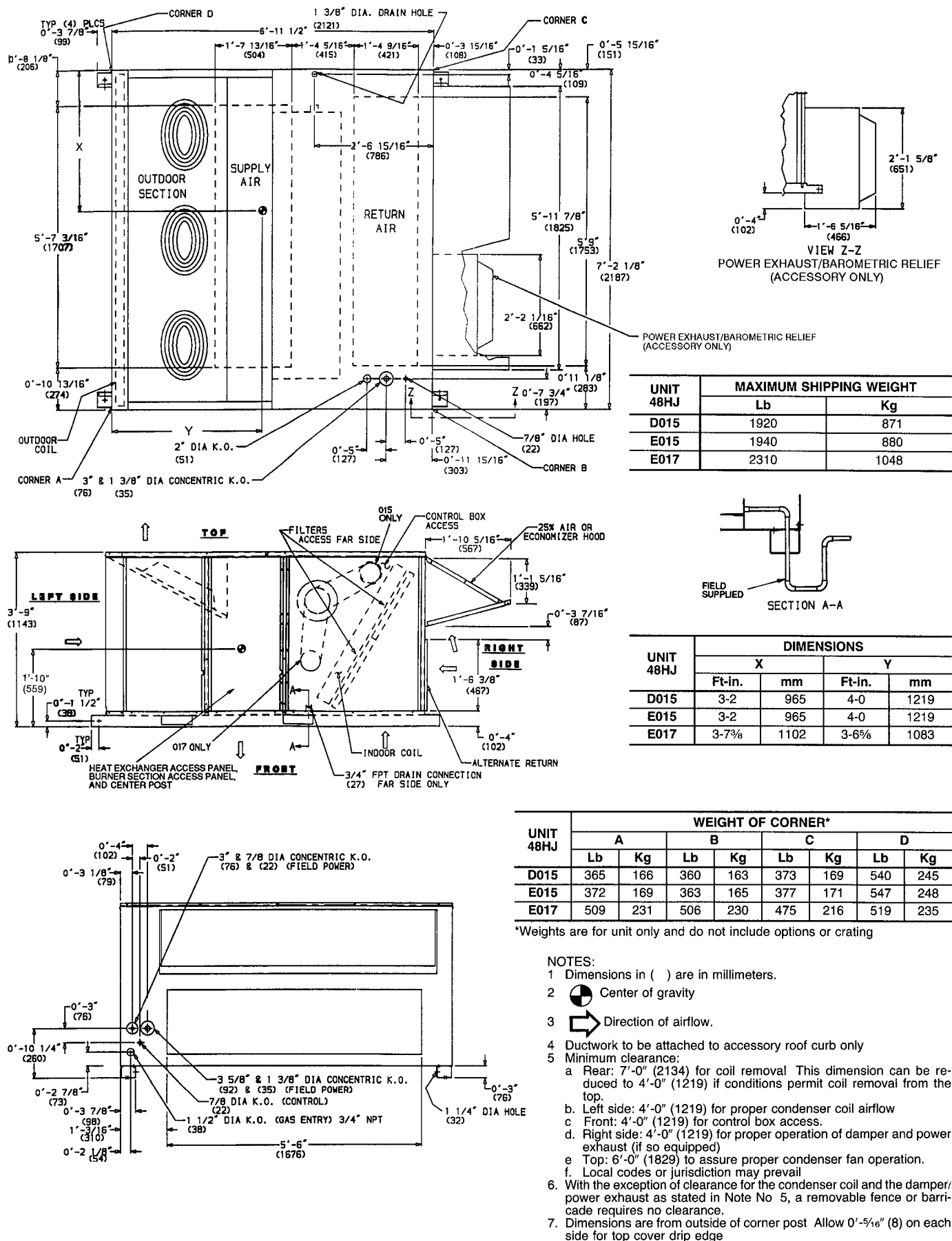


Fig. 4 — Base Unit Dimensions, 48HJ015,017

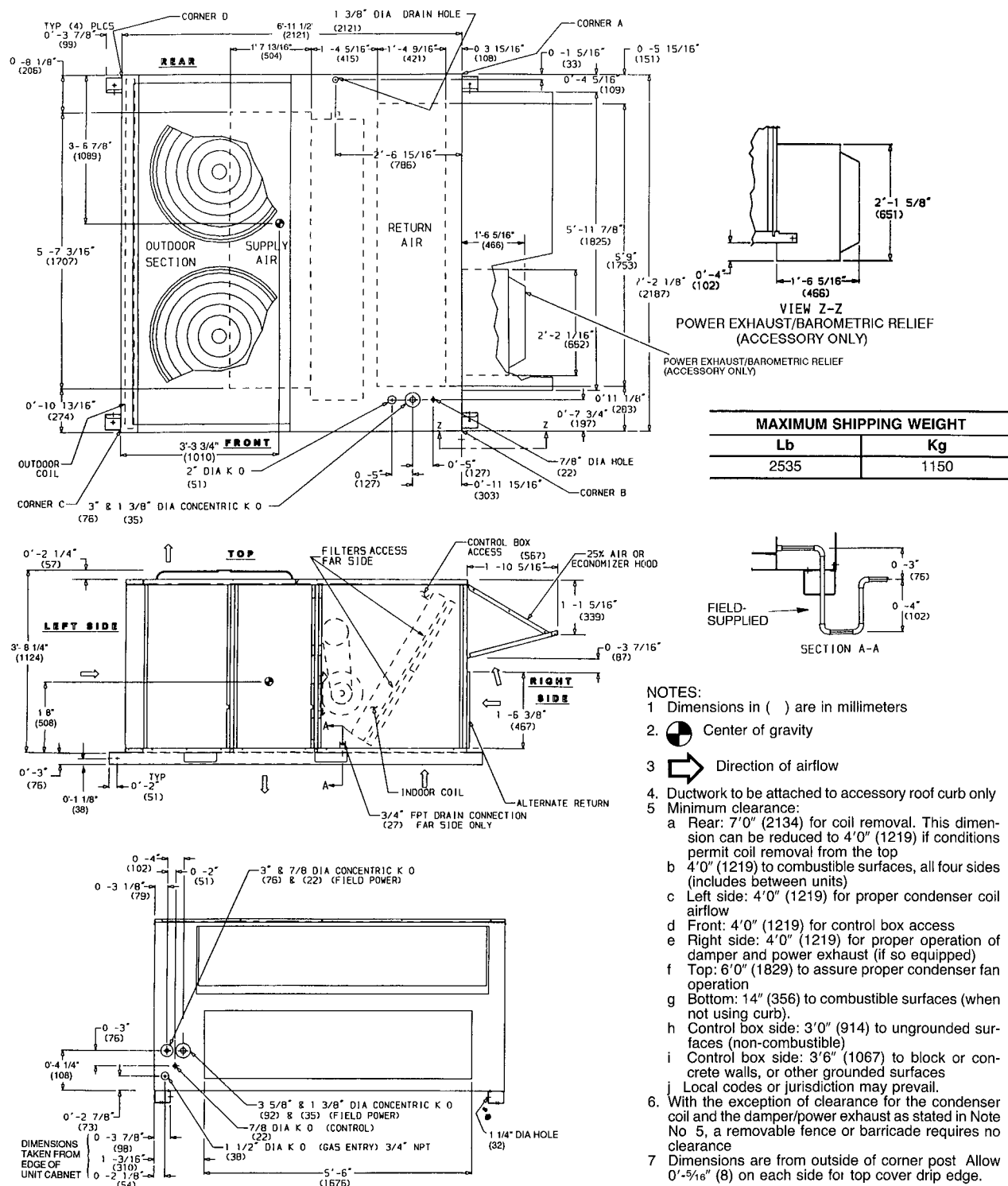
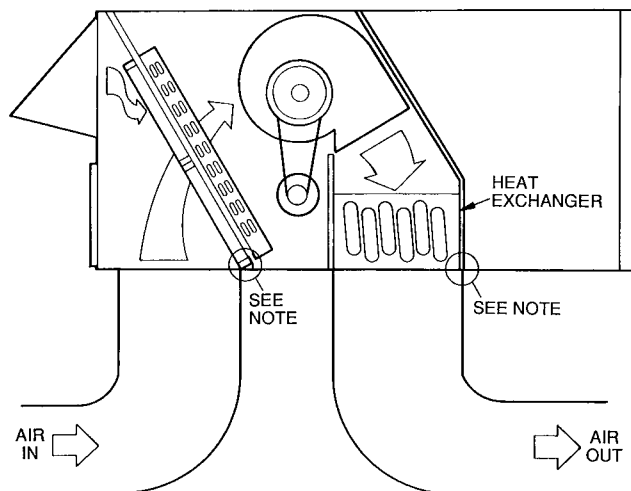


Fig. 5 – Base Unit Dimensions, 48HJ025

Step 3 — Field Fabricate Ductwork — Secure all ducts to building structure. Use flexible duct connectors between unit and ducts as required. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

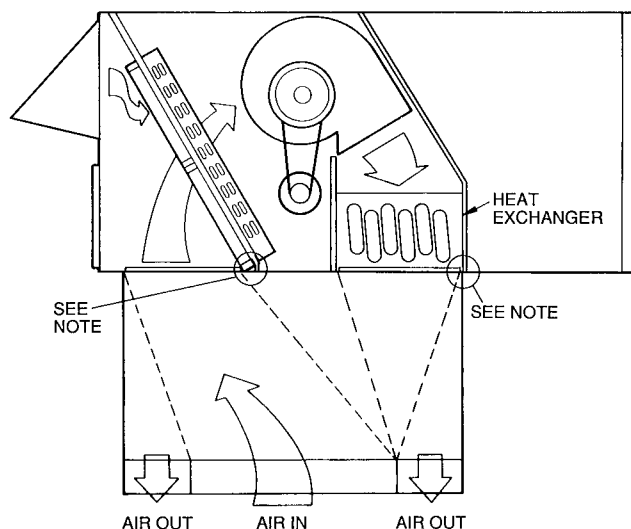
Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

Step 4 — Make Unit Duct Connections — Unit is shipped for through-the-bottom duct connections. Ductwork openings are shown in Fig. 1, 4, and 5. Duct connections are shown in Fig. 6. Field-fabricated concentric ductwork may be connected as shown in Fig. 7 and 8. Attach all ductwork to roof curb and roof curb basepans.



NOTE: Do not drill in this area; damage to basepan may result in water leak

Fig. 6 — Air Distribution — Through-the-Bottom (48HJ017 and 025 Shown)

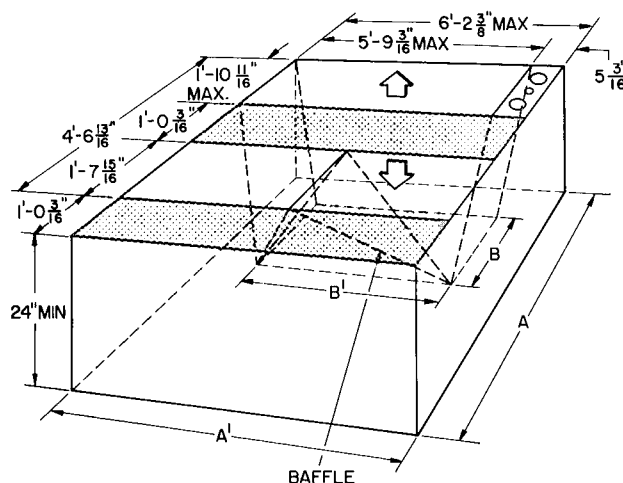


NOTE: Do not drill in this area; damage to basepan may result in water leak

Fig. 7 — Concentric Duct Air Distribution (48HJ017 and 025 Shown)

Step 5 — Install Flue Hood — Flue hood is shipped secured to a baffle under main control box. To install, secure flue hood to access panel. See Fig. 9.

NOTE: When properly installed, flue hood will line up with combustion fan housing. See Fig. 10.



NOTE: Dimensions A, A', B, and B' are obtained from field-supplied ceiling diffuser.

Shaded areas indicate block-off pans.

Fig. 8 — Concentric Duct Details

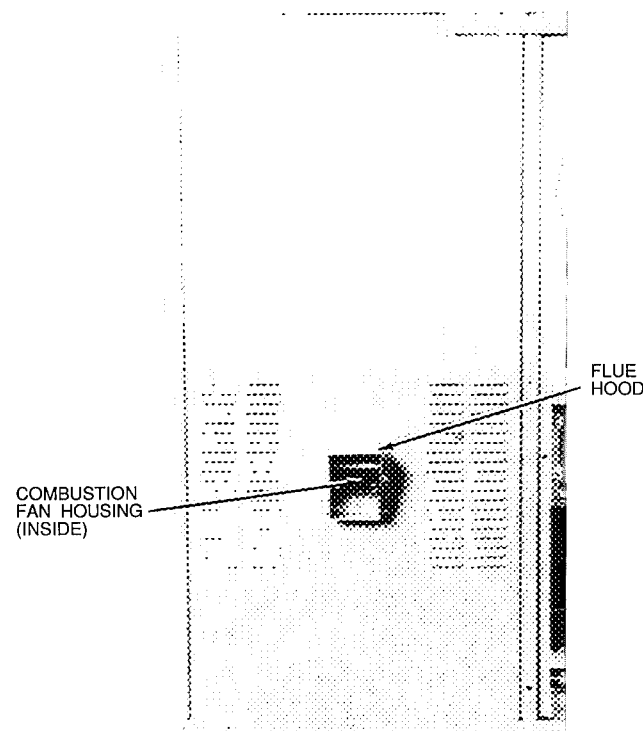


Fig. 9 — Flue Hood Location

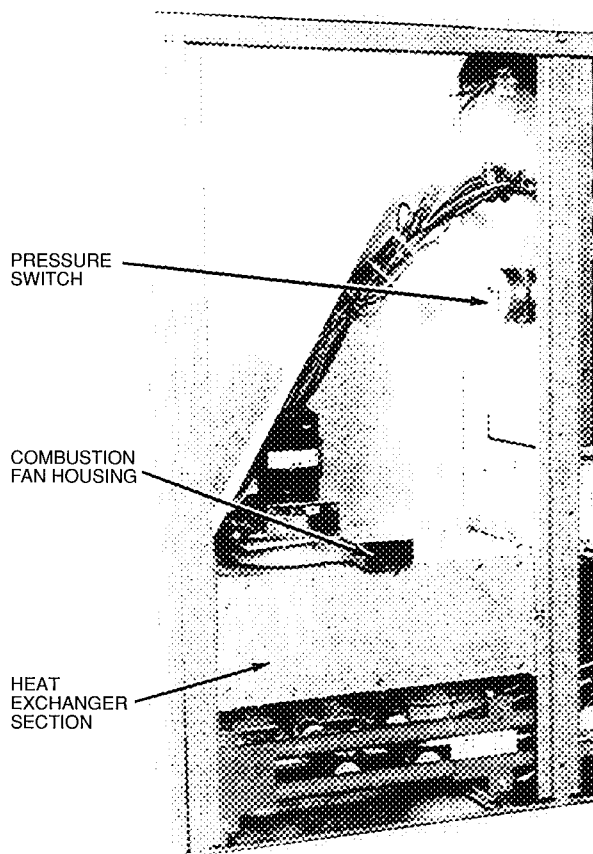


Fig. 10 — Combustion Fan Housing Location

Step 6 — Trap Condensate Drain — See Fig. 11 for drain location. One 3/4-in. half coupling is provided inside unit evaporator section for condensate drain connection. An 8 1/2 in. x 3/4-in. diameter and 2-in. x 3/4-in. diameter pipe nipple, coupled to standard 3/4-in. diameter elbows, provides a straight path down through hole in unit base rail (see Fig. 12). A trap at least 4-in. deep must be used.

Step 7 — Install Gas Piping — Unit is equipped for use with natural gas. Installation must conform with local building codes or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1.

Install manual gas shutoff valve with a 1/8-in. NPT pressure tap for test gage connection at unit. Field gas piping must include sediment trap and union. See Fig. 13.

⚠ WARNING

Do not pressure test gas supply while connected to unit. Always disconnect union before servicing.

Natural gas pressure at unit gas connection must not be less than 5 in. wg or greater than 13.5 in. wg.

Size gas-supply piping for 0.5-in. wg maximum pressure drop. Do not use supply pipe smaller than unit gas connection (3/4-in. NPT).

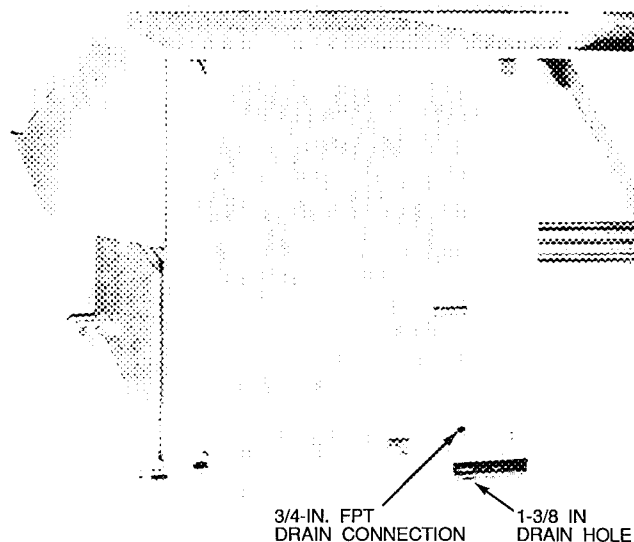


Fig. 11 — Condensate Drain Details

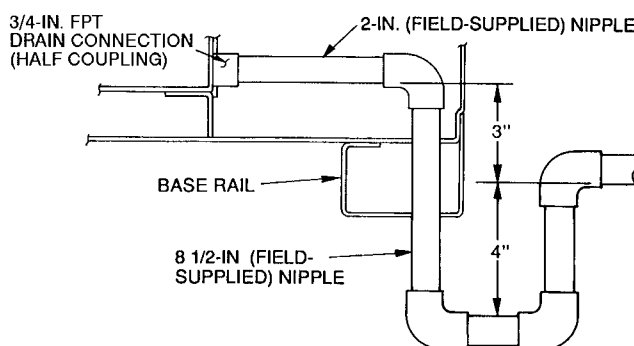


Fig. 12 — Condensate Drain Piping Details

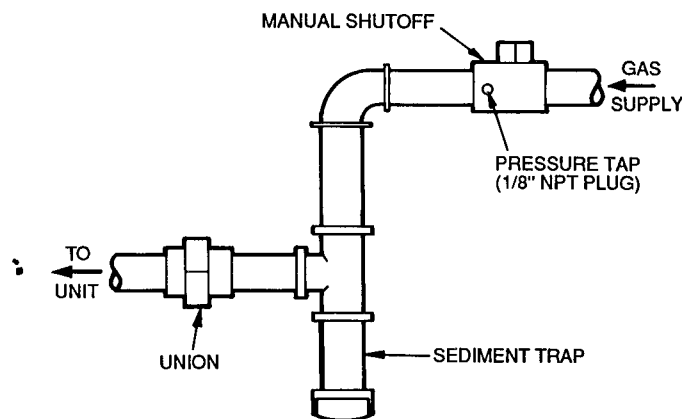


Fig. 13 — Field Gas Piping

Step 8 — Make Electrical Connections

FIELD POWER SUPPLY — Unit is factory wired for voltage shown on unit nameplate

When installing units, provide a disconnect per NEC (National Electrical Code) of adequate size (Table 2).

All field wiring must comply with NEC and local requirements.

Route power and ground lines through control box end panel or unit basepan (see Fig. 4 and 5) to connections as shown on unit wiring diagram and Fig. 14.

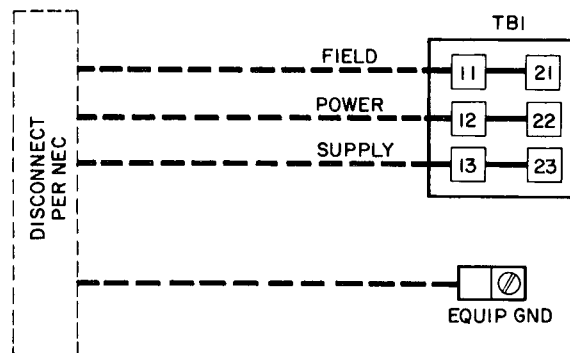
⚠ WARNING

The unit must be electrically grounded in accordance with local codes and NEC ANSI/NFPA 70 (National Fire Protection Association).

Field wiring must conform to temperature limitations for type "T" wire. All field wiring must comply with NEC and local requirements.

Transformer no. 1 is wired for 230-v unit. If 208/230-v unit is to be run with 208-v power supply, the transformer must be rewired as follows:

1. Remove cap from red (208 v) wire
2. Remove cap from orange (230 v) spliced wire.
3. Replace orange wire with red wire.
4. Recap both wires.



LEGEND

EQUIP — Equipment
GND — Ground
NEC — National Electrical Code
TB — Terminal Board

NOTE: Maximum wire size for TB1 is 2/0.

Fig. 14 — Field Power Wiring Connections

IMPORTANT: BE CERTAIN UNUSED WIRES ARE CAPPED. Failure to do so may damage the transformers.

Operating voltage to compressor must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2%.

Table 2 — Electrical Data

UNIT 48HJ	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM			POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY		DISCONNECT SIZE	
				No. 1		No. 2														
		Min	Max	RLA	LRA	RLA	LRA	Qty	FLA (ea)	LRA (ea)	Hp	FLA	LRA	FLA	LRA	FLA	MCA	MOCP*	FLA	LRA
015	208/230	187	254	39.7	228	—	—	3	1.7	3.8	3.7	10.5/10.5	84.5/84.5	—	—	0.57	65/65	100/100	64/64	324/324
														4.6	18.8	0.57	70/70	100/100	70/70	343/343
	460	414	508	19.9	114	—	—	3	0.8	1.9	3.7	4.8	42.3	—	—	0.30	32	50	32	162
														2.3	6.0	0.30	34	50	34	168
	575	518	632	16.0	91	—	—	3	0.75	1.5	3	3.9	23.4	—	—	0.57	26	40	26	119
														2.1	4.8	0.57	28	40	29	124
017	208/230	187	254	28.2	160	28.2	160	3	1.7	24.8	5	15.8/15.8	105/91	—	—	0.57	84/84	110/100	90/90	499/485
														4.6	18.8	0.57	89/89	110/110	95/95	518/504
	460	414	508	14.1	80	14.1	80	3	0.8	10.8	5	7.9	46	—	—	0.30	42	50	45	238
														2.3	6.0	0.30	44	50	47	244
	575	518	632	11.3	64	11.3	64	3	0.75	8.4	5	6.0	37	—	—	0.57	34	40	36	190
														2.1	4.8	0.57	36	45	39	195
025	208/230	187	254	35.6	198	35.6	198	2	5.5	24.8	10	28.0/28.0	193/168	—	—	0.57	119/119	150/150	127/127	639/614
														4.6	18.8	0.57	124/124	150/150	133/133	657/632
	460	414	508	17.8	99	17.8	99	2	2.8	10.8	10	14.6	84	—	—	0.30	60	70	65	304
														2.3	6.0	0.30	63	80	67	310
	575	518	632	14.3	79	14.3	79	2	3.4	8.4	10	13.0	66	—	—	0.57	52	60	56	241
														2.1	4.8	0.57	54	60	59	246

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

*This is the maximum size permissible; smaller fuse size may be used where conditions permit

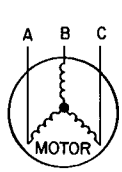


Use the following formula to determine the percent voltage imbalance.

% Voltage Imbalance:

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

EXAMPLE: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\begin{aligned} \text{Average Voltage} &= \frac{452 + 464 + 455}{3} \\ &= \frac{1371}{3} \\ &= 457 \end{aligned}$$

Determine maximum deviation from average voltage:

(AB) 457 - 452 = 5 v
(BC) 464 - 457 = 7 v
(AC) 457 - 455 = 2 v

Maximum deviation is 7 v.

Determine percent voltage imbalance:

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{7}{457} \\ &= 1.53\% \end{aligned}$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components.

FIELD CONTROL WIRING — Install a Carrier-approved accessory thermostat assembly according to installation instructions included with accessory. Locate thermostat assembly on a solid interior wall in the conditioned space to sense average temperature.

Route thermostat cable or equivalent single leads of colored wire from subbase terminals through conduit in unit to low-voltage connections as shown on unit label wiring diagram and in Fig. 15.

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 ft, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected at the thermostat and will require a junction box and splice at the thermostat.

Set heat anticipator settings as follows:

UNIT	VOLTAGE UNIT	W1	W2
48HJD015	All	1.20	—
48HJD025, HJE015, HJE017	All	1.20	0.60

Settings may be changed slightly to provide a greater degree of comfort for a particular installation.

Refer to Accessory Remote Control Panel instructions if required.

Step 9 — Make Outdoor-Air Inlet Adjustments

MANUAL OUTDOOR-AIR DAMPER — All units (except those equipped with a factory-installed economizer) have a manual outdoor-air damper to provide ventilation air.

Damper can be preset to admit up to 25% outdoor air into return-air compartment. To adjust, loosen securing screws and move damper to desired setting, then retighten screws to secure damper (Fig. 16).

OPTIONAL FACTORY-INSTALLED ECONOMIZER

Economizer Motor Control Module (See Fig. 17-19) — Set economizer motor to the D setting (Fig. 18).

Damper Vent Position Setting

- 1 Set fan switch at ON position (continuous fan operation) and close night switch if used.
- 2 Set system selector switch at OFF position.
- 3 Turn damper adjustment knob located on control module clockwise slowly until dampers assume desired vent position. *Do not manually operate economizer motor. Damage to motor will result.*

NOTE: Refer to accessory installation instructions included with the field-installed economizer for installation information. Also see Accessory Field-Installed Economizer Adjustment section on page 11.

Step 10 — Install Outdoor-Air Hood — The outdoor-air hood is common to 25% air ventilation and economizer. If economizer is used, all electrical connections have been made and adjusted at the factory. Assemble and install hood in the field.

NOTE: The hood top cover, upper and lower filter retainers, hood drain pan, baffle (017 and 025 only), and filter support bracket are secured opposite the condenser end of the unit. The screens, hood side panels, remaining section of filter support bracket, seal strip, and hardware are in a package located inside the return-air filter access panel (Fig. 20).

1. Attach seal strip to upper filter retainer. See Fig. 21.
2. Assemble hood top cover, side panels, upper filter retainer, and drain pan (see Fig. 22).
3. Secure lower filter retainer and long portion of support bracket to unit. See Fig. 22. Leave screws loose on 017 and 025 units.
4. 48HJ017,025 Units Only: Slide baffle behind lower filter retainer and tighten screws.

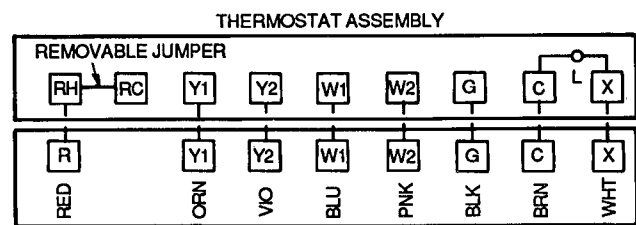


Fig. 15 — Field Control Thermostat Wiring

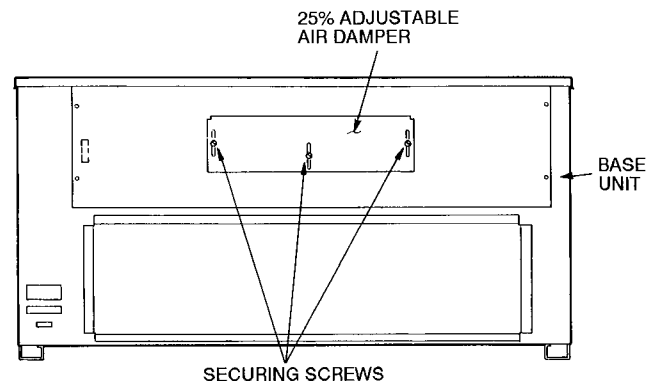


Fig. 16 — 25% Outdoor-Air Section Details

5. Loosen sheet metal screws for top cover of base unit located above outdoor-air inlet opening.
6. Match notches in hood top cover with unit top cover screws. Insert hood flange between top cover flange and unit. Tighten screws.
7. Insert outdoor-air inlet screens and spacer in channel created by lower filter retainer and filter support bracket.
8. Attach remaining shorter section of filter support bracket.

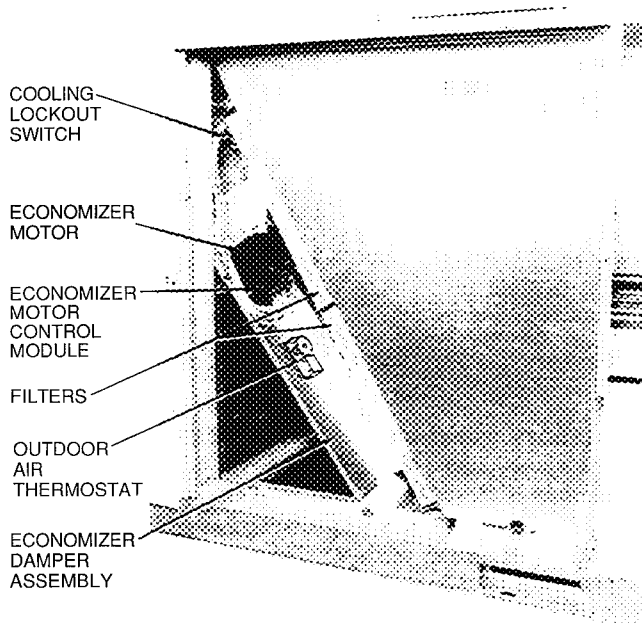


Fig. 17 – Economizer Damper Assembly – End View

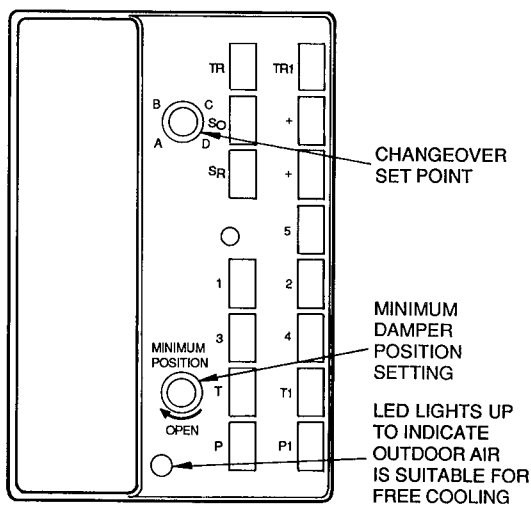


Fig. 18 – Economizer Motor Control Module

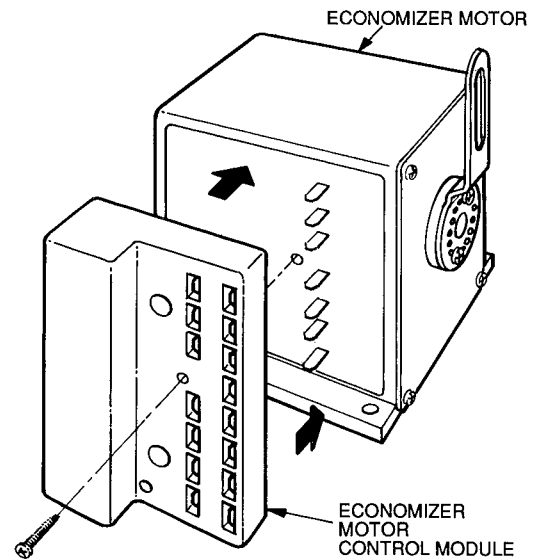


Fig. 19 – Economizer Motor Control Module Location

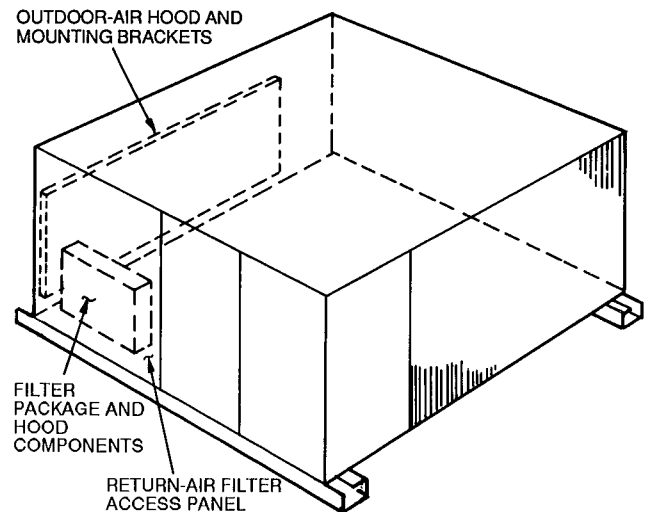


Fig. 20 – Outdoor-Air Hood Component Location

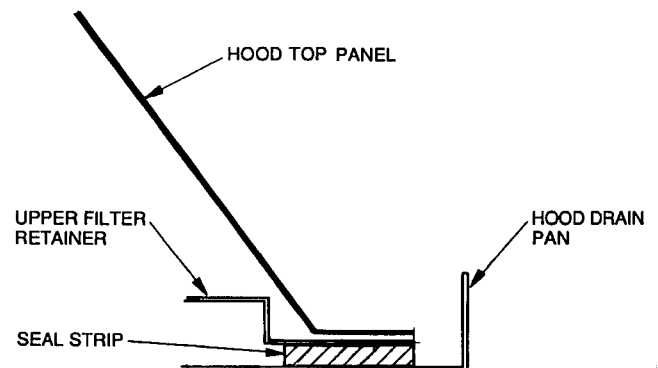


Fig. 21 – Seal Strip Location

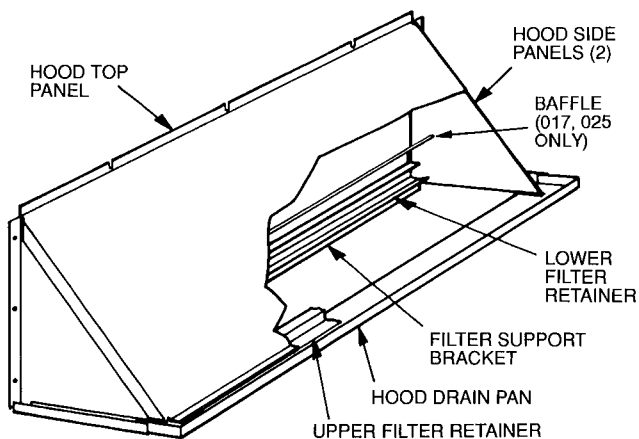


Fig. 22 — Outdoor-Air Hood Details

START-UP

Use the following information and Start-Up Checklist on page CL-1 to check out unit PRIOR to start-up.

Unit Preparation — Check that unit has been installed in accordance with these installation instructions and applicable codes.

Compressor Mounting — Loosen the compressor hold-down bolts until sidewise movement of the washer under each hold-down bolt head can be obtained. Do not loosen completely as bolts are self-locking and will maintain adjustment.

Internal Wiring — Check all electrical connections in unit control boxes; tighten as required

Refrigerant Service Ports and Valves — Each 48HJ unit has 2 Schrader-type service ports per circuit; one on the suction line and one on the liquid line. Be sure that the caps on the ports are tight. The units also have 2 service valves per circuit; one on the suction line and one on the discharge line. Be sure all valves are open.

Crankcase Heater — Crankcase heater is energized as long as there is power to the unit.

IMPORTANT: Unit power must be on for 24 hours prior to start-up. Otherwise, damage to compressor may result.

Evaporator Fan — Fan belt and pulleys are factory installed. See Tables 3A, 3B, 4, and 5 for Fan Performance Data. Remove tape from fan pulley and adjust pulleys on 48HJ015 units as required. See Evaporator-Fan Performance Adjustment section on page 19. Be sure that fans rotate in the proper direction. See Table 6 for air quantity limits. See Table 7 for static pressure drops for accessories and options. See Fig. 23 and 24 for fan performance using horizontal adapter and power exhaust. To alter fan performance, see Performance Adjustment sections on page 19.

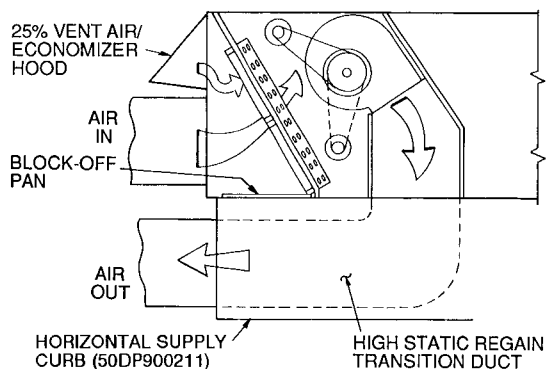
Condenser-Fans and Motors — Condenser fans and motors are factory set. Refer to Condenser-Fan Adjustment section on page 20 as required. Be sure that fans rotate in the proper direction.

Return-Air Filters — Check that correct filters are installed in filter tracks (see Table 1). Do not operate unit without return-air filters.

Outdoor-Air Inlet Screens — Outdoor-air inlet screens must be in place before operating unit.

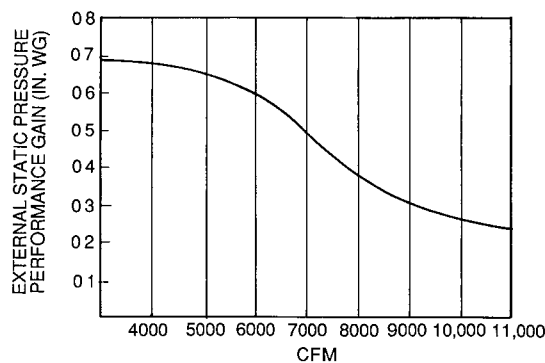
Accessory Field-Installed Economizer Adjustment — Remove filter access panel. Check that outdoor-air damper is closed and return-air damper is open.

Economizer operation and adjustment are described in Base Unit Operation section on page 17; and Economizer Adjustment section on page 20.



NOTES:

1. Dimensions are in millimeters
2. The 50DP900211 high static regain adapter accessory may be used to provide horizontal supply/return



NOTE: The 50DP900211 horizontal supply/return adapter accessory improves 48HJ fan performance by increasing external static pressure by amount shown above

Fig. 23 — Horizontal Supply/Return Fan Performance With 50DP900211 High Static Regain Adapter

Table 3A – Fan Performance Data, 48HJ015, 208/230, 460-V Units

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	741	510	0.58	854	715	0.82	952	921	1.05	1041	1130	1.29	1124	1344	1.53
4000	773	647	0.74	882	859	0.98	978	1071	1.22	1064	1285	1.46	1145	1502	1.71
4250	806	796	0.91	912	1015	1.16	1004	1233	1.40	1089	1452	1.65	1167	1674	1.91
4500	839	958	1.09	942	1183	1.35	1032	1407	1.60	1114	1632	1.86	1191	1859	2.12
4750	873	1134	1.29	972	1365	1.56	1060	1595	1.82	1140	1825	2.08	1215	2056	2.34
5000	908	1323	1.51	1003	1560	1.78	1089	1796	2.05	1167	2032	2.32	1241	2268	2.58
5250	942	1527	1.74	1035	1769	2.02	1118	2011	2.29	1195	2252	2.57	1267	2494	2.84
5500	978	1745	1.99	1067	1992	2.27	1148	2240	2.55	1223	2487	2.83	1293	2733	3.11
5750	1013	1978	2.25	1099	2230	2.54	1179	2484	2.83	1252	2736	3.12	1321	2988	3.40
6000	1049	2227	2.54	1132	2483	2.83	1210	2742	3.12	1282	2999	3.42	1349	3257	3.71
6250	1085	2491	2.84	1166	2751	3.13	1241	3015	3.44	1312	3279	3.74	1378	3541	4.03

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	1203	1562	1.78	1277	1784	2.03	1349	2010	2.29	1417	2240	2.55	1483	2473	2.82
4000	1222	1724	1.96	1294	1950	2.22	1364	2180	2.48	1431	2413	2.75	1495	2650	3.02
4250	1242	1900	2.16	1313	2129	2.43	1381	2362	2.69	1446	2599	2.96	1509	2839	3.23
4500	1264	2089	2.38	1333	2322	2.65	1399	2558	2.91	1463	2799	3.19	1525	3042	3.47
4750	1286	2290	2.61	1354	2528	2.88	1419	2769	3.15	1482	3012	3.43	1542	3259	3.71
5000	1310	2507	2.86	1376	2748	3.13	1440	2992	3.41	1501	3240	3.69	1560	3489	3.98
5250	1335	2737	3.12	1399	2983	3.40	1461	3230	3.68	1522	3481	3.97	—	—	—
5500	1360	2981	3.40	1423	3231	3.68	1484	3483	3.97	1543	3737	4.26	—	—	—
5750	1386	3241	3.69	1448	3495	3.98	1508	3750	4.27	—	—	—	—	—	—
6000	1413	3514	4.00	1474	3773	4.30	1532	4032	4.59	—	—	—	—	—	—
6250	1440	3803	4.33	1500	4066	4.63	1558	4330	4.93	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

NOTES:

1. **Boldface** indicates standard operating range.
2. **Shading** indicates field-supplied motor and drive required.
3. All other numbers indicate field-supplied drive required.
4. Factory shipped motor drive range is 1194 to 1526 rpm. Other rpms require a field-supplied drive.

5. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table. See Table 7 for accessory/FIOP static pressure information.
6. Interpolation is permissible. Do not extrapolate.
7. Maximum continuous bhp is 4.25 and the maximum continuous watts are 3775. Extensive motor and drive testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the watts rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 3B — Fan Performance Data, 48HJ015, 575-V Units

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	741	510	0.58	854	715	0.82	952	921	1.05	1041	1030	1.29	1124	1344	1.53
4000	773	647	0.74	882	859	0.98	978	1071	1.22	1064	1285	1.46	1145	1502	1.71
4250	806	796	0.91	912	1015	1.16	1004	1233	1.40	1089	1452	1.65	1167	1674	1.91
4500	839	958	1.09	942	1183	1.35	1032	1407	1.60	1114	1632	1.86	1191	1859	2.12
4750	873	1134	1.29	972	1365	1.56	1060	1595	1.82	1140	1825	2.08	1215	2056	2.34
5000	908	1323	1.51	1003	1560	1.78	1089	1796	2.05	1167	2032	2.32	1241	2268	2.58
5250	942	1527	1.74	1035	1769	2.02	1118	2011	2.29	1195	2252	2.57	1267	2494	2.84
5500	978	1745	1.99	1067	1992	2.27	1148	2240	2.55	1223	2487	2.83	1293	2733	3.11
5750	1013	1978	2.25	1099	2230	2.54	1179	2484	2.83	1252	2736	3.12	1321	2988	3.40
6000	1049	2227	2.54	1132	2483	2.83	1210	2742	3.12	1282	2999	3.42	1349	3257	3.71
6250	1085	2491	2.84	1166	2751	3.13	1241	3015	3.44	1312	3279	3.74	1378	3541	4.03

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	1203	1562	1.78	1277	1784	2.03	1349	2010	2.29	1417	2240	2.55	1483	2473	2.82
4000	1222	1724	1.96	1294	1950	2.22	1364	2180	2.48	1431	2413	2.75	1495	2650	3.02
4250	1242	1900	2.16	1313	2129	2.43	1381	2362	2.69	1446	2599	2.96	1509	2839	3.23
4500	1264	2089	2.38	1333	2322	2.65	1399	2558	2.91	1463	2799	3.19	1525	3042	3.47
4750	1286	2290	2.61	1354	2528	2.88	1419	2769	3.15	1482	3012	3.43	1542	3259	3.71
5000	1310	2507	2.86	1376	2748	3.13	1440	2992	3.41	1501	3240	3.69	1560	3489	3.98
5250	1335	2737	3.12	1399	2983	3.40	1461	3235	3.68	1522	3481	3.97	—	—	—
5500	1360	2981	3.40	1423	3231	3.68	1484	3483	3.97	1543	3737	4.26	—	—	—
5750	1386	3241	3.69	1448	3495	3.96	1508	3750	4.27	—	—	—	—	—	—
6000	1413	3514	4.00	1474	3773	4.30	1532	4032	4.59	—	—	—	—	—	—
6250	1440	3803	4.33	1500	4066	4.63	1558	4330	4.93	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
FLOP — Factory-Installed Option
Watts — Input Watts to Motor

NOTES:

1. **Boldface** indicates standard operating range
2. **Shading** indicates field-supplied motor and drive required.
3. All other numbers indicate field-supplied drive required
4. Factory shipped motor drive range is 1201 to 1462 rpm Other rpms require a field-supplied drive

5. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table See Table 7 for accessory/FLOP static pressure information
6. Interpolation is permissible. Do not extrapolate.
7. Maximum continuous bhp is 3.45 and the maximum continuous watts are 3065. Extensive motor and drive testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the watts rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 4 – Fan Performance Data, 48HJ017 Units

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	630	805	0.9	741	1059	1.2	846	1341	1.5	945	1653	1.9	1039	1993	2.2
4800	659	943	1.1	765	1208	1.4	865	1497	1.7	961	1816	2.0	1052	2163	2.4
5100	688	1094	1.2	789	1371	1.5	885	1668	1.9	977	1993	2.2	1064	2345	2.6
5400	717	1262	1.4	814	1550	1.7	907	1856	2.1	994	2187	2.4	1079	2546	2.8
5700	748	1450	1.6	842	1752	2.0	930	2067	2.3	1015	2406	2.7	1096	2770	3.1
6000	776	1648	1.8	867	1963	2.2	952	2289	2.6	1034	2635	2.9	1112	3004	3.4
6300	804	1861	2.1	892	2190	2.5	975	2526	2.8	1053	2880	3.2	1129	3256	3.6
6600	835	2103	2.4	919	2445	2.7	1000	2793	3.1	1076	3156	3.5	1149	3540	4.0
6900	863	2356	2.6	946	2712	3.0	1024	3072	3.4	1098	3445	3.9	1169	3835	4.3
7200	892	2628	2.9	972	2998	3.4	1049	3371	3.8	1120	3754	4.2	1189	4152	4.6
7500	923	2933	3.3	1001	3318	3.7	1076	3704	4.1	1146	4098	4.6	1213	4506	5.0

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	1128	2355	2.6	1211	2734	3.1	1289	3127	3.5	1363	3531	4.0	1433	3944	4.4
4800	1138	2533	2.8	1219	2921	3.3	1297	3325	3.7	1370	3742	4.2	1440	4170	4.7
5100	1148	2722	3.0	1228	3119	3.5	1305	3532	4.0	1377	3961	4.4	1447	4400	4.9
5400	1160	2928	3.3	1238	3332	3.7	1313	3755	4.2	1385	4192	4.7	1454	4643	5.2
5700	1175	3158	3.5	1251	3569	4.0	1324	3999	4.5	1395	4445	5.0	1462	4906	5.5
6000	1188	3398	3.8	1262	3814	4.3	1334	4250	4.8	1403	4704	5.3	1470	5173	5.8
6300	1203	3654	4.1	1275	4075	4.6	1344	4517	5.1	1412	4976	5.6	1478	5453	6.1
6400	1221	3944	4.4	1290	4370	4.9	1358	4817	5.4	1424	5283	5.8	1489	5765	6.5
6900	1238	4245	4.8	1305	4676	5.2	1371	5128	5.7	1436	5598	6.3	1499	6087	6.8
7200	1256	4569	5.1	1322	5006	5.6	1386	5463	6.1	1449	5938	6.6	1509	6420	7.2
7500	1278	4930	5.5	1341	5373	6.0	1403	5835	6.5	1465	6316	7.1	1515	6733	7.5

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

NOTES:

1. **Boldface** indicates standard operating range.
2. **Shading** indicates field-supplied motor and drive required.
3. All other numbers indicate field-supplied drive required.
4. Factory shipped motor drive range is 1238 to 1494 rpm. Other rpms require a field-supplied drive.

5. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table. See Table 7 for accessory/FIOP static pressure information.
6. Interpolation is permissible. Do not extrapolate.
7. Maximum continuous bhp is 5.9 and the maximum continuous watts are 5180. Extensive motor and drive testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the watts rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 5 – Fan Performance Data, 48HJ025 Units

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6000	800	1732	1.88	891	2047	2.22	975	2376	2.58	1055	2728	2.96	1133	3104	3.37
6500	853	2134	2.32	939	2471	2.68	1018	2819	3.06	1094	3185	3.46	1167	3573	3.88
7000	907	2596	2.82	989	2957	3.21	1064	3324	3.61	1136	3707	4.02	1205	4107	4.46
7500	962	3123	3.39	1039	3507	3.81	1111	3895	4.23	1179	4295	4.66	1245	4710	5.11
8000	1017	3717	4.04	1091	4126	4.48	1160	4536	4.93	1225	4954	5.38	1287	5386	5.85
8500	1072	4385	4.76	1143	4818	5.23	1209	5250	5.70	1271	5688	6.18	1332	6137	6.66
9000	1128	5129	5.57	1196	5587	6.07	1260	6042	6.56	1323	6501	7.06	1377	6968	7.57
9500	1185	5955	6.47	1250	6437	6.99	1311	6915	7.51	1369	7395	8.03	1424	7881	8.56
10000	1241	6865	7.45	1304	7372	8.00	1363	7873	8.65	1419	8376	9.09	1472	8882	9.64

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6000	1208	3504	3.80	1282	3926	4.26	1353	4368	4.74	1421	4826	5.24	1488	5299	5.75
6500	1239	3983	4.32	1308	4415	4.79	1376	4866	5.28	1442	5337	5.79	1507	5823	6.32
7000	1273	4529	4.92	1339	4970	5.40	1403	5432	5.90	1467	5911	6.42	1520	6339	6.88
7500	1309	5143	5.58	1372	5597	6.08	1434	6067	6.59	1494	6558	7.12	1548	7014	7.62
8000	1349	5833	6.33	1409	6297	6.84	1467	6779	7.36	1529	7313	7.94	—	—	—
8500	1390	6600	7.17	1447	7077	7.68	1504	7571	8.22	—	—	—	—	—	—
9000	1433	7446	8.08	1488	7938	8.62	—	—	—	—	—	—	—	—	—
9500	1478	8378	9.10	—	—	—	—	—	—	—	—	—	—	—	—
10000	1524	9396	10.20	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

NOTES:

1. **Boldface** indicates standard operating range.
2. All other numbers indicates field-supplied drive required
3. Factory shipped motor drive range is 1323 to 1579 rpm. Other rpms require a field-supplied drive.
4. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table. See Table 7 for accessory/FIOP static pressure information.

5. Interpolation is permissible. Do not extrapolate
6. Maximum continuous bhp is 10.2 for 208/230 and 575-v units and 11.8 for 460-v units. The maximum continuous watts are 9510 for the 208/230 and 575-v units and 11,000 for the 460-v units. Extensive motor and drive testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using your fan motors up to the watts rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 6 – Air Quantity Limits

UNIT 48HJ	MINIMUM CFM	MAXIMUM CFM
015	3,750	6,250
017	4,500	7,500
025	6,000	10,000

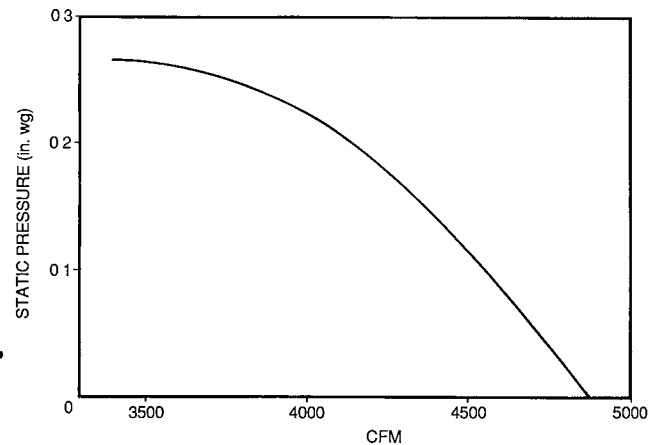


Fig. 24 – Fan Performance Using Accessory Power Exhaust

Table 7 — Accessory/FIOP Economizer Static Pressure (in. wg)

UNIT 480HJ	UNIT VOLTAGE	CFM	ECONOMIZER PRESSURE DROP
015, 017	All	3,750	.03
		4,000	.03
		5,000	.05
		6,000	.07
		7,500	.10
025	All	6,000	.07
		7,200	.09
		9,000	.11
		10,000	.12

LEGEND

BHP — Brake Horsepower
FIOP — Factory-Installed Option

NOTES:

1 The factory-assembled horizontal adapter substantially improves fan performance. See Fig 24

2. The static pressure must be added to external static pressure. The sum and the evaporator entering-air cfm should then be used in conjunction with the Fan Performance table to determine blower rpm, bhp, and watts.

Gas Heat — Verify gas pressures before turning on heat as follows:

1. Turn off manual gas stop.
2. Connect pressure gage to supply gas tap (See Fig. 13 on page 8).
3. Connect pressure gage to manifold pressure tap on gas valve.
4. Turn on manual gas stop and set thermostat to HEAT position. After the unit has run for several minutes, verify that incoming pressure is 5.0 in. wg or greater, and that the manifold pressure is 3.5 in. wg. If manifold pressure must be adjusted, refer to Gas Valve Adjustment section on page 22.
5. After unit has been in operation for 5 minutes, check temperature rise across the heat exchangers. See unit informative plate for correct rise limits of the heat supplied. Air quantities may need to be adjusted to bring the actual rise to within the allowable limits.

Base Unit Operation

COOLING, UNITS WITHOUT ECONOMIZER — When thermostat calls for cooling, terminals G and Y1 are energized. The indoor (evaporator) fan contactor (IFC) and compressor contactor no. 1 (C1) are energized and evaporator-fan motor (IFM), compressor no. 1 (017,025) or unloaded compressor (015), and condenser fan start. The condenser-fan motors run continuously while unit is cooling. If the thermostat calls for a second stage of cooling by energizing Y2, compressor contactor no. 2 (C2) is energized and compressor no. 2 starts (017,025), or compressor no. 1 runs fully loaded (015).

A freeze protection thermostat (FPT) is located on the evaporator coil. It detects frost build-up and locks out the compressors, allowing the coil to clear. Once frost has melted, the compressors can be reenergized by resetting the thermostat.

HEATING, UNITS WITHOUT ECONOMIZER

NOTE: The 48HJD015 units have 1 stage of heat, and the 48HJE015, 48HJE017, and HJD025 units have 2 stages of heat.

First Stage — Turn unit power on. Open manual gas line valve. Set thermostat system switch at HEAT or AUTO. position and set fan switch to AUTO. position for heating.

First-stage thermostat calls for heat. Time-delay relay for evaporator fan begins timer sequence. Induced-draft relay closes, and induced-draft motor starts.

Pressure switch closes and pilot valve no. 1 opens, allowing gas to flow to the first-stage pilot. Spark ignitor ignites pilot flame. Sensor detects flame and the main gas valve no. 1 opens. Gas flows to main burners and first-stage burners ignite. Spark igniter turns off.

When sequence is complete, time-delay relay closes and evaporator fans start.

Second-Stage — On 2-stage units, with an additional heating call, the second-stage thermostat closes. (The control relay [HR2] closes during the first stage of operation.) Pilot valve no. 2 opens, and the spark ignitor ignites pilot. The sensor detects a flame and energizes main gas valve coil no. 2, opening main gas valve no. 2. Gas flows to the main burners, and the second-stage burners ignite. The spark ignitor turns off.

When the second-stage thermostat is satisfied, the second-stage gas valve closes.

When the first-stage thermostat is satisfied, the first-stage gas valve closes. The induced-draft motor turns off, the time delay relay is deenergized, and the timer sequence begins. When the sequence is complete, the evaporator-fan motor turns off.

COOLING, UNITS WITH ECONOMIZER — Upon a call for cooling, when outdoor ambient is above the changeover control setting, the economizer damper moves to VENT position. The compressors and evaporator and condenser fans energize and operate as per Cooling, Units Without Economizer section above.

Upon a first call for cooling, when outdoor ambient is below the changeover control setting, the evaporator fan starts and the economizer is fully open. The compressors remain off.

Upon a second-stage call for cooling, compressor no. 1 (017,025) or unloaded compressor (015) is energized and mechanical cooling is integrated with economizer cooling. If the outdoor-air temperature drops below 50 F, a cooling lockout switch prevents the compressors from running.

When supply-air temperature drops below a fixed set point, the economizer damper modulates to maintain the temperature at the fixed set point.

HEATING, UNITS WITH ECONOMIZER — Outdoor-air damper stays at VENT position while evaporator fan is operating.

SERVICE

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

Cleaning — Inspect unit interior at beginning of each heating and cooling season and as operating conditions require. Remove unit top panel and/or side panels for access to unit interior.

MAIN AND PILOT BURNERS — At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the pilot and main burner flames through view port (in condenser section), and adjust if necessary. Refer to Pilot Adjustment or Main Burners sections on pages 22 and 23.

FLUE GAS PASSAGEWAYS — The flue collector box and heat exchanger cells may be inspected by removing heat exchanger access panel (Fig. 4 and 5), flue box cover, and main burner assembly (Fig. 25). Refer to Main Burners section on page 23 for burner removal sequence. If cleaning is required, remove heat exchanger turbulators (Fig. 26) and clean all parts with a wire brush.

COMBUSTION-AIR BLOWER — Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bi-monthly to determine proper cleaning frequency.

To inspect blower wheel, remove heat exchanger access panel. Shine a flashlight into opening to inspect wheel. If cleaning is required, remove motor and wheel assembly by removing screws holding motor mounting plate to top of combustion fan housing (Fig. 25 and 26). The motor and wheel assembly will slide up and out of the fan housing. Remove the blower wheel from the motor shaft and clean with a detergent or solvent. Replace motor and wheel assembly.

EVAPORATOR COIL — Clean as required with commercial coil cleaner.

CONDENSER COIL — Clean condenser coil annually and as required by location and outdoor-air conditions. Inspect coil monthly; clean as required.

CONDENSATE DRAIN — Check and clean each year at start of cooling season. In winter, keep drains and traps dry.

FILTERS — Clean or replace at start of each heating and cooling season, or more often if operating conditions require. Refer to Table 1 for type and size.

OUTDOOR-AIR INLET SCREENS — Clean screens with steam or hot water and a mild detergent. Do not use disposable filters in place of screens.

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory. Observe the level in the sight glass immediately after shutdown while the oil is still warm. If the oil level is observed when the oil is cold, the level observed may be a mixture of oil and refrigerant which is not a true indication of the oil level. If oil level observed is not between the low limit and high limit levels as indicated in Fig. 27, add oil until it is in the correct range.

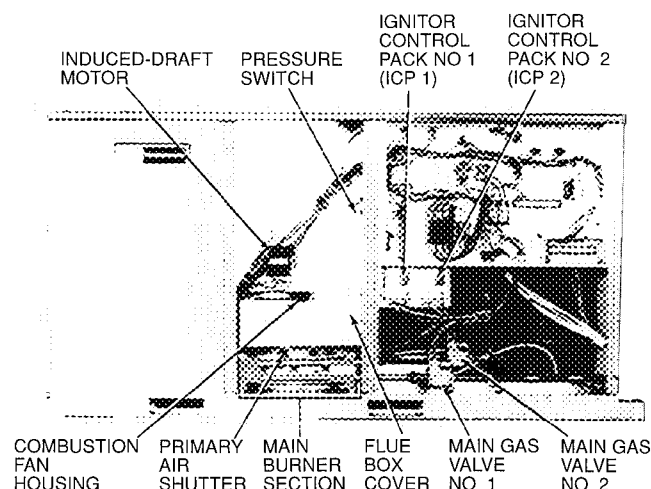


Fig. 25 — Typical Gas Heating Section (48HJE015, 48HJE017, and 48HJD025 Shown)

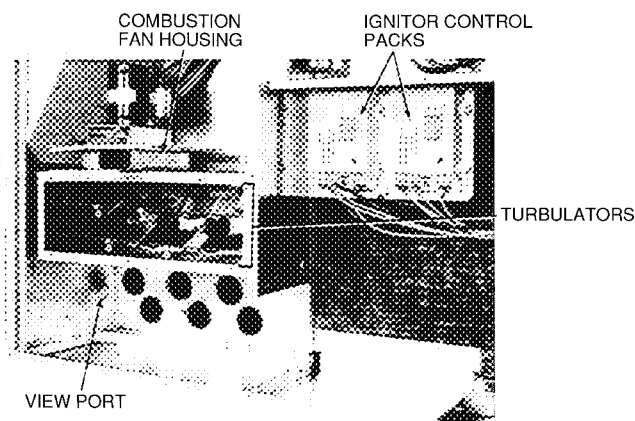


Fig. 26 — Typical Heating Section With Main Burners Removed (48HJE015, 48HJE017, and 48HJD025 Shown)

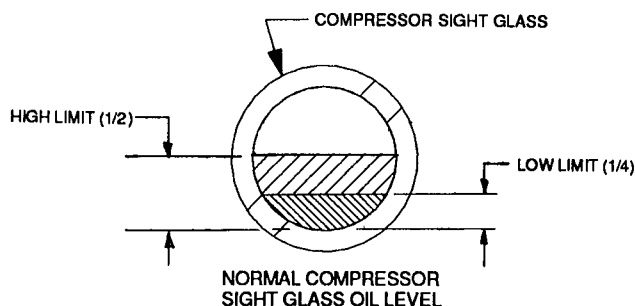


Fig. 27 — Compressor Sight Glass Oil Level

FAN SHAFT BEARINGS — For 015 units, the bearings are permanently lubricated. No field lubrication is required. For 017 and 025 units, the bearings are of the pillow block type and have grease fittings. The bearing opposite the motor end has an extended tube line so it can be lubricated from the motor side. Lubricate the bearings twice annually.

Typical lubricants are given below:

MANUFACTURER	LUBRICANT
Texaco	Regal AFB-2*
Mobil	Mobilplex EP No. 1
Sunoco	Prestige 42
Texaco	Multifak 2

*Preferred lubricant because it contains rust and oxidation inhibitors.

CONDENSER- AND EVAPORATOR-FAN MOTOR BEARINGS — The condenser- and evaporator-fan motors have permanently-sealed bearings, so no field lubrication is necessary.

Evaporator Fan, 48HJ015 Units

PERFORMANCE ADJUSTMENT — The 48HJ015 fan motor pulleys are factory set for speed shown in Table 1.

To change fan speeds:

1. Shut off unit power supply.
2. Loosen belt by loosening fan motor mounting plate nuts.
3. Loosen movable-pulley flange setscrew (see Fig. 28).
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 1.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew.

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.
3. Make angular alignment by loosening motor from mounting plate.

SERVICE AND REPLACEMENT (See Fig. 29)

NOTE: To remove belts only, follow Steps 1-7.

1. Remove filter and supply-air section panels.
2. Remove unit top cover.
3. Remove coil guard.
4. Loosen screws A and B on both sides of motor mount assembly.
5. Loosen screw C.
6. Rotate motor mount assembly (with motor attached) as far as possible away from evaporator coil.
7. Remove belt.
8. Rotate motor mount assembly back past original position toward evaporator coil.
9. Remove motor mounting nuts D and E (both sides).
10. Lift motor up through top of unit.
11. Reverse above procedure to reinstall motor.
12. Check and adjust belt tension as necessary.

Evaporator Fan, 48HJ017,025 Units

PERFORMANCE ADJUSTMENT — Fan motor pulleys are factory set for speed shown in Table 1.

To change fan speeds:

1. Shut off unit power supply.

2. Loosen nuts on the 2 carriage bolts in the mounting base. Install jacking bolt and plate under motor base (bolt and plate are shipped in installer's packet). Using bolt and plate, raise motor to top of slide and remove belt. Secure motor in this position by tightening the nuts on the carriage bolts.
3. Loosen movable-pulley flange setscrew (see Fig. 28).

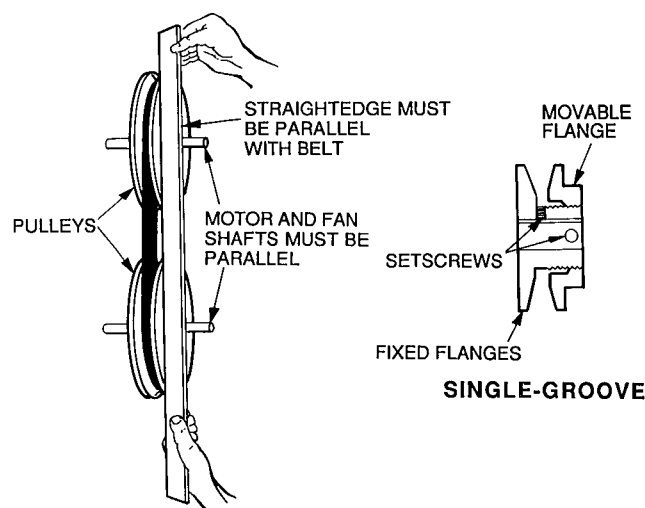


Fig. 28 — Evaporator-Fan Alignment and Adjustment

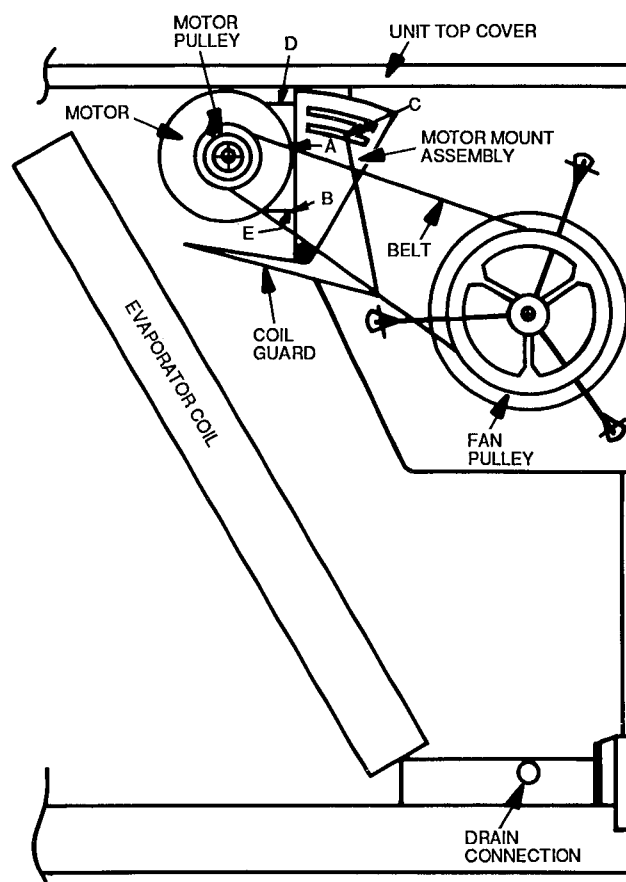


Fig. 29 — 48HJ015 Evaporator-Fan Motor Adjustment

SERVICE AND REPLACEMENT (See Fig. 30) — The 48HJ017,025 units use a fan motor mounting system that features a slide-out motor mounting plate. To replace or service the motor, slide out the bracket.

1. Remove the evaporator-fan access panel and the heating control access panel.
2. Remove the center post (located between the evaporator fan and heating control access panels) and all screws securing it.
3. Loosen nuts on the two carriage bolts in the motor mounting base.
4. Using jacking bolt under motor base, raise motor to top of slide and remove belt. Secure motor in this position by tightening the nuts on the carriage bolts.
5. Remove the belt drive.
6. Remove jacking bolt and tapped jacking bolt plate.
7. Remove the 2 screws that secure the motor mounting plate to the motor support channel.
8. Remove the 3 screws from the end of the motor support channel that interfere with the motor slide path.
9. Slide out the motor and motor mounting plate.
10. Disconnect wiring connections and remove the 4 mounting bolts.
11. Remove the motor.
12. To install the new motor, reverse Steps 1-11.

Belt Tension Adjustment — To adjust belt tension:

1. Loosen fan motor bolts.
2. a. 015 Units: Move motor mounting plate up or down for proper belt tension ($\frac{1}{2}$ in. deflection with one finger).
- b. 017,025 Units: Turn motor jacking bolt to move motor mounting plate up or down for proper belt tension ($\frac{3}{8}$ in. deflection at midspan with one finger [9 lb force]).
3. Tighten nuts.
4. Adjust bolts and nut on mounting plate to secure motor in fixed position.

Condenser-Fan Adjustment

48HJ015,017 UNITS (Fig. 31)

1. Shut off unit power supply.
2. Remove access panel(s) closest to the fan to be adjusted
3. Loosen fan hub setscrews.
4. Adjust the fan height on the shaft using a straightedge placed across the fan orifice.
5. Tighten setscrews and replace panel(s).
6. Turn on unit power

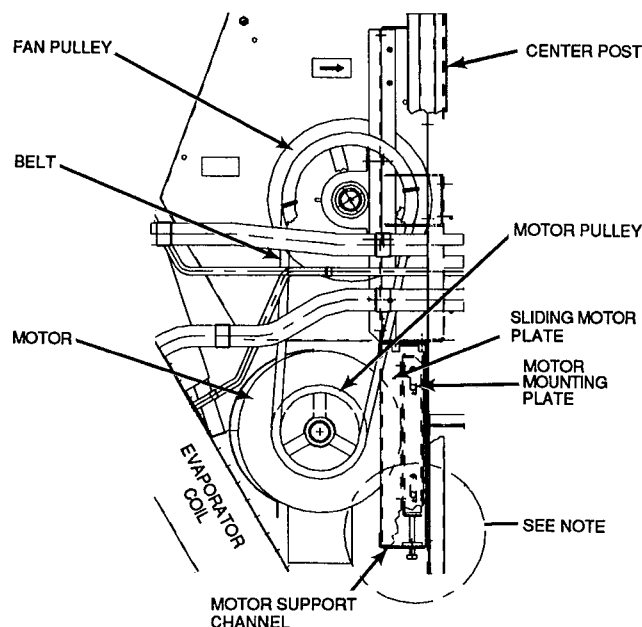
48HJ025 UNITS (Fig. 32)

1. Shut off unit power supply.
2. Remove fan top-grille assembly and loosen fan hub screws.
3. Adjust fan height on unit, using a straightedge placed across the fan orifice.
4. Tighten setscrews and replace rubber hubcap to prevent hub from rusting to motor shaft.
5. Fill hub recess with permagum if rubber hubcap is missing.

Economizer Adjustment — Refer to Tables 8 and 9 for economizer checkout procedures. Make certain the outdoor-air damper is fully closed and the return-air damper is fully open before completing the following steps:

1. Turn on power to the unit.
2. Turn the thermostat fan switch to the ON position. The damper will go to the vent position.
3. Adjust the vent position with the minimum position adjustment on the economizer motor control module. See Fig. 18.
4. Set the system selector switch to COOL position and set the cooling temperature selector to its lowest setting.

NOTE: The Cooling mode may also be simulated by removing the thermostat wires from terminals Y1 and Y2 and installing a jumper between terminals R and Y1. Refer to unit label diagram for terminal locations.



NOTE: A $3\frac{1}{2}$ -in. bolt and threaded plate are included in the installer's packet. They can be added to the motor support channel below the motor mounting plate to aid in raising the motor.

Fig. 30 — 48HJ017,025 Evaporator-Fan Motor Section

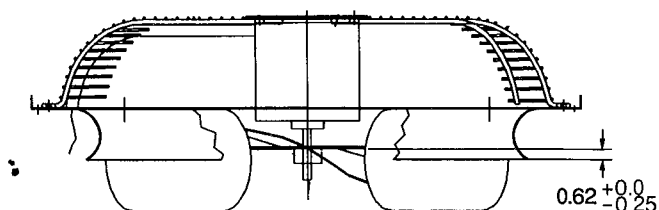


Fig. 31 — Condenser Fan Adjustment, 48HJ015,017

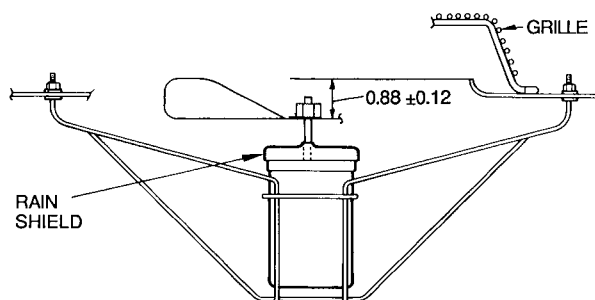


Fig. 32 — Condenser-Fan Adjustment, 48HJ025

5. Set the outdoor-air thermostat (OAT), located in the economizer section of the unit to 75 F.
6. If the outdoor temperature is below 75 F, the economizer will control the mixed air with the mixed-air sensor. If the outdoor air is above 75 F, place a jumper around the contacts of the OAT.
7. Jumper terminal T to terminal T1 on the module (see Fig. 18). The economizer will go to the full open position. The outdoor-air damper will go to the full open position, and the return-air damper will go to the full closed position.
8. Adjust mechanical linkage, if necessary, for correct positioning. If may be necessary to remove the filters to adjust the linkage.
9. Remove the jumper from around the contacts of the OAT if installed in Step 6. Remove the jumper from terminals T and T1 installed in Step 7.
10. If the Cooling mode was simulated to operate the unit in Step 4, remove the jumper and reconnect the thermostat wires to terminals Y1 and Y2.

Table 8 — Economizer Checkout Procedures

TEST PROCEDURE	RESULTS
A. Disconnect power at TR and TR1. Disconnect jumper between P and P1. See Fig. 18. B. Jumper TR to 1. C. Jumper T1 to T. D. Disconnect outdoor-air thermostat connections from S _O and +. Factory-installed 800 ohm resistor should remain connected to S _R and +. E. Reconnect power to terminals TR and TR1.	1 LED (light-emitting diode) should be off. 2. Motor is in closed position.
TEST PROCEDURE	RESULTS
Disconnect factory-installed resistor from terminals S _R and +.	1 LED (light-emitting diode) should be on. 2 Motor drives toward open.

Table 9 — High and Low Outdoor-Air Temperature

TEST PROCEDURE	RESULTS
A. Reconnect factory-installed 800 ohm resistor between terminals S _R and +. B. Connect 1200 ohm checkout resistor between terminals S _O and +. C. Turn set point potentiometer to position A.	Low outdoor-air temperature test results: 1 LED (light-emitting diode) should be on. 2 Motor drives toward open
D. Turn set point potentiometer to position D. E. Disconnect 1200 ohm checkout resistor.	High outdoor-air temperature test results: 1 LED should be off 2 Motor drives toward closed.

Power Failure — Dampers have a spring return. In event of power failure, dampers will return to fully closed position until power is restored. *Do not manually operate damper motor.*

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate and in Table 1. Refer to Carrier GTAC II; Module 5; Charging, Recovery, Recycling, and Reclamation section for charging methods and procedures.

Unit panels must be in place when unit is operating during charging procedure.

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to Table 1).

LOW CHARGE COOLING — Using appropriate cooling charging chart (see Fig. 33-35), add refrigerant until conditions of the chart are met. Note that charging charts are different from those normally used. Charts are based on charging units to correct superheat for various operating conditions. An accurate pressure gage and temperature sensing device are required. Connect temperature sensing device to service port on suction line and insulate it so that outdoor ambient temperature does not affect reading. Indoor-air cfm must be within normal operating range of unit.

TO USE COOLING CHARGING CHART — Take outdoor ambient temperature and read the suction pressure gage. Refer to appropriate chart to determine correct suction temperature. If suction temperature is high, add refrigerant. If suction temperature is low, carefully reclaim some of the charge. Recheck suction pressure as charge is adjusted.

Pilot Light — If pilots do not light as described in Gas Heat section on page 17, be sure that pilot orifice is not obstructed, then check for spark ignitor malfunctions as follows:

1. Shut off control supply power to ignitor control pack (ICP).
2. Check that spark gap is 1/8 in. ± 1/32 inch.
3. Check that ICP is securely grounded.
4. Check that high-voltage lead is securely connected between ICP and electrode body.
5. Restore power to ICP. Check that 24 v is supplied to terminal **TH** of ICP.
6. Check unit label diagram for correct terminal usage if any wires are removed.

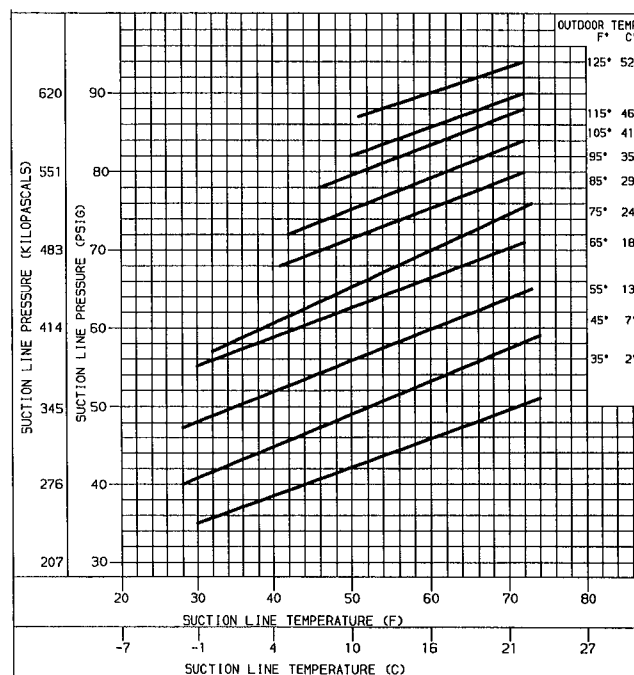


Fig. 33 — Cooling Charging Chart, 48HJ015

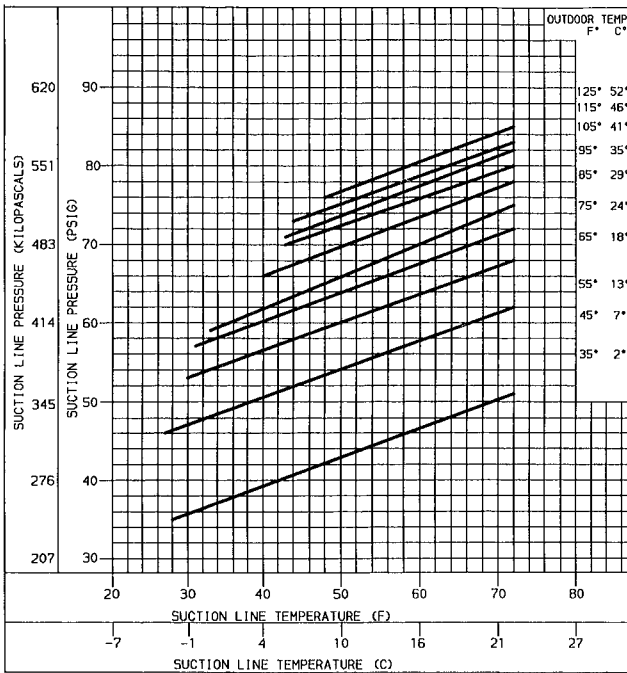


Fig. 34 — Cooling Charging Chart, 48HJ017

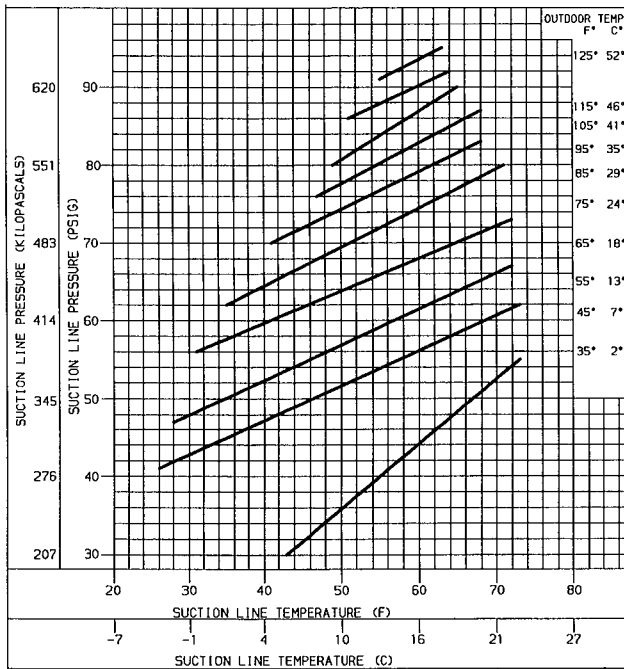


Fig. 35 — Cooling Charging Chart, 48HJ025

Pilot Adjustment

1. Set system selector switch at OFF position to shut off unit. Turn off power to unit.
2. Remove screw cap cover on pilot gas valve to expose adjusting screw (See Fig. 36).
3. Turn valve knobs to pilot position.
4. Turn on power to unit. Set system selector switch to HEAT position and set thermostat to a setting that will call for heat. Pilot ignites.
5. With a small screwdriver, turn adjustment screw until flame fully engulfs sensor. Flame can be observed through view port (Fig. 37).
6. Turn off power to unit. Replace cap on pilot gas valve. Return valve knob(s) to original position.

7. Check for proper burner operation by cycling the burners. Wait 30 seconds between burner cycles.
8. Check that all unit panels are in place before leaving unit.

Gas Valve Adjustment

NATURAL GAS — The gas valve opens and closes in response to the thermostat or limit control.

When power is supplied to valve terminals 3 and 4, the pilot valve opens to the preset position. When power is supplied to terminals 1 and 2, the main valve opens to its preset position.

The regular factory setting is stamped on the valve body (3.5 in. wg).

To adjust regulator:

1. Set thermostat at setting for no call for heat.
2. Turn main gas valve to OFF position.
3. Remove 1/8-in. pipe plug from manifold or gas valve pressure tap connection. Install a suitable pressure-measuring device.
4. Set main gas valve to ON position.
5. Set thermostat at setting to call for heat.
6. Remove screw cap covering regulator adjustment screw (See Fig. 36).
7. Turn adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure.
8. Once desired pressure is established, set thermostat setting for no call for heat, turn off main gas valve, remove pressure-measuring device and replace 1/8-in. pipe plug and screw cap.

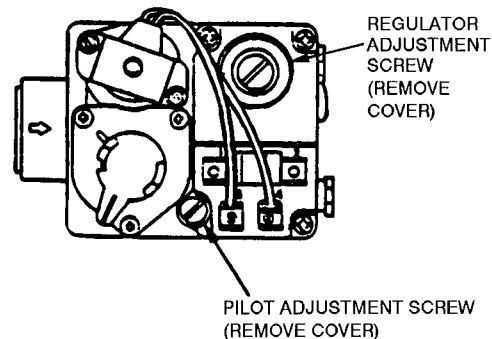


Fig. 36 — Gas Valve

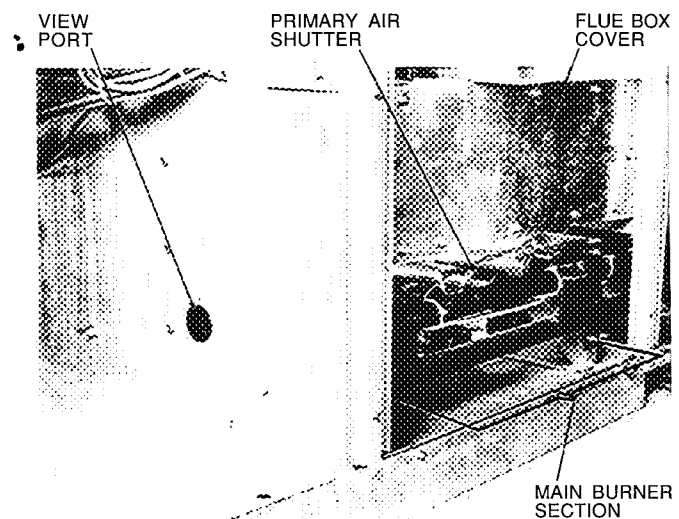


Fig. 37 — Typical Heating Section

Main Burners — For most applications, main burners are factory set and should require no adjustment. However, if burner adjustment is necessary:

1. Perform pilot adjustment.
2. Turn gas valve to ON position. Allow unit to operate at least 15 minutes with burner access panel in place.
3. Remove access panel.
4. Loosen primary air shutter (Fig. 37) and adjust to a minimum opening of $\frac{3}{8}$ inch.
5. Retighten primary air shutter and reinstall access panel.

To check ignition of main burners and fan switch operation, move thermostat dial above and below room temperature several times, pausing at least one minute between cycles.

MAIN BURNER REMOVAL

1. Shut off (field-supplied) manual main gas valve.
2. Shut off power to unit.
3. Remove unit control box/gas valve access panel, burner section access panel, and center post (Fig. 4 and 5).
4. Disconnect pilot ignitor and pilot proving sensor leads at ICP, rollout switch leads at switch, and pilot tube gas connection(s) at the pilot orifice.
5. Disconnect gas connection(s) from between gas valve(s) and main burners.
6. Remove 2 screws securing burner assembly to base unit.
7. Slide burner assembly out of unit.

Filter Drier — Replace whenever refrigerant system is exposed to atmosphere.

Protective Devices

COMPRESSOR PROTECTION

Overcurrent — Each compressor has one manual reset, calibrated trip, magnetic circuit breaker. Do not bypass connections or increase the size of the circuit breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

Overtemperature — Each compressor has an internal protector to protect it against excessively high discharge gas temperatures.

Crankcase Heater — Each compressor has a 125-watt crankcase heater to prevent absorption of liquid refrigerant by oil

in the crankcase when the compressor is idle. Since power for the crankcase heaters is drawn from the unit incoming power, main unit power must be on for the heaters to be energized.

IMPORTANT: After a prolonged shutdown or service job, energize the crankcase heaters for 24 hours before starting the compressors.

Compressor Lockout — If any of the safeties (high-, low-pressure, freeze protection thermostat, compressor internal thermostat) trip, or if there is loss of power to the compressors, the cooling lockout (CLO) will lock the compressors off. To reset, manually move the thermostat setting.

EVAPORATOR-FAN MOTOR PROTECTION — A manual reset, calibrated trip, magnetic circuit breaker protects against overcurrent. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

CONDENSER-FAN MOTOR PROTECTION — Each condenser-fan motor is internally protected against overtemperature.

HIGH- AND LOW-PRESSURE SWITCHES — If either switch trips, or if the compressor overtemperature switch activates, that refrigerant circuit will be automatically locked out by the CLO. To reset, manually move the thermostat setting.

FREEZE PROTECTION THERMOSTAT (FPT) — An FPT is located on the evaporator coil. It detects frost build-up and turns off the compressor, allowing the coil to clear. Once the frost has melted, the compressor can be reenergized by resetting the CLO from the thermostat.

Relief Devices — All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices protect the high and low side.

Control Circuit, 24-V — This control circuit is protected against overcurrent by a 3.2-amp circuit breaker. Breaker can be reset. If it trips, determine cause of trouble before resetting.

Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request.

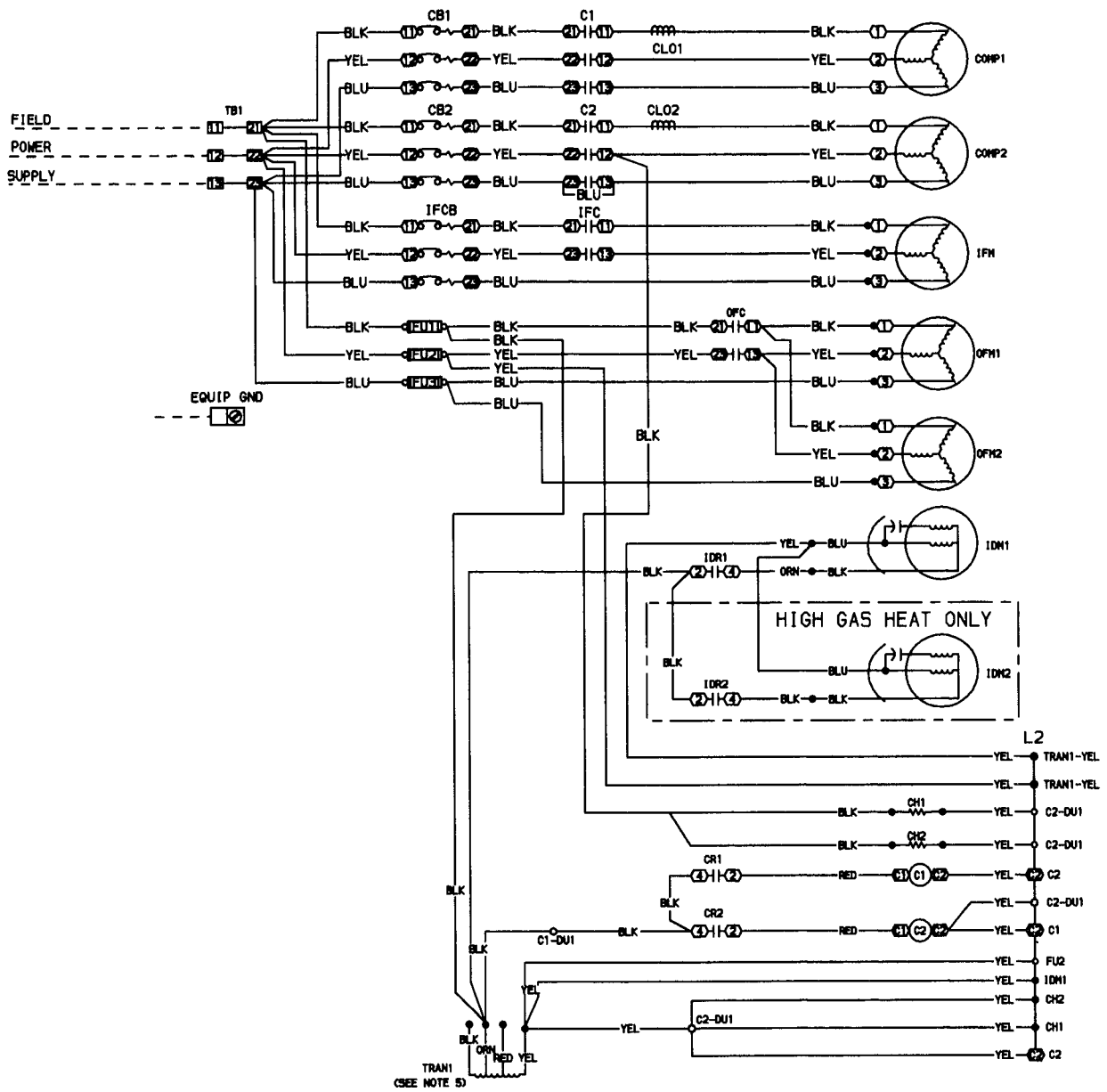


Fig. 38 — Typical Wiring Schematic (48HJ025 Shown)



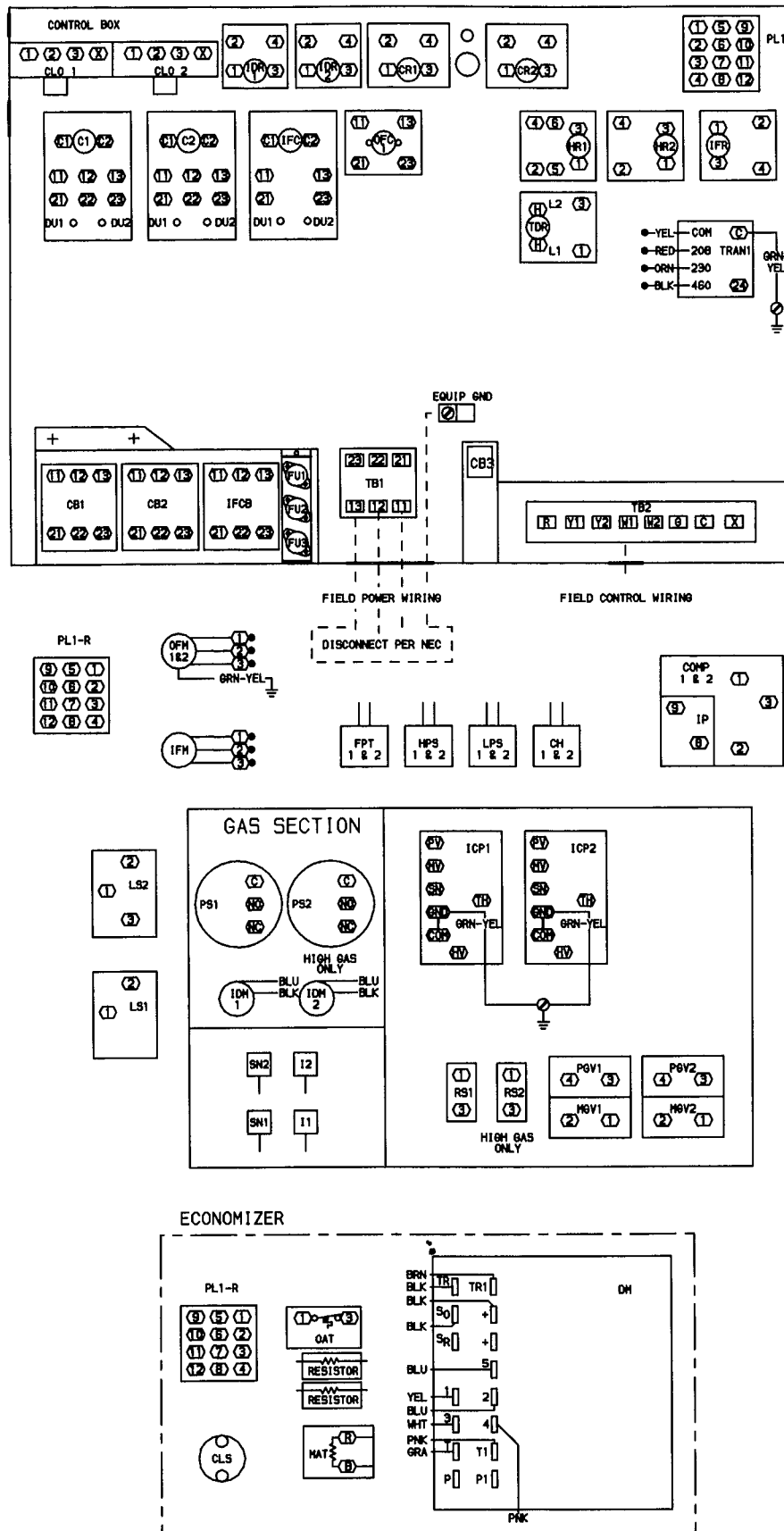


Fig. 39 — Typical Component Arrangement (48HJ025 Shown)

TH	—	Thermostat Heating
TRAN	—	Transformer
		Terminal (Marked)
		Terminal (Unmarked)
		Terminal Block
		Splice
		Splice (Marked)
		Splice (Field Supplied)
		Factory Wiring
		Field Control Wiring
		Field Power Wiring
		Accessory or Optional Wiring
		To Indicate Common Potential Only, Not To Represent Wiring

- 5 CB must-trip amps are equal to or less than 140% full load amps.
6. Number(s) indicates the line location of used contacts. A bracket over (2) numbers signifies a single-pole, double-throw contact. An underlined number signifies a normally-closed contact. A plain (no line) number signifies a normally-open contact.
- 7 The CLO locks out the compressor to prevent short cycling on compressor overload and safety devices. Before replacing CLO, check these devices.

UNIT	W1	W2	VOLTAGE
48HJD015	1.20	—	All
48HJD025, HJE015, HJE017	1.20	0.60	All

ly,

S.
at
st.
in

in
,

START-UP CHECKLIST

MODEL NO.: _____

SERIAL NO.: _____

DATE: _____

TECHNICIAN: _____

PRE-START-UP:

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ REMOVE ALL SHIPPING HOLDDOWN BOLTS AND BRACKETS PER INSTRUCTIONS
- ☐ VERIFY INSTALLATION OF ECONOMIZER HOOD
- ☐ VERIFY INSTALLATION OF EXHAUST HOOD
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- ☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- ☐ CHECK GAS PIPING FOR LEAKS
- ☐ CHECK THAT INDOOR-AIR FILTER IS CLEAN AND IN PLACE
- ☐ VERIFY THAT UNIT IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE, AND VERIFY SETSCREW IS TIGHT
- ☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED

START-UP

ELECTRICAL

SUPPLY VOLTAGE L1-L2 _____ L2-L3 _____ L3-L1 _____

COMPRESSOR AMPS — COMPRESSOR NO. 1 L1 _____ L2 _____ L3 _____
— COMPRESSOR NO. 2 L1 _____ L2 _____ L3 _____

SUPPLY FAN AMPS _____ EXHAUST FAN AMPS _____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ F DB (Dry Bulb)

RETURN-AIR TEMPERATURE _____ F DB _____ F WB (Wet Bulb)

COOLING SUPPLY AIR _____ F

GAS HEAT SUPPLY AIR _____ F

PRESSURES

GAS INLET PRESSURE _____ IN. WG

GAS MANIFOLD PRESSURE STAGE NO. 1 _____ IN. WG STAGE NO. 2 _____ IN. WG

REFRIGERANT SUCTION CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 _____ PSIG

REFRIGERANT DISCHARGE CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 _____ PSIG

- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS ON PAGES 21 AND 22

GENERAL

- ☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS

PACKAGED SERVICE TRAINING

Our packaged service training programs provide an excellent way to increase your knowledge of the equipment discussed in this manual. Product programs cover:

- Unit Familiarization
- Maintenance
- Installation Overview
- Operating Sequence

A large selection of product, theory, and skills programs is available. All programs include a video cassette and/or slides and a companion booklet. Use these for self teaching or to conduct full training sessions.

For a free Service Training Material Catalog (STM), call 1-800-962-9212. Ordering instructions are included.