

Installation, Start-Up and Service 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).

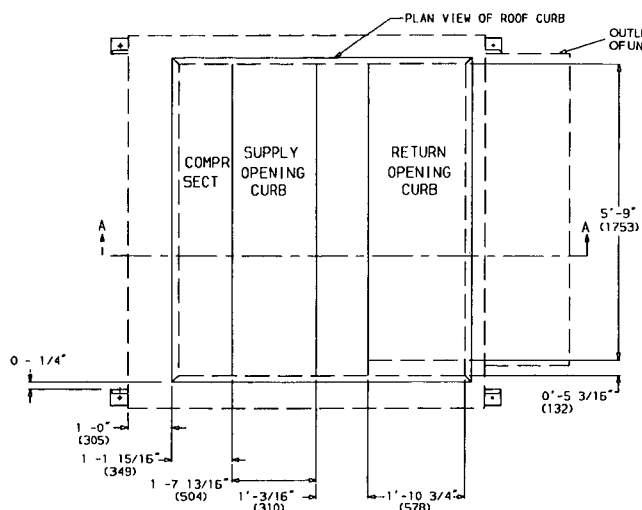
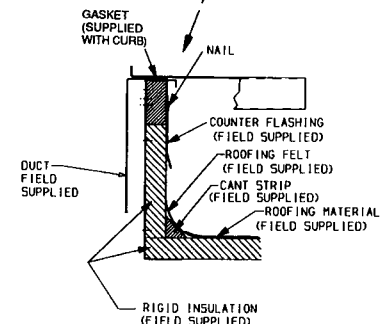
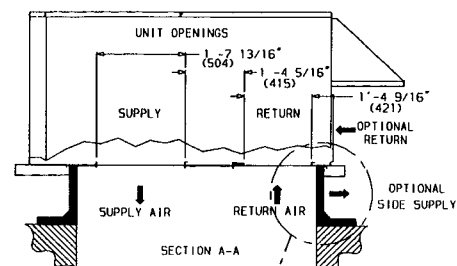
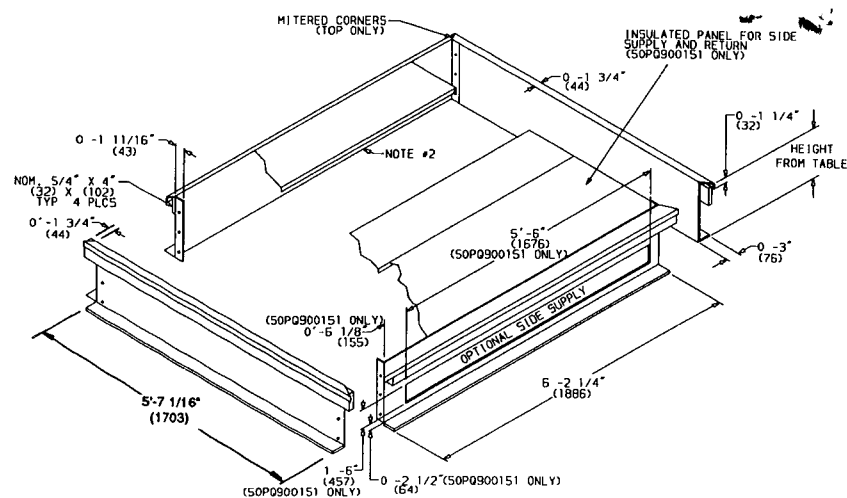
INSTALLATION

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.



ATTACH DUCT TO ROOF CURB

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.

ACCESSORY PACKAGE NO.	CURB HEIGHT	DESCRIPTION
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

LEGEND

COMP SECT. — Compressor Section

NOTES:

1. Roof curb accessory is shipped unassembled
2. Insulated panels, 1-in. thick neoprene-coated, 1½ lb density
3. Dimensions in () are in millimeters.
4. Direction of airflow.
5. Roof curb: 16 gage steel
6. Attach all ductwork to roof curb.
7. Field installation of sidewall is mandatory.

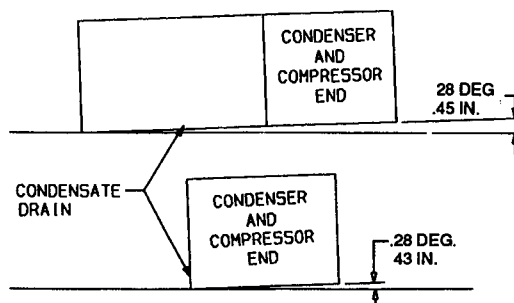


Fig. 1 — Roof Curb Details

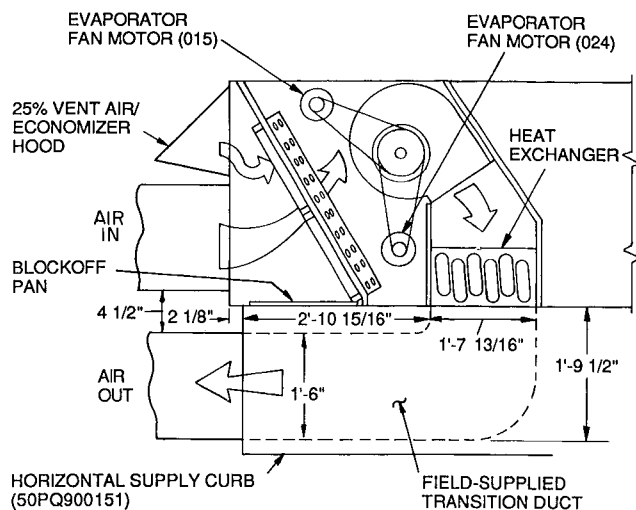


Fig. 2 — Horizontal Supply/Return Curb Details

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 $\pm \frac{1}{16}$ 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, around and above unit to provide minimum distance from combustible materials, proper airflow, and service access.

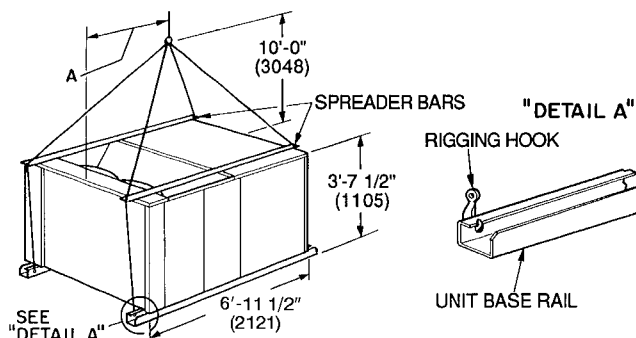
Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air. For proper unit operation, adequate combustion and ventilation air must be provided in accordance with Section 5.3 (Air for Combustion and Ventilation) of the National Fuel 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 6.



UNIT 48	MAXIMUM SHIPPING WEIGHT	
	Lb	Kg
HJD015	1800	816
HJE015	1820	826
HJD024	2430	1102

Dimension A

UNIT	Ft-in.	mm
48HJD015	3-5	1041
48HJE015	3-2	965
48HJD024	3-3 $\frac{3}{4}$	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

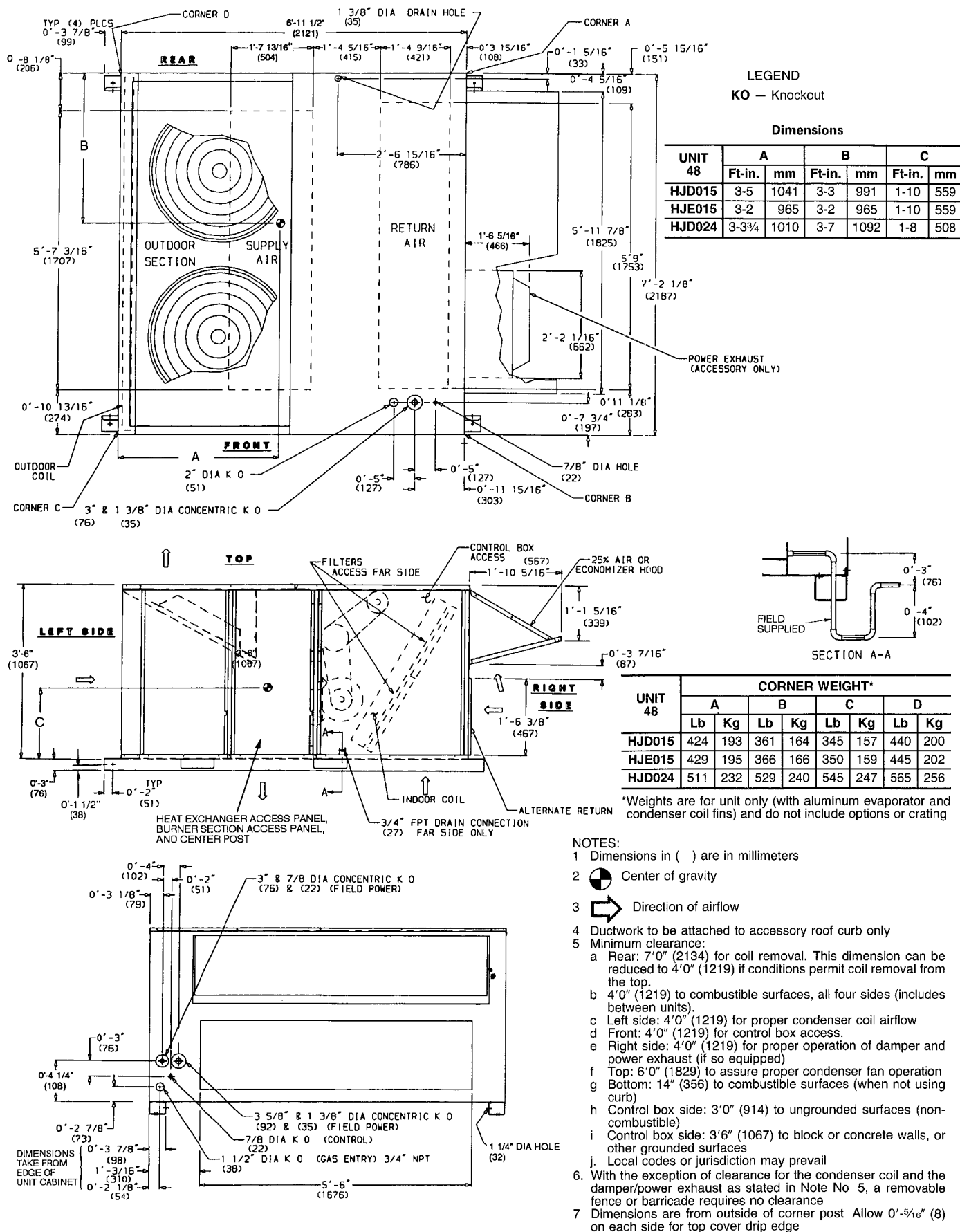


Fig. 4 – Base Unit Dimensions

Table 1 – Physical Data

UNIT SIZE 48	HJD015	HJE015	HJD024
OPERATING WT (lb)			
Al/Al*	1570	1590	2150
Unit Al/Cu*	1650	1670	2280
Cu/Cu*	1730	1750	2390
Economizer	110	110	110
Roof Curb†	200	200	200
COMPRESSOR	06D824 Semi-Hermetic — 6 Cylinders		
Number	1		2
Oil (oz)	152		152 ea
Capacity Steps (%)	67,100		50,100
REFRIGERANT	R-22		
Charge (lb) Sys 1**, Sys 2	21.3, —		16 25, 16.25
REFRIGERANT METERING DEVICE	Capillary Tubes		
Upper Circuit	6...25...0.055/0.125		
No. ...Length (in.)...ID/OD	6...25...0.055/0.125		13 .25 0 055/0.125
Lower Circuit	6...25...0.055/0.125		
No. ...Length (in.)...ID/OD	—		13..25 ..0 055/0.125
CONDENSER COIL	Copper Tubes, Aluminum or Copper Plate Fins		
Rows	3		4
Fins/in.	13.6 Al or 12.4 Cu		13 6 Al or 12.4 Cu
Total Face Area (sq ft)	18.9		22.2
CONDENSER AIR FAN	Propeller Type, Direct Drive		
Nominal Cfm	12,000		11,400
Number...Diameter (in.)	2...26		2...26
Motor Hp (1075 Rpm)	1		1
Watts Input (Total)	2672		3000
EVAPORATOR COIL	Copper Tubes, Aluminum or Copper Plate Fins		
Rows	3		4
Fins/in.	15 6 Al or 14 2 Cu		14.4 Al or 13 1 Cu
Total Face Area (sq ft)	16.5		17 9
EVAPORATOR FAN**	Centrifugal, Fixed Pitch Belt Drive		
Quantity...Size (in.)	2 . 10x10		2...12x12
Nominal Cfm	5000		8000
Maximum Allowable Rpm	1265		1500
Motor Pulley Pitch Diameter (in.)	3 4-4 4		6.1
Fan Pulley Pitch Diameter (in.)	6.0		8.4
Belt, Quantity...Type...Length (in.)	1 . V 41		1...BX ..51
Factory Speed Setting (Rpm)	1092		1287
Motor Hp (Service Factor)	3 (1 15)		7½ (1.15)
Motor Frame Size	56		184T
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	(2) .064.. 52
Natural Gas		(1) .041 ..59	
Thermostat Heat Anticipator Setting			
208/230/575; Stage 1/Stage 2	.98/—	98/ 44	.98/ 44
460; Stage 1/Stage 2	1.2/—	1 2/ 44	1 2/ 44
Gas Valve Quantity	1	2	2
HIGH-PRESSURE SWITCH		426	
Cutout (psig)		320	
Reset (psig)			
LOW-PRESSURE SWITCH		7	
Cutout (psig)		22	
Reset (psig)			
AIR INLET SCREENS		2 ..20 x 25 x 1	
Economizer, Quantity...Size (in.)		1 ..20 x 20 x 1	
RETURN-AIR FILTERS (TYPE)	10% Efficient — 2-in. Throwaway Fiberglass		
Quantity... Size (in.)	2 20 x 20 x 2		4 20 x 20 x 2
	3 . 16 x 20 x 2		4 16 x 20 x 2
	2 ..16 x 25 x 2		

LEGEND

Al — Aluminum

Cu — Copper

*Evaporator coil fin material/condenser coil fin material

†Weight of 14 in. roof curb.

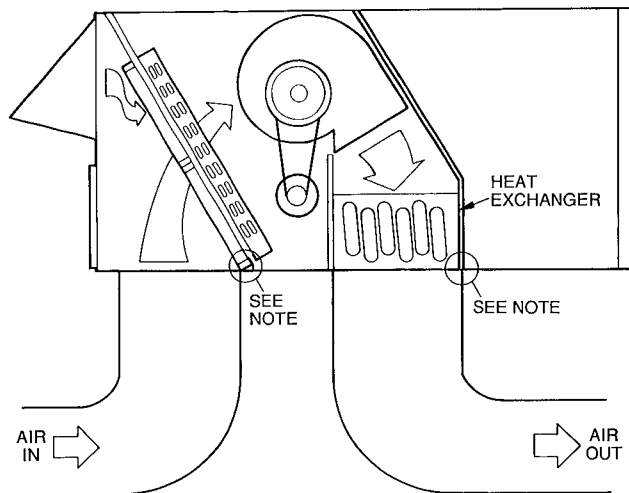
**Evaporator coil is intertwined. System 1 is lower portion of condenser coil, and System 2 is upper portion of condenser coil.

††Rollout switch is manual reset.

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.

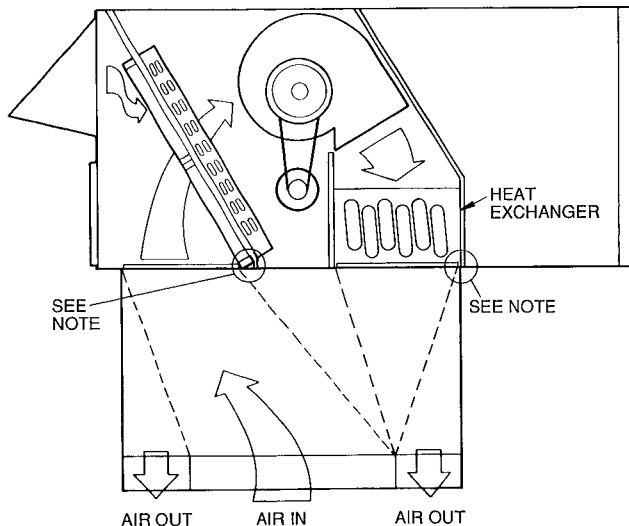
Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

Step 4 – Make Unit Duct Connections – Unit is shipped for through-the-bottom duct connections. Ductwork openings are shown in Fig. 1 and 4. Duct connections are shown in Fig. 5. Field-fabricated concentric ductwork may be connected as shown in Fig. 6 and 7. 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. 5 – Air Distribution – Through-the-Bottom (48HJ024 Shown)

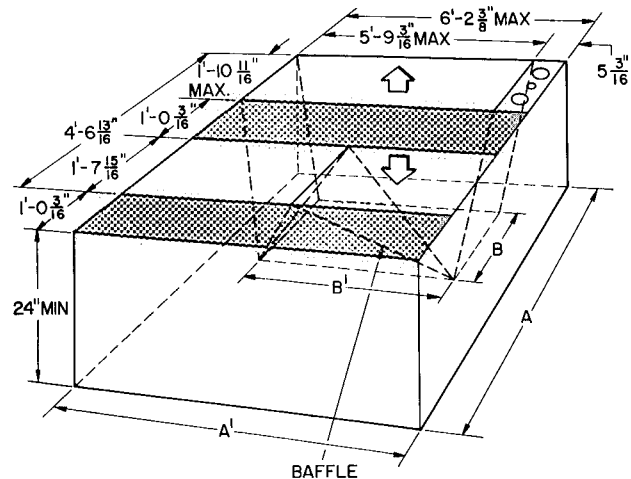


NOTE: Do not drill in this area; damage to basepan may result in water leak

Fig. 6 – Concentric Duct Air Distribution (48HJ024 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. 8.

NOTE: When properly installed, flue hood will line up with combustion fan housing. See Fig. 9.



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

Shaded areas indicate block-off pans

Fig. 7 – Concentric Duct Details

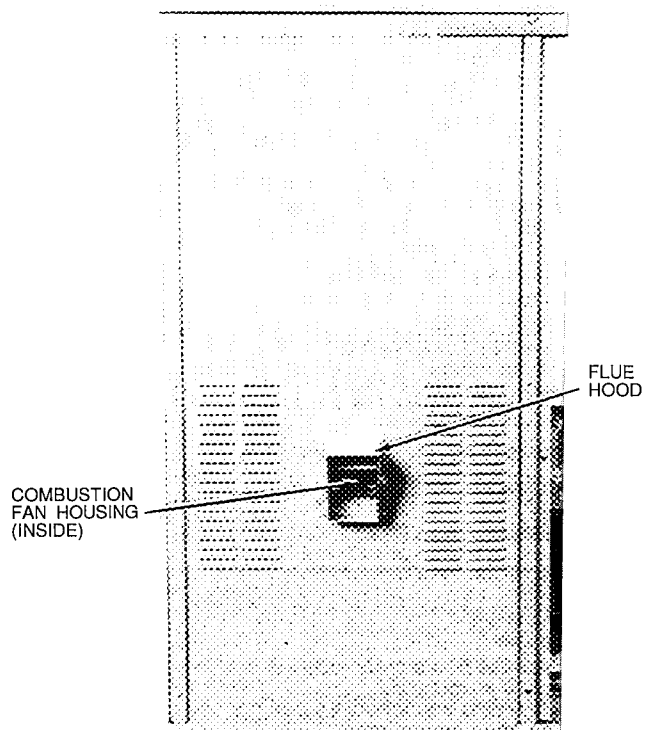


Fig. 8 – Flue Hood Location

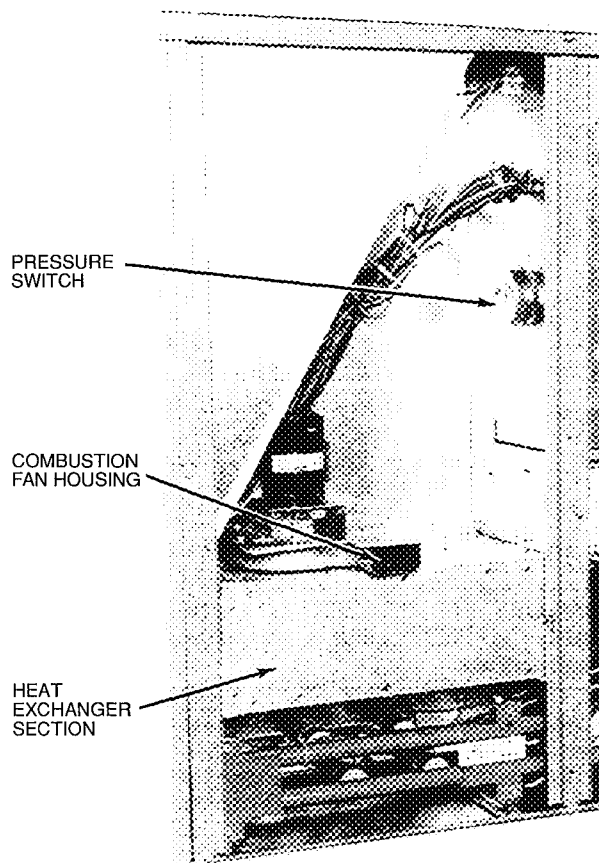


Fig. 9 – Combustion Fan Housing Location

Step 6 – Trap Condensate Drain — See Fig. 10 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. 11). 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. 12.

⚠ 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).

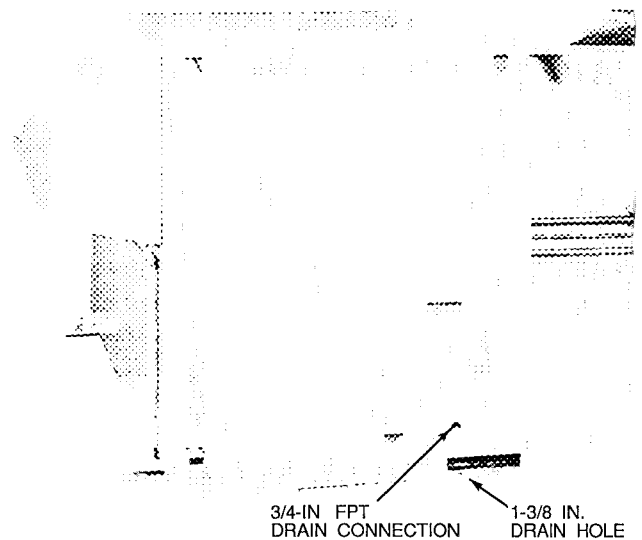


Fig. 10 – Condensate Drain Details

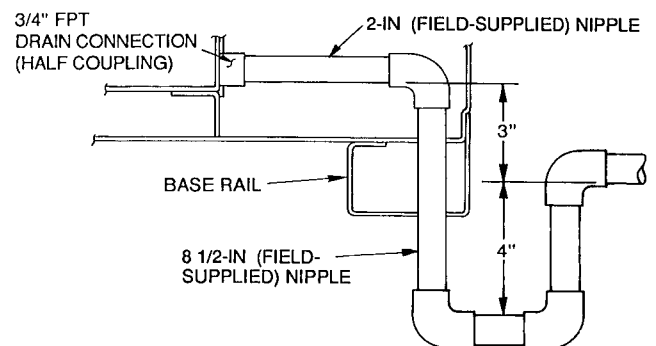


Fig. 11 – Condensate Drain Piping Details

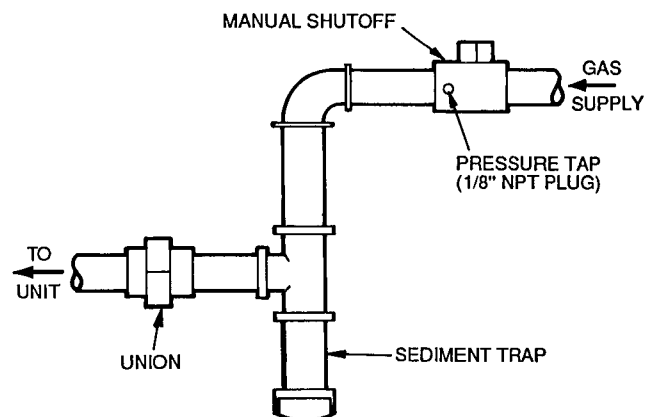


Fig. 12 – Field Gas Piping

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) to connections as shown on unit wiring diagram and Fig. 13.

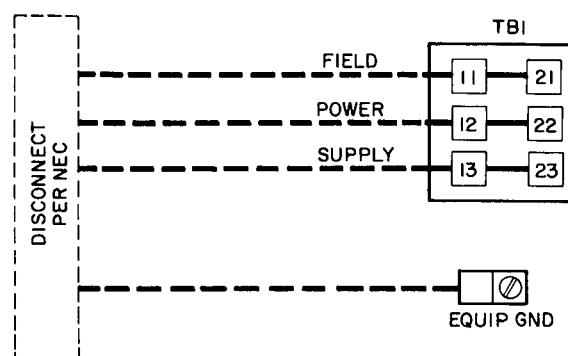
⚠ WARNING

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. 13 – 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	V-PH-HZ	VOLTAGE RANGE		COMPRESSOR				CONDENSER FAN MOTOR		EVAPORATOR FAN MOTOR		COMBUSTION FAN MOTOR	POWER SUPPLY	
				No. 1		No. 2		Qty	FLA (ea)	Hp	FLA	FLA	MCA	MOCP*
		Min	Max	RLA	LRA	RLA	LRA							
48HJD,HJE015	208/230-3-60	187	253	49.3	191	—	—	2	7.7	3	10.5	0.57	88	130/130
	460-3-60	414	508	22.1	86	—	—	2	3.3	3	4.8	0.30	39	60
	575-3-60	518	632	17.9	69	—	—	2	2.6	3	3.9	0.57	32	45
48HJD024	208/230-3-60	187	253	43.9	170	43.9	170	2	5.4	7½	24.2/22.0	0.57	134/132	175/175
	460-3-60	414	508	19.9	77	19.9	77	2	2.7	7½	11.0	0.30	62	80
	575-3-60	518	632	15.9	62	15.9	62	2	3.4	7½	9.0	0.57	52	60

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning & Refrigeration
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
RLA — Rated Load Amps

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



Warnock Hersey



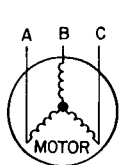
NOTE: In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.

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. 14.

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	208/230,575	.98	—
	460	1.20	—
48HJD024, HJE015	208/230,575	.98	44
	460	1.20	44

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. 15).

OPTIONAL FACTORY-INSTALLED ECONOMIZER

Economizer Motor Control Module (See Fig. 16-18) — Set economizer motor to the D setting (Fig. 17).

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 (024 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. 19).

1. Attach seal strip to upper filter retainer. See Fig. 20.
2. Assemble hood top cover, side panels, upper filter retainer, and drain pan (see Fig. 21).
3. Secure lower filter retainer and long portion of support bracket to unit. See Fig. 21. Leave screws loose on 024 units.
4. 48HJ024 Units Only: Slide baffle behind lower filter retainer and tighten screws.
5. Loosen sheet metal screws for top cover of base unit located above outdoor-air inlet opening.

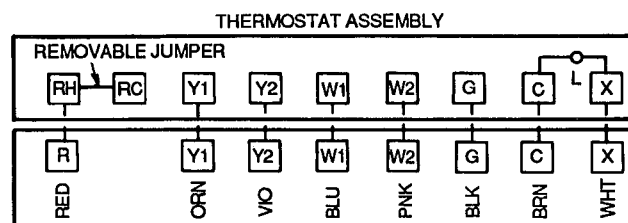


Fig. 14 — Field Control Thermostat Wiring

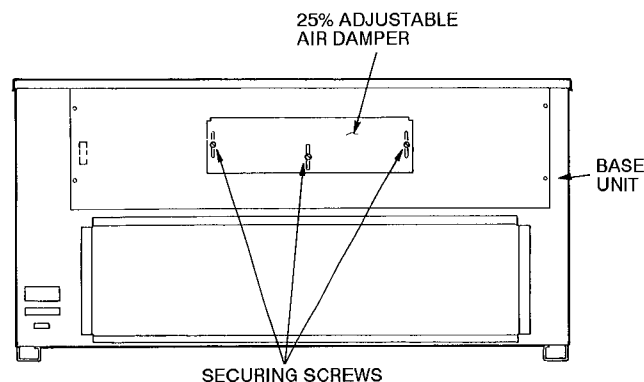


Fig. 15 — 25% Outdoor-Air Section Details

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.

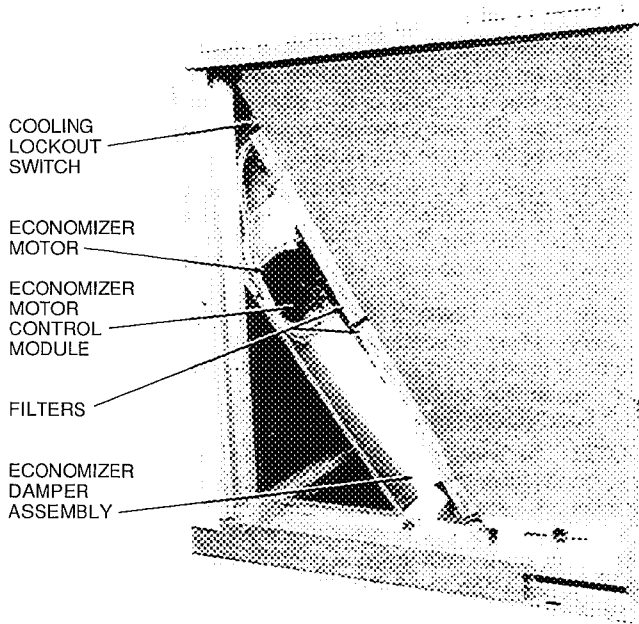


Fig. 16 — Economizer Damper Assembly-End View

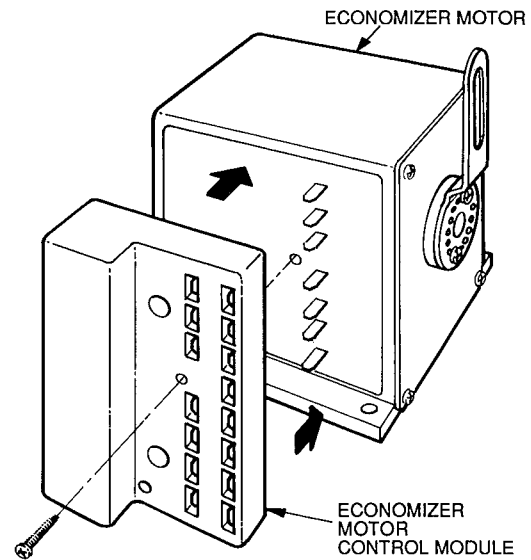


Fig. 18 — Economizer Motor Control Module Location

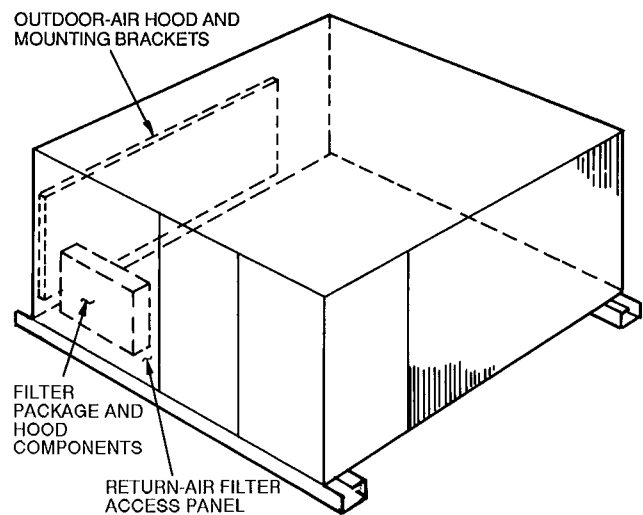


Fig. 19 — Outdoor-Air Hood Component Location

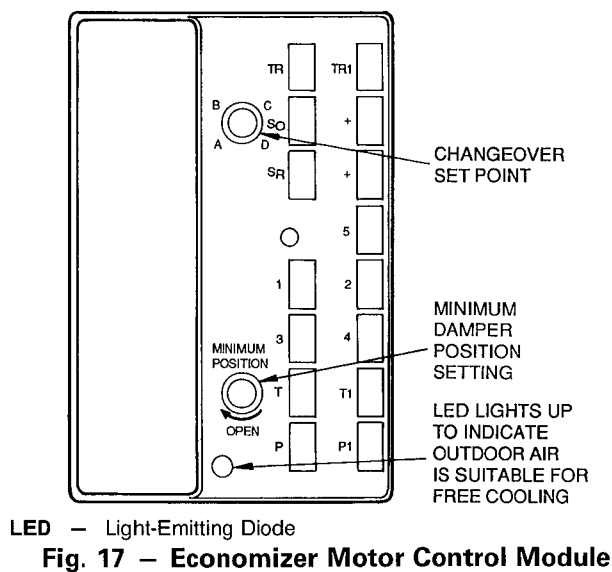


Fig. 17 — Economizer Motor Control Module

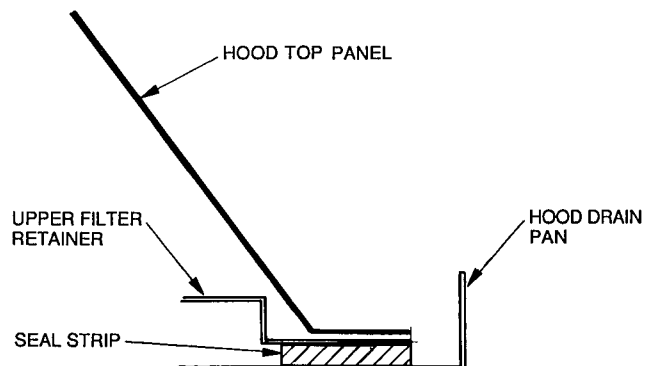


Fig. 20 — Seal Strip Location

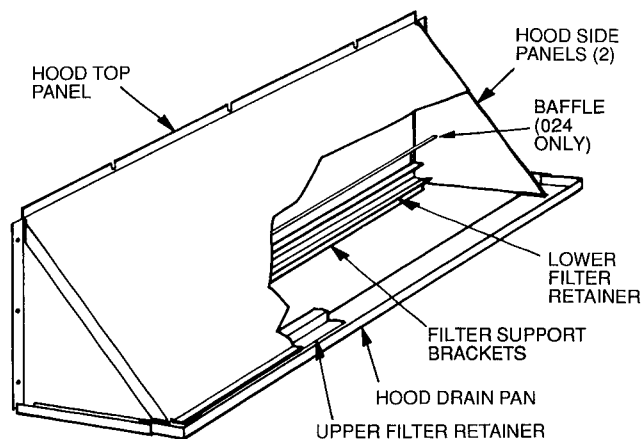


Fig. 21 – Outdoor-Air Hood Details

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 3, 4A, and 4B for Fan Performance Data. Remove tape from fan pulley and adjust pulleys on 48HJ015 units as required. See Evaporator-Fan Performance Adjustment section on pages 14 and 15. Be sure that fans rotate in the proper direction. See Table 5 for air quantity limits. To alter fan performance, see Performance Adjustment sections on pages 14 and 15.

Condenser-Fans and Motors — Condenser fans and motors are factory set. Refer to Condenser-Fan Adjustment section on page 16 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 13; and Economizer Adjustment section on page 16.

Table 3 – Fan Performance Data, 48HJ015

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (In. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
3750	740	693	856	844	957	986	1049	1128	1132	1279	1202	1439	1255	1607	1282	1776	—	—	—	—
4000	773	817	885	986	983	1128	1074	1279	1155	1430	1230	1590	1293	1767	1340	1945	1366	2123	—	—
4250	807	950	914	1119	1011	1279	1099	1430	1180	1599	1254	1758	1322	1927	1379	2114	1423	2300	1450	2487
4500	842	1092	945	1270	1039	1448	1124	1599	1204	1767	1278	1936	1346	2114	1409	2300	1462	2496	1504	2691
4750	878	1243	978	1439	1069	1625	1152	1785	1230	1963	1303	2140	1371	2318	1435	2504	1493	2700	1544	2913
5000	915	1421	1011	1616	1099	1821	1181	1998	1256	2167	1329	2353	1396	2540	1459	2726	1519	2922	—	—
5250	952	1625	1045	1829	1129	2043	1210	2238	1283	2407	1355	2602	1422	2798	1485	2984	—	—	—	—
5500	990	1829	1079	2043	1161	2265	1240	2469	1313	2664	1381	2842	1448	3046	—	—	—	—	—	—
5750	1028	2052	1114	2274	1194	2504	1270	2718	1342	2931	—	—	—	—	—	—	—	—	—	—
6000	1067	2300	1149	2531	1228	2762	1300	2993	—	—	—	—	—	—	—	—	—	—	—	—
6250	1105	2558	1184	2798	1261	3037	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Watts — Input Watts to Motor

NOTES:

- 1 Factory shipped fan speed is 1092 rpm. The range of the standard evaporator-fan motor is 978 to 1285 rpm. Other rpms may require a field-supplied drive.
- 2 Static pressure losses (i.e., economizer, electric heater) must be added to external static pressure before entering Fan Performance table.
- 3 To convert watts to bhp, use the following equation:

$$\text{Bhp} = \frac{\text{Watts} \times \text{motor efficiency}}{746}$$

Motor efficiency:
0.84

Horsepower — Maximum Continuous Watts:
3 hp — 3065

- 4 Interpolation is permissible. Do not extrapolate.
- 5 Fan performance is based on wet coils, clean filters, and casing losses.
- 6 Extensive motor and drive testing on these units ensures that the full 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 4A — Fan Performance Data, 48HJ024, 208/230-v and 575-v Units

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
5000	669	1019	772	1291	870	1582	963	1903	1052	2251	1137	2623	1218	3016	1295	3425	1369	3849
5500	717	1292	813	1585	905	1892	992	2223	1076	2680	1157	2962	1234	3366	1309	3789	1381	4229
6000	767	1617	858	1932	944	2256	1026	2600	1104	2967	1181	3358	1255	3772	1327	4206	1396	4658
6500	817	1992	903	2329	985	2673	1062	3031	1136	3410	1209	3811	1279	4233	1348	4677	1415	5139
7000	869	2427	950	2787	1028	3151	1102	3527	1172	3919	1241	4331	1308	4762	1373	5215	1437	5686
7500	920	2919	998	3303	1073	3689	1143	4083	1210	4490	1275	4914	1339	5356	1401	5818	1462	6298
8000	973	3476	1047	3886	1119	4294	1186	4708	1250	5131	1313	5569	1373	6024	1433	6495	1493	6966
8500	1026	4102	1097	4635	1166	4967	1231	5401	1292	5843	1352	6297	1410	6765	1467	7248	—	—
9000	1079	4800	1147	5257	1214	5714	1276	6171	1336	6632	1393	7102	1449	7584	—	—	—	—
9500	1133	5576	1199	6058	1263	6540	1323	7018	1381	7500	—	—	—	—	—	—	—	—
10000	1188	6432	1250	6939	1313	7444	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Watts — Input Watts to Motor

Motor Efficiency:

Horsepower —
Maximum Continuous Watts:

0.87

7½ hp — 7915

NOTES:

1. Factory shipped fan speed is 1287 rpm. Other rpms may require a field-supplied drive.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table
3. To convert watts to bhp, use the following equation:

$$\text{Bhp} = \frac{\text{Watts} \times \text{Motor Efficiency}}{746}$$

4. Interpolation is permissible. Do not extrapolate.
5. Fan performance is based on wet coils, clean filters, and casing losses
6. 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 4B — Fan Performance Data, 48HJ024, 460-v Units

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
5000	669	1019	772	1291	870	1582	963	1903	1052	2251	1137	2623	1218	3016	1295	3425	1369	3849
5500	717	1292	813	1585	905	1892	992	2223	1076	2680	1157	2962	1234	3366	1309	3789	1381	4229
6000	767	1617	858	1932	944	2256	1026	2600	1104	2967	1181	3358	1255	3772	1327	4206	1396	4658
6500	817	1992	903	2329	985	2673	1062	3031	1136	3410	1209	3811	1279	4233	1348	4677	1415	5139
7000	869	2427	950	2787	1028	3151	1102	3527	1172	3919	1241	4331	1308	4762	1373	5215	1437	5686
7500	920	2919	998	3303	1073	3689	1143	4083	1210	4490	1275	4914	1339	5356	1401	5818	1462	6298
8000	973	3476	1047	3886	1119	4294	1186	4708	1250	5131	1313	5569	1373	6024	1433	6495	1493	6966
8500	1026	4102	1097	4635	1166	4967	1231	5401	1292	5843	1352	6297	1410	6765	1467	7248	—	—
9000	1079	4800	1147	5257	1214	5714	1276	6171	1336	6632	1393	7102	1449	7584	1503	8033	—	—
9500	1133	5576	1199	6058	1263	6540	1323	7018	1381	7500	1436	7988	1488	8403	—	—	—	—
10000	1188	6432	1250	6939	1313	7444	1371	7946	1426	8449	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Watts — Input Watts to Motor

Motor Efficiency:

Horsepower —
Maximum Continuous Watts:

0.87

7½ hp — 8640

NOTES:

1. Factory shipped fan speed is 1287 rpm. Other rpms may require a field-supplied drive
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. To convert watts to bhp, use the following equation:

$$\text{Bhp} = \frac{\text{Watts} \times \text{Motor Efficiency}}{746}$$

4. Interpolation is permissible. Do not extrapolate.
5. Fan performance is based on wet coils, clean filters, and casing losses
6. 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 — Air Quantity Limits

UNIT 48HJ	MINIMUM CFM	MAXIMUM CFM
015	3,750	6,250
024	6,000	10,000

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. 12 on page 7).
3. Connect pressure gage to manifold pressure tap on gas valve.
4. Turn on manual gas stop and set thermostat to HEAT. 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 17.
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 (024) 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 (024), 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 and HJD024 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 (024) 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 17 and 18.

FLUE GAS PASSAGEWAYS — The flue collector box and heat exchanger cells may be inspected by removing heat exchanger access panel (Fig. 4), flue box cover, and main burner assembly (Fig. 22). Refer to Main Burners section on page 18 for burner removal sequence. If cleaning is required, remove heat exchanger turbulators (Fig. 23) 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. 22 and 23). 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.

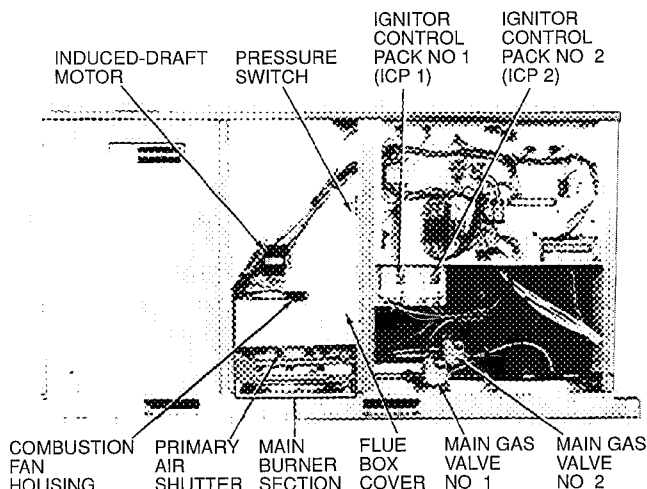


Fig. 22 — Typical Gas Heating Section (48HJE015 and 48HJD024 Shown)

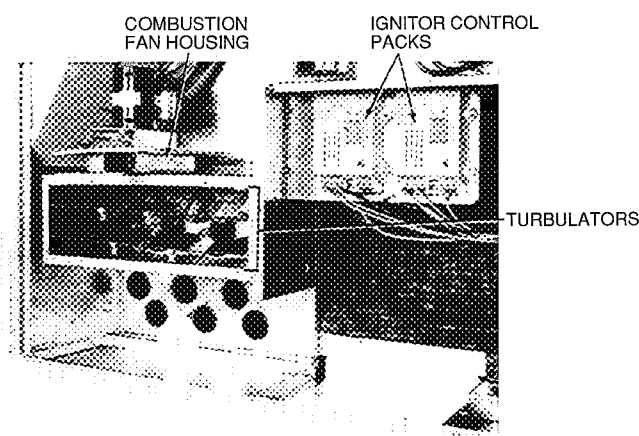


Fig. 23 — Typical Heating Section with Main Burners Removed (48HJE015 and 48HJ024 Shown)

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 oil level in the sight glass at start-up. If unit oil level is below sight glass, add oil until level is approximately $\frac{1}{4}$ sight glass.

If oil charge is above sight glass, do not remove any oil until the compressor crankcase heater has been energized for at least 24 hours.

FAN SHAFT BEARINGS — Lubricate bearings at least every 6 months with suitable bearing grease. Extended grease line is provided for far side fan bearing (opposite drive side). 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. 24).
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.

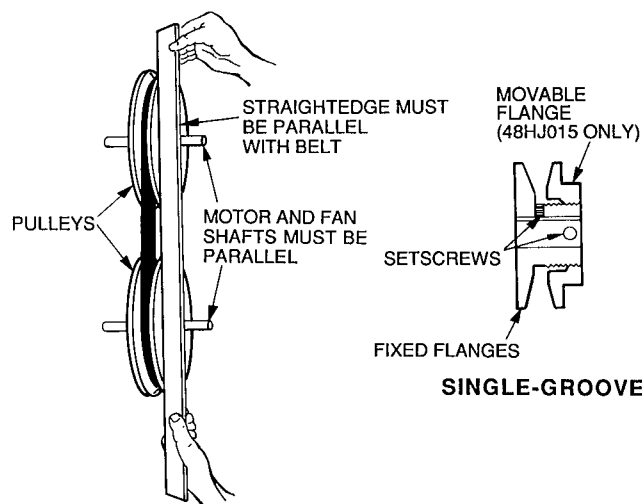


Fig. 24 — Evaporator-Fan Alignment and Adjustment

SERVICE AND REPLACEMENT (See Fig. 25)

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, 48HJ024 Units

PERFORMANCE ADJUSTMENT — The 48HJ024 unit has fixed pulleys. Fan speed can be adjusted only by changing the pulley(s) and belt (if necessary). See Table 6 for alternate drive selection.

To align fan and motor pulleys (see Fig. 24):

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

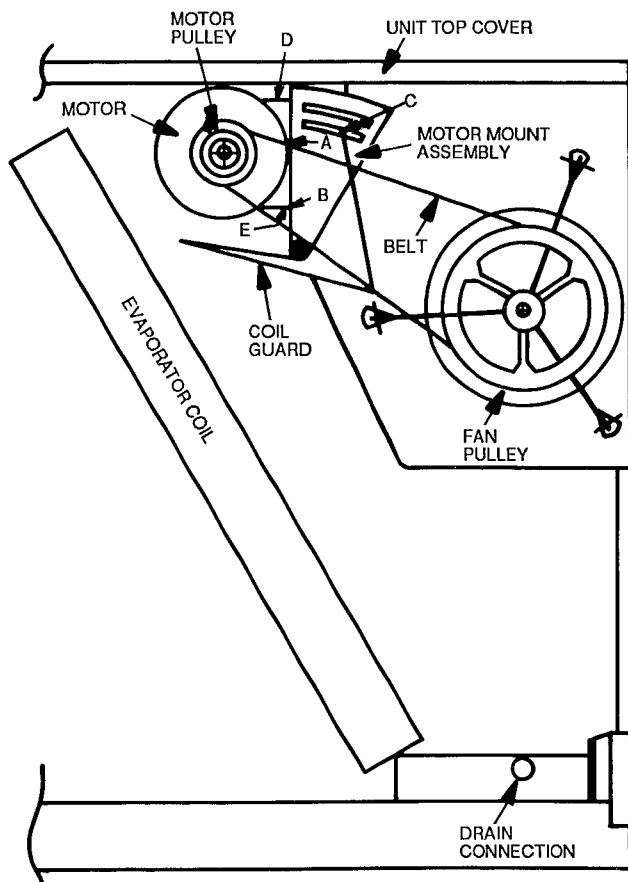


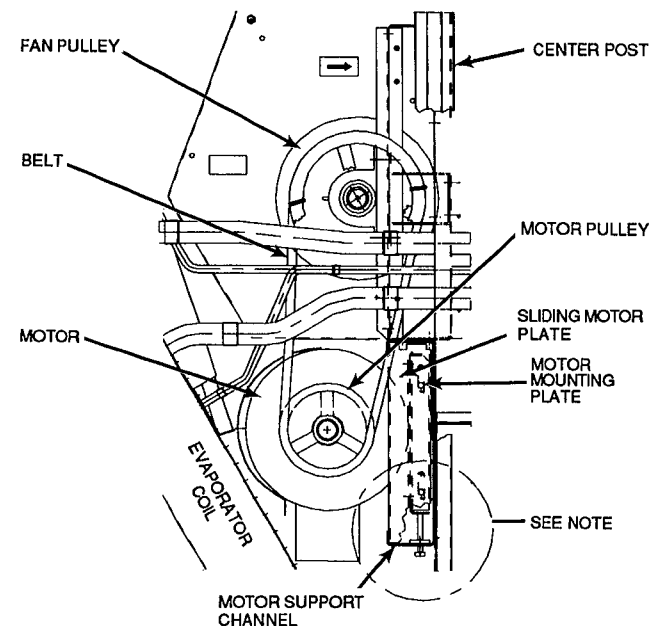
Fig. 25 — 48HJ015 Evaporator-Fan Motor Adjustment

SERVICE AND REPLACEMENT (See Fig. 26) — The 48HJ024 unit uses 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. 024 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.



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. 26 — 48HJ024 Evaporator-Fan Motor Section

Table 6 – Alternate Drive Components Table, 48HJ024

MOTOR HP	DRIVE SOURCE	FAN RPM	MOTOR SHEAVE DATUM DIMENSION* (in.)	MOTOR SHEAVE PART NO.†	BLOWER SHEAVE DATUM DIMENSION* (in.)	BLOWER SHEAVE PART NO.†	BELT PART NO.†
7½	Field	1181	5 6	BK62	8 4	BK90	BX50
7½	Field	1244	5 9	BK65	8 4	BK90	BX51
7½	Factory	1287	6 1	BK67	8 4	BK90	BX51
7½	Field	1379	6 6	BK72	8 4	BK90	BX52

LEGEND

MPTA — Mechanical Power Transmission Association
RMA — Rubber Manufacturer's Association

*Datum dimension is equal to the old pitch diameter per RMA/MPTA Standard IPZO-1977 To convert to new pitch diameter per RMA/MPTA

Standard IP20-1988, add 0.3 in. to the sheave datum dimension
 †Part numbers for motor sheave, blower sheave, and belt are Browning Catalog part numbers The 7½ hp motor sheaves have Browning fixed-bore sheaves supplied with factory drive package

Condenser-Fan Adjustment (Fig. 27)

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.

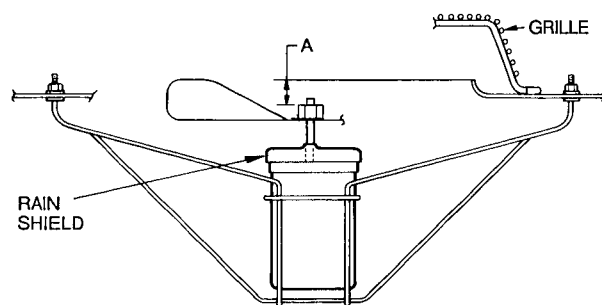
Economizer Adjustment — Refer to Tables 7 and 8 for economizer checkout procedures. Make certain the outdoor-air damper is fully closed and the return-air damper is fully open before completing the following steps:

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. 17.

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.

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. 17). The economizer will go to the full open position.



DIMENSION A	UNIT SIZE	
	015	024
	0.25 ± 0.12	0 ± 0.12

Fig. 27 – Condenser-Fan Adjustment

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 7 – Economizer Checkout Procedures

TEST PROCEDURE	RESULTS
A. Disconnect power at TR and TR1. Disconnect jumper between P and P1. See Fig. 17. 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 8 – 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. 28 and 29), 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 Start-Up, Gas Heat section on page 13, 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 $\frac{1}{8}$ in. $\pm$ $\frac{1}{32}$ inch.
3. Check that ICP is securely grounded.
4. Check that high-voltage lead is securely connected between ICP and electrode body.

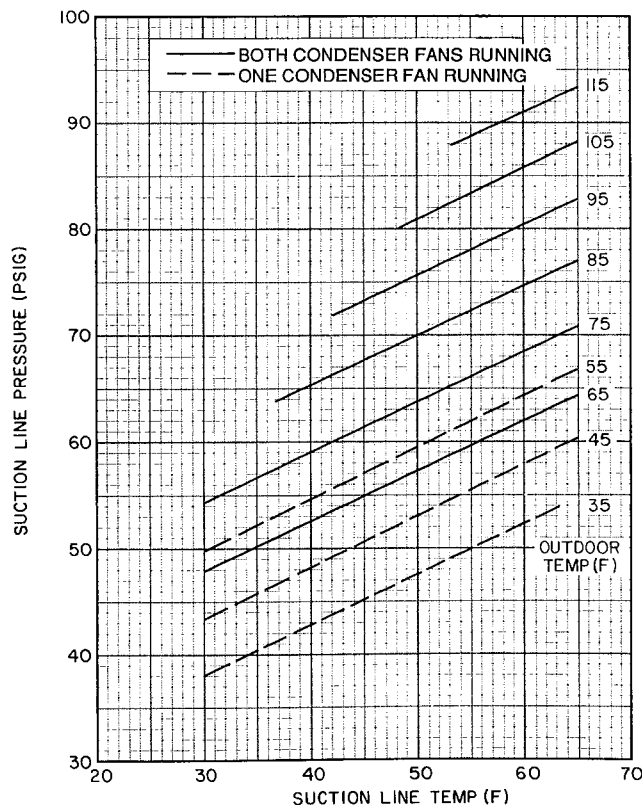


Fig. 28 — Cooling Charging Chart — 48HJ015

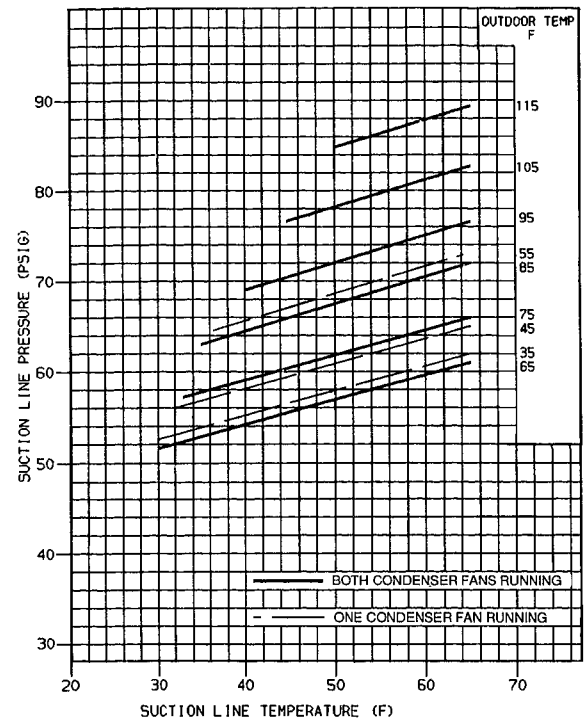


Fig. 29 — Cooling Charging Chart — 48HJ024

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.

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. 30).
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. 31).
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.

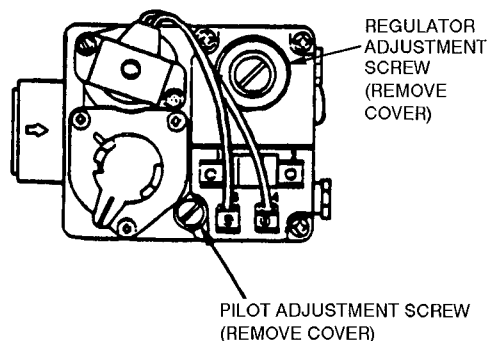


Fig. 30 — Gas Valve

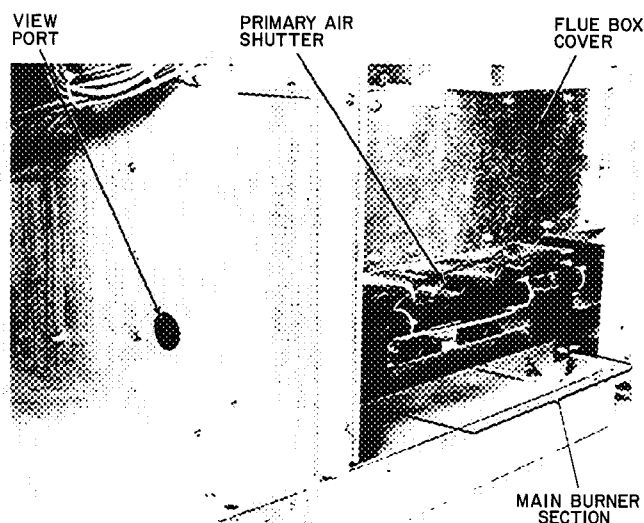


Fig. 31 — Typical Heating Section

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. 30).
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.

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. 31) and adjust to a minimum opening of 5/8 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).
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.

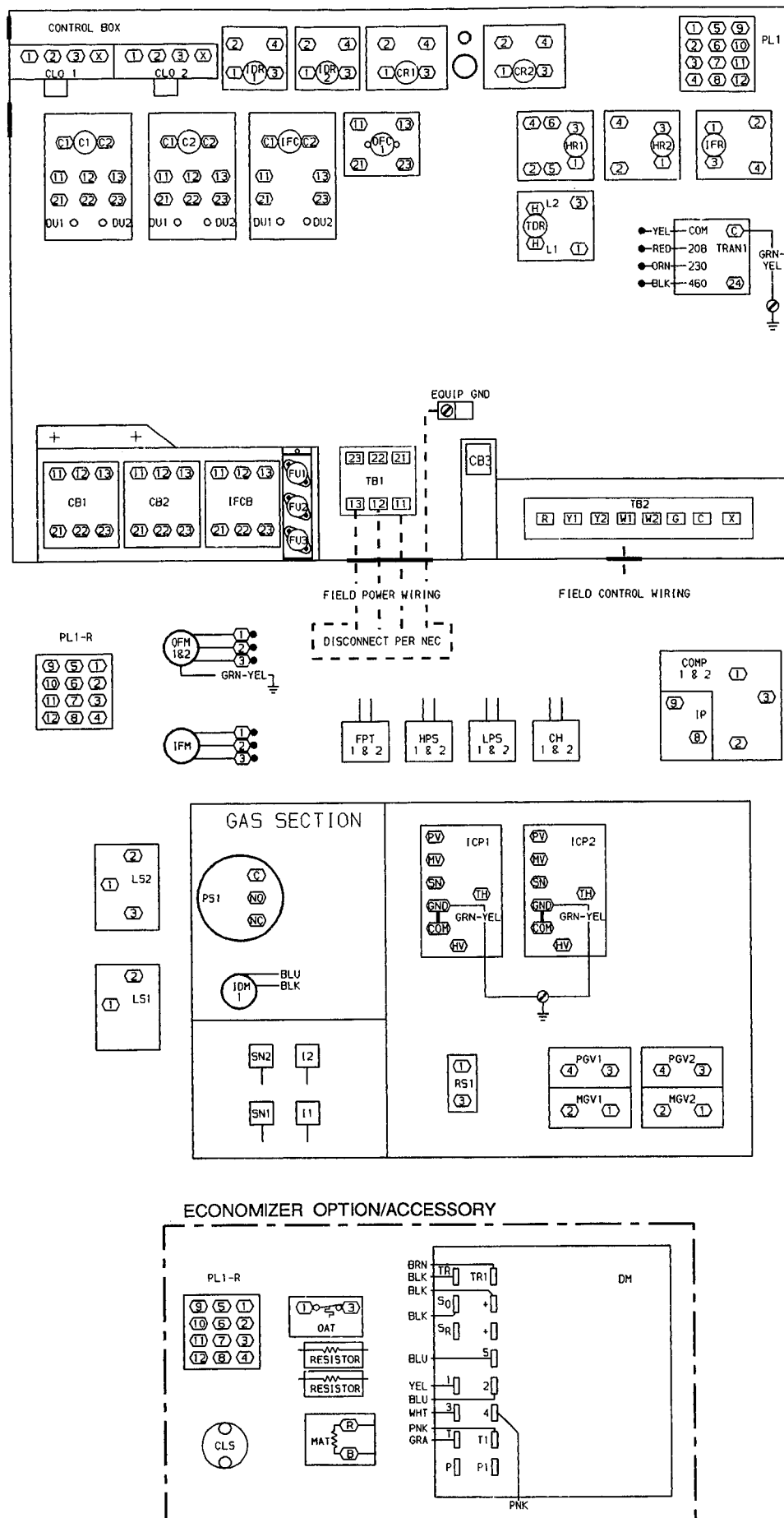
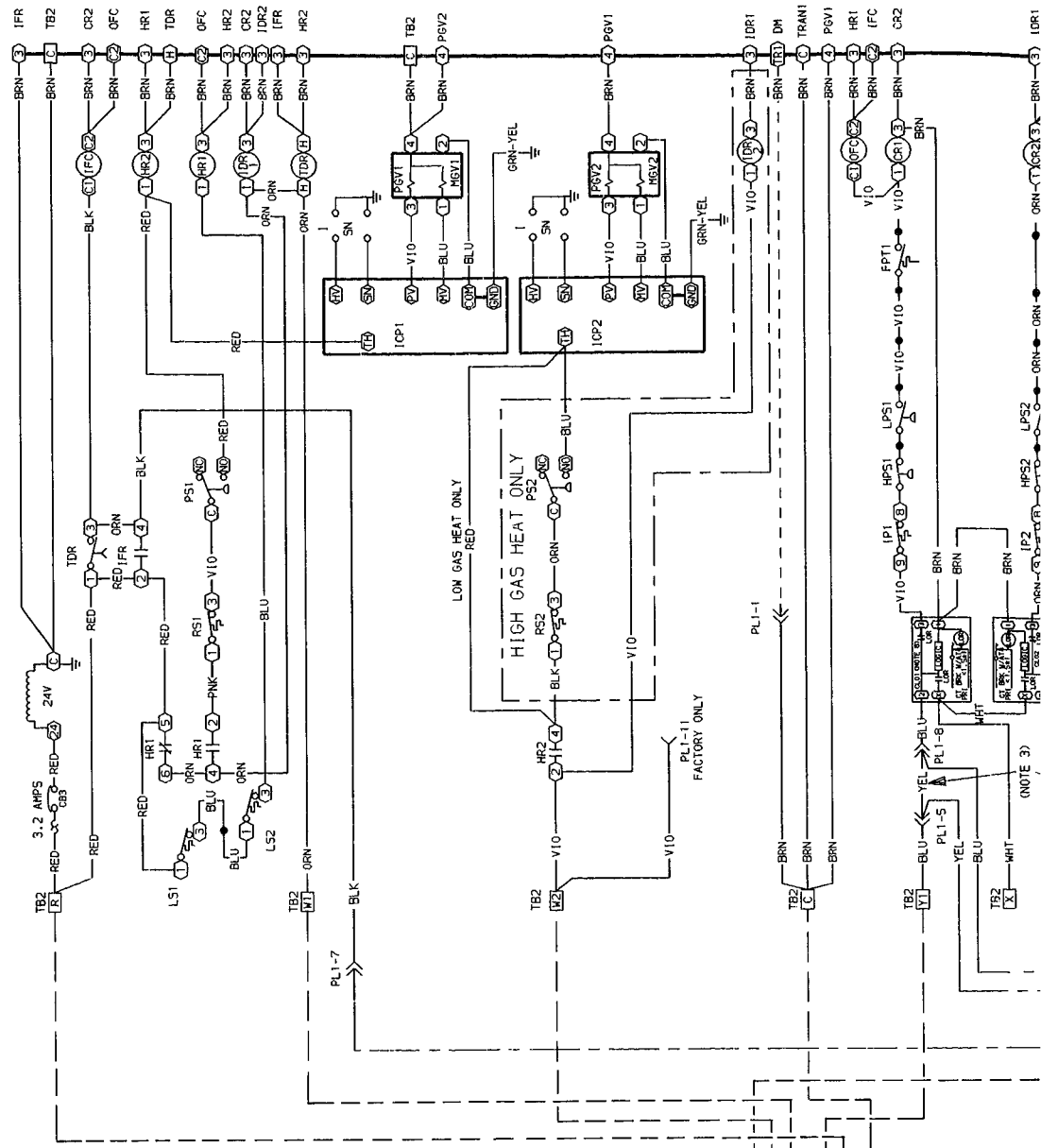
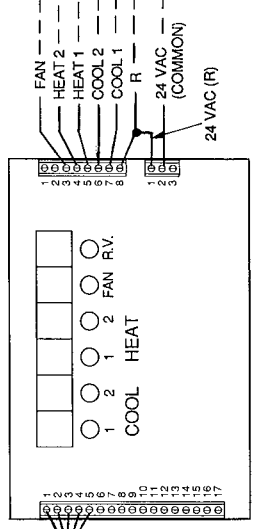
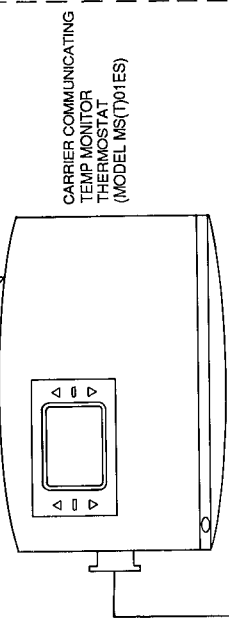


Fig. 32 – Typical Component Arrangement (48HJ024 Shown)





3-WIRE COM BUS TO OTHER COMMUNICATING THERMOSTATS



TSR-01 RELAY PACK (MAXIMUM CONTACT LOAD IS 1 AMP AT 24 V)(SEE NOTE 4.)



Fig. 33 – Typical Wiring Schematic (48HJ024 Shown) (cont)

LEGEND FOR FIG. 32 AND 33

AHA	— Adjustable Heat Anticipator	IFM	— Indoor (Evaporator) Fan Motor	TH	— Thermostat Heating
BKR W/AT	— Breaks with Amp Turns	IFR	— Indoor (Evaporator) Fan Relay	TRAN	— Transformer
C	— Contactor, Compressor	IP	— Internal Protector		Terminal (Marked)
CB	— Circuit Breaker	L	— Light		Terminal (Unmarked)
CC	— Cooling Compensator	LOR	— Lockout Relay		Terminal Block
CH	— Crankcase Heater	LPS	— Low-Pressure Switch		Splice
CLO	— Compressor Lockout	LS	— Limit Switch		Splice (Marked)
CLS	— Compressor Lockout Switch	MAT	— Mixed-Air Thermostat		Splice (Field Supplied)
COMP	— Compressor Motor	MGV	— Main Gas Valve		Factory Wiring
CR	— Control Relay	NEC	— National Electrical Code		Field Control Wiring
CT	— Current Transformer	OAT	— Outdoor-Air Thermostat		Field Power Wiring
DM	— Damper Motor	OFC	— Outdoor (Condenser) Fan Contactor		Accessory or Optional Wiring
DU	— Dummy Terminal	OFM	— Outdoor (Condenser) Fan Motor		To Indicate Common Potential Only, Not To Represent Wiring
EQUIP	— Equipment	PGV	— Pilot Gas Valve		
FPT	— Freeze Protection Thermostat	PL	— Plug Assembly		
FU	— Fuse	PRI	— Primary		
GND	— Ground	PS	— Pressure Switch		
HPS	— High-Pressure Switch	QT	— Quadruple Terminal		
HR	— Heat Relay	R	— Relay		
HV	— High Voltage	RS	— Rollout Switch		
I	— Ignitor	SN	— Sensor		
ICP	— Ignitor Control Pack	SW	— Switch		
IDM	— Induced-Draft Motor	TB	— Terminal Block		
IDR	— Induced-Draft Relay	TC	— Thermostat Cooling		
IFC	— Indoor (Evaporator) Fan Contactor	TDR	— Time Delay Relay		
IFCB	— Indoor (Evaporator) Fan Circuit Breaker				

NOTES:

- Compressor and fan motors thermally protected; 3-phase motors protected against primary single-phasing conditions.
- If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
- Jumpers are omitted when unit is equipped with economizer.
- Set thermostat heat anticipator(s):

- CB must-trip amps are equal to or less than 140% full load amps
- 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.
- 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	.98 1.20	— —	208/230, 575 460
48HJD024, HJE015	.98 1.20	.44 .44	208/230, 575 460

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.

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 PAGE 17

GENERAL

- ☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS