



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

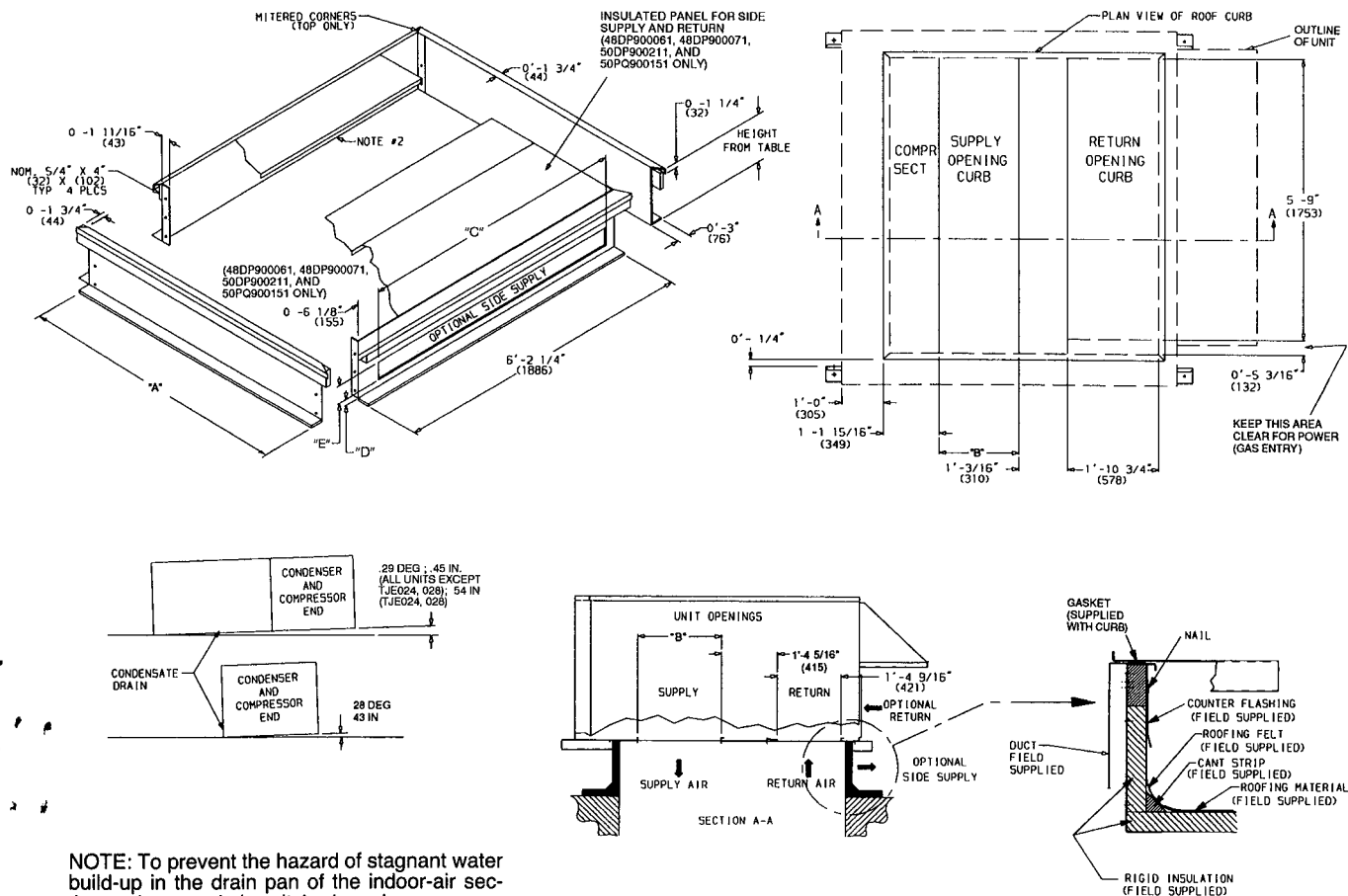
Step 1 — Provide Unit Support

⚠ CAUTION

When handling 48TJE024 and 028 units with a forklift truck, use a minimum of 48-in. long forks and lift **ONLY** through factory-provided holes in base rail. Otherwise, damage to the unit may result.

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.

Instructions continued on page 3.



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.

LEGEND

COMPR SECT. — Compressor Section

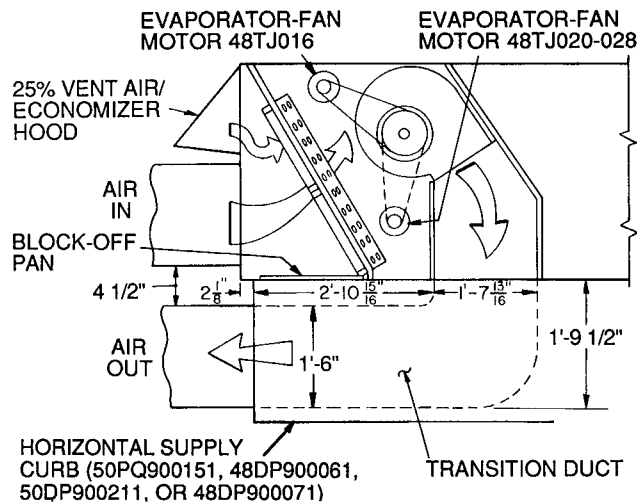
NOTES:

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

ACCESSORY PACKAGE NO.	CURB HEIGHT	DESCRIPTION	"A"	"B"	"C"	"D"	"E"
50PQ900221	1'-2" (355)	Standard Curb — 14" High	5'-7 1/16" (1703)	1'-7 13/16" (503)	—	—	—
50PQ900141	2'-0" (610)	Standard Curb for Units Requiring High Installation	5'-7 1/16" (1703)	1'-7 13/16" (503)	—	—	—
50PQ900151	2'-0" (610)	Horizontal Supply and Return Curb	5'-7 1/16" (1703)	1'-7 13/16" (503)	5'-6" (1676)	0'-2 1/2" (64)	1'-6" (457)
50DP900211	1'-11" (584)	Pre-Assembled, High-Static, Horizontal Adapter Curb	5'-7 1/16" (1703)	1'-7 13/16" (503)	6'-2" (1880)	0'-6 1/4" (159)	1'-2 5/8" (371)
48DP900041*	1'-2" (355)	Standard Curb — 14" High	7'-2 13/16" (2205)	3'-3 5/8" (1006)	—	—	—
48DP900051*	2'-0" (610)	Standard Curb for Units Requiring High Installation	7'-2 13/16" (2205)	3'-3 5/8" (1006)	—	—	—
48DP900061*	2'-0" (610)	Horizontal Supply and Return Curb	7'-2 13/16" (2205)	3'-3 5/8" (1006)	5'-6" (1676)	0'-2 1/2" (64)	1'-6" (457)
48DP900071*	1'-11" (584)	Pre-Assembled, High-Static, Horizontal Adapter Curb	7'-2 13/16" (2205)	3'-3 5/8" (1006)	6'-2" (1880)	0'-6 1/4" (159)	1'-2 5/8" (371)

*For high-heat applications.

Fig. 1 — Roof Curb Details



NOTE: For preassembled horizontal adapter curb part no. 50DP900211 and 48DP900071, the accessory kit includes a factory-designed, high-static, regain transition duct. For horizontal adapter curb part no. 50PQ900151 and 48DP900061, a field-supplied transition duct is required.

Fig. 2 — Horizontal Adapter Curbs

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.

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 and 5, around and above unit to provide minimum distance from combustible materials, proper airflow, and service access.

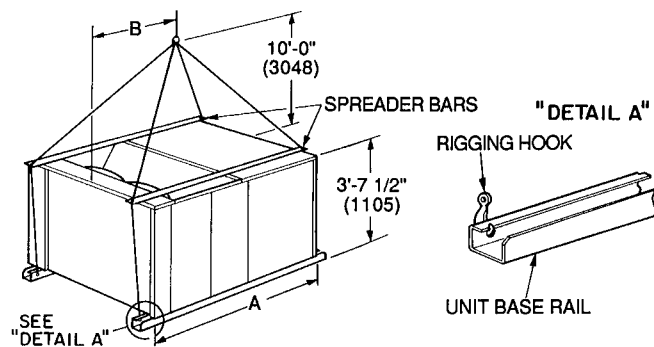
Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air. For proper unit operation, adequate combustion and ventilation air must be provided in accordance with Section 5.3 (Air for Combustion and Ventilation) of the National Fuel 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 9.



UNIT 48TJ	MAXIMUM SHIPPING WEIGHT		DIMENSIONS			
			A		B	
	Lb	Kg	Ft-in.	mm	Ft-in.	mm
D016	1834	832	6-11½	2121	3-2	965
D020	2131	967	6-11½	2121	3-3	991
D024	2131	967	6-11½	2121	3-3	991
D028	2514	1140	6-11½	2121	3-3	991
E016	1854	841	6-11½	2121	3-2	965
E024	2441	1094	8- 7¼	2623	4-2	1270
E028	2793	1267	8- 7¼	2623	4-2	1270

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 on all units except 48TJE024 and 028.
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

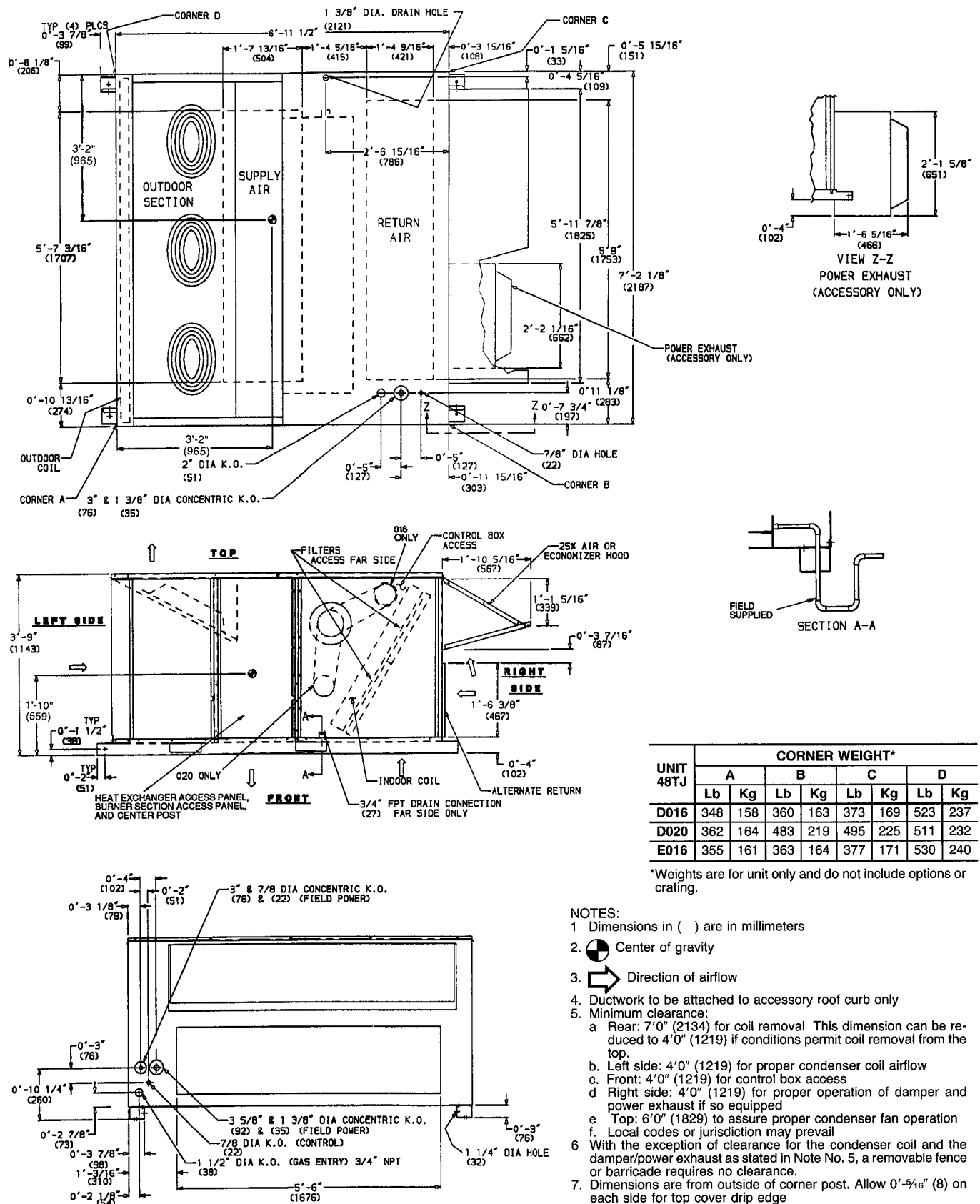
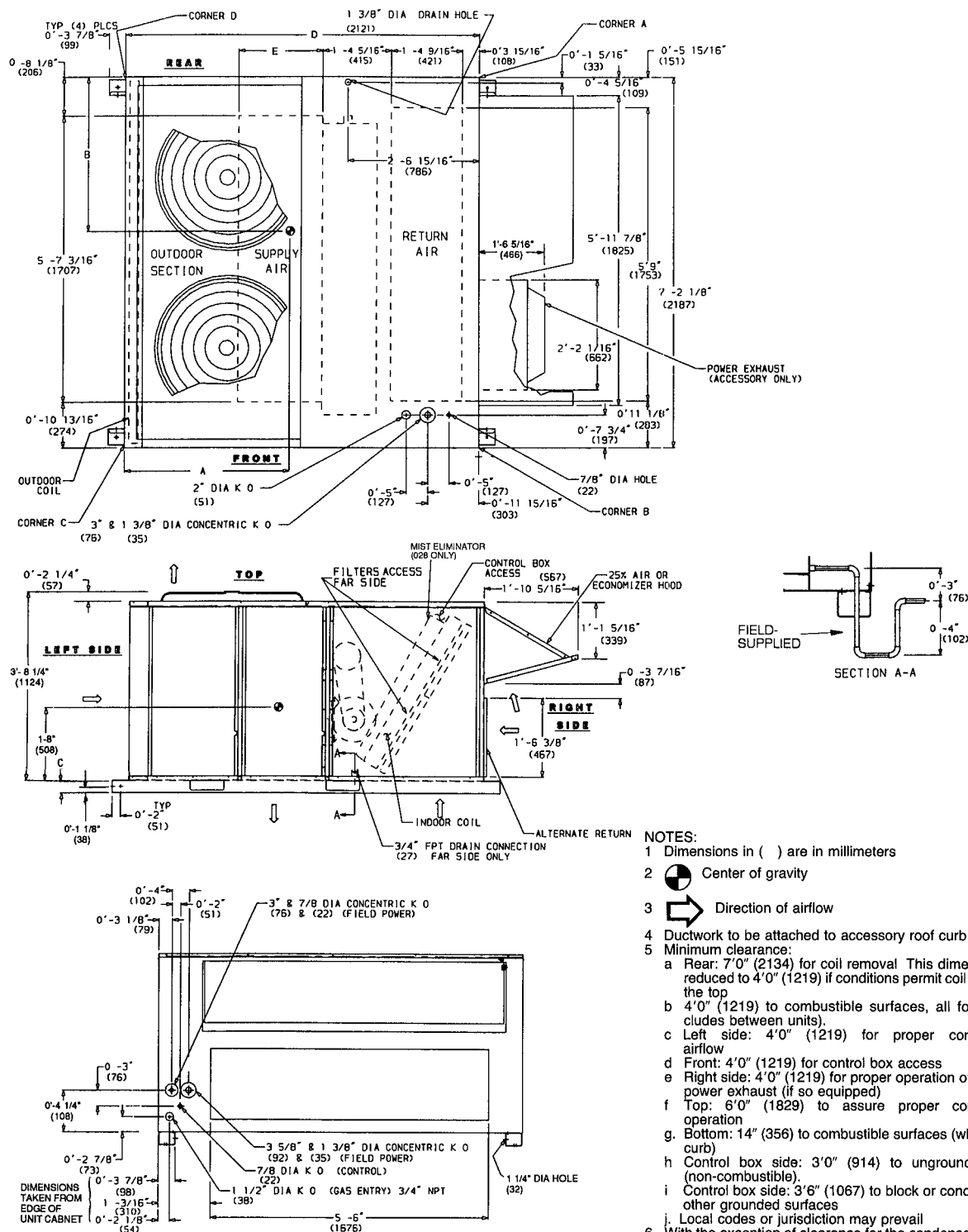


Fig. 4 – Base Unit Dimensions, 48TJ016,020

UNIT 48TJ	CORNER WEIGHT*								DIMENSIONS									
	A		B		C		D		A		B		C		D		E	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Ft-in.	mm	Ft-in.	mm	Ft-in.	mm	Ft-in.	mm	Ft-in.	mm
D024	495	225	483	219	362	164	511	232	3-3	991	3-7	1092	0-3	76	6-11½	2121	1-7⅞	504
E024	431	196	421	191	494	224	685	311	4-2	1270	3-4	1016	0-4½	114	8- 7¼	2623	3-3⅝	1006
D028	523	237	541	245	574	260	596	270	3-3	991	3-7	1092	0-3	76	6-11½	2121	1-7⅞	504
E028	465	211	486	220	725	329	737	334	4-2	1270	3-5	1041	0-4½	114	8- 7¼	2623	3-3⅝	1006

*Weights are for unit only and do not include options or crating



NOTES:

- Dimensions in () are in millimeters
- Center of gravity
- Direction of airflow
- Ductwork to be attached to accessory roof curb only
- Minimum clearance:
 - Rear: 7'0" (2134) for coil removal. This dimension can be reduced to 4'0" (1219) if conditions permit coil removal from the top.
 - 4'0" (1219) to combustible surfaces, all four sides (includes between units).
 - Left side: 4'0" (1219) for proper condenser coil airflow.
 - Front: 4'0" (1219) for control box access.
 - Right side: 4'0" (1219) for proper operation of damper and power exhaust (if so equipped).
 - Top: 6'0" (1829) to assure proper condenser fan operation.
 - Bottom: 14" (356) to combustible surfaces (when not using curb).
 - Control box side: 3'0" (914) to ungrounded surfaces (non-combustible).
 - Control box side: 3'6" (1067) to block or concrete walls, or other grounded surfaces.
 - Local codes or jurisdiction may prevail.
- With the exception of clearance for the condenser coil and the damper/power exhaust as stated in Note No. 5, a removable fence or barricade requires no clearance.
- Dimensions are from outside of corner post. Allow 0'-9/16" (8) on each side for top cover drip edge.

Fig. 5 – Base Unit Dimensions, 48TJ024-028

Table 1 – Physical Data

UNIT SIZE	016D/E		020D	024D/E	028D/E
	208/230,460 v	575 v			
NOMINAL CAPACITY (tons)	15		18	20	25
OPERATING WEIGHT (lb)					
Unit					
Al/Al*	1604/1624		1850	1850/2031	2234/2413
Al/Cu*	1684/1704		1980	1980/2161	2364/2543
Cu/Cu*	1754/1774		2090	2090/2271	2474/2653
Economizer	110		110	110	110
Roof Curb†	200		200	200/213	200/213
COMPRESSOR	Semi-Hermetic			Hermetic	Semi-Hermetic
Quantity	1		2	2	2
Oil (oz)	130		65 ea	65 ea	152 ea
REFRIGERANT TYPE	R-22				
Operating Charge (lb-oz)					
Circuit 1**	19-4		15-4	15-8	16-12
Circuit 2	—		12-6	15-8	15-12
CONDENSER COIL	Enhanced Copper Tubes, Aluminum Lanced or Copper Fins				
Rows...Fins/in.	2...17		3...15	4...15	4...15
Total Face Area (sq ft)	22.2		22.2	22.2	22.2
CONDENSER FAN	Propeller Type				
Nominal Cfm	10,500		10,500	14,200	14,200
Quantity...Diameter (in.)	3...22		3...22	2...30	2...30
Motor Hp...Rpm	½...1050		½...1050	1...1075	1...1075
Watts Input (Total)	1100		1100	3400	3400
EVAPORATOR COIL	Copper Tubes, Aluminum or Copper Plate Fins				
Rows...Fins/in.	2...17		3...17	4...15	4...15
Total Face Area (sq ft)	17.9		17.9	17.9	17.9
EVAPORATOR FAN	Centrifugal Type				
Quantity...Size (in.)	2 . 10 x 10	2...10 x 10	2...12 x 12	2...12 x 12	2 .12 x 12
Type Drive	Belt	Belt	Belt	Belt	Belt
Nominal Cfm	6000	6000	7200	8000	10,000
Motor Hp	3.7	3.0	5	7½	10
Maximum Continuous Bhp	4.25	3.45	5.90	8.7 [208/230,575 v]	10.2 [208/230,575 v]
Motor Frame Size	56H	56H	184T	213T	215T
Nominal Rpm High/Low	—	—	—	—	—
Fan Rpm Range	1194-1526	1201-1462	1047-1251	1238-1494	1323-1579
Motor Bearing Type	Ball	Ball	Ball	Ball	Ball
Maximum Allowable Rpm	1550	1550	1550	1550	1550
Motor Pulley Pitch Diameter Min/Max (in.)	3.4/4.4	4.3/5.3	4.9/5.9	5.4/6.4	5 8/7.0
Nominal Motor Shaft Diameter (in.)	7/8	7/8	1 1/8	1 3/8	1 3/8
Fan Pulley Pitch Diameter (in.)	5.0	6.4	8.4	7.9	7.9
Nominal Fan Shaft Diameter (in.)	1 3/16	1 3/16	1 7/16	1 7/16	1 7/16
Belt, Quantity...Type...Length (in.)	1...AX...42	1...BX...45	1...BX...50	1...BX...50	1...BX...51
Pulley Center Line Distance (in.)	13.5-15.5	13.5-15.5	13.3-14.8	14.6-15.4	14.6-15.4
Speed Change per Full Turn of Movable Pulley Flange (rpm)	66	52	34	43	43
Movable Pulley Maximum Full Turns From Closed Position	5	5	6	6	6
Factory Setting	3.5	3.5	3	3	3
Factory Speed Setting (rpm)	1293	1279	1149	1366	1451
Fan Shaft Diameter at Pulley (in.)	1 3/16	1 3/16	1 7/16	1 7/16	1 7/16

Table 1 – Physical Data (cont)

UNIT SIZE	016D/E	020D	024D/E	028D/E
FURNACE SECTION				
Rollout Switch Cutout Temp (F)††	190	190	190	190
Burner Orifice Diameter (in. ...drill size)				
Natural Gas	113.. 33	113 33	113 ..33	.113 33
Pilot Orifice Diameter (Quantity) in. ...drill size				
Natural Gas	(1) .055...54/ (1) .055 54, (1) .041 59	(1) .055 ..54 (1) .041 ..59	(1) .055.. 54, (1) .041. 59/ (2) .070 .50	(1) .055 54, (1) .041 . 59/ (2) .070. 50
Thermostat Heat Anticipator Setting (amps)				
208/230,575 v Stage 1	.98	.98	98	98
Stage 2	.44	44	44	44
460 v Stage 1	1.20	1 20	1 20	1 20
Stage 2	.44	44	44	44
Gas Input (Btuh) Stage 1	115,500/115,500	115,500	115,500/242,500	115,500/242,500
Stage 2	231,000/270,000	270,000	270,000/485,000	270,000/485,000
Efficiency (Steady State) (%)	80	80	80	80
Temperature Rise Range	25-55/25-55	15-45	15-45/35-65	15-45/35-65
Manifold Pressure (in. wg)				
Natural Gas	3.5	3 5	3 5	3.5
Gas Valve Quantity	2	2	2	2
Field Gas Connection Size (in.)	¾	¾	¾	¾
HIGH-PRESSURE SWITCH (psig)				
Standard Compressor Internal Relief (Differential) Cutout			—	
Reset (Auto.)			426 320	
LOW-PRESSURE SWITCH (psig)				
Cutout			7	
Reset (Auto.)			22	
FREEZE PROTECTION THERMOSTAT (F)				
Opens			30 ± 5	
Closes			45 ± 5	
OUTDOOR-AIR INLET SCREENS				
Quantity...Size (in.)			Cleanable 2 20 x 25 x 1 1 ..20 x 20 x 1	
RETURN-AIR FILTERS				
Quantity...Size (in.)			Throwaway 4 . 20 x 20 x 2 4 16 x 20 x 2	

LEGEND

Al — Aluminum
Bhp — Brake Horsepower
Cu — Copper

*Evaporator coil fin material/condenser coil fin material.

†Weight of 14-in. roof curb

**On 48TJ020-028 units, Circuit 1 consists of lower portion of condenser coil and lower portion of evaporator coil, and Circuit 2 is the upper portion of both coils.

††Rollout switch is manual reset

||The 48TJ028 unit requires 2-in. industrial-grade filters capable of handling face velocities of up to 625 ft/min (such as American Air Filter no 5700 or equivalent)

NOTE: The 48TJ016-028 units have a low-pressure switch (standard) located on the suction side

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.

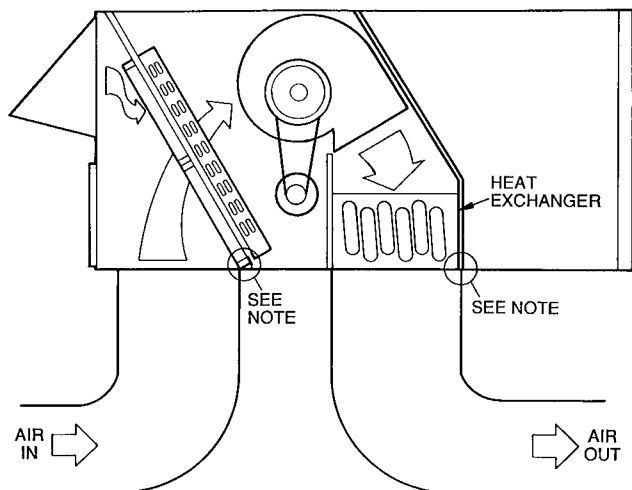
Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

Step 4 – Make Unit Duct Connections – Unit is shipped for through-the-bottom duct connections. Duct

work 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.

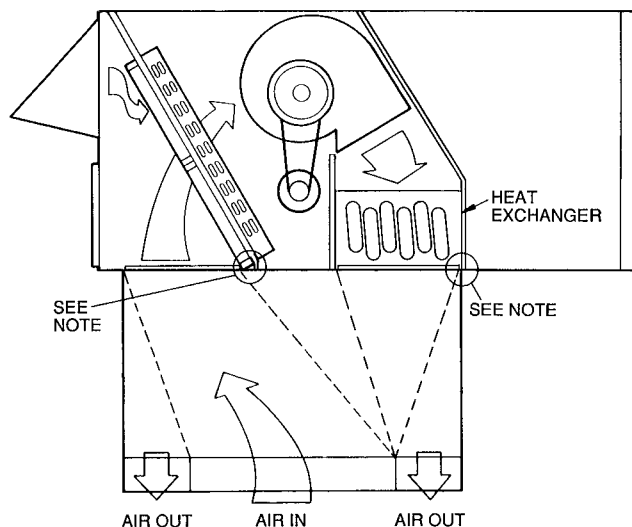
Step 5 – Install Flue Hood – Flue hood is shipped secured under main control box. To install, secure flue hood to access panel. See Fig. 9 and 10.

NOTE: When properly installed, flue hood will line up with combustion fan housing. See Fig. 11 and 12.



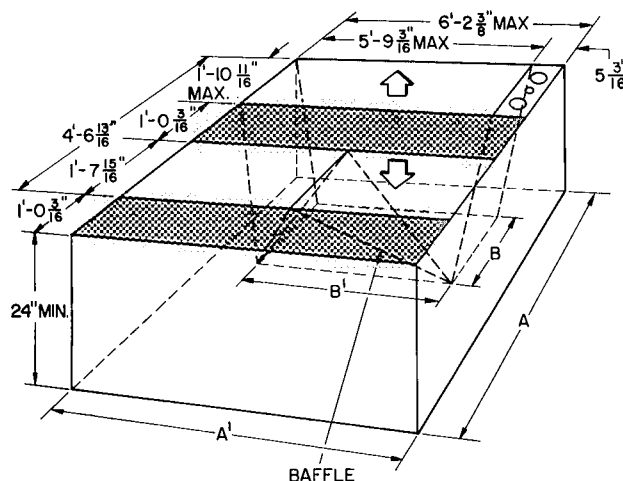
NOTE: Do not drill in this area; damage to basepan may result in water leak

Fig. 6 – Air Distribution – Through-the-Bottom



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

Fig. 7 – Concentric Duct Air Distribution



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

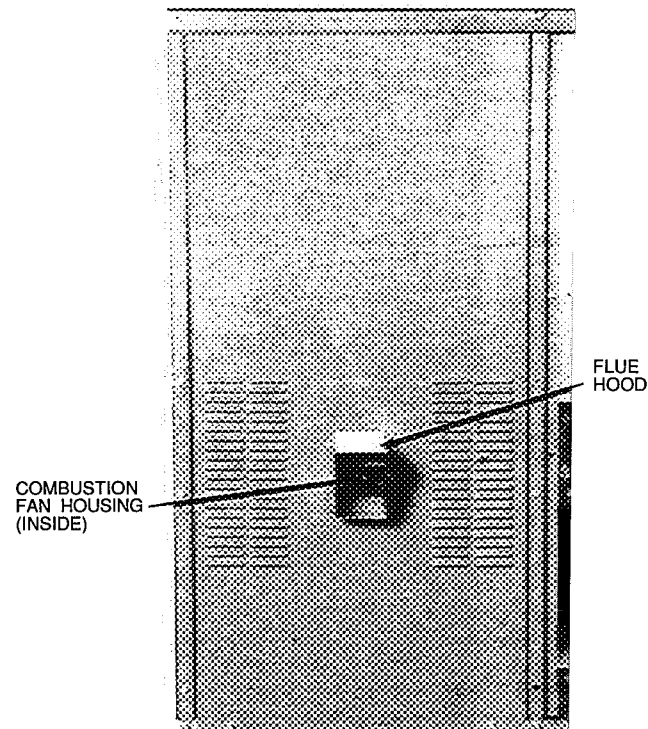


Fig. 9 – Flue Hood Location, 48TJD Low-Heat and 48TJE016 High-Heat Units

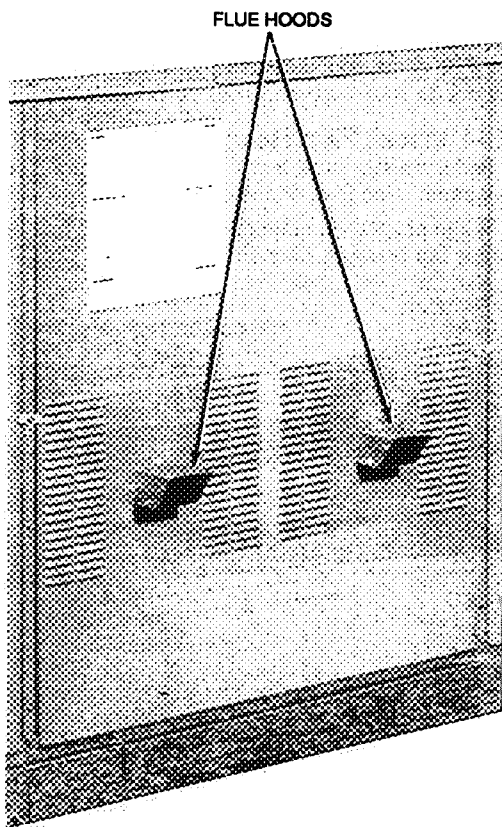


Fig. 10 — Flue Hood Locations, 48TJE024 and 028 High-Heat Units

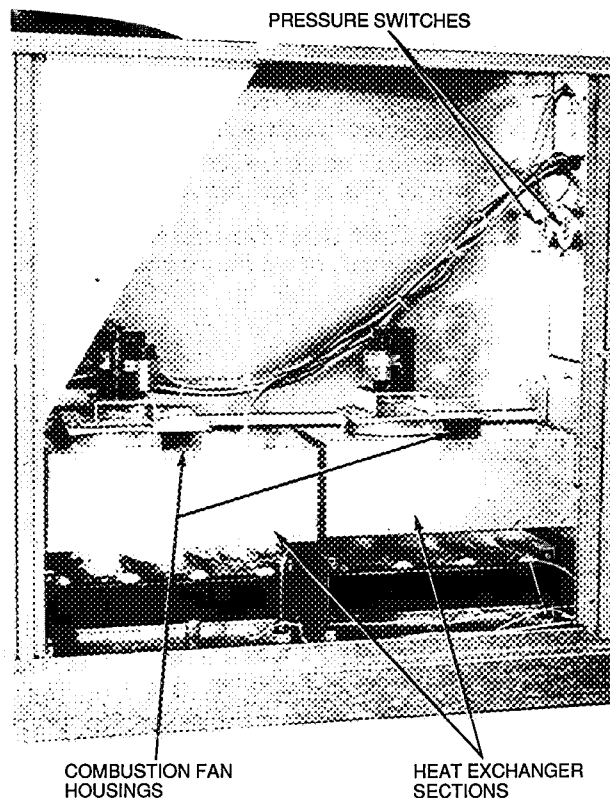


Fig. 12 — Combustion Fan Housing Location, 48TJE024 and 028 High-Heat Units

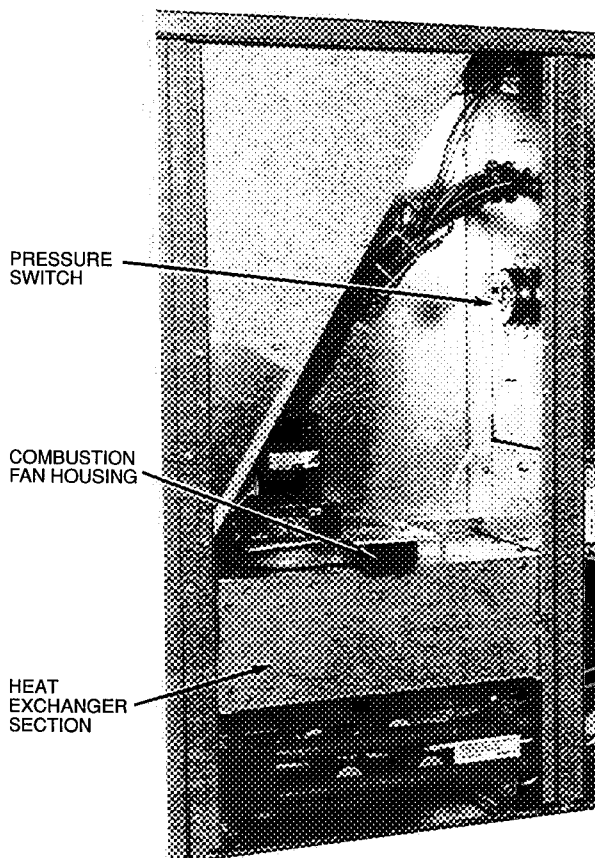


Fig. 11 — Combustion Fan Housing Location, 48TJD Low-Heat Units and 48TJE016 High-Heat Units

Step 6 — Trap Condensate Drain — See Fig. 13 for drain location. One $\frac{3}{4}$ -in. half coupling is provided inside unit evaporator section for condensate drain connection. An $8\frac{1}{2}$ in. x $\frac{3}{4}$ -in. diameter and 2-in. x $\frac{3}{4}$ -in. diameter pipe nipple, coupled to standard $\frac{3}{4}$ -in. diameter elbows, provides a straight path down through hole in unit base rail (see Fig. 14). 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 $\frac{1}{8}$ -in. NPT pressure tap for test gage connection at unit. Field gas piping must include sediment trap and union. See Fig. 15.

⚠ 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.

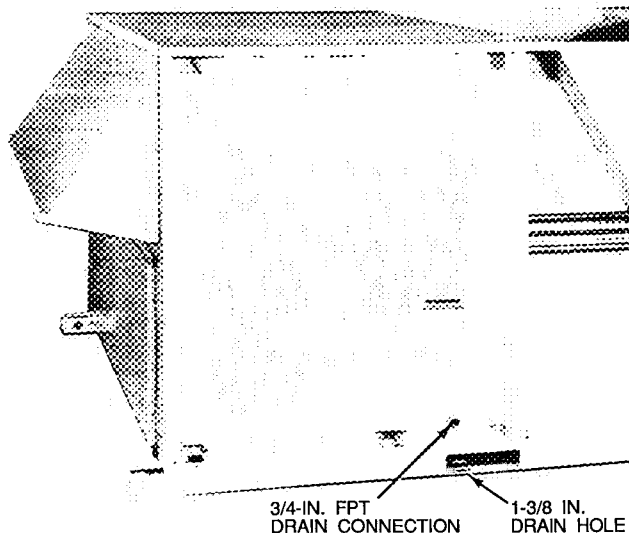


**Fig. 13 — Condensate Drain Details
(48TJ016 Shown)**

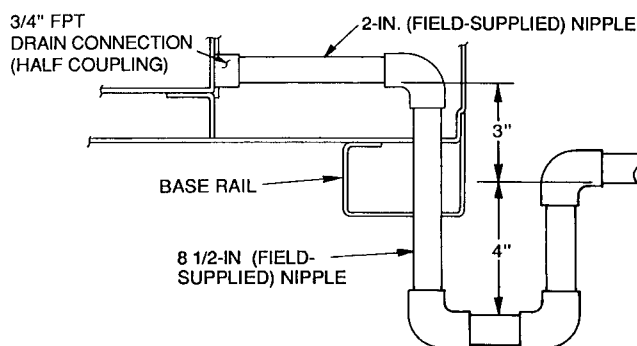


Fig. 14 — Condensate Drain Piping Details

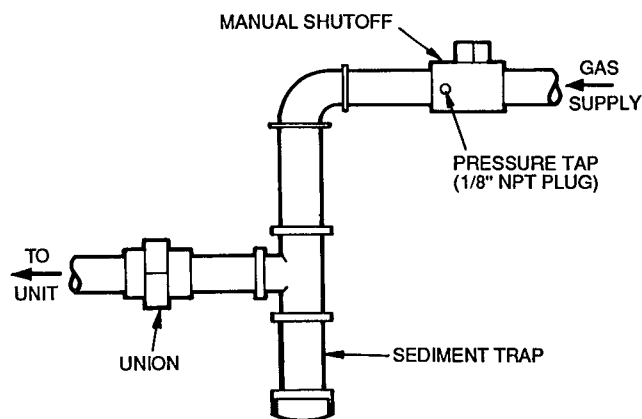


Fig. 15 — Field Gas Piping

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).

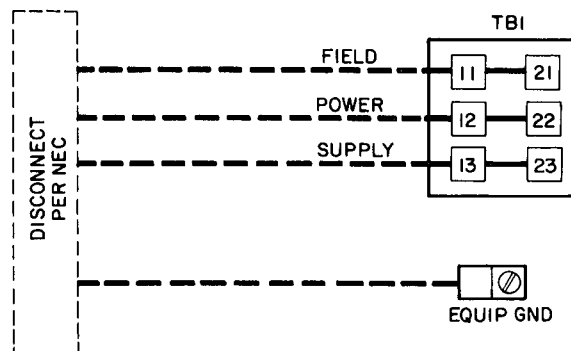
All field wiring must comply with NEC and local requirements.

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. 16.

⚠ 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.



TB1 MAXIMUM WIRE SIZES

UNIT 48TJ	VOLTAGE		
	208/230	460	575
016	2/0	2/0	2/0
020,024	2/0	2/0	2/0
028	2/0	2/0	2/0

LEGEND

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

Fig. 16 — Field Power Wiring Connections

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.

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 48TJ	NOMINAL VOLTAGE (60 Hz)	IFM TYPE	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		COMBUSTION FAN MOTOR*	POWER SUPPLY	
					NO. 1		NO. 2									
			Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	MCA	MOCPT†
016 (15 Tons)	208/230 (3 phase)	Std	187	254	61 0	266	—	—	3	½	1 70	3 7	12.0/12 0	0 57	93/93	150/150
	460 (3 phase)	Std	414	508	28.0	120	—	—	3	½	0.80	3.7	5 4	0.30	43	70
	575 (3 phase)	Std	518	632	23 0	96	—	—	3	½	0.75	3	3 8	0.57	35	50
020 (18 Tons)	208/230 (3 phase)	Std	187	254	28.3	205	25 0	185	3	½	1.70	5	16 7/15 2	0 57	82/81	110/100
	460 (3 phase)	Std	414	508	14.4	104	12.4	89	3	½	0 80	5	7.6	0 30	40	50
	575 (3 phase)	Std	518	632	11.4	78	10 4	78	3	½	0 75	5	6 1	0 57	33	40
024 (20 Tons)	208/230 (3 phase)	Std	187	254	34.5	239	28 3	205	2	1	5 50	7½	24 2/22 0	0 57	107/104	125/125
	460 (3 phase)	Std	414	508	17.0	119	14 4	104	2	1	2 80	7½	11 0	0 30	52	60
	575 (3 phase)	Std	518	632	15.2	111	11 4	78	2	1	3.40	7½	9 0	0 57	46	60
028 (25 Tons)	208/230 (3 phase)	Std	187	254	43.6	228	43 6	228	2	1	5 50	10	30 8/28 0	0 57	140/137	175/175
	460 (3 phase)	Std	414	508	22 1	114	22 1	114	2	1	2 80	10	14.0	0.30	69	90
	575 (3 phase)	Std	518	632	17 9	91	17 9	91	2	1	3.40	10	11.0	0.57	57	70

LEGEND

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

*The 48TJ024 and 028 high-heat units have 2 combustion-fan motors
 †Fuse or HACR circuit breaker



NOTES:

1 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.

2 Unbalanced 3-Phase Supply Voltage

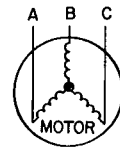
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent voltage imbalance.

% 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.

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.

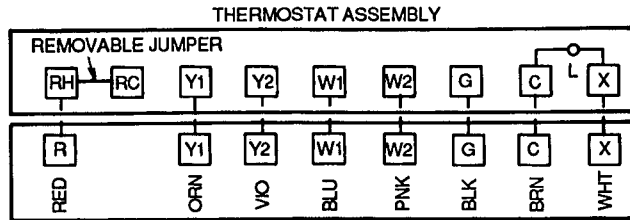


Fig. 17 – Field Control Thermostat Wiring

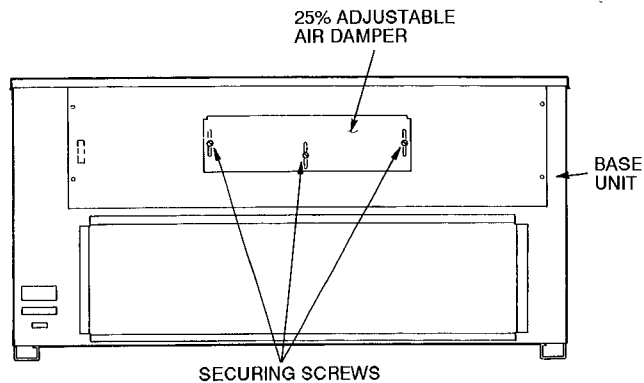


Fig. 18 – 25% Outdoor-Air Section Details

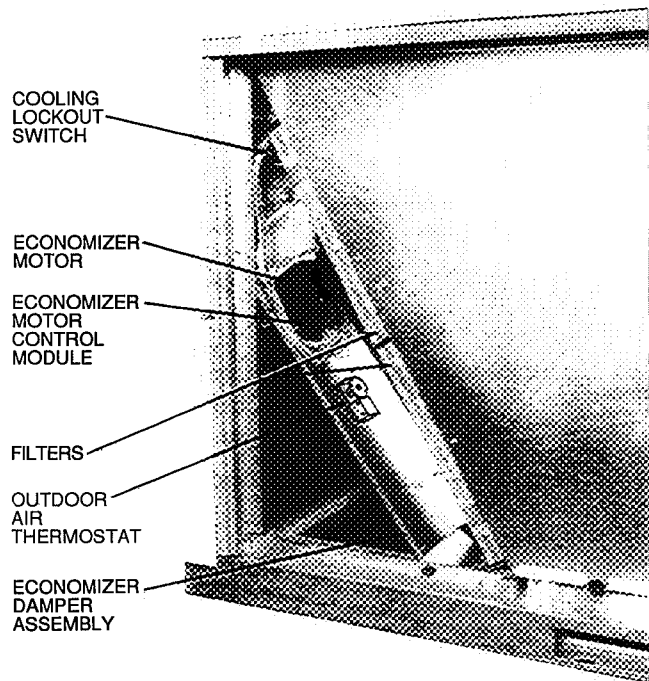


Fig. 19 – Economizer Damper Assembly-End View

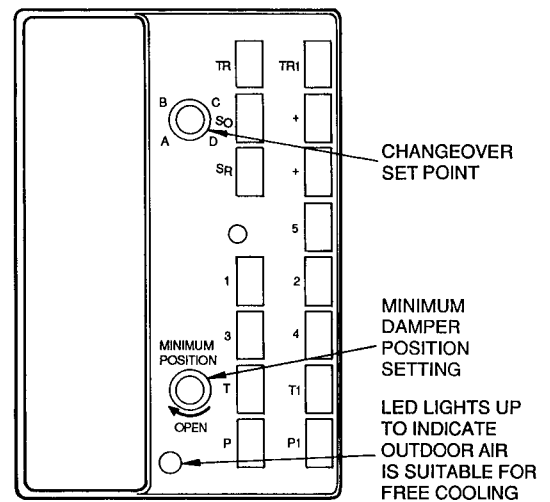
Damper can be preset to admit up to 25% outdoor air into return-air compartment. To adjust, loosen securing screws and move damper to desired setting, then retighten screws to secure damper (Fig. 18).

OPTIONAL ECONOMIZER

Economizer Motor Control Module (See Fig. 19-21) — Set economizer motor to the D setting (Fig. 20).

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.*



LED — Light-Emitting Diode

Fig. 20 – Economizer Motor Control Module

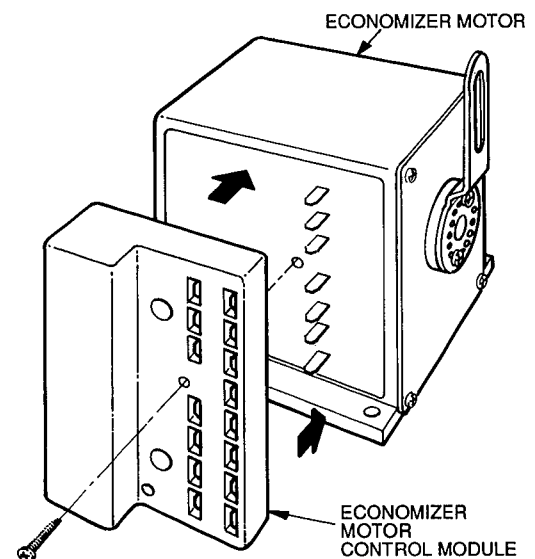


Fig. 21 – Economizer Motor Control Module Location

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 (020-028), 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. 22).

1. Attach seal strip to upper filter retainer. See Fig. 23.
2. Assemble hood top cover, side panels, upper filter retainer, and drain pan (see Fig. 24).
3. Secure lower filter retainer and support bracket to unit. See Fig. 24. Leave screws loose on 020-028 units.
4. Slide baffle (020-028) behind lower filter retainer and tighten screws.
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 section of filter support bracket.

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 on 48TJ016 and 028 units 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.

NOTE: DO NOT loosen hold-down bolts on 48TJ020 and 024 units with hermetic compressors.

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

Refrigerant Service Ports — Each refrigerant system has 1 suction port located in the top of the compressor motor casing (semi-hermetic compressors) or on the suction line (hermetic compressors). All units also have one service port on the liquid line and one on either the compressor discharge flange or discharge line. Be sure that caps on the ports are tight.

Crankcase Heater(s) (48TJ016 and 028 Only)

— Crankcase heater(s) 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 variable pulleys are factory-installed. See Tables 3-7 for Fan Performance Data. Remove tape from fan pulley, and be sure that fans rotate in the proper direction. See Table 8 for air quantity limits. See Table 9 for static pressure information for accessories

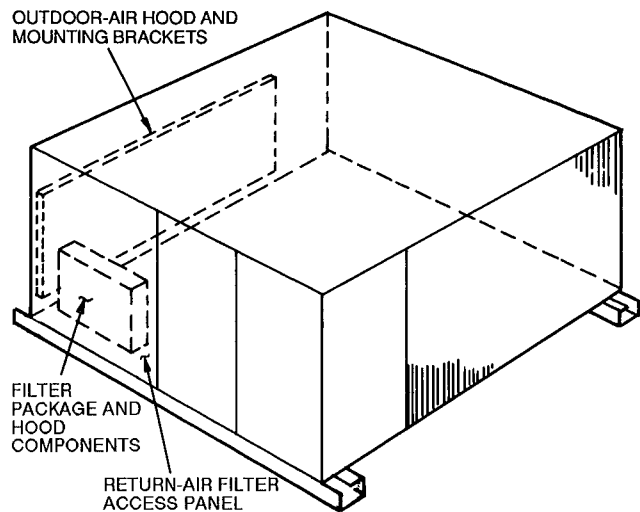


Fig. 22 — Outdoor-Air Hood Component Location

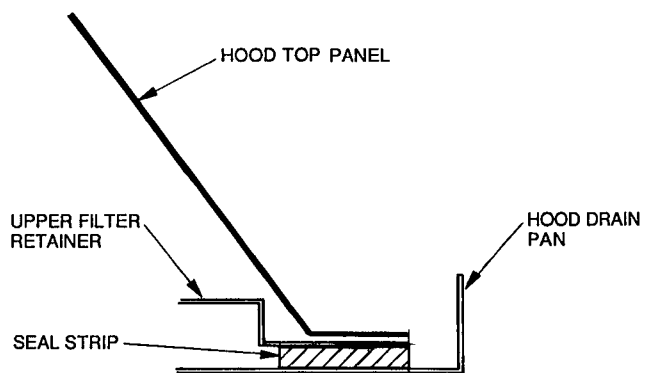


Fig. 23 — Seal Strip Location

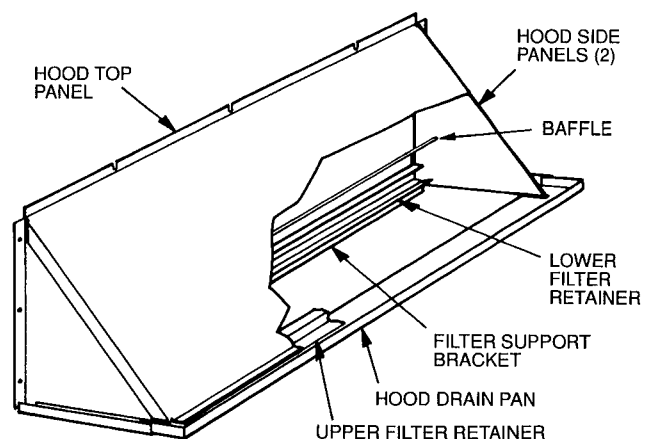


Fig. 24 — Outdoor-Air Hood Details

and options. To alter fan performance, see Evaporator Fan Performance Adjustment section on page 20.

Condenser-Fans and Motors — Condenser fans and motors are factory set. Refer to Condenser-Fan Adjustment section on page 21 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 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 18; and Economizer Adjustment section on page 22.

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. 15 on page 11).
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 25.
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.

Table 3 — Fan Performance Data, 48TJ016 — 208/230-V and 460-V Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
4500	801	1.05	933	890	1.26	1119	971	1.46	1297	1050	1.67	1483	1125	1.88	1670
4800	843	1.25	1110	928	1.47	1306	1006	1.68	1492	1081	1.90	1687	1153	2.13	1892
5100	885	1.47	1306	968	1.70	1510	1043	1.93	1714	1114	2.16	1918	1183	2.40	2131
5400	927	1.71	1519	1008	1.95	1732	1080	2.20	1954	1148	2.44	2167	1214	2.69	2389
5700	971	1.98	1758	1049	2.24	1989	1118	2.50	2220	1134	2.75	2442	1247	3.01	2673
6000	1016	2.28	2025	1091	2.55	2265	1158	2.83	2513	1222	3.10	2753	1282	3.36	2984
6300	1059	2.60	2309	1133	2.89	2567	1198	3.17	2815	1259	3.46	3073	1318	3.74	3321
6600	1104	2.96	2629	1174	3.26	2895	1239	3.56	3162	1297	3.86	3428	1355	4.15	3686
6900	1150	3.35	2975	1218	3.67	3259	1281	3.98	3535	—	—	—	—	—	—
7200	1194	3.77	3348	1260	4.10	3641	—	—	—	—	—	—	—	—	—
7500	1238	4.23	3758	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
	1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
4500	1275	2.39	2123	1349	2.70	2398	1421	3.03	2691	1490	3.39	3011
4800	1293	2.62	2327	1364	2.92	2593	1433	3.24	2877	1501	3.59	3188
5100	1316	2.90	2575	1382	3.18	2824	1448	3.49	3099	1514	3.86	3428
5400	1342	3.20	2842	1403	3.47	3082	1466	3.77	3348	1529	4.16	3694
5700	1370	3.54	3144	1429	3.81	3384	1487	4.11	3650	—	—	—
6000	1401	3.92	3481	1458	4.20	3730	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—
6600	—	—	—	—	—	—	—	—	—	—	—	—
6900	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

NOTES:

1. Factory shipped motor drive range is 1194 to 1526 rpm. Other rpms 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.

See Table 9 for accessory/FIOP static pressure information.

3. Interpolation is permissible. Do not extrapolate.
4. 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 4 – Fan Performance Data, 48TJ016 – 575-V Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
4500	801	1.05	933	890	1.26	1119	971	1.46	1297	1050	1.67	1483	1125	1.88	1670	1200	2.12	1883
4800	843	1.25	1110	928	1.47	1306	1006	1.68	1492	1081	1.90	1687	1153	2.13	1892	1223	2.36	2096
5100	885	1.47	1306	968	1.70	1510	1043	1.93	1714	1114	2.16	1918	1183	2.40	2131	1250	2.64	2345
5400	927	1.71	1519	1008	1.95	1732	1080	2.20	1954	1148	2.44	2167	1214	2.69	2389	1279	2.94	2611
5700	971	1.98	1758	1049	2.24	1989	1118	2.50	2220	1134	2.75	2442	1247	3.01	2673	1309	3.28	2913
6000	1016	2.28	2025	1091	2.55	2265	1158	2.83	2513	1222	3.10	2753	1282	3.36	2984	—	—	—
6300	1059	2.60	2309	1133	2.89	2567	1198	3.17	2815	—	—	—	—	—	—	—	—	—
6600	1104	2.96	2629	1174	3.26	2895	—	—	—	—	—	—	—	—	—	—	—	—
6900	1150	3.35	2975	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
	1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
4500	1275	2.39	2123	1349	2.70	2398	1421	3.03	2691	1490	3.39	3011
4800	1293	2.62	2327	1364	2.92	2593	1433	3.24	2877	—	—	—
5100	1316	2.90	2575	1382	3.18	2824	—	—	—	—	—	—
5400	1342	3.20	2842	—	—	—	—	—	—	—	—	—
5700	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—
6600	—	—	—	—	—	—	—	—	—	—	—	—
6900	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

NOTES:

1. Factory shipped motor drive range is 1201 to 1462 rpm. Other rpms 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.

See Table 9 for accessory/FIOP static pressure information.

3. Interpolation is permissible. Do not extrapolate.
4. 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 5 – Fan Performance Data, 48TJ020

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
5000	669	1.10	1019	772	1.40	1291	870	1.80	1582	963	2.10	1903	1052	2.50	2251	1137	2.90	2623
5500	717	1.40	1292	813	1.80	1585	905	2.10	1892	992	2.50	2223	1076	2.90	2680	1157	3.30	2962
6000	767	1.80	1617	858	2.20	1932	944	2.50	2256	1026	2.90	2600	1104	3.30	2967	1181	3.80	3358
6500	817	2.20	1992	903	2.60	2329	985	3.00	2673	1062	3.40	3031	1136	3.80	3410	1209	4.30	3811
7000	869	2.70	2427	950	3.10	2787	1028	3.50	3151	1102	3.90	3527	1172	4.40	3919	1241	4.80	4331
7200	889	2.94	2624	969	3.34	2993	1046	3.74	3366	1118	4.18	3749	1187	4.64	4147	1255	5.08	4564
7500	920	3.30	2919	998	3.70	3303	1073	4.10	3689	1143	4.60	4083	1210	5.00	4490	1275	5.50	4914
8000	973	3.90	3476	1047	4.30	3886	1119	4.80	4294	1186	5.30	4708	1250	5.70	5131	—	—	—
8500	1026	4.60	4102	1097	5.10	4635	1166	5.60	4967	—	—	—	—	—	—	—	—	—
9000	1079	5.40	4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
	1.3			1.4			1.6			1.8		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
5000	1178	3.15	2820	1218	3.40	3016	1295	3.80	3425	1369	4.30	3849
5500	1196	3.55	3164	1234	3.80	3366	1309	4.20	3789	1381	4.70	4229
6000	1218	4.00	3565	1251	4.20	3772	1327	4.70	4206	1396	5.20	4658
6500	1244	4.50	4022	1279	4.70	4233	1348	5.20	4677	1415	5.80	5139
7000	1275	5.05	4547	1308	5.30	4762	—	—	—	—	—	—
7200	1288	5.33	4783	—	—	—	—	—	—	—	—	—
7500	1307	5.75	5135	—	—	—	—	—	—	—	—	—
8000	—	—	—	—	—	—	—	—	—	—	—	—
8500	—	—	—	—	—	—	—	—	—	—	—	—
9000	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

NOTES:

1. Factory shipped motor drive range is 1047 to 1251 rpm. Other rpms 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.

See Table 9 for accessory/FIOP static pressure information.

3. Interpolation is permissible. Do not extrapolate.
4. 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 6 – Fan Performance Data, 48TJ024

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
6000	767	1.80	1617	858	2.20	1932	944	2.50	2256	1026	2.90	2600	1104	3.30	2967	1181	3.80	3358
6500	817	2.20	1992	903	2.60	2329	985	3.00	2673	1062	3.40	3031	1136	3.80	3410	1209	4.30	3811
7000	869	2.70	2427	950	3.10	2787	1028	3.50	3151	1102	3.90	3527	1172	4.40	3919	1241	4.80	4331
7500	920	3.30	2919	998	3.70	3303	1073	4.10	3689	1143	4.60	4083	1210	5.00	4490	1275	5.50	4914
8000	973	3.90	3476	1047	4.30	3886	1119	4.80	4294	1186	5.30	4708	1250	5.70	5131	1313	6.20	5569
8500	1026	4.60	4102	1097	5.10	4635	1166	5.60	4967	1231	6.00	5401	1292	6.50	5843	1352	7.00	6297
9000	1079	5.40	4800	1147	5.90	5257	1214	6.40	5714	1276	6.90	6171	1336	7.40	6632	1393	7.90	7102
9500	1133	6.20	5576	1199	6.80	6058	1263	7.30	6540	1323	7.90	7018	1381	8.40	7500	1436	8.90	7988
10,000	1188	7.20	6432	1250	7.80	6939	1313	8.30	7444	1371	8.90	7946	1426	9.50	8449	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.4			1.6			1.8			1.9			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
6000	1255	4.20	3772	1327	4.70	4206	1396	5.20	4658	1431	5.45	4884	1465	5.70	5110
6500	1279	4.70	4233	1348	5.20	4677	1415	5.80	5139	1449	6.10	5370	1482	6.40	5601
7000	1308	5.30	4762	1373	5.80	5215	1437	6.40	5686	1469	6.70	5922	1501	7.00	6157
7500	1339	6.00	5356	1401	6.50	5818	1462	7.00	6298	1493	7.25	6538	1523	7.50	6778
8000	1373	6.70	6024	1433	7.30	6495	1493	7.80	6966	1523	8.05	7202	—	—	—
8500	1410	7.60	6765	1467	8.10	7248	1524	8.70	7731	—	—	—	—	—	—
9000	1449	8.50	7584	1503	9.00	8033	—	—	—	—	—	—	—	—	—
9500	1488	9.40	8403	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

NOTES:

1. **Boldface** indicates additional capability of the 460-v motor.
2. Factory shipped motor drive range is 1238 to 1494 rpm. Other rpms require a field-supplied drive.
3. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table. See Table 9 for accessory/FIOP static pressure information.

4. Interpolation is permissible. Do not extrapolate.

5. Maximum continuous bhp is 8.7 for 208/230 and 575-v units and 9.5 for 460-v units. The maximum continuous watts are 7915 for the 208/230 and 575-v units and 8640 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 7 – Fan Performance Data – 48TJ028

AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.2			0.4			0.6			0.8			0.9			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
7,500	962	3.39	3123	1039	3.81	3507	1111	4.23	3895	1179	4.66	4295	1212	4.89	4503	1245	5.11	4710
8,000	1017	4.04	3717	1091	4.48	4126	1160	4.93	4536	1225	5.38	4954	1256	5.62	5170	1287	5.85	5386
8,500	1072	4.76	4385	1143	5.23	4818	1209	5.70	5250	1271	6.18	5688	1302	6.42	5913	1332	6.66	6137
9,000	1128	5.57	5129	1196	6.07	5587	1260	6.56	6042	1320	7.06	6501	1348	7.32	6735	1377	7.57	6968
9,500	1185	6.47	5955	1250	6.99	6437	1311	7.51	6915	1369	8.03	7395	1396	8.30	7638	1424	8.56	7881
10,000	1241	7.45	6865	1304	8.00	7372	1363	8.55	7873	1419	9.09	8376	1445	9.37	8629	1472	9.64	8882
10,500	1298	8.54	7865	1359	9.12	8396	1415	9.69	8921	1469	10.26	9446	1495	10.55	9710	1521	10.83	9973
11,000	1355	9.72	8956	1414	10.33	9512	1469	10.93	10,062	1521	11.52	10,609	—	—	—	—	—	—
11,250	1384	10.36	9540	1441	10.97	10,107	1495	11.58	10,668	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.3			1.4			1.6			1.8		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
7,500	1309	5.58	5143	1341	5.83	5370	1372	6.08	5597	1434	6.59	6067	1494	7.12	6558
8,000	1349	6.33	5833	1379	6.59	6065	1409	6.84	6297	1467	7.36	6779	—	—	—
8,500	1390	7.17	6600	1419	7.43	6839	1447	7.68	7077	1504	8.22	7571	—	—	—
9,000	1433	8.08	7446	1461	8.35	7692	1488	8.62	7938	—	—	—	—	—	—
9,500	1478	9.10	8378	1505	9.37	8626	—	—	—	—	—	—	—	—	—
10,000	1524	10.20	9396	1550	10.48	9653	—	—	—	—	—	—	—	—	—
10,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11,250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

NOTES:

1. **Boldface** indicates additional capability of the 460-v motor.
2. Factory shipped motor drive range is 1323 to 1579 rpm. Other rpms require a field-supplied drive.
3. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table. See Table 9 for accessory/FIOP static pressure information.

4. Interpolation is permissible. Do not extrapolate.

5. Fan performance is based on wet coils, clean filters, and casing losses.

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 8 — Air Quantity Limits

UNIT 48TJ	MINIMUM CFM	MAXIMUM CFM
016	4500	7,500
020	5400	9,000
024	6000	10,000
028	7500	11,250

Table 9 — Accessory/FIOP Static Pressure (in. wg)

UNIT 48TJ	UNIT VOLTAGE	CFM	ECONOMIZER PRESSURE DROP*	FACTORY-ASSEMBLED HORIZONTAL ADAPTER CURB PRESSURE INCREASE†
016	All	4,000	.03	0.68
		5,000	.05	0.65
		6,000	.07	0.60
		7,500	.10	0.45
020-028	All	6,000	.07	0.60
		7,200	.09	0.48
		9,000	.11	0.30
		10,000	.12	0.26
		11,250	.13	0.24

FIOP — Factory-Installed Option

*The static pressure must be added to external static pressure. The result and the evaporator entering-air cfm should then be used with the fan performance table to determine blower rpm, bhp, and watts.

†The static pressure must be deducted from external static pressure. The result and the evaporator entering-air cfm should then be used with the Fan Performance table to determine blower rpm, bhp, and watts.

NOTE: The factory-assembled horizontal adapter curb substantially improves 48TJ016-028 fan performance (by the amount of static pressure listed).

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 (48TJ020-028) or unloaded compressor (48TJ016), 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 (48TJ020-028), or compressor no. 1 runs fully loaded (48TJ016).

HEATING, UNITS WITHOUT ECONOMIZER

NOTE: The 48TJ016-028 units have 2 stages of heat.

First Stage — All Units — 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 — 48TJD016-028 Low-Heat and 48TJE016 High Heat 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 opens, and the timer sequence begins. When the sequence is complete, the evaporator-fan motor turns off.

Second-Stage — 48TJE024,028 High-Heat Units — With an additional heating call, the second-stage thermostat closes. (The control relay [HR2] closes during the first stage of operation.) The second-stage induced-draft relay closes, and the second-stage induced-draft motor starts.

The second-stage pressure switch closes and pilot valve no. 2 opens, allowing gas to flow to the second-stage pilot. Spark ignitor ignites pilot flame. The sensor detects the flame, and main gas valve no. 2 opens. Gas flows to main burners and second-stage burners ignite. Spark ignitor turns off.

When the second-stage thermostat is satisfied, the second-stage gas valve closes and the second-stage induced-draft motor turns off.

When the first-stage thermostat is satisfied, the first-stage gas valve closes. The first-stage induced-draft motor turns off, the time relay opens, 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 (48TJ020-028) or unloaded compressor (48TJ016) 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.

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 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 24 and 25.

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 25 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.

NOTE. The 48TJ028 unit requires industrial grade throw-away filters capable of withstanding face velocities up to 625 fpm. Ensure that replacement filters for the 48TJ028 units are rated for 625 fpm.

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

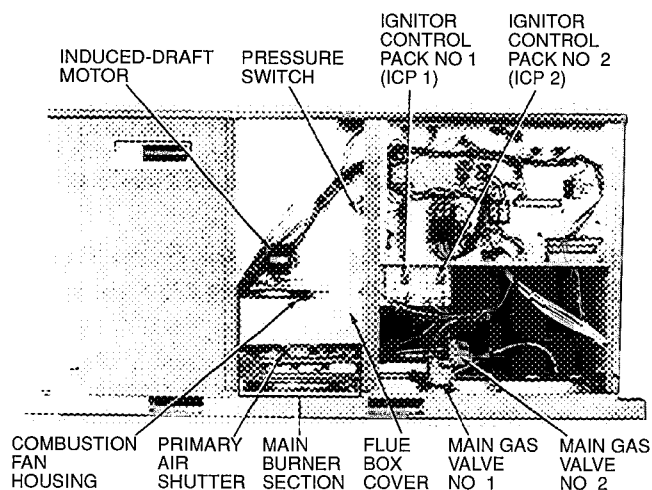


Fig. 25 — Typical Gas Heating Section, 2-Stage Units (48TJD Units Shown)

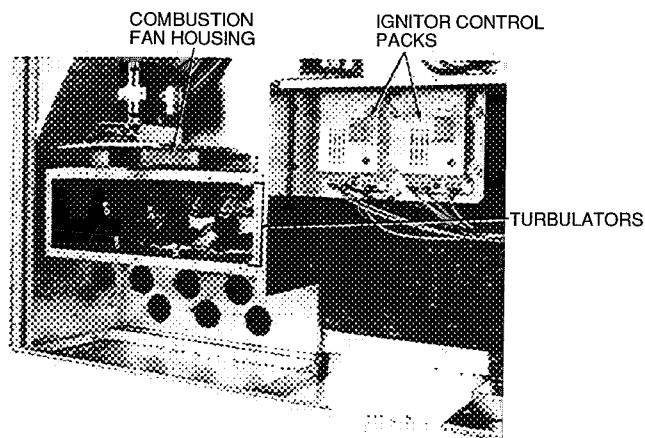


Fig. 26 — Typical Heating Section with Main Burners Removed (48TJD Units Shown)

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory. The 48TJ016 compressor runs with a slightly low sight glass oil level. Oil level with compressor off should be about $\frac{1}{4}$ of sight glass as shown in Fig. 27.

If oil charge is above $\frac{1}{4}$ sight glass, do not remove any oil until the compressor crankcase heater has been energized for at least 24 hours.

FAN SHAFT BEARINGS — For 016 units, bearings are permanently lubricated. No field lubrication is required. For 020-028 units, 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 Performance Adjustment (Fig. 28-30) — Fan motor pulleys are factory set for speed shown in Table 1.

To change fan speeds.

1. Shut off unit power supply.
2. a. 016 only: Loosen belt by loosening carriage nuts holding motor mount assembly to fan scroll side plates (A and B).
b. 020-028 only: 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).

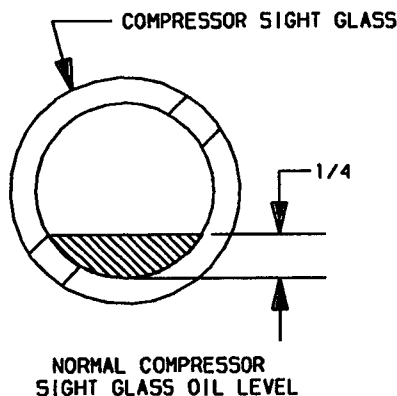


Fig. 27 — 48TJ016 Compressor Sight Glass Oil Level

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.
See Table 8 for air quantity limits.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 1 for speed change for each full turn of pulley flange.)
6. Tighten belts (see Belt Tension Adjustment section on page 21).

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.

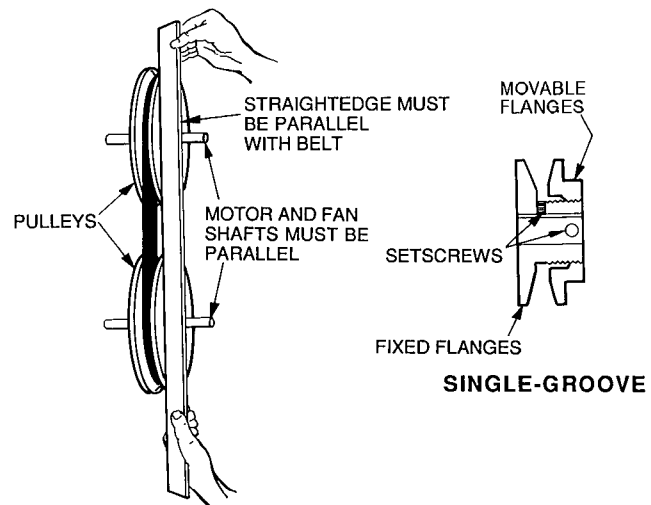


Fig. 28 — Evaporator-Fan Alignment and Adjustment

Evaporator Fan Service and Replacement

48TJ016 UNITS (See Fig. 29)

NOTE: To remove belts only, follow Steps 1-6.

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

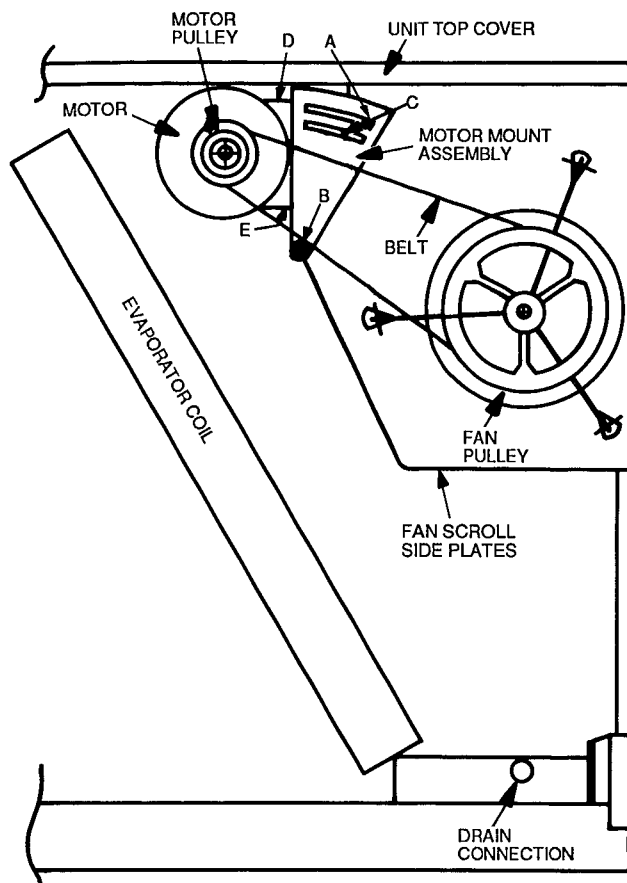
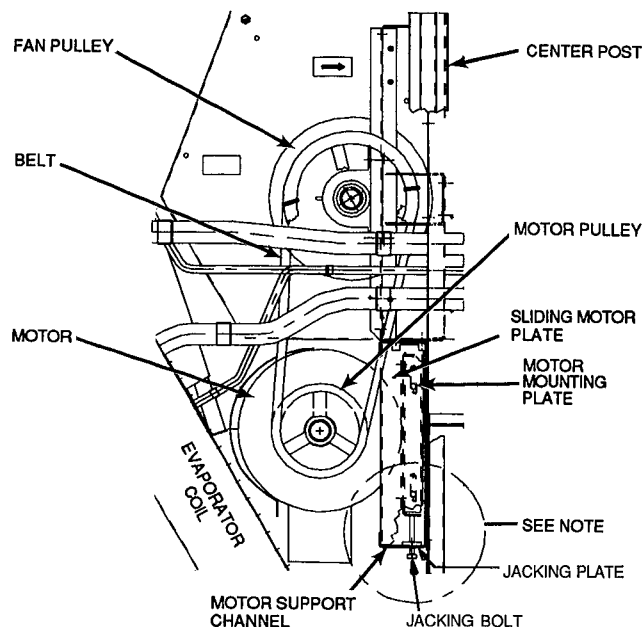


Fig. 29 — 48TJ016 Evaporator-Fan Motor Adjustment

48TJ020-028 UNITS (See Fig. 30) — The 48TJ020-028 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 2 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 1-10.



NOTE: A 3½-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 — 48TJ020-028 Evaporator-Fan Motor Section

Belt Tension Adjustment — To adjust belt tension:

1. Loosen fan motor bolts.
2. a. 016 Units:
Move motor mounting plate up or down for proper belt tension (½ in. deflection with one finger).
- b. 020-028 Units:
Turn motor jacking bolt to move motor mounting plate up or down for proper belt tension (¾ 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

48TJ016,020 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 fan height on shaft using a straightedge placed across the fan orifice.
5. Tighten setscrews and replace panel(s).
6. Turn on unit power.

48TJ024,028 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.

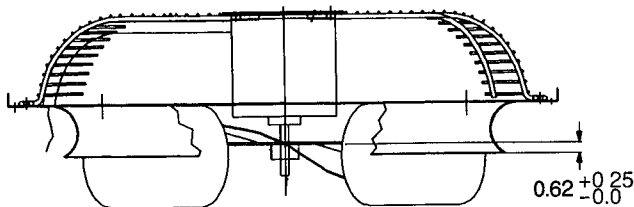


Fig. 31 – Condenser Fan Adjustment, 48TJ016,020

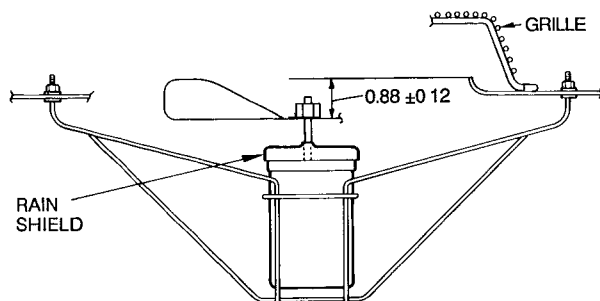


Fig. 32 – Condenser-Fan Adjustment, 48TJ024,028

Economizer Adjustment — See Tables 10 and 11 for checkout and enthalpy simulation. 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. 20.
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. 20). 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

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.*

Table 10 – Economizer Checkout Procedures

TEST PROCEDURE	RESULTS
A. Disconnect power at TR and TR1. Disconnect jumper between P and P1 See Fig. 20. 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 11 – High and Low Outdoor-Air Simulation

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 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 test results: 1. LED should be off. 2. Motor drives toward closed

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.

NOTE: On 020,024 units, do not adjust charge until after compressors have been running for at least 20 minutes and pressures and temperatures have stabilized.

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. 33-36), add refrigerant until conditions of the appropriate chart are met. Note that charging chart is different from those normally used. Chart is 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.

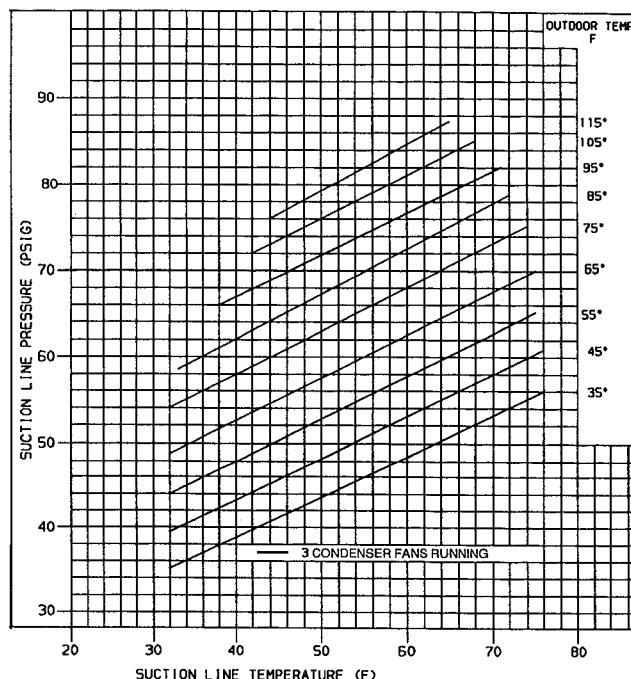


Fig. 33 — Cooling Charging Chart — 48TJ016

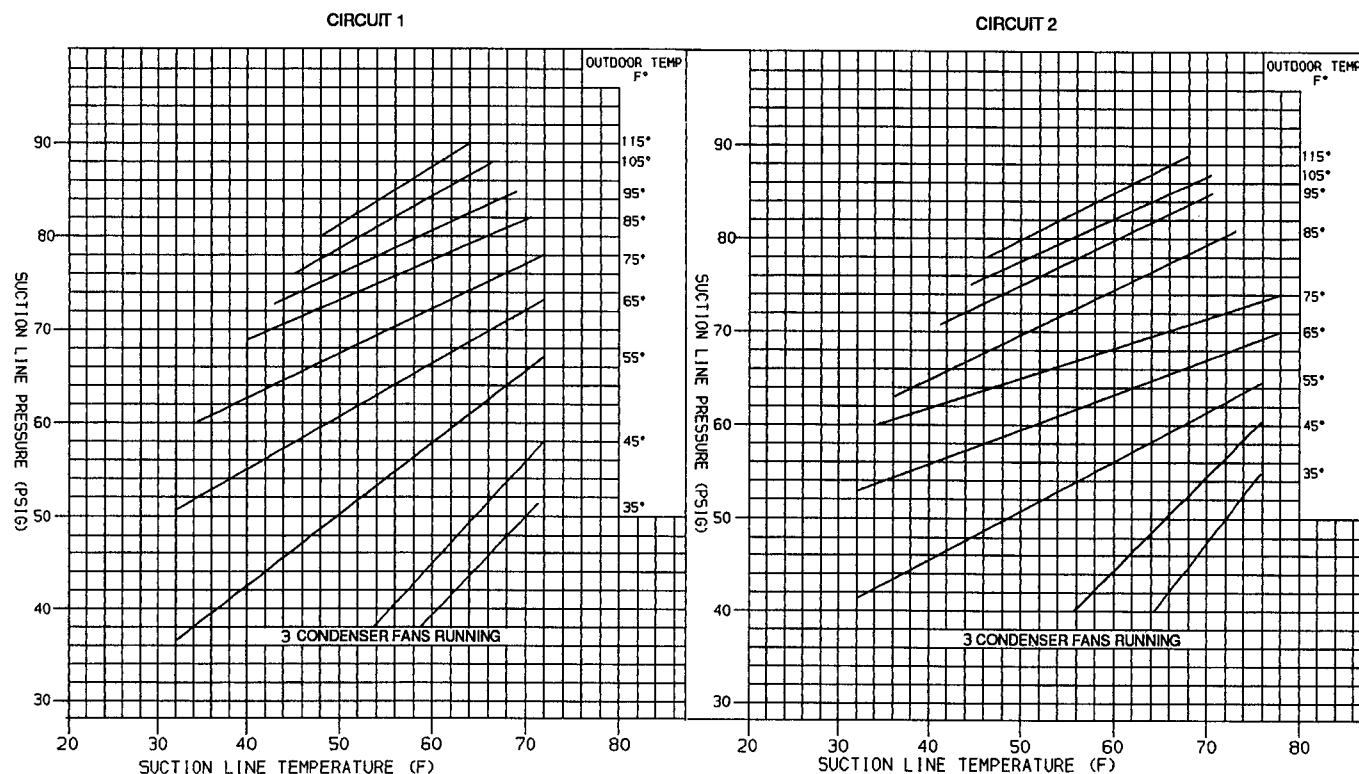


Fig. 34 — Cooling Charging Chart — 48TJ020

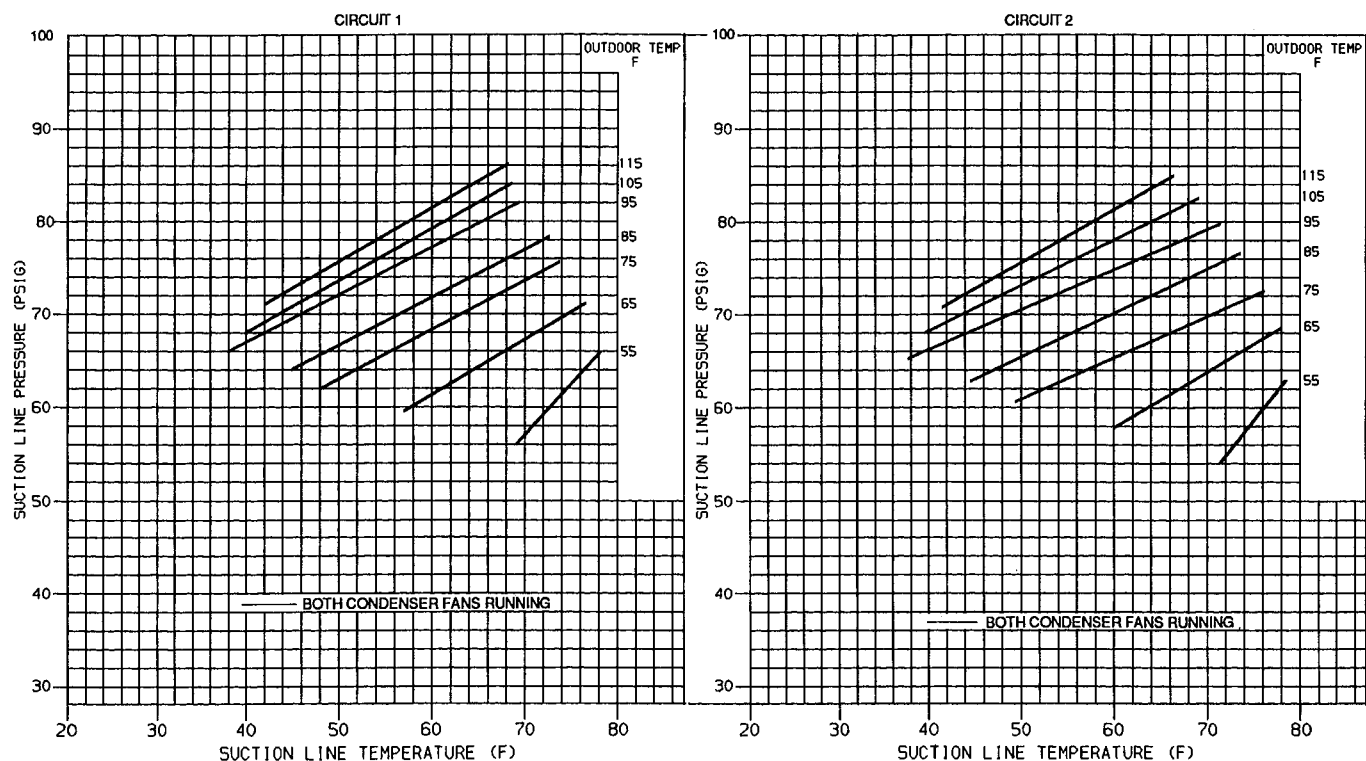


Fig. 35 — Cooling Charging Chart — 48TJ024

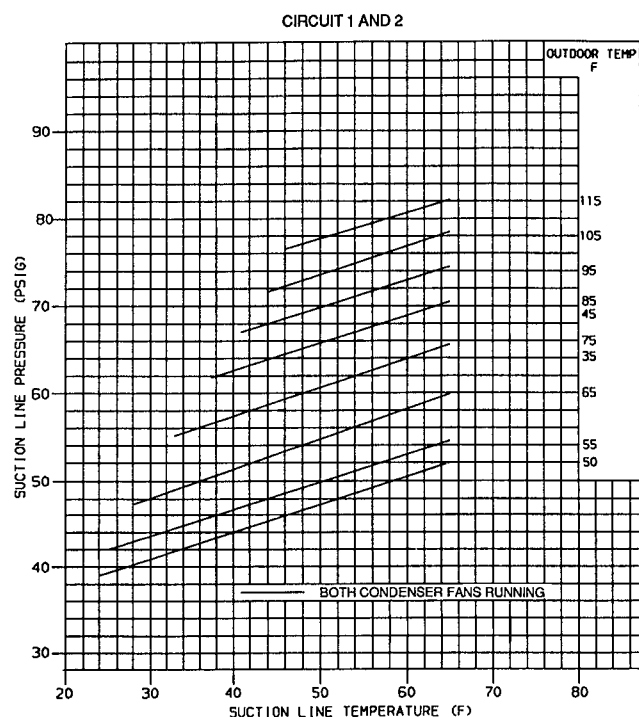


Fig. 36 — Cooling Charging Chart — 48TJ028

Pilot Light — If pilots do not light as described in Start-Up, Gas Heat section on page 15, 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.
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. 37).
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. 38).
6. Replace cap on pilot gas valve. Turn off power to unit. Return valve(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. 37).
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. 38) 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 and 5).

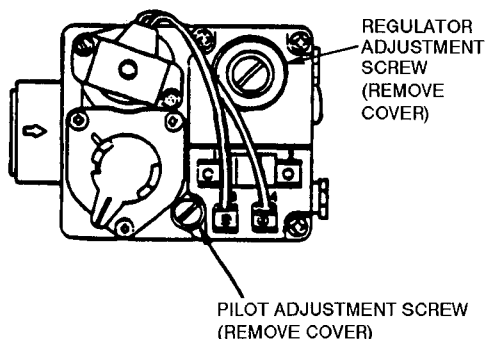


Fig. 37 — Gas Valve

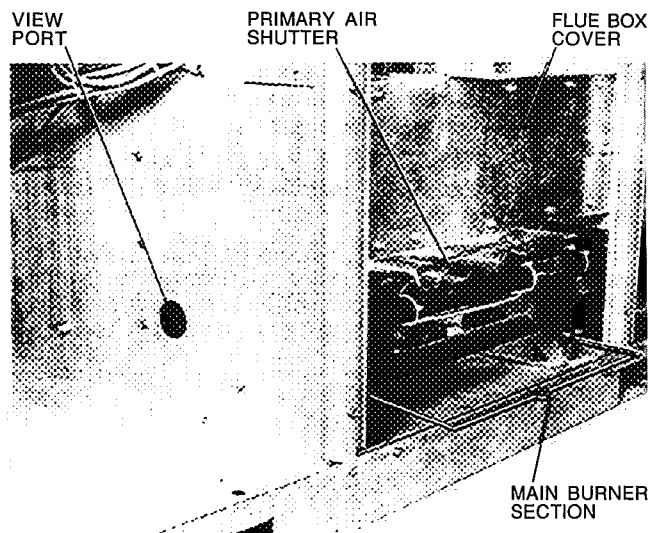


Fig. 38 — Typical Heating Section

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.
NOTE: For 48TJE024 and 028 units only: Remove access plate from base rail.
7. Slide burner assembly out of unit.

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

Protective Devices

COMPRESSOR PROTECTION

Overcurrent (016 and 028) — 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.

NOTE: The 48TJ020 and 024 units have overcurrent protection inherent in the compressor.

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

buildup and turns off the compressor, allowing the coil to clear. Once the frost has melted, the compressor can be reenergized.

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.

LEGEND

Fig. 39 — Typical Wiring Schematic

Fig. 40 — Typical Component Arrangement

AHA — Adjustable Heat Anticipator
BKR W/AT — Breaks with Amp Turns
C — Contactor, Compressor
CB — Circuit Breaker
CC — Cooling Compensator
CH — Crankcase Heater
CLO — Compressor Lockout
CLS — Compressor Lockout Switch
COMP — Compressor Motor
CR — Control Relay
CT — Current Transformer
DM — Damper Motor
DU — Dummy Terminal
EQUIP — Equipment
FPT — Freeze Protection
FU — Fuse
GND — Ground
HPS — High-Pressure Switch
HR — Heat Relay
HV — High Voltage
I — Ignitor
ICP — Ignitor Control Pack
IDM — Induced-Draft Motor
IDR — Induced-Draft Relay
IFC — Indoor (Evaporator)
IFCB — Indoor (Evaporator)
 Fan Contactor
 Fan Circuit Breaker

IFM — Indoor (Evaporator)
 Fan Motor
IFR — Indoor (Evaporator)
 Fan Relay
IP — Internal Protector
L — Light
LOR — Lockout Relay
LPS — Low-Pressure Switch
LS — Limit Switch
MAT — Mixed-Air Thermostat
MGV — Main Gas Valve
NEC — National Electrical Code
OAT — Outdoor-Air Thermostat
OFC — Outdoor (Condenser)
 Fan Contactor
OFM — Outdoor (Condenser)
 Fan Motor
PGV — Pilot Gas Valve
PL — Plug Assembly
PRI — Primary
PS — Pressure Switch
QT — Quadruple Terminal
R — Relay
RS — Rollout Switch
SN — Sensor
SW — Switch
TB — Terminal Block
TC — Thermostat Cooling
TDR — Time Delay Relay

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

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):

UNIT 48TJ	W1	W2	VOLTAGE
016-028	98	.44	208/230, 575
	1.20	.44	460

- 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.





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 PAGES 23 AND 24

GENERAL

- ☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS