



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).

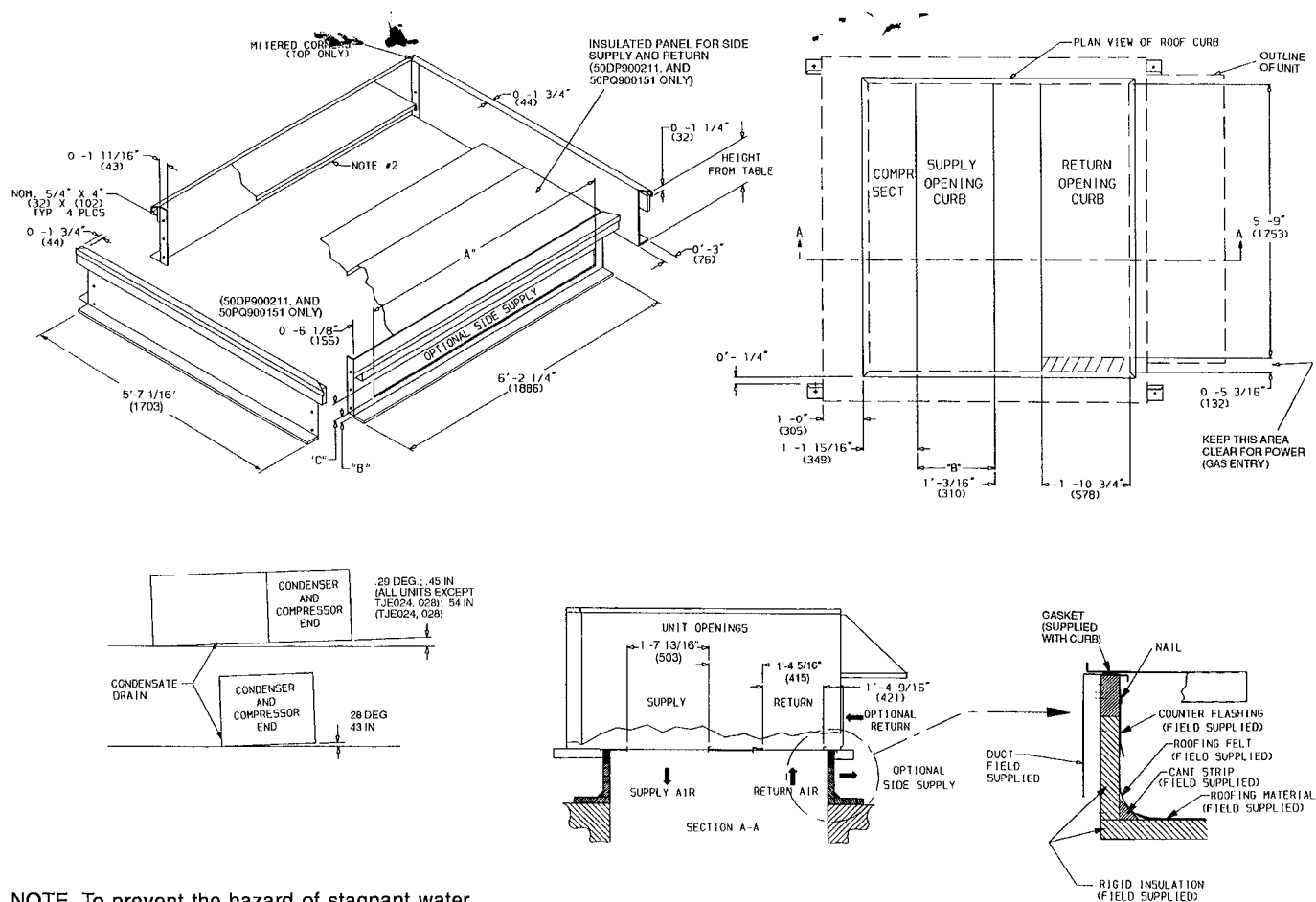
INSTALLATION

Step 1 — Provide Unit Support

ROOF CURB — Assemble or install accessory roof curb or horizontal adapter 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 or horizontal adapter before unit is set in place. Curb or adapter should be level. This is necessary to permit unit drain to function properly. Unit leveling tolerance is $\pm 1/16$ in. per linear ft in any direction. Refer to Accessory Roof Curb or Horizontal Adapter Installation Instructions for additional information as required. When accessory roof curb or horizontal adapter 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 or adapter is critical for a watertight seal. Install gasket with the roof curb or adapter as shown in Fig. 1. Improperly applied gasket can also result in air leaks and poor unit performance.

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

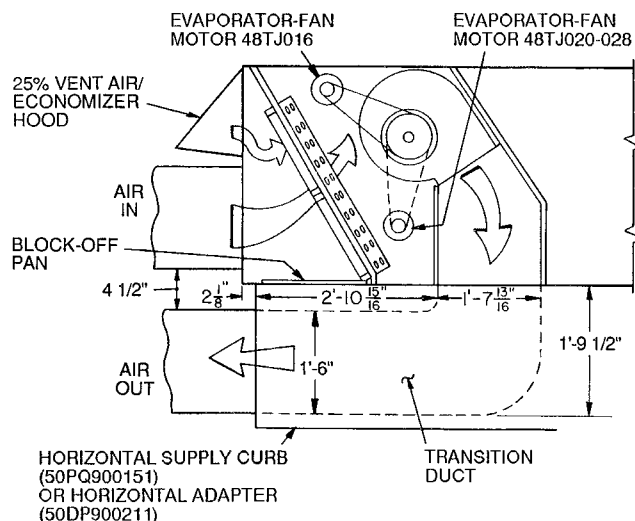
COMPR SECT. — Compressor Section

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 16 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"
50PQ900221	1'-2" (355)	Standard Curb — 14" High	—	—	—
50PQ900141	2'-0" (610)	Standard Curb for Units Requiring High Installation	—	—	—
50PQ900151	2'-0" (610)	Horizontal Supply and Return Curb	5'-6" (1676)	0'-2 1/2" (64)	1'-6" (457)
50DP900211	1'-11" (584)	Pre-Assembled, High-Static, Horizontal Adapter	6'-2" (1880)	0'-6 1/4" (159)	1'-2 5/8" (371)

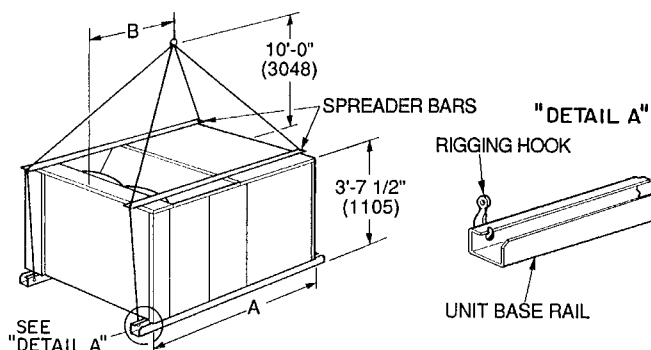
Fig. 1 — Roof Curb Details



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

Fig. 2 — Horizontal Adapters and Roof Curbs

ALTERNATE UNIT SUPPORT — When a curb or adapter 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 operating weight is shown in Table 1.

Instructions continued on page 8.

NOTES

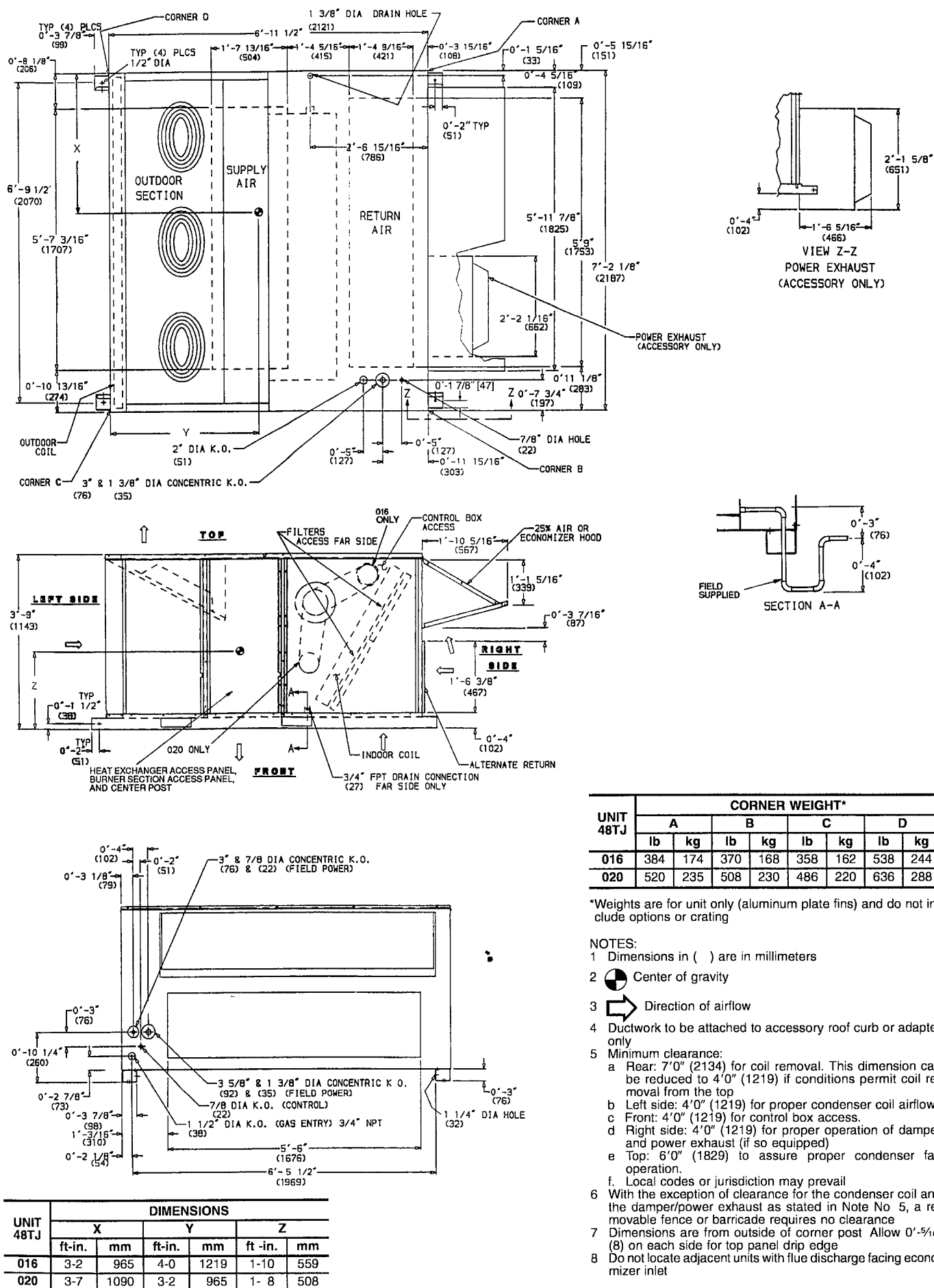
- 1 Dimensions in () are in millimeters
- 2 Refer to Table 1 for unit operating weights
- 3 Remove boards at ends of unit and runners prior to rigging.
- 4 Rig by inserting hooks into unit base rails as shown. Use corner post from packaging to protect coil from damage. Use bumper boards for spreader bars on all units except 48TJF024 and 028.
- 5 Weights do not include optional economizer. See Table 1 for economizer weight.
6. Weights given are for aluminum evaporator and condenser coil plate fins. Weights of other metal combinations are listed in Table 1.

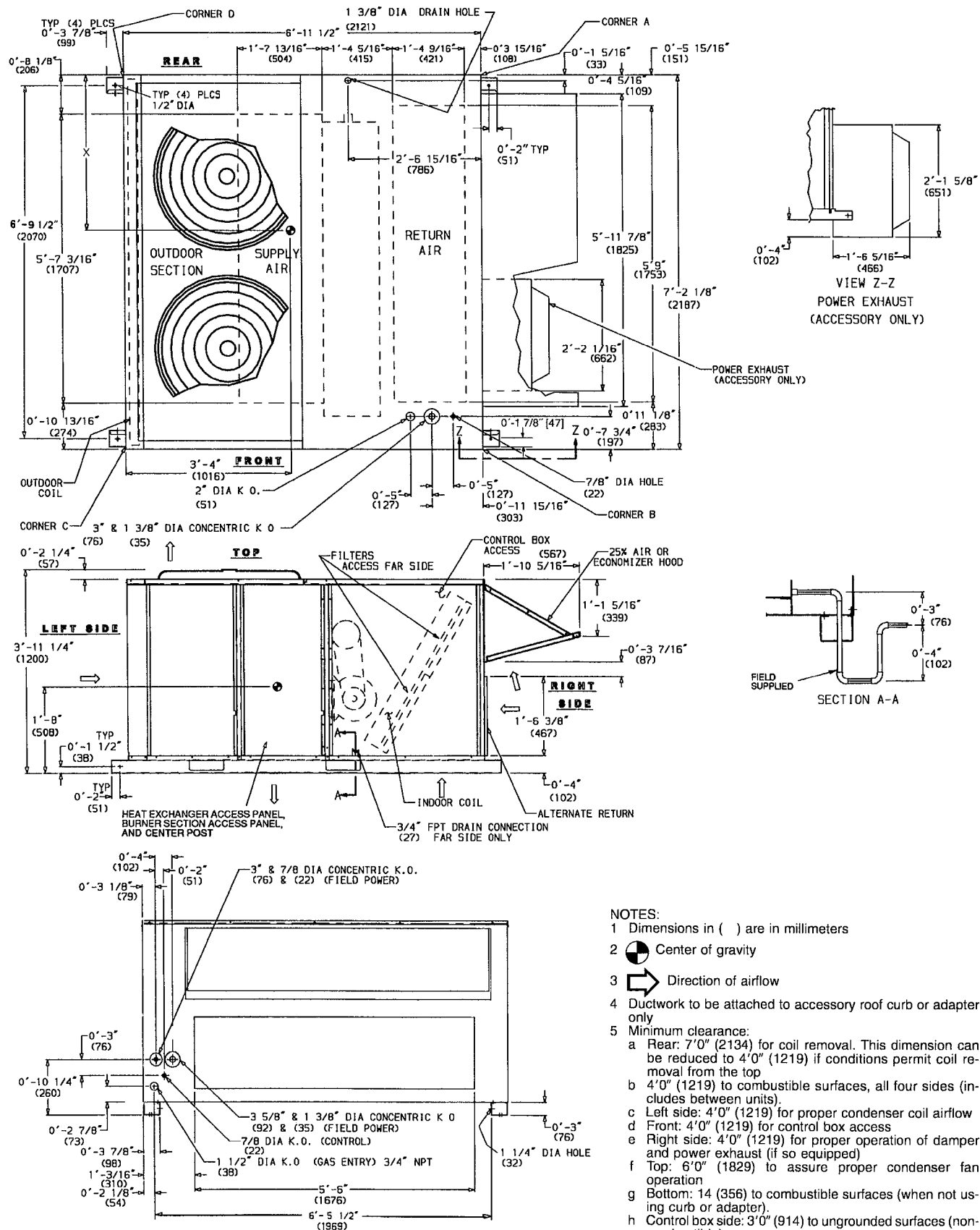
CAUTION

All panels must be in place when rigging

UNIT 48TJ	MAXIMUM SHIPPING WEIGHT		DIMENSIONS			
			A		B	
	lb	kg	ft-in.	mm	ft-in.	mm
016	1800	816	6-11½	2121	4-0	1219
020	2300	1043	6-11½	2121	3-2	964
024	2350	1066	6-11½	2121	3-4	1016
028	2400	1089	6-11½	2121	3-4	1016

Fig. 3 — Rigging Details





UNIT 48TJ	CORNER WEIGHT*								DIMENSION X	
	A		B		C		D		f-in.	mm
	lb	kg	lb	kg	lb	kg	lb	kg		
024	520	235	508	230	532	241	640	290	3-2	965
028	527	239	545	247	578	262	600	272	3-7	1092

*Weights are for unit only (aluminum plate fins) and do not include options or crating

Fig. 5 — Base Unit Dimensions; 48TJ024,028

Table 1 — Physical Data

UNIT SIZE 48TJ	016D/F		020D/F	024D/F	028D/F
	208/230,460 v	575 v			
NOMINAL CAPACITY (tons)	15		18	20	25
OPERATING WEIGHT (lb)					
Unit					
Al/Al*	1650		2150	2200	2250
Al/Cu*	1800		2300	2350	2400
Cu/Cu*	1930		2430	2480	2530
Economizer	110		110	110	110
Roof Curb†	200		200	200	200
COMPRESSOR			Semi-Hermetic		
Model No. ...Quantity	06D-537 . 1 (6)		06D-824 1 (6)	06D-824. 2 (6)	06D-328 .2 (6)
(Number of Cylinders)			06D-818 .1 (4)		
Oil (oz)	115		88,115	115 ea	128 ea
REFRIGERANT TYPE			R-22		
Expansion Device	TXV		Acutrol™ Refrigerant Metering Device		
Operating Charge (lb-oz)					
Circuit 1**	19-4		13-4	12-13	16-12
Circuit 2	—		11-0	12-13	15-12
CONDENSER COIL			Enhanced Copper Tubes, Aluminum Lanced or Copper Fins		
Rows...Fins/in.	2 17		3 15	3 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	1/2 1050		1/2 1050	1 ..1075	1 . 1075
Watts Input (Total)	1100		1100	3400	3400
EVAPORATOR COIL			Copper Tubes, Aluminum or Copper Plate Fins, Face Split		
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	7 1/2	10
Maximum Continuous Bhp	4 25 [208/230 v]	3.45	5 90	8 7 [208/230,575 v]	10 2 [208/230,575 v]
Motor Frame Size	5 75 [460 v]			9 5 [460 v]	11 8 [460 v]
Nominal Rpm High/Low	56H	56H	184T	213T	215T
Fan Rpm Range	862-1132	1201-1462	799-1010	916-1079	1054-1265
Motor Bearing Type	Ball	Ball	Ball	Ball	Ball
Maximum Allowable Rpm	1550	1550	1550	1550	1550
Motor Pulley Pitch Diameter Min/Max (in.)	3 1/4 1	4 3/5 3	3.7/4 7	5 5/6 6	4 9/5 9
Nominal Motor Shaft Diameter (in.)	7/8	7/8	1 1/8	1 3/8	1 3/8
Fan Pulley Pitch Diameter (in.)	6 0	6 4	7 9	10 4	8 0
Nominal Fan Shaft Diameter (in.)	1 3/16	1 3/16	1 1/16	1 7/16	1 7/16
Belt, Quantity...Type...Length (in.)	1. BX 42	1 BX 45	1 BX .46	1 BX 54	2 BX 50
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)	54	52	42	33	42
Movable Pulley Maximum Full Turns From Closed Position	6	5	6	6	6
Factory Setting	3	3 5	3	3	3
Factory Speed Setting (rpm)	1024	1279	925	1015	1180
Fan Shaft Diameter at Pulley (in.)	1 3/16	1 3/16	1 7/16	1 7/16	1 7/16

LEGEND

Al — Aluminum
 Bhp — Brake Horsepower
 Cu — Copper
 TXV — Thermostatic Expansion Valve

*Evaporator coil fin material/condenser coil fin material

†Weight of 14-in. roof curb

**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: Units have a low-pressure switch (standard) located on the suction side.

Table 1 — Physical Data (cont)

UNIT SIZE 48TJ	016D/F	020D/F	024D/F	028D/F
FURNACE SECTION				
Rollout Switch Cutout Temp (F)††	190	190	190	190
Burner Orifice Diameter (in. ...drill size) Natural Gas	0.1405 28/ 0.136 .24	0.1405.. 28/ 0 136 .29	0.1405 28/ 0 136 29	0.1405 .28/ 0.136 29
Thermostat Heat Anticipator Setting (amps)				
208/230,575 v Stage 1	0 98	0 98	0 98	0.98
Stage 2	0.44	0 44	0.44	0.44
460 v Stage 1	0 80	0 80	0 80	0.80
Stage 2	0 44	0 44	0 44	0.44
Gas Input (Btuh) Stage 1	172,000/225,000	206,000/270,000	206,000/270,000	206,000/270,000
Stage 2	230,000/300,000	275,000/360,000	275,000/360,000	275,000/360,000
Efficiency (Steady State) (%)	81	81	81	81
Temperature Rise Range	15-45/30-60	15-45/20-50	15-45/20-50	15-45/20-50
Manifold Pressure (in. wg)				
Natural Gas	3.3	3 3	3.3	3.3
Gas Valve Quantity	1	1	1	1
Field Gas Connection Size (in.)	¾	¾	¾	¾
HIGH-PRESSURE SWITCH (psig)				
Standard Compressor Internal Relief (Differential) Cutout		426		
Reset (Auto.)		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
TXV — Thermostatic Expansion Valve

*Evaporator coil fin material/condenser coil fin material

†Weight of 14-in. roof curb

**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: 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.

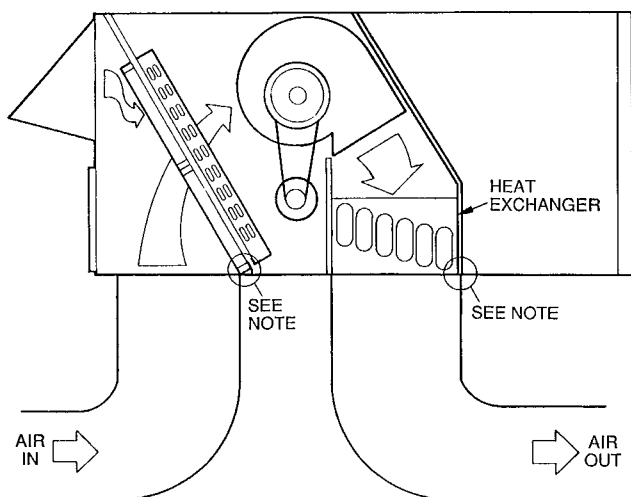
Step 4 — Make Unit Duct Connections — Unit is shipped for thru-the-bottom duct connections. Ductwork openings are shown in Fig. 1, 4, and 5. Duct connections are

shown in Fig. 6. Field-fabricated concentric ductwork may be connected as shown in Fig. 7 and 8. Attach all ductwork to roof curb and roof curb basepans.

Step 5 — Install Flue Hood and Wind Baffle —

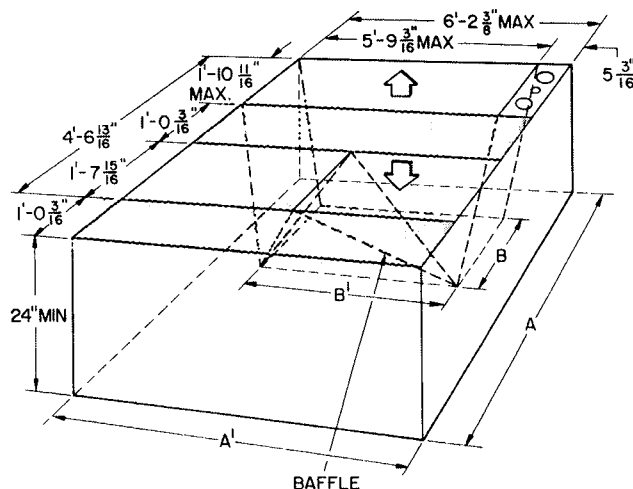
Flue hood and wind baffle are shipped secured under main control box. To install, secure flue hood to access panel. See Fig. 9. The wind baffle is then installed over the flue hood.

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



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

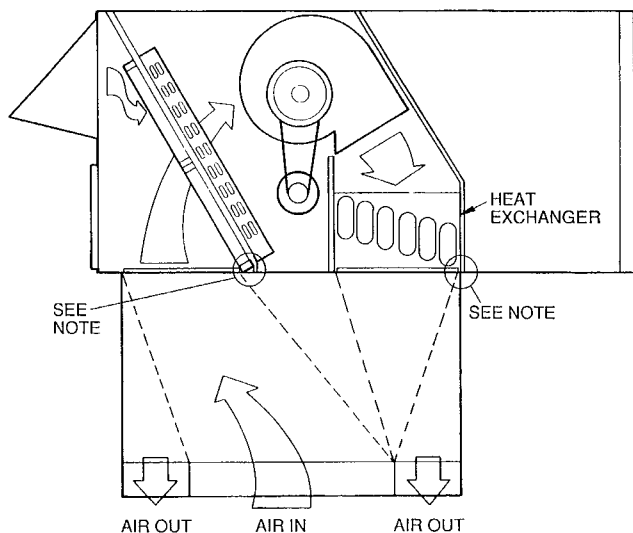
Fig. 6 — Air Distribution — Thru-the-Bottom



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



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

Fig. 7 — Concentric Duct Air Distribution

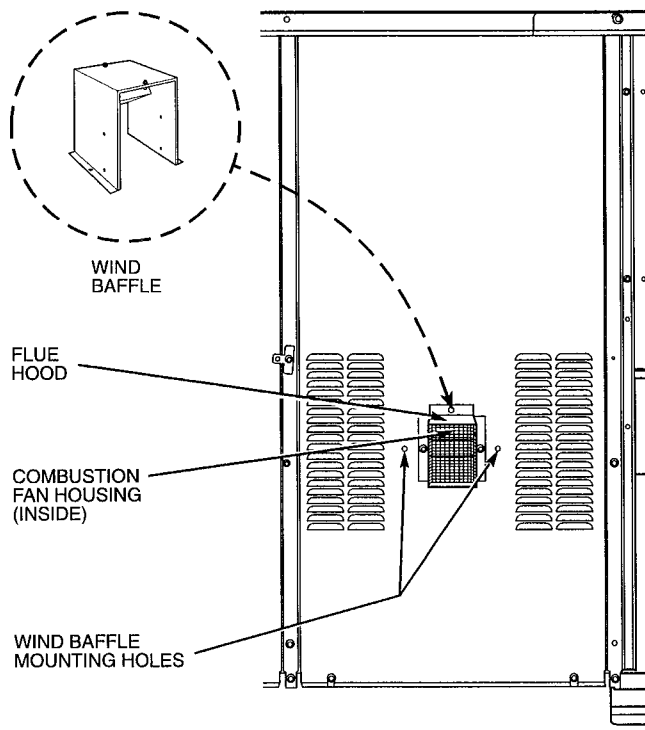


Fig. 9 — Flue Hood Location

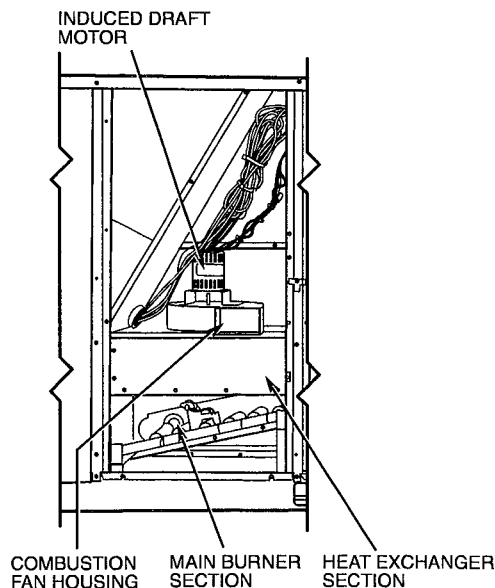


Fig. 10 — Combustion Fan Housing Location

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

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

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

⚠ WARNING

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

Natural gas pressure at unit gas connection must not be less than 5.5 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.

Step 8 — Make Electrical Connections

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

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

All field wiring must comply with NEC and local requirements.

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

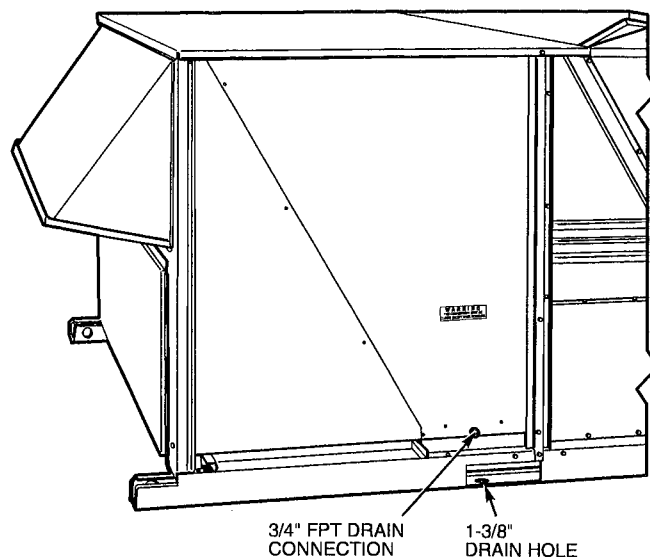


Fig. 11 — Condensate Drain Details (48TJ016 Shown)

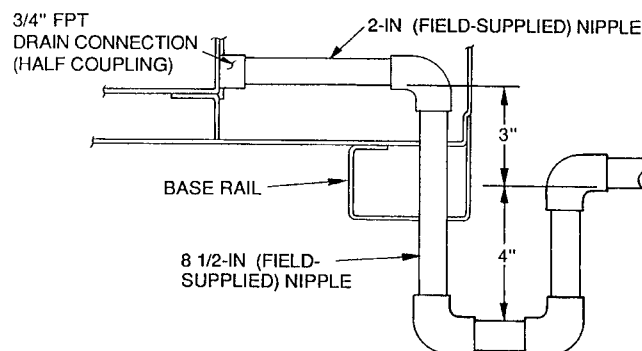


Fig. 12 — Condensate Drain Piping Details

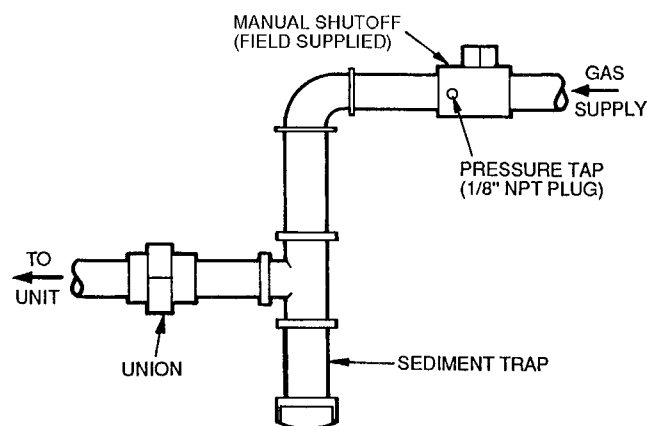


Fig. 13 — Field Gas Piping

⚠ 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.

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

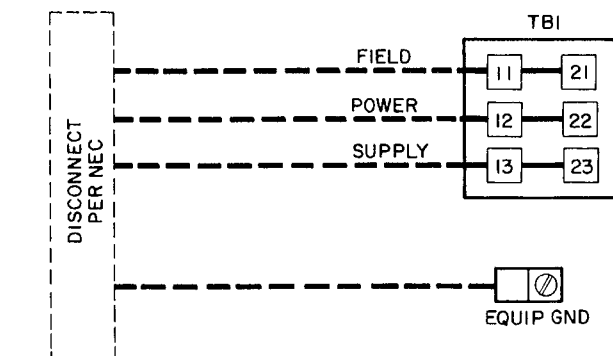
Operating voltage to compressor must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2%.

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

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

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

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gauge) 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).



NOTE The maximum wire size for TB1 is 2/0

LEGEND

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

Fig. 14 — Field Power Wiring Connections

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:

VOLTAGE	W1	W2
208/230, 575	0.98	0.44
460	0.80	0.44

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. 16).

OPTIONAL ECONOMIZER

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

Damper Vent Position Setting

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

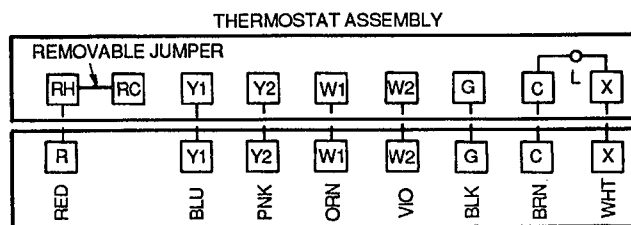


Fig. 15 — Field Control Thermostat Wiring

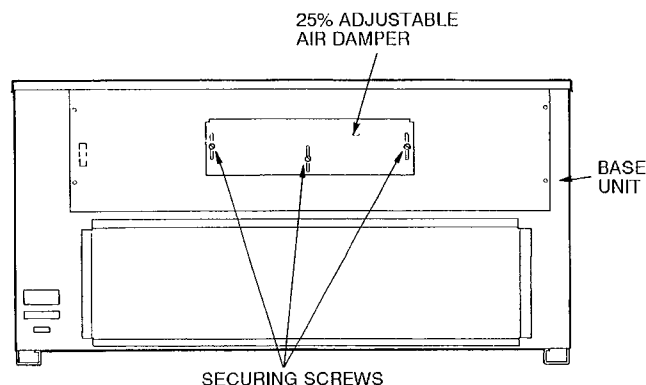


Fig. 16 — 25% Outdoor-Air Section Details

Table 2 — Electrical Data

UNIT 48TJ	NOMINAL VOLTAGE (60 Hz, 3 Phase)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM	POWER EXHAUST		COMBUSTION- FAN MOTOR	POWER SUPPLY	
		Min	Max	NO. 1		NO. 2		Qty	Hp	FLA (ea)	FLA	FLA	LRA	FLA	MCA	MOCPS*
016	208/230	187	254	61.0	266	—	—	3	1/2	1.70	10.5/10.5	—	—	0.57	92/92	150/150
												4.6	18.8	0.57	96/96	150/150
	460	414	508	28.0	120	—	—	3	1/2	0.80	4.8	—	—	0.30	42	70
												2.3	6.0	0.30	45	70
	575	518	632	23.0	96	—	—	3	1/2	0.75	3.9	—	—	0.57	35	50
												2.1	4.8	0.57	37	60
020	208/230	187	254	35.6	198	28.2	160	3	1/2	1.70	15.8/15.8	—	—	0.57	94/94	125/125
												4.6	18.8	0.57	98/98	125/125
	460	414	508	17.8	99	14.1	80	3	1/2	0.80	7.9	—	—	0.30	47	60
												2.3	6.0	0.30	49	60
	575	518	632	14.3	79	11.3	64	3	1/2	0.75	6.0	—	—	0.57	37	50
												2.1	4.8	0.57	40	50
024	208/230	187	254	35.6	198	35.6	198	2	1	5.50	25.0/25.0	—	—	0.57	116/116	150/150
												4.6	18.8	0.57	121/121	150/150
	460	414	508	17.8	99	17.8	99	2	1	2.80	13.0	—	—	0.30	59	70
												2.3	6.0	0.30	61	70
	575	518	632	14.3	79	14.3	79	2	1	3.40	10.0	—	—	0.57	49	60
												2.1	4.8	0.57	51	60
028	208/230	187	254	43.6	228	43.6	228	2	1	5.50	28.0/28.0	—	—	0.57	137/137	175/175
												4.6	18.8	0.57	142/142	175/175
	460	414	508	22.1	114	22.1	114	2	1	2.80	14.6	—	—	0.30	70	90
												2.3	6.0	0.30	72	90
	575	518	632	17.9	91	17.9	91	2	1	3.40	13.0	—	—	0.57	60	70
												2.1	4.8	0.57	62	80

LEGEND

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

*Fuse or HACR circuit breaker.



NOTES:

- 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.

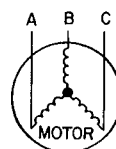
2. Unbalanced 3-Phase Supply Voltage

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.

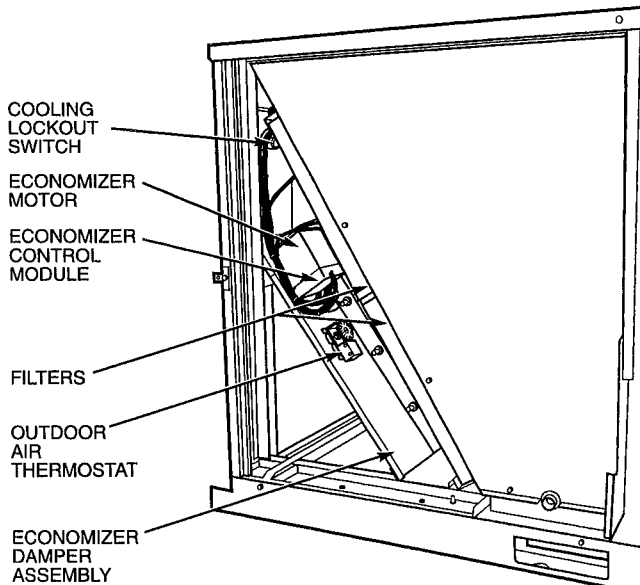


Fig. 17 — Economizer Damper Assembly-End View

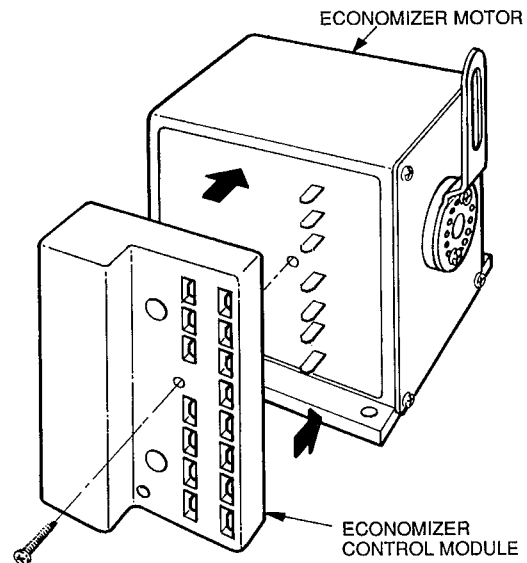
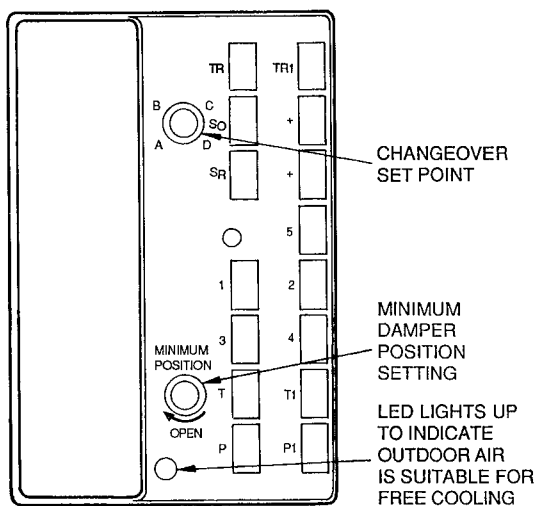


Fig. 19 — Economizer Motor Control Module Location



LED — Light-Emitting Diode

Fig. 18 — Economizer Motor Control Module

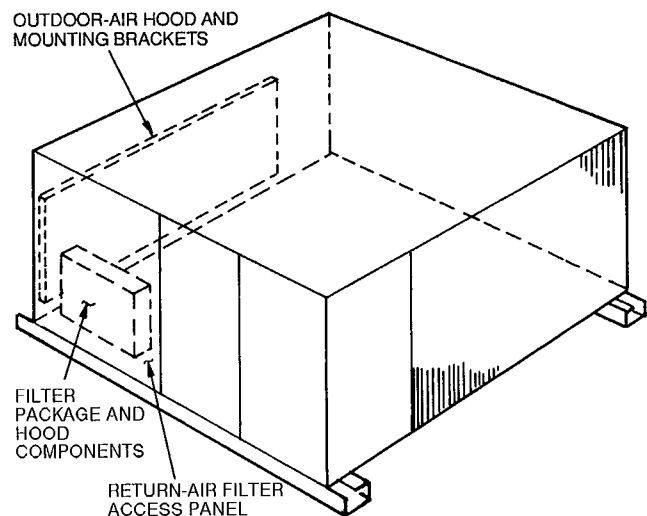


Fig. 20 — Outdoor-Air Hood Component Location

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 panel, upper and lower filter retainers, hood drain pan, baffle (sizes 024-028), 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. 20).

1. Attach seal strip to upper filter retainer. See Fig. 21.
2. Assemble hood top panel, side panels, upper filter retainer, and drain pan (see Fig. 22).

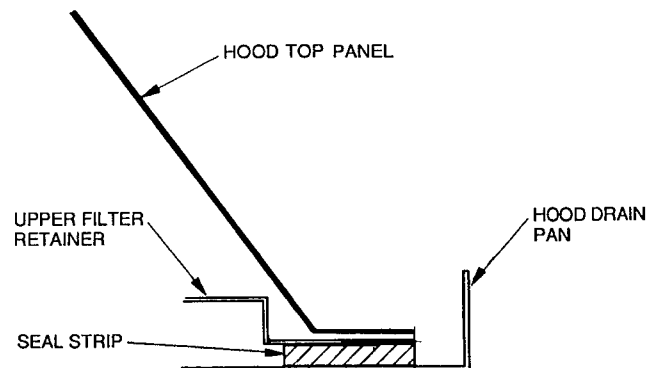


Fig. 21 — Seal Strip Location

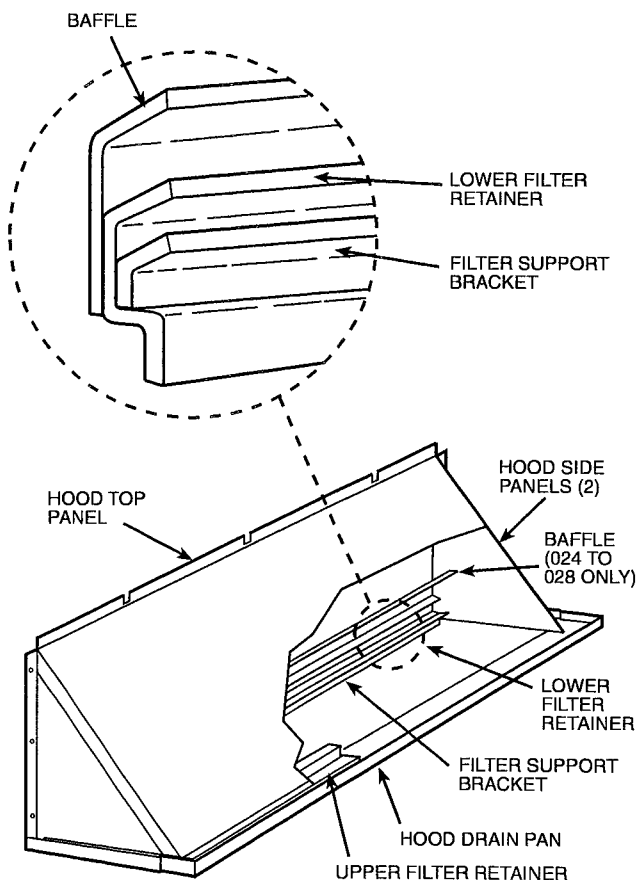


Fig. 22 — Outdoor-Air Hood Details

3. Secure lower filter retainer and support bracket to unit. See Fig. 22. Leave screws loose on 024-028 units.
4. Slide baffle (sizes 024-028) behind lower filter retainer and tighten screws.
5. Loosen sheet metal screws for top panel of base unit located above outdoor-air inlet opening, and remove screws for hood side panels located on the sides of the outdoor-air inlet opening.
6. Match notches in hood top panel with unit top panel screws. Insert hood flange between top panel flange and unit. Tighten screws.
7. Hold hood side panel flanges flat against unit, and install screws removed in Step 5.
8. Insert outdoor-air inlet screens and spacer in channel created by lower filter retainer and filter support bracket.
9. 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 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 — Each refrigerant system has 1 suction port located in the top of the compressor motor casing. 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) — 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. Be sure that fans rotate in the proper direction. See Table 8 for air quantity limits. See Tables 9 and 10 for static pressure information for accessories and options. See Table 11 for fan rpm at various motor pulley settings. To alter fan performance, see Evaporator Fan Performance Adjustment section on page 21.

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 fan motor.

Condenser-Fans and Motors — Condenser fans and motors are factory set. Refer to Condenser-Fan Adjustment section on page 22 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 in 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 pressure tap (see Fig. 13).
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 5.5 in. wg or greater, and that the manifold pressure is 3.3 in. wg. If manifold pressure must be adjusted, refer to Gas Valve Adjustment section on page 24.
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			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	1342	3.64	3233
6300	1059	2.60	2309	1133	2.89	2567	1198	3.17	2815	1259	3.46	3073	1318	3.74	3321	1375	4.02	3570
6600	1104	2.96	2629	1174	3.26	2895	1239	3.56	3162	1297	3.86	3428	1355	4.15	3686	1405	4.40	3970
6900	1150	3.35	2975	1218	3.67	3259	1281	3.98	3535	1340	4.20	3730	1392	4.55	4040	1460	4.95	4350
7200	1194	3.77	3348	1260	4.10	3641	1325	4.40	3907	1390	4.65	4130	1440	5.10	4530	1510	5.30	4700
7500	1238	4.23	3758	1300	4.50	3996	1370	4.90	4351	1435	5.00	4440	1490	5.60	4970	—	—	—

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	1525	4.50	3776	—	—	—
6300	1430	4.30	3820	1490	4.55	4040	—	—	—	—	—	—
6600	1461	4.85	4305	1530	5.00	4440	—	—	—	—	—	—
6900	1500	5.35	4750	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

NOTES:

- 1 **Boldface** indicates field-supplied drive required. (See Note 3)
- 2  indicates additional capability of field-supplied 5-hp motor
- 3 Factory shipped motor drive range is 862 to 1132 rpm. Other rpms require a field-supplied drive

- 4 Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table. See Table 9 for accessory/FIOP static pressure information
- 5 Interpolation is permissible. Do not extrapolate
- 6 Maximum continuous bhp is 4.25 (208/230 v motor) or 5.75 (460 v motor) and the maximum continuous watts are 3775 (208/230 v motor) or 5107 (460 v motor). 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
FIOF — Factory-Installed Option
Watts — Input Watts to Motor

NOTES:

- 1 **Boldface** indicates field-supplied drive required
- 2 Factory shipped motor drive range is 1201 to 1462 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/FIOF static pressure information

4 Interpolation is permissible. Do not extrapolate

5 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
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

NOTES.

- 1 **Boldface** indicates field-supplied drive required. (See Note 2)
- 2 Factory shipped motor drive range is 799 to 1010 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 10 for accessory/FIOP static pressure information
- 4 Interpolation is permissible Do not extrapolate

- 5 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
- 6 Deduct 0.2 in. wg static pressure for high heat units at or above 8000 cfm.

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
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

NOTES:

- Boldface** indicates field-supplied drive required for all voltages (See Note 3)
-  indicates additional capability of 460 v motor (with field-supplied drive)
- Factory shipped motor drive range is 916 to 1079 rpm. Other rpms require a field-supplied drive.
- Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table. See Table 10 for accessory/FIOP static pressure information.
- Interpolation is permissible. Do not extrapolate.
- 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.
- Deduct 0.2 in. wg static pressure for high heat units at or above 9000 cfm. Deduct 0.3 in. wg static pressure for high heat units at or above 10,000 cfm.

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
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

NOTES:

- 1** **Boldface** indicates field-supplied drive required for all voltages. (See Note 3).
- 2**  indicates additional capability of 460 v motor (with field-supplied drive).
- 3** Factory shipped motor drive range is 1054 to 1265 rpm. Other rpms require a field-supplied drive.
- 4** Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table. See Table 10 for accessory/FIOP static pressure information.

- 5** Interpolation is permissible. Do not extrapolate.
- 6** Fan performance is based on wet coils, clean filters, and casing losses.
- 7** 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.
- 8** Deduct 0.3 in. wg static pressure for high heat units at or above 10,000 cfm.

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) — 48TJ016

COMPONENT	CFM				
	4500	5000	6000	7200	7500
Economizer	0.04	0.05	0.07	0.09	0.10

LEGEND

FIOP — Factory-Installed Option

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

Table 10 — Accessory/FIOP Static Pressure*
(in. wg) — 48TJ020-028

COMPONENT	CFM					
	5000	6000	7200	9000	10,000	11,250
Economizer	0.06	0.07	0.09	0.11	0.12	0.14

LEGEND

FIOP — Factory-Installed Option

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

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

Table 11 — Fan Rpm at Motor Pulley Settings*

UNIT 48TJ	MOTOR PULLEY TURNS OPEN												
	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6
016 (208/230,460 v)	†	†	1132	1105	1078	1051	1024	997	970	943	916	889	862
016 (575 v)	1462	1436	1410	1384	1358	1332	1305	1279	1253	1227	1201	—	—
020	†	†	1010	988	967	946	925	904	883	862	841	820	799
024	†	†	1079	1064	1048	1031	1015	998	982	965	949	932	916
028	†	†	1265	1243	1222	1201	1180	1159	1138	1117	1096	1075	1054

*Approximate fan rpm shown.

†Due to belt and pulley size, pulley cannot be set to this number of turns open

NOTE: For speeds not listed above, field supplied drives are required.

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.

When the thermostat calls for heating, power is sent to W on the IGC (integrated gas unit controller) board. An LED (light-emitting diode) on the IGC board will be on during normal operation. A check is made to ensure that the rollout switch and limit switch are closed and the induced-draft motor is running. The induced-draft motor is then energized, and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

If the burners do not light, there is a 22-second delay before another 5-second attempt. If the burners still do not light, this sequence is repeated for 15 minutes. After the 15 minutes have elapsed, if the burners still have not lighted, heating is locked out. To reset the control, break 24-v power to the thermostat.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, as well as the flame sensor. If the unit is controlled through a room thermostat set for fan auto., 45 seconds after ignition occurs, the indoor-fan motor will be energized (and the outdoor-air dampers will open to their minimum position). If for some reason the overtemperature limit opens prior to the start of the indoor fan blower, on the next attempt, the 45-second delay will be shortened to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once modified, the fan on delay will not change back to 45 seconds unless power is reset to the control.

When additional heat is required, W2 closes and initiates power to the second stage of the main gas valve. When the thermostat is satisfied, W1 and W2 open and the gas valve closes, interrupting the flow of gas to the main burners. If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto., the indoor-fan motor will continue to operate for an additional 45 seconds then stop (and the outdoor-air dampers will close). If the overtemperature limit opens after the indoor motor is stopped within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control.

A LED indicator is provided on the IGC to monitor operation. The IGC is located by removing the side panel and viewing the IGC through the view port located in the control box access panel. See Fig. 23. During normal operation, the LED is continuously on. See Table 12 for error codes.

Table 12 — IGC LED Indications

ERROR CODE	LED INDICATION
Normal Operation	On
Hardware Failure	Off
Fan On/Off Delay Modified	1 Flash
Limit Switch Fault	2 Flashes
Flame Sense Fault	3 Flashes
Five Consecutive Limit Switch Faults	4 Flashes
Ignition Lockout Fault	5 Flashes
Inducer Switch Fault	6 Flashes
Rollout Switch Fault	7 Flashes
Internal Control Fault	8 Flashes

LEGEND

IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode

NOTES:

- 1 There is a 3-second pause between error code displays
- 2 If more than one error code exists, all applicable error codes will be displayed in numerical sequence
- 3 Error codes on the IGC will be lost if power to the unit is interrupted

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 on page 18.

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. Refer to Heating, Units without Economizer section on this page for heating sequence of operation.

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 BURNER — At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames. Refer to Main Burners section on page 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. 23). Refer to Main Burners section on page 25 for burner removal sequence. If cleaning is required, remove heat exchanger baffles and clean tubes with a wire brush.

Use caution with ceramic heat exchanger baffles. When installing retaining clip, be sure the center leg of the clip extends inward toward baffle. See Fig. 24.

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. 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.

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 throw-away filters in place of screens.

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. 25.

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.

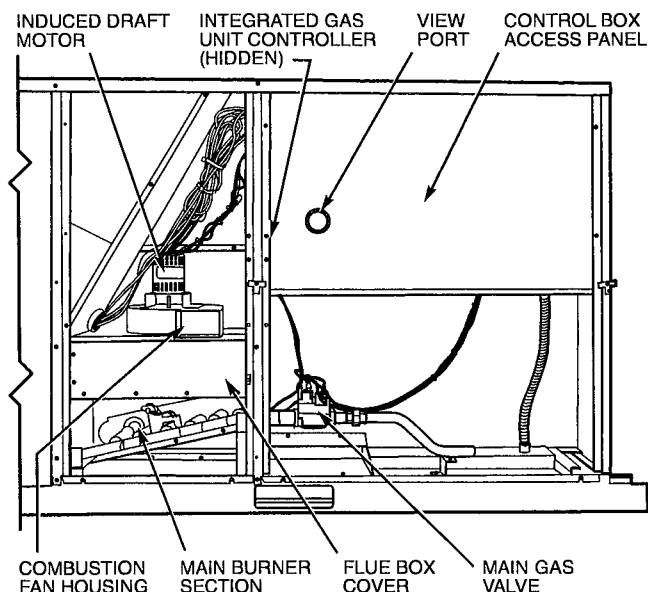
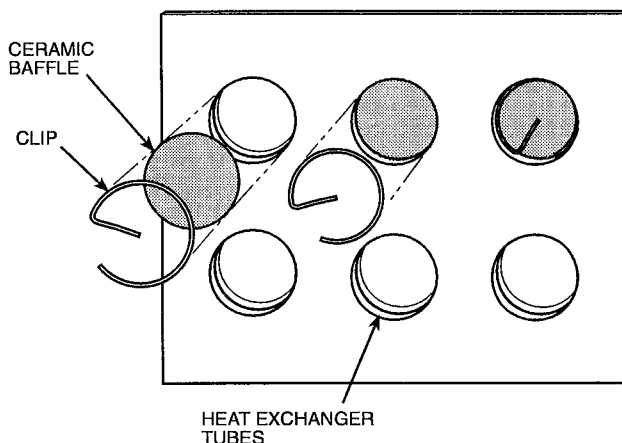


Fig. 23 — Typical Gas Heating Section



NOTE One baffle and clip will be in each upper tube of the heat exchanger

Fig. 24 — Removing Heat Exchanger Ceramic Baffles and Clips

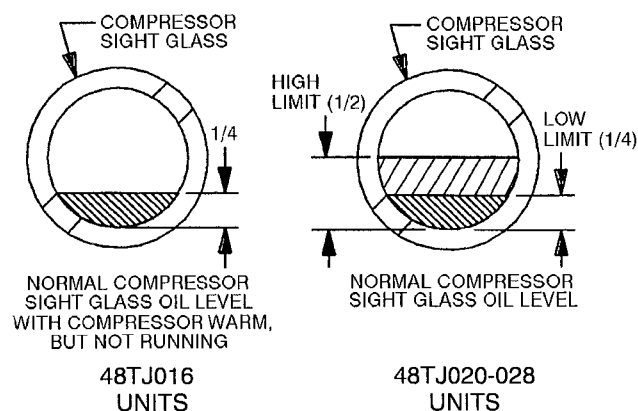


Fig. 25 — Compressor Sight Glass Oil Level

FAN SHAFT BEARINGS — For size 016 units, bearings are permanently lubricated. No field lubrication is required. For size 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. 26-28) — Fan motor pulleys are factory set for speed shown in Table 1.

To change fan speeds:

1. Shut off unit power supply.
2. a. Size 016 only: Loosen belt by loosening carriage nuts holding motor mount assembly to fan scroll side plates (A and B).
- b. Size 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. 26).
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. Replace and tighten belts (see Belt Tension Adjustment section on page 22).

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.

Evaporator Fan Service and Replacement

48TJ016 UNITS (See Fig. 27)

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

1. Remove filter and supply-air section panels.
2. Remove unit top panel.
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.

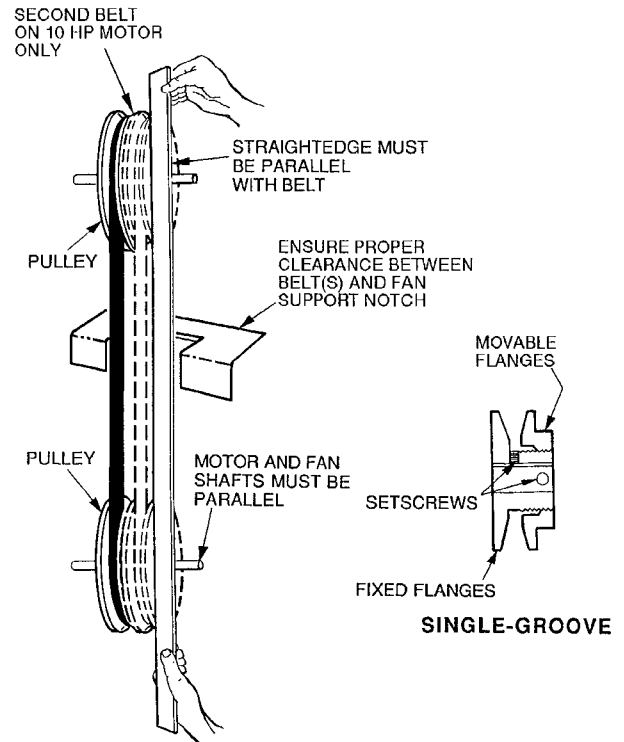


Fig. 26 — Evaporator-Fan Alignment and Adjustment

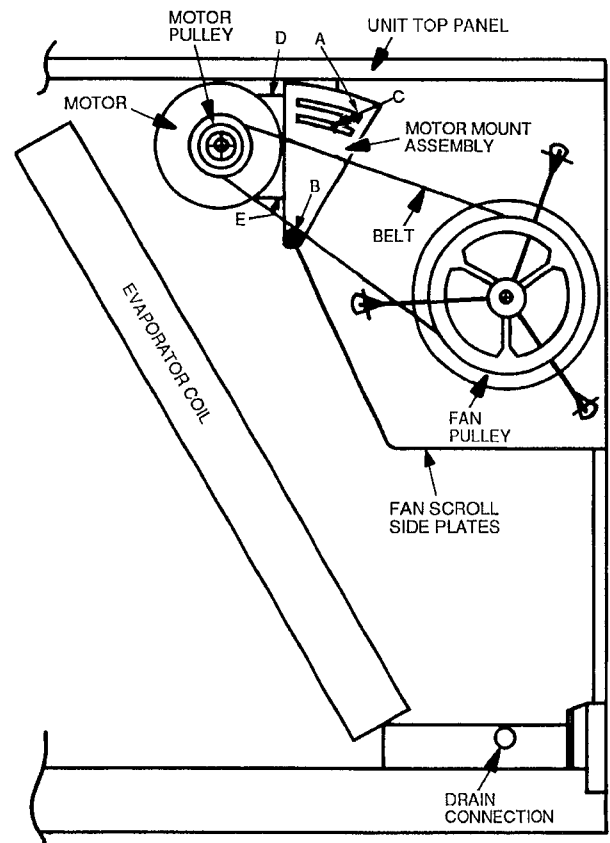


Fig. 27 — 48TJ016 Evaporator-Fan Motor Adjustment

48TJ020-028 UNITS (See Fig. 28) — 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 1-11.

Belt Tension Adjustment — To adjust belt tension:

1. Loosen fan motor bolts.
2. a. Size 016 Units:
Move motor mounting plate up or down for proper belt tension ($\frac{1}{2}$ in. deflection with one finger).
- b. Size 020-028 Units:
Turn motor jacking bolt to move motor mounting plate up or down for proper belt tension ($\frac{3}{8}$ in. deflection at midspan with one finger [9 lb force]).
3. Tighten nuts.
4. Adjust bolts and nut on mounting plate to secure motor in fixed position.

Condenser-Fan Adjustment

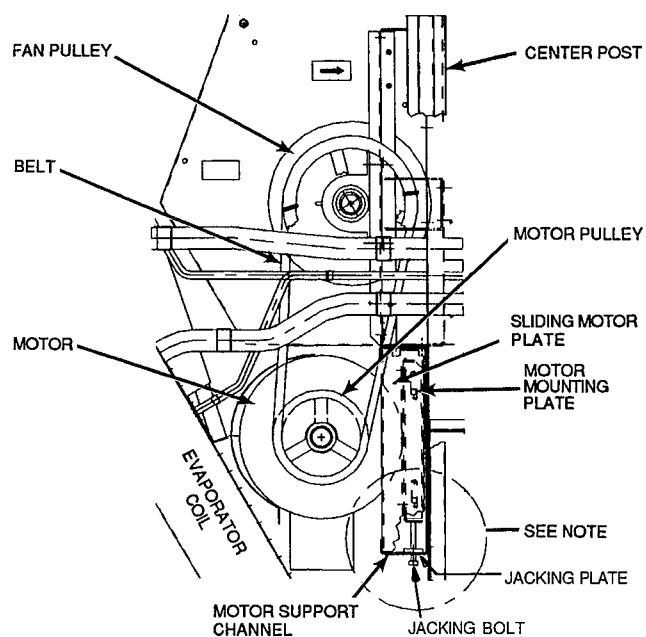
48TJ016,020 UNITS (Fig. 29)

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. 30)

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 — See Tables 13 and 14 for checkout and enthalpy simulation. Make certain the



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. 28 — 48TJ020-028 Evaporator-Fan Motor Section

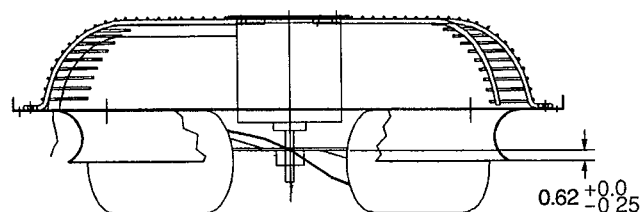


Fig. 29 — Condenser Fan Adjustment, 48TJ016,020

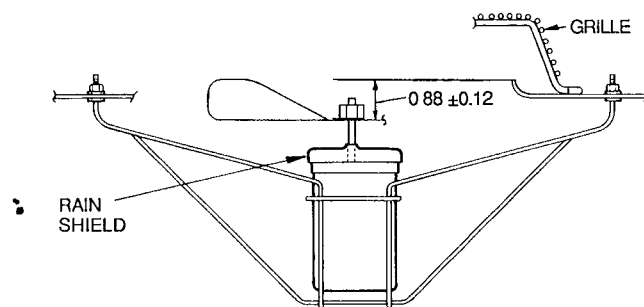


Fig. 30 — Condenser-Fan Adjustment, 48TJ024,028

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 damper position adjustment on the economizer motor control module. See Fig. 18.

Table 13 — Economizer Checkout Procedures

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

Table 14 — 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

- 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.
- Set the outdoor-air thermostat (OAT), located in the economizer section of the unit (see Fig. 17) to 75 F.
- 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.
- Jumper terminal T to terminal T1 on the module (see Fig. 18). The economizer will go to the full open position. The outdoor-air damper will go to the full open position, and the return-air damper will go to the full closed position.
- Adjust mechanical linkage, if necessary, for correct positioning. If may be necessary to remove the filters to adjust the linkage.

- 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.
- 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.*

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. 31-34), add refrigerant until conditions of the appropriate chart are met. Note that 48TJ020-028 charging charts are different from those normally used. All charts are based on charging units to correct superheat for various operating conditions. An accurate pressure gage and temperature sensing device are required for all units. 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, 48TJ016 UNITS — The TXV (thermostatic expansion valve) is set to maintain between 10 and 13° F superheat leaving the evaporator coil. It controls the flow of refrigerant to the evaporator coil. Take the outdoor ambient temperature, and read the suction pressure gage. Refer to Fig. 31 to determine correct discharge pressure. If discharge pressure is low, add refrigerant. If discharge pressure is high, carefully recover some of the charge. Recheck discharge pressure as charge is adjusted.

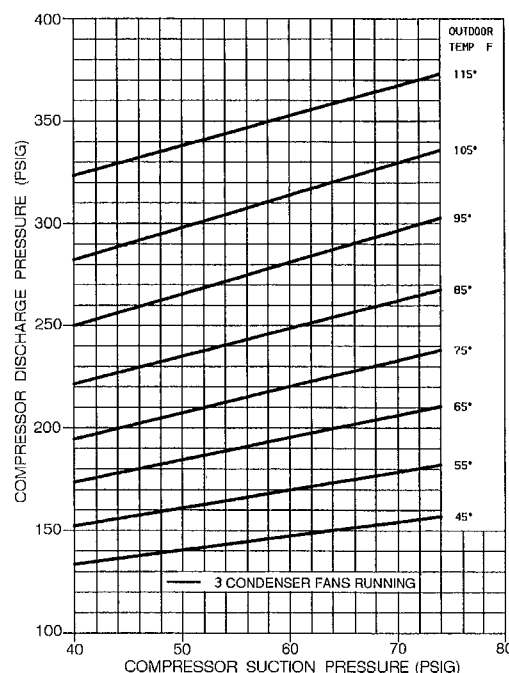


Fig. 31 — Cooling Charging Chart — 48TJ016 (with TXV)

TO USE COOLING CHARGING CHART, 48TJ020-028 UNITS — 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 recover some of the charge. Recheck suction pressure as charge is adjusted.

Example (Fig. 33)

Outdoor Temperature 85 F
 Suction Pressure 70 psig
 Suction Temperature (should be) 60 F
 (Suction temperature may vary ± 5 F)

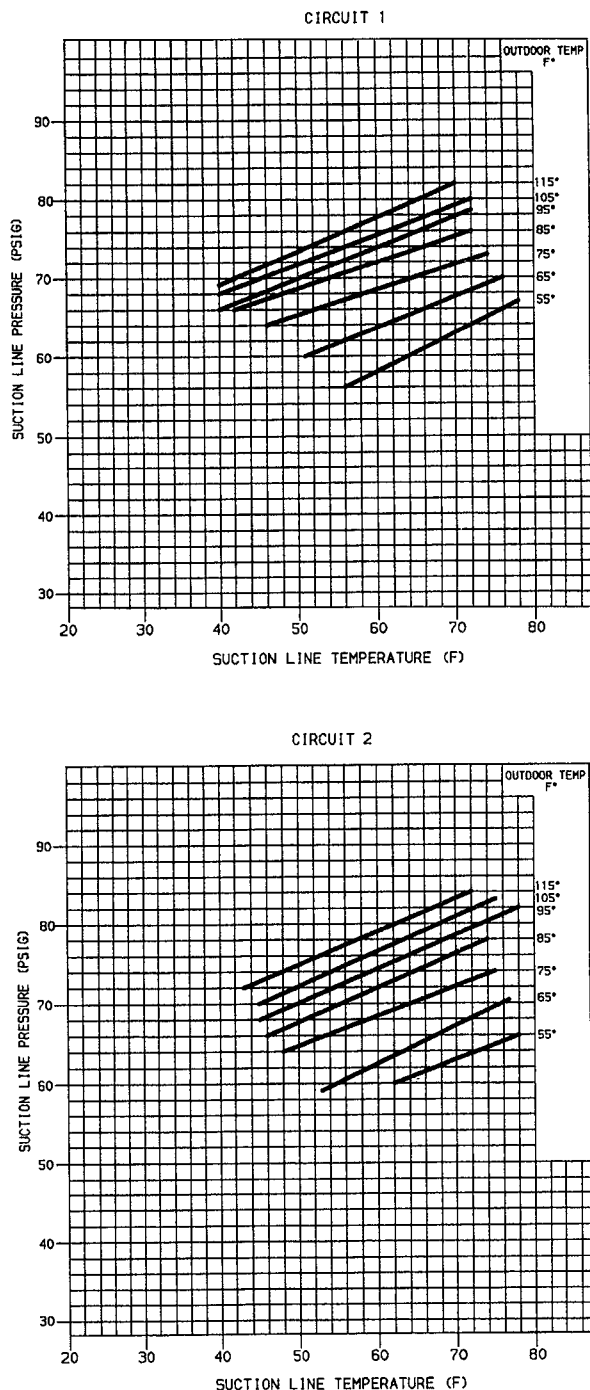


Fig. 32 — Cooling Charging Chart — 48TJ020

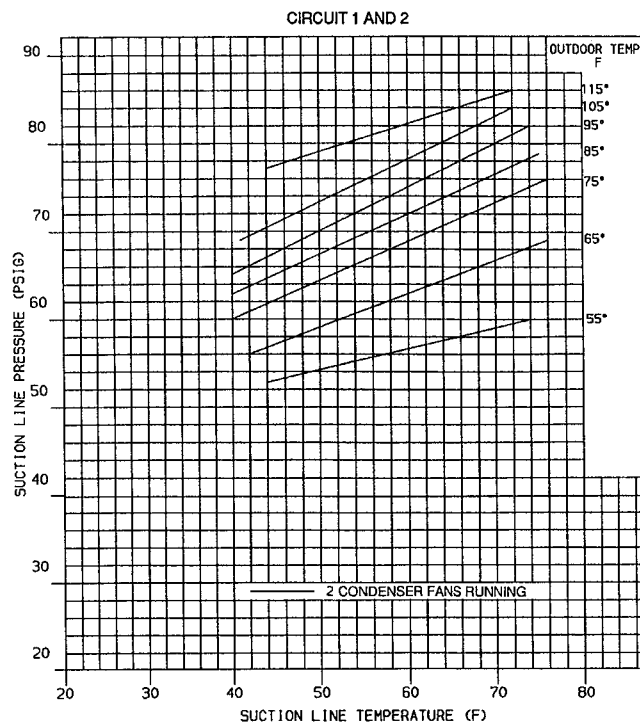


Fig. 33 — Cooling Charging Chart — 48TJ024

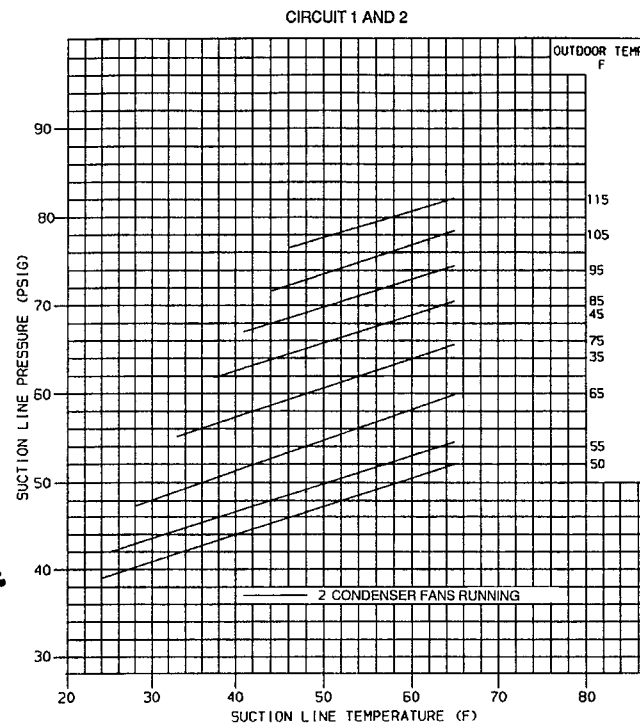


Fig. 34 — Cooling Charging Chart — 48TJ028

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 D1 and C2, the main valve opens to its preset position.

The regular factory setting is stamped on the valve body (3.3 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. 35).
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 all applications, main burners are factory set and should require no adjustment.

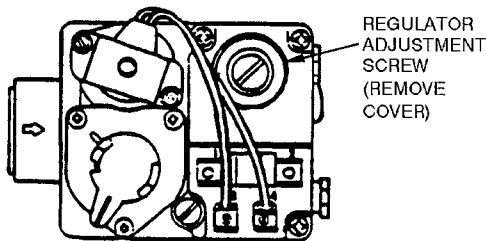


Fig. 35 — Gas Valve

MAIN BURNER REMOVAL

1. Shut off (field-supplied) manual main gas valve.
2. Shut off power to unit.
3. Remove unit control box access panel, burner section access panel, and center post (Fig. 4 and 5).
4. Disconnect gas piping from gas valve inlet.
5. Remove wires from gas valve.
6. Remove wires from rollout switch.
7. Remove sensor wire and ignitor cable from IGC board.
8. Remove 2 screws securing manifold bracket to basepan.
9. Remove 2 screws that hold the burner support plate flange to the vestibule plate.
10. Lift 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-pressure, 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.

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.

Diagnostic LEDs — The IGC control board has a LED for diagnostic purposes. The IGC error codes are shown in Table 12.

LEGEND

Fig. 36 — Typical Wiring Schematic and Fig. 37 — Typical Component Arrangement

BKR W/AT — Breaks with Amp Turns
BR — Burner Relay
C — Contactor, Compressor
CAP — Capacitor
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
EC — Enthalpy Control
EQUIP — Equipment
FPT — Freeze Protection Thermostat
FU — Fuse
GND — Ground
GVR — Gas Valve Relay
HPS — High-Pressure Switch
HS — Hall Effect Sensor
HV — High Voltage

IDM — Induced-Draft Motor
IFC — Indoor (Evaporator) Fan Contactor
IFCB — Indoor (Evaporator) Fan Circuit Breaker
IFM — Indoor (Evaporator) Fan Motor
IGC — Integrated Gas Unit Controller
IP — Internal Protector
L — Light
LED — Light-Emitting Diode
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
PL — Plug Assembly
R — Relay
RS — Rollout Switch
SN — Sensor
SW — Switch
TB — Terminal Block

TDR — Time Delay Relay
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:

- 1 Compressor and fan motors thermally protected; 3-phase motors protected against primary single-phasing conditions
- 2 If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent
- 3 Jumpers are omitted when unit is equipped with economizer
- 4 IFCB must trip amps is equal to or less than 140% full load amps, and CB1 and CB2 (156%).
- 5 On 208/230-v unit, TRAN1 is factory wired to ORN lead for 230-v power supply. If unit is to run on 208-v power supply, TRAN1 must

be rewired. Disconnect the BLK wire on TRAN1 and connect wire to 208-v RED wire. Insulate 230-v ORN wire

- 6 The CLO locks out the compressor to prevent short cycling on compressor overload and safety devices. Before replacing CLO, check these devices.
- 7 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

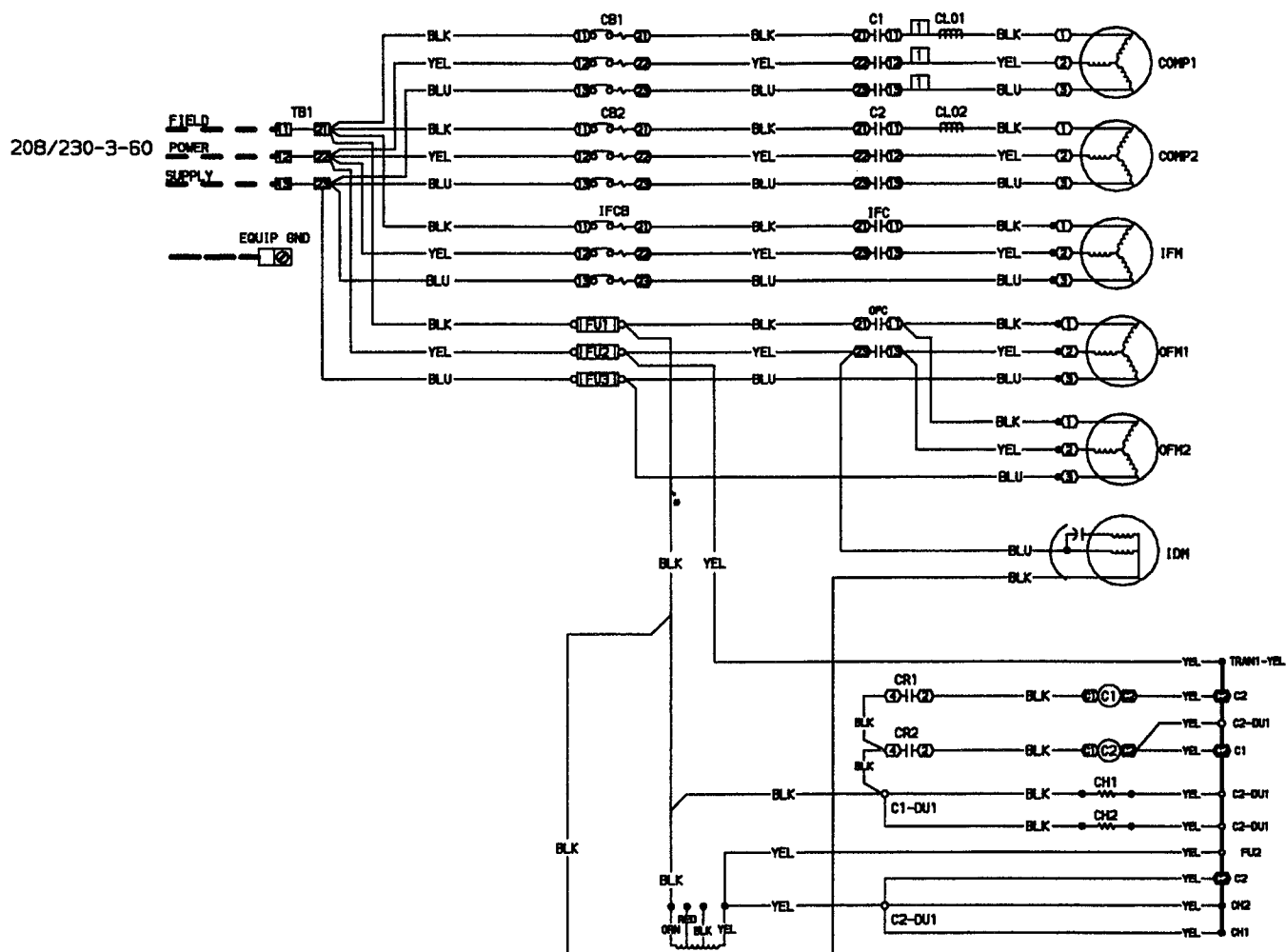


Fig. 36 — Typical Wiring Schematic (48TJD/F024 and 028, 208/230-v Shown)





TROUBLESHOOTING

Refer to Fig. 38 for IGC troubleshooting information.

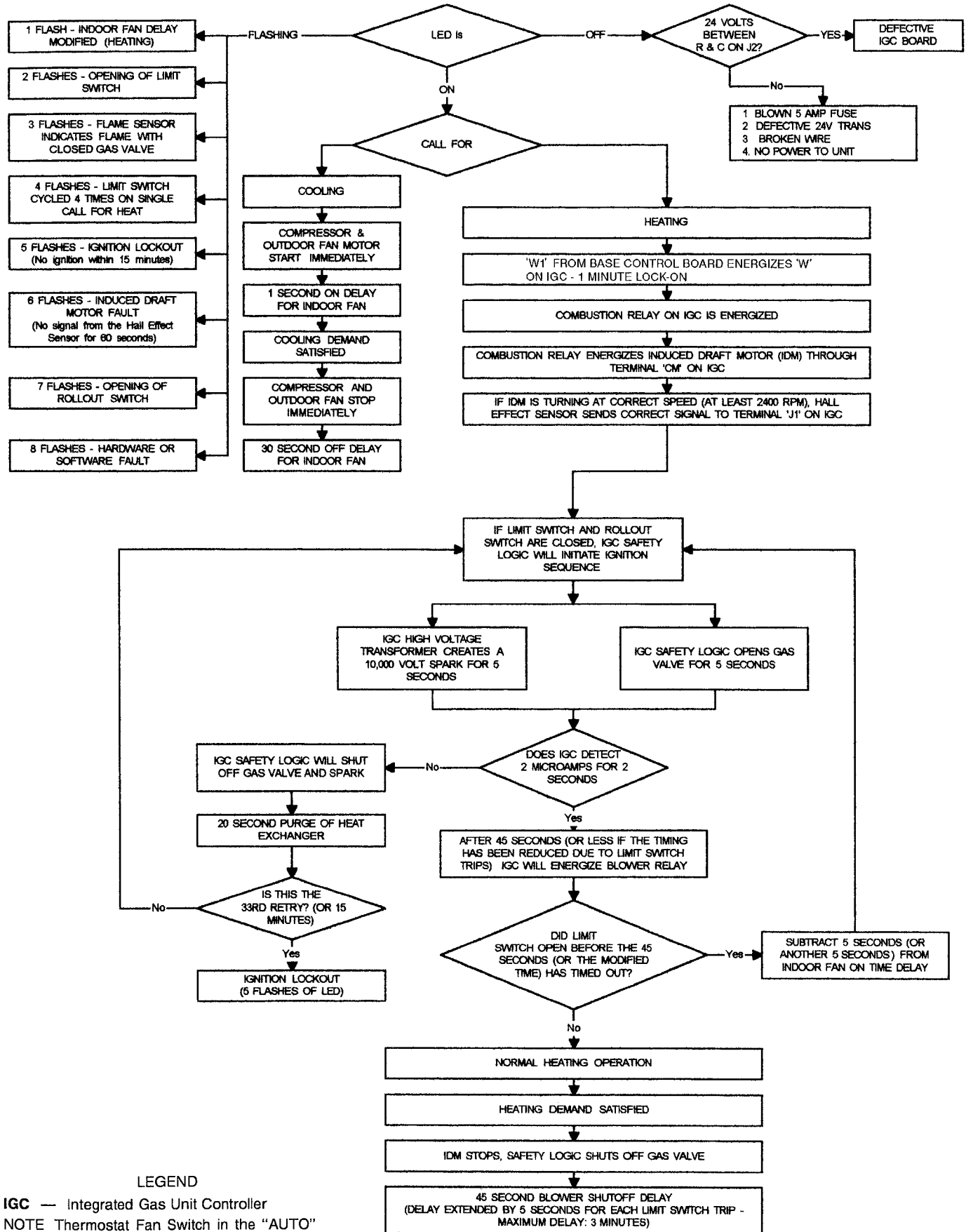


Fig. 38 — IGC Control (Heating and Cooling)

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
- ☐ VERIFY INSTALLATION OF INDOOR FAN MOTOR ADJUSTMENT BOLT AND PLATE (48TJ020-028 ONLY)
- ☐ LOOSEN ALL SHIPPING HOLDDOWN BOLTS (COMPRESSOR) AND BRACKETS PER INSTRUCTIONS
- ☐ OPEN ALL SERVICE VALVES (SUCTION, DISCHARGE, AND LIQUID)
- ☐ 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 _____
(SIZES 020-028 ONLY)

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
(SIZES 020-028 ONLY)

REFRIGERANT DISCHARGE CIRCUIT NO. 1 _____ PSIG

CIRCUIT NO. 2 _____ PSIG
(SIZES 020-028 ONLY)

- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS ON PAGES 23 AND 24

GENERAL

- ☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS