Installation, Start-Up and Service Instructions

CONTENTS

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).

IMPORTANT: Units have high ambient operating limits. If limits are exceeded, the units will automatically lock the compressor out of operation. Manual reset will be required to restart the compressor.

INSTALLATION

Step 1 — Provide Unit Support

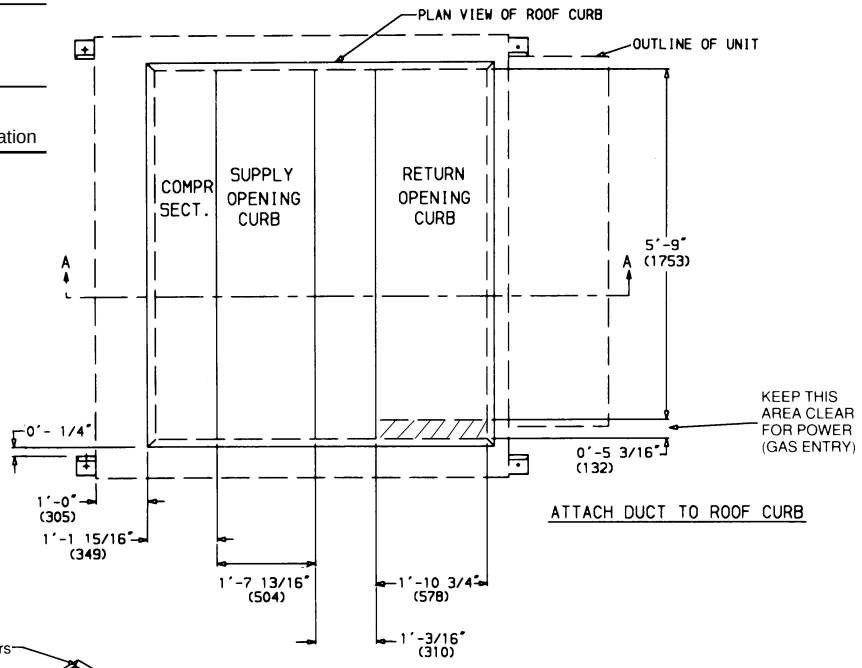
ROOF CURB — Assemble or install accessory roof curb or horizontal adapter roof curb in accordance with instructions shipped with this accessory. See Fig. 1 and 2. Install insulation, cant strips, roofing, and counter flashing as shown. Ductwork can be installed to roof curb or horizontal adapter before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

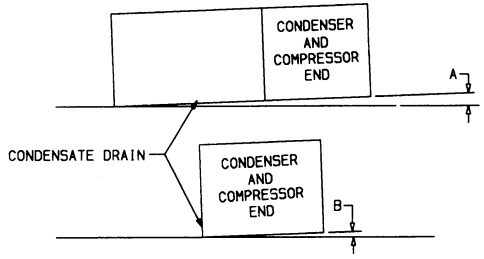
Instructions continued on page 3.

PKG. NO. REF.	CURB HEIGHT	DESCRIPTION
50PQ900221	1′-2″ (305)	Standard Curb 14″ High
50PQ900141	2′-0″ (610)	Standard Curb for Units Requiring High Installation
50PQ900151	2′-0″ (610)	Side Supply and Return Kit for High Installation

NOTES:
1. Roof curb accessory is shipped disassembled.
2. Insulated panels: ½″ thick neoprene coated 2 lb density.
3. Dimensions in ( ) are in millimeters.
4. ➡ Direction of airflow.
5. Roof curb: 16 ga. (VA03-56) stl.

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

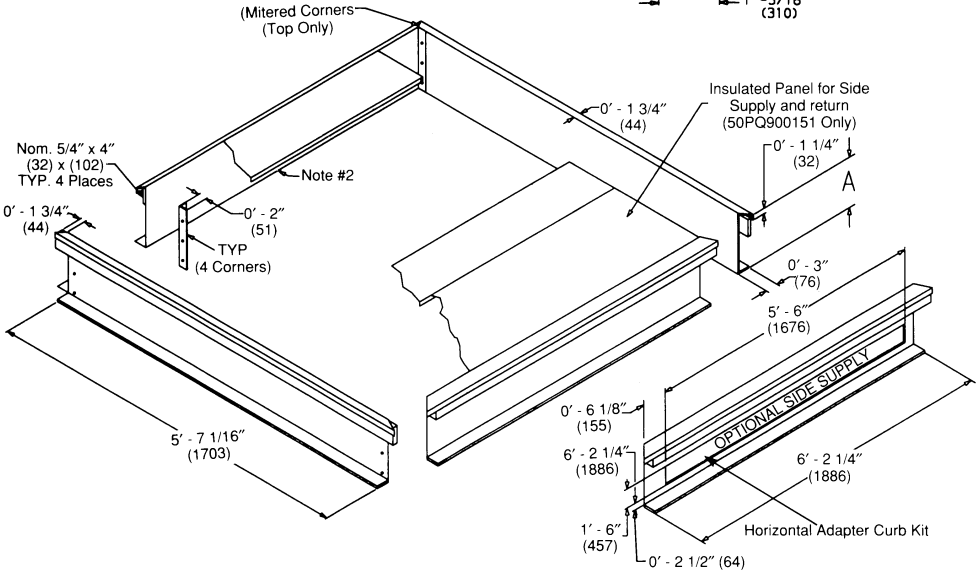


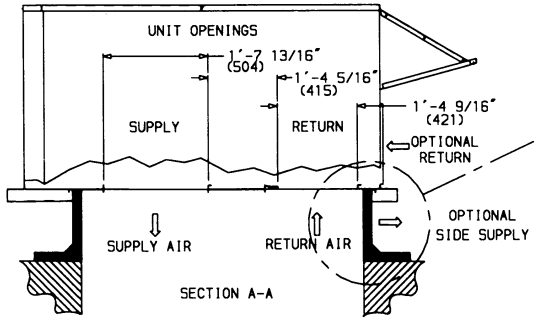


UNIT LEVELING TOLERANCES*
Dimensions (degrees and inches)

UNIT	A		B	
	DEG.	IN.	DEG.	IN.
48TJ	.28	.45	.28	.43

*From edge of unit to horizontal.





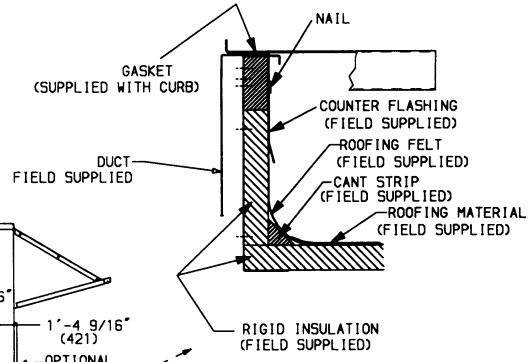
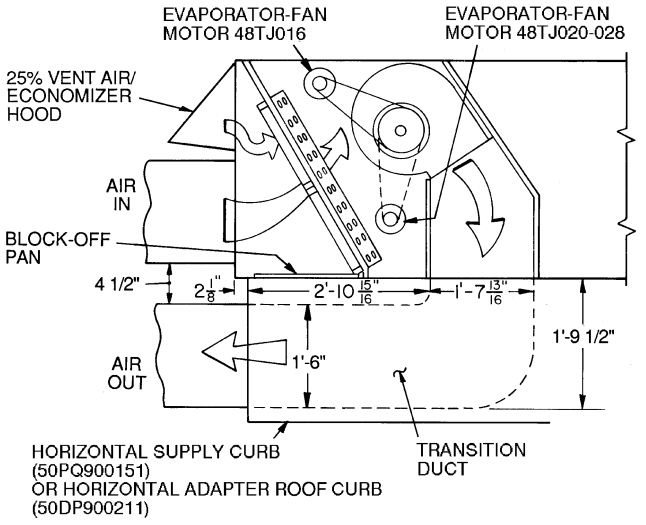


Fig. 1 — Roof Curb Details



NOTE: For preassembled horizontal adapter roof curb 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 Adapter Roof Curbs and Roof Curbs

IMPORTANT: The gasketing of the unit to the roof curb or adapter roof curb 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.

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 ± 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.

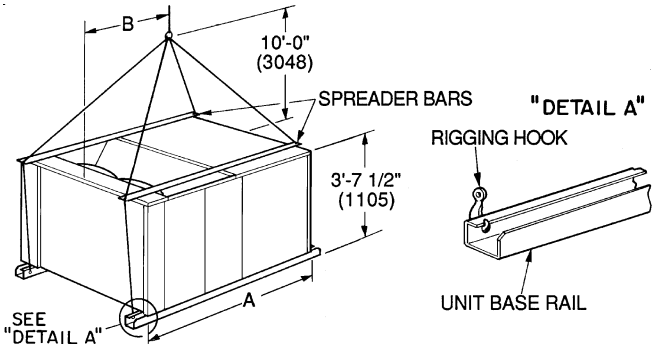
Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air. For proper unit operation, adequate combustion and ventilation air must be provided in accordance with Section 5.3 (Air for Combustion and Ventilation) of the National Fuel 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 Fig. 4 and 5 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.
5. Weights do not include optional economizer. See Fig. 4 and 5 for economizer weight.
6. Weights given are for aluminum evaporator and condenser coil plate fins.

⚠ 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	1775	805	6-11½	2121	4-0	1219
020	1875	850	6-11½	2121	3-2	964
024	1985	900	6-11½	2121	3-4	1016
028	2135	968	6-11½	2121	3-4	1016

Fig. 3 — Rigging Details

UNIT	STD UNIT WEIGHT		ECONOMIZER WEIGHT		CORNER A		CORNER B		CORNER C		CORNER D		DIM A		DIM B		DIM C	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	ft-in.	mm	ft-in.	mm	ft-in.	mm
48TJD, TJF016	1700	771	110	50	411	186	381	173	438	199	471	213	3-3	991	3-5	1041	1-10	559
48TJD, TJF020	1800	816	110	50	422	192	397	180	452	205	503	228	3-2	965	3-6	1067	1-8	508

NOTES:
1. Refer to print for roof curb accessory dimensions.
2. Dimensions in ( ) are in millimeters.
3. Center of Gravity.
4. Direction of airflow.
5. Ductwork to be attached to accessory roof curb only.
6. 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.
7. With the exception of clearance for the condenser coil and the damper/power exhaust as stated in Note #6, a removable fence or barricade requires no clearance.
8. Dimensions are from outside of corner post. Allow 0′-5/16″ (8) on each side for top cover drip edge.
9. See drawing 50TJ500352 for service option details.

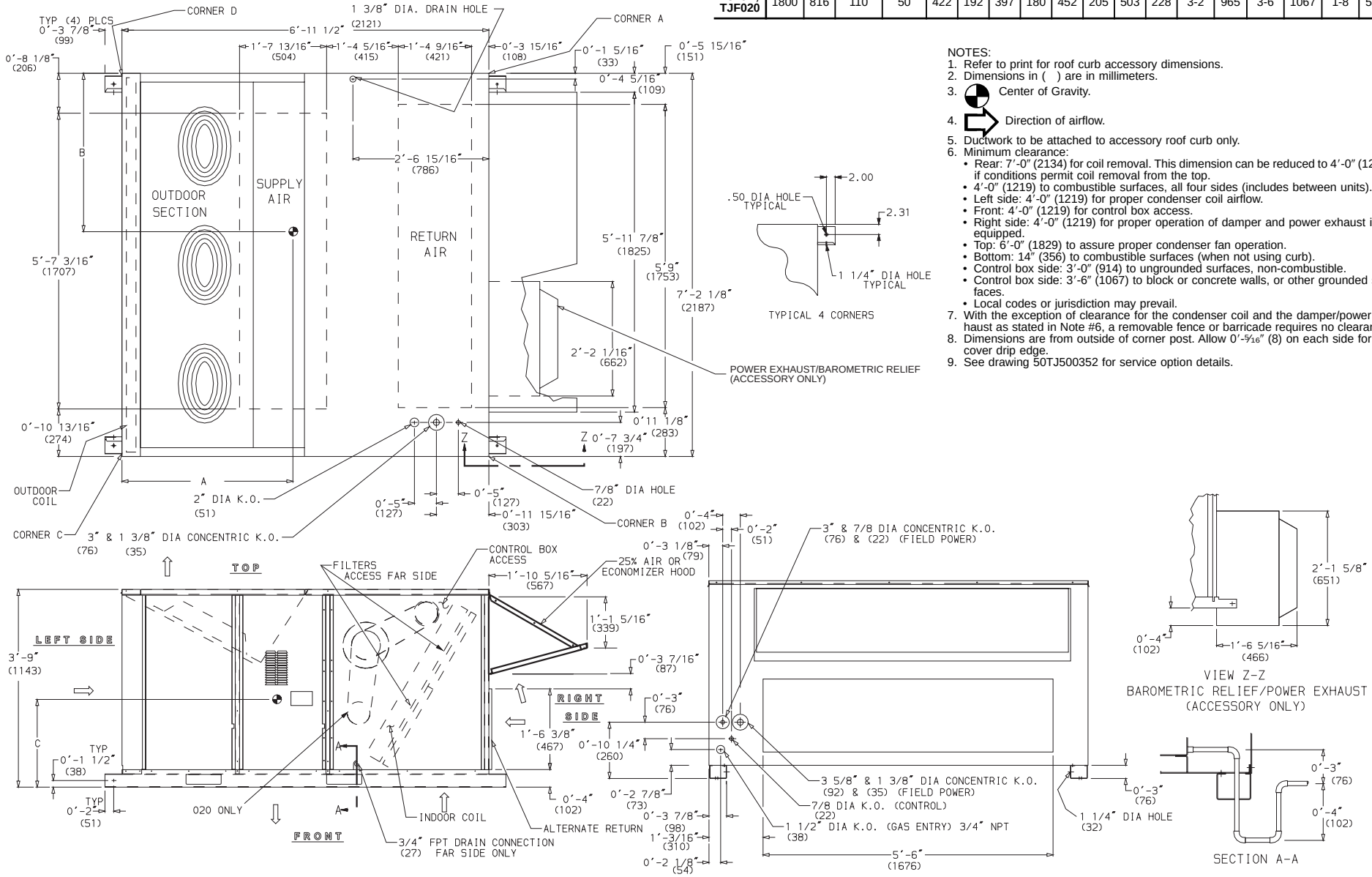
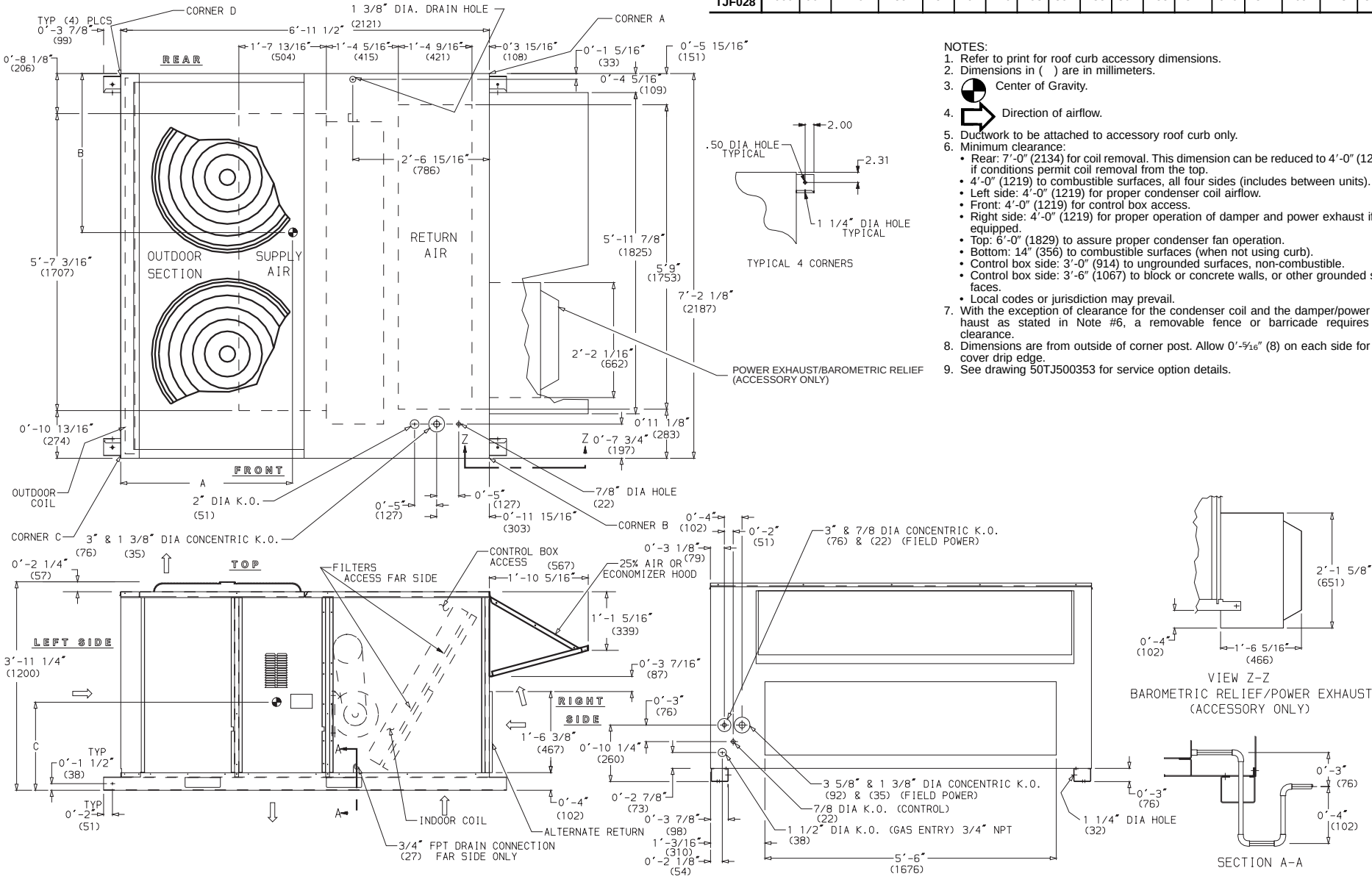


Fig. 4 — Base Unit Dimensions; 48TJ016,020

UNIT	STD UNIT WEIGHT		ECONOMIZER WEIGHT		CORNER A		CORNER B		CORNER C		CORNER D		DIM A		DIM B		DIM C	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	ft-in.	mm	ft-in.	mm	ft-in.	mm
48TJD, TJF024	1850	839	110	50	441	200	408	185	474	215	526	239	3-2	965	3-5	1041	1-8	508
48TJD, TJF028	2000	907	110	50	451	204	426	193	562	255	562	255	3-1	940	3-7	1092	1-8	508



NOTES:
1. Refer to print for roof curb accessory dimensions.
2. Dimensions in ( ) are in millimeters.
3. Center of Gravity.
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5. Ductwork to be attached to accessory roof curb only.
6. 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.
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   - 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.
7. With the exception of clearance for the condenser coil and the damper/power exhaust as stated in Note #6, a removable fence or barricade requires no clearance.
8. Dimensions are from outside of corner post. Allow 0′-5/16″ (8) on each side for top cover drip edge.
9. See drawing 50TJ500353 for service option details.

Fig. 4 — Base Unit Dimensions; 48TJ024,028

Table 1 — Physical Data

UNIT 48TJ		016D/F		020D/F	024D/F	028D/F
		208/230, 460 v	575 v			
NOMINAL CAPACITY (tons)		15		18	20	25
OPERATING WEIGHT		1700		1800	1850	2000
COMPRESSOR/MANUFACTURER		Scroll, Copeland				
Quantity ... Model (Ckt 1 , Ckt 2)		2...ZR94KC		1...ZR108KC, 1...ZR94KC	1...ZR125KC, 1...ZR108KC	1...ZR16M3, 1...ZR125KC
Number of Refrigerant Circuits		2		2	2	2
Oil (oz) (Ckt 1 , Ckt 2)		81, 81		106,81	106, 106	136, 106
REFRIGERANT TYPE		R-22				
Expansion Device		TXV				
Operating Charge (lb-oz)						
Circuit 1 *		10-10		15-5	16-0	20-13
Circuit 2		10-10		12-3	13-6	13- 0
CONDENSER COIL		Cross-Hatched 3/8-in. Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins				
Rows...Fins/in.		2...17		3...15	3...15	4...15
Total Face Area (sq ft)		21.7		21.7	21.7	21.7
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		Cross-Hatched 3/8-in. Copper Tubes, Aluminum Lanced or Copper Plate Fins, Face Split				
Rows...Fins/in.		2...17		3...15	3...15	4...15
Total Face Area (sq ft)		17.5		17.5	17.5	17.5
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	7.5	10
Motor Nominal Rpm		1725	1725	1745	1745	1740
Maximum Continuous Bhp		4.25	3.45	5.90	8.7 [208/230, 575 v] 9.5 [460 v]	10.2 [208/230, 575 v] 11.8 [460 v]
Motor Frame Size		56H	56H	184T	213T	215T
Nominal Rpm High/Low		—	—	—	—	—
Fan Rpm Range	Low-Medium Static	891-1179	1159-1429	910-1095	1002-1225	1066-1283
	High Static	1227-1550	—	1069-1287	1193-1458	1332-1550
Motor Bearing Type		Ball	Ball	Ball	Ball	Ball
Maximum Allowable Rpm		1550	1550	1550	1550	1550
Motor Pulley Pitch Diameter Min/Max (in.)	Low-Medium Static	3.1/4.1	4.3/5.3	4.9/5.9	5.4/6.6	4.9/5.9
	High Static	3.7/4.7	—	4.9/5.9	5.4/6.6	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.)	Low-Medium Static	6.0	6.4	9.4	9.4	8.0
	High Static	5.2	—	8.0	7.9	6.4
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.)	Low-Medium Static	1...BX...42	1...BX...45	1...BX...50	1...BX...53	2...BX...50
	High Static	1...BX...42	—	1...BX...48	1...BX...50	2...BX...47
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)	Low-Medium Static	48	44	37	37	36
	High Static	55	—	34	44	45
Movable Pulley Maximum Full Turns From Closed Position		5	5	5	5	5
Factory Speed		3.5	3.5	3.5	3.5	3.5
Factory Speed Setting (rpm)	Low-Medium Static	1035	1296	1002	1120	1182
	High Static	1389	—	1178	1328	1470
Fan Shaft Diameter at Pulley (in.)		1 3/16	1 3/16	1 7/16	1 7/16	1 7/16

LEGEND

Bhp — Brake Horsepower
TXV — Thermostatic Expansion Valve

*Circuit 1 uses the lower portion of the condenser coil and lower portion of the evaporator coils; and Circuit 2 uses 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 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.

Table 1 — Physical Data (cont)

UNIT 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		0.1285...30/0.136...29	0.1285...30/0.136...29	0.1285...30/0.136...29	0.1285...30/0.136...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	**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
Gas Valve Pressure Range					
in. wg		5.5-13.5	5.5-13.5	5.5-13.5	5.5-13.5
psig		0.235-0.487	0.235-0.487	0.235-0.487	0.235-0.487
Field Gas Connection Size (in.-FPT)		¾	¾	¾	¾
HIGH-PRESSURE SWITCH (psig)					
Cutout		426			
Reset (Auto)		320			
LOW-PRESSURE SWITCH (psig)					
Cutout		27			
Reset (Auto)		44			
FREEZE PROTECTION THERMOSTAT (F)					
Opens		30 ± 5			
Closes		45 ± 5			
OUTDOOR-AIR INLET SCREENS		Cleanable			
Quantity...Size (in.)		2...20 X 25 X 1 1...20 X 20 X 1			
RETURN-AIR FILTERS		Throwaway**			
Quantity...Size (in.)		4...20 x 20 x 2 4...16 x 20 x 2			
POWER EXHAUST		½ Hp, 208/230-460 v Motor Direct Drive, Propeller-Fan (Factory-Wired for 460 v)			

LEGEND

Bhp — Brake Horsepower
TXV — Thermostatic Expansion Valve

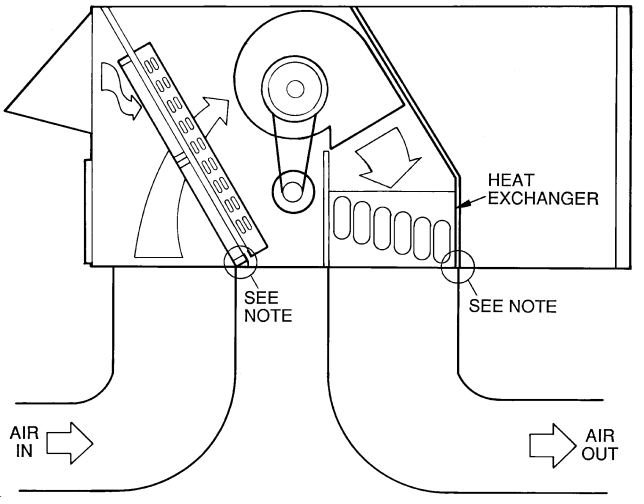
*Circuit 1 uses the lower portion of the condenser coil and lower portion of the evaporator coils; and Circuit 2 uses the upper portion of both coils.
†Rollout switch is manual reset.
**The 48TJ028 unit requires 2-in. industrial-grade filters capable of handling face velocities up to 625 ft/min (such 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.

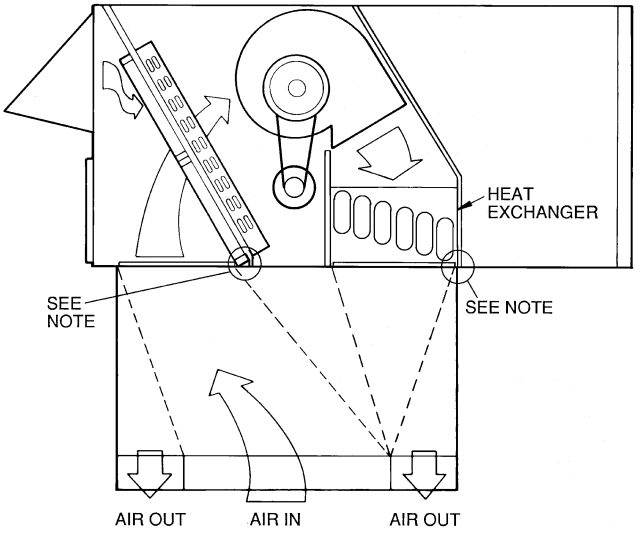
Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

Step 4 — Make Unit Duct Connections — Unit is shipped for 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.



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

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



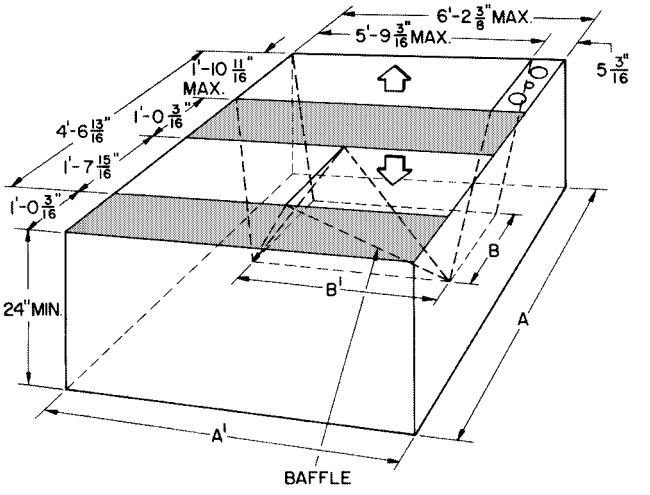
NOTE: Do not drill in this area; damage to basepan may result in water leak.

Fig. 7 — Concentric Duct Air Distribution

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.

Step 6 — Trap Condensate Drain — See Fig. 11 for drain location. One ¾-in. half coupling is provided inside unit evaporator section for condensate drain connection. An 8½ in. x ¾-in. diameter and 2-in. x ¾-in. diameter pipe nipple, coupled to standard ¾-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.



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

Shaded areas indicate block-off pans.

Fig. 8 — Concentric Duct Details

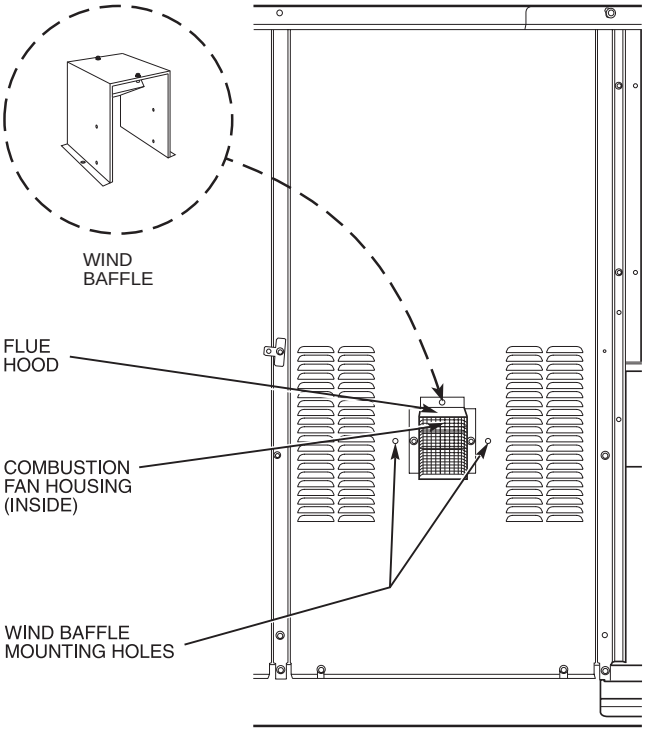


Fig. 9 — Flue Hood Location

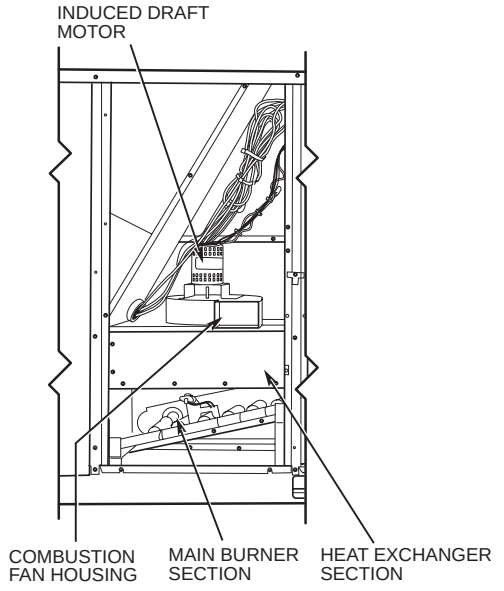


Fig. 10 — Combustion Fan Housing Location

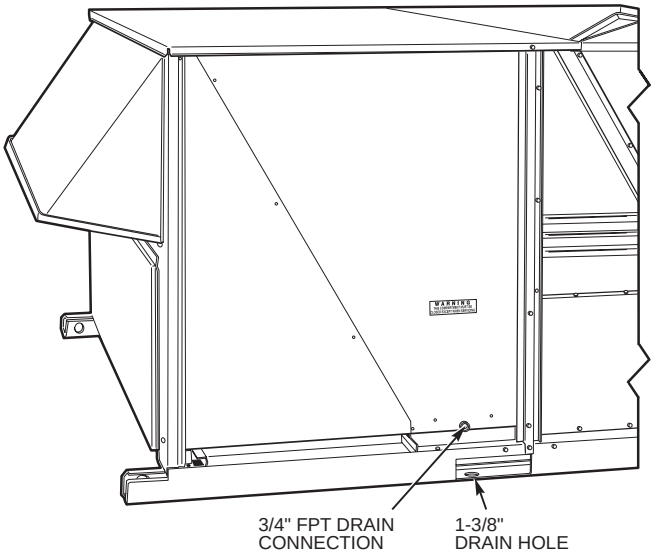


Fig. 11 — Condensate Drain Details (48TJ016 Shown)

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 field-supplied manual gas shutoff valve with a ⅛-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.

IMPORTANT: 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.

⚠ CAUTION

The correct power phasing is critical in the operation of the scroll compressors. An incorrect phasing will cause the compressor to rotate in the wrong direction. This may lead to premature compressor failure.

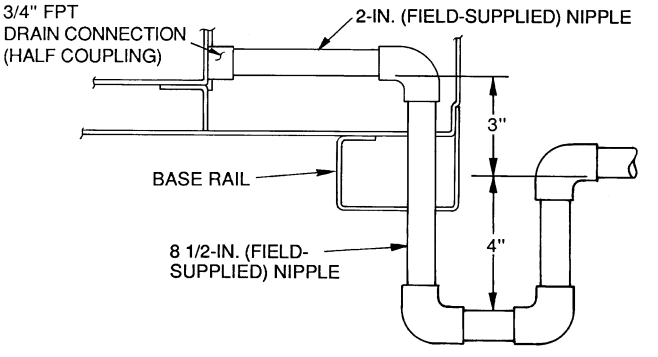


Fig. 12 — Condensate Drain Piping Details

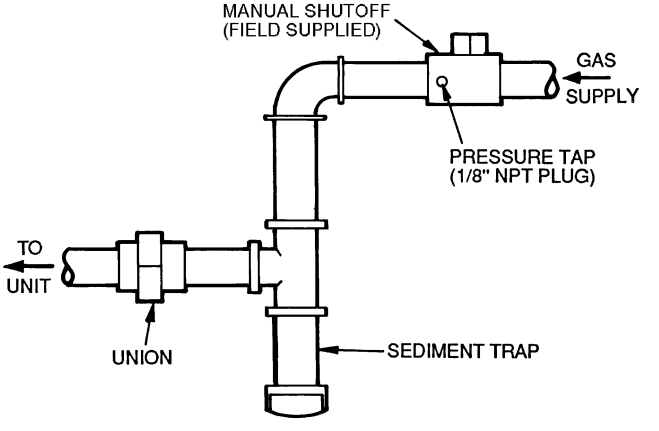


Fig. 13 — Field Gas Piping

⚠ 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.

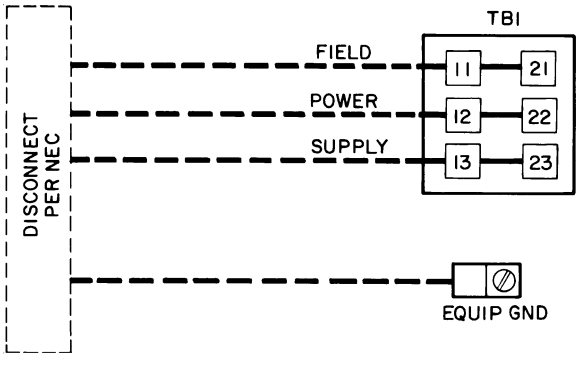
Operating voltage to compressor must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2%.

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 Gage) insulated wire (35 C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 ft, use no. 14 AWG insulated wire (35 C Minimum).



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.*

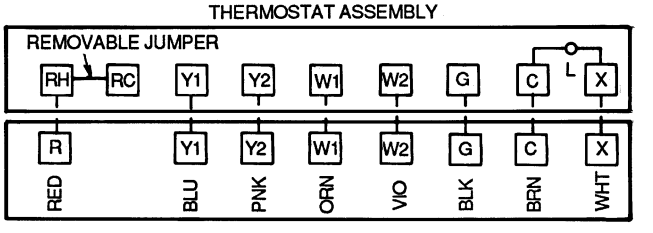


Fig. 15 — Field Control Thermostat Wiring

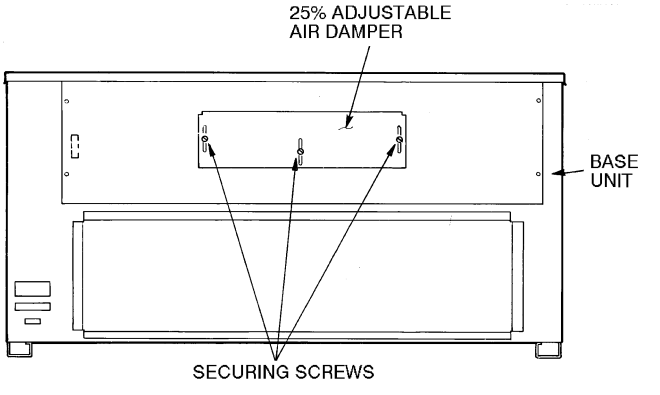


Fig. 16 — 25% Outdoor-Air Section Details

Table 2 — Electrical Data

UNIT 48TJ	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP*
016 (15 Tons)	208/230	187	253	28.8	195	28.8	195	3	0.5	1.7	3.7	10.5/11.0	—	—	0.57	81/81	100/100
													4.6	18.8	0.57	85/86	110/110
	460	414	508	14.7	95	14.7	95	3	0.5	0.8	3.7	4.8	—	—	0.30	40	50
													2.3	6.0	0.30	43	50
	575	518	633	10.8	80	10.8	80	3	0.5	0.8	3.0	3.9	—	—	0.57	30	40
													2.1	4.8	0.57	32	40
020 (18 Tons)	208/230	187	253	30.1	225	28.8	195	3	0.5	1.7	5.0	15.8/15.8	—	—	0.57	87/87	110/110
													4.6	18.8	0.57	92/92	110/110
	460	414	508	15.5	114	14.7	95	3	0.5	0.8	5.0	7.9	—	—	0.30	44	50
													2.3	6.0	0.30	47	60
	575	518	633	12.1	80	10.8	80	3	0.5	0.8	5.0	6.0	—	—	0.57	34	40
													2.1	4.8	0.57	36	40
024 (20 Tons)	208/230	187	253	37.8	239	30.1	225	2	1	6.6	7.5	25.0/25.0	—	—	0.57	116/116	150/150
													4.6	18.8	0.57	120/120	150/150
	460	414	508	17.2	125	15.5	114	2	1	3.3	7.5	13.0	—	—	0.30	57	70
													2.3	6.0	0.30	59	70
	575	518	633	12.4	80	12.1	80	2	1	3.4	7.5	10.0	—	—	0.57	44	50
													2.1	4.8	0.57	46	50
028 (25 Tons)	208/230	187	253	41.0	350	37.8	239	2	1	6.6	10.0	28.0/28.0	—	—	0.57	130/130	150/150
													4.6	18.8	0.57	135/135	175/175
	460	414	508	21.8	158	17.2	125	2	1	3.3	10.0	14.6	—	—	0.30	66	80
													2.3	6.0	0.30	68	80
	575	518	633	17.3	125	12.4	80	2	1	3.4	10.0	13.0	—	—	0.57	54	70
													2.1	4.8	0.57	56	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
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

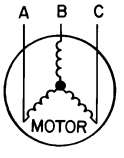
*Fuse or HACR circuit breaker.

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

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

$$= \frac{1371}{3}$$

$$= 457$$

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.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457}$$

$$= 1.53\%$$

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.

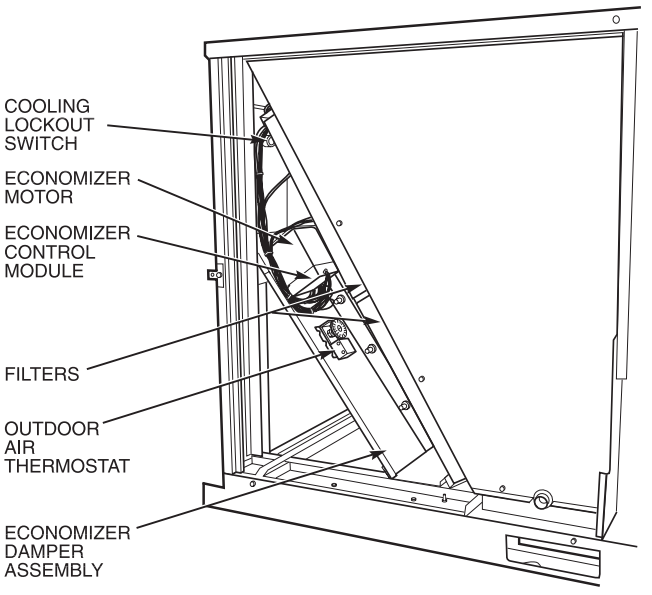


Fig. 17 — Economizer Damper Assembly-End View

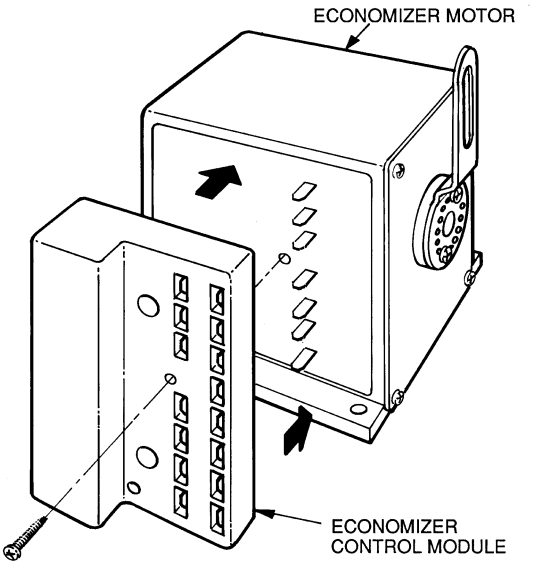
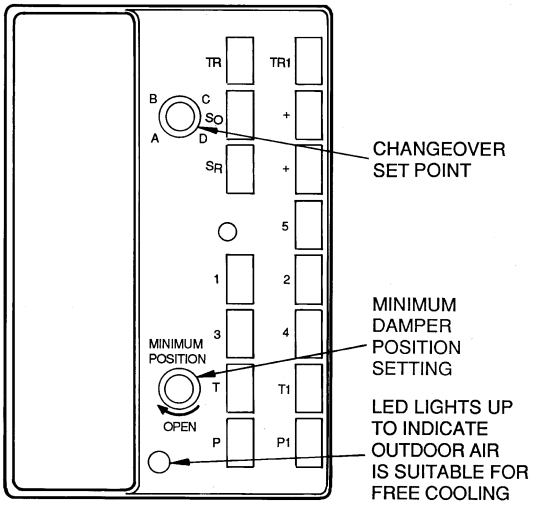


Fig. 19 — Economizer Motor Control Module Location



LEGEND

LED — Light-Emnitting Diode

Fig. 18 — Economizer Motor Control Module (Part Number W7459A)

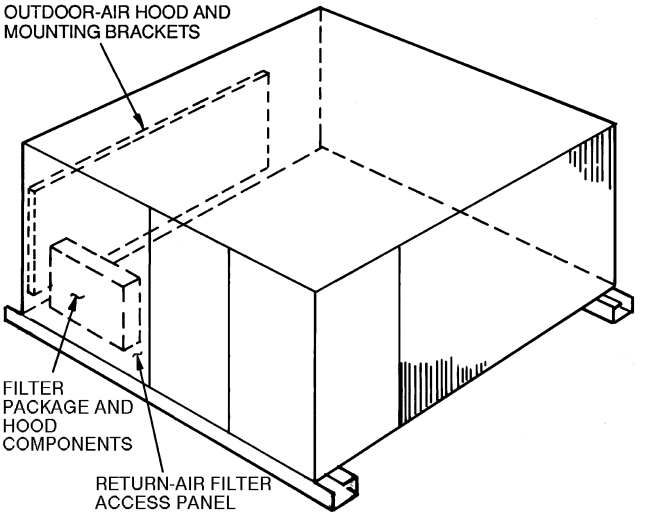


Fig. 20 — Outdoor-Air Hood Component Location

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).

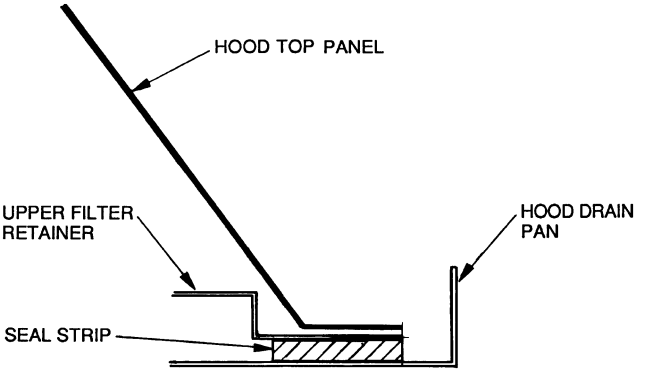


Fig. 21 — Seal Strip Location

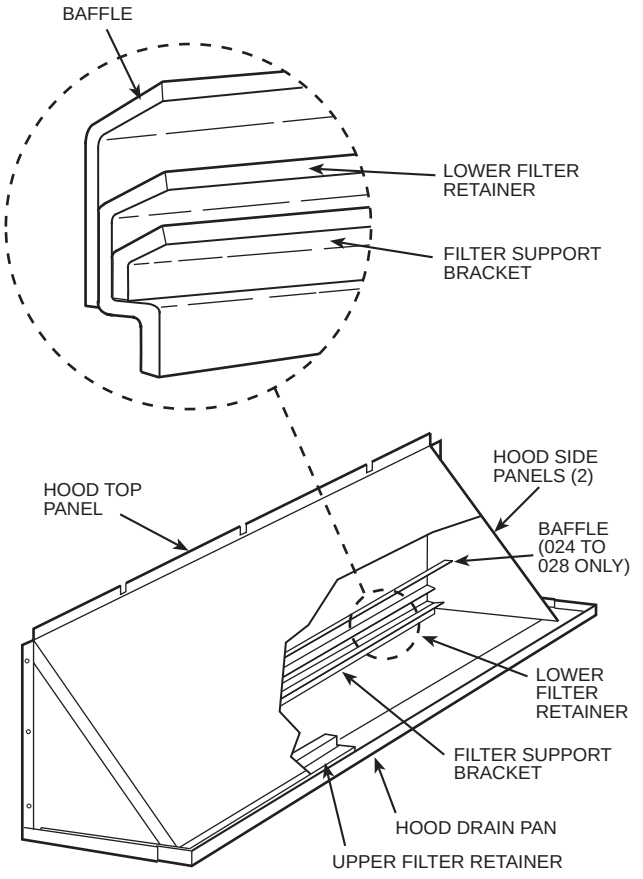


Fig. 22 — Outdoor-Air Hood Details

3. Secure lower filter retainer and support bracket to unit. See Fig. 22. Leave screws loose on 024 and 028 units.
4. Slide baffle (sizes 024 and 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.

ENTHALPY CONTROL INSTALLATION

NOTE: The accessory outdoor-air enthalpy sensor must be installed BEFORE the economizer hoods are installed on the unit or hoods will have to be removed.

1. Remove and discard the factory-installed jumper assembly containing the 800-ohm resistor on the economizer control module (between terminals S_R and +). See Fig. 18.
2. Remove black wire assembly containing the 620-ohm resistor from between economizer control module terminal S_O and the outdoor-air thermostat (OAT). Place this wire assembly (containing the 620-ohm resistor) between economizer control module terminals S_R and +, replacing the jumper removed in Step 1. See Fig. 18.
3. Disconnect the blue wire from the OAT.
4. Remove OAT from the outside of the economizer (see Fig. 16).
5. Mount the enthalpy sensor (Fig. 23) to the economizer on the outside of the unit (in the same location from which the OAT was removed) using the 2 screws provided. See Fig. 16.
6. Reconnect the blue wire removed in Step 3 to the enthalpy sensor terminal +.
7. Cut the violet wire provided to desired length and terminate with quick-connect terminal provided. Route the violet wire from the enthalpy sensor terminal S, through the snap bushing, and to the economizer control module terminal S_O. See Fig. 18.
8. Set changeover set point to the desired location. See Fig. 24.

   NOTE: For maximum benefit of outdoor air, set the enthalpy control to the "A" setting. At this setting, when the relative humidity is 50% and the outdoor air is below 74 F, the relay contacts on the sensor will be closed.
9. Reinstall economizer hoods if removed.

IMPORTANT: Be sure all seal strips and RTV sealant are intact. A watertight seal to inside of unit must be maintained.

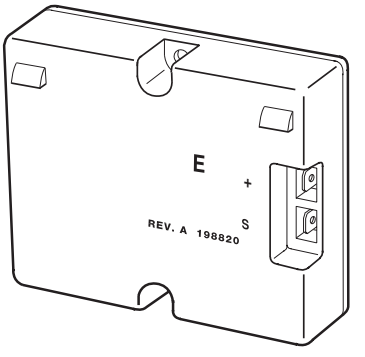
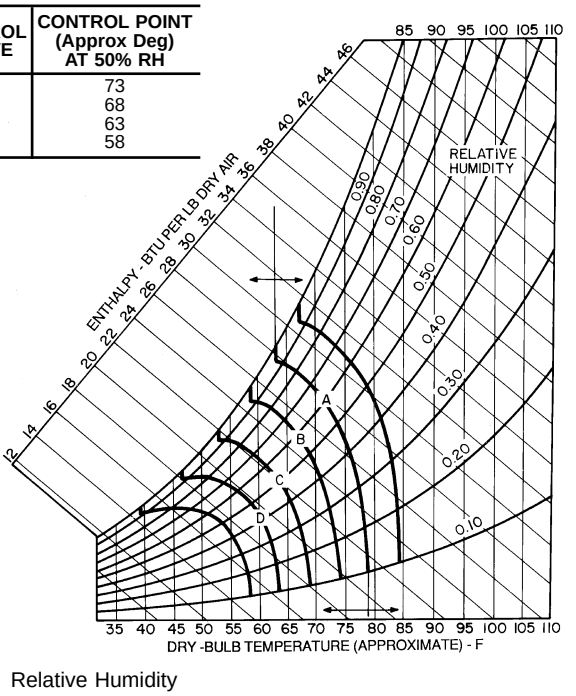


Fig. 23 — Outdoor-Air and Return-Air EnthalpySensor

CONTROL CURVE	CONTROL POINT (Approx Deg) AT 50% RH
A	73
B	68
C	63
D	58



RH — Relative Humidity

Fig. 24 — Psychrometric Chart for Solid-State Enthalpy Control

DIFFERENTIAL ENTHALPY CONTROL

NOTE: The accessory outdoor-air enthalpy sensor must be installed BEFORE the economizer hoods are installed on the unit or hoods will have to be removed.

1. Remove and discard the factory-installed jumper assembly containing the 800-ohm resistor on the economizer control module (between terminals S_R and +. See Fig. 18.
2. Disconnect black wire from economizer control module terminal S_O and blue wire from the OAT (outdoor-air thermostat).
3. Remove OAT and black wire assembly containing the 620-ohm resistor from the outside of the economizer (see Fig. 16).
4. Mount the outdoor-air enthalpy sensor (first sensor) to the economizer on the outside of the unit (in the same location from which the OAT was removed) using the 2 screws provided. See Fig. 16.
5. Reconnect the blue wire removed in Step 2 to the enthalpy sensor terminal +.
6. Cut the violet wire provided to desired length and terminate with quick-connect terminal provided. Route the violet wire from the enthalpy sensor terminal S, through the snap bushing, and to the economizer control module terminal S_O.
7. Mount the second enthalpy sensor in the return-air duct (return-air sensor).
8. Route the blue wire (provided) from terminal + on the return-air enthalpy sensor to the economizer control module terminal +.
9. Route the violet wire (provided) from terminal S on the return-air enthalpy sensor to the economizer control module terminal S_R.
10. Turn changeover set point dial clockwise past the ''D'' setting, or the control will not operate on a differential. See Fig. 18.
11. Reinstall economizer hood if removed.

IMPORTANT: Be sure all seal strips and RTV sealant are intact. A watertight seal to inside of unit must be maintained.

Step 11 — Install All Accessories — After all the factory-installed options have been adjusted, install all field-installed accessories. Refer to the accessory installation instructions included with each accessory.

MOTORMASTER® I CONTROL INSTALLATION (48TJ016 and 020 Only)

Install Field-Fabricated Wind Baffles — Wind baffles must be field-fabricated for all units to ensure proper cooling cycle operation at low ambient temperatures. See Fig. 25 for baffle details. Use 20-gage, galvanized sheet metal, or similar corrosion-resistant metal for baffles. Use field-supplied screws to attach baffles to unit. Screws should be ¼-in. diameter and ⅝-in. long. Drill required screw holes for mounting baffles.

⚠ CAUTION

To avoid damage to the refrigerant coils and electrical components, use recommended screw sizes only. Use care when drilling holes.

Install Motormaster I Controls — Only one Motormaster I control is required per unit. The Motormaster I control must be used in conjunction with the Accessory 0° F Low Ambient Kit (purchased separately). The Motormaster I device controls outdoor fan no. 1 while outdoor fans no. 2 and 3 are sequenced off by the Accessory 0° F Low Ambient Kit.

Accessory 0° F Low Ambient Kit — Install the Accessory 0° F Low Ambient Kit per instruction supplied with accessory.

Sensor Assembly — Install the sensor assembly in the location shown in Fig. 26.

Motor Mount — To ensure proper fan height, replace the existing motor mount with the new motor mount provided with accessory.

Transformer (460 and 575-v Units Only) — On 460 and 575-v units, a transformer is required. The transformer is provided with the accessory and must be field-installed.

Motormaster I Control — Recommended mounting location is on the inside of the panel to the left of the control box. The control should be mounted on the inside of the panel, vertically, with leads protruding from bottom of extrusion.

MOTORMASTER III CONTROL INSTALLATION (48TJ024 and 028 Only)

Install Field-Fabricated Wind Baffles — Wind baffles must be field-fabricated for all units to ensure proper cooling cycle operation at low ambient temperatures. See Fig. 25 for baffle details. Use 20-gage, galvanized sheet metal, or similar corrosion-resistant metal for baffles. Use field-supplied screws to attach baffles to unit. Screws should be ¼-in. diameter and ⅝-in. long. Drill required screw holes for mounting baffles.

⚠ CAUTION

To avoid damage to the refrigerant coils and electrical components, use recommended screw sizes only. Use care when drilling holes.

Replace Outdoor Motor — Replace outdoor fan motor no. 1 with motor included in accessory kit. Existing motor is not Motormaster III compatible.

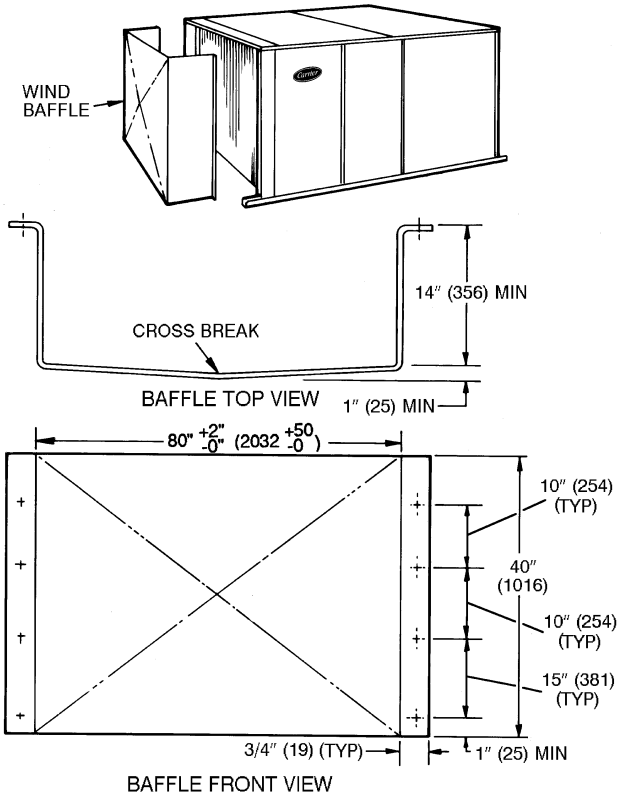
Install Motormaster III Controls — Only one Motormaster III control is required per unit.

Sensor — Install the sensor for thermistor input control in the location shown in Fig. 27. Connect sensor leads to the purple and grey control signal leads on the Motormaster III control.

Signal Selection Switch — Remove the cover of the Motormaster III control. Set the switch to accept the thermistor sensor input signal. Set the frequency to match the unit power supply (60 Hz).

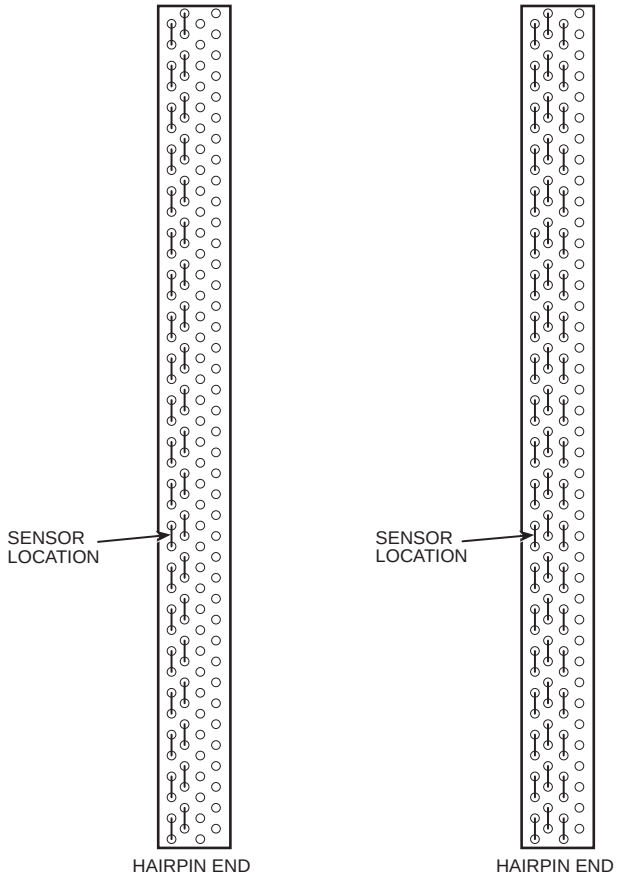
Motormaster III Control — Recommended mounting location is beneath the control box, mounted to the partition that separates the control box section from the indoor section.

NOTE: If unit power is supplied through the roof curb and basepan of the unit, mount the Motormaster III control on the corner post adjacent to the conduit running from the basepan to the bottom of the control box.



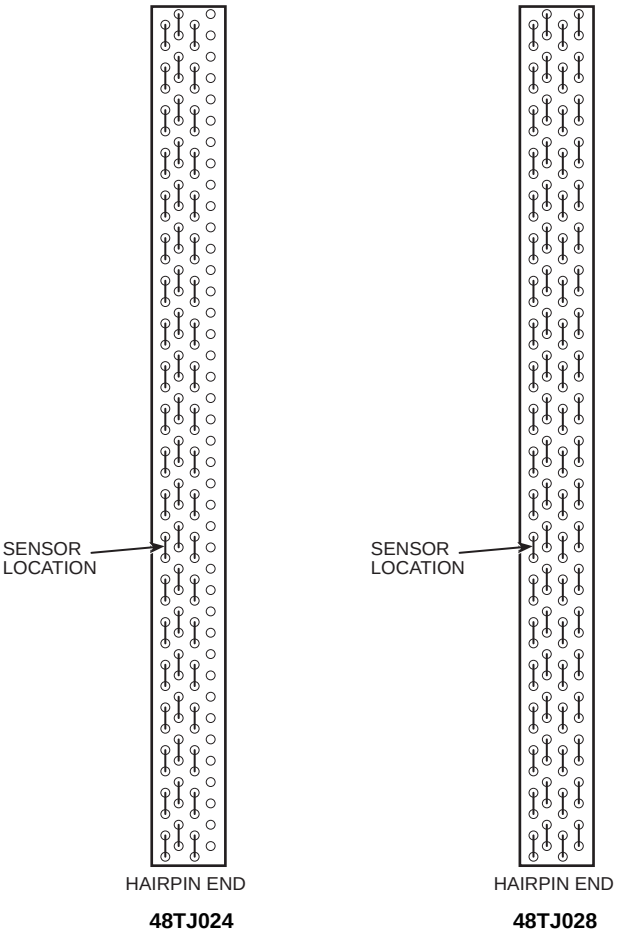
NOTE: Dimensions in ( ) are in mm.

Fig. 25 — Wind Baffle Details



NOTE: All sensors are located on the eighth hairpin up from the bottom.

Fig. 26 — Motormaster® I Sensor Locations



NOTE: all sensors are located on the eighth hairpin up from the bottom.

Fig. 27 — Motormaster III Sensor Locations

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 — Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.

Refrigerant Service Ports — Each refrigerant system has a total of 3 Schrader-type service gage ports. One port is located on the suction line, one on the compressor discharge line, and one on the liquid line. In addition Schrader-type valves are located underneath the low-pressure switches. Be sure that caps on the ports are tight.

Compressor Rotation — It is important to be certain the compressors are rotating in the proper direction. To determine whether or not compressors are rotating in the proper direction:

1. Connect service gages to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Note that the evaporator fan is probably also rotating in the wrong direction.
2. Turn off power to the unit.
3. Reverse any two of the incoming power leads.
4. Turn on power to the compressor.

The suction and discharge pressure levels should now move to their normal start-up levels.

NOTE: When compressors are rotating in the wrong direction, the unit will have increased noise levels and will not provide heating and cooling.

After a few minutes of reverse operation, the scroll compressor internal overload protection will open, which will activate the unit's lockout and requires a manual reset. Reset is accomplished by turning the thermostat on and off.

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

Crankcase Heater(s) (Size 028 Only) — Crankcase heater(s) is energized as long as there is power to the unit and the compressor is not operating.

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 3-8 for Fan Performance Data. Be sure that fans rotate in the proper direction. See Table 9 for air quantity limits. See Tables 10 and 11 for static pressure information for accessories and options. See Table 12 for fan rpm at various motor pulley settings. To alter fan performance, see Evaporator Fan Performance Adjustment section on page 22.

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 23 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 20, and in Economizer Adjustment section on page 24.

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 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 — 48TJD016 (Low Heat Units)

AIRFLOW (Cfm)	AVAILABLE 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	809	1.53	1317	906	1.74	1502	994	1.96	1690	1078	2.18	1882	1156	2.41	2077	1230	2.64	2275
4800	850	1.76	1516	942	1.98	1706	1027	2.20	1899	1107	2.43	2094	1183	2.66	2293	1255	2.89	2495
5100	892	2.01	1733	979	2.24	1928	1061	2.46	2125	1138	2.70	2325	1211	2.93	2528	1281	3.17	2733
5400	934	2.28	1970	1017	2.52	2169	1096	2.75	2371	1170	2.99	2575	1241	3.22	2781	1309	3.47	2990
5700	976	2.58	2225	1056	2.82	2429	1132	3.06	2635	1204	3.30	2843	1272	3.54	3053	1338	3.79	3266
6000	1019	2.90	2500	1096	3.14	2709	1168	3.38	2919	1238	3.63	3131	1304	3.88	3345	1368	4.13	3562
6300	1063	3.24	2795	1136	3.49	3008	1206	3.74	3223	1273	3.99	3439	1337	4.24	3657	—	—	—
6600	1106	3.61	3111	1177	3.86	3329	1244	4.11	3547	1309	4.37	3767	—	—	—	—	—	—
6900	1150	4.00	3448	1218	4.26	3670	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE 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
4500	1301	2.87	2477	1369	3.11	2683	1434	3.35	2891	1497	3.47	2997	1497	3.60	3103
4800	1324	3.13	2700	1390	3.37	2909	1454	3.62	3120	1515	3.74	3226	1515	3.87	3334
5100	1349	3.41	2942	1413	3.66	3153	1475	3.90	3367	1535	4.03	3475	1535	4.16	3584
5400	1374	3.71	3202	1437	3.96	3416	1498	4.21	3633	—	—	—	—	—	—
5700	1402	4.04	3481	1463	4.29	3699	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

NOTES:
1. Standard low-medium static drive range is 891 to 1179 rpm (for 208/230-460-v units) or 1159 to 1429 rpm (for 575-v units). Alternate high-static drive range is 1227 to 1550 (for 208/230-460-v units). The alternate high-static drive is not available for 48TJ016 575-v units. Other rpms require a field-supplied drive.
2. Maximum continuous bhp is 4.25 (208/230-460 v) or 3.45 (575 v) and the maximum continuous watts are 3775 (208/230-460 v) or 3065 (575 v). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
3. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
4. Interpolation is permissible. Do not extrapolate.
5. Fan performance is based on wet coils, clean filters, and casing losses. See Table 10 for accessory/FIOP static pressure information.
6. Extensive motor and drive testing on these units ensures that the full horsepower and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Table 4 — Fan Performance — 48TJD020 and 024 (Low Heat Units)

AIRFLOW (Cfm)	AVAILABLE 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
5,500	755	2.27	1908	831	2.58	2171	901	2.91	2443	968	3.24	2723	1031	3.58	3009	1091	3.93	3302
6,000	810	2.72	2287	881	3.04	2556	947	3.37	2833	1010	3.71	3116	1070	4.05	3406	1127	4.40	3702
6,500	866	3.22	2710	932	3.55	2985	994	3.88	3266	1054	4.23	3554	1111	4.57	3847	1166	4.93	4146
7,000	923	3.78	3177	985	4.11	3458	1044	4.45	3744	1100	4.80	4036	1155	5.15	4333	1207	5.51	4635
7,500	980	4.39	3690	1038	4.73	3976	1094	5.07	4267	1148	5.43	4564	1200	5.78	4864	1250	6.15	5170
8,000	1038	5.06	4251	1093	5.40	4542	1146	5.75	4838	1197	6.11	5138	1246	6.47	5443	1294	6.84	5752
8,500	1096	5.78	4859	1148	6.13	5156	1198	6.49	5456	1247	6.85	5761	1294	7.22	6070	1340	7.59	6382
9,000	1154	6.56	5517	1204	6.92	5818	1251	7.28	6123	1298	7.65	6432	1343	8.02	6745	1388	8.40	7062
9,500	1213	7.40	6224	1260	7.77	6531	1306	8.13	6840	1350	8.51	7154	1394	8.88	7471	1436	9.26	7791
10,000	1272	8.30	6983	1317	8.67	7294	1360	9.05	7608	1403	9.43	7926	1445	9.81	8247	1486	10.19	8570

AIRFLOW (Cfm)	AVAILABLE 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
5,500	1149	4.28	3602	1204	4.65	3907	1258	5.02	4217	1284	5.20	4375	1309	5.39	4533
6,000	1183	4.76	4003	1236	5.13	4310	1288	5.50	4622	1313	5.68	4780	1337	5.87	4939
6,500	1219	5.29	4450	1270	5.66	4759	1320	6.03	5073	1344	6.22	5232	1368	6.41	5391
7,000	1258	5.88	4942	1307	6.25	5253	1355	6.62	5569	1378	6.81	5729	1402	7.00	5890
7,500	1299	6.52	5480	1346	6.89	5794	1392	7.27	6113	1415	7.46	6273	1437	7.65	6435
8,000	1341	7.21	6065	1387	7.59	6383	1392	7.97	6704	1453	8.16	6866	1475	8.36	7028
8,500	1385	7.97	6699	1429	8.35	7019	1472	8.73	7343	1493	8.93	7506	1514	9.12	7670
9,000	1431	8.78	7382	1473	9.15	7705	1515	9.55	8032	1535	9.75	8196	—	—	—
9,500	1478	9.65	8114	1519	10.04	8441	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

NOTES:
1. Standard low-medium static drive range for the 020 size is 910 to 1095 rpm. Standard low-medium static drive range for the 024 size is 1002 to 1225 rpm. Alternate high-static drive range for the 020 size is 1069 to 1287. Alternate high-static drive range for the 024 size is 1193 to 1458 rpm. Other rpms require a field-supplied drive.
2. Maximum continuous bhp for the 020 size is 5.90. Maximum continuous bhp for the 024 size is 8.7 (208/230, 575 v) or 9.5 (460 v). The maximum continuous watts for the 020 size is 5180. The maximum continuous watts for the 024 size is 7915 (208/230, 575 v) or 8640 (460 v). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
3. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
4. Interpolation is permissible. Do not extrapolate.
5. Fan performance is based on wet coils, clean filters, and casing losses. See Table 11 for accessory/FIOP static pressure information.
6. Extensive motor and drive testing on these units ensures that the full horsepower and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Table 5 — Fan Performance — 48TJD028 (Low Heat Units)

AIRFLOW (Cfm)	AVAILABLE 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
7,000	941	3.35	2,769	1002	3.80	3,140	1061	4.27	3528	1117	4.76	3,934	1171	5.27	4,356	1224	5.80	4,794
7,500	999	4.05	3,348	1057	4.53	3,742	1112	5.02	4152	1166	5.54	4,579	1218	6.07	5,020	1268	6.63	5,478
8,000	1058	4.85	4,007	1113	5.35	4,424	1165	5.87	4856	1216	6.41	5,304	1266	6.97	5,766	1314	7.55	6,243
8,500	1117	5.74	4,750	1169	6.28	5,190	1219	6.83	5645	1268	7.40	6,114	1315	7.98	6,597	1361	8.58	7,094
9,000	1177	6.75	5,583	1226	7.31	6,047	1274	7.89	6524	1320	8.48	7,015	1365	9.09	7,520	1410	9.72	8,037
9,500	1237	7.98	6,511	1284	8.46	6,999	1329	9.07	7499	1374	9.69	8,012	1417	10.33	8,538	1459	10.98	9,076
10,000	1297	9.12	7,450	1342	9.74	8,051	1385	10.37	8574	1428	11.02	9,110	1469	11.68	9,657	1510	12.36	10,217
10,500	1358	10.49	8,674	1400	11.14	9,209	1442	11.80	9755	1483	12.47	10,314	1523	13.16	10,883	—	—	—
11,000	1418	12.00	9,919	1459	12.67	10,478	—	—	—	—	—	—	—	—	—	—	—	—
11,250	1449	12.80	10,585	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)								
	1.4			1.6			1.8		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
7,000	1274	6.35	5248	1323	6.92	5,718	1371	5.54	6204
7,500	1316	7.20	6960	1364	7.79	6,437	1410	6.41	6939
8,000	1360	8.14	6734	1406	8.76	7,239	1450	7.40	7759
8,500	1406	9.20	7605	1449	9.83	8,129	1492	8.48	8666
9,000	1453	10.36	8568	1495	11.02	9,111	1536	9.69	9667
9,500	1501	11.64	9627	1541	12.32	10,190	—	—	—
10,000	—	—	—	—	—	—	—	—	—
10,500	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—
11,250	—	—	—	—	—	—	—	—	—

LEGEND

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

NOTES:
1. Standard low-medium static drive range is 1066 to 1283 rpm. Alternate high-static drive range is 1332 to 1550. Other rpms require a field-supplied drive.
2. Maximum continuous bhp is 10.2 (208/230, 575 v) or 11.8 (460 v) and the maximum continuous watts are 9510 (208/230, 575 v) or 11,000 (460 v). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
3. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
4. Interpolation is permissible. Do not extrapolate.
5. Fan performance is based on wet coils, clean filters, and casing losses. See Table 11 for accessory/FIOP static pressure information.
6. Extensive motor and drive testing on these units ensures that the full horsepower and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Table 6 — Fan Performance — 48TJF016 (High Heat Units)

AIRFLOW (Cfm)	AVAILABLE 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	819	1.55	1335	914	1.76	1518	1001	1.98	1705	1083	2.20	1894	1160	2.42	2088	1234	2.65	2284
4800	861	1.78	1538	951	2.00	1726	1035	2.22	1916	1113	2.45	2110	1188	2.68	2307	1259	2.91	2507
5100	904	2.04	1759	989	2.26	1952	1069	2.49	2147	1145	2.72	2345	1218	2.95	2545	1287	3.17	2749
5400	947	2.32	1999	1028	2.55	2197	1105	2.78	2396	1179	3.01	2598	1248	3.25	2802	1315	3.49	3009
5700	990	2.62	2259	1068	2.85	2461	1142	3.09	2665	1213	3.33	2871	1280	3.57	3079	1345	3.81	3289
6000	1034	2.94	2539	1109	3.18	2745	1180	3.42	2953	1248	3.67	3163	1313	3.91	3375	1376	4.16	3589
6300	1078	3.29	2840	1150	3.54	3050	1218	3.78	3262	1284	4.03	3476	1348	4.28	3692	—	—	—
6600	1123	3.67	3161	1192	3.91	3376	1258	4.16	3592	—	—	—	—	—	—	—	—	—
6900	1167	4.06	3504	1234	4.32	3723	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE 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
4500	1304	2.88	2484	1371	3.12	2688	1435	3.36	2895	1467	3.48	2999	1497	3.60	3104
4800	1327	3.14	2711	1393	3.38	2917	1456	3.62	3126	1486	3.75	3232	1517	3.87	3338
5100	1353	3.43	2955	1417	3.67	3165	1478	3.92	3377	1508	4.04	3484	1537	4.16	3592
5400	1380	3.73	3219	1442	3.98	3432	1502	4.23	3646	1531	4.35	3755	—	—	—
5700	1408	4.06	3503	1468	4.31	3718	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

NOTES:
1. Standard low-medium static drive range is 891 to 1179 rpm (for 208/230-460-v units) or 1159 to 1429 rpm (for 575-v units). Alternate high-static drive range is 1227 to 1550 (for 208/230-460-v units). The alternate high-static drive is not available for 48TJ016 575-v units. Other rpms require a field-supplied drive.
2. Maximum continuous bhp is 4.25 (208/230-460 v) or 3.45 (575 v) and the maximum continuous watts are 3775 (208/230-460 v) or 3065 (575 v). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
3. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
4. Interpolation is permissible. Do not extrapolate.
5. Fan performance is based on wet coils, clean filters, and casing losses. See Table 10 for accessory/FIOP static pressure information.
6. Extensive motor and drive testing on these units ensures that the full horsepower and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Table 7 — Fan Performance — 48TJF020 and 024 (High Heat Units)

AIRFLOW (Cfm)	AVAILABLE 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
5,500	795	2.43	2043	866	2.74	2306	934	3.07	2578	998	3.40	2856	1059	3.74	3142	1117	4.08	3434
6,000	854	2.92	2452	921	3.24	2722	984	3.57	3998	1044	3.90	3281	1102	4.25	3570	1158	4.60	3865
6,500	914	3.46	2909	977	3.79	3184	1036	4.12	3465	1093	4.46	3752	1148	4.81	4045	1201	5.16	4343
7,000	975	4.06	3414	1034	4.39	3695	1090	4.73	3981	1144	5.08	4272	1196	5.43	4569	1246	5.79	4870
7,500	1037	4.72	3969	1092	5.06	4255	1145	5.41	4546	1196	5.76	4842	1256	6.12	5142	1294	6.48	5447
8,000	1099	5.44	4575	1150	5.79	4866	1201	6.14	5162	1249	6.50	5462	1297	6.86	5766	1343	7.22	6075
8,500	1161	6.22	5232	1210	6.57	5529	1258	6.93	5829	1304	7.29	6134	1349	7.66	6443	1393	8.03	6755
9,000	1223	7.07	5943	1270	7.43	6245	1315	7.79	6550	1360	8.16	6869	1403	8.53	7171	1445	8.90	7487
9,500	1286	7.98	6708	1331	8.34	7014	1374	8.71	7324	1416	9.08	7638	1457	9.46	7954	1498	9.84	8274
10,000	1349	8.95	7528	1392	9.32	7839	1433	9.70	8154	1473	10.07	8471	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE 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
5,500	1173	4.44	3732	1227	4.80	4036	1279	5.17	4345	1304	5.35	4502	1329	5.54	4629
6,000	1211	4.95	4165	1263	5.32	4471	1313	5.69	4782	1337	5.87	4939	1361	6.06	5097
6,500	1252	5.53	4646	1302	5.89	4954	1350	6.26	5267	1373	6.56	5425	1396	6.64	5584
7,000	1295	6.16	5176	1343	6.52	5487	1389	6.90	5802	1412	7.09	5961	1434	7.28	6121
7,500	1340	6.85	5756	1386	7.22	6070	1431	7.60	6387	1452	7.79	6547	1474	7.98	6709
8,000	1388	7.60	6388	1431	7.97	6704	1474	8.35	7024	1495	8.54	7186	1516	8.74	7348
8,500	1436	8.41	7071	1478	8.79	7390	1520	9.17	7713	1540	9.37	7876	—	—	—
9,000	1486	9.28	7807	1527	9.67	8130	—	—	—	—	—	—	—	—	—
9,500	1538	10.22	8597	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

NOTES:
1. Standard low-medium static drive range for the 020 size is 910 to 1095 rpm. Standard low-medium static drive range for the 024 size is 1002 to 1225 rpm. Alternate high-static drive range for the 020 size is 1069 to 1287. Alternate high-static drive range for the 024 size is 1193 to 1458 rpm. Other rpms require a field-supplied drive.
2. Maximum continuous bhp for the 020 size is 5.90. Maximum continuous bhp for the 024 size is 8.7 (208/230, 575 v) or 9.5 (460 v). The maximum continuous watts for the 020 size is 5180. The maximum continuous watts for the 024 size is 7915 (208/230, 575 v) or 8640 (460 v). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
3. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
4. Interpolation is permissible. Do not extrapolate.
5. Fan performance is based on wet coils, clean filters, and casing losses. See Table 11 for accessory/FIOP static pressure information.
6. Extensive motor and drive testing on these units ensures that the full horsepower and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Table 8 — Fan Performance — 48TJF028 (High Heat Units)

AIRFLOW (Cfm)	AVAILABLE 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
7,000	992	4.05	3,348	1051	4.44	3,668	1106	4.83	3995	1160	5.24	4331	1212	5.65	4675	1262	6.08	5026
7,500	1055	4.77	3,947	1110	5.17	4,277	1162	5.58	4615	1214	6.00	4960	1263	6.43	5312	1311	6.86	5672
8,000	1118	5.58	4,610	1170	5.99	4,950	1220	6.41	5298	1268	6.84	5653	1315	7.27	6014	1361	7.72	6382
8,500	1182	6.46	5,339	1231	6.88	5,690	1278	7.31	6047	1324	7.75	6411	1369	8.20	6782	1413	8.66	7158
9,000	1246	7.42	6,136	1292	7.86	6,498	1337	8.30	6865	1381	8.75	7239	1424	9.21	7618	1466	9.68	8003
9,500	1310	8.47	7,005	1354	8.92	7,377	1397	9.38	7754	1439	9.84	8137	1480	10.31	8525	1520	10.79	8918
10,000	1374	9.61	7,947	1416	10.07	8,329	1457	10.54	8715	1497	11.02	9107	1537	11.50	9504	—	—	—
10,500	1439	10.84	8,964	1479	11.32	9,356	1518	11.79	9752	—	—	—	—	—	—	—	—	—
11,000	1503	12.17	10,059	1542	12.65	10,460	—	—	—	—	—	—	—	—	—	—	—	—
11,250	1536	12.86	10,636	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)								
	1.4			1.6			1.8		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
7,000	1311	6.51	5385	1359	6.96	5751	1405	6.00	6124
7,500	1358	7.30	6039	1403	7.76	6412	1448	6.84	6792
8,000	1406	8.17	6767	1560	8.63	7137	1492	7.75	7524
8,500	1456	9.12	7541	1498	9.59	7929	1539	8.75	8323
9,000	1507	10.15	8393	1548	10.63	8790	—	—	—
9,500	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—
10,500	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—
11,250	—	—	—	—	—	—	—	—	—

LEGEND

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

NOTES:
1. Standard low-medium static drive range is 1066 to 1283 rpm. Alternate high-static drive range is 1332 to 1550. Other rpms require a field-supplied drive.
2. Maximum continuous bhp is 10.2 (208/230, 575 v) or 11.8 (460 v) and the maximum continuous watts are 9510 (208/230, 575 v) or 11,000 (460 v). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
3. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
4. Interpolation is permissible. Do not extrapolate.
5. Fan performance is based on wet coils, clean filters, and casing losses. See Table 11 for accessory/FIOP static pressure information.
6. Extensive motor and drive testing on these units ensures that the full horsepower and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Table 9 — Air Quantity Limits

UNIT 48TJ	MINIMUM COOLING CFM	MINIMUM HEATING CFM		MAXIMUM CFM
		Low Heat	High Heat	
016	4500	3800	3800	7,500
020	5400	4750	5450	9,000
024	6000	4750	5450	10,000
028	7000	4560	5450	11,250

Table 10 — 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 11 — 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 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.

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.

Table 12 — 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)†	††	††	1179	1150	1121	1093	1064	1035	1006	978	949	920	891
016 (208/230, 460 v)**	††	††	1559	1522	1488	1455	1422	1389	1356	1323	1289	1256	1227
016 (575 v)†	††	††	1429	1403	1376	1349	1323	1296	1269	1242	1215	1188	1159
020†	††	††	1095	1077	1058	1040	1021	1002	984	965	947	928	910
020**	††	††	1287	1265	1243	1222	1200	1178	1156	1134	1112	1091	1069
024†	††	††	1225	1209	1187	1165	1143	1120	1098	1076	1053	1031	1002
024**	††	††	1458	1434	1407	1381	1354	1328	1301	1275	1248	1222	1193
028†	††	††	1283	1269	1247	1225	1203	1182	1160	1138	1116	1095	1066
028**	††	††	—	—	1551	1524	1497	1470	1443	1415	1388	1361	1332

*Approximate fan rpm shown.
†Indicates standard drive package.
**Indicates alternate drive package.
††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.

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. 28. During normal operation, the LED is continuously on. See Table 13 for error codes.

Table 13 — 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 20.

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 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.

Freeze protection thermostats (FPT) are located on the top and bottom of 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 compressor lockout.

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. 28). 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. 29.

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. 28). 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 throwaway 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 throwaway filters in place of screens.

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory. Conventional white oil (Sontex 200LT) is used. White oil is compatible with 3GS oil, and 3GS oil may be used if the addition of oil is required. See compressor nameplate for original oil charge. A complete recharge should be four ounces less than the original oil charge When a compressor is exchanged in the field it is possible that a major portion of the oil from the replaced compressor may still be in the system. While this will not affect the reliablity of the replacement compressor, the extra oil will add rotor drag and increase power usage. To remove this excess oil, an access valve may be added to the lower portion of the suction line at the inlet of the compressor. The compressor should then be run for 10 minutes, shut down and the access valve opened until no oil flows. This should be repeated twice to make sure the proper oil level has been achieved.

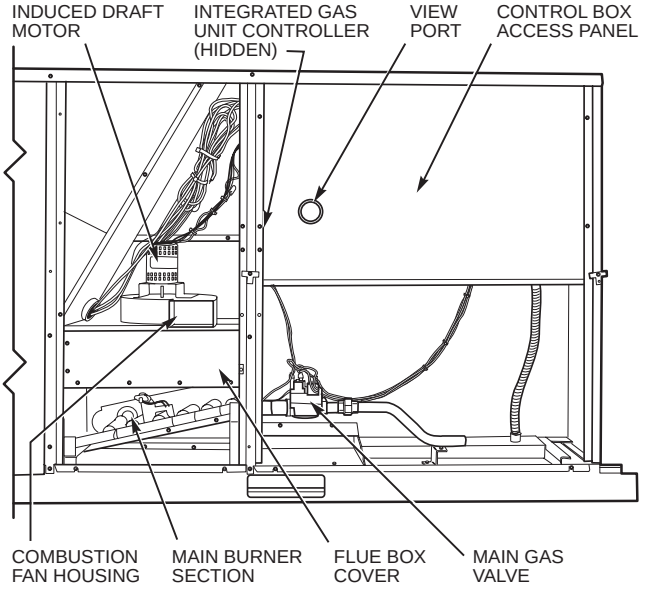
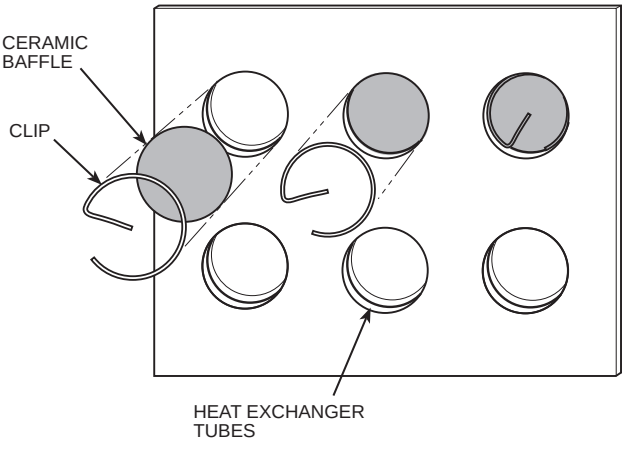


Fig. 28 — Typical Gas Heating Section



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

Fig. 29 — Removing Heat Exchanger Ceramic Baffles and Clips

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. 30-32) — 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. 30).
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 9 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 23).

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. 31)

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.

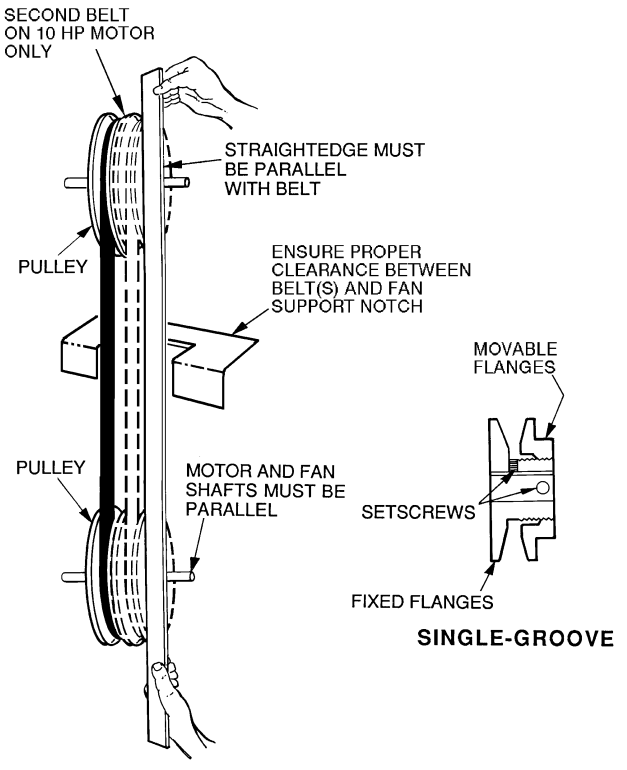


Fig. 30 — Evaporator-Fan Alignment and Adjustment

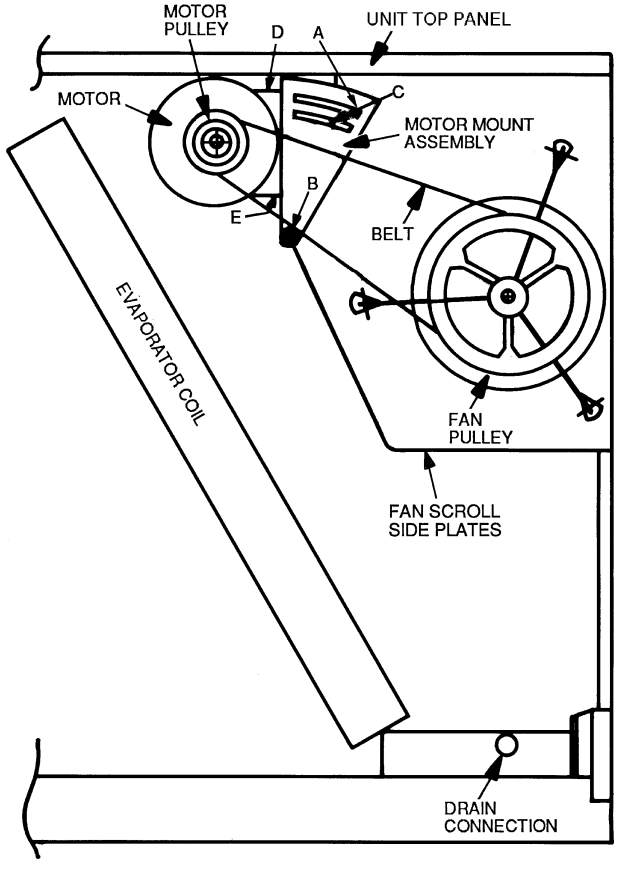


Fig. 31 — 48TJ016 Evaporator-Fan Motor Adjustment

48TJ020-028 UNITS (See Fig. 32) — 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 (½ 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 (⅜ 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. 33)

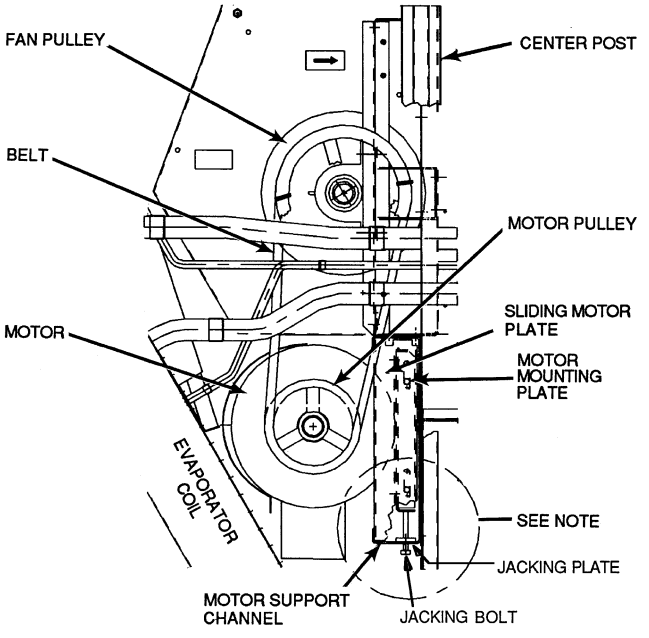
1. Shut off unit power supply.
2. Remove access panel(s) closest to the fan to be adjusted.
3. Loosen fan hub setscrews.
4. Adjust fan height on shaft using a straightedge placed across the fan orifice.
5. Tighten setscrews and replace panel(s).
6. Turn on unit power.

48TJ024,028 UNITS (Fig. 34)

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.

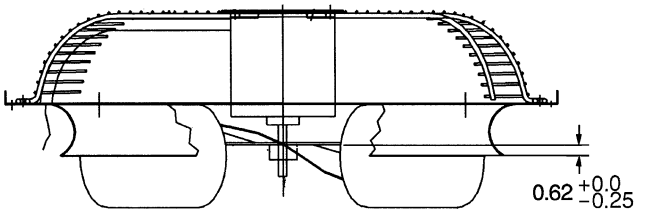
Economizer Adjustment — See Tables 14 and 15 for checkout and enthalpy simulation. Make certain the outdoor-air damper is fully closed and the return-air damper is fully open before completing the following steps:

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



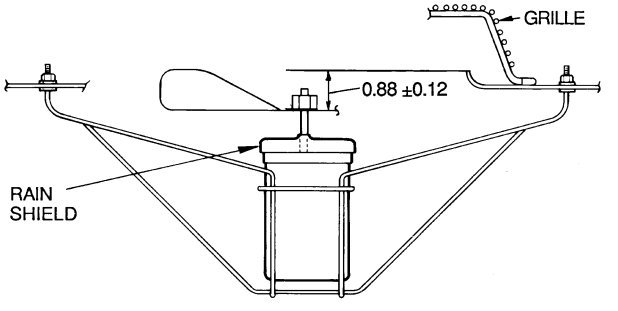
NOTE: A 3½-in. bolt and threaded plate are included in the installer's packet. They should be added to the motor support channel below the motor mounting plate to aid in raising the motor. The plate part number is 50DP503842. The adjustment bolt is ⅜ - 16 x 1¾-in. LG.

Fig. 32 — 48TJ020-028 Evaporator-Fan Motor Section



NOTE: Dimension is in inches.

Fig. 33 — Condenser Fan Adjustment, 48TJ016,020



NOTE: Dimension is in inches.

Fig. 34 — Condenser-Fan Adjustment, 48TJ024,028

Table 14 — 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 15 — 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.

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 (see Fig. 17) to 75 F.
6. If the outdoor temperature is below 75 F, the economizer will control the mixed air with the mixed-air sensor. If the outdoor air is above 75 F, place a jumper around the contacts of the OAT.
7. Jumper terminal T to terminal T1 on the module (see Fig. 18). The economizer will go to the full open position. The outdoor-air damper will go to the full open position, and the return-air damper will go to the full closed position.
8. Adjust mechanical linkage, if necessary, for correct positioning. If may be necessary to remove the filters to adjust the linkage.

9. Remove the jumper from around the contacts of the OAT if installed in Step 6. Remove the jumper from terminals T and T1 installed in Step 7.
10. If the Cooling mode was simulated to operate the unit in Step 4, remove the jumper and reconnect the thermostat wires to terminals Y1 and Y2.

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.

NOTE: Do not use recycled refrigerant as it may contain contaminants.

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

LOW CHARGE COOLING — Using cooling charging chart (see Fig. 35), add or remove refrigerant until conditions of the chart are met. Note that charging chart is different from those normally used. An accurate pressure gage and temperature-sensing device is required. Charging is accomplished by ensuring the proper amount of liquid sub-cooling. Measure liquid line pressure at the liquid line service valve using pressure gage. Connect temperature sensing device to the liquid line near the liquid line service valve and insulate it so that outdoor ambient temperature does not affect reading.

TO USE THE COOLING CHARGING CHART — Use the above temperature and pressure readings, and find the intersection point on the cooling charging chart. If intersection point on chart is above line, add refrigerant. If intersection point on chart is below line, carefully reclaim some of the charge. Recheck suction pressure as charge is adjusted.

NOTE: Indoor-air CFM must be within normal operating range of unit. All outdoor fans must be operating.

The TXV (thermostatic expansion valve) is set to maintain between 15 and 20 degrees of superheat at the compressors. The valves are factory set and should not require re-adjustment.

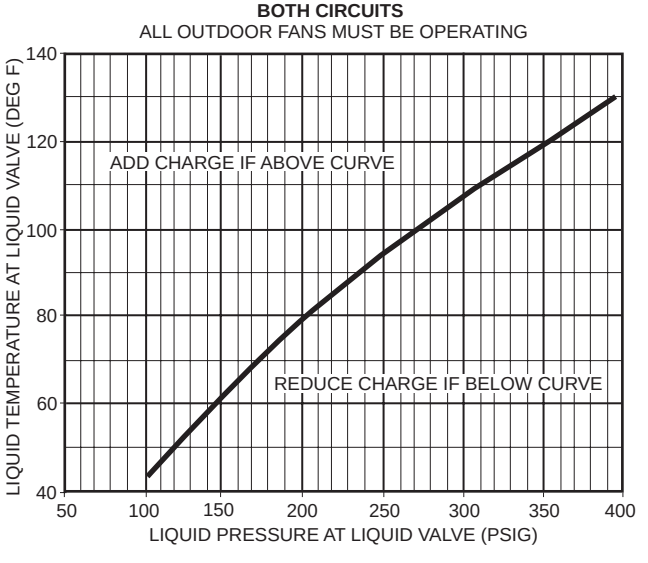


Fig. 35 — Cooling Charging Chart

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 ⅛-in. pipe plug from manifold or gas valve pressure tap connection. Install a suitable pressure-measuring device.
4. Set main gas valve to ON position.
5. Set thermostat at setting to call for heat.
6. Remove screw cap covering regulator adjustment screw (See Fig. 36).
7. Turn adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure.
8. Once desired pressure is established, set thermostat setting for no call for heat, turn off main gas valve, remove pressure-measuring device, and replace ⅛-in. pipe plug and screw cap.

Main Burners — For all applications, main burners are factory set and should require no adjustment.

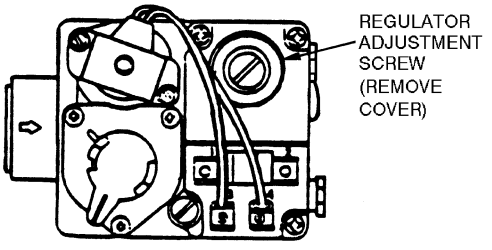


Fig. 36 — Gas Valve

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.

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described in Main Burner Removal section above.
2. Inspect burners, and if dirty, remove burners from rack.
3. Using a soft brush, clean burners and crossover port as required.
4. Adjust spark gap. See Fig. 37.
5. Reinstall burners on rack.
6. Reinstall burner rack as described above.

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

Protective Devices

COMPRESSOR PROTECTION

Overcurrent — Each compressor has internal line break motor protection, except the circuit no. 1 on the 48TJ028 units. Compressor no. 1 on the 48TJ028 unit uses an electronic module, located with the compressor junction box, to provide motor protection. This electronic module monitors winding and discharge temperatures. If these temperatures reach the trip values, the module interrupts the control line and causes the compressor to switch off.

Crankcase Heater — Only the 48TJ028 unit is equipped with a 70-watt crankcase heater to prevent absorption of liquid refrigerant by oil in the crankcase when the compressor is idle. The crankcase heater is energized whenever there is main power to the unit and the compressor is not energized.

> IMPORTANT: After prolonged shutdown or servicing, energize the crankcase heaters for 24 hours before starting the compressors.

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

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.

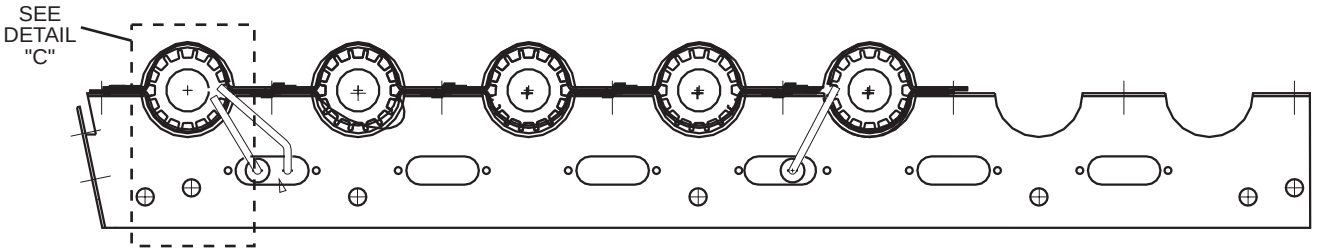
FREEZE PROTECTION THERMOSTAT (FPT) — An FPT is located on the top and bottom of the evaporator coil. They detect frost build-up and turn off the compressor, allowing the coil to clear. Once the frost has melted, the compressor can be reenergized by resetting the compressor lockout.

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.

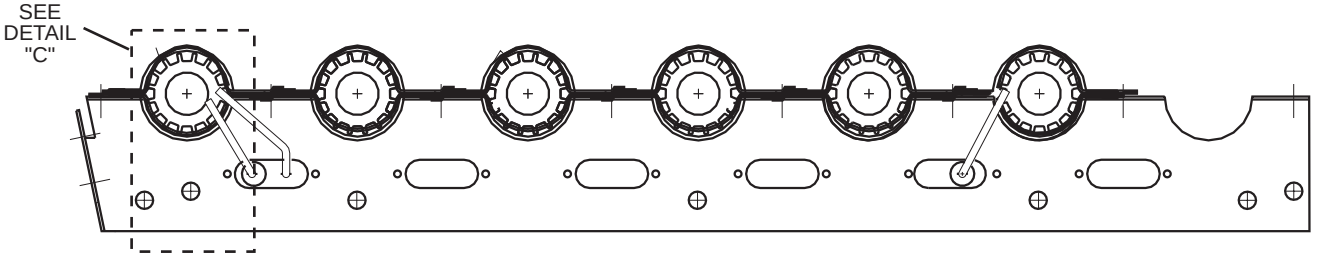
Control Circuit, 24-V — This control circuit is protected against overcurrent by a 3.2 amp circuit breaker. Breaker can be reset. If it trips, determine cause of trouble before resetting.

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

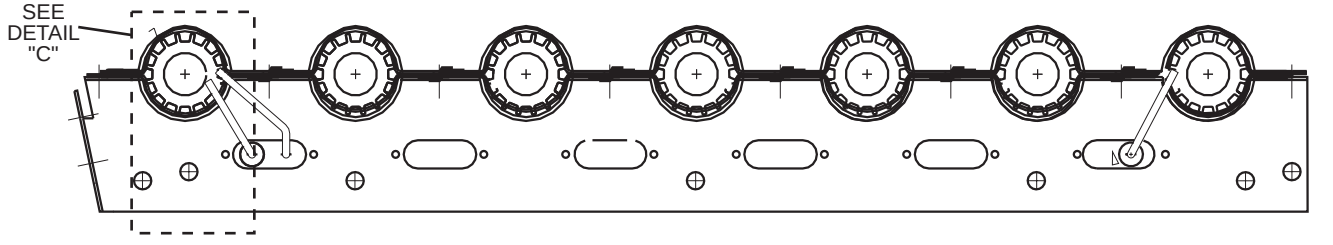
Diagnostic LEDs — The IGC control board has a LED for diagnostic purposes. The IGC error codes are shown in Table 13.



48TJD016



48TJD020-028 AND 48TJF016



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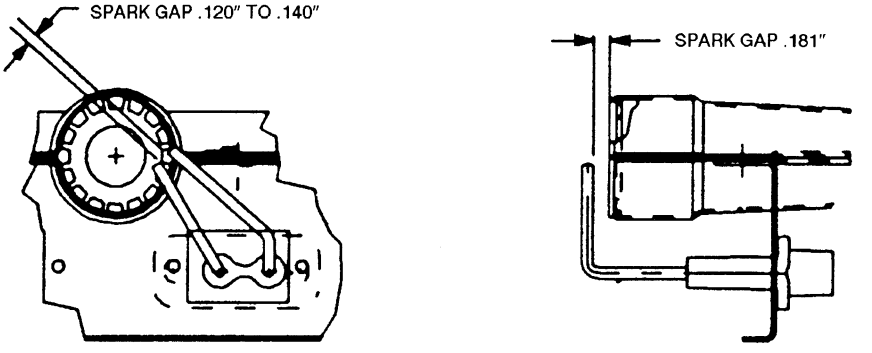


DETAIL ''C''

Fig. 37 — Spark Gas Adjustment

LEGEND

Fig. 38 — Typical Wiring Schematic and Fig. 39 — Typical Component Arrangement

AHA	—	Adjustable Heat Anticipator
BKR W/AT	—	Breaks with Amp Turns
BR	—	Burner Relay
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 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
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
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.
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.

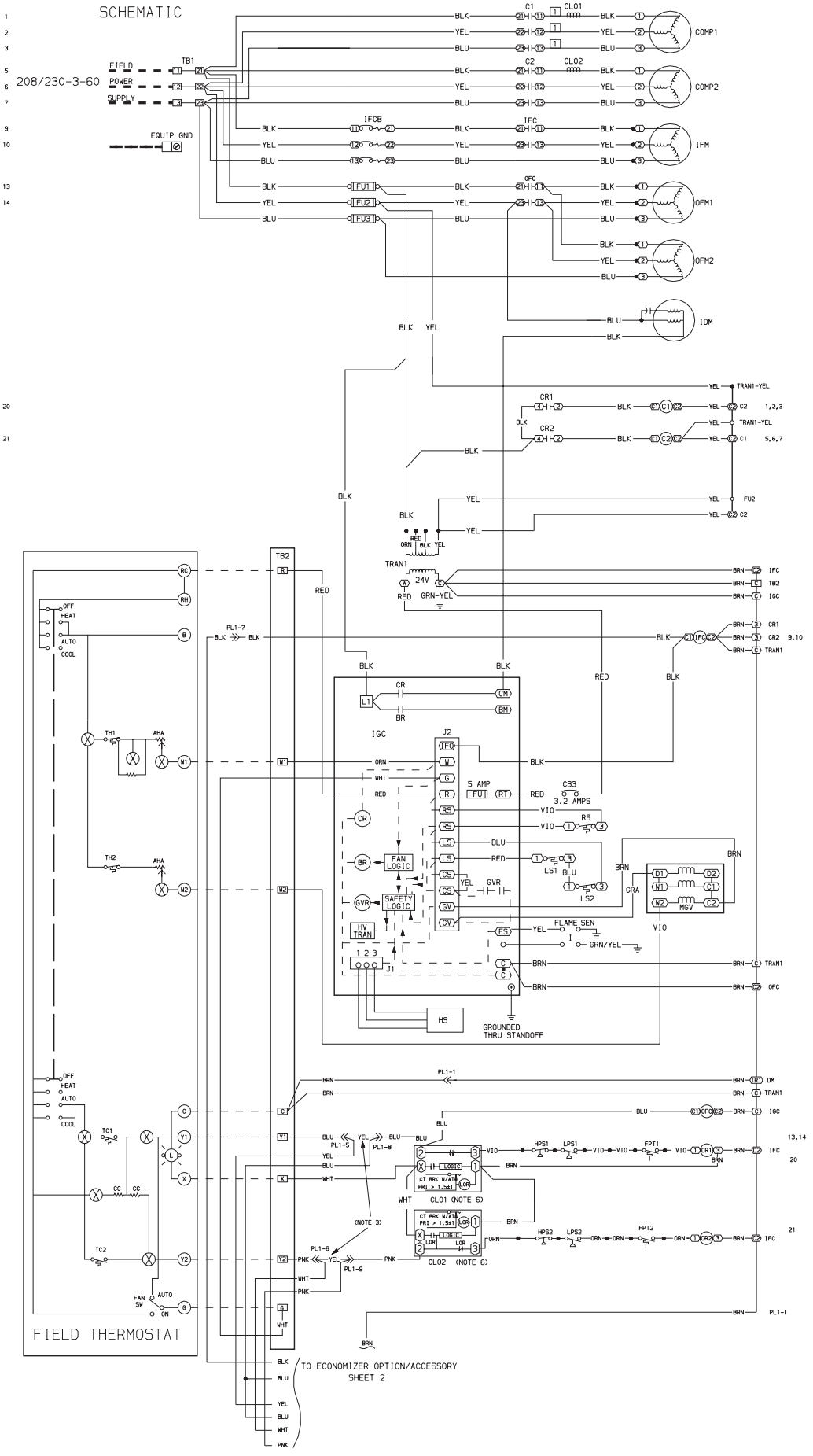


Fig. 38 — Typical Wiring Schematic (48TJ024, 208/230-V Shown)

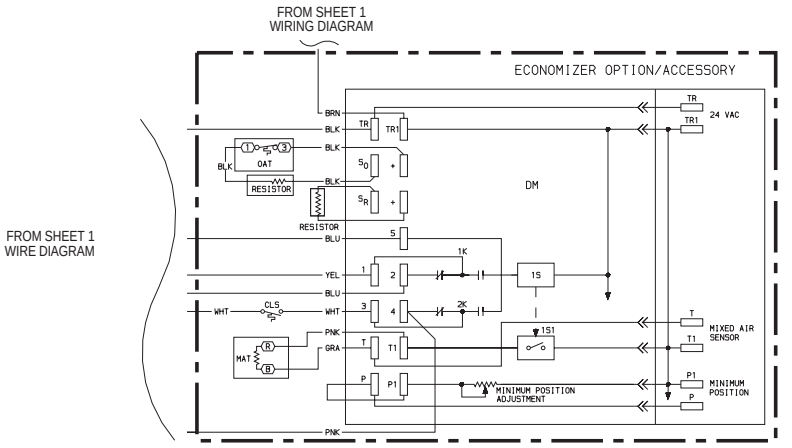


Fig. 38 — Typical Wiring Schematic (48TJ024, 208/230-V Shown) (cont)

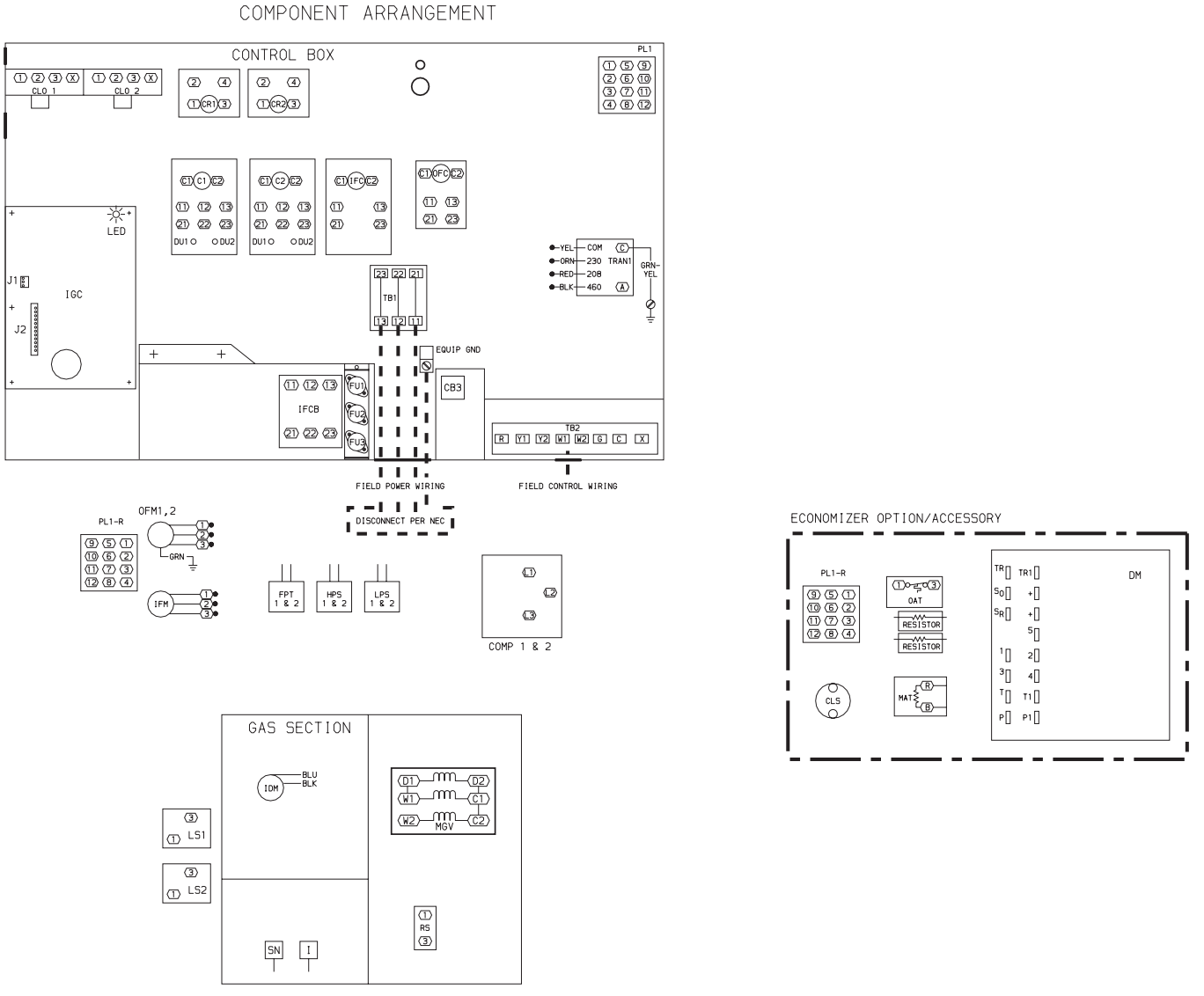


Fig. 39 — Typical Component Arrangement (48TJ024 Shown)

TROUBLESHOOTING

Refer to Tables 16 and 17 for troubleshooting details.

Table 16 — Cooling Service Analysis

PROBLEM	CAUSE	REMEDY
Compressor and condenser fan will not start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
Compressor will not start but condenser fan runs.	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective overload.	Determine cause and replace.
	Compressor locked out	Determine cause for safety trip and reset lockout.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor.	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective overload.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor.	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
Compressor operates continuously.	Dirty air filter.	Replace filter.
	Unit undersized for load.	Decrease load or increase unit size.
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak, repair, and recharge.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive head pressure.	Dirty air filter.	Replace filter.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Recover excess refrigerant.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.
Head pressure too low.	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Restriction in liquid tube.	Remove restriction.
Excessive suction pressure.	High heat load.	Check for source and eliminate.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction pressure too low.	Dirty air filter.	Replace filter.
	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Field-installed filter drier restricted.	Replace.
Compressor no. 2 will not run.	Unit in economizer mode.	Proper operation; no remedy necessary.

LEGEND

TXV — Thermostatic Expansion Valve

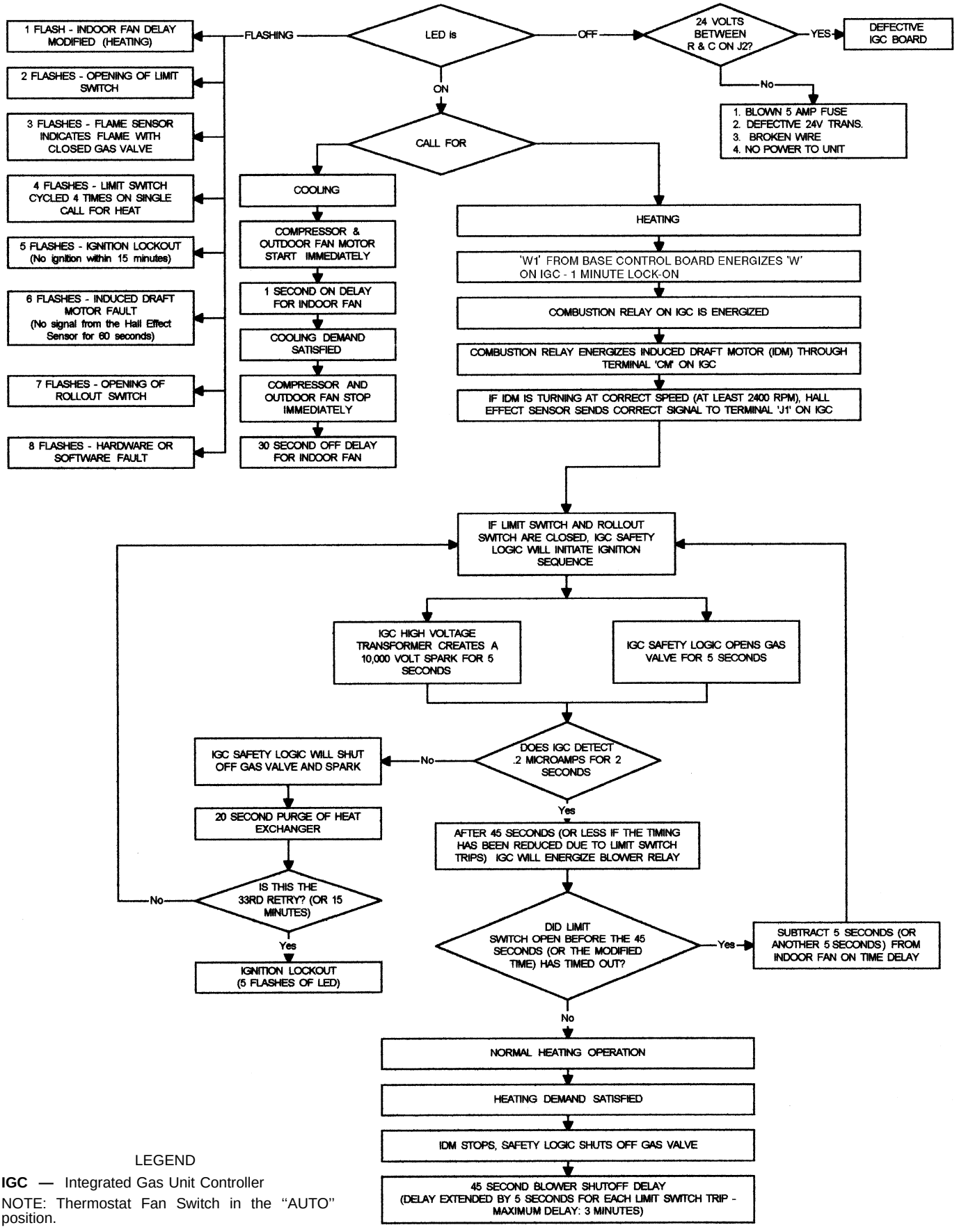
Table 17 — Heating Service Analysis

PROBLEM	CAUSE	REMEDY
Burners will not ignite.	Misaligned spark electrodes.	Check flame ignition and sensor electrode positioning. Adjust as needed.
	No gas at main burners.	Check gas line for air; purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to relight unit.
		Check gas valve.
	Water in gas line.	Drain water and install drip leg to trap water.
	No power to furnace.	Check power supply, fuses, wiring, and circuit breaker.
	No 24 v power supply to control circuit.	Check transformer. Transformers with internal overcurrent protection require a cool-down period before resetting. Check 24-v circuit breaker; reset if necessary.
	Miswired or loose connections.	Check all wiring and wire nut connections.
	Burned-out heat anticipator in thermostat.	Replace thermostat.
	Broken thermostat wires.	Run continuity check. Replace wires if necessary.
Inadequate heating.	Dirty air filter.	Clean or replace filter as necessary.
	Gas input to unit too low.	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure or replace with correct orifices.
	Unit undersized for application.	Replace with proper unit or add additional unit.
	Restricted airflow.	Clean filter, replace filter, or remove any restrictions.
	Blower speed too low.	Install alternate motor, if applicable, or adjust pulley to increase fan speed.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
	Too much outdoor air.	Adjust minimum position.
		Check economizer operation.
Poor flame characteristics.	Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO, sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger.
		Overfired unit — reduce input, change orifices, or adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners will not turn off.	Unit is locked into Heating mode for a one minute minimum.	Wait until mandatory one minute time period has elapsed or power to unit.

LEGEND

GR — Ground

Refer to Fig. 38 for IGC troubleshooting information.



LEGEND

IGC — Integrated Gas Unit Controller

NOTE: Thermostat Fan Switch in the "AUTO" position.

Fig. 38 — IGC Control (Heating and Cooling)

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)

☐ 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

☐ VERITY THAT SCROLL COMPRESSOR IS ROTATING IN THE CORRECT DIRECTION

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 (SIZES 020-028 ONLY)

REFRIGERANT DISCHARGE CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 _____ PSIG (SIZES 020-028 ONLY)

☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHART ON PAGE 25.

GENERAL

☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE