



Installation, Start-Up and Service Instructions

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SAFETY CONSIDERATIONS

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

Untrained personnel can perform 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.

⚠ CAUTION

The 48GJ units may only be charged with R-407C refrigerant. Do not use R-22.

The use of R-407C necessitates the use of a polyolester (POE) oil. POE oil is not to be confused with or mixed with mineral oil typically used in R-22 systems. Precautions must also be taken to minimize open exposure of the oil to atmosphere as it is very hygroscopic and will absorb moisture from the air. To minimize the possibility of moisture contamination to the refrigerant system a special 100% molecular sieve filter drier is used.

Refrigerant R-407C must always be charged liquid. Charging gas will cause the refrigerant to fractionate and change the chemical properties impacting system performance.

⚠ WARNING



Disconnect gas piping from unit when leak testing at pressure greater than 1/2 psig. Pressures greater than 1/2 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 1/2 psig, it *must* be replaced before use. When pressure testing field-supplied gas piping at pressures of 1/2 psig or less, a unit connected to such piping must be isolated by manually closing the gas valve(s).

⚠ WARNING

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

INSTALLATION

Unit is shipped in the vertical configuration. To convert to horizontal application, remove side duct opening covers. Using the same screws, install covers on vertical duct openings with the insulation-side down. Seals around duct openings must be tight.

Step 1 — Provide Unit Support

ROOF CURB — Assemble and install accessory roof curb in accordance with instructions shipped with curb. See Fig. 1A and 1B. Install insulation, cant strips, roofing, felt, and counter flashing as shown. *Ductwork must be attached to curb.* If gas, electric power, or control power is to be routed through the curb, attach the accessory thru-the-curb service connection plates to the roof curb in accordance with the accessory installation instructions. Connection plates must be installed before unit is set in roof curb.

UNIT SIZE 48GJ	"B"	"C"	"D" ALT DRAIN HOLE	"E" GAS	"F" POWER	"G" CONTROL	CONNECTOR PKG ACY
006	1'-9 1/16" [551]	1'-4" [406]	1' 3/4" [45]	3/4" NPT	3/4" NPT	3/4" NPT	50DJ900791 (THRU-THE-SIDE)
				3/4" NPT	3/4" NPT	1/2" NPT	CRBTMPWR001A00 (THRU-THE-BOTTOM)

NOTES:

1. Roof curb accessory is shipped unassembled
2. Insulated panels
3. Dimensions in [] are in millimeters.
4. Roof curb: galvanized steel.
5. Attach ductwork to curb. (Flanges of duct rest on curb.)
6. Service clearance 4 ft on each side.
7.  Direction of airflow.

ROOF CURB ACCESSORY	"A"	UNIT SIZE 48GJ
CRRFCURB001A00	1'-2" [356]	006
CRRFCURB002A00	2'-0" [610]	

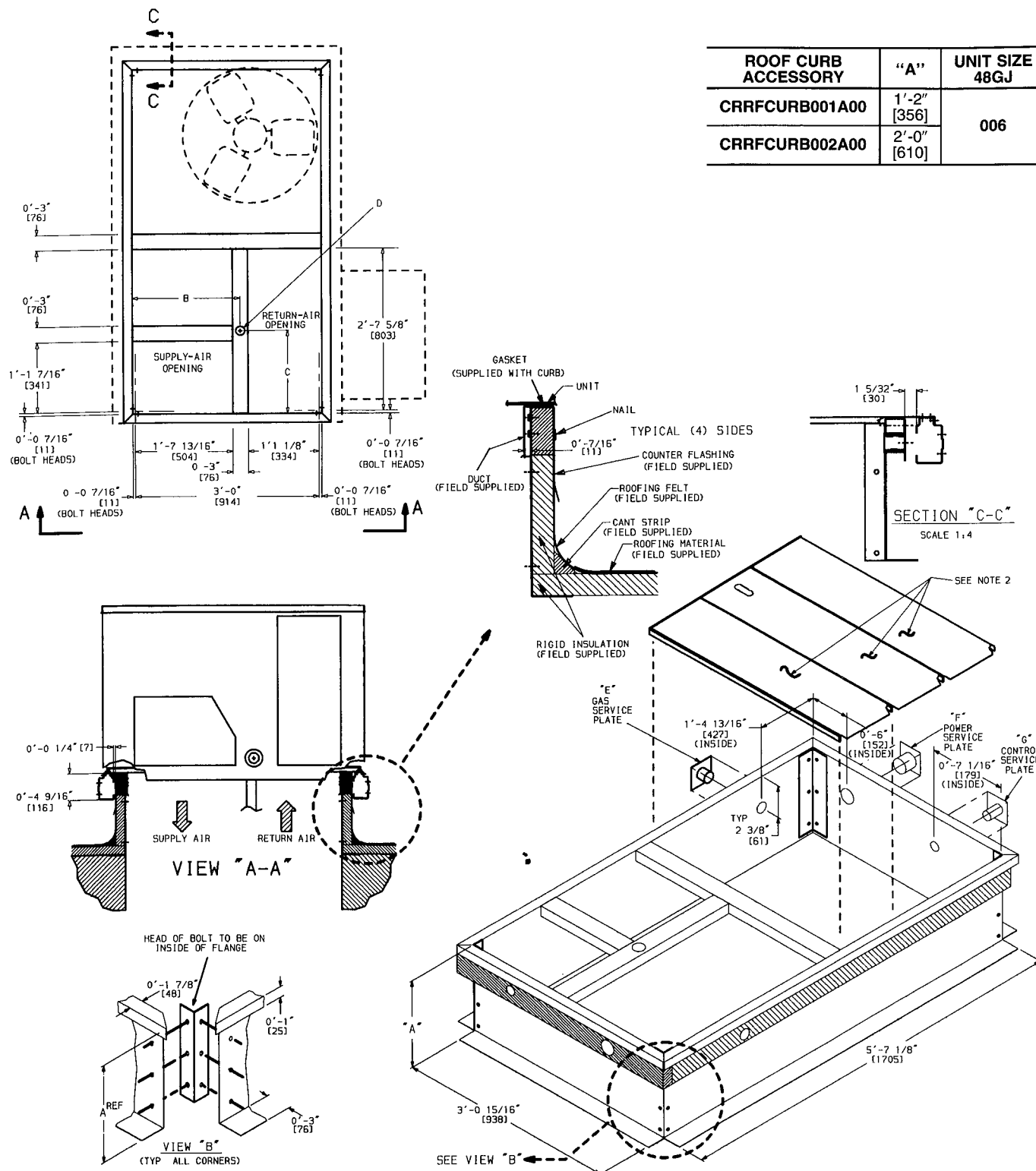


Fig. 1A - Roof Curb Details - 48GJ006

UNIT SIZE 48GJ	"B"	"C"	"D" ALT DRAIN HOLE	"E" GAS	"F" POWER	"G" CONTROL	CONNECTOR PKG ACY
008,012	1'-10 ¹⁵ / ₁₆ " [583]	1'-10 ¹⁵ / ₁₆ " [583]	1 ³ / ₄ " [45]	3/4" NPT	1" NPT	3/4" NPT	50DJ901551 (THRU-THE-SIDE)
				3/4" NPT	3/4" NPT	1/2" NPT	CRBTMPWR001A00 (THRU-THE-BOTTOM)
				3/4" NPT	1 ¹ / ₄ " NPT	1/2" NPT	CRBTMPWR002A00 (THRU-THE-BOTTOM)

NOTES:

1. Roof curb accessory is shipped unassembled
2. Insulated panels.
3. Dimensions in [] are in millimeters.
4. Roof curb: galvanized steel.
5. Attach ductwork to curb. (Flanges of duct rest on curb.)
6. Service clearance 4 ft on each side
7.  Direction of airflow.

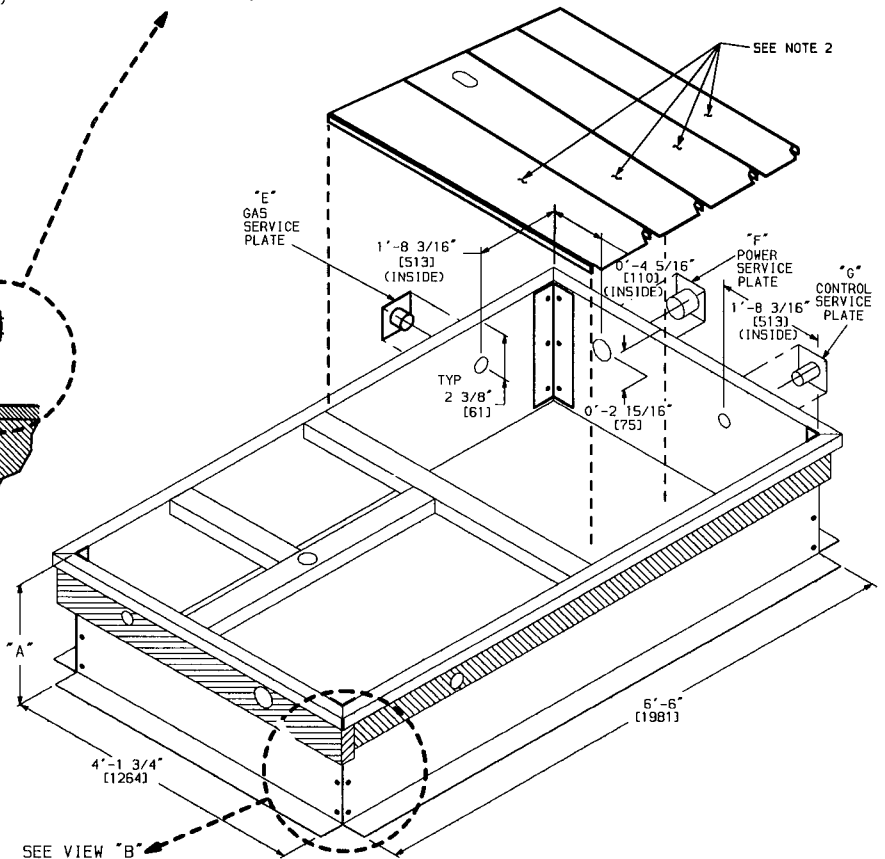
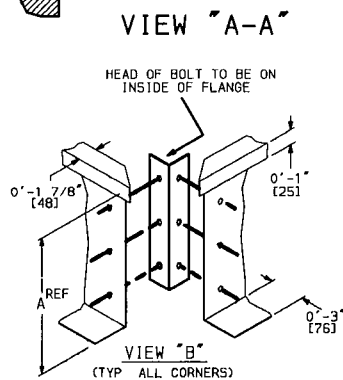
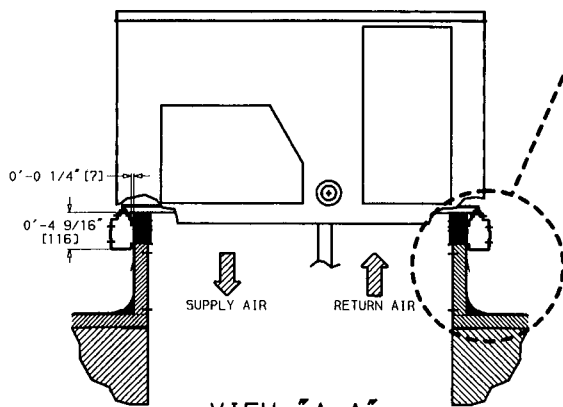
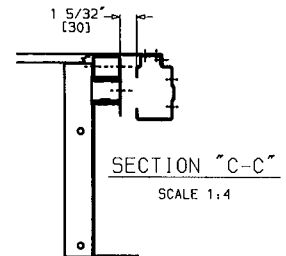
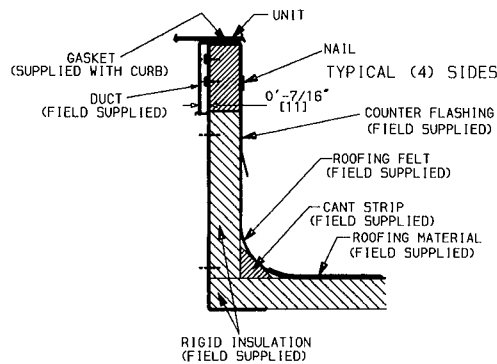
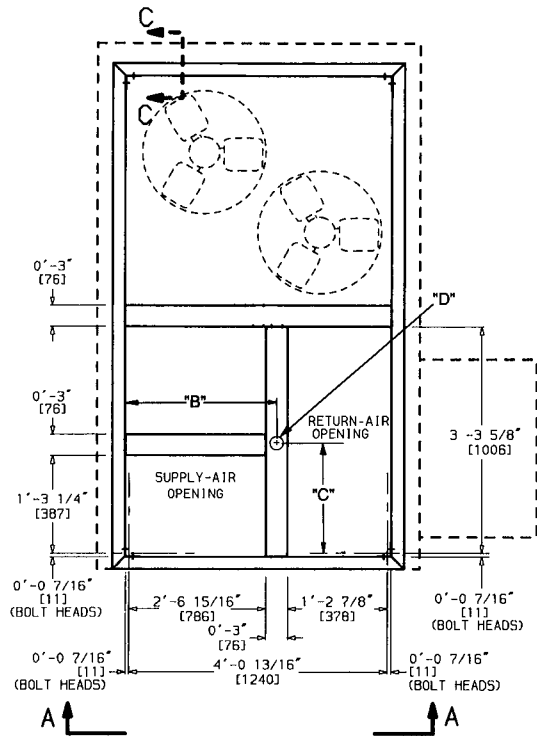


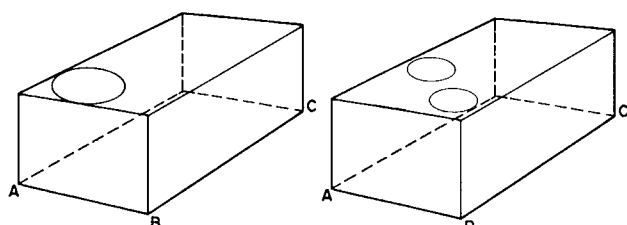
Fig. 1B – Roof Curb Details – 48GJ008,012

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

Curb should be level. Unit leveling tolerances are shown in Fig. 2. This is necessary for unit drain to function properly. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

SLAB MOUNT (Horizontal Units Only) — Provide a level concrete slab that extends a minimum of 6 in. beyond unit cabinet. Install a gravel apron in front of condenser coil inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on a roof curb if required.



48GJ006

48GJ008,012

MAXIMUM ALLOWABLE DIFFERENCE (in.)

A-B	B-C	A-C
0.5	1.0	1.0

Fig. 2 — Unit Leveling Tolerances

Step 2 — Field Fabricate Ductwork — On vertical units, secure all ducts to roof curb and building structure. *Do not connect ductwork to unit.* For horizontal applications, field-supplied flanges should be attached to horizontal discharge openings and all ductwork secured to the flanges. Insulate and weather-proof 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.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

A minimum clearance is not required around ductwork. Cabinet return-air static shall not exceed $-.35$ in. wg with Varislide™ or PARABLADE economizer or $-.45$ in. wg without economizer.

These units are designed for a minimum continuous return-air temperature of 50 F (dry bulb) or an intermittent operation down to 45 F (dry bulb), such as when used with a night setback thermostat.

Step 3 — Determine Location of Drain Line and External Trap — The unit's $\frac{3}{4}$ -in. condensate drain connections are located at the bottom and end of the unit. Unit discharge connections do not determine the use of drain connections; either drain connection can be used with vertical or horizontal applications.

When using the standard end drain connection, make sure the plug in the alternate bottom connection is tight before installing the unit.

To use the bottom drain connection for a roof curb installation, relocate the factory-installed plug from the bottom connection to the end connection. See Fig. 3. The piping for the condensate drain and external trap can be completed after the unit is in place.

All units must have an external trap for condensate drainage. Install a trap at least 4 in. deep and protect against freeze-up. See Fig. 4. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1 in. per 10 ft of run. Do not use a pipe size smaller than the unit connection.

Step 4 — Rig and Place Unit — Inspect unit for transportation damage. File any claim with transportation agency. Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 1 and Fig. 5 for additional information. Operating weight is shown in Table 1 and Fig. 5.

Lifting holes are provided in base rails as shown in Fig. 5, 6A, and 6B. Refer to rigging instructions on unit.

POSITIONING — Maintain clearance around and above unit to provide minimum distance from combustible materials, proper airflow, and service access. See Fig. 6A and 6B.

Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air.

Be sure that unit is installed so that snow will not block the combustion intake or flue outlet.

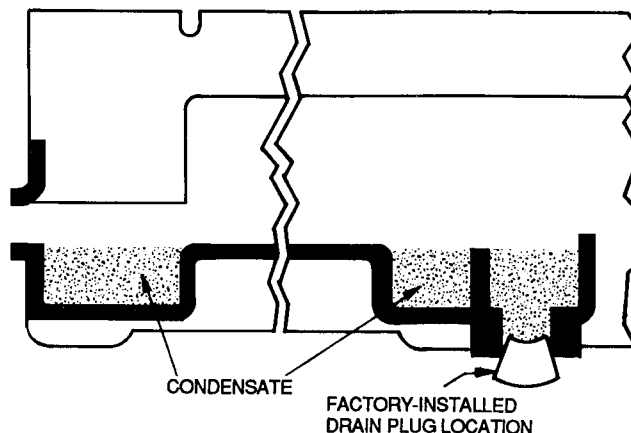
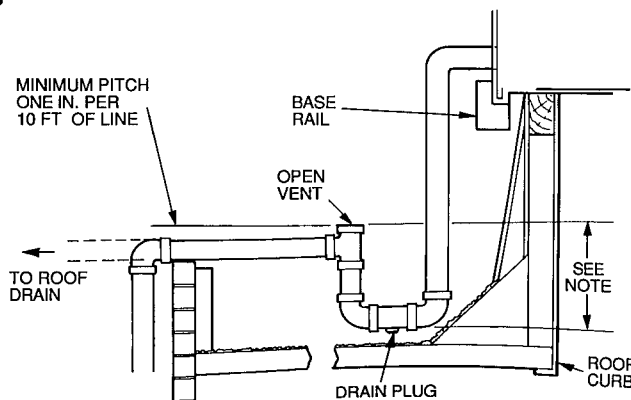


Fig. 3 — Condensate Drain Pan



NOTE: Trap should be deep enough to offset maximum unit static difference. A 4-in. trap is recommended

Fig. 4 — External Trap Condensate Drain

Unit may be installed directly on wood flooring or on Class A, B, or C roof-covering material when roof curb is used.

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

Position unit on roof curb so that the following clearances are maintained: 1/4-in. clearance between roof curb and base rails on each side and front of unit; 1 3/32-in. clearance between roof curb and rear of unit. (See Fig. 1A or 1B, section C-C.)

Locate mechanical draft system flue assembly at least 48 in. from any opening through which combustion products could enter the building, and at least 48 in. from an adjacent building or combustible material. When unit is located adjacent to public walkways, flue assembly must be at least 7 ft above grade.

Flue gas can deteriorate building materials. Orient unit so that flue gas will not affect building materials.

Adequate combustion-air space must be provided for proper operation of this equipment. Be sure that installation complies with all local codes and Section 5.3, Air for Combustion and Ventilation per NFGC, (National Fuel Gas Code), ANSI (American National Standards Institute) Z223.1 and Addendum Z223.1A (most recent year). In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

Flue vent discharge must have a minimum horizontal clearance of 4 ft from electric and gas meters, gas regulators, and gas relief equipment.

After unit is in position, remove shipping materials and rigging skids.

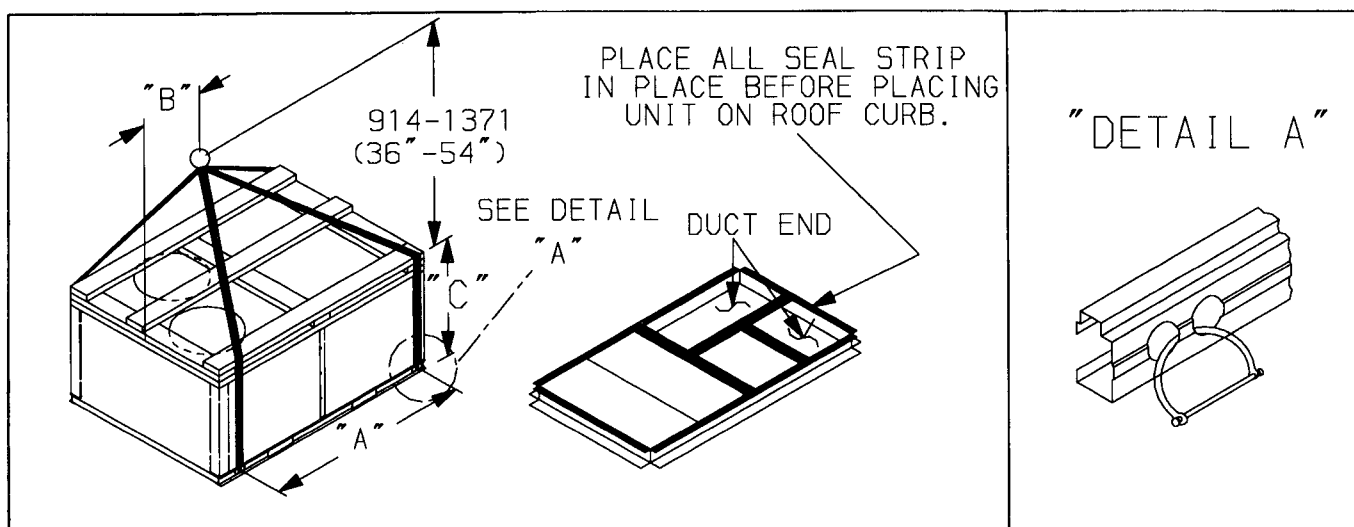
Step 5 — Install Flue Hood — Flue hood is shipped screwed to the burner compartment access panel. Remove from shipping location and, using screws provided, install flue hood in location shown in Fig. 6A, 6B, and 7.

Step 6 — Install Gas Piping — Unit is equipped for use with type of gas shown on nameplate. Refer to local building codes, or in the absence of local codes, to ANSI Z223.1 and Addendum Z223.1A (most recent year) entitled NFGC. In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

For natural gas applications, gas pressure at unit gas connection must not be less than 4.0 in. wg or greater than 13.0 in. wg while unit is operating. For liquid propane and high heat applications, the gas pressure must not be less than 5.0 in. wg or greater than 13.0 in. wg at the unit connection.

Size gas supply piping for 0.5-in. wg maximum pressure drop. Do not use supply pipe smaller than unit gas connection.

Support gas piping as shown in the table in Fig. 8. For example, a 3/4-in. gas pipe must have one field-fabricated support beam every 8 ft. Therefore, an 18-ft long gas pipe would have a minimum of 3 support beams. See Fig. 8 for typical pipe guide and locations of external manual gas shut-off valve.



NOTES:

1. Dimensions in () are in millimeters.
2. Hook rigging shackles through holes in base rail as shown in detail "A". Holes in base rails are centered around the unit center of gravity. Use wooden top skid when rigging to prevent rigging straps from damaging unit.
3. Weights include base unit without economizer. See Table 1 for unit operating weights with accessory economizer

48GJ	OPERATING WEIGHT		A		B		C	
	Lb	Kg	in.	mm	in.	mm	in.	mm
006	560	254	73.69	1872.0	33.5	902	33.31	847
008	870	395	77.42	1966.5	41.5	1054	42.12	1070
012	1035	469	77.42	1966.5	41.5	1054	50.12	1273

CAUTION

All panels must be in place when rigging.

Fig. 5 — Rigging Details

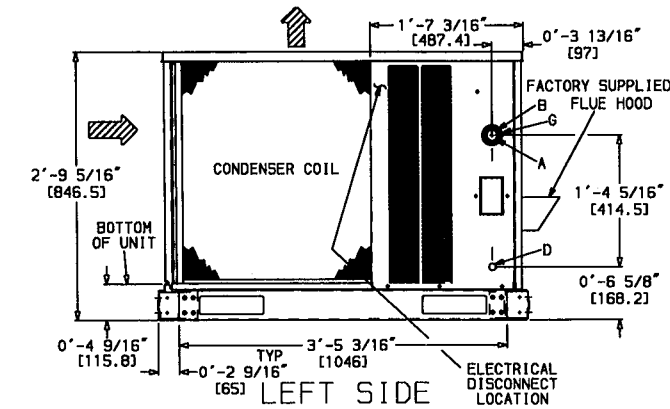
UNIT 48GJ	STD UNIT WEIGHT		VARISLIDE™ ECONOMIZER WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg
D/E/F006	560	254	34	15.4	134	60.8	129	58.5	146	66.2	151	68.5

NOTES:

- 1 Dimensions in [] are in millimeters.
- 2  Center of gravity
- 3  Direction of airflow.

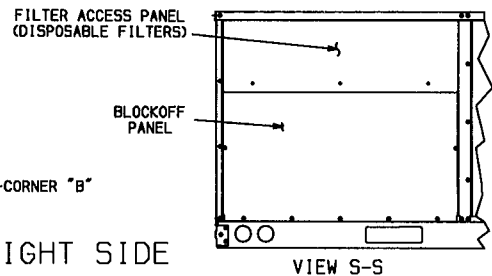
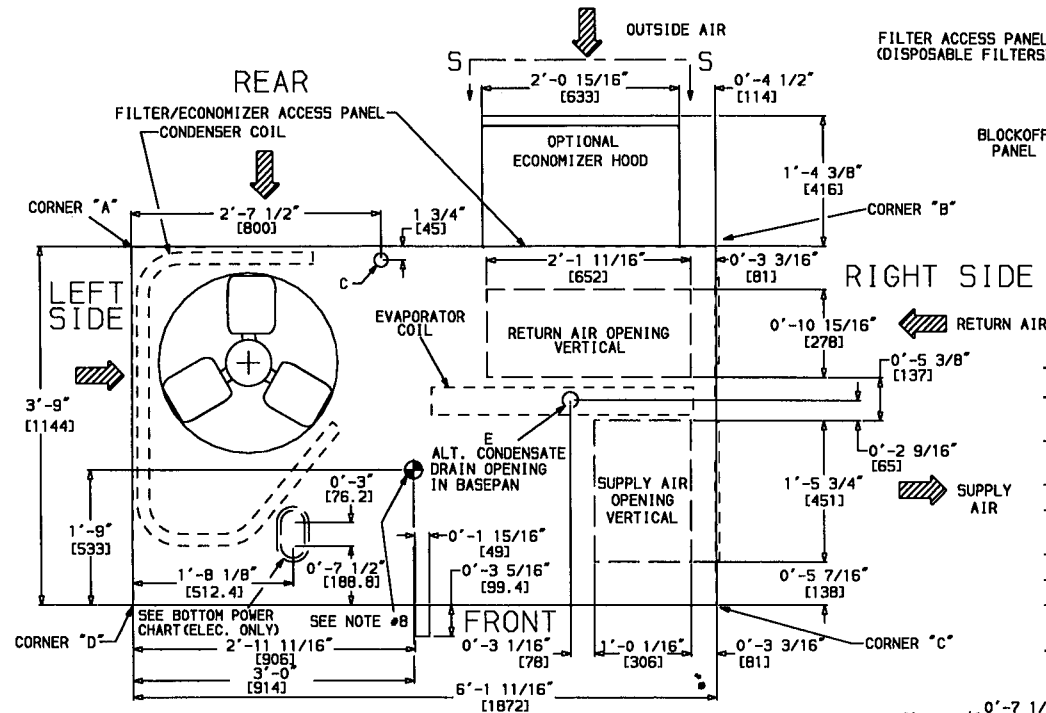
- 4 On vertical discharge units, ductwork to be attached to accessory roof curb only. For horizontal discharge units, field-supplied flanges should be attached to horizontal discharge openings, and all ductwork should be attached to the flanges.

- 5 Minimum clearance (local codes or jurisdiction may prevail):
 - a. Between unit, flue side and combustible surfaces, 48 inches (18 in. when using accessory flue discharge deflector.)
 - b. Bottom of unit to combustible surfaces (when not using curb), 1 inch. Bottom of base rail to combustible surfaces (when not using curb) 0 inches
 - c. Condenser coil, for proper airflow, 36 in. one side, 12 in. the other. The side getting the greater clearance is optional.
 - d. Overhead, 60 in. to assure proper condenser fan operation.
 - e. Between units, control box side, 42 in. per NEC (National Electrical Code).
 - f. Between unit and ungrounded surfaces, control box side, 36 in. per NEC
 - g. Between unit and block or concrete walls and other grounded surfaces, control box side, 42 in. per NEC
 - h. Horizontal supply and return end, 0 inches
6. With the exception of the clearance for the condenser coil and combustion side as stated in notes 5a, b and c, a removable fence or barricade requires no clearance.
- 7 Units may be installed on combustible floors made from wood or Class A, B, or C roof covering material if set on base rail.
- 8 The vertical center of gravity is 1'-6" [457] up from the bottom of the base rail.



BOTTOM POWER CHART, THESE HOLES REQUIRED FOR USE WITH ACCESSORY PACKAGES - CRBTMPWR001A00 (1/2", 3/4")

THREADED CONDUIT SIZE	WIRE SIZE	REQ'D HOLE SIZES (MAX.)
1/2"	24 v POWER	7/8" [22.2]
3/4"		1 1/8" [28.4]



CONNECTION SIZES	
A	1 5/8" Dia [35] Field Power Supply Hole
B	2" Dia [51] Power Supply Knockout
C	1 1/4" Dia [44] Charging Port Hole
D	7/8" Dia [22] Field Control Wiring Hole
E	3/4"-14 NPT Condensate Drain
F	1/2"-14 NPT Gas Connection
G	2 1/2" Dia [64] Power Supply Knockout

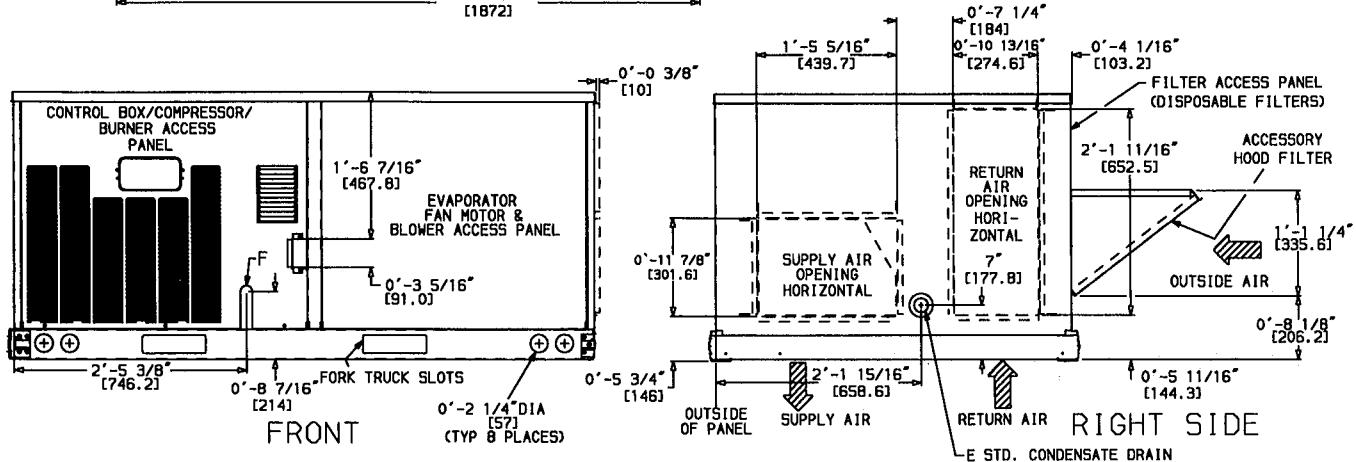


Fig. 6A - Base Unit Dimensions - 48GJ006

UNIT 48GJ	STD. UNIT WEIGHT		VARISLIDE™ ECONOMIZER WEIGHT		PARABLADE ECONOMIZER WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		"H"		"J"		"K"		"L"	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Ft-in.	mm	Ft-in.	mm	Ft-in.	mm	Ft-in.	mm
D/E/F008	870	395	44	20	62	28	189	86	161	73	239	109	280	127	1-2 ⁷ / ₈	378	3-5 ¹ / ₈	1050	2-9 ¹ / ₈	856	2-2 ⁷ / ₈	672
D/E/F012	1035	469	44	20	62	28	225	102	192	87	285	129	333	151	2-5 ⁷ / ₈	759	4-1 ¹ / ₈	1253	3-0 ⁷ / ₈	924	2-10 ⁷ / ₈	875

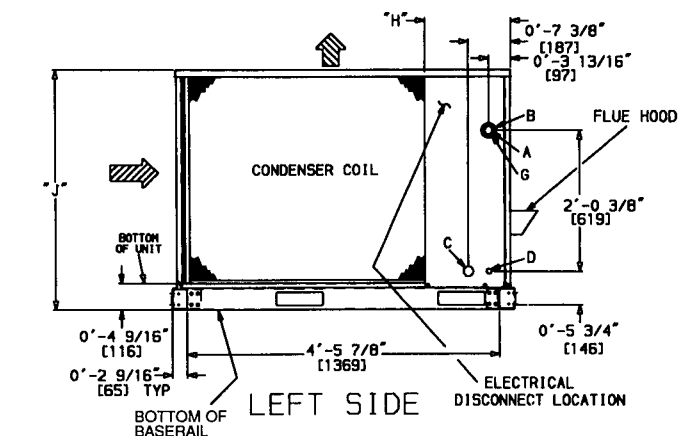
BOTTOM POWER CHART, THESE HOLES REQUIRED FOR USE WITH ACCESSORY PACKAGES — CRBTMPWR001A00 (1/2", 3/4") OR CRBTMPWR002A00 (1/2", 1 1/4")

THREADED CONDUIT SIZE	WIRE SIZE	REQ'D HOLE SIZES (MAX.)
1/2"	24 v POWER*	7/8" [22.2]
3/4"	24 v POWER*	1 1/8" [28.4]
1 1/4"	24 v POWER*	1 3/4" [44.4]

*Select either 3/4" or 1 1/4" for power, depending on wire size.

NOTES:

- Dimensions in [] are in millimeters
-  Center of Gravity
-  Direction of airflow
- On vertical discharge units, ductwork to be attached to accessory roof curb only. For horizontal discharge units, field supplied flanges should be attached to horizontal discharge openings, and all ductwork should be attached to the flanges
- Minimum clearance (local codes or jurisdiction may prevail):
 - Between unit, flue side, and combustible surfaces, 48 inches (18 in with accessory flue discharge deflector)
 - Bottom of unit to combustible surfaces (when not using curb) 1 inch Bottom of base rail to combustible surfaces (when not using curb) 0 inches.
 - Condenser coil, for proper airflow, 36 in on one side, 12 in the other The side getting the greater clearance is optional
 - Overhead, 60 in to assure proper condenser fan operation.
 - Between units, control box side, 42 in per NEC (National Electrical Code)
 - Between unit and ungrounded surfaces, control box side, 36 in per NEC
 - Between unit and block or concrete walls and other grounded surfaces, control box side, 42 in. per NEC
 - Horizontal supply and return end, 0 inches
- With the exception of the clearance for the condenser coil and combustion side as stated in Note 5a, b, and c, a removable fence or barricade requires no clearance
- Units may be installed on combustible floors made from wood or Class A, B, or C roof covering material if set on base rail
- The vertical center of gravity is 1'-7" [483] for 008 1'-11" [584] for 012 up from the bottom of the base rail



CONNECTION SIZES	
A	1 1/8" Dia. [35] Field Power Supply Hole
B	2 1/2" Dia [64] Power Supply Knock-Out
C	1 1/4" Dia. [44] Charging Port Hole
D	7/8" Dia [22] Field Control Wiring Hole
E	3/4"-14 NPT Condensate Drain
F	1/2"-14 NPT Gas Connection 48GJD008 3/4"-14 NPT Gas Connection 48GJE,F008; 48GJD,E,F012
G	2" Dia [51] Power Supply Knock-Out

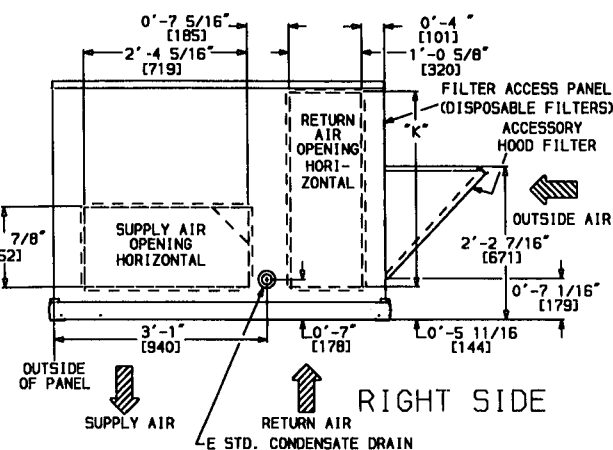
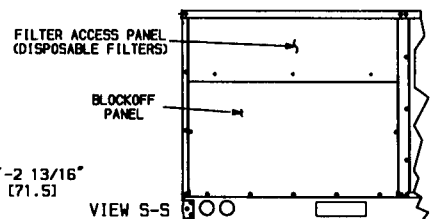
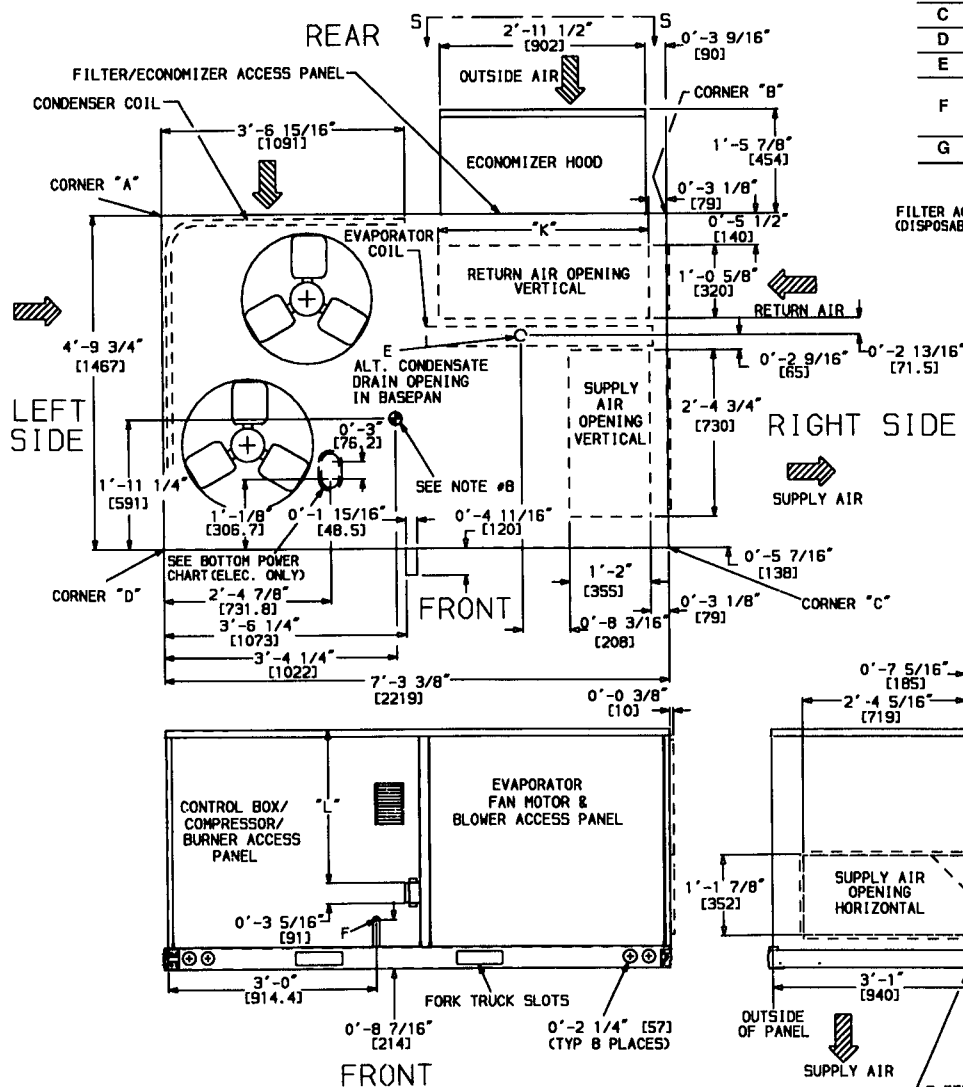


Fig. 6B — Base Unit Dimensions — 48GJ008,012

Table 1 — Physical Data

BASE UNIT 48GJ	D/E/F006	D/E/F008	D/E/F012
NOMINAL CAPACITY (tons)	5	7½	10
OPERATING WEIGHT (lb)			
Unit	560	870	1035
With Varislide™ Economizer	594	914	1079
With PARABLADE Economizer	602	932	1097
Roof Curb	115	143	143
COMPRESSOR		Scroll	
Quantity	1	2	2
Oil (oz) (each compr)	50	57	57
REFRIGERANT TYPE		R-407C	
Operating Charge (lb-oz)			
Circuit 1	9-12	7- 6	9-2
Circuit 2	—	6-15	10-2
CONDENSER FAN		Propeller	
Quantity...Diameter (in.)	1.. 22	2.. 22	2...22
Nominal Cfm	4000	6500	7000
Motor Hp...Rpm	¼..1100	¼...1100	¼...1100
Watts Input (Total)	400	650	650
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins	
Rows...Fins/in.	2...17	2...17	2...17
Total Face Area (sq ft)	16.53	20.5	25.0
EVAPORATOR FAN		Centrifugal Type, Belt Drive	
Size (in.)	10 x 10	15 x 15	15 x 15
Nominal Cfm	2000	3000	4000
Maximum Continuous Bhp	1.80	2.90	4.20
Motor Frame Size	56	56	56
Fan Rpm Range	1020-1460	840-1085	860-1080
Motor Bearing Type	Ball	Ball	Ball
Maximum Fan Rpm	2100	2100	2100
Motor Pulley Pitch Diameter A/B (in.)	2.4/3.4	3 4/4.4	4.0/5.0
Nominal Motor Shaft Diameter (in.)	7/8	7/8	7/8
Fan Pulley Pitch Diameter (in.)	4.0	7 0	8.0
Belt — Type...Length (in.)	A.. 40	A...51	A.. 51
Pulley Center Line Distance (in.)	14.7-15 5	16.75-19.25	15.85-17 50
Speed Change Per Full Turn of Movable Pulley Flange (rpm)	75	50	45
Movable Pulley Maximum Full Turns from Closed Position	6	5	5
Factory Setting — Full Turns Open	3	5	5
Factory Speed Setting (rpm)	1240	840	860
Fan Shaft Diameter at Pulley (in.)	5/8	1	1
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double Wavy Fins	
Rows...Fins/in.	4.. 15	3.. 15	4.. 15
Total Face Area (sq ft)	5.5	8 9	11.1
FURNACE SECTION			
Rollout Switch Cutout (Temp (F))*	195	195	195
Burner Orifice Diameter (in. ...drill size)†			
Natural Gas — Std	113 33/ 113 33/ 129. 30	.120. .31	120 .31/.120.. 31/ 129 30
Liquid Propane — Alt**	.089 . 43/.089 .43/ 102...38	096 41	096 41/.096 . 41/.102 . 38
Thermostat Heat Anticipator Setting (amps)			
Stage 1	14	14/14/ 14	.14
Stage 2	.14	14/20/20	.20
Gas Input Stage 1	50,000/ 82,000/120,000	90,000/120,000/180,000	120,000/180,000/200,000
Stage 2	72,000/115,000/150,000	125,000/180,000/220,000	180,000/220,000/250,000
Efficiency (Steady State) (%)	82/81/80	82/82/82	82/82/80
Temperature Rise Range	15-45/35-65/50-80	20-50/35-65/45-75	35-65/35-65/40-70
Manifold Pressure (in. wg)			
Natural Gas — Std	3.5	3.5	3.5
Liquid Propane — Alt**	3.5	3.5	3.5
Field Gas Connection Size (in.)	.50	50/ 75/.75	75/.75/.75
HIGH-PRESSURE SWITCH (psig)		450 ± 50	
Standard Compressor Internal Relief Cutout		428	
Reset (Auto.)		320	
LOSS-OF-CHARGE/LOW-PRESSURE SWITCH (Liquid Line) (psig)			
Cutout		7 ± 3	
Reset (Auto.)		22 ± 7	
FREEZE-PROTECTION THERMOSTAT			
Opens (F)		30 ± 5	
Closes (F)		45 ± 5	
OUTDOOR-AIR INLET SCREENS		Cleanable	
Quantity...Size (in.)	1. 20 x 24 x 1	1 .20 x 25 x 1 1 .16 x 25 x 1	
RETURN-AIR FILTERS		Throwaway	
Quantity...Size (in.)	2 16 x 25 x 2	4...16 x 20 x 2	4 . 20 x 20 x 2

LEGEND

Bhp — Brake Horsepower

*Indicates automatic reset

†48GJD006 units have 2 burners.

48GJE/F006 units have 3 burners

48GJD008 units have 3 burners

48GJD012 and 48GJE008 units have 4 burners

48GJF008; 48GJE/GJF012; units have 5 burners.

**Liquid propane conversion kit is available as an accessory

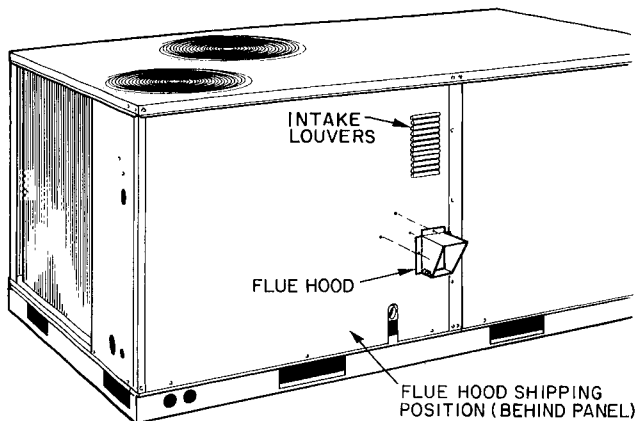
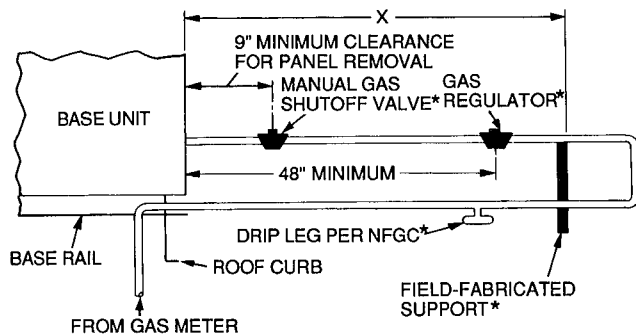


**Fig. 7 — Flue Hood Details
(48GJ008 Shown)**



LEGEND

NFGC — National Fuel Gas Code

*Field Supplied.

NOTE: Follow all local codes.

STEEL PIPE NOMINAL DIAMETER (in.)	SPACING OF SUPPORTS X DIMENSION (ft)
1/2	6
3/4 or 1	8
1 1/4 or Larger	10

**Fig. 8 — Gas Piping Guide (With
Accessory Thru-the-Curb
Service Connections)**

Step 7 — Make Electrical Connections

⚠ WARNING

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code) ANSI/NFPA (National Fire Protection Association), latest edition, and local electrical codes. *Do not use gas piping as an electrical ground.* Failure to follow this warning could result in the installer being liable for personal injury of others.

FIELD POWER SUPPLY — All units except 208/230-v units are factory wired for the voltage shown on the nameplate. If the 208/230-v unit is to be connected to a 208-v power supply, the transformer *must* be rewired by moving the black wire from the 230-v orange wire on the transformer and connecting it to the 200-v red wire from the transformer. The orange wire then must be insulated.

Refer to unit label diagram for additional information. Pigtails are provided for field service. Use factory-supplied splices or UL (Underwriters' Laboratories) approved copper connector.

When installing units, provide a disconnect per NEC.

All field wiring must comply with NEC and local requirements. In Canada, electrical connections must be made in accordance with CSA (Canadian Standards Association) C22.1 Canadian Electrical Code Part One.

Install conduit through side panel openings indicated in Fig. 6A and 6B. Route power lines through connector to terminal connections as shown in Fig. 9.

On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in Tables 2A and 2B, Note 2 to determine the percentage of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

NOTE: If thru-the-bottom accessory connections are used, refer to the thru-the-bottom accessory installation instructions for power wiring. Refer to Fig. 6A and 6B for location to drill holes in basepan.

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

Route thermostat cable or equivalent single leads of colored wire from subbase terminals to low-voltage connections on unit (shown in Fig. 10) as described in Steps 1-4 below.

1. If unit is mounted on roof curb and accessory thru-the-curb service plate connection is used, route wire through connection plate.
2. Pass control wires through the hole provided on unit (see connection D, Connection Sizes table, Fig. 6A and 6B).
3. Feed wires through the raceway built into the corner post to the 24-v barrier located on the left side of the control box. See Fig. 11. The raceway provides the UL required clearance between high- and low-voltage wiring.
4. Connect thermostat wires to screw terminals of low voltage connection board (see Fig. 10).

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gauge) insulated wire (35 C minimum). For 51 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: All wire larger than no. 18 AWG cannot be directly connected to the thermostat will require a junction box and splice at the thermostat.

HEAT ANTICIPATOR SETTINGS — On 48GJ006 units, set heat anticipator settings at .14 amp for both first and second stages. On 48GJ008 units, set heat anticipator settings at .14 amp for both first and second stage heating for low heat. For all other stages and unit sizes, set heat anticipator settings at .14 amp for first stage and .20 amp for second-stage heating.

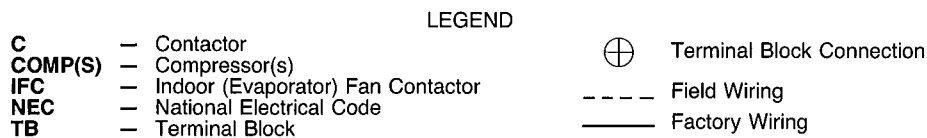
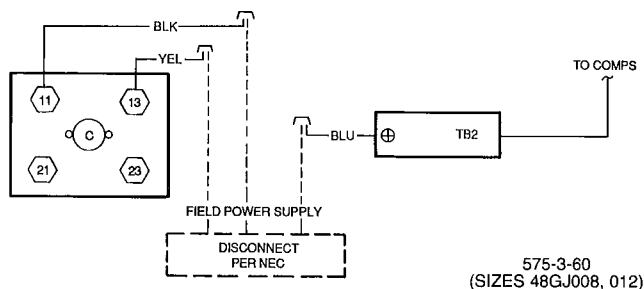
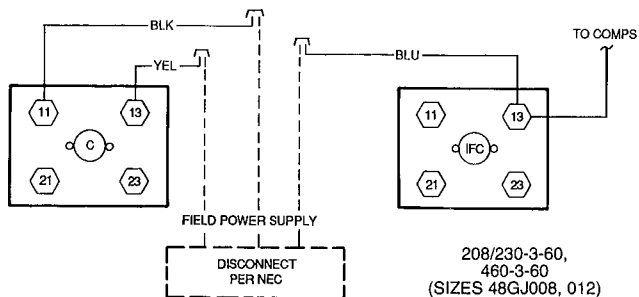
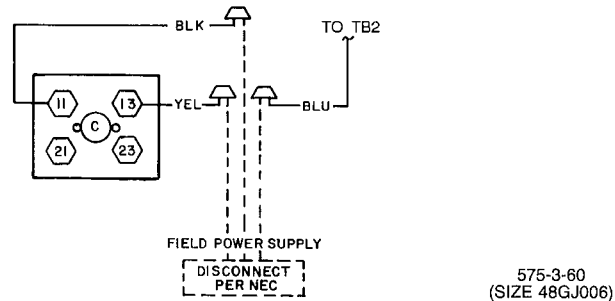
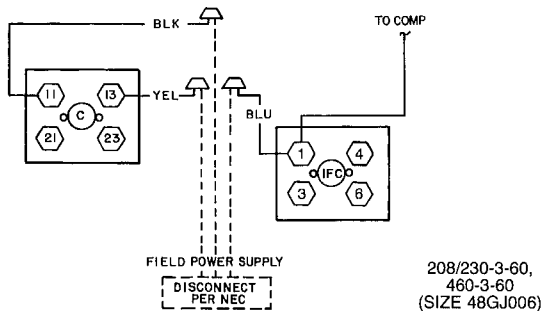


Fig. 9 — Power Wiring Connections

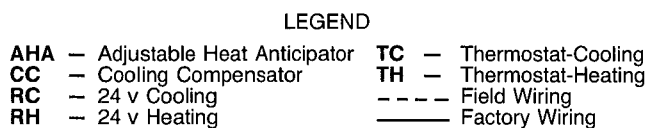
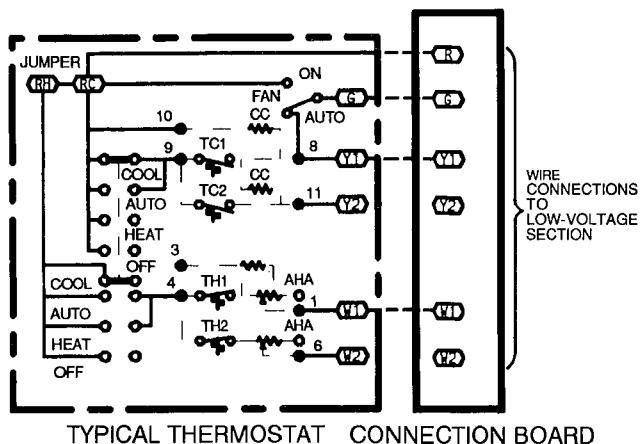


Fig. 10 — Low-Voltage Connections With or Without Economizer

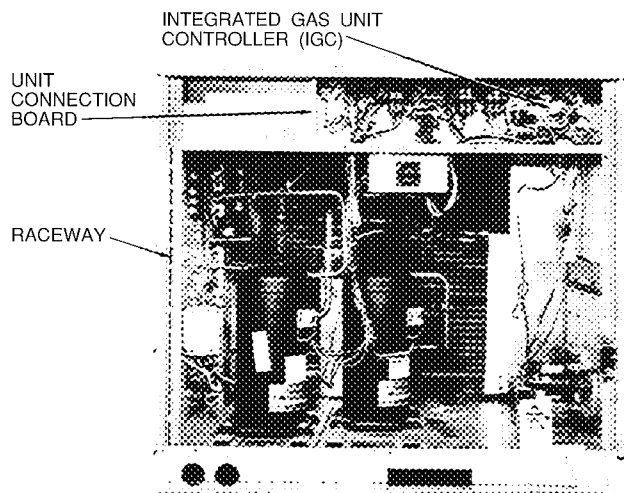


Fig. 11 — Field Control Wiring Raceway (48GJ008 Shown)

Table 2A – Electrical Data
(Units Without Electrical Convenience Outlet)

UNIT 48GJ	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR (each)		OFM (each)	IFM	COMBUSTION FAN MOTOR	POWER SUPPLY		MINIMUM UNIT DISCONNECT SIZE	
		Min	Max	RLA	LRA	FLA	FLA	FLA	MCA	MOCP	FLA	LRA
D/E/F006 (5 Tons)	208/230-3-60	187	254	17.3	123.0	1.5	5.8	.57	28.9/28.9	35/35*	28/28	168/168
	460-3-60	414	508	9.0	62.0	0.8	2.6	.30	14.7	20*	14	84
	575-3-60	518	632	7.1	50.0	0.8	2.6	.30	11.6	15*	11	59
D/E/F008 (7½ Tons)	208/230-3-60	187	254	12.4	88.0	1.4	7.5	.57	38.2/38.2	45/45*	40/40	242/242
	460-3-60	414	508	6.4	44.0	0.7	3.4	.30	19.2	25*	20	121
	575-3-60	518	632	4.8	34.0	0.7	3.4	.30	14.6	20*	16	95
D/E/F012 (10 Tons)	208/230-3-60	187	254	17.3	123.0	1.4	10.6	.57	52.3/52.3	60/60	55/55	337/337
	460-3-60	414	508	10.0	62.0	0.7	4.8	.30	28.7	35*	30	170
	575-3-60	518	632	7.9	50.0	0.7	4.8	.30	22.7	25*	24	136

Table 2B – Electrical Data
(Units With Electrical Convenience Outlet)

UNIT 48GJ	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR (each)		OFM (each)	IFM	COMBUSTION FAN MOTOR	POWER SUPPLY		MINIMUM UNIT DISCONNECT SIZE	
		Min	Max	RLA	LRA	FLA	FLA	FLA	MCA	MOCP	FLA	LRA
D/E/F006 (5 Tons)	208/230-3-60	187	254	17.3	123.0	1.5	5.8	.57	34.9/34.9	40/40*	34/34	173/173
	460-3-60	414	508	9.0	62.0	0.8	2.6	.30	17.4	20*	17	87
	575-3-60	518	632	7.1	50.0	0.8	2.6	.30	13.8	20*	13	61
D/E/F008 (7½ Tons)	208/230-3-60	187	254	12.4	88.0	1.4	7.5	.57	44.2/44.2	50/50*	46/46	247/247
	460-3-60	414	508	6.4	44.0	0.7	3.4	.30	21.9	25*	23	124
	575-3-60	518	632	4.8	34.0	0.7	3.4	.30	16.8	20*	18	97
D/E/F012 (10 Tons)	208/230-3-60	187	254	17.3	123.0	1.4	10.6	.57	58.3/58.3	70/70	61/61	341/341
	460-3-60	414	508	10.0	62.0	0.7	4.8	.30	31.4	35*	33	172
	575-3-60	518	632	7.9	50.0	0.7	4.8	.30	24.9	30*	26	138

LEGEND

CUL – Canadian Underwriters' Laboratories
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.



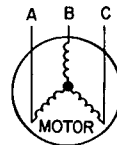
NOTES:

- 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. The CUL units may be fuse or circuit breaker.
- Unbalanced 3-phase Supply Voltage**
Never operate a motor where phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent voltage imbalance.

% Voltage imbalance

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

EXAMPLE: Supply voltage is 460-3-60.



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

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

Determine maximum deviation from average voltage.

$$(AB) 457 - 452 = 5 \text{ v}$$

$$(BC) 464 - 457 = 7 \text{ v}$$

$$(AC) 457 - 455 = 2 \text{ v}$$

Maximum deviation is 7 v.

Determine percent voltage imbalance.

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

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

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

Step 8 — Adjust Factory-Installed Options

APOLLO CONTROL — The optional Apollo control is used to actively monitor all modes of operation as well as indoor (evaporator) fan status, filter status, and indoor-air quality. The Apollo control is designed to work with Carrier TEMP and VVT® systems.

The thermostat must be wired to the Apollo control before starting the unit. Refer to the Apollo control installation instructions for information on installing the thermostat. See Fig. 12 for Apollo location.

DISCONNECT SWITCH — The optional disconnect switch is non-fused. The switch has the capability of being locked in place for safety purposes.

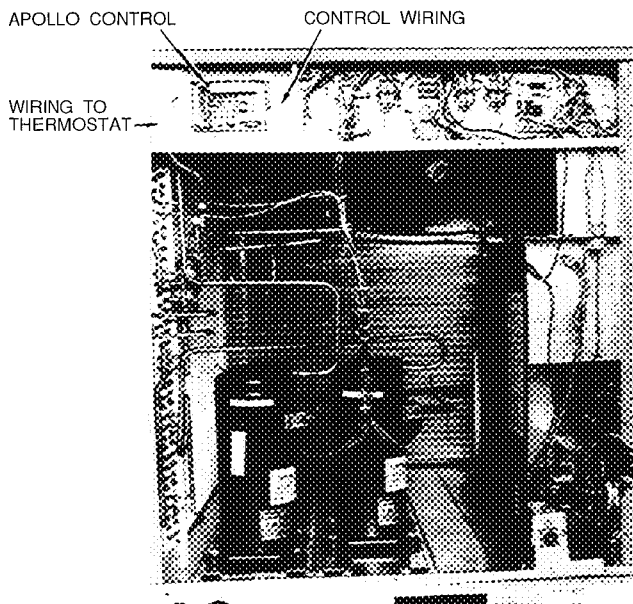


Fig. 12 — Apollo Control Factory-Installed in Typical Unit

OPTIONAL VARISLIDE™ ECONOMIZER — The optional economizer hood assembly is packaged and shipped in the filter section. Damper blades and control boards are installed at the factory and the economizer is shipped in the vertical discharge position.

NOTE: Horizontal discharge block-off plate is shipped with the air hood package. If unit is to be used for vertical discharge application, discard this plate.

Assembly

1. Determine if ventilation air is required in building. If so, determine the minimum amount to be supplied by each unit and record quantity of ventilation air needed for use in Step 8.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove filter access panel. Remove outdoor-air opening panel. Save panels and screws. See Fig. 13. Remove optional outdoor-air damper hood package from filter section.
3. Assemble outdoor-air hood top and side plates as shown in Fig. 14. Install seal strips on hood top and sides. Put aside screen retainer and retainer screw for later assembly. *Do not attach hood to unit at this time.*
4. On 012 units, install vertical discharge block-off plate over duct openings. See Fig. 15.
5. Slide economizer into unit and secure with screws. See Fig. 16.

NOTE: Be sure to engage rear economizer flange under tabs in vertical return-air opening.

6. To convert to horizontal discharge application:
 - a. Rotate the economizer 90 degrees until the economizer motor faces the condenser section (see Fig. 17).
 - b. Rotate the barometric relief damper cover 90 degrees.
 - c. Install horizontal discharge block-off plate over the opening on the access panel. (Block-off plate **MUST** be installed before installing hood assembly.) See Fig. 18.
7. Insert economizer plug into economizer harness. Remove tape from barometric relief damper. See Fig. 16.
8. If ventilation air is not required, proceed to Step 9. If ventilation air is required, determine the minimum position setting for required airflow. See Fig. 19A and 19B. Adjust minimum position setting by adjusting the screws on the position setting bracket. Slide bracket until the top screw is in the position determined by Fig. 19A and 19B. Tighten screws.
9. Remove tape from outdoor-air thermostat (OAT). Fasten OAT to inside of hood using screws and speed clips provided. See Fig. 20. Make sure OAT terminals are positioned up.
10. Replace outdoor-air opening panel using screws from Step 2. Replace filter access panel. Ensure the filter access panel slides along the tracks and is securely engaged.
11. Fasten hood top and side plate assembly to outdoor-air opening panel with screws provided.
12. Place knob supplied with economizer on OAT. See Fig. 20. Set for 3° F below indoor room thermostat

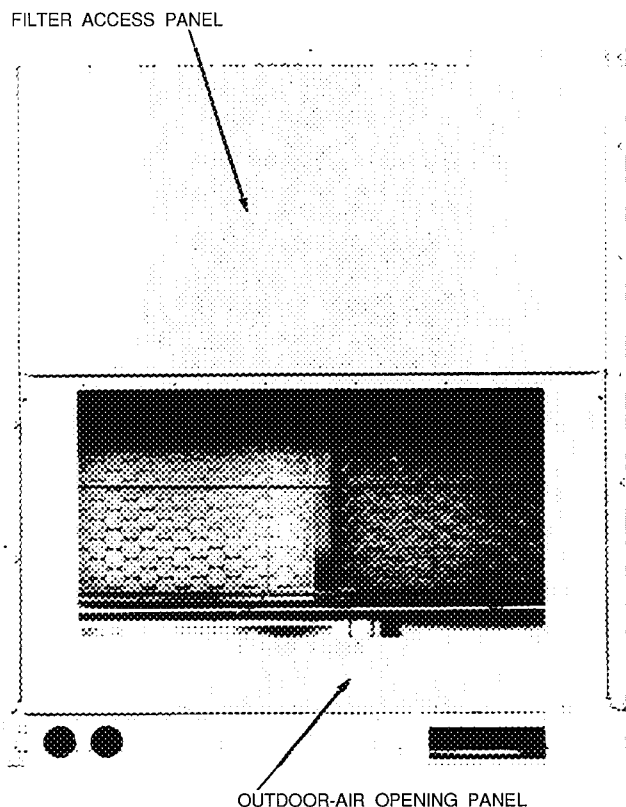


Fig. 13 — Access Panel Locations (48GJ012 Shown)

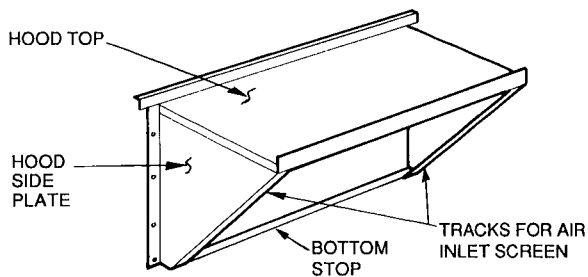
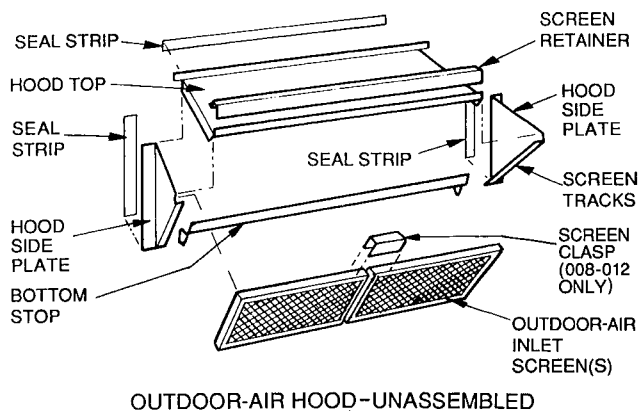


Fig. 14 – Outdoor Air Hood Details

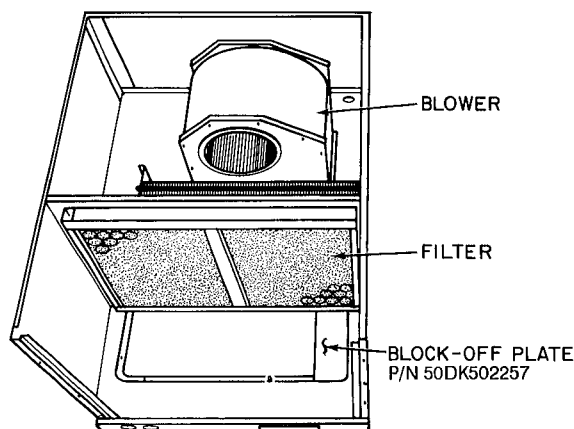


Fig. 15 – Vertical Discharge Block-Off Plate (Size 012 Only)

setting. If accessory enthalpy control (EC) is used in place of OAT, see instructions shipped with EC for installation and adjustment. See Fig. 20.

13. Connect OAT per Fig. 21.
14. Slide outdoor-air inlet screen(s) into screen track on hood side plate. On 008 and 012 units, use screen clasp to hold screens together. While holding screen in place, fasten screen(s) retainer to hood using screws provided.

NOTE: Refer to Fig. 22 for economizer barometric relief damper characteristics.

OPTIONAL PARABLADE ECONOMIZER — The optional PARABLADE economizer hood assembly is packaged and shipped in the filter section. Damper blades and control boards are installed at the factory and the economizer is shipped in the vertical discharge position.

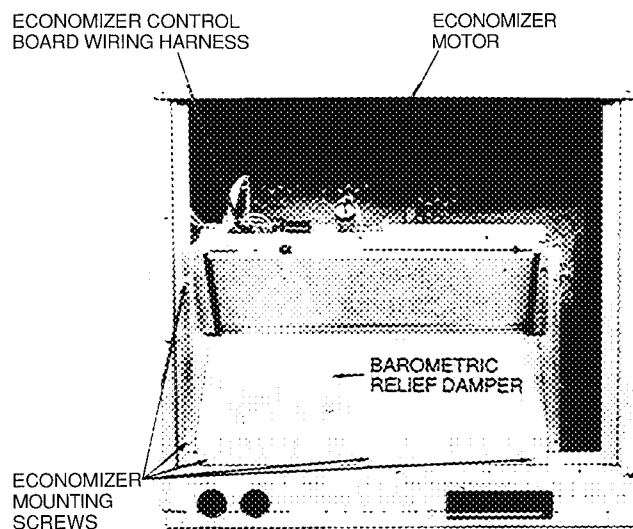


Fig. 16 – Varislide™ Economizer Installed in Unit

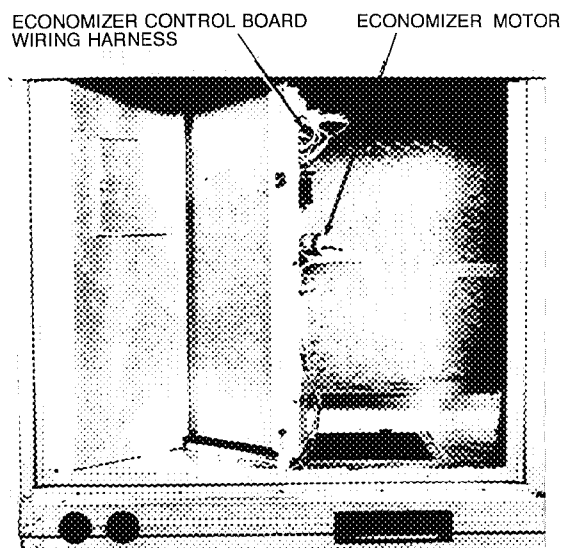


Fig. 17 – Varislide Horizontal Economizer Installation (90 Degree Rotation)

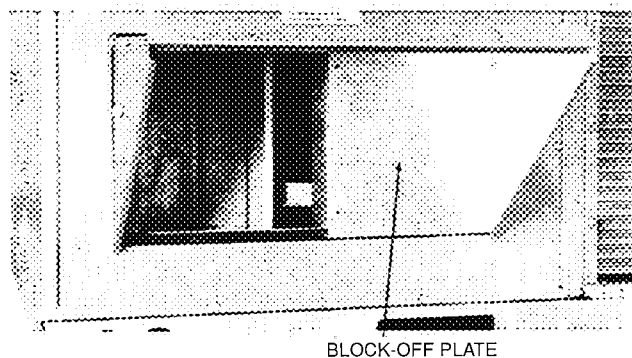
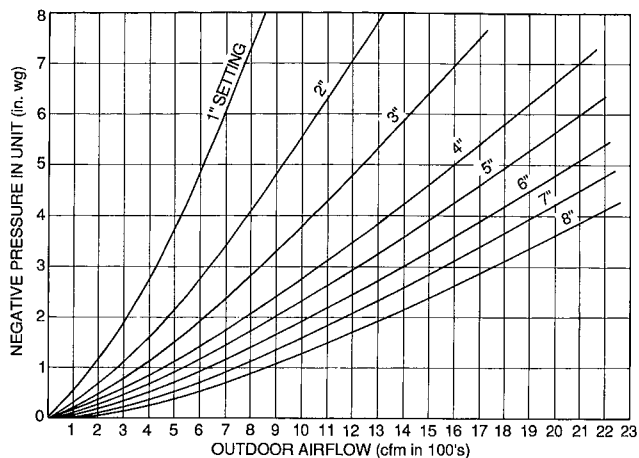


Fig. 18 – Horizontal Discharge Block-Off Plate

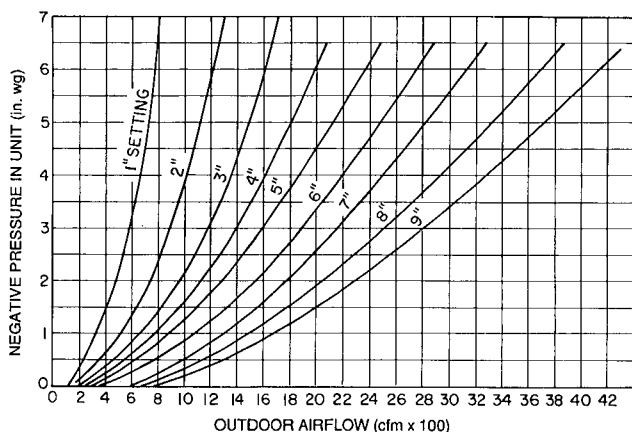
NOTE: Horizontal discharge block-off plate is shipped with the air hood package. The PARABLADE economizer can only be used for vertical discharge applications. Discard this plate.



EXAMPLE:

Given —
 Negative Pressure 0.2 in. wg
 Outdoor Air 900 cfm
 Determine — Setting = 5 in.

Fig. 19A — Varislide™ Economizer Minimum Position Setting (Size 006)



EXAMPLE:

Given —
 Negative Pressure 0.1 in. wg
 Outdoor Air 1100 cfm
 Determine — Setting = 6 in.

Fig. 19B — Varislide Economizer Minimum Position Setting (Sizes 008 and 012)

Assembly

1. Determine if ventilation air is required in building. If so, determine the minimum amount to be supplied by each unit and record quantity of ventilation air needed for use in Step 7.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove filter access panel. Remove outdoor-air opening panel. See Fig. 13. Save panels and screws. Remove optional economizer so the outdoor-air damper hood package can be removed from the filter section.
3. Assemble outdoor-air hood top and side plates as shown in Fig. 14. Install seal strips on hood top and sides. Put aside screen retainer and retainer screw for later assembly. *Do not attach hood to unit at this time.*
4. On 012 units, install vertical discharge block-off plate over duct openings. See Fig. 15.

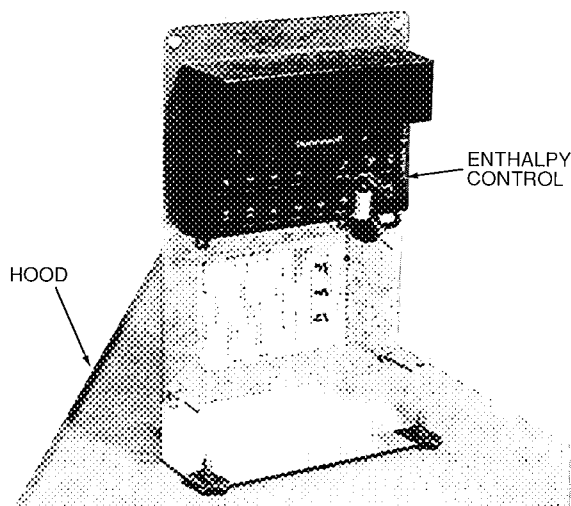
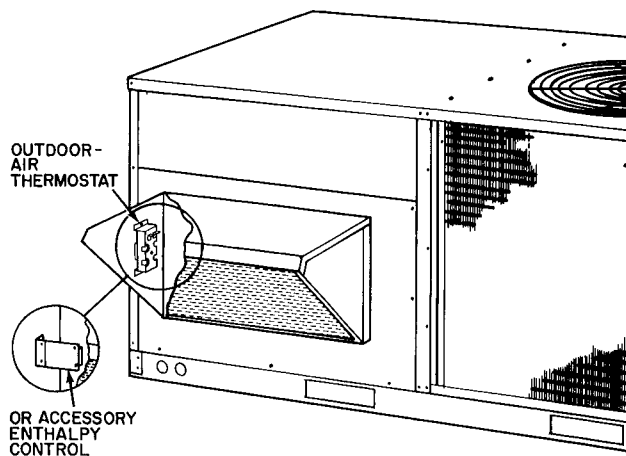


Fig. 20 — Varislide Economizer Outdoor-Air Thermostat/Enthalpy Control Installation

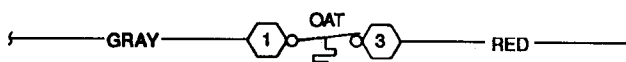


Fig. 21 — Wiring Connections for Outdoor-Air Thermostat

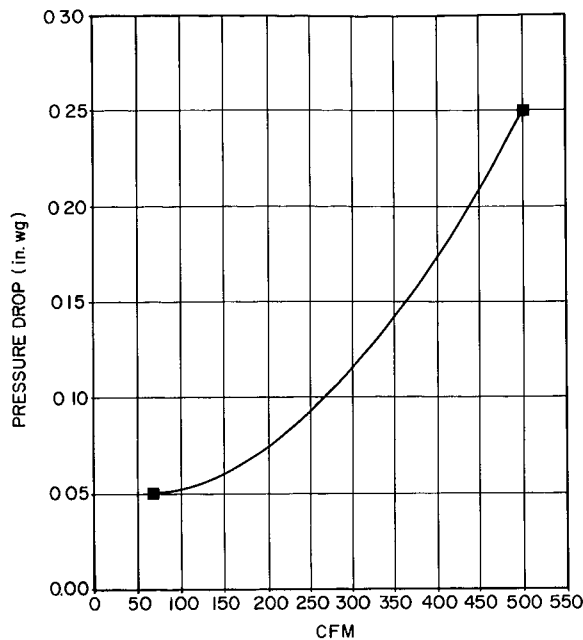


Fig. 22 – Varislide™ Economizer Barometric Relief Damper Characteristics

5. Slide economizer into unit and secure with screws. See Fig. 23.

NOTE: Be sure to engage rear economizer flange under tabs in vertical return-air opening.

6. Insert economizer plug into economizer harness. Remove tape from barometric relief damper. See Fig. 23.
7. If ventilation air is not required, proceed to Step 8. If ventilation air is required, perform the following:
 - a. Make sure the factory-installed jumper is in place across terminals P and P1 on the economizer logic module. T and T1 should be disconnected during adjustment.
 - b. The 2 potentiometers with slots for adjustment are located on the face of the economizer logic module. Turn the lower potentiometer fully clockwise. The

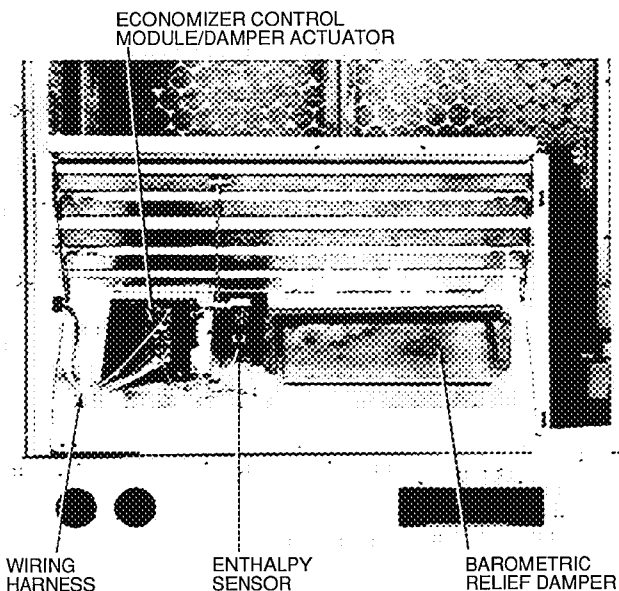


Fig. 23 – PARABLADE Economizer Installed in Unit

dampers should be fully closed. Turn the potentiometer gradually counterclockwise until the desired position is reached.

- c. Connect T and T1 to the 24 v power supply.
- d. After installation is complete, calculate the minimum airflow across the economizer. To calculate the minimum airflow, the following data is needed: total cfm (cfm₃), temperature of the total cfm (T₃), temperature of the return air (T₁), and temperature of the entering outside air (T₂). Cfm₁ is the return air cfm, which will be the minimum airflow.

Insert the data into the following equations:

$$\frac{T_1 (\text{cfm}_1) + T_2 (\text{cfm}_2)}{\text{cfm}_3} = T_3$$

$$\text{cfm}_2 = (\text{cfm}_3 - \text{cfm}_1)$$

Therefore:

$$\frac{T_1 (\text{cfm}_1) + T_2 (\text{cfm}_3 - \text{cfm}_1)}{\text{cfm}_3} = T_3$$

Use this equation to determine cfm₁, which is the minimum airflow across the economizer.

$$\text{cfm}_1 = \frac{(T_3 - T_2) \text{cfm}_3}{(T_1 - T_2)}$$

If cfm₁ does not match the desired minimum airflow from Step 1, re-adjust the minimum position setting screw.

8. Determine the enthalpy changeover set point from Fig. 24. The enthalpy changeover set point should be set to return the outdoor air damper to the minimum position when enthalpy rises above the set point. The settings are A, B, C, and D. Set the enthalpy changeover per the setting in Fig. 24.
9. Replace outdoor-air opening panel using screws from Step 2. Replace filter access panel. Ensure the filter access panel slides along the tracks and is securely engaged. See Fig. 25.

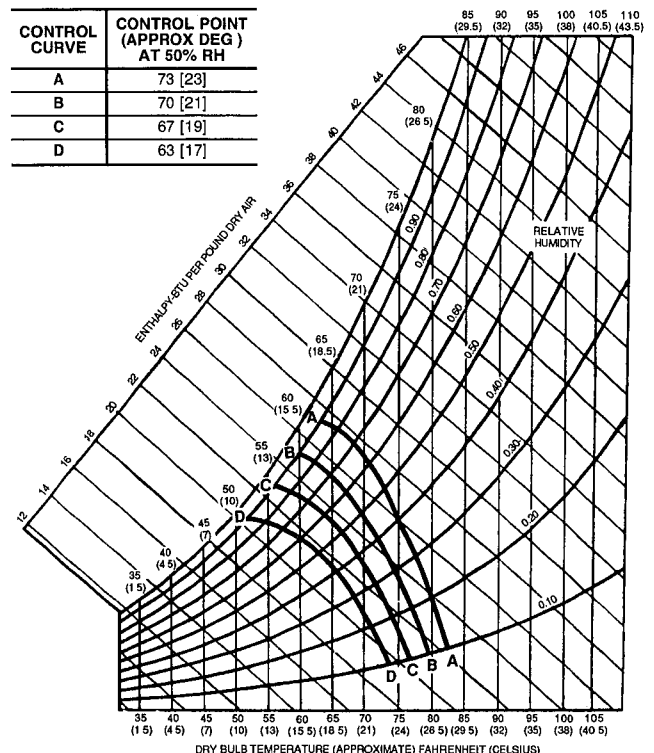


Fig. 24 – Enthalpy Settings for PARABLADE Economizer

10. Fasten hood top and side plate assembly (Fig. 26) to outdoor-air opening panel with screws provided.
11. Slide outdoor-air inlet screen(s) into screen track on hood side plate. On 008 and 012 units, use screen clasp to hold screens together. While holding screen(s) in place, fasten screen retainer to hood using screws provided. See Fig. 27.

Step 9 – Adjust Evaporator-Fan Speed –

Adjust evaporator-fan speed to meet jobsite conditions. Table 3 shows fan rpm at motor pulley settings for standard and alternate motors. Table 4 shows fan motor data. Refer to Tables 5-10 to determine fan speed settings. Fan motor pulleys are factory set for speed shown in Table 1.

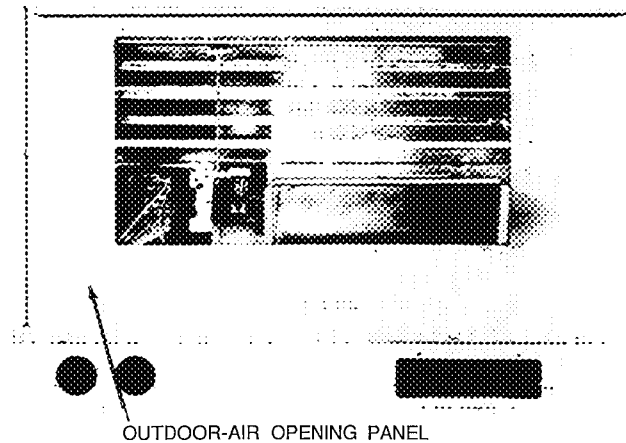


Fig. 25 – Panels Reinstalled on Unit

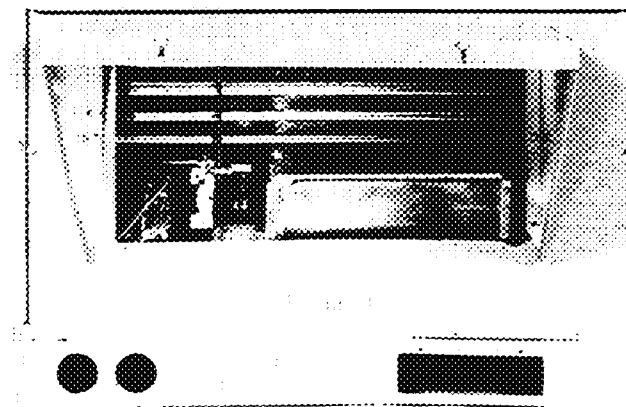


Fig. 26 – Outdoor-Air Hood Installed on Unit

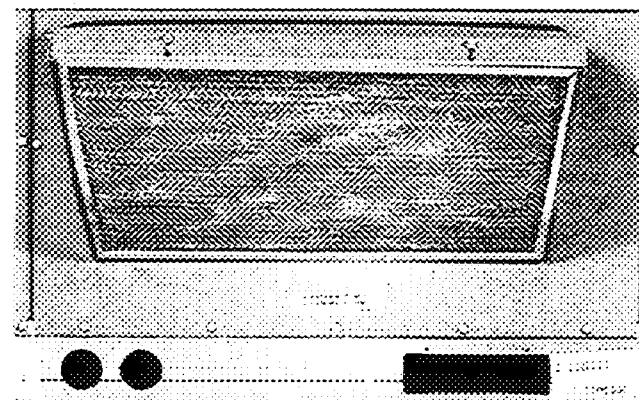


**Fig. 27 – Filter Installed on Outdoor-Air Hood
(Size 006 Shown)**

NOTE: Before adjusting fan speed, make sure the new fan speed will provide an acceptable air temperature rise range on heating as shown in Table 1.

To change fan speeds:

1. Shut off unit power supply.
2. Loosen belt by loosening fan motor mounting nuts. See Fig. 28 and 29.
3. Loosen movable pulley flange setscrew (see Fig. 30).

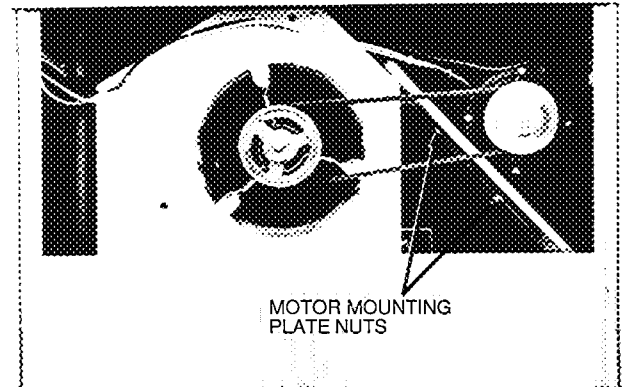


**Fig. 28 – Typical Belt-Drive Motor Mounting
for Sizes 006,008**

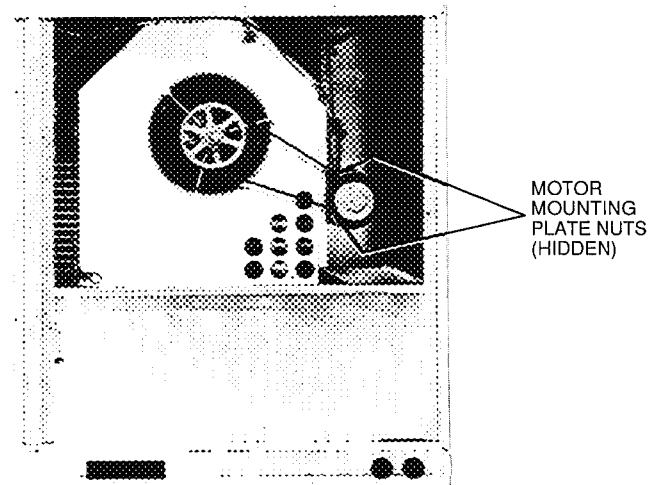


**Fig. 29 – Typical Belt-Drive Motor Mounting
for Size 012**

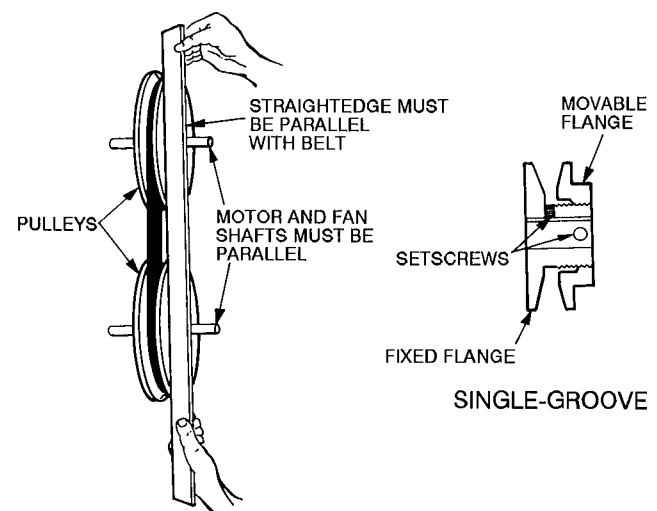


Fig. 30 – Evaporator-Fan Pulley Adjustment

4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 1.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 1 for speed change for each full turn of pulley flange.)

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.

To adjust belt tension:

1. Loosen fan motor mounting nuts.
2. *Sizes 006 and 008* — Slide motor mounting plate away from fan scroll for proper belt tension (1/2-in. deflection with one finger) and tighten mounting nuts (see Fig. 28).
Size 012 — Slide motor mounting plate downward to tighten belt tension. Secure motor mounting plate nuts. See Fig. 29.
3. Adjust bolt and nut on mounting plate to secure motor in fixed position.

Table 3 — Fan Rpm at Motor Pulley Settings

UNIT 48GJ	MOTOR PULLEY TURNS OPEN												
	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6
D/E/F006	1460	1425	1385	1350	1315	1275	1240	1205	1165	1130	1095	1055	1020
D/E/F008	1085	1060	1035	1010	985	960	935	910	890	865	840	—	—
D/E/F012	1080	1060	1035	1015	990	970	950	930	905	885	860	—	—

Table 4 — Evaporator Fan Motor Data

UNIT 48GJ	UNIT PHASE	MAXIMUM CONTINUOUS BHP*	MAXIMUM OPERATING WATTS*	UNIT VOLTAGE	MAXIMUM AMP DRAW
006	Three	1.80	1921	208/230	6.4
				460	2.9
				575	2.9
008	Three	2.90	2615	208/230	7.9
				460	3.6
				575	3.6
012	Three	4.20	3775	208/230	11.7
				460	5.3
				575	5.3

LEGEND

Bhp — Brake Horsepower

*Extensive motor and electrical testing on these units ensures that the full horsepower and watts range of the motors can be utilized with confidence. Using your fan motors up to the ratings shown in this table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 5 — Fan Performance, 48GJ006 — Vertical Discharge Units

BELT DRIVE MOTOR																		
Airflow (Cfm)	External Static Pressure (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	771	0.37	828	0.44	935	0.58	1027	0.73	1107	0.88	1185	1.04	1257	1.20	1330	1.38	1411	1.59
1600	816	0.45	869	0.51	968	0.66	1056	0.81	1137	0.97	1215	1.14	1286	1.31	1353	1.49	1421	1.68
1700	902	0.61	940	0.60	1007	0.75	1094	0.91	1175	1.09	1245	1.26	1315	1.44	1381	1.52	1443	1.69
1800	942	0.70	978	0.66	1063	0.82	1147	0.97	1248	1.20	1322	1.33	1395	1.46	1475	1.56	1542	1.71
1900	982	0.80	1023	0.78	1097	0.91	1175	1.11	1266	1.29	1356	1.47	1430	1.58	1504	1.69	1566	1.82
2000	1022	0.91	1068	0.90	1132	1.01	1218	1.23	1303	1.41	1397	1.52	1459	1.67	1532	1.82	1588	1.97
2100	1063	0.99	1115	1.00	1180	1.17	1261	1.35	1340	1.53	1428	1.66	1489	1.80	1567	1.99	1626	2.16
2200	1104	1.13	1159	1.15	1214	1.28	1310	1.52	1375	1.63	1459	1.80	1528	1.95	1603	2.17	1666	2.37
2300	1130	1.26	1202	1.29	1248	1.38	1358	1.69	1410	1.72	1488	1.93	1561	2.13	1637	2.35	1710	2.54
2400	1174	1.37	1237	1.41	1292	1.55	1392	1.83	1460	1.90	1532	2.14	1584	2.28	1671	2.55	1756	2.70
2500	1201	1.48	1272	1.53	1335	1.71	1427	1.94	1518	2.16	1575	2.25	1633	2.53	1698	2.72	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:

1. **Boldface** indicates field-supplied drive is required (See Note 3)
2. **Shading** indicates field-supplied motor and drive required
3. Motor drive range is 1020 to 1460 rpm. All other rpms require a field-supplied drive.

4. Values include losses for filters, units casing, and wet coils
5. Maximum continuous bhp is 1.80. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify
7. Interpolation is permissible. Do not extrapolate.

Table 6 – Fan Performance, 48GJ008 – Vertical Discharge Units

BELT DRIVE MOTOR																
Airflow (Cfm)	External Static Pressure (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2200	506	0.52	586	0.72	656	0.95	718	1.18	776	1.43	838	1.78	898	2.21	935	2.58
2250	514	0.55	593	0.76	662	0.99	724	1.22	781	1.78	841	1.81	902	2.25	939	2.60
2300	521	0.57	600	0.79	668	1.02	730	1.26	786	1.50	843	1.83	905	2.28	943	2.62
2400	536	0.63	613	0.85	680	1.09	741	1.34	796	1.59	849	1.88	910	2.31	952	2.74
2500	551	0.69	626	0.93	693	1.17	753	1.43	808	1.69	859	1.96	912	2.31	963	2.81
2550	559	0.72	634	0.97	700	1.21	759	1.48	814	1.74	864	2.01	915	2.34	968	2.81
2600	567	0.75	641	1.00	706	1.25	764	1.52	819	1.79	869	2.06	918	2.37	973	2.81
2700	582	0.83	655	1.08	719	1.34	776	1.61	831	1.89	880	2.17	927	2.47	976	2.84
2800	598	0.90	670	1.17	732	1.43	789	1.71	842	2.00	892	2.29	938	2.58	983	2.92
2900	614	0.98	684	1.25	745	1.53	802	1.81	854	2.11	903	2.42	949	2.71	993	3.03
3000	630	1.07	699	1.35	759	1.63	815	1.92	866	2.23	915	2.54	961	2.85	1003	3.17
3100	646	1.16	714	1.45	773	1.74	828	2.04	878	2.35	926	2.67	972	3.00	1015	3.32
3200	662	1.26	729	1.55	787	1.86	841	2.16	891	2.48	938	2.81	983	3.14	1026	3.47
3300	679	1.36	744	1.66	801	1.98	854	2.29	904	2.61	950	2.95	995	3.30	—	—
3400	695	1.47	759	1.78	816	2.10	867	2.42	917	2.75	963	3.10	1007	3.45	—	—
3500	712	1.59	774	1.90	830	2.23	881	2.56	930	2.90	976	3.25	—	—	—	—
3600	729	1.71	790	2.03	845	2.37	895	2.71	943	3.05	988	3.41	—	—	—	—
3700	745	1.84	805	2.17	860	2.52	909	2.87	956	3.22	—	—	—	—	—	—
3750	754	1.91	813	2.24	868	2.59	917	2.95	963	3.30	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:

1. **Boldface** indicates field-supplied drive required (See Note 3.)
2. **Shading** indicates field-supplied motor and drive required
3. Motor drive range is 840 to 1085 rpm. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils.

5. Maximum continuous bhp is 2.90. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 7 – Fan Performance, 48GJ012 – Vertical Discharge Units

BELT DRIVE MOTOR																				
Airflow (Cfm)	External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	556	0.65	624	0.81	682	0.95	737	0.99	745	1.04	750	1.12	809	1.24	815	1.40	899	1.56	950	1.92
3100	569	0.70	636	0.87	693	1.01	748	1.08	755	1.12	757	1.20	862	1.38	903	1.53	943	1.88	971	2.21
3200	583	0.76	649	0.94	705	1.08	758	1.17	787	1.30	769	1.36	905	1.52	971	1.86	982	2.19	992	2.41
3300	597	0.83	662	1.00	717	1.16	770	1.29	815	1.37	780	1.43	965	1.82	991	2.10	1000	2.40	1025	2.59
3400	611	0.90	675	1.08	730	1.23	781	1.41	830	1.50	808	1.63	992	2.11	1015	2.43	1030	2.62	1050	2.72
3500	625	0.97	688	1.15	742	1.32	792	1.49	840	1.64	860	1.85	1011	2.45	1028	2.62	1072	2.74	1099	2.90
3600	639	1.04	701	1.23	755	1.41	803	1.57	850	1.87	890	2.21	1026	2.55	1063	2.75	1095	2.89	1119	3.08
3700	729	1.36	790	1.58	847	1.79	902	2.06	955	2.29	1008	2.55	1060	2.80	1108	3.05	1152	3.27	1190	3.46
3800	745	1.46	805	1.69	861	1.89	915	2.17	967	2.41	1019	2.67	1070	2.94	1118	3.19	1163	3.44	1203	3.65
3900	761	1.56	820	1.80	875	2.01	928	2.29	979	2.55	1029	2.80	1079	3.07	1128	3.34	1173	3.60	1214	3.83
4000	777	1.67	836	1.92	889	2.14	941	2.40	991	2.68	1040	2.94	1089	3.22	1137	3.49	1183	3.76	1225	4.00
4100	793	1.79	851	2.05	904	2.27	955	2.52	1004	2.82	1052	3.08	1100	3.36	1147	3.65	1193	3.93	1236	4.19
4200	810	1.91	867	2.18	918	2.41	968	2.65	1017	2.96	1064	3.23	1110	3.51	1157	3.81	1202	4.09	1245	4.38
4300	826	2.04	883	2.32	933	2.55	982	2.79	1030	3.11	1076	3.40	1121	3.67	1167	3.97	1212	4.27	1255	4.56
4400	842	2.17	898	2.46	948	2.70	996	2.93	1043	3.25	1088	3.56	1133	3.84	1178	4.14	1222	4.44	1265	4.74
4500	859	2.31	914	2.60	962	2.85	1010	3.09	1056	3.40	1101	3.73	1144	4.00	1186	4.31	1232	4.62	1274	4.93
4600	876	2.45	930	2.76	977	3.01	1024	3.26	1070	3.55	1114	3.90	1157	4.19	1199	4.49	1242	4.81	1284	5.13
4700	892	2.60	945	2.91	992	3.18	1039	3.43	1083	3.71	1126	4.07	1169	4.38	1210	4.66	1252	5.00	1294	5.33
4800	909	2.77	961	3.07	1008	3.36	1053	3.61	1097	3.88	1140	4.25	1181	4.58	1222	4.87	1263	5.20	—	—
4900	926	2.93	977	3.24	1024	3.54	1068	3.80	1111	4.06	1153	4.41	1194	4.77	1234	5.09	1274	5.40	—	—
5000	942	3.11	993	3.41	1039	3.73	1080	3.99	1125	4.25	1166	4.59	1207	4.97	1247	5.30	1286	5.62	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:

1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. **Shading** indicates field-supplied motor and drive required.
3. Motor drive range is 860 to 1080 rpm. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils.

5. Maximum continuous bhp is 4.20. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 8 – Fan Performance, 48GJ006 – Horizontal Discharge Units

BELT DRIVE MOTOR																		
Airflow (Cfm)	External Static Pressure (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	741	0.38	798	0.43	895	0.54	990	0.67	1073	0.80	1154	0.95	1218	1.12	1295	1.36	1360	1.40
1600	783	0.45	838	0.51	933	0.63	1016	0.75	1102	0.90	1182	1.04	1251	1.20	1310	1.40	1385	1.49
1700	825	0.53	878	0.60	969	0.72	1049	0.84	1134	1.00	1206	1.14	1281	1.31	1342	1.48	1398	1.53
1800	885	0.63	942	0.73	1047	0.90	1139	1.05	1193	1.14	1276	1.30	1341	1.40	1413	1.55	1474	1.58
1900	928	0.73	982	0.83	1084	1.02	1160	1.11	1223	1.24	1301	1.38	1374	1.53	1437	1.62	1490	1.67
2000	971	0.84	1022	0.94	1121	1.12	1188	1.22	1254	1.36	1329	1.44	1396	1.66	1460	1.68	1509	1.77
2100	1015	0.97	1063	1.10	1140	1.18	1196	1.27	1272	1.45	1354	1.58	1413	1.75	1475	1.73	1523	1.92
2200	1060	1.10	1104	1.20	1159	1.23	1229	1.41	1306	1.53	1363	1.70	1434	1.81	1487	1.85	1554	2.07
2300	1104	1.25	1130	1.27	1196	1.37	1264	1.56	1340	1.66	1397	1.86	1459	1.98	1520	2.07	1576	2.24
2400	1138	1.30	1174	1.37	1245	1.57	1305	1.63	1373	1.84	1440	1.95	1502	2.08	1552	2.24	1604	2.42
2500	1183	1.43	1201	1.50	1284	1.65	1338	1.75	1402	1.99	1469	2.04	1524	2.24	1585	2.42	1636	2.60

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:

1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. **Shading** indicates field-supplied motor and drive required.
3. Motor drive range: 1020 to 1460 rpm. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils.

5. Maximum continuous bhp is 1.80. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 9 – Fan Performance, 48GJ008 – Horizontal Discharge Units

BELT DRIVE MOTOR																		
Airflow (Cfm)	External Static Pressure (in. wg)																	
	0.2		0.4		0.6		0.8		0.9		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2200	499	0.50	580	0.70	652	0.94	717	1.17	748	1.30	779	1.43	839	1.78	905	2.21	951	2.57
2250	507	0.53	586	0.73	658	0.97	722	1.22	752	1.34	783	1.46	843	1.81	908	2.25	955	2.59
2300	513	0.55	592	0.76	663	1.00	727	1.26	756	1.38	786	1.49	846	1.84	910	2.25	959	2.61
2400	528	0.60	606	0.83	674	1.06	738	1.34	766	1.46	795	1.58	853	1.88	912	2.31	967	2.68
2500	542	0.66	619	0.90	686	1.13	748	1.41	777	1.55	806	1.68	859	1.94	919	2.37	971	2.73
2550	550	0.69	627	0.94	692	1.17	754	1.45	783	1.60	812	1.74	864	1.99	920	2.39	974	2.76
2600	557	0.72	634	0.97	698	1.21	759	1.49	787	1.64	816	1.79	868	2.04	921	2.41	976	2.78
2700	573	0.79	648	1.05	711	1.29	770	1.58	798	1.73	827	1.88	878	2.16	928	2.45	983	2.88
2800	588	0.86	662	1.13	723	1.38	782	1.66	809	1.82	837	1.98	889	2.29	937	2.57	986	2.94
2900	604	0.94	676	1.21	737	1.48	794	1.76	821	1.92	848	2.08	900	2.41	947	2.70	993	3.01
3000	620	1.02	690	1.30	750	1.58	806	1.86	832	2.02	849	2.18	910	2.52	958	2.85	1002	3.15
3100	636	1.11	704	1.39	764	1.69	818	1.97	844	2.13	870	2.29	920	2.64	966	2.98	1012	3.30
3200	652	1.21	718	1.49	778	1.80	831	2.09	856	2.25	882	2.40	931	2.76	978	3.12	1023	3.47
3300	668	1.31	732	1.59	793	1.92	844	2.21	869	2.37	894	2.53	942	2.89	989	3.26	1034	3.63
3400	684	1.41	747	1.70	807	2.04	857	2.35	882	2.51	907	2.66	954	3.02	1000	3.40	1044	3.79
3500	701	1.53	762	1.82	821	2.16	871	2.48	895	2.64	919	2.80	966	3.15	1011	3.55	1054	3.94
3600	717	1.65	777	1.94	835	2.29	885	2.63	908	2.79	932	2.95	978	3.28	1022	3.68	1065	4.10
3700	733	1.77	792	2.07	849	2.42	899	2.78	922	2.95	945	3.11	990	3.45	1034	3.84	1076	4.26
3750	742	1.84	800	2.14	856	2.49	907	2.86	929	3.03	952	3.20	997	3.54	1040	3.93	1082	4.27

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:

1. **Boldface** indicates field-supplied drive required (See Note 3)
2. **Shading** indicates field-supplied motor and drive required.
3. Motor drive range is 840 to 1085 rpm. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils.

5. Maximum continuous bhp is 2.90. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 10 – Fan Performance, 48GJ012 – Horizontal Discharge Units

BELT DRIVE MOTOR

Airflow (Cfm)	External Static Pressure (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	478	0.57	658	0.92	721	1.08	796	1.23	851	1.50	898	1.78	942	2.01	983	2.17	1023	2.46	1063	2.61
3100	500	0.62	669	0.97	731	1.16	808	1.30	861	1.57	907	1.86	951	2.09	992	2.24	1031	2.51	1070	2.75
3200	519	0.69	680	1.03	741	1.23	818	1.38	873	1.65	916	1.95	960	2.18	1000	2.32	1039	2.58	1077	2.88
3300	537	0.77	692	1.10	751	1.30	828	1.47	884	1.72	925	2.03	969	2.27	1009	2.41	1048	2.66	1086	2.95
3400	561	0.86	704	1.17	761	1.37	837	1.57	896	1.82	934	2.12	978	2.36	1018	2.51	1057	2.75	1094	3.02
3500	592	0.98	715	1.24	773	1.45	847	1.66	907	1.92	945	2.22	987	2.46	1027	2.60	1066	2.85	1102	3.12
3600	632	1.12	727	1.32	784	1.54	857	1.76	917	2.03	957	2.32	996	2.55	1036	2.71	1075	2.96	1111	3.22
3700	677	1.20	748	1.43	810	1.65	869	1.89	928	2.17	984	2.43	1036	2.68	1080	2.90	1114	3.07	1135	3.17
3800	691	1.28	761	1.52	822	1.75	880	1.98	937	2.28	993	2.55	1046	2.81	1092	3.05	1129	3.25	1156	3.39
3900	705	1.37	773	1.62	834	1.86	891	2.08	947	2.39	1002	2.66	1055	2.94	1102	3.20	1143	3.42	1174	3.59
4000	720	1.47	786	1.71	847	1.97	902	2.19	957	2.50	1011	2.79	1064	3.07	1112	3.34	1155	3.59	1190	3.80
4100	734	1.56	800	1.82	860	2.09	914	2.31	967	2.60	1021	2.91	1072	3.20	1121	3.49	1165	3.76	1203	3.99
4200	749	1.66	813	1.92	873	2.21	926	2.44	978	2.71	1030	3.04	1081	3.34	1130	3.64	1175	3.92	1215	4.18
4300	764	1.77	826	2.04	886	2.33	938	2.57	989	2.83	1040	3.18	1090	3.48	1139	3.79	1185	4.08	1226	4.36
4400	779	1.88	840	2.16	899	2.46	951	2.71	1000	2.96	1050	3.31	1100	3.63	1148	3.94	1194	4.25	1236	4.54
4500	793	1.99	854	2.28	912	2.59	963	2.86	1012	3.09	1061	3.43	1109	3.78	1157	4.09	1203	4.42	1246	4.72
4600	808	2.11	868	2.42	925	2.73	975	3.00	1024	3.25	1071	3.56	1119	3.93	1166	4.26	1212	4.58	1255	4.91
4700	822	2.24	882	2.56	937	2.86	988	3.16	1036	3.42	1082	3.70	1129	4.09	1175	4.43	1221	4.76	1264	5.09
4800	837	2.37	896	2.71	950	3.00	1001	3.32	1048	3.59	1093	3.86	1139	4.24	1185	4.60	1230	4.93	1273	5.28
4900	852	2.51	910	2.86	963	3.15	1014	3.48	1060	3.76	1105	4.02	1150	4.36	1194	4.77	1239	5.12	1282	5.47
5000	867	2.65	924	3.01	977	3.30	1027	3.65	1073	3.94	1117	4.20	1161	4.54	1204	4.95	1248	5.31	1291	5.66

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:

1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. **Shading** indicates field-supplied motor and drive required.
3. Motor drive range is 860 to 1080 rpm. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils.

5. Maximum continuous bhp is 4.20. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

PRE-START-UP

⚠ WARNING

Failure to observe the following warnings could result in serious personal injury:

1. Follow recognized safety practices and wear protective goggles when checking or servicing refrigerant system.
2. Do not operate compressor or provide any electric power to unit unless compressor terminal cover is in place and secured.
3. Do not remove compressor terminal cover until all electrical sources are disconnected.
4. Relieve all pressure from system before touching or disturbing anything inside terminal box if refrigerant leak is suspected around compressor terminals.
5. Never attempt to repair soldered connection while refrigerant system is under pressure.
6. Do not use torch to remove any component. System contains oil and refrigerant under pressure. To remove a component, wear protective goggles and proceed as follows:
 - a. Shut off gas and then electrical power to unit.
 - b. Relieve all pressure from system using both high- and low-pressure ports.
 - c. Cut component connecting tubing with tubing cutter and remove component from unit.
 - d. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Proceed as follows to inspect and prepare the unit for initial start-up.

1. Remove all access panels.
2. Read and follow instructions on all WARNING, CAUTION, and INFORMATION labels attached to, or shipped with, unit.
3. Make the following inspections:
 - a. Inspect for shipping and handling damages such as broken lines, loose parts, disconnected wires, etc.
 - b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using electronic leak detector (qualified for R-407C), halide torch, or liquid-soap solution.
 - c. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight.
 - d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following conditions:
 - a. Make sure that condenser fan blade is correctly positioned in fan orifice. See Condenser-Fan Adjustment section on page 24 for more details.
 - b. Make sure that air filter(s) is in place.
 - c. Make sure that condensate drain trap is filled with water to ensure proper drainage.
 - d. Make sure that all tools and miscellaneous loose parts have been removed.

START-UP

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

Operating Parameters — The maximum outdoor entering-air temperature is 115 F. The minimum entering outdoor-air temperature is 45 F without Motormaster® head-pressure control.

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

Outdoor-Air Inlet Screen(s) — Outdoor-air inlet screen(s) must be in place before operating unit.

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

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

Refrigerant Service Ports — Each refrigerant system has a total of 4 Schrader-type service gage ports: one on the suction line, and one on the compressor discharge line (low-liquid line). Two additional Schrader-type valves are located underneath high-pressure and low-pressure/loss-of-charge 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. Dedicated service gage set is recommended due to compatibility problems with R-407C and oil from R-22 systems.
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 unit power leads.
4. Reapply 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/cooling.

Cooling — To start unit, turn on main power supply. Set system selector switch at COOL position and fan switch at AUTO. position. Adjust thermostat to a setting below room temperature. Compressor starts on closure of contactor.

Check unit charge. Refer to Refrigerant Charge section on page 25.

Reset thermostat at a position above room temperature. Compressor will shut off. Evaporator fan will shut off after a 30-second delay.

TO SHUT OFF UNIT — Set system switch at OFF position. Resetting thermostat at a position above room temperature shuts unit off temporarily until space temperature

exceeds thermostat setting. Units are equipped with Cycle-LOC™ protection device. Unit shuts down on any safety trip and remains off; an indicator light on the thermostat comes on. Check reason for safety trip.

Compressor restart is accomplished by manual reset at the thermostat by turning the selector switch to OFF position and then to ON position.

Main Burners — Main burners are factory set and should require no adjustment.

TO CHECK ignition of main burners and heating controls, move thermostat set point above room temperature and verify that the burners light and evaporator fan is energized. After ensuring that the unit continues to heat the building, lower the thermostat setting below room temperature and verify that the burners and evaporator fan shut off.

Refer to Table 11A or 11B for the correct orifice to use at high altitudes.

NOTE: Upon a call for heat the main burners will remain on for a minimum of 60 seconds.

**Table 11A — Altitude Compensation*
(Size 006 Units)**

ELEVATION (ft)	72,000 AND 115,000 BTUH NOMINAL INPUT		150,000 BTUH NOMINAL INPUT	
	Natural Gas Orifice Size†	Liquid Propane Orifice Size†	Natural Gas Orifice Size†	Liquid Propane Orifice Size†
0-2,000	33	43	30	38
2,000	34	43	30	39
3,000	35	44	31	40
4,000	36	44	32	41
5,000	36	44	33	42
6,000	37	45	34	43
7,000	37	45	35	43
8,000	38	46	36	44
9,000	39	47	37	44
10,000	41	48	38	45
11,000	43	48	39	45
12,000	44	49	40	46
13,000	44	49	41	47
14,000	45	50	42	47

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes.

†Orifices available through your Carrier distributor.

**Table 11B — Altitude Compensation*
(Size 008 and 012 Units)**

ELEVATION (ft)	125,000, 180,000, AND 220,000 BTUH NOMINAL INPUT		250,000 BTUH NOMINAL INPUT	
	Natural Gas Orifice Size†	Liquid Propane Orifice Size†	Natural Gas Orifice Size†	Liquid Propane Orifice Size†
0-2,000	31	41	30	38
2,000	32	42	30	39
3,000	32	42	31	40
4,000	32	42	32	41
5,000	33	43	33	42
6,000	34	43	34	43
7,000	35	44	35	43
8,000	36	44	36	44
9,000	37	45	37	44
10,000	38	46	38	45
11,000	39	47	39	45
12,000	40	47	40	46
13,000	41	48	41	47
14,000	42	48	42	47

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes.

†Orifices available through your local Carrier distributor.

Heating

1. Purge gas supply line of air by opening union ahead of gas valve. If gas odor is detected, tighten union and wait 5 minutes before proceeding.
2. Turn on electrical supply and open manual gas valve.
3. Set system switch selector at HEAT position and fan switch at AUTO. or ON position. Set heating temperature lever above room temperature.
4. The induced-draft motor will start.
5. After a call for heating, the main burners should light within 5 seconds. If the burners do not light, then there is a 22-second delay before another 5-second try. If the burners still do not light, the time delay is repeated. If the burners do not light within 15 minutes, there is a lockout. To reset the control, break the 24-v power to W1.
6. The evaporator fan will turn on 45 seconds after a call for heating.
7. The evaporator fan will turn off 45 seconds after the thermostat temperature is satisfied.
8. Adjust airflow to obtain a temperature rise within the range specified on the unit nameplate and Table 1.

NOTE: The default value for the evaporator-fan motor ON/OFF delay is 45 seconds. The Integrated Gas Unit Controller (IGC) modifies this value when abnormal limit switch cycles occur. Based upon unit operating conditions, the ON delay can be reduced to 0 seconds and the OFF delay can be extended to 180 seconds. When one flash of the LED is observed, the evaporator-fan ON/OFF delay has been modified.

If the limit switch trips at the start of the heating cycle during the evaporator ON delay, the time period of the ON delay for the next cycle will be 5 seconds less than the time at which the switch tripped. (Example: If the limit switch trips at 30 seconds, the evaporator-fan ON delay for the next cycle will occur at 25 seconds.) To prevent short-cycling, a 5 second reduction will only occur if a minimum of 10 minutes has elapsed since the last call for heating.

The evaporator-fan OFF delay can also be modified. Once the call for heating has ended, there is a 10-minute period during which the modification can occur. If the limit switch trips during this period, the evaporator-fan OFF delay will increase by 15 seconds. A maximum of 9 trips can occur, extending the evaporator-fan OFF delay to 180 seconds.

To restore the original default value, reset the power to the unit.

TO SHUT OFF UNIT — Set system selector switch at OFF position. Resetting heating selector lever below room temperature will temporarily shut off unit until space temperature falls below thermostat setting.

Safety Relief — A soft-solder joint at the suction-line Schrader port provides pressure relief under abnormal temperature and pressure conditions.

Ventilation (Continuous Fan) — Set fan and system selector switches at ON and OFF positions, respectively. Evaporator fan operates continuously to provide constant air circulation. When the evaporator fan selector switch is turned to the OFF position, there is a 30-second delay before the fan turns off.

Operating Sequence

COOLING, 48GJ006 UNITS WITHOUT ECONOMIZER — When thermostat calls for cooling, terminals G and Y1 and the compressor contactor (C) are energized. The indoor

(evaporator) fan motor (IFM), compressor, and outdoor (condenser) fan motor (OFM) start. The OFM runs continuously while the unit is in cooling. When the thermostat is satisfied, C is deenergized and the compressor and OFM shut off. After a 30-second delay, the IFM shuts off. If the thermostat fan selector switch is in the ON position, the evaporator motor will run continuously.

COOLING, 48GJ008,012 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, compressor no. 1, and condenser fan start. The condenser-fan motor runs continuously while unit is cooling. For units with 2 stages of 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.

When the thermostat is satisfied, C1 and C2 are deenergized and the compressors and outdoor (condenser) fan motor (OFM) shut off. After a 30-second delay, the indoor (evaporator) fan motor (IFM) shuts off. If the thermostat fan selector switch is in the ON position, the evaporator motor will run continuously.

HEATING, 48GJ006 UNITS WITHOUT ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. When additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45-second time-off delay.

HEATING, 48GJ008,012 UNITS WITHOUT ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. In order to prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor (IDM) is then energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. When additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 and W2 are deenergized, the IFM stops after a 45-second time-off delay.

COOLING, 48GJ006 UNITS WITH VARISLIDE™ ECONOMIZER — When the outdoor-air temperature is above the outdoor-air thermostat (OAT) setting and the room thermostat calls for cooling, compressor contactor is energized to start compressor and the outdoor (condenser) fan motor (OFM). The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. After the thermostat is satisfied, there is a 30-second delay before the evaporator fan turns off. The damper then moves to the fully closed position. When using continuous fan, the damper moves to the minimum position.

When the outdoor-air temperature is below the OAT setting and the thermostat calls for cooling, the economizer damper moves to the minimum position. If the supply-air temperature is above 57 F, the damper continues to open until it reaches the fully open position or until the supply-air temperature drops below 52 F.

When the supply-air temperature falls between 57 F and 52 F, the damper will remain at an intermediate open position. If the supply-air temperature falls below 52 F, the damper will modulate closed until it reaches the minimum position or until the supply-air temperature is above 52 F. When the thermostat is satisfied, the damper moves to the fully closed position when using AUTO. fan or to the minimum position when using continuous fan.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing two stages of cooling. Compressor and the condenser fan will be energized and the position of the economizer damper will be determined by the supply-air temperature. When the second stage of cooling is satisfied, the compressor and OFM will be deenergized. The damper position will be determined by the supply-air temperature. When the first stage of cooling is satisfied, there is a 30-second delay before the evaporator fan shuts off. The damper then moves to the fully closed position. When using a continuous fan, the damper moves to the minimum position.

COOLING, 48GJ008,012 UNITS WITH VARISLIDE™ ECONOMIZER — When the outdoor-air temperature is above the OAT setting and the room thermostat calls for cooling, the compressor contactor no. 1 is energized to start compressor no. 1 and outdoor (condenser) fan motor. The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. Upon a further call for cooling, compressor contactor no. 2 will be energized, starting compressor no. 2. After the thermostat is satisfied and the IFM is deenergized, the damper moves to the fully closed position.

When the outdoor-air temperature is below the OAT setting and the thermostat calls for Y1 and G, the economizer damper moves to the minimum position when the indoor (evaporator) fan starts. The first stage of cooling is provided by the economizer. If the supply-air temperature is above 57 F, a switch on the supply-air thermostat is closed between the T2 terminal and the 24 vac terminal. This causes the damper to continue to modulate open until the supply-air temperature falls below 55 F or the damper reaches the fully open position.

When the supply-air temperature is between 55 F and 52 F, the supply-air thermostat has open switches between the T2 and 24 vac terminals and between the T1 and 24 vac terminals. This causes the economizer damper to remain in an intermediate open position.

If the supply-air temperature falls below 52 F, a switch on the supply-air thermostat is closed between the T1 terminal and the 24 vac terminal. This causes the damper to modulate closed until the supply-air temperature rises above 55 F or the damper reaches the minimum position.

When the supply-air temperature is between 55 F and 57 F, the supply-air thermostat has open switches between the T2 and 24 vac terminals. This causes the economizer damper to remain in an intermediate open position.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing second stage cooling. Compressor no. 1 and outdoor (condenser) fan will be energized, and the position of the economizer damper will be determined by the supply-air temperature. Compressor no. 2 is locked out.

When the second stage of cooling is satisfied, the compressor and outdoor (condenser) fan motor will be deenergized. The damper position will be determined by the supply-air temperature.

When the first stage of cooling is satisfied, the damper will move to fully closed position.

COOLING, 48GJ006 UNITS WITH PARABLADE ECONOMIZER — When the outdoor-air is above the enthalpy control setting and the room thermostat calls for cooling,

the compressor contactor is energized to start the compressor and the outdoor (condenser) fan motor. The indoor (evaporator) fan motor is energized and the economizer damper moves to the minimum position. After the room thermostat is satisfied the damper will spring return to the fully closed position.

When the outdoor-air is below the enthalpy control setting and the thermostat calls for cooling, the economizer outdoor-air damper is opened proportionally to maintain between 50 and 56 F at the mixed-air sensor. If outside air alone cannot satisfy the cooling requirements, economizer cooling is integrated with mechanical cooling. When the room thermostat is satisfied, the damper will spring return to the fully closed position.

COOLING, 48GJ008,012 UNITS WITH PARABLADE ECONOMIZER — When the outdoor air is above the enthalpy control setting, and the room thermostat calls for cooling, the compressor contactor no. 1 is energized to start compressor no. 1 and the outdoor (condenser) fan motor. The indoor (evaporator) fan motor is energized and the economizer damper moves to the minimum position. Upon further call for cooling, compressor contactor no. 2 is energized, starting compressor no. 2. After the room thermostat is satisfied the damper will spring return to the fully closed position.

When the outdoor air is below the enthalpy control setting and the thermostat calls for cooling, the economizer outdoor air damper is opened proportionally to maintain between 50 and 56 F at the mixed air sensor. If outside air alone cannot satisfy the cooling requirements, economizer cooling is integrated with mechanical cooling and the second compressor is locked out. When the room thermostat is satisfied, the damper will spring return to the fully closed position.

HEATING, 48GJ006 UNITS WITH ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited and the damper moves to the minimum position. When additional heat is needed, W2 energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45-second time-off delay. The economizer damper then moves to the fully closed position. When using continuous fan, the damper will remain in the minimum position.

HEATING, 48GJ008,012 UNITS WITH ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. In order to prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor is then energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited and the damper moves to the minimum position. When additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 and W2 are deenergized, the IFM stops after a 45-second time-off delay. The economizer damper then moves to the fully closed position. When using continuous fan, the damper will remain in the minimum position.

SERVICE

⚠ CAUTION

When servicing unit, shut off all electrical power to unit to avoid shock hazard or injury from rotating parts

Cleaning — Inspect unit interior at the beginning of each heating and cooling season or as operating conditions require.

EVAPORATOR COIL

1. Turn unit power off. Remove evaporator coil access panel.
2. If economizer is installed, remove economizer by disconnecting Molex plug and removing mounting screws (see Fig. 16 and 23). Refer to Accessory Economizer or Two-Position Damper Installation Instructions or Optional Economizer sections on pages 12 and 13 for more details.
3. Slide filters out of unit.
4. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of coil and flush with clean water. For best results, backflush toward return-air section to remove foreign material.
5. Flush condensate pan after completion.
6. Reinstall economizer or two-position damper and filters.
7. Reconnect wiring.
8. Replace access panels.

CONDENSER COIL

1. Turn off unit power.
2. Remove top panel screws on condenser end of unit.
3. Remove condenser coil corner post. See Fig. 31 or 32. To hold top panel open, place coil corner post between top panel and center post. See Fig. 33 or 34.
4. Remove screws securing coil to center post.
5. Remove fastener holding coil sections together at return end of condenser coil. Carefully separate the outer coil section 3 to 4 in. from the inner coil section. See Fig. 35 or 36.
6. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.
7. Secure inner and outer coil rows together with a field-supplied fastener.
8. Reposition the outer coil section and remove the coil corner post from between the top panel and center post.
9. Reinstall the coil corner post and replace all screws.

CONDENSATE DRAIN — Check and clean each year at start of cooling season. In winter, keep drain dry or protect against freeze-up.

FILTERS — Clean or replace at start of each heating and cooling season, or more often if operating conditions require it. Replacement filters must be same dimensions as original filters.

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

Lubrication

COMPRESSORS — Each compressor is charged with correct amount of POE (polyolester) oil at the factory. Never add mineral oil to system.

FAN-MOTOR BEARINGS — Fan-motor bearings are of the permanently lubricated type. No further lubrication is required. No lubrication of condenser or evaporator fan motors is required.

Condenser-Fan Adjustment (Fig. 37)

1. Shut off unit power supply.
2. Remove condenser-fan assembly (grille, motor, motor cover, and fan) and loosen fan hub setscrews.
3. Adjust fan height as shown in Fig. 37.
4. Tighten setscrews and replace condenser-fan assembly.

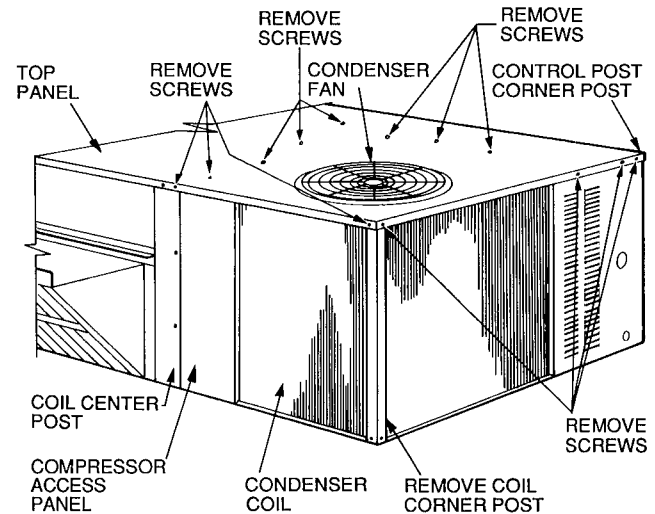


Fig. 31 — Cleaning Condenser Coil (48GJ006)

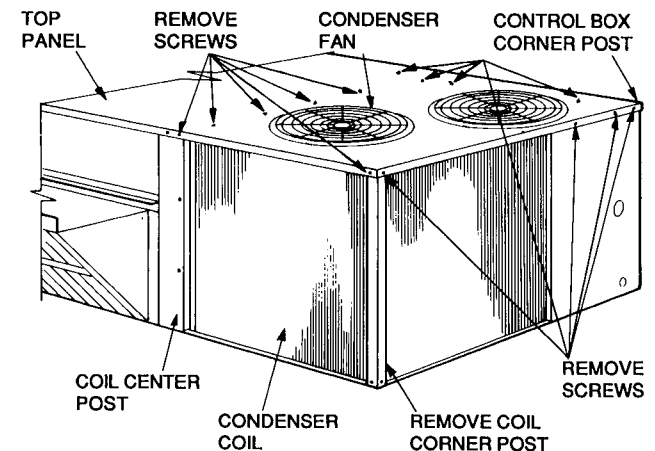


Fig. 32 — Cleaning Condenser Coil (48GJ008,012)

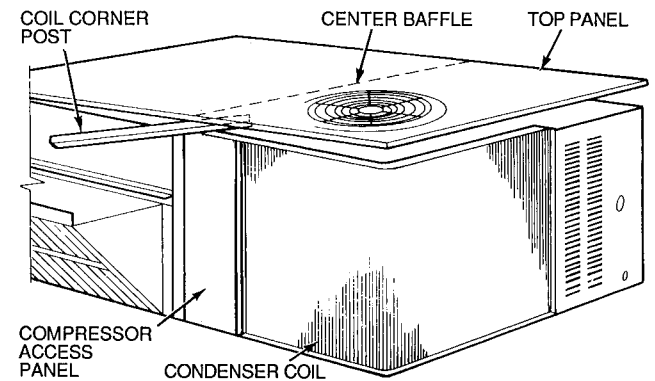


Fig. 33 — Propping Up Top Panel (48GJ006)

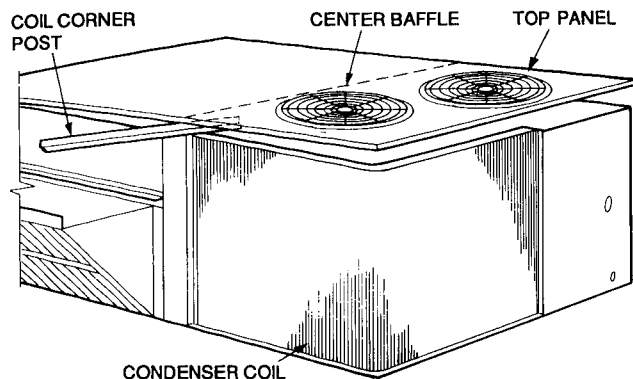


**Fig. 34 — Propping Up Top panel
(48GJ008,012)**

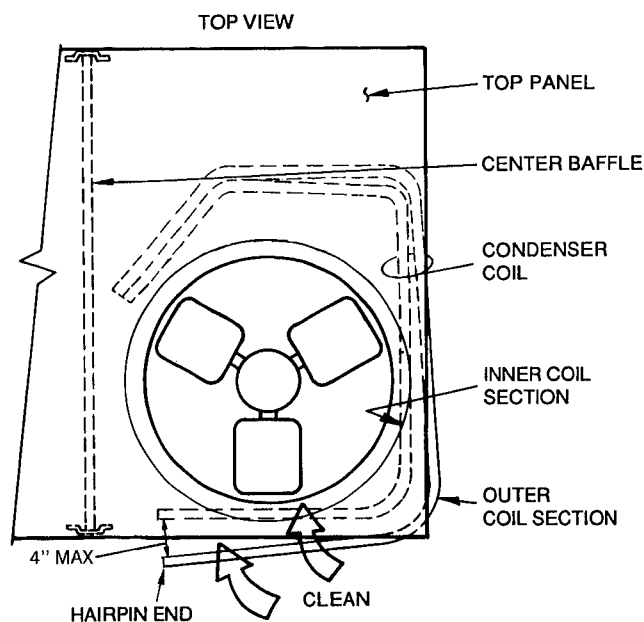


**Fig. 35 — Separating Coil Sections
(48GJ006)**

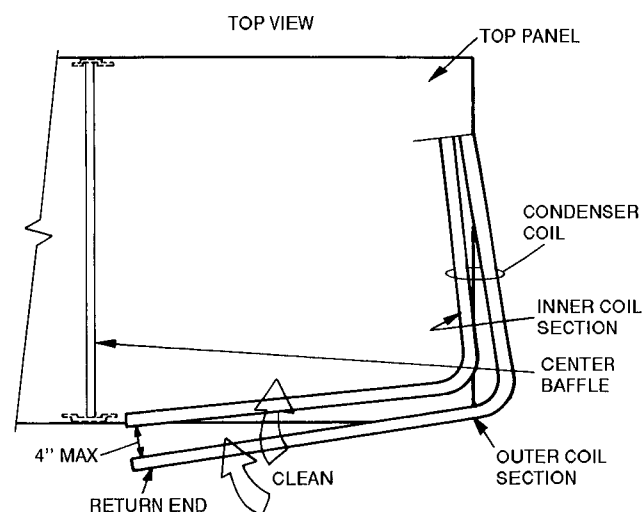
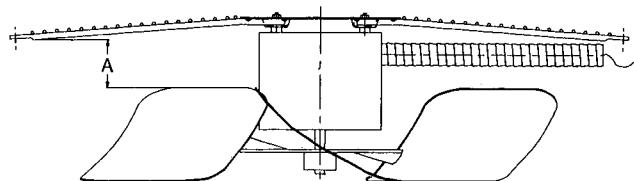


**Fig. 36 — Separating Coil Sections
(48GJ008,012)**



UNIT 48GJ	FAN HEIGHT — A (in.)
006 and 008, 012 (208/230 V)	2.75
008, 012 (460 and 575 V)	3.50

Fig. 37 — Condenser Fan Adjustment

Economizer Adjustment — Refer to Optional Economizer sections on pages 12 and 13.

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate (also refer to Table 1). Refer to Carrier GTAC2-5 Charging, Recovery, Recycling, and Reclamation training manual and the following procedures.

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

When charging units or taking pressure readings, dedicated pressure gages and hoses must be used for R-407C only.

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to Table 1). **Refrigerant R-407C must be charged in liquid state to ensure proper mixture.**

LOW CHARGE COOLING — Using Cooling Charging Charts, Fig. 38-40, vary refrigerant until the conditions of the charts are met. Note the charging charts are different from type normally used. Charts are based on charging the units to the correct superheat for the various operating conditions. Accurate pressure gage and temperature sensing device are required. Connect the pressure gage to the service port on the suction line. Since **liquid** must be removed from the refrigerant cylinder, it is important to charge the refrigerant slowly into the suction line to allow it to flash before it enters the system, in order to avoid damage to the compressor from liquid refrigerant entering the suction side of the compressor. A throttling device may also be used to cause refrigerant to flash before entering system. Mount the temperature sensing device on the suction line and insulate it so that outdoor ambient temperature does not affect the reading. Indoor-air cfm must be within the normal operating range of the unit.

TO USE COOLING CHARGING CHART — Take the outdoor ambient temperature and read the suction pressure gage. Refer to chart to determine what suction temperature should be. If suction temperature is high, add refrigerant. If suction temperature is low, carefully reclaim some of the charge. When reclaiming refrigerant, a dedicated refrigerant cylinder must be used for R-407C. Recheck the suction pressure as charge is adjusted.

EXAMPLE: (Fig 38)

Outdoor Temperature 85 F
Suction Pressure 74 psig
Suction Temperature should be 66 F
(Suction Temperature may vary ± 5 F.)

If Chargemaster® charging device is used, temperature and pressure readings must be accomplished using the R-407C charging charts.

Main Burners — At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames and adjust if necessary.

⚠ CAUTION

When working on gas train, do not hit or plug orifice spuds.

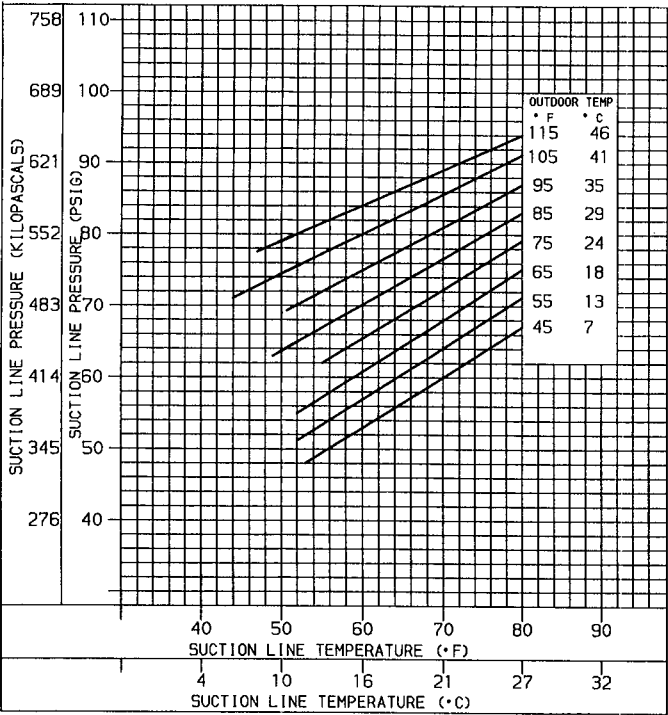


Fig. 38 — Cooling Charging Chart — 48GJ006

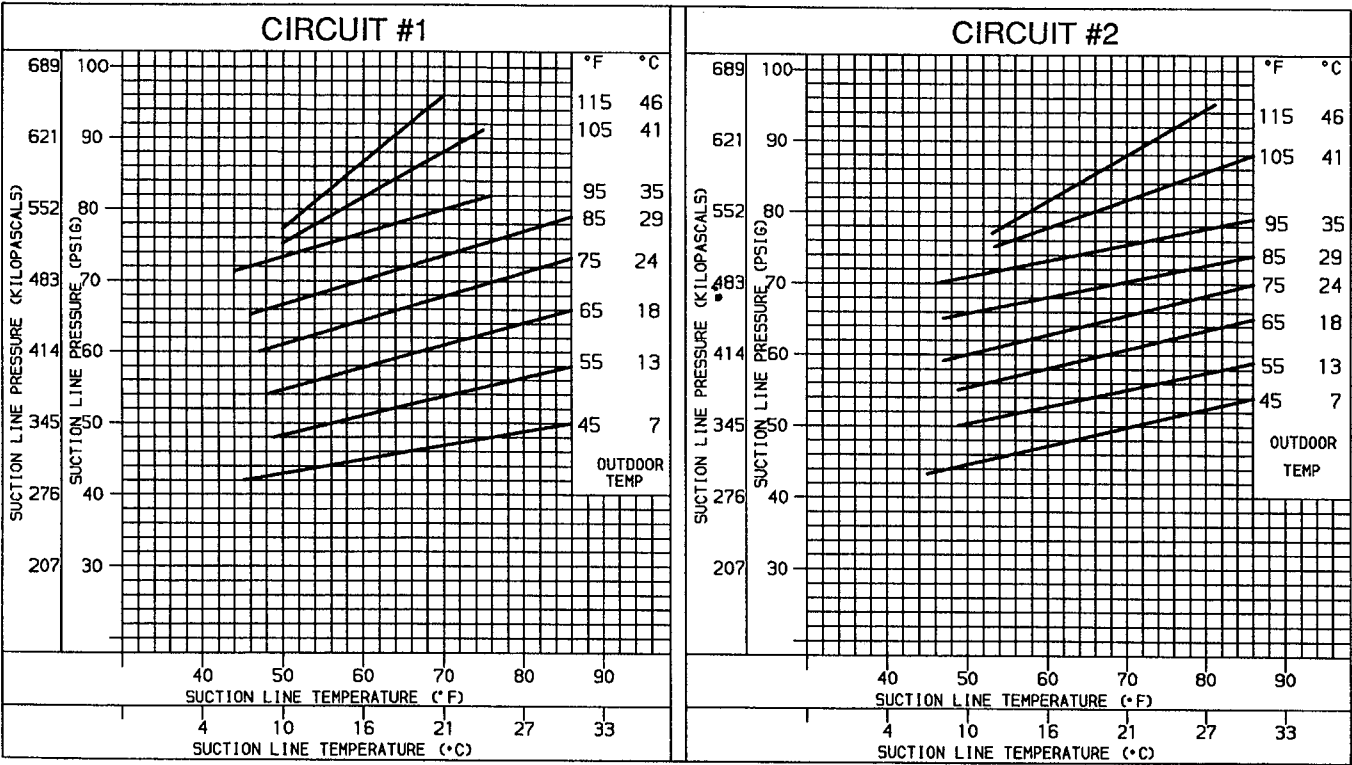


Fig. 39 — Cooling Charging Chart — 48GJ008

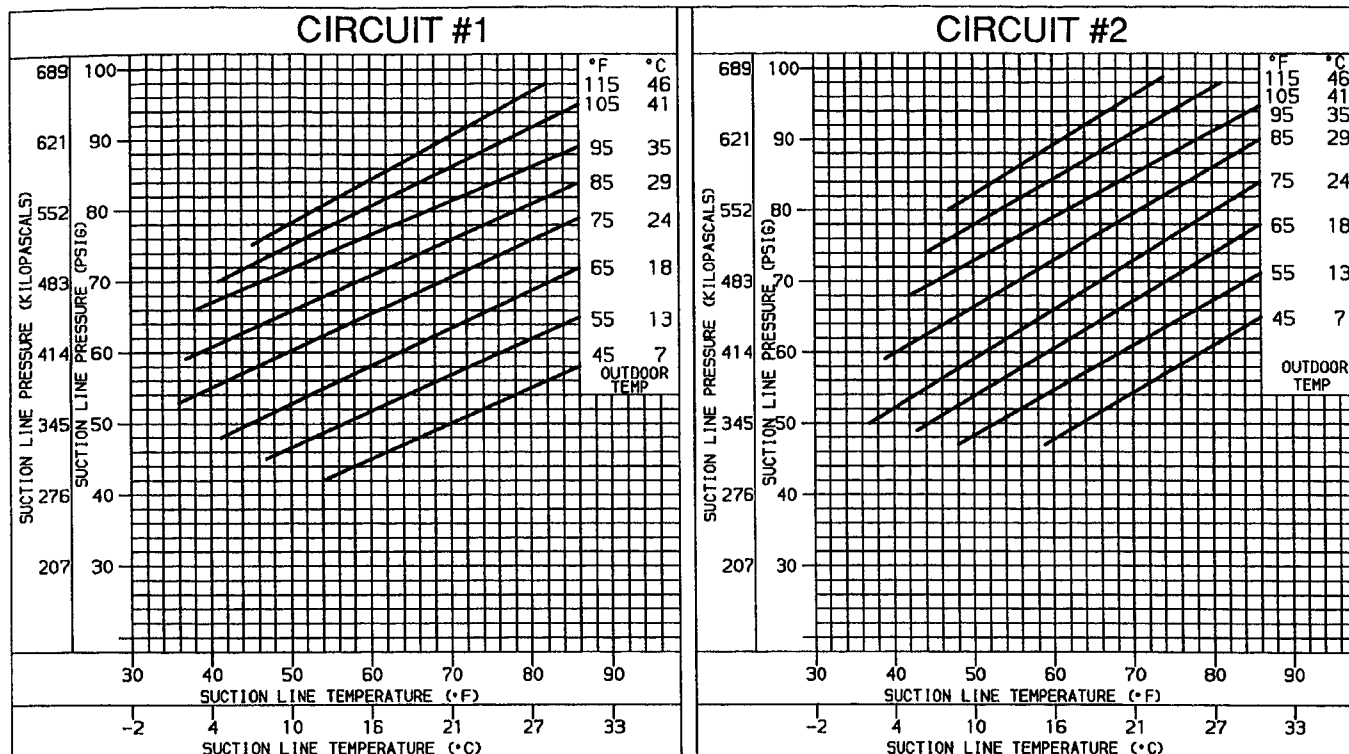


Fig. 40 – Cooling Charging Charts – 48GJ012

Flue Gas Passageways — To inspect the flue collector box and upper areas of the heat exchanger:

1. Remove the combustion blower wheel and motor assembly according to directions in Combustion-Air Blower section on this page.
2. Remove the 3 screws holding the blower housing to the flue cover.
3. Remove the flue cover to inspect the heat exchanger.
4. Clean all surfaces as required using a wire brush.

Combustion-Air Blower — Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bimonthly to determine proper cleaning frequency.

To inspect blower wheel, remove draft hood and screen. Shine a flashlight into opening to inspect wheel. If cleaning is required, remove motor and wheel as follows:

1. Slide burner access panel out.
2. Remove the 2 screws which hold the heat shield in place, and remove heat shield.
3. Remove the 7 screws that attach induced-draft motor mounting plate to blower housing (see Fig. 41).
4. Slide the motor and blower wheel assembly out of the blower housing. The blower wheel can be cleaned at this point. If additional cleaning is required, continue with steps 5 and 6.

5. Remove blower by removing 2 setscrews.
6. Remove motor by removing 4 screws that hold blower housing to mounting plate. Remove the motor cooling fan by removing one setscrew. Then remove nuts that hold motor to mounting plate.
7. To reinstall, reverse the procedure outlined above.

Limit Switch — Remove blower access panel (see Fig. 6A and 6B). Limit switch is located on the fan deck.

Burner Ignition — Unit is equipped with a direct-spark ignition, 100% lockout system. Integrated Gas Unit Controller (IGC) located in the control box (Fig. 11). The IGC contains a self-diagnostic LED (light-emitting diode) that can be observed through the viewport. During service, refer to the label on the control box cover or Table 12 for an explanation of LED error code descriptions.

A single LED on the Integrated Gas Unit Controller (IGC) provides a visual display of operational or sequential problems when the power supply is uninterrupted. When a break in power occurs, the IGC will be reset (resulting in a loss of fault history). The indoor (evaporator) fan ON/OFF time delay will also be reset. Refer to Start-Up, Heating section on page 22 for additional information.

If lockout occurs, unit may be reset by interrupting the power supply to unit for at least 5 seconds.

Table 12 — LED Error Code Description*

LED INDICATION	ERROR CODE DESCRIPTION
ON	Normal Operation
OFF	Hardware Failure
1 Flash†	Evaporator Fan On/Off Delay Modified
2 Flashes	Limit Switch Fault
3 Flashes	Flame Sense Fault
4 Flashes	4 Consecutive Limit Switch Faults
5 Flashes	Ignition Lockout Fault
6 Flashes	Induced-Draft Motor Fault
7 Flashes	Rollout Switch Fault
8 Flashes	Internal Control Fault

LEGEND

LED — Light-Emitting Diode

*A 3-second pause exists between LED error code flashes. If more than one error code exists, all applicable codes will be displayed in numerical sequence.

†Indicates a code that is not an error. The unit will continue to operate when this code is displayed.

IMPORTANT: Refer to Troubleshooting Tables 13-17 for additional information

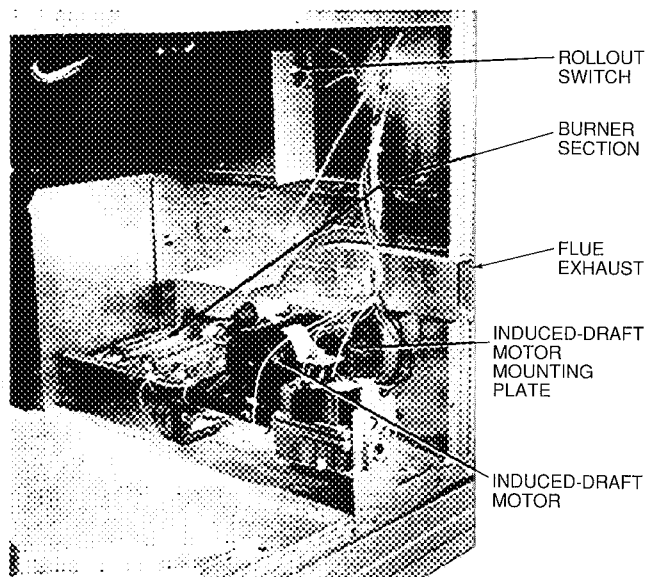


Fig. 41 — Burner Section Details

REMOVAL AND REPLACEMENT OF GAS TRAIN (See Fig. 41 and 42.)

1. Shut off manual gas valve.
2. Shut off power to unit.
3. Remove compressor access panel.
4. Slide out burner compartment side panel.
5. Remove heat shield.
6. Disconnect gas piping at unit gas valve.
7. Remove wires connected to gas valve. Mark each wire.
8. Remove induced-draft motor, ignitor, and sensor wires at the Integrated Gas Unit Controller (IGC).
9. Remove the 2 screws that attach the burner rack to the vestibule plate.
10. Remove the gas valve bracket.
11. Slide the burner tray out of the unit (see Fig. 42).
12. To reinstall, reverse the procedure outlined above.

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described in Removal and Replacement of Gas Train section above.
2. Inspect burners, and if dirty, remove burners from rack.
3. Using a soft brush, clean burners and crossover port as required.

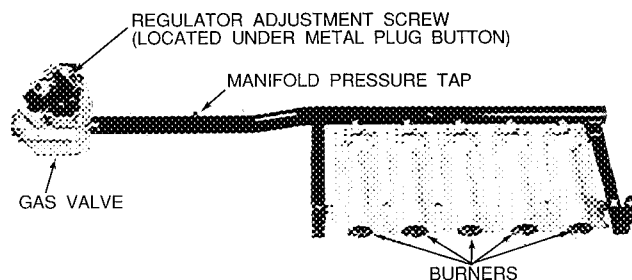


**Fig. 42 — Burner Tray Details
(48GJ008 and 012 Shown)**

4. Adjust spark gap. See Fig. 43.
5. Reinstall burners on rack.
6. Reinstall burner rack as described above.

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

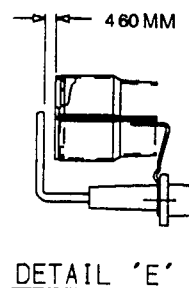
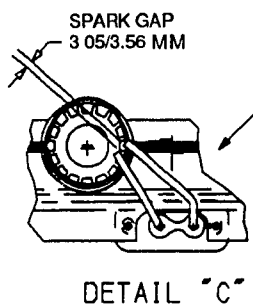
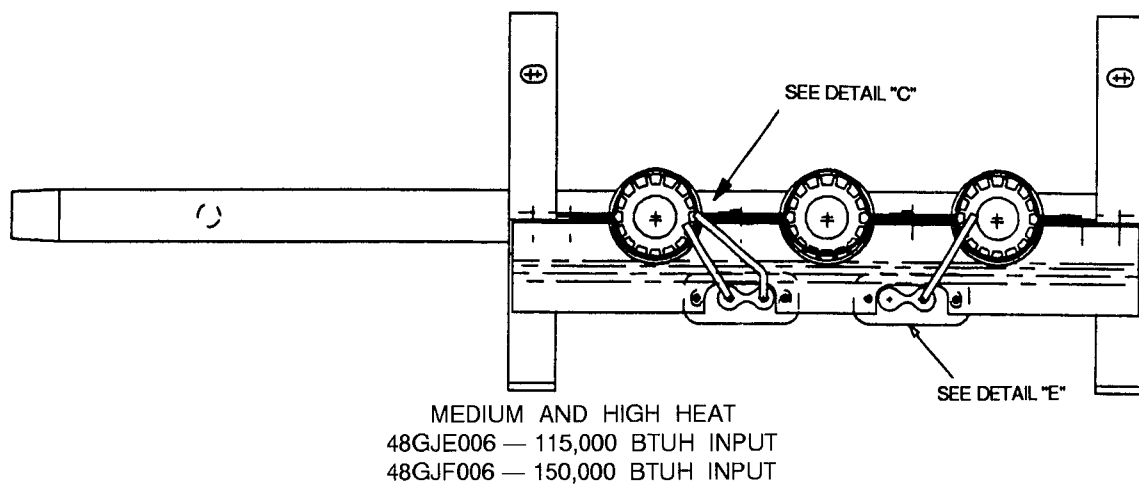
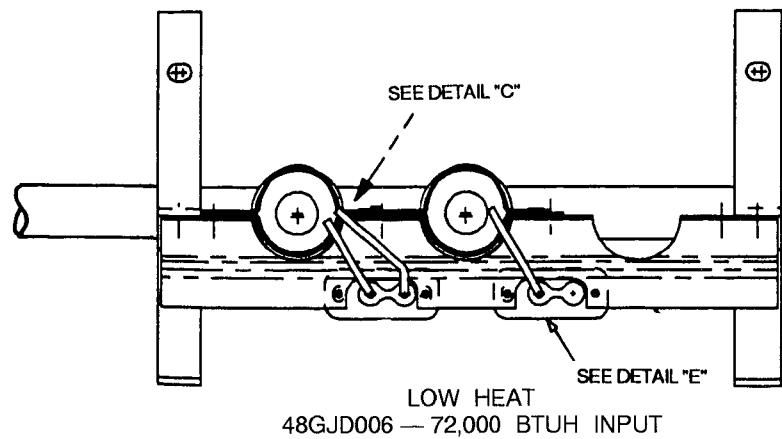
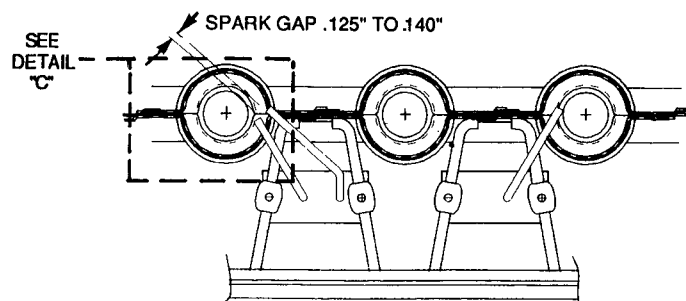
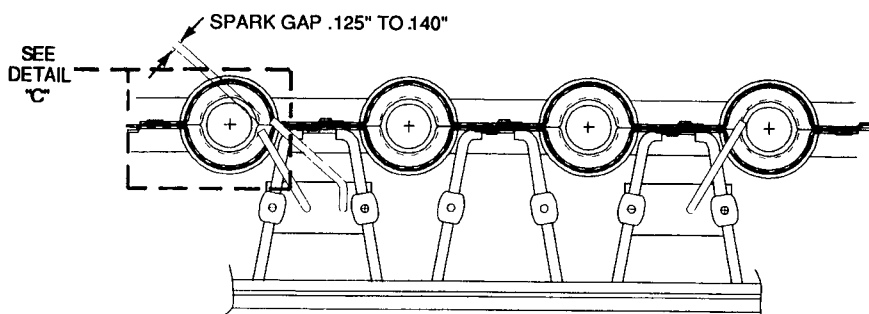


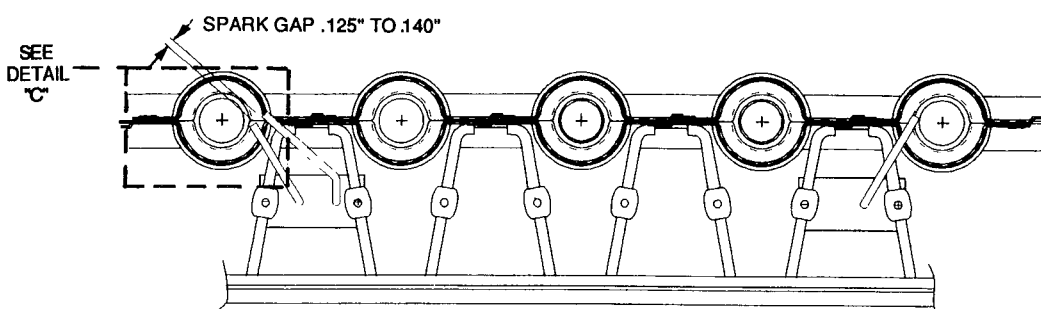
Fig. 43 — Spark Gap Adjustment



48GJD008 — 125,000/90,000 BTUH INPUT

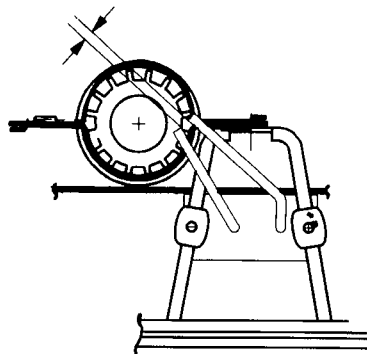


48GJD012, 48GJE008 — 180,000/120,000 BTUH INPUT

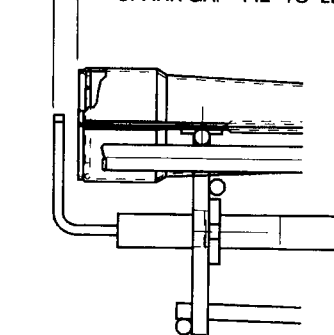


48GJF008, 48GJE012 — 220,000/180,000 BTUH INPUT
48GJF012 — 250,000/200,000 BTUH INPUT

SPARK GAP .125" TO .140"

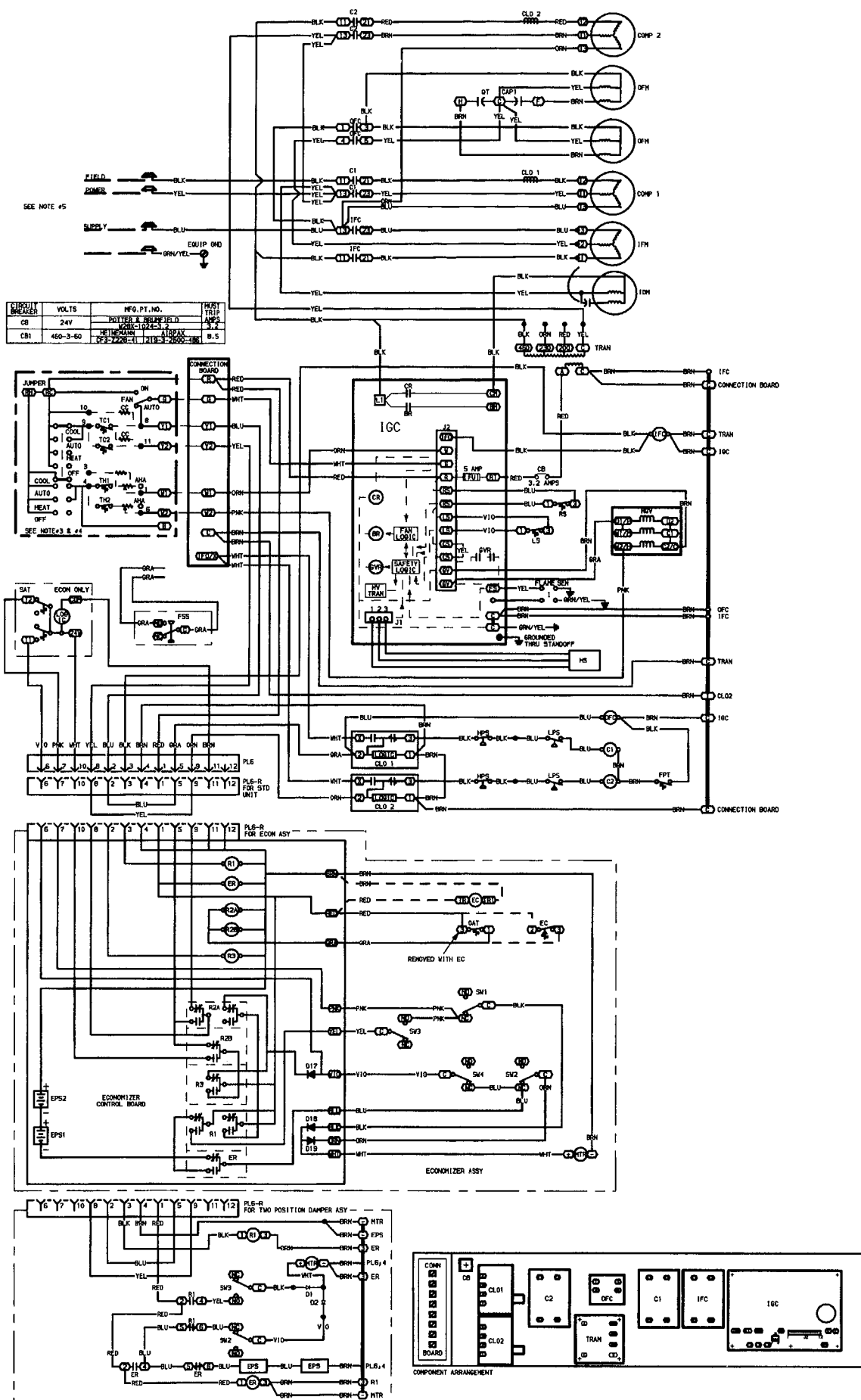


SPARK GAP 142" TO 220"



DETAIL "C"

Fig. 43 — Spark Gap Adjustment (cont)



LEGEND FOR FIG. 44

IMPORTANT: Refer to unit wiring label for actual unit wiring.

AHA	— Adjustable Heat Anticipator	OFC	— Outdoor (Condenser) Fan Contactor
C	— Contactor, Compressor	OFM	— Outdoor (Condenser) Fan Motor
CB	— Circuit Breaker	P	— Plug
CC	— Cooling Compensator	PL	— Plug Assembly
CLO	— Compressor Lockout	QT	— Quadruple Terminal
COMP	— Compressor Motor	R	— Relay
CONN	— Connection	RS	— Rollout Switch
D	— Diode	SAT	— Supply-Air Thermostat
EC	— Enthalpy Control	SEN	— Sensor
ECON	— Economizer	SW1	— Switch Fully Open
EPS	— Emergency Power Supply	SW2	— Switch Fully Closed
EQUIP	— Equipment	SW3	— Switch Minimum Vent Position
ER	— Economizer Relay	SW4	— Switch Maximum Vent Position
FPT	— Freeze-Protection Thermostat	TC	— Thermostat-Cooling
FS	— Flame Sensor	TH	— Thermostat-Heating
FSS	— Filter Status Switch	TRAN	— Transformer
FU	— Fuse		
GND	— Ground		Field Splice
GV	— Gas Valve		Terminal (Marked)
GVR	— Gas Valve Relay		Terminal (Unmarked)
HPS	— High-Pressure Switch		Terminal Block
HS	— Hall Effect Sensor		Splice
HV	— High Voltage		Splice (Marked)
I	— Ignitor		Factory Wiring
IDM	— Induced Draft Motor		Field Control Wiring
IFC	— Indoor (Evaporator) Fan Contactor		Field Power Wiring
IFM	— Indoor (Evaporator) Fan Motor		Accessory or Optional Wiring
IGC	— Integrated Gas Unit Controller		To indicate common potential only, not to represent wiring
LED	— Light-Emitting Diode		
LPS	— Low-Pressure/Loss-of-Charge Switch		
LS	— Limit Switch		
MGV	— Main Gas Valve		
MTR	— Motor		
NC	— Normally Closed		
NO	— Normally Open		
OAT	— Outdoor-Air Thermostat		

NOTES FOR FIG. 44

1. If any of the original wire furnished must be replaced, it must be replaced with Type 90 C wire or its equivalent.
2. Three-phase motors are protected under primary single-phasing conditions.
3. Thermostats: HH07AT170, 172, 174, and P272-2783.
Subbases: HH93AZ176, 178, and P272-1882, 1883.
4. Set heat anticipator for first stage at 0.14 amp, second stage at 0.20 amp, except for 008 low heat. Set both first and second stage at 0.14 amp.
5. Use copper conductors only.

TROUBLESHOOTING

Table 13 – 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.
	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	Reclaim 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.
	Leaking valves in compressor.	Replace compressor.
	Air in system.	Reclaim 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.	Reclaim excess refrigerant
	Air in system	Reclaim 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
	Compressor valves leaking	Replace compressor.
	Restriction in liquid tube	Remove restriction.
Excessive suction pressure.	High heat load.	Check for source and eliminate.
	Compressor valves leaking	Replace compressor.
	Refrigerant overcharged	Reclaim 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.
	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 (molecular sieve only)
Compressor no. 2 will not run.	Unit in economizer mode.	Proper operation; no remedy necessary.

Table 14 – 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 wirenut 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

Table 15 – Varislide™ Economizer Service Analysis

PROBLEM	CAUSE	REMEDY
Damper does not open.	Indoor (evaporator) fan is off.	1. Check to ensure that 24 vac is present at terminal C1 on the IFC or that 24 vac is present at the IFO terminal. Check whether 24 vac is present at PL6-1 (red wire) and/or PL6-3 (black wire). If 24 vac is not present, check wiring (see unit label diagram). 2. Check proper thermostat connection to G on the connection board.
	No power to economizer motor.	1. Check that SW3 is properly making contact with the damper blade. Check that SW1 is in the NC (normally closed) position. 2. Check diode D18. If diode is not functioning properly, replace economizer control board. 3. Confirm that the economizer control board is grounded properly at PL6-4 (brown wire) and at brown terminal of the economizer control board (brown wire). The economizer motor must also be grounded properly at the negative motor terminal (brown wire). 4. Verify SW1 and SW3 are working and wired properly (see unit label diagram). 5. Check for 24 vac input at both PL6-1 (red wire) and PL6-3 (black wire). If 24 vac not present, check unit wiring (see unit label diagram). If 24 vac is found in both places, check for 24 vac at the yellow terminal of the economizer control board (yellow wire). If 24 vac power is not present, replace the economizer control board.
	Economizer motor failure.	If the indoor (evaporator) fan and economizer motor are energized, verify that there is a minimum of 18 vdc at the positive motor terminal. If the motor is not operating, replace the motor.
Economizer operation limited to minimum position.	OAT or EC set too high.	1. Set at correct temperature (3 F below indoor space temperature) 2. Check OAT or EC by setting above outdoor temperature or humidity level. If the OAT or EC switches do not close, replace OAT or EC.
	Economizer control board incorrectly wired or not functioning.	1. Perform the following tests when OAT or EC is closed, Y1 is called for, and damper is at minimum position. Confirm 24 vac on gray terminal of the economizer control board (gray wire). If 24 vac is not present, check wiring (see unit label diagram). 2. Verify that SW1 and SW3 are wired correctly and working properly (see unit label diagram) 3. Check to ensure that 24 vac exists at PL6-2 (blue wire). If 24 vac is not present, check wiring (see unit wiring label diagram) 4. Check 24 vac output at PL6-10 (white wire). If 24 vac is not present, replace economizer control board
	Incorrect SAT wiring or inoperative SAT.	1. After verifying that the OAT and EC settings and the economizer control board wiring are correct, check to ensure that the 24 vac terminal of the SAT has 24 vac (white wire). If OAT, EC, and control board are functioning and wired properly and no 24 vac exists, check wiring (see unit label diagram). 2. If supply-air temperature is greater than 57 F, 24 vac should be found at terminal T2 on the SAT (pink wire). If 24 vac is not present, replace SAT.
Damper does not close.	Incorrect economizer wiring	1. Verify that SW2 and SW4 are wired and working properly (see unit label diagram). 2. Check diode D19. If diode is not functioning properly, replace economizer control board.
	Incorrect damper actuator wiring or inoperative economizer circuit board.	1. After verifying that the wiring is correct, modulate the damper to the minimum position. Remove the calls for G. 2. If the damper does not move, check for 24 vac at PL6-1 (red wire). If 24 vac is not present, check wiring (see unit label diagram). 3. If damper still does not move, check for 24 vac at blue terminal of economizer control board (blue wire). If 24 vac is not present, replace the economizer control board.
	Incorrect SAT wiring or inoperative SAT.	1. After verifying that the wiring is correct and the economizer control board is functioning properly, place the OAT or EC switch in the closed position. Place a call for Y1 and open the damper to the fully open position. Confirm that the 24 vac terminal of the SAT has 24 vac (white wire). If 24 vac is not present, check wiring (see unit label diagram). 2. If supply-air temperature is less than 52 F, 24 vac should be found at terminal T1 on the SAT (violet wire). If 24 vac not found, replace SAT.
	Economizer motor failure.	If economizer control board and SAT are functioning properly, verify that there is a minimum of 18 vdc at the positive motor terminal. If a minimum of 18 vdc is present and the motor is still not operating, replace the motor.
Economizer damper does not close on power loss.	Insufficient battery power, inoperative economizer control board	1. Check voltage potential across batteries. If lower than 14 vdc, replace close-on-power-loss power supply (9-v alkaline batteries). Check this emergency power supply on a regular basis or whenever the filters are changed. 2. If the close-on-power-loss and economizer control board are functioning properly, check for 14 vdc or higher at the blue terminal of the economizer control board (blue wire) when power is disconnected from unit. If 14 vdc is not present, replace the control board.

LEGEND

C1 — Common
EC — Enthalpy Control
IFC — Indoor (Evaporator) Fan Contactor
IFO — Indoor (Evaporator) Fan On

OAT — Outdoor-Air Thermostat
PL — Plug
SAT — Supply-Air Thermostat
SW — Economizer Position Switch

Table 16 – PARABLADE Economizer Service Analysis

PROBLEM	CAUSE	REMEDY
Damper does not open.	Evaporator fan not on	Check wiring between G on connection board and indoor (evaporator) fan contactor.
	No power to economizer motor.	1. Disconnect power at TR and TR1. Disconnect jumper across P and P1. 2. Connect jumper across TR and 1. 3. Connect jumper across T1 and T. 4. If connected, remove enthalpy sensor from terminals S_o and +. Factory-installed 620 ohm resistor should be connected to terminals S_R and +. 5. Apply power (24 vac) to terminals TR and TR1. The LED should be off and the damper should be in the closed position. 6. Disconnect the factory-installed 620 ohm resistor from terminals S_R and +. The LED should light up and the motor should drive towards open. If this does not happen, replace the economizer control module.
	Economizer motor failure	If the indoor (evaporator) fan and economizer motor are energized, verify that there is a minimum of 24 vac at terminals TR and TR1. If the motor is not operating, replace the motor.
Economizer operation limited to minimum position.	Economizer control module failure.	1. To simulate high or low enthalpy, reconnect the factory-installed 620 ohm resistor across terminals S_R and +. 2. Connect 1.2 Kohm checkout resistor across terminals S_o and +. Turn the enthalpy set point to "A." The LED should turn on, indicating low enthalpy. The motor should drive towards open. If LED does not light, replace module. If motor does not drive open, check motor operation. 3. Turn the enthalpy set point to "D." The LED should turn off, indicating high enthalpy. The motor should drive towards closed. If these actions do not occur, replace module. 4. Disconnect 1.2 Kohm checkout resistor before resuming operation.
Damper does not close.	No power to economizer.	1. Disconnect power at TR and TR1. Disconnect jumper across P and P1. 2. Connect jumper across TR and 1. 3. Connect jumper across T1 and T. 4. If connected, remove enthalpy sensor from terminals S_o and +. Factory-installed 620 ohm resistor should be connected to terminals S_R and +. 5. Apply power (24 vac) to terminals TR and TR1. The LED should be off and the damper should be in the closed position. 6. Disconnect the factory-installed 620 ohm resistor from terminals S_R and +. The LED should light up and the motor should drive towards open. If this does not happen, replace the economizer control module.
	Spring return failure.	If power to unit is off and damper does not close, check for a bound linkage. If linkage is not bound, then internal spring may be broken. Replace actuator.
	Economizer motor failure	If the economizer control module is functioning properly, verify that there is a minimum of 24 vac at terminals TR and TR1. If the motor is not operating, replace the motor.
Damper does not open or close according to enthalpy readings.	Sensor incorrectly wired or bad.	To verify sensor operation, reconnect the + lead of the outdoor enthalpy sensor to the + terminal of the economizer control module. Connect a DC milliammeter between terminals S _o of the economizer control module and terminal S of the enthalpy sensor. The milliammeter should indicate between 3 and 25 mA if the sensor is operating properly. If the milliammeter indicates 0, the sensor may be wired backwards. If any other readings are shown, replace the sensor.

LEGEND

LED – Light-Emitting Diode

Table 17 – LED Error Code Service Analysis

PROBLEM	CAUSE	REMEDY
Hardware failure. (LED OFF)	Loss of power to control module (IGC).	Check 5 amp fuse on IGC, power to unit, 24-v circuit breaker, and transformer. Units without a 24-v circuit breaker have an internal overload in the 24-v transformer. If the overload trips, allow 10 minutes for automatic reset.
Limit switch fault. (LED 2 flashes)	High temperature limit switch is open.	Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is in accordance with the range on the unit nameplate.
Flame sense fault. (LED 3 flashes)	The IGC sensed flame that should not be present.	Reset unit. If problem persists, replace control board.
4 consecutive limit switch trips. (LED 4 flashes)	Inadequate airflow to unit.	Check operation of indoor (evaporator) fan motor and that supply-air temperature rise agrees with range on unit nameplate information.
Ignition lockout. (LED 5 flashes)	Unit unsuccessfully attempted ignition for 15 minutes.	Check ignitor and flame sensor electrode spacing, gaps, etc. Ensure that flame sense and ignition wires are properly terminated. Verify that unit is obtaining proper amount of gas.
Induced-draft motor fault. (LED 6 flashes)	IGC does not sense that induced-draft motor is operating.	Check for proper voltage. If motor is operating, check the speed sensor plug/IGC Terminal J2 connection. Proper connection: PIN 1 – White, PIN 2 – Red, PIN 3 – Black.
Rollout switch fault. (LED 7 flashes)	Rollout switch has opened.	Rollout switch will automatically reset, but IGC will continue to lock out unit. Check gas valve operation. Ensure that induced-draft blower wheel is properly secured to motor shaft. Reset unit at unit disconnect.
Internal control fault. (LED 8 flashes)	Microprocessor has sensed an error in the software or hardware	If error code is not cleared by resetting unit power, replace the IGC.

LEGEND

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

⚠ WARNING

If the IGC must be replaced, be sure to ground yourself to dissipate any electrical charge that may be present before handling new control board. The IGC is sensitive to static electricity and may be damaged if the necessary precautions are not taken.

IMPORTANT: Refer to Table 14 — Heating Service Analysis for additional troubleshooting information.

PACKAGED SERVICE TRAINING

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

- Unit Familiarization
- Maintenance
- Installation Overview
- Operating Sequence

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

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

START-UP CHECKLIST
(Remove and Store in Job File)

I. PRELIMINARY INFORMATION

MODEL NO.: _____

SERIAL NO.: _____

DATE: _____

TECHNICIAN: _____

II. PRE-START-UP (insert checkmark in box as each item is completed)

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ REMOVE ALL SHIPPING HOLDDOWN BOLTS AND BRACKETS PER INSTALLATION INSTRUCTIONS
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTALLATION INSTRUCTIONS
- ☐ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS
- ☐ CHECK GAS PIPING FOR LEAKS
- ☐ CHECK THAT RETURN (INDOOR) AIR FILTER IS CLEAN AND IN PLACE
- ☐ VERIFY THAT UNIT INSTALLATION IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER(S) FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS

III. START-UP

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1	_____
COMPRESSOR AMPS	L1	_____	L2	_____	L3	_____
COMPRESSOR AMPS	L1	_____	L2	_____	L3	_____
INDOOR-FAN AMPS	L1	_____	L2	_____	L3	_____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ DB

RETURN-AIR TEMPERATURE _____ DB _____ WB

COOLING SUPPLY AIR _____

GAS HEAT SUPPLY AIR _____

PRESSURES

GAS INLET PRESSURE _____ IN. WG

GAS MANIFOLD PRESSURE _____ IN. WG

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

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

- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING TABLES
- ☐ VERIFY THAT 3-PHASE SCROLL COMPRESSOR ROTATING IN CORRECT DIRECTION