

Single-Package Cooling Units

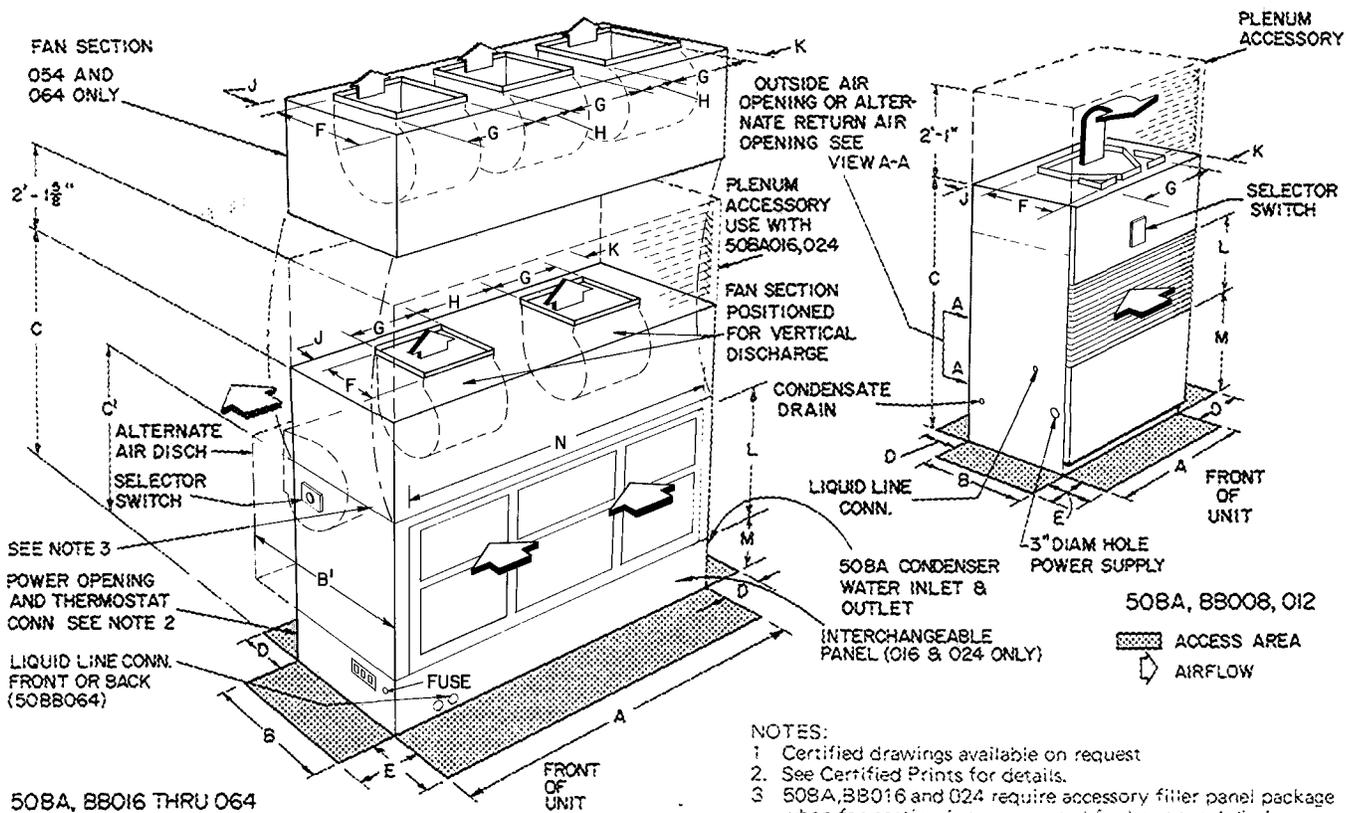
INSTALLATION

General — The 50BA, BB008 thru 024 are self-contained units, assembled for vertical air discharge, wired and piped at the factory.

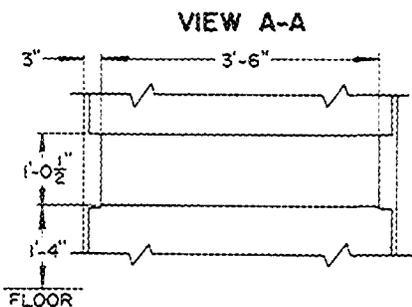
The 50BA, BB028 thru 064 are self-contained units consisting of a base section, fan section, fan

motor and fan drive package, each shipped separately and field assembled. Base section is factory-wired compressor/evaporator coil unit. Fan section mounts for vertical or horizontal air discharge.

Unit Support — Refer to Fig. 1 and Table 1 for unit weight and dimensions.



- NOTES:
1. Certified drawings available on request
 2. See Certified Prints for details.
 3. 50BA, BB016 and 024 require accessory filler panel package when fan section is top mounted for horizontal discharge



UNIT 50BA, BB	008, 012	016, 024	028, 034	044	054	064
A	4-0	6-8	7-9 $\frac{1}{4}$	10-6 $\frac{3}{8}$	10-6 $\frac{3}{8}$	10-6 $\frac{3}{8}$
B	2-6 $\frac{1}{4}$	2-5 $\frac{1}{4}$	2-11 $\frac{1}{4}$	3-10 $\frac{1}{4}$	3-10 $\frac{1}{4}$	3-10 $\frac{1}{4}$
B ^{1*}	-	4-4 $\frac{3}{8}$	5-4 $\frac{3}{8}$	6-4 $\frac{3}{8}$	6-4 $\frac{3}{8}$	6-4 $\frac{3}{8}$
C	6-5	6-10 $\frac{1}{2}$	8-0 $\frac{1}{2}$	8-10	9-9	10-1
C ^{1*}	-	4-11 $\frac{1}{2}$	5-7 $\frac{1}{2}$	6-3 $\frac{3}{8}$	7-2 $\frac{3}{8}$	7-7 $\frac{1}{4}$
D	1-0	2-0	2-0	2-0	2-0	3-0
E	2-0	3-0	3-0	2-6	2-6	3-0
F	1-7 $\frac{3}{8}$	1-7 $\frac{1}{2}$	1-8 $\frac{3}{8}$	1-8 $\frac{3}{8}$	1-8 $\frac{3}{8}$	1-8 $\frac{3}{8}$
G	1-5 $\frac{1}{2}$	1-5 $\frac{1}{2}$	1-8 $\frac{3}{8}$	1-8 $\frac{3}{8}$	1-8 $\frac{3}{8}$	1-8 $\frac{3}{8}$
H	-	1-4 $\frac{3}{8}$	1-7 $\frac{1}{2}$	2-7 $\frac{1}{2}$	1-5 $\frac{1}{2}$	1-5 $\frac{1}{2}$
J	0-1 $\frac{1}{4}$	0-0 $\frac{3}{8}$	0-2 $\frac{3}{8}$	0-3	0-3	0-3
K	0-11 $\frac{1}{4}$	1-7	1-4	2-2 $\frac{3}{8}$	1-2 $\frac{3}{8}$	1-2 $\frac{3}{8}$
L	1-11 $\frac{1}{4}$	2-10 $\frac{1}{4}$	3-2 $\frac{1}{4}$	3-10	4-9	4-9
M	2-5 $\frac{1}{2}$	1-11 $\frac{1}{2}$	2-1 $\frac{1}{2}$	2-2 $\frac{1}{2}$	2-2 $\frac{1}{2}$	2-6 $\frac{1}{2}$
N	-	6-3 $\frac{3}{4}$	7-4 $\frac{1}{4}$	10-0	10-0	10-0

*With fan section relocated for horizontal discharge

Fig. 1 — Dimensions (ft-in.)

→ Table 1 — Physical Data

UNIT 50	BA		BB		BA		BB		BA		BB		BA		BB		BA		BB	
	008		012		016		024		028		034		044		054		064			
OPER WEIGHT (lb)	770*	710*	950*	890*	1414*	1221*	1894*	1464*	2491	2327	2598	2430	3800	3100	4100	3300	4404	3550		
OPER CHARGE (lb)	Refrigerant 22†																			
Sys 1	10	7	10	8	24	15	17	7	24	15	24	15	24	15	29	15	52	25		
Sys 2	-	-	-	-	-	-	17	7	17	12	24	15	24	15	29	15	52	25		
Sys 3	-	-	-	-	-	-	-	-	-	-	-	-	17	11	29	15	-	-		
COMPRESSOR	1750 rpm at 60-Hz (Note 1)																			
06-	R	DA	DB		DD		DA		DA		DA		DA		DA		EA‡			
Sys 1	249	818	724	824	337	537	724	824	337	537	337	537	337	537	337	537	175	275		
Sys 2	-	-	-	-	-	-	724	824	724	824	337	537	337	537	337	537	175	275		
Sys 3	-	-	-	-	-	-	-	-	-	-	-	-	724	824	337	537	-	-		
Unloading Cylinder	0	0	2	2	2	2	0	0	0	0	0	0	0	0	0	0	4	4		
Capacity Steps	1	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	2 or 4			
Oil Capacity (Pts)	5	7	10		10		10 ea		10 ea		10 ea		10 ea		10 ea		17 ea			
CONDENSER, Type	TT	-	TT	-	SC	-	SC	-	SC	-	SC	-	SC	-	SC	-	ST	-		
Number	1	-	1	-	1	-	2	-	2	-	2	-	3	-	3	-	2	-		
EVAPORATOR FAN	1725 Rpm; Belt-Driven Centrifugal																			
Nominal Cfm	3000		4000		6000		8000		10,000		12,000		16,000		20,000		24,000			
Range Cfm	2250-3750		3000-5000		4500-7500		6000-10000		7,500-12,500		9,000-15,000		12,000-20,000		15,000-25,000		20,000-25,000			
Nominal Motor Hp	1.0		2.0		2.0		3.0		5.0		5.0		7.5		10.0		15.0			
Frame (NEMA)	56		145T		145T		182T		184T		184T		213T		256U		284U			
Motor PDR (Note 2)	2.4-3.4		2.4-3.4		3.7-4.7		4.0-5.0		4.3-5.3		4.3-5.3		5.6, 6.0, 6.4		5.8, 6.2, 6.8		7.0, 7.4, 8.0			
Fan PPD	8.5		7.0		11.4		10.0		12.4		11.0		15.4		15.4		15.4			
Belt No. ... Length	1 35		1 35		1 49		2 45		2 88		2 88		2 63		2 100		2 98.8			
FSR (Rpm) (Note 2)	495-700		600-850		568-720		700-875		605-750		685-845		627, 672, 717		650, 695, 762		785, 828, 895			
Speed Change per ½ turn of Pulley	18		22		14.5		17.5		14.5		16.0		-		-		-			
Flange (Rpm)																				
Moveable Pulley - Max full turns from Closed Position	5½		5½		6		5		6		6		-		-		-			
PRESSURESTAT	Settings (psig)																			
High Cutout	BA-280, BB-375																			
High Cut-in	BA-180, BB-275																			
Low Cutout	27																	29		
Low Cut-in	60																	63		
EVAPORATOR COILS	3		3		3		4		4		4		4		4		4			
Rows	13		13		13		11		11		11		11		11		13			
Fins/In.	7.31		8.54		16.90		18.04		22.6		26.9		36.5		46.3		46.3			
Face (sq ft)																				
FILTERS, Low Vel**																				
No. ...Size (in.)	4 16x20x1		4 16x20x1		3 16x25x2 3 20x25x2		3 16x25x2 3 20x25x2		6 25x20x2 2 16x20x2		6 25x20x2 2 16x20x2		11 25x20x2		10 20x25x2 5 16x25x2		10 20x25x2 5 16x25x2			

- FSR — Fan Speed Range
- PDR — Pitch Diameter Range
- PPD — Pulley Pitch Diameter
- SC — Shell and Coil
- ST — Shell and Tube
- TT — Tube in Tube

*Add 140 lb for plenum

†Does not include charge for matching air-cooled condenser or connecting piping used with 50BB units. All 50BB units are shipped with holding charge

‡06EE on System 2

**Filters shown are supplied with unit. Field-supplied 2-in. filters will fit 008 and 012 units

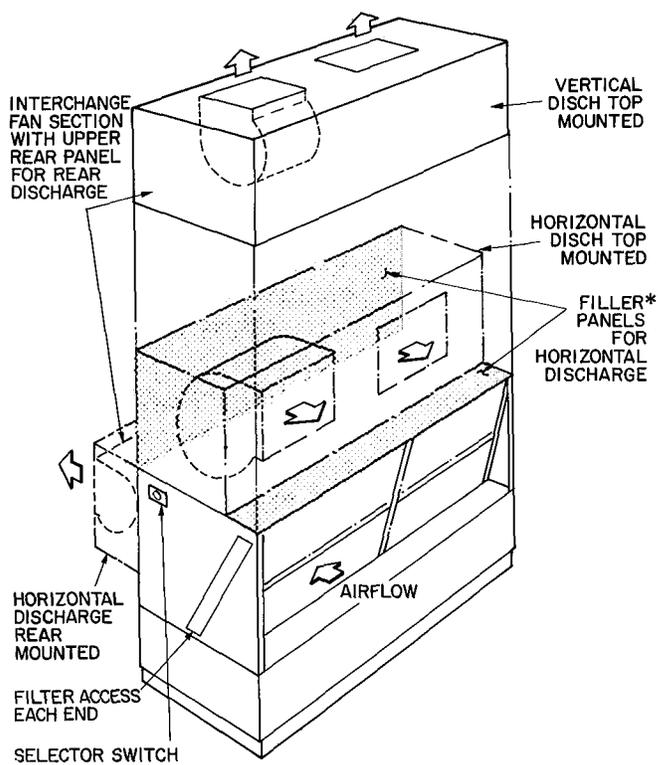
NOTES:

- 1 Compressor rpm on 50BA008 is 3450
- 2 Fan motor pulleys on 50BA, BB044, 054 and 064 are fixed pitch
- 3 Maximum fan speed for all units is 1100 rpm

Rigging and Unit Placement — Inspect unit for shipping damage. File any claim with transportation agency. Provide space around unit for service, filter access, and clearance for plenum, if used. Move and store unit in upright position. Use slings with spacer under base skid to prevent panel damage when using hoist. Raise base skid on blocks and remove bolts. On 028 thru 064 units, unbolt fan section from skid. Units, as shipped, are adequately dampened against vibration. However, if additional dampening is desired, place sponge

rubber, rubber mat or fiberglass roof insulation between floor and base of unit or install vibration isolators.

Units 50BA, BB008 thru 024 are shipped for vertical discharge. If horizontal discharge is desired on 008 and 012 units, a field-fabricated elbow must be installed. On 016 and 024 units for top mounted horizontal discharge, accessory filler panels must be field installed (see Fig. 2).



*See Installation Instructions in Filler Panel Package.

Fig. 2 — Typical Fan Section Arrangements (50BA, BB016, 024 Only)

For 016 and 024 units back mounted horizontal discharge (see Fig. 2).

1. Remove:
 - a. Rear fan section panel.
 - b. Upper rear coil section panel.
 - c. Flexible conduit and wires from motor.
 - d. Corner bolts holding fan-to-coil section.
2. Lift off fan section and rotate 180° lengthwise — motor on left side of unit.
3. Locate on rear of coil section and refasten.
4. Replace motor conduit and wire.
5. Adjust:
 - a. Shaft alignment.
 - b. Fan wheel position.
 - c. Pulleys.
 - d. Fan belt.
6. Replace:
 - a. Coil section rear panel (1b) on top of coil section and fasten.
 - b. Fan section panel (1a) on top of fan section and fasten.

A field-installed accessory plenum is available for free blow application on the 008 thru 024 units.

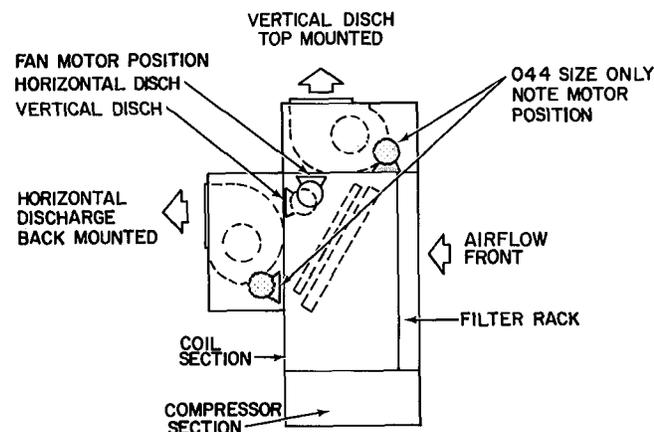
Units 50BA, BB028 thru 064 are shipped in sections as noted previously — can be field assembled for either vertical or horizontal discharge.

HORIZONTAL DISCHARGE (see Fig. 3 and 4)

NOTE: Units vary in size but are basically the same. Fan section panels may be removed for easier lifting and to facilitate motor installation.

1. Remove:
 - a. Upper rear and end panels on coil section.
 - b. End panels on fan section.
 - c. Fasteners holding lower rear edge of fan panel.
2. Lift and position fan section on rear of coil section, Fig. 4. Fasten with provided fasteners
3. Install (see note regarding 044 size unit):
 - a. Motor mount frame angles.
 - b. Motor on plate assembly.
 - c. Motor-plate assembly into frame angles.
 - d. Other drive package components.
4. Adjust:
 - a. Shaft alignment.
 - b. Fan wheel position.
 - c. Pulleys.
 - d. Fan belts.
5. Replace and fasten:
 - a. Rear coil section panel (1a) on top of coil section. Rear holes will overlap fan section top panel. Fasten using hole vacated in (1c). See Fig. 4.
 - b. All end panels after adjustment.

NOTE: Motor mounting channels are factory installed on 044 size units. No angles, plates or fasteners necessary. In this position, fan motor will be located at right side within fan section.



NOTE

Motor pulley on left side of unit — vertical discharge.
Motor pulley on right side of unit — horizontal discharge.

Fig. 3 — Fan and Motor Arrangements 50BA, BB028, 034, 044, 054, 064

VERTICAL AIR DISCHARGE, TOP MOUNTED
(See Fig. 3 and 4)

1. Remove:
 - a. Front, rear and end fan section panels.
 - b. Upper rear and end coil section panels.
 - c. Filter from coil section.
 - d. Fasteners holding filter frame top. Push out away from coil section frame (on 028 and 034 only).

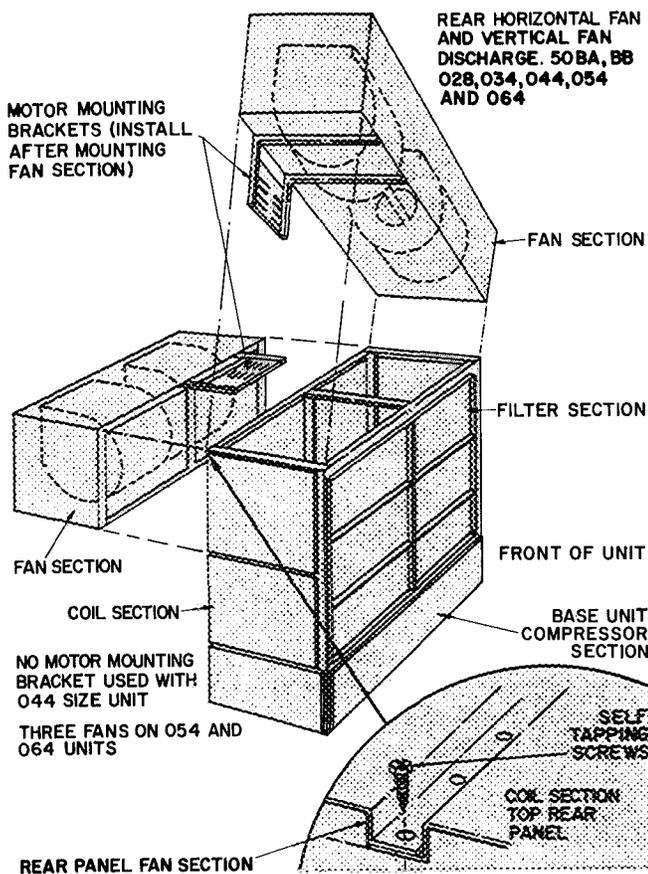


Fig. 4 – Fan Mounting

FAN MOTOR MOUNTING

Units 50BA, BB028, 034, 054 and 064 – Motor, motor mounting assembly, drive package and fasteners shipped separate from unit. Install items after fan section is in place on coil section. See Tables 1 and 2.

NOTE: Before installing motor or motor mounts in 028, 034, 054, and 064 units place plywood over evaporator coil to prevent damage.

To install motor:

1. Fasten motor mounting angle bracket to fan section. Use Fig. 3 or 4 as a position reference and Fig. 5 and 6 as a guide. Be sure lip of angle brackets are around fan section frame and that motor mounting plate slots face each other.
2. Position motor on motor plate and fasten with fasteners provided; use Fig. 7 as a guide.
3. Lift motor-plate assembly and slide into motor mounting angles as shown in Fig. 5. Plate fits in angle slots. On vertical mounts, the motor-frame assembly may be lowered to bottom of support angle channels.
4. Assemble and install motor adjusting screws as shown in Fig. 8. Drive roll pins into screws to prevent screws from backing out while adjusting motor position. On 50BA, BB054 and 064 units, the adjusting screws engage the motor mounting plate.
5. Adjust motor position. Fasten motor mounting plate to mounting angles.

2. Lift and position fan section on coil section, Fig. 4.
3. a. Fasten fan section frame to coil section frame with provided fasteners.
b. Reposition and fasten upper filter frame (on 028 and 034 only).
4. Install (see note regarding 044 size):
a. Motor mounting frame angles.
b. Motor on motor-plate assembly.
c. Motor-plate assembly into frame angles.
d. Other drive package components.

NOTE. Motor mounting plate and channels are factory installed within fan section on 044 size units. No angle frame plates or fasteners necessary. In this position motor will be on right side of unit.

5. Adjust:
 - a. Fan wheel alignment.
 - b. Shaft alignment.
 - c. Pulleys
 - d. Fan belts
6. Replace and fasten:
 - a. Rear coil section panels, front and rear fan section panels.
 - b. All end panels after adjustments.

Table 2 – Alternate Fan Motors and Drives

UNIT 50BA, BB	NEMA FRAME SIZE*	HP	CENTER LINE DISTANCE (in.)		FAN SHAFT DIAM (in.)
			Max	Min	
008, 012	184, 56, 145T	2	10.2	6.8	3/4
	182T, 213	3	10.2	6.8	
016, 024	184, 56, 145T	2	11.8	9.4	1
	213, 182T	3	11.8	8.4	
	184T, 215	5	11.8	8.4	
028, 034	182T, 213	3	34.4	28.8	1 1/16
	184T, 215	5	34.4	28.8	
	254U, 213T	7 1/2	33.3	29.8	
	256U, 215T	10	33.3	29.8	
044	254U, 213T	7 1/2	14.3	10.1	1 1/16
	256U, 215T	10	14.3	10.1	
054, 064	254U, 213T	7 1/2	33.5	29.0	1 1/16
	256U, 215T	10	33.5	29.0	
	284U, 254T	15	33.5	29.0	

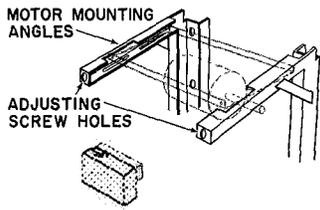
*Range of motor sizes unit will accept

NOTE: Motors and drives other than those furnished with unit must be purchased locally

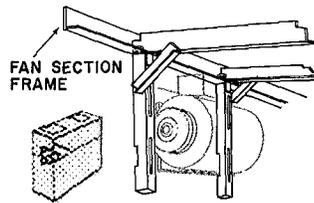
Units 50BA, BB044 – Shipped with motor mounting plate installed in fan section. See Tables 1 and 2 for motor data.

To install motor:

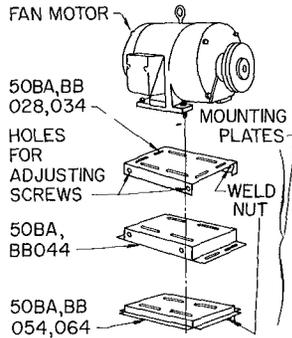
1. Remove bolts holding motor plate to unit support channels.



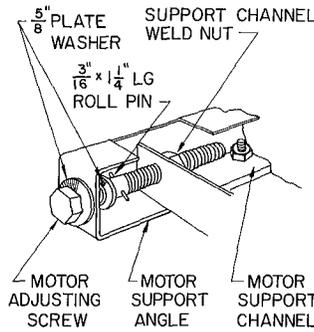
**Fig. 5 – 028 and 034
Horizontal Fan Motor
Mounting Angles**



**Fig. 6 – 054 and 064
Vertical Fan Motor
Mounting Angles**



**Fig. 7 – Motor
Mounting**



**Fig. 8 – Assembled
Fan Motor
Adjusting Screw**

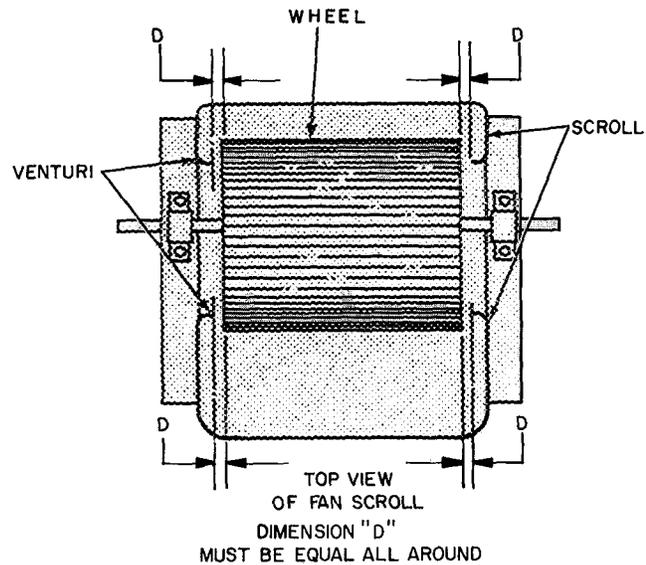


Fig. 9 – Horizontal Wheel Centering

2. Remove two adjusting screws; lift out motor plate.
3. Position motor on motor plate and fasten with fasteners provided as shown in Fig. 7.
4. Lift motor-plate assembly and slide onto channels; be sure plate slides under lip guides.
5. Reinstall adjusting screws and adjust motor position.
6. Fasten motor plate to channels.

Shaft and Wheel Alignment – On units where fan section is shipped separately, check alignments before mounting fan section.

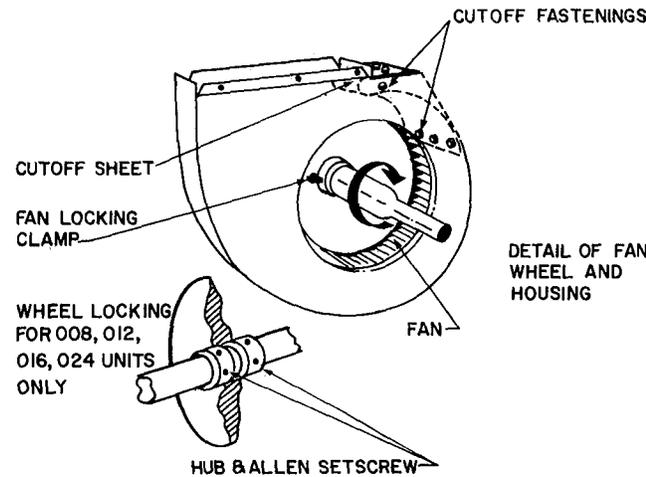
HORIZONTAL WHEEL CENTERING – All wheels must be horizontally centered between the inside edges of their respective fan scroll venturi (Fig. 9). To adjust individual wheels:

Units 50BA, BB008 thru 024

1. Loosen setscrews holding wheel support to shaft (Fig. 10).
2. Center wheel by sliding horizontally (Fig. 9).
3. Retighten setscrews.

Units 50BA, BB028 thru 064

1. Loosen fan wheel locking clamps, one on each side of fan support (Fig. 10).
2. Center wheel by sliding horizontally (Fig. 10).
3. Retighten locking clamp bolts using torque indicated in Table 3.



**Fig. 10 – Fan Locking Detail
– 028,034,044,054,064**

Table 3 – Torque Requirements

BOLT SIZE (in.)	FAN CLAMP BOLT RECOMMENDED TORQUE (ft - lb)
5/16	15 - 18
7/16	30 - 35

CONCENTRIC ALIGNMENT – Shaft and wheels must be concentrically centered with respect to the venturi or air inlet of the fan housing (Fig. 11).

Units 50BA, BB008 thru 024 – Shaft bearings are held by a “spider” support, Fig. 12. If shaft and wheels are concentrically misaligned due to shipping shock, it is possible to rebend spider arms to their original position. Spider should be replaced if it has been extensively damaged by shipping shock.

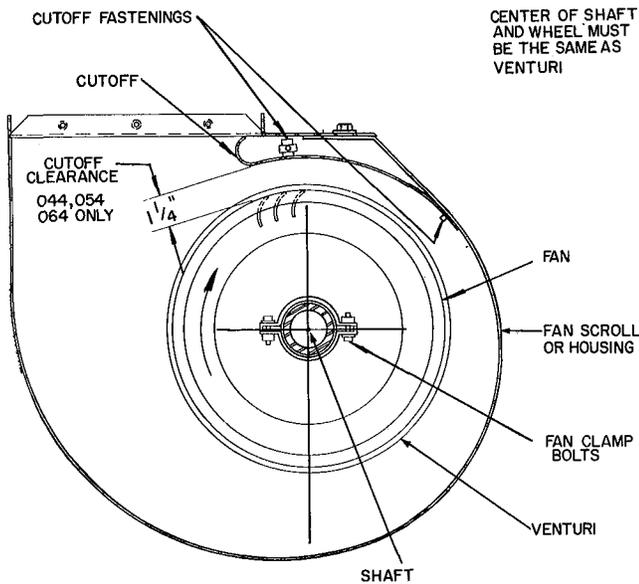


Fig. 11 – Concentric Alignment

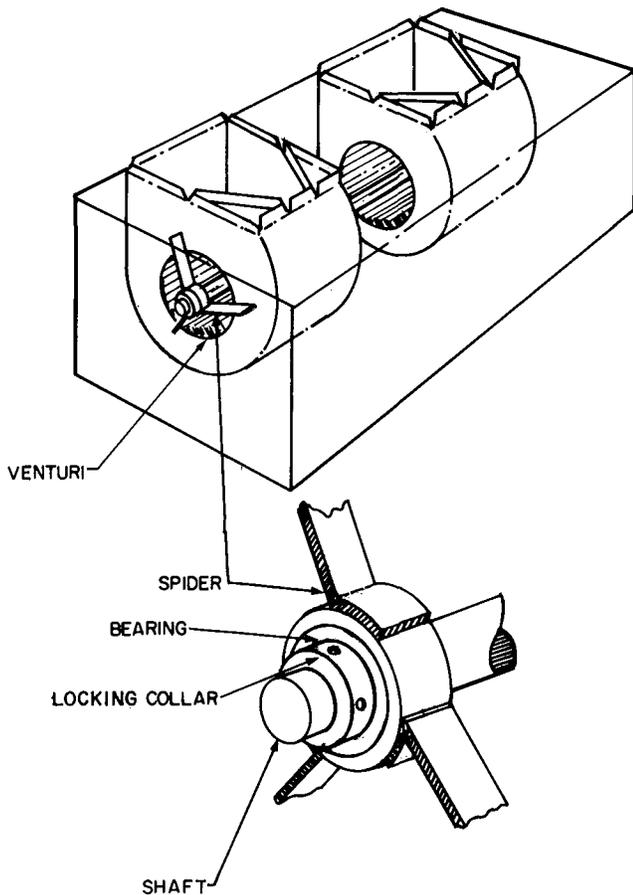


Fig. 12 – Fan Shaft Bearings
– 008,012,016,024

Units 50BA, BB028 thru 064 – Bearings are bolted to an angle support fastened to fan scroll, Fig. 13. If shaft and wheels are concentrically misaligned:

1. Loosen bearing support bolts and shim or move if necessary.
2. Retighten bearing support bolts.

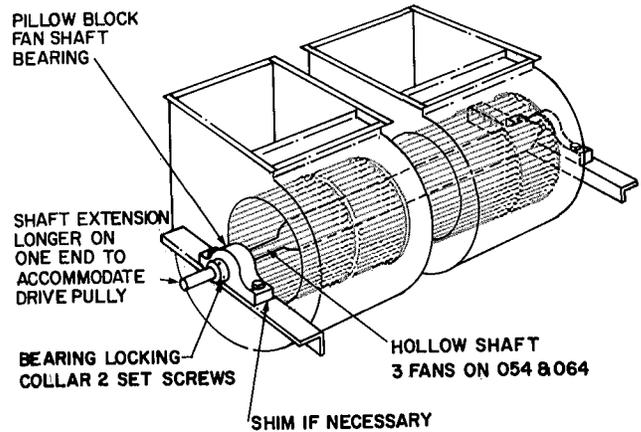


Fig. 13 – Horizontal Shaft Alignment

HORIZONTAL SHAFT ALIGNMENT (ALL UNITS) – If shaft has moved and all wheels are off horizontal center, recenter the shaft. To correct.

1. Loosen setscrews holding bearing locking collar. One on each end of shaft (Fig. 12 or 13).
2. Slide shaft and wheel assembly horizontally until wheels are horizontally centered (Fig. 9).
3. Slide bearing locking collars against bearing race; turn in direction of shaft rotation until tight.
4. Retighten locking collar setscrews.

CUTOFF CLEARANCE (044, 054 and 064 Units Only) – After centering and aligning fan wheel, loosen cutoff sheet, adjust for 1-1/4 in. clearance (all sizes) and then tighten securely. See Fig. 11.

Evaporator Fan Adjustment – Refer to Service Section.

Field-Fabricated Ductwork – Secure all ducts to building structure. Use flexible duct connectors between unit and ducts as required. Insulate and weatherproof any external ductwork, joints and openings with flashing and mastic in accordance with applicable codes.

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

Return Air Filters – Check that filters shipped in unit are the correct size. Refer to Table 1. Do not operate unit without return air filters in place.

Spring-Mounted Compressors (50BB008 and 50BA, BB012 thru 064) – Held rigid in shipment by 4 bolts which extend thru a washer, grommet, and compressor foot into a weld nut (except on 064 unit). Loosen bolt until compressor floats free on springs. Retighten bolts so there is a slight pressure on the neoprene grommet. This will steady compressor and prevent start and stop rocking.

The 50BA, BB064 units are shipped with 4 special flanged washers and neoprene grommets in a cloth bag tied to the compressor.

The 064 compressor hold-down bolts must be removed. The neoprene grommets are installed between compressor feet and special washers. Hold-down bolts are installed and tightened until there is a slight pressure on the neoprene grommets.

Compressors have reversible oil pumps that operate in either direction. Direction of rotation need not be checked.

NOTE: Do not loosen bolts on 50BA008 compressor.

Water-Cooled Condenser Connections — Condensers have water inlet and outlet connections as shown in Fig. 14. Recirculating systems with low-temperature water returning to condenser may require a water regulating valve. Units used on waste or city water must have a regulating valve on the inlet of each condenser and will require field modification for separate condenser piping (except 016). See Fig. 15, 16, 17, 18, 19, 20 and 21 for typical application and conversions. Connect regulating valve capillary to a back-seated liquid service valve. Arrow on valve body must point in direction of flow. After connecting capillary, open regulating valve one turn from back-seated position. Adjust valve to maintain proper condensing temperature.

Install full size gate valve and strainer in water supply line. Valve and strainer must be accessible.

Maximum Water Side Working Pressures Are:

- 50BA008, 012 150 psig
- 50BA016 550 psig
- 50BA024 thru 054 150 psig*
- 50BA064 250 psig

*550 psig if factory-installed couplings are removed and field-fabricated manifold is installed.

Condensate Drain — Requires standard pipe connected to condensate pan nipple as shown in Table 4. Pitch downward to open drain. Provide trap 3 in. high and plugged tees for cleaning. If required, cut hole in panel for drain line. Observe all local sanitary codes.

Table 4 — Condensate Drain Connections (in.)

UNIT SIZE	008, 012	016, 024	028, 034, 044, 054	064
PIPE SIZE	3/4	1	1 1/4	1 1/2

Air-Cooled Condenser Connections — Locate condenser not more than 60 ft above or 15 ft below base unit. Install air-cooled condenser in accordance with Installation Instructions shipped with condenser. Consult Carrier System Design Manual for standard refrigerant piping techniques. Connection location for liquid and hot gas service lines is shown in Fig. 14. Also see Table 5. Condenserless units are shipped with a holding charge. After

**Table 5 — Recommended Line Sizes* (in.)
(Condenserless Models)**

UNIT 50BB	SYSTEM	CONN. SIZES†		LENGTH OF LINE					
				20		40		60-80	
		L	HG	L	HG	L	HG	L	HG
008	—	1/2	7/8	1/2	7/8	1/2	7/8	1/2	7/8
012	—	5/8	7/8	5/8	7/8	5/8	7/8	3/4	1 1/8
016	—	5/8	1 1/8	5/8	1 1/8	7/8	1 1/8	7/8	1 3/8
024	1 & 2	5/8	7/8	5/8	7/8	5/8	1 1/8	7/8	1 1/8
028	1	5/8	1 1/8	5/8	1 1/8	7/8	1 1/8	7/8	1 3/8
	2	5/8	7/8	5/8	7/8	5/8	1 1/8	7/8	1 1/8
034	1 & 2	5/8	1 1/8	5/8	1 1/8	7/8	1 1/8	7/8	1 3/8
044	1 & 2	5/8	1 1/8	5/8	1 1/8	7/8	1 1/8	7/8	1 3/8
	3	5/8	7/8	5/8	7/8	5/8	1 1/8	7/8	1 1/8
054	1,2,3	5/8	1 1/8	5/8	1 1/8	7/8	1 1/8	7/8	1 3/8
064	1 & 2	7/8	1 3/8	7/8	1 3/8	7/8	1 3/8	7/8	1 5/8

HG — Hot Gas Line (OD in)
L — Liquid Line (OD in)

*Using R-22.
†Sweat connections

refrigerant connections are made, evacuate, leak test and charge system as described in Charging Procedure. Refer to Table 1 for unit charge. Water regulating valve on water-cooled condenser or condenser airflow on air-cooled condenser must be properly set before checking system charge.

Carrier Compatible Fittings (50BB008 and 012 units only)

TUBING — Cut tubing to length with tube cutter and remove burrs.

MECHANICAL CONNECTION — Make one connection at a time.

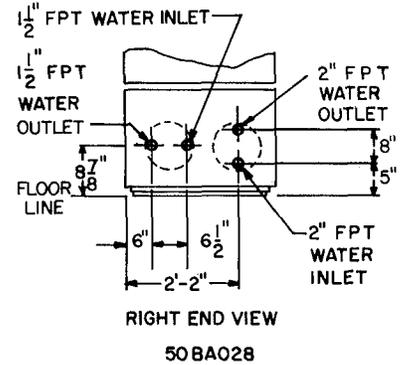
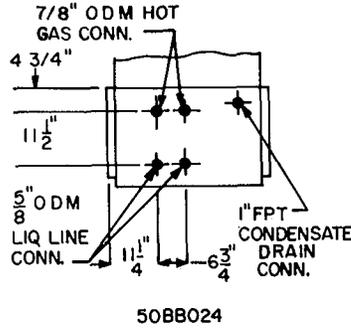
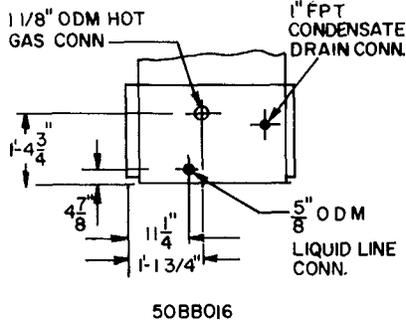
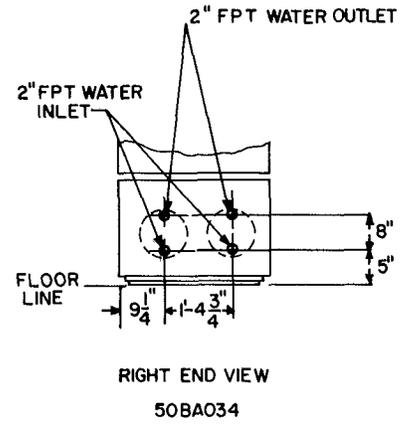
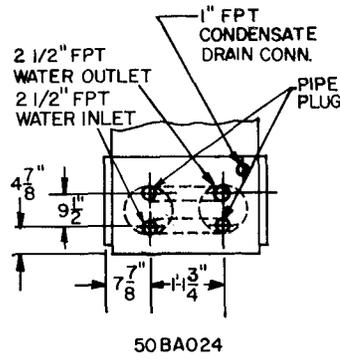
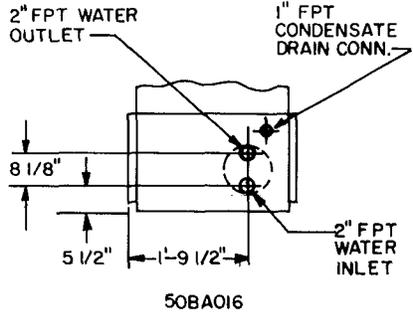
1. Mark required insertion depth on tube, 1-1/4 in. for 5/8- and 3/4-in. OD tubing.
2. Remove plug from fitting and loosen nut one turn.
3. Position tube, remove plug and insert tube into fitting. Bottom tube past depth gage mark.
4. Leave nuts at condenser end of tubing. Loosen and purge one line at a time using holding charge in base unit.
5. Tighten nuts to stop on unit fitting collar.
6. Open all service valves.

SWEAT CONNECTION

1. Clean tube and remove plug and nut from fitting.
2. Remove O-ring from inside fitting with bent pin. *Wrap entire valve with wet rag*
3. Bottom tube in fitting and solder with low-temperature solder such as Allstate 430.

Moisture or Liquid Indicators are located ahead of thermal expansion valves. They must be full of liquid refrigerant to indicate proper moisture content. Operate system 30 minutes before determining moisture content.

RIGHT END VIEWS



RIGHT END VIEWS

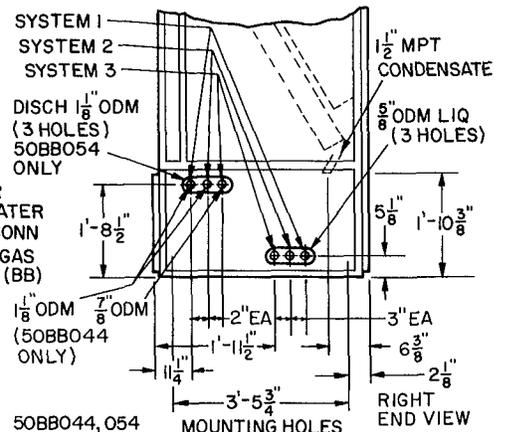
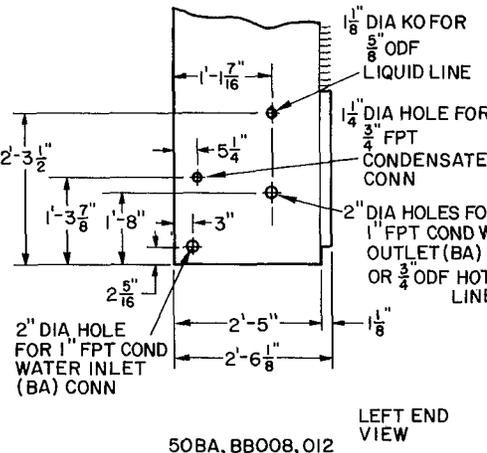
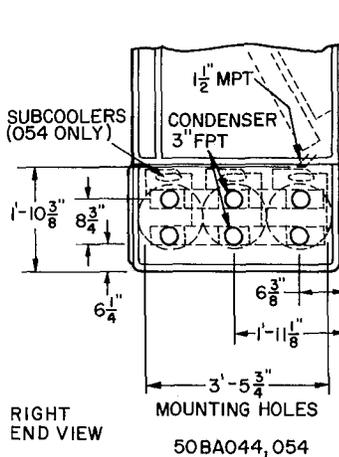
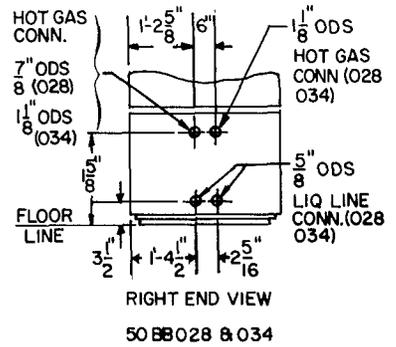
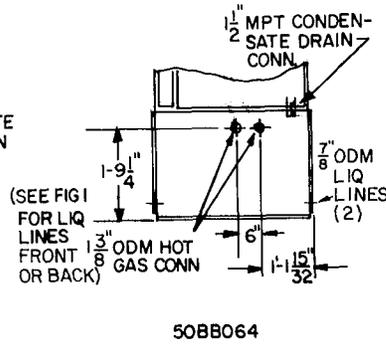
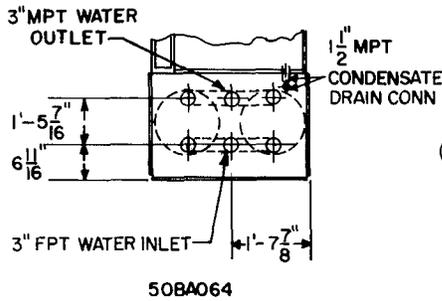


Fig. 14 - Water and Refrigerant Connections

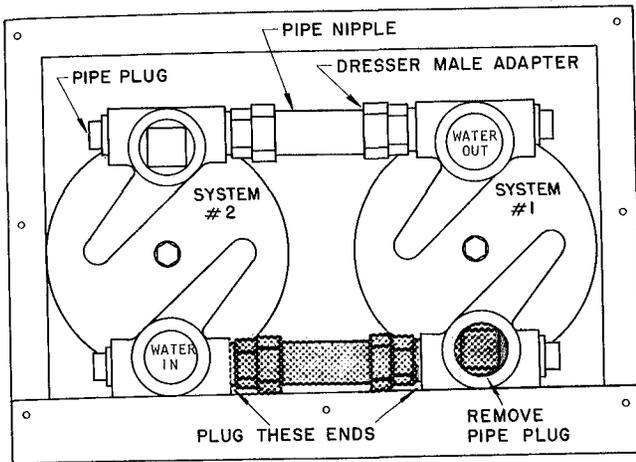


Fig. 15 - 50BA024 City Water Condenser Piping Conversion (Remove Fittings Shaded in Sketch)

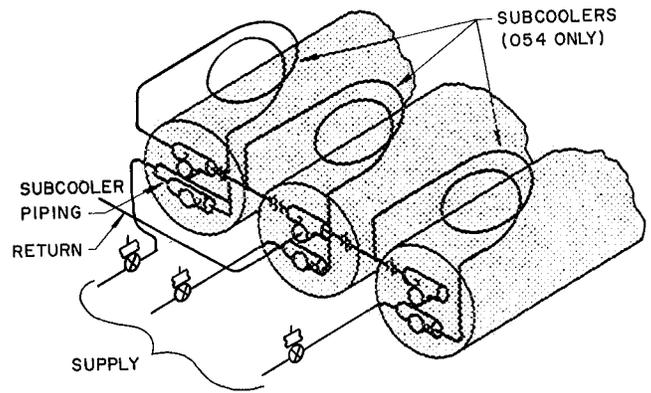


Fig. 18 - Waste or City Water System Piping

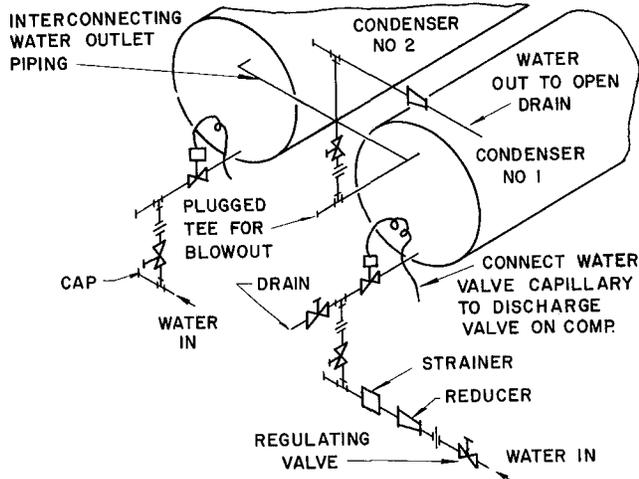


Fig. 16 - 50BA024 Typical Waste or City Water Piping

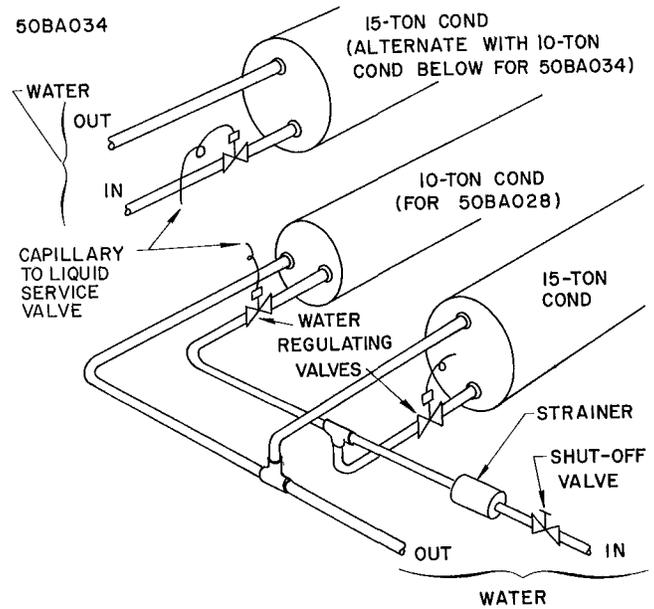


Fig. 19 - Condenser Water Piping

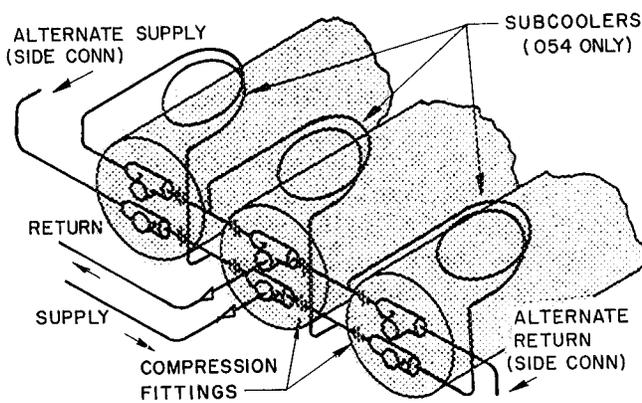
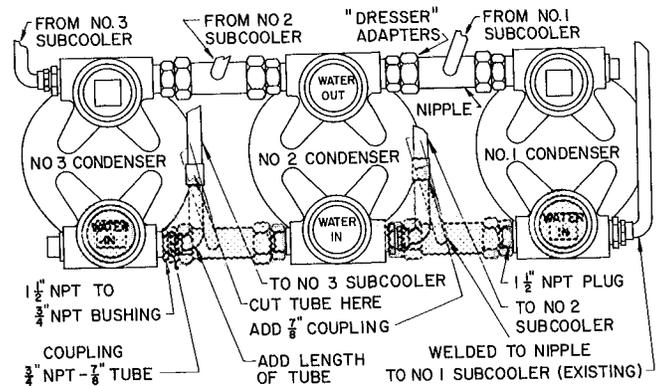


Fig. 17 - Recirculating Water System Piping



- Remove fittings shaded in sketch
 NOTE: 50BA044 units same less subcoolers
 1 Use one outlet for water discharge
 2 Remove interconnecting nipples and "dresser" adapters on inlet side of condensers
 3 Remove 3 in plugs from No. 1 and 3 condenser inlet headers

Fig. 20 - Field Conversion to City or Waste Water System

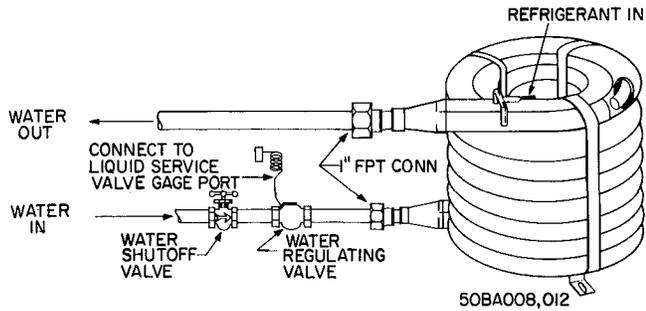
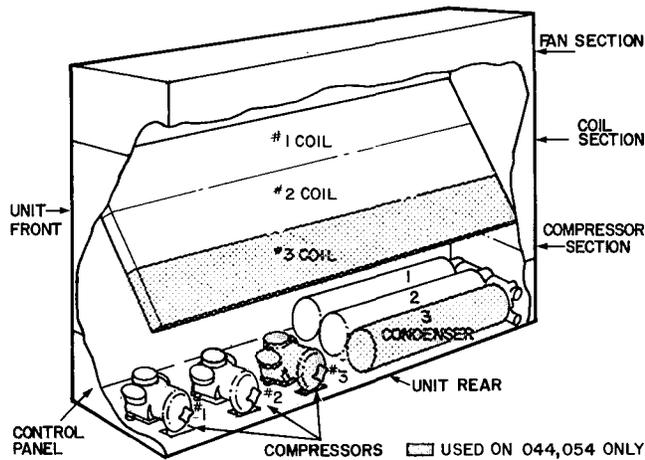


Fig. 21 – Condenser Water Piping, 50BA008,012



Refrigerant Systems

50BA, BB*	COIL NO.	COMPR NO.	COND NO.*
016	1	1	1
024, 028, 034, 064	1, 2	1, 2	1, 2
044, 054	1, 2, 3	1, 2, 3	1, 2, 3

*50BB units are condenserless

Fig. 22 – Refrigeration Circuits (016 – 064)

Service Valves (50BB) – Teflon seat washers are used to provide positive seal with minimum stem torque (10 ft-lb max). Do not overtighten valve stem. Use wet rag on valve when soldering. Midseat valve if refrigerant has been lost. Always replace stem cap.

Power Supply Wiring – Unit is factory-wired for voltage shown on nameplate. All field wiring must comply with National Electrical Codes and local codes.

Voltage at the unit with the compressors operating must be within the voltage range indicated on unit nameplate. (Also see Table 6). On 3-phase units, voltage between phases must be balanced within 2 percent and current within 10

percent. Contact local power company for correction of improper voltage or phase imbalance. Failure of unit due to imbalance constitutes abuse and may damage electrical components. Such operation will invalidate any applicable warranty.

Field power may be supplied to the unit by a feeder circuit. The branch circuit protection is provided in the unit by manual reset circuit breakers. The feeder circuit must be sized in accordance with National Electrical Codes or local codes, whichever takes precedence. The power supply to auxiliary equipment such as air-cooled condenser fan motors and cooling tower must be run separately. See the electrical data table for base unit power requirements.

The power wiring is brought into the unit thru the conduit opening in the panel on the back of the unit near the control panel (see Fig. 23). (On 50BA, BB064 units, power wires may be routed thru front or back). The field power connections are made at the terminal block inside the control panel on the 016 thru 054 units. On the 064 unit, the terminal block is on the back of the control panel. Remove the metal shield for access to the terminal block. Be sure to reinstall shield after connecting power wiring.

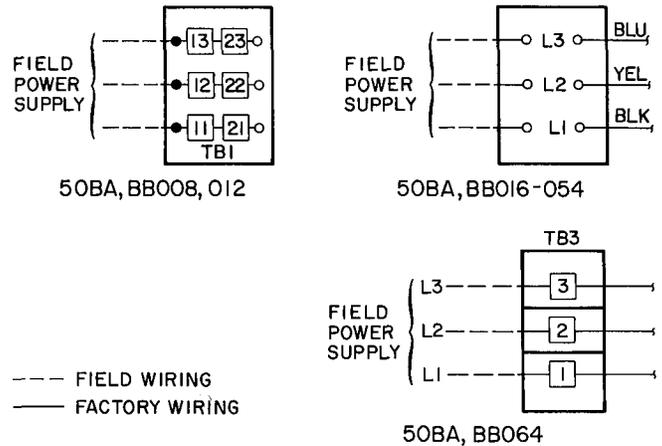


Fig. 23 – Field Power Wiring Connections

Thermostats

The 50BA, BB008 and 012 model units have thermostats factory installed with the sensing bulb in the return air. A field-supplied thermostat must be used on the 50BA, BB016 thru the 064 size units (see Fig. 24 for control wiring).

Two-step thermostats are recommended for capacity control. Three-step thermostats may be used on the 50BA, BB044, 054 and 064 size units. Minimum recommended rating is 125 va at 230 volts. See Table 9 for recommended connecting sequence for the 2-step thermostats. See wiring booklet if other type controls are used.

Table 6 – Electrical Data

UNIT 50BA, BB	VOLTS/PH/HZ	VOLT- AGE RANGE		COMPRESSOR NO. 1*				COMPRESSOR NO. 2*				INDOOR FAN MOTOR		POWER SUPPLY			
		Min	Max	RLA		LRA		RLA		LRA		Hp	FLA	Min Ckt Amps		Max Fuse Amps	
				BA	BB	BA	BB	BA	BB	BA	BB			BA	BB	BA	BB
008	200-3-60	180	229	-	31.3	-	137.0	-	-	-	-	1	3.45	-	43.2	-	70
	208-3-60	187	229	28.6	-	134.0	-	-	-	-	1	3.45	39.0	-	60	-	
	230-3-60	198	254	24.0	28.3	116.0	124.0	-	-	-	1	3.40	33.4	39.0	50	60	
	460-3-60	414	506	12.5	14.1	58.0	62.0	-	-	-	1	1.70	17.5	19.4	25	30	
012	200-3-60	180	229	31.3	40.1	137.0	170.0	-	-	-	-	2	7.10	46.9	57.8	70	90
	230-3-60	198	254	28.3	36.0	124.0	153.0	-	-	-	2	5.60	42.2	51.8	70	80	
	460-3-60	414	506	14.6	18.0	62.0	77.0	-	-	-	2	2.80	21.1	25.9	35	40	
	575-3-60	518	660	11.4	14.4	50.0	62.0	-	-	-	2	2.30	16.6	20.7	25	35	
016	200-3-60	180	229	50.0	64.0	191.0	266.0	-	-	-	-	2	7.10	70.0	87.8	80	100
	230-3-60	198	254	45.0	58.0	172.0	240.0	-	-	-	2	6.20	63.0	79.0	70	90	
	460-3-60	414	506	22.1	29.0	86.0	120.0	-	-	-	2	3.10	31.0	40.0	50	50	
	575-3-60	518	660	17.9	23.0	69.0	96.0	-	-	-	2	2.50	25.0	32.0	40	35	
024	200-3-60	180	229	36.0	44.0	137.0	170.0	36.0	44.0	137.0	170.0	3	10.6	92.0	110.0	110	150
	230-3-60	198	254	32.0	40.0	124.0	153.0	32.0	40.0	124.0	153.0	3	9.2	81.6	99.6	100	125
	460-3-60	414	506	16.0	20.0	62.0	77.0	16.0	20.0	62.0	77.0	3	4.6	40.8	49.8	50	60
	575-3-60	518	660	12.9	16.0	50.0	62.0	12.9	16.0	50.0	62.0	3	3.4	32.9	40.0	45	45
028	200-3-60	180	229	49.3	64.0	191.0	266.0	35.7	45.0	138.0	170.0	5	16.2	114.9	142.5	125	175
	230-3-60	198	254	44.3	58.0	172.0	240.0	32.0	41.0	124.0	153.0	5	13.2	102.7	128.7	110	150
	460-3-60	414	506	22.2	29.0	86.0	120.0	16.0	20.0	62.0	77.0	5	6.6	51.4	63.9	60	70
	575-3-60	518	660	18.0	23.0	69.0	96.0	13.0	17.0	50.0	62.0	5	5.6	41.0	51.9	45	70
034	200-3-60	180	229	49.3	64.0	191.0	266.0	49.3	64.0	191.0	266.0	5	16.2	128.5	161.5	150	175
	230-3-60	198	254	44.3	58.0	172.0	240.0	44.3	58.0	172.0	240.0	5	13.2	114.9	145.7	125	175
	460-3-60	414	506	22.2	29.0	86.0	120.0	22.2	29.0	82.0	120.0	5	6.6	57.6	72.9	60	80
	575-3-60	518	660	18.0	23.0	69.0	95.0	18.0	23.0	69.0	96.0	5	5.6	46.0	57.9	50	80
044	200-3-60	180	229	50.0	64.0	191.0	266.0	36.0	44.0	137.0	170.0	7½	20.8	173.8	213.3	200	225
	230-3-60	198	254	45.0	58.0	172.0	240.0	32.0	40.0	124.0	153.0	7½	19.0	152.0	190.0	175	200
	460-3-60	414	506	23.0	29.0	86.0	120.0	16.0	20.0	62.0	77.0	7½	9.5	77.0	95.0	90	110
	575-3-60	518	660	18.0	-	69.0	-	13.0	-	50.0	-	7½	8.4	62.5	-	80	-
054	200-3-60	180	229	50.0	64.0	191.0	266.0	-	-	-	-	10	28.4	194.7	240.2	225	250
	230-3-60	198	254	45.0	58.0	172.0	240.0	-	-	-	-	10	26.0	172.0	215.0	200	225
	460-3-60	414	506	23.0	29.0	86.0	120.0	-	-	-	-	10	13.0	88.0	107.0	100	125
	575-3-60	518	660	18.0	-	69.0	-	-	-	-	-	10	10.5	69.5	-	80	-
064	200-3-60‡	180	229	101.4	129.0	387.0	464.0	101.4	129.0	387.0	464.0	15	43.1	276.7	337.8	300	400
	230-3-60‡	198	254	91.4	119.0	350.0	420.0	91.4	119.0	350.0	420.0	15	39.1	247.0	312.0	300	350
	460-3-60‡	414	506	47.2	60.0	175.0	210.0	47.2	60.0	175.0	210.0	15	19.5	125.0	156.0	150	175
	575-3-60	518	660	37.2	50.0	140.0	170.0	37.2	50.0	140.0	170.0	15	15.6	99.0	128.0	110	150

FLA – Full Load Amps
 LRA – Locked Rotor Amps
 RLA – Rated Load Amps

*Units 50BA, BB044 and 054 have 3 compressors. On 044 units, compressor no. 1 data applies to Systems 1 and 2, compressor no. 2 data applies to System 3. On 054 units, compressor no. 1 data applies to Systems 1, 2 and 3.

‡Maximum voltage range for 50BA008 is 632

‡Part Wind

NOTES:

- Units 50BA, BB008 thru 034 are UL certified (except BA028, 034 – 575 volts, and BB024, 028 and 034 – 575 volts)
- Phase imbalance must not exceed 2 percent
- Fan motor power wiring, circuit breakers and other electrical components are sized to accommodate special motors on the 50BA, BB016, 024, 028 and 034 units
- Wire sizing amps are sum of 125 percent of the FLA for largest motor plus 100 percent of FLA for all other motors in the unit
- Maximum instantaneous current flow during starting is the sum of the LRA for last compressor to start plus the FLA for all other compressors in the unit

Table 7 – Maximum Wire Sizes for Terminal Block (AWG or MCM)

VOLT/ PHASE	UNIT 50BA, BB										
	008	012	016	024	028, 034	044		054		064	
						BA	BB	BA	BB	BA	BB
200/3	00	00	00	00	350	0000	350	350	350	350	500
208/3*	00	-	-	-	-	-	-	-	-	-	-
230/3	00	00	00	00	350	0000	350	0000	350	350	500
460/3	00	00	00	00	00	00	0000	0000	0000	350	350
575/3	00	00	00	00	00	00	-	00	-	350	350

*50BA008 only

‡350 MCM on BB units only

An accessory defrost thermostat is required on the 064 unit when low-pressure switch setting is lowered or when liquid line low-pressure switch is installed for intermediate or cold weather operation. See installation instructions shipped with accessory.

Heating Coils – Accessory heating coils are available for field installation. For installation, refer to instructions shipped with accessory.

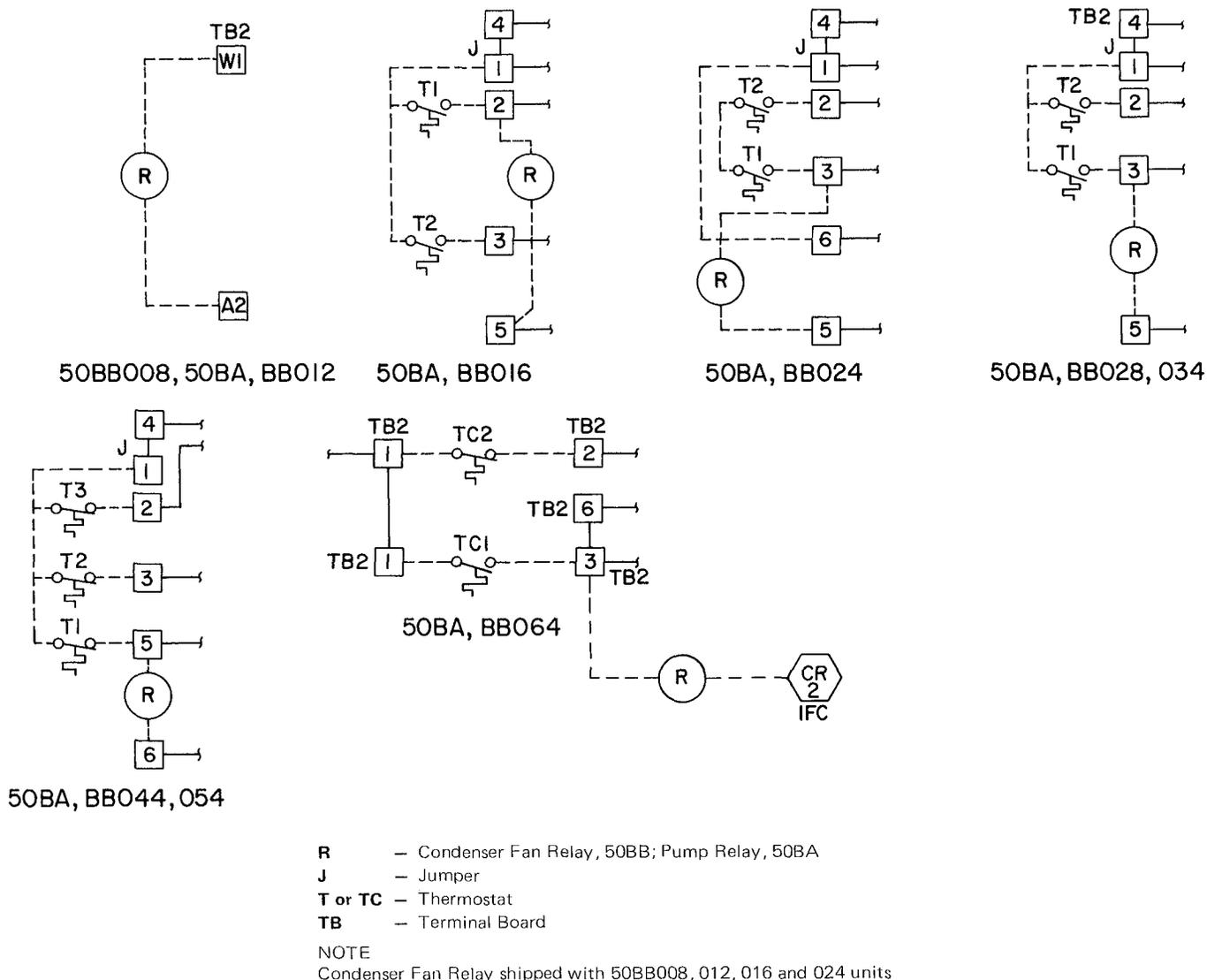


Fig. 24 — Field Control Power Connections

START-UP

1. Thoroughly clean and inspect the unit.
2. Turn circuit breakers ON with selector switch OFF. Leave in this position for 24 hours, if unit is equipped with crankcase heaters (on 50BA008 and 064 units and all sizes of 50BB units).
3. Turn selector switch to COOL. Wait at least 5 or 6 minutes for unit to start due to Time Guard® circuit.
4. Set thermostat to proper temperature.

Service Valves — Open discharge and suction shutoff valves on compressor and liquid shutoff valves before operating unit.

Liquid shutoff valves are accessible from front or rear of unit (rear only on 064). Valve must be back-seated (counterclockwise) to be open. After opening valves replace caps and tighten to prevent leakage.

Shutting Down Unit

1. Drain water from condenser and all water piping if unit is exposed to freezing temperatures.
2. A noncorrosive antifreeze should be added to any residual water in system.
3. Turn selector switch to OFF and turn circuit breakers OFF.
4. If unit is to be used for winter heating, leave circuit breakers ON. Set selector switch to FAN and turn cooling thermostat OFF.

Capacity Control Valve (Fig. 25)

CONTROL SET POINT (CYLINDER LOAD POINT) – Adjustable from 0 psig to 85 psig. Pressure differential between cylinder load-up point and cylinder unload point is adjustable from 6 psig to 22 psig. (See Table 8)

TO REGULATE CONTROL SET POINT – Turn adjustment nut clockwise to its bottom stop (with nut in this position set point is 85 psig). Control set point is then regulated to desired pressure by turning adjustment nut counterclockwise. Every full turn decreases set point by 7.5 psig. (Approximately 11-1/2 turns in counterclockwise direction will decrease set point to 0 psig.)

PRESSURE DIFFERENTIAL ADJUSTMENT – Turn differential adjusting screw in counterclockwise direction to its back-stop position (with screw in this position, differential is 6 psig). Pressure differential is set by turning adjustment screw clockwise. Every full turn increases differential by 1.6 psig. (Approximately 10 turns in clockwise direction will increase pressure differential to 22 psig.)

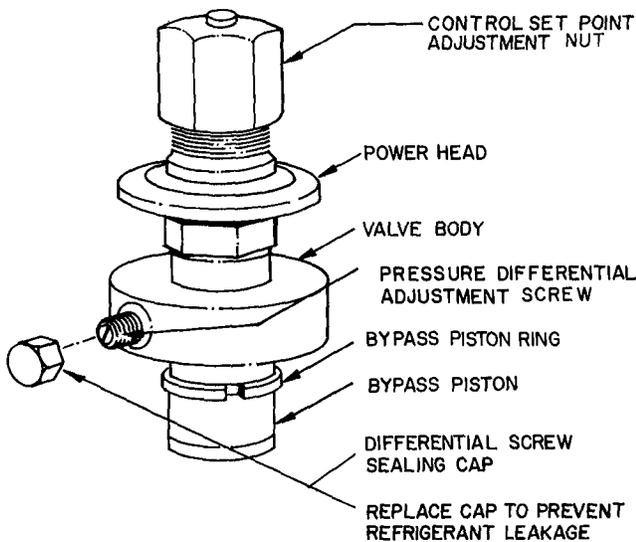


Fig. 25 – Capacity Control Valve

Table 8 – Factory Set Point (psig)

UNIT 50BA, BB	ACTION	UNLOADER NO. 1	UNLOADER NO. 2
012	Load	69	—
	Unload	58	—
016	Load	69	—
	Unload	58	—
064	Load	77	74
	Unload	58	55

Table 9 – Two-Step Thermostat Connection for Capacity Control

UNIT 50BA, BB	THERMO STEP	TERMINAL CONN.	COMPONENT ENERGIZED
016	One	2	Compressor Liquid line solenoid
	Two	3	
024 028 034	One	3	Compressor No. 2 Compressor No. 1
	Two	2	
044 054	One	3 and 5	Compressor No. 2 and 3 Compressor No. 1
	Two	2	
064	One	3 and 6	Capacity control solenoid valve and liquid line solenoid valve No. 2* and compressor No. 2
	Two	2	Liquid line solenoid No. 1* and compressor No. 1

*BB units only

SERVICE

Pressure Relief Devices (Frangible Disc) – Installed on each condenser to 50BA water-cooled units at a setting of 385 ± 5 percent psig (except 064 unit). The 50BB condenserless units are equipped with a fusible plug type safety relief in the compressor with a setting of 197 F or 203 F on all units.

A pressure relief valve with a setting of 385 psig is used on the 50BA064 condenser. A pressure relief valve on the compressor is set at 450 psig.

Crankcase Heaters (50BA008, 064, and all 50BB) – Prevent liquid refrigerant from accumulating in compressor crankcase during extended shutdown periods. Resistance heater is automatically energized when compressor stops. If unit has been disconnected for an extended period, energize heaters for 12 hours before starting compressor. The 50BA units require heaters if installed in unheated rooms.

High and Low Pressurestats – High are located in electrical panel; low on top of compressor except 50BA008 on suction line; 50BA, BB064, in control box.

Time Guard® Control Circuit provides automatic reset protection (except circuit breaker), time delay in starting and controlled cycling. If compressor shuts down for any reason, control prevents restarting for time period as follows:

UNIT 50BA, BB	CIRCUIT NO.	A	B
		FULL CYCLE MINUTES	DELAYED START SECONDS
044, 054	2	6.4	19
	1 and 3	5	15
024, 028, 034, 064	1	6.4	19
	2	5	15

Under normal thermostat cycling, time delay between compressor starts is shown in B. The 008, 012, and 016 units have a 5-minute cycle with a 15-second delayed start. See Table 10 for 016 thru 064 units sequence of operation. Table is useful in troubleshooting

Table 10 – Sequence of Operation with Two-Step Thermostat (016 – 064)

POWER TO CONTROL CIRCUIT AND UNIT SELECTOR SWITCH ON COOL

UNIT 50BA,BB	COMPONENT	THERMOSTAT			
		Calls For Cooling		Satisfied	
		1st Step	2nd Step	2nd Step	1st Step
All Unit Sizes†	Evaporator Fan Cooling Tower* Pump Motor*				
044 & 054	Crankcase Heater #3* Timer Motor #3 Compressor #3	15 sec			4 min 45 sec
All Unit Sizes†	Air-Cooled Cond #2* (#1 on 016) Crankcase Heater #2* (#1 on 016) Timer Motor #2 (#1 on 016) Compressor #2 (#1 on 016) Cap Cont Solenoid (on 064 only) Liquid Line Solenoid (on 016 only)	15 sec ‡			4 min 45 sec **
024 028 034 044 054 064†	Air-Cooled Cond #1* Crankcase Heater #1* Timer Motor #1 Compressor #1		15 sec	4 min 45 sec	
BB064	Liq Line Solenoid #2 Pumpout Relay #2 Crankcase Heater #2 Timer Motor #2 Compressor #2 Cap. Cont Solenoid Low Pressure Sw #2 Liq Line Solenoid #1 Pumpout Relay #1 Crankcase Heater #1 Timer Motor #1 Compressor #1 Low Pressure Sw #1	15 sec			4 min 45 sec 30 sec
			15 sec	4 min 45 sec	30 sec

Components energized

- *When used
- †Except 50BB064
- ‡19 sec (044, 054 only)
- **6 min 5 sec (044, 054 only)

NOTES

- 1 If compressor operation is interrupted by protective devices or a power failure, timer motor will run 4 min 45 sec (or 6 min 5 sec) before above cycle can be repeated
- 2 When liquid line solenoid (016) or capacity control solenoid (064) is energized, it allows refrigerant to flow to complete coil

Indoor Air Fan Adjustment

TO CHANGE FAN SPEED (008 thru 034)

1. Shut off unit power supply.
2. Loosen fan belt by loosening fan motor from mounting bracket. Do not loosen fan motor mounting bracket from unit.
3. Loosen movable pulley flange setscrew (Fig. 24).

4. Screw movable flange toward fixed flange to increase fan speed and away from fixed flange to decrease speed using values shown in Table 1. Increasing fan speed increases load on motor. Do not exceed maximum allowable fan speed (Table 1) or motor full load amps indicated on motor nameplate and Table 6.
5. Set movable flange setscrew at nearest flat of pulley hub and tighten setscrew.

6. Check Pulley Alignment and Belt Tension Adjustment as described below.
7. Check fan operation. Repeat above procedure as required.

PULLEY ALIGNMENT — Loosen fan motor pulley setscrews and slide fan pulley along fan shaft. Make angular alignment by loosening motor from mounting bracket. See Fig. 26.

BELT TENSION ADJUSTMENT — Loosen fan motor from mounting bracket. Do not loosen motor mounting bracket from unit. Move fan motor until proper belt tension is achieved (approximately 1-in. deflection with one finger at midpoint of belt span).

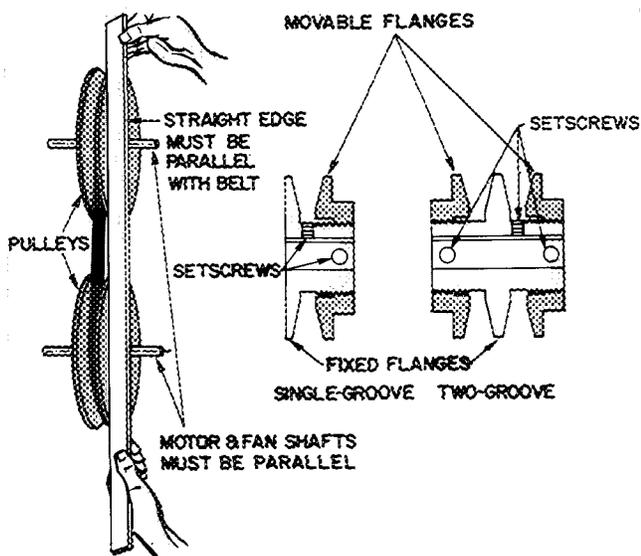


Fig. 26 — Indoor Air Fan Pulley Adjustment

Lubrication — Fan motor bearings are factory lubricated and will need no lubrication for the first 5 years (3 years at continuous service or excessively dirty conditions). Inspect bearings and re-lubricate or replace as required. Follow lubrication instructions on special field supplied motors.

Fan shaft bearings on 008, 012, 016, 024, 028 and 034 sizes are lubricated for the life of the bearings. The 044, 054 and 064 sizes have alemite grease fittings. Lubricate annually with a good grade of grease with a lithium base and rust inhibitor or a mixed base grease.

Add grease until air bubbles from under the seal. Do not over-grease.

Return Air Filters — Inspect filters twice monthly and replace as often as required depending on operating conditions. The correct filter size is shown in Table 1. If cleanable filters are used, flush them with hot water or steam or soak in a mild solution of soap (or detergent) and water. Rinse and allow filters to dry before recoating and reinstalling. Refer to filter manufacturer's instructions as applicable. Do not operate unit without return air filters in place.

Condensate Drains — Clean drain line and unit drain pan at the start of each cooling season. Check flow by pouring water into drain. Be sure trap is filled to maintain an air seal.

Evaporator Coil — Remove dirt and debris from evaporator coil as required. Clean with a stiff brush, vacuum cleaner or compressed air. Use a fin comb with teeth of correct spacing when straightening mashed or bent coil fins (see Table 1).

Water-Cooled Condenser may require cleaning of scale (water deposits). Condensers are best cleaned with an inhibited hydrochloric acid solution such as Oakite 32. Acid will stain hands and clothing and attack concrete. Without inhibitor, it will attack steel. Cover surroundings to guard against splashing. Vapors from vent pipe are not harmful, but take care to prevent liquid from being carried over by the gases. Warm solution acts more readily, but cold solution applied longer is just as effective.

GRAVITY FLOW METHOD (Fig. 27) — Do not add solution faster than vent can exhaust generated gases. When condenser is full, allow solution to remain overnight, then drain condenser and flush with clean water. Follow acid manufacturer's instructions.

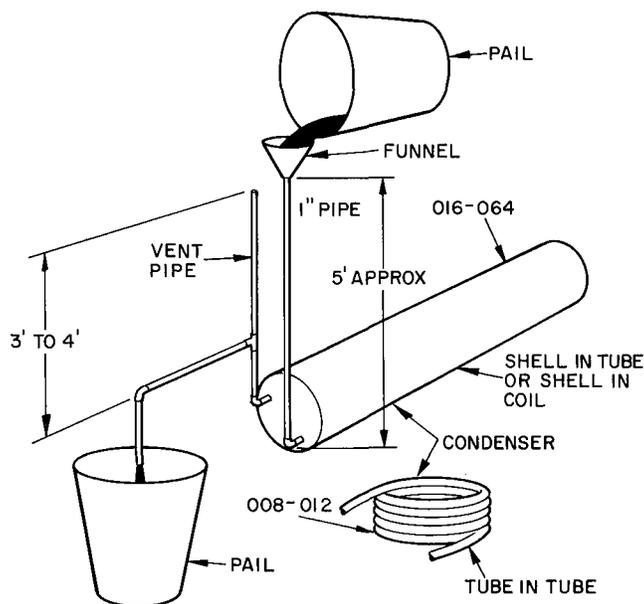


Fig. 27 — Gravity Flow Method

FORCED CIRCULATION METHOD (Fig. 28) — Fully open vent pipe when filling condenser. Vent may be closed when condenser is full and pump is operating. Regulate flow to condenser with supply line valve. If pump is nonoverloading type, valve may be fully closed when pump is running.

For average scale deposit, allow solution to remain in condenser overnight. For heavy deposits, allow 24 hours. Drain condenser and flush with clean water. Follow acid manufacturer's instructions.

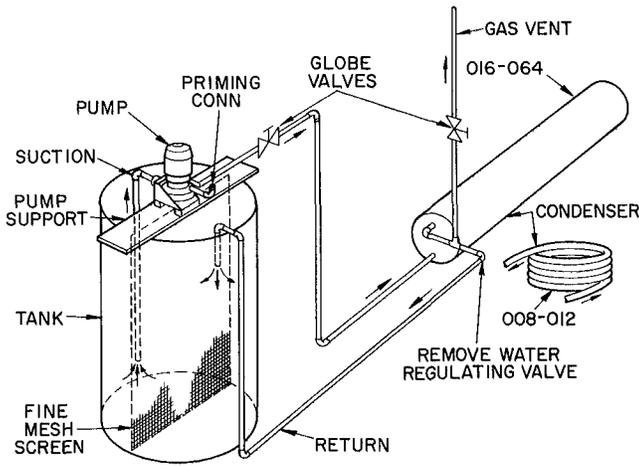


Fig. 28 — Forced Circulation Method

Air-Cooled Condensers — Periodically inspect and clean depending on operating conditions. Refer to Start-Up and Service Instructions pertaining to air-cooled condenser used.

Sight Glasses — Provided at inlet of each expansion valve. Units may be field charged by using the sight glass (see Charging Procedure).

Charging Procedure

UNITS 50BA (WATER-COOLED CONDENSER) — Units are shipped with a full operating charge of refrigerant. If recharging is necessary (complete charge lost), weigh in amount of refrigerant as

indicated on unit nameplate and Table 1. If unit has partial charge, unit may be charged with sight glass using standard refrigerant charging techniques. Adjust water regulating valve to proper saturated condensing temperature (168 to 226 psig).

Refrigerant can be added to 50BA008 and 012 units after sight glass is cleared to take advantage of subcooling feature of these condensers. Add refrigerant as follows:

- 50BA008 — 2.5 lbs
- 50BA012 — 0.5 lbs

The condenser on the 50BA064 unit has a liquid level test cock. Adding liquid refrigerant to level of test cock will provide 12 to 15 F of subcooling.

UNITS 50BB (REMOTE, AIR-COOLED CONDENSERS) — Units are shipped with holding charge only. Open suction and discharge line service valves. Blow holding charge, evacuate and leak test system. Add sufficient refrigerant vapor to permit continuous operation after starting unit. Review Start-Up Instructions. Using standard refrigerant charging techniques, add refrigerant required to maintain operating conditions. See charging chart information supplied with condenser. If information is not available, block off enough of condenser coil to maintain a discharge pressure of 220 psig and charge to a clear sight glass.

For replacement items use Carrier Specified Parts.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

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