Number One Air Conditioning Maker

Carrier

Division of Carrier Corporation

Carrier Parkway • Syracuse N Y 13221

Installation, Start-Up and Service Instructions

38QB 015-060

Heat Pump — Outdoor Section

CONTENTS

SAFETY CONSIDERATIONS

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

Untrained personnel can perform basic maintenance functions of cleaning coils and cleaning 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 brazing operations. Have fire extinguisher available for all brazing operations.

WARNING: Before performing service or maintenance operations on system, turn off main power switches to indoor unit and outdoor unit. Turn off accessory heater power switch if applicable. Electrical shock could cause personal injury.

INSTALLATION

Step 1 — Check Equipment and Jobsite

UNPACK UNIT — Move to final location. Lift carton off, taking special care not to damage service valves or grilles.

INSPECT EQUIPMENT — File claim with shipping company if shipment is damaged or incomplete.

COMPLETE OR CONSIDER SYSTEM REQUIREMENTS before installing the 38QB.

Consult local building codes and National Electrical Code (NEC) for special installation requirements.

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping and servicing. Position so water or ice from roof cannot drop directly on top of unit.

Make provisions for condensate drainage and defrost water disposal whether unit is installed on ground or roof. (Ensure unit basepan drainage holes are not blocked.) See Step 2 for details. Roof installation method for 38QB depends on building construction and special requirements of local codes. Be sure that roof can support unit weight.

It is recommended that 38QB units be used with Carrier approved indoor sections; see Table 1.

System Refrigerant Control on 38QB units and matching Carrier indoor units is a factory-installed AccuRater device (bypass-type). Bypass-type AccuRater components are discussed in the service section of this booklet. The AccuRater piston has a refrigerant metering hole thru it and is field replaceable. Table 1 indicates indoor units for which the required replacement piston is factory supplied with specified 38QB outdoor unit. Replace piston as described under AccuRater Servicing on page 15.

→ Table 1 — Carrier Approved 38QB Systems

OUTDOOR UNIT 38QB	REQUIRED OUTDOOR PISTON SIZE	INDOOR UNIT MODEL & SIZE	REQUIRED INDOOR PISTON SIZE
015	38	28HQ,VQ018 40AQ018	46
		40DQ018	46*
018	42	28HQ,VQ024 40AQ024 40DQ024	52*
024	46	28HQ,VQ024	55
		40AQ024	55*
		40DQ024	59
		28HQ,VQ030 40AQ030 40DQ030	61*
030	59	28HQ,VQ030	63
		40AQ030	63*
		40DQ030	63
		28HQ,VQ036 40AQ036 40FS160 | 28HQ,VQ036	70*
036	61	28HQ,VQ036 40AQ036 40FS160 | 28HQ,VQ036	67
		28HQ,VQ042 40FS160 | 28HQ,VQ042 40QB,QH042	76
042	63	28HQ,VQ042 40FS160 | 28HQ,VQ042 40QB,QH042	76
048	73	28HQ,VQ048 40FS200 | 28HQ,VQ048 40QB,QH048	86*
060	82	40QB,QH060	93

*Replace factory-installed piston with this piston size

Top Cover Removal — Top cover can be removed for wiring or servicing heat pump. Loosen decorative strip and slide down off screw heads. Remove 3 screws in connector plate and 2 screws on front of unit. Loosen remaining 4 screws. Lift top from unit (see Fig. 1).

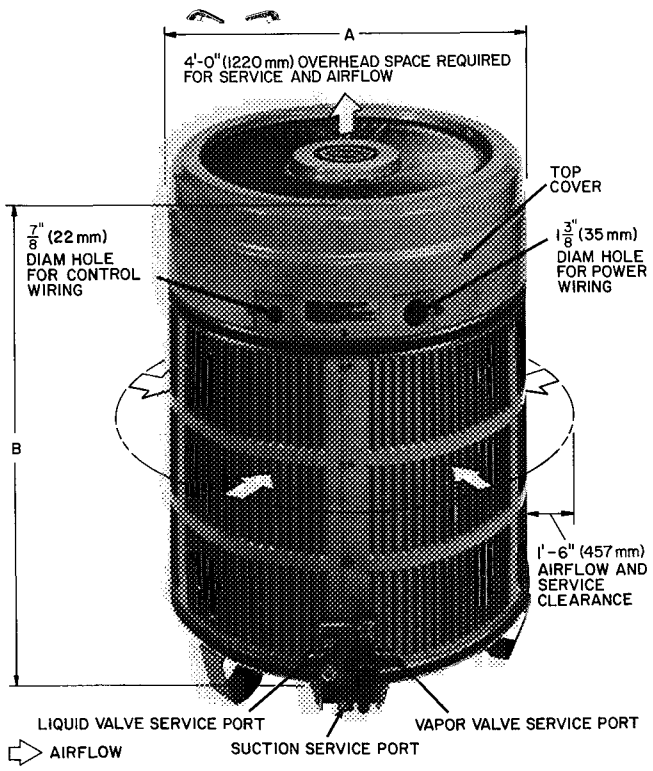
Step 2 — Mount Outdoor Heat Pump

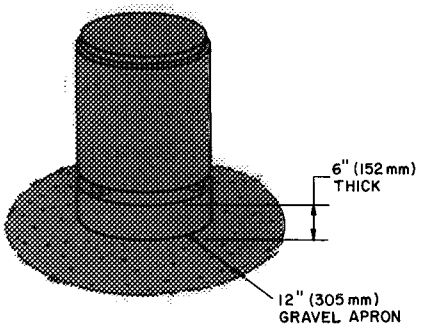
ON THE GROUND: MOUNT ON A SOLID LEVEL CONCRETE PAD (see Fig. 1). Swing 3 legs down and lock in position, except when using accessory rack. Use accessory heat pump rack (Fig. 2) in areas where prolonged subfreezing temperatures or heavy snow occur. (Refer to installation instructions included with rack.) Drainage holes in unit base must not be obstructed.

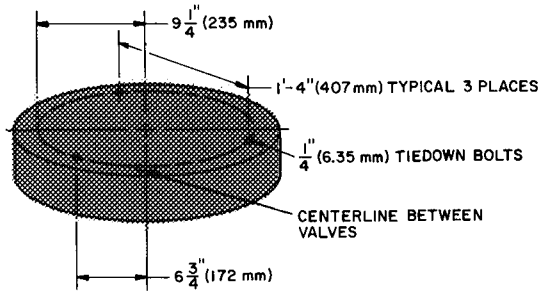
ON THE ROOF: MOUNT ON A LEVEL PLATFORM OR FRAME. Proper precaution must be taken for support of unit in roof design. Elevate unit for proper clearance as described under ground installation, above. Plan roof design and water drainage to prevent unit from setting in water. Flash all roof openings to prevent leaks.

Roof mounted units exposed to winds above 5 mph (8 km/h) may require protective wind baffles (field fabricated) to achieve adequate defrost.

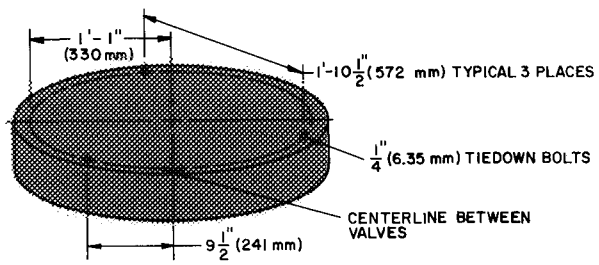
Step 3 — Make Piping Connections — Heat pumps may be connected to indoor sections using Carrier accessory tubing package (Table 3) or field-supplied tubing of refrigerant grade, correct size and







1'-11" (585 mm) DIAM x 6" (152 mm) THK CONCRETE MOUNTING PAD FOR 38QB015



2'-6" (762 mm) DIAM x 6" (152 mm) THK CONCRETE MOUNTING PAD FOR 38QB018-060

Fig. 1 — Dimensions, Connections and Mounting Pad (Refer to Table 2.)

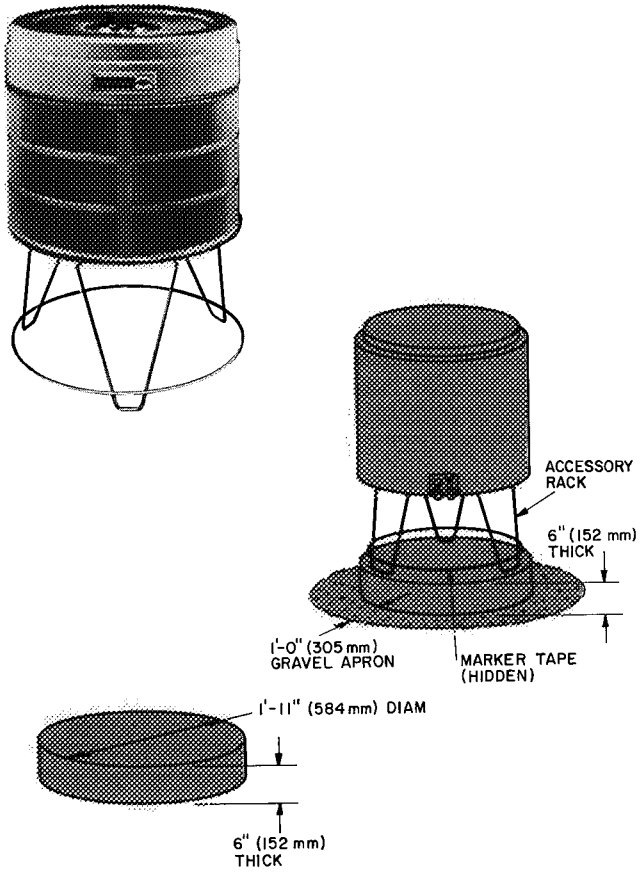


Fig. 2 — Accessory Mounting Rack

condition (Table 2). For requirements beyond 50 ft, obtain information from local Carrier distributor.

WARNING: If undersized, damaged or elliptically-shaped tubing is used when making Compatible Fitting, leaks may result.

If 1-1/8 in. tubing is used (38QB042,048,060), braze it to the accessory 1-1/8 x 3/4-in. suction connection adapter (Carrier Part No. 28AU900061) or to a correctly sized field-supplied adapter, then make Compatible Fitting connections. Isolate interconnecting tubing from framing and ductwork or where tubing runs thru stud spaces, enclosed ceilings or pipe chases. Use isolation type hangers, Fig. 3, since rigid fastening transmits pulsations to structure creating objectionable sound.

CAUTION: DO NOT BURY MORE THAN 3 FT (1 M) OF LINESET IN GROUND. If any section of lineset is buried, there must be a 6-in. (152 mm) vertical rise to the valve connections on the outdoor unit. If more than the recommended length is buried, refrigerant may migrate to the cooler buried section during extended periods of unit shutdown, causing refrigerant slugging and possibly compressor damage at start-up.

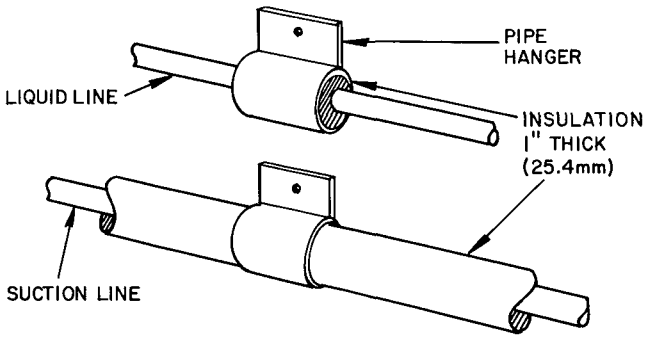


Fig. 3 — Refrigerant Line Hangers

Table 2 — Installation Data (Fig. 1)

UNIT 38QB		015	018	024	030	036	042	048	060
OPERATING WEIGHT	(lb)	140	179	185	187	197	229	240	252
	(kg)	63.5	81.2	83.9	84.8	89.4	103.9	108.9	114.3
DIMENSIONS									
Diameter (ft-in.)	A	1-9-3/4	2-5-1/4						
(mm)		552	743						
Height (ft-in.)	B	2-8	2-2-3/8			2-8		3-1-3/4	
(mm)		813	670			813		959	
REFRIGERANT CONNECTIONS		Compatible Fitting (Suction) & Flare (Liquid)							
Suction (ODF)	(in.)	5/8	3/4						
	(mm)	15.87	19.05						
Liquid (ODF)	(in.)	3/8							
	(mm)	9.53							
REFRIGERANT LINES									
Suction (ODF)	(in.)	5/8	3/4			7/8	1-1/8*		
	(mm)	15.87	19.05			22.22	28.57		
Liquid (ODF)	(in.)	3/8							
	(mm)	9.53							

*May use 7/8-in (22 22-mm) accessory tubing package with slight capacity loss See Table 3

→ Table 3 — Accessories

PART NO.	DESCRIPTION	UNIT 38QB
99TZ90040106	Low-Voltage Control — Honeywell Thermostat HH07AT171 and Thermostat Subbase HH93AZ173 — (Automatic Changeover)	All
99TZ90041106	Low-Voltage Control — Honeywell Thermostat HH07AT171 and Thermostat Subbase HH93AZ175 — (Manual Changeover)	
38QB90002106	Service Sentry (Six HN65CT004)	
99TZ90029101	Honeywell — Manual Changeover. 2-Stage Heating, 1-Stage Cooling	
28AU90006112	Twelve 3/4- x 1-1/8 in. Connection Adapters	042-060
38RQ90008106	Bi-Flow Heat Pump Filter Drier (Six KH45LD077)	All
HN65DE026*	Supplemental Heat Relay — (Required with 2 Outdoor Thermostats) (Service Parts)	
38HQ900002	Outdoor Thermostat (Six 38HQ900011)	
38CQ900172	Optimizer Control Outdoor Thermostat (Six 38CQ900161 ref HH22AG110)	
38RQ900091	Optimizer II Control Assembly (Use with HH2AG110 outdoor thermostat.)	
38QB90001106	Heat Pump Rack (Six)	015-018
38QF90000106	Heat Pump Rack (Six)	024-060
38HQ90014106	Optimizer III (Six 38HQ900141)	All
38QB90003106	Solid-State Time Guard II (24-volt)	
HC95DD120*	Start Capacitor	015
HC95DD121*	Start Capacitor	018
HC95DD058*	Start Capacitor	024,030
HC95DD088*	Start Capacitor	036
HN61HB515*	Relay	015,018
HN61HB496*	Relay	024,030,036
38EB660002*	Wire Bundle for Start Capacitor and Relay	015-036

TUBING PACKAGE	LENGTH		TUBING								Unit 38QB
			Liquid				Suction†				
			OD		Tube End OD		OD		Tube End OD		
									Evap	Cond	
	ft	m	in.	mm	in.	mm	in.	mm	in.	in.	
38LS958151	15	4.6	3/8	10	3/8	10	5/8	15.88	3/4‡	5/8	015
38LS958201	20	6.1	3/8	10	3/8	10	5/8	15.88	3/4‡	5/8	
38LS958251	25	7.6	3/8	10	3/8	10	5/8	15.88	3/4‡	5/8	
38LS958301	30	9.1	5/16	7.9	3/8	10	5/8	15.88	3/4‡	5/8	
38LS958351	35	10.7	5/16	7.9	3/8	10	5/8	15.88	3/4‡	5/8	
38LS958401	40	12.2	5/16	7.9	3/8	10	5/8	15.88	3/4‡	5/8	
38LS958501	50	15.2	1/4	6.4	3/8	10	5/8	15.88	3/4‡	5/8	
38LS934151	15	4.6	3/8	10	3/8	10	3/4	19.05	3/4	3/4	018,024 030
38LS934201	20	6.1	3/8	10	3/8	10	3/4	19.05	3/4	3/4	
38LS934251	25	7.6	3/8	10	3/8	10	3/4	19.05	3/4	3/4	
38LS934301	30	9.1	3/8	10	3/8	10	3/4	19.05	3/4	3/4	
38LS934351	35	10.7	3/8	10	3/8	10	3/4	19.05	3/4	3/4	
38LS934401	40	12.2	3/8	10	3/8	10	3/4	19.05	3/4	3/4	
38LS934501	50	15.2	3/8	10	3/8	10	3/4	19.05	3/4	3/4	
38LS978151	15	4.6	3/8	10	3/8	10	7/8**	22.22	3/4	3/4	036,042 048,060
38LS978201	20	6.1	3/8	10	3/8	10	7/8**	22.22	3/4	3/4	
38LS978251	25	7.6	3/8	10	3/8	10	7/8**	22.22	3/4	3/4	
38LS978301	30	9.1	3/8	10	3/8	10	7/8**	22.22	3/4	3/4	
38LS978351	35	10.7	3/8	10	3/8	10	7/8**	22.22	3/4	3/4	
38LS978401	40	12.2	3/8	10	3/8	10	7/8**	22.22	3/4	3/4	
38LS978501	50	15.2	3/8	10	3/8	10	7/8**	22.22	3/4	3/4	

*Available thru Carrier Service Parts
†Suction line is insulated and has 90° bend
‡For 5/8-in (15 9-mm) evaporator connection, cut off 3/4-in (19 05-mm) belled end
**Capacity reduction may occur when 7/8-in (22 22-mm) accessory tubing is used on 38QB042,048,060

A capacity reduction will result if accessory tubing is used in 38QB042 systems. For example, when a 25-ft (7.6-m) 7/8-in. (22-mm) accessory package is used, there is a capacity reduction of 1-1/2 percent.

When other than 25 ft (7.6 m) of interconnecting tubing is used, follow special requirements described in Refrigerant Charging. Do not use less than 10 ft (3 m) of interconnecting tubing. Do not cut 5/16-in. (7.9-mm) or 1/4-in. (6.4-mm) liquid line due to swage at ends. Do not cut 7/8-in. (22.22-mm) suction line. Bend or coil to fit.

Do not use damaged or contaminated tubing. Always evacuate or purge evaporator coil and tubing system (use field-supplied refrigerant, not unit refrigerant).

When making tubing connections, be sure to provide clearance at unit for electrical connections.

REPLACE THE ACCURATER™ REFRIGERANT CONTROL PISTON IN THE INDOOR COIL AS REQUIRED before connecting refrigerant lines. See Table 1. Correct piston is supplied with 38QB unit. For piston replacement instructions, see AccuRater Servicing on page 15.

CONNECT REFRIGERANT LINES to fittings on unit suction and liquid service valves (Fig. 1). *Liquid service valve has flare fitting; suction service valve has Compatible Fitting.* Make suction line connection first. Slide flare nut on liquid line, then flare and connect liquid line. Use a maximum torque of 15 ft-lb (20 N-m) to tighten flare nut. (Do not disassemble AccuRater.) Unit Compatible Fitting permits mechanical or sweat connection as described below.

When a 7/8-in. (22.22-mm) field-supplied suction line is used on 38QB036,042,048 and 060, a field-supplied 3/4-in. (19.05-mm) to 7/8-in. (22.22-mm) suction line adapter must be provided (not required if 38LS accessory tubing is used).

When a 1-1/8 in. (28.57-mm) field-supplied suction line is used on 38QB042,048 and 060, use accessory adapter 28AU900061 or other field-supplied connection. Sweat connect refrigerant suction line to 1-1/8 in. (28.57-mm) end of adapter. Connect 3/4-in. (19.05-mm) end of adapter to unit suction line Compatible Fitting.

Mechanical Connection to Compatible Fitting (Mate one set of connections at a time.)

1. Loosen nut on Compatible Fitting one turn. Do not remove.
2. Remove plug and be sure O-ring is in the groove inside the Compatible Fitting.
3. Cut tubing to correct length.
4. Insert tube into Compatible Fitting until it bottoms.
5. Tighten nut until it bottoms on back coupler flange. Keep tube bottomed in Compatible Fitting while tightening nut.

Sweat Connection to Compatible Fitting (Use refrigerant grade tubing.)

1. Remove locking nut, rubber O-ring and Schrader core from valve.
2. Cut tubing to correct length.
3. Insert tube into Compatible Fitting. Wrap top and bottom of service valves in wet cloth to prevent damage by heat. Solder with low temperature (430 F [221 C]) silver alloy solder.
4. Replace Schrader core.
5. Evacuate or purge system with field-supplied refrigerant.

Step 4 — Make Electrical Connections — Field wiring must comply with local and national fire, safety and electrical codes. Voltage to unit must be within permissible limits of voltages indicated on nameplate. Contact local power company for correction of improper line voltage.

WARNING: Operation of units on improper line voltage constitutes abuse and could affect Carrier warranty. See Table 4.

Do not apply units in system where voltage may fluctuate above or below permissible limits.

When making electrical connections, provide clearance at unit for refrigerant piping connections. See Table 4 for recommended wire and fuse sizes.

INSTALL A BRANCH CIRCUIT DISCONNECT PER NEC of adequate size to handle unit starting current. Provide a separate disconnect for outdoor unit, indoor unit and for each accessory electric heater circuit as required. (See Indoor Unit and Electric Heater Installation, Start-Up and Service Instructions.) Locate disconnect(s) within sight from and readily accessible from the unit per section 440-14 of National Electrical Code (NEC).

ROUTE LINE POWER LEADS INTO UNIT — Extend leads from disconnect thru power wiring hole provided (see Fig. 1) and into unit splice area. Remove top cover to gain access to unit wiring.

CONNECT GROUND LEAD AND POWER WIRING — Connect ground lead to a ground lug in control box for safety. Then connect power wiring. See Fig. 4. Splice line power leads to yellow and black pigtails. Use wire nuts and tape at each connection. Connect unit wiring to copper power wiring.

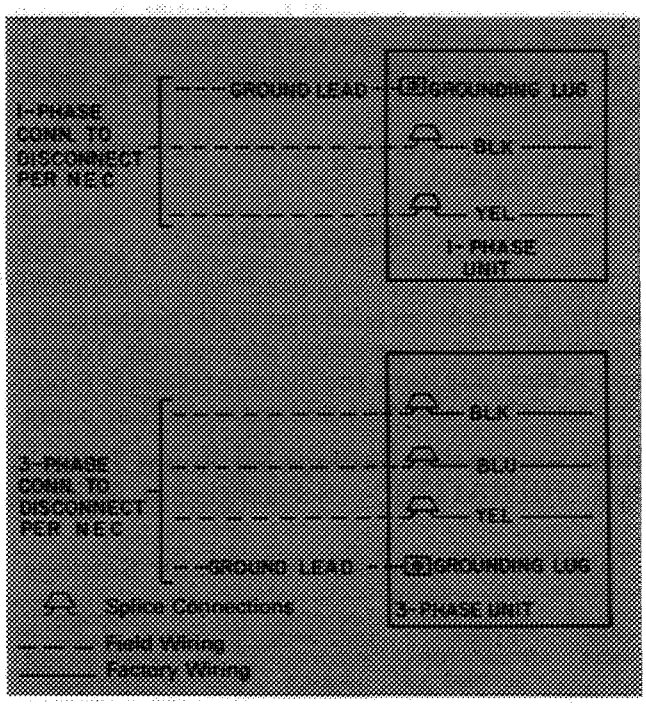


Fig. 4 — Line Power Connections

SEE INDOOR UNIT AND ELECTRIC HEATER INSTALLATION, START-UP AND SERVICE INSTRUCTIONS for line power wiring details. All control wiring is shown in this booklet.

Table 4 — Electrical Data (60 Hz)

UNIT 38QB	V/PH	OPER VOLTAGE*		COMPR		FAN FLA	BRANCH CIRCUIT				
							Min Wire Size (AWG)†	Max Wire		Min Gnd Wire Size‡	Max Fuse** or HACR Type Ckt Bkr Amps	MCA
		Max	Min	LRA	RLA			ft	m			
015	208-230/1	254	197	34	7 7	1 25	14	40	12 2	14	15	10 9
018	208-230/1	254	197	48	12 4	1 25	14	27	8 2	14	25	16 8
024	208-230/1	254	197	66	15 5	2 4	12	32	9 8	12	35	21 8
030	208-230/1	254	197	82	16 5	2 4	12	32	9 8	12	35	23 0
036	208-230/1	254	197	88	20 6	2 4	10	39	11 9	10	45	28 2
042	230/1	254	207	98	19 9	2 4	10	44	13 4	10	45	27 3
048	230/1	254	207	105	22 4	2 4	8	62	18 9	10	50	30 4
060	230/1	254	207	130	27 8	2 4	8	51	15 5	10	60	37 2
036	208-230/3	254	197	87	11 7	2 4	14	32	9 8	14	25	17 0
042	208-230/3	254	197	80	13 3	2 4	14	29	8 8	14	30	19 0
048	208-230/3	254	197	80	16 3	2 4	12	24	7 3	12	35	22 8
060	208-230/3	254	197	98	20 9	2 4	10	19	5 8	10	45	28 5
036	460/3	506	414	30	5 1	1 2	14	159	48 5	14	15	7 6
042	460/3	506	414	35	7 2	1 2	14	120	36 6	14	15	10 2
048	460/3	506	414	40	8 0	1 2	14	109	33 2	14	15	11 2
060	460/3	506	414	49	10 4	1 2	14	86	26 2	14	20	14 2

AWG — American Wire Gage
FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
RLA — Rated Load Amps

*Permissible limits of the voltage range at which the unit will operate satisfactorily

†Copper wire sizes based on 60 C Use copper wire only.
‡Required when using nonmetallic conduit
**Time-delay fuse

NOTE: All units have 24-v control circuit which requires external power source

CONNECT CONTROL POWER WIRING (24 V) — Extend wiring thru hole provided (Fig. 1) and into low-voltage section of unit control ring. Connect leads to control wiring terminal board as shown in Fig. 5.

Use indoor unit transformer as 24-v supply for system. At least a 60-va transformer is recommended. Carrier approved indoor units are equipped with a 60-va transformer. See indoor unit data.

Use Carrier accessory indoor thermostat with subbase, Table 3.

START-UP

The 38QB unit is equipped with a crankcase heater. It is recommended that heater be energized a minimum of 24 hours before starting unit. To energize heater only, turn the thermostat to OFF position and close electrical disconnect to heat pump.

Heat Anticipator Settings for Room Thermostat (HH01AT171) — Set anticipator for room thermostat according to Table 5. These settings may be changed slightly to provide a greater degree of comfort for a particular installation.

Table 5 — Thermostat Anticipator Settings

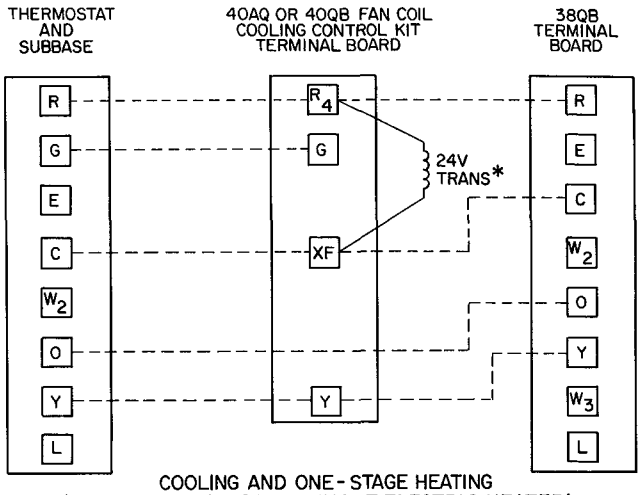
UNIT 38QB	FIRST-STAGE ANTICIPATOR SETTING	INDOOR UNIT WITH ELECTRIC HEATER	HTR KW	SECOND-STAGE ANTICIPATOR SETTINGS
015 018 024 030 036 042 048 060	Fixed	40DQ and 40AQ Fan Coil with 40AQ Htrs or 40QB,QH Fan Coil with 40QB Htrs	5 0 7 5 10 0	25
			15 0 20 0 25 0	50
			30 0 34 0	75

Accessory Outdoor Thermostat provides adjustable outdoor control of accessory electric heater. This thermostat makes contact when a drop in outdoor temperature occurs. It energizes a stage of electric heat when the outdoor temperature setting is reached, provided the room thermostat is on the second stage of heating. One outdoor thermostat is recommended for each stage of electric heat after the first stage. Set the outdoor thermostat(s) progressively lower for each stage. Refer to heat load of building and unit capacity to determine the correct outdoor thermostat settings.

The accessory supplemental heat relay is required when 2 outdoor thermostats are used. It is automatically energized by the manually operated supplemental heat switch in the indoor thermostat subbase. The thermostat locks out compressor and the relay bypasses the outdoor thermostats for electric heater operation during heat pump shutdown. When one outdoor thermostat is used, a supplemental heat relay is not required. The supplemental heat switch in the indoor thermostat subbase bypasses outdoor thermostat, locks out compressor and activates electric heater.

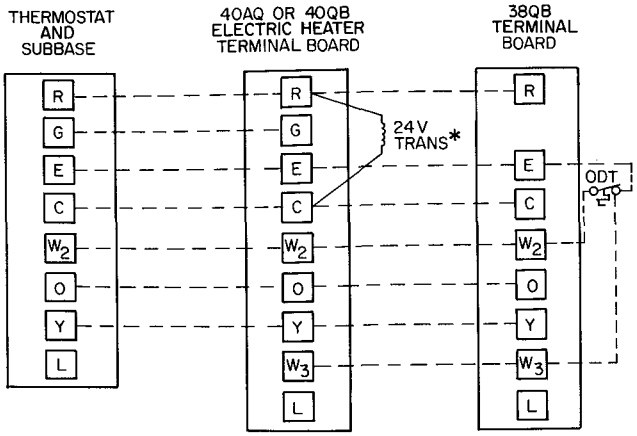
MOUNT OUTDOOR THERMOSTAT on control ring, to the left of the low-voltage control connection. See Fig. 1.

Attach brackets with short sheet metal screws to avoid contact with coil. Leave capillary tube coiled in control compartment making sure it is clear of all electrical connections and sharp metal edges.



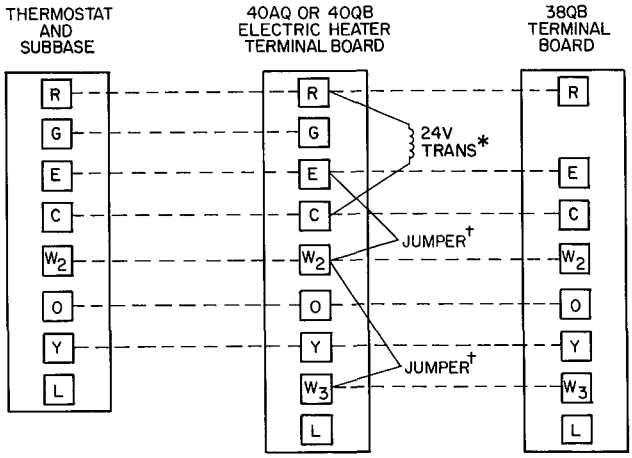
COOLING AND ONE-STAGE HEATING
(38QB/40AQ OR 40QB WITHOUT ELECTRIC HEATER)

A



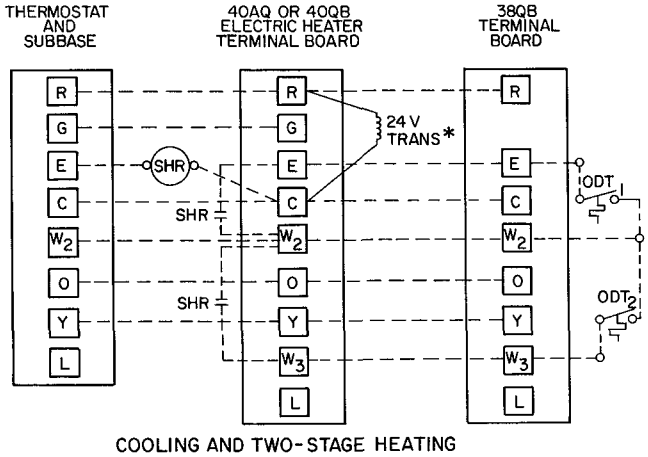
COOLING AND TWO-STAGE HEATING
(38QB WITH 40AQ, 40QB,QH OR 40FS/28HQ,VQ
EQUIPPED WITH ELECTRIC HEATER;
SUPPLEMENTAL HEAT, ONE OUTDOOR THERMOSTAT)

C



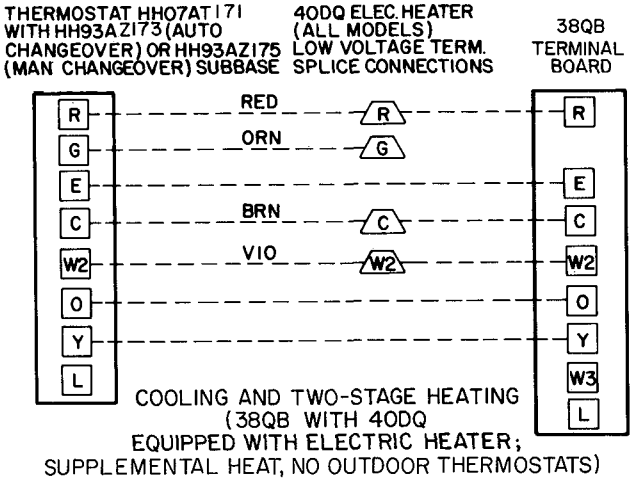
COOLING AND TWO-STAGE HEATING
(38QB WITH 40AQ,40QB,QH OR 40FS/28HQ,VQ
EQUIPPED WITH ELECTRIC HEATER;
SUPPLEMENTAL HEAT, NO OUTDOOR THERMOSTATS)

B



COOLING AND TWO-STAGE HEATING
(38QB WITH 40FS/28HQ,VQ
EQUIPPED WITH ELECTRIC HEATER;
SUPPLEMENTAL HEAT, TWO OUTDOOR THERMOSTATS)

D



COOLING AND TWO-STAGE HEATING
(38QB WITH 40DQ
EQUIPPED WITH ELECTRIC HEATER;
SUPPLEMENTAL HEAT, NO OUTDOOR THERMOSTATS)

E

ODT — Outdoor Thermostat
SHR — Supplemental Heat Relay
——— Factory Wiring
– – – – Field Wiring

*Transformer (60 va) located in cooling control kit or electric heater
†Remove factory-installed jumper (Connection B) when installing outdoor thermostats (ODT)

Fig. 5 — Control Circuit Connections

MOUNT SUPPLEMENTAL HEAT RELAY in convenient location on indoor unit. Attach with sheet metal screw.

To Start Unit — (Make sure crankcase heater has been energized for 24 hours.) Adjust the thermostat as follows:

1. Set selector switch at OFF.
2. Turn on main disconnect switch(es) to indoor and outdoor units.
3. Set fan switch as desired (ON or AUTO.).
4. Set thermostat dial at desired temperature.
5. Set selector switch at HEAT or COOL.

Check system refrigerant charge. See Refrigerant Charging.

SERVICE

CAUTION: Unit has high-pressure piping which may also be hot to touch, energized electrical components and a rotating fan. Before servicing or checking unit, be sure *all* system power is off and tubing is cool.

CAUTION: To prevent personal injury, wear safety glasses and gloves when handling refrigerant.

Do not overcharge system. An overcharge can cause compressor flooding.

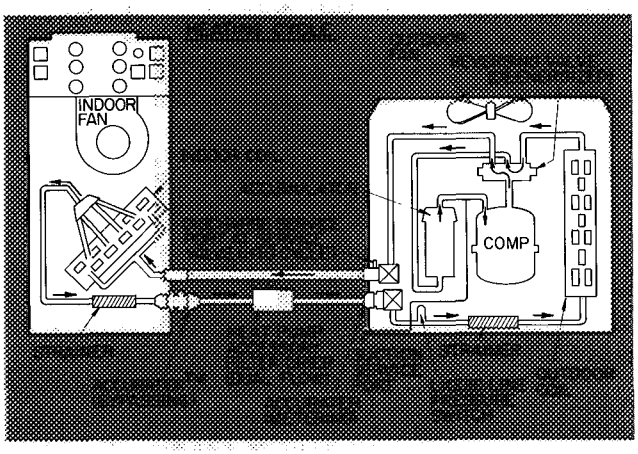
Refrigerant Charging — The 38QB units contain correct operating charge for complete system when connected to 28HQ,VQ, 40QB,QH or 40AQ indoor units with 25 ft (7.6 m) of tubing of recommended diameter. Charge adjustment is required on other systems. Adjust system charge for refrigerant line lengths and diameters that differ from 25 ft (7.6 m) and 3/8 in. (10 mm) OD (liquid line), respectively, using refrigerant weights below. Twenty-five ft (7.5-m), 3/8-in. (10-mm) OD tubing contains 14.4 oz (.4 kg) of R-22. Add R-22 charge to system if liquid line is over 25 ft (7.6 m); remove charge if liquid line is shorter than 25 ft (7.6 m).

When recharging is necessary during heating or cooling season, weigh in total charge indicated in Table 6. (Charge must be weighed in during heating season.) Remove any refrigerant remaining in system before recharging. If system has lost complete charge, triple-evacuate system to 5000 microns (29.7 in. [100.5 kPa] vacuum) before recharging. Service port connections are provided on liquid and suction line service valves for evacuation and charging. (See Fig. 6 for correct service port location on cooling and heating cycles.) Dial-a-charge charging cylinder is an accurate device used to recharge systems by weight. These cylinders are available at refrigeration supply firms.

To check and/or adjust charging during cooling season, use correct Cooling Cycle Charging Chart (Fig. 8, 10, 12, 14, 16, 18, 20, 22) and follow Charging Chart Method below. The charging chart may also be used as an alternate method of recharging system.

To check *system operation* during heating cycle, use correct Heating Cycle Operation Check Chart (Fig. 9, 11, 13, 15, 17, 19, 21, 23). These charts indicate whether a correct relationship exists between system operating pressures and air temperatures entering indoor and outdoor units. If pressure and temperature lines do not intersect on chart, the system refrigerant charge may not be correct or other system abnormalities may exist. Do not use Operation Check Charts to adjust refrigerant charge. Weigh charge into system.

LIQUID LINE DIAM (in.)	OUNCES OF R-22/FT LENGTH OF LIQUID LINE
3/8	.58
5/16	36
1/4	.21
LIQUID LINE DIAM (mm)	KILOGRAMS OF R-22/M LENGTH OF LIQUID LINE
9.53	.05
7.94	.03
6.35	.02



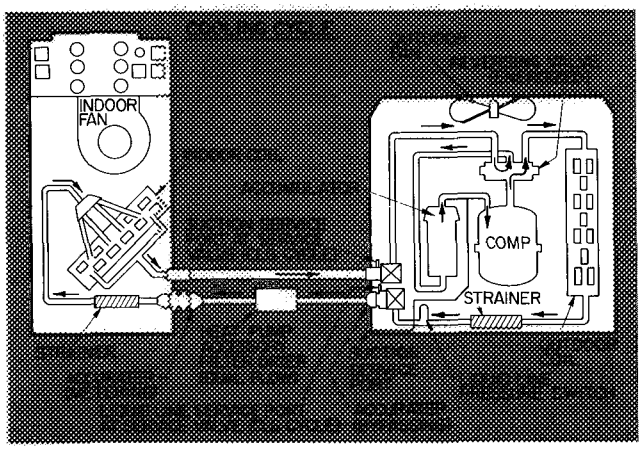


Fig. 6 — 38QB Refrigerant Flow Diagrams

Table 6 — Service Data

UNIT 38QB		015	018	024	030	036	042	048	060
R-22 CHG	(lb)	4 0	6 2	7 2	7 3	7 8	8 5	8 6	8 0
	(kg)								
REFRIG CONTROL		AccuRater™ (Bypass Type)							
FAN									
Cfm		1800	2400	3000					
L/s									
Rpm		1100		1075					
Diam	(in.)	14-3/4	20						
	(mm)								

COOLING CYCLE CHARGING CHART METHOD

1. Operate unit a minimum of 10 minutes before checking charge, and after each charge adjustment.
2. Measure suction pressure by attaching a gage to outdoor unit suction service port. (See Fig. 6 for correct service port location on cooling cycle.)
3. Measure outdoor (coil inlet) air dry-bulb temperature with service thermometer.
4. Using a sling psychrometer, measure wet-bulb temperature of air entering indoor unit.
5. Refer to correct Charging Chart. Locate on curves where outdoor air dry-bulb and indoor air wet-bulb temperature lines intersect.
6. From intersect point, project vertically downward to chart suction pressure line. Compare chart suction pressure to unit suction pressure (Step 2).
7. If unit suction pressure is lower than chart pressure, add refrigerant to system until chart pressure is reached. If unit suction pressure is higher than chart pressure, remove refrigerant until chart pressure is reached.

Unit Single-Phase Compressors

COMPRESSORS OF THE SPLIT CAPACITOR (PSC) TYPE require an equalized system pressure to start. When supply voltage is within nameplate limit and compressor does not start, give compressor a temporary capacitance boost. See Carrier Standard Service Techniques Manual, Chapter 2, for details.

WARNING: Capacitance boost or installation of start capacitor and start relay should be performed by trained personnel. Improper procedure could cause personal injury or equipment damage.

Compressor Removal — See Table 7 for compressor information and Fig. 7 for component location. Shut off power to unit. Remove refrigerant from unit using refrigerant removal methods described in Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants.

Be sure system pressure is 0 psig before proceeding.

Table 7 — Compressor Data (60 Hz)

UNIT 38QB	V/PH	PRODUCTION COMPRESSOR		
		Model*	Oil Recharge	
			Ounces	Liters
015	208-230/1	REK3-0125-PFV	20	
018		CRA1-0150-PFV	51	
024		MD2314GE	44	
030		MD3214GE	44	
036		MD3514GE	44	
042	230/1	PC4616BD	64	
048		PC5016BD	64	
060		PC6016BD	64	
036	208-230/3	MF3513GE	44	
042		PY4616AD	64	
048		PY5016BD	64	
060		PY6016BF	64	
036	460/3	MH3513GE	44	
042		PH4616AD	64	
048		PH5016BD	64	
060		PH6016BF	64	

*Refer to Service Parts Catalog for replacement compressor model numbers

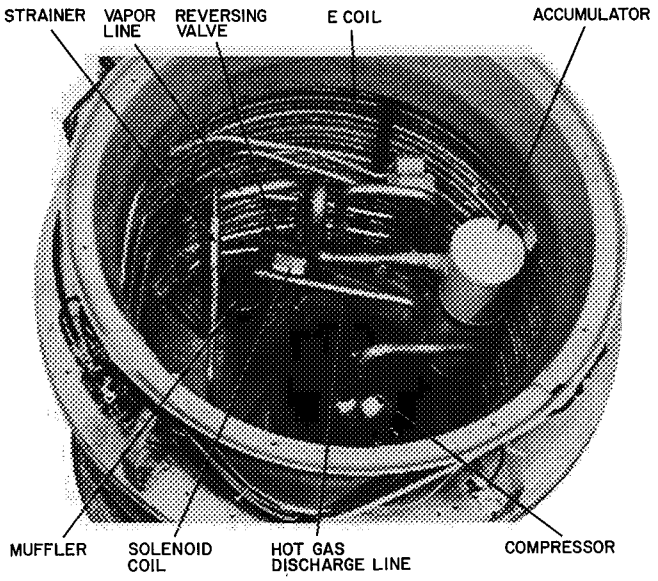


Fig. 7 — Component Location

Follow safety codes. Wear safety glasses and work gloves. Have quenching cloth available.

CAUTION: Aluminum tubing is used in unit coils. Do not overheat or place excessive strain on tubing or damage may result.

1. Remove top cover as described in Installation, Step 1.
2. Disconnect high- and low-voltage field wiring and fan motor leads from capacitor and contactor.
3. Remove screws holding discharge grille in place. Lift grille from unit.
4. Disconnect compressor leads (crankcase heater, low-pressure switch, defrost thermostat and solenoid coil) from electrical components and pull them thru the wire access opening into the

coil section. Lift fan orifice/control ring after pinching and pressing down on 3 plastic pins of tube supports.

5. Remove louvered casing by taking out 16 screws securing it to the cabinet and sliding it away from the coil.
6. Using a midget tubing cutter, cut liquid and discharge lines on the coil and suction and discharge lines at a convenient place near the compressor for easy reassembly with copper slip couplings.

CAUTION: Excessive movement of copper lines at compressor may cause a break where lines connect to condenser coil.

7. After plugging connections, remove condenser coil by pinching plastic pins of tube supports that extend into basepan and lift vertically. Set coil on a clean, flat surface.
8. Remove compressor holddown bolts and slide out compressor. Remove crankcase heater.

WARNING: For brazing and unbrazing operations have fire extinguisher and/or quenching cloth available in case of vapor ignition.

9. Carefully unbraze suction and discharge line piping stubs from compressor after noting position of stubs to assist when reinstalling.
10. Install new compressor, placing crankcase heater around compressor. Be sure compressor holddown bolts are in place.
11. Replace coil; braze suction and discharge lines to compressor piping stubs (at points where cut, Step 6); rewire compressor and leak test.
12. Replace fan orifice/control ring; connect compressor wires after feeding them thru control ring; replace fan/grille assembly and rewire; connect high- and low-voltage power wiring; and replace louvered casing.
13. Replace top cover by running 4 screws into orifice loosely (2 on each side of unit) and tighten when cover is in place. Replace remaining screws.
14. Evacuate and recharge system.

CHARGING AND PRESSURE CHECK CHARTS

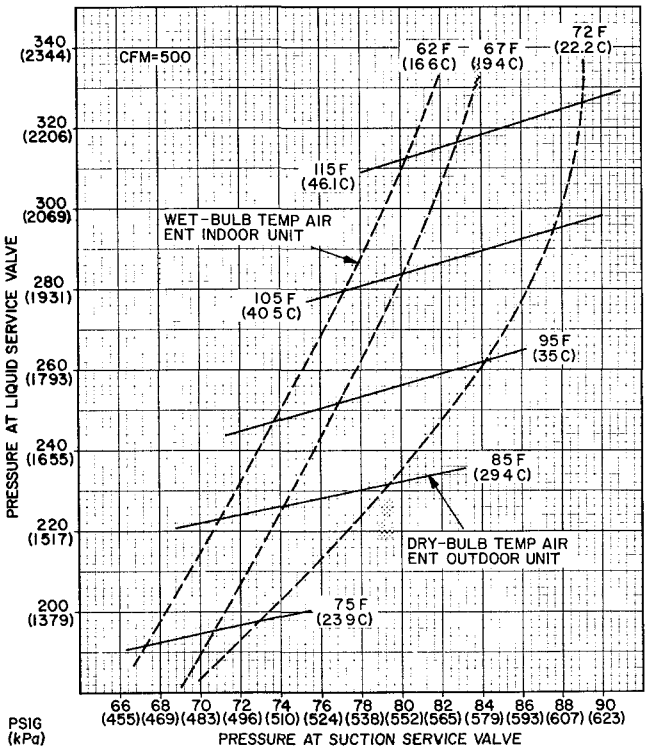


Fig. 8 — 38QB015 with 28HQ,VQ018, 40AQ018 or 40DQ018 Cooling Cycle Charging Chart

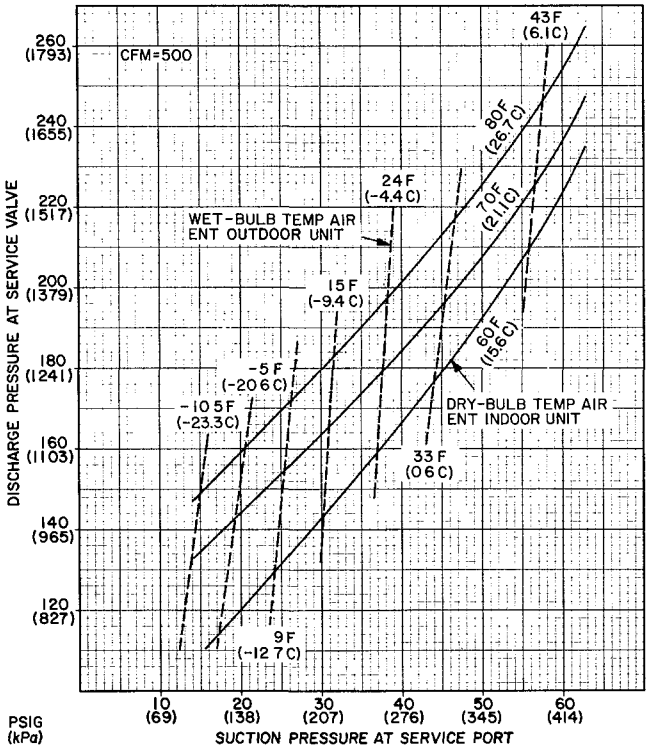


Fig. 9 — 38QB015 with 28HQ,VQ018, 40AQ018 or 40DQ018 Heating Cycle Operation Check Chart

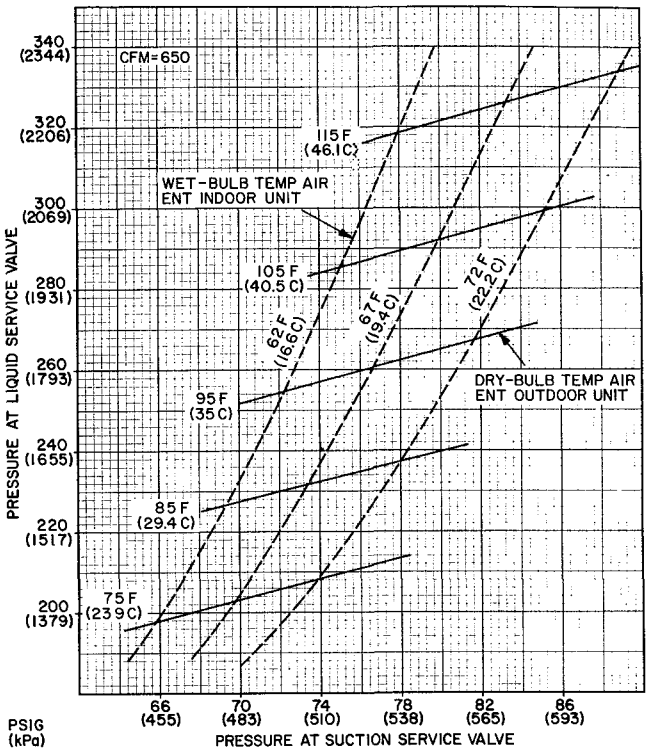


Fig. 10 — 38QB018 with 28HQ,VQ024, 40AQ024, or 40DQ024 Cooling Cycle Charging Chart

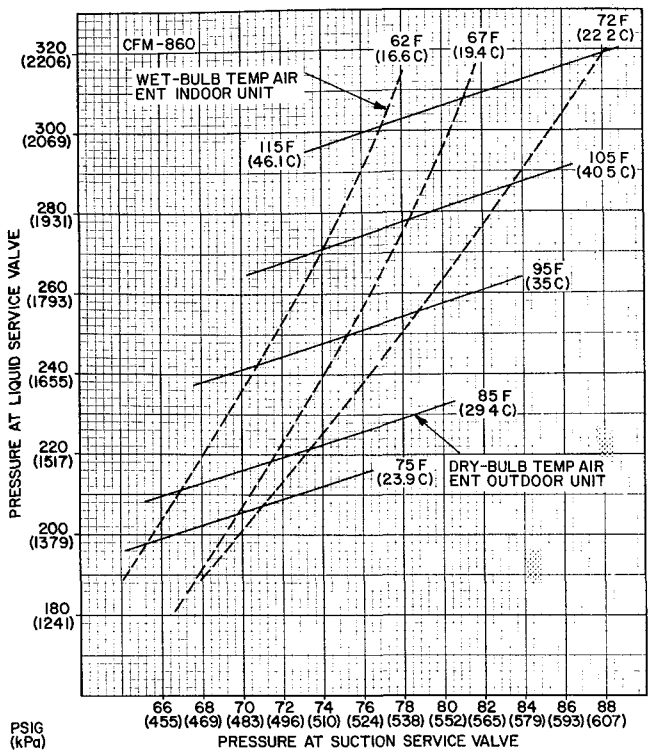


Fig. 12 — 38QB024 with 28HQ,VQ024,030, 40AQ024,030 or 40DQ030 Cooling Cycle Charging Chart

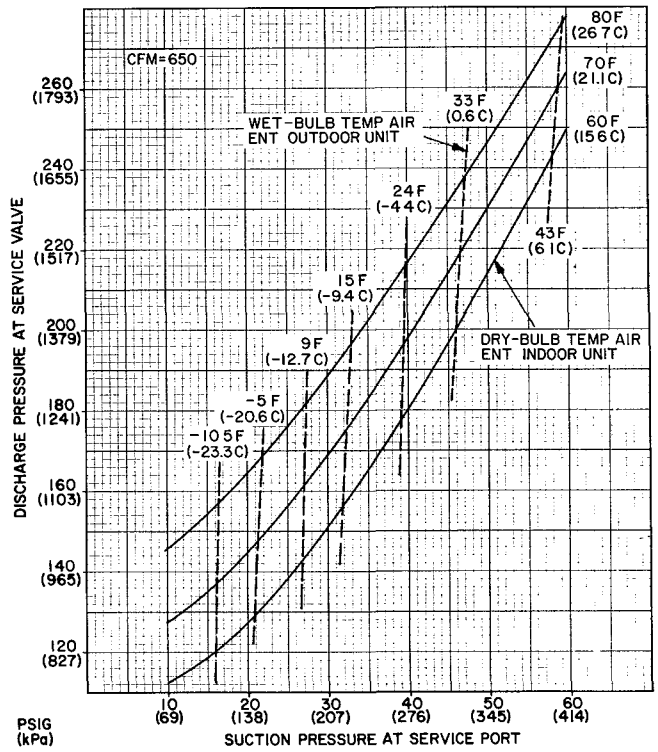


Fig. 11 — 38QB018 with 28HQ,VQ024, 40AQ024 or 40DQ024 Heating Cycle Operation Check Chart

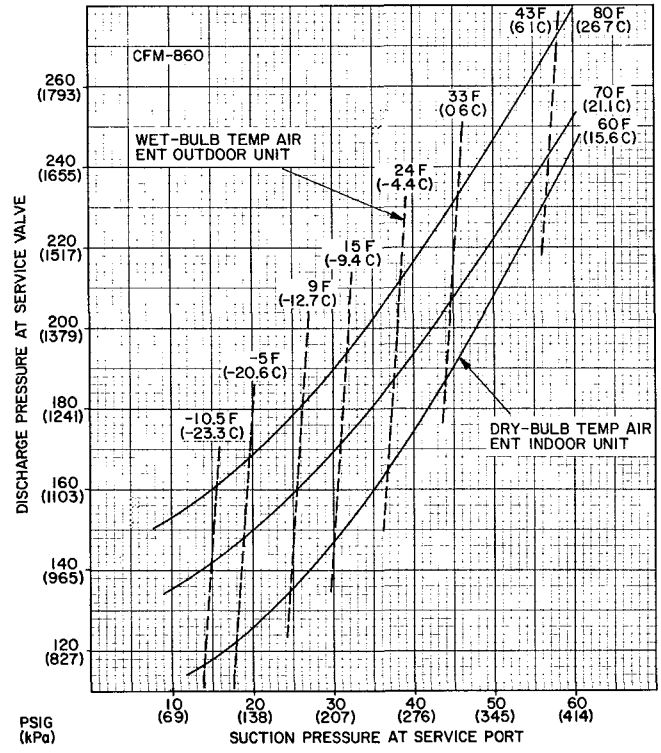


Fig. 13 — 38QB024 with 28HQ,VQ024,030, 40AQ024,030 or 40DQ030 Heating Cycle Operation Check Chart

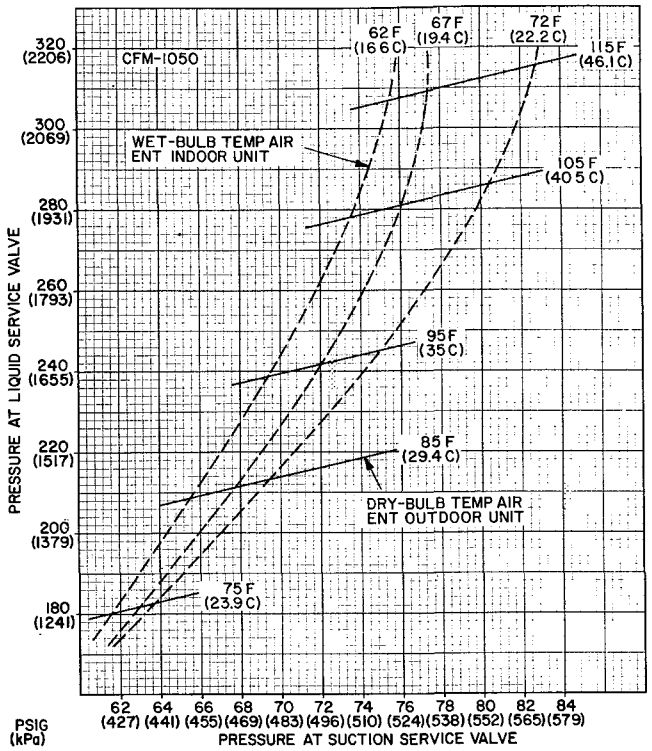


Fig. 14 — 38QB030 with 28HQ,VQ030,036, 40AQ030,036, 40DQ030 or 40FS160 with 28HQ,VQ036 Cooling Cycle Charging Chart

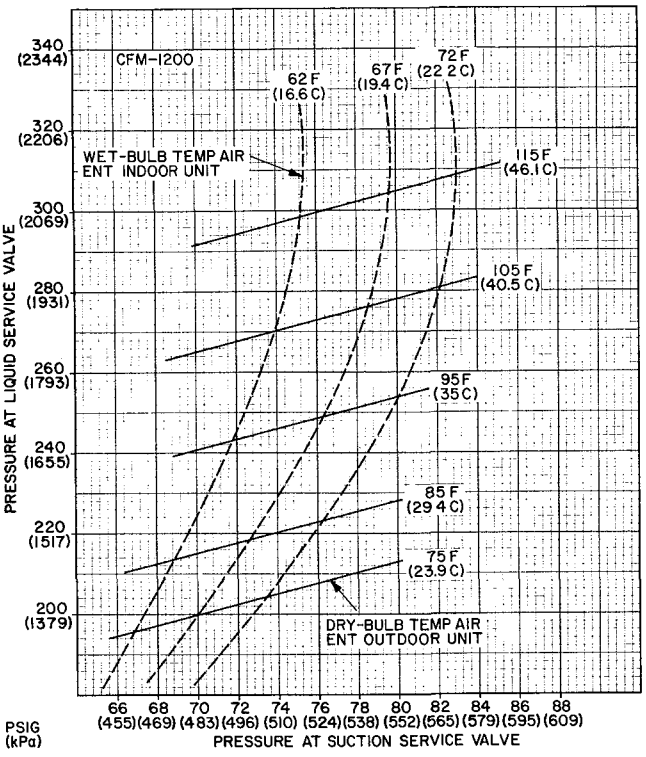


Fig. 16 — 38QB036 with 40AQ036,042, 28HQ,VQ036,042, 40QB,QH042 or 40FS160 with 28HQ,VQ036,042 Cooling Cycle Charging Chart

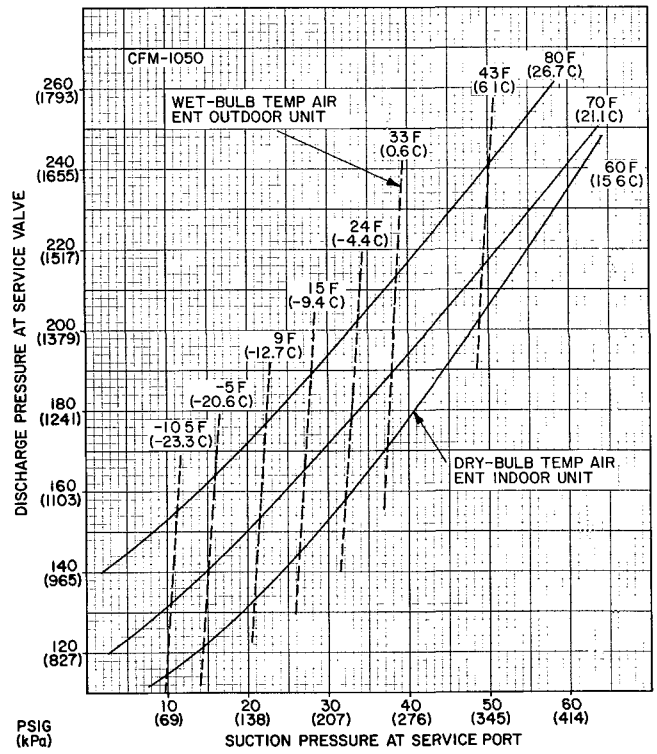


Fig. 15 — 38QB030 with 28HQ,VQ030,036, 40AQ030,036, 40DQ030 or 40FS160 with 28HQ,VQ036 Heating Cycle Operation Check Chart

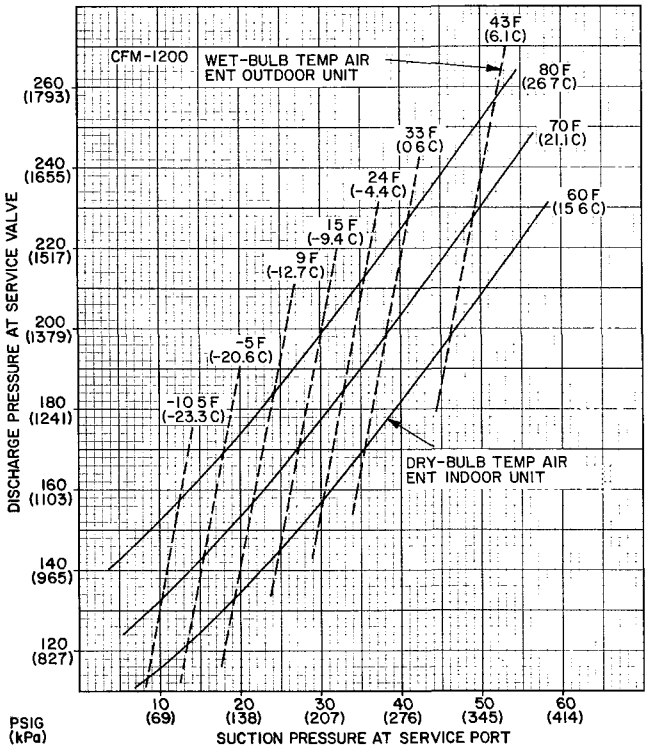


Fig. 17 — 38QB036 with 40AQ036,042, 28HQ,VQ036,042, 40QB,QH042 or 40FS160 with 28HQ,VQ036,042 Heating Cycle Operation Check Chart

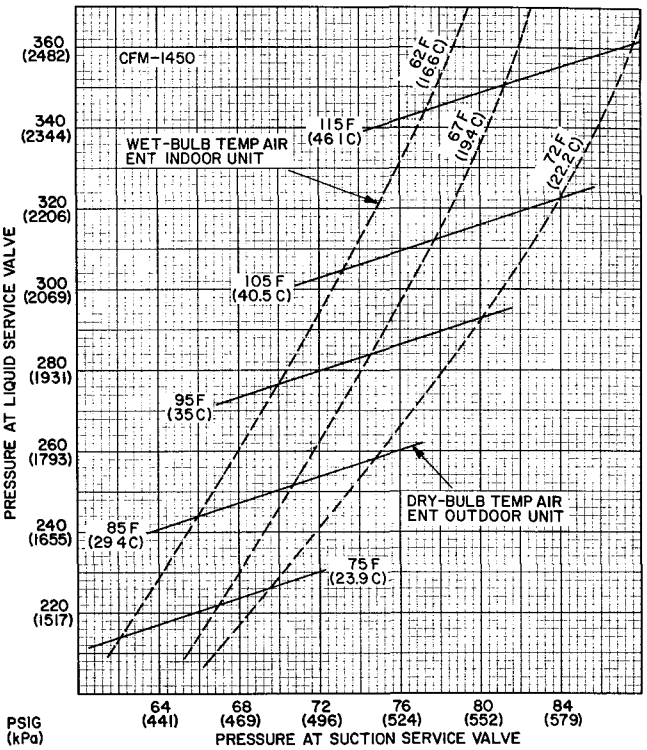


Fig. 18 — 38QB042 with 40QB,QH042, 28HQ,VQ042 or 40FS160 with 28HQ,VQ042 Cooling Cycle Charging Chart

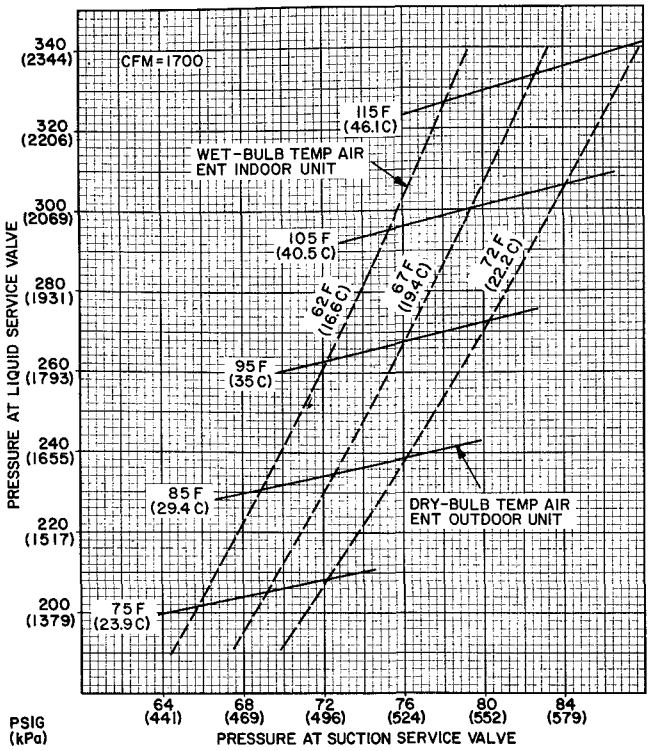


Fig. 20 — 38QB048 with 28HQ,VQ048, 40FS200 with 28HQ,VQ048 or 40QB,QH048 Cooling Cycle Charging Chart

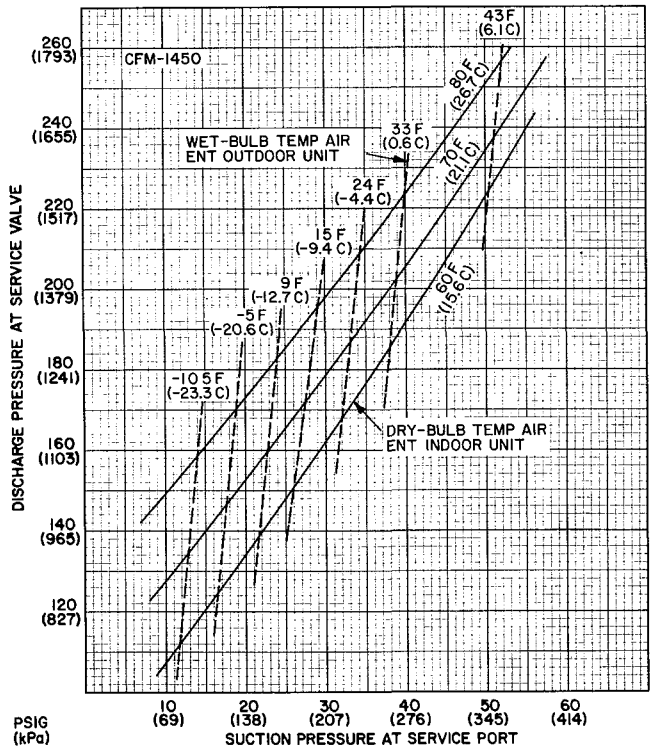


Fig. 19 — 38QB042 with 40QB,QH042, 28HQ,VQ042 or 40FS160 with 28HQ,VQ042 Heating Cycle Operation Check Chart

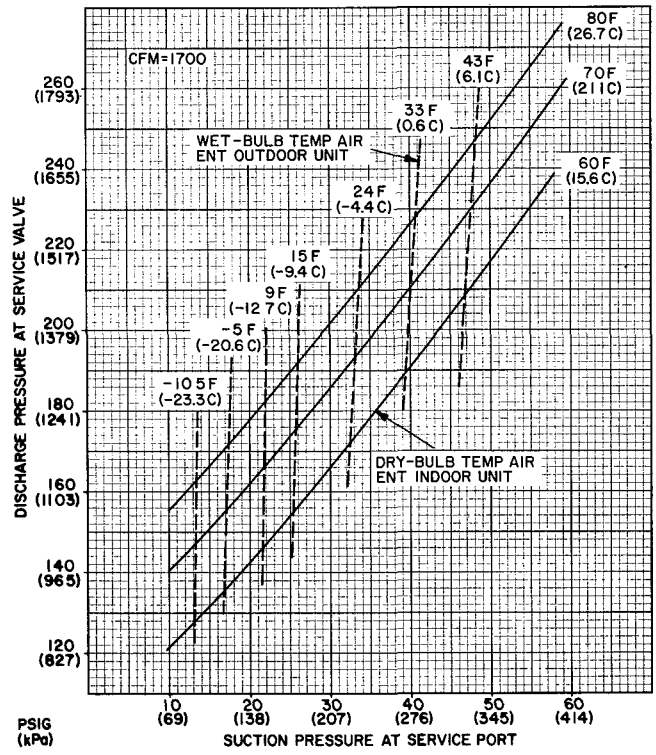


Fig. 21 — 38QB048 with 28HQ,VQ048, 40FS200 with 28HQ,VQ048 or 40QB,QH048 Heating Cycle Operation Check Chart

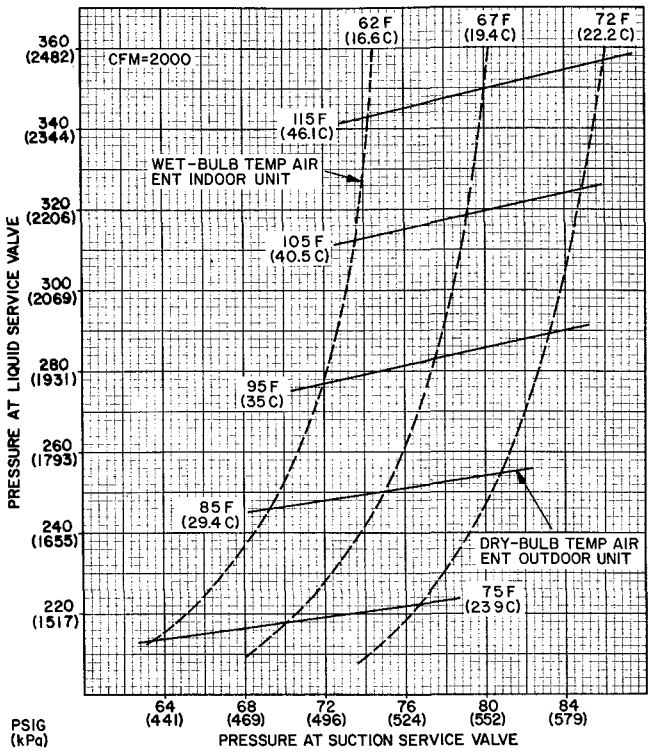


Fig. 22 — 38QB060 with 40QB,QH060 Cooling Cycle Charging Chart

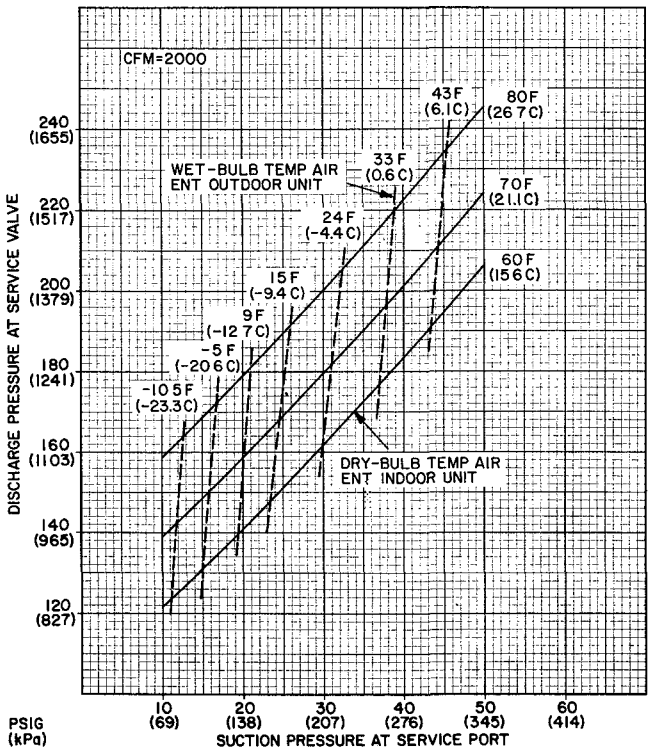


Fig. 23 — 38QB060 with 40QB,QH060 Heating Cycle Operation Check Chart

Filter Drier — Install field-supplied filter drier (Table 3) in system liquid line when refrigerant system is opened for service as described under Compressor Removal. Position drier in liquid line at convenient location.

Pumpdown Procedure — The system may be pumped down in order to make repairs on low side without losing complete refrigerant charge.

1. Attach pressure gage to suction service valve gage port.
2. Frontseat the liquid line valve.
3. Start unit and run until suction pressure reaches 5 psig (35 kPa) (see Caution).
4. Shut unit off and frontseat suction valve.
5. Vent remaining pressure to atmosphere.

CAUTION: 38QB unit coil will hold only factory-supplied amount of refrigerant. Additional refrigerant may cause unit to relieve pressure thru internal pressure relief valve (indicated by a sudden rise of suction pressure) before suction pressure reaches 5 psig (35 kPa). If this occurs, shut off unit immediately, frontseat suction valve and vent remaining pressure to atmosphere.

Unit Controls and Safety Devices

HIGH-PRESSURE RELIEF VALVE is located in compressor. Relief valve opens at a pressure differential of approximately 500 psig (3448 kPa) between suction (low side) and discharge (high side) to allow pressure equalization.

INTERNAL CURRENT AND TEMPERATURE SENSITIVE OVERLOAD resets automatically when internal compressor motor temperature drops to a safe level (overloads may require up to 45 minutes to reset). When an internal overload is suspected of being open, check by using an ohmmeter or continuity tester. If necessary, refer to Carrier Standard Service Techniques Manual, Chapter 2, for complete instructions.

LIQUID LINE LOW-PRESSURE SWITCH (LLPS) is connected in liquid line to work with compressor internal thermostat in providing loss-of-charge protection during the heating cycle. Control is mounted on liquid line.

With a high-side leak, pressure gradually decreases until low-pressure control stops the compressor. (Low-pressure control settings are shown in Table 8.)

Table 8 — Pressure Switch Settings

UNIT 38QB	LIQUID LINE LOW-PRESSURE SWITCH	
	Cut-in	Cutout
015 018 024 030 036 042 048 060	22 ± 5 psig (151 ± 35 kPa)	7 ± 3 psig (48 ± 21 kPa)

With a low-side leak there is always some pressure in the liquid line. However, compressor motor temperature increases because of insufficient suction gas cooling. This causes internal thermostat to actuate and stop compressor. When compressor stops, system pressure equalizes and contacts on pressure control open. The compressor cannot restart until leak is repaired and system recharged.

CRANKCASE HEATER is connected across line side of contactor and operates continuously.

The purpose of the heater is to keep the crankcase warm during the off cycle and thus prevent dilution of the oil with refrigerant. This assures good lubrication and prevents loss of oil from crankcase during start-up.

To energize crankcase heater, turn thermostat to OFF position and energize electrical disconnect to heat pump.

If the electrical disconnect switch to the outside unit has been off for an extended period of time, the crankcase heater should be energized for 24 hours before starting the compressor.

DEFROST CONTROL, consisting of defrost control board and defrost thermostat, interrupts normal system heating operation every 90 minutes to defrost outdoor coil, *if the coil saturated suction temperature indicates freezing temperatures.* Defrost control simultaneously stops outdoor fan, energizes reversing valve solenoid to return system to cooling cycle (outdoor unit as condenser, indoor unit as evaporator), and activates accessory electric heater.

For the heat pump to defrost, 2 conditions are necessary:

1. Defrost timer contacts must be closed.
2. Refrigerant temperature from outdoor unit must be cold enough to cause defrost thermostat contacts to close. Contacts close at 31 ± 4 F (-.5 ± 2.2 C).

Every 90 minutes of elapsed running time, the defrost timer contacts close for 10 seconds. If the defrost thermostat contacts are closed, the unit defrosts. The defrost timer limits defrosting period to 10 minutes. Normally, the frost is removed and the defrost thermostat contacts open to terminate defrosting before 10 minutes have elapsed. Defrost thermostat contacts open at 80 ± 6 F (26.7 ± 3.3 C) liquid refrigerant temperature. When defrosting is terminated, the outdoor fan motor is energized and reversing valve solenoid is de-energized, returning unit to heating cycle.

HEAT PUMP CIRCUITS shown in Fig. 6 are refrigerant flow diagrams for heating and cooling cycles.

AccuRater™ (Bypass-Type) Servicing — See Fig. 24 for bypass-type AccuRater components. The piston has a refrigerant metering hole thru it. The retainer forms a stop for the piston in the refrigerant bypass mode, and a sealing surface for liquid line flare connection. To check, clean or replace piston:

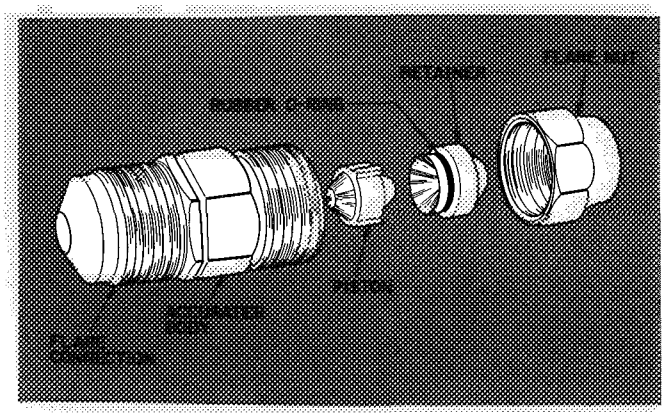


Fig. 24 — AccuRater (Bypass-Type) Components

1. Shut off power to unit.
2. Pump unit down using Pumpdown Procedure described previously.
3. Remove liquid line flare connection from AccuRater.
4. Pull retainer out of body, being careful not to scratch flare sealing surface. If retainer does not pull out easily, carefully use locking pliers to remove retainer.
5. Slide piston out by inserting a small soft wire, with small kinks, thru metering hole. Ensure metering hole, sealing surface around piston cones and fluted portion of piston are not damaged.
6. Clean piston refrigerant metering hole.
7. Replace retainer O-ring before reassembling bypass-type AccuRater. Carrier O-ring part no. is 99CC501052.

LIQUID LINE STRAINER (protects AccuRater) made of wire mesh is located in the liquid line inside 38QB unit behind liquid line service valve. Liquid line is belled and sweat connected where strainer is located. If strainer is plugged, unsweat belled liquid line connection and replace strainer. See Fig. 7.

Compatible Fitting Repair

LEAKING MECHANICAL CONNECTION — Frontseat outdoor section service valves after relieving refrigerant pressure in system. Back locknut off Carrier Compatible Fitting onto tube. Cut fitting between threads and O-ring shown in Fig. 25. Remove tubing section remaining in threaded portion of fitting. Discard locknut.

Clean, flux, and insert new tube end into remaining portion of Carrier Compatible Fitting. *Wrap valve base in wet rag.* Heat and apply low-temperature solder (430 F [221 C]).

LEAKING SWEAT CONNECTION — Frontseat service valves and relieve refrigerant pressure in tubing. Clean and flux area around leak and apply low-temperature solder (430 F [221 C]).

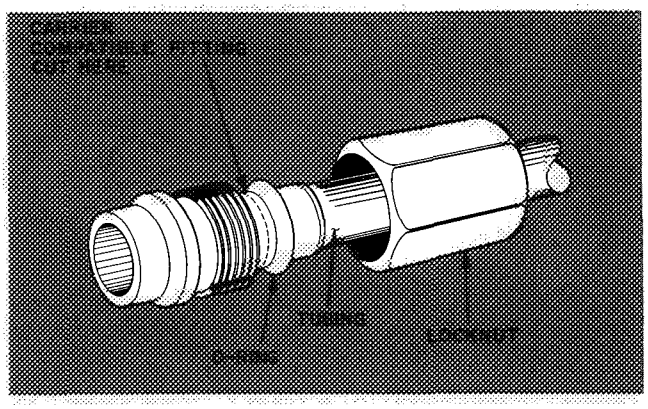


Fig. 25 — Carrier Compatible Fitting

Condenser Fan Motor Removal

1. *Shut off power to unit. Failure to do so may result in electric shock or injury from rotating fan blade.*
2. Remove top cover as described on page 2.
3. Disconnect fan motor leads from controls.
4. Remove 6 screws holding fan motor/discharge grille in place and lift assembly from unit.
5. Remove Carrier nameplate by straightening tabs.
6. Remove 4 nuts holding fan motor to discharge grille. Remove motor and leads.
7. Reverse procedure for reassembly. Seal with Permagum sealer around hub to prevent entry of water between hub and shaft. Make sure fan is positioned correctly as shown in Fig. 26.

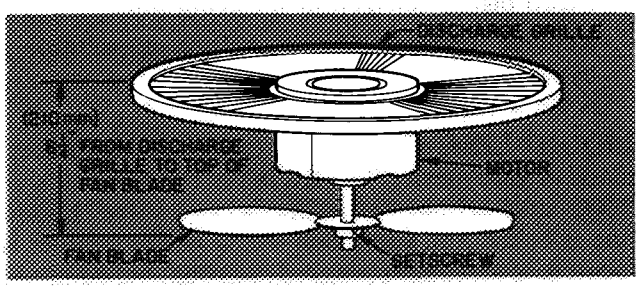


Fig. 26 — Condenser Fan Position

MAINTENANCE

CAUTION: Before performing recommended maintenance, be sure unit main power switch is turned off. Failure to do so may result in electric shock or injury from rotating fan blade.

Lubrication

FAN MOTOR BEARINGS — Oiling holes are provided at each end of condenser fan motor. Remove fan motor and lubricate motor with 32 drops (16 drops per hole) of SAE-10 nondetergent oil at intervals described below.

a. Annually, when environment is very dirty, ambient temperature is higher than 105 F (40 C), and average unit operating time exceeds 15 hours a day.
b. Every 3 years when environment is reasonably clean, ambient temperature is less than 105 F (40 C) and unit operating time averages 8 to 15 hours a day.
c. Every 5 years when environment is clean, ambient temperature is less than 105 F (40 C) and unit operating time averages less than 8 hours a day.

COIL REPAIR — A flare-union coupling is used for E-coil repair. A kit is available, with instructions, thru Carrier Service Parts.

COMPRESSOR contains factory oil charge. If oil requires replenishment, see Table 7 for oil recharge and Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants, page 1-21, for instructions. Use Carrier PP33-1, Texaco WF-32 or Suniso 3GS oil.

Coil Cleaning to be done at the beginning of each cooling season or more often if required.

CAUTION: Fin damage or removal can result in higher operating costs or compressor damage. Do not use flame, high-pressure water, steam, or volatile or corrosive cleaners on fins and tubing. Follow these instructions carefully. Contact your dealer if you encounter problems.

1. Shut off power to unit.
2. Remove louvered casing by taking out 16 screws securing it to the cabinet and sliding it away from the coil.

3. Clean coil using vacuum cleaner and its crevice tool (see Fig. 27). Work crevice tool *vertically* making sure tool only touches dirt on fins. To prevent fin removal, do not "scrub" fins with tool or move tool horizontally.
4. If oil deposits are present, spray coil with household detergent (Fantastic, Lestoil, 409, or any similar type). Wait 10 minutes then proceed to step 5.
5. Using garden hose, spray coil vertically downward with a constant stream of water at moderate pressure (see Fig. 28). Keep nozzle at a 15 to 20 degree angle, about 3 in. (76 mm) from coil face and 18 in. (457 mm) from tube. Spray so debris is washed out and away from coil.
6. Reinstall louvered casing being careful not to damage coil.
7. Restore power to unit.

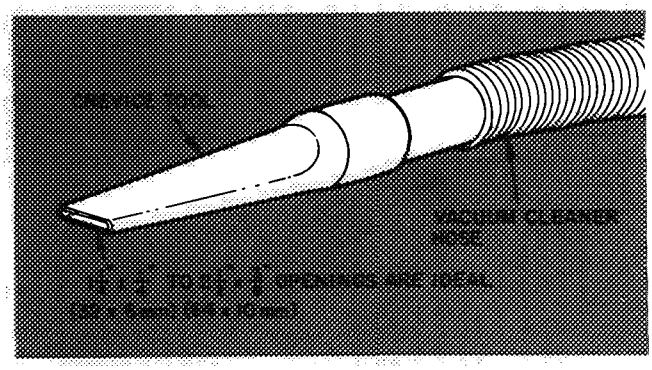


Fig. 27 — Crevice Cleaning Tool

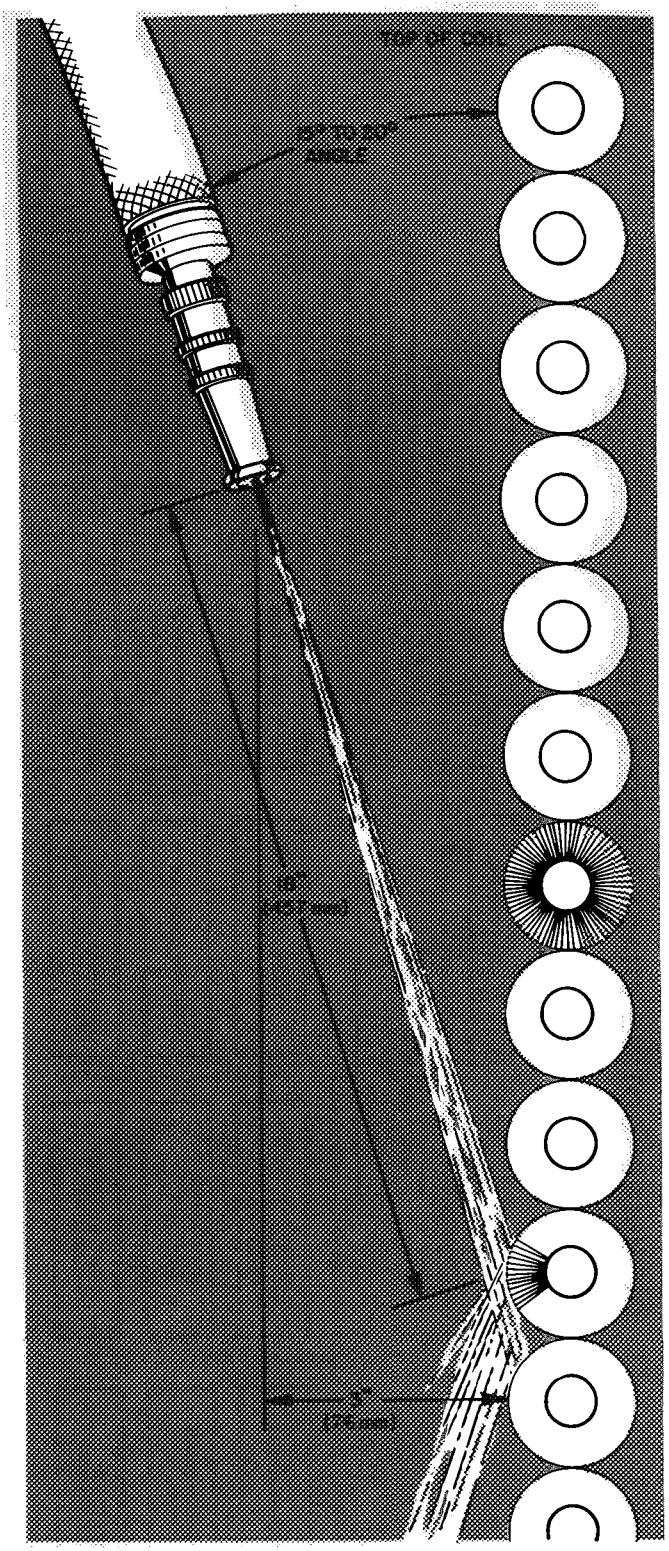
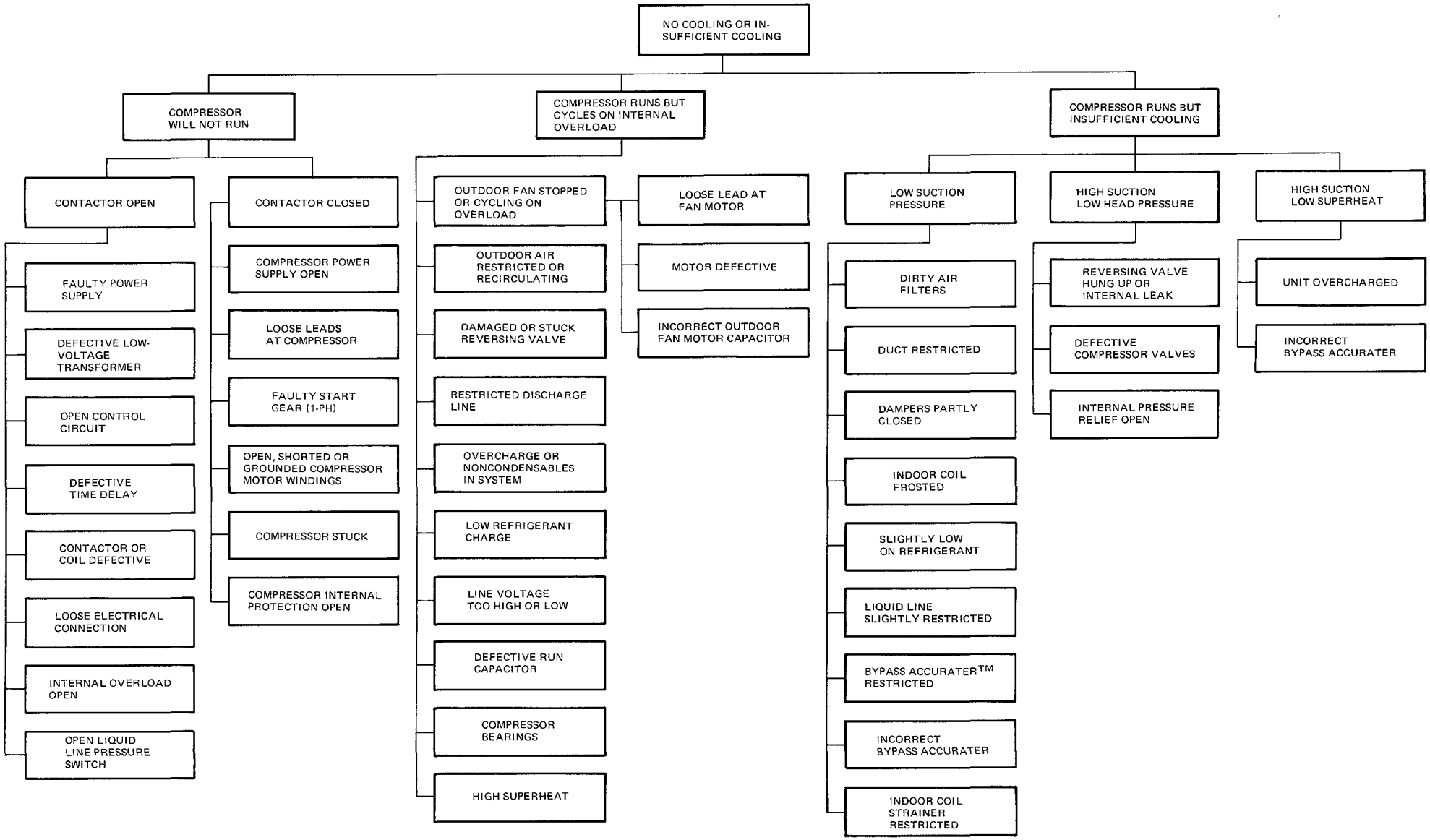
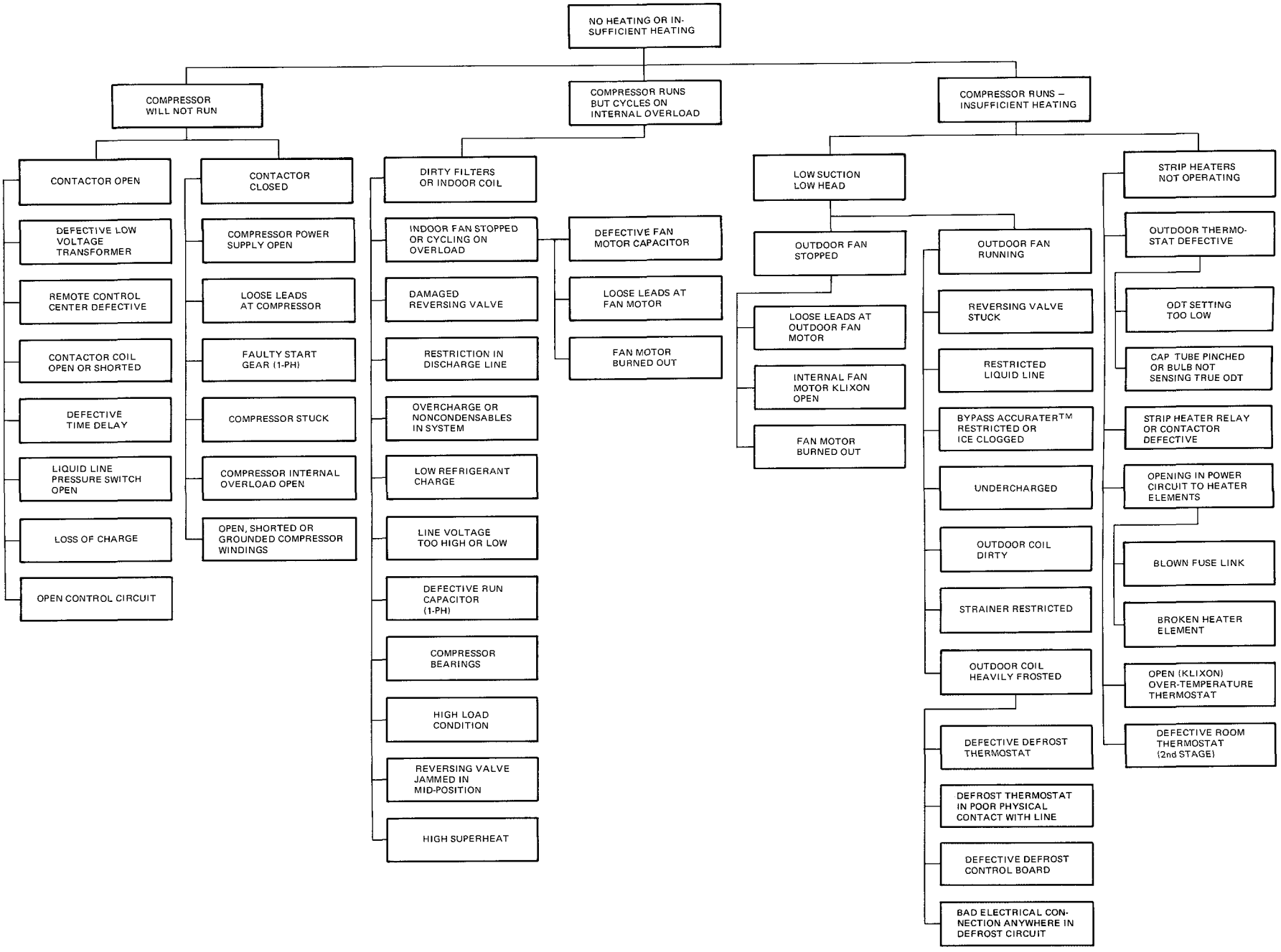


Fig. 28 — Positioning Hose to Spray Coil

TROUBLESHOOTING CHART — COOLING CYCLE



TROUBLESHOOTING CHART — HEATING CYCLE



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Tab	5a	5a

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