



MAINT. & OPERATION
ADMINISTRATIVE SCHOOL FACILITIES

CAMP LEJEUNE, N. C.

MONTFORD POINT
M200 Area

Contract No. - F1-1645

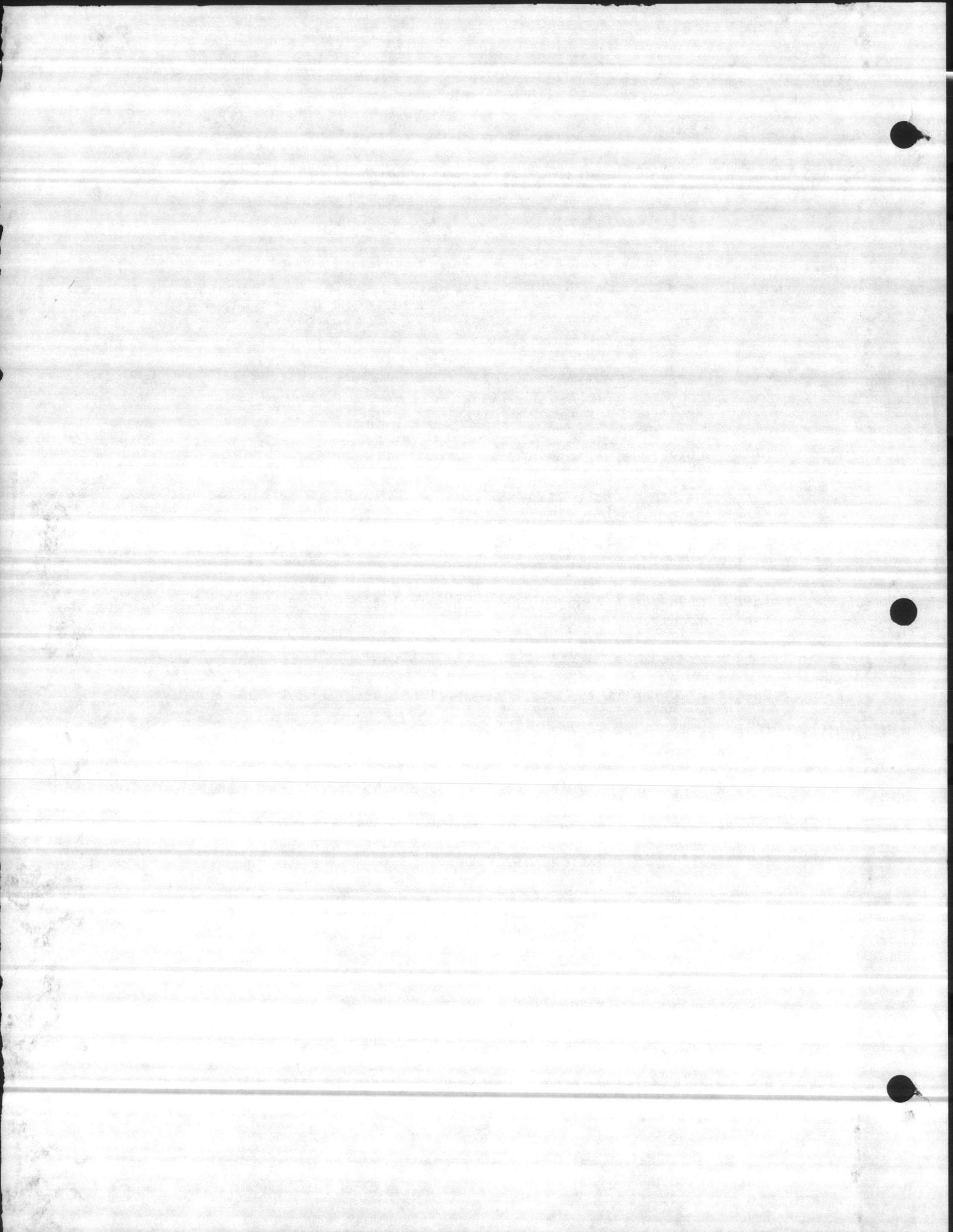
MAINTENANCE AND OPERATION
ADMINISTRATIVE SCHOOL FACILITIES
CAMP LEJEUNE, N. C.

CONTRACT NO. N62470-81-B1645

MECHANICAL CONTRACTOR AND SERVICE CONTRACTOR.....AIR CONDITION-HEATING & ELECT. SER.
5318 HUNTER'S TRAIL.
WILMINGTON, N. C. 28405
(919) 791-2221

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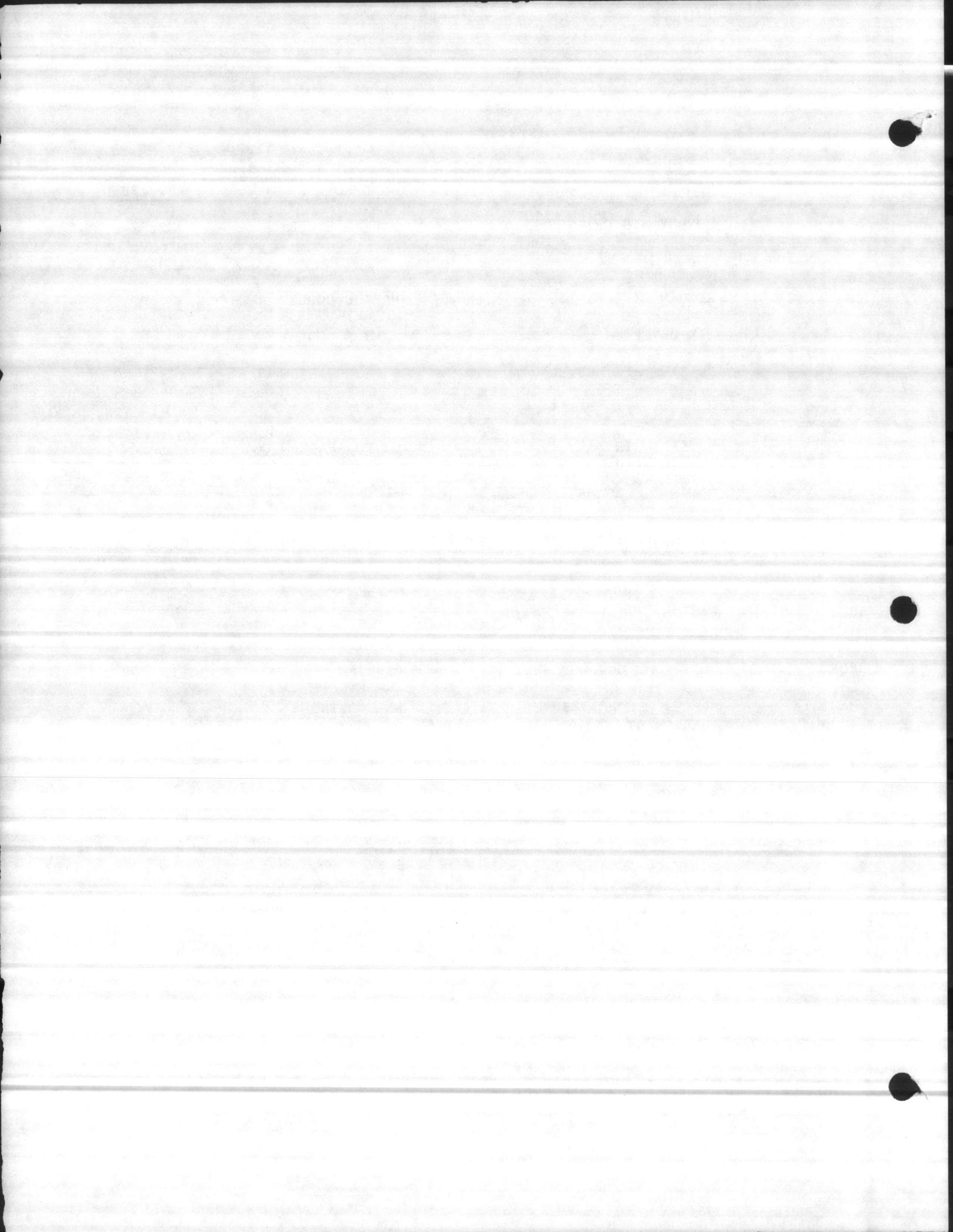


REGISTERS & GRILLES

<u>TYPE</u>	<u>USE</u>	<u>MANUFACTURE</u>	<u>DISTRIBUTOR</u>
SRS	SUPPLY AIR GRILLES	HART & COOLEY	LONGLEY SUPPLY 2018 OLEANDER DRIVE WILMINGTON, N. C.
RHD45	RETURN AIR GRILLES	HART & COOLEY	"
DT	AIR DEVERTER	HART & COOLEY	"
SLX4	OUTSIDE AIR LOUVER	C. E. SPARROW CO.	PACE, INC. 925 SOUTH KERR AVE. WILMINGTON, N. C.
CDS	OUTSIDE AIR DAMPER W/ 240V DAMPER MOTOR	C. E. SPARROW CO.	"

HEAT PUMPS

40AQ	FAN COIL, INDOOR SECTION OF HEAT PUMP	CARRIER	THERMO-INDUSTRIES 1424 S. BLOODWORTH ST RALEIGH, N. C.
40QB	FAN COIL, INDOOR SECTION OF HEAT PUMP	CARRIER	"
38QB	HEAT PUMP OUTDOOR SECTION	CARRIER	"
SMARTSTAT 1,000	ELECTRONIC HEAT PUMP THERMOSTAT	NSI CONTROL PRODUCTS	"



Heat Pump — Outdoor Section

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SAFETY CONSIDERATIONS

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

Untrained personnel can perform basic maintenance functions of cleaning coils and 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.

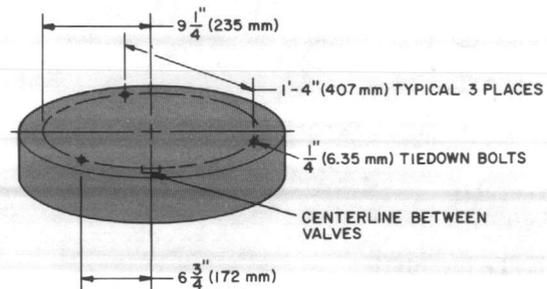
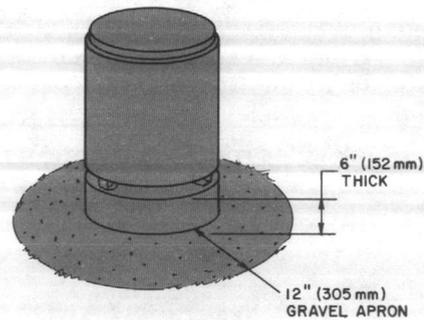
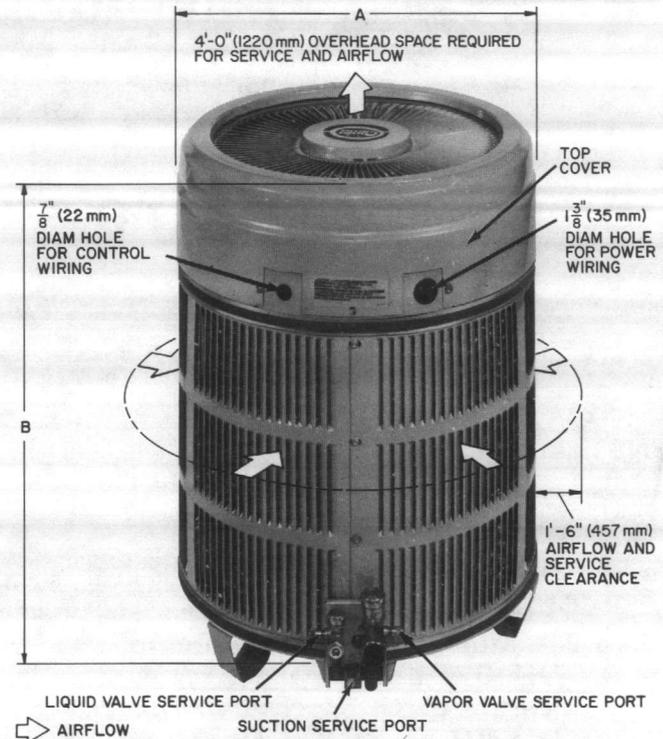
It is recommended that 38QB units be used with Carrier approved indoor sections; see Table 1.

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.

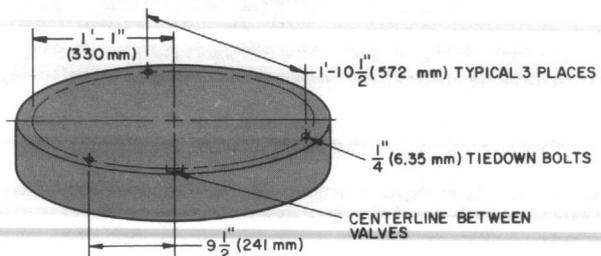
→ **Table 1 — Carrier Approved 38QB Systems**

OUTDOOR UNIT 38QB	REQUIRED OUTDOOR PISTON SIZE	INDOOR UNIT MODEL & SIZE	REQUIRED INDOOR PISTON SIZE
015	38	28HQ,VQ018	46
		40AQ018	
		40DQ018	46*
018	42	28HQ,VQ024	52*
		40AQ024	
		40DQ024	
024	46	28HQ,VQ024	55
		40AQ024	59
		28HQ,VQ030	61*
		40AQ030	
030	59	40DQ030	63
		28HQ,VQ036	70*
		40AQ036	
036	61	40FS160 28HQ,VQ036	67
		28HQ,VQ036	
		40AQ036	
042	63	40FS160 28HQ,VQ042	76
		28HQ,VQ042	
		40QB042	
048	73	40FS200 28HQ,VQ048	86*
		28HQ,VQ048	
		40QB048	
060	82	40QB060	93

*Replace factory-installed piston with this piston size.



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.)**

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).

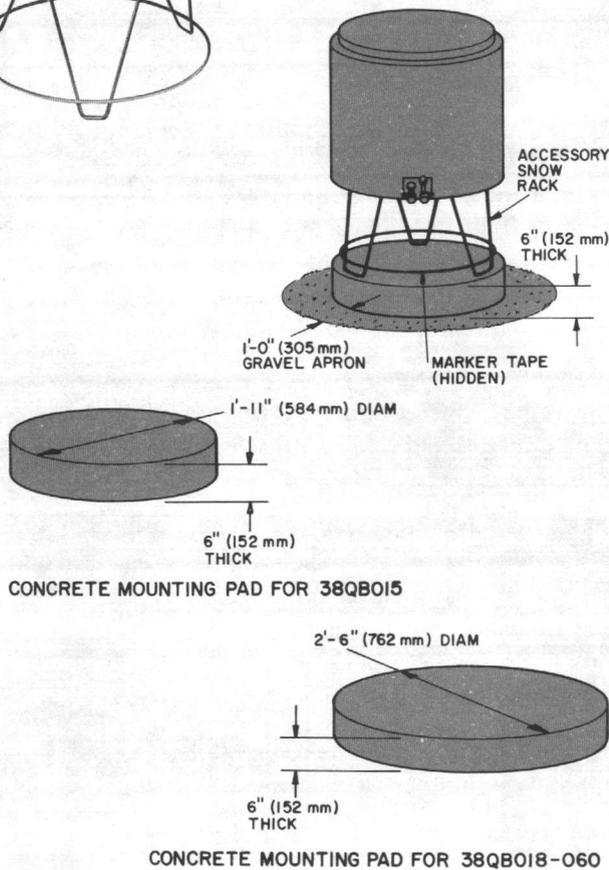
Step 2 — Mount Outdoor Heat Pump

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



CONCRETE MOUNTING PAD FOR 38QB015

CONCRETE MOUNTING PAD FOR 38QB018-060

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. 28VQ900011) 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.

WARNING: DO NOT BURY LINESETS. If system is inoperative for extended periods during warm weather, refrigerant may migrate to the cooler buried section causing refrigerant slugging at start-up. A short run of less than 3 ft (1 m) of line-set may be in ground but there must be a 6-in. (13-mm) vertical rise to the valve connections on the outdoor side.

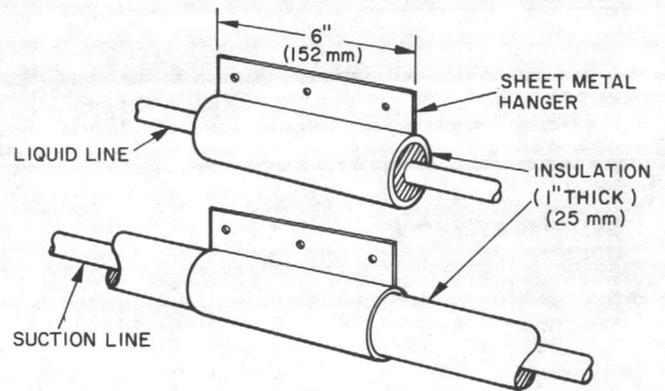


Fig. 3 — Refrigerant Line Hangers

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	103.8	108.9	114.3
DIMENSIONS	Diameter (ft-in.)	A	1-9-3/4			2-5-1/4			
			(mm)			552			
Height	(ft-in.)	B	2-8	2-2-3/8		2-8	3-1-3/4		
	(mm)		813	670		813	958		
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 (slight capacity loss). See Table 3.

Table 3 — Accessories

PART NO.	DESCRIPTION	UNIT 38QB
38CQ900081	Low-Voltage Control — Honeywell Thermostat HH07AT171 and Thermostat Subbase HH93AZ173 — (Automatic Changeover)	All
38CQ900111	Low-Voltage Control — Honeywell Thermostat HH07AT171 and Thermostat Subbase HH93AZ175 — (Manual Changeover)	
38QB90002106	Service Sentry (Six HN65CT004)	
38HQ900011	Hot Shot® Domestic Water Preheater	
28VQ900011	Twelve 3/4- x 1-1/8 in. Connection Adapters	042-060
38RQ900081	Bi-Flow Heat Pump Filter Drier (Six KH45LD077)	All
38RQ900001	Supplemental Heat Relay — (Required with 2 outdoor thermostats.) (Service Parts)	
38QB90004106	Outdoor Thermostat (Six 38HQ900101)	
38CQ900172	Optimizer Control Outdoor Thermostat (Six 38CQ900161 ref HH22AG110)	
38RQ900091	Optimizer II Control Assembly (Use with HH2AG110 outdoor thermostat.)	
38QB90000106	Heat Pump Rack (Six)	015-018
38QB90001106	Heat Pump Rack (Six)	024-060
38HQ90014106	Optimizer III (Six 38HQ900141)	All
38QB900031	Solid-State Time Guard II (24-volt)	
HC95DD121*	Start Capacitor	018
HC95DD058*	Start Capacitor	024, 030
HC95DD088*	Start Capacitor	036
HN61HB515*	Relay	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				
			(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	Evap		Cond		
(ft)	(m)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)		
38LS958151	15	4.6	3/8	10	3/8	10	5/8	15.78	3/4‡	19.05	5/8	15.78	015
38LS958201	20	6.1	3/8	10	3/8	10	5/8	15.78	3/4‡	19.05	5/8	15.78	
38LS958251	25	7.6	3/8	10	3/8	10	5/8	15.78	3/4‡	19.05	5/8	15.78	
38LS958301	30	9.1	5/16	7.9	3/8	10	5/8	15.78	3/4‡	19.05	5/8	15.78	
38LS958351	35	10.7	5/16	7.9	3/8	10	5/8	15.78	3/4‡	19.05	5/8	15.78	
38LS958401	40	12.2	5/16	7.9	3/8	10	5/8	15.78	3/4‡	19.05	5/8	15.78	
38LS958501	50	15.2	1/4	6.35	3/8	10	5/8	15.78	3/4‡	19.05	5/8	15.78	
38LS934151	15	4.6	3/8	10	3/8	10	3/4	19.05	3/4	19.05	3/4	19.05	018,024, 030
38LS934201	20	6.1	3/8	10	3/8	10	3/4	19.05	3/4	19.05	3/4	19.05	
38LS934251	25	7.6	3/8	10	3/8	10	3/4	19.05	3/4	19.05	3/4	19.05	
38LS934301	30	9.1	3/8	10	3/8	10	3/4	19.05	3/4	19.05	3/4	19.05	
38LS934351	35	10.7	3/8	10	3/8	10	3/4	19.05	3/4	19.05	3/4	19.05	
38LS934401	40	12.2	3/8	10	3/8	10	3/4	19.05	3/4	19.05	3/4	19.05	
38LS934501	50	15.2	3/8	10	3/8	10	3/4	19.05	3/4	19.05	3/4	19.05	
38LS978151	15	4.6	3/8	10	3/8	10	7/8**	22.22	3/4	19.05	3/4	19.05	036,042, 048,060
38LS978201	20	6.1	3/8	10	3/8	10	7/8**	22.22	3/4	19.05	3/4	19.05	
38LS978251	25	7.6	3/8	10	3/8	10	7/8**	22.22	3/4	19.05	3/4	19.05	
38LS978301	30	9.1	3/8	10	3/8	10	7/8**	22.22	3/4	19.05	3/4	19.05	
38LS978351	35	10.7	3/8	10	3/8	10	7/8**	22.22	3/4	19.05	3/4	19.05	
38LS978401	40	12.2	3/8	10	3/8	10	7/8**	22.22	3/4	19.05	3/4	19.05	
38LS978501	50	15.2	3/8	10	3/8	10	7/8**	22.22	3/4	19.05	3/4	19.05	

*Available thru Carrier Service Parts.

†Suction line is insulated and has 90° bend.

‡For 5/8-in. (7.9-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.

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. (7.94-mm) or 1/4-in. (6.35-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 28VQ900011 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. (19.06-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.

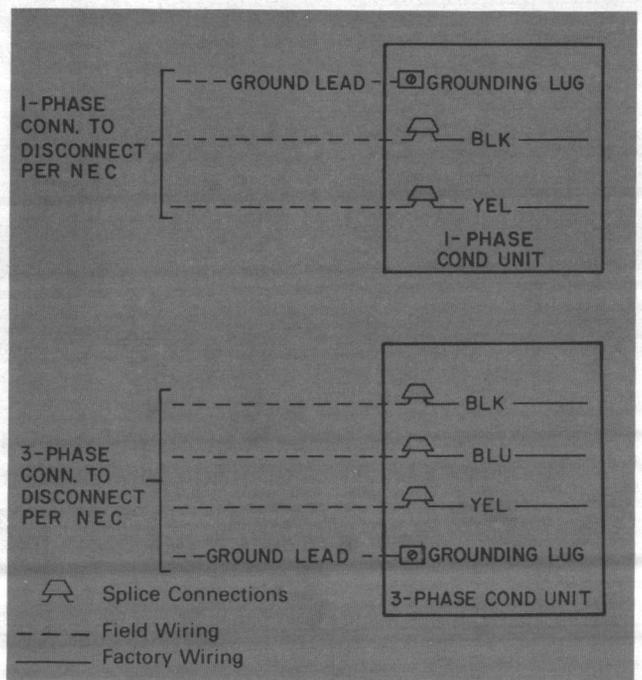
Do not apply units in system where voltage may fluctuate above or below permissible limits.

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 or copper-clad aluminum 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					
		Max	Min	LRA	RLA		Min Wire Size (AWG)†	Max Wire		Min Gnd Wire Size‡	Max Fuse** or HACR Type Ckt Bkr Amps	MCA
								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	15.5	2.4	12	32	9.8	12	35	21.8
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	10.0
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 Gauge

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 60C. Use copper or copper-clad aluminum wire only. Use latest NEC for copper-clad aluminum conductor sizing.

‡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

→ **Table 5 — Thermostat Anticipator Settings**

UNIT 38QB	FIRST- STAGE ANTICIPATOR SETTING	INDOOR UNIT WITH ELECTRIC HEATER	HTR KW	SECOND- STAGE ANTICIPATOR SETTINGS
015	Fixed	40DQ and 40AQ Fan Coil with 40AQ Htrs or 40QB Fan Coil with 40QB Htrs	5.0	.25
018			7.5	
024			15.0	.50
030			20.0	
036			25.0	
042			30.0	
048			34.0	.75
060				

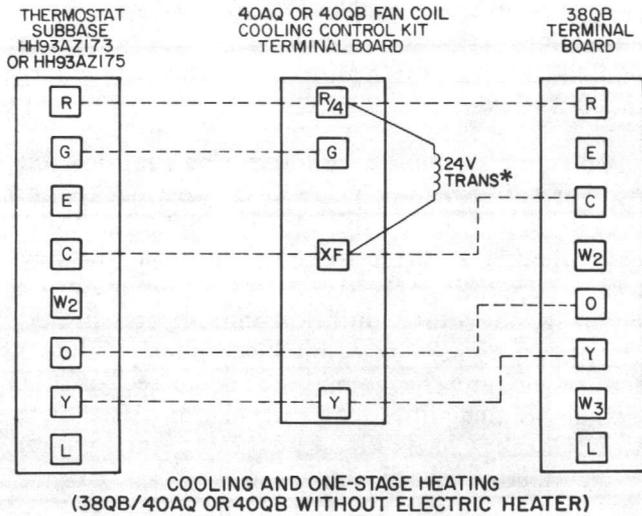
thermostat according to Table 5. These settings may be changed slightly to provide a greater degree of comfort for a particular installation.

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.

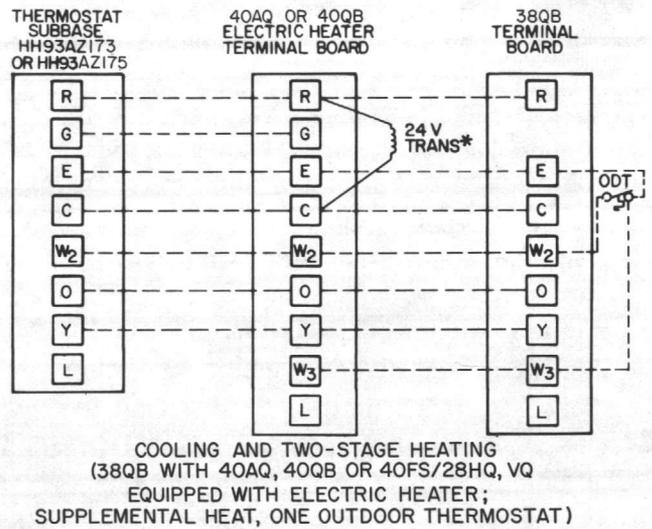
The accessory supplemental heat relay is required when 2 outdoor thermostats are used. It is automatically energized by the manually operated supplemental heat switch in the indoor thermostat subbase. The thermostat locks out compressor and the relay bypasses the outdoor thermostats for electric heater 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.

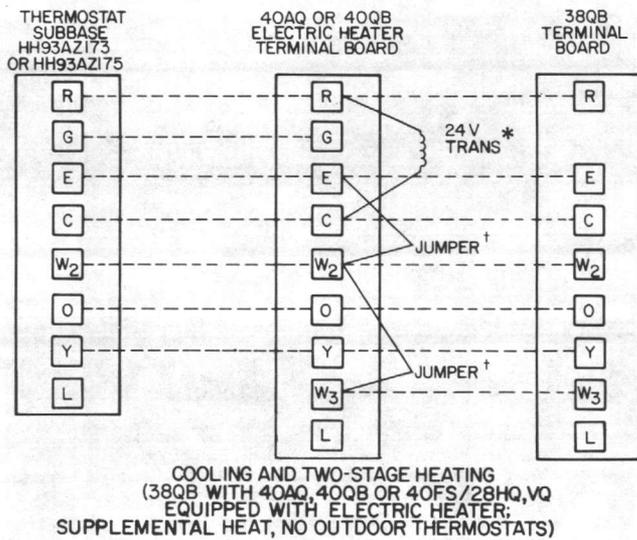
Attach brackets with short sheet metal screws to avoid contact with coil. Leave capillary tube coiled in control compartment making sure it is clear of all electrical connections and sharp metal edges.



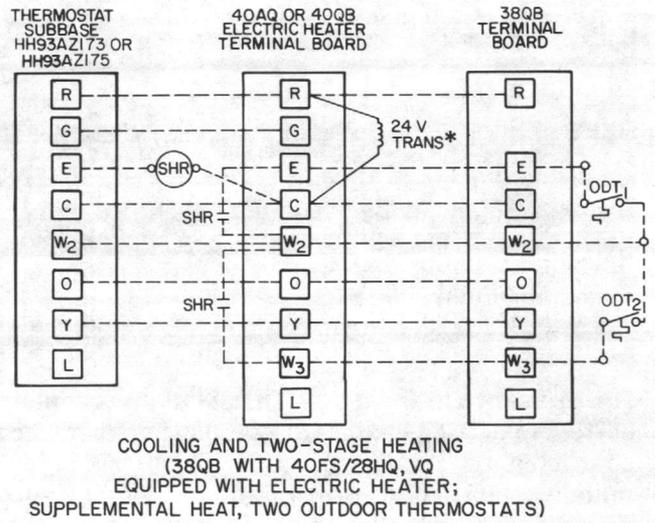
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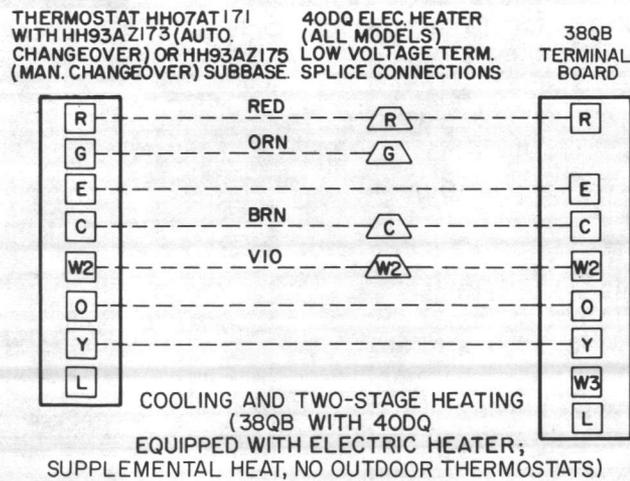
C



B



D



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 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. (9.53 mm) OD (liquid line), respectively, using refrigerant weights below. Twenty-five ft (7.6-m), 3/8-in. (9.53-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	.26
7.94	.16
6.35	.09

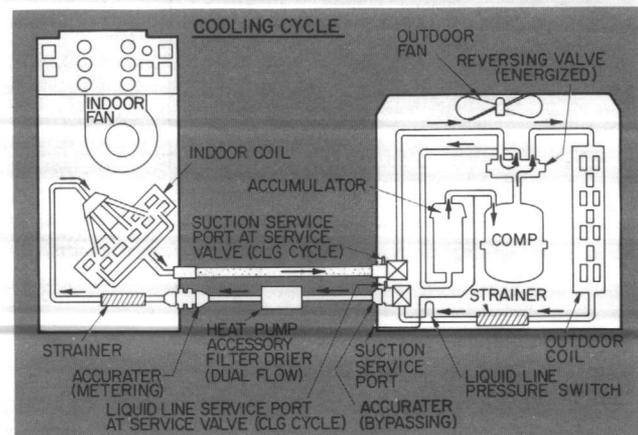
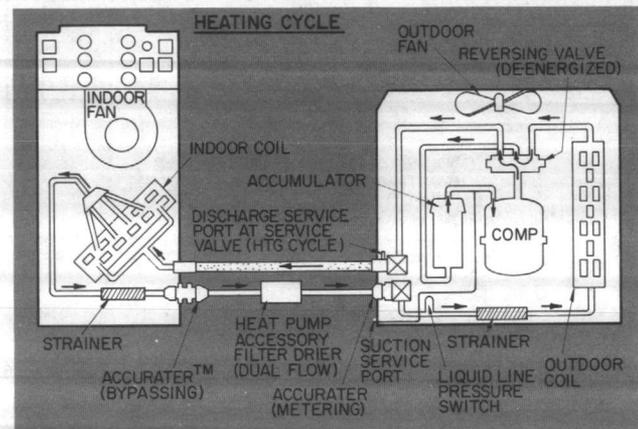


Fig. 6 — 38QB Refrigerant Flow Diagrams

→ **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)	1.81	2.81	3.27	3.31	3.54	3.86	3.90	3.63
REFRIG CONTROL	AccuRater™ (Bypass Type)							
FAN								
Cfm	1800	2400	3000					
L/s	849	1133	1416					
Rpm	1100				1075			
Diam (in.)	14-3/4			20				
(mm)	374.65			508				

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	.6
018		CRA1-0150-PFV	51	1.5
024		MD2314GE	44	1.3
030		MD3214GE	44	1.3
036		MD3514GE	44	1.3
042	230/1	PC4616BD	64	1.8
048		PC5016BD	64	1.8
060		PC6016BD	64	1.8
036	208-230/3	MF3513GE	44	1.3
042		PY4616AD	64	1.8
048		PY5016BD	64	1.8
060		PY6016BF	64	1.8
036	460/3	MH3513GE	44	1.3
042		PH4616AD	64	1.8
048		PH5016BD	64	1.8
060		PH6016BF	64	1.8

*Refer to Service Parts Catalog for replacement compressor model numbers.

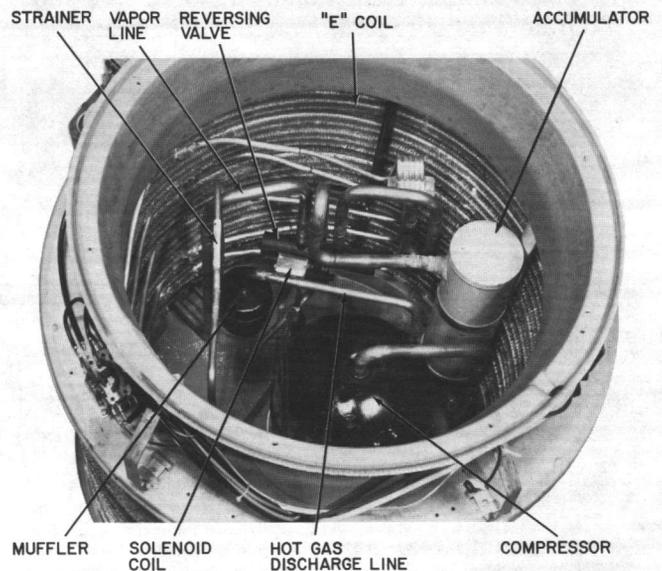


Fig. 7 — Component Location

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 midjet 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 oil vapor ignites.

9. Carefully unbrazed 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

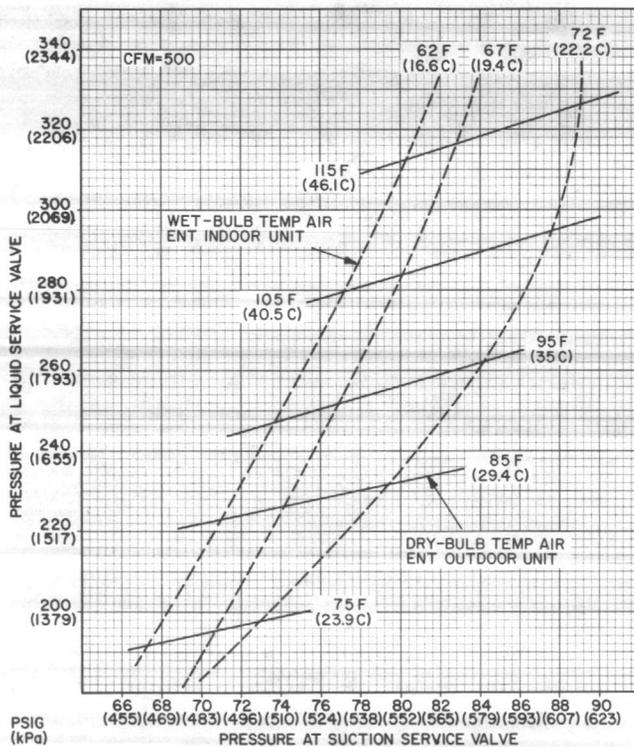


Fig. 8 — 38QB015 with 28HQ,VQ018, 40AQ018 or 40DQ018 Cooling Cycle Charging Chart

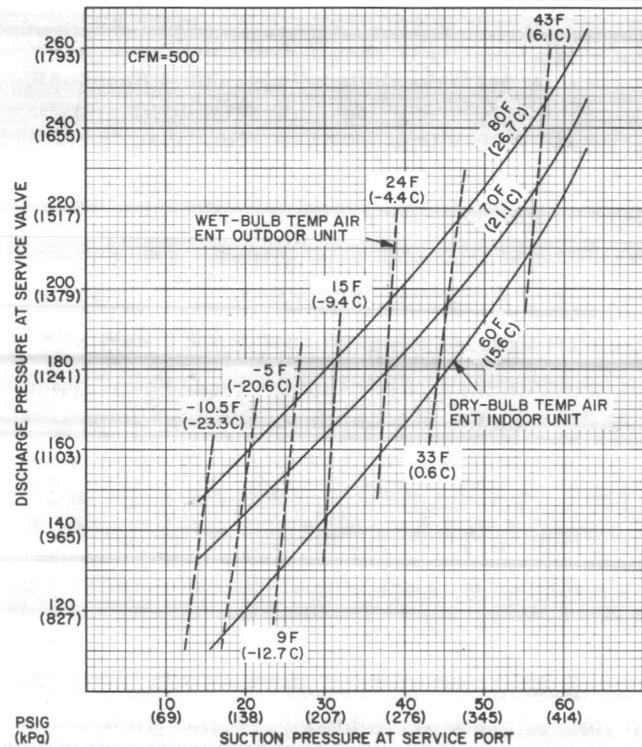


Fig. 9 — 38QB015 with 28HQ,VQ018, 40AQ018 or 40DQ018 Heating Cycle Operation Check Chart

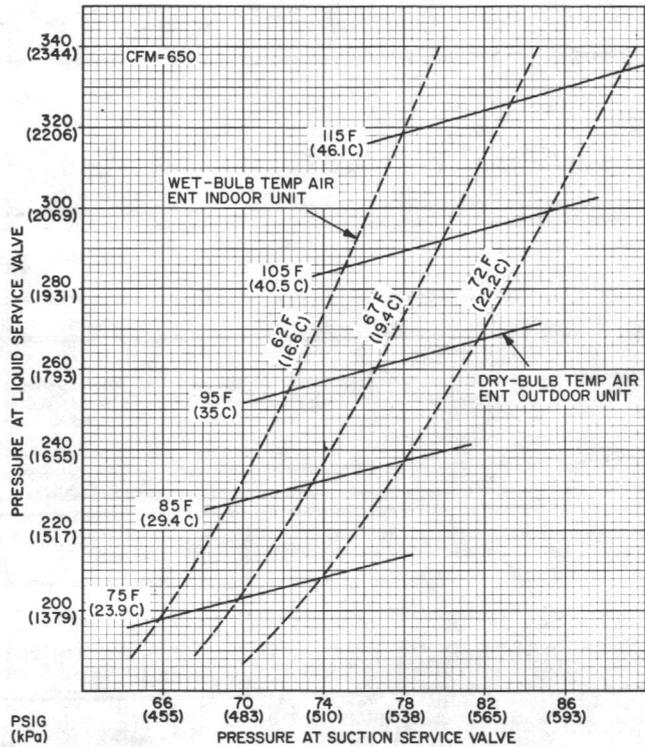


Fig. 10 — 38QB018 with 28HQ, VQ024, 40AQ024, or 40DQ024 Cooling Cycle Charging Chart

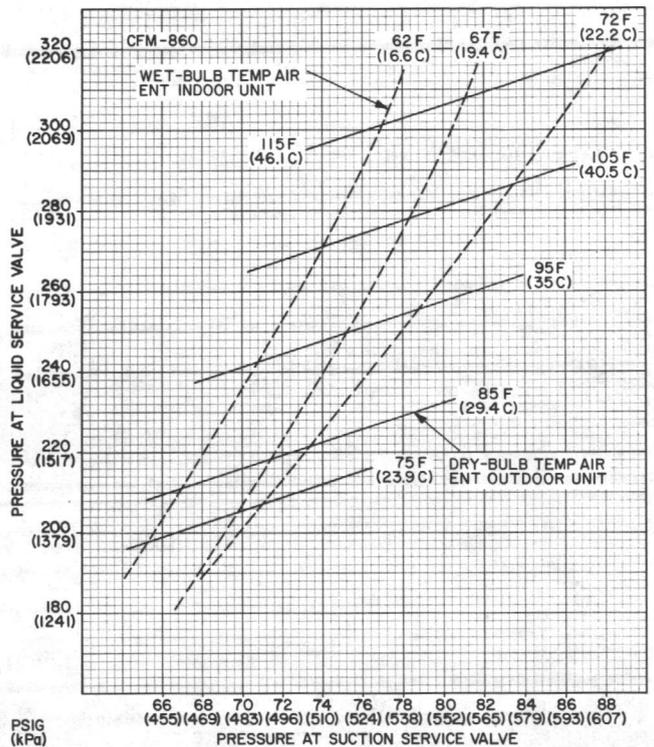


Fig. 12 — 38QB024 with 28HQ, VQ024, 030, 40AQ024, 030 or 40DQ030 Cooling Cycle Charging Chart

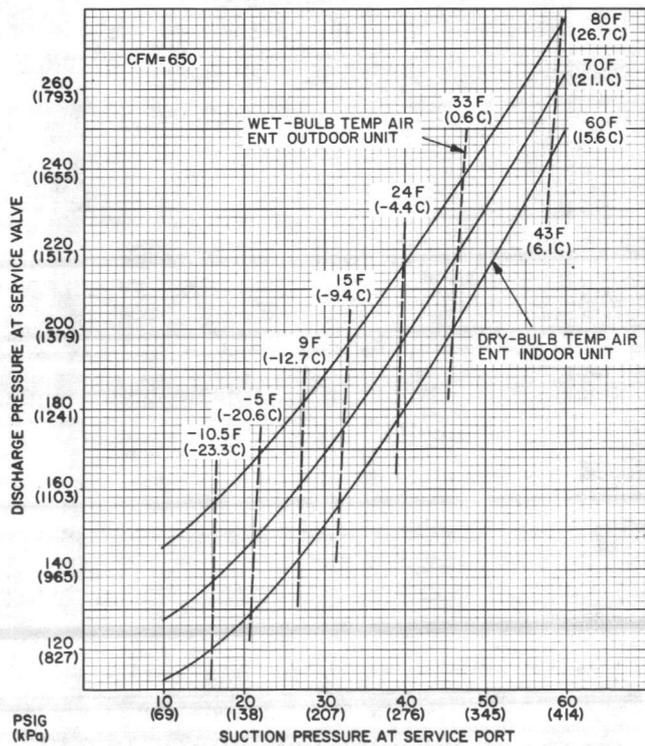


Fig. 11 — 38QB018 with 28HQ, VQ024, 40AQ024 or 40DQ024 Heating Cycle Operation Check Chart

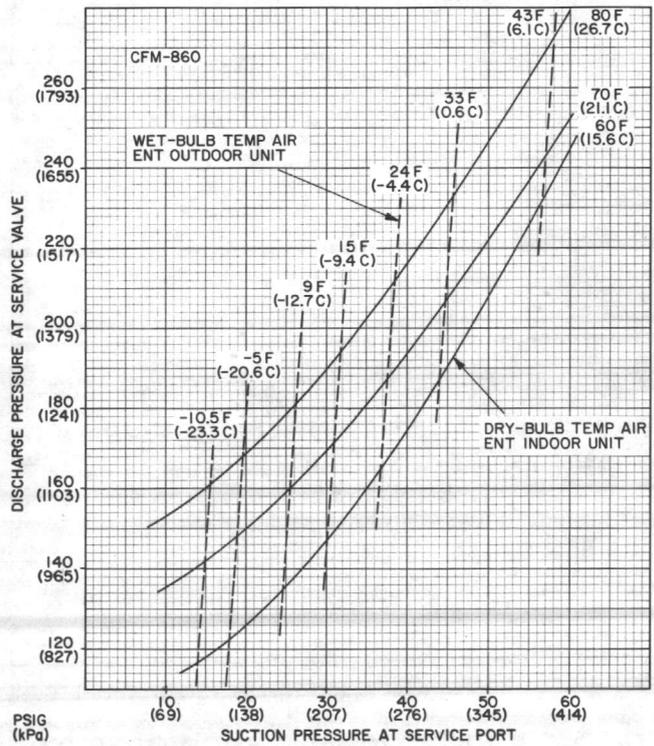


Fig. 13 — 38QB024 with 28HQ, VQ024, 030, 40AQ024, 030 or 40DQ030 Heating Cycle Operation Check Chart

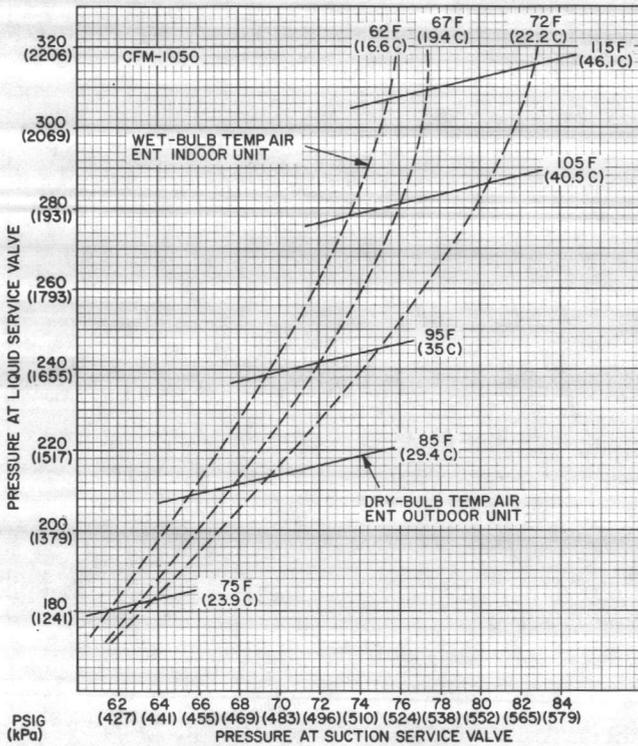


Fig. 14 — 38QB030 with 28HQ,VQ030,036, 40AQ030,036, 40DQ030 or 40FS160 with 28HQ,VQ036 Cooling Cycle Charging Chart

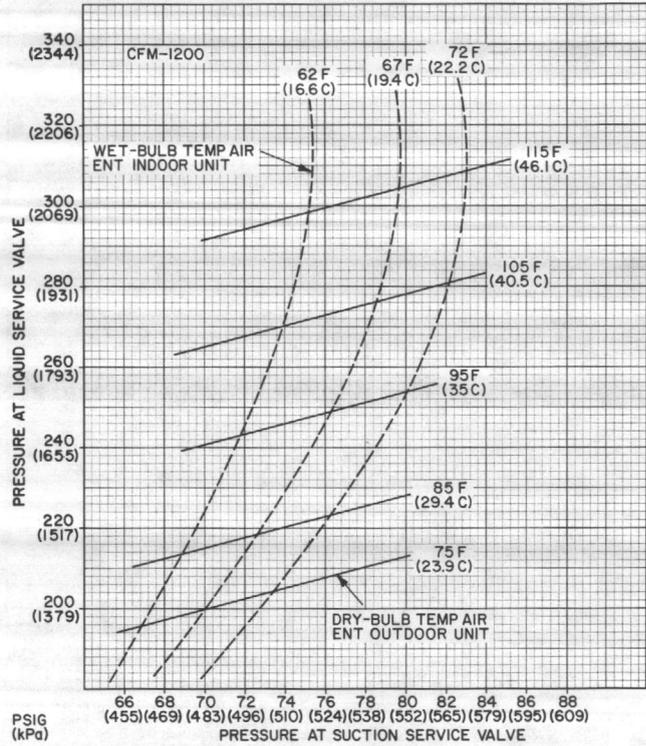


Fig. 16 — 38QB036 with 40AQ036,042, 28HQ,VQ036,042, 40QB042 or 40FS160 with 28HQ,VQ036,042 Cooling Cycle Charging Chart

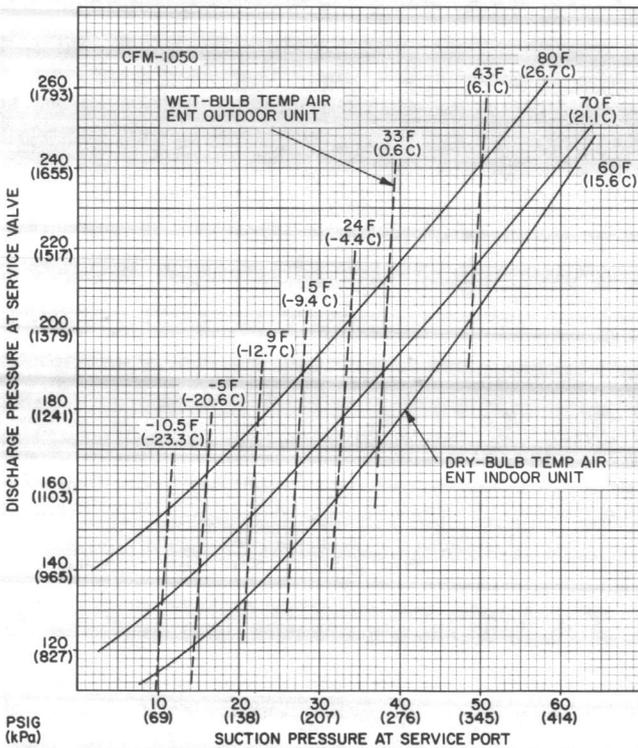


Fig. 15 — 38QB030 with 28HQ,VQ030,036, 40AQ030,036, 40DQ030 or 40FS160 with 28HQ,VQ036 Heating Cycle Operation Check Chart

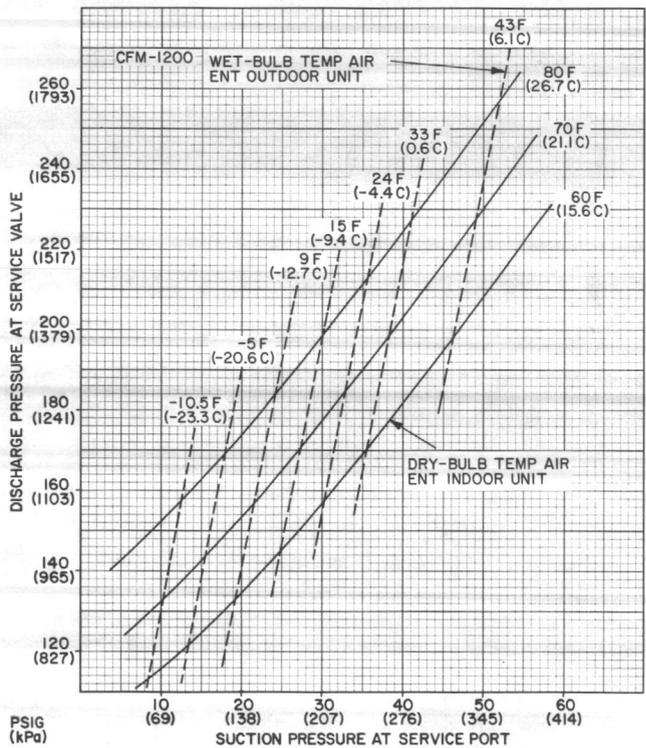


Fig. 17 — 38QB036 with 40AQ036,042, 28HQ,VQ036,042, 40QB042 or 40FS160 with 28HQ,VQ036,042 Heating Cycle Operation Check Chart

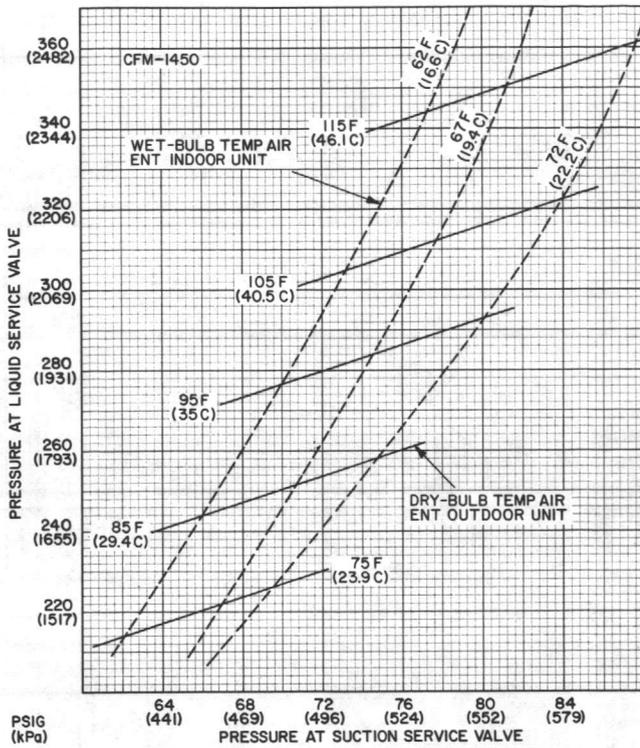


Fig. 18 — 38QB042 with 40QB042, 28HQ,VQ042 or 40FS160 with 28HQ,VQ042 Cooling Cycle Charging Chart

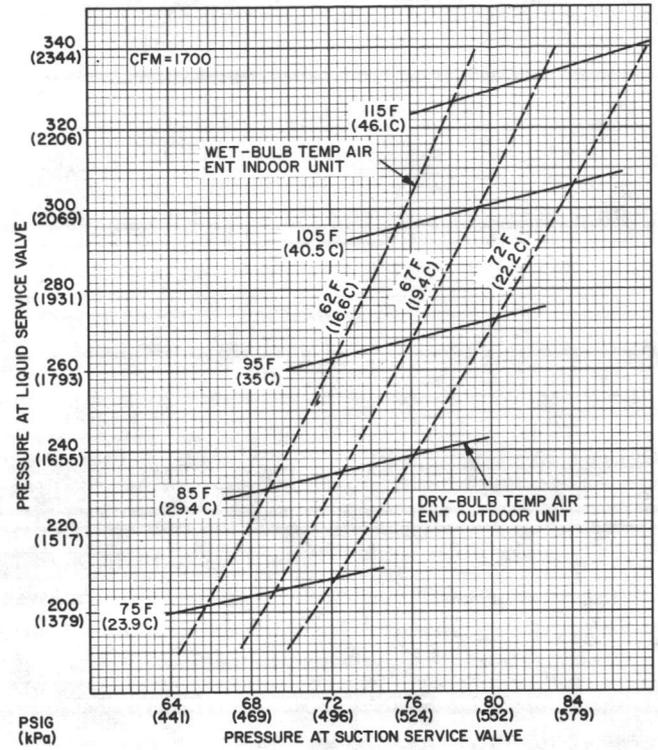


Fig. 20 — 38QB048 with 28HQ,VQ048, 40FS200 with 28HQ,VQ048 or 40QB048 Cooling Cycle Charging Chart

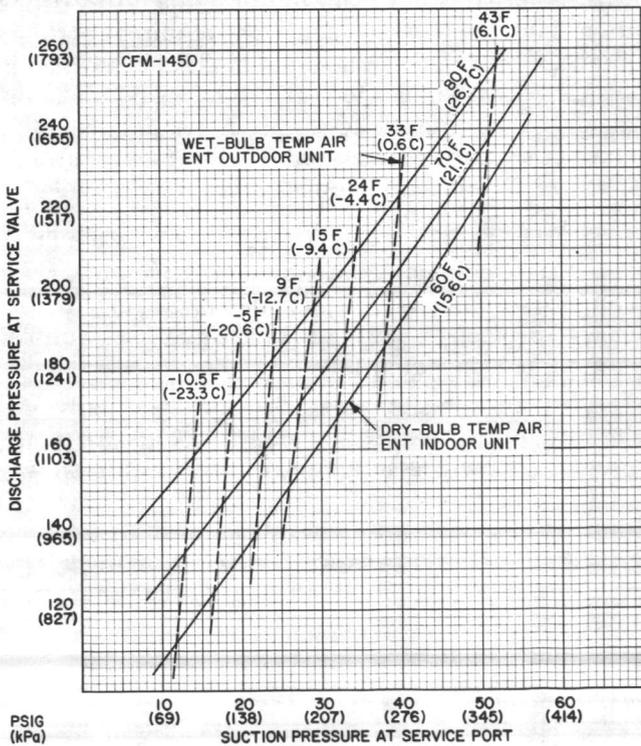


Fig. 19 — 38QB042 with 40QB042, 28HQ,VQ042 or 40FS160 with 28HQ,VQ042 Heating Cycle Operation Check Chart

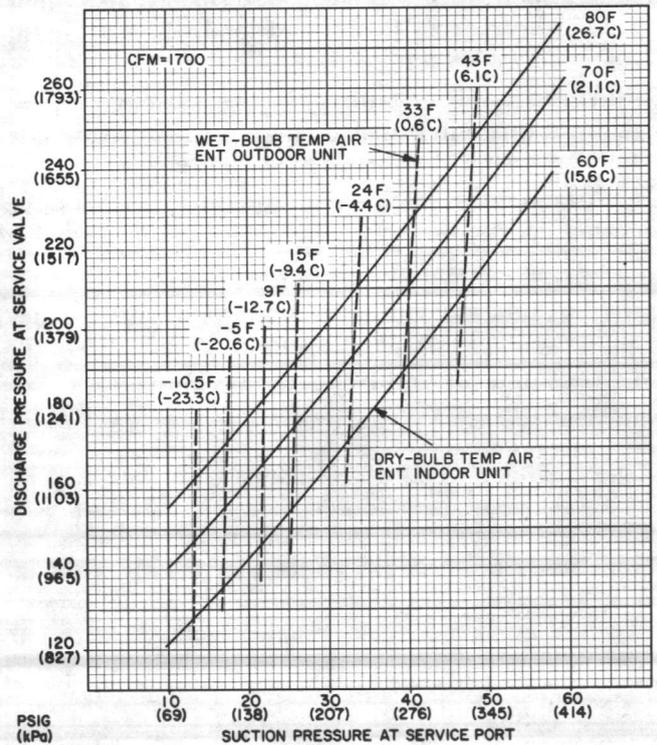


Fig. 21 — 38QB048 with 28HQ,VQ048, 40FS200 with 28HQ,VQ048 or 40QB048 Heating Cycle Operation Check Chart

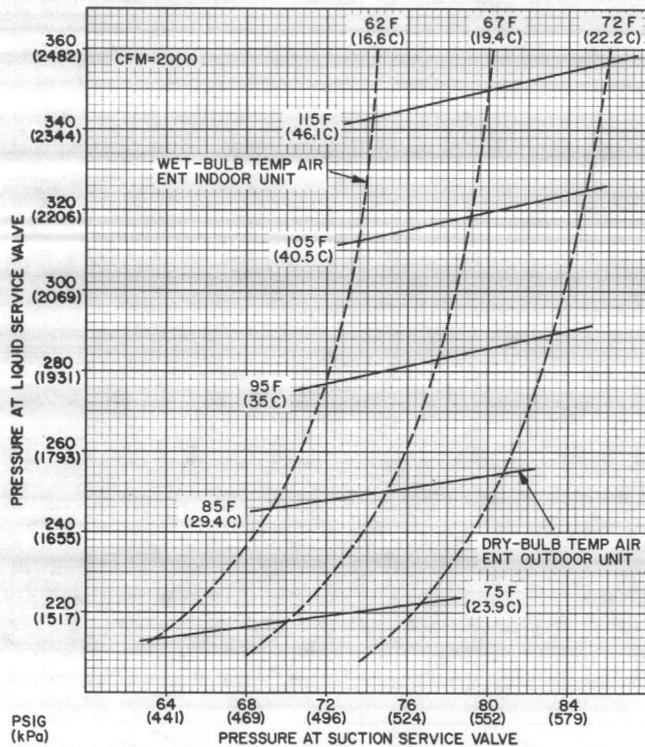


Fig. 22 — 38QB060 with 40QB060 Cooling Cycle Charging Chart

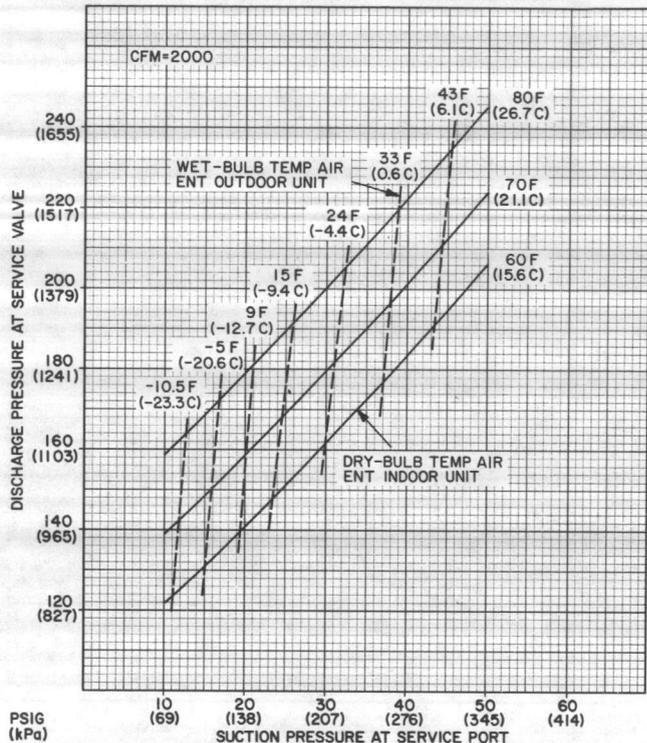


Fig. 23 — 38QB060 with 40QB060 Heating Cycle Operation Check Chart

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 coils will hold only factory-supplied amount of refrigerant. Additional refrigerant may cause units 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	22 ± 5 psig	7 ± 3 psig
036	(151 ± 35 kPa)	(48 ± 21 kPa)
042		
048		
060		

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 close 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 $31 (\pm 4) F$ ($-5 \pm 2.2 C$).

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 $80 (\pm 6) F$ ($26.7 \pm 3.3 C$) 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

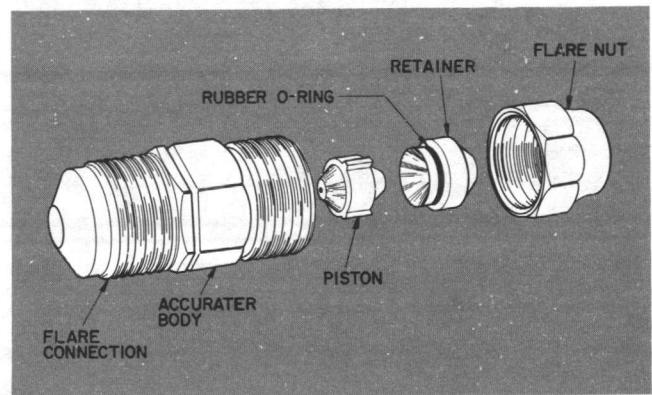


Fig. 24 — AccuRater™ (Bypass Type) Components

bypass mode, and a sealing surface for liquid line flare connection. To check, clean or replace piston:

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 Vise Grip 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]).

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.

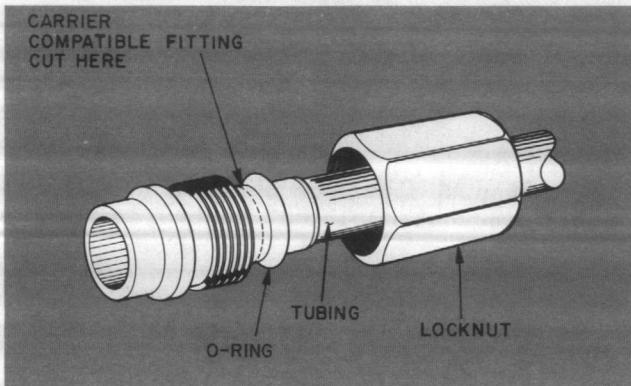


Fig. 25 — Carrier Compatible Fitting

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. Before replacing metal fan, be sure rain shield is in place on motor shaft. Seal with Permagum around hub to prevent entry of water between hub and shaft. Make sure fan is positioned correctly as shown in Fig. 26.

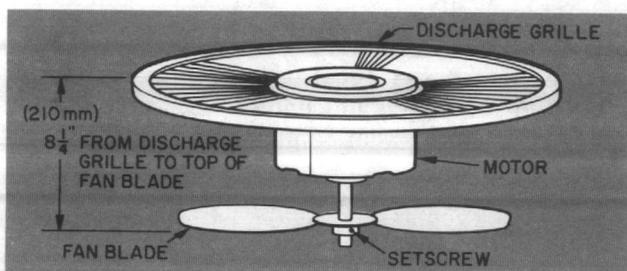


Fig. 26 — Condenser Fan Position

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.

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 WFI-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.

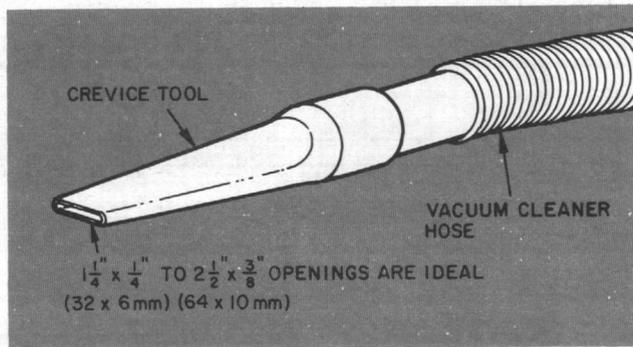


Fig. 27 — Crevice Cleaning Tool

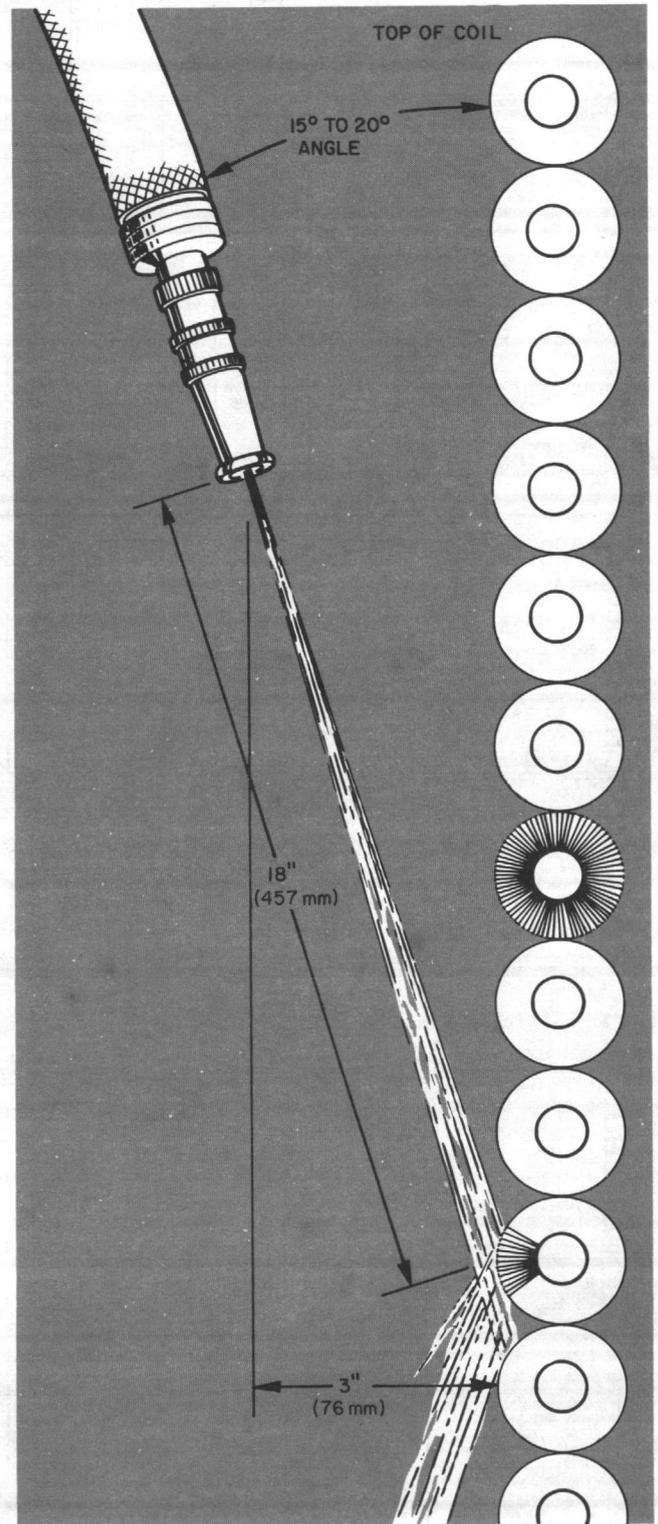
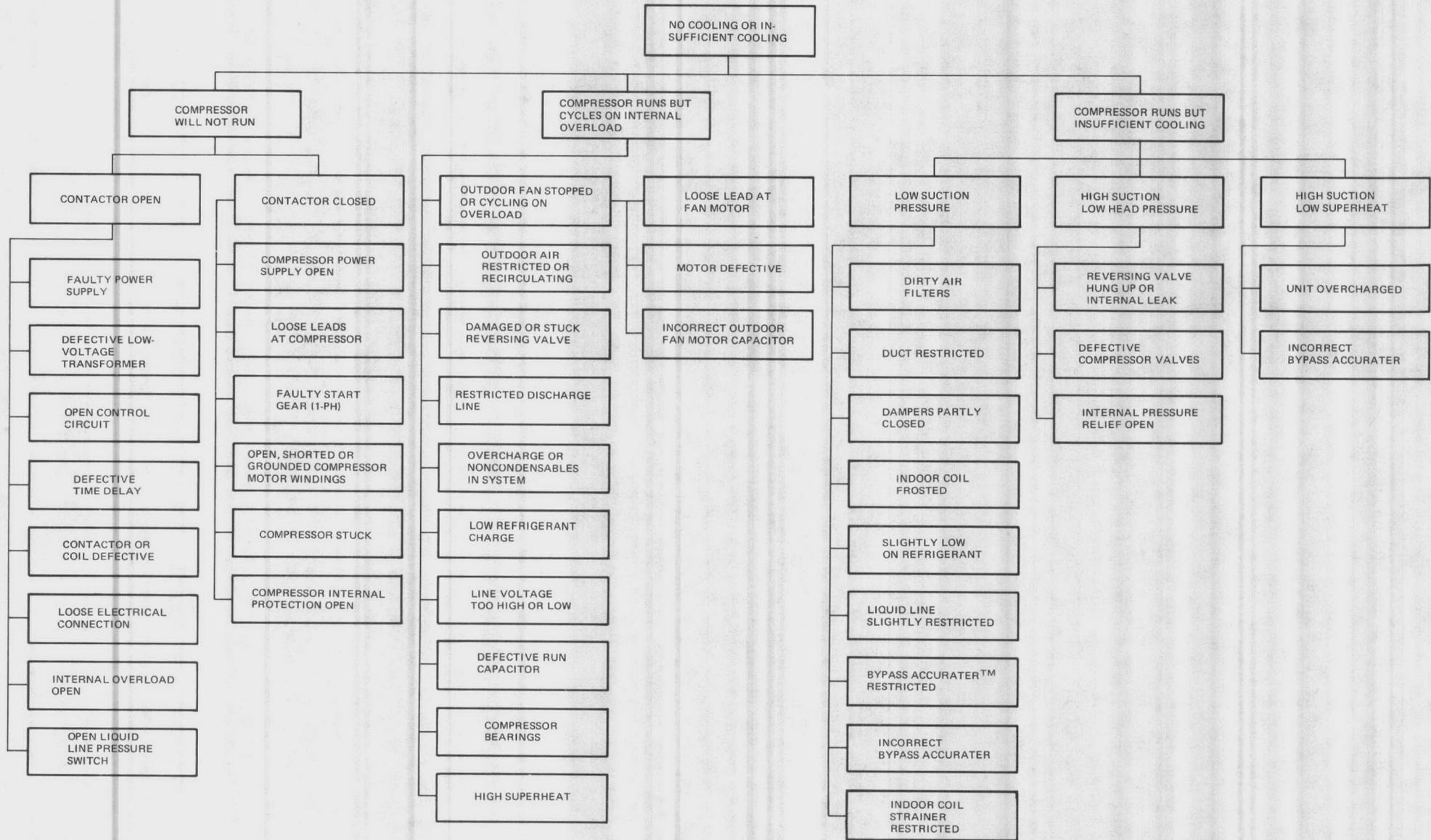
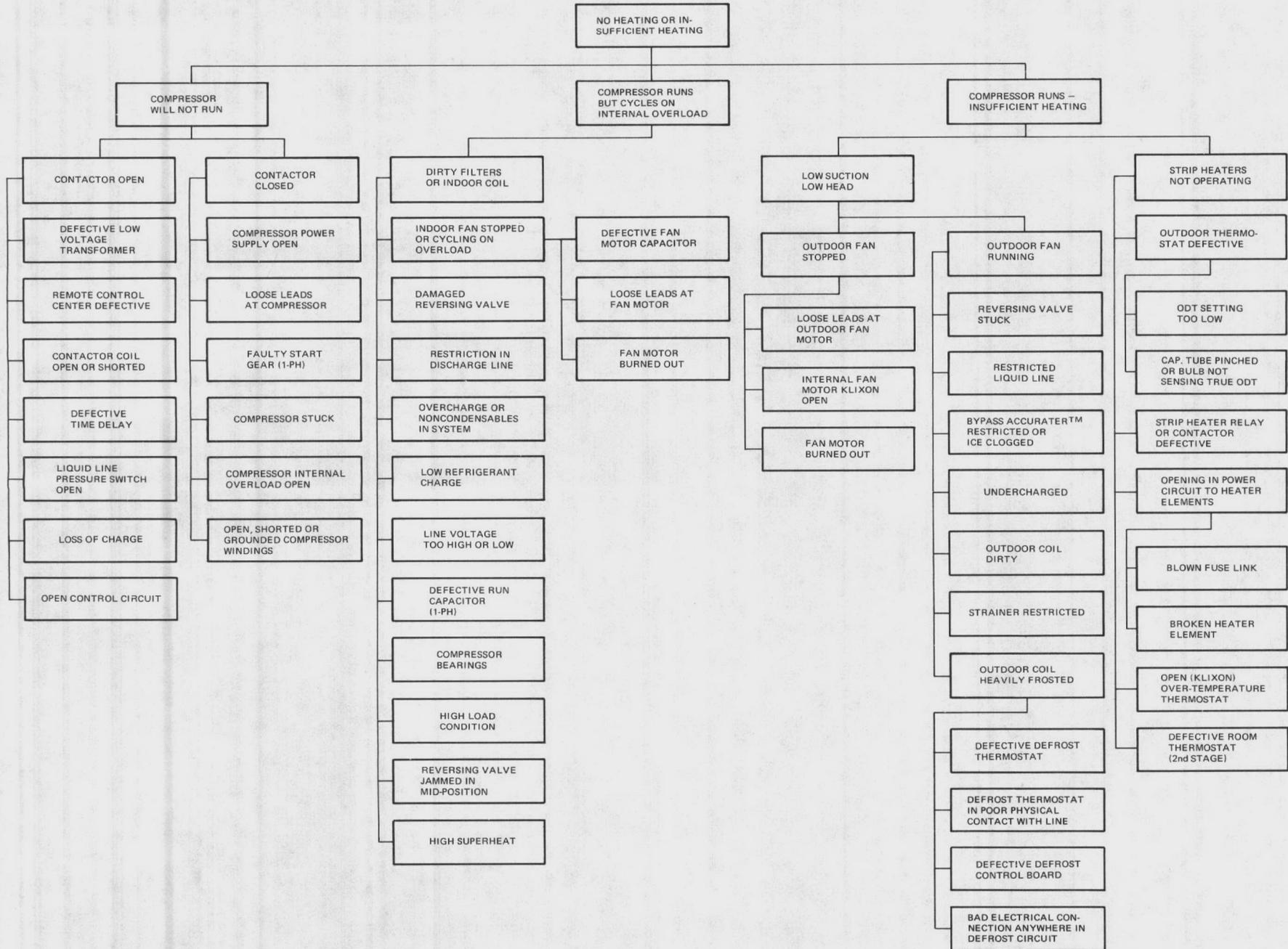


Fig. 28 — Positioning Hose to Spray Coil

TROUBLESHOOTING CHART — COOLING CYCLE



TROUBLESHOOTING CHART — HEATING CYCLE



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.

Book	1	4
Tab	5a	5a

Form 38QB-2SIM Supersedes 38QB-1SIM

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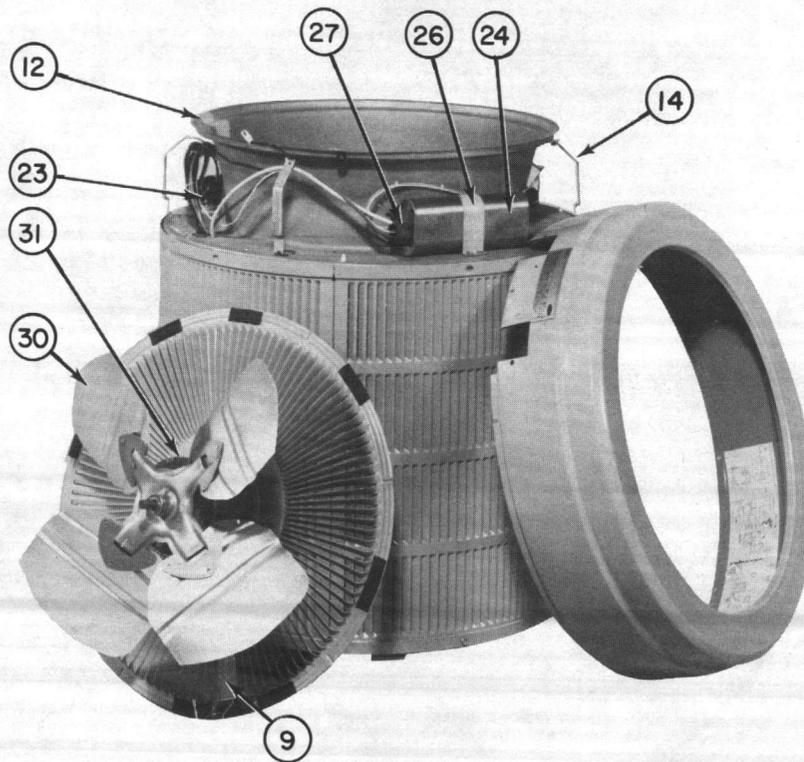
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Catalog No. 563-807

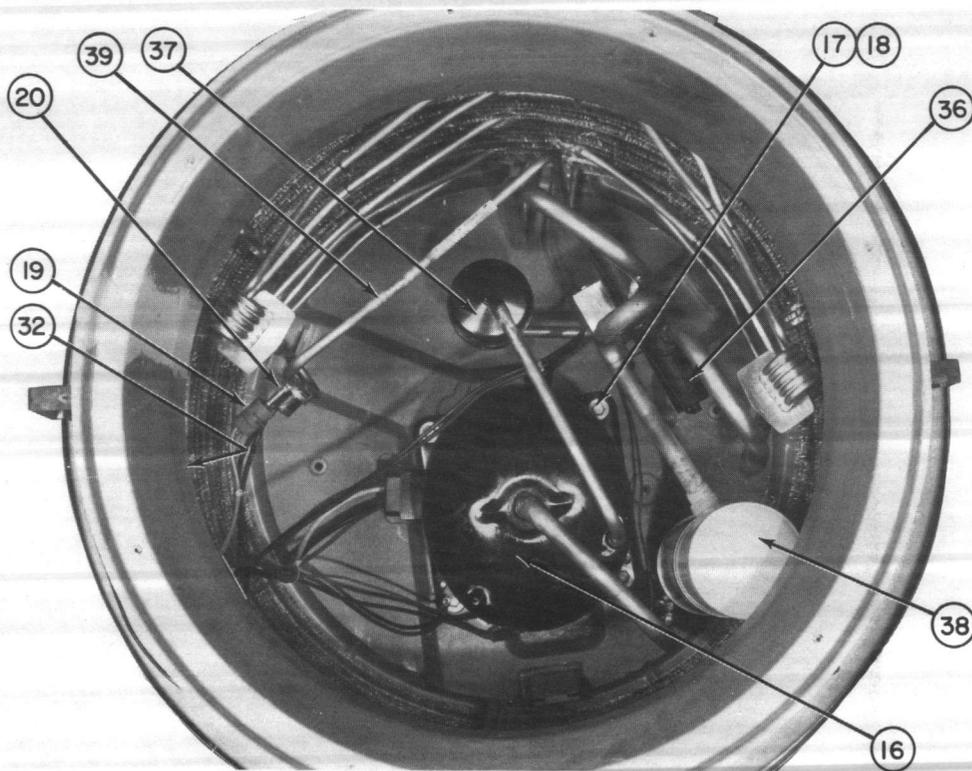
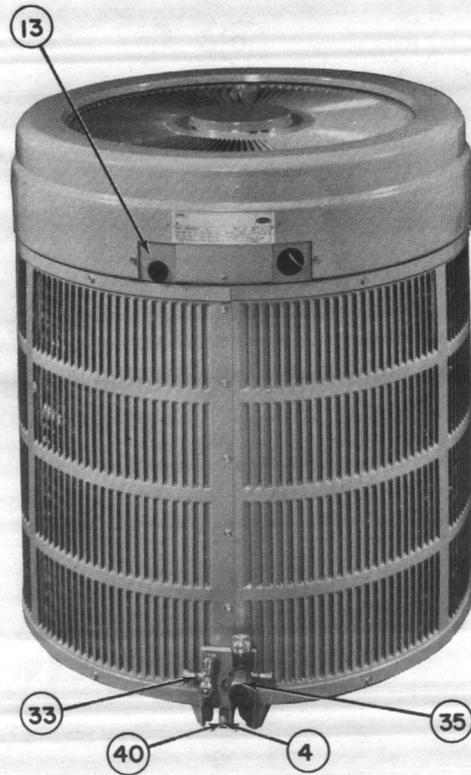
AIR-COOLED HEAT PUMP

38QB



AIR-COOLED HEAT PUMP

38QB





AIR-COOLED HEAT PUMP

38QB

ITEM NO.	PART NAME	LDC	PART NUMBER	38QB				
				0 1 8	0 2 4	0 3 0	0 3 6	0 4 2

CASING GROUP

1.	BASE PAN ASSEMBLY	AC AC	38QB-400---014-- 38QB-400---034--	1	1	1	1	1
2.	WRAPPER	SM1 SM1 SM1	38QB-400---084-- 38QB-400---074-- 38QB-400---094--	2	2	2	2	2
3.	COVER, TOP	SM1 SM1	38QB-400---044-- 38QB-400---054--	1	1	1	1	1
4.	BRACKET, VALVE ASSEMBLY	AC	38QB-400---063--	1	1	1	1	1
NI/5.	POST, ACCUMULTOR MTG.	SM1 SM1	38QB-500---042-- 38QB-500---032--	1	1	1	1	1
NI/6.	STRAP, ACCUMULATOR	SM1	38QB-500---102--	1	1	1	1	1
7.	LEG, MOUNTING	AC	38QB-400---033--	3	3	3	3	3
8.	GRILL, DISCHARGE	AC AC	38QB-400---104-- 38QB-400---114--	1	1	1	1	1
9.	GUIDE, WIRE	SM1 SM1	38QB-400---073-- 38QB-400---083--	1	1	1	1	1
10.	MEDALLION	AC	38QB-500---113--	1	1	1	1	1
11.	STRIP, DECORATIVE	SM1 SM1	38QB-500---693-- 38QB-500---703--	2	2	2	2	2
12.	ORIFICE	SM1 SM1	38QB-500---124-- 38QB-500---134--	1	1	1	1	1
13.	PLATE, CONNECTOR	SM1 SM1	38QB-400---093-- 38QB-400---103--	1	1	1	1	1
14.	GUIDE, TOP COVER	SM1	38EB-500---062--	3	3	3	3	3
NI/15.	PAINT, TOUCH UP	MP	--PH--23PE-023--	AS REQUIRED				

COMPRESSOR AND MOUNTING GROUP

UNIT MODEL	ELECTRICAL CHARACTERISTIC	ORIGINAL COMPRESSOR	TOTAL RUN CAPACITANCE	COMPRESSOR IDENT. NO.	REPLACEMENT COMPRESSOR
38QB018301	208/230-1-60	GB10JF012	25MFD/370V.	CARRIER	51FV660300
38QB024301	208/230-1-60	GB05LF012	25MFD/440V.		MD2364GB
38QB030301	208/230-1-60	GB05PF012	30MFD/440V.	CARRIER	MD3264GB
38QB036301	208/230-1-60	GB05SF012	40MFD/370V.	CARRIER	MD3564GB
38QB042301	200-3-60	GB25HD010	NONE	CARRIER	PF4666HD
38QB042301	230-3-60	GB25HD010	NONE	CARRIER	PG4666HD

NOTE: ORIGINAL COMPRESSOR IS AN EXTENDED VOLTAGE. SELECT REPLACEMENT COMPRESSOR FOR VOLTAGE REQUIRED.



AIR-COOLED HEAT PUMP

38QB

ITEM NO.	PART NAME	LDC	PART NUMBER	38QB				
				0	0	0	0	0
				1	2	3	3	4
				8	4	0	6	2
COMPRESSOR AND MOUNTING GROUP								
NI/16	HEATER-C-CASE	AC	--HT--32BH-246--	1	1	1	1	1
17.	BOLT, COMP. MTG. 5/16-12	MP	--AH--01AM-203--	1				
		MP	--AH--01AM-204--		1	1	1	
		MP	--AH--01AM-202--					1
18.	GROMMET	MP	--KA--56CR-078--	1				
		MP	--KA--56TR-017--		1	1	1	1
ELECTRICAL GROUP								
19.	THERMOSTAT, DEFROST	AC	--HH--18JA-082--	1	1	1	1	1
20.	SWITCH, LO-PRESSURE	AC	--HK--02ZB-003--	1	1	1	1	1
NI/21.	CONTROL, DEFROST BOARD	AC	--HK--25SZ-359--	1	1	1	1	1
NI/22	PLATE, DEFROST BOARD	SM1	38QB-500---043--	1	1	1	1	1
23.	CONTACTOR (25AMP.24V.)	AC	--HN--51DB-024--	1	1	1		
	(30AMP.24V.)	AC	--HN--52KC-051--				1	1
24.	Capacitor							
	(SINGLE) (5MFD., 370V.)	AC	--HC--90AB-005--	1				
	(RUN) (25MFD., 370V.)	AC	--HC--90AB-025--	1				
	(DUAL) (20+5MFD., 440V.)	AC	--HC--92BB-026--		1			
	(DUAL) (30+5MFD., 440V.)	AC	--HC--92BB-031--			1		
	(DUAL) (40+5MFD., 370V.)	AC	--HC--92AB-041--				1	1
	(SINGLE) (20MFD. 370V.)	AC	--HC--90AB-020--					1
NI/25	PTC (START ASSIST)	AC	06MC-660---004--	1	1	1	1	1
26	STRAP, CAPACITOR							
	(FOR HC90AB-005)	SM1	38EB-500---022--	1				
	(FOR HC90AB-025)	SM1	38EB-500---012--	1				
	(FOR HC92BB-026, 031 & HC92AB-041)	SM1	38EB-500---002--		1	1	1	1
27	BOOT, CAPACITOR	SM1	51SA-500---852--	-	1	1	1	1
NI/28	RELAY, START 50AMP.	AC	--HN--61HB-496--	-	-	-	-	1
NI/29	CAPACITOR, START-88+108MFD.	AC	--HC--95DE-088--	-	-	-	-	1
FAN AND MOTOR GROUP								
30	FAN PROP.-5 BLADE, 1/2" BORE, 14 3/4"DIA.	AC	--LA--01AB-015--	1				
	-4 BLADE, 1/2" BORE, 20" DIA.	AC	--LA--01AB-019--		1	1	1	1
31	MTR-OD-PSC----2	AC	--HC--37VA-231--	1				
	208/230-1-60, 1110 R.P.M.							
	MTR-OD-PSC----2	AC	--HC--39VA-231--		1	1	1	1
	208/230-1-60, 1075 R.P.M.							



AIR-COOLED HEAT PUMP

38QB

ITEM NO.	PART NAME	LDC	PART NUMBER	38QB				
				0 1 8	0 2 4	0 3 0	0 3 6	0 4 2
COIL AND PIPING GROUP								
32.	COIL, COND.	NPS	38QB-400---874--	1				
		NPS	38QB-400---884--		1	1		
		NPS	38QB-400---894--				1	
		NPS	38QB-400---904--					1
33.	VALVE, LIQUID	AC	99CC-402---074--	1	1	1	1	1
NI/34.	CORE, CHECK VALVE	MP	--EC--39DM-062--	1	1	1	1	1
35.	VALVE, SUCTION	AC	99CC-401---464--	1				
		AC	99CC-401---474--		1	1	1	1
36.	VALVE, REVERSING	AC	--EF--17BE-140--	1				
		AC	--EF--17BE-241--		1	1	1	1
37.	MUFFLER ASSEMBLY	AC	38HQ-400---223--	1				
		AC	38GR-402---553--		1	1	1	1
38.	ACCUMULATOR ASSEMBLY	AC	38CQ-400---143--	1				
		AC	38QB-400---303--		1	1		
		AC	50MQ-400---043--				1	
		AC	50MQ-401---283--					1
39.	STRAINER, INSERT	AC	--KH--11HH-061--	1	1	1	1	1
40.	COUPLING	AC	99CC-410---282--	1	1	1	1	1
NI/41.	BY-PASS ACCU-RATER PISTON PKG. INCLUDES: PISTON-IDENT. #42	MP	38CQ-660---042--	1				
		NSS	--EA--52PH-042--	6				
NI/42.	BY-PASS ACCU-RATER PISTON PKG. INCLUDES: PISTON-IDENT. #46	MP	38CQ-660---046--		1			
		NSS	--EA--52PH-046--		6			
NI/42.	BY-PASS ACCU-RATER PISTON PKG. INCLUDES: PISTON-IDENT. #59	MP	38CQ-660---059--			1		
		NSS	--EA--52PH-059--			6		
NI/42.	BY-PASS ACCU-RATER PISTON PKG. INCLUDES: PISTON-IDENT. #61	MP	38CQ-660---061--				1	
		NSS	--EA--52PH-061--				6	
NI/42.	BY-PASS ACCU-RATER PISTON PKG. INCLUDES: PISTON-IDENT. #65	MP	38CQ-660---065--					1
		NSS	--EA--52PH-065--					6
NI/43.	PISTON RETAINER ASSEMBLY INCLUDES: RETAINER, PISTON	MP	38CQ-660---031--	1	1	1	1	1
		NSS	99CC-409---892--	6	6	6	6	6



AIR-COOLED HEAT PUMP

38QB

ITEM NO.	PART NAME	LDC	PART NUMBER	38QB					
				0	0	0	0	0	
				1	2	3	3	4	
				8	4	0	6	2	
ACCESSORIES									
NI/44.	MOTOR MASTER 208/230V. 460V.	AP	32LT-900---301--	1	1	1	1	1	1
		AP	33LT-900---611--	1	1	1	1	1	1
NI/45.	DOMESTIC WATER PRE-HEATER (HOT SHOT) INCLUDES:	AP	**38HQ-900---011--	1	1	1	1	1	1
	HEAT EXCHANGER	AC	38HQ-500---574--	1	1	1	1	1	1
	WATER VALVE (SOLENOID)	AC	--EF--23AE-122--	1	1	1	1	1	1
	TEMP. SWITCH (CLOSED #1) CLOSE @ 135 + 8°F. OPEN @ 100 + 6°F.	AC	--HH--18HA-100--	1	1	1	1	1	1
	TEMP. SWITCH (OPEN #2) CLOSE @ 125 + 8°F. OPEN @ 140 + 5°F.	AC	--HH--18HA-142--	1	1	1	1	1	1
	WATER PUMP - 115/1/60, 1600 RPM	AC	--KK--02MA-037--	1	1	1	1	1	1
	CONTROL RELAY	AC	--HN--61KK-324--	1	1	1	1	1	1
	**NOTE: FOR FURTHER INFORMATION REGARDING 38HQ900011 WATER PRE-HEATER, REFER TO SPECIFIED PARTS CATALOG DATED 5/79, CATALOG NO. 553-848.								
NI/46	FILTER-DRIER PACKAGE INCLUDES:	AP	38CQ-900---132--	1	1	1	1	1	1
	FILTER-DRIER	MP	-----433---103--	1	1	1	1	1	1
NI/47	FUEL SAVER OPTOMIZER KIT INCLUDES:	AP	38CQ-900---172--	1	1	1	1	1	1
	OPTOMIZER CONTROL	NS	--HH--22AG-102--	6	6	6	6	6	6
NI/48	ELECTRONIC TIME DELAY PKG. 24V. INCLUDES:	AP	38CQ-900---152--	1	1	1	1	1	1
	ELECTRONIC TIME DELAY	AC	--HN--67PA-024--	6	6	6	6	6	6
NI/49	SERVICE SENTRY PKG.(HEATING CYCLE MALFUNCTION WARNING DEVICE) INCLUDES:	AP	38CQ-900---182--	1	1	1	1	1	1
	CURRENT SENSING RELAY	AC	--HN--65CT-002--	6	6	6	6	6	6
NI/50	EMERGENCY HEAT RELAY PKG. INCLUDES:	AP	38RQ-900---012--	1	1	1	1	1	1
	RELAY	AC	--HN--61KL-704--	6	6	6	6	6	6
NI/51	OUTDOOR THERMOSTAT INCLUDES:	AP	38RQ-900---032--	1	1	1	1	1	1
	TEMP. ACTUATOR SWITCH RATING - 6 AMPS @ 240V. RANGE - 0 TO 50°F.	AC	--HH--22PA-050--	6	6	6	6	6	6
NI/52	RELAY, CRANKCASE HEATER	AP	38QB-900---002--	1	1	1	1	1	1
NI/53	HARD START KIT	AP	38QB-900---011--	1					
		AP	38QB-900---021--		1				
		AP	38QB-900---031--			1	1		1



ORDERING INSTRUCTIONS

- A. All orders and inquiries should include the complete model and serial number of the unit on which the parts are to be used, and the part number and description of each part.
- B. Dealers should forward orders to their CAC Distributor.

GENERAL NOTES

1. Casing parts and panels are not normally stocked, but are available upon request while in production. Requests for casing parts and panels, for units no longer in production, must be cleared through the CAC Parts Center for availability prior to submitting an order.

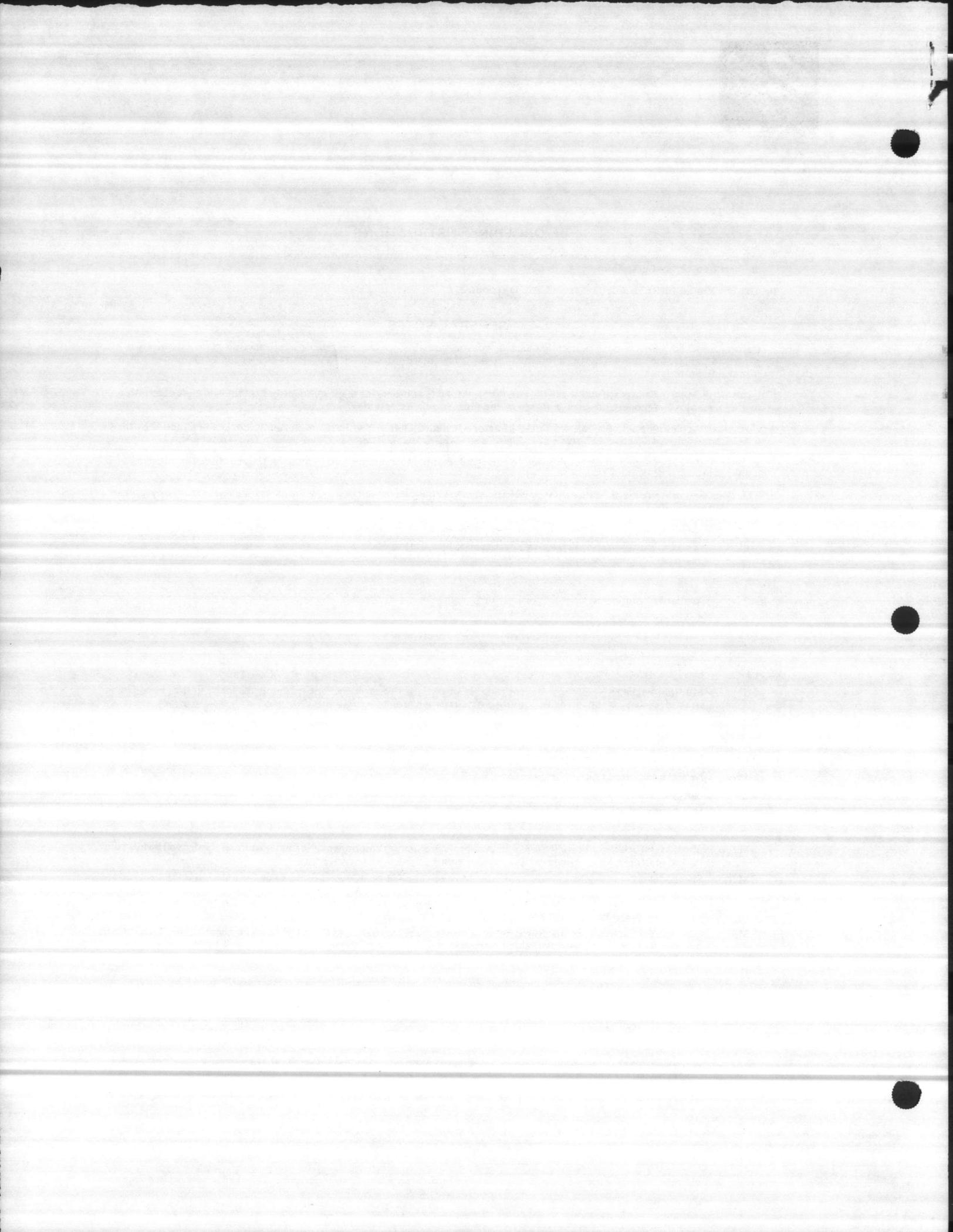
Certain "sheet metal" parts are omitted in the interest of simplicity as orders for them are so infrequent that a simple description of the part, plus the model and serial number of the unit, will be acceptable.

2. Complete "Accessory Packages" or "F.I.O.P.'s" (Factory-Installed Option Plan) are not normally stocked or supplied by the CAC Parts Center. (Refer to "Master Price Pages" and order from: Carrier Air Conditioning Co., Order Dept.)

Accessory Packages and F.I.O.P.'s are listed in this catalog only for reference and to assist in the selection and ordering of components.

3. The replacement parts listed in this catalog are "Carrier Specified Parts" and, as a result of "standardization," may not be identical to the original part furnished on the equipment.
4. Letter designations (appearing in the LDC column preceding the part number column) are used throughout this catalog to represent the classification of those parts. These letter designations are listed below for ease of interpretation and identification. LDC designation in effect when original catalog is issued. Contact your Order Correspondent for latest parts availability.

- AC — Available Component
 - AP — Accessory Package
 - CD — Contact your authorized CAC Distributor for procurement information.
 - FIOP — Factory-Installed Option Plan
 - FF — Field Fabricate
 - MP — Multiple Package — Order sufficient number of packages to meet the unit requirements listed in the "Used On" column. Refer to Price Pages for order quantity.
 - NI — Not Illustrated
 - NA — Part is Not Available
 - NPS — New Part or Item that is Stocked
 - NPN — New Part or Item that is Not Stocked
 - NS — Not Stocked
 - NSS — Not Sold Separately — Order complete assembly
-
- SM1 — Sheet Metal 1. Current production unit. Available production component. Normal lead times. Order will be placed on factory for delivery after next production run.
 - SM2 — Sheet Metal 2 — Obsolete production unit. May be supplied on a special order basis for a period up to two years following last production run. Longer lead times than SM1. Price and delivery will be supplied to the customer for his approval before placing the order. Where customer does not want to place order because of excessive cost, we will supply drawings, if he so requests.
 - SM3 — Obsolete production unit. Tooling is not available, or fabrication cost excessive. Part no longer available. Drawings of these parts will be made available on request.



Direct-Expansion Fan-Coil Units

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SAFETY CONSIDERATIONS

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

Untrained personnel can perform basic maintenance functions of cleaning coils and 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 opera-

tions. 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.

Table 1 — Physical Data and Dimensions
(See Fig. 1)

MODEL 40AQ	018	024	030	036
OPERATING WT*				
	(lb) 69	83	100	114
	(Kg) 31.4	37.7	45.5	51.8
FAN	950/850/750			
Rpm (3-Speed)	Upflow/Horizontal/Downflow			
Air Discharge				
Nominal	(Cfm) 675	900	1050	1150
	(L/s) 319	425	495	543
PSC Motor	(Hp) 1/8	1/4	1/3	1/3
	(Kw) .09	.18	.24	.24
DIMENSIONS				
Length	A (ft-in.) 1-0-3/16	1-2-3/8	1-5-1/4	1-9
	(mm) 310	365	438	533
Width	B (ft-in.)	1-9-1/2		
	(mm)	546		
Height	C (ft-in.) 2-9-1/4	3-2-3/8	3-4-11/16	3-6
	(mm) 845	975	1034	1067
DUCT INLET				
	D (ft-in.) 0-9-7/8	1-0-1/8	1-2-11/16	1-6-3/8
	(mm) 251	308	373	467
	E (ft-in.)	1-6-3/4		
	(mm)	476		
DUCT OUTLET				
	F (ft-in.) 0-9-3/16	1-0-1/16	1-2-15/16	1-6-5/8
	(mm) 299	306	379	473
	G (in.)	9-11/16		
	(mm)	246		
CONNECTIONS				
Suction, ODF† H	(in.) 5/8		3/4	
	(mm) 15.87		19.05	
Liquid, ODF† J	(in.)	3/8		
	(mm)	9.52		
Condensate, FPT	(in.)	3/4		

PSC — Permanent Split Capacitor

*Weights indicated are for standard units. Bare box 40AQ weights are 59, 78, 96 and 110 lb respectively.

†Suction line connection is Compatible Fitting, liquid line connection is 3/8-in. SAE flare fitting.

DESCRIPTION AND USAGE

Use standard Models 40AQ in cooling-only, electric heat and heat pump systems. Units consist of a coil (with a vertical condensate pan), a horizontal drain pan, cooling controls or electric heaters, 3-speed direct-drive fan/motor assembly and filter section with cleanable filter — all within an insulated cabinet. Units may be mounted in vertical upflow, downflow or horizontal airflow arrangements and are suitable for “attic type” installations.

Models 40AQ — BB (bare box) are identical to standard units except that electric heaters, horizontal drain pan and cooling controls are offered as accessories only. Units may be mounted in vertical upflow or downflow arrangements.

→ **Models 40AQ — BU** (bare universal) contain a standard horizontal drain pan and can be mounted in vertical upflow, downflow and horizontal arrangements. Electric heaters and cooling controls are offered as accessories.

All 40AQ units may be used with ductwork; or for free-blow applications when not equipped with electric heaters. Use accessory downflow kit for all downflow applications. Install units in conditioned or unconditioned spaces. All units are tested for installation in unconditioned spaces per ARI standards (80 F [26.7 C] db, 75 F [23.9 C] wb indoor temperature; 80 F [26.7 C] db outdoor temperature).

IMPORTANT: When any fan-coil is installed over a finished ceiling and/or living area, a secondary condensate pan should be installed under the entire unit (see Step 6).

Insulate supply and return air ductwork in unconditioned spaces. Cover insulation with a vapor barrier.

Filter Section comes mounted on return air end of fan-coil. Filter section includes a reversible filter rack with 5/8-in. (16-mm) duct connection flange on one side. The filter section is attached to unit either with flanges exposed or turned over so flanges are inside unit. The permanent 1-in. (25-mm) filter media pulls out for easy removal and cleaning.

Electric Heater — See Table 4 and 5 for fan-coil/electric heater combinations. Electric heaters have both heating and cooling controls that include a control circuit transformer, indoor fan relay and low-voltage connection.

→ **Cooling Control Kit** is a field-installed option required on 40AQ BB or BU units without electric heater. The kit contains a 60-volt transformer, indoor fan relay and low-voltage connections. Cooling control kit is not required when electric heater is used. Heaters are equipped with cooling and heating controls.

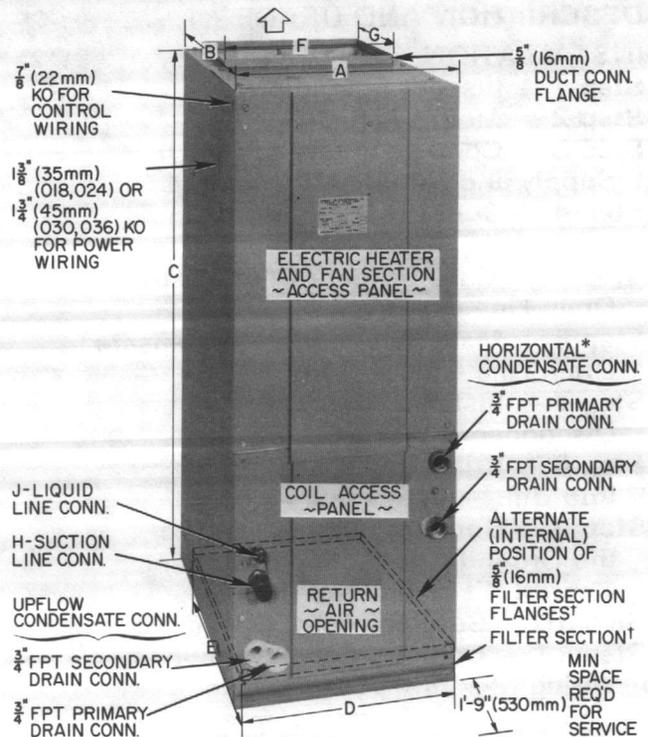
AccuRater™ System Refrigerant Control (bypass type) is factory installed on 40AQ units. See

Table 8 for factory-supplied pistons. Certain combinations of heat pump or condensing unit and fan-coil require field replacement of the piston for optimum efficiency. See outdoor unit instructions for required piston.

Bypass Type AccuRater Components are shown in Fig. 14. The AccuRater piston has a refrigerant metering hole thru it and is field replaceable.

INSTALLATION

Step 1 — Inspect Equipment — File claim with shipping company if shipment is damaged or incomplete.



*Install accessory condensate pan on 40AQ bare box units to provide horizontal condensate drains.

†Filter section may be turned over to provide external duct connection flange.

➡ Airflow

Certified dimension drawings available on request.

Fig. 1 — Dimensions and Connections

Step 2 — Mount Fan-Coil — Unit can stand or lie on floor, or hang from ceiling or wall. Allow space for wiring, piping and servicing unit, Fig. 1.

Before mounting, adjust filter section as required. Filter section can be mounted with its 5/8-in. (16-mm) return air duct connection flange inside or outside of unit casing. When flanges are required, remove filter section from unit, turn it over so flanges are exposed, and reinstall on unit. Remove filter media and turn it over so cross-sectional binding faces upward toward coil.

FLOOR MOUNTING IN VERTICAL UPFLOW AIRFLOW POSITION WITH FILTER SECTION FLANGE OUTSIDE UNIT CASING — Size floor opening large enough to accept duct connection flange on filter section. Make duct flush with floor. Set unit on floor over opening with filter section flange inserted thru floor into duct. Use fireproof resilient gasket, 1/8- (3-mm) to 1/4-in. (6-mm) thick between duct, unit and floor.

Table 2 — Accessory Return Air Plenums

MODEL 40AQ	ACCESSORY PART NO.	PLENUM WIDTH	
		ft-in.	mm
024	40AQ900111	1-2-3/8	365
030	40AQ900121	1-5-1/4	438
036	40FS900141	1-9	533

ACCESSORY RETURN AIR PLENUM is available in 3 sizes for use in upflow installations where return air inlet is required. See Table 2.

Set 40AQ heating and/or cooling assembly in place on top of plenum. Cut opening in either side or back of plenum and make return air ductwork connection. Return air plenums and typical installations are shown in Fig. 3.

FLOOR, WALL OR CEILING MOUNTING IN HORIZONTAL AIRFLOW POSITION — Place unit on its *right side* by turning it clockwise 90°. (Do not install unit on its back.) This provides horizontal airflow to the right. For horizontal airflow to the left, reposition the coil as follows:

- Lay unit on its back and remove front access panels.
- Remove screws holding coil with condensate pans in cabinet.
- Remove coil and condensate pans from cabinet and rotate 180°.
- Leaving both condensate pans in place, reinstall coil in cabinet as shown in Fig. 2. Ensure the coil positioning tabs enter slots provided in rear of cabinet.
- Replace access panels.

Place unit on its left side by turning it counter-clockwise 90°.

WHEN SUSPENDING UNIT FROM THE CEILING OR WALL, provide an adequate level support that extends the full length of unit. Provide means to isolate unit vibration from structure as required.

CAUTION: Install accessory condensate pan in all 40AQ bare box units in horizontal applications. Install secondary condensate pan under units in horizontal applications over finished ceiling.

MOUNTING IN DOWNFLOW POSITION — An accessory downflow kit, Carrier Part No. 40AQ900181, is required for downflow applica-

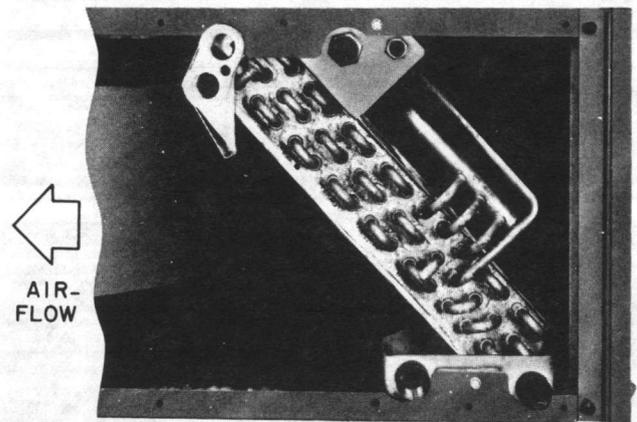


Fig. 2 — Coil Positioned for Left-Hand Discharge

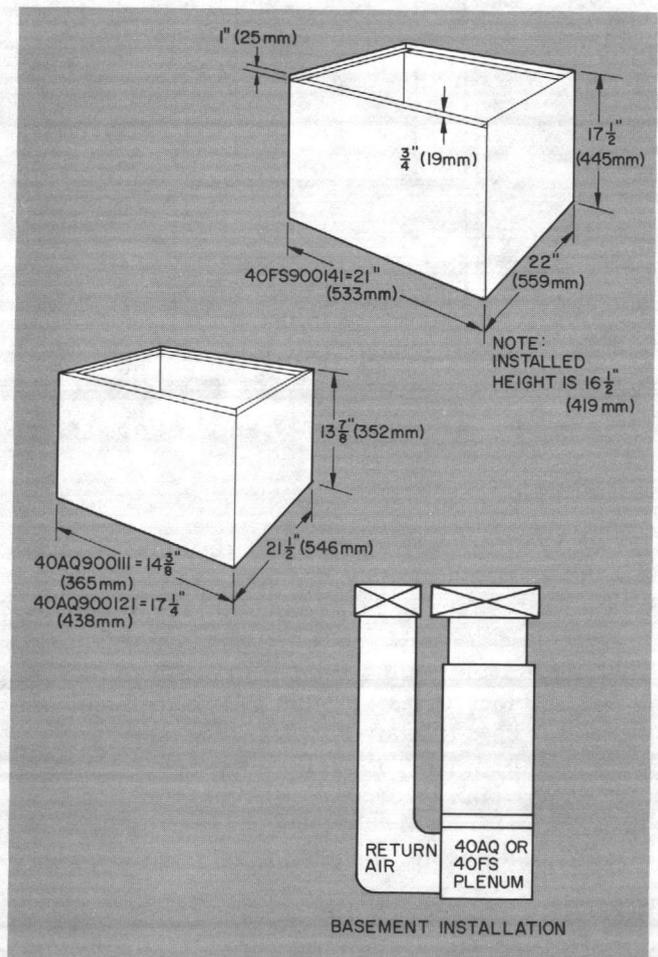


Fig. 3 — Accessory Return Air Plenum

tions. Complete installation instructions are included with the downflow kit.

To install for downflow operation (see Fig. 4):

- Turn unit upside down so filter section is at top.
- Remove access panel and slide coil out of casing.
- Rotate coil 180° and replace coil in casing.
- Replace access panel with nameplate in the upright position.

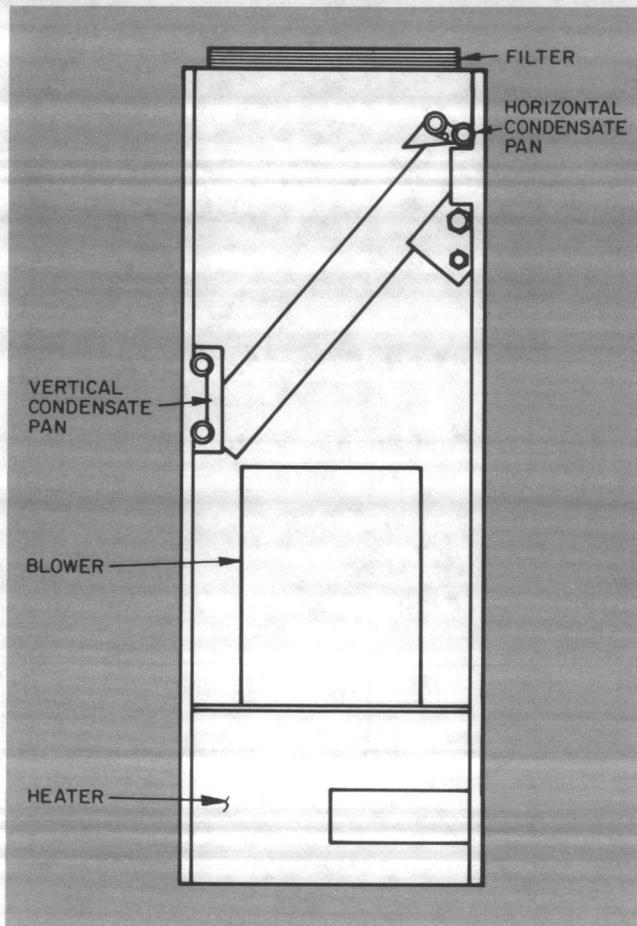


Fig. 4 — Downflow Arrangement

DUCTWORK — When using 40AQ units with electric heaters, maintain a 1-in. (25-mm) minimum clearance between discharge plenum and ductwork to combustible materials for a distance of 36 in. (900 mm) from unit. (0-in. [0-mm] clearance to heater cabinet is permissible.) Use an accessory downflow base to maintain clearance on downflow installations. Carrier downflow base part numbers are: 40AQ900221 for 018; 40AQ900231 for 024; 40AQ900241 for 030; 40AQ900251 for 036. Installation instructions are included with downflow base.

Step 3 — Connect Ductwork to Unit Supply and Return Air Openings — Duct connection flanges are provided on unit air discharge connection and filter section, Fig. 1. When filter section is installed on fan-coil with duct connection flange inside unit casing, field fabricate return air duct connection. For upflow return air connection thru the floor, see FLOOR MOUNTING, page 3.

CAUTION: Do not screw ductwork directly to filter section. Screws prevent removal of filter.

DUCTWORK SPECIFICATIONS — When fan-coil is equipped with electric heater, install air ducts in accordance with standards of the National

Fire Protection Association, NFPA, numbers 90A and 90B and in compliance with paragraph 46.1-E of UL Standard 1096. If necessary, refer to Carrier System Design Manual, Part 2, for system air duct design. Use flexible connectors between ductwork and unit to prevent transmission of vibration. (See DUCTWORK ACOUSTICAL TREATMENT.) When electric heater is installed, use heat resistant material for flexible connector between ductwork and unit air discharge connection. Ductwork passing thru unconditioned space must be insulated and covered with vapor barrier. External ductwork must be insulated and weatherproofed.

DUCTWORK ACOUSTICAL TREATMENT — On metal duct systems that do not have one 90° elbow and 10 ft (3 m) of main duct to first branch takeoff, install internal acoustical insulation lining per the following procedure:

Line the inside of plenum, branch runs and main duct with acoustical insulation in accordance with the latest edition of SMACNA (Sheet Metal and Air Conditioning Contractors Association) application standard for duct liner. Duct liners should be UL classified batts and blankets with a fire hazard classification working of FHC-25/50 or less. Ensure main duct lining is extended 6 to 8 ft (1.8 to 2.3 m) down the duct from plenum.

As an alternative to above, fibrous glass ductwork may be used if constructed and installed in accordance with the latest SMACNA construction standard on fibrous glass duct.

Both acoustical lining and fibrous ductwork shall comply with National Fire Protection Association as tested by UL Standard 181 for Class 1 air ducts.

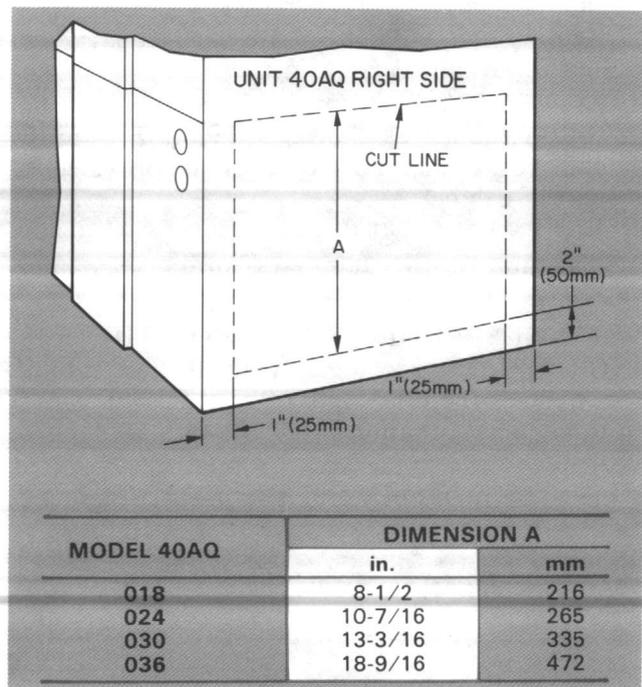


Fig. 5 — Right-Side Return Air Connection Details

RIGHT-SIDE RETURN (Fig. 5) — A return-air connection may be made directly into *the right side (only)* on 40AQ units. It is recommended that when this right side connection is made, the standard return air opening is blanked-off with sheet metal even where not required by local code.

To make right-side return air opening:

1. Remove horizontal condensate pan where supplied.
2. Cut opening as indicated in Fig. 5.
3. Blank-off standard return air opening in bottom of unit (as required).
4. Install return air filter section on right-side return air opening. Use field-supplied sheet metal screws as required.
5. Reinstall horizontal condensate pan as applicable.

Step 4 — Connect Refrigerant Liquid and Suction Lines to refrigerant line connections. See Fig. 1 and Table 1 for line connection sizes, type and location. Use Carrier accessory tubing package or field-supplied tubing of refrigerant grade. Insulate entire suction line if field-supplied tubing is used. Tubing package has an insulated suction line. Do not use damaged, dirty or contaminated tubing because it may plug up the Accu-Rater™ refrigerant flow control. When tubing package is used and mechanical connections are made within 60 seconds, coil and tubing system do not require purging or evacuation. Always evacuate or purge if field-supplied tubing is used, when sweat connections are made or when tubing must be flared.

Units have Compatible Fitting suction line connection and a 3/8-in. (9.52-mm) SAE flare fitting liquid line connection. Make suction line connection first. Compatible Fitting(s) permits mechanical (quick-connect) or sweat connections as described later in this section. When making liquid line connection, slide flare nut on liquid line, then flare and connect liquid line. It is not necessary to flare liquid line if an accessory flare-to-Compatible Fitting coupler (Carrier Part No. 38CQ900061) is used.

MECHANICAL CONNECTION (Mate one set of connections at a time.)

1. Loosen locknut on Compatible Fitting one turn. Do not remove. See Fig. 6.
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 (Use refrigerant grade tubing.)

1. Remove locknut, and rubber O-ring from inside of Compatible Fitting. Refer to Fig. 6.
2. Cut tubing to correct length.
3. Insert tube into Compatible Fitting until it bottoms.
4. Solder with low-temperature 430 F (221 C) silver alloy solder. Wrap a wet cloth around rear of fitting to prevent damaging factory-made joints.
5. Evacuate or purge coil and tubing system with field-supplied refrigerant.

ACCESSORY FLARE-TO-COMPATIBLE COUPLER (see Fig. 7) — Attach flare nut on coupler to coil liquid line flare connection. Connect system liquid line to Compatible Fitting using mechanical or sweat connection. When mechanical connection is made, use 2 wrenches to tighten Compatible Fitting nut — one to hold coupler and one to tighten nut. If coupler is not used, flare the liquid line.

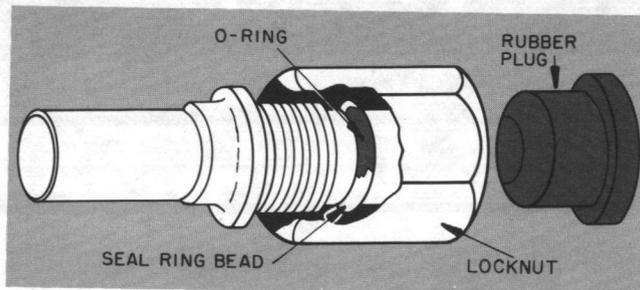


Fig. 6 — Carrier Compatible Fitting

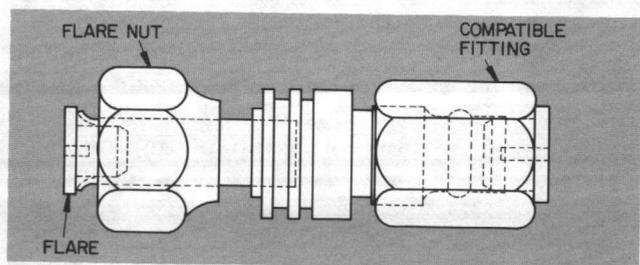


Fig. 7 — Accessory Coupler

Step 5 — Make Primary Condensate Drain Line Connection to connection provided on unit (see Fig. 1). Install a trap in condensate line as close to unit as possible. Trap must be at least 5 in. (125 mm) deep and not higher than the bottom of unit condensate drain opening (see Fig. 8). Pitch condensate line to open drain or sump. Minimum recommended drain line size is 7/8-in. (22.22-mm) OD copper tubing or 3/4-in. (26.70-mm) OD galvanized pipe. Insulate condensate drain line(s) located above a living area.

Step 6 — Make Secondary Condensate Drain Line Connection if required. A connection is provided on unit. Use secondary drain if fan-coil is installed above occupied or usable space. If this drain is used, it must be trapped similar to the primary drain. (Plug secondary drain connection if not used.) Connect piping to secondary drain so that any discharge is visible to owner as applicable to FHA or local code requirements. When fan-coil is installed over a finished ceiling and/or living area, fabricate and install a secondary condensate pan under entire unit. Pipe secondary drain to discharge into the pan. Pipe drain line from pan so any discharge is visible to owner.

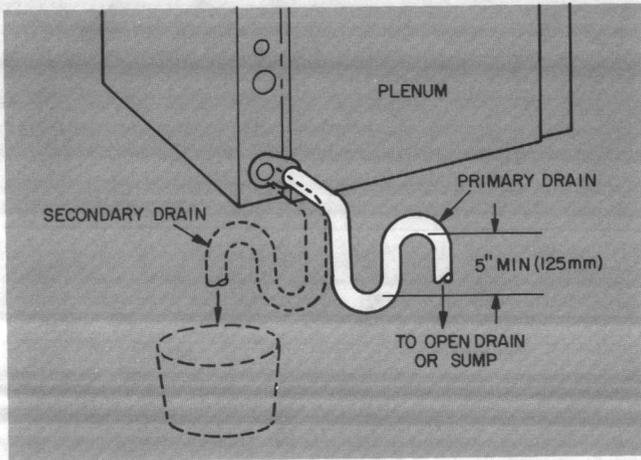


Fig. 8 — Condensate Trap

ELECTRICAL DATA AND WIRING

Field wiring must comply with local and national fire, safety and electrical codes. Voltage to unit must be within $\pm 10\%$ of voltage indicated on nameplate voltage range at which unit will operate satisfactorily for limited periods of time. Contact local power company for correction of improper line voltage.

Operation of unit on improper line voltage constitutes abuse and could affect Carrier Warranty.

See Tables 3 and 5 for recommended wire and fuse sizes.

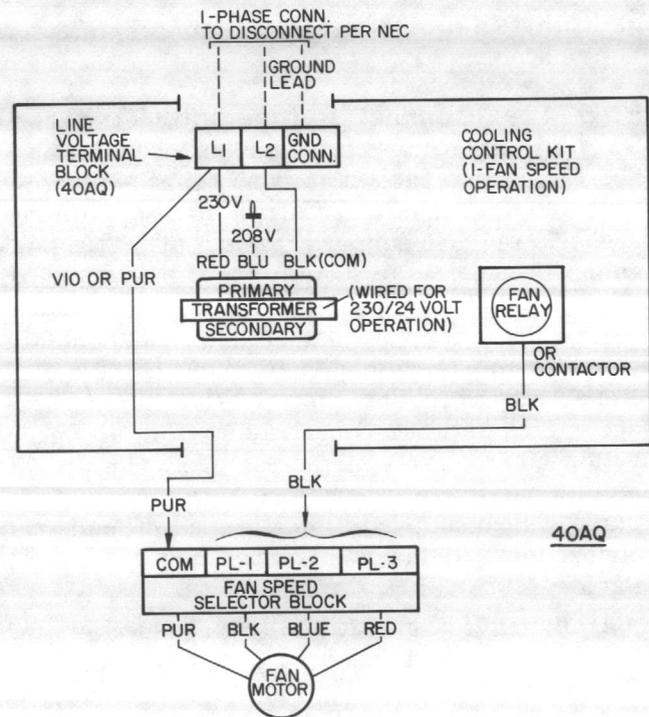
Step 7 — Install a Branch Circuit Disconnect Switch(es) per NEC of adequate size to handle unit current. Locate disconnect switch(es) within sight of and readily accessible to unit per section 440-14 of National Electrical Code (NEC).

All units with cooling control kit or electric heater are factory wired to have a single line power circuit and require one disconnect switch. If one line power

circuit using one disconnect switch is required, attach an accessory line power connection conversion lug set (Part No. 40FS900271) to fuse terminals in electric heater. See Fig. 10.

Units with 11- to 20-kw heater may be wired for operation with 2 line power circuits by removing orange jumpers from heater line power connection terminals (see Fig. 10). Dual circuited units require 2 disconnect switches.

Step 8 — Bring Line Power Leads into Unit — Extend leads from disconnect per NEC thru hole provided (Fig. 1) to cooling control kit or electric heater line power connections. Be sure power is off before making connections.



NOTE: Tape unused leads.

----- Field Wiring
 _____ Factory Wiring

SELECTOR BLOCK TERMINATIONS	
COM — Common	PL-3 — Low
PL-1 — High	—
PL-2 — Medium	—

Fig. 9 — Cooling Unit Line Power Connections

Step 9 — Connect Ground Lead to the Ground Connection in Cooling Control Kit or Electric Heater for safety. Connect power wiring, Fig. 9 and 12. Splice power leads to pigtailed or connect leads to fuse terminals or terminal board. Use wire nuts for splice connections. Tape each connection.

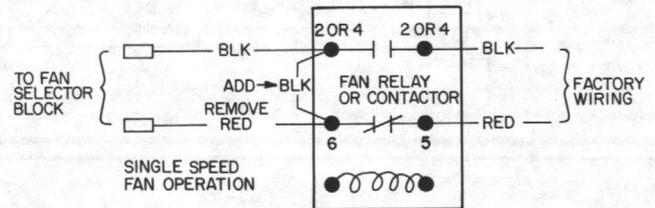
Cooling control kit and electric heater are factory wired for 230/24-volt transformer operation. For 208/24-volt operation, interchange blue (208-v) and red (230-v) transformer leads at the primary connection. Cap unused transformer lead with wire nuts.

THREE-SPEED FAN MOTOR on all units may be field connected for high, medium or low fan speeds. Fan-coil units with cooling control kit come factory connected for high-speed fan operation. Units with electric heater come factory connected for 2-speed fan operation — unit fan operates at high speed when outdoor unit operates (on cooling or heating cycle), medium speed when electric heater is on and outdoor unit is off. Refer to Table 6 for minimum allowable fan speeds when electric heater is used and set fan motor speeds as required.

Step 10 — Set Fan Motor Speed — High, medium or low fan speed leads are provided on motor for choice of fan speeds. Motor leads are factory connected to Molex fan speed selector block located on fan housing, Fig. 10. Selector block terminal 1 is high fan speed, terminal 2 is medium fan speed and terminal 3 is low fan speed.

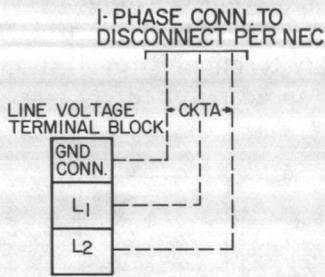
Line power leads supplied with cooling control kit or electric heater are factory connected to selector block for one or 2 fan speeds as described in Step 9. Change fan speed by changing position of black and/or red line power leads on selector block. See Fig. 9 and 10.

One fan speed may be selected on units with cooling control kit; 2 fan speeds on units with electric heater. For single-speed operation on electric heater units: remove red lead from heater fan relay (or contactor) terminal 6; connect a jumper between fan relay terminal 2 (or 4) and 6; connect black heater lead from fan relay terminal 2 (or 4) to fan speed selector block for speed required.

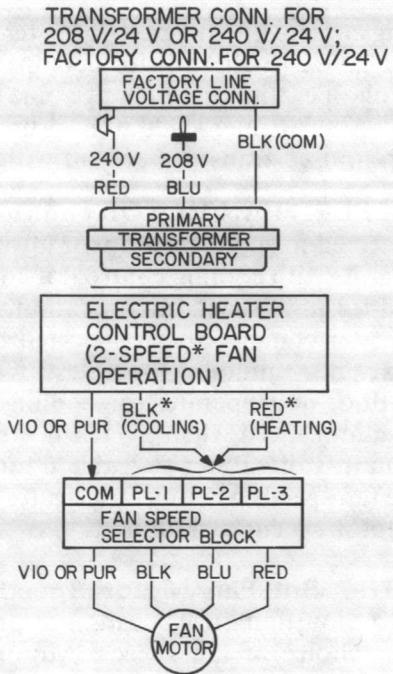
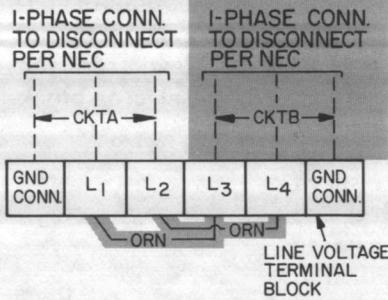


Step 11 — Connect Control Power Wiring (24-Volt) with Cooling Control Kit or Electric Heater — For system 24-v supply, use 60-va transformer from cooling control kit or use electric heater controls. A one-transformer control wiring hookup is recommended for ease of installation. When an outdoor unit transformer is used together with control kit (or heater) transformer, a phasing problem may result. If both transformers are used, also use a thermostat with isolating contacts to prevent interconnection of Class 2 (24-volt) outputs.

3KW TO 10KW HEATERS



11 KW TO 20 KW HEATERS



When 2 line power circuits are required, remove orange jumpers and connect a second disconnect per NEC to L3, L4 and ground connection. See Heater Electrical Data table.

*For 1-speed fan operation, see text for power wiring.

NOTE: Tape unused leads.

- Splice Connection
- Field Wiring
- Factory Wiring

SELECTOR BLOCK TERMINATIONS	
COM — Common	PL-3 — Low
PL-1 — High	—
PL-2 — Medium	—

Fig. 10 — Heating and Cooling Unit Line Power Connections

Table 3 — Fan-Coil Electrical Data (Units Equipped with Cooling Control Kit)

MODEL 40AQ	VOLTS (1-Ph)	FLA	BRANCH CIRCUIT			
			Min Wire Size* (AWG)	Max Wire Length		Fuse Amps
				ft	m	
018---	208/240	1.5	14	200	60.9	15
024---		2.9		200	60.9	
030---		3.6		100	30.5	
036---		3.6		100	30.5	

FLA — Full Load Amps
 --- — Electrical data applicable to all unit models.
 *Copper wire sizes based on 60 C. Use latest National Electrical Code (NEC) for aluminum wire sizes.

- NOTES:
1. Fan motor line power supplied from electric heat line power circuit.
 2. All models above equipped with cooling control kit. See Table 4 for units equipped with electric heater.

Table 4 — Electrical Data, Bare Box Fan-Coil Units

MODEL	AVAILABLE HEATERS (kw at 240 v)
40AQ018300 BB/BU	3, 5, 7.5, 10
40AQ024300 BB/BU	5, 7.5, 10, 12, 15, 20
40AQ030300 BB/BU	7.5, 10, 12, 15, 20
40AQ036300 BB/BU	7.5, 10, 12, 15, 20

NOTE: Bare box units with field-installed heaters as shown are equivalent to 40AQ fan-coil units having factory-installed heaters of comparable kw. Install heaters in accordance with instructions shipped with heaters.

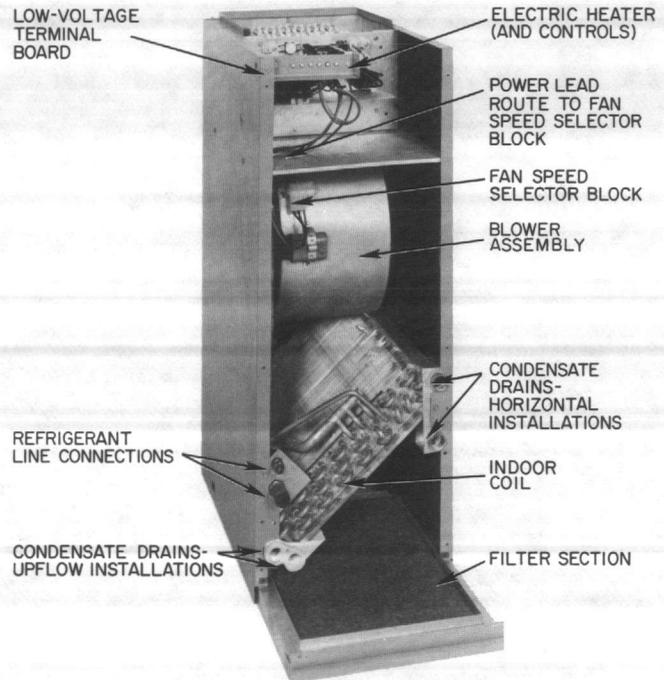


Fig. 11 — Component Location (Fully-Equipped Unit Shown)

Table 5 — Electrical Data, Fan-Coil with Electric Heater (208/240 V — 1 Ph)

MODEL	Kw		BRANCH CIRCUIT													
			No. Ckts	Amps		Min Wire Size (AWG)*		Max Wire Length				Min Gnd Wire Size		Fuse Amps		
	240 V	208 V		240 V	208 V	240 V	208 V	240 V		208 V		240 V	208 V	240 V	208 V	
40AQ018310BG	3.0	2.25	1	A	13.5	12.3	12	12	45	13.7	45	13.7	12	12	20	20
40AQ018330CD	5.0	3.75	1	A	21.5	18.7	10	10	45	13.7	45	13.7	10	10	30	25
40AQ018331DF	7.5	5.60	1	A	31.5	27.5	8	8	50	15.2	50	15.2	10	10	40	35
40AQ018331EH	10.0	7.50	1	A	41.5	36.2	6	6	60	18.3	60	18.3	10	10	60	50
40AQ024331CD	5.0	3.75	1	A	23.0	20.2	10	10	40	12.2	40	12.2	10	10	30	30
40AQ024331DF	7.5	5.60	1	A	33.0	29.0	6	8	70	21.3	45	13.7	10	10	45	40
40AQ024330EH	10.0	7.50	1	A	43.0	37.7	6	6	55	16.7	55	16.7	10	10	60	50
40AQ024330EH†																
40AQ024331FE††**	12.0	9.00	1	A	51.0	44.5	4	4	70	21.3	70	21.3	8	10	70	60
40AQ024340FE**																
40AQ024330GM††**	15.0	11.25	1	A	63.0	55.0	2	4	95	29.0	60	18.3	8	8	80	70
40AQ024340GM†**																
40AQ030330DF	7.5	5.60	1	A	33.6	29.6	6	8	70	21.3	45	13.7	10	10	45	40
40AQ030330EH	10.0	7.50	1	A	43.6	38.3	6	6	55	16.7	55	16.7	10	10	60	50
40AQ030340EH†																
40AQ030330FE††**	12.0	9.00	1	A	51.6	45.1	4	4	70	21.3	70	21.3	8	10	70	60
40AQ030340FE†**																
40AQ030330GM††**	15.0	11.25	1	A	63.6	55.6	2	4	95	29.0	60	18.3	8	8	80	70
40AQ030340GM†**																
40AQ030330JR††**	20.0	15.00	1	A	83.6	72.9	2	2	70	21.3	70	21.3	6	8	110	100
40AQ030340JR†**																
40AQ036330DF	7.5	5.60	1	A	33.6	29.6	6	8	70	21.3	45	13.7	10	10	45	40
40AQ036330EH†	10.0	7.50	1	A	43.6	38.3	6	6	55	16.7	55	16.7	10	10	60	50
40AQ036330FE††**	12.0	9.00	1	A	51.6	45.1	4	4	70	21.3	70	21.3	8	10	70	60
40AQ036340FE†**																
40AQ036330GM††**	15.0	11.25	1	A	63.6	55.6	2	4	95	29.0	60	18.3	8	8	80	70
40AQ036340GM†**																
40AQ036330JR††**	20.0	15.00	1	A	83.6	72.9	2	2	70	21.3	70	21.3	6	8	110	100
40AQ036340JR†**																
			2	A	40.0	35.0	6	6	60	18.3	60	18.3	10	10	50	45
			2	B	43.6	38.6	6	6	55	16.7	55	16.7	10	10	60	50

■ Circuit breaker models. Remaining models over 10 kw are internally fused.

*Minimum wire sizes based on using copper wire with a minimum 75 C (90 C, 40AQ018) insulation rating. Aluminum wire is not recommended.

†Heater models which may be field wired for operation with one or 2 line power circuits. See Step 9 and Fig. 9.

‡Two-stage heaters. Remaining heaters are single stage; see Fig. 12 for control wiring.

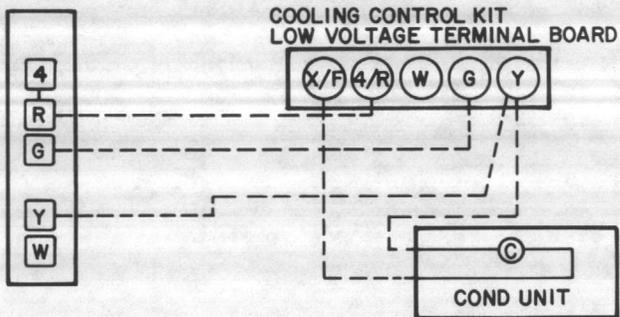
**These models are internally protected. Field-supplied branch circuit over-current protection may be either fuse or circuit breaker.

NOTES:

1. Heaters are equipped with a 60-volt transformer for system control circuit.
2. Field-selected wire sizes must not create a voltage drop between power source and unit in excess of 2% of unit rated voltage.

THERMOSTAT HHOIAD040 OR O42 WITH HH93AZ040 OR O42 SUBBASE

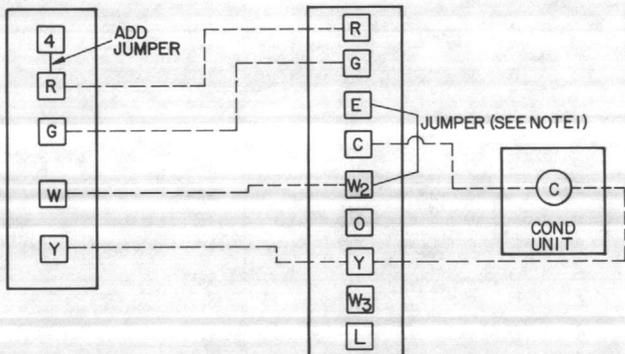
40AQ



ARRANGEMENT A — 40AQ WITH CONDENSING UNIT. COOLING ONLY SYSTEM. TRANSFORMER IN COOLING CONTROL KIT.

THERMOSTAT HHOIAD040 OR O42 WITH HH93AZ040 OR O42 SUBBASE

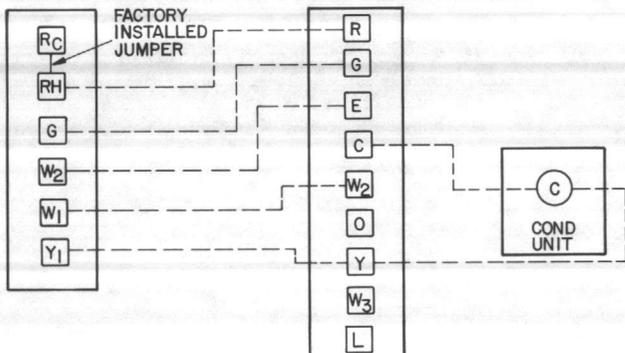
40AQ ELECTRIC HEATER (1- AND 2- STAGE MODELS) LOW VOLTAGE TERMINAL BOARD



ARRANGEMENT B — 40AQ WITH CONDENSING UNIT. COOLING AND ONE-STAGE HEATING SYSTEM. TRANSFORMER IN ELECTRIC HEATER.

THERMOSTAT HH07AT070 SUBBASE HH93AZ080

40AQ ELECTRIC HEATER (2-STAGE MODELS) LOW VOLTAGE TERMINAL BOARD

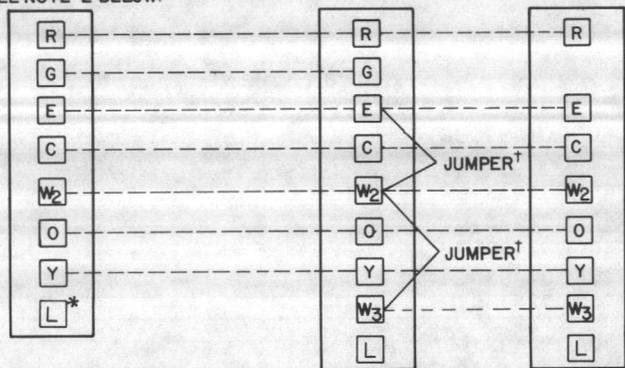


ARRANGEMENT C — 40AQ (EXCEPT O18) WITH CONDENSING UNIT. COOLING AND 2-STAGE HEATING SYSTEM. TRANSFORMER IN ELECTRIC HEATER.

THERMOSTAT HH07AT071 WITH HH93AZ073 (AUTOMATIC CHANGEOVER) OR HH93AZ075 (MANUAL CHANGEOVER) SUBBASE. SEE NOTE 2 BELOW.

40AQ ELECTRIC HEATER (ALL MODELS) LOW VOLTAGE TERMINAL BOARD

38CQ OR 38RQ (HEAT PUMPS) TERMINAL BOARD



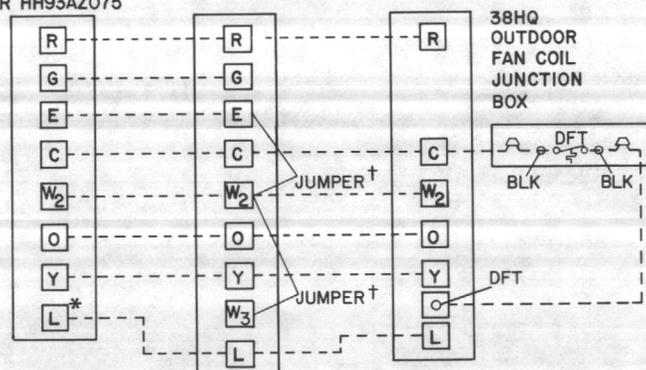
IMPORTANT: Refer to 38CQ, 38RQ Installation Instructions if outdoor thermostats are used.

ARRANGEMENT D — 40AQ WITH 38CQ OR 38RQ HEAT PUMP. COOLING AND 2-STAGE HEATING SYSTEM; EMERGENCY HEAT, NO OUTDOOR THERMOSTAT. TRANSFORMER IN ELECTRIC HEATER.

THERMOSTAT SUBBASE HH93AZ073 OR HH93AZ075

40AQ ELECTRIC HEATER TERMINAL BOARD

38HQ COMPRESSOR SECTION TERMINAL BOARD



IMPORTANT: Refer to 38HQ Installation Instructions if outdoor thermostats are used.

ARRANGEMENT E — 40AQ WITH 38HQ HEAT PUMP. COOLING AND 2-STAGE HEATING SYSTEM; EMERGENCY HEAT, NO OUTDOOR THERMOSTAT. TRANSFORMER IN ELECTRIC HEATER.

C — Contactor
 --- Field Wiring
 ——— Factory Wiring

*Terminal L is identified as terminal X on some former thermostats (required for system malfunction warning indicator on compressor section).

†Remove one or both factory-installed jumpers (Arrangements D and E) when installing outdoor thermostats (ODT) shown in installation instructions for heat pump — outdoor section.

NOTES:

1. On 40AQ 2-stage heaters, remove factory-installed jumper for 2-stage operation. See Arrangements B and C.
2. Thermostat/Subbase package numbers: 38CQ900081 for HH07AT071/HH93AZ073 (Automatic Changeover); 38CQ900111 for HH07AT071/HH93AZ075 (Manual Changeover).

Fig. 12 — Control Wiring Connections

CONTROL WIRING CONNECTIONS — Install rubber grommet (supplied) in hole provided in unit for low-voltage wires, Fig. 1. Extend control wire

leads thru grommet and route to cooling control kit or to heater low-voltage connections. Connect leads to terminal board (see Fig. 12).

Table 6 — Airflow Data

FAN SECTION	HEATER KW		MIN FAN SPEED*	MIN CFM†	MIN L/st
	240 V	208 V			
40AQ018	3.0	2.25	Med	500	240
	5.0	3.75	Med		
	7.5	5.60	Med		
	10.0	7.50	Med		
40AQ024	5.0	3.75	Low	700	330
	7.5	5.60	Low		
	10.0	7.50	Low		
	15.0	11.25	Med		
40AQ030	7.5	5.60	Med	1000	470
	10.0	7.50	Med		
	15.0	11.25	Med		
	20.0	15.00	Med		
40AQ036	7.5	5.60	Med	1000	470
	10.0	7.50	Med		
	15.0	11.25	Med		
	20.0	15.00	Med		

*Minimum fan speeds for safe electric heater operation.

†Minimum air for prevention of nuisance heater cycling on 40AQ units.

START-UP

Refer to outdoor unit Installation, Start-Up and Service booklet for system start-up instructions and refrigerant charging method details.

Table 7 — Thermostat Anticipator Settings

ELECTRIC HEATER KW		ANTICIPATOR SETTING
240 V	208 V	
3.0	2.25	.16*
5.0	3.75	
7.5	5.60	
10.0	7.50	
15.0	11.25	.33
20.0	15.00	

*Anticipator setting is .45 for heaters equipped with Honeywell sequencer.

NOTE: When 40AQ units are used with 38CQ heat pumps, see 38CQ installation book for first- and second-stage anticipator settings.

SERVICE AND MAINTENANCE

Disconnect power to all circuits before servicing unit.

Remove unit front and top access panels for cleaning, lubrication or parts replacement (Fig. 11).

Minimum Maintenance

1. Check and clean or replace air filter each month or as required.
2. Check cooling coil, drain pan, and condensate drain each cooling season for cleanliness. Clean as necessary.

3. Check fan motor and wheel for cleanliness each heating and cooling season. See Fan Motor and Wheel discussed later.
4. Check electrical connections for tightness and controls for proper operation each heating and cooling season. Service as necessary.

Return Air Filter — To clean or replace air filter, remove 2 knurled-head screws (no tools required) and remove filter access door. Slide out filter. Clean filter by using hot soapy water. Rinse clean and let dry. No oiling or coating of filter is required. New filters are available from a local dealer. Place filter in slot with cross-sectional binding up or facing the cooling coil, and replace filter access door with knurled-head screws.

CAUTION: Never operate unit without a filter or with filter access door removed. Damage to blower motor may result.

Coil, Drain Pan, and Condensate Drain — Disconnect electrical power before removing any access panels or electrical shock may result.

The coil is easily cleaned when it is dry; therefore, the coil should be checked and cleaned (if necessary) before each season. To check or clean coil, remove both the coil access panel and the fan/heater access panel. Removal of these panels gives full access to the coil. If the coil is coated with dirt or lint, vacuum with a soft-brush attachment.

Be careful not to bend the fins. If the coil is coated with oil or grease, it may be cleaned with a mild detergent and water solution. Rinse coil with clear water. Be careful not to splash water on insulation or filter.

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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Tab	3c	2c

Form 40AQ-8SIM Supersedes 40AQ-5SI

Printed in U.S.A.

6-81

PC 101

Catalog No. 534-096

Check drain pan and condensate drain at the same time cooling coil is checked. Clean drain pan and condensate drain by removing any foreign matter from pan. Flush pan and drain tube with clear water. If drain tube is restricted, it can generally be cleared by high-pressure water. If this does not work, try a "plumber's snake" or similar probe device.

Fan Motor and Wheel — Clean the fan motor and the wheel when the cooling coil is cleaned. Lubricate motor every 5 years if motor is used on intermittent operation (thermostat FAN switch at AUTO. position), or every 2 years if the motor is in continuous operation (thermostat FAN switch at ON position).

CAUTION: Remember to disconnect electrical power before removing any access panels.

To clean or lubricate fan motor or clean fan wheel, remove coil access panel, fan and heater access panel. Remove 3 electrical leads from bottom of Molex connector located on the fan housing. Note location of wires for reassembly. Remove 2 (outside) screws holding fan/motor assembly against the fan deck flange and slide assembly out of cabinet. Squeeze the side tabs and pull the Molex connector block off fan housing. Loosen a screw in strap holding motor capacitor to fan housing and slide capacitor out from under strap. Remove screw with green wire from fan housing. Mark the fan wheel, motor and motor support in relation to the fan housing before disassembly to ensure proper reassembly. (Note position of blades on wheel.) Loosen setscrew holding fan wheel onto motor shaft.

Remove 3 bolts holding motor mount to fan housing and slide motor and mount out of housing. Further disassembly should not be necessary as adequate clearance is available to clean or lubricate motor. Remove fan wheel from housing by removing cutoff plate from fan housing outlet. Note wheel orientation and cutoff location for reassembly. The fan motor and wheel may be cleaned by using a vacuum with a soft-brush attachment. Remove grease with a mild solvent such as hot water and detergent. Be careful not to disturb the balance weights (clips) on the fan wheel vanes. Also, do not drop or bend wheel, as balance will be affected.

To oil motor, remove dust caps or plugs from oil holes located at each end of the motor. Use a teaspoon, 5 cc, 3/16 oz or 16 to 25 drops of a good grade of SAE 20 non-detergent motor oil in each oil hole. Allow time for total quantity of oil to be absorbed into each bearing. After oiling motor, be sure to wipe off excess oil from housing and replace cap or plugs on oil port.

To reassemble fan, place fan wheel back into housing. Be sure to position correctly for proper rotation. Reassemble cutoff plate to housing, using identified holes from disassembly procedure. Position motor and mount in fan wheel in the housing. Position motor and mount in same position as before when fan housing was in unit. Secure motor

mount to housing, using bolts removed. Make sure mount or motor is grounded to fan housing. Locate fan wheel setscrew over flat on motor shaft. Rotate wheel in housing. It should not rub housing and should be centered in inlet opening. If not, loosen setscrew and align as necessary. Attach green wire to fan housing with screw. Secure motor capacitor under strap and tighten strap screw. Replace Molex connector in bracket by snapping into position. Slide blower assembly into fan deck runners and secure assembly to blower deck with screws removed. Reconnect electrical leads into Molex connector at the proper position. Please note that connections are polarized for assembly — *do not force*. Reconnect electrical power to unit and test fan for proper rotation and necessary speed changes between heating and cooling.

Refrigerant Circuit — The 40AQ coils have a vapor holding charge. Evacuation or purging is not required if accessory Carrier tubing package is used and mechanically connected to Carrier Compatible Fittings within 60 seconds. If tubing or coil is left open longer than 60 seconds, field-supplied tubing is used, sweat or flare connections are made — purge or evacuate coil and tubing. Refer to outdoor unit installation booklet for system refrigerant charging method details.

LEAKING MECHANICAL CONNECTOR

1. Pump down (system refrigerant) to outdoor unit. Close outdoor unit service valves, and relieve refrigerant pressure in tubing and coil.
2. Back locknut off Compatible Fitting onto tube at indoor coil as in Fig. 13.
3. Cut fitting with hacksaw between threads and seal ring bead.
4. Remove tubing section remaining in threaded portion of fitting. Discard locknut.

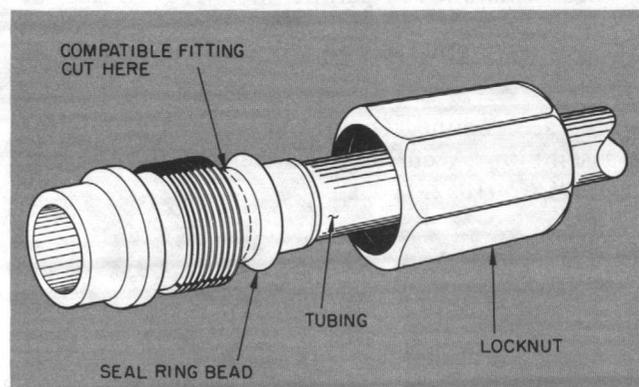


Fig. 13 — Repair of Mechanical Connection

Reconnecting Refrigerant Tubing

1. Remove all burrs and filings from remaining portion of Compatible Fitting.
2. Insert tube end into remaining portion of Compatible Fitting.

- Solder with low-temperature (430 F [221 C]) solder such as Allstate 430 or equivalent silver bearing solder.
- Evacuate indoor coil and tubing system at the outdoor unit service valves.

LEAKING SWEAT CONNECTION — Pump down system refrigerant to outdoor unit. Close outdoor unit service valves, and relieve refrigerant pressure in tubing and coil. Clean and flux area around leak and apply low-temperature (430 F [221 C]) solder.

Evacuate or purge evaporator coil and tubing system. Add refrigerant charge (see charging instructions).

ACCURATER™ (BYPASS TYPE) REFRIGERANT FLOW CONTROL SERVICING — See Fig. 14 for bypass type AccuRater components. *The piston has a refrigerant metering orifice 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:

- Pump down system refrigerant to outdoor unit. Close outdoor unit service valves, and relieve pressure in tubing and coil.
- Shut off power to unit.
- Remove coil liquid line flare connection from AccuRater.
- Pull retainer out of body being careful not to scratch flare sealing surface. If retainer does not pull out easily, carefully use vise grips to remove retainer. (If retainer flare seat is damaged, replace with new retainer, Carrier Part No. 99CC409892.)
- Slide piston out by inserting a small soft wire thru metering orifice. Ensure metering orifice sealing surface around piston cones and fluted portion of piston are not damaged.
- Clean piston refrigerant metering orifice or replace piston as required. Carrier replacement pistons are available from Carrier Service Parts Center.
- Replace retainer O-ring on retainer before re-assembling AccuRater. Carrier O-ring Part No. is 99CC501052.

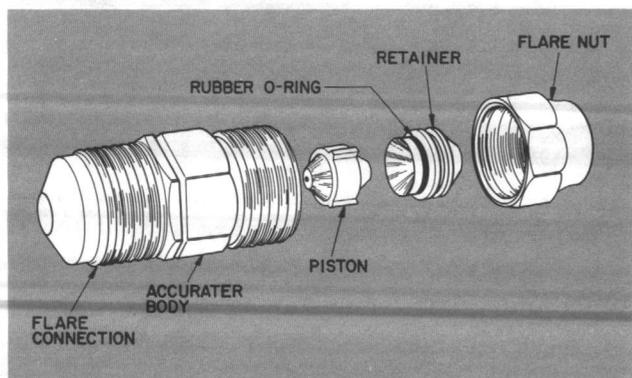


Fig. 14 — AccuRater™ (Bypass Type) Components

Table 8 — Factory-Supplied AccuRater™ Pistons

MODEL 40AQ	018	024	030	036
PISTON NO.	46	52	59	67

LIQUID LINE STRAINER — The outdoor bypass AccuRater is protected on the indoor coil side by a wire mesh strainer. It normally does not require servicing; however, if it becomes plugged, proceed as follows for inspection and cleaning.

- Complete steps 1 thru 3 under ACCURATER REFRIGERANT FLOW CONTROL SERVICING.
- Remove coil access panel.
- Loosen flare fitting joint connecting AccuRater to coil liquid refrigerant line.
- Remove sheet metal screw holding bracket clip in place. Screw is located between coil and AccuRater.
- Pull bracket clip out.
- Remove bypass AccuRater assembly.
- Pull strainer out of coil liquid refrigerant line and replace with new strainer.

Electric Heater Service — See Fig. 11 for component location. All service can be completed with heater in place. Ensure all power is shut off before servicing.

LIMIT SWITCH malfunction prevents heating element from coming on or causes fusible link to blow. Replace switch if malfunction occurs.

SEQUENCER malfunction will cause heater not to come on or never shut off — replace sequencer.

TRANSFORMER is 60 va. Transformer supplies 24-volt power for control circuit. Replace transformer if faulty.

CAUTION: The 60-va transformer on 40AQ electric heater is fused — do not short circuit.

FAN RELAY malfunction will cause unit fan not to run or run continuously — replace relay.

HEATER REMOVAL — Electric heater (and cooling control kit) is held in place by 5 sheet metal screws. If heater removal is required, disconnect wiring, remove screws and pull heater out thru front of unit. When replacing heater, ensure heater element support bars enter holes in rear of unit heat shield.

Direct Expansion Fan-Coil Units

(With Cooling Control Kit or Electric Heater)

INDEX

MODEL 40			VOLTS		FIG. NO.	LABEL DIAGRAM	INTERNAL CIRCUIT PROTECTION	
			240	208				
			KW					
AQ	024300	CD	5.0	3.75	1	300822-301	None	
	024300 030300 036300	DF EH	7.5 10.0	5.60 7.50	2	300823-302	None	
	024320 030320 036320	EH	10.0	7.50	3	300824-302	None	
	024300 030300 036300	FE GM	12.0 15.0	9.00 11.25	4	300825-302	Fuses	
	024310 030310 036310	FE GM	12.0 15.0	9.00 11.25	5	300826-302	Circuit Breakers	
	030300 036300	JR	20.0	15.00	6	300827-302	Fuses	
	030310 036310						Circuit Breakers	
	AS	018320 024320	CD	5.0	3.75	7	72566BP	None
		018320 024320 030320 036320	DF EH	7.5 10.0	5.60 7.50	8	72567BP	None
		024320 030320 036320	FQ GM	13.0 15.0	9.75 11.25	9	72568BP	Fuses
030320 036320		JR	20.0	15.00	10	72569BP	Fuses	

Fig. 11 — Control Wiring Connections	Page 11
Fig. 12 — Heating and Cooling Unit Line Power Connections	Page 12
Fig. 13 — Cooling Unit Line Power Connections	Page 12
Fig. 14 — Connections for Single-Speed Fan Operation	Page 12

GENERAL NOTES

- All wiring must comply with National Electrical Code (NEC) and all applicable local codes.
- Units are suitable for use with copper or copper-clad aluminum supply conductors unless noted otherwise on the diagram.
- Fused disconnect for incoming unit power must be within sight of unit and readily accessible in accordance with NEC, Section 440-14.
- Transformer Primary Code: 208 v - BLK & BLU
240 v - BLK & RED
- Unused transformer lead must be taped.
- Transformer secondary is internally fused; do not short control wiring.
- If any of the original wire, as supplied, must be replaced, use the same wire or equivalent.

FAN MOTOR SPEED

High, medium or low fan speed leads are provided on motor for choice of fan speeds. Motor leads are factory connected to Molex fan speed selector block located on fan housing. Selector block terminal 1 is high fan speed, terminal 2 is medium fan speed and terminal 3 is low fan speed.

Line power leads supplied with cooling control kit or electric heater are factory connected to selector block for 1 or 2 fan speeds as described above. Change fan speed by changing position of black and/or red line power leads on selector block. See Fig. 12 and 13.

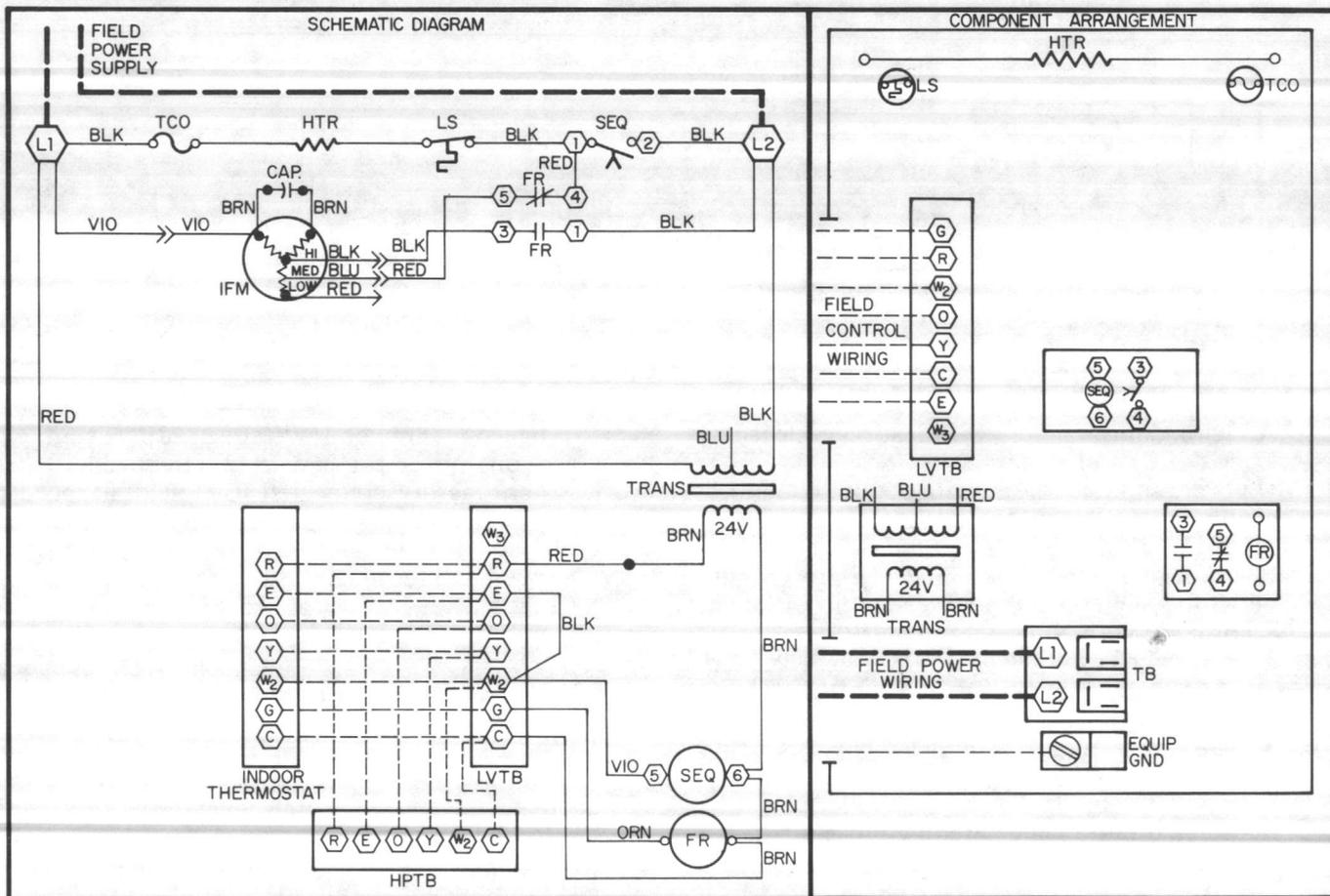
One fan speed may be selected on units with cooling control kit; 2 fan speeds on units with electric heater. For single-speed operation on electric heater units; remove red lead from heater fan relay terminal 5; connect a jumper between fan contactor terminal 3 and 5; connect black heater lead from fan relay terminal 3 to fan speed selector block for speed required. See Fig. 14.

LEGEND (40AQ, Fig. 1 – 6)

Cap.	- Capacitor	TB	- Terminal Block
CB	- Circuit Breaker	TCO	- Thermal Cutoff
Equip Gnd	- Equipment Ground	Trans	- Transformer
FR	- Fan Relay		Marked Connection
Fu	- Fuse		Unmarked Connection
HPTB	- Heat Pump Terminal Board		Junction
Htr	- Heater		Plug-Receptacle Connection
HVTB	- High Voltage Terminal Board		Factory Wiring
IFM	- Indoor Fan Motor		Field Wiring – Power
LS	- Limit Switch		Field Wiring – Control
LVTB	- Low Voltage Terminal Board		
Seq	- Sequencer		

LEGEND (40AS, Fig. 7 – 10)

	Junction		Factory Low-Voltage Wiring
	Factory High-Voltage Wiring		Field High-Voltage Wiring



NOTE: Suitable for use with copper, No. 10 AWG, or copper-clad aluminum, No. 8 AWG, supply conductors rated 75 C minimum.

Fig. 1 – Label Diagram – 40AQ024300CD; 208/240/1/60

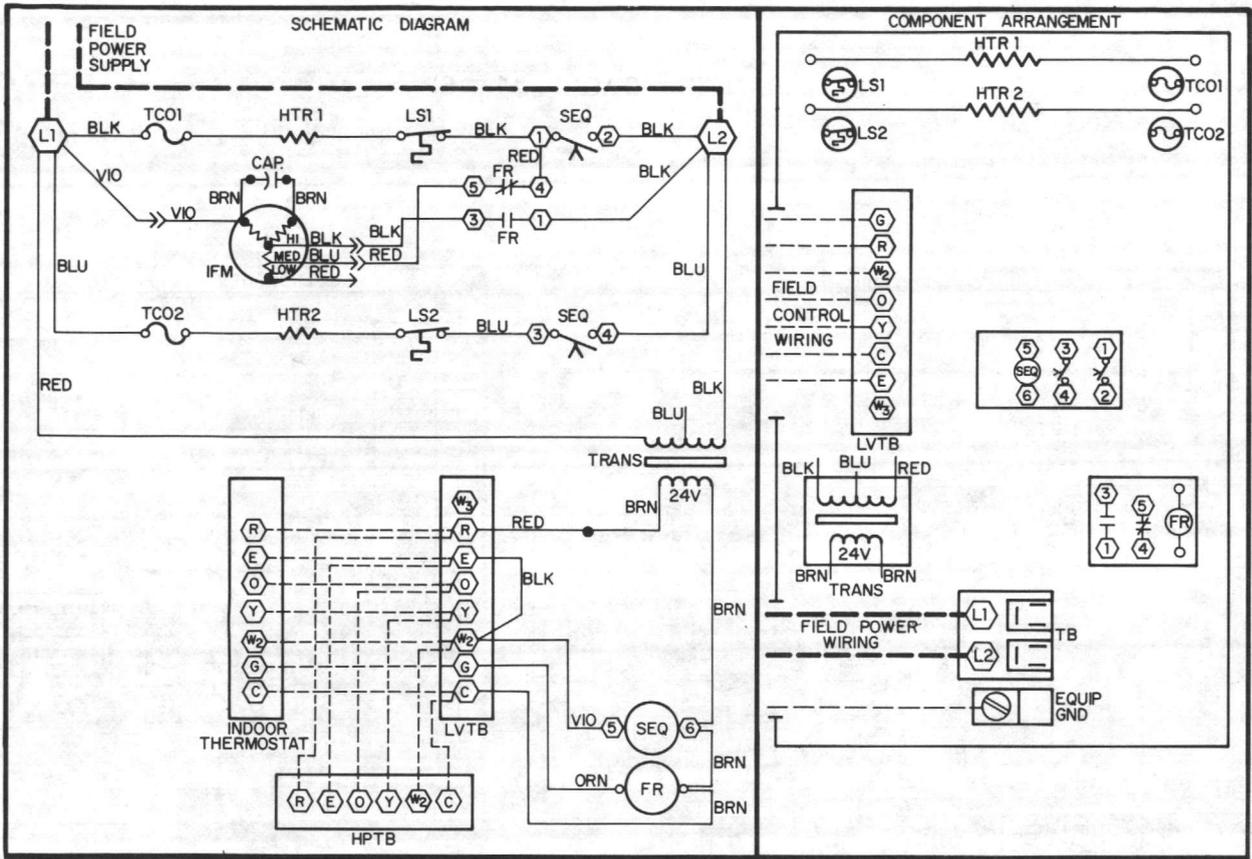


Fig. 2 – Label Diagram – 40AQ024300, 030300, 036300DF, EH; 208/240/1/60

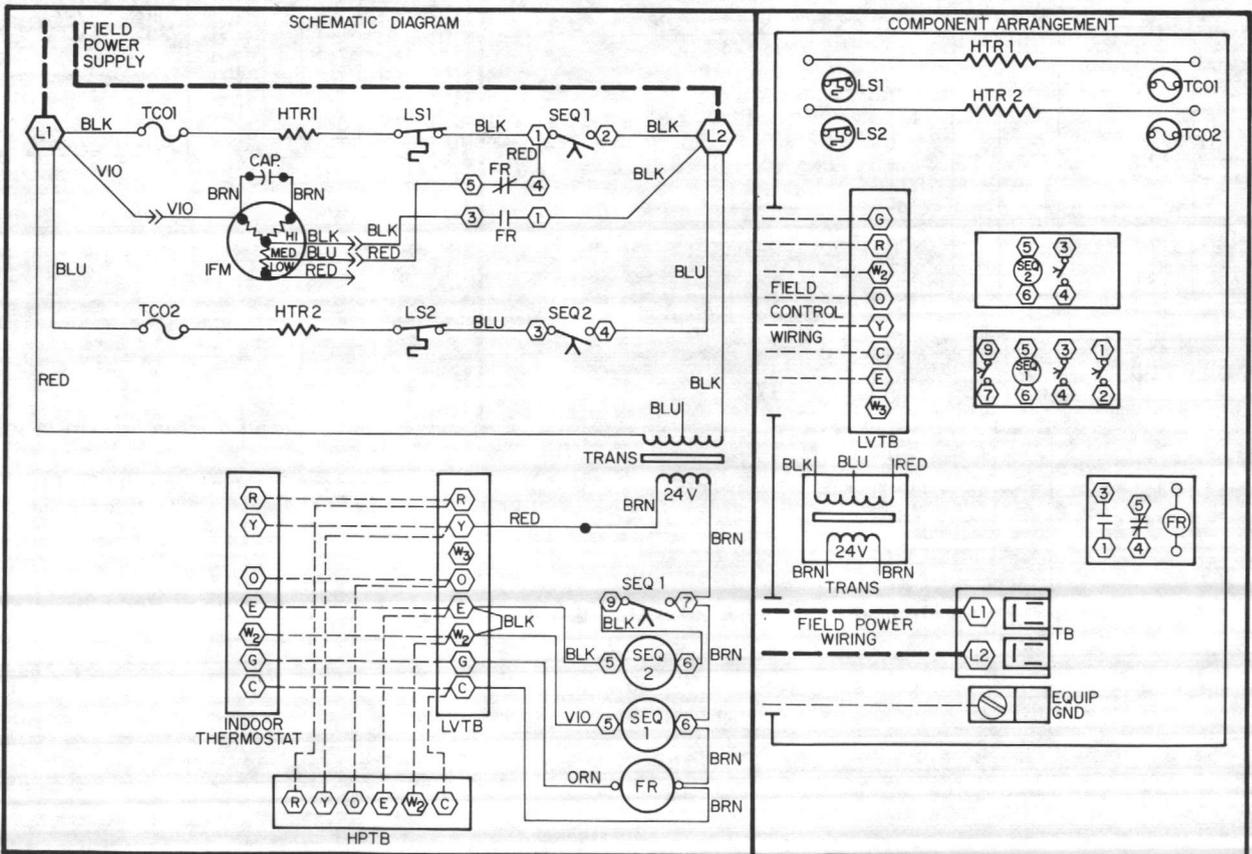
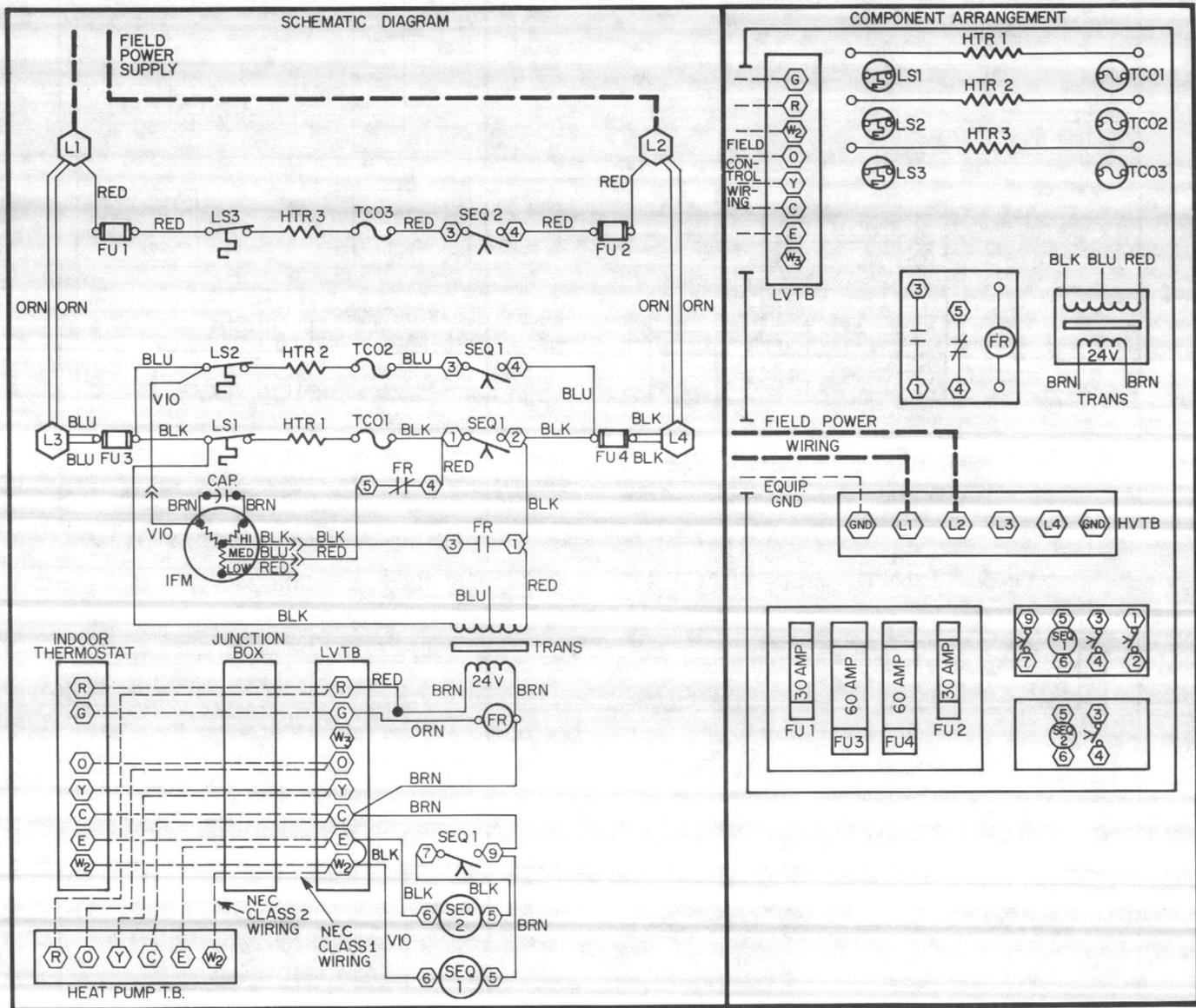


Fig. 3 – Label Diagram – 40AQ024320, 030320, 036320EH; 208/240/1/60



NOTES:

1. Suitable for use with copper only supply conductors rated 90 C minimum for 030 & 036 and 75 C minimum for 024. For single circuit, use No. 3 AWG (2 wires). For dual circuits, use No. 10 AWG for circuit L1-L2 and No. 6 AWG for circuit L3-L4.
2. Use only dual element Class K fuses for replacement.
3. Use Class 1 wire for control circuit field wiring within the fan coil unit.

Fig. 4 — Label Diagram — 40AQ024300, 030300, 036300FE, GM; 208/240/1/60

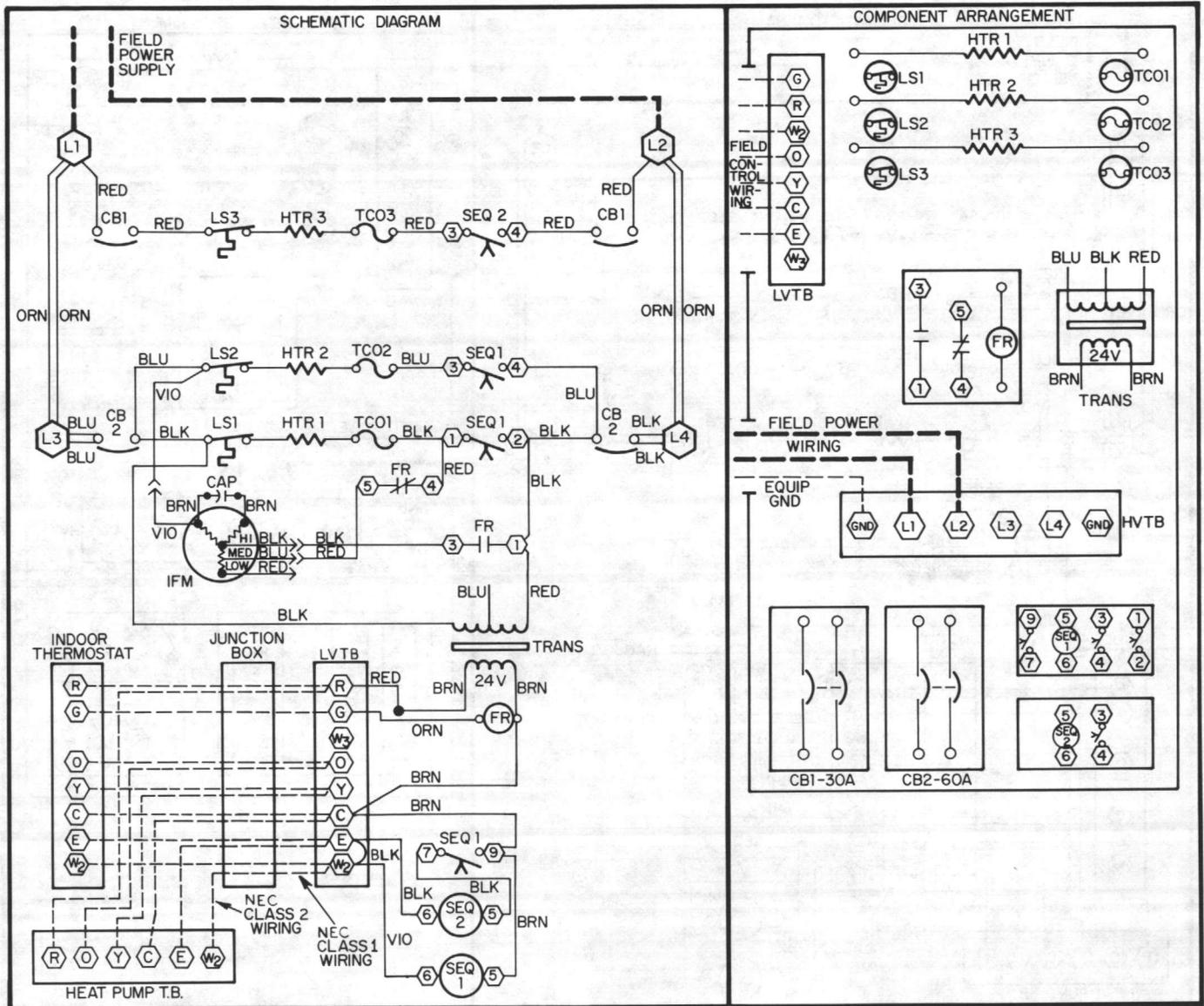
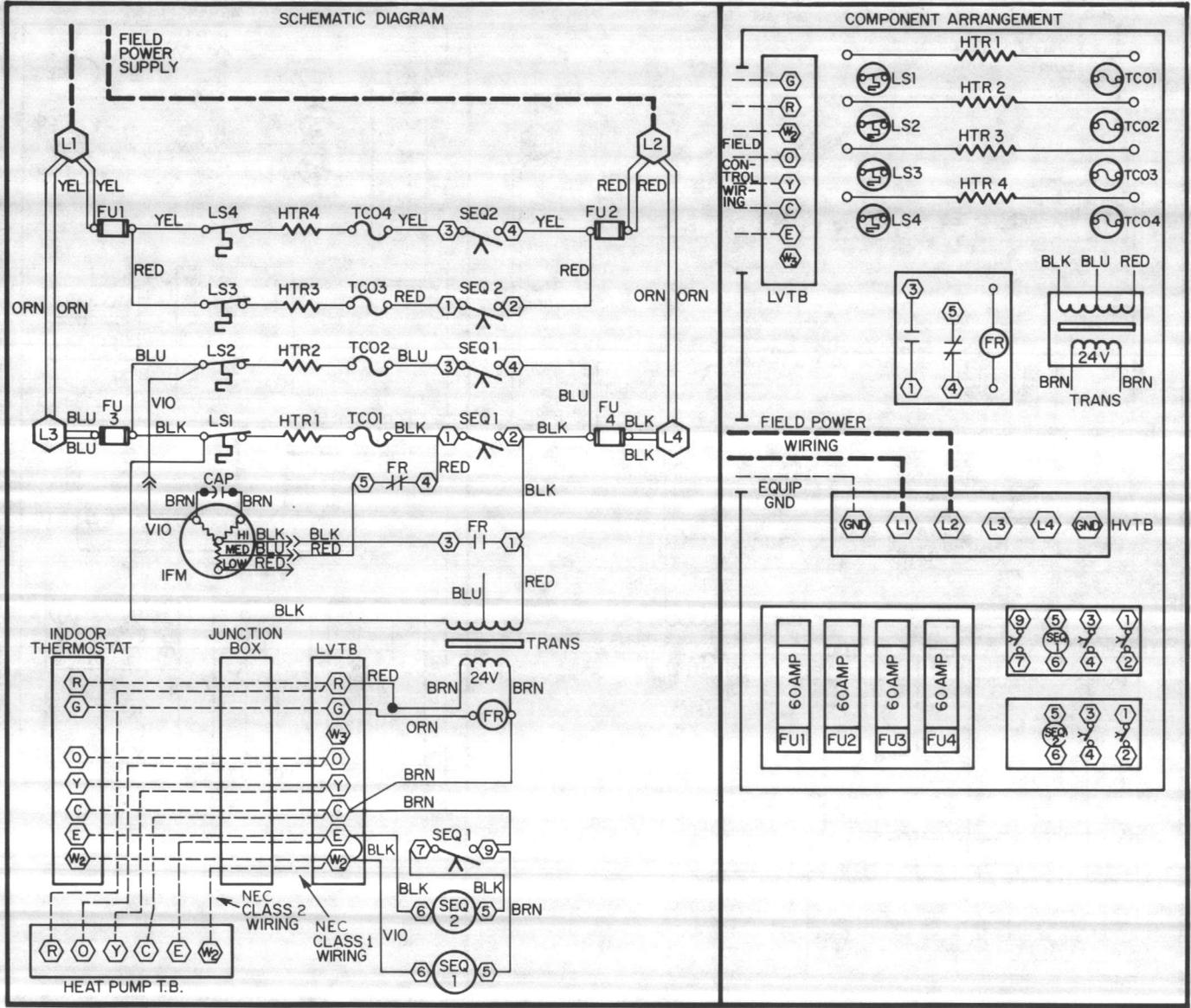


Fig. 5 – Label Diagram – 40AQ024310, 030310, 036310FE, GM; 208/240/1/60



- NOTES:
1. Suitable for use with copper only supply conductors rated 90 C minimum. For single circuit, use No. 2 AWG (2 wires). For dual circuits, use No. 6 AWG (4 wires).
 2. Use only dual element Class K fuses for replacement.
 3. Circuit breakers may be substituted where fuses are shown.
 4. Use Class 1 wire for control circuit field wiring within the fan coil unit.

Fig. 6 – Label Diagram – 40AQ030300, 036300, 030310, 036310JR; 208/240/1/60

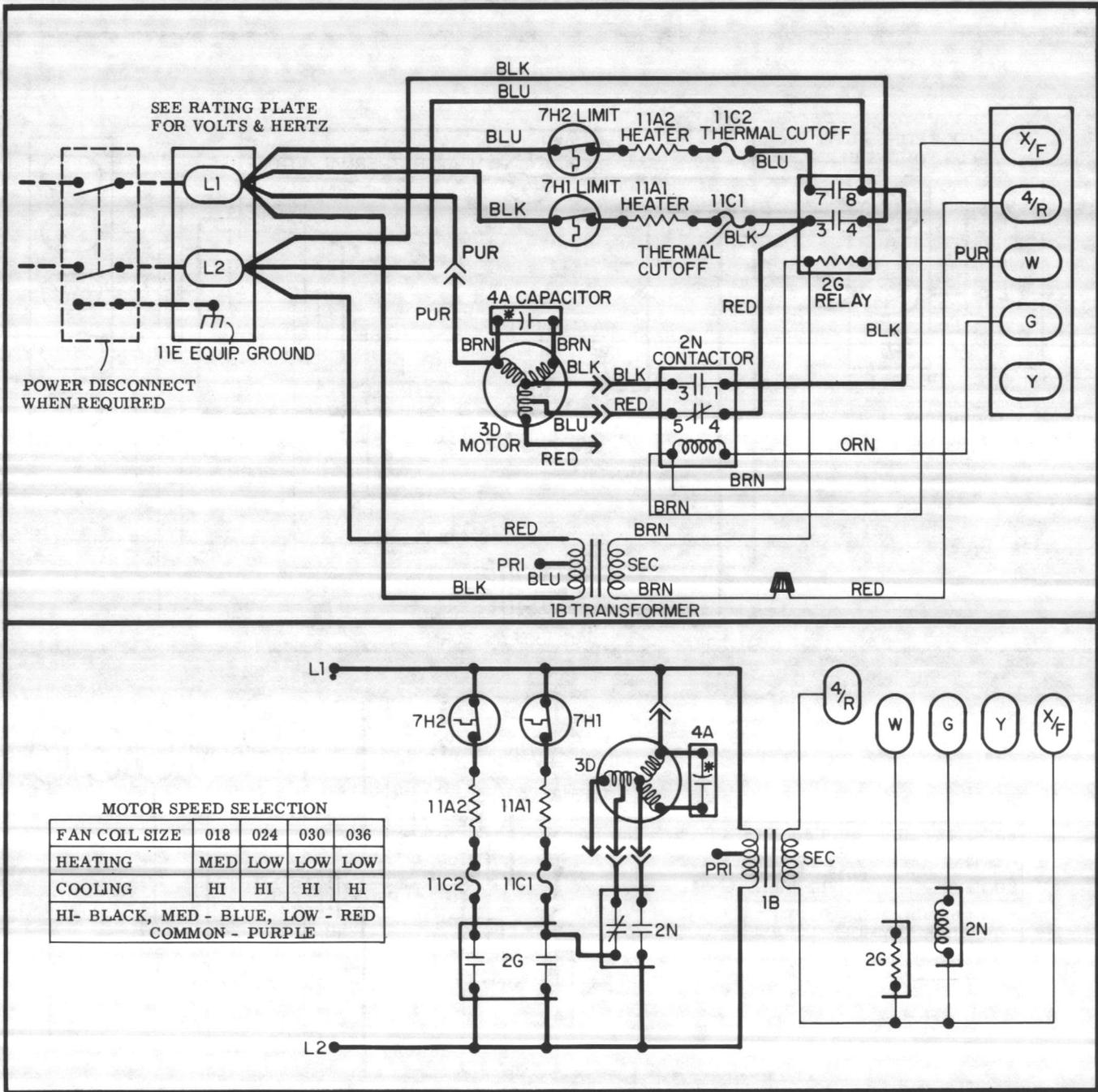
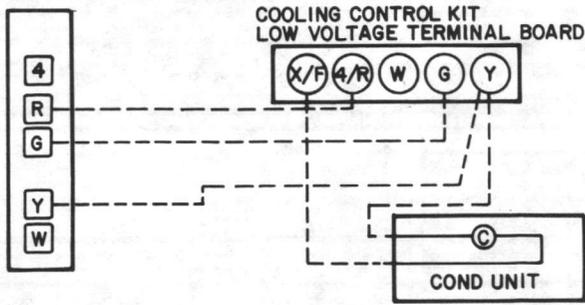


Fig. 8 - Label Diagram - 40AS018320, 024320, 030320, 036320DF, EH; 208/240/1/60

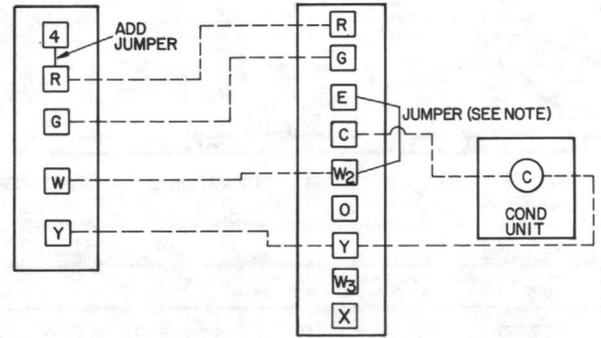
THERMOSTAT HHOIAD040 OR 042
WITH
HH93AZ040 OR 042 SUBBASE



ARRANGEMENT A – 40AS OR 40AQ WITH
CONDENSING UNIT. COOLING ONLY SYSTEM.
TRANSFORMER IN COOLING CONTROL KIT.

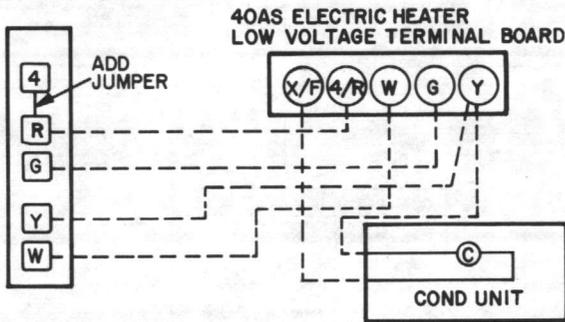
THERMOSTAT HHOIAD040 OR 042
WITH HH93AZ040 OR 042
SUBBASE

40AQ ELECTRIC HEATER (ALL MODELS)
LOW VOLTAGE TERMINAL BOARD



ARRANGEMENT C – 40AQ WITH CONDENSING UNIT.
COOLING AND ONE-STAGE HEATING SYSTEM.
TRANSFORMER IN ELECTRIC HEATER.

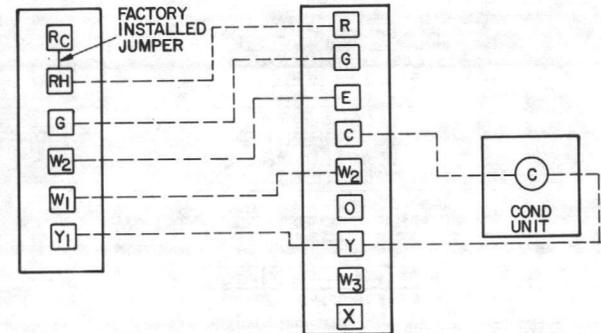
THERMOSTAT HHOIAD040 OR 042
WITH
HH93AZ040 OR 042 SUBBASE



ARRANGEMENT B – 40AS WITH CONDENSING UNIT.
COOLING AND ONE-STAGE HEATING SYSTEM.
TRANSFORMER IN ELECTRIC HEATER.

THERMOSTAT HH07AT070
SUBBASE HH93AZ080

40AQ ELECTRIC HEATER
(2-STAGE MODELS)
LOW VOLTAGE TERMINAL BOARD

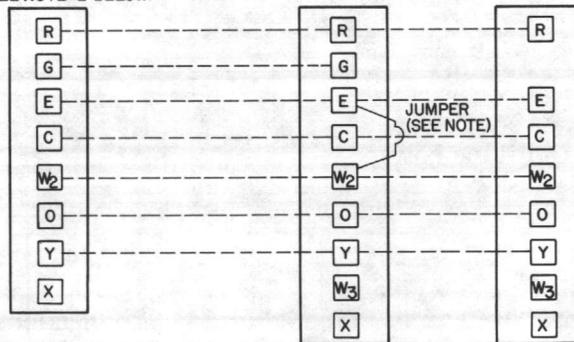


ARRANGEMENT D – 40AQ WITH CONDENSING UNIT.
COOLING AND 2-STAGE HEATING SYSTEM.
TRANSFORMER IN ELECTRIC HEATER.

THERMOSTAT HH07AT071 WITH
HH93AZ073 (AUTOMATIC
CHANGEOVER) OR HH93AZ075
(MANUAL CHANGEOVER) SUBBASE.
SEE NOTE 2 BELOW.

40AQ ELECTRIC HEATER
(ALL MODELS)
LOW VOLTAGE
TERMINAL BOARD

38CQ
(HEAT PUMP)
TERMINAL
BOARD



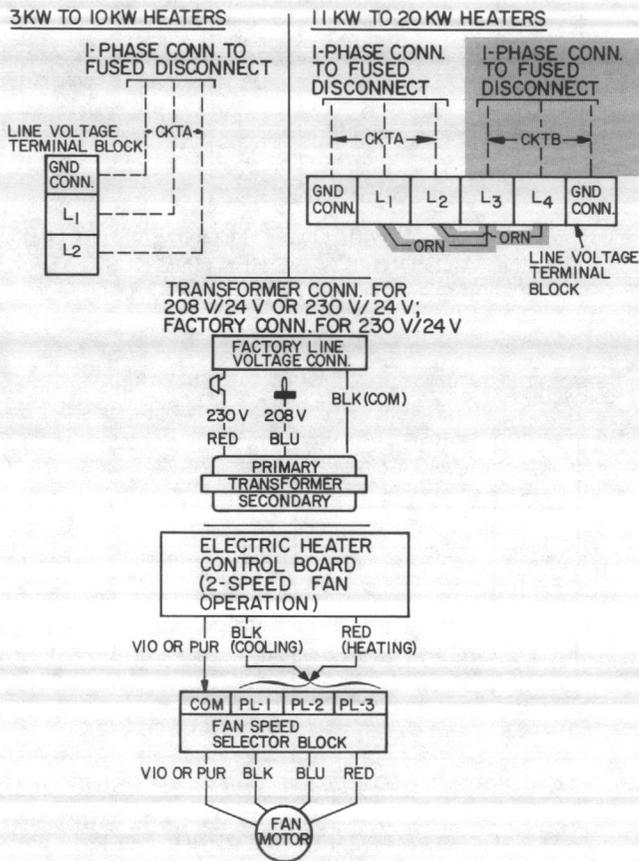
ARRANGEMENT E – 40AQ WITH HEAT PUMP.
COOLING AND 2-STAGE HEATING SYSTEM (see Note 1
below). TRANSFORMER IN ELECTRIC HEATER.

C – Contactor
--- Field Wiring
— Factory Wiring

NOTES:

1. The 40AQ electric heaters may be wired for 2 separate stages of electric heat by removing jumper wire shown above and installing an outdoor thermostat. See 38CQ Heat Pump Installation Instructions for wiring diagrams.
2. Thermostat/Subbase package numbers: 38CQ900081 for HH07AT071/HH93AZ073 (Automatic Changeover); 38CQ900111 for HH07AT071/HH93AZ075 (Manual Changeover).

Fig. 11 – Control Wiring Connections



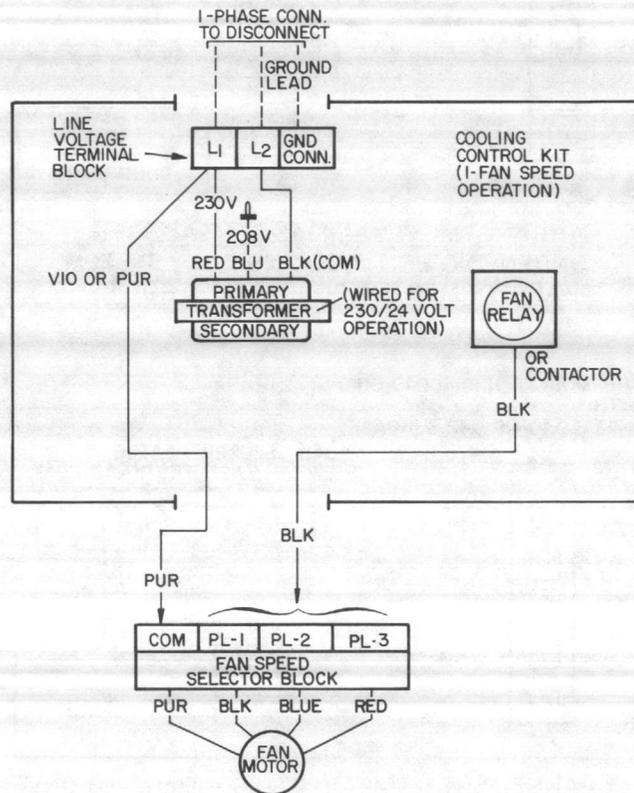
SELECTOR BLOCK TERMINATIONS

COM - Common	PL-3 - Low
PL-1 - High	-
PL-2 - Medium	-

- Splice Conn.
- Field Wiring
- Factory Wiring

When 2 line power circuits are required, remove orange jumpers and connect a second fused disconnect to L₃, L₄ and ground connection. See Heater Electrical Data table in Installation, Start-Up and Service Instructions.

Fig. 12 - Heating and Cooling Unit Line Power Connections



SELECTOR BLOCK TERMINATIONS

COM - Common	PL-3 - Low
PL-1 - High	-
PL-2 - Medium	-

- Field Wiring
- Factory Wiring

Fig. 13 - Cooling Unit Line Power Connections

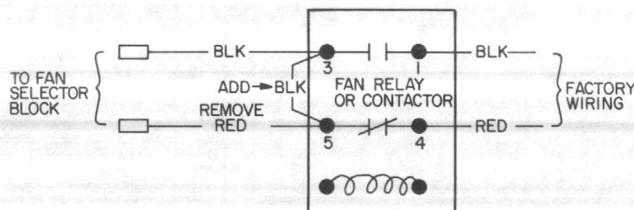


Fig. 14 - Connections for Single-Speed Fan Operation

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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Number One
Air Conditioning
Maker

Division of
Carrier Corporation

SPECIFIED PARTS

40AQ

018-036

INTRODUCTION

This catalog presents the most commonly used replacement parts for the new standard 40AQ Indoor Encased Fan Coil Units and is not applicable to special units.

NOTE: Supersedes previous catalog dated 4/76

ORDERING INSTRUCTIONS

- A. All orders and inquiries should include the complete model and serial number of the unit on which the parts are to be used, and the part number and description of each part.
- B. Dealers should forward orders to their CAC Distributor.
- C. Distributors should forward orders to:
 - Carrier Air Conditioning Co.
 - Parts Center
 - P. O. Box 4802
 - Syracuse, New York 13221

GENERAL NOTES

- (1) Casing parts and panels are not normally stocked, but are available upon request while in production. Requests for casing parts and panels, for units no longer in production, must be cleared through the CAC Parts Center for availability prior to submitting an order.

Certain "sheet metal" parts are omitted in the interest of simplicity as orders for them are so infrequent that a simple description of the part, plus the model and serial number of the unit, will be acceptable.

- (2) Complete "Accessory Packages" or "F.I.O.P.'s (Factory Installed Option Plan) are not normally stocked or supplied by the CAC Parts Center. (Refer to "Master Price Pages" and order from: Carrier Air Conditioning Co., Order Dept.)

Accessory Packages and F.I.O.P.'s are listed in this catalog only for reference and to assist in the selection and ordering of components.

- (3) The replacement parts listed in this catalog are "Carrier Specified Parts" and, as a result of "standardization", may not be identical to the original part furnished on the equipment.

- (4) Letter designations (appearing in the LDC column preceding the part number column) are used throughout this catalog to represent the classification of those parts. These letter designations are listed below for ease of interpretation and identification.

AC -- Available Component

AP -- Accessory Package

CD -- Contact your authorized CAC Distributor for procurement information.

FIOP -- Factory Installed Option Plan

FF -- Field Fabricate

MP -- Multiple Package -- Order sufficient number of packages to meet the unit requirements listed in the "Used On" column.

NA -- Part is Not Available.

NP -- New Part or Item

NS -- Not Stocked

NSS -- Not Sold Separately -- Order complete assembly.

PT -- Available in Packages of Twelve Only. Add suffix -012 to part number when ordering.

- (5) Letter designation (NI) appearing in the Item No. column indicates that the item is not illustrated in the illustration.

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Carrier

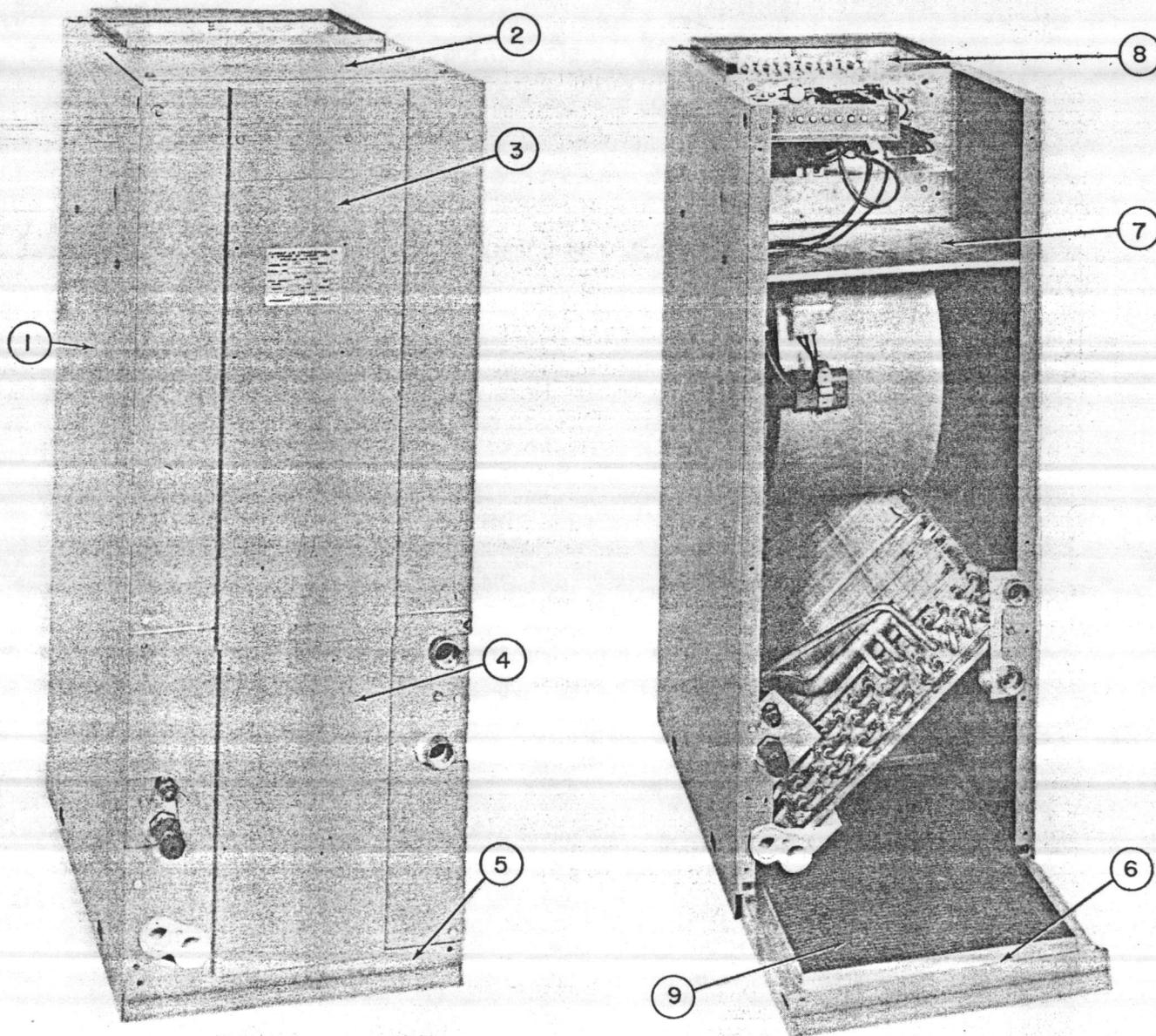
Number One
Air Conditioning
Maker

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40AQ

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Number One
Air Conditioning
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Carrier Corporation

SPECIFIED PARTS

40AQ

018-036

ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
				0	0	0	0
				1	2	3	3
				8	4	0	6
CASING AND FILTER GROUP							
1	Wrapper Assembly	NS	40AS73118LA5	1			
		NS	40AS73118LA6		1		
		NS	40AS680027			1	
		NS	40AS680032				1
2	Top Cover Assembly	NS	40AS73107LA5	1			
		NS	40AS73107LA6		1		
		NS	40AS73107LA7			1	
		NS	40AS73107LA8				1
3	Front Door Assembly	NS	40AS73114LA5	1			
		NS	40AS680029		1		
		NS	40AS680030			1	
		NS	40AS680031				1
4	Coil Door Assembly	NS	40AS73117LA37	1			
		NS	40AS73117LA6		1		
		NS	40AS73117LA7			1	
		NS	40AS73118LA8				1
5	Filter Cover Assembly	NS	40AS73120LA5	1			
		NS	40AS73120LA6		1		
		NS	40AS73120LA7			1	
		NS	40AS73120LA8				1
6	Filter Rack Assembly	NS	40AS73104LA1	1			
		NS	40AS73104LA2		1		
		NS	40AS73104LA3			1	
		NS	40AS73104LA4				1
7	Blower Deck	NS	40AS73109AP1	1			
		NS	40AS73109AP2		1		
		NS	40AS73109AP3			1	
		NS	40AS73109AP4				1
8	Heat Shield	NS	40AS73110AP1	1			
		NS	40AS73110AP2		1		
		NS	40AS73110AP3			1	
		NS	40AS73110AP4				1
9	Air Filter - 11-3/4 x 21-1/4 x 1	CD		1			
	14 x 21-1/4 x 1	CD			1		
	16-5/8 x 21-1/4 x 1	CD				1	
	20-3/8 x 21-1/4 x 1	CD					1
NI/10	Touch-up Paint (Malibu Beige)	NS	PS-1126-108				

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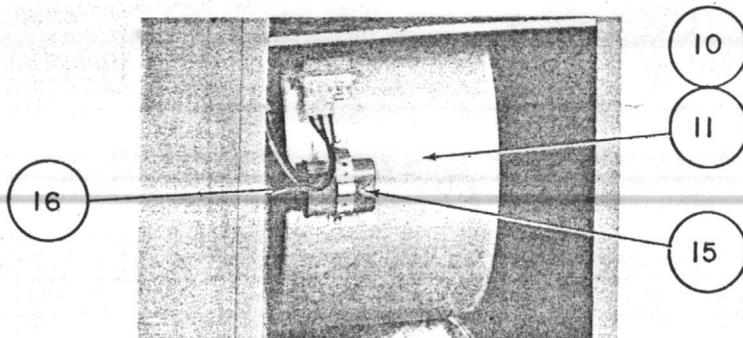
ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
				0	0	0	0
				1	2	3	3
				8	4	0	6

BLOWER AND MOTOR GROUP

10	Complete Blower and Housing Assembly Includes: Motor, Blower Wheel, Capacitor, Motor Arm, Motor Band, Housing and Cut-Off	NS	40AS73147LA2	1			
		NS	40AS73147LA3		1		
		NS	40AS73147LA4			1	
		NS	40AS73147LA5				1
11	Housing Assembly	NS	40AS73143LA1	1			
		NS	40AS73143LA2		1		
		NS	40AS73143LA3			1	
		NS	40AS73143LA5				1
NI/12	Housing Air Cut-Off	NS	40AS73130BP1	1			
		NS	40AS73130BP2		1		
		NS	40AS73130BP3			1	
		NS	40AS73130BP4				1
NI/13	Blower Wheel - 1/2" Bore; 48 Blades; 11-1/8 OD x 4-1/2 W - 1/2" Bore; 48 Blades; 11-1/8 OD x 6 W - 1/2" Bore; 48 Blades; 11-1/8 OD x 7-1/8 W - 1/2" Bore; 48 Blades; 11-1/8 OD x 8 W	AC	LA22XC-040	1			
		AC	LA22XC-060		1		
		AC	LA22LB-112			1	
		AC	LA22XC-100				1
NI/14	Blower Motor - 1/8 HP; 230-1-60; 1075 RPM 1/4 HP; 230-1-60; 1075 RPM 1/3 HP; 208/230-1-60; 1075 RPM	AC	HC35SE-230	1			
		AC	HC39SE-230		1		
		AC	HC41SE-231			1	1
15	Run Capacitor - 7.5 Mfd; 370 Volt 5 Mfd; 440 Volt	AC	HC90AB-007	1			
		AC	HC90BB-005		1	1	1
16	Boot (Run Capacitor)	AC	HC97ZZ-071	1	1	1	1
NI/17	Motor Mounting Band	AC	HC98ZZ-420	1	1		
		AC	HC98ZZ-480			1	1
17A	Motor Plug, 5 Circuit	AC	58GA680115	1	1	1	1
NI/18	Motor Mounting Arm	AC	40AS69600CP06	1	1		
		AC	40AS69600CP05			1	1

ELECTRICAL GROUP (COOLING CONTROL)

NI/19	Transformer - Primary 200/230V; Secondary 24V (60VA)	AC	HT01AW-230	1	1	1	1
NI/20	Relay (Fan)	AC	HN61KK-911	1	1	1	1
NI/21	Terminal Block (Power) - 2 Connectors	AC	HY84FE-302	1	1	1	1
NI/22	Terminal Board - Markings W3,E,C,Y,O,W2,R,G	AC	HY84HA-058	1	1	1	1





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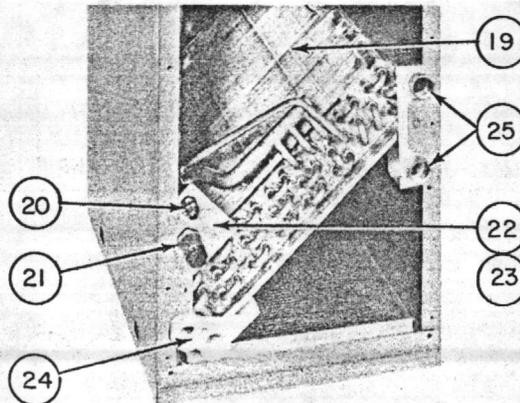
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40AQ

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ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
				0	0	0	0
				1	2	3	3
				8	4	0	6
COIL AND PIPING GROUP							
19	Evaporator Coil Assembly Includes:	AC	40AQ680010	1			
20	Accu-Rater Body - Liquid 3/8" Includes:	AC					
	Seal Ring - 3/8"	PT	(1) 99CC501052				
	Locknut - 3/8"	AC	(1) 99CC501073				
	Plug - 3/8"	AC	(1) KA61ZA-066				
21	Suction Fitting - 5/8" Includes:	AC	(1) 99CC402193				
	Seal Ring - 5/8"	PT	(1) 99CC501062				
	Locknut - 5/8"	AC	(1) 99CC501053				
	Plug - 5/8"	AC	(1) KA61ZA-067				
	Strainer Insert	AC	(1) KH11HH-066				
22	Bracket - Coupling	NS	(1) 28GS500233				
23	Bracket - Retainer	NS	(1) 28GS500162				
NI/23A	Flare Nut - 3/8"	AC	DD02CA-101	1	1	1	1
NI/23B	By-Pass Accu-Rater Piston Package Includes:	AC	38CQ660014-006	1			
	Piston - Ident. #11	NSS	(6) 99CC509912				
NI/23C	By-Pass Accu-Rater Piston Retainer Package Includes:	AC	38CQ660030-006	1			
	Piston Retainer	NSS	(6) 99CC409892				
24	Condensate Pan (Lower)	AC	28MC500384	1	1	1	1
25	Condensate Pan Assembly (Upper)	NS	28MC400644	1	1	1	1
NI/26	Shield (Condensate Pan)	NS	28MC500494	1	1	1	1



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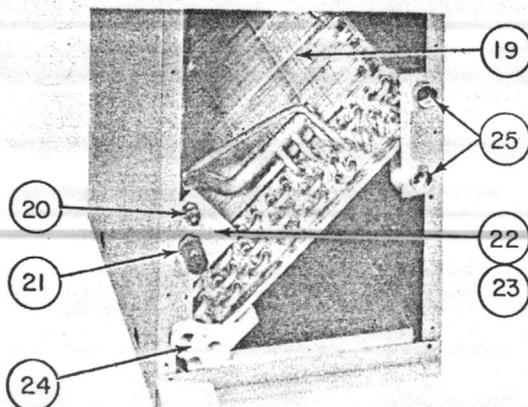
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40AQ

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ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
				0	0	0	0
				1	2	3	3
				8	4	0	6
COIL AND PIPING GROUP							
19	Evaporator Coil Assembly Includes:	AC	28MQ400014		1		
20	Accu-Rater Body - Liquid 3/8" (1) 99CC502363	AC					
	Strainer Insert (1) KH11HH-066	AC					
21	Suction Fitting - 5/8" (1) 99CC402193	AC					
	Includes:						
	Seal Ring - 5/8" (1) 99CC501062	PT					
	Locknut - 5/8" (1) 99CC501053	AC					
	Plug - 5/8" (1) KA61AZ-067	AC					
22	Coupling Bracket (1) 28GS400712	NS					
23	Coupling Retainer (1) 28GS400662	NS					
19	Evaporator Coil Assembly	AC	28MQ400024			1	
	Includes:						
20	Accu-Rater Body - Liquid 3/8" (1) 99CC502363	AC					
	Strainer Insert (1) KH11HH-066	AC					
21	Suction Fitting - 3/4" (1) 99CC402203	AC					
	Includes:						
	Seal Ring - 3/4" (1) 99CC501072	PT					
	Locknut - 3/4" (1) 99CC501043	AC					
	Plug - 3/4" (1) KA61ZA-067	AC					
22	Coupling Bracket (1) 28GS400702	NS					
23	Coupling Retainer (1) 28GS400672	NS					
NI/23A	Flare Nut - 3/8"	AC	DD02CA-101	1	1	1	1
NI/23B	By-Pass Accu-Rater Piston Package	AC	38CQ660007-006		1		
	Includes:						
	Piston - Ident. #2 (6) 99CC509812	NSS					
NI/23B	By-Pass Accu-Rater Piston Package	AC	38CQ660009-006			1	
	Includes:						
	Piston - Ident. #4 (6) 99CC509832	NSS					
NI/23C	By-Pass Accu-Rater Piston Retainer Package	AC	38CQ660031-006		1	1	
	Includes:						
	Piston Retainer (6) 99CC409892	NSS					
24	Condensate Pan (Lower)	AC	28MC500384	1	1	1	1
25	Condensate Pan Assembly (Upper)	NS	28MC400644	1	1	1	1
NI/26	Shield (Condensate Pan)	NS	28MC500494	1	1	1	1





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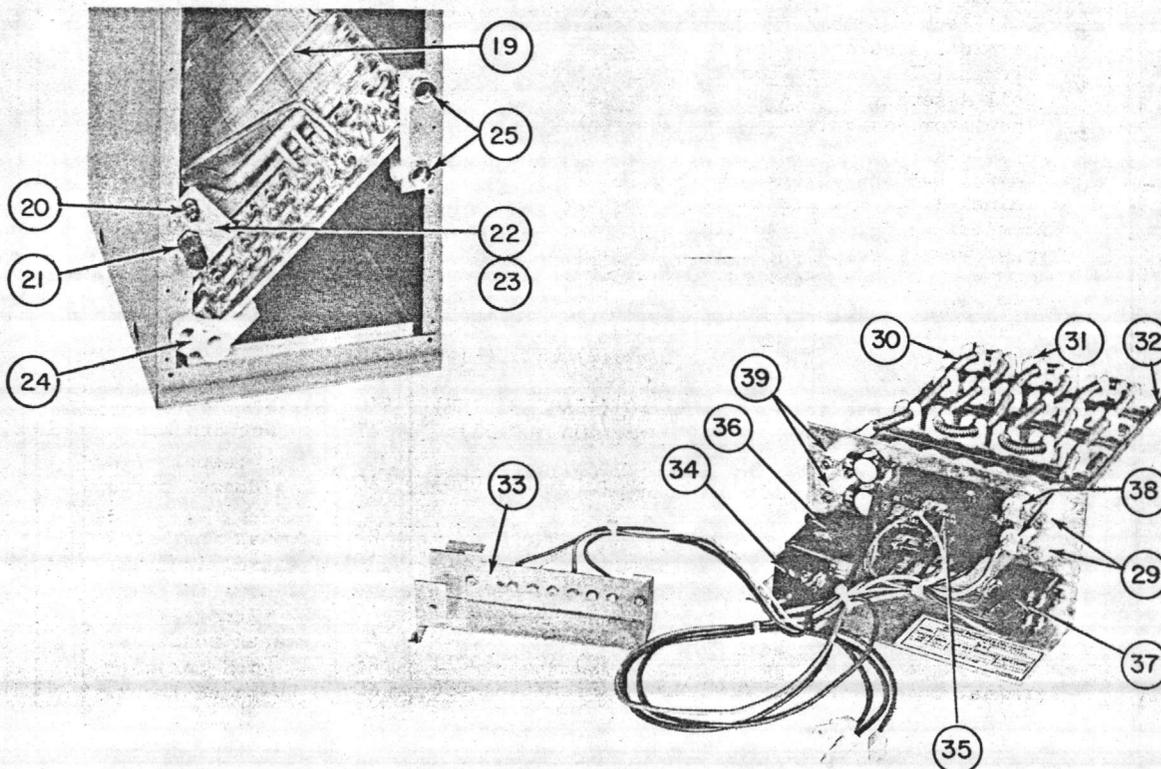
40AQ

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ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
				0	0	0	0
				1	2	3	3
				8	4	0	6

COIL AND PIPING GROUP (CONT'D.)

19	Evaporator Coil Assembly Includes:		28MQ400034				1
20	Accu-Rater Body - Liquid 3/8"	(1) 99CC502363	AC				
21	Suction Fitting - 3/4" Includes:	(1) 99CC402203	AC				
	Seal Ring - 3/4"	(1) 99CC501072	PT				
	Locknut - 3/4"	(1) 99CC501043	AC				
	Plug - 3/4"	(1) KA61ZA-067	AC				
22	Coupling Bracket	(1) 28GS400702	NS				
23	Coupling Retainer	(1) 28GS400672	NS				
NI/23A	Flare Nut - 3/8"		AC	DD02CA-101			1
NI/23B	By-Pass Accu-Rater Piston Package Includes:		AC	38CQ660010-006			1
	Piston - Ident. #6	(6) 99CC509852	NSS				
NI/23C	By-Pass Accu-Rater Piston Retainer Package Includes:		AC	38CQ660031-006			1
	Piston Retainer	(6) 99CC409892	NSS				



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ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
				0	0	0	0
				1	2	3	3
				8	4	0	6
FUSED FIOP GROUP							
27	Electric Heater Ass'y- <u>5KW</u> ; 240-1-60 (40AQ018301CD) (40AQ900131)	FIOP AP	Not Stocked Not Stocked	1 1			
	Each Includes:						
	Element Assembly (1) 40AQ680001	NS					
	Includes:						
	Coil Rack Assembly (1) 40AS680012	NS					
NI/28	Terminal Insulator (Male) (2) 50MH680016	AC					
29	Terminal Insulator (Female) (2) 50MH680017	AC					
30	Coil Assembly (1) 40AS680017	AC					
31	Insulator Assembly (3) 40AS680019	AC					
32	Mounting Bar (1) 40AS680011	NS					
33	Terminal Board-W3,E,C,Y,O,W2,R,G (1) HY84HA-058	AC					
34	Terminal Block - 2 Terminals (1) HY84FE-302	AC					
35	Sequencer (1) HN67BD-002	AC					
36	Transformer - Primary 200/230V Secondary 24V (1) HT01AW-230 (60VA)	AC					
37	Relay (Fan) (1) HN61KK-911	AC					
38	Fusible Link (1) HHI2680002	AC					
39	Limit Switch (1) HHI19ZA-175	AC					
27	Electric Heater Ass'y- <u>7.5KW</u> ; 240-1-60 (40AQ018301DF) (40AQ900141)	FIOP AP	Not Stocked Not Stocked	1 1			
	Each Includes:						
	Element Assembly (1) 40AQ680002	NS					
	Includes:						
	Coil Rack Assembly (1) 40AS680013	NS					
NI/28	Terminal Insulator (Male) (4) 50MH680016	AC					
29	Terminal Insulator (Female) (4) 50MH680017	AC					
30	Coil Assembly (2) 40AS680018	AC					
31	Insulator Assembly (6) 40AS680019	AC					
32	Mounting Bar (2) 40AS680011	NS					
33	Terminal Board-W3,E,C,Y,O,W2,R,G (1) HY84HA-058	AC					
34	Terminal Block - 2 Terminals (1) HY84FE-302	AC					
35	Sequencer (1) HN67BD-002	AC					
36	Transformer - Primary 200/230V Secondary 24V (1) HT01AW-230 (60VA)	AC					
37	Relay (Fan) (1) HN61KK-911	AC					
38	Fusible Link (2) HHI2680001	AC					
39	Limit Switch (2) HHI19ZA-140	AC					
27	Electric Heater Ass'y- <u>10KW</u> ; 240-1-60 (40AQ018301EH) (40AQ900151)	FIOP AP	Not Stocked Not Stocked	1 1			
	Each Includes:						
	Element Assembly (1) 40AQ680003	AC					
	Includes:						
	Coil Rack Assembly (1) 40AS680014	NS					
NI/28	Terminal Insulator (Male) (4) 50MH680016	AC					
29	Terminal Insulator (Female) (4) 50MH680017	AC					
30	Coil Assembly (2) 40AS680017	AC					
31	Insulator Assembly (12) 40AS680019	AC					
32	Mounting Bar (2) 40AS680011	NS					
33	Terminal Board-W3,E,C,Y,O,W2,R,G (1) HY84HA-058	AC					
34	Terminal Block - 2 Terminals (1) HY84FE-302	AC					
35	Sequencer (1) HN67BD-002	AC					
36	Transformer - Primary 200/230V Secondary 24V (1) HT01AW-230 (60VA)	AC					
37	Relay (Fan) (1) HN61KK-911	AC					
38	Fusible Link (1) HHI2680002	AC					
39	Limit Switch (1) HHI19ZA-140	AC					



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				0	0	0	0
				1	2	3	3
				8	4	0	6
FUSED FIOP GROUP							
27	Electric Heater Ass'y- <u>5KW</u> ; 240-1-60 (40AQ024301CD) (40AQ900011)	FIOP AP	Not Stocked Not Stocked				1 1
	Each Includes:						
	Element Assembly (1) 40AQ680001	NS					
	Includes:						
	Coil Rack Assembly (1) 40AS680012	NS					
NI/28	Terminal Insulator (Male) (2) 50MH680016	AC					
29	Terminal Insulator (Female) (2) 50MH680017	AC					
30	Coil Assembly (1) 40AS680017	AC					
31	Insulator Assembly (3) 40AS680019	AC					
32	Mounting Bar (2) 40AS680011	NS					
33	Terminal Board-W3,E,C,Y,O,W2,R,G (1) HY84HA-058	AC					
34	Terminal Block - 2 Connectors (1) HY84FE-302	AC					
35	Sequencer (1) HN67BD-002	AC					
36	Transformer - Primary 200/230V (1) HT01AW-230 Secondary 24V (60VA)	AC					
37	Relay (Fan) (1) HN61KK-911	AC					
38	Fusible Link (1) HH12680002	AC					
39	Limit Switch (1) HH19ZA-140	AC					
27	Electric Heater Ass'y- <u>7.5KW</u> ;240-1-60 (40AQ024301DF) (40AQ900021)	FIOP AP	Not Stocked Not Stocked				1 1
	Each Includes:						
	Element Assembly (1) 40AQ680002	NS					
	Includes:						
	Coil Rack Assembly (1) 40AS680013	NS					
NI/28	Terminal Insulator (Male) (4) 50MH680016	AC					
29	Terminal Insulator (Female) (4) 50MH680017	AC					
30	Coil Assembly (2) 40AS680018	AC					
31	Insulator Assembly (6) 40AS680019	AC					
32	Mounting Bar (2) 40AS680011	NS					
33	Terminal Board-W3,E,C,Y,O,W2,R,G (1) HY84HA-058	AC					
34	Terminal Block - 2 Connectors (1) HY84FE-302	AC					
35	Sequencer (1) HN67BD-002	AC					
36	Transformer - Primary 200/230V (1) HT01AW-230 Secondary 24V (60VA)	AC					
37	Relay (Fan) (1) HN61KK-911	AC					
38	Fusible Link (2) HH12680002	AC					
39	Limit Switch (2) HH19ZA-140	AC					
27	Electric Heater Ass'y- <u>10KW</u> ; 240-1-60 (40AQ024301EH) (40AQ900031)	FIOP AP	Not Stocked Not Stocked				1 1
	Each Includes:						
	Element Assembly (1) 40AQ680003	NS					
	Includes:						
	Coil Rack Assembly (1) 40AS680014	NS					
NI/28	Terminal Insulator (Male) (4) 50MH680016	AC					
29	Terminal Insulator (Female) (4) 50MH680017	AC					
30	Coil Assembly (2) 40AS680017	AC					
31	Insulator Assembly (12) 40AS680019	AC					
32	Mounting Bar (2) 40AS680011	NS					
33	Terminal Board-W3,E,C,Y,O,W2,R,G (1) HY84HA-058	AC					
34	Terminal Block - 2 Connectors (1) HY84FE-302	AC					
35	Sequencer (1) HN67BD-002	AC					
36	Transformer - Primary 200/230V (1) HT01AW-230 Secondary 24V (60VA)	AC					
37	Relay (Fan) (1) HN61KK-911	AC					
38	Fusible Link (2) HH12680002	AC					
39	Limit Switch (2) HH19ZA-140	AC					

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USED ON 40AQ

0	0	0	0
1	2	3	3
8	4	0	6

ITEM
NO.

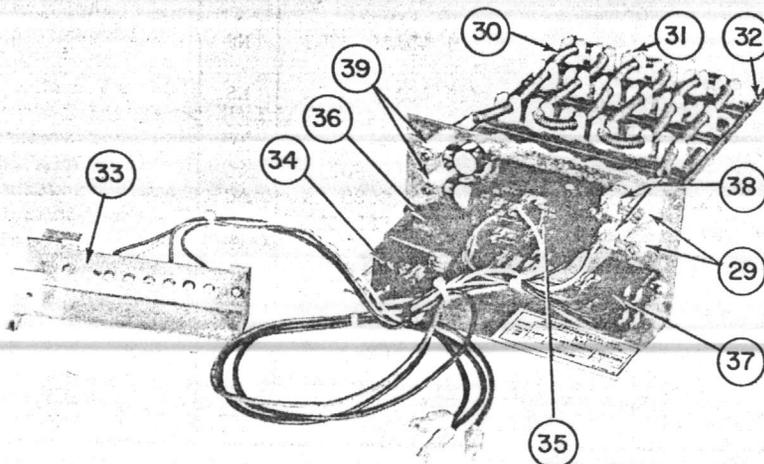
PART NAME

LDC

REPLACEMENT
PART NUMBER

FUSED FIOP GROUP (CONT'D.)

27	Electric Heater Ass'y-12KW; 240-1-60 (40AQ02430IFE) (40AQ900091)	FIOP AP	Not Stocked Not Stocked	1 1
	Each Includes:			
	Element Assembly - 7KW	(1) 40AQ680004	NS	
	Includes:			
	Coil Rack Assembly	(1) 40AQ680006	NS	
NI/28	Terminal Insulator (Male)	(4) 50MH680016	AC	
29	Terminal Insulator (Female)	(4) 50MH680017	AC	
30	Coil Assembly	(2) 40AQ680005	AC	
31	Insulator Assembly	(6) 40AS680019	AC	
32	Mounting Bar	(2) 40AS680011	NS	
	Element Assembly - 5KW	(1) 40AS680010	NS	
	Includes:			
	Coil Rack Assembly	(1) 40AS680016	NS	
NI/28	Terminal Insulator (Male)	(2) 50MH680016	AC	
29	Terminal Insulator (Female)	(2) 50MH680017	AC	
30	Coil Assembly	(1) 40AS680017	AC	
31	Insulator Assembly	(3) 40AS680019	AC	
32	Mounting Bar	(2) 40AS680011	NS	
33	Terminal Board-W3,E,C,Y,O,W2,R,G	(1) HY84HA-058	AC	
36	Transformer - Primary 200/230V Secondary 24V	(1) HT01AW-230 (60VA)	AC	
37	Relay (Fan)	(1) HN61KK-911	AC	
38	Fusible Link	(3) HHI2680002	AC	
39	Limit Switch	(3) HHI9ZA-140	AC	
NI/40	Sequencer -	(1) HN67BD-001	AC	
	Switch 1 - On Time 25 Sec. Off Time 90 Sec.			
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.			
NI/41	Sequencer -	(1) HN67BD-002	AC	
	Switch 1 - On Time 25 Sec. Off Time 65 Sec.			
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.			
NI/42	Branch Terminal Board-L1,L2,L3,L4	(1) HY84FE-069	AC	
NI/43	Fuse Block - 4 Holder	(1) HY11UM-460	AC	
NI/44	Fuse (60 Amp)	(2) HY10MJ-060	AC	
NI/45	Fuse (30 Amp)	(2) HY10NJ-300	AC	



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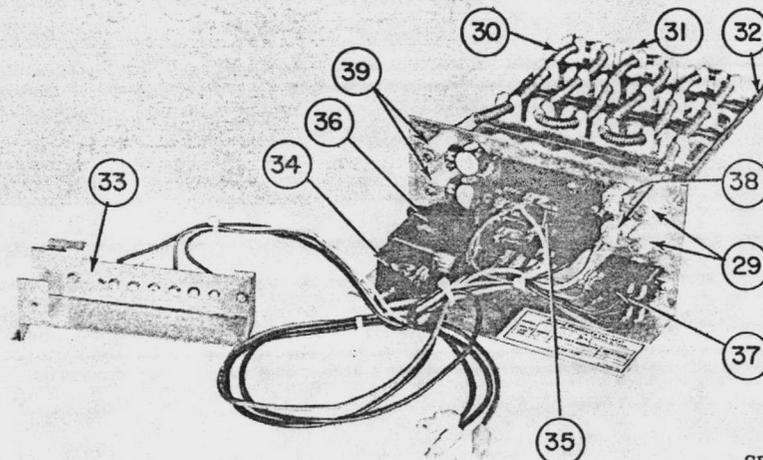
40AQ

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ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
				0	0	0	0
				1	2	3	3
				8	4	0	6

FUSED FIOP GROUP (CONT'D.)

27	Electric Heater Ass'y- <u>15KW</u> ; 240-1-60 (40AQ024301GM) (40AQ900051)	FIOP AP	Not Stocked Not Stocked	1 1			
	Each Includes:						
	Element Assembly - <u>10KW</u>	(1) 40AS680009	NS				
	Includes:						
	Rack Assembly	(1) 40AS680015	NS				
	Includes:						
NI/28	Terminal Insulator (Male)	(4) 50MH680016	AC				
29	Terminal Insulator (Female)	(4) 50MH680017	AC				
30	Coil Assembly	(2) 40AS680017	AC				
31	Insulator Assembly	(6) 40AS680019	AC				
32	Mounting Bar	(2) 40AS680011	NS				
	Element Assembly - <u>5KW</u>	(1) 40AS680010	NS				
	Includes:						
	Rack Assembly	(1) 40AS680016	NS				
	Includes:						
NI/28	Terminal Insulator (Male)	(2) 50MH680016	AC				
29	Terminal Insulator (Female)	(2) 50MH680017	AC				
30	Coil Assembly	(1) 40AS680017	AC				
31	Insulator Assembly	(3) 40AS680019	AC				
32	Mounting Bar	(2) 40AS680011	NS				
33	Terminal Board-W3,E,C,Y,O,W2,R,G	(1) HY84HA-058	AC				
36	Transformer - Primary 200/230V Secondary 24V	(1) HT01AW-230 (60VA)	AC				
37	Relay (Fan)	(1) HN61KK-911	AC				
38	Fusible Link	(3) HH12680002	AC				
39	Limit Switch	(3) HH19ZA-140	AC				
NI/40	Sequencer -	(1) HN67BD-001	AC				
	Switch 1 - On Time 25 Sec. Off Time 90 Sec.						
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/41	Sequencer -	(1) HN67BD-002	AC				
	Switch 1 - On Time 25 Sec. Off Time 65 Sec.						
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/42	Branch Terminal Board-L1,L2,L3,L4	(1) HY84FE-069	AC				
NI/43	Fuse Block (4 Holder)	(1) HY11UM-460	AC				
NI/44	Fuse (60 Amp)	(2) HY10MJ-060	AC				
NI/45	Fuse (30 Amp)	(2) HY10NJ-300	AC				



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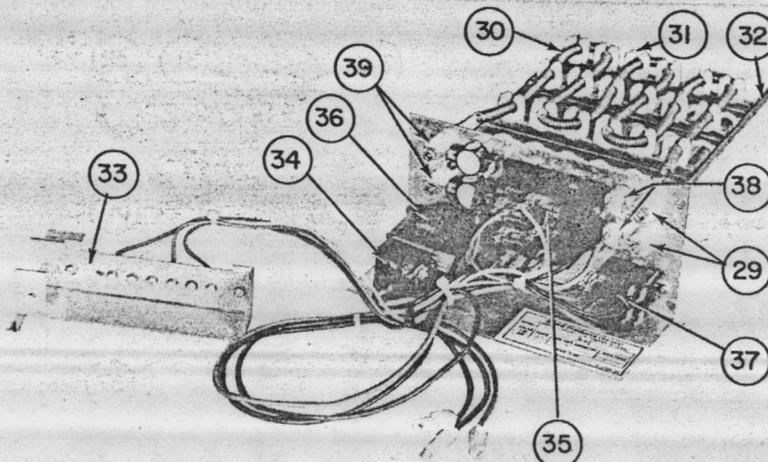
40AQ

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ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
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				1	2	3	3
				8	4	0	6

FUSED FIOP GROUP (CONT'D.)

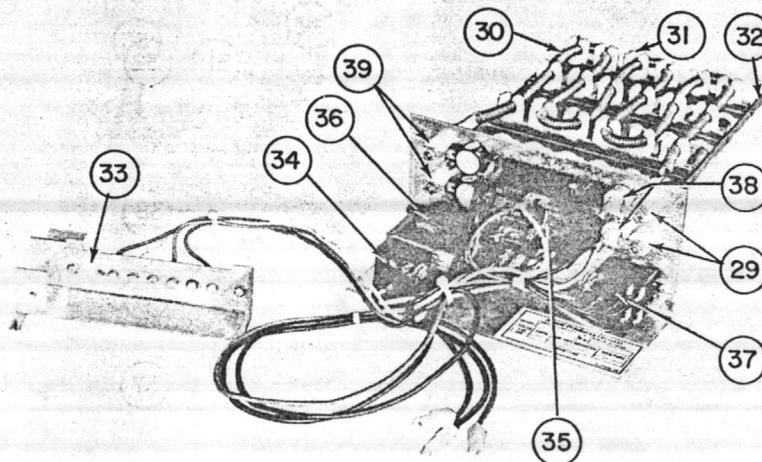
27	Electric Heater Ass'y-7.5KW;240-1-60 (40AQ030301DF) (40AQ036301DF)	FIOP FIOP	Not Stocked Not Stocked			1	1
	Each Includes: Element Assembly (1) 40AQ680002	NS					
	Includes: Coil Rack Assembly (1) 40AS680013	NS					
NI/28	Terminal Insulator (Male) (4) 50MH680016	AC					
29	Terminal Insulator (Female) (4) 50MH680017	AC					
30	Coil Assembly (2) 40AS680018	AC					
31	Insulator Assembly (6) 40AS680019	AC					
32	Mounting Bar (2) 40AS680011	NS					
33	Terminal Board-W3,E,C,Y,O,W2,R,G (1) HY84HA-058	AC					
34	Terminal Block - 2 Connectors (1) HY84FE-302	AC					
35	Sequencer (1) HN67BD-002	AC					
36	Transformer - Primary 200/230V Secondary 24V (1) HT01AW-230 (60VA)	AC					
37	Relay (Fan) (1) HN61KK-911	AC					
38	Fusible Link (2) HH12680002	AC					
39	Limit Switch (2) HH19ZA-140	AC					
27	Electric Heater Ass'y-10KW; 240-1-60 (40AQ030301EH) (40AQ036301EH)	FIOP FIOP	Not Stocked Not Stocked			1	1
	Each Includes: Element Assembly (1) 40AQ680003	NS					
	Includes: Coil Rack Assembly (1) 40AS680014	NS					
NI/28	Terminal Insulator (Male) (4) 50MH680016	AC					
29	Terminal Insulator (Female) (4) 50MH680017	AC					
30	Coil Assembly (2) 40AS680017	AC					
31	Insulator Assembly (12) 40AS680019	AC					
32	Mounting Bar (2) 40AS680011	NS					
33	Terminal Board-W3,E,C,Y,O,W2,R,G (1) HY84HA-058	AC					
34	Terminal Block - 2 Connectors (1) HY84FE-302	AC					
35	Sequencer (1) HN67BD-002	AC					
36	Transformer - Primary 200/230V Secondary 24V (1) HT01AW-230 (60VA)	AC					
37	Relay (Fan) (1) HN61KK-911	AC					
38	Fusible Link (2) HH12680002	AC					
39	Limit Switch (2) HH19ZA-140	AC					



ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
				0	0	0	0
				1	2	3	3
				8	4	0	6

FUSED FIOP GROUP (CONT'D.)

27	Electric Heater Ass'y- <u>12KW</u> ; 240-1-60 (40AQ030301FE) (40AQ036301FE)	FIOP FIOP	Not Stocked Not Stocked				1 1
	Each Includes: Element Assembly - <u>7KW</u>						
	Includes: Coil Rack Assembly	(1) 40AQ680004 NS					
NI/28	Terminal Insulator (Male)	(1) 40AQ680005 NS					
29	Terminal Insulator (Female)	(4) 50MH680016 AC					
30	Coil Assembly	(4) 50MH680017 AC					
31	Insulator Assembly	(2) 40AQ680006 AC					
32	Mounting Bar	(6) 40AS680019 AC					
	Element Assembly - <u>5KW</u>	(2) 40AS680011 NS					
	Includes: Coil Rack Assembly	(1) 40AS680010 NS					
NI/28	Terminal Insulator (Male)	(1) 40AS680016 NS					
29	Terminal Insulator (Female)	(2) 50MH680016 AC					
30	Coil Assembly	(2) 50MH680017 AC					
31	Insulator Assembly	(1) 40AS680017 AC					
32	Mounting Bar	(3) 40AS680019 AC					
33	Terminal Board-W3,E,C,Y,O,W2,R,G	(2) 40AS680011 NS					
36	Transformer - Primary 200/230V Secondary 24V	(1) HY84HA-058 AC					
37	Relay (Fan)	(1) HT01AW-230 AC					
38	Fusible Link	(60VA)					
39	Limit Switch	(1) HN61KK-911 AC					
NI/40	Sequencer - Switch 1 - On Time 25 Sec. Off Time 90 Sec.	(3) HH12680002 AC					
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.	(3) HH192A-140 AC					
NI/41	Sequencer - Switch 1 - On Time 25 Sec. Off Time 65 Sec.	(1) HN67BD-001 AC					
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/42	Branch Terminal Board-L1,L2,L3,L4	(1) HN67BD-002 AC					
NI/43	Fuse Block - 4 Holder	(1) HY84FE-069 AC					
NI/44	Fuse (60 Amp)	(1) HY11UM-460 AC					
NI/45	Fuse (30 Amp)	(2) HY10MJ-060 AC					
		(2) HY10NJ-300 AC					



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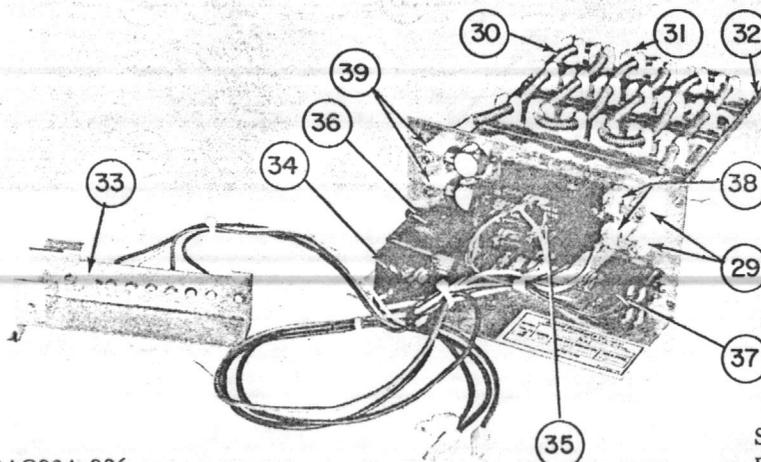
40AQ

018-036

ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
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				1	2	3	3
				8	4	0	6

FUSED FIOP GROUP (CONT'D.)

27	Electric Heater Ass'y-15KW; 240-1-60 (40AQ030301GM) (40AQ036301GM)	FIOP FIOP	Not Stocked Not Stocked				1 1
	Each Includes: Element Assembly - 10KW	(1) 40AS680009	NS				
	Includes: Rack Assembly	(1) 40AS680015	NS				
	Includes: Terminal Insulator (Male)	(4) 50MH680016	AC				
NI/28	Terminal Insulator (Female)	(4) 50MH680017	AC				
29	Coil Assembly	(2) 40AS680017	AC				
30	Insulator Assembly	(6) 40AS680019	AC				
31	Mounting Bar	(2) 40AS680011	NS				
32	Element Assembly - 5KW	(1) 40AS680010	NS				
	Includes: Rack Assembly	(1) 40AS680016	NS				
	Includes: Terminal Insulator (Male)	(2) 50MH680016	AC				
NI/28	Terminal Insulator (Female)	(2) 50MH680017	AC				
29	Coil Assembly	(1) 40AS680017	AC				
30	Insulator Assembly	(3) 40AS680019	AC				
31	Mounting Bar	(2) 40AS680011	NS				
32	Terminal Board-W3,E,C,Y,O,W2,R,G	(1) HY84HA-058	AC				
33	Transformer - Primary 200/230V	(1) HTO1AW-230	AC				
36	Secondary 24V	(60VA)					
37	Relay (Fan)	(1) HN61KK-911	AC				
38	Fusible Link	(3) HH12680002	AC				
39	Limit Switch	(3) HH19ZA-140	AC				
NI/40	Sequencer - Switch 1 - On Time 25 Sec. Off Time 90 Sec.	(1) HN67BD-001	AC				
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/41	Sequencer - Switch 1 - On Time 25 Sec. Off Time 65 Sec.	(1) HN67BD-002	AC				
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/42	Branch Terminal Board-L1,L2,L3,L4	(1) HY84FE-069	AC				
NI/43	Fuse Block - 4 Holder	(1) HY11UM-460	AC				
NI/44	Fuse (60 Amp)	(2) HY10MJ-060	AC				
NI/45	Fuse (30 Amp)	(2) HY10NJ-300	AC				



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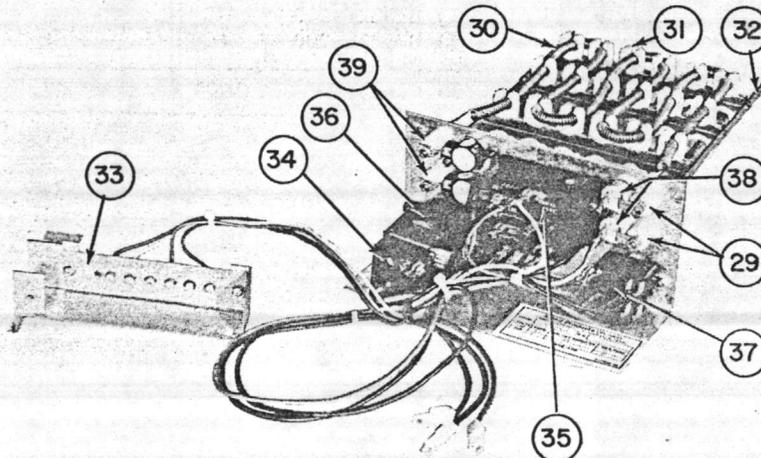
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40AQ

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ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
				0	0	0	0
				1	2	3	3
				8	4	0	6
FUSED FIOP GROUP (CONT'D.)							
27	Electric Heater Ass'y-20KW; 240-1-60 (40AQ030301JR) (40AQ036301JR)	FIOP FIOP	Not Stocked Not Stocked			1	1
	Each Includes:						
	Element Assembly - 10KW (2) 40AS680009	NS					
	Includes:						
	Rack Assembly (2) 40AS680015	NS					
	Includes:						
NI/28	Terminal Insulator (Male) (8) 50MH680016	AC					
29	Terminal Insulator (Female) (8) 50MH680017	AC					
30	Coil Assembly (4) 40AS680017	AC					
31	Insulator Assembly (12) 40AS680019	AC					
32	Mounting Bar (4) 40AS680011	NS					
33	Terminal Board-W3,E,C,Y,O,W2,R,G (1) HY84HA-058	AC					
36	Transformer - Primary 200/230V (1) HT01AW-230 Secondary 24V (60VA)	AC					
37	Relay (Fan) (1) HN61KK-911	AC					
38	Fusible Link (4) HH12680002	AC					
39	Limit Switch (4) HH19ZA-745	AC					
NI/40	Sequencer - (1) HN67BD-001	AC					
	Switch 1 - On Time 25 Sec. Off Time 90 Sec.						
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/41	Sequencer - (1) HN67BD-002	AC					
	Switch 1 - On Time 25 Sec. Off Time 65 Sec.						
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/42	Branch Terminal Board-L1,L2,L3,L4 (1) HY84FE-069	AC					
NI/43	Fuse Block - 4 Holder (1) HY11UM-600	AC					
NI/44	Fuse (60 Amp) (4) HY10MJ-060	AC					



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				0	0	0	0
				1	2	3	3
				8	4	0	6
CIRCUIT BREAKER FIOP GROUP							
NI/27A	Electric Heater Ass'y- <u>12KW</u> ; 240-1-60 (40AQ024311FE)	FIOP	Not Stocked			1	
	(40AQ030311FE)	FIOP	Not Stocked				1
	(40AQ036311FE)	FIOP	Not Stocked				1
	Each Includes:						
	Element Assembly - <u>7KW</u>	(1) 40AQ680004	NS				
	Includes:						
	Coil Rack Assembly	(1) 40AQ680005	NS				
NI/28	Terminal Insulator (Male)	(4) 50MH680016	AC				
29	Terminal Insulator (Female)	(4) 50MH680017	AC				
30	Coil Assembly	(2) 40AQ680006	AC				
31	Insulator Assembly	(6) 40AS680019	AC				
32	Mounting Bar	(2) 40AS680011	NS				
	Element Assembly - <u>5KW</u>	(1) 40AS680010	NS				
	Includes:						
	Coil Rack Assembly	(1) 40AS680016	NS				
NI/28	Terminal Insulator (Male)	(2) 50MH680016	AC				
29	Terminal Insulator (Female)	(2) 50MH680017	AC				
30	Coil Assembly	(1) 40AS680017	AC				
31	Insulator Assembly	(3) 40AS680019	AC				
32	Mounting Bar	(2) 40AS680011	NS				
33	Terminal Board-W3,E,C,Y,O,W2,R,G	(1) HY84HA-058	AC				
36	Transformer - Primary 200/230V Secondary 24V	(1) HT01AW-230 (60VA)	AC				
37	Relay (Fan)	(1) HN61KK-911	AC				
38	Fusible Link	(3) HH12680002	AC				
39	Limit Switch	(3) HH19ZA-140	AC				
NI/40	Sequencer -	(1) HN67BD-001	AC				
	Switch 1 - On Time 25 Sec. Off Time 90 Sec.						
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/41	Sequencer -	(1) HN67BD-002	AC				
	Switch 1 - On Time 25 Sec. Off Time 65 Sec.						
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/42	Branch Terminal Board-L1,L2,L3,L4	(1) HY84FE-069	AC				
NI/46	Circuit Breaker (30 Amp)	(1) HH83ZY-240	AC				
NI/47	Circuit Breaker (60 Amp)	(1) HH83ZY-200	AC				



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40AQ

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ITEM NO.	PART NAME	LDC	REPLACEMENT PART NUMBER	USED ON 40AQ			
				0	0	0	0
				1	2	3	3
				8	4	0	6
CIRCUIT BREAKER FIOP GROUP (CONT'D.)							
NI/27A	Electric Heater Ass'y-20KW; 240-1-60 (40AQ030311JR) (40AQ036311JR)	FIOP FIOP	Not Stocked Not Stocked			1	1
	Each Includes: Element Assembly - 10KW (2) 40AS680009	NS					
	Includes: Rack Assembly (2) 40AS680015	NS					
	Includes: Terminal Insulator (Male) (8) 50MH680016	AC					
NI/28	Terminal Insulator (Female) (8) 50MH680017	AC					
29	Coil Assembly (4) 40AS680017	AC					
30	Insulator Assembly (12) 40AS680019	AC					
31	Mounting Bar (4) 40AS680011	NS					
32	Terminal Board-W3,E,C,Y,O,W2,R,G (1) HY84HA-058	AC					
33	Transformer - Primary 200/230V (1) HT01AW-230	AC					
36	Secondary 24V (60VA)						
37	Relay (Fan) (1) HN61KK-911	AC					
38	Fusible Link (4) HH12680002	AC					
39	Limit Switch (4) HH192A-745	AC					
NI/40	Sequencer - (1) HN67BD-001	AC					
	Switch 1 - On Time 25 Sec. Off Time 90 Sec.						
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/41	Sequencer - (1) HN67BD-002	AC					
	Switch 1 - On Time 25 Sec. Off Time 90 Sec.						
	Switch 2 - On Time 45 Sec. Off Time 40 Sec.						
NI/42	Branch Terminal Board-L1,L2,L3,L4 (1) HH84FE-069	AC					
NI/47	Circuit Breaker (60 Amp) (2) HH83ZY-200	AC					

Direct-Expansion Fan-Coil Units

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SAFETY CONSIDERATIONS

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

Untrained personnel can perform basic maintenance functions of cleaning coils and 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.

DESCRIPTION AND USAGE

Use standard Models 40QB in cooling-only applications with accessory cooling controls or in heat pump systems with accessory electric heaters. Models 40QB are also available with factory-installed electric heaters for heat pumps or condensing units. Units consist of a coil with a condensate pan, 3-speed direct drive fan/motor assembly and filter section with a cleanable filter — all within an insulated cabinet.

Units must be used with ductwork. All models may be mounted in vertical upflow or horizontal left airflow arrangements. Downflow and horizontal right arrangements require field coil modification. Use accessory downflow kit for all downflow applications. Install units in conditioned or unconditioned spaces. All 40QB units are tested for installation in unconditioned space per ARI Standards (80 F [26.7 C] db, 75 F [23.9 C] wb indoor temperature; 80 F [26.7 C] db outdoor temperature).

IMPORTANT: When any fan coil is installed over a finished ceiling and/or living area, a secondary condensate pan must be installed under the entire unit. See Step 6.

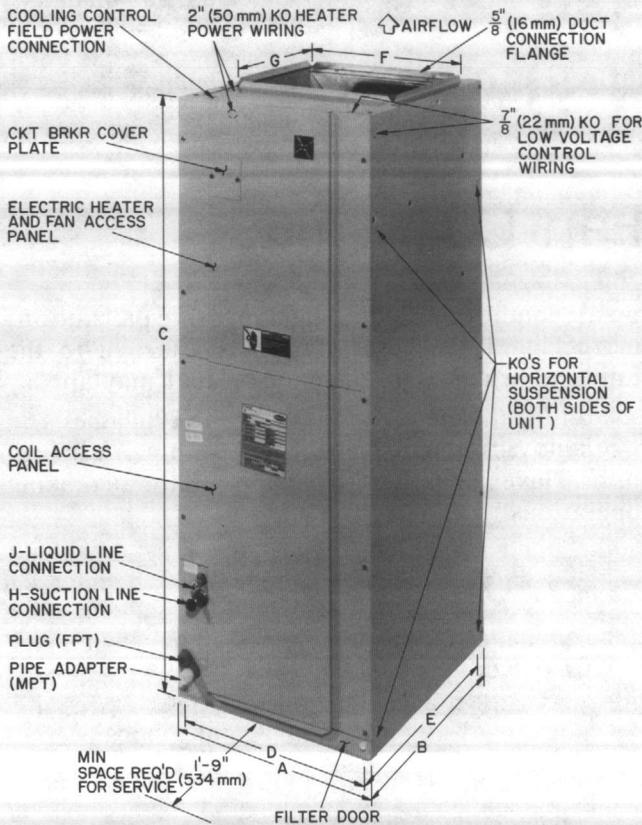
Insulate supply and return air ductwork in unconditioned spaces. It is recommended that insulation with vapor barrier be used.

Filter comes mounted on return air end of fan coil. The reusable, 1-in. (25-mm), washable filter media pulls out for easy removal and cleaning.

Electric Heater — See Table 5 for fan coil/ electric heater combinations. Electric heaters have both heating and cooling controls, including a control circuit transformer, indoor fan relay and low-voltage terminal board.

Cooling Control Kit (accessory) contains a 60-va transformer, indoor fan relay and low-voltage connections. Cooling control kit is not required when electric heater is used. Heater packages are equipped with cooling and heating controls.

AccuRater™ System Refrigerant Control (bypass type) is factory installed on 40QB units. Certain combinations of heat pump or condensing unit and fan coil require field replacement of the piston for optimum efficiency. Refer to heat pump or condensing unit instructions for required piston size. Bypass type AccuRater components are shown in Fig. 13. The AccuRater piston has a refrigerant metering orifice thru it and is field replaceable.



Certified dimension drawings available on request.

Fig. 1 — Dimensions and Connections

Table 1 — Physical Data and Dimensions (Fig. 1)

MODEL 40QB		042	048	060
OPERATING WEIGHT (Standard Units)		(lb) 75	165 79	175 82
FAN Rpm (3-Speed) Air Discharge Nominal		Centrifugal/Direct Drive 1025/925/825 Upflow/Horizontal/Downflow		
		(Cfm) 660	1400 755	1600 944
PSC Motor		(Hp) (Kw)	1/2 372	3/4 559
DIMENSIONS				
A	(ft-in.) (mm)	1-9 524		
B	(ft-in.) (mm)	1-10 578	2-2-1/2 622	
C	(ft-in.) (mm)	4-8 1422		
DUCT INLET				
D	(ft-in.) (mm)	1-7 483		
E	(ft-in.) (mm)	1-9 534	2-0-1/2 622	
DUCT OUTLET				
F	(ft-in.) (mm)	1-6 457		
G	(ft-in.) (mm)	1-1-7/8 351	1-5-1/2 439	
CONNECTIONS				
Suction ODF (Compatible Fitting)	H (in.) (mm)	3/4 19.1		
Liquid ODF (SAE Flare Fitting)	J (in.) (mm)	3/8 10		
Plug FPT	(in.)	3/4		
Pipe Adapter MPT	(in.)	3/4		
Horizontal Suspension Mounting Knockouts	(in.) (mm)	1/2 12.5		
Width Between Suspension Mounting Holes	(ft-in.) (mm)	1-8-3/4 517	1-11-3/4 605	
Height Between Suspension Mounting Holes	(ft-in.) (mm)	3-8-1/8 1121		
NOMINAL FILTER SIZE (Cleanable)	(in.) (mm)	20x21x1 508x533x25	20x25x1 508x635x25	

INSTALLATION

Step 1 — Inspect Equipment — File claim with shipping company if shipment is damaged or incomplete.

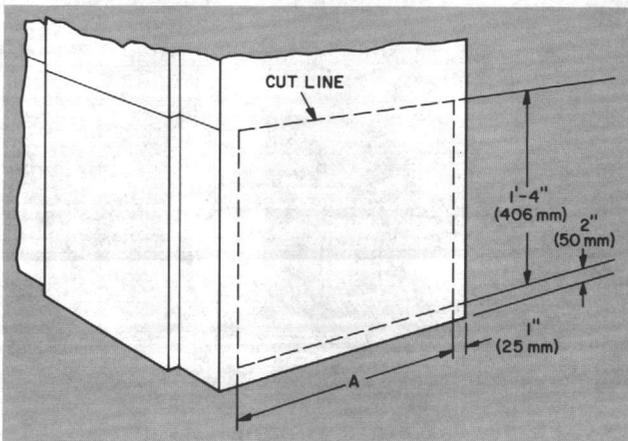
Step 2 — Mount Fan Coil — Unit can stand or lie on floor or hang from ceiling. Allow space for wiring, piping and servicing unit. See Fig. 1.

FLOOR MOUNTING IN VERTICAL UPFLOW POSITION — Make duct flush with floor. Set unit on floor over opening. Use *fireproof resilient gasket, 1/8- to 1/4-in. (3-mm to 6-mm) thick between duct, unit and floor.*

Utility Room Installation — When 40QB is located in a utility room that has louvered doors and is mounted for free air return, a field-fabricated side inlet and filter assembly is recommended.

A return-air connection may be made directly into the *right side (only)* on 40QB units. It is recommended that when the right-side connection is made, the standard return air opening be blanked-off with sheet metal, even where not required by local code. To make right-side air opening:

1. Cut opening as indicated by dimples on right side of unit in Fig. 2.
2. Blank-off standard return air opening in the bottom of unit as required.
3. Install field-fabricated air filter section on right-side return air opening. Use field-supplied sheet metal screws as required.



MODEL 40QB	HEIGHT		WIDTH — A	
	(ft-in.)	(mm)	(ft-in.)	(mm)
042	1-4	406	1- 7-1/2	498
048			1-11-1/4	586
060				

Fig. 2 — Right-Side Return Air Connection Details

FLOOR OR CEILING MOUNTING IN HORIZONTAL AIRFLOW POSITION — Place unit on *left* side by rotating it counterclockwise 90° (as compared to Models 40AQ which are rotated clockwise 90°). This provides horizontal airflow to the *left*. For downflow and horizontal airflow to the right, reposition coil as follows:

- a. Lay unit on its back and remove front access panels.

- b. Remove 3 screws holding coil with condensate pans in cabinet.
- c. Slide coil, condensate pans and horizontal drip shield from cabinet and rotate assembly 180°.
- d. Reinstall coil in cabinet as shown in Fig. 3. Ensure the coil positioning tabs enter slots provided in rear of cabinet.
- e. Replace access panels.

When suspending unit from ceiling, 1/2-in. (12.5-mm) knockouts are provided on both sides of unit for 3/8-in. (10-mm) suspension rods (see Fig. 1). Provide means to isolate unit vibration from structure as required.

All applications require use of pipe adapter and plug to avoid damage to condensate pan (see Fig. 1). For horizontal applications, interchange pipe adapter with plug.

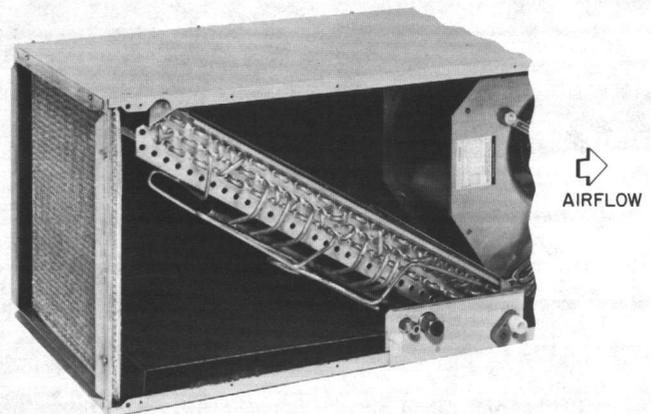


Fig. 3 — Coil Positioned for Right-Hand Discharge

MOUNTING IN DOWNFLOW POSITION — An accessory downflow kit, Carrier Part No. 40QB900141 for Model 042 and 40QB900151 for Models 048 and 060, is required for downflow applications when electric heaters are used. Complete Installation Instructions are included with the downflow kit. See Fig. 4 for Downflow Arrangement.

Step 3 — Connect Ductwork to Unit Supply and Return Air Openings — Duct connection flanges are provided on unit air discharge connection (see Fig. 1).

When using 40QB units with electric heaters, maintain a 1-in. (25-mm) minimum clearance between discharge plenum and ductwork to combustible materials for a distance of 36 in. (900 mm). Heater cabinet needs no clearance.

DUCTWORK SPECIFICATIONS — When a 40QB fan coil is equipped with electric heater: install air ducts in accordance with the standards of the National Fire Protection Association (NFPA), numbers 90A and 90B, in compliance with paragraph 46.1-E of UL Standard 1096.

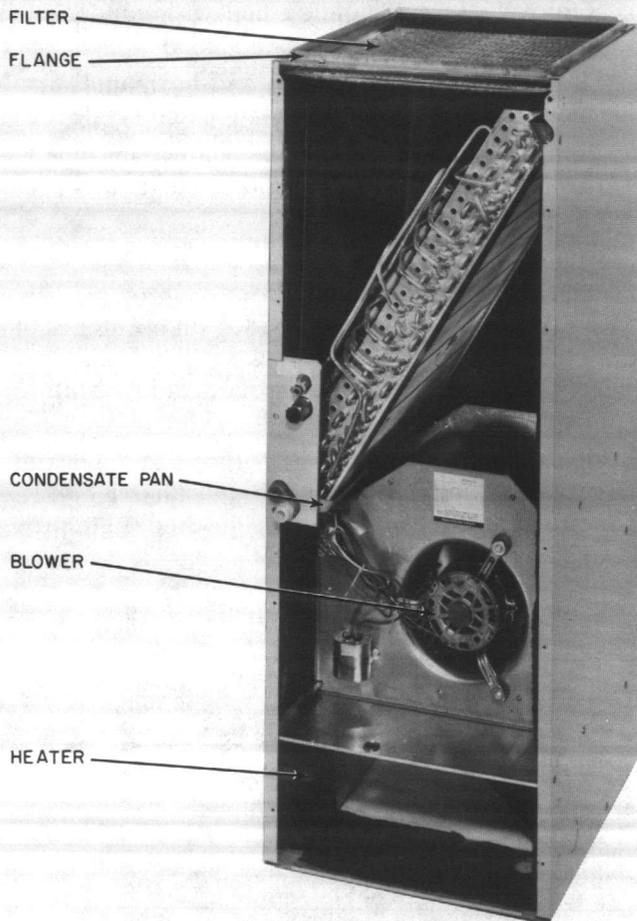


Fig. 4 — Downflow Arrangement

If necessary, refer to Carrier System Design Manual, Part 2, for system air duct design. Use flexible connectors between ductwork and unit to prevent transmission of vibration. (See Ductwork Acoustical Treatment.) When electric heater is installed, use heat resistant material for flexible connector between ductwork and unit air discharge connection. Ductwork passing thru unconditioned space must be insulated and covered with vapor barrier. External ductwork must be insulated and weatherproofed.

DUCTWORK ACOUSTICAL TREATMENT — Metal duct systems that do not have one 90° elbow and 10 ft (3 m) of main duct to first branch takeoff require internal acoustical insulation lining per the following specifications:

Line the inside of plenum, branch runs and main duct with acoustical insulation in accordance with the latest edition of SMACNA (Sheet Metal and Air Conditioning Contractors Association) application standard for duct liner. Duct liners should be UL classified batts and blankets with a fire hazard classification working of FHC-25/50 or less. Ensure main duct lining is extended 6 to 8 ft (1.8 to 2.3 m) down the duct from plenum.

As an alternative to above, fibrous glass ductwork may be used if constructed and installed in accordance with the latest edition of SMACNA construction standard on fibrous glass duct.

Both acoustical lining and fibrous ductwork shall comply with National Fire Protection Association as tested by UL Standard 181 for Class 1 air ducts.

Step 4 — Connect Refrigerant Liquid and Suction Lines to refrigerant line connections. See Fig. 1 and Table 1 for line connection sizes, type and location. Use Carrier accessory tubing package or field-supplied tubing of refrigerant grade. Insulate entire suction line if field-supplied tubing is used. Tubing package has an insulated suction line. Do not use damaged, dirty or contaminated tubing because AccuRater™ refrigerant flow control may plug up. When tubing package is used and mechanical connections are made within 60 seconds, coil and tubing system do not require purging or evacuation. Always evacuate or purge if field-supplied tubing is used, when sweat connections are made or when tubing must be flared.

Units have 3/4-in. (19.1-mm) Compatible Fitting suction line connection and a 3/8-in. (9.52-mm) SAE flare fitting liquid line connection. Make suction line connection first. Compatible Fitting(s) permits mechanical (quick-connect) or sweat connections as described later in this section. When making liquid line connection, slide flare nut on liquid line, then flare and connect liquid line. It is not necessary to flare liquid line if an accessory flare-to-Compatible Fitting coupler (Carrier Part No. 38CQ900061) is used.

MECHANICAL CONNECTION (Mate one set of connections at a time.)

1. Loosen locknut on Compatible Fitting one turn. Do not remove. See Fig. 5.

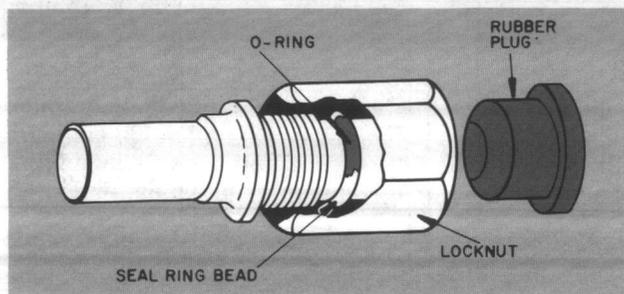


Fig. 5 — Carrier Compatible Fitting

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 (Use refrigerant grade tubing.)

1. Remove locknut, and rubber O-ring from inside of Compatible Fitting. Refer to Fig. 5.
2. Cut tubing to correct length.
3. Insert tube into Compatible Fitting until it bottoms.

4. Solder with low-temperature 430 F (221 C) solder. Wrap a wet cloth around rear of fitting to prevent damaging factory-made joints.
5. Evacuate or purge coil and tubing system with field-supplied refrigerant.

ACCESSORY FLARE-TO-COMPATIBLE COUPLER (see Fig. 6) — Attach flare nut on coupler to coil liquid line flare connection. Connect system liquid line to Compatible Fitting, using mechanical or sweat connection. When mechanical connection is made, use 2 wrenches when tightening Compatible Fitting nut — one to hold coupler and one to tighten nut. If coupler is not used, flare liquid line.

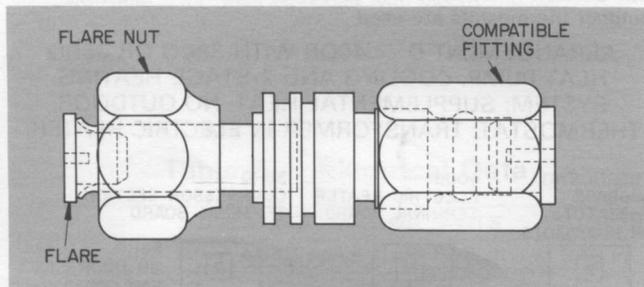


Fig. 6 — Accessory Coupler

Step 5 — Make Primary Condensate Drain Line Connection to connection provided on unit (see Fig. 10). *Do not remove factory-installed 3/4-in. (19-mm) nipple adapter.* Install a trap in condensate line as close to unit as possible. Trap must be at least 5 in. (125 mm) deep and not higher than the bottom of unit condensate drain opening (see Fig. 7). Pitch condensate line to open drain or sump. Minimum recommended drain line size is 7/8-in. (22.22-mm) OD copper tubing or 3/4-in. (19-mm) OD galvanized pipe. Insulate condensate drain line(s) located above a living area.

Step 6 — Make Secondary Condensate Drain Line Connection if required. A connection is provided on unit. Use secondary drain if fan coil is installed above occupied or usable space. If this drain is used, it must be trapped similar to the primary drain. Connect piping to secondary drain so that any discharge is visible to owner as applicable to FHA or local code requirements. When fan coil is installed over a finished ceiling and/or living area, fabricate and install a secondary condensate pan under entire unit. Pipe secondary drain to discharge into the pan. Pipe drain line from pan so any discharge is visible to owner.

ELECTRICAL DATA AND WIRING

Field wiring must comply with local and national fire, safety and electrical codes. Voltage to unit must be within $\pm 10\%$ of voltage indicated on nameplate. (Permissible limits of voltage range at which unit will operate satisfactorily for limited periods of time.) Contact local power company for correction of improper line voltage.

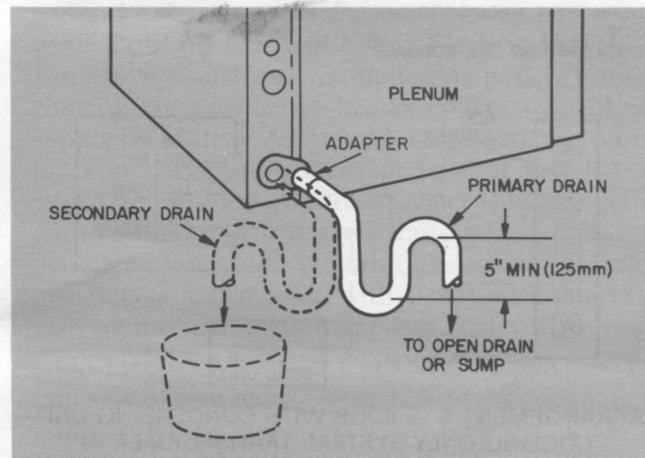


Fig. 7 — Condensate Trap

Operation of unit on improper line voltage constitutes abuse and could affect Carrier Warranty.

See Tables 2 and 5 for recommended wire and fuse sizes.

Step 7 — Install Branch Circuit Disconnect Switch(es) per NEC of adequate size to handle unit current. Locate disconnect switch(es) within sight of and readily accessible to unit per section 440-14 of National Electrical Code (NEC). See Table 5 for supply circuit options. If one line power circuit using one disconnect switch is required, attach an accessory line power connection conversion lug set (Part No. 40FS900271) to fuse terminals in electric heater. See Fig. 9.

Step 8 — Bring Line Power Leads per NEC Into Unit — Extend leads from disconnect thru hole provided (Fig. 1) to cooling control kit or electric heater line power connections. For 30-Kw, 1-phase heaters, side inlet for field power connection (Fig. 1) is recommended. Be sure power is off before making connections.

Step 9 — Connect Ground Lead to the Ground Connection in Cooling Control Kit or Electric Heater for safety. Connect power wiring, Fig. 8 and 9. Splice power leads to pigtails or connect leads to fuse terminals or terminal board. Use wire nuts for splice connections. Tape each connection.

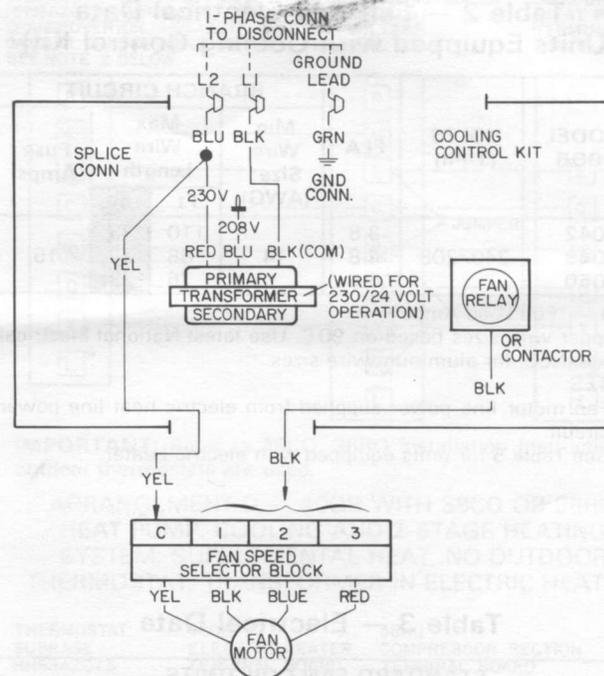
Cooling control kit and electric heater are factory wired for 230/24-volt transformer operation. For 208/24-volt operation, interchange blue (208-v) and red (240-v) transformer leads at the primary connection. Cap unused transformer lead with wire nuts.

THREE-SPEED FAN MOTOR on all units may be field connected for high, medium or low fan speeds as described below. Fan-coil units with cooling control kit come factory connected for high-speed fan operation. Units with electric heater come factory connected for 2-speed fan operation — unit fan operates at medium speed when outdoor unit operates (on cooling or heating cycle), low speed when electric heater is on and outdoor unit is off.

Step 10 — Set Fan Motor Speed — High, medium or low fan speed leads are provided on motor for choice of fan speeds. Motor leads are factory connected to Molex fan speed selector block located on fan housing, Fig. 10.

Line power leads, supplied with cooling control kit or electric heater, are factory connected to selector block for 1 or 2 fan speeds as previously described. Change fan speed by changing position of black and/or red line power leads on selector block. See Fig. 8 and 9.

One fan speed may be selected on units with cooling control kit; 2 fan speeds on units with electric heater. For single-speed operation on electric heater units: remove red lead from heater fan relay (or contactor) terminal 6; connect a jumper between fan relay terminal 2 (or 4) and 6; connect black heater lead from fan relay terminal 2 (or 4) to fan speed selector block for speed required.

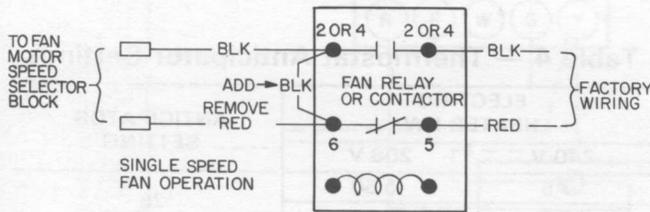


SELECTOR BLOCK TERMINATIONS

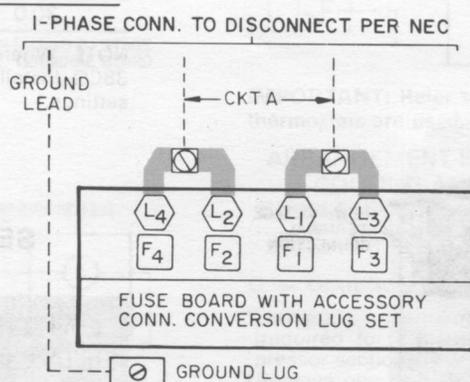
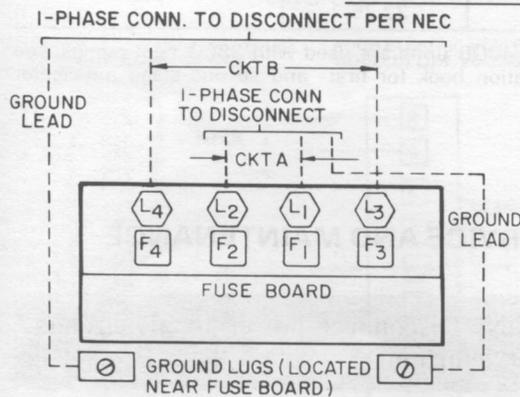
C — Common	3 — Low
1 — High	—
2 — Medium	—

--- Field Wiring
 ——— Factory Wiring
 NOTE: Tape unused leads.

Fig. 8 — Cooling Unit Line Power Connection

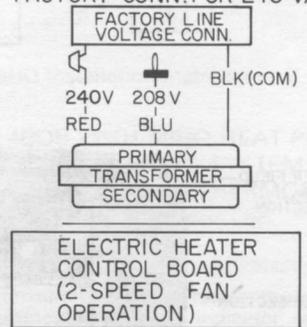


7 1/2 - TO 30-Kw HEATERS

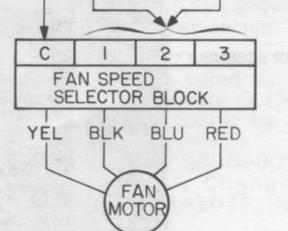


Accessory connection conversion lug set required for one line power circuit. See text for power wiring and Heater Electrical Data table.

TRANSFORMER CONN. FOR 208 V/24 V OR 240 V/24 V;
 FACTORY CONN. FOR 240 V/24 V



ELECTRIC HEATER CONTROL BOARD (2-SPEED FAN OPERATION)



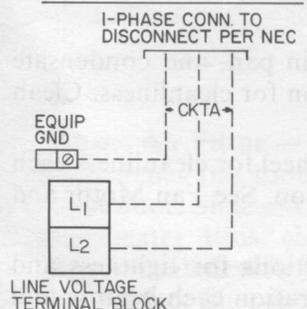
NOTE: Tape unused leads.

SELECTOR BLOCK TERMINATIONS

C — Common	3 — Low
1 — High	—
2 — Medium	—

⌋ Splice Connection
 --- Field Wiring
 ——— Factory Wiring

7 1/2 - TO 10-Kw HEATERS



11 Kw TO 30 Kw HEATERS

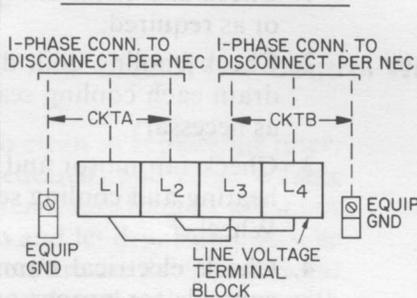


Fig. 9 — 40QB Heating and Cooling Unit Line Power Connections

**Table 2 — Fan Coil Electrical Data
(Units Equipped with Cooling Control Kit)**

MODEL 40QB	VOLTS (1-Ph)	FLA	BRANCH CIRCUIT			
			Min Wire Size* (AWG)	Max Wire Length		Fuse Amps
				Ft	m	
042	240/208	3.8	14	110	33	15
048		4.8		88	27	
060		5.6		76	23	

FLA — Full Load Amps

*Copper wire sizes based on 90C. Use latest National Electrical Code (NEC) for aluminum wire sizes.

NOTES:

1. Fan motor line power supplied from electric heat line power circuit.
2. See Table 5 for units equipped with electric heater.

Table 3 — Electrical Data

STANDARD FAN-COIL UNITS	
MODEL	AVAILABLE HEATERS (Kw at 240 v)
40QB042	7.5, 10, 12, 15, 20
40QB048	7.5, 10, 12, 15, 20, 25
40QB060	7.5, 10, 12, 15, 20, 25, 30

NOTE: Units with field-installed heaters, as shown, are equivalent to 40QB fan-coil units having factory-installed heaters of comparable Kw. Install heaters in accordance with instructions shipped with heaters.

Step 11 — Control Power Wiring (24-Volt) with Cooling Control Kit or Electric Heater —

Use 60-va transformer supplied as part of cooling control kit or electric heater controls as 24-volt supply for system. A one-transformer control wiring hookup is recommended for ease of installation. When an outdoor unit transformer is used together with control kit (or heater) transformer, a phasing problem may result. If both transformers are used, also use a thermostat with isolating contacts to prevent interconnection of Class 2 (24-volt) outputs. CONTROL WIRING CONNECTIONS — Top and side of unit have 7/8-in. (22-mm) knockouts for control wiring (see Fig. 1). Connect leads to terminal board as shown in Fig. 11.

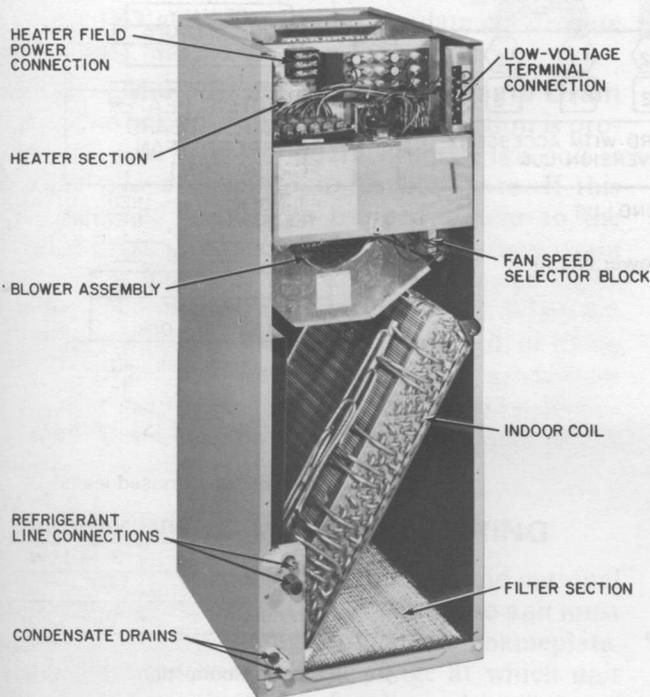
START-UP

Refer to outdoor unit Installation, Start-Up and Service booklet for system start-up instructions and refrigerant charging method details.

Table 4 — Thermostat Anticipator Settings

ELECTRIC HEATER KW		ANTICIPATOR SETTING
240 V	208 V	
7.5	5.60	.25
10.0	7.50	
15.0	11.25	
20.0	15.00	.50
25.0	18.75	
30.0	22.75	.75

NOTE: When 40QB units are used with 38CQ heat pumps, see 38CQ Installation book for first- and second-stage anticipator settings.



**Fig. 10 — Component Location
(Fully Equipped Unit Shown)**

SERVICE AND MAINTENANCE

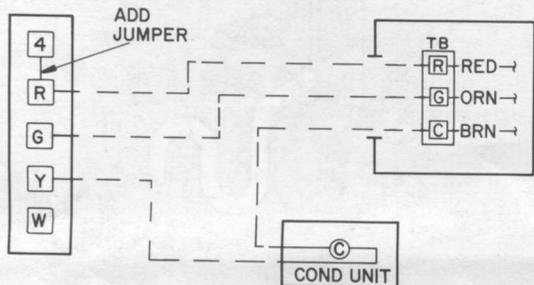
CAUTION: Disconnect power to all circuits before servicing unit.

Remove unit access panels for cleaning, lubrication or parts replacement (Fig. 1).

Minimum Maintenance

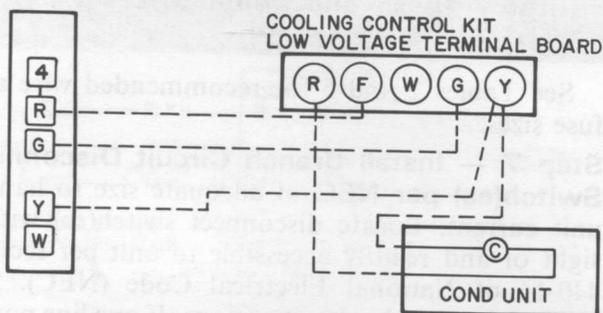
1. Check and clean or replace air filter each month or as required.
2. Check cooling coil, drain pan, and condensate drain each cooling season for cleanliness. Clean as necessary.
3. Check fan motor and wheel for cleanliness each heating and cooling season. See Fan Motor and Wheel.
4. Check electrical connections for tightness and controls for proper operation each heating and cooling season. Service as necessary.

THERMOSTAT HHOIAD040,042
WITH
HH93AZ040 OR 042 SUBBASE



ARRANGEMENT A — 40QB WITH CONDENSING UNIT, COOLING ONLY SYSTEM. TRANSFORMER IN COOLING CONTROL KIT.

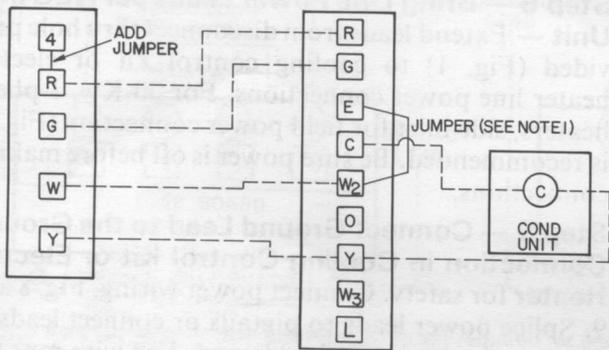
THERMOSTAT HHOIAD040 OR 042
WITH
HH93AZ040 OR 042 SUBBASE



ARRANGEMENT B — 40QB WITH CONDENSING UNIT COOLING ONLY SYSTEM. TRANSFORMER IN COOLING CONTROL KIT.

THERMOSTAT HHOIAD040 OR 042 WITH HH93AZ040 OR 042 SUBBASE

40QB ELECTRIC HEATER (1- AND 2- STAGE MODELS) LOW VOLTAGE TERMINAL BOARD

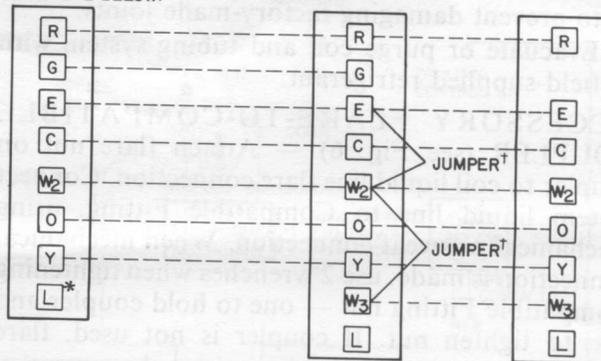


ARRANGEMENT C — 40QB WITH CONDENSING UNIT, COOLING AND ONE-STAGE HEATING SYSTEM. TRANSFORMER IN ELECTRIC HEATER.

THERMOSTAT HH07AT071 WITH HH93AZ073 (AUTOMATIC CHANGEOVER) OR HH93AZ075 (MANUAL CHANGEOVER) SUBBASE. SEE NOTE 2 BELOW.

40QB ELECTRIC HEATER (ALL MODELS) LOW VOLTAGE TERMINAL BOARD

38CQ OR 38RQ (HEAT PUMPS) TERMINAL BOARD



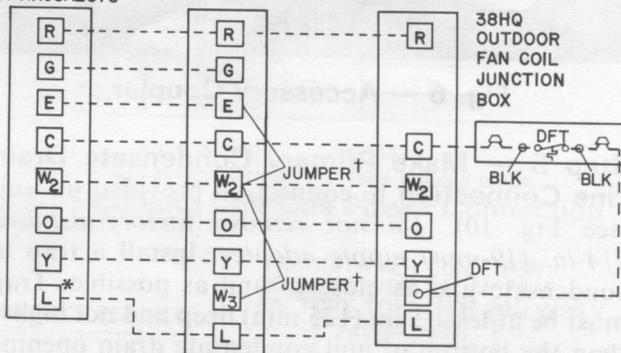
IMPORTANT: Refer to 38CQ, 38RQ Installation Instructions if outdoor thermostats are used.

ARRANGEMENT D — 40QB WITH 38CQ OR 38RQ HEAT PUMP. COOLING AND 2-STAGE HEATING SYSTEM; SUPPLEMENTAL HEAT, NO OUTDOOR THERMOSTAT; TRANSFORMER IN ELECTRIC HEATER.

THERMOSTAT SUBBASE HH93AZ073 OR HH93AZ075

40QB ELECTRIC HEATER TERMINAL BOARD

38HQ COMPRESSOR SECTION TERMINAL BOARD



IMPORTANT: Refer to 38HQ Installation Instructions if outdoor thermostats are used.

ARRANGEMENT E — 40QB WITH 38HQ HEAT PUMP COOLING AND 2-STAGE HEATING SYSTEM; SUPPLEMENTAL HEAT, NO OUTDOOR THERMOSTAT; TRANSFORMER IN ELECTRIC HEATER.

C — Contactor --- Field Wiring _____ Factory Wiring

*Terminal L is identified as terminal X on some former thermostats (required for system malfunction warning indicator on compressor section).

†Remove one or both factory-installed jumpers (Arrangement D and E) when installing outdoor thermostats (ODT) shown in Installation Instructions for heat pump — outdoor section.

NOTES:

1. All 40QB, 2-stage electric heaters can be wired for 1-stage operation by adding jumper wire, Arrangement C. On 40QB 2-stage heaters, remove factory-installed jumper for 2-stage operation. See Arrangements D and E.
2. Thermostat/Subbase package numbers: 38CQ900081 for HH07AT071/HH93AZ073 (Automatic Changeover); 38CQ900111 for HH07AT071/HH93AZ075 (Manual Changeover).

Fig. 11 — Control Wiring Connections

Return Air Filter — To clean or replace air filter, pull catches (no tools required) and remove filter access door. Slide out filter. Clean filter by using hot soapy water. Rinse clean and let dry. Filter may be oiled or coated. New filters are available from local dealer. Place filter in channels and replace door with heavy mesh facing inlet side.

CAUTION: Never operate unit without a filter or with filter access door removed. Damage to blower motor may result.

Table 5 — E

MODEL 40QB 042,048,060	KW		PHASE	INTERNAL CIRCUIT PROTECTION	HEATER AMPS 240/208 V			MIN WIRE SIZE (AWG) 240/208 V*			Single Circuit	
	240 V	208 V			Single Circuit	Dual Circuit		Single Circuit	Dual Circuit		ft	m
						L1, L2	L3, L4		L1, L2	L3, L4		
300CF	7.5	5.6	1	—	30.0/ 27.0			8/8			35/32	11/
300CG	10.0	7.5	1	—	40.0/ 36.0			6/6			42/41	13/
300BG	10.0	7.5	1	CB	40.0/ 36.0			6/6			42/41	13/
500CG	10.0	7.5	3	—	23.0/ 20.8			8/8			47/46	14/
300AH	12.0	9.0	1	F	48.0/ 43.4	32.0/28.9	16.0/14.5	4/6	6/8	12/12	56/38	17/
300AJ	15.0	12.0	1	F	60.0/ 54.0	40.0/36.0	20.0/18.0	4/6	6/6	10/10	45/43	14/
300BJ	15.0	11.3	1	CB	—	40.0/36.0	20.0/18.0	—	6/6	10/10	—	—
500CJ	15.0	11.3	3	—	34.7/ 31.2			6/6			52/51	15/
500CK	18.0	13.5	3	—	41.6/ 37.6			6/6			44/44	13/
300AL	20.0	15.0	1	F	80.0/ 72.0	40.0/36.0	40.0/36.0	2/3	6/6	6/ 8	55/34	17/
300BL	20.0	15.0	1	CB	—	40.0/40.0	36.0/36.0	—	6/6	6/ 8	—	—
048,060 500AM	25.0	18.8	3	F	57.7/ 52.0			4/4			52/52	16/
			1†		100.0/ 90.0			0/1			75/62	23/
060 500AN	30.0	22.5	3	F	69.3/ 62.4			3/3			44/44	13/
			1†		120.0/108.0			00/0			79/63	24/

Coil, Drain Pan, and Condensate Drain — Disconnect electrical power before removing any access panels or electrical shock may result.

The coil is easily cleaned when it is dry; therefore, the coil should be checked and cleaned (if necessary) before each season. To check or clean coil, remove both the coil access panel and the fan/heater access panel. Removal of these panels gives full access to the coil. If the coil is coated with dirt or lint, vacuum with a soft brush attachment.

Be careful not to bend the fins. If the coil is coated with oil or grease, it may be cleaned with a mild detergent and water solution. Rinse coil with clear water. Be careful not to splash water on insulation or filter.

Check drain pan and condensate drain at the same time cooling coil is checked. Clean drain pan and condensate drain by removing any foreign matter from pan. Flush pan and drain tube with clear water. If drain tube is restricted, it can generally be cleared by high-pressure water. If this does not work, try a "plumber's snake" or similar probe device.

Fan Motor and Wheel — It should only be necessary to clean the fan motor and the wheel when the cooling coil is cleaned. Lubricate motor every 5 years if motor is used on intermittent operation (thermostat FAN switch at AUTO. position), or every 2 years if the motor is in continuous operation (thermostat FAN switch at ON position).

CAUTION: Disconnect electrical power before removing any access panels.

To clean or lubricate fan motor or clean fan wheel, remove coil access panel, fan and heater access panel. Remove 3 electrical leads from bottom of Molex connector located on the fan housing. Note location of wires for reassembly. Remove 6 screws holding fan/motor assembly against the fan deck scroll and slide assembly out of cabinet. Squeeze the side tabs and pull the Molex connector block off fan housing. Remove brown capacitor leads from motor capacitor mounted on fan housing. Remove screw with green wire from fan housing. Mark the fan wheel, motor, and motor support in relation to the fan housing before disassembly to ensure proper reassembly. (Note position of blades on wheel.) Loosen setscrew holding fan wheel onto motor shaft. Remove fan wheel.

Remove 3 bolts holding motor mount to fan housing and slide motor and mount out of housing. Further disassembly should not be necessary as adequate clearance is available to clean or lubricate motor. The fan motor and wheel may be cleaned by using a vacuum with a soft brush attachment. Remove grease with a mild solvent such as hot water and detergent. Be careful not to disturb the balance weights (clips) on the fan wheel vanes. Also, do not drop or bend wheel, as balance will be affected.

To oil motor, remove dust caps or plugs from oil holes located at each end of the motor. Use a teaspoon, 5 cc (5 ml), 3/16 oz or 16 to 25 drops of a good grade of SAE 20 non-detergent motor oil in each oil hole. Allow time for total quantity of oil to be absorbed into each bearing. After oiling motor, be sure to wipe off excess oil from housing and replace cap or plugs on oil port.

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.

Book	1	4
Tab	3c	2c

Form 40QB-1SIM New

Printed in U.S.A.

6-81

PC 101

Catalog No. 534-008

Electrical Data

Unit	MAX WIRE LENGTH 240/208 V				MIN GND WIRE SIZE 240/208 V		FUSE/CKT BKR AMPS 240/208 V			
	Dual Circuit				Single Circuit	Dual Circuit		Single Circuit	Dual Circuit	
	L1, L2		L3, L4			L1, L2	L3, L4		L1, L2	L3, L4
	ft	m	ft	m						
0					10/10			45/ 45		
3					10/10			60/ 60		
3					10/10			60/ 60		
4					10/10			40/ 35		
1	32/30	10/ 9	30/29	9/ 9	8/ 8	10/10	12/12	70/ 70	50/45	20/20
3	42/41	13/13	38/37	11/11	8/ 8	10/10	10/10	90/ 80	60/60	25/25
3	42/41	13/13	38/37	11/11	—	10/10	10/10	—	60/60	25/25
5					10/10			60/ 50		
3					10/10			60/ 60		
0	42/41	13/13	47/29	14/ 9	6/ 6	10/10	10/10	110/100	60/60	50/45
0	42/41	13/13	47/29	14/ 9	—	10/10	10/10	—	60/60	50/45
6					8/ 8			80/ 80		
9					6/ 6			150/125		
3					8/ 8			100/ 90		
19					6/ 6			175/150		

CB — Circuit Breaker
F — Fuse

*Minimum wire sizes based on using copper wire with a minimum 90C insulation rating. Aluminum wire is not recommended.

†May be field converted to 1-phase operation.

NOTES:

1. Heaters are equipped with a 60-va transformer for system control circuit.
2. Field-selected wire sizes must not create a voltage drop between power source and unit in excess of 2% of unit rated voltage.

To reassemble fan, replace 3 bolts holding motor mount to fan housing. Place fan wheel back into motor shaft and tighten setscrew. Be sure to position correctly for proper rotation. Replace Molex connector in bracket by snapping into position. Position fan motor assembly and fan wheel in same position as when fan housing was in unit. Secure motor mount to housing, using bolts removed. Make sure mount or motor is grounded to fan housing. Attach green wire to fan housing with screw. Slide blower assembly into fan deck runners and secure assembly to blower deck with screws removed. Reconnect electrical leads into Molex connector at the proper position. Please note that connections are polarized for assembly — *do not force*. Reconnect electrical power to unit and test fan for proper rotation and necessary speed changes between heating and cooling.

Refrigerant Circuit — The 40QB coils have a vapor holding charge. Evacuation or purging is not required if accessory Carrier tubing package is used and mechanically connected to Carrier Compatible Fittings within 60 seconds. If tubing or coil is left open longer than 60 seconds, field-supplied tubing is used, sweat or flare connections are made — purge or evacuate coil and tubing. Refer to outdoor unit installation booklet for system refrigerant charging method details.

LEAKING MECHANICAL CONNECTION

1. Pump down system refrigerant to outdoor unit. Close outdoor unit service valves, and relieve refrigerant pressure in tubing and coil.
2. Back locknut off Compatible Fitting onto tube at indoor coil as in Fig. 12.

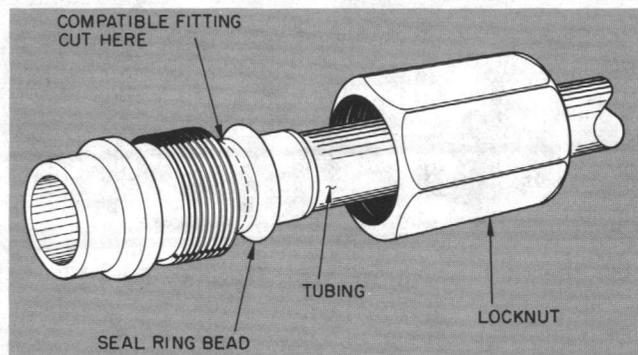


Fig. 12 — Repair of Mechanical Connection

3. Cut fitting with hacksaw between threads and seal ring bead.
4. Remove tubing section remaining in threaded portion of fitting. Discard locknut.

Reconnecting Refrigerant Tubing

1. Remove all burrs and filings from remaining portion of Compatible Fitting.
2. Insert tube end into remaining portion of Compatible Fitting.
3. Solder with low-temperature (430 F [221 C]) solder such as Allstate 430 or equivalent silver bearing solder.
4. Evacuate indoor coil and tubing system at the outdoor unit service valves.

LEAKING SWEAT CONNECTION — Pump down system refrigerant to outdoor unit. Close outdoor unit service valves, and relieve refrigerant pressure in tubing and coil. Clean and flux area around leak and apply low-temperature (430 F [221 C]) solder.

Evacuate or purge evaporator coil and tubing system. Add refrigerant charge (see charging instructions).

ACCURATER™ (BYPASS TYPE) REFRIGERANT FLOW CONTROL SERVICING — See Fig. 13 for bypass type AccuRater components. *The piston has a refrigerant metering orifice 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:

1. Pump down system refrigerant to outdoor unit. Close outdoor unit service valves, and relieve pressure in tubing and coil.
2. Shut off power to unit.
3. Remove coil 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 vise grips to remove retainer. (If retainer flare seat is damaged, replace with new retainer, Carrier part No. 99CC409892.)

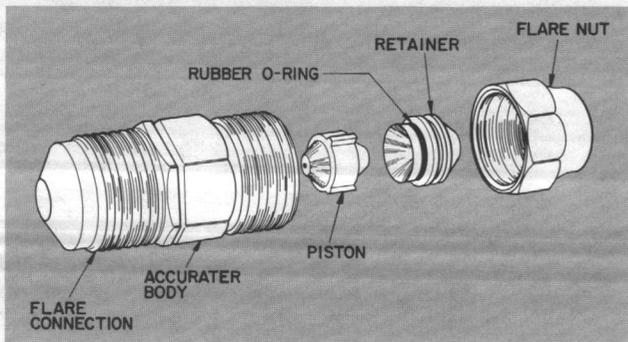


Fig. 13 — AccuRater (Bypass Type) Components

5. Slide piston out by inserting a small soft wire thru metering orifice. Ensure metering orifice sealing surface around piston cones and fluted portion of piston are not damaged.
6. Clean piston refrigerant metering orifice or replace piston as required. Carrier replacement pistons are available from Carrier Service Parts Center.
7. Replace retainer O-ring on retainer before re-assembling AccuRater. Carrier O-ring Part No. is 99CC501052.

Table 6 — Factory-Supplied AccuRater Pistons

MODEL 40QB	042	048	060
PISTON NO.	82	82	93

LIQUID LINE STRAINER — The outdoor bypass AccuRater is protected on the indoor coil side by a wire mesh strainer. It normally does not require servicing; however, if it becomes plugged, proceed as follows for inspection and cleaning.

1. Complete steps 1 thru 3 under AccuRater Refrigerant Flow Control Servicing.
2. Remove coil access panel.
3. Loosen flare fitting joint connecting AccuRater to coil liquid refrigerant line.
4. Remove sheet metal screw holding bracket clip in place. Screw is located between coil and AccuRater.
5. Pull bracket clip out.
6. Remove bypass AccuRater assembly.
7. Pull strainer out of coil liquid refrigerant line and replace with new strainer.

Electric Heater Service — See Fig. 10 for component location. All service can be completed with heater in place. Ensure all power is shut off before servicing.

LIMIT SWITCH malfunction prevents heating element from coming on or causes fusible link to blow. Replace switch if malfunction occurs.

SEQUENCER malfunction will cause heater not to come on or never shut off — replace sequencer.

TRANSFORMER is 60 va. Transformer supplies 24-volt power for control circuit. Replace transformer if faulty.

CAUTION: The 60-va transformer on 40QB electric heater is fused — do not short circuit.

FAN RELAY malfunction will cause unit fan not to run or run continuously — replace relay.

HEATER REMOVAL — If heater removal is required, disconnect wiring, remove screws and pull heater out thru front of unit. When replacing heater, ensure heater element support bars enter holes in rear of unit heat shield.

Direct-Expansion Fan-Coil Units (With Electric Heaters)

INDEX

MODEL 40QB	KW		PH	INTERNAL CIRCUIT PROTECTION	LABEL DIAGRAM NO.	FIG. NO.					
	240 v	208 v									
042300 048300 060300	CF	7.5	5.6	1	—	40QB500544 1					
042300 048300 060300							CG	10.0	7.5	1	—
042300 048300 060300											
042500 048500 060500	CG	10.0	7.5	3	—	40QB500614 3					
042500 048500 060500							CJ	15.0	11.3	3	—
042500 048500 060500											

MODEL 40QB	KW		PH	INTERNAL CIRCUIT PROTECTION	LABEL DIAGRAM NO.	FIG. NO.					
	240 v	208 v									
042300 048300 060300	AH	12.0	9.0	1	Fuse	40QB500554 4					
042300 048300 060300							AJ	15.0	12.0	1	Fuse
042300 048300 060300											
042300 048300 060300	AL	20.0	15.0	1	Fuse	40QB500564 6					
042300 048300 060300							BL	20.0	15.0	1	Circuit Breaker
048500 060500											
060500	AN	30.0	22.5	3	Fuse	40QB500574 8					

Fig. 9 – Control Wiring Connections Page 10
 Fig. 10 – 40QB Heating and Cooling Unit Line Power Connections Page 11
 Fig. 11 – Cooling Unit Line Power Connections Page 11
 Fig. 12 – Connections for Single-Speed Fan Operation Page 11

GENERAL NOTES

- All wiring must comply with National Electrical Code (NEC) and all applicable local codes.
- Units are suitable for use with copper or copper-clad aluminum supply conductors unless noted otherwise on the diagram.
- Disconnect for incoming unit power must be within sight of unit and readily accessible in accordance with NEC, Section 440-14.
- Transformer Primary Code:
 208 v – BLK & BLU
 240 v – BLK & RED
- Unused transformer lead must be taped.
- Transformer secondary is internally fused; do not short control wiring.
- If any of the original wire as supplied must be replaced, use the same wire or equivalent.

FAN MOTOR SPEED

High, medium or low fan speed leads are provided on motor for choice of fan speeds. Motor leads are factory connected to Molex fan speed selector block located on fan housing. Selector block terminal 1 is high fan speed, terminal 2 is medium fan speed and terminal 3 is low fan speed.

Line power leads supplied with cooling control kit or electric heater are factory connected to selector block for 1 or 2 fan speeds as described above. Change fan speed by changing position of black and/or red line power leads on selector block. See Fig. 11 and 12.

One fan speed may be selected on units with cooling control kit; 2 fan speeds on units with electric heater. For single-speed operation on electric heater units: remove red lead from heater fan relay terminal 5; connect a jumper between fan contactor terminal 3 and 5; connect black heater lead from fan relay terminal 3 to fan speed selector block for speed required. See Fig. 12.

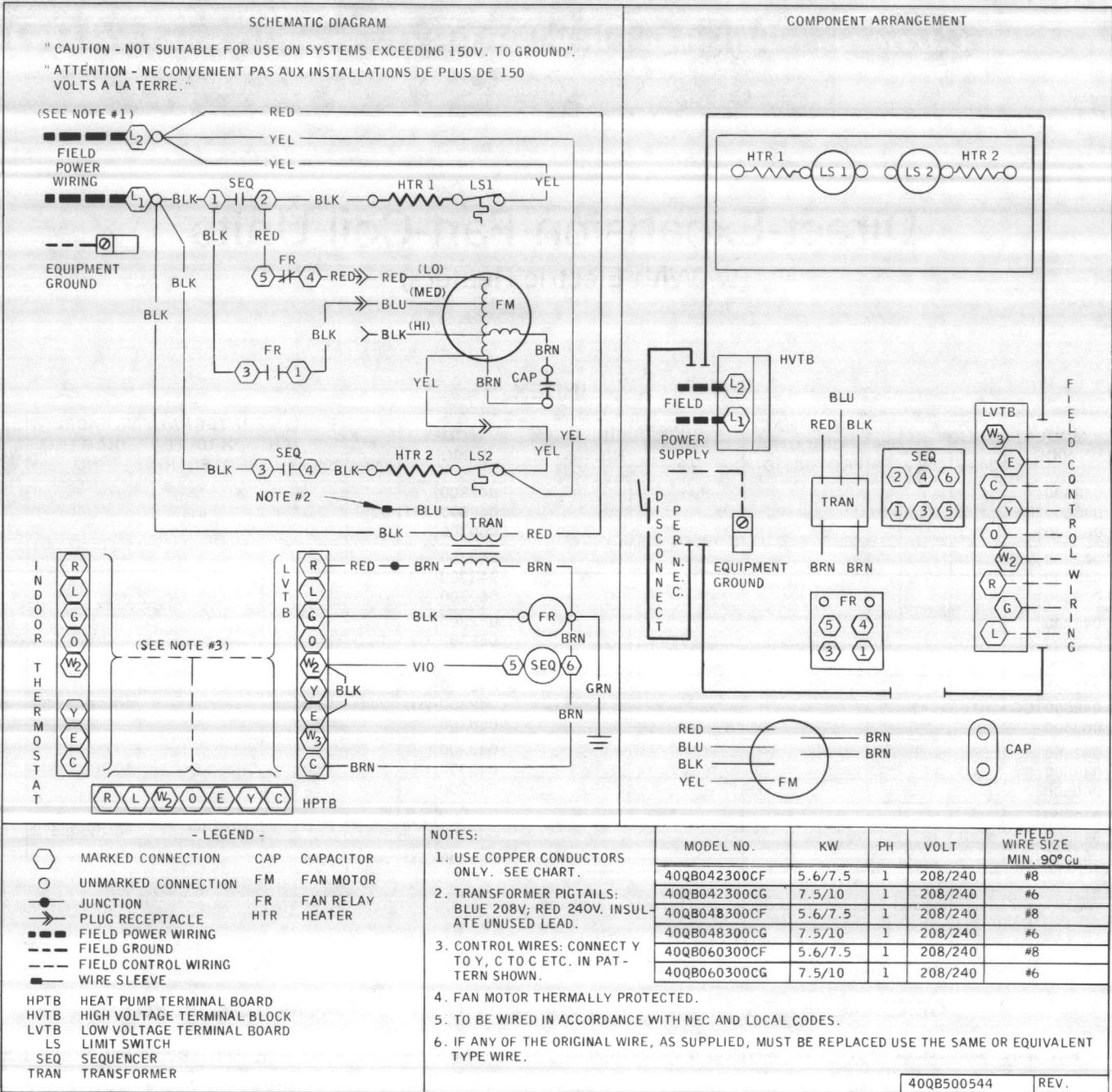


Fig. 1 – Label Diagram – 40QB042300, 048300, 060300CF,CG; 240/208/1/60

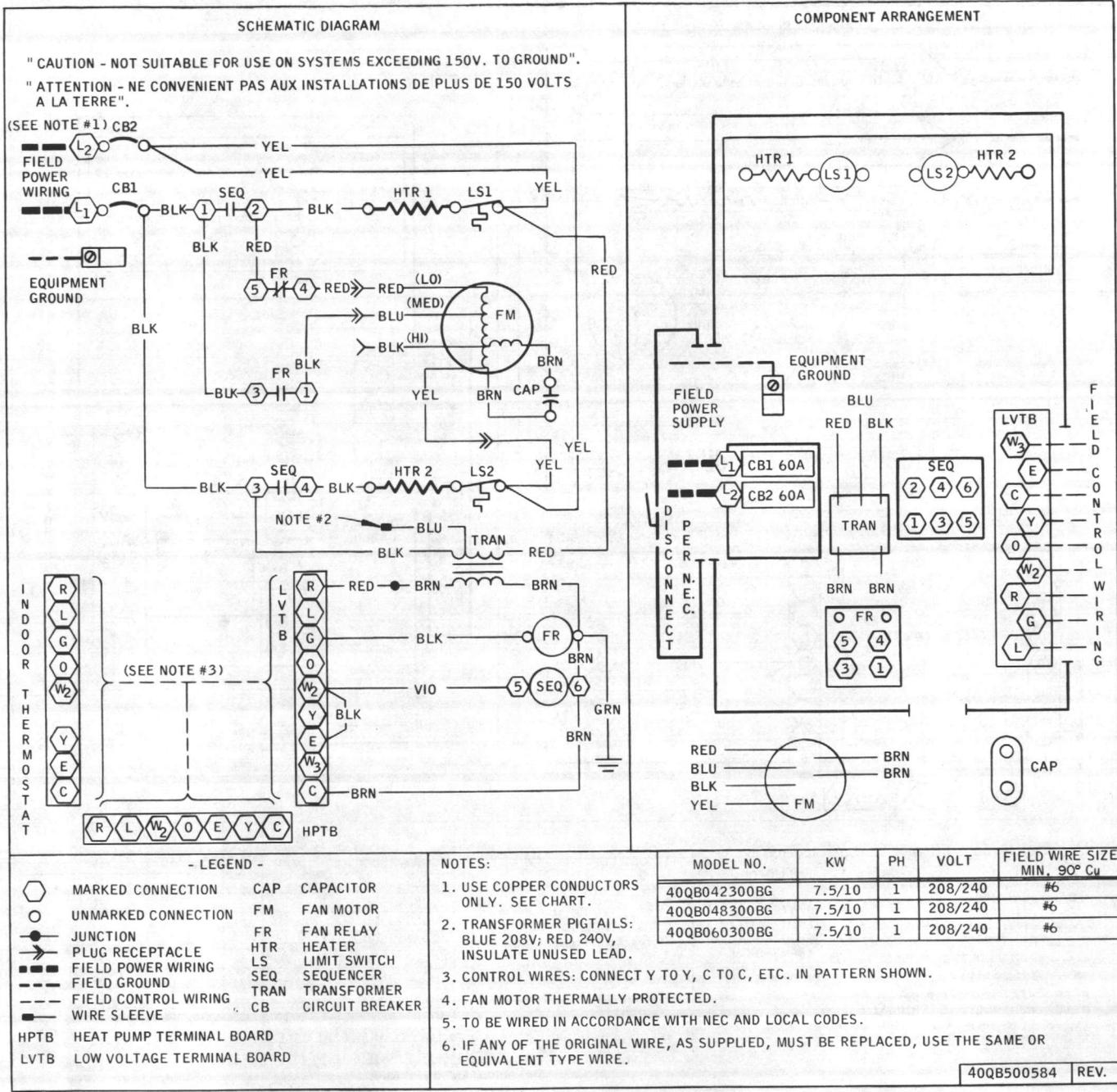


Fig. 2 – Label Diagram – 40QB042300, 048300, 060300BG; 240/208/1/60

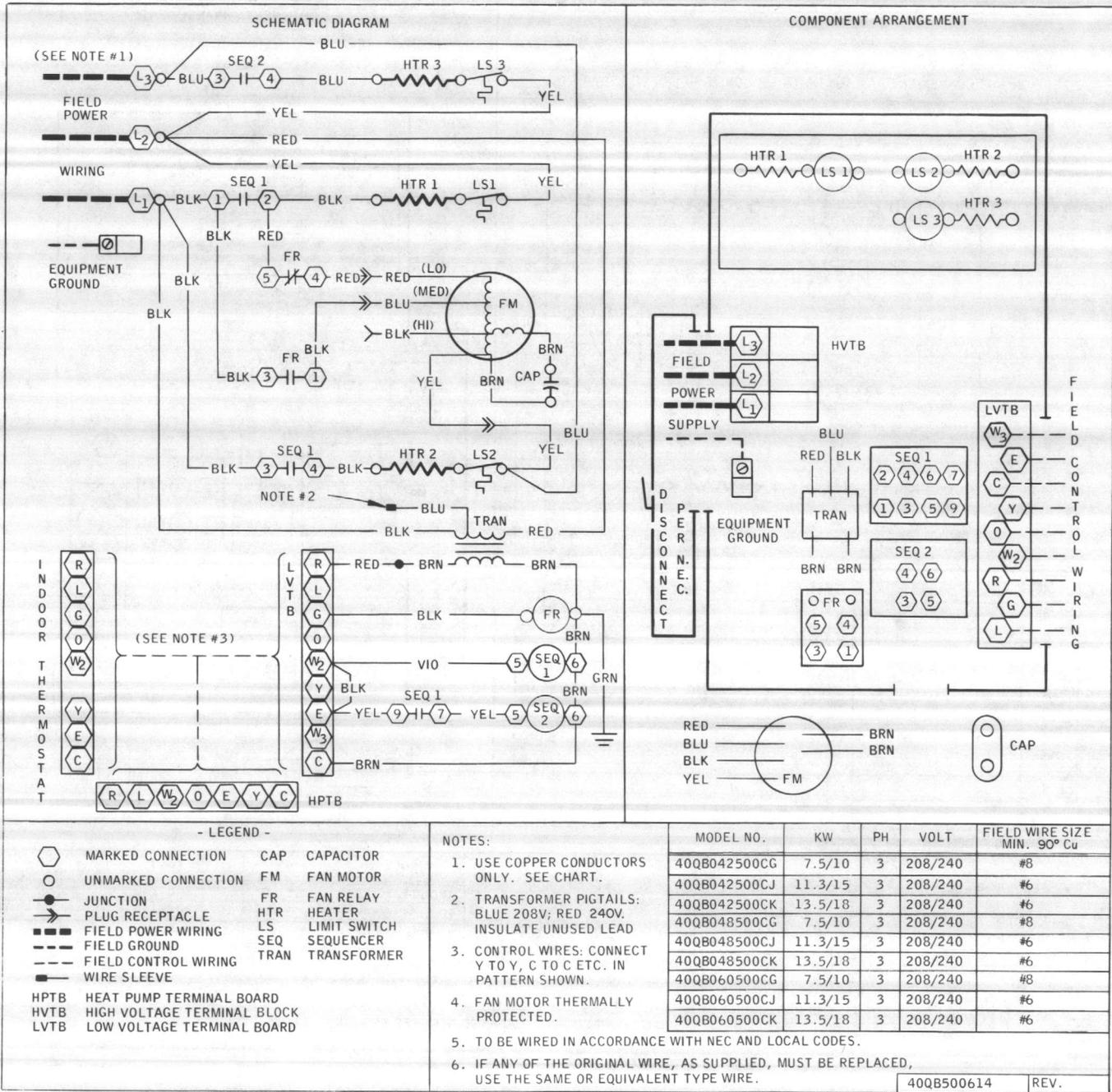


Fig. 3 – Label Diagram – 40QB042500, 048500, 060500CG,CJ,CK; 240/208/3/60

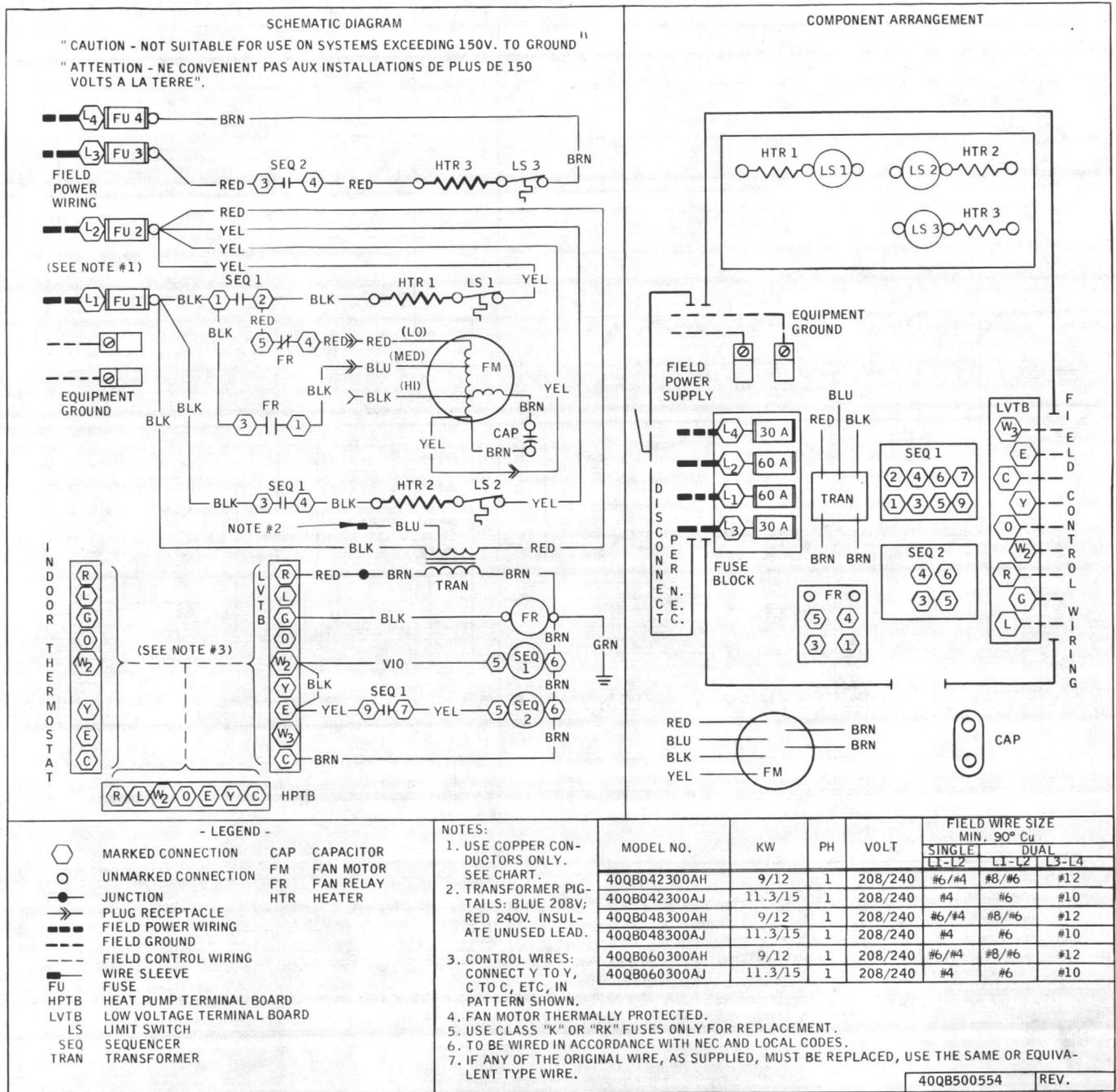


Fig. 4 – Label Diagram – 40QB042300, 048300, 060300AH,AJ; 240/208/1/60

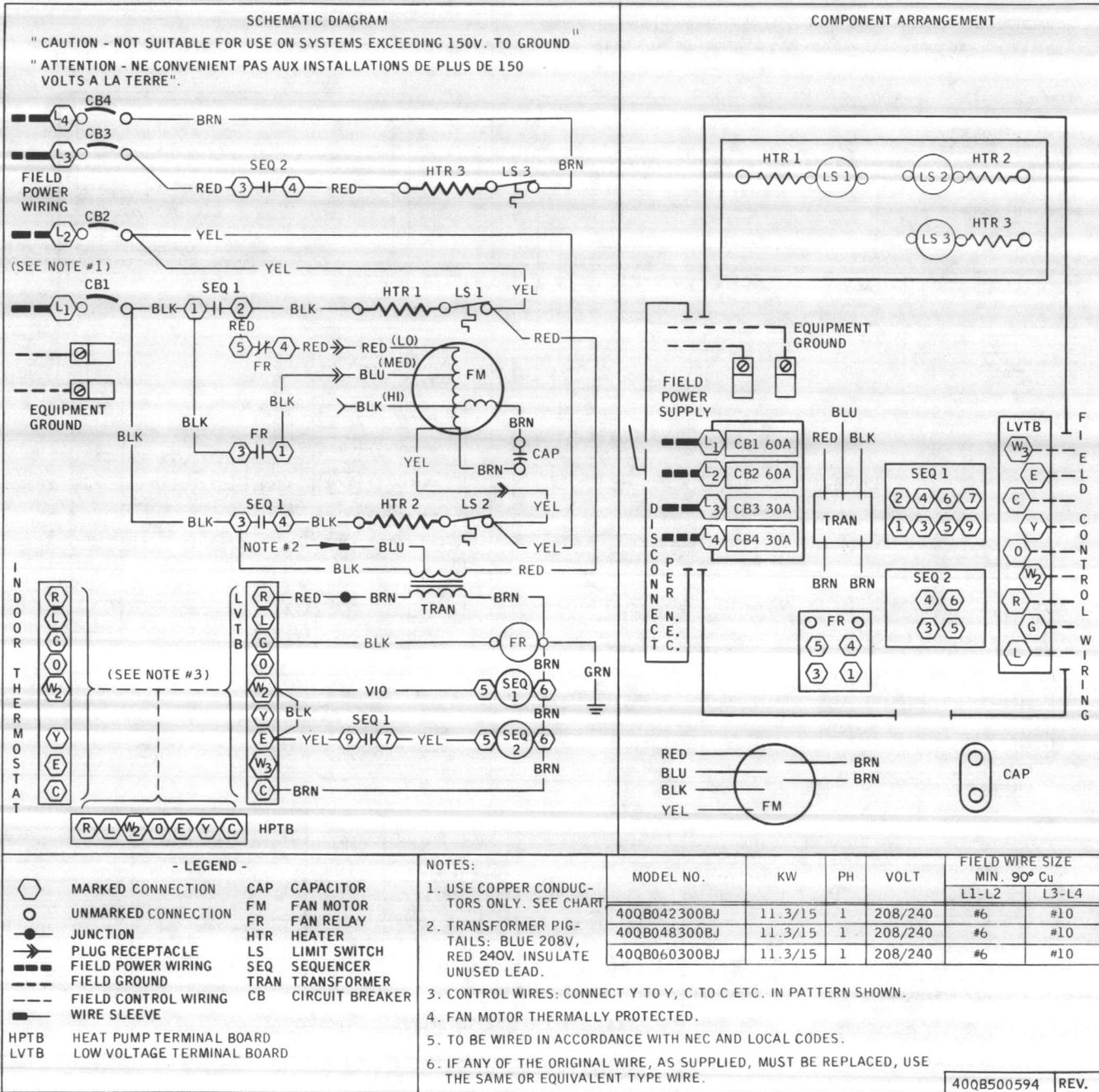


Fig. 5 - Label Diagram - 40QB042300, 048300, 060300BJ; 240/208/1/60

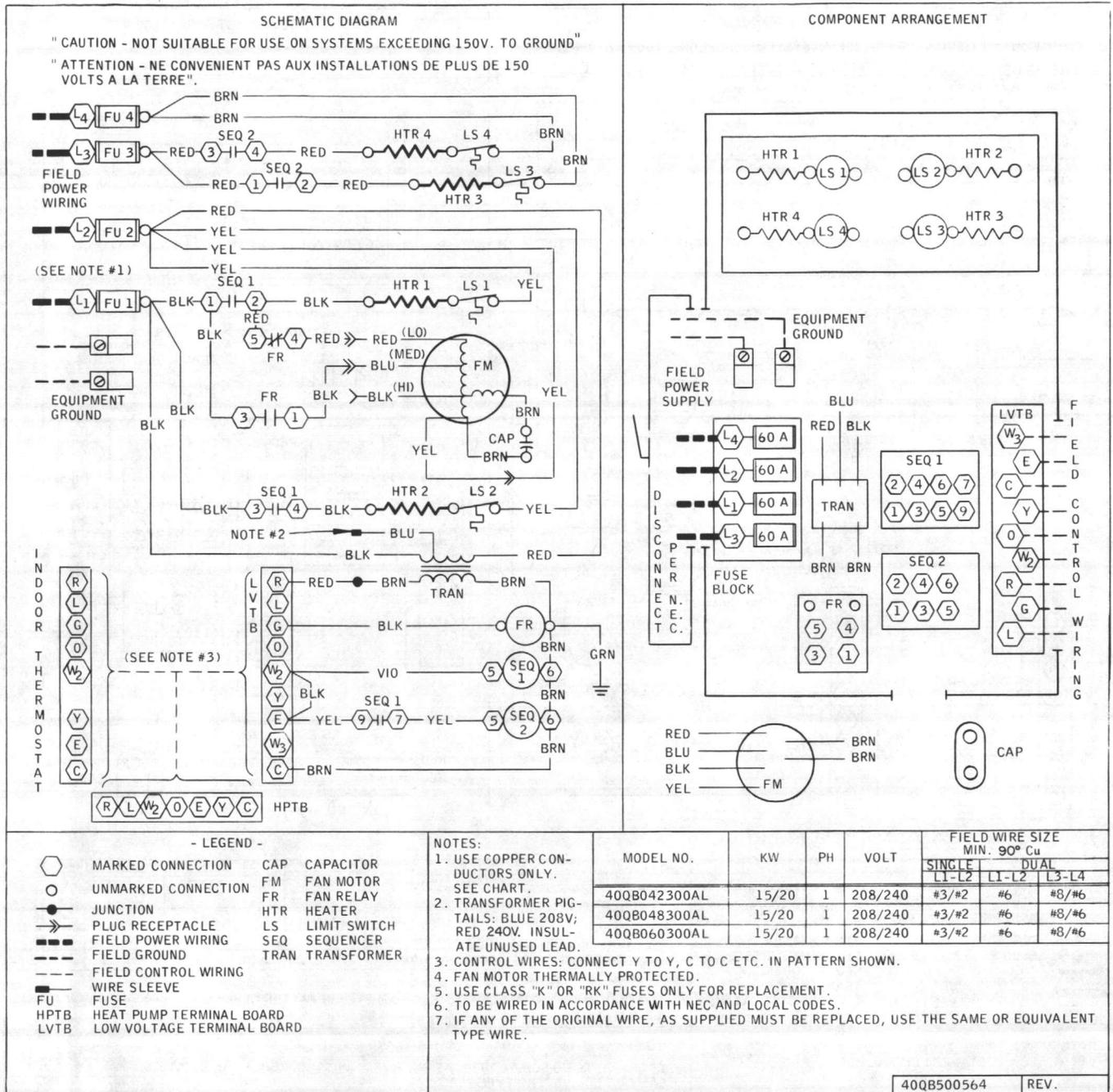


Fig. 6 – Label Diagram – 40QB042300, 048300, 060300AL; 240/208/1/60

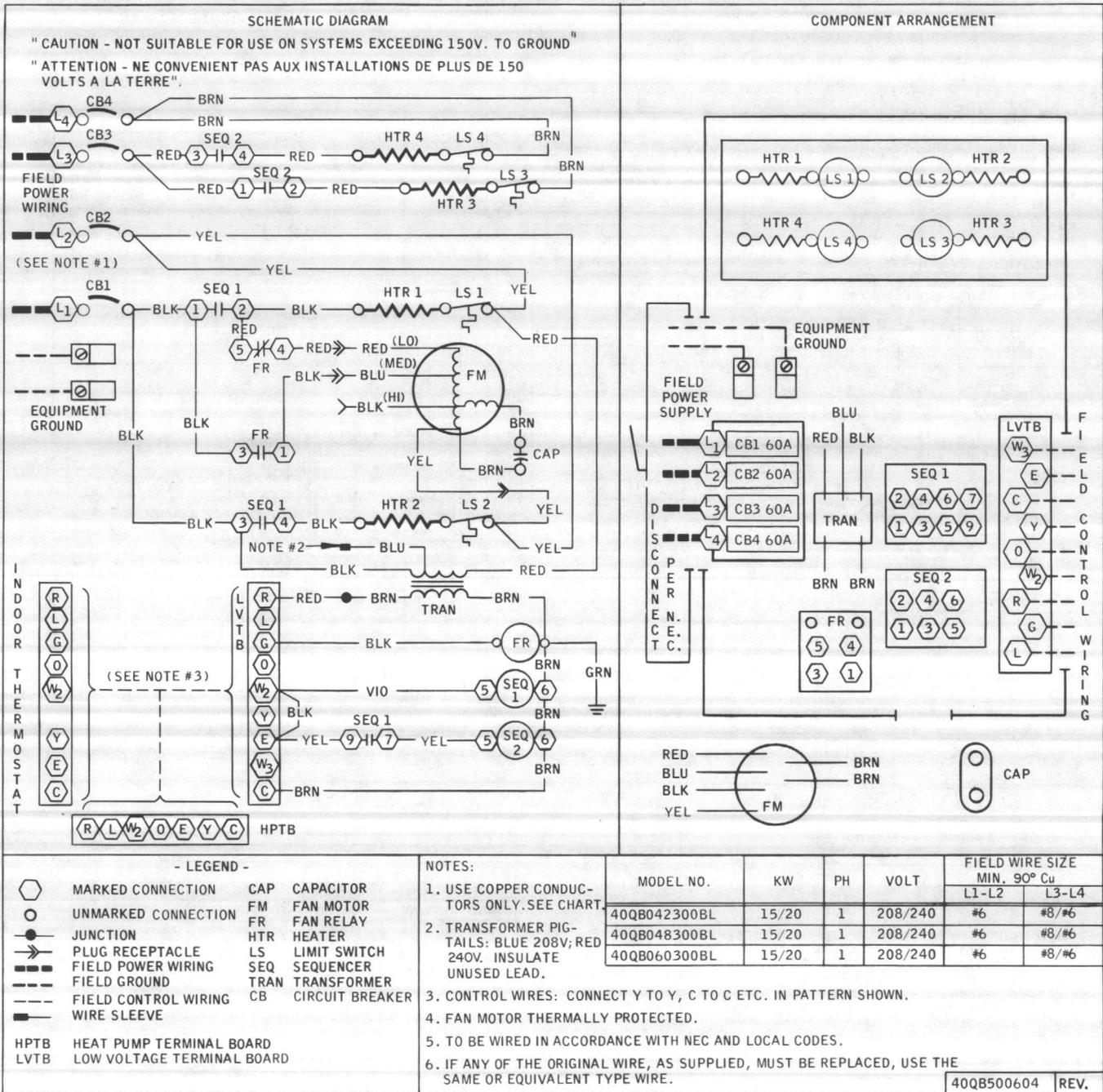


Fig. 7 – Label Diagram – 40QB042300, 048300, 060300BL; 240/208/1/60

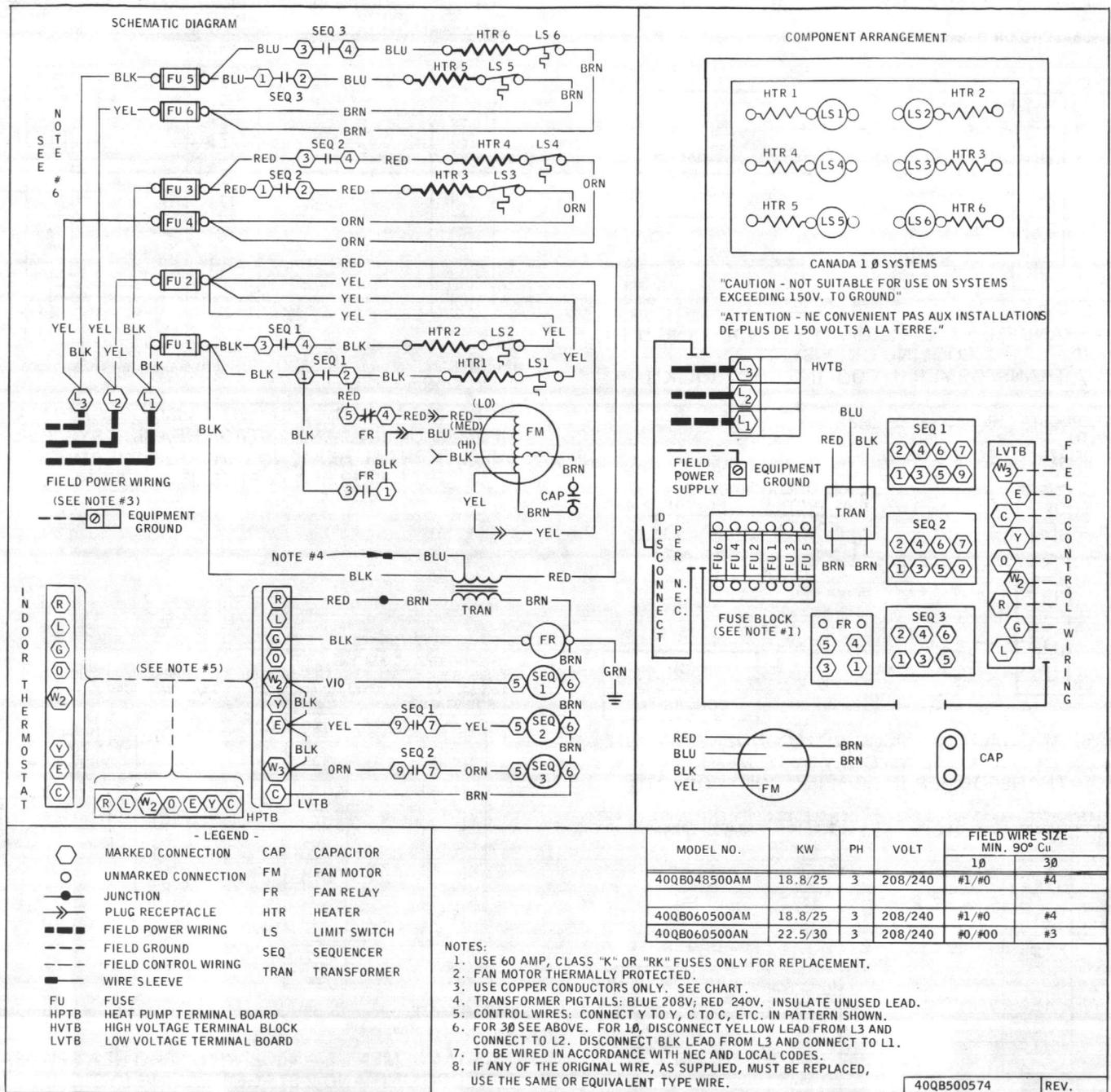
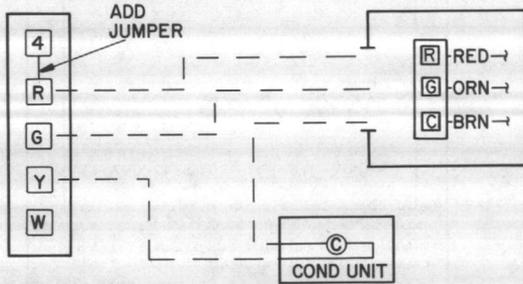


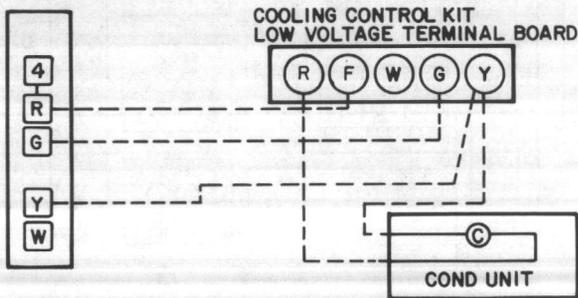
Fig. 8 – Label Diagram – 40QB048500, 060500AM, 40QB060AN; 240/208/3/60

THERMOSTAT HHOIAD040,042
WITH
HH93AZ040 OR 042 SUBBASE



ARRANGEMENT A – 40QB WITH CONDENSING UNIT,
COOLING ONLY SYSTEM.
TRANSFORMER IN COOLING CONTROL KIT.

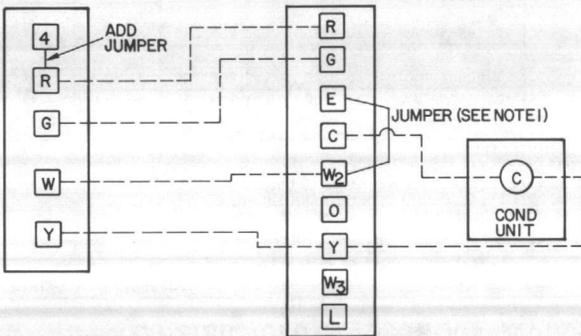
THERMOSTAT HHOIAD040 OR 042
WITH
HH93AZ040 OR 042 SUBBASE



ARRANGEMENT B – 40QB WITH CONDENSING UNIT,
COOLING ONLY SYSTEM.
TRANSFORMER IN COOLING CONTROL KIT.

THERMOSTAT HHOIAD040 OR 042
WITH HH93AZ040 OR 042
SUBBASE

40QB ELECTRIC HEATER (1- AND 2- STAGE
MODELS) LOW VOLTAGE TERMINAL BOARD

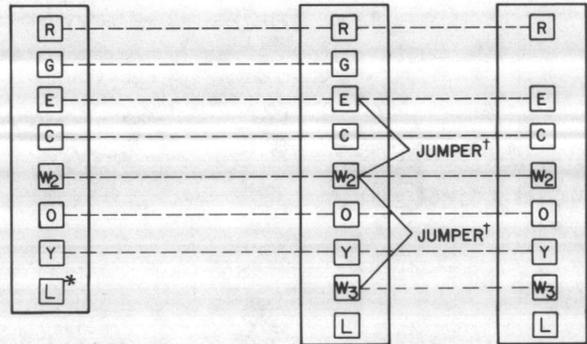


ARRANGEMENT C – 40QB WITH CONDENSING UNIT,
COOLING AND ONE-STAGE HEATING SYSTEM.
TRANSFORMER IN ELECTRIC HEATER.

THERMOSTAT HHO7AT071 WITH
HH93AZ073 (AUTOMATIC
CHANGEOVER) OR HH93AZ075
(MANUAL CHANGEOVER) SUBBASE.
SEE NOTE 2 BELOW.

40QB ELECTRIC HEATER
(ALL MODELS)
LOW VOLTAGE
TERMINAL BOARD

38CQ OR 38RQ
(HEAT PUMPS)
TERMINAL
BOARD



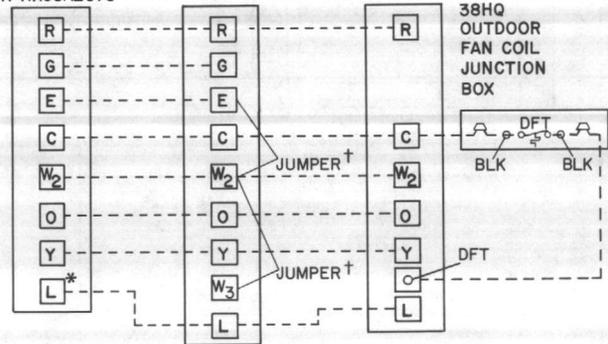
IMPORTANT: Refer to 38CQ, 38RQ Installation Instructions if
outdoor thermostats are used.

ARRANGEMENT D – 40QB WITH 38CQ OR 38RQ HEAT
PUMP, COOLING AND 2-STAGE HEATING SYSTEM;
SUPPLEMENTAL HEAT, NO OUTDOOR THERMOSTAT;
TRANSFORMER IN ELECTRIC HEATER.

THERMOSTAT
SUBBASE
HH93AZ073
OR HH93AZ075

40QB
ELECTRIC HEATER
TERMINAL BOARD

38HQ
COMPRESSOR SECTION
TERMINAL BOARD



IMPORTANT: Refer to 38HQ Installation Instructions if outdoor
thermostats are used.

ARRANGEMENT E – 40QB WITH 38HQ HEAT PUMP,
COOLING AND 2-STAGE HEATING SYSTEM;
SUPPLEMENTAL HEAT, NO OUTDOOR THERMOSTAT;
TRANSFORMER IN ELECTRIC HEATER.

NOTES:

1. All 40QB 2-stage electric heaters can be wired for 1-stage operation by adding jumper wire, Arrangement C. On 40QB two-stage heaters, remove factory installed jumper for 2-stage operation. See Arrangements D and E.
2. Thermostat/Subbase package numbers: 38CQ900081 for HH07-AT071/HH93AZ073 (Automatic Changeover); 38CQ900111 for HH07AT071/HH93AZ075 (Manual Changeover).

- Ⓢ Contactor
- Field Wiring
- Factory Wiring

*Terminal L is identified as terminal X on some former thermostats (required for system malfunction warning indicator on compressor section).

†Remove one or both factory-installed jumpers (Arrangement D and E) when installing outdoor thermostats (ODT) shown in installation instructions for heat pump – outdoor section.

Fig. 9 – Control Wiring Connections

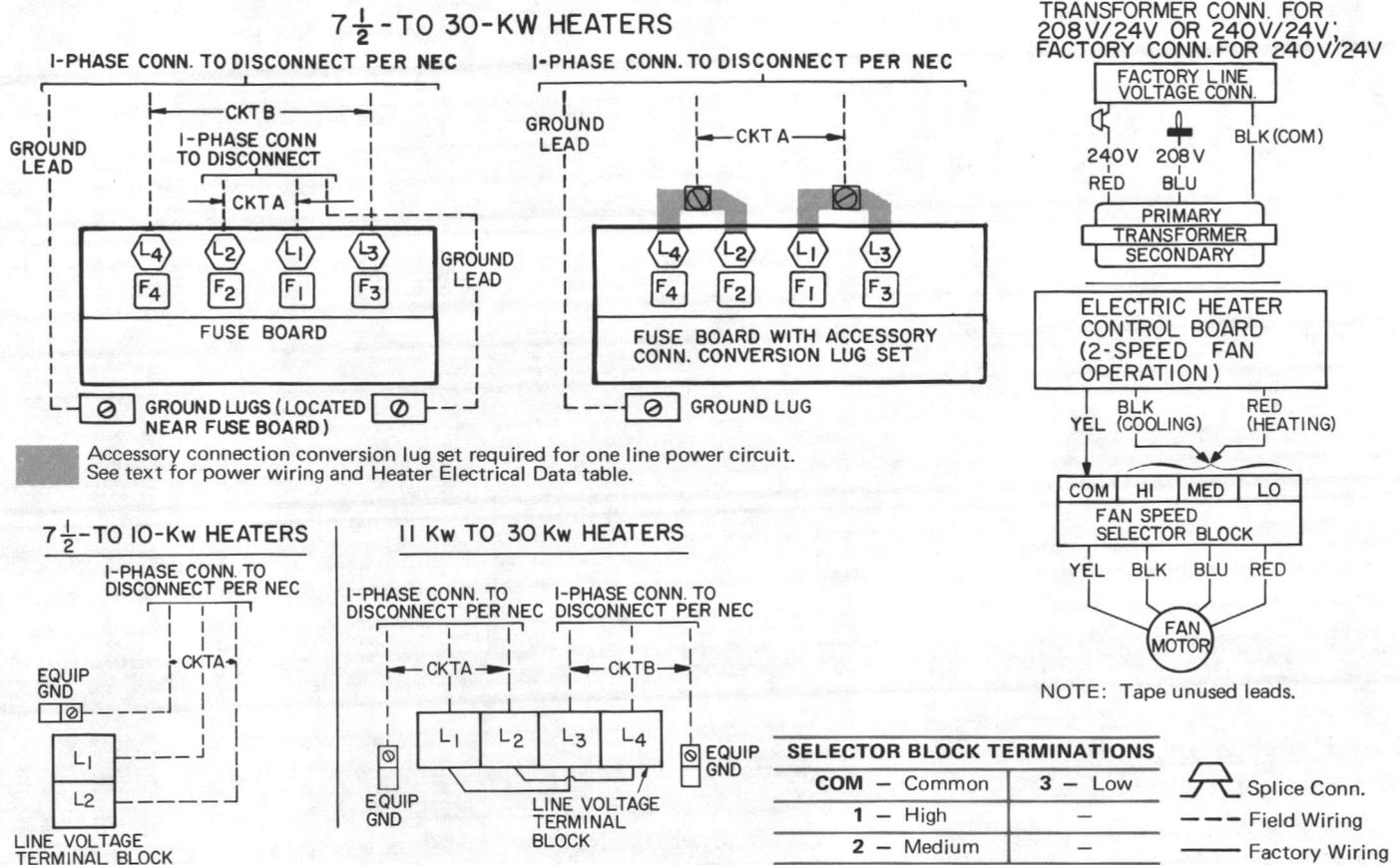


Fig. 10 - 40QB Heating and Cooling Unit Line Power Connections

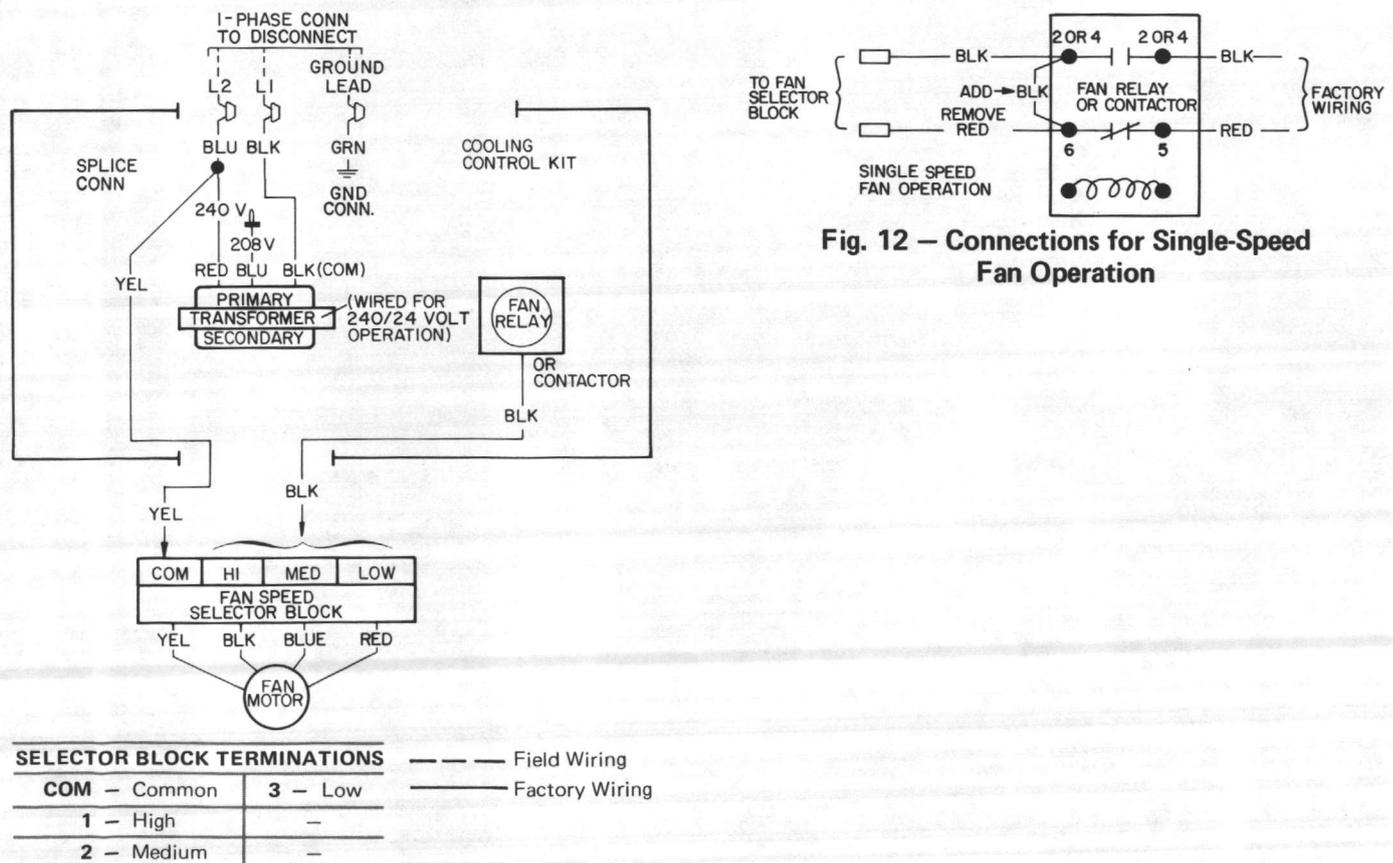


Fig. 12 - Connections for Single-Speed Fan Operation

Fig. 11 - Cooling Unit Line Power Connections

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

Book	1	4
Tab	3c	2c

Form 40QB-1W New

Printed in U.S.A.

6-81

PC 101

Catalog No. 534-009



Number One
Air Conditioning
Maker

Division of
Carrier Corporation

SPECIFIED PARTS

40QB

042,048,060

INTRODUCTION

This catalog presents the most commonly used replacement parts for the new standard 40QB indoor encased fan coil units and is not applicable to special units.

ORDERING INSTRUCTIONS

- A. All orders and inquiries should include the complete model and serial number of the unit on which the parts are to be used, and the part number and description of each part.
- B. Dealers should forward orders to their CAC Distributor.

GENERAL NOTES

1. Casing parts and panels are not normally stocked, but are available upon request while in production. Requests for casing parts and panels, for units no longer in production, must be cleared through the CAC Parts Center for availability prior to submitting an order.
Certain "sheet metal" parts are omitted in the interest of simplicity as orders for them are so infrequent that a simple description of the part, plus the model and serial number of the unit, will be acceptable.
2. Complete "Accessory Packages" or "F.I.O.P.'s" (Factory-Installed Option Plan) are not normally stocked or supplied by the CAC Parts Center. (Refer to "Master Price Pages" and order from: Carrier Air Conditioning Co., Order Dept.)
Accessory Packages and F.I.O.P.'s are listed in this catalog only for reference and to assist in the selection and ordering of components.
3. The replacement parts listed in this catalog are "Carrier Specified Parts" and, as a result of "standardization," may not be identical to the original part furnished on the equipment.
4. Letter designations (appearing in the LDC column preceding the part number column) are used throughout this catalog to represent the classification of those parts. These letter designations are listed below for ease of interpretation and identification. LDC designation in effect when original catalog is issued. Contact your Order Correspondent for latest parts availability.

- AC — Available Component
 - AP — Accessory Package
 - CD — Contact your authorized CAC Distributor for procurement information.
 - FIOP — Factory-Installed Option Plan
 - FF — Field Fabricate
 - MP — Multiple Package — Order sufficient number of packages to meet the unit requirements listed in the "Used On" column. Refer to Price Pages for order quantity.
 - NI — Not Illustrated
 - NA — Part is Not Available
 - NPS — New Part or Item that is Stocked
 - NPN — New Part or Item that is Not Stocked
 - NS — Not Stocked
 - NSS — Not Sold Separately — Order complete assembly
-
- SM1 — Sheet Metal 1. Current production unit. Available production component. Normal lead times. Order will be placed on factory for delivery after next production run.
 - SM2 — Sheet Metal 2 — Obsolete production unit. May be supplied on a special order basis for a period up to two years following last production run. Longer lead times than SM1. Price and delivery will be supplied to the customer for his approval before placing the order. Where customer does not want to place order because of excessive cost, we will supply drawings, if he so requests.
 - SM3 — Obsolete production unit. Tooling is not available, or fabrication cost excessive. Part no longer available. Drawings of these parts will be made available on request.

Catalog No. 554-020

PC 121



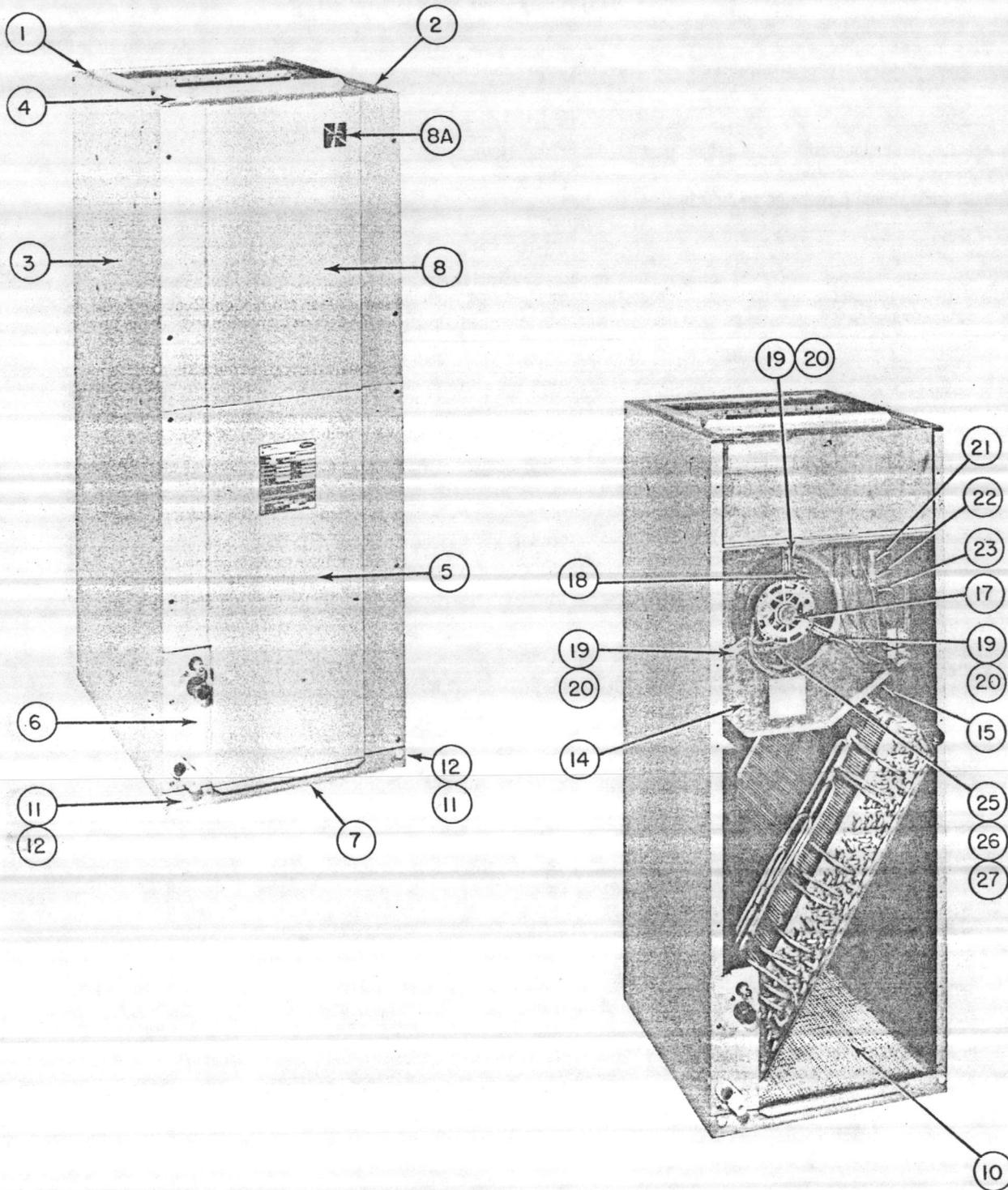
Number One
Air Conditioning
Maker

Division of
Carrier Corporation

SPECIFIED PARTS

40QB

042,048,060



40QB BASE UNIT



Number One
Air Conditioning
Maker

Division of
Carrier Corporation

SPECIFIED PARTS

40QB

042,048,060

ITEM NO.	PART NAME AND DESCRIPTION	LDC	REPLACEMENT PART NUMBER	USED ON 40QB		
				0	0	0
				4	4	6
				2	8	0
CASING AND FILTER SECTION						
1	Rear Panel and Insulation Assembly	AC	40QB-660---001--	1	1	1
2	Side Panel and Insulation Assembly (R.H.)	AC	40QB-660---002--	1		
		AC	40QB-660---003--		1	1
3	Side Panel and Insulation Assembly (L.H.)	AC	40QB-660---004--	1		
		AC	40QB-660---005--		1	1
4	Top Cover and Insulation Assembly	AC	40QB-660---006--	1	1	1
5	Lower Cover and Insulation Assembly	AC	40QB-660---007--	1	1	1
6	Cover Plate and Insulation Assembly	AC	40QB-660---008--	1	1	1
7	Filter Cover and Insulation Assembly	AC	40QB-660---009--	1	1	1
8	Upper Cover and Insulation Assembly	AC	40QB-660---010--	1	1	1
	Includes:					
8A	Sticker, Name Plate (1) 99NA502293	AC				
NI/9	Channel, Filter	SM1	40QB-500---222--	2		
		SM1	40QB-500---212--		2	2
10	Filter, Air (Cleanable) 20 x 21 x 1 20 x 25 x 1	NPS	--KH--03DW-210--	1		
		NPS	--KH--03DW-250--		1	1
11	Plunger	NS	--KA--12BZ-001--	2	2	2
12	Button, Plug	NS	--KA--51BZ-001--	2	2	2
NI/13	Paint, Touch-Up (Silver Sage) 16 oz. Pressurized Can	MP	--PH--23ZS-016--	As Required		
NOTE: ALL PARTS ON THIS PAGE ARE USED WITH 50/60 HZ UNITS.						



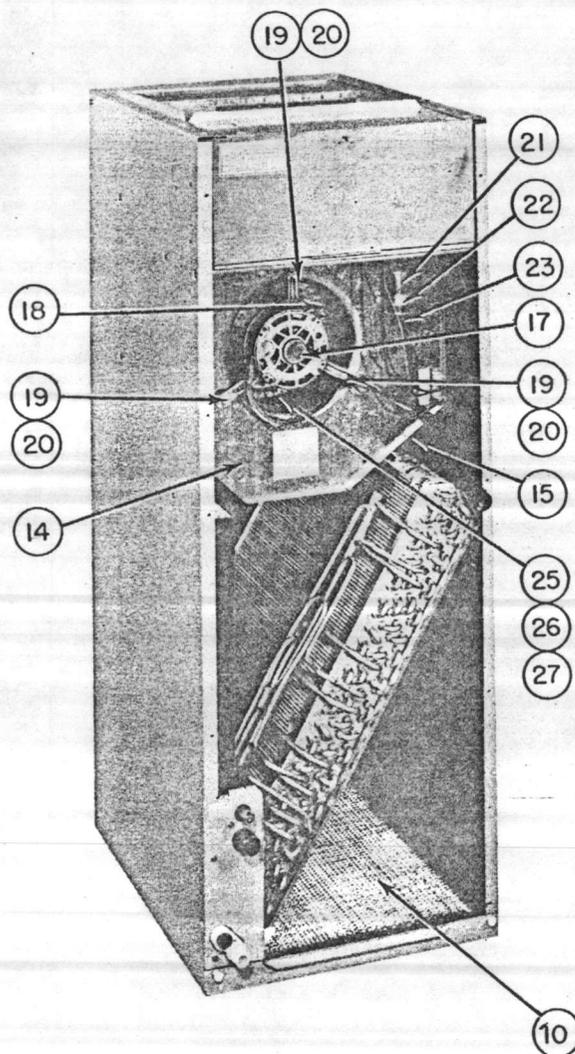
Number One
Air Conditioning
Maker

Division of
Carrier Corporation

SPECIFIED PARTS

40QB

042,048,060



40QB BASE UNIT



Number One
Air Conditioning
Maker

Division of
Carrier Corporation

SPECIFIED PARTS

40QB

042,048,060

ITEM NO.	PART NAME AND DESCRIPTION	LDC	REPLACEMENT PART NUMBER	USED ON 40QB		
				0	0	0
				4	4	6
				2	8	0
BLOWER AND MOTOR SECTION						
14	Plate, Front (60 HZ) (50/60 HZ)	SM1	40QB-500---484--	1	1	-
		SM1	40QB-500---084--	1	1	1
15	Scroll (50/60 HZ)	SM1	40QB-500---094--	1	1	1
NI/16	Plate, Back (50/60 HZ) (50/60 HZ) (50/60 HZ)	SM1	40QB-500---494--	1		
		SM1	40QB-500---534--		1	
		SM1	40QB-500---104--			1
17	Motor, Blower-1/2HP;208/230-1-60;1075RPM;3SPD -3/4HP;208/230-1-60;1050RPM;3SPD -3/4HP;208/230-1-50;940/850RPM;2SPD	NPS	--HC--43MF-230--	1	1	
		NPS	--HC--45MF-232--			1
		NPS	--HC--46MF-233--	1	1	
18	Wheel, Blower-1/2" Bore; 48 Blades; Approx. 9.62 x 10.62 -1/2" Bore; 53 or 54 Blades;50/60 HZ	AC	--LA--22LA-014--	1	1	
		NPS	--LA--22LA-094--			1
19	Arm Motor Mount 60 HZ 50 HZ 60 HZ	AC	--HC--98ZZ-244--	3	3	
		NPS	--HC--98ZZ-250--	3	3	
		AC	--HC--98ZZ-250--			3
20	Screw Assembly	MP	--AH--01AM-172--	3	3	3
21	Capacitor - 10MFD; 370 Volt; Max. Height 2.88 (60 HZ) - 12.5MFD; 370 Volt; Max. Height 3.50 (60 HZ) - 12.5MFD; 440 Volt; Max. Height 4.75 (50 HZ) - 15MFD; 370 Volt; Max. Height 4.13 (50 HZ)	AC	--HC--90AB-010--	1	1	
		AC	--HC--90AB-012--			1
		AC	--HC--90BB-012--	1	1	
		AC	--HC--90AB-015--			1
22	Strap, Capacitor (50/60 HZ)	AC	--HC--98ZZ-045--	1	1	1
23	Boot, Capacitor (50/60 HZ)	AC	--HC--97ZZ-071--	1	1	1
24	Band, Motor Mount (50/60 HZ)	AC	--HC--98ZZ-480--	1	1	1
25	Screw, 1/4-20 x 1-1/2" LG. (Motor Mount Band)	MP	--AA--06BS-173--	1	1	1
26	Nut, 1/4-20 (Motor Mount Band)	AC	--AT--39AB-171--	1	1	1
27	Washer, Lock (Motor Mount Band)	MP	--AU--27AS-171--	1	1	1



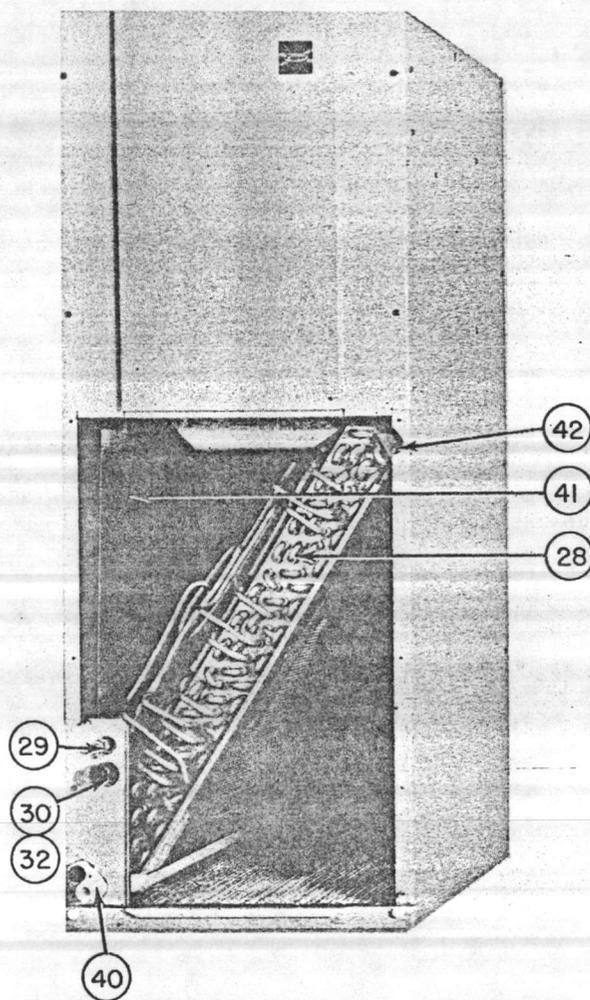
Number One
Air Conditioning
Maker

Division of
Carrier Corporation

SPECIFIED PARTS

40QB

042,048,060





Number One
Air Conditioning
Maker

Division of
Carrier Corporation

SPECIFIED PARTS

40QB

042,048,060

ITEM NO.	PART NAME AND DESCRIPTION	LDC	REPLACEMENT PART NUMBER	USED ON 40QB		
				0	0	0
				4	4	6
				2	8	0
EVAPORATOR SECTION						
28	Evaporator Coil Each Includes:	AC	40QB-400---081--	1		
		AC	40QB-400---061--		1	
		AC	40QB-400---211--			1
29	Accu-Rater Body - Liquid 3/8" (1) 99CC-502---453--	AC				
30	Suction Fitting - 3/4" (1) 28VQ-400---072--	AC				
	Includes:					
NI/31	Seal, Ring (1) 99CC-501---072--	MP				
32	Locknut, Coupling - 3/4 (1) 99CC-501---043--	AC				
33	Nut, Flare-3/8" (1) 99CC-502---163--	AC				
NI/34	Nut, Flare-3/4" (1) 99CC-502---183	AC				
NI/35	Insert Strainer (1) --KH--11HH-068--	AC				
NI/36	Bracket, Coupling (1) 40QB-500---203--	SM1				
NI/37	Retainer, Coupling (1) 28GS-500---172--	SM1				
NI/38	By-Pass Accu-Rater Piston Package	MP	38CQ-660---082--	1	1	
	Includes:					
	Piston-Ident. #82 (6) --EA--52PH-082--	NSS				
NI/38	By-Pass Accu-Rater Piston Package	MP	38CQ-660---093--			1
	Includes:					
	Piston-Ident. #93 (6) --EA--52PH-093--	NSS				
NI/39	By-Pass Accu-Rater Piston Retainer Package	MP	38CQ-660---031--	1	1	1
	Includes:					
	Piston Retainer (6) 99CC-409---892--	NSS				
40	Pan, Condensate	AC	40QB-400---914--	1		
		AC	40QB-400---904--		1	1
41	Baffle, Drip	SM1	40QB-501---903--	1		
		SM1	40QB-501---893--		1	1
42	Baffle, Coil	SM1	40QB-500---172--	1		
		SM1	40QB-500---092--		1	1
NI/42A	Distributor	NPS	--EA--08AL-366--	x	x	1
(x) NOTE: 1) NOT USED ON THESE MODELS. 2) ALL PARTS ON THIS PAGE ARE USED WITH 50/60 HZ UNITS.						



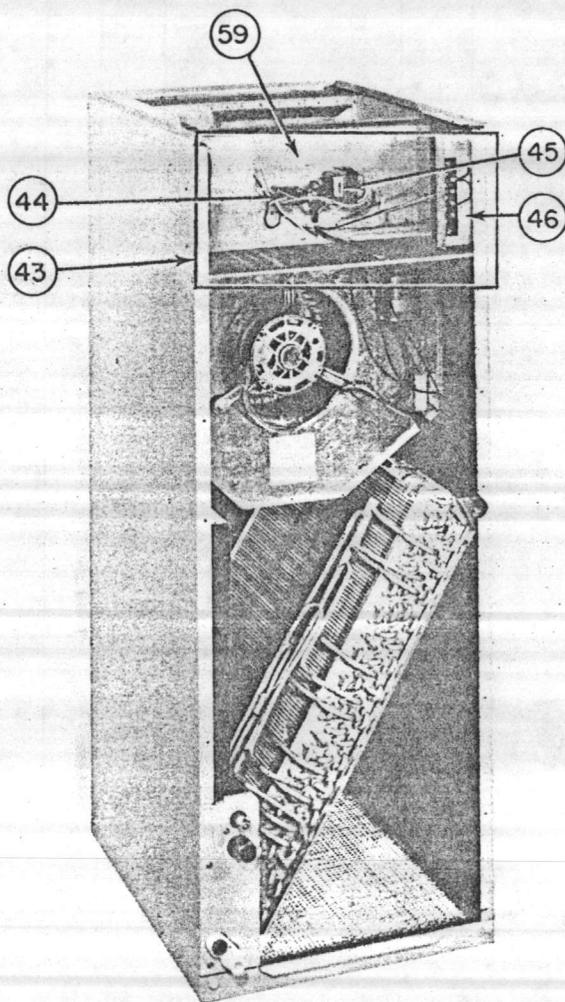
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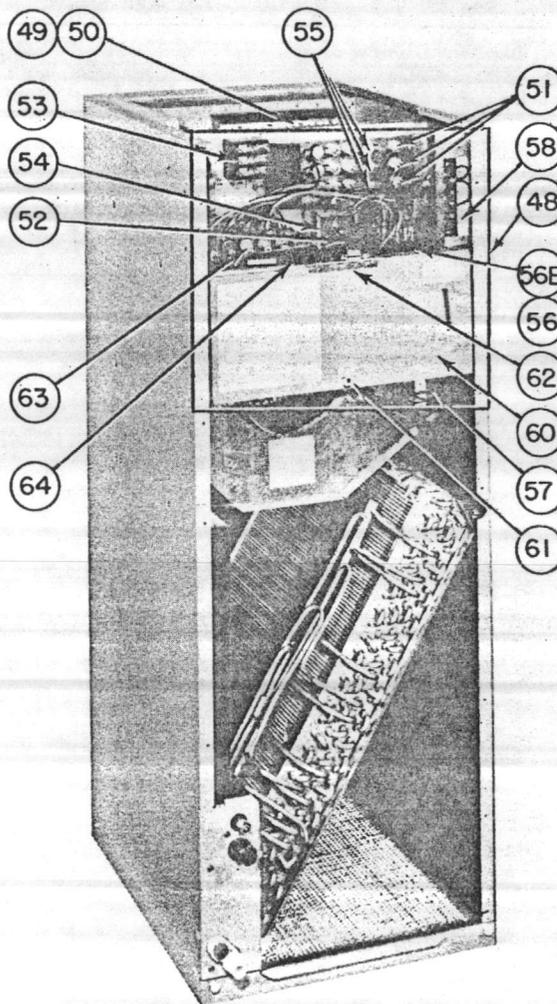
SPECIFIED PARTS

40QB

042,048,060



**40QB BASE UNIT WITH
COOLING CONTROL PACKAGE**



**40QB BASE UNIT WITH
ELECTRIC HEATER ACCESSORY
40QB900051 ITEM #48**



Number One
Air Conditioning
Maker

Division of
Carrier Corporation

SPECIFIED PARTS

40QB

042,048,060

ITEM NO.	PART NAME AND DESCRIPTION	LDC	REPLACEMENT PART NUMBER	USED ON 40QB		
				0	0	0
				4	4	6
				2	8	0

ACCESSORY SECTION

43	Cooling Control Package Includes:		AP	40QB-900---131--	1	1	1
44	Relay, Power	(1) --HN--61KQ-120--	AC				
45	Transformer (60VA) Primary - 200/230V Secondary - 24V	(1) --HT--01AW-230--	MP				
46	Board, Low Voltage Terminal	(1) --HY--84HA-068--	NPS				
47	Electric Heater Package - 10KW; 208/230-1Ø; Non-fused Includes:		AP	40QB-900---011--	1	1	1
48	Heater Assembly Includes:	(1) 40QB-680---001--	NS				
	Element Assembly Includes:	(1) 40QB-680---002--	NS				
49	Rack Assembly	(1) 40QB-680---003--	NS				
50	Coil Assembly	(2) 88CC1244AC104516	NPS				
51	Insulator, Terminal (Male)	(4) 50MH-680---016--	MP				
	(Female)	(4) 50MH-680---017--	MP				
52	Relay, Power	(1) --HN--61KK-911--	AC				
53	Block, Terminal	(1) --HY--11UC-238--	AC				
54	Transformer (60VA) Primary - 200/230V Secondary - 24V	(1) --HT--01AW-230--	MP				
55	Switch, Temp. Act.	(3) --HH--19ZA-145--	AC				
56	Sequencer (Mfr. #TDS-3LA) Front	(1) --HN--67BD-002--	AC				
56B	Sequencer (Mfr. #TDS-3DA) Back	(1) --HN--67BD-001--	AC				
57	Receptacle, Molex	(1) 58GA-660---003--	AC				
58	Board, Low Voltage Terminal	(1) --HY--84HA-068--	NPS				
59	Panel, Control	(1) 40QB-680---004--	SML				
47	Electric Heater Package - 12KW; 208/230-1Ø; Fused Includes:		AP	40QB-900---051--	1	1	1
48	Heater Assembly Includes:	(1) 40QB-680---005--	NS				
	Element Assembly Includes:	(1) 40QB-680---006--	NS				
49	Rack Assembly	(1) 40QB-680---007--	NS				
50	Coil Assembly	(3) 88CC1244AC129617	NPS				
	Insulator, Terminal (Male)	(6) 50MH-680---016--	MP				
	(Female)	(6) 50MH-680---017--	MP				
52	Relay, Power	(1) --HN--61KK-911--	AC				
54	Transformer (60VA) Primary - 200/230V Secondary - 24V	(1) --HT--01AW-230--	MP				
55	Switch, Temp. Act.	(3) --HH--19ZA-145--	AC				
56	Sequencer (Mfr. #TDS-3LA) Front	(1) --HN--67BD-002--	AC				
56B	Sequencer (Mfr. #TDS-3DA) Back	(1) --HN--67BD-001--	AC				
57	Receptacle, Molex	(1) 58GA-660---003--	AC				
58	Board, Low Voltage Terminal	(1) --HY--84HA-068--	NPS				
59	Panel, Control	(1) 40QB-680---004--	SML				
60	Door	(1) 40QB-680---008--	SML				
61	Latch	(1) --KA--05AB-100--	NPS				
62	Hinge	(1) 40QB-680---009--	NS				
63	Fuse Holder	(1) --HY--11UM-461--	AC				
64	Fuse (60 AMP)	(2) --HY--10MJ-060--	AC				
	Fuse (30 AMP)	(2) --HY--10MJ-030--	MP				

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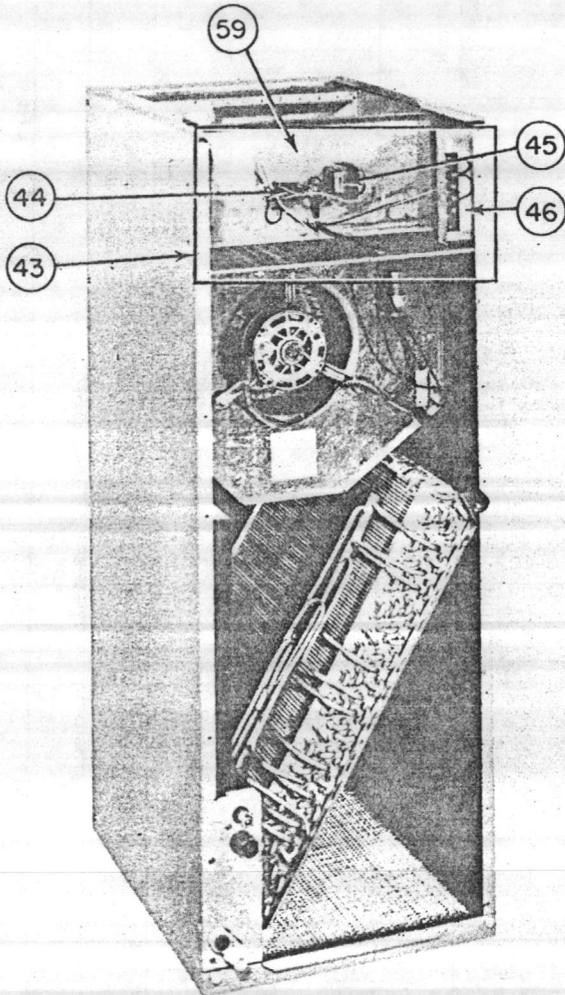
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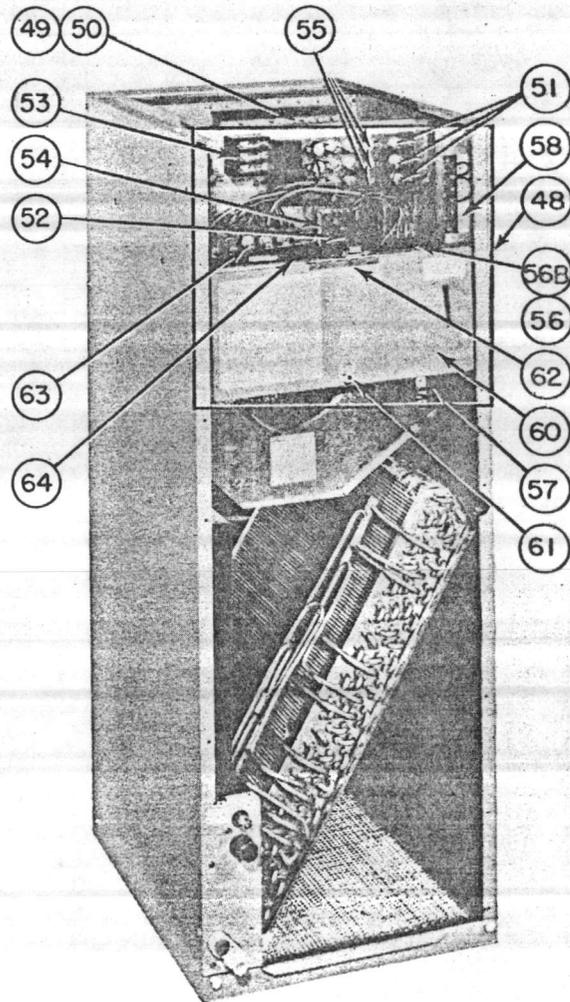
SPECIFIED PARTS

40QB

042,048,060



**40QB BASE UNIT WITH
COOLING CONTROL PACKAGE**



**40QB BASE UNIT WITH
ELECTRIC HEATER ACCESSORY
40QB900051 ITEM #48**



Number One
Air Conditioning
Maker

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Carrier Corporation

SPECIFIED PARTS

40QB

042,048,060

ITEM NO.	PART NAME AND DESCRIPTION	LDC	REPLACEMENT PART NUMBER	USED ON 40QB		
				0	0	0
				4	4	6
				2	8	0

ACCESSORY SECTION (CONT'D.)

47	Electric Heater Package - 15KW; 208/230-1Ø; Ckt. Brkr. Circuit Breaker	AP	40QB-900---061--	1	1	1
	Includes:					
48	Heater Assembly (1) 40QB-680---010--	NS				
	Includes:					
	Element Assembly (1) 40QB-680---011--	NS				
	Includes:					
49	Rack Assembly (1) 40QB-680---007--	NS				
50	Coil Assembly (3) 88CC1244AC104516	NPS				
51	Insulator, Terminal (Male) (6) 50MH-680---016--	MP				
	(Female) (6) 50MH-680---017--	MP				
52	Relay, Power (1) --HN--61KK-911--	AC				
54	Transformer (60VA) (1) --HT--01AW-230--	MP				
	Primary - 200/230V					
	Secondary - 24V					
55	Switch Temp. Act. (3) --HH--19ZA-145--	AC				
56	Sequencer (Mfr. #TDS-3LA) Front (1) --HN--67BD-002--	AC				
56B	Sequencer (Mfr. #TDS-3DA) Back (1) --HN--67BD-001--	AC				
57	Receptacle, Molex (1) 58GA-660---003--	AC				
58	Board, Low Voltage Terminal (1) --HY--84HA-068--	NPS				
59	Panel, Control (1) 40QB-680---003--	SM1				
NI/65	Breaker, Circuit (30 AMP) (2) --HH--83DH-030--	AC				
	(60 AMP) (2) --HH--83DH-060--	AC				
NI/66	Shield (Circuit Breaker) (1) 40QB-680---012--	SM1				
47	Electric Heater Package - 18KW; 208/230-1Ø; Non-fused	AP	40QB-900---081--	1	1	1
	Includes:					
48	Heater Assembly (1) 40QB-680---013--	NS				
	Includes:					
	Element Assembly (1) 40QB-680---014--	NS				
	Includes:					
49	Rack Assembly (1) 40QB-680---007--	NS				
50	Coil Assembly (3) 88CC1244AB086415	NPS				
51	Insulator Terminal (Male) (6) 50MH-680---016--	MP				
	(Female) (6) 50MH-680---017--	MP				
52	Relay, Power (1) --HN--61KK-911--	AC				
53	Block, Terminal (1) --HY--11UC-238--	AC				
54	Transformer (60VA) (1) --HT--01AW-230--	MP				
	Primary - 200/230V					
	Secondary - 24V					
55	Switch, Temp. Act. (3) --HH--19ZA-165--	AC				
56	Sequencer (Mfr. #TDS-3LA) Front (1) --HN--67BD-002--	AC				
56B	Sequencer (Mfr. #TDS-3DA) Back (1) --HN--67BD-001--	AC				
57	Receptacle, Molex (1) 58GA-660---003--	AC				
58	Board, Low Voltage Terminal (1) --HY--84HA-068--	NPS				
59	Panel, Control (1) 40QB-680---004--	SM1				

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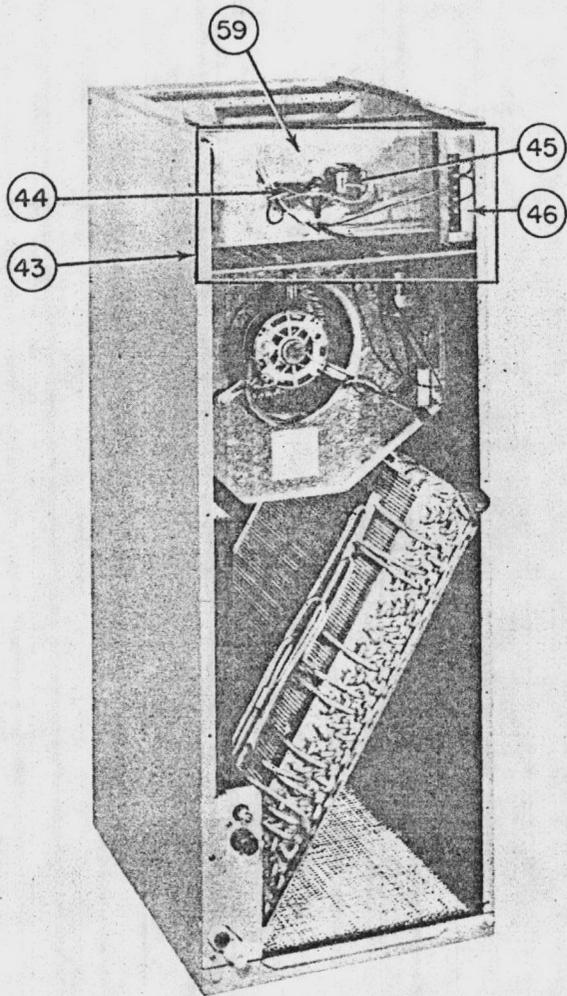
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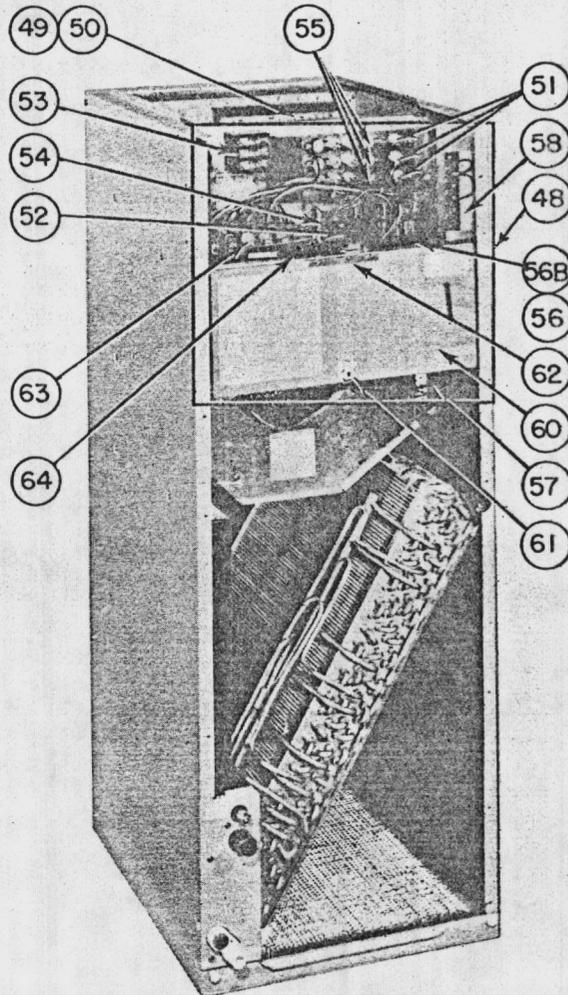
SPECIFIED PARTS

40QB

042,048,060



**40QB BASE UNIT WITH
COOLING CONTROL PACKAGE**



**40QB BASE UNIT WITH
ELECTRIC HEATER ACCESSORY
40QB900051 ITEM #48**



Number One
Air Conditioning
Maker

Division of
Carrier Corporation

SPECIFIED PARTS

40QB

042,048,060

ITEM NO.	PART NAME AND DESCRIPTION	LDC	REPLACEMENT PART NUMBER	USED ON 40QB		
ACCESSORY SECTION (CONT'D.)						
47	Electric Heater Package - 20KW; 208/230-1Ø; Fused	AP	40QB-900---091--	1	1	1
	Includes:					
48	Heater Assembly (1) 40QB-680---015--	NS				
	Includes:					
	Element Assembly (1) 40QB-680---016--	NS				
	Includes:					
49	Rack Assembly (1) 40QB-680---017--	NS				
50	Coil Assembly (4) 88CC1244AC104516	NPS				
51	Insulator, Terminal (Male) (8) 50MH-680---016--	MP				
	(Female) (8) 50MH-680---017--	MP				
52	Relay, Power (1) --HN--61KK-911--	AC				
54	Transformer (60VA) (1) --HT--01AW-080--	MP				
	Primary - 200/230V					
	Secondary - 24V					
55	Switch, Temp. Act. (4) --HH--19ZA-145--	AC				
56	Sequencer (Mfr. #TDS-3LA) Front (1) --HN--67BD-002--	AC				
56B	Sequencer (Mfr. #TDS-3DA) Back (1) --HN--67BD-001--	AC				
57	Receptacle, Molex (1) 58GA-680---003--	AC				
58	Board, Low Voltage Terminal (1) --HY--84HA-068--	NPS				
59	Panel, Control (1) 40QB-680---004--	SM1				
60	Door (1) 40QB-680---008--	SM1				
61	Latch (1) --KA--05AB-100--	NPS				
62	Hinge (1) 40QB-680---009--	NS				
63	Fuse Holder (1) --HY--11UM-601--	AC				
64	Fuse (60 AMP) (4) --HY--10MJ-060--	AC				
47	Electric Heater Package - 20KW; 208/230-1Ø; Ckt. Brkr.	AP	40QB-900---101--	1	1	1
	Circuit Breaker					
	Includes:					
48	Heater Assembly (1) 40QB-680---018--	NS				
	Includes:					
	Element Assembly (1) 40QB-680---016--	NS				
	Includes:					
49	Rack Assembly (1) 40QB-680---017--	NS				
50	Coil Assembly (4) 88CC1244AC104516	NPS				
51	Insulator, Terminal (Male) (8) 50MH-680---016--	MP				
	(Female) (8) 50MH-680---017--	MP				
52	Relay, Power (1) --HN--61KK-911--	AC				
54	Transformer (60VA) (1) --HT--01AW-230--	MP				
	Primary - 200/230V					
	Secondary - 24V					
55	Switch, Temp. Act. (4) --HH--19ZA-145--	AC				
56	Sequencer (Mfr. #TDS-3LA) Front (1) --HN--67BD-002--	AC				
56B	Sequencer (Mfr. #TDS-3DA) Back (1) --HN--67BD-001--	AC				
57	Receptacle, Molex (1) 58GA-660---003--	AC				
58	Board, Low Voltage Terminal (1) --HY--84HA-068--	AC				
59	Panel, Control (1) 40QB-680---004--	NS				
NI/65	Breaker Circuit (60 AMP) (4) --HH--83DH-060--	AC				
NI/66	Shield (Circuit Breaker) (1) 40QB-680---012--	NS				

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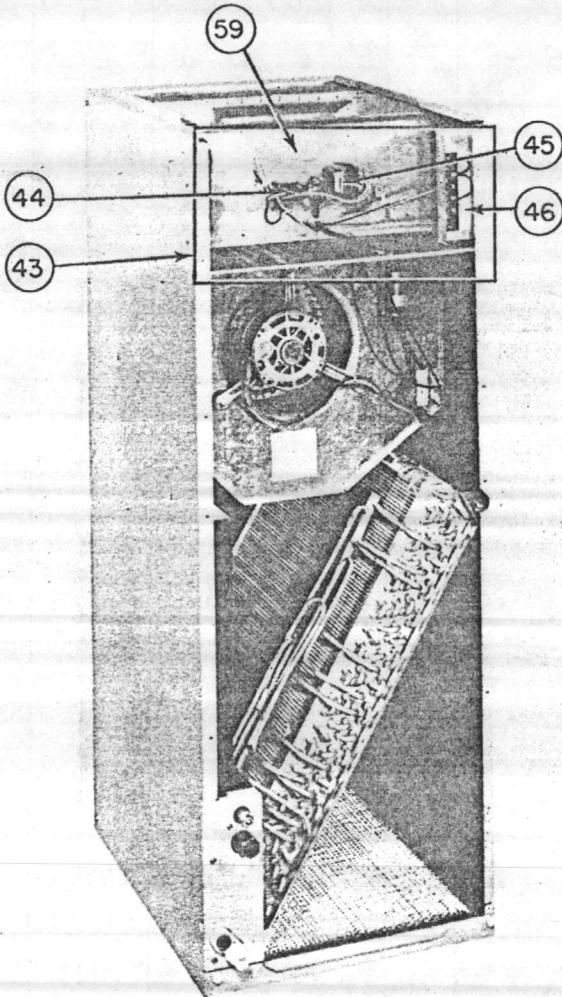
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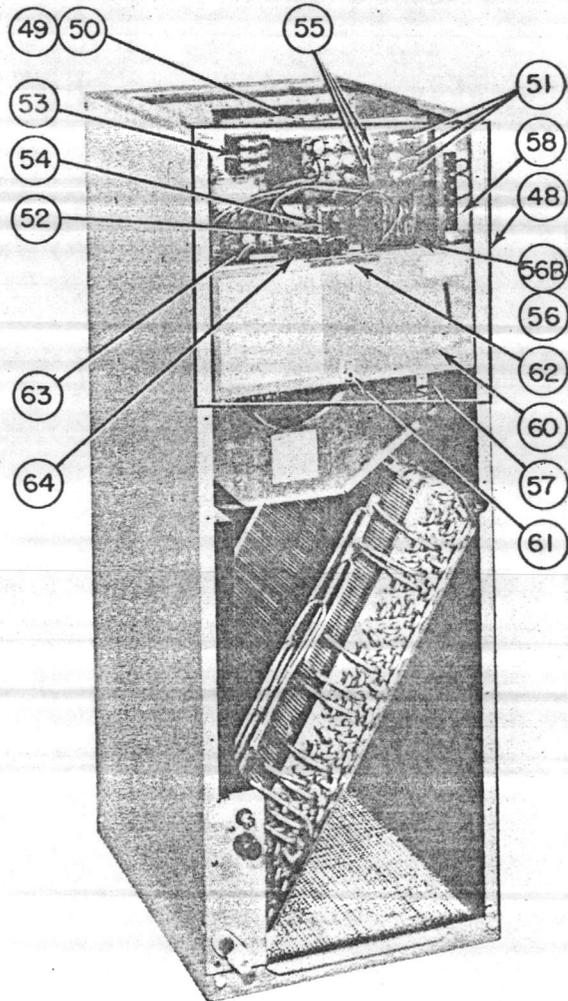
SPECIFIED PARTS

40QB

042,048,060



**40QB BASE UNIT WITH
COOLING CONTROL PACKAGE**



**40QB BASE UNIT WITH
ELECTRIC HEATER ACCESSORY
40QB900051 ITEM #48**



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Air Conditioning
Maker

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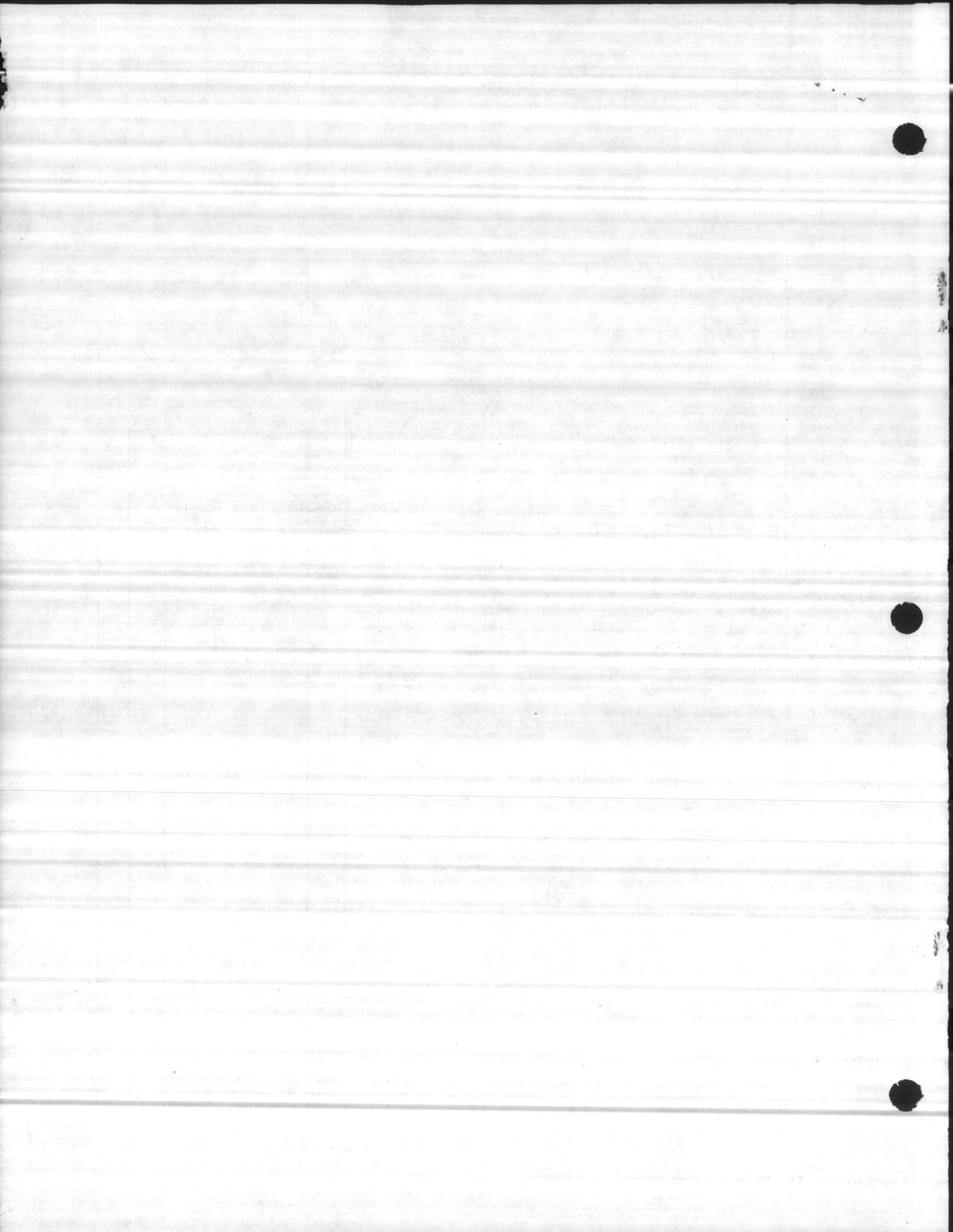
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40QB

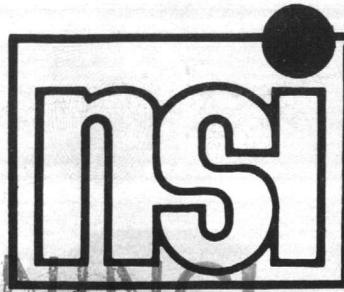
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ITEM NO.	PART NAME AND DESCRIPTION	LDC	REPLACEMENT PART NUMBER	USED ON 40QB		
				0	0	0
				4	4	6
				2	8	0
ACCESSORY SECTION (CONT'D.)						
47	Electric Heater Package - 25KW; 208/230-1 ϕ or 3 ϕ ; Fused	AP	40QB-900---111--	-	1	1
	Includes:					
48	Heater Assembly (1) 40QB-680---018--	NS				
	Includes:					
	Element Assembly (1) 40QB-680---019--	NS				
	Includes:					
49	Rack Assembly (1) 40QB-680---020--	NS				
50	Coil Assembly (6) 88CC1244AC124417	NPS				
51	Insulator, Terminal (Male) (12) 50MH-680---016--	MP				
	(Female) (12) 50MH-680---017--	MP				
52	Relay, Power (1) --HN--61KK-911--	AC				
53	Block, Terminal (1) --HY--11UC-125--	AC				
54	Transformer (60VA) (1) --HT--01AW-230--	MP				
	Primary - 200/230V					
	Secondary - 24V					
55	Switch, Temp. Act. (6) --HH--19ZA-145--	AC				
56	Sequencer (Mfr. #TDS-3LA) Front (1) --HN--67BD-002--	AC				
56B	Sequencer (Mfr. #TDS-3DA) Back (1) --HN--67BD-001--	AC				
57	Receptacle, Molex (1) 58GA-660---003--	AC				
58	Board, Low Voltage Terminal (1) --HY--84HA-068--	NPS				
59	Panel, Control (1) 40QB-680---004--	SM1				
60	Door (1) 40QB-680---008--	SM1				
61	Latch (1) --KA--05AB-100--	NPS				
62	Hinge (1) 40QB-680---009--	NS				
63	Fuse, Holder (1) --HY--11UM-465--	AC				
64	Fuse (60 AMP) (4) --HY--10MJ-060--	AC				
47.	Electric Heater Package - 30KW; 208/230-1 ϕ or 3 ϕ ; Fused	AP	40QB-900---121--	-	1	1
	Includes:					
48	Heater Assembly (1) 40QB-680---021--	NS				
	Includes:					
	Element Assembly (1) 40QB-680---022--	NS				
	Includes:					
49	Rack Assembly (1) 40QB-680---023--	NS				
50	Coil Assembly (6) 88CC1244AC104516	NPS				
51	Insulator, Terminal (Male) (12) 50MH-680---016--	MP				
	(Female) (12) 50MH-680---017--	MP				
52	Relay, Power (1) --HN--61KK-911--	AC				
53	Block, Terminal (1) --HY--11UC-125--	AC				
54	Transformer (60VA) (1) --HT--01AW-230--	MP				
	Primary - 200/230V					
	Secondary - 24V					
55	-Open @ 145 \pm 5 $^{\circ}$ F (4) --HH--19ZA-145--	AC				
	-Close @ 105 \pm 8 $^{\circ}$ F					
	Sw. Temp. Act-Open @ 155 \pm 5 $^{\circ}$ F (2) --HH--19ZA-155--	AC				
	-Close @ 115 \pm 10 $^{\circ}$ F					
56	Sequencer (Mfr. #TDS-3LA) Front (2) --HN--67BD-002--	AC				
56B	Sequencer (Mfr. #TDS-3DA) Back (1) --HN--67BD-001--	AC				
57	Receptacle, Molex (1) 58GA-660---003--	AC				
58	Board, Low Voltage Terminal (1) --HY--84HA-068--	AC				
59	Panel, Control (1) 40QB-680---004--	SM1				
60	Door (1) 40QB-680---008--	SM1				
61	Latch (1) --KA--05AB-100--	NPS				
62	Hinge (1) 40QB-680---009--	NS				
63	Fuse Holder (1) --HY--11UM-465--	AC				
64	Fuse (60 AMP) (6) --HY--10MJ-060--	AC				

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SMARTSTAT 1000

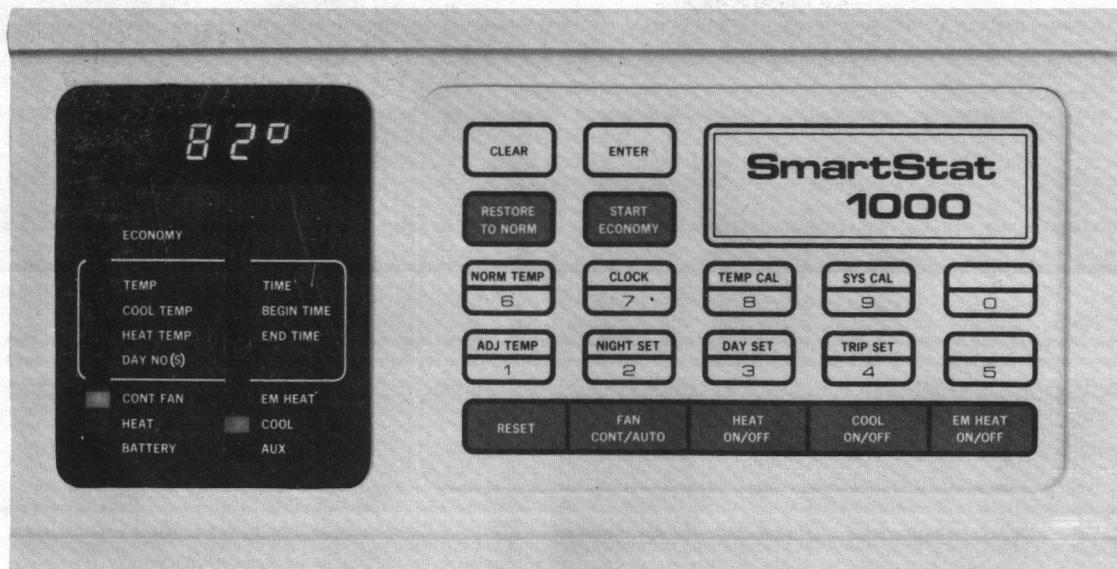


BY

Control Products Division

Failure to read the installation manual and install this SmartStat according to its explicit directions may cause permanent and irreparable damage to this unit and may void the warranty.

INSTALLATION MANUAL



NSI Control Products

RITTENHOUSE ROAD • JEFFERSON CITY, TENNESSEE 37760

1-800-251-0996
(615) 475-7931 IN TN.

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LIST OF TABLES

- Table 1 CHOOSING PROPER WIRING DIAGRAM AND INTERFACE UNIT
Table 2 AC/DC VOLTMETER READINGS FOR SMARTSTAT 1000
Table 3 TROUBLE-SHOOTING GUIDE

LIST OF FIGURES

- Figure 1 CONVERSION FROM CONVENTIONAL THERMOSTAT TO SMARTSTAT
Figure 2 CONTROL UNIT SUBBASE TERMINALS
Figure 3 INTERFACE UNIT TERMINALS
Figure 4 WIRING FOR FOUR-WIRE CONVENTIONAL SYSTEMS
Figure 5 WIRING FOR FIVE-WIRE TWO TRANSFORMER CONVENTIONAL SYSTEMS
Figure 6 WIRING FOR HEAT PUMP SYSTEMS WITH NO REVERSING VALVE CONTROL FROM THERMOSTAT
Figure 7 WIRING FOR HEAT PUMP SYSTEMS WITH COOLING ACTIVATED REVERSING VALVE CONTROL FROM THERMOSTAT
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Figure 9 WIRING FOR MULTI-STAGE NON-HEAT PUMP SYSTEMS
Figure 10 WIRING FOR HEAT PUMP SYSTEMS WITH MULTI-STAGE ELECTRIC HEAT
Figure 11 WIRING FOR COLEMAN HEAT PUMPS (OPTION D)
Figure 12 WIRING FOR DUAL SPEED COMPRESSOR HEAT PUMP SYSTEMS (OPTION E)
Figure 13 WIRING FOR ADD-ON HEAT PUMPS (OPTION J)
Figure 14 WIRING FOR C OPTION (AUXILIARY ECONOMY CONTROL)
Figure 15 TEMPERATURE CALIBRATION PROCEDURE
Figure 16 OPTION B REMOTE TEMPERATURE SENSOR

FOR SUMMARY OF INSTALLATION SEE PAGE 24.

GENERAL DESCRIPTION

SMARTSTAT 1000 is a solid state energy management system with both residential and commercial applications. The system consists of two components: a wall-mounted control unit that provides time and temperature control and an interface unit that connects the control unit and the HVAC system together.

Installation of SMARTSTAT involves mounting and wiring the control unit much like a conventional thermostat and placing the interface unit in series between the control unit and HVAC system. Figure 1A shows the wiring for a conventional thermostat and HVAC system. Figure 1B illustrates how SMARTSTAT is connected to the same HVAC system.

REQUIRED EQUIPMENT

1. AC/DC Voltmeter
2. Screwdriver
3. Wire stripper
4. Needle nose pliers
5. 18 gauge wire
6. Mounting screws
7. Two (2) batteries — 9 volt alkaline as used in transistor radios
8. Thermometer

INSTALLATION

When installing this product . . .

1. Read and follow these instructions carefully. Failure to follow them could damage SMARTSTAT and the HVAC system or cause a hazardous condition.
2. Check the specifications given in these instructions on page 23 and the ratings of the HVAC system to make sure SMARTSTAT is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. Before installation, verify that the HVAC system is operating properly.
5. After installation is complete, check out SMARTSTAT and HVAC system operation as provided for in these instructions.

INSTALLATION PROCEDURE

Installation of SMARTSTAT is a four-step procedure.

1. **Operation of the old thermostat and HVAC must be verified.**
2. The interface unit is connected between the low voltage (24VAC) controls of the HVAC system and the old thermostat.
3. The control unit and its subbase are installed.
4. The system is checked out.

HVAC SYSTEM CHECKOUT

1. Verify that the old thermostat and the HVAC system function properly.
 - a. Check continuous fan.
 - b. Check cooling. **CAUTION:** Do not power cooling equipment when the outside temperature is below 32°F.
 - c. Check heating. If the blower fan comes on immediately when you request heating, then fan control must be provided by SMARTSTAT when heating. In this case use interface unit model numbers 012 or 034 only. See Table 1 for fan applications.
2. Move the continuous fan switch to auto and the system switch to off on the old thermostat.
3. Remove the thermostat cover and the thermostat controls and observe the terminals and their respective wires on the subbase. **Write what color of wire is connected to each terminal in column 3 of Table 1.**

INSTALLATION OF THE INTERFACE UNIT

CAUTION

Disconnect power to HVAC system and controls to prevent equipment damage.

1. Use Table 1 to determine the type of interface unit required and the wiring diagram to be followed. For example, if the old thermostat had four (4) wires on terminals R, G, Y, and W, then model O11 is required and Figure 4 is the wiring diagram to be followed.
2. Locate the central air handling unit — usually the location of the low voltage (24VAC) transformer and controls. In addition, locate the circuit breaker for the HVAC controls.
3. Turn the power off at the circuit breaker to the HVAC system.
4. Determine the bundle of wires that run from the old thermostat to the HVAC low voltage (24VAC) controls (central air handling unit). If there is a confusion, find the wire from the "G" terminal on the thermostat (usually a green wire) that runs to the fan control relay. The bundle with this wire contains the wires that must be connected to the interface unit.
5. A location for the interface unit must now be found so that it may be connected between SMARTSTAT and the HVAC low voltage (24VAC) controls. Choose a location for the interface unit with the following criteria:
 - (a) The thermostat wiring may be easily connected to the interface unit. The easiest way to connect the wiring is to cut the wires in two, so that each end will reach the interface unit. Often this is not possible because the wires are run in conduit or air vents. In these instances, locate the interface unit where the wires from the thermostat connect to the HVAC control relays, usually at the low voltage terminal block.
 - (b) The interface unit should also be located so that the length of wire from the X2 (common) side of the 24VAC control transformer to the interface unit is kept minimal.
 - (c) The interface unit must be mounted in a location that is sheltered from the weather and where the ambient temperature does not exceed -40°F to $+140^{\circ}\text{F}$.
6. The X2 (common) side of the 24VAC transformer must be located and connected to the X2 terminal on the interface unit.
7. The HVAC (AC voltages) side of the interface unit is now ready to be connected to the coils of the HVAC control relays. Either cut the control wiring in two as shown in Figure 1 or run wires from the HVAC side of the interface unit to the HVAC control relays. Use the appropriate wiring diagram chosen from Table 1.
8. Connect the control unit (DC voltages) side of the interface unit to the wires running to the old thermostat. Use the appropriate wiring diagram chosen from Table 1.

INSTALLATION OF CONTROL UNIT

1. Go now to the old thermostat subbase.
2. Disconnect wires from old thermostat subbase.
3. Mount control unit's subbase to the wall, feeding the HVAC system control wiring through the center hole.
4. Connect the wires to the control unit's subbase terminals using the appropriate wiring diagram from Table 1.
5. Install two (2) transistor radio nine (9) volt alkaline batteries and connect them to the terminals provided.
6. DO NOT PLUG THE CONTROL RIBBON INTO THE SUBBASE AT THIS TIME.

SYSTEM CHECKOUT AND TROUBLE SHOOTING

1. Turn the power back on to the HVAC system and its controls.
2. Go to the interface unit and use an AC voltmeter to determine that the voltage between X1 and X2 is 20-30 VAC.
3. Measure the AC voltages between X2 and all the other terminals on the HVAC (AC voltages) side. They all should read near 0 VAC.
4. Measure the DC voltages between DC POS and DC NEG on the control unit (DC voltages) side of the interface unit. It should be 28-42 VDC with the control unit not plugged in.
5. Measure the DC voltages between DC NEG and all the other terminals on the control unit (DC voltages) side of the interface unit. They should be near 0 VDC.
6. Go to the control unit.
7. Plug in the ribbon cable of the control unit to the connector in the subbase.

SYSTEM CHECKOUT & TROUBLE SHOOTING (Cont.)

8. The numeric display should be on as well as the heat and cool control indicators.
9. Extinguish the heat and cool control indicators by touching their respective keys.
10. Touch Cont. Fan key. The Cont. Fan light should be on and the blower fan should be running. If not, consult Table 3.
11. Touch Cont. Fan key. The Cont. Fan light should go off and the blower fan should stop running.
12. Set Temp Cal for 50°. Touch the Heat key. The Heat light should be on and the heating should be operating. If not, consult Table 3.
13. Touch the Heat key. The Heat light should go off and the heating should stop running.
14. CAUTION: Do not attempt to operate cooling equipment if the outside temperature is below 32°F. Otherwise, Temp Cal. for 90°. Touch the Cool key. The Cool light should be on and the cooling operating. If not, consult Table 3.
15. Touch the Cool key. The Cool light should go off and the cooling should stop running.
16. Touch the Reset key until the Heat and Cool lights come back on (about 10 seconds). This will put the control unit in its original power-up condition and it is now ready for programming.
17. See the operation manual for programming instructions.
18. Allow fifteen (15) minutes before attempting to calibrate SMARTSTAT's temperature sensor. See Figure 15 for temperature calibration.

OPTION INFORMATION

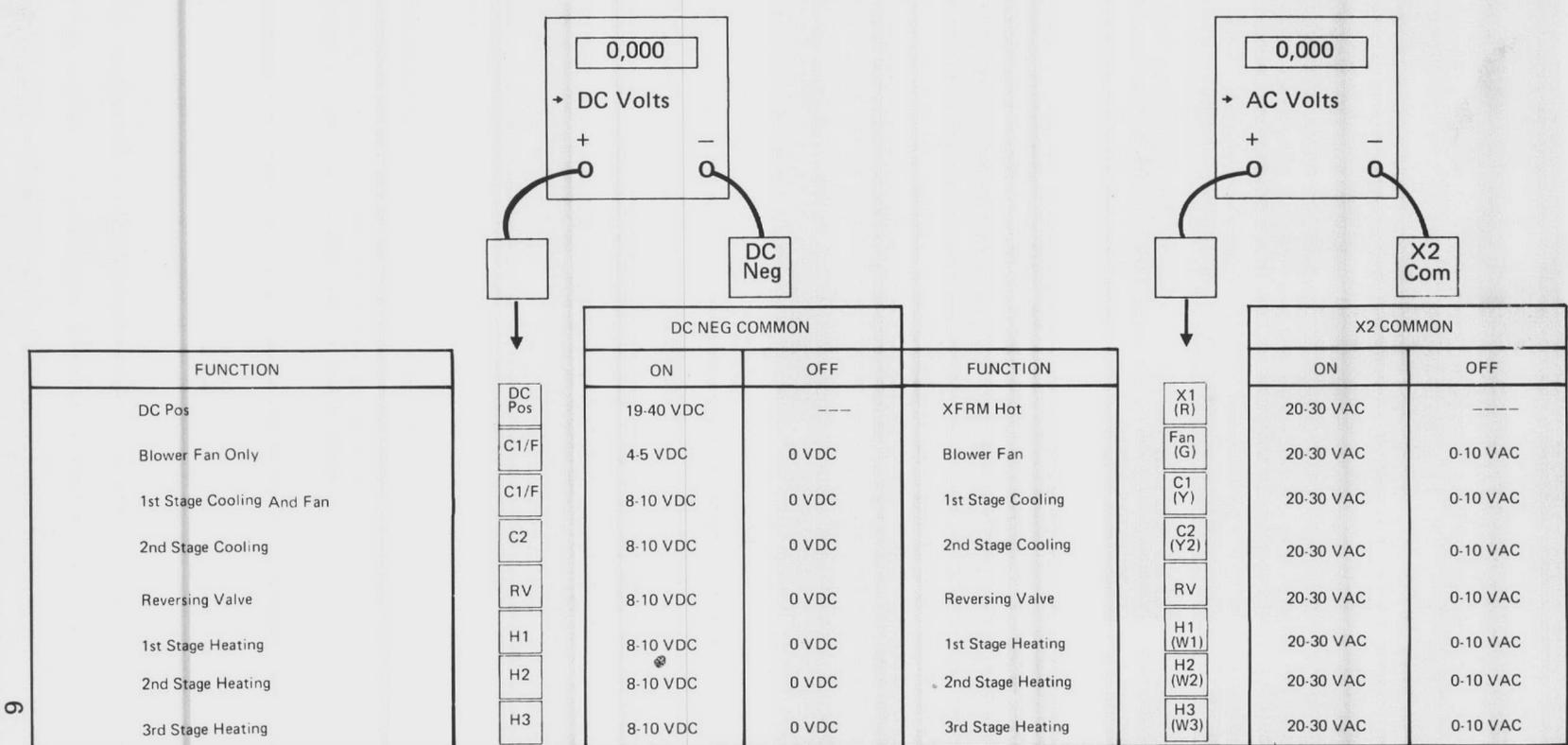
- | | |
|----------|---|
| OPTION A | ECONOMY FAN CONTROL
Allows option of continuous fan during normal operation, then with the activation of economy programs, the fan operates only during heat and cool cycles. To enable Option A, press Cont. Fan key to turn on Cont. Fan light. |
| OPTION B | TEMPERATURE REMOTE SENSING
Mount temperature sensor in the space to be controlled and place the control unit in a secured location. See Figure 16. |
| OPTION C | AUXILIARY ECONOMY CONTROL
Auxiliary output is provided on H3 terminal with 24VAC when an economy program is operational. See Figure 14. |
| OPTION D | FOR COLEMAN HEAT PUMPS
See Figure 11. |
| OPTION E | FOR DUAL SPEED COMPRESSOR HEAT PUMPS
See Figure 12. |
| OPTION F | DELAYED HEAT PUMP FAN
Runs blower for an additional one (1) minute after heat pump is shut off. |
| OPTION G | ECONOMY OVERRIDE SWITCH
Remote switch allows user to return climate controlled space to normal temperature for a period of one (1) hour and then automatically return to economy. |
| OPTION H | ECONOMY OVERRIDE MECHANICAL TIMER
Remote mechanical timer allows user to return climate controlled space to normal temperature for the timer's period and then automatically return to economy. |
| OPTION J | FOR ADD-ON HEAT PUMPS
See Figure 13. |

TABLE 1. CHOOSING PROPER WIRING DIAGRAM AND INTERFACE UNIT

Column 1 Terminal Function	Column 2 Subbase Terminal	Column 3 Wire Color	NUMBER OF MATCHES									
			Figure 4 Model 011	Figure 5 Model 011	Figure 6 Model 012	Figure 7 Model 012	Figure 8 Model 012	Figure 9 Model 034	Figure 10 Model 034	Figure 11 Mod. 034D	Figure 12 Mod. 034E	Figure 13 Mod. 034J
Transformer Hot (X1)	R, V		X		X	X	X	X	X	X	X	X
Cooling Tranformer (X1)	RC, V, VC			X								
Heating Transformer (X1)	RH, M, VR			X								
Blower Fan	G, F		X	X	X	X	X	X	X	X	X	X
Cooling Primary	Y, Y1, C		X	X	X	X	X	X	X	X	X	X
Cooling Auxiliary	Y2							X	X		X	
Heating Primary	W, W1, H		X	X	X			X	X	X		
Heating Auxiliary	W2				X	X	X	X	X	X		X
Heating Standby	W3							X	X		X	
Cooling Reversing Valve	O					X			X		X	X
Heating Reversing Valve	Z, P, B						X					
Emergency Heat	E, A		MAY BE UNNECESSARY							X		X
Transformer Common (X2)	B, X, C					X	X		X	X		
Fault Signal	X, X2, L					X	X		X			
Outdoor Thermostat	T		UNNECESSARY WITH SMARTSTAT									
			Heat Fan	Heat Fan	Instant Fan	Instant Fan	Instant Fan	Either	Either	Either	either	Either

INSTRUCTIONS

1. Write wire color in column 3
2. Match column 3 with only one column from 4 thru 13 in which the filled in blanks in column 3 correspond to the maximum number of "X,s." **Do Not Count** an "X" that corresponds to a blank in column 3. Write the number of matches in the space provided. Compare all columns before making a selection of interface and wiring data.
3. Verify instant fan (fan controlled by thermostat in heating) or heat fan (fan controlled by furnace plentum switch) in bottom row.
4. Go to appropriate wiring diagram and follow installation instructions.
5. Please note that model 034 may be used in place of model 011 or model 012 in any of the wiring diagrams.



FUNCTION	Terminal
DC Pos	DC Pos
Blower Fan Only	C1/F
1st Stage Cooling And Fan	C1/F
2nd Stage Cooling	C2
Reversing Valve	RV
1st Stage Heating	H1
2nd Stage Heating	H2
3rd Stage Heating	H3

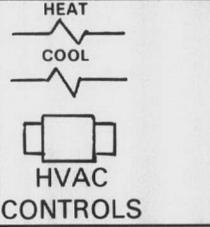
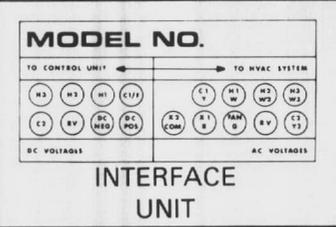
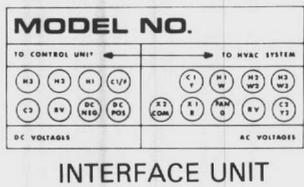
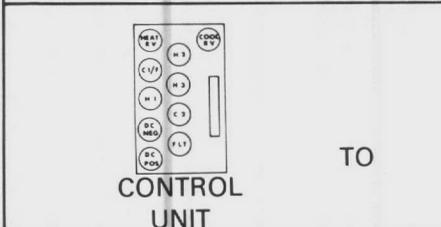
DC NEG COMMON		FUNCTION
ON	OFF	
19-40 VDC	---	XFRM Hot
4-5 VDC	0 VDC	Blower Fan
8-10 VDC	0 VDC	1st Stage Cooling
8-10 VDC	0 VDC	2nd Stage Cooling
8-10 VDC	0 VDC	Reversing Valve
8-10 VDC	0 VDC	1st Stage Heating
8-10 VDC	0 VDC	2nd Stage Heating
8-10 VDC	0 VDC	3rd Stage Heating

Terminal	ON	OFF	FUNCTION
X1 (R)	20-30 VAC	----	XFRM Hot
Fan (G)	20-30 VAC	0-10 VAC	Blower Fan
C1 (Y)	20-30 VAC	0-10 VAC	1st Stage Cooling
C2 (Y2)	20-30 VAC	0-10 VAC	2nd Stage Cooling
RV	20-30 VAC	0-10 VAC	Reversing Valve
H1 (W1)	20-30 VAC	0-10 VAC	1st Stage Heating
H2 (W2)	20-30 VAC	0-10 VAC	2nd Stage Heating
H3 (W3)	20-30 VAC	0-10 VAC	3rd Stage Heating

X2 COMMON		FUNCTION
ON	OFF	
20-30 VAC	----	XFRM Hot
20-30 VAC	0-10 VAC	Blower Fan
20-30 VAC	0-10 VAC	1st Stage Cooling
20-30 VAC	0-10 VAC	2nd Stage Cooling
20-30 VAC	0-10 VAC	Reversing Valve
20-30 VAC	0-10 VAC	1st Stage Heating
20-30 VAC	0-10 VAC	2nd Stage Heating
20-30 VAC	0-10 VAC	3rd Stage Heating

DC VOLTAGES

AC VOLTAGES



TO CHECK VOLTAGES:

RESET FOR 10 SECONDS OR UNTIL DISPLAY SHOWS 12:00

FOR HEAT **TEMP CAL** **CLEAR** **5** **0** **ENTER** — **HEAT ON/OFF** **ON HEAT** **HEAT ON/OFF** **OFF HEAT** HEAT — LIGHT ON, HEAT SHOULD BE ON

FOR COOL **TEMP CAL** **CLEAR** **SYS CAL** **9** **0** **ENTER** — **COOL ON/OFF** **ON HEAT** **COOL ON/OFF** **OFF COOL** COOL — LIGHT ON, COOL SHOULD BE ON

FOR FAN **FAN CONT/AUTO** **ON CONT FAN** **FAN CONT/AUTO** **OFF CONT FAN** LIGHT ON, CONT. FAN SHOULD BE ON.

Table 2. AC/DC VOLTMETER READINGS FOR SMARTSTAT 1000

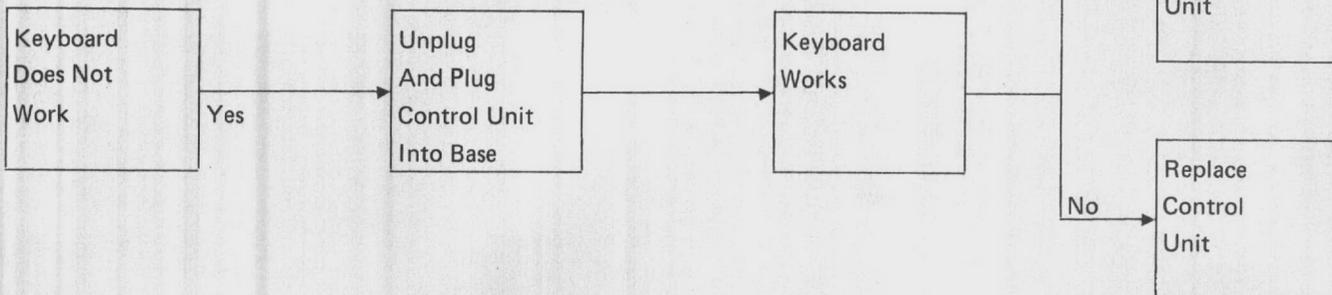
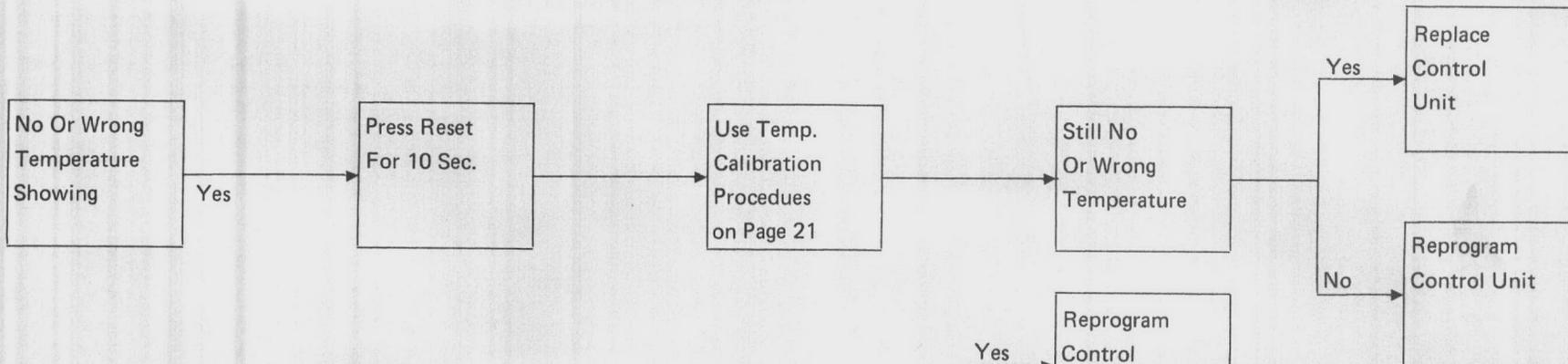
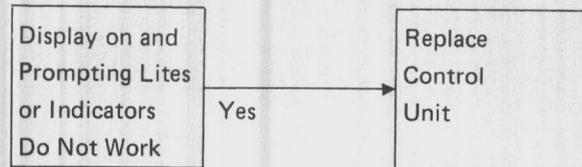
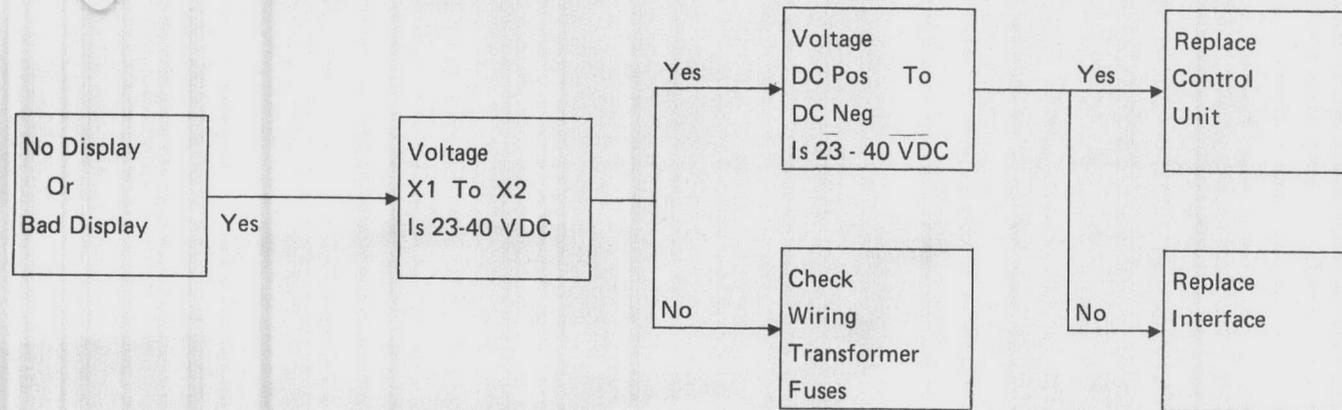


TABLE 3. TROUBLE SHOOTING GUIDE
(Continued On Page 8)

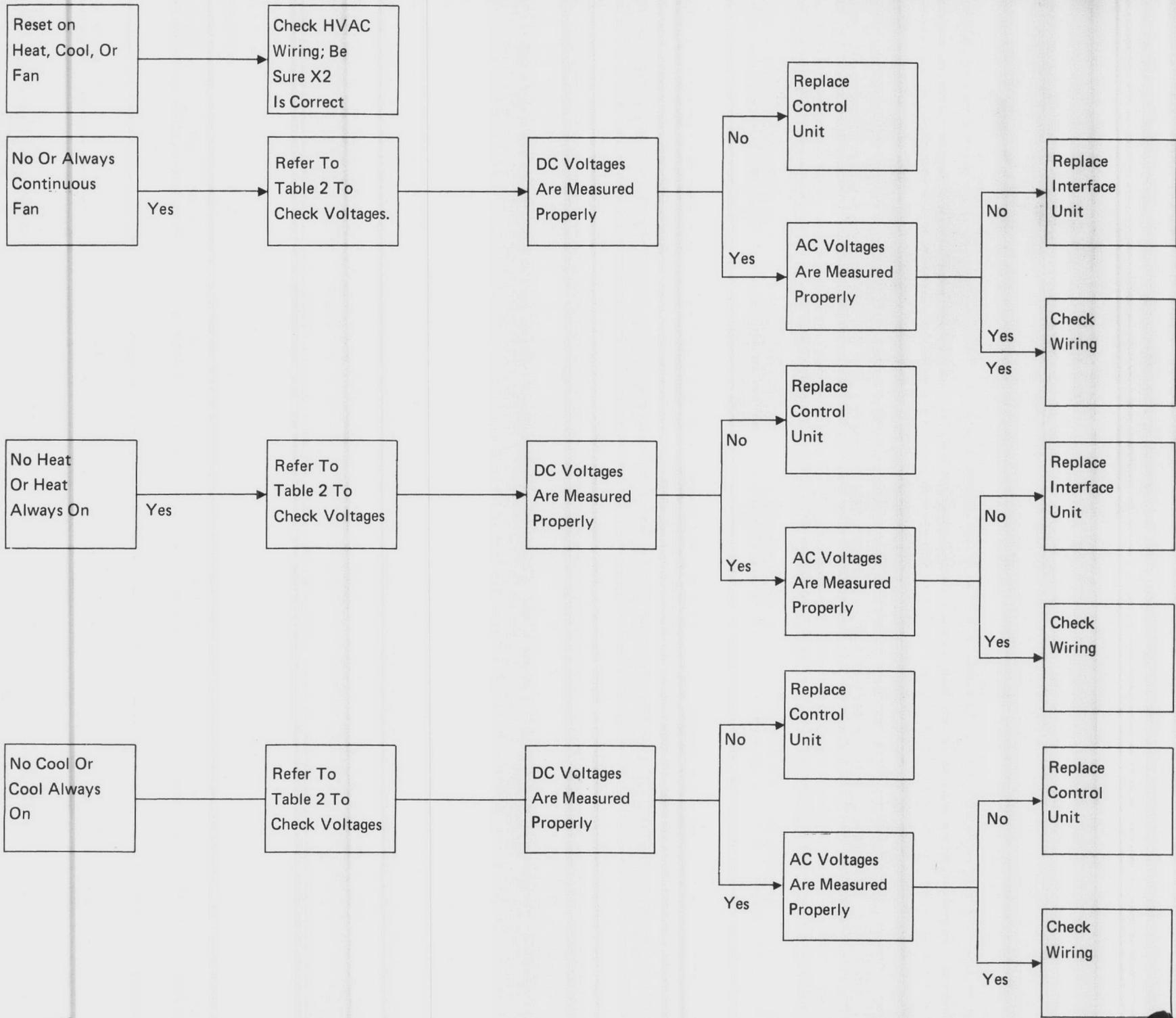


FIGURE 1. CONVERSION FROM A CONVENTIONAL THERMOSTAT TO SMARTSTAT

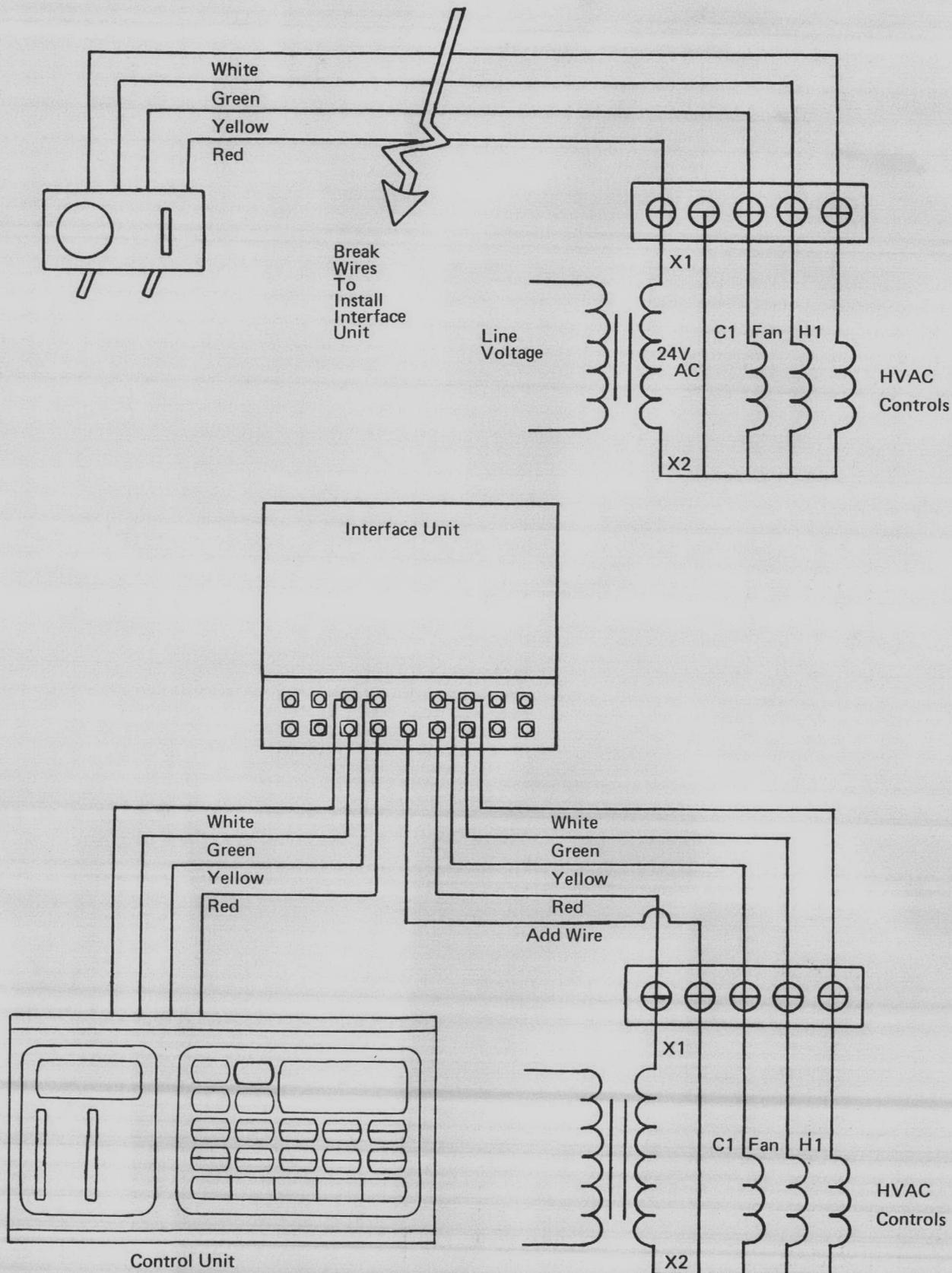


FIGURE 2.
CONTROL UNIT SUBBASE TERMINALS

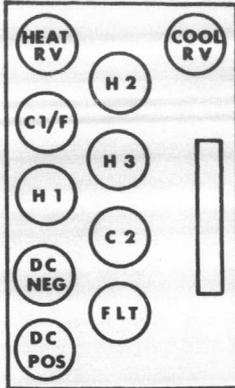


FIGURE 3.
INTERFACE UNIT TERMINALS

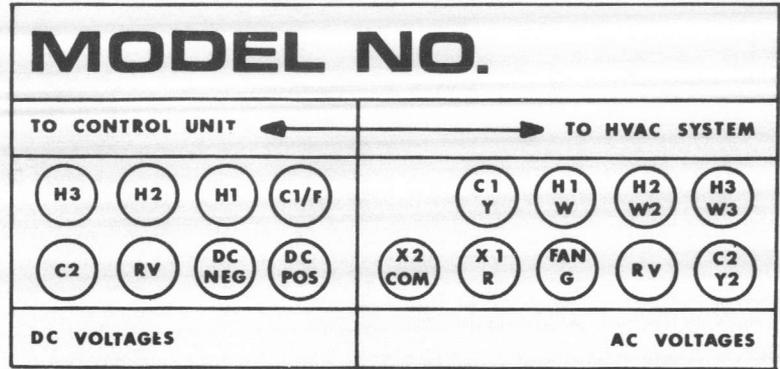
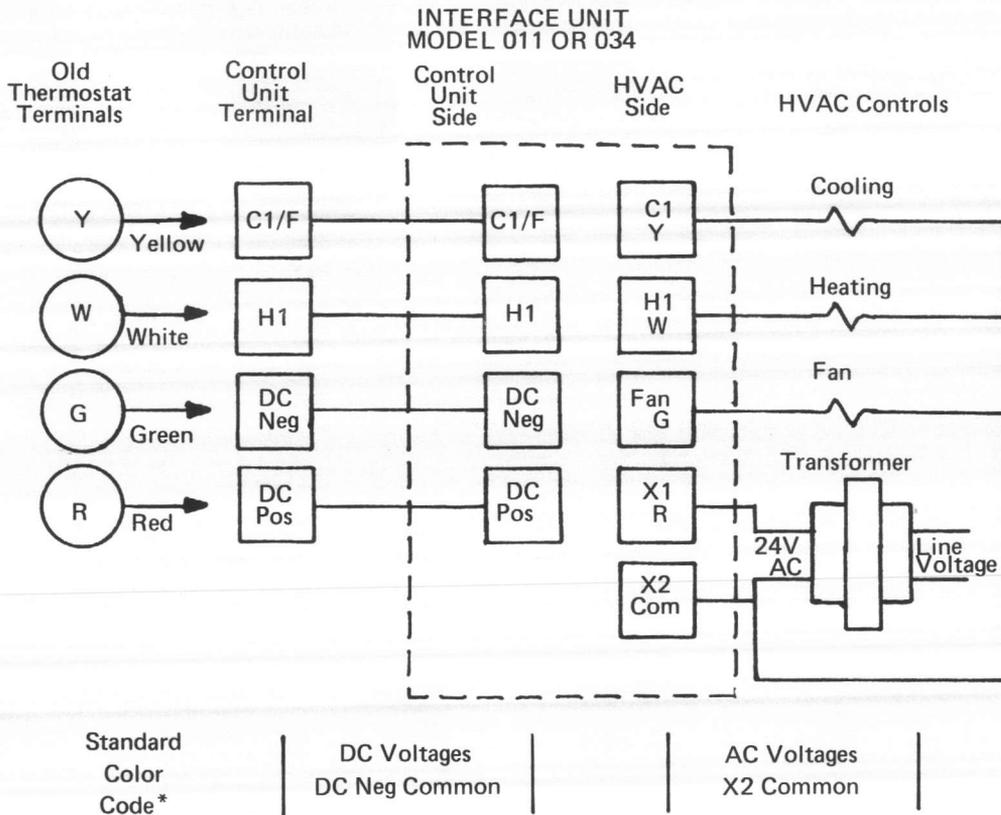


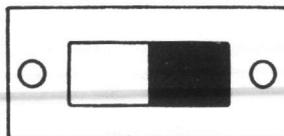
FIGURE 4. WIRING FOR FOUR WIRE CONVENTIONAL SYSTEMS



*Colors shown are conventional color code. Colors may vary in a particular application

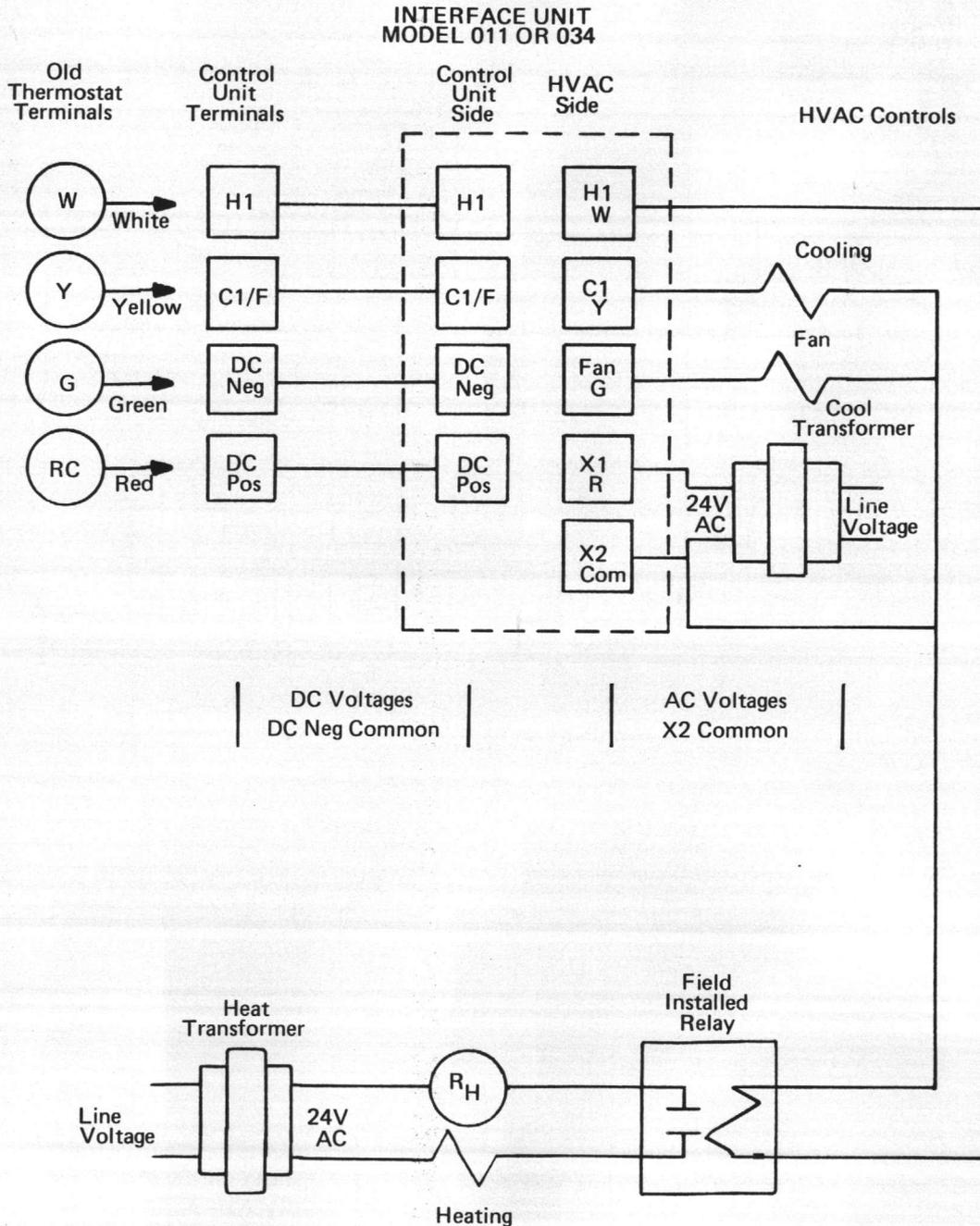
If using Model 034, Fan switch should be in system position.

Fan Control
By Stat



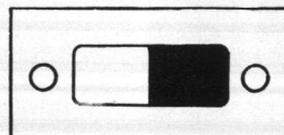
Fan Control
By System

FIGURE 5. WIRING FOR FIVE WIRE TWO TRANSFORMER CONVENTIONAL SYSTEMS



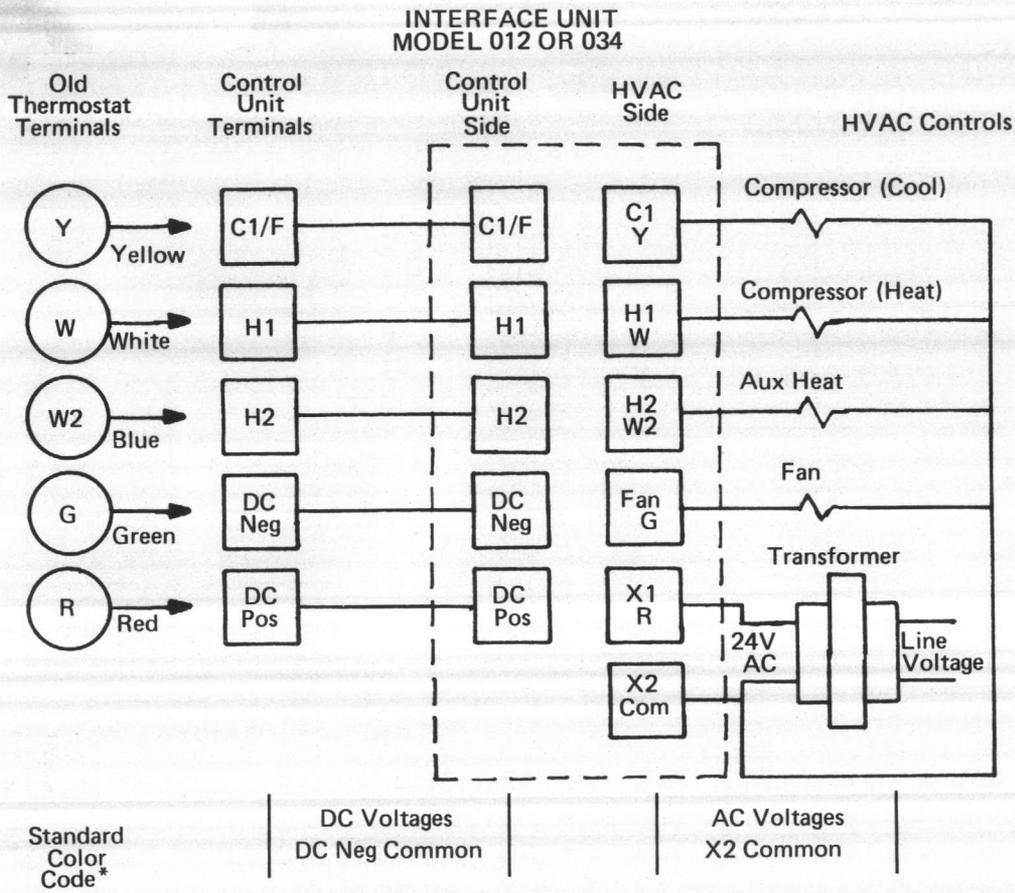
When using Model 034, Fan switch should be in system position

Fan Control
By Stat



Fan Control
By System

FIGURE 6. WIRING FOR HEAT PUMP SYSTEMS WITH NO REVERSING VALVE CONTROL FROM THERMOSTAT



*Colors shown are conventional color code. Colors may vary in a particular application.

If using Model 034, set fan switch in Stat Position.

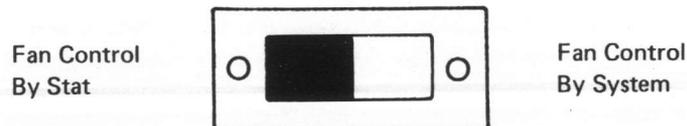
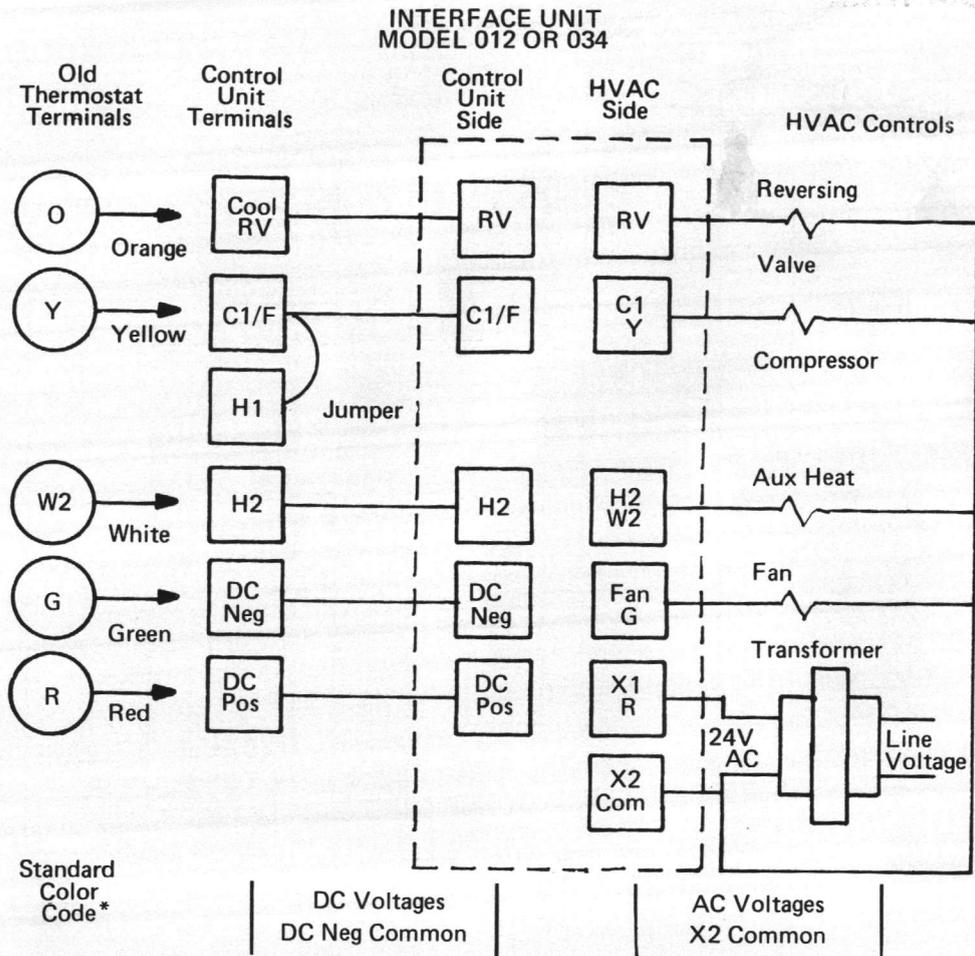


FIGURE 7. WIRING FOR HEAT PUMP SYSTEMS WITH COOLING ENERGIZED REVERSING VALVE CONTROL FROM THERMOSTAT



- *Colors shown are conventional color code. Colors may vary in a particular application.
- X2 is often labeled B, X, C on old thermostat
- For HVAC Systems that provide fault or malfunction detection, connect this line (usually X, X2, or L) to FLT terminal on subbase of control unit. (See Figure 2).

*Colors shown are conventional color code. Colors may a

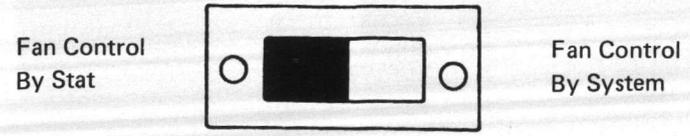
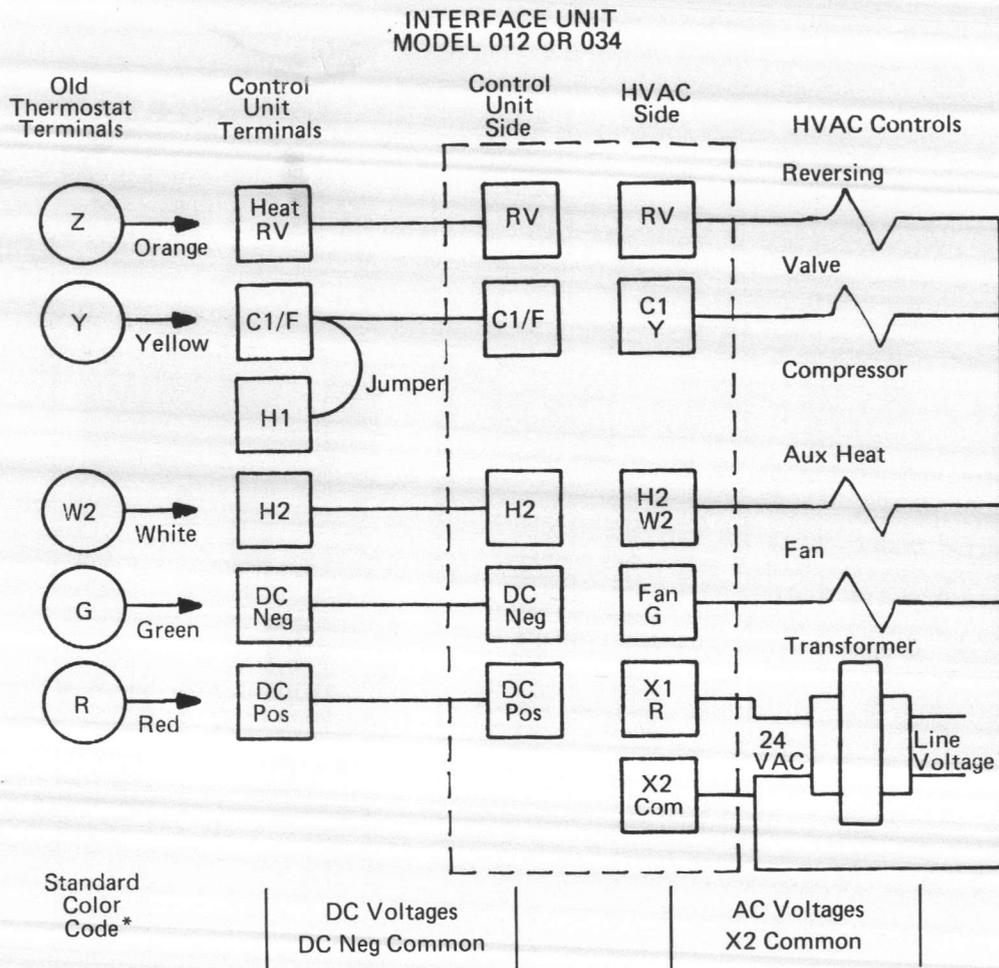


FIGURE 8. WIRING FOR HEAT PUMP SYSTEMS WITH HEATING ENERGIZED REVERSING VALVE CONTROL FROM THERMOSTAT



*Colors shown are conventional color code. Colors may vary in a particular application.

- X2 is often labeled B, X, C on old thermostat
- For HVAC systems that provide fault or malfunction detection, connect this line (usually X, X2, or L) to FLT terminal on subbase of control unit. (See Figure 2.)

If using Model 034, set fan in stat position

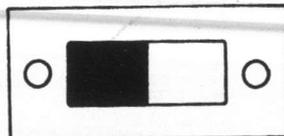
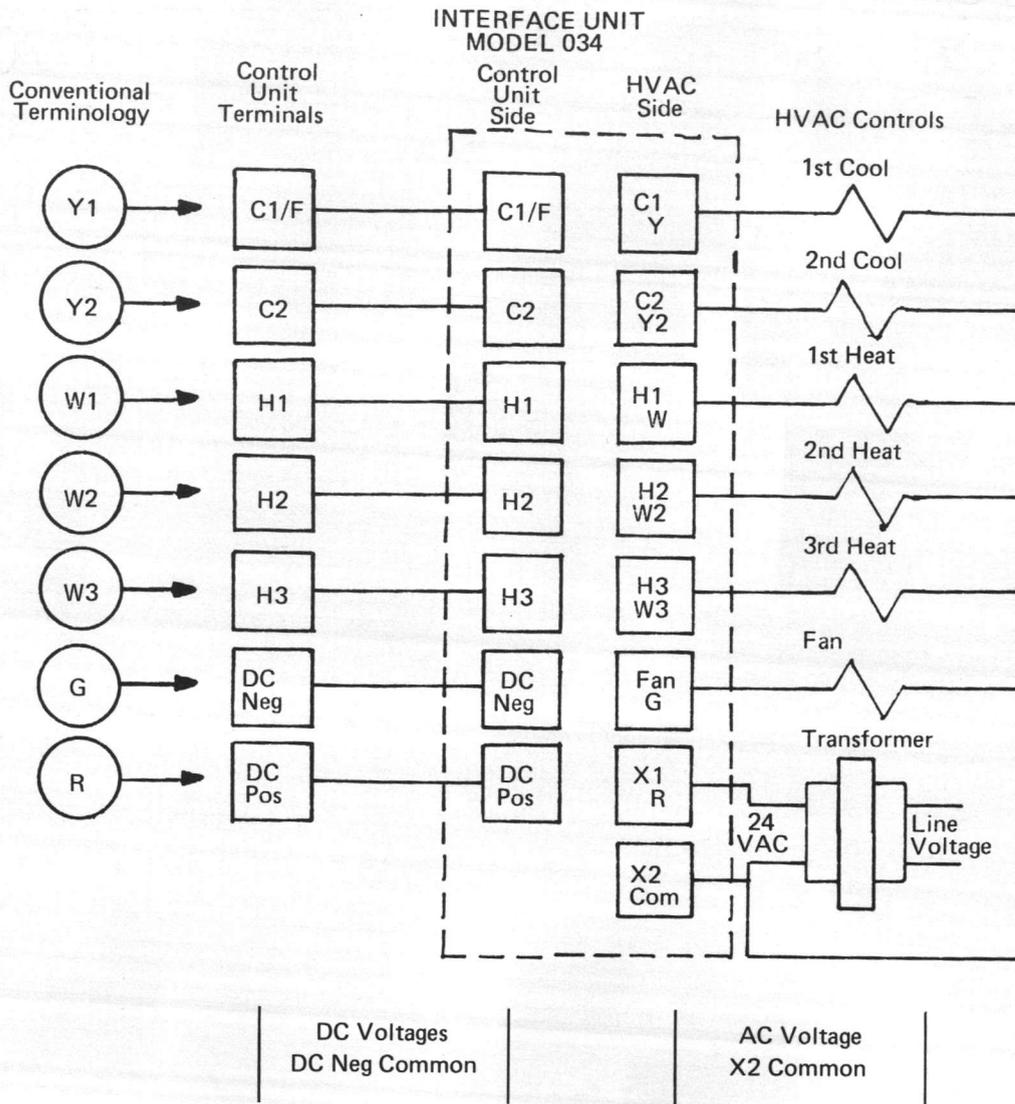


FIGURE 9. WIRING FOR MULTI STAGE NON-HEAT PUMP SYSTEMS



Fan switch in system position.

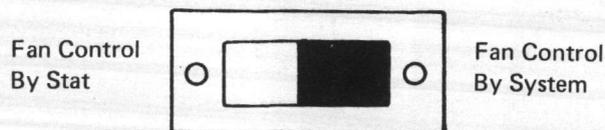
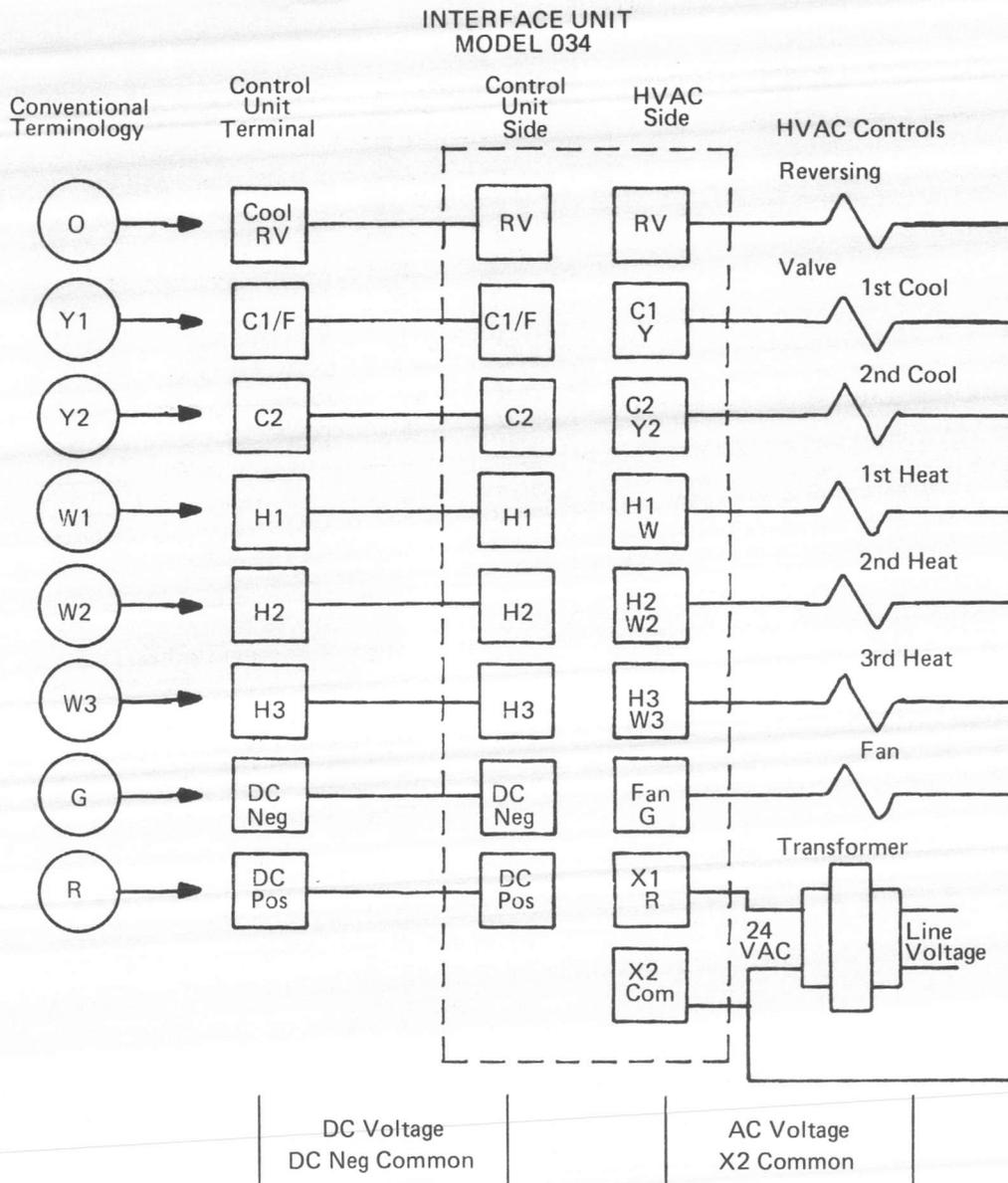
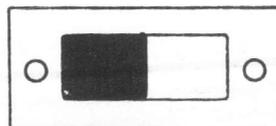


FIGURE 10. WIRING FOR HEAT PUMP SYSTEMS WITH MULTI STAGE ELECTRIC HEAT



Fan switch in stat position

Fan Control
By Stat



Fan Control
By System

OPERATION:

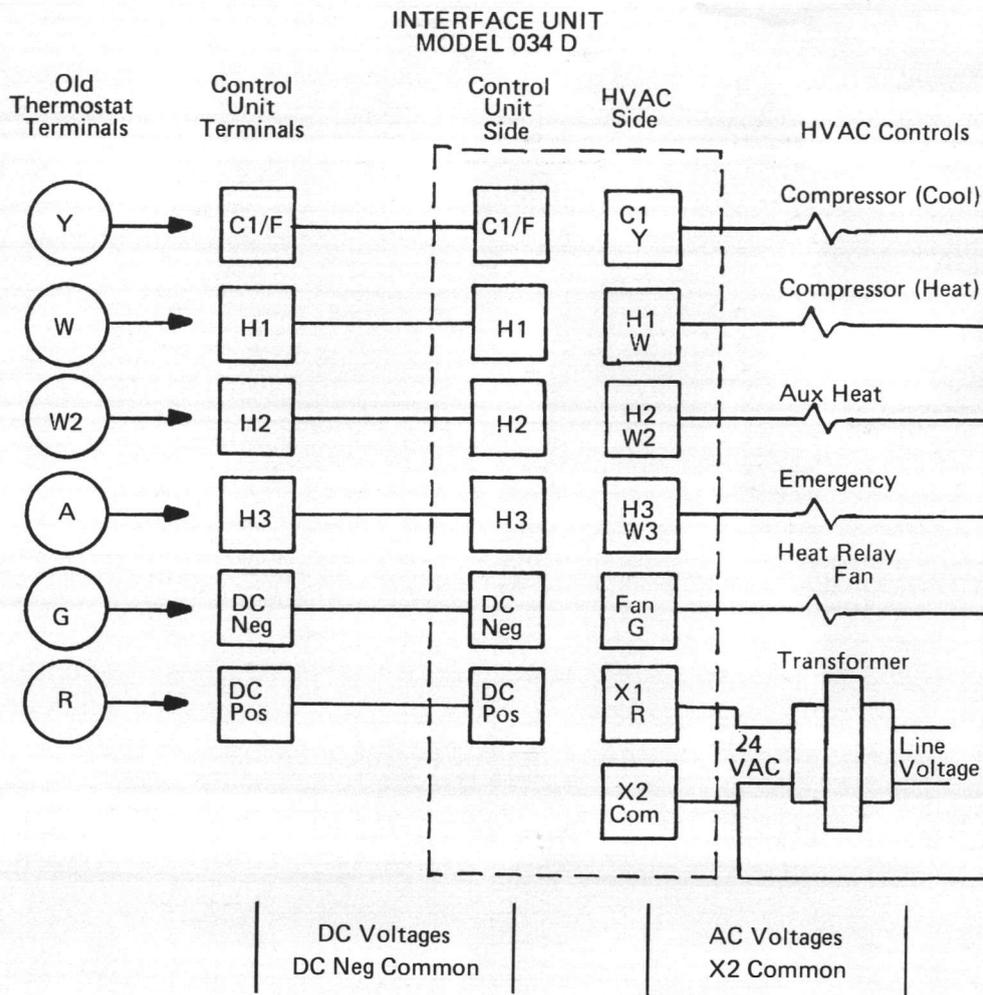
NORMAL:

All allowed to operate. H2 and H3 turn on aux. heat light

EMERGENCY HEAT:

Only H2 and H3 allowed to operate

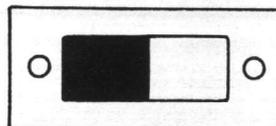
FIGURE 11. WIRING FOR COLEMAN HEAT PUMPS (OPTION D)



Emergency heat relay is normally energized.

Set fan switch in stat position.

Fan Control
By Stat



Fan Control
By System

OPERATION:

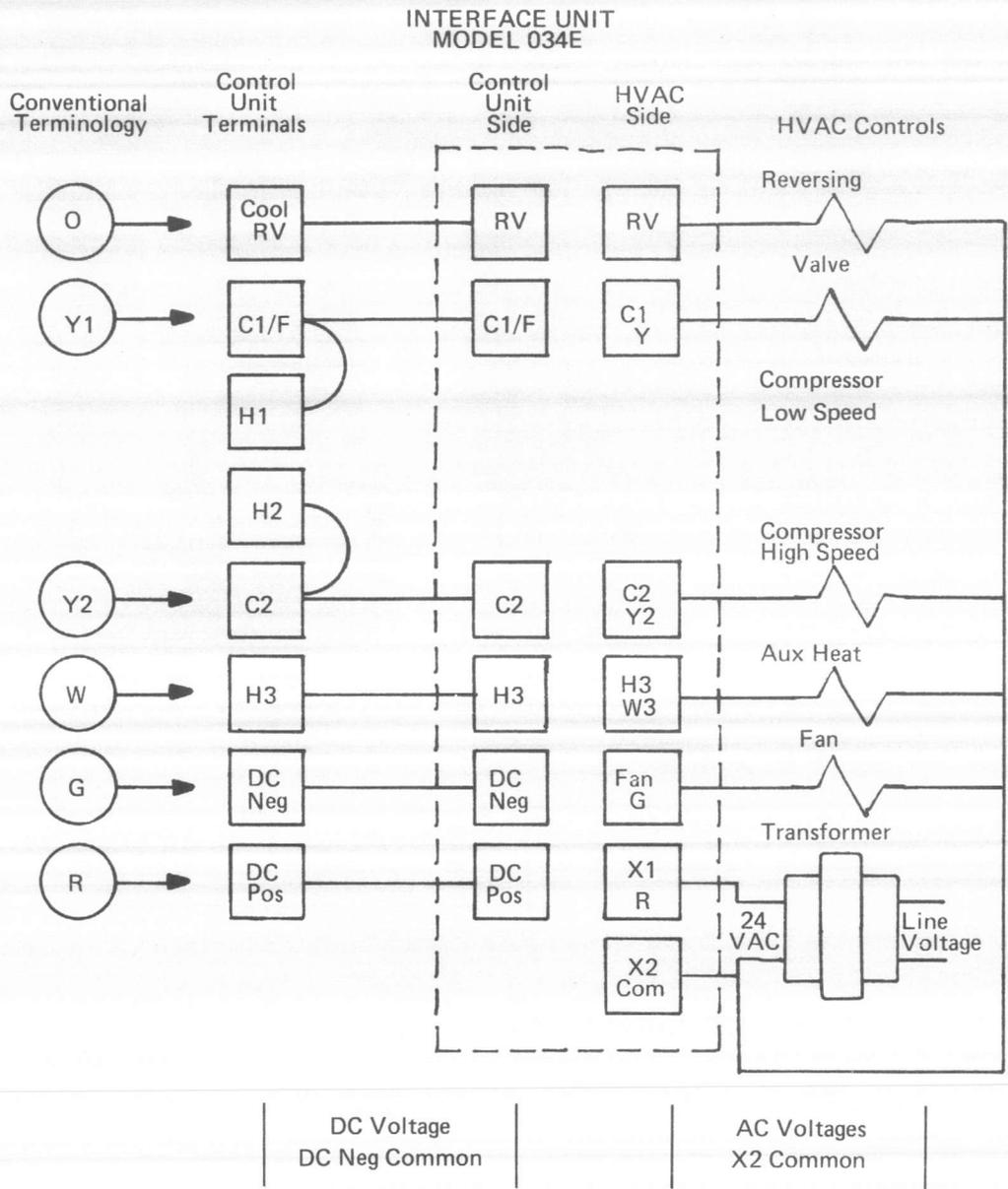
NORMAL:

- All allowed to operate
- H3 Energized
- H2 Turns on aux. heat light

EMERGENCY HEAT:

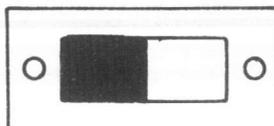
- Only H2 is allowed to operate
- H3 is not energized

FIGURE 12. WIRING FOR DUAL SPEED COMPRESSORS (OPTION E)



Set fan switch in stat position

Fan Control
By Stat



Fan Control
By System

OPERATION:

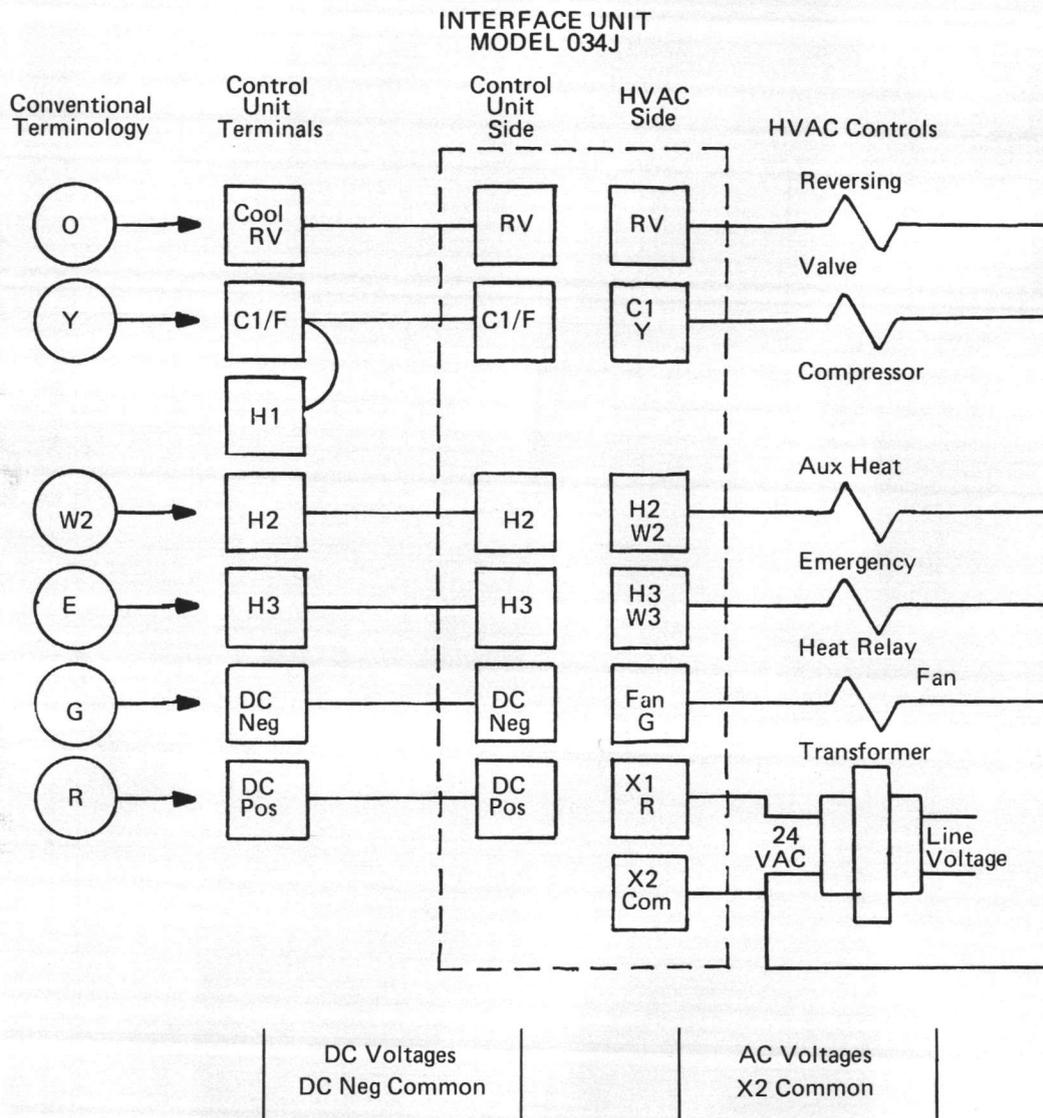
NORMAL:

All allowed to operate
H3 turns on aux. heat light

EMERGENCY HEAT:

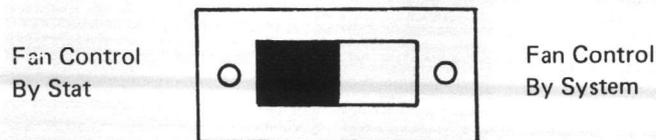
Only H3 is allowed to operate

FIGURE 13. WIRING FOR ADD-ON HEAT PUMPS (OPTION J)



*NOTE: H2-W2 is not used on some add on heat pumps

Set fan switch in stat position.



OPERATION:

NORMAL:

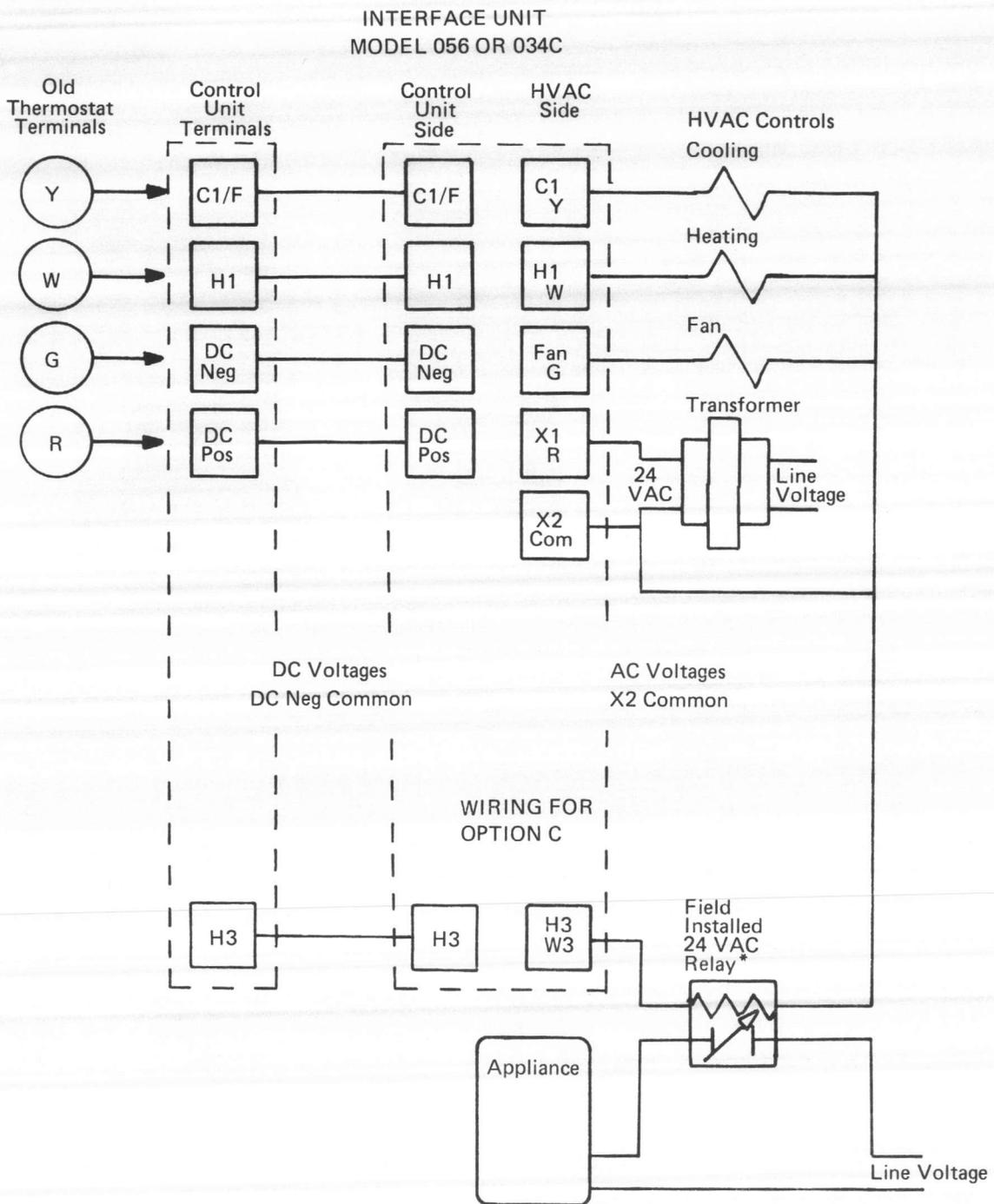
Only H3 is not allowed to operate

H2 turns on aux. heat light

EMERGENCY HEAT:

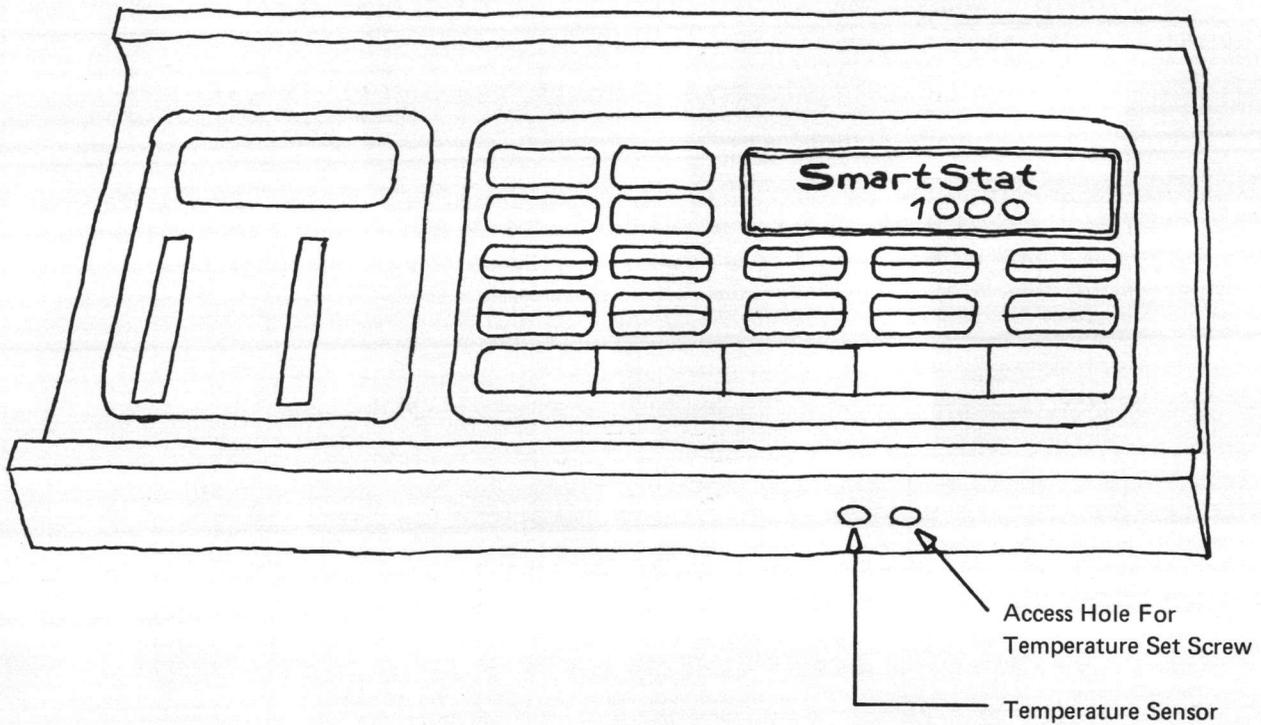
Only H2 and H3 are allowed to operate

FIGURE 14. WIRING FOR C OPTION



* Use normally closed (nc) contacts to turn appliance off during an economy period. Use normally open (no) contacts to turn appliance on during an economy period.

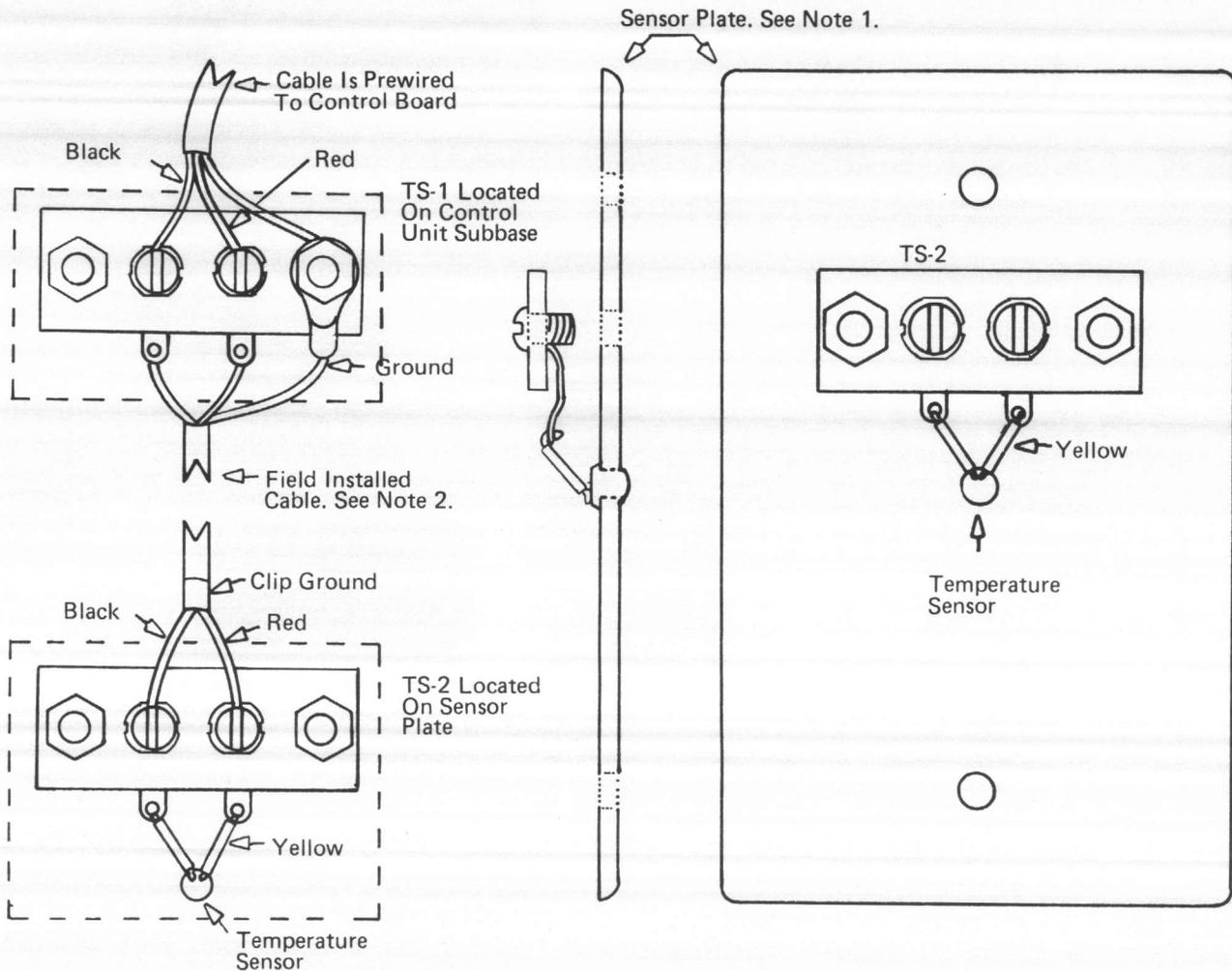
FIGURE 15. TEMPERATURE CALIBRATION PROCEDURE



INSTRUCTIONS:

1. Allow fifteen (15) minutes for temperature sensor to stabilize.
2. Use a known accurate dry bulb or digital thermometer to measure temperature at the sensor. Compare the reading to the temperature displayed by the control unit. If the temperatures do not agree, use a very small blade screw driver and calibrate the temperature displayed by the control unit. If displayed temperature is high, turn clockwise. If displayed temperature is low, turn counterclockwise. Make $\frac{1}{4}$ turn adjustments and allow 30 sec. for temperature to stabilize before making additional adjustments.

FIGURE 16. REMOTE TEMPERATURE SENSOR (OPTION B)



INSTALLATION OF B OPTION

THESE EVENTS SHOULD BE ACCOMPLISHED AFTER THE SUBBASE HAS BEEN INSTALLED, AND BEFORE POWER IS APPLIED TO THE SYSTEM.

1. Determine the location of the sensor installation.
2. Mount wall box as required by local codes.
3. Run field installed shielded cable from wall box to control unit subbase as required by local codes.
4. Connect factory installed cable and field installed cable to TS-1 in subbase as shown above. Keep grounds as short as possible.
5. Connect field installed cable to the sensor plate as shown above. Do not ground this end.
6. Verify that the wiring is correct.
7. Mount sensor plate to wall box.

NOTE 1. SENSOR PLATE FITS NEMA STANDARD SINGLE WALL OR SWITCH BOX.

NOTE 2. USE 2 WIRE FOIL SHIELD CABLE – BELDEN No. 8451 OR EQUIVALENT.

SPECIFICATIONS

REC

CONTROL UNIT

Operating Temperature Range: 32° F To 120° F

Control Range: 40° F To 99° F

Measurement Range: 1° F To 99° F

Accuracy: $\pm 1^\circ$ F Solid State Sensor

Power Supply Requirements: 23 To 40 Volts DC

Battery Back-up: Two 9-Volt Alkaline Batteries Provide 8 Hours Operation During Power Failure

INTERFACE UNIT

Operating Temperature Range: -40° F To +140° F

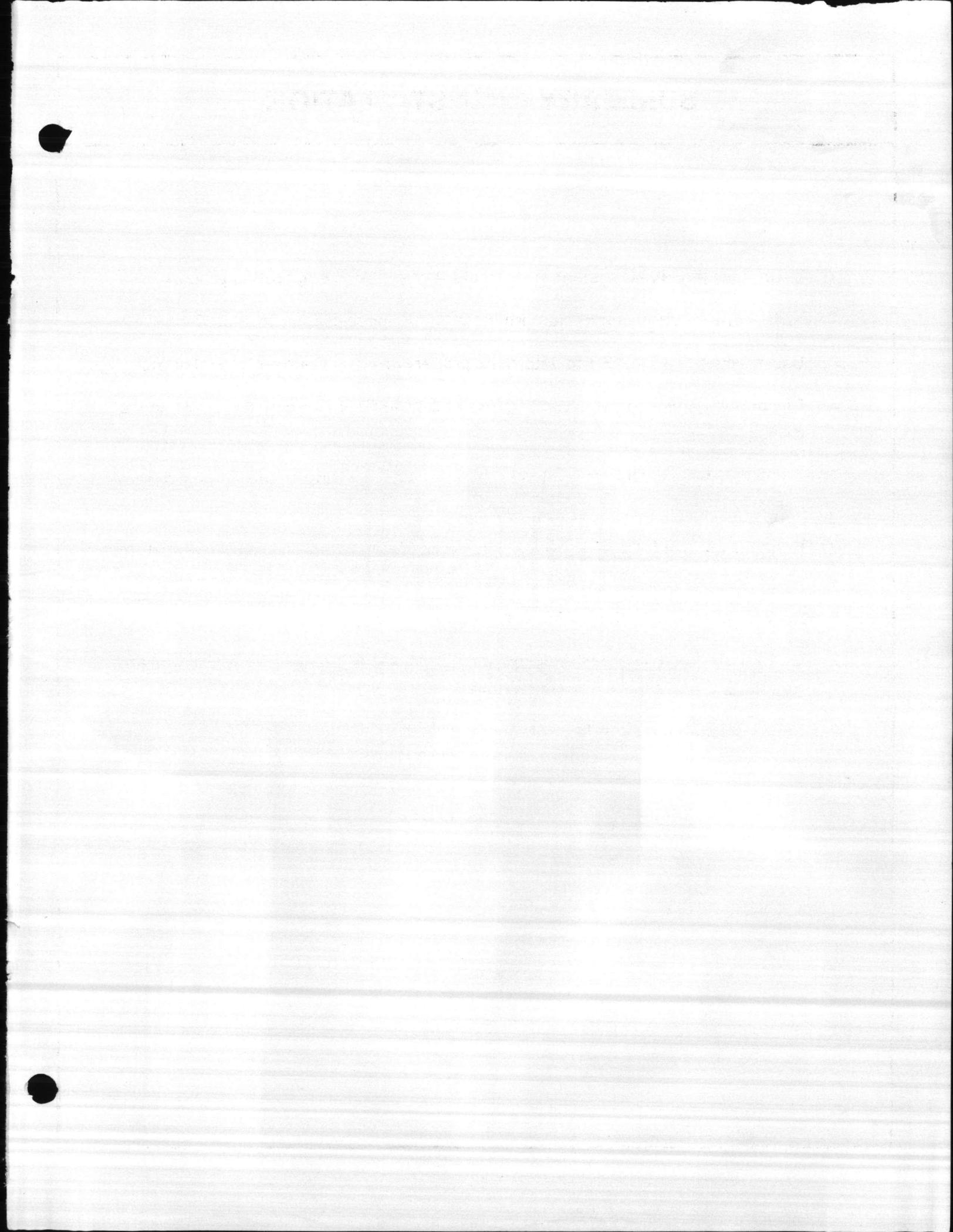
Transformer Requirements: 20 To 30 VAC

Switching: 2 Amps Maximum On Each Terminal



SUMMARY OF INSTALLATION

1. Verify that the HVAC system and the old thermostat are operating properly.
2. Write control wire color beside proper terminal identification in TABLE 1.
3. Use directions in TABLE 1 to determine proper wiring diagram and model number.
4. Disconnect power to the HVAC system and controls. Failure to do so will cause damage.
5. Connect Interface Unit as shown in the appropriate wiring diagram chosen from Table 1.
6. Connect Control Unit as shown in the appropriate wiring diagram chosen from Table 1.
7. Reconnect power to the HVAC system and controls.
8. Verify that the HVAC system and the new Energy Management System are functioning properly according to Table 2.
9. For troubleshooting see Table 3.





Control Products Division

P. O. Box 266

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Jefferson City, TN 37760

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nsi

SMARTSTAT 1000

TEMPERATURE CONTROL



NOT PENDING

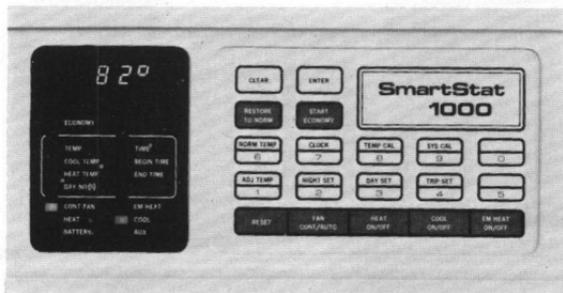
OPERATION MANUAL

Congratulations

You have just purchased the most significant new advancement in heating and air-conditioning control technology since the original thermostat! While SMARTSTAT essentially replaces the conventional thermostat in the home and in a wide range of non-residential buildings (including schools, offices, restaurants, stores, etc.) it is designed to provide for control over both your environmental comfort AND the cost of maintaining it.

SMARTSTAT

is a small-scale energy management system which uses sophisticated control principles found only in very expensive computer-controlled systems used in large commercial buildings. SMARTSTAT also uses a computer . . . a powerful microprocessor (the new miracle computer-on-a-chip) which performs a variety of complex control functions to maintain a comfort level in your home or office at a minimum cost to you. Depending on your lifestyle, location and the type of building, SMARTSTAT can pay for itself from savings in as little as a few months. In these days of ever-increasing utility bills and serious energy shortages in our country, SMARTSTAT is perhaps the most timely new product of the decade.



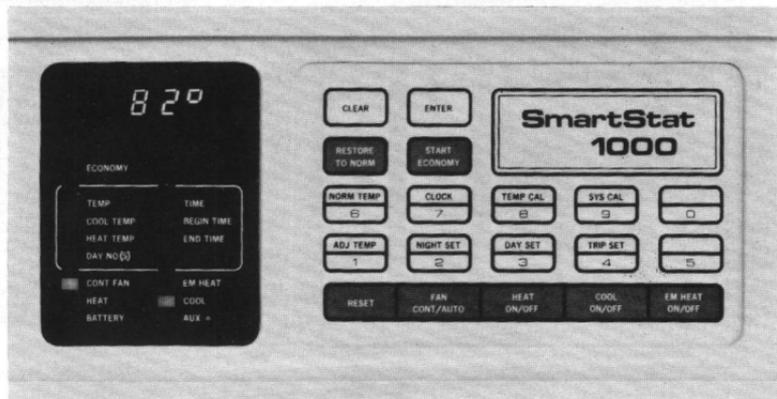
CONTENTS

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B. Programming SMARTSTAT	6
C. Operating Programs	8
D. Economy Programs	13
E. Calibrating Programs	20
F. What SMARTSTAT is Doing for You	23
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What will SMARTSTAT do for you specifically?

Basically, SMARTSTAT will:

- 1** Control room temperature with solid-state accuracy at the touch of a keyboard.
- 2** Display accurate time and room temperature in an attractive manner.
- 3** Permit you to schedule nighttime economy periods, whereby the home or building temperature is allowed to decrease during cold weather (setback) and increase during warm weather (setup) at night while you are asleep. Use of nighttime economy can effect substantial energy savings, depending on your location, lifestyle and type of building.
- 4** Allow you to schedule daytime economy periods, whereby the temperature is decreased during the winter and increased during the summer when the family is away from home at work or school. Daytime economy can effect additional savings, again depending upon the circumstances of usage.
- 5** Allow you to relax the temperature during non-regular absences or trips ranging from a few hours to 99 days in duration. Trip economy can be used during shopping or theater visits, for example, as well as for holiday trips, vacations, and extended periods of absence (up to three months long).



Manufactured by



SMARTSTAT provides all of these features with a degree of convenience and efficiency not found in conventional setback clock thermostats. One example of this is evidenced when SMARTSTAT calculates the amount of time required for the building to recover from economy (i.e. warm up or cool down to the normal temperature at the end of the economy period), and activates the heating or cooling system in advance. This allows you to arise in the morning or arrive in the evening with the building already back at the desired normal temperature, keeping you comfortable regardless of the weather conditions.

SMARTSMAT also allows you to advance, cancel, and reinstate an economy program at the touch of a single key, thereby providing a flexibility impossible to achieve with conventional setback thermostats.

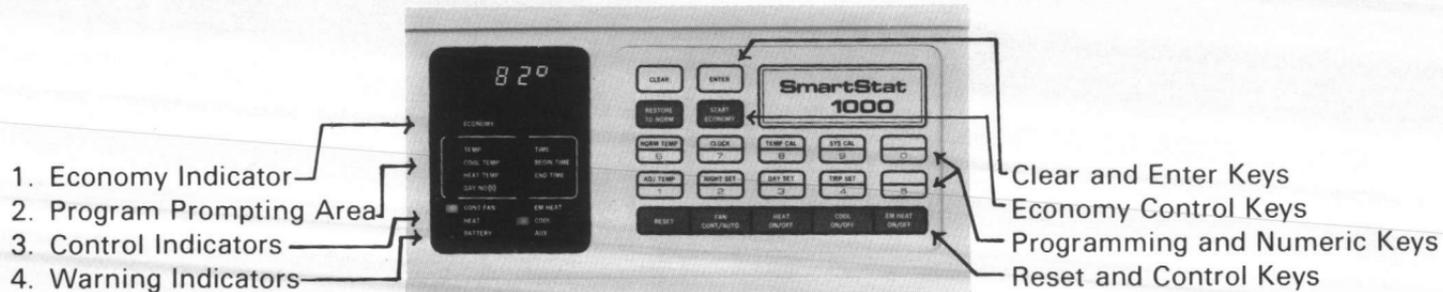
If you own a heat-pump system, SMARTSMAT logic makes it possible to apply setback (lower the temperature) during the heating season without requiring, in most cases, the use of expensive auxiliary electric heat in the recovery from setback . . . thereby eliminating a problem which many experts thought would exclude the use of winter setback with heat-pump systems.

These and many other innovative features, which will be discussed in the following pages, put SMARTSMAT in a class by itself. SMARTSMAT is truly the product of the future, engineered ahead of its time, to meet the challenge of today's energy crisis.

OPERATING INSTRUCTIONS

A. Keyboard and Display

All you need to know to successfully operate SMARTSTAT relates directly to the keyboard and electronic display on the front face of the thermostat. The display combines green numerals with red and yellow prompting lights and indicators.



The display normally shows time and room temperature (in degrees Fahrenheit) which alternate every four seconds. During programming (when you are entering instructions into SMARTSTAT) the display shows the values (time, temperature, day-of-week, etc.) being programmed, as will be explained further below. The indicator lights are located below the display and are divided into four groups as follows:

1. **ECONOMY INDICATOR** which is lit whenever the system is in the economy mode;
2. A **PROGRAM PROMPTING AREA**, comprised of seven prompting lights and outlined by the box in the display area. These lights lead you step-by-step through each program you enter by indicating the nature of the value you are currently required to key-in (time, temperature, etc.). Programming is not complete if any light in the program prompting area remains lit. When programming is complete and all seven prompting lights are off, SMARTSTAT will operate properly, according to your instructions.
3. Four **CONTROL INDICATORS**, which show the selected control functions (heat on or off,

mode, etc.) The emergency heat light may also serve as a malfunction indicator. If this indicator lights, touch the emergency heat key and call your serviceman.

4. Two **WARNING INDICATORS**: a **LOW BATTERY INDICATOR** which lights whenever the back-up batteries need to be replaced and an **AUXILIARY INDICATOR** which lights to indicate the auxiliary heat of multistage HVAC systems is requested.

The keyboard incorporates the following groups of keys:

1. **CLEAR** and **ENTER** keys which function the same as those on a pocket calculator.
2. Two **ECONOMY CONTROL KEYS (RESTORE NORMAL and START ECONOMY)** which permit you to change from economy to normal and back again at any time.
3. Eight **PROGRAMMING KEYS** which are used to program your SMARTSTAT.
4. Ten **NUMERICAL KEYS**, used for programming the desired information into SMARTSTAT.

5. A **RESET KEY** which allows you to erase the entire set of programs you have previously entered into SMARTSTAT. SMARTSTAT will then continue to operate at a cooling season temperature of 78° and a heating season temperature of 68°, the values permanently fixed in SMARTSTAT's memory.
6. Four **CONTROL KEYS** which allow you to select

heating, cooling, continuous fan or automatic, and (in the case of a heat-pump system) to switch off the compressor and control with the auxiliary electric heating in the event of a compressor failure. This emergency heat key applies only to heat pump systems and should not be used with other heating and cooling systems. These particular keys replace the familiar mechanical switches on the conventional thermostat.

B. Programming SMARTSTAT

You have probably heard the term 'programming' used in relation to large, conventional computers, where it can involve extensive and complex operations. We use the term 'programming,' however, in the very simple sense of entering requests and information into SMARTSTAT's computer. Programming SMARTSTAT means asking it to do something (like alter your room temperature) just like you ask a conventional thermostat to alter temperature by moving a lever or rotating a knob. It only involves touching a succession of keys:

PROGRAMMING KEYS

Lightly touch the desired PROGRAMMING key. A prompting light will indicate what particular value is to be changed or programmed (time, temperature, etc.) and the current (previously programmed) value, if any, will be displayed.

CHANGING VALUES

If you wish to change the old value displayed, or enter a value if none was

previously there, touch the CLEAR key and the display will go blank. Then touch one or more of the numerical keys in the appropriate order to generate the new desired value on the display. If you make a mistake, don't worry . . . simply touch the CLEAR key and enter the required value again. You can do this as often as necessary until you have the desired value correctly displayed. Then touch the ENTER key to enter your selected value into SMARTSTAT's computer.

ENTRY OF TWO OR MORE VALUES

If the particular program requires the entry of only one value (as in the case of adjusting room temperature), the programming is complete upon depression of the ENTER key. In that case, the prompting light will go out and the display will return to its normal time/temperature display. Some programs, however, such as economy programs, require the entry of two or more different values. In such cases, upon depression of the ENTER key, a second prompting light will lead you to the next step in the program. Programming is not complete as long as any light in the program prompting area remains lit, and SMARTSTAT WILL NOT OPERATE PROPERLY. Upon entry of the final value required, the prompting lights will go out, and the display will return to its normal time/temperature mode. The reset key, as discussed later, may be used at any time to erase all previously entered programs and begin anew.

PROGRAM REVIEW

If you wish to review a program, first lightly touch the desired programming key. If you do not wish to change the programmed value as displayed on the read-out, touch the ENTER key to re-enter into the computer. Note that the ability to call up previously-programmed values and re-enter them without changing them allows you to review your programs at any time, should you forget, for example,

what you had originally scheduled for a particular economy program. If you wish to erase the programmed value as displayed on the read-out, touch the CLEAR, then the ENTER key to erase the value from the computer.

Even though SMARTSTAT is a sophisticated energy management system, it is not difficult to program. In the following section, we will carefully detail each of the eight programs in step-by-step fashion. Once you have completed each program a few times you will find it surprisingly easy to operate your SMARTSTAT.

C. Operating Programs

NORMAL TEMPERATURE

Normal temperature, as defined here, is the fixed temperature which you require during normal "waking or working" hours, i.e. the current setting on your conventional thermostat. It is the temperature the building will return to at the end of each economy period. Thus, it is the temperature you will wake up to or return to following nighttime, daytime, or trip economy periods. Because most people prefer a somewhat higher temperature in summer than in winter, SMARTSTAT provides selection of two normal temperatures, a cooling temperature for summer and a heating temperature for winter. Unlike the conventional thermostat, SMARTSTAT can thus be set once for year-round operation, both in the cooling season when air conditioning provides climate control, and in the heating season when heating controls your comfort. You can set heating and cooling temperatures at the same time and let SMARTSTAT do the rest. SMARTSTAT provides automatic changeover between heating and cooling.

To set NORMAL TEMPERATURE

1. Touch Norm Temp key — note that if you have not previously entered a value, the display will show 78°, the cooling temperature permanently fixed in SMARTSTAT's memory. The Cool Temp prompter will light.
2. If you wish to change the previous temperature, touch the CLEAR key to remove it.

3. Key in the desired temperature. For example, if you wish to set the cooling season temperature at 74°, touch the (7) and (4) keys in succession to show 74° on the display.
4. Touch the ENTER key to enter the new temperature. The prompting light will go to Heat Temp and the display will show 68° if you have not previously entered a value.
5. If you wish to change the heating season temperature, touch the CLEAR key.
6. Key in the desired temperature, 70° for example. PLEASE NOTE THAT THE HEATING TEMPERATURE MUST BE AT LEAST 4° BELOW THE COOLING TEMPERATURE.
7. Touch the ENTER key to enter the new temperature. The prompting light will go out and the display will return to its regular time/temperature mode.

If you wish to review normal temperature, please refer to Program Review on page 7.

SET NORMAL TEMPERATURE

These instructions may be condensed into a simple table as follows:

STEP	TOUCH KEY	PROMPT LIGHT	DISPLAY SHOWS
1		Cool Temp.	78°
2		Cool Temp.	°
3	 	Cool Temp.	74°
4		Heat Temp.	68°
5		Heat Temp.	°
6	 	Heat Temp.	70°
7		None	Time/Temp.

This simple form will be used in the future to explain the various steps in the other programs.

CLOCK

SMARTSTAT incorporates a 7-day clock controlled by a quartz crystal like digital watches. To set the clock, you must program in both the time of day and the day of the week. Days of the week are indicated by the numbers (1) through (7). You may assign the number (1) to any day of the week, as long as you are consistent through all the programs. Monday is typically used as day (1).

If you wish to review the clock, please refer to Program Review on page 7.

A WORD ABOUT PROGRAMMING IN: TIME-OF-DAY

SMARTSTAT uses 24-hour MILITARY TIME, rather than the regular 12 hour time, for programming. Military time is identical to regular time during the morning period — midnight to noon. Thus, seven-thirty AM would be programmed as 7:30 and keyed into SMARTSTAT by touching the digits (7)(3)(0) in that order. In the time period noon to midnight, add 12

hours to the regular time to obtain military time. For example: three forty five PM would be programmed as: $3:45 + 12:00 = 15:45$ and keyed in by touching the digits (1) (5) (4) and (5) in that order. Note, however, that on SMARTSTAT's regular time/temperature display, the time is always shown in the familiar twelve-hour manner.

SET CLOCK

STEP	TOUCH KEY	PROMPT LIGHT	DISPLAY SHOWS
1	CLOCK 7	Day No.	:
2	CLEAR	Day No.	:
3	ADJ TEMP 1	Day No.	: 1
4	ENTER	Time	random : ?
5	CLEAR	Time	:
6	ADJ TEMP 1 5 TRIP SET 4 5	Time	15:45
7	ENTER	None	3:45/Temp.

TABLE OF MILITARY TIME

HOURS													
1 a.m. thru 12 noon	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	
1 p.m. thru 11:59	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	00:00	

ADJUST TEMPERATURE

This program replaces the rotary knob or mechanical lever used to adjust the temperature above or below the normal temperature for short periods. YOU CANNOT, HOWEVER, CHANGE MODES FROM HEATING TO COOLING OR VICE VERSA WITH ADJUST TEMP. ALSO, ADJUST TEMPERATURE ONLY OVERRIDES THE NORMAL TEMP SETTINGS AND WILL NOT EFFECT ECONOMY SETTINGS. After the temperature has been adjusted with this program as detailed below, you can instantly return to the normal setting by touching the RESTORE NORMAL key. If you forget or choose not to do so, SMARTSTAT automatically erases this program at the beginning of the next economy period. This type of convenience is not possible with the conventional thermostat.

For example, if you have a visitor in the evening who prefers a temperature setting substantially higher than your normal value, you could use the Adjust Temp program to increase the temperature to say 80° for the duration of the visit. If you then forget to return to your normal vlaue of say 74° after the visitor has left, and subsequently go to bed with nighttime economy scheduled, SMARTSTAT ensures that you wake up the next morning NOT to the 80° provided for your visitor but to your normal 74°.

If you wish to review Adjust Temperature, please refer to Program Review on page 7.

ADJUST TEMPERATURE is programmed as follows:

STEP	TOUCH KEY	PROMPT LIGHT	DISPLAY SHOWS
1		Temp.	°
2		Temp.	°
3	 	Temp.	80°
4		None	Time/Temp.

D. Economy Programs

After programming normal temperature and the clock, you have an effective clock-thermostat. Use of the economy programs makes SMARTSTAT much more: a simple, efficient way to save you money.

SMARTSTAT provides three economy (setback/setup) programs to save you money by allowing you to relax your comfort requirements when normal temperature is not necessary. These economy programs, in conjunction with SMARTSTAT's temperature control functions, provide the most sophisticated setback/setup thermostat in the marketplace today. With the use of economy programming, the temperature of a building may be decreased (setback) in the winter when normal comfort level is not desired (say at night while you are asleep or when the building is unoccupied). Similarly, the temperature may be increased (setup) during these periods in the summer. SMARTSTAT provides this function with automatic selection of heating or cooling so that it may be set once and forgotten.

SMARTSTAT's unique START ECONOMY and RESTORE NORMAL keys also put it way ahead of the conventional setback thermostat. Economy programming has presented a problem with conventional setback thermostats simply because their scheduling is too rigid. SMARTSTAT eliminates this problem with the START ECONOMY and RESTORE NORMAL keys.

The Restore Normal and Start Economy keys work like this:

IF, for any reason, you need to arise earlier than the scheduled end of economy (for a nighttime emergency, for example) simply touch the RESTORE NORMAL key and SMARTSTAT will instantly activate the heating or cooling system to restore the home to NORMAL temperature. If you return to bed later, you can touch the START ECONOMY key and return to economy until the regularly scheduled end time.

START ECONOMY and RESTORE NORMAL may also be used with the daytime economy and trip economy programs.

Remember, these keys may be used as often as you like, in no way changing the scheduled economy programs, and provide a flexibility which no conventional setback thermostat can offer.

Use of nighttime, daytime, and trip economy programs can effect substantial energy savings in both the home and business. Keep in mind that the wider the gap between the normal and economy temperatures and the longer the economy period, the more energy and money you save.

The three economy programs are detailed in the following pages.

(1) SET NIGHTTIME ECONOMY

Once programmed, Nighttime Economy operates every night of the week. Programming requires the entry of four values.

(i) The cooling (setup) temperature you wish to permit during the summer. (Cool Temp)

(iii) The time at which you wish nighttime economy to begin. (Begin Time); and

(ii) The heating (setback) temperature you wish to permit during the winter. (Heat Temp)

(iv) The time you wish nighttime economy to end. (End Time)

Experience will help you establish your own preferred temperature limits. As a guide, try setting your economy COOL temp 7-8° above and your HEAT temp 7-8° below the normal settings. Since it takes time for the building to change temperature to the economy value, you will generally have adequate time to fall asleep before the higher or lower temperature is reached. Remember, if economy is scheduled to end at 6:30 a.m., the building will already be at its normal temperature by that time. SMARTSTAT calculates the amount of time required for the building to recover from economy (warm up or cool down to the normal temperature), and activates the heating or cooling in advance to keep you comfortable.

If you wish to review Nighttime Economy, please refer to Program Review on page 7.

NIGHT SET

STEP	TOUCH KEY	PROMPT LIGHT	DISPLAY SHOWS
1	NIGHT SET 2	Cool Temp.	°
2	CLEAR	Cool Temp.	°
3	CLOCK 7 TEMP CAL 8	Cool Temp.	78°
4	ENTER	Heat Temp.	°
5	CLEAR	Heat Temp.	°
6	NORM TEMP 6 5	Heat Temp.	65°
7	ENTER	Begin Time	:
8	CLEAR	Begin Time	:
9	NIGHT SET 2 DAY SET 3 DAY SET 3 0	Begin Time	23:30
10	ENTER	End Time	:
11	CLEAR	End Time	:
12	NORM TEMP 6 DAY SET 3 0	End Time	6:30
13	ENTER	None	Time/Temp.

(2) SET DAYTIME ECONOMY

Daytime Economy is scheduled much like Nighttime Economy, except that you may also select the particular days of the week on which you want it to operate. Daytime Economy can be scheduled to operate every day of the week or on randomly selected days. As with Nighttime Economy, you are required to program in a cooling temperature (summer setup) and a heating temperature (winter setback), a begin time and an end time. In addition, you must program in the days of the week on which you want it to operate. The days of the week must follow the numbering convention you established in setting the 7-day clock.

To save more energy, you may want to set wider temperature limits, possibly as high as 85°F and as low as 55°F, since the home is generally unoccupied during daytime setback.

Remember, however, to consider plants and pets when setting these limits.

Note that in programming the required days of the week, you simply touch the numerical keys corresponding to the desired days (you can do it in any order you please).

Note also that when you review your Daytime Economy program, the days of the week programmed will flash consecutively on the display. You must wait until all the days have appeared and the display has returned to a blank state before touching the final ENTER key to restore the display to its Normal Time/Temperature Mode.

Remember also that heat pumps are not capable of recovery from deep setback in the winter. We suggest you begin with 7° of setback and adjust accordingly to the capabilities of your equipment.

If you wish to review Daytime Economy, please refer to Program Review on page 7.

DAY SET

STEP	TOUCH KEY	PROMPT LIGHT	DISPLAY SHOWS
1	DAY SET 3	Cool Temp.	°
2	CLEAR	Cool Temp.	°
3	TEMP CAL 8 5	Cool Temp.	85°
4	ENTER	Heat Temp.	°
5	CLEAR	Heat Temp.	°
6	5 5	Heat Temp.	55°
7	ENTER	Begin Time	:
8	CLEAR	Begin Time	:
9	TEMP CAL 8 0 0	Begin Time	8:00
10	ENTER	End Time	:
11	CLEAR	End Time	:
12	ADJ TEMP 1 NORM TEMP 6 0 0	End Time	16:00
13	ENTER	Day No.	:
14	CLEAR	Day No.	:
15	ADJ TEMP 1 NIGHT SET 2 DAY SET 3 TRIP SET 4 5	Day No.	: 5
16	ENTER	None	Time/Temp.

(3) SET TRIP ECONOMY

Once you use this program, you will find it an extremely simple method of saving substantial energy and utility costs. This program operates for non-recurring absences, ranging from a few hours to ninety-nine (99) days in duration. This can cover shopping and theater visits, vacations and extended absences. Only two entries are required . . . the time of day you plan to return and the number of whole days (if any) you intend to be absent. (By whole days, we mean the number of times midnight will occur during your absence.) The building is then maintained at the Daytime Economy temperature limit for the duration of your trip. If you do not have a Daytime Economy scheduled, just enter the cooling and heating temperatures desired in the Daytime Economy program. You do not need to enter the begin and end times or the days of the week. Trip Economy takes priority over day and night economy. You may use the RESTORE NORMAL and START ECONOMY keys to override/reinstate the Trip Economy program. For example, if you arrive home early from your trip, touching the RESTORE NORMAL key will instantly activate the heating or cooling as required to bring the building back to its normal temperature. Please note, however, that the RESTORE NORMAL key does not erase the Trip Economy program. You must use the CLEAR key as you review the program to accomplish this. See Program Review on page 7 for details.

To program Trip Economy, proceed as follows:

Example: you are going away for a week-end trip, leaving Friday at noon — returning Sunday evening at 6:00 p.m.

If you wish to review Trip Economy, please refer to Program Review on page 7.

TRIP SET

STEP	TOUCH KEY	PROMPT LIGHT	DISPLAY SHOWS
1	TRIP SET 4	End Time	:
2	CLEAR	End Time	:
3	ADJ TEMP 1 TEMP CAL 8 [] []	End Time	18:00
4	ENTER	Day No.	:
5	CLEAR	Day No.	:
6	NIGHT SET 2	Day No.	: 2
7	ENTER	In Economy	Time/Temp.
8	START ECONOMY	In Economy	Time/Temp.

E. Calibrating Programs

TEMPERATURE CALIBRATION is a totally unique feature found on no other thermostat available today. It allows you to apply a correction to the temperature actually measured, displayed and used by SMARTSTAT to control the heating and cooling systems. While it is highly unlikely that SMARTSTAT's temperature sensor will ever develop an error, if you feel that SMARTSTAT is displaying an incorrect temperature, it may be corrected as follows: Example: SMARTSTAT displays 72° — you feel that the actual temperature is 70°.

TEMPERATURE CALIBRATION

STEP	TOUCH KEY	PROMPT LIGHT	DISPLAY SHOWS
1		Temp.	72°
2		Temp.	°
3	 	Temp.	70°
4		None	Time/Temp.

SYSTEM CALIBRATION

This calibration key relates to SMARTSTAT's unique recovery logic. When a home or building has been in an economy mode at night or during the day, it takes a specific period of time to recover from economy, that is, for the temperature to return to the NORMAL TEMPERATURE level. This time period, known as the RECOVERY TIME, varies from situation to situation depending on a number of factors, including the number of degrees of

setback or setup, the outdoor temperature, the size of the building and its heating and cooling systems and the amount of insulation in the exterior walls of the building (R-FACTOR). Thus, the recovery time varies from building to building, and from day to day in a particular building.

A major problem with conventional setback clock thermostats is, for example, if you schedule winter nighttime setback to end the moment you arise in the morning, the conventional unit will only commence the recovery process at that time, so that it may be 30 or 35 minutes or longer before the home reaches your normal temperature. SMARTSTAT solves this problem through its 'smart' logic which continuously predicts the recovery time. It commences the warm-up process sufficiently far **in advance of the scheduled end of the economy period** to ensure that the home is back at its normal temperature level when you awake.

In order to maximize the efficiency of this unique feature, it is necessary for SMARTSTAT to 'know' the size of your home and its heating and cooling systems as well as the insulation R-factor of the building shell. Since we obviously cannot program SMARTSTAT with this information in advance, we make it possible for you to do so . . . by using the SYSTEM CAL. key. This key allows you to program into SMARTSTAT any one of ten digits, (0) to (9). When the value (0) is programmed, SMARTSTAT will not

calculate a recovery time, and recovery will begin only at the time economy is scheduled to end. The value (5) gives you the correct recovery time for the average home. If you program in a (5) using the SYSTEM CAL. key as detailed below, you will have achieved a much superior warm-up performance compared with the conventional setback thermostat. However, if you want to maximize SMARTSTAT's performance, so that the temperature in your home or building is back to normal right at the end of economy each time, we suggest you follow this procedure.

- (1) Program SYSTEM CAL. with the digit (5).
- (2) Over a period of about 2-3 weeks determine whether SMARTSTAT is consistently achieving normal temperature conditions at or close to the scheduled end of economy or whether it tends to be consistently early or late in doing so. If it is accurate in its recovery process, make no further adjustments to SYSTEM CAL. . . . you have already set the optimum value at (5). If it is consistently early in recovering from economy (temperature is always back to normal 10 minutes or more before the scheduled

end of economy) the SYSTEM CAL. value needs to be reduced below (5) try (3) or (4). Conversely, if it is consistently late in recovering from economy, try changing the SYSTEM CAL. value to (6) or (7). Remember, the higher the value of SYSTEM CAL., the longer SMARTSTAT will allow for the recovery process. Don't worry about the outdoor temperature... SMARTSTAT takes it into account by making several observations without the need for an outdoor tem-

perature sensor. One more thing... if your heating and cooling systems are not uniformly sized in relation to the home or building, you may need to determine and use two different values of SYSTEM CAL... one for the summer and one for the winter. Finally, remember that even if you leave it set at (5), no matter what type of home or building it is installed in, SMARTSTAT's recovery logic will still put you way ahead of a conventional setback clock.

If you wish to review System Cal., please refer to Program Review on page 7.

SYSTEM CAL.* IS PROGRAMMED AS FOLLOWS:

*Note that no prompting light is lit during this program!

SYSTEM CALIBRATION

STEP	TOUCH KEY	PROMPTING LIGHT	DISPLAY SHOWS
1		None	: 0
2		None	:
3		None	: 5
4		None	Time/Temp.

F. What SMARTSTAT is doing for you . . .

COMFORT LEVEL

Once the desired temperature is established, a comfort level may be provided in the home. The comfort level is a two degree temperature "band" around the desired temperature. For example, assume SMARTSTAT is installed to a single stage HVAC system and is in a heating mode. If the room temperature drops one degree below the desired temperature, the heating will be activated. The heating will continue until the room temperature reaches one degree above the desired temperature. At this time, the heating will cut off and the above cycle will repeat itself. This cycle applies in reverse when SMARTSTAT is in a cooling mode. Additional stages of auxiliary heating or cooling will be turned on where applicable by larger temperature differences.

AUTOMATIC SELECTION OF HEATING OR COOLING

SMARTSTAT has the ability to decide whether heating or cooling is required to maintain the desired comfort level. In order for you to enjoy this feature, it is necessary for both the heating and cooling control lights to be lit.

The automatic selection works as follows:

SMARTSTAT will select cooling to maintain your comfort when the home temperature rises to a programmed cooling temperature, either an economy or normal cooling temperature. SMARTSTAT will select heating when the home temperature drops to a programmed heating temperature, again either an economy or normal heating temperature. The heating or cooling is activated only when SMARTSTAT decides that one is required to maintain the comfort level and the control light is lit.

RESET KEY

You may erase all the programs you have previously entered into SMARTSTAT by holding the RESET key down for 10 seconds. This action also returns the clock to midnight. If at any time you feel you have made errors in programming, simply press the RESET key and begin anew.

FAILSAFE

If you do not wish to program SMARTSTAT, it will operate at a cooling season temperature of 78° and a heating season temperature of 68°, the values permanently fixed in SMARTSTAT's memory. SMARTSTAT will automatically light the heating and cooling control indicators and provide automatic changeover between heating and cooling.

BATTERY BACK UP

Another feature of SMARTSTAT that is left to be discussed is its behavior during power outages. SMARTSTAT uses two nine volt alkaline batteries. They power SMARTSTAT's computer when electricity is not being supplied to a building, thus keeping intact the clock and the programs that have been entered into SMARTSTAT. The batteries should provide service for under normal circumstances. A BATTERY indicator light is illuminated when the batteries will no longer power SMARTSTAT's computer. Please remember that the numeric display will not function when battery back-up is being used.

APPENDIX I

Programming Forms

Provided here are handy programming forms, so that you may determine the values that fit your personal program. The first is filled in with the values from examples given earlier.

Prompting Light Function	Temp.	Cool Temp.	Heat Temp.	Begin Time	End Time	Day No.	Time	Sys. Cal.*
Norm Temperature		74°	70°					
Clock						1	15:45	
Temperature Cal	70°							
System Cal								5
Adjust Temperature	80°							
Night Set		78°	65°	23:30	6:30			
Day Set		85°	55°	8:00	16:00	1-2-3- 4-5		
Trip Set					18:00	2		

* Note that no prompting light is lit during this program.

Prompting Light Function	Temp.	Cool Temp.	Heat Temp.	Begin Time	End Time	Day No.	Time	Sys. Cal.*
Norm. Temp.								
Clock								
Temp. Cal.								
Sys. Cal.								
Adj. Temp.								
Night Set								
Day Set								
Trip Set								

* Note that no prompting light is lit during this program.

Prompting Light Function	Temp.	Cool Temp.	Heat Temp.	Begin Time	End Time	Day No.	Time	Sys. Cal.*
Norm. Temp.								
Clock								
Temp. Cal.								
Sys. Cal.								
Adj. Temp.								
Night Set								
Day Set								
Trip Set								

* Note that no prompting light is lit during this program.

APPENDIX II

Commercial Application

SMARTSTAT is ideal for commercial and institutional applications. The use of SMARTSTAT's unique economy programming can save you money by reducing energy needs during non-office hours.

Nighttime economy can be scheduled to operate every day of the week, when the office or institution is closed, say from 5 p.m. to 8 a.m. in a typical business.

Daytime economy can be scheduled to operate on randomly selected days, say Saturday and Sunday. Thus, you can save money on weekends when the office is closed by overlapping daytime and nighttime economy periods.

In the programming form on the next page, a cooling temperature of 78° and a heating temperature of 68° is desired during office hours (8 a.m. to 5 p.m. Monday thru Friday). Economy, 85° cooling — 55° heating, is scheduled for 5 p.m. to 8 a.m., Monday thru Friday, and all day Saturday and Sunday. Please note how the daytime economy is scheduled to overlap the nighttime economy on Saturday and Sunday. This allows the economy periods to cancel the recovery times that may be calculated.

COMMERCIAL APPLICATION

Prompting Light Function	Temp.	Cool Temp.	Heat Temp.	Begin Time	End Time	Day No.	Time	Sys. Cal.*
Norm Temp.		78°	68°					
Clock						1	15:45	
Temp. Cal								
Sys. Cal.								5
Adj. Temp.								
Night Set		85°	55°	17:00	8:00			
Day Set		85°	55°	6:00	19:00	6-7		
Trip Set								

* Note that no prompting light is lit during this program.

SMARTSTAT 1000

by



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