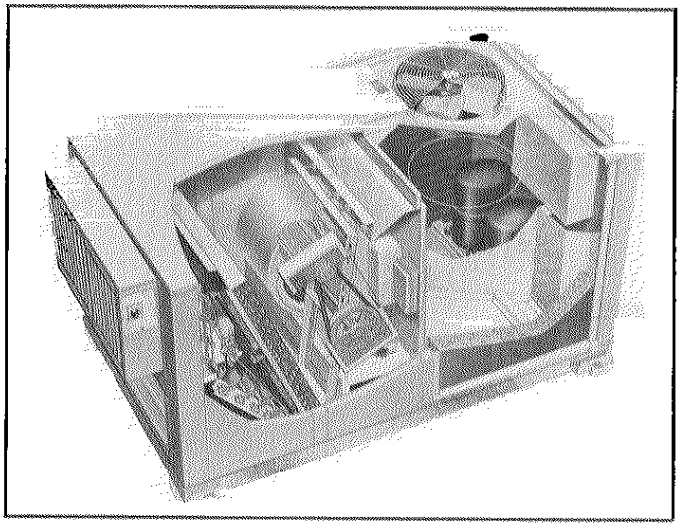
SERVICE — UNIT INFORMATION — CHA11

Litho U S A

CHA11 SERIES UNITS



ACCESSORIES — TABLE 1

Option	Model No. CHA11-953	Model No. CHA11-1353	Availability
Hot Water	HWC11-95 (100,000 - 250,000 Btu)	HWC11-135 (100,000 - 275,000 Btu)	Factory Installed Only
Electric Heat	ECH11-95-15 (15KW)	ECH11-135-15 (15KW)	Factory or Field Installed
	ECH11-95-30 (30KW)	ECH11-135-30 (30KW)	
	ECH11-95-45 (45KW)	ECH11-135-45 (45KW)	
		ECH11-135-60 (60KW)	
Power Saver	PSD11-95	PSD11-135	Factory or Field Installed
Nite Setback	LB-38134CB	LB-38134CB	Field Installed
Gravity Exhaust Dampers	GED11-95	GED11-135	Field Installed Only
Minimum Fresh Air Dampers (Manual)	OAD11-95	OAD11-135	Field Installed Only
Automatic Fresh Air Damper Kit for OAD11	34C23	34C23	Field Installed Only
Roof Mounting Frame	RMF11-95	RMF11-135	Field Installed Only
Horizontal Mounting Frame	RMFH11-95	RMFH11-135	Field Installed Only
Mounting Frame Adaptor	RMFA11-95	RMFA11-135	Field Installed Only
Ceiling Supply & Return Step-Down Diffuser	RTD11-95	RTD11-135	Field Installed Only
Ceiling Supply & Return Flush Diffuser	FD11-95	FD11-135	Field Installed Only
Ceiling Supply & Return Transitions	SRT11-95	SRT11-135	Field Installed Only
Remote Status Panel	SP11	SP11	Field Installed Only
Remote Switching Status Panel	SSP11	SSP11	Field Installed Only
Low Ambient Kit	LB-37124B	LB-37124B	Field Installed Only
Disconnect Mounting Kit	LB-38208BA	LB-38208BA	Field Installed Only

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I - INTRODUCTION

CHA11 production is scheduled in 1980 for the 7-1/2 and 10 ton models. Figure 1 shows a unit cutaway. Auxiliary heat (electric or hot water) is available for these units. Other options are listed in Table 1.

Units are designed for rooftop installation with either bottom or horizontal discharge. The RMF11 roof mounting frame mates to the bottom of unit. The added installation of a RMFH11 mounting frame permits horizontal discharge. The RMFA mounting frame adaptor allows unit installation on an existing RMF3 roof mounting frame in retrofit applications.

The CHA11 incorporates the "Honeywell Single Zone Solid State Control System". Figure 2 illustrates the compatible control options and lists the corresponding ordering numbers.

CHA11 CONTROL OPTION CHART FOR "HONEYWELL SINGLE ZONE SOLID STATE CONTROL SYSTEM"

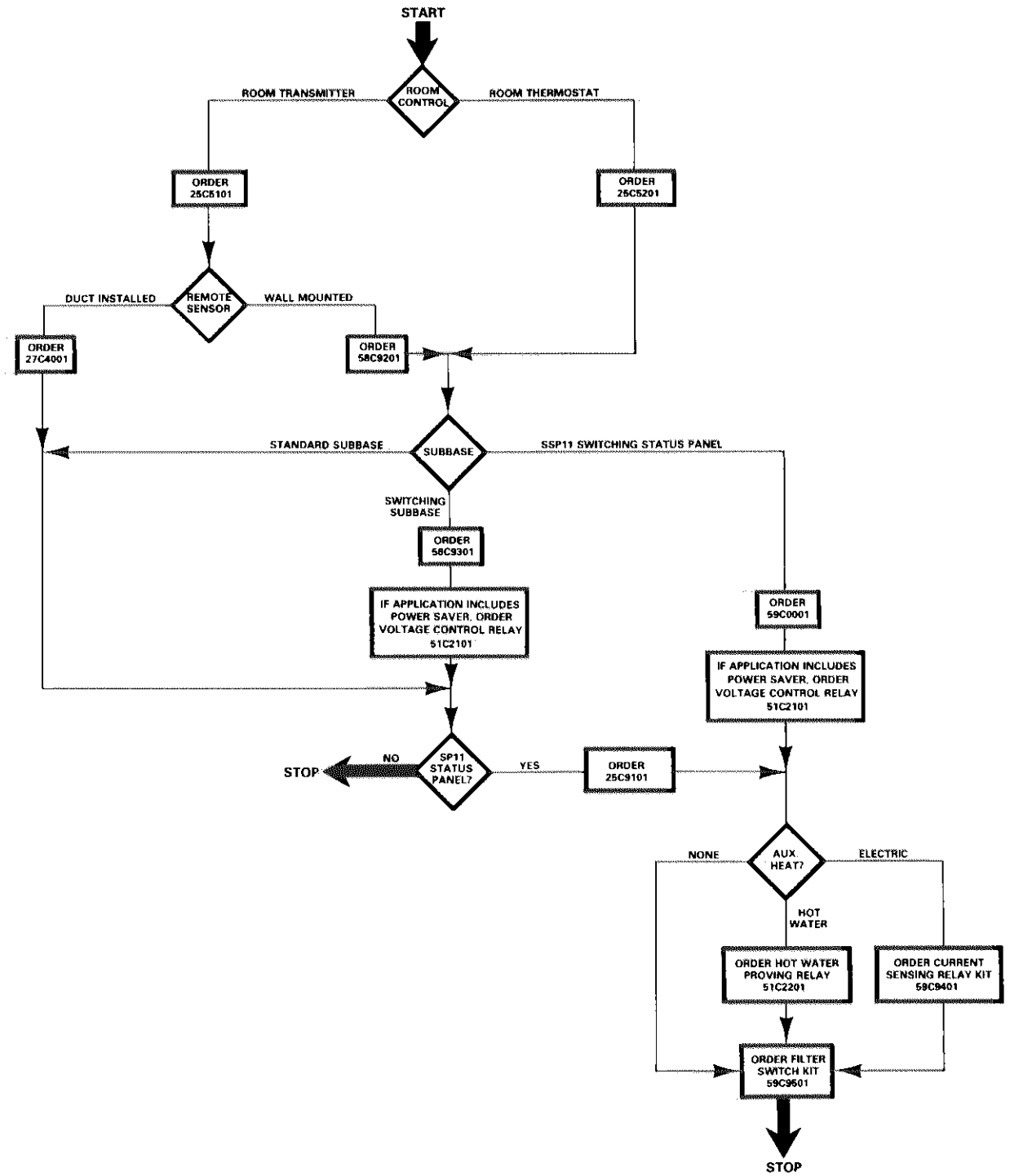


FIGURE 2

II - UNIT INFORMATION

A - Specifications

Model No.		CHA11-953	CHA11-1353
★ARI Standard 270 SRN		21	22
*ARI Standard 210 Ratings	Total cooling capacity (Btuh)	89,000	121,000
	Total unit watts	11,100	15,100
	†EER (Btuh/Watts)	8.0	8.0
	Dehumidifying capacity	29%	31%
Refrigerant (22) charge		15 lbs. 2 oz.	22 lbs.
Evaporator Blower	Blower wheel nominal diam. x width (in.)	(1) 15 x 9	(1) 15 x 15
	Motor horsepower (minimum-maximum)	1-1/2 — 3	3 — 5
Evaporator Coil	Net face area (sq. ft.)	8.3	12.0
	Tube diam. (in.) & No. of rows	1/2 — 3	1/2 — 3
	Fins per inch	15	15
Condenser Coil	Net face area (sq. ft.)	14.6	19.8
	Tube diam. (in.) & No. of rows	3/8 — 3	3/8 — 3
	Fins per inch	20	20
Condenser Fans	Diameter (in.) & No. of blades	(2) 20 — 4	(2) 24 — 4
	Air volume (cfm) (factory setting)	6000	8500
	Motor horsepower	(2) 1/3	(2) 1/2
	Motor watts (factory setting)	850	1150
Optional Hot Water Coil	Model No. & Net weight	HWC11-95 (65 lbs.)	HWC11-135 (75 lbs.)
	**Heating capacity range (Btuh)	100,000 — 250,000	100,000 — 275,000
	Net face area (sq. ft.)	4.5	6.5
	Tube diameter (in.) — No. of rows	1/2 — 2	1/2 — 2
	Fins per inch	16	10
Condensate drain size mpt (in.)		(2) 3/4	(2) 3/4
No. & size of filters (in.)		(4) 16 x 20 x 1	(6) 16 x 20 x 1
Net weight of basic unit (lbs.) (1 Package)		1200	1580

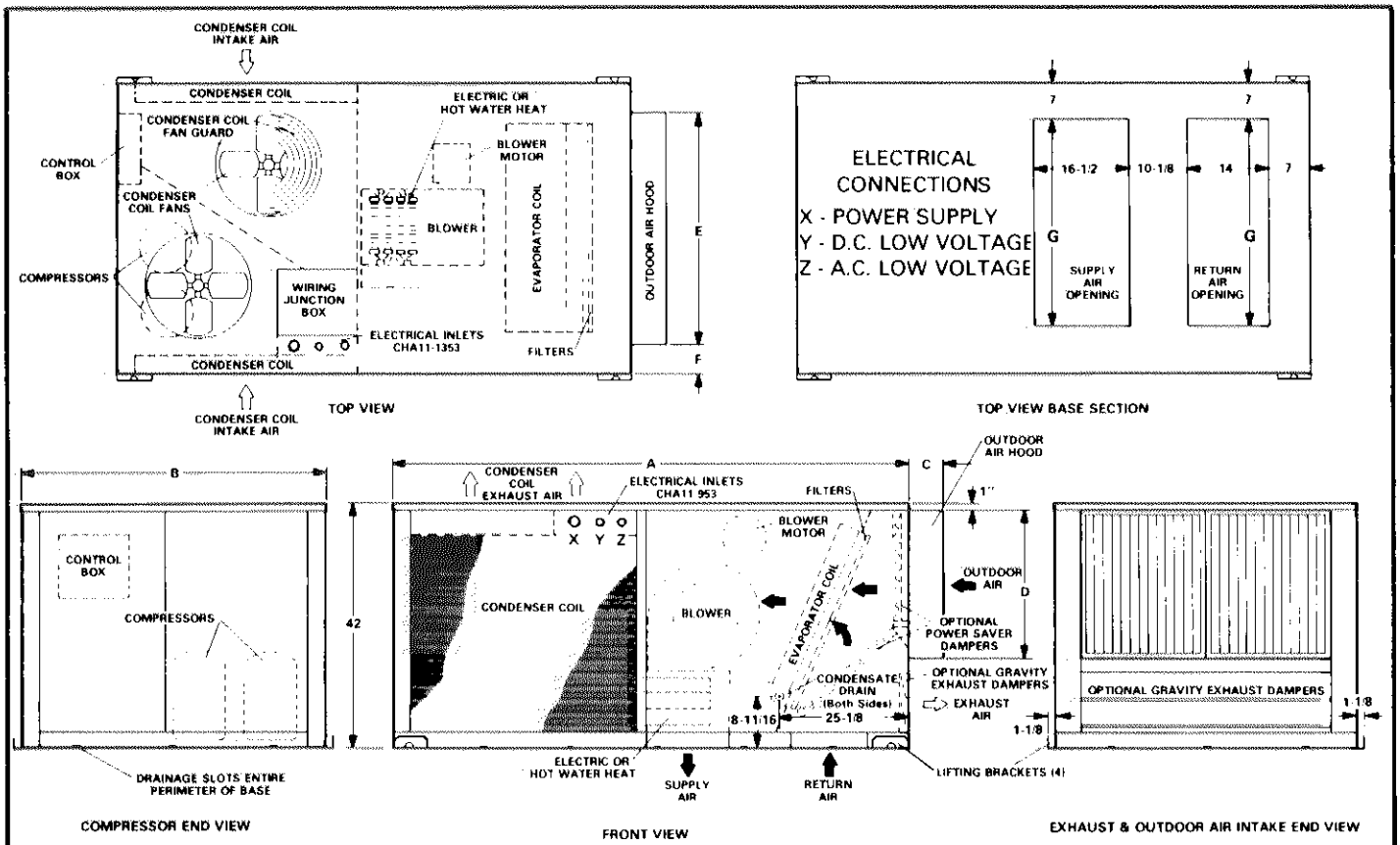
★Sound Rating Number in accordance with ARI Standard 270.
*Rated in accordance with ARI Standard 210; 450 cfm (maximum) evaporator air volume per ton of cooling, 95F outdoor air temperature and 80db/67wb entering evaporator air.
†Energy Efficiency Ratio in accordance with ARI Standard 210.
**Capacity range shown is possible with varying supply conditions and air volumes. See Figure 21.

B - Electrical Data

Model No.		CHA11-953								CHA11-1353							
Line voltage data — 60hz — 3 phase		200V		230V		460V		575V		200V		230V		460V		575V	
Compressors (2)	Rated load amps (total)	30.6		28.2		16.0		11.2		38.0		38.0		18.7		14.7	
	Locked rotor amps (total)	148.0		148.0		74.0		72.0		264.0		264.0		132.0		112.0	
Condenser Fan Motors (2)	Full load amps (total)	4.6		4.2		2.2		1.6		6.8		6.0		3.0		2.4	
	Locked rotor amps (total)	9.4		9.4		4.6		4.0		12.4		12.4		6.2		5.8	
Evaporator Blower Motor	Horsepower	1-1/2	3	1-1/2	3	1-1/2	3	1-1/2	3	3	5	3	5	3	5	3	5
	Full load amps	6.0	11.0	5.2	9.6	2.6	4.8	2.1	3.9	11.0	17.5	9.6	15.2	4.8	7.6	3.9	6.1
	Locked rotor amps	39.0	65.0	34.0	56.0	17.0	28.0	15.0	25.6	65.0	100.0	56.0	90.0	28.0	45.0	25.6	35.0
Recommended max. fuse size (amps)		50	60	50	50	30	30	20	20	70	80	70	70	35	35	30	30
Unit Power Factor		.89	.88	.89	.88	.89	.88	.89	.88	.89	.88	.89	.88	.89	.88	.89	.88
*Minimum Circuit Ampacity		45.0	50.0	41.1	45.5	22.8	25.0	16.4	18.1	60.6	67.1	58.4	64.0	28.9	31.7	22.9	25.1

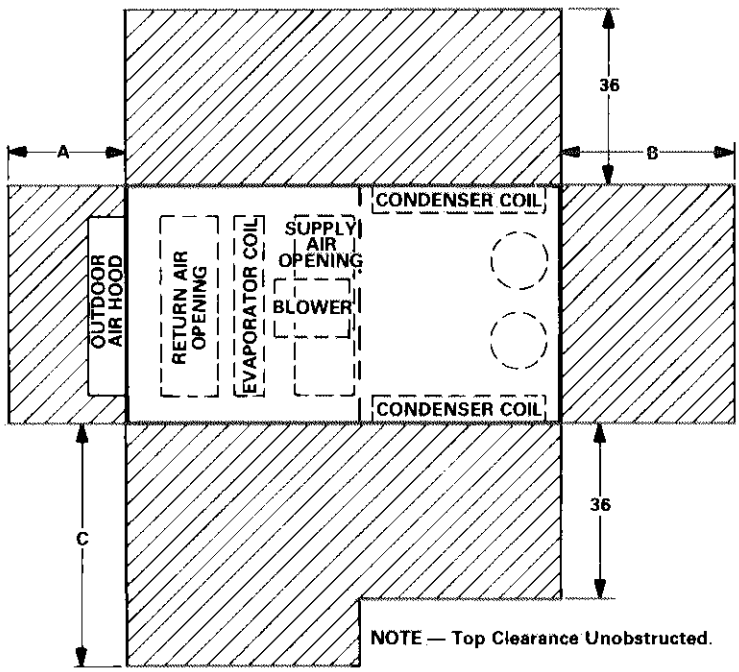
*Refer to National Electric Code manual to determine wire, fuse and disconnect size requirements.
NOTE — Extremes of operating range are plus and minus 10% of line voltage.

C - Dimensions



MODEL NO.		A	B	C	D	E	F	G
CHA11-953	in.	87-7/8	50	6-1/8	20-3/4	40-3/4	4-1/2	35-9/16
	mm	2232	1270	155	527	1035	114	903
CHA11-1353	in.	93-3/8	68	14-1/8	32	63	2-3/8	53-9/16
	mm	2372	1727	359	813	1600	60	1360

D - Installation Clearances



Model No.	A	B	C
CHA11-953	24	36	50
CHA11-1353	32	44	68

E - Blower Performance

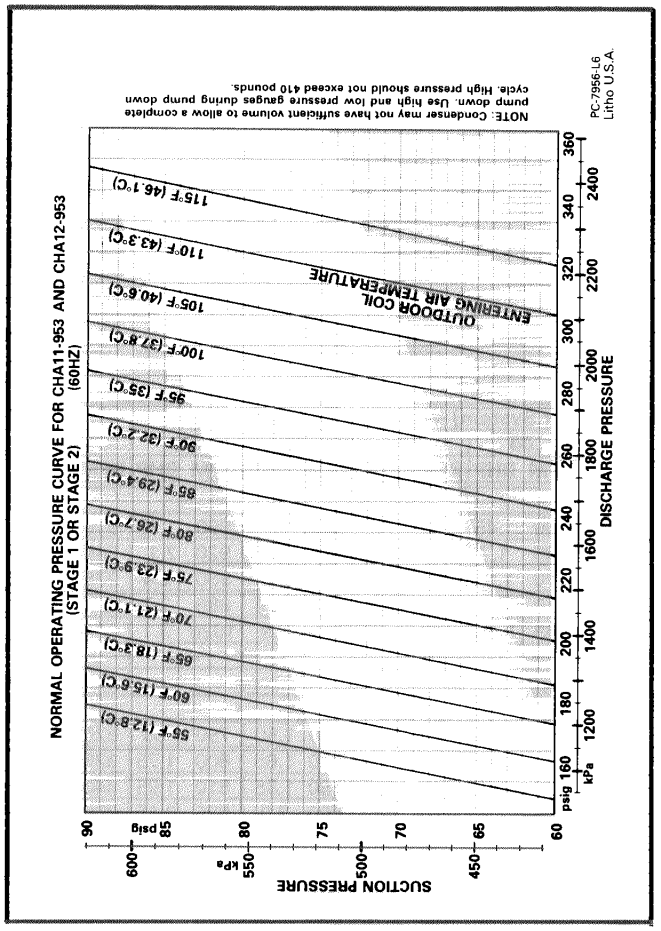
LESS ELECTRIC HEAT

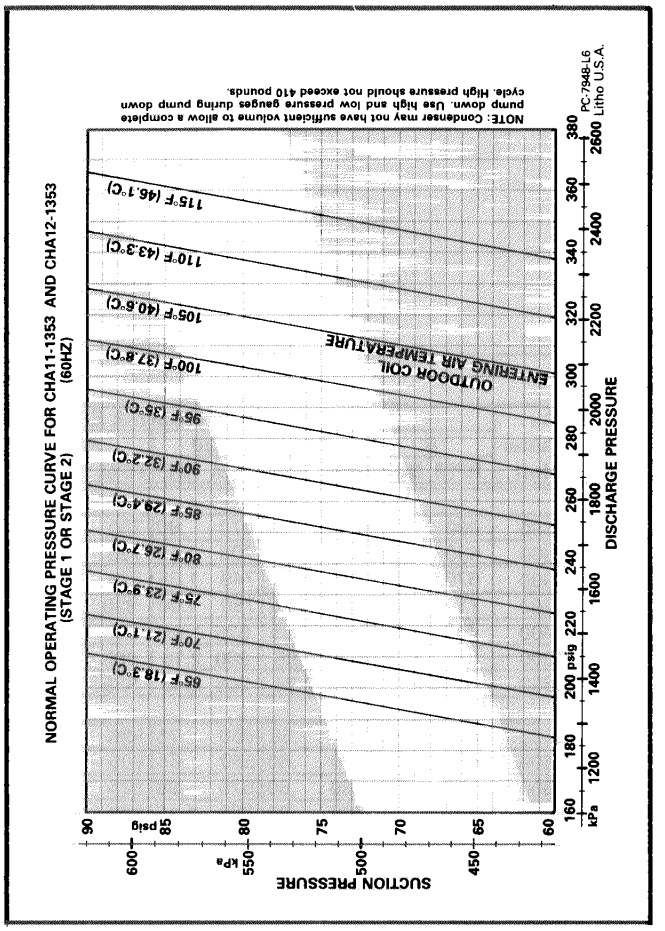
Air Volume (Cfm)	STATIC PRESSURE EXTERNAL TO UNIT (Return Air System) — (Inches Water Gauge)																					
	0		.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
CHA11-953																						
2600	600	.65	630	.75	670	.90	700	1.05	730	1.20	770	1.35	800	1.45	830	1.6	855	1.7	890	1.85	915	1.95
2800	630	.80	670	.95	705	1.10	735	1.25	775	1.40	810	1.55	835	1.7	860	1.8	895	1.95	920	2.1	945	2.2
3000	670	1.00	705	1.15	740	1.35	775	1.50	810	1.65	840	1.8	870	1.95	905	2.1	930	2.3	950	2.4	975	2.55
3200	710	1.25	745	1.35	780	1.60	820	1.75	845	1.85	875	2.2	910	2.2	935	2.4	960	2.55	985	2.7	1012	2.9
3400	750	1.50	785	1.65	825	1.85	855	2.05	885	2.2	920	2.35	945	2.55	970	2.75	995	2.9	1020	3.1	-----	
3600	790	1.75	830	1.95	860	2.15	895	2.3	925	2.5	950	2.7	975	2.9	1010	3.1	----		----		---	
3800	835	2.1	870	2.25	905	2.45	935	2.7	960	2.9	985	3.05	1020	3.3	----		----		----		----	
CHA11-1353																						
3500	450	.35	500	.55	550	.75	595	.90	630	1.10	665	1.25	700	1.35	730	1.40	760	1.50	790	1.65	820	1.75
3600	460	.40	510	.60	560	.85	605	1.00	640	1.15	670	1.35	710	1.40	735	1.50	770	1.65	800	1.75	325	1.85
3800	490	.60	530	.80	575	.95	625	1.15	655	1.30	685	1.4	720	1.55	755	1.7	780	1.85	810	1.95	840	2.1
4000	520	.75	560	.95	605	1.15	640	1.35	665	1.45	705	1.55	730	1.7	770	1.85	800	2.0	825	2.15	855	2.3
4200	545	.90	580	1.10	625	1.30	660	1.45	685	1.65	720	1.7	750	1.9	780	2.05	815	2.2	840	2.35	870	2.5
4400	575	1.1	610	1.25	645	1.50	670	1.65	700	1.75	735	1.9	770	2.1	800	2.3	825	2.4	860	1.6	885	2.8
4600	600	1.25	635	1.50	665	1.70	685	1.8	720	1.95	755	2.15	780	2.3	815	2.45	840	2.65	875	2.85	905	3.05
4800	630	1.50	655	1.70	670	1.8	705	1.95	740	2.15	770	2.35	805	2.55	830	2.75	865	2.95	890	3.15	920	3.25
5000	660	1.75	665	1.85	685	1.9	720	2.15	760	2.4	780	2.6	820	2.8	850	3.0	875	3.2	910	3.35	935	3.55
5200	665	1.90	675	2.0	710	2.2	740	2.4	775	2.6	810	2.85	840	3.1	870	3.3	895	3.45	925	3.65	955	3.85
5400	675	2.10	690	2.2	730	2.4	765	2.6	790	2.85	825	3.15	860	3.4	880	3.55	915	3.75	960	3.95	975	4.3
5600	685	2.2	715	2.35	750	2.65	780	2.85	820	3.15	845	3.45	875	3.65	905	3.85	930	4.05	965	4.3	985	4.45

WITH ELECTRIC HEAT

Air Volume (Cfm)	STATIC PRESSURE EXTERNAL TO UNIT (Return Air System) — (Inches Water Gauge)																					
	0		.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
CHA11-953																						
2600	----		800	1.1	835	1.25	875	1.45	910	1.6	945	1.75	975	1.9	1005	2.05	1030	2.2	1060	2.3	1080	2.5
2800	815	1.25	850	1.4	890	1.6	930	1.75	960	1.9	990	2.05	1025	2.25	1050	2.4	1075	2.55	1110	2.75	1130	2.8
3000	875	1.6	910	1.8	945	1.95	975	2.1	1015	2.3	1040	2.45	1070	2.6	1100	2.8	1125	2.95	1150	3.05	1175	3.25
3200	930	2.0	970	2.2	1000	2.3	1030	2.5	1060	2.65	1090	2.85	1120	3.0	1145	3.15	1170	3.3	----		----	
3400	990	2.35	1025	2.55	1055	2.75	1085	2.9	1120	3.1	1145	3.3	1170	3.45	----		----		----		----	
3600	1050	2.8	1080	3.0	1115	3.15	1140	3.4	----		----		----		----		----		----		----	
3800	1115	3.3	----		----		----		----		----		----		----		----		----		----	
CHA11-1353																						
3500	----		690	1.35	730	1.5	770	1.65	810	1.8	840	1.95	870	2.1	890	2.15	920	2.25	950	2.4	970	2.5
3600	----		710	1.45	750	1.6	780	1.75	820	1.9	850	2.05	875	2.15	910	2.3	935	2.4	960	2.55	980	2.7
3800	710	1.55	745	1.65	780	1.85	820	2.05	850	2.2	875	2.3	910	2.4	935	2.55	970	2.75	985	2.8	1015	3.0
4000	740	1.75	780	1.9	820	2.15	850	2.3	875	2.4	910	2.55	940	2.7	970	2.9	990	3.0	1020	3.2	1035	3.35
4200	780	2.1	820	2.25	850	2.4	875	2.5	915	2.7	940	2.85	975	3.1	1000	3.2	1020	3.4	1040	3.55	1070	3.75
4400	820	2.35	850	2.5	880	2.65	915	2.8	950	3.05	975	3.2	1010	3.45	1025	3.6	1050	3.8	1075	3.95	----	
4600	855	2.6	880	2.75	920	3.0	955	3.25	980	3.4	1015	3.65	1030	3.8	1060	4.05	1080	4.25	----		----	
4800	885	2.9	925	3.15	960	3.4	985	3.55	1015	3.8	1035	4.0	1065	4.25	1080	4.4	----		----		----	
5000	930	3.35	965	3.6	990	3.75	1020	4.0	1040	4.2	1070	4.45	1095	4.7	----		----		----		----	
5200	970	3.75	1000	4.0	1025	4.2	1050	4.45	1075	4.65	----		----		----		----		----		----	
5400	1010	4.2	1030	4.4	1060	4.7	1080	4.95	----		----		----		----		----		----		----	
5600	1030	4.55	1065	4.9	1090	5.2	----		----		----		----		----		----		----		----	

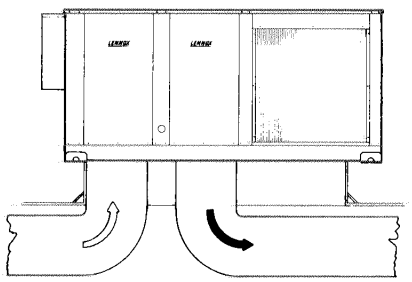
F - Pressure Curves



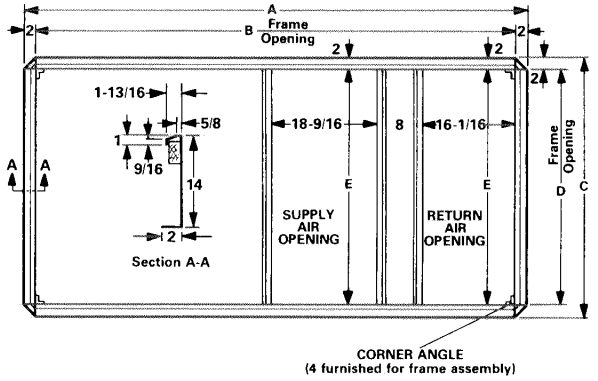


G - RMF11 Roof Mounting Frame

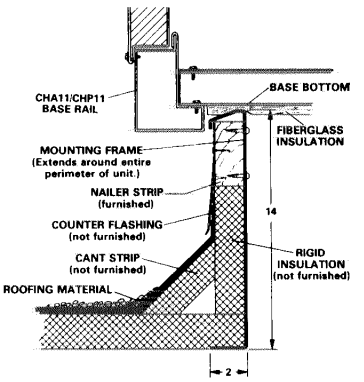
DOUBLE DUCT APPLICAION

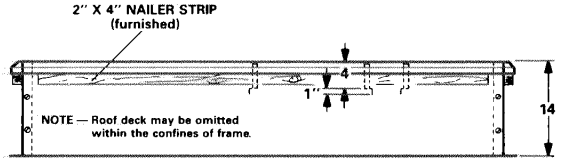


RMF11 ROOF MOUNTING FRAME WITH DOUBLE DUCT OPENING



RECOMMENDED FLASHING FOR RMF11 ROOF MOUNTING FRAME

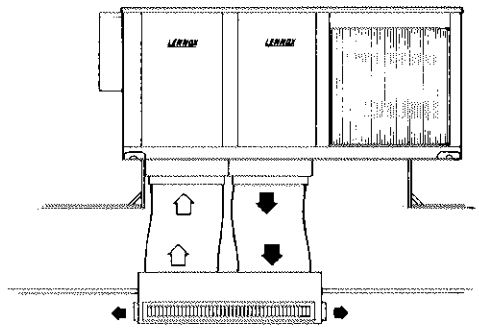




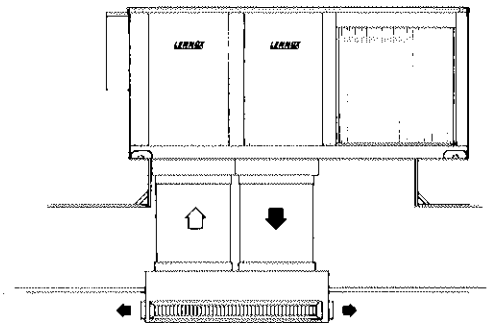
Model No.	A	B	C	D	E
RMF11-95	79⅝	75⅝	41⅝	37⅝	37⅝
RMF11-135	85⅛	81⅛	59⅝	55⅝	55⅝

H - RMF11 With Combination Ceiling Supply And Return

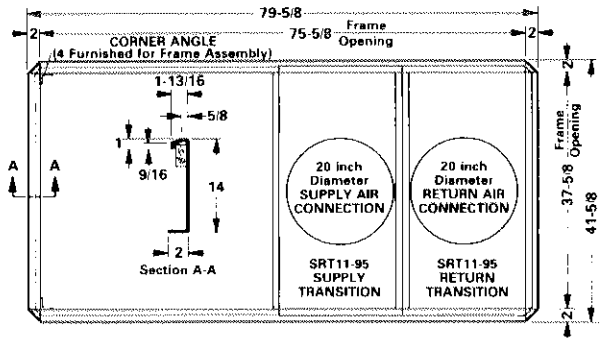
CHA11-953

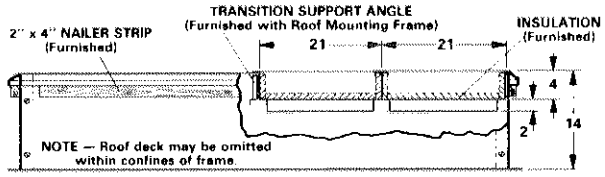


CHA11-1353

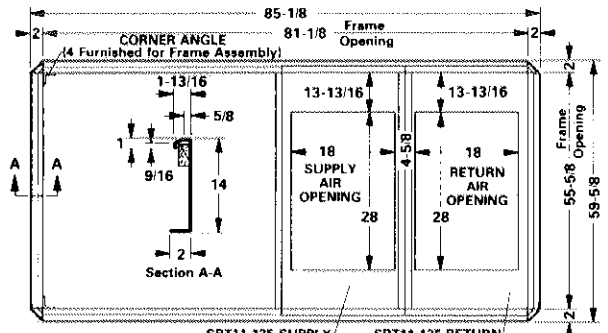


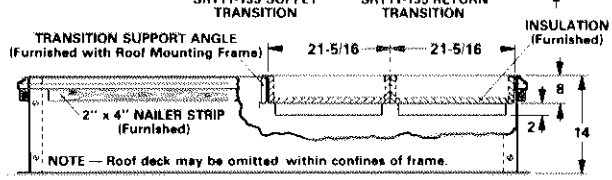
RMF11 WITH SRT11-95 TRANSITIONS



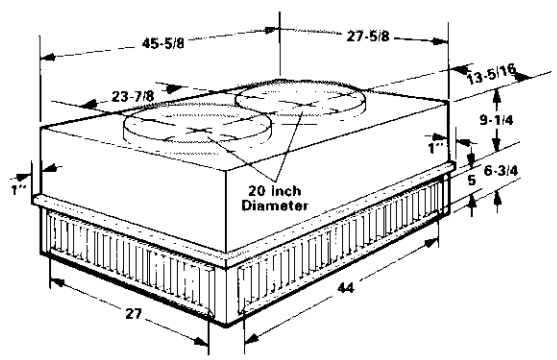


RMF11 WITH SRT11-135 TRANSITIONS

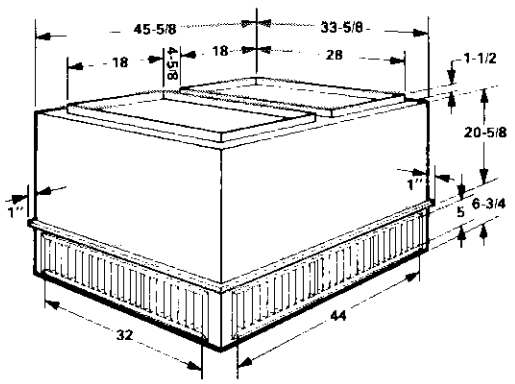




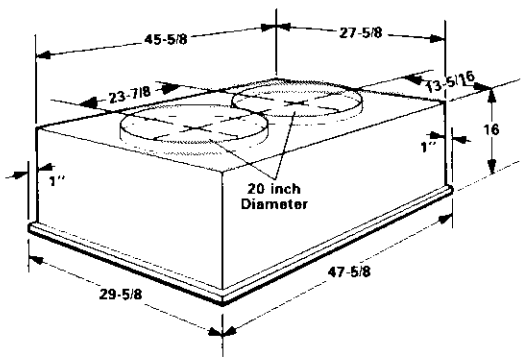
RTD11-95 STEP-DOWN DIFFUSER



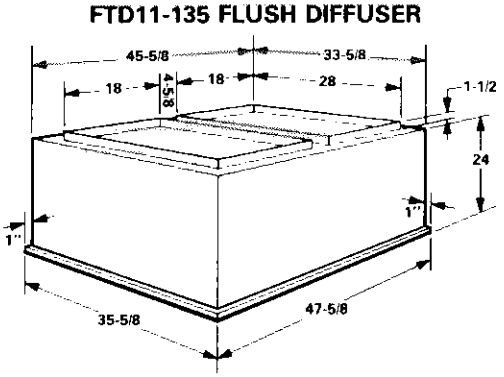
RTD11-135 STEP-DOWN DIFFUSER



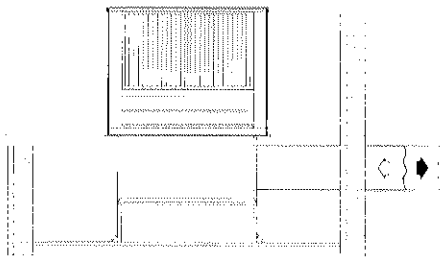
FTD11-95 FLUSH DIFFUSER



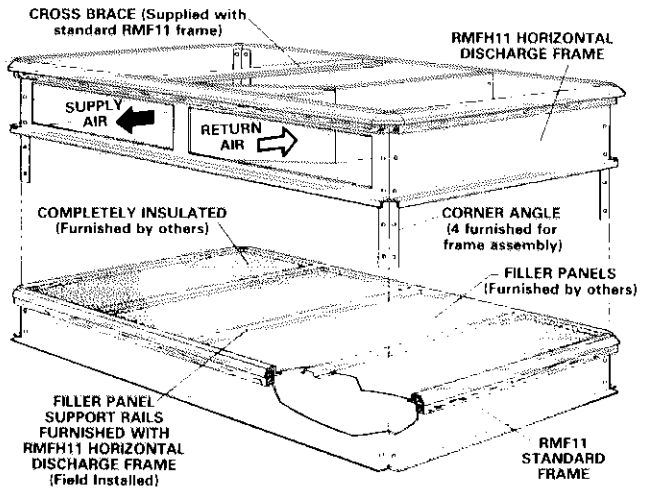
FTD11-135 FLUSH DIFFUSER



I - RMFH11 Horizontal Mounting Frame

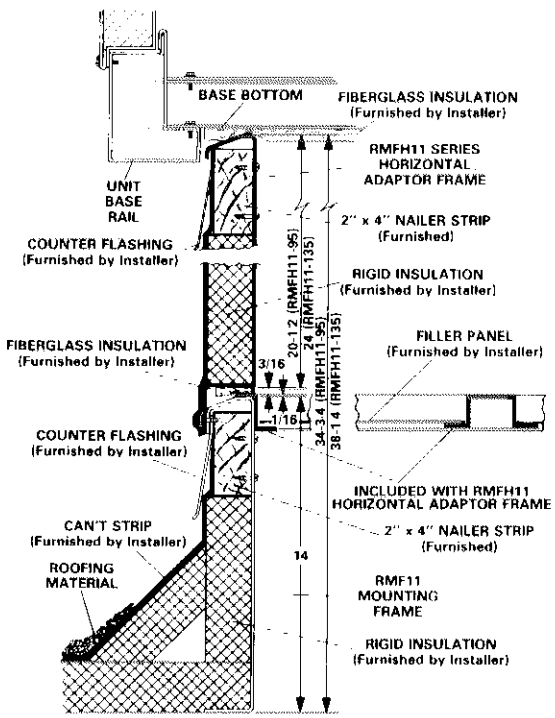


RMFH11 HORIZONTAL MOUNTING FRAME WITH RMF11

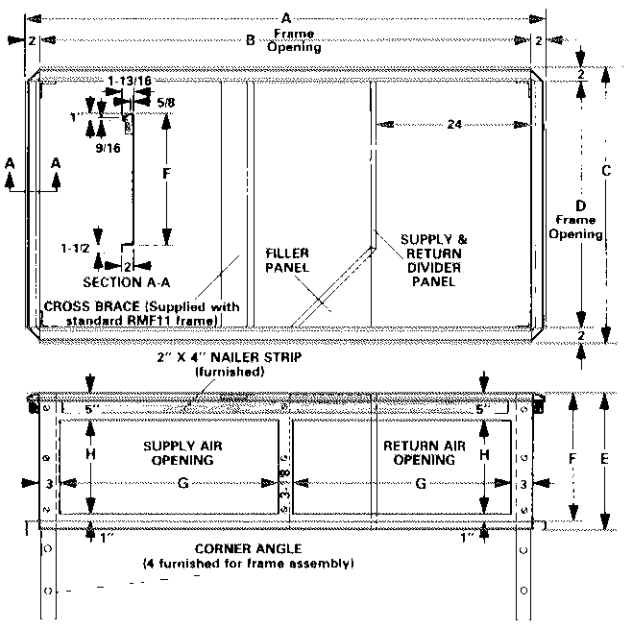


NOTE -- See Installation Instruction for recommended size and location of filler panels.

RMFH11 AND RMF11 FRAME MOUNTING DETAIL



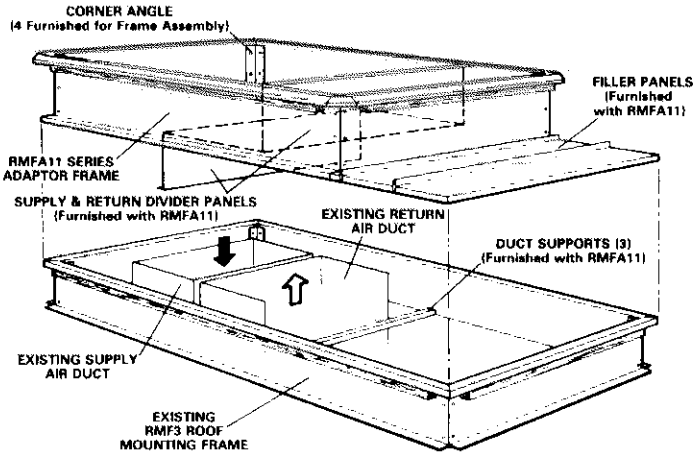
RMFH11 HORIZONTAL MOUNTING FRAME



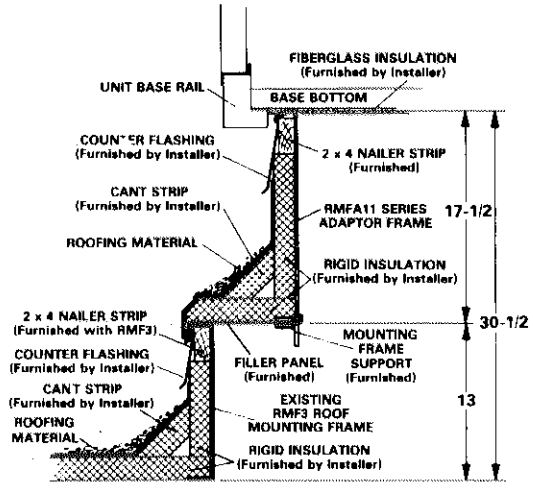
Model No.	A	B	C	D	E	F	G	H
RMFH11-95	79-5/8	75-5/8	41-5/8	37-5/8	22	20-1/2	33-1/4	14-1/2
RMFH11-135	85-5/8	81-5/8	59-5/8	55-5/8	25-1/2	24	36	18

J - RMFA11 Adaptor Mounting Frame

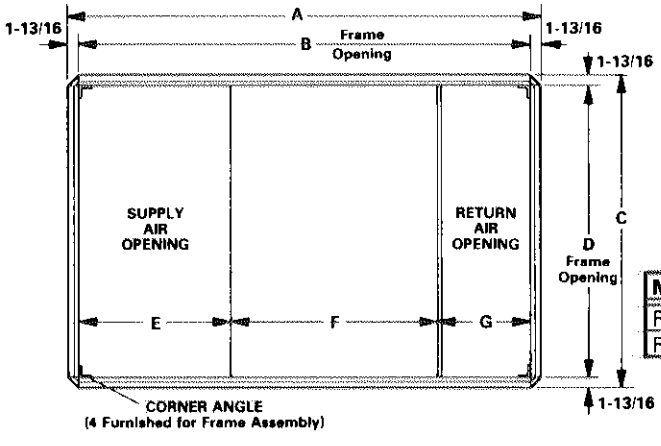
RMFA11 ADAPTOR MOUNTING FRAME WITH EXISTING RMF3 ROOF MOUNTING FRAME

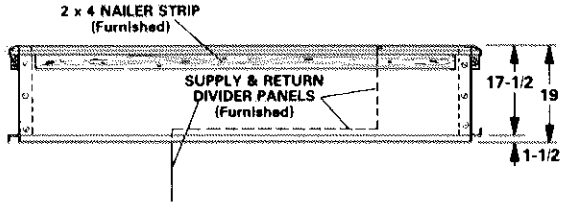


RMFA11 AND RMF3 FRAME MOUNTING DETAIL



RMFA11 ADAPTOR MOUNTING FRAME





Model No.	A	B	C	D	E	F	G
RMFA11-95	79-1/4	75-5/8	41-1/4	37-5/8	23-1/4	28-3/8	24
RMFA11-135	84-3/4	81-1/8	59-1/4	55-5/8	29-7/8	33-1/8	18-1/8

K - Power Supply Field Wiring (Figure 3)

Power Wiring Less Electric Heat

The unit rating plate lists minimum circuit ampacity and maximum fuse size. Connect power supply to high voltage leads in make-up box.

Power Wiring With Factory Installed Electric Heat

The unit rating plate lists minimum circuit ampacity and maximum fuse size. The incoming power connects to the power terminal block on hat section in high voltage junction box.

If the application includes a status panel, the "1, 1" electric heat lead must loop around a current sensing relay (K20). Loop once for "Q" voltage or twice for "G" voltage ECH11. The relay must be ordered separately.

Power Wiring With Field Installed Electric Heat

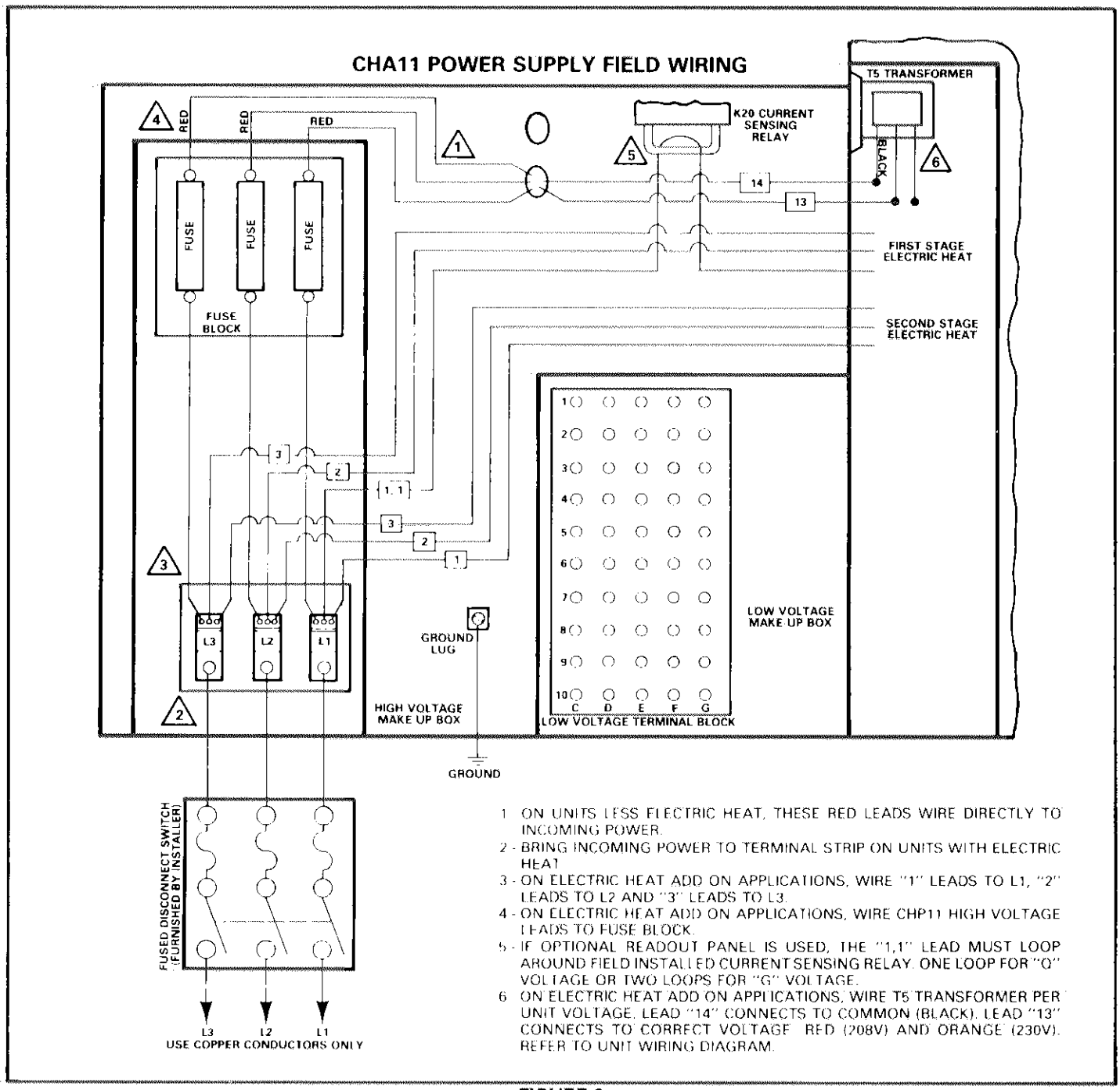
1 - The "Heater Installed" plate on unit access panel lists the minimum circuit ampacity and maximum fuse size for the CHA11 combined with the various heaters.

2 - The incoming power connects to the power terminal block on hat section which installs in high voltage junction box.

3 - The electric heat leads also connect to this terminal block. All "1" leads to L1, "2" leads to L2, and "3" leads to L3.

4 - If the application includes a status panel, the "1, 1" lead must loop around a current sensing relay. Loop once for "Q" voltage or twice for "G" or "J" voltage. The relay must be ordered separately.

5 - Wire T5 electric heat transformer per unit voltage. Lead "14" connects to common (black). Lead "13" connects to correct voltage — red (208V) and orange (230V & 460V).



1 ON UNITS LESS ELECTRIC HEAT, THESE RED LEADS WIRE DIRECTLY TO INCOMING POWER.
2 - BRING INCOMING POWER TO TERMINAL STRIP ON UNITS WITH ELECTRIC HEAT.
3 - ON ELECTRIC HEAT ADD ON APPLICATIONS, WIRE "1" LEADS TO L1, "2" LEADS TO L2 AND "3" LEADS TO L3.
4 - ON ELECTRIC HEAT ADD ON APPLICATIONS, WIRE CHP11 HIGH VOLTAGE LEADS TO FUSE BLOCK.
5 - IF OPTIONAL READOUT PANEL IS USED, THE "1,1" LEAD MUST LOOP AROUND FIELD INSTALLED CURRENT SENSING RELAY. ONE LOOP FOR "Q" VOLTAGE OR TWO LOOPS FOR "G" VOLTAGE.
6 ON ELECTRIC HEAT ADD ON APPLICATIONS, WIRE T5 TRANSFORMER PER UNIT VOLTAGE. LEAD "14" CONNECTS TO COMMON (BLACK). LEAD "13" CONNECTS TO CORRECT VOLTAGE RED (208V) AND ORANGE (230V). REFER TO UNIT WIRING DIAGRAM.

FIGURE 3

L - Low Voltage Field Wiring

1 - Low voltage connections are made at the terminal block located in the low voltage junction box.

2 - If switching subbase or switching status panel is used, remove jumpers between TBC-9 & TBC-10 and TBE-7 & TBE-1.

3 - On all electric heat add on applications except ECH11-95/135-60-1Q, remove jumper between TBF-5 & TBF-6. On ECH11-95/135-60-1Q add on applications, remove jumper between TBF-6 & TBF-7.

4 - If application includes electric heat and status panel option, the K20 current sensing relay must be field installed and wired.

5 - If application includes hot water heat and status panel option, the K24 electronic relay must be field installed and wired.

6 - If application includes power saver, the K23 voltage control relay must be field installed and wired.

7 - Figure 4 illustrates field wiring for room thermostat or transmitter, switching subbase, status panel and electric heat. Figure 5 illustrates field wiring for room thermostat or transmitter, switching status panel and electric heat. Do not route DC wires in same conduit or raceway as AC current. AC will interfere with the DC ramp signals.

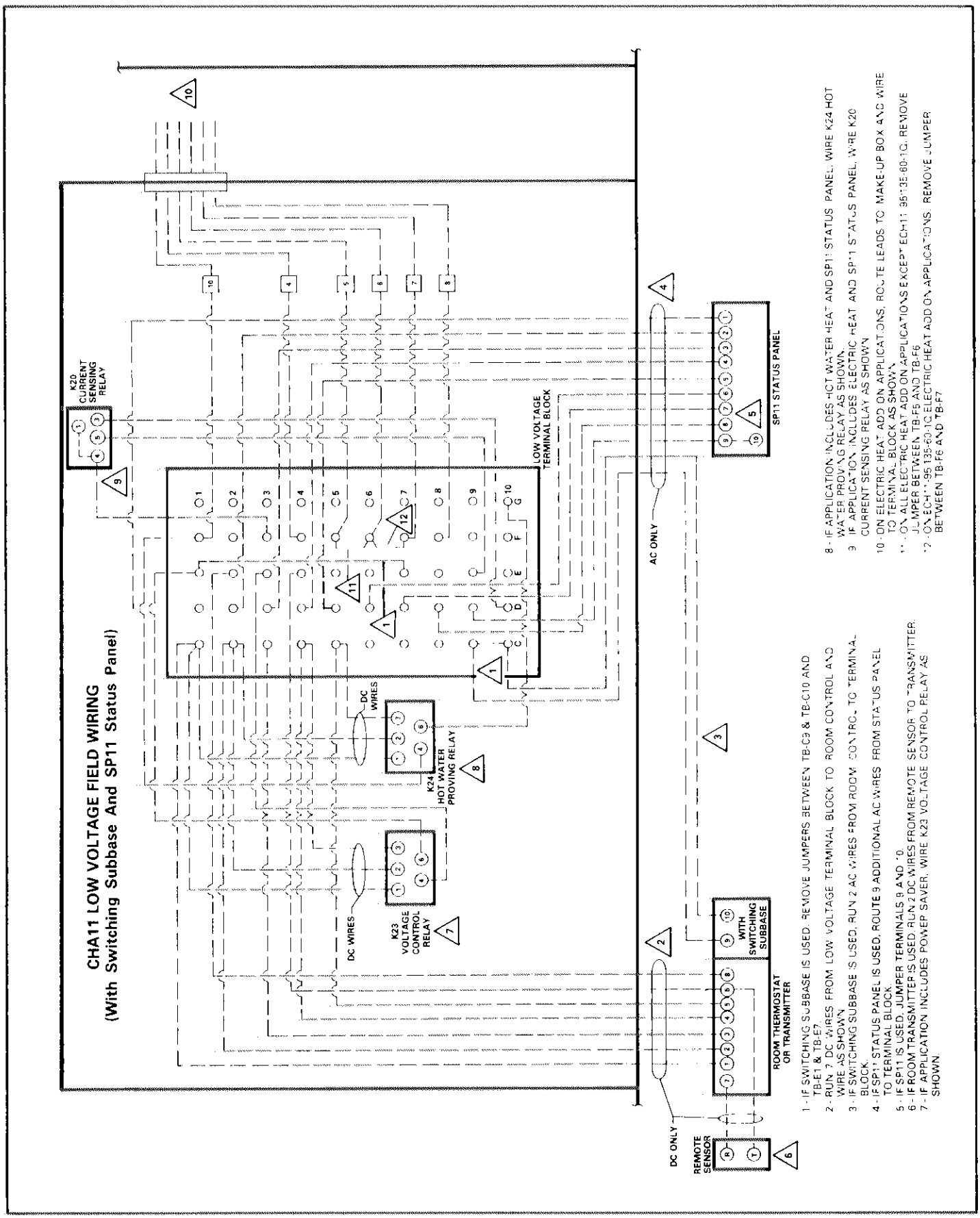

CHA11 LOW VOLTAGE FIELD WIRING
(With Switching Subbase And SP11 Status Panel)
K20 CURRENT SENSING RELAY
LOW VOLTAGE TERMINAL BLOCK
SP11 STATUS PANEL
AC ONLY
DC WIRES
K24 HOT WATER PROVING RELAY
K23 VOLTAGE CONTROL RELAY
DC ONLY
REMOTE SENSOR
ROOM THERMOSTAT OR TRANSMITTER
WITH SWITCHING SUBBASE
1 - IF SWITCHING SUBBASE IS USED, REMOVE JUMPERS BETWEEN TB-C3 & TB-C10 AND TB-E1 & TB-E7.
2 - RUN 7 DC WIRES FROM LOW VOLTAGE TERMINAL BLOCK TO ROOM CONTROL AND WIRE AS SHOWN.
3 - IF SWITCHING SUBBASE IS USED, RUN 2 AC WIRES FROM ROOM CONTROL TO TERMINAL BLOCK.
4 - IF SP11 STATUS PANEL IS USED, ROUTE 9 ADDITIONAL AC WIRES FROM STATUS PANEL TO TERMINAL BLOCK.
5 - IF SP11 IS USED, JUMPER TERMINALS 9 AND 10.
6 - IF ROOM TRANSMITTER IS USED, RUN 2 DC WIRES FROM REMOTE SENSOR TO TRANSMITTER.
7 - IF APPLICATION INCLUDES POWER SAVER, WIRE K23 VOLTAGE CONTROL RELAY AS SHOWN
8 - IF APPLICATION INCLUDES HOT WATER HEAT AND SP11 STATUS PANEL, WIRE K24 HOT WATER PROVING RELAY AS SHOWN.
9 - IF APPLICATION INCLUDES ELECTRIC HEAT AND SP11 STATUS PANEL, WIRE K20 CURRENT SENSING RELAY AS SHOWN
10 - ON ELECTRIC HEAT ADD ON APPLICATIONS, ROUTE LEADS TO MAKE-UP BOX AND WIRE TO TERMINAL BLOCK AS SHOWN
11 - ON ALL ELECTRIC HEAT ADD ON APPLICATIONS EXCEPT ECH11 95135-60-1Q, REMOVE JUMPER BETWEEN TB-F5 AND TB-F6
12 - ON ECH11 95135-60-1Q ELECTRIC HEAT ADD ON APPLICATIONS, REMOVE JUMPER BETWEEN TB-F6 AND TB-F7

FIGURE 4

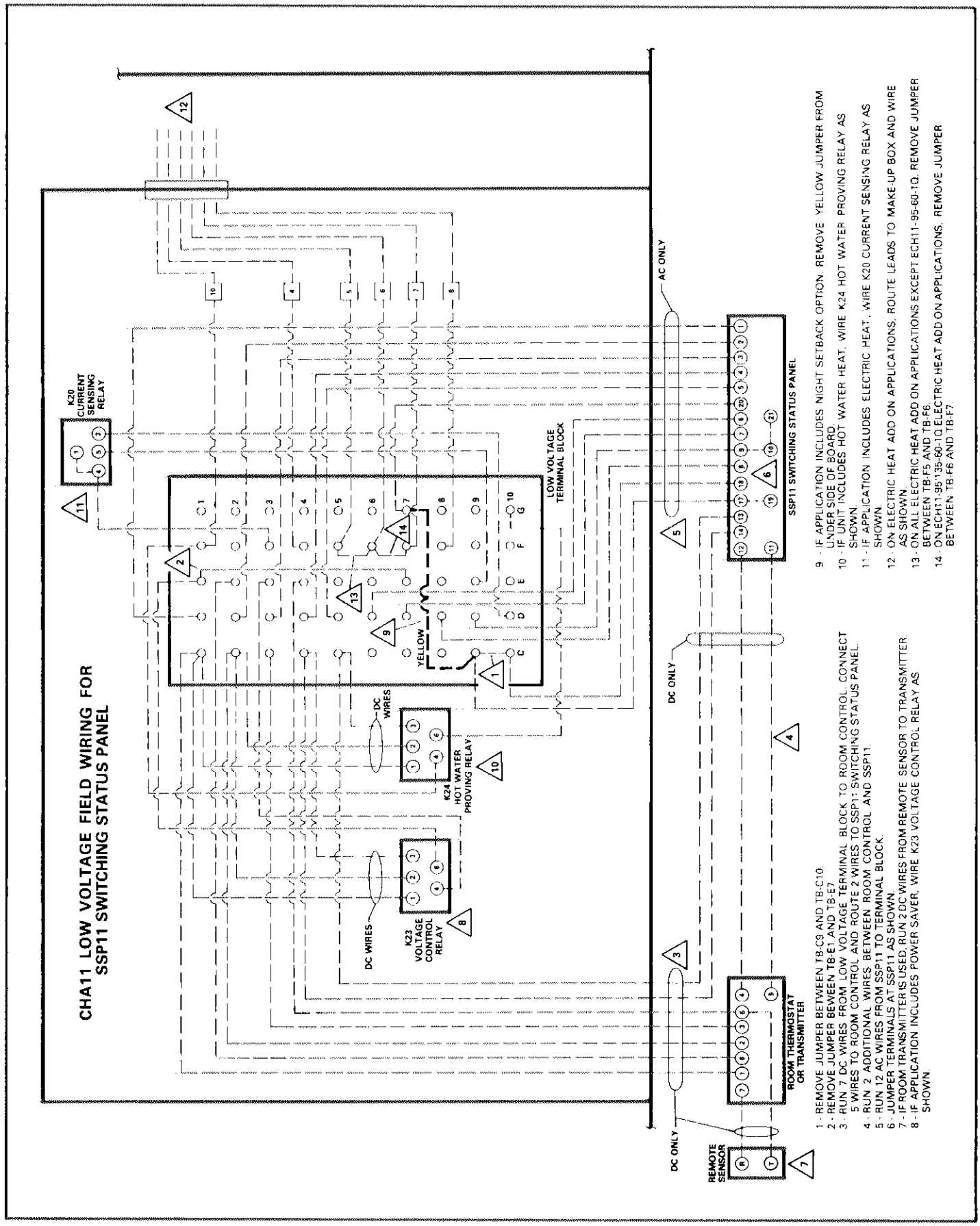

CHA11 LOW VOLTAGE FIELD WIRING FOR SSP11 SWITCHING STATUS PANEL
K20 CURRENT SENSING RELAY
LOW VOLTAGE TERMINAL BLOCK
SSP11 SWITCHING STATUS PANEL
ROOM THERMOSTAT OR TRANSMITTER
REMOTE SENSOR
K23 VOLTAGE CONTROL RELAY
K24 HOT WATER PROVING RELAY
DC WIRES
YELLOW
AC ONLY
DC ONLY
1 - REMOVE JUMPER BETWEEN TB-C9 AND TB-C10.
2 - REMOVE JUMPER BEWEEN TB-E1 AND TB-E7.
3 - RUN 7 DC WIRES FROM LOW VOLTAGE TERMINAL BLOCK TO ROOM CONTROL. CONNECT 5 WIRES TO ROOM CONTROL AND ROUTE 2 WIRES TO SSP11: SWITCHING STATUS PANEL.
4 - RUN 2 ADDITIONAL WIRES BETWEEN ROOM CONTROL AND SSP11.
5 - RUN 12 AC WIRES FROM SSP11 TO TERMINAL BLOCK.
6 - JUMPER TERMINALS AT SSP11 AS SHOWN.
7 - IF ROOM TRANSMITTER IS USED, RUN 2 DC WIRES FROM REMOTE SENSOR TO TRANSMITTER.
8 - IF APPLICATION INCLUDES POWER SAVER, WIRE K23 VOLTAGE CONTROL RELAY AS SHOWN.
9 - IF APPLICATION INCLUDES NIGHT SETBACK OPTION, REMOVE YELLOW JUMPER FROM UNDER SIDE OF BOARD.
10 - IF UNIT INCLUDES HOT WATER HEAT, WIRE K24 HOT WATER PROVING RELAY AS SHOWN.
11 - IF APPLICATION INCLUDES ELECTRIC HEAT, WIRE K20 CURRENT SENSING RELAY AS SHOWN.
12 - ON ELECTRIC HEAT ADD ON APPLICATIONS, ROUTE LEADS TO MAKE-UP BOX AND WIRE AS SHOWN.
13 - ON ALL ELECTRIC HEAT ADD ON APPLICATIONS EXCEPT ECH11-95-60-1Q, REMOVE JUMPER BETWEEN TB-F5 AND TB-F6.
14 - ON ECH11-95-135-60-1Q ELECTRIC HEAT ADD ON APPLICATIONS, REMOVE JUMPER BETWEEN TB-F6 AND TB-F7.

FIGURE 5

III - REFRIGERANT SYSTEM

Two compressors are used in separate refrigerant circuits. Each system uses an expansion valve to meter the refrigerant.

Each unit is furnished with a normal operating pressure curve. The curve uses suction pressure, discharge pressure and outdoor temperature comparison. To use the chart, first check suction pressure, then move over to the outdoor temperature and finally down to the discharge pressure. If the discharge pressure is within five pounds of this reading, the unit is properly charged, providing the three conditions meet in the unshaded area of the chart. If they meet in the shaded area, there is something wrong with the system and further checks are needed.

IV - CHA11 COMPONENTS

Table 3 lists the electrical components by their key numbers and then gives a brief description and location. Table 3 also lists control setpoints (if applicable). Key number labels are mounted next to each component for identification. Both the unit schematic diagram and the repair parts key the components.

A - Main Control Box

Figure 6 identifies the components in the main control box.

B - Make-up Box (Figure 7)

1 - Cooling Lockout Thermostat (S6)
S6 has an adjustable range from 20°F to 80°F. It is factory set at 55°F. Both compressors are locked out during a cooling demand if the ambient temperature drops below setting.

2 - Low Voltage Terminal Block
Low voltage field wiring connects to this terminal block. The terminals are identified by both letters and numbers. The columns are labeled "C" through "G" and the rows are numbered 1 through 10. For example to find TBD-5, locate column labeled "D" and then go to row number 5. This terminal designation is used in the unit wiring diagram.

3 - Hat Section (Electric Heat Usage)
On electric heat applications a hat section is added to the make-up box. A fuse block and high voltage terminal block are mounted on hat section. Line connections are made at terminal block.

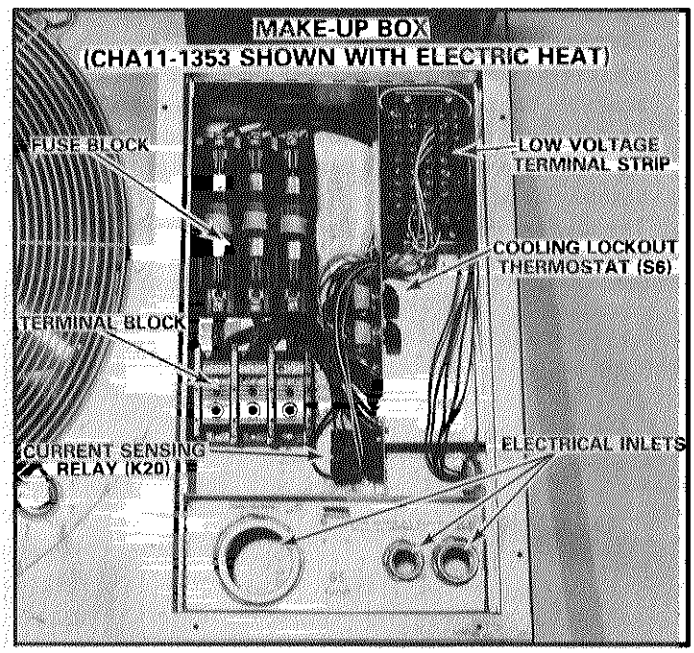


FIGURE 7

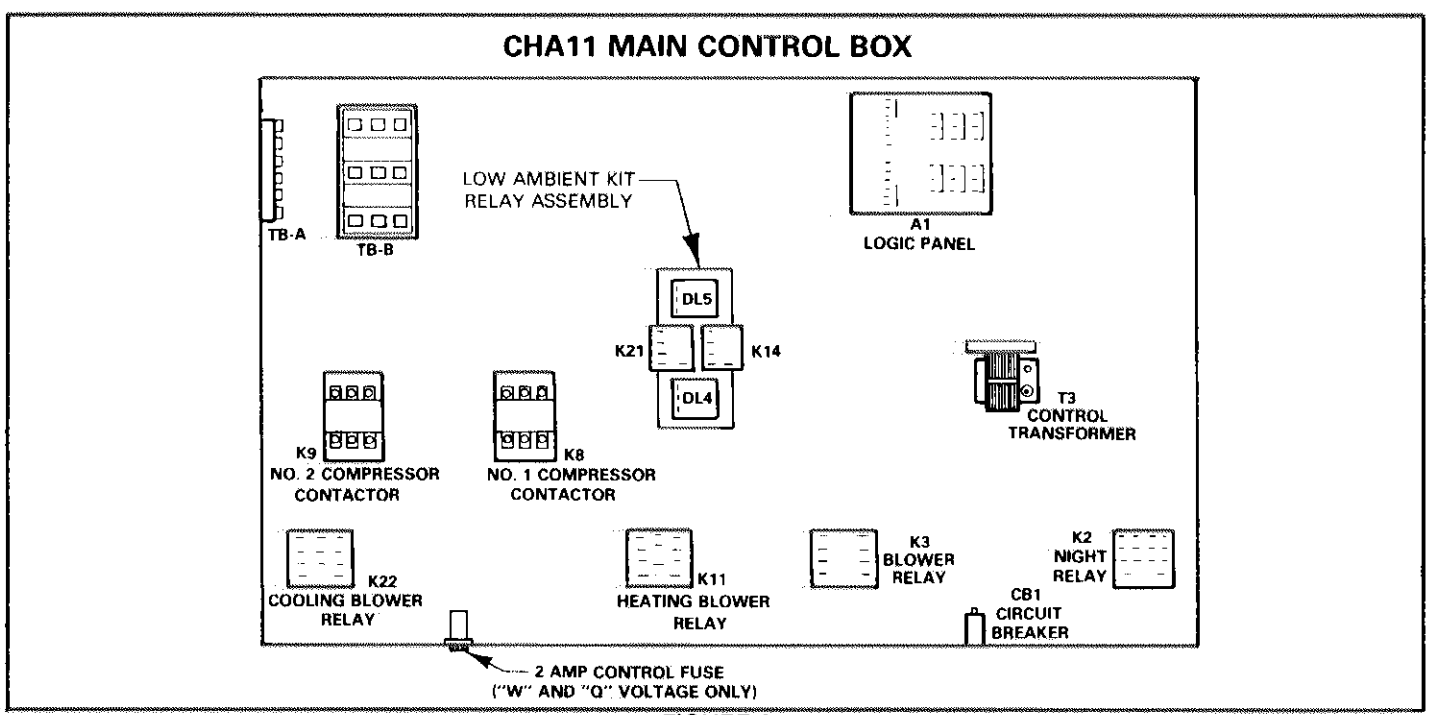


FIGURE 6

4 - Current Sensing Relay (K20)
This field installed relay is only used with a status panel on electric heat applications. It detects the absence of electric heat operation during a demand.

C - Compressor Compartment (Figures 8 & 9)

1 - Each compressor is protected with an internal line break overload. This device detects motor winding temperature to protect compressor from excessive heat and/or current draw. The compressors are also protected by an internal pressure relief valve which is set to open at a discharge and suction differential of 450 psig+ 50. In addition each compressor has an insertion type self regulating crankcase heater.

2 - Each refrigerant circuit includes high and low pressure switches for compressor protection. The high pressure switch opens at 410 psig and must be manually reset. The low pressure switch cuts out compressor at 10 psig and automatically rests at 30 psig.

3 - The low ambient control box is a component within the Low Ambient Kit LB-37124B. Pressure switches within control box sense discharge pressure for each refrigerant circuit.

4 - The condenser fan draws air through the outdoor coil and discharges it out the top of unit. For fan service access, remove the bolts securing fan assembly. Figure 10 illustrates the condenser fan and motor assemblies.

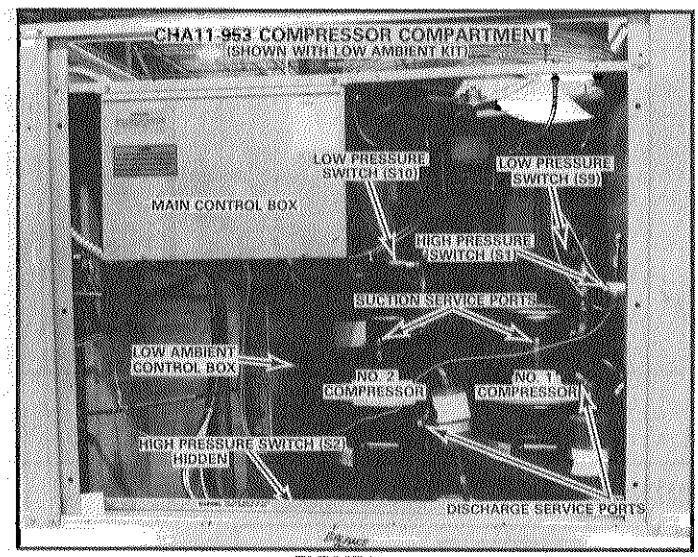


FIGURE 8

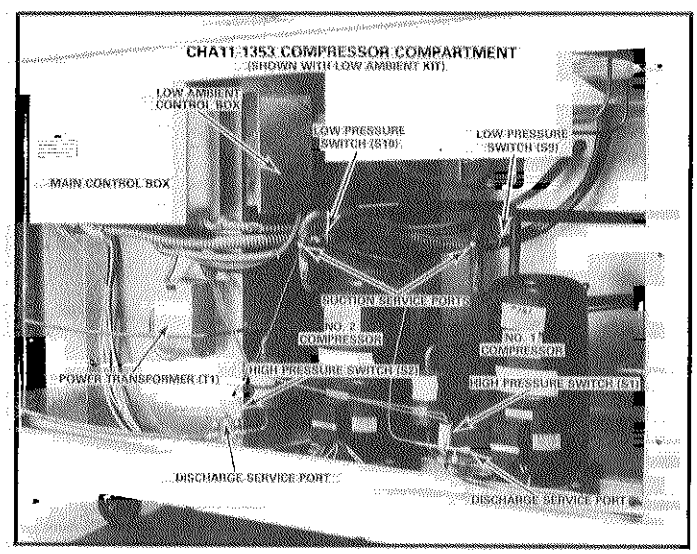
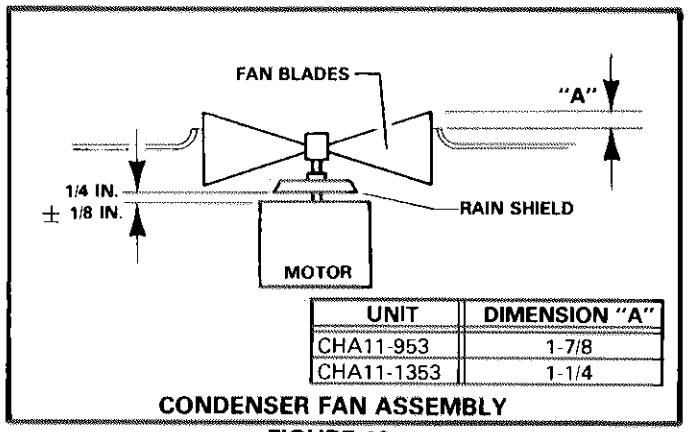


FIGURE 9



UNIT	DIMENSION "A"
CHA11-953	1-7/8
CHA11-1353	1-1/4

CONDENSER FAN ASSEMBLY

FIGURE 10

D - Blower Compartment (Figure 11)

1 - Table 2 lists the drive kit options.

2 - The blower control box sets next to blower housing.

3 - The indoor coil has two distinct stages. The top half is for the No. 2 refrigerant circuit while the bottom half is for the No. 1 circuit. This is a draw through coil.

4 - The discharge sensor is located in supply air stream.

5 - If optional status panel or switching status panel is used, Filter Switch (S14) mounts in blower compartment.

TABLE 2

Model No.	Nominal Motor HP	Maximum Usuable HP	Rpm Range Of All Available Drive Setups @ 1720 RPM Motor Speed
CHA11-953	*1.5	1.725	805-1023
	3	3.45	805-1023
CHA11-1353	3	3.45	677-860
	5	5.75	896-1079

*NOTE - The 1-1/2 HP motor can not be used with over 15 KW of electric heat.

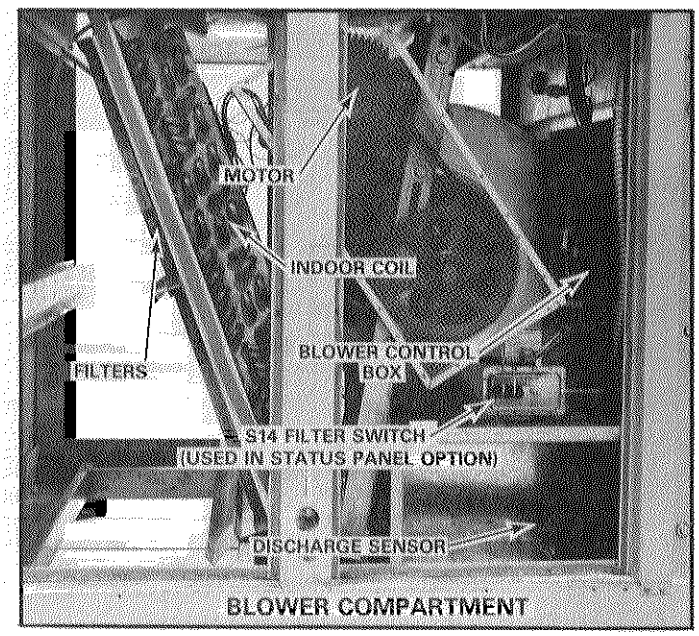


FIGURE 11

TABLE 3

COMPONENT	DESCRIPTION AND FUNCTION	LOCATION	SETTING
A1	Logic Panel — Receives the signal from room thermostat and balances this against the system output as determined by the discharge sensor; then initiates the heating or cooling modes as needed. Also modulates power saver closed with discharge temperatures between 62° and 50°F.	Main Control Box	----
A2	Room Thermostat or Transmitter — Generates heating and cooling ramp signals based on the temperature deviation from the dual setpoint adjustments and a thermistor. Thermistor is internal to thermostat and remote to transmitter.	Remote	Adj. 55° — 85°
B1 & B2	Compressors No. 1 & No.2 — Initiate DX cooling.	Compressor Compartment	----
B3	Indoor Blower Motor — Provides air supply through unit.	Blower Compartment	----
B4 & B5	Condenser Fans No. 1 & No.2 — Draws air across outdoor coil for heat transfer in the refrigeration cycle.	Compressor Compartment	----
B6	Power Saver Motor (optional) — Modulates outdoor dampers and return air dampers.	Power Saver	Minimum Position Adj. at Motor
B7	Motorized Water Valve — Initiates hot water operation.		----
C1 & C2	Capacitors — Condenser Fan.	Compressor Compartment	----
CB1	Circuit Breaker — Protects the logic panel.	Main Control Box	----
CR-1	Light Emitting Diode — Used in status panel to show operating mode and failure.	Status Panel	----
CMC3	Clock Timer (optional) — 24 Hour skip-a-day clock programs a daily schedule. Any day or days can be omitted.	Blower Compartment	----
DL2	Electric Heat Delay — Steps electric heat elements in 30 second time delay.	Electric Heat Control Box	----
DL3	Electric Heat Delay — Steps electric heat elements in 60 second time delay.	Electric Heat Control Box	----
DL6	Hot Water On Delay — This is a 180 second time delay which is used in the status panel circuit on hot water applications.	Blower Compartment	----
DL8	Electric Heat Delay — Steps electric heat elements in 180 second time delay.	Electric Heat Control Box	----
F	Fuses — Circuit protectors.	Throughout Unit	----
HR1 & HR2	No. 1 & No. 2 Compressor Crankcase Heaters — Warms the compressor to prevent liquid refrigerant from migrating to compressor during off cycles and "slugging" it on start-up. (Continuously Energized)	Compressor	----
HR3	Electric Elements (optional) — Provide resistance heat.	Heating Section	----
K1	Blower Contactor — Energizes blower motor.	Blower Control Box	----
K2	Nite Relay — Activates the night setback mode when optional clock timer contacts make.	Main Control Box	----
K3	Blower Relay — When de-energized it drives power saver motor B6 closed.	Main Control Box	----
K8	No. 1 Compressor Contactor — Energizes compressor B1 and condenser fan B4 on demand.	Main Control Box	----
K9	No. 2 Compressor Contactor — Energizes compressor B2 and condenser fan B5 on demand.	Main Control Box	----
K11	Heating Blower Relay — "H1" at logic panel energizes this relay. It then energizes K1 blower contactor and K3 blower relay during periods of intermittent blower operation.	Main Control Box	----
K14	Low Ambient No. 2 Relay (optional) — Used in low ambient applications, this relay is energized with K9. It latches itself in to bypass S10 and allow a compressor start-up. After DL5 times out (30 seconds), this circuit opens and S10 is again brought into the control circuit.	Main Control Box	----
K15	No. 1 Electric Heat Contactor — Energizes first stage of electric heat.	Electric Heat Control Box	----
K16	No. 2 Electric Heat Contactor — Energizes second stage of electric heat.	Electric Heat Control Box	----
K17	No. 3 Electric Heat Contactor — Energizes third 15 KW of electric heat.	Electric Heat Control Box	----
K18	No. 4 Electric Heat Contactor — Energizes fourth 15 KW of electric heat.	Electric Heat Control Box	----

COMPONENT	DESCRIPTION AND FUNCTION	LOCATION	SETTING
K19	Electric Heat Relay — Relay is energized through "H1" at logic panel. It then initiates electric heat if S11 is made.	Electric Heat Control Box	----
K20	Current Sensing Relay — Used only with status panel options. Detects absence of electric heat operation (during a demand) to light the no heat light at status panel.	Field Installed in Make-up Box	----
K21	Low Ambient No. 1 Relay (optional) — Used in low ambient applications. This relay is energized with K8. It latches itself in to bypass S9 and allow a compressor start-up. After DL4 times out (30 seconds), this circuit opens and S9 is again in the control circuit.	Main Control Box	----
K22	Cooling Blower Relay — On units without switching subbase or switching status panel, K22 is energized thru "C1" of logic panel. On units less switching function, K22 is energized thru K23. It energizes K1 and K3 during periods of intermittent blower operation.	Main Control Box	----
K23	Voltage Controlled Relay — Used only with switching subbase or switching status panel and power saver. It opens on a 2.5V-3V dc signal. When made it energizes K22.	Main Control Box	----
K24	Hot Water Proving Relay — This electronic relay is used in the status panel circuit to verify a heating demand.	Blower Compartment	----
K25	Humid Climate Option — This field provided and field installed relay eliminates power saver operation during excessive humidity conditions.	Field Installed	----
R1	Night Heating Operation Resistor — Used in night setback option to determine degree of heating setback.	Make-up Box	(5°, 10° or 15°F)
R2	Night Cool Setup Resistor — Used in night setback option to determine degree of cooling setup.	Make-up Box	(5°, 7°, 9°, 10°, 13°, 15°F or cooling lockout)
RT1	Discharge Sensor — Sends a dc current voltage to logic panel which is equivalent to the discharge temperature.	Blower Compartment	----
RT2	Remote Room Sensor (optional) — This is the thermistor that is used with the room transmitter option.	Remote	----
S1	No. 1 High Pressure Switch — Shuts off compressor (B1) when refrigerant pressure rises above setting. Must be manually reset.	Compressor Compartment	410 psig out
S2	No. 2 High Pressure Switch — Shuts off compressor (B2) when refrigerant pressure rises above setting. Must be manually reset.	Compressor Compartment	410 psig out
S6	Cooling Lockout Thermostat — Shuts off all cooling compressor operation when ambient temperature drops below setting. Factory set at 55°F.	Make-up Box	Adj. 20°F to 80°F
S9	No. 1 Low Pressure Defrost Switch — Shuts off compressor (B1) when suction pressure drops below setpoint. Automatically resets.	Compressor Compartment	30 psig in 10 psig out
S10	No. 2 Low Pressure Switch — Shuts off compressor (B2) when suction pressure drops below setpoint. Automatically resets.	Compressor Compartment	30 psig in 10 psig out
S11	Electric Heat Limit (Used with electric heat) — Drops out all electric heat when temperature exceeds setpoint.	Heating Section	CHA11-953 160°F 120°F CHA11-1353 150°F 110°F
S13	Enthalpy Control (Used with power saver) — Senses heat content of outside air. When heat content rises above setpoint, control switches to close outdoor dampers to minimum position.	Fresh Air Intake	"A" Adj.
S14	Filter Switch — Used with optional status panel. Indicates restricted air flow through the filters.	Blower Compartment	----
S15	No. 1 Low Ambient Pressure Switch — Shuts off condenser fan (B4) when head pressure drops below setting.	Compressor Compartment	250 psig out 290 psig in
S16	No. 2 Low Ambient Pressure Switch — Shuts off condenser fan (B5) when head pressure drops below setting.	Compressor Compartment	250 psig out 290 psig in
S17	Freezestat (Used with hot water) - Prevents coil freezing during a no demand condition. The control opens between 32° - 41°F and then closes again between 50° - 60°F.	Blower Compartment	32° — 41°F open 50° — 60°F close
S18	System Switch — This switch, used on optional switching subbase or switching status panel, changes operating mode.	Switching Subbase	----
S19	Fan Switch — This switch, used on optional switching subbase or switching status panel, changes blower operation.	Switching Subbase	----
S20	Element Limit (Used with electric heat) - This one time limit drops out the element at excessive temperatures	Heating Section	185°F
S21	Temperature Indicating Thermostat — Used within status panel circuit to indicate a no heat condition for hot water.	Blower Compartment	104°F
T1	Power Transformer — On 460V & 575V units, T1 drops line voltage to 220V for the control circuit voltages. (200V & 230V)	Compressor Compartment	----
T3	Control Transformer — Provides 24V power to the control circuit.	Main Control Box	----
T4	Power Saver Transformer — Provides 24 volts to power saver motor (B6). Has multi-tap leads to choose between 200V & 230V input when field installing.	Power Saver	----

COMPONENT	DESCRIPTION AND FUNCTION	LOCATION	SETTING
T5	Electric Heat Transformer — Provides 24 volts for electric heat control circuit. Has multi-tap leads to choose between 200V & 230V input when field installing.	Electric Heat Control Box	----
T6	Hot Water Transformer — Provides 24V power to hot water motor valve.	Blower Compartment	----
TB-A	High Voltage Terminal Block — 3 Phase line voltage.	Main Control Box	----
TB-B	High Voltage Terminal Block — 1 Phase 230V control voltage.	Main Control Box	----
TB-C, D, E, F & G	Low Voltage Terminal Block	Make-up Box	----

V - BLOWER OPERATION AND ADJUSTMENTS

A - Blower Operation

1 - Units with standard room thermostat subbase: Blower operates continuously in normal operation. Units with optional night operation controls will have intermittent blower operation during night control period.

2 - Units with switching subbase or switching status panel: Blower operation is manually set at the fan switch. In "ON" position the blower operates continuously. Intermittent blower will only occur if optional night operation controls are installed. During night operation the blowers will cycle with demand.

With fan switch set in "Auto", the blower cycles with demand. If the application includes power saver, a field installed K23 Voltage Controlled Relay picks up blower for power saver operation.

Blower operation drops out when system switch is set at "Off".

B - Determining Unit CFM

1 - The following measurements must be made with a dry indoor coil. Run blower without a heating or cooling demand. The air filters must be in place while taking measurements.

2 - Measure static pressure external to unit.

3 - Measure the indoor blower motor RPM.

4 - Refer to Blower Performance Chart on Page 5. Use the static pressure and RPM readings to determine unit CFM.

5 - The CFM can be adjusted at the motor pulley on CHA11-1353 units. Loosen the allen screw. Turn adjustable sheave clockwise to increase CFM or counter-clockwise to decrease CFM. See Figure 12.

On CHA11-953 units the pulley has a fixed sheave and there is no adjustment. On 953 electric heat add on applications, a substitute pulley (provided) must be field installed.

C - Blower Belt Adjustment

Maximum life and wear can be obtained from belts only if proper pulley allignment and belt tension are maintained. Initially, tension new belt(s) after a run in period of 24-48 hours. This allows belt(s) to stretch and seat in the grooves. To adjust belt tension, loosen 4 locking bolts. Turn adjusting bolt to slide motor up or down. See Figure 12.

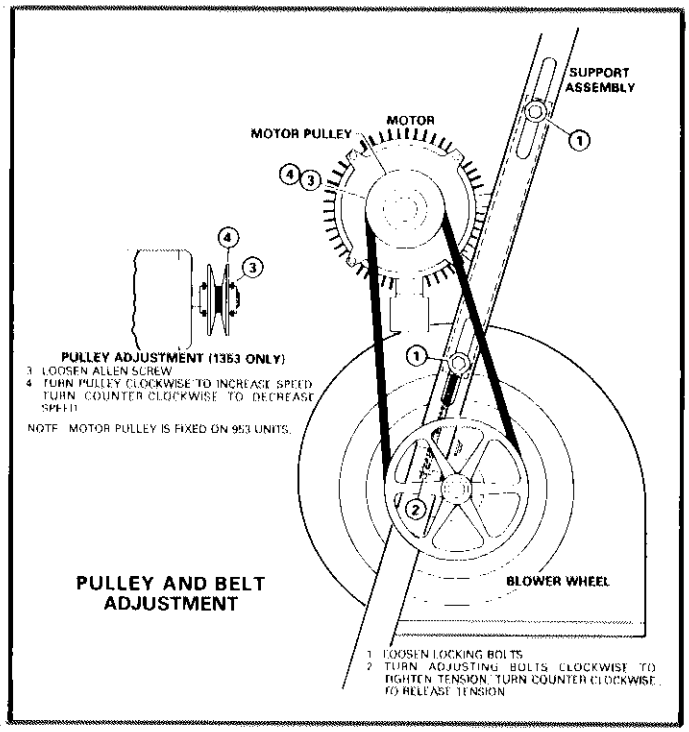


FIGURE 12

VI - THERMOSTAT OR TRANSMITTER OPERATION

A room control installed with a standard subbase allows only heating and cooling setpoint adjustment. The temperature gap between the setpoint levers represents the "no load" band where no heating or cooling can occur. With levers positioned side by side, the no load band is 3°F. With levers wide apart, the no load band is 30°F.

A room control installed with an optional switching subbase or optional switching status panel will allow heating and cooling setpoint adjustment, system function selection and blower operating control. The system function switch is manually set for the desired operation mode:

HEAT — Auxiliary heat only.
COOL — Cooling only.
AUTO — System automatically provides heating or cooling on demand.
OFF — System off.

The fan switch manually sets to desired position:

AUTO — Blower cycles with demand.
ON — Blower runs continuously.

VII — CHA11 UNIT OPTIONS

A - Power Saver (Figure 13)

1 - The power saver motor modulates in response to the cooling ramp signal, discharge low limit feature, and enthalpy control setting. The range is 1.5 to 4VDC. The outside dampers are in minimum position at 1.5 volts and are open at 4 volts.

2 - The enthalpy control senses the heat content of the air. If heat content rises above control setpoint, the power saver dampers drive to minimum position. The recommended set point is "A". If power saver is allowing air which is too warm or humid to enter system, set control to a lower setpoint.

3 - The power saver motor includes a spring return feature which closes motor on a power failure. The motor stroke is 160 degrees as shown in Figure 14 and the timing is 40 seconds. With R-W terminals shorted or B leg open, the motor drives outside dampers closed. With R-B terminals shorted or W leg open, the motor drives outside dampers open.

4 - Dampers are factory adjusted. The dampers rotate 90 degrees. If adjustment is needed, drive the dampers closed and adjust each blade individually.

5 - Adjust minimum positioner with outside dampers at minimum position (turn enthalpy control to "D"). Rotate screw clockwise to open dampers or counterclockwise to close dampers. Table 4 lists the percentage of fresh air per damper blade opening. Return enthalpy control back to normal setting.

If desired a remote minimum positioner may be used in place of the one at motor bracket. Simply disconnect existing minimum positioner and wire the new one with "W" lead to TBC-6 and "R" lead to TBC-7. The remote minimum positioner rotates counterclockwise to open and clockwise to close.

TABLE 4

Damper Blade Angle	FRESH AIR PERCENTAGE (%) Return Air Duct Static Pressure					
	0"		.25"		.5"	
	PSD11	OAD11	PSD11	OAD11	PSD11	OAD11
5°	13%	12%	20%	18%	30%	27%
10°	26	21	34	27	46	37
15°	37	27	46	33	57	41
20°	48	31	57	37	65	43
25°	58	34	66	38	74	44
30°	69	37	75	41	81	45
35°	79	40	84	43	88	46
40°	90	45	92	46	94	47

6 - If the CHA11 application includes power saver and a switching subbase or a switching status panel, a K23 Voltage Control Relay must be field installed. When the fan switch is set at "Auto", this relay picks up the blower for power saver operation. The blower comes on at 4 VDC (cooling ramp signal) and cycles off at 2.5 - 3 VDC.

7 - Humid Climate Option:
In very humid climates it may be desirable to eliminate

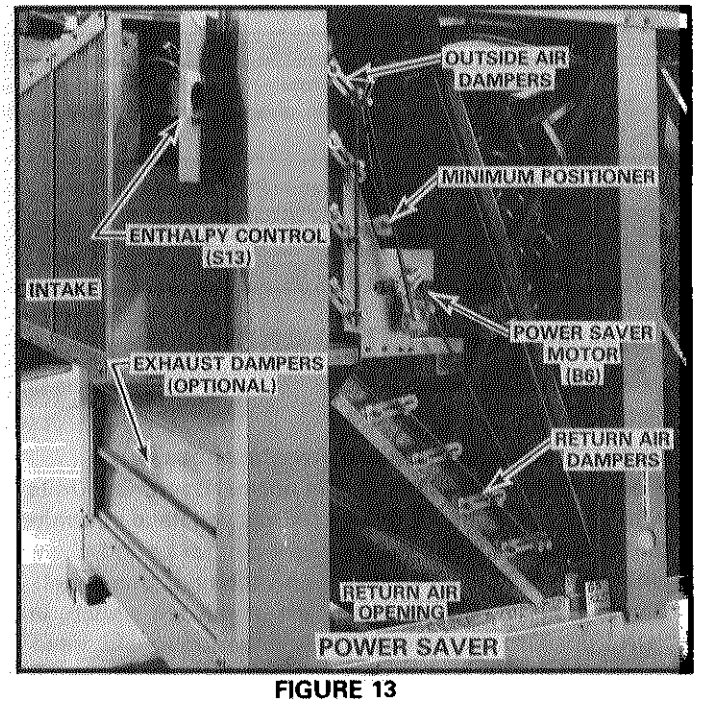


FIGURE 13

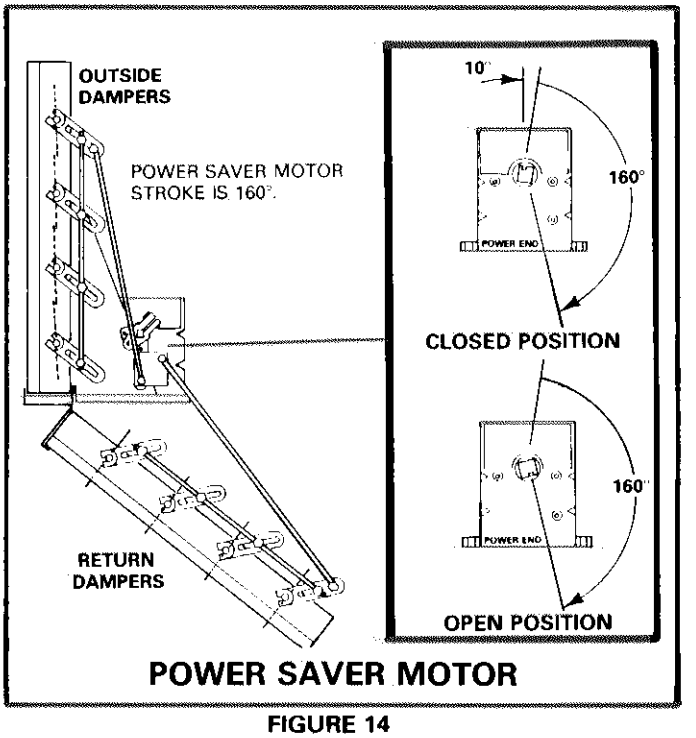


FIGURE 14

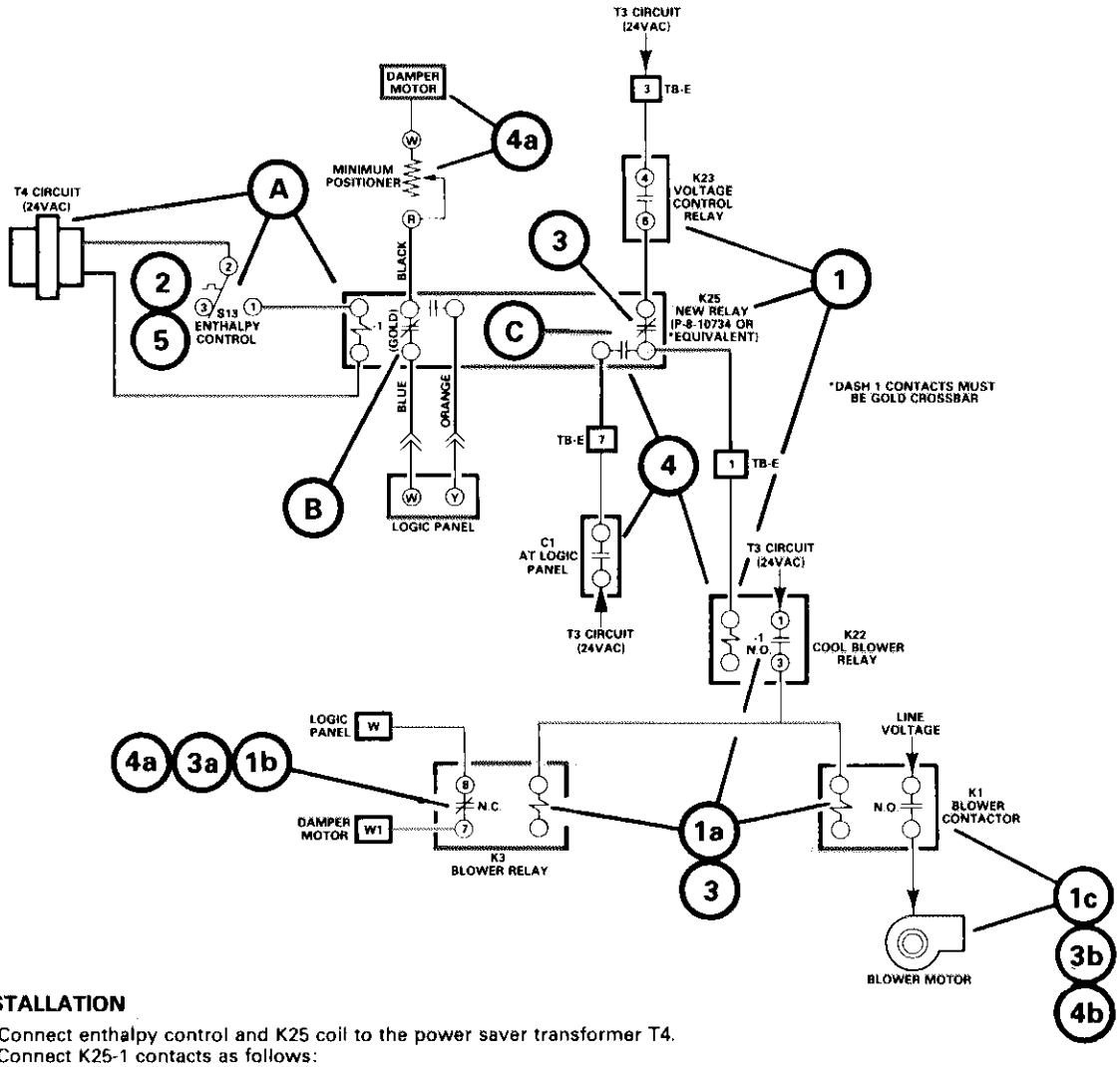
power saver operation during high humidity conditions. This would keep the outside dampers closed and blower motor stopped until there was a mechanical cooling demand. On a mechanical cooling demand, the outside dampers would open to minimum position for ventilation and the blower would run. During favorable conditions the power saver would function normally.

This can be accomplished with the use of a switching subbase or switching status panel and the field installation of a special relay. Figure 15 shows the hook-up and explains the sequence of operation.

B - Fresh Air Dampers

In lieu of a power saver, the OAD11 outdoor air damper may be installed for minimum fresh air intake. This option is available with either manual or automatic damper control (damper motor). The damper motor has a remote minimum position control. This control rotates counterclockwise to open and clockwise to close outdoor air dampers. Table 4 lists the percentage of fresh air per damper blade opening.

HUMID CLIMATE OPTION



INSTALLATION

A - Connect enthalpy control and K25 coil to the power saver transformer T4.
B - Connect K25-1 contacts as follows:
  Common - Black lead going to minimum positioner
  N.C. - Blue lead going to "W" at logic panel
  N.O. - Orange lead going to "Y" at logic panel
C - Connect K25-2 contacts as follows:
  Common - To TBE-1 low voltage terminal block
  N.C. - In series with field installed K23 voltage control relay contacts.
  N.O. - To TBE-7 low voltage terminal block
D - Place fan switch to "Auto" on switching subbase or switching status panel.

OPERATION

1 - On a power saver demand during low humidity conditions, K23 relay makes to energize K22 Cool Blower Relay through N.C. K25-2.
1a - As K23-1 contacts close both K3 Blower Relay and K1 Blower Contactor are energized.
1b - N.C. K3 contact breaks to allow power saver motor to modulate.
1c - N.O. K1 contacts make to start blower motor.
2 - Enthalpy control energizes K25 at excessive humidity.
3 - N.C. K25-2 contacts open to de-energize K22, which in turn de-energizes K3 and K1.
3a - With N.C. K3 contacts made, the outside dampers drive closed.
3b - With K1 de-energized the blower motor stops.
4 - N.O. K25-2 contacts are made. On a compressor demand "C1" makes at logic panel. This again energizes K22.
4a - With N.C. K3 contacts open, the outside dampers open to minimum position for ventilation.
4b - K1 contacts make to start blower motor.
5 - When outside air is again suitable for cooling, enthalpy control de-energizes K25 to return system to power saver operation.

FIGURE 15

C - Electric Heat (Figure 16)

1 - An ECH11-95 fits into a CHA11-953 while an ECH11-135 fits into a CHA11-1353. The ECH11 is available in four sizes, from one to four elements. In addition the ECH11 is also available in two voltages. The ECH11-W uses standard delta elements. The ECH11-G uses standard wye elements.

Table 5 lists the possible CHA11/ECH11 combinations and gives the corresponding KW input.

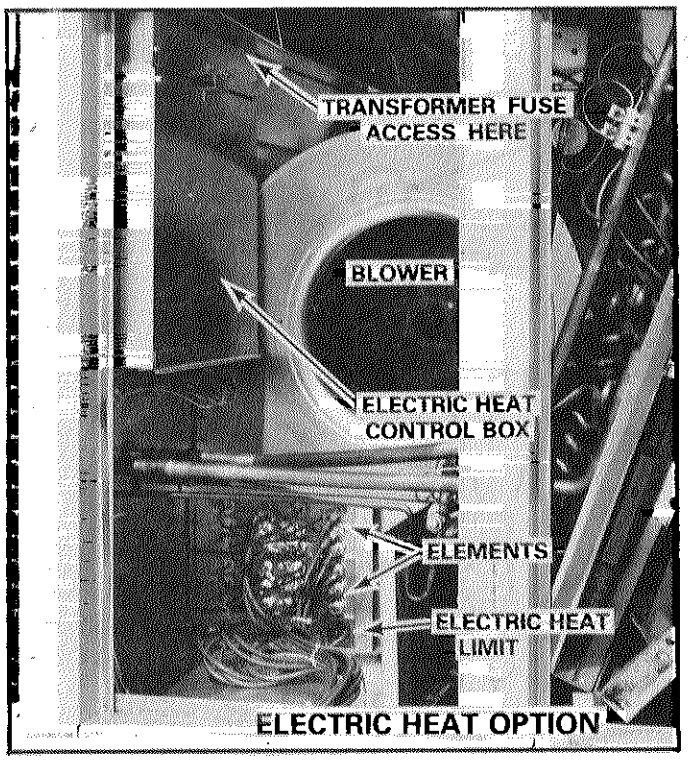


FIGURE 16

2 - The elements install in the heating section. The electric heat control box sets adjacent to blower housing. Figure 17 identifies components in the ECH11 control box.

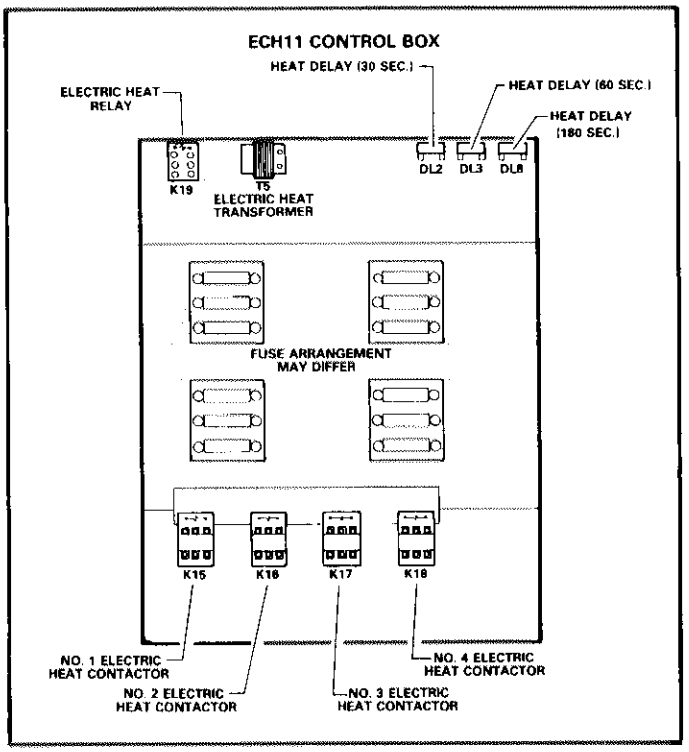


FIGURE 17

3 - The Electric Heat Limit (S11) drops out all the elements when temperature exceeds setpoint. ECH11 heaters are protected by one time limits (S20). See Figure 18 for location of limits.

TABLE 5

CHA11 USAGE	ECH11 HEATER USAGE	NO. OF ELEMENTS	KW INPUT
CHA11-953-W CHA11-1353-W (200/60/3)	ECH11-953/1353-15-Q	1	10.4
	ECH11-953/1353-30-Q	2	20.8
	ECH11-953/1353-45-Q	3	31.3
	ECH11-953/1353-60-Q	4	41.7
CHA11-953-Q CHA11-1353-Q (230/60/3)	ECH11-953/1353-15-Q	1	13.8
	ECH11-953/1353-30-Q	2	27.5
	ECH11-953/1353-45-Q	3	41.3
CHA11-1353-Q (230/60/3)	ECH11-1353-60-Q	4	55.1
CHA11-953-G CHA11-1353-G (460/60/3)	ECH11-953/1353-15-G	1	13.8
	ECH11-953/1353-30-G	2	27.5
	ECH11-953/1353-45-G	3	41.3
CHA11-1353-G (460/60/3)	ECH11-1353-60-G	4	55.1
CHA11-953-J CHA11-1353-J (575/60/3)	ECH11-953/1353-15-G	1	13.7
	ECH11-953/1353-30-G	2	27.6
	ECH11-953/1353-45-G	3	41.3
CHA11-1353-J (575/60/3)	ECH11-1353-60-G	4	55.1
CHA11-953-M CHA11-1353-M (380-420/50/3)	ECH11-953/1353-15-G	1	9.4 — 11.5
	ECH11-953/1353-30-G	2	18.8 — 23.0
	ECH11-953/1353-45-G	3	28.2 — 34.5
CHA11-1353-M (380-420/50/3)	ECH11-1353-60-G	4	37.6 — 44.9

TABLE 6

CHA11 UNIT VOLTAGE	ECH11 HEATER	ELEMENT STAGING	
		FIRST STAGE (H1)	SECOND STAGE (H2)
W (200/60/3) Q (230/60/3)	ECH11-953/1353-15 (1 Element)	1 element is energized by K15 when K19-2 makes.	---
W (200/60/3) Q (230/60/3)	ECH11-953/1353-30 (2 Elements)	1 element is energized by K15 when K19-2 makes.	1 additional element is energized by K16 thirty seconds (DL2) after "H2" makes.
W (200/60/3) Q (230/60/3)	ECH11-953/1353-45 (3 Elements)	1 element is energized by K15 when K19-2 makes.	Uses 2 additional elements. One is energized by K16 thirty seconds (DL2) after "H2" makes. The next is energized by K17, 60 seconds (DL3) after "H2" makes.
W (200/60/3) *Q (230/60/3)	ECH11-953/1353-60 (4 Elements)	2 initial elements. First is energized by K15 when K19-2 makes. The next is energized by K16,thirty seconds (DL2) after K19-2 makes.	Uses 2 additional elements. One is energized by K17, 60 seconds (DL3) after "H2" makes. The next is energized by K18, 180 seconds (DL8) after "H2" makes.
G (460/60/3) J (575/60/3) M (380-420/50/30)	ECH11-953/1353-15 (1 Element)	1 element is energized by K15 when K19-2 makes.	---
G (460/60/3) J (575/60/3) M (380-420/50/3)	ECH11-953/1353-30 (2 Elements)	2 elements are energized by K15 when K19-2 makes.	---
G (460/60/3) J (575/60/3) M (380-420/50/3)	ECH11-953/1353-45 (3 Elements)	2 elements are energized by K15 when K19-21 makes.	1 additional element is energized by K16, 30 seconds (DL2) after "H2" makes.
*G (460/60/3) *J (575/60/3) *M (380-420/50/3)	ECH11-1353-60 (4 Elements)	2 elements are energized by K15 when K19-2 makes.	Uses 2 additional elements. Both are energized by K16, 30 seconds (DL2) after "H2" makes.

*Only applicable to CHA11-1353 units.

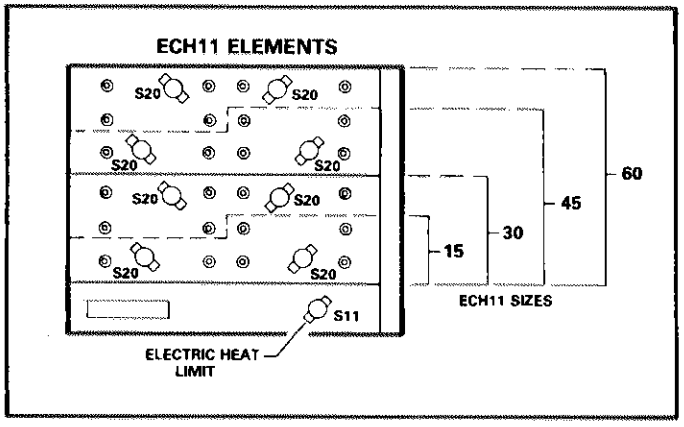


FIGURE 18

4 - Time delays stage the elements in 30, 60 and 180 second increments. Element staging is determined by CHA11 voltage and ECH11 heater size. Table 7 explains the operating sequence for each combination.

5 - Field installed ECH11-95 series heaters are packaged with a blower motor drive sheave. Replace sheave in CHA11-953 units.

6 - Field installed ECH11 heaters (except ECH11-95-60-1Q) are also packaged with 3 additional fuses. On the units listed in Table 7, remove the existing fuses from fuse block and substitute these extra fuses.

TABLE 7

UNIT	BLOWER MOTOR	REMOVE	INSTALL
CHA11-953-1W, -2W	3 HP	50	60
CHA11-953-2Q	3 HP	50	60
CHA11-953-2G	3 HP	25	30
CHA11-1353-1W, -2W	5 HP	70	80

D - Hot Water (Figure 19)

General

1 - The factory installed hot water option fits into the heating section. The coil is equipped with an air bleed valve and a drain valve. Figure 20 illustrates the system piping.

2 - The motorized three way valve either directs hot water through coil or by-passes coil.

3 - A manual balancing valve is located in the by-pass line to equalize pressure drop through coil.

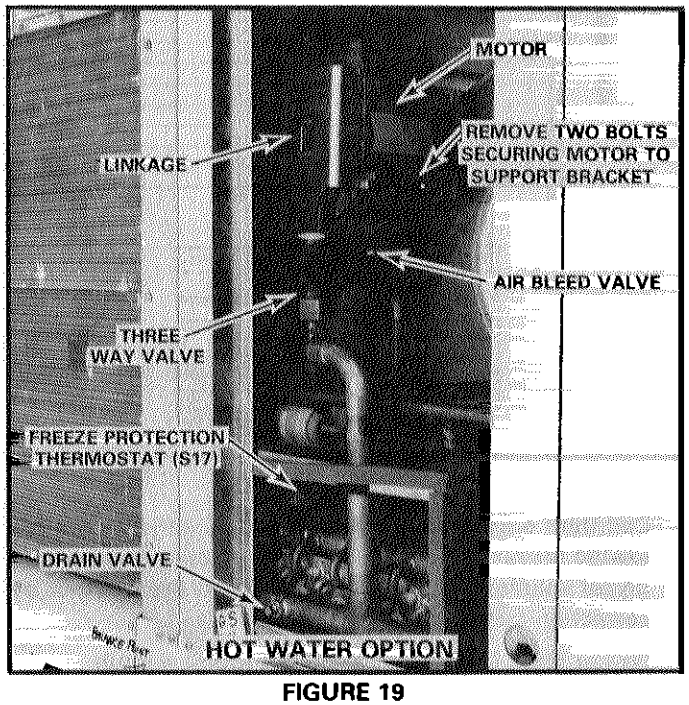


FIGURE 19

4 - The flow rate through coil can be determined per Figure 21. A correction factor is included in illustration for the affects of glycol.

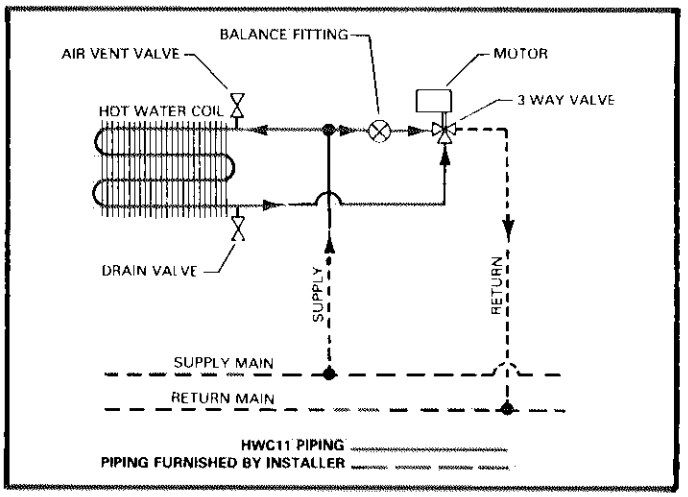


FIGURE 20

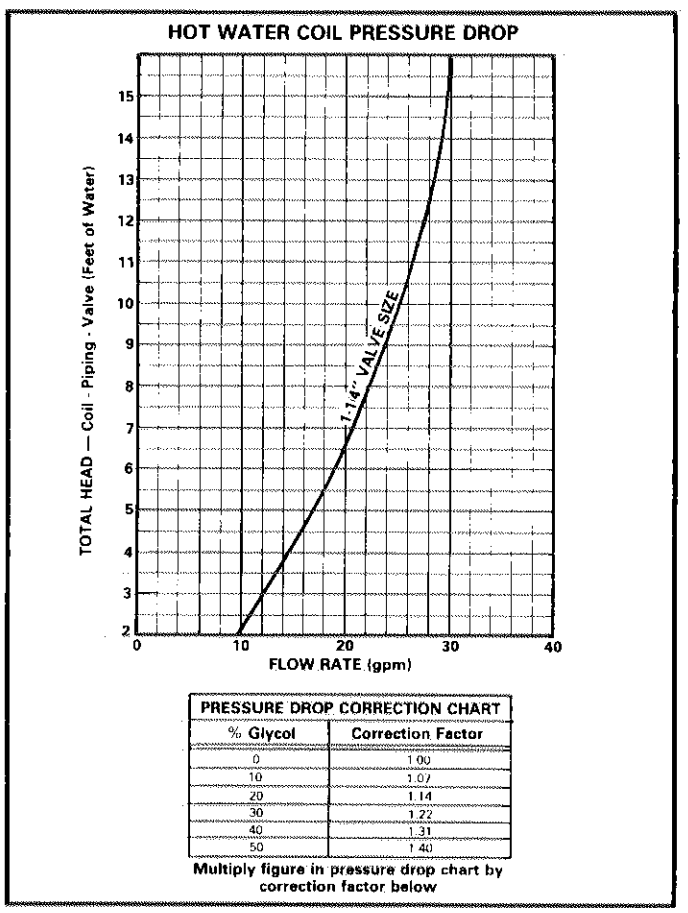


FIGURE 21

5 - Coil Btuh output can be determined by either of the following formulas. Table 8 lists the correction factors for a glycol solution. Multiply the calculated Btuh output by correction factor to obtain actual Btuh's.

(Water Tmp. Difference) X (500) X (gpm) = Btuh
(Air Temp. Rise) X (1.08) X (cfm) = Btuh

TABLE 8

CAPACITY CORRECTION CHART	
% Glycol	Correction Factor
0	1.00
10	.97
20	.94
30	.91
40	.87
50	.84

NOTE - Multiply calculated capacity by correction factor.

Operation

1 - The logic panel modulates the motor in response to the heating ramp signal. the range is 6 to 9 VDC. Figure 22 shows the motor and valve at 6 VDC or less. Figure 23 shows the motor and valve at 9 VDC or more.

2 - The motor includes a spring return feature. On a loss of power the motor opens the valve to coil to allow water flow, thus preventing freezing. The motor and valve are positioned as shown in Figure 23.

3 - A Freeze Protection Thermostat (S17) monitors manifold temperature. Thermostat closes at 32°-41°F which opens valve for water flow through coil. This prevents coil freezing during a no-demand condition. The thermostat opens on a temperature increase to 50°-60°F.

4 - A proving circuit, used in conjunction with the optional status panel, warns of a no heat condition. This circuit is composed of a field installed Hot Water Proving Relay (K24) a Sensing Thermostat (S21) and a Hot Water Delay (DL6). The relay makes on a heating demand as dictated by the heating ramp chart. The thermostat makes on a water temperature fall. If both devices make together, the "NO HEAT" light at status panel will light after a short delay caused by DL6. The K24 Electronic Relay makes at 10 VDC and opens at 8 VDC.

Checking Motor Operation

1 - Remove leads from terminal 5 at logic panel. Put a jumper across terminals "C" and "F" at motor. Valve motor shaft should rotate clockwise, raising valve stem. Refer to Figure 23.
   a - At end of stroke notch in motor shaft should be down, at an angle 10% to right of vertical.
   b - The motor should be free to run its complete stroke.
   c - With the valve in this position, the by-pass line is closed and water will flow through coil.

2 - Remove jumper previously installed. Valve motor shaft should rotate counter-clockwise, lowering valve stem. Refer to Figure 22.
   a - At end of stroke notch in motor shaft should be up, at an angle 10° to right of vertical.
   b - Motor should be free to run its complete stroke.
   c - With valve in this position, the by-pass line is open and water flow through coil is stopped.

3 - Remove lead from "TR" terminal at motor. Valve motor shaft should spring return clockwise, raising valve stem. See Figure 23. With the valve in this position, the by-pass line is closed and water will flow through coil.

4 - Reconnect leads at motor and logic panel.

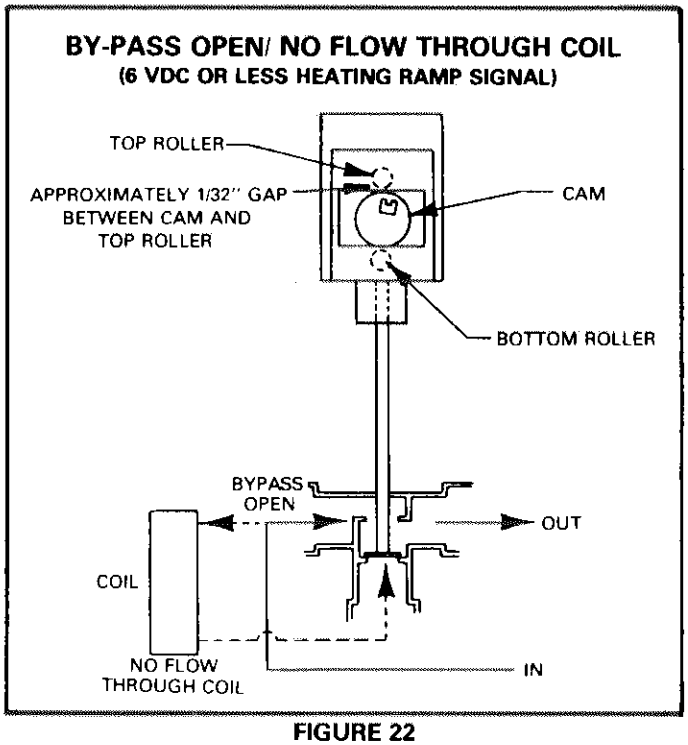


FIGURE 22

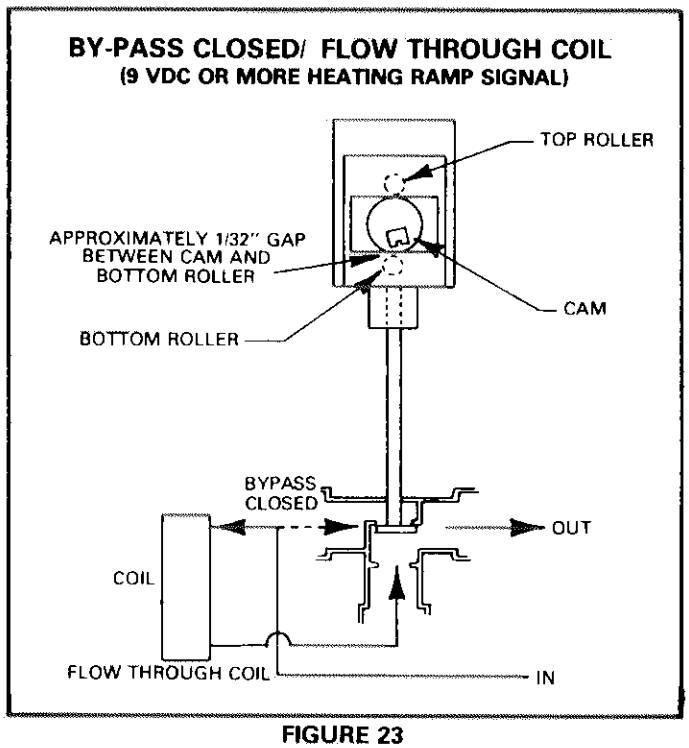
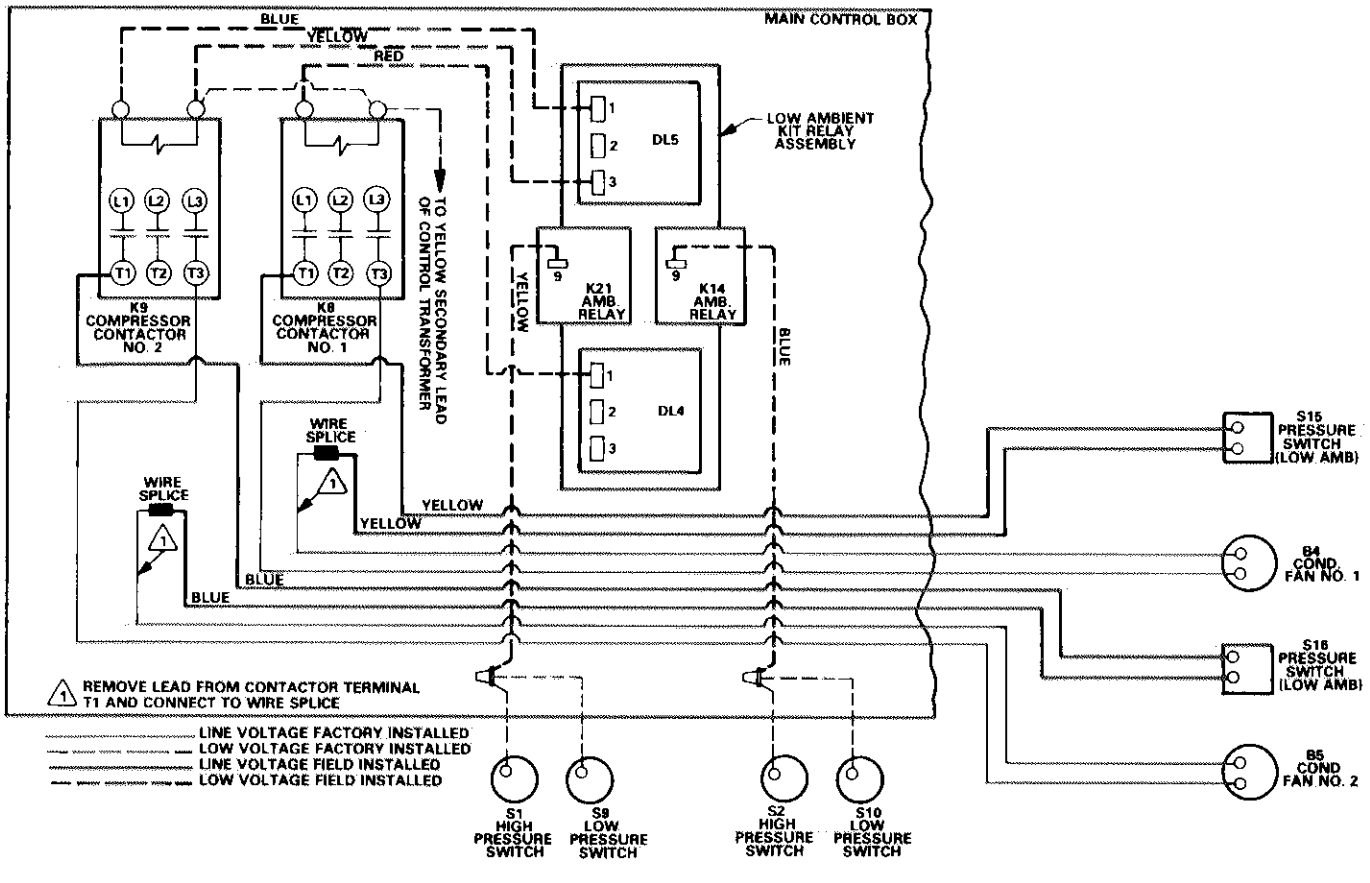


FIGURE 23



LOW AMBIENT KIT — LB-37124B

FIGURE 24

E - Low Ambient Kit (LB-37124B)

This kit allows cooling operation at low outdoor ambients. It provides a momentary low pressure switch by-pass during compressor start-up and also cycles condenser fan to maintain adequate head pressure. Figure 24 shows field hook-up.

Low ambient relay (K14 or K21) is energized with the compressor contactor on a cooling demand closing the relay contacts. Low ambient delay (DL4 or DL5) provides a 30 second timed on circuit to by-pass the compressor low pressure switch. The compressor will stop after 30 sec. if the low pressure switch does not close.

Pressure switches S15 and S16 are wired in series with the condenser fan. Pressure switch set points are:

— open @ 140 psig
— reset @ 180 psig

When discharge pressure drops below S15 or S16 setpoint the fan cycles off until the discharge pressure rises to automatically reset low ambient pressure switch.

F - Night Setback

A Night Setback Time Clock (LB-38134CB) is available. The 24 hour skip-a-day clock programs a daily schedule. Any day or days can be omitted. Wiring consists of jack plug connections in blower compartment.

The degree of heating setback or cooling setup is determined by separate resistors located at the low voltage terminal block. See Figure 25. The resistors can be substituted according to Table 9 to obtain the desired setting. Substitute resistors must be within 10% tolerance.

When an application includes night setback and switching status panel options, the "After Hour Timer" function must be field wired into the night setback circuit. Refer to Figure 5 for field hook-up.

Figure 26 explains night setback operation.

TABLE 9

°F	Night Setback (R1)	Cool Setup (R2)
5	7.5K	20K
7	----	18K
9	----	16K
10	3.6K*	15K
13	----	13K
15	2K	12K
Cool Lockout	----	1.2K**

*This resistor is factory installed for heating. There is a 7.5K resistor taped to side of low voltage junction box.
**This resistor is factory installed for cooling. Establishing a cooling setup value with a resistor of less than 1.2K ohm resistance will limit the maximum heat setback value to 12°F.

VIII - STATUS PANEL OPTIONS

The status panel allows remote monitoring of system operation. Two types of panels are available. The SP11 provides system readout only. The SSP11 switching status panel combines the switching subbase and status panel functions together. In addition the SSP11 has a night setback override. Figures 27 and 28 show both panels.

1 - The "Cool Mode" LED is green when lit. It indicates Power Saver operation when unit is so equipped. Otherwise the LED will indicate DX cooling operation.

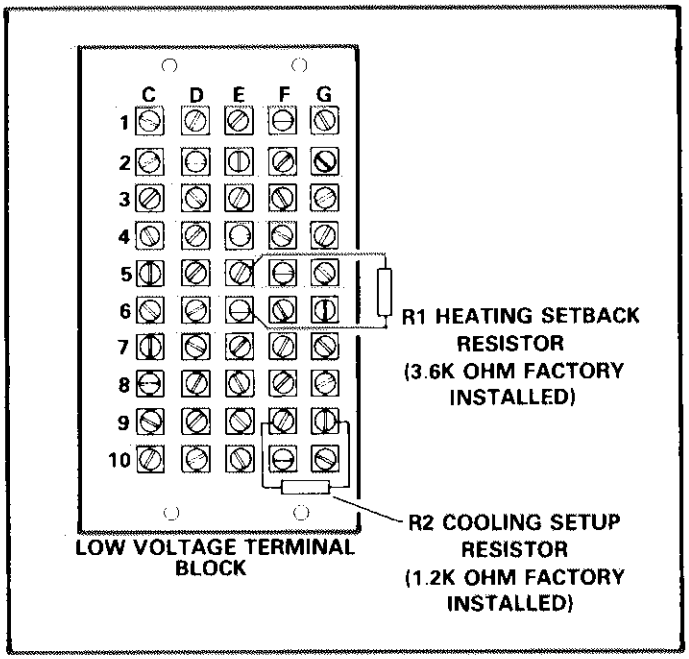


FIGURE 25

2 - The "Heat Mode" LED lights green during heating operation. The system switch on the SSP11 panel includes an emergency heat position. This function is not applicable to the CHA11; however, the "Heat Mode" light will change to red if the switch is placed at emergency heat. To avoid confusion, cut out the yellow wire at the SSP11. This prevents light from changing to red.

3 - The "Compressor 1" and "Compressor 2" LED's are green when the respective compressors are running. Either light will turn red if a compressor safety switch opens during a compressor demand.

4 - The "No Heat" LED lights red on a loss of auxiliary heat. When applied to an ECH11 heater, a field installed current sensing relay (K20) detects current flow to the first element. On hot water applications, a sensing circuit consisting of an electronic relay (K24), a sensing thermostat (S21) and a hot water delay (DL6) detects a no heat situation.

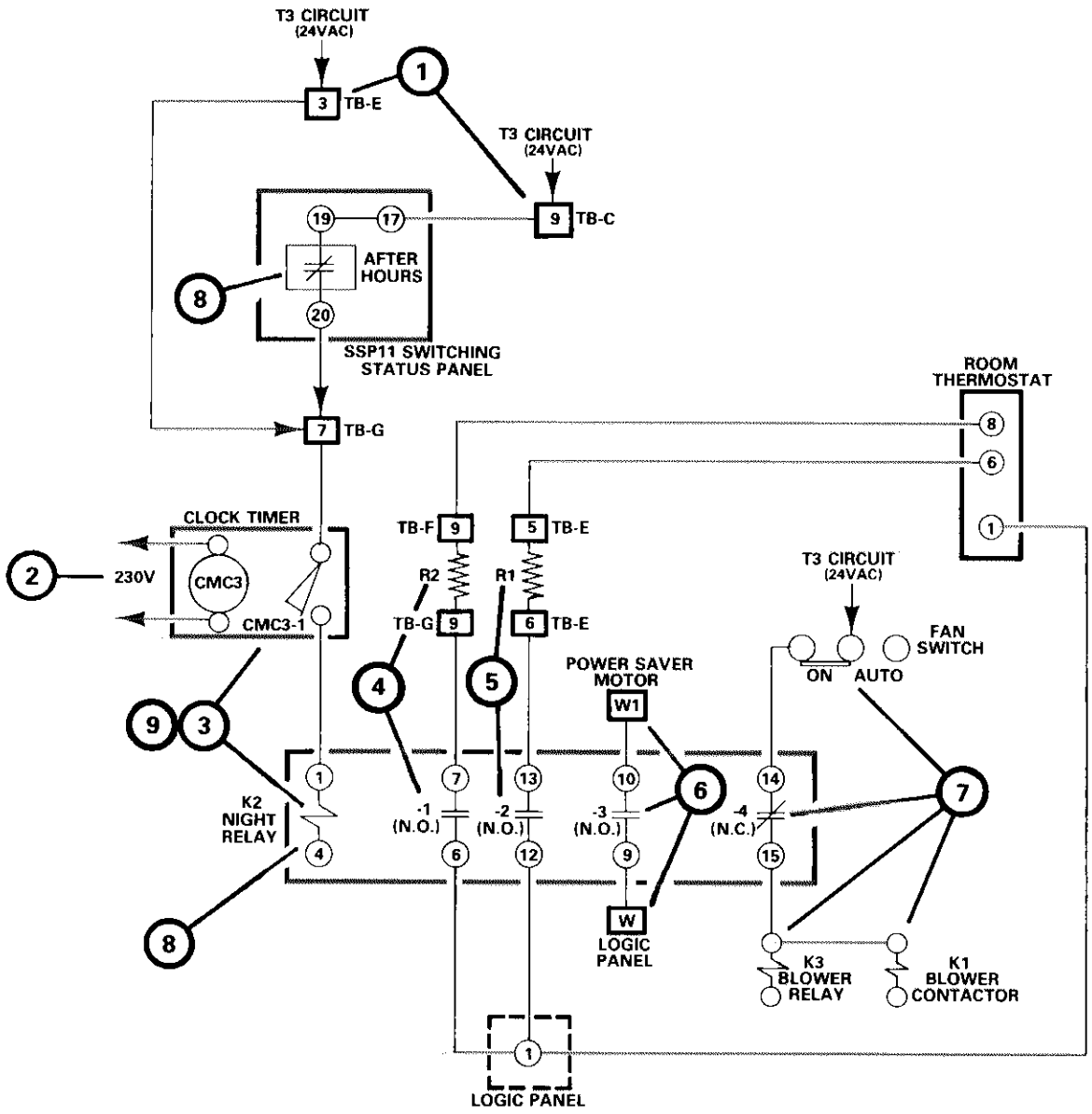
5 - The "Filter" LED will light red when the field installed filter pressure switch (S14) contacts close indicating a dirty filter.

6 - The "System" switch on the SSP11 has five positions to indicate the following modes:
OFF - System off.
HEAT - Heating only.
AUTO - System automatically provides heating or cooling on demand.
COOL - Cooling only.
EMERGENCY HEAT - Not applicable

7 - The "Fan" switch on the SSP11 has two positions to indicate the following modes:
AUTO - Blower cycles with demand.
ON - Blower runs continuously.

8 - The "After Hours" timer on the SSP11 provides an override of night setback from 0 to 12 hours. A momentary push button switch initiates the time period.

CHA11 NIGHT SETBACK OPERATION



1 - On applications using SSP11 switching status panel, the 24VAC circuit feeds through TBC-9. On applications less SSP11, the 24VAC circuit feeds through TBE-3.
2 - Clock timer motor is powered by 230VAC.
3 - Clock timer contacts close to energize Night Relay (K2) and initiate unoccupied mode.
4 - N.O. K2-1 contacts close to bring "R2" cooling resistor into cooling thermostat circuit. The amount of setup is determined by resistor size.
5 - N.O. K2-2 contacts close to bring "R1" heating resistor into heating thermostat circuit. The amount of setback is dependent upon resistor size.
6 - N.O. K2-3 contacts close to jumper "W" on logic panel to "W1" on power saver motor. This drives motor closed.
7 - N.C. K2-4 contacts open to de-energize Blower Relay (K3) and Blower Contactor (K1). The blower cycles with demand.
8 - If the "After Hours Timer" on SSP11 is pressed, the circuit opens for the designated period. This de-energizes K2 to temporarily return unit into normal operation. At the end of designated period, the SSP11 timer again makes to return system into the unoccupied mode.
9 - At the end of unoccupied mode, clock timer contacts open to return unit to normal operation.

FIGURE 26

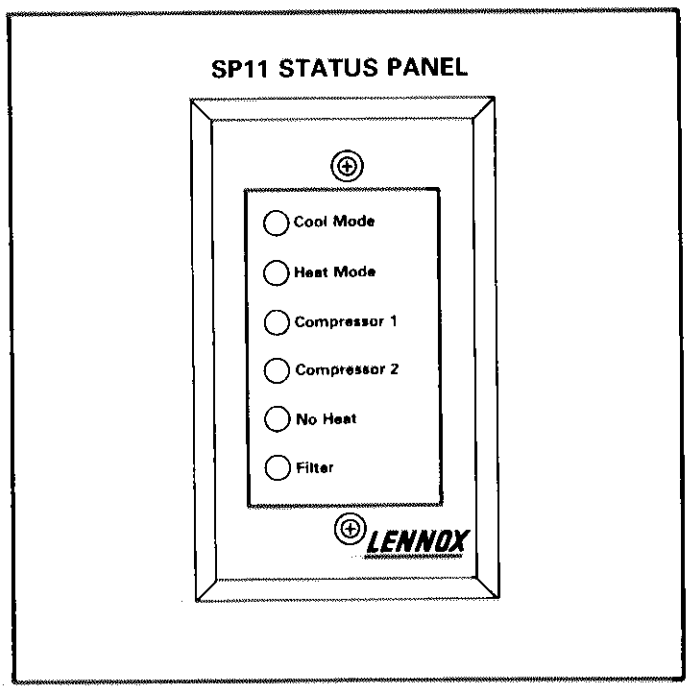


FIGURE 27

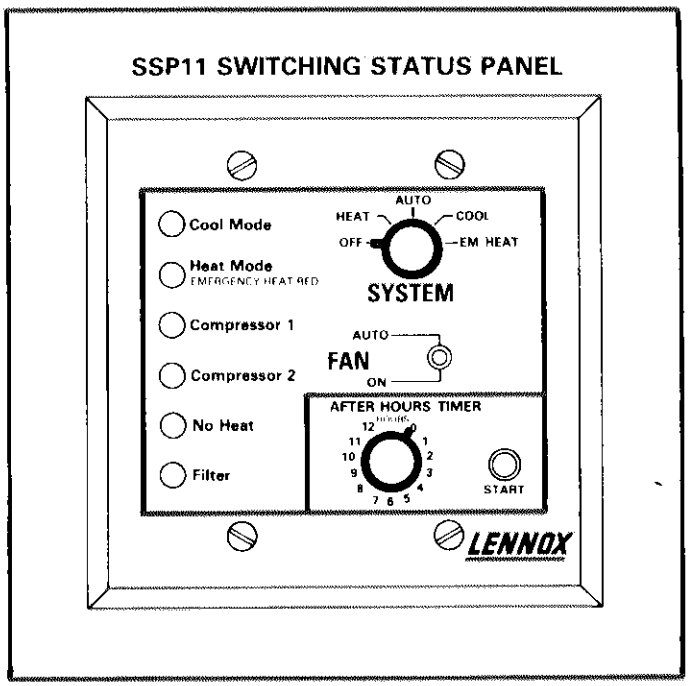
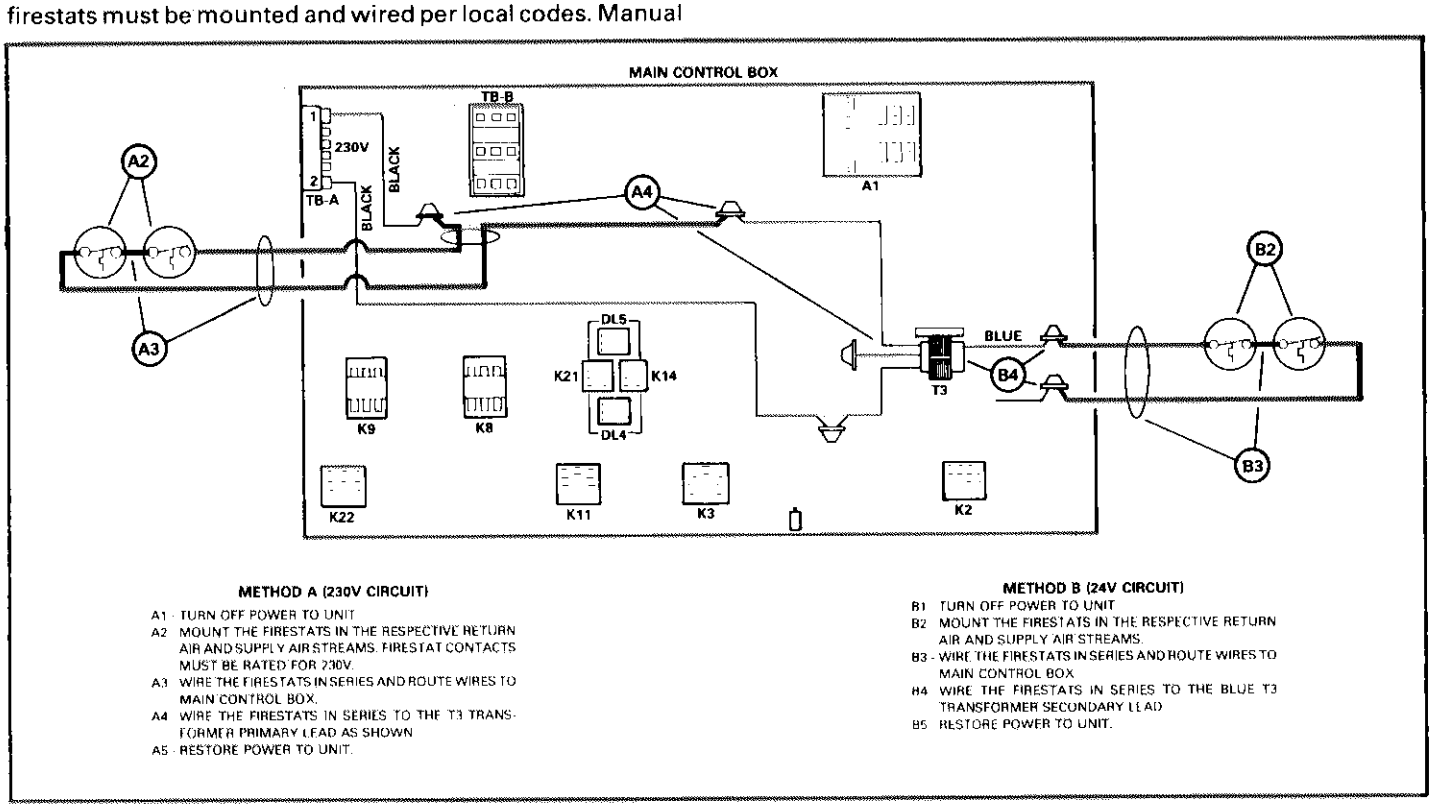


FIGURE 28

IX - FIRESTATS

Some local codes may require the installation of supply air and return air firestats to automatically shut down the equipment at excessive temperatures. These field provided firestats must be mounted and wired per local codes. Manual reset type controls must be accessible. Figure 29 illustrates two suggested methods of wiring the firestats into the control circuit. When a firestat opens the control circuit is de-energized and the unit shuts down.



METHOD A (230V CIRCUIT)

A1 - TURN OFF POWER TO UNIT.
A2 MOUNT THE FIRESTATS IN THE RESPECTIVE RETURN AIR AND SUPPLY AIR STREAMS. FIRESTAT CONTACTS MUST BE RATED FOR 230V.
A3 WIRE THE FIRESTATS IN SERIES AND ROUTE WIRES TO MAIN CONTROL BOX.
A4 WIRE THE FIRESTATS IN SERIES TO THE T3 TRANSFORMER PRIMARY LEAD AS SHOWN
A5 - RESTORE POWER TO UNIT.

METHOD B (24V CIRCUIT)

B1 TURN OFF POWER TO UNIT
B2 MOUNT THE FIRESTATS IN THE RESPECTIVE RETURN AIR AND SUPPLY AIR STREAMS.
B3 - WIRE THE FIRESTATS IN SERIES AND ROUTE WIRES TO MAIN CONTROL BOX.
B4 WIRE THE FIRESTATS IN SERIES TO THE BLUE T3 TRANSFORMER SECONDARY LEAD
B5 RESTORE POWER TO UNIT.

FIGURE 29

X - MAINTENANCE

A - Lubrication

Always relubricate motors according to manufacturer's lubrication instructions on each motor. If no instructions are provided, use the following as a guide:

1 - Indoor Blower Motor Bearings - Bearings are prelubricated. For extended bearing life, relubricate at least once every two years with a lithium base grease, such as Westinghouse 53701RW, Chevron BRB2 (Standard Oil) or Andok 260 (Exxon Oil). To relubricate, replace top plugs with standard grease fittings. Remove lower outlet plugs and add grease with handgun until new grease appears at bottom outlets. Run motor for a short time before replacing bottom plugs.

2 - Condenser Fan Motors - Bearings are prelubricated. For extended bearing life, relubricate at least once every two years with a lithium base grease, such as Alvanie 3 (Shell Oil), Chevron ABRB3 (Standard Oil) or Regal AFB 2 (Texas Oil). Use hand grease gun for relubrication. Add only enough grease to purge through the bearings so that a bead of grease appears at the seal lip contacts.

B - Filters

Inspect filters at least twice annually. Units equipped with optional status panel will indicate at the status panel when filters are dirty or plugged resulting in restricted air flow. Replace the 16 in. x 20 in. x 1 in. frame type filters with equivalent filters available from your Lennox dealer.

C - Outdoor Coil

Annually rinse the outdoor fin coil with water to remove dirt or other accumulation.

D - Compressor Oil Charge

CHA11-953 with Bristol compressors uses 65 oz. of the type Suniso 3GS per compressor.

CHA11-953 with Copeland compressors uses 60 oz. of heat pump grade mineral oil of 190 to 210 viscosity per compressor.

CHA11-1353 with Bristol compressors uses 65 oz. of the type Suniso 3Gs per compressor.

CHA11-1353 with Copeland compressors uses 72 oz. of heat pump grade mineral oil of 190 to 210 viscosity per compressor.

XI - GENERAL SCHEMATIC INFORMATION

1 - The unit schematic wiring diagram format incorporates a horizontal power line which separates the line voltage circuit (motors-compressors-electric elements) from the controlling circuit. The motors, compressors and electric elements are located below the power line with the controlling circuit directly above the line.

2 - The graphic symbols for components and code lettering conforms to the "IEEE Standard and American National Standard" of graphic symbols for electrical diagrams. All symbols and code lettering used are approved by the International Electrotechnical Commission (IEC). Refer to Figure 30 for code and symbol identification.

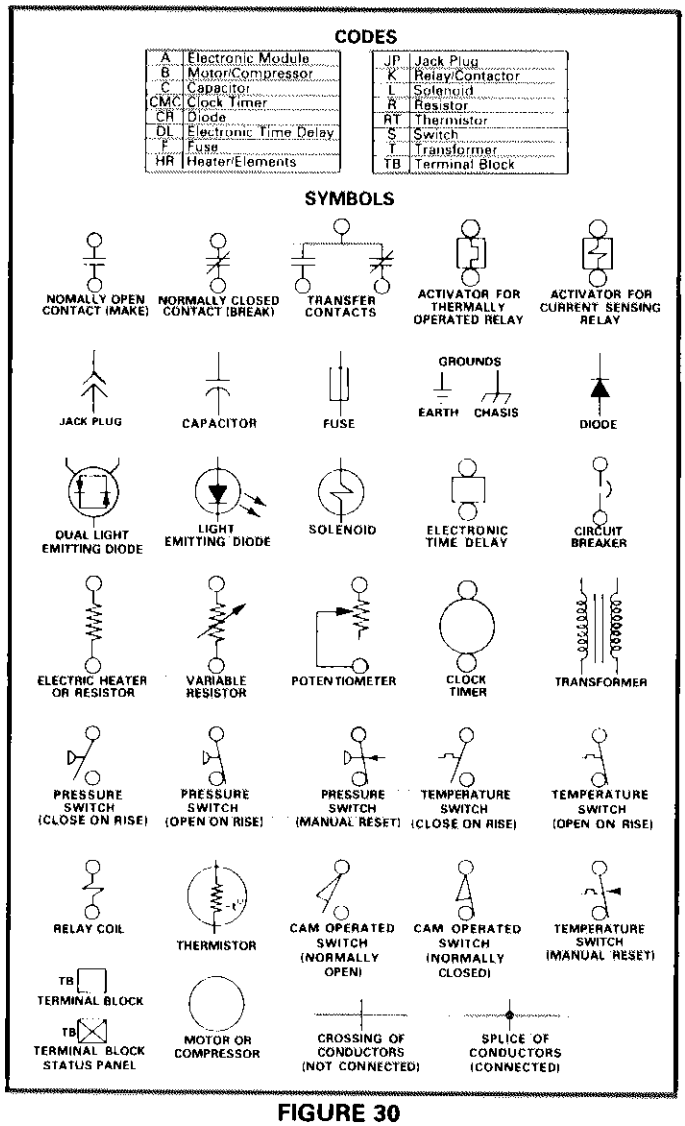


FIGURE 30

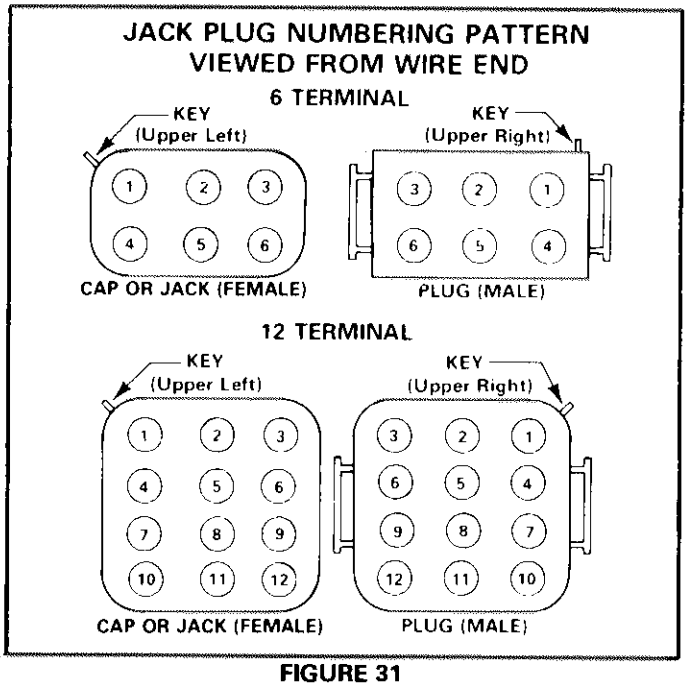


FIGURE 31

3 - Terminal numbers on jack plugs are located by a ridge on the corner of the plug called the "Key." Refer to Figure 31 for proper numbering sequence.

4 - A component index chart is provided on each diagram which includes -
- Code numbers (Key).
- Description of component.
- Location of component. See Example A in Figure 33.
- Cross reference to other diagram sections. See Example B in Figure 33.

NOTE - Figure 33 actually shows a CHP11 wiring diagram in the cross reference example. However, the technique is still the same.

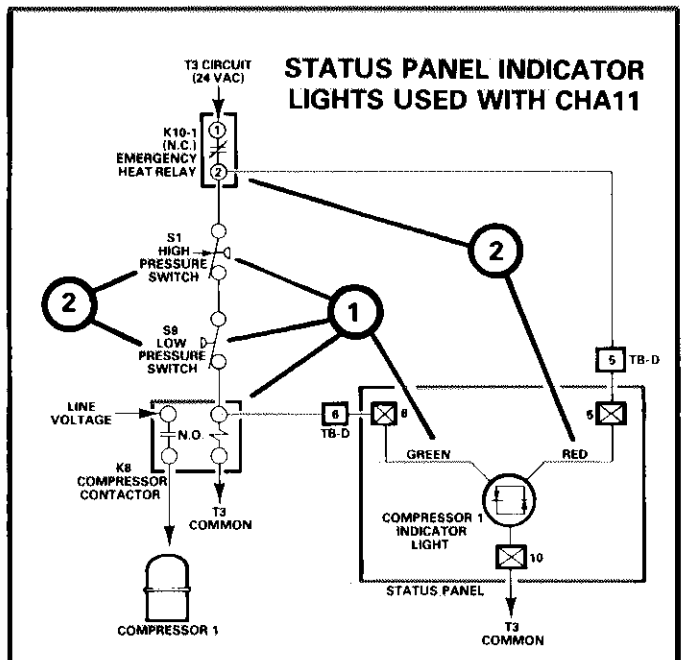
5 - Jack plugs are shown in the schematic circuit by both jack plug number and terminal number. In Example C of Figure 33, JP1-5 indicates jack plug number 1 and terminal number 5.

6 - Optional circuits are shown with arrow connections. In Example D, the remote minimum positioner (R4) is a substitute for the minimum positioner (R3) in unit.

7 - Solid lines around a control indicate a complete control — Example E. Dashed lines around a control indicates only a part of a control — Example F.

8 - The "Compressor 1","Compressor 2" and "Heat Mode" indicator lights used in the status panel options are dual color. Figure 32 illustrates "Compressor 1" light schematically. The light is green during a compressor demand but changes to red if a safety switch opens.

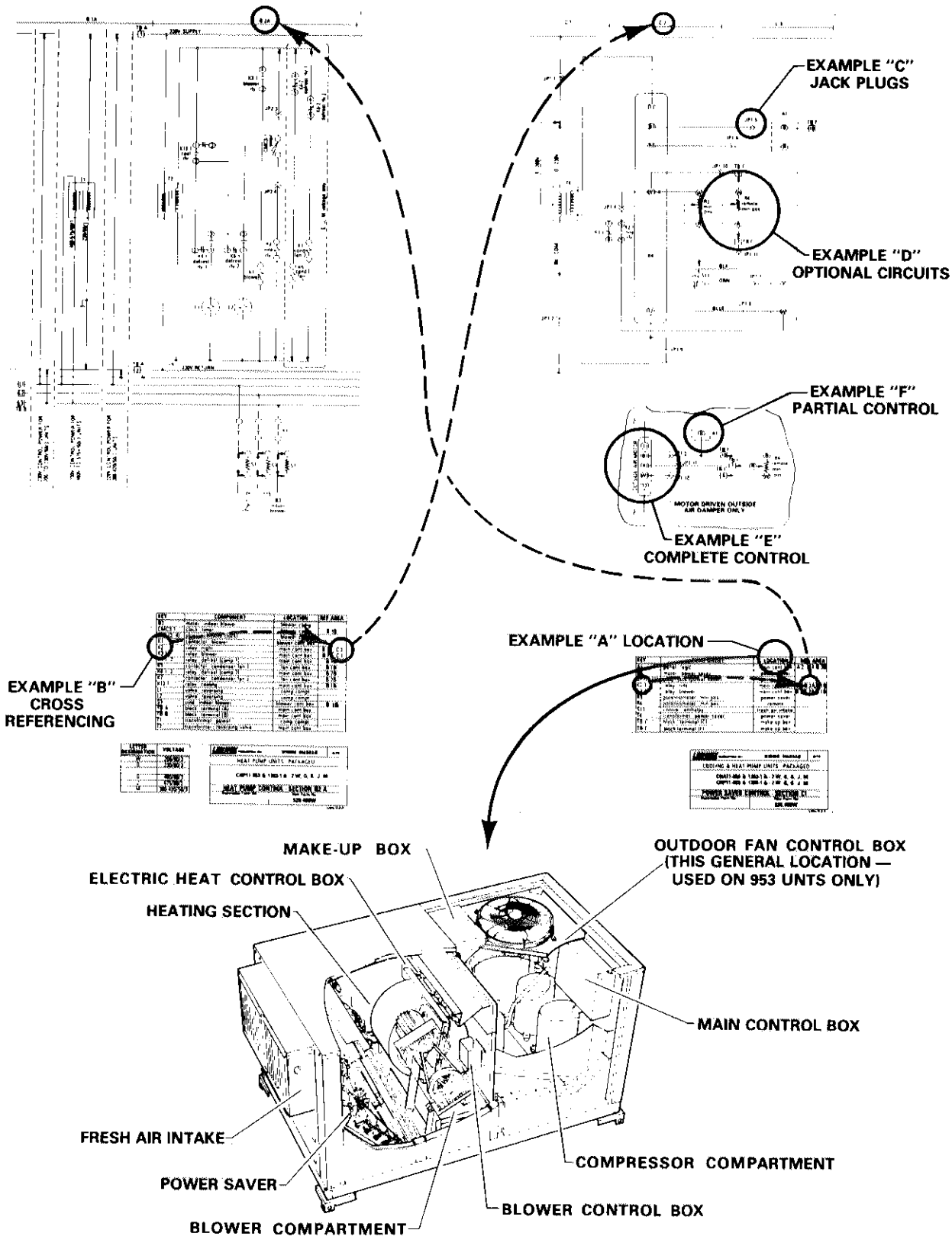
During normal operation internal status panel circuits place potential at the green leg of indicator light. When a compressor safety switch opens, potential feeds through the red leg.



1 - During normal operation internal status panel circuits place potential at green leg of indicator light.
2 - When a safety switch opens, potential feeds through red leg.

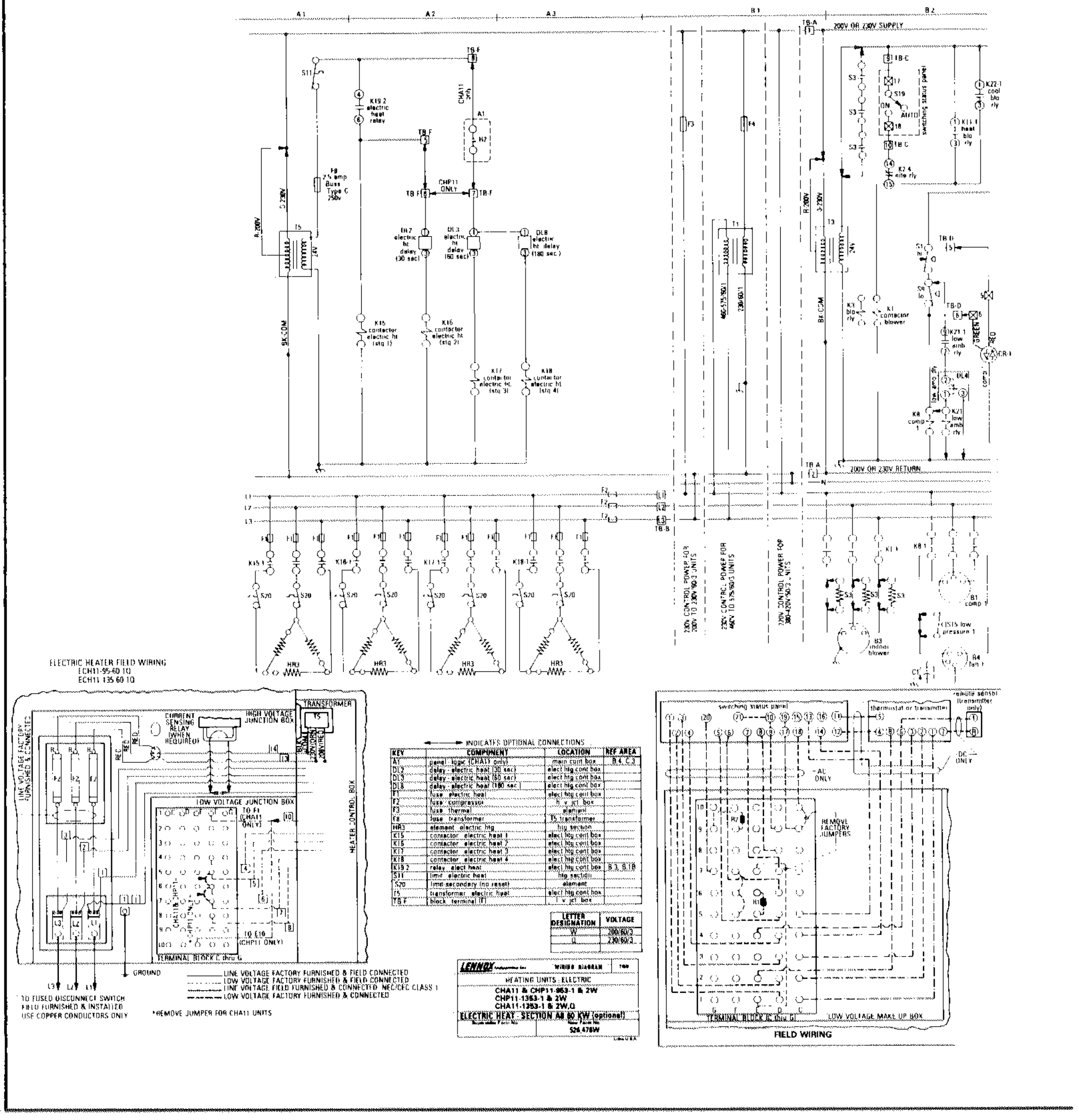
FIGURE 32

9 - Pages 30 and 31 show a complete CHA11 unit schematic for an application including SSP11 switching status panel, power saver and electric heat. Pages 32 and 33 show another CHA11 unit schematic for switching subbase, SP11 status panel, power saver and electric heat.



LOCATIONS (953 SHOWN)

FIGURE 33



←→ INDICATES OPTIONAL CONNECTIONS

KEY	COMPONENT	LOCATION	REF AREA
A1	panel - logic (CHA11 only)	main cont box	B 4, C 3
DL2	delay - electric heat (30 sec)	elect htg cont box	
DL3	delay - electric heat (60 sec)	elect htg cont box	
DL8	delay - electric heat (180 sec)	elect htg cont box	
F1	fuse electric heat	elect htg cont box	
F2	fuse compressor	h v jct box	
F3	fuse thermal	element	
F8	fuse transformer	T5 transformer	
HR3	element electric htg	htg section	
K15	contactor electric heat 1	elect htg cont box	
K16	contactor electric heat 2	elect htg cont box	
K17	contactor electric heat 3	elect htg cont box	
K18	contactor electric heat 4	elect htg cont box	
K19 2	relay elect heat	elect htg cont box	B 3, B 1B
S11	limit electric heat	htg section	
S20	limit-secondary (no reset)	element	
T5	transformer electric heat	elect htg cont box	
TB F	block terminal (F)	l v jct box	

LETTER DESIGNATION	VOLTAGE
W	200/60/3
Q	230/60/3

LENNOX Industries Inc. — WIRING DIAGRAM

HEATING UNITS : ELECTRIC

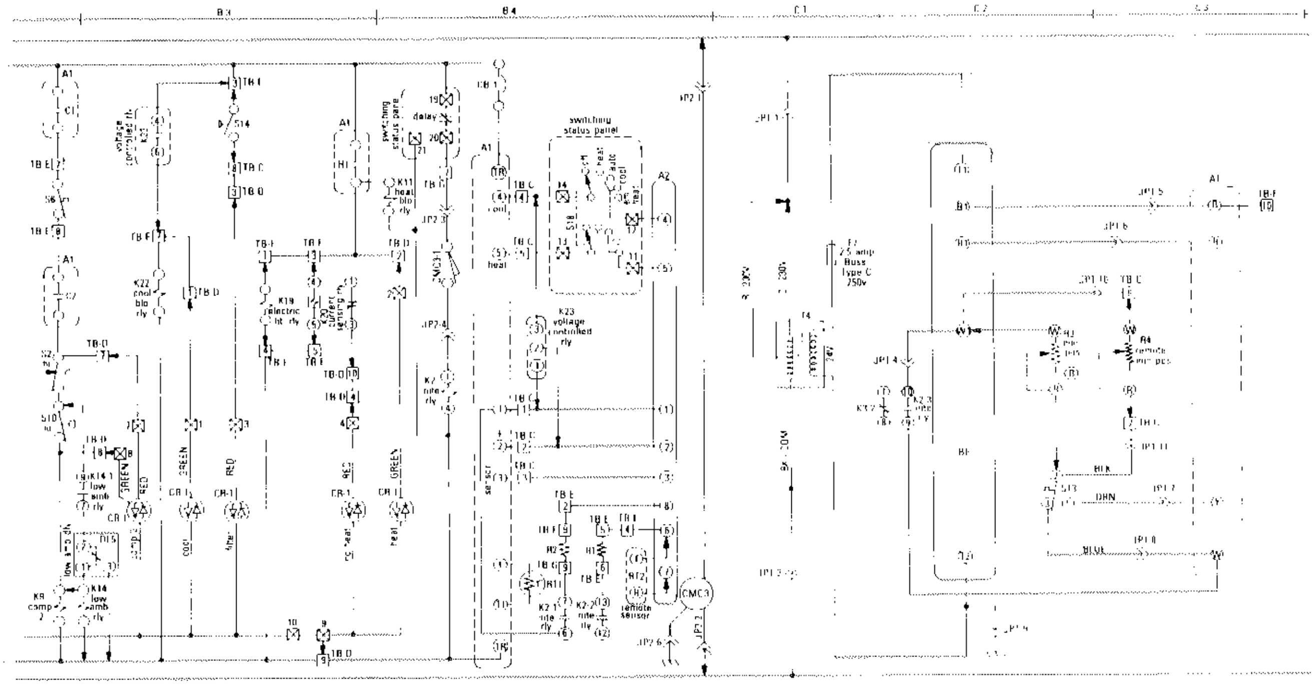
CHA11 & CHP11-953-1 & 2W
CHP11-1353-1 & 2W
CHA11-1353-1 & 2W,Q

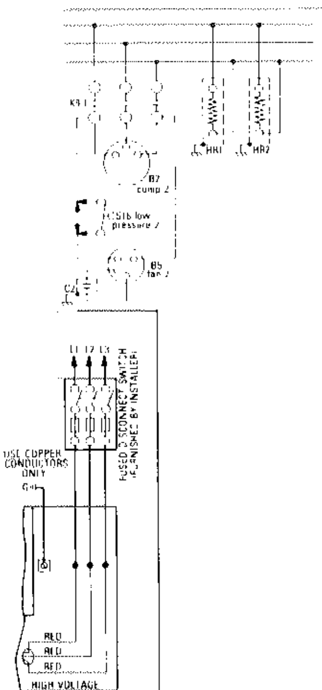
ELECTRIC HEAT - SECTION A8 60 KW (optional)

New Form No. 526,478W

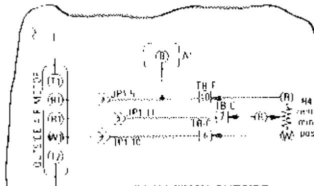
Litho U.S.A.

CHA11 WITH SSP11 SWITCHING STATUS PANEL, POWER SAVER AND ECH11 ELECTRIC HEAT





WITHOUT ELECTRIC HEAT



MOTOR DRIVEN OUTSIDE AIR DAMPER ONLY

KEY	COMPONENT	LOCATION	REF. AREA
A1	panel logic	main cont box	A2, C3
A2	control thermostat or transmitter	remote	
B1-B2	compressor No 1 & No 2	comp compt	
B3	motor indoor blower	blower compt	
B4-B5	motor condenser fan No 1 & No 2	comp compt	
C1-C2	capacitor condenser fan	comp compt	
CB-1	breaker circuit	main cont box	
CR-1	diode light emitting	status panel	
CMC3	clock timer	blower compt	
DL4-DL5	low amb 30 sec on dly	main cont box	
F3	fuse	main cont box	
F4	fuse	T1 transformer	
HR1-HR2	heater crankcase No 1 & No 2	compressor	
JP2(1-4-6)	plug-jack (clock timer)	blower compt	
K1	contactor blower	blower cont box	
K2	relay night	main cont box	C2
K3	relay blower	main cont box	C1
K8	contactor - compressor No 1	main cont box	
K9	contactor compressor No 2	main cont box	
K11	relay heating blower	main cont box	
K14	relay - low ambient No. 2	main cont box	
K19	relay electric heat	elect htg cont box	A1, A2
K20	relay current sensing	make up box	
K71	relay low ambient No 1	main cont box	
K72	relay - cooling blower	main cont box	
K23	relay voltage controlled	main cont box	
R1	resistor night htg operation	make up box	
R2	resistor night cool setup	make up box	
RT 1	sensor discharge	blower compt	
RT 2	sensor room or return air	remote	
S1	switch high pressure (comp 1)	comp compt	
S2	switch - high pressure (comp 2)	comp compt	
S3	OVLD indoor blower	blower cont box	
S6	thermostat cooling lockout	make up box	
S9	switch low pressure (comp 1)	comp compt	
S10	switch low pressure (comp 2)	comp compt	
S14	switch filter	blower compt	
S15	switch pressure 1 (low amb)	comp compt	
S16	switch - pressure 2 (low amb)	comp compt	
S18	switch system	status panel	
S19	switch fan	status panel	
TB-A	block terminal (A)	main cont box	
TB B	block terminal (B)	main cont box	
TB C	block terminal (C)	make-up box	
TB D	block terminal (D)	make up box	
TB E	block - terminal (E)	make up box	
TB F	block terminal (F)	make-up box	
TB G	block - terminal (G)	make up box	
T1	transformer power	comp compt	
T3	transformer - control	main cont box	

⊠ TERMINAL BLOCK STATUS PANEL

LETTER DESIGNATION	VOLTAGE
W	200/60/3
D	230/60/3
G	460/60/3
J	575/60/3
M	380-420/50/3

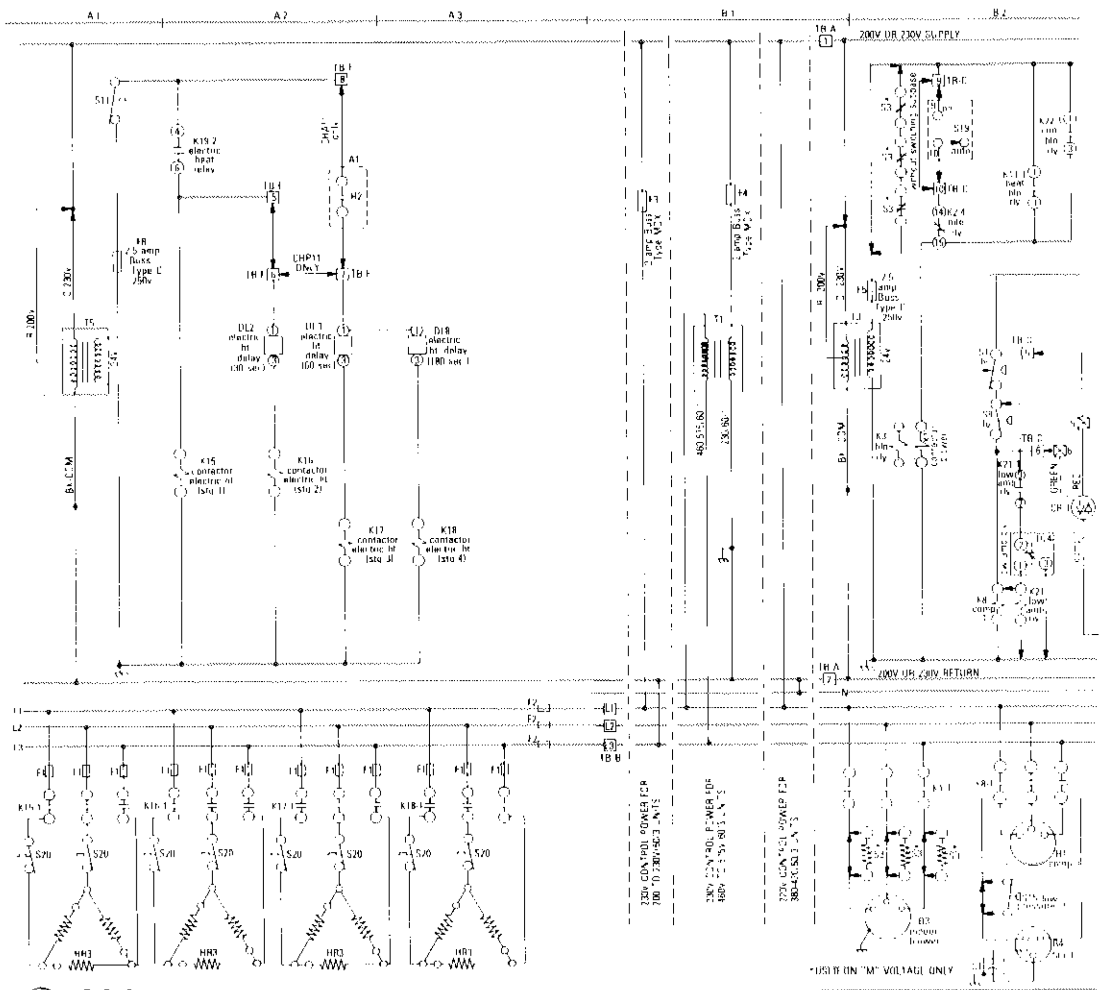
LOW VOLTAGE INSTALLED AT FACTORY (REFER TO ELECTRIC HEAT WIRING DIAGRAMS FOR REMOVAL IF REQUIRED)
LINE VOLTAGE INSTALLED AT FACTORY
LINE VOLTAGE TO BE INSTALLED
LOW VOLTAGE AC FIELD INSTALLED NEC CLASS 2
LOW VOLTAGE DC FIELD INSTALLED NEC CLASS 2

LENNOX Industries Inc — WIRING DIAGRAM
COOLING UNITS PACKAGED
CHA11-953 & 1353-1 & 2 W,Q,G,J,M
(WITH SWITCHING STATUS PANEL SSP11)
COOLING CONTROL - SECTION B1
Supersedes Form No — New Form No 528,717W

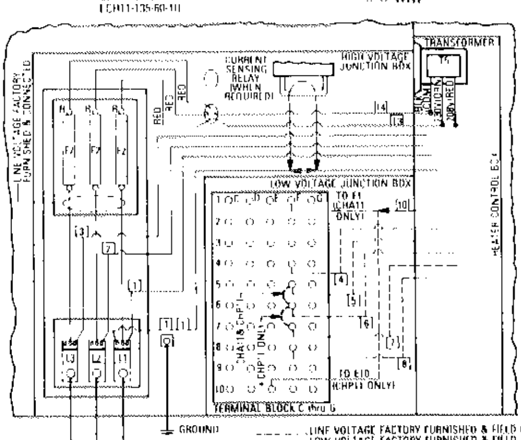
INDICATES OPTIONAL CONNECTIONS

KEY	COMPONENT	LOCATION	REF. AREA
A1	panel logic	main cont box	A2 B4 B(8,2 2
B6	motor power saver	power saver	
F7	fuse transformer power saver	T4 transformer	
JP1-1 15	plug jack (power saver)	power saver	
K2 1	relay nite	main cont box	B2 B1B
K1 2	relay blower	main cont box	B2 B2A B1B
R3	potentiometer min pos	power saver	
R4	potentiometer min pos	remote	
[illegible]	[illegible]	fresh air intake	
T4	transformer power saver	power saver	
TB	block terminal (C)	l v jct box	
TB-F	block terminal (F)	l v jct box	

LENNOX Industries Inc — WIRING DIAGRAM
ACCESSORIES
CHA11-953 & 1353-1 & 2 W, Q, G, J, M HW**
CHP11-953 & 1353-1 & -2 W, Q, G, J, M, -HW**
**DESIGNATES HOT WATER HEAT UNIT
POWER SAVER CONTROL SECTION C1 (optional)
Supersedes Form No — New Form No 526,409W



ELECTRIC HEATER FIELD WIRING
ECH11-95-60-1U
ECH11-135-60-1U



GROUND

L3 L2 L1

TO FUSED DISCONNECT SWITCH
FIELD FURNISHED & INSTALLED
USE COPPER CONDUCTORS ONLY

LINE VOLTAGE FACTORY FURNISHED & FIELD CONNECTED
LOW VOLTAGE FACTORY FURNISHED & FIELD CONNECTED
LINE VOLTAGE FIELD FURNISHED & CONNECTED NEC/CEC CLASS I
LOW VOLTAGE FACTORY FURNISHED & CONNECTED

*REMOVE JUMPER FOR CHA11 UNITS

INDICATES OPTIONAL CONNECTIONS

KEY	COMPONENT	LOCATION	REF AREA
A1	panel logic (CHA11 only)	main cont box	B 4, C 3
DL2	delay electric heat (30 sec)	elect htg cont box	
DL3	delay electric heat (60 sec)	elect htg cont box	
DL8	delay electric heat (180 sec.)	elect htg cont box	
F1	fuse electric heat	elect htg cont box	
F2	fuse compressor	h v jct box	
F3	fuse thermal	element	
F8	fuse - transformer	T5 transformer	
HR3	element electric htg	htg section	
K15	contactor electric heat 1	elect htg cont box	
K16	contactor electric heat 2	elect htg cont box	
K17	contactor electric heat 3	elect htg cont box	
K18	contactor electric heat 4	elect htg cont box	
K19 2	relay elect heat	elect htg cont box	B 3, B 1B
S11	limit electric heat	htg section	
S20	limit secondary (no reset)	element	
T5	transformer - electric heat	elect htg cont box	
TB-F	block - terminal (F)	l v jct box	

LETTER DESIGNATION	VOLTAGE
W	200/60/3
Q	230/60/3

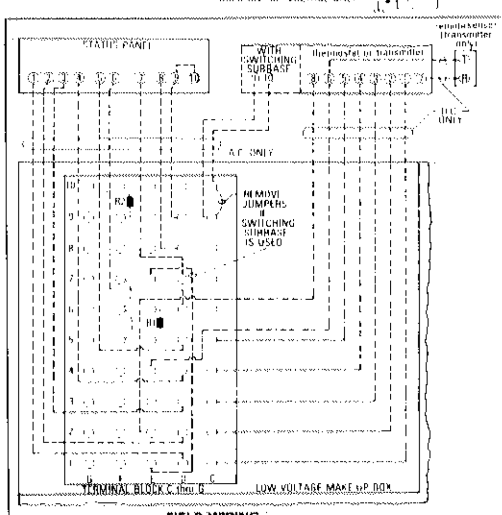
LENNOX — WIRING DIAGRAM — 7/80

HEATING UNITS - ELECTRIC

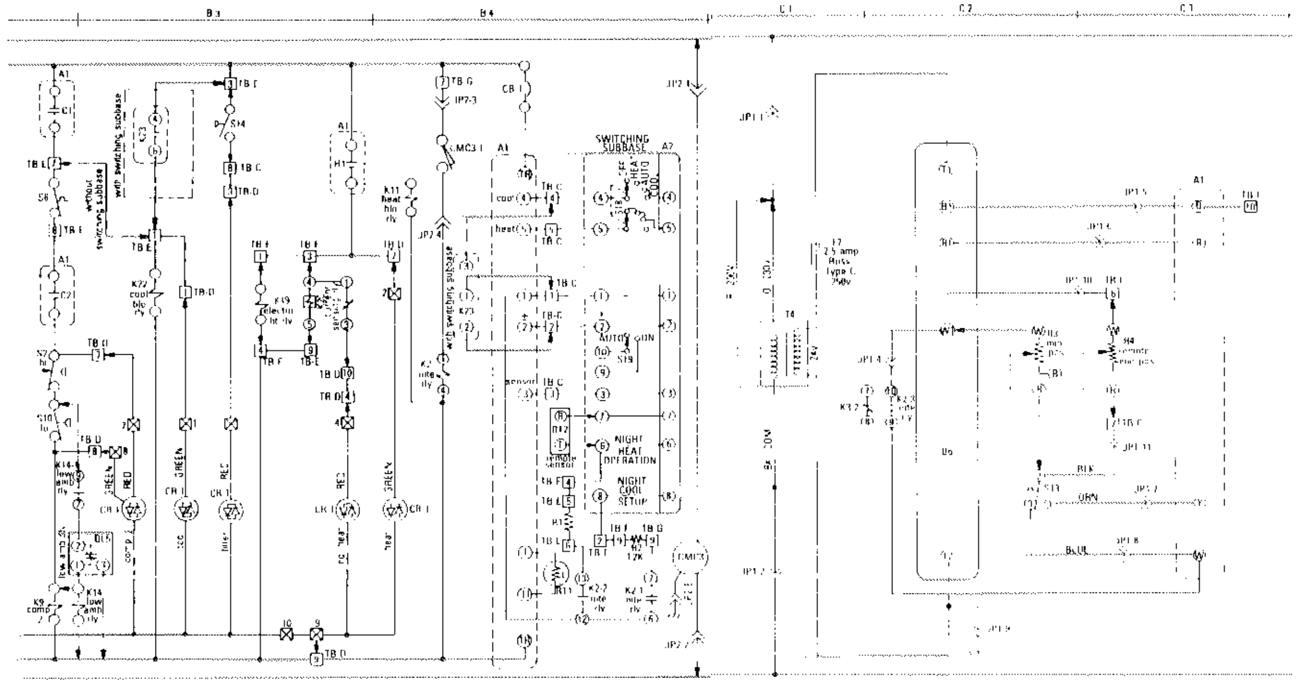
CHA11 & CHP11-953-1 & 2W
CHP11-1353-1 & 2W
CHA11-1353-1 & 2W,Q

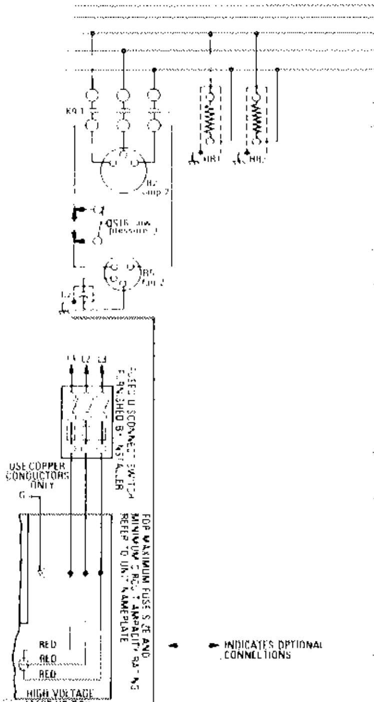
ELECTRIC HEAT - SECTION A8 60 KW (optional)

Supersedes Form No	New Form No
	526,476W



CHA11 WITH SWITCHING SUBBASE, SP11 STATUS PANEL, POWER SAVER AND ECH11 ELECTRIC HEAT





WITHOUT ELECTRIC HEAT

← INDICATES OPTIONAL CONNECTIONS

KEY	COMPONENT	LOCATION	REF AREA
A1	panel logic	main cont box	A2 C3
A2	control - thermostat or transmitter	remote	
B1 B2	compressor No 1 & No 2	comp compt	
B3	motor indoor blower	blower compt	
B4 B5	motor condenser fan No 1 & No 2	comp compt	
C1 C2	capacitor condenser fan	comp compt	
CB1	breaker circuit	main cont box	
CR1	diode light emitting	status panel	
CMC3	clock timer	blower compt	
DL4 DL5	low amb 30 sec on dly	main cont box	
F3	fuse	main cont box	
F4	fuse	T1 transformer	
F5	fuse transformer control	T3 transformer	
HR1 HR2	heater crankcase No 1 & No 2	compressor	
JP2 (1-4, 6)	plug - jack (clock timer)	blower compt	
K1	contactor blower	blower cont box	
K2	relay night	main cont box	C2
K3	relay blower	main cont box	C1
K8	contactor compressor No 1	main cont box	
K9	contactor compressor No 2	main cont box	
K11	relay heating blower	main cont box	
K14	relay low ambient No 2	main cont box	
K19	relay electric heat	elect htg cont box	A1 A2
K20	relay current sensing	h v jct box	
K21	relay low ambient No 1	main cont box	
K22	relay cooling blower	main cont box	
R1	resistor - night htg operation	l v jct box	
R2	resistor night cool setup	l v jct box	
RT1	sensor discharge	blower compt	
RT2	sensor room or return air	remote	
S1	switch high pressure (comp 1)	comp compt	
S2	switch high pressure (comp 2)	comp compt	
S3	OVLD indoor blower	blower cont box	
S6	thermostat cooling lockout	h v jct box	
S9	switch low pressure (comp 1)	comp compt	
S10	switch low pressure (comp 2)	comp compt	
S14	switch filter	blower compt	
S15	switch - pressure 1 (low amb)	comp compt	
S16	switch - pressure 2 (low amb)	comp compt	
S18	switch system	switching subbase	
S19	switch fan	switching subbase	
TB-A	block - terminal (A)	main cont box	
TB-B	block terminal (B)	main cont box	
TB-C	block terminal (C)	l v jct box	
TB-D	block terminal (D)	l v jct box	
TB-E	block terminal (E)	l v jct box	
TB-F	block terminal (F)	l v jct box	
TB-G	block terminal (G)	l v jct box	
T1	transformer power	comp compt	
T3	transformer control	main cont box	

⊠ TERMINAL BLOCK STATUS PANEL

LOW VOLTAGE INSTALLED AT FACTORY (REFER TO ELECTRIC HEAT WIRING DIAGRAMS FOR REMOVAL IF REQUIRED)

LINE VOLTAGE INSTALLED AT FACTORY
LINE VOLTAGE FIELD INSTALLED NEC/CEC CLASS 1
LOW VOLTAGE A.C. FIELD INSTALLED NEC/CEC CLASS 2
LOW VOLTAGE D.C. FIELD INSTALLED NEC/CEC CLASS 2

LETTER DESIGNATION	VOLTAGE
W	200/60/3
Q	230/60/3
G	460/60/3
J	575/60/3
M	380 420/50/3

LENNOX Industries Inc. — WIRING DIAGRAM

COOLING UNITS (PACKAGED)

CHA11-953 & 1353-1 & 2 W,Q,G,J,M

(WITH STATUS PANEL SP11)

COOLING CONTROL - SECTION B1

Supersedes Form No. — New Form No. **528,718W**

MOTOR DRIVEN OUTSIDE AIR DAMPER ONLY

← INDICATES OPTIONAL CONNECTIONS

KEY	COMPONENT	LOCATION	REF AREA
A1	panel logic	main cont box	A2, B4 B3B D2
B6	motor - power saver	power saver	
F7	fuse transformer power saver	T4 transformer	
JP11	plug jack (power saver)	power saver	
K2-1	relay [illegible]	main cont box	B2 B7 B1
K2-2	relay blower	main cont box	B2, B2A B1B
R2	potentiometer min pos	power saver	
R4	potentiometer min pos	remote	
S13	[illegible]	[illegible]	
T4	transformer - power saver	power saver	
TB	block terminal	l v jct box	
TB	[illegible]	l v jct box	

LENNOX Industries Inc. — WIRING DIAGRAM

ACCESSORIES

CHA11 953 & 1353 1 & 2 W, Q, G, J, M, HW**
CHP11 953 & 1353 1 & 2 W, Q, G, J, M, HW**

**DESIGNATES HOT WATER HEAT UNIT

POWER SAVER CONTROL - SECTION C1 (optional)

Supersedes Form No. — New Form No. **526 409W**

XII - SCHEMATIC WIRING DIAGRAM
OPERATING SEQUENCE

Each of the following steps within this section are labeled in the corresponding diagram.

A - Cooling Mode (Figure 34)

Continuous Blower

1 - The K1 Blower Contactor and K3 Blower Relay are energized continuously unless the optional fan switch (used with switching subbase or switching status panel) is set to "auto" or the K2 Night Relay is activated by the night setback option.
2 - K1 energizes blower motor.
3 - N.C. K3 contacts open to break the "W" to "W1" circuit between Logic Panel and Power Saver Motor. This permits power saver operation.

Intermittent Blower

4 - On applications with switching subbase or switching status panel and power saver a K23 Voltage Control Relay must be field installed. This relay initiates blower operation.
5 - Positioning fan switch to "auto" or activation of night setback option puts system into intermittent blower.
6 - K23 Voltage Control Relay makes on a cooling ramp signal of 4VDC. This energizes K22 Cool Blower Relay.
7 - N.O. K22-1 contacts close to energize K1 Blower Contactor and K3 Blower Relay.
8 - K1 energizes blower motor.
9 - K3 permits power saver operation. See step 3.

Cooling

10 - The room control and discharge thermostat generate a cooling ramp signal based on the cooling demand.
11 - The power saver dampers modulate in response to the cooling ramp signal, discharge low limit feature and enthalpy control setting. The range is 1.5 to 4VDC. The dampers are in minimum position at 1.5 volts and are open at 4 volts.
12 - The logic panel switches its contacts also in response to the cooling ramp signal. At approximately 5VDC; "C1" closes at logic panel.
13 - As "C1" closes it energizes K8 No. 1 Compressor Contactor through:
  S6 - Cooling Lockout Thermostat
  S1 - High Pressure Switch (manual reset)
  S9 - Low Pressure Switch (auto reset)
14 - If unit does not include power saver option, "C1" also energizes K22 Cool Blower Relay. This in turn energizes K1 Blower Contactor to energize blower motor.
15 - N.O. K8-1 contacts close to energize both the No. 1 compressor and condenser fan.
16 - "C1" also energizes another circuit to "C2" through the Cooling Lockout Thermostat S6.
17 - "C2" closes at a cooling ramp signal of approximately 6.75VDC.
18 - This energizes the K9 No. 2 Compressor Contactor through:
  S2 - High Pressure Switch (manual reset)
  S11 - Low Pressure Switch (auto reset)
19 - N.O. K9-1 contacts close to energize both the No. 2 compressor and condenser fan.
20 - The logic panel opens the switches in reverse order according to cooling command signal
  C2 opens at approximately 7.5V dc
  C1 opens at approximately 4V dc
  K23 opens between 2.5V - 3V dc

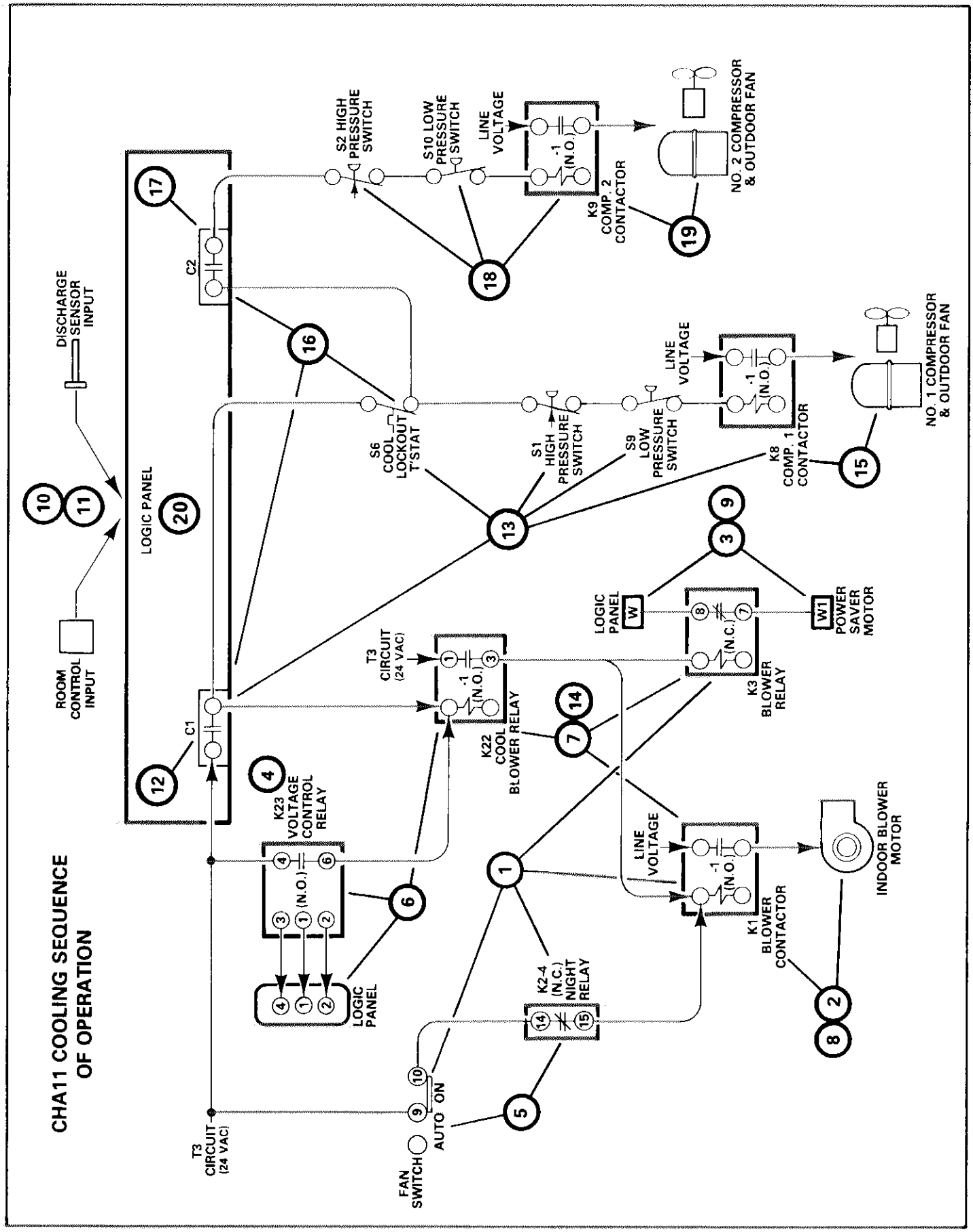

CHA11 COOLING SEQUENCE OF OPERATION
T3 CIRCUIT (24 VAC)
FAN SWITCH
AUTO ON
LOGIC PANEL
K23 VOLTAGE CONTROL RELAY
K2-4 (N.C.) NIGHT RELAY
K22 COOL BLOWER RELAY
K1 BLOWER CONTACTOR
K3 BLOWER RELAY
INDOOR BLOWER MOTOR
POWER SAVER MOTOR
ROOM CONTROL INPUT
DISCHARGE SENSOR INPUT
LOGIC PANEL
C1
C2
S6 COOL LOCKOUT T'STAT
S1 HIGH PRESSURE SWITCH
S9 LOW PRESSURE SWITCH
S10 LOW PRESSURE SWITCH
S2 HIGH PRESSURE SWITCH
K8 COMP. 1 CONTACTOR
K9 COMP. 2 CONTACTOR
NO. 1 COMPRESSOR & OUTDOOR FAN
NO. 2 COMPRESSOR & OUTDOOR FAN
LINE VOLTAGE
(N.O.)
(N.C.)

FIGURE 34

B - Auxiliary Heating Mode (Figure 35)

1 - The K1 Blower Contactor and K3 Blower Relay are energized continuously unless the optional fan switch (used with switching subbase or switching status panel) is set to "auto" or the K2 Night Relay is activated by the night setback option.
2 - K1 energizes blower motor.
3 - N.C. K3 contacts open to break the "W" to "W1" circuit between Logic Panel and Power Saver Motor. This permits power saver dampers to open to minimum fresh air setting.
4 - Positioning fan switch to "auto" or activation of night setback option puts system into intermittent blower.
5 - The room control and discharge sensor generate a heating ramp signal based on the heating demand. The logic panel switches its contacts in response to this signal.
6 - A heating ramp signal of approximately 5VDC closes "H1" at the logic panel.
7 - As "H1" closes the K11 Heat Blower Relay is energized. If the unit was in intermittent blower, N.O.K11-1 contacts close to energize K1 and K3. Refer to steps 2 and 3.
8 - On electric heat applications, "H1" also energizes K19 Electric Heat Relay.
9 - N.O. K19 contacts close to energize K15 No. 1 Electric Heat Contactor through T5 transformer and S11 Electric Heat Limit. S11 opens at a discharge temperature above setpoint.
10 - N.O. K15-1 contacts close to energize first stage of electric heat. See Table 0 for a detailed electric heat sequence of operation.
11 - A heating ramp signal of approximately 6.75VDC closes "H2" at logic panel.
12 - This energizes the contactor controlling next stage of electric heat through:
  T5 - Electric Heat Transformer
  S11 - Electric Heat Limit
  DL - Electric Heat Time Delay
13 - The logic panel opens the "H" switches in reverse order according to heating ramp signal:
  H2 opens at approximately 5.75VDC
  H1 opens at approximately 4VDC
14 - On hot water applications, the valve motor modulates directly in response to heating ramp signal. The range is 6 to 9VDC. The valve is closed at 6 volts and open at 9 volts.

CHA11 HEATING SEQUENCE OF OPERATION

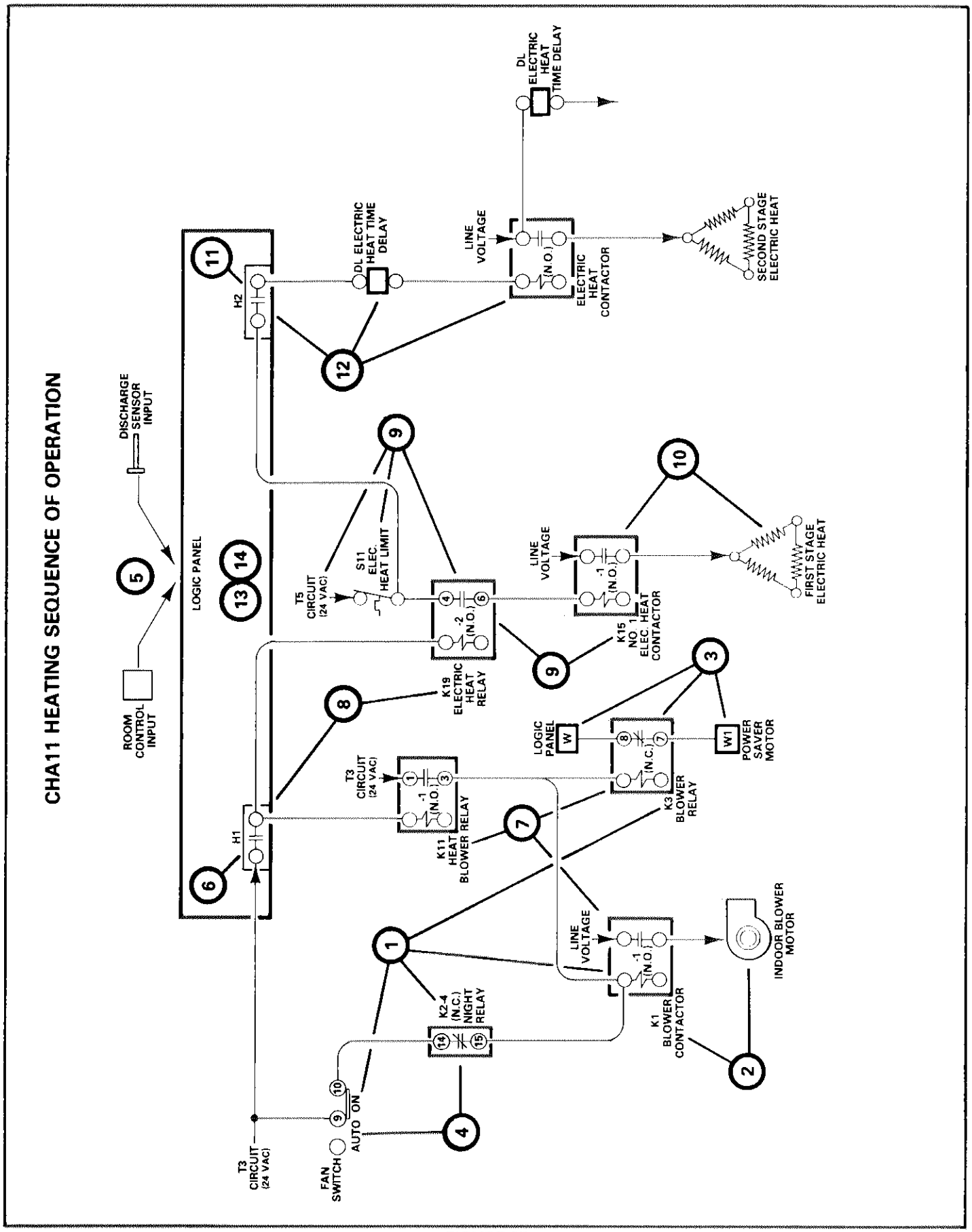


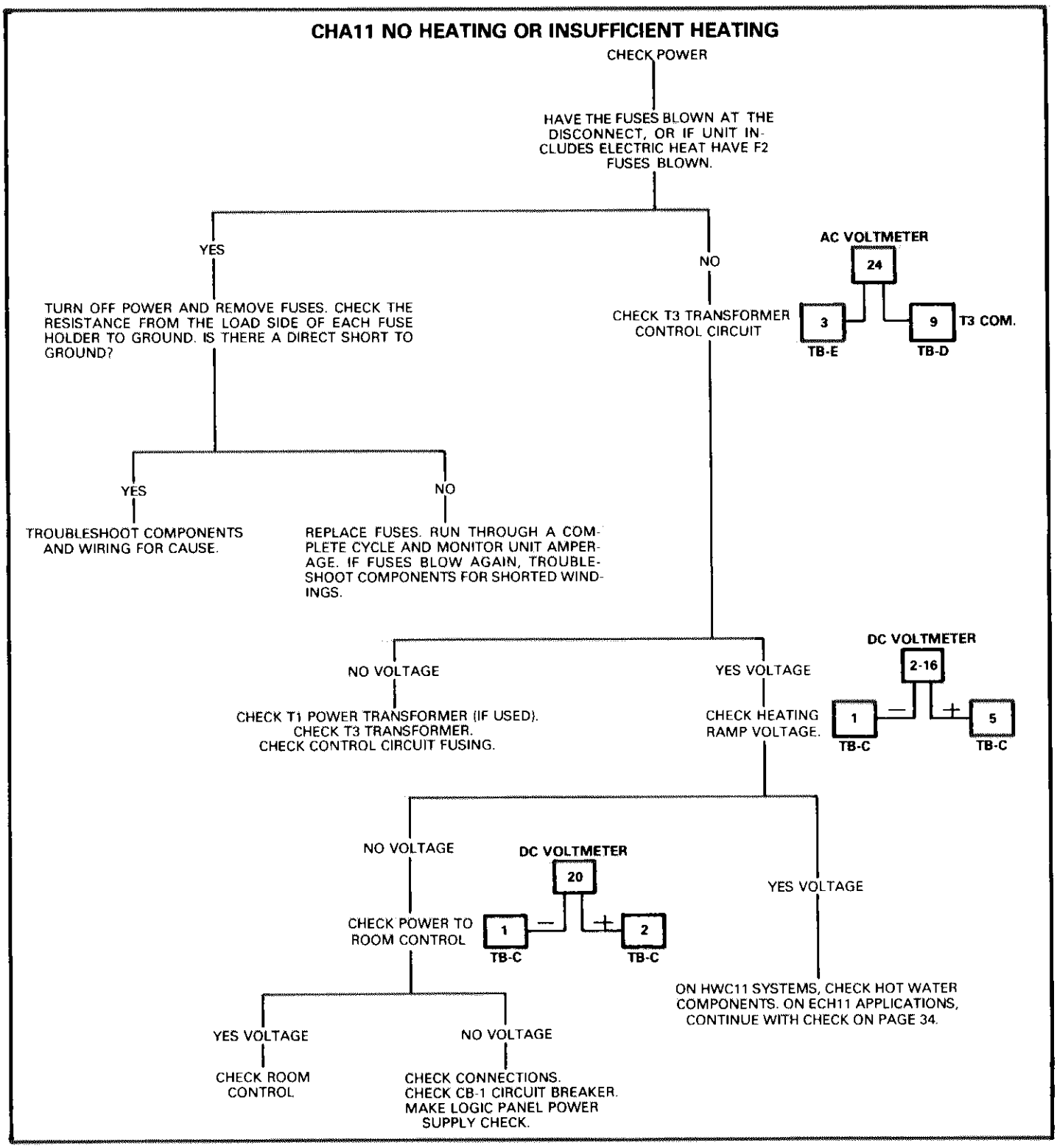
FIGURE 35

XIII - TROUBLESHOOTING

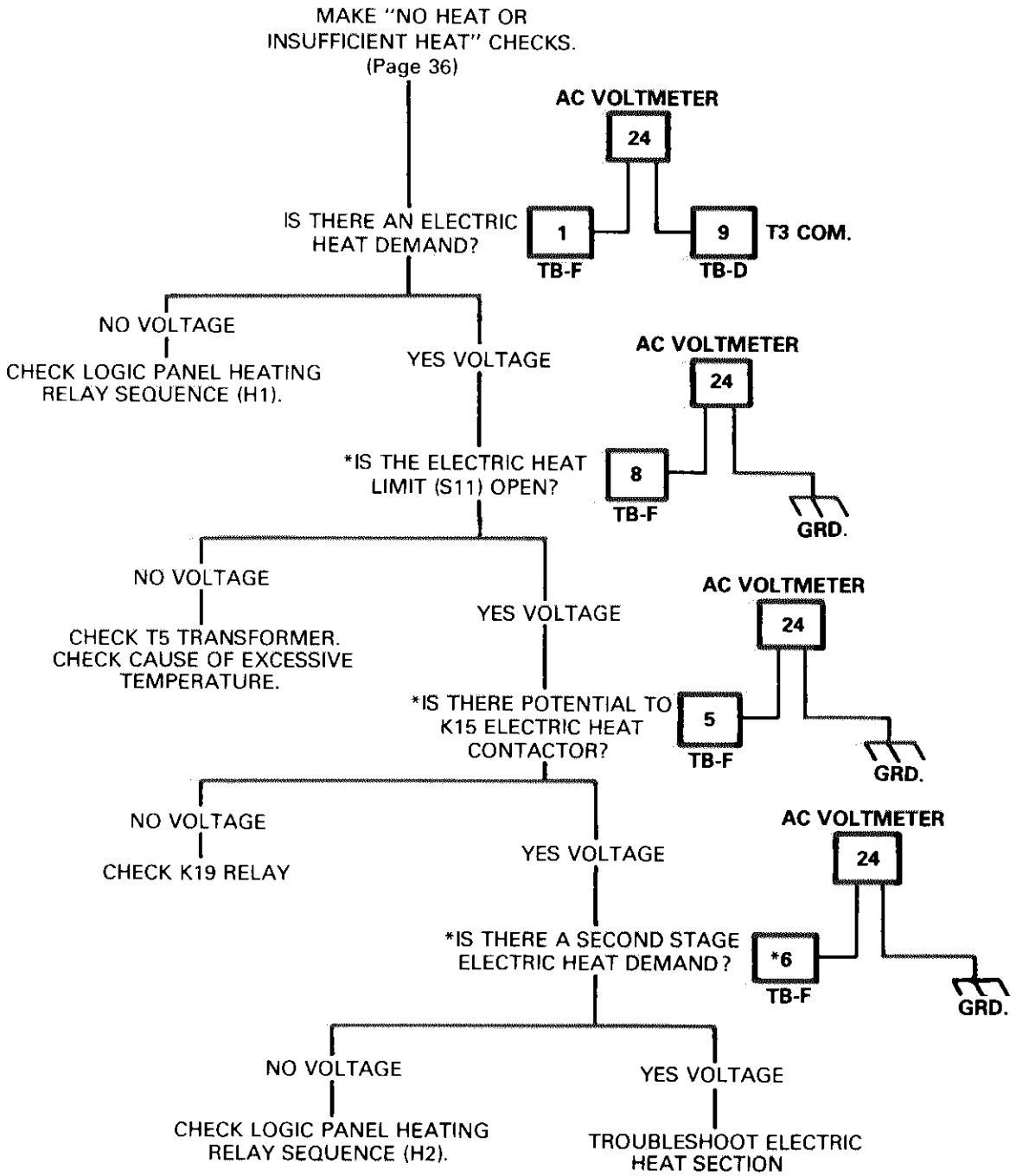
The CHA11 is engineered for troubleshooting convenience. Many problems can be determined at the unit make-up box before opening unit access panels. All that is needed is an ohmmeter and an AC/DC voltmeter

Perform the checks outlined in the following flow charts. Each check shows the terminal block, meter test points and voltage.

Additional information is available for troubleshooting the Honeywell solid-state control system. Refer to the "Miscellaneous" section within this manual. Before condemning any components, be sure all terminal connections are tight in the circuit. This is particularly important on DC voltages, especially at the thermostat.



ELECTRIC HEAT TROUBLESHOOTING CHART



*THESE CHECKS CANNOT BE MADE ON ECH11 "Q" VOLTAGE HEATERS WITH 15KW OR ECH11 "G" VOLTAGE HEATERS WITH 15/30 KW.

**ON ECH11-95/135-60-Q UNITS, THIS CHECK IS MADE AT TB-F7.

CHA11 NO COOLING OR INSUFFICIENT COOLING