

SERVICE UNIT INFORMATION CBP13

Litho U.S.A.

CBP13-480FF SERIES UNITS

I - INTRODUCTION

The CBP13-480FF is designed for horizontal installation with a matching 1-1/2, 2 or 2-1/2 ton Lennox heat pump and L10 line set. Figure 1 shows an exploded view. The unit includes an expansion valve and check valve.

Factory installed electric heaters are available in 5KW increments up to 20 KW. The heating output table lists the KW for each heater at various voltages. The unit model number identifies the amount of KW. Figure 2 explains the model number designation.

II - UNIT INFORMATION

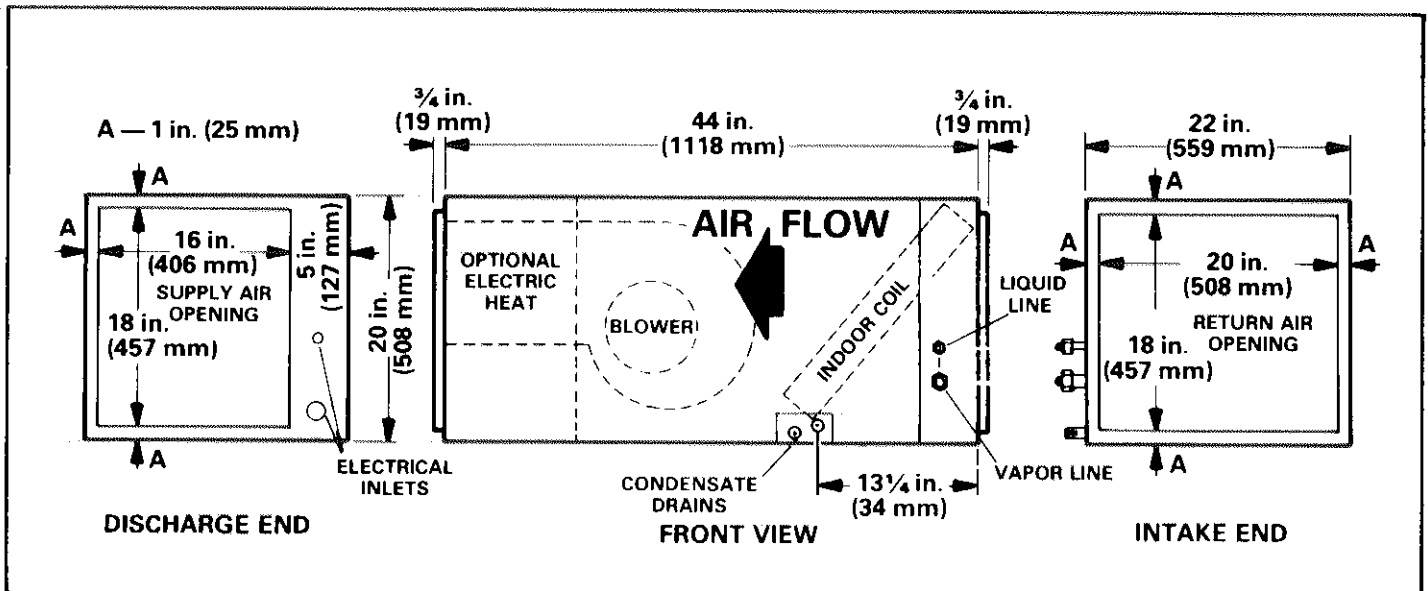
A - Specifications

Model No.		CBP13-480FF
Nominal cooling capacity (tons)		2-1/2
Indoor Coil	Net face area (sq. ft.)	2.5
	Tube diam. (in.) & no. of rows	1/2 — 4
	Fins per inch	10
	Vapor line conn. o.d. (in.)	3/4 (flare)
	Liquid line conn. o.d. (in.)	3/8 (flare)
Refrigerant		R-22
Condensate drains (2)	mpt (in.)	3/4
	Tubing o.d.	7/8
Blower wheel nom. diam. x width (in.)		10 x 9
Blower motor hp		1/4
Net weight (lbs.) (1 package)		135
Electric characteristics		230v/60hz/1ph

C - Heating Output

MODEL NUMBER	OUTPUT	
	VOLTAGE	KW
CBP13-480-05FF	208	3.9
	220	4.4
	230	4.8
	240	5.2
CBP13-480-10FF	208	7.8
	220	8.8
	230	9.6
	240	10.4
CBP13-480-15FF	208	11.8
	220	13.1
	230	14.4
	240	15.6
CBP13-480-20FF	208	15.7
	220	17.5
	230	19.2
	240	20.9

B - Dimensions



CBP13 EXPLODED VIEW

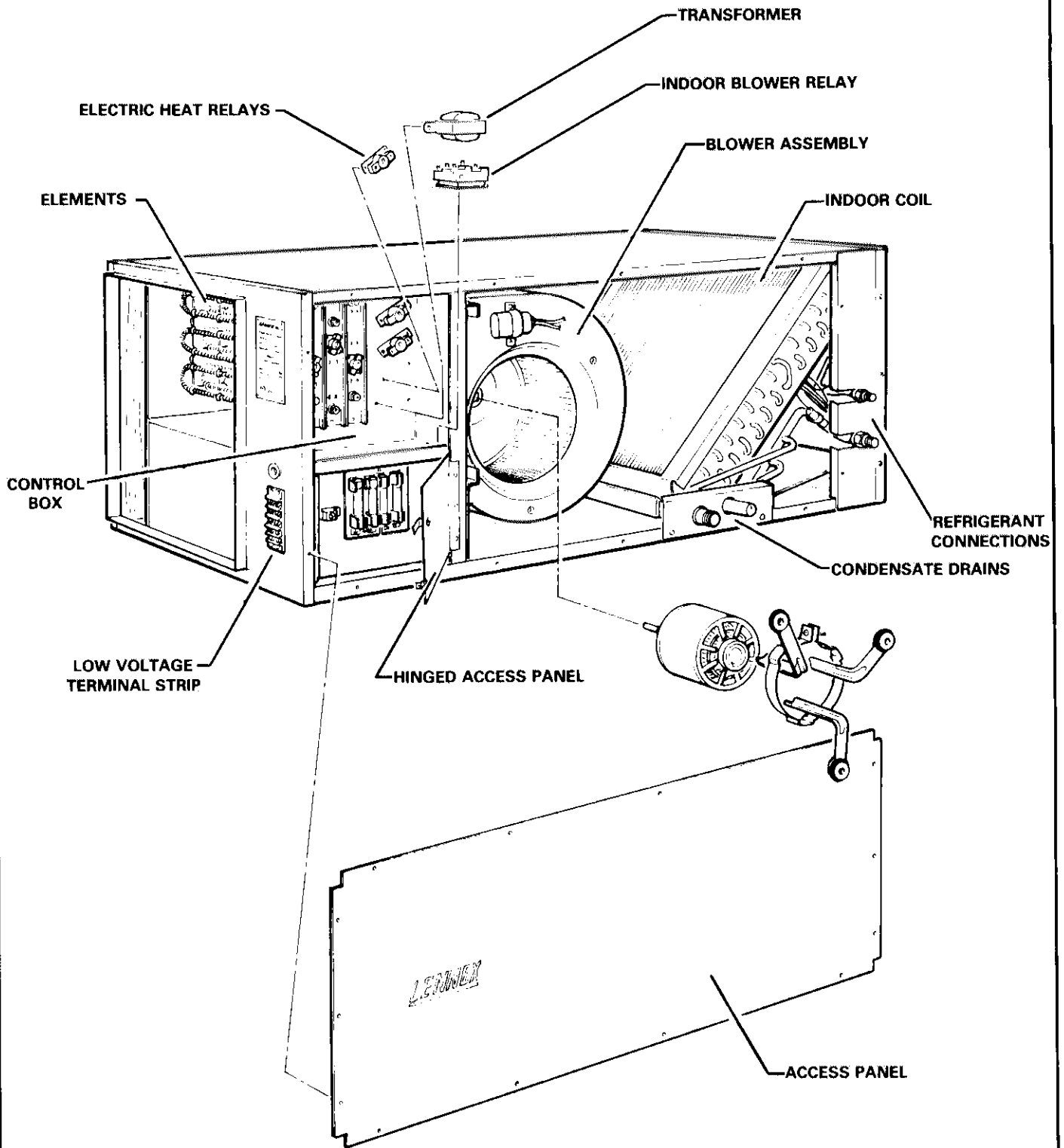


FIGURE 1

D - Field Wiring

Figure 3 illustrates the field wiring. The 5 KW and 10 KW electric heaters can be single staged by installing an outdoor thermostat between the "Y" leg of thermostat and terminal "W1" at CBP13. The 15 and 20 KW heaters can be two staged by removing factory installed jumper from terminals "4" & "W2", and then connecting to an outdoor thermostat. If desired a field installed emergency heat relay can also be added to by-pass outdoor thermostat in the emergency heat mode.

A field installed defrost heat relay assures electric heat operation during a defrost cycle. Heat anticipation setting is 0.25 amps for electric heat.

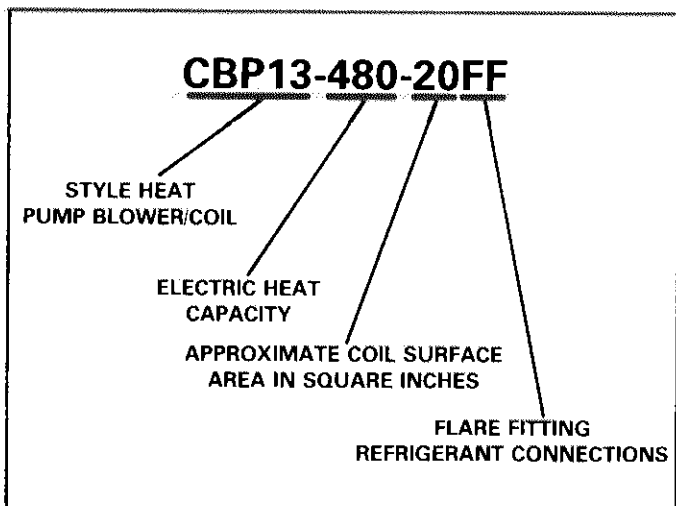


FIGURE 2

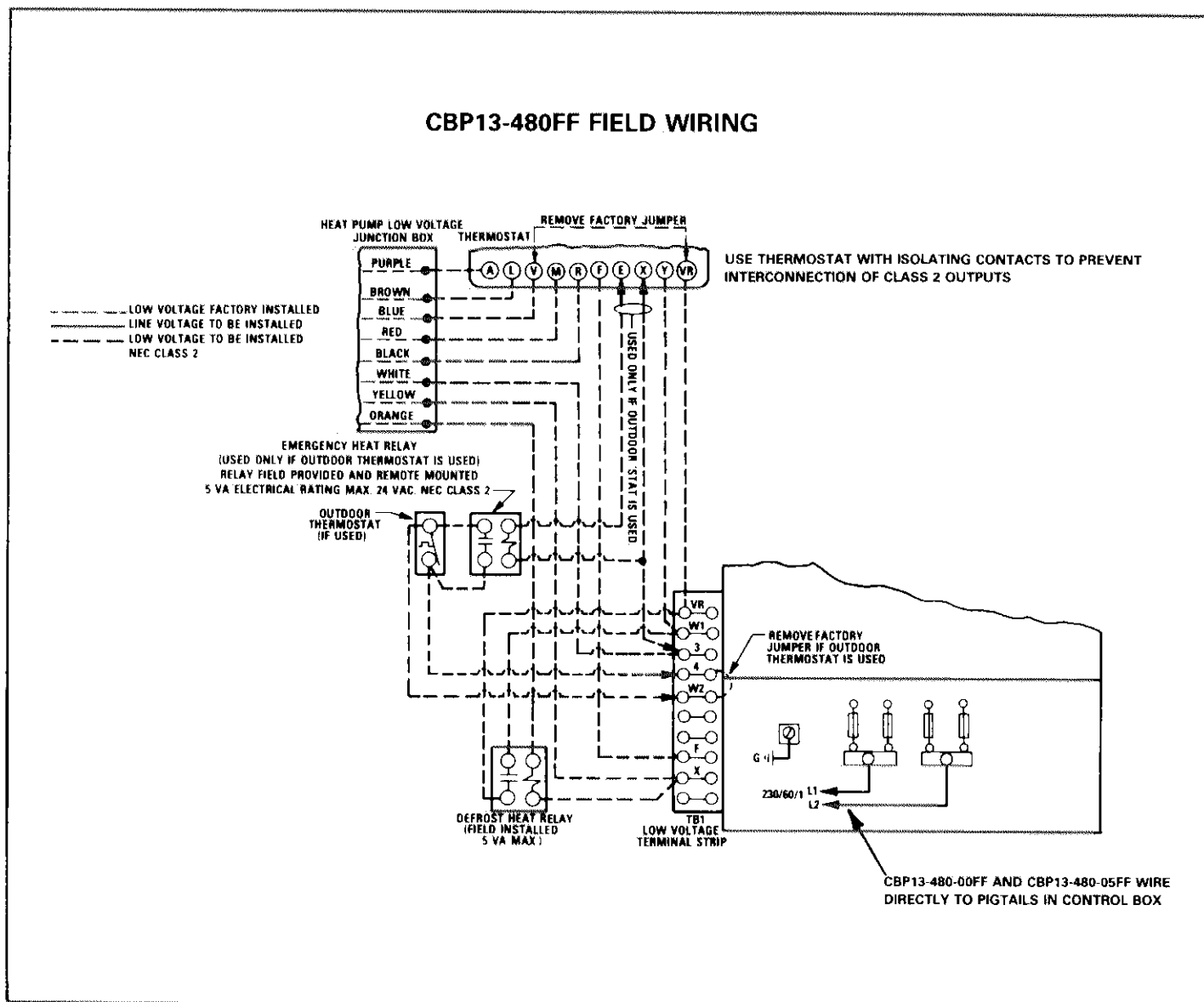


FIGURE 3

E - Blower Performance

CBP13-480FF Only

External Static Pressure (in. wg.)	Air Volume (cfm)@ Various Speeds		
	High	Medium	Low
0	1520	1350	1180
.05	1500	1340	1180
.10	1480	1330	1175
.15	1460	1315	1170
.20	1430	1305	1160
.25	1410	1290	1150
.30	1380	1270	1135
.40	1325	1230	1100
.50	1260	1170	1050
.60	1155	1070	955

With Electric Heat

External Static Pressure (in. wg.)	Air Volume (cfm)@ Various Speeds		
	High	Medium	Low
0	1430	1320	1160
.05	1420	1310	1155
.10	1400	1300	1150
.15	1380	1285	1140
.20	1355	1265	1125
.25	1325	1240	1110
.30	1295	1210	1090
.40	1225	1155	1040
.50	1150	1085	985
.60	1075	1015	930

III - COMPONENTS

Figure 4 identifies the components in CBP13 control box.

1 - Elements

Each element is actually rated for 5.2 KW at 240 volts and is protected by both a thermal fuse and a limit control. The thermal fuse has a cutoff temperature of 300°F

and a resistive interrupt current of 25 A. The limit control de-energizes the element at excessive temperatures. It breaks at 145°F and automatically resets at 110°.

2 - Transformer (T1)

208-230 Volt primary/24 Volt secondary — 30 VA.

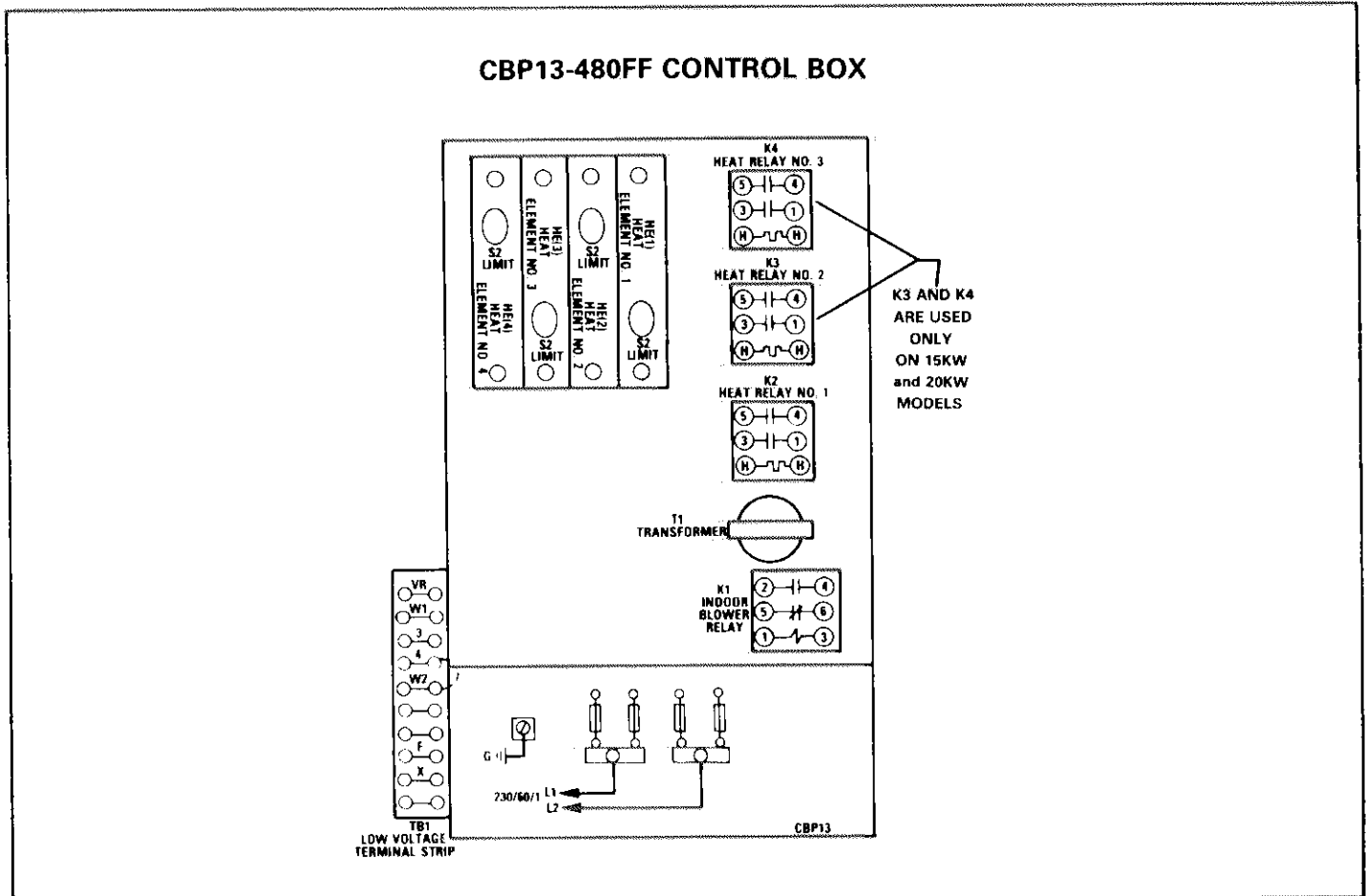


FIGURE 4

3 - Indoor Blower Relay (K1)

Initiates blower motor operation when thermostat is set to "on" or whenever there is a compressor demand.

4 - Fuse Block

Used on 15 KW and 20 KW units only. Replace with same size Class K fuse.

5 - Heat Relays (K2, K3 & K4)

These Texas Instrument relays bring the heating elements on and off the line in a timed sequence. They also initiate and terminate blower motor operation whenever the Indoor Blower Relay (K1) is de-energized.

Table 1 identifies the relay part number and Table 2 lists the timing sequence per contact.

TABLE 1

UNIT	LENNOX PART NO.		
	K2	K3	K4
CBP13-480-05FF	39C4101	----	----
CBP13-480-10FF	39C4001	----	----
CBP13-480-15FF	39C4001	39C4001	39C4101
CBP13-480-20FF	39C4001	39C4001	39C3901

TABLE 2

SEQUENCE TIMING (SECONDS)			
PART NO.		ON	OFF
39C3901	1ST CONTACT	30 - 110	1 - 37
	2ND CONTACT	30 - 110	1 - 30
39C4001	1ST CONTACT	1 - 25	50 - 110
	2ND CONTACT	30 - 110	1 - 40
39C4101		30 - 110	1 - 37

IV - BLOWER SPEED ADJUSTMENT

CBP13-480 units use a three speed direct drive blower motor. Table 3 identifies the speed selection chart. The minimum blower speed in electric heat applications is medium (blue lead). For 1-1/2 and 2 ton heat pump only applications, the minimum blower speed is low; while on 2-1/2 ton applications it is medium.

Proper air volumes must be maintained. Air test holes are provided in cabinet to measure the pressure drop across the coil. See Figure 5. Table 4 correlates pressure drop readings to unit CFM.

Note - The minimum reading on 1-1/2 and 2 ton applications is 0.05 In. W.C. The minimum on 2-1/2 ton applications is 0.12 In. W.C.

- 1 - Remove snap hole plugs from unit and insert an awl through panel insulation.
- 2 - Insert the inclined manometer hoses into air test holes so they extend 1/4 in. past the inside edge of cabinet insulation. Connect the zero end of manometer to the entering air side of coil. Seal around hoses with pergamum or sealing compound.

TABLE 3

SPEED	BLOWER MOTOR LEAD
LOW	RED
MEDIUM	BLUE
HIGH	BLACK

Tape unused motor leads separately.

TABLE 4

DRY EVAPORATOR MANOMETER READINGS			
AIR VOLUME		COIL PRESSURE DROP	
CFM	M ³ /sec	in. W.C.	mm W.C.
800	4.06	0.05	1.3
900	4.57	0.09	2.3
1000	5.08	0.13	3.3
1100	5.59	0.17	4.3
1200	6.10	0.21	5.3
1300	6.60	0.25	6.4
1400	7.11	0.30	7.6

These are not total resistance readings, but simply pressure drop readings across the coil.

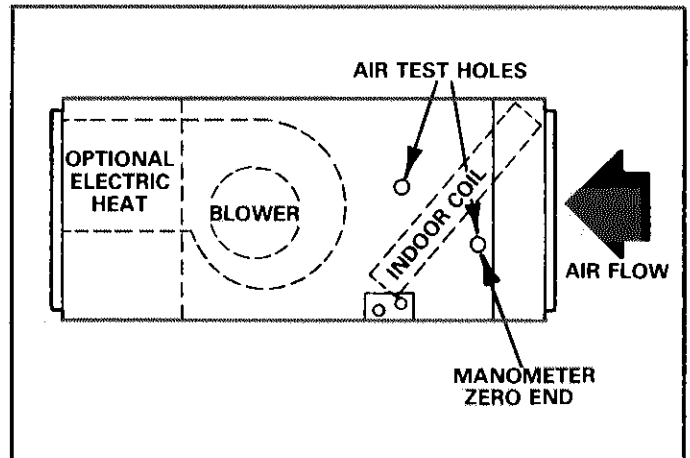


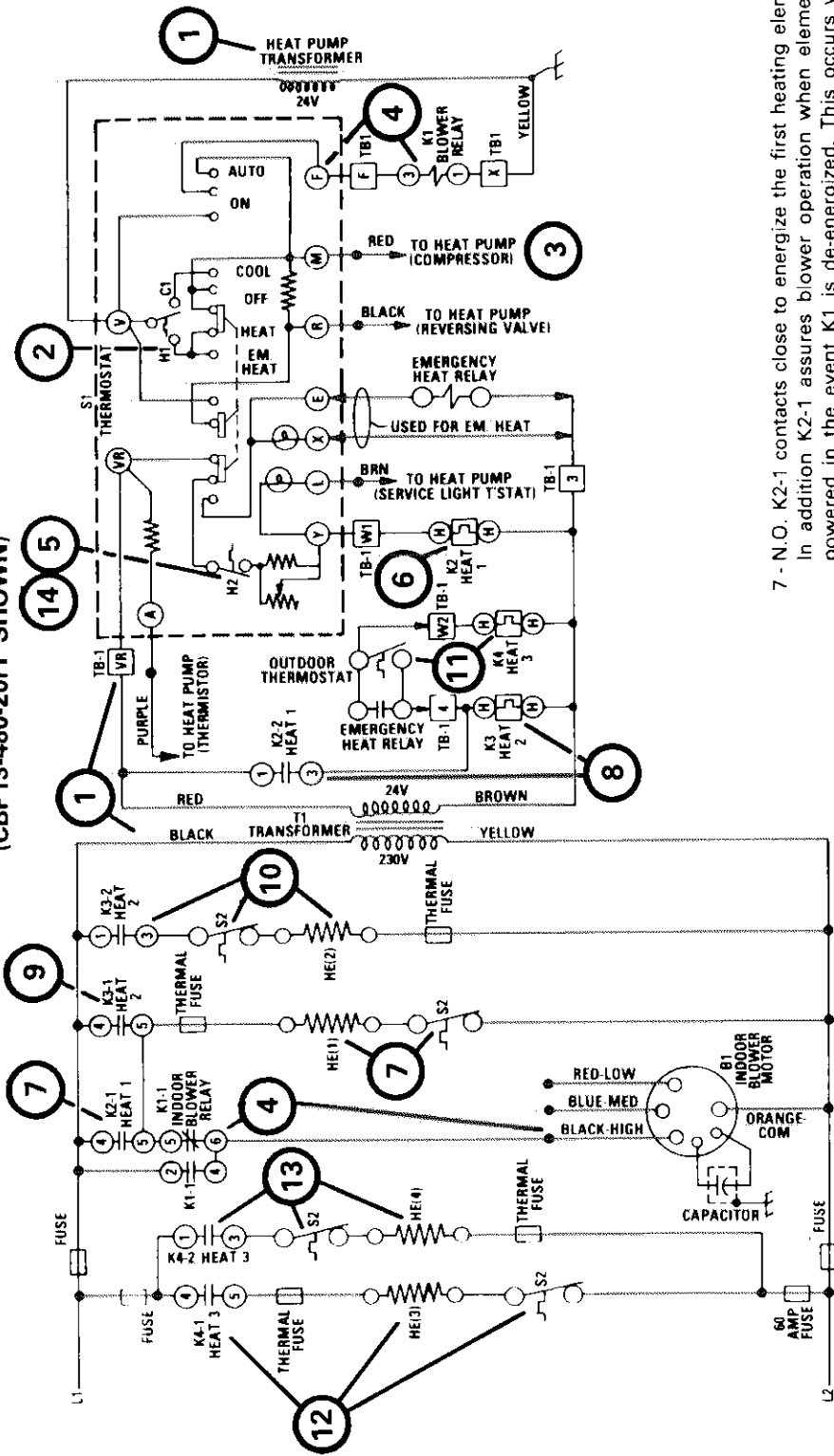
FIGURE 5

- 3 - With only the indoor blower operating, observe the pressure drop reading. Table 4 reflects reading for a dry evaporator. If reading is below air volume required, remove blower access panel and wire motor to a higher blower speed. If reading is above required air volume, wire motor to a lower speed. Do not set blower speed below minimum air requirements.
- 4 - After required readings are established, remove hoses and insert snap hole plugs.

V - SCHEMATIC WIRING DIAGRAM OPERATING SEQUENCE

Figure 6 shows the sequence of operation for a CBP13-480-20FF applied to a typical heat pump with an outdoor thermostat and an emergency heat relay.

**TYPICAL CBP13 SEQUENCE OF OPERATION
(CBP13-480-20FF SHOWN)**



SEQUENCE OF OPERATION

- 1 - CBP13 transformer provides 24 volts to "VR" circuit at thermostat. The heat pump transformer provides 24 volts to "V" circuit.
- 2 - Thermostat's stage 1 heating bulb makes on a heating demand.
- 3 - This energizes the heat pump to provide the initial heating.
- 4 - As the compressor circuit is energized, the indoor blower relay (K1) is energized through "F" leg of thermostat. N.O. K1-1 contacts close to start the indoor blower motor.
- 5 - When additional heat is needed, the second stage heating bulb makes at thermostat.
- 6 - Heat Relay No. 1 (K2) is energized through the "Y" leg of thermostat.

- 7 - N.O. K2-1 contacts close to energize the first heating element. In addition K2-1 assures blower operation when element is powered in the event K1 is de-energized. This occurs when thermostat is placed to "Emergency Heat."
- 8 - After a short delay, the N.O. K2-2 contacts close to energize Heat Relay No. 2 (K3).
- 9 - N.O. K3-1 contacts close to again assure blower operation when the element is powered.
- 10 - After a short delay, the N.O. K3-2 contacts close to bring on the second element.
- 11 - When K2-2 contacts make in step 8, Heat Relay No. 3 (K4) is also energized providing that the optional outdoor thermostat is made.
- 12 - N.O. K4-1 contacts close to bring on the third element.
- 13 - After a short delay, N.O. K4-2 contacts close to bring on the fourth element.
- 14 - When the supplemental heat demand is satisfied, the second stage bulb breaks the control circuit. This de-energizes K2. The heat relays sequence the elements off. The contacts to the blower motor are the last to break.

FIGURE 6