

## E12 SERIES UNITS

### I - INTRODUCTION

The E12 electric furnace was introduced in 1979. It is designed for both up-flow and down-flow installation. An additive base is available for installing unit in the downflow position on combustible flooring. For up-flow applications a return air cabinet is also available for installation on either side of the furnace. Ordering numbers for the additive base and return air cabinet are listed in unit specifications.

E12 electric heater sizes range from 5 KW up to 30 KW in increments of 5 KW. The unit model number identifies the amount of KW. For example an E12Q2-10 model would have two 5 KW elements for a total of 10 KW. The heating output table lists the KW for each furnace at various voltages.

Two different styles of heat relays are used in E12 units. The dash number at the end of the model number designates the style used. Dash 1 is Robertshaw while dash 2 is Therm-O-Disc. Refer to sections within this manual for further information on the controls.

Either up-flow (C12 & CP12) or down-flow (CR12) indoor coils are available. Installation consists of removing access panels and sliding the coil in place. The C12 and CR12 coils require either an expansion valve kit or a heat pump kit for the

respective cooling or heat pump application. See the "Blower Coils/Coils" section for further information. The CP12 is a heat pump only coil which does not require a kit.

Figure 1 illustrates a typical E12 furnace cutaway shown with an up-flow coil.

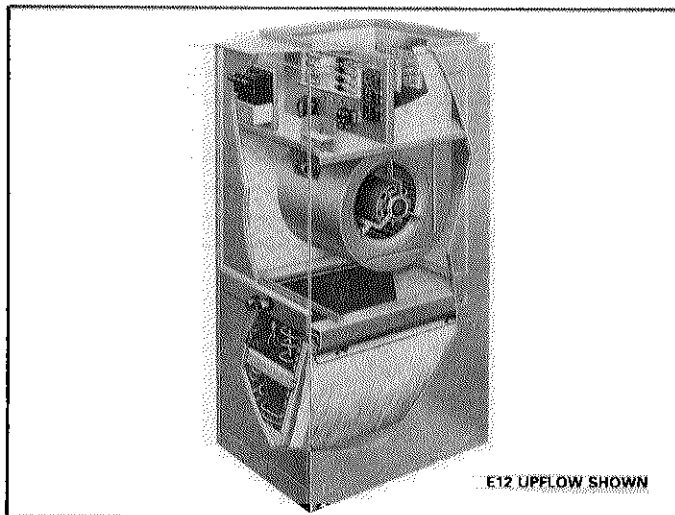
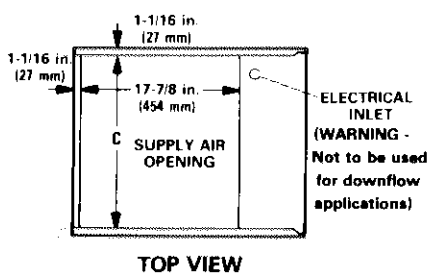
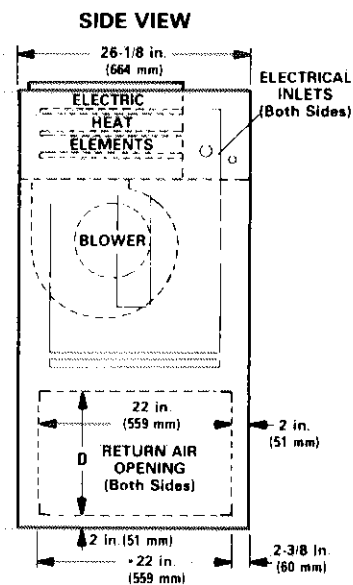


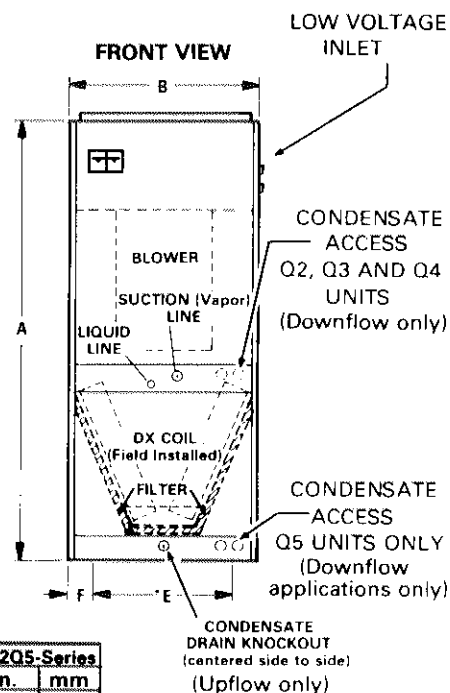
FIGURE 1

### II - UNIT INFORMATION

#### A - Dimensions



*NOTE - All duct openings and mounting holes must be cut and drilled before inserting DX coil.*



	E12Q2-Series		E12Q3-Series		E12Q4-Series		E12Q5-Series	
Dim.	in.	mm	in.	mm	in.	mm	in.	mm
A	49	1245	49	1245	53	1346	53	1346
B	16-1/4	413	21-1/4	540	26-1/4	667	31-1/4	794
C	14-1/8	359	19-1/8	486	24-1/8	613	29-1/8	740
D	14	356	14	356	18	457	18	457
E	11	279	14	356	21	533	26	660
F	2-5/8	67	3-5/8	92	2-5/8	67	2-5/8	67

## B - Specifications

Model No.	E12Q2-05 E12Q2-10 E12Q2-15	E12Q3-10 E12Q3-15 E12Q3-20	E12Q4-15 E12Q4-20 E12Q4-25	E12Q5-15 E12Q5-20 E12Q5-25 E12Q5-30
Blower wheel nominal diam. x width (in.)	10 x 7	10 x 8	10 x 8	12 x 12
Blower motor hp	1/4	1/3	1/2	3/4
Net free filter area (sq. ft.)	5.3	6.3	7.8	8.7
Filter cut size (in.)	30 x 26 x 1	40 x 26 x 1	44 x 26 x 1	50 x 26 x 1
Tons of cooling that can be added	1-1/2 or 2	2-1/2 or 3	3, 3-1/2 or 4	4 or 5
Shipping weight (lbs.)	121	131	158	199
Number of packages in shipment	1	1	1	1
Electrical characteristics	208 240v/60hz/1 phase			
†Optional Return Air Cabinet (Up-Flo only)	Model No.	RA10-16-49		RA10-16-53
	Shipping weight (lbs.)	54		56
†Optional Additive Coils	Up-Flo	C12-420	C12-525, CP12-630	C12-630
	Down-Flo	CR12-420	CR12-525, CR12-630N	CR12-630
†Down-Flo Additive Base (Optional)		LB-34695BA	LB-34695BB	LB-34695BC
				LB-34695BD

†Must be ordered extra.

## D - Blower Performance

### C - Heating Output

UNIT MODEL NO.	OUTPUT	
	VOLTAGE	KW
E12Q2 05	208	3.8
	220	4.2
	230	4.6
	240	5.0
E12Q2 10 E12Q3 10	208	7.6
	220	8.4
	230	9.2
	240	10.0
E12Q2-15 E12Q3 15 E12Q4-15 E12Q5-15	208	11.4
	220	12.6
	230	13.8
	240	15.0
E12Q3 20 E12Q4-20 E12Q5-20	208	15.2
	220	16.8
	230	18.4
	240	20.0
E12Q4 25 E12Q5 25	208	19.0
	220	21.0
	230	23.0
	240	25
E12Q5 30	208	22.5
	220	25.2
	230	27.6
	240	30.0

### E12Q2 SERIES BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds		
	High	Medium	Low
<b>E12 Only</b>			
0	1295	990	680
0.5	1275	990	685
1.0	1255	985	690
1.5	1235	980	690
2.0	1210	975	690
2.5	1190	970	685
3.0	1160	960	685
4.0	1100	935	670
5.0	1030	895	645
6.0	950	840	595
<b>With CR12-420 Coil</b>			
0	965	900	690
0.5	940	875	685
1.0	910	855	680
1.5	885	830	675
2.0	860	805	670
2.5	830	780	660
3.0	800	750	645
4.0	735	685	595
5.0	640	595	505
<b>C12-420 Coil</b>			
0	1155	975	685
0.5	1130	965	685
1.0	1100	955	690
1.5	1070	940	685
2.0	1040	925	680
2.5	1010	910	670
3.0	980	885	660
4.0	940	840	635
5.0	850	775	590
6.0	760	680	505

NOTE - All Cfm is measured external to the unit with the air filter in place.

## E12Q3 BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds			
	High	Med-High	Med-Low	Low
<b>E12 Only</b>				
0	1555	1340	1060	895
.05	1550	1340	1060	895
.10	1545	1340	1060	900
.15	1540	1335	1060	900
.20	1530	1330	1060	895
.25	1525	1325	1055	895
.30	1515	1320	1050	890
.40	1490	1300	1030	875
.50	1465	1275	1010	850
.60	1420	1240	980	820
.70	1370	1200	940	775
<b>With C12-525 Coil</b>				
0	1510	1330	1050	890
.05	1500	1320	1045	890
.10	1485	1315	1040	890
.15	1470	1305	1035	885
.20	1450	1290	1030	880
.25	1435	1280	1025	875
.30	1410	1265	1015	870
.40	1365	1230	990	850
.50	1315	1190	960	820
.60	1250	1145	915	775
.70	1180	1085	860	---
<b>With CR12-525 Coil</b>				
0	1470	1325	1050	895
.05	1445	1305	1045	895
.10	1420	1285	1040	890
.15	1390	1265	1035	890
.20	1365	1245	1030	885
.25	1340	1225	1020	880
.30	1305	1200	1010	875
.40	1245	1160	980	850
.50	1180	1105	940	810
.60	1110	1040	890	750

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds			
	High	Med-High	Med-Low	Low
<b>With C12-630N Coil</b>				
0	1420	1280	1035	890
.05	1405	1270	1035	890
.10	1385	1255	1030	885
.15	1365	1240	1020	880
.20	1345	1225	1010	870
.25	1325	1210	1000	860
.30	1300	1185	985	850
.40	1250	1140	950	820
.50	1195	1095	915	790
.60	1135	1040	870	755
<b>With CR12-630N Coil</b>				
0	1405	1270	1035	890
.05	1385	1255	1030	885
.10	1365	1240	1020	880
.15	1345	1225	1010	870
.20	1325	1210	1000	860
.25	1300	1185	985	850
.30	1280	1165	970	840
.40	1225	1120	935	810
.50	1170	1070	890	770
.60	1105	1010	845	735

NOTE — All Cfm is measured external to the unit with the air filter in place.

## E12Q4 SERIES BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds		
	High	Medium	Low
<b>E12 Only</b>			
0	2112	1560	1174
.05	2080	1550	1180
.10	2040	1540	1185
.15	2000	1530	1190
.20	1960	1520	1190
.25	1925	1510	1195
.30	1885	1495	1195
.40	1805	1460	1180
.50	1730	1415	1155
.60	1645	1350	1095
.70	1560	---	---
<b>With C12-630 Coil</b>			
0	1913	1527	1192
.05	1875	1510	1190
.10	1840	1500	1190
.15	1800	1485	1185
.20	1765	1470	1180
.25	1725	1450	1177
.30	1690	1435	1170
.40	1605	1395	1150
.50	1530	1335	1110
.60	1440	1250	1055
.70	1350	---	---

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds		
	High	Medium	Low
<b>With C12R-630 Coil</b>			
0	1819	1433	1120
.05	1790	1422	1120
.10	1760	1412	1115
.15	1730	1400	1110
.20	1700	1390	1105
.25	1670	1380	1095
.30	1640	1360	1090
.40	1580	1325	1070
.50	1500	1280	1040
.60	1430	1230	1000
.70	1345	---	---

NOTE — All Cfm is measured external to the unit with the air filter in place.

## E12Q5 SERIES BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds				
	High	Med-High	Medium	Med-Low	Low
<b>E12 Only</b>					
0	3024	2732	2443	2100	1793
.05	2990	2705	2420	2080	1770
.10	2960	2680	2390	2065	1750
.15	2930	2645	2370	2045	1735
.20	2895	2620	2340	2030	1710
.25	2860	2590	2320	2000	1690
.30	2830	2560	2290	1980	1670
.40	2760	2500	2240	1930	1615
.50	2680	2440	2180	1870	1560
.60	2610	2320	2120	1805	1500
.70	2530	2295	2050	1740	1430
<b>With C12-840 Coil</b>					
0	2676	2477	2273	1973	1701
.05	2640	2445	2245	1950	1685
.10	2605	2415	2220	1920	1660
.15	2575	2380	2190	1900	1640
.20	2540	2350	2165	1875	1615
.25	2505	2320	2135	1850	1595
.30	2470	2290	2100	1825	1570
.40	2400	2225	2050	1770	1520
.50	2315	2150	1980	1710	1460
.60	2230	2070	1900	1645	1400
.70	2140	1990	1820	1580	1330
<b>With CR12-840 Coil</b>					
0	2311	2221	2104	1943	1734
.05	2280	2190	2070	1920	1710
.10	2250	2160	2048	1880	1680
.15	2220	2115	2020	1850	1660
.20	2180	2085	1985	1820	1622
.25	2145	2050	1960	1790	1595
.30	2105	2015	1922	1760	1570
.40	2030	1940	1850	1695	1502
.50	1945	1865	1770	1630	1440
.60	1860	1782	1698	1550	1370
.70	1780	1700	1612	1470	1290

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds				
	High	Med-High	Medium	Med-Low	Low
<b>With C12-1120 Coil</b>					
0	2614	2443	2239	1939	1679
.05	2580	2420	2210	1915	1655
.10	2550	2385	2180	1890	1630
.15	2510	2350	2150	1870	1610
.20	2475	2320	2120	1840	1585
.25	2440	2290	2090	1820	1560
.30	2400	2250	2060	1790	1535
.40	2330	2180	1990	1735	1480
.50	2255	2100	1930	1675	1430
.60	2175	2030	1860	1610	1370
.70	2085	1950	1780	1540	1300
<b>With CR12-1120 Coil</b>					
0	2244	2163	2071	1907	1700
.05	2210	2130	2040	1880	1675
.10	2172	2100	2010	1850	1640
.15	2140	2065	1980	1820	1615
.20	2100	2030	1940	1785	1585
.25	2070	2010	1910	1755	1550
.30	2035	1960	1870	1720	1530
.40	1962	1890	1805	1660	1465
.50	1890	1822	1740	1590	1400
.60	1815	1740	1660	1520	1335
.70	1730	1665	1585	1440	1262

NOTE — All Cfm is measured external to the unit with the air filter in place.

### III - COMPONENTS

Figure 2 show an E12 exploded view. Figures 3, 4, 5, 6, 7, and 8 show the control box arrangements for the various units.

#### 1 - Element

Each element is rated for 5 KW at 240 volts. The heat relay steps these heaters "on" in 5 KW increments. Each element is protected by both a thermal fuse and a limit control.

The thermal fuse has a cutoff temperature of 333°F and a resistive interrupt current of 40A. The limit control de-energizes the element at excessive temperatures. See Table 1 for control setpoints.

TABLE 1

UNIT	CUT OUT TEMPERATURE	CUT IN TEMPERATURE
E12Q2 Series E12Q3 Series E12Q4 Series	130°F	95°F
E12Q5 Series	160°F	125°F

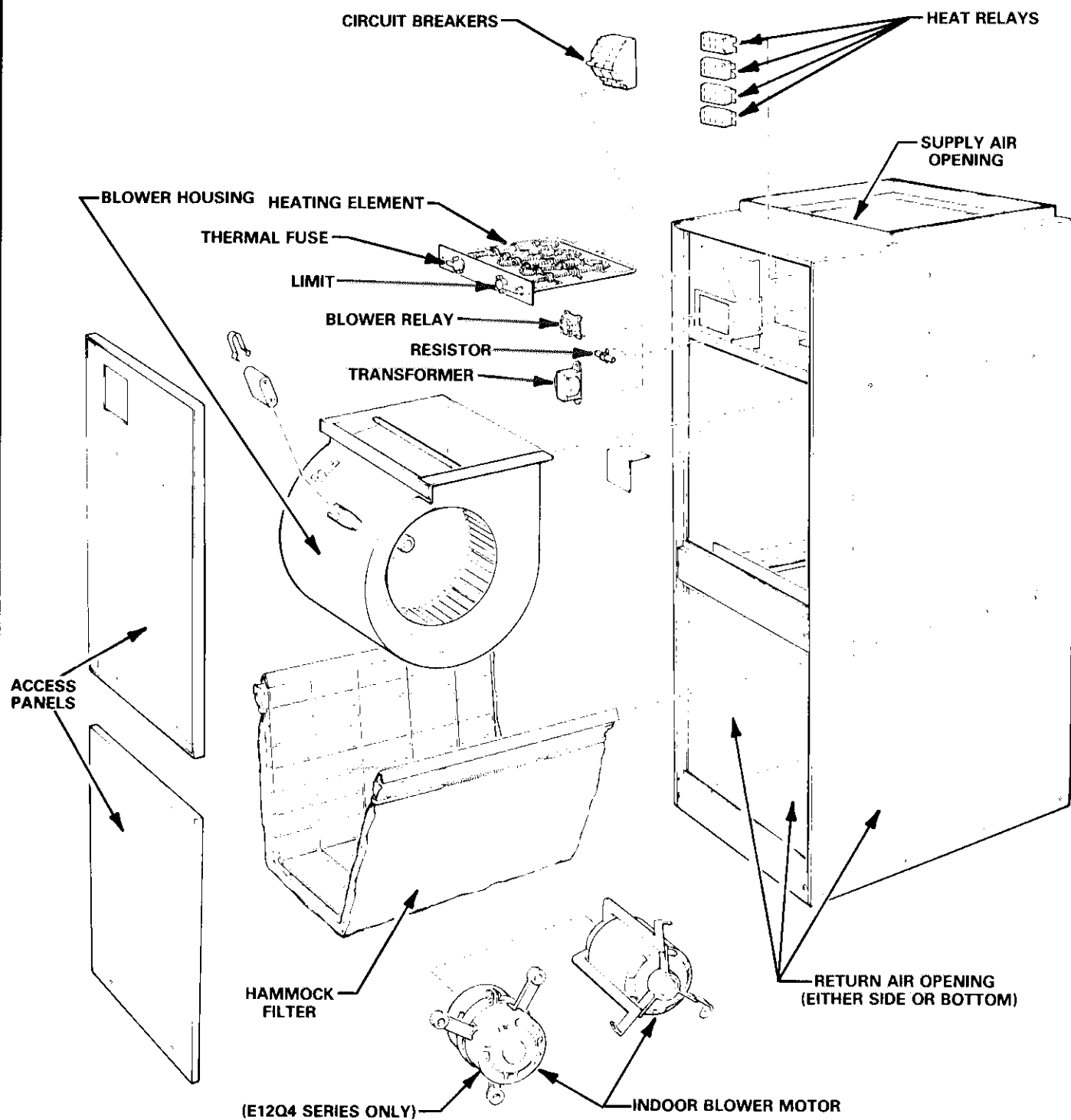
#### 2 - Transformer

Units with 15 KW or less electric heat use a 30 VA control transformer, while units with more than 15 KW use a 45 VA transformer.

#### 3 - Circuit Breakers

Circuit breakers serve as unit protection.

**E12Q2 SERIES  
(SHOWN IN UP-FLOW POSITION)**



**FIGURE 2**

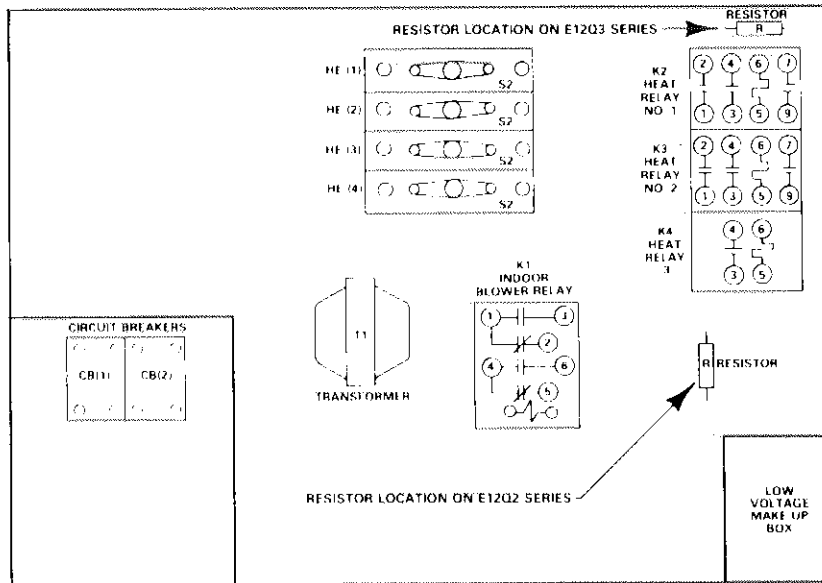


FIGURE 3

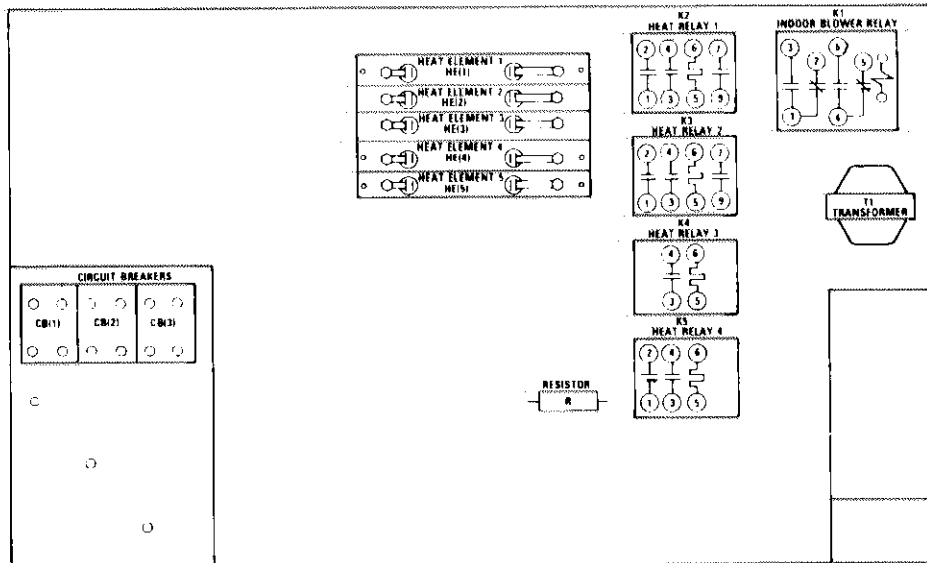
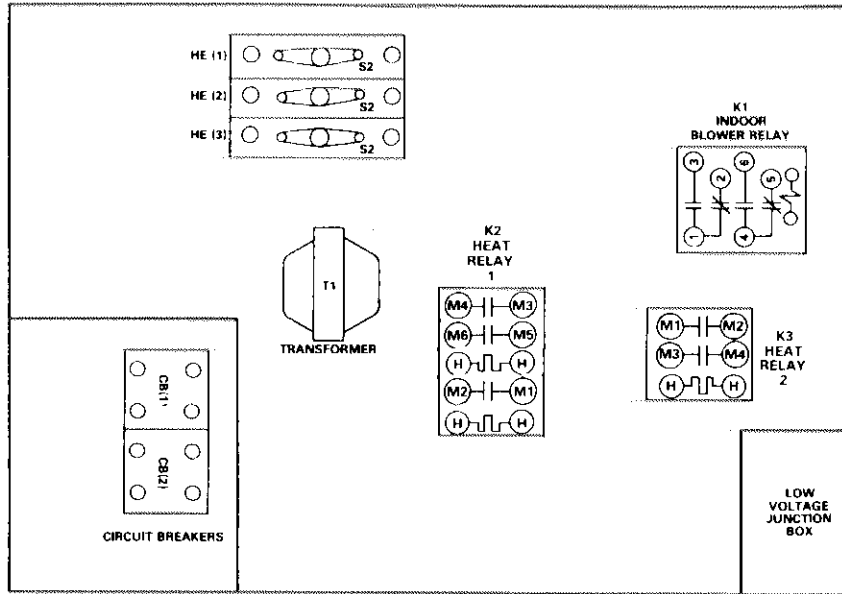


FIGURE 4

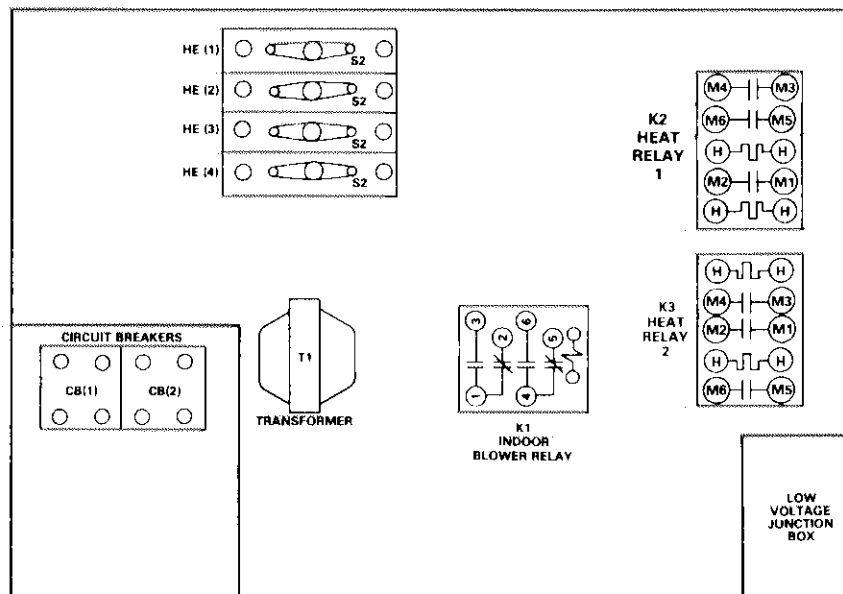
MODEL NUMBER	TOTAL ELEMENTS	ELEMENTS PER STAGE		HEAT RELAY USAGE			CIRCUIT BREAKER USAGE	
		1st Stage	2nd Stage	K2	K3	K4	CB(1)	CB(2)
E12Q2-05-1P	1	1	---	Yes	No	No	Yes	No
E12Q2-10-1P	2	2	---	Yes	No	No	Yes	No
E12Q2-15-1P	3	2	1	Yes	Yes	No	Yes	Yes
E12Q3-10-1P	2	2	---	Yes	No	No	Yes	No
E12Q3-15-1P	3	2	1	Yes	Yes	No	Yes	Yes
E12Q3-20-1P	4	2	2	Yes	Yes	Yes	Yes	Yes

MODEL NUMBER	TOTAL ELEMENTS	ELEMENTS PER STAGE			RELAY USAGE				CIRCUIT BREAKER USAGE		
		1st Stage	2nd Stage	3rd Stage	K2	K3	K4	K5	CB(1)	CB(2)	CB(3)
E12Q4-15-1P	3	2	1	---	Yes	Yes	No	No	Yes	Yes	No
E12Q4-20-1P	4	2	2	---	Yes	Yes	Yes	No	Yes	Yes	No
E12Q4-25-1P	5	2	2	1	Yes	Yes	Yes	Yes	Yes	Yes	Yes
E12Q5-15-1P	3	2	1	---	Yes	Yes	No	No	Yes	Yes	No
E12Q5-20-1P	4	2	2	---	Yes	Yes	Yes	No	Yes	Yes	No
E12Q5-25-1P	5	2	2	1	Yes	Yes	Yes	Yes	Yes	Yes	Yes



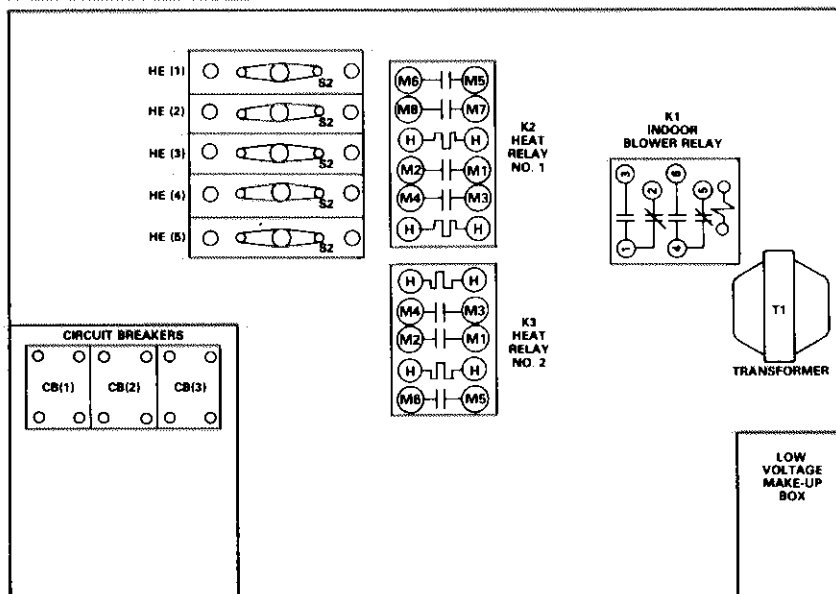
MODEL NUMBER	TOTAL ELEMENTS	ELEMENT PER STAGE		HEAT RELAY USAGE		CIRCUIT BREAKER USAGE	
		1st Stage	2nd Stage	No. 1	No. 2	CB (1)	CB (2)
E12Q2-05-2P	1	1	---	Yes	No	Yes	No
E12Q2-10-2P	2	2	---	Yes	No	Yes	No
E12Q2-15-2P	3	2	1	Yes	Yes	Yes	Yes

FIGURE 5



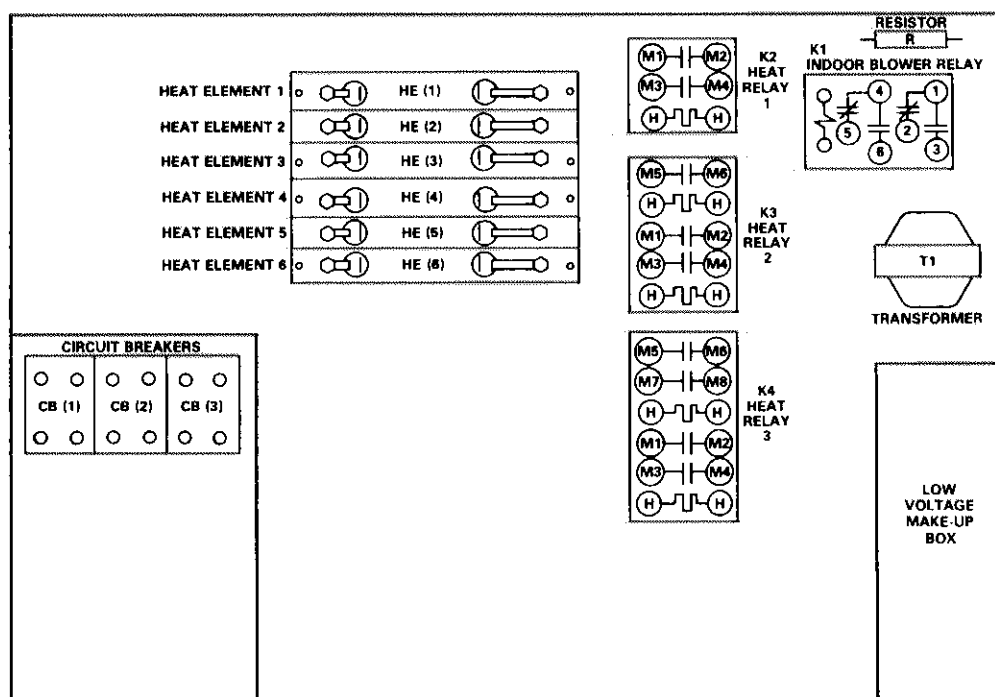
MODEL NUMBER	TOTAL ELEMENTS	ELEMENTS PER STAGE		HEAT RELAY USAGE		CIRCUIT BREAKER USAGE	
		1st Stage	2nd Stage	No. 1	No. 2	CB (1)	CB (2)
E12Q3-10-2P	2	2	---	Yes	No	Yes	No
E12Q3-15-2P	3	2	1	Yes	Yes	Yes	Yes
E12Q3-20-2P	4	2	2	Yes	Yes	Yes	Yes

FIGURE 6



MODEL NUMBER	TOTAL ELEMENTS	ELEMENTS PER STAGE		CIRCUIT BREAKER USAGE		
		1st Stage	2nd Stage	CB (1)	CB (2)	CB (3)
E12Q4-15-2P	3	2	1	Yes	Yes	No
E12Q4-20-2P	4	2	2	Yes	Yes	No
E12Q4-25-2P	5	3	2	Yes	Yes	Yes
E12Q5-15-2P	3	2	1	Yes	Yes	No
E12Q5-20-2P	4	2	2	Yes	Yes	No
E12Q5-25-2P	5	3	2	Yes	Yes	Yes

FIGURE 7



MODEL NUMBER	TOTAL ELEMENTS	ELEMENTS PER STAGE	
		1st Stage	2nd Stage
E12Q5-30-2P	6	3	3

FIGURE 8



#### IV - BLOWER SPEED

Table 2 shows the speed selection chart for the various motors. Table 3 lists the minimum blower speed per E12 usage. Actual unit CFM can be determined using the Blower Performance Charts.

#### V - SCHEMATIC WIRING DIAGRAM OPERATING SEQUENCE

Figure 8 illustrates a typical E12Q5-25-1P application.

TABLE 2

SPEED	BLOWER MOTOR LEAD			
	E12Q2	E12Q3	E12Q4	E12Q5
LOW	RED	RED	RED	RED
MEDIUM LOW	---	YELLOW	---	YELLOW
MEDIUM	YELLOW	---	YELLOW	BLUE
MEDIUM HIGH	---	BROWN	---	BROWN
HIGH	BLACK	BLACK	BLACK	BLACK

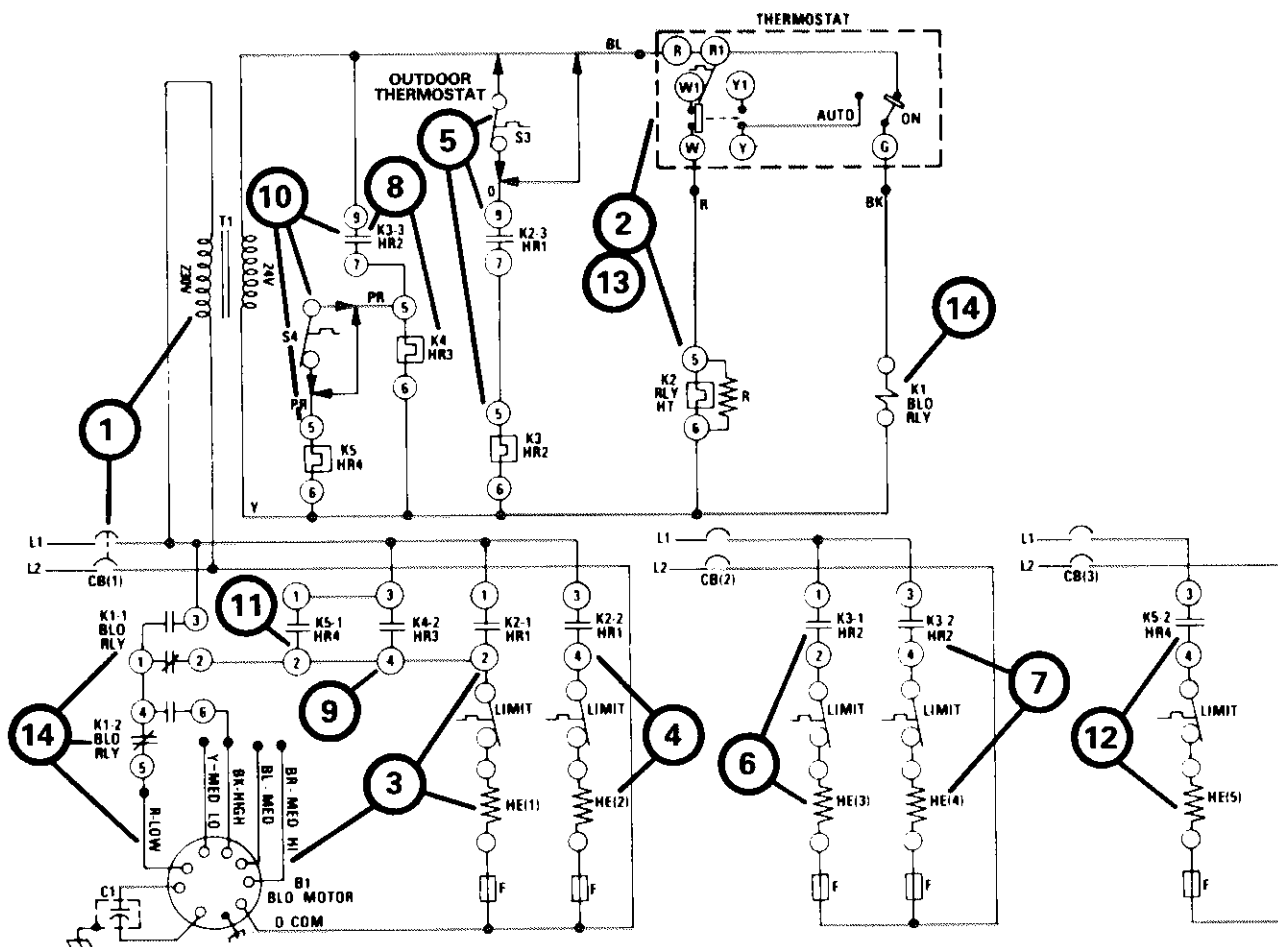
Important - To prevent motor burnout, never connect more than motor lead to any one connection. Tape unused motor leads separately.

TABLE 3

UNIT MODEL NUMBER	ELECTRIC HEAT ONLY	COIL	MINIMUM BLOWER MOTOR SPEED													
			CONDENSING UNIT								HEAT PUMP					
			1-1/2 Ton	2 Ton	2-1/2 Ton	3 Ton	3-1/2 Ton	4 Ton	5 Ton	1-1/2 Ton	2 Ton	2-1/2 Ton	3 Ton	3-1/2 Ton	4 Ton	5 Ton
E12Q2	LOW	C12-420	LOW	MED.	---	---	---	---	---	MED.	MED.	---	---	---	---	---
		C12-420	LOW	MED.	---	---	---	---	---	HI.	HI.	---	---	---	---	---
E12Q3	MED. LOW	C12-525	---	MED. LOW	MED. LOW	MED. HI.	---	---	---	---	MED. LOW	*MED. HI.	---	---	---	---
		CR12-525	---	MED. LOW	MED. LOW	MED. HIGH	---	---	---	---	MED. HI.	MED. HI.	---	---	---	---
		CP12-630	---	---	---	---	---	---	---	---	---	---	HI.	---	---	---
		CR12-630N	---	---	---	---	---	---	---	---	---	---	HI.	---	---	---
		C12-630	---	---	---	LOW	MED.	HI.	---	---	---	---	HI.	HI.	---	---
E12Q4	LOW	CR12-630	---	---	---	LOW	MED.	HI.	---	---	---	---	HI.	HI.	---	---
E12Q5	LOW	C12-840	---	---	---	---	---	MED. LOW	MED.	---	---	---	---	---	MED.	---
		CR12-840	---	---	---	---	---	MED. LOW	---	---	---	---	---	---	MED.	---
		C12-1120	---	---	---	---	---	---	MED.	---	---	---	---	---	---	MED. HI.
		CR12-1120	---	---	---	---	---	---	MED. HI.	---	---	---	---	---	---	MED. HI.

\*On a HP9-311, C12-525 and E12Q3 applications, the minimum blower motor speed is "Med. Low".

## TYPICAL E12 SEQUENCE OF OPERATION (E12Q5-25-1P SHOWN)



### HEATING DEMAND

- 1 - The control transformer is fed off the number 1 circuit breaker. The transformer provides 24 volts to the control circuit.
- 2 - The thermostat makes "W" leg on a heating demand. This energizes (K2) Heat Relay No. 1.
- 3 - N.O. K2-1 contacts close to energize the blower motor on minimum speed through N.C. K1 contacts. K2-1 simultaneously energizes the first heating element to bring on the first 5 KW.
- 4 - After a short time delay, N.O. K2-2 contacts close to bring on the second element.
- 5 - N.O. K2-3 contacts also make at the same time as those in step 4. If the optional outdoor thermostat is made, the (K3) Heat Relay No. 2 is energized.
- 6 - N.O. K3-1 contacts close to bring on the third element.
- 7 - After a short time delay, N.O. K3-2 contacts make to bring on the fourth element.
- 8 - N.O. K3-3 contacts also make at the same time as those in step 7. This energizes (K4) Heat Relay No. 3.
- 9 - N.O. K4-2 closes to lock in blower circuit, thus assuring blower operation when elements are energized.
- 10 - K3-3 also energizes (K5) Heat Relay No. 4 providing that the optional outdoor thermostat is made.
- 11 - N.O. K5-1 contacts close to again lock in the blower circuit to the element demand.
- 12 - N.O. K5-2 contacts close to energize the fifth element.
- 13 - When the heating demand is satisfied, the thermostat bulb breaks the control circuit. This de-energizes K2. The heat relays sequence the elements off. The blower motor is the last to cycle off.

### COOLING DEMAND

- 14 - On a cooling demand, (K1) Indoor Blower Relay is energized. N.O. K1 contacts close to energize blower motor on higher speed.

FIGURE 8