

## CHA10 SERIES UNITS

### I - INTRODUCTION

The CHA10 packaged air conditioning units are designed for residential or small commercial applications. The unit can be slab mounted with end discharge or installed on an RMF9 roof mounting frame. Figure 1 shows a cutaway. Auxiliary electric heat is available (ECH9). Other options are listed in Table 1.

If a hard start kit is necessary, refer to the "Cross Reference Section" of the Lennox Repair Parts Handbook.

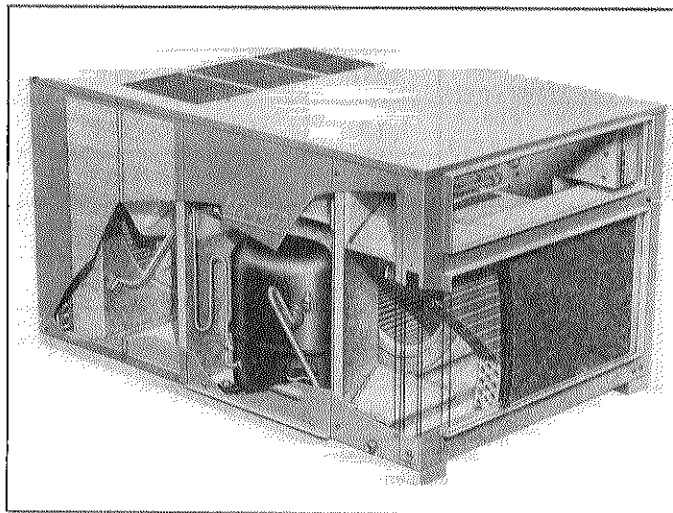


FIGURE 1

TABLE 1

Description	CHA10-261 CHA10-311 CHA10-410	CHA10-460 CHA10-510 CHA10-650	CHA10B-650
Optional Duct Enclosure	RT9-65	RT9-65	RT10B-65
Optional POWER SAVER and No. & size of filters (in.)	RD9-65 (2) — 16 x 20 x 1	RD9-65 (2) — 16 x 20 x 1	RD10B-65 (2) — 16 x 20 x 1
Optional Roof Mounting Frame	RMF9-65	RMF9-65	RMF9-65
RT9/RD9 Adapter Kit	LB-29475B	---	---
Optional Minimum Fresh Air Damper	OAD3-46/65	OAD3-46/65	OAD3-46/65
Optional Comb. Supply & Return Plenum	SRP9-65	SRP9-65	SRP9-65
Optional Combination Ceiling Supply And Return Step-Down Diffuser	RTD-41	RTD-41	RTD-41
Optional Combination Ceiling Supply And Return Flush Diffuser	FD-41 *FD-41-D	FD-41 *FD-41-D	FD-41 *FD-41-D
Timed-Off Control	77A24	77A24	77A24
Low Ambient Control	BM-3434	BM-3434	BM-3434
**PTC Start Kit	Tecumseh Compressors	P-8-10741	---
	Copeland Compressors	LB-29901CA	---
**Crankcase Heater	P-8-8852	---	---

\*Flush diffuser with adjustable baffle blades

\*\*Furnished with CHA10-460, CHA10-510 and CHA10B-650 units

### II - UNIT INFORMATION

#### A - Electrical Data

Model No.	CHA10-261	CHA10-311	CHA10-411	CHA10-413	CHA10-461	CHA10-463
Line voltage data	†208/230v 60hz — 1ph	†208/230v 60hz — 1ph	†208/230v 60hz — 1ph	††208/230v 60hz — 3ph	†208/230v 60hz — 1ph	††208/230v 60hz — 3ph
Compressor	Rated load amps	11.8	16.1	18.9	12.5	20.6
	Power factor	.98	.97	.98	.88	.96
	Locked rotor amps	54.0	87.0	93.9	66.0	107.0
Condenser Coil Fan	Full load amps	1.4	1.4	1.4	1.4	1.9
	Locked rotor amps	3.3	3.3	3.3	3.3	3.3
Evaporator Coil Blower	Full load amps	2.2	2.3	3.9	3.9	3.9
	Locked rotor amps	4.1	5.4	7.8	7.8	5.8
Recommended maximum fuse size (amps)	30	35	45	35	50	40
*Minimum circuit ampacity	20.4	23.8	28.9	21.0	31.6	25.0

\*Refer to National Electric Code manual to determine wire, fuse and disconnect size requirements.

†Extremes of operating range are plus 10% and minus 5% of line voltage.

††Extremes of operating range are plus and minus 10% of line voltage.

\*\*Motors are rated at 230 volts. FLA shown are for step-down transformer output.

Model No.		CHA10-511	CHA10-513		CHA10-651	CHA10-653		CHA10B-651	CHA10B-653	
Line voltage data		†208/230v 60hz — 1 ph	††208/230v 60hz — 3 ph	††460v 60hz — 3ph	†208/230v 60hz — 1ph	††208/230v 60hz — 3ph	††460v 60hz — 3ph	†208/230v 60hz — 1ph	††208v/230v 60hz — 3ph	††460v 60hz — 3ph
Compressor	Rated load amps	25.0	15.4	7.7	32.2	21.0	10.3	28.0	20.0	9.0
	Power factor	.98	.88	.88	.92	.85	.85	.96	.89	.89
	Locked rotor amps	124.0	98.1	45.0	175.0	132.0	66.0	145.0	120.0	60.0
Condenser Coil Fan	Full load amps	1.9	1.9	**1.9	3.0	3.0	**3.0	3.0	3.0	**3.0
	Locked rotor amps	3.3	3.3	**3.3	6.2	6.2	**6.2	6.2	6.2	**6.2
Evaporator Coil Blower	Full load amps	6.0	6.0	**6.0	7.1	7.1	**7.1	6.9	6.9	**6.9
	Locked rotor amps	11.6	11.6	**11.6	13.6	13.6	**13.6	33.0	33.0	**33.0
Recommended maximum fuse size (amps)		60	40	20	80	50	25	70	50	25
*Minimum circuit ampacity		39.2	27.2	13.7	50.4	36.4	17.9	44.9	34.9	16.3

\*Refer to National Electric Code manual to determine wire, fuse and disconnect size requirements.

†Extremes of operating range are plus 10% and minus 5% of line voltage.

††Extremes of operating range are plus and minus 10% of line voltage.

\*\*Motors are rated at 230 volts. FLA shown are for step-down transformer output.

## B - Specifications

Model No.		CHA10-261	CHA10-311	CHA10-411 CHA10-413	CHA10-461 CHA10-463	CHA10-511 CHA10-513	CHA10-650 CHA10-653	CHA10B-651 CHA10B-653
★ARI Standard 270 SRN		21	21	19	21	21	22	21
*ARI Standard 210 Ratings	Total cooling capacity (Btuh)	① 23,000	① 29,000	34,000	41,000	49,000	④ 58,000	④ 56,000
	Total unit watts	② 2550	② 3450	③ 4100	5100	6000	⑥ 8300	⑤ 7000
	†SEER (Btuh/Watts)	9.0	8.3	8.2	8.0	8.1	7.0	8.1
	Dehumidifying capacity	26%	26%	28%	26%	28%	28%	26%
Refrigerant (R-22) charge		5 lbs. 0 oz.	5 lbs. 0 oz.	5 lbs. 13 oz.	8 lbs. 10 oz.	8 lbs. 10 oz.	7 lbs. 12 oz.	10 lbs. 0 oz.
Evaporator Coil	Net face area (sq. ft.)	2.9	3.0	3.0	4.5	4.5	4.5	5.75
	Tube diam. (in.) & No. of rows	1/2 — 2	3/8 — 3	3/8 — 3	3/8 — 3	3/8 — 4	3/8 — 4	3/8 — 4
	Fins per inch	15	16	16	16	14	14	14
Evaporator Blower	Wheel nominal diam. x width (in.)	10 x 9	10 x 9	11 x 9	10 x 10	12 x 12	10 x 10	10 x 10
	Motor horsepower	1/4	1/3	1/2	1/2	3/4	1	1
	RPM	—	—	—	—	—	—	980 — 1230
Factory installed drives range		—	—	—	—	—	—	1175 — 1450
Condenser Coil	Net face area (sq. ft.)	11.6	11.6	11.6	15.3	15.3	15.3	18.1
	Tube diam. (in.) & No. of rows	3/8 — 2	3/8 — 2	3/8 — 2	3/8 — 2	3/8 — 2	3/8 — 2	3/8 — 2
	Fins per inch	13	15	15	13	15	15	15
Condenser Fan	Diameter (in.) and No. of blades	20 — 4	20 — 4	20 — 4	24 — 4	24 — 4	24 — 4	24 — 4
	Air volume (factory setting)	3200	3200	3200	4100	4100	5400	5500
	Rpm (factory setting)	1035	1035	1035	825	825	1060	1065
	Motor horsepower	1/4	1/4	1/4	1/4	1/4	1/2	1/2
	Motor watts (factory setting)	300	300	300	320	320	600	580
Condensate drain size mpt (in.)		3/4	3/4	3/4	3/4	3/4	3/4	3/4
No. & size of filters (in.)		(1)16x25x1	(1)16x25x1	(1)16x25x1	(2)16x20x1	(2)16x20x1	(2)16x20x1	(2)20x20x1
Net weight of basic unit (lbs.) (1 package)		310	330	335	495	515	515	565

★Rated in accordance with ARI Standard 270.

\*Rated in accordance with ARI Standard 210; 450 cfm (maximum) evaporator air volume per ton of cooling capacity, 95F outdoor air temperature and 80F db/67F wb entering evaporator air.

†Proposed Department of Energy Seasonal Energy Efficiency.

\*\*Optional motor pulley is furnished and must be field installed to obtain rpm range shown.

- ① Deduct 500 Btuh for 208 volt operation.
- ② Deduct 50 watts for 208 volt operation.
- ③ Add 150 watts for 3 phase voltage operation.
- ④ Deduct 1000 Btuh for 208 volt operation.
- ⑤ Deduct 100 watts for 208 volt operation.
- ⑥ Deduct 200 watts for 208 volt operation.

## C - Blower Data

### CHA10-260 BLOWER PERFORMANCE

External Static Pressure (in. wg)	Air Volume (cfm) @ Various Speeds		
	High	Medium	Low
<b>CHA10-260 UNIT ONLY</b>			
0	1255	985	760
.05	1225	965	745
.10	1195	945	725
.15	1170	925	710
.20	1140	900	690
.25	1110	880	670
.30	1080	850	645
.40	1010	790	585
.50	925	710	510
.60	815	585	410
<b>WITH ELECTRIC HEAT</b>			
0	1165	940	725
.05	1140	920	705
.10	1110	890	685
.15	1085	870	665
.20	1055	840	645
.25	1025	820	620
.30	990	790	595
.40	915	725	535
.50	820	635	---
<b>WITH RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>			
0	1220	960	705
.05	1150	900	670
.10	1085	835	625
.15	1030	780	585
.20	980	730	540
.25	925	690	500
.30	870	650	---
.40	755	---	---
.50	630	---	---
<b>WITH ELECTRIC HEAT, RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>			
0	1100	825	630
.05	1025	775	595
.10	960	730	555
.15	900	690	515
.20	845	655	---
.25	795	615	---
.30	740	570	---
.40	630	---	---

NOTE - All CFM is measured external to unit with filter in place.

### CHA10-310 BLOWER PERFORMANCE

External Static Pressure (in. wg)	Air Volume (cfm) @ Various Speeds			
	High	Med-High	Med-Low	Low
<b>CHA10-310 UNIT ONLY</b>				
0	1390	1325	1175	1040
.05	1355	1295	1150	1015
.10	1325	1265	1125	995
.15	1295	1235	1100	970
.20	1265	1205	1075	950
.25	1235	1175	1050	925
.30	1200	1145	1025	905
.40	1140	1085	970	860
.50	1070	1020	895	---
<b>WITH ELECTRIC HEAT</b>				
0	1310	1240	1120	990
.05	1280	1215	1095	970
.10	1255	1190	1065	950
.15	1225	1165	1040	925
.20	1195	1140	1015	905
.25	1165	1110	990	880
.30	1135	1080	960	850
.40	1070	1015	900	795
.50	1005	990	---	---
<b>WITH RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>				
0	1352	1275	1130	980
.05	1287	1210	1060	920
.10	1215	1145	990	855
.15	1150	1080	930	800
.20	1087	1020	880	755
.25	1025	965	840	725
.30	970	915	795	680
.40	865	820	705	585
.50	755	715	590	---
<b>WITH ELECTRIC HEAT, RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>				
0	1245	1155	960	840
.05	1210	1075	910	795
.10	1165	1010	865	755
.15	1080	955	820	715
.20	1025	890	785	675
.25	965	845	740	595
.30	915	800	695	---
.40	820	705	---	---
.50	715	590	---	---

NOTE - All CFM is measured external to unit with filter in place.

### CHA10-260 With RT9-65 or RD9-65 And Ceiling Supply & Return

Blower Speed Setting	Cfm @ Various Speeds							
	With Various Discharge Grille Arrangements							
	FD-41 or FD-41-D Flush Model		RTD-41 Step-Down Model					
			2 Sides Open		3 Sides Open		4 Sides Open	
	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.
High	935	1030	860	950	880	970	905	1000
Medium	790	835	755	805	765	815	775	825
Low	630	670	602	640	615	650	620	660

### CHA10-310 With RT9-65 or RD9-65 And Ceiling Supply & Return

Blower Speed Setting	Cfm @ Various Speeds							
	With Various Discharge Grille Arrangements							
	FD-41 or FD-41-D Flush Model		RTD-41 Step-Down Model					
			2 Sides Open		3 Sides Open		4 Sides Open	
	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.
High	1055	1170	1000	1110	1050	1160	1055	1175
Medium-High	1015	1115	990	1070	1010	1100	1020	1120
Medium-Low	890	1000	870	965	885	985	895	1000
Low	800	890	780	850	795	880	805	895

### CHA10-410 BLOWER PERFORMANCE

External Static Pressure (in. wg)	Air Volume (cfm) @ Various Speeds		
	High	Medium	Low
<b>CHA10-410 UNIT ONLY</b>			
0	1630	1365	1080
.05	1600	1345	1070
.10	1570	1320	1060
.15	1540	1300	1050
.20	1510	1275	1035
.25	1475	1250	1020
.30	1440	1230	1005
.40	1360	1175	965
.50	1265	1115	925
.60	1170	1050	---
.70	1050	---	---
<b>WITH ELECTRIC HEAT</b>			
0	1440	1290	1060
.05	1415	1270	1050
.10	1395	1245	1035
.15	1370	1220	1020
.20	1340	1195	1000
.25	1315	1165	980
.30	1285	1140	960
.40	1220	1085	915
.50	1160	1030	870
.60	1100	975	---
<b>WITH RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>			
0	1510	1300	1050
.05	1425	1235	990
.10	1350	1175	940
.15	1285	1120	890
.20	1225	1000	845
.25	1170	945	805
.30	1115	900	---
.40	1005	805	---
.50	905	---	---
<b>WITH ELECTRIC HEAT, RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>			
0	1340	1225	1020
.05	1270	1160	975
.10	1205	1095	925
.15	1105	1040	875
.20	1080	995	835
.25	1020	950	---
.30	970	910	---
.40	875	820	---

NOTE - All CFM is measured external to unit with filter in place.

### CHA10-460 BLOWER PERFORMANCE

External Static Pressure (in. wg)	Air Volume (cfm) @ Various Speeds		
	High	Medium	Low
<b>CHA10-460 UNIT ONLY</b>			
0	1945	1630	1305
.05	1905	1610	1305
.10	1870	1585	1300
.15	1825	1565	1290
.20	1780	1540	1280
.25	1745	1510	1260
.30	1695	1485	1240
.40	1610	1420	1190
.50	1525	1335	1125
.60	1435	1240	1040
.70	1340	1130	---
<b>WITH ELECTRIC HEAT</b>			
0	1710	1540	1295
.05	1680	1510	1280
.10	1650	1480	1265
.15	1610	1450	1250
.20	1575	1420	1230
.25	1535	1385	1210
.30	1495	1355	1185
.40	1415	1285	1125
.50	1335	1205	1035
.60	1250	1110	---
<b>WITH RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>			
0	1815	1575	1280
.05	1750	1530	1250
.10	1690	1485	1220
.15	1635	1440	1190
.20	1590	1395	1155
.25	1540	1350	1120
.30	1490	1305	1080
.40	1390	1210	1000
.50	1280	1110	---
.60	1165	1010	---
.70	1040	---	---
<b>WITH ELECTRIC HEAT, RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>			
0	1655	1510	1230
.05	1600	1460	1250
.10	1550	1420	1220
.15	1500	1370	1190
.20	1450	1320	1155
.25	1400	1275	1120
.30	1345	1225	1080
.40	1240	1120	1000
.50	1130	1010	---
.60	1010	---	---

NOTE - All CFM is measured external to unit with filter in place.

### CHA10-410 With RT9-65 or RD9-65 And Ceiling Supply & Return

Blower Speed Setting	Cfm @ Various Speeds							
	With Various Discharge Grille Arrangements							
	FD-41 or FD-41-D Flush Model		RTD-41 Step-Down Model					
			2 Sides Open		3 Sides Open		4 Sides Open	
	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.
High	1175	1290	1130	1250	1160	1270	1170	1280
Medium	1055	1140	1045	1110	1050	1120	1055	1135
Low	905	945	890	925	900	935	909	945

### CHA10-460 With RT9-65 or RD9-65 And Ceiling Supply & Return

Blower Speed Setting	Cfm @ Various Speeds							
	With Various Discharge Grille Arrangements							
	FD-65 or FD-65-D Flush Model		RTD-65 Step-Down Model					
			2 Sides Open		3 Sides Open		4 Sides Open	
	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.
High	1490	1640	1495	1650	1505	1670	1515	1685
Medium	1360	1470	1360	1475	1380	1485	1395	1500
Low	1160	1230	1165	1235	1170	1240	1175	1245

## CHA10-510 BLOWER PERFORMANCE

External Static Pressure (in. wg)	Air Volume (cfm) @ Various Speeds		
	High	Medium	Low
<b>CHA10-510 UNIT ONLY</b>			
0	2430	2010	1710
.05	2390	1990	1695
.10	2355	1965	1670
.15	2320	1935	1650
.20	2280	1905	1625
.25	2240	1875	1595
.30	2205	1845	1570
.40	2130	1780	1510
.50	2045	1710	1440
.60	1955	1635	1365
.70	1855	1550	1285
.80	1750	1455	1200
.90	1635	1365	1110
<b>WITH ELECTRIC HEAT</b>			
0	2030	1760	1515
.05	1990	1725	1490
.10	1955	1690	1455
.15	1920	1645	1425
.20	1890	1615	1390
.25	1850	1570	1360
.30	1810	1530	1330
.40	1730	1450	1260
.50	1650	1360	1190
.60	1550	1265	1115
.70	1450	1160	1030
<b>WITH RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>			
0	2235	1870	1625
.05	2180	1825	1575
.10	2130	1790	1540
.15	2080	1750	1505
.20	2030	1710	1470
.25	1980	1685	1435
.30	1930	1630	1400
.40	1835	1550	1330
.50	1735	1460	1260
.60	1625	1365	1200
.70	1510	1260	---
.80	1390	1140	---
<b>WITH ELECTRIC HEAT, RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>			
0	1860	1620	1400
.05	1810	1560	1360
.10	1740	1500	1310
.15	1685	1440	1260
.20	1630	1380	1215
.25	1570	1320	1170
.30	1520	1260	1130
.40	1420	1170	1060
.50	1320	1110	1000
.60	1210	---	---
.70	1100	---	---

NOTE - All CFM is measured external to unit with filter in place.

## CHA10-650 BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds		
	High	Medium	Low
<b>CHA10-650 UNIT ONLY</b>			
0	2350	2070	1805
.05	2325	2050	1785
.10	2305	2030	1765
.15	2285	2015	1750
.20	2265	1995	1730
.25	2245	1975	1715
.30	2220	1955	1700
.40	2180	1920	1660
.50	2140	1880	1625
.60	2095	1840	1590
.70	2050	1800	1555
.80	2010	1760	1520
.90	1960	1675	1480
<b>WITH ELECTRIC HEAT</b>			
0	2075	1870	1660
.05	2045	1850	1640
.10	2020	1830	1620
.15	1995	1810	1600
.20	1975	1790	1580
.25	1950	1765	1560
.30	1930	1740	1540
.40	1880	1690	1500
.50	1845	1640	1460
.60	1810	1590	1420
<b>WITH RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>			
0	2240	2010	1760
.05	2225	1990	1745
.10	2205	1970	1730
.15	2185	1950	1715
.20	2165	1930	1700
.25	2140	1910	1680
.30	2120	1890	1660
.40	2075	1855	1620
.50	2020	1810	1590
.60	1980	1770	1545
.70	1935	1720	1505
.80	1885	1670	1465
<b>WITH ELECTRIC HEAT, RT9-65 OR RD9-65 AND DUCT DISTRIBUTION</b>			
0	2025	1840	1640
.05	2000	1820	1620
.10	1980	1795	1600
.15	1955	1775	1580
.20	1935	1750	1560
.25	1910	1725	1540
.30	1885	1700	1520
.40	1830	1650	1480
.50	1760	1600	1435

NOTE - All CFM is measured external to unit with filter in place.

CHA10-510 With RT9-65 or RD9-65  
And Ceiling Supply & Return

Blower Speed Setting	Cfm @ Various Speeds							
	With Various Discharge Grille Arrangements							
	FD-65 or FD-65-D Flush Model		RTD-65 Step-Down Model					
			2 Sides Open		3 Sides Open		4 Sides Open	
	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.
High	1680	2045	1725	2010	1730	2030	1745	2040
Medium	1470	1760	1500	1750	1510	1755	1525	1765
Low	1360	1540	1365	1525	1370	1535	1380	1540

CHA10-650 With RT9-65 or RD9-65  
And Ceiling Supply & Return

Blower Speed Setting	Cfm @ Various Speeds							
	With Various Discharge Grille Arrangements							
	FD-65 or FD-65-D Flush Model		RTD-65 Step-Down Model					
			2 Sides Open		3 Sides Open		4 Sides Open	
	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.	With Elec.	Less Elec.
High	1915	2070	1930	2100	1965	2185	1980	2215
Medium	1770	1870	1780	1897	1800	1960	1810	1985
Low	1590	1660	1600	1670	1610	1730	1615	1745

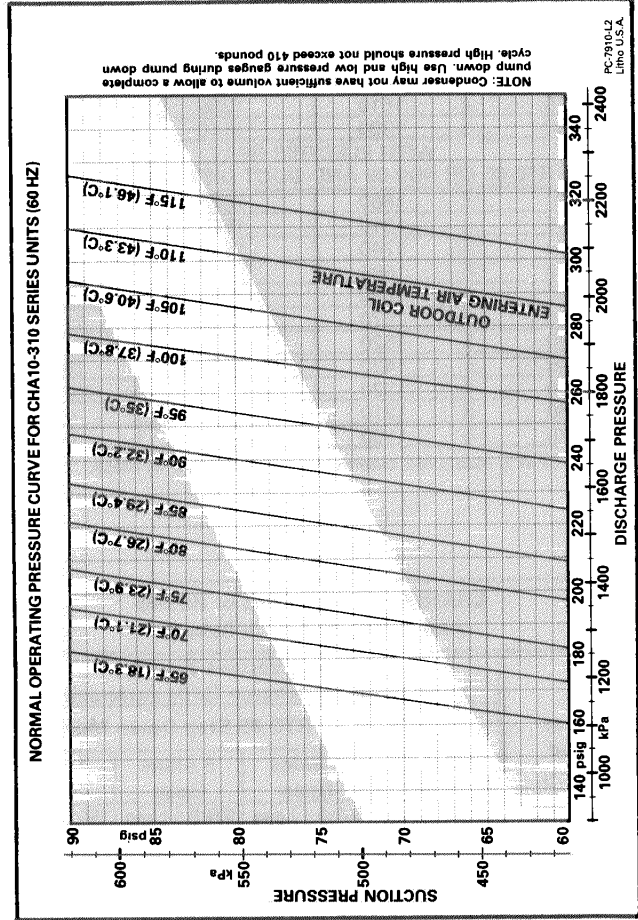
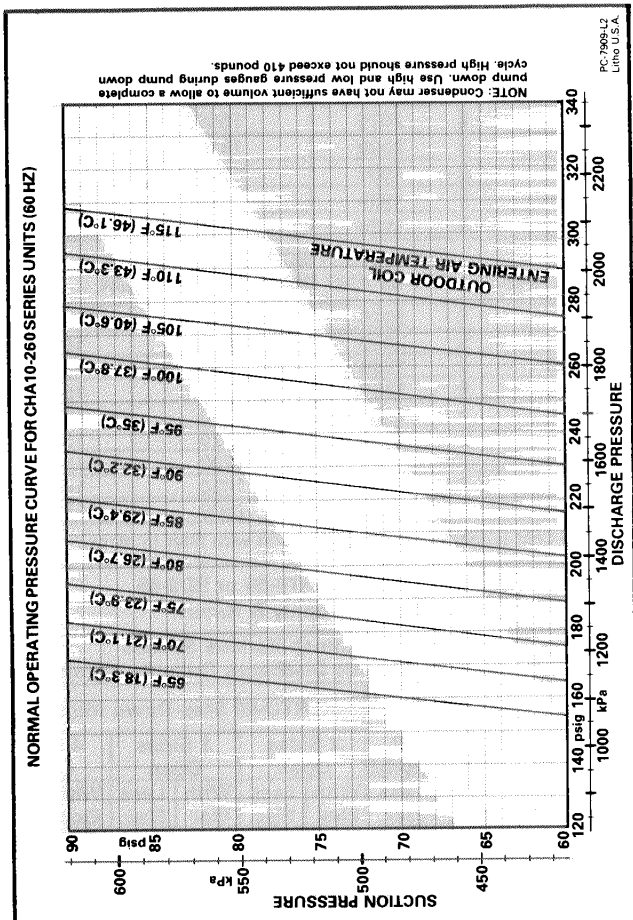
## CHA10B-650 BLOWER PERFORMANCE

Air Volume (Cfm)	STATIC PRESSURE EXTERNAL TO UNIT — (Inches Water Gauge)											
	0		.10		.20		.30		.40		.50	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1800	865	.46	920	.49	970	.53	1021	.58	1067	.63	1110	.68
1900	915	.53	968	.57	1018	.62	1059	.67	1105	.72	1150	.77
2000	964	.61	1014	.66	1060	.72	1104	.77	1150	.82	1188	.86
2100	1013	.72	1060	.78	1104	.82	1150	.88	1187	.92	1225	.97
2200	1065	.84	1109	.89	1150	.94	1188	.98	1225	1.03	1267	1.08
2300	1112	.95	1154	1.01	1192	1.05	1233	1.08	1271	1.15	----	----
2400	1162	1.09	1200	1.14	----	----	----	----	----	----	----	----

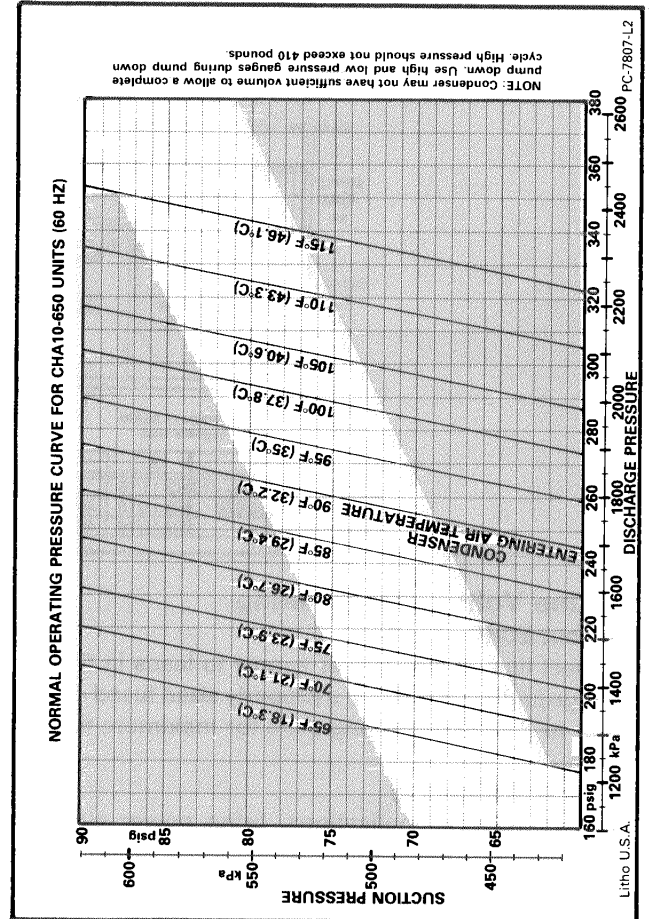
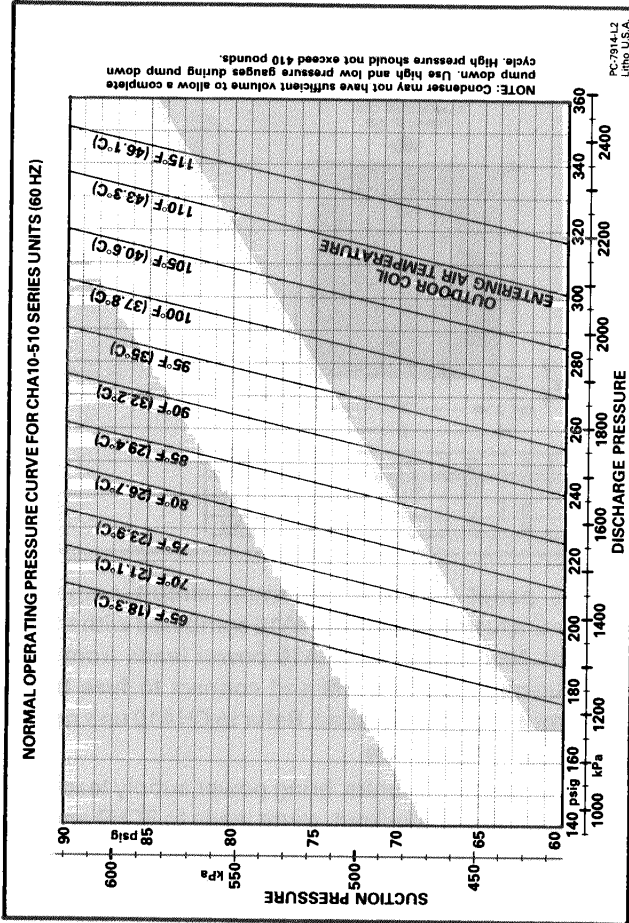
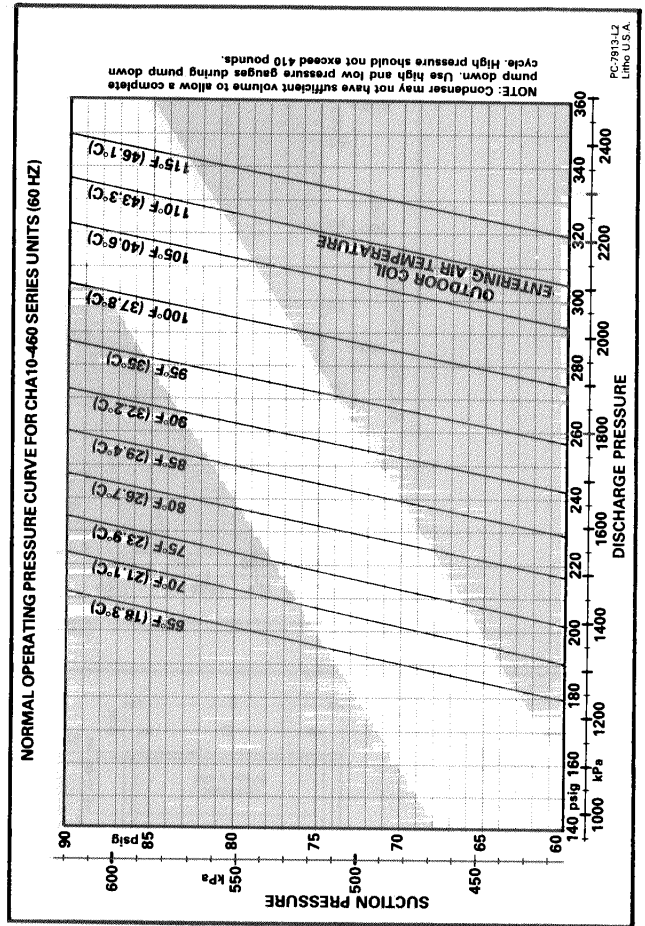
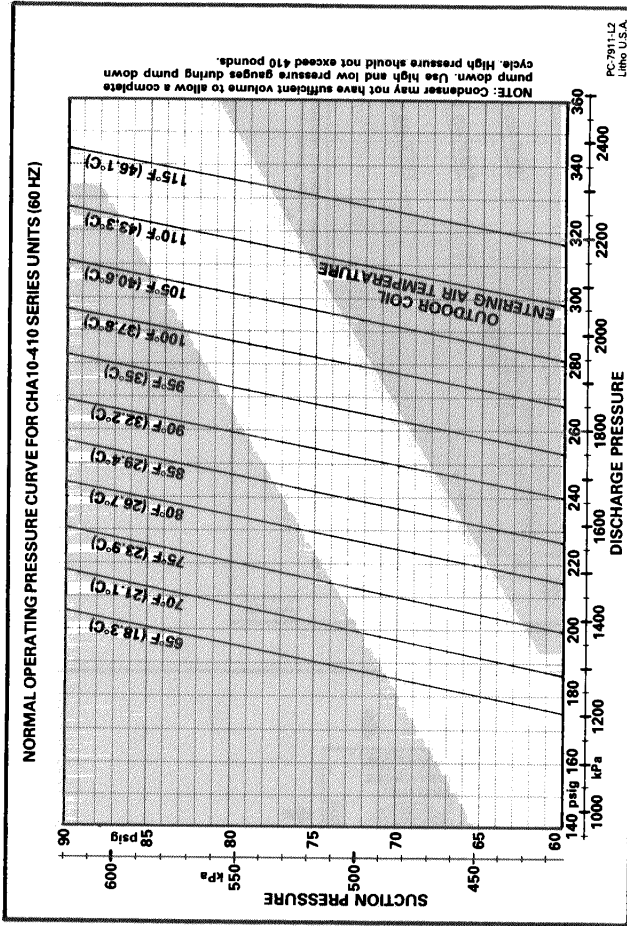
NOTE - Factory installed drive kit will not operate in shaded area.

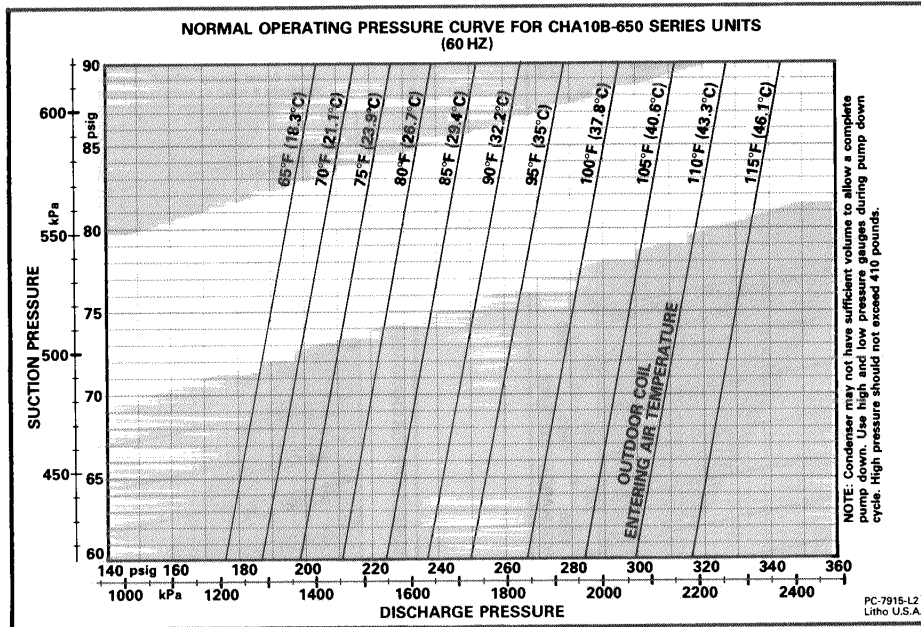
CHA10B-650 With RT9-65 or RD9-65 And Ceiling Supply & Return						
Air Volume (cfm)	Total Pressure Drop (inches water gauge)					
	Electric Heat	Power Saver	RTD Comb. Ceiling Supply and Return			FD Ceiling Supply & Return
			2 Sides Open	3 Sides Open	4 Sides Open	
1800	.50	.13	.23	.12	.09	.26
1900	.55	.14	.26	.14	.10	.29
2000	.61	.16	.29	.15	.11	.32
2100	.68	.18	.32	.17	.12	.35
2200	.75	.19	.35	.18	.13	.39
2300	.82	.21	.38	.20	.15	.42
2400	.89	.23	.42	.22	.16	.46

## D - Pressure Curves

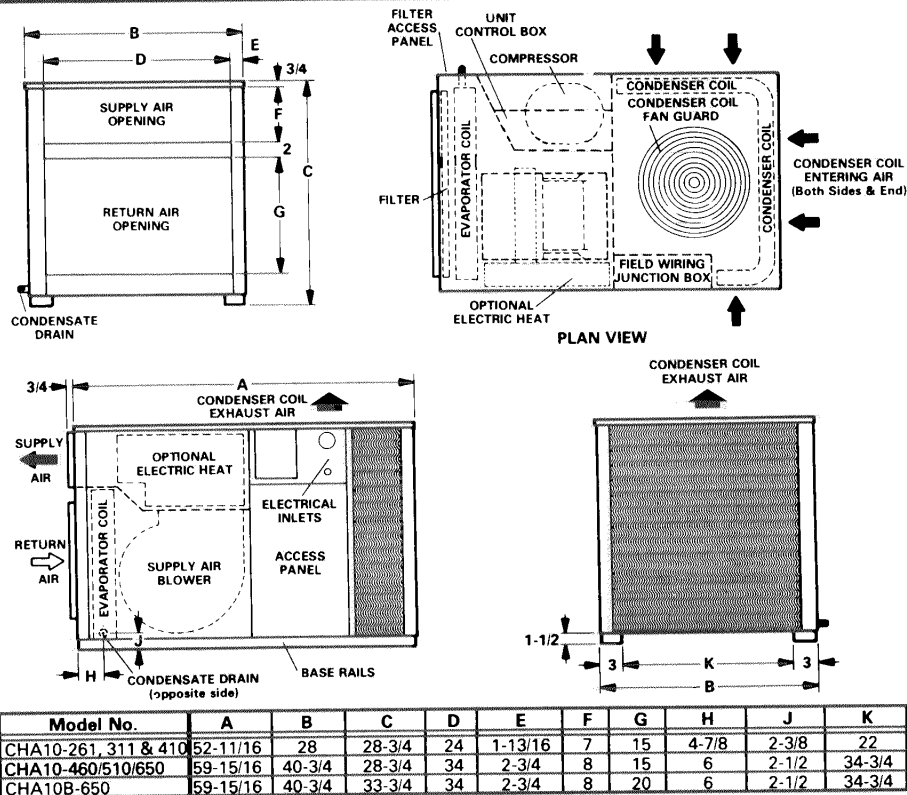








## E - Dimensions



## F - Line Voltage Field Wiring

### Without ECH9

Connect line voltage power supply to leads in CHA10 high voltage junction box from a properly sized fused disconnect. Refer to CHA10 unit rating plate for maximum fuse size.

### With ECH9 (Figure 2)

On "G" voltage applications, bring power supply leads through CHA10 electrical knockout, route leads to ECH9 and connect to fuse block. The "Heater Installed" plate on CHA10

access panel lists the minimum circuit ampacity and maximum fuse size for the CHA10 combined with the various heaters. Next route the CHA10 power leads from high voltage junction box to ECH9 and connect to fuse block. The fuses must be field provided. Refer to CHA10 unit rating plate for maximum fuse size.

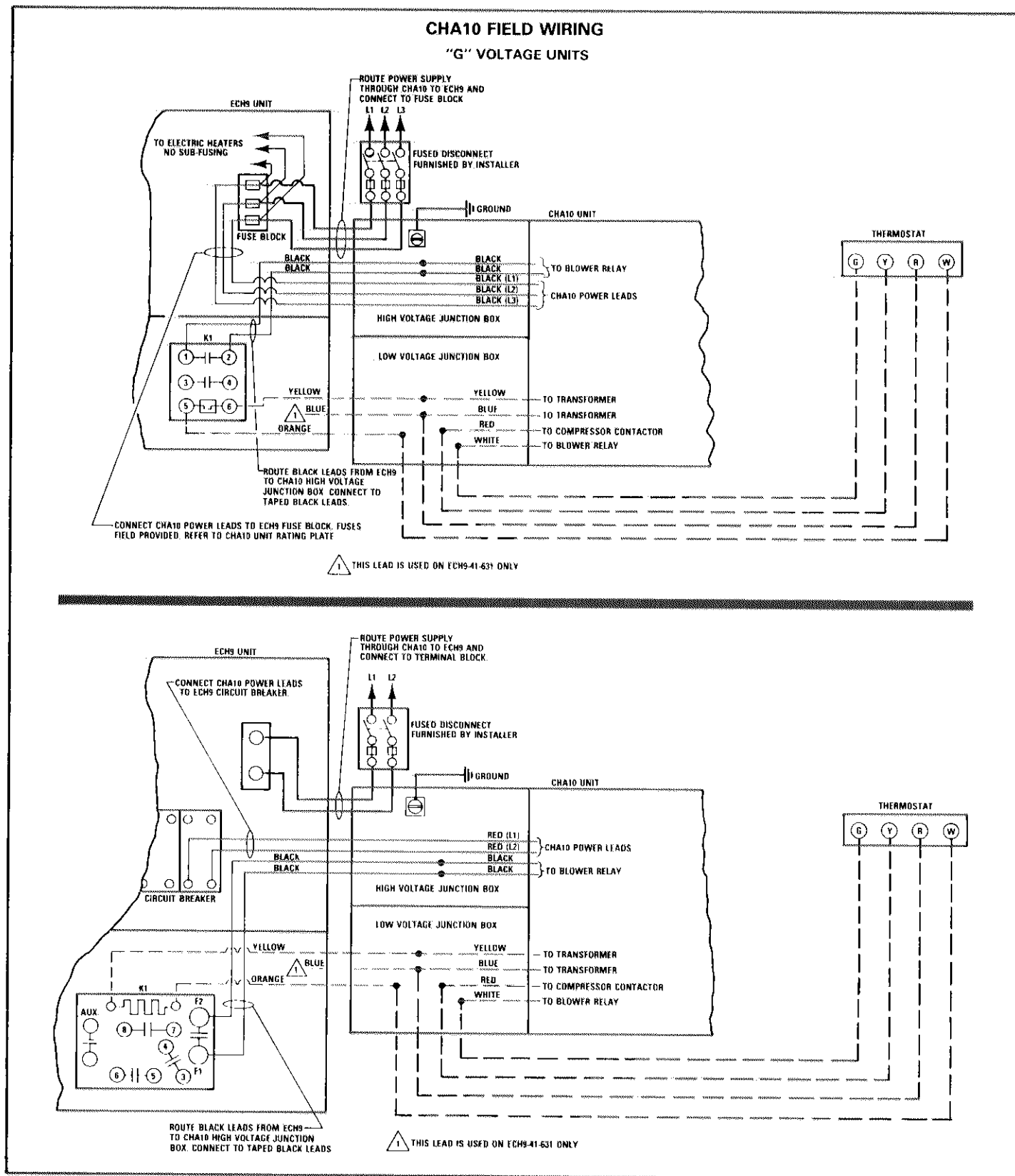
On all other voltage units, bring power supply leads through CHA10 electrical knockout, route leads to ECH9 and connect to terminal block. The "Heater Installed" plate on CHA10 access panel lists the minimum circuit ampacity and



maximum fuse size for the CHA10 combined with the various heaters. Next route the CHA10 power leads from high voltage junction box to the circuit breaker in the ECH9 and connect.

On all CHA10/ECH9 applications route the 2 black leads from the ECH9 to the CHA10 high voltage junction box. Connect to the taped black leads.

Figure 2 illustrates the field wiring.



**FIGURE 2**

### III - REFRIGERANT SYSTEM

CHA10 units have a single compressor in a single refrigeration system. The units use a cap tube assembly as a metering device. The suction line and discharge line service ports are located in compressor compartment. See Figure 3. The head pressure given on operating curves is based on discharge pressure.

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 - COMPONENTS

Figure 4 shows an exploded view of a CHA10 (410 shown).

#### A - Control Box (Figure 5)

##### 1 - Compressor Contactor (K1)

Energizes compressor and on "Y" voltages units it also energizes outdoor fan motor.

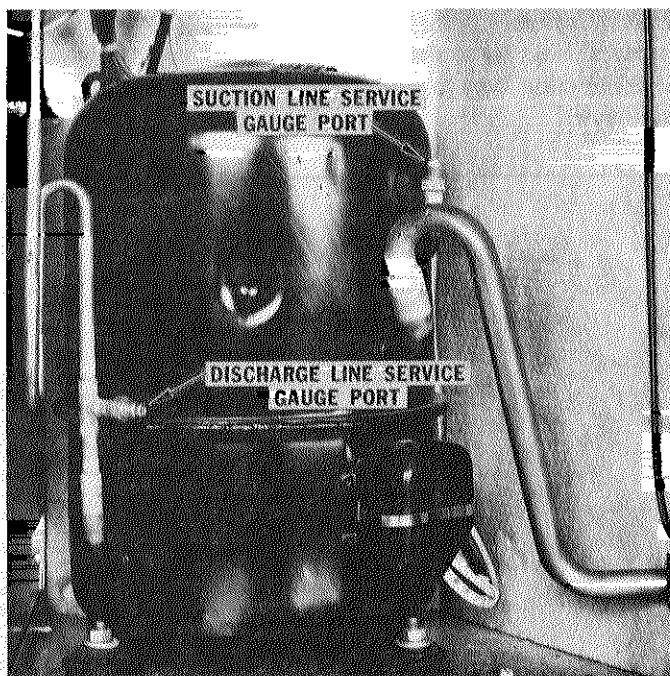


FIGURE 3

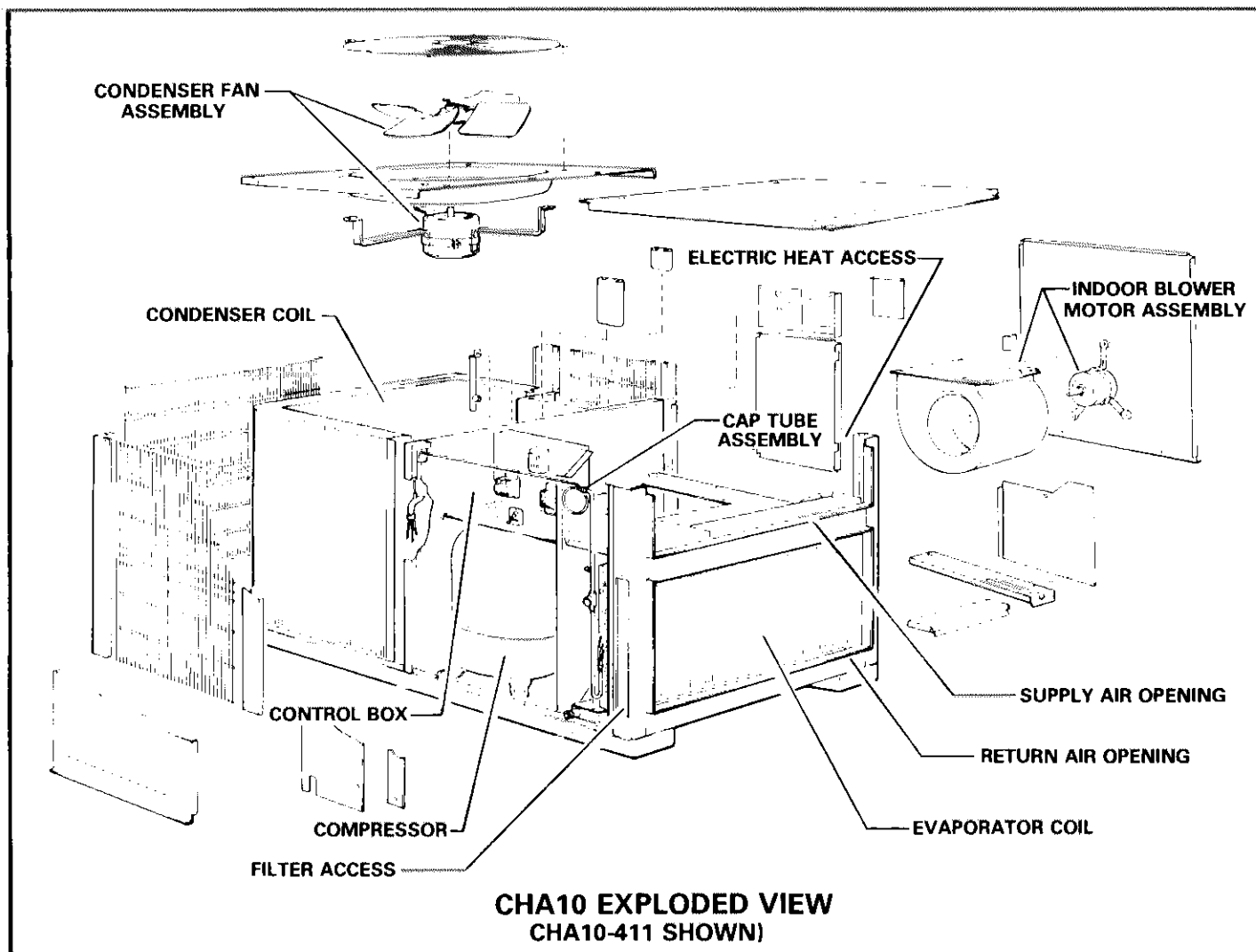


FIGURE 4

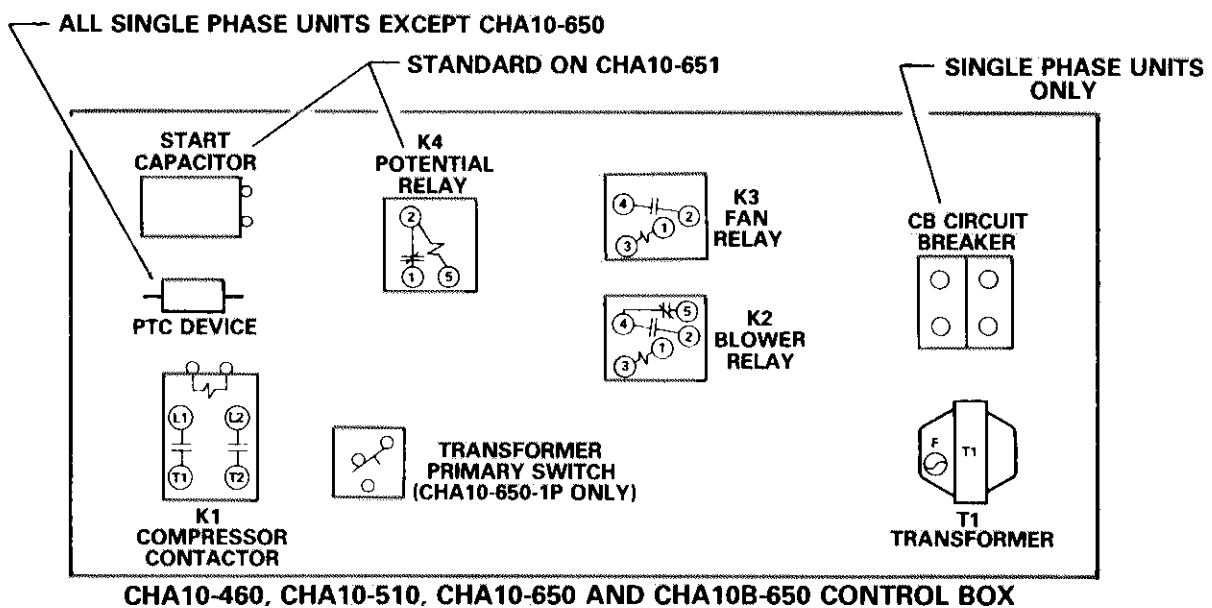
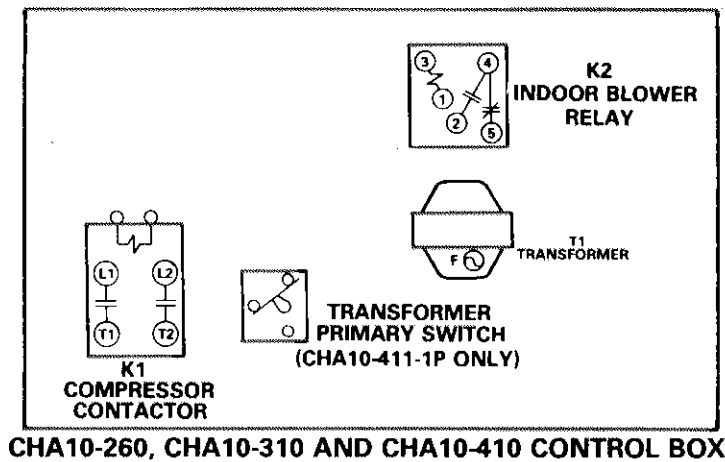


FIGURE 5

**2 - Indoor Blower Relay (K2)**

Energizes Indoor Blower Motor.

**3 - Outdoor Fan Relay (K3)**

On "P" and "G" voltage units, K3 energizes the Outdoor Fan Motor.

**4 - Potential Relay (K4) & Start Capacitor**

On CHA10B-651, CHA10-511 and CHA10-461 single phase units, K4 may come factory installed in place of the PTC start assist device. K4 is standard on CHA10-651 single phase units.

**5 - PTC Start Assist Device**

On CHA10B-651, CHA10-511 and CHA10-461 single phase units, this solid-state PTC provides extra starting torque to solve most compressor hard starting problems. Available as optional equipment on CHA10-261, 311 and 411 units.

**6 - Transformer (T1)**

Provides 24V for the control circuit. Circuit is fused at transformer.

**7 - Circuit Breaker (CB)**

On CHA10B-651, CHA10-651, CHA10-511 and CHA10-461 single phase units, the circuit breaker protects the out-

door fan motor, crankcase heater, indoor blower motor and transformer.

**B - Compressor Compartment****1 - Low Pressure Switch (S4)**

CHA10B-650, CHA10-650, CHA10-510 and CHA10-460 units are protected by a switch in the suction line. It cuts out at 25 psig  $\pm$  5 and automatically resets at 55 psig  $\pm$  5.

**2 - High Pressure Switch (S5)**

CHA10-510 and 460 units are additionally protected by a high pressure switch. Switch cuts out at 410 psig and must be manually reset below 180 psig.

**3 - Crankcase Heater Thermostat (S6)**

CHA10-510 and 460 units have a refrigerant temperature thermostat which controls crankcase heater. Thermostat closes at 65°F and opens at 85°F. Between 65°F and 85°F heater operation depends on whether outdoor temperature is on the rise or fall.

**4 - Crankcase Heater**

Compressor crankcase heater is furnished on CHA10-410, 460, 510, 650 and CHA10B-650 units. The heaters on the 410 and 650 models are energized continuously.

## 5 - Compressor

CHA10-460 and 510 units are equipped with the Lennox "L5" compressor. All compressors are internally protected from excessive current and temperature. Compressors used in CHA10-260, 310, 410, 650 and CHA10B-650 are also protected by an internal pressure relief valve. This valve opens at a discharge and suction differential of 450 psig  $\pm$  50.

## C - Indoor Blower Compartment

CHA10-260 through 650 units are equipped with direct drive blowers. Table 2 shows the speed selection chart for these units.

CHA10B-650 units are equipped with a belt drive blower. Loosen the bolt on the hinged motor cradle to change or adjust belt. Blower speed can be adjusted at the motor pulley. An optional motor pulley is provided with unit to achieve higher RPM's,

TABLE 2

SPEED	MOTOR LEAD		
	CHA10-410 CHA10-460 CHA10-510	CHA10-310 CHA10-650	CHA10-260
COMMON	ORANGE	ORANGE	ORANGE
LOW	RED	RED	RED
MED. LO	---	YELLOW	---
MED	YELLOW	---	BLUE
MED. HI	---	BROWN	---
HIGH	BLACK	BLACK	BLACK

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

## D - Condenser Coil

Air draws through the coil and is discharged out the top of unit. Fan motor is prelubricated for an extended period of operation. Some motors employ ball bearing motors which need no further lubrication. Check motor for lubrication requirements. For fan service access, remove the bolts securing fan assembly. Figure 6 illustrates the condenser fan and motor assembly.

## V - BLOWER SPEED ADJUSTMENT

Blower speed adjustment is based on the charts in "Blower Data" section. These charts list the external pressure and corresponding unit CFM for the various applications.

Checks are made with clean filters in place, unit panels in place and a dry evaporator coil (blower only operating). Readings are measured across supply and return ducts external to unit with an inclined manometer.

- 1 - Measure tap locations on supply and return ducts at least 24 inches from unit and centered top to bottom. See Figure 7.
- 2 - Punch approximately 1/4 inch diameter holes in ducts. Insert manometer hoses flush with inside edge of duct or insulation. Seal around hoses with permagum or sealing compound. Connect zero end of manometer to supply side of system. Refer to Figure 7.
- 3 - With only the indoor blower operating, observe manometer reading and compare to the blower performance data. If reading is below air volume required, increase blower speed. If reading is above air volume required, decrease blower speed.

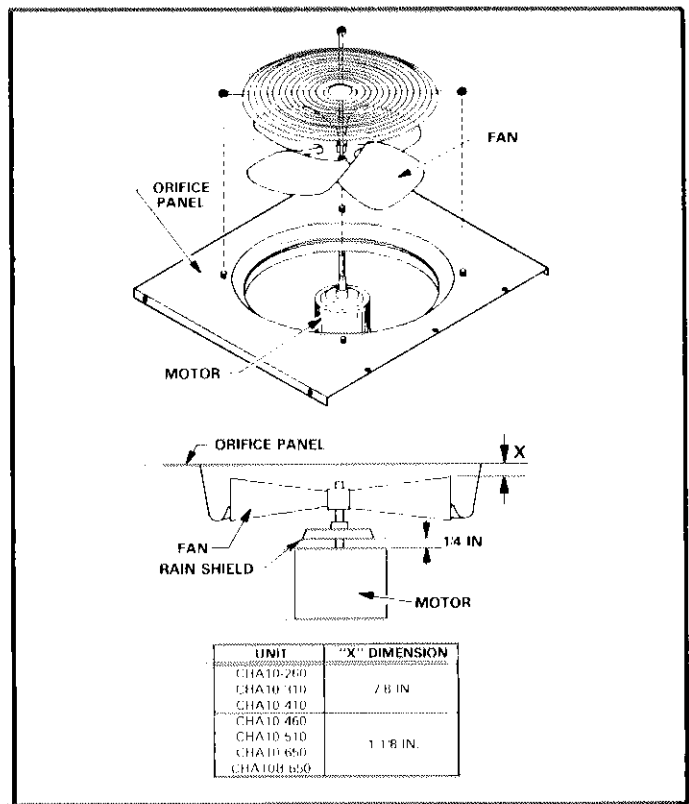


FIGURE 6

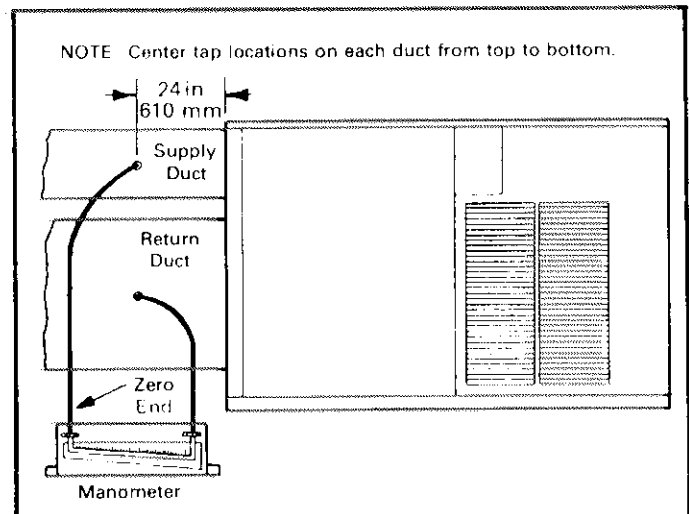


FIGURE 7

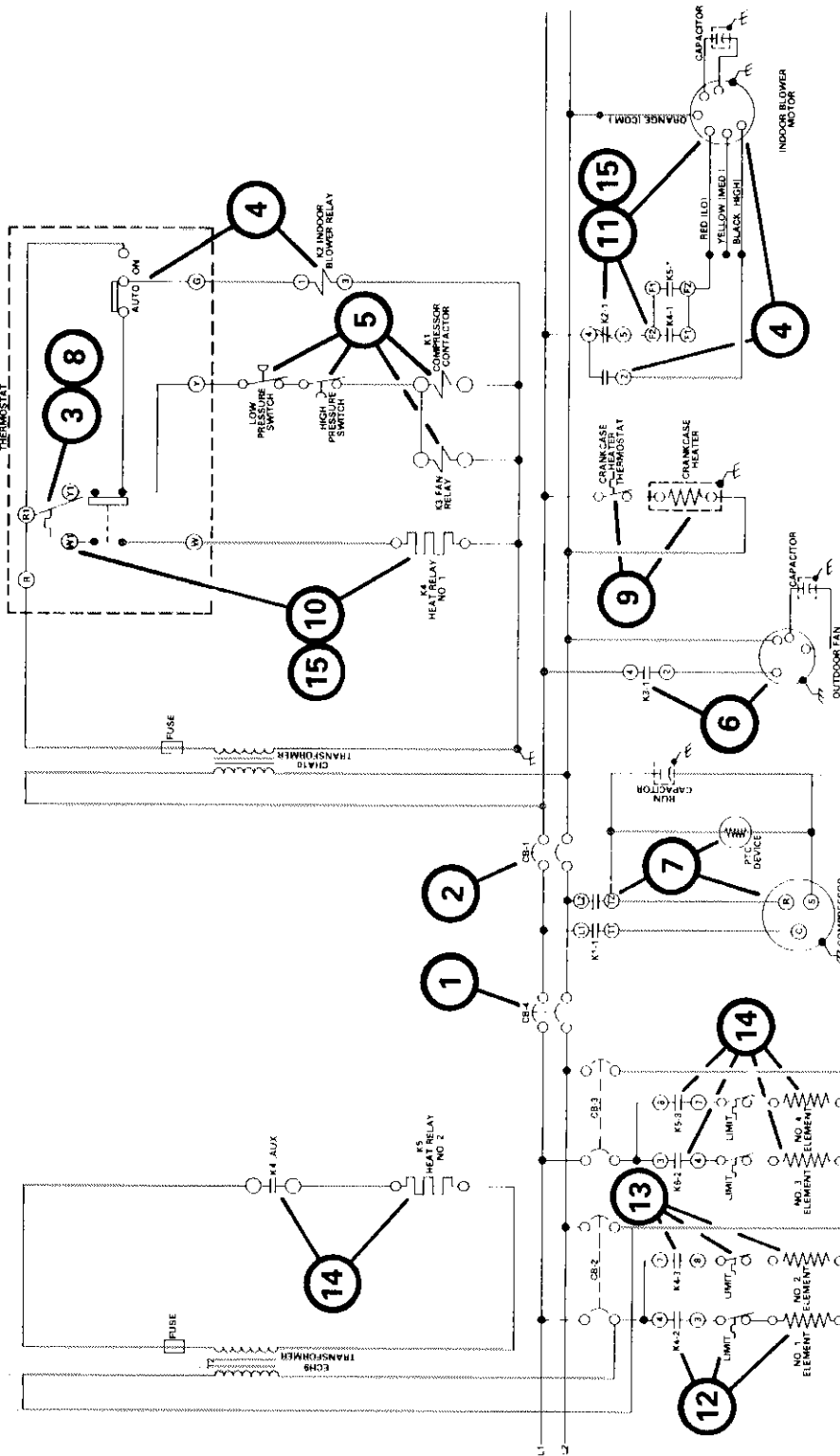
**NOTE** - For ECH9 electric heat, refer to the unit wiring diagram for minimum blower speed.

- 4 - On CHA10B units the blower motor sheave is adjustable. Move sheave halves together to increase blower speed. Move sheave halves apart to decrease blower speed. Be sure allen set screw aligns with sheave flat surface before tightening. Tension belts properly.
- 5 - After check is completed, seal testing holes.

## VI - SCHEMATIC WIRING DIAGRAM OPERATING SEQUENCE

Figure 8 illustrates a typical CHA10 cooling cycle and heating cycle (if used) sequence of operation. To simplify the illustration, the components in the electric heat section are assigned key numbers in sequence to the CHA10.

TYPICAL CHA10 APPLICATION (CHA10-511-1P/ECH9- 46-751 SHOWN)



- 8 - When the cooling demand is satisfied, the cooling bulb breaks to de-energize the system.
- 9 - The Crankcase Heater operation is controlled by a thermostat (CHA10-460 & 510 units) which senses refrigerant temperature.

HEATING CYCLE

- 10 - The thermostat makes on "W1" leg on a heating demand. This energizes (K4) Heat Relay No. 1.
- 11 - The K4-1 fan contacts close. If the thermostat is set on "Auto", the Indoor Blower Motor will run at heating speed through K2-1.
- 12 - The K4-2 contacts also make to power element no. 1.
- 13 - After a short delay (10 second minimum), K4-3 contacts close to power element no. 2. The K4 auxiliary contacts also close to energize (K5) Heat Relay No. 2.
- 14 - K5 closes its contacts to power the remaining elements in sequence.
- 15 - As the heating demand is satisfied, the thermostat breaks the heating control circuit. The control relays de-energize the elements in reverse order. The blower will continue to operate until both fan contacts on the relays have opened.

COOLING CYCLE

- 1 - If the unit includes electric heat, power is fed through CB-4 circuit breaker in the ECH9.
- 2 - The circuit breaker in CH10B-651, CHA10-651, CHA10-511 and CHA10-461 power all the unit components except the compressor.
- 3 - On a cooling demand, the cooling bulb makes at thermostat.
- 4 - If the thermostat is set on "Auto", the Blower Relay (K2) is energized. K2 closes its N.O. contacts to bring the Indoor Blower Motor up to cooling speed. If the application includes power saver, blower motor operation activates it. See RD9 section under accessories.
- 5 - As the cooling bulb makes, it also energizes the Compressor Contactor (K1) and Outdoor Fan Relay (K3) through the Low and High Pressure Switches. High pressure switch is only on CHA10-460 & 510 units.
- 6 - N.O. K3-1 contacts close to power the Outdoor Fan Motor.
- 7 - The N.O. K1-1 contacts close to power the compressor. The PTC device provides extra starting torque. It switches itself out of the circuit after start-up.

FIGURE 8