

HS13 SERIES UNITS

I - INTRODUCTION

The HS13 was first introduced in 1977 in the 2-1/2, 3 and 3-1/2 ton models. It is an expansion valve system only. Expansion valve kit information is available in the evaporator section of the Engineering Handbook. Since these valves have a bleed-off feature, hard start kits are not necessarily needed. However, hard start kits are available and information can be found in the "Cross Reference Section" of the Lennox Repair Parts Handbook.

The refrigerant connections are compression fittings with exception of a 1-1/8 inch sweat suction line connection on 460 units. A low Ambient Kit (BM-3434) allows unit operation down to 0°F.

Figure 1 shows a cutaway of the unit.

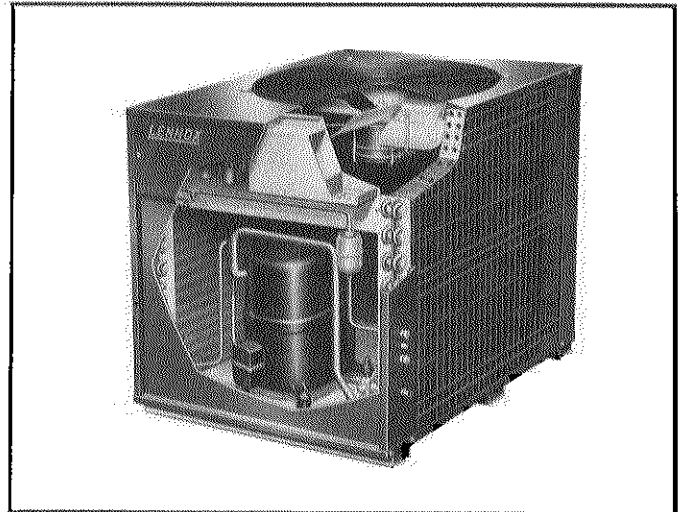


FIGURE 1

II - UNIT INFORMATION

A - Specifications

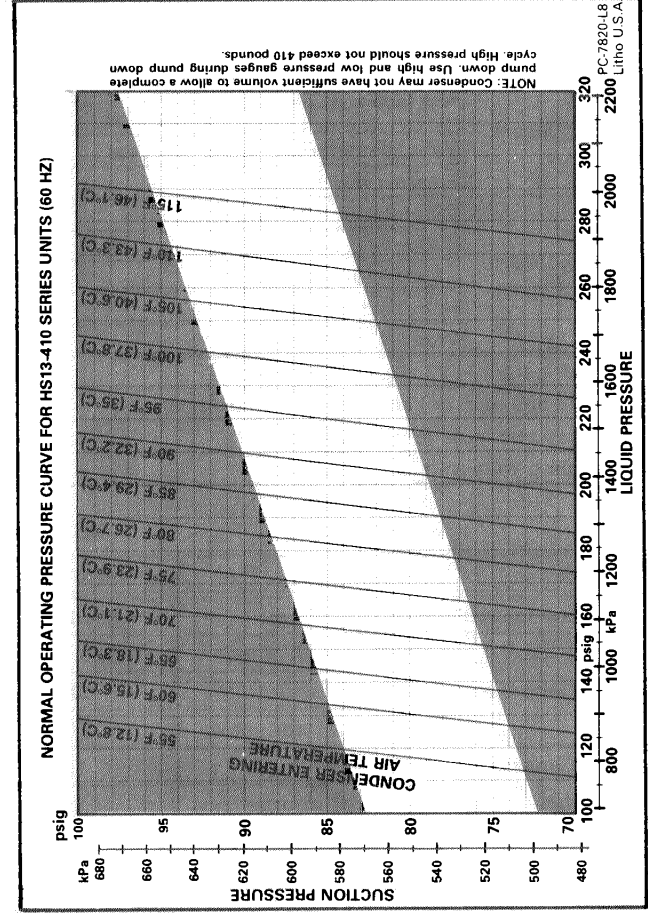
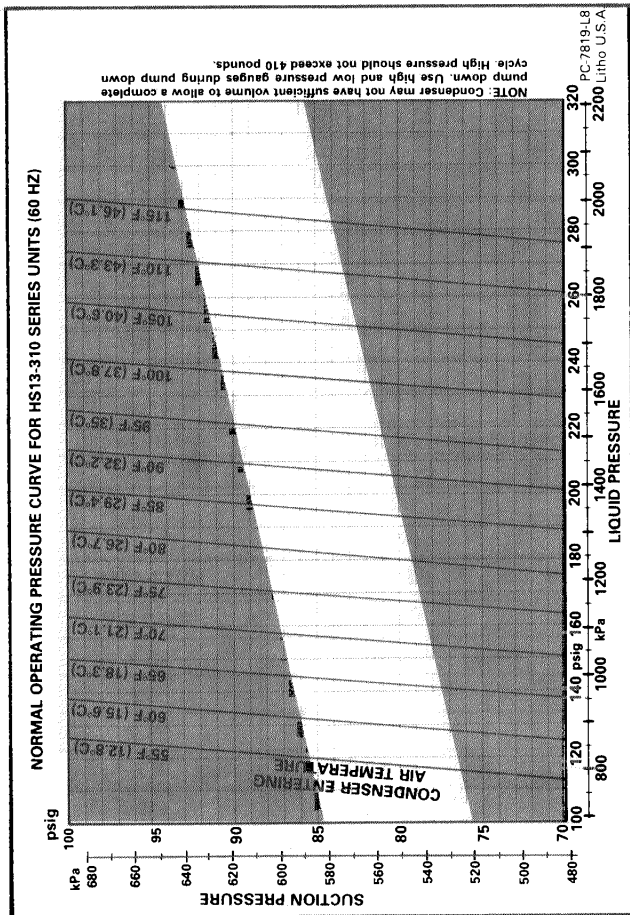
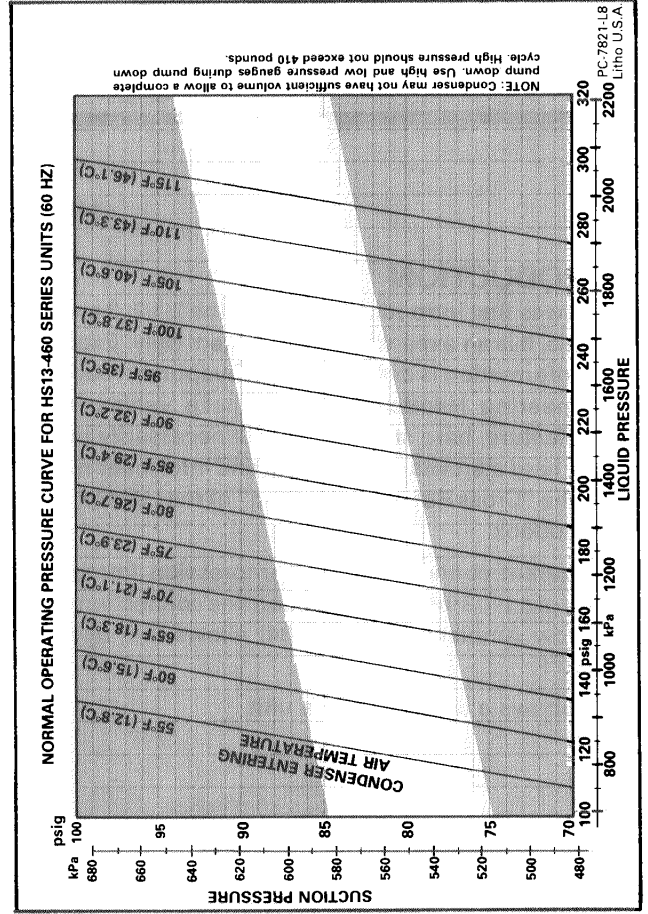
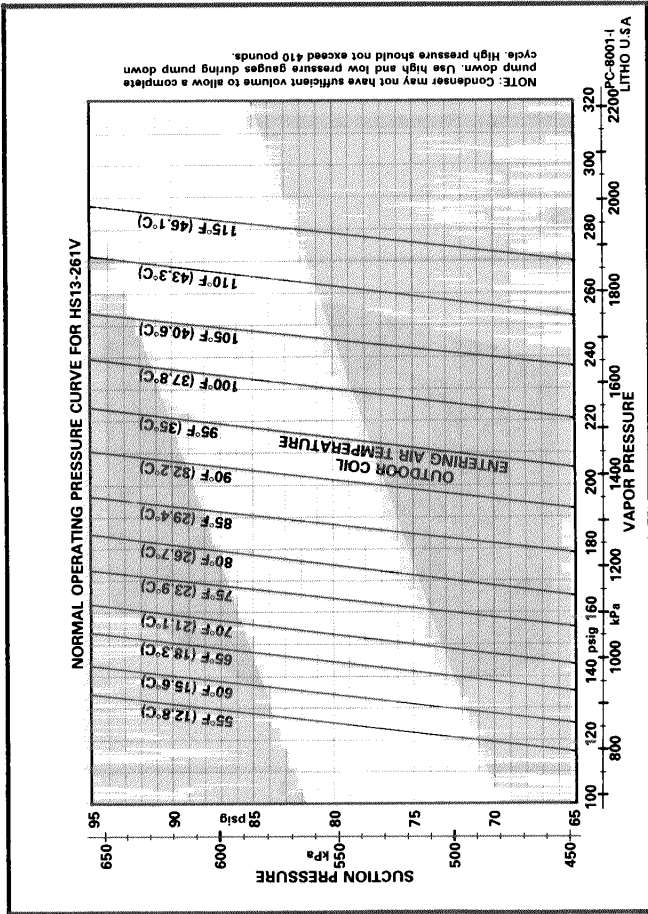
Model No.			HS13-261V	HS13-311V	HS13-411V	HS13-461V
Condenser	Net face area (sq. ft.)	Outer coil	15.66	15.66	18.51	18.51
		Inner coil	14.94	14.94	17.65	17.65
	Tube diameter (in.) & No. of rows		3/8 - 2	3/8 - 2	3/8 - 2	3/8 - 2
	Fins per inch		20	20	20	20
Condenser Fan	Diameter (in.) & No. of blades		24 - 3	24 - 3	24 - 4	24 - 4
	Motor hp		1/10	1/6	1/4	1/4
	Cfm (factory setting)		2800	3400	4100	4300
	Rpm (factory setting)		820	820	820	815
	Watts (factory setting)		150	210	310	380
**Refrigerant - 22 charge furnished			9 lbs - 13 oz.	9 lbs. - 10 oz.	10 lbs. - 0 oz.	10 lbs. - 8 oz.
Liquid line (o.d. in.) connection (compression)			3/8	3/8	3/8	3/8
Suction line (o.d. in.) connection			3/8 (compression)	3/4 (compression)	7/8 (compression)	1-1/8 (sweat)
Shipping weight (lbs.) 1 Package			260	260	275	310

B - Electrical Data

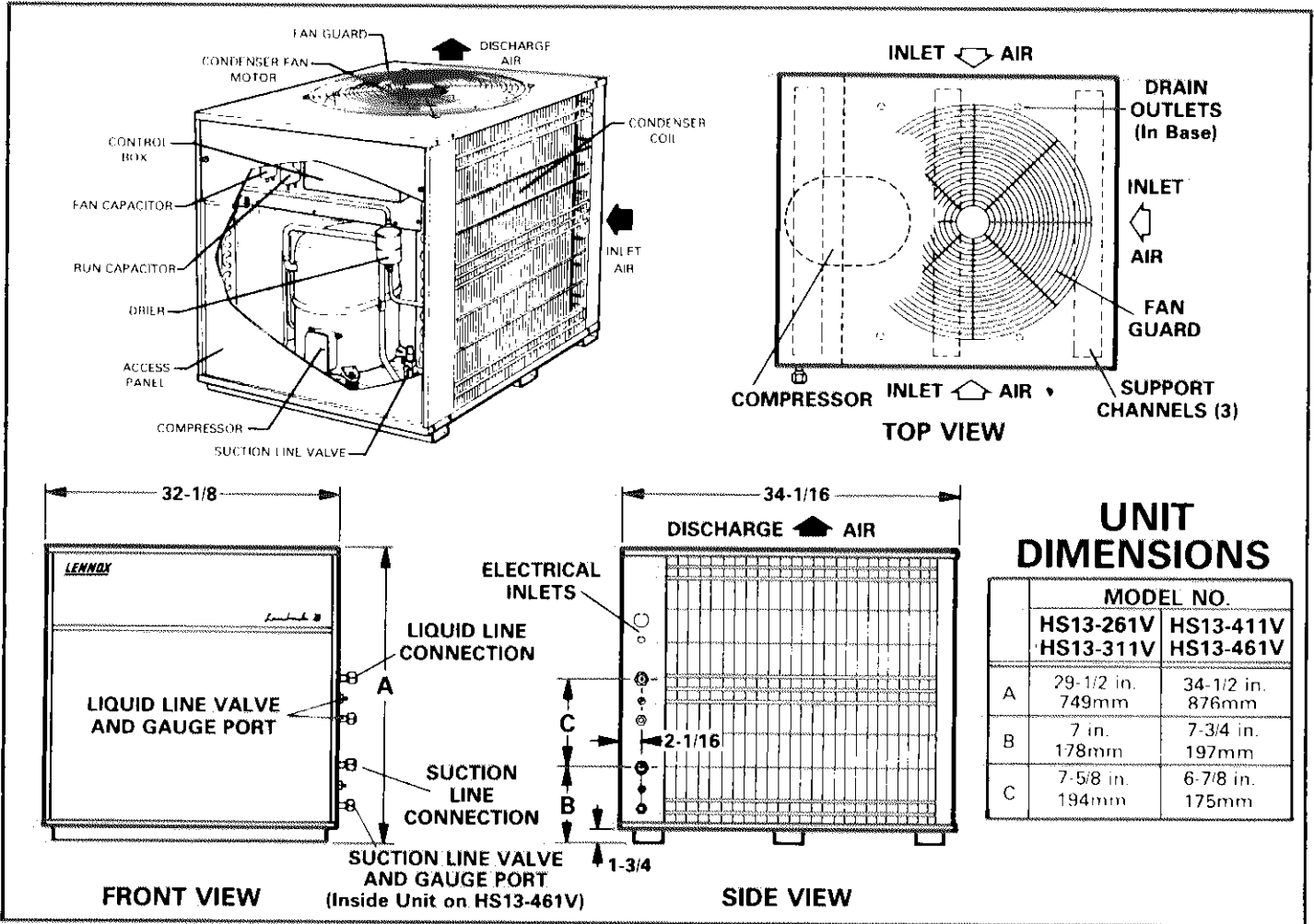
Model No.		HS13-261V	HS13-311V	HS13-411V	HS13-461V
Line voltage data (60hz - 1 phase)		208-230V	208-230V	208-230V	208-230V
Compressor	Rated load amps	9.4	11.8	16.1	18.9
	Power factor	.98	.99	.96	.99
	Locked rotor amps	54.0	54.0	87.0	93.9
Condenser fan motor	Full load amps	1.0	1.0	1.7	1.7
	Locked rotor amps	1.9	1.9	2.9	2.9
Recommended maximum fuse size (amps)		20.0	25.0	35.0	40.0
*Minimum circuit ampacity		12.5	16.0	22.0	25.0

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

C - Pressure Curves



D - Unit Dimensions



II - REFRIGERANT SYSTEM

All the service valve seating adjustments and gauge ports are located on the outside of cabinet except for the suction valve on the 460 units. The external adjustment valves do not backseat. The gauge port can not be shut off by backseating the valve. The suction valve for the 460 units is located inside cabinet and is both front and back seating.

A liquid line gauge port inside cabinet is used to monitor pressures during a system pumpdown.

WARNING - Condenser coil may not have sufficient volume to allow a complete pump down. Always connect a high pressure gauge to the liquid line gauge port during system pump down. High pressure must not exceed 410 psig.

This is a super efficient machine and **MUST** be charged according to the Normal Operating Pressure Curve. HS13 operating pressures vary drastically from standard condensing units. For example, an HS9-411 operating with a 75°F condenser entering air temperature could expect approximately a 70 psig suction and 195 psig head pressure. In contrast an HS13-411 operating at the same 75°F temperature could expect approximately 82 psig suction and 168 psig head pressure. If the head pressure is increased to the expected head pressure of previously produced condensing units, the unit will be seriously overcharged, thus reducing condenser space. The operating cost goes up and the overcharge decreases the compressor life.

IV - COMPONENTS

Figure 2 shows an exploded view of an HS13.

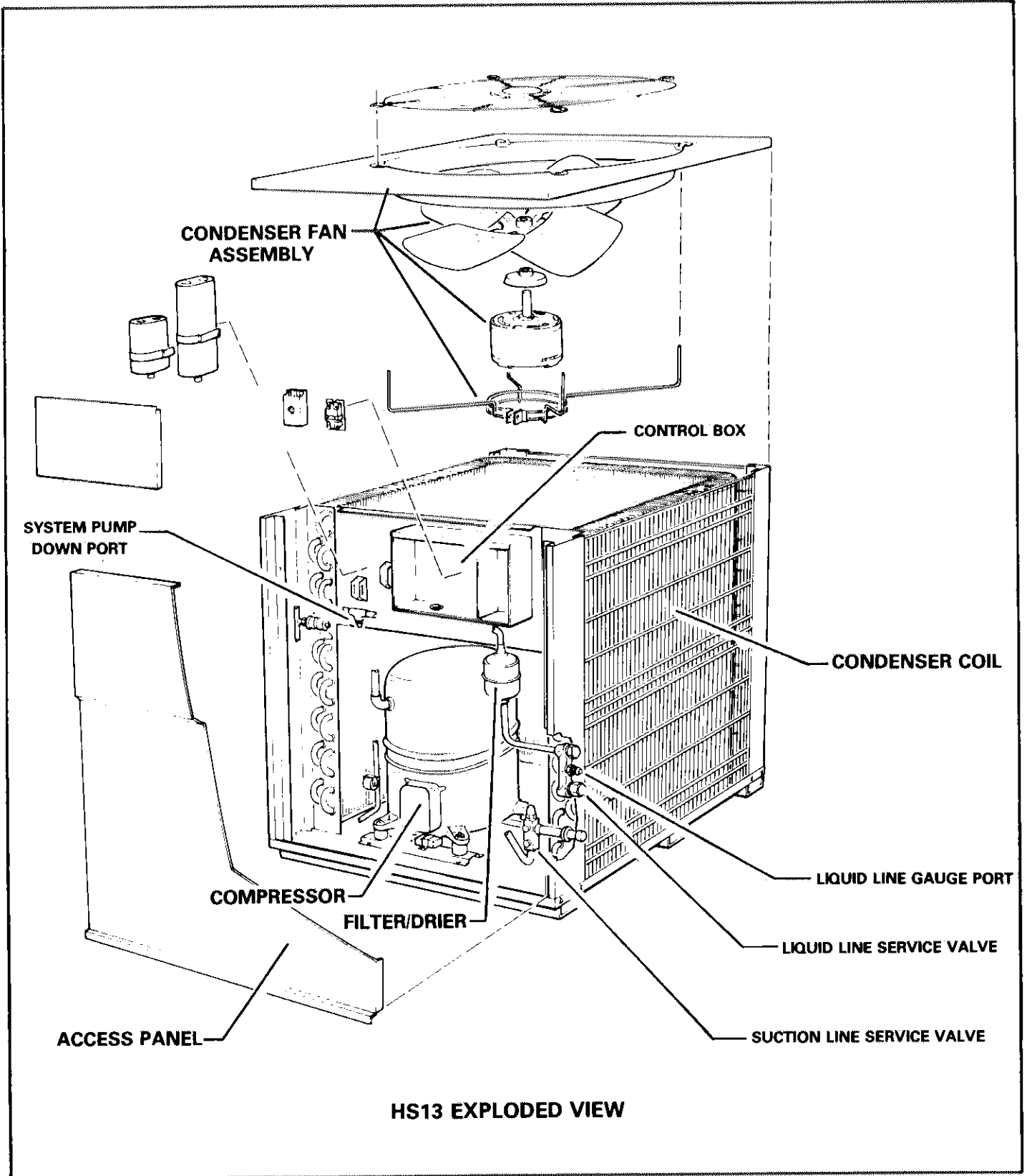


FIGURE 2

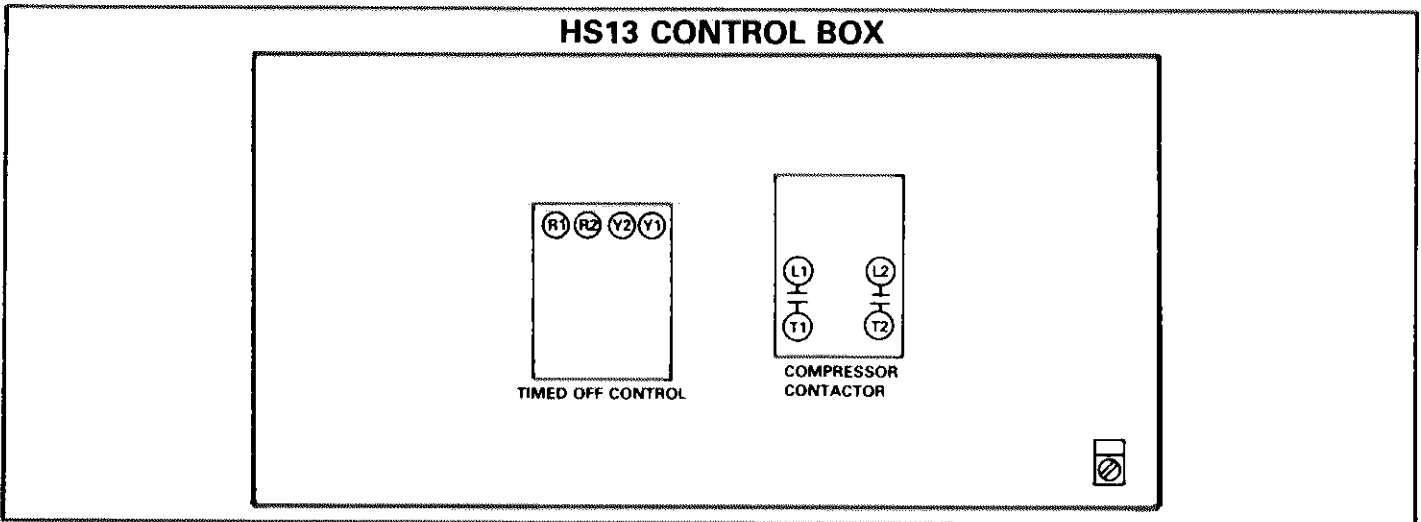


FIGURE 3

A - Control Box (Figure 3)

- 1 - **Compressor Contactor**
Energizes compressor and condenser fan motor.
- 2 - **Timed Off Control**
Prevents compressor short cycling and allows time for suction and discharge pressures to equalize. The control locks out the control circuit for 5 minutes at the end of a cycle.

B - Compressor Compartment (Figure 4)

- 1 - **High Pressure Switch**
Switch cuts out at 410 psig and must be manually reset below 180 psig.
- 2 - **Low Pressure Switch**
Switch is in suction line. It cuts out at 25 psig \pm 5 and automatically resets at 55 psig \pm 5.
- 3 - **Compressor**
Compressor uses an internal overload and a pressure relief valve. The relief valve opens at a discharge and suction differential of 450 psig \pm 50. The HS13-460 compressor employs an internal self-regulating crankcase heater.
- 4 - **Crankcase Heater Thermostat**
The crankcase heater is controlled by a refrigerant temperature thermostat (with exception to Tecumseh 4 and 5 ton compressors). 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.

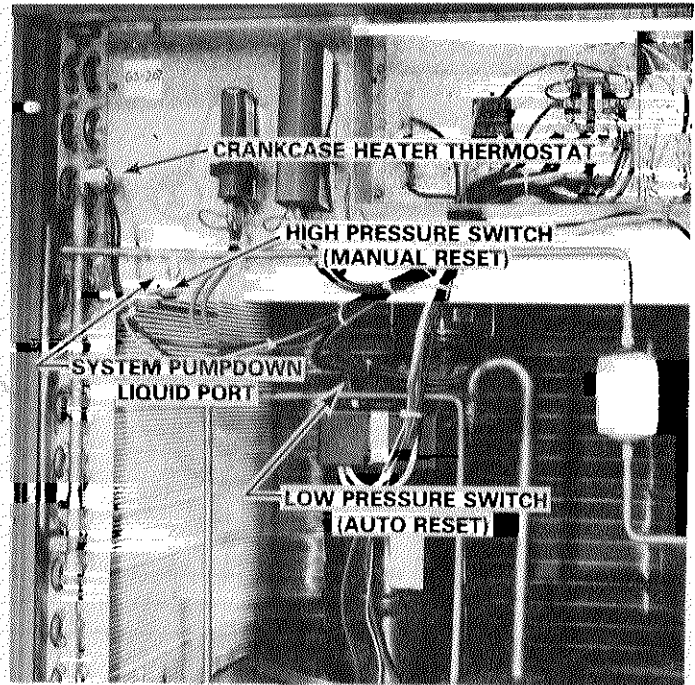


FIGURE 4

C - Condenser Coil Compartment

The unit utilizes a draw through coil with a vertical discharge. Fan motor is prelubricated and sealed. No further lubrication required under normal operation. For fan service access, remove the fan guard. The motor has a rain shield for protection from moisture. Figure 5 illustrates the condenser fan and motor assembly.

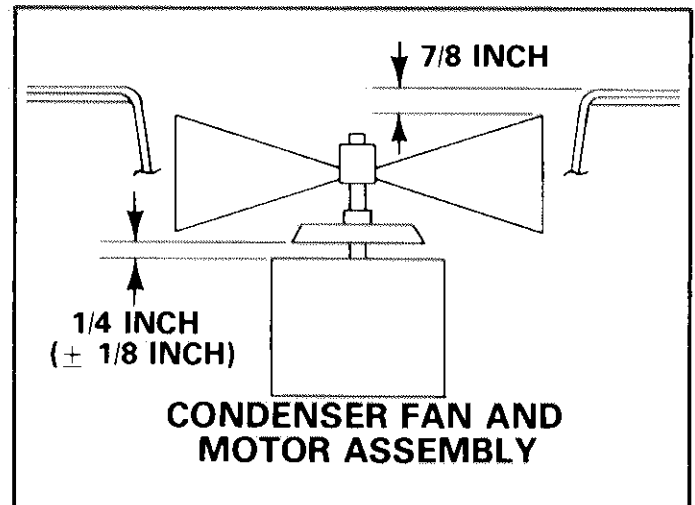


FIGURE 5

V - SCHEMATIC WIRING DIAGRAM OPERATING SEQUENCE

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

- 1 - The thermostat makes on a cooling demand.
- 2 - If the thermostat is set on "Auto", the Blower Relay is energized. The Blower Relay closes its N.O. contacts to energize the Blower Motor at cooling speed.
- 3 - As the thermostat makes it also completes a circuit to the Timed Off Control through the High and Low Pressure Switches. These switches open at abnormal pressures to de-energize the machine.
- 4 - With a circuit complete through "R1" and "R2" terminals of

- Timed Off Control, the "Y" terminals energize the Compressor Contactor.
- 5 - The Compressor Contactor closes its N.O. contacts to energize the compressor. It also energizes the Condenser Fan Motor.
- 6 - When the demand is satisfied, the thermostat contacts open. The Timed Off Control locks out the unit for a 5 minute period.
- 7 - Crankcase Heater operation is controlled by a thermostat which senses refrigerant temperature.

NOTE - On 3-1/2 ton units the crankcase heater is self-regulating.

