

HS10 SERIES UNITS

I - INTRODUCTION

The HS10 was first introduced in 1974. 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 unit includes a 2 speed condenser fan motor. The refrigerant connections are compression fittings with exception of a 1-1/8 inch sweat suction line connection on 510 and 650 units. A Low Ambient Kit (BM-3434) allows unit operation down to 0°F.

The larger condenser coil surface compared to previous condensing units results in lower head pressures and higher efficiency. In 1977 compressor improvements resulted in even higher efficiency. These units are designated by dash 4 and 5.

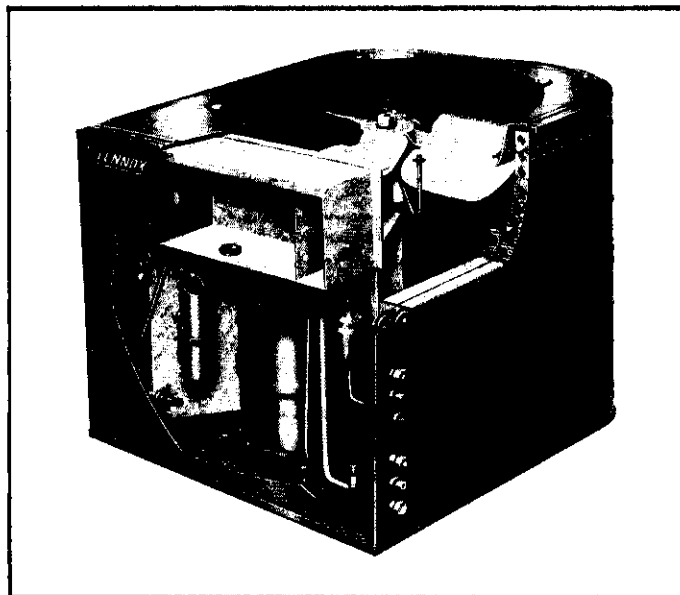


FIGURE 1

II - UNIT INFORMATION

A - Specifications

Model No.		HS10-311V	HS10-411V	HS10-461V	HS10-511V	HS10-651V HS10-653V	
Condenser	Net face area (sq. ft.)	Outer coil	11.8	15.1	15.1	15.1	
		Inner coil	7.8	3.6	7.2	7.2	10.9
	Tube diameter (in.) & No. of rows		3/8 — 1.66	3/8 — 1.24	3/8 — 1.48	3/8 — 1.48	3/8 — 1.72
	Fins per inch		20	20	20	20	20
Condenser Fan	Diameter (in.) & No. of blades		20 — 4	20 — 4	20 — 4	20 — 4	20 — 4
	Motor hp		1/4	1/4	1/4	1/4	1/4
	Cfm (factory setting)		2550	3350	3300	3300	3250
	Rpm (factory setting)		860	1020	1040	1040	1060
	Watts (factory setting)		260	310	310	310	310
**Refrigerant — 22 charge furnished		5 lbs. — 10 oz.	6 lbs. — 10 oz.	8 lbs. — 0 oz.	8 lbs. — 0 oz.	9 lbs. — 3 oz.	
Liquid line (o.d. in.) connection		3/8 comp.	3/8 comp.	3/8 comp.	3/8 comp.	3/8 comp.	
Suction line (o.d. in.) connection		3/4 comp.	3/4 comp.	7/8 comp.	*1-1/8 sweat	*1-1/8 sweat	
Shipping weight (lbs.) 1 Package		218	240	252	277	294	

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

NOTE - Extremes of operating range are plus 10% and minus 5% of line voltage. 3 phase models are plus and minus 10% of line voltage.

B - Electrical Data

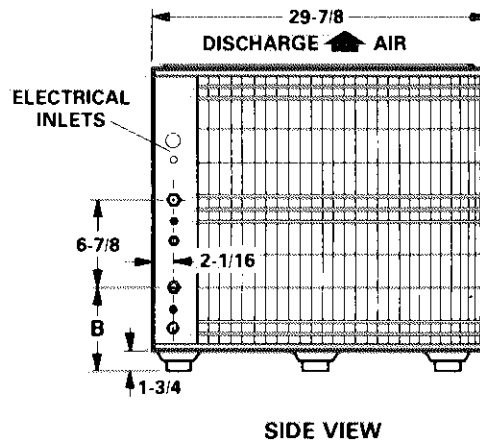
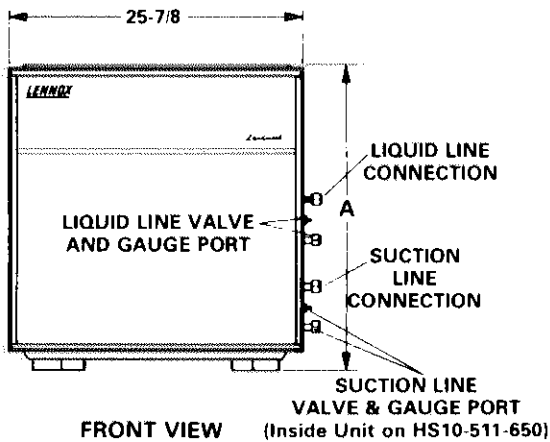
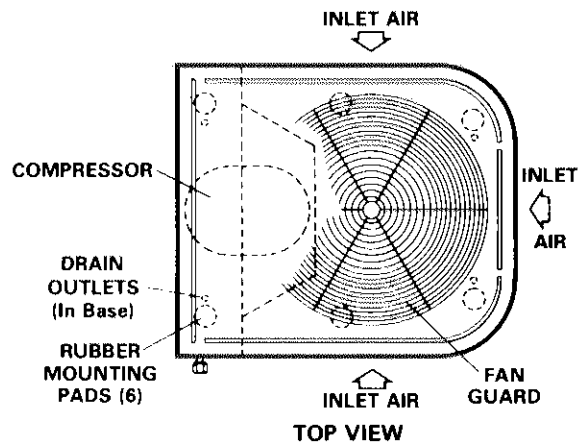
Model No.		HS10-311V	HS10-411V	HS10-461V	HS10-511V	HS10-651V	HS10-653V
Line voltage data		208/230v 60hz — 1ph	230v 60hz — 1ph	230v 60hz — 1ph	208/230v 60hz — 1ph	208/230v 60hz — 1ph	460v 60hz — 3ph
Compressor	Rated load amps	13.3	14.7	17.1	27.3	31.0	10.5
	Power factor	.96	.96	.96	.95	.93	.86
	Locked rotor amps	61.0	75.0	88.0	132.0	165.0	66.0
Condenser fan motor	Full load amps	2.1	2.1	1.4	1.4	1.4	0.7
	Locked rotor amps	4.5	4.5	2.4	2.4	2.4	1.0
*Minimum circuit ampacity		18.8	20.5	22.8	35.5	40.2	13.8

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

NOTE - Extremes of operating range are plus 10% and minus 5% of line voltage. 3 phase models are plus and minus 10% of line voltage.

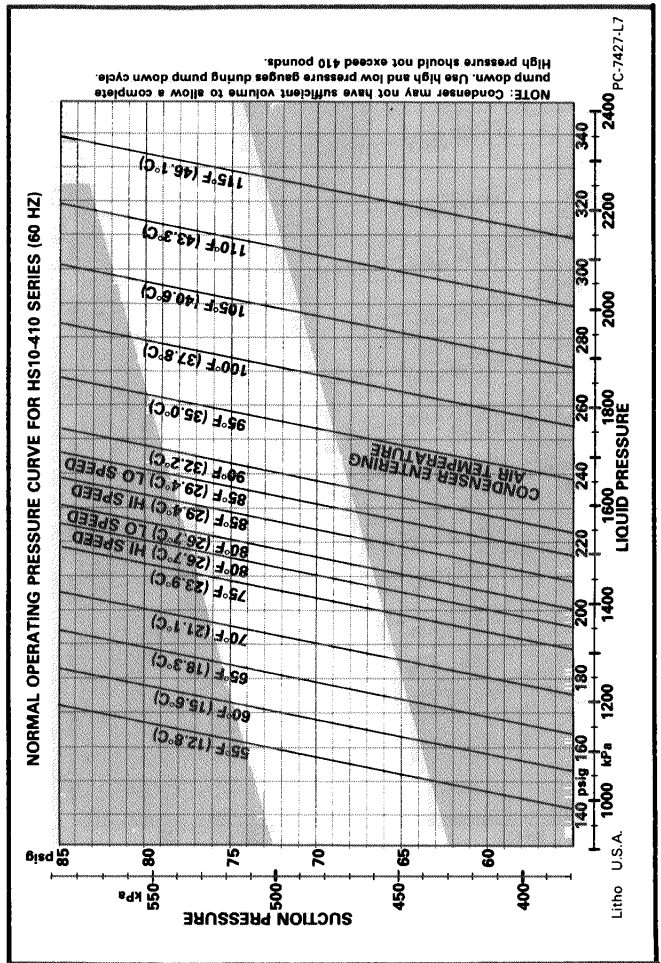
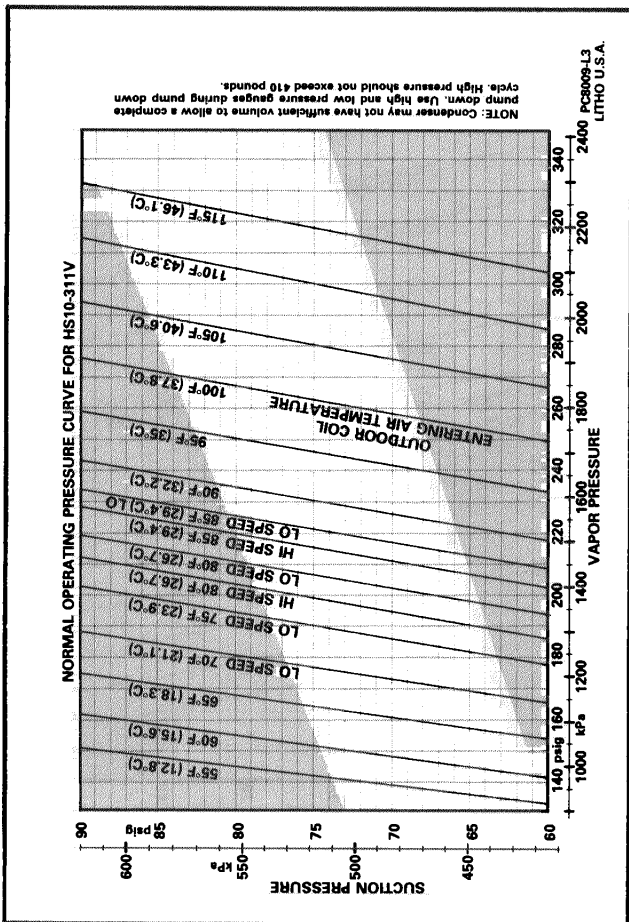
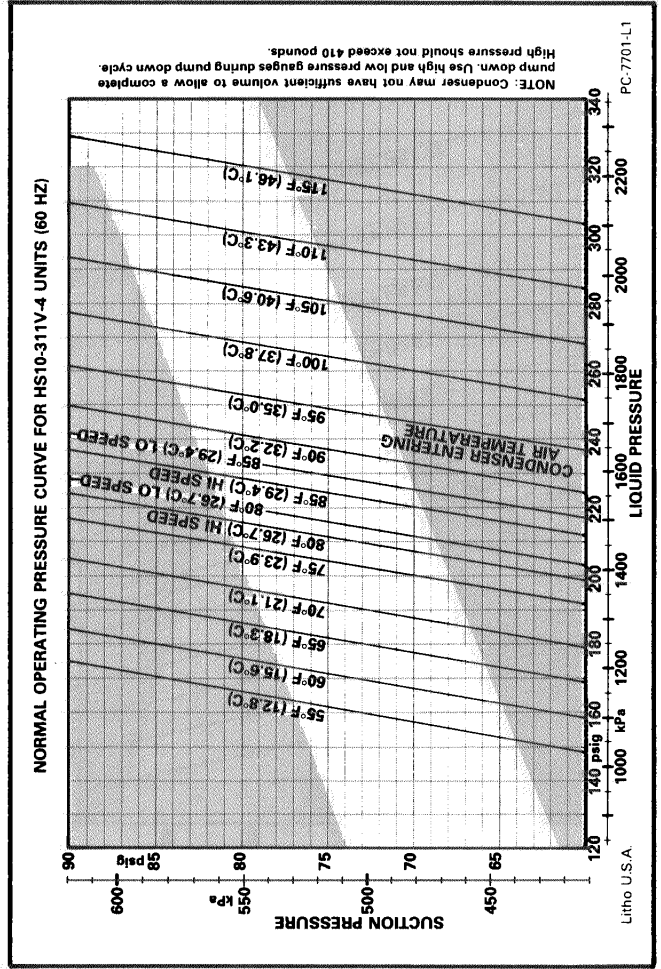
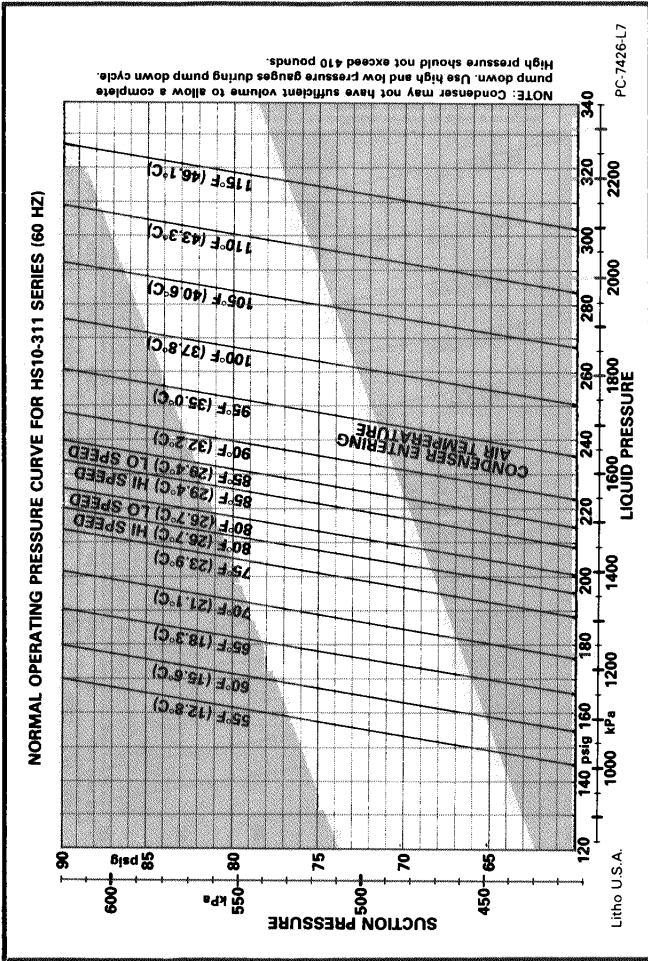
C - Unit Dimensions

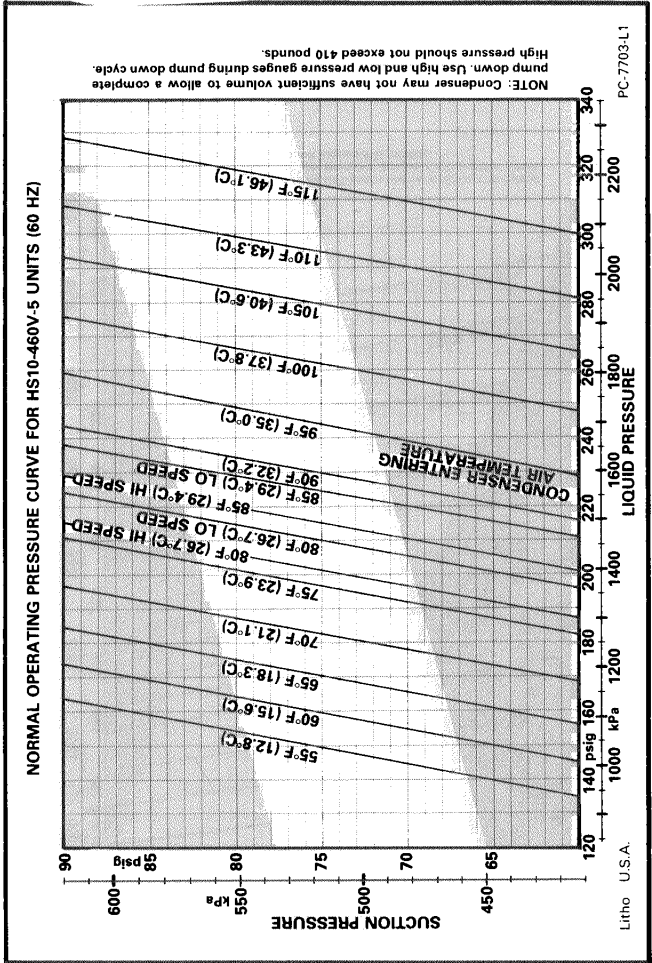
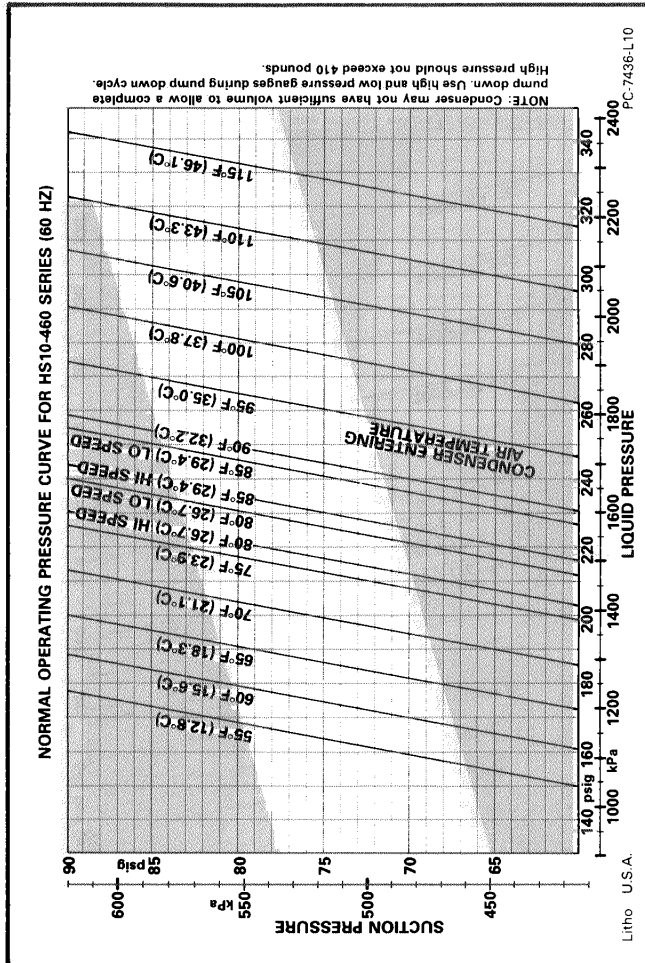
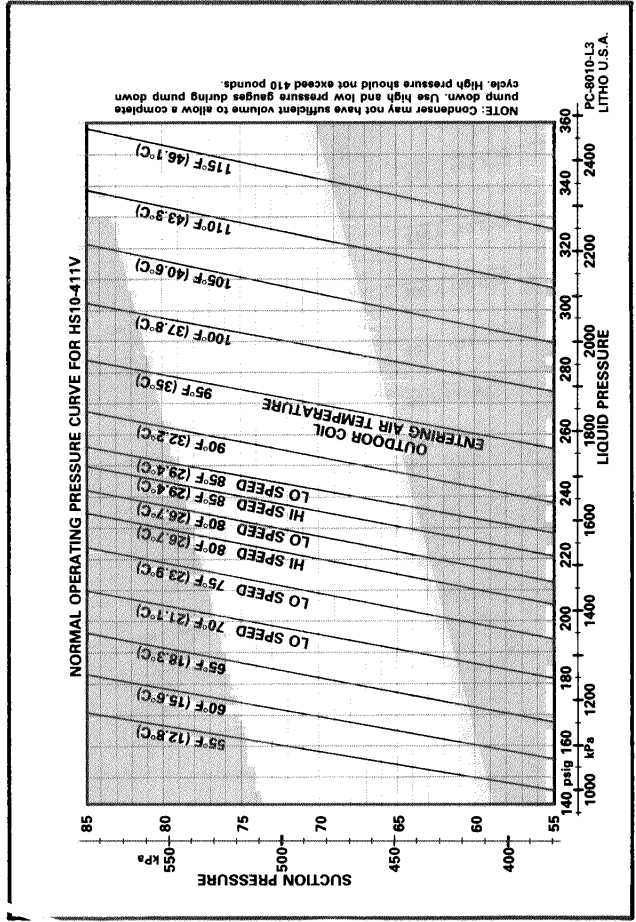
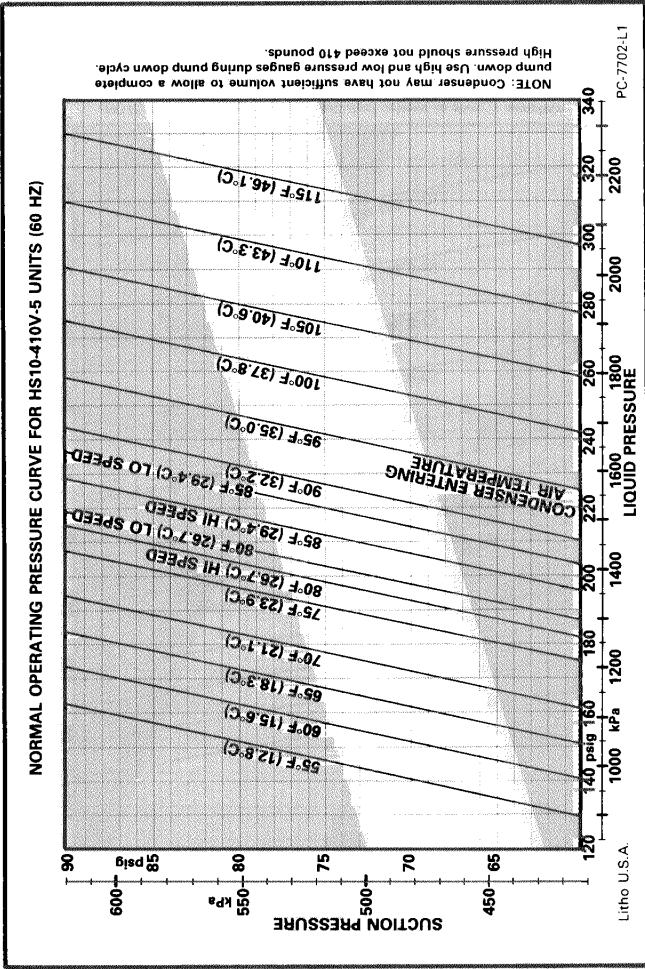
Model No.	A	B
HS10-311V	27-1/16	7
HS10-411V		
HS10-461V	34-1/16	7-3/4
HS10-511V		
HS10-650V		

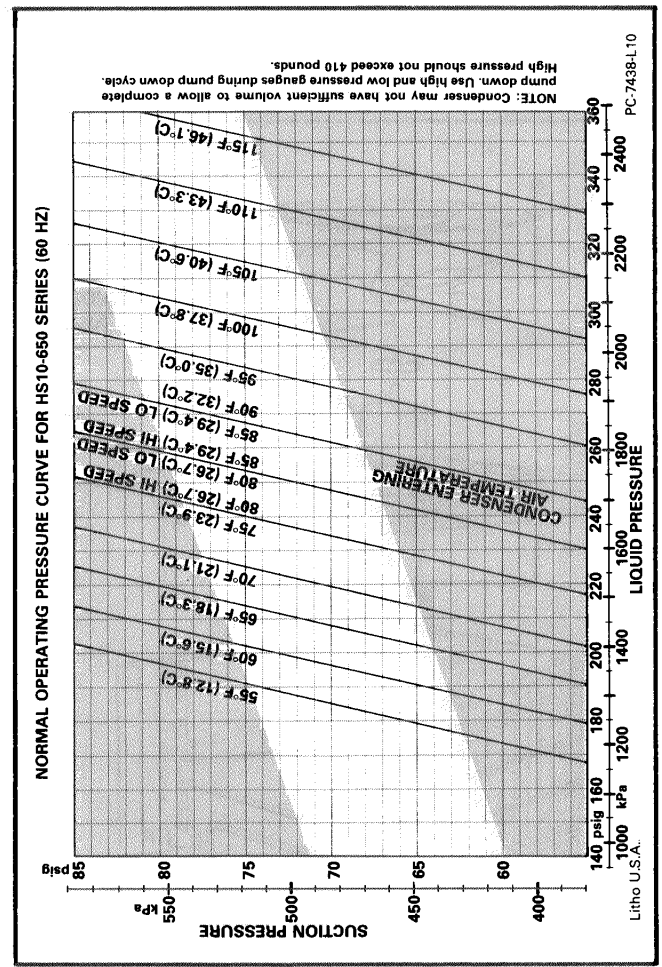
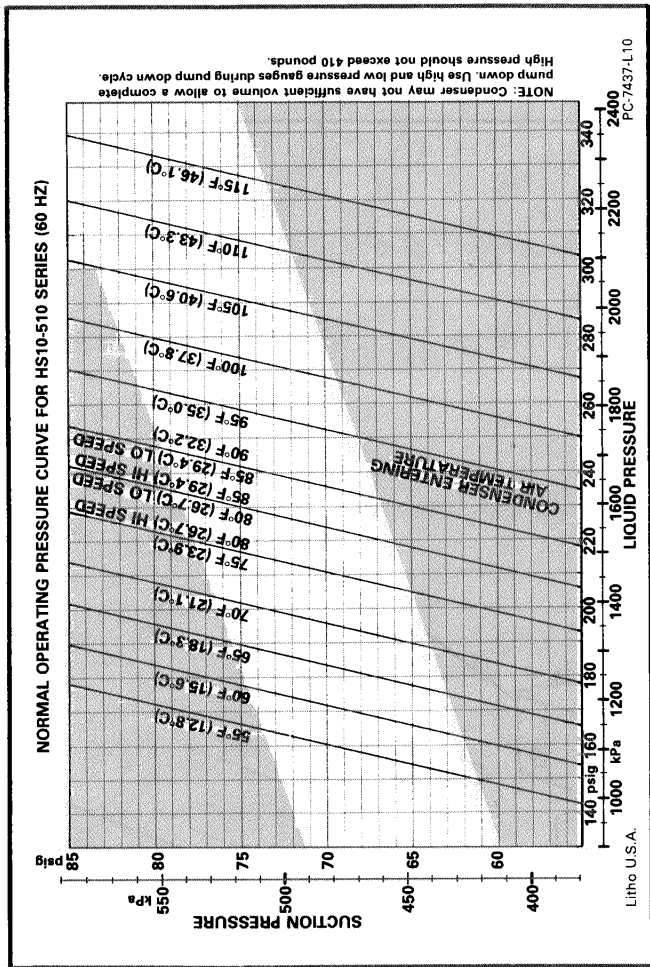


D - Pressure Curves

HS10







III - 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 4 and 5 ton models. The external adjustment valves do not back seat. The gauge port can not be shut off by back seating the valve. See Figure 2.

The suction valve for the 4 and 5 ton units is located inside the cabinet and is both front and back seating.

A liquid line gauge port inside cabinet is used to monitor system pressure during a pump down.

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 (2827 kPa).

Each unit is furnished with a normal operating pressure curve. The curve uses suction pressure, liquid 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 liquid pressure. If the liquid pressure is within five pounds of this reading, the unit is properly charged, providing the three conditions

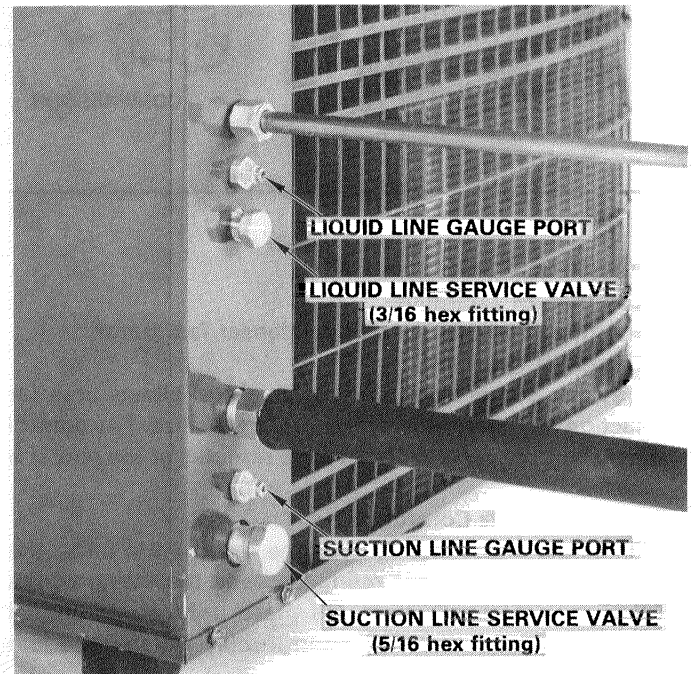


FIGURE 2

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 3 shows an exploded view of an HS10.

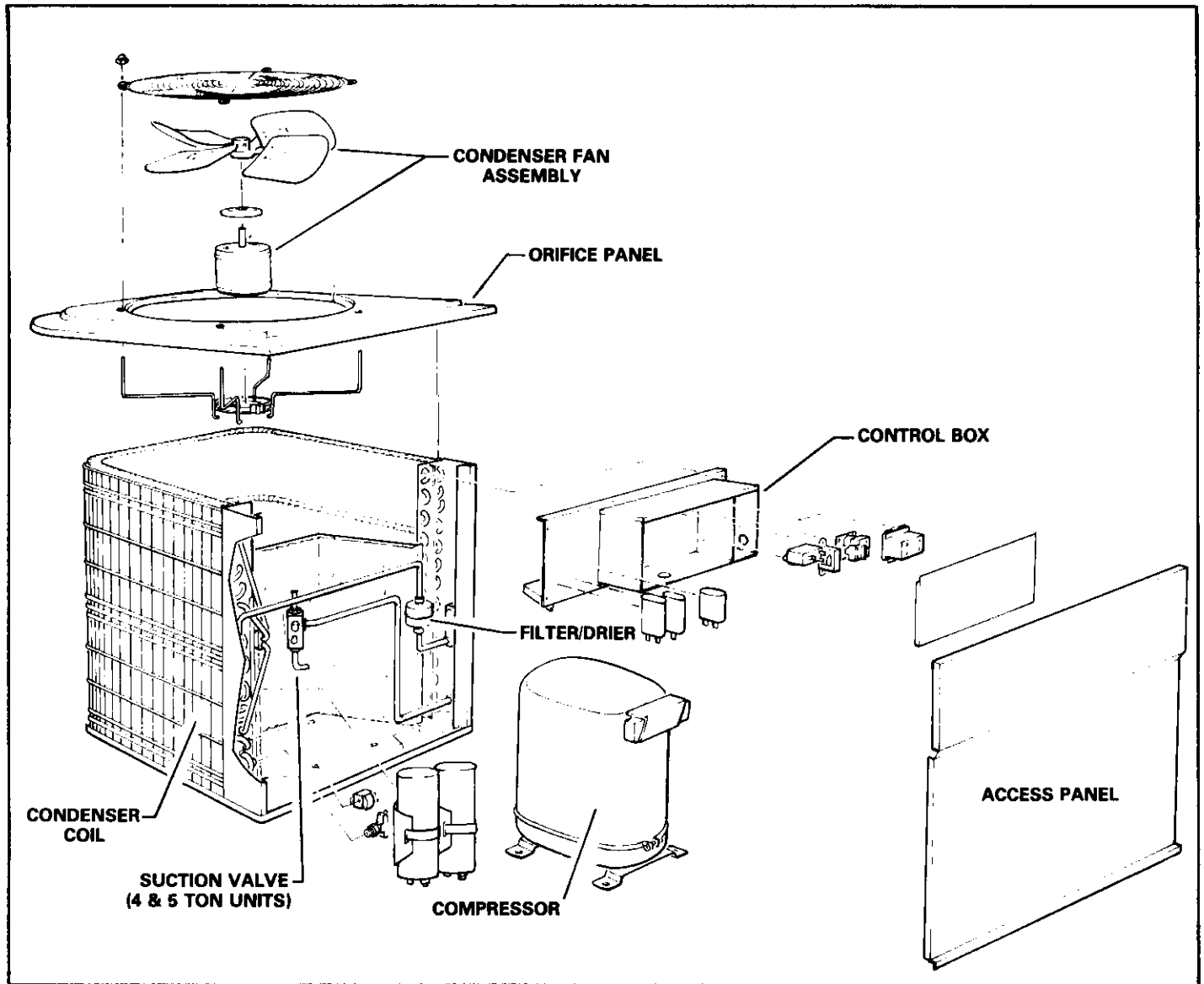


FIGURE 3

A - Control Box (Figure 4)

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.

3 - Transformer & Control Relay

On single phase and "J" voltage 4 and 5 ton units, the compressor contactor rating exceeds the rating of the indoor unit transformers. On these units an additional transformer is used. The control relay isolates the two transformers.

230V primary/24V secondary — 30VA

B - Compressor Compartment (Figure 5)

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. Four and five ton Tecumseh compressors employ an internal self-regulating crankcase heater.

4 - Crankcase Heater Thermostat

The crankcase heater is controlled by a refrigerant tem-

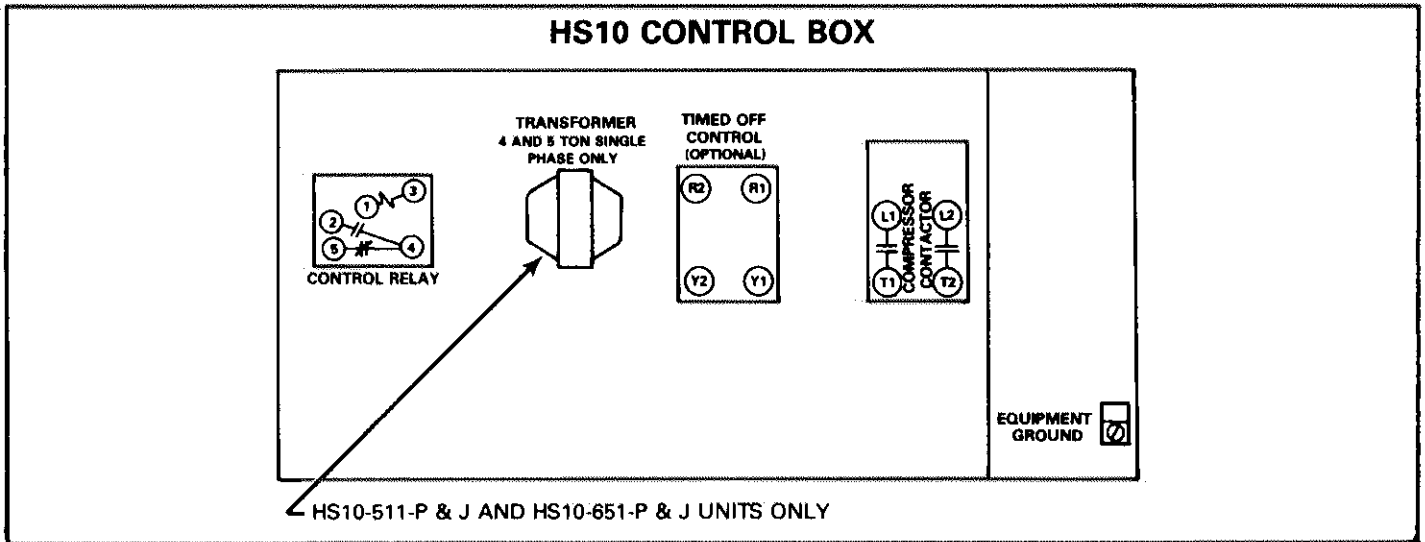
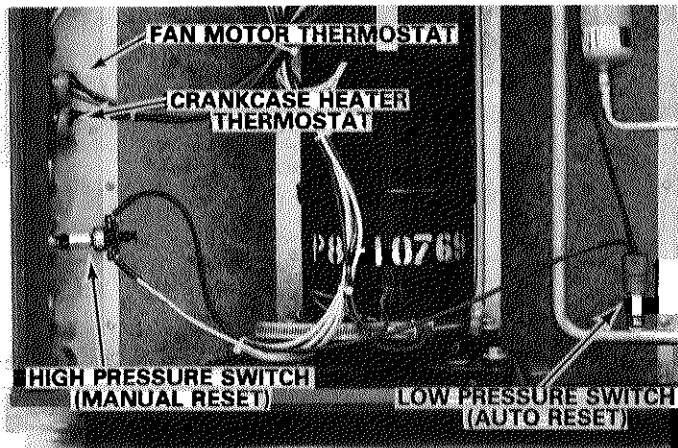


FIGURE 4



perature 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.

5 - Fan Speed Thermostat

A refrigerant temperature thermostat, attached to the condenser coil controls the two speed fan motor.

The thermostat (non-adjustable) switches fan motor at following approximate temperatures:

HS10 Model	HIGH		LOW	
	Ambient	Refrigerant	Ambient	Refrigerant
260 thru 510	90F (32.1C)	110F (43.3C)	75F (23.8C)	95F (35.0C)

Motor may be on either high or low speed between these temperatures, depending if outdoor temperature is on a rise or fall condition.

C - Condenser Coil Compartment

The unit utilizes a draw through coil with vertical discharge. 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 fan guard. The motor has a rain shield for moisture protection. Figure 6 illustrates the condenser fan and motor assembly.

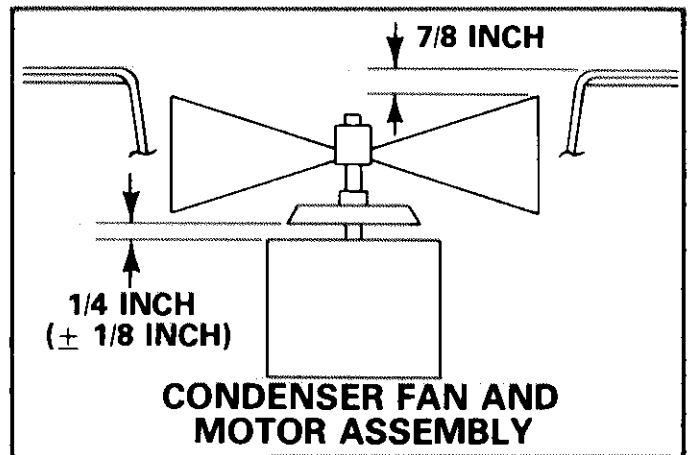


FIGURE 6

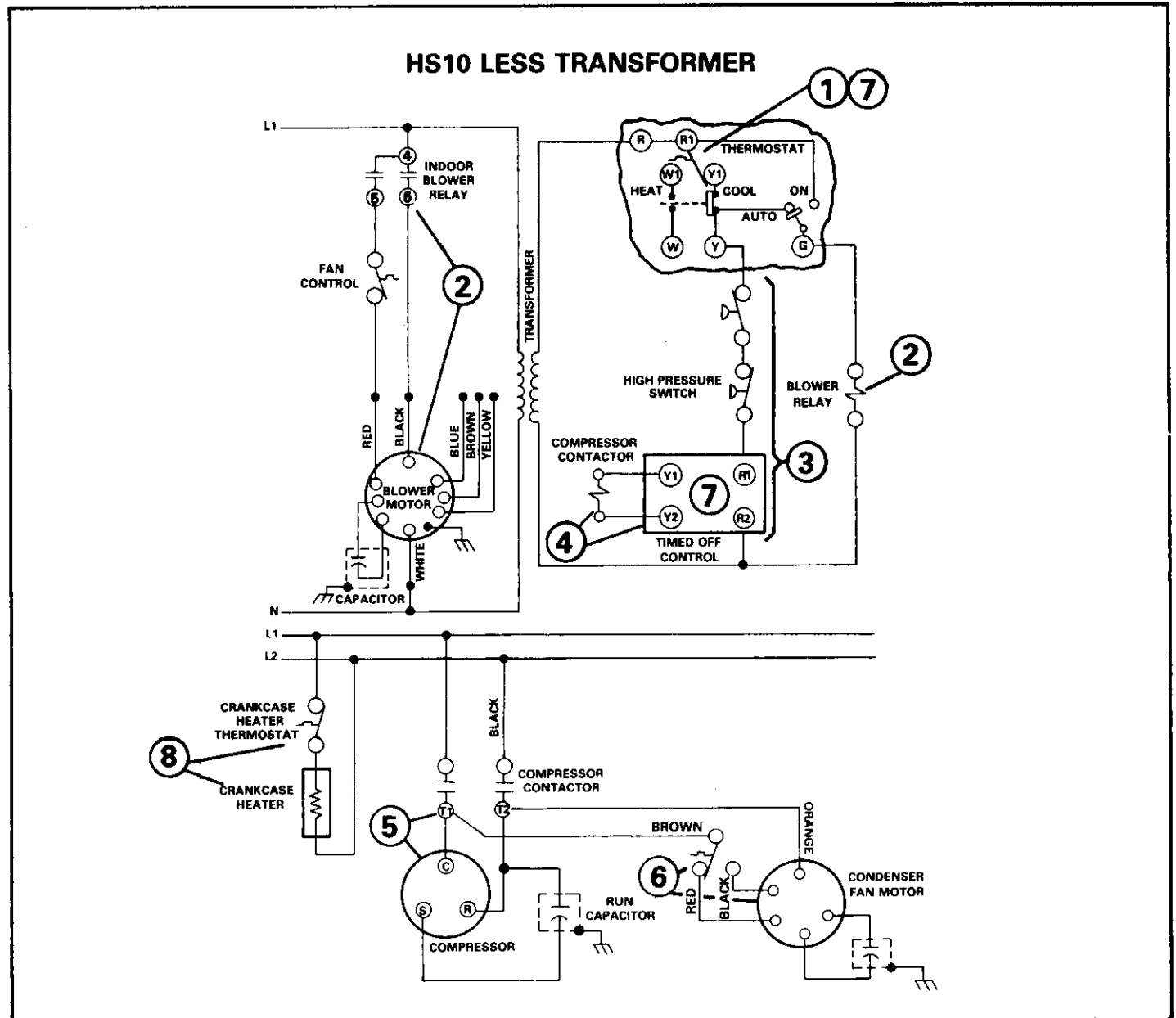
V - SCHEMATIC WIRING DIAGRAM OPERATING SEQUENCE

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

HS10 LESS TRANSFORMER

- 1 - The thermostat makes on a cooling demand.
- 2 - If the thermostat is set on "Auto", the Blower Relay is energized. 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.
 - 6 - Compressor Contactor also completes a circuit to the Condenser Fan Motor through the Fan Speed Thermostat. The refrigerant temperature determines the speed of motor. Black is high speed; red is low speed.
 - 7 - When demand is satisfied, the thermostat contacts open. The Timed Off Control locks out the unit for a 5 minute period.
 - 8 - Crankcase Heater operation is controlled by a thermostat which senses refrigerant temperature.
- NOTE - On some units the heater is self regulating and on others it is energized continuously.



HS10 WITH TRANSFORMER

- 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 bring the Indoor Blower Motor at cooling speed.
- 3 - As the thermostat makes it also energizes the Control Relay at the HS10.
- 4 - The N.O. Control Relay contacts close to power the HS10 Transformer.
- 5 - The transformer provides a 24V circuit to the Timed Off Control through the High and Low Pressure Switches.
- 6 - With circuit complete through "R1" and "R2" terminals of Timed Off Control the "Y" terminals energize the Compressor Contactor.
- 7 - Compressor Contactor closes its N.O. contacts to energize the compressor.
- 8 - Compressor Contactor also completes a circuit to the condenser fan motor through the Fan Speed Thermostat. Refrigerant temperature determines the speed of motor. Black is high; red is low.
- 9 - When the demand is satisfied, the thermostat contacts open. The Timed Off Control locks out the unit for a 5 minute period.
- 10 - On 208 - 230v/60/1 units, the crankcase heater is self regulating. On 375V/ 60/3 units the crankcase heater is controlled by the control relay. It is energized on "off" cycles and de-energized when the machine is on.

