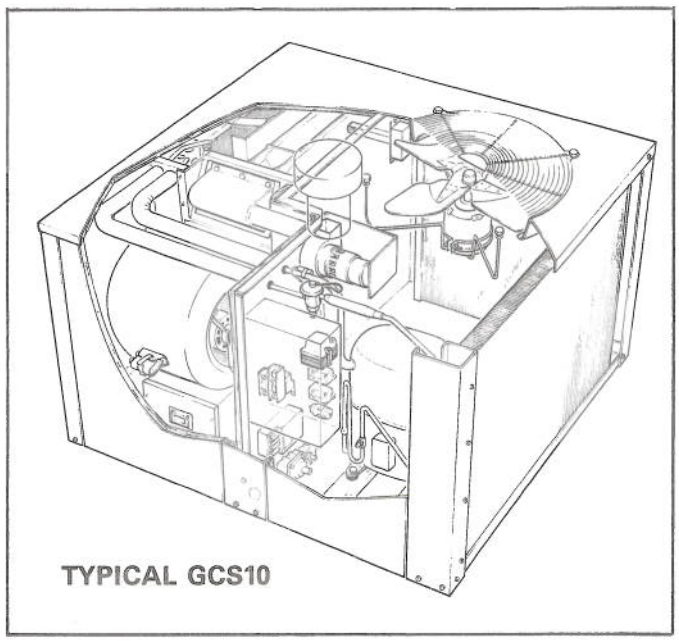
GCS10 SERIES DX COOLING & GAS HEATING
(261, 311, 410, 460, 510 & 650)

I - INTRODUCTION

The GCS10 series, introduced in 1982, are primarily used in roof-top applications. Units use direct drive multi-speed blowers. All units are compatible for use with either of two Power Saver options. Table 1 lists choice of optional equipment for GCS10 series units.

The GCS10 units utilize an induced draft burner (natural or LP gases) with a Johnson Controls proven pilot ignition system. LP changeover kits are available for field installation, kit numbers are given in "Specifications" table on pages 1 and 2. Hard starting components are standard on the 461,511 & 651 units. If necessary, on other single phase units, refer to Lennox Repair Parts Micro-fiche.

Later in 1983 units will incorporate Lennox compressors in the 650 series units with internal crankcase heaters and external high pressure switch in the control circuit.



TYPICAL GCS10

TABLE 1

Optional Equipment	Model No.
Optional Roof Mounting Frame	RMFG10-65
Optional Power Saver Controls	PSDG10-65 PSDGH10-65
Optional Duct Enclosure	RTG10-65
Optional Combination Ceiling Supply & Return Step-Down Diffuser	*RTD9-65
Optional Combination Ceiling Supply & Return Flush Diffuser	*FD9-65

*Not available with GCS10-411-50 model.

II - UNIT INFORMATION

A - Specifications

Model No.		GCS10-261-50	GCS10-311-50	GCS10-411-50	GCS10-411-413-75
Heating capacity input (Btuh)		50,000	50,000	50,000	75,000
†Heating capacity output (Btuh)		40,000	40,000	40,000	58,000
†A.F.U.E.		78.0%	78.0%	78.0%	75.7%
★ARI Standard 270 SRN		20	20	20	20
*ARI Standard 210 Ratings	Total cooling capacity (Btuh)	25,000	29,600	35,600	34,500
	Total unit watts	3220	3750	4310	4185
	††SEER (Btuh/Watts)	8.5	8.5	9.0	9.0
	•EER (Btuh/Watts) — 3 phase models only	----	----	----	8.25
	Dehumidifying capacity	26%	24%	24%	24%
Refrigerant (R-22) charge		3 lbs. 14 oz.	4 lbs. 9 oz.	5 lbs. 2 oz.	4 lbs. 7 oz.
Evaporator Blower	Blower wheel nominal diam. x width (in.)	10 x 8	10 x 8	10 x 8	10 x 8
	Motor horsepower	1/3	1/3	1/3	1/3
Evaporator Coil	Net face area (sq. ft.)	3.30	3.30	3.30	5.56
	Tube diam. (in.) & No. of rows	3/8 — 3	3/8 — 3	3/8 — 3	3/8 — 2
	Fins per inch	13	16	16	16
Condenser Coil	Net face area (sq. ft.)	12.3	12.3	12.3	15.1
	Tube diam. (in.) & No. of rows	3/8 — 1	3/8 — 1-1/4	3/8 — 1-1/2	3/8 — 1
	Fins per inch	20	20	20	20
Condenser Fan	Diameter (in.) & No. of blades	20 — 4	20 — 4	20 — 4	24 — 3
	Air volume (cfm) (factory setting)	3200	3200	3200	3300
	Motor horsepower	1/4	1/4	1/4	1/6
	Motor watts (factory setting)	310	310	310	220
Gas Piping connection mpt (in.)	Natural and **LPG	1/2	1/2	1/2	1/2
Recommended gas supply pressure (wc-in.)	Natural	7	7	7	7
	**LPG	11	11	11	11
**LPG changeover kit — Optional		LB-33151CW	LB-33151CW	LB-33151CW	LB-33151CW

★Sound Rating Number 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.

†Annual Fuel Utilization Efficiency based on DOE test procedures and FTC labeling regulations.

††Seasonal Energy Efficiency Ratio based on DOE test procedures.

•Energy Efficiency Ratio in accordance with ARI Standard 210.

**For LPG units a field changeover kit is required and must be ordered extra.

A - Specifications

Model No.			GCS10-461-463-75	GCS10-511-513-75	GCS10-651-653-75
Heating capacity input (Btuh)			75,000	75,000	75,000
†Heating capacity output (Btuh)			58,000	58,000	58,000
†A.F.U.E.			75.7%	75.7%	75.7%
☆ARI Standard 270 SRN			20	20	21
*ARI Standard 210 Ratings	Total cooling capacity (Btuh)		41,500	47,500	57,000
	Total unit watts		5130	☆6085	6820
	††SEER (Btuh/Watts) -- 1 phase models only		8.9	8.6	8.8
	•EER (Btuh/Watts) -- 3 phase models only		8.10	8.00	8.35
	Dehumidifying capacity		28%	23%	26%
Refrigerant (R-22) charge			5 lbs.10 oz.	5 lbs. 8 oz.	7 lbs. 0 oz.
Evaporator Blower	Blower wheel nominal diam. x width (in.)		10 x 9	12 x 12	12 x 12
	Motor horsepower		1/3	3/4	3/4
Evaporator Coil	Net face area (sq. ft.)		5.56	5.56	5.56
	Tube diam. (in.) & No. of rows		3/8 -- 3	3/8 -- 3	3/8 -- 3
	Fins per inch		13	16	16
Condenser Coil	Net face area (sq. ft.)		15.1	15.1	15.1
	Tube diam. (in.) & No. of rows		3/8 -- 1.27	3/8 -- 1.55	3/8 -- 2
	Fins per inch		20	20	20
Condenser Fan	Diameter (in.) & No. of blades		24 -- 3	24 -- 4	24 -- 4
	Air volume (cfm) (factory setting)		3300	5000	5000
	Motor horsepower		1/6	1/2	1/2
	Motor watts (factory setting)		220	550	590
Gas Piping connection mpt (in.)		Natural and **LPG	1/2	1/2	1/2
Recommended gas supply pressure (wc-in.)		Natural	7	7	7
		**LPG	11	11	11
**LPG changeover kit -- Optional			LB-33151CW	LB-33151CW	LB-33151CW

☆Sound Rating Number 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.
†Annual Fuel Utilization Efficiency based on DOE test procedures and FTC labeling regulations.
††Seasonal Energy Efficiency Ratio based on DOE test procedures.
•Energy Efficiency Ratio in accordance with ARI Standard 210.
☆ 5930 on 3 phase model -- GCS10-513-75.
**For LPG units a field changeover kit is required and must be ordered extra.

B - Electrical Data

Model No.		GCS10-261-50	GCS10-311-50	GCS10-411-50	GCS10-411-75	GCS10-413-75
Line voltage data		208/230v 60 hz./1 phase	208/230v 60 hz./1 phase	208/230v 60 hz./1 phase	208/230v 60 hz./1 phase	208/230v 60 hz./3 phase
Compressor	Rated load amps	12.6	14.0	17.6	17.6	11.2
	Locked rotor amps	64.0	80.0	88.0	88.0	66.0
Condenser Fan Motor	Full load amps	1.4	1.4	1.4	1.1	1.1
	Locked rotor amps	2.9	2.9	2.9	2.4	2.4
Evaporator Blower Motor (230 volt)	Full load amps	2.3	2.3	2.3	2.3	2.3
	Locked rotor amps	5.4	5.4	5.4	5.4	5.4
Induced Draft Blower Motor	Full load amps	.50	.50	.50	.55	.55
Recommended maximum fuse size (amps)		30	35	40	40	25
Unit power factor		.98	.94	.97	.97	.89
*Minimum Circuit Ampacity		19.5	21.2	25.7	25.4	17.4

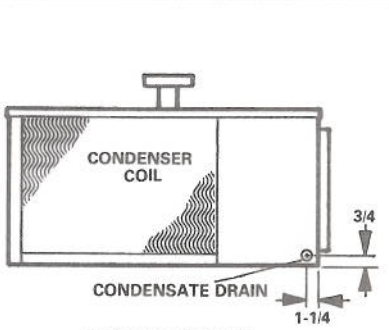
*Refer to National Electrical Code manual to determine wire, fuse and disconnect size requirements.
NOTE -- Extremes of operating range are plus and minus 10% of line voltage.

B - Electrical Data

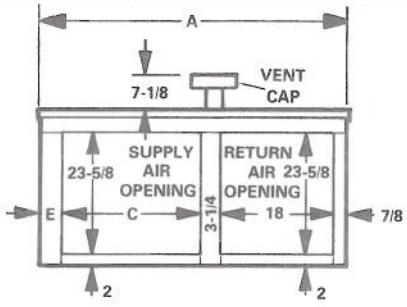
Model No.		GCS10-461-75	GCS10-463-75	GCS10-511-75	GCS10-513-75	GCS10-651-75	GCS10-653-75
Line voltage data		208/230v 60 hz./1 phase	208/230v 60 hz./3 phase	208/230v 60 hz./1 phase	208/230v 60 hz./3 phase	208/230v 60 hz./1 phase	208/230v 60 hz./3 phase
Compressor	Rated load amps	21.2	12.8	23.7	15.1	28.8	17.3
	Locked rotor amps	108.0	75.0	116.0	84.0	139.0	104.0
Condenser Fan Motor	Full load amps	1.1	1.1	3.0	3.0	3.0	3.0
	Locked rotor amps	2.4	2.4	6.2	6.2	6.2	6.2
Evaporator Blower Motor (230 volt)	Full load amps	2.3	2.3	4.6	4.6	4.6	4.6
	Locked rotor amps	5.4	5.4	9.0	9.0	9.0	9.0
Induced Draft Blower Motor	Full load amps	.55	.55	.55	.55	.55	.55
Recommended maximum fuse size (amps)		50	30	60	40	70	45
Unit power factor		.93	.89	.96	.90	.95	.90
*Minimum Circuit Ampacity		29.9	19.4	37.2	26.5	43.6	29.2

*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.

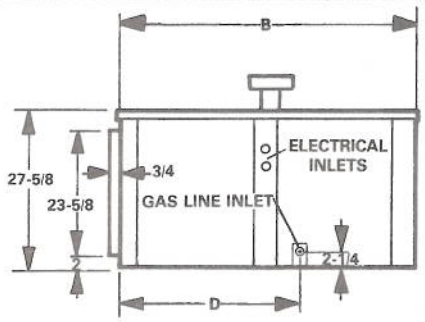
C - Unit Dimensions



CONDENSER VIEW



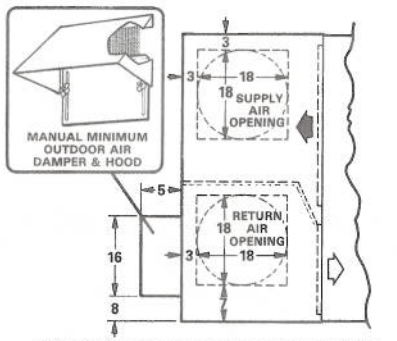
SIDE VIEW



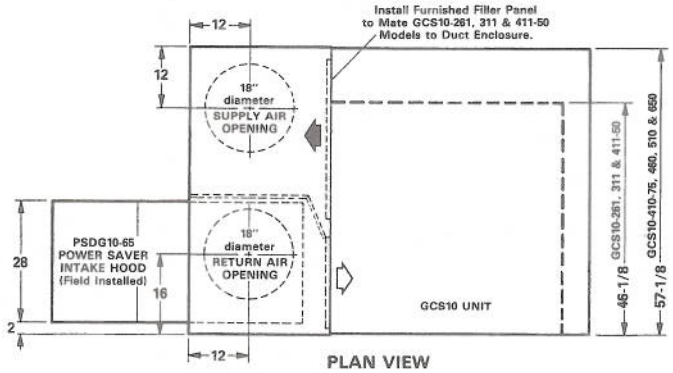
FRONT VIEW

Model No.	A	B	C	D	E
GCS10-261, 311 & 411-50	46-1/8	46-1/8	19	25-1/4	5
GCS10-411-413-75, 460-75, GCS10-510-75 & 650-75	57-1/8	51-7/8	32	28-1/2	3

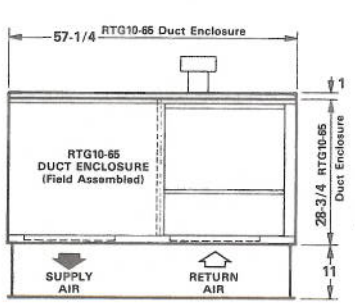
Optional Rooftop Accessories



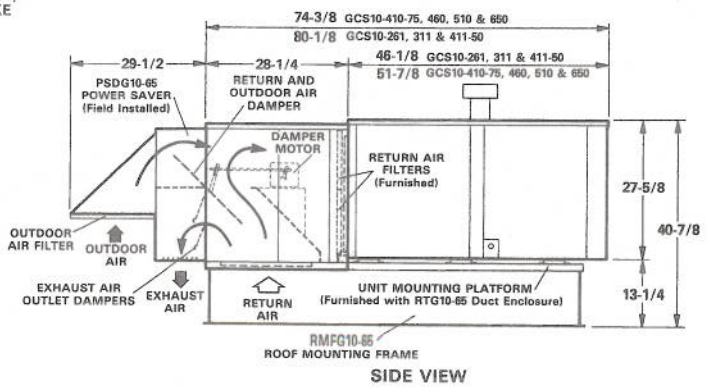
VIEW OF SUPPLY AND RETURN AIR OPENING WITH SQUARE DUCT CONNECTION ADAPTERS AND MANUAL MINIMUM OUTDOOR AIR INTAKE



PLAN VIEW



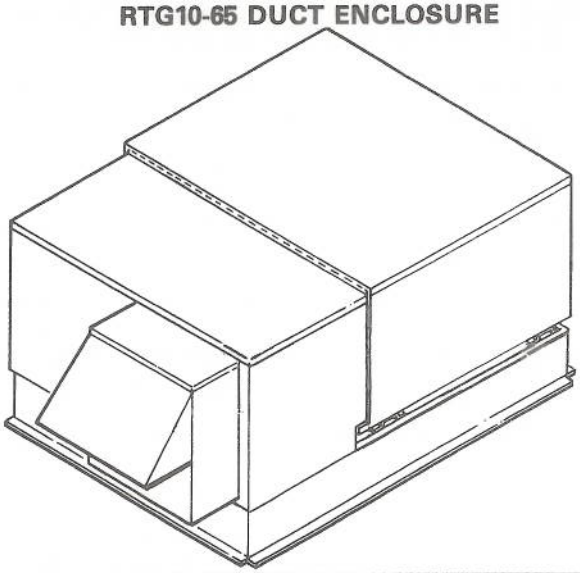
END VIEW



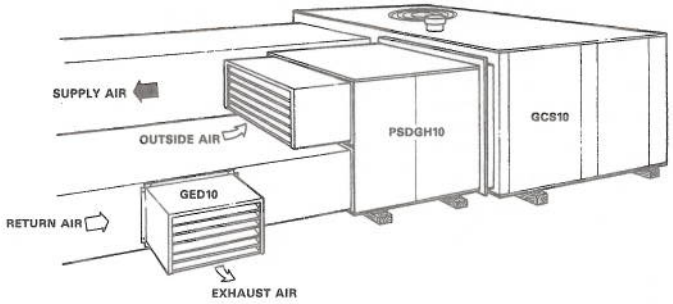
SIDE VIEW

TYPICAL POWER SAVER INSTALLATIONS

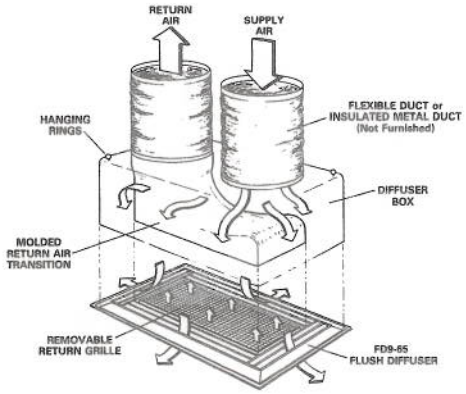
PSDG-10 WITH RTG10-65 DUCT ENCLOSURE



PSDGH-10 WITH GED10 EXHAUST DAMPER

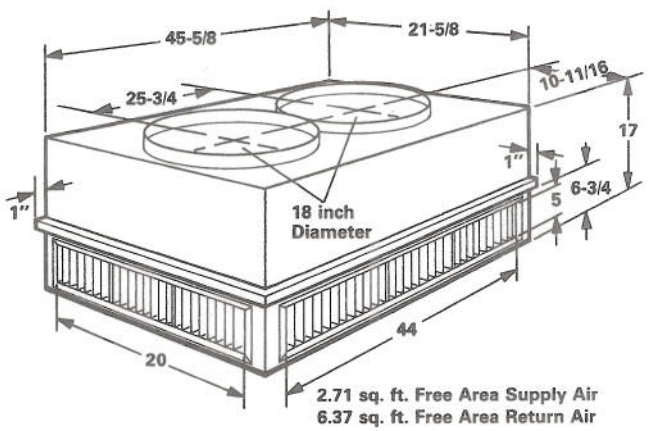


COMBINATION SUPPLY AND RETURN DIFFUSERS



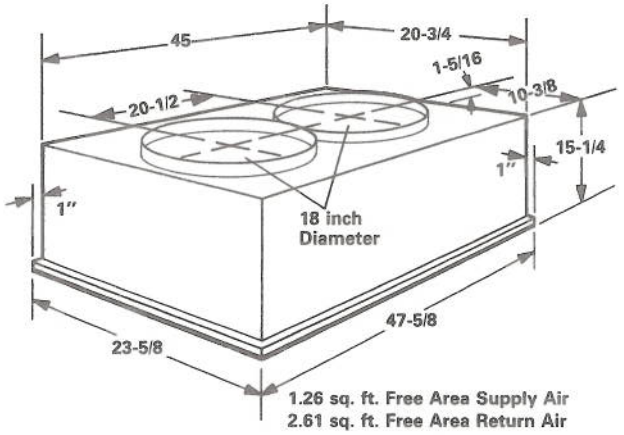
DIFFUSER AIR PATTERN

RTD9-65 STEP DOWN DIFFUSER

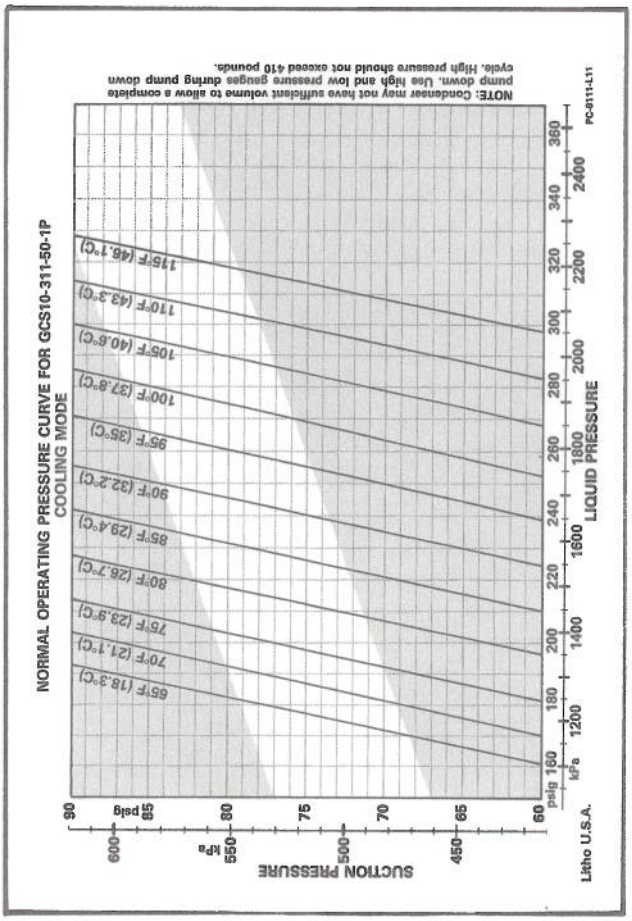


2.71 sq. ft. Free Area Supply Air
6.37 sq. ft. Free Area Return Air

FD9-65 FLUSH DIFFUSER

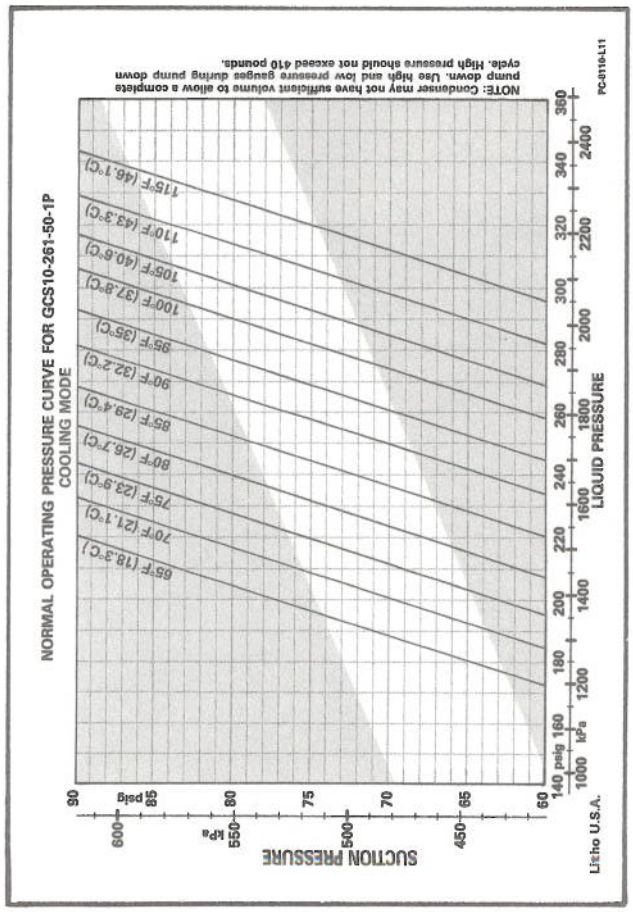


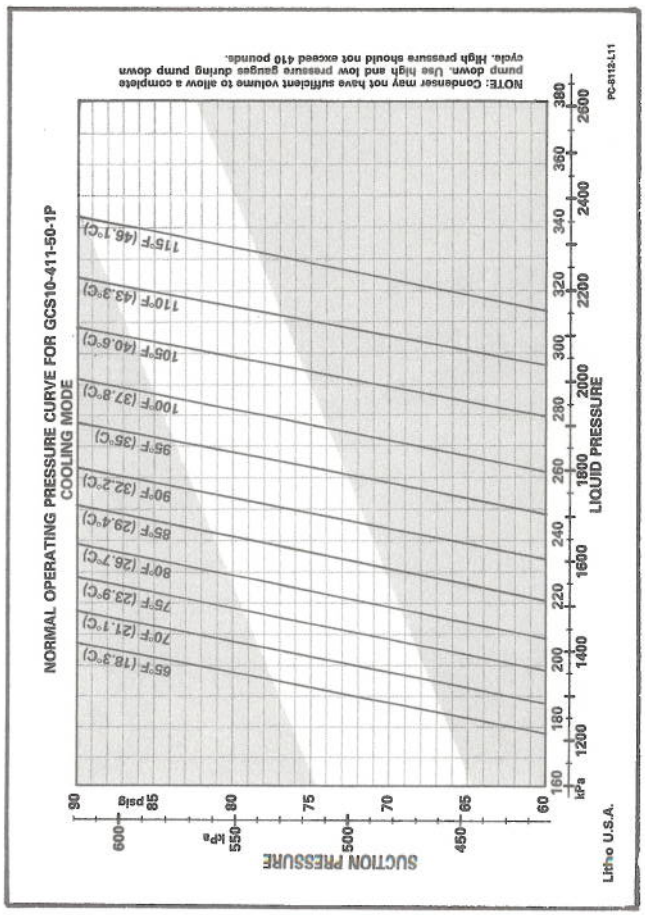
1.26 sq. ft. Free Area Supply Air
2.61 sq. ft. Free Area Return Air



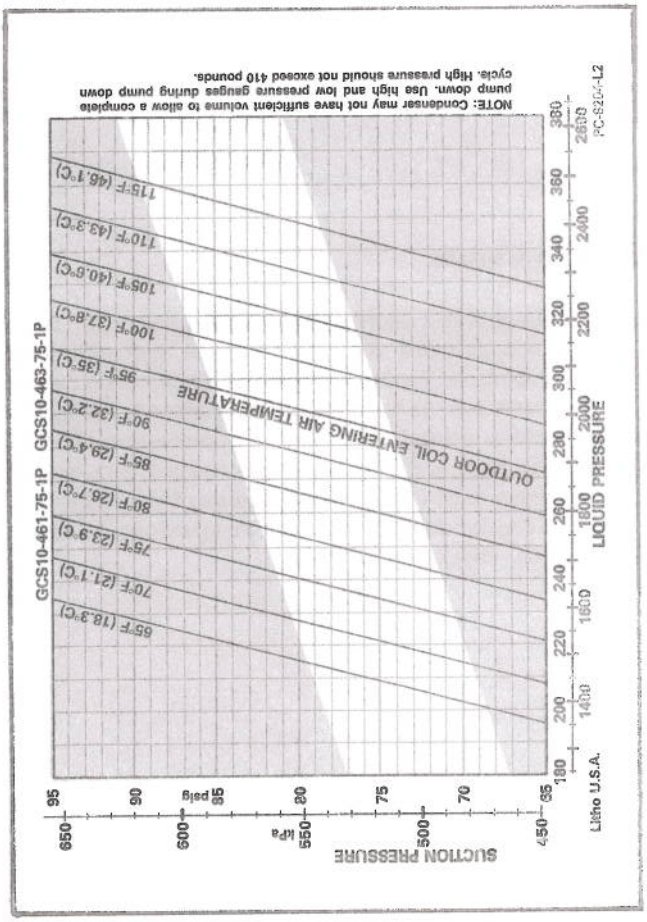
D - Pressure Curves

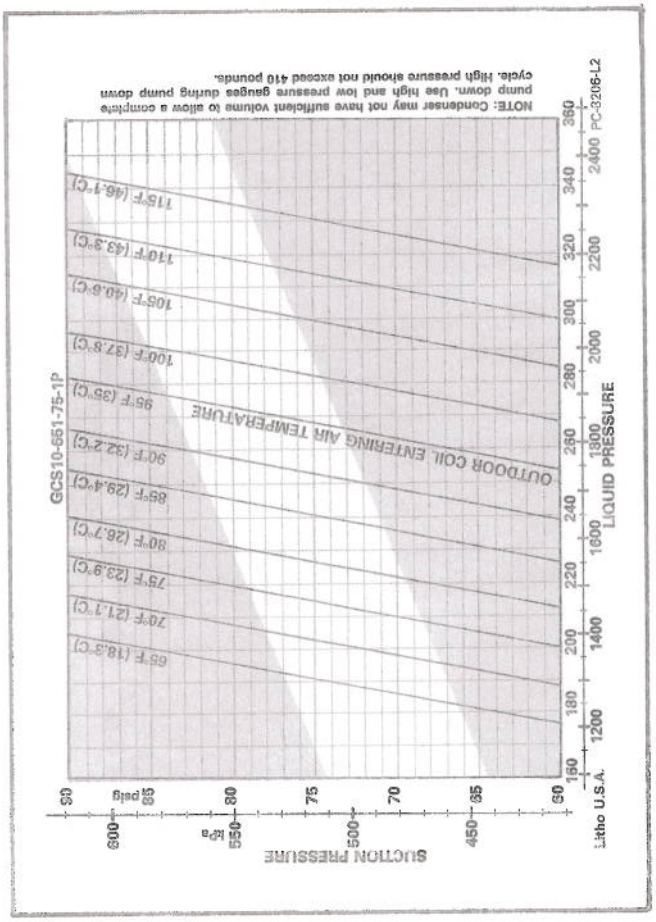
Each unit is furnished with a normal operating pressure curve. The curve uses suction pressure, discharge pressure and outdoor temperature comparison. To use the chart, first check suction pressure, then move over to the outdoor temperature and finally down to the discharge pressure. If the discharge 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.

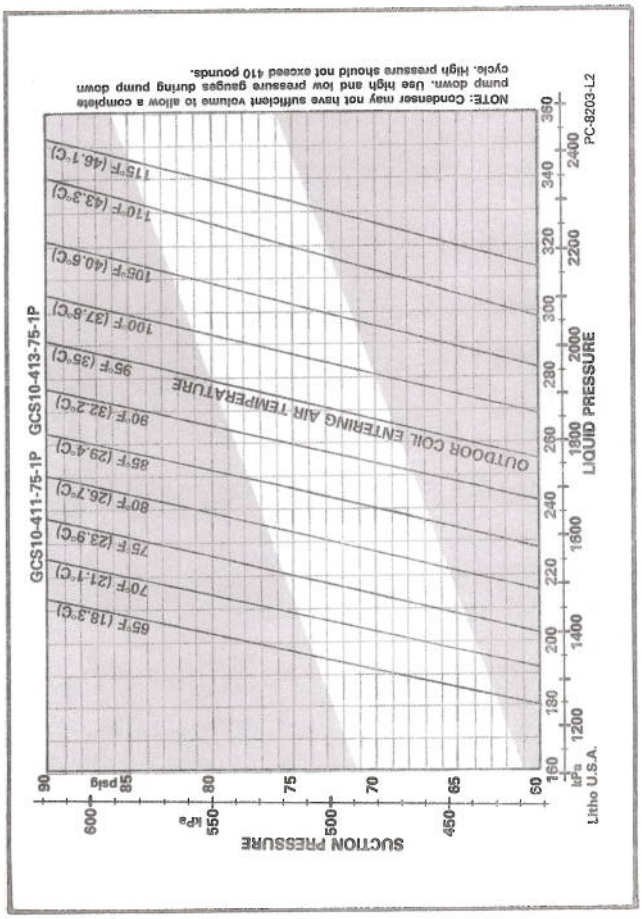


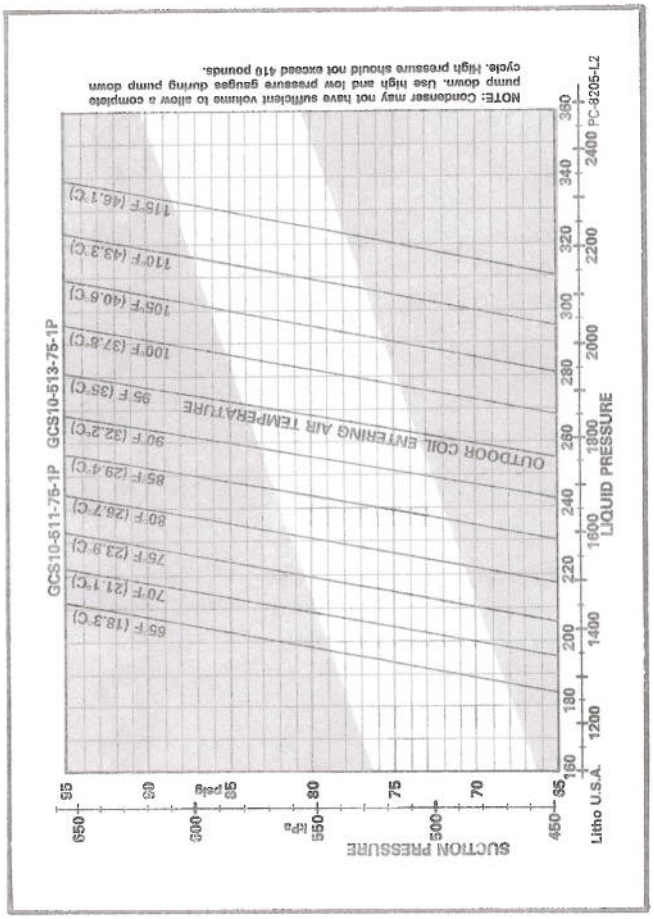


D - Pressure Curves









E - Blower Data

GCS10-261-50 BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds			
	High	Med-High	Med-Low	Low
0	1400	1320	1120	965
.05	1380	1295	1100	950
.10	1355	1270	1080	940
.15	1330	1250	1065	925
.20	1305	1225	1040	910
.25	1275	1200	1020	895
.30	1250	1170	1000	880
.40	1185	1115	955	845
.50	1115	1045	905	805
.60	1025	970	855	760

NOTE – All cfm is measured external to the unit.

GCS10-311-50 AND GCS10-411-50 BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds			
	High	Med-High	Med-Low	Low
0	1350	1270	1065	910
.05	1325	1250	1045	900
.10	1300	1225	1030	885
.15	1275	1200	1015	875
.20	1250	1175	995	860
.25	1225	1150	975	845
.30	1200	1120	955	825
.40	1140	1060	910	785
.50	1070	995	860	740
.60	985	900	790	----

NOTE – All cfm is measured external to the unit.

GCS10-411-413-75 BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds			
	High	Med-High	Med-Low	Low
0	1540	1370	1100	935
.05	1515	1355	1090	920
.10	1485	1335	1075	910
.15	1460	1315	1065	900
.20	1430	1295	1050	885
.25	1405	1275	1035	875
.30	1375	1250	1025	865
.40	1310	1200	990	835
.50	1245	1145	950	795

NOTE – All cfm is measured external to the unit.

GCS10-461-463-75 BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds			
	High	Med-High	Med-Low	Low
0	1460	1250	1040	920
.05	1440	1230	1020	900
.10	1420	1210	1005	880
.15	1400	1190	995	860
.20	1380	1170	975	840
.25	1355	1150	960	820
.30	1330	1130	940	800
.40	1280	1085	905	755
.50	1225	1040	865	710
.60	1140	980	820	----

NOTE – All cfm is measured external to the unit.

GCS10-511-513-75 AND GCS10-651-653-75 BLOWER PERFORMANCE

External Static Pressure (in. wg.)	Air Volume (cfm) @ Various Speeds				
	High	Med-High	Med	Med-Low	Low
0	2650	2350	2060	1780	1530
.05	2620	2330	2030	1760	1510
.10	2590	2310	2010	1730	1475
.15	2550	2275	1985	1700	1440
.20	2515	2245	1965	1670	1410
.25	2475	2210	1935	1640	1370
.30	2430	2175	1905	1610	1330
.40	2350	2100	1845	1540	1250
.50	2225	1995	1770	1450	1160
.60	2120	1850	1675	1340	1050
.70	1920	1750	1530	1270	940

NOTE – All cfm is measured external to the unit.

F - Field Wiring

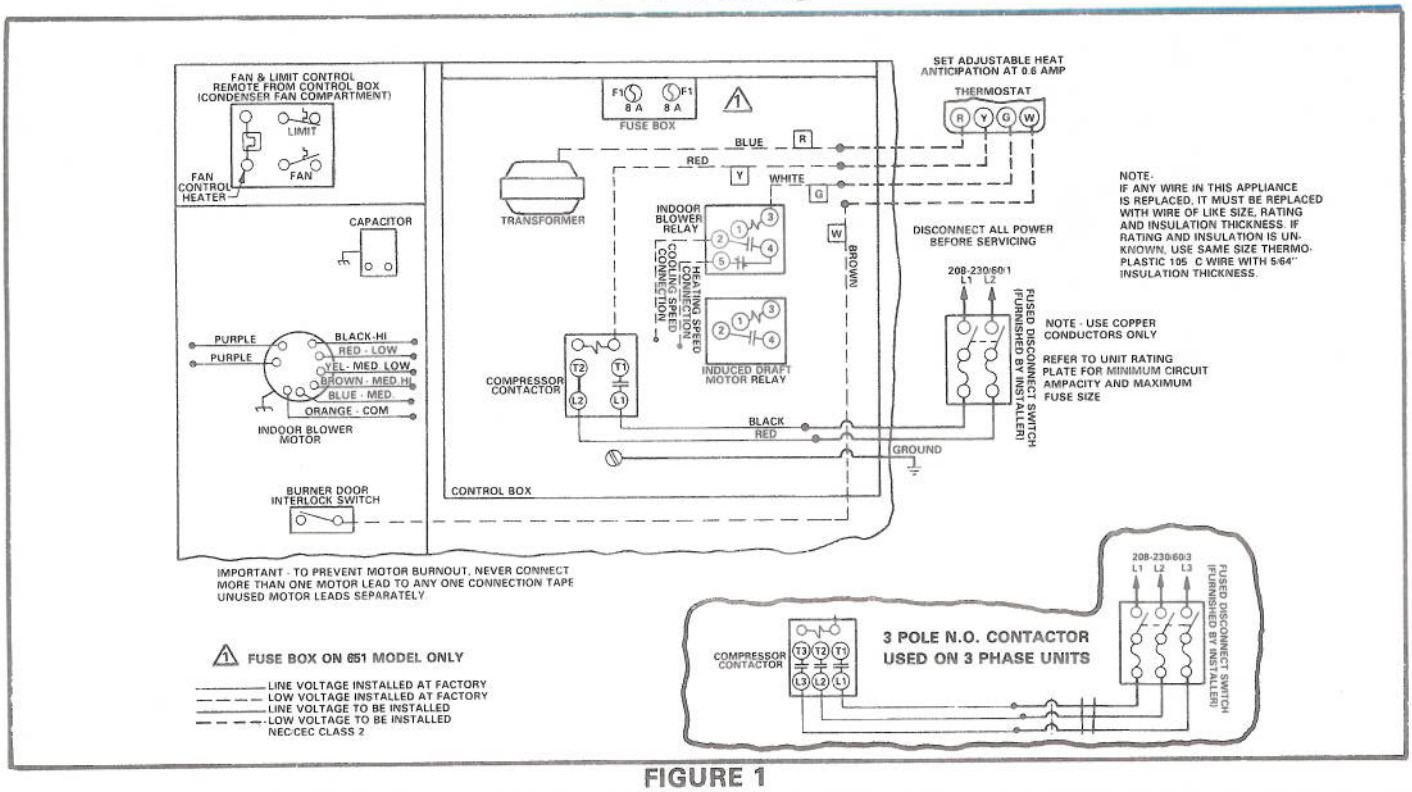


FIGURE 1

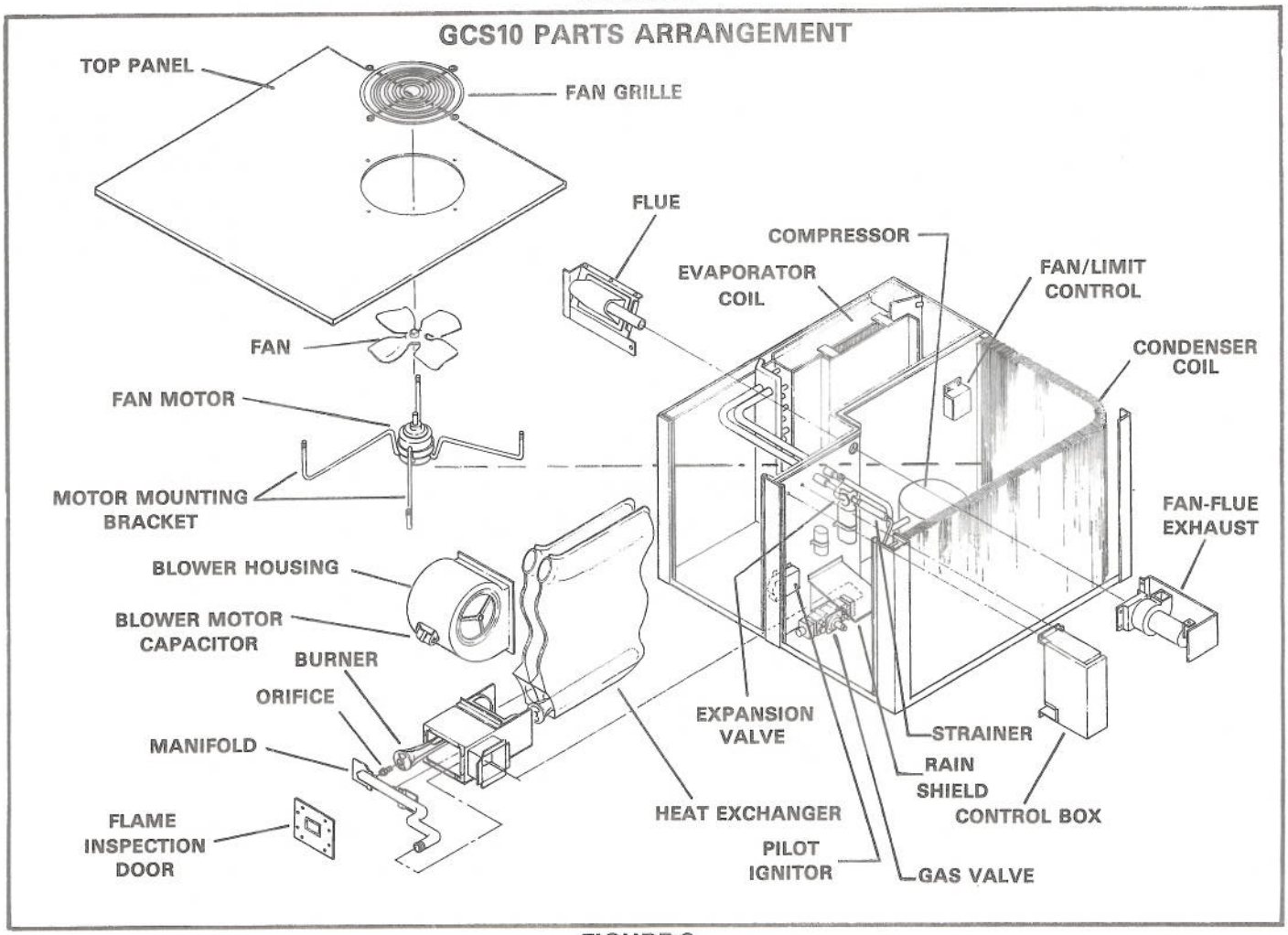


FIGURE 2

III - COMPONENTS

A - Control Box

Refer to Field Wiring Diagram (Figure 1) for parts arrangement.

1 - Compressor Contactor

Energizes compressor on a cooling demand. Also energizes outdoor fan motor. Three phase units use a 3 pole N.O. contactor with 24 VAC coil. Single phase units use a 1 pole N.O. contactor with 24 VAC coil; the L2-T2 side of the contactor is unswitched and the L1-T1 side is switched.

CAUTION - The single pole contactor used on 208-230/1/60 units, although not new to the industry, is new to Lennox equipment. With the disconnect closed, the L2 side is "hot" throughout the unit. TO AVOID ELECTRICAL SHOCK, DISCONNECT ALL POWER TO UNIT BEFORE SERVICING.

2 - Indoor Blower Relay

Energizes indoor blower motor through N.O. contacts for cooling speed and through N.C. contacts for heating speed; 24 VAC coil, S.P.D.T. contacts.

3 - Induced Draft Motor Relay

24 VAC coil, S.P.S.T. contacts. Relay is energized with thermostat heating demand to operate the induced draft blower during each heating cycle.

4 - Control Transformer

Provides 24V control circuit. 208/230 VAC primary, 24 VAC secondary 45VA.

5 - Blower Circuit Fuses (F1)

The GCS10-651-75-1P units have sub fusing for the indoor blower and induced draft blower circuits. Fuses are 8 Amp, 250V Buss MDA8 type.

B - Compressor Compartment (Figure 2)

1 - Compressor

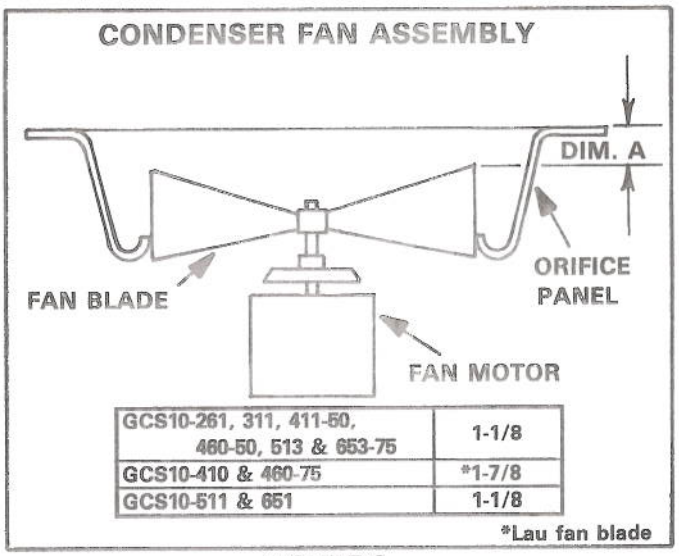
The GCS10-260 through 510 series use Tecumseh compressors. The 650 series units use Bristol compressors. Compressors have internal overload protection and pressure relief valve. The relief valve opens at a discarge and suction differential of 450 psig ±50.

Oil Charge

261,311 models	32 ounces
410,460 & 510 series	54 ounces
650 series	55 ounces Sunico 3GS

2 - Condenser Coil & Outdoor Fan Motor (FIGURE 3)

Air draws through the coil and is discharged vertically out the top of the unit. The outdoor fan motor utilizes a sleeve bearing and has oil ports for lubricating. For fan motor service access remove the bolts securing the motor assembly to top panel of unit. Figure 3 illustrates condenser fan and motor assembly.



GCS10-261, 311, 411-50, 460-50, 513 & 653-75	1-1/8
GCS10-410 & 460-75	*1-7/8
GCS10-511 & 651	1-1/8

*Lau fan blade

FIGURE 3

3 - Pilot Ignitor (Figure 4)

The Johnson Controls electronic pilot system is a solid state intermittent pilot ignition control using flame rectification sensing. When thermostat calls for heat the ignition sparking and pilot valve are energized to light the pilot flame. When pilot flame is proven, internal switch action de-energizes spark and energizes the main burner valve. The burner ignites from the pilot flame and heating cycle is in operation. When thermostat is satisfied, the main burner and pilot valves are de-energized.

On natural gas units the ignition control is a Re-ignitor type. If pilot flame is extinguished, the sensing probe detects absence of flame, causing the control to switch to the ignition cycle. Re-ignition will occur at this time as long as thermostat contacts are closed, starting within 0.8 seconds of flame failure.

On LP gas units, the field conversion also includes addition of a Y79-100% lockout module. It is connected to the ignitor control by removing the jumper plug and connecting a Y84ABJ wiring harness between the two. This converts the pilot ignitor to a 100% lockout system for LP gas. If pilot flame is not established during trial period, the control locks out and must be manually reset by removing heating demand for 15 seconds or more and re-initiating demand (turn thermostat to lowest setting, wait 15 seconds or more, return thermostat to setting higher than room ambient-heating demand).

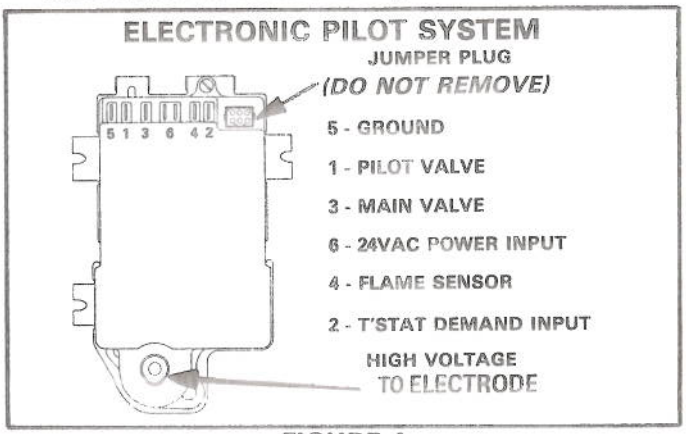


FIGURE 4

4 - Gas Valve

The GCS10 uses a redundant gas valve. This valve utilizes two automatic valves, a pressure regulator and a manual shutoff valve. The valve is used to control pilot and main burner gas with the proven pilot ignition system. Main gas flows through both valve seats. The gas valve has a manual shutoff "A" valve located at the inlet end. The valve handle is at the top of the valve with an optional handle at the bottom. It shuts off the gas flow to both pilot and main valves.

A 1/4" cc pilot outlet, 1/8" NPT inlet and outlet pressure taps with plugs are located in the bottom of the valve.

5 - Induced Draft Blower Motor

The induced draft blower pre-purges heat exchanger and safely vents combustion products regardless of wind or atmospheric conditions. Centrifugal switch proves blower operation before allowing operation of ignition system and gas valve.

6 - Combination Fan/Limit Control (FIGURE 5)

Fan control incorporates sure start heater to energize indoor blower within 30 to 80 seconds after thermostat demand for heat and has adjustable blower "off" temperature setting, Figure 5. Limit control has factory fixed temperature setting and protects heating system from abnormal operating conditions. Do not attempt to change limit setting.

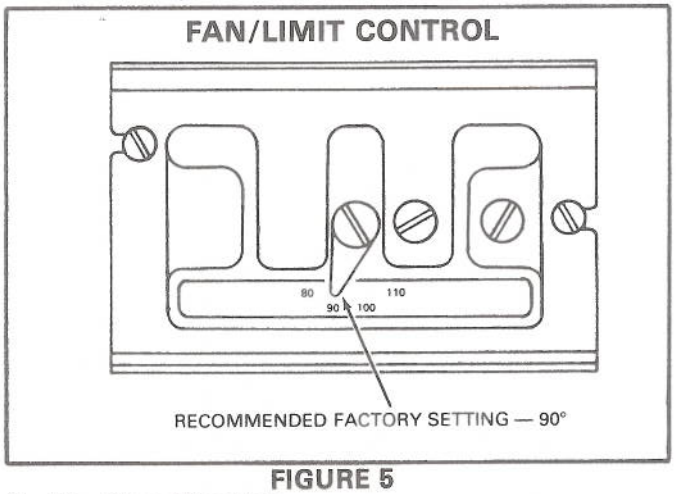


FIGURE 5

C - Heating Section

1 - Burners

The GCS10 series units use aluminized steel burners. A crossover igniter of burner ports, perpendicular to the main burner, carries a positive flame from burner to burner to achieve sure ignition. Combustion air enters burner box from the outdoor section of the cabinet. The burner compartment door has an inspection window to view flame.

2 - LP Conversion Kits

All A.G.A. burners are factory shipped in the GCS10 for natural gas only. However, LP changeover kits are available. See Table 2 below for LP conversion kits and burner orifice sizes. Kit also includes a 100% lockout module and wiring harness.

TABLE 2

Gas	Burner Orifice Size	LP Conversion Kit
Natural	#41	LB-33151CW
LP	#53	

3 - Interlock Switch

The interlock switch located on front of burner box is a N.O. S.P.S.T. switch which de-energizes the primary control circuit when the burner door is removed.

4 - Supply Air Blower

Multi-speed direct drive indoor blower motors are used. Table 3 gives speed tap color coding identification.

TABLE 3

BLOWER SPEED SELECTION

SPEED	MOTOR LEAD
LOW	RED
MEDIUM LOW	YELLOW
MEDIUM	BLUE
MEDIUM HIGH	BROWN
HIGH	BLACK
COMMON	ORANGE

IMPORTANT - TO PREVENT MOTOR BURNOUT, NEVER CONNECT MORE THAN ONE MOTOR LEAD TO ANY CONNECTION. TAPE UNUSED MOTOR LEADS SEPARATELY.

Table 4 gives the minimum blower speeds for heating and cooling.

TABLE 4

Indoor Blower Motor Minimum Speeds		
Unit	Heating	Cooling
GCS10-261-50	LOW	HIGH
GCS10-311-50	LOW	
GCS10-411-50	LOW	
GCS10-411-75	MED LOW	
GCS10-413-75	MED HIGH	
GCS10-461-75	MED HIGH	
GCS10-463-75	MED HIGH	
GCS10-511-75 GCS10-513-75	LOW	
GCS10-651-75 GCS10-653-75	LOW	

IV - REFRIGERANT SYSTEM

GCS10 units have a single compressor in a single circuit refrigeration system. Expansion valve used controls super heat (at a setting of 10° coming out of the evaporator) in response to the effects of low ambient condition on the outdoor coil. A suction gauge port is provided on the compressor and discharge gauge port is provided on the discharge line in compressor compartment. Pressure curves are based on discharge pressure.

V - POWER SAVER OPTION

Either PSDG10-65 or PSDGH10-65 Power Savers may be used with GCS10 units. The PSDG10-65 Power Saver dampers and controls field install in the RTG10-65 duct enclosure. The PSDGH10-65 can be mounted either at the unit or downstream on the return air duct. During Power Saver operation, the outdoor air dampers open and the return air dampers close. Outdoor air provides first stage cooling when the thermostat requires cooling.

1 - Power Saver Relay

Relay initiates Power Saver operation with a first stage cooling demand 24 VAC coil, S.P.N.O. contacts.

TYPICAL POWER SAVER CONTROLS INSTALLATION

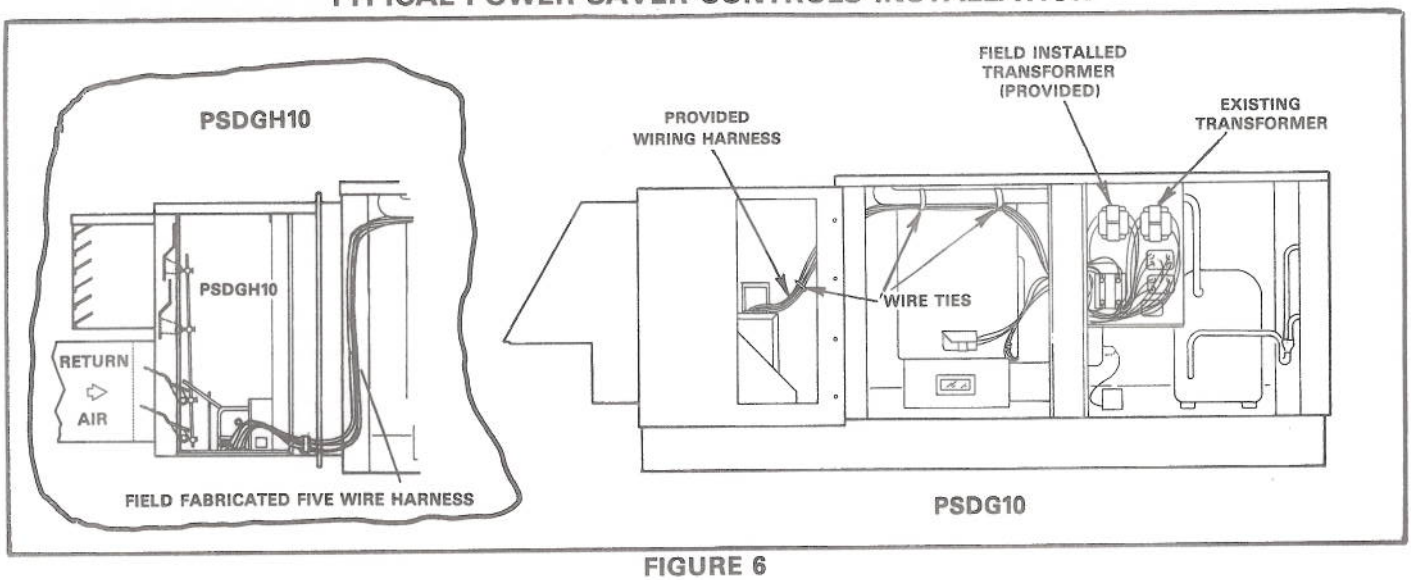


FIGURE 6

2 - Enthalpy Control (at outdoor air hood)

The enthalpy control allows 0 to 100% outdoor air to be used for "free cooling" when outdoor humidity and temperature are acceptable. The recommended set point is "A". If Power Saver allows air which is too warm or too humid to enter system, control may be adjusted to a lower set point. Refer to Chart A. Compressor is locked out by enthalpy control when Power Saver is in operation.

3 - Mixed Air Limit Switch (in Power Saver control box)

The recommended setting is 55°F. The mixed air limit senses the temperature in the unit return air section and closes on rise in temperature. Outdoor air blades will close to minimum position when temperature drops below the limit setting.

4 - Minimum Position Adjustment (at damper blades)

Minimum open position setting of damper blades is mechanically fixed by adjustment of the damper linkage. Use the following steps listed below if minimum position requires adjustment.

a - Check for proper wiring connections.
b - Set thermostat switch to "OFF" and fan switch to "ON".
c - Refer to Table 5 for desired minimum blade setting.
d - Loosen screw on damper motor.
e - Set blades by adjusting lever to desired position.
f - Tighten screw on damper motor.

IMPORTANT — After adjustment is completed, return enthalpy control to desired setting.

5 - Transformer (Figure 6)

Power Saver transformer is located in unit control box next to unit transformer.

6 - Power Saver Motor

A 24 VAC 3 position motor is used.

CHART A

CHART CURVE	CONTROL POINT AT 50% RH °F	°C
A	73	22.8
B	68	20.0
C	63	17.2
D	58	14.4

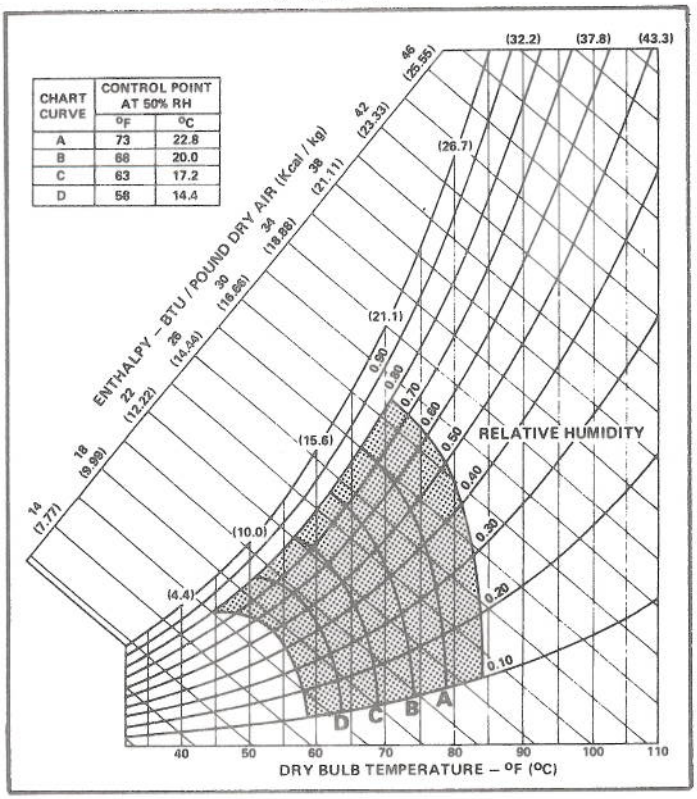


TABLE 5

FRESH AIR PERCENTAGE (%)			
Damper Blade Angle	Return Air Duct Static Pressure		
	0" (0mm)	.25" (6mm)	.50" (13mm)
5°	13	20	30
10°	26	34	46
15°	37	46	57
20°	48	57	66
25°	58	66	74
30°	69	75	81
35°	79	84	88
40°	90	92	94

7 - Power Saver Field Wiring (FIGURE 7)

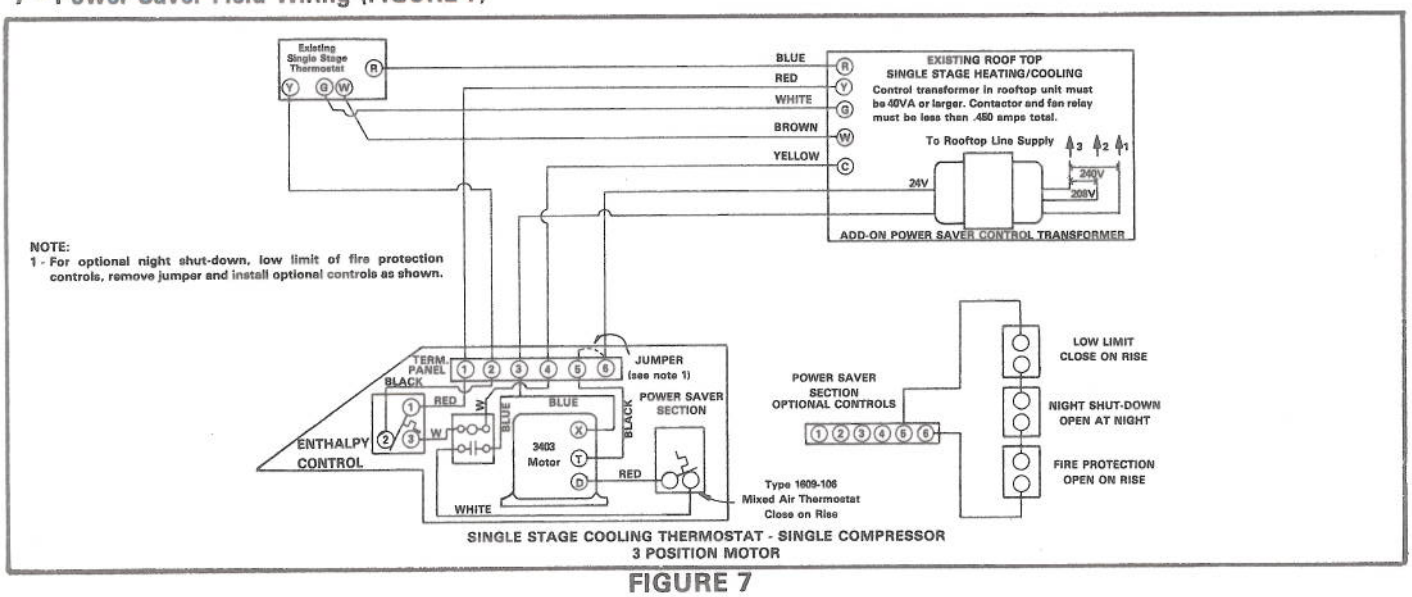


FIGURE 7

VI - HEATING SYSTEM

GCS10 input and output ratings are listed on pages 1 & 2.

A - Gas Pressure Adjustment

Check gas line pressure with unit firing at maximum rate. A minimum of 7 in. wc. for natural gas or 11 in. wc. for LP gas should be maintained. After line pressure has been checked and adjusted, check regulator pressure. Correct manifold pressure for LP gas is 10.5 in. wc. Correct regulator pressure for natural gas is 3.5 in. wc.

B - High Altitude Derate

If the heating value of the gas does not exceed values listed in Table 6, derating ot the unit is not required. Should the heating value of the gas exceed the table values, or if the elevation is greater than 6,000 feet above sea level it will be necessary to derate the unit. Lennox requires that derate conditions be 4% per thousand feet above sea level. Thus at an altitude of 4000 feet, if the heating value of the gas exceeds 1000 Btu/ft³, the unit will require a 16% derate.

TABLE 6

Elevation Above Sea Level (Feet)	Maximum Heating Value (Btuh/ft³)
5001 - 6000	900
4001 - 5000	950
3001 - 4000	1000
2001 - 3000	1050
Sea Level - 2000	1100

C - Pilot and Burner

1 - Pilot Flame

Check pilot and burner flame for proper flame appearance twice during heating season. The flame must surround the end of the flame sensor for proper operation of the pilot safety circuit.

2 - Burner Flame

Start burner and allow to operate for a few minutes to establish normal burning conditions. Check burner flame by observation. Flame should be predominately blue in color, strong appearance and rise directly from the burner ports into heat exchanger. Check to see that the flame is burning from all continuous ribbon ports and that flame does not inpinge on the sides of the heat exchanger.

E - Cleaning Induced Draft Blower

To insure efficient operation, the induced draft blower must be kept clean.

1 - Shut off power to unit.
2 - Disconnect wiring and remove screws securing induced draft blower motor assembly.
3 - Remove blower housing and motor assembly from unit.
4 - Using small brush, clean blower blades.

IMPORTANT - If blower wheel must be removed, loosen Allen screw and pull wheel out of housing. When replacing wheel, make sure flat on motor shaft matches up with Allen screw. Tighten securely.

F - Checking Vent Cap

The vent cap should be inspected at the beginning of the heating season and monthly thereafter. Look for signs of sooting, corrosion and any obstruction or other materials. Remove any obstructions.

G - Inspecting Flue Passages

If it should become necessary to clean the flue gas passageways, use the following steps.

1 - Turn off both electrical and gas power supplies to furnace. Refer to Parts Arrangement (Figure 2) for parts identification for disassembly and reassembly procedures.
2 - Disconnect condenser fan motor leads.
3 - Remove screws securing top panel of unit and remove top panel with fan and motor attached to panel.
4 - Remove furnace access panel, flue cap, pipe, gasket, and burner box cover.
5 - Disconnect supply gas piping and pilot assembly. Remove piping manifold.
6 - Pull burners from heat exchanger.

7 - Remove baffles inside top opening of heat exchanger by twisting tabs to align with slots in baffles.
8 - Insert a 2 ft. long steel rod that has a 20 in. length of chain attached to one end, into top opening of the heat exchanger.
9 - "Shake" the rod so that the chain drops through the clamshell into burner cavity in bottom of heat exchanger.
10 - Attach the bottom of chain to another 2 ft. long rod (Figure 8).
11 - Push and pull the rods back and forth up and down with a vigorous motion. The chain will dislodge the soot and scale deposits inside the heat exchanger. Repeat for each clamshell.

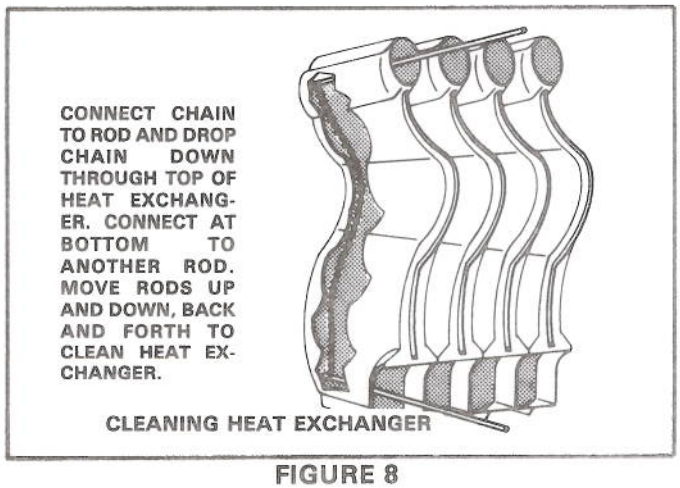


FIGURE 8

12 - With shop vacuum or rags, clean out the soot and scale deposits from the bottom of heat exchanger.
13 - To clean burners:
Clean top of burner ports with a wire brush.
14 - Clean burner ports by inserting a cleaning tool (made from a piece of sheet metal cut to fit the burner ports) and work in and out of each port.
15 - Clean inside of each burner with a bottle cleaning brush.
16 - Replace burners making sure to fully engage in rear receiving slot in heat exchanger. Resecure gas manifold and piping.
17 - Reinstall baffles inside top of heat exchanger (twist tabs to secure), then replace burner box cover, flue cap and gasket, and access panels. Replace top panel with fan and motor assembly, resecure screws, and connect condenser fan motor leads.
18 - Turn on gas and electrical supply and replace access panels.
19 - Check for gas leaks.

TABLE 3

MAINTENANCE FREQUENCY CHART	
Item	Time Schedule
Check & Clean Blower Wheel	Annually
Lubricate Blower Motor	Annually (If Necessary)
Clean Filters	Monthly
Clean Induced Draft Blower	Annually
Inspect Flue Passages	Annually
Check Burner Flame	Periodically
Check Vent Cap	Monthly (During Heating Season)

VII - BLOWER SPEED ADJUSTMENT

Refer to Tables 3 and 4 for speed tap color coding and minimum required speeds for heating and cooling.

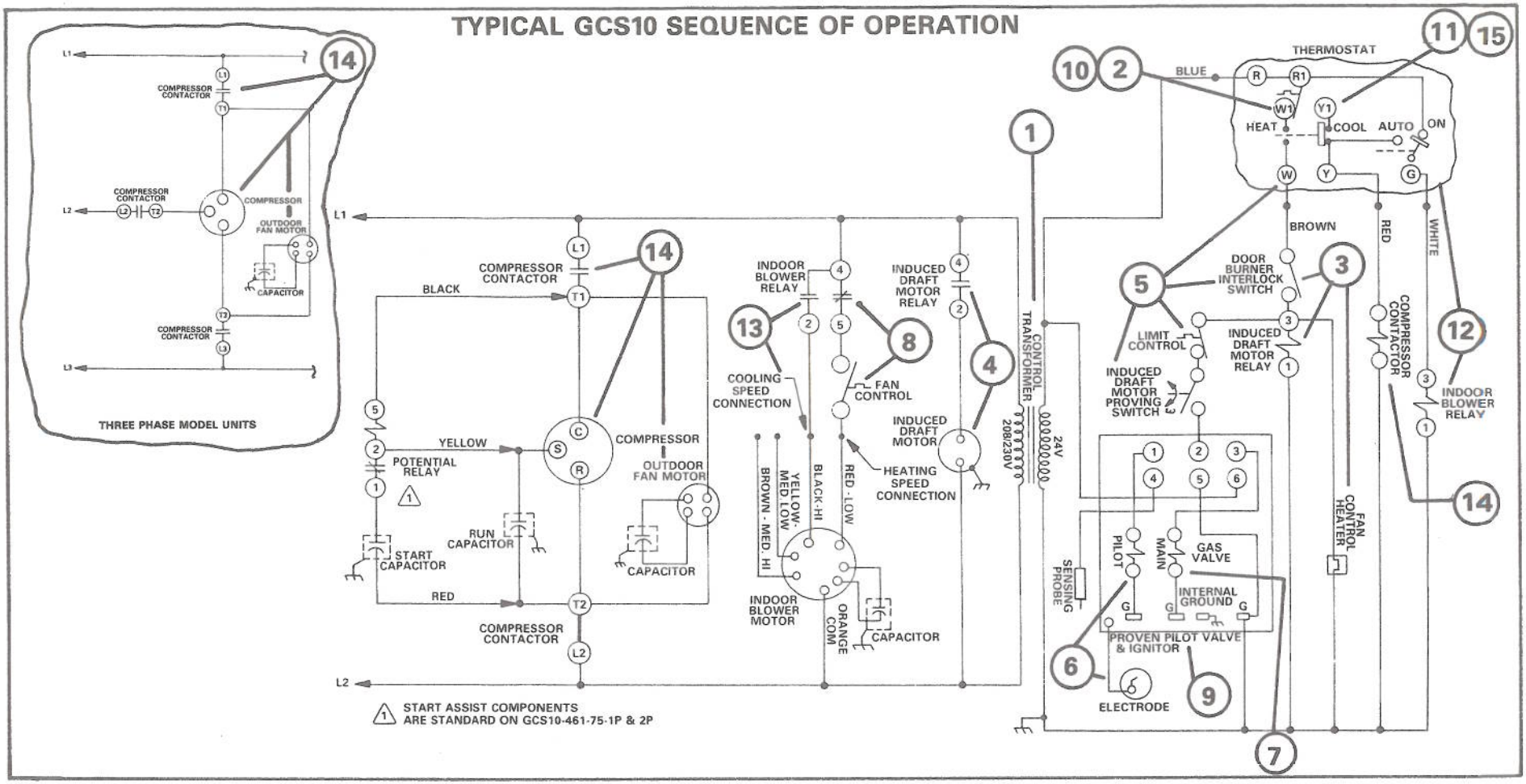
A - Temperature Rise

Adjust the blower speed for the proper air temperature rise (listed on the unit rating plate). To measure this temperature rise, place plenum thermometers in the supply air and return air plenums. Turn up the thermostat as high as possible to start the unit. After plenum thermometers have reached their highest - steadiest reading, subtract readings of thermometers. The difference should be in the range listed on the unit rating plate. If this temperature is high, wire blower to a higher speed; if low, wire blower to a lower speed. Repeat this procedure until desired setting in this range is obtained.

B - Check Evaporator Coil Air Pressure Drop

Measure external static pressure in supply and return air ducts. Refer to "Blower Performance" Tables on Page 7.

TYPICAL GCS10 SEQUENCE OF OPERATION



HEATING CYCLE

1 - The control transformer provides the 24VAC supply for the thermostat control circuit.

2 - On a heating demand the thermostat bulb closes energizing the "W" leg.

3 - From the "W" leg and through the burner door interlock switch the induced draft motor relay and fan control heater are energized.

4 - The induced draft motor relay N.O. contacts close to energize the induced draft motor.

5 - When the induced draft motor comes up to speed, the centrifical proving switch closes. The pilot ignitor is then energized at terminal 2 from the thermostat "W" leg through the burner door interlock switch, N.C. limit control and induced draft motor proving switch.

6 - The pilot ignitor provides sparking at the electrode and energizes the pilot valve.

7 - When pilot flame is sensed, the main gas valve is opened and the burners are ignited from the pilot flame.

8 - The blower is energized on the heating speed approximately 30 to 80 seconds following thermostat demand when the fan control heater closes the fan control contacts. The circuit to the motor is through the N.C. blower relay contacts and fan control contacts.

9 - If a flame outage occurs during an on cycle, the control will close the pilot and main gas valves and retry for pilot ignition automatically.

10 - When heating demand is satisfied, thermostat opens to the "W" leg de-energizing the gas valve, induced draft motor relay and fan control heater. The blower continues running until unit temperature drops below fan control off setting.

COOLING CYCLE

11 - On a cooling demand the thermostat bulb closes energizing the "Y" leg.

12 - If the thermostat is set on "Auto", the blower relay is energized from the "G" leg through the auto switch and cooling bulb.

13 - The blower is energized on the cooling speed through the N.O. blower relay contacts.

14 - The compressor contactor coil is energized from the "Y" leg of thermostat. The compressor contactor contacts close to energize the compressor and outdoor fan motor.

15 - When the cooling demand is satisfied, the cooling leg opens to de-energize the system.

IX - TROUBLESHOOTING

Most of the controls in the GCS10 are standard electromechanical components and should not present any particular service problems.

The intermittent proven pilot ignition control is an electronic device similar to other pilot ignition controls used in the industry. Troubleshooting for this system is broken down on the following pages into 3 flow charts. To use the flow charts, first determine the condition of failure and go to the chart covering those symptoms as given below:

A - No Spark, System Does Not Work (Figure 10)
B - Spark is Present, Pilot Will Not Light (Figure 11)
C - Pilot Lights, Main Valve Will Not Come On (Figure 12)

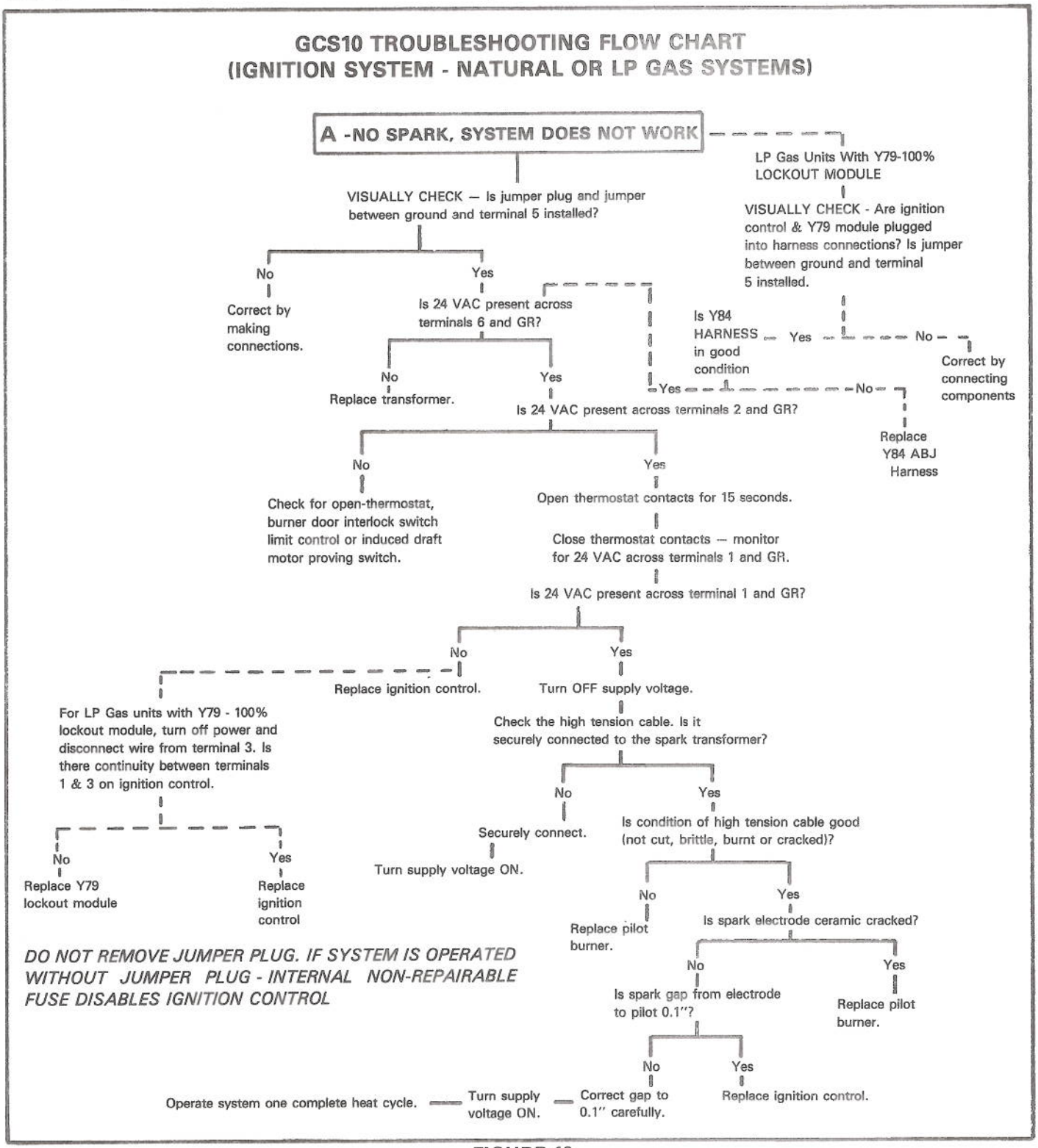
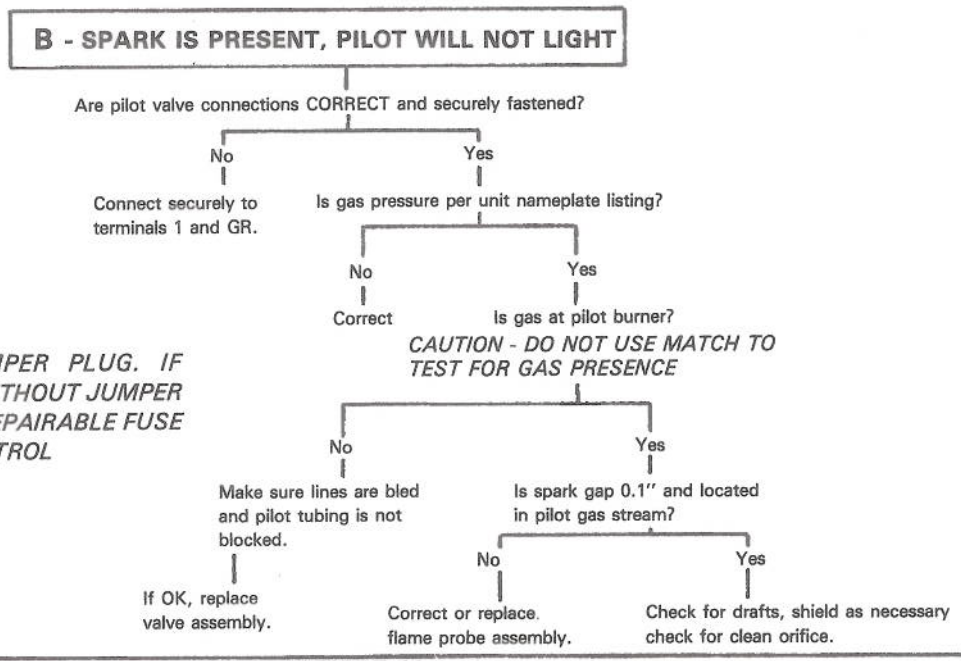


FIGURE 10

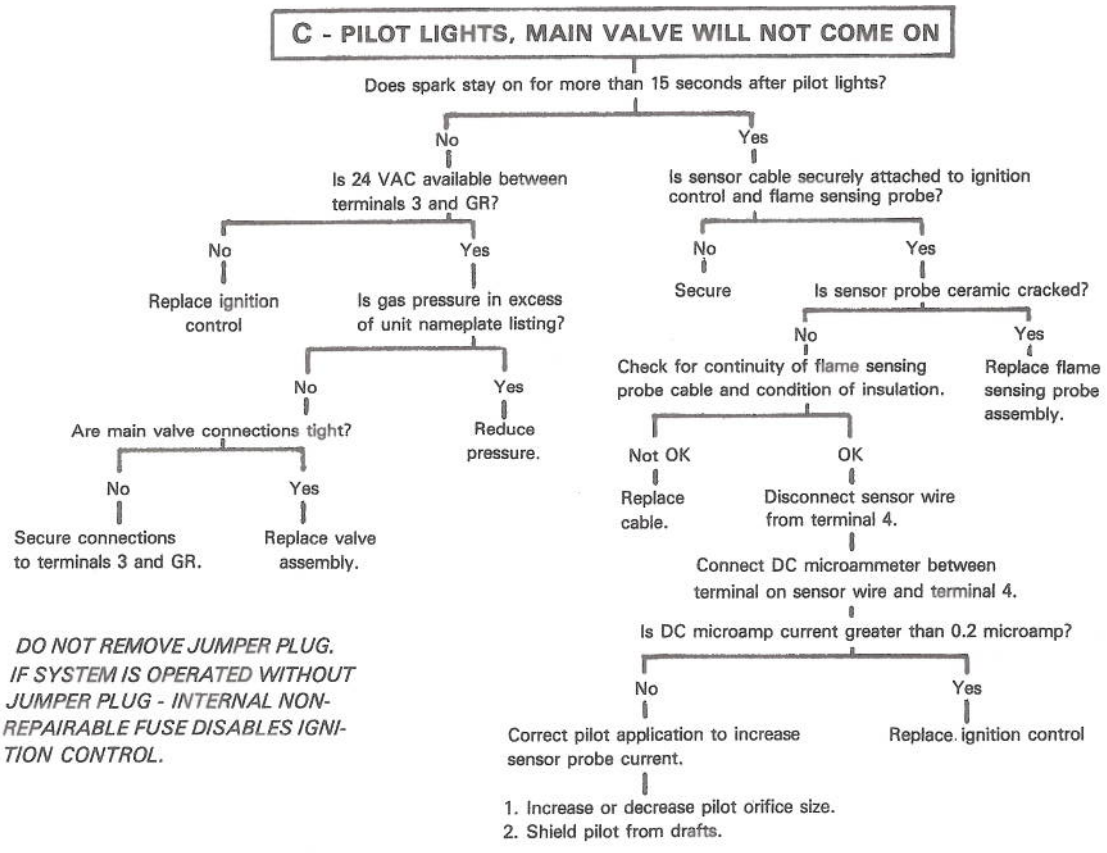
GCS10 TROUBLESHOOTING FLOW CHART
(IGNITION SYSTEM - NATURAL OR LP GAS SYSTEMS)



DO NOT REMOVE JUMPER PLUG. IF SYSTEM IS OPERATED WITHOUT JUMPER PLUG - INTERNAL NON-REPAIRABLE FUSE DISABLES IGNITION CONTROL

FIGURE 11

GCS10 TROUBLESHOOTING FLOW CHART
(IGNITION SYSTEM - NATURAL OR LP GAS SYSTEMS)



DO NOT REMOVE JUMPER PLUG. IF SYSTEM IS OPERATED WITHOUT JUMPER PLUG - INTERNAL NON-REPAIRABLE FUSE DISABLES IGNITION CONTROL.

FIGURE 12