

**operation
maintenance
and
installation
instructions**

GCS3 Series Units

ROOFTOP UNITS

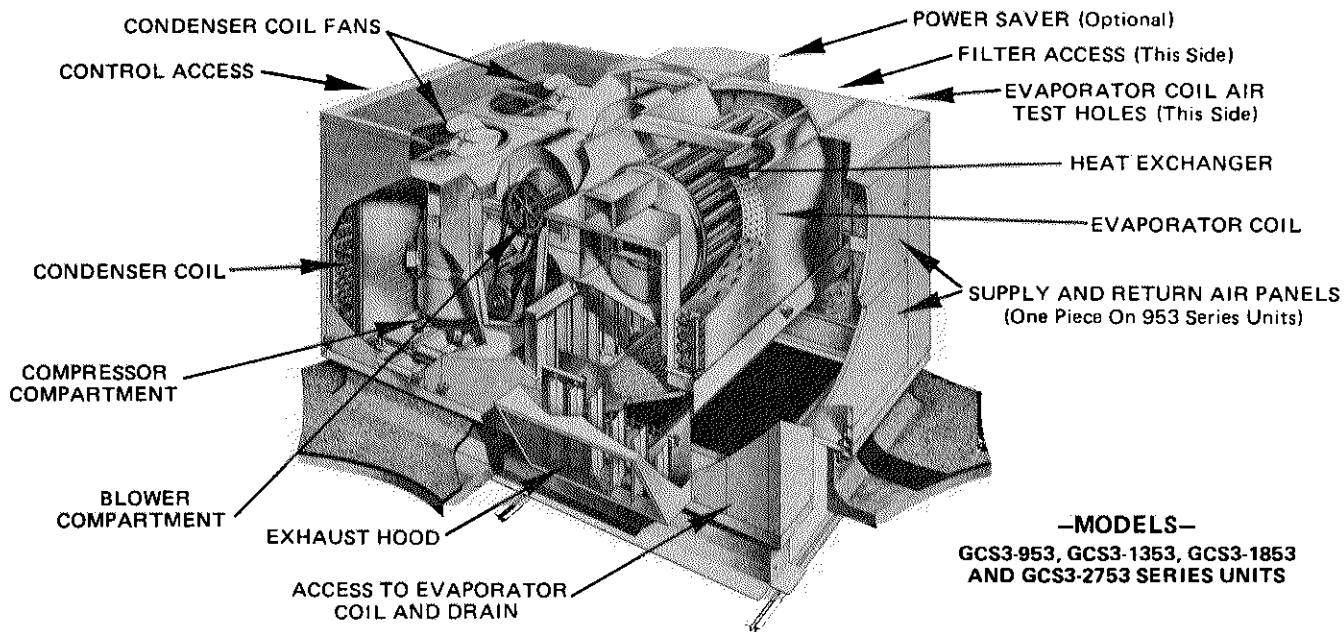
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**RETAIN THESE INSTRUCTIONS
FOR FUTURE REFERENCE**

Supersedes 10/77

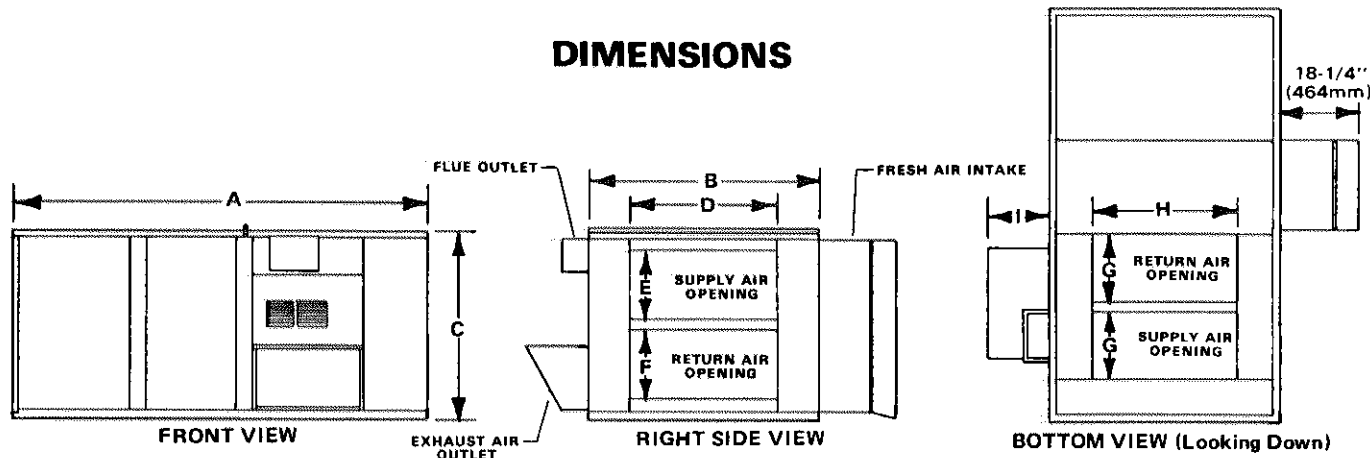
LENNOX *Industries Inc.*

PARTS ARRANGEMENT



-MODELS-
**GCS3-953, GCS3-1353, GCS3-1853
 AND GCS3-2753 SERIES UNITS**

DIMENSIONS



Model No.	A	B	C	D	E	F	G	H	I
GCS3-953	97 in. (2464 mm)	54 in. (1372 mm)	44-5/8 in. (1133 mm)	34-3/8 in. (873 mm)	16-3/8 in. (416 mm)	16-3/8 in. (416 mm)	16-1/16 in. (408 mm)	34-3/16 in. (865 mm)	14-5/8 in. (378 mm)
GCS3-1353	117 in. (2972 mm)	63 in. (1600 mm)	50-5/8 in. (1286 mm)	40-3/8 in. (1026 mm)	20-3/8 in. (518 mm)	20-3/8 in. (518 mm)	20-1/16 in. (510 mm)	40-1/16 in. (1018 mm)	14-5/8 in. (378 mm)
GCS3-1853	137 in. (3480 mm)	83 in. (2108 mm)	52-5/8 in. (1337 mm)	51-3/8 in. (1305 mm)	23-9/16 in. (598 mm)	22-3/16 in. (563 mm)	24 in. (610 mm)	51 in. (1295 mm)	15-5/16 in. (389 mm)
GCS3-2753	137 in. (3480 mm)	83 in. (2108 mm)	62-5/8 in. (1591 mm)	51-3/8 in. (1305 mm)	24-3/8 in. (619 mm)	24-3/8 in. (619 mm)	24 in. (610 mm)	51 in. (1295 mm)	20-1/8 in. (511 mm)

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START-UP AND PERFORMANCE CHECK LIST

Dealer Name _____ Address _____ Phone No. _____
 Job Name _____ Job No. _____ Date _____
 Job Location _____ City _____ State _____
 Unit Model No. _____ Serial No. _____ Serviceman _____

ELECTRICAL

Unit Nameplate Voltage _____
 Minimum Circuit Ampacity - Disconnect _____
 Maximum Fuse Size - Disconnect _____
 Wiring connections checked for tightness
 Supply Voltage - Unit Off 1&2 _____ 1&3 _____ 2&3 _____

INDOOR BLOWERS

Motor H.P. _____ Make _____
 Lube & Bearings: Motor? Blowers?
 Pulleys Tight? Belt tensions & Alignment?
 Proper Blower Rotation? Filters Clean & Secure?
 Motor Amps: 1 _____ 2 _____ 3 _____
 Blower RPM _____ CFM _____

COOLING SECTION

Refrigerant Lines Secure? Service Valves Backseated?
 Proper Condenser Fan Rotation: Fan No. 1 Fan No. 2
 Voltage With Compressors Operating:
 1&2 _____ 2&3 _____ 1&3 _____
 Unloader Switch Setting O.K. Bypass Valve Operating
 Pressure Switch Settings Lo _____ Hi _____
 Amps: Supply 1 _____ 2 _____ 3 _____

GAS SECTION

Burner Model No. _____ Serial No. _____
 Ignition Transformer Voltage _____
 Fuel Type _____ Pipe Size _____
 Line Pressure _____ Pilot Reg _____ Main Reg _____
 Micro-Amps Pilot _____ Low Fire _____ High Fire _____
 Fan Control Setting _____
 Safety Controls Checked Combustion Blower Free & Clean
 Motor Lubricated Motor Amps

THERMOSTAT

Calibrated? Properly Set? Level?

Condenser Fan Motor No. 1 1 _____ 2 _____ 3 _____
 Condenser Fan Motor No. 2 1 _____ 2 _____ 3 _____
 Compressor No. 1 1 _____ 2 _____ 3 _____
 Compressor No. 2 1 _____ 2 _____ 3 _____
 S.P. Drop Over Evaporator (Dry) _____
 Ambient Temp. _____
 Condenser Air Temp: In _____ Out _____
 Discharge Pressure 1 _____ 2 _____
 Suction Pressure 1 _____ 2 _____
 Refrigerant Charge O.K. 1 2

GCS3-1353, GCS3-1853 AND GCS3-2753 SERIES 220/240, 380/420, 440/480 AND 550/600 VOLT UNITS		COMPONENTS ENERGIZED DURING SEQUENCE OF OPERATION																													
		24 VOLT CIRCUIT					120 VOLT CIRCUIT					POWER SUPPLY CIRCUIT			POWER SAVER																
DEMAND	CONDITION	Purge Relay (Approx. 35 Sec.)	Time Delay Relay	No. 1 Heating Relay	Indoor Blower Delay Relay	No. 2 Heating Relay (nat. only)	Indoor Blower Control Relay	No. 1 Cooling Relay	No. 2 Cooling Relay *	Power Saver Relay †	Ignition Transformer	Pilot Valve	Indoor Blower Contactor	1st Stage Gas Valve	2nd Stage Gas Valve (nat. only)	Combustion Air Blower	Primary Control	No. 1 Timed Off Control	No. 2 Timed Off Control *	No. 1 Compressor Contactor	No. 2 Compressor Contactor *	No. 1 Compressor	No. 2 Compressor *	Outdoor Fan Motors	Indoor Blower Motor	No. 1 Oil Rectifier	No. 2 Oil Rectifier *	Minimum Position	Modulating Position	Closed	
1st Stage Heat	Below 58°F (14,4°C)	●	●	●	●						●	●	●	●	●	●	●								●	●	●	●			
2nd Stage Heat	Below 58°F (14,4°C)	●	●	●	●	●					●	●	●	●	●	●	●								●	●	●	●			
Cooling	Below 58°F (14,4°C)						●			●			●												●	●	●	●			●
1st Stage Cooling	Above 58°F (14,4°C)						●	●		●			●						●	●				●	●	●	●		**	**	
2nd Stage Cooling *	Above 58°F (14,4°C)						●	●	●	●			●						●	●	●	●	●	●	●	●	●		**	**	
Unit Indoor Blower "Off"	Any Temperature																									●	●				●

*Two stage cooling (1853/2753 only)

** May be at modulating or at minimum position depending on the humidity and heat content of air.

† 440/480 and 550/600 volt only

COMPONENTS ENERGIZED DURING SEQUENCE OF OPERATION																							
GCS3-953 SERIES 220/240, 380/420, 440/480 AND 550/600 VOLT UNITS		24 VOLT CIRCUIT						120 VOLT CIRCUIT				POWER SUPPLY CIRCUIT		POWER SAVER									
		Indoor Blower Delay Relay	Heat Relay	Time Delay Relay	Purge Relay	Indoor Blower Relay	No. 2 Gas Valve	Cooling Relay	Indoor Blower Contactor	Combustion Air Blower	Primary Control	No. 1 Gas Valve	Power Saver Relay †	Timed Off Control	Compressor Contactor	Compressor	Indoor Blower	Outdoor Fan Contactor †	Outdoor Fan	Oil Rectifier	Minimum Position	Modulating Position	Closed
DEMAND	CONDITION																						
1st Stage Heat	Below 58°F (14,4°C)	●	●	●	●			●	●	●	●	●				●			●	●			
2nd Stage Heat	Below 58°F (14,4°C)	●	●	●	●			●	●	●	●	●				●			●	●			
Cooling	Below 58°F (14,4°C)					●		●	●			●				●			●	●		●	
Cooling	Above 58°F (14,4°C)					●		●	●			●	●	●	●	●	●	●	●	*	*		
Unit Indoor Blower "Off"	Any Temperature																		●			●	

*May be at modulating or at minimum position depending on the humidity and heat content of air.

† 440/480 and 550/600 volt only

START-UP - OPERATION - CHARGING - ADJUSTMENTS

CAUTION TO INSTALLER

Due to fluorocarbon damage to the ozone layer in the stratosphere, Lennox recommends strict refrigeration procedures that prevent venting R-22 refrigerant into the atmosphere during installation and service of Lennox refrigeration systems.

I-START-UP AND OPERATION

WARNING—Power to unit must be turned on at least 24 hours before installing compressor fuses. Refer to instructions on bag containing fuses attached to compressor.

A—Cooling

- 1—Set thermostat in "cool" position, blower switch in "cont" or "auto" position and move cooling adjustment below room temperature. Close unit disconnect switch.
- 2—Compressor starting will be delayed by timed-off cycle control. Wait for clock timer on control to start compressor or mechanically by-pass clock timer with a screwdriver. Push for service start. (One per compressor.)
- 3—Compressor will operate and cycle on demand from room thermostat. Condenser fans and evaporator blower will cycle with compressor. See operating sequence tables.

B - Heating Cycle

- 1 - Close manual main gas valve and pilot valve. Set room thermostat to lowest setting. Wait at least 5 minutes.
- 2 - Open manual main gas valve and pilot valve.
- 3 - Set room thermostat for "heat" and the desired temperature. Wait for pilot to prove (1353, 1853, 2753 units only). Burner should now operate if the thermostat is calling for heat.

NOTE – GCS3-953 – If thermostat is in "heat" position and power to unit is turned on before gas supply, or in case of safety shutdown, disconnect power to unit at least 5 minutes to allow primary control to reset.

NOTE – GCS3-1353, 1853, 2753 units – In case of a safety shutdown, disconnect power to unit, wait at least 5 minutes, manually reset primary control and restore power to unit.

C - Safety Shutdown

- 1 - Turn off power to unit at disconnect switch.
- 2 - Close manual main gas valve and pilot valve.
- 3 - DO NOT RELIGHT pilot or start burner with furnace full of gas or with a very hot combustion chamber.

II-ATTACHING GAUGE MANIFOLD

- 1—GCS3-953 and 1353 units have single stage cooling. Compressor valves and service ports are identified in Figure 1. GCS3-1853 and 2753 units have two stage cooling. No. 1 compressor compartment is on left side of unit when facing condenser coil. No. 2 compressor is on right side. Each compressor has a discharge and liquid line valve. Both liquid line valves are located in No. 1 compressor compartment. Figures 2 and 3 identify all service valves. Each circuit must be checked for proper charge separately. Attach gauge manifold to No. 1 circuit first.

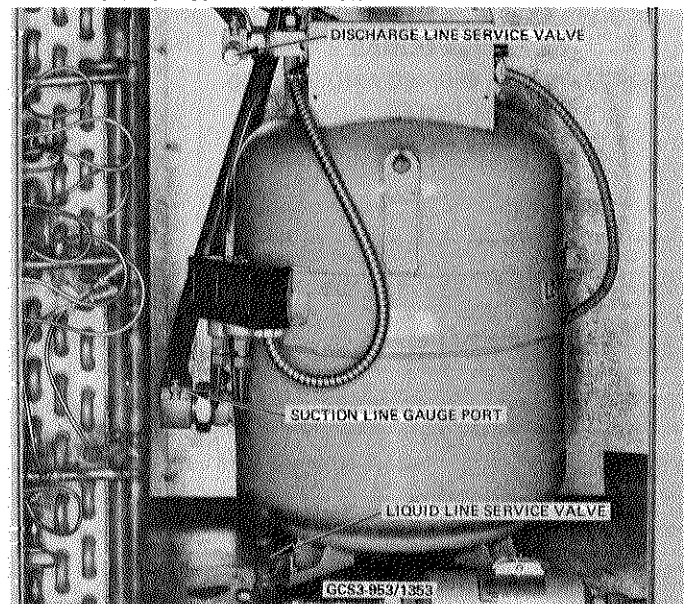


FIGURE 1

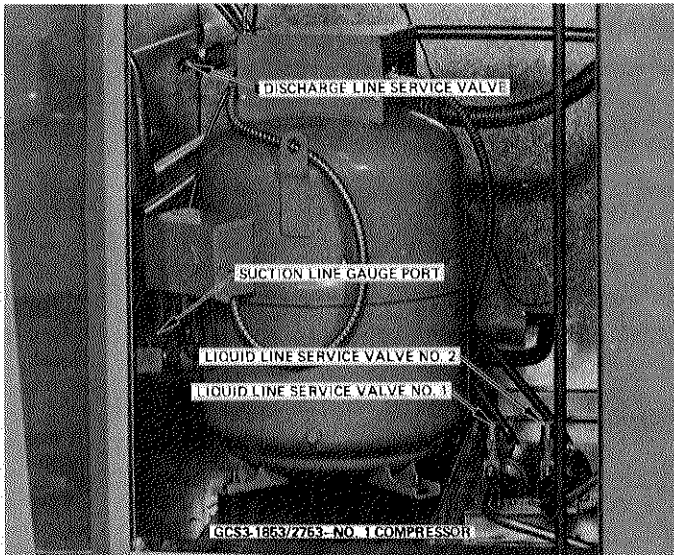


FIGURE 2

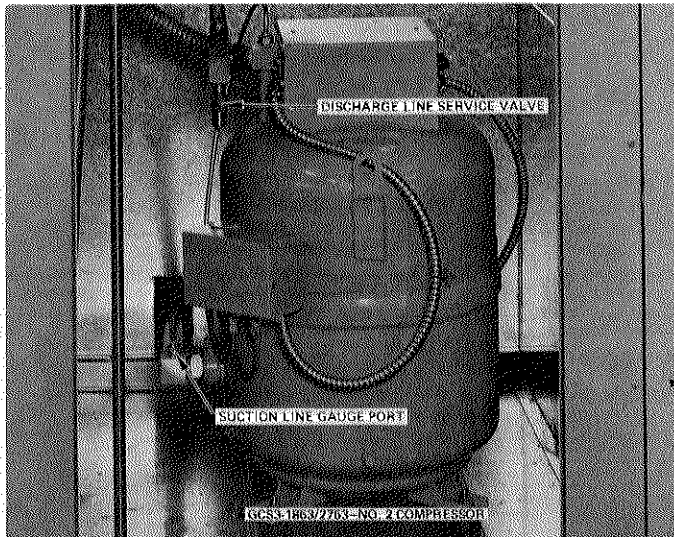


FIGURE 3

- 2—Check that compressor discharge valve and liquid line valve are open (Backseated).
- 3—Attach suction side of gauge manifold to compressor suction gauge port.
- 4—Attach high pressure side of gauge manifold to compressor discharge gauge port.
- 5—Turn compressor discharge valve stem a partial turn clockwise to record pressure at gauge manifold. Purge connecting lines through center port of gauge manifold by momentarily opening manifold valves.

III—CHECKING CHARGE

- 1—Replace all access panels. Tape compressor access panel in place and seal around gauge manifold lines.
- 2—Allow unit to run a few minutes to stabilize system.
- 3—Tape a thermometer on condenser coil and record condenser entering air temperature. Read suction and discharge pressures on gauge manifold.
- 4—From the normal operating pressure curve in this instruction, find correct suction pressure. Following across curve to correct condenser entering air temperature. Mark this point, then read discharge pressure. If discharge pressure is

within 3 psi (0,2 Kg/cm²) of valve on manifold high pressure gauge, unit is properly charged. If not, refer to "IV—Charging."

- 5—If unit is properly charged, open (backseat) compressor suction and discharge valves and disconnect gauge manifold. Replace service valve caps and proceed with checking heat cycle.
- 6—*GCS3-1853 And 2753 Units Only*—Connect gauge manifold to No. 2 compressor circuit and check charge.

IV—CHARGING

If system is completely void of refrigerant, the recommended and most accurate method of charging is to weigh refrigerant into unit through liquid line service valve according to amount shown on unit rating plate. Refer to Cooling Service Manual (Section ISP-3D). If weighing facilities are not available, or if unit is low on charge, use the following procedure.

NOTE—Each circuit on two stage units must be charged and checked separately. Charge the No. 1 circuit first. Compressor on No. 2 circuit may be allowed to run unless system is void of charge. In that case, remove fuse on No. 2 compressor control box to shut off power to No. 2 compressor.

- 1—Connect an upright R-22 refrigerant drum to center port of gauge manifold. Purge air from connecting lines.
- 2—Start unit. In some cases it may be necessary to jumper pressure switches to start unit.
- 3—Open drum valve and charge a quantity of refrigerant gas into system through compressor suction port, then close refrigerant drum valve. Allow unit to run a few minutes to stabilize operating pressure.
- 4—Check unit operating pressures recorded at gauge manifold with normal operating pressure curve in this instruction. Continue charging and checking until pressures at gauge manifold and operating curve agree.
- 5—*GCS3-1853 And 2753 Units Only*—Charge No. 2 compressor circuit using same procedure.

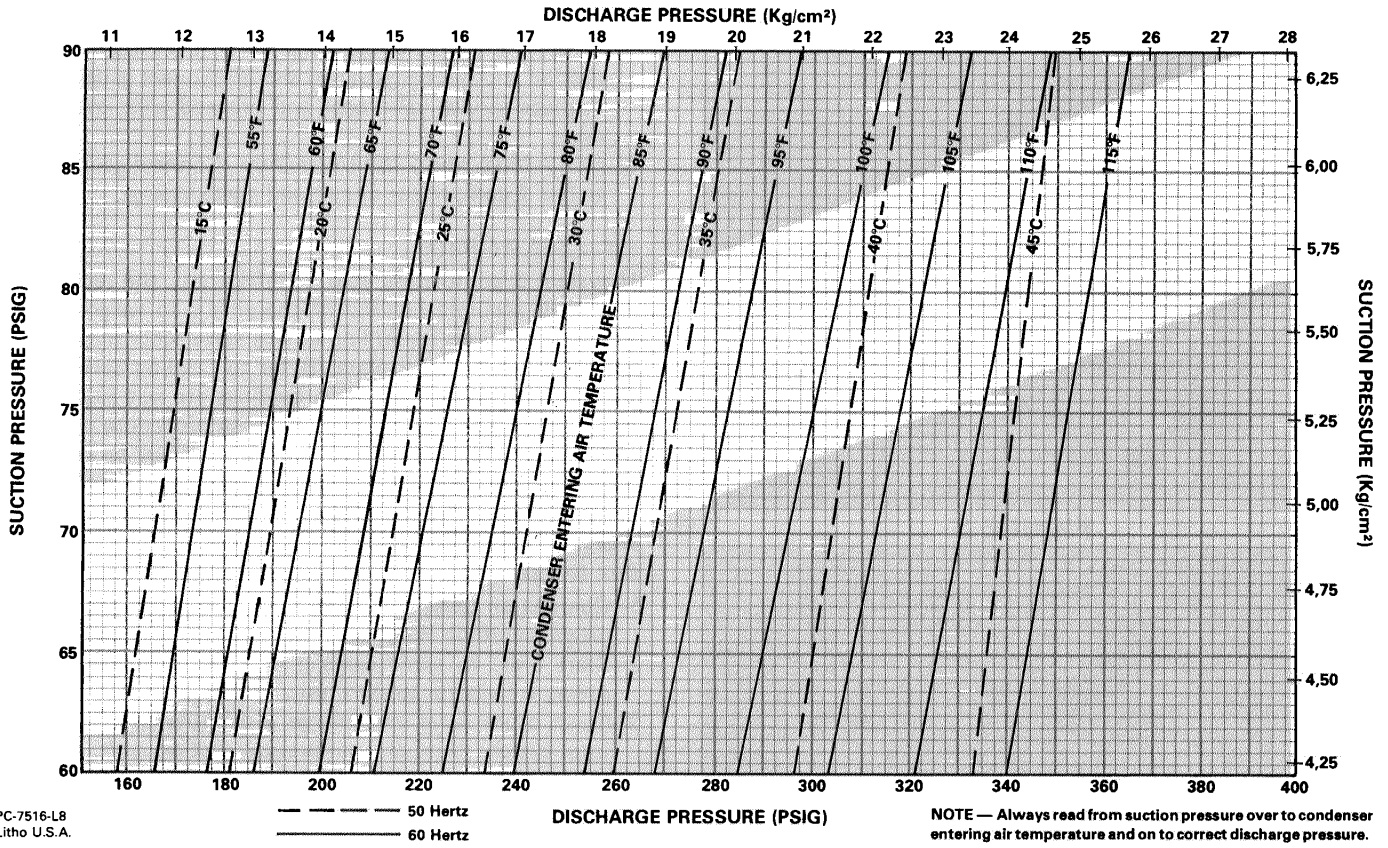
V—REMOVING GAUGE MANIFOLD

Open (backseat) compressor suction and discharge valves. Disconnect gauge manifold and replace service valve caps. Remove service jumper from pressure switches.

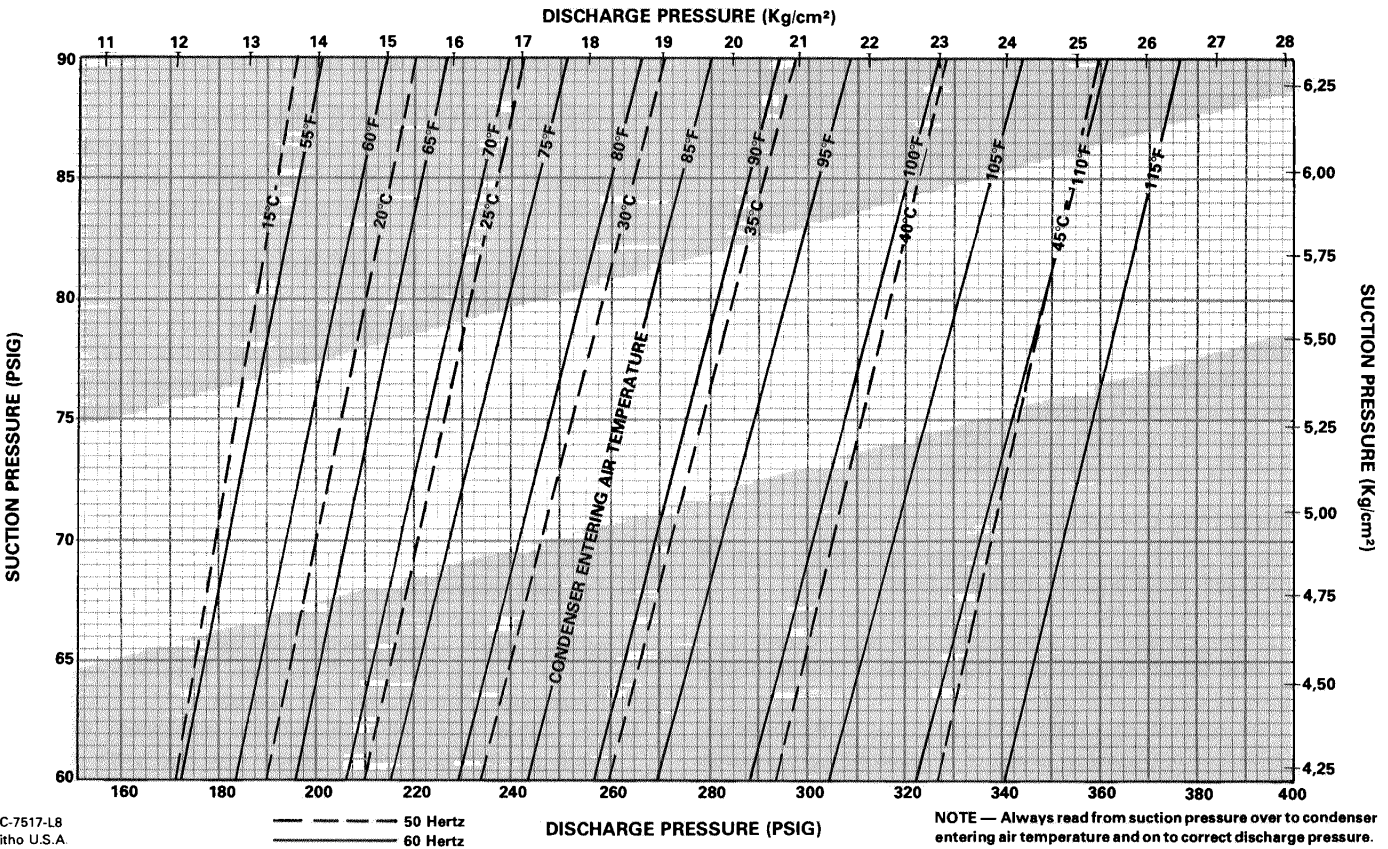
VI—CHECKING EVAPORATOR COIL AIR PRESSURE DROP

- 1—Air test holes are provided (one each side of coil) for checking pressure drop across evaporator coil. This check should be made with an inclined monometer or draft gauge.
- 2—Remove snaphole plugs and insert an awl or screwdriver to open insulation behind holes.
- 3—Insert hoses from draft gauge into air test holes so about 1/4" (6,4 mm) extends inside cabinet. Zero end of draft gauge scale connects to entering side of coil. Seal around holes with permagum or sealing compound.
- 4—To start evaporator blower motor, move thermostat heat selector to lowest setting. Move cooling selector to highest setting. Place system switch in "cool" or "auto" position and fan switch in "cont." position. Turn on power supply. Evaporator blowers only will operate.
- 5—See Table 1 for air volumes and equivalent draft gauge readings. Observe draft gauge readings with evaporator blowers running. If reading is below air volume required, increase blower speed. If reading is above air volume

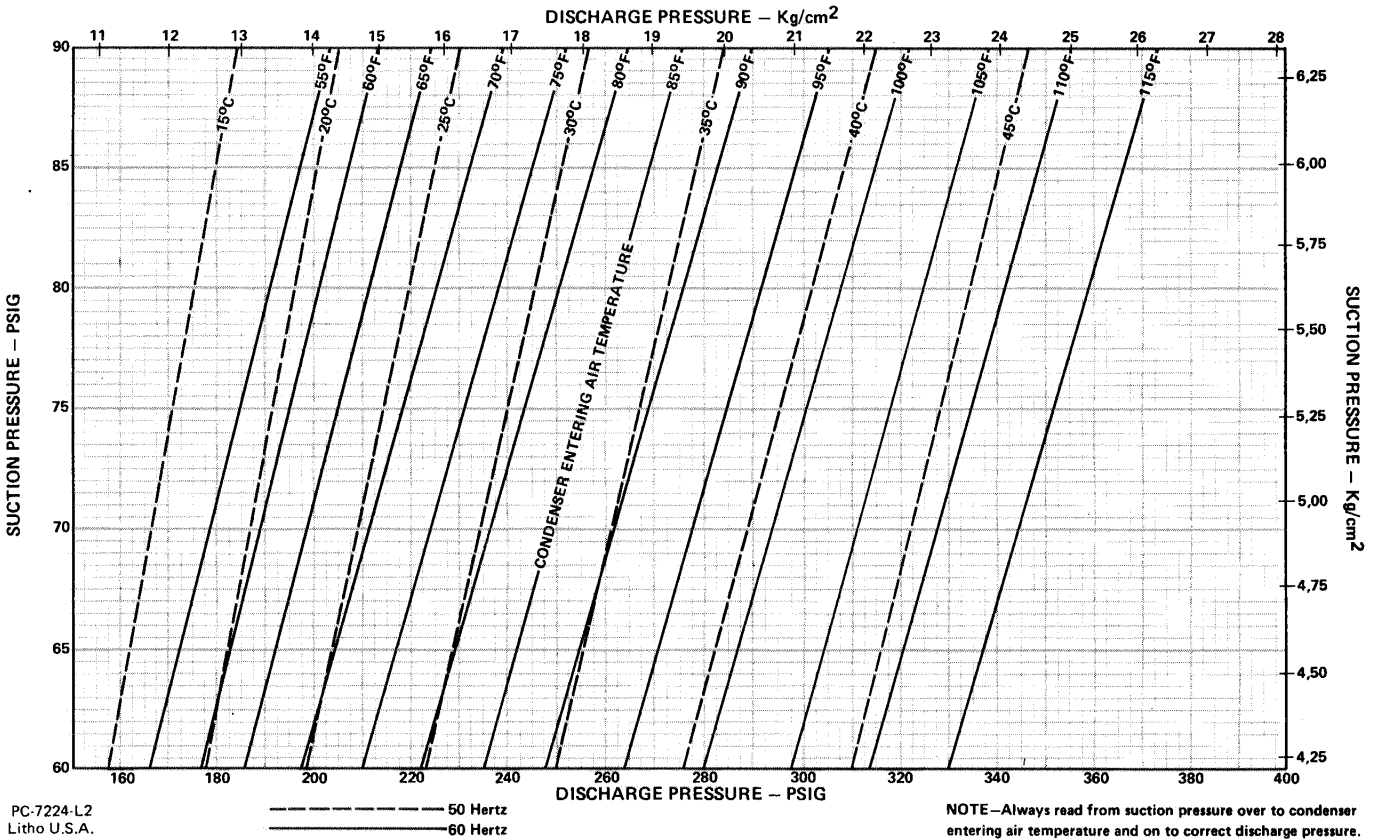
NORMAL OPERATING PRESSURE CURVE FOR GCS3-953 SERIES UNITS



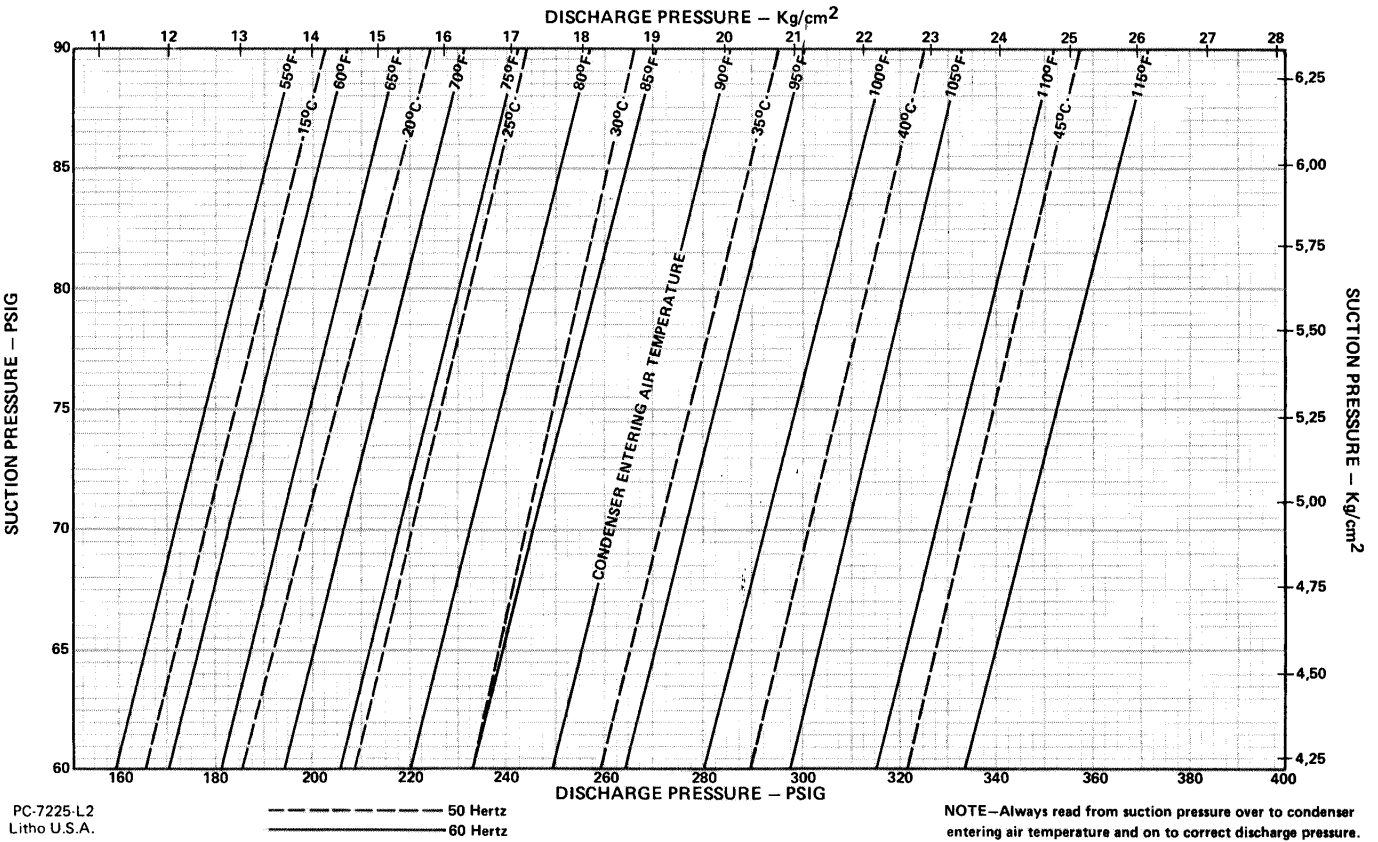
NORMAL OPERATING PRESSURE CURVE FOR GCS3-1353 SERIES UNITS



NORMAL OPERATING PRESSURE CURVE FOR GCS3-1853 SERIES UNITS



NORMAL OPERATING PRESSURE CURVE FOR GCS3-2753 SERIES UNITS



required, decrease blower speed. Refer to the following for pulley adjustment:

Loosen nut on motor base frame, slide motor up and remove belt. Loosen motor pulley with Allen wrench and adjust pulley. Refer to Figure 4.

CAUTION—Be sure Allen screw is lined up with flat side of sheave before retightening.

TABLE 1

DRAFT GAUGE READING (DRY EVAPORATOR)				
UNIT	AIR VOLUME		READING	
	CFM	m ³ /hr	In. Water	mm Water
GCS3-953	2625	4460	.06 — .08	1,52 — 2,03
	3000	5100	.08 — .10	2,03 — 2,54
	3375	5735	.10 — .12	2,54 — 3,05
	3750	6370	.12 — .14	3,05 — 3,56
GCS3-1353	3850	6540	.06 — .08	1,52 — 2,03
	4400	7475	.08 — .10	2,03 — 2,54
	4950	8410	.10 — .12	2,54 — 3,05
	5500	9345	.13 — .15	3,30 — 3,81
GCS3-1853	5250	8920	.09 — .10	2,29 — 2,54
	6000	10 195	.11 — .12	2,79 — 3,05
	6750	11 470	.13 — .14	3,30 — 3,56
	7500	12 745	.16 — .17	4,06 — 4,31
GCS3-2753	7700	13 085	.31 — .33	7,87 — 8,38
	8800	14 950	.27 — .28	9,39 — 9,65
	9900	16 820	.39 — .41	9,91 — 10,4

NOTE — These are not total resistance readings, but pressure drop readings across the coil.

IMPORTANT — To eliminate false readings, close blower access panel before reading draft gauge.

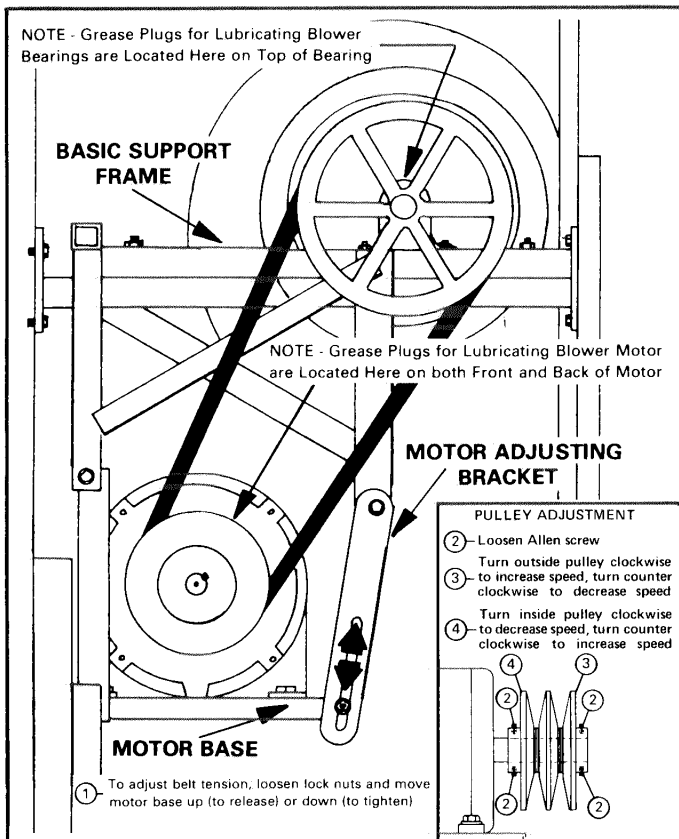


FIGURE 4

6—After draft gauge reading is obtained, remove draft gauge lines and replace snaphole plugs. Turn off blower motor.

VII—ADJUSTMENTS

A—Pressure Switches

High and low pressure controls are factory set at the following:

High pressure Control 410 psi (28,7 Kg/cm²)
 Low Pressure Control
 Setting (psi)—Out 25 psi (1,8 Kg/cm²)
 In 55 psi (3,9 Kg/cm²)

B - Power Saver (Optional)

The Power Saver system is controlled by a control box located in the fresh air intake hood. Unlatch and open fresh air intake hood, then remove top filter for access to control box. Recommended factory setting for controls are:

Compressor monitor.....58°F (14,4°C)
 Mixed air temperature control.....58°F (14,4°C)
 Enthalpy controlSetpoint "A" on Chart 1

NOTE - If the humidity or temperature is too high for the system, a lower setting of the enthalpy control (B, C or D) may be used. Refer to Chart 1.

Adjust the minimum positioner with outside air dampers at minimum position. Turn setting on enthalpy control below the outside air enthalpy (or below "D") to obtain this position. Remove top from damper motor for access to minimum positioner. Rotate screw clockwise to open dampers and counterclockwise to close dampers. Refer to the charts at the end of the RD3 Power Saver installation instructions for percentage of fresh air versus dimensional opening of blade at system static pressures.

IMPORTANT - After adjustment is completed, return the enthalpy control to its normal setting.

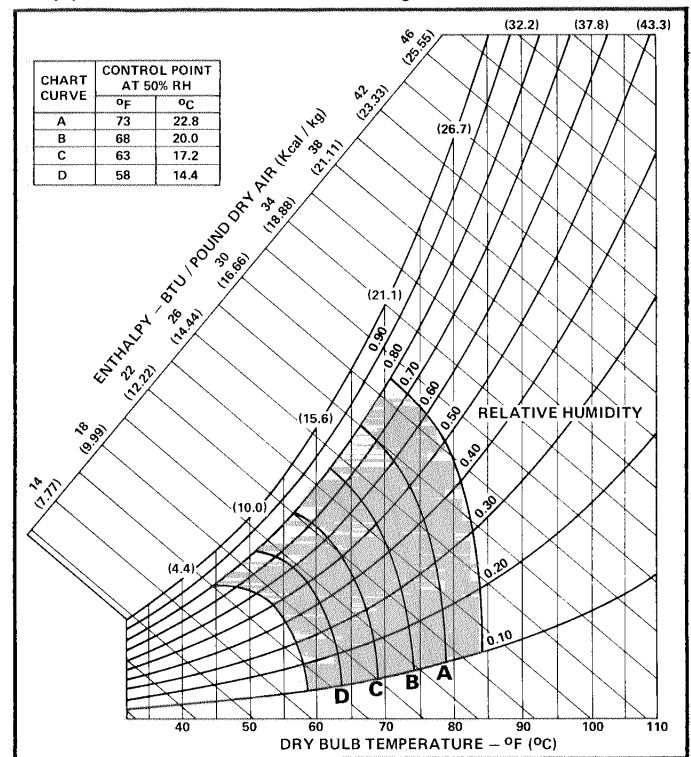


CHART 1

C - Burner Adjustment

Unit is A.G.A. design certified and C.G.A. certified for minimum and maximum ratings shown in Table 2.

TABLE 2

UNIT	GAS TYPE	STAGES	INPUT				OUTPUT		** MANIFOLD OR REGULATOR PRESSURE	
			Minimum		Maximum		Maximum		In. w.c.	mm w.c.
			Btuh	Kcal/h	Btuh	Kcal/h	Btuh	Kcal/h		
*GCS3-953-125	Natural	Single	----	----	125,000	----	93,750	----	3.5	----
†† GCS3-953-250	Natural	Two	★125,000	----	250,000	----	187,500	----	3.5	----
†† GCS3-953-250	Propane	Single	----	----	250,000	----	187,500	----	11.0	----
†GCS3-953-250	Natural	Two	120,000	30 240	225,000	56 700	168,750	42 530	3.6	91,44
*GCS3-1353-175	Natural	Single	----	----	175,000	----	131,250	----	3.5	----
GCS3-1353-350	Natural	Two	200,000	----	350,000	----	262,500	----	3.5	----
GCS3-1353-350	Propane	Single	----	----	350,000	----	262,500	----	9.0	----
†GCS3-1353-350	Natural	Two	174,000	43 850	315,000	79 380	236,250	59 540	3.1	78,74
*GCS3-1853/2753-275	Natural	Single	----	----	275,000	----	206,250	----	3.5	----
GCS3-1853/2753-500	Natural	Two	275,000	----	500,000	----	375,000	----	3.5	----
GCS3-1853/2753-500	Propane	Single	----	----	500,000	----	375,000	----	9.0	----
†GCS3-1853/2753-500	Natural	Two	250,000	63 000	450,000	113 400	337,500	85 050	3.2	81,28

*Not C.G.A. Approved.
 †International units only.
 ★Minimum rate is 140,000 for C.G.A. certified units.

** IMPORTANT - Always check pressure settings listed on burner.
 If different from this table, adjust according to pressures listed on burner.

††The installation must be adjusted for an air temperature rise of 45-75°F (7.2 - 23.9°C) on Model GCS3-953.

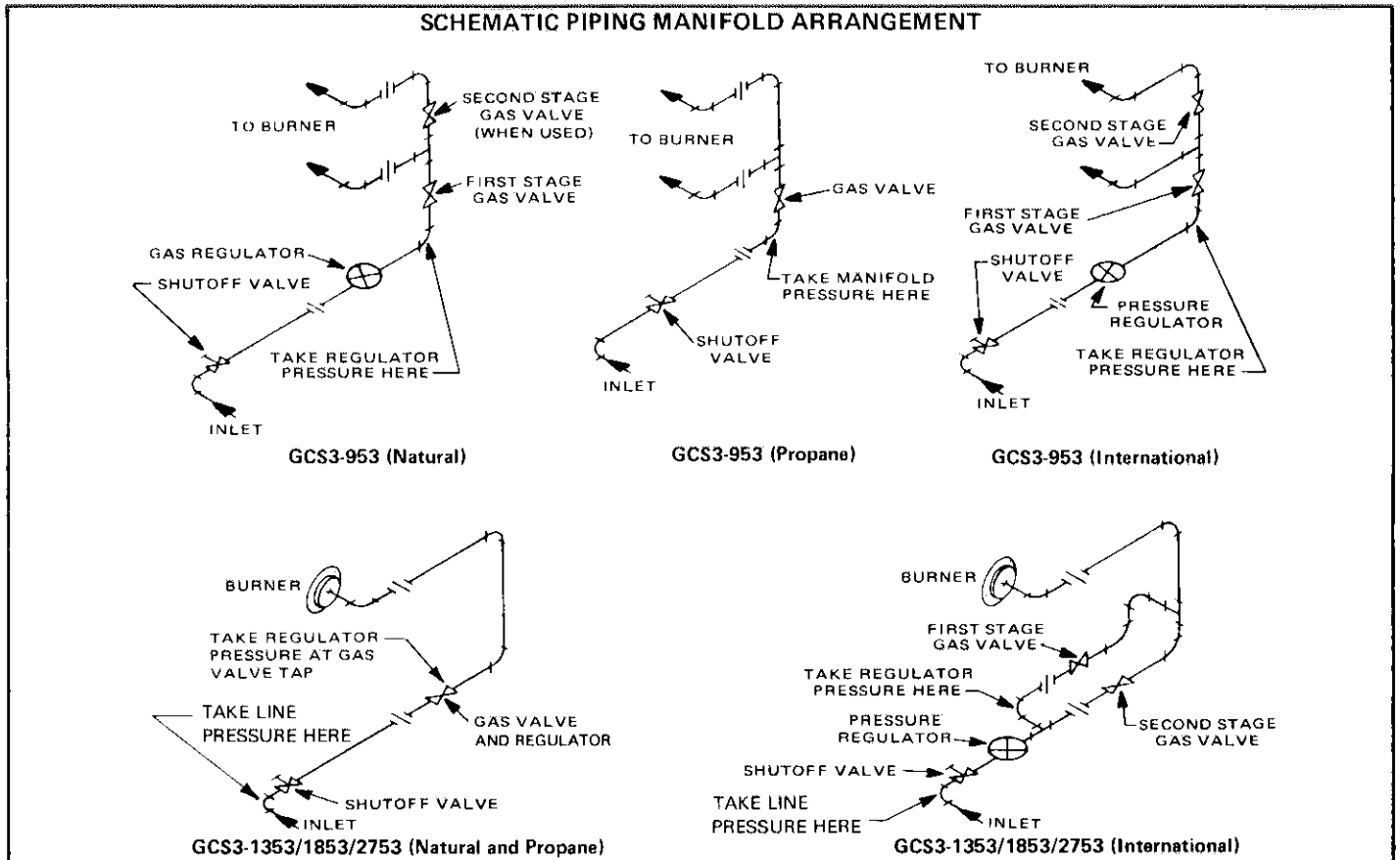


FIGURE 5

- 1 - Check gas line pressure with unit firing at maximum rate. A minimum line pressure of 6 inches w.c. (152,0 mm w.c.) for natural gas or 11 inches w.c. (279,0 mm w.c.) for propane should be maintained. On multiple unit installations, each unit should be checked in sequence beginning with the one closest to supply gas main. Line pressure should be 6 inches w.c. (152,0 mm w.c.) for natural gas or 11 inches w.c. (279,0 mm w.c.) for propane with all units firing on high stage.
- 2 - After line pressure has been checked and adjusted, check manifold or regulator pressure (w.c.) with unit operating on high stage. Refer to Table 2 for correct settings. See manifold schematics in Figure 5 for correct location to take reading.
- 3 - A combustion adjustment lever is provided on burner. Loosen lock screw and move damper indicator to desired

position. The standard combustion air setting uses the damper set at full open. Relock indicator.
 4 - Set gap for ignitor spark plug at .050" (1,27 mm).

VIII-BLOWER BELTS

NOTE - To properly proportion weight of blower motor on blower frame, bulk of motor weight must be kept to left or rear.

Tension new belt(s) at maximum deflection force recommended. Pre-tension belt(s) after a run of 24-48 hours.

NOTE - Refer to Figure 4 for adjustment procedure.

A-Points For Installing Belts

- 1 - Use a matched set of belts (953 series is a single belt unit).
- 2 - Clean oil and grease from grooves. Remove any rust or burrs from sheave grooves.
- 3 - Shorten center distance of drive until belts can be put on sheaves without forcing.

- 4—Make sure sheaves are correctly aligned; shafts are parallel and bearings have oil.
- 5—On two groove pulleys, be sure both are set at same pitch diameter.

B—Tensioning Belts

Over-tensioning shortens belt and bearing life. Use the following recommended procedure for tensioning belts.

- 1—Measure span length, X. Refer to Figure 6.

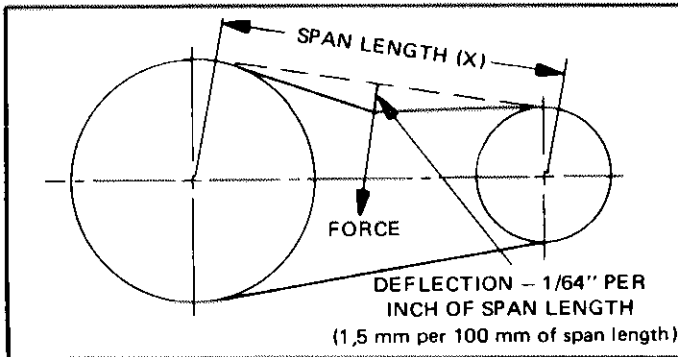


FIGURE 6

- 2—At center of span length (X) apply a force perpendicular to span large enough to deflect belt 1/64" for every inch of span length (deflection 1,5 mm per 100 mm of span length).

Example—Deflection distance of a 40" span would be 40/64 or 5/8".

Example—Deflection distance of a 1000 mm span would be 15 mm.

- 3—Compare applied force with values given in Table 3. If force is between minimum and maximum range shown, drive tension should be satisfactory. A force below minimum value indicates an undertensioned belt. A force that exceeds maximum value indicates an overtensioned belt.

TABLE 3

Belt Cross Section (Marked on Belt)	Motor Pulley Pitch Diameter		Deflection Force			
	IN.	cm	Minimum		Maximum	
			LBS.	kg	LBS.	kg
A	3.0 - 3.6	7,62 - 9,14	2-5/8	1,19	3-1/4	1,47
	3.8 - 4.8	9,65 - 12,2	3	1,36	4	1,81
	5.0 - 7.0	12,7 - 17,8	3-1/4	1,47	5	2,27
B	3.4 - 4.2	8,64 - 10,7	3	1,36	5	2,27
	4.4 - 5.6	11,2 - 14,2	4	1,81	5-7/8	2,66
	5.8 - 8.6	14,7 - 21,8	5-1/4	2,38	7-7/8	3,57

IMPORTANT - Adjust new belts to maximum values as belts will stretch and seat-in during initial running.

IX — COMPRESSOR OIL CHARGE

Compressor oil charge is 132 oz. (3,74 Kg). Oil type is Suniso 4 GD. Refer to Cooling Service Manual procedure to check and add compressor oil.

X—MAINTENANCE

A—Lubrication

NOTE—Always relubricate motors according to manufacturers lubrication instructions on each motor. If no instructions are provided, use the following as guide:

- 1—**Evaporator Blower Bearings** — Bearings are prelubri-

cated. For extended bearing life, relubricate at least once every two years with a lithium base grease, such as Alvania 3 (Shell Oil), Chevron BRB2 (Standard Oil) or Regal AFB2 (Texas Oil). Use a **hand grease gun** for relubrication. Add only enough grease to purge through the bearings so that a bead of grease appears at the seal lip contacts. Refer to Figure 4.

- 2—**Evaporator Blower Motor Bearings** — Bearings are prelubricated. For extended bearing life, relubricate at least once every two years with a lithium base grease, such as Westinghouse 53701RW, Chevron BRB2 (Standard Oil) or Andok 260 (Humble Oil). To relubricate, replace top plugs with standard grease fittings. Remove lower outlet plugs and add grease with a **hand gun** until new grease appears at bottom outlets. Run motor for a short time before replacing bottom plugs. Refer to Figure 4.
- 3—**Condenser Fan Motors**—Permanently sealed and lubricated.

B—Filters

Polyurethane filters are cleanable. Use following procedure:

- 1—Remove filters from unit.
- 2—To clean vacuum or wash with mild detergent in warm water. For increased efficiency, coat with water soluble oil (No. P-8-5069) available from your Lennox Dealer.

CAUTION—Some detergents have an adverse effect on filter media, causing it to lose its flexibility or become soft. It is recommended that dish washing liquid be used. When cleaning filter, do not leave soaking in cleaner. Leave filter in cleaner only as long as it takes to clean it. Do not use enzyme detergents or pre-soakers. After filter is clean, rinse thoroughly before replacing in unit.

- 3—Replace filter with wire mesh on downstream side of air flo.

C - Periodic Check of Safety Controls (Refer to Figure 7.)

- 1 - **Automatic Safety Valve (FIA/FM, C.G.A. units only)**
With unit operating in "heat" mode and burner firing, close the test firing valve. Loss of flame will lock out the primary control and close the automatic safety valve in approximately 15 seconds. Indicator on automatic safety valve will read "closed." Properly restart unit per instructions on Page 2.

- 2 - **Low Pressure Gas Switch (FIA/FM and C.G.A. units only)**
With unit operating, SLOWLY close manual main gas valve. Low pressure gas switch will open as the pressure drops, closing the automatic safety valve. Close manual main gas valve and manually reset low pressure gas switch. Properly restart unit per instructions on Page 2.

- 3 - **Primary Limit Control**

Reduce primary limit control setting by turning adjustment screw clockwise. When the limit control trips, the heat circuit is de-energized closing the automatic safety valve. Return primary limit setting to the fixed maximum stop and restart unit per instructions on Page 2.

- 4 - **Pilot Ignition**

Refer to Table 4 containing proper pilot currents for pilot only and high fire conditions. Current reading should be steady for stable, adequate pilot.

D - Extended Period Shutdown

To shutdown unit for an extended period of time set thermostat at lowest setting and turn off power to unit at disconnect switch. Close internal manual main and pilot gas valve and any external gas valves if provided to

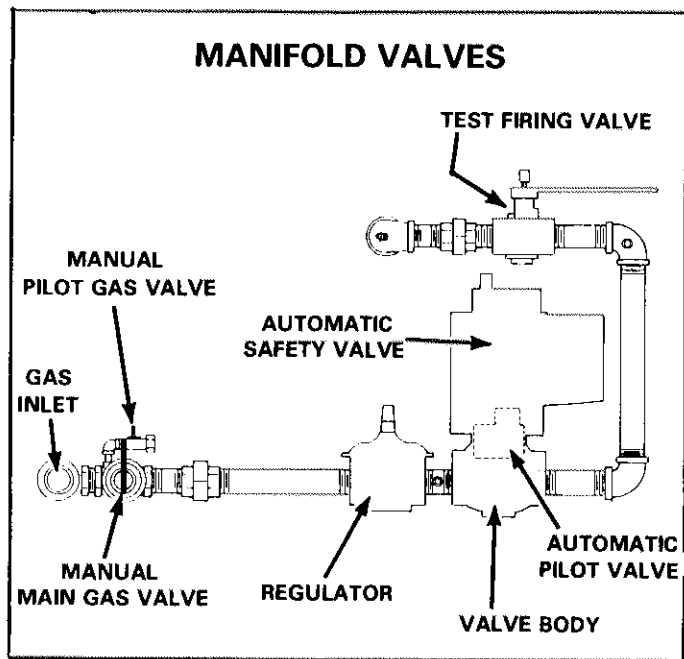


FIGURE 7

guarantee that no gas leaks into the combustion chamber. ALL access panels, covers and vent caps should be in place and secure.

To reactivate unit after an extended shutdown carefully complete the Maintenance, Start-up and Operation procedures contained in this manual.

REQUIREMENTS - APPLICATION - INSTALLATION

I—SHIPPING AND PACKING LIST

Package 1 of 1 Contains:

- 1—Thermostat (packed in blower compartment)
- 1—Vent cap (packed in blower compartment)
- 1 - Primary limit control bracket (attached to gas manifold)

NOTE - Combination supply and return adaptor, when used, and filler pieces for converting 1853 and 2753 units to end discharge are both packaged and shipped separately from the GCS3 units.

II—SHIPPING DAMAGE

Check unit for shipping damage. If damage is found, contact last carrier immediately.

III—GENERAL

These instructions are intended as a general guide and do not supersede local codes. Authorities having jurisdiction should be consulted before installation.

IV—REQUIREMENTS

Wiring must conform to the National Electric Code (NEC) and any local codes.

NOTE - National Electric Code (NFPA No. 70-1978) is available from:

National Fire Protection Association
470 Atlantic Ave., Boston, Mass. 02210

Installation must conform with American National Standard Institute (ANSI-Z223.1-1974), National Fuel Gas Code, manufacturers installation instructions and local municipal building codes.

Note - ANSI - Z223.1 - 1974 National Fuel Gas Code is available from:
American National Standards Institute, Inc.
1430 Broadway, New York, New York, 10018

TABLE 4

UNIT	Micro-amp	
	Pilot	High Fire
GCS3-1353	2.2 - 3.5	3.5
GCS3-1853	2.5 - 3.0	3.0 - 4.0
GCS3-2753	2.5 - 3.0	3.0 - 4.0

E - Periodic Leak Testing

With unit in operating condition close the test firing valve (FIA/FM, C.G.A units). Set thermostat for a heat demand to pressurize manifold. Carefully check all piping connections for gas leaks. Use a soap solution or other preferred means. Do not use matches, candles, flame or other sources of ignition to check for gas leaks. Properly restart unit per instructions on Page 2.

F - Combustion Air Blower

For efficient operation, keep combustion air blower clean.
NOTE—If blower wheel must be removed, loosen Allen screw and pull wheel out of housing. When replacing wheel, make sure flat on motor shaft lines up with flat on blower wheel and that Allen screw is tightened securely.

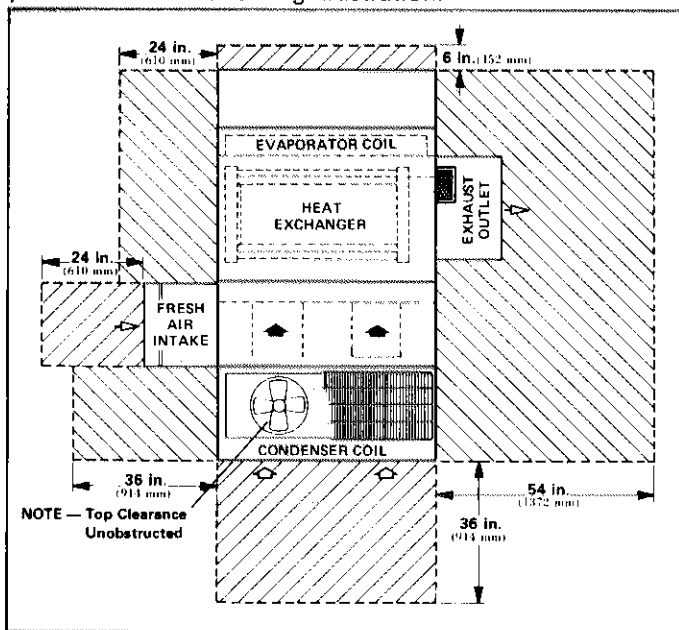
G - Evaporator and Condenser Coil

Periodically check and clean coil if necessary.

H - Cleaning

If cleanout panel of heat exchanger is removed, gasket must be replaced before replacing the cleanout panel.

C.G.A. (Canadian Gas Association) certified units shall be installed in accordance with the Installation Code for gas burning appliances and equipment, C.G.A. B149.1 for natural gas and B149.2 for propane gas, and applicable provincial regulations for the class; which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installation. Unit is A.G.A. design certified and C.G.A. certified for outdoor installation only, at minimum clearances listed on unit rating plate and in the following illustration.



Unit design is certified for installation on combustible floors with ductwork out right side, or out bottom when installed on special frames as listed on unit rating plate.

Adequate clearance shall be provided around air openings into combustion chamber. Clearances from protection of combustible material shall be provided. Provisions shall be made for accessibility and for combustion and ventilating air supply.

Electrical power supply to this unit must be on a separate, fused, and permanently live electrical circuit.

Unit is not suitable for a conventional venting system.

Flue and venting is complete and no alterations or adjustments should be made.

Unit should be adjusted for temperature rises listed on unit rating plate.

V—LOCATION OF PARTS

See Parts Arrangement of unit.

VI—RIGGING AND HOISTING UNIT

Unit net weight:

GCS3-953	1655 lbs. (750 Kg)
GCS3-1353	2150 lbs. (975 Kg)
GCS3-1853	3250 lbs. (1474 Kg)
GCS3-2753	3800 lbs. (1723 Kg)

CAUTION—Before rolling this unit across roof deck, consult mechanical or structural engineer.

A—GCS3-953 and 1353 Units Only

1 - Remove (4) plywood supports (2 each side). Refer to Figure 1, Step 1.

IMPORTANT - Remove plywood base before unit is hoisted.

2 - Rig unit with (4) lines as illustrated in Figure 1, Step 2. Leave top crate in place to serve as spreader.

3 - After unit is set on mounting frame, remove metal brackets and discard crate. See Figure 1, Step 3.

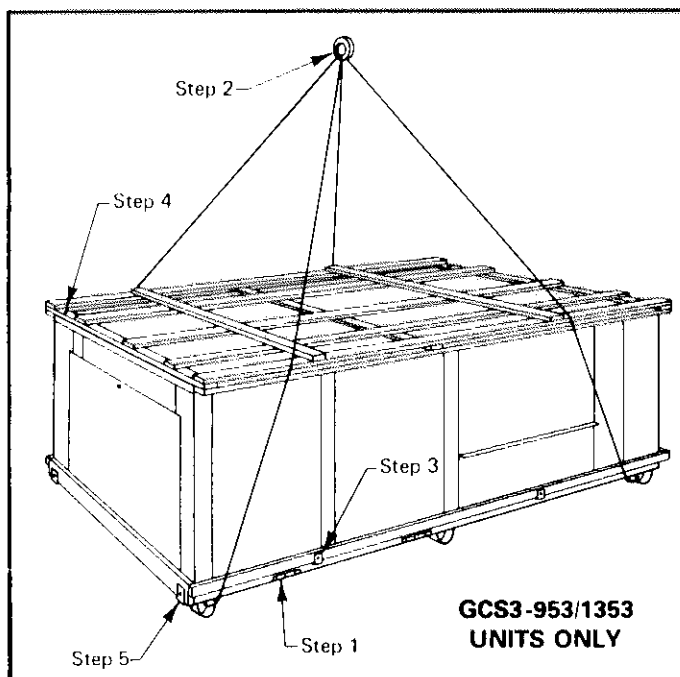


FIGURE 1

4 - Replace bolts in top of cabinet and seal weather tight around the bolts. See Figure 1, Step 4.

5 - Replace (2) bolts in condenser end mullions as shown in Figure 1, Step 5.

B—GCS3-1853 and 2753 Units Only

1 — Rig unit with (4) lines and spreaders as illustrated.

Attach harness to lifting brackets provided on unit.

2 — Hoist the unit into place.

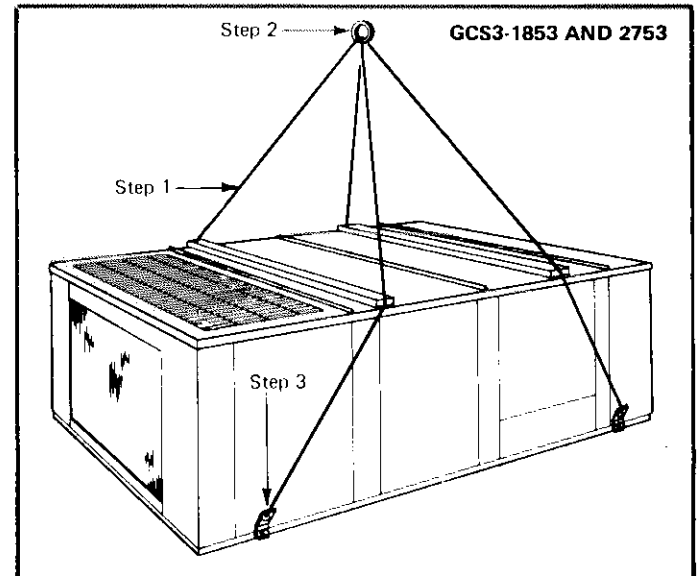


FIGURE 2

3 — After unit is set, remove harness and lifting brackets, and replace bolts.

VII—INSTALLATION

Installation and service clearances must be maintained as listed on unit rating plate.

A—Roof Mounting With RMF3 Lennox Mounting Frame

1—The RMF3 Lennox mounting frame must be installed, flashed, sealed and supply and return air opening cut in roof prior to installation of unit.

2—Run a bead of caulking around top flange on RMF3 mounting frame.

3—Set unit on roof mounting frame. With unit setting squarely on frame, there will be a 1/2" (12,7 mm) space between flange on mounting frame and base of unit.

B—Roof Mounting With Installer's Frame

NOTE—When mounted on installer's frame, do not flash above drain holes located in base of unit.

Many types of roof framing or supports can be used to mount the unit. Important items to keep in mind when building frame or supports are:

1—Unit base is fully enclosed and insulated. An enclosed frame is not required.

2—Be sure framing or supports are square and level.

3—Frame or supports must be high enough to prevent moisture from entering unit.

4—Wood or metal frame supports are acceptable for mounting.

5—For bottom discharge, position supports so they do not interfere with discharge and return air openings.

C—Slab Mounting Unit

1—When locating unit on concrete slab, maintain installation clearances listed on unit rating plate.

2—Top of slab should be at least 4" (102 mm) above finished grade and located where runoff water from higher ground cannot collect around unit. **Be sure slab is level.**

- 3—Change unit to horizontal air discharge as explained under heading “VIII—Duct Connections.”
- 4—Set unit on slab a minimum of 6” (152 mm) from building and align unit supply and return openings with openings in wall.

VIII—DUCT CONNECTIONS

A—Bottom Air Discharge

- 1—Unit is shipped from factory with all panels and parts in place for bottom air discharge.
- 2—Supply and return openings in base are:

UNIT	SUPPLY AND RETURN AIR OPENING	
	Inches	mm
GCS3-953	16-1/16 x 34-3/16	408 x 868
GCS3-1353	20-1/16 x 40-1/16	509 x 1018
GCS3-1853	24-1/16 x 51	611 x 1295
GCS3-2753		

- 3—Insert correctly sized ducts through roof opening into base openings. Secure ducts to flanges on base openings with sheet metal screws. Complete ductwork as desired.
- 4—When other than Lennox frame is used, flash and seal weathertight where ducts come through roof.

B—Horizontal Discharge

- 1—Remove filter access panels from unit.
- 2—Remove clips or screws securing air division panel to base and pull from unit. See Figure 3.

NOTE—Division panel is not needed for horizontal discharge on 2753 units.



FIGURE 3

- 3—953 And 1353 Units Only—Remove center mullion in base dividing air openings.
- 4—953 And 1353 Units Only—Remove closure panel and bottom filler piece from end of unit. Install closure panel through duct opening in end of unit as illustrated in Figure 4. Place panel in bottom opening and secure with sheet metal screws. Replace bottom filler piece.

NOTE—Install top edge of closure panel toward filters. Top and side flanges on panel fit on outside of bottom opening flanges.

- 5—1853 And 2753 Units Only—Remove the supply and return air panels from end of unit and install over openings in base of unit. Drill holes and secure in place with sheet metal screws. See Figure 5.

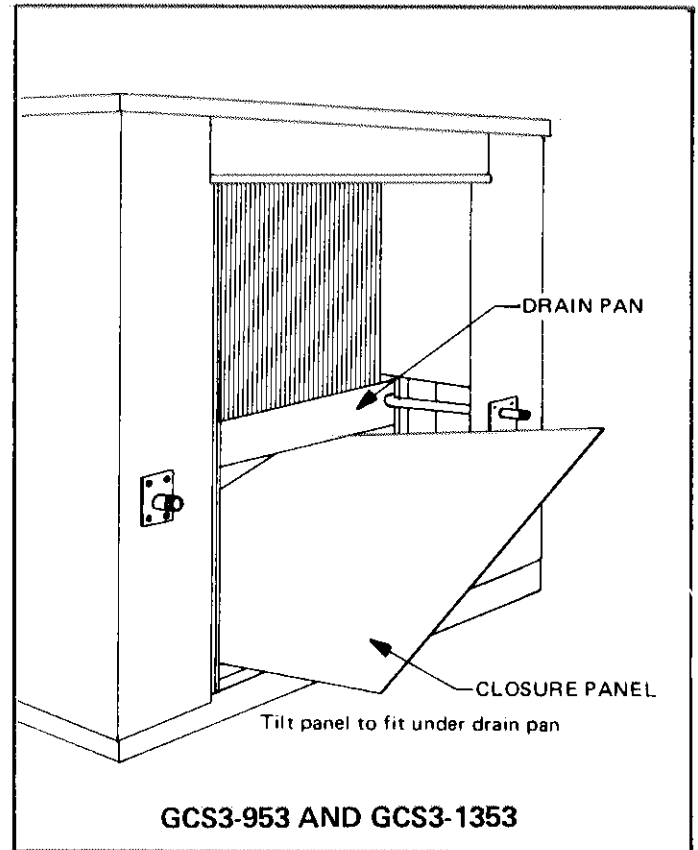


FIGURE 4

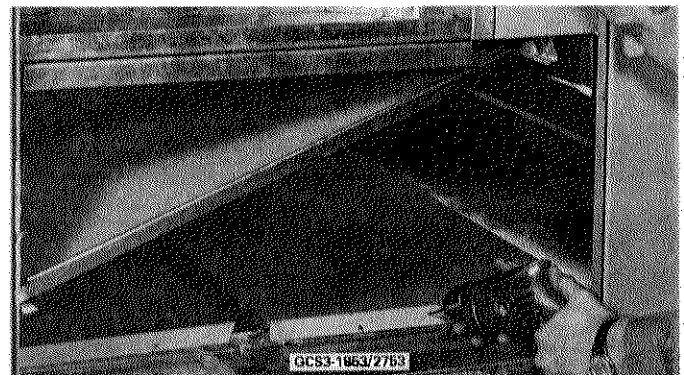


FIGURE 5

- 6—Remove evaporator drip shield from drain pan and discard.
- 7—1853 Units Only - Insert end filler piece through drain pan access opening, set on mounting tabs inside unit, and secure through pre-punched holes with self tap screws. Refer to Figure 6.
- 8—953, 1353 And 1853 Units Only—Turn air division panel end for end and insert through filter access opening. Hook lower flange on division panel into drain pan. On 1853 units, upper standing seam on division panel fits over flange on end of filler piece. See Figure 6.
- 9—2753 Units Only - A 2 piece filler panel is used for horizontal air discharge. Install each piece through opening in end of unit. The lower sides hook into drain pan and upper sides set on tabs in end of unit. Secure 2 pieces together in center and also to tabs in unit. Caulk and seal joints with sealing compound.

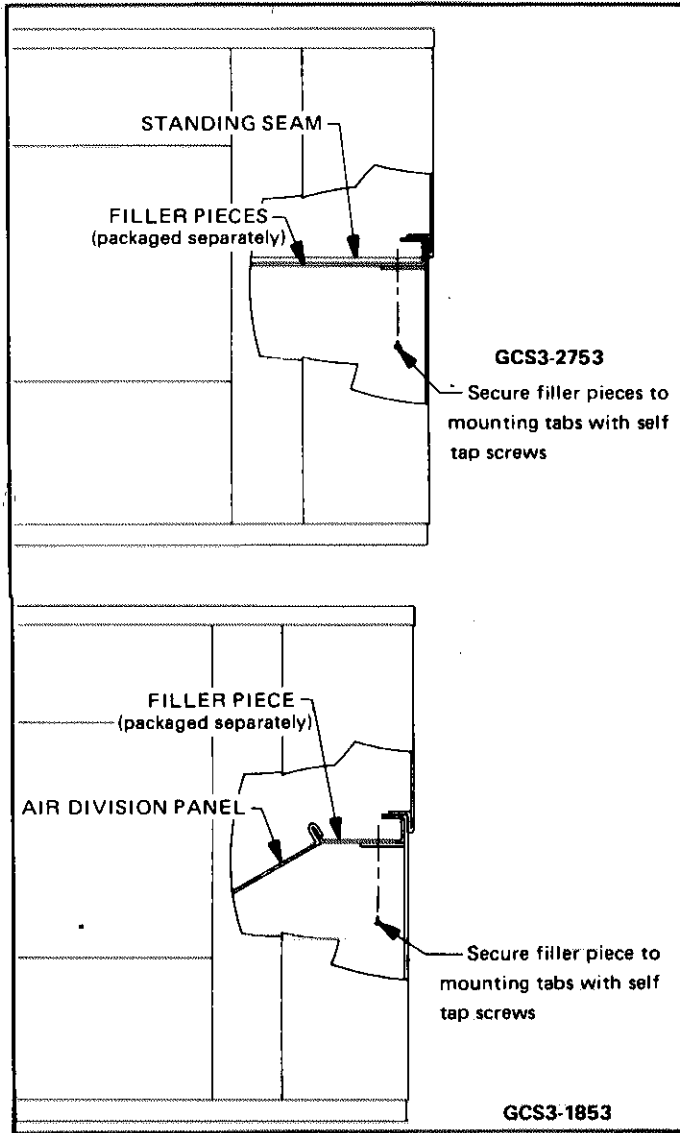


FIGURE 6

10—953 And 1353 Units Only—Place ends of center mullion in standing seam on each side of opening. Position until slots align with holes in standing seams and secure with sheet metal screws. See Figure 7.

11 - Alternate primary limit control element mounting bracket (2753 units). Unwire and remove limit control and bottom discharge element bracket from unit. Remove sensing element from existing bracket and install on alternate horizontal discharge bracket. Reinstall primary limit control and new bracket into the original location. Refer to Figure 8.

12—On all units, caulk and seal where division or filler panel hooks into drain pan, especially around drain nipple.

13—Make duct connections to supply and return air openings in end of unit with insulated ductwork. Caulk and sheet metal screw ducts to standing seams around unit openings. Connect ductwork as required.

C—Combination Supply and Return Ducts

1—Remove filter access panels from unit.

2—Center mullion in base dividing air openings are secured

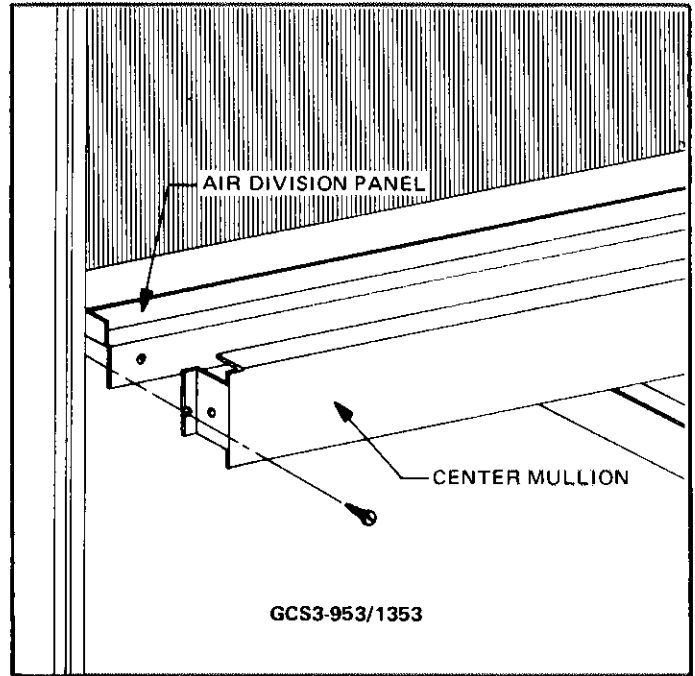


FIGURE 7

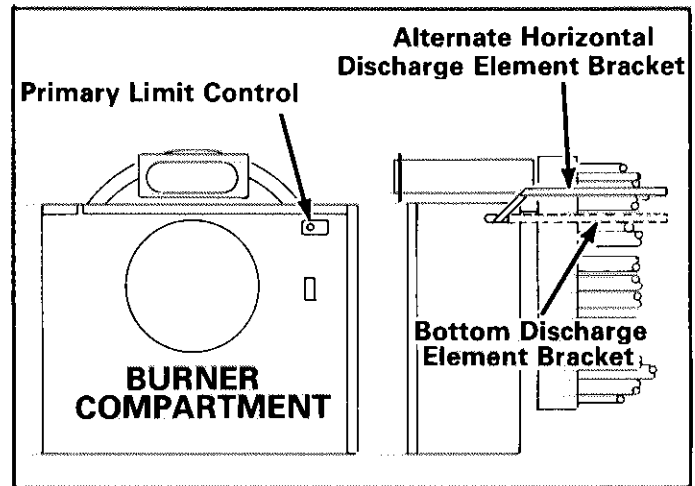


FIGURE 8

with sheet metal screws. Remove screws and mullion. Refer to Figure 9.

3—Install felt seals on correct end of adaptor as shown in Figure 10.

4—Combination supply and return adaptor installs on rails provided in filter compartment. Start end **without** felt seals first and slide into unit. Center side to side.

5—Flush mounted or stepdown diffusers may be used. Refer to installation instructions packed with diffusers for proper duct size and installation.

IX—INSTALLING OPTIONAL ITEMS

Options available:

RD3 Power Saver

Nite Setback Kit

Hot Gas Bypass Kit

Low Ambient Kit

Install options according to installation instructions shipped with each item.

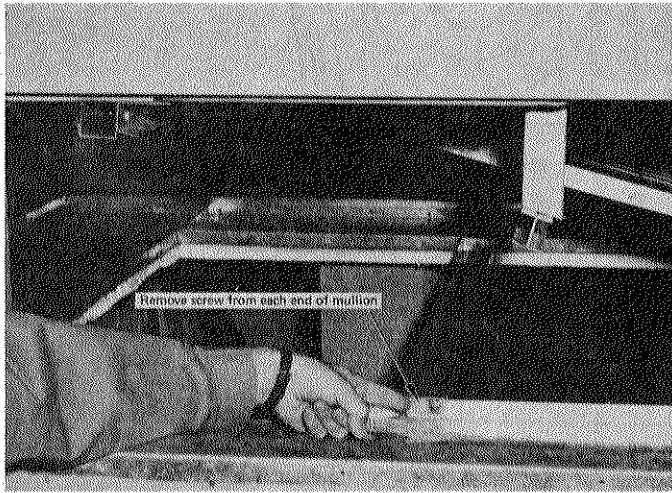


FIGURE 9

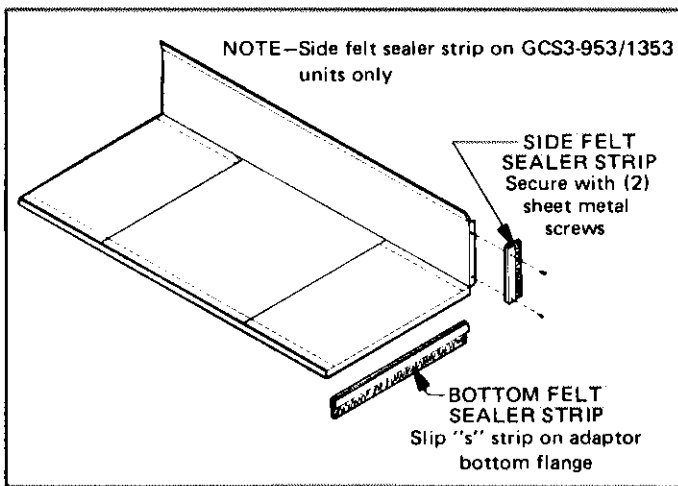


FIGURE 10

X—INSTALL VENT CAP

Remove (4) screws securing cover plate over flue opening on unit. Discard cover plate. Place gasket and flue mounting plate over opening. Reinstall screws and tighten to secure plate in place. Secure vent cover to mounting plate with two screws on each side. See Figure 11.

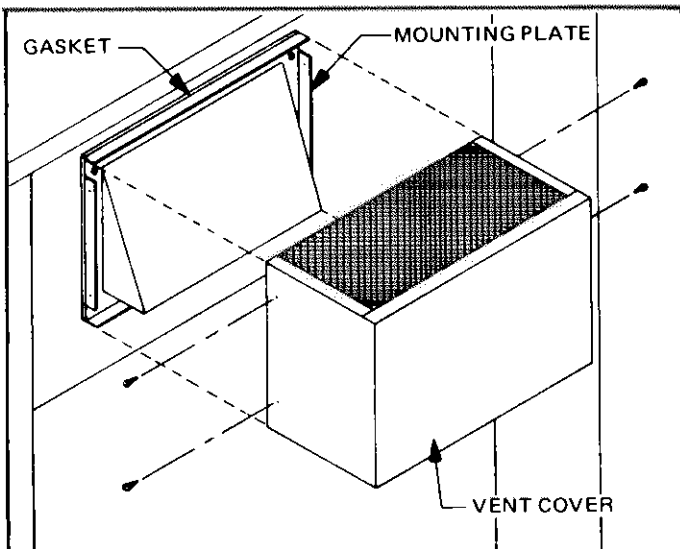


FIGURE 11

XI—INSTALL GAS PIPING

Before connecting piping, check with gas company or authorities having jurisdiction for local codes or requirements. When installing gas supply, length of run from gas meter must be considered in determining pipe size. Pressure drop through pipe should not exceed 1/2" w.c. (12,7 mm w.c.). If high pressure gas is supplied to building, each unit of a multiple installation should be equipped with a pounds to inches (kg to mm) regulator, set to maintain 6" w.c. (152 mm w.c.) at maximum or second stage firing.

A drip leg should be installed on vertical pipe runs.

Punch out gas piping knockout in unit and make piping connections.

NOTE—Codes may require a manual main shut off valve and union (furnished by the installer) be installed in gas line external to unit. Union must be of ground joint type.

Compounds used on threaded joints of gas piping shall be resistant to the action of liquefied petroleum gases.

Carefully check all piping connections for gas leaks. Use a soap solution or other preferred means. **Do not use matches, candles, flame or other sources of ignition to check for gas leaks.**

XII—CONNECT CONDENSATE DRAIN

Condensate stub lines are provided on both sides of unit. Make drain connection from desired side and cap unused stub line. It is usually acceptable to drain condensate on the roof; however, in all cases a tee should be installed on drain to direct condensate downward. **The condensate line must be vented.** Check local codes concerning removal of condensate. Figure 12 illustrates a typical condensate drain.

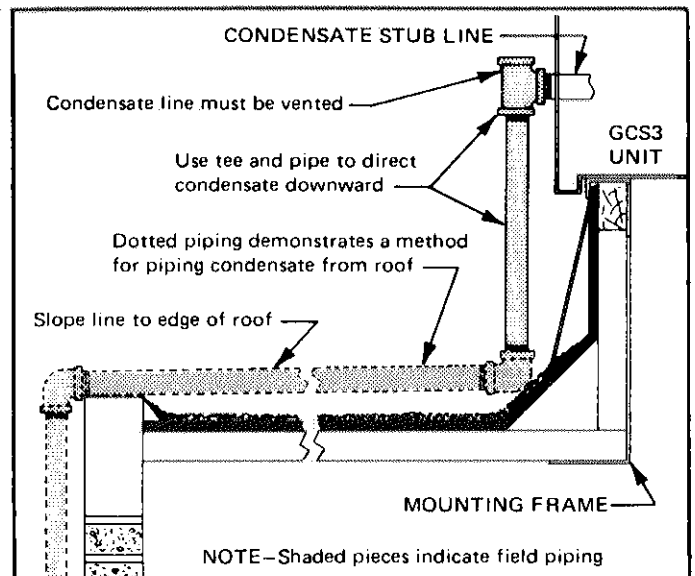


FIGURE 12

XIII—ELECTRICAL CONNECTIONS

1—Refer to unit rating plate for minimum circuit ampacity and maximum fuse size.

2—Install thermostat in the conditioned area where it will not be affected by sunlight, drafts or vibration. A position approximately 5' (1,5 m) from floor near the center of structure is desirable. Connect low voltage wiring according

to unit diagram or field wiring diagram in this instruction.

Be sure jumper is installed between terminals RC and RH.

3—Connect line voltage power supply to unit from disconnect switch. When unit is installed on roof, mount a weather-proof disconnect switch on unit. Wire according to unit wiring diagram or field wiring diagram in this instruction.

NOTE—Do not close disconnect switch or apply power to unit until stated in these instructions.

4—This unit is furnished with a ground clamp directly below electrical inlets. Ground unit with suitable ground connection either through unit supply wiring or an earth ground. Remove tag from grounding clamp.

NOTE—Compressor model number and electrical data are listed on the unit rating plate and compressor rating plate. Evaporator and condenser fan motor sizes and electrical data are listed on unit rating plate and motor rating plate.

XIV—PRELIMINARY CHECK

- 1—Inspect all motor bearings for lubrication.
 - 2 - Remove **all** shipping blocks and shipping bolts from unit. See Figure 13.
- IMPORTANT - All shipping hardware must be removed to prevent damage to unit.*
- 3—Check that refrigerant lines do not rub against cabinet or other refrigerant lines.
 - 4—Inspect all electrical wiring, both field and factory installed for loose connections.
 - 5—Check voltage at disconnect switch. Voltage must be within range listed on unit rating plate. If not, consult power company and have voltage condition corrected before starting unit.

XV—INITIAL START-UP

Refer to "1—Start-up Operation" section on page 2.
NOTE—Unit is equipped with a timed off cycle. Its purpose is to prevent fast cycling resulting in damage to compressor. On start-up, delay can be omitted by mechanically bypassing clock timer with a screwdriver. Push for service start.

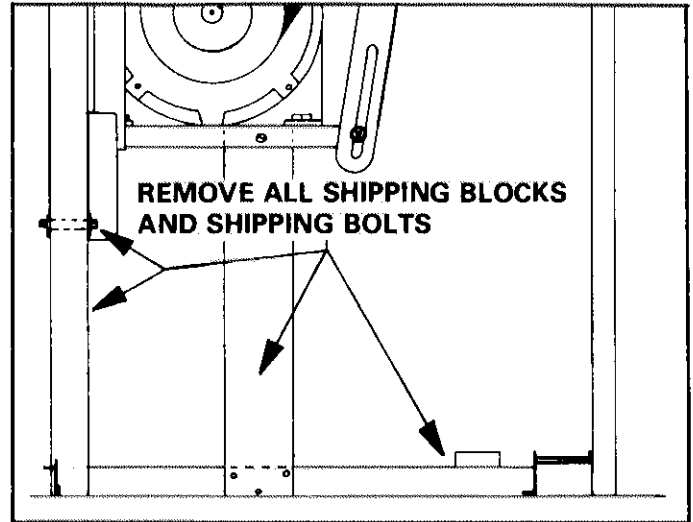


FIGURE 13

Two stage units have 2 timed off cycles. First stage box is on left-hand side when facing control box.

NOTE TO INSTALLER

Identify all important safety shutdown control devices.

In the event of a safety shutdown:

- 1 - Turn off power to unit at disconnect switch.
- 2 - Close manual main and pilot gas valves.

XVI—CLEAN-UP

- After unit is operating properly, proceed with the following:
- 1—Replace control panel covers and access panels.
 - 2—Caulk any open joints, holes or seams to make unit completely weatherproof.
 - 3—Set room thermostat at desired settings.
 - 4—Leave this instruction with owner or in an obvious place in equipment room.
 - 5—Pick up all shipping cartons, metal scraps, extra insulation, etc. and generally clean up installation.

