Carrier
HEATING & COOLING

48H,L Series 008,009
Single-Package Heating/Cooling Units

Installation, Start-Up and Service Instructions

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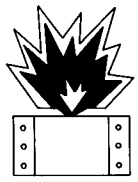
SAFETY CONSIDERATIONS

Installation and servicing of air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair or service air conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

⚠ WARNING



Disconnect gas piping from unit when leak testing at pressure greater than 1/2 psig. Pressures greater than 1/2 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 1/2 psig, it *must* be replaced before use. Close individual manual shut-off valve to isolate unit from the gas piping system when testing at pressures less than 1/2 psig.

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

INSTALLATION

Step 1 — Provide Unit Support

ROOF CURB (Downshot Units Only) — Assemble and install accessory roof curb in accordance with instructions shipped with curb. See Fig. 1. Install insulation, cant strips, roofing and flashing as shown. *Ductwork must be attached to curb.*

IMPORTANT: The gasketing of the unit to the roof curb is critical for water integrity. Install gasketing material with the roof curb as shown in Fig. 1. Improperly applied gasketing can also result in air leaks and poor unit performance.

Curb should be level. Unit leveling tolerance is 1/16 in. per linear foot in any direction. This is necessary for unit drain to function properly. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

SLAB MOUNT (Horizontal Units Only) — Provide a level concrete slab that extends a minimum of 6 in. beyond unit cabinet. The slab should be 8 in. thick with 4 in. above grade. Install a gravel apron in front of condenser air inlet to prevent grass and foliage from obstructing airflow. Trap condensate drain. Allow for trap when pouring slab.

Step 2 — Field Fabricate Ductwork — On downshot units secure all ducts to roof curb and building structure. *Do not connect ductwork to unit.* Insulate and weatherproof all external ductwork, joints and roof openings with flashing and mastic in accordance with applicable codes. On horizontal units secure all ductwork to flanges on unit supply air and return air openings and building structure.

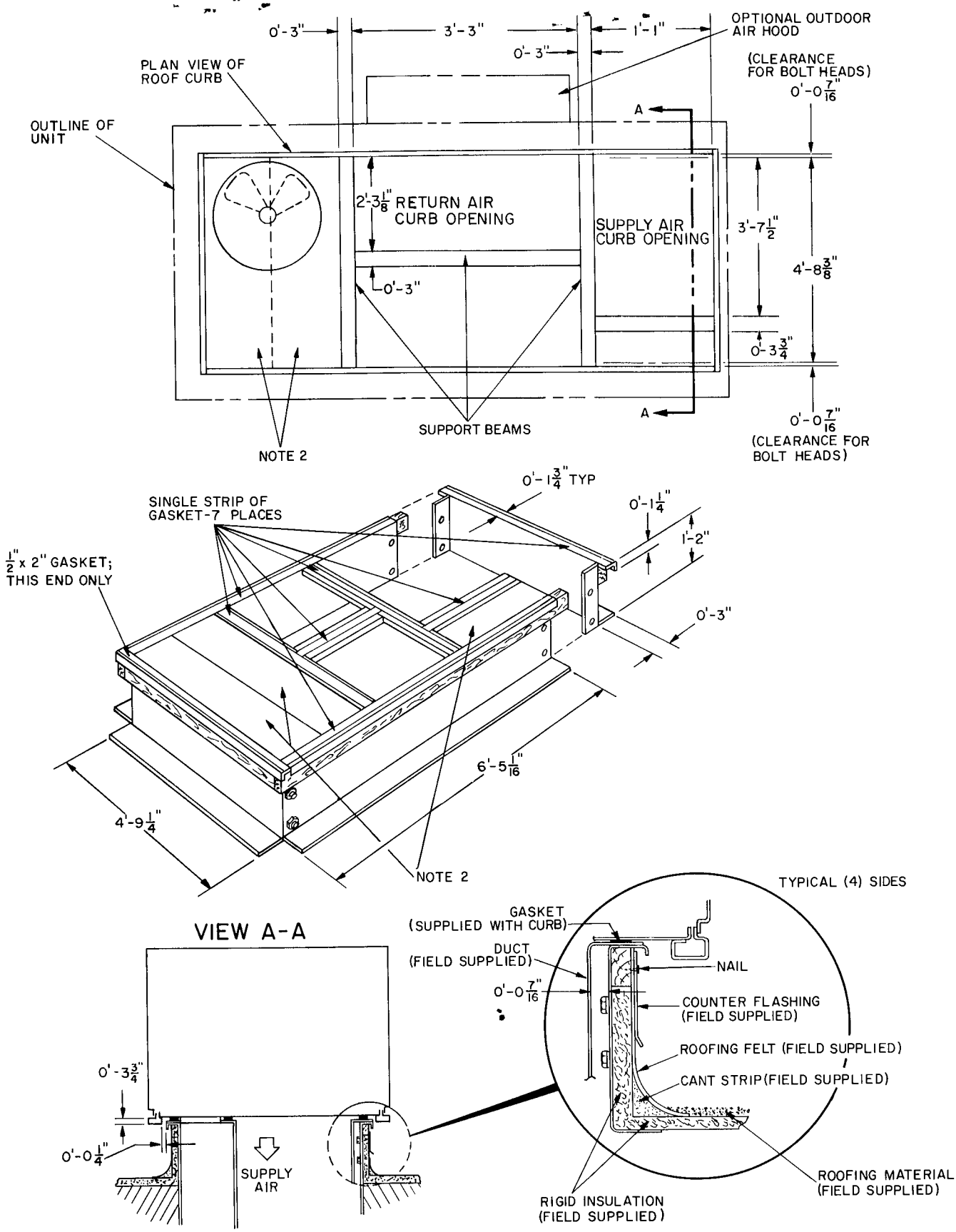
Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

A minimum clearance is not required around ductwork. Cabinet return air static shall not exceed −.35 in. wg with economizer or −.45 in. wg without economizer.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

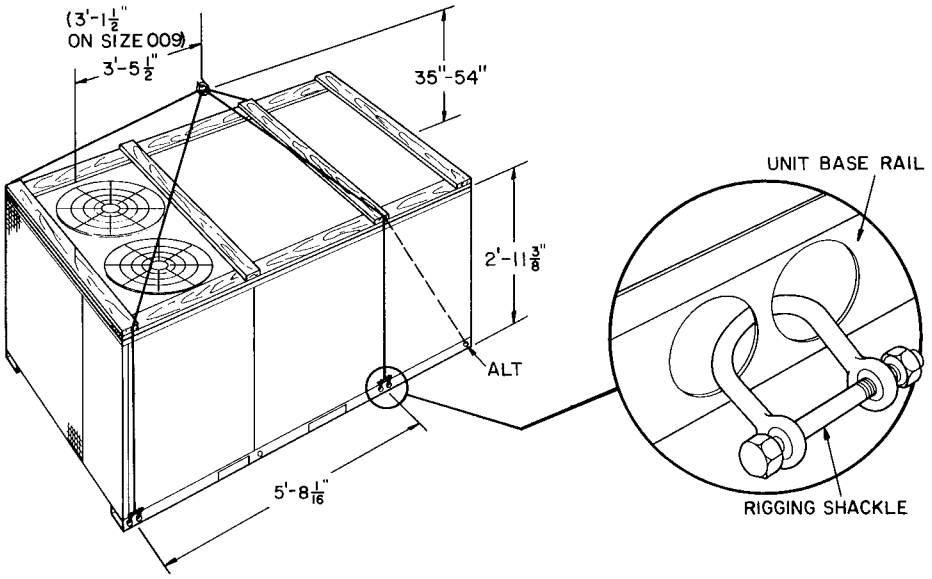
Book 1 4 Tab 1a 6a PC 111 Catalog No 564-815 Printed in U S A Form 48H,L-21SI Pg 1 5-88 Replaces: 48H,L-18SI

For replacement items use Carrier Specified Parts.



NOTES:
1. Roof curb accessory is shipped disassembled
2. Insulated panels, with one-in. thick isocyanurate foam, 2 lb density.
3. Attach all ductwork to roof curb.
4. Curb space should not be used as a return air chamber Duct return to space below roof

Fig. 1 — Roof Curb Details



CAUTION: All panels must be in place when rigging.

NOTE: Hook rigging shackles through holes in base rail as shown Holes in base rails are centered around the unit center of gravity Use wooden top skid, when rigging, to prevent rigging straps from damaging unit

Fig. 2 — Rigging Details

Step 3 — Rig and Place Unit — Inspect unit for transportation damage. File any claim with transportation agency. Keep upright and do not drop. Spreader bars are not required if top crating is left on unit. Rollers may be used to move unit across a roof. Level by using unit frame as a reference, leveling tolerance is ± 1/16 in. per linear foot in any direction. See Fig. 2 for additional information. Weight is shown in Table 1.

Lifting holes are provided in base rails as shown in Fig. 2. Refer to rigging instructions on unit.

POSITIONING — Maintain clearance around and above unit to provide minimum distance from combustible materials, proper airflow and service access. See Fig. 3 or 4, and Fig. 5.

Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air.

Be sure that unit is installed such that snow will not block the combustion intake or flue outlet.

Unit may be installed directly on wood flooring or on Class A, B, or C roof-covering material when roof curb is used.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Locate mechanical draft system flue assembly at least 48 in. from any opening through which combustion products could enter the building, and at least 48 in. from an adjacent building. When unit is located adjacent to public walkways, flue assembly must be at least 7 ft above grade.

Flue gas can deteriorate building materials. Orient unit such that flue gas will not affect building materials.

Adequate combustion air space must be provided for proper operation of this equipment. Be sure that installation complies with all local codes and Section 5.3, Air for Combustion and Ventilation, National Fuel Gas Code, ANSI Z223.1-1984.

After unit is in position, remove polyethylene shipping wrapper and rigging skids.

Step 4 — Install Flue Hood — Flue hood and screen are shipped screwed to the basepan in furnace compartment. Remove from shipping location and using screws provided, install flue hood and screen in location shown in Fig. 3 or 4.

Do not manifold flue exhaust of this unit with any other unit or appliance.

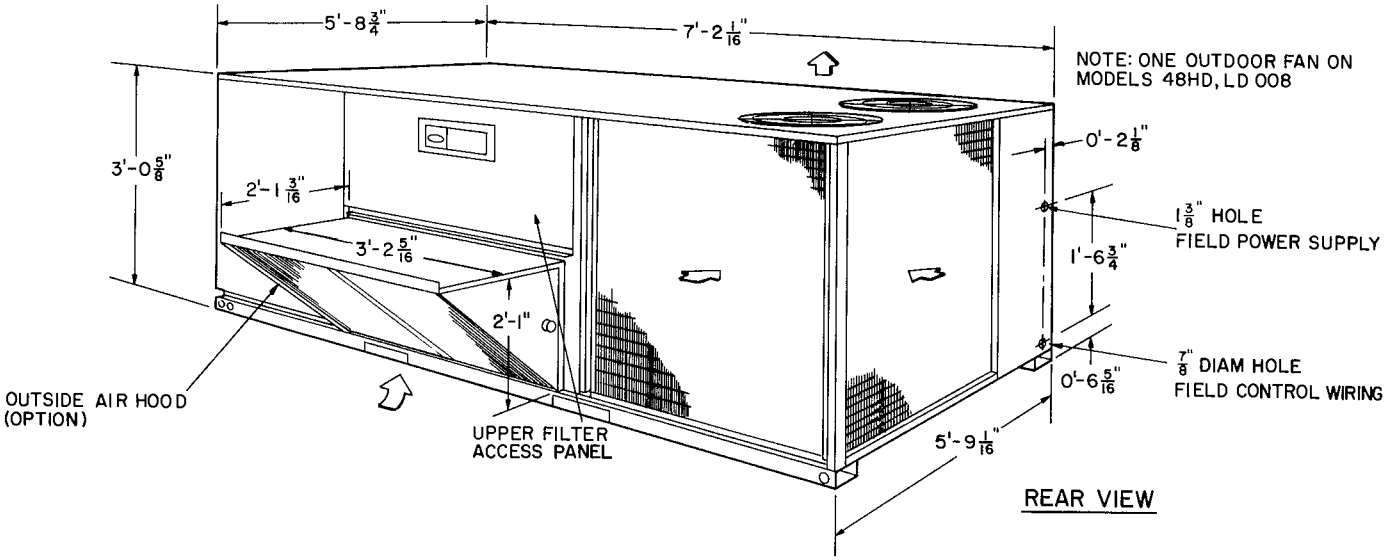
Step 5 — Trap Condensate Drain — See Fig. 3 or 4 for drain location. A 7/8-in. preformed drain hose is shipped clamped to the indoor basepan. At installation, reroute the hose so it passes through the hole in the indoor basepan and unit base rail.

When installed properly, the hose protrudes through the base rail one inch. Replace clamp over the hose where hose passes through the basepan to ensure that hose remains level. Use a trap at least 4 in. deep and provide protection for trap against freeze-up.

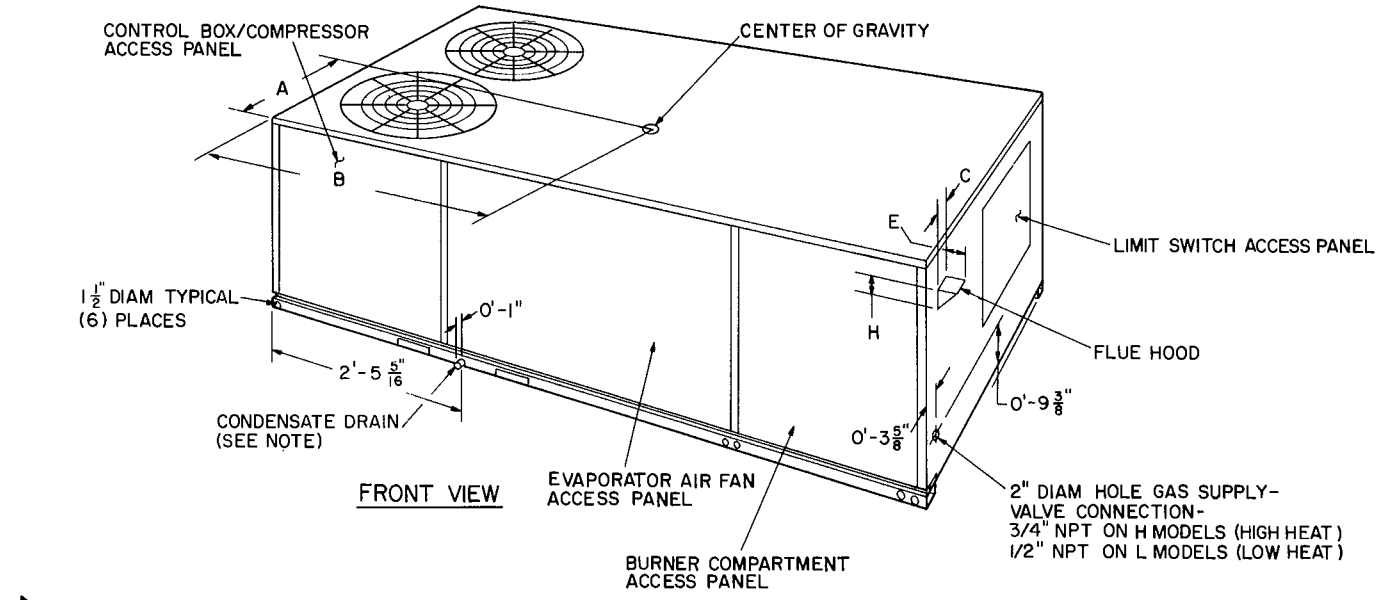
Table 1 — Physical Data

UNIT SIZE 48 SERIES	008				008				009	
	HD	HH	LD	LH	HDE	HHE	LDE	LHE	HD	HH
OPER WT (lb)										
Unit	890	890	886	886	945	945	941	941	980	980
with Economizer	950	—	946	—	1005	—	965	—	1040	—
Roof Curb	125	—	125	—	125	—	125	—	125	—
MAXIMUM RIGGING WEIGHT (lb)	1300	1175	1300	1175	1305	1180	1305	1180	1340	
COMPRESSOR										
Quantity...Type	1 .Copeland BRE				2 .J45				2 .P46/P60	
Oil (oz)	124				46				66	
REFRIGERANT (R-22)										
Charge (lb)										
System 1	9 9				5.8				7 45	
System 2	—				5 8				4.8	
CONDENSER COIL	Copper Tubes, Aluminum Fins									
Rows	2									
Fins/in.	13 9									
Total Face Area (sq ft)	15 6									
CONDENSER FAN	Propeller, Direct Drive									
Nominal Cfm	4500				9000				6900	
Quantity...Diameter (in.)	1. .22				2 22				2 22	
Motor Hp	½				½				½	
Motor Rpm	1075				1075				1075	
EVAPORATOR COIL	Copper Tubes, Aluminum Fins									
Rows	3								4	
Fins/in.	13 9								13 9	
Total Face Area (sq ft)	8 2								8.2	
EVAPORATOR FAN	Centrifugal Belt Drive									
Quantity...Size (in.)	1 12 x 12								1. 12 x 12	
Type	Belt Drive								Belt Drive	
Nominal Cfm	3000								3400	
Motor Hp (Service Factor)	1 5 (1 3)								1 5 (1.3)	
Motor Frame	56								56	
Rpm Range	852-1127								828-1173	
Motor Pulley Pitch Diameter (in.)	2 4-3 4								2.4-3.4	
Fan Pulley Pitch Diameter (in.)	5 0								5 0	
Belt, Quantity...Type...Length (in.)	1 A. 45								1. .A.. 45	
Speed Change per Full Turn of Movable Pulley Flange (Rpm)	69								68	
Movable Pulley Max Full Turns from Closed Position	5								5	
Factory Setting Full Turns Open	4 5								4	
Factory Speed Setting (Rpm)	885								1173	
Maximum Fan Rpm	1300								1300	
FURNACE SECTION										
Temperature Rise (F)	35-65		15-45		35-65		15-45		35-65	
Heating Input (Btuh)*	203,000		114,000		203,000		114,000		203,000	
Output Capacity (Btuh)*	160,370		90,060		160,370		90,060		160,370	
Burner Orifice Diameter (in. ...drill size)										
Natural Gas	132 29		.113. .33		136 29		113 . 33		132 29	
Propane	0785 47		0595 53		0785 47		0595...53		0785 47	
Pilot Orifice Diameter (in. ...drill size)										
Natural Gas	036 64		033 66		036 . 64		033 66		036. .64	
Propane	02 76		02 76		02 76		02 .76		02 76	
Limit Switch										
Open	170		110		170		110		170	
Closed	140		90		140		90		140	
HIGH-PRESSURE SWITCH										
Cutout (psig)	426 ± 7									
Reset (psig)	320 ± 20									
LOW-PRESSURE SWITCH (Suction Line)										
Cutout (psig)	27 ± 4									
Reset (psig)	67 ± 7									
AIR INLET SCREENS†										
Quantity...Size (in.)	2 19 x 31 x ½									
RETURN AIR FILTERS†‡	Disposable									
Quantity...Size (in.)	2 16 x 20 x 1 2...20 x 20 x 1									

*Heat capacity on LP is 5% less than on natural
†48HD/LD008, 48HDE/LDE008, and 48HD009 only
‡Filter tracks will accept field-supplied 2-in filters



UNIT 48	DIMENSIONS (ft-in.)				
	A	B	C	E	H
HD008	2-4	3-5½	0-4	0-2 13/16	0-4 15/16
LD008			0-2 11/16	0-2⅜	0-2 11/16
HDE008		3-3½	0-4	0-2 13/16	0-4 15/16
LDE008			0-2 11/16	0-2⅜	0-2 11/16
HD009	2-3⅜	3-1½	0-4	0-2 13/16	0-4 15/16

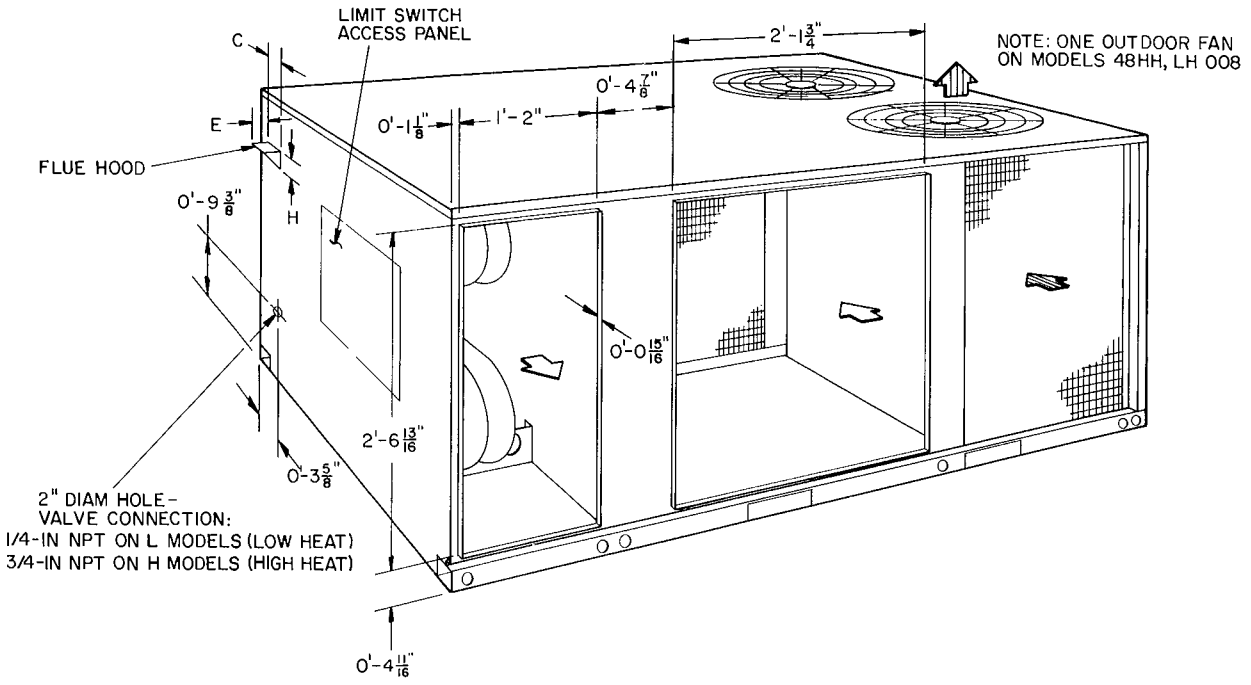


⇛ CONDENSER AIRFLOW

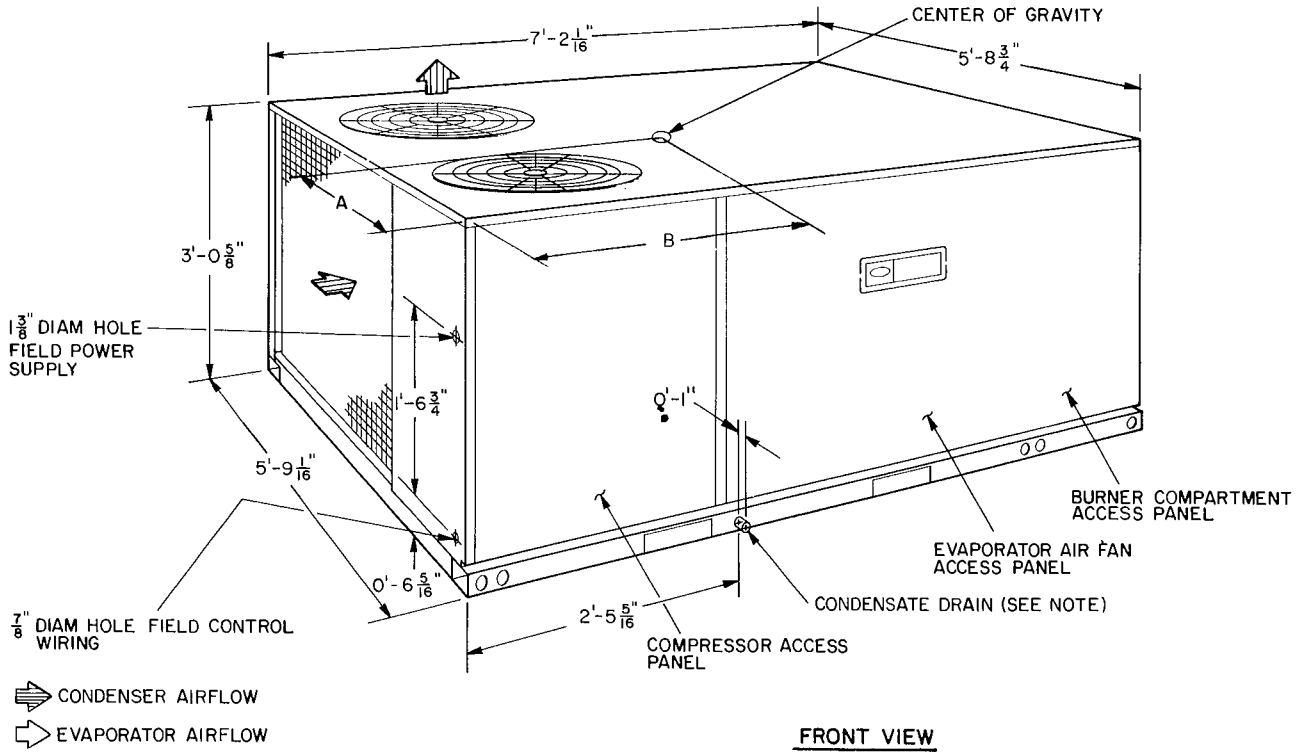
⇨ EVAPORATOR AIRFLOW

NOTES:
1. Minimum clearance to combustibles. 48 in flue side on H Models (high heat), 36 in flue side on L Models (low heat); 6 in all remaining sides, unobstructed above.
2. Minimum clearance from condenser coil for proper airflow: 36 in opposite one coil; 12 in opposite other coil (optional as to which coil); 72 in overhead
3. Minimum recommended clearance for service 36 in. each side; 60 in overhead.
4. Factory-supplied condensate drain hose to be field attached, 1⅛ in OD x ⅞ in. ID, in horizontal position through base rail Field-supplied trap required
5. Economizer available on downshot unit only.

Fig. 3 — Downshot Base Unit Dimensions



UNIT 48	DIMENSIONS (ft-in.)				
	A	B	C	E	H
HH008	2-4	3-5½	0-4	0-2 13/16	0-4 15/16
LH008			0-2 11/16	0-2⅜	0-2 11/16
HHE008		3-3½	0-4	0-2 13/16	0-4 15/16
LHE008			0-2 11/16	0-2⅜	0-2 11/16
HH009	2-3⅝	3-1½	0-4	0-2 13/16	0-4 15/16



FRONT VIEW

NOTES
1 Minimum clearance to combustibles 48 in. flue side on H Models (high heat), 36 in flue side on L Models (low heat), 6 in all remaining sides, unobstructed above.
2 Minimum clearance from condenser coil for proper airflow 36 in opposite one coil; 12 in opposite other coil (optional as to which coil); 72 in overhead
3 Minimum recommended clearance for service 36 in each side; 60 in overhead
4 Factory-supplied condensate drain hose to be field attached, 1⅛ in OD x ⅞ in ID, in horizontal position through base rail Field-supplied trap required
5 Economizer not available on horizontal (sideshot) units

Fig. 4 — Horizontal Base Unit Dimensions

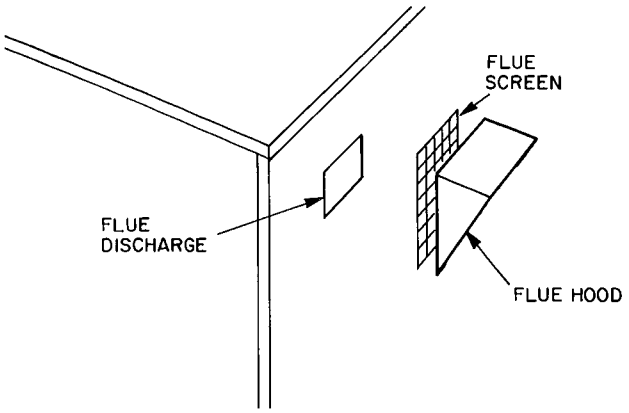


Fig. 5 — Flue Hood Installation

Step 6 — Install Skirt (Downshot Units) — When the unit is installed on the curb, the skirt provided on the blower end of the unit must be lowered from its shipping position to its installed position.

Remove the 2 screws holding the skirt and drop it straight down. Reinstall screws in the upper set of holes and fasten. See Fig. 6.

Skirt will now overhang the roof curb seal strip, protecting the seal strip from ultraviolet damage.

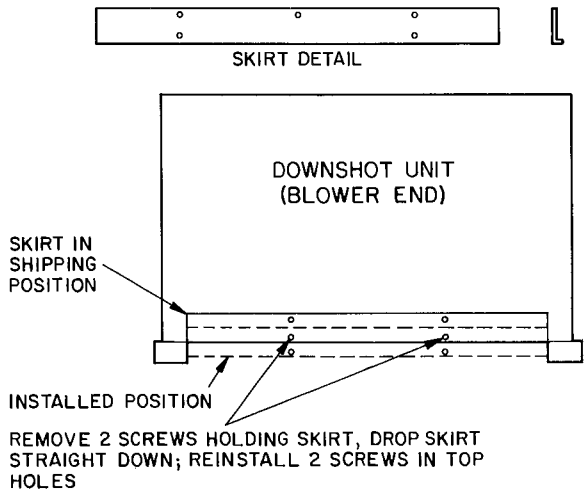


Fig. 6 — Skirt Installation

Step 7 — Install Gas Piping — Unit is equipped for use with type of gas shown on nameplate. Refer to local building codes, or, in the absence of local codes, to ANSI Z223.1-1984 entitled National Fuel Gas Code.

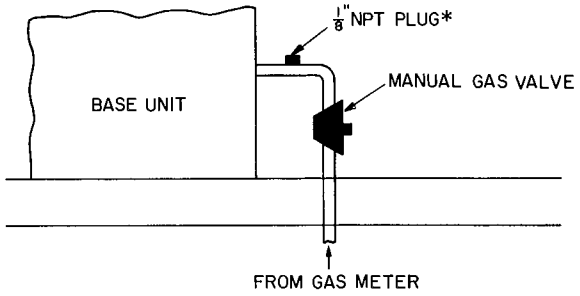
Natural gas pressure at unit gas connection must not be less than 5 in. wg or greater than 13.5 in. wg while unit is operating.

Size gas supply piping for 0.5 in. wg maximum pressure drop. Do not use supply pipe smaller than unit gas connection. See Fig. 7 for typical pipe guide and location of external manual main shutoff valve.

For LP gas units, pressure at unit gas connection must not be less than 10.5 in. wg or greater than 13.5 in. wg.

A 1/8-in. NPT plugged tapping, accessible for test gage connection, must be installed immediately upstream of the gas supply connection to the furnace.

The unit and its shutoff valve must be physically disconnected from the gas supply piping system during any pressure testing in excess of 1/2 psig. Failure to do so will destroy the valve and it must be replaced. The unit must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig.



*NPT plug must be field supplied.
NOTE: Follow all local codes.

Fig. 7 — Gas Piping Guide

Step 8 — Make Electrical Connections

⚠ WARNING

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with National Electrical Code ANSI/NFPA 70-1984 and local electrical codes. *Do not use gas piping as an electrical ground.* Failure to follow this warning could result in the installer being liable for personal injury of others.

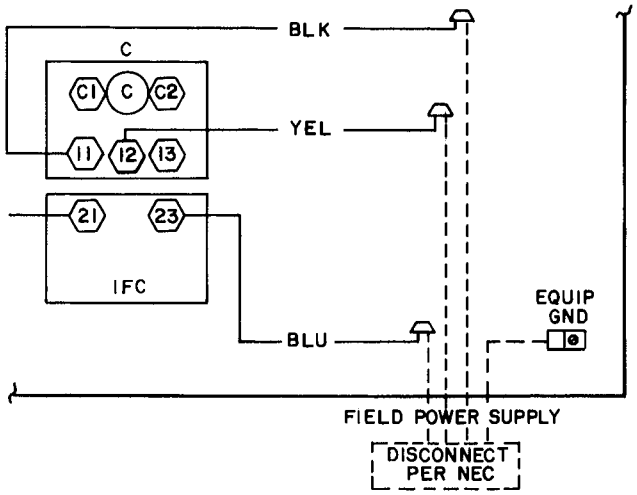
FIELD POWER SUPPLY — All 230- and 460-volt units are factory wired for the voltage shown on nameplate. If unit will be connected to a 208 power supply, the transformer *must* be rewired by connecting the black wire to the 200-volt lead and insulating the 230-volt lead. Refer to unit label diagram for additional information. Pigtails are provided for field service. Use factory-supplied splices or UL-approved copper/aluminum connector.

When installing units, provide a disconnect per NEC.

All field wiring must comply with National Electrical Code and local requirements.

Install conduit connectors in side panel openings indicated in Fig. 3 or 4. Route power lines through connector to terminal connections as shown in Fig. 8.

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate (also see Table 2). On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in Table 2, Note 2 to determine the % voltage imbalance. Contact local power company for correction of improper voltage or phase imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable warranty.



_____ Factory Wiring
_ _ _ _ Field Wiring

NOTE: If connected to 208-volt power supply, rewire unit transformer no 1 by connecting the black wire to the 200-volt lead and insulating the 230-volt lead.

Fig. 8 — Power Wiring Connections, Typical

FIELD CONTROL WIRING — Install a Carrier-approved accessory thermostat assembly according to installation instructions included with the accessory. Locate thermostat assembly on a solid wall in the conditioned space to sense average temperature.

Route thermostat cable or equivalent single leads of colored wire from subbase terminals through connector on unit to low-voltage connections as shown in Fig. 9.

NOTE: For wire runs up to 50 ft, use no. 18 AWG insulated wire (35 C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 ft, use 14 AWG insulated wire (35 C minimum).

Pass the control wires through the hole provided in the corner post; then feed wires through the raceway built into the corner post to the 24-v barrier located on the left side of the control box.

HEAT ANTICIPATOR SETTINGS — Set first-stage heat anticipator settings at 1.20 for 460-volt units and 1.00 for 208/230-volt units. Set second-stage settings at 0.6. Settings may be changed slightly to provide a greater degree of comfort for a particular installation.

Table 2 — Electrical Data

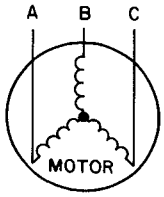
UNIT MODEL 48 SERIES	V-PH-HZ	VOLTAGE RANGE		COMPR		OFM		IFM		COMBUSTION FAN	POWER SUPPLY AMPS	
		Min	Max	RLA	LRA	Qty	FLA	Hp	FLA	FLA	MCA	MOCP
HD,LD/ HH,LH008	208/230-3-60	187	254	32.5	183	1	2.9	1 5	5 6	50	50/50	80/80*
	460-3-60	414	508	15.2	91	1	1 5	1 5	2.8	57	24	35*
	575-3-60	518	632	11 2	73	1	2.9	1 5	2 1	50	18	25
HDE,LDE/ HHE,LHE008	208/230-3-60	187	254	12 8 (each)	90 (each)	2	2.9	1.5	5 6	50	40/40	50/50*
	460-3-60	414	508	6 4 (each)	45 (each)	2	1.5	1.5	2 8	57	20	25*
	575-3-60	518	632	4.7 (each)	35 (each)	2	2 9	1 5	2 1	50	15	15
HD,HH009	208/230-3-60	187	254	21.1 15.7	98 80	2	2.9	1.5	5.6	50	54/54	70/70*
	460-3-60	414	508	10.4 7.3	49 35	2	1 5	1 5	2.8	57	27	35*
	575-3-60	518	632	8.3 6.8	41 27	2	2 9	1 5	2.1	.50	22	30

FLA — Full Load Amps
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps (for wire sizing) Complies with NEC, Section 430-24
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps
*Fuse only in U.S A.; fuse or circuit breaker in Canada.

NOTES:
1 In compliance with NEC requirements for multimotor and combination load equipment (ref NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse only.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase unbalance in supply voltage is greater than 2%. Use the following formula to determine the % voltage unbalance

$$\% \text{ Voltage Unbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 460-3-60



AB = 452 volts
BC = 464 volts
AC = 455 volts

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

$$= \frac{1371}{3} = 457$$

Determine maximum deviation from average voltage
(AB) 457 - 452 = 5 volts
(BC) 464 - 457 = 7 volts
(AC) 457 - 455 = 2 volts
Maximum deviation is 7 volts Determine % voltage unbalance

$$\% \text{ Voltage Unbalance} = 100 \times \frac{7}{457} = 1\ 53\%$$

This amount of phase unbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase unbalance is more than 2%, contact your local electric utility company immediately

NOTE· 575-volt units are CSA only

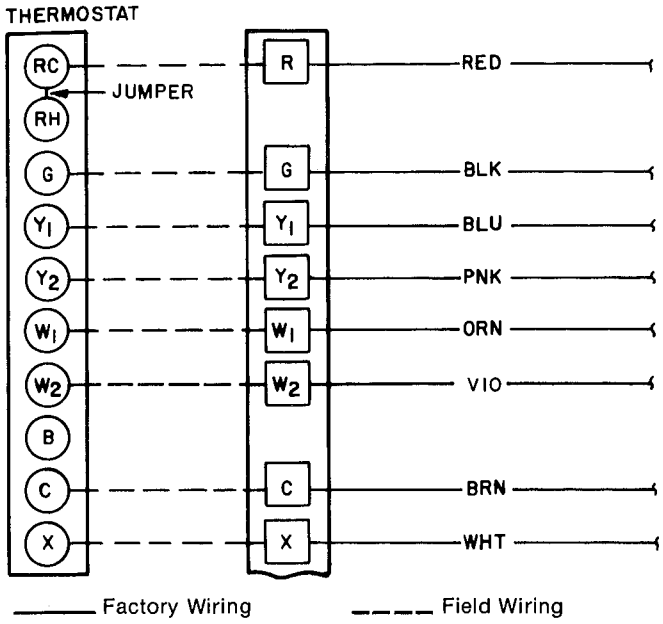


Fig. 9 — Control Wiring Connections, Typical

Step 9 — Make Outdoor Air Inlet Adjustments and Install Outdoor Air Hood

OPTIONAL OUTDOOR AIR DAMPER — Optional outdoor air damper is shipped with hood broken down in unit filter section. See Fig. 10.

Assembly

1. Remove protective cover from unit.
2. Remove upper filter access panel (save screws).
3. Remove hood parts from unit evaporator fan and filter area. Assemble hood top and side plates as shown in Fig. 11. *Do not attach hood to unit at this time.*
4. Adjust outdoor air damper blade to desired setting for outside air intake by releasing linkage rod setscrew and adjusting linkage rod. See Fig. 12. Secure damper blade in desired position with setscrew.
5. Remove screws holding manual outdoor air damper to unit. See Fig. 13.
6. Install outdoor air hood assembly, using screws from step 5. These screws secure the manual outdoor air damper assembly and the outdoor air hood to unit. See Fig. 13.

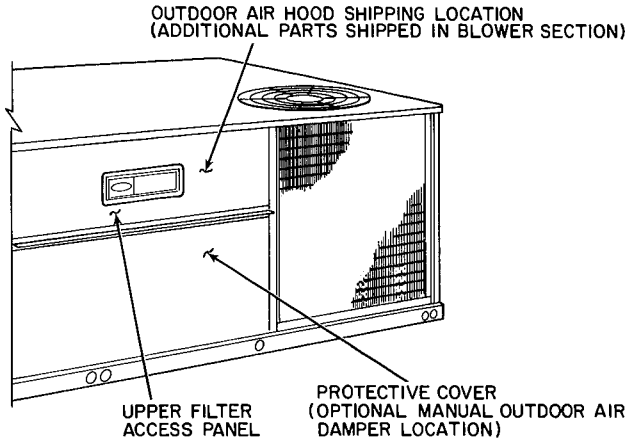


Fig. 10 — Access Panel Location

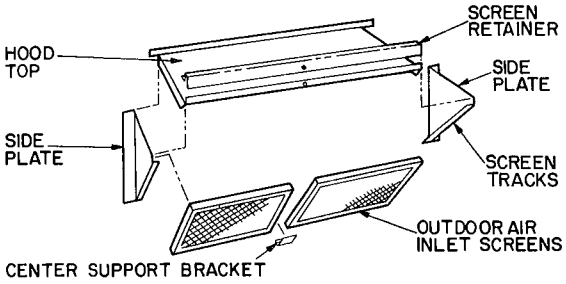


Fig. 11 — Outdoor Air Hood Details

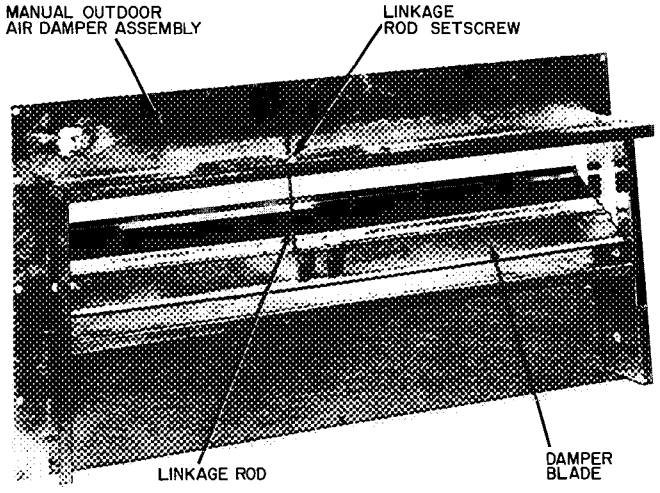


Fig. 12 — Damper Blade Adjustment

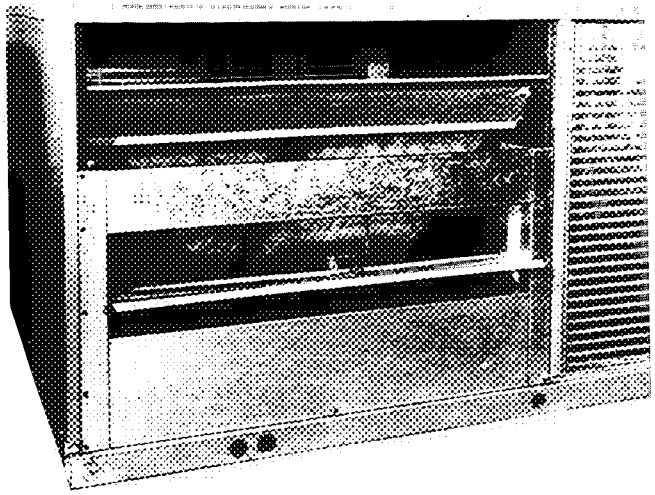


Fig. 13 — Manual Outdoor Air Damper

7. Install center support bracket using screw provided, at bottom center of base rail. Slide outdoor air inlet screens into screen tracks on hood side plates. While holding screens in place, fasten screen retainer to hood using screw provided. Make sure bottom edge of screens rest inside base rail and behind center support bracket as shown in Fig. 14.

8. Replace upper access panel with screws saved from step 2.

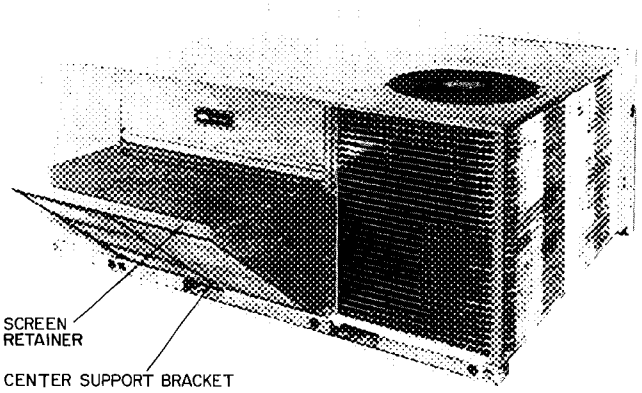


Fig. 14 — Outdoor Air Hood Installed

OPTIONAL ECONOMIZER — Optional economizer is shipped with hood broken down in unit filter section. See Fig. 15.

Assembly

1. Remove protective cover from unit.
2. Remove upper filter access panel (save screws). See Fig. 15.
3. Remove hood parts from unit evaporator fan and filter area. Assemble hood top and side plates as shown in Fig. 16. Remove tape from barometric relief damper (see Fig. 17). *Do not attach hood to unit at this time.* Put aside baffle, screen retainer and retainer screw for later assembly.

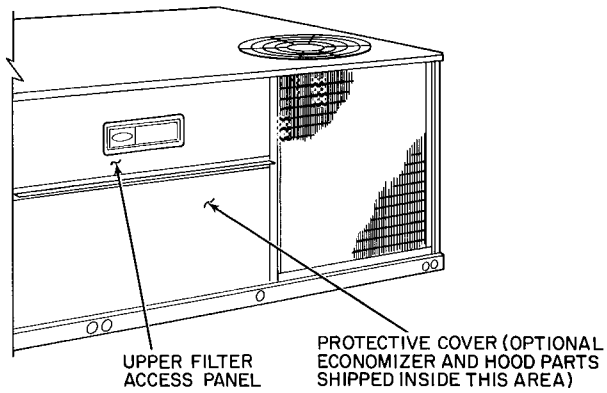
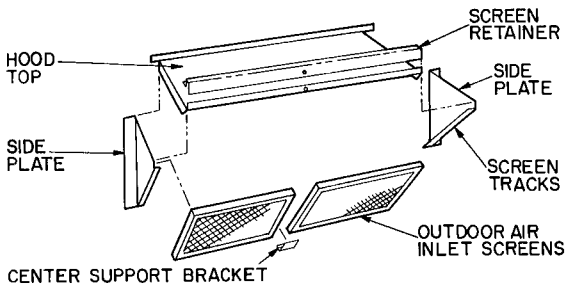


Fig. 15 — Access Panel Location



OUTDOOR AIR HOOD - UNASSEMBLED

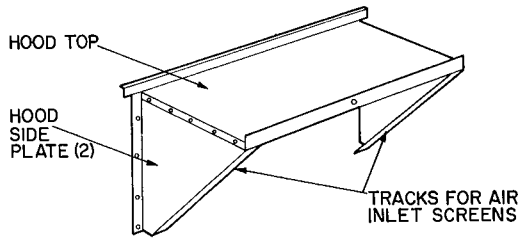
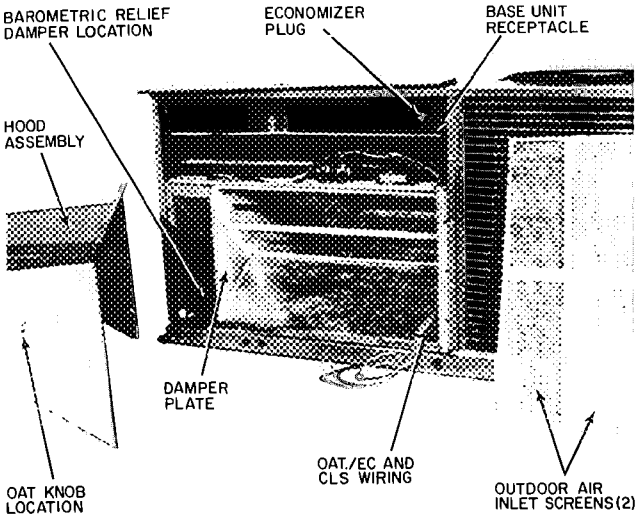


Fig. 16 — Outdoor Air Hood Details



CLS — Cooling Lockout Switch
EC — Enthalpy Control
OAT. — Outdoor Air Thermostat

Fig. 17 — Economizer Installed in Unit

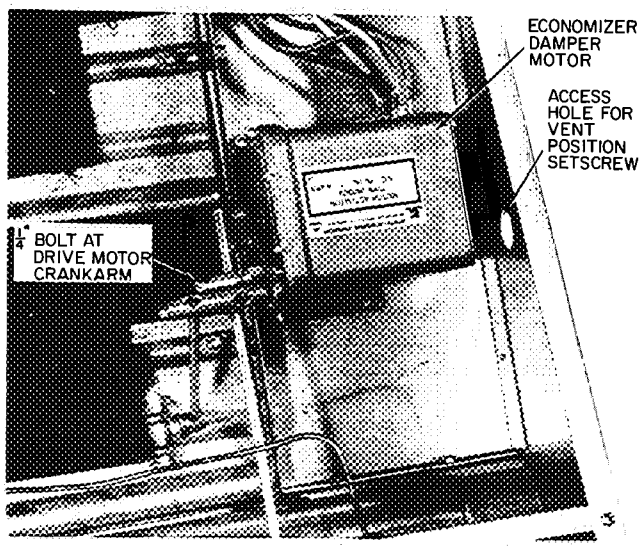


Fig. 18 — Economizer Motor Connections

4. Determine if vent air is required in building to be conditioned. If so, check for percentage of vent air needed and record quantity for vent adjustment in step 11.
5. Steps 6 through 8 involve releasing and adjusting indoor damper blades from factory set position.
6. Release indoor blades drive linkage by loosening linkage connector setscrew at indoor crankarm on drive shaft. See Fig. 18 and 19.

   Remove pink wire from economizer damper motor terminal D and temporarily tape bare wire end.

   Remove violet wire from economizer damper motor and connect to terminal D on economizer damper motor.
7. Jumper terminal R to terminal G at TB1 in base unit. (See Fig. 20.) Disconnect field-supplied thermostat wires from terminals Y1, Y2, W1, and W2 at TB1 to prevent compressor(s) or heater(s) from energizing during economizer checkout procedure.

   Turn on base unit power to energize evaporator fan. The economizer's outdoor blades should open completely.
8. Adjust the indoor blades drive linkage so that indoor blades are fully closed. Tighten the linkage connector setscrew. Turn off base unit power. Reconnect pink and violet wires to economizer motor, pink to terminal D, violet to remaining terminal.
9. If vent air is required, leave terminals R and G jumpered at TB1 for additional testing. If vent air is not needed, remove jumper between terminals R and G and reconnect thermostat wires Y1, Y2, W1, and W2 at TB1.
10. Fasten baffle to left side of damper plate with round head screws provided. See Fig. 21.
11. If vent air is not required, go on to step 12. If vent air is required, proceed as follows:
    a. Turn on base unit power. This energizes the evaporator fan motor.
    b. Slide economizer out of unit so that access hole to vent position setscrew is visible. See Fig. 22.

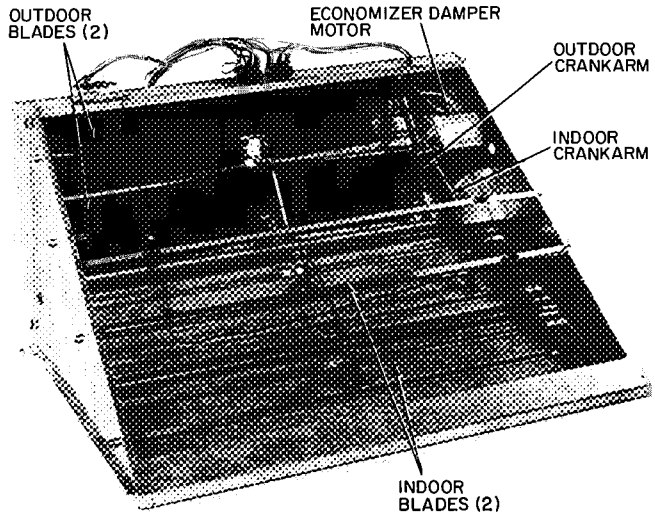
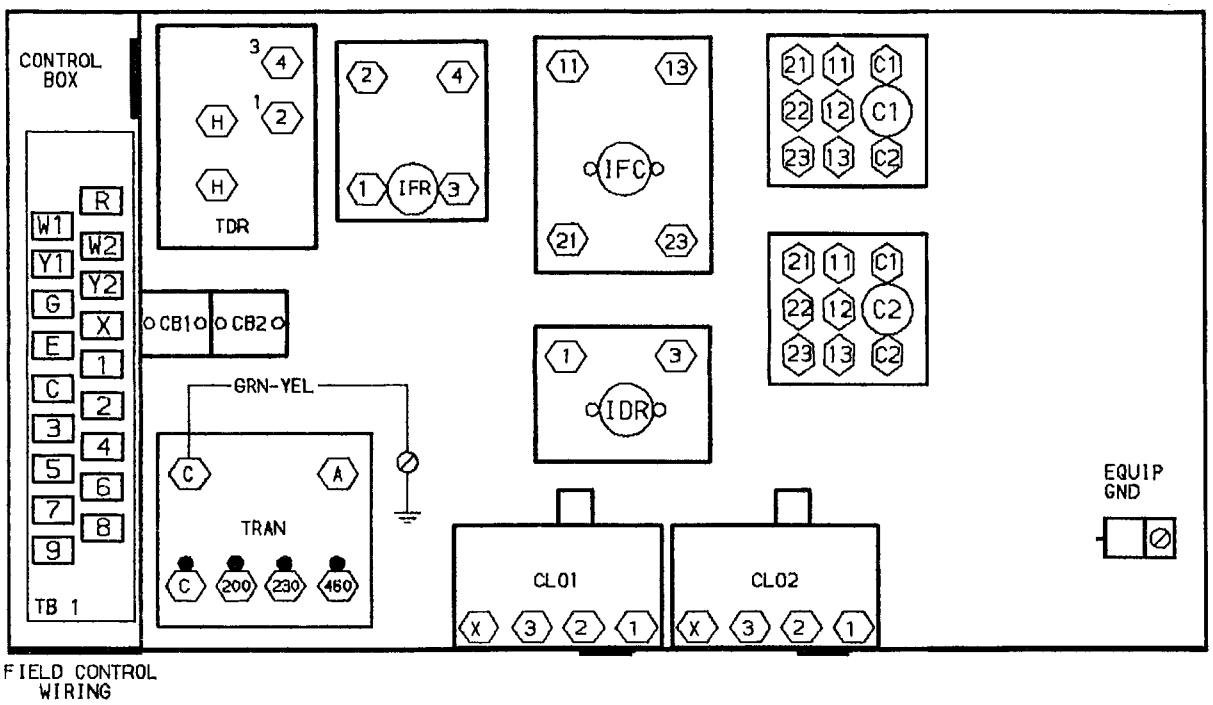


Fig. 19 — Economizer Details

    c. Adjust vent opening by loosening vent position setscrew on left side of economizer damper motor and setting vent position lever to adjust damper (see Fig. 22). Move vent position lever back toward evaporator coil to close damper or forward to open damper. When adjustment is completed, retighten setscrew.
    d. Turn off base unit power and remove jumper from terminals R and G and reconnect thermostat wires to Y1, Y2, W1 and W2 at TB1.
    e. Slide economizer assembly back into unit.
12. Remove tape from outdoor air thermostat (OAT.) and cooling lockout switch (CLS), and fasten to inside of hood with screws and speed clips provided. Make sure terminals on OAT. are up. See Fig. 23.



C — Compressor Contactor
CB — Circuit Breaker
CLO — Compressor Lockout
Gnd — Ground
IDR — Induced-Draft Relay
IFC — Indoor Fan Contactor
IFR — Indoor Fan Relay
TB — Terminal Block
TDR — Time-Delay Relay
Tran — Transformer

Fig. 20 — Control Box Details

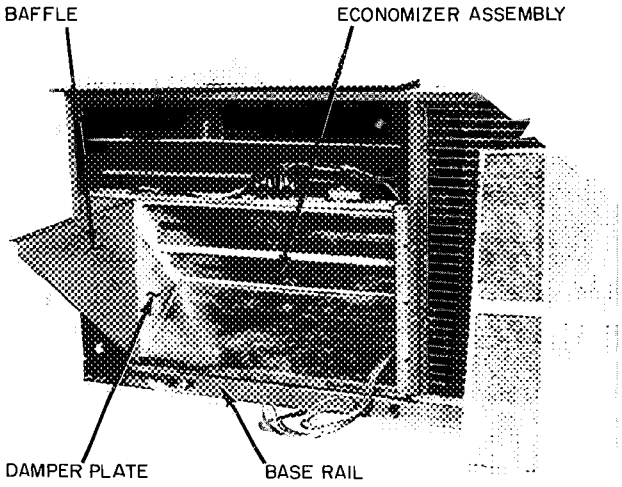


Fig. 21 — Baffle Installation Details

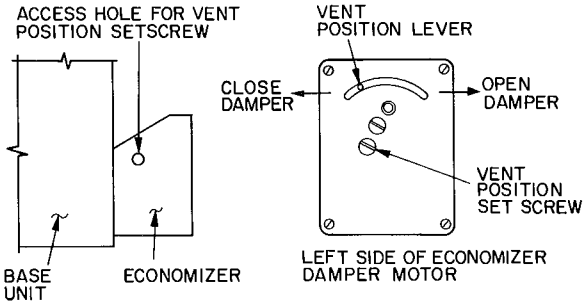
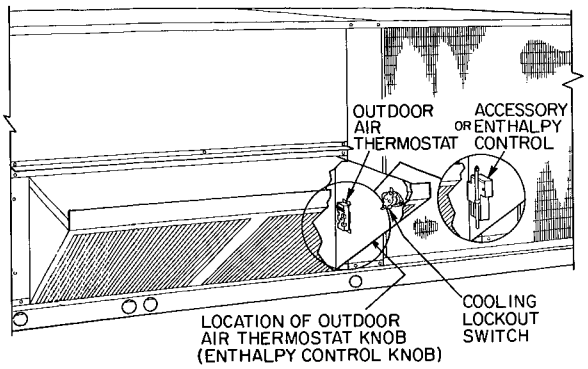


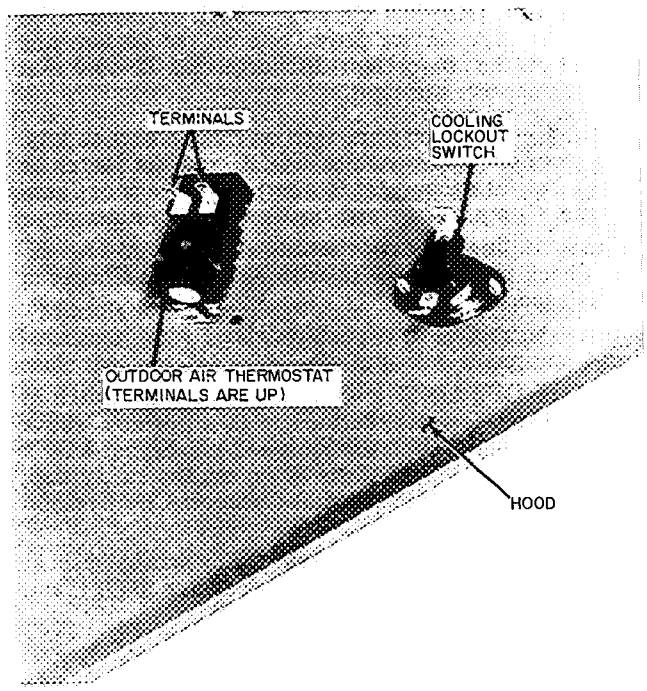
Fig. 22 — Vent Position Setting Details

13. Fasten hood top and side plate assembly (Fig. 24) and economizer to unit with screws supplied. Before attaching, make sure bottom of hood assembly is resting on top of unit base rail.
14. Place knob supplied with accessory economizer on OAT. See Fig. 23. Set for 3 degrees below indoor room thermostat setting.

    If accessory enthalpy control (EC) (Fig. 23) is used in lieu of OAT., refer to instructions shipped with accessory enthalpy control for installation and adjustment.
15. Connect OAT./EC and CLS per unit label. See Fig. 25.

    Connect 2 economizer wires to each switch with quick-connects. Unit connecting wires are shipped taped on outdoor blade. See Fig. 17.





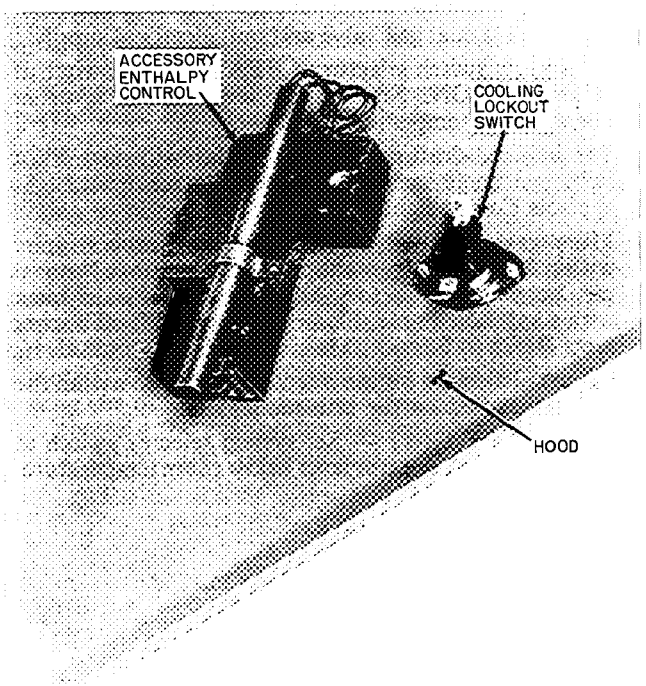


Fig. 23 — Outdoor Air Thermostat/Enthalpy Control and Cooling Lockout Switch Installation

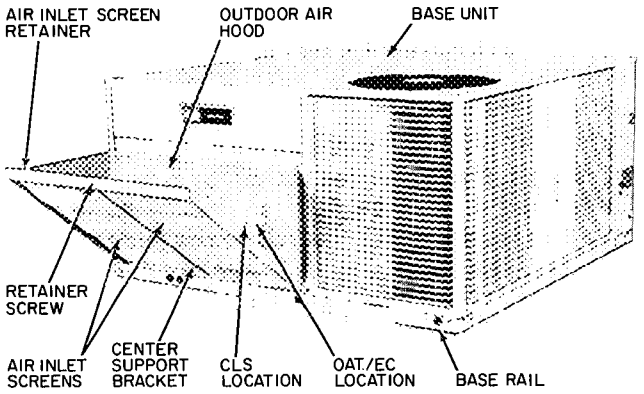
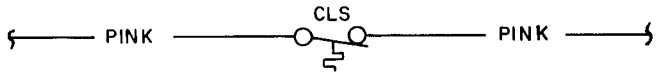
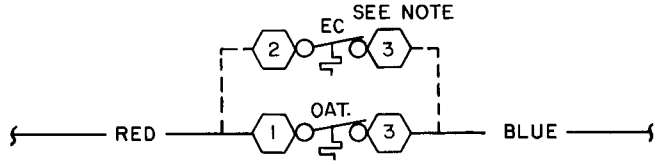


Fig. 24 — Economizer and Outdoor Air Hood Assembled to Unit

16. Install center support bracket using screw provided, at bottom center of base rail. Slide outdoor air inlet screens into screen tracks on hood side plates. While holding screens in place, fasten screen retainer to hood using screw provided. Make sure bottom edge of screens rest inside base rail and behind center support bracket as shown in Fig. 24.
17. Replace upper access panel with screws saved from step 2.
18. Turn base unit power on.





CLS — Cooling Lockout Switch
EC — Enthalpy Control
OAT. — Outdoor Air Thermostat

NOTE: When enthalpy control (EC) is installed, outdoor air thermostat (OAT) is removed from economizer.

Fig. 25 — Wiring Connections for Outdoor Air Thermostat/or Enthalpy Control and Cooling Lockout Switch

Step 10 — Adjust Evaporator Fan Speed — The fan motor pulleys are factory set for speed shown in Table 1.

To change fan speeds:

1. Shut off unit power supply.
2. Loosen belt by loosening fan motor mounting plate nuts.
3. Loosen movable pulley flange setscrew (see Fig. 26).
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 1.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 1 for speed change for each full turn of pulley flange.)

To align fan and motor pulleys, loosen fan pulley setscrews and slide fan pulley along fan shaft. Make angular alignment by loosening motor from mounting plate.

To Adjust Belt Tension — Loosen fan motor pivot bolts. Move motor mounting plate up or down for proper belt tension (1/2-in. deflection with one finger) and tighten pivot bolts. Adjust lock bolt and nut on mounting plate to secure in fixed position.

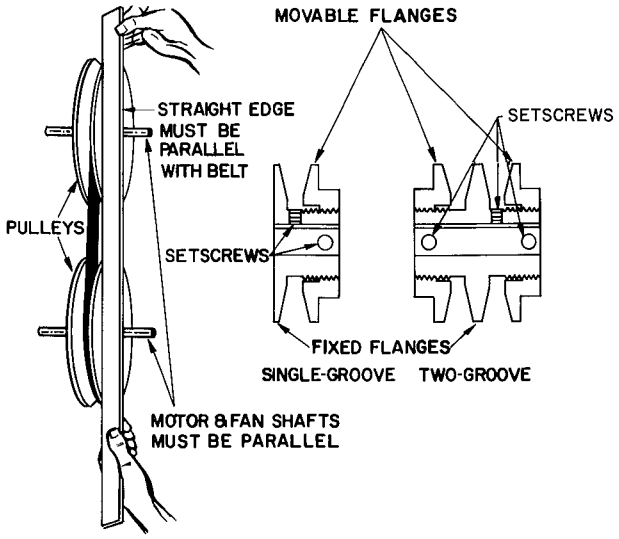


Fig. 26 — Indoor Air Fan Pulley Adjustment

START-UP

Crankcase heater(s) are energized as long as there is power to the unit. Energize heater(s) 24 hours prior to base unit start-up.

Unit Preparation — Make sure that unit has been installed in accordance with installation instructions and applicable codes.

Return Air Filters — Make sure correct filters are installed in filter tracks. See Table 1. Do not operate unit without return air filters.

Outdoor Air Inlet Screens — Outdoor air inlet screen(s) must be in place before operating unit.

Compressor Mounting — Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.

Internal Wiring — Check all electrical connections in unit control boxes. Tighten as required.

Refrigerant Service Valves — Each unit system has 2 Schrader type service ports, one on the suction line and one on the compressor discharge line. Be sure that caps on the ports are tight.

Cooling — To start unit, turn on main power supply. Set system selector switch at COOL and fan switch at AUTO. Adjust thermostat to a setting below room temperature. Compressor starts on closure of contactor.

Check cooling effects at a setting above room temperature. Check unit charge. Refer to Refrigerant Charge in Service section.

Reset thermostat at a position above room temperature. Compressor will shut off.

TO SHUT OFF UNIT — Set system selector switch at OFF position or reset thermostat at a position above room temperature. Units are equipped with Signal-LOC™ protection device. Unit shuts down on any safety trip, and indicator light on thermostat comes on. Check reason for safety trip.

Compressor restart is accomplished by manual reset at the thermostat by turning the selector switch to OFF and then to ON.

Heating

1. Purge gas supply line of air by opening union ahead of gas valve. When gas odor is detected, tighten union and wait 5 minutes before proceeding.
2. Turn on manual gas valve and unit electrical supply.
3. Set system switch selector at HEAT and fan switch at AUTO. or ON. Set heating temperature lever at above room temperature.
4. The induced-draft combustion air fan will start. Pilot lights within 10 seconds. Refer to Service, Pilot Light if pilots do not light.
5. Main gas valve will open and main burners ignite within 30 seconds from the pilot light ignition. Natural gas burners are factory adjusted and should burn with a soft blue flame. Flame should not lift off burner face. Refer to Service, Main Burners, if required.
6. Adjust airflow to obtain a temperature rise within the range specified on the unit nameplate.

TO SHUT OFF UNIT — Set system selector switch at OFF or set heating selector lever below room temperature.

Safety Relief — A soft solder joint at the service Schrader port provides pressure relief under abnormal temperature and pressure conditions.

Ventilation (Continuous Fan) — Set fan and system selector switches at ON and OFF, respectively. Indoor air fan operates continuously to provide constant air circulation.

Economizer Operating Sequence

COOLING MODE — When there is no power applied to the indoor fan motor, the outdoor damper is closed.

If outdoor ambient temperature is above the outdoor air thermostat (OAT.) setting, the OAT. contact is open. No power is supplied to DR2. Upon a first-stage call for cooling, the indoor and outdoor fans and compressor energize. The economizer goes to vent position.

If outdoor ambient temperature is below the outdoor air thermostat (OAT.) setting, the OAT. contact is closed and power is supplied to DR2 (normally open contacts close and normally closed contacts open). Upon a first-stage call for cooling through Y1, power goes through contacts 4 and 6 of DR2 causing DR1 to energize (normally open contacts close and normally closed contacts open). The economizer switches from vent or closed position to modulation mode.

Modulation is accomplished by using the mixed air thermostat (MAT.) in conjunction with the stall circuitry inside the actuator. If the mixed air temperature is above the MAT. setting, C-T1 and C-T2 are made causing the damper motor to open (which causes the air temperature to fall). As the mixed air temperature falls to the MAT. setting (54 F), C-T2 opens causing the motor to stall. When mixed air temperature goes 4 F below the MAT. setting, C-T1 opens causing the spring to close the damper. This in turn raises the mixed air temperature and causes C-T1 to again stall the motor into a less than full open position. If overshoot should occur, this process would oscillate a few times until the mixed air temperature stabilizes.

Upon a second-stage call for cooling through Y2, power goes through contacts 1, 3 and 5 of DR2 and CLO and the compressor is energized. Mechanical cooling is integrated with economizer cooling. Economizer continues in modulation mode.

On units so equipped, compressor no. 2 will not operate while free cooling is available.

When outdoor ambient temperature goes below 50 F, the cooling lockout switch (CLS) opens and mechanical cooling is locked out.

An economizer control thermostat (ECT) on the evaporator coil guards against abnormally low suction temperatures while operating mechanical cooling in conjunction with economizer. Low suction temperatures can lead to frost on the evaporator coil. If frost buildup is detected, thermostat de-energizes economizer, thus closing the outdoor air damper. This raises air temperature entering the evaporator coil and melts frost. Once frost is melted, the economizer is re-energized.

When cooling load is satisfied, the damper motor is de-energized causing the spring to close the damper.

During unoccupied periods, if a field-supplied night switch is used and is opened, the outdoor air damper closes.

HEATING MODE — With no power applied to the indoor fan motor, the outdoor air damper is closed.

Upon a call for heat through W1, the indoor fan contactor is energized and provides power to the indoor fan motor and economizer.

If the night setback switch is closed, the outdoor dampers will open to the manually preset vent position by power passing through contacts 1 and 2 of DR1 and going to switches SW1 and SW2 through terminal XV of actuator. The switches are set with 3 degree angular difference between each other, acting as a dead spot or stall region. Thus, if the damper is below vent position, SW2 is closed powering the damper open until SW1 closes and SW2 opens which stalls the motor. If the damper is too far open, both SW1 and SW2 are open causing the spring to close the damper until SW1 closes, again stalling the motor.

When heating load is satisfied, the damper motor is de-energized causing the spring to close the damper.

During unoccupied periods, if a night setback switch is used and opened, the damper closes.

SERVICE

⚠ CAUTION

When servicing unit, shut off all electrical power to unit to avoid shock hazard or injury from rotating parts.

Cleaning — Inspect unit interior at the beginning of each heating and cooling season or as operating conditions require.

EVAPORATOR COIL

1. Turn unit power off. Remove indoor fan motor access panel.
2. Disconnect indoor motor wiring from main control box.
3. Remove screws from base of fan motor housing.
4. Slide fan motor housing out of base unit.
5. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of coil and flush with clean water. For best results, backflush toward return air section to remove foreign material. Flush condensate pan after completion.
6. Reinstall fan motor housing, reconnect wiring and replace indoor fan motor access panel.

CONDENSER COIL — Inspect coil monthly. Clean condenser coil annually, or as required by location or outdoor air conditions.

Fins are not continuous through coil sections. Dirt and debris may pass through first section, become trapped between the 2 rows of fins, and restrict condenser airflow. Shine flashlight through coil to determine if dirt or debris has collected between coil sections.

Clean coil as follows:

1. Turn off unit power.
2. Remove top panel screws on condenser end of unit. Remove screws from coil side of coil center post. Do not remove center post.
3. Remove condenser coil corner post. See Fig. 27. To hold top panel open, place coil corner post between top panel and center baffle. See Fig. 28.

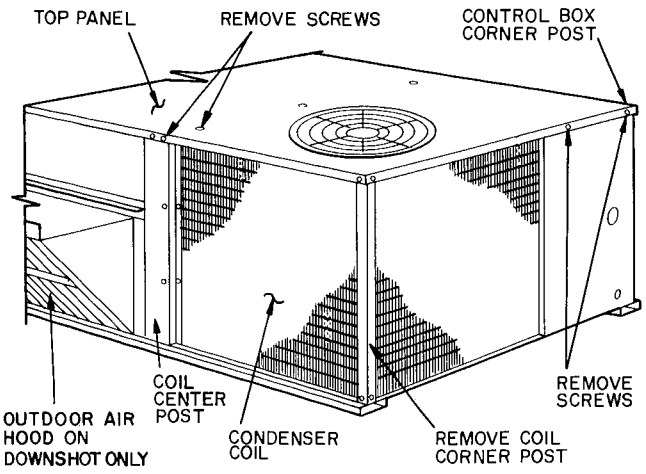


Fig. 27 — Cleaning Condenser Coil

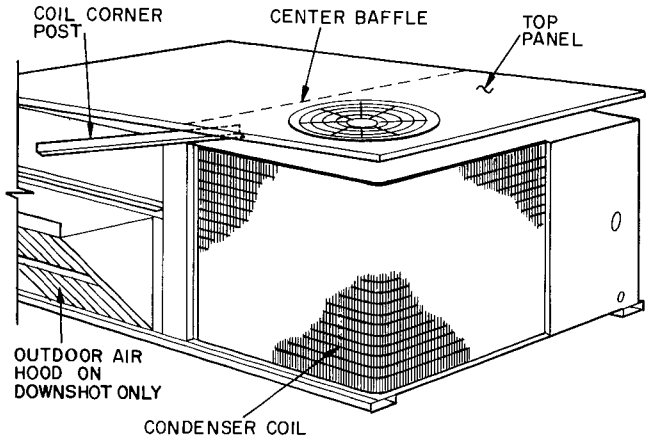


Fig. 28 — Propping Up Top Panel

4. Remove device holding coil sections together at return end of condenser coil. Carefully separate the outer coil section 3 to 4 in. from the inner coil section. See Fig. 29.
5. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.
6. Reposition the outer coil section, remove the coil corner post from between the top panel and center baffle. Secure the sections together. Install the coil corner post, coil center post and replace all screws.

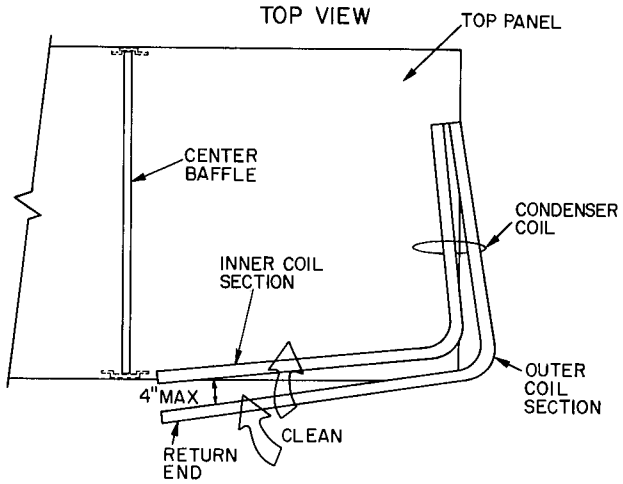


Fig. 29 — Separating Coil Sections

CONDENSATE DRAIN — Check and clean each year at start of cooling season. In winter, keep drain and trap dry or protect against freeze-up.

FILTERS — Clean or replace at start of each heating and cooling season, or more often if operating conditions require it.

OUTDOOR AIR INLET SCREENS (Downshot Units) — Clean screens with steam or hot water and a mild detergent. Do not use throwaway filters in place of screens.

Lubrication

COMPRESSORS — Each compressor is charged with correct amount of oil at the factory.

FAN MOTOR BEARINGS — No lubrication of condenser or evaporator fan motors is required for first 5 years of operation. Annually thereafter, clean and repack bearings with a suitable bearing grease.

Condenser Air Fan Adjustment (Fig. 30) — Shut off unit power supply. Remove condenser fan assembly (grille, motor, motor cover and fan) and loosen fan hub setscrews. Adjust fan height as shown in Fig. 30. Tighten setscrews and replace condenser fan assembly.

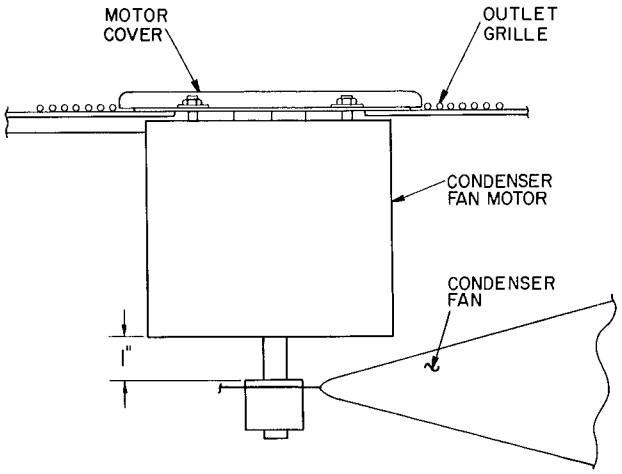


Fig. 30 — Condenser Air Fan Adjustment

Manual Outdoor Air Damper (Downshot Units Only) — If outdoor air damper blade adjustment is required, see Optional Manual Outdoor Air Damper section.

Economizer Adjustment (Downshot Units) — Refer to Economizer section under Installation.

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate (also refer to Table 1). Refer to Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants.

Unit panels must be in place when unit is operating during charging procedure.

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant. (Refer to Table 1.)

LOW CHARGE, COOLING — The factory charge is the correct amount for the best performance; however, this charge may require a slight adjustment to attain rated performance by using either the charging charts on page 18 or the charging tables on page 19.

Charging Charts (48HDE,LDE,HHE,LHE008 and 48HD/HH009) — Using Cooling Charging Chart, Fig. 31-33, vary refrigerant until the conditions of the chart are met. Note the charging chart is different from type normally used. Chart is based on charging the units to the correct superheat for the various operating conditions. Accurate pressure gage and temperature sensing device are required. Connect the pressure gage to the service port on the suction line. Mount the temperature sensing device on the suction line and insulate it so that outdoor ambient temperature does not affect the reading. Indoor air cfm must be within the normal operating range of the unit.

To Use Cooling Charging Chart — Take the outdoor ambient temperature and read the suction pressure gage. Refer to chart to determine what suction temperature should be. If suction temperature is high, add refrigerant. If suction temperature is low, carefully blow some of the charge. Recheck the suction pressure as charge is adjusted.

Example: 48HDE,LDE,HHE,LHE008 (Fig. 31)

Outdoor Temperature ..... 85 F
Suction Pressure ..... 70 psig
Suction Temperature should be ..... 68 F
(Suction Temperature may vary ± 5 F.)

If Chargemaster® charging device is used, temperature and pressure readings must be accomplished using the charging chart.

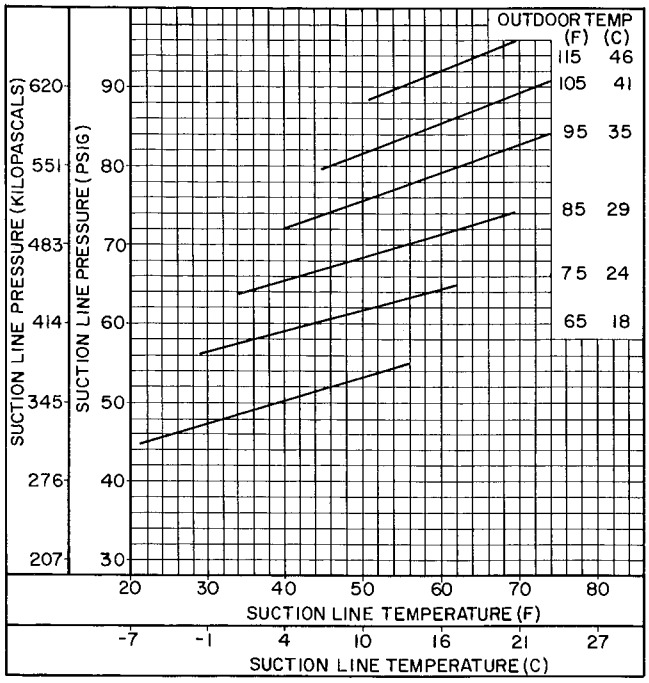


Fig. 31 — Cooling Charging Chart; 48HDE,LDE,HHE,LHE008; Each Circuit Equal

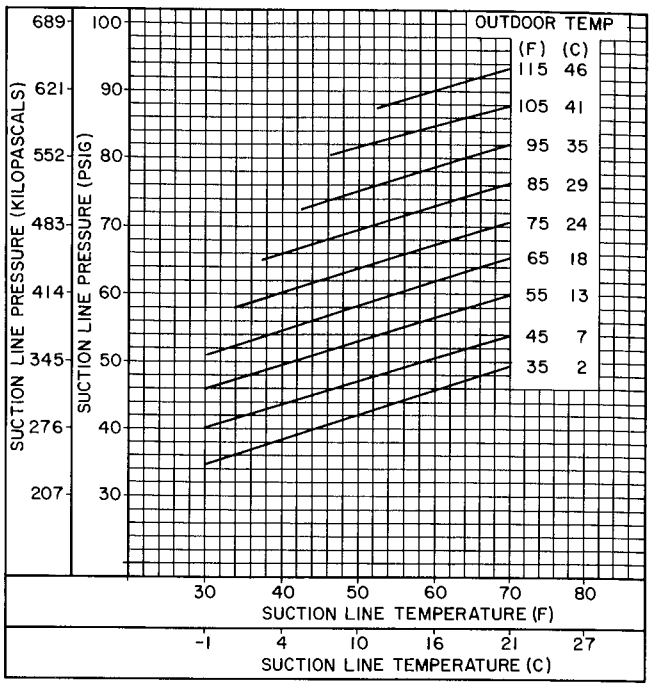


Fig. 33 — Cooling Charging Chart; 48HD/HH009; Ckt 2

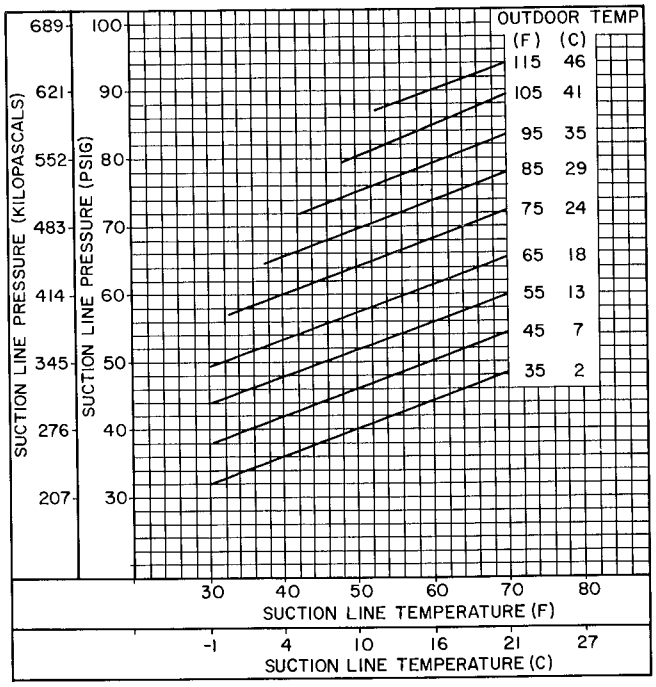


Fig. 32 — Cooling Charging Chart; 48HD/HH009; Ckt 1

Table 3 — Desired Superheat Temperature (F)
(Measured at Low-Side Service Port)

OUTDOOR AMBIENT DBT (F)	EVAPORATOR AIR INLET WBT (F)											
	54	56	58	60	62	64	66	68	70	72	74	76
65	10	13	16	19	21	24	27	30	33	36	38	41
70		10	13	16	19	21	24	27	30	33	36	39
75			9	12	15	18	21	24	28	31	34	37
80			5	8	12	15	18	21	25	28	31	35
85					8	11	15	19	22	26	30	33
90					5	9	13	16	20	24	27	31
95						6	10	14	18	22	25	29
100							8	12	15	20	23	27
105							5	9	13	17	22	26
110								6	11	15	20	25
115									8	14	18	23

Do not attempt to charge system under these conditions or refrigerant slugging may occur

Charging Tables — (48HD,LD,HH,LH009) — An accurate thermocouple-, or thermistor-type thermometer, a sling psychrometer, and a gage manifold are required when using the charging table method for evaluating the unit charge. Do not use mercury or small dial-type thermometers because they are not adequate for this type of measurement.

Remove compressor access panel and cap from high- and low-pressure service fittings. Route refrigerant hoses through access hole located on bottom of electrical entrance panel. Attach high- and low-pressure gage hoses to high- and low-pressure service fittings, respectively. Replace compressor access panel and start unit in cooling mode. Let unit run until system pressures stabilize. Measure and record the following:

1. Evaporator coil entering wet bulb (°F wb).
2. Outdoor ambient-air temperature (°F db).
3. Suction-tube temperature (°F) at low-side service fitting.
4. Suction (low-side) pressure.

To Use Cooling Charging Tables — Proceed as follows:

1. Use Table 3 to determine the desired superheat temperature for the evaporator air wet-bulb temperature and outdoor air-ambient temperature measured above.
2. Use Table 4 and the desired superheat temperature from step 1 to determine the required suction temperature for the measured suction pressure.
3. If the measured suction tube temperature does not agree with the required suction tube temperature — add refrigerant to lower temperature or remove refrigerant to raise temperature. (Allow ±5 tolerance).

   EXAMPLE:

   Evaporator Air Wet-Bulb Temperature ..... 64 F
   Outdoor Air Temperature..... 75 F
   Suction Pressure..... 70 psig
   Desired Superheat Temperature ..... 18 F
   Required Suction Tube Temperature ..... 59 F

Table 4 — Required Suction-Tube (F) vs Desired Superheat (F)
(Measured at Low-Side Service Port)

DESIRED SUPERHEAT TEMP (F)	SUCTION OR LOW SIDE PRESSURE (psig) AT SERVICE PORT								
	61.5	64.2	67.1	70	73	76	79.2	82.4	85.7
0	35	37	39	41	43	45	47	49	51
2	37	39	41	43	45	47	49	51	53
4	39	41	43	45	47	49	51	53	55
6	41	43	45	47	49	51	53	55	57
8	43	45	47	49	51	53	55	57	59
10	45	47	49	51	53	55	57	59	61
12	47	49	51	53	55	57	59	61	63
14	49	51	53	55	57	59	61	63	65
16	51	53	55	57	59	61	63	65	67
18	53	55	57	59	61	63	65	67	69
20	55	57	59	61	63	65	67	69	71
22	57	59	61	63	65	67	69	71	73
24	59	61	63	65	67	69	71	73	75
26	61	63	65	67	69	71	73	75	77
28	63	65	67	69	71	73	75	77	79
30	65	67	69	71	73	75	77	79	81
32	67	69	71	73	75	77	79	81	83
34	69	71	73	75	77	79	81	83	85
36	71	73	75	77	79	81	83	85	87
38	73	75	77	79	81	83	85	87	89
40	75	77	79	81	83	85	87	89	91

NOTE: Measure suction-tube (F) with an accurate superheat thermocouple, or thermister-type thermometer

Main and Pilot Burners — At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the pilot and main burner flames and adjust, if necessary, referring to Automatic Pilot Adjustment or Main Burners sections of instructions.

Flue Gas Passageways — Inspect flue collector box and upper areas of heat exchanger cells by removing burner compartment access panel; then remove flue cover and inspect heat exchangers. Using a wire brush, clean all surfaces as required.

Combustion Air Blower — Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bimonthly to determine proper cleaning frequency.

To inspect blower wheel, remove draft hood and screen. Shine a flashlight into opening to inspect wheel. If cleaning is required, remove motor and wheel as follows:

1. Remove burner access panel.
2. Remove the 6 screws that attach induced draft motor mounting plate to blower housing (Fig. 34). The mounting plate will drop down.

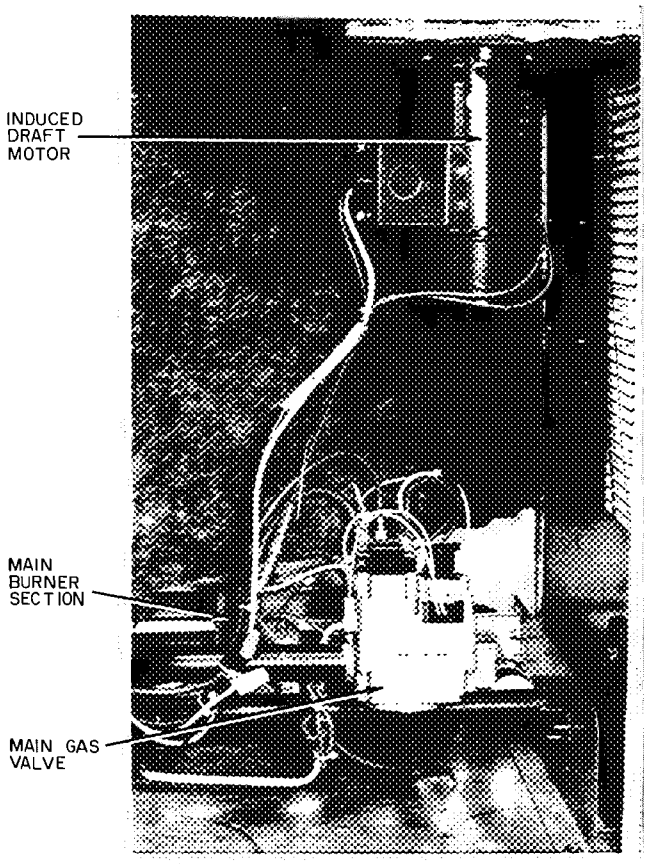


Fig. 34 — Burner Section Details

3. Remove the 4 wires attached to the motor and remove assembly from unit.
4. To remove blower, remove setscrews.
5. To remove motor, remove blower, then remove the nuts that hold motor to mounting plate.

   NOTE: Do not lose spacers for induced draft motor.
6. To reinstall, reverse the procedure outlined above.

Limit Switch — Access panel is located on the heat section side panel (Fig. 3 and 4).

48HD,LD,HDE,LDE: Limit switch is located in the upper section of the heat exchangers. Bimetal sensor is facing the airstream. Remove bracket holding limit switch and remove screw holding switch.

48HH,LH,HHE,LHE: Limit switch is located on partition between blower section and heat section. Remove plate and screw holding switch.

Pilot Light — If pilot does not light as described in Start-Up, Heating: Be sure pilot orifice is not obstructed, gas pressure is not less than 3 in. wg, and air has been bled from gas supply. Check for spark ignitor malfunctions as follows:

1. Shut off unit power supply.
2. Check that spark gap is 1/8 to 3/16 inch.
3. Check that spark generator is securely grounded to furnace vestibule plate.
4. Check that high-voltage lead is securely connected between generator and electrode body.
5. Restore power. Check that 24 volts is supplied to primary side of generator.
6. Check unit label diagram for correct terminal usage if any wires are removed.

Automatic Pilot Adjustment (Low Heat Units Only)

1. Turn off unit power supply, set system selector switch at HEAT, and adjust thermostat to call for heat.
2. Remove burner compartment access panel.
3. Remove screw cap cover on the top of the main gas valve to expose pilot adjusting screw.
4. With a small screwdriver, turn adjustment screw until flame is approximately 1 to 1-1/2 in. high.
5. Replace screw cap cover on pilot gas valve.
6. Observe burner operation and adjust main gas valve for correct burner operation as required. See Fig. 35 for proper flame appearance.
7. Replace all panels.

NOTE: Pilot is factory set and nonadjustable on HIGH HEAT units.

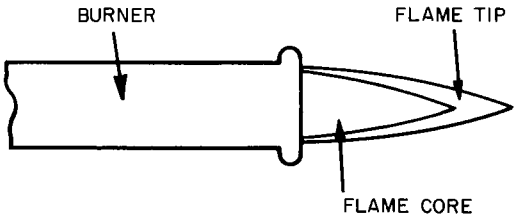


Fig. 35 — Proper Flame Appearance

Automatic Gas Valve Sequence of Operation — Thermostat calls for heat, energizing the spark ignitor and simultaneously opening the pilot solenoids of the gas valve (inside main gas valve). The pilot gas ignites within 10 seconds, stopping the ignitor sparking. Within 30 seconds, the ignition control pack sensor will detect the presence of flame on the pilot tube and energize the main gas valve.

Main Burners are factory set and should require no adjustment. However, if burner adjustment is necessary:

1. Perform Automatic Pilot Adjustment.
2. Turn gas valve to ON. Allow unit to operate at least 15 minutes with furnace access panel in place.
3. Remove access panel.
4. Loosen primary air shutter and adjust to a minimum opening of 5/8 inch.
5. Retighten primary air shutter and reinstall access panel.

TO CHECK ignition of main burners and fan switch operation, move thermostat dial above and below room temperature several times pausing at least one minute between cycles.

REMOVAL

1. Shut off manual main gas valve.
2. Shut off power to unit.
3. Remove evaporator air fan access panel, burner compartment access panel and center post.
4. Disconnect gas piping at unit gas valve.
5. Remove (and mark) red wire from terminal TH on the ignition control pack and brown wire from COM or violet wire from terminal W2 (connections are dependent on whether a 2-stage or single-stage valve is on the unit).
6. Remove the 2 screws at rear of housing just inside burner section.
7. Lift and slide assembly out.

REPLACEMENT

1. Slide assembly into burner section and push snugly against vestibule plate.
2. Screw assembly down.
3. Connect red wire to terminal TH on the ignition control pack and brown wire to COM or violet wire to terminal W2 (connections are dependent on whether a 2-stage or single-stage valve is on the unit).
4. Connect gas piping at unit gas valve.
5. Replace center post and access panels.
6. Turn on manual main gas valve.
7. Restore power to unit.

CLEANING

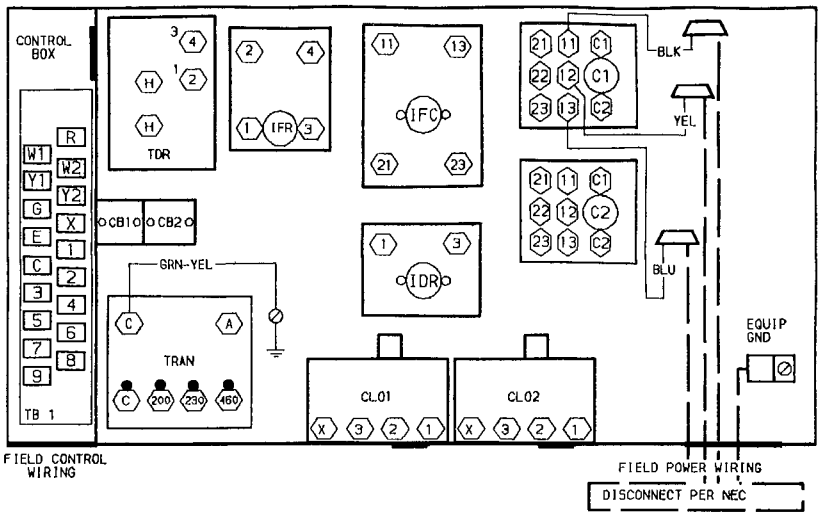
1. Remove burner assembly from unit as described above.
2. Inspect burners and if dirty, remove by removing retaining plate.

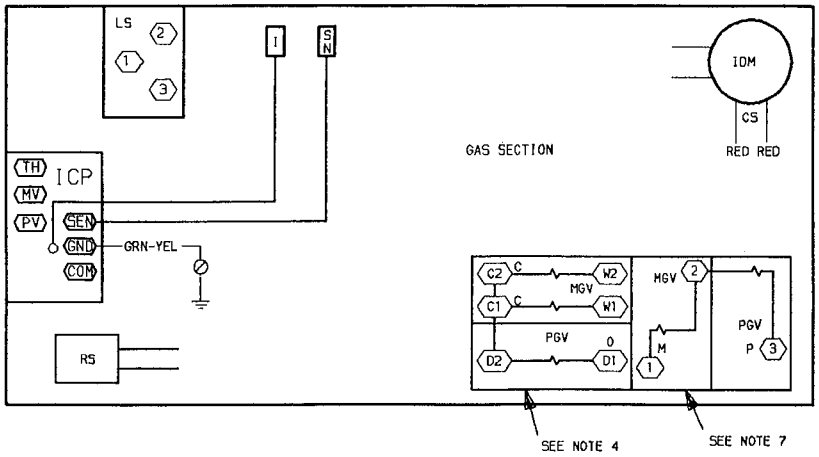
⚠ CAUTION

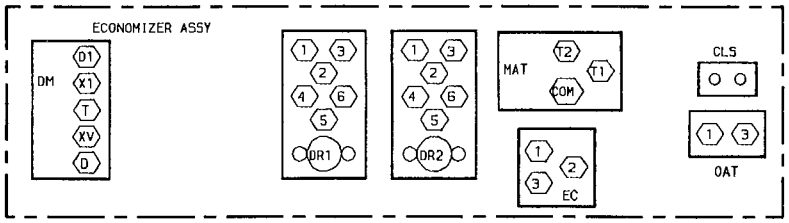
Do not hit or plug orifice spuds.

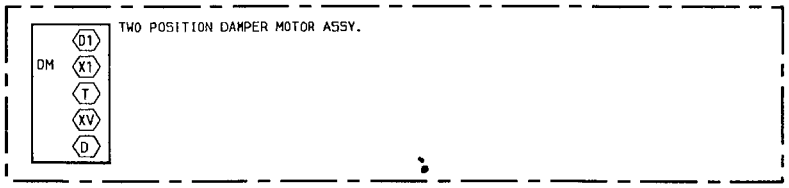
3. Using a soft brush clean burners as required.
4. Replace burners.
5. Replace burner assembly as described above.

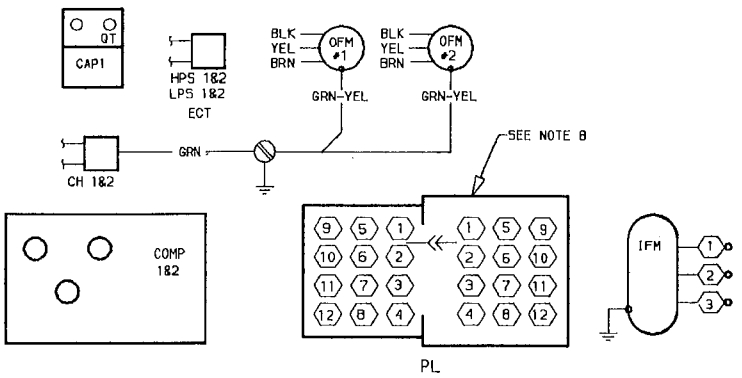
Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request.



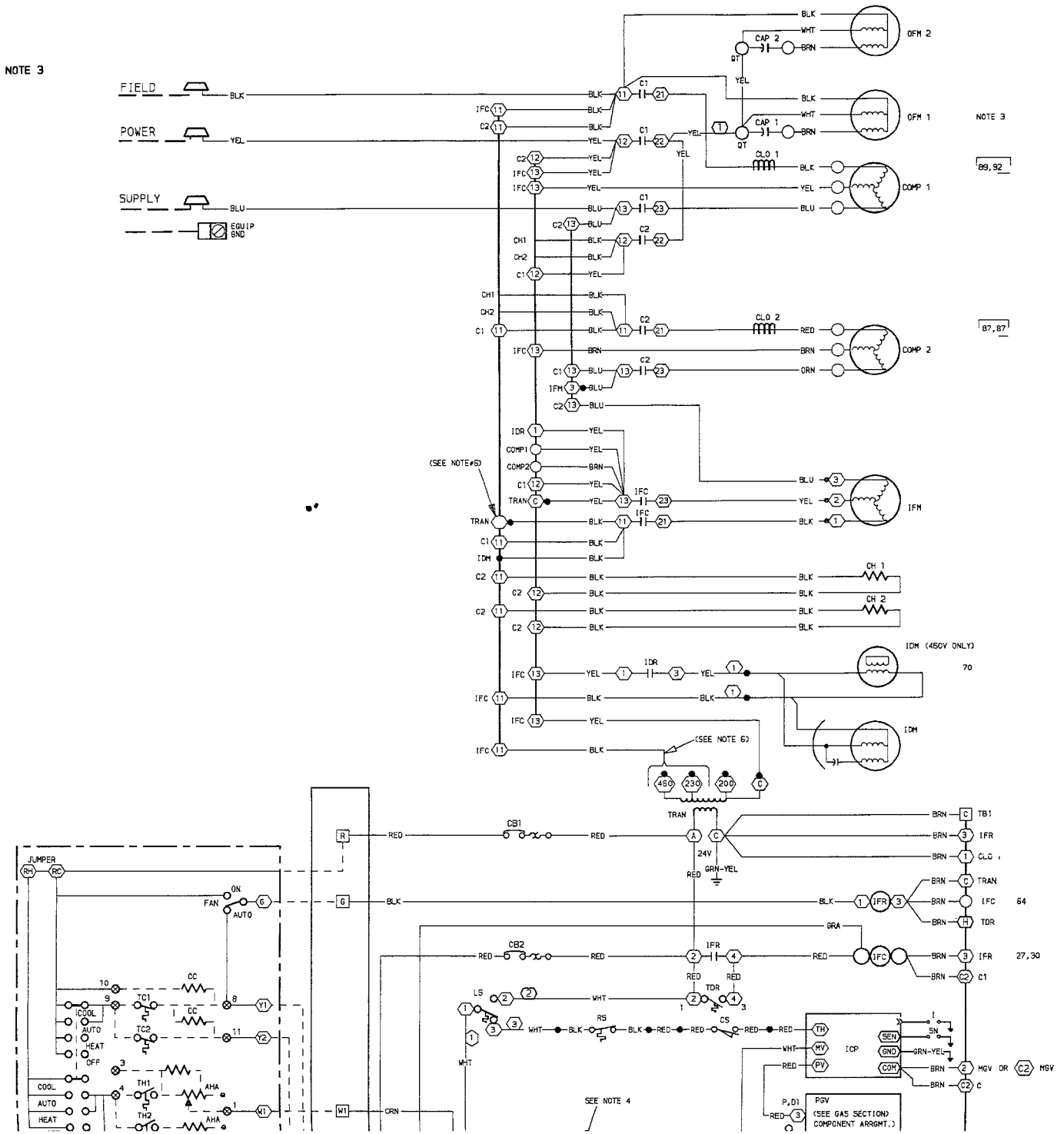


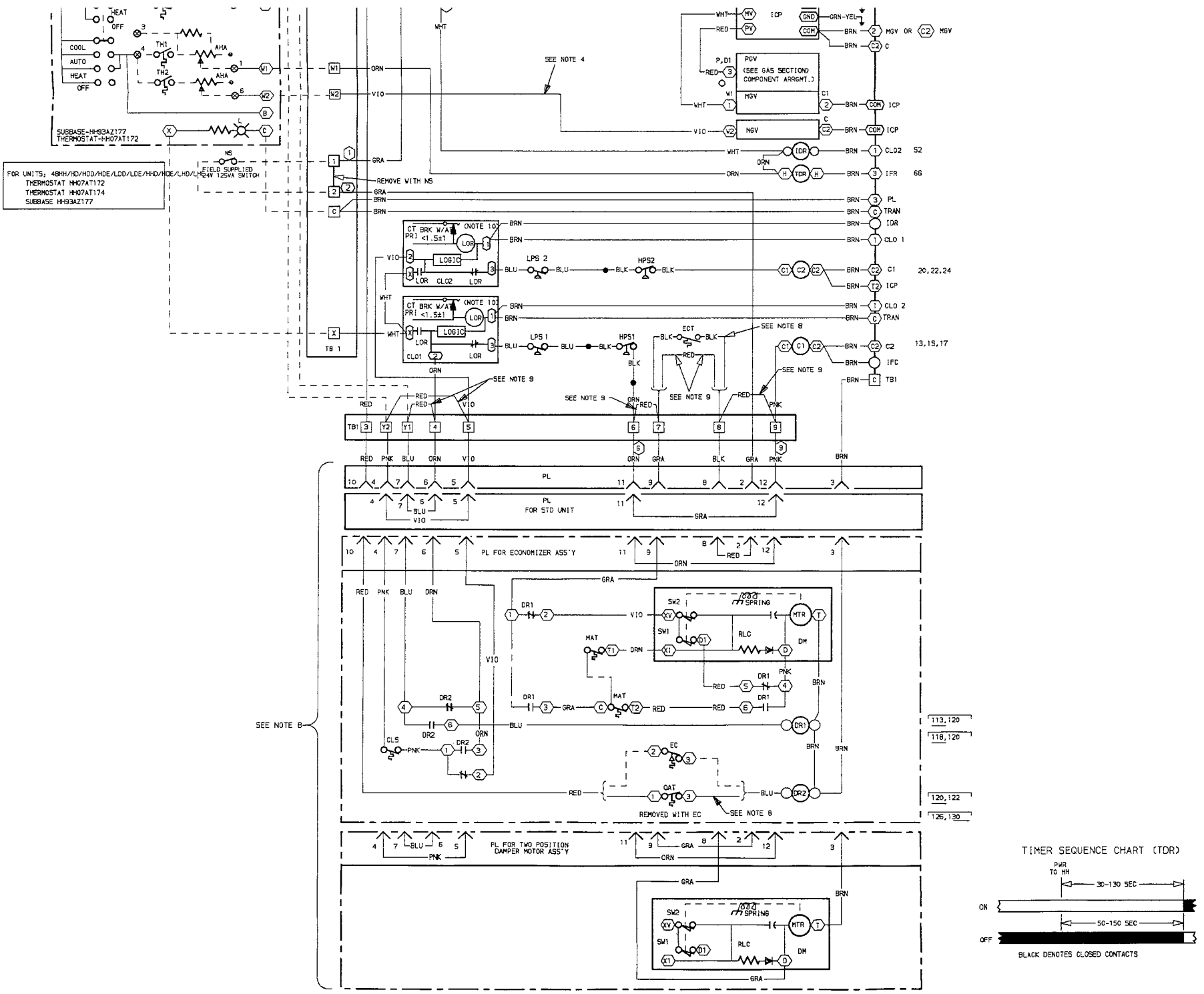






Typical Component Arrangement


NOTE 3
FIELD
POWER
SUPPLY
EQUIP GND
OFM 2
OFM 1
COMP 1
COMP 2
IFM
IDM
IDM (450V ONLY)
CLO 1
CLO 2
CAP 1
CAP 2
CH 1
CH 2
(SEE NOTE#6)
(SEE NOTE 6)
89,92
87,87
70
JUMPER
FAN
ON
AUTO
CC
TC1
TC2
COOL
HEAT
OFF
TH1
TH2
AHA
CB1
CB2
TRAN
24V
IFR
IDR
IFC
LS
RS
CS
TDR
ICP
SEN
GND
COM
PSV
(SEE GAS SECTION) COMPONENT ARRGMT.)
SEE NOTE 4
TB1
CLO
TRAN
TDR
64
27,30
MGV OR
MGV



Typical Wiring Schematic

LEGEND

AHA	— Adjustable Heat Anticipator
Assy	— Assembly
BRK W/AT	— Breaks with Amp Turns
C	— Contactor Compressor
Cap.	— Capacitor
CB	— Circuit Breaker
CC	— Cooling Compensator
CH	— Crankcase Heater
CLO	— Compressor Lockout
CLS	— Cooling Lockout Switch
Comp	— Compressor Motor
CS	— Centrifugal Switch
DM	— Damper Motor
DR	— Damper Relay
EC	— Enthalpy Control
ECT	— Economizer Thermostat
Equip	— Equipment
Gnd	— Ground
HPS	— High-Pressure Switch
I	— Ignitor Electrode
IDM	— Induced Draft Motor
IDR	— Induced Draft Relay
IFC	— Indoor Fan Contactor
IFM	— Indoor Fan Motor
IFR	— Indoor Fan Relay
ICP	— Ignitor Control Pack
L	— Light
LPS	— Low-Pressure Switch
LS	— Limit Switch
MAT.	— Mixed Air Thermostat
MGV	— Main Gas Valve
Mtr	— Motor
NS	— Night Switch
OAT.	— Outdoor Air Thermostat
OFM	— Outdoor Fan Motor
PGV	— Pilot Gas Valve
PL	— Plug Assembly
Sn	— Sensor
QT	— Quadruple Terminal
RLC	— Rotor Locking Circuit
RS	— Rollout Switch
Std	— Standard
Sw	— Switch
TB	— Terminal Block
TC	— Thermostat-Cooling
TDR	— Time Delay Relay
TH	— Thermostat-Heating
Tran	— Transformer


Marked Wire


Denotes connection point between subbase and thermostat


Terminal (Marked)


Terminal (Unmarked)


Terminal Block Connection


Field Splice


Splice (Marked)


Factory Splice

Factory Wiring

Internal Connection

Accessory or Optional Wiring

Field Control Wiring

Field Power Wiring

To indicate common potential only not to represent wiring

NOTES:

1. Compressor and fan motors are thermally protected; 3-phase motors protected against primary single-phase conditions
2. If any original wires furnished must be replaced, it should be replaced with 90 C or its equivalent
3. Numbers indicate the line location of used contacts A bracket over (2) numbers signifies a single pole, double throw contact An underlined number signifies a normally closed contact Plain (no line) number signifies a normally open contact
4. For units; 48HD/HH/HDD/HDE/HHD/HHE
5. Set heat anticipator at 1 2 amp for 460-v units and 1 0 amp for 208/230-v units
6. Factory connected to 230 v or 460 v lead per unit rated voltage If 208-v power supply is used connect to 200-v lead and insulate 230-v lead
7. For units; 48LDD/LDE/LHD/LHE.
8. For units; 48HD/HDD/HDE/LDD/LDE
9. For units; 48HH/HHD/HHE/LHD/LHE
10. The CLO locks out the compressor to prevent short cycling on compressor overloads and safety devices; before replacing CLO, check these devices