Number One Air Conditioning Maker

Carrier

Division of Carrier Corporation

Carrier Parkway • Syracuse N Y 13221

Combination Heating/Cooling Units

INTRODUCTION

The 48EL and EM combination heating/cooling units are complete systems designed for outdoor installation on slab or rooftop.

Installation consists of: rigging and mounting the unit, attaching ductwork, making single gas, electrical and condensate connections, and attaching thermostat leads. A field-furnished filter rack is required in the return airstream.

RECEIVING THE UNIT

Examine the unit carefully for any damage incurred in shipment. If damaged, file claim with transportation company immediately.

Check unit nameplate to ensure that unit electrical requirements match available power supply, and that unit is designed for use with the proper gas type (natural or liquefied petroleum).

INSTALLATION

Check national and local gas and electrical codes and local building codes for any special installation requirements.

Unit Location – Install unit outdoors. Maintain clearance of at least 2 ft from building. Unit may face in any direction since neither the condenser air inlet nor the flue outlet (Fig. 1) are affected by wind. Do not locate unit near sources of contaminated air.

Although the unit is weatherproof, position unit so that water and ice from roofs or eaves cannot fall directly on the unit.

SPACE LIMITATIONS – Provide sufficient space for unimpeded airflow and for wiring and servicing unit (Fig. 1).

OUTSIDE AIR LIMITATIONS – Although there are no restrictions on either the percentage or the temperature of the outside air circulated thru the unit, the rate of moisture condensation from the combustion process increases significantly when return air temperature drops below 50 F. *Protect the drain holes in the bottom pan against ice buildup if outside air of below freezing temperature is used.*

VIBRATION ISOLATION – The unit compressor, evaporator fan and condenser fan are mounted on isolators to minimize vibration. Additional isolation is not required for slab mounting. With some types of roof construction, however, the use of field-furnished rubber pad type isolators may be advisable.

Unit Rigging

1. Sling the unit perpendicularly to shipping skid runners. Use spreader bars to prevent damage from sling or cable.
2. Raise unit to desired location and remove shipping skid.
3. Mount and level the unit as indicated in Unit Support and Mounting section.

Unit Support and Mounting

LEVELING THE UNIT – Level the unit from end to end but pitch the unit slightly (3/8 to 1/2 in.) towards the condensate drain on the service access face of the unit (Fig. 1). Use the unit frame as a leveling reference.

SLAB MOUNTING – Mount the unit on a concrete pad, cement blocks, bricks or creosoted wood of sufficient area and strength to support the unit weight (Table 1) without distortion or damage and maintain the drainage pitch recommended above.

A gravel apron prevents grass and foliage from obstructing the condenser air inlet (Fig. 1).

FLAT OR RECESSED ROOF MOUNTING should be as close as possible to the roof duct opening. Place the unit on at least 2 wooden 2 x 4 in. or 2 x 6 in. sleepers.

Sleepers may be perpendicular to or parallel to the unit mounting rails, but must span at least 2 roof joists or purlins to distribute unit weight. Set the sleepers in roof cement or mastic. Do not plug drain holes in the compressor or furnace compartment.

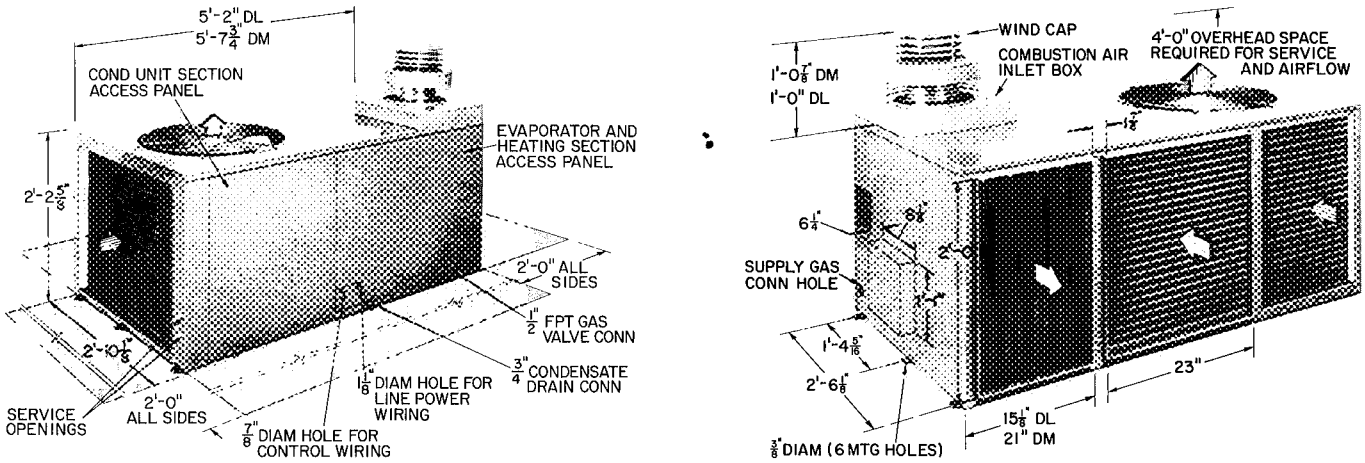
Do not support the unit by the ends of the base rails, nor use vibration isolators at these points. Unit will not be properly supported and could sag in the middle.

PITCHED ROOF MOUNTING – Construct a sturdy welded or bolted frame of 1-1/2 x 1-1/2 x 1/4 in. or larger angle iron, with frame members at right angles to unit rails. Make provisions for securing unit to frame. Use roof cement or mastic where frame is in contact with roof.

Table 1 — Physical Data

UNIT MODEL	48EL006	48EM006
OPERATING WEIGHT (lb)	501	537
REFRIG (22) CHG (lb-oz)	5 5	5 5
COMPRESSOR	GB30K__010	
Cylinders	2	
Rpm (60-Hz)	3500	
CONDENSER FAN	Propeller Type, Direct Drive; Vertical Discharge	
Air Quantity (Cfm)	2700	
Motor Hp	1/3	
EVAPORATOR FAN	Centrifugal, Belt Drive; Horizontal Discharge	
Size (in.)	10x9	
Nominal Cfm	1900	
Rpm Range	820-1250	
Max Allowable Rpm	1500	
Fan Pulley Pitch Diameter (in.)	8 0	
Motor Pulley Pitch Diameter (in.)	1 9-2 9	
Belt	4L40	
Speed Change per Full Turn of Moveable Pulley Flange (Rpm)	90	
Factory Setting — Full Turns Open	2	
Motor Hp	3/4	
CAPACITY (1000 Btuh)		
Cooling	58	58
Heating Input/Bonnet*	110/82 5	150/112 5
MAX EXTERNAL STATIC PRESSURE		
Heating (in. W.C.)	5	
FILTERS† (1-in. thick)		
Disposable — No. ...Size (in.)	2 16x20	1 20x25 1 25x25
Permanent‡ — No. ...Size (in.)	2 16x20	1 20x25 1 25x25
HEAT TEMPERATURE RISE (F)	45-75	
GAS CONNECTION (in.)	1/2	

*Ratings shown for elevations up to 2000 ft above sea level For elevations above 2000 ft deduct 4% capacity for each 1000 ft above sea level
†Recommended field-supplied filter
‡Based on 0 055 in wg pressure drop or less thru filter



Certified dimension drawings available on request

INDOOR AIR
CONDENSER AIR

Space required for service Design certified by A G A for installation on combustible-type floor with minimum space of 2'-0" on all sides

Fig. 1 — Physical Data and Dimensions

Ductwork Installation – For air duct system design information, refer to Carrier System Design Manual, Part 2. System airflow must be within the range of temperature rise and external static pressure shown on the unit A.G.A. rating plate.

Bolt or screw ductwork to unit supply and return air duct flanges and seal joints with sheet metal flashing. Flange location and dimensions are given in Fig. 1. Use flexible connectors between ductwork and unit to dampen vibration. If a single split duct is connected to the unit, use a gasket to prevent air bypass between supply and return sides.

Insulate and weatherproof all external ductwork. Secure ducts to building structure and weatherproof all duct openings in wall or roof. Ducts passing thru unconditioned spaces must be insulated and provided with a vapor barrier.

Filter Installation (Field-Supplied)

1. Locate filter in return air system. Convenient location for filter is inside building behind return air grille. Size and number of required filters is given in Table 1.
2. Attach filter manufacturer's instructions to filter rack.

ASSEMBLE WIND CAP AND COMBUSTION-AIR INLET BOX

Locate – The wind cap assembly, heat-shield collar and combustion-air inlet box (items 1, 2 and 3 of Fig. 2) are shipped within the condenser section except 460 volt units.

On 460 volt units, only the combustion-air inlet box is shipped within the condenser section. The heat-shield collar and wind cap assembly are shipped in a separate package.

Remove 6 sheet metal screws and lift condenser fan, grille and orifice from the top of the condenser section (Fig. 3). Remove and discard metal banding securing the wind cap and/or inlet box and remove the item(s) from the condenser section.

Before replacing the condenser fan, grille and orifice, remove any shipping tape from the condenser fan.

Assemble (Fig. 2)

1. Mount the combustion-air inlet box (item 3) by sliding the horizontal box flange under the retaining clip on the unit top cover. Fasten the inlet box with sheet metal screws provided.
2. Place end of heat-shield collar and secure wind cap assembly (item 1) with 3 sheet metal screws thru wire cage eyelets.

PIPING AND WIRING

Gas Piping – Install piping per national and local codes and ANSI Z223.1 entitled "National Fuel Gas Code," (published by American Gas Association, 1515 Wilson Blvd., Arlington (Rosslyn), VA 22209).

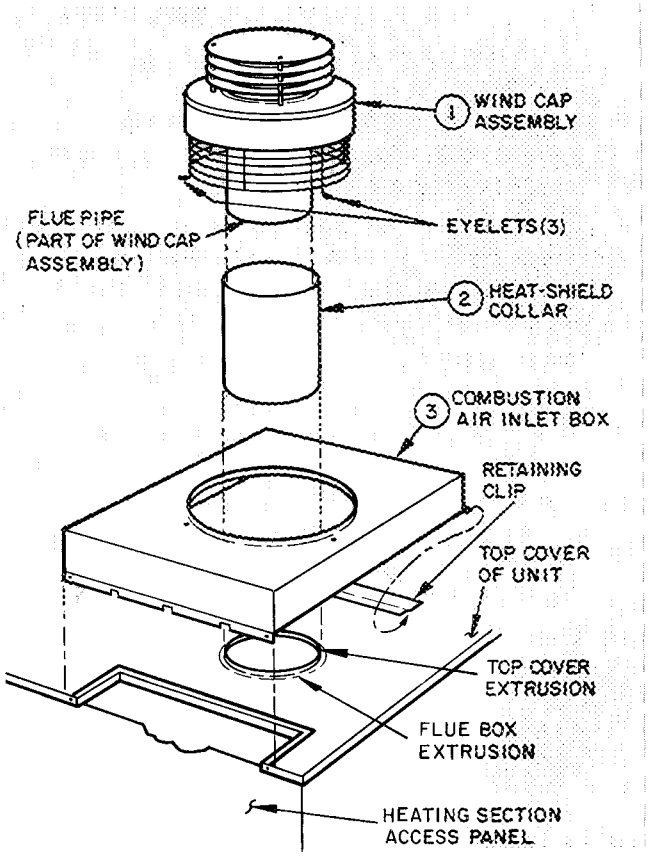


Fig. 2 – Wind Cap and Air Inlet Box Assembly

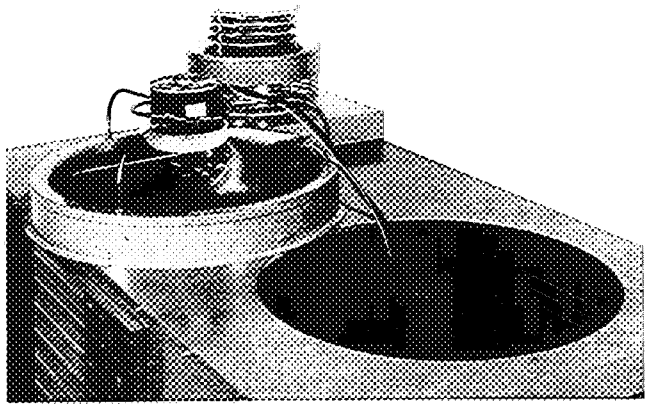
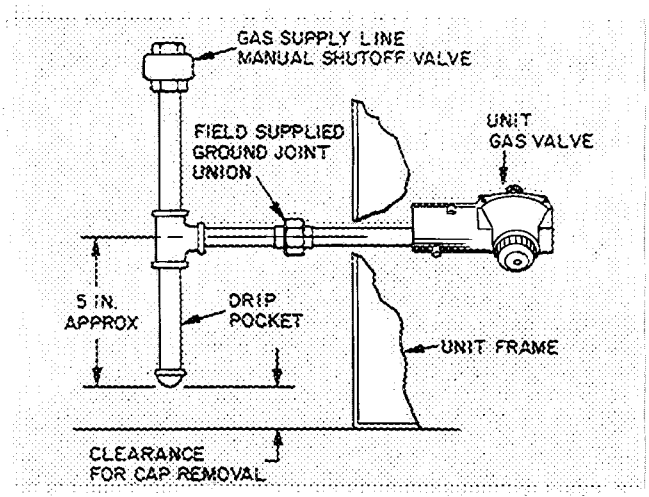


Fig. 3 – Removing Condenser Fan and Orifice Assembly

1. Furnish the gas line from the main gas supply to the unit gas valve (Fig. 4). Connection at gas valve is 1/2 in. FPT.
2. Size the supply pipe for 0.3-in. wg maximum pressure drop and for the volume of gas required (Tables 2, 4 and 5). Pipe size must equal or exceed size of gas connection at unit.
3. Use pipe dope approved for use with liquefied petroleum (LP) gases.

4. Pitch all horizontal pipe runs towards the unit 1/4-in. per 15 ft to prevent trapping condensed moisture.
5. Support piping to maintain proper pitch, prevent strain on unit controls, and prevent accidental movement of piping.
6. Install a tee for attachment of a dirt and moisture drip pocket (Fig. 4). Tee should be at same level or below gas valve connection. *Drip pocket must be protected against freeze-up*
7. Install manual shutoff valve on gas piping per local codes.
8. Provide a ground joint union in the gas supply line near the unit gas valve.
9. *Protect gas piping from freezing temperatures* Gas stoppage can result from failure to insulate pipe against wide or sudden temperature changes.
10. When piping is completed, check entire gas assembly and field piping with soap and water solution.

Never use an open flame for leak testing.



NOTE Connection to unit gas valve is 1/2 in FPT

Fig. 4 – Gas Piping Details

Table 2 – Maximum Pipe Cap. (cfh)*

PIPE LENGTH (ft)	NOMINAL PIPE SIZE (in.)			
	1/2	3/4	1	1-1/4
10	132	278	520	1050
20	92	190	350	730
30	73	152	285	590
40	63	130	245	500
50	56	115	215	440
60	—	105	195	400
70	—	96	180	370
80	—	90	170	350
90	—	84	160	320
100	—	79	150	305

*Cfh — Cu ft/hr based on 0 3 in wg pressure drop and 0.6 gas specific gravity

NOTE: Correction is not necessary for normal number of fittings nor for 0.7 gas specific gravity unless specified

Drain Piping – The condensate drain connection (3/4-in. MPT) is on service access face of unit (Fig. 1). Since drain is on the suction side of the indoor (evaporator) fan, it must be trapped to prevent leakage back into the unit. Trap should be at least 3 in. deep and should be formed of flexible material or in such a manner as to resist freeze-up damage.

Wiring – The design center voltage for each unit is stamped on the unit nameplate. The supply voltage at the unit must be within maximum and minimum limits shown on nameplate and in Table 3. Phase unbalance on 3-phase units must be within 2%. Contact local power company if correction is necessary. *Operation of the unit on improper line voltage or with excessive phase unbalance is considered abuse and is not covered by Carrier warranty.*

Provide a branch circuit fused disconnect of adequate size to handle unit starting current (Table 3). Disconnect must be within sight of and readily accessible from the unit in accordance with Section 440-14 of the National Electrical Code (NEC). Provision for locking switch at open (off) position is advisable to prevent power from being turned on while unit is being serviced.

Use only UL approved copper or copper-clad aluminum power wires.

UNIT CONNECTION

1. Attach field power conduit to 1-1/8 in. hole at front of high voltage (line wiring) junction box (Fig. 1).
2. Run conduit so that access panels can be readily removed.
3. Splice field power wires to the pigtail leads in the junction box. Wire nuts are provided for either copper or aluminum wire. These must be field insulated.
4. Route the control-voltage field wiring thru the 7/8-in. hole in low-voltage junction box (Fig. 1). If conduit is not used, protect wires by inserting diaphragm grommet into the hole. *Make all connections to pigtail leads, but do not use aluminum control wire for splice connection to the copper pigtails.*

Accessory Installation and Wiring

REMOTE CONTROL CENTER – The installation instructions for this combination heating-cooling thermostat and subbase are included with the accessory.

Locate the thermostat on an inside wall or column where it is affected only by the average temperature of the room. The subbase has slots for direct mounting on wall or on vertical outlet box.

Run the thermostat cable or equivalent single leads of no. 18 colored wire from subbase terminals to 7/8-in. diameter hole in access side of unit (Fig. 1) and attach to low voltage (control wiring) terminals in junction box (Fig. 5).

Table 3 — Electrical Data (60-Hz)

UNIT MODEL	VOLTAGE		COMPR		OUTDOOR FAN MOTOR	INDOOR FAN MOTOR	POWER SUPPLY	
	Nom V/Ph/Hz	Min-Max	RLA	LRA	FLA	FLA	Min Ckt Amp	Max Fuse Amps
48EL,EM006300,310	230/1/60	207-264	35 3	175	2.8	6 9	55	70
48EL,EM006500,510	208-230/3/60	187-253	22 7	132	2 8	6 9	40	50
49EL,EM006600,610	460/3/60	414-528	10.4	66	2 8	6 9	20	25

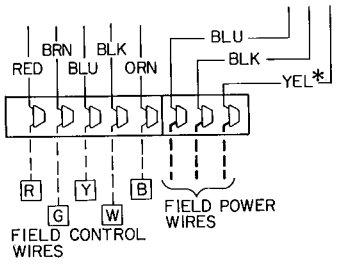
FLA — Full Load Amps **LRA** — Locked Rotor Amps **RLA** — Rated Load Amps

Table 4 — Gas Data — 48EL,EM006

TYPE OF GAS	BTU PER CU FT	SPECIFIC GRAVITY	MANIFOLD PRESSURE (in. wg)	MAIN BURNER ORIFICE	PILOT ORIFICE
Natural	1000	60	3.3	#41 Drill	.023 in
		65	3.5		
	1050	60	3 0		
		65	3.2		
	1100	60	2 7		
		65	2.9		
Butane	3200	2 00	12.2	#54 Drill	009 in
Propane	2500	1 53	—		
Propane	2500	1 53	10 8	#53 Drill	.009 in

THERMOSTAT COMBINATIONS FOR ALL UNITS

1 HH07AT074 AND SUBBASE HH93AZ076
2 HH01AD042 AND SUBBASE HH93AZ042
3 HH01AD040 AND SUBBASE HH93AZ040



☐ Thermostat Connections — — — — Field Power Wiring
— — — — Field Control Wiring
Splice Connection ———— Factory Wiring

*Not connected when single-phase power input is used.

Fig. 5 — Remote Control Wiring for Thermostat Combinations

When thermostat wiring is complete, mount thermostat to subbase per instructions included with the control. Do not turn on unit power at this time; refer to Start-Up section of this publication.

Thermostat heat anticipator setting is 0.6 amps.

REMOVE SHIPPING TAPE on condenser fan, if not previously removed.

CHECK COMPRESSOR HOLD-DOWN BOLTS — Compressor is internally spring-mounted. Do not loosen or remove hold-down bolts.

SET HEAT ANTICIPATOR on thermostat at 0.6 amps.

OPEN GAS SUPPLY LINE VALVE and purge line by loosening ground joint union (Fig. 4). Tighten union when gas odor is detected.

ADJUST BLOWER SPEED, if required, to maintain heat temperature rise limits given in Table 1.

CHECK MAIN BURNERS

1. Measure and adjust main burner gas input as described in Service section.
2. Turn main gas valve to ON position and operate unit for at least 15 minutes with all access panels in place.
3. With unit operating, remove heating section access panel. Check burner flames. Flames should be clear, almost transparent blue. If flames appear yellow, a change to factory set primary air adjustment has occurred. Refer to Fig. 7 and readjust primary air as follows: Loosen primary air spoiler locking screw. Rotate adjustment tab counterclockwise (slightly) until flame becomes blue. If flames lift off burner ports, turn adjustment tab clockwise. Retighten locking screw.

FINAL HEATING SYSTEM CHECKOUT — Move thermostat dial above and below room temperature setting several times, pausing at least 5 minutes between cycles. Check pilot flame, main burner ignition, flame characteristics and indoor (evaporator) fan motor time delay relay operation. Replace heating section access panel.

COOLING SYSTEM CHECKOUT

1. Turn power on.

2. Set room thermostat selector switch at COOL or AUTO. and dial setting below room temperature.
3. Move thermostat dial above and below room temperature several times, pausing at least 5 minutes between cycles. Check fan and compressor operation.

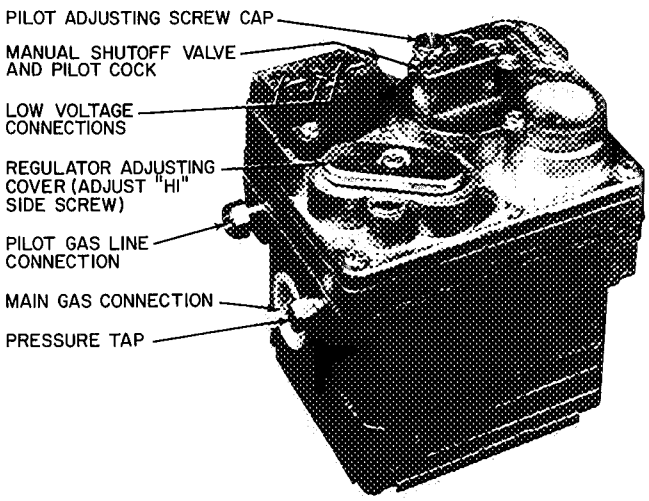


Fig. 6 — Unit Gas Valve

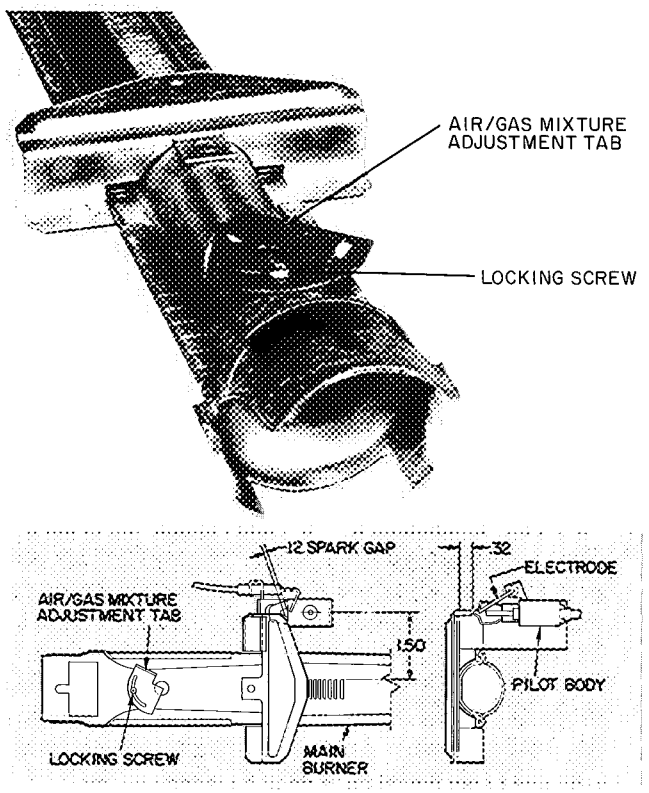


Fig. 7 — Main Burner Adjustment Details

Start-Up Sequence, Natural and LP Gas Units With Intermittent Spark Ignition of Pilot, indoor (evaporator) fan motor time delay relay and Essex SX242 gas valve.

MANUAL SEQUENCE

1. With power off turn manual gas valve knob to ON position.
2. Set thermostat selector switch at HEAT position and set thermostat dial a few degrees above room temperature.
3. Turn power on, and unit automatically operates as described below.

AUTOMATIC SEQUENCE

1. Pilot valve opens, spark ignition and indoor fan time delay relay energize.
2. Gas flows to pilot and ignites. Pilot flame sensing probe permits energizing of the main gas valve. Gas flows to main burner and ignites.
3. Time delay relay starts indoor fan motor in 30 — 45 seconds.
4. When thermostat setting is satisfied, main gas valve and pilot gas valve close and flames are extinguished.
5. Indoor fan motor stops in 1- to 1-1/2 minutes.

CAUTION: Do not use matches to light pilot on intermittent pilot units because of electrical shock hazard.

GENERAL OPERATING SEQUENCES

These sequences apply to both natural and LP gas units in normal operation after initial start-up.

Operating Sequence-Heating

NATURAL GAS AND LP UNITS WITH INTERMITTENT PILOT

1. Thermostat selector switch at HEAT or AUTO. Thermostat dial set above room temperature.
2. Pilot gas valve opens. Gas flows to pilot and ignites. Pilot flame sensing probe causes main gas valve to open. Gas flows to main burner and ignites.
3. TDR starts indoor fan motor in 30 — 45 seconds.
4. When thermostat is satisfied both pilot gas and main gas valves close. Pilot and main burner flames are extinguished.
5. TDR stops indoor fan motor in 1- to 1-1/2 minutes.
6. Pilot is on only when thermostat calls for heating.

Operating Sequence — Cooling

1. Unit energized. Thermostat selector switch at COOL or AUTO. Thermostat dial set below room temperature.
2. Indoor and outdoor fans and compressor start.
3. When thermostat setting is satisfied, fans and compressor stop.

Automatic Operation — Power and gas on. Room thermostat (control center) set at AUTO. Fan switch (on control center) set at AUTO.

Unit performs as described in the operating sequences above on call for heating or cooling.

Automatic changeover type thermostat is required.

Continuous Fan Operation – With power supplied to unit and fan switch at ON position, indoor fan remains on at all times.

Complete Shutdown or Change from Heating to Cooling

1. Turn thermostat selector switch to OFF.
2. Remove heating section access panel.
3. Turn manual shutoff valve (Fig. 6) to PILOT. Then depress valve and turn to OFF.
4. Turn off power. Replace access panel.

SERVICE

Adjusting Main Burner Gas Input (Refer to Fig. 4 and 6 and to Table 4 and 5) – Need for adjustment is determined by comparing measured gas input (flow rate or manifold pressure) against the rated input of a gas with a specific heating value. Check local gas supplier for correct heating value (BTU's per cu ft). Before measuring, shut down all other gas appliances.

Flow rate (cfm), the most accurate method, is measured by gas meter and stop watch. Check measured flow against rated flow in Table 5.

→ **Table 5 – Gas Rate (cfm)**

UNIT	48EL006	48EM006
Natural 1000	1 83	2 50
Natural 1050	1 74	2 38
Natural 1100	1 66	2 27
Butane 3200	57	78
Propane 2500	73	1 00

Manifold pressure (in. wg) is measured as follows:

1. Remove heating section access panel.
2. Shut down unit and close gas supply line valve (Fig. 4).
3. Remove pressure tap plug from main gas valve (Fig. 6) and install pressure tap.
4. Attach U-tube water gage manometer to pressure tap and open gas supply line valve.
5. Start-up heating system.
6. Measure gas pressure (in. wg) and compare with rated pressure in Table 4.

To adjust pressure or flow rate:

1. Remove pressure regulator adjusting screw cap on main gas valve (Fig. 6).
2. Turn screw slowly, clockwise to increase pressure (flow), and counterclockwise to decrease.
3. Replace adjusting screw cap.
4. Shut down heating system.
5. Close gas supply line valve, remove manometer and replace pressure tap plug.
6. Open gas supply line valve and replace heating section access panel.

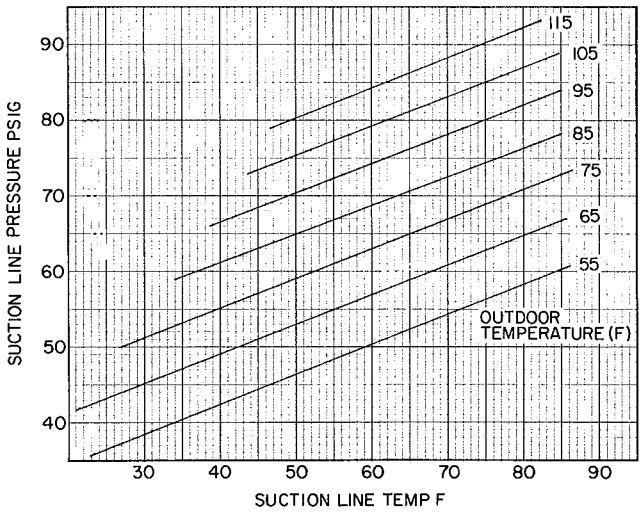
Refrigerant Charging – Standard 1/4-in. Schrader service connections are provided on the high and low sides of the refrigerant system for charging and evacuation.

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.

LOW CHARGE – Using charging chart (Fig. 8), add refrigerant until the conditions of the chart are met. Charts are based on charging the units to the correct superheat for the various operating conditions. An 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.



→ **Fig. 8 – Charging Chart – 48EL,EM006**

TO USE CHARGING CHART – Take the outdoor ambient temperature and read the suction pressure gage. Refer to chart to determine what the suction temperature should be. If the suction temperature is high, add refrigerant. If the suction temperature is low, carefully blow some of the charge. Recheck the suction pressure as charge is adjusted.

If Chargemaster® charging device is used, temperature and pressure readings must be accomplished using charging chart, Fig. 8.

Part Removal (Refrigerant System)

CAUTION: System contains oil and refrigerant under pressure. Do not use torch to remove component. Wear your protective goggles.

1. Shut off electrical power to unit.
2. Relieve all pressure from system.
3. Cut connecting piping with tubing cutter.
4. Remove component from unit.
5. Unsweat piping stubs carefully. Oil may ignite when exposed to torch flame.

WELDED HERMETIC COMPRESSOR – *Make certain that all safety codes are followed. Use protective goggles, work gloves and water-soaked quenching cloth.*

1. Shut off electrical power and remove all wiring from compressor.
2. Purge or remove all refrigerant and pressure from system.
3. Cut suction and discharge lines with tubing cutter at convenient place near compressor to facilitate reassembly with copper slip couplings.
4. Remove compressor from unit and carefully unbraze piping stubs. *Oil vapor in piping stubs can ignite from torch flame, use quenching cloth if necessary*
5. Install old piping stubs on new compressor and carefully braze in place.
6. Clean system. Add or replace liquid line filter drier.
7. Install new compressor in unit and braze in place with field-supplied copper slip couplings. Protect pressure relief plug in suction line with wet rag if brazing near it.
8. Connect wiring; replace wire terminals if necessary.
9. Attach caution sticker to new compressor.
10. Proceed with evacuation, charging and start-up. Procedures for evacuation and system cleanout can be found in Carrier Standard Service Techniques Manual, Chapter 1, Form SM-1.

Part Removal Evaporator Fan (Blower Wheel) – Remove fan as follows:

1. Shut off all electrical power to unit.
2. Remove heating section access panel.
3. Loosen 5 screws and remove interior panel.
4. Disconnect the 2 wires to the fan motor.
5. Remove screws holding the evaporator fan housing and the support strap and slide housing and fan from unit.

Spring Inspection

Disconnect electrical power before working inside unit.

1. Inspect and clean (if required) fan blades and housing, cooling coil, condensate pan and drain. See below for cleaning details.
2. Inspect and clean air filter, and supply and return air grilles.
3. Check electrical components and connections. Checking procedures may be found in Carrier Standard Service Techniques Manual, Chapter 2, Form SM-2.
4. Inspect panels and ducts for air leaks.

Fall Inspection

Disconnect electrical power before working inside unit.

1. Follow all steps under Spring Inspection.
2. Inspect and clean pilot, main burners, heat exchangers and flues.
3. Check main gas valve operation.

Cleaning

HEAT EXCHANGER

1. Shut down unit.
2. Remove heating section access panel, heat shield front upper panel, flue box and radiation baffle over burners. Preserve all gaskets.
3. Clean soot from inside of heat exchanger and other internal surfaces, especially the narrow vertical sections of tubes. Use a long wire-handled nylon-bristle brush and vacuum cleaner.
4. Reassemble unit. Take care not to damage gaskets.

INDOOR (EVAPORATOR) COIL – Clean with stiff brush, vacuum cleaner or compressed air.

OUTDOOR (CONDENSER) COIL – Clean outdoor coil annually or as required by location or outdoor air conditions. Inspect coil monthly – clean as required.

Fins are not continuous thru coil sections. Dirt and debris may pass thru first section, become trapped between the 3 rows of fins, and restrict condenser airflow. Use a flashlight to determine if dirt or debris has collected between coil sections.

Clean coil as follows:

1. Turn off unit power.
2. Remove top cover screws and slide cover toward the compressor end of unit and/or to the side to expose top of condenser coil.
3. Remove screws that fasten the 3 sections of the tube sheet together at the return bend end of the condenser coil. Carefully spread the ends of the coils apart (see Fig. 9).

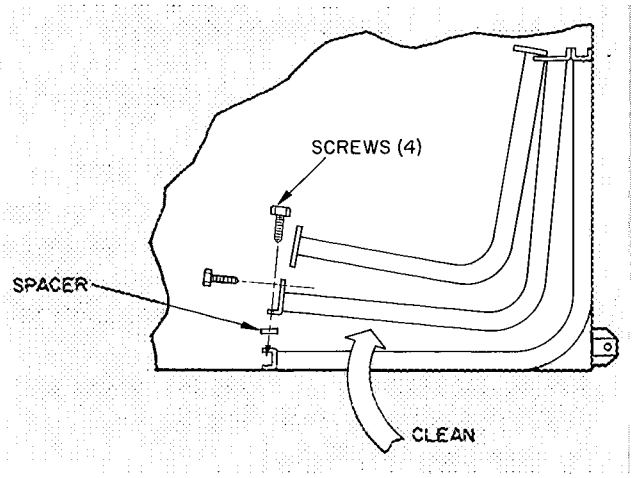


Fig. 9 – Outdoor Coil Cleaning

4. Using a water hose, or other suitable equipment, flush down between the 3 sections of the condenser coil to remove dirt and debris.
5. Clean the remaining surfaces in the normal manner.
6. Reposition the inner coil sections. Reinstall the screws in the tube sheet and replace the top cover.

CONDENSATE PAN AND DRAIN LINES – Clean once a year, preferably in the spring. Drain off water in the fall and keep trap dry or protect from freeze-up thru the winter.

FILTERS – Inspect filters at start of each heating and cooling season and as often during each season as conditions warrant. Clean permanent filters per manufacturer's instructions. Throwaway filters may be cleaned by vacuum or by tapping lightly over newspaper. Replace filters with the cleaner side facing downstream. After one cleaning, replace throwaway filter.

INDOOR FAN ADJUSTMENT – Fan motor pulley is factory set for speed shown in Table 1. To change fan speed:

1. Shut off unit power supply.
2. Slide fan housing from unit.
3. Loosen fan belt by loosening fan motor mounting plate bolts.
4. Loosen movable pulley flange setscrew (see Fig. 10).
5. 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 fan as specified in Table 1.
6. Set movable flange at nearest keyway of pulley hub and tighten setscrew.

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 (see Fig. 10).

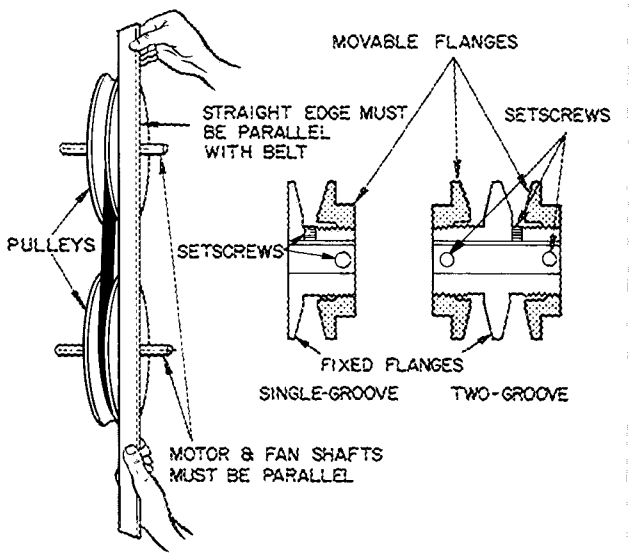


Fig. 10 – Indoor Air Fan Pulley Alignment and Adjustment

To Adjust Belt Tension – Loosen fan motor pivot bolts. Move motor mounting plate 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.

OUTDOOR FAN ADJUSTMENT – The required fan position is shown in Fig. 11. Loosen setscrews, set fan at dimension indicated and retighten.

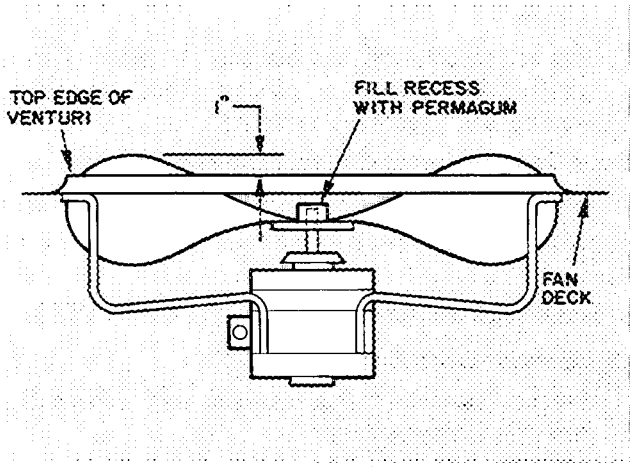


Fig. 11 – Outdoor Fan Clearance

Adjusting Spark Ignition – If pilot fails to ignite, check the spark ignition system as follows:

1. Shut off power to ignitor.
2. Check that spark gap is .12 inch. (See Fig. 7.)
3. Make sure that spark generator is .securely grounded.
4. Check that high-voltage lead is securely connected between generator and electrode body.
5. Restore power. Check for 24-volt supply to primary side of generator.

Lubrication

FAN MOTOR BEARINGS are factory lubricated and do not require service for 3 to 5 years, depending upon type of service. When required, clean and relubricate per motor manufacturer's instructions.

COMPRESSOR contains a factory oil charge. If oil is lost thru leakage, refer to Carrier Standard Service Techniques Manual SM-1, Chapter 1 for oil recharging procedure.

TROUBLESHOOTING – HEATING SYSTEM

Burner Does Not Operate

Power failure – *Power switch off; blown line fuse; defective wiring.*

No power to controls – *thermostat set too low, dirty or defective; defective transformer, faulty limit switch.*

Burner does not ignite – *no gas to unit; faulty valve or pilot switch; faulty spark ignitor; dirty pilot.*

Burner Operates, But Heating is Inadequate

Unit undersized – *unit size selected incorrectly*

Fuel input too low – *wrong orifice size, regulator set too low*

Thermostat opens too soon – *wrong anticipator setting, thermostat out of calibration, wrong thermostat location; thermostat set wrong.*

Limit switch cycles burner – *dirty filters; faulty fan switch or motor; limit switch set wrong; duct system restricted*

Poor Combustion and Flame Characteristics

Smoky flame – *insufficient air, flue restriction.*

Noisy burner – *too much air, incorrect input*

TROUBLESHOOTING – COOLING SYSTEM

Compressor Does Not Start

Power failure – *power switch off; blown line fuse, defective wiring.*

No power to controls – *thermostat set too low; or dirty or defective, defective transformer, contactor coil open; loose leads from closed contactor.*

Power to compressor – *motor windings open, contactor closes, then opens*

Compressor Runs But Cooling is Insufficient

Low suction pressure – *restricted airflow; capillary tubes restricted; low refrigerant charge.*

Low head and high suction pressure – *defective compressor valves.*

Indoor fan stopped – *loose or broken leads, faulty capacitor; internal short circuit*

Compressor Does Not Restart

Power failure – *power switch off, blown line fuse*

Power at closed contactor – *faulty start relay or capacitor, contactor, run capacitor or compressor, low line voltage (must be within 10% of nameplate voltage)*

Compressor Cycles on Overload

Insufficient condenser air – *check condenser fan position in reference to orifice as in Fig 11.*

Condenser air restricted – *dirty coil, airflow restricted*

Condenser air recirculating – *obstruction deflecting airflow.*

Improper line voltage – *circuit overloaded; loose electrical connections*

Faulty run capacitor – *capacitor shorted or low on capacitance (mfd)*

Noncondensables in system – *moisture or air in system*

System overcharged – *high head pressure causes by excessive refrigerant.*

No refrigerant in system – *leak in system.*

System restricted – *capillary tubes restricted or plugged, kinked tubing, dirty strainer*

Fan slipping on motor shaft – *setscrews either loose or missing from fan.*

Fan motor bearing seized – *lack of oil or bearing failure.*

Fan motor defective – *internal short circuit*

For replacement items use Carrier Specified Parts.

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

Book	1	4
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Form 48EL-1SI Supersedes 48DL-1SI Printed in U S A 11-78 PC 111 Catalog No 534-853