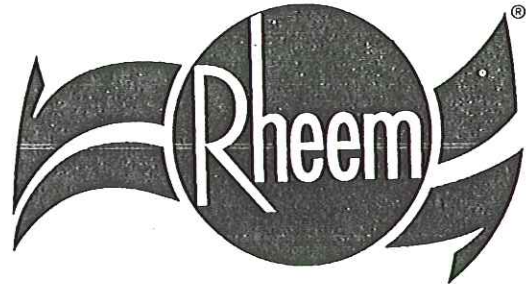
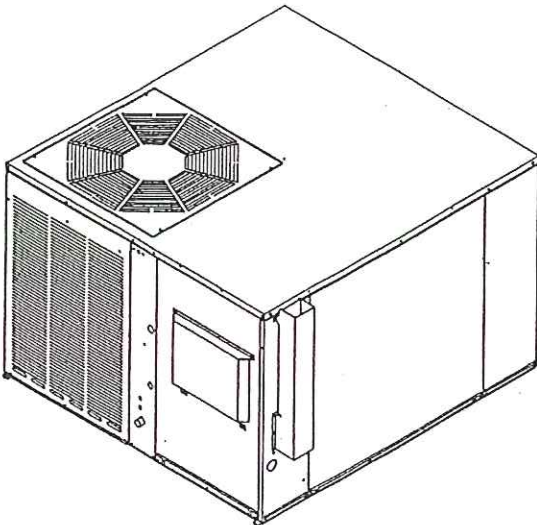



INSTALLATION INSTRUCTIONS

FOR COMBINATION HEATING AND COOLING ROOFTOP UNITS EQUIPPED WITH INTERMITTENT IGNITION

RRKA/RRMA SERIES



 Recognize this symbol as an indication of Important Safety Information!

WARNING

If the information in these instructions is not followed exactly, a fire or explosion may result, causing property damage, personal injury or loss of life.

WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED, LICENSED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

Do Not Destroy this Manual. Please read carefully and keep in a safe place for future reference by a serviceman.

FOR YOUR SAFETY

- Do not store or use gasoline or other flammable vapors and liquids, or other combustible materials in the vicinity of this or any other appliance.
- WHAT TO DO IF YOU SMELL GAS
 - Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
 - Do not return to your home until authorized by the gas supplier or fire department.
- DO NOT RELY ON SMELL ALONE TO DETECT LEAKS. DUE TO VARIOUS FACTORS, YOU MAY NOT BE ABLE TO SMELL FUEL GASES.
 - U.L. recognized fuel gas and CO detectors are recommended in all applications, and their installation should be in accordance with the manufacturer's recommendations and/or local laws, rules, regulations, or customs
- Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency or the gas supplier.



Accredited by the Dutch Council for Certification



ISO 9002



1. FURNACE SECTION CONTROLS AND IGNITION SYSTEM

INDIVIDUAL FURNACE OPERATING SEQUENCE

This unit is equipped with an integrated circulating air blower/induced draft blower control board that works in conjunction with a remote sense direct spark ignition control.

1. Thermostat calls for heat.
2. Induced draft blower is energized.
3. Air proving pressure switch closes.
4. 30 second prepurge is initiated.
5. Gas valve opens and ignitor energized for 7 second trial for ignition period.
6. Burners ignite and flame sensor proves all burners have lit (maximum of 3 trials for ignition each hour).
7. The circulating blower is energized after 20 seconds.
8. Thermostat is satisfied and opens.
9. The gas valve is de-energized and closes, shutting down the burner flame.
10. The circulating air blower is de-energized after 90 seconds.

After a total of three cycles without sensing main burner flame, the system goes into a 100% lockout mode. After one hour, the ignition control repeats the prepurge and ignition cycles for 3 tries and then go into 100% lockout mode again. It continues this sequence of cycles and lockout each hour until ignition is successful or power is interrupted. During the lockout mode, neither the ignitor or gas valve will be energized until the system is reset by turning the thermostat to the "OFF" position or interrupting the electrical power to the unit for 10 seconds or longer. The induced draft blower and main burner will shut off when the thermostat is satisfied.

The indoor blower is energized 50 seconds after a call for heat. Therefore, if the burners ignite on the first try, the indoor blower will be energized 20 seconds after the burners ignite (50 second "on" delay minus the second prepurge). If the burners do not light on the first try, the indoor blower will start before the burners ignite. If the ignition control locks out, the indoor blower will continue to operate as long as there is a call for heat.

The circulating air blower will start and run on the heating speed if the thermostat fan switch is in the "ON" position.

OPERATING INSTRUCTIONS

This appliance is equipped with a direct spark intermittent ignition device. This device lights the main burners each time the room thermostat (closes) calls for heat. See operating instructions on the back of the furnace/controls access panel.

▲ WARNING

DO NOT ATTEMPT TO MANUALLY LIGHT THIS FURNACE WITH A MATCH OR ANY OPEN FLAME. ATTEMPTING TO DO SO CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

TO START THE FURNACE

1. Set the thermostat to its lowest setting.
2. Turn off all electric power to the appliance.
3. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
4. Remove control door.
5. Depress the control knob and move to the "OFF" position. Turn the knob by hand only, do not use any kind of tool.
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow B in the safety information on the Operating Instructions located on the back of the controls/access panel. If you don't smell gas, go to the next step.
7. Move the gas control knob from "OFF" position to "ON" position. Operate this appliance with the gas control knob in the "ON" position only. Do not use the gas control knob as a means for throttling the burner input rate.
8. Replace the control door.
9. Turn on all electric power to the appliance.
10. Set the thermostat to the desired setting.
11. If the appliance will not operate, follow the instructions below on how to shut down the furnace.

▲ WARNING

THE SPARK IGNITOR AND IGNITION LEAD FROM THE IGNITION CONTROL ARE HIGH VOLTAGE. KEEP HANDS OR TOOLS AWAY TO PREVENT ELECTRICAL SHOCK. SHUT OFF ELECTRICAL POWER BEFORE SERVICING ANY OF THE CONTROLS. FAILURE TO ADHERE TO THIS WARNING CAN RESULT IN PERSONAL INJURY OR DEATH.

The initial start-up on a new installation may require the control system to be energized for some time until any air has bled through the system and fuel gas is available at the burners.

TO SHUT DOWN FURNACE

1. Set the thermostat to the lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control door.

4. Depress control knob and move to the "OFF" position.
5. Replace control door.

▲ WARNING

SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, SHUT OFF THE MANUAL GAS VALVE TO THE APPLIANCE BEFORE SHUTTING OFF THE ELECTRICAL SUPPLY. FAILURE TO DO SO CAN RESULT IN AN EXPLOSION OR FIRE CAUSING PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH!

BURNERS

Burners for these units have been designed so that field adjustment is not required. Burners are tray-mounted and accessible for easy cleaning when required.

MANUAL RESET OVERTEMPERATURE CONTROL

A manual reset overtemperature control is located on the burner shield. This device senses blockage in the heat exchanger or insufficient combustion air. This shuts off the main burners if excessive temperatures occur in the burner compartment.

Operation of this control indicates an abnormal condition. Therefore, the unit should be examined by a qualified installer, service agency, or the gas supplier before being placed back into operation.

▲ WARNING

DO NOT JUMPER THIS DEVICE! DO NOT reset the overtemperature control without taking corrective action to assure that an adequate supply of combustion air is maintained under all conditions of operation. Failure to do so can result in carbon monoxide poisoning or death. Replace this control only with the identical replacement part.

PRESSURE SWITCH

This furnace has a pressure switch for sensing a blocked exhaust or a failed induced draft blower. It is normally open and closes when the induced draft blower starts, indicating air flow through the combustion chamber.

LIMIT CONTROL

The supply air high temperature limit cut-off is set at the factory and cannot be adjusted. It is calibrated to prevent the air temperature leaving the furnace from exceeding the maximum outlet air temperature. **WARNING: DO NOT JUMPER THIS DEVICE!** Replace this control only with the identical replacement part.

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Tempstar Roof-top Units

**RESIDENTIAL
PACKAGED GAS-ELECTRIC
COMBINATION UNITS**

**Service
Manual**

PGMD	NPGAA	NG4P0
PGME	NPGAB	NG6P0
	NPGAD	

This manual supports packaged gas-electric combination units manufactured after 1991

Manufactured by:

Inter-City Products
Corporation
Laverne, TN USA 37086

Part Number
462 081001 00

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SV9500 SYSTEM OPERATION

Connecting the unit to the line voltage supply provides 24 volts to power the system. (this is accomplished by the connections from terminals [pins] #4 & #2 from the ST9120 fan timer to terminals #1 & #3 of the SV9500 gas valve)

When the thermostat calls for heat, (the combustion blower starts, causing the pressure switch to close completing the circuit to the ignition system control) there will be approximately a two (2) second delay, while the ignition system control runs a self check

Part of that self check is to see if a flame signal is detected. If a flame signal is detected upon a call for heat (and naturally there shouldn't be), the ignition system control will energize the electronic fan timer output (causing the conditioned air blower to start after the fixed 60 second "ON" delay) and will keep the valve and ignitor circuits off.

Assuming that no flame signal is detected upon the call for heat, (Normal operation), the ignition system control will power the ignitor circuit (24 Volts) causing the ignitor to heat up.

If the ignitor circuit is not proven (I.E. the ignitor is missing, broken, or the connections are loose) there will be no response from the ignition system control. (Lockout)

Once the ignitor circuit has been proven, and the ignitor begins to heat up, the pilot valve will be energized allowing gas to flow to the pilot burner.

With the ignitor now hot, and gas flowing to the pilot, the pilot should light, and the sensor should sense flame.

If no flame is sensed, (I.E. no gas, pilot not lit, flame not enveloping sensor, etc.) the ignitor will stay on, and the pilot valve will remain open until it does sense flame, or until the call for heat is satisfied. THE SYSTEM WILL NOT LOCK OUT under this condition.

Assuming that the pilot does light, and flame is sensed, (normal operation) the ignition system control will turn the ignitor off, while energizing the main valve. This will allow the pilot to light the main burner. It will also energize the electronic fan timer output (causing the conditioned air blower to start after the fixed 60 second "ON" delay).

If a flame outage (I.E. loss of gas supply, blown out, etc.) should occur during a run cycle (Main burner operation),

the ignition system will immediately de-energize the main valve and re-power the ignitor circuit placing the system back in to the "Trial For Ignition" mode.

As previously, it will remain in this "Trial For Ignition" mode (Ignitor powered and pilot valve open) either until the pilot lights and flame is sensed, or until the call for heat ends.

If, during main burner operation, the ignitor circuit opens, (I.E. ignitor breaks, or wiring becomes disconnected or loose from control) the pilot and main valve will close and the system will shut down. (Lockout)

Consequently, as you can see, the only condition that will cause a lockout in this system is an unproven ignitor circuit.

With any other type of condition, (loss of gas, loss of power, etc.) the system will reset itself, and revert to a "Trial For Ignition" mode until it either lights and resumes main burner operation, or the call for heat ends.

The SV9500 system is **not sensitive** to furnace grounding or line voltage polarity. Accordingly, you cannot experience a lockout due to those reasons.

Assuming that the main burner did not experience any problems during the run cycle (normal operation) it would continue to operate as long as the call for heat remained.

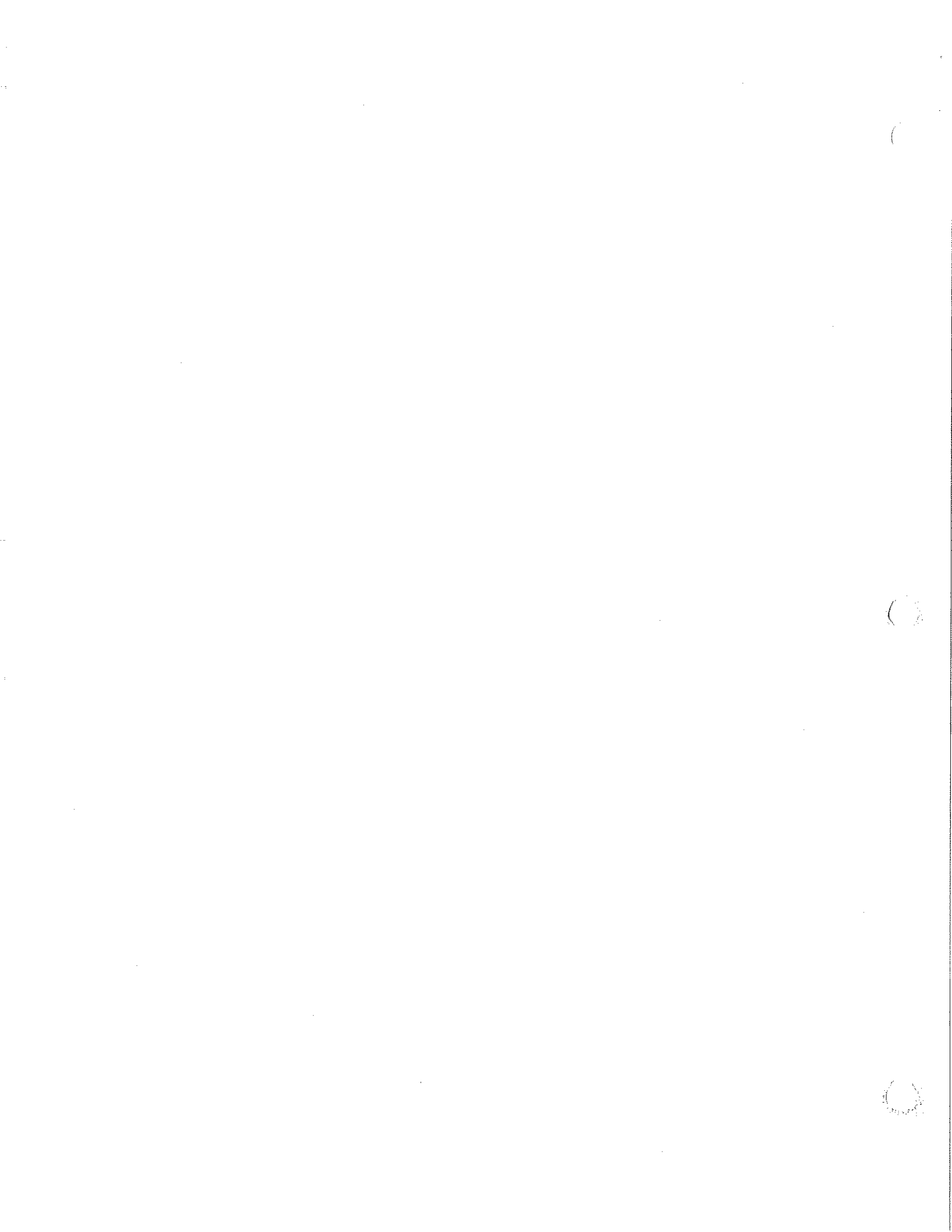
Once the call for heat ended, the ignition system control would immediately close the main and pilot valves, and de-energize the electronic fan timer output.

De-energizing the electronic fan timer output causes the "OFF" delay timing to begin, and when the pre-selected time (60,90,120, or 150 seconds) expires, the blower will turn off.

TROUBLESHOOTING

Malfunctions of the HONEYWELL SV9500 "Smart Pilot" system may be easily diagnosed using a voltmeter and a spare igniter/flame rod assembly. The igniter itself can also be checked using an Ohmmeter. Resistance of a "Good" igniter should be 10 Ohms or less. See the troubleshooting flow chart and the sequence of operation flow charts on pages 140 & 141 of this manual for additional information on operation and troubleshooting.

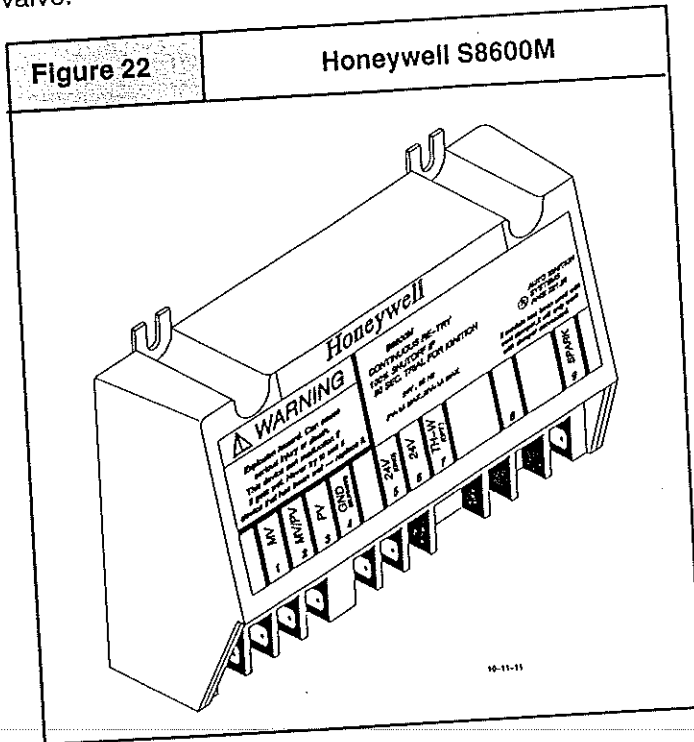
Q #18



HONEYWELL S8600M (SPARK -to- PILOT) IGNITION SYSTEM

Q # 19

Earlier models used a HONEYWELL S8600M spark to pilot ignition system in conjunction with a VR8204 gas valve.



providing a "Trial for Ignition". During this five (5) m "Wait Cycle", apparently nothing will be happening. combustion blower, however, will be running, (assuming the pressure switch is closed), the S8600M will remain energized. The gas valve a spark, however, will not be energized during this Cycle" period.

Once the "Wait Cycle" is complete, the S8600M provide another 90 seconds "Trial for Ignition". S8600M will continually repeat this sequence (1. second "Trial for Ignition" followed by a Five (5) n "Wait Cycle") until the pilot and main burner light, call for HEAT ends.

During troubleshooting, the "long" five (5) minute Cycle" can be eliminated by simply satisfying the HEAT, and recalling, or by breaking and remaking 1 voltage power to the unit. This will reset the S8 and immediately provide another 90 second "T Ignition".

TROUBLESHOOTING

Malfunions of the HONEYWELL S8600M "S Pilot" may be easily diagnosed using a Volt-Ohm. See the troubleshooting flow chart in the back p this manual.

OPERATION

On a call for HEAT, the S8600M is energized (once the pressure switch closes) and provides a 90 second "Trial For Ignition". This "Trial for Ignition" provides a high voltage spark (approximately 20,000 Volts) to the ignitor, and energizes the pilot circuit of the gas valve.

With spark and gas now available at the pilot burner, the pilot should light and prove flame by flame rectification on the flame sensor.

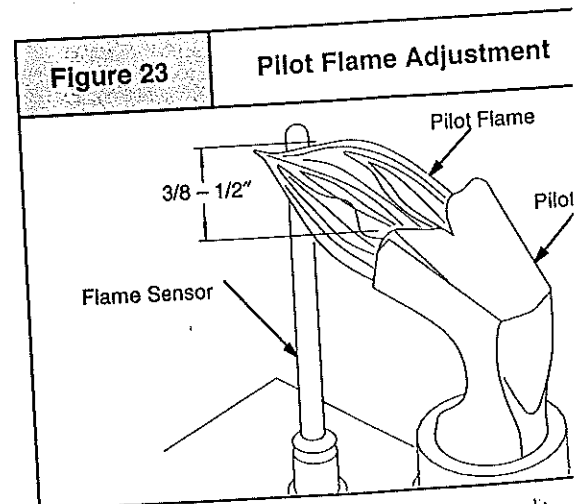
When the S8600M detects the flame rectification of the proven pilot flame, it will simultaneously turn off the spark, and energize the main valve. This will allow the pilot light to light the main burner.

If for some reason the pilot does not light, (I.E. no gas or no spark) or if it lights but does not prove flame (rectification) within the 90 second "Trial for Ignition", the pilot circuit and spark will be de-energized for a "Wait Cycle" of approximately five (5) minutes.

The purpose of the "Wait Cycle is to allow any unburned gasses to be vented out the flue before once again

PILOT ADJUSTMENT (All Model

Pilot flame adjustment is the same for all regardless of which ignition system is used. flame should be adjusted to envelop flame s shown in Figure 23. Turn pilot adjustmen COUNTERCLOCKWISE (out) to INCREASE CLOCKWISE (in) to DECREASE.





Day & Night

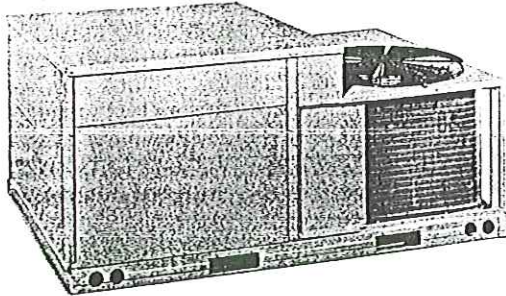
Day & Night
Air Conditioning

**COMMERCIAL
SINGLE PACKAGE ROOFTOP
GAS HEATING/ELECTRIC COOLING UNITS**

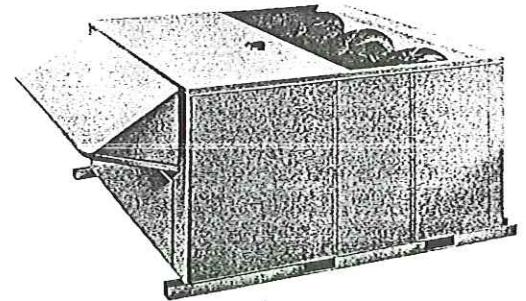
Model 579F/580D

Sizes 036-300

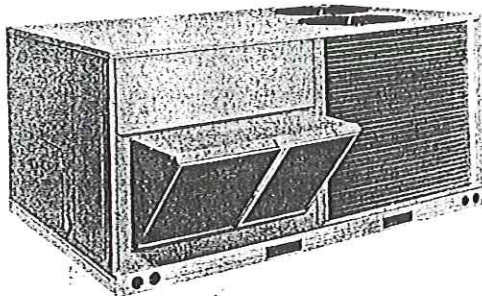
3 to 25 Ton



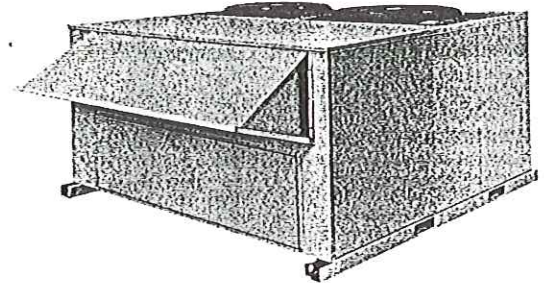
Model 580D036-072



Model 579F180,216



Model 580D090-150



Model 579F240,300

DESCRIPTION

The 579/580 gas heating/electric cooling rooftop units are designed to deliver optimum performance and reliability in a commercial rooftop unit.

The 3 to 25 ton units are one-piece gas heating, electric cooling units that are prewired and precharged with R-22 at the factory, making jobsite installation easy. Every unit is factory run-tested prior to shipment to ensure reliable installation.

The 579/580 units are designed to be field-convertible from vertical supply/return to horizontal supply/return (180-300 units require an accessory horizontal roof curb or horizontal adapter), making them easily adaptable to a wide variety of new construction and replacement applications. For vertical supply/return jobs, ductwork can be connected directly to the roof curb, allowing ductwork to be completed before unit is available for installation. All units include easily replaceable internal filters.

The 579/580 units are available in a range of heating sizes and voltage options to meet most job requirements. Low-voltage terminal blocks make wiring connections quick and simple.

All units are listed with either UL (Underwriters' Laboratories) or ETL Laboratories and with CSA (Canadian Standards Association), UL Canada, or Warnock Hersey. All units are ARI (Air-Conditioning & Refrigeration Institute) approved (except the 300 unit, which is beyond the scope of the ARI certification program) and comply with ASHRAE Standard 62 (American Society of Heating, Refrigeration, and Air Conditioning Engineers).

STANDARD FEATURES

EFFICIENT DESIGN means cooling and heating energy savings. Standard units have EERs (energy efficiency ratios) of 10 to 9.2 and SEERs (seasonal energy efficiency ratios) of 10 to 9.2 (036-060 belt drive units only). The 580D units have an AFUE (Annual Fuel Utilization Efficiency) rating of 80.0% with a California Seasonal Efficiency rate of 75.8% or better. All 579/580 units have a steady-state efficiency of 80.0%.

THE FACTORY-ASSEMBLED PACKAGE is a compact, fully self-contained electric cooling/gas heating unit that is prewired, prepiped, and precharged for minimum installation expense.

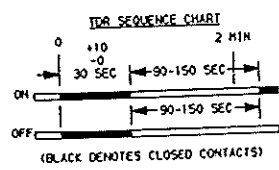
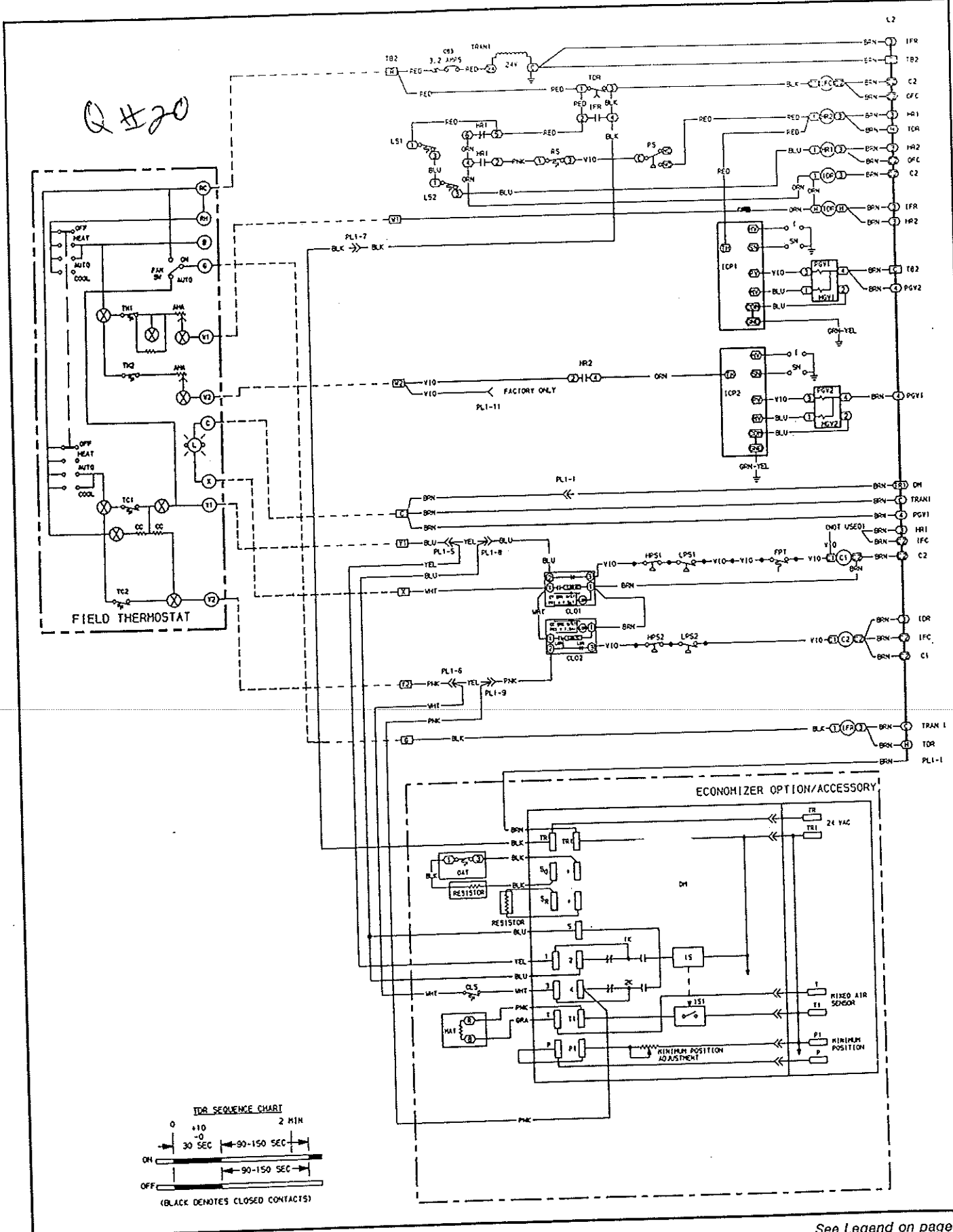
UNITS MAY BE CONVERTED TO HORIZONTAL SUPPLY/RETURN in the field. The units can be modified at the jobsite to fit a variety of applications (180-300 units require an accessory horizontal supply/return roof curb or a horizontal supply/return adapter).

INTERNAL RETURN-AIR FILTERS are provided. Two-throwaway filters are provided standard on all units, and can be easily accessed through the tool-less filter access panel. There is no need to field-fabricate filter racks or install external filter accessories.

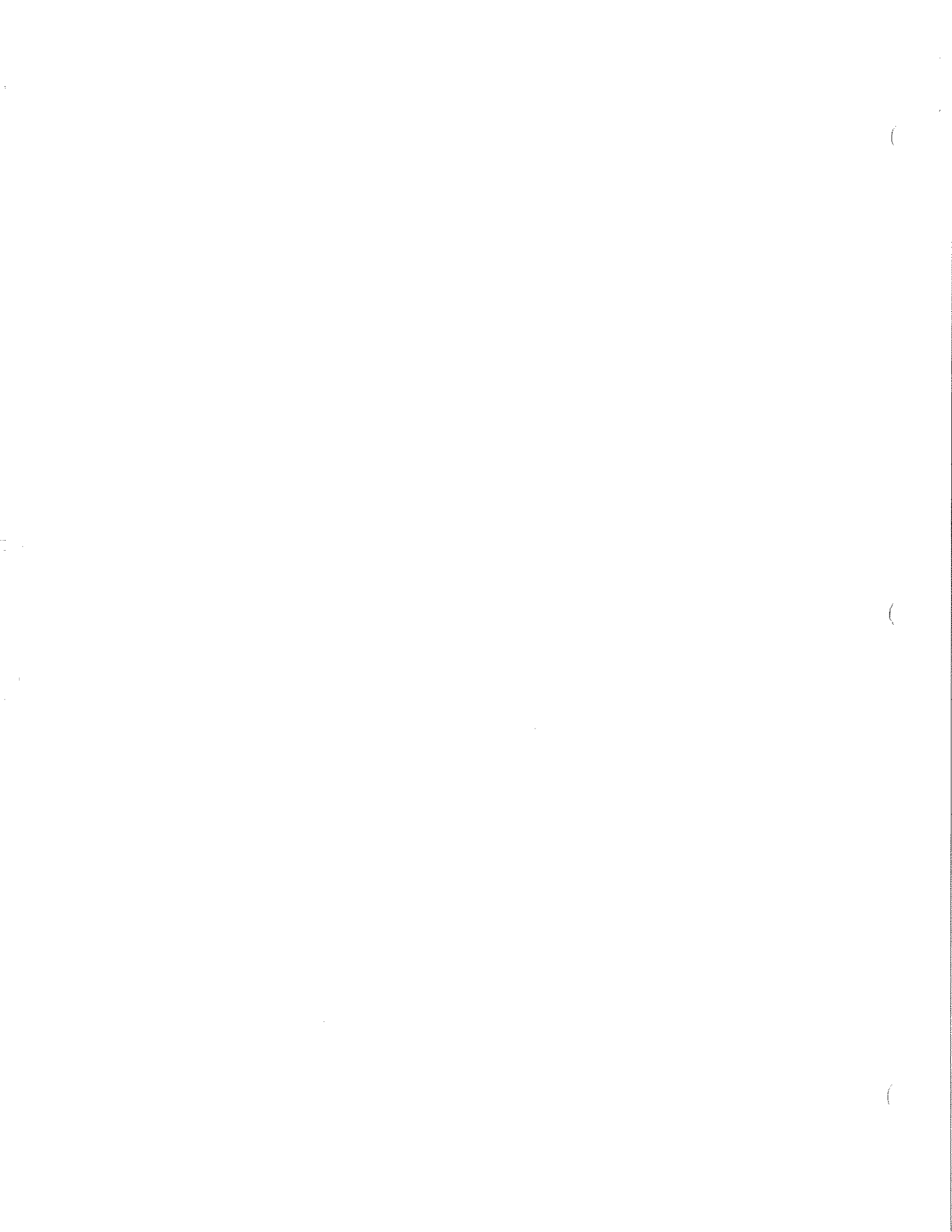
COMPRESSOR PROTECTION is assured. The 036-150 units have an internal pressure relief valve and line break (current overload) protections, and the 180-300 units have high-pressure protection external to the compressor. These protections prohibit operation under abnormal unit conditions.



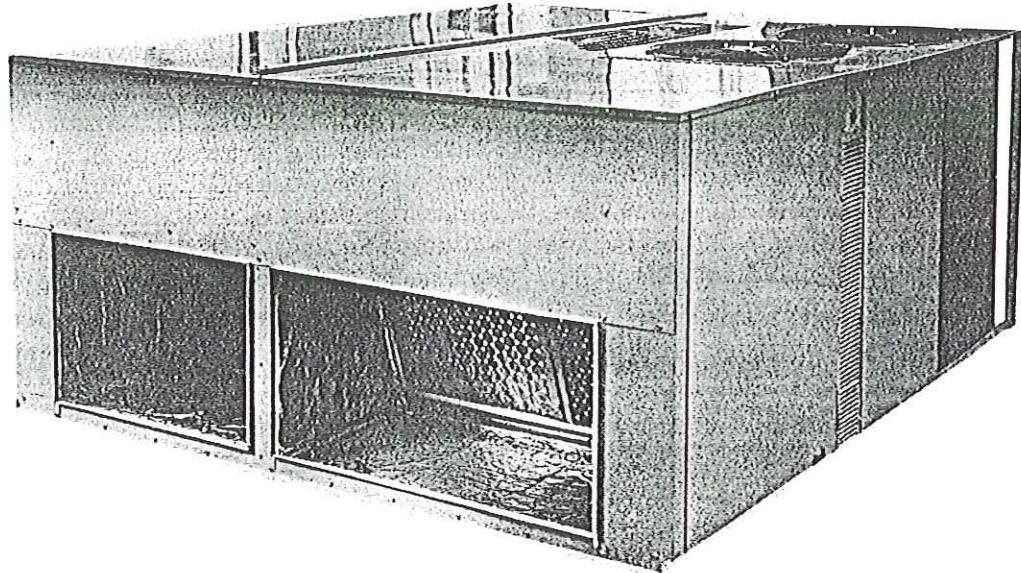
TYPICAL WIRING SCHEMATIC — 579F180-300



See Legend on page 5



INSTALLATION & OPERATING INSTRUCTIONS



COMBINATION HEATING AND COOLING OUTDOOR UNITS PG SERIES (COMMERCIAL)

FOR YOUR SAFETY WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

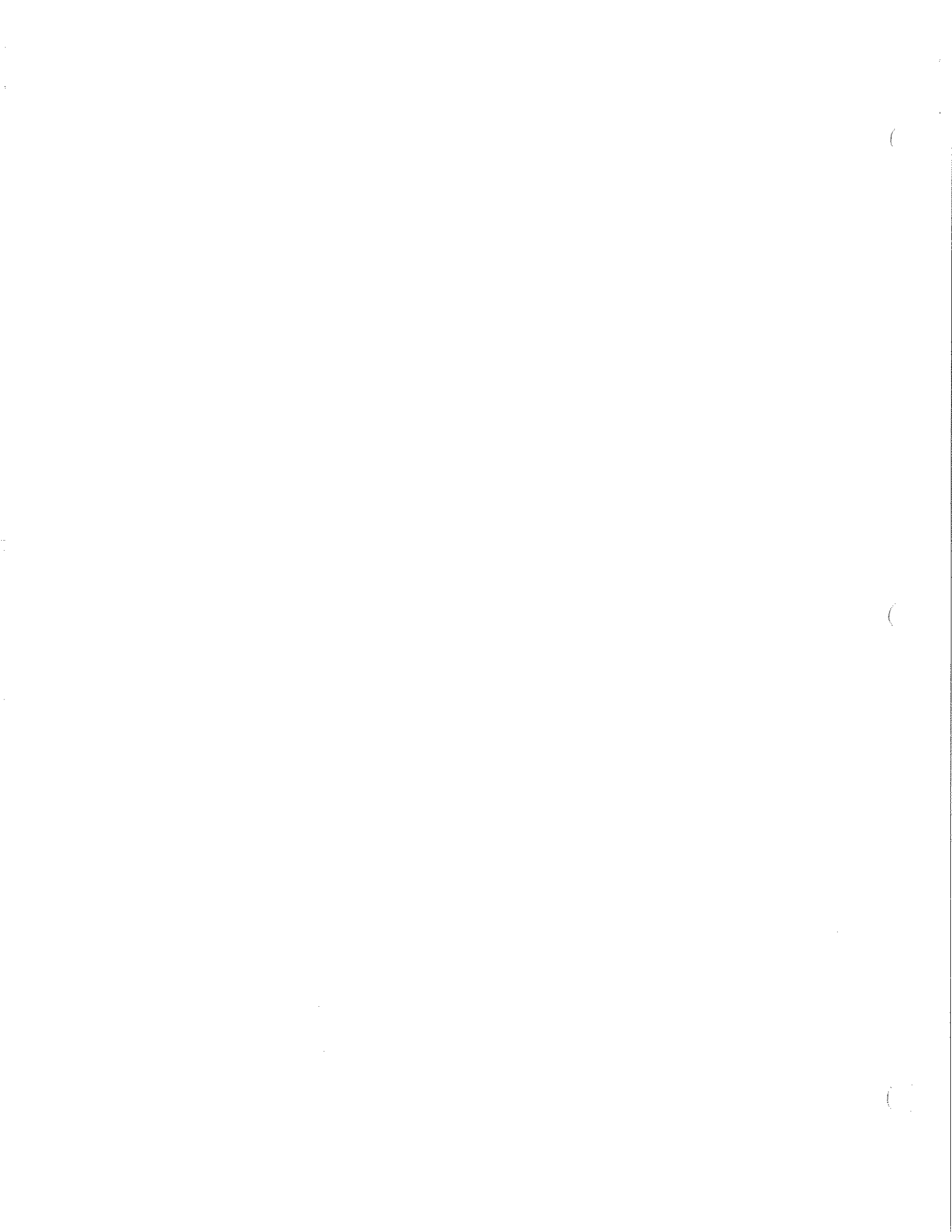
DO NOT DESTROY

**PLEASE READ CAREFULLY
AND KEEP IN A SAFE PLACE
FOR FUTURE REFERENCE.**

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

Goodman Manufacturing Corporation
1501 Seamist · Houston, Texas 77008
(713) 861 - 2500



An independent 115V power supply is recommended to be brought into the general location of this unit. It is advisable that this power supply be adequately sized and protected for use of power tools and portable lighting by a service mechanic. Certain local codes require this extra service. CHECK YOUR BUILDING CODES

Line Voltage

Supply wire size should be determined from the table below and from the appropriate tables in the National Electrical Code or the Canadian Electric Code.

MODEL	VOLTS-PH.-CY.	MAX. AMPACITY	COPPER WIRE SIZE - AWG SUPPLY WIRE LENGTH - FEET					
			50	100	150	200	250	300
PG090200-3	208/230-3-60	50	6	4	3	2	1	1/0
PG090200-4	460-3-60	25	10	8	6	4	4	3
PG120250-3	208/230-3-60	60	6	4	2	1	1/0	2/0
PG120250-4	460-3-60	30	8	6	4	4	3	2

NOTE: Table based on 75C copper connectors

Low voltage control wiring to the room thermostat shall be sized according to the thermostat load amps as shown below. Thermostat wires should not run through the same conduit as unit main supply wiring. All low voltage wiring may be with NEC Class II, unless prohibited by local codes.

Control Voltage

THERMOSTAT LOAD AMPS	SOLID COPPER WIRE - AWG LENGTH OF RUN (FEET)					
	50	100	150	200	250	300
.5	20	20	20	18	16	16
1.0	20	18	16	14	14	14
1.5	20	16	14	14	12	12
2.0	18	16	14	12	12	10

SUPPLY WIRING

Prior to installing supply unit it is important to check main supply panel to ensure that correct voltage and voltage balance exists. Operating this equipment outside the voltages shown below may cause unsatisfactory operation and a potentially dangerous situation to equipment and personnel. It is important to check direction of rotation of the evaporator motor. If motor is running backwards switch any (2) power supply wires at the field supplied disconnect switch.

Series & Rating Plate Voltage	System	Voltage Range	
		Max.	Min.
208/230	208/230-3-60	197	253
460	480-3-60	414	506

Q # 21

No more than 2% voltage unbalance is permissible. To calculate the voltage variation between each phase use the following formula:

$$\text{PERCENT VOLTAGE UNBALANCE} = \frac{100 \times \text{MAX. VOLTAGE DEVIATION FROM AVERAGE VOLTAGE}}{\text{AVERAGE VOLTAGE}}$$



6. After confirmation of pilot flame the "MV" circuit is energized permitting gas flow.
7. The Time Fan Control (located in the control box) will energize the blower contactor starting the evaporator blower at 30 seconds after the burners operation.
8. If second stage heat is required by the room thermostat (W2 energized) the warp switch in the gas valve will open allowing manifold pressure being increased by approximately twice the pressure of first stage operation. The burners will be operational for approximately 20 - 30 seconds on first stage before second stage can be achieved.
9. If all safety switches remain in their normal operating positions (main limit closed, auxiliary limit closed, motor end switch closed) the burners will remain ignited until the room thermostat is satisfied. If a limit switch should open prior to room thermostat being satisfied the burners will extinguish; however, the evaporator blower will continue to operate. The burners will remain off until all limit switches return to their normally closed position.
10. At the end of the heat request the burners will shut off, vent motor de-energize and the evaporator blower will continue to operate for approximately 3 minutes.

COOLING CYCLE

1. On a call for cooling R, G and Y1 on the room thermostat close. *NOTE! IF MAIN LIMIT OR AUXILIARY LIMIT SWITCH ARE OPEN IN THE HEAT EXCHANGERS SECTION, THE BLOWER MOTOR WILL OPERATE CONTINUOUSLY BUT THE COMPRESSOR(S) WILL NOT OPERATE UNTIL THE LIMITS ARE IN THEIR NORMAL CLOSED POSITION.*
2. The first stage compressor contactor is energized allowing the right compressor (looking into the control / compressor access section) and both condenser fans to operate. (Note: The first stage fan will not operate unless the mild ambient switch (located beneath the control box) is closed. The mild ambient switch closes on temperature rise, opens on temperature drop.
3. During a call for cooling, the cool relay on the timed fan control is energized, this in turn energizes the time delay relay for a short delay (approximately 1 - 25 seconds) before the blower contactor is energized allowing the evaporator blower to operate.
4. If the cooling load changes and more cooling is needed, R and Y2 on the room thermostat close.
5. The second stage compressor contactor is energized allowing the left compressor (looking into the control / compressor access section) and both condenser fans to operate. Note: If Y1 and Y2 energize simultaneously, the time delay relay will delay the second stage compressor 1 - 25 seconds after first stage compressor. Also note that when either stage of cooling is energized, both condenser fans will operate unless the mild ambient switch is open.
6. When second stage on the room thermostat is satisfied, the second stage compressor contactor will de-energize and shut off the left compressor. The condenser fans and evaporator blower will run until first stage is satisfied.
7. When first stage on the room thermostat is satisfied, the first stage contactor will de-energize and shut off the right compressor and both condenser fans.
8. At the end of the cooling request the evaporator blower will remain on for approximately 40 - 110 seconds at that time the blower contactor will de-energize.



Single-Package Rooftop 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 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. When pressure testing field-supplied gas piping at pressures of 1/2 psig or less, a unit connected to such piping must be isolated by manually closing the gas valve(s).

⚠ WARNING

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

INSTALLATION

Unit is shipped in the vertical discharge configuration. To convert to horizontal discharge application, remove duct opening covers. Using the same screws, install covers on duct openings in basepan of unit with insulation-side down. Seals around openings must be tight.

NOTE: Any combination of supply and return ducting is permissible, i.e., vertical supply combined with horizontal return.

Step 1 — Provide Unit Support

ROOF CURB — Assemble and install accessory roof curb in accordance with instructions shipped with curb. See Fig. 1. Install insulation, cant strips, roofing felt, and counter flashing as shown. *Ductwork must be attached to curbs, not to the unit.* If gas, electric power, or control power is to be routed through the curb, attach the accessory thru-the-curb service connection plates to the roof curb in accordance with the accessory installation instructions. Connection plates must be installed before unit can be set on roof curb.

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

Curb should be level. Unit leveling tolerances are shown in Fig. 2. 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. Install a gravel apron in front of condenser-coil air inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on a roof curb if required.

Step 2 — Field Fabricate Ductwork — Secure all ducts to roof curb and building structure on vertical discharge units. *Do not connect ductwork to unit.* For horizontal applications, field-supplied flanges should be attached to horizontal discharge openings and all ductwork should be secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

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

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



When installing units, provide a disconnect per NEC. All field wiring must comply with NEC and local jurisdictions. Conduit through side panel openings indicated in Fig. 8. 5. 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 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 2A and B, Note 2 to determine the percent voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes misuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

NOTE: If accessory thru-the-bottom connections and roof curb are used, refer to the Thru-the-Bottom Accessory Installation Instructions for information on power wiring. The power wiring will be routed through a field-drilled hole in the basepan. The basepan is specially designed and dimpled for drilling the power access connection holes.

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 air temperature in accordance with thermostat installation instructions.

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

Connect thermostat wires to matching screw terminals of low-voltage connection board. See Fig. 9.

NOTE: For wire runs up 50 ft, use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 feet, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat.

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. See Fig. 10. The raceway provides the UL required clearance between high- and low-voltage wiring.

HEAT ANTICIPATOR SETTINGS — Set heat anticipator settings at .14 amp for the first stage and .14 for second stage heating, when available.

Step 8 — Adjust Factory-Installed Options

APOLLO CONTROL — The optional Apollo Control is used to actively monitor all modes of operation as well as indoor fan status, filter status, and indoor-air quality. The Apollo Control is designed to work with Carrier TEMP and VVT® systems.

The thermostat must be wired to the Apollo Control before starting the unit. Refer to the Apollo Control installation instructions for information on installing the thermostat.

DISCONNECT SWITCH — The optional disconnect switch is non-fused. The switch has the capability of being locked in place for safety purposes.

Q #25

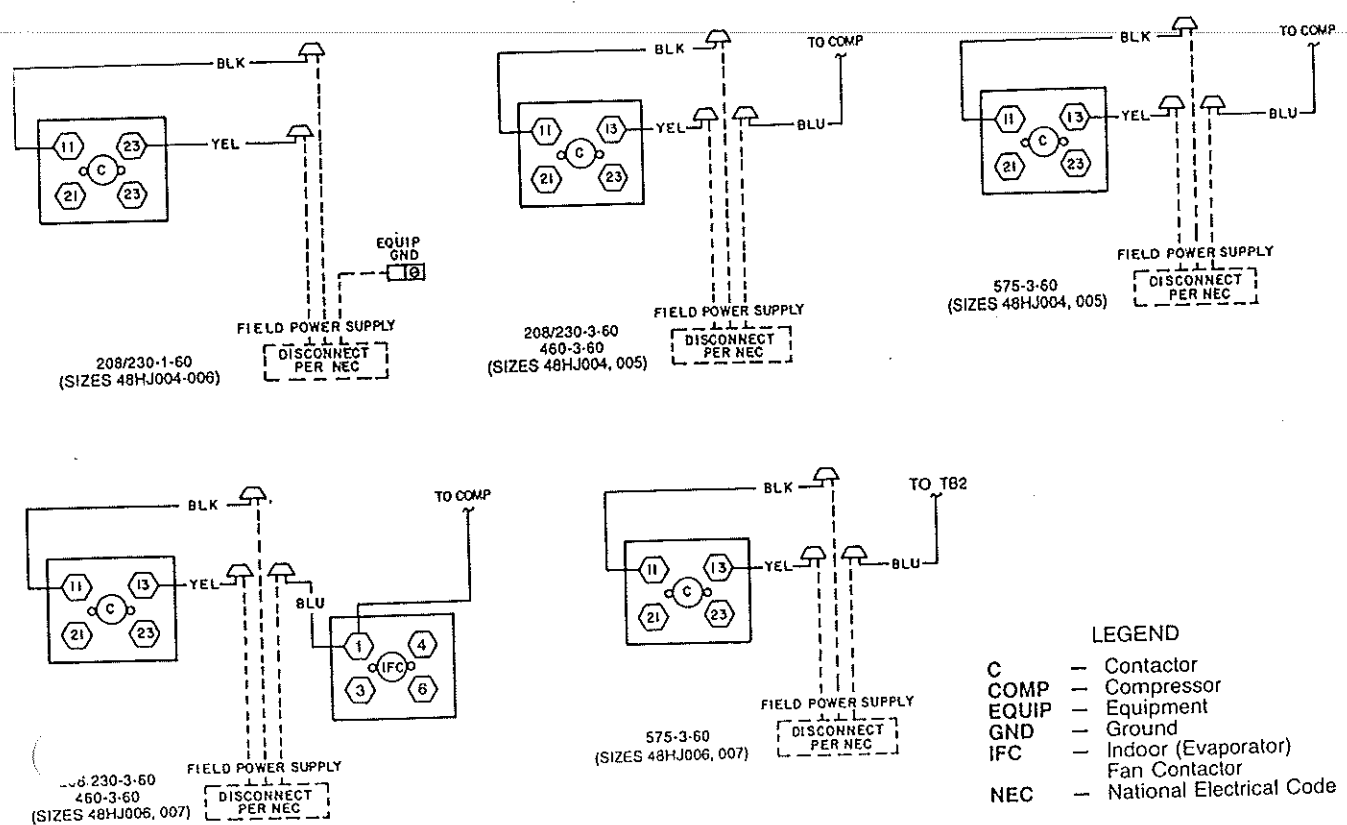


Fig. 8 — Power Wiring Connections



Limit Switch — Remove blower access panel (Fig. 5). Limit switch is located on the fan deck.

Burner Ignition — Unit is equipped with a direct spark ignition 100% lockout system. Integrated Gas Unit Controller (IGC) is located in the control box (Fig. 10). A single light-emitting diode (LED) on the IGC provides a visual display of operational or sequential problems when the power supply is uninterrupted. The LED can be observed through the viewport. When a break in power occurs, the IGC will be reset (resulting in a loss of fault history) and the indoor (evaporator) fan ON/OFF times will be reset. During servicing, refer to the label on the control box cover or Table 15 for an explanation of LED error code descriptions.

If lockout occurs, unit may be reset by interrupting power supply to unit for at least 5 seconds.

Table 15 — LED Error Code Description*

LED INDICATION	ERROR CODE DESCRIPTION
ON	Normal Operation
OFF	Hardware Failure
1 Flash†	Evaporator Fan On/Off Delay Modified
2 Flashes	Limit Switch Fault
3 Flashes	Flame Sense Fault
4 Flashes	4 Consecutive Limit Switch Faults
5 Flashes	Ignition Lockout Fault
6 Flashes	Induced-Draft Motor Fault
7 Flashes	Rollout Switch Fault
8 Flashes	Internal Control Fault

LED — Light-Emitting Diode

*A 3-second pause exists between LED error code flashes. If more than one error code exists, all applicable codes will be displayed in numerical sequence.

†Indicates a code that is not an error. The unit will continue to operate when this code is displayed.

IMPORTANT: Refer to Troubleshooting Tables 16-20 for additional information.

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

CAUTION

When servicing gas train, do not hit or plug orifice spuds.

REMOVAL AND REPLACEMENT OF GAS TRAIN (See Fig. 36 and 37)

1. Shut off manual gas valve.
2. Shut off power to unit.
3. Remove compressor access panel.
4. Slide out burner compartment side panel.
5. Remove heat shield.
6. Disconnect gas piping at unit gas valve.
7. Remove wires connected to gas valve. Mark each wire.

8. Remove induced-draft motor, ignitor, and sensor wire at the Integrated Gas Unit Controller (IGC).
9. Remove the 2 screws that attach the burner rack to the vestibule plate.
10. Remove the gas valve bracket.
11. Slide the burner tray out of the unit (Fig. 36).
12. To reinstall, reverse the procedure outlined above.

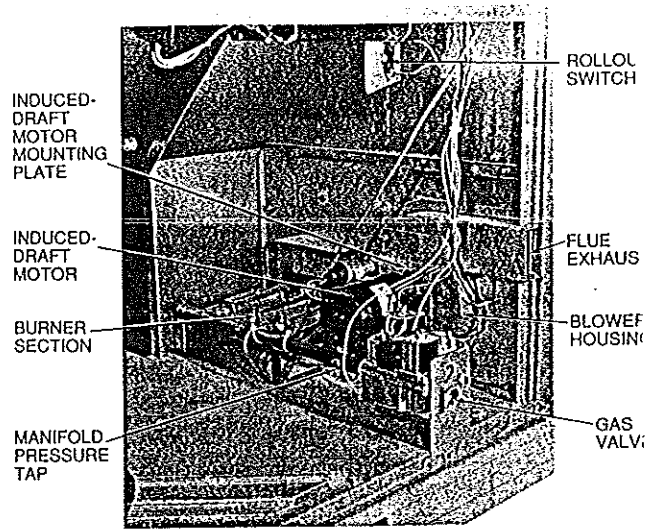


Fig. 36 — Burner Section Details

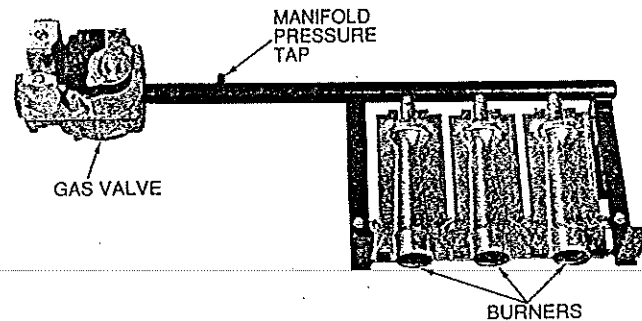
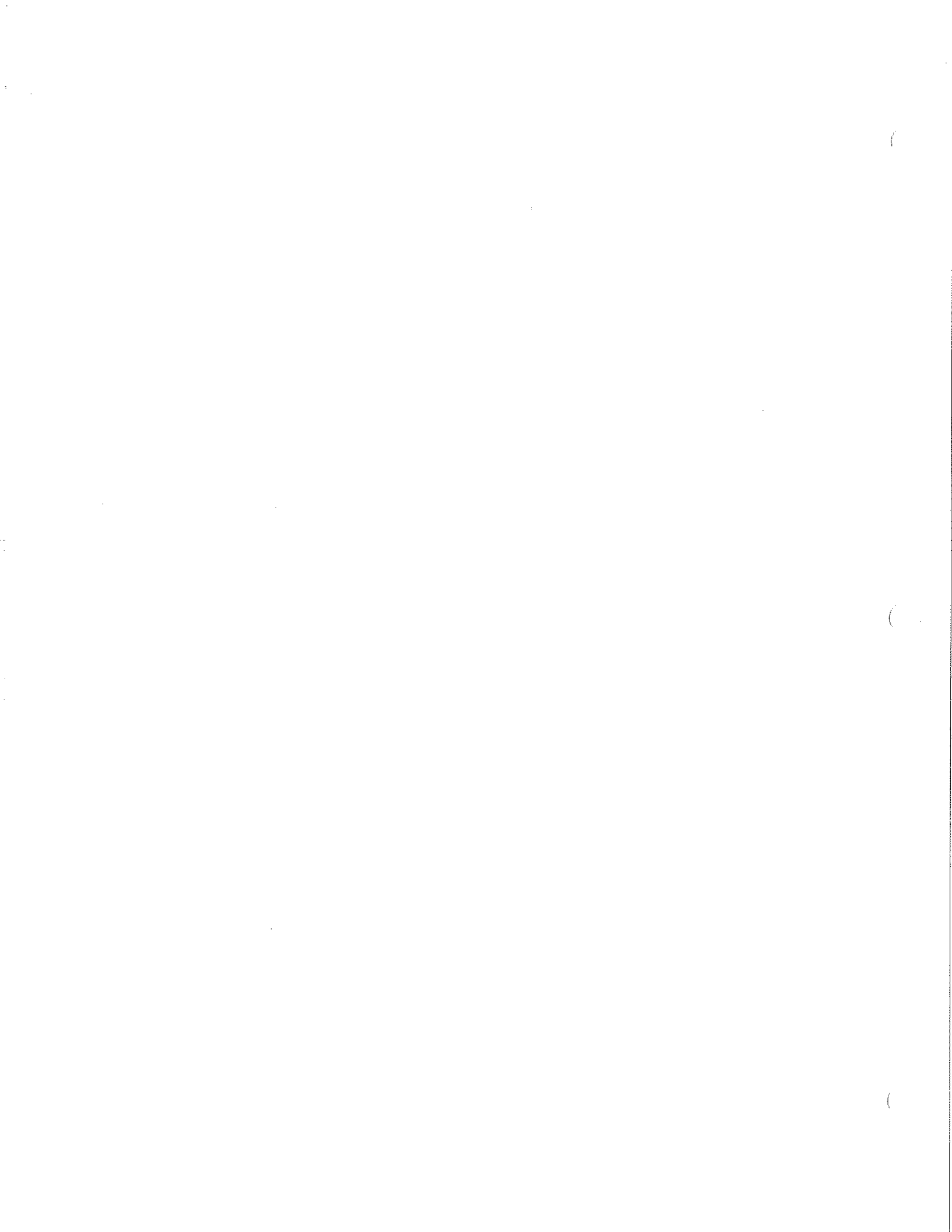


Fig. 37 — Burner Tray Details

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described above.
2. Inspect burners and, if dirty, remove burners from rack.
3. Using a soft brush clean burners and cross-over port as required.
4. Adjust spark gap. See Fig. 38.
5. Reinstall burners on rack.
6. Reinstall burner rack as described above.

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



TROUBLESHOOTING

Table 16 — LED Error Code Service Analysis

PROBLEM	CAUSE	REMEDY
Hardware failure. (LED OFF)	Loss of power to control module (IGC).	Check 5 amp fuse on IGC, power to unit, 24 v circuit breaker, and transformer. Units without a 24 v circuit breaker have an internal overload in the 24 v transformer. If the overload trips, allow 10 minutes for automatic reset.
Limit switch fault. (LED 2 flashes)	High temperature limit switch is open.	Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is in accordance with the range on the unit nameplate.
Flame sense fault. (LED 3 flashes)	The IGC sensed flame that should not be present.	Reset unit. If problem persists, replace control board.
4 consecutive limit switch trips. (LED 4 flashes)	Inadequate airflow to unit.	Check operation of indoor (evaporator) fan motor and that supply-air temperature rise agrees with range on unit nameplate information.
Q #24 Ignition lockout. (LED 5 flashes)	Unit unsuccessfully attempted ignition for 15 minutes.	Check ignitor and flame sensor electrode spacing, gaps, etc. Ensure that flame sense and ignition wires are properly terminated. Verify that unit is obtaining proper amount of gas.
Induced-draft motor fault. (LED 6 flashes)	IGC does not sense that induced-draft motor is operating.	Check for proper voltage. If motor is operating, check the speed sensor plug/IGC Terminal J2 connection. Proper connection: PIN 1 — White, PIN 2 — Red, PIN 3 — Black.
Rollout switch fault. (LED 7 flashes)	Rollout switch has opened.	Rollout switch will automatically reset, but IGC will continue to lockout unit. Check gas valve operation. Ensure that induced-draft blower wheel is properly secured to motor shaft. Reset unit at unit disconnect.
Internal control fault. (LED 8 flashes)	Microprocessor has sensed an error in the software or hardware.	If error code is not cleared by resetting unit power, replace the IGC.

⚠ WARNING

If the IGC must be replaced, be sure to ground yourself to dissipate any electrical charge that may be present before handling new control board. The IGC is sensitive to static electricity and may be damaged if the necessary precautions are not taken.

IMPORTANT: Refer to Table 17 — Heating Service Analysis for additional troubleshooting analysis.

LEGEND

IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode

