AAON, Inc.

INSTALLATION INSTRUCTION MANUAL

HEATING •COOLING AND COMBINATION

ROOFTOP UNITS

FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

WARNING

IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE INJURY OR PROPERTY DAMAGE. REFER TO THIS MANUAL. FOR ASSISTANCE OR ADDITIONAL INFORMATION CONSULT A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.

FOR YOUR SAFETY

WHAT TO DO IF YOU SMELL GAS

- *EXTINGUISH ANY OPEN FLAME.*
- *DO NOT TOUCH ANY ELECTRICAL SWITCH.*
- *DO NOT TRY TO LIGHT ANY APPLIANCE.*
- *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.*

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Owner should pay particular attention to the words: ***NOTE, CAUTION AND WARNING.*** ***Notes*** are intended to clarify or make the installation easier. ***Cautions*** are given to prevent equipment damage. ***Warnings*** are given to alert owner that personal injury and/or equipment damage may result if installation procedure is not handled properly.

GENERAL DESCRIPTION

The units are designed as self-contained heating, cooling or combination units for outdoor installation only, using refrigerant 22, natural or propane gas, electric resistance, steam or hot water.

UNPACKING

When received, the unit should be checked for damage that might have occured in transit. If damage is found, it should be noted on the carrier's Freight Bill. Request for inspection by carrier's agent should be made in writing at once.

CERTIFICATION

• GAS HEAT MODELS

(a) Design Certified as a forced air furnace with or without cooling unit.
(b) Certified for outdoor installation only.
(c) Certified for installation on combustible floor with a minimum of 12" high curb.
(d) Certified with Heat Exchanger located downstream from Evaporator coil.
(e) Not suitable for use with conventional venting systems.

• STEAM OR HOT WATER HEAT MODELS

(a) Certified as a forced air furnace with or without cooling unit.
(b) Certified for outdoor installation only.
(c) Certified for installation on combustible floor with a minimum of 12" high curb.

• ELECTRIC HEAT MODELS

(a) Certified as a electric warm air furnace with or without cooling unit.
(b) Certified for outdoor installation only.
(c) Certified for installation on combustible floor with a minimum of 12" high curb.

• COOLING MODELS

(a) Certified as a commercial and residential central air-conditioner with or without electrically operated compressor.
(b) Certified for outdoor installation only.
(c) Certified for installation on combustible floor with a minimum of 12" high curb.

CODES AND ORDINANCES

System should be sized in accordance with National Warm Air Heating and Air Conditioning Association Literature, or the Guide of American Society of Heating, Refrigeration and Air Conditioning Engineers, and installed in accordance with the latest (United States) National Fuel Gas Code "ANSI-2223.1-1984", (Canada) current CAN / CGA- B149.1 or . 2. Installation Codes for Gas burning Appliances and Equipment, current C.S.A. Standard C22.1, Canadian Electrical Code Part 1, and C.S.A. Standard B52 Mechanical Refrigeration Code, and Local Plumbing or Waste Water Codes.

GAS HEATING SYSTEM

The heating section is for use on natural gas supply pressure of 6" to 10.5" Water Column. The unit can also be fired on propane gas with a supply pressure to the valve of 11" to 12" Water Column. A 1/8" pressure tap must be supplied by the installer in the piping just ahead of the gas valve. The rating plate on the furnace shall be inspected to make sure that the unit is stamped for the proper gas. The pressure tap on the outlet end of the gas valve should be removed and the valve adjusted for the proper manifold pressure to 3.5" on natural gas and 10.5" for propane gas.

The burner area is not sealed and combustion air is supplied by a centrifugal blower which draws in fresh air through a protected opening. This air is introduced into the burner tubes by the action of the induced draft blower. This insures an even flow of primary and secondary air to the burners.

The heating system and safety controls are 100% tested on each unit before it leaves the factory.

WARNING: INSTALLATION IS TO BE ADJUSTED TO OBTAIN A TEMPERATURE RISE WITHIN THE RANGE SPECIFIED ON THE RATING PLATE.

The units are equipped with pilot spark ignition system which includes intermittent recycling pilots that are only in operation during the main burner cycle. The output of the pilot is included in the input and output capacity shown on the unit rating plate.

Power to the ignition control is 24 Volts to reduce hazards. Pilot ignition is by a high intensity spark.

The pilot and burners are easily removed as an assembly.

When heat is called for, the cooling system is inoperable except for the indoor blower motor. Actual heating is accomplished by firing gas into the heat exchanger assembly.

ELECTRIC HEATING SYSTEM

When heat is called for, the cooling section is inoperable except for the indoor blower motor. Actual heating is accomplished by passing amperage through a specified amount of resistance heat strips which will produce the required heat. The indoor motor will energize at the same time as the heat strips.

STEAM OR HOT WATER HEATING SYSTEM

When heat is called for, the cooling section is inoperable except for the indoor blower motor. Actual heating is accomplished by passing steam or hot water through the steam or hot water coil assembly.

COOLING SECTION • DX

All direct expansion refrigeration systems are factory assembled, charged with R-22, tested and operated. On units 8 ton and larger the refrigerant system includes dual circuit evaporator(row split) and condenser coils (face split) providing two stage cooling. These systems are provided with liquid line filter driers, expansion valves, and fully hermatic compressors. Compressors are equipped with a positive pressure forced lubrication system and crankcase heater. The air cooled condenser coil(s) is constructed of copper tubes with aluminum fins, the air is pulled through with steel propeller fans. The evaporator coil is draw through made of copper tubes with aluminum fins.

The refrigeration section of these appliances has been found by E.T.L. and C.G.A. applicable provisions of "ANSI /UL 465-1985", "ANSI / ASHRAE 15-1978", current "C.S.A. Standard C22.1, Canadian Electrical Code Part 1 and C.S.A. B52".

NOTE: Crankcase Heater Operation

All units are equiped with a crankcase heater, which should be energized at least 24 hours prior to setting the thermostat for cooling operation with the compressor.

COOLING SECTION • CHILLED WATER OR NON-COMPRESSORIZED COIL

All chilled water coils or non-compressorized are factory installed. These systems are provided with internal header connections. Coils are aluminum fin / copper tube construction.

WIRING DIAGRAMS

A complete set of unit wiring diagrams is provided and located inside the control compartment door.

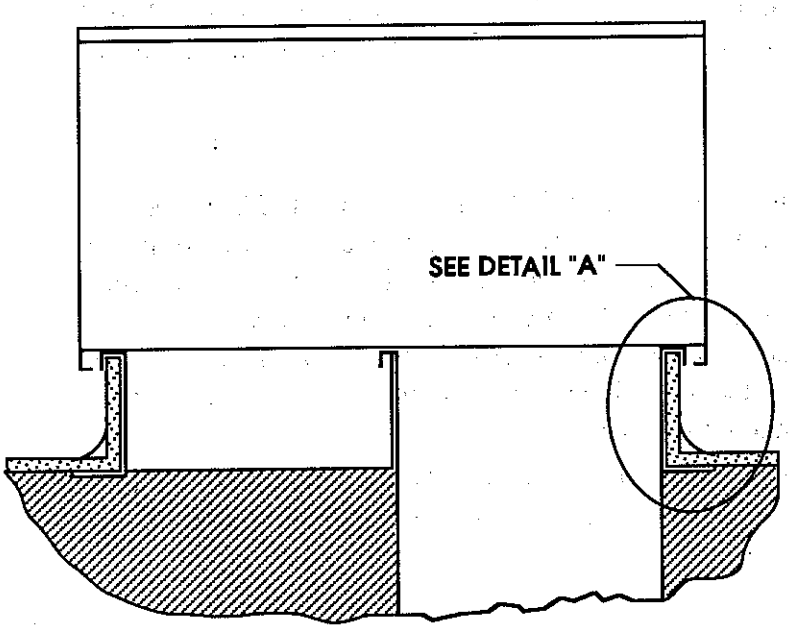
INSTALLATION

AAON Rooftop units are designed for fast, easy installation. The curb is to be located so that duct connections will be clear of structural members of the building.

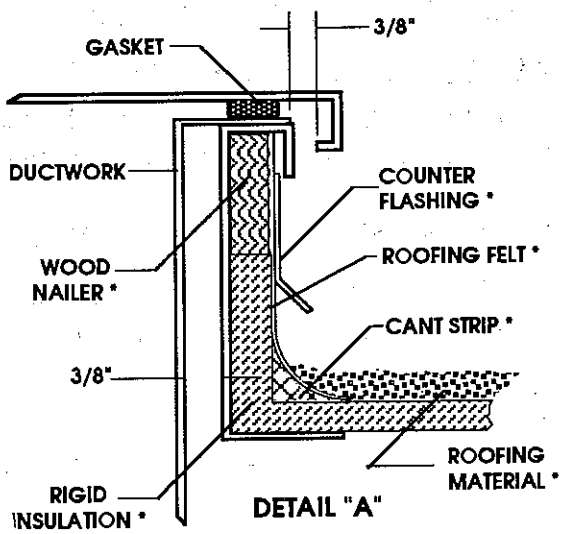
NEW BUILDINGS

WARNING:
IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE INJURY OR PROPERTY DAMAGE. CONSULT A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER FOR INFORMATION OR ASSISTANCE.
INSTALL THE GAS FIRED UNIT SO THAT THE RECTANGULAR FLUE LOCATED ON THE GAS CONTROL SIDE OF THE UNIT IS LOCATED **AT LEAST 48" AWAY FROM ANY OPENING** THROUGH WHICH COMBUSTION PRODUCTS COULD ENTER THE BUILDING.
FOR SERVICE CLEARANCES SEE CHART ON PAGE 7.
INSTALL THE GAS FIRED UNIT TO ASSURE THE FLOW OF COMBUSTION AND VENTILATING AIR IS NOT OBSTRUCTED FROM REACHING THE FURNACE.

When using factory curb, leave opening in roof decking the same size as inside of curb (this dimension is four inches smaller in length and width than the unit cabinet size). Set the curb so the inside of the curb coincides with the opening, and the bottom flange of the curb rests on the decking. After curb is in place, apply a nailer strip and triangular cant strip around the curb and finish the roofing, flashing and mopping around the curb in the same manner used for skylight openings.



SECTIONAL VIEW OF UNIT ON ROOF CURB



DETAIL "A"

*** FIELD SUPPLIED**

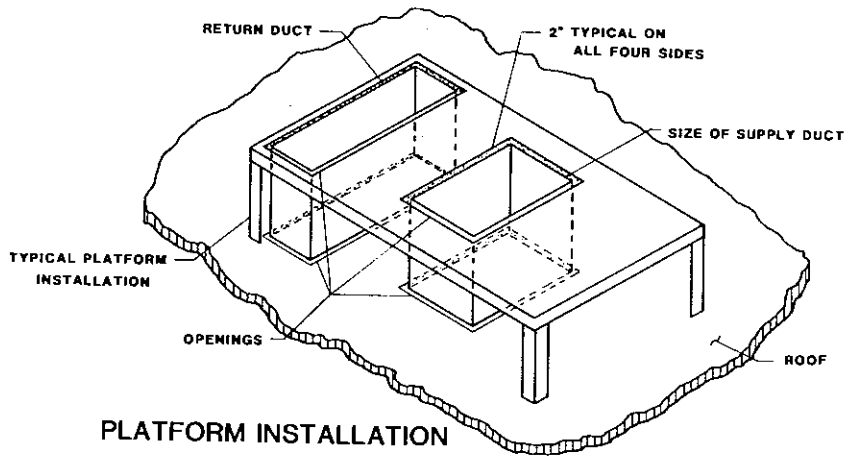
For installation of unit without factory curb, the unit shall be installed on a platform at least 12" above the level of the roof. **MAKE SURE THE PLATFORM IS LEVEL.** The platform shall be built from non-combustible material (and should not be covered with carpeting, tile, or other combustible material) and must meet local codes. In areas of snow build-up, the platform should be built high enough to meet local codes.

Procedure: Measure the duct spacings and openings provided at the bottom of the unit. Using these measurements, make two rectangular openings on platform and two matching openings on roof for duct passages. (see illustration)

CAUTION: Where the supply or warm air duct passes through a combustible platform and roof, a clearance of one inch must be maintained between the outside edges of the duct and combustible material in accordance with National Fire Protection Associaton Standard No. 90A. Provide flashings or enclosure between platform and roof and all joints must be sealed with mastic roofing to insure a watertight seal.

CAUTION: All roofing work should be done by competent roofers to avoid possible leakage.

WARNING: INSULATING MATERIALS MAY BE COMBUSTIBLE. CARE MUST BE TAKEN TO KEEP INSULATION FROM CONTACTING THE UNIT.



PLATFORM INSTALLATION

EXISTING ROOFS

WARNING: The unit is to be installed so that the rectangular flue opening located on the gas control side of the units is located at least 48" away from any opening through which combustion products could enter the building.

The unit must also be installed so that the flow of combustion and ventilating air is not obstructed from reaching the furnace.

The unit must be installed on a platform at least 12" above the level of the roof.

Make openings for ducts large enough to allow for insulation and work space, but do not make openings larger than indicated above.

Scrape away loose gravel and loose material from curb mating area, apply mastic to form a seal with the roof. Apply a nailer strip or cant strip to the curb and have roofer mop in, using roll roofing to make weather tight.

Caution must be used to insure that a 1" clearance between the supply duct and combustible material is maintained on all sides (see illustration page 3).

Caution: All roofing work should be done by experienced roofers to avoid possible leakage.

SETTING THE UNIT

Check the unit data plate to make sure it agrees with the power supply. Connect power to the unit according to the wiring diagram provided with the unit.

If cables or chains are used to hoist the unit, care should be taken to prevent damage to the cabinet.

Hoist unit to a point directly above the openings, and lower unit while guiding so the electric conduit passes into the unit at the proper place. Continue lowering until the unit skirt fits around the curb. Remove the harness used in hoisting. Make sure the unit is properly seated on the curb.

Connect the control wiring and apply power to the unit. See that the evaporator blower rotates in the proper direction (this applies only to units having a three phase blower motor).

ELECTRICAL

The power and control wiring may be brought up through a hole near one corner of the curb top. Locate this hole by feeling for a spot in the top of the curb. Cut the soft material away to expose the opening, and run the power conduit up through it. (When the unit is set, the conduit will attach to the bottom of the unit.) Protect the branch circuit in accordance with code requirements. If the control wires are to run inside the same conduit, use 600 volt wire or as required by applicable codes. The unit must be electrically grounded in accordance with the National Electrical Code, ANSI/NFPA No.70-1984 when installed if an external source is utilized, in Canada use current C.S.A. Standard C22.1 Canadian Electrical Code Part 1.

Power wiring is to the unit terminal block or main disconnect. All wiring beyond this point is done by the manufacturer

START-UP TECHNICIAN: CHECK BLOWER MOTOR AMPERAGE AND ADJUST DRIVES SO AS NOT TO EXCEED THE AMPERAGE LISTED ON THE MOTOR NAMEPLATE.

WARNING

Electrical power is to be disconnected prior to servicing.

NOTE: All units are factory wired for 240, 480 or 575 volt. If unit is to be connected to a 208 volt power supply, the transformer must be rewired for 208 volt service. Check for proper wiring prior to starting unit. Follow markings on transformer for this change.

Units may be factory wired 208 volt at customers request.

GAS

Size gas piping to supply the unit with 5" to 10.5" water column pressure for natural gas and 11" water column pressure for propane when all units connected to the same gas system are operating. Install piping in accordance with local codes, the piping must conform with the latest ANSI-Z223.1 National Fuel Gas Code; in Canada, current Standards CAN / CGA-B149.1 or .2, Installation codes for Gas Burning Appliances and Equipment.

Some utility companies will require pipe sizes larger than the minimum sizes listed.

Gas piping on units with single heat exchangers are connected as shown in Figure 1 on following page. Double heat exchanger piping connections are shown in Figure 2.

(a) ***CAUTION:*** Gas piping is to be supported DIRECTLY AT CONNECTION TO UNIT and must not be strained or bent and shall be supported by metal straps, blocks or hooks at intervals not to exceed that shown in the following table:

SIZE OF PIPE	INTERVALS (IN FEET)
1/2"	6'
3/4" OR 1"	8'
1 1/4" OR LARGER (HORIZONTAL)	10'
1 1/4" OR LARGER (VERTICAL)	EVERY FLOOR LEVEL

(b) Pipe joint compounds used on all gas piping connections shall be resistant to the action of liquified petroleum gases.

(c) A 1/8" NPT plugged tap is required immediately ahead of the appliance gas control.

(d) All piping connections shall be checked with a soap solution for gas leaks before operating the appliance. ***CAUTION:*** The furnace must be isolated by closing the manual shut off valve or disconnected from the gas supply piping during pressure testing of the piping system with pressures in excess of 1/2 PSIG.

(e) The unit shall be installed so that the rectangular flue located on the gas control side is located at least **48"** away from any opening through which combustion products could enter the building. The unit shall also be installed so that the flow of combustion and ventilating air is not obstructed from reaching the furnace.

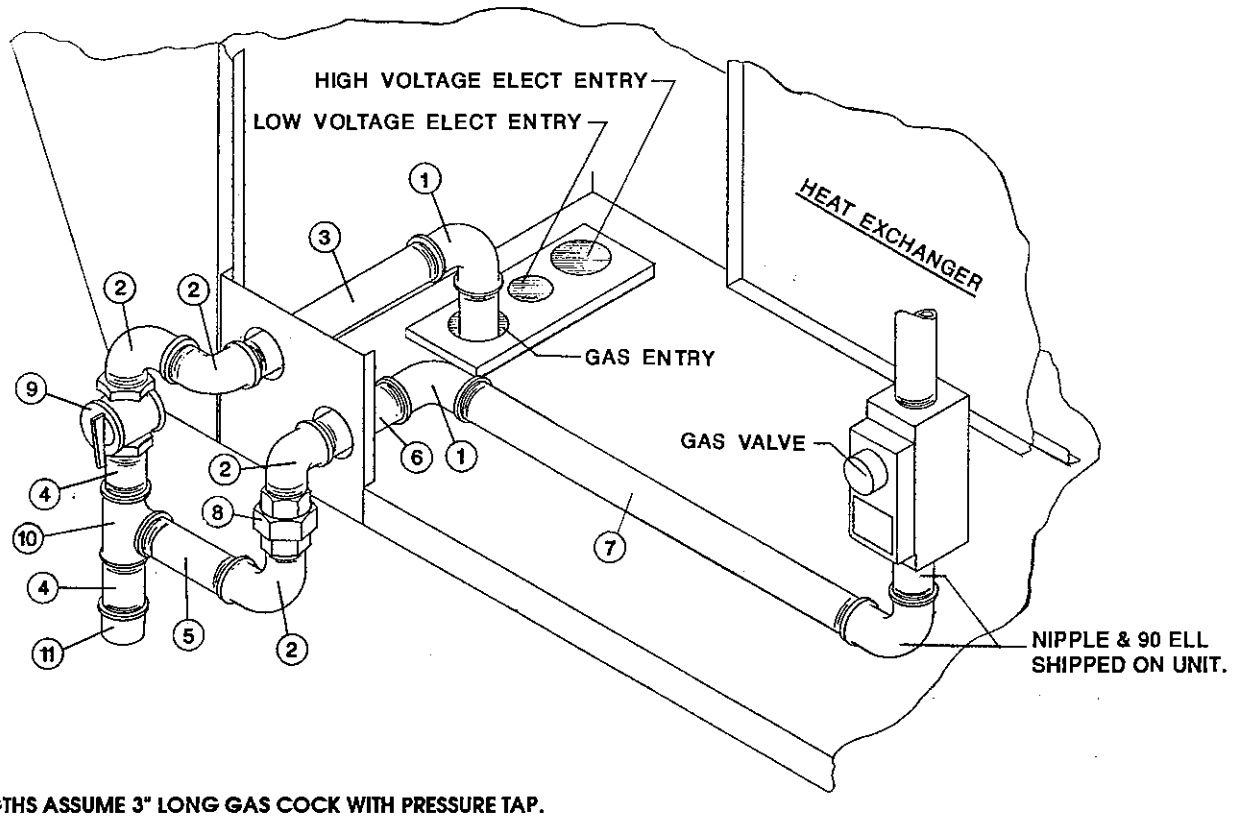
(f) Observe burner and pilot flames through the windows provided on the burner shield in the inside burner compartment. There should be no sign of flames floating or lifting off of the main burners. The pilot flame should encompass the pilot sensor.

(g) The flow of combustion and ventilating air shall not be blocked or otherwise obstructed in any way. This shall include blockage due to accumulation of debris or snow. After electrical power is turned on, set unit controls for heating, and check for operation.

(h) A removable access panel in the supply duct is recommended and should be accessable when the unit is in service. It should be at least 6" x 6" so that smoke may be observed with it removed. it must be attached in a way so as to prevent leaks.

GAS PIPING INFORMATION

UNIT SIZE TON	INPUT MBH	PIPE SIZE	1	2	3	4*	5	6	7	8	9	10	11
02 - 05	65 - 75	1/2"ø	(2) 90 ELL	(4) 90 ST ELL	6 1/2" PIPE	(2) 2" PIPE	3" PIPE	4" PIPE	2 1/2" PIPE	UNION	GAS COCK	TEE	CAP
04 - 07	120 - 142.5	1/2"ø	(2) 90 ELL	(4) 90 ST ELL	6 1/2" PIPE	(2) 2" PIPE	3" PIPE	4" PIPE	2 1/2" PIPE	UNION	GAS COCK	TEE	CAP
08 - 15	182.4 - 228	3/4"ø	(2) 90 ELL	(4) 90 ST ELL	6 1/2" PIPE	(2) 2 1/4" PIPE	3 1/2" PIPE	4 1/2" PIPE	20 1/2" PIPE	UNION	GAS COCK	TEE	CAP
08 - 15	225 - 285	3/4"ø	(2) 90 ELL	(4) 90 ST ELL	6 1/2" PIPE	(2) 2 1/4" PIPE	3 1/2" PIPE	4 1/2" PIPE	17" PIPE	UNION	GAS COCK	TEE	CAP
16 - 24	285	3/4"ø											
16 - 24	350 - 360	3/4"ø											
26 - 63	456 - 570	(2) 3/4"ø		FOR UNITS WITH DUAL HEAT EXCHANGERS DUPLICATE PIPING TO NO. 2 GAS VALVE.									



* PIPE LENGTHS ASSUME 3" LONG GAS COCK WITH PRESSURE TAP.
PIPE LENGTHS FOR #4 MUST BE ADJUSTED FOR OTHER LENGTH COCKS.

CLEARANCES

LOCATION	• UNIT SIZE •			
	2•3•4•5•6•7	8•10•13•15	16•20•24	26•32•40•50•56•63
RETURN AIR~ (BACK)	36	48	48	60
VENT SIDE~ (FRONT)	48	48	48	48
LEFT SIDE	36	48	48	60
RIGHT SIDE	48	60	60	60
TOP	UNOBSTRUCTED			

WARNING:

Do not use an open flame or other source of ignition for leak testing.

The furnace must be isolated or disconnected by closing its individual manual shut-off valve from the gas supply piping system during pressure testing of the gas supply piping at test pressure greater than 1/2 PSIG. Excessive pressure may damage the gas valve.

LIGHTING INSTRUCTIONS
FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

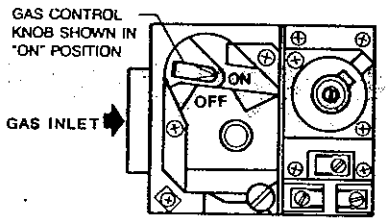
WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.



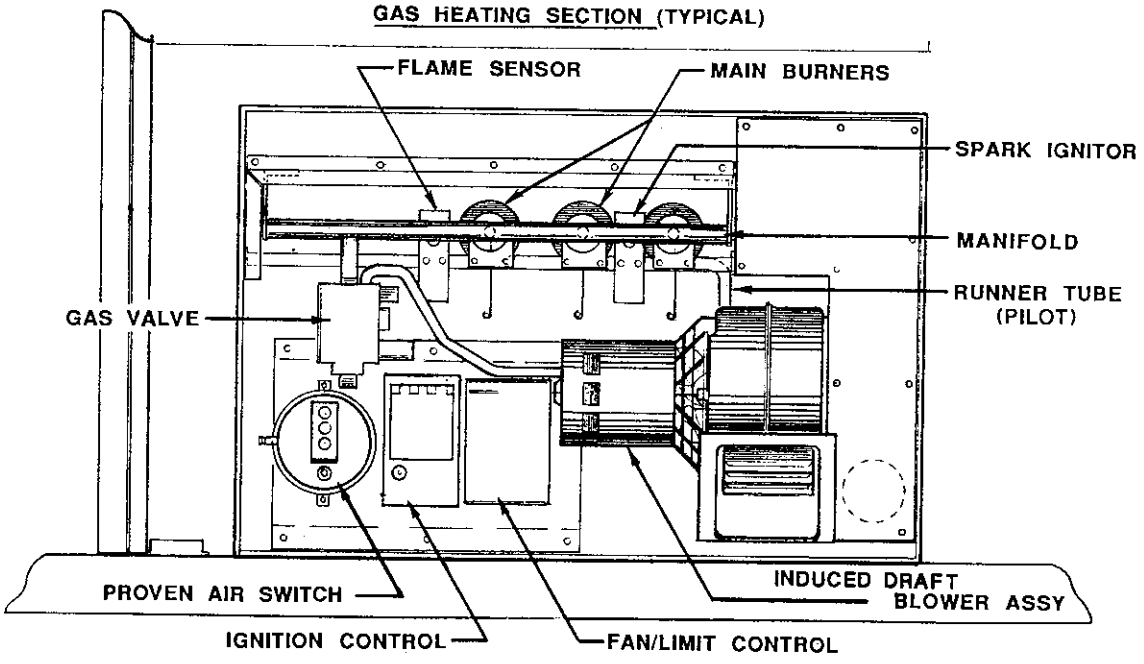
5. Remove control access panel.
6. Push in gas control knob slightly and turn clockwise ↷ to "OFF".

   NOTE: Knob cannot be turned to "OFF" unless knob is pushed in slightly. Do not force.
7. WAIT five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
8. Turn gas control knob counterclockwise ↶ to "ON".
9. Replace control access panel.
10. Turn on all electric power to the appliance
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control access panel.
4. Push in gas control knob slightly and turn clockwise ↷ to "OFF". Do not force.
5. Replace control access panel.

GAS HEATING SECTION (TYPICAL)



CONDENSATE PIPING

The unit requires a drain trap to be connected to the drainpan at the unit. If codes require a condensate drain line, the line should be the same pipe size as drain nipple and should pitch downward toward drain. "P" trap is located in fuse box compartment.

THERMOSTAT

Low voltage room thermostat should be located on an inside wall 4 to 5 feet above the floor where it will not be subjected to drafts, sun exposure or heat from electrical fixtures or appliances. Follow manufacturer's instructions enclosed with thermostat for general installation procedure.

INSTALLATION IS TO BE ADJUSTED TO OBTAIN A TEMPERATURE RISE WITHIN THE RANGE SPECIFIED ON THE FURNACE RATING PLATE.

PERIODIC INSPECTION PROCEDURES • Gas Units

1. The flow of combustion and ventilating air shall not be blocked or otherwise obstructed in any way. This shall include blockage due to accumulation of debris or snow. The indoor blower, evaporator coil and filters should be inspected monthly to make sure there are no obstructions.

2. Once each year, before unit is turned on for the heating season, a qualified serviceman must inspect all flue product carrying areas of the furnace, its vent system, main and pilot burners for continued safe operation, with particular attention given to corrosion of the vent system.
WARNING: At least once each year, a qualified serviceman should check out all of the items listed under the servicing and trouble shooting and maintenance section of this manual.

3. Check return air duct connection to make sure it is sealed to the furnace casing and terminates outside the space of the furnace. Check the unit for sagging, cracks and gaps around base. Check the unit for signs of deterioration.

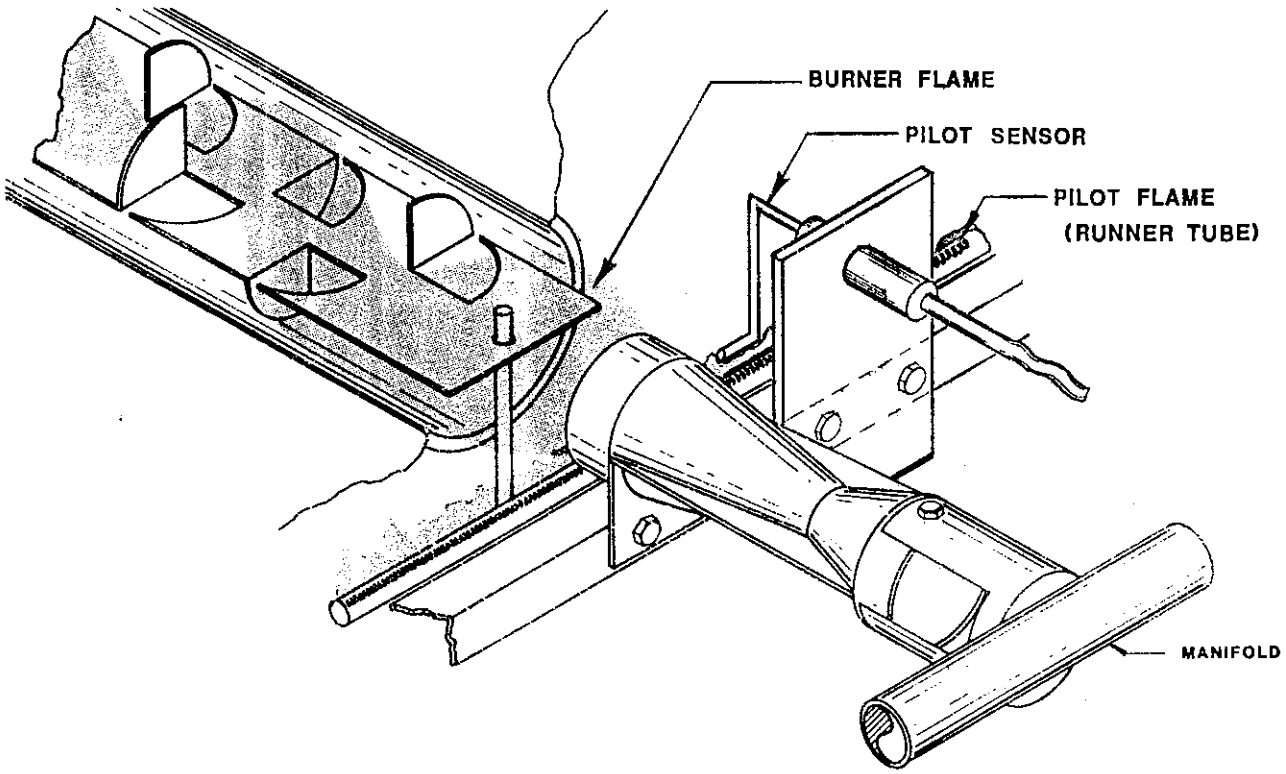
4. At least every 90 days during the heating season, observe the burner runner tube and pilot flame by removal of heat exchanger access panel. (See sketch for proper burner and pilot flame). The pilot flame should encompass the pilot sensor as shown. Poor flame characteristics may indicate a need to clean the heat exchanger.

5. If the induced draft blower/motor assembly has to be replaced, remove the screws holding the blower housing to the burner box. Remove the defective assembly and replace with new assembly. Care must be taken to provide an air-tight seal between the blower housing and the burner box. Silicone sealant must be used to insure a good seal.

6. **MANUFACTURE'S RECOMMENDED METHOD FOR CLEANING MAIN GAS BURNERS**
It is recommended that if the Main Gas Burner require cleaning, call the AAON Service Engineer at (918) 583-2266. The burners should never require cleaning, so if it becomes a necessity, it indicates faulty operation of the unit. The cleaning should only be done by a qualified service agency and only after consultation with a Service Representative.

CLEANING THE GAS BURNERS

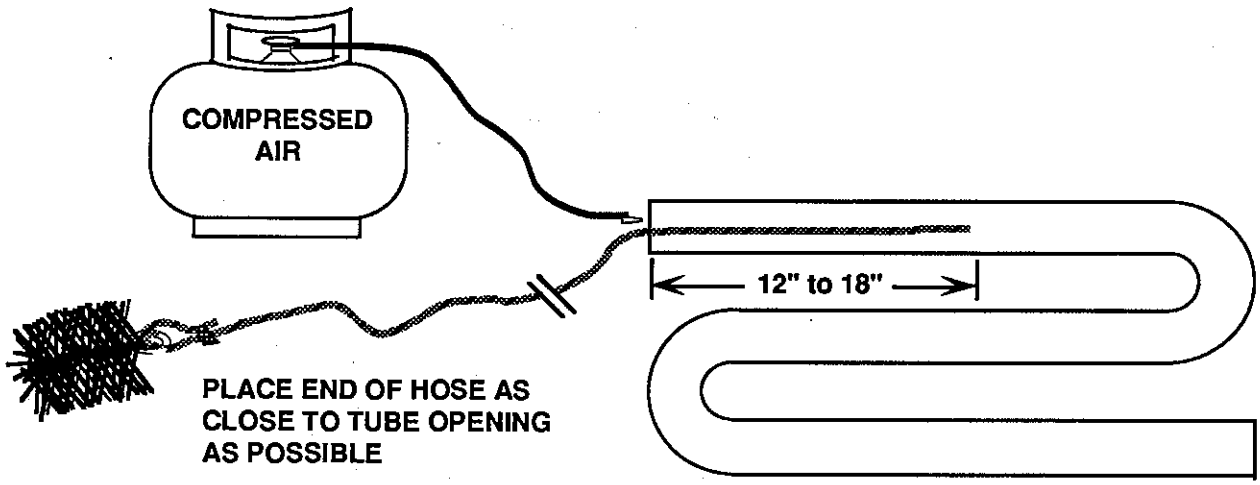
1. Turn thermostat to OFF position.
2. Turn off power to unit.
3. Remove heat exchanger access door.
4. Turn gas valve knob and main shut off valve to OFF position.
5. Remove screws attaching burner mounting bracket to support angle.
6. Rotate burners so that the mounting bracket clears support angle.
7. Slide burners off of spuds and remove.
8. Clean burners with a wire brush.
9. Put burners back in unit following the reverse of the above procedure.
10. ***CAUTION:*** Make sure that the pilot orifice is securely positioned in the runner tube.



7. **MANUFACTURES RECOMMENDED METHOD FOR CLEANING FLUE GAS AND BURNER TUBE PASSAGEWAY OF HEAT EXCHANGER.**
It is recommended that if the Heat Exchanger requires cleaning, call **(918) 583-2266**. The necessity for cleaning the exchanger could indicate faulty operation and should only be checked by a qualified service agency and only after they have discussed the problem with a Service Representative.

MANUFACTURE'S RECOMMENDED METHOD FOR CLEANING FLUE GAS PASSEGEWAYS

1. Shut off power to unit.
2. Turn gas valve and main shut off valve to OFF position.
3. Disconnect gas line from unit gas valve.
4. Disconnect wires from Heat Exchanger gas valve, limit switch, fan switch, and combustion motor.
5. Remove flue hood, screen and flue outlet post.
6. Remove screws holding heat exchanger front plate to bulkhead.
7. Pull heat exchanger out of unit.
8. Remove screws holding front burner support housing. This will allow the combustion blower assembly, burners, lighter tube, and manifold to be removed as an assembly.
9. Remove screws holding baffle retainers and slide baffles out of tubes.
10. Remove rear collection chamber from rear tube plate.
11. A wire brush may be obtained from the factory for cleaning of the internal flue gas passageways. Insert 12 to 18 inches of the cord end of the brush assembly into the end of the tube to be cleaned.
12. The cord end of the brush assembly must be blown through the tube using compressed air. See Detail Below.
13. The cord end of the brush assembly will be blown out of the rear end of the tube. Grasp this end and pull the brush through the tube. Repeat as necessary until all carbon deposits are cleaned from the tube.
14. Inspect combustion blower assembly for carbon buildup and clean as necessary.
15. Re-assemble unit in reverse order. ***CAUTION:*** Make sure all seals removed or broken during disassembly are replaced in original position and are air-tight. Sealing material is Dow Corning #999 Silicone Sealant (or its equivalent) and may be ordered from the factory.



PERIODIC INSPECTION PROCEDURES
Electric, Steam, Hot Water, Cooling and Chilled Water Units

1. Indoor blower, coils and filters should be inspected monthly.
2. Once each year, before unit is turned on for the heating season, a qualified serviceman must inspect the unit for proper operation.
   WARNING: All of the items listed under the service and trouble-shooting and maintenance section of this manual should be performed once a year.
3. Check for sagging, cracks and gaps around the base and signs of deterioration.
4. Inspect all valves and steam traps in accordance with Manufacturers Recommendations.

GENERAL LUBRICATING INSTRUCTIONS

ALL ORIGINAL MOTORS AND BLOWER BEARINGS REQUIRE NO LUBRICATION.

SERVICING, TROUBLE SHOOTING AND MAINTENANCE

In the event the unit cannot be made to function correctly, and a service firm is to be called in, it is strongly recommended that only firms with servicemen who are well qualified and experienced in both gas and electric heating and air conditioning be permitted to service the systems. A tinkerer or inexperienced serviceman can be both hazardous and expensive. If your serviceman needs assistance, have him call the factory. We will be glad to discuss the problem, or send data he might need, which is available at the factory. (Before calling, we suggest he copy the model and serial number as shown on the unit, so he can pass this information on to us when he calls).

AAON, Inc.

2425 South Yukon Ave.
Tulsa, Oklahoma 74107
Phone: 918-583-2266
Fax: 918-583-6094

Ask for Service Department Engineer

CHIEF CAUSES OF REDUCED AIR FLOW

A. **DIRTY FILTERS** - Filters must be inspected and replaced on a regular basis. It is strongly recommended that the media be replaced monthly. Clean filters are your best insurance against premature system breakdown.

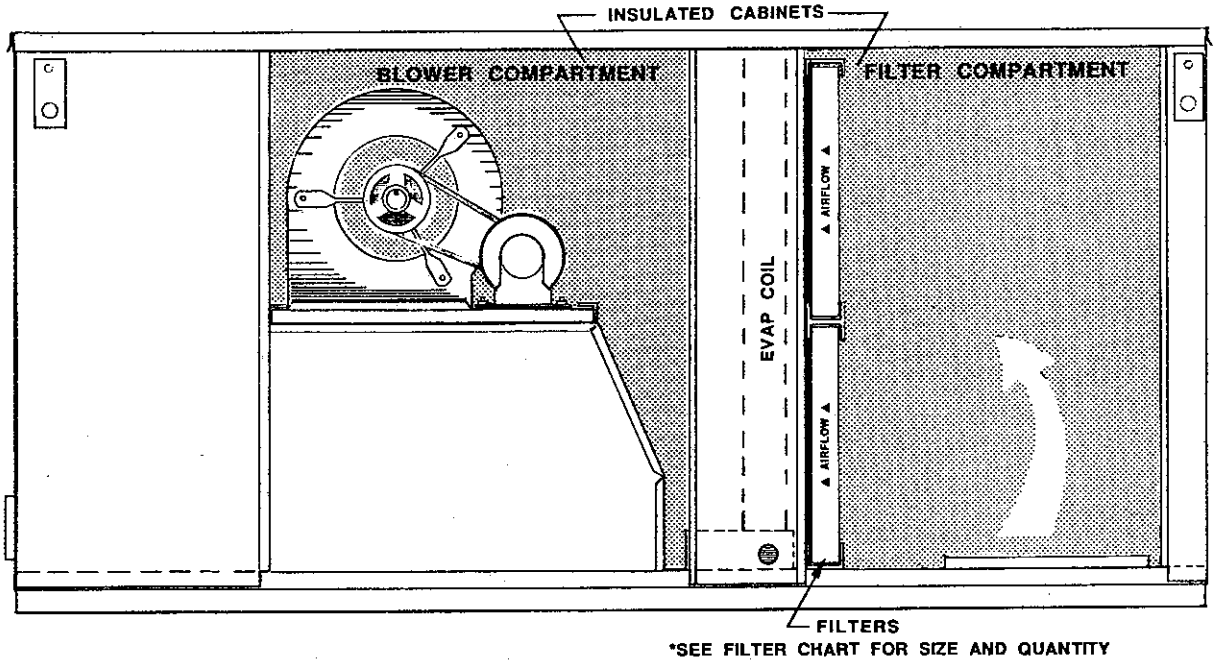
Do not permit the unit to be operated unless the filters are in place. Operation of the unit without filters will result in a clogged evaporator coil - a very expensive service job to correct.

B. **OBSTRUCTION TO AIR FLOW** - Supply and return air grilles must be kept clear so air can be freely drawn into and discharged from the system.

FILTER INSTALLATION / REPLACEMENT:

Open filter access door. Slide filters towards you and inspect. Replace old filters with size indicated on filters or as shown in filter chart below. Be sure arrow points towards the blower. See illustration below. (Filters should be checked every 30 days and replaced or cleaned as necessary.)

IT IS IMPORTANT TO KEEP COILS, BLOWER, AND FILTERS CLEAN!



*SEE FILTER CHART FOR SIZE AND QUANTITY

FILTERS

FILTER SIZE (THICK)	* UNIT SIZE *						
	3 - 4.5	5 - 7	8 - 10	12 - 15	17.5-24	28-32-40	50-58-60
16" x 20" (ELECTRONIC - WASHABLE)	4		6				
16" x 20" (PLEATED - WASHABLE)		4		6			
16" x 25" (PLEATED - WASHABLE)					2		
20" x 25" (PLEATED - WASHABLE)					4	10	12
20" x 22" (REPLACEABLE MEDIA)	2	2					
24" x 40" (REPLACEABLE MEDIA)			2				
17" x 47" (REPLACEABLE MEDIA)				3			

* FILTERS SHOULD BE REPLACED EVERY 30 DAYS OR AS REQUIRED.

SERVICING

TROUBLE	POSSIBLE CAUSE
ELECTRIC HEATING	
SYSTEM OFF	1. Check power at line side of contactor(s). 2. Thermostat not set for heating.
EVAPORATOR MOTOR WILL NOT RUN	1. Over load thermal protector open in motor. 2. Heater Relay not energized. 3. Blower Contactor not energized. 4. Capacitor shorted or open (PSC motors only).
BLOWER DOESN'T DELIVER AIR	1. Blower running backwards (3 phase only). 2. Dirty air filters. 3. Too high static pressure.
BLOWER COMES ON BUT LITTLE - OR NO HEAT	1. One or more heater contactors are open. 2. Limit switches are open. 3. Heater relay open.
GAS HEATING	
SYSTEM OFF	1. Check power and gas supply. 2. Check thermostat switches and settings. 3. Check 24 volt power to ignition control.
PILOT ON, BURNER WON'T COME ON	1. Hand valve turned to "pilot" (this valve should be turned on). 2. Defective gas valve. 3. Loose or broken connection to gas valve.
COMBUSTION AIR BLOWER WON'T RUN	1. Thermostat not calling for heat. 2. Relay not closing. (No power to motor) 3. Motor stuck or winding open.
BURNER GOES "OFF" ON HIGH LIMIT	1. Blower not coming on. (Check fan control) 2. Blower motor running backward. 3. Filters dirty. 4. Ducts obstructed or dampers closed. 5. Mannifold gas pressure too high.
IGNITION ON, PILOT WON'T LIGHT	1. Hand valve "off" (turn to on) 2. Check pilot valve. 3. Gas off or very low pressure.
PILOT/BURNER WON'T COME ON	1. Check for power at main gas valve. 2. Check continuity of differential pressure switch with motor turning. If open, replace differential pressure switch.

SERVICING *cont.*

TROUBLE	POSSIBLE CAUSE
STEAM AND HOT WATER HEATING	
SYSTEM OFF	1. Check power at line side of contactor(s). 2. Thermostat not set for heating.
BLOWER MOTOR WILL NOT RUN	1. Overload thermal protector open in motor. 2. Blower relay not energized. 3. Blower contactor.
BLOWER DOES NOT DELIVER AIR	1. Blower running backwards (3ø only). 2. Dirty air filters. 3. Dirty coils. 4. Duct obstruction.
BLOWER COMES ON, BUT LITTLE OR NO HEAT	1. Check steam traps valves and steam or hot water supply in accordance with manufactures instructions. 2. Faulty thermostat.

SERVICING *cont.*

TROUBLE	POSSIBLE CAUSE	
COOLING PACKAGE and UNITS with REMOTE CONDENSERS		
SYSTEM OFF	1. Check power at line side of contactor(s). 2. Thermostat not set for cooling. 3. High pressure control tripped. 4. Low pressure switch open (loss of charge)	
CONDENSER FAN WILL NOT RUN	1. Overload thermal protector open in motor. 2. Motor run capacitor open or shorted. 3. Fan or shaft stuck.	REFER TO MFG'S INSTRUCTIONS IF REMOTE CONDENSER
EVAPORATOR BLOWER WON'T RUN	1. Overload thermal protector open in motor. 2. Relay not closing. 3. Capacitor shorted or open (PSC motors only). 4. Stuck shaft or blower wheel.	
COMPRESSOR SHORT CYCLES	1. Check for low refrigeration charge. 2. Compressor overload opening. 3. Ambient temperature too low. 4. Thermostat in supply air stream. 5. Filters dirty or air flow restricted. 6. Evaporator blower not running.	REFER TO MFG'S INSTRUCTIONS IF REMOTE CONDENSER
FAN MOTOR RUNS HOT & CUTS OUT	1. Line voltage too high.	
COMPRESSOR WON'T START	1. Line voltage too low. 2. Limit switches are open. 3. Overload or pressure control tripped.	REFER TO MFG'S INSTRUCTIONS IF REMOTE CONDENSER
BLOWER DOESN'T DELIVER AIR	1. Blower running backwards (3 phase only). 2. Dirty air filters. 3. Duct obstruction.	

TROUBLE	POSSIBLE CAUSE
COOLING - CHILLED WATER	
SYSTEM OFF	1. Check power at line side of contactor(s). 2. Thermostat not set for cooling.
EVAPORATOR BLOWER WILL NOT RUN	1. Over load thermal protector open in motor. 2. Relay not closing. 3. Capacitor shorted or open (PSC motors only). 4. Stuck shaft or blower wheel.
FAN MOTOR RUNS HOT AND CUTS OUT	1. Line voltage too high.
BLOWER DOES NOT DELIVER AIR	1. Blower running backwards (3 phase only). 2. Dirty air filters. 3. Duct obstruction.
BLOWER COMES ON, BUT LITTLE OR NO COOLING	1. Faulty thermostat. 2. Check valves and chiller in accordance with manufacturer instructions.

ROOFTOP REPLACEMENT PARTS

A complete list of replacement parts may be obtained from the manufacturer. When ordering parts, always reference the unit model number, serial number and part number.

It is the intent of AAON, Inc. to provide accurate and current specification information. However, in the interest of product improvement, AAON, Inc. reserves the right to change Pricing, Specifications and/or Design of it's Products without notice, obligation or liability.

For Parts, Order From:

AAON, Inc.
2425 South Yukon Ave.
Tulsa, Oklahoma 74107
Phone: 918-583-2266
Fax: 918-583-6094

Ask for Parts Service Department

FOR REPLACEMENT ITEMS USE MANUFACTURER SPECIFIED PARTS

CHECK OUT PROCEDURE

CAUTION: Before leaving installation, a complete operating cycle should be observed to see that all components are functioning properly.

COOLING

1. Main Power Switch(s) is/are on and power is to the unit.
2. Put thermostat in cooling mode and place the "fan" switch to on. Check to see if blower is running in the correct direction and at the nameplate amperage.
3. PACKAGE UNITS - Check to see that the compressor is operating. Check the amperage draw and compare to the nameplate (check amperage load side of the compressor contactor).
4. DX COIL ONLY UNITS - Check remote condenser as per manufactures recommendations.
5. CHILLED WATER UNITS - Check to see that remote chiller is operating as per manufactures instructions. Check coolant flow valves for correct operation and settings.

HEATING

Gas

1. Before turning on the main electrical power switch, be sure all gas supply lines are purged of air.
2. Turn gas valve or (main valve and pilot valve if used) to on position.
3. Turn on main electrical power switch and close the thermostat contacts. The vent motor should operate. The control will automatically supply energy to the spark gap and the pilot valve when thermostat contacts close.
4. The sensing probe detects the presence of the pilot flame and the control de-energizes the spark gap and energizes the main valve.
5. Turn thermostat to a low dial setting to open contacts. The main gas and pilot gas flames should be extinguished.

ELECTRIC

1. Set the thermostat in the heat mode.
2. Turn the thermostat switch all the way to the right which will bring in all electric heat strips. Check blower for proper rotation and voltage.
3. Measure the amperage on each conductor to the individual heat strips and compare to the following table.

STEAM OR HOT WATER

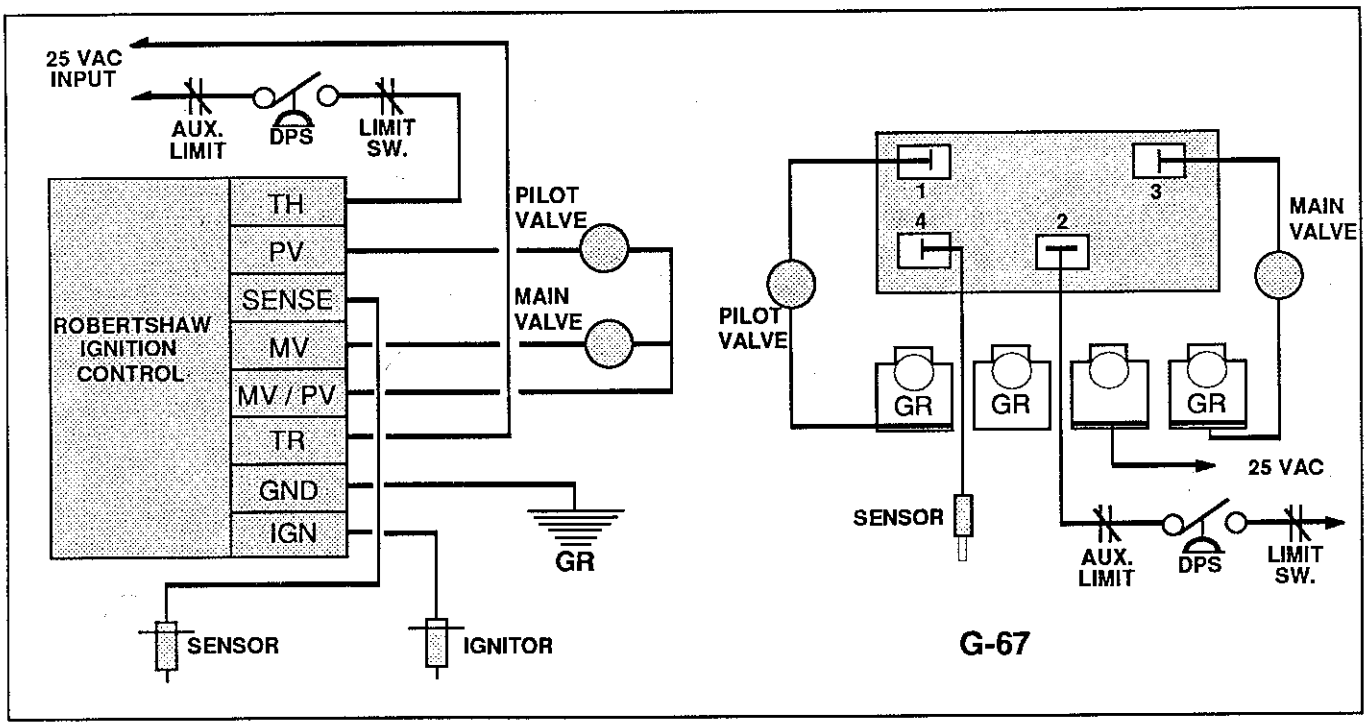
1. Set thermostat for proper operation.
2. Observe supply air blower for proper operation.
3. Check to see that the hot water or steam boiler is operating according to manufactures specifications.
4. Check to see that the flow control valves are operating to manufactures specifications.

VOLTAGE	KW RATING PER HEAT STRIP	APPROXIMATE AMPERAGE PER LEG
240 single phase	10.0 KW (Parallel)	41.7
208	7.5 KW (at 3 Increments, 3 ph. Wye)	20.9
240	10.0 KW (at 3 Increments, 3 ph. Wye)	24.1
480	10.0 KW (at 3 Increments, 3 ph. Wye)	12.0
575	10.0 KW (at 3 Increments, 3 ph. Wye)	10.0

ELECTRONIC PROVEN PILOT CONTROL SYSTEM

OPERATION

When the thermostat calls for heat, the electric spark and pilot valve are automatically energized to produce a pilot flame on each operating cycle. The sensing probe proves the presence of the pilot flame; internal switch action de-energizes the spark gap and energizes the main burner electric valve. The main gas ignites and the heating cycle is in normal operation. When the thermostat is satisfied, the main burner valve and the pilot valve are de-energized.



NORMAL OPERATING SEQUENCE

1. Thermostat calls for heat
2. Vent motor (if used) starts
3. Differential pressure switch contacts close
4. Pilot Valve opens
   Spark gap is energized and lights pilot
5. Main valve circuit is energized only after pilot lights

SEQUENCE OF OPERATION

I. GENERAL

A. HEATING

1. Heating: Gas, Natural

Upon a call for heating from the space thermostat. W1 makes R to the heat relay all N.O. contacts close and all N.C. contacts open. The combustion motor starts and as the pressure decreases in the flue outlet box the ignition control is energized along with the pilot valve. Upon pilot proof the main gas valve opens. When the supply air has reached a certain temperature the supply fan is energized by the fan switch.

On fault the gas train is shut down by a main limit located after the heat exchanger or by an auxiliary limit mounted in the supply air fan housing.

2. Heating: Gas, Propane

The sequence for Propane is the same as above but upon non-proof of pilot the gas train will enter a 100% lockout condition

3. Heating: Electric

Upon a space call for heat W1 make R to the heat relay HR. All NO contacts close, all NC contacts open. The heat relay makes to R to the the first stage of electric heat.

On a fault condition the main limit located in the supply air or the auxiliary limit located in the supply air fan housing will remove power from all contactors.

If additional heating is required a second set of elements can be turned on by W2.

OPTIONAL

When available the electric heat can be sequenced to provide a constant discharge air temperature.

4. Heating: Steam

This option adds a steam coil down-stream of the cooling coil (if supplied). Connections and controls are by others.

5. Heating: Hot Water

See Steam Heating above.

B. COOLING

1. Package Units: Upon a call for cooling from the space, Y1 makes R to CC1 through the LPS, HPS and GOT (low pressure switch, high pressure switch and guarantee off timer) on units 26 tons through 63 tons CC3 is also made. If additional cooling is required CC2 and CC4 (on 26-63 ton) are made through their respective pressure switches and timers.

B. COOLING *cont.*

2. DX ONLY - COIL UNITS

Upon a call for cooling from the space, the condensing unit is energized (refer to manufactures instructions for sequence of operation). The evaporator blower contactor is energized simultaneously with the condensing section.

3. CHILLED WATER COIL UNITS

The blower contactor is energized to provide supply air on a signal from the space thermostat. All other controls are by others.

C. OPTIONS

1. MODULATING GAS

This option replaces the standard gas valve with a modulating style valve. The gas valve is controlled by a discharge air temperature sensor or a space sensor. All existing safties are still present.

2. ECONOMIZERS

When cooling is called for and the unit has the economizer option installed.

Temperature switch ECS (or Enthalpy) allows economizer operation when the outside air reaches the required setpoint. (Some options use dry bulb sensing and some options use enthalpy sensing to determine th OA condition). When the economizer is in operation Y1 controls the opening and closing of the damper, Y2 is then able to control the compressors which Y1 normally controls.

A modulating economizer is also available. The operation is the same as the standard economizer except that the motor modulates the damper position to maintain a preset mixed air temperature.

II. W7400 CONTROL SYSTEM MODULE OPERATION

When equipped with a W7400 control module, compressor lockout thermostat, economizer changeover thermostat and EP74PT control circuit board.

The circuit board consists of four relays and a variable 10 V.D.C. power supply. Power to the board and all wiring and switching is supplied from an external 24 V.A.C. Class 2 transformer. This control system allows the economizer to operate either with three position damper control or automatic air balancing damper control, depending on the control system desired.

A. SEQUENCE OF COOLING OPERATION

Before proceeding, insure that the electric supply is within the prescribed unit application limitation and as specified on the unit nameplate. Close the external fused disconnect and the unit power switch (PS) providing power to the unit and energizing the W7400 system control module. Insure room thermostat is programmed and a demand for cooling exists.

The indoor blower relay (BR) will energize through terminal (G) of the system control module in approximately 1-1/2 minutes after power is turned on. The supply air blower will operate continuously during the occupied hours of each day as programmed in the T7400 room thermostat. During the unoccupied hours of each day the supply air blower will operate only whenever the thermostat call s for cooling.

OPERATION

On a call for cooling from the T7400 room thermostat, Y1 contacts of the W7400 close . If the outside temperature is less than the economizer changeover stat (ECS) setpoint, RY2 relay is energized. This locks out the stage 1 compressor and closes contacts between P and S terminals on the damper motor, driving it to the full open position.

If economizer cooling is insufficient for the heat load, the T7400 will call for additional cooling, closing the Y2 contacts of the W7400. At temperatures below the ECS setpoint, RY1 relay is de-energized. In this position the Y2 signal from the W7400 is made to the Y1 circuit board connection (through the RY1 relay) and energizes the Y1 compressor contactor for additional cooling.

If the outside temperature is greater than the ECS setpoint RY2 relay will de-energize and RY1 relay will energize. A call for cooling will close Y1 contacts on the W7400. This signal is passed to the Y1 contacts on the circuit board (thru the RY2 relay) and energizes the first stage compressor contactor.

On two stage cooling units, Y2 on the circuit board is connected to the second stage compressor contactor. Above ECS setpoint the energized RY1 relay will connect Y2 on the W7400 with Y2 on the board. Therefore, a call for additional cooling above the ECS setpoint will energize both stages of cooling.

ECONOMIZER OPERATION

Automatic Air Balance Economizer Control

The automatic air balance system controls the amount of outside air brought into the conditioned space. This system modulates the outside air intake damper, insuring a slightly positive pressure within the conditioned space. When economizer cooling occurs, the automatic air balance circuitry is bypassed and the damper opens fully in respond to room thermostat demand.

The automatic air balance control panel is connected to the unit terminal strip at terminals S, P and C. The "X" potentiometer is used to set the minimum damper opening. The motor is interlocked thru RY3 relay contacts to operate only in occupied or economizer preconditioning modes.

Three Position Economizer Control

The G-1 unit economizer can be operated as a three position economizer. The motor is interlocked thru RY3 relay contacts to operate only in occupied or Economizer preconditioning modes. "X" or minimum position is maintained during these times only, during blower operation. This position can be adjusted with the "X" potentiometer.

The intermediate "D" position is energized thru RY4 relay contacts. RY4 relay is energized by closing an external switch between terminals D and T2 on the unit terminal block. "D" position can be adjusted with the "D" potentiometer.

Full open economizer operation is achieved on a call for cooling when the outside temperature is below the ECS setpoint.

B. SEQUENCE OF HEATING OPERATION *cont.*

Before proceeding, insure that the electrical supply is within the prescribed unit application limitations as specified on the unit name plate. Turn on the gas supply at the external manual valve and the gas valve after verifying that the system was properly leak tested. Close the fused disconnect and unit power switch (PS) providing power to the unit and its W7400 systems control module. Check room thermostat program and adjust if necessary to provide a demand for heat.

The indoor blower relay (BR) will energize through terminal (G) of the system control module in approximately 1-1/2 minutes after power is turned on. The supply air blower will operate continuously during the occupied hours of each day as programmed in the T7400 room thermostat. During the unoccupied hours of each day, the supply air blower will operate only whenever the thermostat calls for heating.

On a demand for heat from the room thermostat, the (CR) relay (combustion blower) is energized through the (W1) terminal of the system control module, closing contacts (1-3) CR relay thereby energizing the combustion blower motor. Power is applied to the ignition control module causing the spark to start. Power is simultaneously applied to the pilot gas valve, allowing a flow of fuel to the pilot burner and ignition of pilot gas. The spark will stop when the flame sensor signals the ignition control module to provide first stage heating. The second stage becomes activated through terminal (W2) on the system control module.

When the outdoor ambient falls below the setting of the CLO55 degree contacts close, energizing (LLR) relay and closing (1-3) contacts LLR relay. Thermostat (LLS) low limit thermostat monitors duct temperatures as selected by the installer for the specific application. Temperature falling below the sensor setting will energize operation of the heating mode irrelevant of the room thermostat demand.

For detailed heating operation control, consult Honeywell Bulletin "Programmable Commercial Thermostat" covering the T7400 thermostat and W7400 system control module.

III. VAV (Variable Air Volume)

When a call for cooling is received, the controller board stages on compressors to maintain a supply air temperature. As different zones become satisfied their VAV boxes will close. (Boxes and controls by others). This in turn causes the supply duct pressure to rise. The VAV controller board senses this increase in pressure and modulates the supply fan speed to maintain the required supply air pressure setpoint.

Normally VAV units are cooling only units. There are certain applications where electric or gas heat is used to provide morning warmup. When gas or electric heat is used for morning warmup the airflow will not be allowed to vary. The fan speed control will be disabled until a call for cooling is received, then the heating system will be locked out and VAV will be enabled.

IV. VVT (Variable Volume and Temperature)

This control sequence is very similar to VAV. However, the rooftop unit will provide heating as well as cooling. The sequence is as follows.

The microprocessor controller polls the individual zones. Once the controller has determined what zone is furthest from setpoint it selects the mode which is right for the zone (heating or cooling). Once the mode is selected the microprocessor determines which zones require heating or cooling like the zone furthest from setpoint. It then closes the damper boxes of the spaces which do not require conditioning. As zones become satisfied their damper boxes close. This increases the supply static pressure which the unit sees. When the unit is in the cooling mode the duct static pressure is controlled by modulating the fan speed. When the unit is in the heating mode, the volume the unit sees will be constant and the controller will vary the volume of bypass air back to the unit. The bypass can be situated in either the curb or in a piece of ductwork connecting the supply to the return.

The microprocessor controls the rooftop unit through a relay board. This relay board interfaces with the rooftop unit much the same way a conventional thermostat interfaces with the unit. It controls the unit through G, Y1, Y2, W1 and W2. Additionally, the controller has inputs for supply air temperature, outside air temperature, return air temperature, supply static pressure, return static pressure, space temperature and economize position. These inputs will be analog in nature and be in the range of 0 - 4 Vdc.

The microprocessor has also available an output to communicate with other microprocessor controllers on a particular rooftop installation. This output also allows for communication to a remote personal computer.

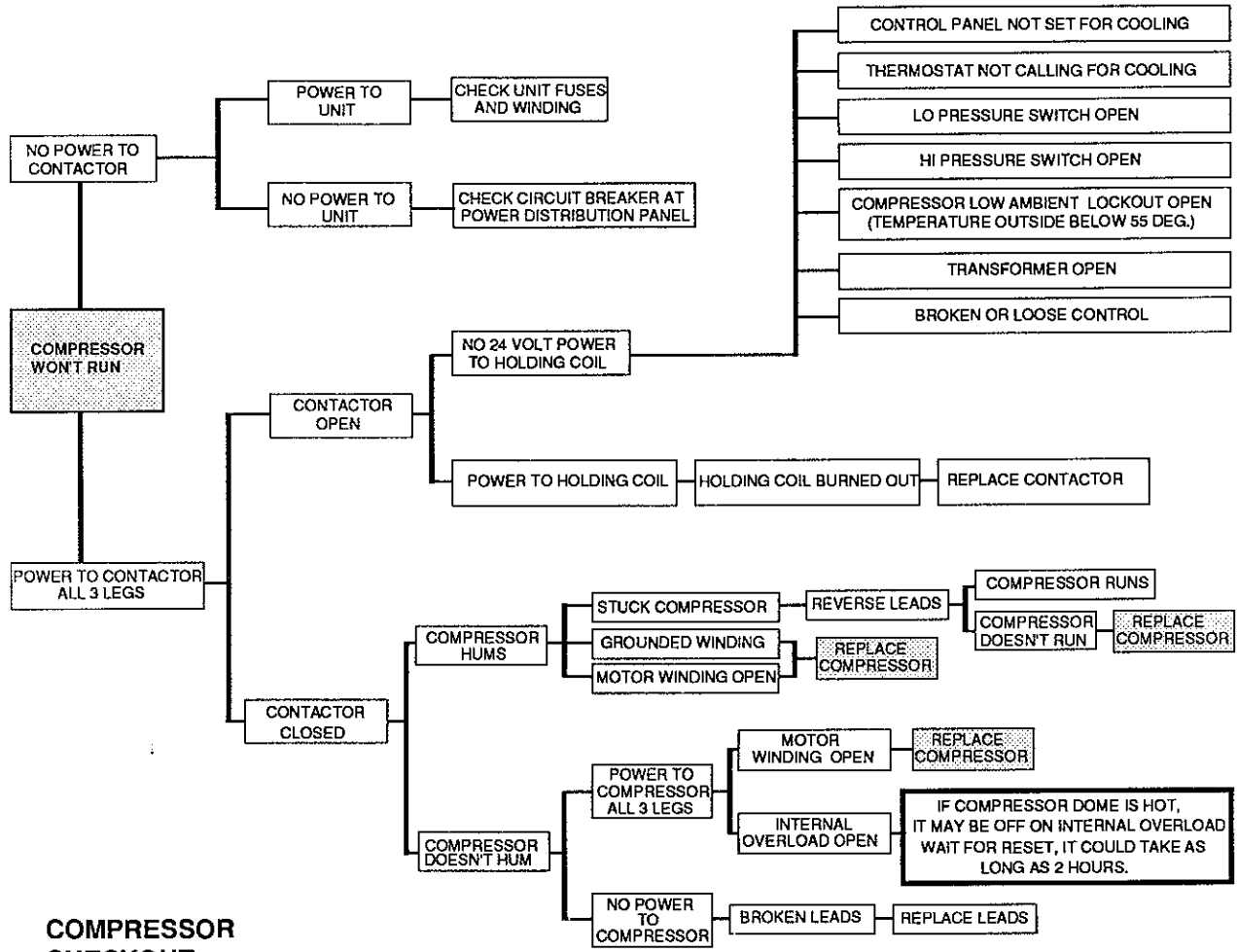
V. POWER EXHAUST

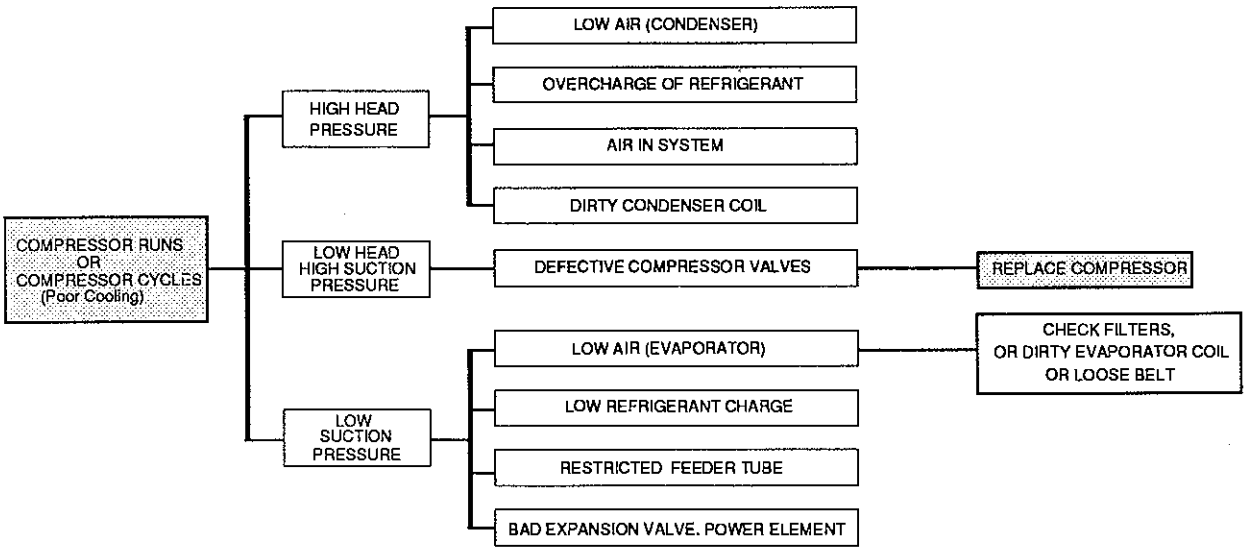
When space over pressurization occurs and the Factory installed, field set, limit switch is made the power exhaust will be enabled.

When the power exhaust is enabled the remote installed pressure transducer will control the power exhaust dampers.

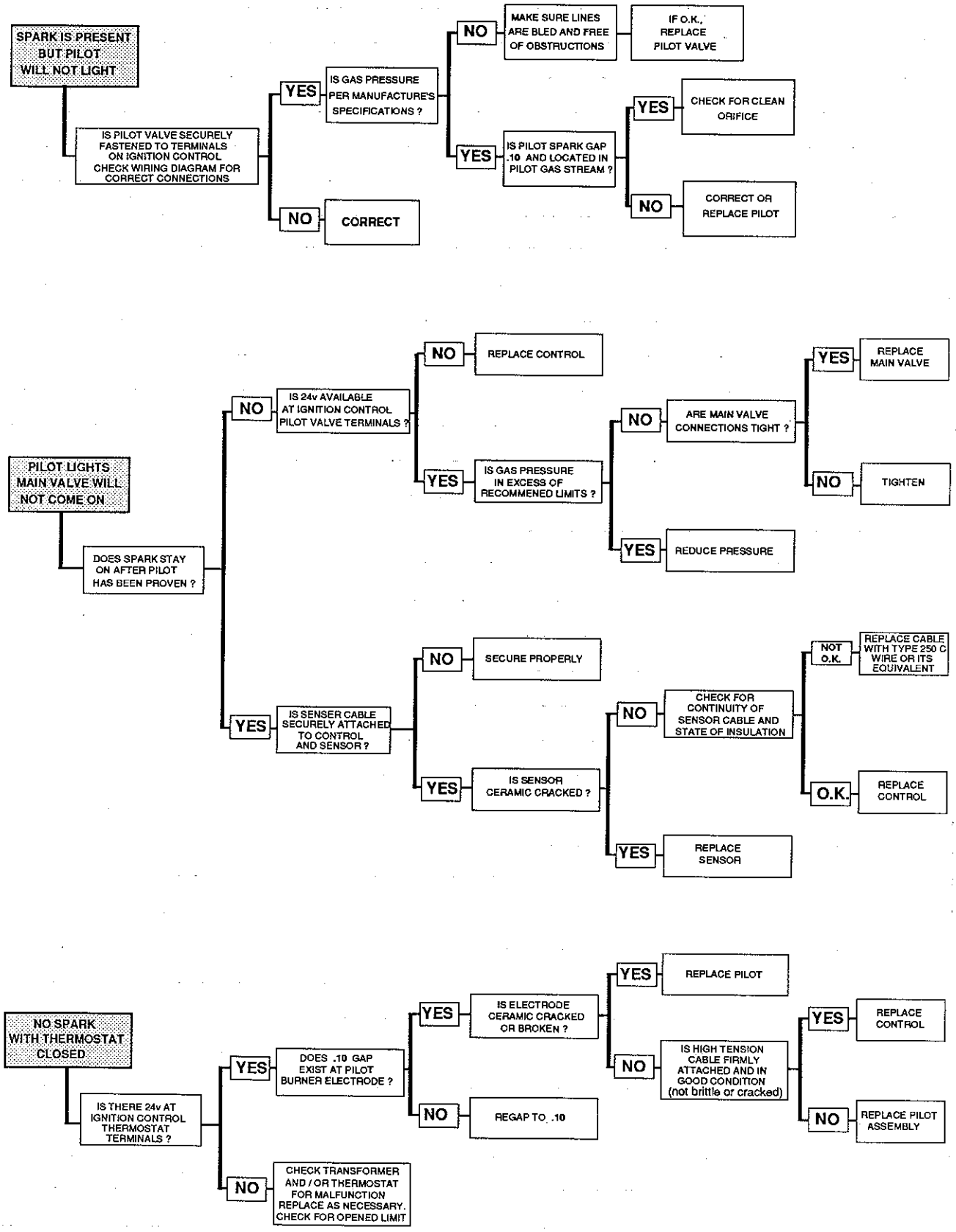
The limit switch located on the economizer OA Damper section is field setable to allow for differences in building design. The switch engages and disengages the power exhaust motor(s) through a contactor. The limit switch is in the 24 VAC circuit.

COMPRESSOR CHECK OUT PROCEDURE





IGNITION CONTROL CHECK OUT PROCEDURE



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AAON ROOFTOP UNITS

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INSTALLATION INSTRUCTION MANUAL

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