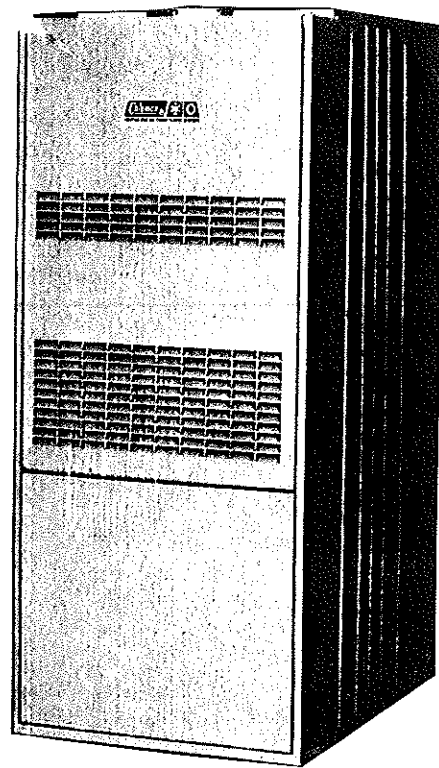


COLEMAN

D.E.S. 80

DELUXE ENERGY SAVER



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SPECIFICATIONS

| MODEL | NAT. | 2845-666 | 2865-666 | 2880-766 | 2895-766 | 2865-766 |
|--|---------------------------------|---|----------|------------|---------------|-------------|
| UNIT RATING Btu/Hr. | Input: 0-2,000 Ft. Elevation | 55,000 | 75,000 | 95,000 | 115,000 | 75,000 |
| | High Altitude | FOR ELEVATIONS ABOVE 2,000 FT. REDUCE INPUT 4% FOR EACH 1,000 FT. OF ELEV. ABOVE SEA LEVEL | | | | |
| AIR TEMPERATURE RISE RANGE °F. | | 30-60 | 40-70 | 45-75 | 50-80 | 40-70 |
| DESIGNED MAX. OUTLET AIR TEMP. °F. | | 155 | 165 | 170 | 175 | 165 |
| MAX. EXTERNAL STATIC PRESSURE IN. W.C. | | .5 | | | | |
| FURNACE FLUE PIPE CONNECTION | | 4 in. ROUND | | 5 in. OVAL | | 4 in. ROUND |
| GAS CONNECTION | | 1/2 in. FPT | | | | |
| ELECTRICAL SERVICE | | 115 VAC 60 HZ 1 PH | | | | |
| MINIMUM DISTANCE TO COMBUSTIBLE MATERIALS — inches | | | | | | |
| FRONT | | 6 | | | | |
| BACK | | 0 | | | | |
| PLENUM-TOP | | 1 | | | | |
| FLOOR | | COMBUSTIBLE | | | | |
| SIDES | | 0 | | | | |
| FLUE | | 0 | | | | |
| Type B-1 Vent | | 1 | | | | |
| Single Wall Metal Pipe | | 6 | | | | |
| FILTER (Furnished) | | 16 x 25 x 1/2 | | | 20 x 25 x 1/2 | |

SAFETY

WARNING

FAILURE TO OBSERVE THE FOLLOWING SAFETY PRECAUTIONS COULD CAUSE FIRE, EXPLOSION, OR ASPHYXIATION.

FOR YOUR SAFETY

DO NOT STORE OR USE FLAMMABLE LIQUIDS, VAPORS OR MATERIALS IN THE IMMEDIATE AREA NEAR THE FURNACE OR OTHER HEATING APPLIANCE. DO NOT STORE BROOMS, MOPS, OR EQUIPMENT OR MATERIALS, NEAR THE FURNACE IN ANY CONFINED SPACE WHICH MAY BE AROUND OR IN FRONT OF THE FURNACE.

A FURNACE INSTALLED IN AN ATTIC OR OTHER INSULATED SPACE MUST BE KEPT FREE AND CLEAR OF INSULATION MATERIALS. EXAMINE THE FURNACE AREA WHEN THE FURNACE IS INSTALLED, OR IF ADDITIONAL INSULATION IS ADDED. THE INSULATION MATERIAL MAY BE COMBUSTIBLE.

Louvered openings in the furnace front panel must be kept clean and unobstructed. Any openings into the furnace closet, or confined room in which the furnace is located, for the entrance of combustion and ventilation air must be kept open and unobstructed.

APPLICATION

FURNACE CERTIFICATION AND USAGE

The furnace models described in these instructions are design certified by the American Gas Association to be in compliance with American National Standard Z21.47-1983.

These furnaces are forced air type and may be utilized for indoor installation in buildings constructed on-site, or manufactured buildings (modular only). These furnaces are

not certified for installation in mobile homes.

MUNICIPAL, STATE AND FEDERAL CODES
The installer must conform to all state and local building codes when installing these appliances. In the absence of state and local codes, these furnaces and related equipment must be installed in accordance with the latest issue of the following:

NATIONAL ELECTRICAL CODE --
ANSI/NFPA 70-1981.

NATIONAL FUEL GAS CODE ANSI Z223.1-1984.

NOTE

The words "Shall" or "Must" indicate a requirement which is essential to satisfactory and safe product performance.

The words "Should" or "May" indicate a recommendation or advice which is not essential and not required but which may be useful or helpful.

INSTALLATION PROCEDURE

Installations on Combustible Flooring

This furnace shall not be installed directly on carpeting, tile or other combustible material, other than wood flooring.

When installing unit on combustible floor -- A casing bottom Block-off panel is supplied with the furnace. This pane must be in place when a side inlet return duct connection is employed. When bottom inlet return connection is employed or furnace is on non-combustible surface the Block-off panel needs to be removed.

Installation in Residential Garages

When furnace is installed in a

residential garage it must be located and installed such that it will be protected against vehicular damage. The furnace must be installed such that the burners, and any source of ignition is a minimum of 18" above the floor.

PROVIDE VENTILATION AND COMBUSTION AIR

WARNING

ADEQUATE VENTILATION AND COMBUSTION AIR MUST BE PROVIDED TO INSURE SATISFACTORY AND SAFE OPERATION OF THE FURNACE. AIR OPENINGS IN CASING FRONT PANEL AND VESTIBULE TOP PANEL MUST NOT BE OBSTRUCTED. FAILURE TO OBSERVE THIS RECOMMENDATION COULD RESULT IN ASPHYXIATION.

DO NOT STORE HALOGEN EMITTING SUBSTANCES SUCH AS LAUNDRY BLEACH AND DETERGENT, CLEANING FLUIDS, SPRAY CAN PROPELLENTS AND SOLVENTS IN THE VICINITY OF THIS APPLIANCE. THE AIR USED BY THE BURNER FOR COMBUSTION MUST BE FREE OF HALOGENS TO AVOID POSSIBLE CORROSION TO THE HEATING SURFACES WHICH COULD RESULT IN ASPHYXIATION.

Installations in a Confined Space

If the unit is to be installed in a confined space such as a small closet or room, provisions must be made for supplying combustion and ventilation air to the space surrounding the furnace. (See Fig. 1)

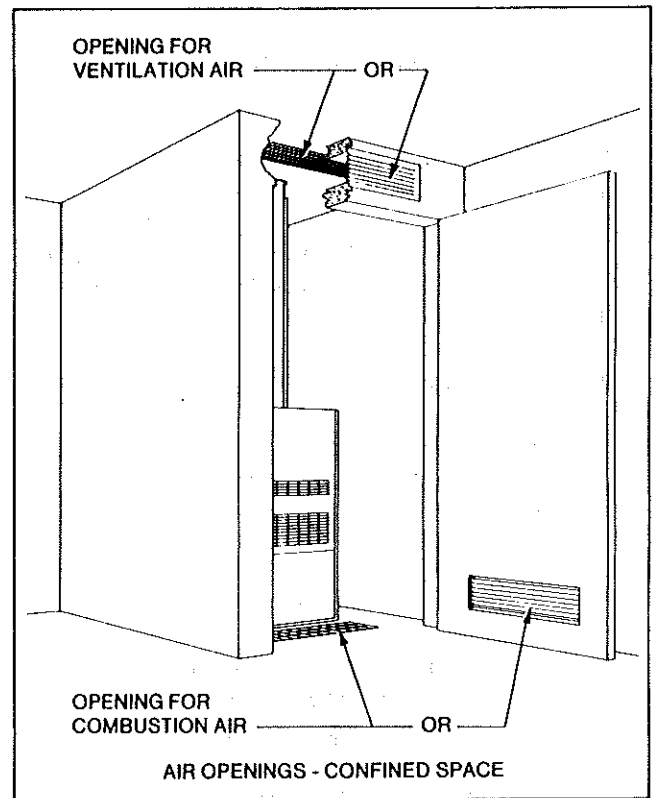


Figure 1

Two openings of equal area must be provided; one commencing within 12 inches of the ceiling and one commencing within 12 inches of the floor of the confined space. The upper opening shall always be above the top of the furnace casing. The lower opening, if in the side wall or door, shall be located below the level of the burner in the furnace.

All air from inside building:

The total free area of each opening must be at least 1 square inch for each 1,000 BTUH of furnace input.

All air from outdoors:

When communicating directly with the outdoors or through vertical ducts, the total free area of each opening must be at least 1 square inch for each 4,000 BTUH of furnace input.

When communicating with the outdoors through horizontal ducts, the total free area of each opening must be at

least 1 square inch for each 2,000 BTUH of furnace input.

When ducts are used, they must be of the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts must not be less than 3 inches.

Installations in an Unconfined Space.

In unconfined spaces in a building, infiltration normally is adequate to provide air for combustion and ventilation.

CAUTION

WHEN THE FURNACE IS INSTALLED IN A CLOSET OR OTHER CONFINED SPACE, AND A SIDE INLET DUCT EMPLOYED, THE DUCT MUST BE SEALED TO THE FURNACE AND EXTEND TO THE CONDITIONED SPACE TO PREVENT ANY COMMUNICATION BETWEEN THE SPACE OR ROOM IN WHICH THE FURNACE IS INSTALLED WHICH COULD RESULT IN ASPHYXIATION.

GAS PIPING AND SUPPLY PRESSURES

In the absence of local codes follow the recommendations contained in NATIONAL FLUE GAS CODE ANSI Z223.1-1984 for gas piping materials, pipe sizing and the requirements for installation.

If test pressure is greater than 1/2 psig., the furnace and its individual shut-off valve must be disconnected from the gas supply piping system.

CAUTION

THOROUGHLY CHECK THE PIPING SYSTEM FOR LEAKS. NEVER USE AN OPEN FLAME, FIRE OR EXPLOSION COULD OCCUR. SINCE SOME LEAK SOLUTIONS INCLUDING SOAP AND WATER MAY CAUSE CORROSION, THE PIPING SHALL BE CLEANED OFF AFTER TESTING.

The maximum and minimum gas supply

pressure required at the inlet of the gas control valve is shown on the unit rating plate. When furnace is in operation the inlet pressure must be within the limits shown.

VENTING

For more information regarding vent design and installation, refer to NATIONAL FUEL GAS CODE ANSI Z223.1-1984.

1. The vent material can be class C or B1 for the first 5' from the furnace. Beyond 5' it must be B1, or a permanent chimney?
2. Maintain minimum 6" clearance to combustible material for class C vent and 1" clearance for B1 vent.
3. When using Listed Type B-1 vent materials and/or a Listed Manufactured chimney is used, they must be installed in accordance with the Manufacturer's Installation Instructions and the terms of the Listing.
4. If horizontal pipe is required, it should be as short as possible and pitch upward toward the vertical riser or chimney inlet at least 1/4" per foot to help insure proper venting characteristics.
5. The vent pipe must be at least as large as outlet on vent box.
6. Where two or more appliances are connected to a common vent or flue, the area of the common vent or connector must be equal in area to the largest appliance vent size plus 50% of the area of the smaller vent size(s).
7. DO NOT USE dampers or restrictors in vent piping or

flue.

- Vent pipe sections must be securely fastened together and fastened to the furnace flue collar using sheet metal screws where required.

Control Wiring

Thermostat should be installed in accordance with the manufacturer's instructions, furnished with the thermostat, and make connections to the unit as shown on the unit wiring diagram. It is recommended 18 AWG wire be used.

If the thermostat has an adjustable heat anticipator, set it to .13 ampere.

Blower Motor Speed Selection

These furnaces are equipped with blowers which have multi-speed direct drive motors.

The furnace must be adjusted to operate at or below the maximum external static (in W. C.) and within the air temperature rise range as shown on the unit rating plate and in the specification table.

Furnace models 28XX-6XX are equipped with 3-speed blower motors.

Furnace models 28XX-7XX are equipped with 4-speed blower motors.

These furnaces are equipped with a blower relay which will change blower speeds automatically when the furnace is properly connected to a heating and cooling type wall thermostat. The blower motors are factory connected to operate on high speed for cooling operation and medium (or medium high) speed for heating operation.

| |
|------------------------|
| 3-Speed Motor |
| Common, White or No. 1 |
| High, Black or No. 2 |
| Medium, Blue or No. 3 |
| Low, Red or No. 4 |

| |
|---------------------------|
| 4-Speed Motor |
| Common, White or No. 1 |
| High, Black or No. 2 |
| Med. Hi, Blue or No. 3 |
| Med. Low, Yellow or No. 4 |
| Low, Red or No. 5 |

Motor Lubrication - If motor is provided with oil ports, lubricate motor with S.A.E. 20 no-detergent type oil. Slowly add 10 to 15 drops to each oil port. Do not over oil. Motors which are not provided with oil ports require no lubrication.

SEQUENCE OF OPERATION

These furnaces are equipped with an electric spark, direct burner ignition system; therefore, in response to a call for heat by the room thermostat, the burner is lighted by an electric arc at the beginning of each operation cycle. The burner will continue to operate until the thermostat is satisfied at which time all burner flame is extinguished. During the off cycle,

no gas energy is consumed. With the room thermostat set below room temperature and with the electrical power and gas supply to the furnace on, the normal sequence of operation is as follows:

1. When the room temperature falls below the setting of the room thermostat, the thermostat energizes the heat relay.
2. When the heating relay closes, a circuit is made starting the vent blower. A circuit is also made through the heating relay to the normally open vent blower centrifugal switch contacts.
3. As the vent blower increases in speed, the contacts of the centrifugal switch will close and complete the electrical circuit through the normally closed limit switch to the electronic ignition module.
4. After 15 to 20 seconds the electronic ignition module simultaneously energizes: (1) the electric ignition electrode, (2) the gas control valve, and (3) a safety lock out circuit.
5. When the burner lights, a flame sensor, which is apart of the ignition electrode assembly, senses the presence of the burner flame and causes the safety lock out circuit in the ignition module to be de-energized. This allows the gas valve to remain open and the burner to operate.
6. If the burner fails to light within 6-8 seconds from the time the ignition control is first energized by the centrifugal switch, the ignition module will de-energize; (1) the gas valve, and (2) the ignition electrode. The ignition control will again energize the gas valve, and the

ignition electrode after a 15-20 second delay. If after three trials for ignition the burner still fails to light, the safety lock out circuit in the ignition module will de-energize and lock off: (1) the gas valve, and (2) the ignition electrode. The system will remain in a lockout mode until the room thermostat is set below room temperature causing the thermostat contacts to open and release the safety lock out circuit. Then setting the room thermostat above room temperature and causing the thermostat contacts to close will start the system to try for ignition again.

7. The lapsed time from the moment the wall thermostat closes to when the burner lights may be from 20 to 40 seconds. This delay in the ignition sequence is caused by: (1) the time required for the vent blower to develop sufficient speed to activate the centrifugal switch and (2) the 15 to 20 second delay designed into the ignition module. The lapsed time will also be effected by the temperature within the furnace and in the flue piping.

The 15 to 20 second delay designed into the ignition module is a purge cycle. This allows the vent blower time to replenish the heat exchange with fresh air so ignition can occur safely.

8. One to two minutes after the burner has lighted, the normally open contacts of the fan switch close and the furnace air circulation blower runs.

NOTE

If a heating/cooling thermostat is being used and the fan switch is set in the "ON" (continuous blower) position, the furnace air circulation blower will run at the air conditioning speed. If the wall thermostat calls for heat, the furnace air circulation blower will shut off for 20 to 40 seconds then the burner will light. One to two minutes after the burner has lighted, the furnace air circulation blower will begin running again but at heating speed. There is no pause in the furnace air circulation blower operation when the wall thermostat is satisfied; the furnace air circulation blower just changes over to cooling (continuous blower) speed.

9. When the room thermostat is satisfied the circuit to the heating relay is broken and the heating relay contacts return to the normally open position. The circuit to the vent blower and the ignition module is broken and the burner is extinguished. Then as heat is drawn from the heat exchanger and the air temperature is reduced to below the fan switch setting, the fan switch will open which stops the furnace air circulation blower.

GAS CONTROL VALVE

The gas valve is multifunction, with two operating valves in line, pressure regulator and manual gas cock.

The pressure regulator is factory set to provide an operating manifold pressure of 3.5" W.C. on models equipped for Natural gas and 10" W.C. on models equipped for LP gas.

The pressure regulator is a limited

adjustment type. The input may be adjusted slightly by adjusting the pressure regulator in the gas control valve in order to change manifold pressure.

To adjust pressure regulator, remove cover screw on top of valve. Turn adjusting screw counter-clockwise to decrease pressure, turn clock-wise to increase pressure. IN NO CASE SHOULD THE FINAL MANIFOLD PRESSURE VARY MORE THAN + .3" W.C. FROM THE SPECIFIED REGULATOR PRESSURE SETTINGS -- 3.5" W.C. FOR NATURAL GAS AND 10" W.C. FOR L.P. GAS.

LIGHTING INSTRUCTIONS

This furnace is equipped with an automatic electric spark, direct burner ignition system which lights main burners each time the thermostat calls for heat.

This furnace cannot be lighted with a match.

WAIT 5 MINUTES

Turn knob on gas control valve to "on".

Set room thermostat to desired setting, above room temperature, burner will light -- which may take 20-40 seconds.

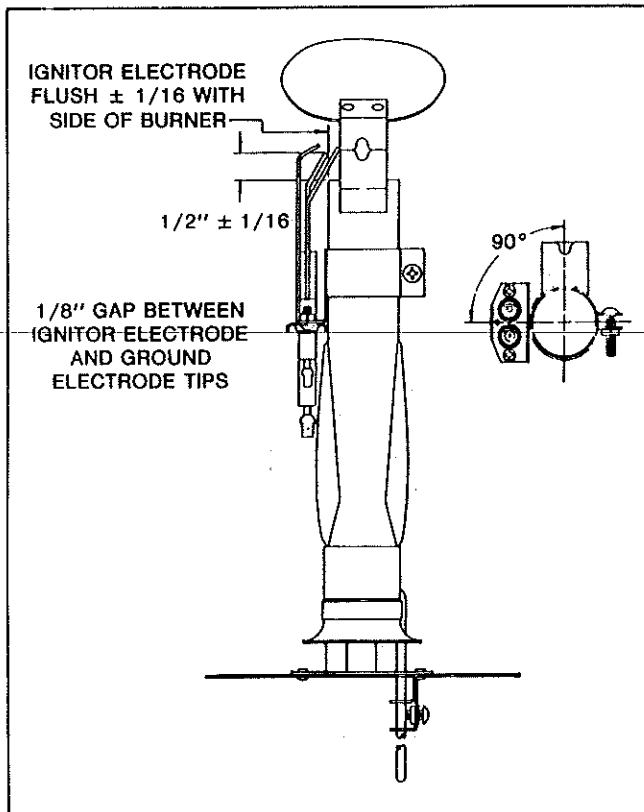
If after 3 trials for ignition, and burner fails to light, go to complete shutdown and determine cause for failure.

BURNER ADJUSTMENT

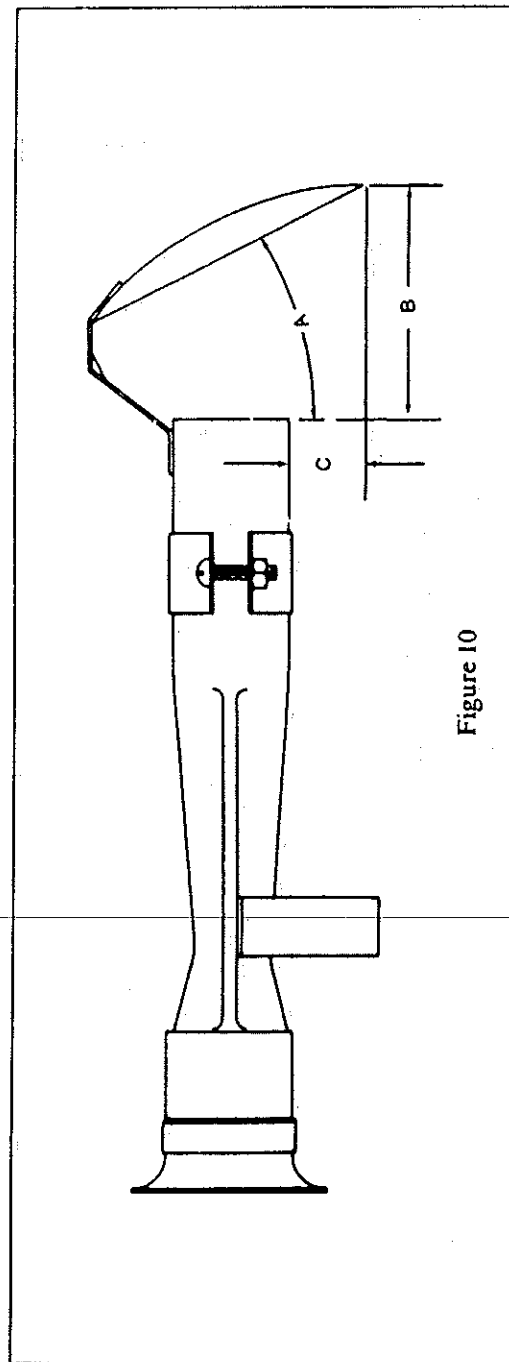
Burner -- Mono-Port with a stainless steel flame spreader and adjustable primary air.

After lighting the furnace, allow the furnace to operate for approximately 15 minutes and then adjust burner primary air as follows:

1. Loosen air adjustment rod lock screw.
2. Close primary air shutter by pulling on adjustment rod until yellow tips appear in the flame at the end of the burner.
3. Slowly open the primary air shutter by pushing adjustment rod in until yellow flame tips disappear; then push adjustment rod in another 1/8 inch.
4. Secure primary air adjustment rod by tightening locking screw against it.



Proper alignment of flame deflector is critical to the proper operation of the burner. Before burner is installed in furnace, check the alignment of the deflector as shown in figure 10. Constructing a template



FURNACE INPUT CAPACITY

The maximum BTUH input capacity for each model is shown on the unit rating plate and in the specification tables. This input must not be exceeded.

The input shown may be used in geographic areas where the elevation is from 0 to 2000 feet. In areas above 2000 feet, high altitude, the furnace BTU input must be reduced 4% for each 1000 feet of elevation above sea level.

The BTU input depends on the BTU content of the gas (BTU/cu. ft.), orifice size and manifold pressure. Coleman orifice sizes are based on BTU content of 1050 BTU/cu. ft. for Natural gas and 2500 BTU/cu. ft. for L.P. gas (Propane). The orifice size supplied with the furnace should provide satisfactory input capacity for installations in most areas, except at high altitude.

Determining Gas Input Rate

Where gas is metered, the input rate may be determined by the following method.

Contact the gas supplier, to obtain the calorific value of the gas being used. When checking the input rate, any other gas burning appliances connected to the same meter should be completely off. The furnace should be allowed to operate for approximately 15 minutes before attempting to check the gas flow rate.

To check flow rate, observe the 1 cubic foot dial on the gas meter and determine the number of seconds required for the dial hand to make one revolution (seconds to flow 1 cubic foot).

To determine the number of seconds required for the flow of one cubic foot of gas, use the following formula.

$$\frac{\text{(Btu Content)} \\ \text{Calorific Value of Gas} \times 3600}{\text{Furnace BTUH input}}$$

Example: 1,000 BTU gas, furnace input 100,000 BTU/hr.

$$\frac{\text{Seconds for 1 cubic foot} \\ 1000 \times 3600}{100,000} = 36 \text{ seconds}$$

GAS CONVERSION

Furnaces can be converted to L.P. gas by using a conversion kit available from The Coleman Company, Inc. The conversion essentially consists of:

1. Instructions, burner orifices, two stickers and a spring for converting a White Rodgers gas valve.
2. Instructions, two screws, gasket, burner orifice, and pressure regulator, for converting a Honeywell gas valve.

Conversion parts for either valve are contained in one conversion kit.

SERVICE PROCEDURES

WARNING: NEVER ATTEMPT TO MODIFY THIS FURNACE OR REPAIR DAMAGE OR DEFECTIVE COMPONENTS. SUCH ACTION COULD CAUSE UNSAFE OPERATION, FIRE, EXPLOSION OR ASPHYXIATION.

All components and assemblies must be reinstalled in the same manner and position as they were originally.

Damaged or defective components must be replaced. Only original equipment components, or substitute components authorized by The Coleman Company may be used in the repair of this furnace.

Vent Motor - If the vent motor does not run, disconnect the black and white wires from the vent motor and check for 115 volts between them. If voltage is present and the motor

does not run, replace the motor. If voltage is not present use the service charts to determine the cause.

Burner Assembly - The burner should be inspected for any accumulation of dust or lint. Use the pressure side of a vacuum cleaner to blow out any dust or lint. The burner must be removed to inspect the ignition electrode assembly, and the heat exchanger.

To Remove the Burner Assembly --

1. Turn off the gas supply to the furnace.
2. Disconnect the gas line to the gas valve.
3. Disconnect low voltage wires to the gas valve.
4. Remove 4 screws holding gas valve mount to the furnace vestibule.
5. Remove 4 screws holding the burner assembly to the furnace vestibule.

Ignition Electrode Assembly -- Check the condition of the electrode rods which should show no sign of serious deterioration, scaling, or carbon build up. Check the dimensional relationship between the rods and between the rods and burner. Minor adjustments can be made by carefully bending the rods slightly. Take care not to damage the porcelain insulators.

Combustion Chamber -- Using an inspection mirror and flashlight inspect the inside of the heat exchanger for any scaling, soot deposits, or metal fatigue. If any soot deposits are found the heat exchanger must be cleaned. Soot is caused by improper burner adjustment and must be corrected when the burner

is re-installed. If any holes are found the heat exchanger must be replaced.

Following the inspection and cleaning re-install all components parts in the reverse order of their removal.

NOTE: If soot deposits are found in the heat exchanger drum, remove the vent motor assembly and inspect the vent blower wheel and housing for soot. If soot deposits are found here also, the heat exchanger will have to be replaced and the condition causing the sooting must be corrected.

FURNACE COMPONENTS

Gas Valve — The gas valve is a redundant type valve. There are two operators which must open to allow gas to flow to the burner. Since furnace cannot be match lighted, there is no pilot position on the control knob. Operating voltage is 24 volts.

CAUTION

Never short the terminals on the gas valve. To do so may damage the valve or burn out the heat anticipator on the thermostat.

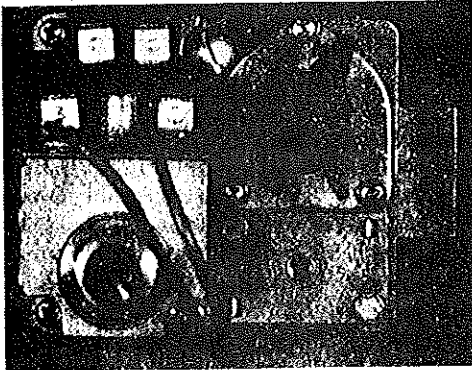


Figure 1
Gas Valve

Vent Motor Assembly — A 115 volt motor powers the assembly which creates the air draft through the burner and heat exchanger. Air for combustion is pulled through the front panel louvers, over the burner, through the heat exchanger and discharged into the vent box, then up through the flue pipe.

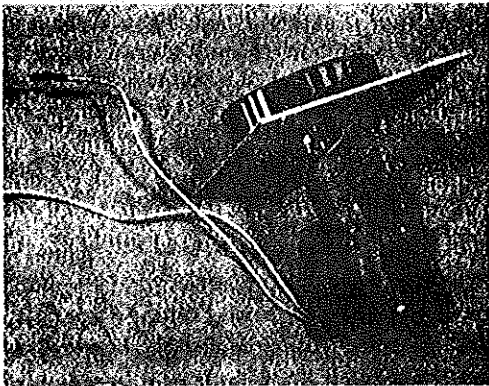


Figure 2
Vent Motor

Centrifugal Switch — A normally open switch attached to the vent motor and actuated by the vent motor r.p.m.'s. If the vent motor fails, the centrifugal switch will not close and the furnace will not operate in the heating mode.

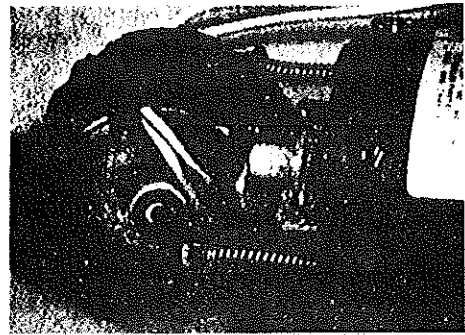


Figure 3
Centrifugal Switch

Ignition Module — The ignition module contains the timing circuits which produces the high voltage spark to ignite the burner. At the same instant the spark starts, the gas valve is energized. After the third try for ignition, if the burner is not ignited, the module locks out the system and will stay locked out until the system is reset.

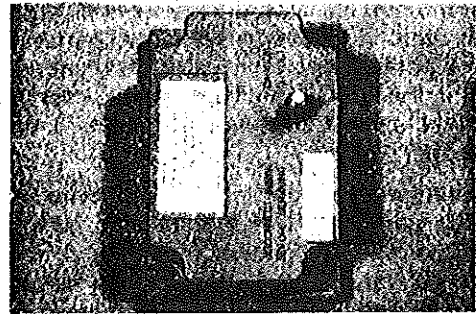


Figure 4
Ignition Module

Heating Relay — The heating relay has 3 sets of contacts — 2 normally open sets and 1 normally closed set. One set of normally open contacts control the power to the vent motor. The other set of normally open contacts control the power thru the normally closed limit switch and normally open air pressure switch to the ignition module. The set of normally closed contacts provides the power to the blower relay for blower operation in either the cooling or continuous mode.

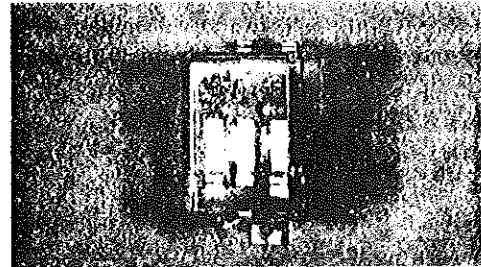


Figure 5
Heating Relay

Blower Relay — Double pole double throw. One set of contacts, normally open, wired to cooling speed of blower motor. Normally closed contacts wired to heating speed of the blower motor.

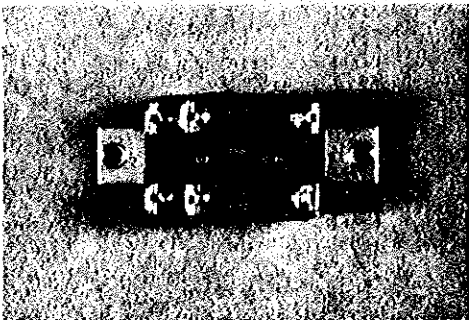


Figure 6
Blower Relay

Blower Motor — 115 volt, multi-speed permanent split capacitor type. Factory wired for medium high or medium speed in heating operation. Speed for cooling is optional and should be selected to match cooling load.

Transformer — The purpose of the transformer is to reduce the 115 volt primary voltage to 24 volts which the serviceman can work with easily and safely. The transformer is rated at 40 VA with sufficient capacity for add on air conditioning.

Fan Switch — Thermally actuated normally open switch — closes when heat exchanger temperature reaches switch temperature. Opens after burner is out and heat exchanger cools off.

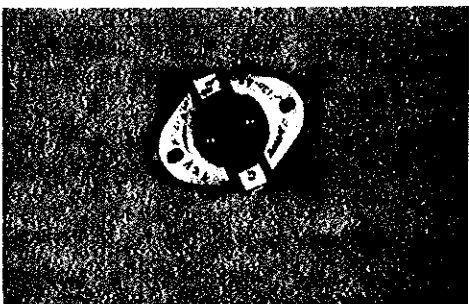


Figure 7
Fan Switch

Limit Control — Thermally actuated normally closed switch. Opens to de-energize the ignition module and close the gas valve when the heat exchanger temperature becomes excessive.

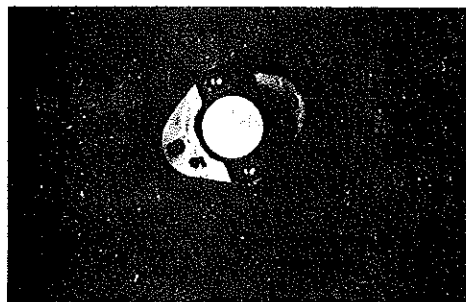


Figure 8
Limit Control

Manual Reset Limit Switch — A normally closed thermally actuated switch that does not reset automatically. The manual reset limit switch is mounted on the vent box sensor tube where it can sense the presence of flue gases if the flue is restricted.

If this switch trips, it will keep the two relays from functioning and that will shut off the operation of everything except the transformer and, if the fan switch is closed, the blower motor.

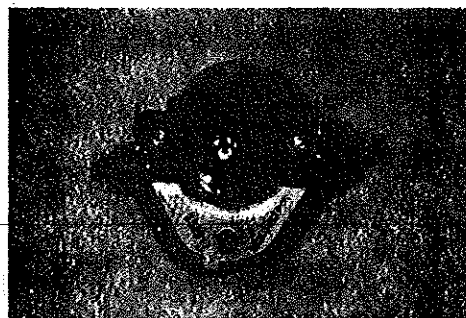
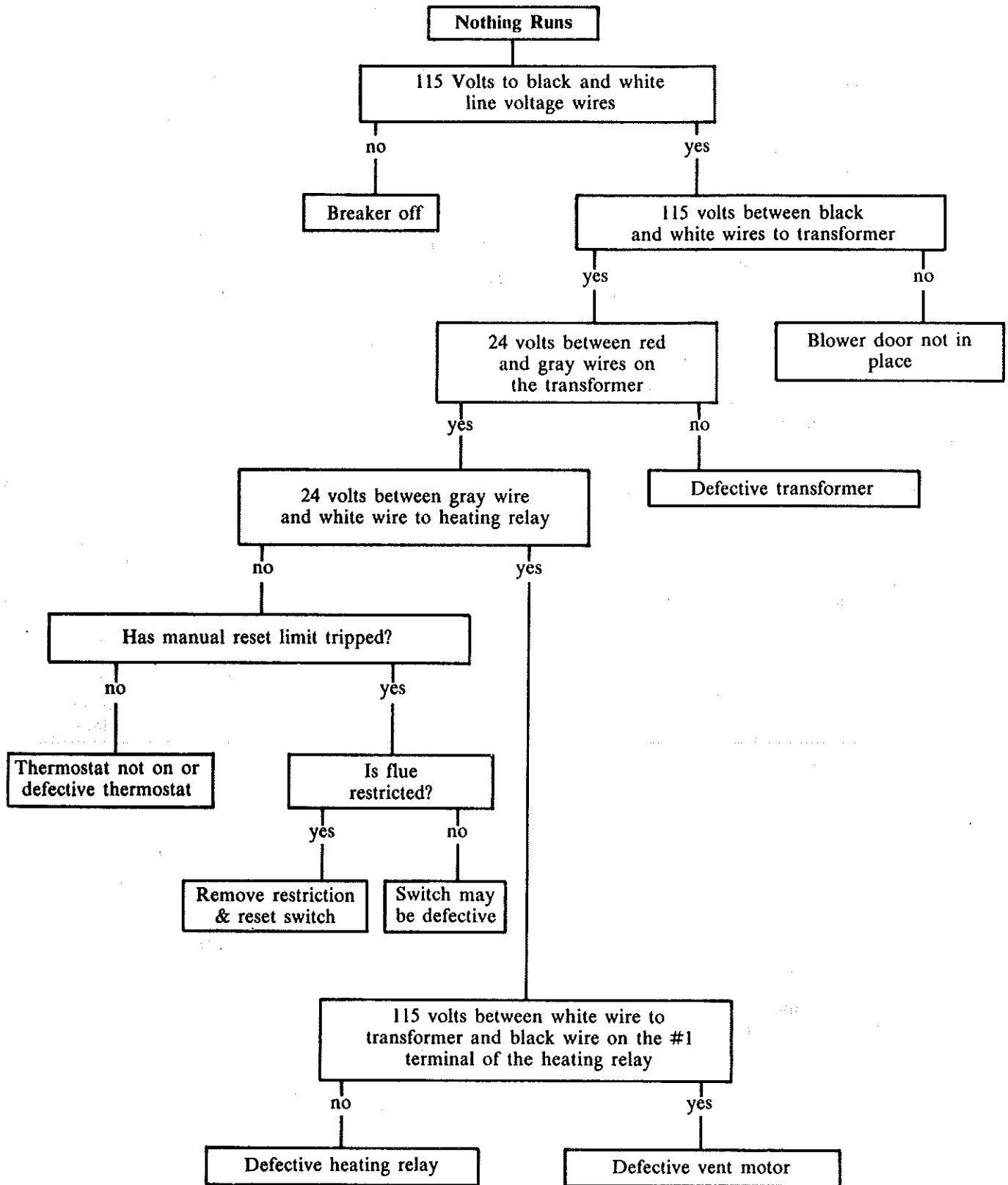
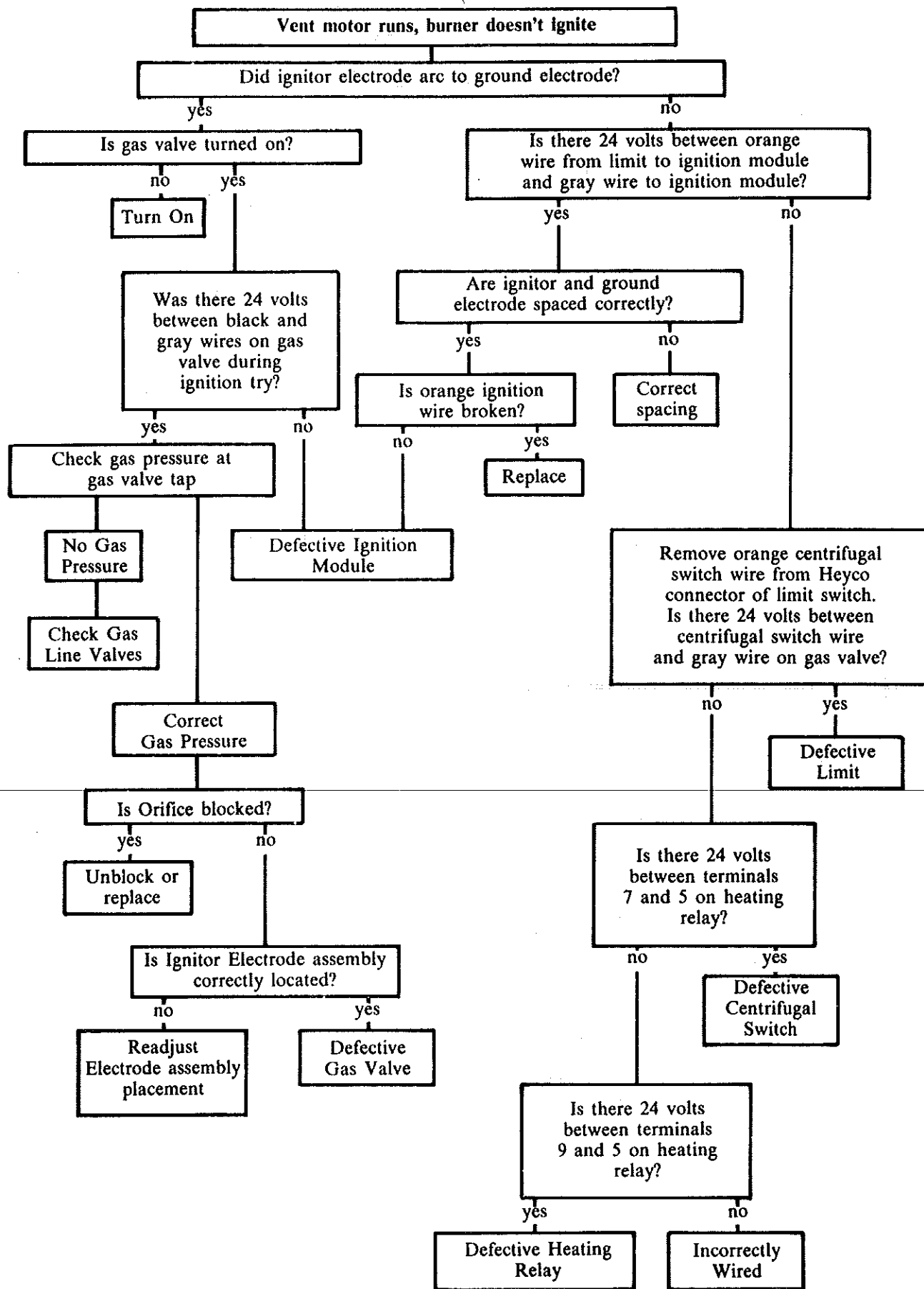


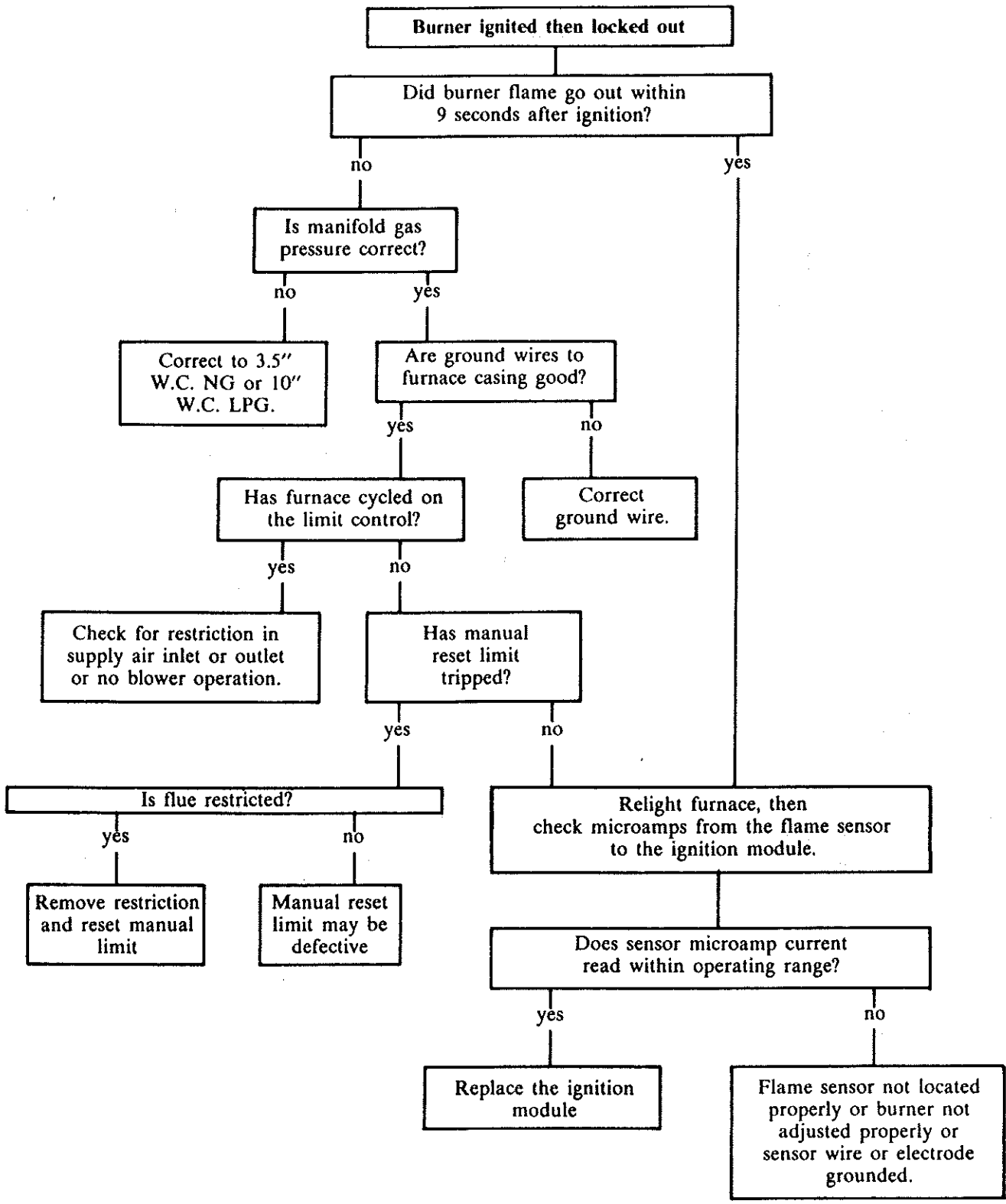
Figure 9
Manual Reset Limit Switch

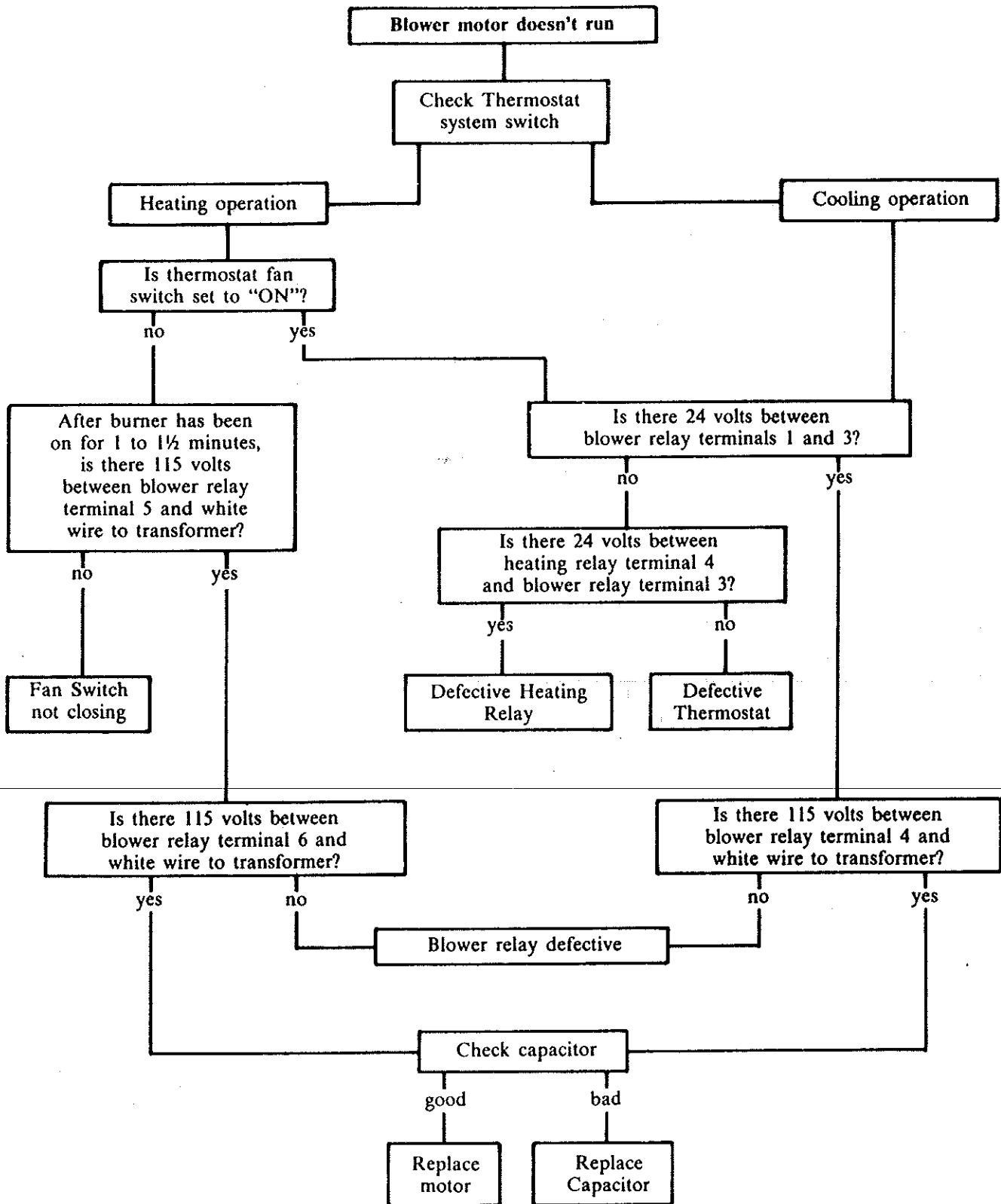
Blower Door Safety Switch — This switch is located inside the blower compartment and controls the electrical supply to the furnace electrical circuits. When the blower door is put in place, the switch is activated allowing the furnace to operate. The switch is designed to prevent furnace operation if the blower door is removed and inadvertently not re-installed, thus preventing the possibility of the blower creating a negative pressure in the furnace enclosure.

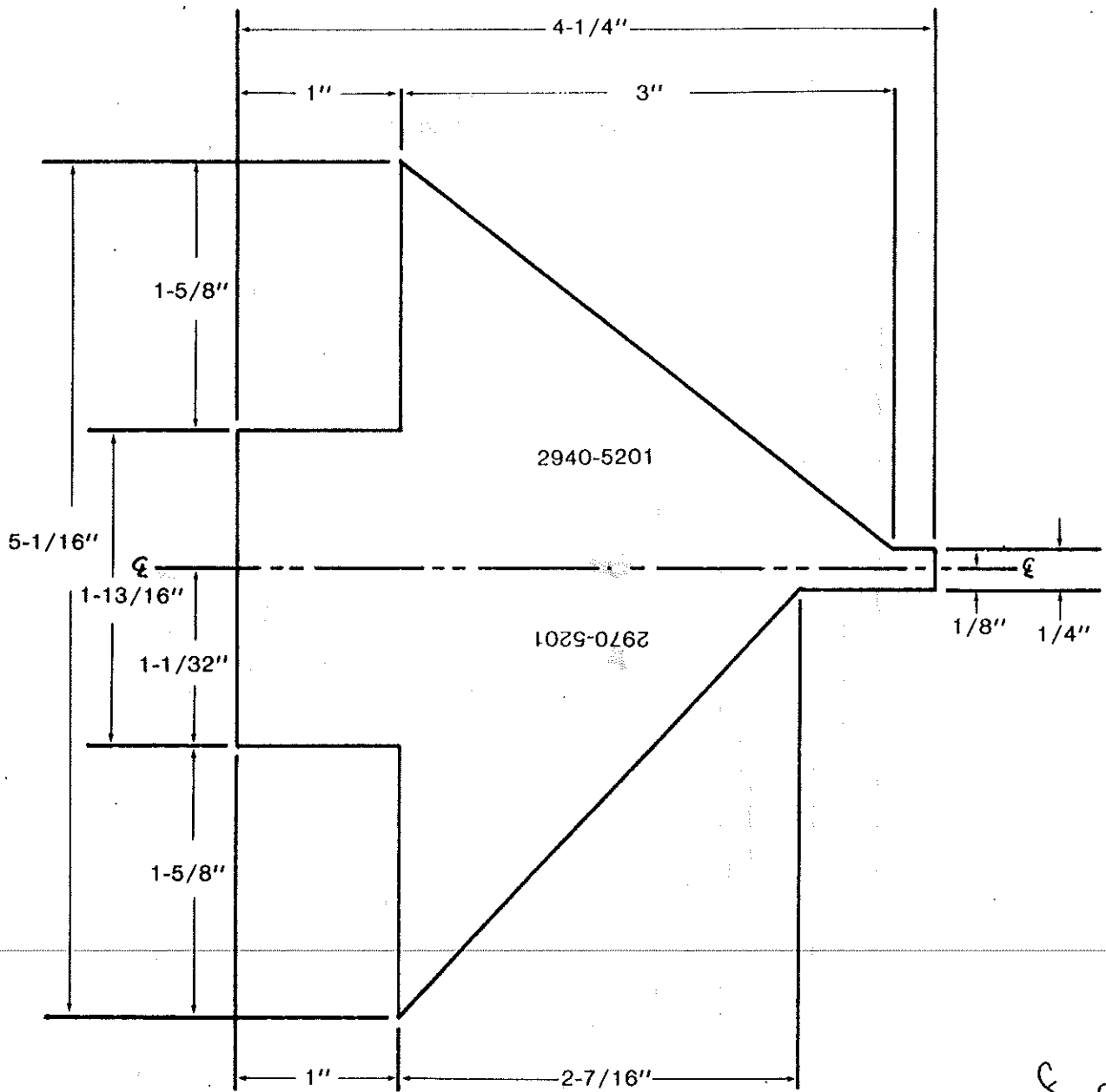
SERVICE CHARTS



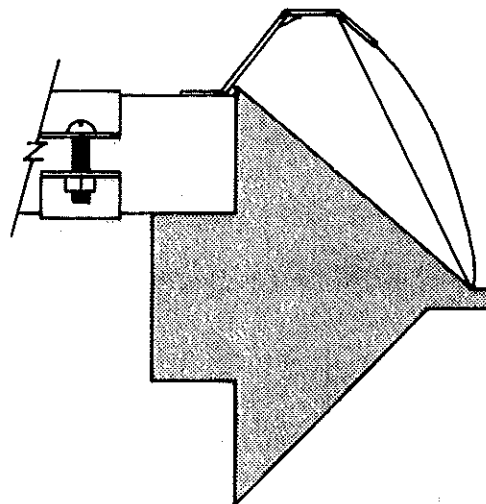






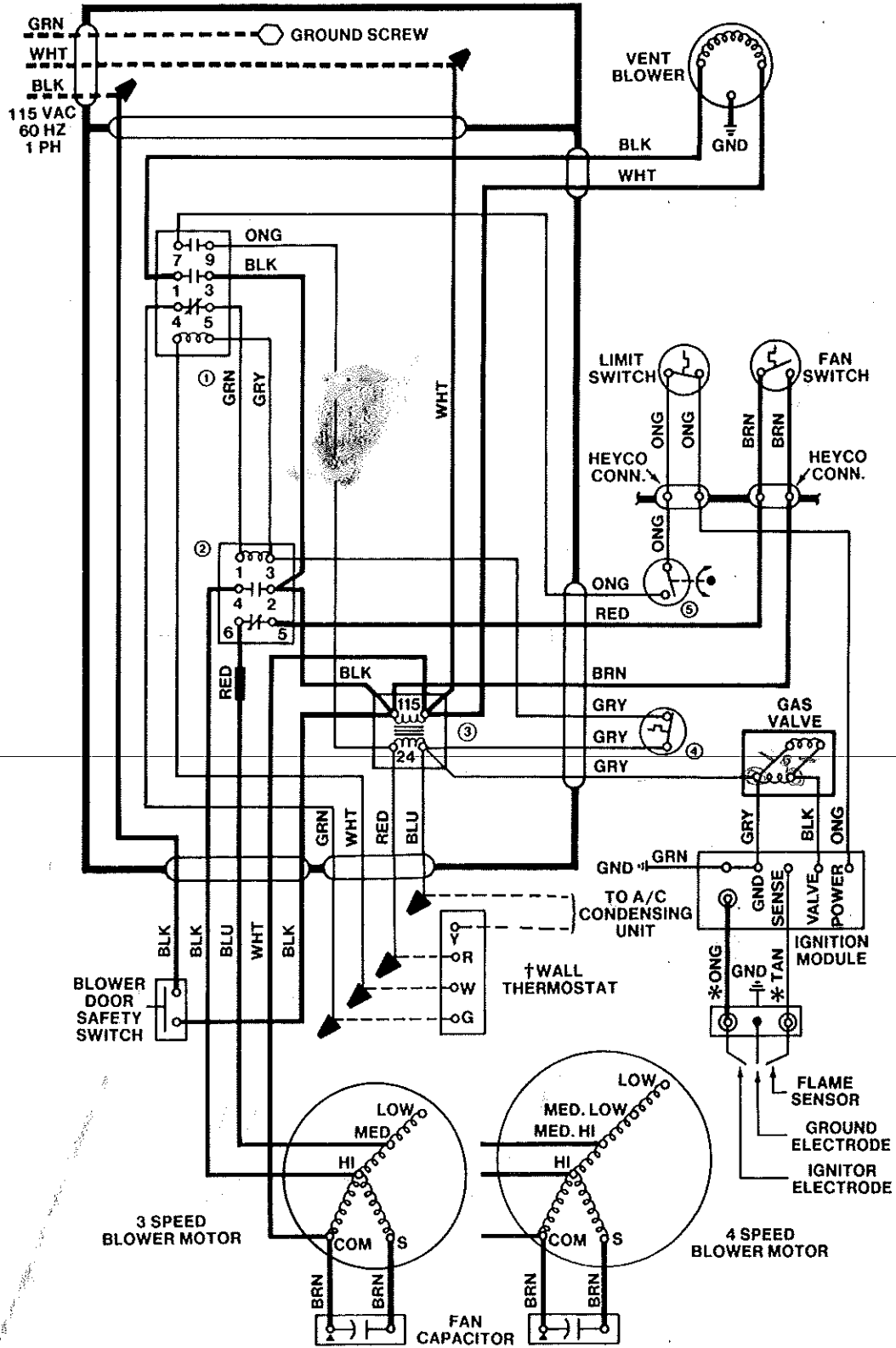


Angle of
Flame Deflector



80 SERIES COLEMAN GAS FORCED AIR FURNACE

USE ONLY 115 VAC 60 HZ 1 PH
LESS THAN 12 AMPS MAX. OVERCURRENT PROTECTION 15 AMPS



- ① HEATING RELAY, ② BLOWER RELAY, ③ TRANSFORMER, ④ MANUAL RESET LIMIT SWITCH, ⑤ CENTRIFUGAL SWITCH

FACTORY INTERNAL WIRING SHOWN SOLID.