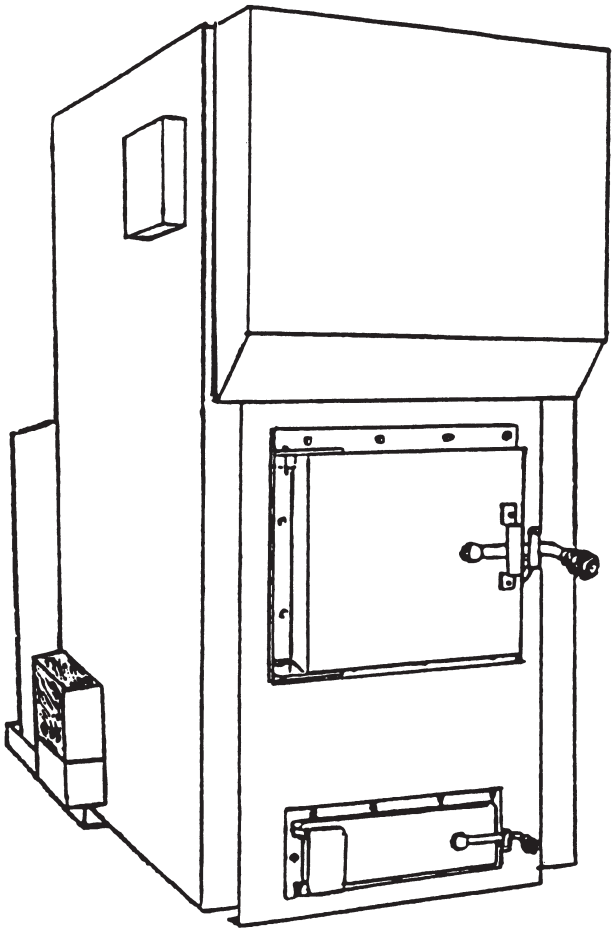
OWNER'S & INSTALLATION MANUAL

KUUMA™ Vapor-Fire
MODEL 100

(NON-CATALYTIC)



Lamppa Manufacturing, Inc.

TOWER, MN 55790 • USA
Tel (218) 753-2330 • www.lamppakuuma.com

CAUTION:

READ ALL INSTRUCTIONS AND RULES FOR SAFE OPERATION CAREFULLY BEFORE STARTING THE INSTALLATION. FOLLOW ALL STATE AND LOCAL CODES AND ORDINANCES.

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INTRODUCTION

Your Vapor-Fire Model 100 by Lamppa Manufacturing Inc. is an electronically controlled, solid-fuel forced-air wood furnace that uses patented technology resulting in the cleanest burning and most efficient indoor forced-air wood furnace. It will give you decades of quality wood heat if installed and operated correctly. Please read all the instructions in this Owner's Manual before installing and operating your new Vapor-Fire Model 100. In addition, our website has many videos that can assist with installation and operation.

LIMITED WARRANTY

Your Vapor-Fire Model 100 wood furnace firebox is warranted for (10) years against defects in materials and workmanship from the date of purchase. The electrical components and the blower carry a (1) year manufacturer warranty. Warranty does not apply to fire bricks, seals, latches, hinges, or other moving parts subject to normal wear and tear.

The warranty applies to normal residential use, extends only to the original purchaser, and is not transferable. Proof of purchase is required when making any warranty claims. The warranty does not cover any damage caused by improper installation, power failures, venting problems, misuse/abuse, or lack of maintenance.

The furnace must be installed, maintained, and operated according to the Manufacturer's Operator's Instructions. The warranty is voided if the Vapor-Fire Model 100 is used to burn materials not certified by the EPA and not operated according to the Manufacturer's Instructions. This warranty does not cover scratch, distortion, corrosion, or discoloration.

Upon obtaining authorization from Lamppa Manufacturing Inc., returned products will be shipped prepaid to the manufacturer. The manufacturer will pay transportation fees to ship the product back to the purchaser.

This warranty applies to products purchased after January 1st, 2023.

SPECIFICATIONS

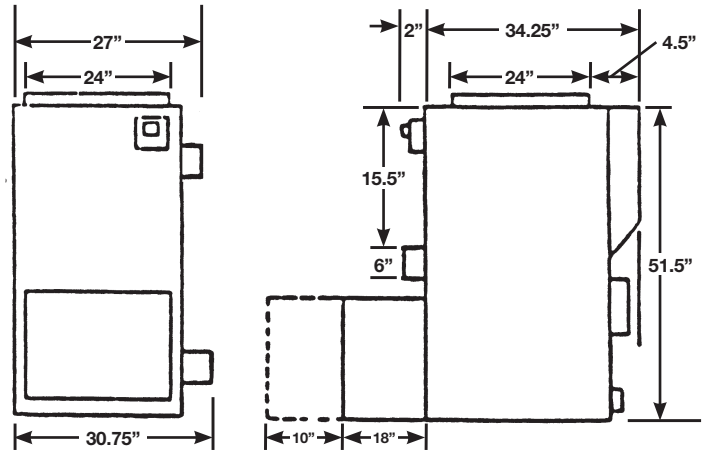


Figure 1

Dimensions	51.5" H x 27" W x 52.25" D
Flue Size	6" Diameter
Heat Outlet Size	24" x 24"
Fire Door Opening	12" W x 12" H
Control Type	Electronic
Ash Drawer Size	19" L x 10" W x 3" D
Combustion Chamber	23" L x 15.5" W x 20" H
Maximum Wood Length	22"
Combustion Chamber Lining	Brick Liner and Stainless Steel
Fan Limit Control	Honeywell L 4064B2210
Fan Low Limit	White Rogers 3F051
24 Volt Honeywell Thermostat	T87K1007
Fan Relay	Honeywell R8239A 1052
Electronic Draft Control	Vapor Fire Model 100/200
Draft Requirement	.03" - .06" W.C.
Filter	14" x 24" x 1" (2)
Cold Air Return	22" W x 26" H
Power Req'd	15 amps, 120 volt, 60 Hz No. 14 AWG wire

Clearance to Combustible

Side	6"
Front	48"
From the Flue Pipe	18"

Weight	695 pounds
Fuel Type	Wood only
Chimney Requirement	6" Class "A"

INSTALLATION INSTRUCTIONS

1. Read thoroughly all of the installation and operation instructions before attempting installation.

2. Install the fire bricks as shown in figure 34 page 5 (also see figure 19, page 12).

3. The unit must be set on a non-combustible surface, such as brick, ceramic tile, stone, or concrete and be at least 1 inch in thickness and 18 inches larger than the dimensions of the base as stated in the specifications, figure 1. The non-combustible floor protection must extend at least **16 inches in front of the unit.**

4. Install the blower assembly to the back of the unit as shown in figure 16. See figure 3 for typical hot air hookup.

5. Use 6 inch stove pipe to connect the smoke outlet in the back of the stove to **AN APPROVED CLASS A CHIMNEY.** Install only ONE connection to one flue. Make sure you use at least three metal screws at each joint connection, refer to figure 9.

6. Install a barometric draft control (field control 6" RC/BT) as described and illustrated on page 7 and 9, also see figures 9, 10 & 11.

7. **WE SUGGEST THAT A LICENSED ELECTRICIAN BE HIRED TO DO ALL YOUR ELECTRICAL CONNECTIONS.** See wiring diagram, figure 23, page 14, also see figure 27 page 16.

OPERATION GUIDELINES

STARTING A FIRE IN A COLD FIRE CHAMBER WITHOUT ANY HOT COALS

1. Open fire door.

2. Scrape the ashes through the grate.

3. Place a moderate amount of paper and kindling on the FRONT half of the fire chamber floor.

4. Place your logs on top of the paper and kindling, making sure that front face of the logs are kept 1 inch away from the front inside face of the fire chamber, also make sure that the primary air openings as shown in figure 18 are kept open. (page 12)

5. Ignite the paper.**

6. Open ash pan door approximately 1/4" until automatic draft damper opens.

7. Momentarily hold the fire door open, approximately one-half inch, this will assist in igniting the kindling and helps to create the initial draft.

8. Close the fire door and ash pan door tight – the electronic control automatically monitors the fire.

** Open ash pan door momentarily, when draft control is activated – **CLOSE ASH PAN DOOR.**

For equipment of this type, National Fire Protection Agency (NFPA) Standard No. 90B specifies the minimum standard clearances to combustible surfaces as summarized below:

Above Top of Plenum	6”
From the Front	48”
From Sides and Back	6”
From Flue Pipe	18”
From Back	10”
From Horizontal Warm Air Duct:	
Within 3 feet of Plenum	6”
Within 3 to 6 feet of Plenum	6”
Beyond 6 feet of Plenum	1”

Area between the furnace and combustible ducts are insulated according to NFPA Bulletin 90B. This copyrighted book is available from National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts 02110.

DUCT CLEARANCES FOR SOLID FUEL DEVICES WITH BLOWER ASSEMBLY

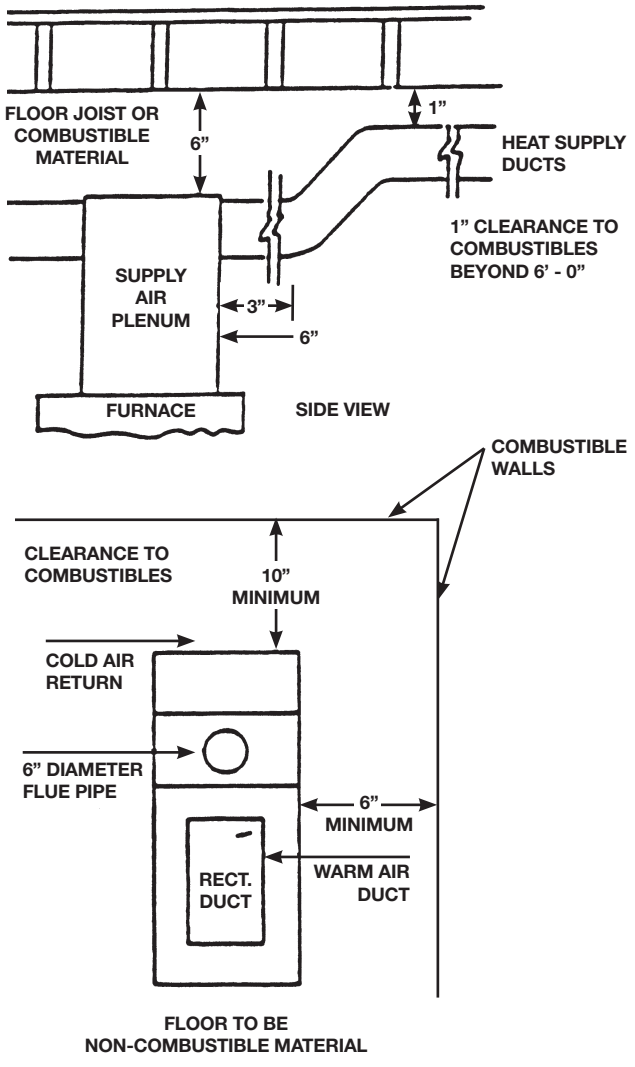
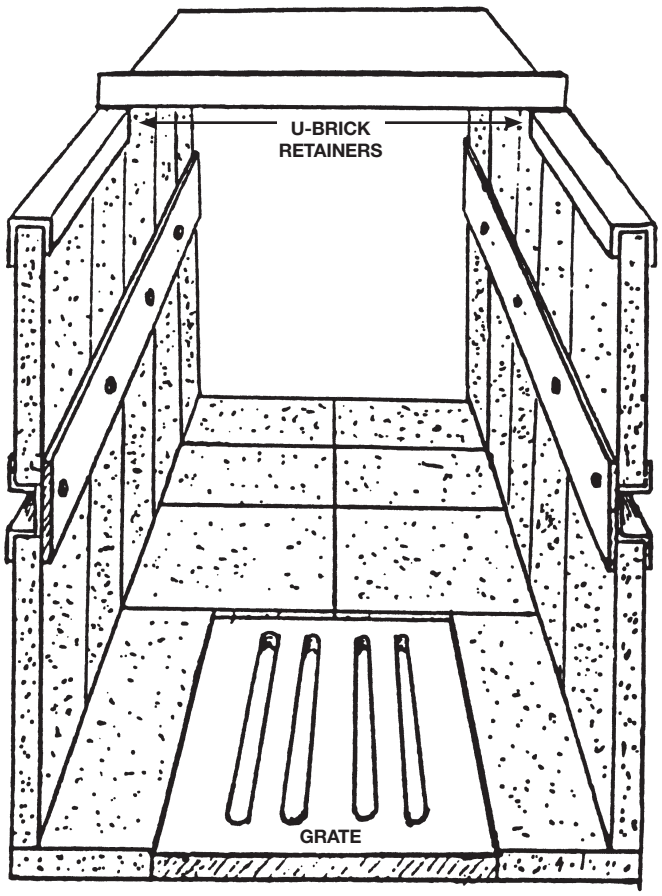
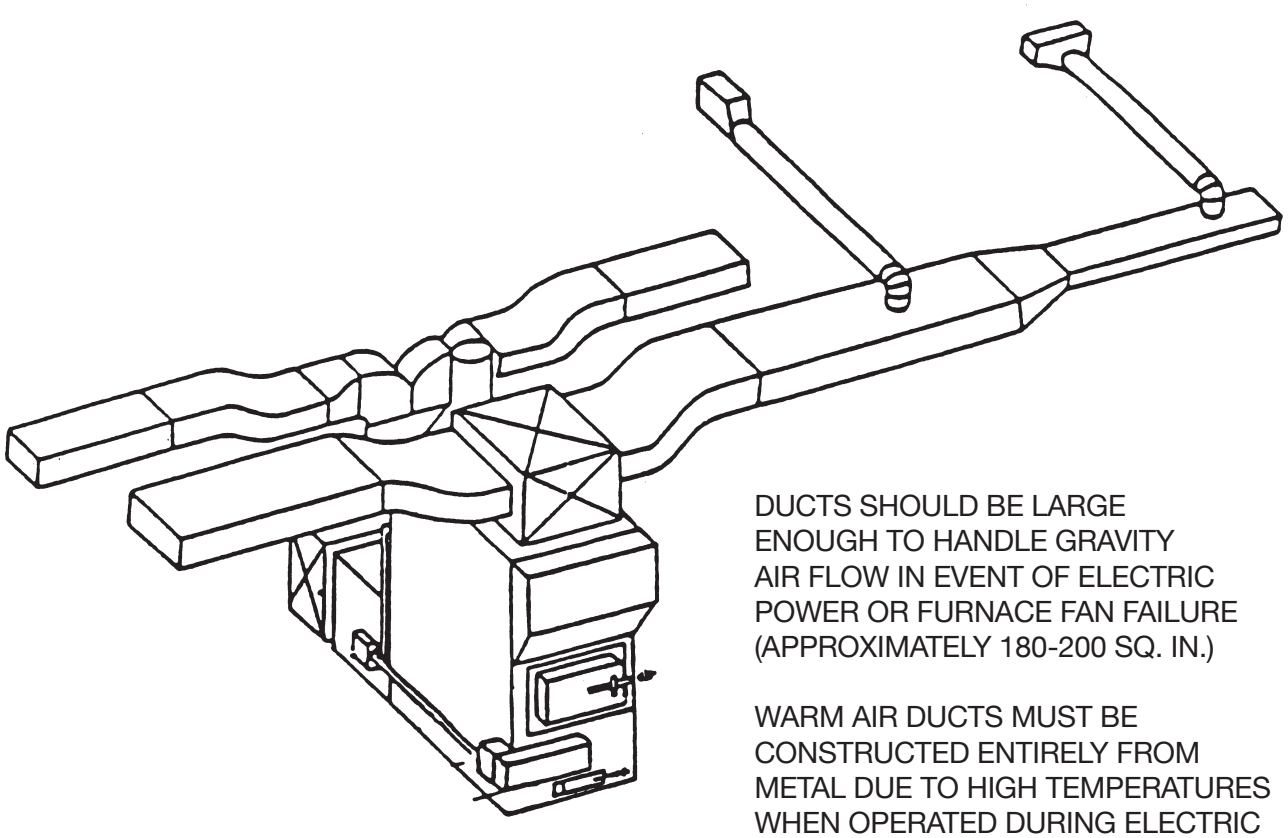


Figure 2

Figure 34



CENTRAL FURNACE INSTALLATION

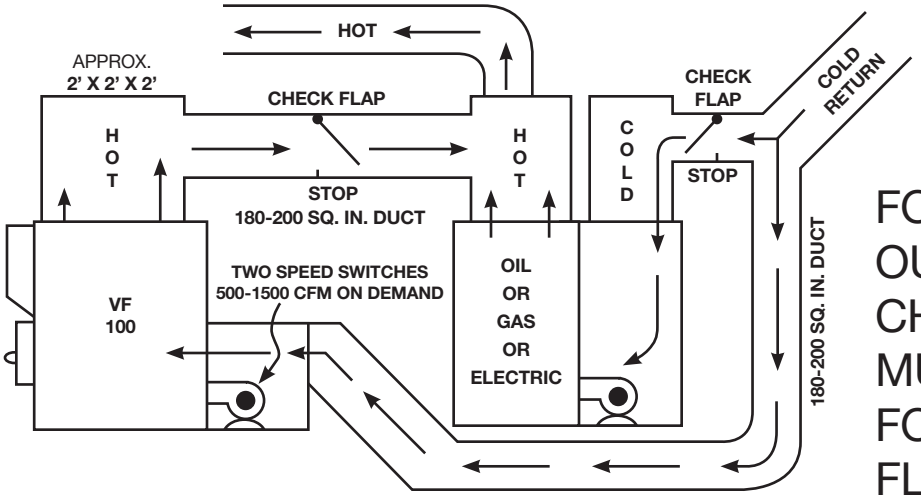


DUCTS SHOULD BE LARGE ENOUGH TO HANDLE GRAVITY AIR FLOW IN EVENT OF ELECTRIC POWER OR FURNACE FAN FAILURE (APPROXIMATELY 180-200 SQ. IN.)

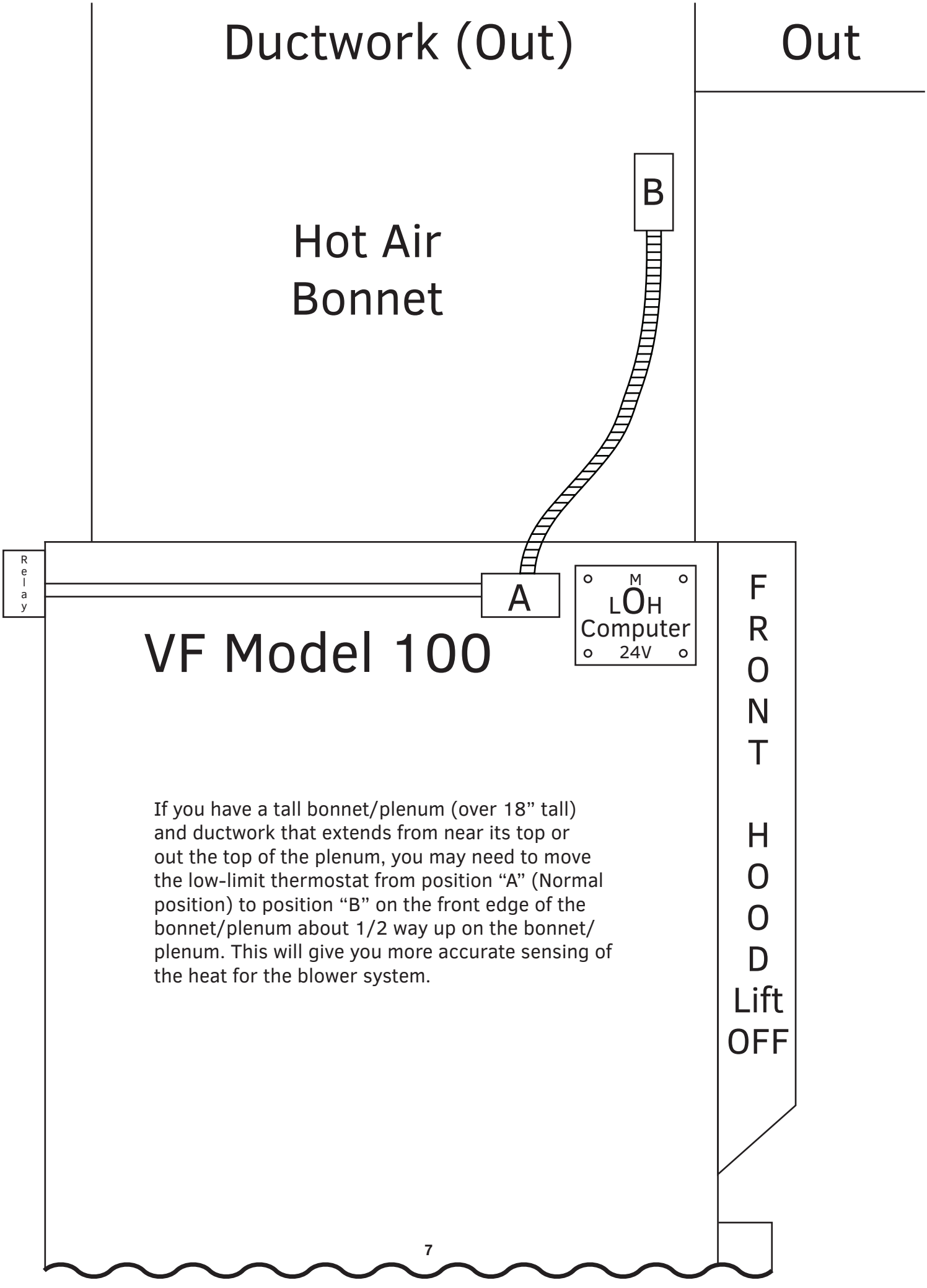
WARM AIR DUCTS MUST BE CONSTRUCTED ENTIRELY FROM METAL DUE TO HIGH TEMPERATURES WHEN OPERATED DURING ELECTRIC POWER FAILURE.

Figure 3

This is the just a basic idea to tie the two systems together. The cold air return could be just an open stairway or large floor grill.



FOR POWER OUTAGE CHECK FLAPS MUST ALLOW FOR GRAVITY FLOW.



If you have a tall bonnet/plenum (over 18" tall) and ductwork that extends from near its top or out the top of the plenum, you may need to move the low-limit thermostat from position "A" (Normal position) to position "B" on the front edge of the bonnet/plenum about 1/2 way up on the bonnet/plenum. This will give you more accurate sensing of the heat for the blower system.

CHIMNEY INFORMATION

The chimney is one of the most important yet most neglected and misunderstood portions of any Solid Fuel Burning Installation. THE FURNACE SHALL NOT BE CONNECTED TO THE CHIMNEY WITH OTHER HEATING DEVICES.

CAUTION

THE CHIMNEY MUST BE A CLASS "A" CHIMNEY IN GOOD OPERATING CONDITION. DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVICING ANOTHER APPLIANCE.

There are two types of Class "A" chimneys:

1. Masonry with tile liner suitable for venting residential or building heating appliances. (See NFPA 211.)
2. Class "A" Chimney, listed or certified by a nationally recognized testing agency as suitable for venting residential or building heating appliances. If your masonry chimney has not been used for some time, have it inspected by a qualified person (building inspector, fire department personnel, etc.). If a listed or certified manufactured chimney is to be used, make certain it is installed in accordance with the manufacturer's instructions and all local and state codes. See Figure 5, Manufactured Chimney Installation and Figure 6 of Masonry Chimney (note roof clearance) in accordance with NFPA 211.

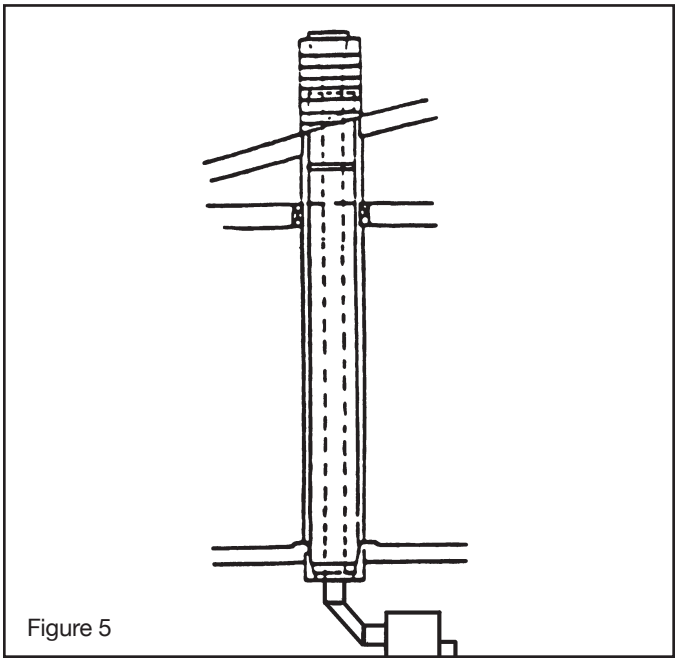


Figure 5

COMMON CHIMNEY PROBLEMS

In order to have a proper operating Solid Fuel Heat System, the chimney must be capable of providing the draft required.

In the Vapor-Fire Model 100 Furnace, the required draft is .03 to .06" water column (W.C.). This can be measured using a draft gauge.

If the chimney cannot supply this constant draft, the unit will not operate properly.

In all furnace installations using Vapor-Fire Model 100 furnaces, a barometric draft regulator must be used and properly adjusted for proper draft. Provided – Set to .03 to .06 W.C. by sliding wt. to #3 to #6 vertical.

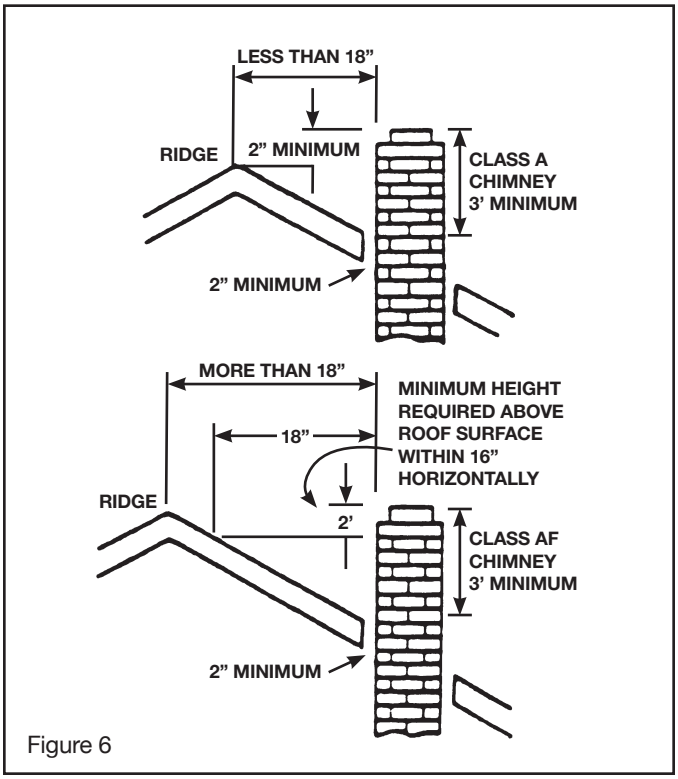


Figure 6

REASONS for insufficient draft readings:

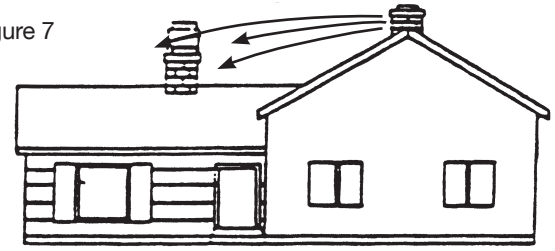
1. Leaky Chimney – Air leaking in around a loose fitting clean-out door, flue pipes not tight at the joints, improper plug openings, or defective masonry.

2. Chimney Improper Height – Chimney does not extend through the roof to a sufficient height to promote sufficient draft or causes a down drafting condition to take place. See NFPA 211.

3. Obstructions in the chimney – Check prior to using holding a mirror in chimney cleanout door. This will give an inside view of the chimney.

4. Trees or other topographical barriers – Impending the chimneys operation or causing a down draft condition to exist. This can also be caused by adjacent building or the roof of the same structure where the chimney is not high enough (Figure 7).

Figure 7



NOTE: THE CHIMNEY ON THE HOUSE ILLUSTRATED IS TOO LOW. IT SHOULD BE RAISED TO COMPENSATE FOR DRAFTS.

5. Chimney Size – Chimney is not properly sized to adequately fit the appliance. It is either too small or too large. Minimum chimney height – 14 foot. Minimum Diameter – 6 inches.

6. Chimney Offsets – Chimneys with offsets should not be used. They cause an obstruction to draft as well as a place for debris to collect.

7. Elbow Restrictions – The flue pipe is connected to the chimney with too many elbows reducing the draft the chimney can provide. Use approximate 45 degree elbows.

8. Multiple Venting – When more than one (1) devise vents into the same chimney flue.

When smoke rises into the chimney, it will rise in a spiraling path.

The most important thing to remember about chimneys is their need for maintenance and cleaning. If chimneys are not cleaned on a regular basis, it effects the draft, as well as make an attributing cause to a chimney fire.

The draft can be improved by using a chimney cone (figure 8) or by extending the height of the chimney and reducing the flue area. A cone or chimney extension can be made by a local sheet metal shop.

GALVANIZED CHIMNEY CONE

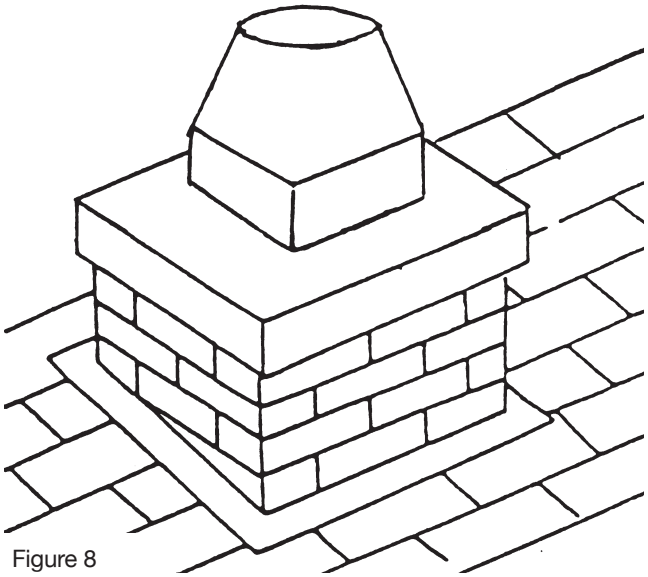


Figure 8

A properly operating chimney will tend to reduce the amount of creosote that is left deposited.

INSTALLATION

A barometric Draft Control (Field Control 6" RC/ BT) i s provided with your model 100 Vapor Fire Furnace. A draft reg-ulator is designed for insertion into a six (6) inch tee. Refer to Figure 9 and 11 for mounting of the baro-metric damper. It is recommended that the stove pipe be installed with the crimped end down so that if any creosote is formed, as a natural by-product of combustion, it will run back towards the furnace and not run through the joint to the outside of the smoke pipe. The section of pipe (tee) holding the draft regu-lator must be installed in either an angled or vertical direction.

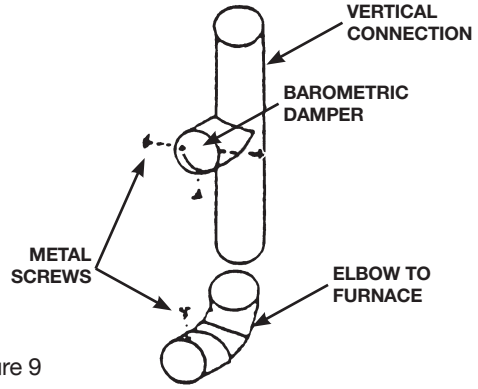


Figure 9

Use approximate 45 degree adj. elbows for angled connections – NO HORIZONTAL PIPING.

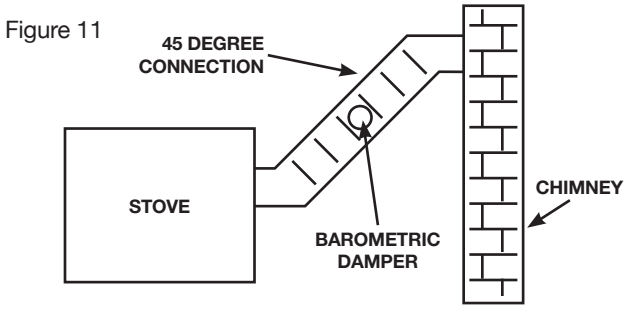


Figure 11

CAUTION

FOLLOW MANUFACTURER'S INSTRUCTIONS ON HOW TO INSTALL THE BAROMETRIC REGULATOR. MOUNT IT VERTICAL OR VERTICALLY.

The draft control can be adjusted within its collar to ensure the flap pivots parallel to the floor.

It is essential that the draft regulator be located in the same room (pressure zone) as the furnace and as close as possible to the flue outlet.

After installation, make certain the draft control barometric regulator is upright and level. Tighten the screw to hold firmly in place. See Figure 10.

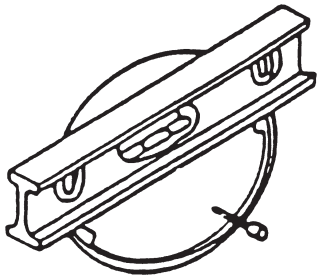


Figure 10

WARNING

LACK OF ENOUGH AIR FOR PROPER COMBUSTION

If your house is fairly well insulated and relatively air tight, it may be necessary for you to think of providing an additional source of fresh air into your house to eliminate the possibility of starving the wood burning stove of the necessary amount for good combustion.

If you have a clothes dryer, kitchen or a bathroom exhaust fans, or even a fireplace burning and is competing for the available combustion air which could cause improper combustion. This could result in some smoke backing up into your house.

You might need to look at installing an air to air exchanger or finding another way to get some fresh air to prevent the smoke back up.

For any questions feel free to call 1-800-358-2049.

Figure 12

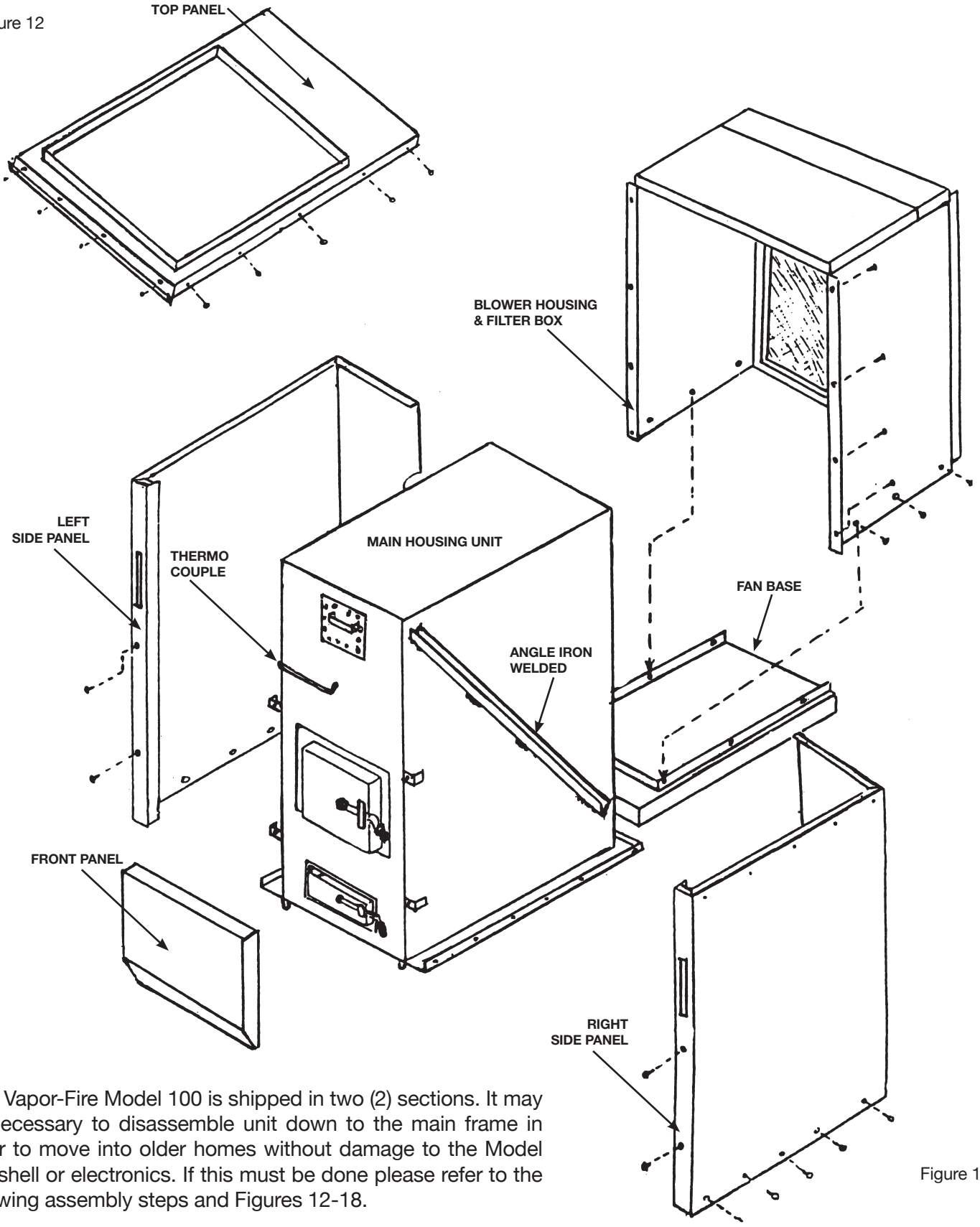


Figure 13

Your Vapor-Fire Model 100 is shipped in two (2) sections. It may be necessary to disassemble unit down to the main frame in order to move into older homes without damage to the Model 100 shell or electronics. If this must be done please refer to the following assembly steps and Figures 12-18.

Attach the draft control with gasket to the draft intake assembly (four screws). Note that it is critical to keep this complete assembly airtight.

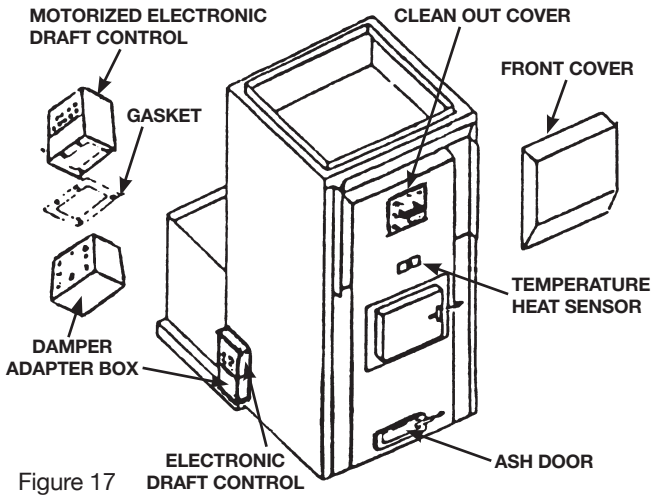


Figure 17

To tighten the door on the handle side – loosen the two set screws, lower handle behind latch, push door in tightly and tighten set screws. (Figure 18)

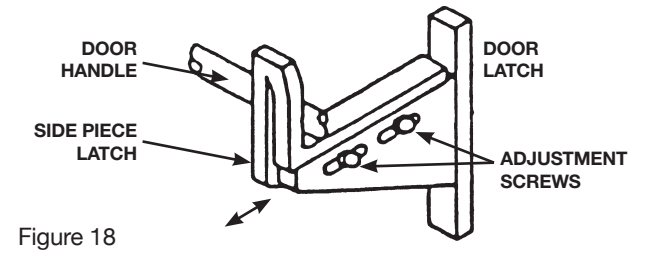


Figure 18

The fire chamber (brick liner), grate, preheating intake air chamber, primary and intermediate air distributor is illustrated in figure 19, with the back removed.

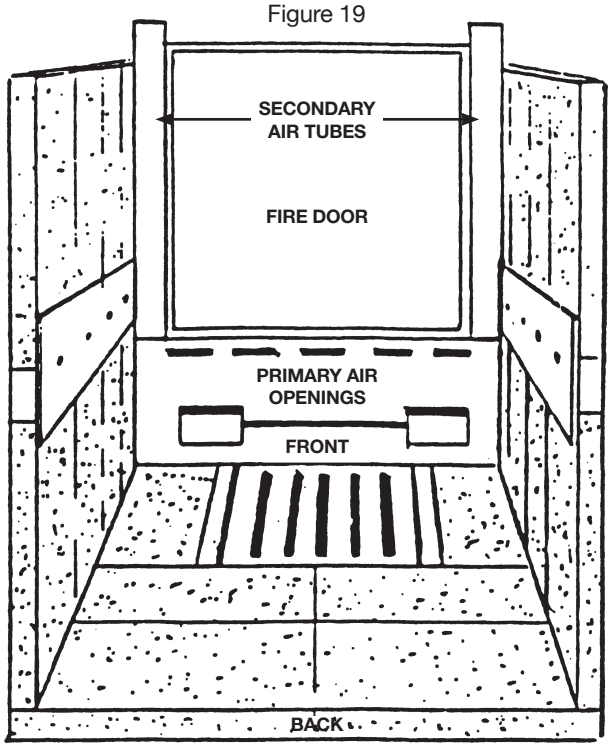
Inspect grate to see that it is setting flush with the fire box floor.

THE LOGS BURN FROM THE FRONT TO THE BACK.

Check vertical secondary air tubes to see if they are in place. (Figure 19)

The two stainless steel removable secondary air tubes are located on the right and left sides of the door frame inside the fire chamber. They actually provide the fourth level of combustion air to complete the burn process. Under normal usage they won't burn out and need no maintenance (see Figure 19).

Figure 19



When adjusting doors, loosen the two screws (Figure 20) and push door in until there is a slight bind. As you close the door, making sure it is not too tight, tighten the screws.

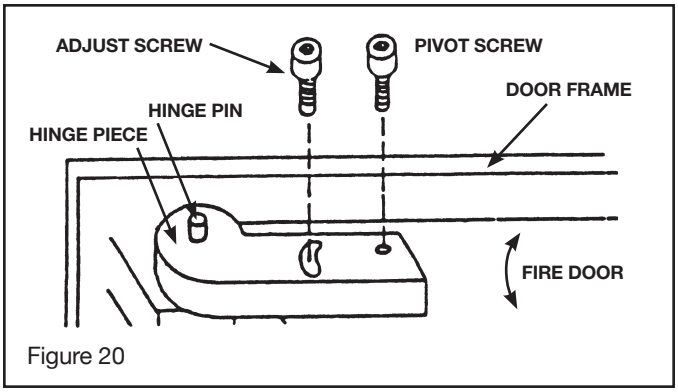


Figure 20

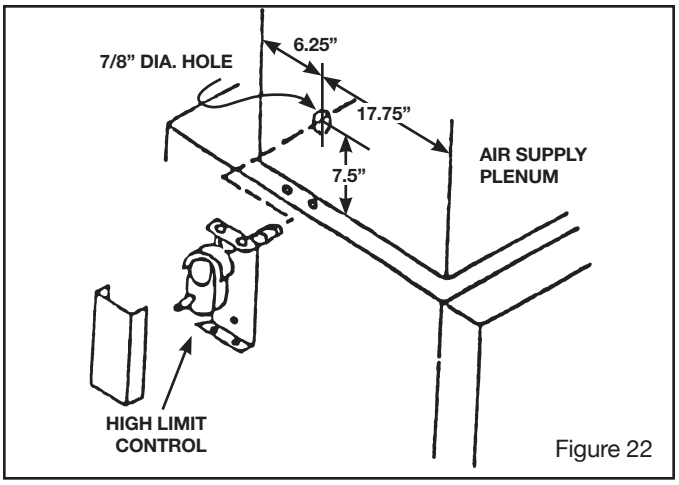


Figure 22

Install warm air plenum and cut hole for high limit control. Refer to Figure 22.

Refer to wiring diagram Figure 23 and 25.

A. Mount control transformer.

B. Mount high limit control.

C. Mount low limit control.

D. Mount electronic control.

E. Connect thermocouple to terminals (white lead to – red lead +).

F. Connect conduit from draft control box to fan junction box with conduit nut and connect wires.

G. Run conduit from transformer to low limit switch and fan junction box, Figure 26.

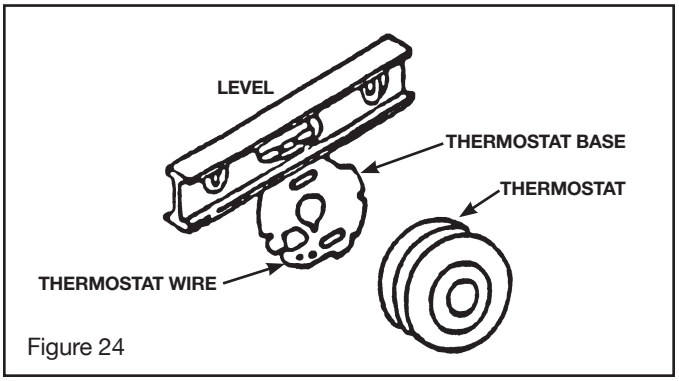


Figure 24

H. Add wires as shown in Figure 23 and connect.

I. Mount thermostat in house and connect to relay control (24 VAC). Refer to Figure 23.

J. Connect wiring to fans in fan enclosure as shown in Figure 23.

K. Run incoming conduit to transformer junction box and connect to a separate circuit breaker panel. Use a 15 amp AWG copper wire to the furnace. Ground the furnace to the electrical system ground.

L. We recommend that a licensed electrician do the electrical wiring.

M. With wiring completed, check the system by turning on the power. The light on the electronic control should energize. The draft control will remain closed until the thermocouple is heated to approximately 100-120 degrees F.

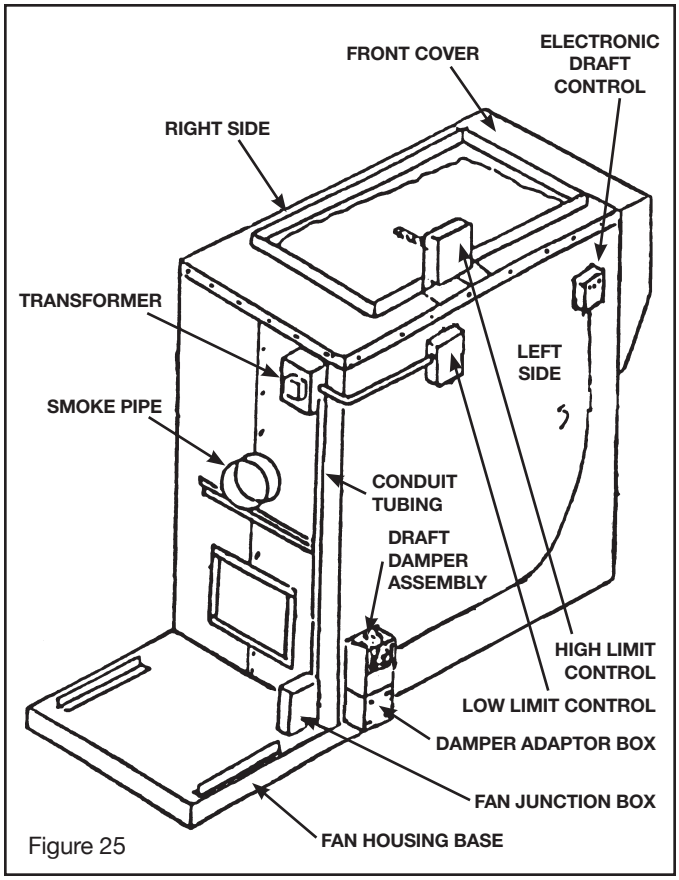
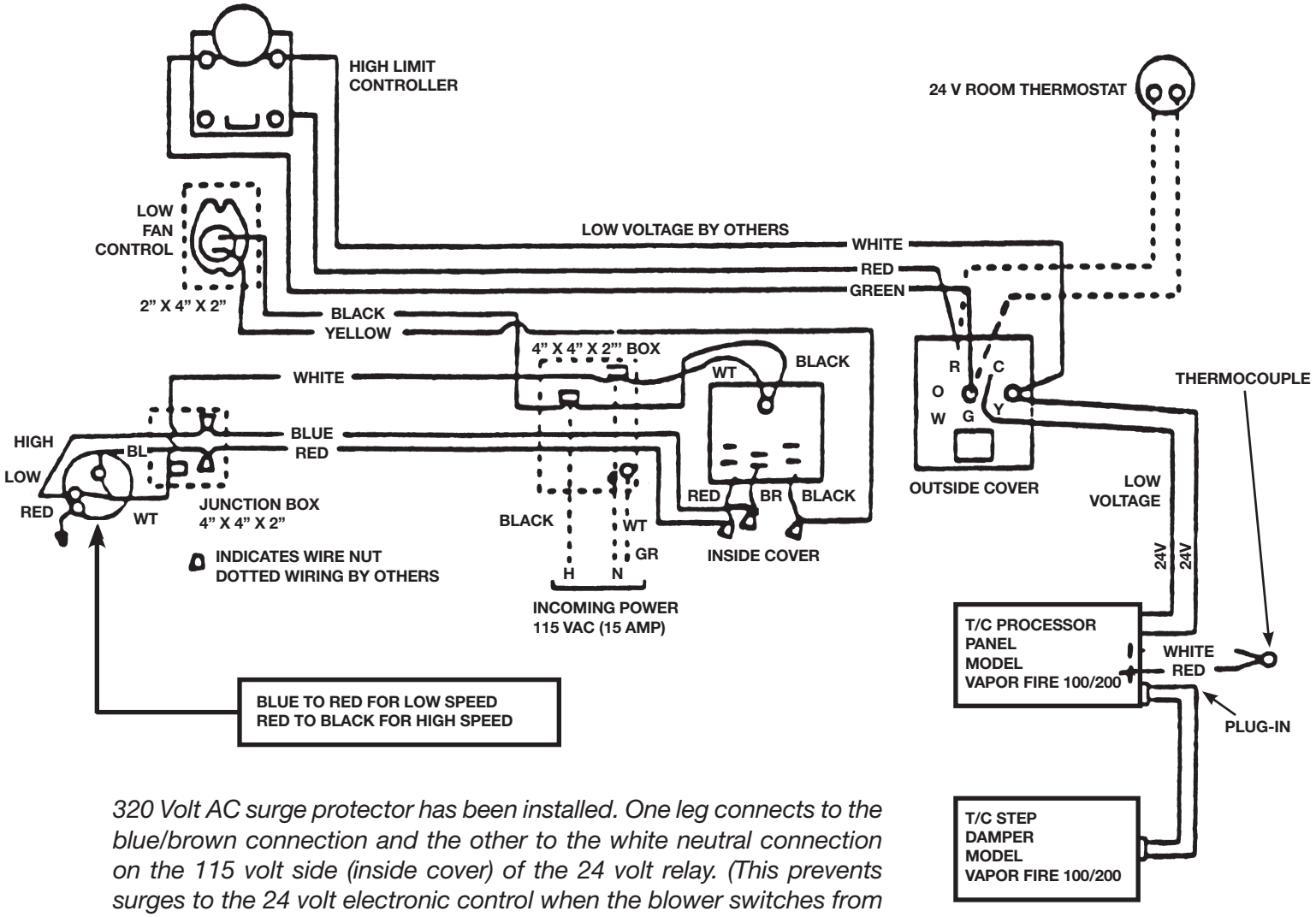


Figure 25

N. Install the cool air return plenum over the filters at the rear of the furnace. See Figure 3.

O. Install the chimney smoke pipe along with the barometric draft control furnished with the furnace. See Figure 10.

P. To set draft for maximum setting. (.06 WC) Slide WT to #6 Vertical.



320 Volt AC surge protector has been installed. One leg connects to the blue/brown connection and the other to the white neutral connection on the 115 volt side (inside cover) of the 24 volt relay. (This prevents surges to the 24 volt electronic control when the blower switches from high to low speed.)

Figure 23

INSTRUCTIONS ON CONNECTING THE 6" STOVE PIPE

1. *Use 24 ga. stove pipe and adjustable elbows.*
2. *Angle your stove pipes upward towards the chimney smoke exit hole.*
3. *Install barometric damper provided. Set to .03 to .06 WC.*
4. *Avoid using 90 degree pipe bends unless it's one 90 degree and then straight up.*
5. *Use sheet metal screw to attach all the pipes with at least three screws evenly spaced around the pipe and any joint.*
6. *Check and inspect pipes periodically for corrosion or any other defects.*

SAFETY SHOULD ALWAYS BE NUMBER ONE

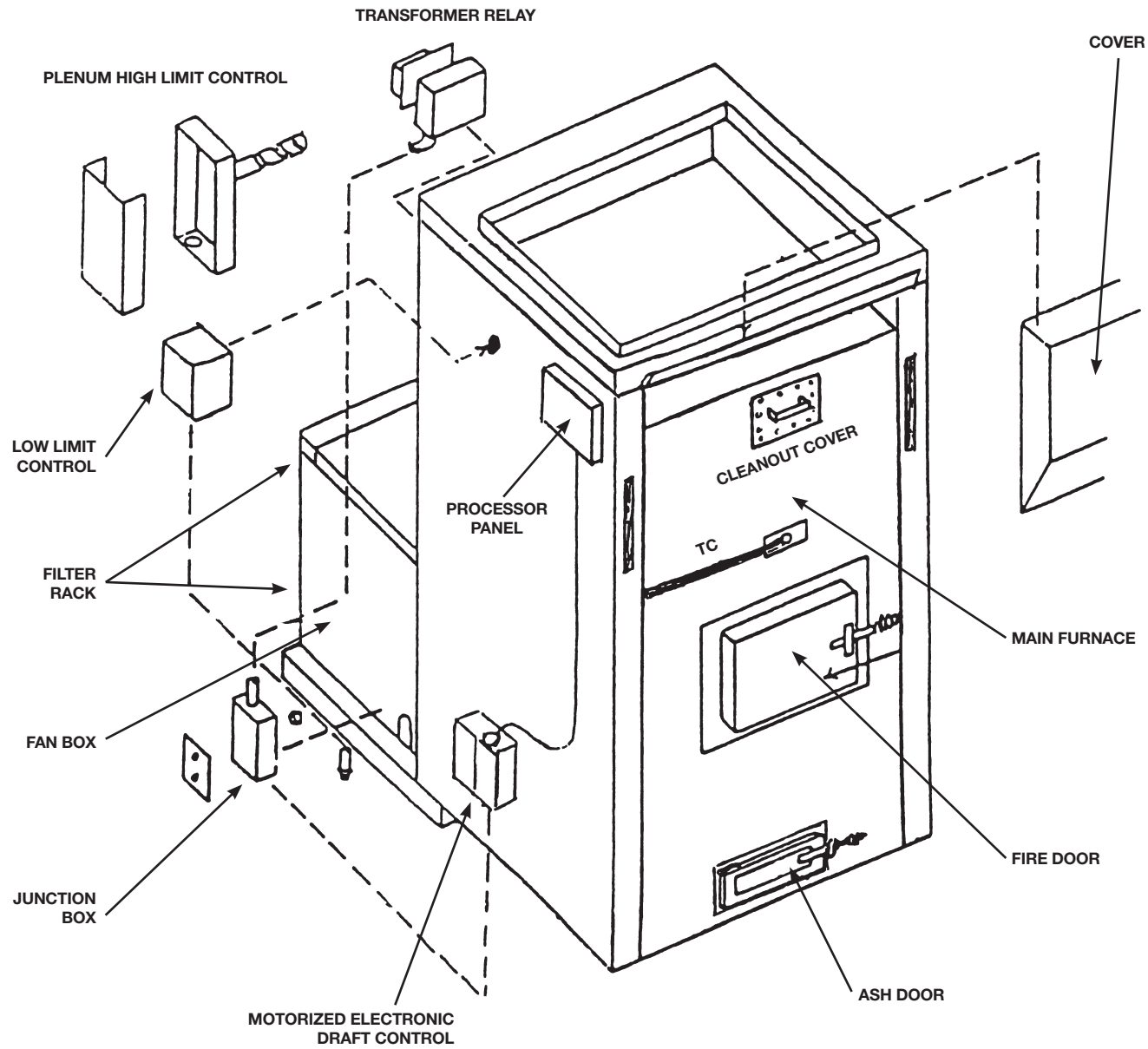


Figure 26

NORMAL AUTOMATIC OPERATION

When power is turned on and the furnace is cold, the draft will be closed. As the temperature in the fire box rises to approximately 100-120°F, the automatic draft opens allowing combustion air to enter the fire cham-ber. As the temperature in the fire chamber rises, the automatic draft will begin its throttling process until it is completely closed, allowing maximum furnace idling. (When it reaches your desired setting low to high.)

As the outer heat jacket temperature rises past 105° F. The blower (low speed) starts automatically and continues to operate until the fire burns down and the heat exchanger cools to approximately 90°F. This is adjustable.

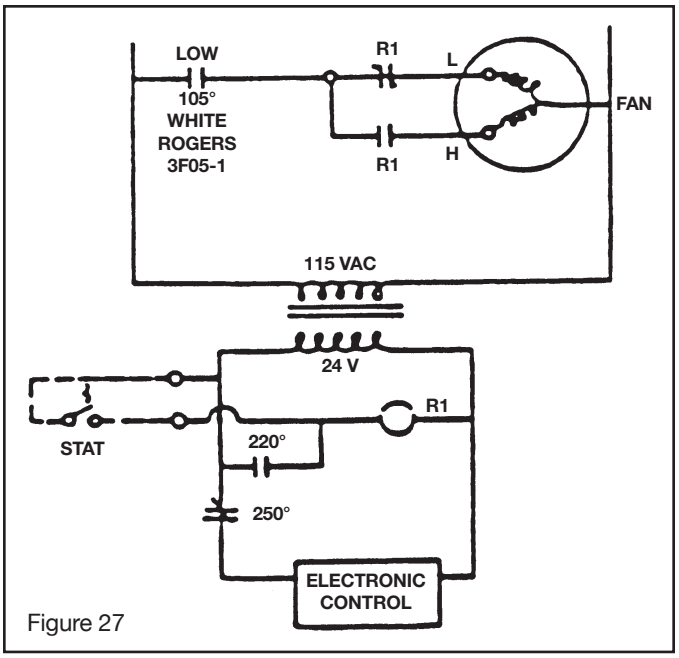


Figure 27

The blower fan (high speed) will turn on automatically provided the plenum is at 105°F whenever the remote room thermostat is calling for heat. The fan will also turn on automatically if the plenum tem-perature rises to the setting on the high limit switch (set at approximately 220°F.) and will continue to op-erate until the temperature of the plenum has cooled down to approximately 100°F. The high limit is set at approximately 250°F. and if this temperature is ever obtained, the electronic control will be entirely de-energized and the automatic draft controller will close.

Conditions will remain in this state until plenum temperature has cooled with the blower running allowing the automatic high temperature cut-out switch to re-set the controller.

If this condition ever occurs, check to see if the damper from the plenum is closed or for any obstructions in the cool air return or in the air supply ducts and registers.

The display screen is furnished on the electric control to provide the following:

A. The letters “O” and “P” will blink on and off and the beeper beeps intermittently when there is an open circuit in the thermocouple. The automatic draft will remain closed. Replace thermocouple.

B. The capital letter “C” will be on the display when the fire chamber is cold (70-100°F) and this indicates that the automatic draft damper is closed. To heat the fire chamber, start the fire with the ash pan door open, as soon as the capital letter “C” goes off CLOSE the ASH PAN door. The display screen will now show the number “3”.

C. The electronic control has four different stages and the numbers “1”, “2”, “3”, and small letter “c” indicate how much air is entering the fire chamber.

D. The small letter “c” will appear on the screen when the temperature in the fire chamber has reached it’s optimum level. (Your low to high setting.) Now the shutter is completely closed, the stove is now on what we call the pilot burn and will continue like this until the fire chamber cools down and then the control again takes over and will adjust the shutter opening based on the fire chamber temperature.

E. When the temperature in the fire chamber is too high the letters “A” and “L” blink on and off and the alarm beeper sounds continuously. If this condition occurs, check the “TO DO” list located on the control.

F. **IF HI-TEMP ALARM GOES ON - TURN CONTROL POWER SWITCH OFF**

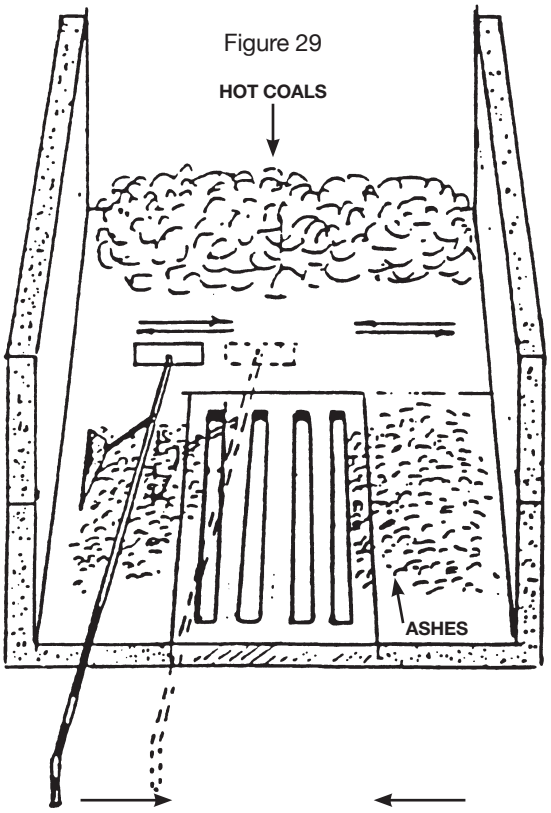
CHECK	WHAT TO DO
Is door dealing?	Adjust hinges and latches to ensure they are tight
Is draft = .03” - .06”?	Adjust Barometric draft to lower setting
Is draft shutter closing?	Inspect draft shutter on motor box
Is wood too dry?	Mix some wetter wood with dry wood
Are you reloading on too many hot coals?	Burn down excess coals before reloading

IMPORTANT

KEEP ASH DRAWER EMPTY. IF ASHES ARE PERMITTED TO BUILD UP ABOVE THE GRATE, THE GRATES COULD WARP AND EVENTUALLY BURN OUT.

Periodically remove ashes from the ash pan via the ash pan door (see figures 17, 26, 29, and 30). Always dispose of ashes in a metal container with a tight metal cover. Do not store ashes inside your house. Always store the metal ash container in a well ventilated area or outdoors as ashes may contain live coals (embers) which may emit carbon monoxide. Do not place the metal ash container next to anything combustible. Pour some water in the container, but do this outdoors in case of live embers. Stir the ashes to distribute the water. Allow at least 3 days for water to fully penetrate all ashes before bagging ashes and disposing in the trash. Make sure you are complying with all local ordinances relating to wood-ash disposal. Many local landfill sites have ash disposal containers.

Figure 29



DANGER

NEVER BURN MATERIALS OTHER THAN WOOD LOGS, PREFERABLY SPLIT AND DRIED.

A CHIMNEY FIRE OR HEAT EXCHANGER FAILURE COULD RESULT. THIS INCLUDES LARGE AMOUNTS OF CORRUGATED BOXES, WOODSHAVINGS, PAPER SCRAPS, DRIED CHRISTMAS TREES, COAL, GARBAGE, TIRES OR OTHER BURNABLE PRODUCTS.

DOS AND DONT'S OF OPERATION

Wood Firing the Unit

IMPORTANT

DURING NORMAL OPERATION, FIRING DOOR AND ASH DOOR MUST BE KEPT TIGHTLY CLOSED. AIR LEAKAGE WILL CAUSE LOSS OF EFFICIENCY RESULTING IN HIGHER HEATING COSTS. IF DOOR GASKETS BECOME WORN, REPLACE WITH 5/8" AND 1/2" CERAMIC ROPE AVAILABLE FROM LOCAL SOURCES.

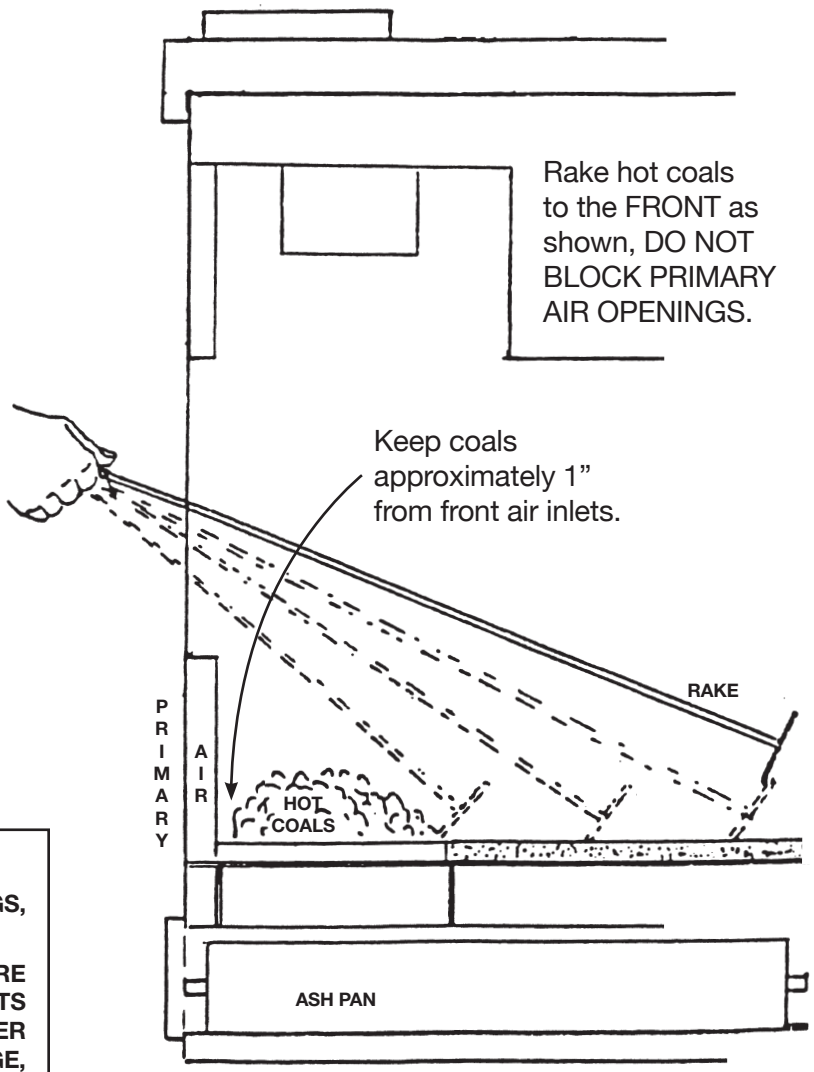


Figure 30

BASIC FIRING INSTRUCTIONS

RULES TO FOLLOW

A. Use dry seasoned wood (15 to 30 percent moisture content), soft wood cut and split in the spring and dried over the summer under cover. Hardwood requires one year drying time – fall to fall.

B. Use a maximum of 22" wood lengths. 20" wood works the best.

C. Never burn less than two (2) rows of wood (3 pc. min.) in a triangle shaped pile.

D. Always preheat a cold stove before any wood lengths are added by burning paper and kindling.

E. ALWAYS RAKE COALS FORWARD TO THE FRONT BEFORE ADDING WOOD LENGTHS, NEVER RAKE THEM ANY CLOSER THAN 1" FROM THE FRONT AIR INLET HOUSING.

F. ALWAYS ADD WOOD LENGTHS LENGTHWISE IN THE FIRE CHAMBER AND PLACE THEM IN THE FIRE CHAMBER SO THAT THE FRONT FACE OF THE WOOD IS APPROXIMATELY ONE (1) INCH AWAY FROM THE AIR INLET HOUSING. BOTTOM PIECES MUST MAKE CONTACT WITH THE HOT COALS THAT WERE RAKED FORWARD.

G. Keep the front approximately one-third (1/3) 9" portion of the fire chamber free of ash by scraping the ashes through the open front grate and into the ash pan using rake provided.

H. With the fire chamber cold, periodically empty the ash pan via the ash pan door. Secure the door tightly when finished.

STARTING A COLD FURNACE – NO HOT COALS

A. Open fire door.

B. Scrape entire fire chamber ashes through open grate, into ash pan using side paddle on ash scraper provided.

C. Preheat fire chamber with generous cuts of paper and kindling and light.

D. Close fire door – allow to preheat 5-10 minutes.

E. Open fire door.

F. Rake hot coals forward.

G. Add full lengths of wood (18-21" minimum of two rows) 1 to 2 inches from front face air inlets; they usually also contact the back wall.

H. Close fire door tight – the fire and heat will be electronically controlled.

STARTING WITH WARM FURNACE AND WITH HOT COALS

A. Open fire door.

B. Scrape front approximately 9" (1/3) of fire chamber ashes through open grate. Scrape front corners, using side paddle. Ashes in the front are usually grey and fluffy.

C. Rake hot coals forward.

D. Add wood lengths (minimum of two rows) so that there is at least 1 to 2 inches of space between front of log and front face of air inlet.

E. Close fire door tight – fire and heat is electronically controlled.

CAUTION

YOU MUST CHECK YOUR CHIMNEY FLUE PIPE CONNECTOR FREQUENTLY WHEN FIRST STARTING TO BURN WOOD TO DETERMINE THE AMOUNT OF CHIMNEY MAINTENANCE (CLEANING) THAT WILL BE REQUIRED. THIS, OF COURSE, IS ALSO DEPENDENT ON WOOD TYPE, MOISTURE, AND, IN GENERAL, HOW THE FURNACE IS USED.

RUNNING FURNACE DURING POWER FAILURE

If unit was in operation during a power failure, leave ash and fire doors closed.

CAUTION
ELECTRIC POWER FAILURE

- **TO IMPROVE GRAVITY AIR FLOW REMOVE AIR FILTERS.**
- **DO NOT TAMPER WITH WOOD PRIMARY AIR CONTROL.**
- **OPEN ALL AIR REGISTERS AND REMOVE ALL OBSTRUCTIONS NEAR THEM.**
- **KEEP CHILDREN AWAY FROM AIR REGISTERS, OR BURNS COULD RESULT.**
- **PRIMARY AIR DAMPER WILL OPERATE AUTOMATICALLY WHEN ELECTRIC POWER IS RESTORED.**
- **REMOVE FRONT LIFT OFF HOOD FOR MORE GRAVITY HEAT FLOW.**

NOTE

IF FOR ANY REASON THERE SHOULD BE AN ELECTRIC POWER FAILURE, EITHER FROM HIGH LIMIT CUT-OFF OR ELECTRICAL POWER OUTAGE, THE DAMPER WILL AUTOMATICALLY CLOSE, PREVENTING OVER-FIRE WITH NO BLOWER AND HEAT EXCHANGER DAMAGE.

WOOD BURNING FACTS

BE AWARE OF CREOSOTE “BUILD-UP” WHEN BURNING WOOD!

Wood burning equipment will give you trouble with creosote deposits under certain conditions, unless you are aware of these conditions and avoid them.

Creosote is a tarry liquid or solid resulting from the distilling of wood during the combustion process. It consists of a number of elements which condense and bake layer upon layer in the chimney flue.

WARNING

SERIOUS FIRE MAY RESULT IF A SUFFICIENT CREOSOTE “BUILD-UP” IS PERMITTED OVER AN EXTENDED PERIOD OF TIME.

Highly combustible in its solid and semi-liquid state, creosote is present in the gases given off by burning wood. Creosote may build up a considerable thickness on the interior surface of the chimney and flue pipes, considerably reducing their cross-sectional area.

Creosote condenses from the flue gases when the stack temperature drops below 250 degrees F. The amount of creosote deposited in the pipe and chimney is dependent on the amount of moisture in the flue gases, the temperature of the stack, and how completely the combustible elements in the flue gases have been burned in the combustion process. Most problems with creosote are due to poor chimneys with low draft and cold walls and to a low rate of burning when heat is needed during the spring and fall months.

Moisture in the flue gases may be controlled by using the driest wood possible, mixing small pieces with a very full load, and never using only large wood during mild weather when combustion is relatively slow. Use seasoned firewood approximately 15% to 30% moisture content.

BEST WOOD FOR BURNING

Generally wood should be cut at least a year in advance and properly split at that time.

This wood should also be stored out of the weather, if possible. If the wood is to remain outside, be sure to cover the top of the wood piles with sheets of metal, etc. This wood should be brought inside and stored there for at least two (2) weeks before it is fired to obtain top performance.

Soft woods burn at a faster rate per cord than do hard woods, and have less BTUs per cord.

Know what types of wood to burn. Wood is safe, clean and economical fuel. Freshly felled wood is not suitable fuel due to the moisture content of the wood. Well-seasoned wood is best for the proper production of heat. The following table will give you some relative values of the heating content of some of (the more readily available wood).

Type	*Weight Cord*	*BTU's Per Cord Air Dried Wood*	*Equivalent Value #2 Fuel Oil Gallons*
White Pine	1800#	17,000,000	120
Aspen	1900	17,500,000	125
Spruce	2100	18,000,000	130
Ash	2900	22,500,000	160
Tamarack	2500	24,000,000	170
Soft Maple	2500	24,000,000	170
Elm	2750	24,500,000	175
Yellow Birch	3000	26,000,000	185
Red Oak	3250	27,000,000	195
White Oak	3750	27,700,000	200
Hard Maple	3000	29,000,000	200
Hickory	3500	30,500,000	215

USEFUL FACTS

No. 2 Fuel Oil – 140,000 BTU/gallon
Natural Gas – 100,000 BTU/therm
Propane Gas – 93,300 BTU/gallon
Butane Gas – 100,671 BTU/gallon
Electricity – 3,413 BTU/kilowatt – hour

TROUBLESHOOTING

IMPORTANT: Your Vapor-Fire Furnace is a controlled combustion solid fuel burning device that heats by the pyrolysis of wood at a slow rate. If you load the furnace and in a short period of time open the fire door, smoke will be expelled from the fire door. This is to be expected.

SMOKE PUFFS FROM VAPOR-FIRE FURNACE

A. Check the chimney draft. With a wood fire burning, the chimney should supply .03" to .06" updraft.

B. Check automatic draft control for proper operation.

C. Check the smoke pipe and be sure it's clean.

D. Chimney may be too low. Increase its height. Make sure the chimney is structurally sound.

E. Add more air to the furnace room. Your home may be so airtight, not enough oxygen is reaching the fire. Your heating contractor can do this. Refer to Figure 31.

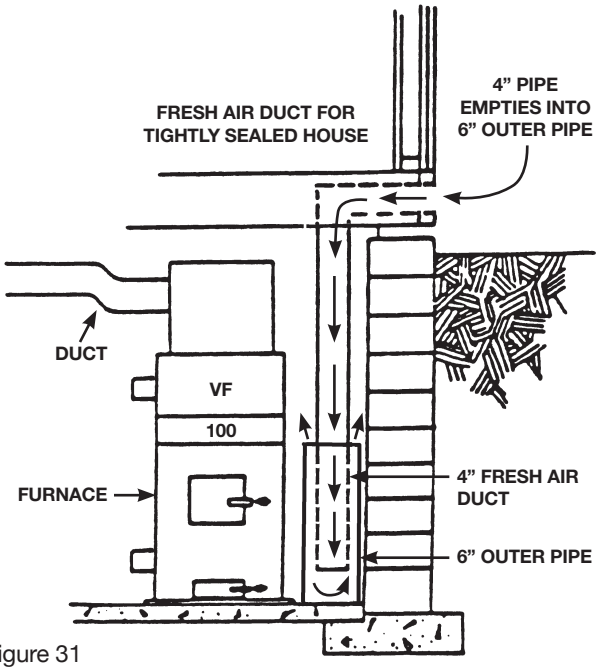


Figure 31

IMPORTANT

NEVER OPERATE YOUR VAPOR-FIRE FURNACE WITH THE FIRE OR ASH DOOR OPEN.

F. Check the smoke pipe and make certain each joint is tight and the connections to the Vapor-Fire Furnace and chimney are air tight.

G. Check the ashes. Ash pan and fire compartment may be overloaded with ashes.

H. Check type of wood being burned. If too green or wet wood is being used, it may cause excessive smoking.

I. Check your chimney for down drafts. This is caused by air currents being deflected down the chimney from higher objects, such as trees , buildings, and hills. This problem can usually be corrected with an open vented chimney cap.

J. Make sure the chimney clean-out door is tightly closed.

K. If other fuel-burning devises are connected to the chimney, they may be causing draft problems. This must be corrected by your heating contractor.

L. Remove any mesh from your chimney cap.

YOU ARE NOT RECEIVING ENOUGH HEAT FROM YOUR FURNACE

A. Make sure the pipe or duct from the Vapor-Fire Furnace, as well as the pipe connections, are air tight.

B. The cold air return of your forced air upflow furnace is blocked. NEVER PLACE SOLID OBJECTS IN FRONT OF OR OVER THE COLD AIR RETURNS IN YOUR HOME.

C. The cold air return of your forced air upflow furnace is inadequate. It may be necessary to increase its capacity.

D. If you don't seem to get enough air circulation – POSSIBLE CAUSES:

1. Air filter is dirty. Clean or replace air filter, as necessary.

2. Registers and grills are obstructed. Check supply pipe or damper positions. Check registers and grills to make sure they are not closed or obstructed by carpet, draperies or furniture. Remove any obstructions.

E. Contact your dealer or installer for further technical assistance.

SERVICE HINTS

A. Thermostat is not set correctly. Check adjustment.

B. No electric power to furnace. Check fuse or circuit breaker. If fuse is blown, replace. If breaker is tripped, reset. Check to be sure shut off switch is "ON".

C. Clean the inside of heat exchanger through opening on the front face of main housing unit. Remove plate covering the opening and scrape the inside of exchanger clean. Remove any loose soot through the flue collar in rear of stove.

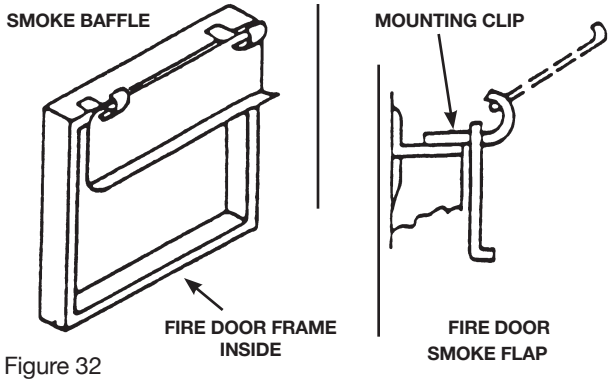


Figure 32

D. Smoke flap not in place. Refer to Figure 32 for proper installation.

E. Automatic damper fails to open. POSSIBLE CAUSES:

1. Improper thermocouple wiring. Recheck field wiring against wiring diagram (Figure 23, page 14).

2. No power to electronic control. Check transformer wiring. Wiring diagram (Figure 23, page 14).

3. Motor damper return spring too tight. Adjust for less tension.

F. Room thermostat not working. Reset the high limit bonnet control by turning counter clockwise until you hear a click. If this does not correct the problem, replace thermostat.

FLOORS ARE COLD

A. Return (cold) air grills blocked. Check to make sure rugs and carpets are not covering return air grills.

B. Air filter is dirty. Clean or replace air filter, as necessary.

C. System is out of balance. Check supply pipe dampers or registers to balance system.

BLOWER/MOTOR IS NOISY

A. Blower motor and/or blower housing need tightening.

B. Air filter is dirty. Clean or replace air filter, as necessary.

FURNACE IS NOT BURNING PROPERLY

A. Chimney draft incorrect. Check chimney draft. With normal wood fire, chimney should draw .03 to .06" W.C. between furnace and barometric control.

B. Soot and creosote buildup in heat exchanger or chimney. Clean if necessary.

C. Chimney too low. Increase chimney height.

D. Obstruction in chimney. Check for obstruction such as loose mortar, bird nests, squirrels nests. Clean chimney to eliminate obstructions.

E. Not enough fresh air to furnace room. Check for obstructions in combustions air inlet.

F. Chimney diameter too large. A too cold a chimney will chill flue gases as they rise up the chimney. As this gas cools, it becomes heavy and other gases from the fire try to penetrate this heavy column of cool air. This results in back puffing, poor combustion or burning, and may cause odors in your home.

G. Chimney clean-out door partially open. Make sure chimney clean-out door is tightly closed.

H. Other fuel burning device connected to same chimney. Make sure other device enters chimney at a higher level than your wood furnace. (It is necessary that the wood furnace have its own flue.)

I. Remove mesh from chimney cap. It is not designed for wood burning furnaces because it reduces your updraft.

J. NEGATIVE PRESSURE. This results from forcing heated air into an area of your home but then not returning the same amount of air to the VF-100 Furnace (via a cold air duct or open stairway) from that same area.

HOW THE VAPOR FIRE ELECTRONIC DRAFT CONTROL WORKS

READ OVER THE FOLLOWING EXPLANATIONS VERY CAREFULLY

1. When you first turn on the power – the 24 volt electronic control is energized, the controls high temperature siren sounds for only a short time, then after this, the control will automatically go to the low temperature setting which is when the capital letter "C" is on the display screen.

2. When first starting a fire, you may open the ash pan door for a very short while until the control senses the heat which is being generated by the fire. Once the control senses the heat it will automatically open the draft shutter. (THE NUMBER "3" WILL APPEAR ON THE DISPLAY SCREEN). Allow the ash pan door to remain open for a short period of time to assure that the wood has properly ignited. NOW CLOSE THE ASH PAN DOOR AND THE ELECTRONIC CONTROL WILL TAKE OVER AND IT WILL CONTROL THE DRAFT AS NEEDED TO BURN THE WOOD, MAKE SURE THE ASH PAN DOOR REMAINS CLOSED AND THAT THE LATCH IS HOOKED THROUGHOUT THE ENTIRE BURN.

*** **NEVER EVER BURN THE STOVE WITH THE ASH PAN DOOR OPEN OTHER THEN DURING THE FIRST FEW MINUTES WHEN STARTING THE FIRE.**

3. The electronic control has four different stages and the numbers "1", "2", "3" and small letter "c" indicate how much air is entering the fire chamber, for example as follows:

   A. At start up, THE NUMBER "3" is on and also again at the end of the burn cycle, this indicates that the shutter is wide open.

   B. As the fire gradually intensifies, the number "2" appears on the screen which means that the control has automatically decreased the amount of air going into the fire chamber, now the shutter is partially closed.

   C. As the temperature in the fire chamber continues to rise, the control automatically closes so that the number "1" appears on the screen which means that the shutter is almost closed.

   D. The small letter "c" will appear on the screen when the temperature in the fire chamber has reached it's optimum level. (Your low to high setting.) Now the shutter is completely closed, the stove is now on what we call the pilot burn and will continue like this until the fire chamber cools down and then the control again takes over and will adjust the shutter opening based on the fire chamber temperature.

   E. When the temperature in the fire chamber is too high the letters "A" and "L" blink on and off and the alarm beeper sounds continuously. If this condition occurs, check the "TO DO" list located on the control.

   F. The letters "O" and "P" will blink on and off and the beeper beeps intermittently when there is an open circuit in the thermocouple. The automatic draft will remain closed. Replace thermocouple.

4. The LOW TO HIGH TEMPERATURE KNOB is used to adjust the total heat output of the vapor fire furnace, depending on what the temperature is outside will determine where you set it.

5. You learn to judge the settings L/H for the weather conditions. L - Mild M - Moderate H - Cold

6. To obtain a lower average BTU output, for any of the computer settings with a longer burn time, here's what to do: **A)** Turn the computer to desired setting. **B)** Adjust the blower speed wall thermostat very low to keep the blower on low speed only. **C)** Turn the blower low limit button thermostat located on the side of the hood next to the computer from 105°F to 120-130°F. so the blower cycles on and off. **D)** Estimate the length of burn you'll have, in relation to how much wood you're loading in the fire box, so that when the #3 reappears on the digital screen near the end of the burn you can then turn off the computer via the toggle switch. This keeps the burn on pilot air only until it ends. Be sure to restart the computer for the next burn. Helpful hint: The #3 reappears when there is approximately two hours left in the burn. If you estimate and eight hour burn, at approximately six hours the #3 would appear, and that's when you would turn the computer off to extend the burn.

7. Maximum load size for any of the computer settings would be numerous rows of cordwood (approximately 20" long) stacked as high as smoke flap followed by another row (approximately 16"-18" long) above the smoke flap. Make sure the smoke flap returns to its normal vertical position once the fire chamber is loaded.

BLOWER ASSEMBLY

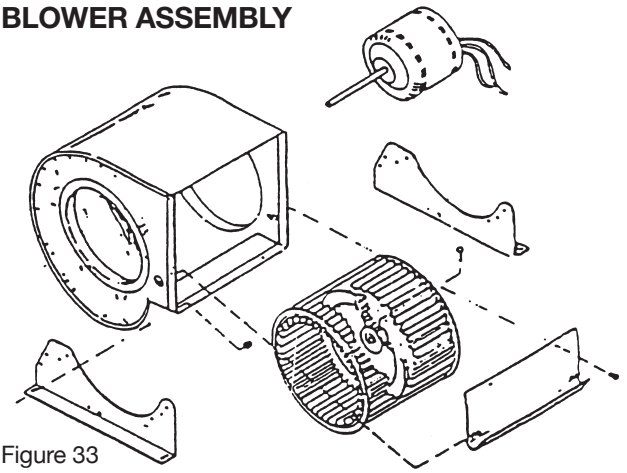


Figure 33

CHECK YOUR FIREWOOD WITH THE MOISTURE METER PROVIDED — FOLLOW DIRECTIONS.

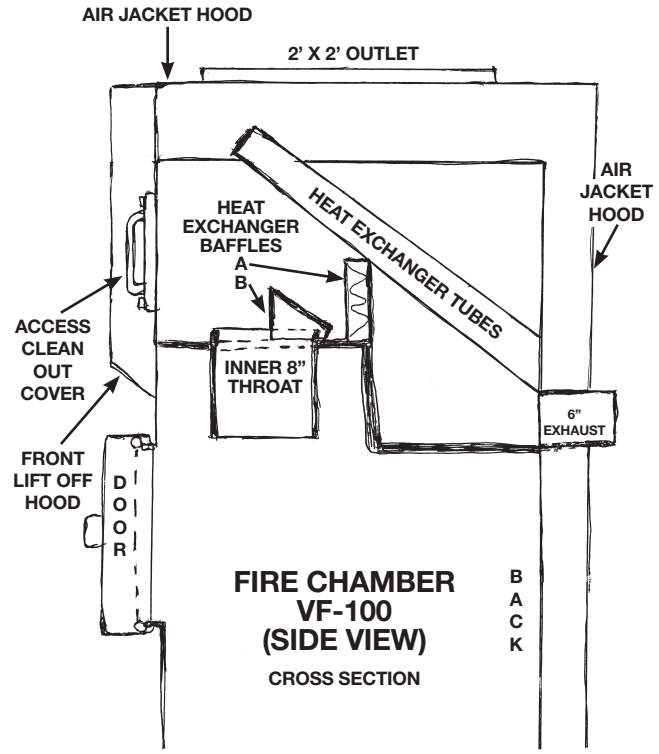
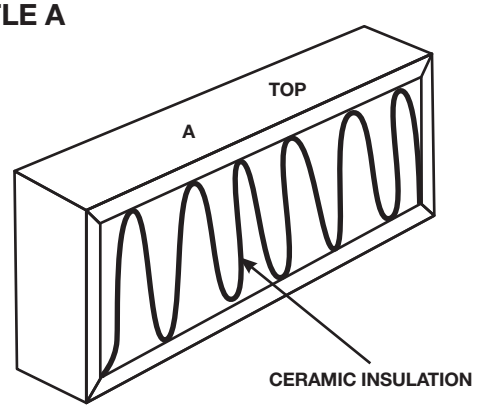
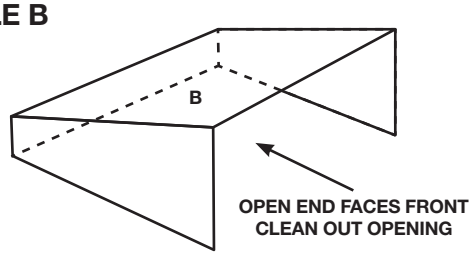


Figure 27

REMOVABLE HEAT EXCHANGER BAFFLE A



REMOVABLE HEAT EXCHANGER BAFFLE B



Install the removable heat exchanger baffles (A & B) via the clean out cover opening (Figure 34). They are quickly removed for cleaning purposes. The baffles allow for greater heat extraction and higher overall efficiency. Center each baffle from one side to the other.

CAUTION: If you have a poor draft set-up, such as connecting to an outside chimney with horizontal piping, 90° elbows, or a short chimney, do not install the heat exchanger baffles; you could get a draft reversal. Smoke backing up or the smell of smoke would indicate a poor draft. If questionable, have your draft checked by a certified installer.

MAINTENANCE AND REPAIR

1. Replacing door gaskets
    a. Main firebox door- after removing the old gasket and clean out the gasket channel, place some furnace cement into the channel (it will work as a glue to help hold the gasket in place). Using a larger flat blade screw driver and a rubber hammer push (may need some mild pounding with the hammer) the gasket into the channel. Make sure the splice is at the bottom of the door. The proper gasket is 5/8” ceramic rope gasket. This gasket will fit quite tight into the channel.
    b. Ashpan gasket- remove the old gasket and clean the gasket channel. Using some furnace cement as a glue to help hold the gasket in place, use a large flat blade screw driver and a rubber hammer to work the gasket into the channel.

2. Replacing the blower motor. The blower should run 80 - 90% of the time the furnace is in operation. The motor is a wear item and will need to be replaced at roughly 10 years of use. To replace the blower, simply disconnect the 3 wires at the blower electrical box. Remove the 4 hold-down bolts and lift the old blower out. Next, lower the new blower down over the studs and re-install the hold-down bolts. Finally, reconnect the 3 electrical wires in the blower electrical box.

REQUIREMENTS AND WARNINGS

This wood heater needs periodic inspection and repair for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with operating instructions in this manual.

This wood heater has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual.

DO NOT BURN.

Burning these materials may result in release of toxic fumes or render the heater ineffective and cause smoke.

A. Garbage;

B. Lawn clippings or yard waste;

C. Materials containing rubber, including tires;

D. Materials containing plastic;

E. Waste petroleum products, pains or pain thinners, or asphalt products;

F. Materials containing asbestos;

G. Construction or demolition debris;

H. Railroad ties or pressure-treated wood;

I. Manure or animal remains;

J. Salt water driftwood or other previously salt water saturated materials;

K. Unseasoned wood; or

L. Paper products, cardboard, plywood, or particle board. The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, sawdust, wax and similar substances for the purpose of starting a fire in an affected wood heater.

- Burning these materials may result in release of toxic fumes or render the furnace ineffective and cause smoke.

Be absolutely sure to install both UL approved carbon monoxide (CO) smoke detector alarms. The CO detector needs to be located in the wood burning furnace area. The smoke detectors should be located on all levels of your home, including the basement. They also have to be installed according to local building codes. They can both save lives and homes and are extremely important.

The Vapor-Fire Model 100 average emission of 87.6 CO g/hr.

The CO emissions vary as you adjust the computer from low to high. The highest setting will produce the lowest CO emissions.

Actual load Btu/hr	CO Emissions (g/hr)	Heating Efficiency (%/HHV)	Heat Output (Btu/hr)
7,291	49.2	77%	29,690
15,214	81.0	76%	15,214
19,243	155.4	74%	23,883
30,002	64.8	77%	33,691

Remember that if you see smoke - carbon monoxide is present. When your Vapor-Fire 100 burns without smoke it is producing carbon monoxide at the lowest level. The more smoke - the more carbon monoxide. Remember that carbon monoxide is invisible and odorless. Carbon monoxide may be present even if there is no smoke. Make sure you have carbon monoxide detectors in the area of the furnace as well as the living quarters of your home in compliance with all local codes.

Actual Load	Total PM Emissions	PM Output Based	PM Output Based	PM Rate	Delivered Efficiency	Stack Loss Efficiency
Btu/hr	g	lb/mmBtu Out	g/MJ	g/hr	%	%
7,291	2.53	0.116	0.05	0.38	18.7%	77%
15,214	4.19	0.076	0.03	0.52	48.7%	76%
19,243	6.82	0.135	0.06	1.18	44.3%	74%
30,002	4.96	0.054	0.02	0.74	68.6%	77%

CO Emissions (g/hr)	Delivered Efficiency	Direct Heat Output
79.2	18.7%	7,291
81	48.7%	15,214
155.4	44.3%	19,243
64.8	68.6%	30,002

The vapor fire furnace is usually located in the basement area readily connecting to existing or new metal ductwork. Because of size constraints it is rarely located on the main floor of the house. It should never be located outside in sub-freezing temperatures.

The delivered (direct) heat output via the two-speed blower system can vary from approximately 7,300 Btu's to 30,000 Btu's / hr. depending upon where you set the computer (from low to high) and which blower speed you select. The to-tal heat output, which not only includes the delivered heat output, but also the conducted and radiated heat from the furnace itself, can vary from approximately 21,465 to 33691 Btu's per hour.

The charts above show the emissions, delivered heat output, total heat output, and heating efficiencies as you adjust the computer from low to high. The overall stack loss efficiency percentage is based on the HHV (higher heat value for wood), not taking into account the valuable Btu's used to drive the moisture from the wood being burned. The wood is usually 15% to 30% moisture content. If this was included the heat efficiency percentage would be higher and would be called the LHV (lower heat value for wood). Gas and oil furnaces don't have the moisture to contend with so the HHV percentage is very accurate for these furnaces.

As you adjust the computer from low to high it always adjusts to reach a sweet spot for each setting to minimize creosote and smoke. The sweetest spot for all the sweet spot settings will occur on the highest setting of the computer.

When the furnace was tested to the EPA standard by Intertek, a certified lab, each burn level was less than .15 pounds of emissions per million Btu's with an overall average of 0.095. This not only satisfies the EPA requirement from 2015 - 2020 of .95 pounds/million Btu's it also surpasses the proposed 2020 limit of .15 pounds per million Btu's for each burn level of delivered heat.

For the best efficiency from your furnace, locate it in a central location of your home. It is best to have the heat ducts of similar length going out from your furnace to better facilitate equal heating. The longer the heat run from the furnace - the less heat will be delivered. If you have a long,narrow house, if you locate the furnace at one end, the other end may be starved for heat from the heating ducts. You will get your best results if you locate your furnace in a central basement location or a utility room on the main floor in a central location.

Solid Fuel Air Furnace

"This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual."

U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with 2020 particulate emissions standards using cordwood.

Conforms to: ASTM E2515-2011 & CSA B415.1-10

Model:		

Emissions: 0.095 lbs/MMBtu - Output

Date of Manufacture:	
Manufactured By:	
Serial Number:	

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Intertek