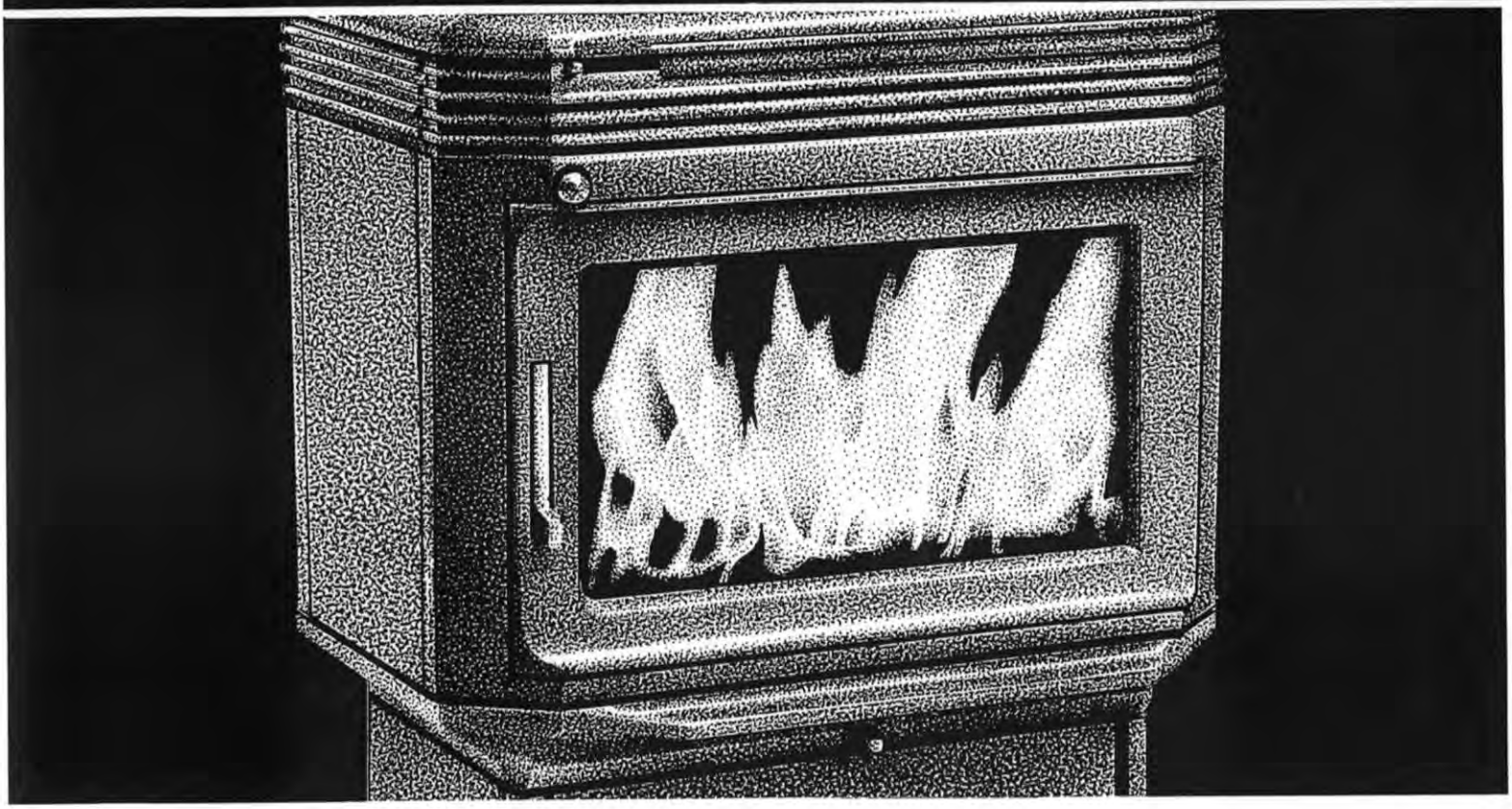
JOTUL



JØTUL ALPHA

INSTALLATION & OPERATING INSTRUCTIONS

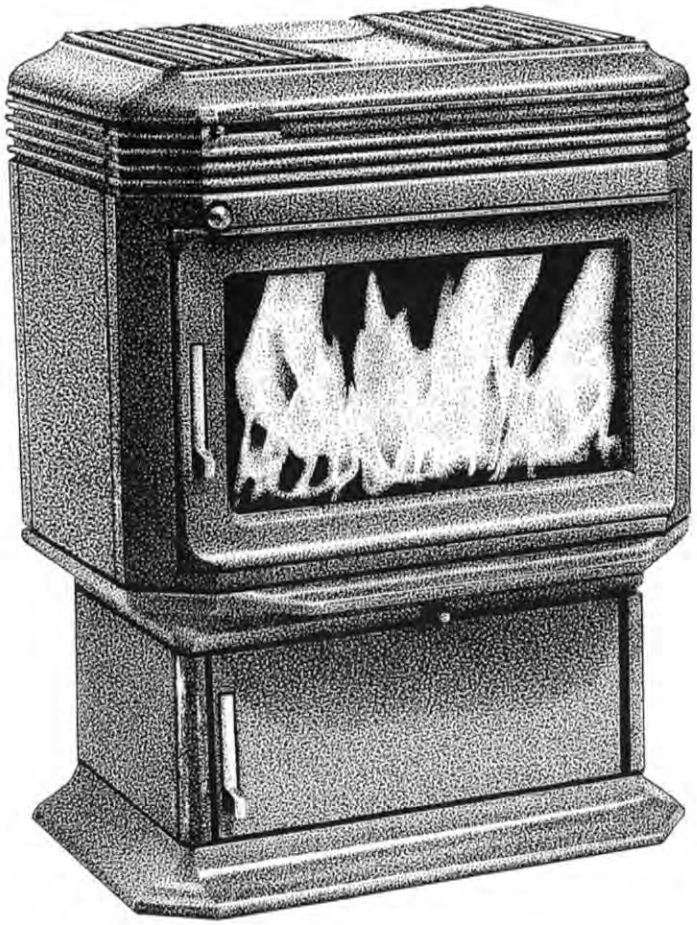
To Jotul
Instruction
file

JØTUL

Tested & Listed by: OMNI™, Beaverton, Oregon
Tested to UL 1482. Test date September 22, 1987. Report No. SS080-4. I.C.B.O.Q.C. No. AA-609

SAFETY NOTICE: IF THIS FIREPLACE STOVE IS NOT PROPERLY INSTALLED,
A HOUSE FIRE MAY RESULT. FOR YOUR SAFETY, FOLLOW THE INSTALLATION DIRECTIONS.
CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS
AND INSTALLATION INSPECTION REQUIREMENTS IN YOUR AREA.

Aksjeselskapet Jotul, Postboks 6206-ET. Oslo 6, Norway



Jotul Alpha Operating and Installation Instructions

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1. General Information

Jotul is the world's largest manufacturer of solid fuel burning appliances and has been making cast iron wood and coal stoves since 1853. Your new Jotul stove has inherited the benefits learned from more than 125 years of producing stoves. With proper care and operation, your new Jotul stove will last many, many years.

The Owner's Manual describes the installation and operation of the Jotul Alpha Model 350132 catalytic equipped wood heater. This heater meets the U.S. Environmental Protection Agency's emission limits for wood heaters sold after July 1, 1990. Under specific test conditions, this heater has shown heat at rates ranging from 10,100 to 32,900 BTU's per hour.

When installing, operating, and maintaining your Jotul fireplace stove, follow the guidelines given in these instructions. Save these instructions, and make them available to anyone using the stove.

Several areas of the U.S. require a building permit to install a solid fuel burning appliance. The National Fire Protection Association's Code 211 or similar regulations may apply to the installation of solid fuel burning appliances in your area. Your dealer has been specially selected for his knowledge of your local codes and can provide assistance in making sure your installation is safe and legal. Contact your insurance representative or building or fire officials to determine what regulations apply in your area.

2. Hazards Connected to the Use of the Jotul Alpha Wood Stove

Any use of fire in the house represents a certain danger. With intense overfiring, temperatures on the surface of the Jotul fireplace stove can exceed 1000 degrees F. (536 degrees C).

Please comply with the following warnings.

- Never overfire the stove. If any part of the stove or chimney glows, you are overfiring, and a house fire or serious damage to the stove or chimney could result. Immediately close down the draft control if you notice this condition.
- Teach children that the stove is hot and should not be touched.
- Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid or similar liquids to start or "freshen up" a fire in this heater. They can ignite with explosive force, causing bodily injury or death. Keep all such liquids far away from the heater while it is in use.
- Never use the stove if there are combustible gases in the house. The fumes from certain cleaning fluids, adhesives, and paints are a few examples of combustible gases. Remember, the operating wood-stove is a source of "open flame".
- Avoid creating a low pressure condition in the room where the stove is operating. Operating an exhaust fan or a clothes dryer could create a low pressure area, causing poisonous gases to come out of the stove into the room. You can prevent a low pressure condition by providing adequate outside combustion air within 24" of the stove.
- Never operate the Jotul fireplace stove with cracked or broken glass. Replace damaged glass with ceramic glass 4 mm in thickness (available from your dealer).
- Never burn trash of any kind in the stove.
- Keep combustible materials far away from the stove.
- Never modify the stove in any way which is not in accordance with the manufacturer's specifications.
- Do not dry clothes over the stove, since they could fall and ignite.
- Use only seasoned wood in your stove. Never use fireplace coal or synthetic logs.
- Always wear protective gloves when adding fuel to the fire.
- Never operate this stove without the catalyst in place. It could overheat and all clearances established to combustibles will be invalidated.
- **This stove is not approved for use in mobile homes.**

3. Installation

Safety Notice

If this stove is not properly installed a house fire may result. For your safety, follow the installation directions. Contact local building or fire officials about restrictions and installation inspection requirements in your area.

Please read this entire manual before you install and use your new stove. Failure to follow instructions may result in property damage, bodily injury, or even death.

A safe stove installation involves several elements.These elements are: (A) the chimney connector, (B) a thimble between the chimney connector and chimney, (C) the chimney itself, and (D) protection of combustible materials in the vicinity of the stove. Each of these elements are equally important for any safe stove installation.

A. Chimney Connector

This is also known as stove pipe or flue pipe. It is used to connect the stove to the chimney. The chimney connector should be 6" diameter black steel, 24 guage minimum.

Do not use aluminum or galvanized steel. They cannot properly withstand the extreme temperatures of a wood fire and can give off toxic fumes when heated. Do not use chimney connector pipe as a chimney.

Chimney connector sections must be attached to the stove and to each other with the crimped end toward the stove (Figure 1). This allows creosote to run into the stove and not onto the outside of the pipe. All joints should be secured with three sheet metal screws to ensure that the connector won't vibrate apart in the event of a creosote fire.

For proper operation the chimney connector should be as short as possible. Horizontal lengths of chimney connector should have an upward slope from the stove of 1/4" per foot. Avoid using more than two 90 degree elbows or toal runs of pipe greater than 10'.

Type L vent chimney connector: The only installation approved for type L vent connector is the Alcove installation which requires its use. Do not use type L vent for any other installation.

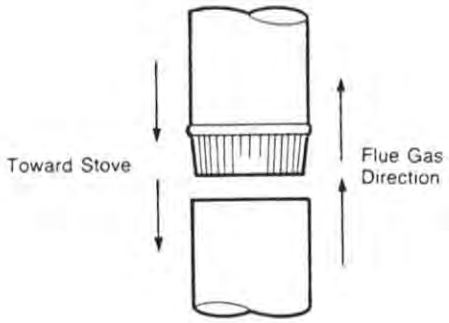


Figure 1

B. Thimble

This is a masonry or listed prefabricated device installed in combustible walls through which the chimney connector passes to the chimney. It is intended to keep walls from igniting.

Masonry Thimble

Construction of a masonry thimble requires 12" of brick around a fireclay liner. Be sure to locate it so that the top of the chimney connector will be at least 18" below the ceiling. To construct the brick thimble you will need an opening of 30" x 30". It will be necessary to cut wall studs and install headers and a sill frame to maintain proper dimensions and to hold the weight of the brick (Figure 2).

Minimum 3-1/2" (4" nominal) thick solid bricks are to be used. The fireclay liner (ASTM C35 or equivalent), minimum 5/8" wall thickness, must not penetrate into the chimney beyond the inner surface of the chimney flue liner and must be firmly cemented in place. If it is necessary to cut a hole in the chimney liner, use extreme care to keep it from shattering. Refractory mortar must be used at the junction to the chimney liner. After the assembly is complete, insert the chimney connector in the fireclay liner. Do not push it beyond the inside edge of the chimney liner because this will affect the draw of the chimney (Figure 3).

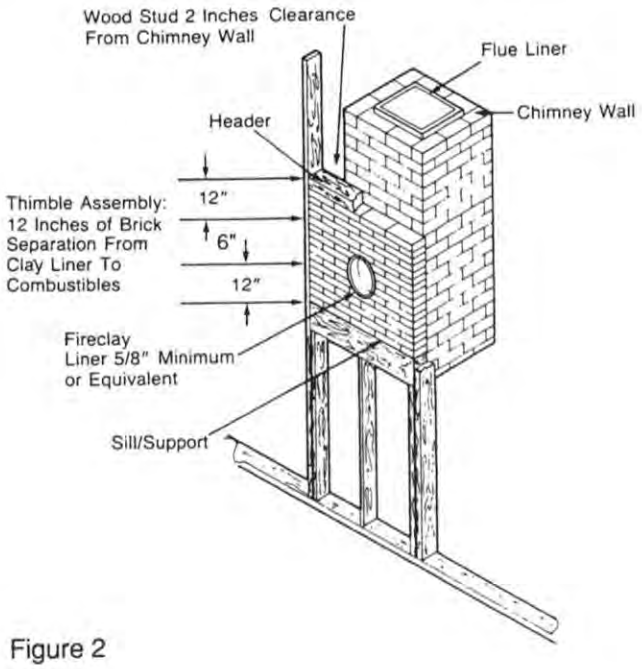


Figure 2

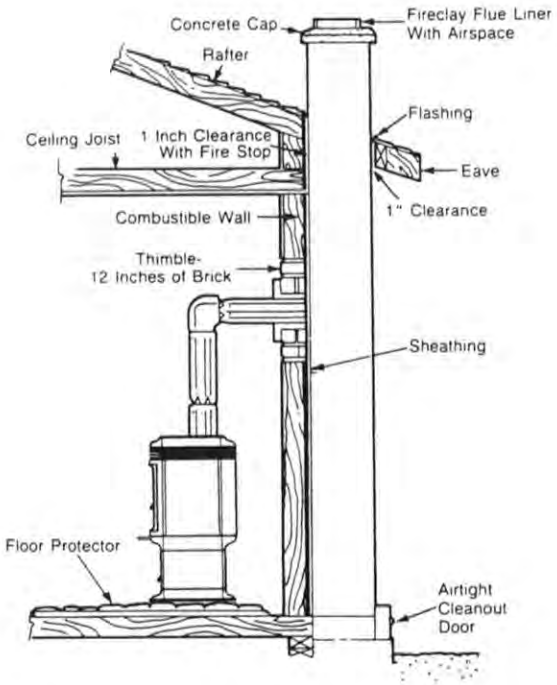


Figure 3

Listed Prefabricated Thimbles

Several manufacturers have developed safe alternatives to the brick thimble just described. In general, these are various types of insulated metal pipes with the necessary hardware to ensure proper clearances. These offer the advantages of being lighter than the brick thimble and requiring less room. These thimbles are "listed". "Listed" means that a laboratory independent of the manufacturer has tested them and certifies that they are safe if installed according to the manufacturer's directions. Be sure if you select a prefabricated thimble system that it is listed for use with woodstoves. Figure 4 shows a typical installation using a section of insulated pipe for a thimble.

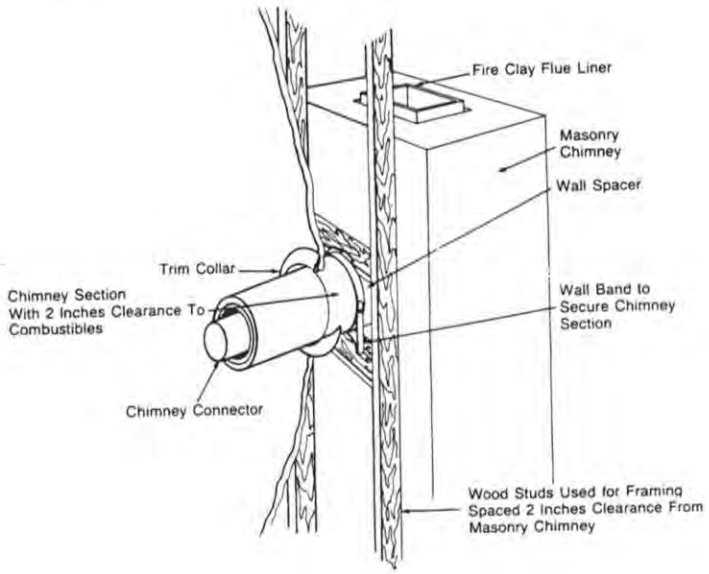


Figure 4

C. Chimneys

There are two types of chimneys suitable for Jotul wood-burning stoves. These are either an approved masonry chimney or a listed residential type building heating appliance chimney.

When selecting a chimney type and the location for the chimney in the house , keep this in mind: it is the chimney that makes the stove work, not the stove that makes the chimney work. This is very important to remember. If you were able to set your new stove out in the yard and build a fire in it , it would very difficult to keep the fire going without a chimney drawing air through the stove.

This is because a chimney actually creates a suction, called draft, which pulls air through the stove. There are several factors which influence draft. Some of the major factors are: height of the chimney, cross section area, temperature of the chimney, and the location of surrounding trees or buildings. In general, a short masonry chimney on the exterior of a house will give the poorest performance, and a masonry chimney inside the house will work the best.

The exterior chimney can be very difficult to warm up, and in extreme northern areas may not work at all. On the other hand, not only is an interior chimney easier to keep warm, but its heat loss is inside the house rather than outside.

This guideline gives the necessary chimney requirements based on the national code (NFPA 211). However, many municipalities have their own code which differs from the national code. Local codes can vary because of climate, altitude, or other factors. It is important that you check with your local building officials to find out what codes apply in your area before constructing a chimney.

Masonry Chimneys

Following is a list of the more important minimum requirements for a properly constructed masonry chimney.

- The foundation must be large enough to support the intended chimney without settling.
- The masonry wall of the chimney, if brick or modular block, must be a minimum of 4" nominal thickness. A mountain or rubble stone wall must be at least 12" thick.
- The chimney must have a fireclay flue liner (or equivalent) with a minimum thickness of 5/8" and must be installed with refractory mortar. There must be at least 1/2" air space between the flue liner and chimney wall.
- The fireclay flue liner should measure at least 8" x 8" and not larger than 8" x 12". 8" x 8" is preferred. If round fireclay liners are used, the inside diameter must be 6". If an existing chimney with larger tiles is used, it should be relined with an appropriate liner.
- No other appliance can be vented into the same flue.
- An airtight cleanout door should be located at the base of the chimney.
- A chimney inside the house must have at least 2" of clearance to the combustible structure. A chimney outside the house must have at least 1" clearance to the combustible structure. Fire stops must be installed at the spaces where the chimney passes through floors and/or ceilings (Figure 5).

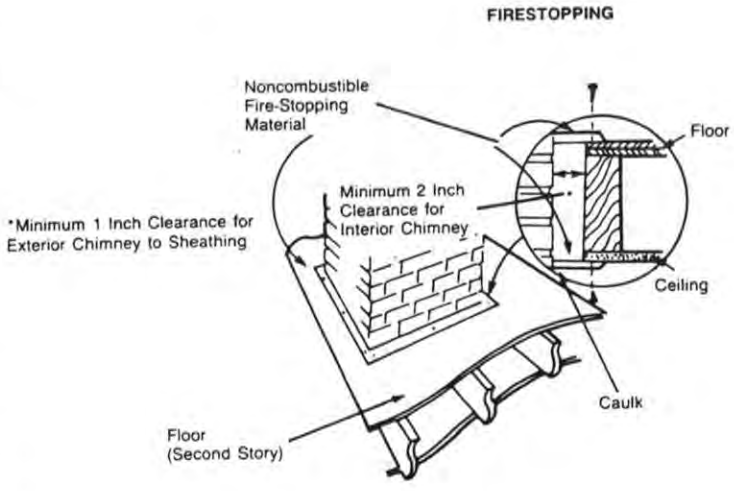


Figure 5

Remember that there must be air space around the chimney, and that insulation must be 2" or more from the chimney (Figure 6).

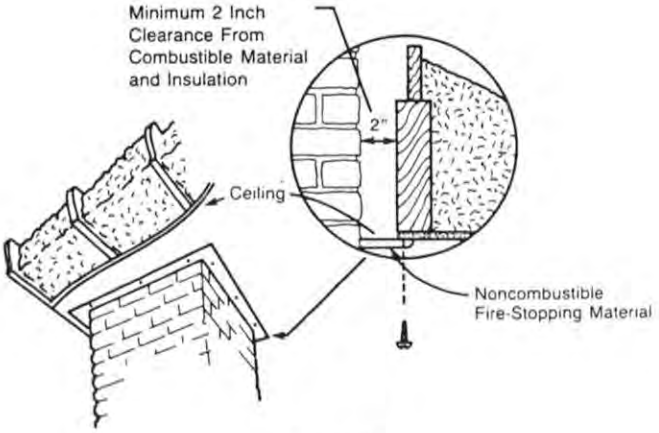


Figure 6

* A chimney must be the required height above the roof or other obstruction for safety and for proper draft operation. The requirement is that the chimney must be at least 3' higher than the highest point where it passes through the roof and at least 2' higher than the highest part of the roof or structure that is within 10' of the chimney, measured horizontally (Figure 7).

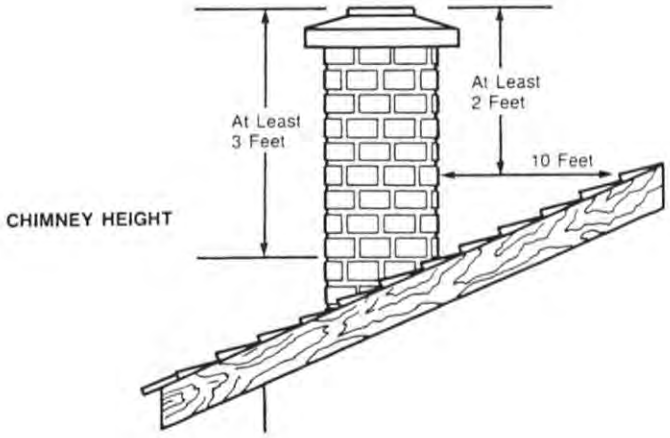


Figure 7

Chimneys shorter than 14' may not provide adequate draft. This could result in smoke spilling into the room from the door or joints in the stove or pipe. In addition, inadequate draft can cause back puffing or catalyst plugging. Too strong a draft, on the other hand, can cause excessive temperatures, damage the catalyst, and shorten burn times. Excessive drafts can be corrected by having your dealer install a barometric damper set at .1" of water column. If you suspect your draft is inadequate, consult your dealer.

Connection to a Metal Prefabricated Chimney

When a metal prefabricated chimney is used, the manufacturer's installation instructions must be followed precisely. You must also purchase (from the same manufacturer) and install the ceiling support package or wall pass through, "T" section package, firestops (when needed), insulation shield, roof flashing, chimney cap, etc. Maintain the proper clearance to the structure as recommended by the manufacturer. This clearance is usually a minimum of 2", although it may vary by manufacturer or for certain components.

There are basically two methods of metal chimney installation. One method is to install the chimney inside the residence through the ceiling and the roof (Figures 8, 9). The other method is to install an exterior chimney that runs up the outside of the residence (Figures 10, 11). The components illustrated may not look exactly like the system you purchase, but they demonstrate the basic components you will need for a proper and safe installation.

The chimney must be the required height above the roof or other obstruction for safety and proper draft operation (Figure 7).

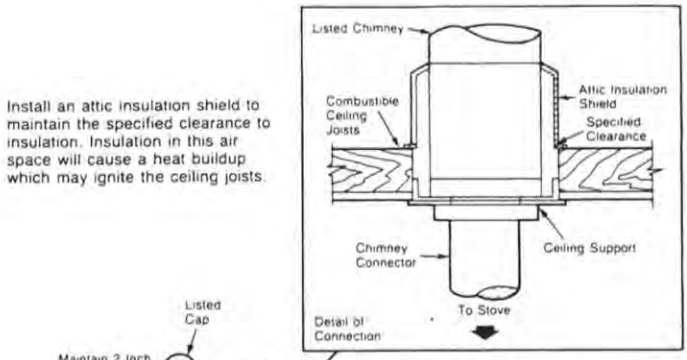


Figure 8

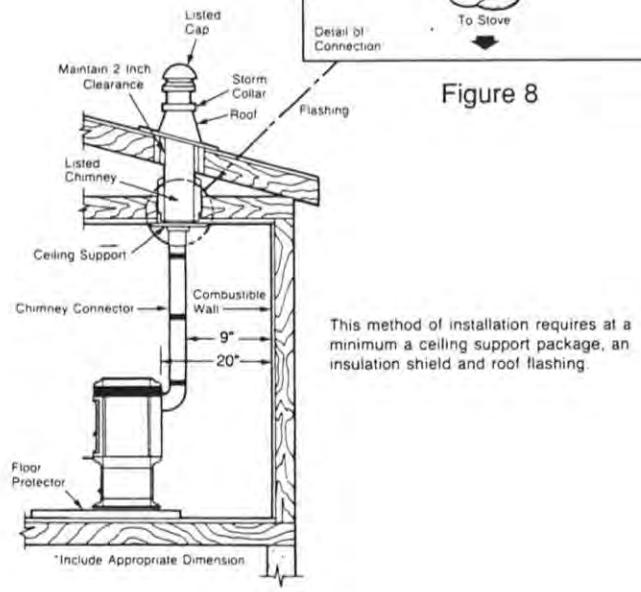


Figure 9

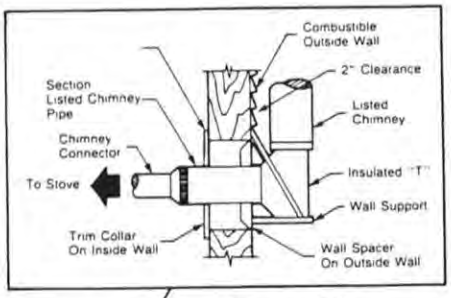
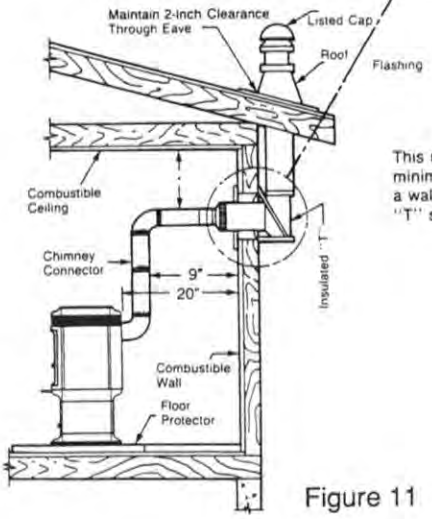


Figure 10



This method of installation requires at a minimum a wall pass through device, a wall support package and insulated "T" section and roof flashing.

Figure 11

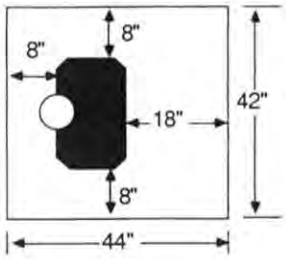


Figure 12A

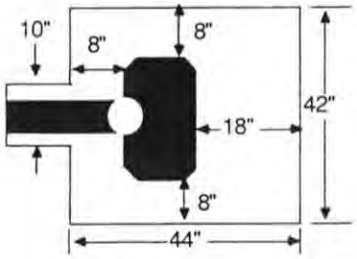


Figure 12B

During laboratory testing, it was determined that the floor protector should be one layer of 3/8" non-combustible millboard or equivalent. You may decorate the millboard with a variety of ceramic tiles or bricks. All joints should be filled using only non-combustible materials.

A number of pre-manufactured floor protectors are also available. If you choose to use one of these, make sure that it has a safety listing mark on it. Never put any type of floor protection on top of carpeting.

REMEMBER: Follow the manufacturer's installation instructions and maintain the manufacturer's specified clearance distances.

D. Clearances to Combustibles

Good planning for stove placement involves more than just ensuring you have adequately protected combustible materials. It should also consider your comfort and convenience.

The radiant heat from your stove will warm its surroundings and, in turn, the air. Will the warm air from the stove freely rise and migrate to other areas of the house? Will the stove and hearth interrupt or disturb traffic patterns in the home? Is it convenient to bring wood to the stove? These are but a few of the questions you will want to ask when choosing a site for your stove.

A simple way to visualize the area required by the stove is to cut out a piece of newspaper the same size as the stove (26" x 18"). Place the newspaper on the floor and select the appropriate dimensions from the following sections on floor and wall protection.

Floor Protection

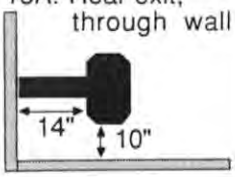
Your stove must be placed on a non-combustible surface which extends 8" beyond the sides and back of the stove and 18" in the front of the stove. This will result in an overall base which is 42" wide x 44" deep (Figure 12A). This is the minimum floor protector size. Floor protection must also be used under the stove pipe and extend 2" beyond either side of the pipe (12B).

Clearances

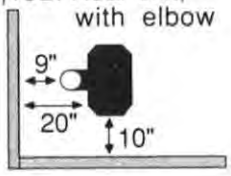
The diagrams in Figure 13 and 14 give the clearances to maintain from unprotected combustibles.

Figure 13 Clearances to combustibles (unshielded stove and unprotected combustible wall)

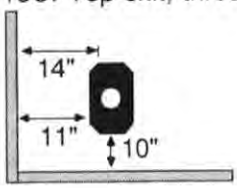
13A. Rear exit, through wall



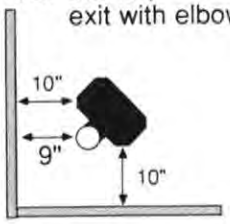
13B. Rear exit, with elbow



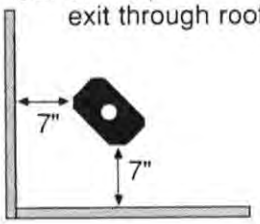
13C. Top exit, through roof



13D. Corner, exit with elbow



13E. Corner, exit through roof



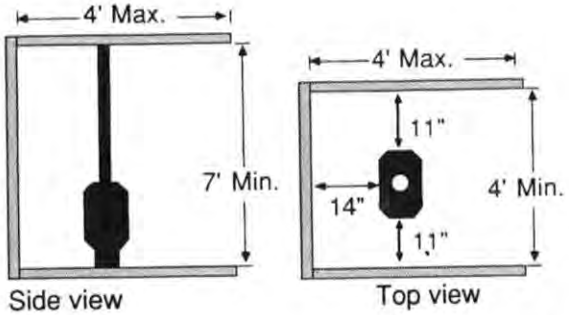


Figure 14, Alcove installation (requires double wall Type L Chimney connector)

A combustible is anything that can burn, and in the case of stove installations, these combustibles may not be visible. If you are not sure of the combustible nature of any material in the vicinity of your planned stove installation, you should check with your local fire officials. Remember that "fire resistant" materials are considered combustible; they are difficult to ignite, but they will burn.

If you have recently purchased a home which has a stove hearth in it that you plan to use, it is extremely important that the entire system is examined for safety. Many older homes have faulty chimneys, or previous owners may have covered combustible walls or studs with brick veneers. Heat is easily conducted through brick and could ignite unseen combustibles behind it.

Top Exit or Rear Exit

Your stove is delivered with the top flue outlet vacant and the rear outlet covered. If you wish to rear exit the stove, spin the flue outlet off of the rear. Remove the 10mm nut, bolt, traverse bar and coverplate. Re-install these parts in the top outlet position in the same sequence.

4. Operation

Before building a fire in your new stove, please read the following section carefully.

This stove is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air-dried seasoned hardwoods, as compared to softwoods or to green or freshly-cut hardwoods.

Do not burn:

- Coal
- Garbage
- Cardboard
- Solvents
- Treated or Painted Wood
- Chemical Chimney Cleaners
- Colored Paper
- Trash

Burning treated wood, garbage, solvents, colored paper, chemical chimney cleaners, or trash may result in release of toxic fumes and may poison or render ineffective the catalytic combustor.

Burning coal, cardboard, or loose paper can produce soot or large flakes of char or fly ash that can coat the combustor, causing smoke spillage into the room and rendering the combustor ineffective.

Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or "freshen up" a fire in this heater. Keep all such liquids far away from the heater while it is in use.

Wood Storage

When storing wood outside, it should be covered and stored off the ground to protect it from the elements . Make certain that the woodpile has good air circulation through it in order to promote drying to aid in the seasoning process.

To obtain the most benefit from the wood you burn, use only seasoned wood which has been cut and split for at least one year. Burning unseasoned or wet wood causes rapid development of creosote, while reducing the heat value of the wood being burned.

Creosote and Soot Formation and the Need for Removal

When wood is burned slowly, it produces tar and other organic vapors which combine with expelled moisture to form creosote. These creosote vapors condense in the relatively cool chimney flue of a slow-burning fire. The creosote that accumulates in the flue is highly flammable and is the fuel of chimney fires. To prevent a chimney fire, the creosote needs to be removed by sweeping the chimney and flue connector. The frequency of sweeping will depend on how you operate your stove, but it is important to inspect the flue after every two weeks of use. An accumulation of 1/4" or more on the sides of the flue or connector is considered hazardous and should be removed.

In the event that creosote in your chimney or flue connector ignites, the resulting fire is often accompanied by a roaring noise and a crackling sound as flakes of burned creosote break loose. If you suspect you are having a chimney fire, immediately close the draft regulator and make sure the stove door is closed. Call the fire department and get everyone safely out of the house.

Trying to extinguish the fire in the stove will not help. In fact, it can make the matter worse by allowing oxygen through the door, which then supports the fire in the chimney. When the roaring and crackling have stopped, you should resist the temptation to open the door and look at the fire. The fire may have suffocated, but could rekindle when you open the door. After a chimney fire, do not use your stove until the chimney and the flue connector have been cleaned and inspected to ensure that no damage has been sustained.

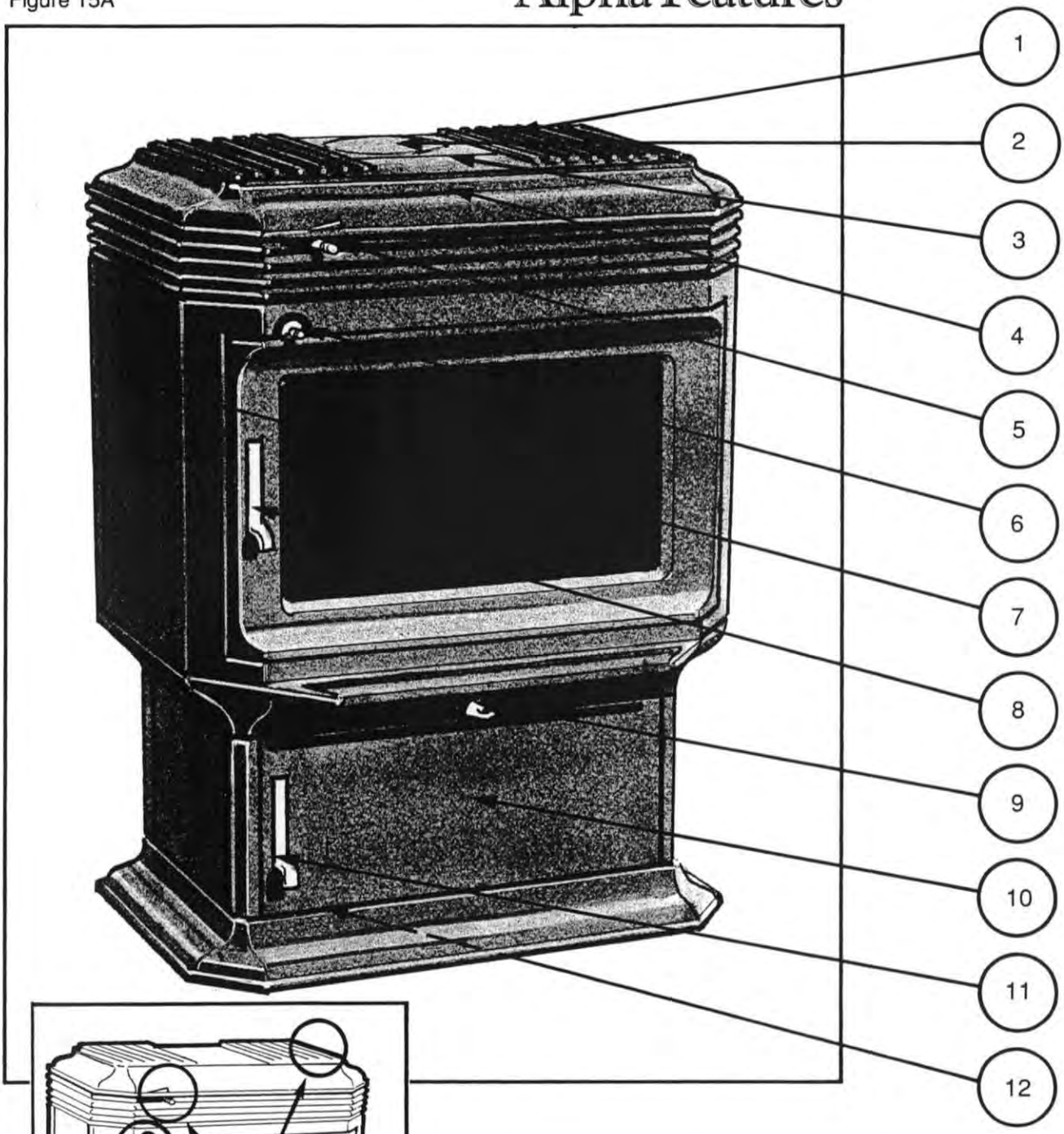
Breaking in Your Stove

A cast iron stove should be "broken in" the same way a new car with a cast iron engine is: gradually. It is mandatory that five consecutive small fires be built in the stove prior to operating the stove continuously. Each fire should be a little larger than the previous one, and the last fire should be a full-sized load. Allow the stove to cool completely between fires. Breaking in your stove this way works much like an athlete limbering up before competing.

Do not start your break-in fires until you have finished reading this entire manual. Save the ashes from your break in fires. The value of those ashes in maintaining a good fire will be pointed out later.

Figure 15A

Alpha Features



1. Extendable grill shelf.
2. Flue outlet cover plate.
3. Hotplate
4. Top.
5. Draft Control.
6. Damper by-pass
7. Side plate.
8. Load door latch.
9. Ash shaker
10. Ash door.
11. Ash door latch
12. Storage for ash pan lid

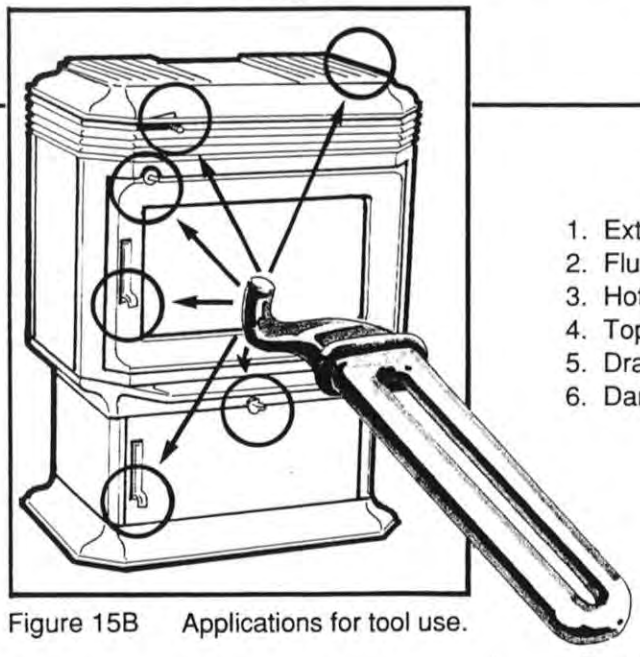


Figure 15B Applications for tool use.

Building a Fire

Building a fire is actually a very good description of what you want to do. Anyone can make a fire, but when you really know what you are doing, you build a fire. Like anything else that is built, the quality of materials and the care exercised is reflected in the final product.

A good fire will efficiently utilize your fuel, keep the glass in the door clean, keep emissions and creosote to an absolute minimum, require less work, and be very predictable. Master fire builders get the same satisfaction from their stoves that cooks get from their favorite sharp knives.

How the Stove Is Regulated

A separate handle is provided to operate the stove (Figure 15C). Insert the end of the handle into the hole on the load door handle and pull the load door open (Figure 16). You should notice immediately that the bypass damper control (Figure 17) prevents you from opening the door more than an inch unless you lift up on the control. When you open the door, the bypass swings open, allowing smoke to go directly into the flue instead of through the catalyst. Whenever you close the load door completely, the bypass automatically shuts.

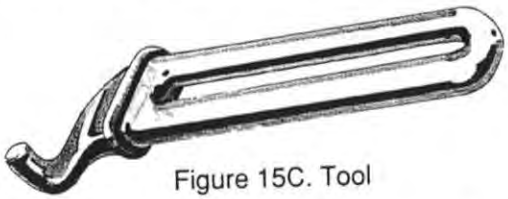


Figure 15C. Tool

Immediately above the damper control is the draft control. This slides back and forth to regulate the amount of air the fire receives and, therefore, the rate of combustion. The far right corresponds to the maximum, far left the minimum, as indicated by the raised arrow above it (Figure 18). Set the draft wide open (far right) when starting the fire.

The first step in building a fire — often overlooked — is to start the fire on a good 1"-2" bed of ash. We are unable to provide ashes with a new stove, but you can generate ashes with your break in fires, covered earlier. The only time to remove all of the ashes from your stove is at the end of the heating season; the rest of the time you should keep a few inches over the grates.

A Good Foundation

Open the load door and cover the bottom of the stove with tightly crumpled newspaper. Criss-cross a generous double handful of kindling on top of the paper. Don't skimp on the kindling, its role is very important. Split pieces of scrap lumber work very well. If you don't have scrap lumber, split some of your best wood down to 1/2" thick and use that.

Light the paper evenly across the front and close the door just until it catches under the bypass damper control. This positions the door slightly open to start the fire and lets the heat directly into the flue, which helps get a good draft established.

Figure 16

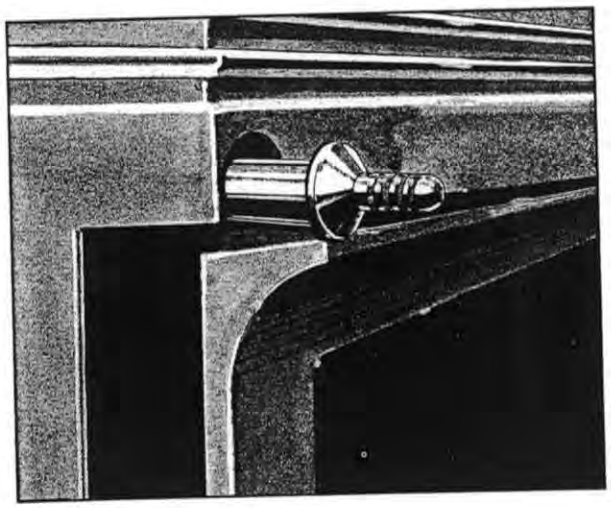


Figure 17

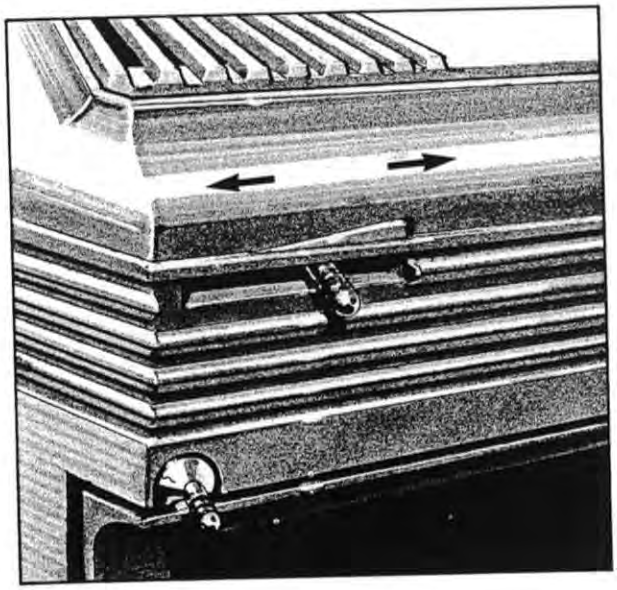


Figure 18

Besides getting the draft established, there are a variety of jobs that the kindling fire must accomplish . It needs to build heat into the glass, warm the catalyst, and form a bed of coals. The bed of coals is very important -- use plenty of kindling so it won't disappear before your fire is well-established.

Depending on the strength of your chimney and condition of your kindling, you will need to leave the load door cracked for five to eight minutes. At the end of this time, your smaller pieces of kindling should be reduced to glowing coals, and all of the kindling should be blackened over.

You can now add three to four small-to-medium pieces of wood. Try to stack this wood so that there are even spaces between it. Allow it to burn like this for several minutes before closing the load door completely. You should be sure that the wood is well caught and has had a chance to burn vigorously.

You are now at a critical stage. Until now, large amounts of air have been flowing between the glass and the fire, and the glass has stayed clear, since the smoke has been prevented from contacting the glass. There may be just a small stain on the lower right corner of the glass because of currents created in the stove when the door was cracked.

The air flow between the glass and fire now comes from the top of the stove and falls all across the glass. Now however, the amount of air is greatly reduced, and you have to take care to keep the smoke off the glass.

First of all, smoke won't deposit on a hot glass, so a lot of your efforts at quickly establishing a hot fire have helped by quickly heating the glass. Secondly, the closer you place the wood, which is cold, to the glass, the more problems you will have.

If the fire dies out and fills with smoke when you close the door, you have not allowed the wood to catch on well enough. It could be that you didn't use enough kindling, used pieces that are too large or too green or simply rushed things. It is perfectly normal for the fire to slow down when you close the door. What is not normal is for the stove to fill with so much smoke that it looks like water flowing over a dam.

If you've made it to this point, you are well on your way to becoming an expert. You may experience a little more staining on the glass in the next few minutes until the stove gets hot. If the glass gets very dirty, there is a very good chance that your wood is green or that the chimney is not providing a strong enough pull. If you suspect a problem with your chimney, seek the advice of your dealer.

After perhaps half an hour, the wood in the stove will be forming a bed of coals a few inches deep and the heat from the fire will be baking off any stains on the glass which formed earlier. When the coal bed is formed, you can add as much wood as you need. With practice, you will learn how to adjust your loads to give the best performance. In general, it is much better to burn small loads fairly hot than to burn a big load slowly.

When you have placed your load on the coals, you may want to give it a few minutes with the door cracked to catch on. Again, it will depend on how good your coal bed is and how dry your wood is.

Adjusting the Heat Output

Until now, we've been operating the stove with the draft fully open. Once you have established a good bed of coals and the load of wood in the stove is burning well, you can cut the draft back. The more you move it to the left, the slower and cooler the stove will burn. If you are planning to reduce the combustion significantly, it is best to cut it back in a few increments rather than all at once. At minimum draft setting, the amount of air entering the stove will be so small that it may be difficult to keep the glass clean. As long as there is a good bed of coals in the stove, it is possible to return to a hot fire and stained glass will clean itself.

You can continue to operate the stove for as long as you like with little attention, provided you maintain a good bed of coals, allow your new loads to catch on well, and gradually decrease the draft.

Ash Removal

After several days of burning it will be necessary to remove some ashes from the stove. Insert the cool handle into the grate shaker, and, using a push-pull motion, sift the ashes through the grates into the ash pan. Open the ash door, remove the ash pan, and slide the ash pan cover onto the pan. (See Figures 19B and 19C.) Do not leave the ash door open while transporting the ashes. The stove could overheat, resulting in damage to the stove or catalyst.

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground well away from all combustible materials or outdoors pending final disposal. If the ashes are disposed of by burial in the soil or otherwise locally dispersed, they should be retained in a closed container until all cinders have thoroughly cooled.

Do not remove all of the ashes from the stove. The stove will perform better if you maintain at least a 1" layer of ashes in the bottom of the stove.

Catalyst

This wood heater contains a catalytic combustor, which needs periodic inspection and replacement for proper operation. It is against the law to operate this wood heater in a manner inconsistent with operating instructions in this manual or if the catalytic element is deactivated or removed.

The catalyst in your stove is a Corning Long Life catalytic combustor, which helps the stove achieve its high efficiency rating. A separate warranty and information card is supplied by Corning with this stove. Please be sure to read the card and submit the catalyst warranty information to Corning.

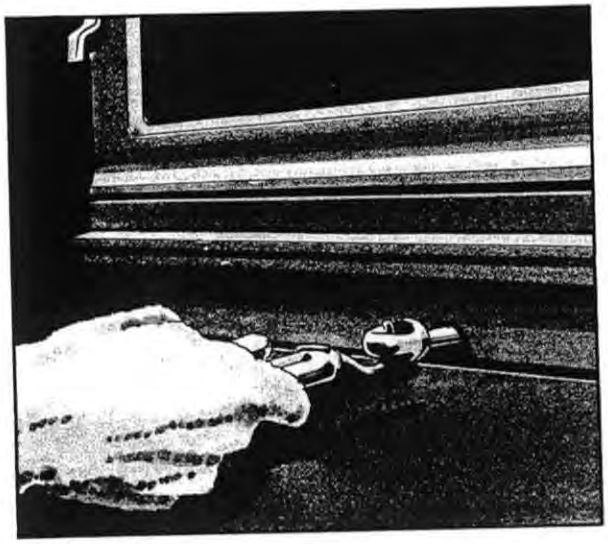


Figure 19A

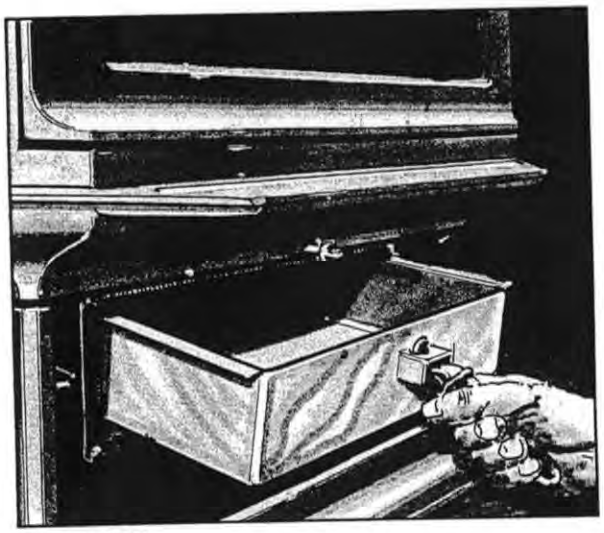


Figure 19B

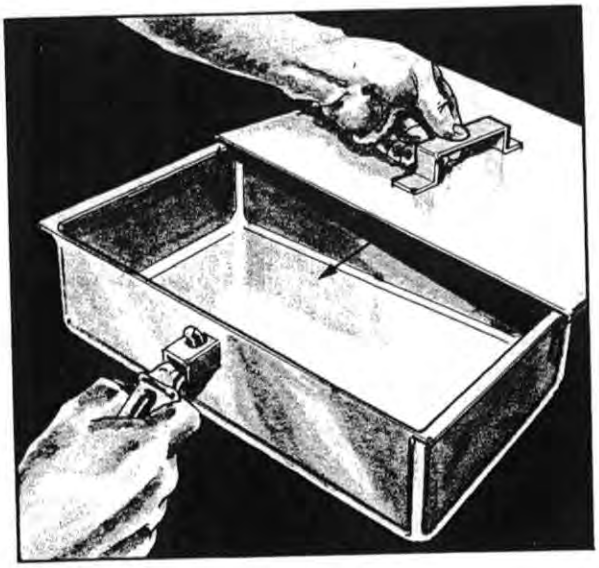


Figure 19C

A catalyst is defined as a substance which promotes or initiates a reaction at a much lower energy level than would normally be required for that same reaction if the catalyst were not present. Furthermore, the catalyst is not used up in the reaction. It is helpful when trying to understand catalytic reactions to think of the catalyst as a bridge. How much energy would it take to jump all the way across a river versus walking across a bridge? When you walk across the bridge, you use much less energy, and when you get to the other side, the bridge is still there. It hasn't been used up, and it continues to provide the same service.

Chances are, you have a catalyst in your home already, although you may not be aware of it. Self-cleaning ovens have catalysts very similar to the one in your stove. On the self-cleaning cycle, you oven gets very hot to burn off the spilled food. Normally, this would produce a lot of smoke, but, by putting the smoke through a catalyst, the smoke is also burned up. Usually this combustion is so complete you don't even realize that it has happened at all.

Directly in front of the top flue outlet is a ceramic honeycomb which is coated with a catalyst. This catalyst reduces the temperatures necessary to ignite the gases and smoke given off as the wood is burning. Normally, these gases require a temperature of 1,100-1,200 degrees F. to burn, but the catalyst allows these gases to burn at a much lower temperature of 500-700 degrees F.

The burning of gases in the honeycomb releases a lot of energy which would normally be lost up the chimney. Tars and resins in the smoke are also burned, which helps keep your chimney and the environment clean.

In general, catalytic combustion is pretty straightforward. Once the stove and gases have been warmed to the 500-700 degrees F. range, any gases reaching the catalyst will ignite. Following the start up procedures outlined in "Building a Fire" should ensure that the catalyst and stove are adequately warmed. Once the catalytic combustor starts working, heat generated in it by burning the smoke will keep it working, even when temperatures on the stove fall below 500 degrees F. The most important thing, then, is to get the stove and catalyst up to operating temperatures before setting the output back.

Several things could cause the catalyst to fall below its operating temperature, however. The most likely time for this to occur is during refueling. Twenty or more pounds of cold wood plus the room air entering the stove during refueling can dramatically lower the catalyst temperature. It is very important whenever reloading to allow the stove to burn hot for 10 to 15 minutes. This reheats the stove as well as raises the catalyst temperature. Getting your new load of wood burning well also helps keep the glass in the door clean.

At the end of a burn cycle, when all of the wood has been reduced to charcoal, very little gas is being generated, and the catalyst can also fall below its operating temperature. Try to time your reloading so that there are enough coals left to get your new load going hot to relight the catalyst.

Catalyst Monitoring

It is important to periodically monitor the operation of the catalytic combustor to ensure that it is functioning properly, and to determine if it needs to be replaced. A non-functioning combustor will result in a loss of heating efficiency and an increase in creosote and emissions. To monitor the catalyst's performance, you can obtain a probe thermometer from your dealer, or you can observe the amount of smoke coming from your chimney.

If you have followed the start up procedures correctly and have sufficiently warmed the stove and catalyst, you should notice very little, if any, smoke coming from your chimney. Be sure not to confuse condensing steam from wet wood with smoke. Smoke gradually becomes thinner as it leaves the chimney, whereas steam travels a few feet and then vanishes.

If you purchased a probe thermometer, it is inserted in the hole provided right behind the catalyst cover plate, as indicated in Figure 20B. With a probe thermometer you should be able to make the following observations: temperatures should be in excess of 500 degrees F. and will often exceed 1,000 degrees F. Temperatures will drop sharply when new fuel is added, but should return to normal once the wood is burning well.

Brief periods of high temperatures are not harmful to the catalyst, but you should avoid operating the catalyst above 1,800 degrees F. Temperatures of this magnitude can reduce the life of the catalyst and are the result of too much smoke reaching the catalyst. Finely split wood, pitchy pine, or tightly packed loads can overwork the catalyst. It is best to use wood that is 4"-7" in diameter and to load the stove frequently with medium-sized loads.

If temperatures are above 1,800 degrees F., they can be reduced by opening the draft control wider. Here's how it works. A large load of wood burning slowly generates a lot of gas. Since the stove is relatively cool, these gases will not burn in the stove, but will go directly to the catalyst where they will burn vigorously. Opening the draft wider allows these gases to burn in the combustion chamber, thereby reducing the total amount of unburned gases reaching the catalyst. If opening the draft fails to lower the catalyst temperature, open the load door wide to allow cold room air to cool the stove and catalyst.

Catalyst Trouble Shooting

A properly operating catalyst can improve woodstove performance in the following ways:

- Increase heat output by 50%
- Reduce creosote formation and emissions by 90%

For these reasons you will want to make sure your catalyst is working and know what to do if it is not.

You should allow your stove to go out and visually inspect the catalyst at least three times a year. To inspect the catalyst, extend the warming shelves, lift out the hotplate (Figure 20A), and remove the two 6 mm bolts securing the inspection plate (Figure 20B). Carefully lift out the ceramic insulation which is on top

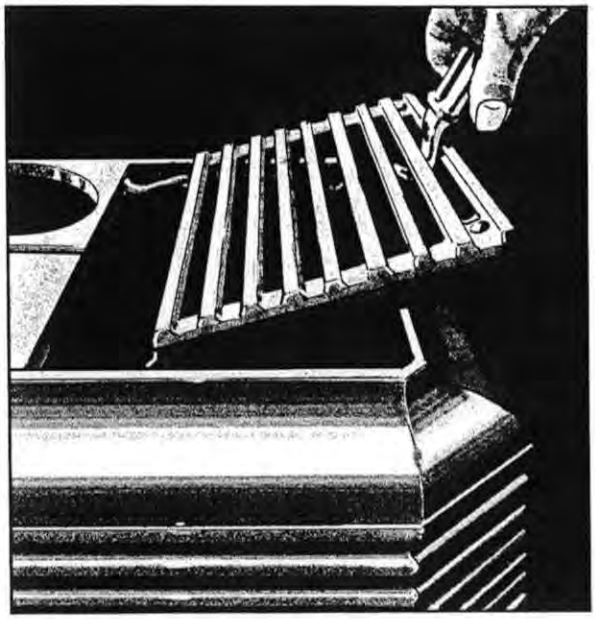


Figure 20A

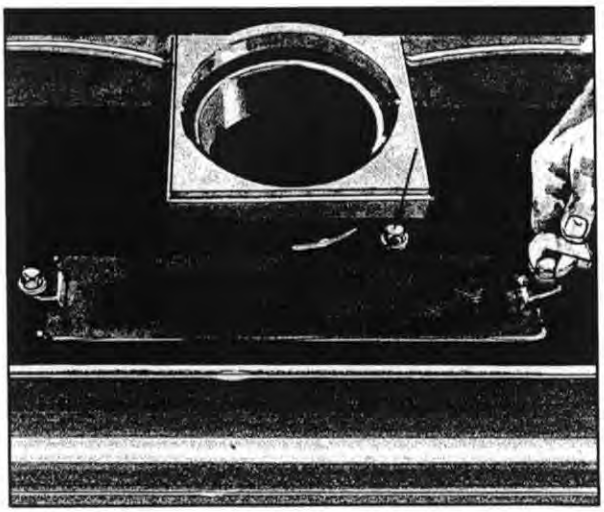


Figure 20B

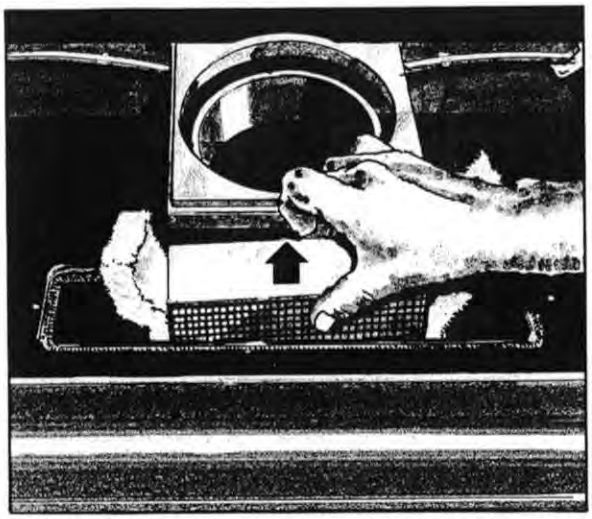


Figure 20C

of the catalyst and set it aside. You may not need to lift the catalyst out of the stove to examine it. It is a good idea to do this while the stove is still new, so that you can learn what a clean and healthy catalyst looks like. After inspection, replace the insulation, cover plate, and bolts.

Combustor Problems

• *Plugging* (Figure 21)
The catalyst cells can be plugged with char, fly ash, or creosote. Burning garbage, cardboard, or wrapping paper produces excessive amounts of char and ash.

Creosote plugging occurs when burning wet or pitchy wood or large loads of wood on very low draft settings without allowing the catalyst to properly warm up and initiate burning. In general, creosote will not form on hot surfaces.

If the catalyst is plugged, it could also indicate that creosote has built up in your chimney and needs cleaning.

A plugged catalyst can be cleaned with a good hot fire, much in the same way that a hot fire cleans up creosote stains on the stove window. Under no circumstances should you attempt to burn out a plugged catalyst unless you are sure your chimney is clean.

• *Masking* (Figure 22.)
This is a build-up of a very fine fly ash which coats the surface of the catalyst and prevents it from coming into contact with the smoke. Fly ash can be brushed off with a soft bristled brush or vacuumed away.

• *Cracking* (Figure 23.)
Cracks can develop from either thermal stress or mechanical stress. As long as large pieces do not fall out of the combustor, it can still function with a few cracks. Mechanical stress may indicate that some part of the surrounding housing has warped and needs to be replaced.

• *Peeling* (Figure 24.)
Temperatures above 1,800 degrees F. and prolonged flame impingement can cause the catalyst coating to peel off the ceramic substrate. If the peeling is severe, the catalyst should be replaced.

• *Deactivation or Poisoning*
If the catalyst is intact and is clean, but fails to operate, it has probably become poisoned from chemicals in pressure treated wood or painted lumber or trash. Deactivated catalysts should be replaced.

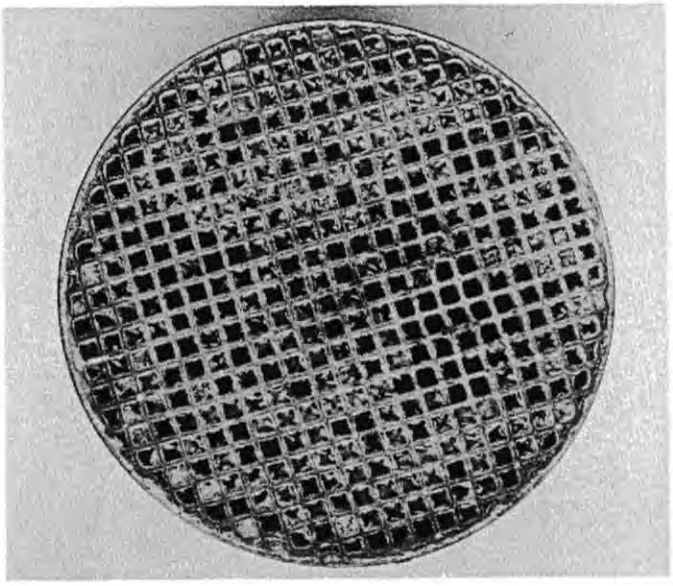


Figure 21
Fly Ash Plugging

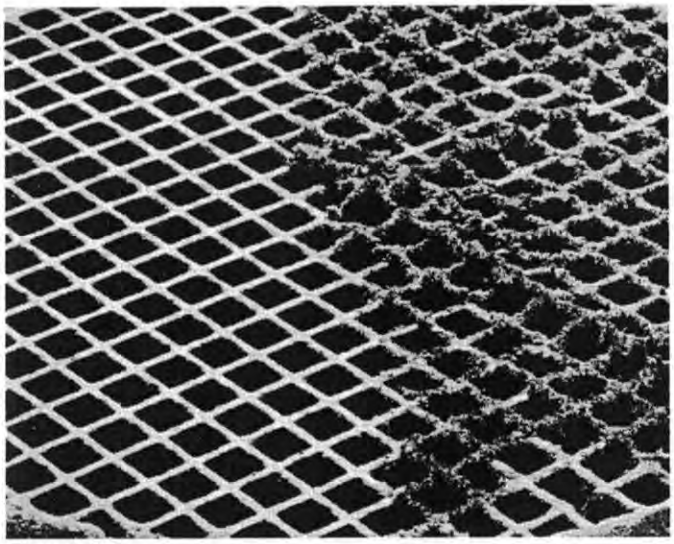


Figure 22
Fly Ash Build Up (right)
Brushed Off (left)

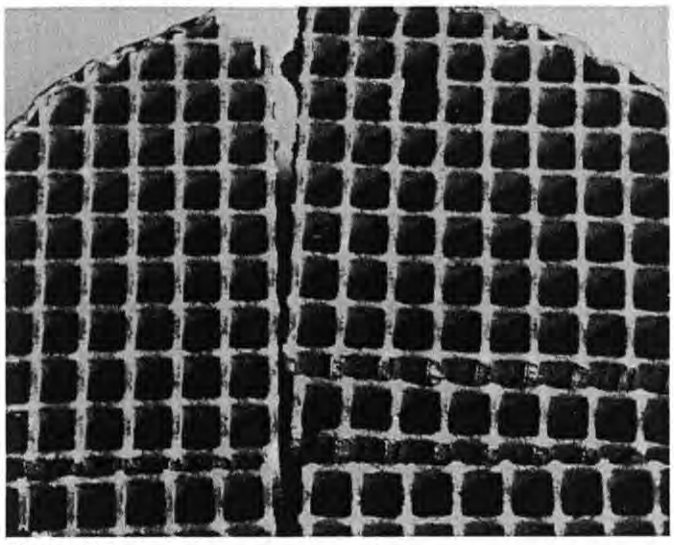


Figure 23
Thermal Cracking

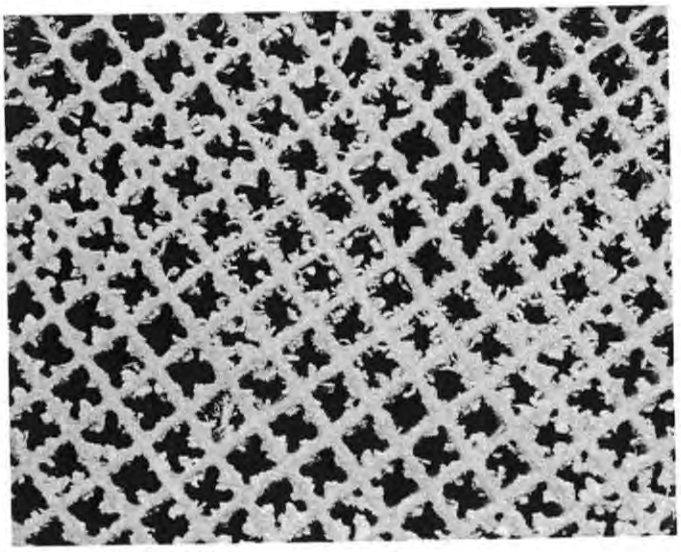


Figure 24 Peeling

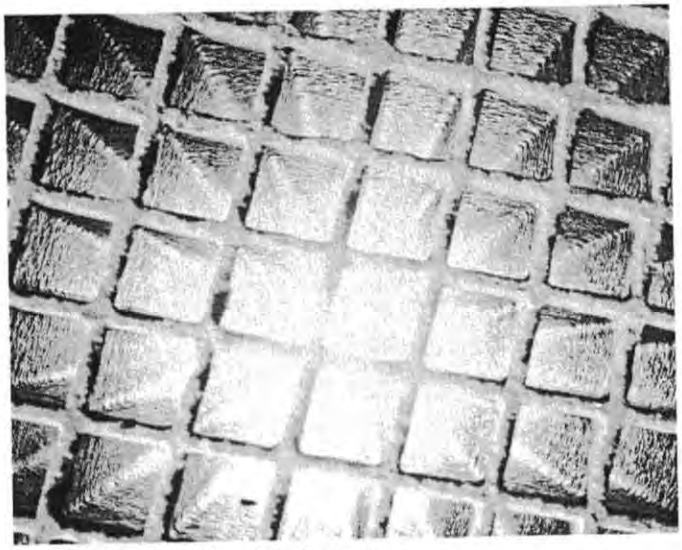


Figure 25 Healthy Combustor

5. Maintenance

At least once a year, you should perform a routine maintenance check. A good time to do this is when you are cleaning the chimney and the connector. Of course you should clean the chimney and connector whenever accumulations of soot and creosote reach 1/4" thick, which may be several times a year, depending on how the stove is operated.

1. Thoroughly clean the entire stove. Enameled surfaces can be wiped clean with soap and water. Brush all ash and soot out of the stove. It is better to brush out the ash and soot than to vacuum it out because soot particles are small enough to pass through most vacuum bags.

2. In a dark room, use a strong light to inspect the stove inside and out for cracks or leaks at corners and joints. Cracked parts should be replaced. Leaks at joints can be patched with stove furnace cement.

3. Check both door gaskets and window gaskets for tightness. To check the door gaskets put a dollar bill half way into the stove, close the door and try pulling the dollar out. If it can be easily removed, the seal is too loose. Check several spots around the door.

To replace the gaskets, scrape out all old gasket material and gasket cement. Run a bead of stove cement into the bottom of the groove and press in new gasket.

The load door requires 62" of 3/8" diameter braided fiberglass. The ash door requires 40" of the same material. The gasket between the glass and the door receives very little wear. The best indication that it needs to be replaced is streaks on the glass caused by air leaking around the gasket. The window gasket requires 56" of 3/16" diameter braided fiberglass and is replaced in the same manner as the door gaskets.

4. Spray the interior of the stove and the ash pan with a light coating of oil at the end of the heating season to inhibit rust during the summer.

By- Pass Gasket Replacement

The smoke by-pass opening is gasketed and this gasket should be periodically checked. Figure 26 shows where the gasket is located behind the catalyst. The seal between the by-pass damper and gasket should be checked for proper adjustment before being checked for tightness.

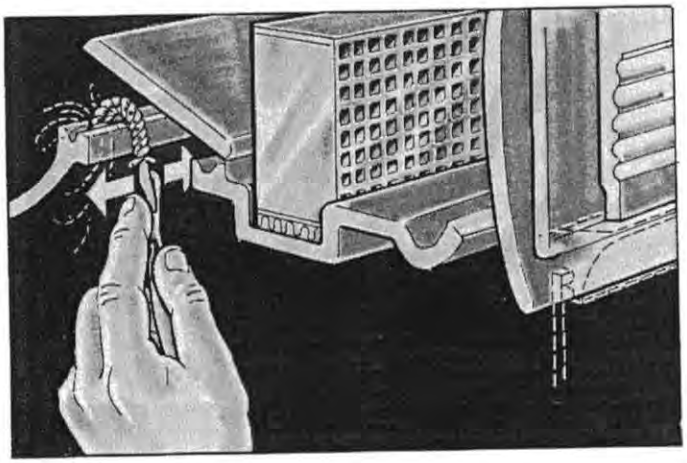


Figure 26

To check the by-pass adjustment, close and latch the load door and then push in on the by-pass control. If you can push the by-pass control in more than 1mm then you need to ajust the coptrol.

To adjust the by-pass control, open the door and loosen the locking nut on the back side of the control. Next, unscrew the control knob a few revolutions and then finger tighten the nut. Carefully relatch the door. Do not force the door closed with the latch, since this could bend the control rod or break the latch. If the door will not latch, then you have unscrewed the control knob too far. Re-adjust the lock nut and control knob until the door latches firmly and you are not able to push in the control knob when the door is closed. Tighten the lock nut.

To check the gasket seal, open the load door and place a dollar bill half way through the by-pass opening with your right hand. With your left hand push the by-pass closed, and while holding it closed, attempt to withdraw the dollar bill with your right hand. If the dollar bill can be easily removed, then the gasket must be replaced.

A tool to help in removing the old gasket can be fashioned from a wire coat hanger and a pair of wirecutting pliers. Hold the coat hanger by the hook and the middle of the bottom section. Pull it out straight so that the hook is at the top. With the pliers, cut the hook off right above the twist in the wire. Firmly grasp both pieces of the twist with the pliers and bring the stretched hanger around to form a new, stronger hook, approximately 3/4 inch wide. Double up the long section of coat hanger to form a handle and scrape out the old gasket. See figure 27.

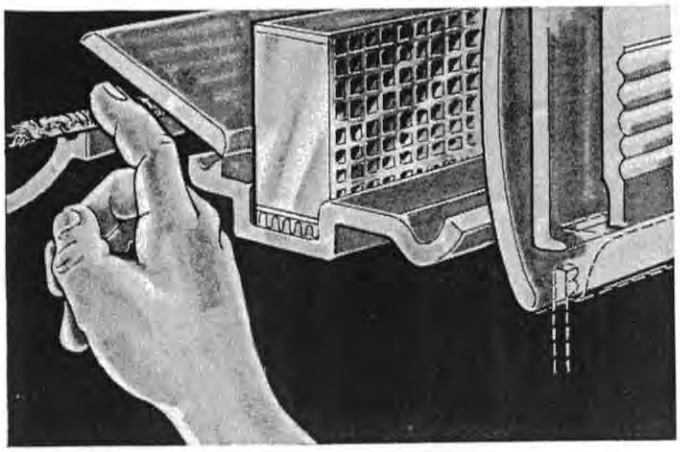


Figure 27

The new by-pass gasket, part #126885, which comes coated with a special adhesive, can now be pressed into place.

Re-adjust the by-pass closing tension if necessary and allow the gasket to set up for 24 hours before refiring the stove.