



# COUNTRY FLAME TECHNOLOGIES

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

## HARVESTER BIOMASS SOLID FUEL STOVE

MODEL HR-01



USA & CANADA TEST:  
ASTM E1509-03, ULCS627-M90

TESTED BY:  
WARNOCK HERSEY

ULCS628-M92, UL 1492,  
Oregon Administrative Rules 814-23-909

MOBILE HOME APPROVED

**WARNING:** If the directions in this manual are not followed exactly, a fire may result causing property damage, personal injury or loss of life.

### FOR YOUR SAFETY

Do not store or use gasoline or other flammables (vapor or liquids) in or around the vicinity of this appliance.

Installation and repair must be performed by a qualified service agency.

Always check with local jurisdiction or code agency before installing this product. Local jurisdiction may require a permit prior to installation.

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COUNTRY FLAME 

### Country Flame Technologies

A Division of American Products, LLC

900 George Street  
Marshfield, MO 65706  
417-859-0990  
417-859-0192

[www.countryflame.com](http://www.countryflame.com)

## SAFETY NOTES

The Harvester Model HR-01 biomass fuel stove is significantly different from a conventional wood-burning stove. One major difference is that the HR-01 requires a reliable source of electrical energy to properly operate. The owner, installer, and operator must understand this manual and read it in its entirety. This understanding should be completed and followed before installation or operation of the HR-01 is attempted. Failure to follow installation and operation instructions may result in property damage, bodily injury, or even death. Country Flame strongly recommends that a certified professional install the Harvester Model HR-01.

**WARNING:** **THE AUTHORITY HAVING JURISDICTION** (such as a municipal building department, fire department, or fire prevention bureau, etc) **SHOULD BE CONSULTED BEFORE BEGINNING INSTALLATION. A PERMIT MAY BE REQUIRED IN ORDER TO PERFORM INSTALLATION.**

**WARNING:** It is recommended that a smoke detector be installed in the vicinity of the HR-01.

**WARNING:** Country Flame Technologies has no control over installation maintenance procedures; therefore, Country Flame grants no warranty, implied or written, for the installation or maintenance of the HR-01. Further, Country Flame assumes no responsibility for any consequential damage resulting from said installation or maintenance of this product.

**WARNING:** After operation, always allow the Harvester stove to completely cool before performing any maintenance operations.

**WARNING:** The HR-01 stove requires reliable electric energy to properly operate. If electrical power is not available, **DO NOT** operate a Harvester stove with only natural draft.

**WARNING:** Only a certified professional should install the HR-01 stove and only a qualified service technician should perform maintenance on this stove. Any parts removed for installation or servicing must be replaced prior to operational use of this stove.

**WARNING:** Modification of this product is not authorized and any modification voids the Country Flame warranty.

**WARNING:** The Harvester must be connected to a code compliant grounded 120-volt, 15 ampere, and 60 hertz electrical outlet. Use of a dedicated circuit is recommended. **NEVER** use an adapter, extension cord or cut or remove any prong from the power cord.

**WARNING:** **NEVER** place or store any combustible or flammable products on or near the Harvester.

**WARNING:** The Harvester is designed to immediately shutdown in the event the front door is opened. Keep the viewing and ash removal door tightly closed during operation. Always clean the HR-01 after the stove has been allowed to return to normal room temperature.

**WARNING:** Do not connect the Harvester to a chimney flue serving another stove of any type.

**WARNING:** **FOLLOW all** operating instructions in this manual. Short cuts in operating procedures, of any kind, can be dangerous.

- WARNING:** Maintain all minimum safety clearances of the Harvester stove and chimney system. Never install the Harvester in a sleeping room.
- WARNING:** The Harvester is designed and approved for burning of number 2 yellow shelled corns with a maximum moisture content of 14% or biomass pellet fuel. Any fuel used in this stove must meet or exceed APFI standards. Do not burn untested fuels, seed corn, or foreign materials in this product. Failure to comply with this restriction voids Country Flame's warranty and the safety listing of the unit. Poor quality fuel will directly (*and adversely*) affect efficiency and cleanliness of operation. Country Flame's local authorized dealer can help in recommending a quality fuel
- WARNING:** **NEVER** use gasoline, lantern fuel, kerosene, charcoal lighter fluid or other combustible liquids to start or "freshen up" the fire in this product. Do not store or use gasoline or other flammable liquids or allow combustible vapors in the vicinity of product.
- WARNING:** **NEVER** put foreign objects in the hopper and **NEVER** burn trash or unapproved material in the Harvester. Using improper fuel voids the Country Flame warranty and damage to the stove resulting from foreign objects is not covered by warranty.
- WARNING:** Ensure free and adequate airflow to and around the Harvester. This stove is a combustion system that requires continuous flow of fresh air for proper operation. Failure to provide an adequate fresh air supply can lead to operational problems such as: negative pressure in the home, poor operation of this or other home combustion appliances, or a host of other issues. Remember that other combustion appliances compete for fresh air in the home. Consult with a professional to ensure positive air flow is provided to the stove during operation.
- WARNING:** The Harvester's exhaust system works with a negative combustion chamber pressure and a low positive chimney pressure. It is very important that the stove's exhaust and chimney system be airtight and properly installed. The chimney joints should be sealed with 500 degrees Fahrenheit (500<sup>o</sup>F or 260<sup>o</sup>C) silicone sealant (RTV) and secured with at least (3) sheet metal screws. An improperly installed stove or chimney system is the major cause of a home fire.
- WARNING:** When installed in a mobile home, the Harvester must be grounded to the steel chassis of the mobile home. In addition, the stove must be bolted to the floor. A mobile home installation of the Harvester should be in accordance with the Manufactured Home and Safety Standard (HUD), CFR 3280, Part 24. Consult the local code authority.
- WARNING:** **SOOT AND FLY ASH:** The products of combustion will contain small particles of fly ash. The fly ash will collect in the exhaust venting system and restrict the flow of the flue gases. Incomplete combustion, such as occurs during start-up, shut down, or incorrect operation of the Harvester will lead to soot formation in the exhaust venting system. The exhaust venting system should be inspected at least twice every year to determine if cleaning is necessary.
- WARNING:** **ASH REMOVAL:** The ash pan is designed to be emptied every day. If the ash pan is not emptied regularly, ash will build up and restrict the flow of fresh air to the combustion chamber. The ash pan door should not be opened for prolonged periods of time (greater than 3 minutes.) If the ash pan door is opened for long periods of time an unrestricted supply of air can flow into the combustion chamber. This unrestricted air flow can cause

an over fire condition. The airtight seal of the ash pan door ensures a combustion process per the stove design.

**CAUTION:** Operate the Harvester with the fuel hopper lid closed at all times. Failure to keep the hopper lid closed during operation may result in the release of combustion gasses into the home from the hopper under certain conditions. Maintain any hopper seal in good condition and do not overfill the hopper.

**CAUTION:** **THE HARVESTER IS HOT WHILE IN OPERATION. DO NOT TOUCH. KEEP CHILDREN, CLOTHING, AND FURNITURE AWAY. CONTACT WITH HOT SURFACES MAY CAUSE SEVERE SKIN BURNS. REFER TO THE SAFETY LABEL FOR INSTRUCTIONS.**

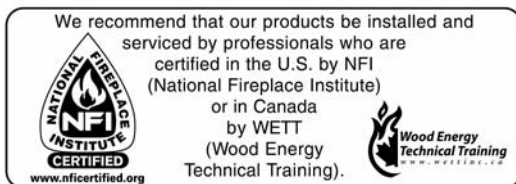
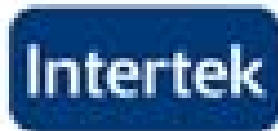
**NOTE:** **RETAIN** this **MANUAL** for future reference as needed and ensure that the model and serial number of the Harvester is written down for use in the future should maintenance be required.

### **EPA STANDARDS**


The Country Flame Harvester meets rigorous emission standards. All Country Flame Harvester Model HR-01 stoves conform to United States Environmental Protection Agency standards.

### **LISTING/TESTING AGENCY**

The Harvester Model HR-01 has been independently tested and listed in accordance with ASTM E1509-03, ULCS627-M90, ULCS628-M92, UL 1492 standard and Oregon Administrative Rules 814-23-909. This listing is for installation into residential dwellings, including standard construction units, mobile home units, or modular home units. The Harvester Model HR-01 was tested to standards by Intertek Testing Services, NA, Inc., 8431 Murphy Drive, Middleton, WI 53562.



# CERTIFICATION SAFETY LABEL (sample)



**Warnock Hersey**  
WN 04358

**LISTED MULTI-FUEL BURNING SPACE HEATER/FIREPLACE INSERT  
ALSO SUITABLE FOR MOBILE HOME INSTALLATION**

**MODEL: HARVESTER**

MODEL HR-01

SERIAL # 2537

**MANUFACTURED BY: COUNTRY FLAME TECHNOLOGIES, INC.**  
1200 INDUSTRIAL PARK RD.  
MT. VERNON, MO 65712

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INSTALL AND USE IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS.  
CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA.

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A 3" (75mm) OR 4" (100mm) TYPE "PL" VENTING SYSTEM OR LISTED TYPE "L" CHIMNEY USED. SEE LOCAL BUILDING CODE AND APPLIANCE AND VENT MANUFACTURER'S INSTRUCTIONS FOR PRECAUTIONS REQUIRED FOR PASSING VENTING SYSTEM THROUGH A COMBUSTIBLE WALL OR CEILING.

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OPERATE UNIT ONLY WITH DOORS FULLY CLOSED  
REPLACE GLASS ONLY WITH CERAMIC GLASS  
START STOVE BY PUSHING ON/OFF SWITCH TO ON POSITION  
STOP STOVE BY PUSHING ON/OFF SWITCH TO OFF POSITION

THIS APPLIANCE QUALIFIES AS A NON-AFFECTED FACILITY ACCORDING TO  
U.S. ENVIRONMENTAL PROTECTION AGENCY

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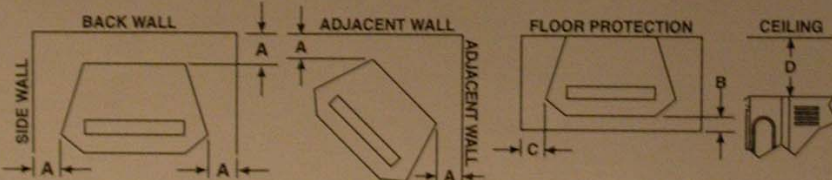
### CAUTIONS

WARNING: DO NOT INSTALL IN A MOBILE HOME SLEEPING ROOM.

FOR USE WITH SHELLED CORN OR PELLETIZED WOOD FUEL.  
USE OF OTHER FUELS MAY DAMAGE UNIT AND CAUSE A HAZARDOUS CONDITION.

DO NOT CONNECT THIS UNIT TO A CHIMNEY SERVING ANOTHER APPLIANCE.

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**FREESTANDING CLEARANCES**

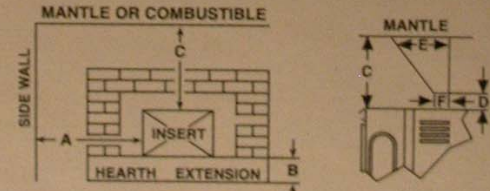
A = 2" (50mm)  
B = 6" (150mm)  
C = 6" (150mm)  
D = 8" (205mm)

INSTALL ON A NON-COMBUSTIBLE FLOOR PROTECTOR EXTENDING UNDER THE APPLIANCE (SEE FLOOR PROTECTION DIMENSIONS)  
WARNING: IF INSTALLED AS FREESTANDING, UNIT MUST BE INSTALLED WITH LEGS OR PEDESTAL PROVIDED.  
DO NOT OBSTRUCT SPACE BENEATH HEATER.

---

**ELECTRICAL REQUIREMENTS:**  
120 VOLTS  
2.4 AMPS  
60 Hz  
ROUTE POWER CORD AWAY FROM UNIT

**INPUT RATING:**  
5.5 LB/HR



**INSERT CLEARANCES**

A = 2" (50mm)  
B = 6" (150mm)  
C = 8" (205mm)  
D = 3" (75mm)  
E = 12" (305mm)  
F = 1.5" (38mm)

INSTALL AND USE IN A FACTORY-BUILT OR MASONRY FIREPLACE.  
DO NOT REMOVE BRICKS OR MORTAR FROM MASONRY FIREPLACE.  
USE A LISTED FLOOR PROTECTOR OR ANY EQUIVALENT NON-COMBUSTIBLE MATERIAL.

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'01 '02 '03 '04 JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

MADE IN U.S.A.

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# FORWARD

## **INTERNATIONAL ISSUES**

Global concerns about climate change, along with rising world oil prices, are creating unprecedented interest in the development of economical and convenient renewable energy fuel burning products. For decades there has been a “grass roots” effort to utilize biomass feedstock as a viable heating fuel. Use of agricultural products such as corn, switch grass, and other annual crops can abate greenhouse gas emissions by increasing carbon storage in the surrounding landscape while displacing fossil fuel use in combustion heating products. Agricultural based pellet fuel is capable of sustained high volume throughput rates that use less energy to produce when compared to the present wood industry. Long term, biomass pellet fuel will become a key part of the global community’s effort to reduce if not reverse the greenhouse effect. This is especially true when emerging third world countries, their growth rates, and their demand for energy is factored into the greenhouse equation.

## **AMERICA**

United States and Canadian stove manufacturers are approaching three decades of providing wood pellet fuel and wood pellet burning products to the hearth industry market. The maturity of this market has ensured a continuous supply of both pellet fuels and pellet appliances while world fossil fuel issues have ensured an ever increasing market demand for more of these products.

These same American and Canadian manufacturers continue to innovate and improve wood pellet products with each passing year. At the same time, an ever increasing demand for the wood fuel puts pressure on both sustaining the volume and the quality of fuel raw materials needed to meet the needs of the fuel market. Transportation costs associated with moving the raw materials to the pellet mill significantly impact the local and regional availability of pellet fuel. Research has proved that there are many agricultural based crops and crop byproducts that can be utilized to fuel biomass heating stove products to meet this ever growing market demand. Demand for biomass burning fuel stoves will grow in the coming years.

## **COUNTRY FLAME**

Country Flame has worked for at least two decades in researching and developing pellet fuel burning stove products. Today, Country Flame offers both freestanding and fireplace-insert model pellet fuel stoves. Country Flame has a dedicated research effort underway to produce advanced pellet stove products capable of burning a wide variety of biomass fuel. In 2002, Country Flame was selected for national recognition for the design and development of its Harvester HR-01 biomass burning fuel stove by the Hearth Industry Association.

The Harvester HR-01 was designed to burn shelled corn and biomass pellet fuel (switchgrass.) At the same time, Country Flame customers claim to have test burnt a wide variety of agricultural products that are available in different locales around the United States.

**THE PURCHASE OF A COUNTRY FLAME HARVESTER BIOMASS FUEL STOVE IS A VOTE TO REDUCE AMERICA’S DEPENDENCE ON FOREIGN OIL. THE USE OF A COUNTRY FLAME HARVESTER BIOMASS FUEL STOVE WILL AID IN CURBING THE GREENHOUSE GAS PROBLEM OUR WORLD IS FACING.** Country Flame is very proud of this American born, American tested, and American made product. With pride and dedication, Country Flame employees wish you and your family a lifetime of happiness and warmth through the use of this product.



# HARVESTER LIMITED WARRANTY

1. **To Whom Extended:** Country Flame Technologies; hereafter known as Country Flame, warrants, with proof of purchase and proper filing of the warranty card, the Model HR-01 to the original retail purchaser only.
2. **Products/Components Warranted.** Country Flame makes the following warranties regarding its Model HR-01 Corn/Pellet Stove Heaters and Inserts:
  - (a) **Heating Units.** Except as set forth below, Country Flame warrants the Harvester Model HR-01 to be free from defects in materials and workmanship for a period of (5) years from date of purchase, so long as the unit is owned by the original consumer purchaser, subject to terms, conditions, and restrictions set forth below.
  - (b) **Blowers, Fan Speed Controls and Electrical Components.** Country Flame warrants the blowers, fan speed controls and electrical components of its Model HR-01 to be free from defects in materials and workmanship for a period of one (1) year from the date of retail purchase or not more than (2) years from date of manufacture, whichever occurs first, subject to the terms, conditions and restrictions set forth below.
3. **Terms, Conditions and Restrictions.**
  - (a) **Products Not Covered.** The above warranties do not apply to glass, refractory materials such as refractory cement or firebrick, gaskets, and irons, paint, and standard accessories, and all parts not permanently attached to the heating unit. Parts not permanently attached to the heating unit are those items designed to be removed from the unit, including those removable with common hand tools.
  - (b) **Exclusions.** The above warranties do not apply to the following conditions or circumstances:
    - (1) To conditions resulting from the Harvester Model HR-01 being installed other than in accordance with the instructions and specifications included in the operating and maintenance instructions.
    - (2) To conditions resulting from failure to provide reasonable and necessary maintenance for the Harvester Model HR-01 in accordance with the operating and maintenance instructions.
    - (3) To conditions resulting from the alteration or modification of any Harvester Model HR-01 by anyone other than an authorized Country Flame representative with written instructions to complete such alteration or modification.
    - (4) To conditions resulting from failure to use and operate the Harvester Model HR-01 in accordance with Country Flame operating and maintenance instructions or as a result of misuse of the product.
    - (5) To conditions not resulting from defects in material or workmanship of the Harvester Model HR-01.
    - (6) To conditions resulting from the improper firing or burning of materials in a Harvester Model HR-01.
  - (c) **Warranty Registration Card.** The Harvester Model HR-01 warranty is void and does not apply unless the Warranty Registration Card provided with the owner's manual is properly completed and mailed by the original retail customer and received by Country Flame within thirty (30) days subsequent to the date of original retail purchase.
4. **Remedies in the Event of Failure.** In the event a Harvester Model HR-01 fails to perform as warranted, the following terms and conditions will apply:
  - (a) **Heating Unit.** Country Flame will repair, or at its option, replace any warranted part of the heating unit that fails to perform as warranted for the lifetime of the original retail purchaser, subject to the term, conditions and restrictions set forth herein.
  - (b) **Blowers, Fan Speed Controls and Electrical Components.** If the blowers, fan speed controls or components of the Harvester Model HR-01 fail to perform as warranted for one (1) year subsequent to the date of retail purchase, Country Flame will repair, or at its option, replace the defective product or component.

## HARVESTER LIMITED WARRANTY (continued)

- (c) **Warranty Service and Freight Costs.** Service on a Harvester Model HR-01 will be provided by any Country Flame authorized dealer or distributor. If there is no authorized dealer or distributor in the original retail purchaser's area, the original retail purchaser may notify Country Flame at 900 George Street, Marshfield, Missouri, 65706 of any defect by providing the following information:

1. The Serial Number of the Harvester Model HR-01
2. The date of original purchase
3. The name of the dealer where the product was purchased
4. The date of installation; and
5. A description of the nature of the defect or problem.

If service is required, the original retail purchaser must send the product or component, freight or postage prepaid, to Country Flame or a designee of Country Flame's choice. Country Flame will not pay freight or postage costs relating to products or components returned for warranty service.

- (d) **Repairs.** All repairs made by Country Flame or its authorized dealers or distributors will be to the original manufacturing specifications.
- (e) **Cost of Repair or Replacement.** Country Flame will repair, or at its option, replace the defective products or component pursuant to the conditions set forth above. The original retail purchaser is responsible for payment of any costs and expenses of disassembly, removal and reinstallation of any defective product or component and any other services involved. Such costs or expenses are NOT covered by this warranty and Country Flame is not liable for any of them.

5. **Limits on Damages.** In no event shall Country Flame be liable for damage to property, lost profit, injury to goodwill, or any other special, incidental or consequential damages resulting from any defective Harvester Model HR-01 product or any breach of the above express warranties. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation may not apply to you.
6. **Limitation of Implied Warranties.** Country Flame expressly limits all implied warranties. Implied warranties include but are not limited to warranties of merchantability or fitness for a particular purpose to one year from the date of original retail purchase. Some states do not allow limitations of how long an implied warranty lasts, so the above limitation may not apply to you.
7. **Legal Rights.** This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.
8. **No Other Warranty – These Remedies Are Exclusive.** Unless otherwise explicitly agreed to in writing, it is understood that this is the only warranty given by Country Flame, and Country Flame neither assumes or authorizes anyone to assume for it any other obligations or liability in connection with this Country Flame product.
9. **Additional Information.** If you wish to obtain additional information or resolve questions concerning the interpretation of any warranties of Country Flame, please write:

**Country Flame**  
**900 George Street**  
**Marshfield, MO 65706**  
[email@countryflame.com](mailto:email@countryflame.com)  
**417-859-0990 phone**  
**417-859-0192 facsimile**

**Place  
Stamp  
Here**

**Country Flame Technologies**  
A Division of American Products, LLC  
**900 George Street**  
**Marshfield, MISSOURI 65706**

-----  
Fold Here

Name \_\_\_\_\_ Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Dealer \_\_\_\_\_  
Dealer's Name \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Date of Purchase \_\_\_\_\_  
Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_

The express warranties made by Country Flame Technologies do not apply unless this warranty card is received by Country Flame Technologies from the original retail purchaser no later than thirty (30) days subsequent to the date the Country Flame product was originally purchased.

Signature \_\_\_\_\_ Date \_\_\_\_\_

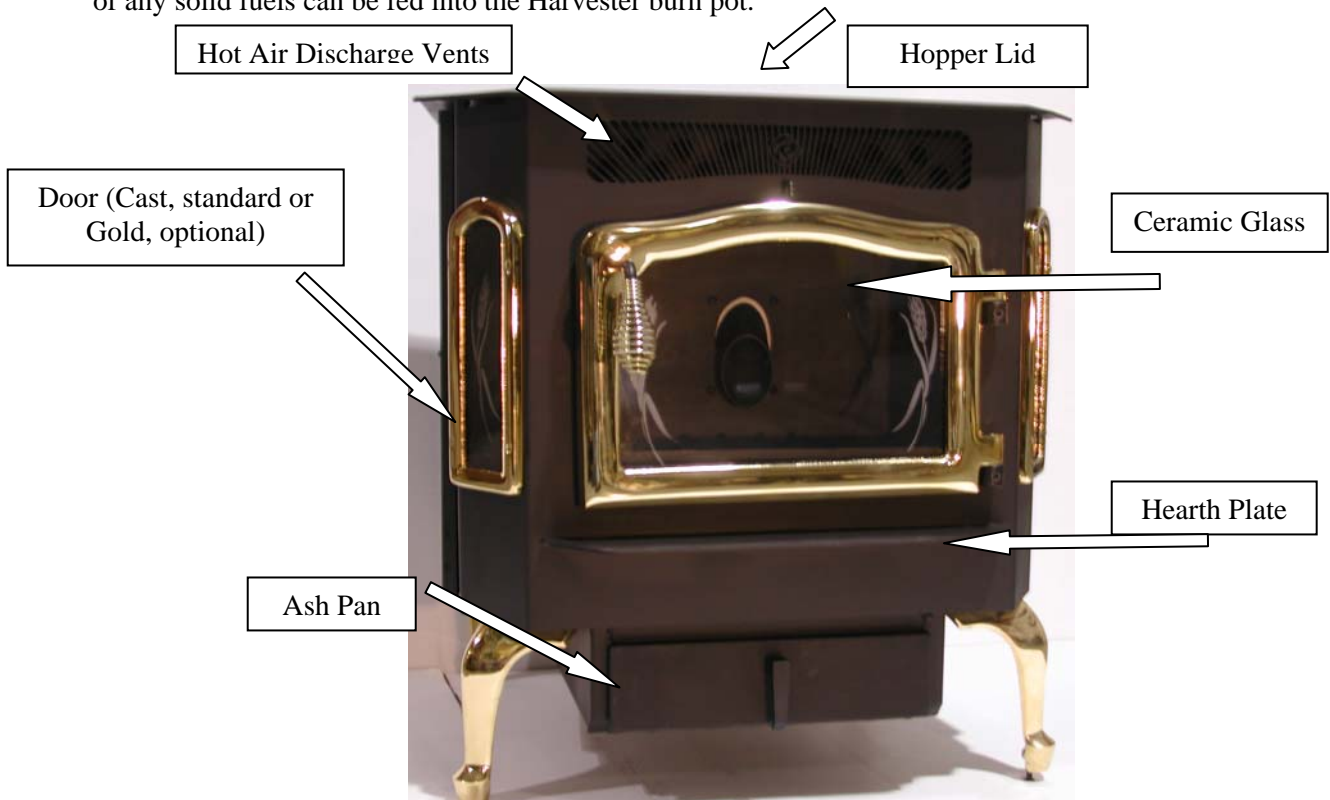
# THE HARVESTER OPERATION

## FEATURES

Country Flame designed and built the Harvester stove to burn 100% shelled corn. Unlike conventional pellet stoves, the Harvester is capable of handling larger amounts of ash. This means the Harvester can burn corn, wood pellets, switchgrass pellets, and other biomass fuel while not being choked out by ash. Country Flame customers who own the Harvester claim they have successfully burnt a wide variety of different biomass fuels. Although Country Flame is pleased that customers are finding wide success in burning locally available fuels, Country Flame cannot support or warranty the burning of untested fuel or seed corn in the Harvester.

Before beginning to install or operate the Model HR-01 Harvester, please consult with the local building authority to obtain a permit. A certified professional should install this product. Before a homeowner operates this stove, a thorough operational understanding should be obtained from reading and understanding this manual. Failure to adhere to all safety notes and instructions contained herein can impact homeowner insurance, void warranty, and create hazardous situations leading to smoke damage, fire, or even death.

The Model HR-01 was designed as a freestanding model stove. The stove has optional legs or a pedestal base. The legs come in a variety of finishes. Contact Country Flame or one of its local authorized dealers to discuss and select product options. Once installed, the Harvester is remarkably simple and safe to operate. FIGURE 1, shown without legs or pedestal, defines some of the Harvester components. From a relatively small firebox the Harvester generates a very beautiful flame with lots of heat being produced into the room where the unit is installed. Clean certified or AFPI approved fuel is to be loaded into the hopper. A motor turns an auger that delivers fuel to the combustion chamber on a timed basis. Corn, pellets, or a combination of any solid fuels can be fed into the Harvester burn pot.



**FIGURE 1: HARVESTER MODEL HR-01 (corn, biomass, or pellet)**

## **SAFETY FEATURES**

The Harvester comes standard with a number of advanced safety features; however, the first step in ensuring maximum safety is to install the stove properly according to all national and local codes. The Harvester requires a fresh air supply. This fresh air is used in the combustion process to achieve thorough burn of all fuel. The Harvester needs a sealed and properly designed “all fuel” vent system. This vent system will be used to remove combustion gasses from the combustion chamber to outside the home. **REMEMBER:** one of the leading causes of house fires is due to improper installation or improper operation of a stove product. Proper installation and operation of the Harvester is required to obtain homeowner insurance coverage. And, the Harvester needs a reliable source of electrical power. Without reliable utility power or a means to ensure reliability, the Harvester operation will be problematic.

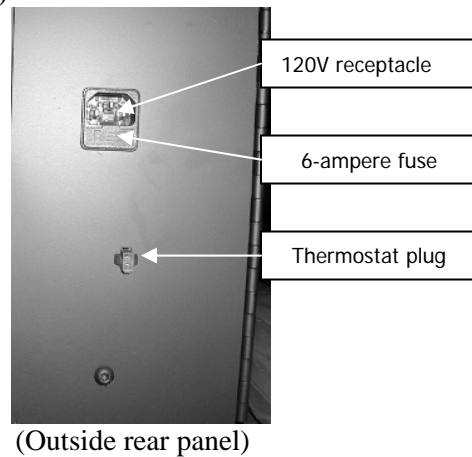
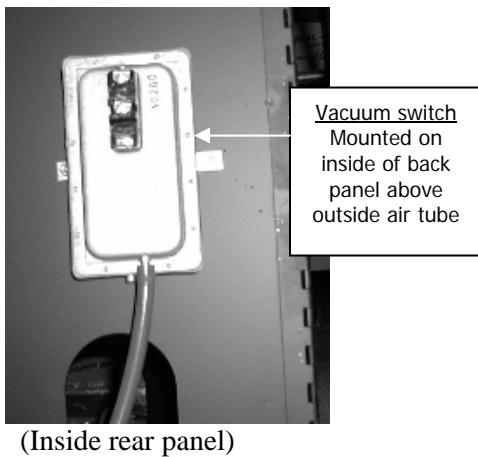
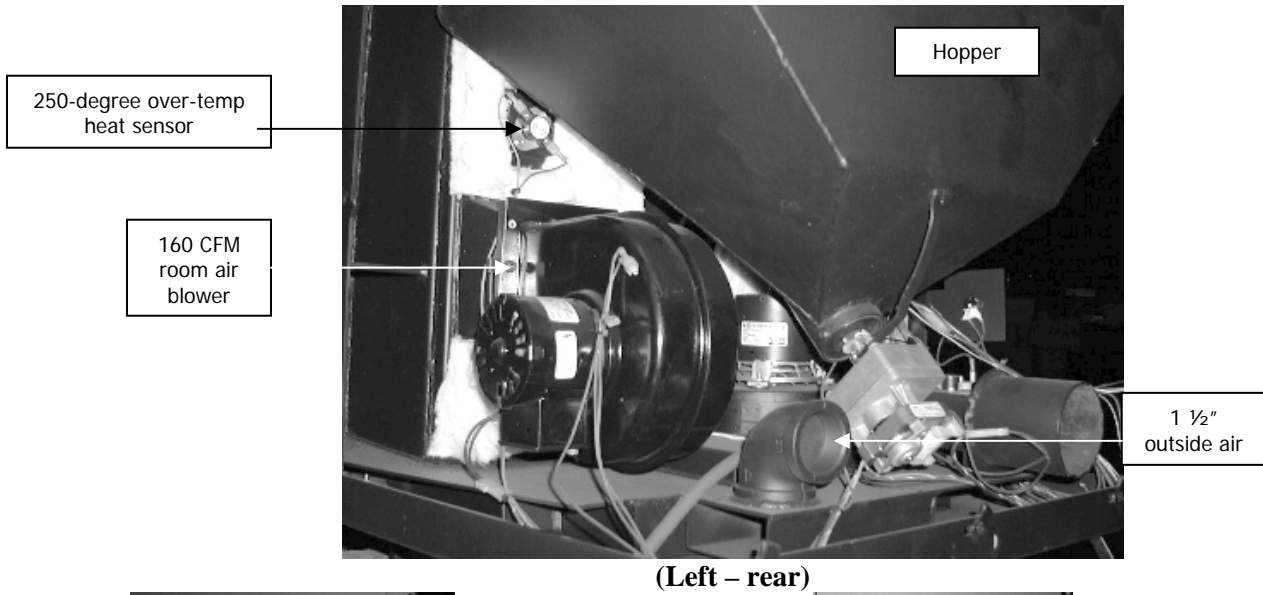
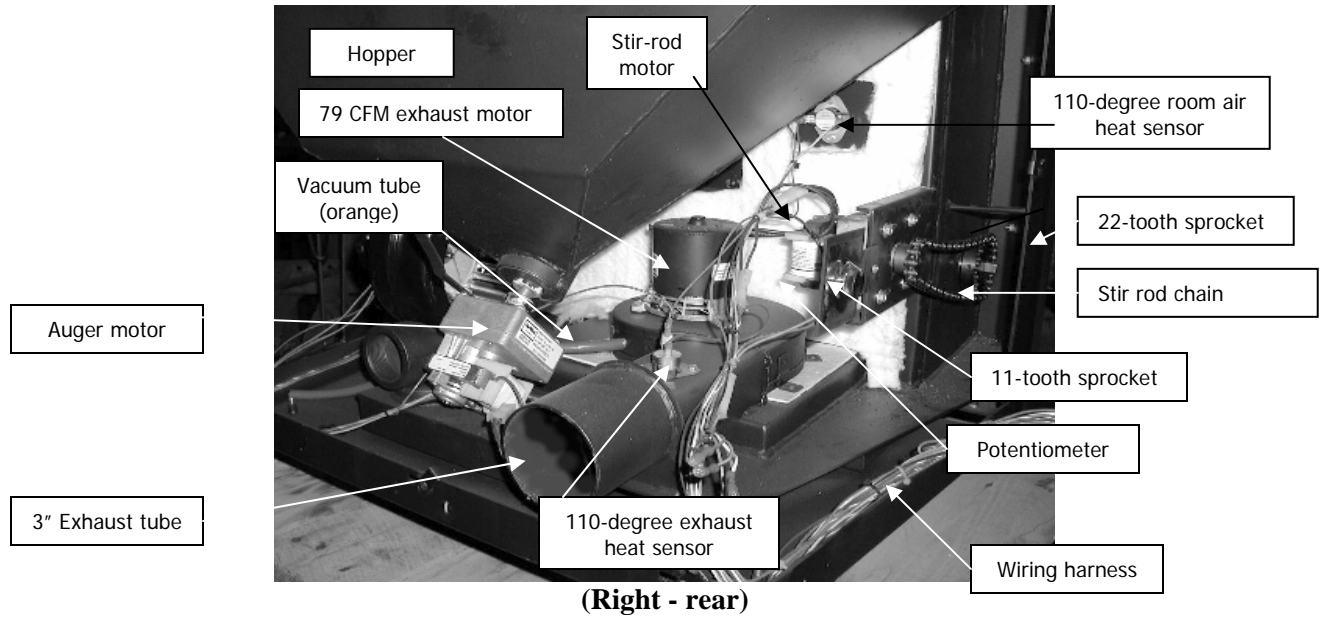
The second step to safe operation is for the homeowner to thoroughly understand the operating characteristics of the Harvester. More importantly, the operator needs to know how to control each one of the stove’s operations. The Harvester has an electronic control system whose “brain” is constantly monitoring stove operations in order to optimize the fuel efficiency and heat output of this product. The Harvester’s electronic control provides a simple one stop location for the homeowner to control Harvester performance and heat output. In order to ensure the safest operation, the Harvester’s electronic control is constantly monitoring pressure and heat activated switches, and input power to ensure proper operation. Additional features include an enclosed firebox, high temperature ceramic glass, optional thermostatic control, a high temperature wiring harness, making the Harvester an extremely safe stove.

## **BATTERY BACKUP SYSTEMS**

The Country Flame Harvester Model HR-01, like all pellet or biomass fuel stoves, relies on electrical energy (wall power outlet) to properly operate. Without electrical energy or with interruptions to the source of electrical energy, the Harvester stove’s operation will be erratic at best. Is power quality, power reliability, or routine winter storm conditions a cause of power problems in a specific locale? If it is, the homeowner will need to provide backup power to ensure stable operation of the Harvester. Fortunately, there are simple and reliable power backup solutions readily available. Today, a homeowner can choose from a variety of cost effective power conditioning systems from a number of reliable outlets today. For example, Home Depot, Circuit City, Best Buy, WalMart, or many other stores carry standard power conditioning equipment. Two good quality power conditioning equipment manufacturers are APC and TrippLite. Their uninterruptible power supplies (UPS) include the capability to handle power failures, brown outs, power surges, and line noise. These products sell for around \$35 to \$150. UPS system cost is largely defined by the features included in the system. The amount of time (battery size) the system must operate before recharging occurs directly relates to cost. UPS systems are usually sold by the number of electrical outlets and the volt-amperes (watts) the system is rated to provide. FIGURE 2 provides a description of the major electrical and operational components.

What does the Harvester stove require from a UPS system in order to sustain proper operation during a power outage? To answer that question, the homeowner has to decide how long they want the Harvester to operate in the absence of utility power. At the same time, an inexpensive solution that will handle a large percentage of the issues would cost less than \$100. This UPS product will operate a Harvester for close to an hour. This same UPS system should provide an audible, as well as visual alarm, to alert the homeowner to local utility interruptions or power outages. The homeowner can then make the decision to continue to operate the Harvester or shut it down until the local utility restores local power. Further, this UPS system will ensure that minor utility glitches do not cause “nuisance” shutdowns or faults in a Harvester stove. If a homeowner wants specific information concerning the size and quality of a specific battery backup system for their Harvester stove, contact Country Flame or one of its local authorized dealers who will assist in providing a specific solution.

**FIGURE 2: HARVESTER COMPONENTS**



## **FUEL REQUIREMENTS**

The Harvester Model HR-01 was designed to burn multiple types of fuel, including corn, switch grass and wood pellets. Country Flame recommends number 2 yellow shelled corn be used as fuel. This corn's moisture content should be limited to no more than 14% moisture content. Country Flame recommends corn fuel moisture content be maintained somewhere in the range of 10% to 12%. **USING SEED CORN AS FUEL IS DANGEROUS TO OCCUPANTS AND BURNING SEED CORN VOIDS THE COUNTRY FLAME WARRANTY.**

If pellet fuel (wood or other solid biomass pellet fuel) is used in the Harvester, Country Flame recommends no more than 8% moisture content. If there are any questions about fuels to be used in the Harvester, please contact a local authorized Country Flame Dealer for assistance.

## **HARVESTER STARTUP**

The first step in preparing the Harvester corn-burning stove is to remove it from its shipping crate. Ensure that all materials packed in the burn chamber have been removed and that the Gold (optional) door and its glass have been cleaned per enclosed instructions included in this manual.

### **NOTE:**

- (1) Failure to properly pre-clean the Gold (or any plated) door and the glass before lighting the first fire could permanently damage either or both of these items.
- (2) DO NOT burn seed corn as it is dangerous and voids the Country Flame warranty.

## **PRIMING**

If this is the first time that the Harvester has been burnt or the stove has run out of corn fuel from a previous burn, priming must be completed in order to fill the auger tube with corn fuel. The Harvester prime mode can be entered by holding the on-off button for approximately 30 seconds or until the auger light starts flashing and the temperature lights start climbing from the lowest light to the highest light showing that the system is "filling the auger." Once corn fuel starts dropping into the burn pot, the system should be shut off. Once priming is completed, the next step is to prepare the Harvester for burning corn.

## **FIRST FIRE**

Country Flame recommends using wood pellets to start the Harvester Corn Stove. Pellets should be added in layers with igniter gel or igniter bricks sandwiched between the pellets inside the burn pot. It is important that the firebox has a hot pellet fire going before corn fuel is fed into the burn pot. This hot pellet fire is required due to the higher combustion temperatures required for corn fuel.

Wood pellets should be layered with igniter fluid at least level with the bottom of the stir pot arm inside the burn pot. Once the wood pellets and igniter material are layered in the burn pot, the on-off switch should be pressed for approximately 5 seconds or until the on-off light turns from red to green. Release the on-off switch once the light changes to green. At this time the red igniter light will be slowly blinking on and off. This blinking light is an indication that it is okay to light the wood pellets that have already been prepared in the burn pot. Once the wood fuel has been ignited, close the Harvester stove door. Monitor the wood pellet fire until a good blaze has been established.

In order to enhance the startup process, you can press both the up and down heat arrows at the same time. Pressing these buttons simultaneously will cause the stir rod to turn. If the stir rod does not turn, the buttons are not being pressed simultaneously or there is a defect in the Harvester stir rod system.

Stirring the wood pellets, by pressing both heat buttons at the same time, will cause the stir rod to turn and will ensure quicker combustion by adding turbulence to the combustion process. Upon obtaining a strong wood pellet fire, hold the on-off button for approximately 5 seconds or until you see the igniter light move from a slow blinking action to a fast blinking action. Once the igniter light blinks rapidly you can let go of the on-off switch. If the igniter light returns to a slow blink, then the Harvester stove has not reached proper

combustion temperature and you will have to repeat holding the on-off button once the Harvester system is allowed to gain additional firebox heat. Upon reaching proper temperature, pressing the on-off button will cause the thermostat lights to light up and cause the auger light to blink green and flash on and off corresponding to the feeding of corn fuel into the burn pot.

Based on the heat setting on the control board, the Harvester will automatically turn the stir rod at a predetermined rate to ensure turbulence and proper mixing of the fuel during the burn process. The stir rod will ensure that “clinkers” are minimized if not completely eliminated. In addition, the stir rod ensures that the fuel and flame are constantly agitated within the burn pot so as to ensure proper mixing with combustion air. The Harvester burn pot has been designed to ensure maximum efficiency of burn while minimizing the amount of ash being produced while at the same time minimizing the clinkers that can choke out a fire. Testing by Country Flame has shown that the unit can be operated for several days to up to two weeks without requiring cleaning depending on the type of fuel being burnt. It should be recognized that environmental variables as well as the type of fuel can have drastic effects on the amount of ash or clinkers formed during the burn cycle. Burn pot cleaning will depend upon the quality, quantity, and moisture content of the fuel. Ash removal will be required from time to time depending on the amount of usage and the heat desired. The Harvester stove should be shut down and cooled before cleaning or removing the ash pan.

### **ASH REMOVAL**

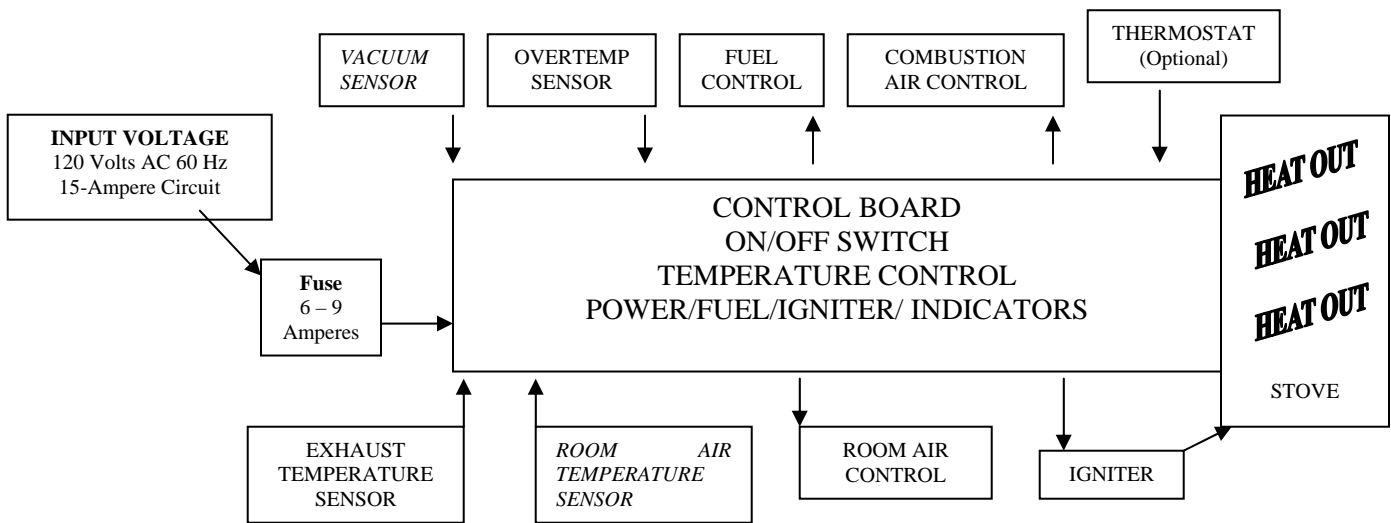
The Harvester stove has an ash pan located on the underside of the firebox. Access to the Harvester ash pan is obtained below the ash lip at the bottom front of the stove. The door on the front of the ash box is a locking handle with a gasket seal. The seal provides an airtight fit and the locking handle ensure the ash door doesn't vibrate open. Lift up on the handle and make a ¼ turn to unlock the handle. Once the ash pan cover is pulled forward, lay the ash pan handle back against the face of the cover. This allows the ash pan cover to be lowered to the floor allowing easing removal of the ash pan itself.

Always remove ashes after they have been allowed to cool properly. Hot ash is dangerous to both surrounding areas and occupants and can cause fires or severe burns. Wait until the fire has been out for several hours before removing the ash pan. After the ash has been allowed to cool, remove the ash pan for cleaning. Protective gloves should be worn anytime the ash pan is removed. Dump the ash in a proper ash container and remove to a safe outdoors area. Remember that although the ash may look and feel cool to the touch, a smoldering ember can start a fire. **CAUTION:** Care should be used to store any ash in a proper container with an approved airtight lid. If ash is taken outside, water should be poured over the ash to ensure no fire flare up can occur.

### **CONTROL BOARD**

In 2001 Country Flame introduced its own control board technology, the “*Intelli-Choice*.” This control board technology was introduced across all Country Flame wood pellets and corn stove product lines. The *Intelli-Choice* control board is being used exclusively on Country Flame product. Country Flame developed its own control board in order to enhance its product offering and provide better support to customers. Country Flame's control board technology is defined as an “open system.” Country Flame will seek to provide the most advanced controls while maintaining the look and feel distributors, dealers, and customers have come to know and expect. This also means a purchase of today's Country Flame product will provide an upgrade path for newer and more advanced technology if the customer chooses to obtain it. Country Flame is committed to its customer base. That means bringing enhancements that provide more heat and improved burn efficiency while lowering the cost of operation. Country Flame will strive to make the service support process easier through systematic troubleshooting procedures and repair events that should allow for evolving “plug n play” operations. Country Flame's goal is to ensure a properly trained and certified service technician can diagnose and repair any stove problem in less than 30 minutes whether the stove is one year or ten years old. FIGURE 3 depicts control board basic theory and FIGURE 4 provides a brief description of sensor controls.





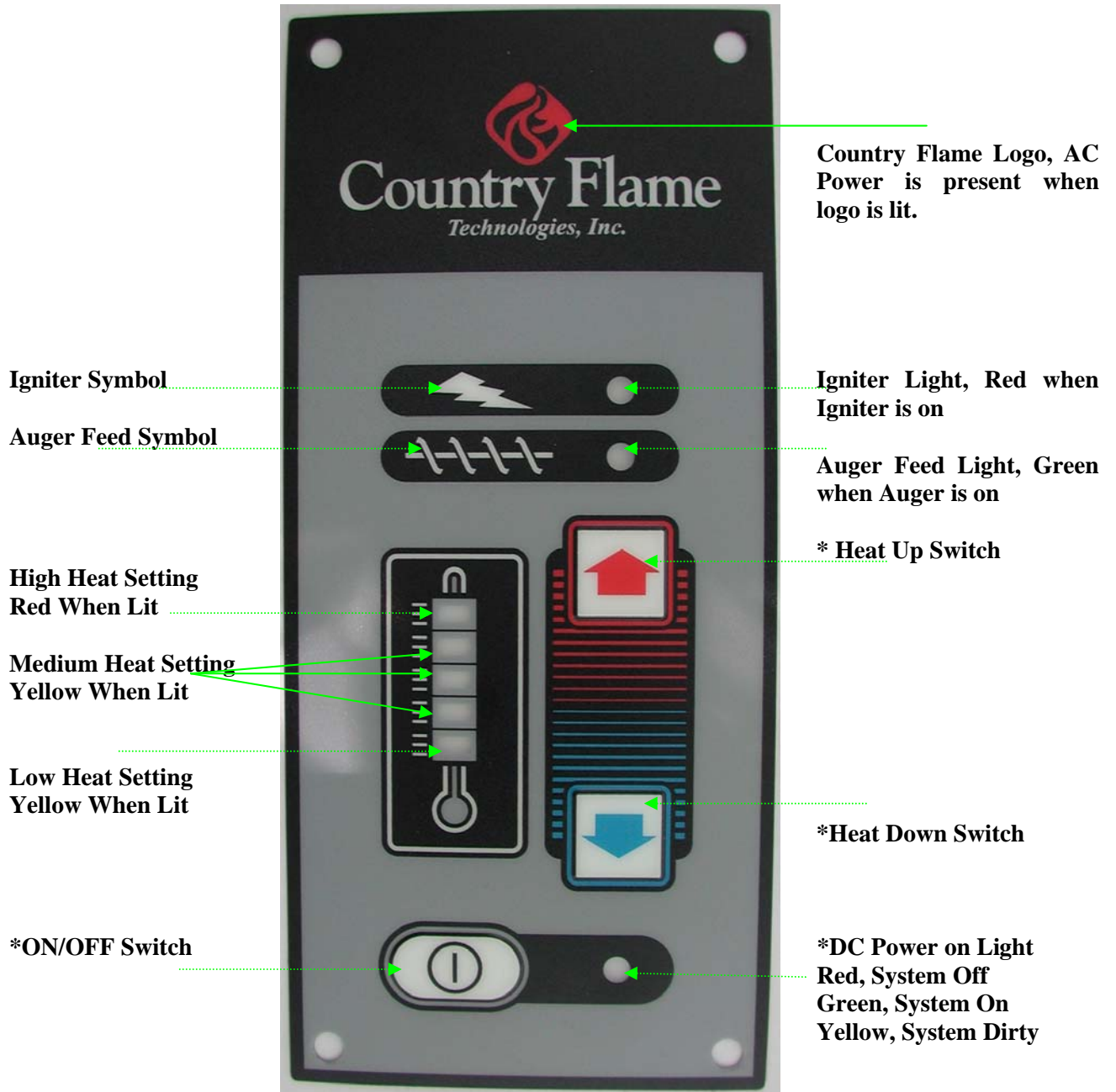
**FIGURE 3: CONTROL BOARD BLOCK DIAGRAM**

<b>Input Voltage</b>	Alternating Current (AC) Input provided by the local power company. This source of energy must provide a 120 Volt input signal with a frequency of 60 Hertz and a maximum branch current capacity of 15 Amperes. If other devices are connected to the branch, interference or over current may cause circuit breaker to trip.
<b>Fuse</b>	The AC fuse should be rated between 6 and 9 amperes. The recommended fuse is a Little Fuse Model _____.
<b>Vacuum Sensor</b>	Ensures that no blockage of the combustion input or combustion exhaust air occurs. If the vacuum sensor does not operate properly, the Control Board will not allow the stove to operate.
<b>Exhaust Temperature Sensor</b>	Presently, this sensor is a snap disk operating at 110° F +/- 20° F. This sensor ensures proper exhaust temperature has been reached and that a fire is present in the burn pot before the control system begins the burn cycle.
<b>Room Air Temperature Sensor</b>	Presently, this sensor is a snap disk operating at 110° F +/- 20° F. This sensor ensures that a proper amount of heat is available at the heat exchanger before the room fan is allowed to operate. If the sensor allows the fan to come on to early, the combustion chambers temperature could drop to the point that self-combustion (ignition temperatures) cannot be maintained.
<b>Overtemp Sensor</b>	Presently, this sensor is a snap disk operating at 250° F +/- 20° F. The purpose of this sensor is to shut the entire system down in the event the firebox causes an overheat condition.
<b>Fuel Control</b>	The fuel control is a signal provided from the Control Board to the Auger Feed Motor. The Control Board controls the amount of time that the Auger Feed Motor is on and thereby controls the amount of fuel fed to the fire pot.
<b>Room Air Control</b>	The room air control is a signal provided from the Control Board to the Room Air Fan. The Control Board controls the phase angle and thereby the amount and time an AC voltage is applied to the Room Air Fan. This signal controls the speed of the room air passing over the heat exchanger tubes and the amount of heat delivered to the living space.
<b>Combustion Air Control</b>	The combustion air control is a signal provided from the Control Board to the Combustion Air Fan. The Control Board controls the phase angle and thereby the amount and time an AC voltage is applied to the Combustion Air Fan. This signal controls the speed of the combustion air passing through the burn pot for the different heat settings
<b>Igniter</b>	An AC heating element used to provide initial heat to the pellet combustion process. Once the Control Board senses combustion, the Igniter is shut off to conserve energy usage.
<b>Thermostat (optional)</b>	A thermostat input is provided on the back of each Country Flame product. The Control Board has individual personality modules that allow for stand-alone, semi automatic, or fully automatic thermostat operation.

**FIGURE 4: STOVE COMPONENT DEFINITIONS**

FIGURE 5 displays the Country Flame Control Board front panel. Each function of the Control Board is identified.. Controls having more than a single function are identified with asterisks. All control board functions are explained in FIGURE 6.

## *“Intelli-Choice”*



**FIGURE 5: CONTROL BOARD FACE PLATE**

<b>ON/OFF SWITCH</b>	The ON/OFF Switch serves to turn the system on and off by holding the switch for approximately 5 seconds. The ON/OFF Switch can also be used to initiate the FUEL PRIME MODE by holding it for approximately 30 seconds. When in the prime mode the Thermostat lights will sequentially light from top to bottom simulating a “filling action” of the auger tube. In a fully automatic mode pellet stove, the ON Function of the switch is ignored.
<b>HEAT UP/ HEAT DOWN SWITCH</b>	When these two switches are pressed during the STARTUP CYCLE only, they can be used to turn the stir rod of the Harvester model. In all other pellet stoves these switches only function as heat up and down switches.
<b>DC POWER LIGHT</b>	This is a 3-color light when AC power is applied. A red light indicates that the Control Board has DC Power available but the system is off. A green light indicates that the System is on. A yellow light indicates that the combustion air should be cleaned. As Country Flame works to improve the sensor technology, this yellow light will become more valuable to the service technician as well as the homeowner.
<b>HIGHWAY PATROL MODE</b>	When all Control Panel lights are flashing on and off, this indicates that the Product has an encountered an unknown state. Nothing more, nothing less. The purpose of these flashing lights is to alert the home owner or the service technician that the stove operation ended out of sequence, ran out of fuel, or encountered a power interruption that the Control System could not recover from.
<b>COOL DOWN MODE</b>	In the Cool Down Mode, the Heat Setting lights will sequentially go out from top to bottom, all relight and then sequentially go out from top to bottom. This cycle will continue until such time that the Control Board senses the stove has properly cooled down.
<b>HEAT SETTING 1 THROUGH 5</b>	Each heat setting, controlled by the stove Heat Up or Heat Down switch, is provides as much combustion air and fuel as is required for that heat setting. Due to the number of unique environmental variables as well as variations in pellet fuel used in different regions, Country Flame cannot provide exact BTU ratings for each heat setting except those that were established in Government Test Labs under controlled conditions. At the same time, the rule of thumb is that each heat setting on the Country Flame line of Biomass Product starts at one pound of fuel per hour and increments to a top setting of five pounds of fuel per hour. Using a BTU rating of from 4,000 to 10,000 BTU per pound of fuel, depending on the type and moisture content of the fuel, an estimate of heat output can be made.

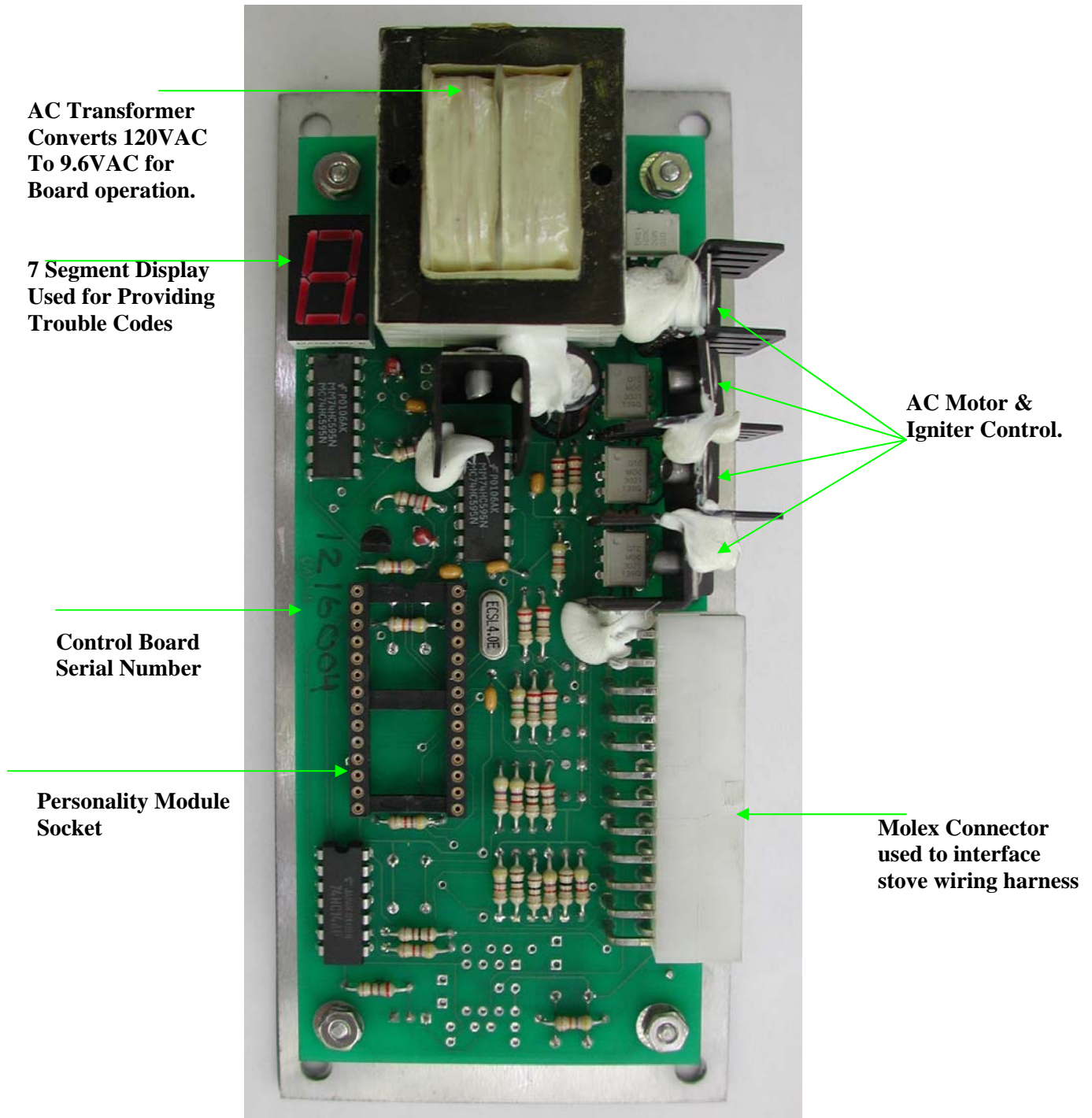
**FIGURE 6: CONTROL BOARD FUNCTIONS**

Country Flame’s control board provides reliable control of stove functions with minimal human intervention required. This control technology provides flexibility in adapting to future changes and improvements in technology. Finally, this control technology offers a simple interface between the operator and the product being used.

Country Flame’s control board is sensitive to utility grid power variations. In the event a homeowner’s area has difficulty with utility power fluctuations, Country Flame’s stove products can be interfaced to an inexpensive battery back up system. The actual cost of a battery backup system will be fully dependent on customer requirements. From random power “glitches” or short duration electrical power interruptions to major power outages, the Country Flame stove can operate off battery or generator backup systems. Contact Country Flame or one of its local authorized dealers to discuss the specifics of a single application.

In conclusion, Country Flame is striving to become a leader in the area of biomass control and product technology. This leadership will provide direct benefits to Country Flame distributors, dealers, and our customers. As always, Country Flame welcomes input on how to better meet the customer’s needs.

In order to utilize the full capabilities of the Control Board, the homeowner should be familiar with the backside of the Control Board. FIGURE 7 provides additional information about the major components on the component side of the control board.



**FIGURE 7: CONTROL BOARD COMPONENT SIDE**

# STOVE ELECTRICAL DIAGRAM

FIGURE 8 provides the Harvester electrical schematic of the components and sensors that are either operated or monitored by the Country Flame control board. Please refer to this diagram when necessary.

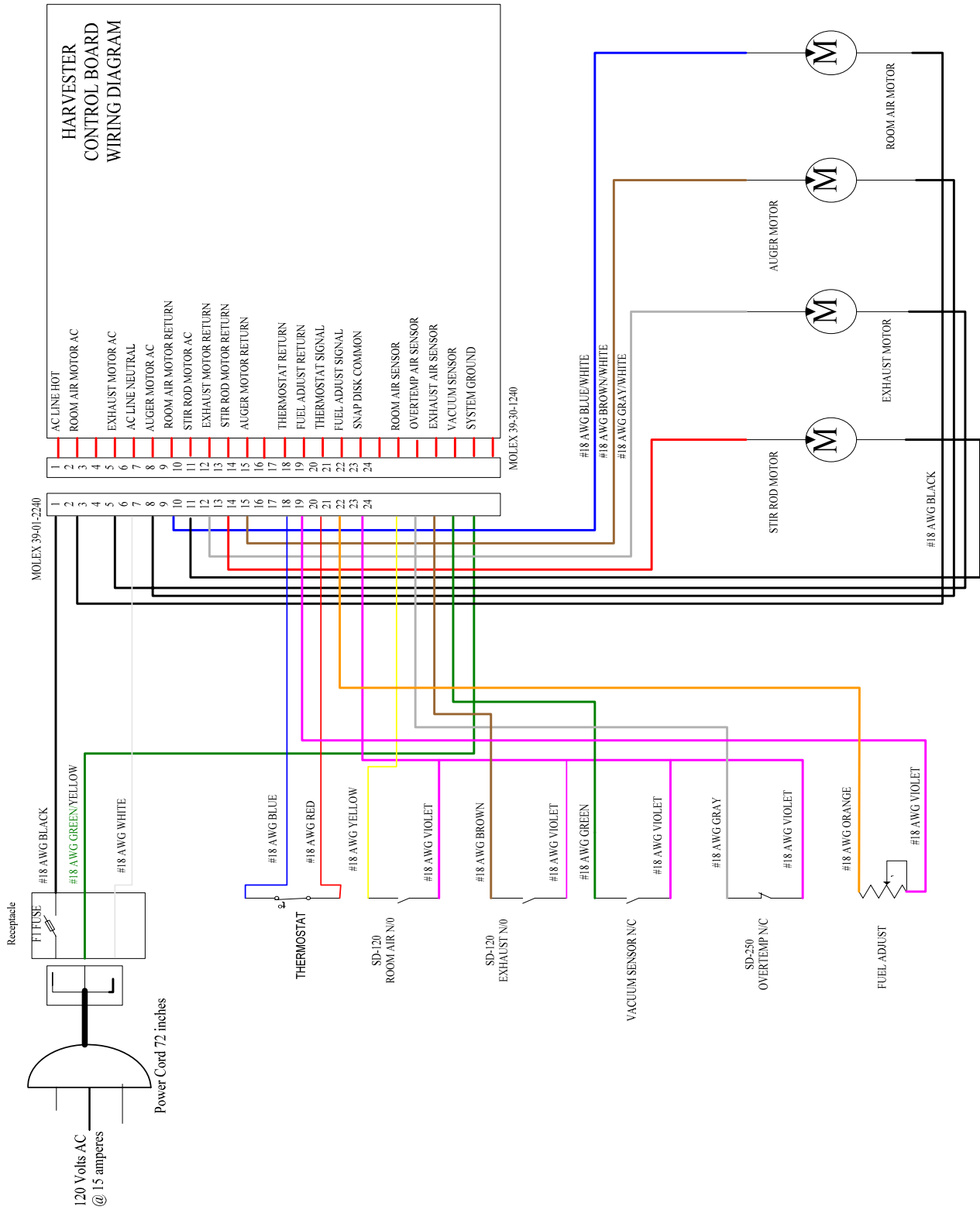


FIGURE 8: ELECTRICAL DIAGRAM

## **STOVE SPECIFICATIONS**

<b>HARVESTER</b>	<b>DIMENSIONS (IN INCHES)</b>
STOVE HEIGHT	22.75 “
STOVE DEPTH	24.50 “
STOVE WIDTH (Rear)	25.50 “
STOVE WIDTH (Widest Point)	30.75 “
STOVE HEIGHT (With Pedestal)	33.75 ”
STOVE HEIGHT (On Legs)	31.25”
STOVE WEIGHT	400 pounds
SHROUD WIDTH	Not Applicable
SHROUD HEIGHT	Not Applicable

**TABLE 1: HARVESTER, HR-01 SPECIFICATIONS**

### **ELECTRICAL REQUIREMENTS**

The Harvester Model HR-01 requires a UL Approved dedicated home electrical outlet rated at a minimum of 120 volts at 60 hertz and capable of delivering 15 amperes. Although the Harvester draws only a fraction (much less than 6 amperes on average) of the 15 amperes rating, it is recommended that a dedicated circuit versus a branch electrical circuit be provided for the stove. Refer to the section on battery backup systems for additional information on Harvester electrical requirements.

### **PLATED (Gold or Nickel) DOOR CARE**

The Harvester gold or nickel plated door should be wiped down BEFORE THE FIRST FIRE and on a regularly basis to ensure that the luster and beauty of the door lasts the life of the stove. Always use an approved glass cleaner (i.e. Windex, Glass Plus) and a lint free soft cloth to polish the doorframe. DO NOT use any abrasives, like steel wool, brass polish, cleaners, like Comet, or other household cleaners. If improper cleaners are used, the Harvester door can be permanently scratched and the finish ruined. A damaged door can be returned to Country Flame for refinishing but repair is expensive. Proper care of the Harvester plated door and other plated trim will ensure these parts will survive a lifetime of use.

A painted Harvester door requires no specific care.

### **OPTIONAL FEATURES**

There is an ever growing list of options for Country Flame stove products, including the Harvester. Some of the Harvester options include:

- a) Optional Queen Ann Legs (various plating options or various painted options)
- b) Optional Cast Doors (various plating options or various painted options)
- c) Pedestal option that is only provided in stove black paint finish
- d) Optional Thermostat system.
- e) Replacements parts are listed in an Appendix in this manual.

### **OPTIONAL THERMOSTAT OPERATION**

A thermostat option is available for the Harvester. Once installed, the thermostat option will adjust the Harvester burn between Heat #1 (thermostat calls for no heat) and somewhere between Heat#1 and Heat #5 setting (thermostat calls for heat), depending on what homeowner has on set control board.

### **HARVESTER IS COLD**

- Until the stove is operating in the Burn State (code 9 or code D) the thermostat is ignored.
- Unless the operator makes a change to the heat setting of the stove, Heat #3 is the de-facto standard setting when the Thermostat calls for heat.
- When the thermostat calls for heat the control board sets the burn to the homeowner specified heat level.
- When the thermostat no longer calls for heat the control board moves to Heat #1.

- If the homeowner makes a change to the control board heat setting before the thermostat calls for heat, the new heat setting becomes the Thermostat (call for heat) heat level setting.

### **HARVESTER IS HOT**

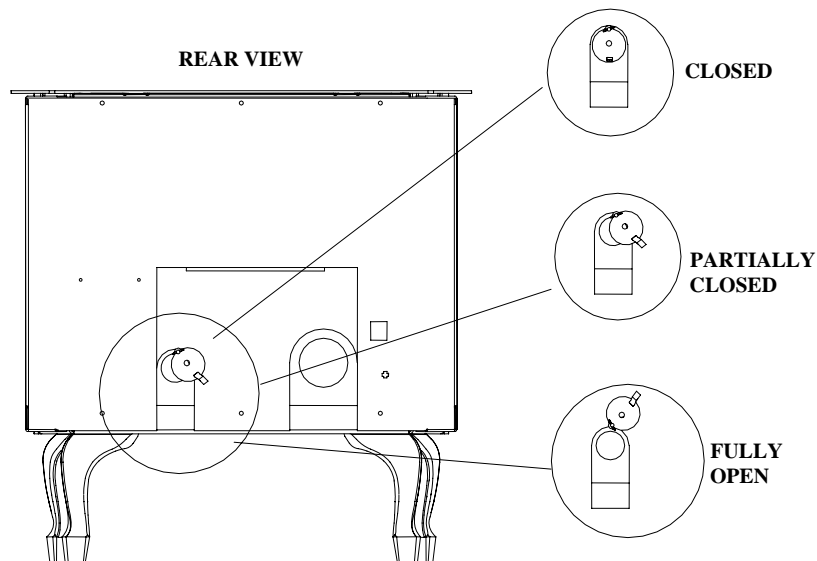
- If the heat level is greater than 1 when the thermostat calls for heat, that heat level becomes the new Thermostat Heat Level.
- If the heat level is equal to 1 when the thermostat calls for heat it will use the last heat level programmed by the operator when the thermostat stopped calling for heat.
- The stove will operate at the Thermostat Heat Level until such time as the thermostat stops calling for heat. It will bring the stove back to heat level 1. The last heat level programmed by the operator will be remembered by the software for use as the next Thermostat Heat Level.

### **CHANGE HEAT LEVEL (thermostat active)**

- When the homeowner changes the control board heat level setting, while the thermostat is active (calling for heat,) the new setting becomes the new thermostat (call for heat) setting. The stove will move to that heat setting anytime the thermostat calls for heat. Otherwise, when the thermostat no longer calls for heat, the control board sets the stove to Heat #1.
- If the operator changes the heat level to 1 while the thermostat is calling for heat, it will become the new Thermostat Heat Level. But because this is the same setting as when the thermostat stops calling for heat, the operator will get no indication that the thermostat is in control of the stove.

### **CHANGE HEAT LEVEL (thermostat inactive)**

- If the operator makes a change to the heat level while the stove is inactive, the stove will move to that level. The next time the thermostat calls for heat, the most recently programmed heat level will become the Thermostat Heat Level and the stove will operate at that point until the thermostat no longer calls for heat.



**FIGURE 9: HARVESTER COMBUSTION FRESH AIR CONTROL**

### **COMBUSTION FRESH AIR CONTROL**

Combustion fresh air can be controlled on the Harvester. This optional control assists in optimizing the burn rate of different corn fuels. All air entering the firebox is controlled by the fresh air control system. By attaching this optional control, the homeowner can adjust the amount of fresh air allowed to enter the firebox. The combustion air control is installed as shown in FIGURE 9. To ensure no air leakage or air infiltration into your home when the Harvester Stove is not in use; the combustion air control lever should be kept in its closed position.

# INSTALLATION

## INSTALLATION PREPARATION

The first step is to ensure the Harvester has been installed properly. Improper installation will create long-term operational and maintenance problems that will plague the homeowner until corrected. If an exhaust vent system is run over ten feet, Country Flame recommends a four-inch versus three-inch vent pipe be used in the exhaust vent system. The basic installation system should include a clean out T, a wall thimble, an exhaust system cap (such as a jet cap) and various lengths of double walled vent pipe.

## STOVE CLEARANCES

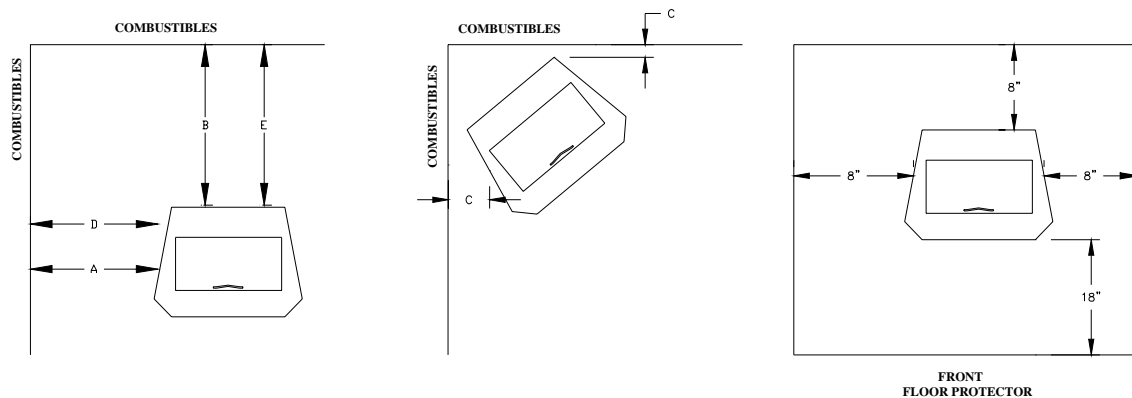
The Harvester minimum clearances must be maintained during installation. Failure to maintain proper clearances can create a hazardous environment that will lead to a house fire or endanger the occupants. A stove that is installed correctly and maintained properly will minimize operating costs. Country Flame recommends the use of a Hearth Industry Professional that is certified to install pellet-burning products. Check with the local dealer or contact Country Flame if there is any question about the installation, the installer, or the product being installed. Maintain the clearances shown in FIGURE 10. Follow the chimney manufacturer's installation instructions when installing the chimney system. Inevitably there will be differences between the chimney manufacturer and Country Flame's stove clearances. Always utilize the largest clearance listed. Contact Country Flame or one of its local authorized dealers to resolve any questions.

## MINIMUM CLEARANCES

TABLE 2 provides clearances for a Harvester installation using type L or type PL pellet stove pipe.

CLEARANCE TO COMBUSTIBLES	TYPE L OR TYPE PL VENT PIPE
A. SIDEWALL TO UNIT	2"
B. BACK WALL TO UNIT	1"
C. CORNER TO UNIT	1"
D. SIDEWALL TO CONNECTOR	3"
E. BACK WALL TO CONNECTOR	3"
F. CORNER TO CONNECTOR	3"

**TABLE 2: REQUIRED CLEARANCES**



**FIGURE 10: FREESTANDING CLEARANCE REQUIREMENTS**



## **VENT SYSTEMS**

A Harvester must be vented into a non defective, clean, and properly lined masonry chimney or must be installed using any one of a number of different manufacturer's factory-built vent pipe product.

**If a masonry chimney system is used, it must conform to all local building codes and must be properly lined with an approved pellet (all fuel) stainless steel liner.**

## **FACTORY-BUILT CHIMNEY**

The Harvester can utilize factory-built vent systems from a number of different manufacturers either in 3" or 4" diameter depending on installed lengths. All Harvester vent systems must be Type L or Type PL rated vent and tested as well as listed to UL Standard 641.

Freestanding clearances are listed in TABLE 2 and must be maintained. If local code allows, these distances can be reduced when acceptable shielding is provided. Consult a local code authority and certified installer to ensure that a specific installation meets proper code. The following recommendations should be adhered to:

- a) Do not install damaged parts and do not mix and match manufacturer's parts.
- b) If a vent system must pass through ceilings or walls, make sure all combustible materials and building installation products are a minimum of 3" away from the vent pipe.
- c) When vent systems exit through walls, make sure NFPA rules are followed for distances from windows and openings.
- d) Ensure good workmanship is maintained during vent system installation.
- e) Never use a vent system with an inside diameter that is smaller than the Harvester flue outlet.
- f) When vent systems pass through a ceiling, use a Firestop/Support assembly.
- g) Use 1/4" sheet metal screws to secure locking vent system joints along with RTV and tape.
- h) Never penetrate the inner lining of a vent system with any screws.
- i) Never install single-wall pipe to a Harvester.
- j) Single wall pipe can only be used as a liner in a masonry fireplace.
- k) DO NOT connect B-vent pipe with aluminum liners to vent a Harvester.
- l) The use of pellet or corn fuel does not eliminate the need for regular inspections and cleaning.
- m) Always follow the vent system manufacturer's installation instructions.

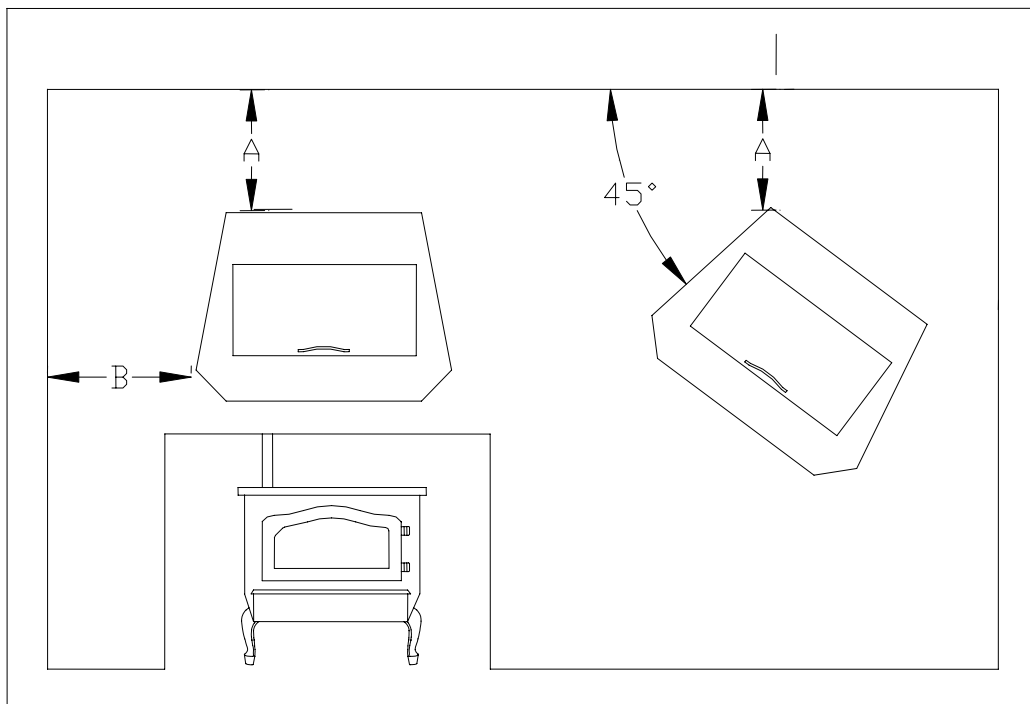
## **MASONRY BUILT CHIMNEY**

Before connecting this Harvester to a specific chimney, be sure to have the chimney inspected by a chimney professional and cleaned, if necessary. Once cleaned, assuming the masonry chimney is of larger diameter than required by the Harvester, a full stainless steel liner will need to be installed. This liner will need to be free from cracks, deterioration, softening, or other damage that may prevent it from containing the byproducts of combustion.

**CAUTION:** When installation requires connection from a Harvester flue through a combustible wall to a masonry chimney a UL Listed wall thimble (wall penetration system) must be utilized. Always conform to local codes, utilize a professional installer, and ensure a proper vent system be utilized with a Harvester installation. Country Flame recommends the use of smoke and carbon monoxide detectors when installing a Harvester.

**ALCOVE INSTALLATION**

All freestanding Harvester stove models are approved for alcove installation using double-wall Type L or Type PL UL listed vent systems. An alcove must not be greater than four feet deep as measured from the alcove face wall to the alcove back wall. In addition, the alcove must have at least seven feet of clearance when measured from the floor to the alcove ceiling. In an alcove installation, side clearances of fourteen inches from the stove to combustibles and rear clearances of six inches from the stove to combustibles must be maintained as a minimum. Alcove clearances require the use of listed UL 641 Type L or type PL vent systems. Contact a certified installer or local building inspector to obtain information on any local code requirements for such installation.



**FIGURE 11: ALCOVE CLEARANCES**

<b>MODEL</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>HARVESTER</b>	3	12	5	42

**TABLE 3: ALCOVE CLEARANCES, IN INCHES**

## FLOOR PROTECTION REQUIREMENTS

1. All Country Flame freestanding Harvester stoves require a listed floor protector that is noncombustible. Country Flame Harvester stoves were tested with a listed floor protection that had an R-value equal to or greater than 1.5. Ensure that any floor protection equals or exceeds  $R = 1.5$  or greater. Refer to FIGURE 10 for floor protector clearance requirements.
2. If a floor protector, different from the tested floor protector, is to be used, it must meet or exceed the requirements of the listed R-value of the tested floor protector. To convert alternate floor protectors to their respective R value use the following procedures:
  - a. Convert floor material specification to R-value.
    - i. R-value is given – no conversion is required.
    - ii. k-factor is given with required thickness (T) in inches:  $R = (1/k) \times T$ .
    - iii. C-factor given:  $R = 1/C$ .
  - b. Determine the R-value of the proposed alternate floor protector.
    - i. Use the formulas provided in STEP 2a to convert values not expressed as “R.”
    - ii. For multiple layers of material, add each R-value of each layer to determine the materials overall R-Value.
  - c. If the overall R-value of the alternate material is greater than the R-value tested material defined in STEP 1, then the alternate floor protection is acceptable.
  - d. **EXAMPLE:**
    - i. The tested material was  $\frac{3}{4}$ -inch thick with a k-factor of 0.84.
    - ii. The R-value of the tested material was  $R = (1/0.84) \times \frac{3}{4} = 0.893$ .
    - iii. The proposed alternative floor protector is 4-inch brick material with a C-factor of 1.25 over  $\frac{1}{8}$ -inch mineral board with k-factor of .29.
    - iv. The 4-inch brick material has a value of  $R_{\text{brick}} = (1/1.25) = 0.80$ .
    - v. The mineral board has a value of  $R_{\text{mnbrd}} = 1/0.29 \times 0.125 = 0.431$
    - vi. Total  $R_{\text{brick}} + R_{\text{mnbrd}} = 0.80 + 0.431 = 1.231$ .
    - vii. Since the total R-value of the alternate example floor protector ( $R=1.231$ ) is greater than the tested example floor protector ( $R=0.893$ ), the alternate is acceptable.
3. Listed Floor Protector Definitions:
  - a. Thermal Conductance =  $C = \text{Btu}/(\text{hr})(\text{ft}^2)(^{\circ}\text{F}) = \text{W}/(\text{m}^2)(^{\circ}\text{K})$
  - b. Thermal Conductivity =  $k = (\text{Btu})(\text{inch})/(\text{hr})(\text{ft}^2)(^{\circ}\text{F}) = \text{W}/(\text{m})(^{\circ}\text{K}) = \text{Btu}/(\text{hr})(\text{ft})(^{\circ}\text{F})$
  - c. Thermal Resistance =  $R = (\text{ft}^2)(\text{hr})(^{\circ}\text{F})/\text{Btu} = (\text{m}^2)(^{\circ}\text{K})/\text{W}$
4. Install in accordance with 24 CFR, Part 3280 (HUD).
5. **WARNING:** Harvester stoves must always be placed on a listed floor protector if the existing floor where the stove is to be placed is made of any combustible material. ***IF THE AREA WHERE THE STOVE IS TO BE PLACED IS CARPETED, THE CARPET MUST BE REMOVED. A LISTED FLOOR PROTECTOR IS NEVER TO BE PLACED ON CARPET. CHECK LOCAL CODES FOR ADDITIONAL CARPET RESTRICTIONS AND FLOOR PROTECTION REQUIREMENTS.***

## **PELLET (ALL FUEL) VENT SYSTEMS**

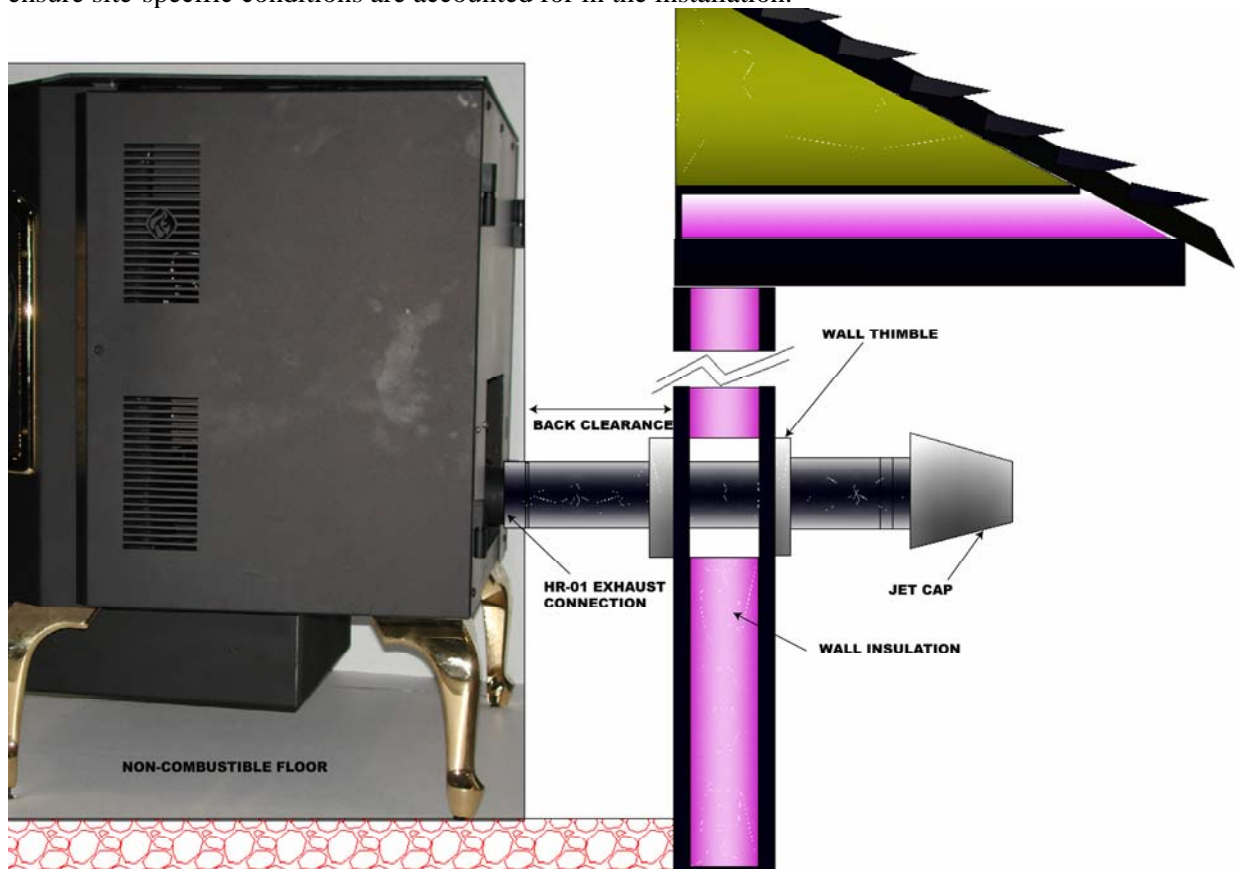
Harvester installations requiring a connection from the product through a combustible wall require either a UL Listed thimble (wall penetration assembly) or other methods as outlined in the National Fire Protection Association (NFPA) Standard 211. Pellet (all fuel) vent system installations fall into 3 basic categories:

- 1) Direct Vent Installation
- 2) Flexible Liner Vent Installation
- 3) Vertical (inside or outside) Vent Installation

All pellet vent system installations must conform to the following basic requirements:

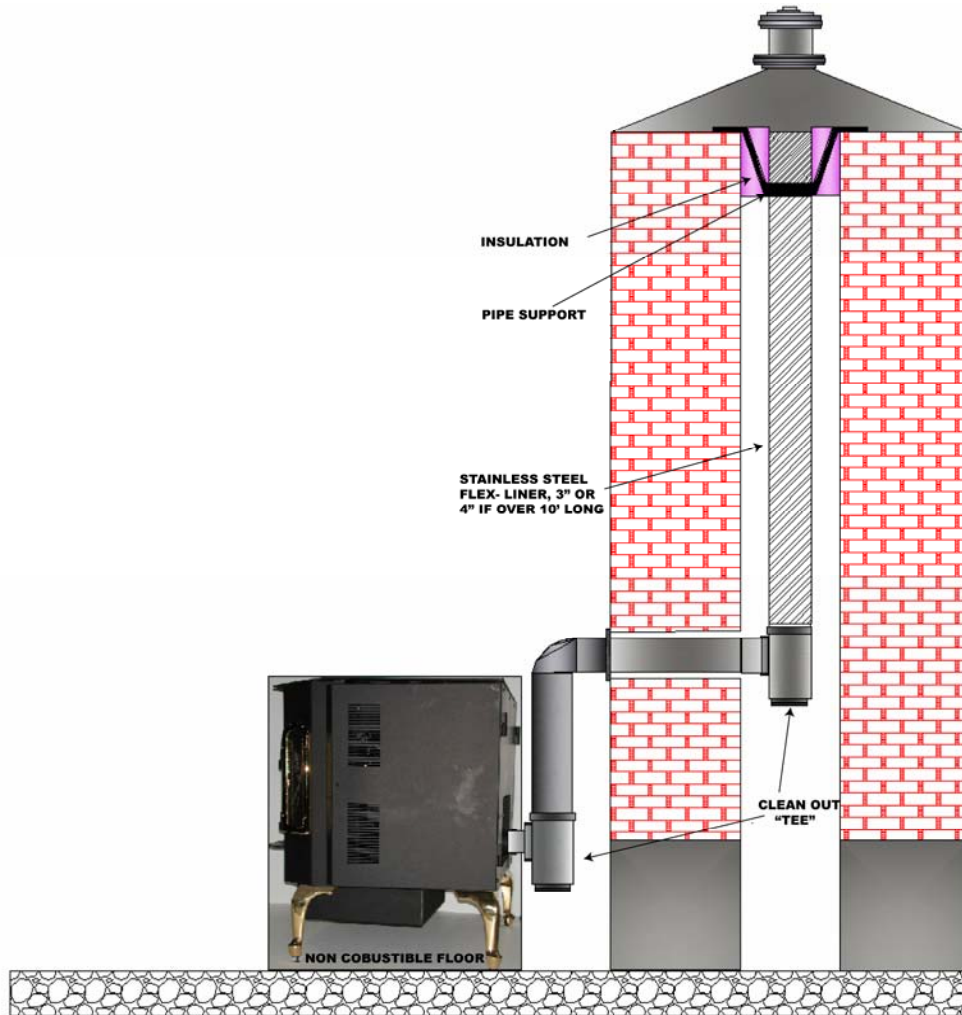
- a. Insulation material used in wall pass-through systems shall be noncombustible material and shall have a thermal conductivity of 1.0 Btu-in./hr-ft<sup>2</sup>-°F (4.88 kg-cal/hr-m<sup>2</sup>-°C) or less.
- b. All clearances and thicknesses are minimums; larger clearances shall be permitted.
- c. Any material used to close up an opening for the connector shall be of noncombustible material.

The installer should have significant experience and knowledge in pellet vent system variations. To maintain your Country Flame Warranty, it is imperative that a certified installer complete an installation that best suits a site-specific application. FIGURES 12 through FIGURE 14 provide examples of combustible wall installations for residential heating appliances. These are ONLY EXAMPLES. During any installation, it is imperative to consult local code authority or an installation professional to ensure site-specific conditions are accounted for in the installation.



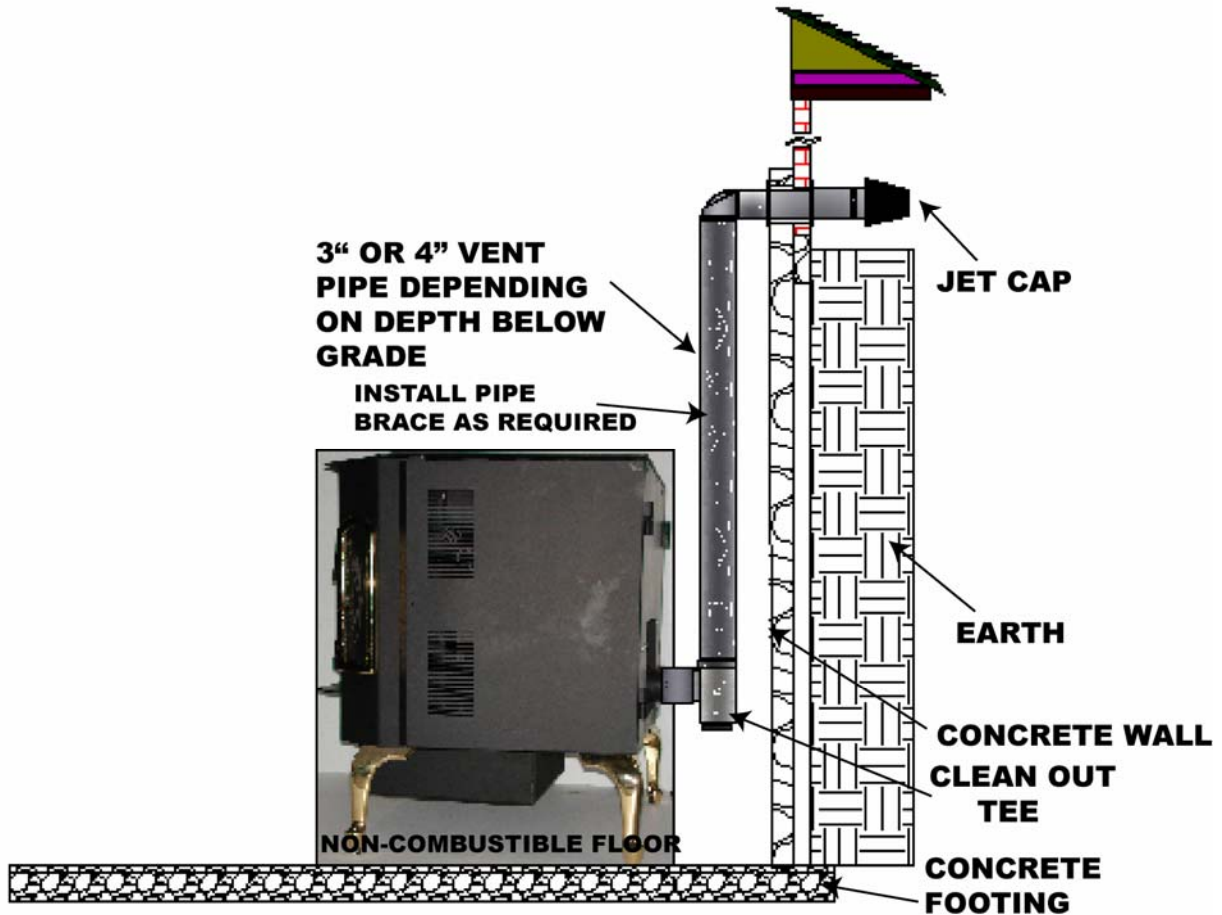
**FIGURE 12: DIRECT VENT SYSTEM INSTALLATION**

FIGURE 12 demonstrates a direct connect (simplest) vent system attached to a Country Flame Harvester. There are a number of critical factors that need to be considered when using the direct connect method. What is the clearance from the ground to the jet cap? What amount of snow (or drift) can be expected (anything blocking the exhaust will inhibit proper Harvester combustion?) What is the exterior covering on the house (combustible or non-combustible?) What are the prevailing wind directions (strong winds blowing directly into the exhaust pipe will cause combustion problems?) What is the ground covering around the jet cap (dry grass can be ignited from sparks causing a house fire?) Despite the direct connect low initial cost, improper planning can lead to expensive problems. Consult with a professional.



**FIGURE 13: FLEXIBLE LINER VENT SYSTEM INSTALLATION**

FIGURE 13 demonstrates a freestanding connection to an existing masonry fireplace chimney. The freestanding connection will require the use of at least one clean out tee located at the back of the Harvester. The diameter of the clean out tee pipe and other vent pipe will be determined by the length of overall pipe required in a specific application. In many cases an additional clean out tee will be required inside the chimney. Failure to provide clean out access to this kind of installation will require additional services of a certified chimney sweep. Chimney sweeps maintain the equipment necessary to professional clean a Harvester installation that does not provide clean out tees. A certified installer will take all site specific requirements into account when completing an installation for the homeowner.



**FIGURE 14: VERTICAL VENT SYSTEM (below grade) INSTALLATION**

FIGURE 14 demonstrates a Harvester installed below grade (such as in a non-walkout basement.) Do not substitute an elbow (of any angle) in place of the clean out tee shown in FIGURE 14. Use of an elbow will limit exhaust gasses and cause the combustion chamber to operate inefficiently. A clean out tee should be checked regularly during the first six months of use until the homeowner determines the frequency of cleaning required to ensure proper operation of the Harvester. A certified installer should take into account all site specific conditions that may impact the installation and operation of the below grade Harvester.

Type L or Type PL Pellet Vent systems, offered in 3" or 4" diameters, has been designed and approved for use in pellet and corn stoves and low temperature venting systems. Type L vents is rated for temperatures up to but not exceeding 570<sup>0</sup>F. Pellet venting systems feature a complete product line that includes wall thimbles for horizontal through-the-wall installations, support boxes for both flat and cathedral ceiling installations and even decorative wall thimbles and ceiling covers are available. Vent pipe is normally designed as double-wall, air-insulated or full insulated liner that provides superior performance and safety. Normally the inner wall is stainless steel; the exterior wall is galvalume steel that provides maximum heat and corrosion resistance.

Pellet vent system installations should avoid long horizontal runs, excessive use of elbows or failing to provide for clean-out of the vent system. Be sure to use a pipe adapter that ensures a proper connection from the appliance to the vent system. Do NOT use a 90-degree elbow off the back of the Harvester.

Be fire safe and maintain proper clearances to all combustibles from a pellet vent system. Always ensure proper bracing and support for the pellet vent system and verify and conform to all local building codes. Once installed, have the vent system inspected by a certified professional.

A chimney connector shall not pass through an attic, roof space, closet, floor, ceiling, or similar concealed space. Where passage through a wall or partition of combustible construction is desired or necessary, the installation shall conform to all national and local codes.

Whatever brand of vent system is used with a Harvester installation, a certified installer must ensure that all chimney manufacturers' installation instructions are followed and that all national and local codes have been met.

### **OUTSIDE AIR COMBUSTION**

It is imperative that the installer or homeowner ensures that a minimum of at least eight square inches (fifty square centimeters) of outside air be admitted to the hearth room or directly to the Harvester. If installation allows, the Harvester fresh air intake should be connected through an exterior wall.

Provision for outside combustion air may be necessary to ensure that fuel-burning appliances do not discharge byproducts of combustion into the house. Guidelines to determine the need for additional combustion air may not be adequate for every situation. If in doubt, it is advisable to provide outside air.

Outside combustion air may be required if:

1. The Harvester does not draw steadily, smoke rollout occurs, fuel burns poorly, or back-drafts occur whether or not combustion is present.
2. Existing fuel-fired equipment in the house, such as fireplaces or other heating appliances smell, do not operate properly, suffer smoke rollout when opened, or back-draft occurs whether or not combustion is present.
3. The home is equipped with a well-sealed vapor barrier and tight fitting windows or has any powered devices that exhaust house air.
4. There is excessive condensation on home windows in the winter.
5. A ventilation system is installed in the house.

If any of these or other indicators suggests that infiltration air is inadequate, additional combustion air should be provided from the outdoors to the Harvester appliance. Outside combustion air can be provided to the appliance by the following means:

1. Direct connection: appliances can only use direct connection of outside combustion air if they are certified for this type installation. Follow the Harvester instructions for direct connection of outside combustion air.
2. Indirect connection: for appliances not certified for direct connection of outside combustion air, outside air can be ducted to within twelve inches of the appliance.
3. Mechanical ventilation: if the house has a ventilation system (air change or heat recovery):
  - a. The ventilation system may be able to provide sufficient combustion make-up air for the Harvester appliance.
  - b. The homeowner should be informed that the ventilation system might need to be re-balanced by a ventilation technician after installation of the Harvester stove.

## MOBILE HOME INSTALLATION

**WARNING:** DO NOT INSTALL A COUNTRY FLAME FREESTANDING HARVESTER STOVE IN ANY MOBILE HOME SLEEPING ROOM.

**WARNING:** THE STRUCTURAL INTEGRITY OF THE FLOOR, WALL, CEILING AND ROOF MUST BE MAINTAINED DURING THE INSTALLATION OF A COUNTRY FLAME HARVESTER STOVE IN A MOBILE HOME.

**WARNING:** A FREESTANDING HARVESTER STOVE INSTALLED IN A MOBILE HOME MUST BE COMPLETED IN ACCORDANCE WITH 24 CFR, PART 3280 (HUD).

**WARNING:** A FREESTANDING HARVESTER STOVE MUST HAVE ITS LEGS OR PEDESTAL PERMANENTLY BOLTED TO THE FLOOR OF THE MOBILE HOME. FIGURE 10 shows a leg option installation and FIGURE 11 shows a pedestal option installation.

**WARNING:** A FREESTANDING HARVESTER STOVE MUST BE ELECTRICALLY GROUNDED TO THE STEEL FRAME OF A MOBILE HOME.

### **MOBILE HOME RULES**

1. Install only a HUD-approved laboratory tested stove in a mobile home. The freestanding Harvester is approved for use in mobile homes and is so certified on the metal tag affixed to the back of the stove. Install all Harvester stoves in accordance with 24 CFR, part 3280 (HUD).
2. A permanent (hard line) combustion fresh air duct system must be installed and connected from the outside of the mobile home directly to the combustion air inlet on an Harvester stove.
3. A Harvester stove must have a UL Listed prefabricated vent system installed in the mobile home. This chimney system must be properly connected and installed directly from the stove through the roof of the mobile home using only one manufacturer's chimney products. Do not deviate from the vent system manufacturer's installation instructions.
4. All mobile home Harvester installations or stove replacements require a permit to be obtained from the local code department and require, as a minimum, at least a final inspection before operation of the stove is authorized. Use only licensed contractors to perform the installation work. Further, an insurance representative should provide an approval document stating that the installation and inspection are in accordance with industry standards and therefore covered by the homeowner's insurance policy.

### **MOBILE HOME CLEARANCES**

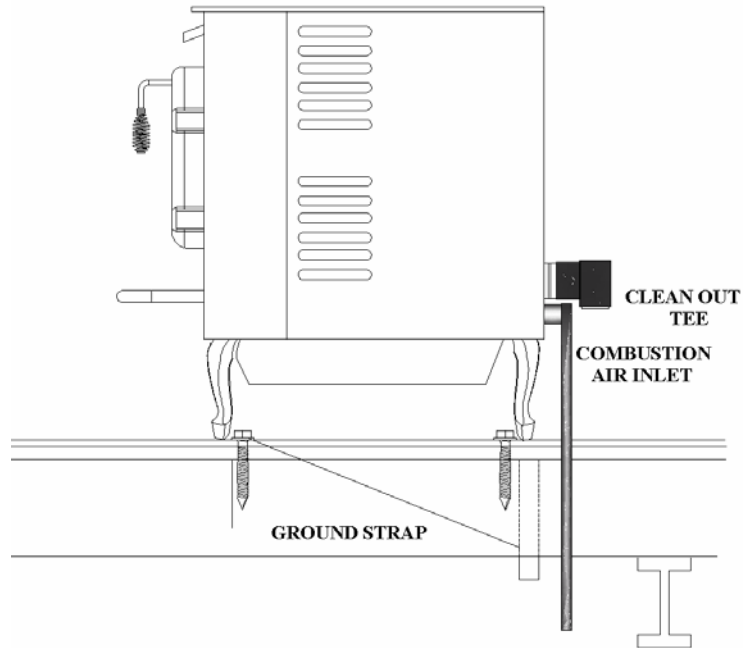
1. Clearance is defined as the open space distance between any part of the stove or its vent system and any combustible material, including but not limited to: walls, ceilings, trim moldings, furniture, word storage containers, or any other combustible item. Refer to the stove clearance section of this manual or the certification tag on a stove for minimum clearances that must be maintained during installation of a stove into a mobile home.
2. Use of an approved thermal barrier may allow for the reduction of no barrier minimum stove clearances. Remember that a wall (wood studs covered with sheetrock, even if that wall is covered with brick) is still considered combustible. Functional thermal barriers are made of hearth pads consisting of two ¼" sheets of mineral board or 24-gauge sheet metal spaced 1" from the combustible wall, with approved spacers that provide additional protection to the combustible wall. Refer to a hearth pad manufacturer's instructions or the NFPA Publication 211. Do not violate minimum clearances with approved thermal



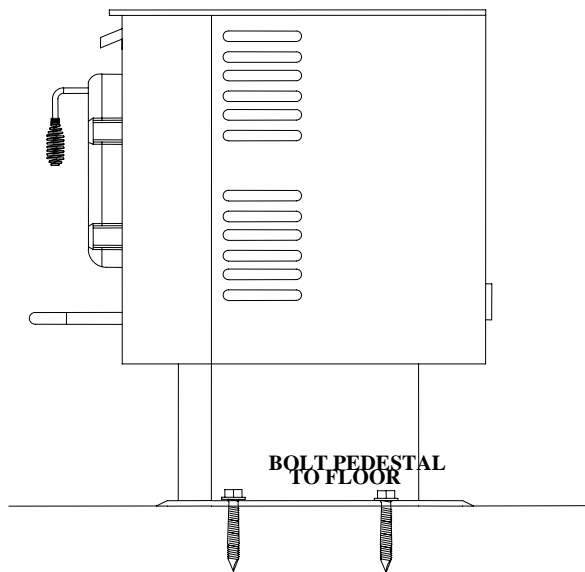
barriers. Manville's CERAFORM 126 is an example of an approved insulated wall protector. This product has a K equal to .27 and is a half-inch thick. Total thermal resistance should exceed 1.5 for any material used to ensure proper thermal protection of a combustible wall.

#### **MOBILE HOME STOVE ATTACHMENT**

1. Install combustion air to the bottom of the stove as shown in FIGURE 18 in all mobile home applications. The other end of the combustion air tube is installed through the mobile home floor. Ensure that snow or other material cannot prevent fresh air from entering the duct located outside the mobile home.
2. A pedestal stove may receive combustion fresh air either through the mobile home floor or through the mobile home exterior wall. FIGURE 16 and FIGURE 17 demonstrates both options.
3. Install a mesh screen or an approved fresh air cap on the outside of the mobile home combustion air tube. This cap will keep foreign material, birds, or small animals out of the fresh air system. Do not use mesh screen from windows as it has too small a hole.
4. If operation of the Harvester freestanding stove causes room air starvation, dangerous fumes can be sucked into the mobile home from other vented appliances. Air starvation usually occurs: (a) because the combustion air intake is blocked, (b) because the stove door is left open or does not seal properly, or (c) due to strong exhaust fans being operated inside the mobile home. Always ensure that fresh air intake systems remain unblocked and ensure free fresh airflow. Contact your local Country Flame dealer or a certified chimney sweep for annual inspections.
5. **WARNING: DO NOT INSTALL ANY HARVESTER IN A SLEEPING ROOM.**



**FIGURE 16: MOBILE HOME LEG INSTALLATION**



**FIGURE 17: MOBILE HOME PEDESTAL INSTALLATION**

**MOBILE HOME FLOOR PROTECTION**

1. A mobile home floor must be protected against stray sparks, radiant heat build up, or from damage during general use.
2. This floor protection must meet certain minimum requirements as a thermal barrier. Calculations are provided in this manual for determining if a floor protector meets minimum requirements for a mobile home installation.
3. At no time should a floor protector be placed on top of carpeting. Carpeting must be removed and the floor protection should sit directly on the uncarpeted portion of the mobile home floor. Floor protection should extend to the front, sides, back, and under the chimney connector as

defined for a specific model listed in this manual. In the event there are floor protection questions, contact Country Flame or one of its local authorized dealers for assistance.

### **MOBILE HOME CHIMNEY AND DUCTS**

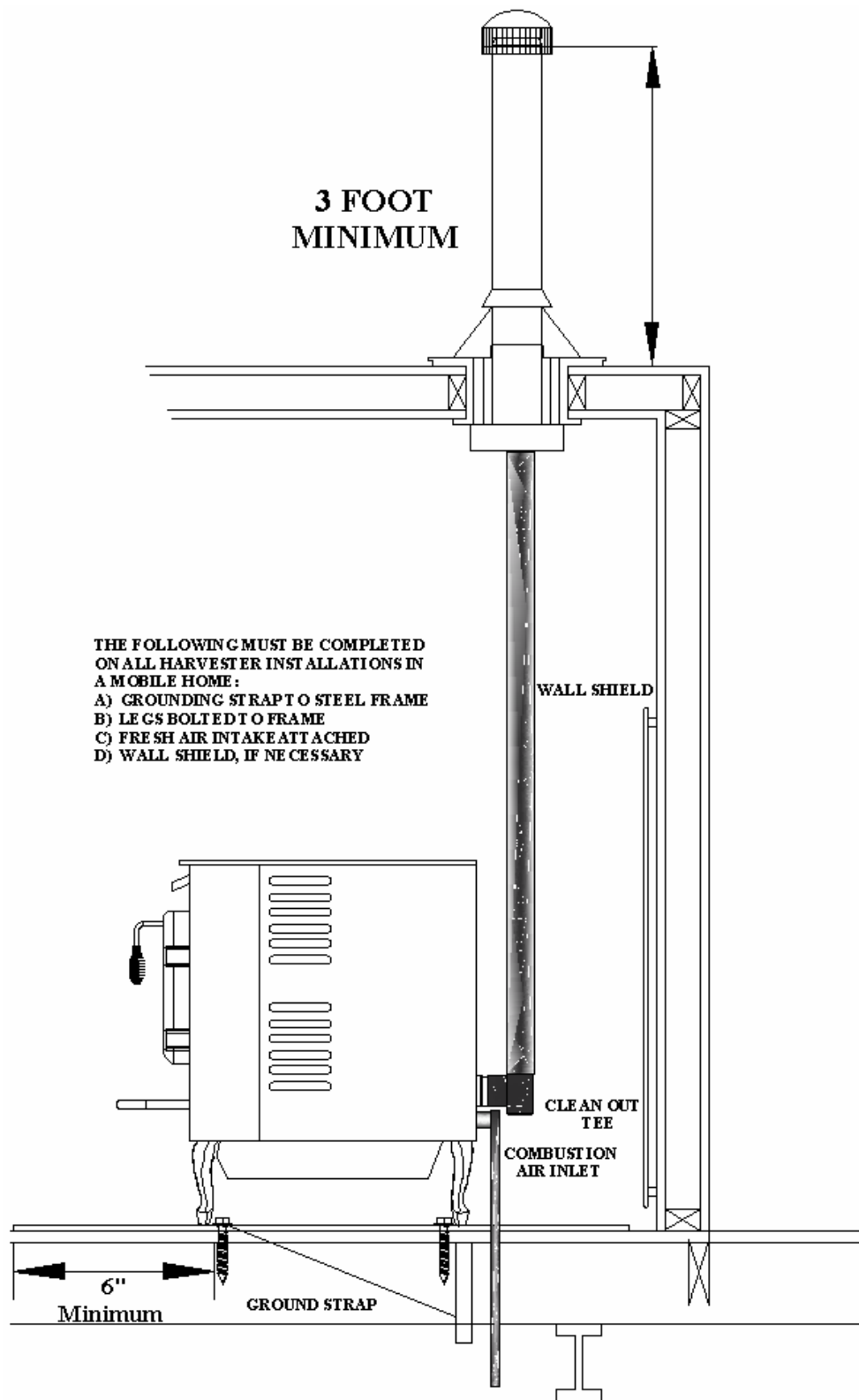
1. ALL chimney connectors, parts, attachments, and ducts should be TYPE L or PL rated vent. One of the UL 641 criteria is that a Type L or PL chimney component withstands temperatures that do not exceed 570°F. Mobile home stove and chimney restrictions are that: (a) regular thin walled stovepipe is not permitted, (b) roof systems cannot be weakened when installing a chimney system, (c) a chimney cap and spark arrester are mandatory, and (d) the chimney must be strong enough to withstand normal area wind velocities.
2. There are many vent pipe manufacturers providing excellent products that meet government listing requirements. Each type and brand meets many various application criteria and has specific installation requirements. Further, each chimney manufacturer provides excellent written instructions on HOW TO install a chimney system. This information should aid the homeowner in ensuring a certified professional completes the job properly. If there are questions, contact Country Flame or a local authorized dealer. If additional information is required, a search of the internet will provide plenty of valuable information. An example of an informative and excellent vent system site is [www.meta-fab.com](http://www.meta-fab.com).
3. A complete chimney system should include a HUD approved spark arresting chimney cap, a storm collar, a roof flashing, an attic radiation shield (if needed), a chimney support box, a ceiling finish collar, an approved chimney connector, and other parts required by site specific conditions. There will be clearance differences presented in both the Harvester and vent pipe manufacturers' product literature. ALWAYS use the larger clearance requirement when installing a Harvester system into a mobile home.
4. A mobile home vent system must serve only one appliance. The vent system must extend at least 1 foot above the highest point on the roofline where it passes through the roof. The vent system should be at least 2 feet higher than any part of a roof or building within a 10-foot clearance around the chimney. The minimum chimney vertical height is 8 feet and the maximum chimney vertical height is 25 feet as measured from the top of a specific Harvester model stove to the chimney flue exit. REMEMBER: The structural integrity of a mobile home wall and roof must be maintained during installation of a Harvester stove. Country Flame strongly discourages the removal or cutting of roof trusses or other structural components of a mobile home in order to install a stove. Consult local code.
5. To comply with over-the-road height limitations and to protect the chimney system and roof from damage remove all above roof chimney parts during transport of a motor home. Use only noncombustible material to seal all chimney system joints to prevent cold air leakage into a mobile home. Refer to local codes or with an authorized local Country Flame dealer to obtain the name of approved noncombustible sealants.
6. Many chimney manufacturers provide pellet (all fuel) vent system kits that contain basic items. These mobile home vent systems kits are not all-inclusive. A homeowner should consult with a certified professional. Additional pellet vent system parts will be required to handle variations in local codes, site-specific mobile home issues, ceiling height, ceiling slope, roof pitch, attic insulation, attic height, and surrounding objects. Use a certified professional to install a Harvester vent system and do not deviate from the vent system manufacturer's installation instructions. Contact Country Flame or a local authorized dealer to resolve any questions or installation procedures. TABLE 4 shows the required components needed for a typical mobile home installation. Contact Meta-Fab ([www.metal-fabinc.com](http://www.metal-fabinc.com)) or other authorized vent system

manufacturers for the latest specifications and the cost of mobile home chimney system parts or a mobile home chimney kit.

**TABLE 4: MOBILE HOME (minimum) VENT SYSTEM REQUIRED PARTS**

<b>PART NUMBER</b>	<b>DESCRIPTION</b>	<b>QTY</b>
4PRC	VERTICAL CHIMNEY CAP 4" OVER TEN FEET	1
4PF	STANDARD ROOF FLASHING	1
4P36	THREE FOOT VENT PIPE, 4"	1
4PRS	ROOF SUPPORT	1
4P60	FIVE FOOT VENT PIPE, 4"	1
4PT3	3" TO 4" CLEAN OUT "T"	1
CERAFORM 126	WALL PROTECTION ( IF REQUIRED)	1
3PSAU	UNIVERSAL STOVE ADAPTER	1
4PSC	STORM COLLAR	1

NOTE: The information provided in TABLE 4 and detailed in FIGURE 18 are for EXAMPLE only. Vent systems are affected by local site conditions and local codes. Consult a certified professional and insure that any mobile home Harvester vent system installation meets all federal, state, and local building codes. Failure to follow the chimney manufacturer's installation instructions will void Country Flame's product warranty. Failure to utilize a certified installation will void the warrant and may have an adverse impact on the homeowner's insurance policy. One of the major causes of mobile home fires is improperly installed and operated heating systems. Contact Country Flame or one of its local authorized dealers to resolve any questions about installation or parts usage.



**FIGURE 18: MOBILE HOME HARVESTER  
(FREE STANDING VENT) INSTALLATION**

# MAINTENANCE REQUIREMENTS

## **GENERAL REQUIREMENTS**

The Harvester Model HR-01 has minimal maintenance requirements; however, failure to perform cleaning or maintenance items will lead to degraded performance and potential safety hazards for both the home and its occupants. The Harvester stove should not be operated routinely without thorough monthly cleaning (or more often) depending on frequency of use.

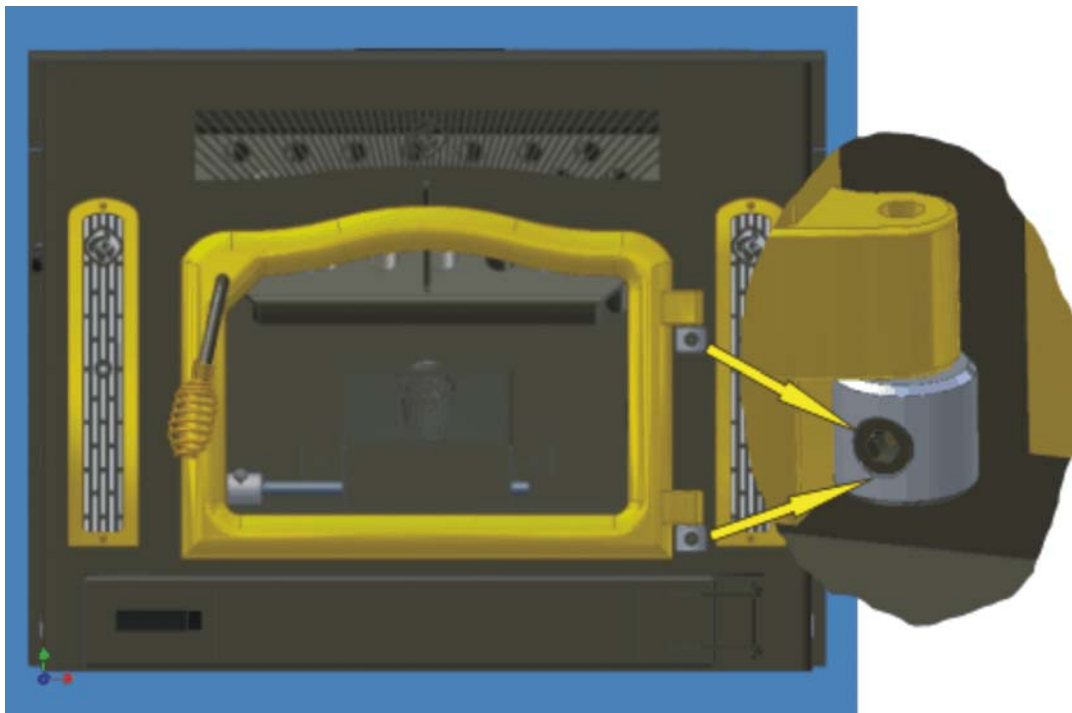
The three most common maintenance chores will be:

- a) Refilling the hopper with fuel as needed.
- b) Cleaning the firebox and glass as required, satisfying the customer.
- c) Emptying the ash bin to ensure ash buildup does not interfere with operation.

Country Flame strives to use high quality low maintenance components in the Harvester.

## **STOVE DOOR INSTALLATION**

The Harvester door has been mounted and checked for proper fit at the factory. If the door is removed for any reason, care must be taken in reinstalling the door to ensure proper alignment and fit. Setting the door is quite simple. Ensure the door is in the fully open position. Once done, align the female portion of the door hinge with the male portion of the stove hinge. Gently lower the door hinges over the stove hinge pin. Once the door hinges have been set, the door can be closed to check for proper fit. The Harvester door installation should now be complete. To remove the door, simply lift up on the door from the stove hinges. Store the door in a secure place. If the door is left sitting, ensure that the door cannot fall and injure someone or damage the door or glass. The Harvester door has been adjusted at the factory. If the door fit is not satisfactory, the homeowner can adjust the door using the hinge screws, refer to FIGURE 19.



**FIGURE 19: DOOR ALIGNMENT POINTS**

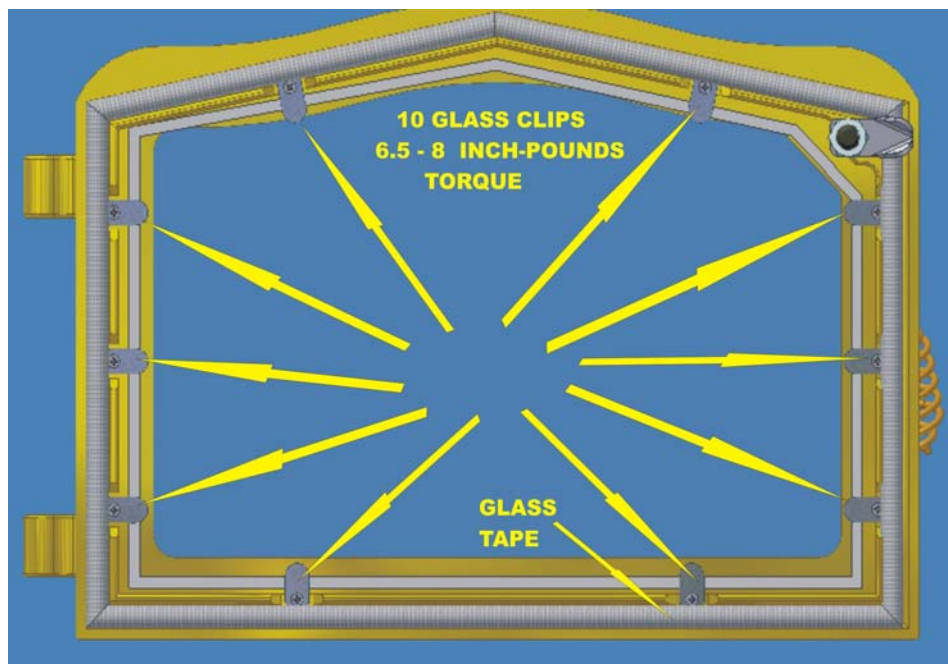
### **STOVE DOOR ADJUSTMENT**

The Harvester door may require fine adjustment due to variations in the door, the gasket material, due to hinge wear, or to maintain a center-aligned appearance. The Harvester door needs to remain airtight to ensure proper firebox operation. The Harvester door can be adjusted up or down and left or right with the adjustable hinge pins as shown in FIGURE 19.

The door gasket can also be adjusted to improve on the airtight fit. To adjust the gasket tightness, simply rotate the door latch clockwise (tighten) or counterclockwise (loosen) one complete revolution or as necessary to adjust the gasket seal. A good test to evaluate proper door gasket seal is to lay a dollar bill against the stove frame and then close and latch the door. If gently tugging on the dollar bill does not dislodge it from the door, the seal is appropriate. In the event that a proper door gasket seal cannot be obtained, it may be time to replace the door gasket.

### **STOVE DOOR GLASS CLEANING**

The Harvester stove is designed with an advanced air wash system that assists in keeping the door glass clean. If the Harvester stove is operated continuously on low heat setting, the door glass will get dirty quicker than when a medium to high fire is fueling the firebox. In order for glass to remain clean, a high temperature fire must be maintained in the firebox. **CAUTION:** Do not clean hot glass. If the door glass does require cleaning, use an authorized stove glass cleaner. Contact Country Flame or one of its local authorized dealers to obtain a suitable cleaner or the name of a recommended glass cleaner. Regular household glass cleaners are not effective in cleaning creosote and other residue from the glass. **DO NOT** use abrasives such as steel wool or powder abrasives as they will permanently damage the glass. Once the glass has been scratched, complete replacement of the glass is required. Use only approved 1400°F high temperature stove ceramic glass to replace any cracked or broken glass.



**FIGURE 20: DOOR GLASS REPLACEMENT**

### **GLASS REPLACEMENT**

The glass used in the Harvester stove is a 1400°F high temperature ceramic glass. If the glass should crack or break for any reason, it must be replaced with an equal or better grade ceramic glass. The use of tempered glass or ordinary glass **IS NOT AUTHORIZED** and its use is hazardous. Harvester replacement glass can be purchased direct from Country Flame or one of its authorized dealers. See FIGURE 20 for securing points for

the door glass. Removal of these glass retaining clips can be accomplished with household tools. Order the necessary replacement screws or glass clips when ordering glass to ensure worn parts are replaced.

### **GLASS-CERAMIC SPECIFICATIONS**

Manufacturer  
Window Type

**Euro Kera**  
**Glass-Ceramic, Kera Lite®**

**KERA LITE®** glass-ceramic has a thermal endurance far exceeding that of normal tempered glass. **KERA LITE®** is designed to operate at temperatures ranging from **-400<sup>0</sup>F to +1400<sup>0</sup>F**. Despite its superior thermal properties, **KERA LITE®** stove windows should be treated with care. This glass-ceramic can still be scratched or broken by mechanical abuse. When cleaning the window, use only non-caustic, non-abrasive cleaners. The Harvester stove uses **KERA LITE®** glass-ceramic that is 0.197 inches thick +/- 0.008 inches. Country Flame custom cuts each **KERA LITE®** glass at its factory to fit both the Harvester stove and the trim side glass. If problems occur with the glass or replacement parts are needed, contact Country Flame or a local authorized dealer for assistance in ordering the necessary parts.

**CAUTION:** Do not attempt to clean hot glass. Do not abuse, strike, slam shut, or operate the Harvester stove with any broken glass in the appliance.

### **GASKET REPLACEMENT**

Remove the doors from the unit. Place the doors, face down on a protective surface to ensure no marring or scratching occurs during gasket replacement. To replace the Thermoglass™ knitted rope and tape gasket, first remove all of the old material and gasket cement. Use a putty knife or other sharp instrument to assist in removal. Use caution to prevent injury when removing old material. It is important to ensure the doorframe area is totally clean before installing the new gasket cement and material. The gasket must fit tight against the door frame in order to ensure a proper airtight seal when the stove is being operated. Apply gasket cement to the gasket channel per instructions provided with the gasket kit. Once the cement has been properly applied, install the new gasket. Both gasket and gasket cement are available from your authorized Country Flame dealer. The following table defines the gasket material used in the Harvester stove:

<u>Gasket</u>	<u>Length</u>	<u>Quantity</u>	<u>Dimensions</u>
Around glass	4.25 feet each	2	¾" wide by 1/16" thick tape
Doorframe	5 feet each	2	3/8" rope, high density
Ash drawer	30 inches	1	½" wide by 1/8" thick tape



## APPENDIX A: TROUBLESHOOTING GUIDE

**Shut off the power to the unit and allow it to cool off when performing cleaning and maintenance.**

	<b>PROBLEM</b>	<b>SOLUTION</b>
<b>Ignition</b>	<b>The Stove power indicator does not flash red.</b>	Check the power supply.
	<b>Stove does not switch on</b>	The starter fire in the firepot has not ignited or is not burning properly. Using gloves carefully open the doors and relay the pellet fire. Wait 8-10 minutes for the pellets to burn well, before restarting the system.
<b>Fuel</b>	<b>If Corn/Pellets contain a large amount of “fines” (foreign matter) or sawdust</b>	You may want to screen/sift Corn/Pellets before use if they contain a large number cob and stalk pieces. Check the heat exchanger area for buildup often to determine if any additional maintenance is needed.
	<b>No fuel in Firepot</b>	The Auger needs to be primed, as it has run empty or has become blocked. The stirring rod can be manually rotated by holding in the “up” and “down” arrows on the control board at the same time. The control board needs to be in the “off” setting.
	<b>Hard build-up on the firepot base</b>	Sand in the pellets may cause “clinkering” (hard brittle deposits found in the bottom of the firepot). Screen your fuel to make sure that there is no sand or other foreign matter
	<b>Blockage in the auger.</b>	If the corn is not feeding into the firepot at the normal rate the auger may need to be cleaned. This may be due to fines in the fuel.
<b>Stove Performance</b>	<b>If your stove is not working effectively</b>	You may be using the wrong fuel. Check that you are using the correct fuel. Either # 2 Yellow Shelled Corn - with a moisture content of 14% or less (12% preferred) or Pelletized wood fuel - with a maximum moisture content of 8% may be used. Your Country Flame Dealer can advise on where to obtain this fuel. Do not use seed corn.
	<b>If your stove is not generating enough heat</b>	Fines or dust in the corn can cause the unit not to burn properly or can cause a buildup in the drop tube and restrict the flow of corn. Clean the auger and fuel supply.
	<b>Stove not performing effectively</b>	Clean the Heat Exchanger System, as it may be clogged and blocked.
	<b>Stove not getting enough air</b>	Check to ensure that the fresh air intake is clear and unobstructed.
	<b>Stove Heat not adjusting</b>	It takes 30 minutes for the stove to warm up before you can change setting on the temperature control
	<b>Restricted flue gas flow</b>	Fly-ash will collect in the exhaust venting system and restrict the flow of the flue gases. Incomplete combustion, such as occurs during start-up, shut down, or incorrect operation of the room heater will lead to some soot formation which will collect in the exhaust venting system. The exhaust vent should be checked frequently and cleaned at least once a season.
	<b>Room Air Blower does not activate</b>	Please contact your Country Flame Dealer as your stove may need maintenance

## APPENDIX A: TROUBLESHOOTING GUIDE (CONT'D)

	<b>Firepot Lid Lifts during the lighting cycle.</b>	This may happen until the corn has started to burn. This is normal and may occur at other times. This aids in keeping the corn from sticking to the stirring paddles until the fire is established.
	<b>Stirring Paddles do not turn</b>	The chain drive for the stirring paddles needs to be checked after the first 8 hours of operation as it can loosen. It is located by opening the left side door (the one with the control panel). Inspect the tension of the chain. It should have approximately 1/2" play. If the chain is too loose, adjust the chain drive motor by loosening the 4 bolts securing it and sliding it back until there is proper play in the chain. Re-tighten the bolts securely. This should be checked monthly or if you notice the stirring paddles not turning or binding.
<b>Fire Goes out</b>	<b>Ash Build Up</b>	The ash pan must be emptied every day, to prevent the build up of ash under the firepot blocking the air flow to the fire pot putting the fire out.
	<b>Fire goes out during cleaning of the ash pan</b>	Do not leave the ash pan out for more than three minutes or you may have to restart fire. Remove the ash pan using gloves.
	<b>Build up of Corn</b>	Your Firepot may need additional cleaning as extended burning on the high setting may cause a build-up of corn
<b>Stove Smokes</b>	<b>Your Corn/Pellet Stove Smokes</b>	Your fuel may be damp or you may be using the incorrect fuel.
	<b>Your Corn/Pellet Stove Smokes</b>	You have used the incorrect starter fluid. Only use the approved pellet starter gel. Your Country Flame Dealer can advise you on where to find this.
	<b>Your Corn/Pellet Stove Smokes</b>	Check that the chimney is clean and free of soot and fly-ash build-up. Your stove exhaust system works with a negative combustion chamber pressure and a low positive chimney pressure. It is very important that the exhaust system be completely airtight and properly installed.
<b>Cleaning</b>	<b>Cleaning is messy and difficult</b>	Clean the Heat Exchanger more frequently. This cleaning procedure should be done daily. If buildup is allowed to go unattended, cleanup will be much more difficult and the efficiency of your stove will be adversely affected.
<b>Glass</b>	<b>Glass Breaks</b>	Use care not to slam or strike door, this could result in glass breakage. If the glass in your heater is broken or cracked, <b>DO NOT</b> operate your stove until the glass has been replaced.
<b>Doors</b>	<b>Luster on Gold Doors Fades</b>	Always use an approved glass cleaner (ie. Windex, Glass Plus) and a lint free soft cloth to polish the door frame. Do not use abrasives like steel wool, brass polish or adhesive cleaners like comet, as these will scratch the finish. If the Gold Doors are scratched they will have to be replaced or returned to Country Flame for refinishing. This is expensive and during this time you will not be able to use your stove.
	<b>Doors are not airtight</b>	The doors need alignment or need to have the gaskets replaced. This needs to be inspected on a regular basis.

## APPENDIX B: MAINTENANCE GUIDE

**Shut off the power to the unit and allow it to cool off when performing cleaning and maintenance.**

<b>Regular Cleaning</b>	<b>Removing and cleaning the Firepot</b>	The firepot can be removed for cleaning by loosening the bolt holding the stirring rod in place. Slide the keeper sleeve off of the gear shaft exposing the connector piece. Rotate the stirring rod until the slot is vertical. Now lift the firepot and the stirring rod out of the firepot holder. To replace reverse the procedure. The stirring rod can be manually rotated by holding in the “up” and “down” arrows on the control board at the same time. The control board needs to be in the “off” setting.
	<b>Removing “Clinkers”</b>	A clinker on the bottom of the firepot, may be removed with a spoon and dropped into the ash pan. NOTE: For your Safety, only remove clinkers from stove when unit is cool. Wear gloves and eye protection.
	<b>Soot and Fly-ash Build Up</b>	The ash pan must be emptied every day. If the ash pan is not emptied regularly ash will build up under the firepot and block the air flow to the fire pot putting the fire out. When the stove is cold, the firepot can be pulled out and removed for a thorough cleaning. Also, check the drop tube (where the corn drops into the firepot) for blockage.
	<b>Thorough Cleaning</b>	Remove the ash pan using a glove. Turn latching handle and slide the ash pan out of the ash pan drawer. Dump the ash pan into a fire safe, covered container. The firepot may be lifted out (first loosen bolt on the agitator shaft hub and slide hub to the side) and dump using a glove. With these items removed, carefully check that the unit and all ashes are cooled completely. Vacuum out the bottom of the unit. Vacuum the inside of the unit out thoroughly and replace all parts, firepot, and ash pan.
	<b>Cleaning the Heat Exchanger.</b>	A sliding plate fits over the fifteen tubes of the heat exchanger. The sliding plate is attached to a small rod protruding through the front of the stove just below the louver vent. Push the rod to the back of the exchanger and then pull forward to the front, several times. This will effectively remove ash and debris from the surface of the heat exchanger. Performing this step often will ensure that cleaning is an easy task. This cleaning procedure should be done daily. If buildup is allowed to go unattended, cleanup will be much more difficult and the efficiency of your stove will be adversely affected. CAUTION: Cleaning rod may be hot! Use a fireplace glove to protect your hand when using the cleaning rod to avoid getting burned!

## APPENDIX B: MAINTENANCE GUIDE (CONT'D)

	<b>Cleaning the Glass</b>	To clean glass, use a mild non-abrasive cleaner when the stove and glass are cool. Creosote builds up on glass quickly when fire is burned at lowest settings. DO NOT use abrasive cleaners on glass. (Glass may crack if subjected to cold liquid cleaners while the glass is still hot. Using cleaner on hot glass may also cause burns, emit fumes and the glass is more likely to stain.)
	<b>Cleaning the Gold Doors (optional feature)</b>	The doors should be wiped down regularly to ensure the luster of the door system lasts. Always use an approved glass cleaner (ie. Windex, Glass Plus) and a lint free soft cloth to polish the door frame. Do not use abrasives like steel wool, brass polish or adhesive cleaners like comet, as these will scratch the finish.
	<b>Door Air Wash</b>	Periodically clean out the door air wash (a groove at the bottom of the door). This air wash directs air over the glass door to minimize soot buildup on the door.
<b>General/Yearly Maintenance</b>	<b>Exhaust Venting System</b>	After using your stove, you will observe small particles of fly-ash. The fly-ash will collect in the exhaust venting system and restrict the flow of the flue gases. Incomplete combustion, such as occurs during start-up, shut down, or incorrect operation of the room heater will lead to some soot formation which will collect in the exhaust venting system. The exhaust venting system should be inspected at least once every year to determine if cleaning is necessary.
	<b>Air Intakes</b>	When starting to use the stove at the beginning of the season, check to ensure that the fresh air intake is clear and unobstructed.
	<b>Oiling the Room Air and Exhaust Blowers</b>	Both the room air & exhaust blowers need to be oiled at least once a season with lightweight oil. Locate the oil ports on either the side or top of the units and add three drops of oil. This simple step will greatly increase the life and serviceability of your unit.
	<b>Checking the tension on the Chain Drive of the Stirring Paddles.</b>	The chain drive is located by opening the left side door (the one with the control panel). Inspect the tension of the chain. It should have approximately 1/2" play. If the chain is too loose, you need to adjust the chain drive motor by loosening the 4 bolts securing it and sliding it back until there is proper play in the chain. Re-tighten the bolts securely afterwards. This should be checked monthly or if you notice the stirring paddles not turning or binding.
	<b>Inspecting the Door Gasket</b>	This is done by taking a 2" strip of paper and shutting the door on it. Then pull the paper to test the gasket pressure. You should have to pull the paper from the door. Check all around the gasket. If the paper slides out easily or falls out, the gasket needs to be replaced. Country Flame recommends that both the door and glass gaskets be replaced at the same time.

## APPENDIX B: MAINTENANCE GUIDE (CONT'D)

	<p><b>Replacing the Door / Glass Gaskets</b></p>	<p>To replace the gaskets, remove the door by lifting it straight up off its hinge pins and laying it face down on a soft surface. Remove the door gasket (you may need to use pliers) and then remove the glass retaining clips and remove glass. Strip off old gasket around glass and clean glass well. Clean out old stove gasket material from gasket track. Once the door and glass are clean, apply gasket material to glass surface and return glass to door, securing with clips (Use care not to over-tighten). Then apply a generous bead of gasket cement into the track. Position the NEW gasket into track and gently press into door. Trim off any excess gasket and wipe away excess cement. Let the cement set 24 hours before placing door back on unit and using the unit. Gasket material and cement may be obtained from your dealer.</p>
	<p><b>Replacing the Glass</b></p>	<p>Remove the door gasket (you may need to use pliers) and then remove the glass retaining clips and remove glass. Replacement glass should be 0.200" (5mm) thick. Overall size of the glass is 16" (405mm) wide by 11" (279mm) high, cut to an irregular shape to fit the door front. Your unit uses <b>KERA LITE®</b>, or a similar ceramic type high temp glass. Do not use any other than recommended glass type in this unit. Replacement glass may be obtained from your dealer. Clean out old stove gasket material from gasket track. Once the area is clean, apply gasket material to new glass surface and return glass to door, securing with clips (Use care not to over-tighten).</p>
	<p><b>Adjusting the Doors</b></p>	<p>The doors of your Harvester Pellet Stove may need some adjustment due to shipping vibrations, jarring during installation and extended use. As it is important that the doors fit properly to remain airtight, it is suggested that you periodically check the alignment of the doors. To adjust the doors .....</p>

## APPENDIX C: TECHNICAL SPECIFICATIONS

<b>Fuel Type:</b> #2 Yellow Shelled Corn Fuel Moisture Content: 14% or less (12% preferred) Heat Content: 10,000 Btu/lb* Ash Content: 3% maximum	Wood Pellet Fuel A.P.F.I. residential fuel Heat Content: 8200 BTU/lb Ash Content: 1% max Bulk Density: 40 lb./cubic ft. min Moisture Content: 8% max Size: 1/4" to 3/8" diameter 1.5" long max Fines: 1% max through 1/8 <sup>th</sup> screen
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**Hopper Size:** 75 pounds corn or 55 pounds wood pellets

**Flue Size:** 3" or 4" – dependent on the chimney height

**Flue Type:** Type L or PL (double wall vent)  
Type L or PL (single wall stainless steel liner)

**Air Inlet:** 1 1/2" Sch 40 Black Iron pipe

**Auger Type:** 1 1/8" cup Auger Feed System

**Controls:** Electronic Integrated Feed Rate/Blower Speed Controls

**Electrical:** 120 Volts, 3 Amperes, and 60 Hz

<b>Measurements:</b>	UNIT BODY HEIGHT	22.75"
	HEIGHT ON PEDESTAL	33.75"
	HEIGHT ON LEGS	31.25"
	UNIT WIDTH (REAR)	25.5"
	WIDTH AT WIDEST POINT	30.75"
	UNIT DEPTH	24.5"

<b>Weight :</b>	STOVE WEIGHT	400
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<b>Clearances:</b>	UNIT TO SIDEWALL	2"
	UNIT TO BACKWALL	1"
	UNIT CORNER TO DIAGONAL WALL	1"
	TOP TO COMBUSTIBLE	8"
	TOP TO CEILING (Alcove)	8"

**Shroud Measurements:**

\*BTU/lb can vary depending on the moisture content of the corn.

## APPENDIX D: HARVESTER THEORY OF OPERATION

### **STARTUP PHASE**

Startup procedure assumes that proper electrical power is being provided from the grid and the stove is in proper working order. Approaching the control panel two red lights should be illuminated. One is the Country Flame logo located at the top of the board and the second red light is located at the bottom right of the control board next to the on/off switch.

Upon pressing the on/off switch and holding it “on” for no less than 5 seconds and no more than 10 seconds will ensure that the red light next to the on/off switch turns from red to green and the igniter light will begin flashing red about once per second.

The stove has now entered the “startup” phase and the operator can build a fire in the burn pot of the corn stove. It is important to ensure a “hot” fire of pellets has been ignited to ensure that the corn will begin to burn once the burn phase has been entered. Once the fire is burning properly and a bed of red coals can be seen, the operator can press and hold the on/off control panel switch for another five seconds or less than 10 seconds. The igniter red light should increase its flashing rate from about once per second to 5 times per second. It will be evident to the operator when the igniter begins this increased rate of flashing. Once this occurs, the operator can release the on/off switch and the system will automatically begin burning corn in the number 3-heat setting. NOTE: In the event that the operator releases the on/off switch and the red igniter light returns to a slow flash rate, this is an indication that a fire has not reached the proper minimum temperature. Allow more time to elapse and then repeat pressing the on/off switch until rapid flashing, of the igniter light and release. Again the control system will switch to number 3-heat setting and begin burning corn if proper minimum temperature of the system has been achieved with the startup fire.

### **BURN PHASE**

Multiple heat lights indicate the control panel burn phase. There are four yellow lights and one red light used to indicate the relationship to the system’s heat settings. Using the up heat (red arrow) increases the desired heat level from Heat 1 through Heat 5. Using the down heat (blue arrow) decreases the desired heat level from Heat 5 through Heat 1. The operator controls the heat output of the stove by utilizing Heat 1 through Heat 5 settings. Heat 1 setting provides the lowest heat output from the system and the longest time between refills of the fuel hopper. Heat 5 provides the maximum heat output from the system and the shortest time between refills of the fuel hopper. Changing any heat setting up or down by one increment will cause an immediate increase or decrease in the heat output of the system. Changing any heat setting up or down by two or more increments will cause the system heat output to immediately change by one increment change followed by each additional increment needing ten minutes to complete the change.

The control system automatically adjusts to the requested heat settings without further intervention of the operator. NOTE: The control panel display immediately reflects the final heat setting requested by the operator regardless of how many incremental changes occur.

During the burn phase the auger light (green) will routinely turn on and off as corn is fed into the system. The igniter light (red) will always remain off once the operator has transitioned the system from startup to burn phase assuming normal operation of the system.

## APPENDIX D: THEORY OF OPERATION (cont'd)

### COOL DOWN PHASE

Any time the system is switched off by holding the on/off switch for more than 3 seconds during normal stove operation, the control system will revert to the cool down phase. During the cool down phase the room, exhaust, and stir pot motors will be operated at high speed. The auger motor will cease to operate thereby ensuring minimal time for the burn phase to be extinguished. During the cool down phase the heat indicator lights will step down from red (5<sup>th</sup> light being on) to the first yellow light being on. This process will be repeated until such time as the control system senses that the stove has been properly cooled down. The auger and igniter lights are both off during the cool down phase.

### FAULT PHASE

The fault phase is indicated by all lights except the Country Flame logo light flashing on and off at a rapid pace. This event signifies that the control board has encountered an improperly operating system and requires intervention by either the operator or a properly trained service technician. In the event that the fault phase continues to flash lights, the operator should not try any repairs except those listed below without contacting their dealer or an authorized and properly trained service technician. Country Flame has made every effort to ensure the safety of the homeowner through proper use of this system. Any attempt to modify or circumvent the safety features of this product is prohibited by the manufacturer. In the event that the fault phase does not reset with the manufacturers recommended procedures, please contact your local authorized Country Flame service representative.

### RESET CONDITION

Reset Condition #1 requires the system to properly proceed through cool down phase. By allowing cool down to occur the control panel will automatically shut off the system. In order for system shut off to occur all electronic controls must sense safe system temperatures. In the event “safe temperatures” are not sensed by the system, the control panel will continue to operate in the cool down phase until such time that safe temperatures are achieved or the operator intervenes. In order to perform a “hot restart” from the cool down phase, Reset Condition #2 must be followed.

Reset Condition #2 assumes the operator has shut down the system and has now decided that a restart of the system is required. In order to perform a restart the operator must press and hold the up heat (red) arrow for a minimum of 15 seconds. This will return the system to startup phase. Please refer to startup phase for specifics. All procedures in the startup phase should be followed in order to ensure burn phase is properly achieved from the hot restart phase. **NOTE: A HOT RESTART CAN ONLY BE ACHIEVED FROM A COOL DOWN PHASE.** In the event of a “fault phase” no hot restart can be initiated.

### SYSTEM MAINTENANCE

There are two functions built into the control board that can be used to assist with maintenance or troubleshooting a system. These two control board functions are:

- a) Prime State
- b) Manual Control

The Prime State is utilized upon installing a new stove or after a fuel bin (hopper) has been depleted of fuel. The prime state can be entered by pressing and holding the on/off switch for a minimum of 15 seconds. By holding the on/off switch on for 15 seconds or more, the auger light (green) will be turned on and the heat lights will be sequenced from lowest to highest light being consecutively turned on to signify the auger being filled with fuel. This prime state will remain on for a maximum of 10 minutes or until the operator presses the



on/off switch at which time the system will revert to the off state. The prime state is utilized only for filling the auger with fuel and can only be utilized from an “off state.”

The Manual Stir Control can only be operated during two states: (a) when the system is shutdown, and (b) when the system is in the startup phase. The purpose of the manual stir control is to allow the operator to position the stir rod for easy removal in order to enhance routine cleaning or maintenance during the shutdown phase. In addition the manual stir control can be utilized to facilitate starting a fire by rotating the stir arm to enhance air flow during the startup phase.

In order to manually turn the stir arm, the up and down (red and blue) heat arrows must be simultaneously pressed while the control is in only the **OFF PHASE** or the **STARTUP PHASE**. As long as the up and down heat arrows are held in either the off or startup phase, the stir rod will rotate. Upon releasing either of these arrows, the stir rod rotation will stop turning. **WARNING:** Keep hands or loose clothing away from the stir pot.

## APPENDIX E: COMBUSTION BASICS

An understanding of **Combustion Basics** will assist in resolving problems with a variety of fuels, changing product and environmental conditions during the operational life of a stove. Just exactly what are pellet or corn stove products suppose to do?

PROVIDE A CONVENIENT PLACE FOR STORAGE OF FUEL.

PROVIDE FOR CONROLLING IGNITION, FUEL, COMBUSTION AIR

PROVIDE CONTROLLING HEAT FROM FIREBOX TO HEAT EXCHANGER.

CONTROL SYTEM TEMPERATURE.

OPERATE SYSTEM EFFICIENTLY TO MINIMIZE WASTE.

ENSURE SAFETY FEATURES PROTECT USER AND SURROUNDING AREA.

Some standard terminology is required in order to discuss Combustion Basics. This terminology is reasonably standard throughout the different industries. The following terms should be part of a service technician's vocabulary and a basic understanding of these items is a must in maintaining a stove system:

**Ash content:** Refers to the non-combustible materials in a fuel, which reduce the heating value per unit of weight.

**Biomass:** All forms of organic matter, including wood, agricultural crops and residues, animal dung and human waste.

**Carbon**

**Dioxide:** A heavy colorless gas that does not support combustion and dissolves in water to form carbonic acid.

**Combustion:** Combustion refers to the rapid oxidation of fuel accompanied by the production of heat, or heat and light. Complete combustion of a fuel is possible only in the presence of an adequate supply of oxygen. Chemical reaction between a fuel and oxygen that usually takes place in air. Commonly known as burning.

**Combustion**

**Air:** The amount of air required inside the combustion chamber to create a burn. Combustion air, for this manual, is defined as the amount of air required to ensure 100% burn of all fuel present in the burn chamber.

**Combustion**

**Efficiency:** Calculated measurement (in percent) of how well the heating equipment is converting a specific fuel into useable heat energy at a specific period of time in the operation of a heating system.

## Combustion

**Temperature:** The temperature required to ensure the release of flammable vapors. To sustain combustion, the heat evolved must maintain this temperature to provide a constant supply of vapors.

**Excess Air:** Any air added to the combustion process above the theoretical value defined as 100% efficiency. A combustion system operated exactly at the peak burn efficiency ratio has a high probability that some of the oxygen in the combustion air will not get paired up with the fuel. Adding **excess air** ensures that a percentage of additional air is available to ensure complete burn of all fuel. Excess air reduces efficiency but ensures complete fuel burn as environmental variables change. In addition, a little excess air provides a cushion against the fuel-air ratio drifting over into the rich (excess fuel) range. With time, all combustion systems will tend to burn richer (that is more fuel than air.) The big enemy that creates a richer burn is dirt. Dirt is more likely to accumulate in the air system rather than in the fuel system. The combustion and makeup air fans, in addition to everything else within a stove, are giant vacuum cleaners, sweeping in any dust, dirt and vapors that happen by. In time, the systems air path becomes partially obstructed, starving the system for air and causing the fuel-air ratio to become rich. Excess air ensures that complete combustion can occur at all times regardless of changes in environmental variables.

## Ignition

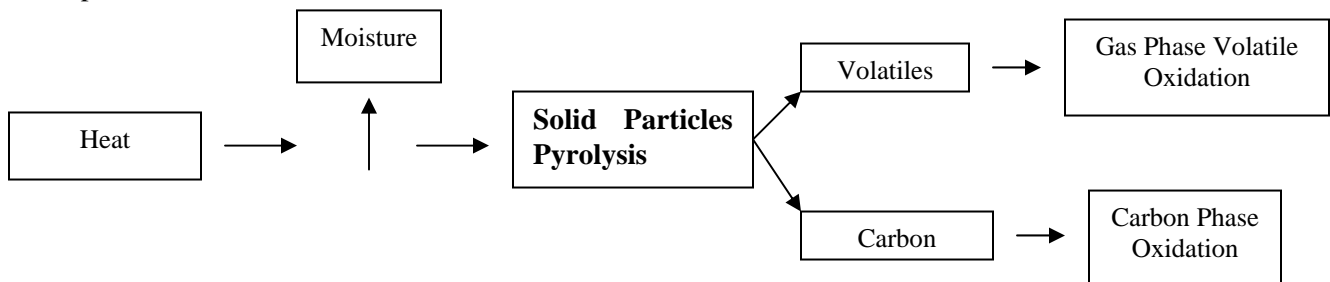
**Temperature:** The temperature at or above which a substance will combust.

**Pyrolysis:** The second stage of ignition during which energy causes gas molecules given off by a heated solid fuel to vibrate and break into pieces.

**Room Air:** Air that is passed through a stove's heat exchanger tubes which elevates the room air temperature and thereby delivers heat to a living space.

## WOOD COMBUSTION BASICS

In a normal wood combustion process, water is first boiled out of the wood and then volatile matter and fixed carbon matter are released and later burned to create heat. Any remaining product left behind in the burn process is defined as ash. FIGURE 21 illustrates the combustion process of wood.



**FIGURE 21: WOOD COMBUSTION PROCESS**

The obvious advantage of wood pellets over conventional chopped wood logs is the consistency of the fuel both from a size and moisture content. Thus, wood pellets burn more efficiently than their log counterparts. The heat generated in the burn process, once combustion is achieved, sustains the process as more fuel is added. As the gases burn, the pellet stove's firebox temperature can reach up to 2000° Fahrenheit. The obvious advantage of corn fuel is it is Nature's palletized fuel. As customer demand for wood pellets increase, corn fuel will be readily available across America. The list below gives a sample of ignition temperatures for some of the carbon and volatile matters released when wood is burnt:

<b>COMBUSTIBLE</b>	<b>FORMULA</b>	<b>IGNITION TEMP (° F)</b>
<b>Fixed Carbon</b>	C	765 – 1115
<b>Volatiles</b>		
Hydrogen	H <sub>2</sub>	1076 – 1094
Methane	CH <sub>4</sub>	1202 – 1382
Ethylene	C <sub>2</sub> H <sub>4</sub>	1008 – 1018
Benzene	C <sub>6</sub> H <sub>6</sub>	1364
Ethane	C <sub>2</sub> H <sub>6</sub>	968 – 1166
Carbon Monoxide	CO	1191 – 1216

Note that all **ignition temperatures** fall between 950° F through 1400° F for volatile matter. All visible flames emitted during a wood fire come from the ignition of volatile matter. Good combustion occurs when the fuel vapors are thoroughly mixed with the combustion air. Mixing ensures that fuel molecules come in contact with oxygen fuel molecules. There must be an abundant amount of oxygen molecules available to react with the fuel molecules or an incomplete burn will occur. NOTE: The fuel-air mixture must at all times exceed the combustion temperature as well as exceed the ignition temperature if a burn is to be sustained. There must be adequate time for the reaction to proceed to completion (complete burn.) It is commonly stated that good conditions for combustion are defined as the THREE T's:

<b>Turbulence</b>	<b>Temperature</b>	<b>Time</b>
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It requires turbulence in the fuel-air path to ensure that fuel and air molecules are thoroughly mixed to sustain the burn process. In addition, it takes a certain amount of temperature, defined as Ignition Temperature to sustain the burn if volatile and carbon matter and it takes a certain combustion temperature to ensure volatile and carbon matter is released from the fuel that will then combine with the oxygen in the air. All of this takes time to occur and is self-sustaining only if all conditions are met for the fuel being burnt.

Heat is obtained from a stove by the thermal radiation that occurs from the burning wood pellets. Although a fairly complex phenomena to define, the heat radiated from the fire is a very strong function of the local (burn pot) temperature and the overall combustion temperature that is maintained within a stove's burn chamber. A relatively minor combustion temperature increase in a pellet stove can produce a significant amount of increased heat output. NOTE: The reverse of the preceding statement is also true. That is, if too much heat is pulled from the combustion chamber via the heat exchanger tubes, the combustion temperature can drop rapidly thus causing a "burn out" once the combustion chamber drops below the critical "ignition temperatures" required of the different fuel components. Wood pellets, because of their low combustion temperature ensure an ample supply of volatile and carbon matters available for continued ignition. However, for other types of fuel, such as corn, it is important that the service technician understand the complexity of this principle and how environmental variables can affect the combustion chamber, combustion temperature, and ignition temperatures. Once a burn chamber's temperature begins to fall below critical ignition temperatures, the heat required to sustain the combustion temperature can also be lost and the fire will go out.

As a final note, the four basic stages of wood burning are:

- a) Up to 212° F the wood is boiling of the moisture.
- b) Near 575° F gasification of the solid wood fuel occurs. The wood will simply seem to disappear. Very little energy is released in these first two stages and external energy must be applied to sustain any combustion that is occurring.
- c) Somewhere between 900° F and 1100° F the wood fuel particles have combined with oxygen molecules and released the majority of the available energy. Some gases will still not have reached ignition temperature and at this critical stage, if too much heat is removed from the combustion chamber, no more fuel will be burnt. All remaining fuel will simply exhaust through the system as unburned material.
- d) At temperatures around 1500° F the remaining gases and tars will burn off in the combustion chamber. This final combustion yields an additional 10 to 20% additional heat energy and gives a very clean final exhaust from the product.

Wood pellets, as compared to wood logs, enhance the amount of energy released during the burn cycle because of the uniformity of product, the reduced moisture content, and the variation in materials used to produce the wood pellet. These variations allow the turbulence in the burn system to ensure a better agitation of fuel with air and a more rapid and efficient burn. As other biomass fuels are utilized, optimum mixes of pellets will ensure clean burning, reduced emission system are available that compete favorably in the consumer market.

The service technician must be aware that as technology evolves, all stove manufacturers will strive to control more of the variables that might adversely affect the combustion process. In addition, stove manufacturers will strive to optimize the efficiency of the products burn process. It is the service technician's responsibility to understand not only the particular product but also how environmental issues beyond the control of both the manufacturer and the service technician can affect a product's burn process. This understanding will make trouble diagnosis less time consuming and more accurate for all parties involved in maintaining the product in a reliable manner to the satisfaction of our mutual customers.

## APPENDIX F: REPLACEMENT PARTS

### REPLACEMENT PARTS

<u>Part Number</u>	<u>Description</u>	<u>Number per HARVESTER</u>
CB-43	BURN POT SCREEN	1
CB-74	STIR ROD ASSEMBLY	1
CB-145	BURN POT ASSEMBLY	1
PP-353	EXHAUST MOTOR ASSEMBLY	1
PP-355	ROOM AIR MOTOR ASSEMBLY	1
PP-352	VACUUM SENSOR SWITCH	1
PP-347	250 <sup>0</sup> F OVER TEMPERATURE SENSOR	1
PP-12	110 <sup>0</sup> F EXHAUST/ROOM AIR SENSOR	1
25-0052-00	OWNERS MANUAL	1
PP-989	AC RECEPTACLE	1
PP-995	<i>Intelli-Choice</i> CONTROL BOARD	1
PP-1029	WIRING HARNESS	1
PP-40	DOOR FRAME ONLY	1
PP-87-NC	DOOR ROPE GASKET	1
PP-1192	ASH PAN DOOR HANDLE	1
CB-62	CLEAN OUT PLUGS	2
PP-535	AUGER MOTOR ASSEMBLY	1
PP-27	VACUUM HOSE	1
PP-48	NON-ETCHED DOOR GLASS W/TAPE	1
PP-525	ETCHED DOOR GLASS W/TAPE	1

## APPENDIX F: REPLACEMENT PARTS (cont'd)

### REPLACEMENT PARTS

<u>Part Number</u>	<u>Description</u>	<u>Number per HARVESTER</u>
PP-538G	SIDE TRIM, GOLD	2
PP-538N	SIDE TRIM, NICKEL	2
PP-538	SIDE TRIM, BLACK	2
PP-53	SIDE GLASS, NON-ETCHED	2
PP-54	SIDE GLASS, ETCHED	2
PP-185	SIDE TRIM, CUSTOM	2

## APPENDIX G: LABELS

### REPLACEMENT LABELS

Part Number                      Description                      Number per HARVESTER

PP-483

CAUTION LABEL

1



PP-484

CAUTION LABEL

1



PP-35-0300-13

ATTENTION LABEL

1





# APPENDIX G: LABELS (cont'd)

## REPLACEMENT LABELS

Part Number                      Description                      Number per HARVESTER

PP-486	ELECTRICAL LABEL	1
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