

**PD - Agitator Period.** This variable determines the number of seconds to repeat the agitator on time. Increasing this variable increases the agitator off time and decreases the percentage of on time for the agitator. Decreasing this period decreases the agitator off time and increases the percentage of on time for the agitator. The default value is 10 seconds.

**PE - Ignore Vacuum Sensor Setting.** The variable determines the heat ranges that the control will ignore the status of the vacuum sensor. If this variable is set to 4, then the control will ignore the vacuum sensor at heat ranges 4 and lower. The default setting is 3.



### 13. Display Indicators

Several situations or events are indicated in normal operation by blinking display indicators or segments in the display :

Flashing On Indicator : This means that the stove is in the "Start Up" state waiting for either a 3 minute timeout to begin burning or for the stove to reach the warm temperature whichever comes first.

Flashing Off Indicator : This indicates that the stove is in the "Shutdown" state waiting for the OFF button, or for a 15 minute period after the stove was turned off, or for the stove to cool down, or for the door to be closed.

Flashing dash in Heat Range Display : This indicates that the stove is in the normal run mode and is ramping from the current heat range setting to the target heat range setting. Once the ramp is complete, the dash will stop flashing. For ramping from heat range 1 to 9, the default time is 12 minutes (with a 90 second ramp time).

Flashing Automatic Mode Indicator : This indicates that the stove is in normal operation and is running in the automatic mode. However, either the Draft Fan or Auxiliary setting is manually configured.

Flashing Draft Fan Setting Indicator : This indicates that the stove is in normal operation and that the vacuum sensor detects a loss of pressure either because the door is open or because there is a negative pressure in the room with respect to the exhaust.

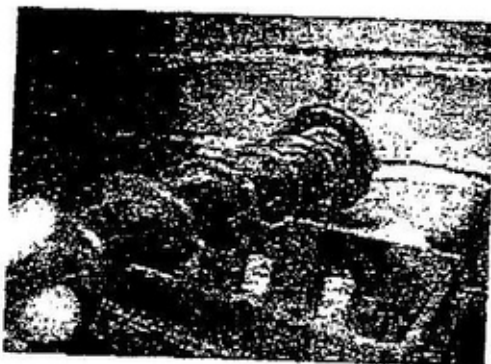


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adjustments made to your American Harvest to manage that fuel. Other than pellets and corn almost any pelletized fuel that meets the Pellet Fuel Industry standards will work.

#### Pre-Start Test Sequence (Diagnostic Tool)

Once unboxed and legs attached (6039T only), install the auger into the auger tube (see illustration). The auger simply slides into the auger tube and interlocks with the auger motor coupler. Once pushed all the way back, rotate the auger to assure the auger has meshed with the coupler. Once together, you should not be able to rotate the auger. *Note: The auger will remain capable of being pulled straight out for removal. Due to the auger always pushing fuel out, it is always pushing itself in. That is why no retainers are used.*



Now, remove the remaining items from the hopper and install the power cord. *Note: When power is supplied to the American Harvest a version number and program code will be displayed on the digital control board for 2 seconds.*

1. After power is supplied to the control board, press and hold switches A and B until the control displays "o 1". The control will then turn on the exhaust blower (combustion) blower. You should be able to verify that the combustion fan is running by placing your hand over the exhaust pipe. The LED over switch "A" will be turned on if the vacuum switch contacts are closed. If it is not, make sure ash dumps located inside firebox are in place and glass door is closed. The combustion fan pulls a vacuum through the firebox when running and the DCB monitors the vacuum switch to assure proper operation. During normal operation, if the switch does not close, signifying vacuum, the DCB will begin a shut down of the stove. During the test procedure, you should verify the operation of the vacuum switch by opening and closing the door. The LED should blink ON/OFF. Press any switch to continue to step 2.
2. The control will display "o 2" and will turn on the room fan. You should verify that the room fan is operating by placing your hand over the front of the stove. Air should be passing through the front grill. Press any switch to continue to step 3.
3. The control will display "o 3" and will turn on the agitator motor. You should see that the agitator rotating inside the firepot. The rotation will be clockwise from the DCB side of the stove. Press any switch to continue to step 4.
4. The control will display "o 4" and will turn on the auger motor. You should see the auger is operating by looking inside the hopper or looking through the glass door. At this time, the DCB also checks the HI LIMIT switch. A correct reading would be a normally "closed" switch, signified by the LED above "A". If the LED does not light, the HI LIMIT switch circuit is "open" and the DCB would normally shut down. Press any switch to continue to step 5.
5. The control will display "i 1" and will turn on the LED over switch A if the low temperature switch is open (which it should be at room temperature). This switch signifies the DCB as to the operating temperature. If closed, the DCB interprets the stove is hot enough for normal operation. Press any switch to continue to step 6.
6. The control will display "i 2" and will turn on the LED over switch A if the thermostat input is shorted (which it should be if the shorting clip is in place). If this test is performed after stove installation and a thermostat has been installed, check the LED light by operating the thermostat. Depress any switch to continue to step.
7. The unit will then display the temperature measured by the temperature sensor. Both 6039 and 6039T will display "00". Press any switch to continue to step 8.
8. The control will then display the frequency of the A/C input voltage. The displayed frequency should be 59, 60 or 61. Press any switch and the letter "d" will be displayed signifying the test mode is "done". Press the "OFF" button to complete.



### 6039 Firmware V34 Changes

**Auger Control** – The auger period is fixed at 8.0 seconds. There are two variables that determine the stoves fuel feed rates. Low Auger Time sets the pounds of corn/hour that will be fed on Heat Range 1. High Auger Time sets the pounds of corn/hour that will be fed on Heat Range 9. "Low Auger Time" can be viewed/modified by pressing the "A" switch. "High Auger Time" can be viewed/modified by pressing the "A" switch again. The default values for these variables are 2.0 and 5.0.

**Agitator Control** – The agitator control has been modified to operate in a manner similar to the furnace control. Using the default value of the agitator period (10 seconds), the agitator will be turned on for 5 seconds and off for 15 seconds on heat ranges 1-3. The agitator will be turned on for 5 seconds and off for 10 seconds on heat ranges 4-6. The agitator will be turned on for 5 seconds and off for 5 seconds on heat ranges 7-9.

Additionally, if the fan is off and cold (all outputs off), pressing the "C" button energizes the agitator to aid in removing the burn pot.

**Combustion Fan Control** – Combustion fan control now utilizes two variables, Low Burn Air and High Burn Air. Low Burn Air sets the voltage applied to the combustion fan on Heat Range 1. High Burn Air sets the voltage applied to the combustion fan on Heat Range 8. Full voltage is applied to the fan on heat range 9. We've found that this approach drastically improves linearity. Low Burn Air can be viewed/modified by pressing the "B" switch. High Burn Air can be viewed/modified by pressing the "B" switch again. The default values for these variables are 90 and 108.

**Room Fan Control** – The room fan Voltage doesn't vary as much as it did with previous firmware. The lowest setting with this firmware is approximately the voltage applied on 4 with previous firmware. An "Auto" setting has been added. If blower speed 9 is displayed, pressing the blower speed up switch will cause the unit to display "A". In this mode, the room fan will follow the heat range.

**Heat Range Changes – Ramping** – When the heat range is changed, the combustion fan and auger will ramp to the new setting. The control will spend a programmable length of time on intermediate heat ranges before increasing or decreasing. Variable P7 determines the time spent on each heat range. The default value is 30 seconds.

**Error Codes** – Added error codes for unnatural stove shutdowns (shutdowns that occurred without someone pressing the off button). The error codes are listed below:

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Error codes are

- E1 - Over temperature shut down
- E2 - Fire Out (out of fuel, vacuum switch open, etc.)
- E3 - Time limit for start up expired without the low temperature thermal disc closing.
- E4 - Power loss. Power went out when the stove was operating and up to temperature (low temperature thermal disc closed). When power was restored, the low temperature thermal disc was open

**Factory Default Values** - Pressing the blower speed up and down switches for 2 seconds will return the control to factory default values.



E4 - Power loss. Power was lost when the stove was operating and up to temperature (low temperature thermal disc closed). When power was restored, the low temperature thermal disc was open.

When initially turning on a fan (combustion or room), the fan will be turned on fully (120 VAC) for the first two seconds. This was previously only 1 second.

When the stove is off and cold (no outputs on), depressing switch C will activate the agitator. This was done to facilitate positioning the agitator to make removal of the agitator and burn pot easier.

#### 6039 Programmable Variables Version 34

P1 - Auger High Feed Rate. This variable determines the number of pounds of corn to feed into the burn pot when the Heat Range is set to 9. The default value is 5 pounds of corn per hour. This variable can be more easily changed via Switch A.

P2 - High Burn Air Setting. This variable sets the combustion fan speed for Heat Range 8 (Heat Range 9 is fully on - 120 VAC). This variable is more easily modified via Switch B (see above). The default setting is 108.

P3 - Hot Stove Temperature. Not used in the 6039

P4 - Hot Stove Temperature Hysteresis. Not used in the 6039

P5 - Air On Temperature - Not used in the 6039.

P6 - Auger Bump Timer - The variable determines the number of minutes that the auger will "bump" corn off the auger tube when the auger is being inhibited from operating. (shut down etc.) The default setting is 15 minutes.

P7 - Ramp Timer - This variable determines the number of seconds that the stove will spend on intermediate heat ranges when changing from one heat range to another. The stove will ramp down twice as fast as it will ramp up. The default value is 30 seconds.

P8 - Start Up Time Limit. This variable determines the number of minutes that the stove will be given to heat up to operating temperature when starting. The default value is 15 minutes.

P9 - Default Factory Settings. Selecting this variable will cause the unit to load and store the factory defaults for all variables. This function can also be selected by depressing the Blower Speed Up and Down switches for 2 seconds.

PA - Room Fan On Temperature. Not used in the 6039.

PB - Lower Auger Off Status. Not used in the 6039.

PC - Go High Status. Not used in the 6039.



## 12. Error Codes

During normal operation, the stove is constantly monitored for problems. In the event of an error condition, the stove is stopped and an error code is displayed as follows :

- Err1 - The high limit temperature sensor was tripped.
- Inadequate ventilation,
  - Room fan failure,
  - Exhaust blockage,
  - Electrical Open in over temperature switch or wiring
- Err2 - Stove ran out of fuel in normal operation.
- Hopper empty
  - Auger output failure or jam
  - Flame or Fuel quality caused fire to go out
  - Electrical Open in low temperature switch or wiring
- Err3 - The stove was unable to reach the 110 deg F. within the startup time
- Flame or Fuel quality caused the fire to burn too slowly or go out
  - Auger output failure or jam
  - Hopper empty on startup
  - Electrical Open in low temperature switch or wiring
- Err4 - The power failed while the stove was hot, and when power was restored, the fire was out.
- Power loss
  - Electrical Open in low temperature switch or wiring
- Err5 - The Auger output fuse has blown.
- Auger motor jammed or bad
- Err6 - The Agitator output fuse has blown.
- Agitator motor jammed or bad
- Err7 - The Exhaust blower output fuse has blown.
- Exhaust Fan motor jammed or bad
- Err8 - The Room fan blower output fuse has blown.
- Room Fan motor jammed or bad
- Err9 - Zero Cross Input failed
- AC Supply frequency out of range
  - Zero Cross Optocoupler Failure

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## Electrical Overview

Power is supplied by a 110Vac grounded circuit protected by a 4amp in-line fuse, placed directly on the control board. The wiring harness connects power input, to all AC motors, Hi Limit switch and Low Limit switch to the Digital Control Board (DCB) via an eight wire snap on/off Molex connection (see illustration).

The Vacuum Switch for 2005 is wired directly to the DCB on both 6039 and 6039T. This connection is located on the lower left corner of the control board next to the "Thermostat" connection terminals (see illustration). By



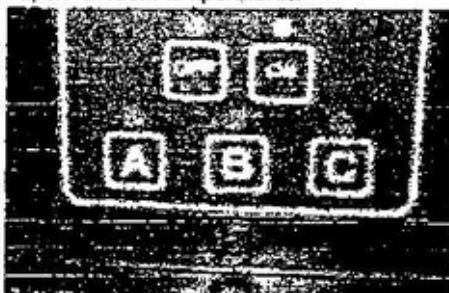
default, the "Thermostat" connection terminals are jumped from the factory for normal operation. Should a thermostat be installed, remove this jumper and wire directly to the terminals.

The eight wire harness connection provides two wires for power input (black, white), two wires for switch input (Low Limit - green, Hi Limit - purple) and four wires for power output (Auger - red, Agitator - brown, Combustion Fan - orange, Distribution Fan - blue).

## Electrical Input Switches (Low Limit, Hi Limit, Vacuum)

The DCB receives input from one of three operating switches located on the stove other than the control board itself. These are the Low limit, Hi Limit and Vacuum.

Low Limit is a normally open, heat sensitive contact that closes when exposed to 110F. The actual heat range for this switch is 110F-20F. Meaning, the circuit remains closed, once exposed to closing temperature, until the switch cools down 20F. This switch informs the DCB the stove running normally. Test this switch by checking continuity across the terminals. Proper reading would be "Open" at room temperatures.



Hi Limit is a normally closed, heat sensitive contact that opens when exposed to 250F. This switch allows for a safe shut down should temperatures reach elevated levels. Test this switch by checking continuity across the terminals. Proper reading would be "Closed" at room temperatures.

Vacuum is a normally open, pressure sensitive contact that opens when the vacuum from the exhaust blower is lost through the firebox. Should this vacuum be lost, the DCB would begin a safe shut down by slowing the fuel feed. Test this switch by checking continuity across the terminals. Proper reading would be "Open" when exhaust blower is running and the firebox is sealed.

During operation of the American Harvest, the DCB indicates an open circuit or problem with the Hi Limit and Vacuum switch by illuminating an LED light. A light above the letter "A" will indicate the Vacuum Switch (see illustration). A light above letter "B" will indicate a Hi Limit switch. Should the light above the letter "C" be lit, indicates a pause in the auger. This happens during start-up when the auger is delayed or when the letter "C" is depressed, causing a 1-minute pause in the fuel feed. The Low Limit switch is a normally "open" circuit and closes when heated above 110F, indicating normal operation. (For the Low Limit switch to reopen, it must cool down 110F-20F or 90F)





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store the variable. Note: If P9 is selected, the control will store the default variables, exit the variable modify utility and go into the Off Mode.

P1 - The auger period in tenths of seconds. The default is 175 (17.5 seconds for Program B, 16.0 seconds for all other programs). See Auger On Worksheet below

P2 - Cold Stove temperature. When the off button is depressed, the stove will continue to run the draft fan, room fan and lower auger until this temperature is reached. When reached, all outputs will be turned off. The default setting is 95 degrees for models with a heat sensor. Others will use a 110F - 20F disk causing the control board to read an open circuit at 90F.

P3 - High temperature shutdown. When the stove reaches this temperature, the control will stop the starting auger or reduce the auger cycle. The default value is 350 degrees. For models using a HI limit disk, this temperature will be 250F.

P4 - High temperature hysteresis. If the stove reaches the high temperature shutdown value, this variable determines how many degrees the stove must cool below the shutdown value to resume normal auger operation. The default value is 1 degree.

P5 - Air On Temperature base. If the Air On Temperature setting is 1, this value determines the temperature the stove must attain to be considered "On Temperature". This is the temperature that the stove must attain during the 15 minute start up period to avoid being shut down. It is also the temperature that must be reached to operate the room fan. If the AOT setting is increased, the "On Temperature" temperature is increased by 3 degrees for every increment. The default value is 115 degrees.

P6 - Auger "Bump" Timer. If program B is selected (Com Stove operation), this variable is the number of minutes that the control will "bump" the auger when shutting down to help prevent burn back. The "On" time for the auger in this mode is .5 seconds during the period. The default setting is 15 minutes.

P7 - Electric Starter On Time. If an electric starter is used, the variable determines how long (in minutes) the electric starter will be operated to start the fire. The default value is 8 minutes.

P8 - Maximum Start Time. This variable determines how many minutes will be allowed for the stove to attain "On Temperature" when started. If an electric starter is used, this time begins when the electric starter is turned off. The default value is 15 minutes.

P9 - If this variable is selected, the unit will set all variables to default values.

PA - Almost Hot Temperature (5500/XL, 5700 ONLY) If the stove reaches this temperature, the room fan will be turned on high no matter what the room fan setting is. The duty cycle of the auger will be cut back from a maximum rate to a lower rate. The default value is 290 degrees.

PB - Auger Operation During Electric Start (5500/XL, 5700 ONLY) - If this variable is set to 1, the upper and lower auger will be turned off while the electric starter is on. If this variable is set to zero, the auger will operate at its normal duty cycle while the starter is on. The default value is 0.

PC - Max Auger Operation (5500/XL, 5700 ONLY) If this variable is set to one, the auger will be operated at a maximum rate of 4 lbs of fuel per hour (if the stove temperature is less than the "Almost Hot Temperature"). If this variable is set to 0, the maximum auger operation will be 3 lbs of fuel per hour. The default value is 1.

PD - Agitator Period. This variable is the period of the agitator. The on times for the agitator for the 9 heat ranges (1-9) are 16, 21, 26, 31, 36, 41, 46, 54 and 62 seconds. The off time for a heat range setting is the period minus the off time so if the period is set less than 16, the auger will run constantly. Setting the period of 255 seconds means the agitator will never turn on. The default setting is 61 seconds.

PE - Ignore Vacuum Sensor Setting. The combustion air fan can be operated at a slow enough speed during normal operation that the vacuum sensor input can open. Setting this value to 2 for example, will cause the control to ignore the vacuum sensor input for heat range settings of 2 and 1. Setting this variable to 9 will cause the control to ignore the vacuum sensor totally. The default setting for this variable is 1. (Set to 0 if programs A, C or D are selected).

Auger Run Times 6039 (Default: Auger Duty Cycle is 6039/18.5 seconds)



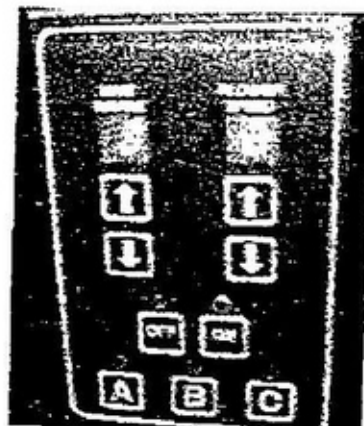
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Digital Control Board ver. 5  
6039/5700/5500/5500XL**Upon Powering Up Control Board**

When power is supplied to the control board a version number and program code will be displayed for 2 seconds. The program code is referenced by A, B, C, or D. At present, program "A" is for a future furnace, program "B" is for the 6039, program "C" is to be determined and program "D" is for the 5700. Due to the current stage of development, the models 5500 and 5500XL have yet to be assigned a default program. It is possible these two models will share the same program as the 5700.

**Adjusting the Air Fuel Mixture**

The two adjustments necessary for proper air/fuel mixture are the combustion air blower setting and the auger run time setting. These two adjustments are the basis for allowing this model the ability to burn many types of fuel in many different installations.



The auger run time adjustment is made by pressing the "A" button and adjusting the nine variables up or down as necessary. This allows the user ultimate control of the amount of fuel delivered. Increasing the number displayed, feeds more fuel and lowering the number decreases the fuel. When adjustments are needed for the Combustion air blower, press "B" and adjust up or down as required. The adjustments made here are saved automatically and applied to all nine heat ranges. Even though all nine heat ranges are affected, the lower ranges are adjusted the most. These adjustments allow "tweaking" your unit for maximum efficiency.

*Note: On some models the "A" and "B" buttons are deactivated from the factory.*

**If activation of "A" and "B" is necessary:**

Step 1 turn unit "ON".

Step 2 Press and hold the Blower "UP" arrow and the Heat range "DOWN" arrow at the same time for 5 seconds. In most cases, you will see the numbers displayed in the heat range window and blower window blink. Then release the buttons and press "A" or "B" buttons to check activation. When activated, pressing either button will display a light above that letter and display a single digit in the blower speed window. The heat range window will be blank. If not activated, repeat the Step 1.

**Programmable/Viewable Variables**

The 6039 control has 13 programmable operational parameters, 2 viewable real time parameters, a method of returning the control to factory defaults and a method of enabling and disabling the lower 3 switches on the control panel. These 3 switches are labeled "A", "B" and "C". From the factory, "C" will be enabled allowing the user to "Pause" the auger for one minute increments.

The 2 viewable real time parameters are the measured stove temperature (Not available on 6039/6039T) and the measured frequency of the A/C input power. To enter the "View Parameter" mode, depress and hold the "Heat Range Up" and "Blower Speed Down" switches for 3 seconds. The unit will display "U 1". Use the "Heat Range" Up and Down switches to select the desired variable (1 for stove temperature and 2 for frequency). Depress the "On" switch to display the variable. See the discussion below pertaining to displaying 3 digit numbers on a 2 digit display. Depress the "On" or "Off" switch to return to normal operation.

The control has 13 operational variables that can be modified and an additional function that causes the control to return to factory defaults. To view/modify the variables press and hold switches "B" and "C" on the front panel for 3 seconds. "P1" will be displayed on the display. Use the "Heat Range" up and down switches to select the desired variable (P1 to PE). When the desired variable has been selected, press the "On" switch. The selected variable will be displayed on the numeric display. The control only has 2 numeric displays and several of the variables can be 3 digits in length. For these cases, the 2 numeric displays show the last 2 digits. If the variable is equal to or above 100 and less than 200, the "A" LED will be turned on. If the variable is equal to or above 200 and less than 300, the "B" LED will be turned on. If the variable is equal to or above 300, the "C" LED will be turned on.

Use the "Heat Range" up and down switches to modify the variable. To exit, depress the "On" switch if you want to store the modified variable and return to normal operation. Depress the "Off" switch to exit if you do not want to



### 6039 Firmware Version 34

**Auger Control**— The auger period is fixed at 8.0 seconds. There are two variables that determine the stove fuel feed rates. Low Auger Time sets the pounds of corn/hour that will be fed on Heat Range 1. High Auger Time sets the pounds of corn/hour that will be fed on Heat Range 9. "Low Auger Time" can be viewed/modified by pressing the "A" switch. "High Auger Time" can be viewed/modified by pressing the "A" switch again. The default values for these variables are 1.5 and 5.0.

The maximum feed rate (Heat Range setting 9) has been changed from 6 pounds of corn per hour to 5 pounds of corn per hour. Five pounds of corn per hour is approximately the same feed rate as Heat Range setting 7 of previous firmware versions. The approximate feed rates of the heat ranges are listed below:

Heat Range 1 - 1.5 pounds of corn/hour  
Heat Range 2 - 1.9375 pounds of corn/hour  
Heat Range 3 - 2.375 pounds of corn/hour  
Heat Range 4 - 2.8125 pounds of corn/hour  
Heat Range 5 - 3.25 pounds of corn/hour  
Heat Range 6 - 3.6875 pounds of corn/hour  
Heat Range 7 - 4.125 pounds of corn/hour  
Heat Range 8 - 4.5625 pounds of corn/hour  
Heat Range 9 - 5.0 pounds of corn/hour

Pressing switch C to inhibit the operation of the auger for 1 minute now also stops the agitator from operating during the 1 minute time period.

Pressing the Blower Speed Up and Down switches for approximately 2 seconds will return the control to factory default settings.

The firmware was modified to "ramp" when a new Heat Range is selected. For example if the Heat Range selection is changed from 1 to 9, the unit will operate for a programmable length of time on settings 2, 3, 4, 5, 6, 7 and 8 before operating on Heat Range 9. Programmable variable P7 sets the number of seconds that the unit will operate at the intermediate heat ranges. The default value is 30 seconds. The stove will ramp down twice as fast. For example, with P7 set at 30 seconds, the unit will spend 15 seconds on intermediate Heat Ranges before decreasing.

The Room Fan speed was increased on the lower heat range settings. The speed of the fan on a heat range setting of 1 is now what it used to be on heat range 4.

Control of the agitator has been changed. The agitator on time is always five seconds. With variable "Pd" set to 10 seconds (the default value), the agitator will turn on 5 seconds then off for 5 seconds on Heat Ranges 7, 8 & 9. On Heat Ranges 4, 5 and 6, the agitator period will be 1.5 times variable "Pd" or 5 seconds on and 10 seconds off. On Heat Ranges 1, 2 and 3, the agitator period will be 2 times variable "Pd" or 5 seconds on and 15 seconds off.

Error codes are now displayed to indicate the cause of an unnatural stove shut down. An unnatural stove shutdown is a shutdown that didn't involve someone depressing the off switch. The displayed error codes are given below:

E1 - Over temperature shut down.

E2 - Fire out (out of fuel, vacuum switch open, etc.)

..... thermal disc closing.

