Hot Water Boilers

Operating instructions and maintenance enclosed
Thoroughly read and understand instructions
Always leave this manual with stove owner

Follow the instructions within this manual. If instructions are not followed, a fire may result causing property damage, personal injury, or even death.

A carbon monoxide detector has been supplied with your stove. You must plug it in.

Danger risk of fire or explosion. Do not burn garbage, gasoline, drain oil, or other flammable liquids. Do not use chemicals or fluids to start fire.

Burn rice or buckwheat anthracite coal only

Stoves surfaces may be hot while in operation. Keep children away. Do not touch during operation

Do not connect this unit to a chimney flue serving another appliance.

Follow all local building and Zoning ordnances

KEYSTOKER BOILER INSTALLATION INSTRUCTIONS

Through these instructions we will try to guide you on a step by step procedure for installing, adjusting and operating of your new KEYSTOKER stoker boiler unit.

Selection of location. Keystoker boilers are available with fire door on the right or left side. When you stand at the stoker end of the boiler and look directly over top of boiler toward stack end, you may choose to have a fire door on the right or left side of boiler. Selecting a position to make this door accessible is important. When door side must be placed toward a wall, 30" clearance is recommended for easy fire and ash door access. Clearance from wall at stack end should be 18" to permit removal of water heating coil if necessary. Clearance on blank and hopper sides should be 6".

Setting up boiler. Place boiler in desired position. We strongly recommend placing steel shims or bricks under each corner of boiler to allow an air space, to prevent moisture from accumulating and rusting base of boiler. Using a level, plumb stoker end of the boiler, adding steel shims as necessary to plumb the stoker end of the boiler. Failure to do this will change pitch on stoker unit and may have adverse effects when burning coal. Again with level, check top of boiler from side to side, adding shims as necessary to level boiler. Do not place shims completely under boiler. Allow 1" to 2" of shims to extend out from under the boiler. Shims will then be used as a base to rest insulated jacket upon.

Supply & Return piping system. The top of you boiler has at least 4 openings. The largest opening is the feed line to your radiation. Since this outlet has a drop tube welded inside the boiler, you must use if for your radiation supply line. Even thou it may be necessary to bush down to a smaller size, we recommend starting with 1 ¼" pipe and installing a 1 ¼" x 1 ¼" x 1" tee in supply line to be used for a by-pass loop. (See Installation Diagram) Pg 5. You may now make your piping connections from feed outlet on boiler to flow valve.

You may use either of the large openings on the bottom of the stack end of the boiler as your return. Select the side that will allow convenient access to the circulator for future servicing. Install return piping and circulator, again referring to (Installation Diagram Pg 6) for location of by-pass loop. Your 1 ¼" x 1 ¼" x 1" tee must be installed below circulator.

Install by-pass loop as per (Installation Diagram) with 1" pipe size. Place a tee 1' x ½" F x 1" in by-pass loop to allow installation of immersion well for the 4006B Honeywell Hi Limit control to extend into full water flow.
Over 50 years of installation experience has proven to us that the above mentioned by-pass loop is absolutely necessary for optimum performance of your heating system (See Diagram Pg 7).

Install a boiler drain valve in the other large opening at bottom of boiler. (See Diagram pg 7).

Boiler fill and domestic water piping. Refer to Installation Diagram Pg 6; install ½" male adaptors in both fittings on domestic water coil. Install a ½" male adaptor in the ½" fittings on top of boiler to be used for a boiler water fill.
NOTE: Before proceeding with connections for piping of boiler fill and domestic water, INSTALL stack end of insulated steel jacket NOW. Then you may proceed with completion of domestic piping and installation of necessary valves. (See Diagram Pg 6).

Install a domestic water mixing valve, we recommend a Honeywell AM-1 series not included with boiler install as per manufactures instructions (See Diagram Pg 5).

If an automatic fill valve is desired, install as per manufacture's instructions.

Install a PH 5 expansion tank on the domestic mixed water line as per manufactures instructions (See Diagram Pg 5).

Installation and piping of accessories: A ¾" 30 lb. AMSE approved relief valve must be installed in ¾" fitting on top of boiler, turning discharge to the side and hard pipe it to 3" above floor (See Diagram Pg 7).

Install altitude gauge (temperature/ pressure gauge, See Diagram Pg 5).

Connect expansion tank directly to remaining fittings on top of the boiler, NOT to any other part of the heating system. Install a 1/2 " ball valve in pipe going to expansion tank with direction marker on valve pointing toward the expansion tank. (See Diagram Pg 5).

Install immersion well for low water cut off, in ¾" fitting on side of boiler above fire door in lower hole closet to unit end of boiler (See Diagram Pg 5).

Install immersion well for Triple Aquastat, in ¾' fitting on side of boiler above fire door in upper hole (see Diagram) Pg 6.

Place fire door into boiler opening and secure by tightening screws in frame of fire door. Seal fire door with high temp. silicone or furnace cement. Install spring handle on fire door handle by bending spring handle open and put it through hole in handle on fire door and squeezing it closed.

Jacket and stoker installation: Install hopper end of jacket, then blank side, then fire door side, secure with #8 x 1 sheet metal screws provided. Install jacket top and secure with #8 x 3/8 sheet metal screws.

Stoker units are shipped entirely assembled. Lift stoker into opening, bottom of a stoker has a ¼" rod welded in place which must go inside the stoker opening. Place a thick smear of furnace cement or high temp. silicone on flange of stoker and tilt into place, securing with 3/8 x 1 ¼ machine screws, washers, and nuts as provided.

Set hopper into place. The hopper bottom should lap over stoker throat approximately 1". Since one hopper is use for several size stokers, it may be necessary to trim the opening. Bend flange down to fit inside throat of stoker – be sure mechanism is free to operate.

Control installation and electrical wiring: Install triple aquastat into its well being careful not to kink the thin capillary tube. Install low water cutoff onto its well. Screw timer to jacket next to the triple Aquastat (See Diagram Pg 8).

Install 4006B hi limit into well in by-pass loop. (See Diagram Pg 6).

Your stoker must be on its own circuit. From main breaker to boiler use 12-2 wire with ground on a 20 amp breaker. Follow wiring diagram and any applicable UL and local code

Stack pipe and draft control installation: Stack pipe may now be connected from boiler to chimney, using as few elbows as possible. If stack pipe must be reduced in size, reduce stack at thimble. It is important to run full size stack from boiler to chimney thimble. Install barometric draft controls in first full section of stack closest to boiler. Follow instructions packed with draft control, making sure the draft control bearing are level and face of draft control is perpendicular to floor. Stack pipe must be 18" from any combustible.

Initial start up: Fill system by opening boiler feed valve. Open air vents on radiation one at a time until air is removed from system. Normal operating pressure on most heating systems is between 10 and 20 PSI. Automatic fill valves are factory set at 12 PSI. If an automatic fill valve is not used, then boiler feed valve must remain in normally closed position.

Open valve supplying water to domestic hot water coil, this valve must remain in the normally open position.

Open valve supplying water to expansion tank, this valve must remain in the normally open position.

Starting coal fire: D0 NOT USE ACCELERANT SUCH AS: as gasoline, litter fluid, or kerosene, etc. Use dry coal only. Put coal in hopper. By reaching through fire door, pull coal down to cover entire grate. Crush several charcoal briquettes into smaller pieces, crumble newspaper and dig it through the coal, so it touches the grate. Lay charcoal on top of newspaper. Turn switch on. When charcoal turns red, place a few hands full of coal on top of charcoal. If fire moves toward bottom of grate before fire is established, coal feed can be slowed down by turning red nut CCW or by flipping feed bolt to a sideward position. (Part #22 on Unit specification sheet)

After starting coal fire: Allow stove and chimney to warm up. Insert draft gauge through pre-drilled hole in upper portion of fire door. Open air shutter (located on bottom of scroll between stoker motor and gear box about ½"). Then with stoker motor running and feeding coal adjust the barometric damper until draft gauge reads (-.02). If draft is less than a (-.02) draft with the barometric damper closed you must close the air shutter (between gear box & stoker motor) a little and recheck. Repeat until you obtain a (-.02) draft. If the draft is higher than (-.02) you must adjust the barometric draft regulator. Move the weight on barometric regulator left or right to obtain the (-.02) Recheck the draft until you obtain a (-.02).

Initial coal feed: Advance red nut all the way forward. Then turn it counter clockwise 11 or 12 turns if burning rice coal, if burning buckwheat coal turn coal feed, back 9 or 10 turns. When boiler is running for about an hour under full load grates should have about 2" of dead ash on them before falling into the ash pan.

As prices of fuel continues to increase –KEYSTOKER – continues to improve and make its product more fuel efficient.

To obtain a more complete burn out of coal, a small secondary blower motor was attached to the stoker unit. THIS MOTOR IS DESIGNED FOR CONTINUOUS RUN.

When large stoker motor is running on demand, small blower will assist with combustion and heat output, by producing a more intense and hotter fire. When demand cycle is completed, large stoker motor will shut off, and small secondary motor will continue to run. This will cause the coal that is already on the grate to burn, rather than to allow coal to smolder and die out in an unburned condition. This will achieve a cleaner ash, and allow more heat to be produced and absorbed into heating system.

During summer operation, the small combustion motor will force a small amount of air through grates at all times, which will cause the ash to become like powder. It also prevents the fire from going out. At the same time, it reduces the size of fire bed to approximately 1 ½" to 2" which will prevent boiler water from becoming overheated.

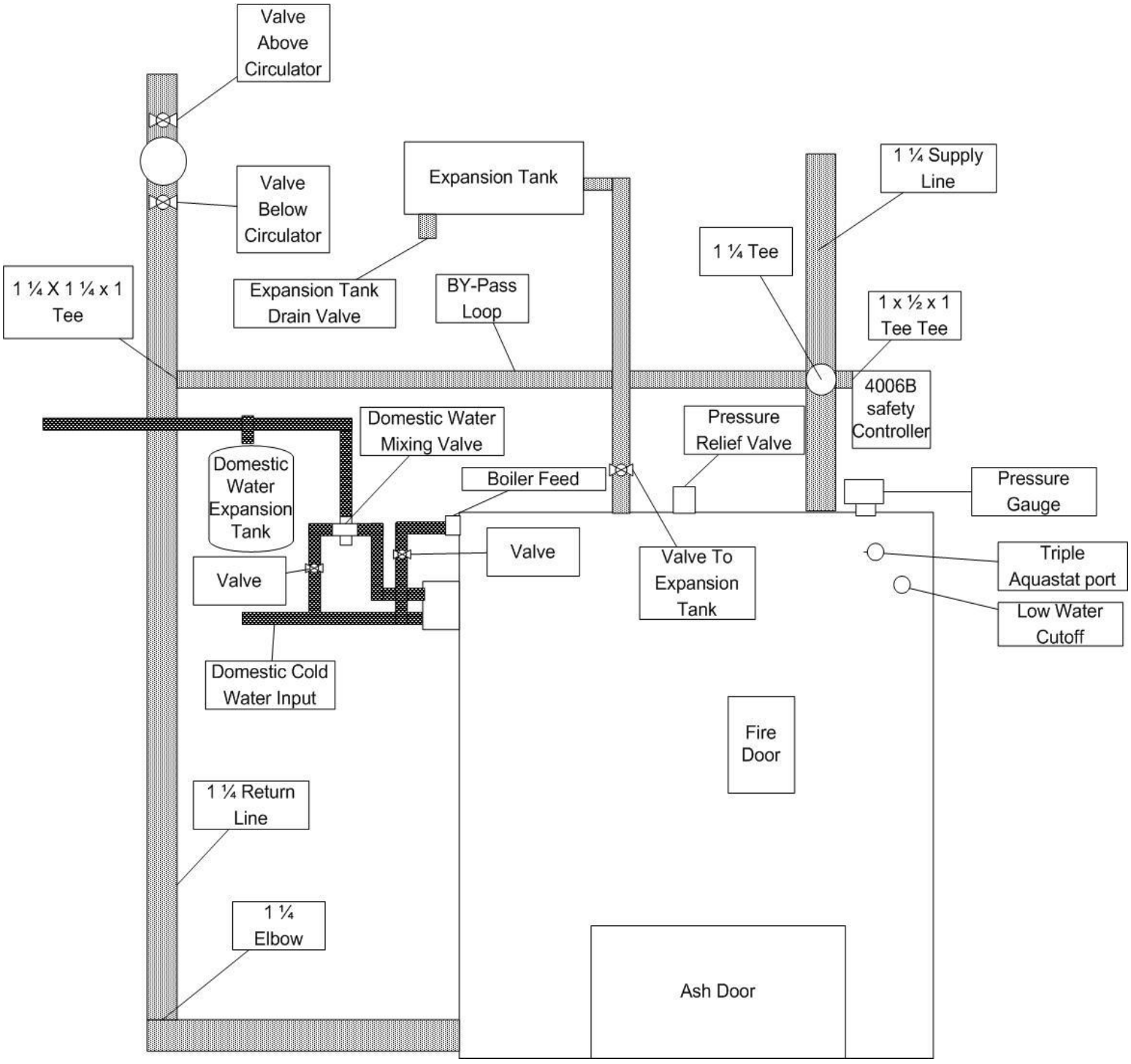
Proper sizing of fire is obtained by turning red nut on feed control arm. Clockwise (CW) for more coal feed and Counterclockwise (CCW) for less coal feed.

Location and final placement for red nut will be determined by size of coal you purchase. For rice coal, red nut might be turned down 12 turns for maximum setting, whereas for buckwheat coal, red nut might only be turned down 10 turns from maximum setting.

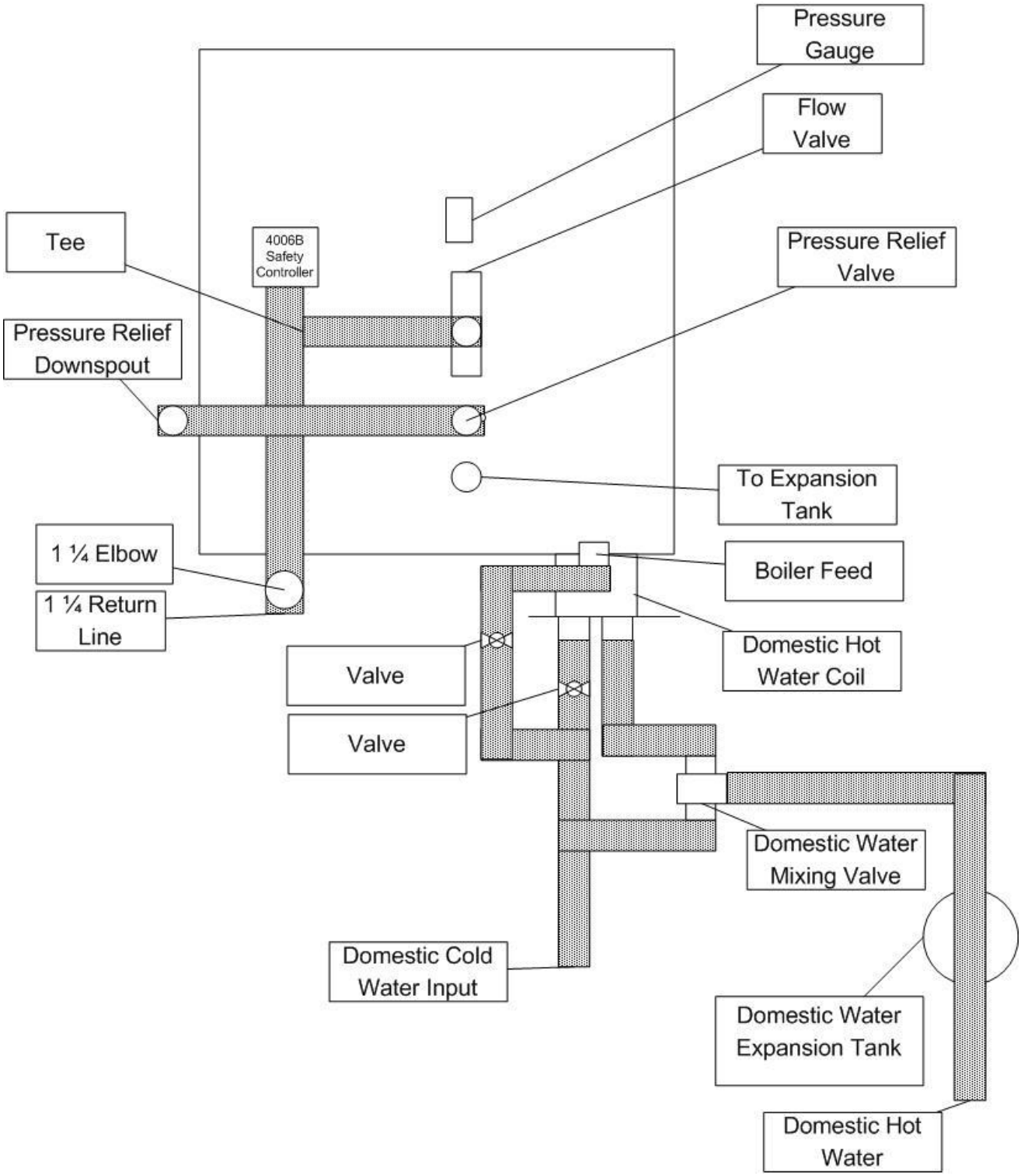
During winter operation, hot coals should never be pushed off end of grate. This indicated that coal feed needs to be reduced (CCW) or if during winter operation; fire bed is too small, turn red nut (CW).

After coal feed adjustment is completed, if during summer, the water is too hot…DO NOT ADJUST COAL FEED. Reduce timer only. If fire goes out…DO NOT ADJUST COAL FEED. Increase timer only.

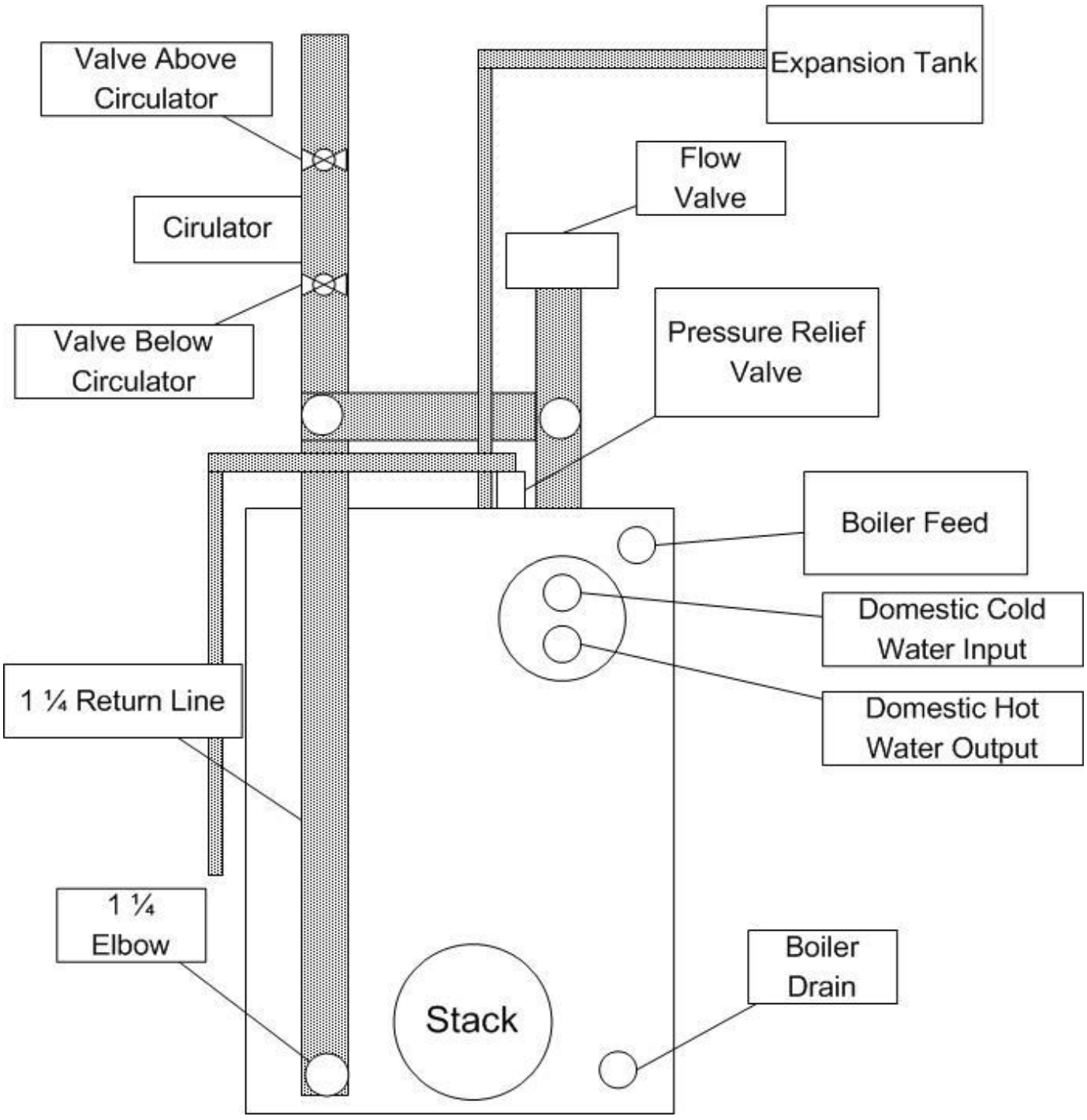
Side View


Valve Above Circulator
Valve Below Circulator
Expansion Tank
1 ¼ Supply Line
1 ¼ Tee
1 ¼ X 1 ¼ x 1 Tee
Expansion Tank Drain Valve
BY-Pass Loop
1 x ½ x 1 Tee Tee
4006B safety Controller
Domestic Water Mixing Valve
Pressure Relief Valve
Domestic Water Expansion Tank
Boiler Feed
Pressure Gauge
Valve
Valve To Expansion Tank
Triple Aquastat port
Valve
Low Water Cutoff
Domestic Cold Water Input
Fire Door
1 ¼ Return Line
1 ¼ Elbow
Ash Door

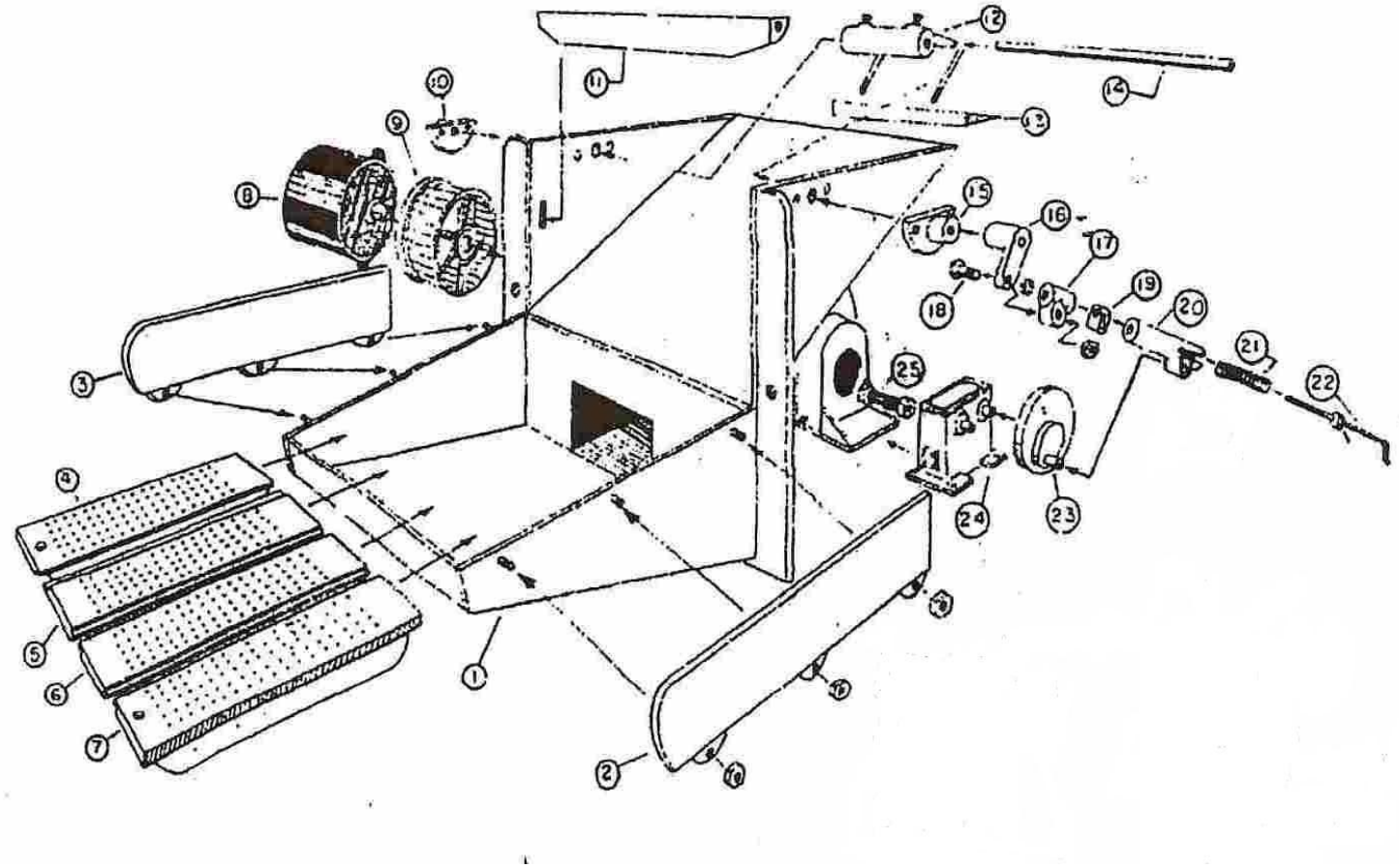
Top View


Pressure Gauge
Flow Valve
Tee
4006B Safety Controller
Pressure Relief Valve
Pressure Relief Downspout
To Expansion Tank
1 ¼ Elbow
Boiler Feed
1 ¼ Return Line
Domestic Hot Water Coil
Valve
Valve
Domestic Water Mixing Valve
Domestic Cold Water Input
Domestic Water Expansion Tank
Domestic Hot Water

Front View


Valve Above Circulator
Expansion Tank
Flow Valve
Cirulator
Valve Below Circulator
Pressure Relief Valve
Boiler Feed
Domestic Cold Water Input
Domestic Hot Water Output
1 ¼ Return Line
1 ¼ Elbow
Stack
Boiler Drain

1. Stoker Body
2. Side Rail Left K-2C
3. Side Rail Right K-1C
4. Grate K-15-1-L
5. Grate K-15-2-L
6. Grate K-15-3-L
7. Grate K-15-4-L
8. Motor
9. Blower Rotor
10. Bearing K-19
11. Throat Strap K-18
12. Pusher Bar Drive Yolk K-8-BC
13. Pusher Bar K-9-BC
14. Pusher Bar Drive Shaft
15. Bearing K-17
16. Feed Crank K-7
17. Feed Assembly Connector K-6
18. Feed Arm Nut
19. Feed Arm Adjustment Nut
20. Feed Latch K-12
21. Feed Spring
22. Feed Bolt
23. Drive Wheel K-5
24. Gearbox K-14
25. Coupling
26. Secondary Combustion Blower



Oil the stoker motor and circulator annually with a good grade of light lubricating oil. DO NOT OVER OIL. Gear box uses #90 gear oil and should be filled from ½ to ¾ full. Oil level can be measured with wire or straw dipped through top lid of gear box while stoker unit is not running.

Keep boiler baffles clean. Clean baffles mean more efficient operation. Baffles are accessible through ash door. Clean stack pipe and base of chimney. Dust off barometric damper to be sure it opens and closes freely.

Air chamber under grates should be cleaned once a year. The fine coal and ash droppings can be removed by removing the screws on scrolling plate and vacuuming, older models require removal of motor and coupling to clean under grates.

If stoker is left idle without fire longer than one week, the hopper should be emptied and cleaned, placing a few drops of oil on moving parts of stoker unit.

A good grade of Anthracite rice or buckwheat coal should be used for best results and performance.

Remove ashes regularly to prevent ashes from piling up to restrict movement of fresh ash to fall off grate. DO NOT allow ash door to remain open for too long, this may cause fire to be extinguished.

A draft reading must be taken by inserting draft gauge in 1/4" hole in fire door. Draft is best checked when chimney is warm, so fire should be lit at least a half hour. Draft must be set at.-02 when stoker unit is idle. (Adjust barometric damper to obtain this reading on gauge.)
While stoker unit is running, the draft should be set approximately -.01. (Air intake on stoker is used as an adjustment to obtain this reading.)

CONTROLS- Electrical controls insure proper operation of stoker unit and circulator. These controls consist of the following:

THERMOSTAT- Adjustable for desired room temperature. Set this to where the house is made comfortable.

TRIPLE AQUASTAT - Controls temperature of boiler and domestic hot water. It should be set at about 180º (º=degrees) on high (Hi) and low (LO) maybe set at 160º for winter and 140ºin summer. A 20º minimum must be kept between HI and LO settings.

TIMER-(If used) Controls stoker unit to maintain fire. It should be set initially to run about one minute every fifteen minutes when draft is -.02. SEE INSTRUCTIONS packed with timer for making adjustments.

MAIN SHUT OFF SWITCH – Is located above Triple Aquastat and will shut off power supply to stoker unit and circulator.

FUSE – Located under main shut off switch under little cover and should never be larger than 20 amps.

HIGH LIMIT AQUASTAT – This control should be mounted in bypass loop above boiler. This acts only as a safety control and should be set at least 220 degrees. If boiler temperature becomes too high, this control starts circulator pump to relieve boiler temperature and will heat radiators, acting as a signal. If this condition occurs, refer to overheating.

TEMPERATURE GAUGE – Located on top of boiler. Lower half indicates water temperature. Upper half indicates water pressure. This pressure should be kept at a point which is determined by filling radiation system until water bleeds freely from air release valves on the highest radiators. In most cases between 12 to 20 pounds. To purge air from entire system, start with lowest radiator o first floor and purge highest radiator last.

MOTOR RESET BUTTON – Small red button located on outside of stoker unit motor in case of overloads, will trip outward, shutting off stoker motor. This can be reset by pr red button inward. Should this trip again after being reset, CALL your dealer.

COAL FEED ADJUSTMENT – Facing the stoker-hopper end of the boiler, you will see on the stoker an adjustable Drive connection threaded rod, attached to gear box. On this threaded rod is a RED adjusting nut. When this RED nut is in highest position toward boiler there is no lost motion on drive rod. Stoker is now at full coal feed. Moving this RED nut down on the threads away from boiler, allows less feed in proportion to amount of lost motion on driving rod. Turn RED nut Counterclockwise for less coal feed. Turn RED nut Clockwise for more coal feed.

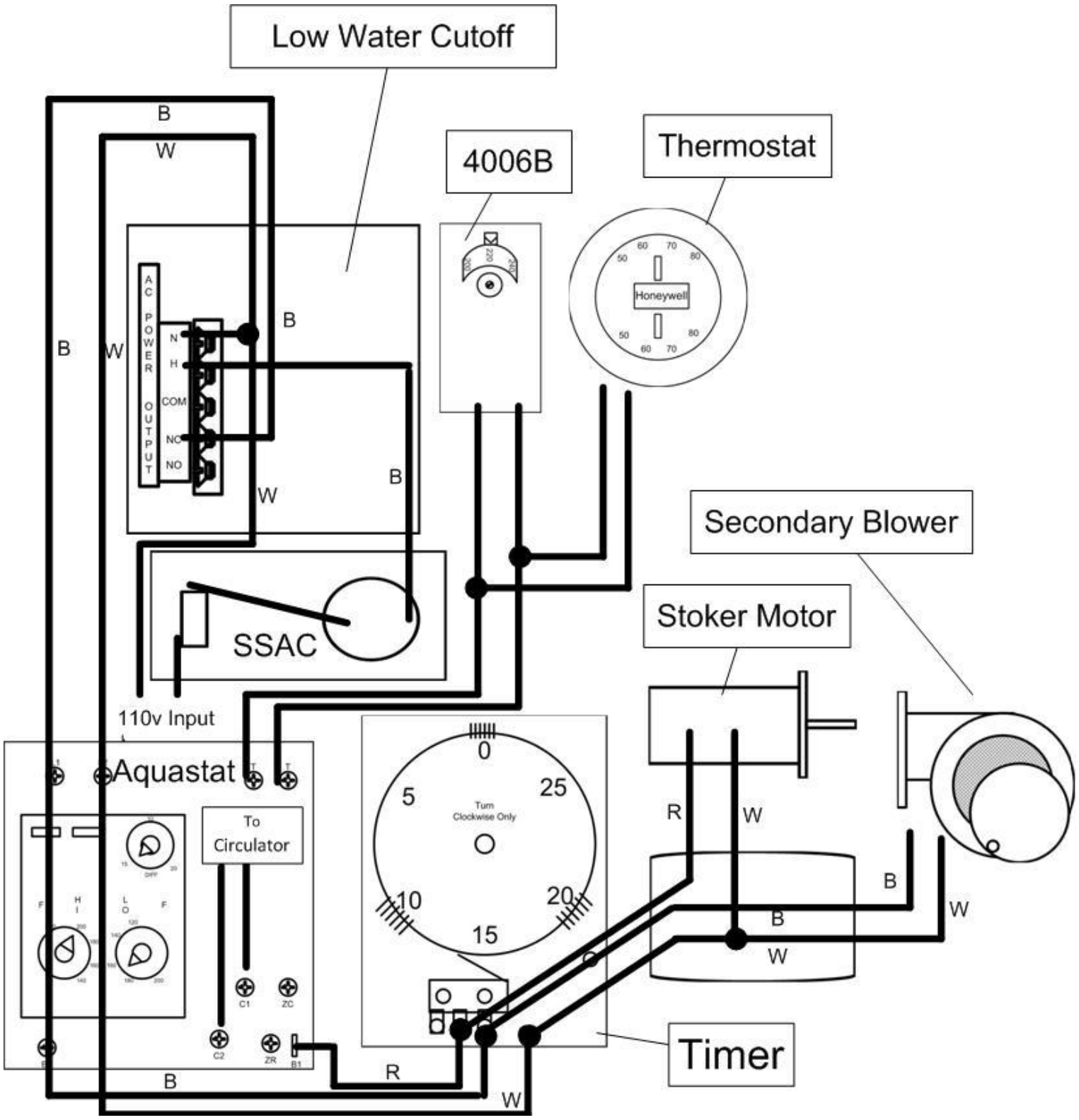
AIR ADJUSTMENT – Located under scroll on stoker unit. This is to be adjusted for proper combustion by means of loosening locking screws and setting air shutter in proper position. This air shutter will be adjusted by your dealer with a draft gauge. (Air shutter is usually set ½ ways open.)

LOW WATER CUTOFF – Located on stack end of boiler. It shuts off stoker unit when water level drops. Water level can be seen in glass tube on stack end of boiler. When shut down by low water level, more water must be added to boiler before stoker unit will be reactivated.

PRESSURE CONTROL – Located on top of the boiler. This control shuts off stoker unit when steam pressure rises and will allow stoker unit to start again when steam pressure drops. Settings will be made by your dealer and should not need adjustments

COLD WEATHER FIRE – When stoker unit is running steady (1/2 hour or longer) the upper portion of grate will have approximately 4" supply of fresh unburned black coal. Fire bed should extend down toward bottom of grate with bottom holding 2" dead ash. If fire bed is less than needed, increase coal feed. If fire is falling off grate, reduce coal feed. (See coal feed adjustment).

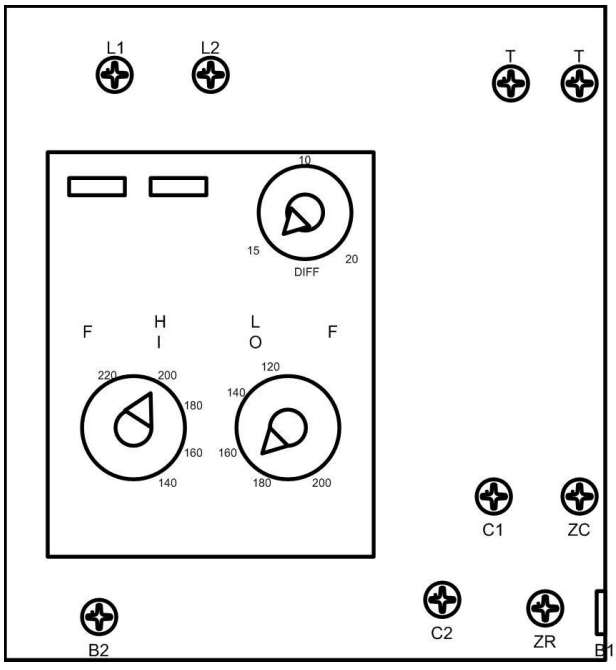
WARM WEATHER FIRE – Upper portion of grate where coal feeds in from hopper should have approximately 4" black unburned coal. The red hot burning coals should be 3" to 4" in length. Remainder of grate should be covered with dead ash.


Low Water Cutoff
4006B
Thermostat
Honeywell
AC POWER OUTPUT
N
H
COM
NC
NO
B
W
SSAC
Secondary Blower
Stoker Motor
110v Input
Aquastat
To Circulator
C1
ZC
C2
ZR
B1
0
5
25
Turn Clockwise Only
10
20
15
R
Timer

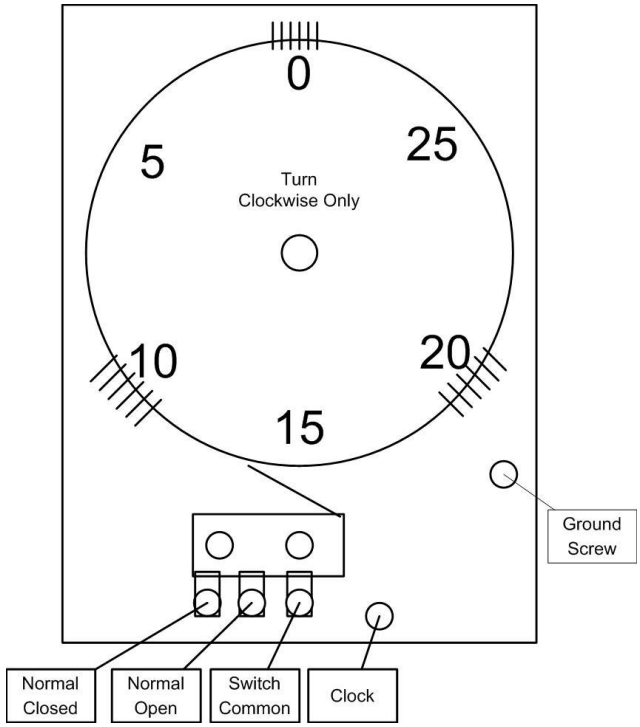
TROUBLE SHOOTING HINTS

PROBLEM	POSSIBLE CAUSE	REMEDY
Stoker doesn't run	Main circuit breaker tripped	Reset
	Main fuse blown	Replace
	Fuse on stoker blown	Replace
	Motor out on reset	Press rest button on motor
	Lo water level (steam)	Fill boiler to proper water level
Stoker motor goes out on reset	Obstruction in throat of stoker	Empty hopper and clear
	Feed mechanism tight or corroded	Empty hopper and free-soaking with penetrating oil-Use dry coal to prevent reoccurrence.
	Motor or gear motor defective	Replace
Pressure fluctuates and water out relief valve	Expansion tank full of water Relief valve defective	Drain – Close valve in pipe that goes from expansion tank to boiler. Drain tank dry. Close drain in expansion tank. Open valve in pipe to expansion tank. Put water pressure in boiler up to 12 to 15 lbs.

Triple Aquastat With High and Low Settings



Timer Showing Pin Locations



TROUBLE SHOOTING HINTS

PROBLEM	POSSIBLE CAUSE	REMEDY
Stoker runs but doesn't feed coal	Feed nut backed off too far.	Increase feed-see preceding instructions.
	Obstruction in throat of stoker.	Empty hopper and remove obstruction.
	Feed mechanism tight or corroded	Empty hopper –free- use dry coal to prevent reoccurrence.
	Broken or slipping coupling	Replace
	Defective gearbox	Replace
	Feed mechanism out of adjustment	Throat bar height to be 1-3/4" to 2" (Part #11). Pusher bar (Part #12) to be approximately ¾" behind the face (flat part) of throat bar when in its most forward position with feed nut (Part #19)
Circulator doesn't run	Lo limit setting in Triple aquastat too high	Summer Winter Set Lo at 140 160
	Boiler not up to temperature.	Set Hi at 160 180
	Fire bed too small	Increase coal feed to get bigger fire.
	Defective thermostat	Replace
	Circulator defective	Replace
Circulator runs but no heat	Air in lines Pressure low.	Purge air from radiation Increase – 12 to 15 lbs. Check for leaks if pressure drops frequently.

SAFETY

THE BURNING OF ALL FOSSIL FUELS GENERATES CARBON MONODIDE GASES. CARBON MONODIDE GASES ARE TOXIC. CAN CAUSE SICKNESS, AND CAN BE FATAL.

TO PREVENT toxic carbon monoxide gases from entering the home, certain precautions must be taken.

ASH TUBS must be emptied on a regular basis to prevent ashes from overflowing into ash pit area. Excessive ash accumulation may impede air flow to chimney, preventing gases to be drawn up the chimney.

FIRE DOOR and **ASH DOOR** must be closed at all times during normal operation.

It is necessary to keep some coal in hopper while stove is in operation.

In most applications it is sufficient to clean stove and stove pipes twice during the heating season. However, under extreme weather conditions or high demand on stove running periods, the stove and stove pipe may need more frequent cleaning. Clean as often as necessary.

CAUTION: ASH PAN IS HOT! ALWAYS USE GLOVES TO REMOVE ASH PAN.

Before removing ash pan, turn switch off, or pull power cord plug from 110 volt outlet. Open ash door. Use a good pair of gloves, to remove ash pan. Place ash pan on non-combustible surface. Slide empty ash pan into stove. Close ash door. Turn switch on or plug power cord back into 110 volt outlet.

Hot Water Checklist

Thermostat
Relief
Pressure/Temperature Gauge
40006B with Well
Fire Door
Draft Regulator
Control
Instructions
Warranty Card
Low Water Cutoff Well
2 - 5/16 Stoker Bolts
2 - 3/8 Nuts
6 3/8 Washers
4 Hopper Washers
Spring Handle
Carbon Monoxide Detector
Charcoal