KEYSTOKER INSTALLATION INSTRUCTIONS

Thru 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.

I. Selection of location. Keystoker boilers are available with firedoor on the right or left side when you stand at the stoker end of the boiler. Selecting a position to make this door accessable is important. When door side must be placed toward a wall, 30" clearance is recommended for easy firedoor and ash door access. Clearance from wall at stack end should also be 30" to permit removal of water heating coil if necessary. See Figure 1 - Page 5

II. Set up of boiler. Place boiler in desired position. We strongly recommend placing steel shims under each corner of boiler to allow an air space which will prolong its life by preventing moisture from accumulating and rusting its base. Using a level, plumb the stoker end of the boiler, adding steel shims as necessary. Again with a level, check top of boiler side to side for level, adding shims as required.

III. Hot water piping system.

1. The top of your 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 it for your system feed line even tho in many cases it is necessary to bush down to a smaller size.

2. Assuming that you have a flow valve in place from your old system, you may now make your piping connections from feed outlet to flow valve referring to Figure 2 - Page 5 Don't forget to install a tee in this line to which you will later connect the by-pass loop. See Figure 2 - Page 5

3. 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 service. We recommend locating circulator higher than the boiler which would permit its removal if necessary without completly draining the system. Install return piping and circulator, again referring to Figure 2 for location of by-pass loop. It must be on the boiler side of circulator.

4. Install by-pass loop as per figure 2 with a minimum of 1" pipe size and a tee which will allow installation of the immersion well of the 4006B hi limit (shipped with your controls) into the full water flow of the loop as per Figure 2 - Page 5 Our 35 year of experience installing stoker fired equipment has shown to us that the installation of the above mentioned by-pass loop and the limit control is absolutely necessary for optimum performance of your system.

5. Install in the other large opening on the stack end of the boiler a drain valve of at least ½".

IV. Boiler feed and domestic water piping.

1. Refer to Figure 2 - Page 5 You will most likely be using copper tubing for all the small pipe work (½) on your boiler. On the stack end install adapters in

the 2 coil fittings and in one of the top ½" fittings in the boiler. Plug all other outlets. Use teflon tape on all threads. Place stack end of jacket in place and proceed with piping as illustrated in Figure 2. Note valves and their normal operating position.

2. If a domestic water tempering valve or an automatic fill valve is desired, install asper manufacturers instructions.

V. Installation and piping of accessories:

1. A new 3/4" 30 lb. relief valve must be installed on 3/4" fitting on top of boiler turning the discharge to the side. Install a piece of pipe into the relief valve so that it extends past the side of the boiler, finish with an elbow pointed toward floor.

2. Install pressure temperature gauge.

3. Connect expansion tank directly to remaining fitting on top of boiler, not to any other part of system. Be sure to install a stop and waste valve in expansion tank line with flow direction marker on valve pointing toward the expansion tank. See figure 3 - Page 5.

4. Install immersion well for triple aquastat relay in 3/4" fitting on side of boiler above firedoor. Do not install in any stack end fitting. Response time is much faster in the side fitting.

VI. Jacket and stoker installation.

1. Install hopper end of jacket, then plain side, then firedoor side. Secure with #8 x 1 sheet metal screws provided. Install jacket top, and secure with #8 x 3/8 sheet metal screws.

2. Stoker units are shipped entirely assembled. Lift stoker into opening, bottom of stoker has a ¼" rod welded in place which must go inside the stoker opening. Place a thick smear of furnace cement on flange of stoker and tilt into place, securing with 3/8 x 1½ machine screws, washers and nuts as provided.

3. Set hopper into place. The hopper bottom should lap over stoker throat approximately 1". Since the same size hopper is used with several different 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. See Figure 4 - Page 5.

II. Control installation and electrical wiring.

1. Install triple aquastat into its well being careful not to kink the thin capillary tube. Screw timer to jacket next to the triple aquastat.

2. Install 4006B hi limit into well in by-pass loop. See Figure 2 - Page 5.

3. Your stoker should be on its own circuit. From main fuse or circuit breaker panel to boiler run a piece of size 12-2 W/ground cable on a 30 amp fuse stat

or breaker in main panel. Be sure to connect the "hot" line to the switch supplied with your controls, and not the neutral wire, because controls system will not work properly if these wires are reversed. Check with tester hot wire to ground will light - Neutral will not light. Refer to hot water wiring diagram and connect stoker and circulator wires. Use 18-2 thermostat wire for 4006B hi limit and install thermostat as per manufacturers instruction packed with it.

VIII. Stack pipe and draft control installation.

1. Full size stack from boiler to chimney, In case should stack be reduced more than 1". 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.

IX. Initial start up.

1. Fill system by opening boiler feed valve. Open air vents on radiation one at a time until air is removed from system. 10 lb. of pressure in your system when it is cold should be enough, as pressure will naturally rise as water is heated. Check for leaks.

2. Set timer to operate approximately 3 trippers ever 10 minutes. This is a starting setting and may have to be changed in final adjustment. Set triple aquastat at Hi - 180° Lo - 160° - differential at 10. Set hi limit in loop at 220°. Set thermostat higher than room temperature.

3. It works best when starting a new fire to fill the lower half of the grates with ash and top of course with coal. Place kindling, granulated hardwood charcoal works best, on top of coal and then partially fill hopper. light kindling on to fire. Coal will feed on to grate and stoker will run continously to build boiler temperature. After stoker has run for 20 minutes, turn off switch. It is now time to adjust barometric draft control. Remove one ¼" bolt from firedoor that holds insulation in place and insert draft gauge tube thru firedoor. Adjust draft control for a maximum of .02 draft. Turn stoker switch on and adjust air shutter on stoker unit, by loosening screw and moving air shutter until draft gauge reads on the draft side. of 0. In no case may this reading approach a positive or pressure reading. There is <u>no substitute</u> for a draft gauge in making these settings. A draft gauge is and essential instrument on any heating installation.

4. Your stoker will run until temperature has reached the lo setting in triple aquastat at which time the circulator will start. While circulator is running is the best time to go over all radiation in the home to bleed any air that may remain in system. On initial start up you may experience circulator shut off while boiler is building temperature. Circulator will continue to operate until thermostat is satisfied. Stoker will continue to run until temperature reaches 180 (hi setting in triple aquastat) or until thermostat is satisfied, whichever comes first. Thereafter stoker will not run unless there is a call for heat from thermostat, triple aquastat or by the timer. When both circulator and stoker have shut off, check hi limit (control in loop) operation by lowering its setting from 220° to below the temperature in the boiler. Circulator should start. Return to 220° setting.

X. Final adjustment.

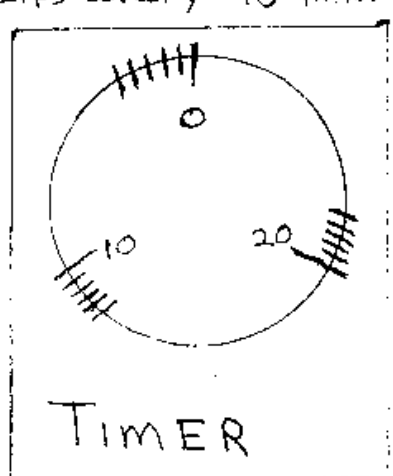
1. During periods of no demand the stoker unit runs only on air temperature. Fire bed should shrink to about 3 inches in length, with about 3 inches of unburned coal above it and the rest of grate covered with ash. Observe brightness of fire when stoker turns on during the timing cycle, fire should look dull and ashen. Immediately after cycle, fire should be bright with short yellow and blue flame at the point where unburned coal and fire bed meet. It may be necessary to adjust timer and/or coal feed because of variations in coal size, quality and different job conditions. In no case should a radical adjustment be made. One turn on coal feed adjusting nut, or one pin added to or subtracted from timer. Several hours should be allowed between adjustments to show their effect.

X1. Customer relations.

We prefer to return to the job the day after installation has been completed to check fire size, recheck draft and most important to instruct customer on the operation and care of his new Keystoker. Instruct customer how to oil stoker and circulator motor, maintain water pressure, check fuses and motor reset, make coal feed adjustments and adjust controls for different operating temperature. In this way he can, in many cases help himself or with your assistance by telephone solve minor heating system problems.

K2

INSERT 6 CLIPS every 10 min. IN TIMER



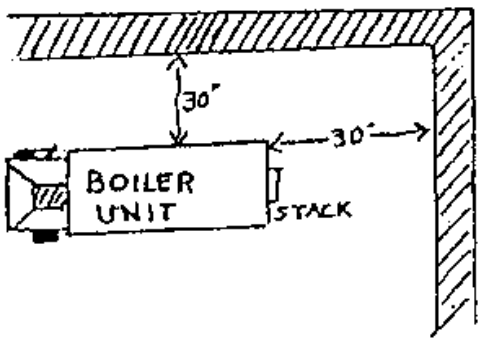


FIG. 1

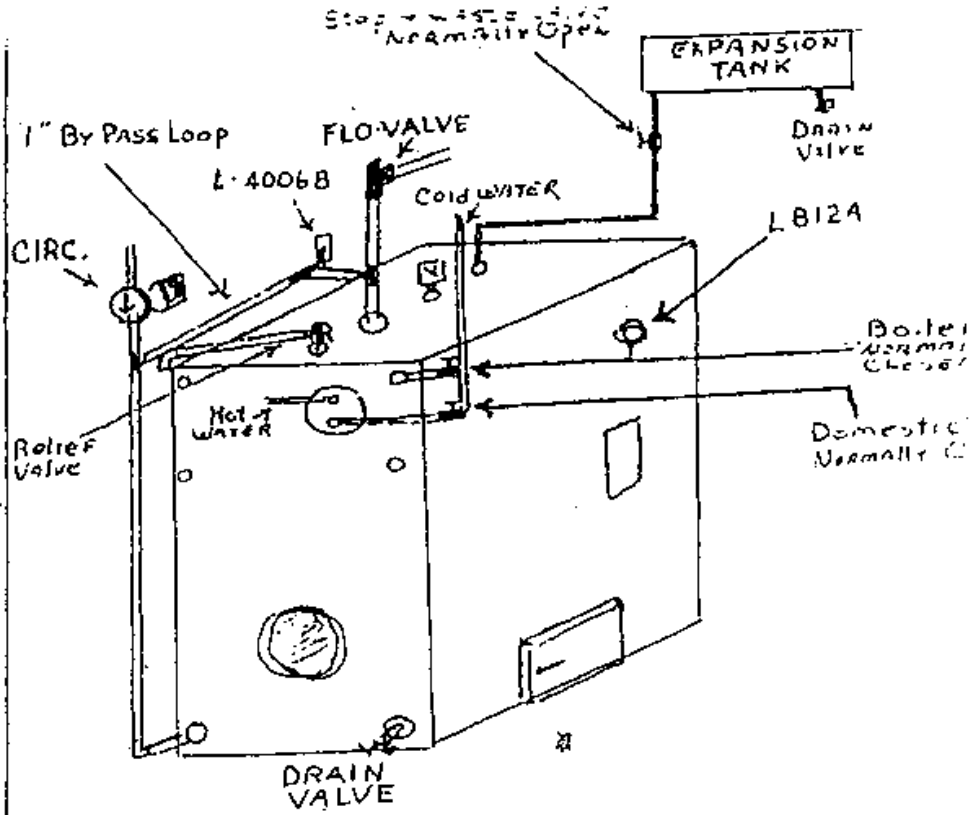
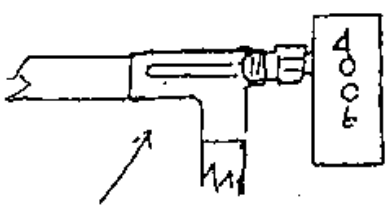
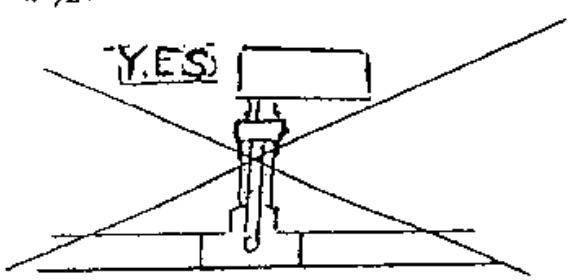


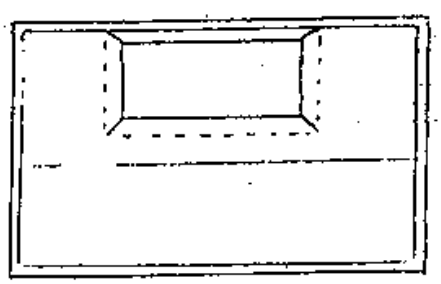
FIG. 2





NO

FIG 3



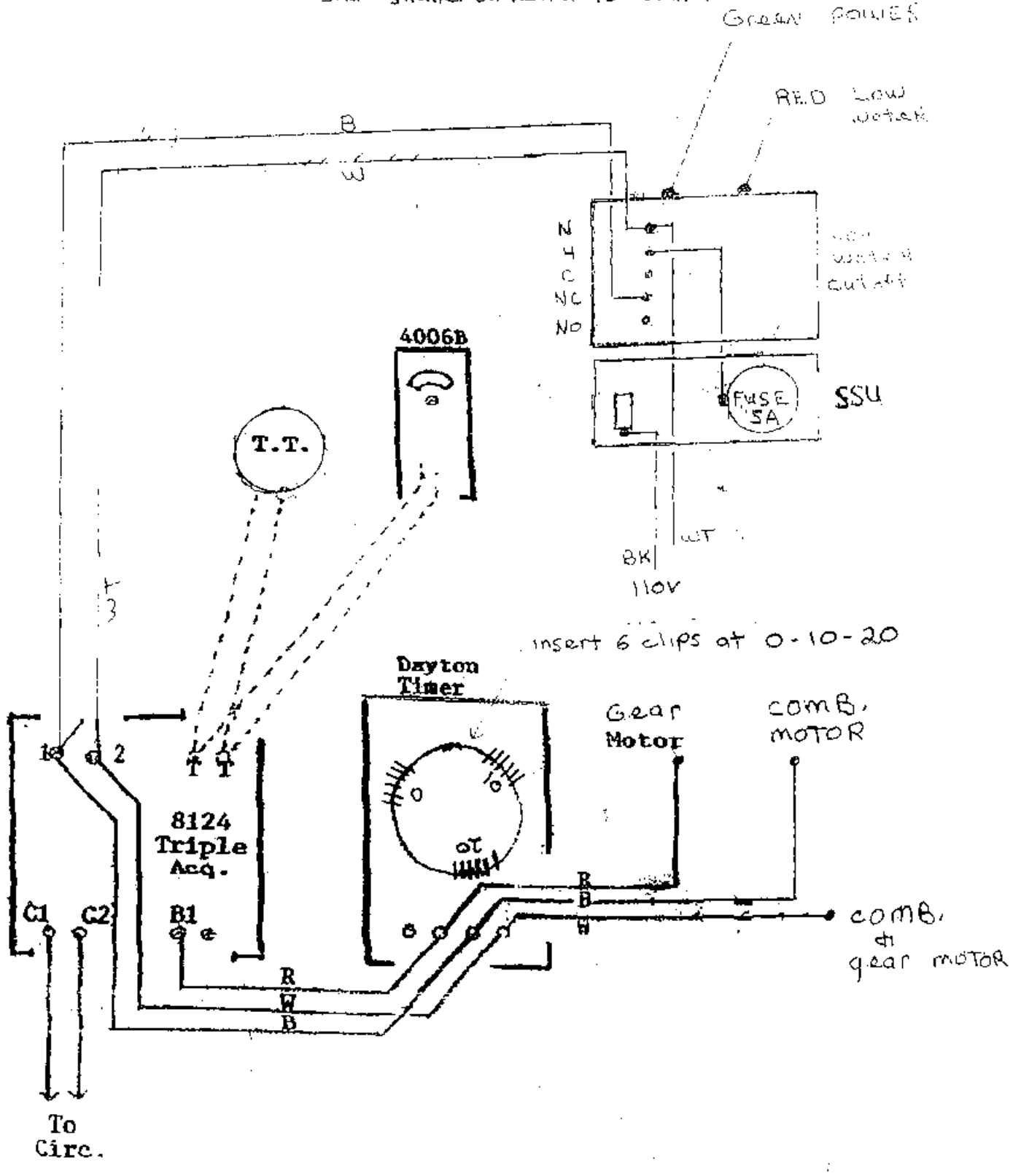
TOP VIEW - HOPPER CUTOUT

FIG 4

K2

COAL HOT WATER

Set shutter on combustion motor at ½ open
insert 3 groups of 6 clips in timer
set [illegible] fwd at max and backoff 2 turns
adjust draft with slide shutter on venter to -2 at Fullfire



TROUBLE SHOOTING GUIDE

1. Fire goes out
   A. Increase coal feed, as necessary, to maintain approximately three inches of red burning coals on grate.
   B. Raise heat sensor 10 to 20 points above present setting daily, until fire stays lit. Sensor control has one purpose TO MAINTAIN A FIRE, during periods of no demand by room thermostat. The number heat sensor is finally set at is irrelevant.
   C. If timer is used instead of heat sensor, increase timing cycle by adding additional clips to increase running cycle of stoker unit.

2. Coal over side rails
   A. Reduce coal feed.
   B. Increase opening of combustion air shutter.
   C. Check, with level, to be certain that hopper end of stove is plumb.
   D. Sand grate and side rails smooth with emery cloth.
   E. MIxing buckwheat coal with rice coal may help.

3. Coal gas smell
   A-120 - A-90 models, clean heat exchanger, stove pipe and or chimney. Close combustion air shutter as necessary to eliminate gas smell.
   Top vent, bottom vent and Econo stoves - clean top of stove, stove pipe, and or chimney. Close combustion air shutter as necessary
   Hearth models - open ash door, remove ash pan, vacuum or brush out elbow at bottom rear of stove.
   If problem persists, shut stove off, call your local dealer for assistance.

4. Stoker unit cycles too often
   A. 416-4 Heat sensor has a fixed differential of 20 degrees, between turning on and off. Lower setting on dial 5 points per day. Being careful not to lower setting to the point where loss of fire results.

5. Stoker unit doesn't feed coal

   A. Pusher bar may be jammed. Remove all coal from hopper and stoker unit. Work pusher bar inward and outward, not side ways. Pusher bar is free when it has a slight inward and outward movement.
   B. Gear motor defective. Replace. Remove screw from black expanded metal cover. Disconnect wires on gear motor. Remove two screws from gear motor mounting bracket, place hand on gear motor, pull motor toward you. Remove old gear motor from mounting bracket, install new gear motor on mounting bracket. Place cam into hole in pusher bar, slide assembly into stoker unit. Tighten screws and reconnect wires.

Not enough air through fire

A. Fan blades on combustion motor dirty. Brush off.
B. Accumulated flyash under grate. Remove combustion motor, and clean.
C. Holes blocked in grate. Open holes with eighth inch center punch.
D. Combustion or stoker motor not running. Replace. To replace stoker motor, remove three nuts, disconnect wires, install new motor. Hearth model stove stoker motors are fastened by screws.

To clean under or replace grate

Remove all coal from hopper and stoker unit. Remove nut and bolt from bottom of grate. Tap grate in upward direction with hammer. Remove grate, clean off old furnace cement from grate and unit. Clean flyash from under grate. Smear furnace cement around top of grate and sides of grate down to where holes start. Place grate back into unit, and secure with nut and bolt.

To order parts

Should it become necessary to order a control, identify the number marked on the control before ordering. The controls are also date coded, the first two numbers indicate the year, second two numbers indicate the week of the year.

If you need to order s part on stoker unit, find the 4½" X 3" Keystoker label fasten3d to stoker unit body. The four or five diget number will be required to get proper replacement parts from your dealer.

SAFETY

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

To prevent toxic carbon monoxide gases from entering the home, certain precautions must be taken.

Ash tub 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 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 pipe 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 110V outlet. Open ash door. Use a good pair of gloves, to remove ash pan. Place ash pan on non-combustible surface. Slide an empty ash pan into stove. Close ash door. Turn switch on or plug power cord back into 110V outlet.

ON DIRECT VENT MODELS

After removing ash pan, using long brush supplied with stove. Reach brush straight back into 6" exhaust pipe and with a circular motion, sweep brush around inside of pipe. Sweep excess toward bottom of stove and remove or vacuum dust out of stove. This procedure may only be required once or twice a month during heating season. Place empty ash pan into stove and turn switch on or plug power cord into 110V outlet.

Fan blade and fan blade chamber may have to be cleaned several times during the heating season. (See cleaning instructions)

The 4" exhaust pipe going through outside wall of home should also be cleaned when fan chamber is being cleaned.

If 4" exhaust pipe is not going straight out through outside wall and 4" pipe is in a vertical position to access an area above outside grade, the 4" elbow is a likely location for dust to accumulate and restrict exhaust air flow to outside of home. A 4" tee may also be used in place of a 4" elbow. This will allow the bottom of tee to be used as a collection point (out of the flow of exhaust gases) providing an easier access for cleaning and less chance for restriction or blockage.

IT IS ESSENTIAL that every 4" pipe joint or connection be sealed with a high temperature silicone or equivolent. All adjustable joints on elbows must also be sealed with silicone. FAILURE TO SEAL ALL JOINTS could allow carbon monoxide to leak in to home.

HOW TO REMOVE OR REPLACE GEAR MOTOR

First... Pull power cord plug from 115V outlet.

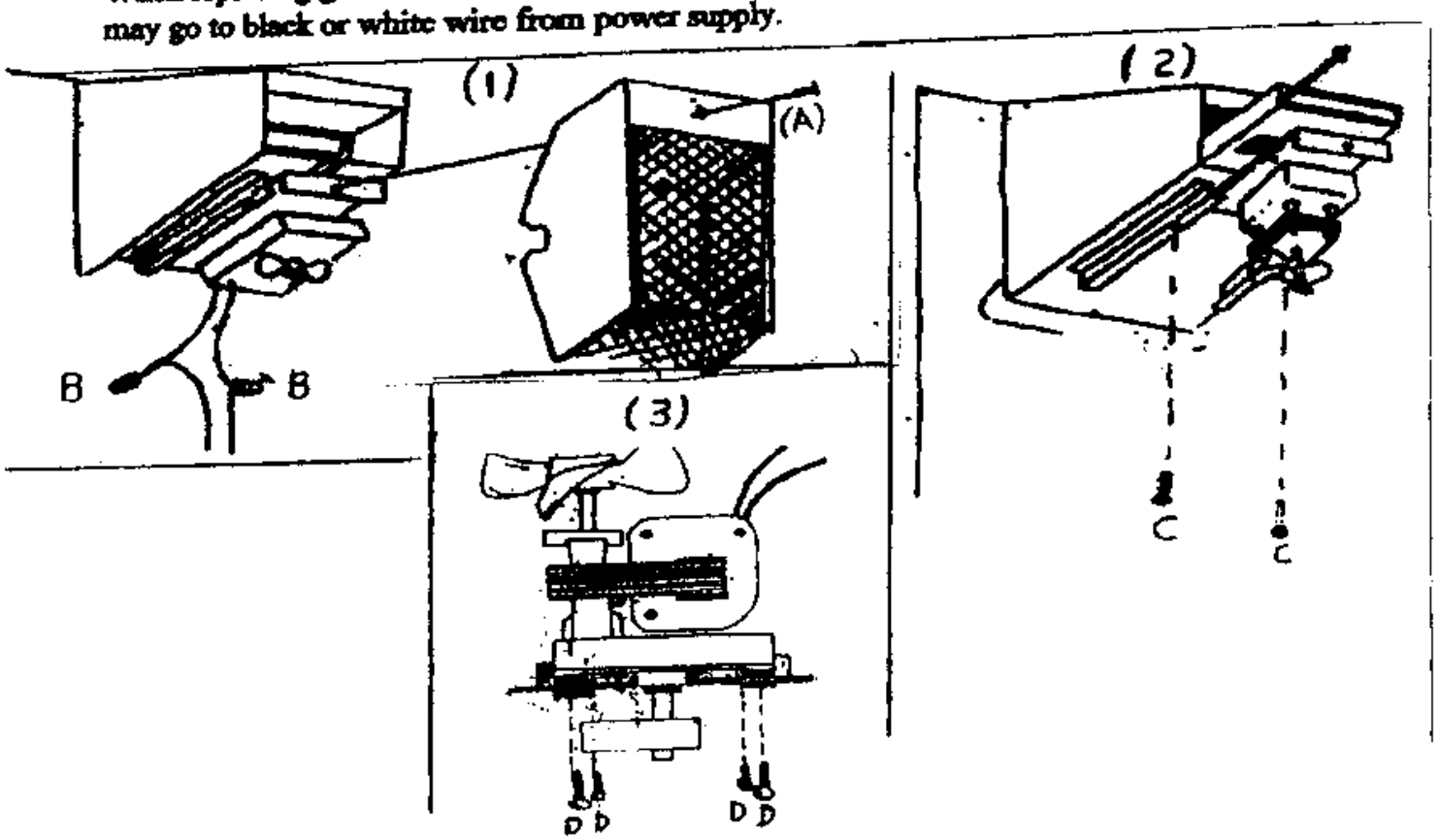
Figure (1)
Remove screw (A) and then remove protective cage
Remove both blue wire nuts marked (B)

Figure (2)
Remove both screws (C) from mounting bracket
Slide gear motor out of its track toward you, pusher bar will also come out with Gear motor.

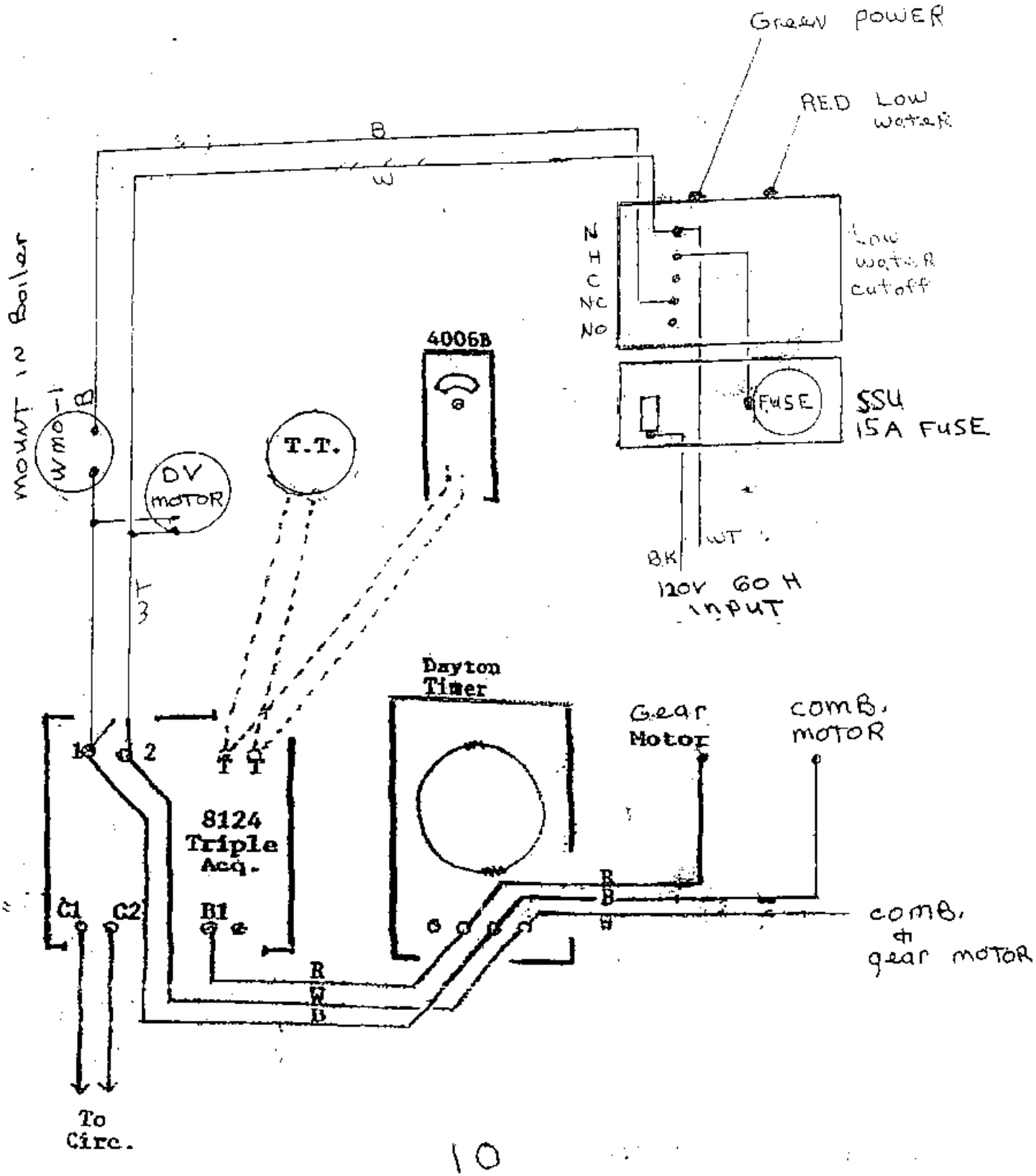
While pusher bar is out of its chute, Clean chute area and remove any obstructions
Check nylon screws on pusher bar (2 on each side) for wear or breakage. (Replace if necessary)
Slide pusher bar in and out of chute (should move freely) check for sideward movement.
Adjust nylon screws on right side to allow only a slight sideward movement

Figure (3)
To replace gear motor, - remove 4 screws (D) that hold gear motor onto mounting bracket. Before removing gear motor from bracket, look at position of gear motor,install new motor in exact same position before reinstalling screws (D)
Then reverse procedures shown in figures (2) and (1)

When replacing gear motor with a new one, both gear motor wires are black, either wire may go to black or white wire from power supply.

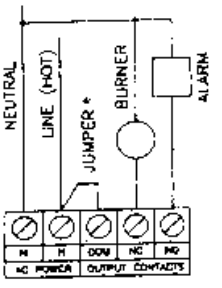


K2 Direct vent coal hot water



LWCO WIRING DIAGRAM USING BURNER CIRCUIT POWER SOURCE

FIG. 5

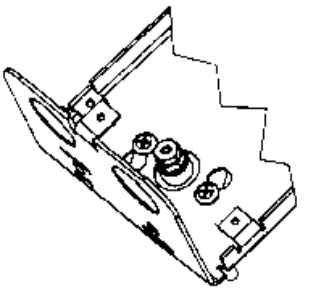


DWG. #1108-5

*Factory installed

CONTROL UNIT MOUNTED ON PROBE

FIG. 2



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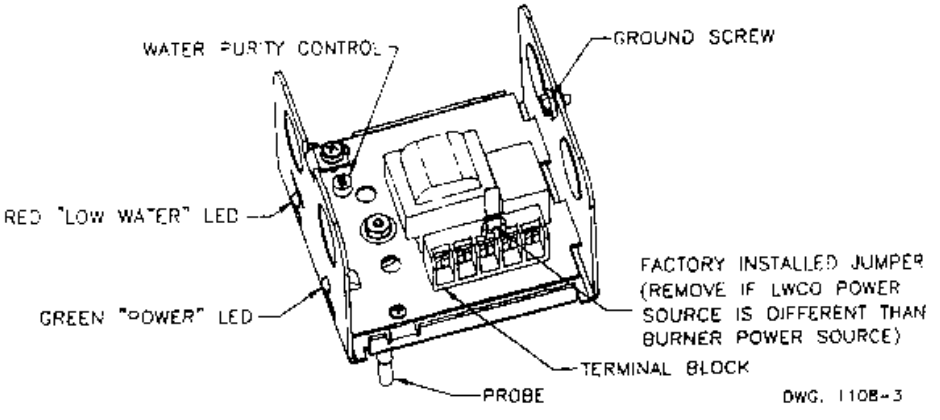
LWCO
FIG.3



DWG. 1108-3

INSTALLATION

IMPORTANT NOTES FOR PROBE INSTALLATION: Apply a small amount of pipe sealant to external threads of the probe.

CAUTION: *DO NOT use teflon tape!*

1. Be sure the probe is installed above the minimum safe water level, as previously determined from the boiler manufacturer's literature.
2. Be sure the probe extends into the boiler cavity so that contact with the water is made.
3. Be sure the exposed portion of the stainless steel probe is a *minimum* of 1/4" from any grounding surface inside the boiler to prevent the probe from shorting (see Fig. 1).

Control Unit Mounting onto Probe (See Fig. 2):

1. Tighten the probe into the tapped location of the boiler with a wrench, using the bushing flats provided.
2. Make sure the heads of the two mounting screws in the probe bushing are loosened approximately 1/8" from the bushing surface.
3. Then remove the first lock washer/nut from the probe threads.
4. Orient the slotted holes in the control unit over the heads of the mounting screws of the probe and turn control unit counter-clockwise so that the ends of the slots are fully under the mounting screw heads. Tighten mounting screws.
5. Replace the lock washer/nut onto probe and tighten