HI-SEAS DIESEL HEATER

OWNER'S MANUAL

OCTOBER 1, 1981

MODEL 100-C-8

IMPORTANT !

IT IS MANDATORY TO READ THIS MANUAL BEFORE INSTALLATION AND OPERATION

MANUFACTURED BY

MARINE HEAT CORPORATION
4400 23rd Ave. W.
Seattle, WA 98199
(206) 284-9103

TABLE OF CONTENTS

9-11 dwgs.

Cover page….

IMPORTANT NOTICE TO PURCHASER

All statements, technical advice and recommendations contained herein are based on tests believed to be realistic, but the accuracy thereof is not guaranteed, and the following is made in liew of all warranties, expressed or implied; Seller's and manufacturer's only obligation shall be to replace the quantity of product proved to be defective. Neither seller nor manufacturer shall be liable for any injury, loss or damage, direct or consequential, arising out of the use of or the inability to use the product. Before using, user shall determine the suitability of the product for intended use, and user assumes all risk and liability whatsoever in connection therewith. No statement or recommendation not contained herein shall have any force or effect unless in an agreement signed by officers of seller and manufacturer.

Troublesome, complex systems have been eliminated from this heater. OPERATOR EDUCATION AND PARTICIPATION are required. Follow the instructions carefully to receive excellent service.

WARNINGS

1. DON'T leave your heater to run unattended.
2. DON'T install or operate your heater until you have read and THOROUGHLY UNDERSTAND the contents of this manual.
3. When operating this or any other heating or cooking equipment, Always have a suitable fire extinguisher close at hand.
4. DON'T permit liquid fuel to accumulate in the burner as it could overflow and cause a fire.
5. Failure to comply with instructions in this manual could result in a fire hazard.

INSTALLATION INSTRUCTIONS

Mounting the Heater

The HI-SEAS heater is to be mounted vertically. It has all the hardware to mount it to a bulkhead. The bulkhead may be oriented in any direction. There must be a 2" clearance between the bottom of the heater and any permanent structure. This permits easy removal of the burner from the bottom of the heater.

Use the tubular spacers to mount the heater out from the bulkhead. Check the temperature of all combustible surfaces near the heater and the exhaust pipe during high temperature operation. If you can not hold your hand on these surfaces they require more space or insulation. Stainless steel over 1/8" asbestos matte board makes a good heat shield on these surafces. The bulkhead will need protection behind the stove pipe for the first 2 feet above the heater. We suggest you use the shield specially designed for this purpose available through the same dealer from which you purchased the heater.

Never mount the heater in the bilge of a gasoline powered boat. It is an open flame unit and will ignite gas vapors if they become concentrated.

Exhaust Pipe Installation

The manner in which you install the 3" diameter exhaust pipe depends upon the location of the heater and smoke cap.

Smoke Cap Installation

1. A breeze passing across the boat should be unobstructed in all directions so that it may pass freely across the smoke cap.
2. Never mount the cap along side a cabin, deck box, etc., as a breeze hitting a vertical surface can cause a high pressure area and result in back drafting.
3. Always mount the cap vertically.

Pipe Configuration

1. There is no specific pipe length required.
2. Generally, the longer the pipe the better the draft.
3. If the vertical length is 4' minimum, the result will be satisfactory.
4. If a 2' maximum length of horizontal pipe is added to the vertical 4' , it will be an improvement. The closer the horizontal pipe approaches vertical, the better it will be. On a sailboat, this horizontal pipe should never point downward, even if the boat is heeled 45 degrees.
5. If you must use less than 4' of vertical pipe, reduce the length of horizontal pipe proportionally. The shorter the pipe is, the more sensative the heater will be to erratic wind and pressure conditions.
6. If you must mount the heater in a high position and use inadequate pipe length, add more pipe above deck. Arrange the deck iron so you can remove the smoke cap, put a pipe in its place and put the cap on top of the pipe. Thus you have the benefit of a longer stack and a clear deck when necessary.
7. Even with 4' of stack below deck, carry an extra length of pipe aboard and use it. You will benefit as noted in item 6 above.
8. If your exhaust system creates a strong draft, it can draw too much cold air into the burner while operating on low fire and cause smoke and soot. Use a damper to reduce the draft.
9. If there is a difficulty in mounting the stack onto the heater top. Drill two holes through the heater and stack and insert two sheet metal screws. This should especially be done if pipe configuration has elbows which do not give stability to the stack.

9. During back drafting conditions, a small amount of smoke may leak through the pipe joint at the deck iron. To eliminate this, either seal the pipe joint or add a 2' length of pipe above deck.

FUEL SUPPLY INSTALLATION

You have the option of using a fuel pump, gravity system, or a pressure tank. All must supply steady fuel pressure. Also the fuel pressure must not exceed 10 PSI going into the control valve, as the excessive pressure could damage the control valve and cause potential fire hazard.

It is also recommended to install a shut-off valve in the fuel line between the fuel tank and the heater. The shut-off valve is necessary so that the heater or fuel supply system may be serviced and as a safety shut down. The shut-off valve should be located as near as possible to the fuel source.

The fuel line may be of ¼" copper tube or hose. It is attached to the 1/8" pipe threads at the lower left side of the control housing. The fuel line should be flushed with at least 1 quart of fuel through the line before making the final attachment to the control valve.

Although a fuel filter is not necessary (the fuel flow control has its own filter), it is desirable under conditions of heavy usage to reduce the frequency with which the small filter must be replaced in the control unit.

It is recommended that you use a small electric fuel pump which uses less than 0.1 amps per hour. This is the simplest, smallest, easiest, and cheapest means of supplying fuel. The only time this system should not be used is if you can't tolerate a 0.1 amp per hour battery draw.

Fuel Pump System

If your boat is diesel powered, supply the heater from the engine tank. Tee into the fuel line after the filter, connect the pump near the filter and run a line to the heater. Don't try to connect to a line returning fuel from the engine to the tank. You may also use the pump to supply the heater and engine simultaneously. This aids in bleeding the fuel line.

The recommended pump is the "Autopulse" type manufactured by "Walbro Corp.". Its specifications are 12 volt DC, 4-6 PSI pressure, and demand pump. The pump is normally off except when cycling approximately 1/5 second out of each 5-30 seconds. The maximum current drain is less than 0.1 amp per hour. You should use a separate on/off switch and fuse for 3 amps. The pump must be rubber mounted for comfortable noise level.

Pressure Tank System

1. The pressure tank may be located at any position in the boat.
2. A bicycle pump is used to pressurize the tank.

Gravity Feed System

If the gravity tank is the only tankage aboard, make it as large as possible to allow maximum heating time.

1. The tank must be located to allow a minimum elevation from the bottom of the tank to the bottom of the heater of 5 feet

2. Minimize the distance between tank and heater without warming the tank.
3. The tank is best on the same fore and aft line as the heater
4. It should be close to the boats' center of roll, pitch & heel.
5. You will not be able to accomplish all this in any one installation, as some of these goals are in conflict with others. However, if you were to mount the tank in the position of minimum compromise between items 2-4 above, you would have a good installation. The more you deviate from the above suggestions, the more erratic the fuel flow will become, due to the boat's motion.

START-UP PROCEDURE

1. Turn fuel flow control knob to #3 position.
2. Allow 1.5 minutes for fuel to saturate starting wick.
3. Remove access door.
4. Open ignition door 100% and use match to light wick.
5. Open the damper
6. During the 3-5 minutes required for the heater to reach operating temperature, you will hear a roaring sound because the ignition door is 100% open.
7. When heater is warmed up to operating temperature (fuel is vaporizing and no liquid fuel remains in the bottom of the burner) set control knob to desired heat level and close the ignition door. When running on high, it may help to open the ignition door slightly to let more air in and provide leaner, cleaner burning. If you hear a roaring sound or see a flame near the ignition door, it is open too far.
8. If you get too much draft, particularly on low or medium, you may notice smoke coming from the exhaust. Close the damper far enough to prevent this. Be careful not to close the damper too far, as you could prevent the fuel from burning completely and cause liquid fuel to build up in the burner.
9. At 5 minutes and 20 minutes later, look through ignition door hole to be sure there is no liquid fuel or fuel dampness in the bottom of the burner. If there is, give it more air and/or turn the fuel flow down for awhile.
10. Control knob positions 0, 1, 2, 3, correspond to the fuel flow rates of off, low, medium, and high respectively with the flat portion of the fuel control shaft in contact with the set screw in the knob.

OPERATING INSTRUCTIONS

1. Never let liquid fuel accumulate in the burner. This might occur if the start-up procedure is not properly completed and the heater has not yet reached operating temperature or the damper is closed too far. Open the ignition door until the flame roars, to burn off the fuel and reach operating temperature. Be particularly careful when starting the heater while the boat is heeled over as there could still be liquid fuel in a low or remote corner of the burner which may be difficult to see.
2. Opening the ignition door until the flame roars accelerates burning and warm-up.
3. To determine whether your heater is burning properly, look at the exhaust. There should be no smoke.
4. If you see smoke coming from the exhaust, increase the ignition door opening or decrease the heat setting or close the damper farther if smoke is caused on low settings, but not on high.
5. It always takes time for heating equipment to stabilize or reach its operating temperature, after the level of operation has been reset. Thus if you adjust the setting and immediately check the exhaust, you may be observing a temporary or transitional condition, which may not display the result of the new setting. If in doubt, wait a few minutes for the system to stabilize.

6. The purpose of the temperature gauge is to indicate that the heater is running at a steady operating temperature.

7. To compensate for back drafting, operate at the high setting or add a 2' lenght of pipe above deck. This will cause a stronger draft.

8. Although the unit burns cleanly in the normal operating range, it is normal for smoke to exhaust during start-up.

9. If the heater is operated improperly and results in a backfire, do not be concerned, as it is neither dangerous nor harmful. A backfire results in either the heater making a bang or a small puff of smoke coming out through the ignition hole if the door is open, or both.

10. If you run in the high range for long periods, carbon will form in the burner beneath the air holes and on the baffles. Look through the air holes at either side of the burner to inspect for carbon build-up. When you see lumps have formed, set the heater on position #1 for a couple of hours to burn off the carbon. You can run on high for about 24 hours before the cleaning cycle is necessary. When the carbon has burned off, you can set the heater on high again. Carbon will accumulate slower at the lower settings. You may also remove the carbon by scraping with a wire inserted through the air holes. This can be done while the unit is in operation.

11. It is normal to have a thin layer of carbon covering the interior of the burner. However, if lumps form, it is time to use the cleaning cycle or wire.

12. You may notice carbon flakes collecting in the bottom of the burner. Periodically break them down to a smaller size with a stiff wire inserted through the ignition door. They can become fairly deep without affecting combustion. The carbon will usually build to a certain level and stop. However, if it seems excessive, you may vacuum it out.

13. The heater exhausts all products of combustion outside the boat and requires an air supply from the cabin. Thus, you must permit a small amount of air to enter. Never seal the cabin air tight. Another way to avoid back draft is to adjust the hatches, ventilators, etc., to provide a better air supply.

14. A flooded burner can be dangerous but the fuel may be burned off by running the heater with the fuel control turned off and the ignition door closed. However, if the fuel has overflowed the burner, there could be fuel collected outside the burner but inside the burner housing. It is necessary to remove the burner and disassemble the housing so the fuel may be wiped from the interior surfaces, as there is a possibility it could ignite. Refer to the service instructions on burner removal.

15. At some time, you will experience adverse atmospheric conditions which will interfere with heater operation. It is usually possible to compensate for these conditions by using the information in this manual. If you have a difficult installation, consult the dealer or manufacturer.

16. The above information must be considered approximate, as variations in installation and environment will affect the heater. As you gain experience, you will learn to operate the heater so that it will give you excellent service with a minimum of attention.

SERVICE PROCEDURES

1. The 1/8"stainless steel tube supplying fuel from the control to the burner may plug or burn out in a few thousand hours of operation and need replacement.

2. To replace burner fuel tube, disassemble the heater as follows:

   A. Remove control knob.
   B. Remove upper and lower shrouds.
   C. Remove fuel control; by disconnecting fuel inlet line (bottom left side of control) and fuel burner tube (top of control).
   D. Remove burner by removing burner attachment screws.
   E. Remove back burner housing (2 screws on each side of burner).
   F. Remove burner baffles and burner fuel tube by unscrewing mounting screws located in the middle of the burner .
   G. Remove fuel burner tube by bending tube horizontal to its burner entry hole.
   H. Replace burner tube by reversing the above process. The tube should extend into the vaporizing wick by .5 inch. To get the desired angle of bends; insert the tube into its entry hole by .5 inch and bend it down then insert the tube another inch into the burner and bend it down again. Replace remaining parts.

3. The ignition door must close completely. Deposits may collect on its inner surface and prevent it from sealing. Tap on it sharply or remove it and scrape it clean.

4. If your heater has the brass housing, it will require considerable polishing with "Brasso" to remove the tarnish and the texture at the front corners.

5. It will probably never be necessary to replace the starting wick. If replacement is desirable, order another from the manufacturer or you may use asbestos wicking.

6. Intermittently check the fuel supply line for leaks. If there is a leak, you can usually smell it and the fittings will be wet below the point of leakage.

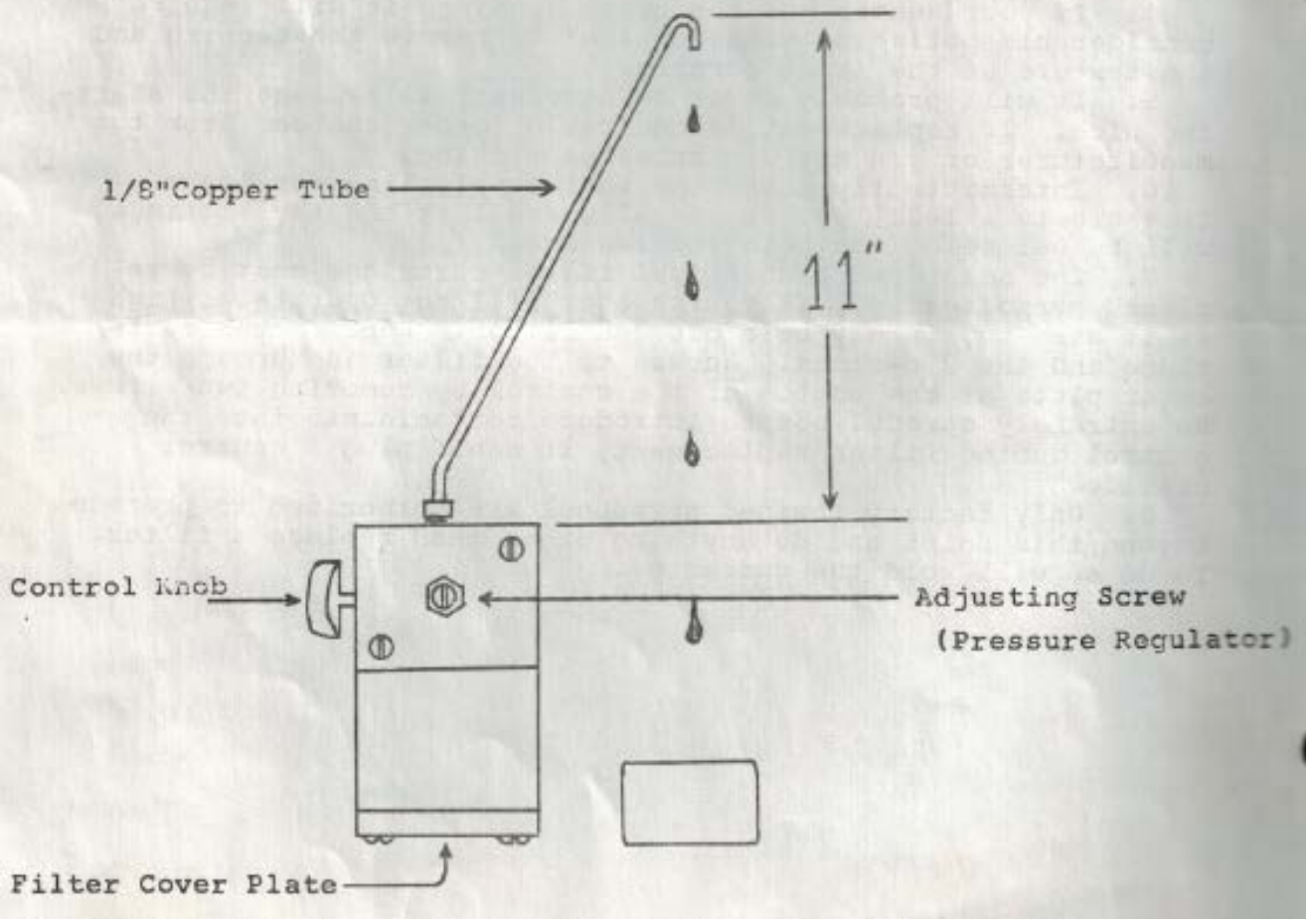
7. The scintered bronze fuel filter cartridge must be replaced periodically. If your heater will not operate as high as it used to, it may be a plugged filter. Replace the cartridge and the 2 o-rings. Access to the filter is through the cover plate at the bottom of the control by removing two screws. Be extremely careful not to introduce contaminants into the control during filter replacement, it could plug a control orifice.

8. Only factory trained personnel are authorized to procede beyond this point and do anything other than replace a filter. To do so will void the warrantee.

9. If the heater still does not seem to run high enough, it could require readjustment of the pressure regulator. The lock nut and adjusting screw of the pressure regulator are located on the right side of the control. DO NOT simply adjust the screw!! The calibration of the control must be checked as follows:

A. Disconnect the fuel line from the top of the control.
B. Remove the brass fitting from the top of the control.
C. Install a brass fitting which will accept a 1/8" copper tube.
D. Extend the copper tubing upward vertically as indicated in the sketch and provide a container into which the fuel may drip. The dimension from the top surface of the control to the end of the tube must precisely 11 inches. The top end of the tube must point vertically downward. Do not tip it at an angle. With the control knob set at #3 the fuel must drip at a rate of 4 drops per second at 70° F. Be sure the incoming fuel pressure is at least 1.5 PSI or 5' of head and that the filter is clean and not causing a restriction. Back off the locking nut & adjust the screw to produce the proper flow. Clockwise turning increases the flow. It should require very gentle force to turn the screw. Less than one turn of the screw should be reuired. Be careful not to strip threads, distort the spring, gall internal passiages, rupture diaphram, etc.

10. If it seems that only one flow setting is running slow, the problem is most likely that a fine particile is lodged in an orifice and must be removed. The orifices are located behind the control knob. The control must be disassembled and cleaned.



TROUBLE SHOOTING

A. Symptom: Fuel will not flow.
   1. Cause: Foreign matter plugging fuel line.
      Solution: remove blockage.
   2. Cause: Supply from fuel pump is inadequate.
      Solution: a. Turn on fuel pump.
      b. Check electrical circuit.
      c. Check output pressure or flow of pump.
      d. Check in-line shut-off valve.
   3. Cause; Plugged filter.
      Solution: Replace filter cartridge.
   4. Cause: Plugged orifice in fuel control valve.
      Solution: Clean orifice.

B. Symptom: Carbon accumulation in upper section of burner.
   1. Cause: Overly rich or excessively high level of operation.
      Solution: a. Scrape carbon from inside walls of burner by inserting stiff wire through air holes at the top of burner.
      b. Adjust burner to its cleaning cycle and run until clean.
      c. Lean out fuel mixture for all subsequent operation.

C. Sympton: Carbon accumulates on the lower walls of the burner.
   1. Cause: This will result when the heater is run continuously while making a roaring sound caused by the ignition door being open too far.
      Solution: a. Scrape the lower walls of the burner clean by inserting stiff wire through the ignition hole.
      b. Close the ignition door until silent operation is achieved.

D. Symptom: Flakes or small chunks of carbon collect at the bottom of the burner.
   1. Cause: Results of manual scraping of burner.
   2. Cause: Overly rich or high operation of heater.
      Solution: a. Insert stiff wire through the ignition hole, break down the chunks to a small size and spread them evenly over the bottom of the burner and they will slowly be consumed.
      b. Vacuum out the burner.

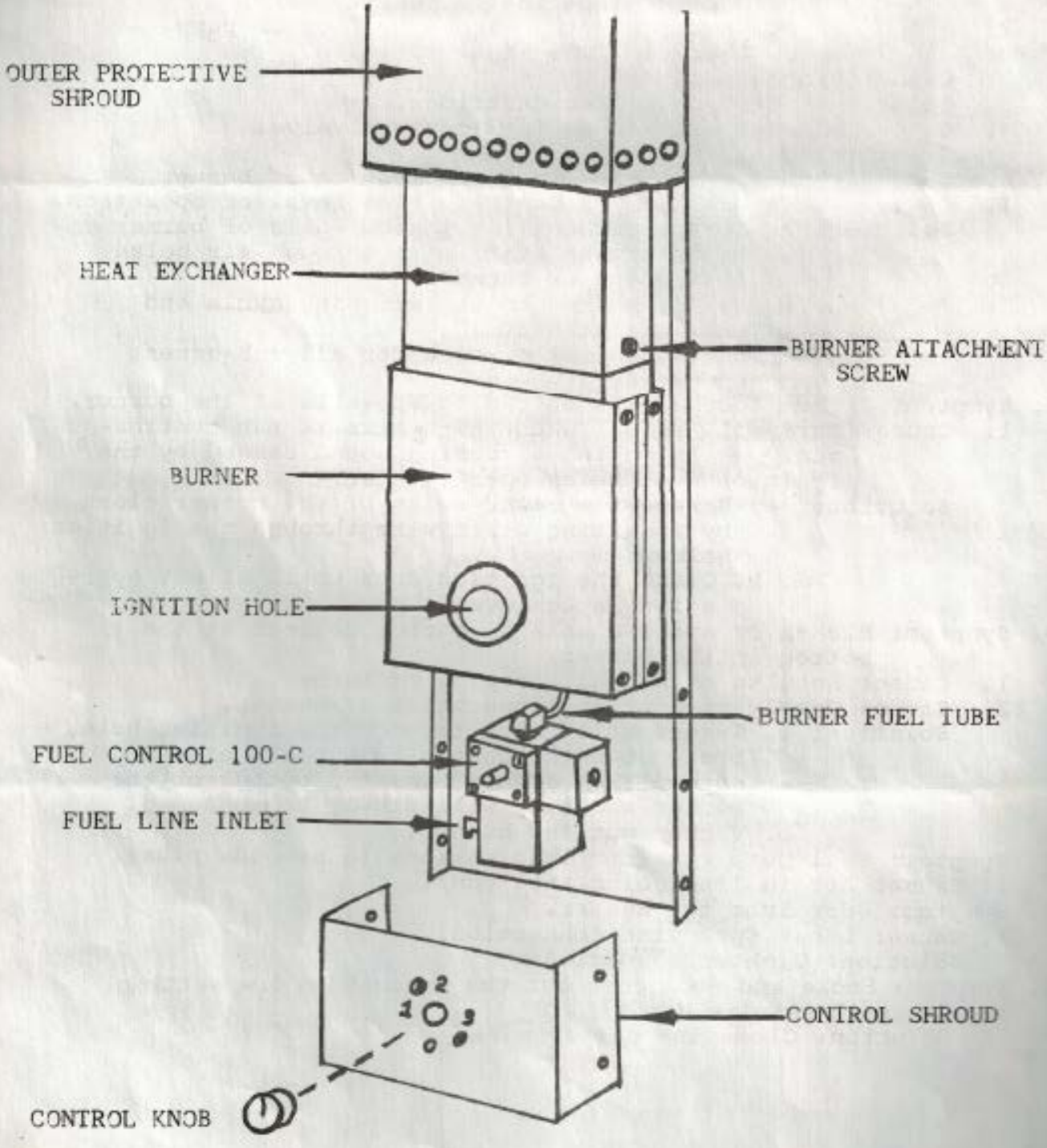
E. Symptom: Fuel pump runs for long periods (5 seconds plus).
   1. Cause: Air in line going into pump.

F. Symptom: Odor from the heater.
   1. Cause: Loose fuel line connection.
      Solution: Tighten connection.

G. Symptom: Smoke and soot come out the exhaust on low setting.
   1. Cause: Excessive draft
      Solution: Close the damper more.

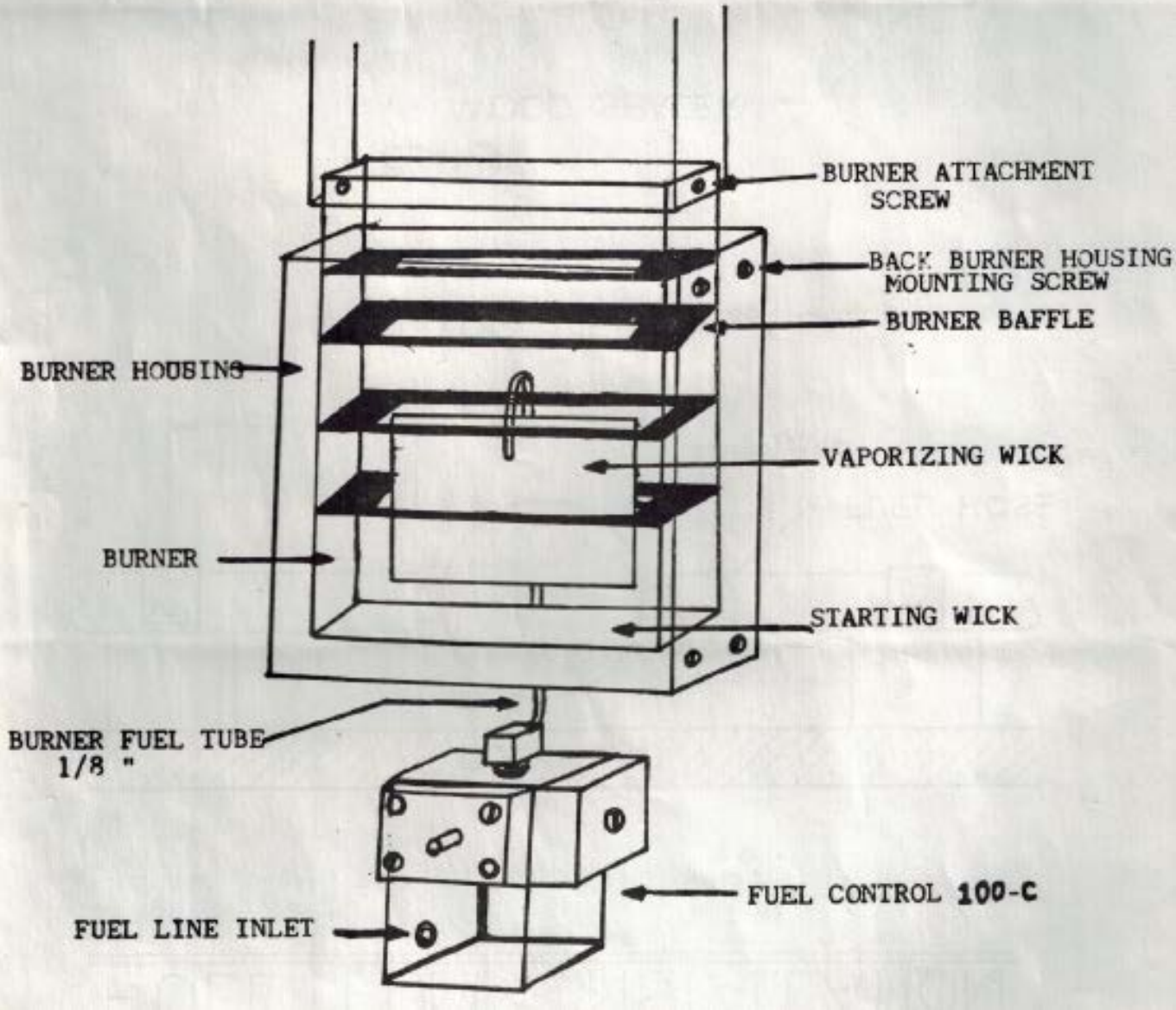
HEATER ASSEMBLY DRAWING

HI-SEAS HEATER MODEL 100-C-8

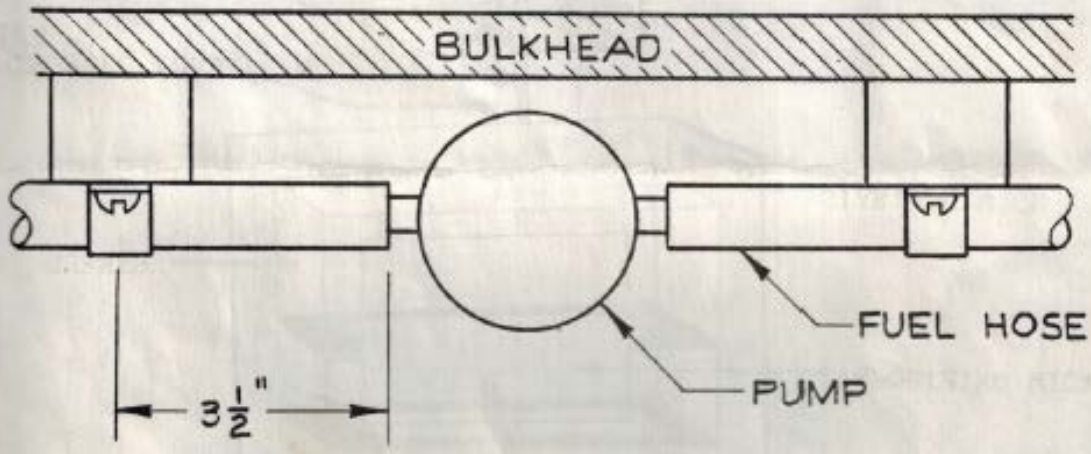


BURNER ASSEMBLY DRAWING

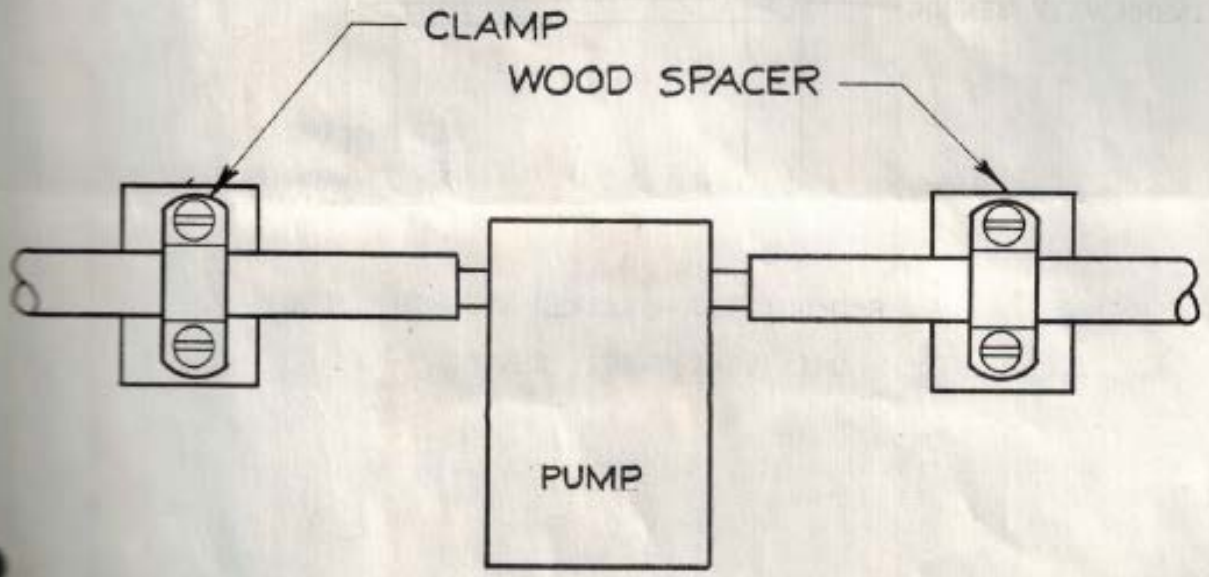
HI-SEAS HEATER MODEL 100-C-8



FUEL PUMP INSTALLATION



TOP VIEW



FRONT VIEW