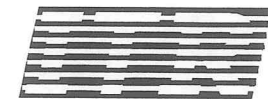


# ***HURRICANE®***

# ***HEATING SYSTEM***

## ***OPERATOR'S MANUAL®***



**INTERNATIONAL LTD**  
**THERMAL RESEARCH**

**HURRICANE®** is a registered trademark of  
**International Thermal Research Ltd.**

Covered by U.S. Patent # 5,391,075  
And other U.S. and foreign patents  
and patent applications

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International Thermal Research Ltd.

The **HURRICANE** Heating System has been tested to UL 307A by Testing Engineers International Inc.

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# CHAPTER 1

## INTRODUCTION AND TECHNICAL SPECIFICATIONS

Congratulations on the purchase of your new ITR *HURRICANE* heater.

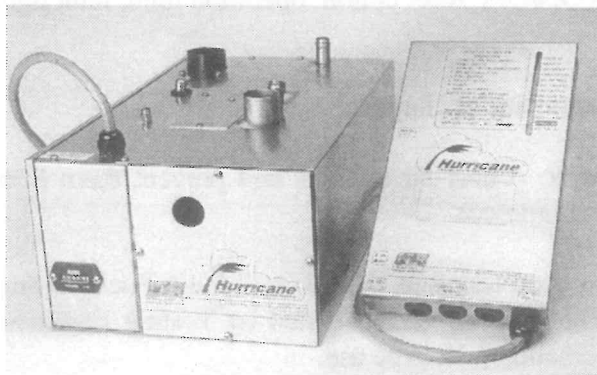
This manual should tell you the basics of what you need to know for a proper installation, operation, and maintenance of your heater. ITR or your local *HURRICANE* dealer are available to help with installation and maintenance, and to answer your questions. Your local *HURRICANE* dealer can supply you with any accessories needed to install the heater. See Chapter 7 for information on our warranty and customer service, and how to contact us.

The *HURRICANE* heater is currently available in six capacities:

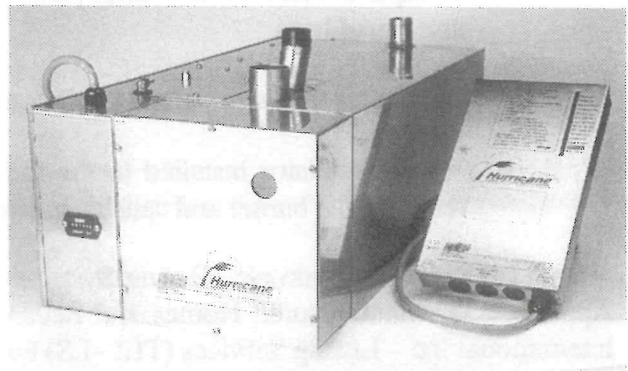
### Technical Specifications

MODEL	BTUH Input	WATER Connection	EXHAUST Outlet	US GAL Capacity	AMPS	FUEL GAL/H	MIN FLOW GPM	O.D. h x w x d (Wt - lbs)
CO20	20,000	0.75"	1.50"	1.0	3.5	0.15	2	7"x11"x19.0" (37)
CO32	32,000				3.5	0.20	2	
CO45	45,000				5	0.30	3	
CO65	65,000	0.75"	2.0"	1.25	5	0.45	4	7"x11"x24" (42)
CO85	85,000	1.50"	2.0"	2.50	10.5	0.60	6	10"x15"x29.0" (75)
CO105	105,000				12.0	0.75	7	

Each of the above capacities is available as a deluxe model, which includes insulation and a complete wrap around stainless steel cover.



MODEL CO45D

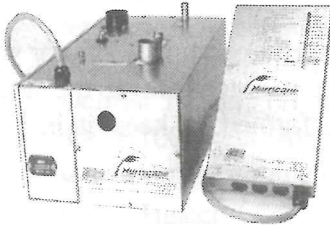


MODEL CO105D

## CHAPTER 2

### 2.1 COMPONENTS

Below is a description of the parts that come with the basic *I TR HURRICANE* heater. Before you start the installation, make sure you have all of the components and **ARE FAMILIAR WITH ALL ASPECTS OF THIS MANUAL.**



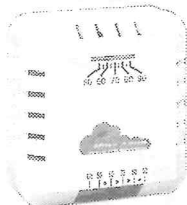
- **HEATER** – includes a fuel pump, air accumulator, combustion air fan, compressor, regulator, fuel and air nozzle, burner, combustion chamber, and water jacket. Figure 2-1 at the end of this chapter shows a cross-section of a heater, with all the component parts. These are typical of all models. The deluxe unit includes an insulated water jacket and a complete wrap around stainless steel cover.



- **ELECTRONIC CONTROL BOARD** – consists of a service switch, a jumper for a constant circulation pump, fuses, terminal connections, circuit board, a fault indicator panel of 14 LED's, from which you can monitor the entire operation of the heater. The circuit board allows single zone hookup of one thermostat, one Domestic Water Aquastat, one Heat Exchanger Aquastat, one water pump ( maximum 10 amps total ), and maximum 1 amp for Cabin Fan Heaters unless a separate relay is used or H.D. thermostat part # 20022.



- **REMOTE PANEL INDICATOR** – An ON / OFF - RESET switch with a green operation light, a red fault light, and signal horn.



- **THERMOSTAT** – The *HURRICANE* heater comes with one thermostat, but can be controlled by up to four thermostats through the optional 4 zone control board.

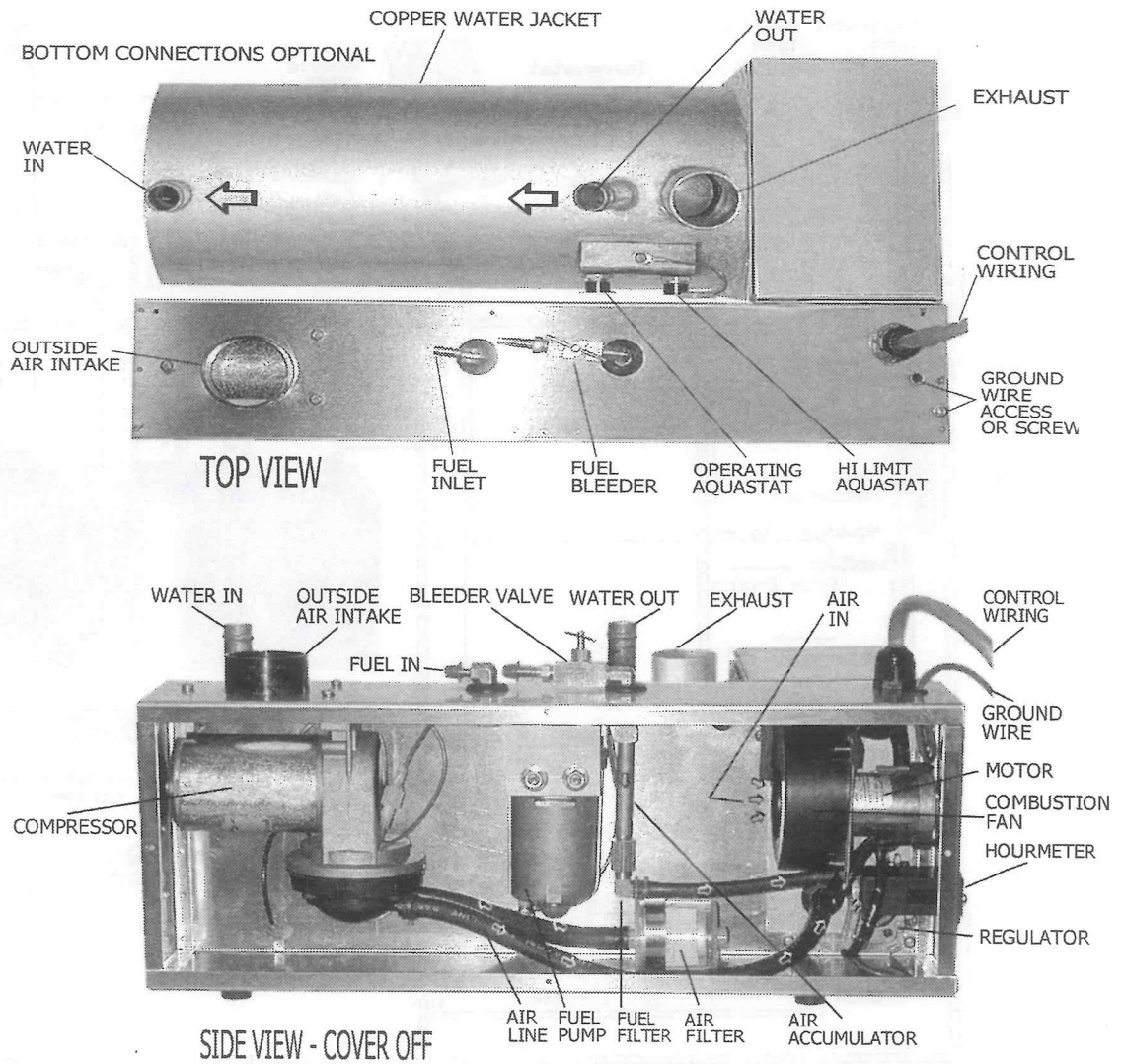


Figure 2-1  
Component Parts

CO-85, CO-105 utilizes 2  
compressors

See Chapter 8 for complete parts  
listing

## CHAPTER 3

### INSTALLATION

#### 3.1 OVERVIEW

Installation of the *HURRICANE* heater is best done with some mechanical aptitude and electrical knowledge. It is a central hot water heating system, similar to what you might have in your home. Critical factors include sizing of the circulating pump, routing of the water lines, purging of water and fuel lines and installation of the electronic control box, among others. See fig. 2-2, page 2-6 for a typical installation.



**A properly designed and installed system is essential to ensure that the customers receive satisfactory results, and a warm, comfortable environment. The following is a basic guideline to the entire heating system and will vary with every application.**

**ITR can only guarantee the *HURRICANE* heater if the entire system has been sized and installed by our approved dealers, or alternatively, if ITR or the dealer reviews and approves the system design both prior to and after the installation.**

**Systems installed without dealer approvals will be limited to a 90 day or 250 hours of operation warranty. See Chapter 7 for warranty details before installing your system.**

#### 3.2 MOUNTING THE HEATER

The heater's physical size allows it to be mounted in a very small area that may be difficult or nearly impossible to access. For normal servicing, access to the front, left side, and top must be provided. The *HURRICANE* heater can also be ordered with bottom connections and/or front/right side access.

Choose a sturdy side wall or a mounting location that will not be affected by the heavy jarring and movement experienced by a boat in rough seas or a vehicle on rough roads.

You must consider the weight of the heater (full of water) when selecting a mounting location and mounting equipment. Keep in mind the exhaust run from the heater which may limit the mounting location. Ensure that the exhaust tubing can be properly and safely routed to the outside.

The heater comes with rubber mounting grommets installed, two installed in the bottom of the component enclosure box and one or two in separate brackets with self adhesive rubber standoffs. A screw or bolt with a washer (not included) must be used through the center of the grommet to secure the heater in place.

If the heater is going to be mounted in the engine compartment, check for adequate ventilation. When the engine is running, this area could be under a negative pressure. Make sure the air intake and exhaust hoses have no leaks and are well fastened to the heater, muffler, and thru-hull fitting. Assembly parts that may cause injury through accidental contact, should be protected.

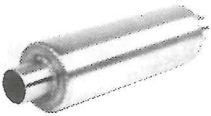
### 3.5 EXHAUST INSULATION

If you wish to insulate the exhaust system, ask a qualified dealer for your options. Various high temperature insulation materials are available. If you do not insulate, an exhaust sleeve, can be used to protect yourself from burns due to accidental contact with the exhaust pipe (part # 5135, 5136).



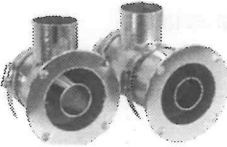
### 3.6 EXHAUST MUFFLER

This muffler is a straight through design (part # 13008,13009) offering no resistance to exhaust flow. This is the only type that can be used in the *HURRICANE* heating system. It can effectively reduce exhaust noise by up to 50%. It must be tightly clamped in series with the exhaust piping.



### 3.7 THRU-HULL FITTINGS

According to American Boat and Yacht Council (ABYC) recommended practices and standards for installing boat heating systems, 100% fresh air must be available for combustion. To ensure a 100% fresh air supply, use a combination thru-hull exhaust outlet and air intake fitting. Make sure the fitting will not be installed where it could possibly take on water. If separate exhaust outlet and air intake fittings are used, ensure that they are located in the same side of the boat. This will ensure an equal pressure on both for a balanced system. In RV and truck applications where the heater is mounted in an airtight compartment, an intake air hose must be used, or an opening, of at least 3 inches in diameter, be cut to the outside to allow for combustion air.



### 3.8 AIR INTAKE TUBING

Air intake tubing of 2 inch diameter is for combustion air intake (part # 8019). The same rules apply as apply to exhaust runs, with a maximum of 12 feet.



1. Install tubing from the combustion air intake fitting (located on the end of the heater), to the thru-hull fitting. If possible, the air intake connection of the thru-hull fitting should be pointed up and the air intake tubing should follow a route parallel to the exhaust tubing.

**DO NOT allow the combustion air intake and exhaust system tubing to touch as the exhaust system tubes can become very hot, and could melt the combustion air intake tube.**

2. The air entrance for the air intake shall be guarded, shielded, or located to exclude rain, snow, debris and birds.
3. Secure both ends of the intake tube with properly sized hose clamps.

### 3.11 FAN HEATERS

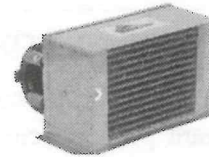
Where space is limited and for individual cabin or area control, use **I**TR fan heaters, Cabin Heater, #6002 or Spacesaver, # 6034. These heaters draw as little as 0.9 amps and deliver 140 cfm. They should be mounted as close to the floor as possible. They have a built in aquastat, which turns on the fan when the water running through it reaches 120°F (49°C), to prevent the blowing of cold air. See page 2-3 for sizes.



CABIN



SPACESAVER

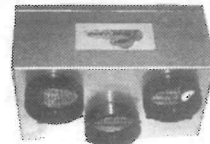
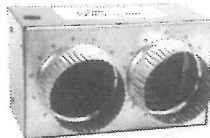
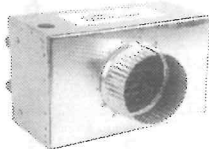


DEFROST

The **HURRICANE** heater comes with a single zone hookup but can be used with an optional 4 zone (part # 2014) system to heat individual rooms or areas. Four thermostats control the fan heaters and the **HURRICANE** heater, allowing you to regulate the room temperatures in four different locations. The zone control board can control up to a 10 amp draw in total. **When using other than *HURRICANE* fan heaters, check the amperage draw for compatibility with the zone controller.**

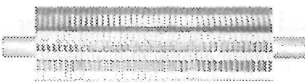
**A limited number of *HURRICANE* fan heaters can be used with the *HURRICANE* heater (3 for 20,000 Btuh models, 4 for 32,000 Btuh models, or 6 for 45,000 Btuh models).**

Care must be taken when connecting the hose to the inlet and outlet tubes of the heater. Use lubricant or soapy water in the end of the hose when making this connection. If too much force is used, the tube will break at the core and leak. This is not covered by warranty. Ensure that the fan heater's mounting compartments will be able to take in adequate air to the inlet of the heater. A minimum 16 square inch (100 square cm.) opening is required.



If two areas are located together, a dual air outlet plate will deliver heat for both areas. The fan heater can be mounted in a central location with one or two 3 inch or 4 inch ducts. Limit the length to 36 inches (92 cm.) for optimum air output.

### 3.12 BASEBOARD, FIN AND TUBE



If a long straight run of space is available, you may use baseboard heaters or build in fin and tube. This, however, will produce heat whenever the **HURRICANE** heater is operating and cannot be individually controlled by a separate thermostat.



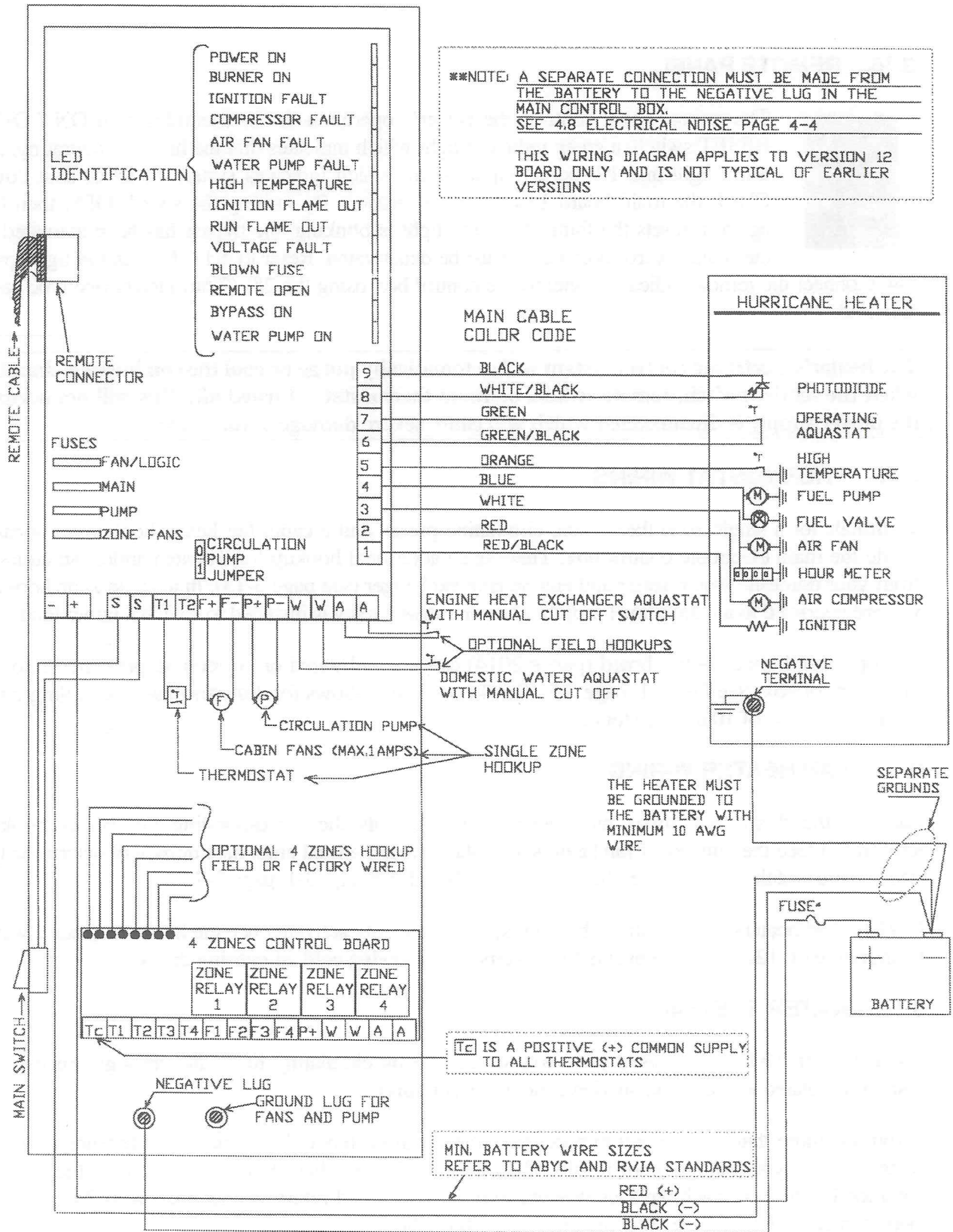


Figure 3-1

Wiring Diagram

### 3.20 MOUNTING THE EXPANSION TANK

Refer to Fig. 2-2, page 2-6, to see how water flows in and out of the heater. The flow directions are properly labeled in this figure, so do not reverse them during installation.

1. Mount either the horizontal or vertical expansion tank at the high point of the system and pipe to the inlet of the circulation pump.
2. We recommend you install an overflow reservoir beside the expansion tank, connected to the collar at the top of the tank. The overflow reservoir will make it easier to fill the system with water and monitor water levels.

**Never remove the expansion tank radiator cap when the system is hot and running. Scalding hot water may be forcefully expelled, seriously burning you. Only remove the cap when the system is cold.**

### 3.21 CIRCULATING WATER PUMP

Your heating system should be properly sized to circulate the water in your heating system.

A flow rate of 1 G.P.M. (gallon per minute) for every 10,000 Btuh of heater capacity is recommended which will provide approximately 20°F (6°C) temperature difference between the inlet and outlet of the heater. The slower the flow, the larger the temperature difference and the more time for heat transfer. The faster the liquid flows, the less temperature difference and the higher the resistance to the system. A pump must also have the capacity to flow the water through the resistance of a single heating loop consisting of all the pipe, fittings, boiler, heaters, etc., everything which makes up your heating system. On larger boats, a number of loops may be run off a common header in which case only the loop with the highest resistance should be used to size the pump. Each item has a pressure drop (psi.) across it and the total pressure drop X 2.3 equals pressure head in feet. If a pressure gauge is used on the inlet and outlet of a pump, the difference in pressure (psi.) is the resistance. Using the head in feet and the flow in G.P.M., the manufacturer's flow charts will allow you to pick the right pump.



If you anticipate vibration noises from the pump, mount the pump to a 4" piece of 3/4" rubber hose and screw the hose to the floor or bulkhead. Ensure the pump is at a lower point than your *HURRICANE* heater. Terminals are located inside the main control box which allow switching of pumps up to 10 amps maximum. Once the number and sizes of pumps are established, the total amperage will determine the size of wire and the fuse used in the main control board. See Fig. 3-1, page 3-7.



**The most sensitive part of the heater system is the water pump. NEVER let the pump run dry or you will damage the seals and the pump will leak. This is not covered by the warranty.**

### 3.25 WATER FILLING PROCEDURE

After your system has been completely installed, filled with straight water, purged of all air, and operating for a period of time at normal operating temperatures, you should now double check all connections for leaks. If no leaks are found, the system can be drained and filled with a 50/50 mixture of antifreeze and water.



**PRECAUTION:** Where there is a chance of contamination of your domestic water when using a heating system, use antifreeze specifically intended for hydronic heating systems. Inhibited propylene glycol is recommended. Do not use automotive, ethylene glycol, or any undiluted or petroleum based antifreeze as they can cause severe personal injury.

To fill the system use a separate self priming pressure pump with a hose on the suction side. Put the hose into a 5 gallon container. Remove the systems hose from the outlet of the expansion tank, which is feeding the systems circulating pump and attach it to the outlet of the self priming pressure pump. Remove the hose from the inlet of the expansion tank and hang it into the 5 gallon container.

Make a final check to ensure all of the air vents and drains are closed. Pour a mixture of antifreeze and water into the container and start the pump. As the mixture is pumped out, slowly add more mixture keeping the level above the inlet of the suction hose until all air has been expelled and the mixture starts coming out of the return hose hanging in the container. This will flush the system of any debris and purge the lines of air. Continue to run the pump for about 15 minutes.

When no more air is being expelled, stop the pump and reconnect the lines to the expansion tank. Top off the expansion tank with the mixture and turn on the system's circulating pump with the jumper, located on the main control board just right of the pump fuse, marked "Circ. Pump Override". When the jumper is on, the pump will run continuously and the bottom LED will be lit.

Check for a good flow through the expansion tank and double check all joints for leaks. Open and close all air vents to eliminate any remaining air bubbles. Recheck the mixture level and circulation in the expansion tank.

**CAUTION:** Make sure you have a good, quiet circulation of water through the heater. Check the pump to make sure it does not run dry. If the heater has air pockets trapped in the water jacket when it is turned on, it could overheat and damage the unit. None of this is covered by warranty.

**PRECAUTION:** Where there is a chance of contamination of your domestic water when using a heating system, use antifreeze specifically intended for hydronic heating systems. Inhibited propylene glycol is recommended. Do not use automotive, ethylene glycol, or any undiluted or petroleum based antifreeze as they can cause severe personal injury.

**It is not recommended to mix your engine cooling system with your heating system. Before connecting anything to your engine, consult your engine owner's manual for any restrictions or plumbing into the engine cooling system.**

For more information on operating the engine connected heat exchanger, see Chapter 4, page 4-3.

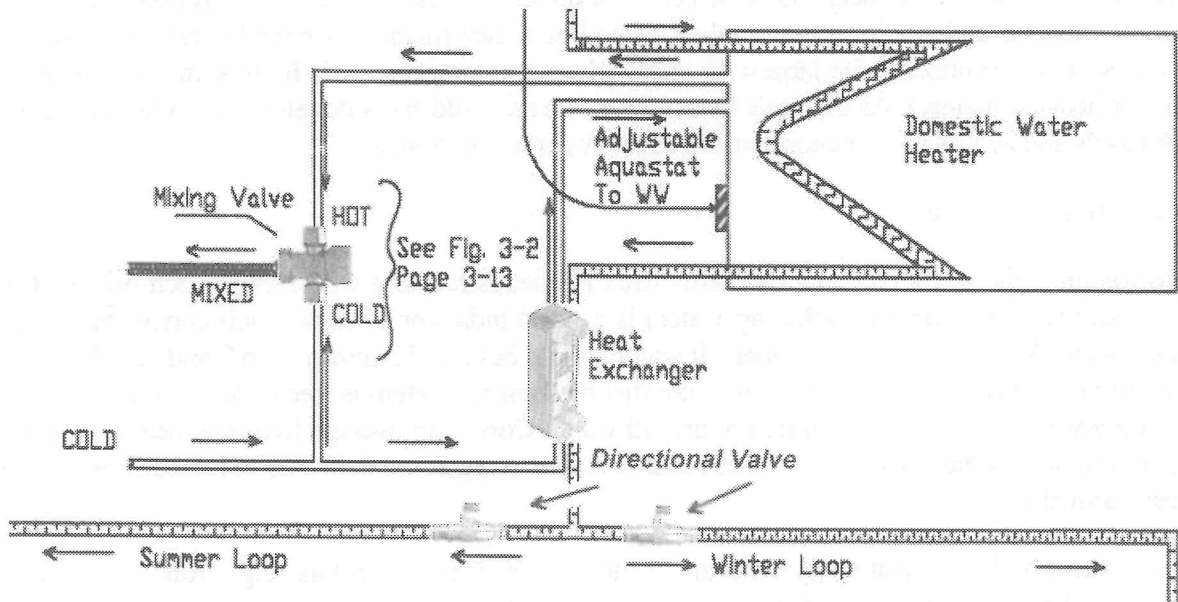


Figure 3-2

Optional Domestic Water Hookup using a heat exchanger and mixing valve for a continuous supply of hot water

## CHAPTER 4

### OPERATION



The initial start of your *HURRICANE* heater must be done by an authorized service person. Be sure that all components have been properly installed according to the instructions laid out in this manual before the initial start.

#### 4.1 STARTING THE HEATER

The major steps in starting the heater are as follows:

1. Turn on the ON/Off control switch, located on the remote indicator panel.
2. Turn up the zone thermostat to a setting higher than room temperature.
3. Start the heater by switching the service switch to ON. This switch is located on the side of the electronic control box.

#### 4.2 SIGNS OF NORMAL OPERATION

When the heater is operating normally:

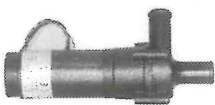


- The top two green indicator lights on the indicator panel should light up.
- Two separate relays inside the electronic control box will switch on. You may hear them if you are standing nearby.



- The ignitor will glow and the combustion air intake fan and the circulating pump begin to run. Whenever the pump is running, the green LED at the bottom of the LED's will be on.
- Shortly thereafter (about 10 seconds), the fuel pump starts delivering fuel to the regulator, the compressor turns ON, the fuel valve opens, and fuel is drawn to the air aspirating nozzle. The fuel is atomized and sprayed into the combustion chamber to start combustion.

After the ignition period (about 10 seconds), the ignitor shuts OFF, and the burner continues to operate. The heater will operate until all the zone thermostats are satisfied, or until the heater reaches its normal water operating temperature of 180°F. Once the normal operating temperature is reached,



the burner itself will cycle off and the combustion fan will operate for an additional two minutes to purge the burner. If a zone thermostat, domestic water heater aquastat, or engine heat exchanger aquastat is not satisfied, the

## 4.6 HEAT EXCHANGER OPERATION

If you've installed a heat exchanger to pre-heat your engine and recycle waste engine heat, follow these procedures.

### To pre-heat your engine:



Turn on the heater by a manual switch or timer wired to jumper the W-W terminal. If the heat exchanger is mounted upright, close to and near the bottom of the engine, it will transfer heat to the engine's cooling system through gravity circulation. A more positive solution is to install a pump on the engine side of the heat exchanger wired to the pump terminals on the main board in series with a master switch.

### To use waste engine heat for space and domestic water heating:

1. Install a switch, and/or an aquastat (part # 1027), on the engine supply line to the heat exchanger, and wire to the A-A terminals on the main control board.
2. Turn OFF, the ON/OFF control switch, located on the remote indicator panel. This will stop the burner from operating, but all other heater functions will operate normally.
3. Start your engine.
4. When the engine aquastat heats up to its preset temperature, it will automatically switch on the circulating pump of the heating system. All other functions of the system will operate normally.
5. The circulating pump will continue to operate until the engine aquastat has cooled down. A manual switch can be wired in series with this aquastat to shut down the pump sooner if required.

## 4.7 DOMESTIC WATER OPERATION

If your water heater is connected to the *HURRICANE* heating system and its controlling aquastat (part # 1024) is wired to the W-W terminals on the main board, it will cycle the heater and the water pump. A manual switch can be wired in series with this aquastat to shut down the operation if desired. A bypass loop can be plumbed in for summer operation. See figure 2-2, page 2-6 and figure 3-2, page 3-13.

**PRECAUTION:** Where there is a chance of contamination of your domestic water when using a heating system, use antifreeze specifically intended for hydronic heating systems. Inhibited propylene glycol is recommended. Do not use automotive, ethylene glycol, or any undiluted or petroleum based antifreeze as they can cause severe personal injury.

## CHAPTER 5

### TROUBLESHOOTING

#### 5.1 OVERVIEW



You can easily monitor your *HURRICANE* heater's operation by checking the electronic control box. Refer to figure 3-1, page 3-7, to see how the electronic control box is wired. Any fault or problem will be immediately picked up by the control board and an LED indicator will light up to pinpoint the fault. Once the fault has been corrected, it can be reset by switching the service or remote switch OFF, then ON again. The purpose of each of the LED indicators is described below.

**If a number of LED indicators flash or light up at one time, or if the heater cycles ON/OFF rapidly, check the ground from the heater to the battery. The ground should be a minimum 10 gauge and connected directly to the battery.**

#### 5.2 POWER ON (GREEN)



The POWER ON indicator is lit when both the service switch on the control box and the ON/OFF reset switch on the remote panel are ON, or, during the purge period after the remote switch is turned OFF.

If the light does **NOT** come on:

1. Check other indicator lights for a blown fuse or remote switch open.
2. Check the power terminal on the control box with a voltmeter (fuseholder to ground). The voltage should be between 11 and 15 volts. Check power source.

#### 5.3 BURNER ON (GREEN)

This indicator comes on during ignition and each time the burner starts running and stays on as long as the burner continues to run. If the light is not on, the burner is not running or is up to temperature and in the OFF cycle of the operating aquastat.

If the light is **NOT ON**:



1. Check the other indicator lights for indications of other faults.
2. Make sure the thermostat is turned ON.
3. Check the wiring and connectors at the thermostat control and on the main terminal block in the main control panel.

1. Check the wiring for an open circuit to the photodiode.
2. If the heater runs for a second or two during ignition and the flame looks normal before it shuts down on ignition flame out, it may be a defective control board.
3. Contact your nearest dealer.

B. If the light comes on and the heater runs for a second or two and the flame is small, partial, or not there at all:

1. Check the fuel supply. The fuel pump will chatter if there is no fuel or when air is passing through the pump. Check the Air Accumulator for air and bleed if necessary. Check connections between the fuel tank and fuel pump and the regulator and nozzle for air leaks. Find source of air entry and repair.



2. Check if the ignitor is working – it should be glowing brightly. If not working or dull in color, check the wiring connections and voltage. If necessary, replace the ignitor making sure the end of the tip is horizontal.



Make sure the nozzle or fuel filter is not clogged.

3. Check the air line hoses for any restriction of air flow through the compressor. Restrictions may be caused by a crimped hose, clogged air filter, or a loose or leaking air hose from the compressor outlet to the nozzle. Check the air filter inlet for any obstructions.



4. Make sure the air pressure of each compressor with the nozzle installed, is at 8 to 9 psig for SS-32, CO-20, and CO-32 models and 10 to 12 psig for SS-45, CO-45, CO-65, and 14 to 16 psig of the two compressors combined for CO-85, CO-105 models.



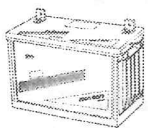
5. Check for negative pressure in the area around the heater. When the engine is running, it can draw air back through the heater's exhaust pipe. Make sure all intake air and exhaust connections are tight.

6. Check for restrictions or leaks in the combustion air intake hose or exhaust pipe.

## 5.8 VOLTAGE FAULT

This indicator lights up when the voltage is too low (below 10.5 Vdc), or too high (above 15 Vdc). If the voltage is too low, it will fault. If the voltage is too high, the heater will automatically restart when the voltage falls below 15 Vdc.

Low voltage can be caused when another appliance, with high amperage draw, is running or comes on at the same time as the heater.



High voltage may be caused when your alternator, battery charger, or inverter are putting out more than 15Vdc. Be sure the heater is wired directly to the battery with the proper size fuse and wire so that the battery will act as a buffer against voltage spikes. See wire size table on page 3-6.

**Make sure that the control box and the heater ground are wired directly to the battery.**



The red light will blink, whenever the bypass is activated, to alert the authorized service personnel to deactivate it when servicing is complete. See 5.11, Bypass On.

**NEVER LEAVE THE RED LIGHT BLINKING WITHOUT AN AUTHORIZED SERVICE MAN IN ATTENDANCE**

#### **5.14 REDUCED OUTPUT**

The heater may run without faulting, but at a reduced output. If this is noticed, it could be caused by the following:

1. High altitude
2. Dirty nozzle (see page 6-2)
3. Defective regulator
4. Too small a nozzle
5. Poor water circulation (see page 3-12)
6. Ash deposit in combustion chamber (see page 6-2)

#### **5.15 SMOKEY, SMELLY EXHAUST**

The heater may run without faulting, but you may experience signs of soot, exhaust smoke and/or a pungent smell. This is usually caused by the wrong fuel to air mixture. This can be affected by the following:

1. Low voltage
2. High altitude
3. Dirty compressor air filter
4. Low compressor air output
5. Restricted combustion air flow (intake hose / exhaust hose / combustion chamber)
6. Low combustion fan output (defective motor / wrong rotation (see page 8-7) / dirty fan blade)
7. Partially clogged grooves in nozzle distributor ( see page 6-2)

## CHAPTER 6

### MAINTENANCE

#### 6.1 THE FIRST FEW WEEKS

Once your *HURRICANE* heater has been installed to approved standards and workmanship, and you have test operated it a few times, your *HURRICANE* heater requires little maintenance.



About two weeks after your *HURRICANE* heater has been running, you should conduct a general inspection of the entire system.

- Check for any leaks in the exhaust, fuel, or water systems. Tighten all clamps.

#### 6.2 ADDING ANTIFREEZE

Once the system has been filled with water and purged of all air during the installation procedure, you need to operate the heater at normal temperatures and then check for water leaks. If you do not find any, add antifreeze to lubricate the pump and prevent the water system from corroding or freezing in cold weather. See Chapter 3, "Water filling procedures", page 3-11.

**PRECAUTION:** Where there is a chance of contamination of your domestic water when using a heating system, use antifreeze specifically intended for hydronic heating systems. Inhibited propylene glycol is recommended. Do not use automotive, ethylene glycol, or any undiluted or petroleum based antifreeze as they can cause severe personal injury.

#### **IT IS VERY IMPORTANT THAT YOU NEVER USE WATER ONLY AS A COOLANT.**



We recommend that you add a mixture of 50% water and 50% antifreeze. NEVER use more than a 50/50 mixture, since the added viscosity of the antifreeze solution will cause circulation problems. Your antifreeze/water mixture should be changed every three years. Antifreeze does wear out and can become very acidic.

A coolant conditioner should can be added to the water system, to keep the coolant alkaline and not acidic, see page 3-14. These inhibitors also prevent the coolant from forming calcium scales. Conditioners are available from diesel engine manufacturers to maintain water stability and prolong heater life. If a conditioner is not installed in your system, check the pH level yearly. The components inside the heater should not normally require maintenance, except for periodic checks for obvious problems, such as leaks or overheating.

#### 6.3 MARINE EXHAUST SYSTEM

**Always be careful that nothing combustible is placed adjacent to the exhaust pipes.**



While the exhaust system is made of a high quality stainless steel material, it is still affected by the marine environment. Check the general condition of the pipes every so often for possible leaks and corrosion. Service as required and replace corroded pipes immediately. On rough seas, there is a danger of water entering the exhaust outlet. Ask

**NEVER let the water pump run dry or you will cause irreparable damage to the pump and void your warranty.**

## 6.8 ELECTRICAL SYSTEM

The electronic control panel should not normally require servicing, except for the following:

- Make sure that all your connections are secure.
- Periodically, do a voltage test to ensure that you are getting 12 volts from the battery.
- Check for corrosion of wires.

## 6.9 RECOMMENDED SPARE PARTS

Like any piece of machinery, your *HURICANE* heater will need servicing from time to time. A suggested maintenance schedule, page 6-4, lists suggested maintenance items and intervals. The following is a list of parts recommended to have on hand.

<u>Description</u>	<u>Part No.</u>
• Fuel filter cartridge	6021
• Air filter	6018
• Fuel nozzle ( # for model CO 45)	14017
(See page 8-1 for the part # for other models)	
• Fuel nozzle "O" ring	14025
• Photocell (Board versions 5-10)	16002
• Photodiode (Board version 11/12)	16003

Over a period of time, operational parts of the heater will wear out and need replacing.

- Air compressor
- Fan motor
- Ignitor
- Cycling aquastat
- High limit aquastat

## CHAPTER 7

### WARRANTY AND SERVICE

#### 7.1 WARRANTY

**Warranty cards must be filled in completely, signed by the Owner and Dealer and returned to ITR within 30 days of the date of the original installation. This warranty is not transferable by the owner.**

ITR warrants the *HURRICANE* water jacket to be free of defects in materials and workmanship under design usage and service conditions for three (3) years from the date of the completion of the installation or three thousand (3,000) hours of operation, whichever comes first. All other accessories, components supplied or installed in the heater shall be covered by the manufacturer's warranty for a period of two (2) years or two (2,000) hours from the date of the manufacture of that component. Warranty replacement parts are covered for the remainder of the Heater's warranty or ninety (90) days, whichever is greater.

**This warranty does not apply to damage or failure of the Heater, or the vessel or vehicle into which it was installed, due to improper installation, assembly, maintenance, or abuse, accident, or the use of parts not supplied by ITR.**

#### 7.2 INSTALLATIONS

The purchaser and installer are advised that specific rules and regulations may be in effect with respect to the installation of the *HURRICANE* heater. It is the installer's responsibility to review and comply with all such rules and regulations.

Non-standard installations, that is, those requiring a departure from published installation instructions, should not be undertaken without first having consulted and obtained the written approval of ITR. Coverage for warrantable parts will, at the discretion of ITR, be made to the claimant in the form of repair, replacement, or credit.



**Systems installed without ITR's or an authorized Dealer's approval will be limited to a 90 day warranty measured from the date of the completion of the installation and so registered, or 250 hours of operation, whichever comes first.**

#### 7.3 LIMITED WARRANTY

**The following warranties are in lieu of all other warranties and conditions. ITR makes no other warranties, representations, or conditions, express or implied, and there are expressly excluded all implied or statutory warranties or conditions of merchantability of fitness for a particular purpose and those arising by statute or otherwise in law of from a course of dealing or usage of trade.**

- Diagnosis or repairs when caused by problems not directly related to the Heater or due to empty fuel tanks or poor fuel quality, acidic water, and electrolysis.
- Running the system dry or without appropriate preservatives (antifreeze), causing damage to the heat exchanger, pump seals, etc.
- Exposing the Heater to an environment detrimental to its effective operation (such as excessively wet, dirty, or hot areas).
- Other products which ITR does not manufacture.
- Any products or parts which have been used in a manner contrary to ITR's printed instructions.

**PLEASE FOLLOW THE RECOMMENDATIONS INCLUDED IN THIS MANUAL.**

## 7.6 CUSTOMER SERVICE CALLS

Installation and service warranty is the joint responsibility of the ITR and the authorized Dealer. ITR warrants its products and the Dealer warrants the installation. Normal service calls are at the owners expense.

Check the TROUBLESHOOTING CHAPTER of this manual to see if your problem is addressed.

When calling with a service problem, please have the following information at hand:

- The model number and serial number of your heater and main electronic control board.
- If your heater is already installed, ensure you are familiar with the design and installation setup.
- Have ready a detailed description of the problem and keep the manual handy to refer to.

## 7.7 RETURNS

To obtain warranty service, the owner must:

1. **Contact your dealer or ITR on instructions to repair and or return the warranty item.**
2. **Provide a full description of the problem.**
3. **Obtain a Return or Repair Material Authorization (RMA) number from ITR for any warranty return, repair or service. ITR will refuse any return package and will not authorize service or repairs without a RMA number. For field repairs, an authorized dealer must obtain an authorized repair (RMA) number from ITR before warranty work commences.**
4. **When shipping your product, pack securely, show the RMA and serial number of the heater on the outside of the shipping container, and ship prepaid and insured.**
5. **Provide written details of the problems, date of installation, proof of purchase, and a return address.**

**After repair or replacement** of products still under warranty, ITR will pay return shipping charges. Factory repairs or replacement will be done as quickly as possible, with an estimated five working day turn around.

- Diagnosis or repairs when caused by problems not directly related to the Heater or due to empty fuel tanks or poor fuel quality, acidic water, and electrolysis.
- Running the system dry or without appropriate preservatives (antifreeze), causing damage to the heat exchanger, pump seals, etc.
- Exposing the Heater to an environment detrimental to its effective operation (such as excessively wet, dirty, or hot areas).
- Other products which ITR does not manufacture.
- Any products or parts which have been used in a manner contrary to ITR's printed instructions.

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After repair or replacement of products still under warranty, ITR will pay return shipping charges. Factory repairs or replacement will be done as quickly as possible, with an estimated five working day turn around.

**CHAPTER 8****PARTS LISTING**

ITEM	PART#	DESCRIPTION	ITEM	PART#	DESCRIPTION
1	9022	BURNER BOX CO 20,32,45	32	2020	BOLT
1	9104	BURNER BOX CO 65,85,105	33	23004	WASHER
2	9072	MECHANICAL BOX, CO 20,32,45	34	23007	WASHER
2	9106	MECHANICAL BOX, CO 65,85,105	35	23001	WASHER
3	20006	WATER JACKET CO 20,32,45	36	19003	SCREW
3	20007	WATER JACKET CO 65,85,105	37	23003	WASHER
4	9013	FAN BRACKET	38	23005	WASHER
5	2185	BURNER CO 20,32,45	39	14029	NUT
5	2185	BURNER CO 65,85, 105	40	2018	BOLT
6	6018	AIR FILTER	41	6015	FAN MOTOR CO 20,32
7	8031	HOURMETER	41	6011	FAN MOTOR CO 45,65,85,105
8	18001	REGULATOR	42	6009	FAN BLADE (UNIT)
9	16011	FUELPUMP	43	6009	FAN BLADE SPRING CLIP (UNIT)
10	3005	AIR COMPRESSOR CO 20,32,	44	6008	FAN BLADE HOUSING
10	3004	AIR COMPRESSOR CO 45,65,85,105	45	19006	SCREW
11	9101	ISOLATION MOUNTS	46	9002	IGNITOR
12	2062	ELBOW	47	9001	IGNITOR CLIP
13	2059	ELBOW	48	14015	NOZZLE BODY CO 20 (UNIT")
14	2147	BLEEDER VALVE	48	14016	NOZZLE BODY CO 32 (UNIT)
15	2175	ELBOW FILTER	48	14017	NOZZLE BODY CO 45 (UNIT)
16	2127	TEE	48	14018	NOZZLE BODY CO 65 (UNIT)
17	2103	NIPPLE	48	14019	NOZZLE BODY CO 85 (UNIT)
18	2050	COUPLING	48	14020	NOZZLE BODY CO 105 (UNIT)
19	2067	ELBOW	49	14022	NOZZLE DISTRIBUTOR (UNIT)
20	1026	AQUASTAT	50	14026	NOZZLE SCREW PIN (UNIT)
21	1028	AQUASTAT HIGH LIMIT	51	14025	NOZZLE "O" RING
22	5125	STRAIN RELIEF (UNIT)	52	14023	NOZZLE FILTER
23	5125	STRAIN RELIEF NUT (UNIT)	53	6039	FUELBLOCK
24	5125	STRAIN RELIEF LOCKNUT (UNIT)	54	16001	PHOTODIODE NUT(UNIT)
25	9019	BURNER BOX LID CO 20,32,45	55	16003	PHOTODIODE (UNIT)
25	9107	BURNER BOX LID CO 65,85,105	56	2059	ELBOW
26	7019	MECHANICAL BOX LID CO 20,32,45	57	2101	NIPPLE
26	9108	MECHANICAL BOX LID CO 65,85,105	58	19056	SOLENOID
27	7019	GROMMET	59	9103	ISOLATION MOUNTS
28	7020	GROMMET	60	19013	SCREW
29	5006	EYELET	61	7003	GASKET
30	19010	SCREW	62	7010	GROMMET
31	19009	SCREW	63	16006	PLASTIC WINDOW
			64	2237	BARB FITTING

NOTE: Parts listed as a unit must be purchased as a unit assembly

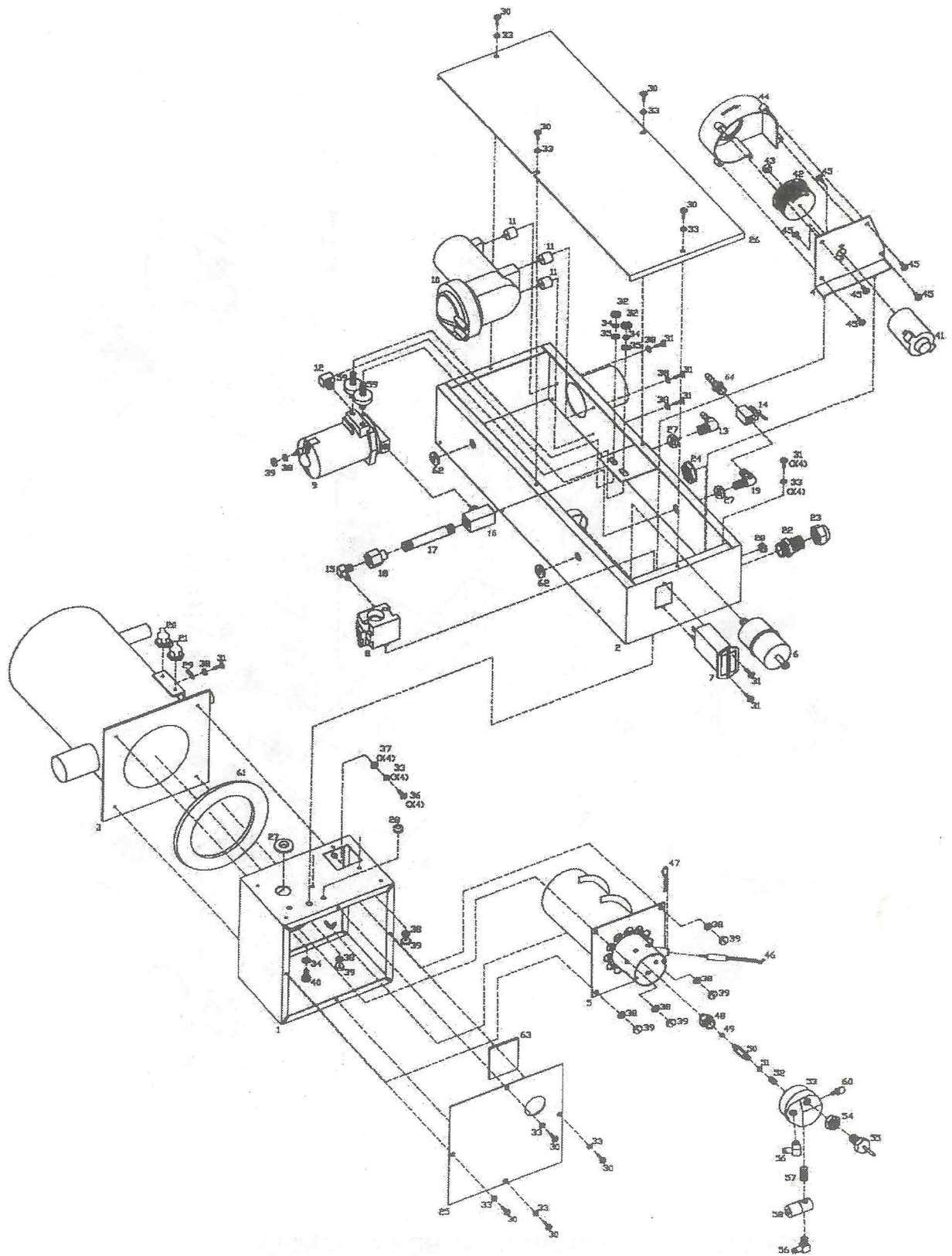


FIGURE 8-1 HEATER ASSEMBLY



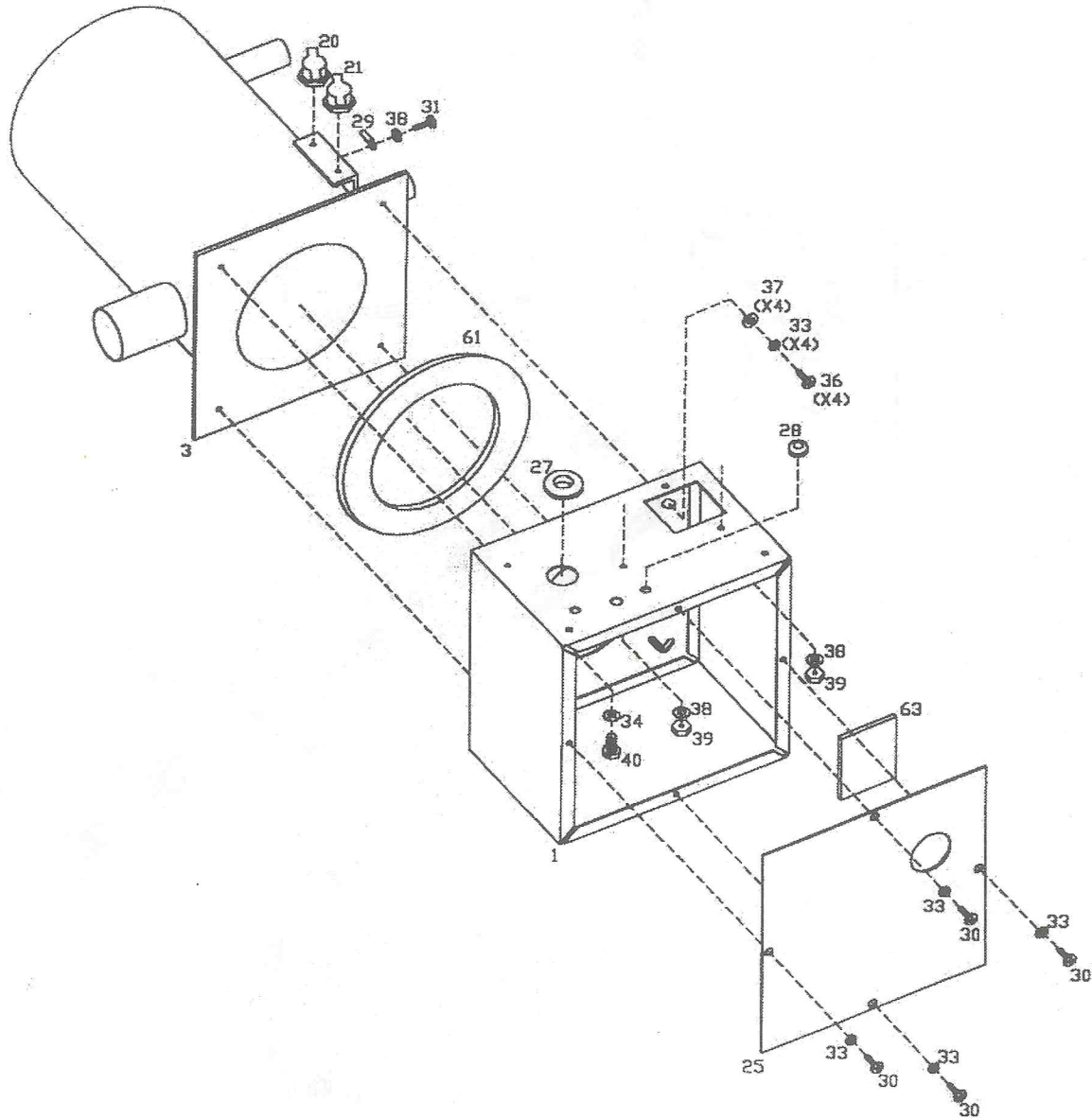


FIGURE 8-3 WATER JACKET AND BURNER BOX ASSEMBLY

FAN ROTATION

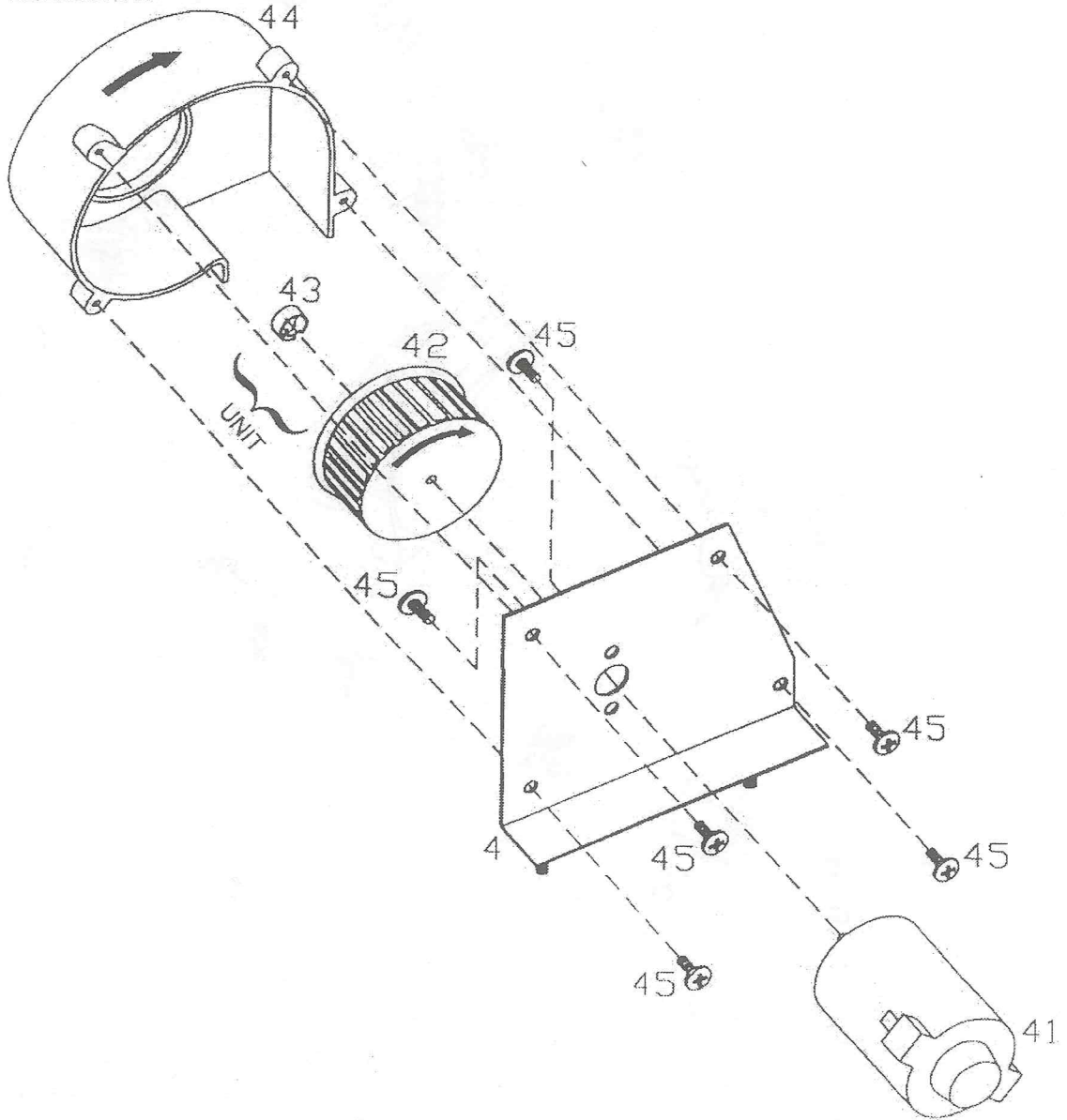


FIGURE 8-5 COMBUSTION FAN ASSEMBLY