

THE HARDY

INSTALLATION AND OPERATING INSTRUCTIONS

for

THE HARDY OUTSIDE WOOD BURNING FURNACE

Models - H2 & H4

HARDY MANUFACTURING CO., INC.
12345 ROAD 505
PHILADELPHIA, MISSISSIPPI 39350
PHONE: (601) 656-5866 or (601) 656-6948
FAX: (601) 656-4559

INTRODUCTION

Thank you for purchasing the original all stainless steel Hardy Outside Wood Burning Furnace. It represents the result of many years of Hardy experience and the input of Hardy customers in the production of a top quality furnace. With the purchase of this Hardy Furnace, you can now appreciate the high degree of craftsmanship and reliability that have made The Hardy the leader in the Outside Woodburning Furnace field. This manual will provide you with a good basic understanding of the installation and operation of this furnace.

THIS MANUAL INCLUDES IMPORTANT SAFETY INFORMATION.

Your new furnace should have the following:

- (1) Owners Manual complete with Installation and Hook-Up Instructions
- (2) Warranty & Return Warranty Card
- (3) A tube of silicon (located in the firebox for shipping)
- (4) Smoke stack and condenser tank stack both with trim (located in firebox for shipping)
- (5) Three cast iron grates (located in firebox)
- (6) Two I-beams (located in firebox)
- (7) Shovel (located in the firebox for shipping)
- (8) Stainless steel panel and insulation that will be located between the firebox door & ash door after installation of the furnace.
- (9) Stainless steel flame baffle (15" x 10"). Only for use on Hardy model H4 180,000 BTU furnace.

Should your furnace not have any of these items or if you have any questions regarding the operation or maintenance of your furnace, please consult your local Hardy Dealer.

Again, thank you for purchasing a Hardy Furnace.

Sincerely,

Frank L. Moore
President
Hardy Manufacturing Company Incorporated

Please fill in the following information

Hardy Model _____

Serial Number _____

Date of Purchase _____

Date of Installation _____

Dealer Purchased from _____

Dealer Address _____

Dealer Phone Number _____

Please keep this manual with all other important papers. The information in this manual is necessary for the installation, operation and proper use of this unit. If you should ever have a problem or question please refer to this manual or have it available when you call your Hardy Dealer or Hardy Manufacturing Company Incorporated.

HARDY MANUFACTURING CO., INC.
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(Model H2,H4)

SAFETY PRECAUTIONS WARNING

Do not operate this equipment for other than its intended purpose nor other than in accordance with the instructions contained in this manual and all other instructions accompanying the unit.

For units covered by this instruction book, it is important to observe safety precautions to protect yourself from possible injury. Among the many considerations, you are advised to:

- * Observe all safety stickers on the unit
- * This unit must be wired by a qualified electrician in accordance with the National Electrical Code.
- * Never use any type of petroleum product, petroleum based product, charcoal starter, lighter fluid, or any other flammable accelerant to start your unit.
- * Always open the ash door (bottom) before you open the firebox door (top).
- * Never leave the doors open, always latch the doors securely.
- * Always use proper care when installing, operating and maintaining the unit.
- * Do not modify the unit.
- * Do not substitute repairs which can be provided by your dealer, distributor, or Manufacturing Company.

Failure to heed this warning or any additional warnings on the unit may result in an accident causing personal injury.

THE HARDY OUTSIDE WOODBURNING FURNACE

How does an outside furnace heat my home?

The Hardy outside wood furnace is designed to save the most energy and provide the most comfortable heating available. It heats your home by heating a stainless steel tank filled with water, which surrounds the firebox of the outside furnace. The furnace is basically a nonpressurized boiler with an atmospheric vent. This hot water is then circulated through underground hot water pipes to a water coil inside your existing central duct system.

The Hardy furnace can be connected to any existing hydronic heating system that operates at 180 degrees or less.

How does THE HARDY heat water for household use?

A cold water supply line goes to the outside furnace. This water line keeps the water tank on the furnace full. The tank only takes on more water as it evaporated and the water line also connects to a heat exchanger which lies inside the water reservoir of the outside furnace. The pressure on the supply water line forces water through the heat exchanger when you open a hot water faucet inside your home. As this water passes through the heat exchanger it picks up the heat from the hot water which surrounds it and then goes to the cold water input on your hot water heater. This means the hot water heater will take on hot water. This water is not contaminated with the water that passes through your furnace and coil to heat your house.

How do the Thermostat Controls work?

The only visible addition to the heating system inside your home is the thermostat which is located near the existing thermostat. The two thermostats are installed so that if the outside wood furnace is not in operation, your existing unit will automatically take over to maintain your household temperature. The wall thermostat which regulates the heat from the outside furnace performs two functions; when it senses your need for heat according to your temperature setting, it turns the water pump on to circulate the hot water through the coil and also turns the blower on inside your central unit to force air across the hot coil. This forces hot air into your central duct system. The outside furnace has a hot water thermostat which senses the water temperature of the unit. If the water is not as hot as thermostat setting (normally set on 170 degrees) then the combustion air intake is automatically opened and remains open until such temperature is attained.

Where should an Outside Wood Burning Furnace be located?

The outside unit should be located at least 10 feet from your home so that all fire danger is removed from your home. The unit may be installed as much as 100 ft. away and still heat your house an hot water. If the unit is located more than 100 ft. away, you may experience some heat loss on the water going to your hot water heater. Locate the outside wood furnace where it will be convenient for refueling and wood storage. All water and power lines are installed underground between the house and the outside wood furnace.

TABLE OF CONTENTS

SECTION I: General Information

1-1 Specifications	1-2
1-2 Furnace Component Parts (Model H2)	3
1-3 Furnace Component Parts (Model H4)	4

SECTION II: Installation Of Furnace

2-1 Location of Furnace	5-6
2-2 Hull Removal	7
2-3 Set-Up of Grates	8
2-4 Location of Plumbing & Electrical Lines	9
2-5 Connection of Power to Furnace	10
2-6 Wiring Diagram	11
2-7 Plumbing Instructions	12-13
2-8 Filling the Furnace with Water	14-15

SECTION III: Connection to Central Heating/AC System

3-1 Connection to Central Unit with existing Blower Relay	16-18
3-2 Location of Heating Coil	19-20

SECTION IV: Connection to Hydronic Heating Systems (Baseboard)

4-1 Connection to Hydronic System with existing 24 Volt Transformer	21-22
4-2 Typical Diagram for Plumbing Hydronic System	23

SECTION V: Circulating Domestic Hot Water

5-1 Description of Circulating Domestic Hot Water	24
5-2 Plumbing Instructions for a 2 Line Circulating Domestic Hot System	25
5-3 Wiring Diagram for Circulating Domestic Hot Water	26

SECTION VI: Furnace Operation

6-1 Firing the Furnace	27
6-2 Water Temperature	27
6-3 Wood Usage	27
6-4 Moisture in the Firebox	27
6-5 Improper Burning	28
6-6 Ash Removal	28

SECTION VII: SERVICE INFORMATION

7-1 Electric Make-Up Water Systems	29
7-2 Water Circulation System	30
7-3 Temperature Control System	31
7-4 Preseason Heater Maintenance	32
7-5 Trouble Shooting Guide	33-35

SECTION VIII: Repair Parts

36

SECTION I

GENERAL INFORMATION

1 - 1 Specifications

Type of fuel - Wood

For outdoor use only

US Patent No. 4,360,003

Underwriters Laboratories Inc. Listed - 84E4

Electrical Rating 115 VAC/ 60 HZ / 1P
MFS-15 AMP, MCA-15 AMP

Clearance to Combustibles

Top, Rear, Sides - 18"
Chimney Connector - 18"
Front - 48"
Flooring - Non Combustible

Water Capacity

H2 - Holds 100 Gallons of Water
H4 - Holds 130 Gallons of Water

FURNACE DIMENSIONS

<u>Description</u>	<u>Width</u>	<u>Depth</u>	<u>Height</u>	<u>WEIGHT</u>
H2 - 120,000 BTU	30"	52 1/2"	59 1/2"	650 lbs.
H4 - 180,000 BTU	40"	52 1/2"	59 1/2"	850 lbs.

FIREBOX SIZES

<u>Description</u>	<u>Width</u>	<u>Depth</u>	<u>Height</u>
H2 - 120,000 BTU	24"	32"	36" + 8" for Grates
H4 - 180,000 BTU	34"	32"	36" + 8" for Grates

1 - 1 Specifications (continued)

On the front of your furnace there is a nameplate. Along with other information you will find the model number of your furnace. This model number tells you what your furnace rating is and what electrical and plumbing options your furnace has. Use the following list to determine this. The first section determines the rating of your furnace. The second section determines electrical options. The last section determines the plumbing options. For example furnace model number **H2-1-17**. The **H2** designates that you have a 120,000 BTU furnace. The **1** in the second section designates that you have a standard pump. The **1** in the last section designates that you have standard domestic hot water. The **7** in the last section designates that you have extra ports on your furnace.

Furnace Rating

H2 - 120,000 BTU
H4 - 180,000 BTU

ELECTRIC OPTIONS STD. PUMP	PLUMBING OPTIONS HOT WATER	EXTRA PORTS
MODEL		
HARDY MANUFACTURING CO., INC. ROUTE 4 / BOX 156 PHILADELPHIA, MISSISSIPPI 39350 PHONE (601) 656-5866 FOR OUTDOOR USE ONLY U.S. PATENT NO. 4860003 WOOD-FIRED HOT WATER HEATER HARDY OUTSIDE WOODBURNING FURNACE MODEL H2-1-17 SERIAL NO. CAPACITY BTU/HR 120000 DATE OF MFG. ELECTRICAL RATING 115VAC/60 HZ/1P 2.50 AMPS MFS-15 AMP MCA-15 AMP TYPE OF FUEL-WOOD CLEARANCE TO COMBUSTIBLES TOP, REAR, & SIDES --18 INCHES FRONT---48 INCHES CHIMNEY CONNECTOR-18 INCHES FLOORING--NON-COMBUSTIBLE		

Electrical Options

- 0 - Without a Pump
- 1 - Standard Pump
- 2 - 2nd Pump & Relay
- 3 - 3rd Pump & Relay
- 4 - Without a Pump for Heating system and with Circulating Domestic Hot Water
- 5 - With a Standard Pump for Heating System and with Circulating Domestic Hot Water
- 6 - With 2nd Pump and Relay and with Circulating Domestic Hot Water
- 7 - With 3rd Pump and Relay and with Circulating Domestic Hot Water

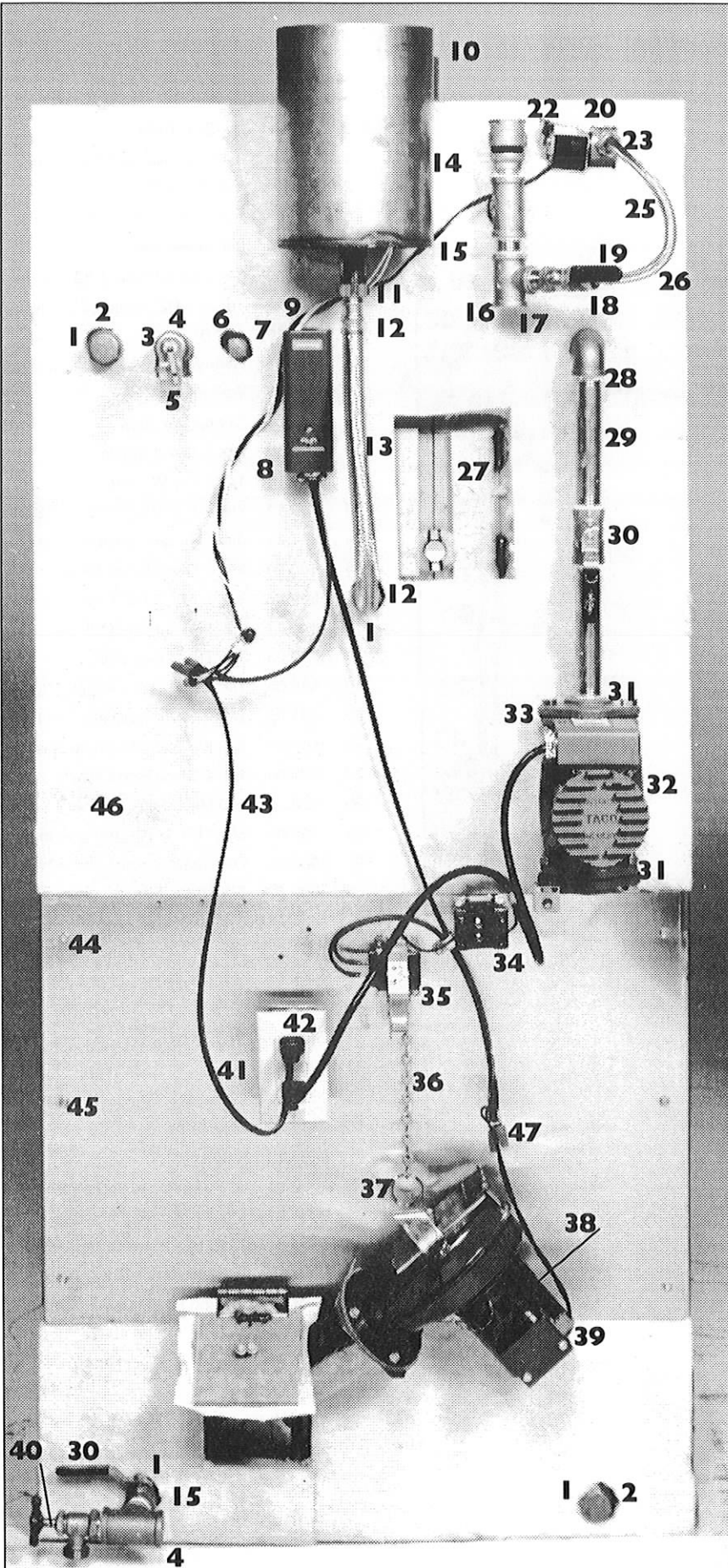
Plumbing Options

- 0 - Without Domestic Hot Water
- 1 - Standard Domestic Hot Water
- 2 - With 2nd Heat Exchanger (2nd Domestic Hot Water or Swimming Pool Heat Exchanger)
- 3 - With 3rd Heat exchanger (2nd Domestic Hot Water and Swimming Pool Heat Exchanger)
- 4 - Extra 60' copper in Domestic Hot Water
- 5 - Extra 60' copper in Domestic Hot Water and Swimming Pool Heat Exchanger
- 6 - 1" Heat Exchanger - 2 - 60' Rolls 3/4" Copper Manifold to 1" Ports.
- 7 - Extra Ports, 1/2", 3/4", 1", etc.

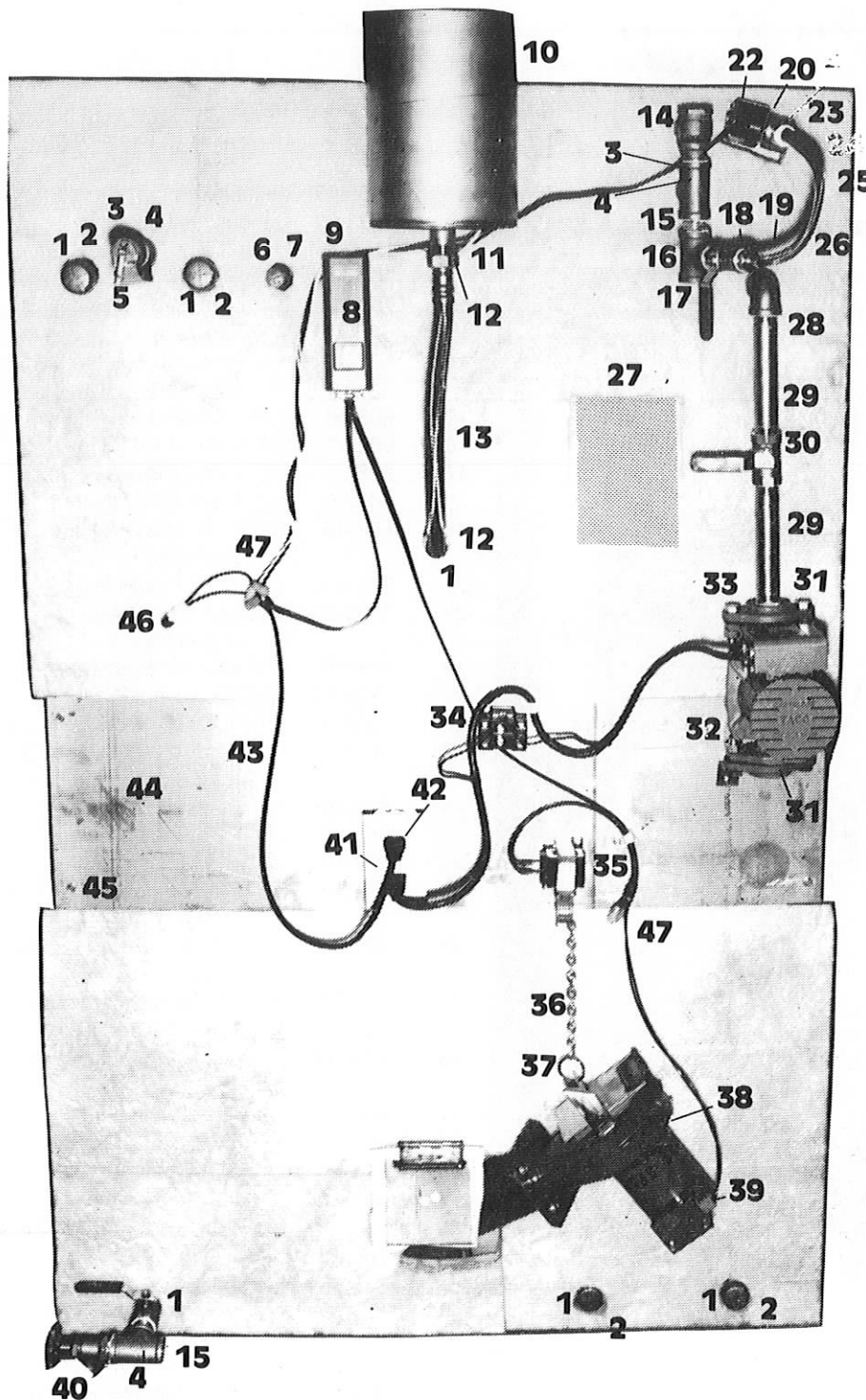
Section I 1 - 2

Furnace Component Parts (Model H2)

Legend	Part No.	Description
1	701.36	3/4" x 3" Stainless Steel Toe
2	604.32	3/4" Brass Cap
3	702.08	3/4" x 5" Stainless Steel Nipple
4	602.16	3/4" Brass Tee
5	607.30	3/4" Pop-off Valve (Pres. Relief)
6	701.12	1/2" x 1 1/2" Stainless Steel Toe
7	604.16	1/2" Brass Cap
8	2000.08	Honeywell Hi-temp Thermo No Well
9	2000.48	Well Fitting
10	3103.00	Condenser Tank
11	1100.15	Liquid Level Switch
12	700.24	1/2" Fiber Washer
13	700.12	3/4" F/P x 3/4" F/P X 18" SS Flex Line
14	607.36	3/4" Vacuum Relief Valve (Breaker)
15	603.40	3/4" x Close Brass Nipple
16	602.32	3/4" x 3/4" x 1 1/2" Brass Tee
17	603.08	1/2" x Close Brass Nipple
18	607.00	1/2" Brass Ball Valve
19	605.00	1/2" x 1/4" Brass Adaptor Bushing
20	701.00	1/4" x 1 1/2" Stainless Steel Toe
22	1100.00	Electric Water Solenoid-Assembly
23	603.00	1/4" x Close Brass Nipple
25	1100.55	100 Mesh Filter Washer
26	700.03	5/16" I.D. X 12" SS Flex Line
27	2000.36	Low Temp Sensor (Behind Insulation)
28	600.30	3/4" Brass Elbow
29	603.32	3/4" x 6" Brass Nipple
30	607.12	3/4" Brass Ball Valve
31	501.42	3/4" C.I. Flanges For Taco 009 Pump
32	501.06	Taco 009 C.I. Pump W/Power Cord
33	2004.24	Romex Connector (Metal)
34	2000.52	Honeywell Relay, DPDT
35	2001.00	Doermeyer Damper Solenoid
36	3200.12	Jack Chain
37	3200.16	Key Ring
38	2002.16	100 CFM Damper Blower W/Flapper
39	2004.28	Plastic Romex Connector
40	607.42	3/4" Male Brass Boiler Drain Valve
41	2004.16	Receptical Box 2 1/8" Deep
42	2004.00	Ground Fault Interrupter Receptical
43	2004.08	8' Black 2 Wire Power Cord
44	2004.52	Electrical Mounting Panel
45	3000.38	No.1 2 x 3/4" SS Self Tap Screw
46	1100.30	Low Water Indicator Light
47	2004.40	Wire Connectors



Section I 1 - 3 Furnace Component Parts (Model H4)



Legend	Part No.	Description
1	701.36	3/4" x 3" Stainless Steel Toe
2	604.32	3/4" Brass Cap
3	702.08	3/4" x 5" Stainless Steel Nipple
4	602.16	3/4" Brass Tee
5	607.30	3/4" Pop-off Valve (Pres. Relief)
6	701.12	1/2" x 1 1/2" Stainless Steel Toe
7	604.16	1/2" Brass Cap
8	2000.08	Honeywell Hi-temp Thermo No Well
9	2000.48	Well Fitting
10	3103.00	Condenser Tank
11	1100.15	Liquid Level Switch
12	700.24	1/2" Fiber Washer
13	700.12	3/4" F/P x 3/4" F/P X 18" SS Flex Line
14	607.36	3/4" Vacuum Relief Valve (Breaker)
15	603.40	3/4" x Close Brass Nipple
16	602.32	3/4" x 3/4" x 1/2" Brass Tee
17	603.08	1/2" x Close Brass Nipple
18	607.00	1/2" Brass Ball Valve
19	605.00	1/2" x 1/4" Brass Adaptor Bushing
20	701.00	1/4" x 1 1/2" Stainless Steel Toe
22	1100.00	Electric Water Solenoid-Assembly
23	603.00	1/4" x Close Brass Nipple
25	1100.55	100 Mesh Filter Washer
26	700.03	5/16" I.D. X 12" SS Flex Line
27	2000.36	Low Temp Sensor (Behind Insulation)
28	600.30	3/4" Brass Elbow
29	603.32	3/4" x 6" Brass Nipple
30	607.12	3/4" Brass Ball Valve
31	501.42	3/4" C.I. Flanges For Taco 009 Pump
32	501.06	Taco 009 C.I. Pump W/Power Cord
33	2004.24	Romex Connector (Metal)
34	2000.52	Honeywell Relay, DPDT
35	2001.00	Doermeyer Damper Solenoid
36	3200.12	Jack Chain
37	3200.16	Key Ring
38	2002.28	130 CFM Damper Blower W/Flapper
39	2004.28	Plastic Romex Connector
40	607.42	3/4" Male Brass Boiler Drain Valve
41	2004.16	Receptical Box 2 1/8" Deep
42	2004.00	Ground Fault Interrupter Receptical
43	2004.08	8' Black 2 Wire Power Cord
44	2004.52	Electrical Mounting Panel
45	3000.38	No. 12 x 3/4" SS Self Tap Screw
46	1100.30	Low Water Indicator Light
47	2004.40	Wire Connectors

SECTION II

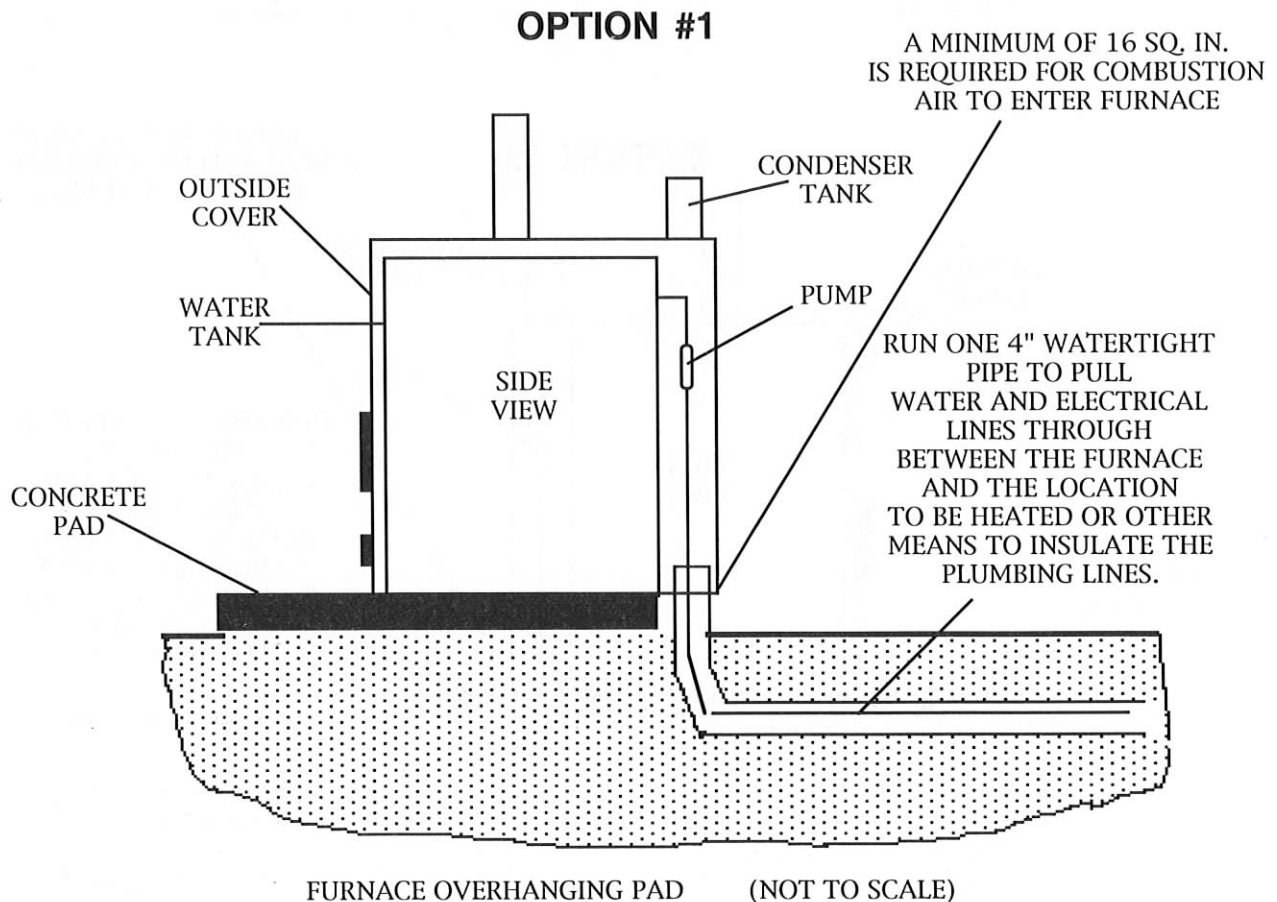
INSTALLATION OF FURNACE

Section II 2 - 1 Location of Furnace

The Hardy Furnace is designed to set outside the building to be heated. The unit must be located a minimum of 10 feet from the building. The unit should be installed upon a concrete pad. There are two typical options that we recommend.

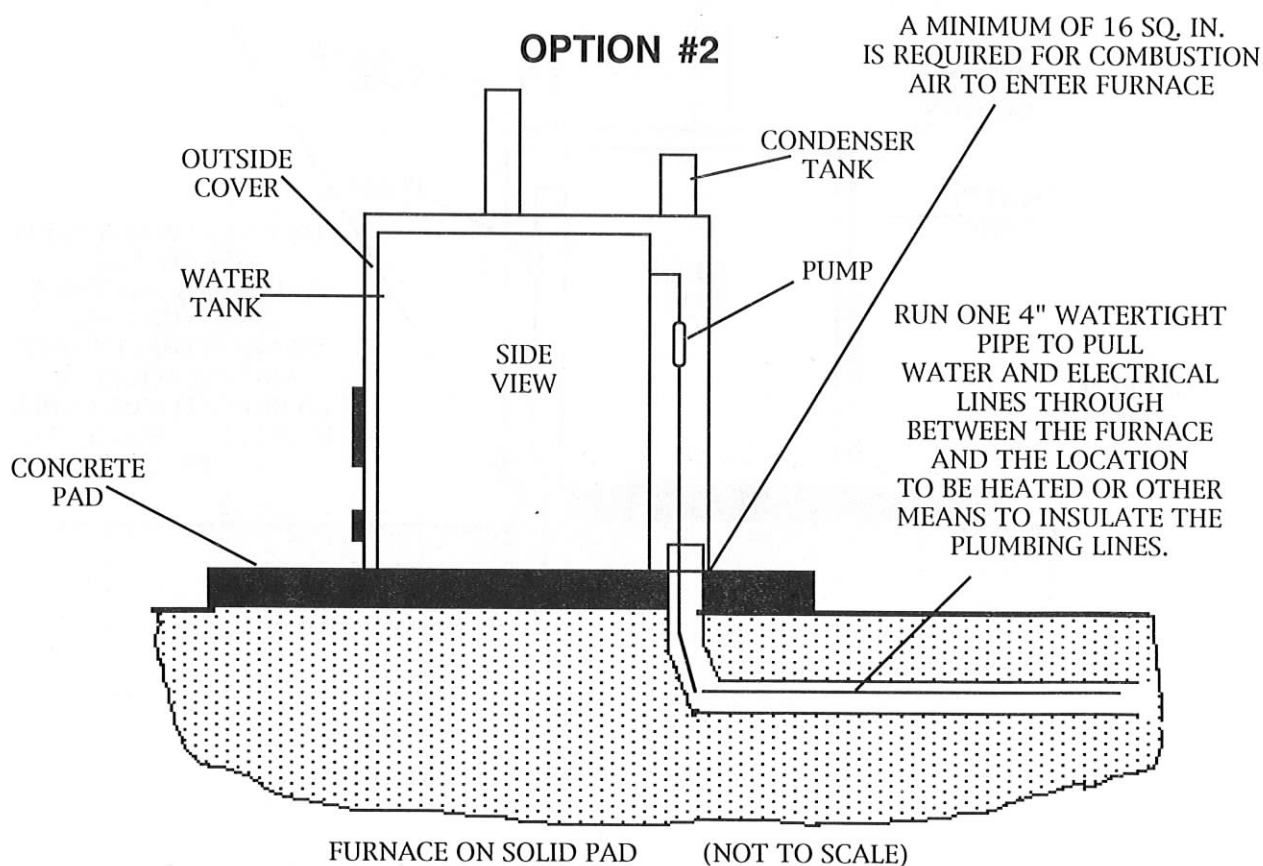
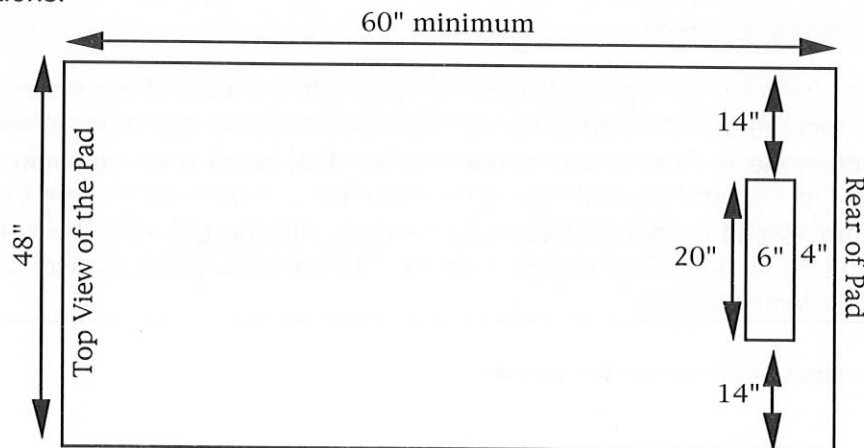
Option 1 has the unit installed on a precast concrete pad with the rear of the water tank flush with the end of the pad. We recommend the pad to be 48" wide and 48" long minimum. If you add extra length it will allow ample concrete in front of the furnace for loading wood and removing ashes. The space between the rear of the unit and the outside cover will allow a 4 inch water tight pipe or other means to insulate the plumbing and electrical lines to run directly into the ground. The outside cover can be removed by lifting it off the water tank on all four corners. This will allow you easy access for the connection of the plumbing and electrical lines.

Please see the illustration below for details.



Section II 2 - 1 Location of Furnace (continued)

Option 2 illustrates the unit installed on a precast concrete slab with a cut out in the slab for the plumbing and electrical connects to run through. We recommend this pad to 48" wide by 60" minimum long. If you add extra length it will allow ample concrete in front of the furnace for loading wood and removing ashes. The 4 inch watertight pipe or other means to insulate plumbing that runs underground exits through this cut out to allow connections to the unit. The unit sits on the slab with the rear of the water tank flush or even with the front side of the cutout. The outside cover of the furnace can be removed by lifting it from the water tank on all four corners. This will allow you easy access for the plumbing and electrical connections.

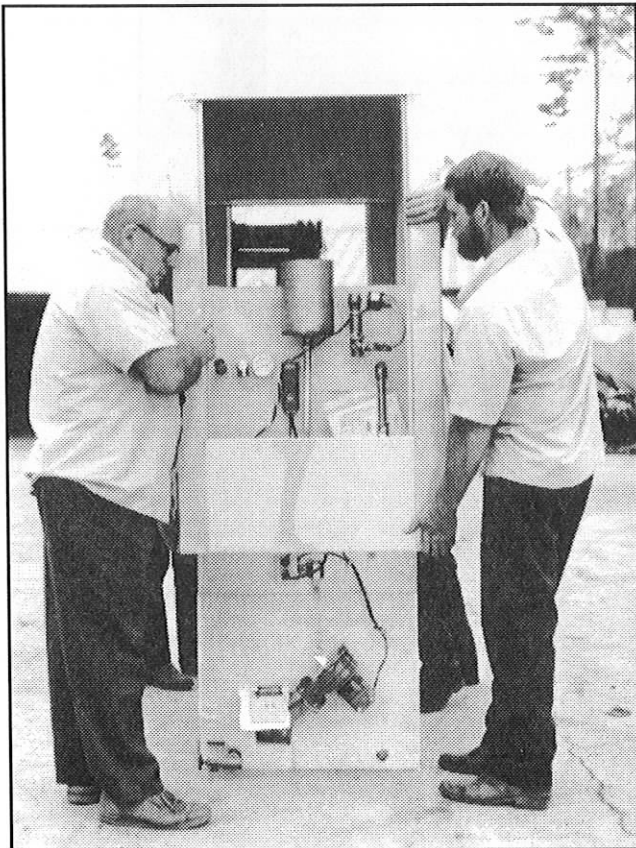


Section II 2 - 2 Hull Removal

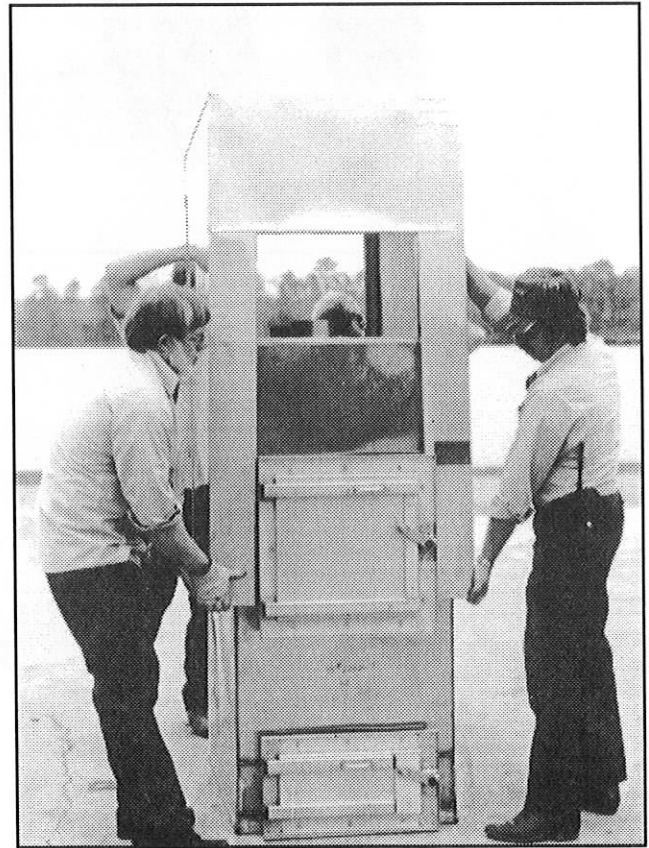
After placing your new Hardy Furnace upon the concrete pad, you are ready to continue the installation process. There are two methods to gain access to the rear of the furnace to make plumbing and electrical connections.

The first and easiest method is to remove the screw holding the back door panel in place. The door is easily removed by lifting up on the handle, sliding the door up and taking it out. With the back door removed, using a 5/16" wrench, remove the 8 metal screws that are located below the back door. There are four on each side that hold the panel in place. After the screws are removed, the panel should come out easily and allow access to the bottom of the unit to make plumbing and electrical connections.

The second method is the removal of the entire cover. With the back door and the rectangular piece of stainless and insulation between the fire box and ash door removed, the outside cover can be lifted up and off as seen in the picture. To replace the cover simply repeat these steps in reverse order.



REAR



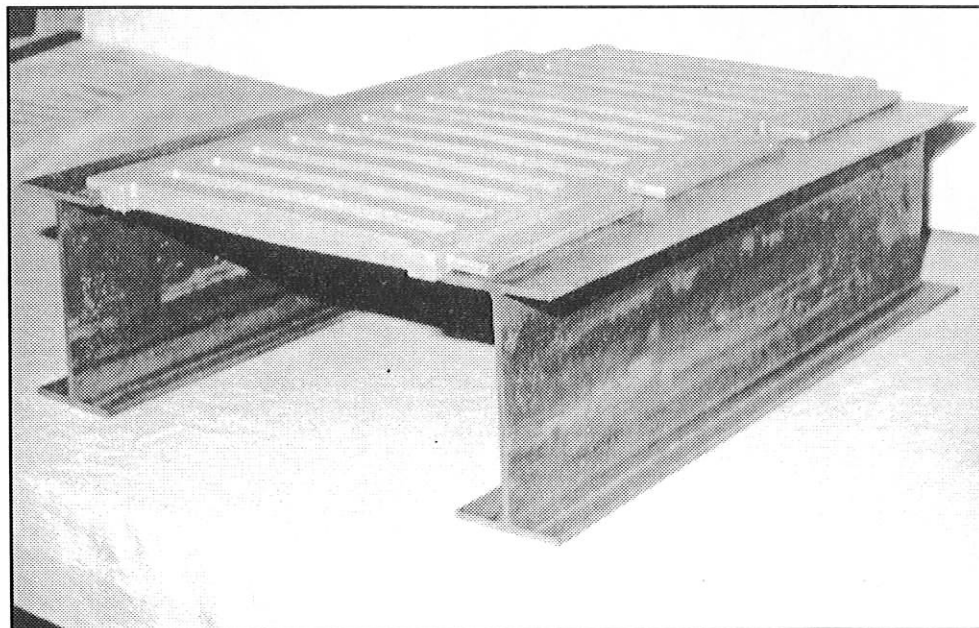
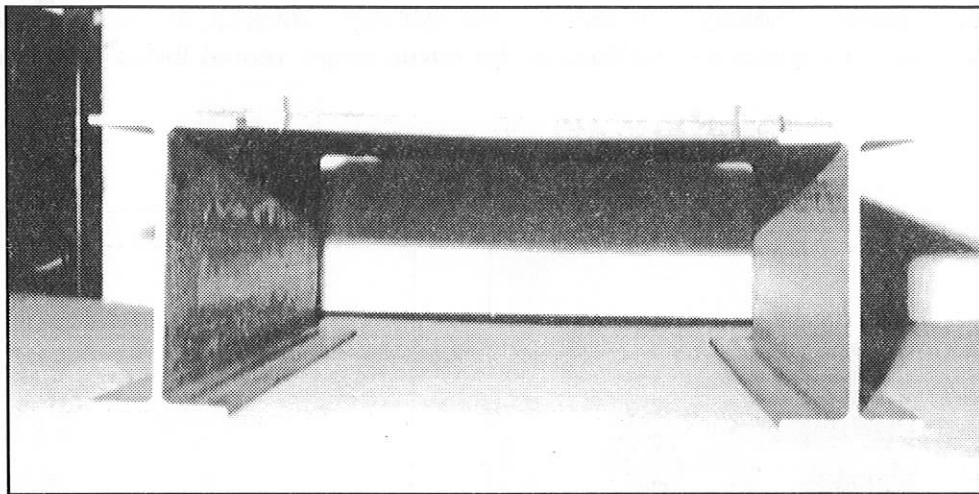
FRONT

Section II 2 - 3 Set-Up of Grates

First open the firebox door and remove everything from inside of the furnace except the two I-beams and three grates. Lay the two I-beams up on the edge and over against the tabs as shown in the picture below. The grates can now be placed on the I-beams in line and side to side. The picture below shows the proper way for grates to be installed.

These grates are designed to be turned over if they warp.

On Hardy H4 models, there is a stainless steel flame baffle (15" x 10"). This flame baffle is inserted in the firebox across the 3/4" stainless steel pipes located directly below the smokestack.



Section II 2 - 4 Location of Plumbing and Electrical Lines

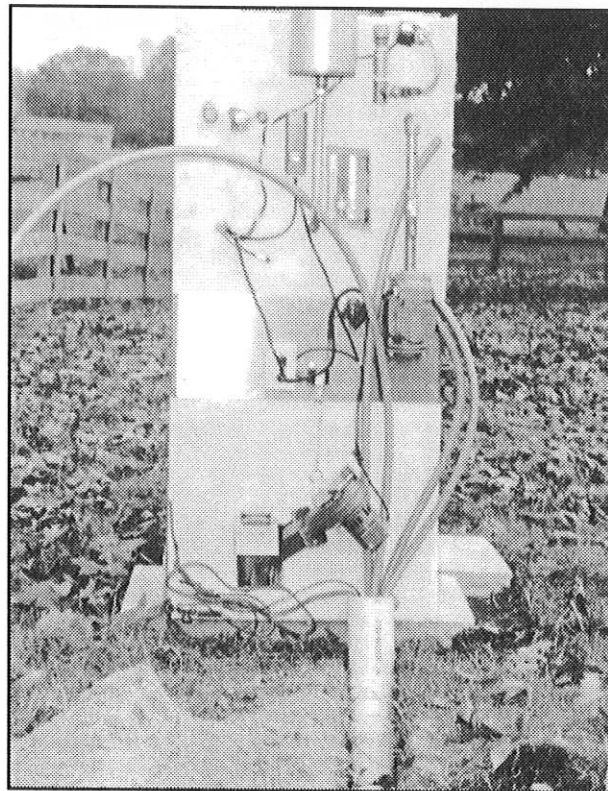
The plumbing and electrical lines for your unit must be installed underground. The water lines must be buried below the frost line to prevent freezing. The depth of the trench varies to different regions of the country. Be completely sure about the correct depth before the plumbing lines are installed underground.

A trench must be dug wide enough to accommodate a 4 inch watertight pipe or other insulation means. All plumbing and electrical lines should be run inside the 4 inch water tight pipe or other insulation means for a standard installation. If more than 1 zone is to be heated or more than 1 location is to be heated then an additional pipe, or insulation must be installed underground.

This pipe will run from the rear of the unit to the location to be heated. Inside the 4 inch watertight pipe will be the 4 water lines, thermostat wire, and electric supply wire. The listing below describes each line and their function.

1. One cold water supply line
2. One hot water supply line to hot water heater
3. One water supply line to heating system
4. One water return line from heating system
(All of these must be at least 3/4" pipe and may require 1" because of longer distances or some hydronic applications)
5. One 3 conductor thermostat wire
6. One #12/2 W/G UF underground Romex wire

If more than one location is to be heated, a second 4 inch or a single 6" watertight pipe or other insulation means will need to be installed underground for the water lines and thermostat wires of the second location.



Section II 2 - 5 Connection of Power to Furnace

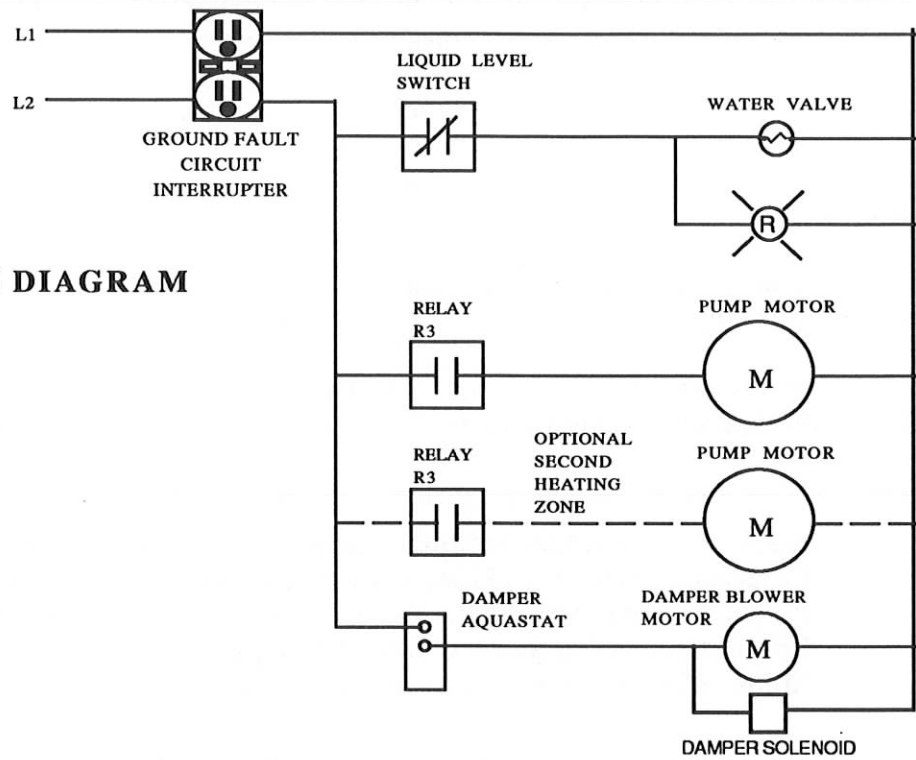
**This unit must be wired by a qualified electrician
in accordance with the National Electrical Code.**

1. The #12/2 W/G UF wire is run from the electrical system in the house through the 4" watertight pipe or other insulation means to the furnace.
2. This wire will connect to the Ground Fault Circuit Interrupter (GFCI) on the back of the furnace.
3. Install a Romex connector in the bottom of the electrical make-up box, and insert Romex wire through this connector.
4. Connect the black wire to the brass screw on the line side of the GFCI receptacle.
5. Connect the white wire to the silver screw on the line side of the GFCI receptacle.
6. Connect the bare copper wire to the green screw on the GFCI receptacle.
7. After the wiring is complete check the receptacle with a circuit tester to determine if the polarity is correct, and to make sure the ground is connected. Press the test button on the GFCI receptacle. The reset button should pop out indicating the interrupter is operating correctly. Push the reset button back in to restore the GFCI receptacle to normal operation. This test should be done monthly to insure safe operation of the furnace.
8. If moisture is allowed into Ground Fault Circuit Interrupter box, it will have a tendency to trip unwarranted. Measures should be taken to keep the box dry.

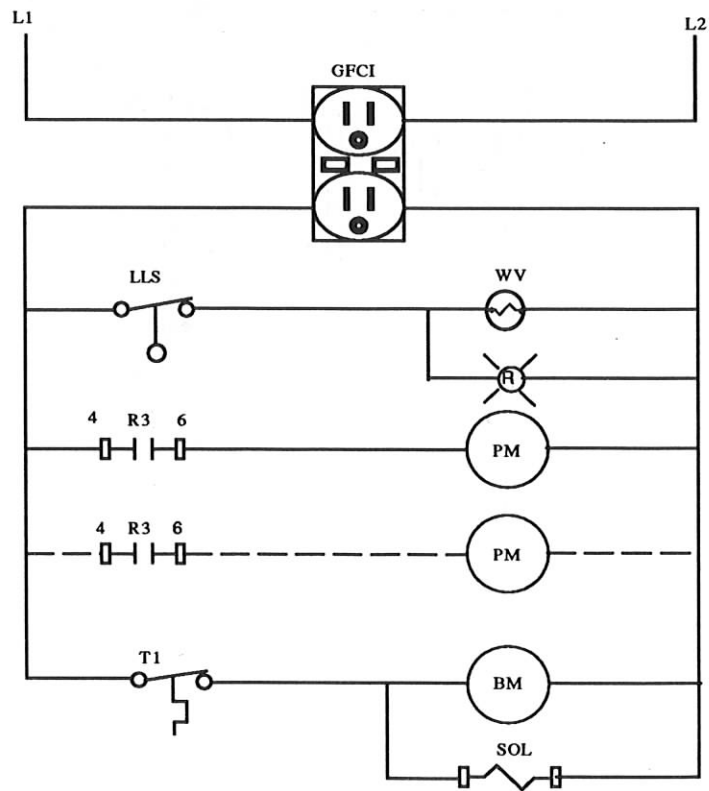
Section II 2 - 6 Wiring Diagrams

This equipment must be installed in accordance with the National Electrical Code.

CONNECTION DIAGRAM



SCHEMATIC DIAGRAM



LEGEND

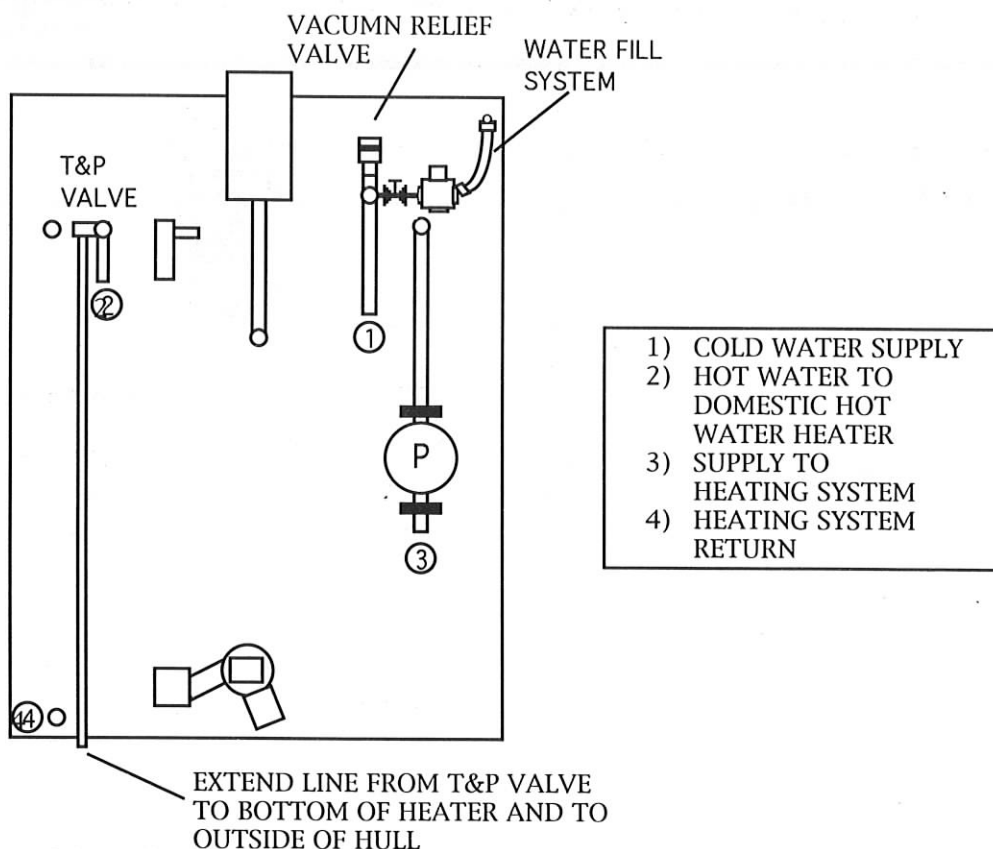
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
LLS	LIQUID LEVEL SWITCH
WV	WATER SOLENOID VALVE
R3	CIRCULATOR PUMP RELAY
PM	WATER CIRCULATOR PUMP
T1	DAMPER AQUASTAT
BM	DAMPER BLOWER MOTOR
SOL	DAMPER SOLENOID
R	LOW WATER LIGHT

Section II 2 -7 Plumbing Instructions

Connection to Heating System

1. The 3/4 inch pipe that will supply your furnace with fresh water connects to the 3/4" brass tee on the upper right hand side of the furnace (noted by #1 in diagram). We recommend installing a valve in your supply line for maintenance considerations.
2. The 3/4 inch pipe that will supply the domestic hot water is connected to the 3/4" brass tee located in the upper left hand side of the furnace. Also install a drain line from the Temperature and Pressure relief valve (pop-off) down to the ground and to the outside of the hull. This line must never be plugged or capped.
3. The pipe that will supply the heating system is connected to the under side of the pump. This pump is located on the right hand side of the furnace (noted by #3 in diagram).
4. The pipe that will carry the return water from the heating system is connects to the 3/4" brass tee located at the bottom left hand corner of the furnace (noted by #4 in diagram).
5. Tighten 3/4" flex line below condenser tank and where it reenters tank.

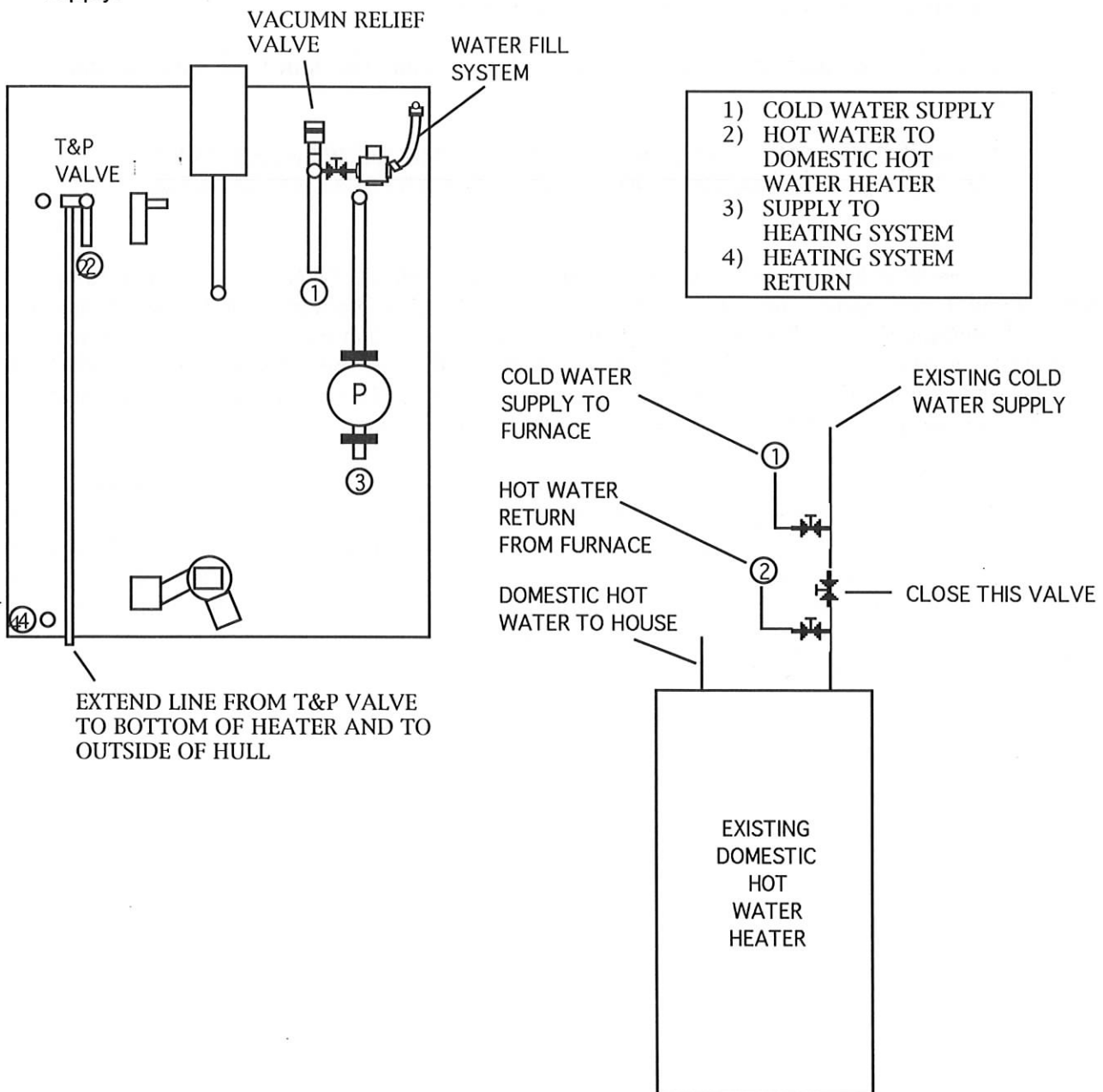
Water Pipes must be designed for hot water service (ex. copper, cpvc, Polybutylene, or Pex.) Pipes should be installed in a 4" watertight pipe or some other type of insulating means to prevent heat loss from furnace to heating system. Use only copper, brass, or stainless steel fittings. Do not use galvanized or black iron.



Section II 2 - 7 Plumbing Instructions (continued)

Connection to existing Hot Water Heater

1. The cold water supply to your furnace can be picked up from the cold water line supplying your existing hot water heater. This can be accomplished by inserting a tee into the existing cold water line. Directly below this tee you will need to insert a valve to stop cold water from entering the hot water heater. Another cold water supply may be used that is closer or more accessible to the furnace.
2. The hot water supply line from the furnace is connected into the existing hot water heater by teeing it into the cold water supply line below the valve that was installed in step 1. If you picked up your cold water supply elsewhere, then a valve will need to be inserted above the tee for the hot water supply.



Section II 2 - 8 Filling the Furnace with Water

When you are ready to replace the cover, the hull can slide down over the furnace. Make sure that the condenser tank and smoke stack opening come through the outside cover.

The space between the smoke stack opening and outside cover will need a bead of silicon applied to fill in any openings. The condenser tank stack will also need to be sealed in this manner. The application of silicone to these openings is illustrated by the pictures and diagrams on the next page.

Inside of the firebox should be a rectangular piece of insulation and stainless steel. The insulation fits between the firebox and ash doors. The stainless steel slides between the two doors to protect the insulation.

After these steps, you can install the smoke stack which is the three foot section of pipe. The trim should be slid down the smokestack until it sits on the outside cover.

The condenser stack must also be installed in the condenser tank. The trim must also sit snugly on the outside cover.

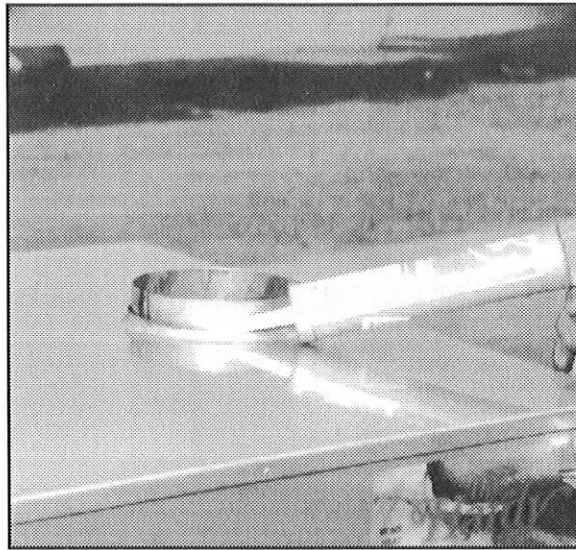
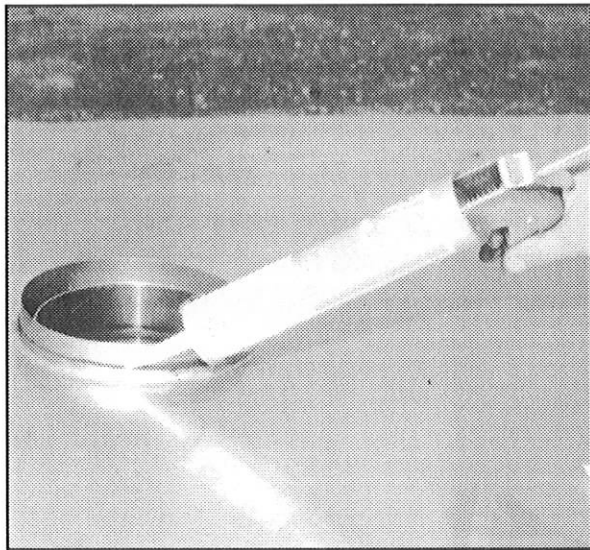
DO NOT SEAL THE CONDENSER TANK TO THE CONDENSER TANK LID. THIS IS THE WATER TANK VENT AND MUST NOT BE SEALED.

The furnace can be filled with water by opening the water supply valves. Plug in the cord that energizes the water solenoid. After the heater is filled with water, the water should cover the low water float switch located in the condenser tank. Reach into the condenser tank and push the low water float down. The low water light should come on and the electric make-up solenoid valve should open. This test will insure that the low water light and electric solenoid are working properly. This should be done occasionally to insure the low water warning light and electric solenoid are working.

There are certain parts of the country that have high enough levels of chloride in the water to be harmful to stainless steel tanks. Even though the USDA allows up to 250 parts per million of chloride (salt) in the water as acceptable for drinking, experience has shown that chloride levels as low as 45 parts per million will eventually cause stress corrosion cracking in stainless steel tanks when the water is heated. It is therefore required to use rain water or bottled water with a chloride content of less than 15 parts per million or test the water supply for chloride to assure that the water supply does not exceed 45 parts per million. Call your Hardy Dealer to get a chloride test on your water supply.

Fill your furnace with water through the condensor stack opening. If the chloride content of your local water supply exceeds the specifications mentioned above and requires the use of bottled or rain water, please do so to maintain the warranty for your furnace.

Section II 2 - 8 Filling the Furnace with Water (continued)



SEAL BETWEEN THE COVER
AND THE TANK LID COLLAR

DO NOT SEAL BETWEEN
THE CONDENSER LID
AND CONDENSER TANK

SEAL BETWEEN THE
CONDENSER TANK
AND HEATER COVER

INSULATION

STAINLESS STEEL TRIM

HEATER WITH
COVER INSTALLED

WOOD FURNACE
WATER TANK

DO NOT FILL WATER
PAST THIS POINT

CONDENSER TANK

MINIMUM WATER LEVEL

LOW WATER CUTOFF FLOAT

SECTION III

CONNECTION TO CENTRAL HEATING/AC SYSTEM

3 - 1 Connection to Central Unit with existing Blower Relay

CONNECTED TO ONE CENTRAL HEATING/AC SYSTEMS THAT HAS AN EXISTING BLOWER RELAY AND ONE PUMP USING HONEYWELL RELAY R822D 1006 FOR THE PUMP RELAY AND THE NEW BLOWER RELAY.

**This unit must be wired by a qualified electrician
in accordance with the National Electrical Code.**

1. Run a three conductor thermostat wire from the wood heater to central unit in the house. This wire must be rated for underground use or be run inside a watertight pipe. The colors normally used are red, white, and green.
2. At the heater connect the white wire to terminal 8 of the water pump relay (R-3).
3. Connect the red wire to one side of the low temperature sensor (the round disc with two terminals under the insulation near the center of the heater appx. 12" from the top). This is an option that prevents the pumping of water less than 100° F but is not required. If you elect not to use this option, then only a two wire conductor is required, bypassing the low temperature sensor.
4. Connect a jumper wire from the other side of the low temperature sensor to terminal 7 of the water pump relay (R-3) and also connect the green wire to terminal 7 of R-3. If two wires are used then one is connected to terminal 7 and the other to terminal 8.
5. Inside the house:
 - a. Install the new wood heating thermostat near the existing thermostat;
 1. Remove the cover on the new wood home heat thermostat to mount it to the wall. There is a round dial visible with an adjustable pointer. This is the heat anticipator. The dial also has a series of numbers. The pointer must be set to the highest number on the dial. On the Honeywell model # (t 822-1016), the pointer is turned counter clockwise as far as it can go.
6. Run a two conductor thermostat wire from the new thermostat to the central unit:
 - a. The colors normally used are red and white.

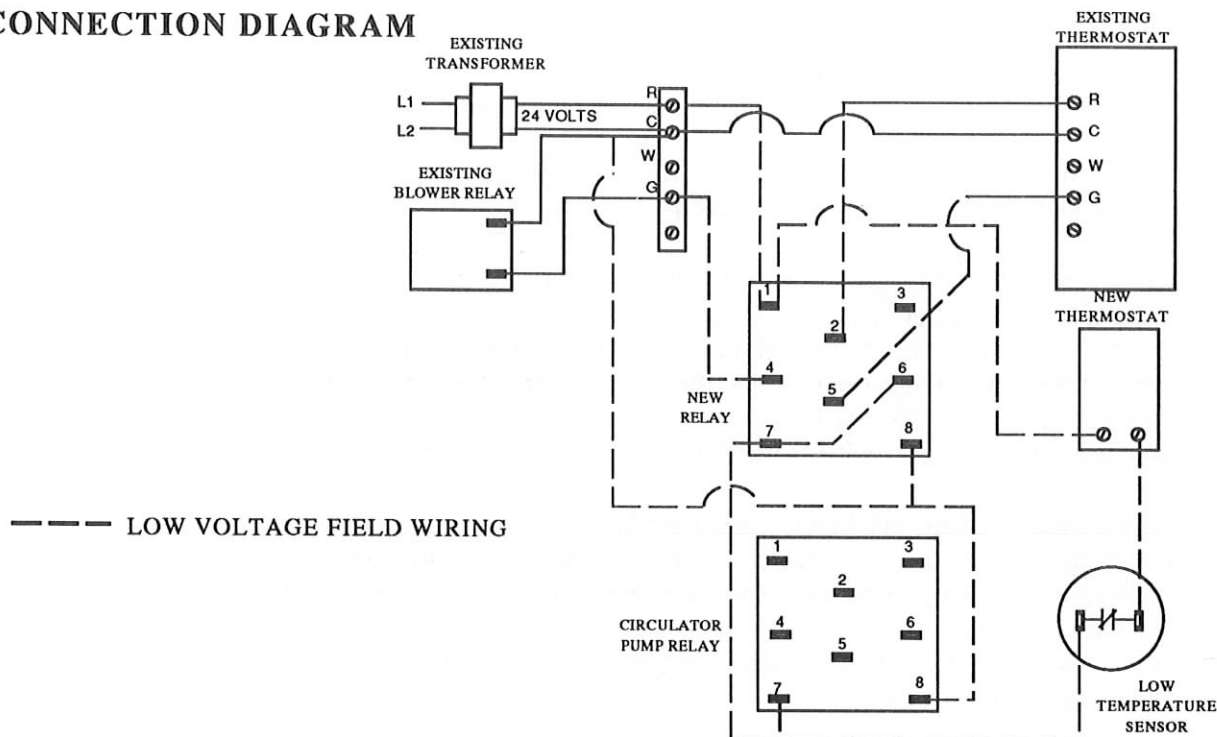
NOTE: If you are not familiar with the control circuit of your central unit, do not continue beyond this point. Call a heating and air conditioning serviceman to complete the wiring. Improper wiring can cause excessive electrical usage or cause your blower motor to overheat and burn out.

Section III 3 - 1 Connection to Central Unit with existing Blower Relay (continued)

7. Locate the existing 24 volt transformer:
 - A. One 24 volt line (hot) should run from the transformer to the existing thermostat;
 1. Cut this wire and connect the wire going to the existing thermostat to terminal 2 of R-2 (new blower relay).
 2. Connect the wire running from the 24 volt transformer to terminal 1 of R-2 and also connect the red wire of the two conductor thermostat wire to terminal 1 of R-2.
 3. Connect the white wire of the two conductor thermostat wire to the red wire of the three conductor thermostat wire.
8. Locate the other 24 volt line (common) coming from the transformer:
 - A. Splice a white jumper wire to this wire.
 - B. Connect the other end of the white jumper wire to terminal 8 of R-2.
 - C. Also connect the white wire of the three conductor thermostat to terminal 8 of R-2.
 - D. Connect the green wire of the three conductor thermostat wire to terminal 7 of R-2.
 - E. Also connect a jumper wire from terminal 7 of R-2 to terminal 6 of R-2.
9. Locate the existing central unit blower relay (R-1):
 - A. Locate the wire running from the existing thermostat to the blower relay coil;
Disconnect this wire from the existing blower relay coil and connect it to terminal 5 of the new blower relay R-2.
 - B. Connect a jumper wire from the existing blower relay coil (the point that you just disconnected) to terminal 4 of relay R-2.
10. If all connections are made properly and the water in the wood heater is hot, the unit should be ready for operation. NOTE: This is a general diagram. You may have to make various changes according to how your unit is wired.
 - A. Insure that the compressor on a heat pump or A/C unit does not run when the wood system is running.
 - B. Insure that the gas burner, oil burner, or electric elements do not come on when the wood system is running.
 - C. Insure that only one speed of the blower motor can be energized at one time. If more than one speed is energized at the same time, the blower motor will burn out.
 - D. Insure that the Volt Amp rating of the existing 24 volt transformer is not exceeded when the relays in the wood heating system are energized.

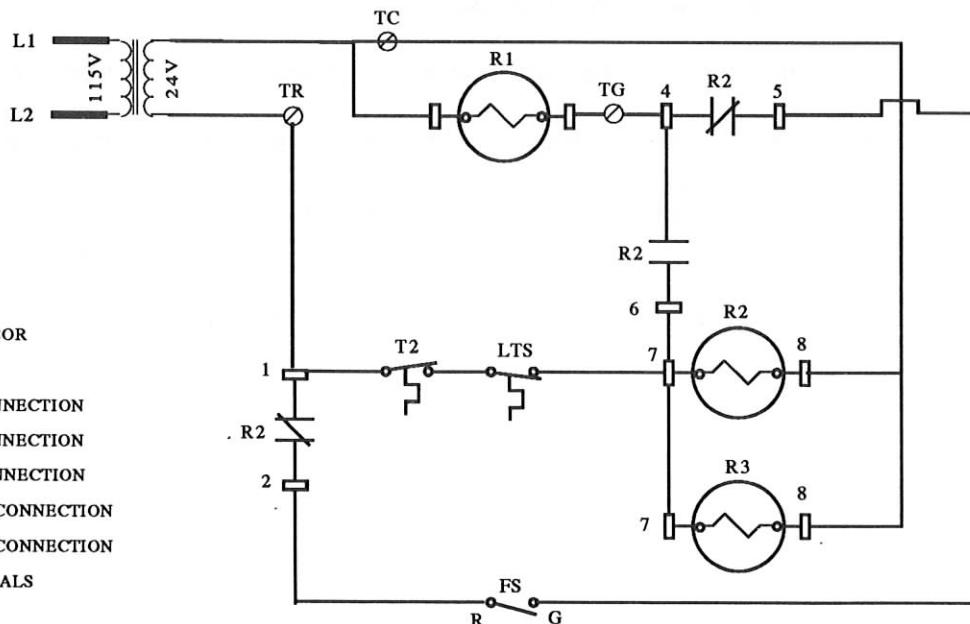
Section III 3 - 1 Connection to Central Unit with existing Blower Relay (continued)

CONNECTION DIAGRAM



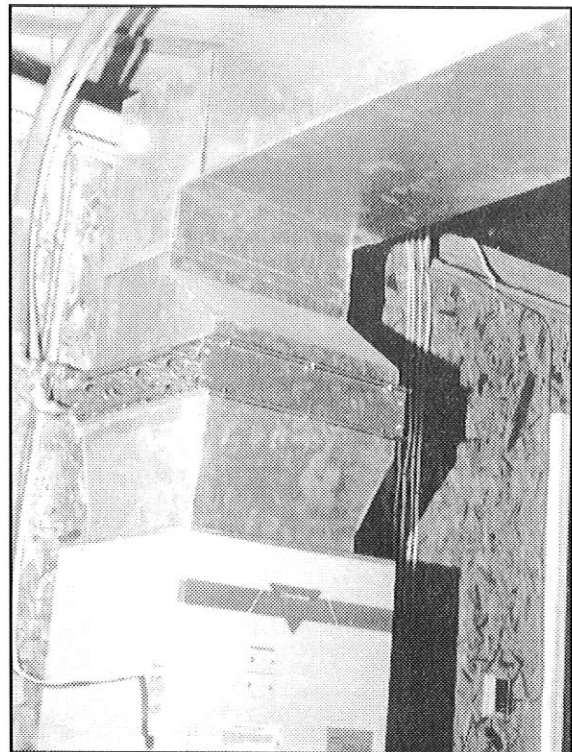
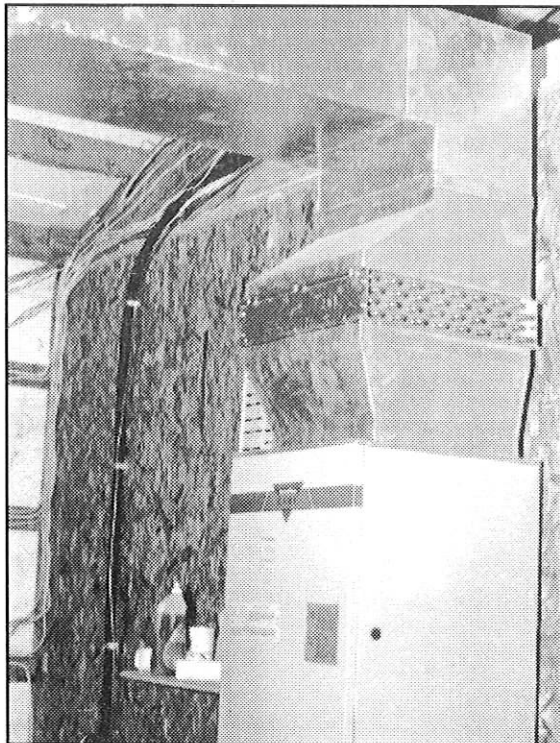
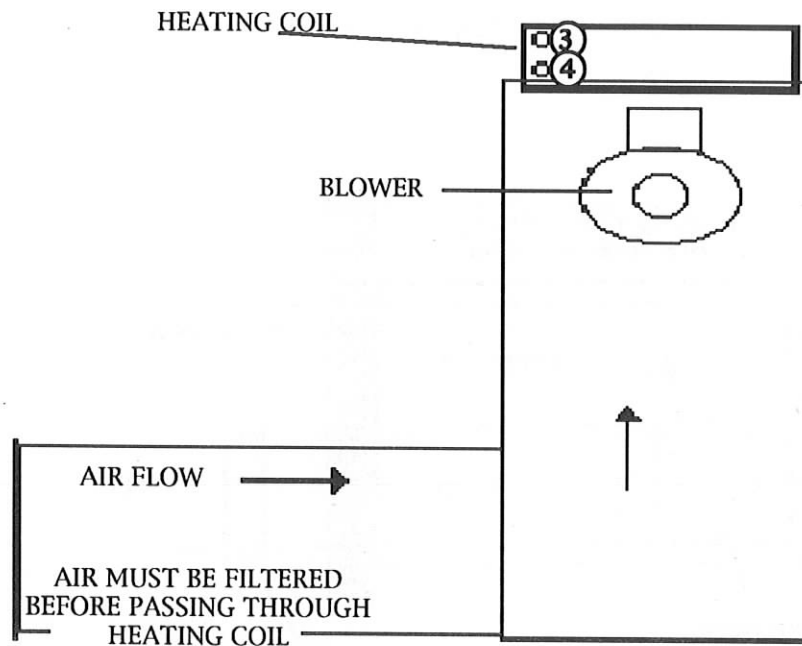
SCHEMATIC DIAGRAM

- LEGEND**
- R1 EXISTING BLOWER RELAY
 - R3 PUMP CONTROL RELAY
 - R2 NEW CONTROL RELAY
 - T2 NEW THERMOSTAT
 - LTS LOW TEMPERATURE SENSOR
 - FS EXISTING THERMOSTAT
 - TC TERMINAL STRIP "C" CONNECTION
 - TR TERMINAL STRIP "R" CONNECTION
 - TG TERMINAL STRIP "G" CONNECTION
 - R EXISTING THERMOSTAT CONNECTION
 - G EXISTING THERMOSTAT CONNECTION
 - QUICK CONNECT TERMINALS



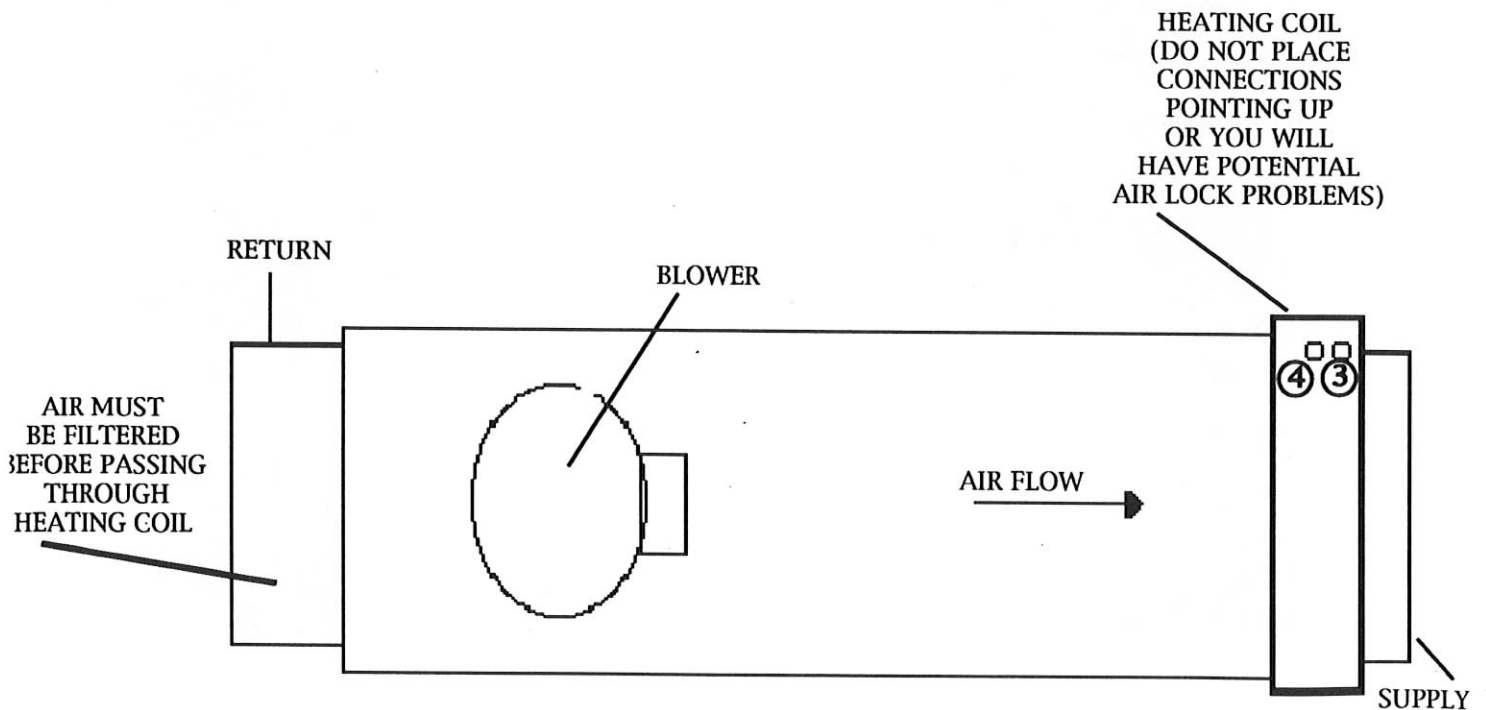
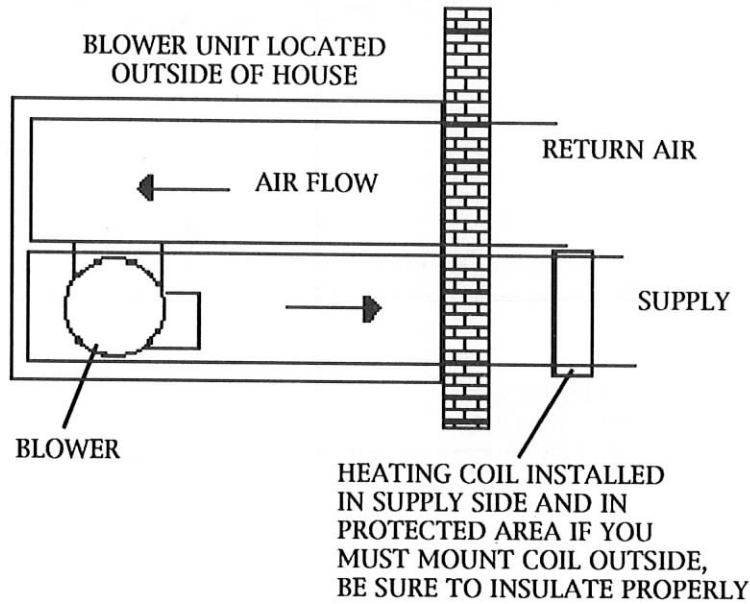
Section III 3 - 2 Location of Heating Coil

The following diagrams and pictures on this page and the following page show various methods of installing the heating coil in a forced air system.



Section III 3 - 2 Location of Heating Coil (continued)

- 3) SUPPLY TO HEATING SYSTEM
- 4) HEATING SYSTEM RETURN



SECTION IV

CONNECTION TO HYDRONIC HEATING SYSTEMS (BASEBOARD)

4 - 1 Connection to Hydronic System with Existing 24 Volt Transformer

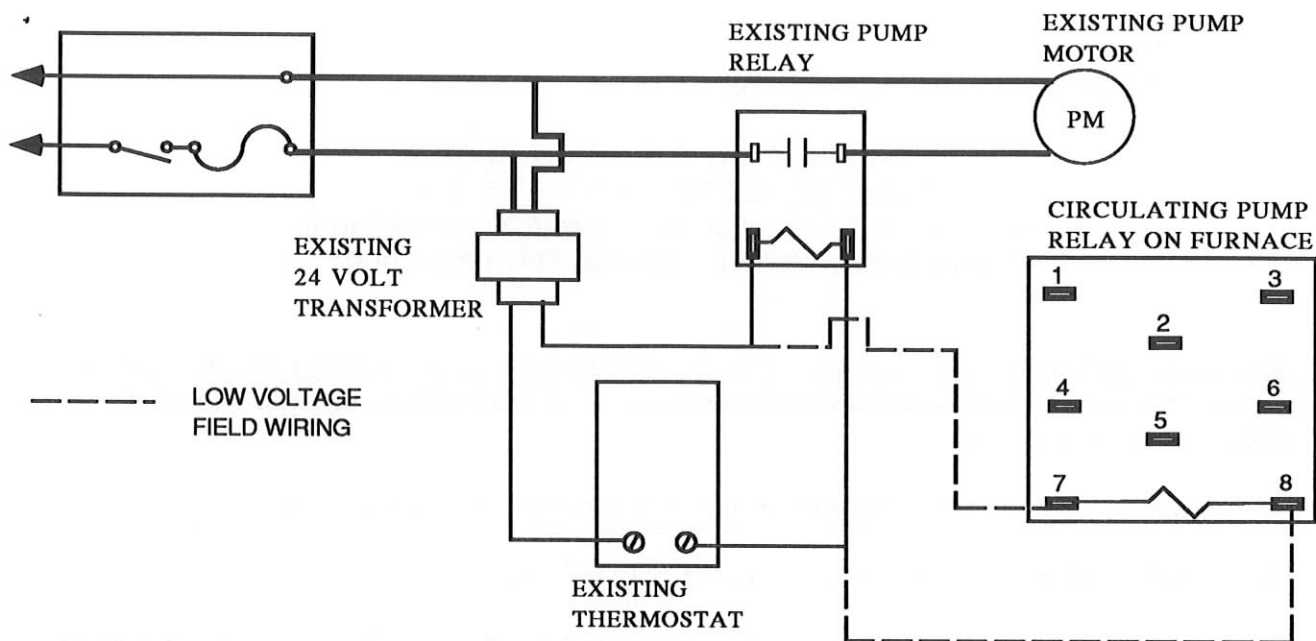
ONE PUMP ON THE WOOD HEATER USING HONEYWELL RELAY R8222D.

**This unit must be wired by a qualified electrician in
accordance with the National Electrical Code.**

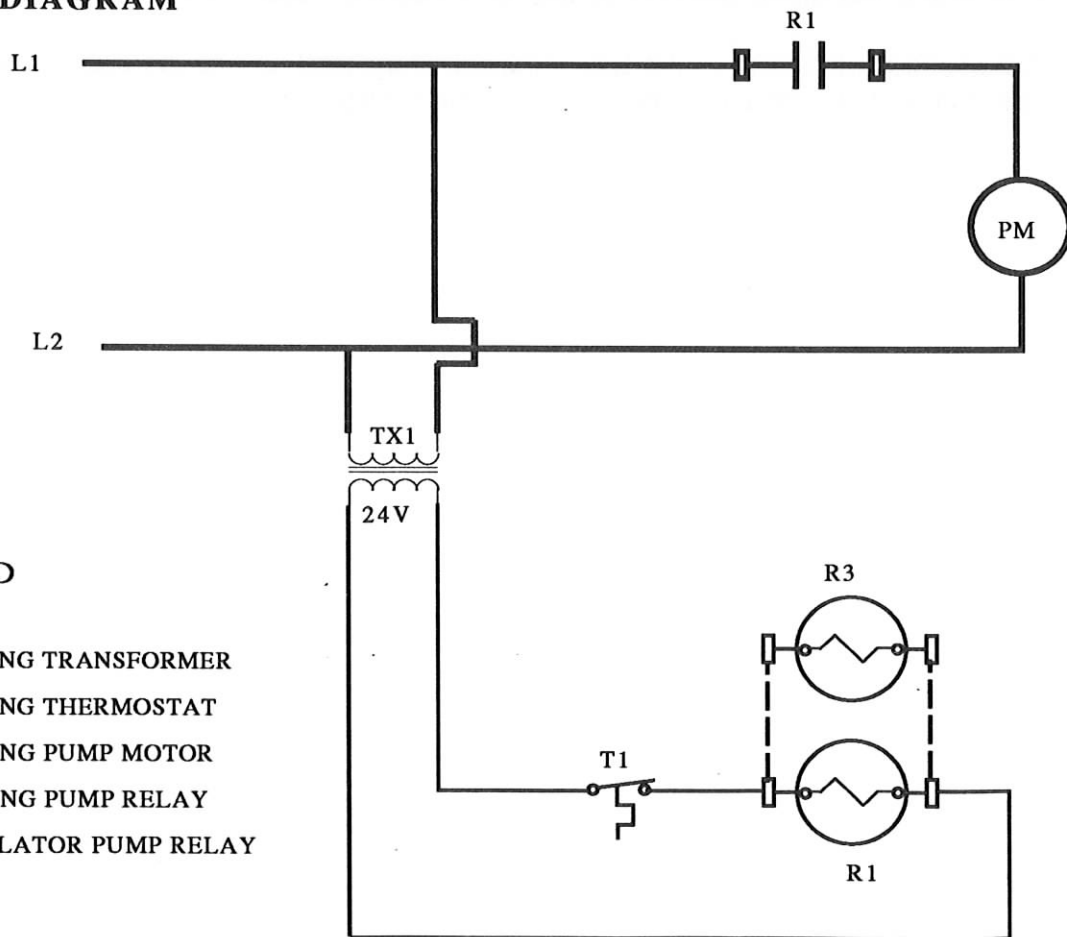
1. Run a two conductor thermostat wire from the wood heater to the existing heating system in the house. This wire must be rated for underground use or be run inside a pvc pipe. The colors normally used are red and white.
2. At the heater, connect the white wire to terminal 8 of the water pump relay (R-3).
3. Connect the red wire to terminal 7 of the water pump relay (R-3).
4. In the house locate the existing pump relay. Connect the red wire of the two conductor thermostat wire to the coil of the pump relay that is fed by the existing thermostat.
5. Connect the white wire of the two conductor thermostat wire to the coil of the pump relay on the side that is fed from the common side of the transformer.

**Section IV 4 - 1 Connection to Hydronic System
with Existing 24 Volt Transformer (continued)**

CONNECTION DIAGRAM



SCHEMATIC DIAGRAM

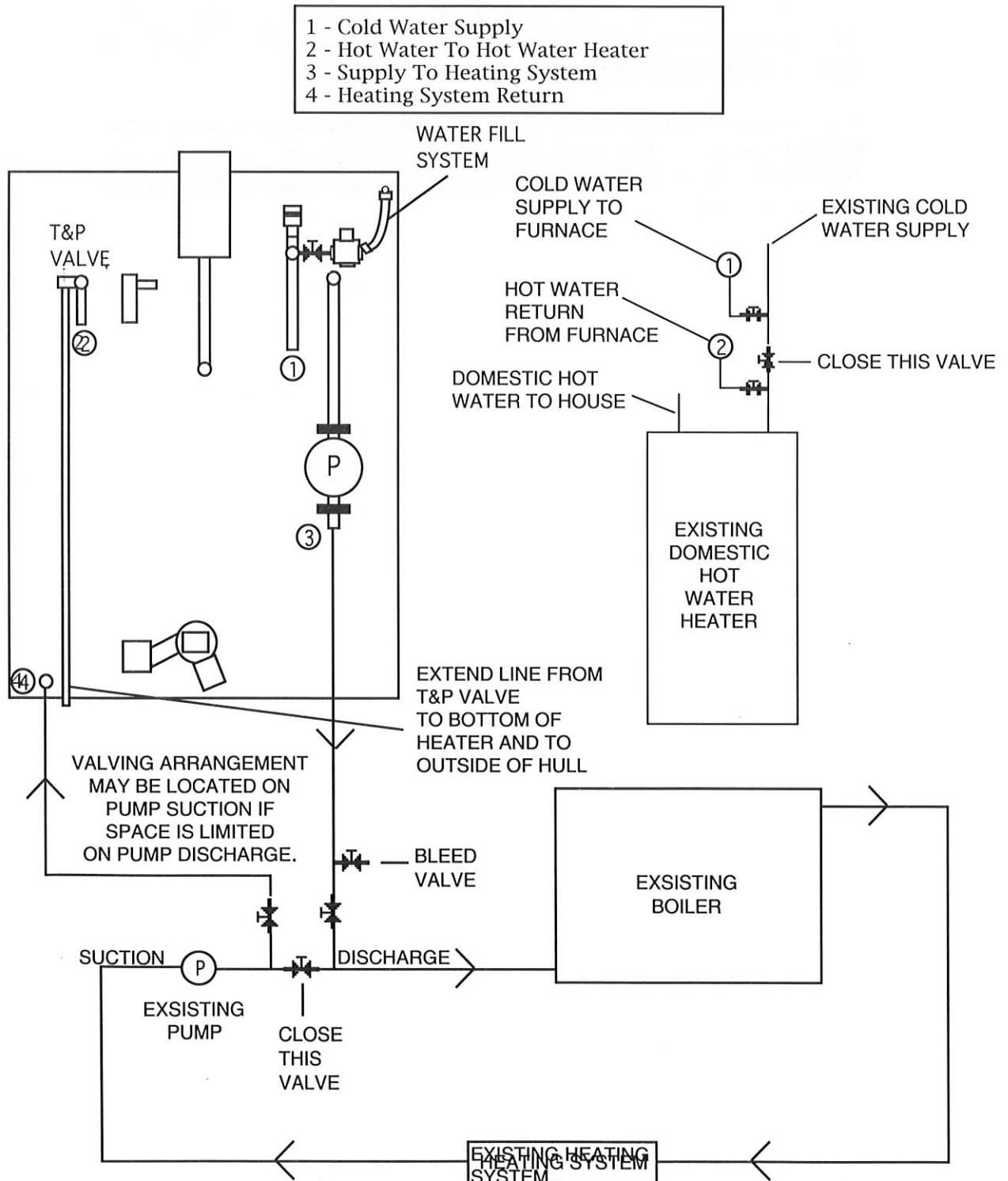


LEGEND

- TX1 EXISTING TRANSFORMER
- T1 EXISTING THERMOSTAT
- PM EXISTING PUMP MOTOR
- R1 EXISTING PUMP RELAY
- R3 CIRCULATOR PUMP RELAY

Section IV 4 - 2 Typical Diagram for Plumbing Hydronic System

Water Pipes must be designed for hot water service (ex. copper, cpvc, or crosslinked polyethylene.) Pipes should be installed in a 4" watertight pipe or some other type of insulating means to prevent heat loss from furnace to the heating system. Use only copper, brass, or stainless steel fittings. Do not use galvanized or black iron. Turn off the makeup water for the existing system. The electric water solenoid on the wood furnace will supply makeup water for the wood furnace and the existing hydronic system. Close all automatic air vents on the existing system.



SECTION V

CIRCULATING DOMESTIC HOT WATER

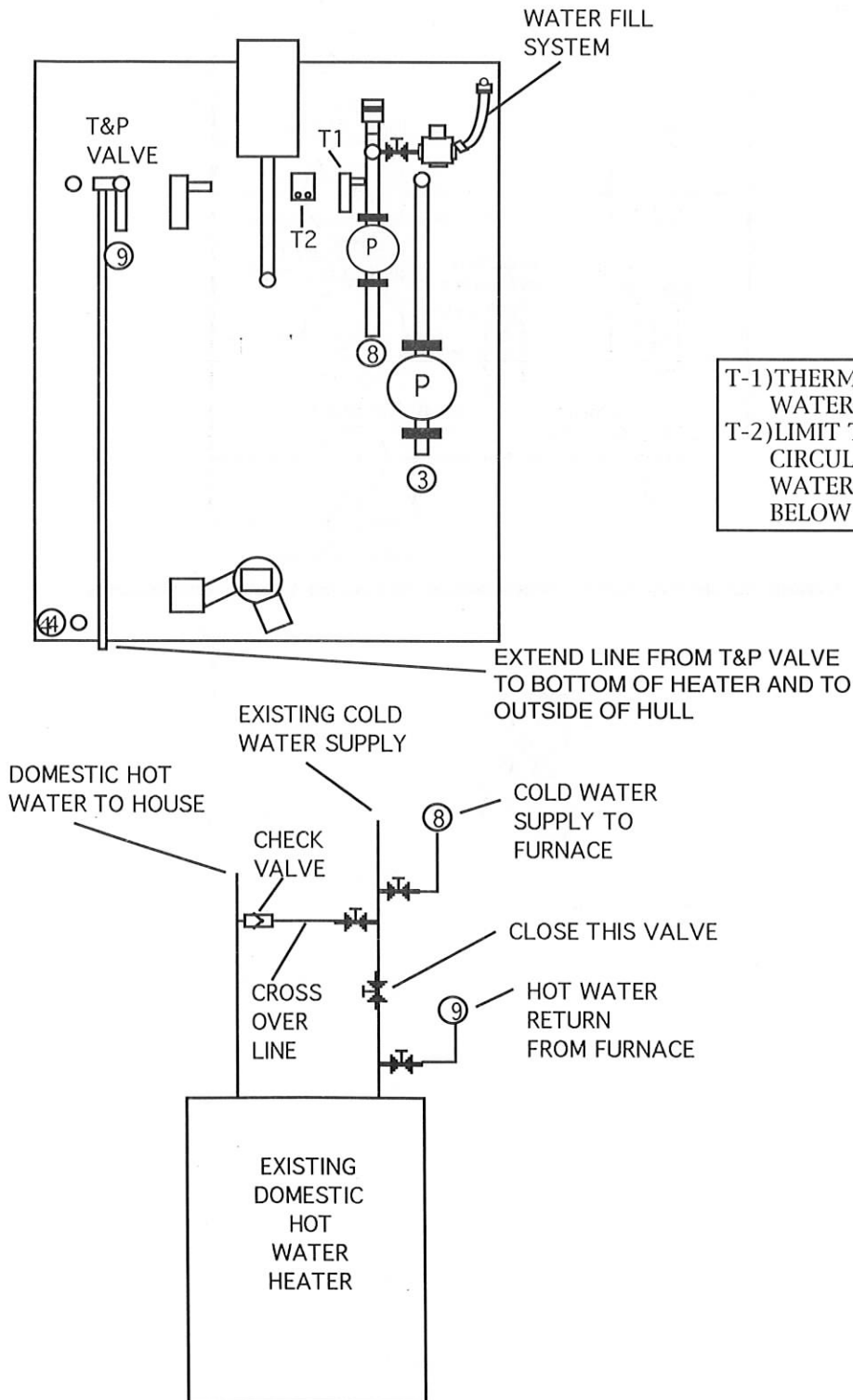
5 - 1 Description of Circulating Domestic Hot Water

Circulating domestic hot water is available as an option on Hardy Furnaces. This option allows your domestic hot water to be circulated between the Hardy and your current hot water heater. This type of circulation keeps the water at a preset temperature.

A thermostat mounted in the water line constantly measures the water temperature. When the water temperature decreases, a pump cuts on to circulate the domestic hot water through a heat exchanger to maintain the preset temperature.

Section V 5 - 2 Plumbing Instructions for a 2 Line Circulating Domestic Hot Water System

Water Pipes must be designed for hot water service (ex. copper, cpvc, or crosslinked polyethylene.) Pipes should be installed in a 4" watertight pipe or some other type of insulating means to prevent heat loss from furnace to heating system. Use only copper, brass, or stainless steel fittings. Do not use galvanized or black iron.



- 3) SUPPLY TO HEATING SYSTEM
- 4) HEATING SYSTEM RETURN
- 8) COLD WATER SUPPLY
- 9) HOT WATER RETURN

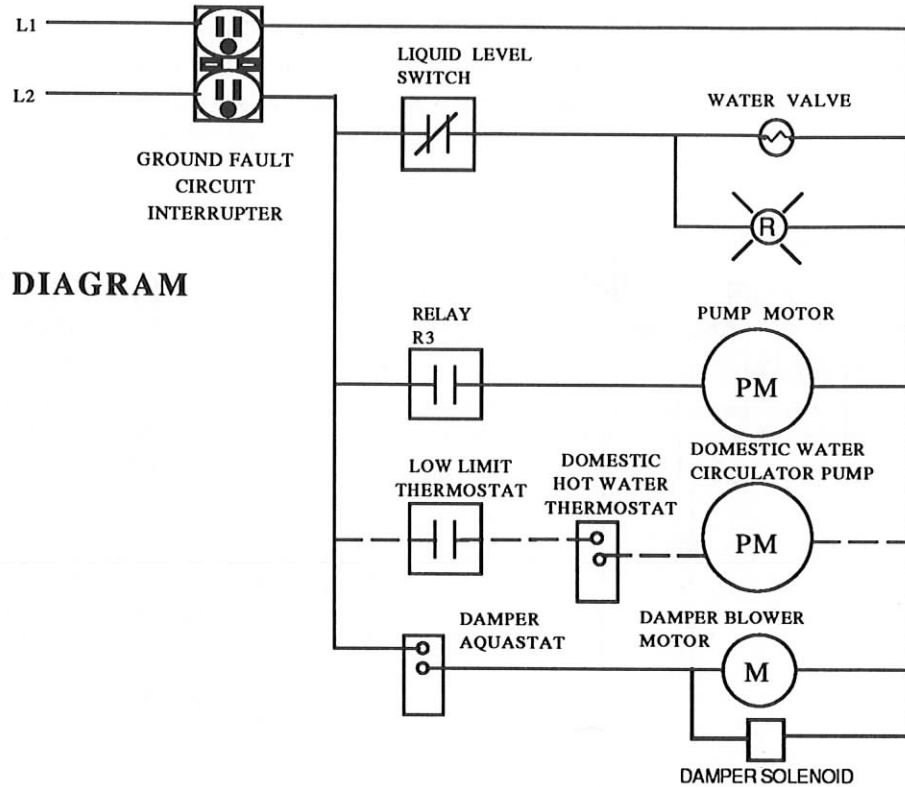
T-1) THERMOSTAT FOR DOMESTIC HOT WATER SET ON APPX. 140 DEGREES F.
T-2) LIMIT THERMOSTAT - WILL NOT ALLOW CIRCULATING PUMP FOR DOMESTIC HOT WATER TO RUN IF WATER IN WOOD FURNACE IS BELOW SET POINT. SET ON APPX. 160 DEGREES F.

CHECK VALVE IS SHIPPED ON HOT WATER SUPPLY PIPE ON FURNACE REMOVE CHECK VALVE FROM FURNACE AND INSTALL AT HOT WATER HEATER

Section V 5 - 3 Wiring Diagram for Circulating Domestic Hot Water

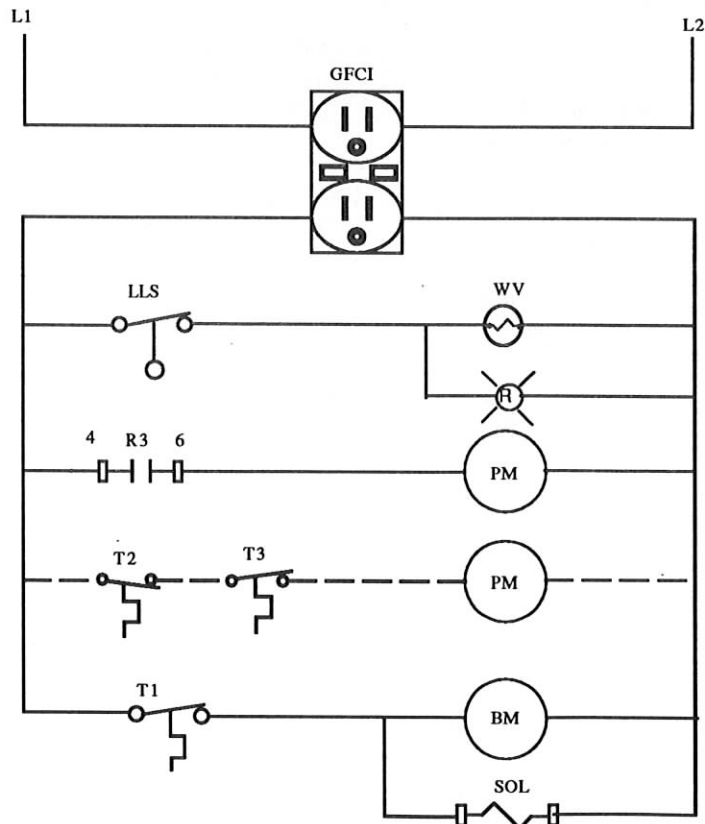
This equipment must be installed in accordance with the National Electrical Code.

CONNECTION DIAGRAM



SCHEMATIC DIAGRAM

LEGEND	
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
LLS	LIQUID LEVEL SWITCH
WV	WATER SOLENOID VALVE
R3	CIRCULATOR PUMP RELAY
PM	WATER CIRCULATOR PUMP
T1	DAMPER AQUASTAT
T2	LOW LIMIT THERMOSTAT
T3	DOMESTIC WATER THERMOSTAT
BM	DAMPER BLOWER MOTOR
SOL	DAMPER SOLENOID
R	LOW WATER LIGHT



SECTION VI

FURNACE OPERATION

6 - 1 Firing the Furnace

Start the fire as you would in any other wood heater. Do not use petroleum products to start a fire. After you get an initial fire started, always stack the wood in the fire box straight. Do not cross the wood because this can cause the fire to go out. Any time you add wood, fill the fire box completely full. The heater will burn only as much wood as is needed to keep the water hot.

CAUTION: ALWAYS OPEN THE BOTTOM DOOR BEFORE YOU OPEN THE TOP DOOR.

6 - 2 Water Temperature

In the back of the heater on the left side is a Honeywell hot water aquastat. The normal operating temperature is 170°F-180°. Do not set the thermostat lower than 140°F because the fire might go out. Never set the thermostat above 180°F because the furnace could overheat and boil the water away.

6 - 3 Wood Usage

Never leave the doors open unattended because it will cause excessive wood consumption and could possibly damage the furnace. If the furnace is burning more wood than usual, check the seal around the front doors. If the seal is bad it will need replacing. Call your local Hardy Dealer and order rope and silicone for the firebox or ash door.

The fire in the furnace must be out to seal the door. With the door still mounted on the furnace, scrape the old silicone out of the groove. Run a small bead of silicone in the groove of the door. Start installing the rope at the top edge of the wide groove (next to the hinges) running down the hinge side and continue around the door. Run the rope past the starting point to the bottom of the hinge side of the door. The hinge side of the door will have two layers of gasket. Press the rope gasket into the groove so that both layers are even.

6 - 4 Moisture in the Firebox

On a new heater or the first time you start a fire each year, you will probably think you have a leak in the firebox. The firebox walls will sweat and water will run down the sides. This can also happen if the water temperature drops below 100°F in the winter. This drop in temperature can be caused by improper burning due to stopped up grates.

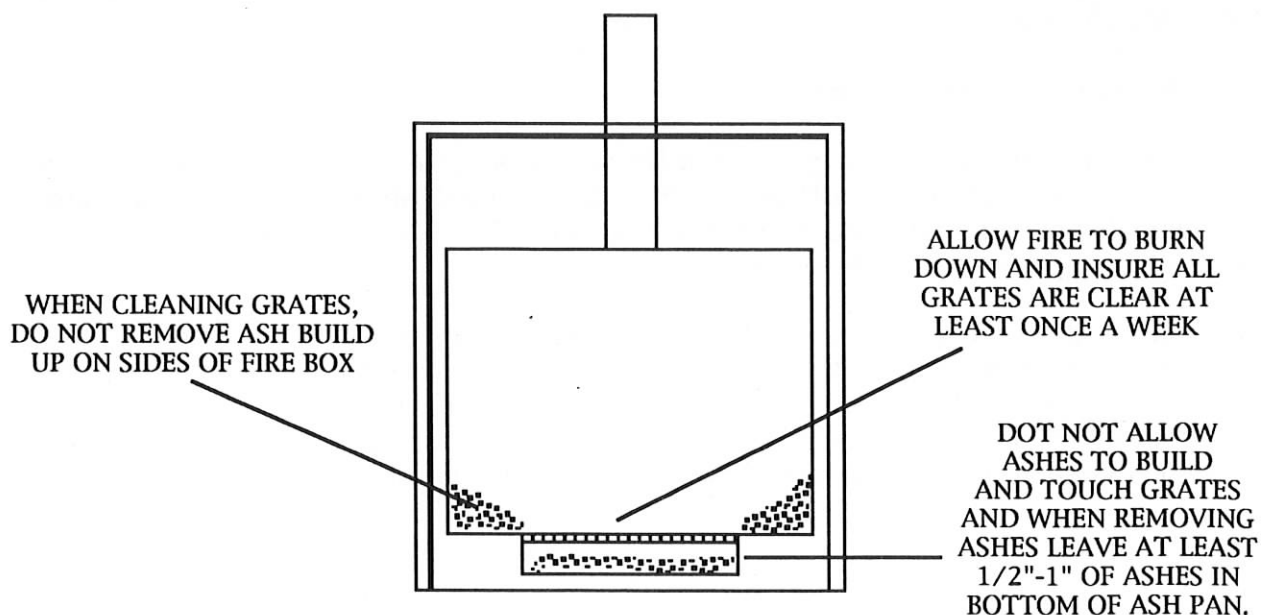
If you see moisture in the firebox, wait three days before you get alarmed. If it continues, check to see if you are burning green wood. Green wood will create a lot of moisture in the firebox, even to the extent that water can get as high as an inch or two in the ash pan. If you still think you have a leak in your heater, remove all wood and ashes from the heater. Let it set a couple of days with the doors closed. Then open the ash door. If you have a leak, water will run out of the firebox.

Section VI 6 - 5 Improper Burning

If the heater is not burning properly, remove all of the ashes and wood from the heater. Check to see if the grates are stopped up. Check the air intake at the back of the heater to insure it is clear of ashes. Lift the damper lid to check for ashes. Check to see if the forced air blower is running. If you have made these checks and the fire will not burn properly, remove the smokestack and check for creosote buildup. Look down the smoke stack into the firebox to check for creosote buildup. On the 180,000 BTU heater, there is a removable baffle in the firebox just below the smoke stack. Remove this baffle through the firebox door. Clean off the creosote and reinstall the baffle. These steps should correct the problem. If the fire goes out when the damper is closed and will not start (After the damper has been open for at least 15 minutes), remove one of the screws in the damper lid. If the problem continues, remove the other screw. (Remove the screws only if you are absolutely sure the fire is going out !!!!)

6 - 6 Ash Removal

Ashes must be removed before they build up to the level of the grates. Failure to keep the ash bin cleaned out will result in warped grates. The buildup of ashes in the firebox should be checked at least once a week. Allow the fire to burn down until the grates can be seen. This insures that all of the grates are clear. Failure to do this will cause your heating system to stop working and the grates to warp. If the grates warp slightly, they can be turned over and allowed to straighten out. The drawing shown below shows how the grates should look when you allow the fire to burn down.



SECTION VII

SERVICE INFORMATION

7 - 1 Electric Make-Up Water Systems

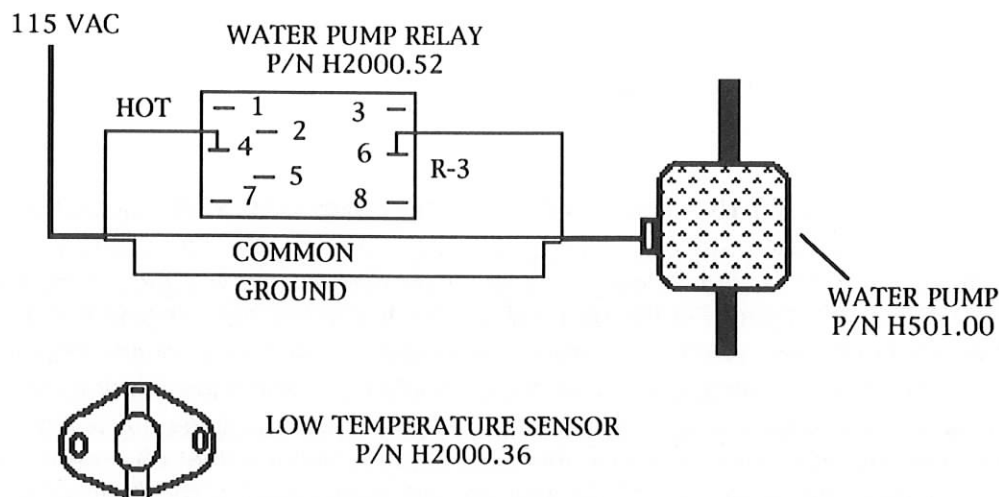
FLOAT SWITCH, P/N H1100.15 - (WARNING : When working with electrical circuits, use caution to avoid electrical shock) - The float switch consists of a stem with a reed switch sealed inside and a float that slides up and down the stem. The reed switch is operated by a magnet located inside the float. When the float is in the up position, the low water light should be off and the electric water solenoid should be off. When the water level drops or the float is pushed down, the low water light should come on and the electric water solenoid should open and allow water to fill the heater. Note: If the switch works in reverse-the light is on when the float is up and goes out when the float is down-the float is installed up side down. Remove the retaining clip, pull the float off, turn it over, and reinstall the float and retaining clip. Also, do not connect any additional load to the float switch because it will not carry more than 30 watts.

LOW WATER LIGHT, P/N H1100.30- (WARNING : When working with electrical circuits, use caution to avoid electrical shock) - 115 VAC indicator light controlled by the float switch. This light comes on when the water level in the heater is low.

ELECTRIC WATER SOLENOID, P/N H1100.00 - (WARNING : When working with electrical circuits, use caution to avoid electrical shock) - 115VAC electric solenoid controlled by the float switch. This solenoid keeps the heater full of water by allowing water to fill the heater when the float switch closes.

WATER FILTER, H1100.55 - (WARNING : When working with electrical circuits, use caution to avoid electrical shock) - 100 MESH FILTER WASHER is located in the 1/2" x 1/4" brass hex bushing at the solenoid. It is inserted with the cone of the screen pointed out. Filter washers are always placed where the cone points toward the water flow. It can be removed for cleaning.

Section VII 7 - 2 Water Circulation System

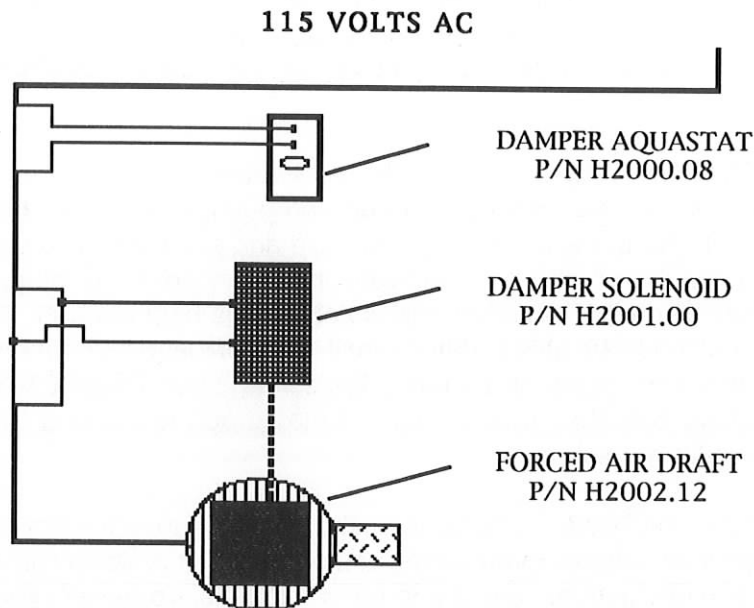


LOW TEMPERATURE SENSOR, P/N H2000.36 - (WARNING : When working with electrical circuits, use caution to avoid electrical shock) - This sensor can be wired in the home heat thermostat circuit to prevent the pump on the heater from running when the water in the wood heater is not hot. The sensor has a set of contacts that close when the water rises to 110°F and open when the water drops to 90°F.

WATER PUMP RELAY, P/N H2000.52 - (WARNING : When working with electrical circuits, use caution to avoid electrical shock) - This is a Honeywell DPDT relay with a 24 volt coil. Terminal 4 and 6 (normally open contacts) are used to turn on the water pump. Control voltage (24 volts) connected at terminals 7 and 8 routed through a home thermostat energizes the relay.

WATER PUMP FOR HEATING SYSTEM, Taco 009 pump P/N H501.00 - (WARNING : When working with electrical circuits, use caution to avoid electrical shock) - with cast iron body. If the pump will not run, first unplug the power cord then check the water pump relay. The relay can be bypassed by disconnecting the wire from terminal 6 and then connecting to terminal 5 (terminals 4 to 5 is normally closed) and plug the power cord back in. This should supply 115vac directly to the pump. If the pump will still not run, unplug the power cord. Remove the four bolts holding the pump to the pump housing. Remove the cartridge from the pump. Spin the impeller by hand to see if the cartridge is locked up. If the impeller will not spin, replace the cartridge. If the impeller will spin, it may have been temporarily stuck (reassemble and try again) or the problem is the electrical winding or capacitor. Use an ohm meter to check the winding and capacitor. If the capacitor is defective, replace it. If the electrical winding is defective, replace the complete pump.

Section VII 7 - 3 Temperature Control System



DAMPER AQUASTAT, P/N H2000.08 - (WARNING : When working with electrical circuits, use caution to avoid electrical shock) - This thermostat has a probe that is in a well in the water tank of the wood heater. It has one set of contacts that open on a temperature rise and close on a temperature fall. This thermostat is normally set at 170°F to 180°F. It controls the damper solenoid and the forced air draft. If the damper solenoid and forced air draft will not operate, place a jumper wire across the terminals on the thermostat. If they operate when the thermostat is jumpered out, and the temperature of the water in the heater is below the set point on the thermostat, the thermostat is defective. Do not leave the jumper on the thermostat because the heater will overheat.

DAMPER SOLENOID, P/N H2001.00 - (WARNING : When working with electrical circuits, use caution to avoid electrical shock) - This solenoid lifts the cover off the intake to the forced air draft blower. The solenoid is controlled by the damper thermostat. It should lift the cover when the forced air blower comes on and drop the cover when the blower goes off. If the solenoid does not drop the cover when the blower goes off, the solenoid should be replaced. The forced air draft intake cover must be in place when the blower is not running or the heater will overheat and cause excessive wood usage.

FORCED AIR DRAFT BLOWER, P/N H2002.12 - (WARNING : When working with electrical circuits, use caution to avoid electrical shock) - This blower supplies air to the fire box when the damper thermostat calls for heat. When the blower is not running, all air flow through the blower must be closed off. If the blower wheel or the intake to the blower is clogged, the blower will not deliver the proper amount of air to the fire. The blower can be disassembled and cleaned. Be sure to seal the blower motor back to the blower housing if the blower is disassembled. The motor should be oiled at the beginning of each heating season. When the heater is not in use, the power cord for the blower should be unplugged.

Section VII 7 - 4 Preseason Heater Maintenance

**Each year before the heating season begins,
you should check your furnace to insure
that everything is ready for the heating season.**

1. ELECTRIC MAKE UP WATER - Turn on the cold water supply to the furnace. Plug in the power cord. Check the float switch operation by lifting up and pushing down on the float. When you push the float down it should activate the electric water solenoid and allow water to enter the furnace water tank. When you lift up on the float it should deactivate the water solenoid, stopping the water. Also make sure the float will float up on its own when the water level is high enough. After checking the float and solenoid operation, you should be able to determine if either of these components will require replacement. Next, turn off the cold water supply and remove the screen filter. Clean this filter or replace it. Reinstall the screen filter, making sure the cone or point of the screen is pointing towards the incoming water. Turn the cold water supply back on.

2. WATER QUALITY - The Hardy Furnace is designed not to lose furnace water through evaporation. At times during the year, accidental overheating can occur, and the water will evaporate. The evaporation causes a concentration of chlorides (salts) and other minerals. To protect your furnace from this buildup of chlorides (salts) and other minerals, we recommend to drain your furnace each year at time of start-up for the heating season and refill with rain water or bottled water with a chloride concentration of less than 15 parts per million. This will add to the life of your stainless steel tank.

3. DAMPER AND DRAFT SYSTEM - When you plugged in the power cord, the damper solenoid should have opened the draft lid on the draft blower. The forced air draft blower should also have come on. If both of these components are working correctly, unplug the power cord. Open the clean out lid beside the draft blower and check for any build up of ash, tar, or any other material that could restrict the amount of combustion air entering the furnace. Check the seal on the clean out lid to assure a good air tight seal is still established. Lift the damper lid on the draft blower and inspect the blower wheel for any build up of lint, dust, creosote, or any other substance that could effect the performance of the draft blower. Spray the damper lid hinge and the damper solenoid plunger with WD-40, or its equivalent. Oil the draft blower motor with electric motor oil, or 10 weight non detergent motor oil. Do not use WD-40 or machine oil. Check the grates inside the furnace to see if there is any ash build up or if the grates are warped. If a grate does warp, lift that grate up and turn it over. At this time, check the smoke stack for blockage.

4. WATER PUMP - Unplug the power cord going to the water pump. Close the valve above the water pump and the return water valve at the bottom of the furnace. Remove the pump motor from the pump housing by removing the four bolts in the pump housing. Remove the impeller cartridge assembly from the pump housing. Check the impeller to determine if it is free by spinning the impeller in the cartridge. Check the pump housing for rust or any other build up that could impede the flow of water. Reassemble the water pump making sure the "O" ring in the cartridge is seated right. Once the pump is reinstalled, open the water valve above the pump and the return valve.

Section VII 7 - 5 Trouble Shooting Guide H2/H4

--- WARNING ---

HAZARDOUS VOLTAGE WILL CAUSE DEATH, SEVERE PERSONAL INJURY OR SUBSTANTIAL PROPERTY DAMAGE. ALWAYS FOLLOW THE SAFETY PRECAUTION WARNINGS POSTED IN THIS INSTRUCTION BOOKLET.

PREVENTATIVE MAINTENANCE

Preventative Maintenance can provide measureable improvements in system performance as well as a marked reduction in comfort complaints. The Customer should always remain aware of preventative maintenance actions that could help them avoid unnecessary shutdown time and save them repair expense.

PREVENTATIVE MAINTENANCE CHECKLIST:

1. **Ground Fault Interrupter Receptical** > Should be tested monthly to insure proper and safe operation. (a.) Check with a circuit tester to determine if the polarity is correct. (b.) Press the test button----the reset button should pop out indicating the interrupter has tripped. Press the reset button to restore normal operation.
2. **Furnace Piping** > Check all piping occasionally on back of furnace for any possible water leaks. Water leaks on furnace components can cause electrical shorts, damage to component parts and insulation.
3. **Low Water Warning Light** > Check the low water warning light each week for proper operation to avoid low water or over filling in furnaces with electric make-up water systems. See service information section in owners manual for proper checking procedures.
4. **Ash Bin** > Keep ash bin from ash buildup. Remove ashes before they build up to the level of the grates. This will restrict proper air flow and cause the grates to warp. Leave at least 1/2" to 1" of ashes in bottom of ash pan to protect the bottom from burnout.
5. **Damper/Draft System and Smoke Stack** > Check at least every two weeks for build up of ash, tar, or any other material that could restrict the amount of air flow required. Oil the blower motor bearings prior to each heating season with 10 to 20 drops of electric motor oil.
6. **Door Seals** > Check firebox door and ash door seals occasionally for damage or obstructions that would affect an airtight seal.
7. **Preseason Maintenance** > Review preseason heater maintenance section in owners manual prior to each heating season.

COMPLAINT	AREA OF TROUBLE	POSSIBLE CAUSES	CORRECTIVE ACTION
Ground Fault Interrupter Receptical Tripping	Ground Fault Interrupter Receptical.	1. Moisture in receptical. 2. Receptical not grounded properly.	1. Remove cover and check for moisture inside box. If moisture is present, use blow dryer to dissipate. If moisture inside box continues to be a problem, wrap the box with cellophane to protect from moisture. 2. Remove cover and check the bare copper wire connected to the green screw for secure attachment. Test Receptical for proper operation.
	Forced Air Draft Blower Motor and Damper Solenoid.	Moisture or corrosion in electrical connections or windings.	Check electrical connections and windings for moisture or corrosion. Clean or dry and then test for proper operation.
	Pump Motor.	Corrosion in motor electrical connections or windings.	Check electrical connections, capacitor and motor winding for bad connections or corrosion. Clean, dry and then test for proper operation.
	Liquid Level Switch, Low Water Light, and Water Solenoid Valve.	Bad connections possibly to ground.	Check electrical connections for bad connections or corrosion. Clean, dry and then retest for proper operation.

Section VII 7 - 5 Trouble Shooting Guide H2/H4 (continued)

COMPLAINT	AREA OF TROUBLE	POSSIBLE CAUSES	CORRECTIVE ACTION
NO HEAT Water Temperature is "HOT" Main Power Supply and Ground Fault Interrupter Receptical "OK"	Pump Operation.	Pump not running.	Unplug pump and by-pass pump relay by tying wires on relay pole #4 and #6 together. Plug pump back in. If pump does not run see instructions below.
	Pump does not run.	1. Defective pump cartridge. 2. Defective pump capacitor. 3. Defective pump motor winding.	1. Unplug pump. Remove pump motor body by taking 4 body bolts out. Pull cartridge out of motor housing and spin impeller by hand. If impeller will not spin -- replace cartridge. 2. Use ohmmeter. When the meter is connected to the capacitor, the needle should jump towards "0" ohms and slowly drift back to infinity. Replace if defective. 3. Disconnect the wires connected to the motor terminals to test the motor independent of electrical connections. Check for ground and continuity with ohmmeter. The insulator of the windings should show no break age. If it does -- replace pump.
	Pump does run.	1. Defective pump relay. 2. Defective low temperature sensor. 3. Defective wall thermostat (furnace). 4. Defective 24 volt transformer.	1. Check relay terminals #7 & #8 for 24 volts reading. If 24 volts is present, use ohmmeter to check contacts. Connect ohmmeter to terminals #4 & #6. If no reading, replace pump relay. If no 24 volts is present, check for continuity of wall thermostat wires. 2. Remove wires on sensor and connect to each other to bypass. If pump runs, replace low temperature sensor. 3. Inside house. Remove cover. Check wiring for 24 volts. Level the mounting base. Blow dust from sensing bimetal. Adjust heat anticipator. See owners manual connection instructions. 4. Located at existing central unit. If 115/120 volts is being supplied to primary side, check for 24 volts on secondary side. If 24 volts not present, replace transformer.

Section VII 7 - 5 Trouble Shooting Guide H2/H4 (continued)

COMPLAINT	AREA OF TROUBLE	POSSIBLE CAUSES	CORRECTIVE ACTION
NO HEAT Water Temperature is "COLD" Main Power Supply and Ground Fault Interrupter Receptical "OK"	Firebox	No Fire	Restart
	Damper Aquastat.	Defective aquastat.	Adjust temperature setting on aquastat to get blower motor to come on. Place a jumper wire across aquastat terminals. If damper solenoid and damper blower operates -- replace the aquastat.
	Damper Solenoid.	Defective damper solenoid.	When by-passing aquastat, if solenoid does not lift the cover off the intake to the forced air draft blower -- replace solenoid.
	Forced Air Draft Blower Motor.	Defective blower motor. 1. Defective electrical wiring. 2. Air passage stoppage. 3. Blower wheel clogged. 4. Defective motor.	1. Check wiring for damage/corrosion & make sure connectors are secure. 2. Clear air passages in cleanout and damper blower outlet. 3. Clean blower wheel of any lint, ashes or creasote buildup. 4. Replace.
	Ash Bin.	Ash buildup in bin.	Ashes should be removed from ash bin each week. Ash buildup under grates can cause grates to warp. If grates warp they can be turned over and allowed to straighten. When removing ashes, leave at least 1/2" to 1" of ashes in bottom of ash pan.
	Heater Stack.	Creosote or Ash buildup .	Clean heater stack of any creosote buildup. On model H4 make sure the baffle plate is clear of ash or creosote buildup. Make sure baffle is in place, otherwise heat will be lost up the stack.
NO HEAT Water Level is "LOW" Water Temperature is "HOT" Main Power Supply and Ground Fault Interrupter Receptical "OK"	Water Supply.	Inline valves to furnace or fill assembly valve closed.	Open or repair.
	Liquid Level Switch.	Defective liquid level switch. (condenser tank)	Liquid level switch controls the water level indicator light and water solenoid valve. Check switch with hand by pulling up and down on float inside the condenser tank. If water solenoid does not click and light does not go on and off -- replace the liquid level switch.
	Water Solenoid Valve.	1. Defective solenoid valve. 2. Water filters. (mesh filter screens inside stainless steel flex line stopped up.)	1. If water solenoid valve does not click when checking the liquid level switch, but level indicator light does come on -- replace. 2. Remove filter screen from each end of line connected to the water solenoid valve. Clean or Replace.
	Plumbing Leaks.	Various	Check visible connections and check if plumbing will hold pressure.

Section VII 7 - 5 Trouble Shooting Guide H2/H4 (continued)

COMPLAINT	AREA OF TROUBLE	POSSIBLE CAUSES	CORRECTIVE ACTION
NO HEAT: Blowing Cold Air in House Water Temperature is "HOT" Power OK!	Water not circulating through the heat loop.	1. Pump not operating. 2. Inline valves closed/bad. 3. Air trapped in plumbing lines. (air lock) 4. Scale deposits in hot water coil reducing water flow and restricting heat transfer. 5. Air Lock in hot water coil.	1. See area of trouble: "Pump Operation" 2. Open or replace valves. 3. Bleed lines if air is trapped. 4. Disconnect the inlet and outlet sides of the hot water coil and pump clean with descale cleaning kit. 5. Bleed air from hot water coil.
EXCESSIVE WOOD USAGE OR OVER HEATING (BOILING)	Furnace Water Boils. (Symptom - Pop-Off Valve is relieving)	1. Doors open. 2. Defective door seals. 3. Damper blower flapper lid stuck. 4. Damper aquastat defective. 5. Water line/connections leaking.	1. Close all doors and make sure they are securely fastened. 2. If the seal is bad it will need replacing. Call your local Hardy Dealer to request rope and silicone for the particular door. See Owners Manual, (furnace operation section) for replacing door seals. 1. Unplug blower motor. Check flapper lid for creosote, debris or dirt buildup. Clean if dirty. Check flapper lid for proper seal over opening. Check blower housing and blower wheel for creosote or debris buildup. If dirty, remove damper blower, disassemble, clean and oil. Clean out all air passages. 2. Check temperature setting on aquastat. should be 170° F. If aquastat is allowing blower to run until water boils -- replace aquastat. 4. Repair or replace all lines or connections that are leaking.

Section VII 7 - 5 Trouble Shooting Guide H2/H4 (continued)

COMPLAINT	AREA OF TROUBLE	POSSIBLE CAUSES	CORRECTIVE ACTION
EXCESSIVE WOOD USAGE OR OVER HEATING (BOILING)	Excessive Wood Usage Symptom: (1) Pop-Off Valve relieving. (2) Furnace water overflowing.	1. Pop-Off valve. 2. Defective liquid level switch. (condenser tank) 3. Solenoid Valve Stuck or Corroded. 4. Domestic hot water heat exchanger Coil Leaking at connections or has pin hole corrosion.	1. If Pop-Off valve is relieving for no reason -- replace. 2. Check Liquid Level Switch Float for upright position. Float Magnets should be on top. Liquid Level Switch controls the water level indicator light and Water Solenoid Valve. Check switch with hand by pulling up and down on float inside condenser tank. If Water Solenoid does not click and light does not go on and off, replace the Liquid Level Switch. 3. If the Water Solenoid Valve does click and the furnace still overflows, it could be stuck in the open position by grit, debris or corrosion. The valve can be removed and cleaned or replaced if necessary. 4. Disconnect hose connected to the electric water solenoid and turn off the electric fill system valve to assure no water enters the tank from the fill system. If the tank still overfills, then remove the furnace hull and tank top to check the copper coil for leaks and possible replacement.
IMPROPER BURNING	Grates	Grates stopped up.	Clear grates of ash buildup. If grates are warped, turn them over.
	Air Intake.	Damper blower stopped up.	Clean damper blower assembly.
	Damper inspection door.	Damper inspection tube stopped up.	Lift damper inspection lid and check for ash and cresote buildup.
	Smoke Stack.	Smoke stack stopped up.	Remove smoke stack and check for cresote buildup.
	Baffle	(Model H4 only) Baffle stopped up.	Remove the baffle thru the firebox door and remove cresote buildup.
	Firebox Fire.	Fire going out.	If fire goes out after damper is closed for 15 minutes, remove one of the screws in the damper lid. If problem continues, remove additional screw.
	Forced Air Blower running with no draft.	1. Solenoid not lifting flap. 2. Creasote buildup.	1. Replace Solenoid. 2. See Excessive Wood Usage Section.
MOISTURE IN FIREBOX	Firebox	1. Initial or yearly startup. 2. Green wood.	1. The firebox walls will sweat and water will run down the sides. This should clear up in a week or so. 2. Green wood will create moisture.

Section VIII

Repair Parts

Legend	Part No.	Description
	1	701.36 3/4" x 3" Stainless Steel Toe
	2	604.32 3/4" Brass Cap
	3	702.08 3/4" x 5" Stainless Steel Nipple
	4	602.16 3/4" Brass Tee
	5	607.30 3/4" Pop-off Valve (Pres. Relief)
	6	701.12 1/2" x 1 1/2" Stainless Steel Toe
	7	604.16 1/2" Brass Cap
	8	2000.08 Honeywell Hi-temp Thermo No Well
	9	2000.48 Well Fitting
	10	3103.00 Condenser Tank
	11	1100.15 Liquid Level Switch
	12	700.24 1/2" Fiber Washer
	13	700.12 3/4" F/P x 3/4" F/P X 18" SS Flex Line
	14	607.36 3/4" Vacuum Relief Valve (Breaker)
	15	603.40 3/4" x Close Brass Nipple
	16	602.32 3/4" x 3/4" x 1 1/2" Brass Tee
	17	603.08 1/2" x Close Brass Nipple
	18	607.00 1/2" Brass Ball Valve
	19	605.00 1/2" x 1/4" Brass Adaptor Bushing
	20	701.00 1/4" x 1 1/2" Stainless Steel Toe
	22	1100.00 Electric Water Solenoid-Assembly
	23	603.00 1/4" x Close Brass Nipple
	25	1100.55 100 Mesh Filter Washer
	26	700.03 5/16" I.D. X 12" SS Flex Line
	27	2000.36 Low Temp Sensor (Behind Insulation)
	28	600.30 3/4" Brass Elbow
	29	603.32 3/4" x 6" Brass Nipple
	30	607.12 3/4" Brass Ball Valve
	31	501.42 3/4" C.I. Flanges For Taco 009 Pump
	32	501.06 Taco 009 C.I. Pump W/Power Cord
	33	2004.24 Romex Connector (Metal)
	34	2000.52 Honeywell Relay, DPDT
	35	2001.00 Doermeyer Damper Solenoid
	36	3200.12 Jack Chain
	37	3200.16 Key Ring
	38	2002.16 100 CFM Damper Blower W/Flapper
	39	2004.28 Plastic Romex Connector
	40	607.42 3/4" Male Brass Boiler Drain Valve
	41	2004.16 Receptical Box 2 1/8" Deep
	42	2004.00 Ground Fault Interrupter Receptical
	43	2004.08 8' Black 2 Wire Power Cord
	44	2004.52 Electrical Mounting Panel
	45	3000.38 No.1 2 x 3/4" SS Self Tap Screw
	46	1100.30 Low Water Indicator Light
	47	2004.40 Wire Connectors

