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“Build your own Hot Tub System”

Installation and Operation Manual

TABLE OF CONTENTS

Fixtures

Suction Fitting Installation	3
Hydro-Therapy Jet Installation	4
Skimmer Installation	5

Plumbing

General Information	5
Suction Manifold	6
Jet Plumbing	7
Gate Valves	8
Optional Bubbler System	8
Optional Gas Heater	9

Supporting Equipment

Support Equipment Mounting and Plumbing	10
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Electrical

General Information	10
Air Switch Button Installation	11
Optional Water Purifier	12
Optional Freeze Protector	13
Optional Low Voltage Light	14
Important Information for Installers	14

Maintenance and Operation

Important Safety Instructions	15
Support System Startup and Test Procedure	17
Equipment Maintenance and Servicing	18
Controls and System Operation	18
Water Testing and Treatment	19
Cleaning the Filter Cartridge	19
Draining the System	19
Winterizing Outdoor Systems	20
Unsolved Problems	20

Chemical Maintenance

Water Balance	21
Sanitizing	22
Chemical Precautions	22

ILLUSTRATIONS

Figure 1 - Suction Fitting Assembly	3
Figure 2 - Hydro Therapy Jet Assembly	4
Figure 3 - Skimmer Installation	5
Figure 4 - Flexible PVC Plumbing Installation	6
Figure 5 - Mounting and Plumbing the Support Equipment	10
Figure 6 - Wiring with the Single Function Air Switch/Timer and Optional Accessories	11
Figure 7 - Wiring with the Four Function Air Switch/Timer and Optional Accessories	12
Figure 8 - Plumbing Schematic for Small Jet Set and Plumbing Kit	23
Figure 9 - Plumbing Schematic for Medium Jet Set and Plumbing Kit	24
Figure 10 - Plumbing Schematic for Large and Supercharged Jet Set and Plumbing Kit	25

FIXTURES

SUCTION FITTING INSTALLATION

Suction fittings are always installed into the lowest part of the tub or spa. The “flange” is the part of the fitting with male threads that is inserted from the inside of the tub. We recommend that you attach the supplied gasket to the suction fitting’s flange using a continuous bead of silicone sealant. This will prevent the gasket from bunching as the suction fitting’s flange is tightened into the suction nut. Wipe off any excess silicone and allow it to set (at least 1-2 hours) before proceeding. **See Figure 1.**

Immediately before you thread the flange into the body, it is also recommended that you apply a generous amount of silicone to the male threads on the flange to prevent water from leaking around them. Make sure to completely fill in the spaces between the threads with silicone along the entire length and circumference of the flange.

Quickly screw the flange into the body before the silicone can start to set. **MAKE SURE TO USE THE SILICONE SUPPLIED BY US, WHICH IS “NEUTRAL CURE” AND APPROVED FOR BOTH PVC AND ABS PLASTIC.** Failure to do so could damage the plastic.

A wrench has been supplied with the system for tightening the suction fitting and hydro-therapy jet flanges. **See Figure 2.** The system may or may not include more than one type of suction fitting.

There are splines inside the flange to accommodate the Slimline wrench. To tighten the suction flange into the suction nut, slide the Slimline wrench through the suction flange and turn it clockwise until firm.

BE CAREFUL NOT TO OVER TIGHTEN THIS FLANGE if you have a wooden tub, which could cause the suction fitting to crack as the wood swells. After tightening the flange, screw on the suction cover. **NEVER OPERATE THE PUMP WITHOUT THIS COVER INSTALLED.**

Most suction fittings have a female slip connection in the back of the suction body. Glue a 1½” “Street Elbow” into the back of each suction fitting after you have tightened the suction flange (do not confuse this elbow, which has one end narrower than the other, with a slip by slip elbow, which has identical ends). Before you glue the elbow, be certain that it is aligned properly for plumbing into the suction manifold (see the section FLEXIBLE PVC PLUMBING INSTALLATION below, before gluing the elbow).

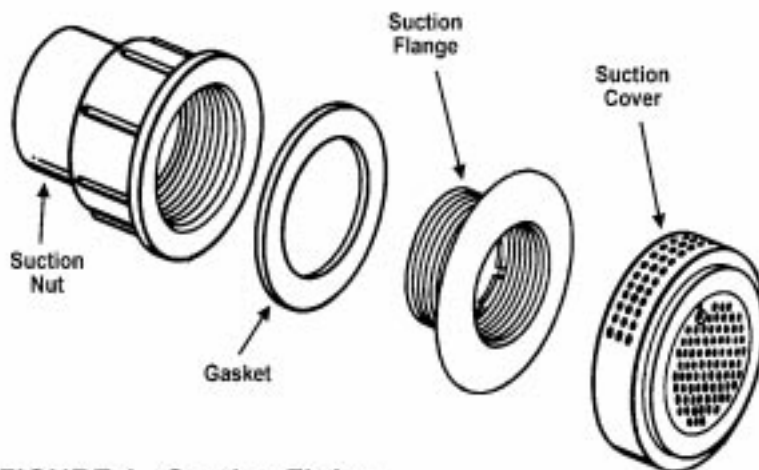


FIGURE 1 - Suction Fitting

HYDRO-THERAPY JET INSTALLATION

If the ball fitting is presently screwed into the jet body, remove it by unscrewing the retaining ring using a blunt needle nose pliers. This step is necessary before you can screw the jet flange into the jet body.

See **Figure 2**.

The seal around the jet is accomplished in the same manner as the suction fitting (see previous section). Put a continuous bead of silicone between the flange and its gasket and allow it to set. Apply a small amount of silicone to the threads of the flange immediately before the flange is screwed into the jet body.

MAKE SURE THAT THE SILICONE OR PIPE DOPE THAT YOU USE ON THESE THREADS IS APPROVED FOR BOTH PVC AND ABS PLASTIC. Failure to do so could damage the plastic. All silicone supplied by Almost Heaven is approved.

Be certain that the jet body is aligned properly on the back of the tub before you screw in the jet flange. The jet body is labeled for AIR and WATER, and each jet has two connections for each. **THE JET SHOULD BE POSITIONED SO THAT THE AIR CONNECTIONS ARE ALWAYS ON TOP.**

Before proceeding, you should also read the following section so that you understand how the jet should be positioned for plumbing into the system with flexible PVC.

There are splines inside the flange to accommodate the Slimline wrench. To tighten the jet flange into the jet body, slide the Slimline wrench through the jet flange and turn it clockwise until firm.

BE CAREFUL NOT TO OVER TIGHTEN THIS FLANGE in a wooden tub, which could cause the jet to crack as the wood swells.

After tightening the jet flange, replace the retaining ring and ball fitting using a blunt needle nose pliers.

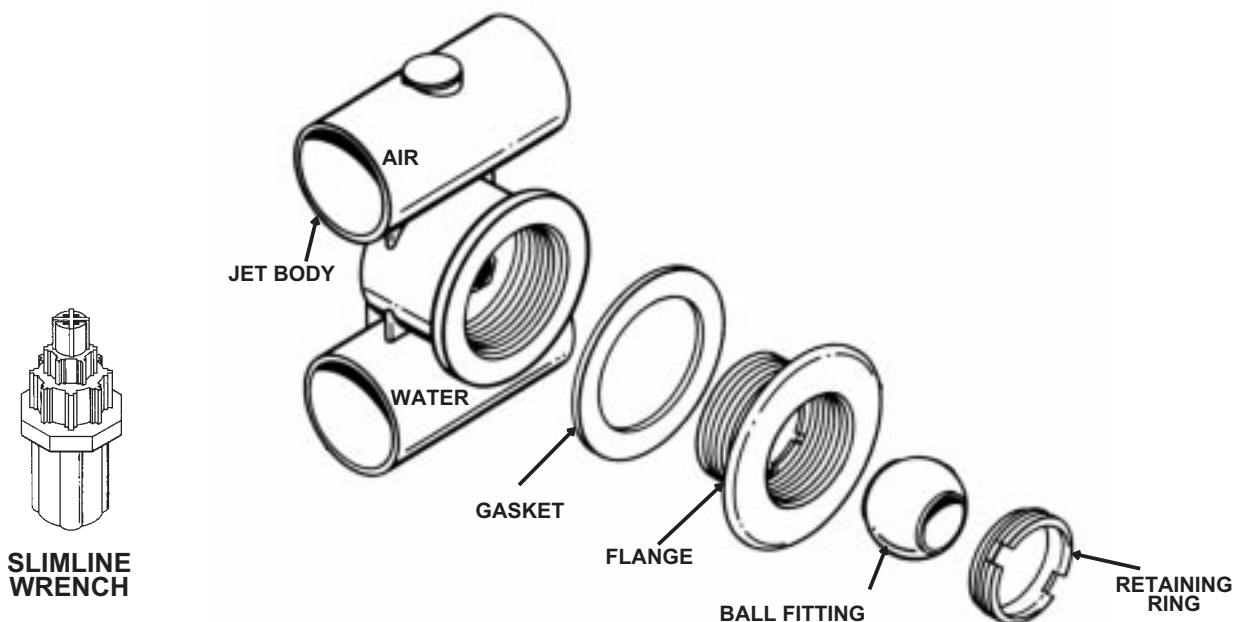


FIGURE 2 - HYDRO THERAPY JET ASSEMBLY

SKIMMER INSTALLATION

The Skimmer described here is the one supplied for wooden hot tubs. If you have a spa, your skimmer will be different, but it is still plumbed into the suction system in the same way as the one described here. Install the hot tub skimmer's flange, gasket and nut in the same manner as the jets and suction fittings (see previous sections). Place the skimmer's faceplate over the flange, and attach its bottom by screwing the skimmer grate into the flange. Hand-tighten the grate, and secure the top of the skimmer faceplate by screwing it into the tub wall. See Figure 3.

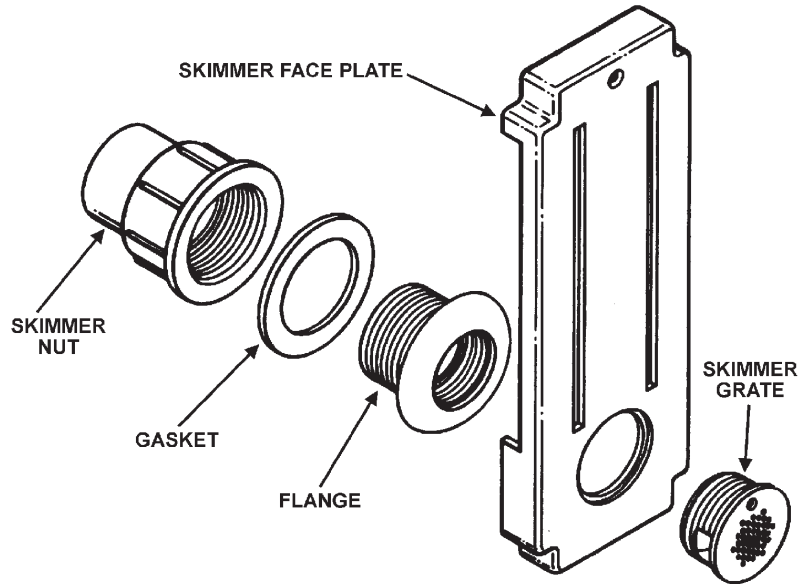


FIGURE 3 - SKIMMER INSTALLATION

PLUMBING

GENERAL INFORMATION

Even if you have purchased our plumbing kit, depending on the distance between the tub and support pack, it may be necessary to purchase additional pipe and plumbing fittings. These materials should be readily available at the local hardware or plumbing supplier. CAUTION : Use ONLY Schedule 40 pressure-type pipe and fittings. DO NOT use DWV fittings or pipe.

All plumbing connections should be made with pressure-type fittings such as those supplied with the system. These fittings have a socket that's deeper than fittings that are used primarily in low pressure drain and waste situations. When gluing connections, be sure to make use of the full depth of the socket, especially when fastening flexhose.

The flexible PVC in the plumbing kit will make the assembly of the system much easier, but certain precautions must be observed when using it. Supplied with the plumbing kit is a can of PVC CLEANER, and all plumbing connections must be cleaned prior to gluing. If you supplement the plumbing supplies with materials purchased locally, it is important that you DO NOT USE PVC PRIMER WITH FLEXIBLE PVC. PVC primer is more aggressive than the PVC cleaner supplied with the kit and will probably etch the flexible PVC too much, increasing the possibility of leaks or a total failure of the connection.

Use the flexible PVC to plumb the jets and suction fittings on the system first, then you can use any remaining flexible PVC to connect the support equipment to the tub. If you need additional pipe to connect the equipment to the tub, rigid PVC can be used. Be certain that all connecting pipe is properly supported with straps or hangers, and that no stress exists on any of the connections.

If the temperature at the installation is likely to fall below 60° F within the first 48 hours after gluing, we recommend that you either tent and heat the assembly area or obtain a special glue intended for use in cold weather from your local supplier. Make sure the glue is appropriate for flex PVC and ALLOW ALL GLUED CONNECTIONS TO SET FOR 12 TO 24 HOURS BEFORE STARTING THE PUMP.

When measuring needed lengths of flexible hose, be certain to account for the full depth of the socket into which each end will be glued. Use a hacksaw to cut the flexhose, and be sure to cut the ends square. After cutting, use a utility knife to trim any burrs from the end of the pipe.

Thoroughly coat both the male and female parts of the connections with adhesive and work quickly, before it can set up. Assemble the connection with a twisting motion, to make certain that the full depth of the socket is used, and hold the connection together tightly for about 5 seconds, to allow the glue to set initially.

It will be easier to assemble the plumbing system if you identify all of its components first. **See the appropriate plumbing schematic at the end of this manual before proceeding.** The components in the plumbing system are referred to by the type of connection that they make, and there are basically four types. Aside from male thread and female thread, an unthreaded female connection is referred to as a “slip” connection, and an unthreaded male connection is referred to as a “spigot” connection.

As you identify the various parts of the plumbing system, note that two different types of elbows have been supplied – “slip by slip” and “slip by spigot”. The latter is also commonly referred to as a “street el”.

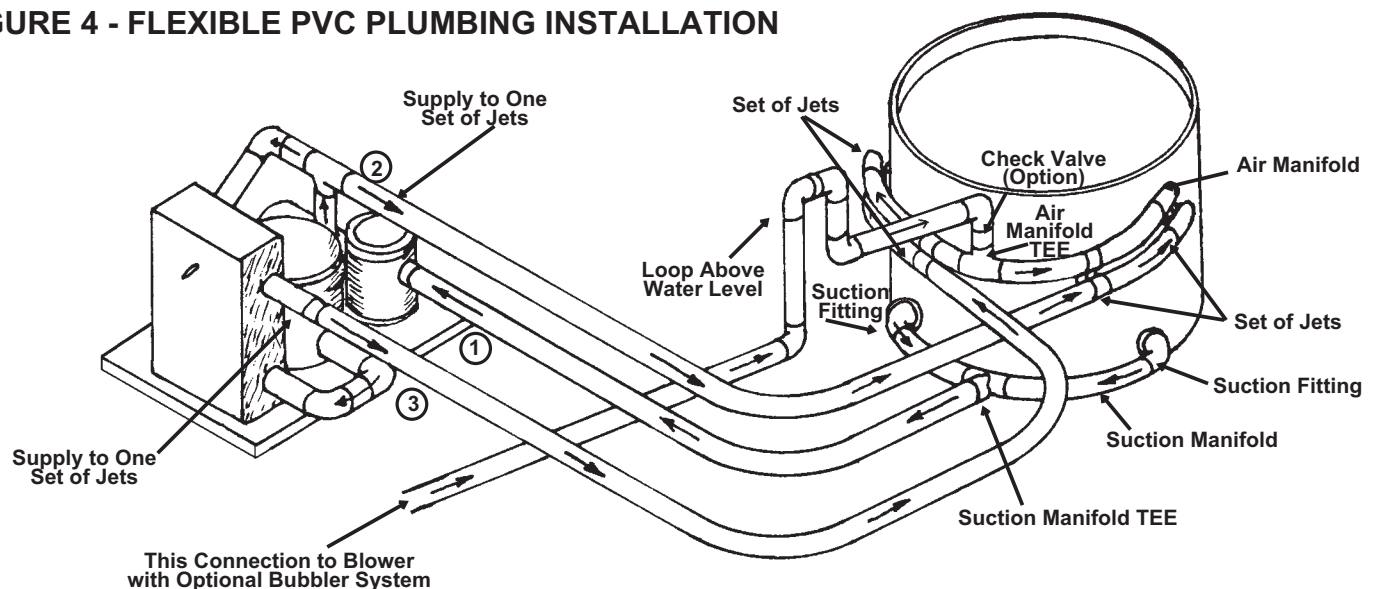
SUCTION MANIFOLD

If you have the smallest plumbing kit (which has only one suction fitting), connect the elbow glued into the back of this suction fitting in the previous step to a 1½” TEE with a section of hose that’s been cut to fit. One side of this TEE will bring water from the skimmer, and the other side will connect to the suction inlet on the pump. For this smallest plumbing kit, all piping and fittings are 1½”.

If you have more than one suction fitting in your system, you’ll connect a section of 1½” piping to each suction elbow and the other end of this piping will connect into a 1½” to 2” reducing bushing and then either into a section of 2” pipe and a 2” TEE, or directly into a 2” TEE. The line from the skimmer is plumbed into the suction manifold in the same manner. **See Figure 9 or 10.**

Regardless on the number of suction fittings in your system, somewhere in the suction manifold, preferably at the lowest point, you will want to plumb another TEE to which to connect your drain line and valve.

FIGURE 4 - FLEXIBLE PVC PLUMBING INSTALLATION



Once all the suction fittings have been plumbed together into the suction manifold, connect the main suction manifold TEE to the inlet on the pump (Connection # 1 in **Figure 4 or 5**).

If the suction inlet on the pump will be above the water level in the tub, purchase and install a check valve between the pump and the main suction manifold TEE (as close to the TEE as possible), to prevent the pump from losing its prime. You should also place a drain valve in the line between the pump and the check valve, as close to the check valve as possible, to facilitate the complete draining of the tub.

Make sure that you have plumbed together all the jets and suction fittings on the tub before using the flexible PVC to connect the main suction manifold TEE to the pump inlet. If necessary, use standard Schedule 40 pressure-type PVC pipe and fittings from your local supplier to complete the connection between the tub and the support equipment. **DO NOT** use any DWV pipe or fittings.

JET PLUMBING

Depending upon the size of your system, you will have anywhere from four to ten high capacity hydro-therapy jets in the system. Regardless of the number of jets in the system, the ideal plumbing arrangement will have half these jets connected directly to the pump (Connection # 2 in **Figure 4 or 5**), and the other half of the jets connected to the filter and heater (Connection # 3 in **Figure 4 or 5**). Study **Figure 4 and the plumbing schematics at the back of this manual**, and do not proceed until you understand this principle.

Plumb together the WATER connections on each set of jets, using the supplied caps to close the ends on the farthest two jets (one for each set of half the jets). As an option, you may connect these capped ends together to form a loop, which may provide a slightly more consistent force at each of the jets but will obviously also use up additional piping.

Connect one set of jets to the support equipment at connection #2 and the other set of jets at connection #3 (see **Figure 5**). Do not use flexible PVC for these connections until you have completed plumbing all the jets and suction fittings, and you know that enough remains. If necessary, use standard PVC pipe and fittings from your local supplier to complete the connection between the tub and the support equipment.

Construct the air manifold by joining the AIR connections together on each set of jets, capping the ends on the farthest jets as you did for the WATER connections. Again, if enough flexhose is available, you may connect these capped ends together, forming a continuous loop and providing more consistent aeration. Plumb the remaining two AIR connections (one from each set of jets) together into a TEE as shown in **Figure 4 and the plumbing schematics at the back of this manual**. It is best to have the remaining connection on this TEE (the "stem") pointing up.

When the pump is operating on high speed, the venturi action of the jets will draw air through this TEE and the air manifold. When the pump is not on, water will fill the air manifold. Therefore the air manifold must be connected to plumbing that terminates (or is looped) a significant distance above the level of the water in the tub.

The next step depends upon the needs of your particular installation and whether or not you have purchased the Bubbler System option. If you do not have the Bubbler System option, then the other end of the pipe connected to the air manifold must remain unobstructed and terminate at least 18 inches above the level of the water in the tub. If the tub is installed outdoors in a northern climate, then it is best to terminate the air manifold pipe in a heated space, so the jets do not draw cold air which would cool the tub and increase operating expenses. If the end of the air manifold pipe will be below the water level, then it should have a loop at least 18 inches above the water level somewhere between the tub and the end of the pipe. If you have purchased the Bubbler System option, then the pipe from the air manifold will be connected to the air blower that is part of the Bubbler System. See the next section for further details. Regardless of whether or not you have the Bubbler System, the air manifold pipe must either loop or terminate at least 18 inches above the level of the water in the tub.

GATE VALVES

All of our plumbing kits include a set of three guillotine style valves , which enable the user/servicer to isolate the tub from the support equipment. This prevents the need to drain the tub if the filter needs cleaning or the support equipment needs servicing. Plumb one valve into each water pipe feeding the jets and a third into the suction line. A fourth valve may be procured for your drain line, which should be mounted through a TEE in the suction line, preferably at its lowest point..

The valves can be located anywhere in the plumbing that is convenient. The closer to the equipment that they are, the less the amount of water that will need to be drained away when the filter is cleaned. However, you should avoid connecting any valves directly to the support equipment. Install at least a short section of rigid or flexible PVC between each valve and the pump or heater. It will probably also be necessary to support the valves in some manner to prevent strain to the plumbing connections.

Note : Unless you have purchased our smallest plumbing kit, the suction line is 2", and one of the valves is also 2" to accommodate these connections. If you have the smallest plumbing system, then all the valves are 1½".

CAUTION : BE SURE TO FULLY OPEN ALL THREE VALVES BEFORE ATTEMPTING TO OPERATE THE SYSTEM. FAILURE TO DO SO COULD CAUSE DAMAGE TO THE EQUIPMENT AND LEAKS IN THE SYSTEM.

OPTIONAL BUBBLER SYSTEM INSTALLATION

Because of the 18 inch requirement mentioned above, the air blower that is part of the Bubbler System is best mounted above the water level of the tub. Since the pump is best when installed below the water level, the air blower and the pump need not necessarily be mounted in the same location.

Almost Heaven recommends that, if at all possible, you mount the blower indoors, even for an outdoor hot tub. This will prevent the blower from inducing cold air into the tub. To mount the blower, use self-tapping, 1½", #8 screws (stainless steel is best), and screw the aluminum blower base to a deck, wall or stud. As an alternative, you can drill or punch the screw holes into the blower's base.

If you are mounting the blower outdoors, IT MUST be mounted vertically with its discharge to the side. This is to prevent rain water from entering the blower housing. If you are mounting the blower indoors, it can be mounted in any orientation, but mounting it with its discharge pointing down will yield the best performance. If possible, always mount the blower at least 18 inches above the level of the water in the tub. If you cannot do this, there must be a loop in the pipe that connects the blower to the air manifold, and this loop must extend at least 18 inches above the level of the water in the tub.

Once the blower is mounted, have an electrician use an amp probe and measure the "no load" rating on the air blower. This is the current that the blower will draw with no pipe connected to it. This value should be approximately 3.0 amps. Record this value before proceeding.

After measuring the "no load" current of the blower, you can connect its line to the air manifold at the tub. Additional flexible PVC has been supplied for this purpose. Connect from here to the check valve and air manifold TEE at the tub. Depending upon the size of your kit, you have been supplied with either a 1½" x 1½" x 2" TEE, or a 1½" TEE and, possibly, a reducing bushing for this purpose.

If the blower outlet is less than 18 inches above the level of the water in the tub, then somewhere in the air manifold line you must install a loop at least this high. Four elbows have been provided with the Bubbler System to construct this loop in a tight space if necessary. After this loop and as close to the tub as possible, install the check valve into the air manifold line. See **Figure 4 and the plumbing schematics at the back of this manual**. For best results, this check valve can be glued directly to the air manifold TEE. Be sure that the arrow in the check valve points to the tub. **THE LOOP AND CHECK VALVE ARE NECESSARY TO PREVENT WATER FROM GETTING INTO THE BLOWER.**

Once the system is running, have the electrician use an amp probe to measure the current draw of just the blower while the blower and the pump (high speed) are running simultaneously. The current should be no less than $\frac{1}{2}$ Amp lower than the blower's "no load" rating, which was measured previously. If the current is lower than this, relief must be provided (or an obstruction exists) in the air supply line. Contact Almost Heaven for details. Per the manufacturer's instructions, the life of the blower can be extended if you refrain from running it for more than one hour at a time. Allow a cool-down period of 20 to 30 minutes before operating the blower again.

OPTIONAL GAS HEATER

If you have purchased the optional gas heater, it is plumbed into the system in the same manner as the electric heater pictured in **Figure 4 and the schematics at the end of this manual**. Connect the outlet from the filter to the inlet on the gas heater and the outlet on the heater to one set of half the jets. Consult the instructions supplied by the heater manufacturer. A licensed plumber should make the final gas connections to the heater.

SUPPORTING EQUIPMENT

SUPPORT EQUIPMENT MOUNTING AND PLUMBING

Even if you have purchased the optional Freeze Protector, it is not totally foolproof, and outdoor installations in northern climates will still benefit from the indoor placement of the equipment, if at all possible. Besides lessening the chance for a catastrophic freeze, mounting the equipment indoors saves energy, removes noise from the tub area and usually makes servicing easier. Moreover, mounting the blower indoors will prevent it from inducing cold air into the tub.

Follow the manufacturer's instructions to mount the pump and filter, and connect them together using either rigid or flexible PVC. A total of six complete screw unions has been provided so that any component can be easily removed, should servicing ever be necessary. **Figure 5** shows an example of pump, filter and heater mounted next to one another (note that this picture does not show the unions).

NOTE: If the suction inlet on the pump will be above the water level in the tub, purchase and install a check valve between the pump and the suction manifold's TEE fitting, as close to the TEE as possible, to prevent the pump from losing its prime. You should also place a drain valve in the line between the pump and the check valve, as close to the check valve as possible, to facilitate the complete draining of the tub.

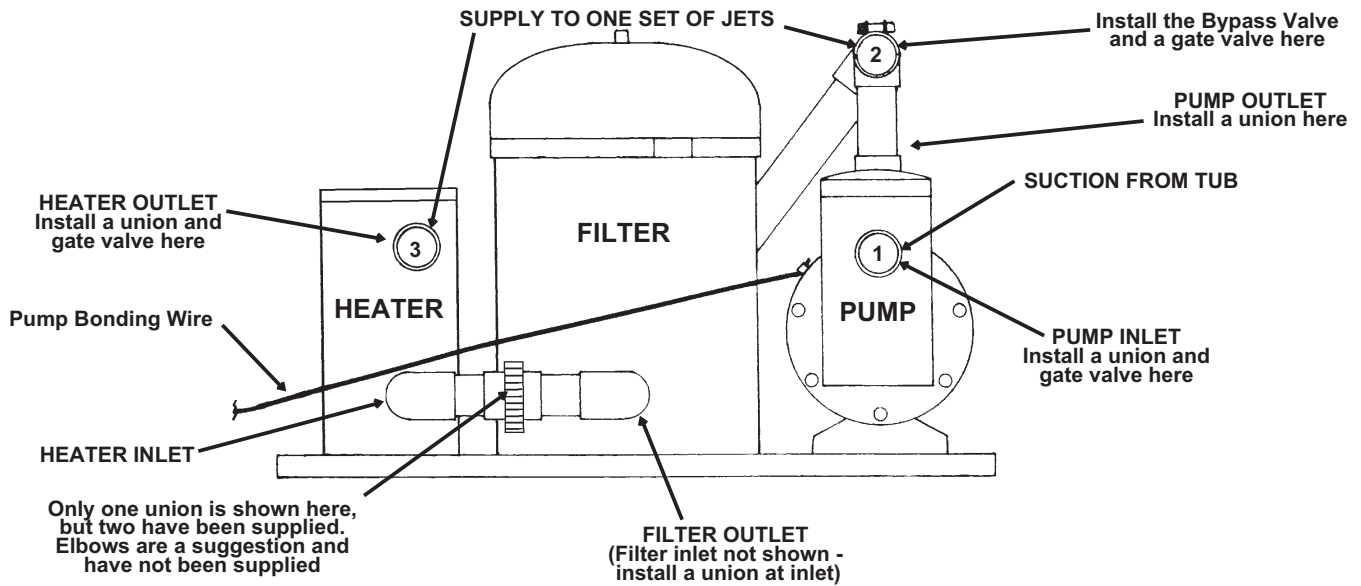
Follow the manufacturer's instructions for mounting the heater, and screw female threaded $1\frac{1}{2}$ " adapters into both the heater's inlet and outlet. How you connect the heater's inlet (bottom) connection to the outlet of the filter will depend specifically upon how you mounted your heater in relation to the pump and filter.

If the filter and heater are close enough together, a single union can be used between them, with flexhose or rigid PVC on either side. You may, however, also have to supply a standard slip by slip elbow to accommodate a turn too tight to be done in this manner. See **Figure 5**.

Two more unions are installed right at the pump's inlet and outlet, a union has been supplied for between the pump and filter and one more union is supplied to be installed between the heater's outlet and gate valve. See **Figure 5 and the schematics at the end of this manual**. A rigid section of PVC (not supplied) should be glued into the pump's outlet and topped with a TEE. For smaller pumps, this assembly will be all $1\frac{1}{2}$ ". For Magnum Force pumps, however, this assembly is 2", and two 2" to $1\frac{1}{2}$ " reducing bushings have been supplied for either side of the TEE's stem.

For all systems with the standard two speed pumps, a bypass valve has been supplied for the side of the pump's outlet TEE that goes directly back to the tub. **MAKE CERTAIN THAT THE ARROW ON THE VALVE POINTS TOWARD THE TUB.**

FIGURE 5 - MOUNTING AND PLUMBING THE SUPPORT EQUIPMENT



ELECTRICAL

GENERAL INFORMATION

Even though all the components in the system may be 220 VAC, the control still requires 110 VAC for the operation of its relays. Be sure to wire the circuit for the pump and accessories using four conductor, #12-3 (with ground).

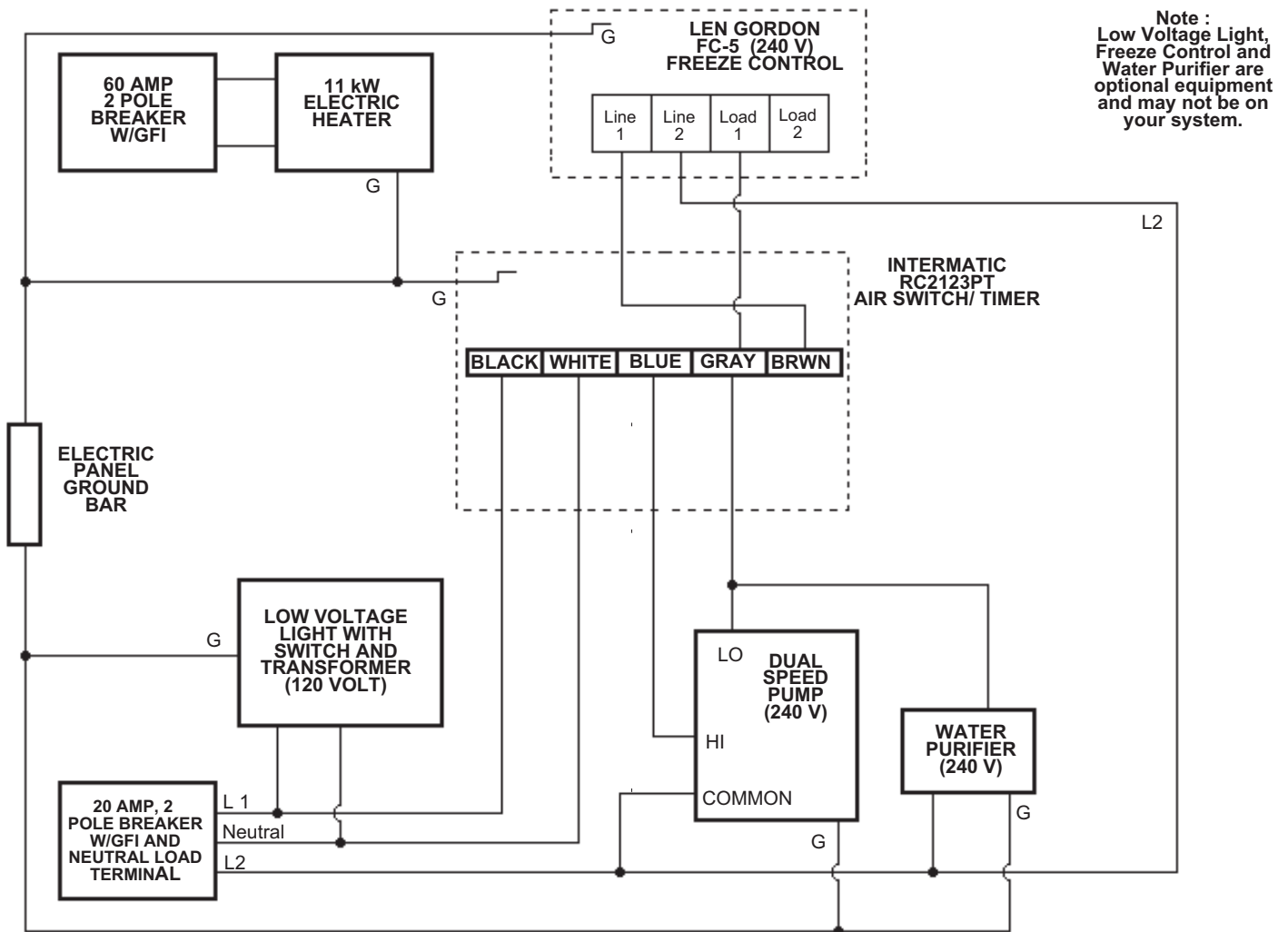
Figure 6 shows the basic wiring for the standard system with an electric heater, dual speed pump, NO BUBBLER but other possible optional accessories. The Intermatic RC2123PT is the integrated timer/air switch that controls this system. If you have purchased the optional Bubbler, then the system is controlled by the Intermatic RC2343PT. See **Figure 7** instead of **Figure 6**.

For systems with the RC2123PT, splice the black pigtail on the control to one of the loads (L1) of the GFI breaker (not supplied). Connect the white pigtail on the control to the NEUTRAL LOAD TERMINAL OF THE GFI BREAKER. For systems with the optional Bubbler and RC2343PT, check the local codes to see if the air blower is permitted to share the same circuit as the pump and other accessories. If so, splice the black and red pigtails on the RC2343PT together and connect them to one of the loads (L1) on the GFI Breaker, and connect the white pigtail on the control to the NEUTRAL LOAD TERMINAL OF THE GFI BREAKER.

In all systems, the remaining load on the GFI breaker (L2) is connected directly to the pump and any accessories as indicated in **Figures 6 & 7**. **Consult labeling on the side of the pump motor to identify the pump wiring terminals, which are often marked arbitrarily.** All connections shown in **Figures 6 & 7** are field wiring connections and must be completed. Use approved connectors and at least # 12-3 wire (with ground) to make all connections. Heavier gauge wire may be required for long runs.

If local codes do not permit the pump and blower to share the same circuit, connect one leg of a second GFI Breaker (not shown) to the red pigtail and be certain to use this second breaker's L2 for the other leg of the blower.

In all installations, be certain to connect the white pigtail coming from the inside of the GFI breaker to the neutral bar in the electrical panel box. Mount the Intermatic control box up and away from any possible flood or water damage should an accident or leak occur.



Note :
Low Voltage Light,
Freeze Control and
Water Purifier are
optional equipment
and may not be on
your system.

NOTE : NEUTRAL SUPPLY MUST CONNECT TO NEUTRAL TERMINAL ON GFI BREAKER.

FIGURE 6 - WIRING WITH THE RC2123PT AIR SWITCH/TIMER AND OPTIONAL ACCESSORIES

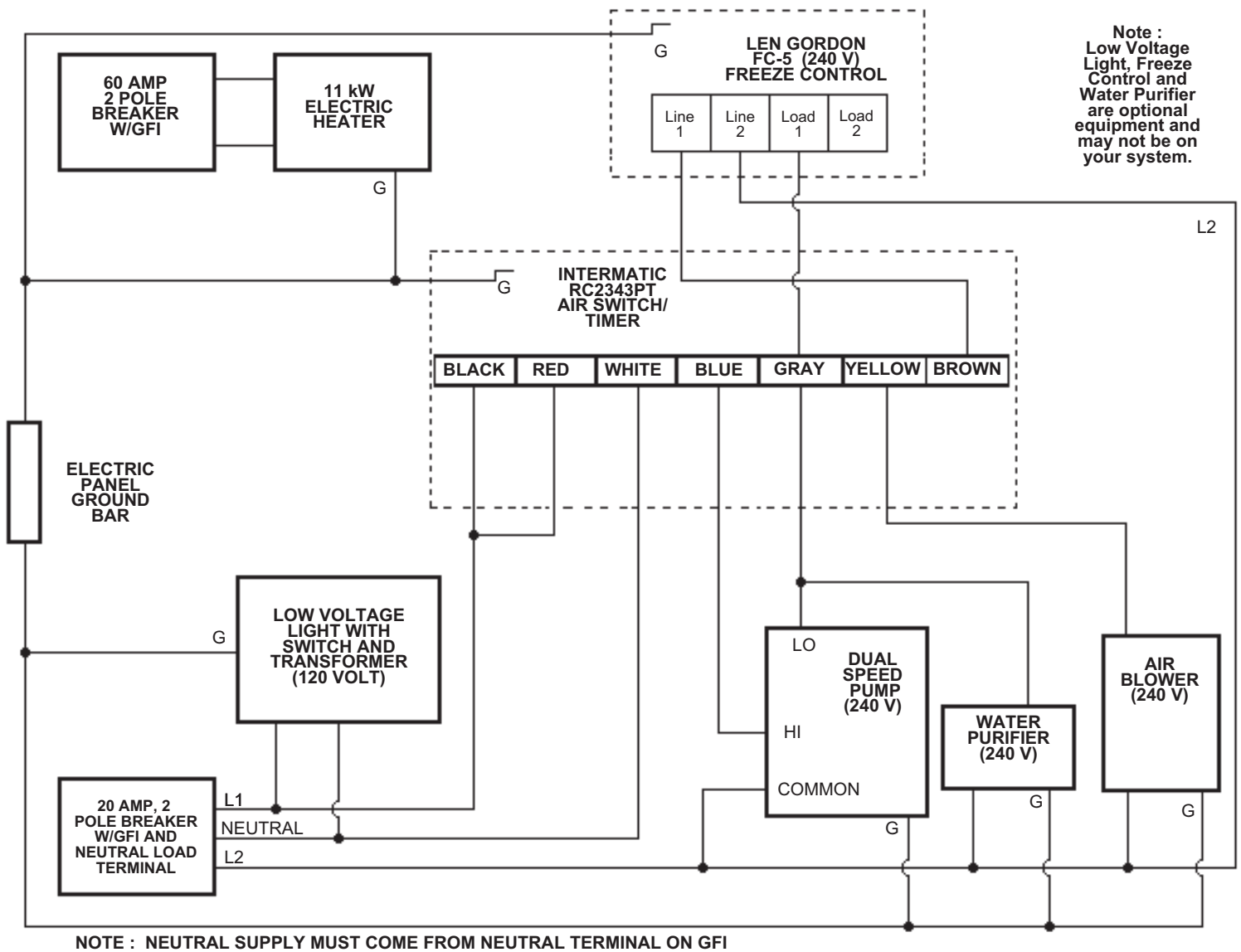
Follow the heater manufacturer’s instructions and connect the 11 kW electric heater using at least #6-2 wire (with ground). Heavier gauge wire may be required for long runs. **DO NOT USE ALUMINUM WIRE TO MAKE ANY CONNECTIONS TO THE HEATER, PUMP OR ACCESSORIES.**

Figures 6 and 7 do not show bonding to the pump and heater. A bonding loop is suggested and may be required by code. A competent and licensed electrician should complete all electrical connections and make certain that the final hookups comply with all federal, state and local codes.

AIR SWITCH BUTTON INSTALLATION

Regardless of whether or not you have purchased the optional Bubbler System, a single air switch button controls the pump and the blower if there is one.

The air switch button must be installed into a vertical surface (such as a nearby wall), but should not be mounted in the top of one of the tub’s staves. It can be mounted in any material up to 1¼" in thickness. Drill appropriate sized holes (1¼" for the standard Len Gordon button), and mount the button by means of its screw flange. The button attaches to the tub’s electrical controls (either the RC2123PT or RC2343PT) by means of a thin vinyl tube. Both the air switch button and the control box have slip-on barbed nipples to accommodate this vinyl tubing.



Note :
Low Voltage
Light, Freeze
Control and
Water Purifier
are optional
equipment and
may not be on
your system.

NOTE : NEUTRAL SUPPLY MUST COME FROM NEUTRAL TERMINAL ON GFI

FIGURE 7 - WIRING WITH THE RC2343PT AND OPTIONAL ACCESSORIES

OPTIONAL WATER PURIFIER

The electronic Water Purifier System eliminates the need for using chlorine or bromine thus avoiding the inconvenience, odor and hazards of halogen sanitizers. The Water Purifier also protects and extends the life of natural wooden tubs which can be easily and irreparably damaged by halogen sanitizers.

A TEE has been designed to hold the Water Purifier's electrodes in place in the water line. Install the electrode TEE into the plumbing line carrying water from the heater and filter to the tub (#3 in **Figure 4 or 5**). Mount the TEE as close to the tub as possible, and with its stem pointing horizontally.

The purifier control box must be wired to come on only when the pump is running. For our standard, 240 Volt, two speed pump systems, splice the power pigtail of the purifier control box to the LO and COMMON terminals of the pump (see **Figure 6 or Figure 7**). Connect the electrodes to the control box. A competent, licensed electrician should make all connections.

The Water Purifier should run whenever the timer has the pump running on slow speed, yielding a consistent output of copper and silver into the water. Follow the instructions supplied with the unit for initializing a freshly filled tub and testing for copper levels, which should be done on a daily basis, at least after the unit is first installed.

The amount of copper in the water can be adjusted by the control on the front of the unit. Keep in mind that copper and silver levels will also be affected by the amount of time that the pump is run by the timer, and, of course, by sanitizer demand.

If you have purchased a natural wooden hot tub, **DO NOT USE THE WATER PURIFIER IMMEDIATELY.** The redwood in a new hot tub leaches tannins into the water which are harmless but give the water a red color. These tannins also have a tendency to absorb the copper and silver ions. It is best not to power the Water Purifier until the tub has ceased to leach, which generally occurs after it has been filled with water for 30 to 90 days. In the interim, chlorine should be cautiously used as a sanitizer. **NEVER EXCEED 3 PPM (Parts Per Million)** of chlorine in a natural wooden tub. If you have a hot tub with a vinyl liner, then you may start using the Water Purifier immediately.

DO NOT USE A STAIN & SCALE PREVENTER in your tub if you are using the Water Purifier. Although some chemical dealers recommend the regular use of Stain & Scale Preventer, it is only ever needed if you have water from a well with high concentrations of metal, lime, etc. Although Stain & Scale Preventer is designed to sequester ions of iron and calcium, it will also do so to the copper and silver. If you have a serious staining and scaling problem, it should be treated at the point where the water enters the home so as to protect all the other plumbing and fixtures in the house.

NOTE : The Water Purifier is a sanitizer and replaces the need for chlorine. It does not preclude the need to keep the water balanced nor does it provide the oxidation necessary to keep the water fresh. Balance the tub's water with standard chemical preparations and shock the water occasionally with the Non-Chlorine shocking agent supplied with the Water Purifier.

OPTIONAL FREEZE PROTECTOR

The Len Gordon FC-5 Freeze Control is part of a stand alone freeze protection system which will function with any control system. The FC-5 installation wiring is simplified, however, if it is used with our standard RC2123PT or RC2343PT controls. See **Figure 6** or **Figure 7**. Note that Line #2 on the FC-5 splices into the L2 supply from the breaker, which is the voltage leg that does not go through the switching controls.

Line #1 on the FC-5 connects directly to brown wire on either control. Load #1 on the FC-5 connects to the gray wire on either control. On our standard two speed pump systems, the FC-5 will run the pump on low speed.

NOTE : On some FC-5 controls, Line #1 is marked simply as Terminal #1, Line #2 as Terminal #2, Load #1 as Terminal #3 and Load #2 as Terminal #4.

The FC-5 is part of a complete freeze protection system which includes a thermowell (dry well) for the temperature probe installed in an EL for mounting the thermowell into a water line. The thermostat on the FC-5 is adjustable and should initially be set to turn the system on at about 40° F. When the temperature falls below this preset limit, the FC-5 will run the pump until the water is heated a few degrees.

Do not attempt to use the Freeze Protector to try to maintain the tub at an operating temperature by turning up the FC-5's thermostat. This is the purpose of the timer in the system and the thermostat on the heater.

The location of the temperature probe's EL, as well as the ultimate setting of the thermostat, can be critical but will vary with the layout of your specific installation. We have included a separate printed sheet with your Freeze Protector titled, "Installing a Freeze Protector". Read and follow these additional instructions very carefully to assure proper installation and satisfactory performance of the unit.

If you are **NOT USING AN INTERMATIC OR LEN GORDON CONTROL** with one of our freeze protection systems, then the FC-5 must be wired in parallel with any timer and/or air switch that is used by the system. Connect Line #1 and Line #2 of the FC-5 to the line side of the existing switch, and Load #3 and Load #4 to the load side of the existing switch in the system. **NOTE:** This freeze control cannot be used to control a two speed pump without one of the aforementioned controls.

On such alternate FC-5 wiring, YOU MUST MAINTAIN PHASE CONTINUITY. Line #1 and Load #1 on the FC-5 must connect to the same leg (or pole) of the 240 VAC. Line #2 and Load #2 are for the other leg. DO NOT WIRE THE FC-5 TO A TWO SPEED PUMP, unless a relay or similar device (such as the RC2123PT or RC2343PT) can assure that both speeds on the pump will not be powered at the same time.

A competent, licensed electrician should complete all wiring.

OPTIONAL LOW VOLTAGE LIGHT

Install the Low Voltage Light fixture into a $2\frac{3}{4}$ " hole. Apply a continuous bead of silicone to the flange of the light. The flange is the part that is installed from the inside of the tub and is tightened against the tub wall. Attach the supplied gasket to the flange and allow the silicone to set before proceeding. Carefully tighten the light fixture by turning the nut on the back of the tub with a pair of pump pliers (channel locks).

The Low Voltage Light is powered by its own transformer and operated by a separate switch mounted on the power supply. Mount the low voltage switch and power transformer as per the supplied manufacturer's instructions.

The light's transformer must be connected to a GFI circuit breaker. The light can share the GFI circuit on which the pump resides. If the light is rated for 120 VAC, then the neutral supply to the light's transformer MUST come from the neutral load terminal of the GFI circuit breaker. A licensed, competent electrician should complete all wiring.

CAUTION: The Low Voltage Light is not made to be operated 24 hours per day. Be sure to turn the light off when you're done using the tub!

IMPORTANT INFORMATION FOR INSTALLERS

Whenever the equipment is being installed, serviced or maintained, you should turn off the system at the circuit breakers. Otherwise, the timer could activate unexpectedly and cause damage or injury. Don't forget to reset the timer to the correct time after power is reapplied.

All wiring must follow the same phase throughout the system. Use color coded wire and be careful not to mix the two poles (hot legs) on the 240 VAC circuit, which could severely damage the equipment.

Be certain to properly ground all equipment as per each equipment manufacturer's instructions. Set up an additional "bonding circuit" by connecting the bonding lugs of the pump, heater and any other metal devices within the required distance to a ground rod nearby the tub. Use minimum 6 gauge copper wire for this bonding circuit.

Mount all electrical boxes in a dry place away from the tub if possible. Use water tight conduit and connectors in those place where water leaks and/or splashing may pose a potential hazard.

To comply with the National Electrical Code, the pump, all electrical accessories and the electric heater should reside on GFI circuits for proper protection from electrical hazards.

A competent, licensed electrician should complete all wiring. Local codes take precedent over any instructions in this manual. If the local code disagrees with any directions in this manual, the manual should be disregarded.

MAINTENANCE AND OPERATION

IMPORTANT SAFETY INSTRUCTIONS

The owner of the hot tub should become well acquainted with the following safety instructions. It is the owner's responsibility to inform guests and family of these safety precautions and to see that they are enforced. When installing and using this electrical equipment, these basic safety precautions should always be followed:

- **READ AND FOLLOW ALL INSTRUCTIONS.**
- **WARNING-**To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.
- Bonding lugs are provided where appropriate, and should be used to connect a minimum No. 8 AWG(8.4mm²) solid copper conductor between the equipment and any metal objects .
- **DANGER-**Risk of injury. For cord-connected components...
- Replace damaged cords immediately.
- Do not bury cords.
- Connect each cord to its proper receptacle only.
- **WARNING-**All electrical power supplied to this system must be connected to a ground-fault circuit-interrupter at the power source. The GFCI should be tested regularly. Push the test button on the GFCI. The product should not operate. Now push the reset button on the GFCI. The product should now operate normally. If the product fails to perform in this manner, there's a chance that there could be a ground current flowing, indicating the possibility of an electric shock. Disconnect the power until the fault has been identified and corrected.
- **DANGER-**Risk of Accidental Drowning. Extreme caution must be exercised to prevent unauthorized access by children. To avoid accidents, ensure that children cannot use the tub unless they are supervised at all times.
- **DANGER-**Risk of Injury. The suction fittings in this system are sized to match the specific water flow created by the pump. Should the need arise to replace the suction fittings or the pump, be sure that the flow rates are compatible. Never operate the hot tub if any part of the suction fittings is broken or missing. Never replace a suction fitting with one rated less than the flow rate marked on the original fitting.
- **DANGER-** Risk of Electric Shock. The actual tub or spa should be installed at least 5 feet (1.5 m) from all metal surfaces. As an alternative, it may be installed within 5 feet of metal surfaces if each metal surface is permanently connected by a minimum No. 8 AWG (8.4 mm²) solid copper conductor to the wire connector on the terminal box that is provided for this purpose.
- **DANGER-**Risk of Electric Shock. Do not permit any electric appliance, such as a light, telephone, radio, or television, within 5 feet (1.5 m) of the tub.
- **WARNING-**To reduce the risk of injury:
- The water in the hot tub should never exceed 104° F (40° C). Water temperatures between 100° F and 104° F (38° and 40° C) are considered safe for a healthy adult. Lower water temperatures are recommended for the elderly, for young children and when hot tub use exceeds 10 minutes.
- Since excessive water temperatures have a high potential for causing fetal damage during the early months of pregnancy, pregnant or possibly pregnant women should limit hot tub water temperatures to 100° F (38° C).
- Before entering a hot tub, the user should measure the water temperature with an accurate thermometer since the tolerance of water temperature-regulating devices varies.

- The use of alcohol, drugs, or medication before or during hot tub use may lead to unconsciousness with the possibility of drowning.
- The elderly, obese persons and persons with a history of heart disease, low or high blood pressure, circulatory system problems, or diabetes should consult a physician before using a hot tub.
- Persons using medication should consult a physician before using a hot tub since some medication may induce drowsiness while other medication may affect heart rate, blood pressure, and circulation.
- High water temperature and prolonged periods of exposure can raise internal body temperature excessively and impair the body's ability to regulate temperature. This effect is even heightened in children. High body temperature affects people differently. Excessive exposure may result in nausea, dizziness or fainting. Until you become familiar with your own body's reaction to hot water immersion at various temperatures, you should limit your initial time in the water to 10 minutes at a maximum temperature of 100° F.
- Do not use the hot tub immediately following strenuous exercise.
- People with open sores or infectious conditions should not use the hot tub.
- Do not jump or dive into the hot tub, which can result in serious injury or death.
- Wet surfaces surrounding hot tubs are slippery and care must be used when entering and exiting. Installation and use of handrails is recommended.
- Glass and other breakable objects should not be brought into or near the hot tub.
- When not in use, the hot tub should be covered with a rigid cover (such as our Vinyl Insulated Cover). The cover should be completely removed prior to the use of the hot tub. Do not sit, stand or lie on the Vinyl Insulated Cover as it is not meant to support such weight. The cover should be locked or latched when the hot tub is not in use to prevent unauthorized use or entry, especially by small children.
- All outdoor installations should comply with local fencing codes, and some method should be employed to prevent unauthorized use or entry to the area around the tub.
- Do not use attachments unless recommended by the manufacturer. Use the equipment in this system only for its intended use.
- Never drop or insert any object into any opening. Prevent small objects such as beads, buttons, etc. from entering the system through the jets or suction fittings. Remove loose fitting jewelry (such as earrings) before entering the hot tub.
- Bathers with long hair should tie their hair up or use a bathing cap to prevent hair from entering the system.
- Never operate this unit without the guard (screen cover) over the suction fittings, which can result in serious injury and possible drowning.
- Install the equipment so that access for future servicing is provided.
- Never service the unit without first interrupting the power supply by turning off the main circuit breaker in the home's electrical panel box.

Carefully read the instructions for the support equipment supplied with your system. Make sure that all electric, gas and plumbing connections are made in accordance with the manufacturer's recommendations. Consult with a licensed electrician to assure compliance with national and local building codes. Your professional electrician should obtain whatever permits are required in your community, and he should have the finished installation inspected by the local building or electrical inspector.

SUPPORT SYSTEM STARTUP AND TEST PROCEDURE

Follow this procedure the first time that your tub or spa is filled as well as each time thereafter. Before proceeding, you should go back and check all electrical and plumbing connections. If all seems well, **with both circuit breakers turned off**, begin filling the tub or spa with a garden hose.

Before you turn on the breaker for the pump, be sure that the water level in the tub is at least a few inches above the highest jet, and the **CIRCUIT BREAKER FOR THE HEATER REMAINS OFF. ALSO BE CERTAIN THAT ANY VALVES BETWEEN THE TUB AND THE SUPPORT EQUIPMENT ARE FULLY OPENED.** Read the following section on tub controls to familiarize yourself with the proper operation of the equipment.

If the pump is above the water level in the tub, it may have to be primed. Remove the strainer cover on the pump and slowly fill the pump strainer with water until it is completely filled, then replace the strainer cover. For systems with pumps above the water level in the tub, if a check valve has been installed in the suction line per our recommendation (see the previous section), then the pump should only require priming when the tub is first filled. If the pump is below the water level in the tub, it should fill with water as the tub is filled and therefore should not require any priming.

Once the tub or spa is completely filled with water, power the breaker for the pump only (not the heater) Press the air switch button connected to the control box until you find the appropriate setting that will run the pump on high speed with the optional blower off (if you have one). You may need someone to listen at your spa pack to be sure that only the pump is running.

The pump should quickly indicate proper suction and start moving water. If it does not, turn off the pump immediately at the circuit breaker and go back over the system checking electrical and plumbing connections for errors or obstructions. Make certain that all the Gate valves are fully open.

Once the pump is working properly, look for a small bleeder valve on the top of the filter. Open this valve until water starts to leak from it, allowing any air trapped in the filter to escape. Look through the clear plastic cover on the strainer of the pump (if you have one) for air bubbles

If bubbles are present, allow the pump to run for a few more minutes until this air can migrate to the filter, then re-bleed the air from the filter. If air bubbles remain or return in the strainer after some time, then a leak in the suction line is indicated and must be remedied.

Once all the air has been removed from the system, the circuit breaker for the heater can then be turned on. Turn up the thermostat on the heater close to its highest setting and allow the pump to operate for several hours on high speed. Observe the rise in temperature of the tub's water. Consult the specifications supplied with the heater to verify that the heatrise is within expectations for the capacity of your tub.

If the heater is below the level of the tub, turn the pump off and verify that the heater turns off automatically within a few seconds. If it does not, or the heater's hi-limit device trips, readjust the pressure switch in the heater per the included manufacturer's instructions.

If the heater is so much below the level of the tub that it is out of its pressure switch's range, then the pressure switch will have to be replaced (in circuit) with a flow switch. Consult Almost Heaven for further information.

The Hydro-therapy jets in our jet set are usually adjustable, but care should be taken not to restrict their flow too much, which can cause leaks in the plumbing, unless it has been carefully assembled. All testing should be done with the jet nozzles completely opened (counterclockwise).

Check the system for proper operation during control by the timer. The equipment pack has a bypass valve installed on the direct line feeding the tub (#2 in **Figure 5**). This valve assures adequate flow to the heater and filter when the pump is run by the timer on low speed.

Verify that the heater is working on the pump's low speed by putting the system in timer mode. This can easily be done by pushing in a timer tab and rotating the timer wheel until it passes this tab.

If the heater fails to come on, or it trips its hi-limit after a certain amount of time, check the bypass valve and the line that comes from the pump directly back to the tub. If the bypass valve is functioning properly, most, if not all, of the flow coming from the pump on low speed will pass through the heater and filter and only half the jets in the system. If the support equipment is not located directly next to the tub, it may become necessary to balance the flow to the jets by reducing flow at those jets closest to the pump.

EQUIPMENT MAINTENANCE AND SERVICING

For maintenance and servicing of the equipment and accessories included in the Almost Heaven system, carefully follow the instructions that have been supplied by each component's manufacturer. The warranty on each piece of supporting equipment applies as per its manufacturer, and these warranties can be voided due to misuse of the equipment in question.

Whenever the equipment is being installed, serviced or maintained, you should turn off the system at the circuit breaker(s). Otherwise, the timer could activate unexpectedly and cause damage or injury. Don't forget to reset the timer to the correct time after power is reapplied.

CONTROLS AND SYSTEM OPERATION

The Intermatic brand integrated timer/air switch automatically operates the pump and optional Bubbler System in several different modes. With the timer, the pump can be programmed to operate at low speed during predetermined periods. Push a timer tab in on the timing wheel for each period desired.

The system should be operated in this manner at least two to three hours per day to filter the water and regain lost heat. Even if the tub is not used on a daily basis, it should still be run on the timer to filter the water. Infrequent users can, however, turn the heater down between uses to conserve energy, but only if there is no danger of freezing and the user can accept the time required to reheat the tub.

The timer is equipped with a three position control switch. In the center position, the timer will run the pump on low speed each time it is passing a tab that is pushed in. With the switch in the upper position, the pump will run constantly on low speed, ignoring the settings on the timer. This mode can be useful to prevent catastrophic freezing during drastically dropping temperatures, since water will not freeze if it is moving. In the lower position the low speed of the pump is turned off completely, regardless of the timer settings.

If the air switch button is pressed in either of these three timer modes, it will act to override the slow speed on the pump. With Almost Heaven systems that do not have the optional Bubbler System, the air switch button will switch the pump between high speed and off or low speed, depending upon the prevailing mode of the timer.

If the system includes the optional Bubbler System, then each press of the air switch will sequence between four modes. These modes are BOTH PUMP AND BLOWER ON, ONLY BLOWER ON, ONLY PUMP ON (high), OFF (or pump on slow speed if this is the prevailing mode of the timer). The sequence is repeated if you continue to press the air switch button. The air switch button will operate the pump and optional blower. The heater will be switched automatically by the pressure from the pump, providing that there is a demand for heat according to the heater's thermostat setting.

The Hydro-therapy jets on the hot tub are adjustable from about 12 to 25 Gallons Per Minute (GPM), but care should be taken not to restrict their flow too much, which can cause leaks in the plumbing if it has not been carefully assembled. Begin with all jet nozzles opened completely (counterclockwise). For systems with extra jets (more than four) or long distances between the tub and the support equipment, the jets closest to the pump may deliver more water if all the jets are left completely open. If preferred, the closer jets can be adjusted to send more water to the farthest ones, producing a more consistent effect. The jet nozzles are also directionally adjustable as well. Simply position the nozzle with your finger for the desired effect.

WATER TESTING AND TREATMENT

DO NOT, under any circumstances use the hot tub unless its water has been and is being kept balanced and properly treated with some type of sanitizer. Failure to maintain proper pH and sanitizer levels can cause personal injury and damage to the equipment.

A water testing kit should be procured to monitor the condition of the water. It should be used on a daily basis to verify proper pH and sanitizer levels. If you have an unlined, natural wooden tub and have not purchased the optional, electronic Almost Heaven Water Purifier, you will probably use halogen sanitizers (chlorine or bromine), and you must be very careful not to damage to the wood, which is quite common. On a daily basis, test for and maintain sanitizer concentrations at levels just high enough to assure clean, healthy water. NEVER "SHOCK" AN UNLINED WOODEN TUB WITH CHLORINE, AND NEVER USE A FLOATING CHEMICAL FEEDER IN ONE.

After adding chemicals, water should circulate for at least one hour (with the blower off) before additional tests are taken. Evaporation will cause water loss. Always maintain proper water level in the tub and recheck water chemistry after adding water to the tub.

See the section near the end of this manual for additional information on chemical maintenance, and feel free to consult Almost Heaven for maintenance advice.

CLEANING THE FILTER CARTRIDGE

The filter cartridge should be cleaned whenever the tub is drained and also whenever the gauge on the filter indicates that the cartridge is soiled. Record the pressure on the filter gauge with a clean cartridge in place and the pump running on high speed. A soiled cartridge is indicated when the pressure on this gauge increases by ten pounds per square inch (psi).

Each time the cartridge is cleaned, the suction fittings and skimmer should be inspected and cleared of any collected debris. The cartridge should never be cleaned with water above 110° F, nor should a high pressure spray be used. Coarse dirt and debris can be removed from the cartridge by washing with a garden hose inside and out. Fine particles of dirt are more easily removed from a dry cartridge by using compressed air.

If the filter cartridge is allowed to dry, you should stuff the centers of the ends of the cartridge to prevent shrinkage. Suntan and body oils can rapidly clog a cartridge and are not as easily removed by hosing. A chemical solution, specifically designed to clean polyester cartridges, is available from your local chemical supplier. Follow the directions on the bottle.

Excessive calcium and mineral deposits can be removed from the cartridge using a 10 percent solution of muriatic acid. Use a plastic container and exercise great care since acid can be harmful to skin, eyes and clothing. Whenever using a chemical or acid solution to clean the filter cartridge, be sure to rinse it thoroughly before replacing. Check and readjust the water chemistry as necessary.

You should consider the convenience of having a spare cartridge available when the filter needs cleaning. The soiled cartridge can then be cleaned at your convenience. You can purchase a spare or replacement cartridge from Almost Heaven.

DRAINING THE SYSTEM

BE SURE TO TURN OFF ALL CIRCUIT BREAKERS CONNECTED TO THE TUB BEFORE DRAINING. Operating the tub without water can cause irreparable damage to the equipment. Open the drain valve to empty the tub. If the tub is lower than any drains, then the water must be baled or pumped out using a portable electric pump. If you are using a pump to empty the tub, proper caution must be observed. Use grounded cords, preferably with a plug-in GFCI (Ground Fault Circuit Interrupter). Tubs should be drained and cleaned at least once every three months or every month in cases of heavy usage.

WINTERIZING OUTDOOR SYSTEMS

If you do not plan to use your tub system during the winter months, and you have not installed our optional Freeze Protector, you must follow a certain procedure to shut down the system.

Disconnect the plumbing wherever a screw union has been supplied to make the connection. Open the drain plugs on the pump and filter to drain them completely. Drain the heater by loosening the screw union between its bottom connection and the filter.

Using compressed air or the blowing attachment on a vacuum cleaner, attempt to blow all remaining water from the PVC lines. NOTE : IF YOU USE A VACUUM CLEANER, IT SHOULD BE A "WET/DRY" TYPE, AND YOU SHOULD PLUG IT INTO A GFI CIRCUIT FOR SAFETY.

UNSOLVED PROBLEMS

We try to make our systems as easy as possible to assemble, however errors in manufacturing, as well as assembly, can occur. If you have a problem, go back over this manual completely to see if you overlooked something.

If you still need help, feel free to contact our technical staff. You may e-mail, write, call or fax us with your questions. E-mail your questions to sales@almostheaven.net. Technical assistance via telephone is available Monday through Friday, from 9 A.M. to 5 P.M. EST. The technical assistance number is 304-497-2610. You may also fax your questions to us at 304-497-2698.

Of course, we hope that you do not need to call us for help. This manual is intended to provide all the required information. Also, if you have any constructive feedback to offer with regard to our systems or instruction manuals, we would be very happy to hear from you.

CHEMICAL MAINTENANCE

Both spas and wooden hot tubs, as well as their equipment, can easily be damaged through improper chemical maintenance, and the natural wood in a hot tub is especially susceptible to damage through the overuse of halogen (chlorine or bromine) sanitizers. The chemistry of the water in your tub is something that needs daily attention. At first, proper water maintenance can seem a daunting chore, but practice and understanding will make it fairly easy after time.

Maintaining the water in the tub can be thought of as two separate but related tasks. The first task is water balance, and the second is sanitization. Without a proper water balance, most sanitizers become ineffective and there is also the risk of corrosion damage to the support equipment. Without adequate sanitization, bacteria can grow causing unpleasant odors and a health risk to bathers. Additionally, if halogen sanitizers (chlorine or bromine) are used in excess, an unlined wooden tub **CAN BE DAMAGED BEYOND REPAIR**.

You should purchase a comprehensive chemical Start-Up-Kit from a local supplier, and it should include all of the materials necessary to maintain clean and healthy water. Even if you have purchased the optional Water Purifier, you still need the items in a good chemical Start-Up-Kit to test your water and keep it sanitized and balanced.

WATER BALANCE

The two most important variables affecting water balance are pH and Total Alkalinity (TA). The pH of the water in the tub should be checked on a daily basis. It is best maintained between 7.4 and 7.6 but must be maintained at least between 7.2 and 7.8. If you have purchased the optional Water Purifier, the pH should be maintained at the lower half of this range (7.2 to 7.5). The pH level is easily adjusted by the addition of pH Increaser or pH Decreaser. To determine the amount of pH Increaser or pH Decreaser to add, perform the chemical tests Alkaline Demand or Acid Demand, respectively.

Total Alkalinity should be maintained between 100 and 150 parts per million (ppm). TA acts as a buffer to keep the pH easy to adjust and maintain. If the TA is too low, the pH level is too easily changed and can fluctuate wildly. If the TA is too high, the pH level is difficult to adjust using the normal methods of pH Increaser and pH Decreaser. Your test kit should include a test for TA, and you can purchase TA Increaser from your local source. If you have difficulty maintaining a stable pH level, the TA most likely needs adjustment.

Although far less important than sanitizer level, TA or pH, a level of 150 to 300 ppm of Calcium Hardness (CH) is also recommended, to prevent corrosion of the tub's equipment. However, excessive levels of CH and TA can lead to cloudy water, scale deposits and clogged pipes. If levels of TA or CH climb above their acceptable ranges, the best solution is usually to drain and refill the tub.

Several accessory chemicals should be included with any quality chemical kit. A bottle of Filter Cleaner will simplify cleaning the filter cartridge (see a previous section for more on cleaning the filter cartridge). A bottle of Defoamer prevents suds from forming, which can be a problem due to foreign substances introduced by the bather and the high flow rate and aeration of the water.

If the water used to fill the tub is "hard" or high in metal content and staining and scaling is a concern, then a Stain & Scale Preventer can be used. However, this chemical can interfere with the operation of the optional Water Purifier. You should consult Almost Heaven if you would like to use a Water Purifier and need to use a Stain & Scale Preventer. If you fill your tub with municipal tap water, this should not be a concern.

A bottle of Water Clarifier should also always be included with any good chemical kit, and for owners of natural (unlined) wooden tubs, this is **YOUR BEST DEFENSE AGAINST THE RED STAIN** which leaches into the water for the first few months of the life of the tub. **UNDER NO CIRCUMSTANCES SHOULD YOU "SHOCK" THE TUB TO HASTEN THE LEACHING PROCESS.**

SANITIZING

The other part of water maintenance involves sanitization and can take one of several forms. The most basic method of sanitization is to use a halogen sanitizer (chlorine or bromine). However, extreme care must be exercised when using halogen sanitizers with a natural (unlined) wooden tub.

- **NEVER “SHOCK” THE TUB WITH A CHLORINE OR BROMINE BASED AGENT.**
- **NEVER, EVER USE A FLOATING CHEMICAL FEEDER.**
- **IF YOU ARE USING CHLORINE TO SANITIZE YOUR TUB, DO NOT USE THE TUB IF CHLORINE LEVELS FALL BELOW 1 PPM.**
- **NEVER ALLOW THE CHLORINE LEVEL TO EXCEED 3 PPM, AND TRY TO KEEP THE LEVEL BETWEEN 1 AND 2 PPM AT ALL TIMES.**
- **NEVER SCRUB OR CLEAN THE TUB WITH A CHLORINE SOLUTION, REGARDLESS OF HOW DILUTE YOU THINK THE SOLUTION IS.**

If you are using halogen sanitizers, you should check your levels on a daily basis, even if you are using an in-line feeder.

The best way to eliminate the risk of damage to your natural wooden tub by halogens is to use the optional Almost Heaven Water Purifier. This device uses copper and silver ions to kill bacteria, algae and viruses. It totally eliminates the need for chlorine or bromine.

The Water Purifier is not effective on a new natural wooden tub, until it is no longer leaching. For the first few months of a natural wood tub's life, the judicious use of granular chlorine is recommended. The chlorine should be added manually and its level checked on a daily basis.

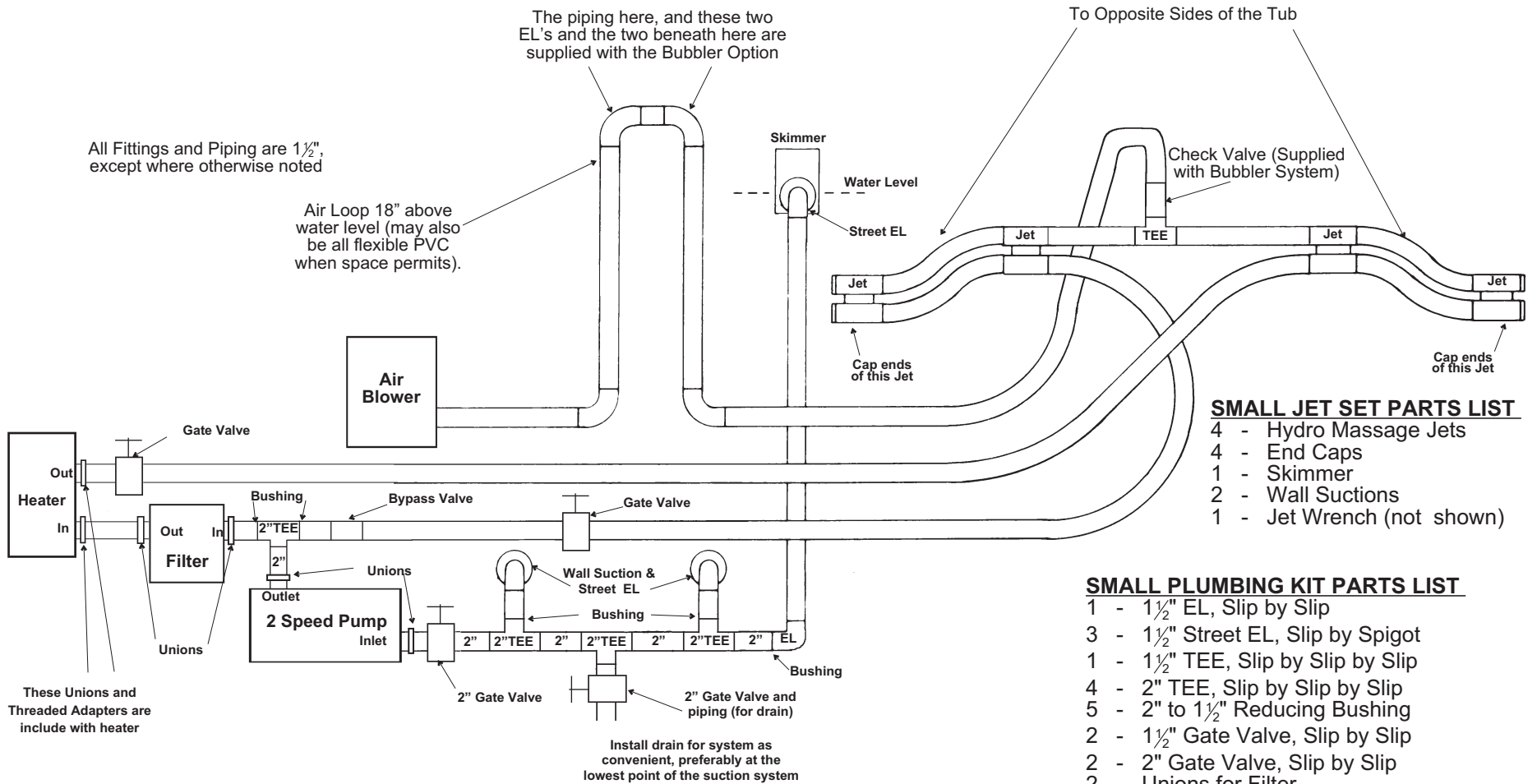
Once the Water Purifier is on line, copper levels should be checked as frequently as chlorine levels, at least at first. Since the copper and silver ions are sanitizers but not oxidizers, once per week or after heavy usage, a non-chlorine oxidizer (such as the potassium peroxymonosulfate supplied with the Water Purifier) should be added to the tub to “burn” off excess organic materials.

CHEMICAL PRECAUTIONS

When working with chemical preparations for your hot tub, you should observe the following precautions:

- Add only one chemical at a time to the tub water
- Never mix chemicals directly with each other.
- Follow each chemical's instructions carefully with regard to dilutions, and always add only the amount indicated.
- When making a dilution, always add the chemical to the water. Never add water to the chemicals.
- Never add any chemical through the skimmer, if the tub has one.
- Avoid breathing concentrated chemical fumes or dust.
- Avoid skin contact with chemicals.

Figure 8 - Schematic for Small Plumbing Kit and Jet Set



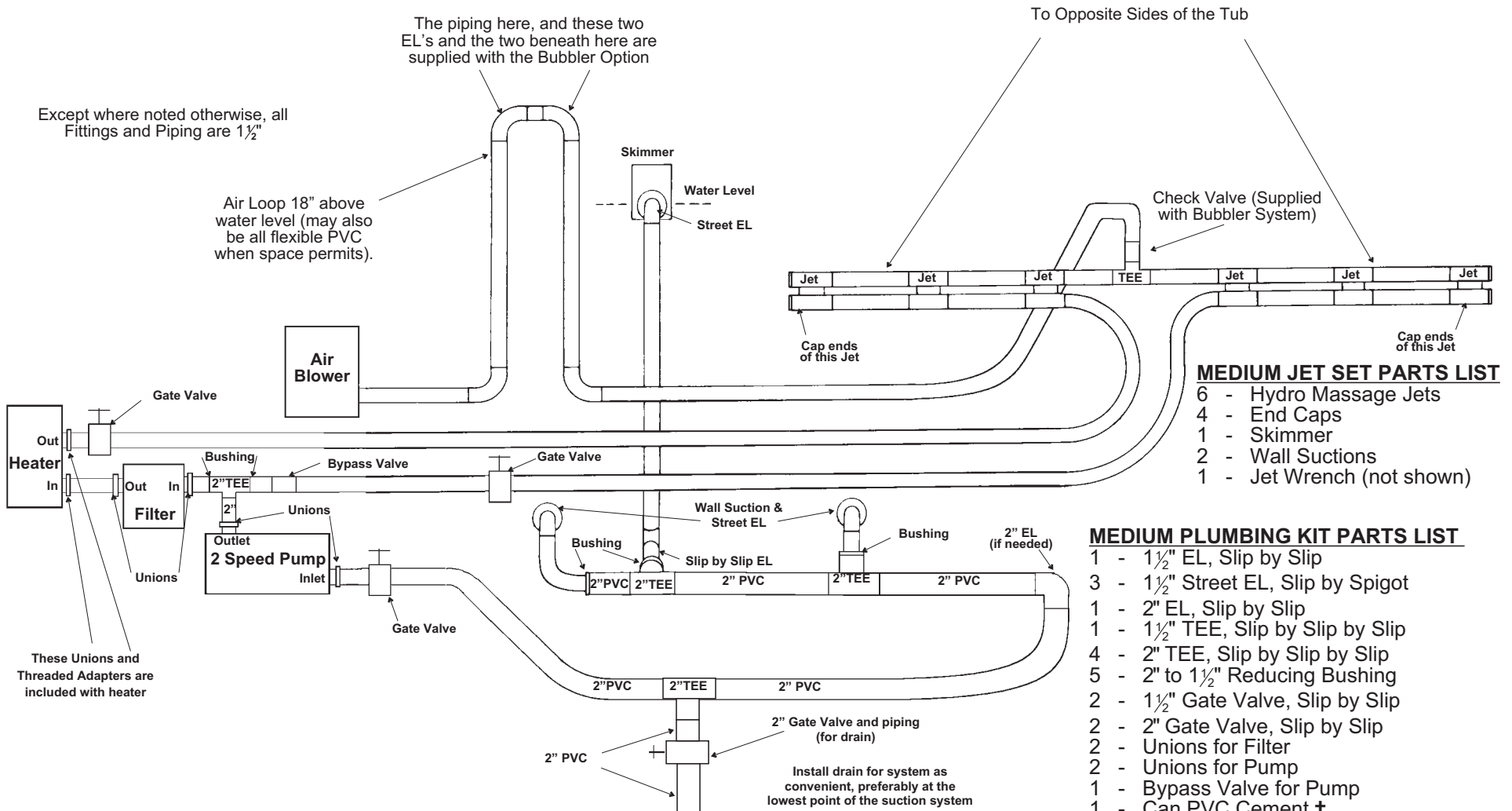
- SMALL JET SET PARTS LIST**
- 4 - Hydro Massage Jets
 - 4 - End Caps
 - 1 - Skimmer
 - 2 - Wall Suctions
 - 1 - Jet Wrench (not shown)

- SMALL PLUMBING KIT PARTS LIST**
- 1 - 1½" EL, Slip by Slip
 - 3 - 1½" Street EL, Slip by Spigot
 - 1 - 1½" TEE, Slip by Slip by Slip
 - 4 - 2" TEE, Slip by Slip by Slip
 - 5 - 2" to 1½" Reducing Bushing
 - 2 - 1½" Gate Valve, Slip by Slip
 - 2 - 2" Gate Valve, Slip by Slip
 - 2 - Unions for Filter
 - 2 - Unions for Pump
 - 1 - Bypass Valve for Pump
 - 1 - Can PVC Cement †
 - 1 - Can PVC Cleaner †
 - 50 feet of 1½" Flexible PVC
 - 25 feet of 2" Flexible PVC
 - Tube of Silicone
 - † Cannot be included with overseas air shipments

Recommended Plumbing Schematic
using Small size Jet Set and Plumbing Kit
as supplied by Almost Heaven Group

(This is a recommendation only. Your actual installation may vary.)

Figure 9 - Schematic for Medium Plumbing Kit and Jet Set



MEDIUM JET SET PARTS LIST

- 6 - Hydro Massage Jets
- 4 - End Caps
- 1 - Skimmer
- 2 - Wall Suctions
- 1 - Jet Wrench (not shown)

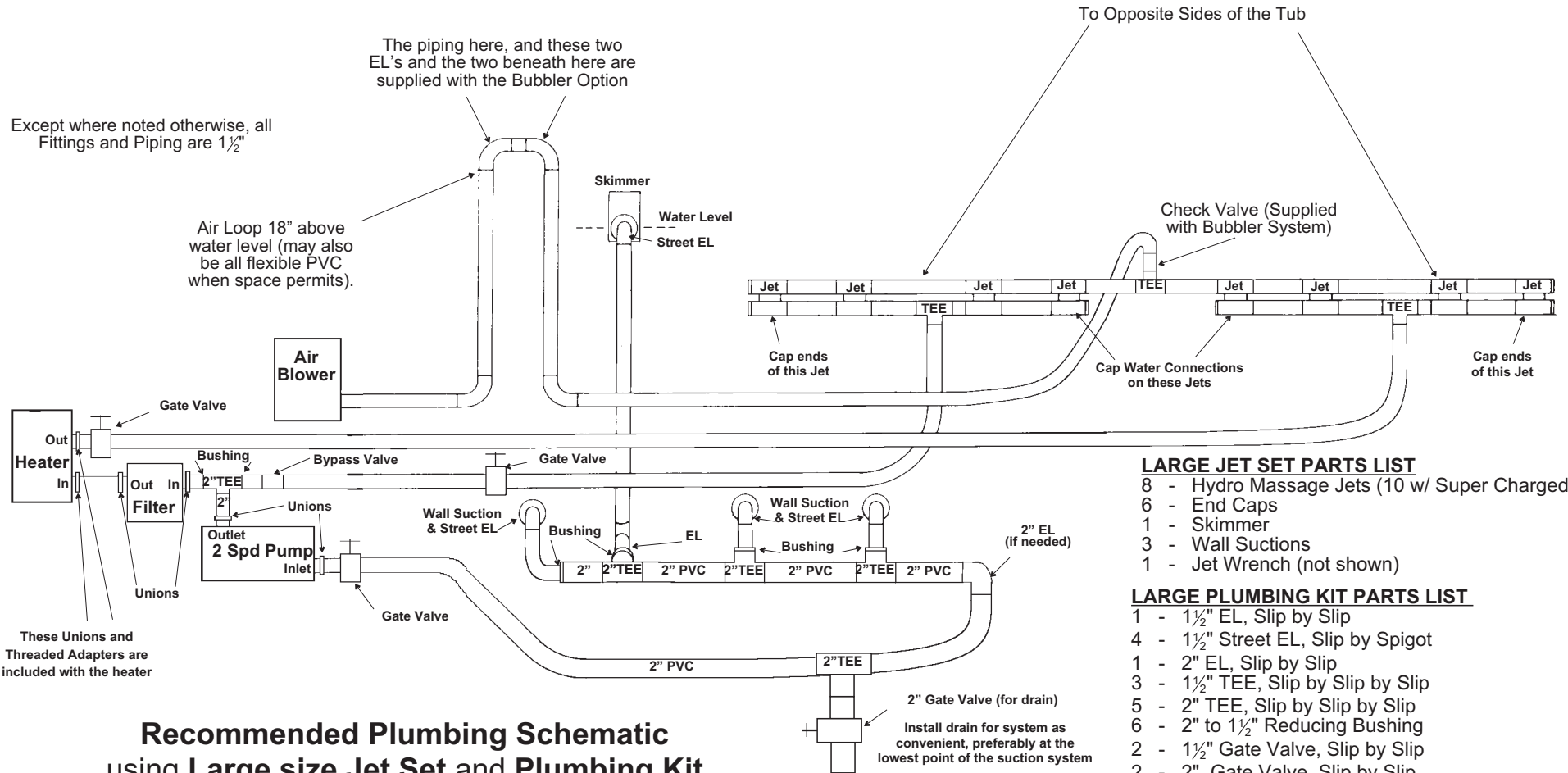
MEDIUM PLUMBING KIT PARTS LIST

- 1 - 1 1/2" EL, Slip by Slip
- 3 - 1 1/2" Street EL, Slip by Spigot
- 1 - 2" EL, Slip by Slip
- 1 - 1 1/2" TEE, Slip by Slip by Slip
- 4 - 2" TEE, Slip by Slip by Slip
- 5 - 2" to 1 1/2" Reducing Bushing
- 2 - 1 1/2" Gate Valve, Slip by Slip
- 2 - 2" Gate Valve, Slip by Slip
- 2 - Unions for Filter
- 2 - Unions for Pump
- 1 - Bypass Valve for Pump
- 1 - Can PVC Cement †
- 1 - Can PVC Cleaner †
- 75 feet of 1 1/2" Flexible PVC
- 25 feet of 2" Flexible PVC
- Tube of Silicone
- † Cannot be included with overseas air shipments

**Recommended Plumbing Schematic
using Medium size Jet Set and Plumbing Kit
as supplied by Almost Heaven Group**

(This is a recommendation only. Your actual installation may vary.)

Figure 10 - Schematic for Large and Supercharged Plumbing Kit and Jet Set



**Recommended Plumbing Schematic
using Large size Jet Set and Plumbing Kit
as supplied by Almost Heaven Group**

Super Charged Jet Set includes 2 extra Hydro Massage Jets not shown above.
Plumb as desired between other jets.

Super Charged Plumbing Kit includes an additional 50' of 1.5" Flexible Hose.

(This is a recommendation only. Your actual installation may vary.)

LARGE JET SET PARTS LIST

- 8 - Hydro Massage Jets (10 w/ Super Charged)
- 6 - End Caps
- 1 - Skimmer
- 3 - Wall Suctions
- 1 - Jet Wrench (not shown)

LARGE PLUMBING KIT PARTS LIST

- 1 - 1 1/2" EL, Slip by Slip
- 4 - 1 1/2" Street EL, Slip by Spigot
- 1 - 2" EL, Slip by Slip
- 3 - 1 1/2" TEE, Slip by Slip by Slip
- 5 - 2" TEE, Slip by Slip by Slip
- 6 - 2" to 1 1/2" Reducing Bushing
- 2 - 1 1/2" Gate Valve, Slip by Slip
- 2 - 2" Gate Valve, Slip by Slip
- 2 - Unions for Filter
- 2 - Unions for Pump
- 1 - Bypass Valve for Pump
- 1 - Can PVC Cement †
- 1 - Can PVC Cleaner †
- 100 feet of 1 1/2" Flexible PVC (150 w/ Super Charged)
- 25 feet of 2" Flexible PVC
- Tube of Silicone
- † Cannot be included with overseas air shipments