COMPU-SYBARITIC

MODULAR SPA COMPONENT EQUIPMENT SYSTEM

OWNER’S MANUAL
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IMPORTANT SAFETY INSTRUCTIONS

When installing and using this equipment, basic safety precautions should always be exercised, including the following:

READ AND FOLLOW ALL INSTRUCTIONS before proceeding to install your spa.

1. This system must be installed by a licensed and qualified electrician.

2. **DANGER** - To reduce the risk of injury to persons, do not remove suction grate or cover.

3. A pressure wire connector marked “BONDING LUG” is provided on your equipment to permit connection of a minimum No. 6 AWG solid copper conductor between this point and any metal equipment, metal enclosures of electrical equipment, metal water pipe, or conduit within 5 feet (1.5 m) of the unit as needed to comply with local requirements.

3.1 All field-installed metal components such as rails, ladders, drains, or other similar hardware within 3m of the spa or hot tub shall be bonded to the equipment grounding bus with copper conductors not smaller than 6 awg.

4. This equipment may be provided with a ground fault circuit interrupter (GFCI) located on the side of the control box. If so, it is there to provide protection to the circuitry and the major components of your systems (i.e. heater, pump(s), light, ozonator, and blower). If this equipment does not include the GFCI, the National Electrical Code requires that a properly rated (Class A) GFCI be installed in the supply circuit to this equipment. (Contact your dealer for more information."

Before using your equipment, with the power on push the TEST button on the GFCI. The red RESET button should pop out (control box-mounted GFCI only). Push the RESET button, the RESET button should stay in. On a sub panel-mounted GFCI, the GFCI will display red in a window when tripped. Simply switch the breaker to “off” and then “on” to reset. If the interrupter does not perform in this manner, a ground current is flowing, indicating the possibility of an electric shock. Disconnect the power until the fault has been identified and corrected.

5. Position spa or hot tub to provide drainage of compartment for electrical components.

6. Install equipment at least five (5) feet (1.5m) from inside wall of spa or hot tub using nonmetallic plumbing unless a cabinet is installed with this spa such that equipment access is not possible without exiting the spa.
7. Install in accordance with diagram on page 3 to keep spa water out of the blower. A check valve and plumbing loop must be incorporated in the installation to protect the blower from backflow into it of spa water. Please refer to this diagram prior to installation.

8. To reduce the risk of drowning from hair and body entrapment, install a suction fitting(s) with a marked flow rate in gallons-per-minute that equals or exceeds the flow rate marked on the equipment assembly. If not marked, install one suction fitting rated minimum 100 GPM per pump used.

8a. DANGER - RISK OF INJURY. The suction fittings in this spa 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 spa if the suction fittings are broken or missing. Never replace a suction fitting with one rated less than the flow rate marked on the original suction fitting.

9. DANGER - RISK OF ELECTRICAL SHOCK. Install at least 5 feet (1.5m) from all metal surfaces.

(A spa may be installed within 5 feet of metal surfaces if each metal surface is permanently connected by a minimum No. 6 AWG solid copper conductor attached to the wire connector in the control box that is provided for this purpose.)

9.1 DANGER - RISK OF ELECTRICAL SHOCK. All electrical appliances (such as light, telephone, radio, or television) must be located at least 10 feet (3m) away from the spa or hot tub.

10. WARNING: If the control box of your unit is labeled “FOR INDOOR USE ONLY” or “FOR ENCLOSURE USE ONLY” then it is not intended for outdoor use such that it would be exposed to any form of precipitation.

11. A wire connector marked is provided within the control box. To reduce the risk of electric shock, this terminal must be connected to the grounding means provided in the electric supply conductors supplying this equipment.

12. This equipment must be wired into a dedicated circuit for this equipment only. Refer to your wiring diagram or the label on your equipment service panel for information to determine the proper breaker protection to provide.

NOTE: The electrical supply for this product must include a suitably rated, user accessible switch or circuit breaker to open all ungrounded supply conductors to comply with Section 422-20 of the National Electrical Code, ANSI / NFPA 70-1993 and section C22.1-1994 Part 1 of the Canadian Electrical Code.

The disconnecting means must be readily accessible to the tub occupant but installed at least 5 feet (1.5m) from the tub water.

13. If this equipment includes a cord-and-plug connection, connect this plug to a grounded, grounding type receptacle only.

13.1 Do not bury the power cord.

13.2 WARNING - To reduce the risk of electric shock, replace the damaged cord immediately.

SAVE THESE INSTRUCTIONS
BLOWER CHECK VALVE

It is essential that a loop be constructed such that the highest point in the blower line is above the highest water level in the spa. There must also be a check valve with an inner dimension of at least 1-1/2" installed as seen at left.

INSTALLATION INSTRUCTIONS

A. WIRING COMPARTMENT

To access the field wiring connections, remove the two screws in the top left and right corners on the side of the face plate, then loosen but do not remove the two screws in lower left and right corners on the side of the faceplate. The cover will pivot toward you and slide off for easy service access.

B. ELECTRICAL SERVICE CONNECTIONS

1. Be sure all wiring is done by a licensed qualified electrician.

2. Run the proper size wire in conduit from a dedicated circuit breaker (see chart below) to the equipment package. The equipment should be visible from the breaker box but no closer than five (5) feet (1.52m) from the spa, unless mounted under a fully enclosed spa cabinet.

<table>
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<tr>
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<th>Amp load</th>
<th>Minimum Circuit Ampacity</th>
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<td>120V 2 WIRE+Gr</td>
<td>16</td>
<td>20</td>
<td>20</td>
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<tr>
<td>240V 3 WIRE+Gr</td>
<td>16*</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>240V 3 WIRE+Gr</td>
<td>40</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>240V 3 WIRE+Gr</td>
<td>48**</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

USE COPPER CONDUCTORS ONLY!

*Based on using a single pump with a gas water heater.

**Based on using two Jet pumps. If only one Jet pump is used, the 40 amp rating applies.

3. An illustration showing proper electrical connections for 120 volts and / or 240 volt service has been provided for you on a label affixed to the faceplate and / or on the wiring diagram provided in the clear packet attached to the faceplate. Be sure to follow them and all instructions carefully.

4. Be sure that all connections are tight before switching on the circuit breaker.

C. CONTROL PANEL INSTALLATION

1. Make sure power to your equipment is off. It should be shut off at the circuit breaker.

2. A cutout should already have been made in your spa to receive the control panel. The control panel itself may have already been installed in the shell. If not, it comes with a gasket that has adhesive tape on both sides. Peel the protective tape off one side and apply the gasket to the bottom of the control panel. Press it firmly into place. Now you can mount the panel in one of two ways, which ever is easiest for your situation.
3. Plug the 8-pin cable from the control panel into the matching receptacle on the control box marked "CONTROL PANEL". Be sure to press it fully into the socket to insure a good quality connection.

**CAUTION:** Never plug the control panel into the receptacle with the power on. If you do, the system may not properly communicate with the panel. Also, if you unplug the control panel any time after programming the system, all of your programming changes and settings will be erased. The system will return to the default settings described later and must be reprogrammed.

![Diagram of control panel and cable connection]

**D. ALARM INSTALLATION**

Your system may include a piezo alarm. If so, when used it will alert you for a variety of different things that will be described later in this manual. It is in your best interest to use it, although the system will function without it if you so choose. If it isn't already installed, follow these instructions:

1. You should mount this on the skirt of your spa or on any surface that will keep it from sitting in water in the event of rain. If the cable is not long enough to reach your desired location, it can be extended with any 2 conductor cable. There are two holes in the body of the alarm to allow ease of mounting. It is recommended that the switch be mounted with the wires facing the ground.

2. If the desired location is outside the cabinet of the spa, which will allow the alarm to be heard from a much greater distance, simply drill a small hole in the cabinet for the cable to pass through near where the alarm is to be mounted.

3. Once mounted, the colored wires on the cable should be matched up to the same colored wires on the alarm. If reversed, the alarm will not work.

![Diagram of alarm mounted and hole drilled]
IMPORTANT USER
SAFETY INSTRUCTIONS

1. DANGER-To reduce the risk of injury do not permit children to use this product unless they are closely supervised at all times by a responsible adult.

2. DANGER-RISK OF CHILD DROWNING. Extreme caution must be exercised to prevent unauthorized access by children. To avoid accidents, ensure that children cannot use a spa or hot tub unless they are supervised at all times.

3. WARNING- To Reduce Risk of Injury:

   a. The maximum temperature of the spa water should never exceed 104°F (40°C). Water temperatures between 38°C (100°F) and 40°C (104°F) are considered safe for a healthy adult. Lower water temperatures are recommended for extended use (exceeding 10-15 minutes) and for young children.

   WARNING - Your spa was designed and engineered to give therapeutic action during high speed operation. Under normal circumstances 30 minutes of high speed operation is to be expected at any time. Your system automatically limits the high speed operation to 30 minutes. However, if you repeatedly override the 30 minute limit by pressing the JETS 1 pad you may experience an extreme rise in water temperature due to the heat from the pump itself. This excessive temperature will result in the shut down of your pump and heating system. If this happens, follow the instructions under “Error Messages” on page 11.

   b. Since excessive water temperatures have a high potential for causing fetal damage during the early months of pregnancy, a pregnant or possibly pregnant woman should limit spa or hot tub water temperatures to 100°F (38°C).

   c. Always enter and exit spa slowly and cautiously as wet surfaces will be slippery. Before entering a spa or hot tub, the users should measure the water temperature with an accurate thermometer since the tolerance of water temperature-regulating devices may vary by as much as ±3°C (5°F).

   d. Never use a spa while under influence of alcohol, anticoagulants, antihistamines, vasoconstrictors, vasodilators, stimulants, hypnotics, narcotics, or tranquilizers. The use of drugs or alcoholic beverages before or during spa or hot tub use may lead to unconsciousness with the possibility of drowning.

   e. Persons suffering from obesity or with a medical history of heart disease, low or high blood pressure, circulatory system problems, or diabetes should consult a physician before using a spa or hot tub.

   f. Persons using medication should consult a physician before using a spa or hot tub since some medications may induce drowsiness while other medication may affect heart rate, blood pressure, and circulation.

4. Long exposures to hot water may induce hyperthermia. Hyperthermia occurs when the internal temperature of the body reaches a level several degrees above the normal body temperature of 98.6°F. The symptoms include drowsiness, lethargy, and an increase in the internal temperature of the body. The effects of hyperthermia include (1) unawareness of impending hazard, (2) failure to perceive heat, (3) failure to recognize the need to exit the spa, (4) fetal damage in pregnant women, and (5) unconsciousness and danger of drowning. WARNING - The use of alcohol or drugs can greatly increase the risk of hyperthermia in hot tubs and spas.

5. Do not use the spa alone.
6. It is recommended that the following emergency telephone numbers should be listed at the nearest telephone: Physician, hospital, ambulance and police.

7. Be sure the power to your equipment is turned off before servicing your equipment.

8. **WARNING** - Do not use a spa or hot tub immediately following strenuous exercise.

9. **WARNING** - People with infectious diseases should not use a spa or hot tub.

10. **CAUTION** - Maintain water chemistry in accordance with manufacturer's instruction.

**SAVE THESE INSTRUCTIONS**

**SPA LOCATION**

1. If your spa is to be located outdoors, consider the following:
   a. Local codes pertaining to fencing.
   b. Local electrical and plumbing codes.
   c. View from your house.
   d. Wind direction. (If spa is in a deck, there should be a wind break surrounding the spa and equipment.)
   e. Exposure to sunlight.
   f. Location relative to trees (falling leaves and shade).
   g. Dressing and bathroom location.
   h. Storage area for maintenance equipment and chemicals. (Do not store chemicals under the spa)
   i. Location to facilitate adult supervision.
   j. Landscaping and night-time lighting.

2. If your spa is to be located indoors, consider the following:

   a. Because indoor spas develop high humidity, a means of removing this humidity must be provided. This can be done by either cross ventilation fans or oversize dehumidifiers or both. **NOTE**: Be sure to install a good quality cover when spa is not in use.

   b. Chemicals will evaporate off the water surface. This will cause corrosion to certain metals found in home hardware and appliances.

   c. Floor drains should be provided to carry off water splashed from the spa.

   d. Walls, ceilings, woodwork etc. should be of materials capable of withstanding high humidity.

   e. If spa is to be placed on a second story or elevated deck, be sure supporting structure is adequate. It would be best to avoid a second story installation, due to the risks of water damage to the finished living space below.

   f. Be sure surface on which spa is set is smooth and level.
IMPORTANT PRE-OPERATION INSTRUCTIONS

1. Open spa equipment inlet and outlet valves if provided.
2. Fill spa with water until level is within 6-8 inches from the top of the spa or adequate to flood all skimmer devices.
3. As it comes from the factory, your equipment should have the GFCI tripped (if it has one). The system cannot come on until the_RESET button is pressed in as tested on page 1, paragraph 4. Once reset, your equipment should be powered and set to operate as outlined in the sections that follow.

START UP INSTRUCTIONS

Be sure to follow the Pre-Operation instructions above before proceeding.

Press the Jets 1 pad on your control once to turn on the high speed of the main jet pump. Ordinarily, the high speed is used to achieve maximum water flow through the jets. On start-up, it will be most effective in purging your plumbing system of trapped air. Within 15-30 seconds, you should have water flowing from the hydrotherapy jets in the side of your spa. Note: If you have more than one pump, only some of the jets will be affected by this pump. If after 30 seconds you do not have water flowing freely, turn off the pump (press the Jets 1 pad once more) and open the air bleed on your filter (if provided) to clear the system of air. Then try engaging the pump again and repeat the procedure. If after 3 or 4 tries you cannot get water to flow, contact your dealer for instructions on how to purge the air from your plumbing lines.

THERMOSTAT ADJUSTMENT

Once the water is flowing freely from the jets, you may adjust your temperature setting. As it comes from the factory, the setting is too low to come on by itself. Follow the instructions under TEMPERATURE CONTROLS on page 9 to set your desired temperature. It is recommended that you initially operate the spa between 95° and 100°F, and increase the temperature setting over a few days as you become accustomed to its effect. When the desired water temperature is reached, the heater will automatically maintain that temperature as long as your programmed setting calls for it.

NOTE: Units connected to 120 volt 20 amp services will heat only when the Lo speed of the main pump (controlled by JETS 1) is on by itself.

OZONATORS

If your spa is equipped with an ozonator, it will plug into a marked receptacle on your control box intended specifically and solely for use with an Ozonator. Depending upon how this feature was ordered, your ozonator may run 24 hours per day (the preferred method for longer operating life) or only come on with the low speed operation of the main jet pump.

AUXILIARY PUMP

Your equipment and spa may have been provided with a second jet pump for added water-moving performance. If so, this pump is engaged using the JETS 2 pad on your control. The pad will turn it on and off. If after 30 minutes of operation you have not yet shut off the pump, the system will automatically shut it off.
CONTROL PANEL OPERATING INSTRUCTIONS

Function Pad

Used for initiating time setting, filter programming, panel lock, and temperature lock. It is always used in conjunction with another pad to achieve a special programming function.

Mode Pad

Switches the spa from Economy to Standard mode and back again.

In Economy mode, the spa will heat only during the filter cycles (provided you have programmed the cycles to include heater operation. (See "Changing Filter Cycles" for programming instruction.) If you prefer continuous low speed operation and heat maintenance (recommended for winter operation) simply press the JETS 1 pad once. The low speed will come on and remain on indefinitely. The heater will come on only as needed to maintain water temperature.

In Standard mode, the spa will be heated automatically to the set temperature and maintain that temperature. This will turn the low speed or your main Jet pump on and off along with the heater as needed to maintain water temperature.

This pad also silences the alarm and/or resets the controls in the event of an error condition. See section on "ERROR MESSAGES" for this use of the Mode Pad.
Clock Pad

Touch to view the time of day. The current spa temperature display will automatically resume after five seconds. If you have not yet set the clock, the time shown will be based on having started at 12:00 when you first turned the power on to your equipment. You may want to set the proper time of day now following the instructions below.

Setting the Clock

To fully utilize the unique capabilities of this control, it is important to set the clock to the proper time of day. To set the clock:

Press the CLOCK button:

Then the FUNCTION button; an LED labeled "Set Time" will be flashing. Press FUNCTION button once to flash the hour, again to flash the tenths minute, and again to flash the units minute;

To change any segment, press TEMP UP or TEMP DOWN

After time is set, press MODE button to store time;

Note: To keep from losing the time setting, as well as any other settings you program in the event of a power outage, the low voltage backup battery must be operational. The battery on your circuit board should last for several years as it is only draining when your power is interrupted and your control panel is plugged-into the control box. Even then, it should last for months without losing memory.

Temperature Controls

When either of these pads are touched once, the window will display the current temperature setting; if the pad is held down, the "Set Temp" light will blink and the set temperature will increase or decrease, depending on which pad is pressed. Release the pad and after 3 seconds the window will automatically display the current spa temperature. Note: The maximum temperature setting is 104°F. When power is first introduced, the temperature setting will be 50° to prevent the heater from coming on. Simply adjust the temperature setting to a setting 2° above your current water temperature and the heater will come on. WARNING: Be sure to follow the start-up procedure on page 7 before setting the thermostat.

NOTE: There is a temperature lock feature to prevent unauthorized temperature setting adjustment. (See TEMPERATURE LOCK.)
Jet Pumps

JETS 1:
The sequence of jet action is:

In ECONOMY MODE (with the filter cycle off)
1. low speed jets
2. high speed jets
3. off

In STANDARD MODE (with the filter cycle off and heat satisfied)
1. low speed jets
2. high speed jets
3. off

NOTE: If there is a heat demand, instead of going off, the low speed jets and heater will remain on.

If the filter cycle is on, the pump will already be in low speed jets operation regardless of the Mode setting. Pressing the JETS 1 pad once will simply engage the high speed jets. Pressing it again will return to low speed via filter cycle operation.

The low speed jets is either controlled by the thermostat during Standard Mode operation, by the Economy Mode filtration cycle timer, or can be allowed to run continuously as described earlier on page 8 under Economy Mode.

High speed jets can be engaged at any time. When engaged, they will automatically shut off after 30 minutes.

NOTE: When using your high speed jets while in Economy mode, there are two things to remember:

FOR FILTER CYCLE CONTROL: If you wish to have the filter cycles take control of the pump (non-continuous Run setting), then when you exit the spa with the high speed pump running, do not shut it down to low speed. Let the automatic 30 minute timer shut it off.

FOR CONTINUOUS OPERATION: If you want the pump to continue to run continuously on low speed, then when you exit the spa, press the Jets 1 pad once if the filter cycle is on, and twice if it is not. Just so you end up with the low speed pump running.

If you are in high speed in Standard Mode, and you press the Jets 1 pad once, the pump will shut off unless your heater is on. You can either turn the high speed jets off or let the system do it automatically, it doesn’t matter. If you engage the low speed with the heater off, it will run until the thermostat calls for heat, and then automatically shut off when the thermostat is satisfied.

JETS 2: (Second Jet Pump optional on 240 volt models only)
The sequence of jet action is on or off.
The second jet pump will automatically shut off after 30 minutes.

Note: Since a second jet pump is optional, a separate temperature probe assembly can be connected to the control board and the pump plumbing also as an option. This temperature probe will be used for freeze protection and will perform as the primary freeze protector except it will only control the second jet pump.
Air Jets (Blower)

If the spa has a blower, this control will make it run at two speeds.
1. High
2. Low
3. Off

Daily Purge

In order to keep water from becoming stagnant in the plumbing lines for days at a time, the high speed jet pump and air jets will automatically turn on for 30 seconds of operation just prior to the afternoon filtration cycle (Filter 2), whether the unit is in Standard or Economy mode. If a second Jet Pump is used, it too will come on during the Daily Purge.

Light

Touch this pad to turn on the spa light. Touch again to turn off. The system is programmed to turn off the light automatically after 30 minutes of operation.

Timer

You can set this timer for the amount of time you plan to use the spa. Time settings are in 5 minute increments for a maximum of 20 minutes.

To set the timer, simply press the Timer pad. If you press it once, the display will read “OFF”. Repeated pressing of the pad will display the settings “5”, “10”, “15”, “20” (minutes), and then back to “OFF”.

When the time has elapsed, an alarm will sound for 15 seconds. To silence the alarm, press the Timer pad. To add more time, simply press the pad again for time desired.

Pre-set Filter Cycles

You have two preprogrammed filter cycles that will cause the spa to automatically come on for a three hour period twice per day to filter the water. If not set by the user, the three-hour periods are set to run between 8:00 - 11:00 a.m. and 6:00 - 9:00 p.m. automatically. The three-hour period can be reprogrammed for two or four-hour intervals instead and to start during any A.M. (Filter 1) and P.M. (Filter 2) hours you desire. Whenever a filter cycle is active, it is indicated by a light next to the function on the control pad.

Example: (We will use the preprogrammed settings)

FILTER1 LED is lit
The first filter cycle is automatically activated at 8:00 a.m. and operates the low-speed pump until 11:00 a.m. Heater is off.

FILTER2 LED is lit
The second filter cycle is automatically activated at 6:00 p.m. and operates the low-speed pump until 9:00 p.m. Heater is off.

Remember - the Daily Purge will turn on the blower and pumps just prior to engaging the FILTER 2 cycle.
Changing Filter Cycles

If the present times are inconvenient, if a different duration is preferred, or if you wish to turn the heater on during the cycle(s), the following procedure can be used to change the automatic filter cycle settings.

Press CLOCK button once;

Then press FUNCTION once; ("Set Time" LED will be flashing)

Then TEMP UP \(\uparrow\) or TEMP DOWN \(\downarrow\) buttons to select "FILTER 1" or "FILTER 2" (Now Flashing)

Once you have decided which filter cycle to adjust, press FUNCTION again and follow the clock setting procedure described on page 9. Once you have set the hours (AM only if Filter 1 and PM only if Filter 2) of the desired "On" time setting (minutes are not adjustable here), the next press of the FUNCTION button will call for the "OFF" time setting. This will adjust the "OFF" time to be 2, 3, or 4 hours after the "ON" time setting chosen. Press the FUNCTION one more time and you will be asked whether you want the heater ON or OFF during the cycle. Use an arrow key to change the setting from "OFF" to "ON".

In the "ON" position, the spa will warm to the set temperature during the filter cycles. In the "OFF" position, the heater will not be activated during the filter cycle(s).

NOTE: If your Filter Cycle 1 hours overlap into your Cycle 2 hours, both filter cycle indicator lights will come on during the overlap hours. If overlapped, the heater will respond to the Cycle 2 setting.

Once you have set the filter cycle(s), press the MODE button to exit the procedure. The display window will now show the current water temperature.

Panel Lock - To prevent unauthorized use of the control panel.

To set panel lock:

Press FUNCTION button once;

Then press TEMP UP once; (the display will now have 4 lit dots below it)

This sequence must be done within three seconds to activate the Panel Lock feature. The center display will show the spa temperature along with the dots. All the panel pads are now deactivated except the program pad, which is used to indicate the unlock sequence and other sequences.
To unlock the panel:
Press FUNCTION once;

Then press TEMP DOWN once. (the lit dots will go out).

When the panel lock is engaged, all automatic spa functions will operate normally, but cannot be altered. To unlock the panel, the pads must be pressed in the correct sequence and within four seconds. When the second pad is pressed, the dots will disappear. All pads are now active.

NOTE: Always wait at least 5 seconds between each set of commands given. Otherwise the control system may not respond to your commands. For example, hit Panel Lock sequence, wait 5 seconds, then hit the Cover Alarm sequence.

Cover Alarm - To prevent unauthorized access to the spa. This is to make you aware if an intruder or small child has lifted the spa cover without permission. To use this feature, the Alarm Switch Pad must be installed. Follow the Alarm Switch Pad Placement Instructions on page 17 if it hasn't already been done for you.

How to activate cover alarm

Press FUNCTION once;

Then press MODE once;

Then press the UP arrow. Now place the cover over the control pad with the switch pad properly aligned. This must be done within 15 seconds. If you exceed the 15 seconds, the alarm will sound and must be deactivated.

How to deactivate the alarm:

Press FUNCTION once;

Then Press MODE once;

Then press the DOWN arrow. To reactivate, align the cover, make sure nothing is holding the cover away from the control pad (Alarm switch mounted on cover must be within 1/2" of the control pad), reset the alarm, and place the cover in position.

Temperature Lock

To prevent unauthorized temperature adjustment of your spa water. While setting your thermometer, after you have pressed either temperature pad, follow the instructions below to lock your set temperature, if desired.

To lock the temperature:

Press the UP arrow once;

Then the FUNCTION button once;

Then the MODE button twice;

The 3rd and 4th dots in the display will be lit.
To unlock the temperature;

- Touch FUNCTION button once
- Then press MODE button twice

To unlock the panel, the pads must be pressed in the correct sequence and within three seconds. When the last pad is pressed, the dots will disappear. All pads are now active.

**Error Messages**

The following explains the error messages that may be displayed in the control pad window and how to react to each of them.

**OH** Overheat - Means thermostat circuit failure. There are two temperature pickup sensors on the system to detect overheating: a thermostat sensor and a hi-limit sensor. The thermostat sensor causes the heater to shut down when the water temperature reaches 112 degrees, the system will automatically revert to low speed operation and the window will display "OH". This circuit automatically resets itself when the spa cools to 2 degrees below the set temperature.

How to react: This may be due to excessive hi speed pump operation, i.e. resetting the hi speed pump continuously after each 30 minute shut down cycle until the spa reaches this temperature. If this is the case, don't do that. If you are sure this is not the case, contact your dealer for service as this is an indication of a failure in the temperature control circuit.

**SN1** Open Sensor Detection

The hi-limit sensor is tripped and the spa will be running on low speed only.

How to react: For the hi-limit sensor to drop the temperature at its sensing point must exceed 118 degrees F. The red reset button on the equipment control face labeled "HI LIMIT" can be pressed to reset once the temperature drops below 100 degrees. If you reset this and the error message goes away, contact your dealer to investigate the cause of the error. This sensor will not trip unless other component failure has occurred.

**WARNING:** Failure to investigate may result in damage to your spa.

**SN2** Open Sensor Detection

The thermostat sensor or heating circuit is nonfunctional or not able to keep up with current heat demand. The spa will be running on low speed only.

How to react: If the program does not sense at least one degree rise in the water temperature every hour while the heater is engaged, it considers this a sensor failure and gives you this error message. Make sure the covers is in place, especially if the pad is outside during cold weather and you are running it with a 120 volt power supply. If this is not the case, contact your dealer for service.
FLO  Indicating the water flow has been interrupted. This circuit is controlled by the flow/pressure switch. Opening this circuit will disable the heater and sound the piezo alarm.

How to react: If this is occurring sporadically, it may be due to a low water level in your spa, a dirty filter cartridge, or damage to your pump or suction-side plumbing. This would cause temporary losses in pressure. (Once the pump regains prime, the switch will reset itself.) If the FLO remains on the display and the alarm remains on, TURN OFF THE PUMP. RUNNING THE PUMP WITHOUT ADEQUATE WATER MAY DAMAGE IT, RUNNING IT WITHOUT ANY WATER WILL DAMAGE IT. Make sure you have the proper amount of water in your spa. If you do, check your filter cartridge and clean as needed. To check to see if it is one of these two things, remove the filter cartridge from the filter chamber. Turn the pump back on. If the system resets and the error does not reoccur, then one of these two problems exists. If the error reoccurs, then you may have lost prime. Turn the pump off, follow your spa start up instructions and try again. If this doesn’t work and the error reoccurs, shut your system off at the circuit breaker and contact your dealer for service.

ICE  Freeze Protection

The spa software will automatically activate the low speed pump and blower to circulate the water when a freeze condition is detected (temperature of the sensor is below 40 degrees F) and automatically shut them back off when the temperature rises to 50 degrees F. The alarm will also go off while this occurring.

How to react: You don’t have to do anything here. The spa is protecting itself. However, you are probably set in Economy Mode operation with the Filter Cycles controlling when the pump is on. Having the blower and alarm come on periodically may be annoying. To avoid it, first make sure your blower line is well insulated to protect from freezing, then set your pump for continuous operation by pressing the Jet 1 pad once. Then set your thermostat to a desired temperature setting. The pump will stay on and automatically maintain this temperature. Warning: If your blower line is not properly insulated, and it freezes, the line will break and the spa will drain.

FUSES  There are several small fuses located on the circuit board inside the control box. They protect various parts of your equipment from damage. If any fuse opens so as to prevent operation of the circuit(s) it protects, DO NOT SIMPLY REPLACE IT! They may have opened due to major component failure. The descriptions below explain what will cause each to open. If this should happen, contact your dealer for service.

F1-120V 1.5A TRANSFORMER LINE FUSE - the line service is hooked up incorrectly (120V is connected to terminal N) or the transformer has failed.

F2-12V 1.5A SECONDARY RELAY FUSE - one of the relay coils failed or shorted.

F3-5V 1.5A SECONDARY CONTROL CIRCUITS FUSE - an electronic component on the circuit board has failed or the piezo wires have touched each other.

F4-120V 10A BLOWER FUSE - This will open if the blower circuit has failed or been overloaded in some way.

F5-12V 1A SPA LIGHT FUSE - The light circuit has been overloaded or shorted.
# Troubleshooting Your Control System

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set time is flashing</td>
<td>You haven't set your time clock yet</td>
<td>See &quot;Setting the Clock&quot;</td>
</tr>
<tr>
<td>Control pad won't respond</td>
<td>The panel lock function is activated</td>
<td>See &quot;Panel Lock-to Unlock the Panel&quot;</td>
</tr>
<tr>
<td>I can't silence the alarm</td>
<td>Error has occurred (Check display in window) If no error in display</td>
<td>If error- see &quot;Error Messages&quot; &quot;and how to react&quot; Your cover alarm is probably activated See &quot;Cover Alarm-How to De-Activate&quot;</td>
</tr>
<tr>
<td>Spa is not heating</td>
<td>Temperature set too low</td>
<td>Check temperature setting</td>
</tr>
<tr>
<td></td>
<td>Hi Limit is Tripped</td>
<td>Reset switch and contact your dealer for service (see &quot;SN1&quot; in &quot;Error Messages&quot;)</td>
</tr>
<tr>
<td></td>
<td>Dry-Fire Switch is Tripped</td>
<td>Check water valves. If closed, open them. Switch will automatically reset when the temperature in the heater manifold drops to below 85 degrees. If valves are not closed contact your dealer.</td>
</tr>
<tr>
<td>System hung - control pad won't respond</td>
<td>Electrical noise spikes Poor control panel connection</td>
<td>Shut power off for 30 seconds. Make sure control panel is fully plugged in. Then restore. If still hung, contact your dealer.</td>
</tr>
<tr>
<td>System won't come on at all</td>
<td>Fuses F1 or F3 blown</td>
<td>Replace fuse-Note: If repeats, call for service.</td>
</tr>
<tr>
<td></td>
<td>Battery backup dead</td>
<td>Replace battery</td>
</tr>
</tbody>
</table>

Note: Pressing the MODE button once should silence the alarm while you are responding to the cause. However, it is critical that all error messages be dealt with as described above. If no one is around to silence the alarm, it will automatically silence itself after 10 minutes.

If your system repeatedly "hangs up", you could be experiencing some electronic failure. Contact your dealer for service.
You should have an alarm switch pad that looks like this

Follow these steps for placement:

1. Align your spa cover such that it sits on the spa exactly the way you want in relation to the sides of the cabinet.

2. Flip the cover back on itself being careful not to lose your alignment with the spa.

3. Place the switch pad on the control panel (magnet side up) such that the radi-used corner on the pad lines up with the corner on the control panel. The brown label should be against the control panel.

4. To make sure the magnet is properly aligned with the control panel, press in the control sequence to turn on the alarm (hit FUNC, MODE, and UP Arrow). Wait 15 seconds. If the alarm does not sound, remove the switch pad. Within 15 seconds the alarm should sound. When it does, turn it off (hit FUNC, MODE and the DOWN Arrow). Put the switch pad back in place.

5. Peel the backing off the switch pad to reveal the adhesive. (The adhesive is on the side of the pad that faces the spa cover).

6. Carefully close the cover down over the control panel and switch pad. Press the cover down firmly such that it touches the pad. Now lift the cover and press the pad more firmly into place. The pad should remain permanently on the cover. Note: If your cover was not clean or the adhesive got dirty, the pad may fall off. Reapply using an instant adhesive (i.e. "super glue").

7. To test, press in the alarm sequence again and close the cover within 15 seconds. Make sure the cover is still in proper alignment. Wait 15 seconds. The alarm should stay quiet.

Now lift the cover and wait 15 seconds. The alarm should sound out. Press in the "OFF" sequence again (FUNC, MODE DOWN Arrow) and the alarm should be quiet. If you hit the buttons out of order or hit the wrong buttons, just wait 5 seconds and hit them again in the correct order.

If the alarm fails to work as described above, read the troubleshooting tips that follow.
ALARM SWITCH PAD PLACEMENT TROUBLESHOOTING TIPS:

If the alarm sounds without removing the pad, double check your alignment and reset. If it still sounds, your spa may be set up with two sensors in which case both switch pads must be in place to prevent the alarm from sounding. Place the second switch pad over the other sensor on the spa and retest. If you are still having trouble, contact your dealer or Hercules Products for assistance.

If the alarm does not sound when the pad is removed try hitting the button sequence again. If this fails to work, you may either have an alarm problem, or a circuit problem.

To find out: Set our timer for 5 minutes and wait. After 5 minutes the alarm should give 15 short bursts, 1 second apart. If this happens, you have a circuit problem. Contact your dealer.

If the alarm does no sound after 5 minutes, check to be sure the black and red wires at the alarm are connected to the same color wires on the cable. (This is only 12 volts). If they are reversed (black or red and red to lack), then switch them to match the colors. Try the timer test again.

If the wires are not reversed, or after a second timer test it still does not sound, contact your dealer.

If after the test the alarm sounds, try following the switch pad test instructions once again.

FILTER MAINTENANCE

Cartridge filtration because of its simplicity, ease of maintenance, efficiency, and absence of backwash effluent is very desirable. Filtration is accomplished by causing water to flow through fine mesh polyester elements. As water flows through the elements, suspended particles are entrapped on the element surfaces. When the element surfaces become clogged, the filter is disassembled and the elements are removed for cleaning. This is accomplished by spraying with a garden hose until all entrapped dirt is removed. Then it must be soaked in a cleaning agent for at least 10-12 hours before returning to service. (Consult your spa salesperson to acquire proper cleaning agent.). After installing the clean elements, the filter is ready for another cleaning cycle. For further instruction, refer to the Owner’s Manual for your filter.

NOTE: Be sure to turn the power to your equipment off before cleaning your filter, and to follow instructions on page 7 before restoring power to your equipment.
PROTECT YOUR SPA

Cold climates, where danger of freezing exists, require special care on your part in order to prevent damage to the spa shell and equipment. If you plan to use your spa during the cold months, be sure your pump is running frequently enough to keep water moving so that the heater will operate. It may be best to set your controls to keep the pump on low speed at all times (See Page 8 “Continuous Pump Operation”). This will keep the water from freezing and the heater will come on as the temperature drops.

WARNING: If you have a power outage, and cold temperatures are a possibility, your spa and equipment will quickly freeze, especially if it is mounted in a deck without a cabinet. Ice in the spa and equipment will cause damage. You should consider the need to winterize your spa if it is to be dormant for a period. This is especially true if you are taking a winter vacation.

WINTERIZING YOUR SPA

Follow the procedure below to help prevent damage to your spa and related equipment.

1. Drain the spa of all water.

2. Run the AIR JETS to clear the air channels of water. 10-20 seconds should be sufficient.

3. Remove any remaining water with a sponge. If you have a shop-vac, try vacuuming as much water as possible out of the jets and the spa shell. If you cannot remove all of the water (especially from the air channels) anti-freeze should be added to the remaining water. If anti-freeze is used, it should be inhibited Propylene Glycol.

4. Shut off all electrical power at the breaker.

5. The filter should be drained and cartridge removed and cleaned. If the filter is top-loading, remove the filter cartridge and pour anti-freeze as mentioned earlier into the filter canister. Store the filter element in a room with above-freezing temperatures. If the filter is under the cabinet, remove the canister with the cartridge and store both inside.

DEAD BATTERY

If the battery on the circuit board in your control box loses its charge, your control panel will cease to function and the control relay on the board will cycle on and off constantly until you either replace the battery or shut off the power to the spa. The cycling of this relay should not do any damage to your system so if it has gone on and off for a long period of time, don't be concerned. We suggest you shut the power to the spa off and acquire a new battery. A suitable battery can be purchased from your local Radio Shack (part number 23-156) and from K-Mart (Eveready No. E-CR2032). Other stores will have them as well. It should be a lithium battery rated 3 volts, D.C. It should be as close to the thickness of the original battery as possible, and can be a little smaller in diameter. Once the battery is installed, simply turn on the power and re-program your desired settings as described in this manual. The battery will not drain unless you turn off the power and leave the control panel plugged-in. In the event of a power failure, the battery should allow the system to hold your settings, and would continue to do so for up to 3 months, but eventually it will lose its charge.
# TROUBLE-SHOOTING YOUR SPA

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>THINGS TO CHECK</th>
</tr>
</thead>
</table>
| Spa Equipment will not run                   | 1. GFCI in supply circuit tripped  
2. Insufficient voltage in supply circuit  
3. Breaker tripped in fuse box  
4. Dead battery (see page 19)               |
| Pump does not prime                          | 1. Inlet-Outlet valves closed  
2. Not enough water in spa  
3. Air-locked—open air bleed valve at top of filter. |
| Hydrotherapy jets don’t operate              | 1. Low flow because of dirty filter-clean filter  
2. Air valves closed-open valves  
3. Water level too low  
4. Adjustable jets set too low  
5. Pump not primed                           |
| Hydrotherapy jets don’t operate or intermittent | 1. Low flow because of dirty filter-clean filter  
2. Air valves closed-open valves  
3. Water level too low  
4. Adjustable jets set too low  
5. Pump not primed                           |
| Spa doesn’t heat                             | 1. Heater element not energized-turn up thermostat  
2. Heater element burned out  
3. Spa not covered  
4. Ambient temperature too low               |
| Heater Failure                               | 1. Are the ball valves open?  
2. Is the water level correct?  
3. Is the filter cartridge dirty? (remove if in doubt)  
4. Are the jets wide open?  
5. Is the system primed?  
6. Are the fittings tight?  
7. Are the O-rings in place?  
8. Is the thermostat set properly?  
9. Is the Hi Limit switch tripped? (If so, call service person to determine why)  
10. Is there power to the heater?  
11. Is the pack in the proper mode for heater operation?  
12. Does the heater work on high speed? |
| Blower does not function                      | 1. Is the G.F.C.I. reset?  
2. If G.F.C.I. trips, is there water in the blower or blower lines?  
3. Is the top of the plumbing loop mounted higher than the water level, as it should be? |
A bracket has been supplied to add stability to your control assembly. If you apply it during installation, it will add support and rigidity between the control box and base.

Hole in bracket lines up with hole in base.

To apply bracket, remove screw "A", line up top hole in bracket with hole on control box, and replace screw. Then secure bracket above base through hole that lines up with hole in base.
WARNING

IMPORTANT NOTE TO THE LICENSED ELECTRICIAN

If this unit requires 120 volt service, please be sure that you are installing a 20 amp receptacle into a DEDICATED circuit supplied with proper gauge wire for the application.

If it can be wired for 240 volt operation (see your electrical rating and your instructions), then you must understand that when wired for 240 volt operation it is a hybrid system containing both 120 volt AND 240 volt components. For this reason it is absolutely imperative to install the neutral (white) AND ground (green) wires separately and correctly as specified by the National Electrical Code. Failure to do so may prove hazardous to the user and will void the consumer’s warranty.

Please also note that as required by N.E.C. 680-42, effective January 1, 1994 all spas, hot tubs, and associated equipment must be fully protected by a Class A GFCI. Be sure to carefully follow the instructions provided with this equipment and with the GFCI when installing ground fault protection, especially with respect to the proper placement of the load neutral wire (from the equipment pack). Improper placement will cause the GFCI to trip when 120 volt components are energized.

IMPORTANT NOTE TO THE INSTALLER

Mishandling during shipment can cause cracks to develop in PVC joints and unions. It is essential that all unions and joints be inspected during installation to detect cracks and leaks. Failure to do so can result in severe water damage.

IMPORTANT NOTE TO THE SPA USER

Your spa was designed to give you therapeutic action during high speed operation. Under normal circumstances, up to 30 minutes of high speed operation will give the desired results. It is important that upon exiting the spa you must return the pump operation to low speed as indicated in your instruction manual (unless your system has built-in safeguards limiting high speed pump operation automatically, SEE YOUR MANUAL).

In the event you should accidentally leave the high speed pump running for an extended period of time, you may experience an extreme rise in water temperature due to heat transferred from the pump itself. The excessive temperature may result in the loss of safe, accurate calibration of your temperature controls as well as damage to your spa’s surface. If this should happen and/or your system ceases to operate normally, contact a qualified service person immediately. Failure to get service may result in damage to your spa and equipment, or serious personal injury to the user.
HERCULES SPA CONTROLLER
EASY REFERENCE CARD

This easy reference card is provided for your convenience in operating the Hercules Spa Controller. Please see your instruction manual for complete instructions. Note: Allow at least five seconds between each set of program entries.

Start-Up Instructions

When the spa is first connected to its properly rated (Class A) GFCI protected source, it is in the economy mode. Filtration is pre-set to run twice a day. By pressing the "Jet 1" pad on your control twice, you will turn on the high speed pump. Within 15-30 seconds, you should have water flowing from the hydrotherapy jets in the side of your spa. If not, turn off the pump (hit Jet 1 once more) and open the air bleed on your filter (if provided) to clear the system of air. Then repeat this procedure until water is flowing freely from the hydrotherapy jets.

Setting the Clock

Press CLOCK, then press FUNCTION (LED will flash "Set Time"). Press FUNCTION to flash the hour, press FUNCTION again to flash the tenths minutes and press FUNCTION again to flash the units minutes. To change any segment, press the TEMP UP or TEMP DOWN button. After the time is set, press MODE to store.

Setting the Temperature

When either of these pads are touched once, the window will display the current temperature setting. If the pad is held down, the "Set Temp" will change accordingly.

Changing Filter Cycles

To change filter cycles, press CLOCK once, then press FUNCTION (LED will flash "Set Time"). Press TEMP UP or TEMP DOWN to select Filter 1 or Filter 2 (now flashing). Once the cycle is selected, press FUNCTION and follow clock setting procedure described earlier. Once hours are set for the desired "ON" time setting (AM only for Filter 1, PM only for Filter 2), press FUNCTION to set "Off" time. This will adjust the "Off" time to be 2, 3 or 4 hours after the "On" time setting is chosen. Press FUNCTION again to see heater setting, on or off. Use ARROW key to change setting as desired. Press MODE once filter cycle selections are complete. The display window will now show the current water temperature.

To Set Panel Lock

Press FUNCTION once, then press TEMP UP once (the display will show four lit dots below it). This sequence must be done within three (3) seconds to activate the Panel Lock Feature. The Center display will show the spa temperature along the dots. All panel pads are now deactivated except the program pad which is used to initiate the unlock sequence.

To Unlock Panel Lock

Press FUNCTION once, then press TEMP DOWN once (the lit dots will go out). These pads must be pressed in correct sequence and within four (4) seconds. All pads will now be active.

To Activate Cover Alarm

Press FUNCTION once, press MODE once, then press UP arrow. Place cover over control pad with switch pad properly aligned. This must be done within 15 seconds. If not done within 15 seconds, the alarm will sound and must be deactivated.

To Deactivate Cover Alarm

Press FUNCTION once, then press MODE once, then press DOWN arrow.

To Set Temperature Lock

Press UP arrow once, then press FUNCTION once, then press MODE button twice. The center display will show the spa temperature along with dots 3 and 4. Temperature Lock is now activated.

To Unlock Temperature Lock

Press FUNCTION once, then press MODE twice. These pads must be pressed in correct sequence and within three (3) seconds. When last pad is pressed, dots 3 and 4 will disappear. All pads are now active.
<table>
<thead>
<tr>
<th>Message</th>
<th>Meaning</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>O H</td>
<td>Means thermostat circuit failure. This may be due to excessive high speed pump operation, i.e. resetting the high speed pump continuously after each 30 minute shut-down cycle.</td>
<td>Do not reset high speed pump continuously. If you are sure this is not the case, contact your dealer for service.</td>
</tr>
<tr>
<td>F L O</td>
<td>Indicates water flow has been interrupted.</td>
<td>To quiet alarm, press MODE on your control pad. Now make sure you have the proper amount of water in your spa. If you do, check filter cartridge - it may need cleaning. Remove the cartridge, press MODE to reset the FLO circuit. If system senses that water flow has not been restored, error message will reoccur and alarm will sound. Follow your start up instructions and try again. If error occurs again, shut your system off at circuit breaker and contact your dealer for service.</td>
</tr>
<tr>
<td>I C E</td>
<td>A freeze condition has been detected.</td>
<td>No action is required by you. The spa software will automatically activate the low speed pump and blower to circulate the water and automatically shut them back off when the temperature rises to 54 degrees F. The alarm will also alert you while this is occurring.</td>
</tr>
<tr>
<td>S N 1</td>
<td>The hi-limit sensor is tripped and the spa will run on low speed only. This will trip when the temperature at its sensing point exceeds 118 degrees F.</td>
<td>The RED reset button on the equipment control face labeled &quot;HI LIMIT&quot; can be reset once when temperature drops below 100 degrees F. If you reset and the error message goes away, contact your dealer to investigate the cause of the error. This sensor will not trip unless other component failure has occurred.</td>
</tr>
<tr>
<td>S N 2</td>
<td>The thermostat sensor or heating circuit is non-functional or not able to keep up with current heat demand. The spa will run on low speed only.</td>
<td>Make sure cover is in place, especially if spa is outside during cold weather and you are running it with a 120V power supply. If this is not the case, contact your dealer for service.</td>
</tr>
</tbody>
</table>
COMPONENT
BREAKDOWN
CS
PACK
BATTERY BACKUP

A battery installed upside down will just prevent its working.

If the power goes out with a dead battery, when the power is restored the system will not come on. The battery must be functional in order to get the processor to respond upon start-up.

The battery will only discharge if the power is off and the control panel is plugged in. If you know the unit will not be used for months at a time, the control panel should be unplugged to save its charge.

GENERAL INFORMATION

If 120 VAC is applied to the flow switch terminal, any relays that are closed at the time will have their coils blown.

Reversing the polarity of the line service to the board will not hurt anything.

It is very important that the control panel be plugged into the control head socket solidly and completely. If left out at all, even 1/8", the system could experience intermittent loss of communication between the control box and spa-side panel. This loss will result in a hanging of the system and/or illegitimate error messages on the display. (i.e.. An "SN1" could appear and the alarm go off even though the hi limit isn't tripped.)

Never plug the control panel in with the power on. The system will more effectively boot when everything is intact at the time the power is turned on.

The relays on the board operate between 8.7 and 18 volts. Low incoming line voltage to the transformer should not affect them.

Relays are epoxy sealed and nitrogen filled. The covers do NOT come off for inspection purposes. The relay covers do not have a vent hole in them to vent off gasses created by arcs during switch operation because the nitrogen eliminates the arcing and gases.

Shorting out the piezo alarm will put 12 VDC to Ground. This will blow F2. If the piezo wires are reversed, the alarm simply will not work and may make static noises.

REBOOT!

If a fault occurs that hangs the circuit board, you can always refresh the microprocessor by turning the power to the spa off for one or two seconds and restoring again. This is called re-booting, much like re-booting your computer when it hangs. The programming and circuitry are designed to protect against this but until it has been in the field seeing all of the different circumstances it will encounter, we won't know how successful we were. Time will tell.

Keep in mind that the control panel will not respond to most commands if the panel lock feature is on. (4 dots will appear at the bottom of the display.) Also remember that once you activate a program change like setting the clock, setting the temperature, activating the timer, or any other program function, you must wait 5 seconds before pressing another button or the panel will not respond to you.

If you do run into something you don't understand, please don't hesitate to give us a call. We want to answer your questions and we value your input!
COMPU-SYBARITIC CONTROL SYSTEMS (C/S PACK)

The C/S pack is 80% electronic, and 20% electromechanical. The only everyday equipment pack parts used in it include the hi limit switch, the pressure switch, the dryfire override switch, and the heater assembly. The rest of the pack is made up of parts unique to the C/S pack. They include the transformer, control panel (spa-side), the large circuit board we call the "slave", the temperature probe circuit board that plugs into the slave, and an alarm assembly. There isn't much for you to do here but I will go over the basics.

1. The pressure switch performs the same function with this system as it does on a pack with airswitches. It must be calibrated the same as always. If it opens, the programming tells the pump and heater to shut off, the alarm to sound, and the word "FLO" to come across the display. The owner's manual tells you how to deal with this. If the pressure switch goes bad, replace it just as you would any other.

2. The hi limit, if tripped, shuts off the heater, turns on the low speed pump, and disables the high speed pumps. The alarm will sound, and the message "SN1" will appear. Again, the book explains how to react.

3. The heater and dryfire override switch work the same as always and are to be handled as such. There isn't much on the electronic controls that can be serviced. However, there are a few things you can look at if trouble arises.

TRANSFORMER CHECK

If the transformer fails, it is easily replaced. Unplug it, remove the screws, install the new one, plug it in, and away you go. To check voltage output on the secondary wires, use your voltmeter set for AC volts to get the following readings:

Blue = 13.4 V (for relay coils)
Red = 9 V (for circuitry)
Orange = 12 V (for the light)

The primary (incoming) voltage should be 120 V (black and white wires).

The test loop terminals on the board are used to verify that the proper voltages are getting to the circuitry. They should read as follows:

VCC = 5VDC
GND = Board Ground (NOT Earth Ground)
+12NS S/B = 12VDC (tolerance +6 -1)

To test the transformer for proper power supply, connect volt meter to:

GND and VCC terminals - should read 4.91 and 5.80 VDC.
GND and 12NS terminals - should read 12-16 VDC.

Bear in mind that if you do not see voltage at these terminals, it could be fuses blown (F2 or F3) rather than a bad transformer. Be sure to check fuse integrity before checking the transformer itself.
FUSES

There are several fuses on the slave to protect various parts. The fuses protect the transformer (F1), relay coils (F2), control circuitry (F3), the blower (F4), and the light circuit (F5).

F1 fuse will blow if the electrician hooks up 240 volts to the hot and neutral terminals on the board for incoming voltage. It would also blow if the transformer fails causing a current draw exceeding 2A. Improper voltage hookup is the most likely cause.

F2 would blow if a
A. relay coil shorts out.
B. someone touches the piezo wires together.
C. someone installs the Aux. hall device jumper in wrong place connecting the two uppermost terminals.
D. someone replaces F2 with a fuse rated 1/2A or less.

A particular symptom of the F2 fuse being blown will be the lack of any “click” heard in the circuit board from the relay in RY8 closing when power to the system is turned on at the breaker. If this relay doesn’t close, the rest of the relays will not close. Also the hi limit circuit will not be complete. If left to stand for 2-3 minutes without doing anything, an "SN 1" error will come on the display. If you try to activate the pump with the Jets 1 pad, the system will look for pressure switch closure, not get it, and the message "FLO" will appear on the display, followed by "SN1". Remember, the circuit board will remain dead silent through all this. If none of the relays close, you can bet that the fuse in F2 is blown.

F3 would blow if:
A. a direct short in the control circuit occurs.
B. the voltage regulator on board fails to prevent voltage to pass and current levels exceed 1.75A.

F4 and F5 would blow if an excessive load is put on them. F4 for the blower, is rated at 10A (slow blow) and F5, for the light, is rated at 1A (fast blow). The trace in the blower circuit is 4oz. copper capable of handling up to 27.5A load. If the wrong light bulb (should be GE912) is installed or someone tries to run two lights from this circuit, the fuse will blow.

During an electrical storm, a lightning strike will be absorbed by the metal oxide varistor (MOV). This is located just above F1. It is rated at 135V. When the voltage increases above that rating, the resistance in the MOV decreases sending the spike voltage to board ground. The board ground acts like a capacitor absorbing the spike.

The board will absorb approx. 150 Jewels or Calories of power. The absorbed power will discharge through circuit usage within milliseconds. However, if someone wires the pack wrong, blows the F1 fuse, and bypasses the fuse without correcting the wiring, the MOV will be the next to go.

Our circuitry is designed to absorb, without causing failure, any static it might see from a service person's handling of it, provided it is installed in the pack. If you are handling a loose circuit board, it is recommended that you ground yourself first. Always store the bare circuit board in an anti-static bag designed for such purposes.