



# The Mechanical Operation and Repair of Gatsby, Blue Ridge, and Swift River Spas built by Jacuzzi®

ONLY for the Following ELECTRONIC Spas Made 1999-2002 with this Topside:



(does not Apply to ANY Model using other topsides)

**Published by GatsbySpaParts.com**

©Copyrighted. All Rights Reserved. B.Bouman and Company, LLC  
2010

## Disclaimer

Every effort has been made to make this manual understandable and applicable. If you have doubts or little experience with electrical appliances, it's best to leave electrical work to licensed electricians. Care and proper electrical procedures must be adhered to whenever working with electricity and especially is true with spas since you are dealing with electrical current that can harm or kill you or those near or in the spa.

**As a Rule of Thumb: ALWAYS TURN THE SPA'S MAIN POWER OFF UNLESS REQUIRED TO PERFORM A TEST. WHEN YOU DO HAVE POWER ON BE CAREFUL AND USE PROPER ELECTRICAL PROTECTION AND PROCEDURES.**

Although this booklet should be able to guide you through most repairs and even diagnosing the problem, [www.gatsbyspaparts.com](http://www.gatsbyspaparts.com) offers an "Ask the Expert" free of charge where you can write me and be more specific for your spa and your particular problem.

Every effort has been made to be accurate and complete but note we cannot guarantee specific accuracy.

Throughout this manual reference to part numbers are Jacuzzi/Gatsby Spa numbers, . If the part number prefix is "CC" the part is our own number and available on our website. Also note, normally, numbers on the part are not Jacuzzi stocking numbers but numbers used by the original manufacturer including mold number. We have no cross reference from these numbers.

## Table of Contents

### **Words and Their Meaning.**

#### **Introduction**

#### **Overview**

#### **Section One: Equipment and Parts**

Chapter One:	Pumps and Motors
Chapter Two:	Heaters
Chapter Three:	Control System
Chapter Four:	Air Blowers
Chapter Five:	Pressure Switch: Flow Switch
Chapter Six:	Sensors
Chapter Seven:	Topside Control
Chapter Eight:	Ozonators
Chapter Nine:	Mood Lights
Chapter Ten:	Plumbing
Chapter Eleven:	Spa Jets

#### **Section Two: Troubleshooting**

- I. Trips GFCI
- II. Doesn't Heat
- III. Motor Hums or Doesn't Work
- IV. Pump Leaks
- V. Error Codes Defined and Fix
- VI. Models

## Words and Their Meaning.

“Spa”; typically means same as hot tub. Often get confused with indoor jetted bath. But spas normally are outside, require heating, and are operationally 24/7.

“Pump”; Generally only applies to “wetend” or part that moves the water. Attaches to “motor”.

“Motor”; part that when electrical current is applied it will spin. Normal low speed is 1725 rpm and 3450 for high. Can be one or two speeds. Some single speed motors are dual voltage. On dual voltage motors usually the motor comes wired for high or 240vac. But always confirm from diagram on motor’s label which you motor is. Usually apply high voltage to a low voltage motor will permanently harm it. Usually applying low voltage to a high voltage motor will if corrected quickly, not permanently harm it.

“Jet”; The part of the plumbing that secures the piping to the spa shell and injects water/air into the spa.

“Topside”; the control pad on the outside of the spa that you operate the spa from including temperature change and jet action.

“Control Box” or “Command Center”; the box underneath that includes the pc board and cables. Basically the “brains” of the spa.

“Power”; spas are designed for either 110-130vac or 220-240vac. There is a certain tolerance of voltage but normally the range should be the above. Outside the range can harm equipment include the control box and pump motors. Some spas come designed to operate on either 115v or 230v. In this case, the difference is efficiency of the spas heater and when it can come on. When the spa is operated on 115v, the heater uses about 1/3 of its ability to heat. Therefore 1-2 heating per hour is normal. When the same heater has 230v applied to it, the spa will heat 5-6 degrees per hour. On most system, when the jet pump is on high and the spa is operating on 115v, the heater turns off. When the spa is operated on 230v, the heater will remain on. To gain this feature usually requires an adjustment on the board.

## Introduction

I started servicing Jacuzzi Whirlpool Bath spas in 1995. I first started by working for a friend who was an Authorized Service Center for Jacuzzi Whirlpool Bath. Shortly after that I purchased the spa repair business from him and became the owner.

From that date to 2001 we were the authorized Service Center for Jacuzzi Whirlpool Products in the Denver and Eastern Colorado area. During that time we were rated in the top 10 service companies in the United States for customer service. We were the only Service Company to receive that award every time it was offered during those years. When Jacuzzi, Inc reorganized their company in 2001, they moved their spa production to their Sundance plant. We continue to and are still servicing Jacuzzi Hot Tubs as a service center.

It just happened that when I started working and servicing spas for Jacuzzi Whirlpool Bath was also the time the industry was switching to electronic controlled spas. Therefore I experienced the changes that have occurred during this time and continue to work in the field, I have experienced a wide spectrum of problems and their solution. I would like to say I have seen it all but that always proves untrue.

I have tried to make this manual simple but comprehensive; quite a challenge. To do so I try first to explain what and how the part works. Then how to replace or repair the part.

This manual also includes common failures and error codes and their solution. In the Troubleshooting Section I have found 99% of the problems with a spa are routine if you follow a systematic approach. Sometimes I make this approach too obvious but for the sake of the weekend warrior, I made it so.

If you have questions not specifically addressed in this manual, you can contact me at [bbouman@clearcreekspas.com](mailto:bbouman@clearcreekspas.com). It's the first email I check, usually every business day. I will be happy to help all I can.

# Overview

## Who is Gatsby?

Gatsby was a manufacturer of hot tubs in Plant City, Florida. For years they built entry level spas sold throughout the SE states. They produced a number of spa models under brand names like Gatsby, Blue Ridge, Swift River, and Imperial Spas. In most cases, one model design will come under one or more of those labels.

Jacuzzi bought Gatsby spas and began moving their entry level production to Florida and have Gatsby division build all their entry level spas. Soon after that, Jacuzzi closed down production at that plant and discontinued all lines built by that division.

When Jacuzzi bought Gatsby the support of earlier production spas had already been discontinued. Jacuzzi service companies received no technical information or parts for servicing those earlier, non-electronic spas. Unfortunately for spa owners of earlier non electronic models parts and support are not available. Jacuzzi recommendation to those owners with problems with their older control system is to replace their older non-electronic spas with newer electronic systems. We carry both those systems and more economical fully electronic aftermarket retrokits for these spas. See our website under "Tutor" for more information.

Therefore if your spa has a topside with a DIAL temp control and plunger like on/off buttons, there is not support or supply for that system. Motors and heaters are available but not your circ ump.

## **GENERAL; How Spa's Work**

Basically, spa operation is simple. The pump draws the water from the spa, usually through a filter, then through the pump and pushes it through the heater and back into the spa. Now add more jets, more pumps, an air blower, and maybe a stereo. That's today's popular spa.

America's lust for more jets has driven the need for more pumps to drive the jets.

To help keep the spa clean with less chemicals, manufactures have added a 24 hour circulation pump and Ozonator. For a few models you also have an air blower that blows air bubbles up from the seats of the spa.

### **GATSBY Specific SPA DESIGN:**

Most electronic spas built by Gatsby division have the following configuration:

- a. Main electronic control box.
- b. Separate canister heater.
- c. Small 24hr circulation pump
- d. One of two large jet pumps.
- e. Jet pumps can be one or two speed.

Less common configuration is:

- a. Main electronic control box with heater attached.
- b. NO circulation pump.
- c. One or two large jet pump.
- d. #1 jet pump is two speed. Low speed also operates to heat and filter.

### **SPA SHELL**

Spa shells are typically acrylic. A sheet of acrylic is heated and dropped into a mold and vacuumed to form the shell. Then it's flipped over and sprayed with a fiberglass solution that gives it strength. Holes are drilled into the spa and jets installed. Then the plumbing is finished and insulation is now sprayed. Finally the equipment is installed. The construction of the spa is mostly performed with the spa upside down. Finally the spa is flipped upright and final tests including water testing is done.

The spa frame was made a wide variety of ways over the years but basically it was on either a wood bracing, solid plywood base, or fiberglass base. Often the spa shell has part of the frame molded into the actual spa shell or glued to it to create strength.

### **Paneling**

The paneling of spas has changed over the years. Initially redwood slates were the common siding. In an attempt to economize the cost of panels, Gatsby built panels with various stained wood. Some of the late production was synthetic

plastic panels or slats. These are becoming popular even though they can be as costly as redwood or cedar. But they are able to withstand the elements with little care.

Typically you should re-stain pine panels every year.

Newer spas with synthetic siding require little upkeep other than cleaning. I have seen spas where the heat of the sun causes the panels to bow and lose shape. If you see this happening, you might consider reinforcing the back of the panel with a piece of wood or where you can and available, add a screw or two to center areas that are bowing. You will need to locate a wood vertical post to screw the panel against to create more support and avoid bowing.





## Chapter ONE Pump & Motors

### Overview:

There can be confusion; What's a pump? What's a motor? Are they the same?

The **"pump"** is considered by many to be the complete pump/motor and by others only the end where the water passes through. The "wetend" is the more common word for the end that moves the water. For the industry, "pump" and "wetend" are the same. "Motor" is JUST the motor. "Pump/Motor Complete" would be both already assembled. In most cases, "complete" does not mean with a new cord.

### I. Circulation Pump (see more later)

Most Gatsby built spas used either the less common 115v small circulation pump or the more common 230v circulation pump. This pump runs 24/7. It avails the homeowner with a system that keeps water clean by constant filtering.

Most common is full replacement of failed circulation pumps, not replacing internal parts.

### II. Jet Pump

Your spa will have one or two jet pumps. The pump motor can either be 115v or 230v. Also it can be one or two speed. Plus, to complicate, there are two pump styles and a variety of pump horsepower. So how do you tell what you have?

First, your pump is either center or side discharge. 1.5hp pumps can be either center or side. All others are side. Center discharge means the top discharge is in the middle of the pump. Side discharge means your output of the pump is on the side. Most pumps are side discharge but check.

Next is pump's horsepower. As a rule of thumb, the horsepower rating must be equal or less than the motor's rating. If the pump is oversized for the motor, it

likely will shorten the life of the motor or cause it to continue to overheat and shut off. You can oversize the motor but not the pump.

Jet pumps on Gatsby spas are basically a generic designed pump. The main body or bracket mounts on the motor by the 4 bolts that hold the motor together and pump to motor.

Next part of the pump is the mechanical seal. This seal is 2 pieces. One piece goes into the seat cup of the pump housing. The other slides on the impellor's shaft. When the impellor tightens to the motor shaft, the two halves press outward and seal the pump.

The impellor attaches to the motor shaft. They simply screw together with standard clockwise screw. When the impellor rotates it is what moves the water.

A large oring seals the front of the pump (volute) when the bolts tighten them together.

Last part is the volute or front of the pump. It has a seat the impellor sits into when the bolts are tighten.

Simply explained, when the impellor turns it compresses the water and the compressed water escapes out of the top of the pump.

Commonly, the “**motor**” is ONLY the motor. Most common are either AO Smith or Emerson motors although other companies make motors like GE. Spa motors are either 115vac or 230vac although some can be either. If either, you can “field wire” the motor to match the application you are installing. Likely the motor came wired for 230v but you can field wire it down to 115v. The way to tell if your motor is dual voltage is on the label of the motor. It will show a High and a Low wiring diagram. This is relation to volts, not speed. Typically you will check the label to see what voltage the motor is wired for. If its wired for the wrong voltage, you follow the motor's diagram.. But typically, it's either 115v or 230v.

The key for motors is matching the horsepower (hp) of the motor to the pump. You can have a motor oversized for a pump hp and be OK. It's like having an oversized motor for your car. But you cannot have a pump too large for the motor. If you do, the motor will have a early failure. It's like driving a large car with an undersized motor. Best bet is to match.

Gatsby used one and two speed 115v motors and one and two speed 230v

motors. They all were 48y frame motors.

Lastly, in the industry the motor is motor only, pump is the wetend, and when they are together, they are called pump complete.

## **PUMP/MOTOR**

The motor takes electrical current and turns the shaft clockwise. Although individual parts may be available, usually bad motors are replaced not repaired.

### **REPLACING JET Pump/Motor:**

#### **Removal:**

Turn main power off. Drain the spa. Most models do not have valves to close to avoid draining the spa. Once the spa is drained, disconnect the 2 couplings attached to the pump (wet end). Normally you can hand loosen but occasionally you will need to use a large wrench to loosen. You can also use a oil filter wrench to loosen.

Next: The motor itself is attached by four nuts at the feet. There is likely a copper bonding wire attached to the motor. Remove. Unplug the pump cord from the control box.

Remove pump/motor assembly.

Disassemble Pump (wetend).

A. Remove 4 bolts holding the front face of the pump (volute) to the pump housing.

B. You will see the nose of the impellor. You will want to disconnect the impellor from the motor shaft. The motor shaft screws into the impellor. The intended method to separate is this: on the opposite end of the pump/motor assembly, in the middle, is the motor shaft end. It has a slot. Take a large slotted screwdriver and while holding the impellor stationary with one hand, turn the motor shaft with the other. If this doesn't work, reverse focus and turn the impellor with your hand while holding the motor shaft stationary. In worst case situations, you can grab the motor shaft between the pump and motor with a pair of vice grips and hand turn the impellor loose. If that doesn't work, you will have to use a wrench on the impellor to separate. This will likely damage the impellor and will need to be replaced.

C. Once the impellor is separated you need to disconnect the pump bracket or body from the motor. It is held by 4 long bolts that run through the motor and bolt to the pump. Disconnect each bolt but DO NOT pull the bolts out.

They also hold the motor together and removal will likely cause the motor to disassemble.

D. If you are replacing the pump (wetend), reverse. If the motor shaft is corroded, you need to remove the rust. The least abrasive method is best. Start with steel wool, then try a wire brush or even sandpaper. You need to have a clean motor shaft so the impellor can tighten cleanly against the seal and make the seal work. If the motor shaft is highly corroded, the new impellor will not tighten against the seal and the pump will leak.

E. If you are replacing the motor, you have to move the motor cord from the old to new. The motor is only a 110-130vac motor so you don't have any internal wiring to change for the new motor. Note the wiring sequence on the label of the old motor in reference to the color of the wires. It will show a neutral, low, and high plus ground sequence. Compare to new motor label and make sure the wires go to the same speed.



## **Circulation Pump:**

Most Gatsby models have a 24 hour circulation pump. It sits next to the heater. When power is applied to the spa the control unit turns on the circ pump. So it runs all the time. Because of that, normal life is between 5-7 years. Also individual parts are hard to obtain and usually only extend the life of the pump/motor marginally if at all. So service techs routinely replace the complete pump/motor circulation pump and you should too.

Your circ pump is either 115v or 230v. The label on the motor will identify which you have.

Replacement is simple. When you get the new circ pump, confirm you are getting the same voltage pump. Note the discharge direction of the new with the old. Sometimes you have to turn the pump  $\frac{1}{4}$  turn to match. This only requires removal of 2 screws. Gatsby replacement circulation pumps come with a cord so it is an unplug, plug situation.

Usually I do not drain the spa. You may choose to do so to avoid lack of need of speed. I have found that usually I keep the old pump bracket in place. I remove

the 2 screws holding the pump to the mounting frame on the old and new. Swap and done. It is fairly easy.

Jacuzzi has updated their inventory to carry only the newer "E" pump from the same manufacturer. This pump has several advantages. First, its expected to last longer because it draws less current and doesn't get as hot. And second, to avoid airlocks, the motor has a built in chip that will start at a low rpm and build higher. It is the only circulation pump Jacuzzi now uses and the one we stock.



## Chapter TWO HEATER

### **Function:**

The heater is a simple device. Electricity is applied to the heater element. Because the element is made to resist the current but not completely, the heater's resistance causes the element to glow. The result is heat.

### **Overview:**

The heater does just what's name says, heats the water. Generally on models with horizontal heaters you will not notice noticeably warm water coming out of the jets because of the design of the water flow. On spas with a canister heater and circulation pump, you will because the heater water only comes out of one or two heater ports.

The two basic flow methods start the same way; the water is pulled from the lower part of the spa (called suction fittings) and one or two assemblies with filters designed to pull water from the top of the spa. The theory is this will draw water from upper and lower and therefore keep a thorough water movement.

On spa models without a small circulation pump the water is pulled through the #1 pump and into the spa. This pump/motor is typically 2 speeds.

On spa models with a small circulation pump the water flows from the filter, through the pump, through the heater and back into the spa.

The heater itself is simply an element that heats. Electrical current enters it and slows down. This slowing down causes the element to heat. As water flows by the heated element the temperature is transferred from the element to the water. It's typical to heat 1-6 degrees per hour. The spas that operate on 110-130vac typically heat 1-2 degrees per hour. Spas that operate on 220-240vac heat 5-6 degrees per hour.

Spas with horizontal heater attached to the control box have a pressure switch screwed directly into the heater. Typically it's a 2lb switch. The high limit sensor either clips against the heater or is a round sensor mounted against the heater.

The canister heater is either 4.0kw or 5.5kw. Both operate on either 115v or 230v. FYI: Gatsby engineers built spas that operated on 115v with 5.5kw heaters; and spas operating on 230v with 4.0kw heaters. Jacuzzi engineers had the opposite approach. So pre-2000 spas had Gatsby design and post Jacuzzi's. Nothing changed except engineer's opinion. So if you are operating your spa on 230v, you might consider the 5.5kw heater replacement which cost no more, is the exact same heater, and will heat faster.

## Replacement of Heater:

### I. Horizontal Heater:

The horizontal heater typically requires you to drain the spa. You then disconnect the heater couplings from the plumbing.

Your heater will either be held to the control box by nuts holding the heater's bolts to the control box or straps. Either way, removal will release the heater assembly.

Your spa has either the OH/High Limit sensor attached by a clip to the heater or more common, the spa uses a disc high limit sensor against the heater. For those with a sensor clipped to the heater, you slide the sensor out of the clip. For those with a disc high limit, its held either in place on the heater or the housing of the control box. On the former you disconnect. On the later you leave the sensor in place.

### II. Vertical Heater:

Typically you drain the spa to replace the heater. Although not impossible, it's a challenge to replace the heater with water in the spa.

Replacement is very simple. You remove the copper ground wire if present. Unplug the element cord and pressure switch cord (if applicable). The

heater is typically mounted with 3 screw/bolts. Remove. Disconnect heater hose off the heater, swap, and install. Plug in cords. Attach ground wire. Done.





## Chapter THREE Control System

*WE call the "Control System" the box which the electronic control is located and on some models, the heater.*



### **BOARDS:**

#### **Overview:**

Circuit boards came into common use in the mid 90's. They are a major improvement in many ways over the older mechanical spas. They are more accurate in keeping the proper temperature. They typically will filter automatically or on some models, are programmable to when and what length of time they will filter. They also have settings for when you are away so the spa will keep the water clean yet not stay hot.

#### **How It Works:**

Basically the board is a computer board and is commonly called pc board. They constantly test various components including pressure/flow switches, temp and OH sensors, topside, motors, and heaters. Some will notify you when its time to replace the filter. They are design both to make operation of the spa easier, keep the water cleaner, and filter the water on a regular basis.

#### **The Steps the Board Takes to Come On:**

Gatsby circuit boards typically go through the same routine. When you turn on

power the spa does a self test to make sure internally everything is operating properly. At this time the 24hr circ pump comes on or the low speed on the #1 pump does.

When the board is going through its test it will look to confirm the board's integrity is fine. It will look at the temp and OH sensor to confirm they are within tolerance and close to equal. It will look at the flow/pressure switch to confirm that the switch is open. Then it will turn on either the circulation pump, the #1 pump, or the low speed on the 2 speed pump; whichever you have.

When it turns the pump on it will look again at the flow/pressure switch to confirm the switch is now closed since water movement should be sufficient to register. If the switch is closed, the board will turn the heater on.

Your board may also include a "blowout" mode. Periodically the board will turn all the pumps and the air blower on to move water throughout the complete water system. This assures clean, sanitized water is refreshed.

If you don't have a spa with a circulation pump the spa should periodically go into a filter cycle. On standard models by default they filter twice a day for 2 hours or a total of 4 hours. These cycles usually default when you first power up the spa. Then it filters 2 hours at that point and 12 hours later.

## **REPLACEMENT:**

Your board either is a 1042 or 1044 board. See our website for pictures to help you identify which you have if you don't see the part number on your board. Besides which number board you have, you also must configure the new board to match the old. This is critical. Just above the socket on the board you will see 3 jumpers; JP 7-9. One or two of these wires must be cut to configure your new board to your system. It's hard to "see" which. You must put your fingernail on all three and ID which wire on the new board must be cut.

**WARNING:** As a routine, always touch a metal surface before touching a board. A static charge from your hand can damage the board.

These boards are fairly easy to replace if you are careful. First turn off main power at the main breaker panel.

a. Remove control box cover.

- b. Remove the screws holding the lower finger boards to the lower terminal.
- c. On the wires connecting to the board on the left, it's easy to mix up the wires. So note which wires go to which connection. It would make sense to label the wires. Typically I try to keep these wires in place. Disconnect the rest of the board connections and swing the board out and to the left. Install new board. Then I can disconnect wire by wire from old to new board.
- d. Unplug the transformer wire to the board.
- e. Unplug the pressure switch and both sensor wire connections to the board. Disconnect topside plug from the side of the control box.
- e. Remove screws holding board to control box. Your board might be held to the control box by nylon posts. To release the board from the nylon post: there is a clip on the post. Press the clip toward the middle of the post and pull the board toward you. Do this for all posts and the board will release. To install, reverse.

**NOTE HOW TO CONFIGURE NEW BOARD DISCUSSED ABOVE.**

Reverse to install.



## Chap Four: AIR BLOWER:

Few models have an air blower system besides the water flowed plumbing. It is separate then from the normal forced water jets. The blower is turned on and the air is forced into the spa as bubbles. Between the air blower and the method of air disbursement is a looping system to stop water from flowing back to the air blower. Typically either two loops of flex hose or 2 rigid pipe loops and a check valve will stop any water from reaching the blower.

When building the spa one of two common methods was used: either one or more channels are built into the bottom of the spa. Then holes are drilled along these channels. When the air blower is turned on it pushes air into the channels. The other common method is installing a separate piping system with small nozzles along the bottom of the seating area and applying air into those nozzles.

Electronic spas typically have an automatic blowout at least a couple of times a day. The spa will turn on several times a day and run for a couple minutes. This will fill the channels with air. When the blower turns off the cleaner sanitized water will flow back into the channels and help keep them clean.

### **Removal:**

The blower is either 110v or 220v depending on the model. You must match voltage. Most are 1hp blowers.

To remove is easy. There usually is one screw holding the blower to the plumbing. There might also be a hose strap tighten around the area. IF so, loosen.

Once both screw and strap are removed, loosen, the blower lifts out. Replacement blowers might have a cord to splice in to the older cord or include a cord you simply plug into the control box.

# Chap FIVE: Pressure/Flow Switches



## **PRESSURE SWITCH**

**How It Works:** The lower chamber of the switch is physically attached to the water flow of the plumbing system. The pressure internal to the plumbing is also manifested in this chamber. This chamber expands to push a post toward a microswitch. When the chamber is not pressurized (pump off) the post pulls back and the microswitch opens. When the pump is turned on the post pushes out and closes the microswitch. The distance between the post and microswitch can be adjusted on most switches. Typically turning the adjustment wheel clockwise moves the post closer to the chamber and further from the microswitch. Turning the wheel counterclockwise gives the opposite result.

**What it Does:** The purpose of the pressure switch is to notify the board whether enough water is moving past the heater element. If sufficient pressure closes the microswitch, the board turns the heater on. Otherwise it does not. Due to the low pressure of circulation you should use a 1 or 2lb pressure switch. Overtime the microswitch can fail, the post is less responsive, or doesn't withdraw fast enough. Any of these failures will cause the board to fail.



## **FLOW SWITCH:**

The flow switch performs the same function as the pressure switch.

**How It Works:** The flow switch is a simple device. It is installed typically after the #1 pump discharge. It's a reed switch and a magnet. The switch is inside the center post of the flow switch. The magnet is on the metal armature.

**What It Does:** When water flows pass the armature it moves toward the center post and closes the reed switch. This tells the board that there is enough water flow. When water stops flowing, the armature moves back and the switch opens. Flow switches either work or do not. The key to installing is making sure the right

direction of water flow matches the design of the flow switch. Flow switch usually have arrows pointing the direction of the flow but if not, it's easy to understand. The armature will be toward the water flow so when the flow comes, it moves to the post.

### **REPLACEMENT:**

On pressure switches, they are not directional. If the new switch did not come with pipe thread, add either plumbers putty or Teflon tape on the threads to help seal the connection. So simply tighten to snug. The connections on the switch are also non polarity so wires can connect either way.

On flow switches: note the direction of the flow of water. The new switch must follow the same flow. Remove the clips and hoses and switch with new.



## Chapter SIX: SENSORS

### TEMP/OH SENSORS:

HOW IT WORKS: Sensors work by reacting to temperature at the bulb. As the temperature raises or lowers, the resistance inside the sensor bulb changes. The board reads the resistance of the temperature and knows what the temperature of the spa is. That is how it determines spa temp. Some spas have their temperature sensor inserted into the actual spa. Others in a housing inserted into the spa.

The second sensor is the Overheat or high limit sensor. If that sensor raises above a certain threshold, usually 112-115 degrees, it shuts the spa down. It is clipped against the heater.

### Typical Resistance Values for Sensors and the water temperature.

Temperature	Resistance
59	55.0
65	40.0
77	30.0
84	25.5
94	20.2
99	18.1
101	17.2
104	16.2
106	15.4
108	14.7
110	14.1
115	12.7

## **WHAT IT DOES:**

Typically, when you power up the sensor the board looks at both Over Heat or High Limit Sensor and the Temperature Sensor and compares them. It should see no significant difference and the range should be within normal range. If it see outside the tolerances, depending on which system you have, it will notify you of the problem and fail to turn the spa on. If the temperatures are close, it continues it's self test.

## **To Replace:**

Gatsby used 2 types of Temp Sensors. The most common is the “dry well” sensor. The spa has a plastic assembly housing attached to the spa shell. The sensor inserts into this housing and the sensor bulb never touches water.

The less common type is the “wet well” sensor. The tip of the sensor actually touches the water. You can touch the stainless steel tip of the bulb from the inside of the spa. Typically to remove you simply pull the sensor out and the seal will break and the sensor comes out. If you have water in the spa, it will pour out. You usually can switch with the new sensor fast enough to minimize water.

The Over Heat sensor clips on horizontal heater and on the vertical canister heater has a clamp you loosen and remove the sensor.

## **Connection to the board:**

The sensors use a crimp style connection directly to the board.





## Chap Seven: Topside Control

**NOTE: TOPSIDES WITH DIAL TEMPERATURE CONTROL AND PLUNGER TYPE ON/OFF BUTTONS HAVE BEEN DISCONTINUED.**

Gatsby electronic control consist of a topside pad and a overlay.

The topside used two styles of controls; one with 1 jet button and the other with 2. Other than the buttons, they are identical. Jacuzzi discontinued sourcing the 1 pump topside. Now only the 2 jet button is available.

The overlay simply sticks onto the topside. You peel the sticky cover off and stick to the topside.

Overlays come in a variety of designs. They can have the brand label such as GATSBY or IMPERIAL on the overlay. They can have one or two jets labeled. On a few there is a “blower” label. All overlays will work since they are simply a cover and perform no function than cosmetic.

### **HOW THEY WORK:**

The buttons on electronic topsides operate with piezo button. They are simply a crystal that when press creates a small voltage that travels down the wire to the board. The board sees this impulse from the topside and responds.

The topside digital readout uses LED readout. There is a cable that connects to the bottom of the topside and the side of the control box.



## Chapter Eight OZONATORS:

What is an Ozonator? Ozone gas is  $O^3$  which is a gas that can serve as a sanitizer. Because it serves as a sanitizer, you can use less bromine or chlorine. You must use a chemical sanitizers with an ozonator to make them work effectively. So the reason a person uses an Ozonator is to lower the need to use a large amount of chemicals to keep the water clean.

How does it work? The two popular methods for producing ozone gas with an ozonator is with a bulb coated with a coating that will produce the gas when lit or with a capacitor discharge that makes an arc and the arc creates ozone gas. The capacitor discharge method is becoming the most common method used. Because of their ability to make a large amount of gas (measured in milliliters). With this method a large amount of gas injected into the water will lower to amount of sanitizer you will need.

Whether the bulb or CD method is used, the actual method of injecting ozone gas is the same. First, you plug the ozonator into the control box. Although older spas require a “hot wired” method, your spa’s control system should have a socket designed for an ozonator to plug in. Once the ozonator is plugged in, depending on the configuration of the spa, the board will turn the ozonator on.

When the ozonator comes on it produces ozone gas. Now you need a method of getting that gas into the water. This is how it’s done: in line with the circulation pump or the low speed #1 pump, a mazzai or molex or like is installed. What it does is as the water is reduced through the device it creates suction. There is also a 3<sup>rd</sup> barb which is the air line hose from the ozonator. So as the water passes by the mazzai or like suction pulls the ozonated gas into the water. From there the mixture is blown into the spa. Some ports where the water comes out are dedicated for the ozonator; other are a mixture of heated water and ozone gas. As the ozonated bubbles rise to the surface of the spa they sanitize the water.

GATSBY used the UV bulb generation. You can either continue to use or switch to the more popular CD ozonator. You **MUST** confirm the voltage to the spa. Spas running on 115v will have a 115v ozonator. Spas operating on 230v can

have EITHER 115 or 230v ozonator. You must check either the power to the ozone socket or the label on the old ozonator.



## Chapter Nine: SPA MOOD LIGHTS:

Most spas have some type of mood light system. The simpler method is with a light bulb and lens. The board applies 12vac to the bulb. You usually have the option to put a colored lens over the clear lens or leave the clear lens.

The replacement bulb is a standard older car dome light you can purchase at your local automotive supplier.

Manufacturers have now added the ability to add color not by a lens but with assemblies that produce a variety of colors through red, blue, and green bulbs. Some systems allow you to choose the color, some follow a certain rotation, and others allow you to start and stop at certain colors. Many systems that came with a standard clear light are upgradeable to these color light assemblies by simply unplugging the clear 120vdc bulb and plugging in the color assembly.



## Chapter Ten: Plumbing

Spas are made up of several zones. First is the heater zone. On spas with circulation pumps the piping from the filter, through the circ pump and heater, and back to the spa is typically 1".

The suction side of the spa is how the jet pumps draw water from the suction fittings on the spa and filter. These pipes are either 1 ½" or 2" pipes.

Last is the discharge zone. This is where the jet pump(s) apply water to the spa. The discharge main hose will be 1 ½" or 2". That hose will run to a "manifold" which will lower disburse water to smaller ¾" soft plastic hoses to the jets.

The soft hoses go to barb fittings so are simply installed and clamped.

The larger flex and rigid hose are glued at connections.

The key to gluing is care. First, you need clean both inside and outside of couplings and pipes that will come into contact. Then prime. Primer/cleaner remove dirt and soften the plastic. Again, do both side of the pipe where they will come together.

Finally, add a good layer of glue. I prefer "medium" body glue which is a fast setting glue. Glue and insert together and hold about 30 seconds.

The glue sets within minutes but you should wait 24 hours to fully cure. If you add water and apply pressure too early there is a good chance you will have a leak. If it leaks, usually you have to cut the parts apart and start over again.

Let's Follow the Water:

Spa WITH Small Circulation Pump.

a. Zone One. The circulation pump draws from the filter. If you have two filters it usually draws from the filter closest to the topside. So the water travels from the

filter, through the circulation pump, through the heater, through the ozone injector if you have one, and back into the spa. Usually there are 2 ports where the heated water returns to the spa.

b. Zone Two and maybe Three. The one or two larger jet pumps will draw from the filters AND the suction fittings. It does this to move the water well. The water flows through the jet pump and to a manifold. Typically one or two manifolds for each jet pump. From the manifolds the water flows into smaller ¾" soft plastic hose to one or two jets. This allows all jets in that zone to have even flow.

Spa WITH One 2 Speed jet pump and maybe a second jet Pump.

a. Pump One. Typically this is a 2 speed pump. The water flow from the one filter AND one or two suction fittings. The water proceeds through the pump and through the heater and normally a manifold. This manifold disburses the water into smaller ¾" hoses and then to one or two jets.

b. Pump Two. One or two speed pump. Water flows from filter and suction fitting through pump and into a manifold. The manifold disburses the water through ¾" hose to jets.

The key difference between spas with circulation pump and spas without is this:

Spas with circ pump have the circulation pump running 24hrs heating and filtering. The jet pumps are used only to turn on the jets.

Spas without circ pumps use the Zone or #1 pump to heat when on low and when you want jet action, you turn on the pump to high. The second pump if available is only used for jet actions.







Smaller spas have the same amount of jet action to all jets. Larger spas usually have the spa in 2 or 3 zones. The zones are activated by the operating of the jet pumps.


## Chapter Eleven: SPA JETS:

There are several methods jets are installed. One way is ½ of the jet body is placed on the plumbing side of the spa. Then the opposite half is screwed into the half with either a gasket or silicon sealer from the water side. Then the jet assembly snaps into the 2 halves.

The second method is the jet assembly inserts through the spa wall and tightened by a nut on the plumbing side. Either silicone or a gasket is used to seal the housing.

Gatsby used a large variety of jet designs... almost at times changing as they went. The following are the most common jets:

<p>Euro Jet Swirl 2" Face; 2 1/2" Long</p>	
<p>Euro Jet Directional 2" Face; 2 1/2" Long</p>	
<p>Cyclone Luxury Jet Directional 3 1/2" Face; 3 1/2" Length</p>	
<p>Cyclone Swirl 4" Face; 5" Length</p>	
<p>Luxury Jet Swirl 3 1/2" Face; 4" Length</p>	
<p>Luxury Directional 3 1/2" Face; 4" Length</p>	

<p>Micro Jet II Swirl 3" Face; 3 1/4" Length</p>	 <p>ClearCreekClearCreek</p>
<p>Micro Jet II Directional 3" Face; 3 1/4" Length</p>	 <p>ClearCreekClearCreek</p>

See these and more on our website, [www.gatsbypaparts.com](http://www.gatsbypaparts.com)



## SECTION TWO: TROUBLESHOOTING:

### **Warning:**

I need to repeat the warning given at the beginning of this manual. If you don't have a working knowledge of electricity and can safely work with electricity, then you should have a licensed electrician or properly trained service repairman handle electrical problems. We try to make this information safe but we can't cover all possibilities. Just make it a routine to turn off main power when doing any service. There are only a handful of times you might have to do tests that require power to be on. Special care must be given in those situations. Also, although some troubleshooting is reasoning on the problem and observing what is happening, at times the definitive test will require use of a volt/ohm meter. Again, if you are knowledgeable of their use it makes it easier to isolate the problem. But if you are not comfortable using a meter, it's best to consider experience help.

## TROUBLESHOOTING SECTIONS:

- I. Trips GFCI or GFI.
- II. Doesn't Heat
- III. Motor hums
- IV. Pump Leaks
- V. Error Codes on the Topside:

## I. Trips GFCI

First, check the equipment and electrical connections for any water. Water dripping onto equipment will cause the gfcI to trip.

**1.** Most common cause is the heater. If the gfcI pops instantly its almost always the heater. To isolate, do the following:

Turn off power. On MOST spas the heater is a canister heater and simply plugs into the side of the control box. If you have this style, unplug the heater cord from the side of the control box.

On models with horizontal heater connected to the control box, remove the cover on the control box. You will see 2 wires from the heater post to the board terminal. You need to disconnect both wires connecting the board to the heater posts.

Turn ON power. If the spa comes on and operates fine without tripping the gfcI as it did previously, you have identified the heater as the cause. That is common because the heater's element can crack or corrode enough for the voltage to leak and the gfcI to see the leak to ground and trip.

NOTE: On some spas the heater is not turned on until after the #1 pump comes on. You must wait until that occurs.

**2.** If the spa still trips the spa, try disconnecting the ozonator and leaving disconnected to test to see if that is the problem.

**3.** If the two steps above don't isolate the problem, then the circ or #1 pump could cause the problem. Usually the motor will be hot to the touch. But either way, sporadic gfcI failure is most likely the pump/motor.

**4.** In rare cases the gfcI tripping is caused by the board. It's the least likely cause.

## II. Doesn't Heat

If the heater light is solid and the spa is not heating, it's likely the heater. Remember, spas plugged by a cord into an outlet only gain 1-2 degrees per hour. Spas hardwired to 220-240vac will gain 5-6 degrees per hour. You might not be able to feel a different temperature of water coming out of the heater nozzle. Even touching the heater element doesn't always "feel" different.

The tech's method to test the integrity of the heater element is with an ohm meter. **TURN OFF MAIN POWER.** Set the meter to OHMS. Place each probe on the heater posts. You should get 11-15k ohms resistance. If not, you have a failed element. If the ohms is correct, the next checks:

The power to the spa. A perfect heater without proper current won't heat. **PLEASE NOTE:** that to check current you need a good meter and know how to use it safely. If you do not, seek help from someone who does or have a licensed electrician do this test.

When the heater light is ON, the heater should be receiving either 110-130vac or 220-260vac, depending on your spa and incoming power service.

To check canister heater do this: Turn off power and unplug heater cord. Turn power on. Set voltmeter to above 300vac. When the heater light is ON, carefully place probes in heater socket like you would test a wall outlet. If you have no current and no errors on the topside, the board has failed.

On spas with connected heater, follow same procedure as with canister except you do not have to remove the wires from the board to the heater. If you do not and the heater light is solid, then the board has failed and you will have to replace.

If you have the proper ohms resistance on the first test **AND** the proper voltage at the heater **AND** you gave the spa enough time to heat, several things could be the problem.

First, it's not uncommon for the above test to pass and still be misleading. The test proves true and then minutes or an hour later the heater stops heating and the heater light goes out. There will be an error code but you are not there to see. So you have to eliminate that possibility. First, remove the filter(s) and leave out for a day. Does the spa still not heat? If not, check to confirm the heater light is On or an error code is displayed, that will lead you one direction. But, if the heater

light is on all the time, you have voltage, and the resistance on the heater was correct even with the power off, then it's likely the board. What can happen is the heater relay although closed and applying voltage to the heater, it's not allowing enough current to reach the heater element to heat. To determine if that is the problem, you need to test the amperage draw when the heater is on.

What the spa tech will do is use his meter set to AMPS and test one hot wire to the spa. He will note the amperage draw when the pump comes on. Then when the board turns on the heater and the heater light is solid he will notice the meter show a large demand again. If so, the heater should be heating. Yours would not. But if you don't have a meter to check the amps or do not know how to, if you have come to this point and can't check the amps, then you should expect the board to be the cause of the heater failure.

If you are getting an error code, See the "CODES" failure section.

## **Why do Heaters Fail?**

Heaters tend to fail one of two ways. They no longer pass current through the element and therefore no longer heat.

The most common cause of this failure is water quality. Over time water quality can cause the element to "leak" current and cause the GFCI to shut down the spa. The manufacturers of elements insist that if the water is kept to "optimum" levels that the element should last forever. Their claim is that the only thing that will harm an element is the on/off of the electrical current to the heater and poor water quality that damages the element itself.

Their claim is paralleled to a light bulb. If you leave a light on and do not turn it off, it will last a long time. It's the initial startup that causes the bulb to fail (that's why this flash when you turn them on). The element on the heater is supposed to have the same problem. Since they will literally be turned on/off throughout the day over the years, they fail. That along with the water quality determines the longevity of the heater.

Therefore you can extend the life of your spa by making sure the top and sides of the spa are insulated well (to lower heat lost) and keep the water chemistry balanced and not using too much or too little chemicals.

### **III. Motor Hums**

Why does the motor hum? Because it doesn't know the words.... Sorry, just had to say that.

Humming motors is typical of a failed motor. Can internal parts be replaced? If a tech was trying to save the motor he might start with a new discharge capacitor. But other parts also can be near failure including bearings. Because of the possibilities, most techs will opt to replace the motor rather than having it rebuilt.

A major reason is economics; both for the tech and the homeowner. If the customer pays the cost of removing, rebuilding, and installing the motor and then a couple months later it fails, who is to blame? The homeowner will place the fault on the tech's shoulders. So in an effort by the tech to save the customer money turns out to create friction between tech and homeowner. Whereas replacing the motor with new makes the failure a remote possibility.

## IV. Pump Leaks

Pumps can leak for several reasons. The most likely is the seal on the pump. The seal is a 2 section construction. Basically the seal has  $\frac{1}{2}$  of the seal that's a ceramic ring with a rubber boot to seal in a seat on the main body or bracket of the seal. The other  $\frac{1}{2}$  slides onto the impellor shaft and contains a rubber seal and has a steel spring to compress both  $\frac{1}{2}$ 's to seal. There are 3 rubber parts of the seal that can leak.

Next possibility is the rubber o-ring that seals the 2 halves of the pump together. If you have leak from there make sure the bolts or screws that hold the halves together are tight or not stripped. The  $\frac{1}{2}$ 's of the pump must be tight together.

Rarely but possible are the o-ring seals of the pump union seals. These are the seals where the plumbing connects to the pump. This is call a union and has a o-ring. Usually you can hand tighten the union and stop the drips.

Finally, in rare exceptions the pump body has a crack.

For me, I have found that replacing the whole pump makes sense. Often you replace the part you think is leaking, fill the spa and turn it on and find it still leaking. Therefore, it makes sense for time and effort to replace the pump. It's the only option I give my customers.

## V. Error Codes Defined and Their Fix

### On 1042 and 1044 Boards:

**HtS** Board sees the High Limit Sensor has failed, it will give the HtS error or HtS and Oht.

**FIX:** Either error, you must replace the High Limit sensor. The problem could be the board but likely it's the sensor unless the water IS hot (see overheating spa problem later). To replace Oh sensor is simple. The most common OH sensor has 2 crimp connections on one end. The board has a post for each crimp. The other end is held against the heater by a clip with a wing nut that clamps the sensor to the heater. On a limit number of spa models have a high limit "disk" that is held against the heater with 2 nuts. This is easy to replace. Remove the 2 nuts and swap new disc. Move wires to same post on new disk and you are done.

**tS** Board sees failure of the temperature sensor.

**FIX:** Likely means failure of the sensor. COULD mean failure of the board but typically and cheaper is the sensor. Gatsby spas have 2 type of temp sensors; dry well and wet well. Dry well means the sensor inserts into a housing that goes through the spa's wall. So the sensor is close to the spas water but not actually in the water. "Wet well" sensors actual have the tip of the sensor in the water. IF you can touch/see the stainless steel tip in the water, you have a wet well. Most likely you will see the sensor in the dry well housing.

Both have one end that consists of two crimp connections. Simply pull off old and plug in new.

On dry well sensors, you may have a rubber plug or small twist cap holding the sensor in the well. Remove and swap. On "wet well" sensors, typically you pull out the old and insert the new. Be aware that this is a hole in your spa's shell so if you have water in the spa, it will pour out. So do quickly or with water below the sensor's level.

**PS2** Board sees the pressure/flow switch is stuck closed.

**FIX:** Replace pressure or flow switch. Most models have a pressure switch. Pressure switches screw into the heater. If you have a canister heater, you remove the black cover and it will expose the pressure switch. Horizontal heaters have a pressure switch you get access to through the inside of the control box.



Most pressure switches used by Gatsby can be hand removed and replaced. They use a plastic threaded switch. The new may have red pipe dope already on the thread. If not, you must add plumbers putty or Teflon tape on the thread to avoid leaks. Only tighten to slightly snug. If over tighten you will damage the threads and worst, break the pressure switch inside the heater.

The wires are not polarized. Simple unplug and plug wires into new switch posts. The switch is not directional.

Flow switches mount into the piping. Usually the new switch comes with housing. If not, you can remove the new and swap into old housing. Key is this switch IS directional. Piping and switch have water flow arrows to match with water flow. This is important.

**PS1** Board sees lack of water flow after it turned the circ or low speed pump on.

FIX: First, turn off power and remove and leave filters out. Power up.

Touch nothing but look at water. Do you see water moving?

If yes, wait to see if PS1 returns. If not, replace filters.

If PS1 returns, replace pressure switch or flow switch. (see above)

If you do NOT see water moving, likely the circulation pump or low speed pump has failed. You confirm by checking the voltage to the pump. If voltage is present and pump is not turning on, replace pump. If correct power is not present, replace board.

**DCP** DC power error.

IFIX: hate this error code. In THEORY it means “dc power” error which means either incoming power is poor or failed OR the transformer is failing. On all the service calls I have made, this code has never been accurate. It always means a damaged board. If you have a small circulation pump, the dcp error means you likely have a failed board. If you have a 2 speed pump behind the control box that feeds the heater, I have seen the vibration of the pump cause the error and eventually the failure of the pump. You will confirm that the pump is causing the problem because if you turn the spa off and on after a couple minutes, the spa is good for awhile AND the low speed on the pump will be noisy. If this occurs, email me and I can give you suggestions how to quiet the pump. You might still have to replace the board but you can eliminate the possible damage the vibration the spa creates that seemly damages some board.

**FLO** Board sees low or no amperage draw by the circ pump or low speed pump.

FIX: This board has an uncommon ability to look at amp draw of the

pump. If it detects the draw is below what it expects, it's a good indication your circulation pump or 2 speed pump is failing.

**FC** Board sees cold water

FIX: Means Freeze Control. It's automatic. It comes on when water goes below 60 degrees (such as when you change the water). Its telling you the water is cold and it will turn all pumps on periodically to avoid the spa from freezing. When the spa heats, this feature will automatically cancel. It's a nice feature to protect your spa from freezing if the heater fails.

**Ht** High Temperature

FIX: Means the water has reached at least 110 degrees and will shut all jets off. If you have an air blower, it will come on to try to cool the spa. Once the spa cools the unit will come back on. (not uncommon in summer heat)

**Oht** Over Heat Error

FIX: Water has reached 120 and the spa shuts completely down. It will not reset until you power off and then back on.

OPTIONAL MODES ON TOPSIDE

**ECON:** Turns off heater but jets and light work.

**STAN:** Standard mode. All functions work.

**The 6600-287 Board:**

**SN1** High Limit Sensor Failure.

FIX: Replace sensor (might be a board failure but more likely the sensor). Most board models use a high limit disc. It is located pressed against the heater when you open the control box cover. With power out, remove the 2 nuts holding the disc against the heater. Swap disc. Swap wires. Done.

**SN2** Temp Sensor Failure.

FIX: Replace sensor (might be a board failure but more likely the sensor). The most common temp sensor on this model is a gray stud that is located on the spa shell. To replace, drain the water below this sensor stud. Open the control box cover and identify the temp sensor where it connects to the board. Unplug and fish wires out of the control box. You will either see the temp sensor on the spa's shell or by the filter. If the wire goes into a 1/2" flex hose, do the following:

Tie string to old sensor wire. Unbolt temp sensor stud. Pull the sensor while feeding the string through the hose. When the hold old wire is out and you have the string now in the hose, move the string to the new sensor and reverse pulling the new sensor wire through the hose.

Tighten the new temp sensor in place, only to snug. If you over tighten you could break the new holding the sensor to the shell. Plug the temp sensor wires back into the board.

**FL1** Pressure switch not closing when heat pump is on.

FIX: First try removing the filters and power up. If nothing, do you SEE water moving? If no, likely the circulation or #1 pump. You can confirm that proper current is being applied to the pump motor. If yes, replace pump/motor. If no, replace board.

If you Do see water moving, then error is likely the pressure or flow switch. Replace. See above how to replace.

**FL2** Pressure switch is not opening.

FIX: Replace pressure or flow switch. See how above.

**COL** Cool condition.

FIX: None. Will reset when water is heated. Normal to happen when water is changed and water is cold. If water keeps getting colder, see below.

**ICE** Water is below 55 degrees. Jets will come on until water heats.

FIX: Spa is getting worried the water is getting cold. Alright, if everything seems fine, heater light is on, on other error code, but the water IS getting colder, then one of two things is likely.

Most common is the heater has failed. The spa is applying current to the heater but the heater is not doing it its job. Replace heater (see heater section).

Second possibility is the board is saying it is powering the heater but is not. When this happens, you must replace the board.

**OH** Water is going over 110 degrees

FIX: If the water IS overheating, then either the temp sensor or the board has failed. If the heater is NOT getting hot, then the Temp sensor has failed.

**- - -** Watchdog mode.

FIX: Water heated to 120 degrees or board has internal faults. If the water DOES overheat, see error code OH. If the water doesn't heat but you got this error, first turn off power for several hours and restart. If the error returns, then next step is replacing the temp sensor. This has commonly solved the problem. If this doesn't solve the problem, replace pboard.

Remember:

We are always an email away. Email at [asktheexpert@clearcreekspas.com](mailto:asktheexpert@clearcreekspas.com) and we will be happy to reply to any inquiry.

**Copyrighted 2010  
All Rights Reserved**

**Any Reproduction, Copying, or Distributing of any part or pictures of this Manual without the written consent of B. Bouman and Company, LLC, is prohibited by law.**