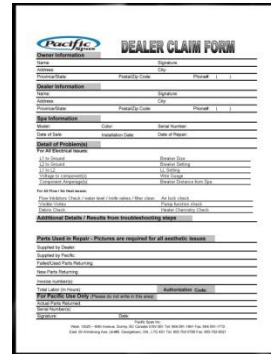


# Troubleshooting Tools and Strategies

Note: All electrical work must be performed by a certified electrician. Do not attempt to perform electrical work on a spa unless you are a certified electrician. This guide is for educational purposes only.



A form titled "Pacific Spas DEALER CLAIM FORM". It contains sections for Dealer Information, Spa Information, and Special Features. The form is designed for recording details of a spa purchase and any issues that may arise.



## ***Troubleshooting Tools & Strategies - Tools***

The following is recommended as a minimum for onsite troubleshooting and repair:

***Screw Driver Bit Set***  
***Hand Screw Driver Set***  
***Small Hacksaw***  
***Water Proof PVC Glue***  
***Clear PVC Primer***  
***Flex pipe Assorted***  
***Assorted PVC Fittings***  
***Cell Phone***  
***Meter (amp loop style)***  
***Pacific Service Manual***  
***Submersible pump***

***1 ¼" Drain hose***  
***Head Band LED Light***  
***Teflon Tape***  
***Silicone***  
***Batteries for Meter***  
***Any needed parts as per troubleshooting.***  
***O-Rings Assorted***  
***Silicone Lubricant***  
***Channel Locks x2***  
***Cordless Drill***

***Shop Vac***  
***Camera***  
***Wire pad or brush for drill***



# Troubleshooting Tools & Strategies - Tools

Record-keeping is essential to troubleshooting any complex system. Keep all records of all the information received, the equipment configuration, previous problems and their solutions, and installation dates.



ABER Hot Tub Manufacturing Ltd.  
13025 - 80th Avenue  
Surrey, BC  
Canada V3W 3B1

**Invoice**  
DATE: 7/23/2001  
INVOICE NO.: 01-2742

**SOLD TO:**  
SAVII Spas Products Ltd.  
One House of Cedar  
1712 Steeles St. North  
Windsor, ON N2J 3K6  
1-800-1237-166

**SHIP TO:**  
House of Cedar  
210 Steeles St. North  
Windsor, ON N2J 3K6

**PAID**

P.O. NO.	TERMS	REP.	SHIP DATE	SHIP VIA	SALES ORDER
52485.01	Net 15	RC	7/23/2001	Georgetown	81975

QTY	DESCRIPTION	UNIT #	RATE	AMOUNT
	Model DISCOVERY Hot Tub - Galaxy Green Serial# 1200 1 Granite Finish Upgrade 1 SpaJet System - 160Aure 1 SpaJet System - 160Aure 1 Hot Tub Deck Panel 1 Cover #3 Energy Shield - Emerald Business Number: 87NOM028	011028		

This does not pass until invoice paid in full. Warranty claim parts must be approved within 30 days of installation and shipping to qualify for full credit. Interest chargeable on all invoices at 12% p.a. after 30 days unpaid.

GR1 \_\_\_\_\_  
PST \_\_\_\_\_

**TOTAL**



# ***Troubleshooting Tools & Strategies – Basic Strategy***

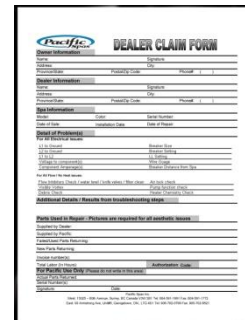
The troubleshooting process is often a combination of standard procedures and creativity, however there is a basic strategy to follow when beginning the troubleshooting process:

- A) Get as much information as possible before going on site and while on site.
- B) Eliminate the obvious causes of the problem.
- C) Isolate the problem to a specific component or components
- D) Bring replacement parts for all potentially affected components to the repair site.
- E) Make only one change at a time.
- F) Reassess after each change.



# Troubleshooting Tools & Strategies – Basic Strategy

1. Analyze symptoms and factors. Listen and ask questions.
2. Isolate the source of the problem.
3. Define a Game Plan.
4. Attempt to solve the issue.
5. Reassess once the resolution has been performed - is the issue resolved?





## ***Troubleshooting*** - 1. **Analyze symptoms and factors.**

### **Listen and ask questions:**

- Review the problem carefully.
- What facts are you given?
- Do you need to find out more?
- Ask yourself if you've seen a problem similar to this one. If so, what is similar about it?
- What did you need to do?



The first step to resolving any problem is to identify and interpret the symptoms. You will invariably get feedback from your customers about how the spa is running.

## ***Troubleshooting*** - 1. **Analyze symptoms and factors.**

Start troubleshooting by analyzing symptoms to determine a strategy for resolving the problem. You will need to adapt the questions to suit the issue. Consider the following questions:



### **Chronological Factors**

- When does the issue occur?
- Has this issue ever occurred before?
- When did the issue begin?
- Is the issue reproducible or random?
- Does the issue occur in one or all spa function modes?
- Have you changed anything in the spa, such as adding or removing components or programming changes?
- Has the spa worked previously? If so, what has changed?



## ***Troubleshooting*** - 1. **Analyze symptoms and factors.**

Start troubleshooting by analyzing symptoms to determine a strategy for resolving the problem. You will need to adapt the questions to suit the issue. Consider the following questions:

If appropriate consider **factors outside the spa**

What is the breaker size?

What is the wire gauge?

How far is the breaker from the spa?

How old is the wire?

Are there leaves or pine needles in the area?

Is the spa leveled?

What is the ambient temperature?

What is the temperature in the equipment area? (+60C?)



## ***Troubleshooting - 1. Analyze symptoms and factors.***

Start troubleshooting by analyzing symptoms to determine a strategy for resolving the problem. You will need to adapt the questions to suit the issue.

- What is the model / serial number?
- Are there any error messages?
- What is the water temperature?
- What is the set temperature?
- Is the change expected or unusual?
- Does the issue interfere with vital operations?
- Does the issue affect one or many devices?
- Is the issue reproducible or random?
- Is the issue specific to a Pacific component, such as a topside malfunction or heater error code?
- Does the issue occur in any or all other spa function modes?
- Have you changed anything in the spa, such as adding or removing components or programming changes?
- How many vents are on the door?



# ***Troubleshooting - 1. Analyze symptoms and factors.***

## Electrical Issues

Is there an error message?

Has there been a power surge or brownout?

Is the error message accurate? (i.e.; FLO but there is flow)

Does resetting the breaker correct the issue?

Have the fuses been checked?

Have the connections been checked?

Have the connectors & pins been checked?

What is the breaker size?

What is the breaker setting?

What is the Low Level Programming setting?



# ***Troubleshooting - 1. Analyze symptoms and factors.***

## Electrical Issues

What is the wire gauge?

How far is the breaker from the spa?

How old is the wire?

What is the incoming voltage of Line 1 to Ground?

What is the incoming voltage of Line 2 to Ground?

What is the incoming voltage of Line 1 to Line 2?

What is the outgoing voltage to the affected component(s)?

What is the amperage of the affected component? (L / H if jet pump)

Blower overheats – are all jets & air controls open?



## ***Troubleshooting - 1. Analyze symptoms and factors.***

### Overheating Pump Issues

What is the breaker size?

What is the breaker setting?

What is the Low Level Programming setting?

What is the wire gauge?

How far is the breaker from the spa?

How old is the wire?

What is the incoming voltage of Line 1 to Ground?

What is the incoming voltage of Line 2 to Ground?

What is the incoming voltage of Line 1 to Line 2?



## ***Troubleshooting - 1. Analyze symptoms and factors.***

### Overheating Pump Issues

What is the outgoing voltage to the affected component(s)?

What is the amperage of the affected component? (low / high if jet pump)

How much space in cubic feet is in the pump area for ventilation?

How many vents are on the pump door?

Are the vents positioned so that the pumps can breathe?

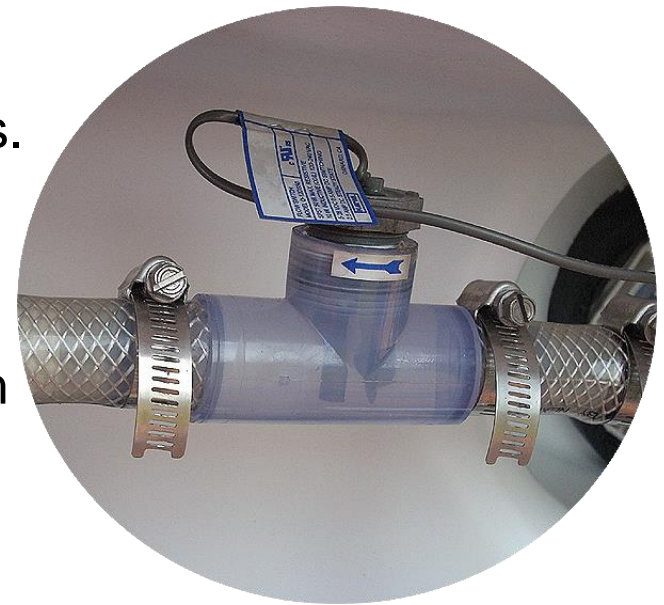




# ***Troubleshooting - 1. Analyze symptoms and factors.***

## ***Flow Issues***

- When was the spa last filled and how?
- Is the water level 3" above the skimmer?
- Are the knife valves open?
- Are the filters clean? If unsure run without filters.
- Is the bypass plugged?
- Can you see a vortex with the pump on high?
- Can you see debris?
- Is the inside of the heater blocked or caked with debris?
- Does Pump 1 run when the Pump 1 key is pressed?
- Is the circulation pump running?



## ***Troubleshooting - 1. Analyze symptoms and factors.***

### ***Flow Issues***

**For in.therm;**

Is the element within 1/8 " of the housing?

Is the housing caked with debris?

Is the element loose?

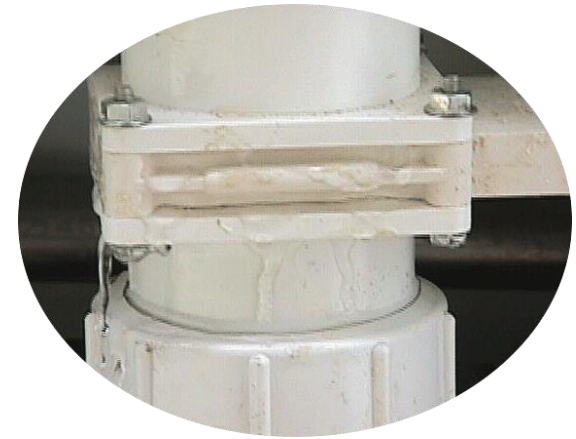


## ***Troubleshooting - 1. Analyze symptoms and factors.***

### ***Plumbing Issues, Leaks***

The drop test will consist of measuring the water loss in the spa in two separate 24 hour periods. This is done by placing masking tape at the water line, allowing the spa to run normally for 24 hours having engaged the pumps on high speed for two 20 minute cycles with no one entering the spa.

The water drop is measured by measuring the distance in between the tape and the water line the next day. The second test is done in the same manner except that the breaker is off and there is no power to the spa.



## ***Troubleshooting - 2. Isolate the source of the problem.***

You can resolve a problem faster by **systematically isolating and testing error conditions**. Eliminating variables helps to determine a problem's cause.



For example;

- consider asking to see whether a vortex exists to identify flow.
- consider detaching all components and re-attaching them one at a time to identify the component that trips the breaker.
- Bypassing a pressure switch to confirm flow to the circuit board.

If a component doesn't work properly after being replaced or a programming change, replace the new version with the original item and then retest it.

## **Troubleshooting – 3. The Game Plan.**

**Define your strategies to solve this problem.**

- Have you seen a problem like this before?
- Identify what you did.
- Consult technical support resources whenever needed.

If you contact Technical Support personnel, make note of the serial number, the current status, all modifications and their effect on symptoms. This information helps them troubleshoot the issue. Also, the information provides an excellent reference for future troubleshooting.

When possible, check the technical manual. Suggestions from the manual could save you time in tracking down the source of the problem and might give you ideas that can help with troubleshooting.



## ***Troubleshooting – 4. Attempt to Resolve the issue.***

After you develop a theory about the cause of the problem, test your theory. The test must conclusively prove or disprove your theory.

- If your strategy doesn't work, it may lead you to an 'aha' moment and to a strategy that does work.
- If you cannot reproduce a problem, then no problem exists unless it happens again on its own.



## ***Troubleshooting*** – 5. **Reassess**

Reflect: This part is critical.

Look over your solution.

Is the issue resolved? If not is the next step clear?

Contact Technical Service whenever needed.

At times there may be more than one issue and it will be necessary to address each separately.

Keep a record of all service calls for future reference.

