

Rip Current Simulator User's Manual



Thank you for your purchase of the Rip Current Simulator (Patent Pending). This display was designed to demonstrate how a rip current works by simulating one of the several beach topographies that can cause one in a tabletop, interactive format. Almost all of the rip current safety-related materials available today consist of signage, pamphlets and videos. This display creates an actual rip current in a water-filled container that allows the user to actively interact with it by placing "swimmers" in different locations and watching how the rip current carries them "out to sea" and demonstrates that "swimming" parallel to the shore will return them back to the beach.

Description:

This Rip Current Simulator consists of a 2-foot square plastic box that is 8" high. Inside this box is a custom-manufactured beach topography that is used to create the rip current effect. This topography consists of a beach line that slopes down, forms a channel parallel to the beach, then rises again to form a sandbar that has a channel cut through it. From the sandbar, the bottom then slopes off into the deep end of the box.



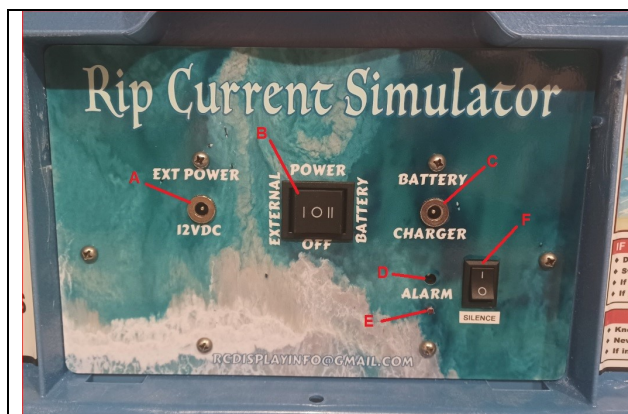
The simulator is filled with approximately 5 gallons of water. Located in the deep end of the box are 2 small submerged water pumps that move water from the deep end towards the beach. As the water flows over the sandbar, it enters the channel and then exits back out into the deep end through the channel cut through the sandbar, creating the rip current. Users can place simulated swimmers (ping-pong balls, rubber ducks, etc.) in the water at different locations and see, in real time, how the rip current works.



The simulator is designed to be easily transported and setup. It is powered by either a plug-in wall-wart-type power supply or the built-in battery, both of which are included.

WARNING: If using the External Power supply to power this display it MUST be plugged into a GFCI-protected outlet!

Also included is a battery charger, spare pump and several "swimmers". The display has a removable top cover that can be used as a white board for drawing diagrams, etc., to supplement the learning experience and the exterior of the display is decorated with several graphics relating to rip current safety. On the front is a control panel used for controlling the display. To protect the battery, the control panel has an audible and visible alarm that will activate when the battery voltage gets close a point that damage might occur to the battery if not recharged soon.



- A – Power Jack for External Power Supply.
- B – 3-Position Power Selection Switch.
- C – Power Jack for Battery Charger.
- D – Battery Low Voltage Alarm (Audible).
- E – Battery Low Voltage LED.
- F – Audible Alarm Silence Switch.

When you receive your display, it will include everything that you need to get the display up and running right away. One exception is the battery. It will be shipped to you separately via Amazon. This is done to assure that you get a fresh battery. The display (empty, with battery and lid installed), weighs only 20

pounds and is easily carried by one person. You may want to order a small, collapsible dolly (see Accessory List at bottom of this document) to make transportation even easier.

Battery Installation / Replacement:

Once you have both the display and battery, you will need to install the battery into the display. The battery is held in place by an internal battery holder located behind the control panel. Following are detailed instructions on installing and replacing the battery.

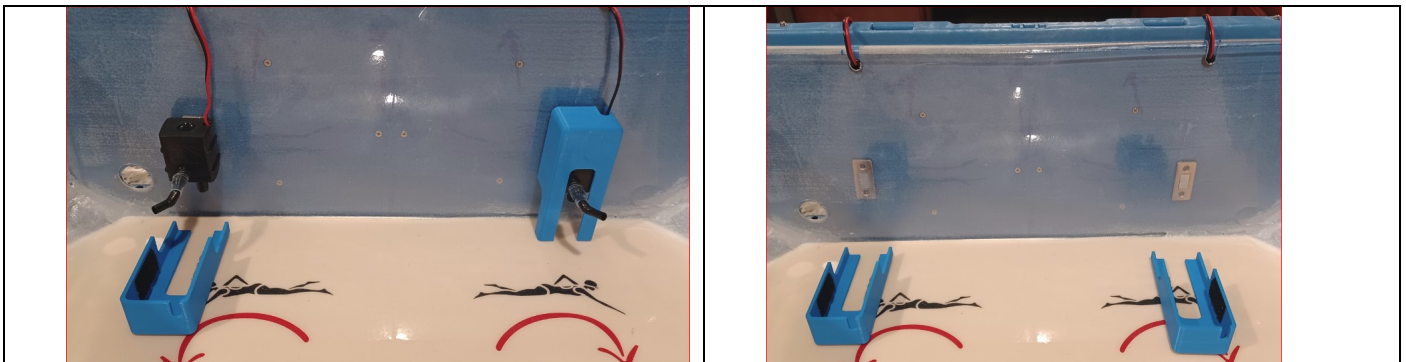
Installation of New Battery:

Note: This procedure is to be performed when you first receive your display. The battery will be shipped to you separately and you will need to install it. New battery should be fully charged (with included charger) before installing.

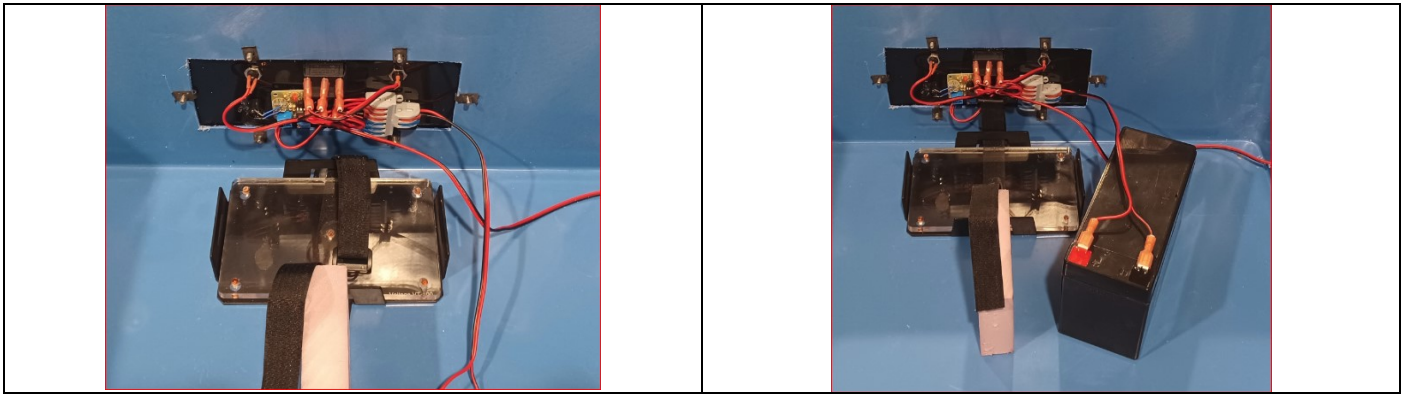
1. Place empty display on stable table-top and remove cover.
2. Remove the brass cover on the drain at the back of the display. Make sure you don't lose the rubber gasket in the cap.



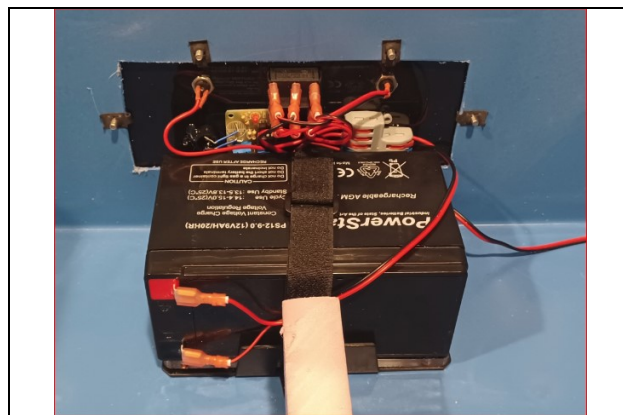
3. Using the supplied plastic wrench, loosen the brass nut on the drain and remove it and the black gasket.
4. Remove the brass drain. (NOTE: this drain may not be installed when you first receive your display).
5. The pumps on the inside are held in place with magnets. Remove the pump covers and then hang the pumps over the back of the display.



6. The entire plastic internal shell can now be lifted out of the blue plastic external shell, exposing the battery holder.



7. The battery is secured into the holder with a Velcro strip. Unbuckle the strip and tuck it out of the way.
8. Place new battery inside and hook the 2 battery wires to the battery terminals. The red wire will go to the red battery terminal (positive) and the black wire will go to the other (negative) terminal. Note that the black wire may have a red strip on it, but it will be mostly black. The red wire will be completely red.
9. Position the battery on its side in the battery holder as shown below and secure the battery in place with the Velcro strip.

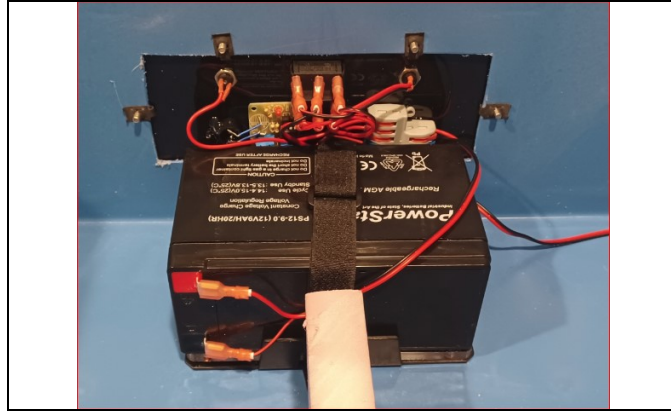


10. Test installation by switching 3-position Power Selection switch to the "Battery" position and you should hear the small water pumps power up.
11. Reinstall internal shell, pumps and drain by reversing steps 6 – 2.

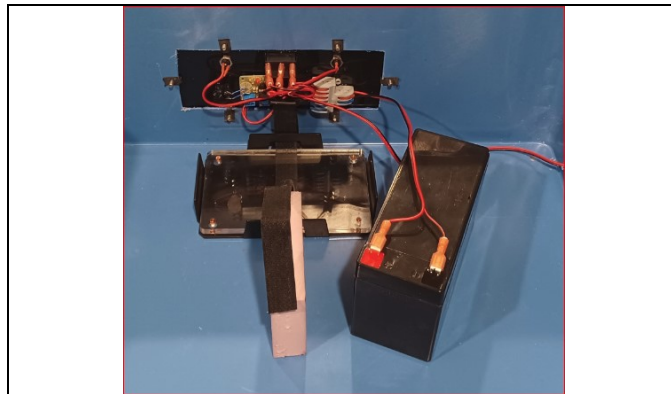
Removal of Old Battery:

In the event that your battery will no longer hold a charge, it will need to be replaced. Replacement batteries are available through Amazon and many other suppliers. It is a common 12VDC battery similar to what is used in UPS power backup systems. When looking for a replacement, look for one with the following specifications: 12VDC SLA (Sealed Lead Acid) battery with 9 AH (Amp Hour) capacity.

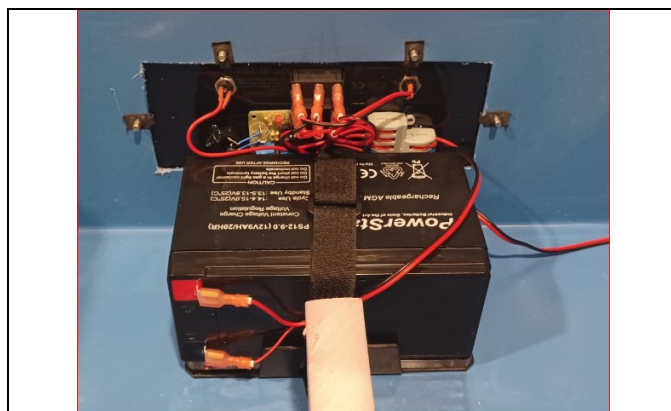
To begin the battery replacement, repeat steps 1 – 6 of the Installation of New Battery section to expose the internal battery.



1. The battery is secured into the battery holder with a Velcro strip. Disconnect and position the loose strip out of the way.
2. Stand battery up and carefully remove the 2 wires to the battery.



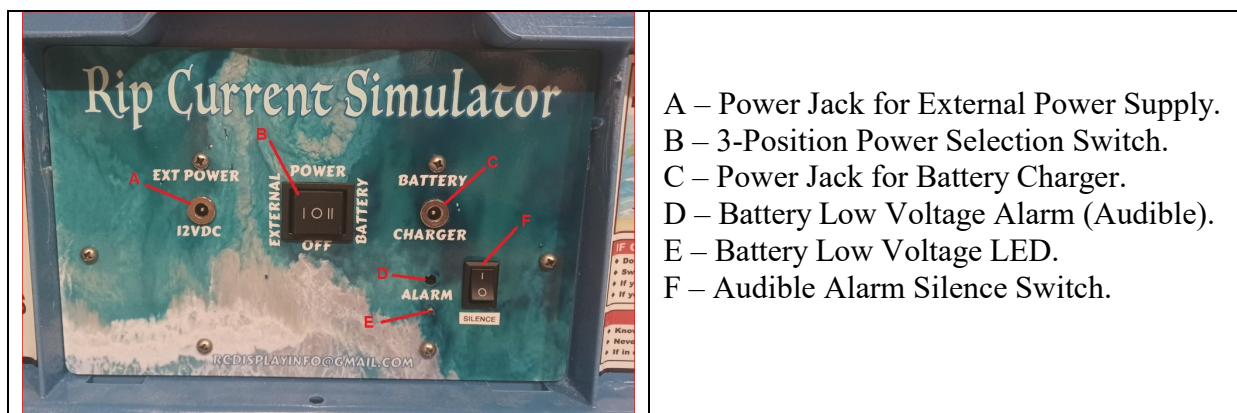
3. Attach battery cables from control panel to the new battery. The red cable will go to the terminal on the battery with the red patch (positive) and the black cable will go to the other terminal.
4. Slide battery, on its side, down into battery holder. Run upper Velcro strip through plastic buckle on lower strip, pull tight and fold over. Battery should now be snugly secured in place and should not move around too much.



5. Test installation by switching 3-position Power Selection switch to the "Battery" position and you should hear the small water pumps power up.
6. Switch Power Selection Switch back to the center (Off) position. Battery installation is complete.
7. Reinstall internal shell, pumps and drain by reversing steps 6 – 2.

Battery Notes:

The battery used in this display is a 12V 9Ah (amp-hour) sealed lead acid (SLA) battery similar to what is used in UPS power backup systems. Replacement batteries are available through Amazon and cost approx. \$30-\$40 (see Accessory Table at end of document). With proper care and maintenance, the battery you receive with the initial purchase should last several years. As mentioned, there is an audible low battery alarm that sounds when the battery voltage gets low as well as a LED indicator.



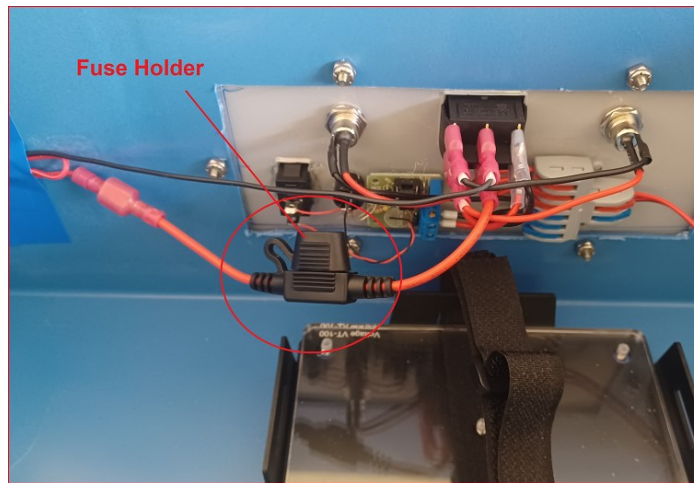
- A – Power Jack for External Power Supply.
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When you hear the alarm, you should attach the battery charger to the battery via the control panel (power jack labeled "Battery Charger" located to the right of the Power Selection switch) as soon as convenient. There is an Alarm Silence switch on the control panel that will silence the alarm but will not extinguish the Alarm LED. When the battery voltage returns to a good level, the alarm will silence and the LED will go out. After charging the battery, don't forget to turn off the Alarm Silence Switch or you may miss the next alarm event. The Power Selection switch should be in the OFF position when charging. It is good practice to leave the battery charger attached to the display and plugged into a wall outlet whenever the display is not in use. The battery charger has a LED indicator on it that will indicate the progress of the charge. When it is red, the battery is charging. When the indicator turns green, the battery is fully charged and ready to use. If the red indicator does not go out after about 12 hours of charging, then the battery needs to be replaced using the steps presented above. The display can still be used without a battery by using the included 12V power supply (marked "DISPLAY"). It is plugged into the control panel at the External Power Jack located to the right of the Power Selection Switch. To use this source of power, switch the Power Selection Switch to the "EXTERNAL" position. Please use caution when using this power source in a wet location.

WARNING: If using the External Power supply to power this display it MUST be plugged into a GFCI-protected outlet!

Fuse Replacement:

In the unlikely event that a short circuit occurs in the circuitry, there is a fuse that will protect the display and user(s). The fuse is located inside the display near the front panel. You can access this fuse by removing the beach form as previously described and locating the in-line fuse holder. It will look like what is circled below:



To change the fuse, just lift the protective rubber cover, pull out the old fuse, replace with a new one and close the rubber cover again. The fuse is a readily available mini blade fuse rated at 2A and is available at any auto parts store. One spare fuse is included with the display.

Display Setup:

To set up display for use, follow these directions:

1. Place display on a level, sturdy surface. It is important that the display is level for the display to work properly. You will need approx. 5 gallons of water which will add 40 pounds to the weight of the display, so make sure whatever you set this on can handle the weight and resists tipping.
2. Remove cover. The cover is secured by 4 small plastic thumb-nuts located at the 4 corners of the lid. Be careful not to lose them. The cover can act as a white board for diagrams and notes.
3. Make sure drain cap is installed. If display is on a table top or other elevated surface, it is best to have the display positioned such that the drain slightly over-hangs the surface to simplify draining. Make sure that location can handle at least 60 pounds of weight and is not easily tipped.



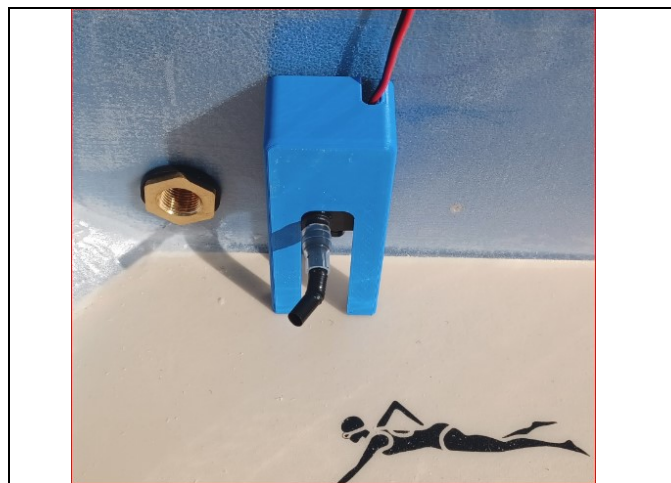
4. Add approximately 5 gallons of fresh water to the display until the level of water is just beneath the level of the beach. You can play with different levels until you get what you like, then mark the level with a Sharpie for future reference.



5. Attach external power supply if not using battery source.

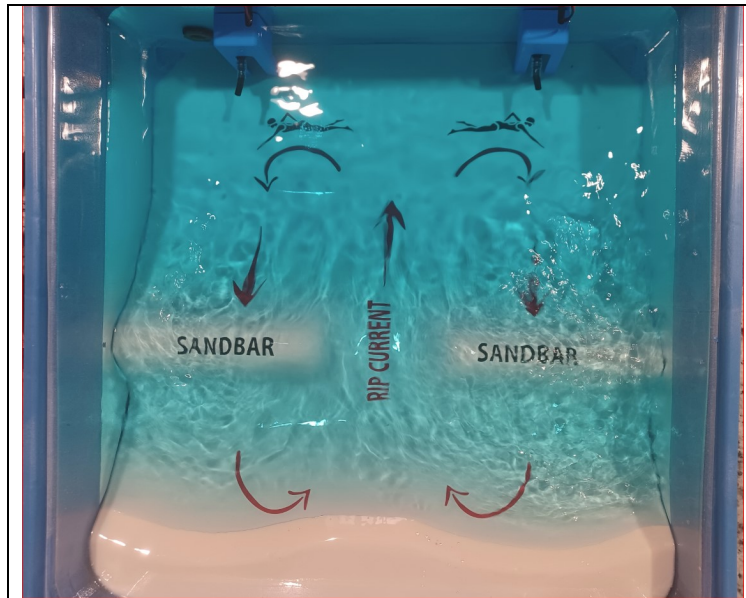
WARNING: If using the External Power supply to power this display it MUST be plugged into a GFCI-protected outlet!

6. Switch Power Selection Switch to select the appropriate power source and pumps should begin pumping.
7. The pumps are equipped with directional nozzles that allow you to adjust the flow of water towards the beach in order to get the desired effect. Place "swimmers" in water to test water flow (current).



8. Display is ready! Have the spectators place the swimmers in different locations so that they can see how the currents can work for or against them. Feel free to decorate the beach with small beach-related decorations.

TIP! Add some blue food color to the water. It will make it look more “ocean-like” and accentuate the differences in depth.



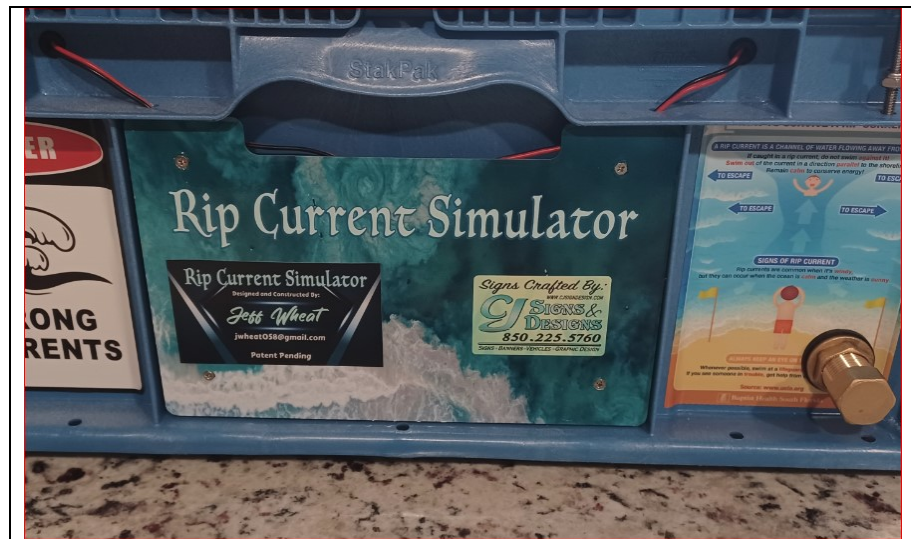
Display Take-Down:

1. Turn off power to the display by switching the Power Selection Switch to the OFF position.
2. Remove the drain plug and drain the water into a bucket (or directly on ground, if located outside). Not all of the water will completely drain. When little or no water is draining out of the drain, tip the box on its side to empty out the rest.
3. When drained, use a towel to dry interior of display. Remove pumps (attached by magnets) and shake out water. Dry them off and re-mount them.
4. Replace cover and secure with thumb-nuts.
5. It is best to recharge the battery after using the display and if the display is to be stored for more than a couple of weeks, you might want to leave it connected to the charger. Always recharge the battery before use so that you can get full use of your display. It is recommended that if you know you are going to use your display, you put it on the charger the night before.

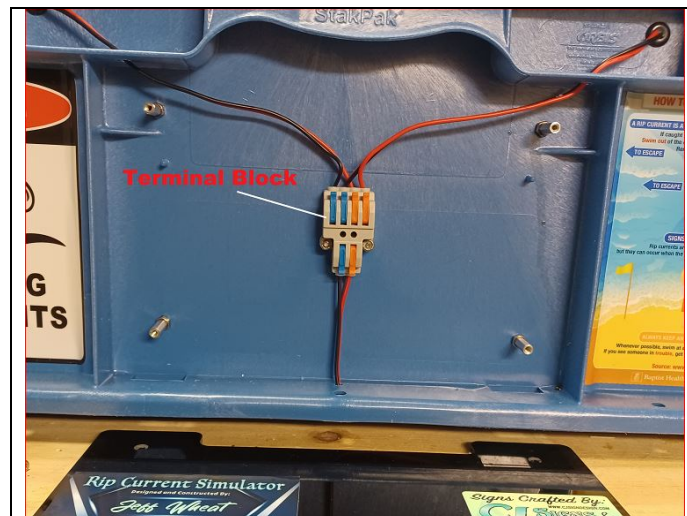
Pump Replacement:

The display is shipped with 2 pumps installed along with a spare pump that is easily replaced should one fail. Additional replacement pumps are available via Amazon (see accessory table at end of document). To replace a pump, follow these steps:

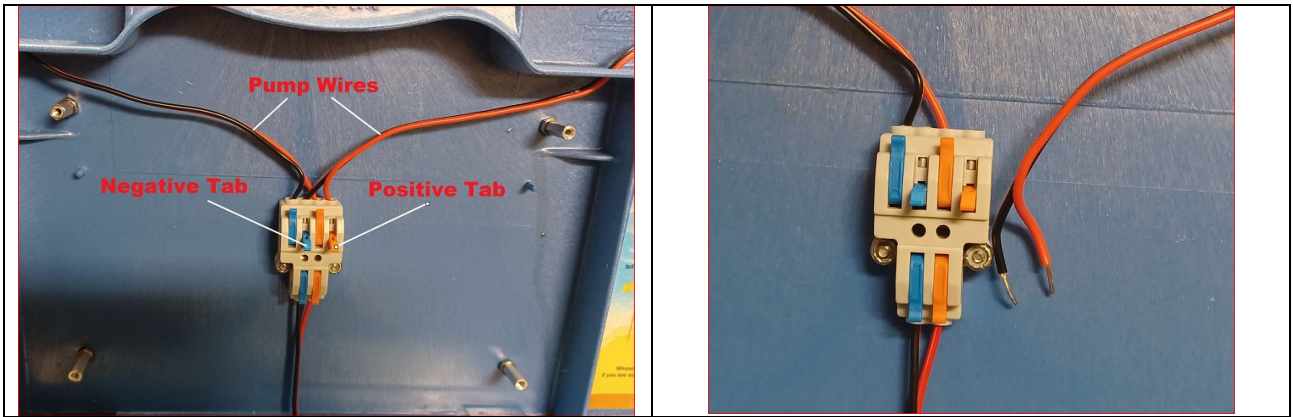
1. Turn off power to the display.
2. On the back side of the display is an access panel that covers the connection point for the 2 pumps. It is held in place by 4 small Phillips-head screws.



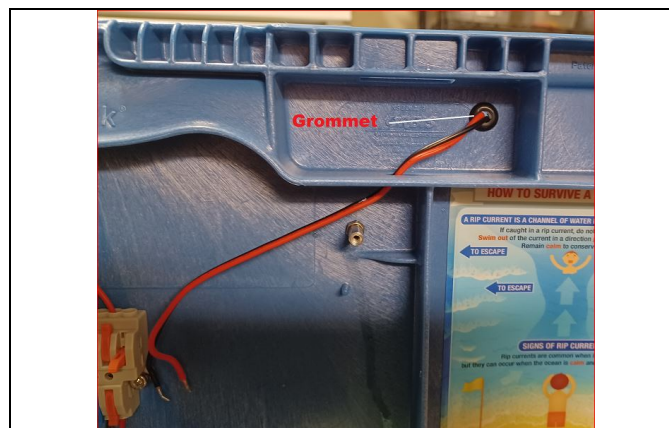
3. Remove the screws and set the panel aside.
4. You will see a terminal block with orange and blue tabs on it and 2 wires (red and black) attaching to it from the bottom and 4 wires attaching to it from the top. The top 4 wires go to the 2 pumps.



5. To remove the wires for the defective pump, follow those wires from the pump, through the grommet and to the terminal block.
6. The red wire (positive) from that pump is attached to an orange-tabbed terminal and the black wire (negative) from that pump will go to the blue-tabbed terminal on that block. Note that the 2 black wires are side by side and the 2 red wires are side by side.
7. To remove those wires from the block, lift the orange and blue tabs for that wire until they are 90 degrees (sticking straight out) from their original position.



8. Lift wires out of the terminal block.
9. Remove pump from magnetic mount and feed wires through hole and grommet leading into the box.

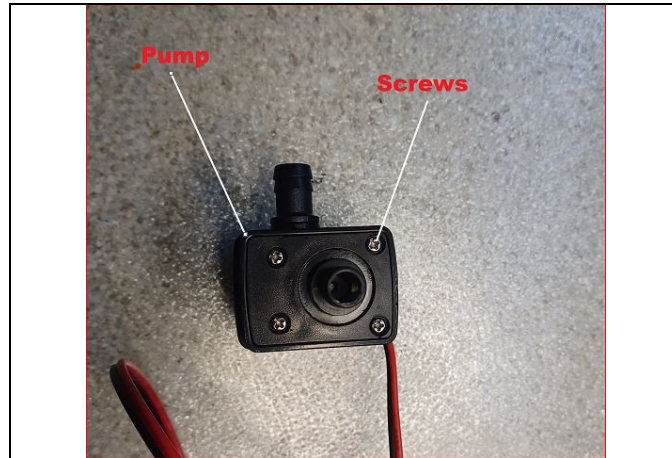


10. Make sure there is a magnetic plate on the new replacement pump and feed the wires back through the grommet and hole down to the terminal block.
11. Strip the leads of the pump wires so that there is at least 1/4" of wire exposed from the insulation (if not already done for you).
12. Insert the red wire into the orange-tabbed terminal and flip that tab back down flat. The wire should be snugly attached to the terminal block. If not, re-lift that tab and try again.
13. Repeat this for the black wire (to blue-tabbed terminal).
14. Turn the power on at the front control panel by switching the 3-position Power Selection switch to the Battery position.
15. Both pumps should now make noise, indicating that they are functioning. It does not hurt the pumps to run dry for short periods of time. If a pump is not working, check the insertion of the wires for that pump into the terminal block. If inserted too far or not far enough, the contacts won't make contact with the wire. Also, double check that the red wire is inserted into a orange terminal and the black wire is inserted into the blue terminal.
16. If all good, replace the back access panel using the 4 screws and return the replaced pump to the magnetic mount.

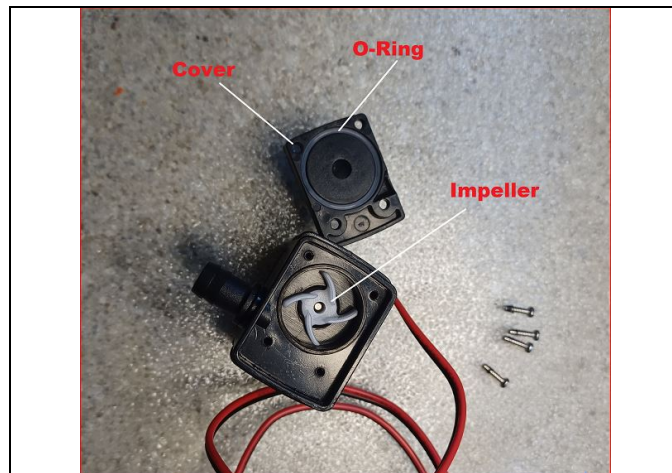
Pump Repair:

In many cases, a pump may stop working because something (sand, etc.) has become lodged in its impeller (what moves the water). You can check this by removing the pump from the display, as described above and opening the pump up.

1. If you look at the end of the pump that is opposite from where the wires enter the pump body, you will see 4 very tiny Phillips screws.



2. Very carefully, remove those 4 screws being careful not to lose any.
3. Lift that cover off by gently pulling on the nozzle. Be careful not to lose the O-ring located on the cover.



4. Using your little screwdriver, try to spin the impeller (white). It should spin freely. If not, it is jammed.
5. Grab the impeller with some tweezers or small needle-nose pliers and gently pull up on the impeller. It should come right out. There are no other loose or removable parts.



6. Clean all surfaces of the impeller and inside the pump housing where the impeller goes (with a Q-tip) making sure there is no foreign material attached.
7. Re-insert impeller into pump body and test for easy spin. If all good, replace cover using small screws. Make sure small white O-ring is still in place.
8. Test operation by applying 12VDC to pump wires. You should easily hear its operation if it is working.
9. If this procedure does not work, then the pump is defective and should be replaced.

Accessories / Replacement Parts

Here are links to some accessories and replacement parts that are available from Amazon.

Description:	Part Number (AIN)
Battery (12V 9AH)	B005J510PK
Battery Charger	B09STGP4VD
Power Supply	B018JKSDRO
Submersible Pumps	B08XJTF1FP
Dolly (for transportation)	B0CF69VL8H
Step Stool (18" high) - 2 Req. (if used)	B0B8HMZ5MD
Beach Decorations	B09898WXGM

If you need any additional help or information, please contact me at RCDisplayInfo@gmail.com