

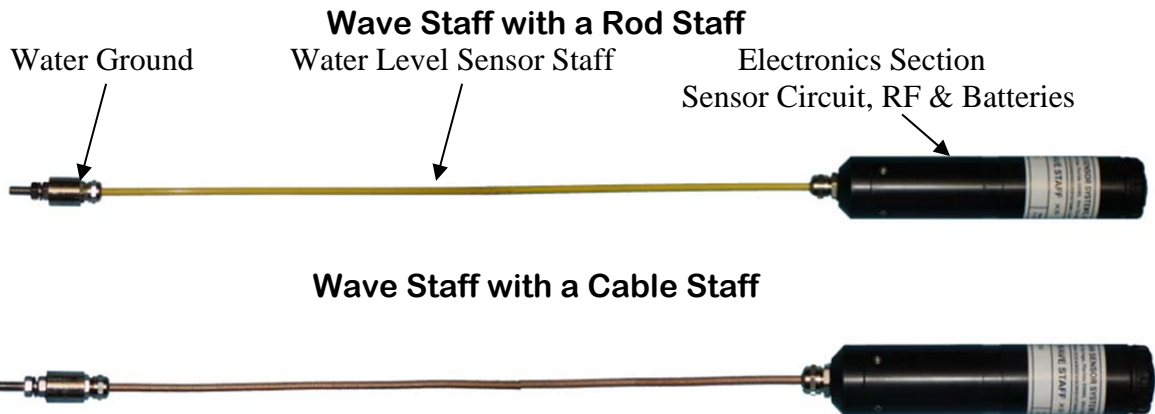


# OSSI-010-025 Wave Staff XB User Manual

**Introduction:** The Ocean Sensor Systems wireless Wave Staff XB has been designed to provide a high-resolution measurement of liquid surface height at a data rate of up to 32Hz. Applications include the measurement of waves, wakes, tides, water, pond, tank and pool levels. The instrument is capable of operating for months on two standard C cell alkaline batteries. It can collect data continuously or in a burst sampling mode; sampling for short periods and then going into low power sleep mode. The Wave Staff XB is very robust with solid-state electronics sealed in a waterproof housing.

The self-grounding Coaxial Rod and Cable Staffs eliminate the need for a separate water ground wire. Laptops and PCs can easily receive the Wave Staff XB's data with any one of several optional wireless Adaptors. Time stamped data can be used to synchronize up to 8 Wave Staff XBs for wave directional measurements.

The instrument can be ordered in a variety of Staff lengths from 0.5 to 20 meters long. Please see the data sheet available on our web site at [www.oceansensorsystems.com](http://www.oceansensorsystems.com) for detailed information.



This manual is designed to help the user with the installation and maintenance of the Wave Staff XB. We at Ocean Sensor Systems are dedicated to making your use of our equipment as easy and rewarding as possible.

**Operating principle:** The basic operating principle is to measure the capacitance between the Sensor Staff and the water. A capacitor is two electrodes separated by a dielectric. One electrode is the water and the other is the shield conductor in the Sensor Staff. The dielectric is the outer Teflon insulation of the staff. As the water moves up the staff the water electrode surface increases and in-turn increases the capacitance. The capacitance is measured by the time that it takes to change the voltage with a given

current. ( $C = T * V / I$ ) The result is then scaled with a Micro Processor and transmitted over the Xbee wireless network to an Xbee to USB adapter. A Windows USB to Serial Converter (driver) connects the USB port to the User Interface Software (GUI).

**Mounting:** The physical mounting of the Main Unit at the measurement site requires no special protection from spray, rain or sun, though it should not be mounted underwater. The Wave Staff XB may be used in any fluid compatible with glass, PTFE, stainless steel, and ABS plastic. The unit is mounted with the electronics head on the top and the staff projecting down into the fluid. The water surface for the highest and lowest tide plus waves should be on the staff to operate correctly. The output is a measurement of the height of the air/fluid interface.

The unit may be mounted with clamps around the body of the black electronics housing. Specially designed Mounting Hardware Kits are available from OSSI for this purpose (see OSSI 015-018 Mounting Hardware Kit).



The staff projects into the fluid, and may require additional support for anything but small waves and short Rod Staffs. The supports should cover only a small portion of the vertical section of the staff as they will create distortion in the measurements. The supports should hold the staff securely without crushing the Teflon plastic insulation. The Mounting Kit contains stanchions for this purpose and will hold the staffs securely and will not damage the staff. When mounting the Wave Staff XB, a level should be used to assure it is vertical. The staffs should be mounted at least 5 to 6 inches away from any metallic or grounded surface. The Staff should also be 4 to 5 feet away from large objects like concrete or wood pillars where saltwater waves may wash up and slowly drain off.

The Cable Staff is designed to be mounted either in tension or secured with stanchions every meter. The tension may be applied by suspending a weight on the bottom of the staff or with a spring or bungee cord creating the tension. The tensioning device may be secured to the end of the cable using the 1/4 inch stud. A mounting hardware kit is also available with brackets and stanchions for securing the staff.

For tension mounting use a weight that will give a tension of about 2 to 4 pounds. Do not exceed 5 lbs. even though the unit is designed to take up to 50 lbs. This will allow for dynamic loading due to the wave forces without exceeding the maximum allowable load.

**Power Requirements:**

The power is provided with 2 C size batteries. The battery type may be Alkaline or nickel–metal hydride. The voltage sum of the two batteries must be greater than 1.8 volts for the unit to operate. The voltage sum must never exceed 3.3Volts.



Batteries ALKALINE C 1.5V Energizer # EN93 Part number OSSI-591-014



Batteries NIMH C 1.2V Energizer #NH35BP-2 Part number OSSI-591-015

To add or change batteries unscrew the battery holder cap on the top of the Electronics Section. Note: Use a small piece of tape to link the batteries together to extract the batteries while the Electronics Section is in a vertical position.

**Wireless Computer Adapter:**

The Wave Staff XB wireless network protocol is called Xbee. A connection from the Xbee Wireless network to a computer can be made with either an Xbee to USB Adapter or an Xbee to Serial Adapter. The following are the three types that are available:



The XStick USB Adapter XU-Z11 part #OSSI-581-016 for US,CA,EU with a RF Line of Sight Range of 66 ft. and Indoor/Urban Range of 200 ft.



XBee ZB USB Adapter XA-Z14-CE1P part #OSSI-581-019-A Pro for North America with a RF Line of Sight Range of 2 miles and Indoor/Urban Range of 300 ft. and OSSI-581-019-W Pro for International with a RF Line of Sight Range of 4000 ft. and Indoor/Urban Range of 200 ft.



XBee RS232 Adapter XA-Z14-CS2PH part #OSSI-581-020-A Pro for North America with a RF Line of Sight Range of 2 miles and Indoor/Urban Range of 300 ft. and OSSI-581-020-W Pro for International with a RF Line of Sight Range of 4000 ft. and Indoor/Urban Range of 200 ft.

**Maintenance:** The Ocean Sensor Systems Wave XB requires minimal maintenance. Prolonged exposure may require wiping off any slime buildup from the case and staff using only soap, water and a soft cloth.

**Changing the staff:**

In most cases the staff will never need to be changed unless it is damaged or a different staff length is desired. Below are the steps that are required to change the staff.

Remove the battery cap to disconnect the power and then remove the 4 screws.



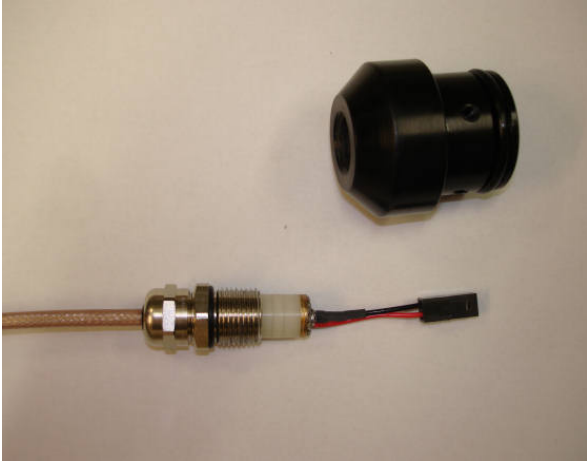
Slowly pull off the lower section of the case.



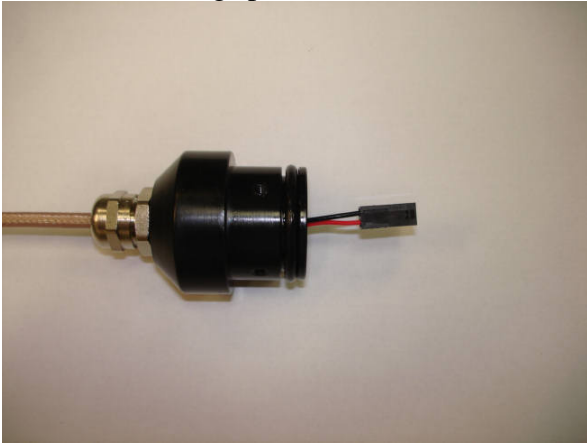
Unplug the in line connector.



Unscrew the cable grip from the case's lower section



Screw the cable grip in with the new staff.



Plug in the inline connector. Slide the Circuit board back in the slots and push the case back together. Take care that the o-ring is inserted correctly.



Align the holes and add the 4 screws. Then add the battery holder cap.



### **Using the Staff & Sonic Product Interface Program:**

Wave Staff XB OSSI-010-025 Version 2.00:

One known bug - The Calibrate “Factory Values” button used to restore the factory calibration values does not work correctly.

Work around: After pressing the “Factory Values” button then cycle the units’ power by monetarily unscrewing the battery cap.

Wave Staff XB OSSI-010-025 Version 2.01:

No known software bugs.