VR2W USER MANUAL

***VEMCO**, a Division of AMIRIX Systems Inc.*

DOC-4400-09 2011-05-08

AMIRIX Systems Inc.
Warranty and Disclaimer

WARRANTY

AMIRIX Systems Inc., doing business under its trade name VEMCO, provides a one (1) year warranty period for the Product from date of shipment.

VEMCO warrants that on the date of shipment all Products manufactured by VEMCO are free from defects in material and workmanship under normal use and service. This warranty applies to the components necessary for equipment upgrades, i.e. the VR1/VR2 to VR2W upgrade. With respect to transmitter products, while VEMCO is able to predict battery life with some certainty, VEMCO cannot guarantee that these Products will remain functional while submerged for extended periods of time. This warranty does not apply to any equipment, materials or design supplied by Buyer or a third party; re-battery services provided by VEMCO; Products for which VEMCO has not received payment; problems that results from: external causes such as accident, abuse, misuse; servicing not authorized by VEMCO; usage not in accordance with Product instructions; failure to follow the Product instructions or failure to perform preventative maintenance; usage of accessories, parts or components not supplied by VEMCO.

This warranty shall survive delivery only on the conditions and subject to the limitations set forth below.

NOTICE PERIODS

To receive a warranty remedy for a Product, Buyer must contact VEMCO's Customer Support Department during the warranty period to receive the Return Material Authorization ("RMA") instructions. Each defective Product returned for warranty remedy must be shipped at the Buyer's expense according to the RMA instructions and must include reasonable proof that the claimed defect is due to a matter embraced within the warranty set forth above and that such defect did not result from any act or omission of Buyer, including but not limited to any failure to operate and maintain the Product in accordance with VEMCO's applicable written instructions.

REMEDY

VEMCO's liability, and the Buyer's exclusive remedy under this warranty, as to a defect in material or workmanship, is limited to the repair of such defect in the accessory, equipment or part in which the defect appears or, at VEMCO's option, to the replacement of such accessory, equipment or part with a similar item free from defect. As to any item repaired by VEMCO or furnished as a replacement by VEMCO, VEMCO's liability and the Buyer's exclusive remedy to the repair or replacement of such item for any further defect in material or workmanship, provided VEMCO receives written notice at Halifax, Nova Scotia, of such further defect from BUYER within ninety (90) days after the repaired or replaced item is shipped to BUYER and provided that BUYER returns same to VEMCO as provided under "Notice Periods".

RETURNED ITEMS

All repairs, replacements and corrections described above shall be performed by VEMCO at its plant at Halifax, Nova Scotia, or at such other place as may be mutually agreeable, and with reasonable care and dispatch in order that the Product, accessory, equipment or part will not be kept out of service longer than necessary. Return to BUYER of a repaired, replacement, or corrected accessory, equipment, part or Product shall be at VEMCO's expense. Title to and risk of loss of the Product, accessory, equipment, or part returned to VEMCO pursuant hereto shall at all times remain with the BUYER, except that title to a returned accessory, equipment, part, or Product shall pass to VEMCO concurrently with shipment to BUYER of any item furnished by VEMCO to BUYER as a replacement therefore. VEMCO shall have only such responsibility for any Product, accessory, equipment, or part owned by the BUYER and in the possession of VEMCO as is chargeable by law to a bailee for hire, but shall not be chargeable for loss of use thereof.

WEAR AND TEAR

Normal wear and tear and the need for regular maintenance shall not constitute a defect under this warranty.

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EXPORT

Products and associated materials supplied or licensed hereunder may be subject to various export laws and regulations. It is the responsibility or BUYER to comply with such laws and regulations.

NEGOTIATED AGREEMENT

It is fully understood by the parties that the price of the Product and other mutual agreements of the parties set forth in this agreement were arrived at in consideration of this warranty, SPECIFICALLY INCLUDING THE WAIVER, RELEASE AND RENUNCIATION BY BUYER SET FORTH ABOVE (DISCLAIMER AND RELEASE)

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Regulatory Compliance Information

The VR2W-xxxx-110 complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation

The VR2W-xxxx-110 has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Warning: Changes or modification not expressly approved by AMIRIX Systems Inc. could void the user's authority to operate the equipment.

Warning

If the VR2W is not used in the manner specified by the manufacturer protection may be impaired.

1 INTRODUCTION

1.1 SYSTEM OVERVIEW

The VR2W is a submersible, single-channel acoustic receiver capable of identifying VEMCO coded transmitters. The receiver operates on a factory set frequency and can decode uniquely coded pingers and sensor transmitters. The receiver is housed in a corrosion resistant cylindrical plastic high pressure case, and incorporates an integral hydrophone at one end of the case. The VR2W features include *Bluetooth*® wireless technology, a Smart LED, eight megabytes of data storage, record mode, and a replaceable battery (single Lithium cell).

The VR2W records the tag code number, the date/time of valid detections, and sensor data if the tag received is equipped with a sensor. This information is stored in memory until downloaded from the receiver using *Bluetooth* wireless communication and a PC running VUE software.

WARNING: The VR2W pressure case and seal have a static depth rating of 500 meters (730 psi). Physical shocks to the receiver, such as bumping into a solid object, when it is at any depth can result in a considerably higher pressure on the casing than just the depth pressure, and water may enter the VR2W case. If the O-rings or their mating surfaces are dirty or damaged, then water may also enter the receiver case. If you are suspicious that water has entered the receiver, then follow the suggestions in section 5.2.3 - Trouble Shooting, Pressurized Case.

TABLE 1: VR2W-69kHz and VR2 Comparison Table

	VR2W	**VR2**
Memory Available (MB)	8	2
Number of Detections	more than 1,000,000	more than 300,000
Communication Method	*Bluetooth*	Serial / electromagnetic waves
Battery Life (months)	15	15
Firmware Upgradeable?	Yes	No
Real Time Clock?	Yes	No

For the latest versions of user manuals and software, visit

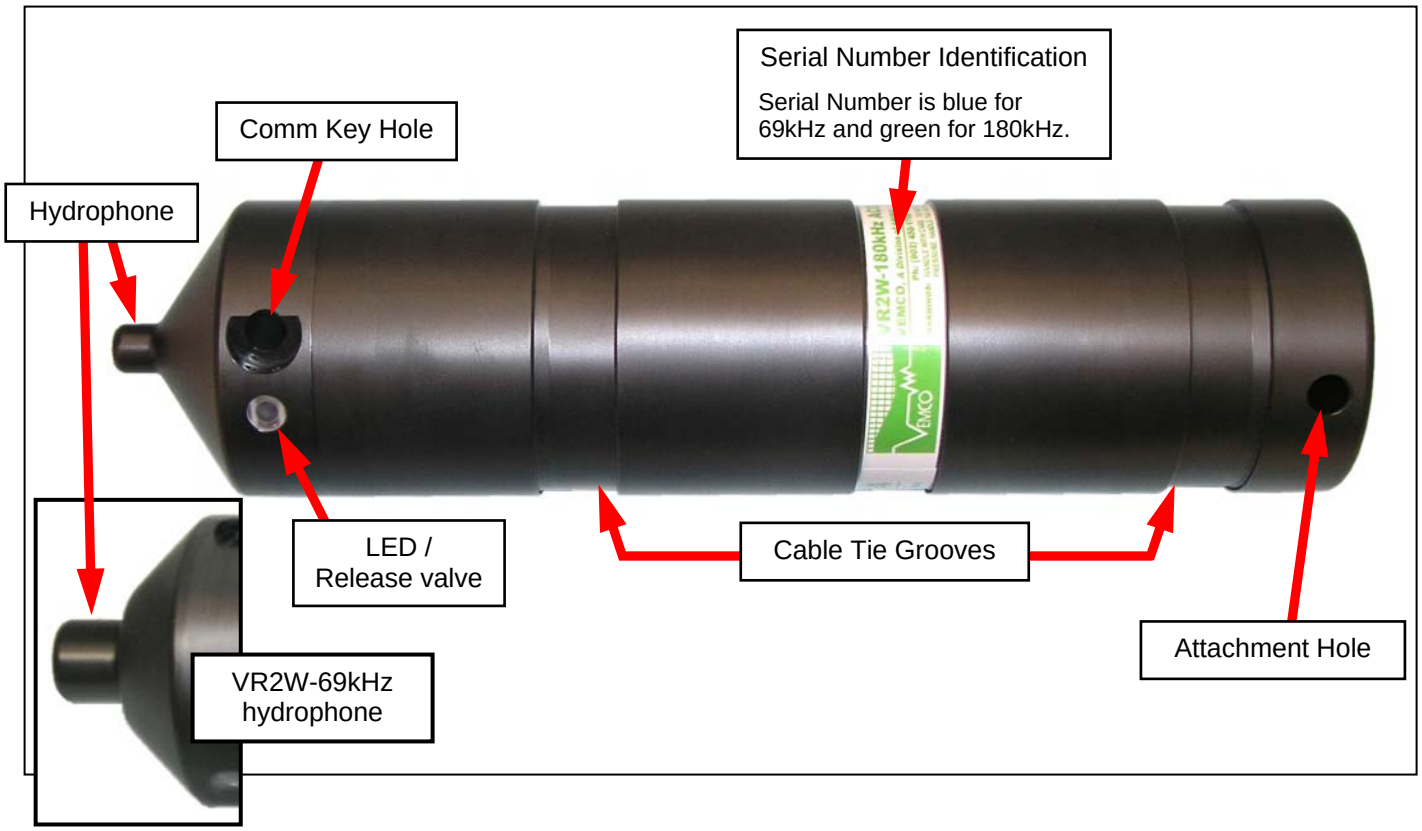
www.vemco.com.

2 HARDWARE FEATURES

2.1 VR2W CASE

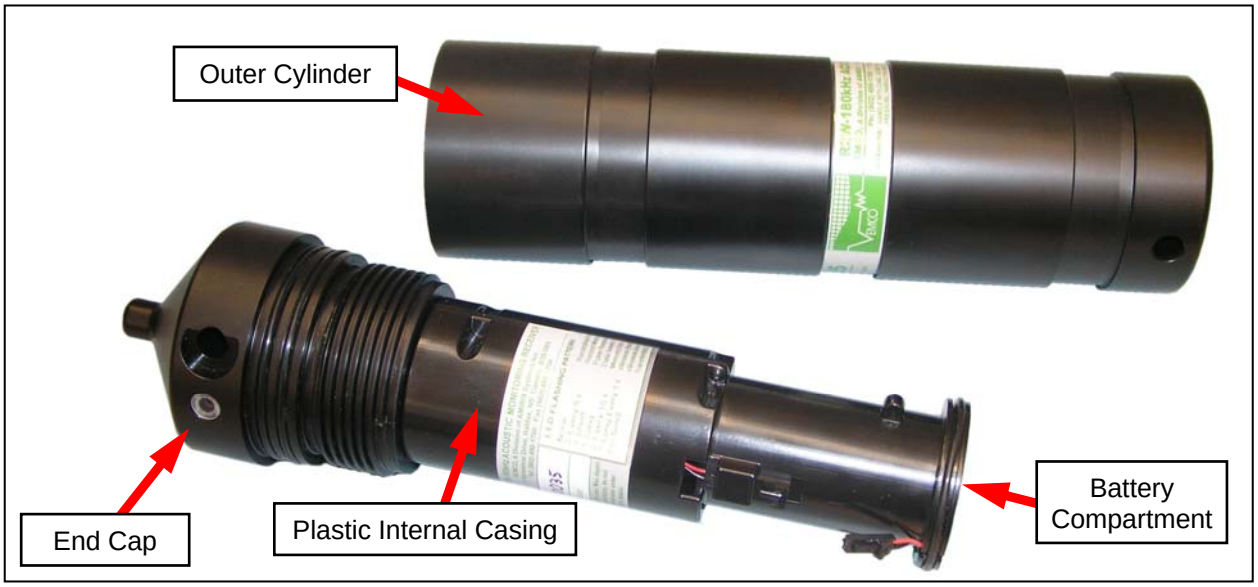
The VR2W receiver is housed in a black plastic high pressure case as shown in the photo below. The outer cylinder is removed from the receiver to install the D-cell Lithium battery, as described in Section 3 - Battery. When the outer cylinder is removed, the internal casing protecting the electronics can be seen. There are two types of internal casing, the older metal/PVC casing and the newer plastic casing. These two internal casing types are identified in the photos on the following page. The metal/PVC internal casing has an O-ring between the metal internal casing and the PVC battery cup to reduce vibration and is not used for water protection. Do not grease this O-ring.

There are external physical differences between the VR2W-69kHz and the VR2W-180kHz. The VR2W-180kHz has a smaller hydrophone than the VR2W-69kHz, and the identification band around the middle of the VR2W-180kHz receiver has green text while the VR2W-69kHz has blue text, making it easier to distinguish between the two frequencies at a glance.

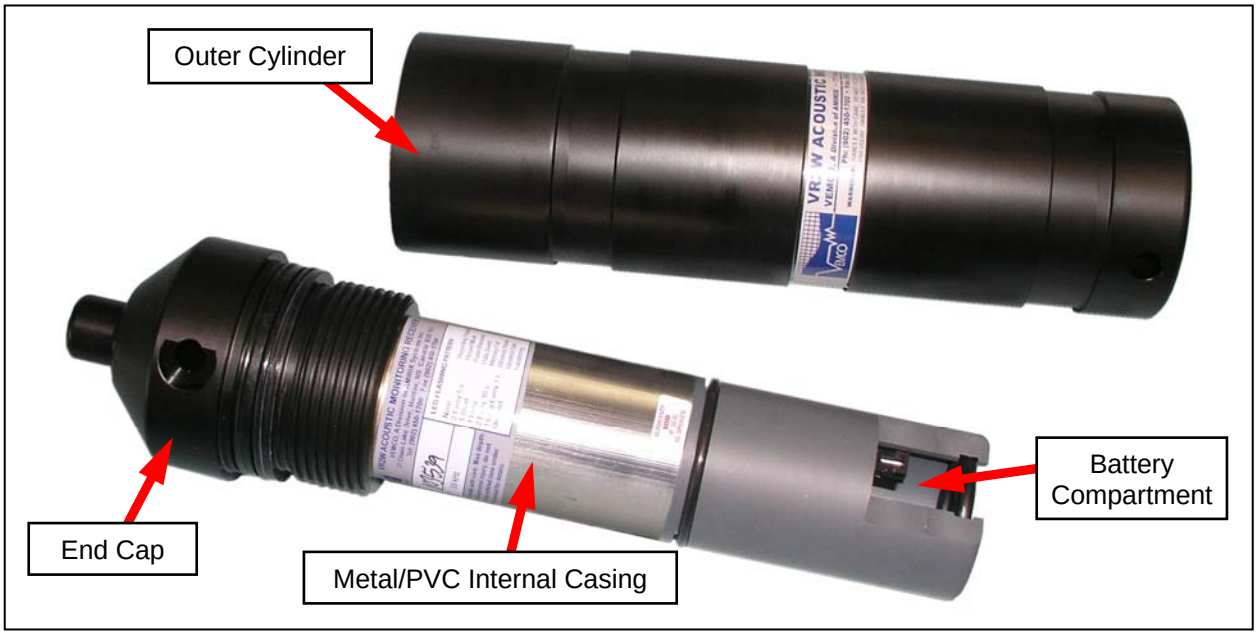


WARNING: Do not bump the hydrophone (identified in the photo above) or damage may occur and the receiver will not detect transmitters.

WARNING: The internal casing surrounding the electronics is ***not waterproof***. Water, even condensation from a humid environment, will enter the case and damage the electronics.



VR2W-180kHz with plastic internal casing.



VR2W-69kHz with metal/PVC internal casing.

2.2 FLASH MEMORY

The VR2W receiver uses a non-volatile Flash Memory (memory that can retain stored information even when not powered) to store valid detections of coded transmitters and the date/time at which the detection was recorded. The VR2W will not continue to record received data once the memory is full. The memory is capable of storing more than one million valid detections. If a valid detection is received every 30 seconds it will require approximately 365 days to fill the VR2W memory (see Table 2 below).

TABLE 2: Time required to fill 8 MB memory based on various detection time.

Valid detection every…	Time to fill VR2W memory
15 Sec	6 months
20 Sec	8 months
30 Sec	12 months
45 Sec	Exceeds VR2W battery life

2.3 WIRELESS COMMUNICATION

The VR2W uses *Bluetooth* to communicate between the receiver and the software. This feature dramatically increases data upload speed. To illustrate this, Table 3 below lists the time required to load data from a VR2 and a VR2W based on the amount of data stored in memory.

TABLE 3: Time required to load data to PC using VR2W and VR2 based on various amounts of data.

Amount of Memory Used (MB)	Time to upload from VR2W (minutes)	Time to upload from VR2 (minutes)
1	1.6	39.3
2	3.3	78.6
4	6.6	NA*
6	9.8	NA*

*The VR2 does not contain this amount of memory.

Bluetooth is still a relatively new standard and we have observed that not all *Bluetooth* devices are created equal or work reliably. To ensure successful operation with the VEMCO VR2W, we provide our users with a *Bluetooth* USB adapter that we are confident will provide reliable functionality.

IMPORTANT

Due to *Bluetooth* characteristics in water, the VR2W must communicate to the *Bluetooth* USB adapter ***through air*** (typical range is 10 meters).

2.3.1 Setup Wireless Communication with VUE software

VUE software requires Windows XP SP2 or WINDOWS VISTA.

Bluetooth® USB Adapter

To install VUE, first attach the VEMCO supplied *Bluetooth* USB adapter in any USB port on your PC (see photo). If the "Found New Hardware Wizard" window opens, select cancel.

Then simply run the VUE setup file delivered by VEMCO or download it from the VEMCO website, http://www.vemco.com/support/vue_support.php. Follow the instructions in the installation wizard.

The *Bluetooth* USB adapter is required for operation with the VR2W but not with the VR2. If you are not using VR2W receivers and you do not have a VEMCO supplied *Bluetooth* USB adapter, select cancel when prompted to install the BT drivers.

Launch the software. If this is the first time running VUE, you will be asked to create a new database. If you already have databases created, then VUE will default to the last one opened. You can choose an alternate database using *File/Open*.

2.3.2 Wireless Activation

Communication Key with orange float

The VR2W receiver has a receptacle (hole) for a specially designed key, the VR2W Communications Key (VR2W Comm Key) to activate *Bluetooth* communication. The receptacle, called the Comm Key Hole, is located on the end-cap and is identified in the first photo on the previous page. Be sure that any marine growth has been removed from the receptacle before inserting the key.

Insert the VR2W Comm Key for approximately 5 seconds. The LED will flash once a second to indicate that the *Bluetooth* component in the receiver is ready for communication with VUE software. Information for using the VUE software is located in the VUE Software manual. The key can now be removed from the hole.

WARNING

The VR2W Communication Key contains a strong magnet. Do not put it near magnet-sensitive materials, such as computer monitors or magnetic stripes, or they could be seriously damaged.

2.4 RECORD MODE

The VR2W must be in Record Mode to record the received pings and detections. The VR2W is designed to enter Record Mode when any of the following events occur:

- The battery is installed
- The "Start Recording" button is selected in the Receiver Control Window of the VUE software
- The Receiver Control Window is closed
- The VR2W is initialized
- The VR2W has received no communication from VUE software for 10 minutes
- The Receiver Control Window is open and inactive for 30 minutes

When a VR2W is powered, it is ***always*** either in Record Mode or in wireless communication mode.

These events were chosen to prevent a VR2W receiver from being deployed while it was not in Record Mode. The only way to remove a VR2W from Record Mode for more than 30 minutes, unless the memory is full, is to remove the battery (see section 3, Battery).

When a receiver will not be deployed for an extended period of time, remove the battery from the receiver (see section 3, Battery) to stop the VR2W from recording. This will prevent the possibility of recording pings from noise sources during storage.

2.5 LED FLASHES

The red LED on the side of the VR2W case flashes based on the task being performed or the status of the receiver. The flashes can be interpreted using the table below.

VR2W LED Flashes	Interpretation of Flashes
No flash	Battery is disconnected or has depleted
Two quick flashes every 5 seconds	VR2W is in record mode (records any received pings)
Two quick flashes every 10 seconds	The VR2W memory full
One short flash	An acoustic ping was received
One long flash	A complete detection was written to memory
Continuous long flashes (1 per second)	The VR2W is ready for *Bluetooth* wireless technology communication
LED on constantly	Communicating with VUE software using *Bluetooth* wireless technology

3 BATTERY

The VR2W receiver is powered by a single "D" size 3.6 Volt Lithium battery with a connector attached – the Tadiran TL-5930/F. The VR2W is usually shipped with the battery inside the VR2W but not connected – the VR2W is not shipped powered. Battery life is consumed from the time the battery is connected so always disconnect the battery when the receiver is not being used for an extended period of time. The battery must be connected before the VR2W can be initialized. Section 3.2.3 contains the details of installing and connecting the battery.

3.1 BATTERY LIFE

A new Lithium D-cell battery will last approximately 15 months in a VR2W-69kHz and approximately 9 months in a VR2W-180kHz.

3.1.1 Saving Battery Life

NOTE

Battery life is consumed from the time the battery is ***installed***, even if the VR2W is not detecting tags.

Larger amounts of battery life are consumed while the VR2W is ready for *Bluetooth* communication or is communicating with the PC than during the receiver's Record mode. For this reason, the VR2W exits *Bluetooth* mode as soon as the Receiver Controller Window (RCW) in the VUE software is closed. If the RCW is left open for 30 minutes, the PC will automatically terminate the *Bluetooth* link and the receiver will enter the lower power consuming Record mode. This feature, which conserves battery life, will only occur if "Automatically close inactive receiver connections" is enabled in the *Devices* section (tab) of the *Options* window (*Tools/Options*).

If the study is not continuing (i.e. the last download of data for this study has occurred), then remove the battery and store it separately. The used battery may be marked with the amount of life used for future reference or use.

NOTE

Always remove the battery when the receiver is not being used for an extended period of time.

3.2 BATTERY INSTALLATION/REPLACEMENT

Inserting or replacing a battery in the VR2W requires four basic steps, opening the case, removing the battery, inserting the battery, and closing the case. Each of these steps is dealt with in detail in the following sections.

Before removing battery:

Use the VUE software to send a "Stop Recording" command to the VR2W receiver (see VUE manual) to exit Record Mode.

There are two styles of internal casing within the VR2W, a newer plastic casing and an older metal/PVC casing. Instructions for both casing types are found below. The method for opening and closing the VR2W case is the same for both the VR2W-69kHz and the VR2W-180kHz.

3.2.1 Opening the VR2W Case

The method used to open the VR2W case is the same as shown regardless of receiver frequency.

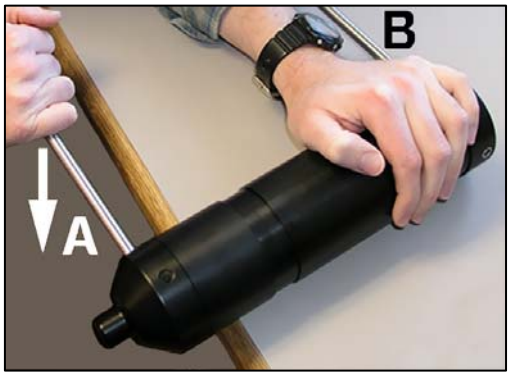
Two steel rods are necessary to properly open and close the VR2W case. A pair of rods is included with each shipment of VR2W receivers.

1. Make sure there is ***absolutely no water*** on or near the VR2W case. If the VR2W is attached to a wet rope, remove the receiver from the rope before opening the case.

WARNING

It is vitally important that the electronics inside the receiver case ***do not come in contact with any water*** or the receiver will be damaged. This also means the electronics can not be exposed to a sudden change in temperature and **humidity** that will cause condensation to develop on the electronics and destroy the receiver (see the note in the *Closing the VR2W Case* section).

2. Place the VR2W on a clean, flat surface so the hydrophone is hanging over the edge as shown in the photo. DO NOT let the receiver fall off the surface.
3. Insert one steel rod into the hole that runs through the diameter of the case near the flat end of the VR2W. This rod is labelled "B" in the photo.
4. Insert the other steel rod into the wider end of the Comm Key Hole on the end-cap of the receiver. Make sure the rod is fully inserted into the hole or damage may occur to the Comm Key Hole. This rod is labelled "A" in the photo.
5. Place a hand on the back of the receiver to hold it in place (see photo).
6. Apply pressure to rod "A" in a downward direction (see arrow in photo) so the end-cap twists in a counter-clockwise direction when you are facing the hydrophone. Rod "B" will act as a brace while you apply pressure.
7. Continue moving the rod in the counter-clockwise direction until turning becomes easier.
8. Remove the steel rods from the VR2W case.
9. Use your hands to continue twisting the end-cap in a counter-clockwise direction until the end-cap and outer cylinder separate.
10. Slide the end-cap and cylinder apart until the battery compartment has cleared the cylinder.



Opening a VR2W case

WARNING

DO NOT impact the threads on the end-cap or they will dent and prevent the VR2W case from closing. See the Trouble Shooting section of the Appendix for tips on thread care.

3.2.2 Disconnecting and Removing Battery

3.2.2.1 Plastic internal casing

STEP 1

Open VR2W case as described previously in “Opening the VR2W Case” (section **3.2.1**).

STEP 2

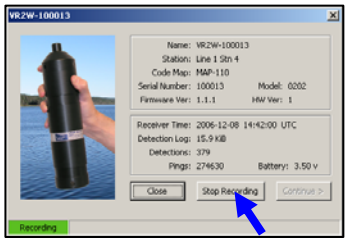
Open the VUE software (see VUE manual for details).

STEP 3

Insert VR2W Communication Key into the Comm Key Hole for approx. 5 seconds (LED flashes once a second).

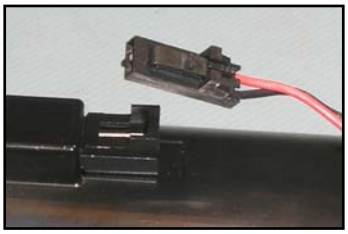
STEP 4

Open the Receiver Control Window for this receiver (double click receiver in selection tree) and click the “Stop Recording” button.



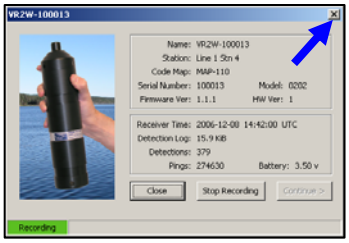
STEP 5

Press the release lever on the battery connector and pull the connector apart. The connector is small and a small flat screw driver may be helpful.



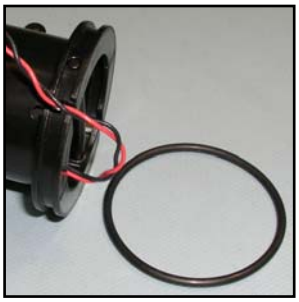
STEP 6

Close the Receiver Control Window in the VUE software.



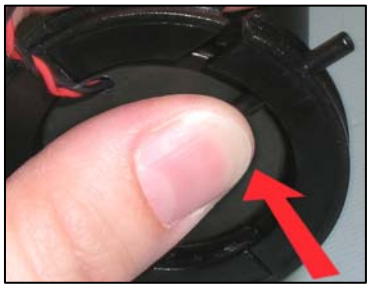
STEP 7

Remove the O-ring from around the end of the battery section of the receiver.



STEP 8

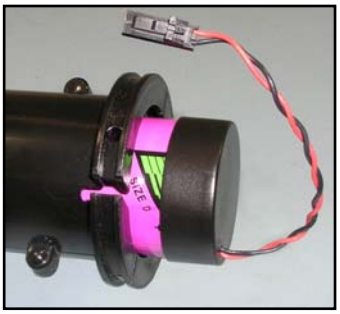
Slide the pin along its long axis until it exits the receiver case.



TIP: Apply downward pressure (see arrow) on the battery end while pushing pin sideways.

STEP 9

Slide battery out of case and set aside.



3.2.2.2 Metal/PVC internal case

1. Open the VR2W case as described previously in “Opening the VR2W Case” (section 3.2.1).
2. Open the VUE software (see VUE manual for details).
3. Insert the VR2W Communication Key into the Comm Key Hole until the LED flashes once a second.
4. Open the Receiver Control Window for this receiver (double click receiver in selection tree).
5. Click “Stop Recording” button.
6. Press the release lever on the battery connector and pull the connector apart. The connector is small and a small flat screw driver may be helpful.
7. Close the Receiver Control Window in the VUE software.
8. Press the back of the battery towards the body of the VR2W until the battery is not pressing against the O-ring. There is a spring at the other end of the battery cup so the battery will move.
9. Slip the O-ring from its groove as shown in the photo. The O-ring’s purpose is to hold the battery from sliding out the end of the battery cup.
10. Slide the O-ring along the battery’s connector wires so they are separated from each other.
11. Tip the VR2W so the battery slides out of the battery cup.

Removing the battery’s O-ring

3.2.3 Inserting or Replacing Battery

If the battery was shipped inside the receiver, connect the two halves of the battery connector (steps 8 and 9 below) to power the receiver.

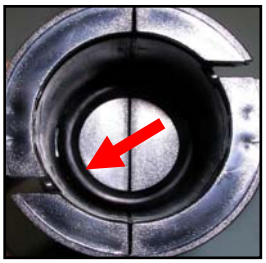
3.2.3.1 Plastic internal casing

STEP 1

If a battery is already in the receiver, disconnect it as described in "Disconnecting and Removing Battery" (section **3.2.2**).

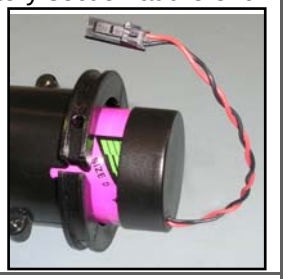
STEP 2

Verify O-ring inside the battery cavity is still at the back of the cavity.



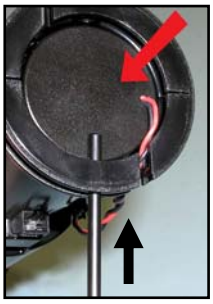
STEP 3

Slide the Lithium D-cell battery into the battery section at the end of the receiver so the battery's wires are outside the case.



STEP 4

Insert the battery pin into one of the holes in the edge around the battery cavity and slide the pin across the end of the battery until the ends of the pin are both in the receiver case (see photo below).



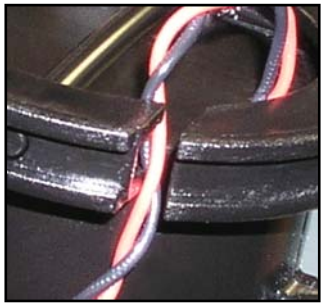
Downward force (see red arrow) may be required on battery end to get the pin started.

STEP 5

Check that both ends of the pin are flush with the case.

STEP 6

Place the battery wires into the gap in the end of the receiver case closest to the battery connector on the case. There are two gaps in the end of the case.

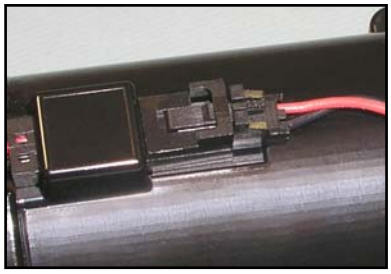


STEP 7

Place the O-ring in the O-ring groove around the end of the case so the battery wires are inside the O-ring. This also holds the battery pin in place.

STEP 8

Connect the two battery connector halves together until a "click" is heard and the VR2W receiver's light begins flashing.



STEP 9

Gather any excess battery wire at the end of the battery cavity and not along the side of the receiver casing. This reduces the chance of damage to the battery wires.

3.2.3.2 Metal/PVC internal case

1. Disconnect the battery as described previously in “Disconnecting and Removing Battery” (section 3.2.2).
2. Remove the O-ring from the groove in the battery cup if it hasn’t already been removed (see photo).
3. Slide the end of the new battery without connector wires into the battery cup. The connector wires should be sticking out of the battery cup.
4. Thread the connector wires through the O-ring.
5. Press on the battery until the top of the battery is below the O-ring groove (see photo).
6. Squeeze the O-ring into an oval shape and push it into the groove in the battery cup as shown in the photo. ***Do not grease the O-ring.***
7. Make sure the connector wires are not pinched in any way, especially between the O-ring and the battery or case. Pinched wires can break internally and disrupt power to the receiver.
8. Connect the Tadiran TL-5930/F battery to the VR2W connector in the proper orientation. The two connector halves should lock together with a little click.
9. Close the VR2W case as described in the “Closing the VR2W Case” section.

Inserting O-ring into PVC battery case to hold battery in place.

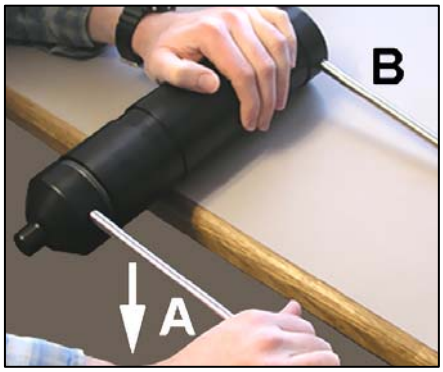
3.2.4 Closing the VR2W Case

3.2.4.1 Plastic internal casing

1. Make sure the serial number around the outer cylinder matches the serial number on the internal casing. This is particularly important when more than one VR2W receiver is open at the same time.
2. Inspect the O-ring surface inside the outer cylinder to be sure it is clean, undamaged, and debris free.
3. Inspect the two O-rings near the threads on the end-cap to make sure they have not been damaged and that they are properly greased (see section 5.2.2 for proper O-ring care).
4. Place a new desiccant pack in the bottom of the cylinder so both ends of the pack are touching opposite sides of the cylinder's wall (see photo).
5. Slide the end-cap into the cylinder until the first threads are inside the outer cylinder.
6. Turn the end-cap in a clockwise direction (when looking at the hydrophone) with your hand until it becomes too hard to turn.
7. Place the VR2W on a clean, flat surface so the hydrophone is hanging over the edge as shown in the photo. DO NOT let the receiver fall off the surface.

Desiccant pack in cylinder

8. Insert one steel rod into the hole that runs through the diameter of the case near the flat end of the VR2W. This rod is labelled "B" in the photo.
9. Insert the other steel rod into the wider end of the Comm Key Hole on the end-cap of the receiver. Make sure the rod is fully inserted or damage may occur to the Comm Key Hole. This rod is labelled "A" in the photo.
10. Place a hand on the back of the receiver to hold it in place (see photo).
11. Apply pressure to rod "A" in a downward direction (see arrow in photo) so the end-cap twists in a clockwise direction when you are facing the hydrophone. Rod "B" will act as a brace while you apply pressure.
12. Continue moving the rod until the end-cap suddenly stops turning. DO NOT continue to apply pressure on the rod or the receiver case will be damaged. The gap between the end-cap and the outer cylinder will be closed. Do not over tighten the end-cap or the receiver case will be damaged.
13. Remove the steel rods from the VR2W case.
14. Deploy the VR2W receiver.



Closing a VR2W case

NOTE: The VR2W will immediately return to recording detections after the battery has been replaced. Settings are not lost when the power is disconnected.

A desiccant pack has been included in the bottom of the VR2W to reduce the occurrence of condensation in the VR2W. This pack should remain in the receiver case during storage and deployment.

We recommend that you replace the desiccant pack with each deployment and with each battery replacement cycle (see manual for instructions).

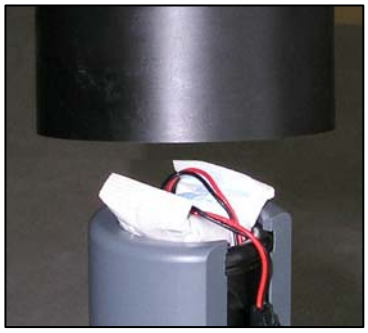
More information on the availability and usage of these packs is located on our website, www.vemco.com.

3.2.4.2 Metal/PVC internal case

1. Make sure the serial number around the outer cylinder matches the serial number on the internal casing. This is particularly important when more than one VR2W receiver is open at the same time.
2. Inspect the O-ring surface inside the outer cylinder to be sure it is clean, undamaged, and debris free.
3. Inspect the two O-rings near the threads on the end-cap to make sure they have not been damaged and that they are properly greased (see section 5.2.2 for proper O-ring care).
4. Position the battery wire so it's away from the end of the battery cup as shown in the photo (at right).
5. Hold the receiver's inner casing so the hydrophone is pointing down.
6. Place a new desiccant pack on top of the battery compartment and fold the ends of the pack over onto itself.
7. Fold the battery wires over so they are lying on top of the desiccant pack. This is important to protect the wires from being pinched inside the tube.
8. Slide the cylinder down over the inner casing until the first threads are inside the outer cylinder.
9. Turn the end-cap in a counter-clockwise direction with your hand until it becomes too hard to turn.

Battery wires

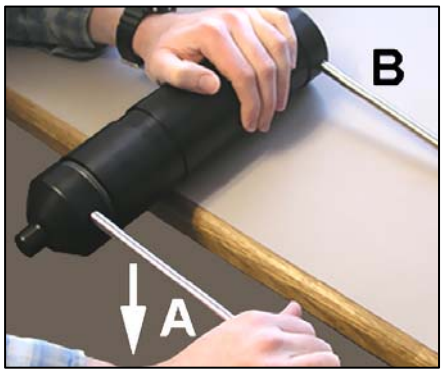
Desiccant pack in place



Sliding tube over inner casing

Hand tightening the case

10. Place the VR2W on a clean, flat surface so the hydrophone is hanging over the edge as shown in the photo. DO NOT let the receiver fall off the surface.
11. Insert one steel rod into the hole that runs through the diameter of the case near the flat end of the VR2W. This rod is labelled "B" in the photo.
12. Insert the other steel rod into the wider end of the Comm Key Hole on the end-cap of the receiver. Make sure the rod is fully inserted or damage may occur to the Comm Key Hole. This rod is labelled "A" in the photo.
13. Place a hand on the back of the receiver to hold it in place (see photo).
14. Apply pressure to rod "A" in a downward direction (see arrow in photo) so the end-cap twists in a clockwise direction when you are facing the hydrophone. Rod "B" will act as a brace while you apply pressure.
15. Continue moving the rod until the end-cap suddenly stops turning. DO NOT continue to apply pressure on the rod or the receiver case will be damaged. The gap between the end-cap and the outer cylinder will be closed. Do not over tighten the end-cap or the receiver case will be damaged.
16. Remove the steel rods from the VR2W case.
17. Deploy the VR2W receiver.



Closing a VR2W case

NOTE: The VR2W will immediately return to recording detections after the battery has been replaced. Settings are not lost when the power is disconnected.

4 ATTACHMENT METHODS

The common method used to attach a VR2W receiver to a mooring line is to use five cable ties with the characteristics described in section 5.5. One set of five cable ties is shipped with the receiver and more may be purchased from VEMCO. Details for using the cable ties are found in section 4.1, Cable Tie Attachment Method.

Additional equipment may be purchased from VEMCO to allow other methods of attachment to be used, including the traditional mounting bar used with past VR2 receiver cases. Contact VEMCO for more information on the optional attachment methods.

For best horizontal range, mount the VR2W receiver in a vertical position. If the VR2W is deployed close to the bottom of the water, mount the VR2W with the hydrophone pointing up to the surface. If the VR2W is deployed close to the surface of the water, position the VR2W so the hydrophone is pointing down.

NOTE: The hydrophone ***must be kept free of mooring lines*** regardless of the attachment method. Objects around the hydrophone will affect the detection range of the VR2W receiver.

Some customers use a rubber shrink tape, such as DAFLEX ST250 Cold Shrink Tape available from Digikey (W211-ND), to prevent biofouling on the VR2W receiver. It can be used to cover the entire receiver case or just the Comm Key Hole and does not leave a glue residue when it's removed. Another option is to use an antifouling paint, such as Interlux Micron CSC.

4.1 CABLE TIE ATTACHMENT METHOD

The VR2W is attached directly to the mooring line with five non-releasing cable ties. Five cable ties are supplied with the VR2W and replacement cable ties can be purchased from VEMCO. Follow the instructions listed below to attach the VR2W receiver to the rope used as the mooring line. A minimum rope size of 3/8" diameter nylon rope is suggested.

1. Open the "warp in the rope":
   a. Identify the location on the rope where the bottom of the VR2W receiver will be attached.
   b. Twist the rope so the strands of the rope separate from each other and an opening in the rope is seen (see Figure 4-1).
2. Slide one of the cable ties through the center of the rope. This cable tie is identified as number 5 in the photo below.
3. Place the VR2W receiver against the rope so the hole running through the bottom of the receiver is lined up with the cable tie.
4. Pass the cable tie through the hole in the bottom of the receiver and latch the cable tie so the head of the cable tie is next to the rope.
5. Wrap the cable tie labelled 4 in the photo below around the body of the VR2W so the cable tie is in the bottom half of the lower groove in the VR2W body (see the Figure 4-2).
6. Open the "warp in the rope" as described in Step 1 to line up with the #4 cable tie.
7. Slide the cable tie through the center of the rope and latch the cable tie so the head of the cable tie is next to the rope.

Figure 4-1: "warp in the rope"

8. Wrap a cable tie around the VR2W receiver and the rope so the cable tie occupies the top half of the lower groove in the VR2W body (see Figure 4-2).
9. Latch the cable tie so the head of the cable tie is over the rope. This cable tie is #3 in the photo below.
10. Repeat Steps 5 to 9 to place the cable ties labelled 1 and 2 in the photo below in the upper groove in the VR2W body.
11. Trim the cable ties so there is no excess cable tie material and no sharp edges.

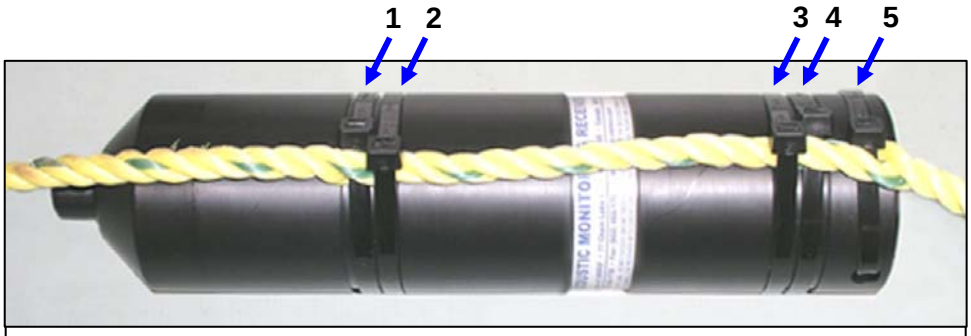


Figure 4-2: Cable tie locations for attaching VR2W receiver to a mooring line.
NOTE: Cable ties labelled 1, 4, and 5 pass through the wrap in the rope.

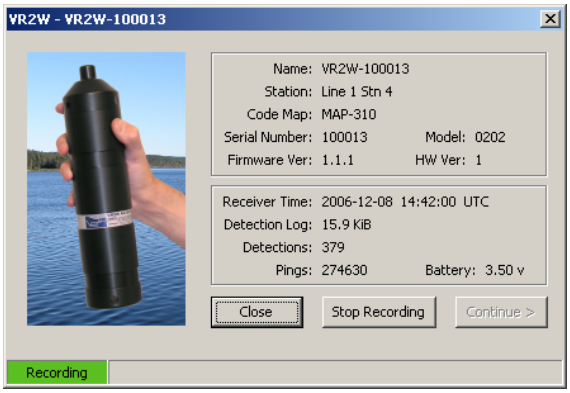
IMPORTANT: Cut the cable ties when removing a VR2W from the mooring line. DO NOT re-use cable ties. Use only new cable ties when deploying a VR2W receiver.

5 APPENDIX

5.1 TESTING PROCEDURES

5.1.1 Air Tests

The VR2W can detect coded pingers in air, but at a much reduced range (between one and three meters) compared to range capabilities in water. Perform air tests away from electrical noise sources such as motors, PC screens, or fluorescent lights. Before beginning the test, ensure the clock of the PC to be used is set to the correct time. Follow the steps listed:



Receiver Control Window

1. Open VUE software on your PC.
2. Insert the VR2W Comm Key into the Comm Key Hole in the VR2W.
3. When the receiver appears in the selection tree on the left side of the window, double-click the receiver name to open the Receiver Control Window.
4. Activate a coded tag on the same frequency that the VR2W operates (refer to Transmitter Specifications manual for the tag information). A VR100 receiver may be used to audibly confirm when the tag is transmitting.
5. Lay the VR2W receiver on its side with the hydrophone (pointed end) past the edge of the table.
6. Hold the tag approximately one meter from the hydrophone with the side of the pinger facing the side of the hydrophone.
7. Watch the LED on the VR2W receiver. The LED will flash briefly for each acoustic ping received. A long flash occurs when the receiver is writing information to the memory.
8. Verify that the "Detections" and Pings" numbers in the Receiver Control Window are increasing.
9. Stop recording and retrieve the stored data (see the VUE manual for details). Select "Automatically importing the VRL file into current database" to view the data immediately after the data is recovered. This also captures a copy of the receiver's settings at the time it was deployed.

5.1.2 Water Tests

1. Initialize a study with your watch synchronized to the PC time.
2. Moor the VR2W close to the bottom and with the hydrophone pointing up. If you hang the VR2W's from a noisy boat and moor the pinger you may observe reduced range.
3. Activate a coded pinger.
4. Hang the pinger 5 meters below the surface.
5. If you have a VR100, place its hydrophone in the water on the pinger frequency and record when the pinger transmits.
6. Record the time and distance between the pinger and VR2W receiver.
7. Move further away and repeat.
8. Download the data and compare the detections with your recorded time and distance.

For a detailed discussion on range testing, visit
http://www.vemco.com/education/whitepapers.php

5.2 TROUBLE SHOOTING

5.2.1 Dented Threads

It's very important that the threads on the end-cap are not dented or the outer cylinder will not thread onto the end-cap properly. If the threads on the end-cap are slightly dented, use a sharp knife, such as an X-Acto knife, to remove the deformed plastic until the sides of the thread are smooth and below the normal line of the thread. It is important that there is nothing sticking out of the thread to damage the thread on the outer cylinder or prevent the case from closing.

5.2.2 O-ring Care

O-rings located in the end-cap of the VR2W case are crucial to the watertight seal of the receiver. Each time an O-ring is disturbed, for any reason, it ***must*** be checked before the unit is sealed again.

The surface inside the outer cylinder the O-rings come in contact with must be clean and smooth, free of debris and nicks. Dirt or damage may cause flooding of the VR2W receiver.

The O-rings must be free from dirt or debris and covered with a ***light*** coat of O-ring grease for lubrication. If too much grease is used, the O-rings may pop out of their grooves and not seal correctly. Each O-ring should be inspected for any damage, such as nicks or cracks. A damaged O-ring should be replaced ***immediately*** with an O-ring of the same size and type. Ensure that the O-rings are properly seated in their grooves as the end-cap is moved into the outer cylinder.

WARNING: Improper care of the O-rings and their mating surfaces can result in water leaking into the receiver casing.

5.2.3 Pressurized Case

When handled correctly, the VR2W pressure case and seal have a static depth rating of 500 meters (730 psi). If the receiver experiences a pressure greater than this, then water may enter the case.
NOTE: Physical shocks to the receiver, such as bumping into a solid object, when it is at <u>any</u> depth can result in a considerably higher pressure on the casing than just the depth pressure. Also, if the O-rings or their mating surfaces are dirty or damaged, then water may enter the receiver case.

If water enters the receiver case under high pressure, then some water may still be in the case when it is returned to the surface, along with compressed air. This can be identified by its increased weight and a sloshing sound when the case is moved. The VR2W case will also be very difficult to open, if at all possible. If you are suspicious there is compressed air in the receiver case, then check for air or water leaking from seam in the case where the end-cap and outer cylinder meet.

To check for...	**Then...**
water leakage	dry the seam completely and watch for drops of water around the seam
air leakage	spread soapy water around the seam and watch for bubbles indicating air escaping

If air and/or water are found leaking from the receiver case, do not attempt to remove the end-cap. Instead, place the receiver in a safe place and cover it with a protective layer of towels, tarpaulins, etc. until the leaking stops. If water is still in the case after the air and/or water have finished leaking from the case, then attempt to open the case with the steel rod kit. If it will open, do so very slowly to allow the compressed air to escape. If the case will not open using the steel rods, then it is under a greater pressure than will allow the case to open. Contact VEMCO for further instructions.

When the pressure has been released from the VR2 case, carefully unscrew the end-cap from the outer cylinder (see section 3.2.1, Opening the VR2W Case). Use fresh water to rinse the internal parts of the VR2W while avoiding skin contact with any battery electrolyte that may have escaped from the battery.

Do not attempt to re-use the VR2W receiver after water has been inside the case. The internal casing protecting the electronics is not waterproof and the electronics have been destroyed by contact with water.

5.3 CLEANING INSTRUCTIONS

Clean the VR2W with a damp cloth and mild detergent.

Do not use solvents. Do not use a scraper or abrasive cleaner on the LED window or the seal surfaces.

5.4 CONTACT INFORMATION

Product manufactured by

VEMCO Division
AMIRIX Systems Inc.
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Halifax, Nova Scotia
Canada B3S 0B9

Phone: +1-902-450-1700
Fax: +1-902-450-1704

Web Site: www.vemco.com

5.5 VR2W SPECIFICATIONS

Size	308 mm (12.125") overall length x 73 mm (2.875") diameter
Receive Frequency	VR2W-69kHz: 69.0 kHz
	VR2W-180kHz: 180.0 kHz
Battery	1 - Tadiran TL-5930/F Lithium Inorganic battery or equivalent, 3.6 Volts
Battery Life	VR2W-69kHz: Approximately 15 months
	VR2W-180kHz: Approximately 8 months
Memory	8 Megabyte Flash Memory (approximately one million detections)
Operating temperature	-5°C to +60 °C NOTE: Water in which VR2W is deployed must not freeze.
Static depth rating	500 meters (730 psi)
Ingress Protection	IPX8 to rated depth
Bluetooth wireless certifications	Bluetooth ID: B012394 FCC ID: ED9LMX9838 Industry Canada ID: IC-1520A-LMX9838
Cable Ties:	5 non-reusable lashing cable ties, 388 mm (15.25") long, 7.5 mm (0.3") wide, UV protected, 120 lb tensile strength (VEMCO number HWE 507450).

5.6 INDEX