



WEATHERPAK® TRx²

User's Manual

November 26, 2012

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TABLE OF CONTENTS

	PAGE
CHAPTER 1 FOREWORD	5
CHAPTER 2 INTRODUCTION	5
CHAPTER 3 SYSTEM COMPONENTS	6
CHAPTER 4 DEPLOYING THE WEATHERPAK®	6
4-1 Siting Considerations	6
4-1.1 Compass Accuracy	6
4-1.2 Wind Speed and Direction Accuracy	6
4-1.3 Radio Transmission Issues	6
4-2 Tripod Tower	7
4-3 Vehicle Mount Adapter	7
CHAPTER 5 SYSTEM ASSEMBLY	8
5-1 Receiver/Display Connections	8
5-2 Connecting to a Computer with a SERIAL Port	8
5-3 Connecting to a Computer with a USB Port	8
CHAPTER 6 SYSTEM OPERATION	9
CHAPTER 7 WEATHERPAK® AND PLUME MODELING SOFTWARE	9
7-1 ALOHA® Data Line Interpretation	12
CHAPTER 8 MAINTENANCE	12
8-1 Periodic Maintenance Schedule	12
8-2 TOWER BATTERY LOW VOLTAGE INDICATOR	12
8-3 Replacing Tower Batteries	12
8-4 Troubleshooting	13
8-4.1 The WEATHERPAK®	13
8-4.2 The Receiver/Display	13
8-4.3 Data Light	14
8-4.4 The Computer	14

TABLE OF FIGURES

<i>Figure 1 – Assembly</i>	<i>7</i>
<i>Figure 2 – Optional Vehicle Adapter</i>	<i>7</i>
<i>Figure 3 – Receiver/ Display Box</i>	<i>8</i>
<i>Figure 4 - CAMEO®/ALOHA® Screen</i>	<i>10</i>
<i>Figure 5 - ALOHA® Plume</i>	<i>11</i>
<i>Figure 6 – Battery Replacement</i>	<i>13</i>

LIST OF TABLES

<i>Table 1 - WEATHERPAK® TRx2 Components</i>	<i>6</i>
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APPENDICES

<i>Appendix 1 – Coastal Environment Systems Term and Conditions (includes warranty)</i>	<i>13-16</i>
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IMPORTANT NOTES

Please call Coastal Environmental Systems with any issues or questions about the **WEATHERPAK® TRx2**.

Coastal Environmental Systems, Inc.
820 First Avenue South, Seattle, WA 98134

Main: (800) 488-8291 Fax: (206) 682-5658

Parts & Service: x157 or

Support@CoastalEnvironmental.com

- **When contacting Coastal**, please have the serial number of your system available. The serial number is on a silver label located near the bottom of the weather-head.
- **Wash or decon the WEATHERPAK® when fully assembled.** Do not allow water to enter the connectors. The WEATHERPAK® is water-resistant when assembled.
- **Follow the maintenance schedule.** (See Chapter 8).
- **Do not open (or otherwise dismantle) the WEATHERPAK®.** The WEATHERPAK® is double O-ring sealed and purged with desiccant to assure a tight seal, and to keep out moisture. Opening the cylinder will allow moisture in, damage the electronics, and invalidate your warranty.
- **Do not pick up the WEATHERPAK® by the wind sensor.** This is a durable but sensitive wind sensor, and it can be broken if mishandled.
- **Do not remove the antenna from the WEATHERPAK®.** If the WEATHERPAK® is activated without the antenna, the radio will be damaged.
- **REPLACING TOWER BATTERIES. WARNING: DO NOT LEAVE BATTERIES IN TOWER WHEN STORING OR SHIPPING TOWER ASSEMBLY. BATTERIES MAY LEAK CAUSING DAMAGE TO UPPER TOWER SECTION.**

CHAPTER 1 FOREWORD

Thank you for purchasing the WEATHERPAK® TRx2 manufactured by Coastal Environmental Systems, Inc. The system has no customer serviceable parts (other than tower battery replacement) and does require some periodic maintenance (See Chapter 8). We recommend reading the entire User's Manual prior to using your new WEATHERPAK® for the first time. Coastal products are in continuous development; therefore, specifications may be subject to change and improvements may be made without prior notice.

CHAPTER 2 INTRODUCTION

The WEATHERPAK® TRx2 measures wind speed and direction, air temperature, and relative humidity and calculates the wind stability class (required by plume modeling software). Atmospheric conditions are sampled every second and then the system computes a 5-minute running average (also required by plume modeling software). The data is then transmitted every 30 seconds to the display and plume model.

The WEATHERPAK® TRx2 has been specifically designed for use by Hazardous Materials Responders and shares the following features with the rest of the WEATHERPAK® line of products:

- The wind sensor is an advanced technology, “ultrasonic” style anemometer. The ultrasonic wind sensor has no moving parts, is very accurate (particularly at very low wind speeds) and does not require periodic calibration.
- Automatically updates CAMEO®/ALOHA®, CHARM®, MIDAS® and most other plume modeling software programs.
- A built-in electronic compass allows the WEATHERPAK® to be set up in any orientation – will automatically determine True North and give true wind direction.¹
- Set-up time is less than one minute.
- The electrical connections are designed to intrinsically safe standards² and the housing and tower are constructed of 6061-T6 aluminum, a non-corrosive and non-sparking alloy. The WEATHERPAK® has been tested and meets or exceeds MIL-STD 810F and MIL-STD-461C.
- The WEATHERPAK® housing is double O-ring sealed and dried with a desiccant to protect the electronics against moisture and to withstand decontamination procedures.
- All electronics are grounded at a single point to protect the WEATHERPAK® against EMI (electro-magnetic interference) and RF (radio frequency) interference, thus assuring reliable data and transmission.

This manual will familiarize you with the installation, operation, and maintenance of the WEATHERPAK® TRx2. Please read all of the instructions before attempting to operate or troubleshoot the system.

¹ Declination (the variation of True North from Magnetic North) for your location is configured by Coastal Environmental Systems prior to shipping. If necessary, the declination can be reconfigured. Please contact Coastal's Customer Service Department if this is necessary.

² WEATHERPAK® TRx2 is designed to intrinsically safe standards, but not tested against those standards.

CHAPTER 3 SYSTEM COMPONENTS

Table 1 provides a description of the components of the WEATHERPAK® TRx2.

Description
WEATHERPAK® sensor package with wind monitor
Upper tower section, 9 D-Cell batteries included
Lower tower section
Tower leg – 3 each
Receiver/Display box
Serial data output cable
Receiver/Display box antenna
Serial to USB converter and driver disk
WEATHERPAK® carrying case
Tower carrying bag
User's Manual
WEATHERPAK® Training Guide (CD)

Table 1 - WEATHERPAK® TRx2 Components

CHAPTER 4 DEPLOYING THE WEATHERPAK®

4-1 SITING CONSIDERATIONS

4-1.1 Compass Accuracy

The WEATHERPAK® contains an electronic compass for automatic alignment to True North. Like any compass, an error will be created if it is located too close (laterally) to a large mass of steel or other magnetic material. (In other words, on top of a vehicle is OK, but next to it is not an ideal location). Try to place the WEATHERPAK® at least 30 meters (100 feet) from large metal objects (vehicles, steel buildings, etc).

4-1.2 Wind Speed and Direction Accuracy

Select a site that is as exposed as possible. Structures, trees, terrain, etc. will disrupt the wind flow for a considerable distance. For example, if the WEATHERPAK® is placed immediately North of your vehicle and the wind is coming from the South, erroneous wind direction and speed data will result.

4-1.3 Radio Transmission Issues

Locate the WEATHERPAK® as close as safety permits to the hot zone. The WEATHERPAK®'s UHF radio has a range of 5 to 7 miles³ "line-of-sight". The radio typically will not transmit through structures containing steel, or through hills, so try to position the WEATHERPAK® accordingly.

³ This distance assumes ideal conditions. Reception range will vary depending on radio signal path.

4-2 TRIPOD TOWER

Assemble the tower in the following manner:

1. Insert and lock the legs onto the bottom section of the tower, forming the tower tripod base.
2. Align the slot on the WEATHERPAK® with the guide pin on the quick release and push straight in. DO NOT “screw” the WEATHERPAK® onto the KamLock connector. The KamLock provides a precision sealed fit and may require an extra push to properly seat the WEATHERPAK®. Once the weather station is properly seated, press the arms of the clamp down to assure a tight fit.
3. Place the entire unit (upper tower section and WEATHERPAK®) onto the tripod and finger-tighten the tower locking screw.
4. The WEATHERPAK® is now running and sampling data. When the WEATHERPAK® is removed from the KamLock connector, it will stop sampling and shut itself off.

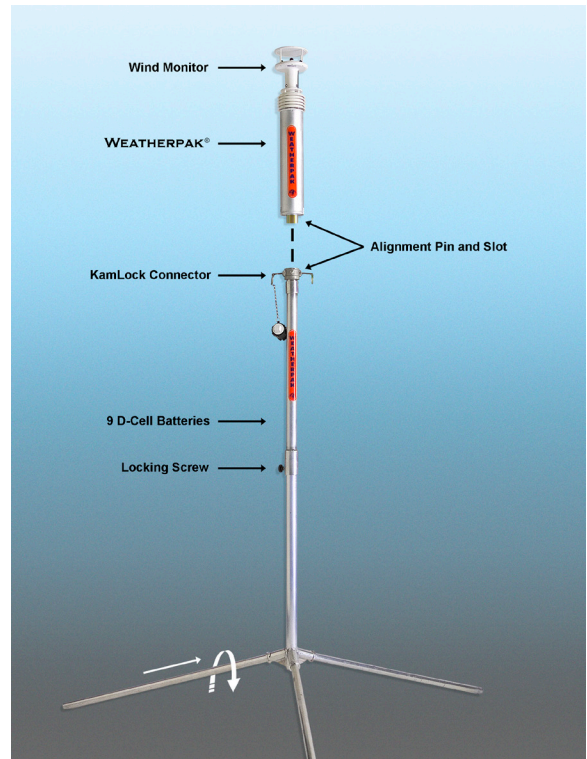


Figure 1 – Assembly

4-3 VEHICLE MOUNT ADAPTER



Figure 2 – Optional Vehicle Adapter

Coastal Environmental Systems offers an optional Vehicle Adapter (P/N S80061) which allows the WEATHERPAK® TRx2 to be mounted onto a vehicle, van or trailer.

The adapter consists of a KamLock quick release (just like the one on the tripod tower) with a 1 ½” National Pipe Thread, 25 feet of cable and a removable protective cap (See Fig. 2).

The threaded KamLock can be adapted to any type of vehicle mounted tower or stanchion that fits your needs and vehicle. The vehicle adapter provides power only (12 VDC) and data is sent to the Receiver/Display via radio.

CHAPTER 5 SYSTEM ASSEMBLY

5-1 RECEIVER/DISPLAY CONNECTIONS

The WEATHERPAK® TRx2 Receiver/Display box, as the name implies, contains the radio receiver and features a 4 x 20-character vacuum florescent data display housed in a ruggedized enclosure.

1. Connect the radio antenna to the appropriate connectors on the back of the display box.
2. Connect the data cable to the Serial connector. Please Note: If your computer does not have a Serial port, use a Serial to USB converter method.
3. Plug the display box power cord into a power source (110 VAC, unless otherwise marked).
4. Toggle the power switch to the 'up' position (located on the front, lower right corner of the display box). The power indicator light will illuminate, the screen will illuminate immediately, and the display will wait to receive the transmission from the weather station.



Figure 3 – Receiver/ Display Box

5-2 CONNECTING TO A COMPUTER WITH A SERIAL PORT

1. Plug one end of the Serial data cable into the Serial connector on the back of the display box and the other end into an available 9-pin Serial port on your PC.
2. Turn the receiver on.
3. The receiver power indicator light should now be illuminated. The system will take a few seconds to boot-up.
4. With the WEATHERPAK® assembled and running, and after the display box has completed the boot-up routine, the red data light will blink approximately every 30 seconds as an indication that data is being received from the WEATHERPAK®.

5-3 CONNECTING TO A COMPUTER WITH A USB PORT

In the event your computer does not have a Serial port available, or you simply prefer to use a USB port, you must employ the "Serial to USB" converter. Connect the Serial cable to the converter. Follow the directions provided with the Serial to USB device.

CHAPTER 6 SYSTEM OPERATION

Once assembled, the WEATHERPAK® automatically begins sampling weather conditions and transmits data to the Receiver/Display every 30 seconds.

The Receiver/Display takes approximately 5 -10 seconds to complete a boot-up routine. When this process is complete, the Receiver/Display is ready to accept the first transmission from the WEATHERPAK®. You can now view the data on the Receiver/Display box, run plume modeling software, or view and archive the data using Coastal's optional INTERCEPT™ Software.

CHAPTER 7 WEATHERPAK® AND PLUME MODELING SOFTWARE

When the WEATHERPAK® is set up and operational, and the Receiver/Display box connected to your computer, real-time data is available to run air dispersion plume modeling software.

IMPORTANT NOTE: Some earlier versions of ALOHA® need to be upgraded in order to work with a Station for Atmospheric Measurement (SAM); the WEATHERPAK® is a SAM. The U.S. EPA provides CAMEO®/ALOHA® software downloads, support, and information at its website: <http://www.epa.gov/osweroe1/content/cameo/index.htm> .

The following is a brief outline of the steps taken to produce an ALOHA® plume model on a PC operating Windows®. Our assumptions are that the user is familiar with ALOHA® and that the program is properly loaded onto the user's computer. Coastal Environmental Systems recommends consulting the ALOHA® web site and/or a certified CAMEO®/ALOHA® instructor for training, program details and limitations.

1. Open ALOHA® by clicking on its desktop icon, or selecting it from the Windows® Programs menu. An "Air Model Limitations" dialogue box will appear with important notes on program limitations. Read them, and then select "OK".
2. A "Text Summary" window will appear with information summarizing the event.
3. Confirm that your "Site Data" information is correct. If required, use the [SiteData] drop-down menu to change data.
4. Select the drop-down menu [SetUp] – [Chemical]. Choose the appropriate chemical.
5. Select the drop-down menu [SetUp] – [Atmospheric] – [SAM Station]. A series of dialogue boxes will then appear requiring user observations or assumptions. Please Note: relative humidity is not automatically captured by the ALOHA® model and may be manually entered using data from the WEATHERPAK® display.
6. (Optional) To confirm that the WEATHERPAK® data is being delivered to ALOHA®, use the drop-down menu [SAM Options] – [Processed Data]. A "Processed SAM Data" window will appear. Please Note: If the WEATHERPAK® has been collecting data for less than five minutes, a warning message will be displayed in both the Text Summary and Processed SAM Data windows.

7. ALOHA® requires that the SAM station be operating for five minutes before allowing the selection of the source of the release (tank, pipe, direct, etc.). Select the drop-down menu [SetUp] – [Source]. Select the source of the leak (tank, for example); a series of dialogue boxes will then appear requiring user observations or assumptions.
8. Select the [Display] – [Footprint] drop-down menu. A “Level of Concern” dialog box will appear with default ERPG ranges displayed. Select “OK” to show the plume footprint. Displaying the footprint in ALOHA® is essential before the plume can be overlaid on a MARPLOT® or other street map.
9. (Optional) Select the [Display] drop-down menu to produce graphs for source strength and concentration.
10. Select the [Sharing] drop-down menu to plot the plume onto a MARPLOT® (or other) map. As weather conditions change, the plume size and position will change, shortly after the WEATHERPAK® provides updated data. Please Note: MARPLOT® software requires that the ALOHA® window overlay the map window in order for the map-plume to update automatically (See Fig. 5).

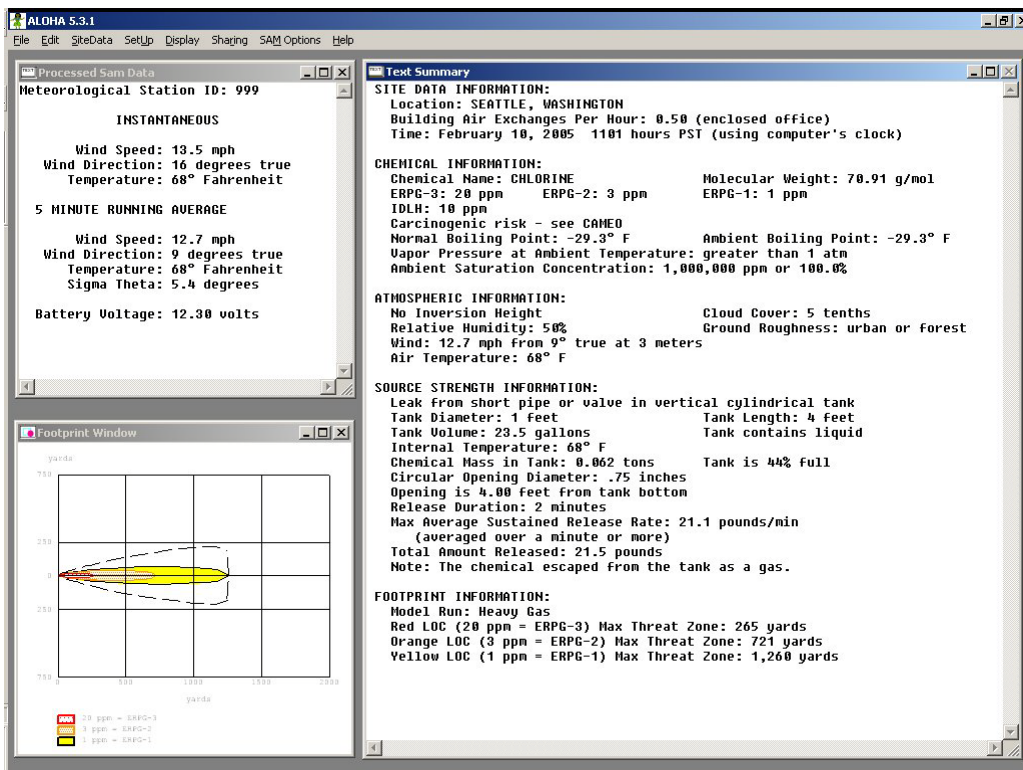


Figure 4 - CAMEO®/ALOHA® Screen

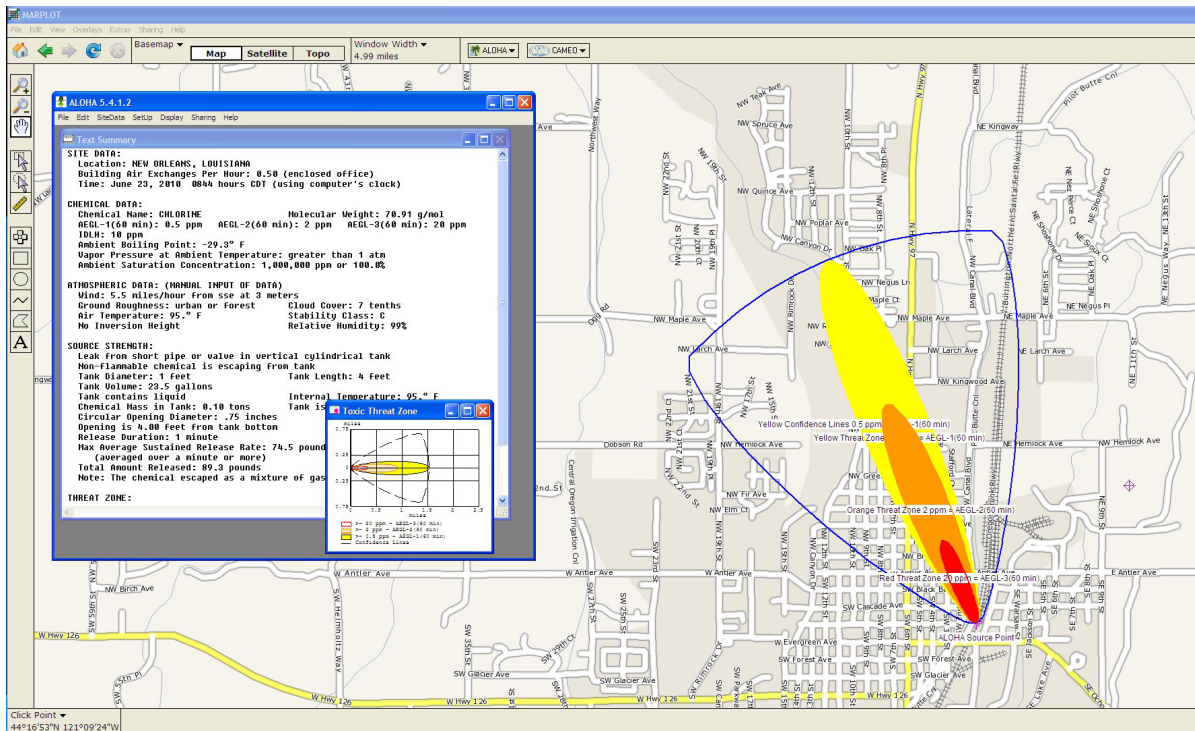


Figure 5 - ALOHA® Plume

WEATHERPAK® reads the sensors every second and automatically applies an algorithm to the sensor data to calculate five-minute running averages. This calculated data is transmitted, along with the “**INSTANTANEOUS**” data, every thirty seconds to the receiver and subsequently the plume model. In addition, the WEATHERPAK® calculates Sigma Theta. This is a measurement of air turbulence, which affects the mixing or dispersion of a chemical in the atmosphere. Sigma Theta is also referred to as “Stability.”

The “**INSTANTANEOUS**” data is the last direct sensor reading prior to the thirty-second update. The operator may be able to detect a trend (i.e. wind shift) by comparing the “**5 MINUTE RUNNING AVERAGE**” and “**INSTANTANEOUS**” data. The battery voltage is also transmitted. Battery Voltage is the tripod battery voltage. When fresh batteries are installed, the reading will be 13.5 VDC (or higher). This number will go down slowly as the batteries are depleted. Batteries should be replaced when this reading reaches 10.7 or lower.

If you drop-down the [SAM Options] from the Main menu and select [Raw Data], something like the following line of data will appear:

421, 0.9, 225, 1.0, 23.9, 1.0, 226, 23.9, 14.0, 1917.,, 46, 2536

This is ASCII data being sent by the WEATHERPAK®. Notice that most of these numbers will appear in the “Processed Sam Data” dialog screen in ALOHA®. The difference is that there are no labels and some additional number characters are present. In addition, this raw data is delivered in metric units (millibars, m/s, C), whereas the processed data has been converted to Standard English units (inches, MPH, F).

Two “checksums” are performed to ensure that the message was sent correctly. The computer adds up the “ASCII value” of the data line (each letter, number, comma, etc., has a numerical value universal to all computers) to make sure that the computer received the same number that the WEATHERPAK® transmitted.

7-1 ALOHA® DATA LINE INTERPRETATION

The data line fields are as follows:

ID, MW, MD, ST, AT, SI, DI, TI, BV, CKSUM1, , RH CKSUM2	
ID –	WEATHERPAK® unique identification number
MW –	5 minute averaged wind speed in meters per second
MD –	5 minute averaged wind direction in degrees
ST –	Stability class in degrees
AT –	5 minute averaged air temperature in degrees Celsius
SI –	Instantaneous wind speed in meters per second
DI –	Instantaneous wind direction in degrees
TI –	Instantaneous air temperature in degrees Celsius
BV –	Battery voltage in volts
CKSUM1 –	First checksum
BP –	Null
RH –	Relative humidity in percent
CKSUM2 –	Second checksum

CHAPTER 8 MAINTENANCE

8-1 PERIODIC MAINTENANCE SCHEDULE

Routine maintenance is required on the WEATHERPAK® every 12 months, to ensure the overall system and its sensors are working and performing within specification. The actual services vary, based on the sensors installed on your WEATHERPAK® model. For example, a WEATHERPAK® TRx2 should have the compass, air temperature and relative humidity sensors tested to their stated specifications. (The wind monitor does not require periodic calibration or maintenance). In addition, the entire WEATHERPAK® should be examined for any wear, damage or other non-conforming variances. For more information, please contact Coastal Environmental Systems' service department at (800) 488-8291 x157 to arrange maintenance on your WEATHERPAK®.

8-2 TOWER BATTERY LOW VOLTAGE INDICATOR

When the tower batteries voltage drops below 10.7 VDC a flashing "T" will appear in the lower right corner of the display. Replace with fresh batteries when this occurs. The system will function at lower voltages, but components will begin to fail, for example, the wind sensor will cease function at 10 volts and the radio will lose 70% of its transmission power at 9 volts.

8-3 REPLACING TOWER BATTERIES

WARNING: DO NOT LEAVE BATTERIES IN TOWER WHEN STORING OR SHIPPING TOWER ASSEMBLY. BATTERIES MAY LEAK CAUSING DAMAGE TO UPPER TOWER SECTION.

The WEATHERPAK® TRx2 has nine alkaline "D" cell batteries, which are located in the upper section of the tower. The batteries must be replaced with high quality alkaline batteries. Rechargeable batteries do not perform well in the WEATHERPAK®. (See Fig. 6)

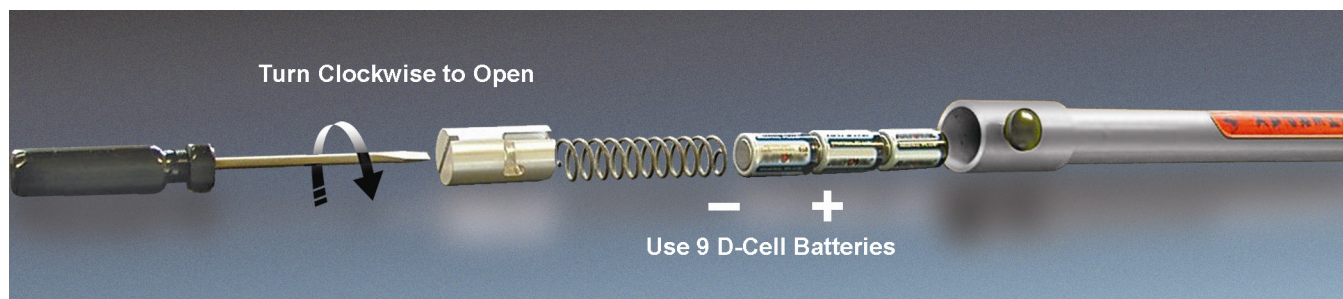


Figure 6 – Battery Replacement

You will need a large screwdriver to replace the batteries. The battery “plug” is slotted. With the screwdriver, **PUSH** (the plug is held in place by a spring), then rotate the plug **clockwise**. The plug will come out, followed by a spring, and then the batteries. Slide the new batteries in (positive end first) and replace the spring and plug.

To check the new voltage, set up the WEATHERPAK® and then open the ALOHA® plume model. Drop down the [MISC] menu to “**Processed Sam Data**”. One of the items shown is battery voltage. With new batteries installed, it should read between 13 to 15 volts. The tower ‘low-voltage’ indicator will stop flashing.

8-4 **TROUBLESHOOTING**

Do not take the WEATHERPAK® or the Receiver/Display box apart; this will void the warranty. If the procedures below do not solve the problem, call Coastal Environmental Systems’ Service Department: (800) 488-8291 x157.

8-4.1 **THE WEATHERPAK®**

When the WEATHERPAK® system is assembled, it automatically powers up, finds True North and begins sampling the atmospheric conditions; it then transmits weather data every 30 seconds. If it does not, check the following, in this order:

- Confirm that the WEATHERPAK® is properly secured in the KamLock connector on the tripod tower.
- Check the batteries in the tower. **Use only high quality alkaline batteries. (Do not use rechargeable batteries).**

8-4.2 **THE RECEIVER/DISPLAY**

Is the Receiver box on?

The power indicator light should be on and the display characters visible. If this is not the case, check the following:

- Be sure the receiver unit is plugged in and turned on.
- Check the power at the outlet.

8-4.3 **DATA LIGHT**

Data light not flashing?

Every 30 seconds (approximately), the red data light will flash, signifying that the WEATHERPAK® is sending data to the Receiver/Display. If the light does not flash, then do the following:

- Be sure the receiver unit is plugged in and turned on. Check the power indicator light on the “on/off” switch on the front panel.
- Check to see if the WEATHERPAK® is “line-of-sight” (less than 5 - 7 miles, and not blocked by an obstruction (hills, vehicles, steel buildings, etc.)
- Check to see that both the WEATHERPAK® antenna and the receiver antenna are securely connected.
- Reset the system by removing the WEATHERPAK® from the KamLock connector on the tower. Wait 10 seconds, and then replace the WEATHERPAK® on the tower.
- Check to see if the “low tower battery” indicator is flashing (flashing “T” on the display screen). Replace batteries if necessary.
- Assure the batteries in the tower are properly aligned (positive towards the top of the tower).

8-4.4 **THE COMPUTER**

There is data on the display but no data on the computer.

- Check all the connections from the receiver to the computer.

Error messages while running plume model.

These are not related to the use of the WEATHERPAK®; these are coming from the plume modeling software.

- Consult the CAMEO®/ALOHA® website: www.epa.gov/emergencies/content/cameo
- Contact Coastal Environmental Systems as a last resort. We are not certified CAMEO®/ALOHA® representatives, but we may be able to help.

APPENDIX 1

COASTAL ENVIRONMENTAL SYSTEMS TERMS AND CONDITIONS

1. **GENERAL:** The following terms and conditions (this "Agreement") constitute the sole and entire agreement between the parties. Any different or additional terms or conditions are not binding unless accepted in writing by Coastal Environmental Systems (Coastal). This Agreement may not be varied, modified, altered, or amended except in writing. Buyer's rights, duties, agreements or obligations hereunder may not be assigned or transferred without the prior written consent of Coastal. The obligations of Buyer shall be binding on its successors and assigns.

2. **PRICE AND PAYMENT:** Quoted prices shall apply only for the period specified in the proposal or quotation. If no period is specified, the quoted prices shall apply for thirty (30) days from the date of the proposal or quotation. Unless otherwise indicated in writing, payment terms shall be net thirty (30) days. Past due payments are subject to a service charge of 1.5% per month (18% annual) on the unpaid balance or the maximum legal rate permitted by state law, whichever is lower. Buyer shall pay for Coastal's legal costs in the event that collection becomes necessary. Coastal reserves the right at any time to revoke any credit extended to the Buyer because of the Buyer's failure to pay for any goods when due or for any other reason deemed good and sufficient by Coastal, and in such event, all subsequent shipments shall be paid for on delivery. Shipping and transportation charges, and applicable taxes, if any, are additional unless otherwise specified in the proposal or quotation.

3. **DELIVERY AND TITLE:** All shipments of products by Coastal are FOB Seattle, Washington (or other place of shipment, at Coastal's sole discretion) and all transportation charges shall be paid by Buyer in addition to the price of the products. Insurance, if desired by Buyer, shall be the responsibility of Buyer. Coastal may, at Coastal's discretion, add insurance to the delivery method and include its costs in shipping costs. Subject to Coastal's right of stoppage in transit, delivery of the products to the carrier shall constitute delivery to Buyer, and title and risk of loss shall thereupon pass to Buyer. Buyer acknowledges that any delivery dates provided by Coastal are estimates only and that Coastal is not liable for a carrier's failure to deliver on such dates. Coastal reserves the right to make deliveries in installments. Delivery of a quantity that varies from the quantity specified shall not relieve Buyer of the obligation to accept delivery and pay for the products delivered. Delay in delivery of one installment shall not entitle Buyer to cancel other installments.

4. **ACCEPTANCE OF PRODUCTS AND PRODUCT RETURNS:** Inspection and acceptance of products shall be Buyer's responsibility. Buyer is deemed to have accepted the products unless written notice of rejection is received by Coastal within thirty (30) days after delivery of the products. Buyer shall report any discrepancy in shipment quantity or damage within thirty (30) days after delivery. No return of products shall be accepted by Coastal without a Return Material Authorization ("RMA") number, which may be issued by Coastal in its sole discretion. Returned products must be in original manufacturer's shipping cartons complete with all packing materials. All products for return shall be returned freight prepaid in the manner specified in the RMA. Buyer is subject to a 25% restocking fee for returns of *standard products*. *Non-standard or custom products* may not be returned.

5. **CANCELLATION:** *Standard products:* Upon written notice of cancellation for Buyer's convenience of an order for standard products only, charges will be as follows: after delivery: 25% of purchase price; within thirty (30) days of scheduled delivery: 15% of purchase price. *Non-standard or custom products:* Upon written notice of cancellation for Buyer's convenience of an order for non-standard or custom products only, charges will be as follows: after delivery: 100% of purchase price; after placement of order but before delivery: 50% of purchase price.

APPENDIX 1 - COASTAL ENVIRONMENTAL SYSTEMS TERMS AND CONDITIONS (Continued)

6. FORCE MAJEURE: Coastal shall not be liable for failure to fulfill its obligations herein or for delays in delivery due to causes beyond its reasonable control, including but not limited to acts of God, natural disasters, acts or omissions of other parties, acts or omissions of civil or military authority, government priorities, changes in law, material shortages, fire, strikes, floods, epidemics, quarantine restrictions, riots, war, acts of terrorism, delays in transportation or inability to obtain labor or materials through its regular sources. Coastal's time for performance of any such obligation shall be extended for the time period of such delay or Coastal may, at its option, cancel any order or remaining part thereof without liability by giving notice of such cancellation to Buyer.

7. WARRANTIES: *In lieu of any and all implied warranties, all of which are expressly disclaimed, and as its sole and exclusive warranty, Coastal hereby warrants for a period of twelve (12) months from the delivery date of products (the "Warranty Period") that the products manufactured and supplied by Coastal and purchased by Buyer shall be free from defects in material and workmanship.* EXCEPT AS EXPRESSLY SET FORTH IN THIS SECTION, COASTAL MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, WRITTEN OR ORAL, WITH RESPECT TO THE PRODUCTS, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY, TITLE, OR FITNESS FOR A PARTICULAR PURPOSE. COASTAL MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESSED OR IMPLIED, WRITTEN OR ORAL, WITH RESPECT TO THOSE COMPONENTS MANUFACTURED BY THIRD PARTIES, INCLUDING WITHOUT LIMITATION MERCHANTABILITY, TITLE, OR FITNESS FOR A PARTICULAR PURPOSE. Upon shipment of the products, Coastal assigns to Buyer, to the extent assignable, and Buyer may have the benefit of, any and all manufacturer's warranties, service agreements and patent indemnities, if any, with respect to those components of the products manufactured by third parties. Buyer's sole remedy for breach of any such third-party warranty shall be against such third party and not against Coastal, nor shall such breach have any effect whatsoever on the rights and obligations of either party with respect to this Agreement. Buyer understands and agrees that this coverage will not necessarily coincide with Coastal's warranty of products manufactured by Coastal, and Coastal warrants only those products manufactured by Coastal. All warranty claims shall be subject to Coastal's determination, in its sole discretion, that the products are subject to this warranty and are defective in material or workmanship. Upon Coastal's positive determination thereof, Coastal at its option after receiving from Buyer the defective products, will either (1) deliver to Buyer products of like quality, or (ii) repair the defective products, or (iii) refund to Buyer the total sales price paid for the defective products. THIS EXPRESS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY OF COASTAL, AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ORAL OR WRITTEN, ARE EXPRESSLY DISCLAIMED BY COASTAL.

8. LIMITATION OF LIABILITY: COASTAL SHALL NOT BE LIABLE TO BUYER, BUYER'S CUSTOMERS, OR ANY OTHER PARTY FOR ANY LOSS, DAMAGE, OR INJURY THAT RESULTS FROM THE USE OR APPLICATION BY BUYER, BUYER'S CUSTOMERS, OR ANY OTHER PARTY, OF COASTAL PRODUCTS DELIVERED TO BUYER, UNLESS THE LOSS OR DAMAGE RESULTS DIRECTLY FROM THE INTENTIONALLY TORTUOUS OR FRAUDULENT ACTS OR OMISSIONS OF COASTAL. IN NO EVENT SHALL COASTAL BE LIABLE TO BUYER OR ANY OTHER PARTY FOR LOSS, DAMAGE, OR INJURY OF ANY KIND OR NATURE ARISING OUT OF OR IN CONNECTION WITH THESE TERMS AND CONDITIONS, OR ANY AGREEMENT INTO WHICH THEY ARE INCORPORATED, OR ANY PERFORMANCE OR NONPERFORMANCE UNDER THESE TERMS AND CONDITIONS BY COASTAL, ITS EMPLOYEES, AGENTS, OR SUBCONTRACTORS, IN EXCESS OF THE NET PURCHASE PRICE OF THE PRODUCTS OR SERVICES ACTUALLY DELIVERED TO AND PAID FOR BY BUYER HEREUNDER. IN NO EVENT SHALL COASTAL BE LIABLE TO BUYER OR ANY OTHER PARTY FOR INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO LOSS OF GOODWILL, LOSS OF ANTICIPATED PROFITS, OR OTHER ECONOMIC LOSS ARISING OUT OF OR IN CONNECTION WITH COASTAL'S BREACH OF, OR FAILURE TO PERFORM IN ACCORDANCE WITH ANY OF THESE TERMS AND CONDITIONS, OR THE FURNISHING, INSTALLATION, SERVICING, USE OR PERFORMANCE OF ANY PRODUCTS OR INFORMATION COASTAL SHALL PROVIDE HEREUNDER, EVEN IF NOTIFICATION HAS BEEN GIVEN AS TO THE POSSIBILITY OF SUCH DAMAGES. BUYER EXPRESSLY WAIVES ANY AND ALL CLAIMS FOR SUCH DAMAGES. IN NO EVENT SHALL COASTAL HAVE ANY LIABILITY FOR ANY PRODUCTS USED FOR AVIATION OR HAZARDOUS MATERIAL MANAGEMENT APPLICATIONS.

APPENDIX 1 - COASTAL ENVIRONMENTAL SYSTEMS TERMS AND CONDITIONS (Continued)

9. INTELLECTUAL PROPERTY: Buyer agrees and acknowledges that it is not acquiring any ownership or other interest of any kind whatsoever in any of Coastal's trademarks, trade names, patents, copyrights, registrations or applications for registration of any of the foregoing, know-how, unpatented inventions, trade secrets, common law rights in any of the foregoing, computer software (including all documentation and source codes) or any other intellectual property of any kind whatsoever or the goodwill associated or which may become associated therewith. Coastal provides the products to Buyer subject to the terms and conditions of any standard end-user license agreement of which a copy is provided to Buyer with the products. Buyer may not sublicense, sell, rent, lend, or give away the products to others. Buyer may not copy, alter, modify, or adapt the products, nor create any derivative works based on them. Nothing herein shall be construed to grant any rights or license to use any software or other intellectual property in any manner or for any purpose not expressly permitted by such license agreement. Buyer further acknowledges and agrees that the sale of products to Buyer does not convey any license express or implied, other than as expressly stated herein, and Buyer shall not manufacture, modify, reverse engineer, duplicate, otherwise copy or reproduce any of the products or any part thereof.

10. DEFAULT AND TERMINATION: Either party hereto may terminate this Agreement upon written notice to the other following any material breach or omission by the other with respect to any term, representation, warranty, condition, or covenant hereof and the failure of such other party to cure such material breach or omission within ten (10) days of notice of such breach or omission. Upon such termination, Coastal shall have the right to repossess all products delivered to Buyer under this Agreement. Costs of repossession will be paid by Buyer if Buyer is the defaulting party. Termination under this paragraph does not relieve Buyer from its payment obligations under this Agreement.

11. U.S. GOVERNMENT CONTRACTS: If the products are to be used in the performance of a U.S. Government contract or subcontract and a U.S. Government contract number shall appear on Buyer's purchase order, those clauses of the applicable U.S. Government procurement regulation which are required by Federal statute to be included in U.S. Government subcontracts shall be incorporated herein by reference.

12. RESALE AND ASSIGNMENT: Buyer agrees that it will not assign its rights under these terms and conditions to any third party and will not sell any products unless explicitly authorized to do so in writing by Coastal.

13. COMPLIANCE WITH U.S. EXPORT LAW: If Buyer delivers the products to its customer who may use the products outside of the United States, Buyer acknowledges and shall advise its customer that the products are controlled for export by the U.S. Department of Commerce and the products may require authorization prior to export from the United States or re-export. Buyer agrees that it will not export, re-export, or otherwise distribute products, or direct products thereof, in violation of any export control laws or regulations of the United States.

14. APPLICABLE LAW: This Agreement and the performance of the parties hereunder shall be construed in accordance and governed by the law, including the Uniform Commercial Code, as enacted in the State of Washington under the exclusive jurisdiction and venue of the state and federal courts sitting in Seattle, Washington.

15. ATTORNEYS' FEES AND COSTS: In any dispute concerning or arising under this Agreement or any transaction relating hereto, the prevailing party shall be entitled to reasonable attorneys' fees and costs, including, without limitation, costs and fees incurred on appeal or in a bankruptcy or similar action.

16. NOTICE: Notice may be delivered to Buyer and process served by certified mail or by any nationally recognized delivery service that provides proof of delivery, addressed to any of the Buyer's addresses on Buyer's Purchase Order, or as authorized by applicable law or court rule.

APPENDIX 1 - COASTAL ENVIRONMENTAL SYSTEMS TERMS AND CONDITIONS (Continued)

17. **SEVERABILITY:** If any term of this Agreement or the application thereof to any person, entity or circumstance shall at any time or to any extent be determined to be invalid or unenforceable under any provision of applicable law, to the full extent the applicable law may be waived, it is hereby waived. To the extent such law cannot be waived, the invalid or unenforceable term shall be replaced by a valid term which comes closest to the intentions of the parties to this Agreement. In case such replacement term cannot be agreed upon, the invalidity of the term in question shall not affect the validity of any other term or this Agreement as a whole, unless the invalid term is of such essential importance that it can be reasonably assumed that the parties would not have entered into this Agreement without the invalid term.

18. **TAXES:** Coastal will pay and Buyer will reimburse Coastal for any federal, state, or local sales, use excise, or similar tax on all orders applicable to this Agreement.

19. **WAIVERS:** A waiver of any breach or default under this Agreement will not constitute a waiver of any other or subsequent breach or default. The failure of either party to enforce any term of this Agreement will not constitute a waiver of such party's rights to subsequently enforce the term.

20. **CAPTIONS:** The headings, subheadings, and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the terms of this Agreement.

21. **COMMUNICATIONS EQUIPMENT:** Coastal Environmental Systems, Inc. provides expert support in designing and installing various types of communications systems (cell modem, radio, satellite, etc.). However, communication devices are subject to issues in regard to functionality in the field that may not be within the control of Coastal to resolve without additional third party support, engineering effort or equipment changes not included with the original work ordered by the customer. Where issues of this type arise and there is a need for additional engineering support, services or equipment beyond what was originally included with the order, the customer will be billed for the additional work. Delays in shipping the equipment to the customer that exceed 30 days will be subject to invoicing for the work performed up to that point prior to shipping the order and prior to resolution of the particular communications issue.