



WEATHERPAK[®] MTR

User's Manual

November 26, 2012

TABLE OF CONTENTS

CHAPTER 1	SYSTEM DESCRIPTION	5
CHAPTER 2	SITING AND SETUP	7
2-1	SITING CONSIDERATIONS	7
2-1.1	COMPASS ACCURACY	7
2-1.2	PROPER WIND MEASUREMENT	7
2-1.3	RADIO TRANSMISSION	7
2-1.4	GPS OPERATION	7
2-2	SYSTEM ASSEMBLY	8
2-2.1	RECEIVER/DISPLAY CONNECTIONS	8
2-2.2	CONNECTING TO A COMPUTER WITH SERIAL PORT (USED ON EARLIER MTR VERSIONS)	8
2-2.3	CONNECTING TO A COMPUTER WITH SERIAL TO USB CONVERTER	9
2-2.4	CONNECTING TO A COMPUTER WITH THE ETHERNET PORT	9
2-3	TRIPOD AND WEATHERPAK[®] SET UP	9
CHAPTER 3	SYSTEM OPERATION	9
3-1	CONFIGURING THE DISPLAY	9
3-2	RECEIVER/DISPLAY FUNCTIONS AND OPERATION	10
3-3	USING THE TOUCH SCREENS	11
3-3.1	THE ACTIVE WPAK SCREEN	11
3-3.2	THE WEATHERPAKS DETECTED SCREEN	11
3-3.3	THE GRAPH DATA SCREEN	13
3-3.4	THE PREVIEW SCREEN	13
3-3.5	WEATHERPAK STATUS SCREEN	14
CHAPTER 4	WEATHERPAK[®] AND PLUME MODELING SOFTWARE	16
4-1	ALOHA[®] DATA LINE INTERPRETATION	18
CHAPTER 5	MAINTENANCE	18
5-1	PERIODIC MAINTENANCE SCHEDULE	18
5-2	TROUBLESHOOTING	18
5-2.1	THE WEATHERPAK[®]	18
5-2.2	THE RECEIVER/DISPLAY	18
5-2.3	DATA TRANSMISSION INDICATOR LIGHT	19
5-2.4	THE COMPUTER	19
5-3	REPLACING TOWER BATTERIES AND FUSE	19
5-3.1	TOWER BATTERIES	19
5-3.2	TOWER FUSE	20

TABLE OF FIGURES

FIGURE 1	COMPUTER WITH RECEIVER/DISPLAY	5
FIGURE 2	BACK OF RECEIVER/DISPLAY BOX	8
FIGURE 3	TOWER SET-UP	9
FIGURE 4	CONFIGURATION SCREEN.....	10
FIGURE 5	ACTIVE SCREEN.....	11
FIGURE 6	WEATHERPAK®'S DETECTED SCREEN	12
FIGURE 7	GRAPH DATA SCREEN.....	13
FIGURE 8	PREVIEW SCREEN.....	14
FIGURE 9	STATUS SCREEN.....	15
FIGURE 10	"NO DATA" ALERT SCREEN	15
FIGURE 11	ALOHA® SCREEN CAPTURE	16
FIGURE 12	ALOHA® WITH MARPLOT® MAP	17
FIGURE 13	BATTERY REPLACEMENT.....	20
FIGURE 14	FUSE LOCATION.....	20

LIST OF TABLES

TABLE 1	WEATHERPAK® MTR COMPONENTS.....	6
---------	---------------------------------	---

LIST OF APPENDICES

APPENDIX A	GAMMA SENSOR
APPENDIX B	VEHICLE MOUNTING A WEATHERPAK®
APPENDIX C	WEATHERPAK® USB CONNECTION AND VIRTUAL COM PORT SET UP
APPENDIX D	COASTAL ENVIRONMENTAL SYSTEMS SALES TERMS AND CONDITIONS

IMPORTANT NOTES

Please call Coastal Environmental Systems if any issues arise or if you have questions regarding the **WEATHERPAK® MTR**.

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

Main: 800-488-8291 · Fax: 206-682-5658
Parts & Service: x157
Support@CoastalEnvironmental.com

- **WHEN CONTACTING US, PLEASE REFER TO THE MODEL NUMBER AND SERIAL NUMBER** of your WEATHERPAK®. The serial number is located on a silver label under the radiation shield near the top of the WEATHERPAK®, on a silver label located near the bottom of the WEATHERPAK® cylinder, or on the **Weatherpak Status** screen on the Receiver/Display unit.
- **WASH OR DECON THE WEATHERPAK® WHEN FULLY ASSEMBLED.** Do not allow water to enter the connectors. WEATHERPAK® is water-resistant only when completely assembled.
- **FOLLOW THE MAINTENANCE SCHEDULE.** (See "Periodic Maintenance Schedule" Chapter 5, Section 5-1).
- **DO NOT OPEN OR DISASSEMBLE THE WEATHERPAK®.** The WEATHERPAK® is double O-ring sealed and purged with desiccant to assure a watertight seal. Opening the cylinder will allow moisture in, damage the electronics, and invalidate your warranty.
- **DO NOT REMOVE THE ANTENNA FROM THE WEATHERPAK®.** If the WEATHERPAK® is activated without the antenna, the radio will be damaged.
- **REPLACING TOWER BATTERIES AND FUSE. WARNING: DO NOT LEAVE BATTERIES IN TOWER WHEN STORING OR SHIPPING TOWER ASSEMBLY. BATTERIES MAY LEAK CAUSING DAMAGE TO UPPER TOWER SECTION.**

CHAPTER 1 SYSTEM DESCRIPTION

The WEATHERPAK® MTR measures wind speed and wind direction, air temperature, relative humidity and barometric pressure. Gamma radiation sensor is optional. In addition, the WEATHERPAK® calculates the wind stability class and provides location information. Atmospheric conditions are sampled every second and the system computes a 5-minute running average. Data is then transmitted every 30 seconds to the display and plume model.

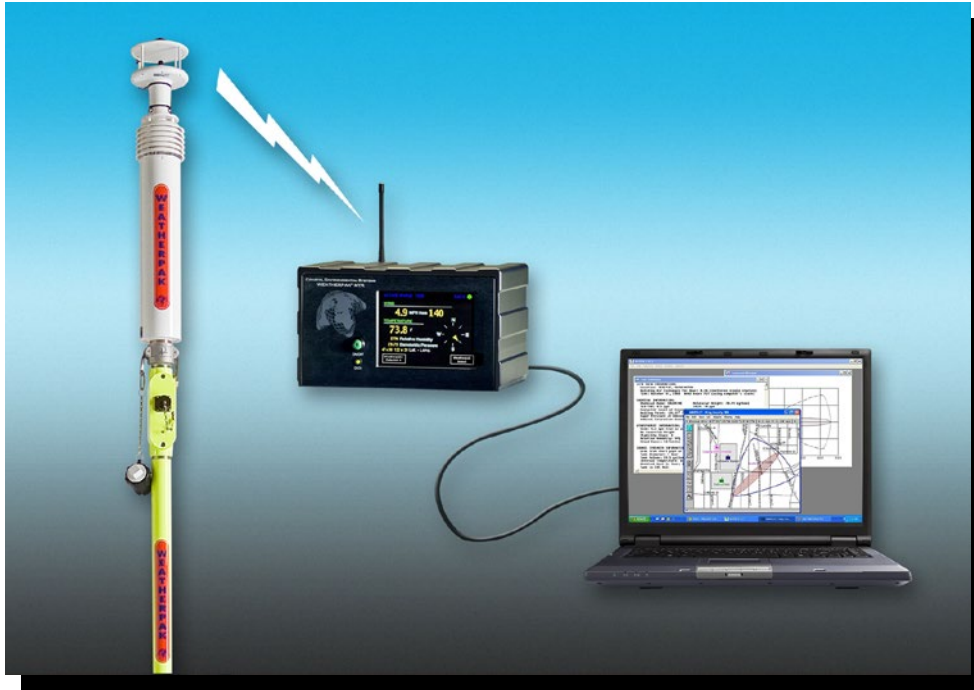


Figure 1 - Computer with Receiver/Display

WEATHERPAK® was specifically designed for use by Hazardous Materials Responders. The following is a list of some of the features that make the WEATHERPAK® MTR unique:

- WEATHERPAK® MTR features an advanced electronic interface, which allows the use of features such as GPS and *SmartDetect™*, the MTR's unique automatic networking capability, as well as future enhancements as they are needed.
- 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.
- WEATHERPAK® MTR features a multi-function, 5.7" full color, flat panel touch screen display in a ruggedized enclosure. Multiple display screens are available via the touch screen, which displays data from multiple WEATHERPAK® weather stations.
- WEATHERPAK® MTR is the only WEATHERPAK® that offers an optional gamma radiation sensor.

In addition to the above features, MTR shares the following with the rest of the WEATHERPAK® line of products:

- Automatically updates CAMEO®/ALOHA®, CHARM®, MIDAS® and most other plume modeling software programs.
- Built-in electronic compass allows the WEATHERPAK® to be set up in any orientation – will automatically determine True North and give you true wind direction.¹
- Set-up time is less than one minute.
- The electrical connections are designed to be intrinsically safe and the housing and tower are constructed of 6061-T6 aluminum, a non-corrosive and non-sparking alloy.
- Designed to withstand decontamination procedures. The WEATHERPAK® housing is double O-ring sealed and dried with a desiccant to protect the electronics against moisture.
- All electronics are grounded at a single point to protect the WEATHERPAK® against EMI (electro-magnetic interference) and RFI (radio frequency interference), thus assuring reliable data and transmission.

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

WEATHERPAK® MTR SYSTEM COMPONENTS

Description	Part Number
WEATHERPAK® sensor package with wind monitor	Please Call
Three meter tower, including:	1220-109-040
Upper tower section with j-box and KamLock	--
Lower tower section	--
Tower leg – 3 each	--
Receiver/Display box	1201-140-002
Receiver/Display power supply	4050-000-094
Receiver/Display power cable	6016-000-001
GPS antenna and cable (for Receiver/Display box)	1914-000-108
USB data output cable	6003-000-094
Receiver/Display radio receiver antenna	1914-000-068
WEATHERPAK® carry-case	3603-000-040
Tower carry-bag	3603-101-009
User's Manual	0302-140-001
Quick reference card for assembly and ALOHA®	0302-140-002
WEATHERPAK® Training Guide (CD)	1220-109-001

Table 1 - WEATHERPAK® MTR Components

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.

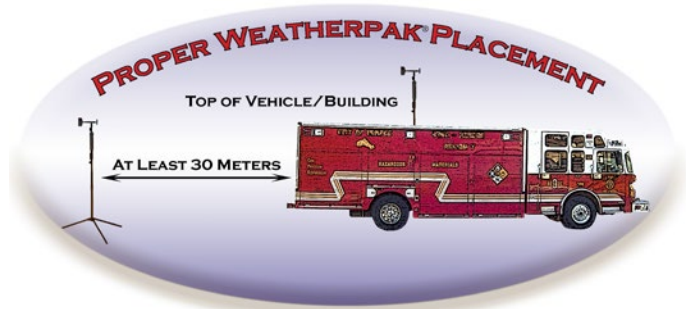
CHAPTER 2 SITING AND SETUP

2-1 SITING CONSIDERATIONS

The following siting considerations must be addressed:

2-1.1 Compass Accuracy

The WEATHERPAK® contains an electronic compass for automatic alignment to True North. If placed laterally near a large mass of steel or other magnetic material, an erroneous compass reading may result. (The top of a van is OK, but next to it is not an ideal location). Try to place the WEATHERPAK® at least 30 meters laterally from large vans, busses, cranes, etc.



2-1.2 Proper Wind Measurement

Select a site that is as unobstructed 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, an erroneous wind data reading will result.

2-1.3 Radio Transmission

Deploy the WEATHERPAK® as close as safety permits to the hot zone. The WEATHERPAK®'s UHF radio has a range of 5 to 7 miles² "line-of-sight". Do not attempt to transmit through structures containing steel, or through hills.

2-1.4 GPS Operation

There is a GPS receiver inside the MTR Receiver/Display box and a GPS receiver inside the WEATHERPAK® MTR. These GPS receivers work together and provide data to the *SmartDetect*™ firmware, which in turn furnishes direction and distance information for additional WEATHERPAK® MTRs operating in the vicinity. (The MTR receiver will also accept data from Coastal Environmental Systems' WEATHERPAK® TRx and TRx2s, but since only the MTR has a GPS, location information for the others is not available).

The GPS in the Receiver/Display must be connected to an external GPS antenna. The receiver will automatically begin to search for and track GPS satellite signals at power-up. The antenna must have good exposure to the sky.

The performance of a GPS receiver at power-up is determined largely by the availability and accuracy of the satellite ephemeris data and the availability of a GPS system almanac. When the WEATHERPAK® is powered-up, the GPS searches for satellites from a cold start (no almanac). The GPS will begin to compute position solutions within the first two minutes. The WEATHERPAK® system should be powered up as soon as possible upon arrival at the incident scene.

² This distance assumes ideal conditions. Reception range will vary depending on radio signal path.

2-2 **SYSTEM ASSEMBLY**

2-2.1 **Receiver/Display Connections**

The WEATHERPAK® MTR Receiver/Display box contains the radio receiver and features a 5.7" color TFT display with a touch screen. In addition, it contains GPS and electronics that allow the WEATHERPAK® to communicate with the computer. The touch screen on the display provides access to multiple screens that display the weather data in a variety of ways, including: **Active**, **Preview**, and **Weatherpak Status** screens, a columnar list of other WEATHERPAK®s in the vicinity, and sensor data graphs.



Figure 2 - Back of Receiver/Display Box

1. Connect the external GPS and radio antenna to the appropriate connectors on the back of Receiver/Display box. (See Figure 2).
2. Connect the USB data cable. (The Ethernet connection will only be used in rare instances where the Receiver/Display box will be connected to a network).
3. Plug the Receiver/Display box power supply AC cord into a power source (110V, unless otherwise marked) then plug the mini-plug end into the plug on the back of the Receiver/Display box.
4. Press the green power "On/Off" button on the front of the unit. The power indicator light will illuminate, the Coastal Environmental Systems splash screen will immediately appear, and the display will complete its boot-up within 20-30 seconds.

2-2.2 **Connecting to a Computer with Serial Port (used on earlier MTR versions)**

1. Plug one end of the Serial data cable into the Serial connector (RS 232) on the back of the Receiver/Display box and the other end into an available 9-pin Serial port on your PC.
2. Turn the Receiver/Display on.
3. The receiver power indicator light should now be on. The system will take approximately 20-30 seconds to boot-up.
4. With the WEATHERPAK® assembled and running and after the Receiver/Display box has completed the boot-up routine, the amber colored data light will blink approximately every 30 seconds as an indication that data is being received from the WEATHERPAK®.

2-2.3 Connecting to a Computer with Serial to USB Converter

In the event the computer does not have a USB port, you must employ a "Serial to USB" converter, which is available at your local computer supply store. Connect the Serial cable to the converter. Follow the directions provided with the Serial to USB device.

2-2.4 Connecting to a Computer with the Ethernet Port

This method is to be employed only if the Receiver/Display must be connected to a network. Please contact Coastal Environmental Systems, Inc. for further information.

2-3 TRIPOD AND WEATHERPAK® SET UP

Assemble the tower in the following manner:

1. Insert and lock the legs onto the bottom section of the tower, forming the tower's 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 seat the WEATHERPAK® properly. Once the weather station is properly seated, press the arms of the clamp down to assure a tight fit. The battery indicator light (on the tower junction box) should illuminate when the WEATHERPAK® is properly seated into the KamLock.
3. Place the entire unit (upper tower section and WEATHERPAK®) onto the tripod, engage the twist-lock and turn clockwise ¼ turn.
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.

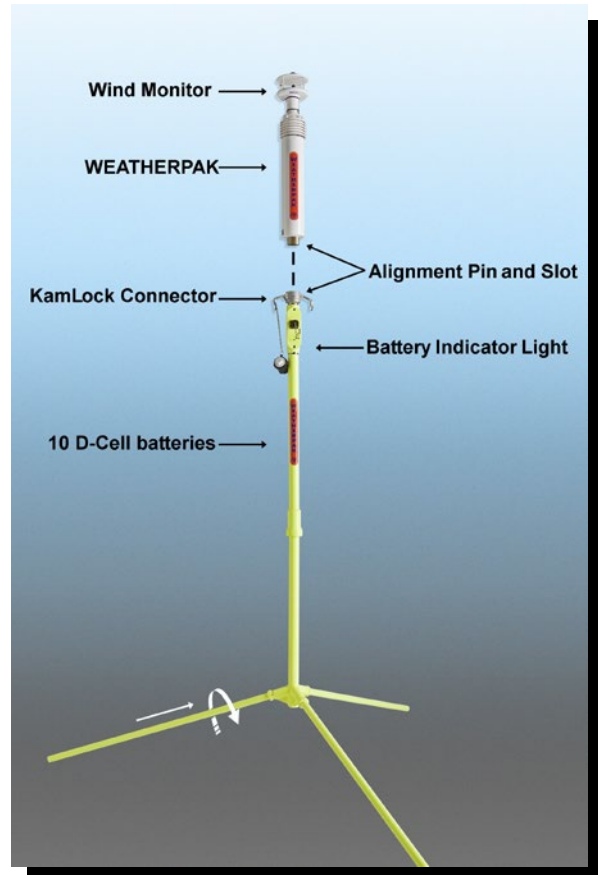


Figure 3 – Tower Set-up

CHAPTER 3 SYSTEM OPERATION

Once set up, the WEATHERPAK® automatically begins sampling weather conditions and transmits data to the Receiver/Display every 30 seconds. (See "Data Line Interpretation" in Section 3-

3.5, for additional information.)

The Receiver/Display takes approximately 20-30 seconds to complete a boot-up routine. When this process is complete, it is ready to accept the first transmission from the WEATHERPAK®. The data may now be viewed on the display or viewed and archived using Coastal Environmental Systems' optional INTERCEPT™ software. Plume modeling software requires five minutes of data before a valid plume can be presented,

3-1 CONFIGURING THE DISPLAY

During the boot-up process two touch screen buttons will appear labeled **Configure** and **Skip Configuration**. When selected, the **Configure** button opens a series of screens which allow the operator to select from several data display configuration choices. Once these selections have been made (typically the first time you boot-up your new system), the values are stored in memory. It is not necessary to configure the system every time it is used. The configuration screen will time-out in approximately five seconds, or you can touch the **Skip Configuration** button to proceed. Configuration choices are:

- Screen 1: **Pressure Temperature and Wind** – Metric or English units.
- Screen 2: **Latitude and Longitude** – Various decimal or Hs:Ms formats.
- Screen 3: **Forward All Weatherpak Data** – If using ALOHA® **always, select “No”**. The “Yes” selection is for custom applications only. Selecting “Yes” will prevent ALOHA® or other plume models from working properly.
- Screen 4: **Calibrate Touch Screen** – Calibrating re-aligns the touch screen. There is no need to calibrate the display screen every time the system is used. If, over time, the screen becomes misaligned or the touch screen buttons do not function properly, re-start the Receiver/Display box and follow the procedure presented on this screen.



Figure 4 - Configuration Screen

3-2 RECEIVER/DISPLAY FUNCTIONS AND OPERATION

The touch screen on the display provides access to multiple information screens which display the weather data in a variety of ways. The screens include: the **Active** and **Preview** screens, a raw data screen, a columnar list of all WEATHERPAK®s in the vicinity, and sensor data graphs. The following is a summary of the function of each screen:

- The **Active** screen is the most important and most frequently used information screen. It displays the data received from the **Active** WEATHERPAK®. An **Active** WEATHERPAK® is defined as the weather station selected to provide data to the plume model. Access to all other screens is initiated here.
- The **Weatherpaks Detected** screen displays data from all WEATHERPAK®s detected in the vicinity, in a columnar fashion. If any of the remote systems are WEATHERPAK® MTR's, the relative position (direction and distance) will also be displayed for those stations.
- The **Preview** screen displays data from any one of the stations listed on the **Weatherpaks Detected** screen and allows the operator to view the status of that system and change its Active or Default status, if desired. **Please Note:** Reset the default upon receiving your new WEATHERPAK® MTR. It is common practice for organizations to purchase multiple WEATHERPAK® weather stations and then distribute the systems to several teams without taking into account the factory default setting. (See Section 3-3.4, “Changing or Setting the Default WEATHERPAK®”).
- The **Weatherpak Status** screen displays the unique serial number of the WEATHERPAK®, its tower battery voltage, and the raw data line being transmitted by the selected system. The **MTR Info** screen (accessed by the button at the bottom of the **Weatherpak Status** screen) lists the serial number of the Receiver/Display box, the firmware version and the network ID.
- The **Graph Data** screens display simple graphs of wind direction, wind speed, air temperature, barometric pressure and relative humidity. The time line auto-scales to a maximum of three hours.

3-3 USING THE TOUCH SCREENS

3-3.1 The Active WPAK Screen

Once the boot-up process is complete, the **ACTIVE WPAK** screen appears and, upon receiving the first transmission from the weather station, the “Default” WEATHERPAK[®] data is automatically displayed. If a default station has not been chosen, the **ACTIVE WPAK** screen will remain blank until a station is selected (from the **Weatherpaks Detected** screen) and designated as “Active” or “Default”. (See Figure 5).

The screen label **ACTIVE WPAK** is followed by the unique serial number of the currently active WEATHERPAK[®]. The data validity indicator is located in the upper right corner of the screen. Green indicates the data is current and valid. Red indicates no data has been received from the WEATHERPAK[®] for more than two minutes.

The data fields presented on this screen are:

- 5-minute running average of wind speed and wind direction (in degrees 0-360)
- 5-minute average air temperature
- Relative humidity
- Barometric pressure
- Latitude and Longitude
- Gamma radiation indicator (optional)

(Section 3-3.5, “Weatherpak Status Screen” provides a detailed description of data output).

Three touch screen buttons are located at the bottom of the **ACTIVE WPAK** screen: **Weatherpaks Detected**, followed by the number of systems automatically detected, **Graph Data**, and **Weatherpak Status**. Touch the **Weatherpaks Detected** button to view a columnar list and data from additional WEATHERPAK[®]s in the vicinity. Touch **Graph Data** to view the sensor data graphs. Touching the **Weatherpak Status** button will open the **Weatherpak Status** screen for the active system.



Figure 5 - Active Screen

3-3.2 The Weatherpaks Detected Screen

This screen is accessed by touching the **Weatherpaks Detected** button on the **ACTIVE WPAK** screen. Listed in a columnar fashion are all WEATHERPAK[®]s, (MTR, TRx, and TRx2) that are within range and detected by the receiver. (See Figure 6.)

The data displayed on this screen is:

- **WPAK** lists the unique serial numbers in numerical order.
- **WSPD** is the instant wind speed. Instant wind speed is the speed measured one second before data transmission. (This reading will typically be different from the 5-minute average wind speed displayed on the **ACTIVE WPAK** screen).
- **WDIR** is the instant wind direction, in degrees. Instant wind direction is the direction measured one second before data transmission. (This reading will typically be different from the 5-minute average wind direction displayed on the **ACTIVE WPAK** screen).
- **LOC** is the direction to the specified remote WEATHERPAK[®] MTR. (This data is only available for WEATHERPAK[®] MTRs).
- **DIST** is the distance, in statute miles, to the specified remote WEATHERPAK[®] MTR. (This data is only available for WEATHERPAK[®] MTRs).
- **STAB** is wind stability class, also known as standard deviation. This number is associated with air turbulence and reflects the mixing ability of air for chemical plume modeling purposes. The default value (-1) is displayed until the weather station has accumulated 5 minutes of data. STAB ranges from 1 to 100. The higher the STAB number, the more unstable the wind, which relates to a wider area of concern.
- **Status** Touching this button will open the **Weatherpak Status** screen for the selected WEATHERPAK[®]. (For additional details see Section 3-3.5).

Color indicators

Some information on the **Weatherpaks Detected** screen is color-coded to provide additional information:

Green text identifies the Active WEATHERPAK[®] and indicates valid data.

Yellow text identifies systems other than the Active system and indicates valid data.

Red text indicates data has not been updated for more than two minutes and may be invalid.

The data indicator in the upper right corner of the screen indicates the Active WEATHERPAK[®]'s data status. Green is valid. Red indicates no data has been received for more than two minutes.

Previewing WEATHERPAK[®]s other than the Active system

Touch the appropriate data line and the **Preview** screen will open, displaying the information for the selected WEATHERPAK[®].

Touch "**Exit**" to return to the **Active** screen.

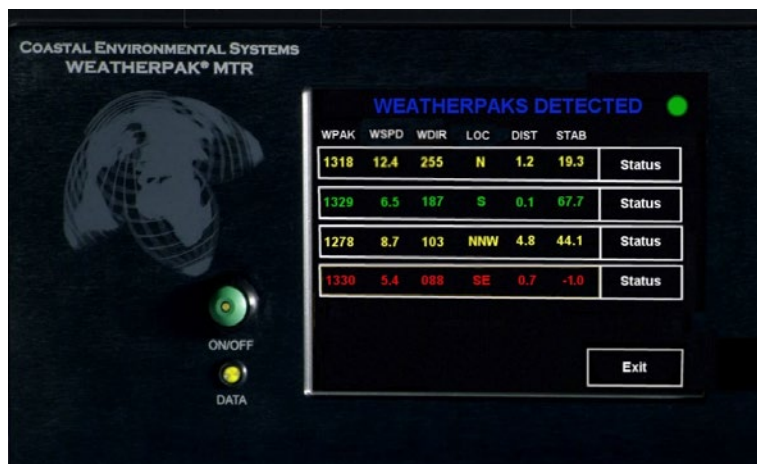


Figure 6 - WEATHERPAK[®]s Detected Screen

3-3.3 The Graph Data Screens

These screens present the wind direction and speed, air temperature, station barometric pressure and relative humidity data on graphs. The graphs display historic data (on a self-scaling time line) up to a maximum of three hours. The various data values are accessed by touching the buttons at the bottom of the screen.

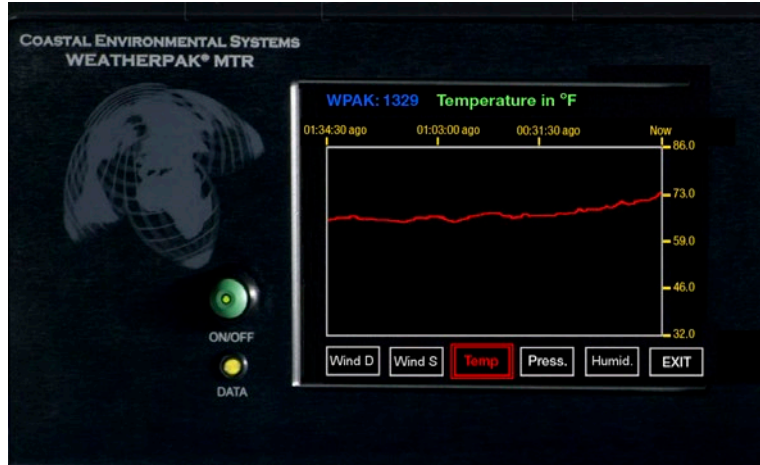


Figure 7- Graph Data Screen

3-3.4 The Preview Screen

The layout of the **Preview** screen is similar to the **Active** screen, but the **Preview** screen serves a very different function. When viewing data on the **Preview** screen you are simply viewing the data on one of the non-active weather stations. The currently Active WEATHERPAK® is still sending data to the plume model.

ALOHA® (and similar plume modeling programs) are only able to accept data from one weather station at a time. The WEATHERPAK® MTR is unique in that it allows the operator to select which weather station sends data to the model. When the Receiver/Display is turned on, it “looks” for the default WEATHERPAK®. The default system is then listed first on the **Weatherpaks Detected** page and is automatically designated as the Active WEATHERPAK®.

Previewing allows the operator to view detailed weather data from other WEATHERPAK® locations. If it is determined the Previewed WEATHERPAK® is providing more representative information, the operator may select the alternate WEATHERPAK® as the Active system and send that data to the plume model instead. To reassign the previewed station to Active status, simply touch the “Select as Active” button near the bottom of the **Preview** screen.

The Default WEATHERPAK® - A “default” WEATHERPAK® must be selected for the system to operate properly. When the Receiver/Display is powered-on, it automatically searches for the default WEATHERPAK® and then displays its data on the **Active** screen. If data does not appear (or the wrong data appears) within 30-40 seconds after the boot-up routine ends, it is an indication that no default, or the wrong default has been set. For this reason, Coastal Environmental Systems recommends you check the default and reset if necessary upon receiving your new WEATHERPAK® MTR.

It is common practice for organizations to purchase multiple WEATHERPAK® MTRs and then distribute the systems to several teams without taking the factory default setting into account. To accommodate every scenario, the default WEATHERPAK® MTR is factory set according to the following convention:

1. If one MTR is purchased with one Receiver/Display unit, the default is factory configured. No additional configuration is necessary.
2. If multiple MTRs are purchased and each has its own Receiver/Display, the default is not set at the factory. The default WEATHERPAK® must be set by the ultimate end user.
3. If multiple MTRs are purchased with only one Receiver/Display, the weather station with the lowest serial number is factory configured as the default.

Setting or Changing the Default WEATHERPAK® - The default WEATHERPAK® can be set or changed by the following procedure: Open the **Weatherpaks Detected** screen and select the system you wish to designate as the default by touching the corresponding line on the display. When the **Preview** screen appears, touch the **Select as Default** button. The new default WEATHERPAK® is now established. Once set, the default serial number is preserved in the Receiver/Display's microprocessor and does not need to be reset during subsequent uses. The operator may change the default at any time by repeating this process. (See Figure 8.)



Figure 8 - Preview Screen

3-3.5 **Weatherpak Status Screen**

This screen displays all the information being transmitted by the selected WEATHERPAK®. (See Figure 9).

- **WPAK:** is followed by the unique serial number. Every WEATHERPAK® has a unique ID number.
- **Battery Voltage:** is the tripod battery voltage. This value should read approximately 13.5 VDC when fresh batteries are installed. This number will go down slowly as the batteries are depleted. Batteries should be replaced when this reading reaches 10.7 or lower.
- **Data Message:** is the raw data message being transmitted by the WEATHERPAK® and will look similar to the following:

1329,2.19,140,67.7,23.2,2.9,187,73.7,11.9,2018,1008,27,2661,4,1439,4735.705,-
12220.026,,,,2893

DATA LINE INTERPRETATION

ID, MW, MD, ST, AT, SI, DI, TI, BV, CKSUM1, BP, RH, CKSUM2, SAT, GMT, LAT, LON,,,,CKSUM3

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 –	Barometric pressure in millibars
RH –	Relative humidity in percent
CKSUM2 –	Second checksum

SAT –	Number of satellites acquired
GMT –	Greenwich Mean Time
LAT –	GPS Latitude
LON –	GPS Longitude
CKSUM3 –	Third checksum



Figure 9 - Status Screen

“NO DATA” ALERT

If no data is received for more than two minutes from the viewed WEATHERPAK® (Active or Previewed), the “No Data” alert shown in Figure 10 will appear. This message is intended to alert the operator that there may be a problem with the system. This message indicates an interruption in the flow of data from the met station for longer than two minutes in duration. There are several reasons this may occur. Some possible explanations:

- The WEATHERPAK® tripod tower batteries may be low.
- The station may be out of range due to repositioning of the weather station.
- Line-of-sight may have been lost due to repositioning of the station or vehicle, or a vehicle may have moved into the line-of-sight.
- A system malfunction is least likely.

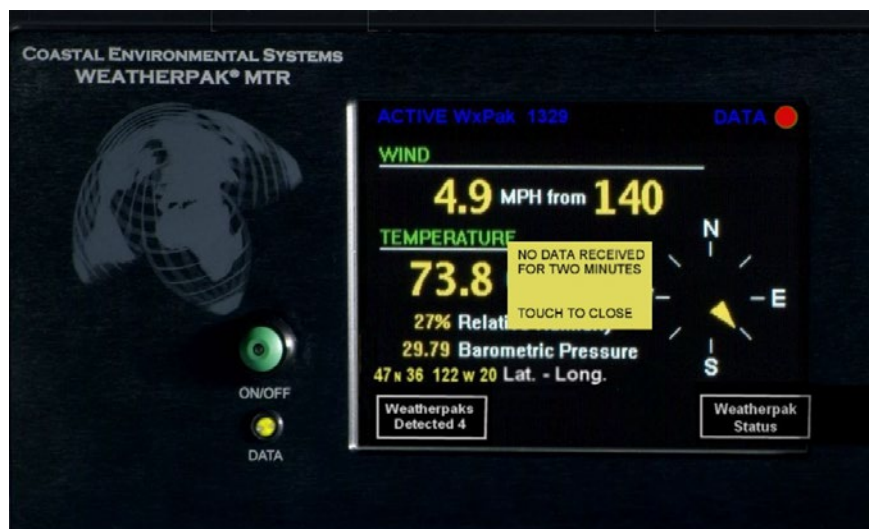


Figure 10 - “No Data” Alert Screen

CHAPTER 4 WEATHERPAK® AND PLUME MODELING SOFTWARE

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

The following is a brief outline of the steps taken to produce an ALOHA® plume model on a PC. The following is based upon the assumption 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. Begin by clicking on the ALOHA® desktop icon, or selecting ALOHA® from the Windows® Programs menu. An "Air Model Limitations" dialogue box will appear with important notes on program limitations. Read and 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 appear requiring user observations or assumptions. Please note: relative humidity is not captured automatically by the ALOHA® model and may be entered manually using data from the WEATHERPAK® display.
6. (Optional) Use the drop-down menu [SAM Options] – [Processed Data] to confirm that WEATHERPAK® data is being delivered to ALOHA®. The "Processed SAM Data" window will appear. Please Note: A warning message appears in both the "Text Summary" and "Processed SAM Data" windows if the WEATHERPAK® has been collecting data for less than five minutes.
7. ALOHA® requires the SAM station to 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], then select the source of the leak (tank, for example). A series of dialogue boxes will appear requiring user observations or assumptions.
8. Select the [Display] – [Threat Zone] 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.

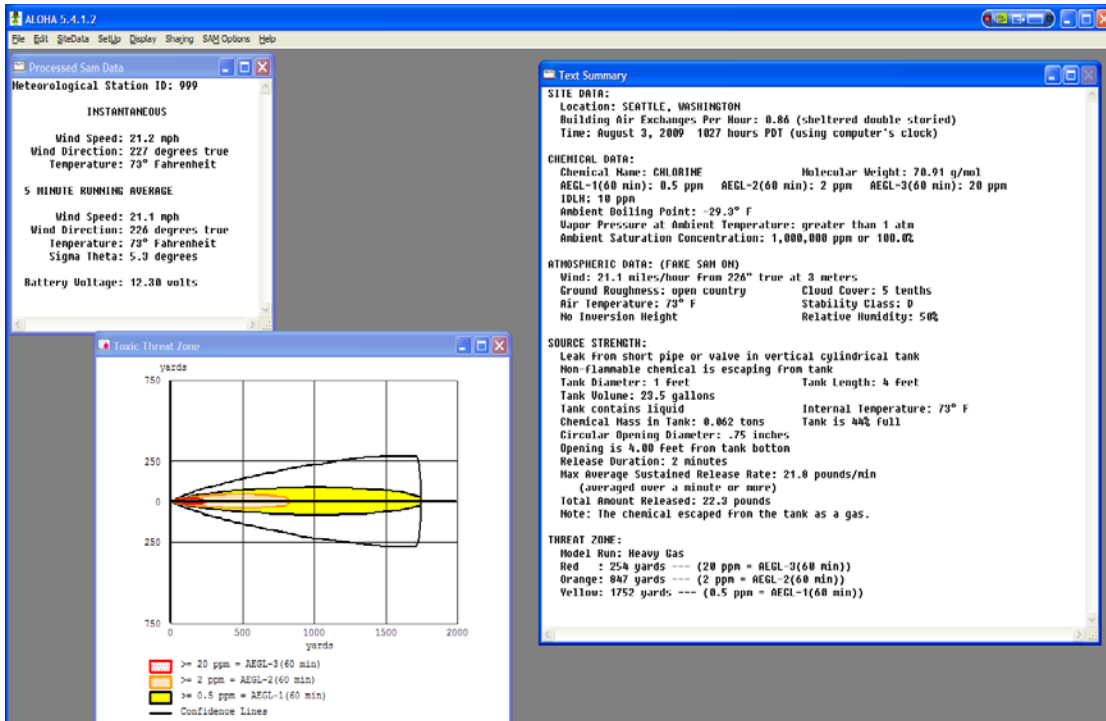


Figure 11 - ALOHA® Screen Capture

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 on the map, shortly after the WEATHERPAK® provides updated data. Note: MARPLOT® software requires that the ALOHA® window overlay the map window in order for the map-plume to update automatically. (See Figure 12.)

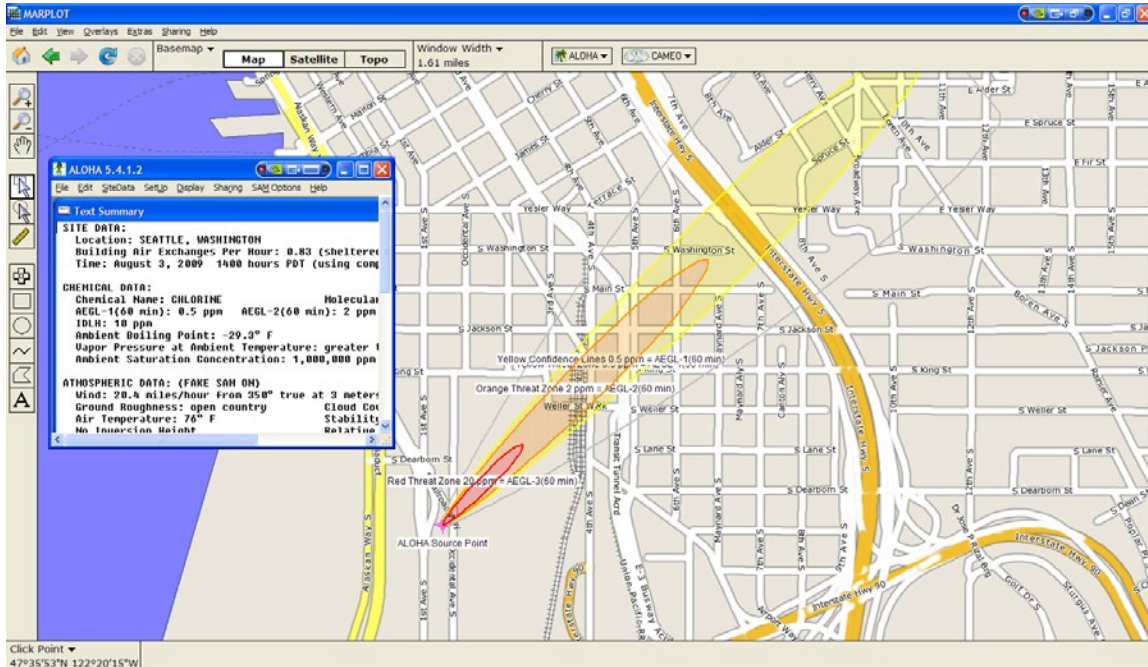


Figure 12 - ALOHA® with MARPLOT® Map

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 “**INSTANTANEOUS**” data, every thirty seconds to the Receiver/Display 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. Please Note: If the battery voltage falls below 10.7 VDC, the batteries in the WEATHERPAK® tower should be replaced.

If you drop-down [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, 999, 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.

4-1 **ALOHA® DATA LINE INTERPRETATION**

The data line fields are as follows:

ID, MW, MD, ST, AT, SI, DI, TI, BV, CKSUM1, BP, 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 –	Barometric pressure in millibars
RH –	Relative humidity in percent
CKSUM2 –	Second checksum

CHAPTER 5 MAINTENANCE

5-1 **PERIODIC MAINTENANCE SCHEDULE**

Routine maintenance should be performed on the WEATHERPAK® every 12 to 24 months. This maintenance is to ensure that 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® MTR should have the compass, air temperature, relative humidity, and barometric pressure sensors tested to their stated specifications. (The wind monitor and optional gamma detector do not require periodic calibration or maintenance.) In addition, the entire WEATHERPAK® should be examined for any wear, damage or other non-conforming variances. Please contact Coastal Environmental Systems' Service Department (800-488-8291 x157) for more information.

5-2 **TROUBLESHOOTING**

Do not take the WEATHERPAK® or the Receiver/Display box apart. Doing so will void the warranty. If the following procedures do not solve the problem, call Coastal Environmental Systems' Service Department (800-488-8291 x157).

5-2.1 **The WEATHERPAK®**

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

- Confirm the WEATHERPAK® is properly secured in the KamLock connector on the tripod tower.
- Check the batteries in the tower. The red LED voltage indicator light on the tripod tower will remain illuminated when the battery voltage is higher than 10.7 VDC. If the LED indicator is not illuminated or if it is flashing, replace the batteries with fresh alkaline D-cells. The precise battery voltage can be found by viewing the **Weatherpak Status** screen on the Receiver/Display. When replacing tower batteries, use only high quality alkaline batteries. Do not use rechargeable or bargain batteries.
- Check the fuse. There is an in-line fuse holder located in the junction box at the top of the tripod tower. Access the fuse by removing the two screws on the junction box cover. If the fuse is blown, replace with a 3AGC fuse. If the fuse blows repeatedly, contact the Coastal Environmental System's Service Department. See Section 5-3 "Replacing Tower Batteries and Fuse".

5-2.2 **The Receiver/Display**

The green power indicator light, located in the center of the "On/Off" button, should be on and the display should be illuminated shortly after the "On/Off" button is pressed. If this is not the case, check the following:

- Be sure the Receiver/Display unit is plugged in and turned on. Double check the power cord connections at the wall, power supply and back of the Receiver/Display box. If this does not correct the problem, contact Coastal Environmental Systems' Service Department.

5-2.3 **Data Transmission Indicator Light**

Every time a WEATHERPAK® that is within range of the Receiver/Display transmits data (typically every 30 seconds); the amber colored data light will flash, signifying the WEATHERPAK® data carrier signal is being received. If the light does not flash, check the following:

- Double check the power cord. Be certain the Receiver/Display unit is plugged in and turned on. Check the power indicator light on the "On/Off" button on the front panel.
- Make certain you have direct line-of-sight to the WEATHERPAK®, that it is within 5 to 7 miles, and not blocked by an obstruction (hills, vehicles, steel buildings, etc.).
- Check to see that both the WEATHERPAK® antenna and the receiving antenna are securely connected.
- Reset the system by removing the WEATHERPAK® from the KamLock connector on the tripod tower. Wait 10 seconds, and then replace the WEATHERPAK® on the tower.
- Check the tripod battery voltage and be certain the batteries are properly aligned (positive towards the top of the tower). Replace batteries if necessary. (See Section 5-3.)

5-2.4 **The Computer**

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

The WEATHERPAK® is designed to deliver weather data to a computer and plume modeling software (or other data collection software such as INTERCEPT™). If your computer is not receiving the data it is probably caused by one of the following:

- Check all the connections from the Receiver/Display to the computer. If the connections appear to be sound, this indicates the weather station and Receiver/Display box are both working properly and the fault is probably with the computer.
- If the issue is with ALOHA®, be certain the most recent version of the software is installed on the computer. Some earlier versions of ALOHA® (e.g. ver. 5.2.1) need to be upgraded in order to work with an automatic weather station like the WEATHERPAK®. The U.S. EPA provides CAMEO®/ALOHA® software downloads, support, and information at its web site: <http://www.epa.gov/OEM/content/cameo/index.htm>.
- If indications are that data is not being received by the computer, whether you are running ALOHA® or another software program, there is a probable virtual COM port configuration problem. ALOHA® must receive data on COM 1, 2, 3 or 4. If these ports are in use by other devices or if Windows® has arbitrarily assigned another virtual COM port for use with ALOHA®, the weather station data will not be received by the software. A discussion and remedy can be found in Appendix B, located in the back of this manual.

Error messages while running plume model.

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

- Consult the CAMEO®/ALOHA® web site: <http://www.epa.gov/OEM/content/cameo/index.htm>.
- Contact Coastal Environmental Systems' Service Department. We are not certified CAMEO®/ALOHA® trainers or representatives, but we may be able to help.

5-3 **REPLACING TOWER BATTERIES AND FUSE**

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

5-3.1 **Tower Batteries**

The WEATHERPAK® MTR uses ten alkaline D-cell batteries, located in the upper vertical section of the tower. Rechargeable and bargain batteries do not perform well in the WEATHERPAK®. Always use high quality

alkaline batteries. (See Figure 13.)

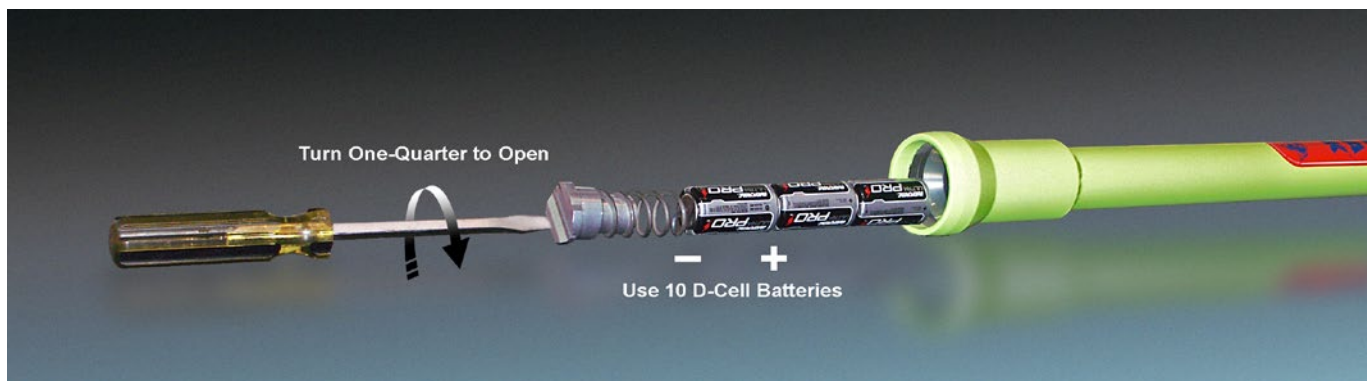


Figure 13 - Battery Replacement

Remove the battery “plug” using a large screwdriver. Insert the blade of the screwdriver into the slotted plug, push the spring-loaded plug in gently, then rotate the plug one-quarter turn either direction. The plug and spring will come out followed by the batteries. Insert the new batteries by tilting the tower section at an angle of approximately 45-degrees. A steeper angle will cause the batteries to impact the top terminal too forcefully denting the positive terminal of the batteries. This may cause the batteries to leak or create a faulty electrical connection. Slide the batteries in, positive end first, and then replace the spring-loaded plug using the reverse procedure.

The red LED voltage indicator light on the tripod tower will remain illuminated when the battery voltage is higher than 10.7 VDC. The precise battery voltage can be determined in two ways: (1) view the **Weatherpak Status** screen on the Receiver/Display box. If multiple WEATHERPAK®s are used, be sure you are viewing the status screen for the appropriate WEATHERPAK®, (2) with the ALOHA® plume model open on the PC, drop down the **[MISC]** menu to “**Processed Sam Data**”. One of the items shown is battery voltage. With new batteries installed, the voltage should be between approximately 13 and 15 volts.

5-3.2 **Tower Fuse**

The in-line fuse is located in the tower junction box (see Figure 14). Gain access to the fuse holder by removing the two machine screws on the junction box faceplate; then carefully separate the faceplate from the junction box. Inspect the in-line fuse and replace if necessary with a 3AGC fuse.

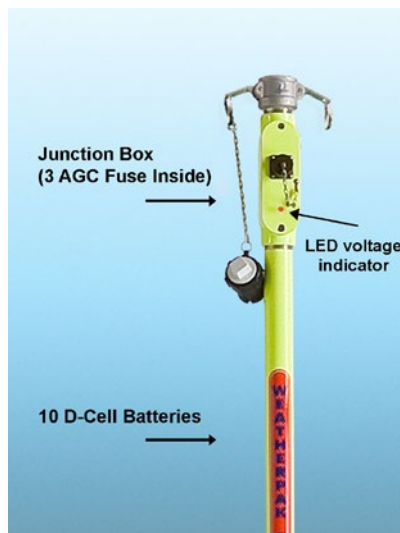


Figure 14 - Fuse Location